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论文汇编

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专题发言

S-01

艾滋病合并马尔尼菲篮状菌感染者肺部 CT 征象分析及诊断

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目的：探讨艾滋病（AIDS）合并马尔尼菲篮状菌（TM）感染者胸部 CT 表现，以提高对该病的认识及诊断水平。

方法：回顾性分析武汉大学中南医院 2013 年 1 月 30 号至 2020 年 8 月 11 号期间，经过病原学确诊为“艾滋病合并马尔尼菲篮状菌感染”患者 32 例，在收集相关临床和影像学资料后，观察并总结该病患者的胸部 CT 征象。

结果：本组研究中，AIDS 合并 TM 患者出现斑片状磨玻璃密度影/实变影 15 例（46.9%），其中 3 例（9.4%）出现以肺门为中心，向外周扩散，对称性分布、大小不等的片状实变影；肺内实性结节 17 例（53.1%），其中 1 例出现空洞，结节样肿块 3 例（9.4%）；弥漫性粟粒样病变 3 例（9.4%）；胸腔积液 8 例（25%）；胸膜增厚 3 例（9.4%）。纵隔内淋巴结肿大 20 例（62.5%），最大短径范围为 13.6-20.4mm。7 例（21.9%）患者出现纵隔内淋巴结的明显增多，呈簇状聚集。

结论：AIDS 合并 TM 感染者肺内 CT 表现多样，部分患者出现粟粒样病变及以肺门为中心、向外周扩散的片状实变影，这两个征象具有一定特征性。同时关注其纵隔肿大淋巴结病变的规律也能对该病提供重要的诊断价值。

S-02

耐药肺结核影像学诊断专家共识解读

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结核病（TB）仍是全球重大传染病之一，发病率居高不下，而耐药肺结核（DR-TB）更是结核病防控中的世界三大挑战之一。对耐药肺结核的早期、快速、准确诊断对于选择适当和个性化治疗方案至关重要，也是减少疾病传播和降低病死率的重要手段。近年来耐药肺结核的影像学诊断研究发展迅速，但缺乏一致性认识。为此，中国研究型医院学会感染与炎症放射学专委会、中华医学会放射学分会传染病放射学组等牵头组织全国结核病临床及影像学相关专家，参考国际国内 DR-TB 的诊疗现状，结合我国临床实践及循证医学对指南及标准的方法学要求，经反复讨论形成耐药肺结核影像诊断专家共识。其内容主要包括 DR-TB 的临床诊断与分型、病原学及影像学检查（主要为 X 线、CT）的优选，CT 是诊断耐药肺结核的主要手段（证据级别：IV，推荐强度：强），建议常规平扫，必要时增强扫描；胸部 X 线检查可作为耐药肺结核的首选筛查方法（证据级别：III，推荐强度：强），也是疗效评估的常用手段（证据级别：IV，推荐强度：强）。DR-TB 的 DR 及 CT 影像表现中肺结节、实变和空洞发生率比药敏肺结核更高；空洞大小、空洞内径、数量、空洞分布、空洞类型和空洞壁的厚度等相关的影像征象是诊断 MDR-TB 最重要的依据之一；若同时出现空洞数量 ≥ 3 个、厚壁空洞及病变分布在 3 叶以上时，是诊断耐药结核的重要影像学依据（证据级别：IV，推荐强度：强）；单耐药肺结核（含利福平耐药肺结核）的影像表现、MDR-TB（含 PDR-TB）的影像学表现以及 XDR-TB/pre-XDR-TB 的影像学表现各有相似性，病灶的影像表现范围、空洞的程度等尚有一定差异。DR-TB 主要应与非结核分枝杆菌病、肺真菌病（肺曲霉病和肺隐球菌病）进行鉴别诊断。以期通过该专家共识提高 DR-TB 影像学改变的认识，作为及时检测可疑 DR-TB 患者的起点，并可以有效提高临床诊断效率，达到对耐药肺结核早期诊治的目的。

S-03

Using Artificial Intelligence for Chest Radiograph Interpretation: A Retrospective Multi-reader-multi-center (MRMC) Study of the Automatic Detection of Multiple Abnormalities and Generation of Diagnostic Report System

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We evaluate the performance of a novel AI-based system to assist radiologists in image interpretation and diagnostic report generation on PA/AP chest X-ray (CXR), and assess its potential clinical utility through a retrospective multi-reader-multi-center (MRMC) study in western China. The AI system (MOM-ClaSeg) for multiple disease detection and diagnostic report generation has been developed by applying augmented Mask R-CNN deep learning and Decision Fusion Networks. From May-1-2022 to Sept-30-2022, 33,439 PA/AP CXR from 15 hospitals were retrospectively collected as control group (G1) and experiment group (G2), respectively. A group of 11 radiologists were involved in this study: 6 junior radiologists (JrR) (5~10 yr-experience) generating initial diagnostic reports, 2 senior radiologists (SrR) (>15 yr-experience) reviewing initial reports from JrR with/without MOM-ClaSeg to generate final reports, and 3 consensus expert radiologists (ExR) (>25 yr-experience) to reconcile the potential difference between initial and final reports. Compared with standard CXR screening and diagnosing (G1) of JrR, the sensitivity of JrR for G2 with MOM-ClaSeg has increased significantly by 18.67% (from 70.76% to 89.43%, $P<0.001$), and the specificity has slightly decreased by 3.36% (from 99.49% to 96.13%, $P<0.001$). The overall reading time of G2 has decreased by 27.07% ($P<0.001$) across all CXR, with a particularly significant reduction of 66.48% ($P<0.001$) on abnormal CXR, indicating that the MOM-ClaSeg system has the potential for lung disease triaging. This study presents the first AI-based system to assist radiologists in image interpretation and diagnostic report generation, displaying a promising step toward improved diagnostic performance and productivity in future clinical practice.

S-04

Is contrast-enhanced MRI an alternative for contrast-enhanced CT? Appraisal of guidelines on intravenous gadolinium-based contrast media use in patients with kidney disease

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Objective: To appraise the quality of guidelines on intravenous gadolinium-based contrast medium (GBCM) use in patients with kidney disease, and to compare the recommendations.

Methods: English and Chinese guidelines published between January 2018 and June 2023 on intravenous GBCM use in patients with kidney disease were identified by searching four literature databases, eight guideline libraries, and ten homepages of radiological societies. The appraisal of

the guidelines was conducted according to Scientific, Transparent and Applicable Rankings (STAR) tool.

Results: Ten guidelines were included, with a median sum STAR score of 40.0 (range 34.0-61.5). The guidelines performed well in "Recommendations" domain (30/40, 75%), while poor in "Registry" (0/20, 0%) and "Protocol" domains (0/20, 0%). The consensus has been almost reached on the cutoff of the estimated glomerular filtration rate (eGFR) < 30 mL/min/1.73m² for referring patients to discuss the risk-benefit balance of GBCM use. Macrocytic or liner ionic GBCM were recommended for patients with reduced eGFR by some of guidelines, especially the macrocytic GBCM. The risk of nephrogenic systemic fibrosis (NSF) from GBCM in patients with advanced kidney disease is thought to be very low. Further, the potential harms of delaying or withholding GBCM in patients with acute kidney injury or eGFR < 30 mL/min/1.73m² should be balanced against and may outweigh the risk of NSF. The contradictory recommendations were found on dialysis initiation or alteration based on GBCM use. The relation and timing between GBCM and iodinated contrast medium use were unclear.

Conclusion: The quality of guidelines on GBCM use in in patients with kidney disease is unsatisfied. The contradictory remains in managements after GBCM use. The recommendations for patients plan to undergo contrast-enhanced MRI as an alternative for contrast-enhanced CT were lacking.

S-05

儿童遗传代谢性疾病相关颅内钙化影像学特点

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目的: 分析 36 例儿童遗传代谢性疾病相关颅内钙化影像学表现, 找出提示性特点, 缩小颅内钙化鉴别诊断范围方法: 婴儿颅内钙化原因, 假 TORCH 综合征。幼儿颅内钙化原因, Krabbe 病、Aicardi-Goutières 综合征、Cockayne 综合征、假 TORCH 综合征、HIV、T。学龄前儿童颅内钙化原因, Cockayne 综合征、Down 综合征、脉络丛、松果体。学龄期儿童颅内钙化原因, Kearns-Sayre 综合征、MELAS、僵联合。青春期儿童颅内钙化原因, 生殖细胞肿瘤、碳酸酐酶 II 缺乏症。

结果: 儿童遗传代谢性疾病相关颅内钙化包括, 线粒体病、假 TORCH 综合征、脑白质病、家族性特发性基底节钙化等。MELAS 典型影像学表现, 皮层受累为主, 常多发, 多位于颞、顶、枕叶, 分布与血管供血区不一致, 呈游走性及多变性。ASL 急性期病变呈高灌注, MRS NAA 峰 ↓、Lac 峰 ↑, CT 双侧基底节、丘脑钙化灶、随儿童年龄增加。T1WI 低信号、T2WI 及 FLAIR 高信号, 急性期 DWI 高信号。Kearns-Sayre 综合征典型表现, MRI 额、顶叶皮层下白质及小脑白质为主, 胼胝体压部与内囊后肢可受累, 后期累及深部核团, 双侧对称性; T1WI 低信号、T2WI 及 FLAIR 高信号; DWI 急性期呈高信号。CT 疾病晚期, 基底节区、丘脑等钙化。Cockayne 综合征典型影像学表现, 进行性脑萎缩, 大脑半球白质脱髓鞘。MRS 白质和灰质 NAA/Cr ↓, 白质 Cho/Cr ↓, Lac 峰 ↑。颅内钙化多见于早期出现症状的患儿, 双侧基底节钙化, 壳核最常见, 大脑半球深部皮层区、小脑齿状核钙化, 丘脑、白质、软脑膜钙化, MRIT1WI 稍高信号、SWI 低信号。

结论: 儿童期颅内钙化病因复杂, 见于多种神经系统疾病, 病因广泛, 年龄、钙化位置、合并神经影像学表现有助于疾病诊断, 颅内钙化的影像学表现、结合临床实验室、可提示潜在遗传学病变。

S-06

癫痫 MR 成像规范 (HARNESS-MRI) 及 MR 新技术应用进展

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在癫痫病学中, MRI 彻底革新了我们检测大脑病变的能力, 癫痫病学已从以前主流的电-临床研究转变为多学科的研究。尤其重要的是结构 MRI 对病灶的精准定位, 与良好的术后预后相关, 使得该技术已成为药物难治性癫痫临床诊疗的基石。但是, 常规头 MRI 扫描对脑内癫痫灶的检测能力较低, 而且不同单位扫描序列不一致。针对 MRI 检查的目标患者: 癫痫 MRI 检查方案的最低要求是什么? 如何评估 MRI 图像? 如何优化病灶的检出? 国际抗癫痫联盟诊断方法委员会 (ILAE) 委托 2013-2017 年神经影像专题工作组制定了一套建议, 组确定了一组以三维采集为核心、统一的癫痫结构神经成像序列—HARNESS-MRI 方案。由于这些序列在大多数 MR 扫描仪上都可用, 与临床环境和国家/地区无关, 因此 HARNESS-MRI 方案可推广使用。

目前对于 FCD 的诊断主要依赖于 MRI 检查, 但大约 40% 的 II 型 FCD 和 85% 的 I 型 FCD 在常规 MRI 上没有明确的阳性征象, 常导致漏诊。对于怀疑 FCD 但 MRI 上表现为阴性的患者, 临床常用脑磁图 (MEG)、脑电图 (EEG)、颅内脑电图 (IEEG) 进行定位并指导手术切除, 但这些方法难以精确定位 FCD 的边界, 可能会导致病灶切除不完全或过度切除, 从而导致癫痫复发或脑组织功能损伤。随着 MRI 硬件、软件及后处理技术发展, 极大提高了 MRI 阴性 FCD 的检出率 (综合诊断增益率为 31%), 对病灶准确定位、指导手术、降低术后癫痫发作具有重要的作用。

S-07

影像征象与临床病理 - 探讨如何正确地影像思维

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在疾病的诊断中, 影像学检查也已成为日常医疗工作必不可少的重要手段。正确的思维方法和路线非常重要。疾病的影像思维过程包括两个部分: 影像检查的设计: 如何根据患者的临床症状和体征选择最适宜的检查方法以显示疾病的病理改变-怎么做? 影像的解读: 将影像所见尽可能准确地还原回病理-怎么看? 正确诊断的保证: 能真正掌握和熟练应用影像学检查技术及具有宽、厚的临床、病理学基础;

一、选择正确的检查方法是影像诊断和鉴别诊断的关键: 1、真正掌握各种影像检查方法的成像原理, 深刻认识其适应证、应用价值与限度; 常规检查作为首选, 特殊检查及功能成像作为补充; 2、在此基础上根据患者的临床症状和体征选择最适宜的检查方法以显示疾病的病理改变。二、借助功能影像及特殊的影像检查探求疾病的本质解读“异病同影”: 随着现代科技的发展, 医学影像学已由过去的大体、宏观观察转变为宏观加微观信息观察, 由过去单纯的解剖学形态观察转变为解剖形态加功能观察, 一些特殊检查方法的出现, 更有益于揭示疾病的本质, 进行定性诊断及鉴别诊断的。三、充分认识疾病发生、发展的影像学变化过程, 必要时需调整影像诊断思路: 许多疾病的发病初期, 影像学征象往往不能反映出其特征性病理改变, 给疾病的诊断和鉴别诊断带来一定的困难; 但其发展变化的过程, 对治疗的反映、转归等则会对诊断有大帮助, 因此, 随诊复查非常必要, 要根据影像的演变过程调整诊断思路, 以接近疾病的本质。四、充分认识影像征象形成的机制, 切忌单纯地“看图识字”: 我们接触到的影像学征象往往不是某一种病的特征征象, 很多疾病在发展到某一阶段常常会出现相同的征象。既: “异病同影”; 如何从错综复杂的现象中, 寻找疾病的特性, 揭示疾病的本质? 要求影像医生还必需充分认识疾病自身的病理基础、发病机制以及特定的临床表现等, 追根溯源, 探寻彼此间的差异。

S-08

人工智能技术在儿科影像的应用

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人工智能（Artificial Intelligence, AI）是研究用于模拟、延伸和扩展人的智能的一门新的技术科学。人工智能在医学领域中广泛应用，影像组学和深度学习就是人工智能在医学影像中的应用。

影像组学是从 CT、MRI 等影像学图像的感兴趣区中高通量的提取高维特征（如一阶直方图、二阶纹理以及经小波变换、高斯拉普拉斯算子等滤波转换的高阶特征），并通过机器学习方法从其中提取关键的信息，对病灶进行精准量化评估。深度学习是机器学习领域中一个新的研究方向，深度学习建立模拟人脑进行分析学习的神经网络，对影像中的可疑病灶进行评估。以影像组学和深度学习为基础的人工智能不仅可以对成人患者的疾病进行鉴别诊断、疗效评估和预后预测，在儿科影像临床中也发挥了重要的作用。

呼吸系统疾病是儿童最常见的疾病，而肺炎又是儿童最常见的呼吸系统疾病。人工智能可以对儿童肺炎的病原菌进行鉴别，也可以对肺实变患者是否发生坏死、肺炎后是否发生纤维化等结果做出预测。

人工智能在儿童实体瘤中的应用也非常广泛。影像组学可以对不同病理类型肿瘤进行鉴别诊断：儿童盆腔横纹肌肉瘤和卵黄囊瘤；儿童腹膜后神经母细胞瘤和节细胞神经母细胞瘤；儿童弥漫大 B 细胞性淋巴瘤与霍奇金淋巴瘤；儿童肾脏恶性肿瘤的鉴别诊断。影像组学也可以区别不同基因分型的肿瘤：影像组学特征结合机器学习有助于识别儿童神经母细胞瘤 MYCN 基因是否扩增。影像组学还可以在治疗前判断实体瘤的危险分层：影像组学模型可以较好的识别高危神经母细胞瘤。

基于深度学习的人工智能可以判别儿童胼胝体是否存在结构异常，以及异常的亚区所在，也可以对主动脉缩窄及弓发育不良的儿童患者提出诊断标准。

人工智能作为一种无创、精确的新方法有望在未来更多儿童疾病研究领域中发挥作用。

S-09

基于 CT 影像组学的机器学习模型在儿童社区获得性肺炎诊疗体系中的应用

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摘要：目的：探讨 CT 影像组学机器学习模型构建对儿童社区获得性肺炎进行早期病原学预测、疗效监测、评估预后中的作用。

方法：提取 3000 例不同类型儿童社区获得性肺炎 CT 影像组学特征，构建影像组学标签，通过不同类型机器学习选取最优模型，再结合相关临床实验室检查构建融合模型，对肺炎进行早期病原学预测、疗效监测及预后评估。

结果（1）：从每位患儿的 CT 图像中共提取 386 个影像组学特征。通过 UFS 和 MI 筛选出 5 个较优特征。6 种机器学习模型均有较高的区分能力，其中 DT 模型的预测能力最好，在训练集中预测支原体肺炎、细菌性肺炎及病毒性肺炎的 AUC 分别为 0.918, 0.806 和 0.823，在验证集中分别为 0.816, 0.741 和 0.876。结果（2）在诺模图中，D-二聚体、CT 影像表现（斑片、大片、都有）、肝损害、坏死性肺炎、热程、应用激素时长为预测儿童重症肺炎的独立特征。训练组和内部验证验证组的 AUC 分别为 0.807 和 0.799，校准曲线显示 nomogram 预测值与实际观测值之间有良好的-致性。DCA 显示 nomogram 具有临床应用价值。

结论: CT 影像组学机器学习模型可全面提高儿童社区获得性肺炎的诊疗水平, 提高早期诊断准确率及治愈率, 最大可能减少并发症的发生, 减少家庭及社会的负担。

S-10

Differential diagnosis of cerebellopontine angle area neoplasms in children

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Abstract

Objectives: To investigate the imaging features and differential diagnosis of cerebellopontine angle (CPA) neoplasms in children.

Methods: The area of the cerebellopontine angle is complex. The neoplasms of CPA area have various origins and pathological types. The spectrum of neoplasms in the CPA area in children is different from that in adults. The preoperative diagnosis is mainly based on CT and MRI imaging features.

Results: The neoplasms in the CPA area can be divided into extra-axial and intra axial masses. The lesions can originate from the nerves, meninge, and blood vessels in the CPA area, or from adjacent brain parenchyma. They can also originate from the lateral foramen area of the fourth ventricle or extend from the fourth ventricle to the cerebellopontine angle area. Based on the location of the lesions, the characteristics of conventional MRI sequence, enhancement type, are helpful to make the diagnosis of the lesions. The types of lesions involving the CPA area in children that require differential diagnosis, include embryonic tumors (such as medulloblastoma, AT/RT), ependymoma, and less common types include choroid plexus papilloma, meningioma, brainstem glioma, cranial nerve schwannoma, pilocytic astrocytoma, vascular lesions (aneurysm, cavernous hemangioma) and so on, which also need to be differentiated from tumor like diseases, such as dermoid cyst, epidermoid cyst, arachnoid cyst, etc.

Conclusions: The common spectrum of neoplasms in the CPA area in children is different from that in adults, and the pathological types are various. It is necessary to combine CT and MRI manifestations to define the imaging characteristics of these diseases, which is helpful for differential diagnosis.

S-11

小儿双侧基底节病变的影像诊断思路

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主要从以下几方面进行讲解。

- 1.基底节区及丘脑的 MRI 解剖;
- 2.基底节区及丘脑的主要生理功能;
- 3.病因和诊断思路主要参照如下“Midnights”原则:

(1) M-metabolism, 如代谢性疾病 HIE、有机酸尿血症、Wilson 脑病、线粒体脑肌病 (Leigh 综合征、MELAS 综合征) 等。

(2) I-immunity/inflammation, 指免疫/炎性疾病, 如 NMO、抗 NMDAR 相关性脑炎、ADEM、PANDAS。

(3) D--degeneration, 指变性性疾病: 如 Fahr's 病、Huntington's 病、NBIA。

(4) N--neoplasm, 指肿瘤: 如 1 型神经纤维瘤、胶质瘤。

- (5) I--infection, 指感染, 如疱疹病毒感染、黄病毒感染、CJD。
- (6) G--gland, 内分泌疾病, 如甲状旁腺功能减退。
- (7) H--hereditary, 包括遗传性: M-有机酸尿、Wilson 脑病、线粒体脑肌病 (Leigh 综合征、MELAS 综合征);
- (8) Trauma, 指外伤, 小儿急性外伤性基底节梗死。或者 T--toxication 中毒, 如一氧化碳、美沙酮、抗癫痫药中毒。
- (9) S--stroke, 指卒中。

S-12

Fetal development: From Biometry to sulcus

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MRI 单次激发快速自旋回波序列评价胎儿脑沟发育的可行性研究

目的 利用 MRI 单次激发快速自旋回波序列评价宫内胎儿的脑沟发育。**方法** 分析 203 例 22-38 孕周的正常胎儿的脑部 MRI 图像, 根据孕周分组, 评价胎儿半球间裂、外侧裂、顶枕沟、海马裂、胼胝体沟、距状裂、扣带沟、边缘沟、侧副沟、中央沟、额上沟、中央前沟、中央后沟、顶内沟、颞上沟、额下沟、颞下沟、枕颞沟、次级扣带沟、次级枕沟及岛沟的发育, 并计算各孕周组中脑沟的可见百分率。**结果** 建立了 22-38 孕周胎儿大脑所有初级脑沟和部分次级脑沟的可见百分率的时间表。超过 75% 的胎儿在 22 孕周时可见半球间裂、外侧裂、顶枕沟、海马裂、胼胝体沟和距状裂, 在 24 孕周可见扣带沟, 在 25 孕周可见边缘沟、侧副沟、中央沟、额上沟, 在 26 孕周可见中央前沟、中央后沟、顶内沟, 在 27 孕周可见颞上沟、额下沟, 在 31 孕周可见颞下沟、枕颞沟、次级扣带沟, 在 32 孕周可见次级枕沟, 在 34 孕周可见岛沟。**结论** MRI 单次激发快速自旋回波序列可以用于评价胎儿脑沟的发育, 为评价胎儿脑部发育提供了一个参考标准, 可用于评价正常胎儿脑沟发育和辅助诊断脑发育滞后。

S-13

imaging diagnosis of central nervous system involvement in leukemia

Disrupted spontaneous brain activity in obese children: a resting-state fMRI study

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Aims: To investigate spontaneous brain activity changes in obese children based on fractional amplitude of low-frequency fluctuation (fALFF) analysis.

Materials and Methods: Fifty-nine obese children and forty-eight age-, sex-matched healthy controls underwent resting-state functional MRI. The characteristics of fALFF were analyzed in obese children compared with the healthy controls. The correlations between fALFF and clinical data and intelligence quotient (IQ) were examined in the obese group.

Results: Compared with control subjects, obese children showed significantly increased fALFF values in the left insula, left superior temporal gyrus (STG), left middle frontal gyrus (MFG) and right middle cingulate gyrus ($p < 0.05$, corrected for multiple comparisons). In the obese group, fALFF values in the left insula were negatively correlated with visceral adipose tissue area and positively correlated with subcutaneous adipose tissue area and high-density lipoprotein, while

fALFF values in the right middle cingulate gyrus were positively correlated with alanine aminotransferase and aspartate aminotransferase ($p < 0.05$).

Conclusions: Childhood obesity is associated with disturbed spontaneous activity in brain regions associated with salience (insula and middle cingulate gyrus), self-control and inhibition (MFG), and verbal comprehension (STG). Regional neural activity is affected by lipids, liver function and abdominal adipose tissue area. Our results may contribute to the understanding of the mechanisms underlying childhood obesity and obesity-related cognitive impairment.

S-14

Detention of fetal cardiac anomaly using prenatal MRI

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The objective of this presentation is to provide an overview of fetal cardiac MR imaging methods and their applications in congenital heart disease. This presentation will cover recent technical advances in fetal CMR, the modified anatomic segmental approach to image fetal congenital heart disease, imaging appearances of fetal normal cardiovascular structure and appearances of various structural congenital heart disease on fetal CMR. Multiple imaging examples of fetal congenital heart disease diagnosed by fetal cardiac MR will be presented. The entire fetus in 3 planes including the cardiovascular structures, brain, chest and abdomen via standard protocol, fetal cardiac structures were analyzed using a modified anatomic segmental approach of congenital heart disease (CHD).

S-15

胎儿畸胎瘤的 MRI 评价

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畸胎瘤 (teratoma) 是胎儿最常见的肿瘤, 约占胎儿肿瘤 50%, 起源于胚胎早期的全能干细胞。尾骨前方的亨森结是多能干细胞集中的部位, 故骶尾部畸胎瘤 (sacroccocygeal teratoma, SCT) 最为多见。发病率约为 1/35000~1/40000, 75% 发生在女胎。根据良恶性程度可分为成熟型和未成熟型, 90% 为良性、10% 为恶性, 但良性有恶变的潜能。SCT 胎儿可无其他结构畸形, 50% SCT 胎儿可伴发其他畸形, 如泌尿生殖系统畸形 (最常见)、心血管畸形。SCT 合并染色体异常率较正常人群无增加, 文献报道合并染色体异常的病例均合并有其他畸形。胎儿 MRI 可作为产前超声的有效补充, 提供更全面的信息。根据肿瘤的位置可分为四型: I 型: 完全位于体外, 骶前没有肿瘤; II 型: 体外和骨盆内均有肿瘤; III 型: 体外存在肿瘤, 体内部肿瘤蔓延至腹部; IV 型 (内生型): 完全位于体内, 体外没有肿瘤。从 I 型到 IV 型, 其外科手术方式由易到难, 恶性程度的可能性从小到大。I 型、囊性、肿瘤较小者预后良好, 出生后手术治疗成功率高。III 型、IV 型 SCT 因位置较隐匿, 出生后不易被发现, 可能因此而失去最佳的治疗时机。IV 型 SCT 最容易检出恶性成份。SCT 体外部分肿块越大的, 其恶性成份检出率越低。肿瘤直径大于 10cm 提示高风险, 但同时需要联合囊实性比例评估。胎儿 MRI 可准确评估肿瘤的成分: 囊性、实性、继发的瘤体坏死、囊性变、内部出血、钙化等。根据肿瘤的成分可分为: 囊性型 (囊性 > 90%)、囊性为主型 (囊性占 50%~90%)、实性为主型 (实性占 50%~90%)、实性型 (实性 > 90%)。实性成分比例是一个有意义的预后评估指标, 囊性成分比例越大, 提示良性可能性大; 实性成分比例越大, 提示恶性程度高。I、II、III 型的囊性 SCT 需与骶尾部脊膜膨出相鉴别: SCT 的骶尾部脊柱排列是完整的, 瘤

体与脊髓的硬膜囊界限清楚，瘤体与椎管不相连通；骶尾部的脊膜膨出通常与脊柱裂同时存在，通过骶骨局限性的骨质缺损与椎管相通，严重者胎儿颅内结构也会出现异常。胎儿 MRI 可为 SCT 胎儿的预后判断及后期的临床治疗提供依据。

S-16

熵 减 ---放射科护理人员管理

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摘要：目的：对《放射科护理质量管理》一书的内容进行解读，便于从事放射科护理工作的同仁了解和借鉴书中的方法和管理工具。方法：详细讲解本书的写作背景、大纲、主要内容、编写过程、参考文献。结果：本书可为放射专科护理专业人员提供全面、系统的管理方法，是一本清晰、可理解的重要的资料书。结论：本书为放射科护理质量管理提供了有效的质控工具，便于临床的护理质量评估、质量持续改进，提高专科护理质量。

S-17

Angiopep-2 靶向识别帕金森病脑内 α -突触核蛋白的 7T CEST-MRI 研究

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目的：基于化学交换饱和转移成像技术 (CEST)，验证了一种多肽 (Angiopep-2) 靶向可视化 α -突触核蛋白的可行性。

方法：使用化学分析平台预测 Angiopep-2 结构，将 Angiopep-2 分别与 α -突触核蛋白、A β 蛋白分别对接，分析其结合能力。通过体外荧光结合实验验证并对比 Angiopep-2 分别与 α -突触核蛋白、A β 蛋白间亲和力。再使用 CEST 技术研究尾静脉注射 Angiopep-2 后 PD 大鼠 CEST 信号变化，通过免疫组化观察 α -突触核蛋白与 CEST 图像是否存在共定位。最后昆明小鼠尾静脉注射 Angiopep-2，取 7d 组及 30d 组做相关血液生化检验及 HE 染色，评估 Angiopep-2 活体毒性。

结果：分子对接结果表明 Angiopep-2 与 α -突触核蛋白的特点是结合能高，甚至高于与 A β 蛋白的结合能。体外荧光实验结果表明含有 A β 1-42 或 α -突触核蛋白聚集体的溶液中所存在的 FITC-Angiopep-2 的荧光强度随着 A β 1-42 或 α -突触核蛋白聚集体的浓度增加而增加，证明其与 α -突触核蛋白聚集体和 A β 1-42 存在亲和力。FITC-Angiopep-2 对 α -synuclein 的 Kd 值为 16.98 μ mol/L，而 FITC-Angiopep-2 对 A β 1-42 的 Kd 值为 18.63 μ mol/L。动物实验表明 PD 大鼠为出现明显认知功能障碍，注射 Angiopep-2 后，PD 大鼠脑内 CEST 效应明显增强 ($P < 0.001$)，且 CESTR 效应主要分布在右侧纹状体和前额叶皮层，与免疫组化结果相匹配。最后，毒性试验证实 Angiopep-2 具有良好生物相容性。

结论：Angiopep-2 可作为 PD 的 CEST 探针，未来将有望应用于临床，提高 PD 患者的早期临床诊断准确性，为患者争取更多治疗干预时间。

S-18

肿瘤磁共振精准成像

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核磁共振成像 (MRI) 因具有非侵入性、无电离辐射、组织断层扫描等特点, 特别是结合探针的使用, 可进一步增强病灶显影, 使其在临床医学诊疗中具有非常重要的地位。但目前 1H-MRI 的成像灵敏度、病灶信噪比和特异性还较低; 另外 MRI 探针成像尺度局限性, 无法同时提供结构和分子功能信息。针对上述问题, 本次报告将从 MRI 原理出发, 讲解核磁共振探针催化加速氢质子弛豫过程, 并结合相关机制分享探针设计原则。在探针制备方面, 汇报本课题组近些年发展起来的蛋白生物模拟仿生合成新方法, 特别是在超小铁基 T1 型磁共振探针蛋白介导合成及其疾病组织增强显影方面的研究。另外, 课题组创制了系列病生理响应型磁共振探针, 实现从疾病的单一结构造影到与特征分子事件跨尺度融合可视化, 提供多维度疾病诊断信息。该系列研究在磁共振成像和成像引导治疗中具有重要意义。

S-19

Pyrrolizidine alkaloids-induced hepatic sinusoidal obstruction syndrome: the correlation between CT and MRI findings with liver function and the severity

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Objectives: To conduct quantitative analysis of contrast-enhanced CT and contrast-enhanced MRI images in patients with pyrrolizidine alkaloids (PAs)-induced hepatic sinusoidal obstruction syndrome (HSOS), and compare the correlation between the CT-based and MRI-based quantitative parameters with the liver function tests and clinical severity of HSOS.

Methods: Thirty PAs-induced HSOS patients who underwent CECT and CE MRI were retrospectively enrolled in this study, basic information, clinical data, CT and MRI images were collected. The damaged volume ratio and changes in lesion-to-normal liver density ratio (ΔDR)/grayscale ratio (ΔGR) on CT and MRI were quantitative measured on portal venous phase images, and the severity of imaging findings (CT score/MRI score) were calculated based on the volume ratio and $\Delta DR/\Delta GR$ (CT score = damaged volume ratio $\times \Delta DR$, MRI score = damaged volume ratio $\times \Delta GR$). The correlation between CT-based or MRI-based quantitative parameters and clinical factors was analyzed.

Results: CT score was positively correlated with PT and INR, biomarkers of synthetic liver function. While MRI score was positively correlated with PT and INR, as well as liver function tests revealed as ALT and AST. CT score on CECT was positively correlated with model for end-stage liver disease (MELD) score, while volume ratio and MRI score on CE MRI were positively correlated with MELD score. ΔGR and MRI score of CE MRI were positively correlated with the severity grading of HSOS, however, such correlations were not observed in CT-based quantitative parameters.

Conclusion: Quantitative parameters of CE MRI were demonstrated to be more accurate than CECT in evaluating the clinical severity of patients with PAs-induced HSOS.

S-20

人工智能骨关节智能测量的研究和应用

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目的: 分析国内外人工智能骨关节测量的研究现状, 为该领域的研究和临床应用提供指导。

方法: 综述近五年国内外基于深度学习算法的人工智能骨关节测量的相关研究报告, 结合作者单位 2018 年以来的相关实践, 对骨关节智能测量的方法、应用场景、使用效果能进行归纳和总结。

结果: 1) 相关研究主要集中于中国、美国、韩国、德国等国家; 2) 涉及的解剖部位包括脊柱、髋关节、膝关节、手足、肩关节、下肢、头颅和软骨; 3) 涉及的领域主要在计算机、骨科和放射学; 4) 主要的技术手段包括兴趣区分割和关节点识别等。5) 作者单位近年来针对膝关节、髋关节、脊柱等解剖部位开展了相关研究。

结论: 人工智能骨关节测量可成为替代人工测量、实现大数据分析的有效工具。

S-21

TFCC 损伤的病理及影像学表现

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目的: 利用高分辨 3.0T MR 研究腕关节三角纤维软骨复合体(Triangular fibrocartilage, TFCC)正常解剖及损伤的分型及 MR 表现。

方法: 利用大体标本断层解剖图像及相应的 MR 图像, 详细介绍 TFCC 断层解剖结构及 MR 表现。研究 TFCC 正常断层解剖与影像表现的相关性。研究 TFCC 的损伤机制、病理特点与影像学表现的相关性。

结果: 高分辨 3.0T MR 可清晰显示 TFCC 正常解剖结构及损伤的 MR 表现, 为损伤的早期诊断奠定基础。TFCC 损伤的病理特点与影像学表现特点密切相关。TFCC 损伤分型的病理、MR 表现与损伤的功能变化具有明显的相关性。

结论: TFCC 损伤在临床上很常见, 高分辨 3.0T MR 可清晰显示 TFCC 正常解剖结构和损伤的影像学表现, 为损伤的早期诊断和治疗, 提供精准的解剖学和影像学依据。

S-22

2023《中国 Stanford B 型主动脉夹层影像诊断和介入治疗临床指南》解读

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Stanford B 型主动脉夹层 (TBAD) 是一种急危重症心血管疾病, 及时有效的诊断及治疗极为重要。影像学在 TBAD 的诊疗中发挥着关键作用, 但目前我国缺乏 TBAD 影像诊断临床应用指南。介入治疗已成为 TBAD 的主要治疗方式, 但在不同分型、分期、分类中的治疗仍缺乏标准。为此, 中华

医学会放射学分会介入学组组织专家共同编写了 2023《中国 Stanford B 型主动脉夹层影像诊断和介入治疗临床指南》，内容包括概述、主动脉夹层的诊断、治疗、围手术期管理、术后常见并发症的预防及处理、随访管理等，旨在提高行业对 TBAD 的认识，促进我国 TBAD 的诊疗向更加专业、规范的方向发展。通过对本指南的内容进行详细解读，旨在帮助相关专业技术人员熟悉 TBAD 的最新研究进展，了解 TBAD 的新规范，从而更好的开展 TBAD 的影像诊断和介入治疗，造福患者。

S-23

医用胶在胃静脉曲张 BRTO 中应用

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球囊辅助逆行经静脉闭塞术（BRTO）是治疗孤立性胃静脉曲张的有效方法。该介入治疗技术经门脉高压自发性胃-体分流道(如胃-肾分流)，向胃底静脉曲张血管内注入硬化剂/栓塞剂，达到闭塞胃静脉曲张的目的。其中，硬化剂/栓塞剂在 BRTO 治疗中起至关重要的作用。本文就胃静脉曲张的概述、BRTO 技术中硬化剂/栓塞剂使用进展，以及医用胶的应用优势作一讲述。

S-24

从跟跑到并跑，浅谈 UKKA 指南中的中国技术

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血透通路介入治疗是外周血管介入治疗的重要内容，但是长期未受到国人重视，尤其是放射专业的介入专业人士关注甚少。近年来一些相关学科开始开展这项工作，也获得了国际认可。UKKA 是英国肾病学会简称，UKKA 通路指南是与美国肾病学会的 KDOQI 齐名的国际指南文件。今年 UKKA 最新血透通路诊疗指南于 4 月 5 日发布，这份指南中收录了诸多中国介入同仁在中心静脉狭窄闭塞方面的最新技术和经验，其中包括中山大学附属第一医院本团队的宝贵经验。在引用文献频次上，中国仅次于美国成为国际相关经验技术数据最大的提供国家之一。作为被引作者之一，本稿荟萃了该指南中主要的中国技术，向大家展示我国在该领域最新进展。

S-25

TIPS 治疗门静脉阻塞所致门静脉高压症

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目的：分析 TIPS 治疗门静脉阻塞所致门静脉高压合并静脉曲张出血及顽固性腹水的安全性及价值。
方法：回顾性收集了我院 352 例经 TIPS 手术治疗的患者的信息，其中 56 例符合标准。门静脉海绵样变的病例达 22 例，门静脉血栓患者有 28 例，门静脉癌栓患者有 6 例，食道胃底静脉曲张出血的病例有 42 例，顽固性腹水患者有 14 例。
结果：TIPS 技术成功率 100%，出血及腹水控制率 100%，HE 发生 2 例。
结论：TIPS 治疗门静脉阻塞所致门静脉高压症所致并发症安全、有效。

S-26

CT-guided percutaneous radiofrequency ablation of hepatic malignancies adjacent to the heart

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Objective: To explore the safety and effectiveness of CT-guided percutaneous radiofrequency ablation (RFA) in the treatment of hepatic malignancies adjacent to the heart. **Materials and methods:** From January 2019 to December 2020, 412 patients who underwent RFA for hepatic malignancies were retrospectively analyzed, of which 42 patients had lesions less than 5 mm from the border of the heart. During the follow-up period, the complete ablation rate within 1 month and 24 months and the treatment-related complications within 30 days were recorded, and the complete ablation rate of adjacent cardiac lesions and non-adjacent cardiac lesions was calculated. Univariate and multivariate Logistic regression analyzes were used to analyze the relevant prognostic factors affecting complete ablation. **Results:** A total of 42 patients had 61 lesions. The average tumor size of 42 adjacent cardiac lesions was 3.01 ± 1.04 cm, and the total diameter of intrahepatic lesions was 3.60 (2.98, 4.73) cm. During the 1-month follow-up, the complete ablation rates of lesions adjacent to the heart and non-adjacent to the heart were 85.7% (36/42) and 89.5% (17/19). The follow-up time ranged from 12 to 26 months, and 2 patients were lost to follow-up. The complete ablation rate of adjacent cardiac lesions was 82.5% (33/40), and the complete ablation rate of non-adjacent cardiac lesions was 88.2% (15/17). Univariate and multivariate Logistic regression analysis showed that liver metastases and not receiving preoperative TACE were independent risk factors affecting the rate of complete ablation ($P < 0.05$). No serious complications related to RFA occurred during the treatment, and the overall safety was controllable. **Conclusion:** CT-guided radiofrequency ablation of tumors adjacent to the heart is safe and effective.

S-27

(讲座) 内耳内淋巴积水磁共振影像评估

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内耳膜迷路内淋巴积水(endolymphatic hydrops,EH)于 1938 年由 Hallpike 和 Cairns 发现内淋巴积水,2007 年日本学者 Nakashima 等率先利用磁共振内耳钆造影的延迟成像方式在梅尼埃病患者中成功实现了膜迷路成像。其基本原理是利用迷路膜迷路生物屏障对不同物质的选择性运输的特性,使钆对比剂选择性地进入外淋巴腔隙,通过外淋巴腔隙间接显像反映内淋巴腔隙。内耳 MR 钆造影的检查方法:鼓膜穿刺或咽鼓管注射、静脉注射钆对比剂引入内耳,使用 3.0 T 磁共振设备和多通道颅脑或头颈联合线圈,多采用 3D-FLAIR 或 3D-REAL IR 等序列延迟扫描。内耳内淋巴积水 MR 影像评估方法包括定性、半定量、定量方法。对内淋巴积水的影像学评估,不同的评价方法各有利弊。

S-28

头颈部罗道病病例分享

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头颈部罗道病变少见，表现多样，影像医生及临床意思认识不足。

本文收集了头颅、鼻窦、颈部等头颈五官部位的病理证实的罗道病病例，以临床影像病理对照的方式分享和展示。

目的是提高大家的认识。

罗道病临床表现为无痛性肿块为主，鼻腔鼻窦区的可以表现为鼻塞，头颅的常常为头痛等，症状无特异性。

影像表现：密度信号较为均匀，T2WI 信号往往较低。增强扫描显著强化。坏死囊变少见。

虽然为良性病变，但手术后容易复发。

鉴别诊断：其他肿瘤性病变。

S-29

双侧前庭疾病的临床与影像学认识的探讨

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目的：探讨双侧前庭病(Bilateral Vestibulopathy, BVP)的定义、特点和临床表现。提出 BVP 在中枢神经功能上的影响和影像学所关联关系，探讨 BVP 在功能影像上逻辑关系。

定义和特点：双侧前庭病（BVP）是以头部运动时出现视震荡，行走时出现步态不稳，具有空间记忆和定向障碍为主要临床特征的前庭疾病。BVP 以单侧迷路或前庭神经的外周性损害造成的前庭功能丧失为特点。生物学上前庭功能存在涉及到外周性前庭和中枢性前庭的整合。中枢性前庭在功能解剖上存在着双侧前庭的 4 个交叉：前庭神经核水平，前庭神经核上方的脑桥水平，中脑水平，两个半球的前庭皮层区域之间的连接穿越胼胝体。

材料和方法：我们系列的文献复习，临床相关认知和焦虑量表，动物行为研究和实际患者的颅脑空间解剖（MRI-VBM）和 MRI 功能成像技术（DTI，静息态 fMRI）等研究和分析，探索 BVP 患者大脑局部体积和功能反射和连接的变化。

结论：（1）BVP 患者空间焦虑增加；（2）BVP 患者会影响到空间记忆和导航；

（3）BVP 会导致海马形态萎缩。（4）BVP 测量海马容积和空间能力是正相关的。

显然，部分或完全 BVP 患者都会导致脑解剖和功能的改变，特别是海马形态的改变表现为患者主观和客观行为缺陷。这些缺陷应该能直接反映医生在评估 BVP 患者日常生活时发现。

S-30

咽旁间隙肿瘤或瘤样病变诊断新观察

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目的:咽旁间隙肿瘤影像诊断的分析方法不易掌握，特别对大部分非头颈部专业和初入门的影像大夫，易发生误诊。如何解决这些问题，值得思考。方法：回顾我院咽旁间隙肿瘤或肿瘤样病变误诊病例，深入分析误诊的原因，寻找解决的方法。结果：误诊原因主要有：对咽旁间隙病变解剖定位

征象不熟悉；未能掌握咽旁间隙常见病变的病理影像特征；对特别难的患者，无最后穿刺取得病理诊断的方法。结论：熟悉咽旁间隙肿瘤定位诊断的思路，掌握常见咽旁间隙肿瘤病理影像特征。特别困难患者，需借助穿刺活检，获得病理诊断。

S-31

Quantitative and semi-quantitative diagnostic points for salivary gland tumors on MRI

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Purpose: Magnetic resonance imaging (MRI) plays a crucial role in the diagnosis of salivary gland tumors. This study explores the diagnostic value of applying functional MRI techniques in addition to conventional imaging sequences.

Methods: Through a retrospective analysis of a large number of cases involving salivary gland tumors, we compare the diagnostic efficacy of conventional MRI techniques with the inclusion of functional imaging. We also analyze the diagnostic value of quantitative and semi-quantitative parameters in functional imaging.

Results: Combining functional MRI parameters, including DWI, DCE-MRI, and MRS, with conventional MRI imaging significantly improves the accuracy of tumor diagnosis, as well as the ability to directly diagnose certain tumors, such as pleomorphic adenomas and adenolymphomas.

Conclusion: Functional MRI imaging is a valuable tool for enhancing disease diagnosis and guiding surgical interventions. The quantitative and semi-quantitative techniques provided by MRI offer effective assurance in distinguishing between benign and malignant diagnoses.

S-32

MRI in Thyroid-Associated Ophthalmopathy: State of the Art

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Thyroid-Associated Ophthalmopathy is a common orbital disease, with a increase of mobility. It has a very negnative influence on the quality of life of the patients. Magnetic resonance imaging plays an important role on the management of the thyroid-associated ophthalmopathy. Accurate diagnosis and stage is the base for establishing the individual treatment approach for the patients with thyroid-associated ophthalmopathy.

Follow-up magnetic resonance imaging is very important for judge whether the treatment is effective or nor. In this lecture, we aimed to discuss the role of magnetic resonance imaging (including functional magnetic resonance imaging) in the diagnosis, stage, and follow-up of thyroid-associated ophthalmopathy.

S-33

基于真实世界事件的 NSCLC 疗效的影像学客观评估要点与主观评估差异分析

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目的：探讨基于真实世界事件的非小细胞型肺癌（NSCLC）影像学评估标准的应用要点及影像评阅结果差异的常见缘由。方法：浅析、比较肿瘤影像评估标准的发展演变过程，从 WHO 标准发展到 RECIST 和 RECIST 1.1 标准及其之间的区别。解读 RECIST 1.1 标准中的主要诊断术语解析及应用要点；NSCLC 多中心临床试验影像评估实际案例分析：28 家全球分布的多中心 890 例病例 4900 个访视点，独立影像中心采用 A、B 两组双盲独立阅片所有病例，每组由 2 名 5 年以上 RECIST 阅片经验的放射医师采用双盲一致性独立评估所有病例，评估结果不一致时由另一名同样资质的阅片人进行裁判阅片。最后，比较 2 组阅片人的结果差异，并归纳导致此差异的来源。结果：A 组、B 组 2 组的组内阅片一致率分别为 95.7%、97.2%（ $P<0.05$ ）；经裁判阅片后，两组间的评估结果一致性为 92.3%，符合 FDA 的评估要求。组内与组间的不一致性的主要原因有（占 80%）：靶病灶的选择，肺内靶病灶的测量时的窗宽位合理选择，肺癌靶病灶梭形机化以及访视期靶病灶测量时遵行患者临床真实世界事件规则；新病灶的确认；其次原因有（20%）：非靶病灶明确进展的确认；新增淋巴结病灶的判断；腹膜转移的忽略。结论：RECIST1.1 要点的精准掌握并结合患者临床真实世界事件是科学精准 NSCLC 疗效的基础，也是避免评估结果主观差异的主要手段。

S-34

建立以病人为中心的影像检查及质量管理与控制体系

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目的：影像学在疾病诊疗和保障人民健康方面发挥着越来越重要的作用，如何建立以病人为中心的影像检查及质量管理与控制体系进一步提升影像学的价值和促进影像学高质量发展是目前面临的巨大机遇和挑战。方法：从顶层设计影像检查适应性评价（适应证）和影像检查方法的选择、影像检查方案和参数的制定和选择到最后问题的总结与分析及持续改进方案是一个闭环过程。结果和结论：在这个过程中，要做到：既要坚持以人民健康为中心确实解决病人和临床关注的问题，又要优化流程提升两个效益；既要扩大影像学的应用范围，又要避免不必要的过度影像检查；既要严格按照规范实施检查和质控保证同质化，又要不断创新提升影像的价值，促进影像学高质量发展。

论文发言

OR-0001

磁共振四维血流成像在肥厚型心肌病 左室流出道应用的可行性研究

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目的 探索磁共振四维血流成像 (4D-Flow MRI) 技术在左心室腔内应用的可行性。

方法 本研究为前瞻性、横断面研究, 纳入 2022 年 8 月至 2023 年 1 月于我院接受心脏 MRI 检查的肥厚型心肌病患者, 采用 3.0T MR 扫描仪进行 2D-Flow 及 4D-Flow 成像, 收集患者 1 周内进行的超声心动图检查结果。采用组内相关系数 (ICC)、变异系数 (COV) 及 Bland-Altman 分析比较 2D-Flow、4D-Flow 评估左室流出道峰值流速的可重复性及一致性, 并通过 Pearson 相关性分析探究二者与超声测量结果的关系。

结果 共纳入 21 例完成全部心脏 MR 及超声心动图检查的患者。2D-Flow 和 4D-Flow 观察者内/观察者间的 ICC 分别为 0.999/0.999 和 0.995/0.992, COV 分别为 0.408/0.429 和 1.815/2.334。4D-Flow 与超声的一致性较好, ICC 为 0.375 ($P=0.013$), 相关系数 r 值为 0.574 ($P=0.006$)。2D-Flow 与 4D-Flow 和超声间的一致性较差, 与 4D-Flow 间的 ICC 为 0.102 ($P=0.287$), r 值为 0.132 ($P=0.567$), 与超声间的 ICC 为 -0.038 ($P=0.617$), r 值为 -0.099 ($P=0.670$)。

结论 4D-Flow 技术能够可视化心腔内血流模式, 对左室流出道峰值流速的测量具有高度可重复性, 且与超声心动图的测量结果具有显著的一致性。

OR-0002

Cerebral blood flow changes and their genetic mechanisms in major depressive disorder: a combined neuroimaging and transcriptome study

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Background: Extensive research has shown abnormal cerebral blood flow (CBF) in patients with major depressive disorder (MDD) that is a heritable disease. The objective of this study was to investigate the genetic mechanisms of CBF abnormalities in MDD.

Methods: To achieve a more thorough characterization of CBF changes in MDD, we performed a comprehensive neuroimaging meta-analysis of previous literature as well as examined group CBF differences in an independent sample of 133 MDD patients and 133 controls. In combination with the Allen Human Brain Atlas, transcriptome neuroimaging spatial association analyses were conducted to identify genes whose expression correlated with CBF changes in MDD, followed by a set of gene functional feature analyses.

Results: We found increased CBF in the reward circuitry and default-mode network and decreased CBF in the visual system in MDD patients. Moreover, these CBF changes were spatially associated with expression of 1532 genes, which were enriched for important molecular functions, biological processes, and cellular components of the cerebral cortex as well as several common mental disorders. Concurrently, these genes were specifically expressed in the brain tissue, in immune cells and neurons, and during nearly all developmental stages. Regarding behavioral relevance, these genes were associated with domains involving emotion and sensation. In addition, these genes could construct a protein-protein interaction network supported by 60 putative hub genes with functional significance.

Conclusions: Our findings suggest a cerebral perfusion redistribution in MDD, which may be a consequence of complex interactions of a wide range of genes with diverse functional features.

OR-0003

Comparison of DW-MRI and FDG PET/CT in preoperative assessment of specific-region metastases in advanced epithelial ovarian cancer: a correlation study with surgical results

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Objectives: To compare the efficacy of DW-MRI and FDG PET/CT in detection of specific-region metastases in epithelial ovarian cancer (EOC).

Methods: This prospective study involved women with suspected stage III-IV EOC between October 2020 and July 2021. Prior to surgery, participants underwent both DW-MRI and FDG PET/CT. Data on clinical, pathological, surgical, and residual tumor were collected. The peritoneal cancer index (PCI) with additional points for involvement of specific regions were used. The key region metastases which independently predicted the feasibility of incomplete resection were identified. The agreement between imaging PCI and surgical PCI were calculated. The diagnostic performance of the two imaging modalities in specific regions were also compared.

Results: A total of 43 patients with stage III-IV EOC were enrolled in the study. Both DW-MRI and FDG PET/CT underestimated the imaging PCIs. DW-MRI performed significant better in detecting lesions of the diaphragmatic peritoneum ($p=0.017$) and omental lesions extending to the hepatic flexure or splenic flexure ($p=0.028$). The key regions associated with incomplete resection were small bowel mesentery lesions ($OR=4.645$; $p=0.010$) and omental lesions extending to the hepatic flexure or splenic flexure ($OR=4.202$; $p=0.019$). The area under receiver operating characteristic curves of DW-MRI and FDG PET/CT in above two key regions were 0.789, 0.967 and 0.663, 0.846 respectively.

Conclusions: Both DW-MRI and FDG PET/CT often underestimated the actual extent of peritoneal dissemination. DW-MRI showed a tendency for higher accuracy than FDG PET/CT in key regions that were more predicting incomplete resection.

OR-0004

IVIM 监测间充质肝细胞对肝部分切除后大鼠肝再生的疗效研究

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目的: 探索体素内不相干运动 (IVIM) 成像监测间充质干细胞 (MSCs) 促进部分肝切除后肝再生的效果研究。

材料与方法: 将 70 只成年 SD 大鼠随机分为对照组和治疗组, 每组 35 只。所有大鼠均行 70% 肝大部切除术 (切除肝左外侧叶和肝中叶)。每组大鼠再根据时间点分为 7 个亚组 (术前、术后第 1、2、3、5、7、14 天), 每个组 5 只。培养间充质干细胞, 术中经门静脉移植到大鼠体内 (每鼠移植 2×10^6 个细胞), 对照组注射等量的 PBS 溶液。每组在对应时间点均进行肝脏 IVIM 成像, 随后处死取肝脏组织和静脉血, 测量肝功能化验指标和肝细胞 Ki-67 增殖指数。分析肝脏 IVIM 功能参数、病理指标和血液生化指标在组间和不同时间点间的差异。分析影像参数与病理和生化指标的关联性。

结果: 对照组与治疗组肝实质 D、D*、PF 值差异均有统计学意义 ($P < 0.05$)。两组大鼠肝实质 D 值在术后均先上升后下降, 术后第 2、7、14 天 D 值有明显差异 ($P < 0.05$)。两组大鼠肝实质 D*、

PF 值在术后均先下降后上升, 治疗组肝实质 D*、PF 值下降速度较对照组缓慢, D*值恢复速度较对照组缓慢, D*值在术后第 14 天没有恢复到基线水平 ($P<0.05$)。对照组与治疗组的 ALT 与 AST 值术后先上升后逐渐下降, 且治疗组术后 1 天的 ALT 与 AST 值较对照组明显减低 ($P<0.05$)。肝细胞 Ki-67 增殖指数与肝细胞大小均先上升后下降, 治疗组术后第 2 天肝细胞 Ki-67 增殖指数低于对照组, 第 3、5 天肝细胞 Ki-67 增殖指数高于对照组。治疗组肝细胞大小在术后 2~14 天均大于对照组, 治疗组肝实质 D、D*、PF 值与 AST 水平、肝细胞 Ki-67 指数和肝细胞大小具有相关性 ($|r|=0.35\sim0.71$; $P<0.05$)。

结论: 骨髓间充质干细胞治疗后会延长肝部分切除后肝脏增值期, IVIM 参数可以无创监测治疗后肝再生及肝功能恢复过程。

OR-0005

多参数 MRE 预测肝硬化患者的肝静脉压力梯度

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目的: 评估磁共振弹性成像 (MRE) 在预测肝硬化患者肝静脉压力梯度 (HVPG) 中的价值。

方法: 前瞻性分析接受经颈静脉肝内门体静脉分流术 (TIPS) 治疗的肝硬化患者 48 例, 记录患者的天冬氨酸转氨酶与血小板比率指数 (APRI) 及纤维化-4 (FIB-4) 指数, 行 60HZ 的 MRE 检查并测得肝弹性值 (LS)、脾弹性值 (SS)。以 TIPS 术中所测 HVPG 为金标准, 定义 $\geq 10\text{mmHg}$ 为临床显著门静脉高压 (CSPH), $\geq 12\text{mmHg}$ 为严重门静脉高压 (SPH)。采用线性回归分析 HVPG 与 LS、SS 及可能影响因素的相关性, 得到 HVPG 预测值 (PV), 用受试者工作特征 (ROC) 曲线下面积 (AUC) 评价 MRE 在预测 CSPH、SPH 中的效能。

结果: 在多元线性回归中, SS 是 HVPG 的唯一独立影响因子 ($\beta=2.52$, $P=0.000$), 调整后 $R^2=0.69$, ($P=0.00$)。PV 对于诊断 CSPH 的 AUC 为 0.82 (95%CI: 0.68, 0.92, $P<0.0001$), FIB-4 AUC: 0.73 (95%CI: 0.58, 0.85, $P=0.01$), 高于 APRI AUC: 0.53 (95%CI: 0.38, 0.67, $P=0.80$ 未达统计意义)。PV 对诊断 SPH 的 AUC 为 0.90 (95%CI: 0.78, 0.97, $p<0.0001$), 高于 APRI AUC: 0.68 (95%CI: 0.53, 0.81, $P=0.04$), FIB-4 AUC: 0.64 (95%CI: 0.49, 0.78, $P=0.09$ 未达统计意义)。

结论: MRE 是一种简单有效的无创预测 HVPG 的方法。

OR-0006

基于 MRI 生境成像及影像组学预测高级别浆液性卵巢癌患者铂敏感性: 一项多中心研究

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目的: 探讨 MRI 生境成像及影像组学预测 HGSOC 患者铂耐药的可行性, 并与传统影像组学和深度学习模型进行比较。

材料与方法: 回顾性搜集了 3 家医院的 HGSOC 患者的临床及 MRI 数据。采用基于队列的 K-means 算法对 T2WI、CE-T1WI 和 ADC 图进行生境聚类分析。根据 Calinski-Harabasz (CH) 评分决定聚类数。计算各生境容积、容积所占比例以及不同序列上的像素灰度均值。经特征提取及选择后, 分别构建传统影像组学模型、生境模型和深度学习模型对铂耐药和铂敏感患者进行识别。然后通过选

择以上三个模型中的最优模型和临床独立预测因子构建诺模图。使用 ROC 曲线及德龙检验评估比较各模型性能,采用净重分类指数 (NRI) 和综合判别指数 (IDI) 比较不同模型间的增益。

结果:本研究共纳入 394 例 (300 例铂敏感患者和 94 例铂耐药患者) 符合条件的 HGSOC 患者,其中训练组 307 例,外部验证组 87 例。根据 CH 评分, $K=3$ 时聚类效果最好,故将肿瘤聚类成 3 个生境,其中生境 1 (ADC 低、T2WI 低、CE-T1WI 高) 所占比例最高 (42.30%), 其次是生境 3 (ADC 低, T2WI 高, CE-T1WI 中等, 占 31.06%) 和生境 2 (ADC 高、T2WI 中等、CE-T1WI 中低, 占 26.70%)。铂耐药组不同序列的生境 2 容积和像素灰度均值显著高于铂敏感组 ($P<0.05$)。铂耐药组生境 3 的 ADC 值显著高于铂敏感组 ($P=0.021$)。与传统影像组学模型 ($AUC=0.640$) 和深度学习模型 ($AUC=0.603$) 相比, 生境模型的 AUC (0.710) 更高。采用生境标签和临床独立预测因子 (新辅助化疗) 构建的诺模图 AUC (0.721) 明显高于其他模型, NRI 和 IDI 均为阳性。

结论: 基于 MRI 的生境成像及其影像组学有潜力预测 HGSOC 患者铂耐药。结合了生境标签的诺模图对于评估 HGSOC 患者铂耐药具有最高的效能和净效益。

OR-0007

T2-weighted magnetic resonance imaging radiogenomic features for the prediction of neoadjuvant chemotherapy response in patients with osteosarcoma

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Objectives: This study aims to explore the role of T2-weighted magnetic resonance imaging (MRI) radiogenomic features in characterizing changes in patients with osteosarcoma (OS) and on neoadjuvant chemotherapy (NACT).

Material and Methods: Twenty-one patients with OS were examined retrospectively and divided into poor-response group ($n = 13$) and good-response group ($n = 8$). T2-weighted sequencing was performed at baseline. A total of 98 radiomic features and 31 gene expression profiles were analyzed for each patient. Age, sex, alkaline phosphatase, pathologic type, tumor size, and tumor location were also analyzed. Comparisons between the good- and poor-response groups were made using t-test, Mann-Whitney U test, or Fisher's exact test. The relationships between radiomic features and gene expression profiles was conducted using Spearman correlative analyses.

Results: Statistical differences in 19 radiomics features and glutathione-s-transferase 1 were found between the good- and poor-response groups ($P < 0.05$). No significant differences in clinical features were found ($P > 0.05$). The receiver operating characteristic curve showed that boxmean_ngtdm_Busyness, binomialblurimage_ngtdm_Busyness,

wavelet_ngtdm_wavelet_LLL_Busyness, and mean_ngtdm_Busyness had the best performance in predicting the NACT of patients with OS, with area under the curve of 0.788, sensitivity of 0.750, and specificity of 0.923. Correlation analysis showed that the HLA_I, CD274, GSTP1, and CCND3 were significantly correlated with one or more radiomics features ($P < 0.05$).

Conclusions: The T2-weighted MRI radiogenomic features can be used as biomarkers for the early response evaluation of NACT in OS. The radiomic features of patients with OS were associated with some chemotherapy-related genes.

OR-0008

In vivo Imaging Exploration: Irisin Prevents High-Fat Diet-Induced Metabolic Disorders via Brown Adipose Tissue Activation

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Objective: This study sought to find whether an intervention with irisin, a small myokine, could restore interscapular brown adipose tissue (iBAT) function and improve systemic metabolism in the context of prolonged high-fat diet (HFD) feeding, and whether the irisin improves systemic metabolism through activation of iBAT.

Methods: Non-invasive magnetic resonance imaging (MRI) and position emission tomography (PET) with ^{18}F -fluoro-2-deoxy-D-glucose (^{18}F -FDG) were used to determine and follow the changes of systemic metabolism and lipid accumulation in liver and iBAT in HFD-induced obese mice during intervention with irisin for 2-week or 4-week. Additionally, an obese mouse model with the removal of iBAT was also constructed and scanned during a 4-week irisin intervention. Pathological and molecular biology analyses, including uncoupling protein 1 (UCP 1) protein expression level, were performed on tissue and blood samples.

Results: Prolonged HFD feeding in mice not only induced obesity but also impaired the thermogenic capacity of iBAT with a decline in overall metabolic activity. MRI showed that irisin intervention decreased lipid content in iBAT, coupled with increased UCP 1 protein expression and FDG uptake measured by PET. This restoration of iBAT activity was accompanied by an improvement in systemic metabolism. The beneficial effects of irisin appears to be dependent on the length of intervention time. When iBAT was removed, the positive effects of irisin on metabolism were partially suppressed, suggesting that irisin regulates metabolism through the restoration of the thermogenic function of iBAT.

Conclusion: HFD results in reduced thermogenic capacity of iBAT, while irisin intervention can effectively restore iBAT function, leading to improvement in overall glucose and lipid metabolism.

OR-0009

Multifrequency MR Elastography Based Tomoelastography: Additional New Imaging Tool for Postoperative Pancreatic Fistula Risk Stratification

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Background: Postoperative pancreatic fistula (POPF) is a prevalent and severe complication of pancreatico-enteric anastomosis but accurate preoperative prediction has been challenging. Pancreatic stiffness and fluidity quantified with tomoelastography (a multi-frequency MR elastography technique) may reflect pancreatic texture which was reported be strongly predictive of POPF.

Purpose: To investigate the predictive performance of pancreatic stiffness and fluidity and further to stratify the POPF risk.

Materials and Methods: This prospective study enrolled participants who underwent preoperative tomoelastography and pancreatico-enteric anastomosis between November 2021 and January 2023. Stiffness and fluidity were quantified using maps of shear-wave speed (c) and phase angle (ϕ) obtained from tomoelastography. The correlation between fibrosis, lipomatosis and MR

parameters was evaluated with Pearson correlation. The independent predictive clinical-radiological factors of POPF were determined using logistic regression analysis. The predictive performance was assessed with area under the receiver operating characteristic curve (AUC) analysis and compared using net reclassification improvement (NRI) and integrated discrimination improvement (IDI).

Results: Among 112 participants enrolled (56.5 ± 13.7 years, 53 males), 25 participants had POPF. There was a strong correlation between stiffness and fibrosis ($r=0.822$, 95% confidence interval [CI]: 0.752-0.875, $P<0.001$) while a moderate correlation between fat fraction and lipomatosis ($r=0.776$, 95%CI: 0.690-0.840, $P<0.001$). Stiffness (adjusted odds ratio [OR]: 0.00; 95% CI: 0.00-0.02; $P=0.002$), fluidity (adjusted OR: 0.00; 95%CI: 0.00-0.09; $P=0.014$) and fat fraction (adjusted OR: 1.13; 95%CI: 1.05-1.22; $P<0.001$) were independent predictive factors for POPF. The AUC of incorporating stiffness, fluidity and fat fraction in predicting POPF was 0.922 (95%CI: 0.856-0.964), which was higher than stiffness (0.838; NRI: 0.247, IDI: 0.183, both $P<0.05$), fluidity (0.763; NRI: 0.287, IDI: 0.331, both $P<0.05$), fat fraction (0.743; NRI: 0.344, IDI: 0.290, both $P<0.05$).

Conclusion: Pancreatic mechanical properties (stiffness and fluidity) quantified with tomoelastography can improve the predictive performance of conventional MRI in postoperative pancreatic fistula risk stratification.

OR-0010

Initial and Follow-up High-Resolution Vessel Wall MRI Study of Spontaneous Cervicocranial Artery Dissection

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Objectives To explore the factors associated with ischemic stroke secondary to spontaneous cervicocranial artery dissection (sCCAD) and evaluate the initial imaging markers related to outcomes.

Methods Initial and follow-up high-resolution vessel wall MRI (VW-MRI) in consecutive patients with sCCAD were retrospectively analyzed. The associations of clinical and imaging factors and variants of the circle of Willis (COW) with ischemic stroke were evaluated using binary logistic regression analyses. The anatomical outcomes were categorized as complete, partial and no remodeling based on changes of vessel wall and lumen. Ordinal logistic regression analysis was used to assess associations between initial features and outcomes.

Results: A total of 115 dissected arteries (79 strokes, 36 non-strokes) were detected in 103 patients. Follow-up VW-MRI was available in 46 patients (44.7%, with 51 vessels), with a median interval of 8.5 months. Pseudoaneurysm (OR, 0.178; 95% CI, 0.039-0.810; $p = 0.026$) tended to rarely cause ischemic stroke, while intraluminal thrombus (OR, 5.558; 95% CI, 1.739-17.765; $p = 0.004$), incomplete COW (OR, 9.309; 95% CI, 2.122-40.840; $p = 0.003$), and partial complete COW (OR, 4.463; 95% CI, 1.211-16.453; $p = 0.025$) were independently associated with stroke occurrence. Furthermore, the presence of double lumen (OR, 5.749 95% CI, 1.358-24.361; $p = 0.018$) and occlusion (OR, 12.975; 95% CI, 3.022-55.645; $p = 0.001$) were associated with no remodeling of sCCAD.

Conclusions: Multiple initial factors were found to be related to stroke occurrence and anatomical outcomes of sCCAD. High-resolution VW-MRI may provide valuable insights into the pathophysiology and evolution of sCCAD.

OR-0011

Rectal Adenocarcinoma: Ex vivo 9.4T MRI - Correlation with Histopathologic Treatment Response to Neoadjuvant Chemoradiotherapy

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Objective: To determine the imaging detail and diagnostic information that can be obtained at 9.4T magnetic resonance imaging (MRI) of evaluating the treatment response to neoadjuvant chemoradiotherapy (nCRT) of rectal adenocarcinoma by ex vivo.

Methods: Fifteen cases with locally advanced rectal cancer (LARC) who underwent surgical resection after nCRT between September 2022 and February 2023 were included. Excised rectal adenocarcinoma specimens were fixed in a perfluoropolyether-filled test tube and scanned with a 3.0T and 9.4T MRI system ex vivo. The residual tumor depth and tumor regression grade (TRG) based on T2-weighted imaging (T2WI) were subjectively assessed and then compared with the pathological findings.

Results: The ex vivo 9.4T T2WI without fat suppression enabled clear differentiation between tumor tissue, fibrosis and normal rectal wall, which clearly corresponded to the pathologic tissues of the rectal specimens. The TRG could be accurately assessed on ex vivo 9.4T images in 13/15 specimens (86.7%), while in 11/15 specimens (73.3%) on ex vivo 3.0T images.

Conclusions: Ex vivo 9.4T MR imaging enables clear delineation of the rectal wall layers and demonstrated good performance for evaluating the TRG of LARC after nCRT, which allow radiologists to understand and then assess more accurately the treatment response to nCRT of rectal adenocarcinoma.

OR-0012

区域选择性动脉自旋标记 MRI 技术对颈动脉近闭塞患者内膜剥脱术后脑过度灌注的预测价值研究

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目的: 探索在颈动脉近闭塞患者中, 区域选择性动脉自旋标记 (tASL) MRI 技术能否预测颈动脉内膜剥脱术 (CEA) 后脑过度灌注的发生。

方法: 2015 年 5 月至 2022 年 5 月, 连续纳入因颈动脉近闭塞接受 CEA 的患者, 在术前 2 周和术后 1 周内进行 MRI 检查。在 tASL 图像上, 视觉评估患侧颈内动脉 (ICA) 供血区面积 (正常、部分减小 [$<50\%$]、明显减小 [$>50\%$]), 对侧 ICA 和椎-基底动脉代偿情况 (无、部分代偿 [$<50\%$]、明显代偿 [$>50\%$]) 和术后患侧 ICA 灌注区域是否正常化 (图 1), 并定量患侧和健侧 ICA 供血区脑血流量 (ipCBF、conCBF)、患侧和健侧 ICA 供血体积比 (ripPV、rconPV) 和总灌注体积比 (rtPV)。脑过度灌注定义为与基线相比, 术后 CBF 增加超过 100%。

结果: 34 名患者 (平均年龄 64.8 ± 7.5 岁, 男性 79.4%) 中, 16 名 (47.1%) 患者发生过度灌注。Willis 环不完整 (43.8% vs 88.8%, $p=0.004$)、患侧 ICA 供血面积明显减小 (62.5% vs 16.7%, $p=0.013$)、对侧 ICA 无代偿 (43.8% vs 5.6%, $p=0.031$) 和术后 ICA 灌注区域正常化 (85.7% vs 43.8%, $p=0.045$) 与脑过度灌注的发生有关 (表 1); 联合三种术前半定量影像学标记物, 预测过度灌注的 AUC 为 0.929, 灵敏度 75.0%, 特异度 94.4% (图 2a)。在定量指标上, 过度灌注组术前 ipCBF (14.1 ± 6.2 ml/100g/min vs 17.8 ± 2.9 ml/100g/min, $p=0.041$) 和 conCBF 更低 (22.9 ± 8.6

ml/100g/min vs 27.9 ± 4.7 ml/100g/min, $p=0.049$), rtPV 更小 ($98.1\% \pm 13.6\%$ vs $108.7\% \pm 12.3\%$, $p=0.023$, 表 1); 联合三者预测过度灌注的 AUC 为 0.83, 灵敏度 81.25%, 特异度 83.33% (图 2b)。

结论: 在颈动脉近闭塞患者中, 术前进行 tASL 成像有助于识别 CEA 后脑过度灌注高风险的患者。

OR-0013

Reproducibility and normal value of liver and spleen stiffness measurement among healthy volunteers by multi-frequency magnetic resonance tomoelastography

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Background: Gastroesophageal varices, as a common complication of portal hypertension, constitute a major medical emergency with a high mortality rate. Early identification of gastroesophageal varices and timely intervention in high-risk cases makes positive influence in the prognosis for patients with portal hypertension. Consequently, there is a clinical need for non-invasive methods to predict the risk of gastroesophageal varices bleeding. Tomoelastography proves valuable in it. Currently, there is no research on the repeatability and influencing factors of measuring liver and spleen stiffness in tomoelastography in healthy volunteers. Therefore, our study focuses on investigating the measurement reproducibility and determining the normal value of liver and spleen stiffness in healthy volunteers, exploring the difference among healthy volunteers base on age, sex, BMI and the influence of steatosis in liver. **Methods:** Fifty-three healthy volunteers and thirty-two patients with steatosis were enrolled and underwent the examination at intervals of 2 ± 1 months to test the feasibility and repeatability of the hepatic and splenic tomoelastography. Two radiologists with 20-year (reader 1) and 4-year (reader 2) experience using hepatic and splenic MR imaging analyzed the images using ImageJ software. The stiffness of left robe of liver was compared to the right. The mean liver stiffness and spleen stiffness were compared based on the age, gender and BMI. And the mean liver stiffness in healthy volunteers was compared to the patients with steatosis.

Results: In the healthy volunteer group, the stiffness of the right robe of the liver and the left robe of the liver were 1.58 ± 0.09 m/s and 1.65 ± 0.11 m/s, respectively. The mean liver stiffness was 1.61 ± 0.08 m/s, and the spleen stiffness was 2.60 ± 0.25 m/s. The Bland–Altman analysis showed high intraobserver agreements and short-term reproducibility for both liver and spleen stiffness measurement. There were difference in hepatic stiffness between the right robe of the liver and the left lobe of the liver. ($P < 0.0001$) The frequencies of the mean liver stiffness and spleen stiffness did not differ by sex, age, or BMI. In the patients group, there were no difference in liver stiffness between patients with hepatic steatosis and healthy volunteers.

Conclusion: In conclusion, tomoealstography is a promising and reproducible method for measurement of liver and spleen stiffness. The mean liver stiffness in healthy volunteers was 1.61 ± 0.08 m/s, and the spleen stiffness was 2.60 ± 0.25 m/s. There were no significant difference in the frequencies of the liver and spleen stiffness among age, gender and body mass index groups. And we found no difference in liver stiffness between patients with hepatic steatosis and healthy volunteers.

OR-0014

脑动静脉畸形血管构筑特征、破裂状态与 4D flow MR 血流动力学参数相关性的初步研究

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目的:脑动静脉畸形(AVM)的血流动力学特征很难通过形态学成像或外科分级来反映。本研究旨在研究脑 AVM 血管构筑特征和血流动力学之间的关系。

方法:前瞻性连续纳入 DSA 诊断脑 AVM 的患者,行 4Dflow MRI,体素为 1.0mm(3D 各向同性)。用 4D flow 计算三维速度场和血流量。计算瘤巢附近供血动脉的壁剪切力,搏动指数(PI),阻力指数(RI),瘤巢体积,病灶流入比(供血动脉总流量/瘤巢体积),流出比(引流静脉流量/瘤巢体积)。比较不同血管构筑特征、破裂状态的血流动力学组间差异。随访介入栓塞术后的血流变化。

结果:16 例患者中 13 例图像质量可获得血流动力学评估(男性 8 例,女性 5 例,年龄 19~61 岁),其中 AVM 破裂 4 例,未破裂 9 例。4 例介入术后再评估(随访 7~12 个月,中位数 11 个月)。破裂状态与 Spetzler-Martin 分级之间无显著相关性。多动脉供血与未破裂状态相关($p=0.001$),其余构筑特征(深静脉引流、瘤巢内动脉瘤、瘤巢紧密/松散)与破裂状态未见显著相关。Spetzler-Martin II 级患者的总流量(7.8~500.4 ml/min)与 III 级患者的总流量(7.8~920.4ml/min)有较大重叠。未破裂组与破裂组的总流量未见显著差异,但破裂组有更高的 PI ($p=0.02$)和 RI ($p=0.023$),更低的流出比($p=0.01$)。供血动脉单根最大流量、总流量与瘤巢体积高度相关($p=0.023, 0.001$)。PI 与供血动脉单根最大流量相关($p=0.031$)。流入比与动脉平均速度、最大流量及壁剪切力相关($p=0.004, 0.047, 0.001$)。随访的 4 例病例中,单根动脉最大流量均下降(幅度 20~91%),流速均下降(幅度 5~65%),总流量均下降(幅度 10~87%)。

结论:脑 AVM 即使具有相似的临床分级或血管构筑特征,其血流动力学也具有异质性,这可通过 4D flow 来量化。本初步研究中,AVM 在破裂病变中流量差异不明显,但 PI 及 RI 更高、流出比更低。供血动脉的高流量与瘤巢体积、PI、流入比正相关。介入栓塞后近 1 年显示了显著的病灶血流减量。

OR-0015

基于高分辨率磁共振血管壁成像研究 颈动脉斑块内出血与斑块分布象限的关系

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目的 通过 3D 高分辨率磁共振血管壁成像(VW-MRI)研究颈动脉斑块内出血(IPH)的发生与斑块分布象限的关系。

方法 招募 92 例急性期脑缺血或脑梗死的患者,通过超声检查发现至少一侧颈动脉有斑块。所有患者均行 VW-MRI 检查,序列包括 T1WI、T2WI、增强 T1WI、同步非增强血管造影和斑块内出血成像序列(SNAP)和 MRA。分别测量斑块和 IPH 体积,并计算两者体积百分比;将颈总动脉分叉部及颈内动脉起始部划分成 I-IV 四个象限;观察斑块强化情况。比较无 IPH 斑块组和出血斑块组的斑块象限分布差异。

结果 在纳入的 118 枚斑块中,有 IPH 的斑块共 28 枚(23.73%),IPH/斑块体积平均值 0.23 ± 0.16 ,斑块强化率 100%。同无 IPH 的斑块相比,出血斑块更多分布在第 I 象限(21.43% vs. 6.67%, $P < 0.05$),较少分布在第 III 象限(0.00 vs. 17.78%, $P < 0.05$),分布差异具有统计学意义。

结论 颈动脉斑块 IPH 的发生与其分布象限有关, 这或许与不同位置管壁所受壁切应力 (WSS) 不同有关, WSS 较大的斑块出血概率较高。此外, IPH 与斑块强化之间存在一定关联。进而提示斑块的分布象限可能一定程度影响其稳定性。

OR-0016

Development and validation of a model integrating radiomics and pathomics for predicting post-surgical prostate cancer biochemical recurrence

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Objective: The goal of this study is to investigate the prediction performance of radiomics model and pathomics model for post-surgical BCR in PCa patients, and to develop and validate a combined model using macroscopic multiparametric magnetic resonance imaging (mpMRI) and microscopic whole-slide image (WSI).

Methods: We retrospectively recruited 363 eligible PCa participants who underwent pre-operative 3T MRI and received radical prostatectomy between January 2015 to March 2020 at the First Affiliated Hospital of Soochow University with a mean 36-month follow-up and then divided them into training (n=254) and test (n=109) sets at a ratio of 7:3. Both preoperative mpMRI and WSI of surgical specimens were collected and annotated for each patient. Quantitative image features were extracted from mpMRI and WSI and used to construct radiomics signature and pathomics signature powered by least absolute shrinkage and selection operator (LASSO) Cox regression. Independent clinical features were identified by univariate and multivariate Cox regression. The combined model incorporating two signatures and independent clinical factors were developed by a multivariate Cox proportional hazard model and compared against pre-operative CAPRA and post-operative CAPRA-S score for BCR prediction.

Results: Both radiomic and pathomics signatures presented significant prognostic prediction ability in training and test cohorts (C-index: 0.690–0.837). The radiomics-pathomics combined model showed a significant improvement for predicting BCR compared with CAPRA and CAPRA-S score in the training (C-index: 0.872 versus 0.602 and 0.587, all $p < 0.050$), and test cohorts (C-index: 0.871 versus 0.684 and 0.705, all $p < 0.050$). The combined model also significantly outperformed single-modality prediction models for the radiomics model and for pathomics model in both training (C-index: 0.872 versus 0.837 and 0.690, all $p < 0.050$) and test cohorts (C-index: 0.871 versus 0.742 and 0.730, all $p < 0.050$). Furthermore, the combined model successfully stratified PCa patients into two groups with distinguishable prognosis (log-rank $p < 0.0010$).

Conclusion: The magnetic and microscopic imaging features were able to predict BCR of PCa and may provide a novel tool to assist post-surgical individualized treatment by identifying who might benefit from addition therapy.

OR-0017

Eight weeks of bright light therapy increases myelin density in the posterior thalamic radiation in young adults with subthreshold depression: A inhomogeneous magnetization transfer MRI study

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Introduction: Subthreshold depression (SD) is a significant risk indicator of major depressive episodes. The inhomogeneous magnetization transfer (ihMT) technique has not been used to probe myelin abnormalities and its response to bright light therapy (BLT) in SD.

Methods: A total of 104 college students with SD and 91 age- and sex-matched healthy controls (HCs) were included. All participants underwent ihMT imaging, and pseudo-quantitative ihMT (qihMT), and ihMT ratio (ihMTR) were obtained. The qihMT and ihMTR values of 50 white matter (WM) fibers were compared between SD and HCs. Thirty-one SD participants underwent eight weeks of BLT, after which we observed the effect of treatment on WM fibers with abnormal qihMT and ihMTR values at baseline in SD. Also, the psychological variables were compared before and after BLT in SD.

Results: Compared to HCs, SD showed decreased qihMT values in the bilateral posterior thalamic radiation (PTR) (including optic radiation), right sagittal stratum (including inferior longitudinal fasciculus and inferior fronto-occipital fasciculus), and right uncinate fasciculus, and decreased ihMTR values in the left PTR (include optic radiation) at baseline (all, $p \leq 0.001$). After eight weeks of treatment, qihMT values of all the above fiber tracts increased by BLT in SD patients, with no significant differences than HCs, and qihMT values of the right PTR increased in SD compared to baseline ($p < 0.05$).

Conclusion: These findings suggest the macromolecular disruption of myelin in the PTR, sagittal stratum, and uncinate fasciculus in the early stages of depression. Furthermore, the myelin impairments in the PTR could be reversed by BLT, thus suggesting they might be used as the potential neural target for BLT in SD.

OR-0018

三维多频磁共振弹性成像评价肝细胞癌的预后

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目的: 探讨通过三维多频磁共振弹性成像进行量化的生物力学特性是否可以预测肝切除术后肝细胞癌的无复发生存期。

方法: 本回顾性研究包括 105 例患者, 其中 75 例肝细胞癌作为训练组, 31 例肝细胞癌作为验证组。所有患者术前均行三维多频磁共振弹性成像和多参数磁共振检查。肿瘤和肝脏通过磁共振弹性成像进行量化的生物力学特性。剪切波速度(c)和损失角(ϕ)分别表示硬度和流动性。Cox 分析用于评估可能预测无复发生存期的变量, 并为可视化构建诺模图。

结果: 多因素 Cox 回归结果显示, 肝脏 c (HR:4.43; 95% CI:1.89, 10.41; $p=0.001$), MVI (HR:3.24; 95% CI: 1.35, 7.80; $p=0.009$), 肿瘤数目 (HR:2.77; 95% CI:1.14, 6.74; $p=0.025$)是复发的独立预测因素。无复发生存期诺模图的 C-index 为 0.82 (95%CI:0.70, 0.93), 具有良好的预测性能。

结论: 源自三维多频磁共振弹性成像的肝脏 c 是无复发生存期的生物标志物。

OR-0019

Prediction of EGFR Mutation Status in Non-small cell lung cancer Based on Chest MRI Radiomics

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Objective: To establish and validate a predictive model based on magnetic resonance imaging (MRI) radiomics features combined with clinicopathological factors to predict the mutation status of EGFR in non-small cell lung cancer (NSCLC).

Patients and methods: A total of 91 NSCLC (72 in the training cohort and 19 in the validation cohort) were continuously included in this study. A total of 1708 radiomics features were extracted from MRI (T2w, CET1w) sequences. The variance threshold method combined with univariate selection method and least absolute shrinkage and selection operators (LASSO) regression were used to screen important radiomics features, calculate radiomics scores, and construct an radiomics model. The combination of radiomics scores (Rad-score) and independent predictive factors is based on multivariate logistic regression analysis to construct an radiomics nomogram to predict the mutation status of EGFR. The predictive performance and clinical practicality of the model were evaluated using area under curve (AUC), calibration curve, and clinical decision curve.

Result: A total of 30.8% (28/91) of EGFR mutant patients were identified. Thirteen important radiomics features were selected from 1708 radiomics features. The radiomics model can effectively classify EGFR mutant and wild-type, with AUCs of 0.846 and 0.808 for the training and validation cohorts, respectively. The radiomics nomogram has higher diagnostic efficiency, with AUCs of 0.880 and 0.859, respectively. The calibration curve shows that the model has good predictive performance, and the decision curve indicates that the radiomics nomogram has high clinical benefits.

Conclusion: The predictive model based on MRI radiomics has good diagnostic efficacy for EGFR mutation status in NSCLC, and can provide guidance for individualized targeted therapy.

OR-0020

基于动脉自旋标记联合 T1 mapping 的机器学习模型诊断阿尔茨海默病的应用研究

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目的: 本研究探索阿尔茨海默病 (Alzheimer's disease, AD) 和轻度认知障碍 (mild cognitive impairment, MCI) 患者脑血流量 (cerebral blood flow, CBF) 和纵向弛豫时间定量 (T1 mapping) 的变化, 为 AD 诊断提供依据。

方法: 纳入 34 名 AD 患者、24 名 MCI 患者和 38 名正常对照 (normal control, NC)。自动分割得到 24 个脑区的 CBF 及 T1 值。T 检验和 U 检验挑选出有显著性差异的特征, 递归特征消除和 Relief 进行数据降维, 支持向量机和逻辑回归构建诊断模型, 受试者工作特征 (receiver operating characteristic, ROC) 曲线和决策曲线分析 (Decision Curve Analysis, DCA) 评价模型诊断性能, 校准曲线评估模型预测概率和实际概率一致性, Hosmer-Lemeshow 检验评估模型的拟合优度。

结果: 筛选出左侧岛叶 T1 值, 左侧海马 T1 值, 右侧岛叶 T1 值, 左侧海马 CBF 值四个影像特征和一个临床特征 (年龄), 分别构建五种模型, 包括: 年龄、T1、ASL、T1+ASL 和 T1+ASL+临床。对于 AD 和 NC 的鉴别, T1+ASL+临床数据诊断效能最好 (AUC=0.931); 对于 MCI 组和 NC 的鉴别, ASL 模型、ASL+T1 模型、T1+ASL+临床模型、T1 模型 AUC 分别是 0.793、0.764、0.773、

0.709, 差异均没有统计学意义 ($P > 0.05$) ; 对于 AD 和 MCI 鉴别, 单纯 ASL 模型 $AUC=0.531$, 低于 T1 模型 ($AUC=0.724$) 和 ASL+T1 模型 ($AUC=0.727$) , 差异有统计学意义 ($P < 0.05$) , 而 ASL+T1+临床模型并未展现更高的诊断效能 ($AUC=0.674$) 。 T1+ASL 模型校准曲线显示实际概率与预测概率之间有良好的预测精度。

结论: ASL 技术联合 T1 mapping 技术比单纯 ASL 技术可以更好地鉴别 NC、MCI 和 AD, 尤其对于 MCI 和 AD 的鉴别。由此可见, ASL 技术联合 T1 mapping 技术可能作为 AD 诊断和精准诊断的有力工具。

OR-0021

Added-value of 3D amide proton transfer MRI in assessing prognostic factors of cervical cancer: a comparative study with multiple model diffusion-weighted imaging

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Purpose: Amide proton transfer (APT) imaging has been gradually applied to cervical cancer, however, the relationships between 3D APT and multiple model diffusion-weighted imaging (DWI) have yet to be investigated. To evaluate the added value of 3D APT imaging to multiple model DWI for assessing prognostic factors of cervical cancer.

Methods: Eighty-eight patients with pathologically confirmed cervical cancer underwent APT imaging and DWI with 11 b-values (0 to 2000 s/mm²) on a 3T system (Ingenia CX, Philips Healthcare, Best, the Netherlands). APT imaging was conducted using an optimized 3D TSE pulse sequence combined with chemical shift-selective fat suppression for better robustness to field inhomogeneity and 3D volume coverage. The pre-saturation pulses consisted of 3 consecutive radiofrequency pulses of 500-ms duration with 500-ms interpulse delays and a time-average amplitude of 2 μ T. Six different image volumes at saturation frequencies (± 3.5 ppm, ± 3.42 ppm, ± 3.58 ppm, and -1560 ppm, relative to the water resonance frequency) were acquired for the Z-spectrum normalization and interpolation, and three acquisition were performed at $+3.5$ ppm with different echo time shifts to obtain a Dixon-type B0 field map to correct for B0 inhomogeneities in the Z-spectrum frequency domain. DWI was obtained in a single-shot echo-planar imaging (EPI) sequence with diffusion gradient b factors of 0, 10, 20, 50, 100, 200, 400, 800, 1,200, 1,600, and 2,000 s/mm². All data were transferred to a post-processing station (IntelliSpace Portal V10, Philips Healthcare, the Netherlands) for quantitative analysis. Mono-exponential, bi-exponential, and kurtosis models were fitted to calculate apparent diffusion coefficient (ADC), pure molecular diffusion (D), pseudo-diffusion (D*), perfusion fraction (f), mean diffusivity (MD), and mean kurtosis (MK). The APT SI was calculated as the asymmetry of the magnetization transfer rate (MTR_{asym}) at the frequency offset of $+3.5$ ppm. The mean, minimum, and maximum values of APT signal intensity (APT SI) and DWI-derived metrics were compared based on tumor stages, subtypes, grades, and lymphovascular space invasion (LVSI) status. Receiver operating characteristic (ROC) curves were generated to examine the ability of each metric to distinguish different prognostic factors when appropriate. Logistic regression analyses were used to identify independent factors and combination diagnosis.

Results: APT SI_{max}, APT SI_{min}, MK_{mean}, and MK_{max} showed significant differences between squamous cell carcinoma (SCC) and adenocarcinoma (AC) (all $P < 0.05$). APT SI_{mean}, APT SI_{max}, and MK_{max} were higher and ADC_{min}, D_{mean}, D_{min}, and MD_{min} were lower in the high-grade group than in low-grade group (all $P < 0.05$). For distinguishing LVSI, only MK_{mean} showed significant difference ($P < 0.05$). There was no significant difference between any metrics with regard to stages (all $P > 0.05$). APT SI_{max}, APT SI_{min}, and MK_{mean} were the independent predictors for tumor subtype, and APT SI_{max}, MD_{min} were the independent predictors for histological grade of cervical cancer. When APT SI_{min} and APT SI_{max} was combined with

MKmean and MKmax, the diagnostic performance was significantly improved for differentiating SCC and AC (AUC, 0.908). The combination of APT SImean, APT SI_{max}, ADC_{min}, MK_{max}, and MD_{min} demonstrated a higher diagnostic performance than each individual metric (all $P < 0.05$) for predicting tumor grade (AUC, 0.903).

Conclusion: 3D-APT imaging was comparable with multi-model DWI for cervical cancer typing and grading. Addition of APT to DWI may improve the ability to noninvasively predict poor prognostic factors of cervical cancer.

OR-0022

视野优化和约束无失真单次激发弥散加权成像 对肺部病变图像质量及定量分析准确性的研究

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目的: 与单次激发弥散加权成像 (SS) 对比, 探讨视野优化和约束无失真单次激发弥散加权成像 (FOCUS) 在肺部病变成像中的准确性。

材料与方法: 在 2022 年 11 月至 2023 年 5 月期间, 对 40 例肺部病变患者前瞻性的进行磁共振 FOCUS 及 SS 序列扫描。并对所有患者的两种磁共振扫描序列图像进行客观评价及主观评价。客观评价由两个测量者分别测量肺病变、肺实质和肌肉的感兴趣区并计算对比噪声比 (CNR)、病灶信噪比 (SNR) 和形变率 (DR)。图像主观评分是由两个具有 10 年胸部诊断经验的放射科医生依据 Likert Scale 评分法进行双盲评估。另有两名测量者测量病灶的 ADC 值, 其中一个测量者间隔一周再次测量。客观评价的组间及组内一致性由配对样本 t 检验和组内相关性 (ICC) 评估, 主观评价的观察者间一致性由 Kappa 系数检验, 不同序列间定量值的差异由 Wilcoxon 秩和检验评估, 并使用 ROC 曲线显示序列对鉴别良恶性的效能。

结果: 所有观察者在 ADC, SNR, DR 以及主观评分上的组内及组间一致性均较高 ($ICC > 0.6$), 而在 CNR 上则一致性较弱。对于客观评价中的 SNR, FOCUS 与 SS 之间的差异无显著性 ($P = 0.246$)。对于 CNR, FOCUS (4.41 ± 2.02) 高于 SS (3.03 ± 1.55), 差异有统计学意义 ($P < 0.001$)。在病灶显示上, FOCUS 的 DR 值 (0.57 ± 0.35) 显著小于 SS (0.68 ± 0.45), 差异有统计学意义 ($P < 0.001$)。两位观察者对 40 位患者 FOCUS 图像的评分均分 (4.01 ± 0.70) 高于 SS (3.85 ± 0.65), 差异具有统计学意义 ($P = 0.048$)。FOCUS 的 ADC 值与 SS DWI 相当, 无显著差异。对病变良恶性鉴别的 ROC 曲线上, FOCUS (AUC=0.778) 的 AUC 值高于 SS (AUC=0.748), 说明 FOCUS 在疾病鉴别上的能力。

结论: 与 SS 相比, FOCUS 对肺部病灶的偏移更小, 在临床的主观评分更高, 具有提供肺部病变良恶性诊断以及更多临床影像学信息的潜在价值。

OR-0023

Feasibility study on Pointwise encoding time reduction with radial acquisition (PETRA) magnetic resonance angiography (MRA) to assess intracranial artery at 7 Tesla

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Introduction Pointwise encoding time reduction with radial acquisition magnetic resonance angiography (PETRA-MRA) is a non-contrast subtraction-based MRA technique for intracranial vasculature assessment. As an ultra-short TE technique, PETRA-MRA is inherently robust to

metallic susceptibility artifacts and has better performance than time-of-flight (TOF) MRA in follow-up imaging of stent-assisted coil embolization [1]. Furthermore, unlike TOF-MRA, PETRA-MRA is not subject to turbulent-flow-related dephasing artifacts and therefore has better performance in depicting saccular unruptured intracranial aneurysms (UIAs) [2]. Lastly, PETRA-MRA produces much lower acoustic noise. 7T MRI should further improve the performance of PETRA-MRA thanks to its higher SNR and in turn higher allowed spatial resolution. On the other hand, PETRA-MRA at 7T faces challenges such as SAR and limited B1 coverage in the labeling regions. To our knowledge, no previous PETRA-MRA study has been report at 7T for imaging intracranial artery, so in this study, we aim to demonstrate the feasibility and performance of PETRA-MRA at 7T in evaluating intracranial vasculatures.

Purpose To investigate the feasibility of PETRA-MRA and compare its performance to TOF on evaluating intracranial vasculatures at 7 Tesla.

Methods Under local QRB approval, 3D TOF and PETRA-MRA were performed on volunteers on a 7T MR scanner (Magnetom Terra, Siemens Healthcare, Erlangen, Germany) equipped with an 8Tx/32Rx head coil (Nova Medical, Wilmington MA, USA).

The 3D TOF was performed in an axial orientation with the following parameters: FOV = 200 × 148 mm², voxel size = 0.4 × 0.4 × 0.4 mm³, TR/TE = 17.00/3.57 ms, flip angle = 20°, GRAPPA acceleration factor of PE=3, bandwidth= 206Hz/Px, and acquisition time (TA) = 8 min 38 s.

For PETRA-MRA, the isotropic 3D acquisitions were performed with axial orientation and the following imaging parameters: FOV = 218 × 218mm², TR/TE = 5.72/0.07 ms, flip angle = 6°, imaging matrix = 544 × 544, voxel size = 0.4 × 0.4 × 0.4 mm³, bandwidth = 204 Hz/Px, and radial view number = 40,000. Two imaging datasets were acquired for PETRA MRA: TAG, a slice-selective saturation slice was placed at the skull base; Control, the same slice-selective saturation slice was placed on top of the head to achieve comparable MT effects on the imaging volume. The segmentation number of saturation pulse was set to 15 and the saturation slice thickness was set to 80mm to achieve desired black blood effects on the TAG images. The acquisition time for each TAG and CONTROL is 4 min 39s. We also acquired additional TAG and CONTROL pair with higher resolution (0.3×0.3×0.3 mm³) and the acquisition time is 6 min 37s each. The PETRA MRA images were obtained by subtracting the TAG image from the CONTROL image.

The MIP images of PETRA-MRA and TOF were reviewed by two MRI scientists. Visualization of Circle of Willis and lenticulostriate arteries were independently evaluated, focusing on artery blood signal homogeneities and sharpness depictions using a 4-point scale: 4, excellent; 3, good; 2, poor; 1, not assessable. For raw images before MIP, the contrast between arteries and background signal at MCA were calculated and compared between PETRA-MRA and TOF.

Results The contrast ratio between MCA and background tissue for PETRA MRA was significantly higher than TOF (12.66±1.45 vs 5.85±1.67, p< 0.001). The subjective image scores regarding artery blood signal homogeneities were higher in PETRA-MRA than in TOF, and sharpness were comparable between PETRA-MRA and TOF.

Discussion Sensitivity of PETRA-MRA in the detection of residual flow, turbulent flow and saturation effects is significantly superior to that of TOF-MRA because ultrashort-TE MRA is known to decrease the susceptibility artifacts and insensitive to slow blood flow. Our results indicate that at 7T, PETRA-MRA showed a higher blood to background contrast ratio compared to TOF. In addition, PETRA-MRA can cover the whole cerebral vasculature, while TOF is not able to image the top part of the brain due to placement of venous saturation band. Another advantage of PETRA-MRA is its greatly reduced acoustic noise compared to TOF, which is ideal for noise sensitive patients. One limitation of PETRA MRA is it's a subtraction-based method and thus sensitive to motion, but this could be further addressed by rigid (or no-rigid) 3D registration to reduce the motion induced discrepancy between TAG and CONTROL images.

Conclusions PETRA-MRA, with better visualization of cerebral arteries including lenticulostriate arteries, and higher contrast to background ratio than TOF, showed a promising performance in evaluating cerebral arteries in healthy volunteers, which may potentially benefit patient MRA exam at 7T.

OR-0024

Alterations of cerebral perfusion and corresponding brain functional networks in neuropsychiatric systemic lupus patient with cognitive impairment

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Objectives: Cognitive impairment (CI) frequently occurs in systemic lupus erythematosus (SLE) patients. Neuroinflammation processes, which interact with neurovascular changes in SLE, may disrupt local and global brain functions. However, the features of whole-brain, regional cerebral blood flow (CBF) and intrinsic functional connectivity (FC) in SLE have not been previously investigated.

Methods: In this study, we used the Montreal Cognitive Assessment (MoCA) to measure CI status in SLE patients, and conducted non-invasive arterial spin labeling (ASL) and seed-based FC analyses to detect the characteristics of local CBF and corresponding network alterations. The SLE patient group included 29 patients with normal cognition (SLE-NC) and 20 patients with cognitive impairment (SLE-CI), and the control group included 31 age and sex-matched healthy controls (HCs). Additionally, correlation analysis between these alterations and neuropsychological performances were further examined in patient groups.

Results: Compared with HCs, the SLE patients (both SLE-NC and SLE-CI) showed commonly decreased CBF in the bilateral orbitofrontal cortex, left insula, left temporal lobe, and increased CBF in the bilateral cerebellum posterior lobe (cerebellar area 8). In the patient subgroups comparison, SLE-NC patients had lower CBF than the SLE-CI group in the bilateral cerebellum_8. In the secondary analyses, increased FC in SLE-CI of the right supramarginal gyrus was observed when we set the right cerebellum_8 as the seed region. In the correlation analysis, CBF and FC values of the cerebellum were negatively correlated with MoCA scores and its component scores. Finally, orbitofrontal and right temporal CBF values negatively correlated with the SLE disease severity index (SLEDAI).

Conclusion: Our findings indicate that altered CBF and changed cerebello-cerebral networks are possible image biomarkers of cognitive impairment in SLE patients.

OR-0025

Quantitative assessment of tumor burden in multiple myeloma using MY-RADS from whole-body MRI: comparison with established prognostic biomarkers

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Objectives To explore the value of MY-RADS from whole-body MRI in assessing tumor burden quantitatively in multiple myeloma (MM) with reference to established prognostic biomarkers.

Methods 108 consecutive newly diagnosed MM patients were enrolled from June 2019 to September 2022. Bone marrow (BM) infiltration patterns were determined by MRI presentation. The total burden score using MY-RADS, ADC, and fat fraction (FF) of representative background BM were measured. Spearman correlation analysis was used for correlating these parameters against plasma cell infiltration, and independent sample t-test was used to evaluate the differences between different ISS stages and free light-chain ratio groups.

Results The patients were divided into five infiltration patterns according to MY-RADS criteria. For diffuse and salt-and-pepper patterns, there were significant difference of ADC-L3 and FF-L3 between different ISS stages ($P < 0.001$, $P = 0.033$) and free light-chain ratio groups ($p < 0.001$, $p = 0.007$). They were also correlated with plasma cell infiltration ($P < 0.001$, $r = 0.650$; $P < 0.001$, $r =$

0.841). In contrast, the total burden score did not show difference between groups. For focal pattern, there was no significant difference of ADC and FF between groups. They didn't correlate with plasma cell infiltration as well. While, the total burden score showed difference ($P=0.006$, $P=0.005$) between groups and correlated well with plasma cell infiltration ($P=0.003$, $r=0.547$). For mixed pattern, ADC-L3, FF-L3 and the total burden score all showed statistical difference between groups and correlated well with plasma cell infiltration.

Conclusions The present study supports the applicability of MY-RADS as a surrogate biomarker when established prognostic biomarkers were not accessible conveniently.

OR-0026

脑小血管病患者白质损害介导脑龄增加对认知功能的影响

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目的: 脑小血管病 (cerebral small vessel disease, CSVD) 是血管性认知损害的重要病因。白质损害, 特别是脑白质高信号 (white matter hyperintensity, WMH) 是 CSVD 的典型影像学表现。PSMD (peak width of skeletonized mean diffusivity) 是一种新型白质微结构完整性标志物。神经影像衍生的脑龄是一种个性化评估大脑老化的生物标志物。本研究旨在探究 CSVD 患者脑龄与白质损害以及认知功能的关系。

方法: 纳入年龄性别匹配的 55 名 CSVD 患者和 42 名健康对照。认知评估包括简易智能精神状态量表 (MMSE), 听觉词语学习测验 (AVLT-short 和 AVLT-long) 和连线测试 (TMT-A 和 TMT-B)。基于预训练的神经网络模型以高分辨 T1 预测脑龄, 并通过回归排除实际年龄计算相对脑龄 (relative brain age, RBA)。我们还通过 T2 和 DTI 计算了 WMH 体积和 PSMD 以衡量白质损害。以性别、年龄和教育年限作为协变量, 通过 glm 探究 CSVD 患者和健康对照之间的 RBA 差异, 并进一步在 CSVD 组中将 RBA 与 WMH 体积、PSMD 以及认知功能进行偏相关分析和中介分析。

结果: CSVD 患者的 RBA 显著高于健康对照组 ($P<0.001$)。CSVD 患者 RBA 与 WMH 体积 ($P<0.001$) 以及 PSMD ($P=0.002$) 呈正相关。关于认知功能, CSVD 患者 RBA 与 MMSE ($P=0.006$), TMT-A ($P=0.003$) 和 TMT-B 评分 ($P<0.001$) 存在显著相关。基于以上相关性, 中介分析结果显示 WMH 体积 ($P=0.004$, 中介比例 55.1%) 和 PSMD ($P=0.004$, 中介比例 57.8%) 均是 RBA 影响 MMSE 评分路径中显著的中介因子。此外, PSMD 还介导了脑龄增加对 TMT-A ($P=0.025$, 中介比例 48.3%) 和 TMT-B ($P=0.018$, 中介比例 28.8%) 的影响。

结论: 在 CSVD 中脑龄增加和白质损害存在相关, 并部分通过白质损害来影响认知功能, 是监测 CSVD 认知障碍的潜在指标。

OR-0027

基于 11.7 T 磁共振成像系统 DWI 相关参数 评估肝纤维化的实验研究

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目的 探索 and 比较传统 DWI、IVIM 和 DKI 在胆管结扎 (BDL) 模型或四氯化碳 (CCl₄) 模型中无创性分期肝纤维化的性能

材料与方法 CCl₄ 模型中分别于第 2、4、7、10 周最后一次给药后 3-5 天内进行实验, BDL 模型中分别与术后第 8、15、24、40 天进行实验, 两种纤维化模型分别于各时间点随机从对照组中抽取 3 只大鼠和实验组共同进行 MRI 扫描, 扫描完成后对所有实验鼠解剖肝脏行病理学检查。天狼星红染色对肝纤维化进行半定量分析 (METAVIR 评分系统), HE 染色对肝脏坏死性炎症、脂肪变性进行评估, 普鲁士蓝染色用于铁沉积评分。采用盲法进行 MRI 参数测量及组织学分期, 最后根据组织学分期进行统计学分析各参数与纤维化各分期之间统计学差异及相关性和诊断效能。

结果 随着肝纤维化程度加重, ADC、D、f 和 MD 均降低, MK 值呈逐渐上升趋势。D* 在所有纤维化分期中均未见明显统计学差异。Spearman's 相关分析显示 MK 在所有纤维化模型中与纤维化分期呈强正相关 (rCCl₄ model=0.773, rBDL model=0.731, r Total cohort=0.757; 所有 P<.001)。

ADC、D 和 MD 值与肝纤维化分期呈中度负相关 (r=-0.421~-0.695, 所有 P<.011)。f 值在 CCl₄ 模型中与纤维化分期呈弱相关 (r=-0.383, P<.001), 而 BDL 模型中为中度相关 (r=0.532, P<.01)。所有扩散参数中 MK 和 MD 在两种纤维化模型中的一致性较好, f 在两种纤维化模型中的一致性稍差。ROC 曲线分析显示 MK 的诊断效能高于其它扩散参数 (AUC CCl₄ model=0.91, AUC BDL model=0.90, AUC Total cohort=0.91)。

结论 多个扩散参数与肝纤维化分期相关, 但在不同的纤维化模型中表现各异。其中 MK 是评估肝纤维化程度更有价值的成像生物标志物。f 在两种纤维化模型中的一致性较差。

OR-0028

基于相位敏感反转恢复技术的灰血序列 在检测瘢痕心肌中的临床应用

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目的: 比较相位敏感反转恢复灰血 LGE 与常规亮血 LGE 对瘢痕心肌的诊断差异。

方法: 前瞻性收集临床确诊为冠脉综合征的患者 41 例 (男 28 例, 女 13 例), 平均年龄 (55±9) 岁, 按照心脏磁共振 (CMR) 检查流程逐步扫描, 于静脉注射钆对比剂 (0.2mmol/kg) 后的 10-20 分钟内, 随机进行常规存活心肌磁化归零扫描 (亮血 LGE) 和左室血池磁化归零扫描 (灰血 LGE), 记录两种 LGE 开始扫描时的对比剂注射后的时间, 在 LGE 扫描前行 TI-scout 扫描以明确正常心肌和左室血池信号分别归零时的准确 TI 值。两位 CMR 技师分别在左心室血池、正常存活心肌和瘢痕心肌中绘制感兴趣区, 获取信号强度值, 以评估三种组织之间的相对对比度 (组织 A 与组织 B 的相对对比度定义为 A 与 B 的平均信号差值除以 B 的平均信号), 每种组织的信号强度定义为两位技师测值的平均值, 并评估两位技师所测得数据的一致性。两名 CMR 医师对亮血和灰血 LGE 图像进行独立评估, 采用美国心脏协会 16 段模型对左室短轴心肌分析有无 LGE, 采用 3 点 Likert 评分法评估 LGE 透壁程度: 0 分, 无 LGE; 1 分, LGE<50% 室壁厚度; 2 分, LGE>50% 室壁厚度, 以此测

量左室瘢痕负担,同时采用二元量表(自信/不自信)对每个 LGE 的确定性水平评级,并比较观察者间的一致性。

结果:与常规 LGE 相比,灰血 LGE 瘢痕心肌与左室血池之间的相对对比度显著增加($p<0.001$),血池与正常心肌之间的相对对比度也显著增加($p<0.001$),而瘢痕与正常心肌之间的相对对比度无显著差异。灰血 LGE 诊断阳性 LGE 多于亮血 LGE,诊断瘢痕心肌的可信度更高,差异具有显著性($p<0.05$),观察者间一致性良好(灰血 LGE 和亮血 LGE: ICC 均 >0.75)。

结论:与常规亮血 LGE 相比,灰血 LGE 检测出更多的瘢痕心肌,提高了对瘢痕心肌的检测能力,增加观察者的信心。此外,灰血 LGE 无需使用额外的磁化准备脉冲,因此无需进行广泛的优化、软件修改或额外的培训,即可在当前的 MR 系统上进行临床应用。

OR-0029

基于血管周围间隙扩散张量成像技术评价 发作性睡病患者的脑类淋巴系统改变

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基于血管周围间隙扩散张量成像技术评价发作性睡病患者的脑类淋巴系统改变

目的:研究血管周围间隙扩散张量成像(DTI-ALPS)指数在评价 1 型发作性睡病(NT1)患者脑类淋巴系统的改变的作用。

方法:纳入 32 例经多导睡眠图(PSG)确诊的发作性睡病(NT1)患者和 28 例与之相匹配的健康对照者。所有被试者均行常规颅脑 MRI 和弥散张量成像扫描。利用 DSI-Studio 后处理软件分别在双侧大脑半球侧脑室体部水平的投射纤维区域、联合纤维区域勾画矩形感兴趣区(ROI),投射纤维区域、联合纤维区域的四个矩形 ROI 维持在一条直线上,测量每种纤维在 X、Y 和 Z 轴方向的扩散率,并根据公式分别计算 NT 组和正常健康对照组的 DTI-ALPS 指数,并分析其与其他变量的相关性。使用协方差分析方法评估 ALPS 指数的组间差异,根据数据的分布采用 Spearman 或 Pearson 相关分析法对 DTI-ALPS 指数与 PSG 结果进行相关性分析。

结果:NT1 组的 DTI-ALPS 指数低于正常健康对照组,并发现 NT 组的 DTI-ALPS 指数与 PSG 中的某些参数存在相关性,与 N1 期睡眠百分比呈负相关,N3 期睡眠占比呈正相关。

结论:发作型睡病患者的 DTI-ALPS 指数发生改变,提示患者发作型睡病患者存在胶质淋巴系统功能障碍,在探索发作性睡病的相关发病机制方面具有较好的应用前景,并需要进一步研究来确定脑类淋巴循环系统功能障碍是否与发作性睡病的病理生理学有关。

OR-0030

心脏移植术后患者与健康者的心脏磁共振多参数对比研究

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目的:比较心脏移植术后患者和健康志愿者的左室心功能各项参数的差异以及 T1 mapping、T2 mapping 和 ECV 等心肌标志物的区别。

材料和方法:连续纳入既往在本院行心脏移植手术并于 2021 年 1 月至 8 月在本院行常规临床复查且无不良临床症状及指标的患者为移植组,并招募既往无心脏相关病史的健康志愿者为对照组,分别行 CMR 检查,并于 CMR 检查当天查血常规获取 hct 值。采用 Siemens Skyra 3.0T 扫描仪进行左室短轴电影、T2 mapping、LGE 及增强前、后 T1 mapping 成像。主要测量的心功能包括:

LVEDV, LVESV、LVEF, LVM, 除 LVEF 外, 均经体表面积标准化得到各项指数: LVEDVi、LVESVi、LVMi。通过增强前、后 T1 和 htc 值自动计算心肌 ECV 图。参照美国心脏协会心肌 16 段分法, 手动测量心肌每个节段增强前 T1 值、增强后 T1 值、T2 值和 ECV 值。为了避免部分容积效应, 尽量避开心内膜和心外膜边界, 测量心肌中层。排除含有伪影的心肌节段, 包括呼吸和心脏运动伪影、偏共振伪影, 心肌周围的肝、肺、血池和脂肪组织导致的部分容积效应伪影。采用 SPSS 22.0 对上述所得数据进行统计分析。

结果: 移植组 45 例, 男 35 例, 女 10 例, 平均年龄 44.6 岁, 平均移植时间约 2.3 年; 对照组 30 例, 男 23 例, 女 7 例, 平均年龄 41.2 岁。移植组较对照组: 平均 LVEF ($P < 0.001$) 及 LVMi ($P < 0.05$) 增加, LVEDVi ($P < 0.001$) 及 LVESVi ($P < 0.001$) 显著降低。移植组的初始 T1、ECV 及 T2 值均明显增高(初始 T1: $P < 0.001$; ECV: $P < 0.05$; T2: $P < 0.001$), 而增强 T1 值减低 ($P < 0.05$)。心脏移植术后患者中约有 36% 出现心肌延迟强化, 并以非缺血表现为主。对 ECV 与 T2 值进行相关性分析显示两者呈明显正相关 ($r = 0.81$, $P < 0.001$)。

结论: 临床上无症状的心脏移植术后患者存在着左室心肌重构的情况: 心肌细胞外容积分数增加、心肌水肿, 并且这两者之间有一定关联, 有可能细胞外容积分数的增加部分来源于心肌水肿。

OR-0031

神经突方向离散和密度成像 (NODDI) 在颞叶癫痫伴海马硬化患者中的诊断价值

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目的: 本研究旨在探讨神经突方向离散和密度成像 (NODDI) 在颞叶癫痫伴海马硬化 (TLE-HS) 患者中的诊断性能。**方法:** 招募 59 例 TLE-HS 患者及正常对照 (HC) 64 例, 使用单次激发自旋回波 EPI 序列采集 DWI 数据 (b 值为 0, 1000, 2000 s/mm^2)。使用开源 Amico 工具进行神经突方向离散和密度成像 (NODDI) 参数拟合, 然后获得 NODDI 参数图, NODDI 参数包括各向同性体积分数 (ISOVF)、细胞内体积分数 (ICVF) 和取向分散指数 (ODI), 选择双侧海马为感兴趣的分割区域 (ROIs)。然后计算海马 NODDI 各参数和 Flair 序列信号强度的平均值。采用单因素方差分析 (ANOVA) 或 Kruskal-Wallis 检测患侧、对侧和 HC 组之间的参数差异。然后, 采用 LSD 事后多重校正法的两样本 t 检验或 Mann-Whitney U 检验进行任意两组之间的成对比较。通过 ROC 分析确定每个参数的鉴别诊断效率。**结果:** 与对侧和 HC 相比, 患侧的 ICVF 和 ODI 显著降低, ISOVF 显著升高 (均 $P < 0.05$)。与 HC 组相比, 对侧的 ISOVF 较高 ($P < 0.05$)。Flair 信号强度在患侧和 HC 之间有显著性差异 ($P < 0.05$)。在患侧和 HC 之间, Flair 具有中等的诊断性能 (曲线下面积, $AUC = 0.660$), NODDI 模型的参数具有高的诊断性能 ($AUCs = 0.824 \sim 0.931$), 并且结合 ISOVF、ICVF、ODI 的 logistic 回归模型 (combined NODDI 模型) 具有最佳的性能 ($AUC = 0.970$)。在患侧和对侧之间, ISOVF、ICVF 和 ODI 均具有较高的诊断性能, AUC 范围为 0.723 至 0.908, 最佳组合 NODDI 模型的 AUC 为 0.962。在患侧和 HC 之间, ISOVF 具有中等诊断性能 ($AUC = 0.653$)。基于 Delong 检验, 与其他单一参数相比, 组合的 NODDI 模型在区分患侧和对侧海马以及 HC 方面实现了显著更高的诊断性能 (均 $p < 0.05$)。

结论: NODDI 在 TLE-HS 诊断方面可能优于常规 Flair 成像。

OR-0032

A modified diffusion-weighted MRI-based Suidan criteria from the radiologist's perspective: improved performance in determining the surgical resectability for advanced high grade serous ovarian cancer

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Objectives: To evaluate the value of the modified Suidan criteria on diffusion-weighted MRI (DW-MRI), which focused on the growth pattern of different parts of metastases for predicting gross residual disease (RD) at primary debulking surgery (PDS) in advanced high-grade serous ovarian cancer (HGSOC) patients.

Methods: A total of 184 patients with HGSOC who underwent pre-operative DW-MRI were enrolled from December 2018 to May 2023 at two centers in China. Samples were divided into study sample (n=100), internal (n=46) and external validation cohorts (n=38). Preoperative radiological assessments were reviewed by two radiologists, according to the original Suidan criteria and modified Suidan criteria. MRI morphological characteristics of the ovarian tumors were assessed. Transcriptomics analysis of primary tumor samples were performed. Univariable and multivariate statistical analyses were conducted.

Results: In the study sample, The intra- and inter-observer agreements were excellent with intra-class correlation coefficient of 0.980 and 0.959 in the original Suidan score, and 0.962 and 0.940 in the modified Suidan score, respectively. Original/modified Suidan criteria was independent factor for predicting the surgical resectability. The modified Suidan criteria displayed the best prediction value with an area under the curve of 0.867 in the study sample and 0.806, 0.913 in the internal and external validation respectively. With the modified Suidan criteria, the R0 rates for patients with predictive score 0-2, 3-4, 5-6, 7-10 and ≥ 11 were 90.3%, 66.7%, 53.3%, 11.8% and 0%, respectively. The original and modified Suidan criteria in the infiltrative HGSOCs were significantly higher than those in the mass-like ones. And molecular differences were identified between the two morphological subtypes.

Conclusions: Compared to the original Suidan criteria, the modified Suidan criteria exhibited improved accuracy in preoperatively predicting resectability for advanced HGSOC. Patients with predictive score 0-6 were suitable for PDS at our institution.

OR-0033

集成磁共振影像特征对三阴性乳腺癌的预测的研究

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目的: 本研究旨在评估集成磁共振影像 (synthetic magnetic resonance imaging, SyMRI) 定量参数对三阴性乳腺癌 (TNBC) 的预测价值。

方法: 本研究前瞻性研究纳入了病理诊断为浸润性导管乳腺癌 (invasive ductal breast carcinoma, IDBC) 的患者, 并将其分为 TNBC 组和 Non-TNBC 组。术前乳腺 MRI 图像包括 SyMRI 和常规磁共振影像序列。SyMRI 的定量参数包括 T1 和 T2 弛豫时间、R1 ($1/T1$)、R2 ($1/T2$)、质子密度 (PD) 及其标准差 (SD)。我们对所有参与者的临床病理特征、常规 MRI 特征和定量综合参数进行了评估, 并进行了多变量逻辑回归分析以在术前确定 TNBC 的潜在独立成像预测因子。并使用受试者工作特征 (ROC) 曲线分析评估这些参数的性能。

结果: 该研究共包含 231 名病理学证实为 IDBC 的患者(TNBC 组, n=46; Non-TNBC 组, n=185)。与 Non-TNBC 组相比, TNBC 组显著具有更大的肿瘤大小 ($P=0.011$) 和更常见肿瘤内囊变或坏死 ($P<0.001$)。单变量分析结果表明 TNBC 组肿瘤具有比 Non-TNBC 组肿瘤显著更高的 T1 值 ($P=0.006$) 和 T2 值 ($P<0.001$)。TNBC 组肿瘤的 R1 值 ($P=0.003$) 和 R2 ($P<0.001$) 值显著低于 Non-TNBC 组。进一步多变量分析结果表明, T2 值和囊变或坏是 TNBC 的显著独立预测因子。结论: 综合影像学 T2 值和乳腺癌病人肿瘤囊变或坏死两者可作为术前鉴别 TNBC 和 Non-TNBC 的潜在影像学标志物。

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MRI evaluation of serous borderline ovarian tumors and identification of risk factors predicting peritoneal implants

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Objective: To evaluate magnetic resonance imaging features of serous borderline ovarian tumors and identify the risk factors that predict peritoneal implants.

Methods: This retrospective study included 130 consecutive patients with serous borderline ovarian tumors (median age, 37 years) who underwent preoperative magnetic resonance imaging examinations. Among the 130 patients, 52 had pathologically proven peritoneal implants and 78 had no pathologically proven peritoneal implants. Patients' clinical characteristics and the imaging features were involved in the logistic regression analysis for the identification of risk factors that predict peritoneal implants, including patients' age, CA-125 level, the anatomical site of the tumor, tumor size, growth pattern of papillary projection, ADC value, presence of hemorrhage, presence of detectable ipsilateral ovary, and ascites.

Results: Younger age (≤ 35 years) ($P=0.041$), elevated CA-125 (>227 U/ml) ($P=0.004$), bilateral involvement ($P=0.003$), exophytic papillary projection ($P=0.000$), and large amount of ascites ($P=0.000$) were significant risk factors associated with the development of peritoneal implants. A cutoff value of 4.0 cm in diameter of exophytic papillary projection significantly predicts the incidence of peritoneal implants, with an accuracy of 90.8%. Multivariable analysis further found that exophytic papillary projection with a height larger than 4.0 cm was an independent risk factor for peritoneal implants with an odds ratio of 25.6.

Conclusions: The exophytic growth pattern of papillary projection is a strong marker for the development of peritoneal implants in patients with serous borderline ovarian tumors. Exophytic papillary projection larger than 4.0 cm is an independent risk factor.

OR-0035

Prenatal magnetic resonance imaging features and postnatal outcomes of congenital hepatic hemangioma: an observational retrospective study

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Objective: To explore the MRI features, growth patterns, and clinical outcomes of congenital hepatic hemangiomas (CHH).

Methods: Thirty-six pregnant women with a fetus prenatally diagnosed and postnatally confirmed CHH were included. According to the maximum diameter, CHHs were divided into small (< 1.5 cm), medium (1.5–5 cm), and large CHHs (> 5 cm). The volume of the CHH was measured at every follow-up. Based on different growth patterns, CHHs were divided into rapidly involuting congenital hemangiomas (RICH) and non-involuting congenital hemangiomas (NICH). Fisher's exact tests were performed to compare the MRI features among small, medium, and large CHHs. The repetitive measurement and analysis of variance were used to compare the volume of the CHH before and after birth.

Results : Thirty-three cases were confirmed by postnatal imaging and 3 were confirmed by biopsy. Small and medium CHH appeared homogeneous, but large CHH presented a more heterogeneous appearance ($p < 0.001$). Thirty-one (93.9%) cases were classified as RICH, and 2 (6.1%) were NICH. Among the RICH, 4 (12.9%) showed a tendency of initial proliferation followed by spontaneous regression. The CHH volume showed a downward trend with age and the fastest decline was at the age of 9 months ($p = 0.025$). There was only one case dead due to high-output cardiac failure, and the remaining 33 cases were asymptomatic.

Conclusions : The morphological features and growth patterns of the CHH were varied and the former were correlated with the lesion size. However, all patients showed a good prognosis if without complications at birth.

OR-0036

Astrocyte reactivity influences cerebral cortical atrophy in prodromal Alzheimer's disease

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Objective: Previous animal experiments have demonstrated that astrocyte reactivity is critical for triggering deposition of Alzheimer's disease (AD) pathology, which includes amyloid beta ($A\beta$) and tau phosphorylation. However, it remains unclear that whether astrocyte reactivity promotes the progression of mild cognitive impairment (MCI) patients (i.e., prodromal AD).

Methods: The flow chart of participants including was shown below (Fig. 1). Finally, we included 105 $A\beta+$ MCI patients (51 Ast- and 54 Ast+) and 28 $A\beta-$ normal controls with cerebrospinal fluid biomarkers (GFAP, $A\beta_{42}$ and p-tau₁₈₁) and structural MRI data. Structural MRI images were automatically segmented by CAT12 toolbox. By using a general linear model, we tested regional between-group differences for each of the ROIs concerning the Destrieux atlas, and the models were adjusted for age, gender, and years of education. Partial correlation analysis was performed for assessing the relationship between cortical thickness and cognitive function.

Results: The results of general linear models showed the differences of cortical thickness in bilateral angular gyrus, left insular gyrus, and right sulcus intermedius primus (Fig. 2). By post-hoc analyses, we found that MCI patients showed significant atrophy in the regions above compared to

controls (Fig. 3). Moreover, in the Ast+ MCI patients, the cortical thickness of left angular gyrus was thinner than other groups (Fig. 3), and it was associated with AD biomarkers and global cognitive function (Table. 1).

Conclusion: Our study showed that astrocyte reactivity could accelerate the atrophy of several regions which were reported to be vulnerable to AD pathology, suggesting astrocyte reactivity as an important upstream event related to cognitive decline.

OR-0037

脑小血管病相关认知障碍患者总负荷评分 与认知储备、认知功能的相关性研究

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目的：在 CSVD 相关认知障碍患者中，探究磁共振 CSVD 总负荷评分与整体及认知域认知功能的相关性，并探索测试认知储备与认知改变之间的关系是否因 CSVD 总负荷程度不同而改变。

方法：共入组 84 例 CSVD 相关认知障碍患者进行分析，均满足 MoCA 量表 <26 分。对患者进行 CSVD 总负荷、认知储备分数和神经心理学量表测试。磁共振 CSVD 总负荷评分包括 CMB、WMH、EPVS 和腔隙灶，总积分范围为 1-4 分。认知储备分数通过纳入文化程度、婚姻伴侣关系、职业成就、身高、每周体育活动时间进行分析，范围为 0-8 分。整体认知测评量表采用 MoCA 评分；各认知域的测评，包括定向力（MoCA 量表的定向力部分）、记忆（费城词语学习训练-12 词）、注意力/执行功能（数字广度测验、语音语义流畅性测验）、视空间结构功能（积木试验）及语言（波士顿命名测验）五个认知域的测评。认知域评分标化为 Z 分数。采用 Spearman 分析 CSVD 总负荷、认知储备分数与认知量表的相关性。选择多元线性回归模型来研究 CSVD 总负荷评分、认知储备与整体和认知域 Z 分数的关联。

结果：。校正人口学因素后，随 CSVD 总负荷评分升高，Z 注意力/执行 ($\beta = -0.197$)、Z 记忆 ($\beta = -0.218$) 及 Z 视空间 ($\beta = -0.220$) 认知域评分下降；随认知储备分数升高，MoCA 评分 ($\beta = 0.638$)、Z 注意力/执行 ($\beta = 0.194$)、Z 记忆 ($\beta = 0.150$) 及 Z 语言 ($\beta = 0.141$) 认知域评分升高 ($P < 0.05$)。将 CSVD 总负荷评分与认知储备分数的交互项代入回归方程，并没有发现交互项与各认知评分存在显著性关联 ($P > 0.05$)。

结论：在 CSVD 相关认知障碍患者中，CSVD 总负荷评分和认知储备是认知功能改变的独立影响因素。同时关注病理性血管性脑损伤和认知储备的概念，对于认识 CSVD 相关认知障碍的发病机制及延缓病程进展具有重要作用。

OR-0038

A Multiparameter Diagnostic Model Based on MRI Volumetric ADC Histogram and Clinical Variables Accurate Differentiate Thymic Epithelial Tumors from Thymic Lymphomas

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Objectives: To evaluated the diagnostic value of multiparameter model based ADC histogram and clinical variables in differentiating TETs and thymic lymphomas.

Methods: The study retrospectively enrolled patients who were admitted to our hospital. ADC histogram data were derived from the whole tumor with ROIs drawn on all slices of DWI scans ($b = 0, 800 \text{ s/mm}^2$). Clinical characteristics and radiological features including ADC histogram metrics were assessed and compared between TETs and thymic lymphomas. Univariate and multivariate analyses were performed to identify the significant variables in two groups, these variables were then incorporated into a comprehensive diagnostic model. ROC curve analysis was carried out to evaluate diagnostic performance. A nomogram was developed to differentiate TETs and thymic lymphomas.

Results: A total of 130 patients were recruited for MRI before surgery or biopsy, including 93 TETs patients and 37 thymic lymphomas patients. At univariate analysis, the age of lymphoma is significantly lower than TETs (53.66 ± 12.99 years vs. 38.11 ± 13.51 years). A significant difference was observed in different symptoms. Elevated serum lactate dehydrogenase (LDH) level ($> 250\text{U/L}$) was more seen in thymic lymphomas. Radiologically, maximal diameter of TETs was significantly lower than thymic lymphomas, ADC histogram parameters, including 25thpercentile, 50thpercentile, 75thpercentile, 90thpercentil, 95thpercentile, ADCmax, ADCmean of thymic lymphomas patients were significantly lower than patients with TETs, while the skewness of patients with lymphomas were statistical higher than that of TETs (all $P < 0.05$). Comprehensive diagnostic model was established based on stepwise regression results which including age, LDH $>250\text{U/L}$ and skewness, the AUC was 0.914 (95%CI: 0.850-0.977). The internal bootstrap resampling and calibration plots demonstrated good consistence between the prediction and observation.

Conclusion: The comprehensive diagnostic model based on ADC histogram parameters and clinical characteristics had excellent value in the differential diagnosis of TETs and thymic lymphomas.

OR-0039

基于多模态磁共振的全流程端对端深度学习模型对经新辅助放化疗的局部进展期直肠癌患者的疗效及预后预测价值

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目的: 治疗反应及预后预测是指导新辅助放化疗方案决策的关键。最近, 新型多模态、多任务深度学习模型被用于各种癌症的肿瘤分割、疗效预测及预后预测, 并取得了良好的性能。本研究旨在评估基于多模态磁共振的全流程端对端深度学习模型对经新辅助放化疗 (nCRT) 的局部进展期直肠癌 (LARC) 患者疗效及预后预测的临床价值。

材料和方法: 本研究回顾性纳入包括三个中心的共 416 例经 nCRT 治疗的直肠癌患者数据, 包括临床信息、基线多模态 MRI 影像 (T2、ADC、D、K) 以及随访生存期数据。其中, 中心一及中心二

的数据合并作为训练和内部验证集 (316 例), 中心三数据作为外部测试集 (100 例)。我们采用深度多任务联合生存模型, 同时进行肿瘤分割、疗效预测和预后预测。这些多任务相互协作, 有助于充分挖掘影像数据和临床数据的关键特征。考虑到多模态输入的情况, 我们引入了注意力机制, 以有效地捕捉模态内部和模态之间的有用信息, 以减少噪声对实验结果的影响。为了应对数据缺失问题, 我们采用了基于掩膜的图网络结构, 以充分利用数据并提高网络的适应性和鲁棒性。最后, 我们使用了不同的评估指标来衡量我们的结果。我们使用 DSC (Dice Similarity Coefficient) 用于评估分割结果; 对于疗效预测结果, 我们考虑了 AUC (Area Under the Curve)、召回率、精确度和准确性; 而对于预后预测结果, 我们使用了 C-index 和 AUC。此外, 我们还使用 Kaplan-Meier 方法来计算高风险和低风险患者的 PFS 率, 并与观察到的 PFS 概率进行比较。

结果: 在训练集、内部验证集及外部测试集中, 模型 DSC 分别为 0.845、0.792 及 0.778; 对于疗效预测结果, 模型 AUC 值在各数据集中分别为 0.982、0.858 及 0.887; 对于预后预测结果, 模型 C-index 分别为 0.822、0.742 及 0.722。

结论: 基于多模态影像的多任务深度学习模型在 LARC 患者中均具有较高的准确性和稳定性, 未来有望实现可实现全自动一站式预测, 为 LARC 患者个性化治疗的提供重要的参考信息。

OR-0040

基于健康志愿者的三种感知磁共振弹性成像系统的比较研究

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背景: 不同的 MR 弹性成像 (MRE) 系统可能会产生不同的肝硬度测量值, 这使得在多中心研究中很难进行直接比较。

目的: 本研究的目的是评估三种不同的 MRE 系统测量的肝硬度的可重复性和偏差。

材料和方法: 从 2023 年 3 月到 2023 年 7 月招募 35 名健康志愿者, 对其进行了三种不同 MRE 设备的扫描。使用相位噪声比和位移噪声比来评估两台气动系统和一台电磁共振成像系统采集的波形图像。两名观察者为组织硬度进行评估。基于每位参与者的平均肝脏硬度对三个 MRE 系统的再现性和偏差进行了量化。使用组内相关系数 (ICC)、变异系数 (CV) 和 Bland-Altman 分析来评估观察者之间的重复性、电磁系统的重复性和系统之间的重复性。采用配对 t 检验来评估电磁系统的观察者间变异和描间变异。最后使用 Dunn 多重比较校正的 Friedman 检验来评估三个系统之间的差异。P 值小于 0.05 表明存在显著差异。

结果: 在三种不同的 MRE 设备上, 肝硬度值在两位观察者之间表现出很高的重复性 ($ICC > 0.8$), 并且没有显著差异 ($CV < 5\%$, P 值 > 0.20)。电磁式驱动的 MRE 在两次重复扫描之间同一志愿者的肝硬度重复性也很高 ($ICC > 0.91$), 且没有显著偏差 ($CV < 4\%$, P 值 > 0.5)。尽管三个 MRE 系统的刚度测量值存在显著差异 (P 值 < 0.01), 但观察到了良好的重复性 ($ICC = 0.78$), 偏差较小 (平均 $CV = 8.2\%$)。

结论: 不同 MRE 系统测量的肝脏绝对硬度值可能存在显著差异, 但三个 MRE 系统的测量结果一致, 具有可重复性且偏差较小。

OR-0041

影像组学在透明细胞型肝癌和普通型肝细胞癌鉴别诊断中的价值

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目的：通过比较逻辑回归模型、影像组学模型和组合模型的诊断效能评估影像组学在鉴别透明细胞型肝癌（primary clear cell carcinoma of the liver, PCCCL）和普通型肝细胞癌（common hepatocellular carcinoma, CHCC）中的临床价值。

方法：回顾性分析术前接受 CT 平扫和增强检查的 42 例 PCCCL 和 109 例 CHCC 患者，将患者按照 2:1 的比率随机分为训练集和验证集，利用训练集患者的临床影像特征建立逻辑回归模型。利用开源 python 平台在训练集患者的图像内获取影像组学表型特征，使用 Metlab 软件（2014 版）提取重复性较好的影像组学表型特征。使用决策树算法得到 4 个单序列影像组学标签，利用向前逐步回归得到最优影像组学融合模型并获取影像组学融合模型标签（Radscore），最后利用逻辑回归筛选出来的临床影像特征和融合影像组学标签构建组合模型。

结果：逻辑回归模型在训练集诊断 PCCCL 和 CHCC 的 AUC 值、敏感度、特异度和准确度分别为 0.797、0.808、0.662 和 0.700；在验证集的 AUC 值、敏感度、特异度和准确度分别为 0.647、0.625、0.600 和 0.608。影像组学融合模型在训练集的 AUC 值、敏感度、特异度和准确度分别为 0.878、1.000、0.703 和 0.780，在验证集的 AUC 值、敏感度、特异度和准确度分别为 0.812、0.688、0.857 和 0.804。组合模型在训练集的 AUC 值、敏感度、特异度和准确度分别为 0.940、1.000、0.757 和 0.820，在验证集的 AUC 值、敏感度、特异度和准确度分别为 0.868、0.688、0.886 和 0.824。

结论：Radscore 是鉴别 PCCCL 和 CHCC 的独立影响因子，三类模型比较结果表明基于临床影像特征和影像组学表型特征构建的组合模型诊断效能最高。

OR-0042

COVID-19 肺部病变短期吸收与否的临床和 CT 影像特征对比及 CT 随访研究

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目的：探讨 COVID-19 肺部病变短期未完全吸收者的临床和 CT 影像特征。

方法：回顾性收集 2020 年 1 月 24 日至 2020 年 3 月 15 日确诊的 COVID-19 患者的临床及影像学资料，并按照出院后第 4 周 CT 随访时肺部病变的吸收情况进行分组。出院后第 4 周随访时，肺病变未完全吸收者纳入 A 组，完全吸收者纳入 B 组。对两组患者的性别、年龄、流行病学史、临床症状、实验室检查结果、CT 表现等进行统计学分析。

结果 1) 分组及一般情况比较：82 例患者纳入研究，A 组 33 例，B 组 49 例。A 组与 B 组的平均年龄分别为 59.5 岁、40.5 岁，差异具有统计学意义。

A 组合并基础疾病者多于 B 组；其中合并高血压者 A 组多于 B 组。

2) 临床症状比较：两组均以咳嗽、发热为常见临床症状。

3) 实验室结果比较：

①入院时，A 组中性粒细胞绝对值、中性粒细胞百分比、ALT、AST、LDH 均高于 B 组；A 组淋巴细胞计数、淋巴细胞百分比、白蛋白、白球比、CD3 计数、CD4 计数、CD8 计数均低于 B 组。

②出院时，A 组白蛋白、CD3 细胞计数均低于 B 组。

4) CT 影像特征比较:

①入院时, A 组左肺上叶、右肺上叶和中叶受累的发生率和累及肺叶总数高于 B 组; A 组实变影、充气支气管征象、胸膜下线的发生率及 CT 积分高于 B 组。

②出院时, A 组左肺上叶和下叶、右肺上叶和下叶及中叶受累的发生率和累及肺叶总数均高于 B 组; A 组磨玻璃影、实变影、条索影、网状影、胸膜下线的发生率及 CT 积分高于 B 组。

③出院后第 4 周随访时, 肺部病变未完全吸收组以磨玻璃影、条索影、胸膜下线为主; 实变影、条索影、网状影、胸膜下线、累及肺叶总数和 CT 积分低于出院时。

结论: 与肺部病变完全吸收者相比, 未完全吸收者多为老年患者, 合并基础疾病者较多, 入院时炎症指标更高, 营养状态较差, 免疫力水平较低; 肺部病变累及范围更大, 实变影较多, CT 积分较高。出现胸膜下线多提示肺部病变不会在短期内完全吸收。

OR-0043

Vertebral and pelvic echinococcosis in northwestern China

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Version:0.9 StartHTML:0000000105 EndHTML:0000004110 StartFragment:0000000141 EndFragment:0000004070 Purpose Echinococcosis remains a major economic and severe public health problem in endemic areas. Bone echinococcosis is rare, and the vertebra and pelvis are the most common sites of echinococcosis involving the skeletal. Because of the clinical severe symptoms and high recurrence rate, it brings excellent trouble to patients. Methods This study retrospectively analyzed the clinical manifestations, laboratory tests, radiological findings, and treatment of 44 patients with vertebral and pelvic echinococcosis during a period of 16 years (2005–2020). Results The mean age was 43 years (25 males, 19 females; 19–68 years). The most common symptom was pain, followed by numbness, weakness, activity limitation, and progressive paraparesis. Enzyme-linked immunosorbent assay test (ELISA) results were positive in 18 cases (75%). There are 24 cases of hydatid infection of the spine, 14 hydatid infection of the pelvis, and six hydatid infection of both vertebra and pelvis. The site of infection was 13 (29.5%) thoracic, five (11.4%) lumbar, four (9.1%) lumbosacral, seven (15.9%) sacral, 19 (43.2%) ilium, seven (15.9%) hip, six (13.6%) ischium, five (11.4%) pubis, and two (4.5%) femur, respectively. The imaging findings were cystic dilatancy, septal, and irregular bone destruction. MRI has a special value in showing the relationship between the surrounding tissues and organs of cystic bone echinococcosis. All patients were followed up for at least one year. The mean follow-up time was 3.6 years. Conclusions Even in epidemic areas, the incidence of bone echinococcosis is relatively rare. However, when encountering the vertebral and pelvic destruction, consider bone echinococcosis's possibility, especially for the herdsmen in endemic regions.

OR-0044

使用放射组学模型进行脑胶质瘤术前分级并与 3DASL 比较

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目的: 构建应用机器学习的放射组学模型进行胶质瘤高/低级别的区分并与 3DASL 比较, 选取更优区分方法。材料与方法: 回顾性分析经病理证实的河北大学附属医院 105 例胶质瘤患者的 MRI T1WI 增强图像, 按照 8: 2 比例分为训练组和验证组, 测试组选取 BraTS 2020 中的 200 例患者, 进行图像分割、提取特征、筛选, 使用 MLP、SVM、RF 及 LR 构建模型并评估模型的预测性能。获取河北大学附属医院的 105 例患者的 3DASL 的平均相对 rCBFmax 值并用于评估高/低级别胶质

瘤的鉴别效能。结果：机器学习中，MLP 分类器模型区分高/低级别胶质瘤性能最好，MLP 的验证组和测试组曲线下面积分别与使用 rCBFmax 的曲线下面积比较结果为 0.968vs.0.815，0.981vs.0.815。与 3DASL 相比，机器学习 MLP 分类器模型区分高/低级别胶质瘤性能更好。结论：应用机器学习的放射组学模型及 3DASL 均对区分高/低级别脑胶质瘤有一定的价值，机器学习 MLP 模型的诊断效能更好。

OR-0045

Evaluating the diagnostic value of different field strengths MRI diffusion-weighted imaging in liver inflammation grading in chronic hepatitis B patients

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Purpose To explore the clinical value of diffusion-weighted imaging (DWI) derived from 3.0 T and 1.5 T MRI in assessing liver inflammation grades in chronic hepatitis B (CHB).

Methods The research was designed by the method of diagnostic test and self-matching. Since August 2019-July 2022, we prospectively recruited 140 consecutive patients with CHB who underwent both 1.5 T and 3.0 T DWI MRI ($b = 800s/mm^2$) at random order within 6 hours before liver biopsy, the interval between two scans was within 15 minutes, the protocol was respiratory-triggered DWI (RT-DWI). The apparent diffusion coefficient (ADC) values near the liver puncture site of the same patient were measured at both field strengths by using the delineation region of interest (ROI) method. With the pathological liver inflammation grade as the gold standard, the patients were divided into the case group ($N=70$, inflammation stage $\geq G2$) and the control group ($N=70$, inflammation stage $\leq G1$), ROC was used to predict the diagnostic power for liver inflammation stages $\geq G2$ of different strengths DWI MRI for the same CHB patient.

Results The area under curve (AUC) of 3.0 T DWI MRI in predicting liver inflammation stages $\geq G2$ was 0.913 in CHB patients, the sensitivity and specificity was 85.7 % and 80 %, the cutoff value of $ADC = 1.16 \times 10^{-3} mm^2/s$, meanwhile the AUC of 1.5 T DWI MRI in predicting liver inflammation stages $\geq G2$ was 0.880, the sensitivity and specificity was 78.6 % and 88.6 %, the cutoff value of $ADC = 1.19 \times 10^{-3} mm^2/s$.

Conclusion When using DWI to evaluate the liver inflammation stage non-invasively, if the measured ADC values of 3.0 T DWI MRI $\leq 1.16 \times 10^{-3} mm^2/s$ or the measured ADC values of 1.5 T DWI MRI $\leq 1.19 \times 10^{-3} mm^2/s$, the accuracy of predicting liver inflammation stage $\geq G2$ in CHB patients is high, and antiviral therapy should be actively performed.

OR-0046

CT 在鉴别异位 ACTH 综合征患者肺部神经内分泌肿瘤和肿瘤样肺部感染中的作用

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目的：肺神经内分泌肿瘤（NEN）是异位促肾上腺皮质激素综合征（EAS）最常见的病因，且 EAS 患者肺部感染的发生率较高。在某些情况下，EAS 患者感染的影像学表现可能会类似 NEN，并导致不必要的手术。然而，迄今为止，对 EAS 相关肺部影像学表现的研究，特别是对胸部 CT 影

像诊断价值的研究有限。本研究拟通过回顾性分析北京协和医院近 20 年来明确诊断因肺部 NEN 导致 EAS 或 EAS 伴类肿瘤样肺部感染的患者的临床及胸部 CT 影像学特征,以探索引起 EAS 的肺部 NEN 的典型临床及 CT 影像学特征,并筛选哪些特征可以帮助鉴别肺部 NEN 和类肿瘤样肺部感染。

方法:本回顾性研究共纳入 59 名明确诊断为 EAS 的患者(45 名肺部 NEN 患者和 14 名类肿瘤样肺部感染的患者),共 72 个肺部病变(45 个肺部 NEN 和 27 个类肿瘤样肺部感染病灶)。分别比较两组患者的临床表现、血液生化学指标、放射科医师定义的胸部 CT 影像学特征、生长抑素受体闪烁扫描(SRS)结果、18F-FDG PET/CT 结果、68Ga-DOTATE PET/CT 结果以及病理结果。

结果:肿瘤样感染组高敏 C 反应蛋白(hs-CRP, $P<0.001$)和咳痰发生率($P=0.04$)高于肺部 NEN 组,指氧饱和度($P=0.01$)低于肺 NEN 组。本研究中肺 NEN 均为孤立性原发性肿瘤,80% 为周围性肿瘤。与肿瘤样感染组相比,肺 NEN 组的血管贴边征和气道受累更为常见(P 均 <0.001)。肿瘤样感染组的多灶性($P=0.001$)和外周性($P<0.022$)病变、空洞($P<0.001$)、毛刺($P=0.01$)、胸膜牵拉凹陷($P<0.001$)、与肺静脉相连($P=0.023$)和伴有远端肺不张或炎性渗出征象($P=0.001$)更为常见。肺 NEN 组的 CT 增强幅度明显高于肿瘤样感染组($P<0.001$);受试者操作特征曲线(ROC)分析表明,在 ΔCT 值为 48.3 HU 时具有中度预测能力(敏感性=95.0%,特异性=54.1%)。

结论:胸部 CT 扫描有助于准确定位和表征 EAS 的肺部病变,从而能够帮助临床医师积极寻找导致 EAS 的靶病灶,并能更及时地对 EAS 进行鉴别诊断和有效的临床治疗。

OR-0047

AIDS 并发肺结核的临床影像表现分析

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目的 探讨艾滋病合并肺结核与正常免疫肺结核的临床影像表现,提高对艾滋病合并肺结核的认识。方法 回顾分析 2018 年 10 月~2020 年 9 月本院诊治的 142 例艾滋病合并肺结核(观察组)及 150 例非艾滋病患者肺结核(对照组)临床及胸部影像表现。结果 观察组在发热 93.7%、呼吸困难 36.6%、乏力 78.9%、纳差 79.6%、体质量下降 74.6%、头痛 18.3%、腹泻 14.8%、视物模糊 7.7%、尿路刺激征 7.7%,合并其他肺部感染 35.9%,合并肺外结核 29.6%,均多于对照组,两组比较差异有统计学意义($P<0.05$)。痰图片及痰培养阳性率 16.9%,PPD 试验阳性率 10.6%,对照组分别为 38%、78.7%,两组比较差异有统计学意义($P<0.05$)。观察组死亡率为 8.5%,对照组 2.7%,两组比较差异无统计学意义($P>0.05$)。影像表现:观察组以 II 型(14.8)、IV 型(44.4%)、V 型(29.6%)较多,病灶位于中下肺 62.0%,累及 3 叶以上 51.4%,均多于对照组($P<0.05$)。观察组肿大淋巴结增环形强化 35.7%(10/28),对照组环形强化 70.6%(12/17),两组比较差异有统计学意义($P<0.05$)。结论 艾滋病合并肺结核患者病情严重,临床表现不典型,容易合并多种机会性感染,影像表现复杂多样,当艾滋病患者出现全身多发症状,CT 表现为大片实变、空洞、粟粒结节、淋巴结肿大及胸腔积液时应考虑到艾滋病合并肺结核的可能。

OR-0048

造血干细胞移植后肺孢子菌肺炎 与巨细胞病毒肺炎的 CT 影像对比

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目的 肺孢子菌肺炎（PJP）与巨细胞病毒肺炎（CMVP）是造血干细胞移植（HSCT）后的常见肺部并发症，临床特点相似，但治疗方式迥异，早期鉴别具有重要临床意义。胸部 CT 是 HSCT 患者肺部感染并发症的重要诊断手段，本文目的是比较 HSCT 后 PJP 与 CMVP 的影像学特点，为早期鉴别诊断提供依据。

方法 回顾性分析 HSCT 后 21 例 PJP 患者的胸部 CT 影像学资料。计算 CT 中病变的总严重程度评分（TSS），每个肺叶按病变累及范围评分，0 分：0%；1 分：1-25%；2 分：26-50%；3 分：51-75%；4 分：76-100%，全肺总分 0-20 分。再将主要病变分为实变、磨玻璃影、结节，分别计算三种病变的 TSS。此外选取 26 例 CMVP 患者作为对照组，对比其影像学特征。

结果 PJP 患者出现实变、磨玻璃影、结节者分别 11（52.4%）、17（81.0%）、8（38.1%）例，CMVP 患者出现实变、磨玻璃影、结节者分别 13（50.0%）、20（76.9%）、14（53.8%）例，两组间无明显统计学差异（ $P=0.871$ ， $P=0.737$ ， $P=0.282$ ）。磨玻璃影中弥漫分布者，PJP 组 7（41.2%）例，CMVP 组仅 1（5%）例，有明显差异（ $P=0.027$ ）。结节中表现为弥漫微结节者，PJP 组未出现，CMVP 有 5（19.2%）例，组间差异明显（ $P=0.034$ ）。PJP 组出现肺气肿者 4（19.0%）例，CMVP 组未出现，有统计学差异（ $P=0.020$ ）。PJP、CMVP 的平均 TSS 总分分别约 12.8 ± 6.2 、 11.3 ± 6.2 ，差异不明显（ $P=0.418$ ）。与 CMVP 组相比，PJP 组磨玻璃影评分较高（ 11.2 ± 7.6 ， 5.9 ± 5.2 ， $P=0.010$ ），结节评分较低（ 1.9 ± 4.4 ， 6.1 ± 7.9 ， $P=0.027$ ），实变评分无明显差异（ 2.1 ± 2.6 ， 2.3 ± 3.4 ， $P=0.814$ ）。

结论 HSCT 后 PJP 与 CMVP 的主要影像学表现均为实变、磨玻璃影、结节，但 PJP 的磨玻璃影分布更广泛，结节分布相对较少。PJP 中出现肺气肿，CMVP 中出现弥漫微结节，分别为特异性征象，有助于早期诊断。

OR-0049

基于双模态 MRI 的影像组学分析 在 HIV 相关神经认知障碍早期诊断中的研究

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背景 HIV 相关神经认知障碍综合征（HAND）损害患者认知功能，给家庭和社会带来沉重负担。cART 时代，HAND 中无症状神经认知损伤期（ANI）居主导地位，目前 HAND 诊断依赖神经认知量表，耗时长，亟需探寻客观精准的 ANI 期诊断替代指标。

目的 探讨基于双模态 MRI 的影像组学对 HAND 早期（ANI 期）的诊断价值。

方法 基于 Frascati 标准筛选入组 138 名无症状 HIV 感染者（PLWH），其中 68 人为无认知缺损组，70 人为 ANI 组，招募 70 名匹配的健康对照组；将三组受试者进行双模态 MRI（sMRI、DTI）扫描，并对 DTI 和 sMRI 数据进行 TBSS、皮层厚度的差异分析。针对 sMRI、DTI 计算出的差异脑区（右侧额内侧回、右侧额中回、左侧颞横回、胼胝体）及先验脑区（纹状体、丘脑）选取五组不同的感兴趣区（ROI）。ROI-1：右侧额内侧回、右侧额中回、左侧颞横回、纹状体、丘脑及胼胝

体, ROI-2: 纹状体+丘脑+胼胝体, ROI-3: 纹状体、胼胝体, ROI-4: 纹状体, ROI-5: 胼胝体。提取 ROI 的 sMRI 影像组学特征, 按照 7: 3 将三组受试者分为训练集和测试集, 基于 sMRI 提取的影像组学特征及临床特征, 利用 LR 和 SVM 分类器构建诊断模型并测试, 基于五组不同 ROI 区域影像组学特征模型的识别表现, 获取最优识别 PLWH 以及识别 PLWH 中 ANI 组的模型, 基于健康对照组与 PLWH 组、PLWH 中无认知缺损组与 ANI 组分别构建二分类模型 Model-A1, Model-A2, 基于健康对照组、无认知缺损组与 ANI 组构建三分类模型 Model-A3。

结果: Model-A2 在利用 ROI-4 (纹状体) 的影像组学特征构建模型时, 识别 PLWH 中的 ANI 期表现最优, 在测试集 AUC 为 0.80。Model-A1、Model-A3 均在利用 ROI-5 (胼胝体) 影像组学特征构建模型时表现最优, 在测试集中, Model-A1 的 AUC 为 0.87, Model-A3 的 AUC 为 0.76。

结论: 基于双模态 MRI 的影像组学模型对识别 HAND 早期 (ANI 期) 患者具有较高的准确性, 为 HAND-ANI 期的早期诊断提供了科学依据。

OR-0050

PET/CT 在感染与炎症中的临床应用

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正电子发射计算机断层显像 (positron emission tomography and computed tomography, PET/CT), 突破了常规医学影像的范畴, 提高了对全身疾病的诊断与鉴别诊断能力。在近二十多年的时间, PET/CT 已成为医学诊疗中强大的检查手段。然而, 因 PET/CT 在肿瘤, 特别是恶性肿瘤局部及全身评估中不可替代的作用, 难免让我们忽视了其在肿瘤以外的价值。实际上, 由于 PET/CT 的应用积累, 它在其他领域的作用越来越受到重视, 其中, PET/CT 在感染与炎症的应用最为广泛和重要, 但相关总结及阐述缺乏系统性。

本文聚焦于 PET/CT 在感染与炎症方面的临床应用, 涉及日常工作中常见的不同系统来源的感染和炎症, 同时也覆盖了对不明原因发热、结核、艾滋病、假体关节及血管移植物来源的特殊感染与炎症性疾病。同时探讨 PET/CT 检查对诊断胸部感染性疾病的优劣势及应用前景。相信本文能够为大家学习和掌握 PET/CT 在感染与炎症性疾病中的应用提供一定帮助。

OR-0051

Changes in White Matter and Neurophysiology in HIV Patients with Different Cognitive Functions after 1-2 years of Follow-up

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Background: HIV patients may have HIV-associated neurocognitive disorder (HAND), cognitive function decline and white matter microstructure changes, which can be observed by diffusion tensor imaging (DTI) and neuropsychological test. Patients with symptomatic neurocognitive impairment (ANI) and peoples living with HIV (PLWH) without cognitive impairments received special attention.

Methods: 26 male HIV-patients with ANI and 26 male peoples living with HIV (PLWH) after highly active antiretroviral therapy (HAART) were included in this study, including clinical information collection, DTI and neuropsychological test, which were divided into baseline period and follow-up period, with an interval of 1-2 years (an average of 1.66 years). DTI post-processing is based on track based spatial statistics (TBSS).

Results: There were differences in clinical and neuropsychological data between the two groups during the baseline and follow-up periods ($P<0.05$). There were differences in DTI parameters between the baseline and follow-up periods in both the ANI group and the PLWH group, and some brain regions with differences were correlated with neuropsychological results.

Conclusion: Regardless of the cognitive level, after HAART treatment, the cognitive level of HIV patients may still decline and slight white matter damage, and the patients with lower cognitive level may be more obvious.

OR-0052

不同 Child-Pugh 分级肝硬化患者 并发新冠病毒肺炎后胸部 CT 表现

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目的 探讨不同 Child-Pugh 分级肝硬化患者并发新冠肺炎后的胸部 CT 表现差异。**方法** 回顾性分析 2022 年 11 月-2023 年 3 月收治的 58 例并发新冠病毒肺炎的肝硬化患者胸部 CT 影像学资料, 根据 Child-Pugh 评分进行分级后将患者分为 A、B、C 三组, 总结其胸部 CT 特点, 比较三组患者间影像学表现差异。**结果** 依据 Child-Pugh 评分结果, A、B、C 三组患者分别为 12 例、23 例、23 例; B 组患者年龄高于 A、C 组 ($P<0.05$), 性别及肝硬化病因三组间无统计学差异 ($P>0.05$); 三组患者胸部 CT 共性表现为分布于胸膜下为主的斑片/片状磨玻璃影和/或实变影, 双肺多发 (98.3%); 三组患者胸部 CT 所示的病灶分布、肺叶受累、病灶密度、病灶特征、肺外伴随征象均无统计学差异 ($P>0.05$); C 组患者病灶的 CT 严重度评分较高, 与 A 组差异有统计学意义 ($P<0.05$)。结论 并发新冠肺炎的不同 Child-Pugh 分级肝硬化患者间胸部 CT 表现并无显著差异, 但 Child-Pugh 评分为 C 级的患者肺部炎症倾向表现为更大的受累范围。

OR-0053

HIV 患者无症状神经认知障碍 相关神经机制的多参数 MR 成像研究

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目的: 探索基于多参数 MR 的 HIV 患者无症状神经认知障碍 (ANI) 全脑功能和结构变化特征, 为 ANI 的早期诊断和神经机制的研究提供依据。

方法: 共招募 151 名 HIV 患者和 70 名健康人 (HCs) 进行神经认知测试、静息态功能磁共振、3D-T1 成像和弥散张量成像扫描。最终共纳入 44 名 ANI 患者和 47 名 HCs。1. 区域同质性 (ReHo) 用来评估全脑自发性神经元活动。2. 独立成分分析 (ICA) 评价全脑 13 个网络间功能连接 (FC) 的差异。3. 基于体素的形态学测量 (VBM) 和表面的形态学测量 (SBM) 对灰质体积和皮质厚度进行分析。4. 采用纤维束示踪空间统计分析 (TBSS) 探究白质纤维束各向异性分数 (FA)、平均弥散系数 (MD)、轴位弥散系数 (AD) 和垂直弥散系数 (RD) 变化。

结果: 1. ANI 组右侧舌回、左侧枕中回、双侧枕上回、右侧额中回、小脑蚓部 ReHo 降低, 左侧额中回和左侧脑岛 ReHo 增加; 左侧额中回与语言表现呈负相关; 左侧脑岛与病程呈正相关; 右侧舌回与抽象与执行功能呈正相关。2. ANI 组突显网络和外侧视觉网络、内侧视觉网络 FC 降低; 突显网络和内侧视觉网络 FC 降低与 CD4、CD4/CD8 比值呈负相关。3. ANI 组右侧小脑 Crus2 区、左侧额

下回三角部、右侧角回灰质体积降低,左、右侧楔前叶灰质体积增加,右侧海马旁回、左侧梭状回和颞下回皮层厚度增加。左侧楔前叶灰质体积与工作记忆呈负相关;右侧楔前叶灰质体积与 CD4、CD4/CD8 比值呈负相关;右侧海马旁回皮层厚度和 CD4/CD8 比值呈正相关。4. ANI 组双侧丘脑前辐射、双侧皮质脊髓束、双侧扣带回、双侧额枕下束、双侧上、下纵束、双侧钩状束、额钳、枕钳 FA 降低、RD 增加;ANI 组左侧丘脑前辐射、左侧扣带回、左侧额枕下束、左侧上纵束、左侧钩状束 MD 增加;FA 值和精细运动呈负相关;MD 值和精细运动、语言表现呈正相关;RD 值和精细运动呈正相关。

结论: 1.视觉网络改变可能是 ANI 最具代表性的特征。2.免疫指标和 ANI 脑结构功能改变密切相关。3.TBSS 方法可能对探测 ANI 较为敏感。4.ANI 主要累及患者的感知皮层系统,而联合皮层系统受累较轻。

OR-0054

HIV 感染伴无症状神经认知障碍的脑体积改变及肠道菌群特征

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目的 探讨 HIV 感染伴无症状神经认知障碍 (asymptomatic neurocognitive impairment, ANI) 的脑体积改变及肠道菌群特征。

方法 选取 52 例 HIV 感染者,经一系列神经认知量表评估,以 26 例伴无症状神经认知障碍的 HIV 感染者 (HIV-ANI) 为观察组,以 26 例认知功能正常的 HIV 感染者 (HIV with cognitive integrity, HIV-CI) 为对照组,此外招募 26 例年龄、性别、教育背景匹配的健康志愿者为健康对照组 (healthy control, HC)。对受试者进行 3D T1WI 的脑影像数据采集及 AccuBrain 自动分割和提取大脑结构的体积,并取受试者粪便样品进行 16SrRNA 基因测序技术分析,比较三组肠道菌群的组成及其丰度差异,采用 Pearson 相关性分析评估脑容量参数与肠道菌群特征的相关性。

结果 与 HIV-CI 和 HC 相比, HIV-ANI 患者双侧尾状核和侧脑室的相对体积存在显著差异,肠道菌群显著改变 (Adonis test, $P=0.02$), 主要表现 HIV-ANI 组患者在 Eubacterium、cCoproductus、Eisenbergiella、Aggregatibacter、Hungatella、RuminococcaceaeUCG_010、Pseudarthrobacter、Barnesiella、Ruminiclostridium 6、Alistipes 等属细菌的富集 ($P < 0.05$), 和 Desulfovibrio 属菌的减少 ($P < 0.05$)。HIV-ANI 患者双侧尾状核的相对体积与 Eubacterium 的细菌数呈正相关。

结论 HIV 感染可诱导肠道菌群结构失衡,而肠道菌群失调可能与 HIV 感染早期的神经认知功能障碍的发生及发展相关。

OR-0055

艾滋病合并原发性甲状腺淋巴瘤病例报道

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本文报道 1 例艾滋病合并原发性甲状腺弥漫大 B 细胞淋巴瘤影像表现及诊治过程。患者,女,67 岁,颈部包块伴呼吸困难 5 月余入院,患者 HIV 感染 7 年,既往有桥本氏甲状腺炎病史。超声提示甲状腺左叶边界清楚低回声巨大包块,大小 74mm×45mm,CT 提示甲状腺低密度肿块,增强扫描肿块无强化,肿块上极可见粗大血管穿行,正常甲状腺组织受压呈线状明显强化。经皮穿刺活检确诊弥漫性大 B 细胞淋巴瘤。行 R-CHPEP 方案化疗,化疗 5 天后,肿块明显缩小。弥漫性大 B 细胞

淋巴瘤被定义为艾滋病相关性肿瘤，桥本氏甲状腺炎也为原发性甲状腺淋巴瘤发生的危险因素，后者在影像表现上可分为实性结节型、多发结节型和弥漫型，经皮穿刺活检有助于诊断。

OR-0056

Analysis of Acute Adverse Reactions Caused by CT Contrast Medium: A Retrospective Study of 72556 Patients

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Objective: To determine the correlation between age, sex and iodinated contrast medium (ICM) and acute adverse reactions (ARs) in patients who underwent contrast-enhanced CT examinations.

Methods: We retrospectively collected and analyzed the age, sex, type of ICM and severity of ARs in patients who underwent contrast-enhanced CT at our institution from August 1, 2020, to June 30, 2021. Univariate and multivariate logistic regression were performed to determine the independent risk factors for ARs.

Results: A total of 166 of 56752 patients experienced acute ARs (0.29%). The age (48 vs. 56, $p < 0.001$), sex (female vs. male=45% vs. 55%, $p < 0.001$) and Iohexol (0.41%, $p = 0.005$) were significantly different between the AR group and the non-AR group. Multivariate regression analysis revealed that younger age (OR=0.974, 95% CI: 0.965-0.983), female sex (OR=1.713, 95% CI: 1.255-2.340) and Iohexol (OR=1.590, 95% CI: 1.139-2.221) were independent risk factors for ARs. There were significant differences in AR incidence among different age groups and different ICM ($p < 0.001$). Adverse reaction occurred mostly in the 30-39 age group (0.61%) and mostly in the Iohexol group (0.41%). However, AR types and severity showed no significant relation with age, sex, and type of ICM.

Conclusion: ARs were associated with age, sex, and the type of contrast media. Younger and female patients who used Iohexol had a relatively higher risk of developing acute adverse reactions.

OR-0057

钆对比剂在小鼠体内不同组织沉积的研究

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目的 研究钆对比剂在小鼠体内不同组织的沉积，评价钆沉积的潜在毒性作用。

方法 实验(一): 对小鼠注射不同类型 GBCAs，在不同时间点进行钆滞留检测、痛觉、组织学、血常规和血生化检测。将 240 只 ICR 小鼠随机分为 5 组 (n=48/组)，4 次/周、连续 5 周以 2.5 mmol Gd/kg 的剂量静脉注射 GBCAs (钆喷酸葡胺、钆特酸葡胺、钆双胺、钆布醇) 或生理盐水。分别在 0、6、10 周进行热痛觉检测、机械痛觉检测、血液学检测及病理检测；在第 4、6 和 10 周采用 ICP-MS 测小脑、神经、肝脏、肾脏、皮肤、骨骼中的钆浓度。实验(二): 由于在实验(一)中我们发现仅钆双胺组的数只小鼠出现尾部皮肤的溃烂。对小鼠 (48 只/组；共 5 组) 进行尾静脉注射不同类型的 GBCAs 或生理盐水，以 5 mmol Gd/kg 的浓度每周注射 5 次，共注射 5 周。观察小鼠尾部皮肤等状态变化，在相应的时间点进行钆滞留检测、痛觉测试、组织学、血常规和血生化分析。

结果 实验一: 1. 在第 6 周时，钆双胺组小鼠发现肾小球结构相对完整的基础上，肾小管上皮细胞出现明显的空泡状变化，第 10 周时此变化消失。2. 第 6 周时，线性 GBCAs 明显诱导了热痛觉过敏，再经过 4 周的恢复，钆双胺组仍然显著引起热痛觉过敏，而钆喷酸葡胺组恢复至基线水平。3. 线性 GBCAs 组在第 6 周 WBC 显著的升高，在第 10 周时恢复正常。实验二: 1. 钆双胺组在注射 4-

5 周期间出现了 6 只小鼠尾部的溃烂，溃烂部位可见鳞状上皮缺失伴坏死及炎性渗出，溃疡形成，病变部位外观及组织病理检查改变在 5 周内逐渐恢复。

结论 1. 线性 GBCAs 在组织中表现出更多的钆滞留，可引起白细胞一过性的升高，诱导小鼠的热痛觉过敏，其中钆喷酸葡胺组可恢复。3. 注射钆双胺可导致小鼠尾部注射部位的皮肤溃烂、肾小管上皮细胞的一过性空泡变化。

OR-0058

老年高血压患者冠脉 CTA 检查注射非离子型碘对比剂血流动力学变化特征分析

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目的：观察老年高血压患者冠脉 CTA 检查注射非离子碘对比剂血流动力学效应，为进一步解释指南中提出注射对比剂后可能引起高血压急症的生理反应是否与血流动力学变化有关提供依据。

方法：采用便利抽样法，选择老年非高血压与高血压冠脉 CTA 检查患者共 64 例，其中非高血压患者 32 例、高血压患者 32 例。持续无创测量从注射前 1 分钟到注射后 30 分钟内 6 个时间点的血流动力学数据，包括 SBP, DBP, MAP, HR, SVR, CO, SV。

结果：注射碘普罗胺后，组内比较：非高血压组：SBP：除 5 分钟外，其余各时间点测值和注射前有统计学差异；DBP：10、15、30 分钟测值和注射前测值有统计学差异。MAP：10、15、30 分钟测值和注射前测值有统计学差异。HR：注射过程中测值和注射前测值有统计学差异。CO：注射过程中、5、30 分钟测值和注射前测值有统计学差异。SVR：注射过程中、5、10、15 分钟测值和注射前测值有统计学差异。高血压组：SBP：注射过程中、5、30 分钟测值和注射前测值有统计学差异。HR：注射过程中、30 分钟测值和注射前测值有统计学差异。SV：注射过程中、5、10 分钟测值和注射前测值有统计学差异。CO：注射过程中、5 分钟测值和注射前测值有统计学差异。SVR：各时间点测值和注射前测值有统计学差异。除上述描述外，其余组内测值比较均无统计学差异。2 组所有指标的变化曲线趋势基本一致，除 SVR 呈短暂下降后再回升，30 分钟未恢复到基线水平之外，其余指标均呈短暂升高后再回落至基线水平的趋势。

结论：2 组患者注射非离子对比剂后血流动力学指标的变化曲线趋势基本一致，均在标准范围内波动，服药控制良好的高血压组较非高血压组引起更为明显的血流动力学变化。临床中应该重点关注血压控制不良患者注射对比剂后的血流动力学变化，防止高血压急症的发生。

OR-0059

双低剂量联合 KARL 3D 技术在肺动脉 CTA 中的应用

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目的：探讨低管电压和低对比剂总量联合双域迭代重建降噪算法（KARL 3D）技术在肺动脉 CT 血管造影中的临床应用价值。

方法：选取 60 例疑诊为肺动脉栓塞的患者作为研究对象，随机分成 A、B、C、D 四组，每组 15 例。使用联影 640 层螺旋 CT（uCT960+）应用 KARL 3D 技术，A 组管电压为 120 KV，常规造影剂总量（60-80 mL 碘佛醇）；B 组管电压为 100 KV，常规造影剂总量（60-80 mL 碘佛醇）；C 组管电压为 120 KV，低造影剂总量（20-30 mL 碘佛醇）；D 组管电压为 100 KV，低造影剂总量（20-30 mL 碘佛醇），对比四组的 CT 扫描结果：CT 值、有效辐射剂量、噪声值、信噪比、对比噪声比和图像质量评分，并进行统计学分析。

结果: B 组的 CT 值最高, C 组最低。B、D 组的有效辐射剂量比 A、C 组下降约 67.4 %, 差异有统计学意义($P < 0.05$); 噪声值方面, D 组最高, A 组最低, B 组高于 C 组, 各组间差异均有统计学意义($P < 0.001$); 信噪比、对比噪声比和图像质量评分方面, B 组最高, C 组最低, A 组高于 D 组, 各组间差异均有统计学意义($P < 0.05$)。

结论: 四组中扫描方案图像质量最高的是 B 组, 但考虑到辐射剂量危害和使用碘对比剂的肾毒性危害, 最理想的扫描方案为 D 组: 低管电压和低对比剂总量。D 组扫描方案联合 640 层螺旋 CT 的 KARL 3D 技术在进行肺动脉 CT 血管造影时, 虽然信噪比有所减低, 但成像效果相差无几仍能满足临床诊断需求, 且同时降低了辐射危害和碘对比剂的肾毒性危害, 且不良反应少, 具有临床推广的价值。对于患有严重心脏病的患者, 应使用较多的对比剂总量进行个性化扫描。

OR-0060

Biomaterialized Gadolinium-cerium metal-doped nanoparticles with High relaxation rate for enhanced MRI

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Background and purpose: Paramagnetic Gadolinium-based contrast agents (Gd-CAs) have been widely used in MRI examinations. However, emerging evidence has documented their long-term deposition in the body, leading to uncertain biosafety risks. Current challenges of existing Gd-CAs call for the development of high relaxivity CAs allowing minimal dose.

Method: In this study, a novel paramagnetic nanoparticle (CeGd@BSA) was synthesized by biomaterialization method. Subcutaneous tumor mouse models were established and intravenously injected with CeGd@BSA (15 mg/kg) or Magnevist (control group). Then dynamic MR imaging was performed at the scheduled time-points, with the contrast to noise ratio (CNR) of tumors monitored. Next, swine models were used and received MR angiography after intravenous injection at doses of 0.07 mg per kg body weight to validate its efficiency and biosafety in large animals. To investigate the retention of CeGd@BSA, brains of rats receiving 4 injections of either CeGd@BSA, Magnevist, or saline, were sampled to determine the Gd contents via inductively coupled plasma mass spectrometry (ICP-MS).

Result: The prepared NPs exhibited an ultra-high T1 relaxivity of above $80 \text{ mM}^{-1} \text{ s}^{-1}$, which was significantly higher than Magnevist. After intravenously injection, CeGd@BSA NPs demonstrated superior T1 enhancement effect and contrast-to-noise ratio in tumors than Magnevist. In swines, the 3D reconstructed images of MRA exposed an explicit depiction of whole-body vessels. Interestingly, the Gd dose in the CeGd@BSA group was a thousandth of the standard dose of Magnevist. After 4 doses of administration, magnevist caused gadolinium retention in the DCN, pons, and striatum. Whereas, no gadolinium retention was observed after CeGd@BSA injection.

Conclusion: In summary, this study proposes a promising MR CAs candidate for low-dose enhanced MRI with the advantages of ultra-high T1 relaxivity, high water solubility, and biocompatibility.

OR-0061

Conventional pituitary MRI radiomics feature improves diagnostic performance between growth hormone deficiency and idiopathic short stature

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Background and Aims: In clinical practice, growth hormone deficiency (GHD) and idiopathic short stature (ISS) are characterized by short stature. Apart from invasive growth hormone stimulation tests, there is a lack of stable and reliable diagnostic tools. We plan to develop and validate a clinical-radiomics model based on clinical indicators and conventional pituitary magnetic resonance imaging (MRI) data to improve the noninvasive diagnosis of GHD.

Methods: In this cross-sectional study, a retrospective cohort (4-12 years) of 297 GHD children and 300 ISS children were included in the analysis. All participants underwent sagittal pituitary T1-weighted MRI scan and blood testing, and were divided into training and validation sets respectively (randomized in a ratio of 7 to 3). A total of 2264 radiomics features were extracted from the MRI images of the anterior pituitary gland and a radiomics model was subsequently constructed through the utilization of Least Absolute Shrinkage and Selection Operator (LASSO) regression analysis. The hematological biomarkers were selected to create a clinical diagnostic model and were included in the combined clinical-radiomics model. In addition, an external validation dataset with 100 children was employed in evaluating the stability of the constructed Integrated model. The area under the curve (AUC) and Delong test were used to assess the diagnostic performance of models.

Results: Seventeen radiomics features were selected for constructing radiomics model, while total protein, total cholesterol, and triglyceride were utilized for clinical model. The diagnostic performance of the combined model (AUC = 0.82) was found to be comparable to that of the radiomics model (AUC = 0.81, $p = 0.122$), with both models surpassing the clinical model (AUC = 0.58, $p < 0.0001$). Similar findings were observed in the internal validation cohort, with the combined model exhibiting an AUC of 0.80. Notably, in the external validation cohort, the combined model displayed the highest performance (AUC = 0.76) among all models (all $p < 0.05$).

Conclusion: Incorporating clinical indicators and conventional pituitary MRI data into a clinical-radiomics model improved the diagnostic performance of GHD.

OR-0062

Structural covariance network alterations associated with motor controlling in preterm and full-term children with periventricular leukomalacia

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Objective To compare grey matter (GM) volumes and graph theory parameters of the motor covariance network between children with PVL and healthy controls, and between preterm and full-term patients.

Methods T1-weighted 3T brain MRI data were collected from 42 patients with PVL and 38 age- and gender-matched healthy children. According to gestational age, the patient group was stratified into the premature PVL group (pPVL, $n=27$) and the full-term PVL group (fPVL, $n=15$). Voxel-based morphometry (VBM) was employed to compare global structural volumes and regional grey matter

(GM) volumes between groups. For multiple comparison correction, family-Wise Error (FWE) and Monte Carlo z-field simulation were applied, setting $p < 0.05$ (2-tailed) as a threshold.

The quantification of structural connection strength between pairs of grey matter areas was conducted using structural covariance analysis. Connectivity strength among motor-related cortex-basal ganglia nuclei-cerebellum regions was compared with connectivity strength between 5,000 sets of randomly chosen regions. Graph theory was applied to analysis the motor covariance network. All participants underwent Gross motor function assessment (GMFM) and fine motor function assessment (FMFM).

Results Compared to the HC, GM volume loss of bilateral thalamic was observed in pPVL ($p < 0.001$), whereas only left thalamus in fPVL ($p < 0.001$). Structural covariance in both pPVL and fPVL groups was significantly weaker between thalamus and other chosen regions, including motor cortex and cerebellum, when compared with the HC group ($P < 0.001$). Conversely, both the pPVL and fPVL groups had significantly stronger structural covariance than the HC group in regions between the motor cortex and cerebellum ($P < 0.001$). The pPVL group performed abnormal global network parameters, whereas the fPVL group did not. Increased nodal local efficiency in basal ganglia nuclei was observed in both pPVL and fPVL group. In pPVL, several regions including left postcentral gyrus, bilateral superior parietal lobule were lost hubs, and left putamen was reconfigured hub. In fPVL, left postcentral gyrus and right superior parietal lobule were lost hubs. Right precentral gyrus and right paracentral lobule were reconfigured hub. Gross motor function scores were associated with thalamus volume in both pPVL and fPVL groups.

Conclusion These results elucidate altered structural covariance of the motor network in pPVL and fPVL, and basal ganglia nuclei, especially the thalamus, may play an important role in modulating motor control in early stages, indicating the potential association between motor performance and motor network alterations in the rehabilitation process.

OR-0063

Alterations of white-matter functional network in children with drug refractory temporal lobe epilepsy: A Graph-Theoretical Study

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Epilepsy is a brain disorder consisting of abnormal electrical discharges of neurons resulting in epileptic seizures that affects more than 10.5 millions children worldwide. A severe impairment of cognitive function characterizes drug refractory temporal lobe epilepsy (DRTLE) thus, the early diagnosis of DRTLE is very important. However, it is not clear whether there are white matter (WM) alterations in children with DRTLE. With confirming evidence that resting-state functional magnetic resonance imaging (rs-fMRI) of brain white matter (BWM) signals can effectively describe neuronal activity, this study investigated the interactions among BWM functional networks in DRTLE relative to healthy controls (HCs). Hence, this study was aimed to comprehensively analyze the topological properties of WM functional networks among children with DRTLE. We apply a region growing method to defined Node in WM functional networks, The correlation matrix for each participant was constructed by Pearson's correlation coefficient between averaged BOLD signals of paired nodes. Global and nodal topological properties were assessed based on the weighted WM functional networks. Independent samples t-test was used for comparisons of global topological properties and nodal topological properties between groups. The correlation between the altered WM functional network topological properties and neuropsychological tests were analyzed using spearman's correlation analysis ($p < 0.05$). As compared to the HCs group, the Network efficiency in DRTLE group was significantly decreased. Compared with the HC group, The DRTLE group showed significantly lower nodal clustering coefficient in 22 nodes, and higher nodal clustering coefficient in 1 node. The DRTLE group showed

significantly lower nodal local efficiency in 21 nodes. The DRTLE group correlated with duration, processing speed, working memory, and Full-scale Intelligence quotient(all $P < 0.05$). These findings may aid a new perspective for a deeper comprehension of the neuropathological mechanisms underlying this disease.

OR-0064

The associations of MRI-based proton density fat fraction of liver and vertebral marrow with common data acquired from physical examinations in children with obesity

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Objectives To investigate the associations of PDFFs in liver and vertebral marrow with common data in children with obesity.

Methods Thirty-five children with obesity (age range, 6-17 years; 9 female) underwent an axial mDixon-quant sequence. Regions of interests were respectively put on each of nine segments to calculate the mean PDFF. Vertebral fat quantifications were acquired by averaging three PDFFs measured from T10-T12. At the level of 5-cm above navel, abdominal circumference and area were also measured. Additionally, heights and weights of all children were recorded and BMIs were calculated. Spearman correlation analysis were performed. $P < 0.05$ was considered statistically significant.

Results The mean BMI of enrolled children was 27.00 ± 3.61 (22–39), and 80% of them had fatty liver. The mean PDFF of all children was $15.01 \pm 10.78\%$ in liver and $38.54 \pm 12.3\%$ in vertebral marrow. The mean abdominal circumference and area of children were 840.69 ± 66.80 mm and 50772 ± 8578.993 mm² respectively. PDFF of vertebral marrow showed moderate negative correlation with age, height, BMI and weight ($\rho = -0.545$ – -0.436 ; $P \leq 0.009$) and mild negative correlation with abdominal circumference and area ($\rho = -0.344$ – -0.334 , $P < 0.05$). However, liver fat had neither positive nor negative correlation with any of the parameters ($P > 0.05$), including PDFF of vertebral marrow ($P = 0.349$).

Conclusion PDFF of vertebral marrow negatively correlates with age, weight, height, BMI, and abdominal circumference and area in children with obesity.

OR-0065

Alterations of large-scale functional network connectivity in patients with infantile esotropia before and after surgery

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Abstract Background: Growing evidences have indicated neurodevelopmental disorders in infantile esotropia (IE). However, few studies have analyzed the characteristics of large-scale functional networks of IE patients or their postoperative network-level alterations. **Methods:** Here, individuals with IE ($n = 32$) and healthy subjects ($n = 30$) accomplished the baseline clinical examinations and resting-state MRI scans. A total of 17 IE patients also under went corrective surgeries and completed the longitudinal clinical assessments and resting-state MRI scans. Linear mixed effects models were applied for cross-sectional and longitudinal network-level analyses. Correlation analysis was performed to assess the relationship between longitudinal functional connectivity (FC)

alterations and baseline clinical variables. Results: In cross-sectional analyses, network-level FC were apparently aberrant in IE patients compared to controls. In longitudinal analyses, intra- and internetwork connectivity were observed with significant alterations in postoperative IE patients compared to the preoperative counterparts. Longitudinal FC changes are negatively correlated to the age at surgery in IE. Conclusions: Obviously, altered network-level FC benefiting from the corrective surgery serves as the neurobiological substrate of the observed improvement of stereovision, visuomotor coordination, and emotional management in postoperative IE patients. Corrective surgery should be performed as early as possible to obtain more benefits for IE in brain function recovery.

OR-0066

Early recognition of necrotizing pneumonia in children based on non-contrast-enhanced computed tomography (CT) radiomics signatures

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Objective: Streptococcus pneumoniae and Mycoplasma pneumoniae pneumonia are two common pathogens of lung necrosis. The purpose of this study was to explore the ability of imaging omics to distinguish the two pathogens causing lung necrosis based on plain scan CT imaging features. **Materials and methods:** 86 cases of lung necrosis with early pulmonary consolidation were included according to the standard of sodium discharge. Imaging images and clinical features were collected. RadCloud was used to segment the lesions in CT scan manually, and 1207 radiomics features were extracted. In order to reduce redundancy, we use minimum absolute contraction and selection operator (LASSO) method for eigendimension reduction. The model based on imaging omics features and the composite model based on imaging and clinical features were established respectively, and the two models were compared. Random forest (RF), support vector machine (SVM) and logistic regression (LR) are three machine learning algorithms used to build machine learning models. To evaluate the recognition effect, area under the receiver operating characteristic curve (AUC), sensitivity, specificity and other indicators were used in the validation cohort.

Results: The minimum absolute contraction and selection operator (Lasso) method was used for feature dimension reduction, and eight imaging omics features with the best correlation coefficients with lung necrosis were identified. Three kinds of models were established: the model based on imaging omics, the model based on clinical features, and the composite model based on imaging features and clinical features. Random forest (RF), support vector machine (SVM) and logistic regression (LR) are three machine learning algorithms used to build the models. The values of AUC, F1-scores and RF in the composite model are 0.795 and 0.78 respectively in the training queue, and 0.774 and 0.81 respectively in the test queue.

Conclusion: The machine learning model RF based on the combined model of imaging and clinical features extracted from the area of interest at the early stage of pulmonary necrosis is helpful for the identification of two pathogens (Streptococcus pneumoniae pneumonia and Mycoplasma pneumoniae pneumonia).

OR-0067

基于多学科联合循证医学护理在 CT 增强碘对比剂外渗预防及处理中的应用

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目的：探讨基于多学科联合循证医学在 CT 增强碘对比剂外渗预防及处理中的应用。方法：选取 2021.07-2021.12 在广西医科大学第一附属医院放射科行 CT 增强扫描的患者 64 例作为对照组，选取 2022.01-2022.06 在广西医科大学第一附属医院放射科行 CT 增强扫描的患者 64 例作为干预组。对照组采用传统护理模式，干预组在对照组的基础上采用多学科联合循证医学护理模式，比较两组患者的外渗发生率、碘对比剂不良反应事件发生率、护理风险事故总发生率、GSES 评分以及患者的满意度。结果：干预组碘对比剂外渗发生率、碘对比剂不良事件发生率以及护理风险事件总发生率明显低于对照组，差异有统计学意义 ($P<0.05$)，护理前，两组患者 GSES 评分进行比较，不存在统计学意义；两组患者护理后 GSES 评分均显著高于护理前，且干预组护理后 GSES 评分明显高于对照组，差异有统计学意义 ($P<0.05$)。干预组护理满意度显著高于对照组，差异有统计学意义 ($P<0.05$)。结论：基于多学科联合循证医学在 CT 增强碘对比剂外渗预防及处理中的应用理想，有效降低碘对比剂外渗发生率、不良事件发生率、护理风险事件总发生率等，提高患者满意度等，值得推广应用。

OR-0068

经导管主动脉瓣置换术中循环崩溃的抢救与护理

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目的：探讨经导管主动脉瓣置换术中循环崩溃的抢救措施与护理要点。方法：回顾分析 2019 年 10 月-2023 年 5 月我院经导管主动脉瓣置换术中发生循环崩溃的病例资料，梳理术中紧急抢救措施及护理配合要点，进行根本原因分析，详细讨论可以优化的程序步骤。结果：我院行 TAVR 手术的 231 例患者中，术中循环崩溃 19 例 (8.23%)，包括心室颤动 ($n=6$, 31.58%)、主动脉破裂或夹层 ($n=4$, 21.05%)、瓣膜移位 ($n=3$, 15.79%)、急性左心室衰竭 ($n=2$, 10.52%)、心脏骤停 ($n=2$, 10.52%) 和心脏穿孔和心包填塞 ($n=2$, 10.52%)。快速判断，明确原因，及时采取有效的电除颤、静脉给药、心肺复苏、体外循环下中转开胸等一系列抢救措施。15 例抢救成功顺利完成手术，4 例抢救失败，其中 3 例自动离院，1 例抢救无效死亡。不同病因不同入路引起循环崩溃抢救措施及护理配合要点不同，故针对不同的循环崩溃原因总结相应的个性化、标准化的围术期急救护理要点，包括：组建循环崩溃急救团队，制定 TAVR 术中循环崩溃应急预案，清单管理法准备器械设备及用物，制定各类规范化抢救流程，组织培训考核、确保循环崩溃发生时能快速反应、各司其职、分工协作。结论：TAVR 术中循环崩溃事件发生率虽低，但抢救难度大、死亡率高。早期识别和制定标准化的抢救措施和个性化精准护理配合可以帮助快速应对 TAVR 术中循环崩溃。

OR-0069

新型机器人辅助穿刺系统在 CT 引导下肺穿刺活检术的应用研究及护理

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目的 探讨新型机器人辅助穿刺系统 RC120 在 CT 引导下肺穿刺活检术的应用效果及护理配合，以期新型机器人辅助穿刺系统的推广应用提供现实依据。

方法 2022 年 1-6 月，采用便利抽样法选择某院行机器人辅助穿刺的患者 29 例为观察组；同期同法选择采用传统经 CT 引导下人工操作穿刺的 29 例患者为对照组。比较两组穿刺患者的定位精度、护理满意度及并发症发生率。

结果 观察组患者定位精度为 5.0 (3.6-6.2) mm[中位数 (四分位数)]，优于对照组的 6.4 (4.0-8.4) mm[中位数 (四分位数)]，差异有统计学意义 ($z = -2.179$, $P = 0.034$)。观察组患者的满意度为 91.1 ± 1.6 分 (平均值 \pm 标准差)，明显高于对照组的 82.2 ± 1.7 (平均值 \pm 标准差) 分，差异有统计学意义 ($t = 21.047$, $P < 0.001$)。观察组中有 2 例患者发生并发症，并发症发生率为 6.9%；而对照组有 8 例患者发生并发症，并发症发生率为 27.6%；差异有统计学意义 ($\chi^2 = 4.350$, $P = 0.037$)。

结论 针对性护理能够减少辅助穿刺系统 RC120 在 CT 引导下进行肺穿刺引起的并发症发生风险，提高肺穿刺定位精度，提升患者护理满意度，值得推广。

OR-0070

基于视觉传达理论的视频宣教模式在输液港患者自我维护中的效果研究

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目的 探讨动画视频健康宣教模式对完全植入式静脉输液港患者自护能力提升的应用价值。

方法 本研究为一项单中心、前瞻性临床研究，共纳入 208 例接受完全植入式静脉输液港(Totally implantable venous access ports, TIVAPs)患者，其中 108 例为对照组（接受常规护理宣教），100 例为强化动画视频宣教组。比较两组患者的基本信息、TIVAPs 认知量表、并发症发生率及 TIVAPs 使用时长。

结果 两组患者人群均呈正态分布，无显著统计学差异 ($p > 0.05$)。在进行了强化视频宣教后，患者对于 TIVAPs 的认知度显著上升，表现为认知评分量表得分明显提高 ($71.77 + 19.22$ vs $59.8 + 15.41$, $p < 0.01$)，其自我护理能力得分也随之显著加强 ($78.83 + 2.23$ vs $73.92 + 5.15$, $p < 0.05$)。正因如此，视频宣教组的并发症总体发生率显著降低 (20.4% vs 12% , $p < 0.05$)。导管相关性感染均为两组最常见术后并发症，且两组发生率相似 (7.4% vs 6% , $p > 0.05$)。然而，对照组中，伤口愈合障碍和导管尖端血栓形成发生率分别为 5.6% 和 3.7% ，均显著高于视频宣教组 ($p < 0.05$)。由于对照组存在较高的 TIVAPs 并发症发生率，导致研究期间对照组 TIVAPs 使用时长显著短于视频宣教组 ($p < 0.05$)。

结论 围手术期强化动画视频宣教可显著提升使用者对于 TIVAPs 的认知程度和自我护理能力，从而显著降低 TIVAPs 并发症。提示强化视频宣教是一种有效的 TIVAPs 护理宣教方式。

OR-0071

优化护理流程在脑血管重症患者 颅脑“百秒”快速成像磁共振检查中的应用研究

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目的：探讨优化护理流程在脑血管重症患者颅脑“百秒”快速成像磁共振检查中的应用效果。

方法：2022 年 2 月至 2022 年 11 月神经内科重症患者 53 例为研究对象，随机分为对照组和干预组（对照组 26 例，干预组 27 例），均采用 3.0T MR（uMR Omega, 上海联影医疗）进行颅脑磁共振检查。对照组患者按照常规检查流程管理模式进行颅脑磁共振成像检查，扫描序列包括轴位 T2WI，T2-flair，T1WI，DWI，3D-TOF-MRA，各序列扫描时间分别为 124s、112s、136s、68s、183s。总扫描时间 623s。干预组患者按照流程优化管理模式进行颅脑“百秒”快速磁共振成像检查，扫描序列与常规颅脑磁共振检查相同，各序列扫描时间分别为 15s、18s、34s、44s、57s。总扫描时间 168s。检查完成后由护士记录磁共振检查全流程时间并完成家属护理满意度评分。由一名放射科诊断医生对两组图像进行图像质量评分。采用 Mann-Whitney U 检验比较两组磁共振检查全流程时间、磁共振图像质量和家属护理满意度评分， $P < 0.05$ 为差异具有统计学意义。

结果：干预组患者一次检查成功率高于对照组。差异具有统计学差异（ $P < 0.05$ ）。两组图像均符合诊断标准，两组图像质量主观评分差异无统计学差异（ $P > 0.05$ ）。干预组和对照组家属护理满意度评分差异具有统计学差异（ $P < 0.05$ ）。

结论：优化护理流程颅脑“百秒”快速磁共振成像能显著缩短脑血管重症患者磁共振检查时间，降低检查的风险，提高了检查成功率和家属护理满意度，保证了患者的安全，具有较高的临床价值。

OR-0072

CT 增强过敏史患者检查前禁食情况与不良反应的关系

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目的：最新指南明确提出不推荐常规 CT 增强检查前禁食。以往研究已经发现具有碘对比剂过敏史和其他过敏史患者是不良反应的独立危险因素。但取消禁食是否会与碘对比剂相关不良反应产生协同效应进一步增加不良反应发生风险，目前还不清楚。因此临床人员难以将指南运用至放射实践中。本研究旨在探寻具有碘对比剂过敏史和其他过敏史这类特殊患者饮食状态与不良反应和呕吐之间的关系，以期指南的丰富和完善提供依据。

方法：对 2014 年 1 月至 2020 年 12 月期间接受 CT 增强有过敏史的患者进行回顾性分析。进行 c_2 检验和单变量回归分析以探讨禁食与不良反应和呕吐之间的关系。

结果：27758 例有过敏史的患者（713 例碘对比剂过敏史和 27045 例其他过敏史；59.1 岁 \pm 13.7；14415 名男性）入组。未发生吸入性肺炎或死亡。有过敏史患者禁食组与非禁食组不良反应或呕吐总体发生率差异无统计学意义（ $P > 0.05$ ）。对于注射碘克沙醇 320 有碘对比剂过敏史患者，禁食组不良反应发生率高于非禁食组（44.44% vs 0%， $P = 0.021$ ）。对于其他过敏史的患者，禁食组严重不良反应的发生率高于非禁食组（0.06% vs 0.01%， $P = 0.046$ ）。腹部检查时禁食组不良反应发生率高于非禁食组（0.63% vs 0.24%， $P = 0.022$ ）。单变量回归分析显示未禁食不是不良反应发生的危险因素。

结论：取消禁食不会增加不良反应和呕吐并发症的总体风险。其他过敏史的患者，禁食与较高的严重不良反应发生率相关。对于一些特殊的患者亚组，禁食与较高的不良反应发生率相关。

OR-0073

一例脑出血合并肺栓塞病例分享

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本案例中，患者是一位自发性脑出血病人，治疗中并发了肺栓塞，目前公认的肺栓塞治疗为溶栓及抗凝，但抗凝溶栓治疗又会大大增加脑出血风险，处于两难境地，孰是孰非，何去何从？为了改善严重肺栓塞患者的临床结局，我院建立肺栓塞多学科快速反应团队，通过专家面对面会诊或实时线上会议等形式，为脑出血合并严重肺栓塞患者提供最佳的、个体化的诊疗方案。

在整个治疗过程中，护理团队通过详细全面的护理评估，梳理出护理难点有转运风险、术中体位管理、抗凝与出血的风险、右心衰与水化。通过制定详细的护理措施、专科流程，最终患者转危为安，顺利出院。

OR-0074

今天也想辞职（原创情景剧）

李德彪、谭凌珊、徐蝶、陈丽行、蔡璐
重庆医科大学附属大学城医院

李小帅:00 后职场新人，初入职场 1 年，也曾想在职场干出一番事业，满腔热情与赤诚，但遇各类型患者后感觉热情受挫，心生辞职念头，他的护理生涯该何去何从.....

王顿顿:心理卫生中心重度精分患者，因不按医嘱服药治疗效果不佳，近期突发咳嗽气促加剧，家属对病情好转关注度高，遂选择住院治疗，完善 CT 检查，家属去买早餐后，独自出现在放射科，又会掀起怎样的风雨.....

OR-0075

1 例碘克沙醇致罕见急性泛发性发疹性脓疱病

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急性泛发性发疹性脓疱病(acute generalized exanthematous pustulosis, AGEP) 是一种罕见的迟发性超敏反应(non-immediate hypersensitivity reactions, NIHR)，发病率仅为 1~5 /1 000 000，于 1980 年由 Beylot 等报道并命名。临床上以红斑基础上发生的成片针尖大小、非毛囊性、无菌性脓疱及发热等全身症状为特征，多伴外周血白细胞增多及中性粒细胞增多，约 1/3 的患者可能伴有嗜酸性粒细胞增多，预后良好。内脏受累并不常见，低于 20%可发生，常累及器官为肝、肾、肺等，严重时可能导致死亡。据报道，AGEP 可由药物、感染或其他因素诱发（如汞、蜘蛛接触史等），约 90%的病例是由药物引起，但由碘对比剂所致极少报道，尤其是碘克沙醇。本案例为发生在本院的 35 岁女性行腹部多层螺旋 CT 增强扫描时使用碘克沙醇所致的罕见 AGEP，该患者在注射碘克沙醇后的 12 小时内出现瘙痒感，红疹从颈部、枕部、双臂短时间内蔓延至整个躯干部，并以红斑为基础出现密集或散在的白色针尖大小样脓疱，部分区域皮温稍高。同时该患者出现了发烧以及白细胞、中性粒细胞计数增高、血沉增快等典型特征。在即刻停止可疑致敏物碘克沙醇之后，基于患者不适表现进行对症治疗，其病情逐渐好转，部分区域脱屑、红斑变淡直至全身皮肤状况基本与患病前一致。即本案例报告了该患者 AGEP 的发生、发展、内在机制、治疗及转归。经过系统检索，国

内目前尚未发现碘克沙醇所致的 **AGEP** 案例，国外（仅英文）也仅有 4 例。鉴于该碘对比剂在放射科的广泛应用，放射科医生和转诊临床医生应该意识到这种潜在的并发症，对此类反应应有充分的认识，熟悉诊断及处理流程，以期更合理、规范地加以应对。

OR-0076

急诊手术--生命之舞

王京

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各位老师大家好，我是来自武汉协和医院介入放射科的一名护士，我叫王京。今天我想给大家分享一个故事，这是我第一次急诊的故事。说起急诊，在座的各位老师肯定都经历过。急诊，对各位老师来说意味着什么呢？是打碎美梦，离开温暖被窝的无奈？还是临近下班又被通知有手术的失落？亦或是一直处于“待机”状态的惴惴不安？对我来说，有不安，在于不知何时会想起的电话铃声；有无奈，在于不得不放下手中的一切，马上赶到医院参与手术；但是更多的还是对生命的敬畏与珍视，我甘心付出所有，只为患者能够转危为安。

OR-0077

影像科护士共情疲劳现状及影响因素研究

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目的：对影像科护士的共情疲劳现状进行调查，并分析其影响因素，为促进影像科护士心理健康、稳定护理队伍提供参考。

方法：于 2022 年 7 月便利选取 169 名来自四川省三级医院的影像科护士进行问卷星横断面问卷调查，调查工具包括一般资料调查表、领悟社会支持量表、中文版专业生活质量量表。采用 SPSS23.0 进行统计分析，主要统计学方法为描述性统计分析、单因素方差分析、相关性分析及多元线性回归分析。

结果：影像科护士共情疲劳三个维度得分为：共情满意（ 30.88 ± 8.43 ）分、职业倦怠（ 24.42 ± 5.74 ）分、继发性创伤应激（ 19.49 ± 4.21 ）分，89.9%的护士共情满意处于中低水平，61.5%的护士职业倦怠为中、高水平，26.6%的护士处于继发性创伤应激中等水平。多元线性回归分析显示，无工作场所暴力经历、工作满意度高、领悟社会支持高的护士共情满意水平高、职业倦怠水平低（ $P < 0.05$ ），无工作场所暴力经历的护士继发性创伤应激水平低（ $P < 0.05$ ）。

结论：影像科护士存在一定程度的共情疲劳，并且受工作场所暴力、工作满意度和领悟社会支持的影响。提示护理管理者应重视影像科护士共情疲劳管理，营造良好的工作环境，减少工作场所暴力，提供更多的支持，提升护士工作满意度，以减轻护士共情疲劳。

OR-0078

临床路径管理模式在成人 CTE 检查中的应用效果与评价

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目的 探讨临床路径管理模式在成人 CTE 检查中的应用效果。

方法 采用便利抽样法，选取 2022 年 5 月-2023 年 4 月行 CTE 检查的 81 例成年患者为研究对象。

以 2022 年 10 月为节点,将 2022.5-2022.10 的 CTE 检查者作为对照组 (39 例),实施常规管理模式。将 2022.11-2023.4 的 CTE 检查者作为实验组 (42 例),实施临床路径管理模式。比较两组检查准备时长,肠道充盈评分及患者就诊满意度。

结果 对照组检查准备时长显著高于实验组,对照组肠腔充盈评分低于实验组评分,对照组肠道准备优良率显著低于实验组,对照组患者就诊满意度显著低于实验组。

结论 在 CTE 检查中实施临床路径管理模式具有良好的临床效果,能充分调动患者的主观能动性,提升患者就诊满意度,提升图像质量和技护工作效率,值得影像科推广应用。

OR-0079

6 例肝癌患者载药微球经导管动脉化疗 栓塞术后罕见并发症的护理

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目的:对 6 例载药微球经导管动脉化疗栓塞治疗肝癌术后发生的罕见并发症进行原因分析,总结护理经验。

方法:选取 2019 年 1 月至 2020 年 12 月行载药微球经导管动脉化疗栓塞术的 700 例肝癌患者中发生罕见并发症的 6 例进行分析,总结罕见并发症发生的原因及护理对策。

结果:本组 6 例患者中,2 例继发感染中 1 例好转出院,1 例死于感染性休克;2 例 DIC 中 1 例好转出院,1 例抢救无效死亡;1 例肠梗阻、1 例肿瘤破裂,均治疗好转出院。

结论:护理人员应结合患者既往史、血液检查指标及载药微球经导管动脉化疗栓塞术后常见的不良反应发生的规律,针对反复高热、尿色异常、穿刺点延迟瘀斑的出现、药物无法控制的腹痛及肠梗阻等异常情况,要与正常栓塞综合征相鉴别,做好潜在感染性休克、DIC、肠梗阻及肿瘤破裂等并发症发生的风险评估、应急处理准备及实施科学规范的健康宣教,可有效减少术后并发症的发生。

OR-0080

体外膜肺氧合支持下危重患者行 CT 血管造影检查的放射科管理

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目的:总结 8 例体外膜肺氧合支持下危重患者行 CTA 检查的放射科管理。

方法:放射科管理包括 1.组建由高年资护师、技师、医师组成的放射科检查团队。2.专人负责培训学习、制定科室应急预案、ECMO 患者行 CT 检查的模拟情景急演练(与监护室联合)。3.制定 ECMO 支持下危重患者行 CT 的检查流程。4.监护室转运团队同质化培训及要求。5.检查前快速病情评估。6.安全过床,固定导管位置,各人员各司其职。7.增强过程中护理监控,个性化设计 CTA 扫描模式。7.快速安全转运。8.急诊结构化报告。

结果:本院自 2020 年 7 月 3 日~2022 年 9 月 30 日共有 8 例患者进行 CTA 检查(1 例肺动脉造影,3 例肺动脉及支气管动脉造影,1 例胸痛 CTA,2 例 CT 全主动脉造影,1 例冠脉 CTA)。8 例患者均快速平稳顺利完成了检查,无生命体征大波动及碘对比剂过敏及外渗情况的发生,外出检查不良事件发生率为零,外出检查总耗时 15~25 分钟,病情好转出院 2 例,6 例自动出院。

结论:放射科管理有助于降低 ECMO 支持下危重患者院内转运不良事件的发生率。

OR-0081

The application of predictive nursing in magnetic resonance scan using the Hopkins Fall Score

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Magnetic resonance imaging is considered a key reference for clinical treatment, with a large number of inpatients and outpatients visiting the magnetic resonance imaging room for examination every day. Patients have diverse symptoms and varying states. How to efficiently, orderly, and safely complete magnetic resonance scan under the current shortage of nurses and auxiliary personnel is an urgent problem for medical imaging departments to solve. According to the Hopkins Fall Scale, the patient's level of consciousness, mobility, vision, hearing, scanning coordination, and use of high-risk medications were assessed before the MRI examination to evaluate the cooperation level and scanning safety of hospitalized patients. Based on the evaluation results, the number of patients scheduled for MRI scanning per hour was determined, and corresponding numbers of nurses and support personnel were provided to assist patients with the examination.

The patient's cooperation level can be predicted based on the score, thereby avoiding the risk of transportation and the need for other protective measures. This will increase nursing and support personnel, safeguard patient safety, shorten patient waiting time, and guarantee that patients complete their examination in the safest manner and avoid cross-infection in the hospital within the shortest possible timeframe. Simultaneously, meticulous planning and quality control should be implemented for the examination process of patients, ensuring the accuracy of the examination results. In addition, attention should be paid to the mental state and psychological needs of patients, and necessary measures should be taken to alleviate patients' tension and anxiety, thereby enhancing their cooperation. Through rigorous and scientific management techniques, patients receive top-quality nursing care throughout the examination process, maximizing patient safety.

OR-0082

Analysis of the current situation of perioperative pain management and the influencing factors of self-efficacy of pain management of nurses in interventional department in China

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Objective: The aim of this study was to critically evaluate the present status of perioperative pain management among nurses in interventional departments, as well as to delineate the factors influencing the self-efficacy of pain management. The objective was to furnish recommendations that may advance the standardized administration of perioperative pain.

Methods: In the month of October 2022, a bespoke questionnaire was utilized to examine the current pain management practices of 941 nurses in interventional departments across 24 provinces and municipalities directly governed by the Central Government in China. The investigation was conducted utilizing a convenient sampling technique, in conjunction with the

nursing working group platform of the Radiology Branch of the Chinese Medical Association.

Results: A significant majority (76.5%) of the nurses in the interventional departments had undergone training related to pain management; however, over one-third (37.6%) had not engaged in relevant training during the previous two years. Merely 4.9% of nurses expressed confidence that their knowledge in pain management was adequate to satisfy the requisites of clinical practice. The foremost three areas of pain management information desired by the nurses in the intervention department were pain psychology (79.6%), pharmacological pain treatment (78.1%), and non-pharmacological pain interventions (77.4%). A majority (57.6%) of the nurses failed to assess the patients' comprehension and perspectives of analgesia, elements contributing to pain exacerbation or alleviation, and the outcomes of analgesic measures. The cumulative score for the pain self-efficacy questionnaire among nurses in the intervention department was 63.95 ± 21.83 . Multiple linear regression analysis revealed that variables such as the acquisition of pain knowledge, the frequency of pain training in the past two years, the ratio of evaluation tools employed for assessment, the prevalent utilization of multi-dimensional evaluation instruments, and professional course studies in academia were determinants influencing pain management self-efficacy.

Conclusion: The state of perioperative pain management by nurses within China's interventional departments is unstandardized; the proficiency and capabilities of nurses in pain management are inadequate to fulfill clinical demands, and the provision of continued education in pain management is lacking. It is imperative for nursing administrators within the interventional department to devise accurate and targeted training schemes, congruent with the identified deficiencies among the nursing staff, thereby enhancing the ability to assess, prevent, and treat pain in the perioperative context. This, in turn, can lead to an augmented patient experience during interventional diagnostic and therapeutic procedures.

OR-0083

“防微杜渐，步步为营”——1 例主动脉夹层合并 心功能不全患者 CT 增强检查惊险记

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案例呈现：患者女性，68 岁，高血压史 20 余年，因胸痛 6 小时，外院就诊怀疑主动脉夹层，120 送入我院急救部，为进一步明确诊断，拟行头颈 CTA、胸腹 CT 增强检查，平车推入影像中心。T: 36.5°C, P:126 次/分, R: 26 次/分, BP:140/115mmHg, SPO2: 90%。无碘对比剂使用史、过敏史。患者胸腹平扫时发现有心包积液，初步判断可能存在夹层内破风险。与影像科和急诊科医生沟通后，决定先行头颈 CTA 检查。当注射 ICM 后患者立刻出现一过性意识障碍，但生命体征相对平稳，考虑与心包填塞有关。与临床医生沟通，影像科建议停止检查，快速安全转移至急诊科。

原因分析：（1）脉压差缩小：结合患者高血压病史，且有胸痛体征，怀疑存在心包积液，导致脉压差缩小。（2）心包积液：患者怀疑主动脉夹层，考虑是组织液经过假腔薄弱的血管壁渗透到心包腔，导致少量的心包积液。（3）平扫发现明显心包积液是否继续检查：立即与临床医生沟通，考虑风险/获益比，决定继续行头颈 CTA 检查。（4）注射碘 ICM 后一过性意识障碍：一方面考虑夹层类型的原因，该患者为 Standard A 型。另一方面考虑高压注射 ICM 进一步加重心脏负荷，引起了阿斯综合征。

思考与启示（护理方法）：（1）开启急救绿色通道，同时做好环境、医护、设备、急救四准备。（2）全程动态评估与护理：①检查前：患者到达后，护士立即开始评估，患者存在脉压差缩小、心功能不全等风险，属 ADR 高风险人群，告知风险并签慎用知情同意书，同时告知医生、技师检查风险，设置个性化扫描方案，全程动态监护。②检查中：搬运过程中注意保持平稳，设计个性化体位，检查过程中行动态观察。患者胸腹平扫后发现明显胸包积液，此时生命体征平稳，但脉压差

变小, 说明存在夹层破裂风险。立即沟通医生是否继续检查, 最终决定继续行 CTA 检查。注射 ICM 时严密观察, 患者发生一过性意识障碍, 护士即刻呼救并评估患者, 高度怀疑夹层随时破裂, 与临床沟通果断终止检查。②检查后: 再次评估患者感受/意识, 确认患者生命体征相对稳定, 快速安全转运。

OR-0084

虚拟护士在肝癌患者增强 CT 检查中的心理干预

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目的: 探讨增强 CT 检查前多媒体宣传及心理护理在肝细胞癌(HCC)患者中的应用价值。

方法: 选取 2020 年 7 月至 2023 年 4 月在我院接受增强 CT 检查的 HCC 患者 150 例, 随机分为研究组和对照组, 每组 75 例。在检查前等待期间, 研究组患者在独立安静的房间内, 观看与肝脏增强 CT 检查相关多媒体视频 30 分钟, 而对照组患者则进行常规呼吸训练等基础护理。采用焦虑自评量表 (SAS) 和抑郁自评量表 (SDS) 评估检查前后患者心理状况的变化, 记录 CT 增强检查后不良反应的发生情况。同时邀请 1 名放射科医师, 在不了解患者情况的前提下, 按照 I-IV 级对患者检查后图像质量进行评价。

结果: SAS 和 SDS 评分的克隆巴赫系数分别为 0.875 和 0.851, 可信度较好。在实施多媒体心理护理干预前, 对照组和研究组患者的 SAS 和 SDS 评分在检查前基本相同。但经多媒体心理护理干预后, 观察组患者 SAS 和 SDS 评分分别为 35.65 ± 6.67 和 38.21 ± 4.32 , 均显著低于对照组 (48.34 ± 3.33 和 46.91 ± 4.26), 差异均有统计学意义 ($p < 0.05$); 研究组不良反应发生率为 1.3%, 显著低于对照组的 4% ($P < 0.05$)。研究组的图像质量获评 I 级的数量高于对照组, 与对照组患者比例差异有统计学意义 ($p < 0.05$)。研究组中 II-IV 级图像质量患者比例低于对照组, 但差异无统计学意义 ($p > 0.05$)。

结论: 对接受增强 CT 检查的 HCC 患者, 在检查前进行多媒体宣传和心理护理, 可显著改善患者检查当时的紧张和焦虑情绪, 保证增强 CT 图像质量, 同时减少不良反应发生的可能性。

OR-0085

医学影像学线上、线下实习的探索与实践

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背景: 在 2020 年突发全球紧急情况下, 我院线上教学进行了放射科大课讲授及实习课讲授。本研究旨在比较线上与线下实习授课的效果, 并探索更适合放射科实习的模式。

方法: 选取 2019 年及 2020 年于我院进行实习的临床医学及临床医学 (中德班) 本科生进行匿名问卷调查。2019 年线下实习时主要从校内的评价系统中提取对课堂及老师评价相关信息, 2020 年线上实习时同时包括电子调查问卷、校内评价系统中提取。校内评价系统包括, 包括授课内容丰富程度、病例新颖程度、是否全面 (即包括中枢、胸、腹、骨肌等多个系统)、是否起到了对大课的补充及巩固作用; 电子调查问卷包括对放射科实习的整体打分、是否起到了补充作用、是否提高了对放射学的兴趣以及恢复线下实习的意愿、课堂的生动性、内容丰富度、内容难易程度、是否适合自己进行打分, 并统计授课老师的工作年限、性别、年龄及课堂回应情况。上述各项需要评分时, 均为 5 分制, 非常满意为 5 分, 非常不满意为 0 分, 依此类推。

结果: 在 2020 年线上实习授课中, 共三个临床医学专业, 分别有 7、4、26 名学生进行了评价, 三个专业相比, 学生对医学影像学整体较感兴趣 (三个专业评分均值为 4.6-5.0 分), 线下实习意愿

较为强烈 (4.8-5.0 分), 并认为对大课起到了补充作用 (4.7-4.8 分), 无明显统计学差异。而对于不同的影像专业部位授课, 共进行了 68 人、85 次授课, 在授课的生动性、丰富性、易理解性、是否适合本科生/本人, 均无明显统计学差异 ($P>0.05$), 但工作年限、性别、年龄、课堂回应应有统计学差异, 在进一步研究相关性分析中, 发现课堂回应与授课教师年限 ($r=0.10$, $P=0.06$)、年龄 ($r=0.21$, $P<0.01$) 呈正相关趋势, 而女性比男性打分更高 ($P<0.01$)。线上与线下的授课对比中, 实习带教的内容丰富性、病例吸引力、与大课授课内容的互补性在两组间大致相仿, 但线上实习授课系统更为全面, 线下实习带教局限于 1-2 个系统。

结论: 放射科线上实习效果与线下实习效果无显著差异, 短期内线上实习涉及知识更为全面, 但学生恢复线下实习意愿较为强烈。年龄更长、工作年限更长的女性教师可能有更好的课堂回应。

OR-0086

Naked eye 3D-AR teaching assistant system applied to undergraduate medical imaging education: a pilot study

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Objective: Naked eye three-dimensional (3D) is an innovation that enables stereoscopic vision without external tools such as polarized glasses. This research aimed to explore the application value of the Augmented Reality (AR) teaching assistant system based on naked eye 3D in the undergraduate medical imaging education.

Methods: 52 students of grade 2019 clinical medicine major undergraduate as experimental group were taught through the naked eye 3D-AR Application (APP), which was independently developed. In contrast, 50 students of grade 2018 clinical medicine major undergraduate who adopted the traditional teaching method were the control group. According to Bloom's cognitive learning taxonomy, teaching effect of the two groups was evaluated by test score and students' satisfaction questionnaire, those were analyzed with t test and χ^2 test in SPSS Statistics software. **Results:** The theoretical examination (62.06 ± 3.06 vs 59.82 ± 3.38), practical testing (22.90 ± 2.35 vs 21.06 ± 2.65) and total score (84.96 ± 4.58 vs 80.88 ± 6.01) were statistically different between the experimental group and control group. The questionnaire showed by Likert scores (include enjoyment, satisfaction, participation, learning efficiency and understandable) of experimental group were significantly higher than those of control group. What's more, scores of the convenience of using the naked eye 3D-AR APP and the willingness to keep use the APP were really high in the experimental group.

Conclusions: The naked eye 3D-AR teaching assistance system is a new and efficient teaching model for medical imaging undergraduate teaching. Follow Bloom's cognitive learning taxonomy, compared with traditional teaching methods, it improved students' learning interest, increased teaching interaction, enhanced teaching effect, and has a good application prospect.

OR-0087

基于“三维融通 虚实结合”理念的医学影像技术本科生临床思维模式培养策略

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目的: 探讨采用基于现实临床场景的情境案例库和基于真实病例的影像三维重建可视化案例库的实

习带教模式在影像技术检查操作及后处理重建, 综合临床思维培养中潜在的应用价值, 可拓展性, 并展望其建设推广的可能。

方法: 选取 2019 年至 2022 年在我院接受影像检查并确诊为常见疾病的患者, 经医学伦理委员会批准, 患者签署知情同意后, 利用三维重建技术将影像数据转化为三维模型, 并加入相关解剖结构和临床信息, 构建了包含 117 个案例的影像三维重建可视化案例库。同时, 根据疾病特点、检查项目操作要点等因素, 设计了 14 个基于实际临床场景的情境案例, 包括患者全流程诊治、设备操作、影像检查与诊断等内容, 形成了一个涵盖多场景和多层次的情境案例库。将 2019、2020 级影像技术专业本科生分为两组, 一组为案例库教学, 20-25 人, 除已有理论教学和实践教学外, 使用基于三维重建、3D 打印技术的可视化案例库进行解剖结构、临床疾病的教学和讨论, 并使用基于实际临床场景的情境案例进行模拟操作、后处理重建和临床思维训练; 另一组为常规教学, 使用传统课件和模型进行教学。两组分别由高年资技师进行临床带教工作辅助教学进行。在教学结束后, 对两组学生分别进行了解剖结构、临床疾病知识和操作技能考核, 并在临床生产实习轮转考核过程中对两组学生的教学满意度进行问卷调查。

结果: 案例库教学组的学生在解剖结构、临床疾病知识和操作技能考核中, 平均分分别为 92.3、90.5 和 88.7, 高于常规教学组的平均分 85.6、83.2 和 81.4, 差异均有统计学意义 ($P<0.05$)。案例库教学组的学生在教学满意度问卷中, 对教师授课水平、案例质量、教学方法、教学效果等方面的评价均高于常规教学组的评价, 差异均有统计学意义 ($P<0.05$)。

结论: 使用基于现实临床场景的情境案例库和基于真实病例的影像三维重建可视化案例库的实习带教模式, 在提高医学生解剖结构、临床疾病知识和操作技能水平, 增强医学影像专业学生对临床实践操作的兴趣和参与度方面, 具有明显优势。该教学模式也有利于创新拔尖人才的培养, 有助于培养具有新医科视野和临床思维模式的影像技术人才。

OR-0088

3D 打印断层影像模型在医学影像教学中的初步应用

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目的: 建立 3D 打印断层影像模型, 并且应用于医学本科生医学影像学小组教学课堂, 评价模型在教学中的作用。

方法: 基于正常 CT 增强图像分别制作头、胸部、肝脏三维仿真模型, 并且将其分为多个切片的仿真模型。通过 3D 打印技术制作切片实物模型, 然后组装成三维模型, 并且将影像断层图像与切片实物模型进行对应, 即为 3D 打印断层影像模型。将 3D 打印影像断层模型应用于北京协和医院 2021 年度本科生医学影像学小组教学课堂。使用德尔菲法及层次分析法, 采用 1-5 分法评价模型在教学中的绩效期望以及社会影响, 共 13 二级个指标。比较老师及学生对模型评价的差异。

结果: 收集 5 位教师及 28 位学生对 3D 打印断层影像模型的问卷评价结果, 并进行分析。结果表明, 教师对模型的总体评价高于学生 (4.14 ± 0.55 v.s. 2.86 ± 1.05 , $P=0.003$)。老师和学生均认为模型可以帮助讲解和教授断层影像, 有助于将器官的断面结构转换为 CT/MR 图像中的器官断面, 并且对胸部及肝脏模型的教学使用体验比较满意, 教师和学生的评分比较无统计学差异 ($P>0.05$)。对于模型的总体绩效期望及社会影响, 教师的评价均高于学生 ($P<0.05$)。

结论: 3D 打印影像断层模型应用于医学影像学课堂教学, 对讲解和教授断层影像有一定辅助作用。教师对模型的评分普遍高于学生, 未来尚需对模型的结构进行优化, 以及进一步探索有利于学生使用的方式。

OR-0089

磁粒子成像和荧光分子成像双模态成像监测 具有强靶向保留效应的自体外泌体负载平台并 引导小鼠前列腺癌模型的光热/磁热治疗

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目的：前列腺癌是最常见的男性癌症类型。早期诊断和治疗对于改善前列腺癌患者的预后至关重要。在最近的研究中，来自癌症患者的尿液外泌体已被广泛用于靶向递送。磁粒子成像是一种新兴的非侵入性成像方法，用于对分布在生物体中的超顺磁性氧化铁纳米粒子进行实时定量成像。由于信号只能在磁纳米粒子中检测到，因此它提供了极高的对比度和信噪比，无背景信号。荧光分子成像具有较高的灵敏度和空间分辨率，广泛应用于前列腺癌的 diagnosis 和治疗，但荧光分子成像存在深度限制，成像深度较低。如果将荧光分子成像和磁粒子成像结合起来，可以发挥两种成像的优势，获得高分辨率、高灵敏度的成像，为肿瘤的精准成像提供新的方向。它还提供了一种用于检测体内外泌体加载平台的准确成像方法。本研究旨在利用高灵敏度磁粒子成像和荧光分子成像来检测肿瘤部位外泌体负载平台的靶向递送，从而指导前列腺癌的光热和磁热联合治疗方案。

方法：从患者体内提取尿液外泌体，并负载磁纳米粒子和荧光染料。采用磁粒子成像和荧光成像进行双模态成像，动态监测外泌体负载平台在前列腺肿瘤部位的靶向和代谢。同时，使用外泌体负载平台对前列腺癌进行联合热治疗。

结果：利用磁粒子成像和荧光分子成像监测外泌体在前列腺肿瘤小鼠模型中的靶向滞留效应。外泌体负载平台在成像过程中也表现出强大的同源靶向能力(实验组:66.48%±3.85%;对照组:34.57%±7.55%, **P<0.01)，经体外成像和体外组织普鲁士蓝染色证实。同时，我们验证了光热治疗和磁热治疗前列腺癌模型可以达到更好的治疗效果。

结论：利用磁粒子成像和荧光分子成像双模态成像研究发现，外泌体负载平台对肿瘤部位具有更好的靶向滞留性，并且与肿瘤细胞有更好的结合，这表明内源性外泌体可以作为示踪剂并指导后续治疗。内源性外泌体结合多模态成像具有良好的临床转化潜力，未来可用于前列腺癌的靶向诊断和治疗。

OR-0090

响应型纳米探针联合定量磁共振成像技术 精准评价肺癌耐药的实验研究

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目的：本研究拟通过构建 H₂O₂ 响应型纳米探针 Fe-MOFs@MnO₂，并与定量 T1-mapping MRI 技术联合应用，以期对 NSCLC 耐药的无创精准评价提供新方法。

方法：在乙醇溶液中，采用低温的合成方法制备 MIL-53 纳米颗粒，再在其表面可控氧化原位生长 MnO₂ 层，得到探针 Fe-MOF@MnO₂。对纳米探针的理化性质和体外水溶液 MRI 性能行相关表征。细胞和动物 MRI 实验，分别验证纳米探针 Fe-MOF@MnO₂ 联合 T1-mapping 定量 MRI 技术精准评价肺癌耐药的有效性和高效性。细胞和动物活体水平评价纳米探针的生物安全性。动物活体水平评价纳米探针的药代动力学特征。

结果：X 射线衍射、傅里叶红外光谱、紫外光谱、透射电镜等检测结果表明，成功合成纳米探针 Fe-MOF@MnO₂，且合成的纳米探针形貌均一，分散良好，水合动力学直径约 129±15 nm。体外水溶液试验结果提示，纳米探针 Fe-MOF@MnO₂ 能够灵敏响应 H₂O₂ 产生 MRI 信号，与 T1WI 技

术相比, T1-mapping 技术不仅可以提供定量数据, 且具有更高的检测灵敏度 (约为 T1WI 的 2.6 倍, $p < 0.01$)。细胞与动物 MRI 实验结果表明, 纳米探针 Fe-MOF@MnO₂ 行 MRI 能够有效诊断肺癌耐药, 且与 T1-mapping 技术联合应用具有更高的检测灵敏度和可重复性。Mn²⁺螯合实验和动物活体药代动力学实验结果表明, 纳米探针响应 H₂O₂ 后能够发生降解, 排除体外, 且能够同时螯合游离 Mn²⁺, 降低其可能的生物毒性。细胞和动物毒性实验结构也表明探针具有良好的生物安全性。结论: H₂O₂ 响应型纳米探针 Fe-MOFs@MnO₂ 与 T1-mapping 成像技术联合, 能够有效检测肿瘤微环境中 H₂O₂ 含量的变化, 为肺癌耐药提供无创、精准的评价方法。同时, T1-mapping 成像技术提供的定量数据可以保证检测结果的对比性和可重复性。

OR-0091

Dual-modality imaging-guided manganese-based nanotransformer for enhanced photothermal therapy combined immunotherapeutic strategy against triple-negative breast cancer

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PURPOSE: To treat refractory triple-negative breast cancer, we designed a functional nanotransformer, which could diagnose the tumor and confirm the time window of laser radiation via dual-modal imaging, and effectively suppress tumor growth and metastasis through gas-photothermal therapy combined STING-induced immunotherapeutic strategy.

METHODS: Preparation and characterization of MnCO based nanosystem (MnIR@NS) Firstly, the MnCO based nanosystem (MnIR@NS) was obtained through ultrasonic self-assembly towards Pluronic F127, MnCO and IR780 dyes into one system. Secondly, we characterized its particle size, morphology, near-infrared second region imaging, MRI, the photothermal effect, and CO release capability. Biocompatibility, phototherapy and macrophage polarization in vitro The uptake level of MnIR@NS at various time points in 4T1 cells was assessed by flow cytometry (FCM). The photothermal effect of MnIR@NS at the cellular level was proceeded by CCK-8 assay and propidium iodide (PI) and calcien-AM staining. The intracellular expression levels of characteristic proteins downstream of the STING pathway towards 4T1 cells with different treatments were measured by western blot. The ROS level towards 4T1 cells with different treatments was measured by DCF staining which was observed by laser confocal microscope and FCM. To investigate the ability of MnIR@NS to repolarize M2 macrophages to M1 phenotype, M1 (F4/80⁺IA/IE⁺) and M2 (F4/80⁺CD206⁺) in RAW264.7 cells with various treatment were estimated by flow cytometry. MRI-NIRF dual-modality imaging in vivo Breast cancer model was established via Balb/c mouse (female, 6 weeks old) injected 4T1 cells. When the tumor volume reached to 800 mm³ approximately, the tumor-bearing mice were randomly divided into three groups (PBS, free IR780 and MnIR@NS, n=3/group) and underwent NIRF II imaging. MR imaging in vivo of two groups mice (PBS group and MnIR@NS group, n=3/group) was performed on a 3.0 T MR system (Siemens, Germany). The T1-weighted images of tumors were obtained before injection and post injection (0 h, 2 h, 12 h, 24 h, 48 h). Parameters of T1-weighted imaging were as follow: FOV: 120 mm, TR/TE: 720/9.4 ms, slice thickness: 2 mm and slice spacing: 2 mm.

Anti-tumor Immunity synergistic therapy in vivo Firstly, the mice were classified as six groups randomly (n=5) as the tumors grew to approximately 100 mm³: ①health (no tumor), ②PBS, ③MnIR@NS, ④PBS+808 nm NIR, ⑤IR780+808 nm NIR, ⑥MnIR@NS+808 nm NIR. At 24 h post-

injection with PBS, IR780 and MnIR@NS, mice of group ④⑤⑥ were irradiated with 808 nm laser ($1.0 \text{ W} \cdot \text{cm}^{-2}$, 5 min). Secondly, dendritic cell (DCs) ($\text{CD45}^+\text{CD11c}^+\text{CD80}^+\text{CD86}^+$), cytotoxic T cells (CTLs) T cells ($\text{CD45}^+\text{CD3}^+\text{CD8}^+$), M1 ($\text{CD45}^+\text{F4/80}^+\text{IA/IE}^+$) and M2 ($\text{CD45}^+\text{F4/80}^+\text{CD206}^+$) macrophages in tumor of mice with different treatments at 7 days. In addition, the level of IFN- β , TNF- γ , IL-12 and IL-10 were measured by enzyme-linked immunosorbent assay. After undergoing different treatments, tumor volume and mouse body weight were measured every two days. And the tumors and vital organs were collected at 14th days and stained with hematoxylin-eosin, Ki67 and tunnel. All statistical analyses were performed using the software GraphPad Prism 8.0 (* $p < 0.05$, ** $p < 0.01$).

RESULTS AND DISCUSSIONS Firstly, MnIR@NS showed a diameter of $79.99 \pm 3.06 \text{ nm}$ and the TEM images further confirmed the core-shell spherical shape (Fig. 1A-C), which showed great potential for tumor accumulation through the EPR effect. Secondly, excellent cellular uptake capacity and photothermal effect in 4T1 cells was in Fig. 2A-C. Furthermore, remarkable NIR II and MRI imaging potential of MnIR@NS were showed in vitro (Fig. 1D&E) and in vivo (Fig. 3A-C). What's more, the excellent photothermal effect of MnIR@NS based laser irradiation were demonstrated in vitro (Fig 1F) and in vivo (Fig. 3D). STING pathway was activated (Fig. 2D) and the generation of ROS by MnIR@NS based laser irradiation were identified (Figs. 2E-G). Together, all of these activated immunotherapy because of MnIR@NS based phototherapy, and the antitumor immune cells (DCs, CD8^+ CLT cells and M1 macrophages) were upregulated along with the protumor immune cells (M2 macrophages) were downregulated (Fig. 2H-I & 4A-H). Meanwhile, The level of anti-tumor cytokines (IFN- β , TNF- γ , IL-12) was increased and promo-tumor cytokines (IL-10) were decreased (Fig. 4I-L). Finally, compared with the control groups, primary tumors and lung metastases in MnIR@NS+NIR group shrank significantly (Fig. 5A-J).

CONCLUSION We developed a multifunctional MnIR@NS nanocomposite, which could diagnose the tumor and confirm the time window of treatment via NIR II/MRI dual-modal imaging, and effectively suppress tumor growth through phototherapy, STING pathway and anti-tumor immunity. This MnCO-based nanosystem provided a promising strategy for cancer theranostic applications.

OR-0092

酸性肿瘤微环境激活的 MRI 纳米探针 用于抗 PD-L1 免疫治疗的调节和可视化

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目的：细胞毒性 T 淋巴细胞 (CTL) 的缺乏和对免疫检查点阻断 (ICB) 治疗的有限反应是胰腺导管腺癌 (PDAC) 治疗的重大挑战。肿瘤 pH 的调节和可视化将是增强并监测 PDAC 中 ICB 治疗的有效方法。在这项研究中，我们报道了一种 MRI 引导 ICB 治疗 (MRGIT) 策略，以调节和可视化 anti-PD-L1 抗体治疗在 PDAC 肿瘤免疫抑制中的疗效。

方法：首先合成了能够调节和指示肿瘤 pH 的 pH 响应型纳米探针 (APPAM@U-104)。APPAM@U-104 对肿瘤的 pH 成像和缓解酸化在 Panc02 荷瘤小鼠中通过 MR-T1 和 T2 成像进行研究。同时研究了 T1-MR 增强到 T2-MR 增强的转换时间，以确定 anti-PD-L1 给药的最佳时间。用流式细胞术和免疫荧光染色法分析肿瘤 T 细胞活化情况。

结果：APPAM@U-104 治疗的小鼠肿瘤微环境 pH 从 6.5 增加到到了 7.2，同时伴随着从 T1 到 T2 的 MR 信号转换，随后在 T2“ON”时间给予 anti-PD-L1 治疗后显著抑制了肿瘤生长。免疫学检测显示，在 Panc02 荷瘤小鼠中 APPAM@U-104 与 anti-PD-L1 的组合导引引起了 T 细胞的活化和免疫抑制剂对肿瘤的杀伤效应的增强。

结论：我们开发了一种新的 MRGIT 策略来重塑酸性肿瘤微环境，并在 TME 的 pH 接近中性时指导 anti-PD-L1 的给药。通过分子成像关联抗肿瘤免疫反应，为胰腺癌的精准诊断和免疫治疗提供了新思路。

OR-0093

Biodegradable Silica Nanoparticles Incorporating Nanozyme for multimodal tumor imaging and therapy

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Objectives: Nanotechnological systems are emerging as potent tools for the combination of biomedical imaging and cancer therapies. The exceptional safety and specificity of these nanomaterials enable on-site delivery of imaging probes and the conversion of less toxic substances into powerful cancer-fighting agents, driven by the unique characteristics of the tumor microenvironment (TME). However, the inherent antioxidant mechanisms and insufficient hydrogen peroxide (H_2O_2) within the cancer cells significantly hinder their effectiveness. Utilizing nanozymes to mediate glycolytic reactions, which act as a highly efficient catalyst for H_2O_2 production, could overcome these obstacles by providing additional H_2O_2 , thus enhancing the effect of reactive oxygen species (ROS)-oriented chemotherapy. In light of this, our aim is to create a nanotech-based system intended to boost the effectiveness of combined chemotherapy and sonodynamic cancer treatment, while simultaneously enabling effective imaging.

Methods: In this research, an innovative approach was formulated by incorporating glucose oxidase (GOx) into the core of biodegradable hybrid hollow silica nanoparticles (HSN), and subsequently encasing them within the metal-organic framework (MOF) known as HKUST-1, which contained a luminescent dye and sonosensitizer TCPP (referred to as GOx@HSN@HKUST-1-TCPP). The properties of this nanomaterial were examined using transmission electron microscopy, Zeta potential, X-ray diffraction, and dynamic light scattering. The cytotoxicity of the nanoparticles on cancer cells was assessed via the MTT assay. Furthermore, an on-site breast cancer model was established, and the biodistribution of the nanoparticles was tracked in real-time using near-infrared fluorescence imaging. The treatment effectiveness was evaluated by monitoring changes in tumor size and survival time analysis.

Results: Taking advantage of the enhanced permeability and retention (EPR) effect, the GOx@HSN@HKUST-1-TCPP effectively gathered at the tumor site post systemic administration. In the acidic tumor microenvironment (TME), the outer layer of pH-sensitive HKUST-1 rapidly broke down, accelerating the release of Cu^{2+} and TCPP. The Cu^{2+} ions reacted with the intracellular glutathione (GSH) to disrupt the reactive oxygen defense mechanisms, leading to their reduction to Cu^+ . Simultaneously, the interior GOx@HSN layer rapidly biodegraded, freeing GOx, which could be catalyzed to produce H_2O_2 and gluconic acid. The resulting H_2O_2 further interacted with the reduced Cu^+ to initiate a highly effective Fenton-like reaction, generating hydroxyl radicals ($\bullet OH$) for amplified chemodynamic therapy (CDT). Furthermore, the released TCPP served as both a luminescent dye and a sonosensitizer, aiding in effective sonodynamic therapy (SDT) and tumor imaging.

Conclusions: The GOx@HSN@HKUST-1-TCPP nanoparticles demonstrated a potent anticancer action, providing a reliable platform for both breast cancer imaging and treatment.

OR-0094

抗基质纳米平台靶向胰腺导管腺癌的成像与协同治疗研究

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研究目的: 胰腺导管腺癌 (PDAC) 中过度的细胞外基质 (ECM) 沉积严重阻碍了治疗药物的渗透, 并与不良预后相关。胶原蛋白是基质中含量最丰富的蛋白, 其形成了药物扩散的主要障碍。为克服 PDAC 药物渗透屏障, 构建了一种胶原酶功能化的仿生载药金纳米平台 (Col-M@AuNCs/Dox), 并联合 CT 成像监测, 实现 PDAC 精准主动联合治疗, 为 PDAC 治疗困境提供一种新策略。

方法: 设计构建了 Col-M@AuNCs/Dox 纳米平台, 集 ECM 降解、主动靶向、免疫逃逸、近红外光触发的药物释放、协同抗肿瘤治疗和 CT 成像于一体。通过提取 PDAC 肿瘤细胞膜, 包覆在负载阿霉素的金纳米笼上, 藕联胶原酶后得到该纳米平台, 并系统评估了该纳米平台的理化性质、体外和体内靶向性、肿瘤穿透性及体内外疗效。

结果: 该纳米平台可通过表面细胞膜的同源靶向作用高效靶向肿瘤, 在向肿瘤组织渗透的过程中, 致密的 ECM 逐渐被胶原酶降解, 进而能够深入渗透肿瘤实质, 最终在近红外照射下, 通过化疗、光热治疗和光动力治疗, 发挥强大的协同抗肿瘤作用, 同时该纳米平台的 X 射线衰减特性实现了 CT 成像指导下的治疗监测。

结论: 本研究提出了一种独特、简单而有效的策略来调控 PDAC 的 ECM 成分, 增强瘤内渗透和肿瘤杀伤作用, 并为治疗提供指导和监测, 为 PDAC 的治疗困境提供了有效的新途径。

OR-0095

RSNA-10837 CT radiomics features of body composition can predict postoperative early recurrence of hepatocellular carcinoma

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Objectives To investigate the potential of computed tomography (CT) radiomics features extracted from body composition in predicting early recurrence (ER) of hepatocellular carcinoma (HCC) subsequent to surgical intervention.

Methods The retrospective study enrolled a total of 252 patients with HCC who underwent CT scans and curative resection from two independent institutions. In the training cohort of 178 patients from institution A, radiomics signatures extracted from visceral adipose tissue, subcutaneous adipose tissue, and skeletal muscle were applied to establish the radiomics score using least absolute shrinkage and selection operator regression. Using multivariable Cox regression analysis, two models were developed: one incorporating preoperative variables and the other incorporating both pre- and postoperative variables. Then the external validation of the two models was conducted at institution B with 74 patients.

Results The preoperative model incorporated tumor size, AFP, BMI, and radiomics score, while the postoperative model additionally integrated ES grade based on the aforementioned parameters. In both cohorts, both models demonstrated superior performance with time-dependent AUC exceeding 0.81 and concordance indices exceeding 0.72 which was significantly higher than traditional staging systems and corresponding clinical models ($P < 0.01$). Furthermore, the two models exhibited lower prediction errors (integrated Brier score < 0.19), well-calibrated calibration curves, and greater net benefits as determined by decision curve analysis. Importantly, the radiomics-based models facilitated risk stratification by accurately distinguishing high, intermediate, and low-risk groups for ER ($P < 0.01$).

Conclusion Statistical models integrated body composition-based radiomics can provide accurate and reliable predictions of postoperative ER for patients with HCC.

OR-0096

Manganese Ion-Bridged Nanodrug for MR/NIR-I/II Fluorescence Imaging and Synergistic Phototherapy of Breast Cancer

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PURPOSE As an emerging anticancer approach, photodynamic therapy (PDT) produces cytotoxic reactive oxygen species (ROS) by exciting photosensitizers (PSs) under light triggers in the tumor site, which has the advantages of minimal invasiveness, fewer side-effects, and negligible drug resistance. However, the therapeutic efficacy of PDT is still stunted by several intrinsic obstacles, such as shallow depth of light penetration, tumor hypoxia and inevitable phototoxicity.

METHOD AND MATERIALS Herein, we successfully developed a carrier-free nanodrug, IR820-Mn/TH287, based on coordination-driven self-assembly of IR820/TH287 with Mn^{2+} via a "green" method.

RESULTS Photophysical properties of IR820-Mn/TH287 exhibited J-aggregates of IR820 monomer, such as absorption/emission beyond 900 nm, enhanced absorption coefficients, and photothermal performance. Molecular dynamics simulations further illustrated the interaction between Mn^{2+} and IR820 during the formation process of J-aggregates. Under laser irradiation, IR820-Mn could produce higher photothermal temperature and sufficient ROS to cause oxidative damage, and TH287 could improve cellular sensitivity to oxidative damage by suppressing the activity of MTH1 protein. Furthermore, the best time for laser irradiation would be achieved under the precise guidance of MR/NIR-I/NIR-II fluorescence imaging. Because of the synergistic effects from the above designs, IR820-Mn/TH287 could hold high-efficiency tumor elimination with negligible toxicity.

CONCLUSION Such Mn^{2+} -coordinated carrier-free nanodrug with multimodal imaging-guided phototherapy in NIR-II window could be an efficient and safe approach for breast cancer treatment.

OR-0097

SPIONs-enhanced Magnetic Particle Imaging Visualizes Intraplaque Macrophages for Detecting and Assessing Inflammation of Atherosclerotic Unstable Plaques

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Objective: Inflammation contributes to progression of atherosclerotic plaques, and reflects the disease activity and severity of atherosclerosis. However, detecting and evaluating inflammatory reaction of the unstable plaque by ¹⁸F-FDG-PET imaging may put human body in danger due to its radioactivity. Magnetic particle imaging (MPI) is an emerging, highly sensitive, radiation-free, and no-tissue-background tomographic technique that uses superparamagnetic iron oxide nanoparticles (SPIONs) as its contrast agent. Theoretically, SPIONs can be taken up by accumulated macrophages via surface scavenger at sites of inflammation. Therefore, We aimed to

investigate: 1) whether SPIONs-enhanced MPI could assess inflammation in unstable plaques by imaging macrophages; 2) compare the efficacy of four types of commercially available SPIONs in atherosclerotic inflammation imaging using MPI. **Methods:** We fed six-week-old male ApoE^{-/-} mice a high-fat diet and induced unstable plaques by cast placement over the left carotid artery. After twenty weeks, mice were divided in four groups (N=3-4) and intravenously administered with four types of SPIONs (Fe concentration, 8mg/kg), including Nanoeast (Nanjing Nanoeast Biotech Co., China), Vivotrax (Magnetic Insight Inc., USA), Synomag (Micromod Partikeltechnologie GmbH, Germany) and Ferumoxytol (AMAG pharmaceuticals, USA). MPI scanning was performed at Pre, 4h, 12h, 24h, 48h, and 72h post-injection. Signal-to-noise ratio (SNR) value of unstable plaques on MPI images was calculated. Plaque specimens were analyzed histologically. **Results:** For the ApoE^{-/-} mice injected with Nanoeast, the MPI SNR values of unstable plaques at multiple time points were 1.20 ± 0.12 (Pre), 7.11 ± 0.79 (4h), 9.86 ± 1.94 (12h), 12.20 ± 1.23 (24h), 6.70 ± 1.15 (48h), 6.01 ± 1.57 (72h). These revealed that MPI SNR values reached the peak at 24h after intravenous injection of Nanoeast. While the MPI SNR values reached the peak at 12h after intravenous injection of Synomag and Vivotrax, and were both significantly lower than the peak SNR values of the Nanoeast group (Synomag 6.91 ± 0.52 vs. Nanoeast 12.20 ± 1.23 , $P < 0.05$; Vivotrax 3.14 ± 0.36 vs. Nanoeast 12.20 ± 1.23 , $P < 0.05$). Of interest, the ferumoxytol group showed no significant differences in MPI SNR values between different time points. Histological analysis confirmed that more SPIONs accumulated in the unstable plaques of Nanoeast group than in those of the three other groups. **Conclusions:** The radiation-free MPI enabled macrophage detection in atherosclerotic plaques via imaging of SPIONs, which allows in vivo visualization of inflammation in atherosclerosis. Among the commercial MPI contrast agents, Nanoeast shows the highest MPI SNR values and may represent the most promising contrast agent in MPI imaging of atherosclerotic inflammation.

OR-0098

Association between PD-L1 expression in patients with cervical cancer and ADC values: comparison of different ROI-position methods at DWI

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Abstract: The expression status of programmed cell death ligand-1 (PD-L1) is crucial for immunotherapy of cervical cancer (CC). Diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) can provide the intrinsic characteristics of tumors. To assess the effects of different regions of interest (ROI) position methods for ADC measurements on the associations between ADC and PD-L1 expression and identify its independent relevant factors in CC.

Materials and Methods: The study was approved by our institutional review board. Between January 2021 and August 2022, 1015 eligible patients (range, 25–91 years old) with CC were enrolled. From January 2018 to June 2020, a training cohort (including 683 cases) was established through retrospective enrollment, while a validation cohort (including 332 cases) was constructed through prospective enrollment July 2020 to December 2022. ADC_{mean}, ADC_{ss} (at the largest level of tumor solid components), and ADC_{min} were measured using different ROI-position methods. Logistic regression analyses were performed to identify independent factors related to PD-L1 expression and establish combination models. The performance of combined models was evaluated by the receiver operating characteristic (ROC) analysis. The nomogram was created, and the calibration and discrimination performances were estimated.

Results: The ADC_{mean}, ADC_{ss}, and ADC_{min} were independently correlated with PD-L1 expression, among which the ADC_{min} demonstrated most excellent performance with AUC of 0.88 through the DeLong test (Z : 2.45-2.89, $P < 0.05$). FIGO staging, pathological grade, parametrial

invasion, lymph node status, and ADCmin were independently associated with PD-L1 expression. A combination model with the above parameters was constructed and yielded an AUC, sensitivity, and specificity of 0.91(0.88–0.93), 87.6%, and 85.5%, which is higher than the clinicopathological model (including FIGO staging, pathological grade, parametrial invasion, lymph node status, AUC: 0.83(0.79–0.85), 93.2%, 53.5%). A nomogram constructed based on the combination model was well validated in the validation cohort with C-index values of 0.90 and AUC of 0.90. The calibration with $P = 0.12$ Hosmer–Lemeshow test demonstrated good agreement, and the DCA verified the benefits of the nomogram.

Conclusion: The ADC values extracted from the DWI sequence were associated with PD-L1 expression, and ADCmin had excellent performance. The combination model could adequately discriminate while predicting PD-L1-positive in CC patients, thereby serving as a predominant tool for selecting eligible cases for immunotherapy.

OR-0099

Forebrain neural progenitors effectively integrate into host brain circuits and improve neural function after ischemic stroke

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Background: The diversity and complexity of impaired cortical neurons and circuits pose a significant challenge in stem cell therapy for ischemic cortical stroke(1). To enhance neuronal replacement and functional repair in cases of ischemic cortical stroke, we have generated new-generation forkhead box G1 (FOXP1)-positive neural precursor cells (NPCs), which can differentiate into various cortical neurons including upper- and deep-layer excitatory and inhibitory neurons, achieving early functional maturation simultaneously in vitro (Extended Fig.1). In this study, we systematically investigated the in vivo neuronal differentiation and functional integration of transplanted forebrain NPCs in stroke-damaged brains, focusing on synaptic regeneration and neural circuit reconnection of transplanted cells.

Methods: The synaptic vesicle glycoprotein 2A (SV2A) PET was employed for the first time to assess the overall modification in synaptic density in the infarct-adjacent area subsequent to transplantation of forebrain NPCs. Single-nucleus RNA sequencing (SnRNA-seq) and neurobiological analyses, including immunoelectron microscopy, electrophysiology, and virus tracing, were utilized to confirm efficient synaptic integration achieved by forebrain NPCs.

Results: In this study, 18F-SynVesT-1, a novel PET imaging probe targeting SV2A, was synthesized using trimethyltin precursors according to the reported method(2) (Fig. 1a). The radiosynthesis of 18F-SynVesT-1 proceeded with non-decay radiochemical yield ($9.74 \pm 4.55\%$; $n = 15$) and good radiochemical purity ($>99\%$, Fig. 1b,c). Furthermore, SV2A PET imaging results demonstrated a significant increase in 18F-SynVesT-1 accumulation in the NPC group compared to the vehicle control at 4 weeks post-transplantation. This suggests that there is an increased

occurrence of newly established synapses in the ipsilateral cortex adjacent to the infarct (the main transplantation location) (Fig. 1d,e). In snRNA-seq studies, the top expressed gene in transplanted human cells is associated with synapse organization, axonogenesis, and synapse assembly according to GO enrichment analysis (Fig. 1f). To confirm the direct integration of human grafts into rat brain circuits, we employed immunoelectron microscopy to identify synaptic connections between the grafts and host neurons. Results showed most forebrain NPC-derived cells displayed mature neuron ultrastructures 6 weeks post-transplantation, including mitochondrial-rich cytoplasm, rough endoplasmic reticulum, Golgi apparatus, and free ribosomes (Fig. 1g). Interestingly, we found most synaptic contacts (83%) were asymmetric with excitatory synapse structural characteristics, e.g., broad synaptic cleft, high postsynaptic density, and spherical synaptic vesicles (Fig. 1h-j). Whole-cell patch-clamp recordings were performed in acute brain slices at 7 and 11 weeks post-transplantation. Results showed that 93% of the 27 recorded forebrain NPC-derived cells fired action potentials upon depolarizing current injection (Fig. 1k). In addition, most recorded forebrain NPC-derived cells received postsynaptic currents, including spontaneous excitatory (sEPSCs, 78%) and inhibitory postsynaptic currents (sIPSCs, 4%) in 23 recorded forebrain NPC-derived neurons (Fig. 1l). These results demonstrate that transplanted forebrain NPC-derived neurons can establish effective functional synaptic connections with the host brain. Six weeks after transplantation, we injected a scAAV2/1-hSyn-Cre virus into the ipsilateral ventral thalamus of stroke model rats and AAV2/8-EF1 α -DIO-mCherry virus into the somatosensory-motor cortex where forebrain NPCs were transplanted. Four weeks after injection, the manifestation of mCherry signals was detected in forebrain NPC-derived neurons expressing GFP, which also exhibited positivity for HuNu (Figure 1m). This observation indicates that the forebrain NPC-derived neurons have successfully integrated into the thalamocortical projection circuit. Taken together, SV2A PET imaging, snRNA-seq and neurobiological analysis confirmed that the FOXG1+ NPC-derived cells achieved early functional maturation and efficient integration into the stroke-injured cortex.

Conclusions: The FOXG1 forebrain progenitor cells demonstrated proficient synaptic integration following transplantation into the stroke-injured brains. The non-invasive, in vivo 18F-SynVesT-1 PET imaging was successfully employed to evaluate changes in synapse count pre- and post-FOXG1 progenitor transplantation, which will play a pivotal role in clinical translational studies of NPCs therapy by enabling visual observation of synaptic regeneration and repair.

OR-0100

基于 J 差异编辑磁共振波谱的人体肝脏脂质组分测量

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目的: 人体肝脏脂肪沉积与包括非酒精性脂肪肝炎在内的代谢类疾病相关, 并且脂肪成分相比于脂肪总量可能与肝脏脂肪变性的进程更加相关。肝活检是目前用于评价肝脂成分的“金标准”, 但其侵入性限制了其应用和研究范围, 而一般的磁共振波谱 (1H-MRS) 方法无法准确分离不饱和脂肪信号 (见图 1)。本研究旨在验证 J 差异编辑 (JDE) 波谱技术在人体肝脏脂质成分测量上的可行性。

方法:

设备/序列: 3 T 西门子临床磁共振/MEGA-PRESS 序列。

受试者: 16 例健康人, 15 例脂肪肝患者 (6 例轻度脂肪肝, 9 例中度脂肪肝), 8 例糖尿病伴随脂肪肝患者, 均禁食 8 小时以上。

测量方法: 在呼吸门控和屏气的条件下分别测量了右肝中段和下段的磁共振波谱, 用于比较不同方法下测量的稳定性。

脂肪成分分析: 测量不饱和脂肪质子信号, 计算脂肪成分的不饱和度 (UIs): 烯丙基 (allylic) / 亚甲基; 多不饱和度 (PUI): 二烯丙基 (diallylic) / 亚甲基。

数据分析: 用组内相关系数 (ICC) 分析不同测量方法的稳定性。分析不同测量方法下分析正常人与脂肪肝患者和糖尿病患者、脂肪肝患者和糖尿病患者之间的肝脏脂肪成分差异。

结果:

测量方法比较: 图 2a 展示了不同测量方法及获得的所有瞬态下的 JDE 波谱。图 2b 显示了在健康人、轻度和中度脂肪肝患者中不同测量方法的 ICC 值。呼吸门控+右肝下段的组合在所有组别中都表现出最好的稳定性。

脂质组成: 图 3a 展示了健康人和脂肪肝患者的 JDE 波谱。图 3b 显示, 健康人的 UIs 和 PUI 都显著高于脂肪肝患者和治疗前后的糖尿病患者。另外, 配对检验显示糖尿病患者治疗前后的 UIs 和 PUI 都存在显著差异。脂肪肝患者和糖尿病患者之间则没有表现出差异性。

结论: 本研究展示了 JDE 技术测量人体肝脏脂质成分的可行性。该方法获得的脂质组成与以往研究中人体肝脏活检的结果一致, 即脂肪肝患者更有可能以饱和脂质的形式储存肝脏脂肪。本研究提出的测量方法和有效性可为今后 JDE MRS 在人体肝脏上的进一步应用研究提供依据。

OR-0101

纳米技术引发细胞焦亡联合影像技术监测癌症治疗的研究进展

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[目的] 在医工交叉创新融合的发展下, 通过构建精准功能化的纳米材料来应对复杂的肿瘤微环境和特殊的肿瘤疾病, 深入探索新型多功能纳米材料在肿瘤成像和治疗中的应用价值。

[方法] 近年来, 研究证明细胞焦亡是在 gasdermin 蛋白介导下破坏细胞膜并释放内容物诱导细胞死亡, 对肿瘤免疫进行调控并产生强烈的炎症反应和显著的肿瘤消退。在智慧医疗的提倡下, 肿瘤免疫疗法结合纳米制剂在影像技术的监测下能有效的清除恶性肿瘤, 可作为肿瘤有效治疗的新策略。在现有的抗癌策略中, 光动力疗法可以利用激光照射由光敏剂合成的新型纳米材料来提高肿瘤靶向治疗效率; 光热疗法可以通过光能转换为热能直接杀死肿瘤细胞, 而良好的生物降解性和较强的光热转换性的光热材料是提高肿瘤有效治疗的关键因素; 在继光动力疗法后, 新型声动力治疗策略以塑造超声响应的声敏剂, 实现声致发光介导的抗癌效应。另外, 通过多功能纳米颗粒调控肿瘤内环境的氧化还原平衡实现纳米催化治疗, 肿瘤内发生氧化应激以提升活性氧水平实现细胞焦亡。对于单一的化疗药物治疗作用广泛, 纳米药物递送系统能精准递送到肿瘤部位, 增强渗透滞留效应并有效降低化疗药物的副作用。在肿瘤成像方面, 能谱 CT 在性能和后处理能力上具有卓越的材料区分优势。能谱 CT 成像后处理技术结合纳米材料成像对比剂可以实现监测与治疗并行。在肿瘤与正常组织难以区分的情况下, 能谱 CT 成像利用物质分离、能谱曲线、能量分析技术等影像处理技术带来更精准、定量的多参数成像信息。

[结果] 新型的多功能纳米材料不仅可以满足实时高时空分辨率成像的需求, 给肿瘤治疗提供可视化的影像引导作用。此外, 纳米材料还可以调节肿瘤微环境, 通过调节氧化还原平衡产生活性氧诱导细胞死亡达到治疗肿瘤的目的。

[结论] 肿瘤免疫疗法结合纳米制剂可以在影像技术的监测下有效的清除恶性肿瘤, 可作为肿瘤有效治疗的新策略。设计多功能纳米制剂结合现阶段的影像技术手段可以满足影像成像与肿瘤治疗的需求, 辅助多种模式治疗方法实现动态监测治疗疗效。

OR-0102

基于 18F-FDG PET/CT 瘤内瘤周影像组学对非小细胞肺癌病理亚型分类的预测价值

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目的：本研究旨在探究基于 18F-FDG PET/CT 的肺癌瘤内瘤周影像组学模型在非小细胞肺癌病理亚型分类中的作用。

方法：收集了 2019 年 5 月至 2023 年 1 月期间 141 例非小细胞肺癌患者的 PET/CT 扫描数据。

使用 Pyradiomics 模块从 PET/CT 图像中提取瘤内和瘤周的 CT 和 PET 影像组学特征。

建立了基于瘤内、瘤周 2mm 和瘤周 4mm 区域的逻辑回归模型。

结果：在 141 例患者中，70% 被随机选择为训练集，30% 为测试集。

使用逻辑回归模型，瘤周 2mm 联合模型的 AUC 值达到 0.964，是所有模型中表现最佳的，其次是瘤内联合模型 (AUC=0.937) 和瘤周 4mm 模型 (AUC=0.890)。

结论：基于 18F-FDG PET/CT 的瘤内瘤周影像组学模型对非小细胞肺癌的亚型分类具有高度的预测准确性，其中瘤周 2mm 模型表现最佳。这为非小细胞肺癌的诊断和治疗提供了新的视角和方法。未来，结合影像组学与其他先进技术，如基因组学和多模态数据融合，将为研究提供更多可能性。

OR-0103

自噬抑制剂增效锰促 STING 通路激活的免疫治疗用于防止 TNBC 术后复发转移

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目的：高复发、转移率是导致 TNBC 患者死亡的最直接原因，T 细胞浸润不足及肿瘤免疫抑制微环境等临床现行干预手段无法使患者获益。 Mn^{2+} 作为人体必备微量元素可以介导干扰素基因 (STING) 通路的激活，有效促进 T 细胞的启动和招募，提高免疫治疗疗效。但其通路的激活易诱使肿瘤细胞产生保护性自噬，降低 STING 通路激活效果。因此协同激活 STING 通路并抑制保护性自噬可以显著降低 TNBC 术后复发和转移，并同步实现基于 Mn^{2+} MRI 成像的动态监测，从而改善患者预后。

材料与方法：我们构建了一种由水凝胶包载的纳米体系 (GOx-MPN/HCQ@Gel)。纳米颗粒进入肿瘤细胞后， Mn^{2+} 激活 STING 通路，HCQ 抑制保护性自噬解除对 STING 通路抑制，从而高效招募效应 T 细胞，发挥强效抗肿瘤治疗效果。同时， Mn^{2+} 在 GOx 参与下介导的类芬顿反应可以协同增强 STING 通路的激活，并通过 CDT 疗法增效肿瘤杀伤，最终实现多机制联合的免疫治疗。我们对纳米体系的理化性质、体内外成像能力、STING 通路及自噬相关蛋白表达和免疫治疗效果进行了评估。

结果：MR 扫描显示纳米体系具有锰浓度依赖性成像特点，材料及动物层面均可实现稳定成像能力。CCK-8 结果显示 GOx-MPN/HCQ@Gel 可以有效诱导 4T1 细胞凋亡。Western Blot 检测证实纳米体系处理的 4T1 细胞中 STING 通路相关蛋白表达明显增加，抑制性自噬蛋白表达显著降低。小动物术后模型在给予水凝胶治疗 15 天后，GOx-MPN/HCQ@Gel 治疗组肿瘤体积明显减小，且组织内见大片坏死；相关 CD4、CD8 以及记忆 T 细胞等免疫细胞的表达较其他组均显著增加；同步进行的 MRI 检查亦可观察到相同的现象。血液生化指标检测以及组织器官病理切片染色显示纳米体系生物安全性高。

结论：本研究成功构建 GOx-MPN/HCQ@Gel 纳米体系，显著增强 STING 通路激活并抑制保护性自噬，明显增强免疫治疗效果，有效降低 TNBC 术后复发和转移率。同时具备缓释和实时磁共振评

估能力, 实现药物肿瘤部位长时程蓄积及疗效动态监测评估; 并且具有良好的生物相容性及生物安全性。

OR-0104

基于磁共振 CEST 成像对脉冲电磁场治疗阿尔兹海默症小鼠的疗效评估与机理研究

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目的: 尝试利用磁共振 CEST 成像活体动态监测脉冲电磁场 (Pulse Electromagnetic Field, PEMF) 干预下阿尔兹海默症 (Alzheimer's disease, AD) 小鼠的抑制性神经递质 γ -氨基丁酸 (GABA) 的变化, 并通过比较与疾病组和空白组之间的差异以探索疗效和机制。

方法: 在这项研究中, 对 APP/PS1 转基因小鼠进行脉冲电磁场治疗, 持续 4 周。对 APP/PS1+PEMP 组、APP/PS1 组、WT 组于治疗期/假治疗期的前/后进行磁共振 CW-CEST 与 VDMP-CEST 成像, 揭示 PEMF 对海马及皮层 GABA 含量及微观结构的影响, 采用酶联免疫吸附实验 (ELISA) 检测脑组织中海马及皮层的 GABA 水平, 通过免疫组织化学 (IHC) 分析评估 A β 病理的参与, 通过尼氏染色 (Nissl staining) 检查神经元功能状态, 采用莫里斯水迷宫 (Morris water maze) 检验探讨 PEMF 对 AD 动物模型运动和认知障碍的影响。通过 MATLAB 软件进行 CEST 图像后处理并计算 CEST 比率 (CEST ratio, CESTR), 用 image J 软件分析免疫组化切片阳性 A β 斑块面积与尼氏染色阳性细胞计数, 用 SPSS、Graphpad Prism 软件统计绘图。

结果: 本研究探讨 PEMF 对 AD 小鼠模型中 GABA 能突触传递的影响。在体内和体内实验中, 我们证实 PEMF 可以使 APP/PS1+PEMP 组小鼠大脑的 GABA 含量增多、A β 沉积减少, 而 APP/PS1 组与 WT 组于假治疗期前后的 GABA 含量无明显差异、A β 沉积较多, 且 VDMP-CEST 较 CW-CEST 对 GABA 的成像效果更优。另外, PEMF 能够改善 APP/PS1+PEMP 组小鼠大脑神经元数目和形态, 减轻 APP/PS1+PEMP 组小鼠的认知障碍。这种神经保护机制可能涉及调节大脑的 GABA 能传递。

结论: GABA 是改善 AD 认知障碍的重要神经递质, VDMP-CEST 是脉冲电磁场治疗中 GABA 变化可视化的有效方法。

OR-0105

新型靶向 LAG-3 环肽 PET 分子探针 在肝细胞癌个体化免疫治疗的研究

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目的: 淋巴细胞活化基因 3 (Lymphocyte-activation gene 3, LAG-3) 在肝癌患者 CD8⁺ 肿瘤浸润 T 淋巴细胞上广泛表达, 与肝癌预后不良密切相关, 有潜力成为评价肝癌治疗疗效的潜在生物标志物, 因此对 LAG-3 进行活体成像具有重要价值。在本研究中, 我们开发了一种基于环肽结构的靶向 LAG-3 的 PET 分子成像探针-⁶⁸Ga-NOTA-C25, 在体内评估小鼠肝癌 LAG-3 的表达。

方法: ⁶⁸Ga-NOTA-C25 是利用 ⁶⁸Ga 定点标记的方法制备获得。标记完成后, 计算标记率、放化纯度等进行表征及质控。构建 Hepa1-6 小鼠肝癌皮下移植瘤模型, 并随机分配为靶向组和阻断组 (n=3-4, 在探针前 60min 经鼠尾静脉注射未做标记的 C25 500 μ g)。随后经鼠尾静脉给两组小鼠注射 ⁶⁸Ga-NOTA-C25 (约 200 μ Ci), 分别在 30、60 和 120min 进行 micro-PET 扫描。比较两

组老鼠肝癌在各个时间点的摄取值和肿瘤与肌肉比 (tumor/muscle, T/M)。

结果: ^{68}Ga -NOTA-C25 的放射化学产率约 60%和纯度约 99%。 ^{68}Ga -NOTA-C25 在靶向组和阻断组 Hepa1-6 小鼠肝癌摄取值有显著差异。靶向组 Hepa1-6 小鼠肝癌摄取值在 30min 为 0.852 ± 0.272 %ID/g, T/M 约 20.52 ± 4.78 , 随后分子探针在 60min、120min 的摄取值、T/M 下降, 摄取值分别为 0.435 ± 0.124 %ID/g、 0.315 ± 0.075 %ID/g, T/M 分别为 8.45 ± 1.32 、 7.42 ± 1.56 。阻断组小鼠肿瘤的摄取值在 30、60 和 120min 分别 0.428 ± 0.144 %ID/g, 0.237 ± 0.125 %ID/g, 0.218 ± 0.115 %ID/g, T/M 分别为 5.32 ± 1.56 、 4.55 ± 1.22 、 4.23 ± 1.38 。

结论: ^{68}Ga -NOTA-C25 PET 成功在活体监测到小鼠肝癌的 LAG-3 表达, 有望成为监测肝癌免疫治疗的分子影像学工具。

OR-0106

Low-Power Magnetic Resonance-Guided Focused Ultrasound Tumor Ablation upon Controlled Accumulation of Magnetic Nanoparticles by Cascade-Activated DNA Cross-Linkers

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Magnetic resonance-guided focused ultrasound (MRgFUS) is a promising non-invasive surgical technique with spatial specificity and minimal off-target effects. Despite the expanding clinical applications, the major obstacles associated with MRgFUS still lie in low magnetic resonance imaging (MRI) sensitivity and safety issues. High ultrasound power is required to resist the energy attenuation during the delivery to the tumor site and may cause damage to the surrounding healthy tissues. Herein, a surface modification strategy is developed to simultaneously strengthen MRI and ultrasound ablation of MRgFUS by prolonging Fe_3O_4 nanoparticles' blood circulation and tumor environment-triggered accumulation and retention at the tumor site. Specifically, reactive oxygen species-labile methoxy polyethylene glycol and pH-responsive DNA cross-linkers are modified on the surface of Fe_3O_4 nanoparticles, which can transform nanoparticles into aggregations through the cascade responsive reactions at the tumor site. Notably, DNA is selected as the pH-responsive cross-linker because of its superior biocompatibility as well as the fast and sensitive response to the weak acidity of 6.5–6.8, corresponding to the extracellular pH of tumor tissues. Due to the significantly enhanced delivery and retention amount of Fe_3O_4 nanoparticles at the tumor site, the MRI sensitivity was enhanced by 1.7-fold. In addition, the ultrasound power was lowered by 35% to reach a sufficient thermal ablation effect. Overall, this investigation demonstrates a feasible resolution to promote the MRgFUS treatment by enhancing the therapeutic efficacy and reducing the side effects, which will be helpful to guide the clinical practice in the future.

OR-0107

The mechanism of myocardial injury in iron overload cardiomyopathy based on CMR and Cell Biology

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Objective: To investigate the effect of ferroptosis on the mechanism of myocardial injury in iron overload cardiomyopathy (IOC) by CMR in vivo and Cell Biology in vitro.

Methods: An IOC rat model was established by intraperitoneal injection of iron dextran to simulate human iron overload conditions and cardiomyocytes (H9C2) were cultured in different concentrations of iron overload medium (ferric citrate) for the IOC cell model. CMR was performed to evaluate cardiac function and iron deposition. Blood biochemistry was used to detect circulating iron overload. Prussian blue staining and Masson staining were used to detect iron and fibrosis deposition in myocardial tissue, respectively. The mitochondrial morphology was observed by Transmission Electron Microscopy (TEM). IOC cell model was constructed and ferroptosis-related markers including Malondialdehyde (MDA) and prostaglandin-endoperoxide synthase 2 (PTGS2) were detected to verify the underlying mechanism of myocardial injury in iron overload.

Results: T2 values of septum papillary muscle level in the IOC group (septum: 22.3 ± 2.6 ms Vs. 12.7 ± 3.3 ms, $P < 0.01$). There were no significant differences in LVEF between the IOC and control group ($P > 0.05$). However, GLS was significantly reduced in the IOC model group ($-21.9 \pm 1.3\%$ vs. $-18.8 \pm 2.1\%$, $P < 0.01$), but GRS and GCS were not significantly reduced ($P > 0.05$). LGE was negative in the IOC group. Blood biochemical results showed that serum iron, ferritin, and transferrin levels were significantly increased in IOC rats (all $P < 0.01$). Serum iron levels in the IOC group correlated with myocardial T2 values ($R^2 = 0.5051$, $P = 0.01$). Massive iron particles were deposited in the myocardial tissue by Prussian blue staining and there was no fibrosis in Masson-stained myocardium in the IOC group. CCK-8 results showed that cardiomyocyte viability decreased ferric citrate dose-dependently ($R^2 = 0.5483$, $P < 0.0001$). Markers of ferroptosis included MDA, which was dose-dependently increased with the concentration of iron citrate ($R^2 = 0.5451$, $P = 0.0005$), and PTGS2 was significantly upregulated in iron-treated cells and positively correlated with ferric citrate (FAC) concentration ($R^2 = 0.6939$, $P = 0.04$). Under TEM the mitochondrial degeneration and swelling, crest broke even disappeared, and local vacuolization of cardiomyocytes in the myocardium in IOC rats and cardiomyocytes were visible.

Conclusions: CMR, blood biochemistry, and pathology confirmed that intraperitoneal injection of iron dextran can construct a rat model of iron overload cardiomyopathy. Ferroptosis may be the potential mechanism of cardiac dysfunction in IOC rats.

OR-0108

Nanoparticle-Mediated Blockade of CXCL12/CXCR4 Signaling Enhances Glioblastoma Immunotherapy: Monitoring Early Responses with MRI-Radiomics

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The limited therapeutic efficacy of checkpoint blockade immunotherapy against glioblastoma (GBM) is closely related to the blood-brain barrier (BBB) and tumor immunosuppressive microenvironment, the latter being largely driven by tumor-associated myeloid cells (TAMCs). Targeting the C-X-C motif chemokine ligand-12/C-X-C motif chemokine receptor-4 (CXCL12/CXCR4) signal pathway orchestrates the recruitment of TAMCs and has emerged as a promising approach to alleviate immunosuppression. Herein, we developed an iRGD ligand-modified polymeric nanoplatform for co-delivery of the CXCR4 antagonist AMD3100 and the small-molecule immune checkpoint inhibitor BMS-1. The iRGD peptide facilitated superior BBB crossing and tumor targeting abilities, validated in both in vitro and in vivo models. In mice bearing orthotopic GL261-Luc tumor, co-administration of AMD3100 and BMS-1 significantly inhibited tumor proliferation without adverse effects. Notably, we observed a reprogramming of immunosuppression upon CXCL12/CXCR4 signal blockade, characterized by the reduction of TAMCs and CD4⁺CD25⁺Foxp3⁺ regulatory T cells (Treg cells), an increased proportion of CD3⁺CD8⁺ T lymphocytes, as well as the upregulation

of antitumor cytokines IFN- γ and TNF- α , and downregulation of protumor proteins TGF- β and IL-10. Remarkably, elevation of IFN- γ secreted from activated immune cells upregulated PD-L1 expression in tumor cells, highlighting the synergistic effect of BMS-1 in counteracting the PD-1/PD-L1 pathway. Additionally, our study unveiled the ability of MRI-radiomics to reveal early changes in the tumor immune microenvironment following immunotherapy, offering a powerful tool for monitoring treatment responses.

OR-0109

Intracranial gadolinium deposition after using gadolinium-based contrast agents in children: A systematic review and meta-analysis

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Background: Gadolinium-based contrast agents (GBCAs) have been widely used in contrast-enhanced magnetic resonance imaging (MRI) examinations, but the safety of GBCAs has always been a concern due to the toxic of free Gd³⁺. Currently, most research on intracranial gadolinium deposition has been conducted in adults, but the influence of GBCAs in children is still unknown. **Purpose:** To determine whether the use of GBCAs induces gadolinium deposition in the brains of children.

Methods: We searched PubMed、MEDLINE、Web of Science、Embase 和 Cochrane Central Register of Controlled Trials databases until April 2023. Studies on changes in T1-weighted MR images (T1WI) signal intensity in the globus pallidus (GP) and dentate nucleus (DN) in the brains of children after administration of GBCAs were included. Quality evaluation, heterogeneity analyses, meta-regression, subgroup analyses, sensitivity analyses and publication bias analyses were performed.

Results: Ten studies were finally included in the meta-analysis, including 459 pediatric patients with an age range of 0.1 to 18.1 years. In the linear GBCAs studies, the changes in T1-weighted imaging intensity in the GP and DN exhibited significant difference (effect size=1.55, 95% CI: 0.75 to 2.34; effect size=1.96, 95% CI: 1.01 to 2.91, respectively) and notable heterogeneity ($I^2=83.3\%$, $P<0.001$; $I^2=89.4\%$, $P<0.001$, respectively). In the macrocyclic GBCAs studies, after excluding interfering studies, no significant change existed in T1WI signal intensity in GP or DN (effect size=0.13, 95% CI: -0.08 to 0.35; effect size=-0.02, 95% CI: -0.21 to 0.16, respectively) and no heterogeneity existed ($I^2=0\%$, $P=0.884$; $I^2=0\%$, $P=0.959$, respectively).

Conclusion: Regarding linear contrast agents, a history of brain radiation therapy and the number of uses of GBCAs affected gadolinium deposition in the brains of children. Macrocyclic GBCAs had higher safety in children. These data lay the foundation for future prospective large-scale clinical trials in children.

OR-0110

用于乳腺癌早期诊断及精准手术 导航的靶向 FI/MRI 多模态分子探针的构建

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目的: 乳腺癌作为最常见的恶性肿瘤之一, 是女性癌症相关死亡的第二大原因。通常在乳腺癌的早期就已经发生了转移, 因此, 乳腺癌的早期诊断和复发筛查是提高乳腺癌患者生活质量和生存率的决定因素。但乳腺癌的早期诊断和治疗目前仍面临以下三个重要的临床问题: 首先目前临床常见的影像检查方式对早期乳腺癌的敏感性较低, 严重影响了患者的预后; 其次, 转移与否决定了不同治疗方式的选择, 但是目前临床常见的检查方式对微转移灶并不敏感, 这是肿瘤复发的重要原因。再者, 外科医生手术时仅能靠主观观察去判断切除范围, 这导致术后手术切缘肿瘤阳性的比例较高, 严重影响了患者的预后。为有效解决上述 3 个临床问题, 实用荧光-磁共振双模态分子探针可以实现肿瘤的早期诊断和术中可视化手术导航, 对肿瘤的精准切除和改善预后有重要的临床价值。

方法: 本研究拟通过“一锅法”合成碳钆复合物 (GCNP), 为了能够靶向乳腺癌细胞, 在 GCNP 表面修饰了 CD44 抗体作为靶向配体。随后通过细胞毒性实验、溶血实验评估分子探针的急性毒性反应, 通过对小鼠心、肝、脾、肺、肾组织切片的 H&E 染色来评估分子探针的急慢性毒副作用小鼠多器官对分子探针的安全性、靶向性及成像功能进行检测。通过细胞电镜、细胞荧光、细胞及活体 MRI 评估分子探针成像效果及靶向性。

结果: TEM 显示该探针成球形, 大小约 35.38 ± 4.93 nm, 荧光量子产率约 62.17%。纵向弛豫率 (r_1) 明显高于 Gd-DTPA (8.58 (GCNPs)、2.08 (Gd-DTPA))。细胞荧光成像显示靶向细胞发出明显的蓝光、绿光和红光, 细胞磁共振显示随着分子探针量的增加信号增强明显。小鼠切片、荧光成像及 MRI 成像显示分子探针主要在肿瘤边界聚集, 逐渐向中心进展。

结论: 该研究构建的荧光-磁共振双模态分子探针为乳腺癌的精准手术、复发转移检测提供了重要的临床价值。

OR-0111

A CT-based radiomics approach to predict intra-tumoral tertiary lymphoid structures and recurrence of intrahepatic cholangiocarcinoma

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Purpose This study aims to predict the TLSs status and recurrence-free survival (RFS) of intrahepatic cholangiocarcinoma (ICC) patients using preoperative CT texture analysis.

Patients and methods A total of 116 ICC patients from two centers were included (training cohort = 86; external validation cohort = 30). The enhanced CT images were performed for radiomics model construction. The logistic regression analysis was applied to construct the clinical model. The combined model was based on clinical and radiomics models. Model performance was compared by ROC curves.

Results A total of 6 features were combined to establish a radiomics model, with an AUC of 0.82, 0.86 in the training and external validation cohorts, respectively. Arterial phase diffuse hyperenhancement and AJCC 8th stage were combined to construct a clinical model, with AUCs of 0.75, 0.71 in the training, external validation cohort. Patients of intra-tumoral TLSs-positive showed significantly better RFS than those of TLSs-negative ($p=0.014$). Patients of rad-score no

less than -0.76 (low-risk) group showed significantly better RFS than those of rad-score less than -0.76 (high-risk) group ($p < 0.001$). Patients of nomogram-score no less than -1.16 (low-risk) group showed significantly better RFS than those of nomogram-score less than -1.16 (high-risk) group ($p < 0.001$). And all the stratifications were confirmed in the external validation cohort.

Conclusions CT radiomics nomogram could serve as a preoperative biomarker of intra-tumoral TLSs status, better than independent radiomics or clinical models; pre-operative CT radiomics nomogram achieved accurate stratification for RFS of ICC patients, better than the post-operative pathologic TLSs status.

OR-0112

改变“廓清”在钆塞酸二钠增强 MRI 上的定义后 LI-RADS 对肝细胞癌 (HCC) 的诊断效能

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目的 探讨将钆塞酸二钠增强 MRI (EOB-MRI) 上肝脏成像报告与数据系统 (LI-RADS) 中“廓清”定义扩大到移行期 (TP) 低信号或肝胆期 (HBP) 低信号后, LI-RADS 中 LR-5 (肯定 HCC 的分类) 对 HCC 的诊断效能。

方法 回顾性收集经病理证实且进行 EOB-MRI 检查的高 HCC 风险患者资料。根据不同的“廓清”定义, 提出了三种改进的 LI-RADS (mLI-RADS) 算法: a) PVP 或 TP 低信号; b) PVP 或 HBP 低信号; c) PVP 或 TP 或 HBP 低信号。计算 LI-RADS 中 LR-5 对 HCC 的诊断效能, 包括敏感度, 特异度、阳性预测值、阴性预测值、准确度和约登指数。采用 McNemar χ^2 检验比较 LI-RADS 与 mLI-RADS 的诊断效能的差异。

结果 共 379 例患者, 426 个经病理证实的肝脏病灶 (250 例 HCC, 88 例非 HCC 恶性病变和 88 例良性病变)。mLI-RADS a-c 的敏感度均高于 LI-RADS (80.0% vs. 74.4%, 80.8% vs. 74.4%, 80.8% vs. 74.4%, p 均 < 0.001)。mLI-RADS a-c 对 HCC 的特异度略低于 LI-RADS (86.9% vs. 88.6%, 85.8% vs. 88.6%, 85.8% vs. 88.6%), 但差异无统计学意义 (p 均 > 0.05)。三种 mLI-RADS 算法的准确度相同且均高于 LI-RADS (82.9% vs. 80.3%, p 均 < 0.05)。

结论 当在 EOB-MRI 图像上使用 LI-RADS 诊断 HCC 时, 将“廓清”定义不仅限于 PVP 低信号, 而是扩展到 TP 或 HBP 低信号时, 可获得更高的敏感度和准确度, 且特异度降低不显著。

OR-0113

Radiomics model based on contrast-enhanced CT texture features for pretreatment prediction of overall survival in esophageal neuroendocrine carcinoma

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Background Limited studies have observed the prognostic value of CT images for esophageal neuroendocrine carcinoma (NEC) due to rare incidence and low treatment experience in clinical. In this study, the pretreatment enhanced CT texture features and clinical characteristics were investigated to predict the overall survival of esophageal NEC.

Methods This retrospective study included 89 patients with esophageal NEC. The training and testing cohorts comprised 61 (70%) and 28 (30%) patients, respectively. A total of 402 radiomics features were extracted from the tumor region that segmented pretreatment venous

phase CT images. The least absolute shrinkage and selection operator (LASSO) Cox regression was applied to feature dimension reduction, feature selection, and radiomics signature construction. A radiomics nomogram was constructed based on the radiomics signature and clinical risk factors using a multivariable Cox proportional regression. The performance of the nomogram for the pretreatment prediction of overall survival (OS) was evaluated for discrimination and calibration.

Results Only the enhancement degree was an independent factor in clinical variable influenced OS. The radiomics signatures demonstrated good predictability for prognostic status discrimination. The radiomics nomogram integrating texture signatures was slightly superior to the nomogram derived from the combined model with a C-index of 0.844 (95%CI: 0.783-0.905) and 0.847 (95% CI: 0.782-0.912) in the training set, and 0.805 (95%CI: 0.707-0.903) and 0.745 (95% CI: 0.639-0.851) in the testing set, respectively.

Conclusion The radiomics nomogram based on pretreatment CT radiomics signature had better prognostic power and predictability of the overall survival in patients with esophageal NEC than the model using combined variables.

OR-0114

多模态功能磁共振成像鉴别 p53abn 与 p53wt 型子宫内膜癌的价值

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目的 探讨多模态功能磁共振成像 (fMRI) 鉴别 p53 突变型 (p53 abnormal, p53abn) 与 p53 野生型 (p53 wild-type, p53wt) 子宫内膜癌 (EC) 的价值。**材料和方法** 回顾性分析经手术病理证实的 47 例 EC 患者资料, 其中 p53abn 14 例, p53wt 33 例, 术前 MR 扫描序列包括酰胺质子转移加权 (APT_w) 成像、T2 定量成像 (T2 mapping)、魔镜成像 (mDIXON-Quant)、扩散加权成像 (DWI), 经后处理获得 APT、T2、横向弛豫率 (R2*)、脂肪分数 (fat fraction, FF)、表观扩散系数 (ADC) 图。由两位观察者分别测量两组病例的 APT、T2、R2*、FF 和 ADC 值, 采用同类相关系数 (ICC) 检验两位观察者对两组病例各参数值测量结果的一致性, 采用独立样本 t 检验或 Mann-Whitney U 检验比较两组病例各参数值的差异, 采用受试者工作特征曲线评价有统计学差异的参数及其联合后鉴别 p53abn 和 p53wt 型 EC 的效能, 采用 Delong 检验比较各曲线下面积 (AUC) 之间的差异。结果 两位观察者测量各数据的一致性良好 (ICC>0.75)。p53abn 组的 APT 值、R2* 值大于 p53wt 组, ADC 值小于 p53wt 组, 差异具有统计学意义 (P<0.05), 两组之间的 T2 值、FF 值无统计学差异 (P>0.05)。APT、R2*、ADC 以及 APT+R2*+ADC 值鉴别 p53abn 和 p53wt 型 EC 的 AUC 分别为 0.739、0.689、0.718、0.820, 各 AUC 之间无统计学差异 (P>0.05)。结论 APT_w、mDIXON-Quant 和 DWI 技术可定量鉴别 p53abn 和 p53wt 型 EC, 为术前 EC 定量评估 EC 分子分型提供新途径, 具有一定临床应用价值。

OR-0115

Feasibility of synthetic magnetic resonance imaging for deciding whether neoadjuvant chemoradiotherapy and predicting it's short-term efficacy in cervical cancer: Comparison with high resolution T2WI and DWI

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Purpose To investigate the feasibility of a synthetic MRI sequence(MAGiC) for deciding whether neoadjuvant chemoradiotherapy(NCRT) and predicting it's short-term efficacy(STE) in cervical cancer(CC) patients,in comparison to high resolution T2-weightedimaging(hrT2WI) and diffusion weighted imaging(DWI).

Materials and Methods The study protocol was approved by the local Research Ethics Committee.Informed consent was obtained from all subjects. 244 patients suspected of CC were enrolled and undergone the pre-treatment MAGIC, hrT2WI and DWI(Table 1).For those CC patients underwent NCRT,hrT2WI were performed again at 2 months after NCRT for evaluating STE(devided into completed response(CR)and no-CR group).MAGiC can generate synthetic morphologic images(syT2WI)and quantitative synthetic images(synthetic T1, T2 and PD maps)(Fig1).For the syT2WI,the tumor staging was assessed and decided whether NCRT for CC patients (hrT2WI as the reference).For the quantitative synthetic images,T1,T2,PD value were measured by regions of interests (ROIs) (Fig 2) to analysis the predictive performance of STE after NCRT (apparent diffusion coefficient (ADC) as reference). In addition, the image quality of syT2WI and hrT2WI were assessed with 4-point scale for anatomical details display, distortion, artifacts and lesion conspicuity.

Results 44 out of 75 confirmed CC patients undergone NCRT were followed up at least two months (Fig3). For the image quality, syT2WI was no significant differences in comparison of hrT2WI (All $P > 0.05$;Table2, Fig2).For deciding whether NCRT,the acc,sen,and spec of sy-T2WI were 0.899,0.947and0.999 in CC patients (Table3). For the quantitative synthetic images, T2, T1 and ADC values had a significant statistical differences to identify CR from no-CR($P < 0.05$)but PD($P > 0.05$; Table 4). Furthermore,T2(AUC:0.825) and T1 value (AUC:0.795) had a similar predictive performance for the STE after NCRT compared with ADC (AUC: 0.789,all $P > 0.05$) (Table5, Fig4).However,T1 combined T2 could not improve the predictive performance for STE with comparison of ADC (AUC:0.818vs0.789) (Table5, Fig4).

Conclusions MAGiC can derive synthetic morphologic images and quantitative synthetic images in one acquisition,which is a promising technique and feasibility for deciding whether NCRT and predict the STE in CC patients.

OR-0116

Multiparametric magnetic resonance investigations on acute and long-term kidney injury

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Abstract: Acute kidney injury (AKI) is a frequent complication of critical illness and carries a significant risk of short- and long-term mortality. The prediction of the progression of acute kidney injury to long-term injury has been difficult for renal disease treatment. Radiologists are keen for the early detection of transition from acute kidney injury (AKI) to long-term kidney injury, which would help in the preventive measures. The lack of established methods for early detection of long-

term kidney injury underscores the pressing needs of advanced imaging technology that reveals microscopic tissue alterations during the progression of AKI. Fueled by recent advances in data acquisition and post-processing methods of magnetic resonance imaging (MRI), multiparametric MRI is showing great potential as a diagnostic tool for many kidney diseases. Multiparametric MRI studies offer a precious opportunity for real-time non-invasive monitoring of pathological development and progression of AKI to long-term injury. It provides insight into renal vasculature and function (arterial spin labeling, intravoxel incoherent motion), tissue oxygenation (blood oxygen level-dependent), tissue injury and fibrosis (diffusion tensor imaging, diffusion kurtosis imaging, T1 and T2 mapping, quantitative susceptibility mapping). The multiparametric MRI approach is highly promising but the longitudinal investigation on the transition of acute kidney injury to irreversible long-term impairment is largely ignored. Further optimization and implementation of renal MR methods in clinical practice will enhance our comprehension of not only acute kidney injury but chronic kidney diseases. Novel imaging biomarkers for microscopic renal tissue alterations could be discovered and benefit the preventative interventions. This review explores recent MRI applications on acute and long-term kidney injury while addressing lingering challenges, with emphasis on the potential value of the development of multiparametric MRI for renal imaging on clinical systems.

OR-0117

光谱 CT 的细胞外容积及电子云密度在结肠癌浆膜受侵中的研究

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目的：研究基于双层探测器光谱 CT(Dual-layer detector computed tomography, DLCT)的细胞外容积 (Extracellular volume, ECV) 及电子云密度 (Electron density, ED) 在鉴别结肠癌肠周脂肪间隙模糊时浆膜层受侵中的价值。方法：搜集经 DLCT 检查的结肠癌肠周脂肪间隙模糊患者 62 例，根据病检结果分为突破浆膜层组 18 例，未突破浆膜层组 44 例，对差异有统计学意义的参数绘制 ROC (Receiver operating characteristic, ROC) 曲线。结果：有淋巴结转移的结肠癌患者更易突破结肠癌浆膜层，差异具有统计学意义 ($P < 0.05$)；两组间性别、发病部位及分化程度差异无统计学意义。未突破浆膜层与突破浆膜层两组患者在动脉期、静脉期及延迟期图像中，突破浆膜层组标准化碘浓度 (Normalized iodine concentration, NIC)、ECV 及 ED 差均大于未突破浆膜层组，且差异具有统计学意义 (均 $P < 0.05$)。利用延迟期 ECV 预测结肠癌突破浆膜层的诊断价值最高，临界值为 3.685 时，AUC 为 0.948，灵敏度为 94.44%，特异度为 90.91%。利用 ED 差进行诊断时，静脉期具有较高的诊断价值，临界值为 4.300% 时，AUC 为 0.903，灵敏度为 77.22%，特异度为 72.22%；而利用 NIC 进行诊断时，动脉期具有较高的诊断价值，AUC 为 0.902，灵敏度为 88.33%，特异度为 90.91%。结论：基于双层探测器光谱 CT 的 ECV 及 ED 在鉴别结肠癌肠周脂肪间隙模糊患者浆膜层侵犯中具有较高的诊断价值。

OR-0118

多参数 MRI 在识别 HCC 瘤内自发性凝固性坏死的价值研究

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背景：肝细胞肝癌 (hepatocellular carcinoma, HCC) 瘤内自发性凝固性坏死 (spontaneous intratumoral coagulative, iCN) 是一种常见的坏死亚型，可能代表 HCC 高侵袭性形式，并与低存活

率相关。

目的：探讨多参数 MRI 在识别肝细胞肝癌内自发性凝固性坏死中的价值。

方法：回顾性选取 2015 年 1 月至 2019 年 2 月行多参数 MRI 检查并行手术治疗的 HCC 患者进行研究。使用单变量和多变量 logistic 回归分析以筛选与 iCN 相关的 MRI 影像学特征，并评估其敏感性与特异性。多变量 Cox 比例风险模型和 Kaplan-Meier 生存分析用于评估 iCN 在预测 HCC 早期复发中的价值。

结果：对 163 名 HCC 患者(中位年龄：56 岁；四分位数：49, 64 岁；139 名男性)进行了评估，其中 27 例(16.6%)为 iCNs。在多变量 logistic 分析中，动脉期不规则边缘样强化($P=0.029$)和门脉癌栓($P=0.041$)是 iCN 的独立预测因子。动脉期不规则边缘样强化识别 iCN 的敏感性为 92.6% (25/27)，特异性为 57.4%(78/136)。门脉癌栓识别 iCN 的敏感性为 70.4%(19/27)，特异性为 92.1% (116/136)。当同时存在动脉期不规则边缘样强化及门脉癌栓时，识别 iCN 的敏感性为 80.0%，特异性为 86.4%。在多变量 Cox 比例风险模型中，只有存在 iCNs 与早期肿瘤复发独立相关($HR=2.73$; 95% CI: 1.20~6.21; $P=0.017$)。Kaplan-Meier 生存分析也显示存在 iCN 与 HCC 肿瘤早期复发相关 ($P<0.01$)

结论：在多参数 MRI 中，结合动脉期不规则边缘样强化和门脉癌栓有助于识别肝细胞肝癌内自发性凝固性坏死。存在 iCN 与 HCC 术后早期复发显著相关。

OR-0119

肝细胞肝癌的自然生长模式：单中心回顾性研究

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背景及研究目的：目前中国人群的肝细胞肝癌的发病和死亡人数均居于世界首位，然已发表的中英文文献中缺乏对中国人群肝癌自然病程及生长的研究的结果报道，本研究旨在量化中国区域内肝细胞肝癌患者肿瘤的自然生长速度与体积倍增时间，探索其自然生长特征及其相关影响因素，从而为中国区域内肝癌患者随诊及患者管理提供证据。

方法：回顾性观察我中心 2014 至 2021 年期间诊断 HCC 且未接受针对肝癌治疗患者，基于治疗前三维的患者 CT 及磁共振增强图像测量其肿瘤体积，计算肝癌肿瘤体积倍增时间及生长速度。采用描述性统计学方法进行描述，Kruskal-Wallis 检验，Fisher exact test 及 Univariable logistic regression 进行相关数据分析。

结果：研究最终共纳入肝癌患者 60 例，肿瘤中位体积倍增时间为 163.7 天。肿瘤倍增时间与肿瘤直径有关，直径增大，倍增时间延长；患者之间肿瘤的生长速度存在差异，肝癌直径越大，生长速度越慢。以 3 个月、9 个月分组，研究人群中肝癌快速生长组（体积倍增时间<3 个月）、中间组（3-9 个月）及惰性生长组（>9 个月）各占 1/3。

结论：本研究支持对中国大陆区域人群自然状态下采用间隔 6 个月的随诊，肝细胞肝癌生长与肿瘤直径相关，且人群中的肝癌肿瘤生长存在异质性。

OR-0120

Early tumor shrinkage and depth of response during treatment with immune checkpoint inhibitors as predictors of overall survival in patients with second-line or later therapy for advanced esophageal squamous cell carcinoma

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Background: Evaluation of tumor heterogeneity through early tumor shrinkage (ETS) and depth of response (DoR) serves as an indicator of inherent variations in treatment sensitivity. We hypothesized that ETS and DoR have potential as imaging biomarkers for assessing the efficacy of immune checkpoint inhibitors (ICIs) in patients receiving second-line or later therapy for advanced esophageal squamous cell carcinoma (ESCC).

Materials and methods: We retrospectively analyzed 121 patients with a histological or cytological diagnosis of advanced or metastatic ESCC. Patients who had failed or were intolerant to previous first-line or second-line standard treatments and received immunotherapy at our institute were eligible for inclusion in this study. ETS and DoR were calculated according to the Response Evaluation Criteria in Solid Tumors (RECIST) methodology. Additionally, multivariate analyses were performed to identify the significant prognostic variables for overall survival (OS).

Results: The results of the analysis revealed significant associations between longer overall survival (OS) and higher ETS and DoR values, as well as patients without lymphatic metastasis or with disease control ($p < 0.05$). OS was significantly shorter in patients with ETS $< 10\%$, DoR $< 13\%$, and those with lymphatic metastasis or without disease control ($p < 0.05$). Lymphatic metastasis, disease control, ETS with a 10% cut-off value, and DoR with a 13% cut-off value were independent predictive factors correlated with OS in the univariate and multivariate analyses.

Conclusion: ETS and DoR values were significantly associated with the overall survival of patients treated with ICIs during second-line or later therapy for advanced ESCC.

OR-0121

Contrast-enhanced CT radiomics for preoperative prediction of stage in epithelial ovarian cancer: a multicenter studyYinping Leng¹, Ao Kan¹, Xiwen Wang¹, Xuan Xiao¹, Yu Wang², Lianggeng Gong¹

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Background Preoperative prediction of stage in patients with epithelial ovarian cancer (EOC) is crucial for determining appropriate treatment strategy. This study aimed to explore the value of contrast-enhanced CT (CECT) radiomics in prognosticating the preoperative staging of EOC, and to validate the stability of the model through an independent external dataset.

Methods A total of 201 EOC patients from three centers, divided into a training cohort ($n=106$), internal ($n=46$) and external ($n=49$) validation cohorts. The least absolute shrinkage and selection operation (LASSO) regression algorithm was used for screening radiomics features. Five machine learning algorithms, namely logistic regression, support vector machine, random forest, light gradient boosting machine (LightGBM), and decision tree, were utilized in developing the radiomics model. The optimal performing algorithm was selected to establish the radiomics model, clinical

model, and the combined model. The diagnostic performances of the models were evaluated through receiver operating characteristic analysis, and the comparison of the area under curves (AUCs) were conducted using the Delong test.

Results Seven optimal radiomics features were retained by the LASSO algorithm. The five radiomics models demonstrate that the LightGBM model exhibits notable prediction efficiency and robustness, as evidenced by AUCs of 0.83 in the training cohort, 0.80 in the internal validation cohort, and 0.68 in the external validation cohort. The multivariate logistic regression analysis indicated that carcinoma antigen 125 and tumor location were identified as independent predictors for the staging of EOC. The combined model exhibited best diagnostic efficiency, with AUCs of 0.95 in the training cohort, 0.83 in the internal validation cohort, and 0.79 in the external validation cohort. The Delong test indicated that the combined model exhibited a significantly superior AUC value compared to the radiomics model ($P=0.04$) in the external validation cohort.

Conclusions The combined model integrating clinical characteristics and radiomics features shows potential as a non-invasive adjunctive diagnostic modality for preoperative evaluation of the staging status of EOC, thereby facilitating clinical decision-making and enhancing patient outcomes.

OR-0122

Survival time prediction of patients with high-grade serous ovarian cancer based on PET/CT-derived spatial heterogeneity metrics

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Objectives: To determine whether models based on quantitative PET/CT-derived spatial heterogeneity metrics can accurately predict the progression-free survival (PFS) and overall survival (OS) of patients with high-grade serous ovarian cancer (HGSOC). The correlation between model risk scores and p53 and Ki-67 expression levels was also assessed.

Methods: Patients diagnosed with HGSOC were retrospectively enrolled at our two affiliated hospitals from January 1, 2010, to December 30, 2020. Quantitative spatial heterogeneity metrics were calculated based on conventional measurements and texture features of primary and metastatic lesions in PET/CT. Then the conventional models, heterogeneity models and integrative models were constructed to predict PFS and OS. Spearman's correlation coefficient (ρ) was used to evaluate the correlation between immunohistochemical scores of p53 and Ki-67 and model risk scores.

Results: 292 patients were included (median age: 54 ± 9.4 years). The integrated models showed best performance in predicting both PFS and OS. The C-indices of the verification sets of integrated PFS model and OS model were 0.891 (95% confidence interval [CI]: 0.860–0.921) and 0.905 (95% CI: 0.873–0.936), respectively. The integrated PFS model showed the strongest correlation with the expression levels of p53 ($\rho = 0.859$, $p < 0.001$) and Ki-67 ($\rho = 0.829$, $p < 0.001$).

Conclusion: The models based on PET/CT quantitative spatial heterogeneity metrics exhibited good performance for predicting the PFS and OS of patients with HGSOC. P53 and Ki-67 expression levels were strongly correlated with the risk scores of the integrated predictive models.

OR-0123

基于深度学习重建的膀胱 MRI 在 VI-RADS 评估肌层浸润诊断中的前瞻性应用

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目的: 本研究目的为在前瞻性临床队列中探究 DLR 对膀胱 MRI 的影响, 包括检查时间、图像质量以及膀胱成像报告和数据系统 (vertical imaging reporting and data system, VI-RADS) 的诊断表现。

方法: 本前瞻性研究连续纳入 2022 年 8 月至 2023 年 2 月间经病理证实的膀胱尿路上皮癌患者。扫描标准横轴位和冠状位 T2WI (T2WIs) 以及标准横轴位 DWI (DWIs; 扫描时间为 5 分 57 秒) 后, 获取基于 DLR 的快速横轴位和冠状位 T2WI 序列 (T2WIDL) 以及横轴位 DWI (DWIDL; 扫描时间为 3 分 13 秒; 减少了 46%)。三名放射科医师独立进行 Likert 评分 (1-5 分, 5 分为最佳)、测量感兴趣区域信噪比和对比噪声比进行图像评估。此外, 还测量了 DWIs 和 DWIDL 中靶病灶的表观扩散系数 (apparent diffusion coefficient, ADC), 并进行了 VI-RADS 评分。对于标准序列和应用 DLR 的快速序列之间的数据比较, 根据数据是否为符合正态分布选择配对 T-检验和配对 Wilcoxon 符号秩检验。

结果: 本研究共纳入 70 名患者 (平均年龄 64 岁; 年龄范围 40-82 岁)。与横轴位和冠状位 T2WIs 和横轴位 DWIs 相比, 横轴位和冠状位 T2WIDL 以及横轴位 DWIDL 显示出显著更高的信噪比、对比噪声比以及提高的图像质量 (包括总体图像质量、图像清晰度和病变边缘锐利度)。DWIDL 和 DWIs 的 ADC 值未显示出显著性差异。在三名影像科医生中, 标准序列和应用 DLR 的快速序列在 VI-RADS 评估肌层浸润的受试者操作曲线下面积没有显著差异。

结论: 将 DLR 应用于膀胱 MRI 中的 T2WI 和 DWI 序列显著缩短了检查时间, 提高了图像质量, 并且不影响 VI-RADS 在评估膀胱癌肌层浸润的诊断性能。

OR-0124

Association between computed tomography-measured skeletal muscle quantity and quality characteristics and early diabetic kidney disease: a propensity score-matched study

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Objective: To investigate the association between computed tomography (CT)-measured quantity and quality characteristics of skeletal muscle (SM) and early diabetic kidney disease (DKD) in patients with type 2 diabetes mellitus (T2DM).

Methods: This retrospective study included patients diagnosed with T2DM, with and without early DKD, between January 2019 and December 2021. To reduce potential bias, propensity score matching (PSM) was performed. The areas and CT attenuation values for SM, intermuscular, visceral, subcutaneous, and perirenal adipose tissue were measured. After PSM, logistic and multiple linear regression analyses were performed to analyse risk factors for early DKD. Receiver operating characteristic (ROC) curve was performed to evaluate the performance of CT body composition characteristics in detecting abnormal cystatin C level.

Results: A total of 267 patients were enrolled (mean age, 61.67 years \pm 10.87; 155 men) and divided into two groups: T2DM with early DKD (n=133); and T2DM without DKD (n=134). After PSM, 230

patients were matched (T2DM with early DKD [n=115]; and T2DM without DKD [n=115]), with no statistical differences in general characteristics between the two groups ($P>0.05$). In multivariate logistic regression analysis, high-density lipoprotein cholesterol (odds ratio [OR] 0.14; $P=0.002$), uric acid (OR 1.01; $P=0.006$), and SM attenuation value (OR 0.94; $P=0.003$) were independent risk factors for early DKD. Multiple linear regression analysis revealed significant correlations between SM attenuation value and cystatin C after adjustment for confounders ($\beta=-0.39$, $P=0.004$). The area under the ROC curve for detecting abnormal cystatin C level was 0.711 with SM attenuation value ($P<0.001$; cut-off value, 28.05 HU).

Conclusion: T2DM patients with lower SM attenuation values may exhibit a higher risk for early DKD than those with higher values, which provides a potential imaging biomarker for early DKD diagnosis.

OR-0125

钆塞酸二钠增强磁共振功能性肝脏影像学评分及影像征象与 ALBI 分级评估肝功能的对照研究

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目的 以白蛋白-胆红素 (ALBI) 分级作为肝功能评估标准, 通过分析慢性肝病患者钆塞酸二钠增强磁共振肝胆期图像, 探讨功能性肝脏影像学评分 (FLIS) 及其三个影像学征象在评估肝功能方面的应用价值。

方法 回顾性分析 2022 年 2 月至 2023 年 4 月于本院行钆塞酸二钠增强 MRI 检查的 170 例慢性肝病患者的临床及影像资料。根据实验室指标计算 ALBI 评分并将患者分为 ALBI1 级、2 级、3 级。两名放射科医生独立评估钆塞酸二钠增强 MRI 肝胆期图像并计算 FLIS 及其三个影像学征象 (肝实质增强、胆道对比剂排泄、门静脉征) 得分。采用 Spearman 检验评估 FLIS 及影像学征象与 ALBI 评分之间的相关性并用 K-W H 检验分析上述影像学参数在不同 ALBI 分级之间的组间差异。采用 ROC 曲线评价 FLIS 及影像学征象鉴别不同 ALBI 分级的诊断效能。采用组内相关系数评估不同审阅者之间评分的一致性。

结果 FLIS 及三个影像学征象得分与 ALBI 评分之间均有较高的相关性, 其中 FLIS 的相关系数最高, $r=-0.735$, $P<0.001$ 。K-W H 检验示仅 ALBI1 级和 ALBI2 级之间的胆道造影剂排泄得分差异无统计学意义 ($P=0.111>0.05$), 余影像学指标均有明显统计学差异。ROC 曲线分析示 FLIS 相较于其他三个影像学征象在鉴别不同 ALBI 分级时的诊断效能最高, AUC 值分别为 0.846 (ALBI1 级 vs ALBI2 级或 3 级)、0.952 (ALBI3 级 vs ALBI1 级或 2 级)。两位审阅者对 FLIS、肝实质增强、胆道对比剂排泄及门静脉征评估的一致性均较高, ICC 值分别为 0.951、0.847、0.930、0.945。

结论 FLIS 相较于其他三个影像学征象与 ALBI 评分之间具有更高的相关性且能较准确地鉴别不同 ALBI 分级。FLIS 有望作为一种简单无创的影像学指标评估慢性肝病患者的肝功能并对其临床管理具有一定指导价值。

OR-0126

Quantitative imaging techniques of Creeping fat: research progress and clinical value in Crohn's disease

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Creeping fat (CF) in Crohn's disease (CD) patients refers to the pathologically proliferating

mesenteric adipose tissue that wraps around the inflamed parts of the intestine. It is significantly associated with CD's etiology, progression, and prognosis of the disease. Non-invasive imaging techniques, such as CT, MRI and ultrasound, can help with the diagnosis, differentiation and grading assessment of CD by evaluating the extent of mesenteric adipose tissue growth. Moreover, these techniques assist in predicting patient responsiveness to anti-TNF, guiding treatment and determining prognosis. CF is identified when there is mesenteric adipose tissue growth detected on CT/MRI, causing separation or displacement of the surrounding bowel. Alternatively, it can be diagnosed when an inhomogeneous hypoechoic band greater than 5-6mm is seen around the thickened bowel wall on sonogram. Currently, a number of studies have used the mesenteric fat index (MFI) to indirectly assess the impact of CF on CD, defined as the visceral fat area divided by the subcutaneous fat area at the level of the 3rd lumbar vertebra. However, MFI primarily reflects the proportional change in visceral adipose tissue and does not accurately indicate the effect of CF on CD since it includes the peri-organ fat and retroperitoneal fat. Recently, the reliability of emerging quantitative imaging indices, such as the mesenteric creeping fat index (MCFI) and slope of the energy spectrum curve of CF (λ HU), has not yet been supported by large sample sizes and multicentre studies, despite their promising outcomes. Additionally, it is crucial to conduct further research to detect CD mesenteric alterations through novel technologies like radiomics and artificial intelligence.

OR-0127

基于 APTw 和 DCE-MRI 序列定量参数的列线图评估 子宫内膜癌 Her-2 基因表达的价值

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目的 探讨基于多模态功能 MRI 技术的列线图可视化评估子宫内膜癌人表皮生长因子受体 2 表达的价值。

方法 本研究回顾性分析了 2019 年 8 月至 2023 年 8 月因怀疑子宫疾病在我院术前行盆腔 3.0T MRI 检查且术后病理证实为 EC 的患者，经纳排标准筛选后，最终有 66 例 EC 患者纳入最终的研究，其中 Her-2 阳性组 32 例，Her-2 阴性组 34 例。MRI 扫描序列包括常规序列、酰胺质子转移加权成像和动态增强磁共振序列。两组间的各定量参数值统计学差异检验通过两独立样本 t 检验或 Mann-Whitney U 检验来评估；通过 logistic 回归分析预测 EC Her-2 表达的独立预测因素纳入诊断模型，并构建列线图；采用受试者工作特征曲线评价有统计学差异的参数和诊断模型评估 EC Her-2 表达的价值；绘制校准曲线直观评价模型的预测准确性，采用 Hosmer-Lemeshow (H-L) 检验评价模型的拟合优度；采用 Delong 检验比较各曲线下面积间的差异性。

结果 APT 值和 Ve 值在 Her-2 阳性组和阴性组间的差异均有统计学意义 ($P < 0.05$)；经 logistic 回归分析发现 APT 值、Ktrans 值和深肌层侵犯值为预测 EC Her-2 表达基因状态的独立预测因子；基于独立预测因子构建的诊断模型在术前预测 EC Her-2 基因表达价值较高，经 H-L 检验分析显示，诊断模型校准曲线与理想模型校准曲线之间无统计学差异 ($P = 0.924$)；APT 值、Ve 值及诊断模型评估 EC Her-2 基因表达的 AUC 分别为 0.691、0.669 及 0.859；DeLong 检验结果显示诊断模型具有最好的诊断效能，较单一参数评估效能均得到了提升 ($P < 0.05$)。**结论** 基于 APTw 和 DCE-MRI 序列定量参数联合临床病理信息的列线图可更全面、更有效地评估 EC Her-2 基因的表达，具有一定的临床应用前景。

OR-0128

A Fully Automated Artificial Intelligence Model to Predict Extrapaneuric Perineural Invasion at CT in Pancreatic Ductal Adenocarcinoma

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Background: Extrapaneuric perineural invasion (EPNI) is a significant risk factor for the prognosis of patients with pancreatic cancer, yet few reliable clinical indicators exist to assess its presence.

Purpose: To develop and validate an automated preoperative artificial intelligence (AI) algorithm model for prediction of EPNI in patients with pancreatic ductal adenocarcinoma (PDAC).

Materials and Methods: In this study, patients with surgically resected, pathologically confirmed PDAC underwent CT from March 2016 and December 2020. We developed a fully automated AI algorithm for the segmentation of tumors and vessels, which utilized the spatial relationships between tumors and peripheral vessels to predict EPNI. The performance of the model was determined on the basis of the discrimination. Kaplan-Meier curves, the log-rank test, or Cox regression were used for survival analysis.

Results: Overall, 709 patients (mean age, 63 years \pm 9 [SD]) were evaluated. All patients were split into training (n = 497) and validation (n = 212) sets. In the training set, the AI model showed the highest performance (area under the receiver operating characteristic curve [AUC], 0.87) in the prediction of EPNI, whereas the clinical model had AUC of 0.62. In the validation set, the AI model showed the highest performance (AUC, 0.88) in the prediction of EPNI, AI model-predicted positive EPNI was associated with worse survival (hazard ratio, 1.49; 95% CI: 1.05, 2.21; P = .03). Furthermore, when patients underwent subgroup analysis for survival based on different pathological indicators (T category, N category, LVSI, and differentiation), the model-predicted EPNI was a stable predictive factor.

Conclusion: The AI model can be an efficient tool for diagnosis of extrapancreatic perineural invasion at CT in patients with PDAC

OR-0129

The changes of gut microbiome and neuropsychological activity in patients with Crohn's disease: A prospective microbiota-gut-brain axis study

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***Purpose:** Recent studies point to the microbiota-gut-brain axis dysfunction as a key player in the development of Crohn's disease (CD). There is an urgency to identify biological mechanisms underlying neuropsychological activity in patients with CD. This study aims to explore the relationship between neuropsychological changes and gut microbiome in CD. ***Methods and Materials:** 230 CD patients and 30 healthy controls (HCs) were prospectively recruited. Serum neurotransmitter levels of the total 260 participants and fecal microbiota determined by 16S rRNA of the 182 participants (CD patients, n=152; HCs, n=30) were tested. Among them, 80 patients and 30 HCs underwent brain functional and structural MRI (including T1-weighted structural images, BOLD and DTI) and state-trait anxiety inventory (STAI) questionnaire. Additionally, 230 CD patients also received MR Enterography and they were divided into mild (G1) and moderate-severe (G2) groups according to the cut-off value (<12 or \geq 12) of the MR Enterography Global Score.

***Results:** According to the MR Enterography Global Score, 230 CD patients were divided into G1 groups (n=108) and G2 groups (n=122). Comparing to G1, alpha diversity (an important indicator for judging the species richness of intestinal microbiota) in G2 was decreased and negatively associated with depressive scores (Shannon index; $R=-0.247$; $P<0.05$). In Lefse analysis of beta diversity of gut microbiome, the abundance of depression-related bacteria (genera Eggerthella, Coprococcus, Sellimonas, Lachnospirillum, Ruminoclostridium) in G2 was more abundant than that in G1 groups. The differential neurotransmitter metabolites between G1 and G2 included glutamine, histidine, tryptophan and gamma amino butyric acid (GABA) (all $P<0.05$). Aforesaid neurotransmitters concentrations were lower in G2 groups than that in G1, which are consistent with the hypothesis that low neurotransmitters concentration is associated with depression. CD patients in G2 had higher amplitude of low frequency fluctuations in thalamus, higher regional homogeneity in cerebellar, higher fractional anisotropy in seven fiber bundles (eg, body of corpus callosum, etc), but lower gray matter signal in orbitofrontal cortex than those of G1 and HCs (all $P<0.05$). ***Conclusions:** CD patients demonstrate abnormal neural and mental activity associated with intestinal dysbacteriosis and abnormal serous neurotransmitter. We present evidence that the microbiota-gut-brain axis plays a key role in the disease course of CD patients.

OR-0130

肝脏局灶实性病灶的 MRI 多动脉期强化特征变化的研究

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目的: 探讨肝细胞癌高危人群肝局灶实性病变 MRI 多动脉期图像强化特征变化情况。

材料和方法: 回顾性收集了 2018 年 4 月至 2021 年 12 月在首都医科大学附属北京友谊医院行肝脏增强 MRI 检查的患者, 所有患者均行多动脉期扫描。根据纳入及排除标准, 最后共纳入来自 141 位患者的 238 个病灶。对所有患者的多动脉期 MRI 图像随机分布排序。四名副主任医师参与阅片, 在阅片过程中, 仅告知医师所读图像来源于肝癌高风险患者, 而不提供其他临床信息。两名副主任医师在多动脉期 MRI 图像上独立判读病灶有无动脉期高强化及动脉期高强化类型。另外两名副主任医师基于影像征象判断并记录采集的各个多动脉期图像的时相。当两名副主任医师意见不一致时, 由第三位主任医师进行仲裁并给出最后判读结果。

结果: 2.1% (5/238) 的病灶在多动脉期图像中出现了动脉期高强化类型的不一致, 且均从非边缘高强化到边缘高强化。87.8% (209/238) 的病灶在多动脉期图像中表现出一致的非边缘 APHE, 10.2% (24/238) 的病灶表现出一致的边缘 APHE。在基于影像征象判读时相后, 87.9% (124/141) 多动脉期图像均为动脉期, 12.1% (17/141) 多动脉期图像中包含门脉期。通过单因素分析得出, 多动脉期图像时相会影响病灶在多动脉期图像上强化特征的变化。在考虑时相结果排除门脉期后, 89.9% (214/238) 的病灶在多动脉期图像中表现为一致的非边缘 APHE, 10.1% (24/238) 的病灶表现出一致的边缘 APHE, 因此病灶在多动脉期图像上未出现动脉期高强化类型的不一致。

结论: 多动脉期图像时相是病灶在多动脉期上出现强化特征变化的影响因素。由于部分患者多动脉期序列扫描会采集到门脉期图像, 从而在相应图像上造成病变强化特征的变化。因此基于多动脉期图像判读病灶强化特征, 应先基于影像征象判断时相, 避免诊断错误。

OR-0131

Combination of clinical and spectral-CT parameters in evaluating the perineural invasion of node-negative gastric cancer

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Objective: Node-negative gastric cancer with perineural invasion-positive has a significantly increased chance of staging migration, and the choice of treatment regimen should be equivalent to that of node-positive patients. The purpose of this study was to investigate the utility of combining clinical and spectral computed tomography (CT) parameters in the preoperative evaluation of perineural invasion (PNI) in node-negative gastric cancer (GC).

Methods and materials: We retrospectively analyzed 106 patients with GC. All cases were confirmed by pathology, underwent spectral-CT examination, and were divided into positive group (n=78) and negative group (n=28) depending on PNI occurrence. Clinical characteristics, including demographic information, serum tumour markers, and gastroscopic pathological information, were collected. The effective atomic number (Zeff), iodine concentration (IC), and water concentration were measured in the arterial (AP) and venous (VP) phases. Parameter differences between the two groups were compared, and diagnostic performance was evaluated.

Results: The PNI-positive group's histological grade, Borrmann type, Zeff, and IC were substantially greater than those of the negative group (AP-Zeff, 8.90 ± 0.21 vs 8.24 ± 0.18 ; VP-Zeff, 8.98 ± 0.16 vs 8.45 ± 0.15 ; AP-IC, 18.67 ± 7.19 vs 12.42 ± 5.51 ; VP-IC, 21.50 ± 4.04 vs 16.77 ± 4.16 , all $p < 0.05$). The evaluated efficiency of the combination of clinical and spectral-CT parameters was superior to that of individual parameters. The clinical parameters combined with Zeff and IC in AP and VP exhibited good evaluation efficacy (AUC=0.820, sensitivity=80.9%, specificity=75.4%).

Conclusions: Clinical and energy spectral-CT parameters exhibited considerable value in the preoperative evaluation of PNI in GC. The combination of clinical and spectral-CT parameters exhibited a favorable performance in predicting PNI in GC.

OR-0132

Predicting Tumor Perineural Invasion Status and Risk Stratification in Patients with Intrahepatic Mass-forming Cholangiocarcinoma Based on Preoperative MRI Features

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Purpose This study focused on developing and validating the nomogram based on clinical and magnetic resonance imaging (MRI) features to preoperatively predict perineural invasion (PNI) in intrahepatic mass-forming cholangiocarcinoma (IMCC).

Methods We enrolled 158 consecutive patients diagnosed with IMCC underwent preoperative MRI and R0 resection. Clinical and histopathological findings were collected from medical records. Univariate and multivariate stepwise logistic regression analyses were applied to screen for independent factors of PNI. A nomogram was established, and the predictive performance was assessed by receiver operating characteristic (ROC) curves. Furthermore, the patients were classified into two risk groups for PNI. Correlations between PNI and the nomogram with disease-free survival (DFS) were explored by log-rank survival analysis.

Results Among 158 patients, PNI was present in 70 (44.3%). Survival analysis showed that PNI-

negative had significantly better DFS than PNI-positive (1-year DFS, 57.6% vs 38.6%, $P < 0.001$) in the total cohort. Multivariate logistic regression revealed that CA 19-9, tumor multiplicity, tumor location, and necrosis were independent predictors for PNI. The nomogram incorporating these indicators had significant predictive power in training (area under the curve [AUC]: 0.759) and validation (AUC: 0.751) cohorts. Low-risk group defined by nomogram had significantly better DFS than high-risk group in the training (1-year DFS 60.5% vs 28.9%, $P < 0.001$) and validation (1-year DFS 62.7% vs 26.3%, $P < 0.05$) cohorts.

Conclusion The nomogram can preoperatively predict PNI in patients with IMCC, which can also provide prognostic value and help filter patients into effective treatment strategies.

OR-0133

Preoperative CT-Based Radiomics and Deep Learning Model for Predicting Risk Stratification in Patients with Gastric Gastrointestinal Stromal Tumors

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Objective To establish and evaluate an artificial intelligence (AI) model based on CT morphological features, radiomics and deep learning features to predict the risk stratification of primary gastric Gastrointestinal stromal tumors (GISTs) preoperatively.

Methods The preoperative CT enhanced images of 193 gastric GISTs lesions were retrospectively analyzed. The data were randomly divided into training set (117), validation set (37), and test set (37) in a ratio of 6:2:2. Senior radiologists segmented three-dimensional images of the tumor area manually and extracted radiomic features and deep learning features based on ResNet50. Recursive feature elimination and multivariate logistic regression were used for feature selection and model construction. The arterial phase, venous phase and dual-phase AI models were built respectively and the morphological features were added to the dual-phase AI model to construct a combined model. Receiver operating characteristic (ROC) curves were used to evaluate the efficacy of each model. The clinical application value of the combined model was determined through the decision curve analysis (DCA) and the net reclassification index (NRI) of the combined model was analyzed.

Results The area under the curve (AUC) of the dual-phase AI model was 0.876, which was higher than that of the arterial phase model or venous phase model (0.813, 0.838, respectively). The combined model with morphological features had best predictive performance than the above models, with an AUC of 0.9408 (95% CI: 0.8871-0.9735) ($p = 0.012$, Delong test). DCA demonstrated that the combined model had good clinical application value, with an NRI of 0.575 (95% CI: 0.357-0.891).

Conclusion In this study, we established a combined model that incorporated dual-phase morphological characteristics, radiomics, and deep learning characteristics, which can be used to facilitate the individualized prediction of preoperative risk stratification of gastric GISTs.

OR-0134

Noninvasive Identification of Proliferative Hepatocellular Carcinoma Preoperatively Using Quantitative Measurements and 2021 LI-RADS Lexicon-Based Features on Dynamic Contrast Enhanced CT

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Objective To noninvasively identify proliferative hepatocellular carcinoma (HCC) preoperatively by employing quantitative measurements combined with the standard 2021 Liver Imaging Reporting and Data System (LI-RADS) lexicon-based qualitative features on dynamic contrast enhanced (DCE) computed tomography (CT).

Methods 163 patients (66 proliferative HCC, 97 non-proliferative HCC) who underwent preoperative DCE CT with surgically confirmed HCC, were retrospectively analyzed. Imaging qualitative features were evaluated according to 2021 LI-RADS lexicon and quantitative measurements were recorded. All CT findings and clinical factors were compared between proliferative HCCs and non-proliferative HCCs. Multivariable logistic regression was utilized to screen predictive factors for proliferative HCC, with four predictive models (clinical, CT quantitative-clinical, CT qualitative-clinical and combined model) were developed. ROC analysis and DeLong test were used to assess model performances. A nomogram was built for the most effective model and tested in a subgroup of patients with lesions < 5cm in size (n = 58, 19 proliferative HCC vs. 39 non-proliferative HCC).

Results Both the CT quantitative-clinical model and CT qualitative-clinical model demonstrated excellent performance in identifying proliferative HCC, with the AUCs of 0.806 (95% CI: 0.737-0.864) and 0.813 (95% CI: 0.744-0.870), respectively. The combined model, integrating multiple-scale features (AFP ≥ 200 ng/mL, two qualitative features including non-smooth tumor margin and rim arterial phase hyperenhancement, and two quantitative indicators including standardized tumor-to-aorta density ratio in portal venous phase $\leq (-0.13)$ and the proportion of persistent or increased enhancement after arterial phase $\geq 12.5\%$, significantly improved performance (AUC of 0.869 (95% CI: 0.808-0.917) ($p < 0.05$)). This combined model was particularly effectively in the subgroup analysis, with an AUC of 0.901 (95% CI: 0.826-0.977).

Conclusions The standard 2021 LI-RADS lexicon-based features, quantitative CT measurements and AFP ≥ 200 ng/mL can contribute to the identification of proliferative HCC in a noninvasive manner. The combined model, which integrates clinical, CT quantitative and qualitative features, holds significant promise for preoperative prediction of proliferative HCC.

OR-0135

PI-RADS v2.1 评分联合 PSAD 检测 PSA 灰区 临床显著性前列腺癌的双中心研究

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目的 基于双中心数据, 探讨 PI-RADS v2.1 评分联合前列腺特异度抗原密度 (PSAD) 在前列腺特异度抗原灰区 (4-10ng/mL) 患者中对临床显著性前列腺癌 (csPCa) 的诊断价值。

材料与方法 回顾性分析 2017 年 1 月至 2021 年 12 月解放军总医院第一医学中心（中心一）和 2019 年 1 月至 2022 年 5 月解放军总医院第六医学中心（中心二）PSA 灰区疑似 PCa 患者的临床及影像资料，所有患者均接受了标准 mpMRI 扫描。由两名放射科医师根据 PI-RADS v2.1 评分对所有图像进行盲法评估。将中心一患者作为试验组，中心二患者作为测试组。在试验组应用单变量及多变量 Logistic 回归对 csPCa 和 non-csPCa 组间有统计学差异的参数进行分析，确定对 csPCa 的独立预测因素，并分析多参数组合对 csPCa 的诊断效能；并在测试组进行验证。

结果 最终纳入中心一 220 例，csPCa 患者 152 例；中心二 50 例，csPCa 患者 25 例。试验组 csPCa 和 non-csPCa 组间，年龄和 tPSA 无统计学差异；PV、PSAD、PI-RADS v2.1 评分有统计学差异；多变量 Logistic 回归显示 PI-RADS v2.1 评分和 PSAD 是 csPCa 的独立预测因素。PI-RADS v2.1+PSAD 预测灰区 csPCa 的 AUC 为 0.86，高于 PI-RADS v2.1 (0.82) 和 PSAD (0.78)，且差异具有统计学意义。测试组 PI-RADS v2.1+PSAD 预测 csPCa 的 Se、Sp、PPV、NPV 分别为 94.1%、84.0%、85.4%、87.5%。PI-RADS 4-5 分且 PSAD \geq 0.15 ng/ml² 时 csPCa 比例最高 (94%)。

结论 PI-RADS v2.1 评分与 PSAD 可作为 PSA 灰区 csPCa 的独立预测因素，两者联合应用对 csPCa 的诊断效能优于单独应用，有助于指导临床活检决策。

OR-0136

基于肝脏和病灶自动分割的 MRI 拓扑深度学习 技术预测肝细胞癌微血管侵犯

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背景与目标 微血管侵犯(MVI)是导致肝细胞癌(HCC)患者预后不良的重要危险因素，传统的深度学习(DL)模型通常存在一些无法解释的因素，拓扑信息不仅为深度学习提供了可解释性，而且有可能进一步提高深度学习模型的预测性能。因此，我们的目的是建立并验证一种新的磁共振成像(MRI)拓扑深度学习模型，用于术前预测 MVI。

方法 本研究回顾性纳入了两家大型医疗中心 2015 年 1 月至 2022 年 12 月间行手术治疗且术前进行了 MRI 检查的 HCC 患者。采用弱监督和半监督学习方法实现肝脏和病灶的全自动分割。计算了肿瘤区域的持续同源性和拓扑(Topo)信息。采用深度学习网络构建了 Pure CNN、TopoCNN 和 TopoCNN+Clinic 模型预测 MVI，并进行外部验证。采用 gad - cam 算法生成显著性图。采用 Cox 回归分析筛选危险因素，使用 ROC 曲线下面积(AUC)评估模型的效能。采用 Kaplan-Meier 法和 log-rank 法进行生存分析。

结果 该研究共纳入 589 例 HCC 患者，TopoCNN 模型用于训练集、内部验证集和外部验证集的 AUC 分别为 0.903 (95% CI: 0.870 ~ 0.935)、0.890 (95% CI: 0.828 ~ 0.951)和 0.871 (95% CI: 0.817 ~ 0.925)。显著图可显示经病理证实的肿瘤周围 MVI 高危区域。Cox 回归分析显示，TopoCNN 模型的 MVI 预测概率是早期 RFS 的独立危险因素(HR=6.64; 95% CI: 4.38 ~ 10.07)和 OS (HR=13.33; 95% CI: 5.38-33.01)。对于 MVI 的高危和低危组，TopoCNN 模型预测的中位早期 PFS 分别为 444 天和 670 天，中位 OS 分别为 1517 天和 2595 天 (P <0.001)。

结论 基于全自动肝脏和病灶分割的 MRI 拓扑深度学习模型能够准确便捷地预测 MVI，该模型在 HCC 术后患者早期 RFS 和 OS 评估方面也显示出显著的分层能力，这可能为高危 HCC 患者的临床分层管理决策提供更多信息支持。

OR-0137

Optimizing Prostate Biopsy Decision-Making for Patients with PI-RADS ≥ 3 Lesions: Novel MRI-based Nomograms

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Objectives To construct and externally validate a novel nomogram based on Multiparametric MRI (mpMRI) and Synthetic MRI to predict the risk of PCa and avoid unnecessary biopsy in patients with PI-RADS ≥ 3 lesions.

Methods From January 2020 to December 2022, a total of 323 patients suspected of PCa and undergoing mpMRI, including synthetic MRI, prior to targeted biopsy were enrolled from two medical centres (cohort 1: 243; cohort 2:80). Univariable and multivariable logistic regression analyses were executed to identify independent risk factors for PCa. Internal validation was performed using 1000 bootstrap resamples. The nomogram's performance was assessed by the area under the receiver operating characteristic curve (AUC), calibration plots, and decision curve analysis (DCA). Data from cohort 2 were utilized for external validation. The nomogram's impact on biopsy decisions was assessed through calculation of the biopsy avoidance rate, unnecessary biopsies avoidance rate, as well as the rates of missed PCa diagnoses.

Results Four independent predictive factors of PCa were incorporated into the nomogram, including age, SyMRI-derived transverse relaxation time (T2), ADC values, and PI-RADS. High AUC values were observed in the training set (0.916, 95%CI:0.877-0.956) and external validation set (0.947, 95% CI: 0.900-0.994). Calibration curves and DCA curves confirmed its clinical practicability. With the assistance of the nomogram, 20.16% and 13.75% of biopsy could be avoided in the training and external validation cohorts. The PCa missed rates were 4.49% and 4.54%, respectively.

Conclusion The nomogram combining mpMRI and Synthetic MRI could efficiently predict the risk of PCa, and reduce the number of unnecessary biopsies in patients with PI-RADS ≥ 3 lesions.

OR-0138

基于深度学习成像重建低剂量 40keV 虚拟单能成像早期发现结直肠癌肝转移

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目的: 探讨低剂量 40keV-VMI 宝石光谱成像(GSI)和深度学习图像重建(DLIR)能否增强结直肠癌肝转移(CRLM)的早期发现和诊断。**方法:** 在 2022 年 3 月至 8 月前瞻性纳入 35 例经病理证实的结直肠癌进行腹部 CT 常规护理。对比增强 CT 采用 GSI 模式, 获得两幅门静脉期 CT 图像[标准剂量(SD) CT 剂量指数(CTDIvol) = 15.51 mGy, RD CTDIvol = 7.95 mGy]。通过滤波后投影(FBP)和迭代重建(ASIR-V 60%, AV60)对 SD 和 RD 图像进行重建。采用 RD 中等强度深度学习图像重建(DLIR-M)和 RD 高强度深度学习图像重建(DLIR-H)对 40keV-VMI 进行重建。客观评价肝脏及病变的信噪比(CNR)、对比噪声比(SNR)。主观评价整体图像质量、病变显著性、诊断置信度。**结果:** 35 例受试者均行两次门静脉期 CT 扫描。与 SD- GSI 扫描相比, RD- GSI 扫描的剂量-长度乘积降低了 49-53%(420.22 \pm 31.95)vs(817.58 \pm 60.56)。共发现 219 个病变, 其中良性 55 个, 转移 164 个, 平均大小为 7.37 \pm 4.14 mm。SD-FBP 检测到 207 个病灶, SD-AV60 检测到 201 个病灶, DLIR-M 和 DLIR-H 分别检测到 199 个和 190 个病灶。病变 ≤ 5 mm 时, SD-FBP 与 DLIR-M(P= 0.32)、SD-AV60 与 DLIR-M(P= 0.56)的检出率差异无统计学意义。DLIR-M 和 DLIR-H 40keV-VMI 图像的 CNR、SNR 和噪声优于 SD-FBP 图像(P < 0.01), 与 SD-AV60 图像差异无统计学意义(P > 0.05)。病变 ≤ 5 mm

时, 与 SD-FBP、SD-AV60、DLIR-M、DLIR-H 比较, 病变总体诊断敏感性差异有统计学意义 ($P<0.01$)。结论: RD-DLIR-M 40keV-VMI 可用于 CRC 患者的常规随访护理, 优化 CT 图像质量。同时维持小病变的检出率及诊断敏感性和特异性。

OR-0139

MRI 定量评估膀胱癌人表皮生长因子受体 2 (HER2) 表达

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目的: 探讨扩散加权成像(DWI)及集成 MRI 定量参数在评估膀胱癌人表皮生长因子受体 2 (HER2) 表达的应用价值。

方法: 前瞻性收集 2021 年 4 月至 2023 年 7 月就诊于中山大学附属第一医院并经手术病理证实的 76 例膀胱癌患者的临床及影像学资料。所有患者均在术前 2 周内接受了包括 DWI 和集成 MRI 的磁共振检查。测量病灶的纵向弛豫时间(T1), 横向弛豫时间(T2), 质子密度(PD)和表观扩散系数(ADC)值。采用独立样本 t 检验和 χ^2 检验比较不同 HER2 表达状态膀胱癌患者的临床、病理及定量参数差异。采用受试者工作特征曲线 (ROC) 的曲线下面积 (AUC) 评估各定量参数鉴别膀胱癌 HER2 表达状态的诊断效能。

结果: 90 例膀胱癌患者中 HER2 表达阳性 51 例, 阴性 25 例。HER2 阳性、阴性患者肿瘤 ADC 值 ($1.01 (0.93, 1.157) \times 10^{-3} \text{ mm}^2/\text{s}$ vs. $0.88 (0.83, 0.99) \times 10^{-3} \text{ mm}^2/\text{s}$)、T1 值 ($1532.65 \text{ msec} \pm 245.98$ vs. $1419.17 \text{ msec} \pm 165.98$) 及 T2 值 ($111.04 (102.14, 125.35) \text{ msec}$ vs. $97.46 (88.21, 109.67) \text{ msec}$) 差异均具有统计学差异 ($P = 0.001, 0.041, 0.003$)。多因素回归分析发现肿瘤病理级别及 ADC 值为独立预测因子 ($P < 0.05$), 构建联合模型。联合模型用于鉴别 HER2 表达状态的 AUC、灵敏度及特异度分别为 0.864、70.59%、96.00%。DeLong 检验提示 ADC 值、T2 值及 ADC 值+T2 值三者 AUC 无明显统计学差异 ($P > 0.05$)。

结论: ADC 值及集成 MRI 定量参数 T2 值可用于治疗前评估膀胱尿路上皮癌 HER2 表达状态, 有助于膀胱癌抗 HER2 靶向治疗计划的制定。

OR-0140

CT-based artificial intelligence for individual lymph node metastasis assessment in gastric cancer

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Background: Accurate preoperative lymph node (LN) metastasis assessment on a per-LN basis is imperative but challenging in gastric cancer (GC). Therefore, we aimed to develop an artificial intelligence (AI) model on preoperative CT images to predict individual LN metastasis and to investigate whether the model could be used to improve radiologist interpretation accuracies.

Methods: Consecutive GC patients of whom the resected LNs could be matched rigidly on preoperative CT images were retrieved from a prospectively-collected database spanning 5 years. An AI model, integrating handcraft radiomic and deep learning features, was generated based on both the LNs and corresponding primary tumors. In the testing dataset, LN metastasis was predicted by the AI model and also by three independent radiologists without and with the assistance of AI against histopathology. Diagnostic performances were characterized by area under the receiver operating characteristic curve (AUC), sensitivity, and specificity.

Results: A total of 1381 LNs (739 [53.5%] metastasis positive) in 666 patients (median age, 61 years; range, 29-86 years; 462 males) were included. In the testing dataset, the AUC of the AI model was 0.804 for predicting individual LN metastasis. Compared with radiologist consensus interpretation, the AI model demonstrated a higher specificity (70.6% vs. 48.5%, $p<0.001$) but a lower sensitivity (73.9% vs. 85.8%, $p<0.001$). The specificity of radiologist consensus interpretation with AI assistance improved over that without AI assistance (60.3% vs. 48.5%, $p<0.001$), whereas the sensitivities remained comparable (81.5% vs. 85.8%, $p=0.052$).

Conclusions: In GC patients, we developed a CT-based AI model with high accuracy for predicting the metastasis status of individual LNs. The AI model also showed promise in assisting radiologists to improve their diagnostic accuracies.

OR-0141

Differential value of amide proton transfer imaging combined with diffusion weighted imaging in prostate cancer and benign prostatic hyperplasia

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Objective: To explore the value of magnetic resonance amide proton transfer (APT) imaging combined with diffusion weighted imaging (DWI) in the differential diagnosis of prostate cancer (Pca) and benign prostatic hyperplasia (BPH). **Materials and Methods:** A retrospective analysis was conducted on the data of 52 patients with prostate cancer and 60 patients with prostate hyperplasia. The APT parameter values MTRasym and DWI parameter values ADC were measured in both groups, and two independent sample t-tests were used to compare and analyze the parameters between the two groups. Evaluate the efficacy of meaningful parameters and their combined diagnosis using the receiver operating characteristic (ROC) curve. Use Delong test to compare those two parameters and joint diagnostic efficacy. Analyze the correlation between two parameters using Pearson test. **Result:** The MTRasym value in the prostate cancer group $[(3.70 \pm 0.94)\%]$ was significantly higher than that in the prostate hyperplasia group $[(2.35 \pm 0.60)\%]$ ($P<0.05$); ADC value in prostate cancer group $[(0.93 \pm 0.15) \times 10^{-3}\text{mm}^2/\text{s}]$ significantly lower than that in the prostate hyperplasia group $[(1.32 \pm 0.22) \times 10^{-3}\text{mm}^2/\text{s}]$ ($P<0.05$). The areas under the ROC curve for identifying Pca and BPH using MTRasym value, ADC value, and their combination were 0.886, 0.914, and 0.966, respectively. There was no statistically significant difference in the diagnostic efficacy between the MTRasym value and the ADC value ($P>0.05$), and the combined diagnostic efficacy of the two was superior to the individual diagnostic efficacy of the MTRasym value and ADC value ($P<0.05$). The MTRasym value is negatively correlated with the ADC value ($r=-0.469$, $P<0.001$). **Conclusion:** APT and DWI have high efficacy in distinguishing between prostate cancer and benign prostatic hyperplasia, and the two parameters are negatively correlated. The combination of the two sequences has higher diagnostic efficacy.

OR-0142

双层探测器光谱 CT 定量参数联合常规 CT 特征列线图术前预测结直肠癌肿瘤沉积的价值

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目的: 探讨双层探测器光谱 CT 定量参数联合常规 CT 特征的列线图模型在术前预测结直肠癌肿瘤沉积 (TDs) 中的应用价值。

方法: 回顾性收集苏州大学附属第一医院 2022 年 1 月至 2023 年 3 月术前接受光谱 CT 腹部增强扫描且经病理确诊的 126 例结直肠癌患者, 根据病理结果将其分为 TDs 阳性组 (n = 38) 和 TDs 阴性组 (n = 88)。分别测量并计算病灶动脉期、静脉期 40-100Kev 光谱曲线斜率 (K40-100kev)、标准化有效原子序数 (NZ)、标准化碘浓度值 (NIC) 以及动-静脉期 NIC 差值; 同时评估其常规 CT 特征:cT 分期、cN 状态、静脉期强化是否均匀、瘤周脂肪浸润 (PFI)、肿瘤最大径以及肿瘤位置等。采用多因素 logistic 回归分析筛选出独立预测因素并构建基于光谱 CT 定量参数及常规 CT 特征的列线图模型, 利用 ROC 曲线评估各参数及模型的预测效能。采用 DeLong 检验比较各 AUC 间的差异, 利用校准曲线评估列线图的校准度。

结果: TDs 阳性组和阴性组间 cT 分期、cN 状态、静脉期强化是否均匀、PFI、NICv、NZv、Kv(40-100kev)、动-静脉期 NIC 差值之间差异均有统计学意义 (P<0.05), 以动-静脉期 NIC 差值的预测效能最高 (AUC、灵敏度、特异度分别为 0.802,80.7%、71.6%)。由静脉期强化不均匀、PFI、动-静脉期 NIC 差值构建的列线图模型的 AUC、灵敏度、特异度、准确度分别为 0.919、84.2%、86.5%、85.7%, 其诊断效能优于 cT 分期、cN、静脉期强化是否均匀、PFI、常规 CT 特征模型 (AUC 为 0.646-0.796) 及各光谱 CT 定量参数 (AUC 为 0.713-0.802), 差异均有统计学意义 (P<0.05)。

结论: 双层探测器光谱 CT 可用于术前预测结直肠癌 TDs, 以光谱 CT 定量参数联合常规 CT 特征的列线图模型诊断效能最佳。

OR-0143

The Value of Magnetic Resonance Elastography in Preoperatively Predicting Wnt/ β -catenin Pathway Activation and MVI Expression in Hepatocellular Carcinoma

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Purpose: To investigate the impact of preoperative magnetic resonance elastography (MRE) on predicting Wnt/ β -catenin pathway activation and MVI expression in hepatocellular carcinoma (HCC).

Methods and Materials: Between June 2020 and April 2024, 209 individuals with pathologically confirmed HCC underwent hepatectomy or liver transplantation and were recruited for preoperative MRE. Tumor morphologic hallmarks and the quantitative parameters of MRE were evaluated, and recurrence-free survival (RFS) was recorded after periodic surveillance tests. Multivariate logistic and COX regression identified independent clinicoradiologic predictors of MVI or Wnt/ β -catenin phenotype, and relapse or mortality, respectively. Predictive discrimination was quantified with the

area under the receiver operating characteristic curve (AUC), and $P < 0.05$ was considered as statistically significant.

Results: Totally, 59 patients suffered from MVI with the median RFS of 9.967 months (non-MVI > 37.967 months; Log-rank test, $P = 0.007$), while 105 patients were in a state of Wnt/ β -catenin pathway silencing (27.067 months; activated state > 37.967 months; $P < 0.001$). Multivariate COX regression analysis indicated that Wnt/ β -catenin pathway activation (HR 0.405, 95%CI 0.247-0.664, $P < 0.001$; AUC=0.834, 95%CI 0.777-0.890, $P < 0.001$) and MVI (HR 1.737, 95%CI 1.021-2.954, $P = 0.042$; AUC=0.718, 95%CI 0.641-0.796, $P < 0.001$) were independent predictors for postoperative recrudescence, together with carcinoembryonic antigen, aspartate aminotransferase, multiple lesions and enhancing capsule. Besides, an elevated tumor stiffness (c value: OR 1.582, 95%CI 1.034-2.420, $P = 0.034$), total bilirubin $> 24 \mu\text{mol/L}$ (OR 2.465, 95%CI 1.154-5.267, $P = 0.020$), smooth tumor margin (OR 2.226, 95%CI 1.157-4.283, $P = 0.017$), and mosaic architecture (OR 1.990, 95%CI 1.029-3.851, $P = 0.041$) were markedly prone to Wnt/ β -catenin expression, yielding an AUC of 0.711 (95%CI 0.641-0.782, $P < 0.001$). Nevertheless, the decreased tumor c value (OR 2.075, 95%CI 1.095-3.937, $P = 0.025$), alongside with non-smooth tumor edge (OR 8.246, 95%CI 3.048-22.307, $P < 0.001$), peritumoral enhancement (OR 2.677, 95%CI 1.081-6.630, $P = 0.033$), incomplete or absent capsule enhancement (OR 3.846, 95%CI 1.680-8.800, $P = 0.001$), and multiple lesions (OR 2.579, 95%CI 1.036-6.420, $P = 0.042$) were identified as independently correlated to MVI-positive HCC (AUC=0.880, 95%CI 0.827-0.933, $P < 0.001$).

Conclusion: The integration of tumor stiffness with morphologic traits could satisfactorily distinguish HCC patients with high risk of Wnt/ β -catenin activation and MVI, both of which facilitate stratifying patients' outcomes before surgery.

OR-0144

探究 T1 mapping 与体素内不相干运动 (IVIM) 参数评估慢性肾病的价值

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目的 探究 T1 mapping 与 IVIM 参数评估慢性肾病(CKD)患者肾功能的价值。

材料与方法 回顾性收集 3.0 T MRI 检查的慢性肾病共 26 例, 扫描序列包括 T1 mapping、IVIM 序列。根据 CKD 分期标准将其分为 A 组(轻度肾损害, $n=12$)和 B 组(中重度肾损害, $n=14$), 同时搜集 10 例健康志愿者作为对照组 (C 组)。使用 Functool、ISP 软件重建图像, IVIM 序列生成 Standard ADC 图、D-mono、D*-mono 和 f-mono 图, 在右肾最大横断面及其相邻上下两个层面的皮质、髓质区分别放置一个感兴趣 (ROI), 取三个层面均值进行统计分析。使用 Shapiro-Wilk 检验数据正态性, 使用 Kruskal Wallis 检验比较组间各参数的差异性; 应用二元 Logistic 回归和受试者工作特征 (ROC) 曲线分析各单一参数和联合参数的诊断效能。

结果 皮质 T1 ($P < 0.01$)、髓质 T1 ($P = 0.011$) 与皮质 D-mono ($P = 0.034$) 在三组间存在显著差异, 余定量参数无明显差异 ($P > 0.05$)。B 组皮质 T1 [1692.22(1644.16, 1736.29)ms] 显著高于 A 组 [1468.65(1426.88, 1546.88)ms] 和 C 组 [1477.72(1437.84, 1516.55)ms] ($P < 0.05$); A 组髓质 T1 [1703.43(1696.12, 1769.05)ms] 显著低于 B 组 [1816.35(1703.50, 1931.80)ms] 和 C 组 [1841.99(1715.06, 1898.62)ms] ($P < 0.05$)。C 组皮质 D-mono 值明显高于 B 组 ($P < 0.05$)。皮质 T1、髓质 T1 及二者联合鉴别 A 组和 B 组的 ROC 曲线下面积 (AUC) 分别为 0.869, 0.815, 0.875; 皮质 T1、皮质 D-mono 及二者联合鉴别 B 组和 C 组的 AUC 分别为 0.929, 0.186, 0.921; 髓质 T1 鉴别 A 组与 C 组的 AUC 为 0.8。

结论 T1 mapping 与 IVIM 参数值可无创性评估 CKD 肾功能损害程度, 有助于疾病的早期发现与诊断。

OR-0145

Application of DKI for the Evaluation of Renal Cold Ischemia-reperfusion Injury in Rat Model: A Preliminary Study

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Purpose: To investigate the value of diffusion kurtosis imaging (DKI) in evaluating renal cold ischemia-reperfusion injury (CIRI) after different cold ischemia time (CIT) in rats.

Materials and Methods: Sixty-five Sprague-Dawley rats were randomly divided into 4 groups: 5 rats in control group, 20 rats in different CIT groups (CIT-1h, CIT-2h, CIT-4h) respectively. CIRI in-situ perfusion model of left kidney was established. Five rats in control group and each CIT group at 1 hour, 1 day, 2 days, and 5 days after reperfusion were randomly selected for DKI scans. DKI images were processed and analyzed to generate mean diffusivity (MD) and mean kurtosis (MK) parametric maps. Blood was collected from the inferior vena cava to obtain laboratory indicators, and the left kidney was removed for pathological examination 1 hour after scan.

Results: The cortical and medullary MD values in different CIT groups were significantly lower than control group 1 hour after reperfusion ($P < 0.01$), CIT-1h group and CIT-2h group recovered 1 day after reperfusion, and CIT-4h group recovered 5 days after reperfusion. The cortical MK values of CIT-1h group were lower than control group 1 hour and 1 day after reperfusion ($P < 0.01$), and gradually recovered 2 days after reperfusion. The cortical MK values of CIT-2h group and CIT-4h group 1 hour after reperfusion were higher than control group, and decreased 1 day and 2 days after reperfusion ($P < 0.05$), CIT-2h group recovered 5 days after reperfusion, and CIT-4h group were still lower than control group 5 days after reperfusion ($P < 0.05$). There were moderate negative correlations between medullary MD values and pathologic scores ($r = -0.517$, $P < 0.01$). Cortical MK values were negatively correlated with pathologic scores, serum CRE and BUN ($r = -0.512$, -0.433 , -0.492 , $P < 0.01$).

Conclusion: DKI can effectively and noninvasively evaluate the microstructural changes of renal CIRI.

OR-0146

基于时间依赖性磁共振弥散成像的细胞微结构研究鉴别前列腺癌与前列腺增生价值

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目的：本研究旨在利用时间依赖性磁共振弥散成像探究前列腺癌与前列腺增生的细胞微结构信息。

材料与方法：

所有患者均行振荡梯度自旋回波序列扫描，经过 IMPULSED 模型建模得定量参数值细胞平均直径（dmean）、细胞内体积分数（fin）、细胞密度（cellularity）、细胞外扩散系数（Dex）。采用数字病理图像测量 PCa 及 BPH 测量细胞等效直径(dhistology)，并采用 MONAI 软件计算细胞核体积分数 fin-histology 值。Pearson 检验用于评估 PCa 及 BPH 细胞的 dhistology 值与 dmean 值的相关性及 fin-histology 值与 fin 值的相关性。独立样本 t 检验或 Mann-Whitney 检验评估 PCa 及 BPH 组各定量参数的差异。受试者工作特征曲线用于评估各定量参数值的诊断效能。Spearman 检验用

于评估 ADC 值与各微结构定量参数的相关性。

结果: PCa 细胞的 dhistology 值与 dmean 值呈正相关 ($r=0.91$, $P=0.04$), BPH 细胞的 dhistology 值与 dmean 值不相关 ($r=0.49$, $P=0.33$)。PCa 及 BPH 细胞的 fin-histology 值与 fin 值呈正相关 ($r=0.63$, $P=0.04$)。dmean 值鉴别 PCa 与 BPH 差异无统计学意义 ($P=0.092$); PCa 组 fin 及 cellularity 值高于 BPH 组 ($P<0.05$)。PCa 组 Dex 值低于 BPH 组, ($P<0.05$)。fin 及 cellularity 与 ADC 值呈负相关 ($r=-0.803$ 、 -0.838 , P 均 <0.05), Dex 与 ADC 值呈正相关 ($r=0.701$, $P<0.05$)。

结论: 基于时间依赖性弥散磁共振成像的细胞微结构参数对于鉴别前列腺增生与前列腺癌具有很好的价值, 可以作为临床无创诊断前列腺癌的影像标志物。

OR-0147

MR 早期强化特征对局部进展期食管鳞癌新辅助化疗/化免治疗后肿瘤完全缓解的诊断价值

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目的: 探索食管增强 MR 早期强化特征对接受新辅助化疗 (NAC) 或 NAC 联合免疫检查点抑制剂 (ICI) 治疗的食管鳞癌患者治疗后肿瘤完全反应 (ypT0) 的术前诊断价值。

方法: 回顾性收集 198 例于 2020 年 12 月至 2022 年 6 月间接受 NAC 或 NAC+ICI 治疗患者术前食管 MR 图像。评估肿瘤早期强化 (ECE-MR) 和 T2WI 联合 DWI 特征诊断 ypT0 的准确性。采用组内相关系数 (ICC) 计算评估者间一致性, 采用受试者工作特征曲线分析 MR 特征诊断效能; 采用 DeLong 法比较不同 MR 方法对 ypT0 诊断的曲线下面积。对不同肿瘤分期的 ECE-MR 及 T2+DW-MR 的鉴别诊断效能进行亚组分析。根据多因素 Logistic 回归筛选与 ypT0 诊断独立相关的影像特征。采用卡方检验比较不同 MR 特征与病理特征间的相关性。

结果: 食管增强 MR 早期强化特征评估具有极佳的评估者间一致性, ICC 为 0.84。ECE-MR 对 ypT0 具有较好的诊断效能, AUC 为 0.85, 显著高于 T2+DW-MR ($AUC=0.69$, $p<0.001$)。T2+DW-MR 和 ECE-MR 的诊断效能随着肿瘤分期的上升而提高; 与 T2+DW-MR 相比, ECE-MR 可显著提高鉴别治疗后分期较早的肿瘤 (ypT1~2 肿瘤) 与 ypT0 的准确性 ($p=0.03$), 而对于 ypT3 肿瘤与 ypT0 的鉴别效能则与 T2+DW-MR 相当 ($p=0.18$)。病理分析显示 2~3 级肿瘤相关炎性细胞浸润 (TILN) 较 1 级 TILN 在 ECE-MR 误诊的 ypT0 肿瘤中更常见 ($p=0.049$); 2~3 级纤维化较 1 级纤维化在 T2+DW-MR 误诊的 ypT0 肿瘤中更常见 ($p=0.023$)。在基于 ECE-MR 和 T2+DW-MR 误诊的 ypT1~4 肿瘤中, TRG 1 较 TRG2~3 更常见、残存肿瘤细胞呈分散分布者更常见 ($p<0.001$)。结论: ECE-MR 对 ypT0 有良好的诊断效能, 特别是对于治疗后分期较早的肿瘤与 ypT0 的鉴别, 其诊断价值明显优于常规影像征象的评估。

OR-0148

ASL combined with T1 mapping quantitatively assess renal function in patients long term after kidney transplantation and correlate with pathology

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Objective To investigate the value of ASL combined with T1 mapping for assessing renal function in patients long term after kidney transplantation and to validate these functional MRI measurements against kidney allograft biopsy findings to establish radiologic-histopathologic correlations.

Methods This prospective study included 63 long-term surviving renal allograft recipients undergoing ASL, T1 mapping. Twenty patients underwent biopsies. Patients were divided into 3 groups according to estimated glomerular filtration rate (eGFR): group 1, $eGFR \geq 60$ ml/min/1.73m²; group 2, $30 \leq eGFR < 60$ ml/min/1.73m²; group 3, $eGFR < 30$ ml/min/1.73m². Cortical T1, medullary T1, $\Delta T1$ from T1 mapping and renal blood flow (RBF) from ASL were calculated and compared. The receiver operating characteristic (ROC) curve and binary logistic regression analyses were performed to assess the diagnostic performances. Pearson correlation was used to analyze the correlation between MRI parameters and eGFR. Spearman correlation were used to analyze the correlation between MRI parameters and Banff renal allograft histopathology scores.

Results RBF was higher in group 1 (221.2 ± 52.1 ml/100g/min) than those in group 2 (172.0 ± 63.8 ml/100g/min, $P=0.009$) and group 3 (122.6 ± 46.5 ml/100g/min, $P<0.001$); group 2 had higher RBF than group 3 ($P=0.044$). Cortical T1 in group 1 (1284.5 ± 114.6 ms) was lower than those in group 2 (1384.3 ± 103.7 ms, $P=0.008$) and group 3 (1456.3 ± 106.3 ms, $P<0.001$). The $\Delta T1$ of group 1 (39.5 ± 10.0 ms) was larger than those in group 2 (24.9 ± 9.2 ms) and group 3 (23.9 ± 6.0 ms). RBF, cortical T1 and $\Delta T1$ were moderately correlated with eGFR ($r = 0.569, -0.573, 0.672$ respectively, all $P < 0.05$). Several MRI parameters were correlated with Banff pathological scores of renal allograft: RBF was negatively correlated with peritubular capillaryitis ($r=-0.485$), cortical T1 was positively correlated with interstitial inflammation ($r=0.459$) and tubulitis ($r=0.520$), $\Delta T1$ was negatively correlated with interstitial fibrosis ($r=-0.502$) and tubular atrophy ($r=-0.452$), all $P < 0.05$. The area under the curve for the discrimination of Group1 versus Group2 and Group1 versus Group3 were 0.740 and 0.923 by ASL, 0.873 and 0.926 by T1 mapping, 0.892 and 0.956 by multiparameter. The area under the curve for the discrimination of Group2 versus Group3 were 0.729 by ASL.

Conclusion RBF, cortical T1 and $\Delta T1$ can serve as new imaging biomarkers of renal function and histopathological microstructure.

OR-0149

肾动脉几何形状联合计算流体动力学 评价肾动脉动脉粥样硬化斑块特征

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目的：动脉粥样硬化性肾动脉狭窄被认为是继发性高血压和其他并发症的主要原因。我们旨在探讨肾动脉几何形状与血流动力学的关系，以及它们在预测动脉粥样硬化肾动脉轻度狭窄斑块特征方面的表现。

材料和方法：回顾性分析纳入轻度狭窄的肾动脉粥样硬化斑块患者。于 CTA 图像评估肾动脉几何参数（曲率，弯曲度，分叉角），斑块特征（斑块面积，斑块体积，斑块负荷，动脉重塑率，狭窄和钙化程度）。使用有限元软件评估血流动力学参数，包括壁剪切应力（wall shear stress, WSS），振荡剪切指数（oscillatory shear index, OSI）和相对停留时间（relative residence time, RRT）。使用广义估计方程分析评估几何形状和血流动力学参数的预测性能。

结果：结果纳入 45 例患者的 76 块斑块。分布于上部斑块的 WSS 低于下部和腹侧（ $p=0.017$ 和 $p<0.001$ ），OSI 高于下部和腹侧（ $p=0.004$ ），RRT 高于下部和腹侧（ $p=0.001$ 和 $p=0.012$ ）。WSS 与斑块负荷（ $r=0.26$; $p=0.023$ ）以及曲率和斑块负荷（ $r=0.284$; $p=0.013$ ）之间存在弱正相关。WSS 与斑块负荷（OR 1.004; $p=0.004$ ）和狭窄程度（OR 1.005; $p=0.038$ ）相关，曲率与斑块负荷（OR 1.093; $p=0.045$ ）独立相关。

结论：肾动脉分叉处具有固定的血流动力学分布，WSS 和曲率与斑块负荷有关。

OR-0150

The LiverRisk Score: an accurate marker to predict liver fibrosis and diabetes-related death in the general population

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Background and aims Non invasive and early assessment of liver fibrosis is of great significance and challenge. We evaluated the predictive performance of the LiverRisk Score for liver fibrosis and diabetes-related death in the general population.

Methods In a cross-sectional study using data from the National Health and Nutrition Examination Survey (NHANES) 2017-2020, we included adult subjects with transient elastography (TE) data for exploring the link between the LiverRisk Score and liver fibrosis. Data from NHANES from 1999-2018 was used to explore the value of the LiverRisk score in the prediction for metabolic-associated deaths through the use of Cox proportional hazard models. In addition, subgroup analyses were further performed. The prognostic value of the LiverRisk Score, FIB-4, APRI, AAR, GPR, FI and Forns was validated with the receiver operating characteristic (ROC) curve.

Results We included 3,770 participants in the cross-sectional cohort, 25,317 in the follow-up cohort. The LiverRisk score had the highest prognostic accuracy, with AUC of 0.78 (0.73-0.83) over 15 kPa compared to FIB-4 [0.69 (0.63-0.74)], APRI [0.67 (0.61-0.73)], AAR [0.52 (0.47-0.58)], GPR [0.72 (0.66-0.77)], FI-fibrosis index [0.68 (0.62-0.74)] and Forns score [0.71 (0.65-0.77)]. According to the selected cut-off values (6 and 15), we stratified patients into 3 groups with

significantly different risks: Low risk, Medium risk and High risk group. We found that the improved LiverRisk grading criteria can better and accurately predicted liver fibrosis. In addition, the score was effective in identifying individuals at risk of diabetes-related deaths. The hazard ratio for diabetes-related mortality in the high-risk group was 13.88 (95% CI 9.83–19.60), compared with the minimal risk group ($P < 0.001$).

Conclusion The LiverRisk Score is an accurate marker to predict liver fibrosis and diabetes-associated outcomes in the general population.

OR-0151

CT Characteristics of Invasive Intraductal Tubulopapillary Neoplasms versus Invasive Intraductal Papillary Mucinous Neoplasms of the Pancreas

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Objective: This study aimed to compare the CT characteristics of invasive intraductal tubulopapillary neoplasm (ITPN) and invasive main duct or mixed type intraductal papillary mucinous neoplasm (IPMN) of the pancreas.

Methods: Preoperative CT images of pathologically confirmed ITPN and IPMN were retrospectively reviewed. Fifteen patients (9 males and 6 females; age, 56.00 ± 8.09 years [mean \pm SD]) had invasive ITPN, and 53 patients (35 males and 18 females; mean age, 63.55 ± 7.92 years) had invasive main duct or mixed type IPMN. Two independent observers blinded to the pathological findings compared the CT characteristics of the two groups. The t test and chi-square tests were used to determine differences between the two groups. Risk factors associated with invasive ITPN were assessed by multivariate analyses, and apparent performance was assessed according to the ability to discriminate patients with the two conditions.

Results: The presence of an intraductal solid component, a 2-tone duct sign, a cork-of-wine-bottle sign, no change in caliber of upstream MPD, and growth into the duodenum were significantly associated with invasive ITPN ($P < 0.05$). Multivariate analysis revealed that a 2-tone duct sign and a cork-of-wine-bottle sign were independent predictors for invasive ITPN (odds ratios: 11.76 and 11.76), and the area under the curve values both were 0.81. The sensitivity, specificity, and accuracy of these two findings both were 73.33%, 88.68% and 85.92%, respectively.

Conclusion: Preoperative CT is helpful in differentiating invasive ITPN and invasive main duct or mixed type IPMN. These findings are important because the prognosis of invasive ITPN is better than that of invasive main duct or mixed type IPMN.

OR-0152

基于 BOLD-MRI 评估 CCL4 诱导肝硬化 大鼠肾脏动态变化及对肾损伤早期诊断的研究

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目的: 探索 BOLD-MRI 监测 CCL4 诱导肝硬化大鼠肾脏氧合变化过程及对肾损伤的早期诊断价值。
材料方法: 运用 CCL4 皮下注射法建立慢性肝病模型。将 43 只 Sprague-Dawley 大鼠随机分为两组, 病理组 (N=36) 及连续扫描组 (N=7)。其中病理组根据时间点分为 6 个亚组 (n=6 只/组), 分别于基线、CCL4 注射后第 2 周、第 4 周、第 6 周、第 8 周、第 12 周进行肾脏 BOLD-MRI 扫描, 随后处死取静脉血进行肝肾功能检测、取肝肾组织进行组织学分析。连续扫描组在相同时间点进行连续肾脏 BOLD-MRI 扫描。测量所有大鼠肾脏皮质及外髓外带 BOLD-MRI 衍生的 T2* 值。采用单因素方差分析比较病理组各亚组间肾脏皮质及外髓外带 T2* 值、肝肾功能化验指标、肝肾组织病理学指标的差异。采用重复测量方差分析比较连续扫描组各时间点间肾脏 T2* 值的差异。采用 Pearson 或 Spearman 相关分析肾脏 T2* 值与肝肾功能生化指标、肝纤维化 Ishak 评分、肾损伤评分的相关性。

结果: 病理组各亚组和连续扫描组不同时间点的肾脏 T2* 值与基线的差异均具有统计学意义 ($P < 0.05$)。CCL4 注射后 2 周肾脏 T2* 值出现明显下降, 4 周回升后至 12 周急剧下降, 除第 4 周外, CCL4 注射后各组肾脏 T2* 值均明显低于基线 ($P < 0.05$)。而 CCL4 注射后各组 Scr 只在第 8 周相较基线明显升高 ($P < 0.05$)。病理组 CCL4 注射后各亚组间肝纤维化 Ishak 评分、肾损伤评分均明显高于基线组 ($P < 0.05$)。肾脏皮质带及外髓外带 T2* 值与肾损伤评分、肝脏纤维化 Ishak 评分均存在中-高度负相关 (r 值分别为 -0.554、-0.605、-0.698、-0.660)。

结论: BOLD-MRI 监测的 CCL4 诱导肝硬化大鼠肾脏变化早于 Scr, 且能准确评估肾脏损伤, 有望在 Scr 正常情况下尽早提示肾脏潜在的病理损伤。

OR-0153

A novel SSP strategy for screening of high risk varices by two-dimensional shear wave elastography (CHESS2004): A prospective multicenter study

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Objective: In patients with compensated advanced chronic liver disease (cACLD), the invasive examination of esophagogastroduodenoscopy (EGD) is the gold standard for risk assessment of variceal bleeding. This is a prospective, multi-center study and have been registered on the clinical trials (NCT04546360). The aims of our study were to develop and validate a novel strategy based on two-dimensional shear wave elastography (2D-SWE) for screening of high risk varices (HRV) and avoiding unnecessary EGD in cACLD patients and to compare the performance of the strategy with existing screening models based on 2D-SWE.

Methods: A prospective multicenter study was conducted in patients with cACLD. We recruited 410 patients from 14 hospitals in China between October 2020 to September 2022 as a prospective training cohort to develop a novel strategy, and 90 patients from Croatia between January 2011 to December 2020 as a retrospective cohort to validate. All patients underwent liver stiffness measurement and spleen stiffness measurement by 2D-SWE and EGD. The new strategy has been compared with previous standards regarding the performance for spared EGD.

Results: 416 patients were included in the final analysis. Of them, 343 patients were included in the prospective training cohort and 73 patients in the retrospective validation cohort. In the training cohort, independent predictors of HRV were identified including spleen stiffness measurement, spleen diameter, and platelet count and fitted to develop the novel strategy, termed "SSP" strategy. The SSP strategy performed significantly better (all $P < 0.05$) than other assessed methods with receiver operating characteristic curve of 0.85 (95% confidence interval: 0.81–0.89) in the training. The spared EGD was best stratified by the cutoff value at 2.5, which could spare 122 (35.6%) EGD with a missed HRV rate of 4.1% (5/122). In the validation cohort, comparing with other models, SSP strategy improved the proportion of avoided EGD and lowered the rate of misclassified HRV.

Conclusion: The SSP strategy can be readily applied into clinical practice to accurately spared EGD in cACLD patients.

OR-0154

系膜内结节“血管植入征”是局部进展期直肠癌预后独立影响因素

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背景: MR 图像显示局部进展期直肠癌的系膜内结节, 当观察到血管穿行于其中时, 定义这种征象为“血管植入征”, 本研究旨在基线和疗后 MRI 图像上识别血管植入征, 探讨其与预后的关系, 从而进一步筛选需要强化治疗的高风险病人。

方法: 回顾性连续纳入从 2015 年 1 月到 2018 年 6 月于本中心就诊的 261 位局部进展期直肠癌患者, 评价所有患者的 MR 特征, 包括: 影像 TN 分期、原发灶 mrEMVI (T-mrEMVI) 状态、mrMRF 状态以及是否存在血管植入征, 并比较这些特征与总生存 (OS)、无转移生存 (DFS) 和局部无复发生存 (LRFS) 的相关性。

结果: 单因素分析显示, 基线及疗后血管植入征与 OS (HR=7.24; $P<0.001$)、DFS (HR=6.72; $P<0.001$) 均显著相关。基线多因素生存回归结果显示, 对于 OS, T-mrEMVI (HR=3.78; $P=0.002$) 和血管植入征 (HR=4.49; $P=0.001$) 是其独立影响因素。对于 DFS 和 LRFS, 仅血管植入征 (HR=6.72; $P<0.001$; HR=5.03, $P=0.005$) 是其独立影响因素。疗后多因素生存回归结果显示, 对于 OS, T-ymrEMVI (HR=4.09; $P=0.001$) 和血管植入征 (HR=2.83; $P=0.02$) 是其独立影响因素。T-ymrEMVI (HR=2.76; $P=0.001$) 和血管植入征 (HR=3.73; $P<0.001$) 两者同样也是 DFS 的独立影响因素。

结论: 在同时接受新辅助治疗与根治性手术的局部进展期直肠癌患者中, 血管植入征这一影像指标是生存及疾病进展的独立危险因素, 可作为风险分层的依据, 从而帮助识别高风险患者并制定个体化的治疗策略。

OR-0155

Predicting human epidermal growth factor receptor 2 status of patients with gastric cancer by computed tomography and clinical features

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Objective: There have been no studies on predicting human epidermal growth factor receptor 2 (HER2) status in patients with resectable gastric cancer (GC) in the neoadjuvant and perioperative settings. We aimed to investigate the use of preoperative contrast-enhanced computed tomography (CECT) imaging features combined with clinical characteristics for predicting HER2 expression in GC.

Methods: We retrospectively enrolled 301 patients with GC who underwent curative resection and preoperative CECT. HER2 status was confirmed by postoperative immunohistochemical analysis with or without fluorescence in situ hybridization. A prediction model was developed using CECT imaging features and clinical characteristics that were independently associated with HER2 status in multivariate logistic regression analysis. Receiver operating characteristic curves were constructed; the performance of the prediction model was evaluated. The bootstrap method was used for internal validation.

Results: Three CECT imaging features and one serum tumour marker were independently associated with HER2 status in GC: enhancement ratio in the arterial phase (odds ratio [OR]=4.535; 95% confidence interval [CI]: 2.220–9.264), intratumoral necrosis (OR=2.64; 95% CI: 1.180–5.258), tumour margin (OR=3.773; 95% CI: 1.968–7.235), and cancer antigen 125 (CA125) level (OR=5.551; 95% CI: 1.361–22.651). A prediction model derived from these variables showed an

area under the receiver operating characteristic curve of 0.802 (95% CI: 0.740–0.864) for predicting HER2 status in GC. The established model was stable, and the parameters were accurately estimated.

Conclusions: The enhancement ratio in the arterial phase, intratumoral necrosis, tumour margin, and CA125 level were independently associated with HER2 status in GC. The prediction model derived from these factors can be used preoperatively to estimate HER2 status in GC and guide clinical treatment.

OR-0156

The Involvement of Mesorectal Fascia by Tumor Deposits and Extramural Venous Invasion Predicts Poor Overall Survival in Locally Advanced Rectal Cancer

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Objective: In magnetic resonance imaging (MRI), mesorectal fascia (MRF) involvement serves as an adverse prognostic indicator for locally advanced rectal cancer (LARC). However, prognoses among MRF-positive (MRF+) patients vary. This study aims to further classify MRF involvement in MRF+ cases and investigate its prognostic implications.

Methods: We conducted a retrospective analysis of data from LARC patients who were evaluated MRF+ and underwent surgery after neoadjuvant chemoradiotherapy at Fudan University Shanghai Cancer Center between January 2012 and December 2019. Patients were categorized into four groups based on MRF involvement: MRF+ (Tumor) vs MRF+ (Non-tumor), MRF+ (Extramural venous invasion; EMVI) vs MRF+ (Non-EMVI), MRF+ (lymph node; LN) vs MRF+ (Non-LN), and MRF+ (Tumor deposits; TDs) vs MRF+ (Non-TDs). Survival curves were generated using the Kaplan-Meier (K-M) method, and differences in overall survival (OS) were assessed using the log-rank test. Prognostic factors were evaluated through multivariate Cox proportional hazards models.

Results: A total of 400 LARC patients with MRF+ status were included in the study. The occurrence of MRF+ (Tumor), MRF+ (TDs), and MRF+ (EMVI) was higher in patients aged ≥ 60 years compared to those aged < 60 years, and this difference was statistically significant ($p < 0.05$). In the K-M survival analysis, both MRF+ (TDs) and MRF+ (EMVI) cases were associated with significantly worse OS compared to MRF+(Non-TDs) and MRF+ (Non-EMVI) (p all < 0.05). Conversely, there were no significant differences in OS between MRF+ (Tumor) and MRF+ (LN) cases and MRF+ (Non-tumor) and MRF+ (Non-LN). In the multivariate COX regression analysis, MRF+ (TDs) demonstrated a significant association with OS (HR 1.744; 95% CI, 1.064–2.860, $P < 0.05$). Similarly, MRF+ (EMVI) displayed a significant correlation OS (HR 1.886; 95% CI, 1.076–3.306, $P < 0.05$). Conversely, there were no significant associations observed between MRF+ (Tumor) or MRF+ (LN) and OS.

Conclusion: MRF+ (TDs) and MRF+ (EMVI) independently indicated higher risks for adverse prognosis in MRF-positive LARC patients, providing valuable insights for treatment and follow-up strategies.

OR-0157

酰胺质子转移磁共振成像评估慢性肾病纤维化程度的价值霍宇婷^{1,2}、鞠烨¹、张倩瑜¹、张瀚月¹、胡庆晨¹、骆仁娜¹、刘爱连¹

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目的：本研究旨在探索酰胺质子转移磁共振成像 (APT-MRI) 序列与纤维化肾脏组织病理学指标之间的关联关系，通过病理指标和磁共振序列参数的映射关联，验证 APT 序列在评估 CKD 患者肾脏纤维化程度中的价值。

方法：通过回顾性队列研究数据，收集大连医科大学附属第一医院 2020 年 5 月至 2023 年 8 月接受肾脏功能磁共振检查的 CKD 患者。扫描序列包括 3.0 T 磁共振 APT 序列。功能磁共振参数值分别为皮髓质的 APT 值。所有患者在 MRI 检查后 3 天内，在超声引导下肾活检。肾活检方法采用国家肾脏疾病临床医学研究中心发明并推广的“B 超引导下斜角进针负压吸引一秒钟快速经皮肾活检法”。收集肾活检常规病理数据(球性硬化比例)以及肾脏病理诊断。球性硬化比例=硬化肾小球数量/切片上所有肾小球数量。根据肾小球球性硬化百分比进行分组，以小于 10%，10%-30%，30%-50% 和大于 50% 分为四组，分析对应的磁共振序列参数变化。采用 SPSS 27.0 统计学软件(IBM SPSS Statistics)进行统计分析。皮髓质 APT 值与肾纤维化病理指标的相关关系采用皮尔逊相关系数(Pearson's r)或斯皮尔曼相关系数(Spearman's Rho)。所有检验均为双侧检验， $P < 0.05$ 为差异有统计学意义， $P < 0.01$ 为差异有非常显著统计学意义。

结果：皮质 APT 值、髓质 APT 值与球性硬化百分比之间存在显著正相关性分别为： $Rho = 0.736$, $P < 0.01$; $Rho = 0.626$, $P < 0.01$ 。

结论：APT 序列对评估慢性肾病纤维化程度具有优势。本研究将 APT 序列与肾脏病理纤维化指标进行相关性分析，以明确其对肾脏纤维化的评估作用和 CKD 进展的预后判断能力。未来可以尝试用于患者远期预后判断和随访过程中肾脏慢性化病变进展的监测。

OR-0158

A Nomogram for Preoperative Prediction of Vessels Encapsulating Tumor Clusters (VETC) Pattern and Prognosis of Hepatocellular CarcinomaYinzhong Wang¹, miaomiao wang^{1,2}, liang cao¹, hongliang huang¹, shi cao³, xiaoxue tian⁴, junqiang Lei¹

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Background Vessels encapsulating tumor clusters (VETC) is a novel pattern of vascular metastasis that is significantly associated with poor prognosis after surgical resection in patients with hepatocellular carcinoma. Predicting VETC-positive HCC will help patients make clinical treatment decisions and individualized treatment.

Objective To establish a nomogram model to predict VETC patterns based on preoperative CT imaging features, and to evaluate prognostic factors associated with recurrence-free survival (RFS) of HCC.

Methods The study included HCC patients who underwent radical surgical resection between January 1, 2016 and August 31, 2022. CT imaging features were evaluated based on LR-RADS. Logistic regression analysis was used to identify independent variables related to the VETC pattern, and a nomogram model was constructed. Receiver operating characteristic curve (ROC) was plotted to evaluate the diagnostic performance of the CT features and nomogram model. COX

regression was used to determine the predictors associated with RFS after surgical resection in patients with HCC, and Kaplan-Meier method was used to plot the survival curve. P value <0.05 was considered statistically significant.

Results A total of 84 patients were included for CT analysis. All patients underwent radical surgical resection. Multivariate logistic regression showed that AST/ALT >1.07(odds ratio [OR], 4.91; 95% CI: 1.11, 21.68; P=0.036), intratumoral necrosis (OR, 4.99; 95% CI: 1.25, 19.99; P=0.023) and enhancing capsule (OR, 3.32; 95% CI: 1.27, 8.94; P=0.017) were independent predictors of VETC-positive HCC. By combining the above three predictors, a nomogram model showed the optimal diagnostic performance, with specificity, sensitivity and accuracy of 68.09%, 78.38% and 72.62%, respectively, and the highest AUC value of 0.767 (95%CI [0.662, 0.852]). In multivariate COX regression analysis, CK19 status (Hazard ratio [HR], 2.02; 95% CI: 1.06, 3.86; P=0.032), the number of tumors (HR, 3.31; 95% CI: 1.47, 7.45; P=0.004) and VETC pattern (HR, 2.52; 95% CI: 1.31, 4.86; P=0.006) were independent predictors of postoperative RFS in patients with hepatocellular carcinoma. The Kaplan-Meier curve showed shorter RFS and higher risk of recurrence for VETC-positive HCC, and the Log-Rank test found significant differences between the two groups.

Conclusion A nomogram model based on preoperative CT imaging features can be used to predict VETC pattern, and has prognostic significance for postoperative recurrence-free survival in patients with hepatocellular carcinoma.

OR-0159

基于多参数磁共振成像的膀胱影像报告 与数据系统对不同形态膀胱癌评估的应用价值

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目的：探讨基于多参数磁共振成像（mpMRI）的膀胱影像报告与数据系统（VI-RADS）对不同形态膀胱癌肌层侵犯评估的应用价值。

方法：回顾性连续入组 2019 年 1 月~2023 年 4 月间于解放军总医院第一医学中心行膀胱 MRI 检查及根治性膀胱切除术或经尿道膀胱肿瘤切除术（TURBT）的 97 例膀胱癌患者。VI-RADS 评分由一名放射科医生（7 年盆腔疾病影像诊断经验）在对病理信息不知情的前提下，首先将膀胱病变形态划分为腔内生长型，非腔内生长型（壁内生长型，内层增厚型），然后根据 T2WI、扩散加权成像和动态增强图像进行两次评估，时间间隔为 2 个月。以病理为金标准，利用受试者工作特征曲线计算 VI-RADS 评分诊断肌层浸润性膀胱癌的曲线下面积（AUC），采用 kappa 分析对 VI-RADS 评分的重测信度进行评估。

结果：73 例患者（平均年龄 63±12 岁，男性 59 例）影像表现为腔内生长型，24 例（平均年龄 64±10 岁，男性 21 例）为非腔内生长型（壁内生长型 7 例，内层增厚型 17 例）。使用 VI-RADS 评分系统评估腔内生长型膀胱癌肌层侵犯的 AUC 为 0.787（95%CI: 0.675~0.874），以≥3 分为截断值时诊断敏感性和特异性分别为 82.6%、68.0%；使用 VI-RADS 评分系统评估非腔内生长型膀胱癌肌层侵犯的 AUC 为 0.916（95%CI: 0.729~0.990），以≥3 分为截断值时诊断敏感性和特异性分别为 92.3%、81.8%。评估者对于腔内生长型膀胱癌前后评估结果重复性较好（加权 κ 值=0.670, 95%CI: 0.510 ~ 0.830）；评估者对于非腔内生长型膀胱癌前后评估结果重复性良好（加权 κ 值=0.826, 95%CI: 0.698 ~ 0.954）。

结论：VI-RADS 评分受膀胱癌形态的影响，VI-RADS 在非腔内生长型膀胱癌中评估其肌层侵犯情况诊断效能更高。

OR-0160

使用钆塞酸二钠增强 MRI 定量评估移植肝功能： 功能性 T1 mapping

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目的：钆塞酸二钠增强 MRI 已显示出作为评估肝功能的宝贵工具的前景。它被认为是评估肝移植最有前途的成像技术之一，可以很好地检测移植后的并发症，并有机会评估肝损伤的严重程度。本研究的目的是探讨钆塞酸二钠增强 MRI 得出的功能性 T1 mapping 与肝移植功能之间的相关性，并评估这种方法是否有助于识别处于高危状态的受者。

方法：2021 年 1 月至 2022 年 9 月间，101 名肝移植受者接受了 3.0 T 的肝脏 MRI，包括 T1 mapping 和钆塞酸二钠增强 MRI。使用终末期肝病 (MELD) 模型定量评估肝功能。在注射钆塞酸二钠 (0.025 mmol/kg) 前和后 20 分钟，通过使用 T1 mapping 序列获得 T1 mapping 图。评估 MELD 模型与以下 MRI 参数之间的关系：肝脏的对比前和对比后 T1 值、减少率 ($\Delta T1\%$) 和胆管显示程度。使用受者工作特征曲线下面积与其他参数比较 $\Delta T1\%$ 对高危状态患者的诊断效能。

结果： $\Delta T1\%$ 与 MELD 模型呈负相关， r 为 -0.61 ($P < 0.001$)。在低风险或中风险状态的肝移植受者中，其 $\Delta T1\%$ 高于高风险状态的受者 ($P < 0.001$)。

结论： $\Delta T1\%$ 与 MELD 模型测量的肝移植功能呈负相关，并提供可接受的诊断性能，帮助识别处于高风险状态的受者。此外，钆塞酸二钠增强 MRI 可以在一次检查中实现动态成像和肝细胞特异性成像，从而为评估肝移植后并发症和肝损伤提供综合方法。因此，钆塞酸二钠增强 MRI 代表了一种“一站式”肝脏评估方法。

OR-0161

Radiomics Nomogram Model Based on Multi-phase Contrast-enhanced Magnetic Resonance Imaging for Predicting Early Recurrence in Hepatocellular Carcinoma After Curative Ablation

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Purpose: Predicting early recurrence (ER) after curative ablation for hepatocellular carcinoma (HCC) patients is critical for the decision of subsequent follow-up and treatment. We aimed to develop and validate a radiomics nomogram based on multi-phase contrast-enhanced magnetic resonance imaging (CE-MRI) to preoperatively predict early recurrence (ER) (≤ 2 years) of HCC after curative ablation.

Methods: We retrospectively enrolled 134 patients with HCC who underwent curative ablation. Patients were randomly divided into the training ($n = 94$) and validation ($n = 40$) cohorts. Preoperative multi-phase CE-MRI images were reviewed, and the 3D volumes of interest (VOIs) of the whole tumor were delineated on non-contrast T1-weighted imaging (T1), T2-weighted imaging (T2), arterial phase (AP), portal venous phase (PVP), delayed phase (DP), and hepatobiliary phase (HBP). One hundred and seven original radiomics features were extracted from each phase. Minimal redundancy maximal relevance and recursive feature elimination were applied to screen the optimal features subset and logistic regression was used to train corresponding radiomics models. Clinical characteristics and qualitative imaging features were identified by two independent radiologists and combined to establish a clinical-radiological model. A combined model comprising the best radiomics model and clinical-radiological risk factors was constructed based on

multivariable logistic regression analysis, which was ultimately presented as a radiomics nomogram model. Utilizing the receiver operating characteristic curve and its area under the curve (AUC) to evaluate the performance of each model.

Result: In total, six radiomic features and three clinical-radiological risk factors were identified and used for model construction, and they presented good performance in the discrimination of early recurrence alone with an AUC of 0.727 and 0.810, respectively. The combined radiomics nomogram model integrating the radiomics score with clinical-radiological risk factors showed the best predictive performance with AUCs as 0.888 and 0.964 in the training and testing cohort. A better net benefit was observed with the combined model compared with the other two models according to the decision curve analysis.

Conclusions: The combined radiomics nomogram model which combined radiomic features extracted from multi-phase CE-MRI images with clinical-radiological risk factors could non-invasively predict HCC early recurrence after curative ablation, which could provide support for individualized treatment planning.

OR-0162

Diagnostic value of synthetic magnetic resonance imaging in prostate disease patients with PSA levels in the gray area.

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Purpose: To investigate the diagnostic performance of synthetic MRI in discriminating prostate diseases (including prostate cancer and non-cancerous lesions) in patients with prostate-specific antigen (PSA) levels in the gray area.

Materials & Methods: Patients with prostate-specific antigen (PSA) levels in the gray area (4 -10 ng/ml) who were suspected with prostate cancer were retrospectively collect from two medical centers between August 2020 and August 2022. All patients underwent the serum PSA test and magnetic resonance imaging (MRI) examination including synthetic MRI and diffusion-weighted imaging (DWI) before treatment, and transrectal ultrasound (TRUS)-guided biopsy or radical prostatectomy for pathology were subsequently performed. Patients were classified into prostate cancer and non-cancerous prostatic lesions according to pathology. Regions of interest (ROIs) and the values of quantitative parameters such as longitudinal relaxation time (T1), transverse relaxation time (T2), proton density (PD), and apparent diffusion coefficient (ADC), were separately drawn and measured by two independent radiologists based on relaxometry maps and ADC maps. Interobserver agreement was evaluated using the interclass correlation coefficient (ICC). Independent sample t-test or Mann-Whitney U test was used to assess the differences in quantitative parameter values between prostate cancer and non-cancerous lesions. Receiver operating characteristic curve (ROC) analysis was performed to evaluate the diagnostic performance of each parameter (T1, T2, PD, and ADC values), and their combination in discriminating the cancer and non-cancerous lesions groups. Differences of $P < 0.05$ were considered statistically significant.

Results: A total of 130 patients were enrolled in this study, and the mean age was 67 ± 9 years (Table 1). Interobserver agreement of all T1, T2, PD and ADC values was classified as good and above ($ICC = 0.60-1.00$). The means of all the T1, T2, PD, ADC values were significantly different between prostate cancer and non-cancerous lesions ($P < 0.05$, Figure 2), while the diagnostic performance of the ADC value outperformed the other parameters, with the AUC of $0.854(0.781-0.909)$. The combination of the T1, T2, PD and ADC, with the AUC of $0.853(0.781-0.909)$, showed a higher diagnostic performance than either T1, T2, or PD values (AUC values: 0.622, 0.721, 0.608, respectively) for differentiating prostate cancer and non-cancerous

lesions, while when compared to ADC value, there was no statistical significance ($P > 0.05$, Table 2).

Conclusions: The quantitative parameters including T1, T2, and PD derived from synthetic MRI can be applied to distinguish prostate cancer from non-cancerous lesions in patients with PSA levels in the gray area. While when ADC combined with those parameters, the diagnostic performance was not improved compared with ADC value alone.

Clinical relevance/ application: Prostate cancer (PCa) is a common malignancy of the male genitourinary system and the second leading cause of cancer death among males. Early detection and accurate diagnosis of prostate cancer have always been a clinical research focus. PSA test contributes to routine screening of prostate cancer. But its specificity is not high, additionally, it would be more difficult to accurately differentiate prostate cancer from benign prostatic hyperplasia, especially in patients with PSA levels of 4-10 ng/ml. Synthetic MRI is capable of quantifying the relaxation time of tissues, reflecting tissue biophysical characteristics, and providing more objective quantitative data. Combined with DWI, it may be possible to further improve the objective diagnostic performance of prostate diseases. Our results showed that the means of all the T1, T2, PD, ADC values were significantly different between prostate cancer and non-cancerous lesions. However, compared to ADC value alone, the combined diagnostic performance has not improved ($P > 0.05$, the difference was not statistically significant) when T1, T2, and PD values were combined with the ADC value. Our study suggested that synthetic MRI was helpful for distinguishing prostate cancer but did not improve the diagnostic performance of the ADC value when it came to making a diagnosis among clinically suspected prostate cancer patients with PSA levels in the gray area.

OR-0163

Preoperative Scoring Model for Identifying Proliferative Hepatocellular Carcinoma on Multiphase Liver MRI and Its Implication for Surgical Resection

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Objectives: To develop and validate a scoring model for preoperative identification of proliferative hepatocellular carcinomas (HCCs) using multiphase liver MRI, and to compare the early recurrence rates between patients with model-predicted proliferative and nonproliferative HCCs after surgical resection.

Materials and methods: Between September 2019 and August 2021, consecutive patients with surgically proven HCC who underwent preoperative multiphase liver MRI were retrospectively enrolled. The classification of HCCs into proliferative and nonproliferative classes was determined through histological analyses. Univariate and multivariate logistic regression analyses were conducted to identify predictors associated with the proliferative HCC. The significant predictors from the training cohort were used to establish a scoring model, which was then verified in a time-independent validation cohort using the area under the receiver operating characteristic curve (AUC). To assess the model's applicability in molecular classification, it was applied to a RNA sequencing dataset for discriminating proliferative HCCs (G1, G2, G3) from nonproliferative HCCs (G4, G5, G6). The early recurrence rates of HCC patients following surgical resection were evaluated by the Kaplan–Meier method with log-rank test.

Results: A total of 498 patients (391 men; median age, 59.1 years; IQR, 18–83 years) were divided into the training cohort ($n=332$), time-independent validation cohort ($n=144$), and RNA sequencing dataset ($n=22$). Logistic regression analyses showed that serum alpha-fetoprotein level >100 ng/mL (odds ratio [OR], 3.1; $P < 0.001$; 7 points), lobulated or infiltrative tumor margin (OR, 4.9; $P < 0.001$; 10 points), rim arterial phase hyperenhancement (OR, 3.6; $P = 0.002$; 8 points), marked diffusion weighted imaging (OR, 3.3; $P < 0.001$; 8 points), and tumor-to-liver arterial phase ratio ≤ 1.4 (OR, 3.1; $P < 0.001$; 7 points) were independent predictors for proliferative HCC. The scoring

model was constructed using these predictors, with cutoff values of >18 points. The AUC of the model was 0.83, 0.80, and 0.77 in the training cohort, time-independent validation cohort, and RNA sequencing dataset, respectively. Moreover, in the both training and validation cohorts, patients with model-predicted proliferative HCCs exhibited significantly higher postoperative early recurrence rates compared to those with model-predicted nonproliferative HCCs (all $P < 0.05$). Furthermore, patients with BCLC stage B-C and predicted nonproliferative HCCs exhibited similar early recurrence rates to those with BCLC stage 0-A and predicted proliferative HCCs in the both cohorts (all $P > 0.05$).

Conclusion: The developed scoring model, incorporating four MRI features and serum AFP level, showed promising potential for predicting proliferative HCCs and identifying suitable surgical candidates for patients with HCC.

OR-0164

Predictive Value of a Radiomics Nomogram Model Based on Contrast-Enhanced Computed Tomography for KIT Exon 9 Gene Mutation in Gastrointestinal Stromal Tumors

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Objectives: To establish and validate a radiomics nomogram model for preoperative prediction of KIT exon 9 mutation status in patients with gastrointestinal stromal tumors (GISTs). **Materials and methods:** Eighty-seven patients with pathologically confirmed GISTs were retrospectively enrolled in this study. Imaging and clinicopathological data were collected and randomly assigned to the training set ($n=60$) and test set ($n=27$) at a ratio of 7:3. Based on contrast-enhanced CT (CE-CT) arterial and venous phase images, the region of interest (ROI) of the tumors were manually drawn layer by layer, and the radiomics features were extracted. The intra-class correlation coefficient (ICC) was used to test the consistency between observers. Least absolute shrinkage and selection operator regression (LASSO) were used to further screen the features. The nomogram of integrated radiomics score (Rad-Score) and clinical risk factors (extra-gastric location and distant metastasis) was drawn on the basis of multivariate logistic regression. The area under the receiver operating characteristic (AUC) curve and decision curve analysis were used to evaluate the predictive efficiency of the nomogram, and the clinical benefits that the decision curve evaluation model may bring to patients. **Results:** The selected radiomics features (arterial phase and venous phase features) were significantly correlated with the KIT exon 9 mutation status of GISTs. The AUC, sensitivity, specificity, and accuracy in the radiomics model were 0.863, 85.7%, 80.4%, and 85.0% for the training group (95% confidence interval [CI]: 0.750-0.938), and 0.883, 88.9%, 83.3%, and 81.5% for the test group (95% CI: 0.701-0.974), respectively. The AUC, sensitivity, specificity, and accuracy in the nomogram model were 0.902 (95% confidence interval [CI]: 0.798-0.964), 85.7%, 86.9%, and 91.7% for the training group, and 0.907 (95% CI: 0.732-0.984), 77.8%, 94.4%, and 88.9% for the test group, respectively. The decision curve showed the clinical application value of the radiomic nomogram. **Conclusion:** The radiomics nomogram model based on CE-CT can effectively predict the KIT exon 9 mutation status of GISTs and may be used for selective gene analysis in the future, which is of great significance for the accurate treatment of GISTs.

OR-0165

与潜在基因表达模式相关的放射组学特征 预测肝细胞癌的预后和治疗反应

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目的: 确定肝细胞癌 (HCC) 的稳健预后和治疗效率预测生物标志物具有挑战性。本研究的目的是开发一种基于治疗前 CT 图像预测总生存期 (OS) 的放射组学方法, 并探索与放射组学相关的关键基因。

方法: 本研究回顾性纳入三个数据集中经病理或临床证实的 HCC 患者。使用接受经动脉化疗栓塞 (TACE) 治疗的研究所内部数据作为训练集, 构建放射组学特征, 通过最小绝对收缩和选择算子 COX (LASSO-COX) 回归算法来预测 OS。该模型在癌症基因组图谱 (TCGA) 的 41 名患者中进行了外部测试, 并提供了可用的 CT 图像。受试者工作特征曲线下面积 (AUC) 和对数秩检验用于基于高放射组学评分与低放射组学评分的生存分析。使用 TCGA 和 GEO 公共数据库的 RNA 测序数据进行基因表达分析。

结果: 共有 752 名患者分为放射组学队列 ($n = 267$)、TCGA 队列 ($n = 338$) 和 GEO 队列 ($n = 147$)。rad 评分将患者分为高风险组和低风险组, 训练组和外部测试组的生存率存在显著差异 ($P < 0.0001$ 和 $P = 0.0055$)。5 年 OS 的 AUC 分别为 0.730 和 0.695。鉴定出 7 个 OS 相关基因 (SPP1、GJA5、GJA4、INMT、PDZD4、ALDOA 和 MAFG), 除 MAFG 外, 所有这些基因都与 TACE 效率相关 (P 大于 0.05)。

结论: CT 影像组学特征可以有效预测 HCC 的预后和治疗反应, 并与肿瘤微环境异质性相关

OR-0166

钆塞酸二钠增强 MRI 简化序列 对肝细胞癌高危人群的诊断新策略

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目的 探讨对肝细胞癌 (HCC) 高危患者采用钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 简化序列 (AMRI) 形成新的诊断策略。

方法 回顾性分析 2020 年 1 月至 2023 年 6 月行 Gd-EOB-DTPA 动态增强 MRI 的 405 例慢性乙型或丙型肝炎和/或肝硬化患者的临床及影像学资料, 由两名诊断医师评阅 Gd-EOB-DTPA 动态增强 MRI 全序列: T1WI+T2WI+动态增强四期 (动脉早期、动脉晚期、门脉期和移行期)+扩散加权成像 (DWI)+肝胆期 (HBP), 及从全序列中提取组合的两组 AMRI 模拟全序列 MRI 对 HCC 的诊断: 平扫 (NC)-AMRI 组: T2WI+DWI; HBP-AMRI 组: T2WI+DWI+HBP。将病理和随访结果作为是否存在 HCC 的参考标准, 采用 Cochran's Q 检验评估并比较三组扫描方案对 HCC 的诊断效能, 并分析三组方案的扫描时间。

结果 纳入的 227 例患者中 (HCC 组患者 137 例, 非 HCC 组 90 例) 共检出 238 个病灶。全序列组、NC-AMRI 组和 HBP-AMRI 组的敏感度分别为 95.17%、82.76% 和 94.48%; 特异度为 96.77%、86.02% 和 91.39%; 准确度为 95.79%、84.03% 和 93.28%。三组扫描方案的敏感度 (Cochran's $Q = 34.111$, $P < 0.001$)、特异度 (Cochran's $Q = 12.500$, $P = 0.002$) 和准确度 (Cochran's $Q = 43.467$, $P < 0.001$) 差异均有统计学意义, 当进行两组间比较时, 全序列组和

HBP-AMRI 组的敏感度、特异度和准确度均无统计学意义, 三组中 NC-AMRI 组的敏感度、特异度和准确度最低。两组简化方案的扫描时间为 4~5 分钟均短于全序列扫描所需时间。三组扫描方案受试者操作特征曲线 (ROC) 下面积 (AUC) 分别为 0.960、0.844 和 0.929。

结论 两组简化序列方案有极大的潜力成为 Gd-EOB-DTPA 增强 MRI 全序列可供选择的替代方案作为 HCC 高危患者的诊断新策略, 其中由 T2WI+DWI+HBP 构成 HBP-AMRI 组是最佳的简化方案。

OR-0167

双能量 CT 来源的细胞外体积分数预测进展期胃癌新辅助免疫治疗的肿瘤退缩等级

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目的: 本研究旨在使用双能量 CT (DECT) 来源的细胞外体积分数 (ECV) 预测进展期胃癌 (AGC) 新辅助免疫治疗的肿瘤退缩分级 (TRG)。

方法: 回顾性纳入瑞金医院 2019 年 8 月至 2023 年 3 月在术前接受抗 PD-1 免疫治疗和 DECT 扫描的 88 名 AGC 患者。收集患者的临床数据和血清标志物参数。勾画三期增强 DECT 图像及对应碘图的原发灶感兴趣区, 测量肿瘤三期碘浓度 (ID) 和碘比率 (IR), 根据延迟期 IR 计算 ECV。采用 Ryan 标准评估患者的 TRG, 将所有患者分为病理学完全缓解 (pCR) 组和 non-pCR 组。采用五倍交叉验证单因素分析和 Spearman 相关性分析筛选变量; 随后采用权重 logisitc 回归模型预测患者的 pCR。测量 DECT 参数的观察者间一致性评价采用组内相关系数 (ICC)。

结果: 88 名患者中, 71.6% 为男性, 年龄中位数为 65.0 岁。免疫治疗的 pCR 率为 23.9%。Sintilimab 是最常用的抗 PD-1 免疫检查点抑制剂 (ICI) (42.0%)。两名观察者间具有较高一致性, 其 ICC 分别为 0.977 和 0.969。ECV、肿瘤面积和 IDAV (静脉期相对于动脉期的 ID 变化率) 纳入最终的交叉验证模型中。ECV 在所有模型中一致地表现为独立的预测因子 ($p < 0.05$, 平均 $OR = 0.911$ (95%CI, 0.798~0.994))。组合模型在训练集中的平均 AUC 为 0.780, 准确度、敏感性和特异性分别为 69.1%, 74.9% 和 67.1%。在验证集中, 相应的指标分别为 AUC 0.766, 准确度 71.5%, 敏感性 71.0% 和特异性 72.4%。

结论: DECT 来源的 ECV 具有预测 AGC 患者新辅助免疫治疗后 TRG 的潜在价值。

OR-0168

Feasibility study on the diagnosis of fatty liver with VNC in abdomen using second-generation dual-layer detector spectral CT

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Objective To explore the feasibility of diagnosing fatty liver with second-generation dual-layer detector spectral CT virtual non-contrast images.

Methods Retrospective analysis of the imaging data of 148 patients who underwent abdominal enhanced CT at the second-generation dual-layer detector spectral CT in West China Hospital of Sichuan University from June 2022 to June 2023. The liver CT values of the left lobe, right anterior lobe, right posterior lobe and spleen of all patients were measured on the true non-contrast (TNC), arterial phase virtual non-contrast (A-VNC) images and venous phase VNC (V-VNC) images, and the difference (L-S) and ratio (L/S) between the liver CT values and the spleen CT values at the corresponding phase were calculated. Referring to the threshold value of TNC image for diagnosis

of fatty liver in previous studies, the patients were divided into two groups: fatty liver and non-fatty liver. Mann-Whitney U test was used to compare the difference of quantitative parameters between fatty liver group and non-fatty liver group. The efficacy of VNC in the diagnosis of fatty liver was evaluated by receiver operating characteristic (ROC) curve, and the difference between ROC curves was compared with DeLong's test. The intraclass correlation coefficient (ICC) were used to evaluate the consistency of data measurement.

Results The intra-group and inter-group consistency of all measured data is very good, the range of ICC values is (0.826~0.977) and (0.804~0.951) respectively ($P<0.05$). The CT value, (L-S) value and (L/S) value of TNC, A-VNC and V-VNC images in non-fatty liver group were higher than those in fatty liver group (all $P<0.05$). The area under the curve (AUC) of CT values of A-VNC and V-VNC for the diagnosis of fatty liver were 0.946, and there was no statistical difference ($P=0.684$). The AUC of A-VNC (L-S) and V-VNC (L-S) in the diagnosis of fatty liver were 1.00 and 0.961, respectively, and there was no statistical difference ($P=0.074$). The AUC of A-VNC (L/S) and V-VNC (L/S) in the diagnosis of fatty liver were 0.992 and 0.987, respectively, and there was no statistical difference ($P=0.606$).

Conclusion The CT values of liver and spleen in VNC images reconstructed by second-generation dual-layer detector spectral CT are lower than TNC, but it is still feasible to diagnose fatty liver based on VNC images.

OR-0169

基于 MR 影像组学实现前列腺癌患者 DDR 基因信号通路致病突变的预测——一项多中心回顾性研究

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背景: 早期识别携带有 DNA 损伤修复基因致病突变 (pDDRg) 的前列腺癌 (PCa) 患者具有重要的临床意义。因为此类肿瘤侵袭性较强, 但对 PARP 抑制剂的相关治疗敏感。然而由于基因检测费用昂贵, 因此 DDR 基因检测目前在真实世界中的应用推广受到了较大的限制。基于以上背景, 研究者计划基于 MRI 影像组学来无创评估 PCa 的患者携带 pDDRg 突变的风险, 从而减少不必要的基因检测患者。

方法 研究为回顾性研究, 共涉及 3 个中心。纳入标准为在前列腺活检前进行多参数 MRI 并后续进行 DDR 突变基因检测患者。其中四川大学华西医院的数据用于模型建模与内部验证, 上海复旦附属肿瘤医院和中山大学肿瘤防治中心的数据用于外部验证。模型的评估采用受试者工作特征曲线、校准曲线和决策曲线。

结果: 研究最终纳入了 225 名患者, 其中共有 48/225 (21.3%) 的患者通过基因检测确定为 pDDRg 突变阳性。通过一致性分析, LASSO 降维, 研究者最终从 T2WI ($n=7$) 和 ADC 序列 ($n=6$) 中提取了 13 个放射学特征来建立模型。T2WI+ADC 的综合诊断模型在内部验证数据集中的 AUC 为 0.824 (95% CI 0.677-0.923), 在外部验证数据集中为 0.836 (95% CI 0.738-0.908)。值得注意的是, 在“零漏诊”的截止值, 上述模型可在内部和外部验证数据集中减少约 25% 的不必要的基因检测。此外, 在亚组分析中, 该模型的诊断效能不受年龄、基线 PSA、Gleason 评分和转移状态等因素的影响。

结论: MRI 影像组学具有预测 PCa 患者是否合并 pDDRg 突变的潜能。但仍需要前瞻性研究来验证上述结论。

OR-0170

基于多参数 MRI 评估肝细胞癌伴 门静脉癌栓患者手术切除的预后研究

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目的：基于术前多参数 MRI 构建肝细胞癌伴门静脉癌栓患者手术切除后的预后预测模型。

方法：回顾性纳入 2008 年 1 月至 2021 年 5 月于四川大学华西医院接受术前增强 MRI、手术切除治疗且有完整随访资料的成年肝细胞癌伴门静脉癌栓患者。MR 图像由两名放射科医师采用双盲法独立评阅。采用单因素和多因素 Cox 回归分析评价多参数 MRI、临床及实验室检查等特征对接受手术切除的肝细胞癌伴门静脉癌栓患者的预后价值，并构建了预测总生存期（overall survival, OS）的预后评分。

结果：本研究共纳入 94 名患者（84 名男性，平均年龄 50.1 岁）。多因素 Cox 回归分析结果显示，患者年龄[风险比(hazard ratio, HR), 0.978; $p=0.04$]、血清白蛋白 (HR, 0.948; $p=0.02$)、术前 MRI 显示的最大两个肿瘤的大小之和 (HR, 3.050; $p<0.001$) 以及肿瘤生长亚型 (HR, 1.928; $p=0.006$) 是患者 OS 的独立风险预测因素。基于上述特征构建了预后评分模型： $100 \times$ 最大两个肿瘤的大小之和 ($>13\text{ cm}$, 1; $\leq 13\text{ cm}$, 0) + $59 \times$ 肿瘤生长亚型 (融合多结节或浸润型, 1; 单结节或单结节伴结节外生长型, 0) - $5 \times$ 白蛋白 (g/L) - $2 \times$ 年龄 (岁) + 300。基于此模型，患者被分为高危组 (评分 >29.5 分) 和低危组 (评分 ≤ 29.5 分)。其中，高危组患者的 OS 明显短于低危组 (11.7 个月 vs. 25.0 个月, $p<0.001$)；门静脉癌栓程氏 I 型 (12.1 个月 vs. 25.9 个月, $p=0.002$) 及 II 型中高危组的 OS 均明显短于低危组 (11.7 个月 vs. 25.0 个月, $p=0.004$)。

结论：基于患者年龄、血清白蛋白、以及 MRI 显示的最大两个肿瘤的大小之和以及肿瘤生长亚型四项术前指标构建的预后评分模型能够对肝细胞癌伴门静脉癌栓患者进行准确的术前风险分层，且为现有门静脉癌栓分型系统的有力补充。本研究结果有助于识别有望从手术切除治疗中获益的肝细胞癌伴门静脉癌栓患者，辅助个体化治疗决策制定，延长患者生存期。

OR-0171

2 型糖尿病伴肾功能不全患者肾脏磁共振体素内 不相干运动及弥散峰度成像参数与糖尿病视网膜病变的相关性

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目的：探究 2 型糖尿病伴肾功能不全患者肾脏磁共振体素内不相干运动 (IVIM) 及弥散峰度成像 (DKI) 参数与糖尿病视网膜病变 (DR) 的相关性。

方法：2022 年 1 月至 2023 年 9 月前瞻性、连续性纳入在解放军总医院第一医学中心行磁共振扫描并接受肾脏穿刺活检的 2 型糖尿病伴肾功能不全患者 68 名，测得肾脏皮质、髓质 IVIM 及 DKI 参数：灌注分数 f 、扩散系数 D 、灌注系数 D^* 、表观扩散系数 ADC、平均扩散系数 MD 及弥散峰度系数 MK 值，根据有无 DR 将患者分为 DR 组和无 DR (NDR) 组。使用 Mann-Whitney U 检验或独立样本 t 检验比较两组间的 IVIM 及 DKI 参数、临床信息、糖尿病及肾功能相关生化指标，应用单因素及多因素 logistic 回归分析筛选 DR 的独立危险因素，并应用受试者工作特征 (ROC) 曲线分析其对 DR 的诊断效能。

结果：共 53 名 NDR 组患者 (53.81 ± 9.29 岁, 36 名男性, 17 名女性) 及 15 名 DR 组 (49.20 ± 10.23 岁, 13 名男性, 2 名女性) 患者纳入了本研究。相较于 NDR 组, DR 组患者具有较长的糖尿病病

程、较高的血肌酐, 以及较低的总胆固醇 (TC)、低密度脂蛋白 (LDL)、皮髓质 f 值及 ADC 值 (均 $P < 0.05$)。单因素 logistic 回归分析显示总胆固醇、低密度脂蛋白、皮质 ADC 值及髓质 ADC 值是影响 DR 发生的相对危险因素, 在调整了年龄、性别、糖尿病病程、体重指数 (BMI)、收缩压、舒张压、TC 及 LDL 等因素后, 肾皮质 ADC 值仍与 DR 相关 [OR (95%CI): 0.990(0.982,0.999), $P=0.026$]。受试者工作特征曲线分析显示, 肾皮质 ADC 值曲线下面积为 0.776, 肾皮质 ADC 值预测 DR 的截断值为 $1105 \times 10^{-6} \text{ mm}^2/\text{s}$ 时灵敏度及特异度最高, 分别为 77.4% 和 73.3%。亚组分析显示, 在 25 名病理证实为糖尿病肾病患者中, DR 患者的皮质 ADC 值仍显著低于无 DR 患者 ($Z=-2.23$, $P=0.026$)。

结论: 2 型糖尿病伴肾功能不全患者肾皮质 ADC 值与 DR 患病风险呈明显相关性, 肾皮质 ADC 值有助于诊断 DR 及筛查有 DR 风险的人群。

OR-0172

Radiomics analysis based on dual-energy CT hydroxyapatite (HAP)-fat decomposition technique for osteoporosis prediction

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Purpose: To develop and validate a radiomics model based on the hydroxyapatite (HAP)-fat material decomposition (MD) images of dual-energy CT for osteoporosis prediction. **Materials and Methods:** 83 patients who underwent dual-energy CT included L1-L5 and quantitative computed tomography (QCT) were collected. With QCT as the reference standard, the patients were divided into two groups according to the guidelines introduced by the International Society for Clinical Densitometry (ISCD) and American College of Radiology (ACR), osteoporosis of the spine was defined as a BMD value $< 80 \text{ mg/cm}^3$, and non-osteoporosis (osteopenia and normal) was defined as a BMD value $\geq 80 \text{ mg/cm}^3$. Radiomic features were selected from HAP-fat MD images of dual-energy CT. A radiomics model was constructed from linear combinations of the selected features weighted by their coefficients. The ROC curve was performed to evaluate the performance of the radiomics model. **Results:** The radiomics model, which comprised 8 selected radiomics features (shape_Maximum2DDiameterColumn, shape_Maximum2DDiameterSlice, shape_Sphericity, firstorder_10Percentile, firstorder_90Percentile, firstorder_Skewness, glcm_LargeDependenceHighGrayLevelEmphasis, glcm_LargeDependenceLowGrayLevelEmphasis) based on HAP-fat MD images of dual-energy CT, showed excellent differential ability with AUC of 0.999 (95%CI, 0.987–1.000), sensitivity of 0.983, specificity of 1.000, negative prediction value of 0.960, positive prediction value of 1.000 in the cohort. The discrimination performance of the radiomics model to identify osteoporosis from non-osteoporosis (osteopenia and normal) showed high accuracy of 98.8% in the cohort. **Conclusions:** The radiomics model comprised 8 selected radiomics features had excellent ability to predict osteoporosis based on dual-energy CT HAP-fat MD images.

OR-0173

Radiomics Model based on MRI to Differentiate Spinal Multiple Myeloma from Metastases: A Two-center Study

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Purpose: Spinal multiple myeloma and metastases are two common cancers with similar imaging characteristics, which need differential diagnosis from each other to guide appropriate precision diagnosis and treatment planning. The aim of this study is to establish radiomics models for effective differentiation between the two cancers.

Methods: This study enrolled a total of 263 patients from two medical centers, of whom 127 were diagnosed as spinal multiple myeloma, and 136 were spinal metastases. They were divided into internal training cohort ($n = 210$, Institution I) and external validation cohort ($n = 53$, Institution II). Contrast-enhanced T1-weighted imaging (CET1) and T2-weighted imaging (T2WI) sequences were collected and reviewed. After 1037 radiomics features extracted from both CET1 and T2WI images, Logistic Regression (LR), AdaBoost (AB), Support Vector Machines (SVM), Random Forest (RF), and multiple kernel learning support vector machine (MKL-SVM) were adapted to evaluate the generalization of them, respectively. We split the training data set into five equally-sized parts, each exhibiting the same class distribution, and then the five-fold cross-validation was used to tune hyper-parameters. The diagnostic efficiency among different radiomics models were compared by Accuracy (ACC), Sensitivity (SEN), Specificity (SPE), the area under the ROC curve (AUC), YI, Positive Predictive Value (PPV), Negative Predictive Value (NPV), and F1-score.

Result: The RF model outperformed all other models based on single-sequence. All models based on T2WI images performed better than those based on CET1. All models' efficiency was boosted by incorporating CET1 and T2WI sequences, and MKL-SVM achieved the best performance with an ACC, AUC, and F1-score of 0.86, 0.87, and 0.87, respectively.

Conclusions: The radiomics models constructed based on MRI achieved satisfactory diagnostic performance for the classification of spinal MM and metastases, and have broad application prospects for individualized diagnosis and treatment.

OR-0174

髌下脂肪垫脂肪含量可评估膝骨性关节炎严重程度 —— 一项基于磁共振 mDIXON—Quant 脂肪定量技术的研究

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目的: 本研究基于磁共振 mDIXON-Quant 技术, 定量测量髌下脂肪垫 (infrapatellar fat pad, IPFP) 脂肪含量与膝骨性关节炎 (knee osteoarthritis, KOA) 严重程度的相关性。**材料与方法:** 本研究招募 44 例 KOA 患者共计 70 例膝关节进行膝关节 MRI 检查及 mDIXON-Quant 序列扫描, 分别测量每例膝关节 IPFP 脂肪含量与 KOA 严重程度的相关性。基于膝关节全器官磁共振评分 (Whole-Organ Magnetic Resonance Imaging Score, WORMS) 评估 KOA 严重程度, WORMS 总得分越高, 反映结构损伤的严重程度越高。分析各膝 IPFP 脂肪含量与膝关节疼痛时间、膝关节 WORMS 所含 11 个特征区独立评分及总评分的相关性。**结果:** KOA 患者 IPFP 脂肪含量与膝关节 WORMS 总评分、滑膜炎/积液、关节软骨完整性、关节面下骨髓信号异常、关节面下骨囊肿、关节面下骨磨损、边缘骨赘、内外侧半月板完整性、前后交叉韧带完整性、关节内游离体、关节周围囊肿/滑囊炎 ($r = -0.989, -0.259, -0.884, -0.739, -0.544, -0.815, -0.862, -0.544, -0.243, -0.460, -0.285$, p 均 < 0.05) 均呈负相关性; 与疼痛时间、内外侧副韧带完整性 ($r = 0.028, r = 0.027$, p 均

≥ 0.05) 无显著相关性。结论: 磁共振 mDIXON-Quant 技术可以敏感、定量评估 KOA 患者 IPFP 脂肪含量, IPFP 脂肪含量改变与膝关节结构异常密切相关, 可以用于评估 KOA 的严重程度, 为膝骨性关节炎患者的早期干预和治疗提供重要的依据。

OR-0175

Deep Learning-Based Reconstruction Enhances Image Quality and Improves Diagnosis in MR Imaging of the Shoulder Joint

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Objectives: To compare the image quality of accelerated magnetic resonance imaging (MRI) sequences reconstructed using a deep-learning (DL) algorithm with conventional MRI for shoulder examinations. Additionally, we aimed to evaluate the effectiveness of DL MRI in accurately demonstrating the degree of subacromial (SbA) bursa and subcoracoid (SC) bursa thickening.

Methods: A total of forty-one patients who underwent 3-T MRI of the shoulder were included in this study. Both Conventional MRI and accelerated MRI sequences were acquired. The image quality and degree of artifacts were assessed using a 5-point Likert scale for both Conventional MRI and DL MRI. Additionally, the degree of SbA and SC thickening, as well as the relative signal-to-noise ratio (rSNR) and relative contrast-to-noise ratio (rCNR) of Conventional MRI, DL MRI, and accelerated MRI sequences reconstructed without using deep-learning (Non-DL) MRI and DL MRI, were analyzed using the Paired Wilcoxon test. Statistical significance was defined as $p < 0.05$.

Results: The use of accelerated sequences resulted in a remarkable 58% reduction in total scan time. Overall, DL MRI exhibited superior image quality scores and fewer artifacts compared to Conventional MRI. Specifically, DL MRI (3.92[2.83,5.82]mm) demonstrated significantly higher measurements of SC thickenings in the oblique sagittal FS PDWI sequence compared to Conventional MRI (3.74[2.92,5.96]mm) ($p=0.028$). Moreover, DL MRI exhibited higher detection of SbA thickenings in the oblique coronal FS PDWI sequence, with a notable trend towards significant differences. Furthermore, DL MRI exhibited better noise reduction in muscle tissue compared to bone when compared to Conventional MRI. Additionally, all DL MRI images exhibited significantly greater rSNRs and rCNRs compared to Non-DL MRI ($p<0.001$).

Conclusions: DL MRI enhances image quality and improves diagnostic capabilities, making it a promising alternative to Conventional MRI for shoulder imaging.

OR-0176

Investigation of the anatomic risk factors in acute anterior cruciate ligament rupture combined with ramp lesions of the medial meniscus by quantitative MRI

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Objective To investigate the anatomic risk factors of knee in patients with acute non-contact anterior cruciate ligament (aACL) rupture coexisted with ramp lesions of medial meniscus.

Methods A total of 202 subjects were retrospectively assigned to the following 3 groups: (1) aACL rupture with ramp lesion group ($n=76$); (2) isolated ACL rupture group ($n=56$) and (3) a normal

control group (n=70). Several morphological parameters on MRI were manually measured and analyzed: the diameter of medial femoral condyle (MFC), the anterior-posterior length and depth of medial tibial plateau (MTP AP length and MTP depth), the lateral posterior tibial slope (LPTS) and medial posterior tibial slope (MPTS), the asymmetry of LPTS and MPTS (LMPTS), the lateral meniscal slope (LMS), and medial meniscal slope (MMS).

Results The incidence of ramp lesion in aACL ruptures was 17.4%. The MTP AP length ($p < 0.001$), MTP AP length/ MFC diameter ratio ($p < 0.001$), MTP depth ($p < 0.001$), LPTS ($p < 0.001$) and the asymmetry of LMPTS ($p < 0.001$) showed significant differences among the three groups. The MTP AP length was significantly longer (40.9 ± 3.7), the MTP AP length / MFC diameter ratio was larger (0.87 ± 0.06), the MTP depth was deeper (2.4 ± 0.9), the LPTS (6.42 ± 2.17) was steeper, with an increased the asymmetry of LMPTS (3.38 ± 2.07) in the group of aACL rupture with ramp lesions. The risk factors associated with the ramp lesions including a longer MTP AP length (OR 1.17, 95%CI 1.00-1.44, $p = 0.044$), deeper MTP depth (OR 1.91, 95%CI 1.22-3.00, $p = 0.005$) and larger MTP AP length/ MFC diameter ratio (OR 1.11, 95%CI 1.01-1.22, $p = 0.036$). The highest AUC was MTP AP length/ MFC diameter ratio (0.74; 95% CI, 0.66-0.82), with a sensitivity of 73% to predict the ramp lesions.

Conclusion Some occult anatomic characteristics especially the morphology of proximal medial tibia can be as risk factors for patients of aACL rupture with concurrent ramp lesions and produce potential impact on injury patterns.

OR-0177

基于 3.0T 化学位移编码 磁共振成像的髌髌关节骨髓脂肪酸成分分析

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目的: 应用化学位移编码磁共振成像分析、比较中轴型脊柱关节炎患者及对照组的髌髌关节骨髓脂肪酸成分, 探索中轴型脊柱关节炎定量评估的新的影像标志物。

方法: 前瞻性招募诊断为年龄在 18-45 岁之间的中轴型脊柱关节炎患者及年龄、性别、体质指数匹配的非脊柱关节炎对照组。所有参与者在同一台 3.0T 磁共振仪 (UMR780, 联影, 上海, 中国) 上进行多回波梯度回波的化学位移编码成像髌髌关节磁共振扫描, 并通过后处理分析髌髌关节骨髓脂肪酸成分, 包括多不饱和脂肪酸、单不饱和脂肪酸及饱和脂肪酸比例。在髌骨侧及髌骨侧分别手动勾画感兴趣区, 分析的区域包括存在脂肪沉积和不存在脂肪沉积的骨质。疾病组与对照组之间不同骨髓脂肪酸成分的比较采用 T 检验进行分析。

结果: 本研究共招募了 85 名参与者, 包括 48 名中轴型脊柱关节炎患者 (25 名男性, 23 名女性) 和 37 名非脊柱关节炎患者 (18 名男性, 19 名女性)。男性脊柱关节炎患者髌髌关节多种骨髓脂肪酸成分与对照组之间存在显著差异, 包括: 髌骨、髌骨脂肪沉积区域及髌骨无脂肪沉积区域单不饱和脂肪酸比例显著升高 (髌骨脂肪沉积区, +12%, $p < 0.001$, 髌骨脂肪沉积区, +9%, $p < 0.001$, 髌骨无脂肪沉积区, +10%, $p = 0.002$), 髌骨、髌骨脂肪沉积区域多不饱和脂肪酸比例显著降低 (髌骨脂肪沉积区, -10%, $p = 0.001$, 髌骨脂肪沉积区, -11%, $p < 0.001$), 以及髌骨无脂肪沉积区饱和脂肪酸比例显著降低 (-6%, $p = 0.001$)。在女性脊柱关节炎患者中, 仅仅髌骨脂肪沉积区域的饱和脂肪酸比例显著高于对照组 (+7%, $p = 0.036$)。

结论: 中轴型脊柱关节炎患者髌髌关节骨髓脂肪酸成分与对照组之间存在显著差异, 这种差异可以用化学位移编码磁共振成像扫描检测到。

OR-0178

Feasibility of artificial intelligence-supported assessment of dual-energy computed tomography for measuring bone mineral density: correlation with quantitative CT

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Purpose Artificial intelligence (AI) is considering the promising method in automating assessment of bone mineral density (BMD) in dual-energy computed tomography (DECT). The objective of this study was to evaluate the precision and agreement between BMD measurements performed in DECT-derived hydroxyapatite (HAP) concentration of the L1 vertebra to L3 vertebra and automated, AI-supported assessment of DECT-derived HAP concentration of the three vertebrae with European Spine Phantom (ESP) in comparison to quantitative CT (QCT).

Materials and Methods The image acquisitions were performed on Revolution CT (GE Healthcare, Waukesha, WI) at 120kV with tube rotation times of 0.8 seconds and modulated tube currents of 100 and 500mA, and fast tube voltage switching between high and low energy (140/80kVp) with tube rotation times of 0.5 seconds and modulated tube currents of 240 and 365mA using ESP (No. 145, Germany ORM company) on March 2023. The ESP was scanned for ten repeated times without repositioning. For QCT measurement, the QCT PRO workstation (Mindways QCT PRO workstation) can automatically generate analyze the ROIs and analyze the BMD values of the L1, L2, L3. For the measurement of DECT-derived HAP values, the circular region of interest (ROI) was set as the median plane of the vertebral body with an area of 468.78mm² avoiding cortical bone and its pedicle, and the HAP values of the L1, L2, and L3 were measured from the axial-view HAP (Water)-based material decomposition (MD) images on a dedicated Gemstone Spectral Imaging workstation (GE Workstation). For the measurement of the automated, AI-supported assessment of DECT-derived HAP concentration of the three vertebrae was performed by a new post-processing workflow for fully automatic and highly accurate BMD analysis based on AI technology, detailed analysis process as follows:

Firstly, Spine analysis, using spectral CT images as the original input, process detects, names, segments, and recognizes the orientation of the vertebral body within the image without the need for manual location positioning; Secondly, ROI extraction, the system automatically selects the most suitable three vertebrae for evaluation, recognizes their direction and central plane, segments their trabecular bone, and extracts the three-dimensional structure of the vertebrae for measuring bone density based on vertebral body segmentation; Thirdly, bone density calculation, using spectral CT technology combined with X-ray attenuation principles, the system automatically calculates the calcium-based substance concentration of voxels within the ROI as the current BMD values of the vertebral trabecular bone; Lastly, intelligent reporting, with reference to domestic and foreign databases and guidelines, the system generates personalized bone density reports and diagnosis and treatment recommendations for patients. The paired sample t test was used to determine the differences between the two measurements. The association and consistency of the two measurements were analyzed by Pearson correlation.

Results The volume CT dose index (CTDI_{vol}) derived from QCT were 5.53mGy in 100mA and 27.66mGy in 500mA, whilst DECT-derived HAP were 5.80mGy in 240mA and 9.25mGy in 365mA. Under different scanning conditions, the QCT-derived BMD values of the L1, L2, and L3 were 53.60±0.27, 106.25±0.11, 202.76±0.23mg/cm³, respectively. The DECT-derived HAP-Water values of the L1, L2, and L3 were 45.25±0.42, 89.2±0.86, 180.00±0.15mg/cm³ with the tube current of 240mA, whilst 39.46±0.51, 88.64±0.74, 170.1±0.38mg/cm³ with the tube current of 365mA. The DECT-derived HAP-Water values of the L1, L2, and L3 with AI were 44.2±0.87, 94.73±0.32, 173.22±0.71mg/cm³ with the tube current of 240mA, and 41.23±0.23, 92.03±0.74, 173.79±0.78mg/cm³ with the tube current of 365mA. There was a strong positive correlation between the two methods ($r=0.91$, $P<0.0001$).

Conclusion The automated, AI-supported assessment of DECT-derived HAP concentration of

the three vertebrae is feasible to measure the BMD values and potentially aid a help in opportunistic screening of osteoporosis in high-risk populations.

OR-0179

基于深度学习的肩关节 MR 冈上肌腱撕裂的全自动诊断方法

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目的:以关节镜检查为参考标准,探讨应用深度学习检测方法检测肩关节 MRI 冈上肌腱撕裂的可行性。

材料和方法:在这项回顾性研究中,来自两个中心的 431 名参与者被用于建立和验证基于深度学习的冈上肌腱撕裂检测系统。提出的系统是通过使用 U-Net 网络来分割和隔离冈上肌腱,然后使用 Swin-transformer 网络来确定是否存在冈上肌腱撕裂。并对 Densnet101 和 Resnet50 作为分类器进行了对比评估。由 3 名放射科医师进行主观诊断,获得诊断结果。采用受试者工作特征曲线、曲线下面积、灵敏度、特异度和准确度评价系统和放射科医师的诊断性能。我们还将模型的性能与放射科医师的诊断结果进行了比较。

结果:本文提出的基于 U-net 和 Swin-transformer 网络的冈上肌腱撕裂检测系统的 AUC 为 0.986,准确率为 0.929,灵敏度为 0.918,特异度为 0.940,总体诊断准确率较高。提出的基于深度学习的肩关节 MR 冈上肌腱撕裂的全自动诊断方法和肌骨放射科专家之间的诊断效能无统计学差异。

结论:本文提出的冈上肌肌腱撕裂检测系统具有与经验丰富的临床放射科医师相当的诊断性能。

OR-0180

Inter-rater variability and repeatability in the assessment of the Tanner-Whitehouse classification of hand radiographs for the estimation of skeletal age

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Background The visual atlas is thought to be less objective and reliable than the Tanner-Whitehouse (T-W) classification when determining skeletal age (SA). However, because of how complicated and time-consuming it is to use, there are few studies evaluating the inter-rater variability and repeatability in the assessment of bone maturity using the T-W methods.

Objective To determine which bone growth classification had the lower consistence and accuracy hence needed deeper scrutiny when employing the T-W approaches.

Materials and Methods 24 radiologists were recruited to be trained in the T-W classification of skeletal development. The consistency and skill of the radiologists in determining bone developing status was then assessed using 20 pediatric hand radiographs as test radiographies. The results of the two tests performed by the remaining 20 radiologists were analyzed since 4 of them were excluded considering the poor concordance rate of their results in their 1st reading test. With the mean assessment of two senior experts as the reference standard, concordance rate, scoring, and standard deviation (SD) were calculated to evaluate accuracy and consistency.

Results The RUS system outperformed the C system in terms of scores. The repeatability analysis between 2 tests shows that the second rating test performed after two months of SAA practice was more consistent and accurate than the first. The capitate had the lowest average concordance rate and scoring (0.620, 31.95 points), as well as the lowest concordance rate for its D classification. Moreover, the G classification in 6/7 carpal bones had a concordance rate less than 0.6. The bones with higher SDs were likewise those with lower scores and consistency rates.

Conclusion The grade D of capitate showed the highest variation, and the use of T-W to determine SA was frequently inconsistent. A more comprehensive description with a focus on inaccuracy bones or ratings and a modification to the T-W3 approach would significantly advance SAA.

OR-0181

Quantitative multiparametric UTE-MRI sequences for early cartilage degeneration corresponding to biochemical components—an in vivo study

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Purpose To investigate the feasibility of UTE-MRI quantitative imaging in diagnosing early cartilage degeneration in vivo, compare the diagnostic efficacy of various sequences and explore their corresponding pathological and biochemical basis.

Materials and Methods Twenty volunteers with osteoarthritis (OA) for total knee arthroplasty (TKA) were recruited between June 2020 and August 2021. MRI scans (UTE-MT, UTE-AdiabT1p, UTE-T2* mapping, CubeQuant-T2 and CubeQuant-T1p) were performed one day before surgery. From each patient, 11 regions of interests (ROIs) were manually drawn to get MRI quantitative values, seven from the tibial plateau and four from the lateral femoral condyle. During TKA, cartilage samples were collected in strict accordance with the preset positions corresponding to MRI images. Then, the pathological and biochemical components of the corresponding ROI were obtained, including histological grading, glycosaminoglycan (GAG) content (constituting PG), collagen structural integrity and water content of the cartilage. The receiver operating characteristic (ROC) was conducted to evaluate the performance of three UTE-MRI quantitative imaging techniques.

Results Ninety-one regions of interest (ROIs) from 20 volunteers (7 males, age range: 68 to 78 years; 74±3 years; 13 females, age range: 57 to 79 years; 67±6 years) were assessed. UTE-MT ($r=-0.619$, $P<.001$), UTE-AdiabT1p ($r=0.568$, $P<.001$), and UTE-T2* ($r=-0.495$, $P<.001$) values demonstrated stronger correlations with histological grading compared to T2 ($r=0.287$, $P=.006$) and T1p values ($r=0.435$, $P<.001$). Among them, UTE-MTR exhibited the highest diagnostic performance when compared to UTE-AdiabT1p and UTE-T2* values (AUC=0.824, 0.796, 0.635; $P<.001$, $=.001$, $=.113$, respectively). Upon analyzing the correlation between each quantitative value and three main biochemical components of cartilage, UTE-MTR primarily related to collagen structural integrity ($r=0.536$, $P<.001$), UTE-AdiabT1p value mainly associated with PG content ($r=-0.652$, $P<.001$), while UTE-T2* value predominantly reflected water content ($r=-0.518$, $P<.001$).

Conclusion Quantitative UTE-MRI values exhibit superior diagnostic efficacy for detecting early cartilage degeneration in vivo, surpassing conventional T2 and T1p values. UTE-MTR demonstrates the highest effectiveness in diagnosing early cartilage degeneration. Specifically, UTE-MTR, UTE-AdiabT1p, and UTE-T2* values primarily reflect distinct aspects of cartilage degeneration, including collagen structure integrity, PG content, and water content, respectively.

OR-0182

基于影像及临床参数对脊髓型颈椎病预后评估的列线图模型构建

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目的：构建并验证影响脊髓型颈椎病预后的列线图模型

方法：收集 2016 年 9 月-2022 年 9 月期间在南昌大学第一附属医院诊治的 189 例脊髓型颈椎病 (CSM) 患者术前临床资料及影像数据 (术前 Cobb、椎间稳定性、椎间旋转不稳、最大脊髓受压程度、脊髓压迫类型及信号等)，基于术后 1 年 JOA 疗效评分，按照 3: 7 比例分为训练数据集与测试数据集。应用 LASSO-Cox 筛选对 CSM 患者临床预后的影响因素，应用 R 软件 (版本 R 3.6.3) 构建预测 CSM 患者临床预后的 nomogram 预测模型，用受试者工作特征 (receiver operating characteristic, ROC) 曲线、校准曲线来评估本研究构建的列线图预测模型的预测效能。决策曲线分析 (DCA) 用于评估临床适用性。

结果：多因素 Cox 回归模型结果提示性别、preCobb、椎间段不稳定、椎间旋转不稳、最大脊髓受压程度 (MSCC) 为 CSM 临床预后的独立影响因素。绘制 ROC 曲线、校准曲线，结果显示：ROC 曲线下面积为 0.918 (95% 置信区间为 0.674~0.835)，曲线斜率接近 1。决策曲线分析 (Decision curve analysis, DCA) 表明，当阈值概率在 5% 到 100% 之间时，nomogram 预测模型对预测脊髓型颈椎病患者预后具有较高的净收益。

结论：通过 LASSO-Cox 回归筛选出 CSM 临床预后预测的影像及临床参数，并在此基础上初步构建了 nomogram 模型，具有较好的预测效果。

OR-0183

基于骨骺弥散张量成像的模型可用于儿童身高的预测

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目的：验证骨骺 DTI 指标作为身高增加速度 (从 MRI 检查开始的 1 年身高增益) 和总身高增益 (从 MRI 检查到生长停止的身高增益) 的预测因子，并将预测精度与基于骨龄的模型进行比较。

方法：本研究为基于 2021 年 1 月至 2023 年 7 月期间接受了膝关节 MRI 检查的健康儿童的前瞻性研究，受试儿童同时接受了股骨 DTI 检测 (b 值=0 和 600 秒/mm²；方向= 20)、骨龄 X 线检查、身高及体重检查。并在 1 年后随访复查。分析 DTI 束的体积和长度与身高的增加速度的相关性。采用多线性回归模型来评估 DTI 指标在预测这两个参数中的潜力。Bland-Altman 图用于比较基于骨骺 DTI 和基于骨龄的身高预测方法的均方根误差 (RMSE) 和偏差。

结果：65 名儿童 (平均年龄 11±3 岁，37 名男孩) 测量身高增加速度。在控制了年龄和性别后，DTI 束的体积与长度 ($r^2 = 0.49$) 和身高增加速度 ($r^2 = 0.46$) (P, 均为 0.001) 相关。DTI 束的长度是预测身高增加的最强预测因子。与基于骨龄的估算方法 (身高增加速度: $R^2=0.32$, RMSE=2.9cm) 相比，基于 DTI 束长度的估算模型，可以有效提高对身高增加速度 ($R^2 = 0.63$, RMSE=1.7cm) 的预测。

结论：在儿童中，使用弥散张量成像得到的束体积模型在预测身高速度和总身高增益方面可能比基于骨年龄的模型表现更好。

OR-0184

Prediction the early retear in the rotator cuff tear patients after arthroscopy based on preoperative indexes

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Background: Retear after arthroscopic rotator cuff repair (ARCR) consistently challenges medical staff and patients. At present, the rate of retear after arthroscopic rotator cuff repair is 11-57.3%, and the rate of retear after arthroscopic repair of huge rotator cuff tear is even as high as 94%, and some patients even need a second operation, which has a great adverse impact on the postoperative functional recovery and life quality.

Purpose: The purpose of this study was to identify the risk factors that cause retear after ARCR and provide diagnostic basis for predicting tendon retear at an early stage.

Methods: The authors reviewed the records of 258 patients who, 3 months after primary rotator cuff repair had magnetic resonance imaging to assess repair integrity. The mean age at the time of surgery was 55.83 ± 7.72 years (range, 37-73 years), and 170 patients were women (65.6%). For morphologic assessment, the routine PD-FS images were used to classify the repair tendon integrity into five categories based on Sugaya classification. Sugaya classification type IV or V was regarded as healing failure. The factors affecting cuff integrity were analyzed through univariate and multivariate analyses. The cutoff values and ROC curve were received to obtain diagnosis efficiency of retear.

Results: The overall healing failure rate was 15.9%. The independent risk factors were age, pre VAS, costant score, internal rotation, tear retraction and width, infraspinatus tendon tear, supraspinatus muscle atrophy and fatty infiltration, tear form and operation method in the arthroscopic. The following independent risk factors were identified in the multivariate analysis: pre-operation costant score 42 ($P = 0.031$, $OR = 0.93$), and tear width 1.3cm in anteroposterior dimension ($P = 0.021$, $OR = 2.03$). The ROC of the combining diagnostic value was 0.727. The sensitivity and specificity were 69.57% and 75.74%, respectively ($P = 0.002$).

Conclusion: The preoperative costant score and tear width affected the tendon retearing after arthroscopic at an early stage. Explore the related factors affecting the rate of rotator cuff retear is prone to improve the understanding of retear meanwhile reduce the occurrence of retear after surgery.

OR-0185

Evaluation of the peripheral nerves of the knee using Double-Echo Steady-State MRI at 7 T

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Purpose The peroneal nerve (PN), tibial nerve (TN), and saphenous nerve (SN) are the main peripheral nerves of the knee, which cannot be reliably visualized on 3T MRI. This study aims to evaluate the potential of the DESS sequences at 7T MR for assessing the detailed structures of the peripheral nerve in healthy and patient adults.

Methods Twenty-two healthy subjects and one patient underwent 7T MR scans (MAGNETOM Terra, Siemens Healthcare) with a 28-channel knee coil. Scanning protocol (Table 1) included axial Proton Weighted (PD) and two three-dimensional double-echo steady-state (3D-DESS) sequences with different resolutions: sagittal DESS-A images for 3D structural evaluation and axial DESS-B images with a high in-plane resolution for the nerve fascicles assessment. The quality of nerve images in different sequences was evaluated by two radiologists with a 3-grade scale. The signal-

to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of the nerves to surrounding fat tissue were measured.

Results The κ value of subjective scores for image quality was from 0.65 to 1. The subjective scores, SNR, and CNR of the three protocols were summarized in Table 2. DESS-A protocol provided superior delineation for the PN, while DESS-B protocol provided excellent image quality for depicting the TN and SN (Fig. 1 and Fig. 2).

The representative images of a patient with peripheral nerve damage caused by trauma are shown in Figure 3. The PD imaging showed markedly swollen TN and PN with enhanced signal and thickening of the nervous tracts and epineurium. Thickened tibial and peroneal individual nerve fascicles and muscular branches of the TN and the lateral sural cutaneous nerve were clearly observed on DESS-B images.

Conclusions The DESS sequences have the potential to provide precise assessments of the peripheral nerves of the knee and more valuable information for the diagnosis of peripheral nerve diseases.

OR-0186

基于倾向性得分匹配法分析椎旁肌退变 对腰椎椎间融合术后相邻节段病翻修术的预测价值

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目的：通过比较腰椎椎间融合术（PLIF）后行相邻节段病（ASD）翻修手术与未行 ASD 翻修术患者椎旁肌的退变情况，研究其对 PLIF 后 ASD 翻修手术的预测价值。

材料与方法：收集 2006 年 9 月至 2022 年 9 月在大连医科大学附属第一医院连续进行两次 PLIF，且符合纳入及排除标准的患者 40 例作为实验组；使用倾向性得分匹配法，选取同期仅接受过一次 PLIF 且与实验组年龄、性别、身体质量指数、手术节段数相匹配的患者 40 名作为对照组，使用两组术前腰椎 MRI 图像，分别测量多裂肌（MF）、竖脊肌（ES）、腰大肌（PS）和多裂肌及竖脊肌之和即椎旁肌群（PVM）的总横截面积（CSA）、有效横截面积（FCSA）、肌肉椎体指数 CSA-VI 和 FCSA-VI（ $\text{CSA-VI}=\text{CSA}\times 100/\text{同层椎体横截面积}$ ， $\text{FCSA-VI}=\text{FCSA}\times 100/\text{同层椎体横截面积}$ ），采用独立样本 t 检验比较两组差异，并绘制受试者工作特征曲线（ROC）曲线。

结果：在腰 3 下终板水平，病例组 MF、ES、PVM 的 FCSA 和 FCSA-VI 均较对照组小，差异有统计学意义（ $P<0.01$ ）；病例组和对照组 MF、ES、PVM 的 CSA、CSA-VI 相比较，差异均无统计学意义（ $P>0.05$ ）；病例组和对照组 PS 的 CSA、FCSA、CSA-VI、FCSA-VI 相比较，差异均无统计学意义（ $P>0.05$ ）。多裂肌 FCSA-VI 用于预测 PLIF 后相邻节段翻修术的最佳截断值为 41.82，曲线下面积为 0.874，敏感性为 62.07%，特异性 96.55%。

结论：PLIF 后 ASD 翻修术患者 MF、ES 的肌肉萎缩程度比不需要 ASD 翻修术患者程度重，多裂肌的 FCSA-VI 是 PLIF 后发生 ASD 翻修手术的预测因素。

OR-0187

Experimental Study on Thermal Field of Microwave Ablation in Homogenous Liquid Using Cyst-Mimicking Models

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Objective The aim of this study was to explore the thermal field characteristics of microwave ablation (MWA) in homogeneous liquid using cyst-mimicking models.

Methods A total of twelve bladders of New Zealand White rabbits were used to mimic cysts, divided into an MWA experimental group ($\phi = 5\text{ cm}$, 60 W) and a control group. The MWA antennas were introduced into the centers of the cyst-mimicking models. We measured the real-time temperatures during MWA and used an infrared thermal imaging device to dynamically monitor the thermal field distribution. The macroscopic and histological changes of the cyst-mimicking models were evaluated, and statistical analysis was conducted.

Results A total of ten cyst-mimicking models were performed MWA, with five temperature points in each case, and two cases without MWA in the control group. There was a positive correlation between the temperature gradient of cyst-mimicking model (wall and liquid) and MWA power. The temperature of the cystic left side wall was similar to the right side wall ($P > 0.05$), and below the average of the cystic top wall and fluid ($P > 0.05$), and obviously higher than the cystic bottom wall ($P < 0.05$), with all temperature values eventually balanced. The microwave thermal field was regionally distributed in the cyst-mimicking model, the region and range of the thermal field was associated with the ablation duration. The temperature of cystic side wall and liquid can reach the point of coagulative necrosis (70°C) with covered by microwave thermal field. Histopathology of control group showed normal bladder epithelial cells and intracellular structural integrity, the morphology of lamina propria and muscle cell integrity; experimental group revealed bladder wall epithelial cell degeneration and necrosis, and lamina propria and muscular layer of normal tissue structure were completely disappeared.

Conclusions Microwave thermal energy was transmitted in the liquid by thermal convection, and the distribution of the thermal field in the homogeneous liquid was regional and uniform. MWA is a promising treatment for cystic lesions.

OR-0188

ERAS 理念联合氢吗啡酮 PCA 在恶性肿瘤介入围手术期的应用研究

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目的 观察加速康复外科 (enhanced recovery after surgery, ERAS) 理念联合氢吗啡酮患者自控镇痛 (patient controlled analgesia, PCA) 在恶性肿瘤介入围手术期的有效性及安全性。方法 选取 2021 年 01 月—2022 年 01 月贵州医科大学附属肿瘤医院介入科恶性肿瘤行介入手术病人 60 例为研究对象, 随机分为观察组和对照组, 30 例/组, 对照组常规围手术期护理, 术前 8h 禁食、水。观察组 ERAS 理念联合氢吗啡酮 PCA 镇痛治疗, 成立 ERAS 护理小组。术前: 收集患者一般资料, 医生根据患者情况拟定手术方案; 护士做好术前宣教、营养评估, 术前 2h 可口服碳水化合物, 术前 1h 使用氢吗啡酮 PCA 镇痛治疗。配置方法为氢吗啡酮 $5\text{mg} + \text{生理盐水 } 115\text{ml}$, 背景量 2ml/h , PCA 单次剂量 4ml/次 , 锁时 15min 。给药前评估患者疼痛情况, 记录 NRS 评分。术中: 麻醉医师根据病人情况为其实施麻醉方案, 密切观察患者术中生命体征。术后: 定时监测患者生命体征, 术

后出现爆发性疼痛时, 根据病人情况遵医嘱予相应止痛治疗。记录 PCA 给药前, 栓塞即刻, 栓塞后 5min 及术后 2、6、12、24、48h 的 NRS 评分, 每日发生疼痛次数, 补救镇痛次数、患者满意度、不良反应情况和生活质量 BPI 评分。结果 术前两组患者临床特征比较, 差异均无统计学意义 (均 $P>0.05$)。观察组在栓塞及术后各时间点 NRS 评分均低于对照组, 每日发生疼痛的次数、补救镇痛次数均低于对照组, 患者满意度更高, 差异有统计学意义 ($P<0.05$)。患者无过度镇静、呼吸抑制等严重不良反应, 差异无统计学意义 ($P>0.05$)。生活质量 BPI 评分改善, 差异有统计学意义 ($P<0.05$)。结论 ERAS 理念联合氢吗啡酮 PCA 可有效缓解恶性肿瘤介入围手术期患者疼痛, 改善患者生活质量, 不良反应轻, 提高患者护理满意度, 可推广应用。

OR-0189

基于 NaXWO₃ 纳米晶体的微波消融 和化学动力学联合治疗三阴性乳腺癌

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目的: 本研究旨在探讨基于六方相 NaXWO₃ 纳米晶体的微波消融和肿瘤微环境响应性化学动力学对小鼠 4T1 三阴性乳腺癌移植瘤的联合治疗作用。

方法: 采用环保水热法, 以 WO₃ 前驱体和 Na₂SO₄ 为原料合成六方相 NaXWO₃ 纳米晶体, 并对其理化性质进行表征。细胞层次采用 CCK-8 实验和线粒体膜电位 JC-1 检测 NaXWO₃ 纳米晶体选择性杀伤肿瘤细胞的可行性和机制。活体层次构建 4T1 小鼠乳腺癌模型, 待肿瘤体积达到 50 mm³ 左右时进行随机分组治疗 (n=5)。治疗结束后, 正常饲养小鼠, 并且每隔一天监测各组小鼠的体重和肿瘤体积。观察结束后, 取小鼠肿瘤及重要脏器行组织病理学 H&E 染色以及细胞凋亡标志物 Tunel 的免疫组化分析。

结果: 通过环保水热法成功制备了 PVP 修饰的长度约为 100-150 nm, 直径约为 5 nm 的六方相 NaXWO₃ 纳米晶体。体外模拟液的 DCF 荧光光谱图和 TAOH 荧光光谱图显示, 以 W5+ 为优势价态的 NaXWO₃ 纳米晶体可分解 H₂O₂ 生成强氧化性的·OH, 且该催化性能随着底物浓度、反应时间以及反应温度的增加而逐渐增强。CCK-8 实验表明当 NaXWO₃ 纳米晶体浓度达到 400 μg mL⁻¹ 时, 4T1 细胞的活力下降到 67.8±2.6%, 而 HUVEC 细胞活力仍接近 100%。当加入外源性 H₂O₂ 和 NaXWO₃ 纳米晶体后, HUVEC 细胞活力明显下降 (77.2±5.7%)。JC-1 实验结果进一步揭示 NaXWO₃ 纳米晶体处理的 4T1 细胞线粒体膜电位发生去极化改变, 而 HUVEC 细胞的线粒体膜电位并无明显的改变。活体实验中, 与对照组相比, NaXWO₃ 纳米晶体+MWA 处理组呈现最好的肿瘤体积抑制效果以及最严重的肿瘤坏死和凋亡。

结论: 六方相 NaXWO₃ 纳米晶体通过在肿瘤部位同时产生加热效应和强氧化性的·OH 实现了外源性 MWA 和内源性化学动力学联合治疗小鼠 4T1 三阴性乳腺癌移植瘤。

OR-0190

Low-dose CT fluoroscopy-guided interventional minimally invasive robot

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Object: This study aimed to assess the feasibility, safety, and accuracy of a low-dose CT fluoroscopy-guided remote-controlled robotic real-time puncture procedure.

Methods: The study involved two control groups: Group A, which underwent low-dose traditional

CT-guided manual puncture (blank control), and Group B, which underwent conditional control puncture. Additionally, an experimental group, Group C, underwent CT fluoroscopy-guided remote-controlled robotic real-time puncture. In a phantom experiment, various simulated targets were punctured, while in an animal experiment, attempts were made to puncture targets in different organs of four pigs. The number of needle adjustments, puncture time, total puncture operation time, and radiation dose were analyzed to evaluate the robot system.

Results: Successful punctures were achieved for each target, and no complications were observed. P-values were calculated for all parameters using SPSS 26.0 software and independent-samples t-test.

Conclusion: The low-dose CT fluoroscopy-guided puncture robot system is a safe, feasible, and equally accurate alternative to traditional manual puncture procedures.

OR-0191

脊髓 CT 血管造影对脊髓血管畸形的评价价值

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[摘要] 目的 观察 CT 血管成像 (CTA) 诊断脊髓血管畸形 (SCVM) 的价值。方法 回顾性分析 85 例经手术确诊 SCVM 患者 CTA 及数字减影血管造影 (DSA) 资料, 以术中所见及术后临床诊断为金标准, 计算 CTA 判断病变类型和范围的准确率, 以及 CTA 显示增粗供血动脉及瘘口位置与 DSA 的符合率。结果 85 例 SCVM 包括硬脊膜动静脉瘘 (SDAVF) 59 例、脊髓周围动静脉瘘 (SPAVF) 10 例、脊髓动静脉畸形 (SAVM) 12 例及海绵状血管瘤 (CM) 4 例。CTA 判断病变类型和范围的准确率分别为 85.88% (73/85) 和 92.94% (79/85)。除 4 例 CM CTA 及 DSA 结果均为阴性外, CTA 显示 81 例 SCVM 供血动脉及瘘口位置与 DSA 的符合率分别为 86.42% (70/81) 和 82.72% (67/81)。结论 脊髓 CTA 能较准确显示 CM 之外大部分 SCVM 病变范围、供血动脉及瘘口位置

OR-0192

Clinical analysis of esophageal artery chemoembolization combined with camrelizumab for advanced esophageal squamous carcinoma

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Purpose To evaluate the safety and feasibility of esophageal artery chemoembolization combined with camrelizumab for the treatment of patients with advanced esophageal squamous cell carcinoma (ESCC).

Methods The present study retrospectively analyzed the clinical efficacy and adverse effects of esophageal artery chemoembolization combined with camrelizumab (200 mg, q3w) for patients with advanced ESCC. The observation indexes were objective response rate (ORR), disease control rate (DCR), progression-free survival (PFS) time, overall survival (OS) time, and treatment-related adverse reactions. The changes of life assessment scale and esophageal cancer specific scale were assessed before and after treatment.

Results Twenty-three patients with advanced ESCC were successfully treated, with a follow-up time of 15.4 ± 5.7 months. The ORR and DCR reached 80.0% and 90.0% after receiving 15 cycles of camrelizumab. Median OS and PFS were 15.8 months (13.0,20.0) and 8.6 months (7.8,19.1). Emotional function improved significantly after six treatment cycles compared to pre-treatment

($P=0.018$). Social function and the overall status improved gradually, with significant changes after nine cycles ($P=0.012$, $P=0.023$). The esophagus-specific symptoms were all significantly relieved after nine treatment cycles compared to the pre-treatment period ($P=0.004$, 0.001 , and 0.005). All adverse reactions during treatment were all relieved by symptomatic treatment.

Conclusion Camrelizumab combined with esophageal artery chemoembolization is effective in the control of advanced ESCC and significantly improves PFS and OS with controllable adverse drug effects. This combination of treatments can improve the overall quality of patient lives.

OR-0193

介入光学成像实时引导及评估肝癌射频消融治疗

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目的：创建一种介入光学成像技术实时引导及评估肝癌射频消融治疗，实现肝癌的完全消融治疗。

材料与方法：本研究分 3 部分进行：（1）VX2 肝癌细胞在不同时间点吸收不同浓度的 ICG，优化光学显影剂吲哚菁绿(ICG)在体外行光学成像的剂量及浓度；（2）建立体外介入光学成像系统，并评估该系统在体外能否鉴别活的吸收 ICG 的 VX2 肝癌细胞与热消融后死亡的吸收 ICG 的 VX2 肝癌细胞；（3）创建兔 VX2 肝癌模型，验证介入光学成像系统可实时引导及评估兔 VX2 肝癌射频消融治疗。

结果：ICG 被 VX2 肝癌细胞吸收良好，在体外最佳吸收浓度为 $100 \mu\text{g/mL}$ ，最佳吸收时间点为 24 小时。吸收 ICG 的 VX2 肝癌细胞行热消融(80°C)治疗 10 分钟后，其光学信号强度显著降低，体外介入光学成像可清晰鉴别活的吸收 ICG 的 VX2 肝癌细胞与热消融后死亡的吸收 ICG 的 VX2 肝癌细胞。体内动物实验显示介入光学成像可在射频消融术中发现未消融的残存活性 VX2 肝癌细胞，并且可以清晰鉴别消融肿瘤边界病理三区（完全射频消融区、炎症反应带、残存活性肿瘤/正常肝脏组织）。

结论：介入光学实时成像可实时引导及评估肝癌射频消融治疗，实现肝癌完全消融治疗。

OR-0194

Immunomodulators enhance the effect of anti-PD-1 therapy on incomplete ablation of residual tumors.

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Background and aims: Radiofrequency ablation (RFA) often results in incomplete ablation for medium-to-large and irregular tumors. To solve this clinical problem, we proposed a new treatment strategy of OK-432 in combination with an anti-programmed cell death protein 1 ($\alpha\text{PD-1}$) antibody for residual tumors after incomplete RFA (iRFA) of hepatocellular carcinoma (HCC).

Approach and results: The effect of OK-432 on immature dendritic cells (iDCs) was evaluated in vitro. A CCK-8 kit and ELISPOT were used to assess the killing effect of OK-432-induced CD8+ T cells in combination with an $\alpha\text{PD-1}$ antibody on Hepa1-6 cells. We found that OK-432 significantly increased the maturation level of DCs, and OK-432-induced CD8+ T cells in combination with $\alpha\text{PD-1}$ antibody significantly enhanced the function of CD8+ T cells. In the in vivo experiment, HCC model mice were treated with (1) pseudo iRFA + phosphate-buffered saline (PBS); (2) iRFA + PBS; (3) iRFA + OK-432; (4) iRFA + $\alpha\text{PD-1}$; or (5) iRFA + OK-432 + $\alpha\text{PD-1}$. We found that the combined therapy of OK-432 with $\alpha\text{PD-1}$ antibody significantly increased the infiltration and function of CD8+ T cells and significantly decreased the number of FoxP3+ regulatory T cells in residual tumors after iRFA of HCC. Moreover, the smallest tumor volumes and the longest survival were observed in the

triple combination treatment (iRFA+OK-432 + α PD-1 antibody) group compared with the other four groups.

Conclusions: The combined therapy of OK-432 with α PD-1 antibody induced a strong antitumor immune

response, which significantly inhibited the residual tumors after iRFA of HCC. This concept may provide a new treatment strategy to increase the curative efficacy of RFA for medium-to-large and irregular HCCs.

OR-0195

基于深度学习的 TBAD 真假腔智能分割重建研究

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目的: 本研究基于影像学先验知识, 旨在开发一种基于内膜注意力机制、能够整合夹层动脉上下层信息的深度学习方法实现 TBAD 真腔(true lumen, TL)和假腔(false lumen, FL)的智能分割重建。

方法: 从四个大型医院收集 TBAD 患者的术前 CTA 影像数据, 构建一个多中心数据集。该数据集含有与临床场景一致的假腔无血栓化和有血栓化的病例。基于 PyTorch 框架为 TBAD 分割开发一种特有的内膜注意力机制, 联合级联网络

结构和两步训练策略提出一种深度学习模型, 命名为 ADSeg。用单中心数据进行模型训练, 并在多中心数据集

上测试模型的分割性能和泛化能力, 用 Dice 系数 (dicecoefficient) 和平均边界距离 (boundary distance) 对分割结果进行评估。

结果: ADSeg 分割 TL、FL、动脉主干及 BR 的 Dice 系数分别为 91.1%、88.4%、93.2% 及 84.9%。

与经典的 U-Net 算法相比, ADSeg 分割 TL、FL 及 BR 的 Dice 系数分别提高了 6.4%、7.4% 及 2.4%; 边界距离分别降低了 0.36mm、0.38mm 及 0.10mm。与此前报道的最优方法相比, ADSeg 分割 TL 和 FL 的 Dice 系数分别提高了 4.1% (91.1% vs. 87.0%) 和 5.9% (88.4% vs. 82.5%); 边界距离分别降低了 0.21mm (1.47mm vs. 1.68mm) 和 0.64mm (2.10mm vs. 2.74mm)。

结论: 本研究提出了一种以内膜注意力机制和长距离 z 轴信息交互为特点, 同时利用了级联网络结构及两步训练策略的深度学习方法, 相比现有的主动脉夹层真假腔分割方法具有更高的分割准确性, 并在多中心测试集上表现出强大的泛化性。ADSeg 有望为 TBAD 精准智能诊断、个体化治疗方案制定、术后随访及预后预测等提供价值。

OR-0196

MRI-based Investigation of Dynamic changes in Viable Hepatocellular Carcinoma following Transarterial Chemoembolization

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Objective To analyze the dynamic changes in MRI radiological features of viable tumors at different follow-up times after the initial Transcatheter arterial chemoembolization (TACE) treatment for hepatocellular carcinoma (HCC) to improve the understanding and diagnostic accuracy of viable tumors.

Methods The study analyzed a prospective, single-arm, multicenter clinical trial data set (NCT03113955) and another three centers of clinically diagnosed patients with intermediate-stage

HCC who received TACE as their first treatment. Viable tumors in two follow-up MRI were evaluated according to the Liver Imaging Reporting and Data System (LI-RADS). Radiological features were evaluated including signal characteristics of T1WI, T2WI, and DWI, the presence or absence of wash in and wash out, as well as the size, location, and shape characteristics of the viable tumors.

Results There were 157 HCCs in multicenter data set and 297 HCCs in another three centers met inclusion criteria. After exclusion, there were total 160 viable tumors on both follow-up MRI. Compared with the radiological features of the baseline, the T2WI hyperintensity ($P = .002$), wash out ($P < .001$) and the tumor short diameter ($P < .001$) of the first follow-up viable tumors significantly decreased. Compared with the radiological features of the first follow-up viable tumors, the DWI hyperintensity of the second follow-up viable tumors increased ($P = .009$), and the other features were similar. For the shape features of viable tumors, both follow-ups showed mostly regular shapes (66.9%, 60.6%). Another location feature, the first follow up viable tumor showed mostly internal location (51.3%), but the second follow up viable tumor showed mostly non-internal location (66.9%).

Conclusions The radiological features of viable tumors at early follow up post-TACE showed more variability compared to the baseline HCC, while those at second follow-up remained variable but less than the first follow up viable tumors.

OR-0197

肝动脉输注化疗联合分子靶向和免疫治疗 最佳治疗有效率的初步研究

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目的:本研究旨在探讨在不可切除的肝细胞癌(HCC)患者接受氟尿嘧啶、亚叶酸钙和奥沙利铂(FOLFOX)联合分子靶向和免疫治疗的肝动脉输注化疗(HAIC)时,使用改进的实体瘤反应评价标准(response Evaluation Criteria in Solid tumor),以最佳反应率(BRR)作为总生存期(OS)的替代指标的有效性。方法采用限制性三次样条(RCS)和最大选择的秩和统计方法确定BRR的最佳阈值。绘制高评分组和低评分组患者的生存曲线。然后,我们使用估计变化(CIE)方法过滤掉混杂因素,并使用处理加权逆概率(IPTW)来平衡两组之间的混杂因素,以评估结果的稳健性。结果本研究连续入组111例影像学资料完整的患者。在总体人群中,联合治疗方案的中位数频率为3次。计算出的最佳BRR截断值为-0.2。根据该值将77例患者分为低评分组,34例患者分为高评分组。高评分组和低评分组的OS差异有统计学意义(6个月 vs 11个月;术中;0.001)。采用绝对10%截断值,CIE方法筛选影响预后的混杂因素:转换手术成功、基线肿瘤大小、巴塞罗那临床肝癌(BCLC)分期、血清总胆红素水平、介入治疗次数、甲胎蛋白水平、下腔静脉肿瘤血栓存在、部分凝血酶激活时间。然后使用IPTW对混杂因素再次绘制生存曲线,发现低评分组的OS继续优于高评分组。最后分析BRR与基线因素的关系,下腔静脉肿瘤血栓、基线肿瘤大小与BRR有显著相关。结论BRR可作为不可切除HCC患者接受FOLFOX-HAIC联合分子靶向和免疫治疗的替代终点。因此,通过计算BRR,可以预测HCC患者联合治疗后的预后。下腔静脉肿瘤血栓和基线肿瘤大小与BRR密切相关。

OR-0198

Safety and Efficacy of CT-guided Preoperative Indocyanine Green Localized Simultaneous Video-Assisted Thoracoscopic Surgery of Multiple Pulmonary Nodules a Retrospective Study

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Objectives To evaluate the safety and efficacy of indocyanine green (ICG) in preoperative CT-guided localization of multiple pulmonary nodules.

Methods The patients who underwent CT-guided preoperative ICG localization followed by Video-Assisted Thoracoscopic Surgery (VATS) from June 2021 to March 2023 were included. The clinical, nodular, localization, and surgery characteristics were collected. Patients were divided into multiple nodules group and single nodules group. The patients in the multiple nodules group were divided into bilateral and unilateral subgroups according to the localization side.

Results A total of 374 patients (mean age, 54.8 ± 11.4 years, 96 men, 99 multiple nodules) with 511 nodules were evaluated. The success rate in the multiple nodules group reached 98.3%, which is equal to the single nodule group. The other outcomes between the single nodule group and multiple nodules group showed no significant difference except in the postoperative hospital stay [3(2-4) days vs. 3(3-4) days, $P = 0.022$]. Multivariate analysis indicated pulmonary hemorrhage during localization, surgery blood loss, postoperative complication, and not segmentectomy were significantly associated with longer postoperative hospital stay. For pneumothorax, advanced age is the only independent risk factor. The success rate unilateral group and nodule group was 97.8% and 99% respectively. Only a higher pneumothorax rate was observed in the unilateral group than in the bilateral group (38.3% vs. 20%).

Conclusion CT-guided preoperative ICG localization is a safe and effective method to localize multiple pulmonary nodules. ICG localization of both unilateral and bilateral MPNs has similar safety and efficacy, which could be applied in simultaneous VATS resection of MPNs.

OR-0199

直接淋巴管造影在原发性乳糜尿中的诊断价值

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目的 探讨直接淋巴管造影 (DLG) 在诊断原发性乳糜尿中的应用价值。

方法 回顾性收集确诊为原发性乳糜尿的 37 例患者的临床及影像学资料, 所有患者均行直接淋巴管造影 (DLG), 采用美国 GE Innova 2000-IQ DSA 机行 DLG 检查。根据患者临床情况, 选取一侧足 (本组 1 例患者从腹股沟淋巴结注入) 注射碘油, 若患者合并下肢淋巴水肿, 则选择健侧足, 患者取仰卧位, 于一侧足第 1~3 趾根间皮内及皮下注射亚甲蓝与 2%利多卡因混合液 (1:1) 约 1~2ml, 在显微镜下足背中部局部以 1%利多卡因麻醉后, 做 0.5~1cm 皮肤横切口, 自皮下寻至一支蓝染浅淋巴管, 用淋巴管造影针穿刺进入淋巴管管腔, 以 6~8ml/h 的注射流率, 注入碘油总量约 7~15ml, 于 DSA 下间断动态观察碘油显影及反流情况, 直至显示胸导管末端入血情况, 观察时间约 1.5~4.0h 不等。DLG 统计指标包括: 泌尿系统及胸腹部异常淋巴管分布、反流及扩张情况。对于原发性乳糜尿患者 DLG 征象采用分类变量资料中的构成比进行统计描述。

结果 DLG 示同侧髂淋巴管迂曲、扩张 30 例 (81.1%); 对侧髂淋巴反流 17 例 (45.9%); 同侧

腰干迂曲扩张、反流 19 例 (51.4%)；对侧腰干反流 21 例 (56.8%)；同侧肾盂肾窦反流 17 例 (45.9%)；对侧肾盂肾窦反流 21 例 (56.8%)；胸导管回流受阻 32 例 37 例 (100.0%)；支气管纵隔干反流 7 例 (18.9%)，其中 1 例 (2.7%) 肺门反流，3 例 (8.1%) 肋间反流 (图 11%)；4 例 (10.8%) 会阴反流；1 例 (2.7%) 腹腔反流；颈干、锁骨下干反流 21 例 (56.8%)。

结论 DLG 能够动态直观显示淋巴回流及异常反流、准确评价淋巴管形态，对于原发性乳糜尿的诊断能够达到 81.8%。

临床应用 DLG 能够对原发性乳糜尿的诊断及术前评估提供重要影像学依据。

OR-0200

Transcatheter arterial embolization for hepatic hemangioma: effectiveness and its affecting factors

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Purpose: To evaluate the effectiveness of Transcatheter arterial embolization (TAE) for the treatment of hepatic hemangioma (HH) and to analyze the factors affecting the TAE effectiveness.

Method: Institutional review board approvals were obtained for this study and written informed consent was waived. A retrospective analysis was conducted of consecutive HH patients who received TAE with bleomycin-Lipiodol emulsion and gelatin sponge particles at three institutions from January 2014 to January 2021. TAE effectiveness was defined as more than 50% reduction of tumor volume. The effectiveness, safety, and CT changes of hemangiomas after TAE were assessed. Factors affecting TAE efficacy were analyzed with logistic regression analysis.

Results: A total of 102 patients with 109 HHs were included. TAE effectiveness was achieved in 80.7% (88/109) of hemangiomas, which was characterized by significant reduction in tumor volume during the first year with Lipiodol retention. Atypical enhancement pattern ($p = .001$) and central arterioportal shunt (APS) ($p = .002$) were independent predictors of TAE ineffectiveness. Postembolization syndrome and transient increase in liver enzymes were common without severe complications and death.

Conclusion: TAE was safe and effective in shrinking hemangioma, with characteristic changes during follow-up CT. Lesion enhancement pattern and APS type were associated with TAE efficacy.

OR-0201

Efficacy of TACE Combined with Sirolimus in the Treatment of Kasabach-Merritt Phenomenon in Infants

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[Abstract] **Objective:** To observe the efficacy of TACE combined with sirolimus in the treatment of hemangioma combined with Kasabach-Merritt phenomenon. **Methods:** A total of 11 infants with Kasabach-Merritt phenomenon (KMP) who were treated at our hospital from January 2016 to September 2021 were chosen and treated with arteriosclerosis embolotherapy by using the emulsion and microsphere formed by bleomycin + ultra-fluid lipiodol + dexamethasone + contrast agent or bleomycin mixed microsphere as the embolizing agent. The patients took orally sirolimus after surgery. The clinical efficacy and examination indicators before and after treatment were

observed and compared. Results: The 11 infants underwent TACE treatment of arteriosclerosis embolotherapy for 21 times, among whom 10 were cured and 1 showed moderate response, without non-response case or death case. The platelet count rose to $236.0 (188.0, 275.0) \times 10^9/L$ after surgery from $10.0 (7.0, 18.0) \times 10^9/L$ before surgery, and the tumor size decreased to $7.0 (3.5, 17.0) \text{ cm}^3$ from $49.0 (43.0, 111.7) \text{ cm}^3$. The differences were statistically significant (Z values were -2.943 and -2.934 respectively, $P < 0.05$). Conclusion: TACE combined with sirolimus has significant efficacy on critical children with KMP.

OR-0202

Radiation Dose and Image quality evaluation of Virtual Monoenergetic Images from Spectral CT in CT guided percutaneous spine biopsy

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Purpose: to evaluate whether improved image quality by means of 74keV virtual monoenergetic images enables a radiation dose reduction compared to conventional images in CT guided percutaneous spine biopsy.

Methods: Thirty patients (male, female, age range, mean age) who underwent spectral CT-guided percutaneous spine biopsy were retrospectively analyzed from March to April 2021. Each patient received conventional 120kVp scanning and spectral scanning after the needle tip of the spine biopsy reached the target lesion area. All other scanning parameters were kept identical. The volume CT dose index was recorded. ROIs were placed in front of the spine biopsy needle tip on conventional images and copied to identical positions in 74keV virtual monoenergetic images. The contrast-to-noise ratio was calculated. Two radiologists blinded to the reconstruction technique evaluated image quality on a 5-point Likert-scale. Statistical assessment was performed using ANOVA and Wilcoxon test adjusted for multiple comparisons.

Results: The mean volume CT dose index of 120kVp group and 74keV group was 7.01 and 9.31 mGy, respectively. Irrespective of the volume CT dose index, noise was significantly lower in 74keV virtual monoenergetic images compared with conventional images (20.8 ± 8.4 vs. 19.1 ± 6.3 HU, $P < 0.001$). Overall, the contrast-to-noise ratio in 74keV virtual monoenergetic images was superior to that in conventional images irrespective of the volume CT dose index (0.76 ± 0.04 vs. 0.24 ± 0.03 , $P < 0.001$). Subjective analysis confirmed better image quality in 65- keV virtual monoenergetic images.

Conclusion: The 74keV virtual monoenergetic images from spectral CT unenabled a radiation dose reduction compared to conventional images in CT guided percutaneous spine biopsy, while it could improve the overall CT image quality.

OR-0203

Endovascular Treatment for Patients with Perforator Stroke Related to Middle Cerebral Artery Stenosis: Based on Multi-Mode Imaging

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Background: Although most neurologists believe that patients presenting with perforator stroke (PS) related to intracranial atherosclerotic stenosis (ICAS) are not suitable for endovascular treatment, the author finds that this is untrue and that some patients may be treated with endovascular therapies under the guidance of multi-mode imaging. This study aimed to investigate the outcomes of endovascular treatment for PS related to middle cerebral artery stenosis (MCAS).

Materials and methods: Patients who presented with PS related to MCAS and accepted endovascular treatment in our center between January 2015 and June 2022 were enrolled retrospectively. The clinical and surgical data of the patients were evaluated. The primary endpoint was procedure-related PS. We also focused on any stroke or death within 1 month, stroke or death in the territory of qualifying artery beyond 1 month through 1 year after procedure, and changes in postoperative visualization of perforator arteries in lesions.

Results: A total of 26 patients (mean age 57.7 years) were enrolled. The primary endpoint of procedure-related PS was in 1 patient (1/26, 3.8%), and no other patient had any stroke or death within 1 month. During follow-up, one patient experienced symptomatic in-stent restenosis (3.8%). DSA revealed that perforator arteries in lesions improved in 16 patients after the procedure (61.5%).

Conclusion: In this retrospective study, endovascular treatment for PS related to MCAS did not increase the incidence of procedure-related PS. Endovascular treatment may be safe and effective in such patients.

OR-0204

肝肾囊肿 CT 引导下聚桂醇硬化治疗

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目的: 评估肝肾囊肿 CT 引导下聚桂醇硬化治疗效果。 **方法:** 对 114 例 (122 个) 肝肾囊肿 CT 引导下聚桂醇硬化治疗进行回顾性分析, 其中肾囊肿 79 例 (83 个), 肝囊肿 35 例 (39 个)。术前准备: ①增强检查排除肾囊肿是否与肾盂肾盏、肝囊肿是否与胆道系统相通; ②进行血常规、出凝血功能、肝肾功能和心电图检查; ③根据增强检查的囊肿部位来确定穿刺治疗体位: 肾囊肿采取俯卧位或者侧卧位、肝囊肿采取仰卧位或侧卧位; ④并且确定进针路径以及定位标记的放置。术中:

①采取平静呼吸模式; ②确定穿刺层面、路径及距离: 平扫后肾囊肿选择靠近尿里收集系统侧的最大层面作为进针层面, 肝囊肿选择肝区最大径层面作为进针层面; 肝囊肿避开周围大血管及胆道、肾囊肿避开肝脾和肠道、选择最短的进针路径, 针尖一般位于囊肿中心偏肾盂侧或肝区侧、确定穿刺距离; ③穿刺和抽液: 确定好穿刺层面、穿刺路径和距离后常规消毒、铺无菌洞巾, 然后 BADR 18G 同轴穿刺针进行穿刺、扫描确定进针路径和距离准确后, 进行抽液, 囊肿较大时、需要缓慢抽液、避免减压太快发生囊壁毛细血管破裂导致的囊内出血; ④冲洗: 扫描确认囊液抽净或基本抽净后, 用生理盐水 40-100mL 反复冲洗 1-2 次, 去除囊壁附着的蛋白及粘液; ⑤硬化: 再次抽净囊内液体后、向囊腔内注入 20-80mL 的聚桂醇泡沫硬化剂 (氧气和聚桂醇按照 1: 1 配比)。然

后拔针包扎穿刺点。结果：囊肿最大径约 4.3-14 cm；抽出囊液量为 100-1200mL，肝囊肿囊液为无色或淡绿色，肾囊肿为淡黄色或淡茶色。所有患者在经过聚桂醇泡沫硬化治疗后，临床症状均有明显的好转或消失。本组患者术后 1 月、3 月和半年复查随访的总体疗效指数（有效率）分别为：88.10%、90.72%、95.24%。整个抽吸硬化治疗过程顺利，患者均无硬化剂外渗和并发症发生。结论：肝肾囊肿 CT 引导下聚桂醇硬化治疗效果显著、且操作便捷简单，与外科手术相比对患者造成的创伤更小、费用更少、住院天数短，可以替代外科手术。

OR-0205

真实世界中肝动脉灌注化疗治疗 一线化疗失败的胰腺癌肝转移的疗效和安全性

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目的：本研究的目的是评价经肝动脉灌注化疗（HAIC）治疗一线化疗失败的胰腺癌肝转移的疗效、安全性及患者生存期。方法：回顾性分析 2021 年 11 月至 2022 年 12 月期间在北京清华长庚医院接受肝动脉内灌注奥沙利铂联合 5-FU 方案治疗的 16 例病人，该组病例特点均是一线化疗后进展的胰腺癌肝转移患者。采用 Kaplan-Meier 法分析患者肝内中位无进展生存期（mPFS）及中位总生存期（mOS）。结果：随访至 2023 年 7 月，中位随访时间 8.2 个月，16 例患者中 3 例存活，13 例死亡。客观缓解率（ORR）：43.75%，疾病控制率（DCR）：68.75%，mPFS：4.7 个月（95%CI：3.328~6.072），mOS：8.0 月（95%CI：6.824~9.176）。3 级不良反应：4 例，2 例为血红蛋白减少，1 例为总胆红素升高，1 例发生腹痛。结论：以奥沙利铂为基础的经肝动脉灌注化疗是治疗一线化疗后进展的胰腺癌肝转移安全有效的疗法。结论：以奥沙利铂为基础的肝动脉灌注化疗是治疗一线全身静脉化疗失败的胰腺癌肝转移安全有效的疗法，与化疗或化疗和靶向药物联合可以同时控制肝内外肿瘤进展。

OR-0206

肝硬化脾功能亢进大鼠模型的构建和部分脾动脉栓塞术治疗研究

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目的 介绍一种肝硬化脾功能亢进（脾亢）大鼠动物模型的建立方法，并在此模型基础上进行部分脾动脉栓塞（PSE）治疗研究。方法 给予大鼠 40% CCl₄-橄榄油溶液皮下注射，造成中毒性肝硬化后继发门脉高压性脾功能亢进，再进行 PSE 治疗，观察大鼠外周血细胞变化，了解脾脏影像学变化以及组织病理学改变。结果 经 CCl₄-橄榄油溶液皮下注射数月后，血红细胞、血小板降低，脾脏组织被膜大范围增厚，结缔组织增生，脾脏组织学改变符合脾脏淤血肿大的改变。脾动脉栓塞后能引起脾脏广泛坏死，胞核碎裂溶解。结论 经四氯化碳皮下注射建立的肝硬化继发脾功能亢进大鼠模型，便于构建、运输及饲养，可以作为肝硬化脾亢外科或介入治疗的较理想模型，PSE 治疗是一种有效的干预措施。

OR-0207

逆向开通技术在肠系膜上动脉闭塞的应用策略

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目的：探讨逆向开通技术在肠系膜上动脉闭塞患者中的应用体会。

方法：针对肠系膜上动脉完全闭塞的患者无法经原动脉开口行介入开通，采用经腹腔干动脉分支逆向开通技术反向开通闭塞的肠系膜上动脉，具体路径为经腹腔干动脉-分支-肠系膜上动脉主干-肠系膜上动脉开口闭塞；具体方式为：经股动脉及肱动脉入路，应用 4F 蛇管进入腹腔干动脉并建立轨道，经微导管进入腹腔干动脉与肠系膜上动脉沟通侧枝，反向应用微导丝经肠系膜上动脉远端逆向开通开口闭塞段，后采用 2mm, 3mm, 4mm 球囊依次扩张闭塞段；经肱动脉入路应用鹅颈抓捕器抓捕微导丝并建立轨道，应用 6mm 及更大球囊扩张闭塞段，并置入支架完全开通肠系膜上动脉闭塞段。

结果：应用逆向开通技术开通肠系膜上动脉闭塞患者三例，两例完全开通，效果明显；一例患者未开通，后应用自体大隐静脉行髂动脉-肠系膜上动脉转流后效果可。两例患者随访 3-10 月，未出现支架狭窄及闭塞，中期随访效果明显。

结论：由于肠系膜上动脉的特殊解剖结构，肠系膜上动脉完全闭塞经正规入路开通困难，临床中遇到类似患者可采用逆向开通技术进行肠系膜上动脉闭塞段的开通及介入治疗，效果明显，值得临床推广。

OR-0208

Development of a Sun Yat-sen sharp recanalization (SYSR) scoring system for thoracic venous occlusive disease in hemodialysis patients

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Object: There has been no reliable scoring system for sharp recanalization of thoracic central venous occlusive disease (TCVOD) in hemodialysis patients. We aim to establish a scoring system to guide therapy in hemodialysis patients with TCVOD.

Methods: Data from 122 TCVOD procedures were analyzed. Using sharp device for recanalization was set as an end point, instead of actual procedural success. The least absolute shrinkage and selection operator (LASSO) method was used to select independent predictors. The SYSR (Sun Yat-sen University Sharp Recanalization) score was determined by assigning 1 point for each independent predictor of this end point and summing all points accrued. This value was then used to develop a model stratifying all lesions into 3 recommend intensity for sharp recanalization: minor (SYSR score of 0), intermediate (score of 1), and highly recommended (score of ≥ 2). 10-fold cross-validation was used to test the robustness and accuracy of our model.

Results: The set end point was achieved in 25.4% (31/122) of lesions. Independent predictors included calcification and blunt stump. Minor, intermediate, and highly recommended groups, stratified by SYSR score, demonstrated recommend intensity of using sharp recanalization for TCVOD. The receiver operating characteristic (ROC) curve yielded an RUC of 0.84(95%CI, 0.755-0.925). In the 10-fold cross-validation, the AUC in the derivation group was 0.795 to 0.878, while in the validation group, the AUC was 0.717 to 0.885.

Conclusions: This model would predict the probability of using sharp recanalization very well and can be applied for thoracic central venous occlusive disease in hemodialysis patients.

OR-0209

Glubran2 组织胶在肝细胞癌外科切除术前 计划性门静脉栓塞术中的应用价值

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目的 肝细胞癌 (HCC) 在我国高发, 致死率高, 外科手术是治疗可切除 HCC 的首选方法, 但存在术后剩余肝脏体积 (FLR) 过小、残余肝功能代偿不足等问题, 因此外科术前计划性应用门静脉栓塞术 (PVE), 促进残余肝脏组织增生肥大, 增加肝脏储备功能, 有效避免术后肝衰竭。但 PVE 的理想栓塞材料存在争议。本研究比较 Glubran2 组织胶和氰基丙烯酸异丁酯 (NBCA) 在 HCC 外科切除术前计划性 PVE 治疗中的有效性及安全性。

方法 回顾性分析 2020 年 1 月至 2023 年 6 月收治于我院 56 例进行 HCC 外科切除术前计划性 PVE 患者的临床资料, 根据主要栓塞材料不同, 将患者分为 Glubran2 组 26 例和 NBCA 组 30 例。比较两组 PVE 手术成功率、术中及术后并发症发生率、HCC 外科手术切除率、FLR 增加值 (PVE 术后-PVE 术前 FLR)、FLR 增生率 (PVE 术后-PVE 术前 FLR/PVE 术前 FLR)、FLR 增生速度 (FLR 增加值/PVE 后天数)、HCC 外科手术围术期的死亡率及术后 90 天内死亡率。

结果 Glubran2 组和 NBCA 组的 PVE 手术成功率、术中及术后并发症发生率、HCC 外科手术切除率均无显著统计学差异 ($P=0.632$ 、 0.565 、 0.662), Glubran2 组 PVE 术后 (27.63±9.32) 天 FLR 增加值 (236.87±62.95) ml, NBCA 组 PVE 术后 (26.31±8.73) 天 FLR 增加值 (158.97±71.63) ml ($P=0.032$)。Glubran2 组及 NBCA 组 FLR 增生率分别为 (56.96±13.28)%、(45.23±18.19)% ($P<0.039$), FLR 增生速度分别为 (10.91±6.39) ml/天、(6.79±6.85) ml/天 ($P=0.019$), Glubran2 组 1 例患者于 HCC 外科手术围术期内死亡, Glubran2 组及 NBCA 组各 1 例患者于术后 90 天内死亡 ($P=0.685$)。

结论 Glubran-2 组织胶应用于肝细胞癌外科切除术前的计划性门静脉栓塞术, 有效促进 FLR 增加, Glubran-2 和 NBCA 作为主要栓塞材料的门静脉栓塞术安全性相当。

OR-0210

TACE 联合靶向或免疫药物治疗 不可切除的肝内胆管细胞癌的临床疗效研究

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目的: 评估 TACE 联合靶向或免疫药物治疗不可切除肝内胆管细胞癌的临床有效性与安全性。

方法: 回顾性收集了 2016 年 2 月 1 日至 2022 年 7 月 7 日在浙江省肿瘤医院接受 TACE 联合靶向药物或免疫药物 (pd-1 或 pd-L1) 治疗不可切除的肝内胆管细胞癌 (ICC) 患者 42 例, 其中 8 例患者接受 TACE 联合靶向药物 (仑伐替尼、阿帕替尼或安罗替尼), 7 例接受 TACE 联合免疫药物 (信迪利单抗、替雷利珠单抗或特瑞普利单抗), 27 例接受 TACE 联合靶向药物和免疫药物。同时与同期在本院接受单纯 TACE 治疗的 36 例 ICC 患者进行疗效的比较。根据 mRECIST 标准进行疗效评估, 比较 TACE 联合靶向或免疫药物组和单纯 TACE 组的肿瘤客观缓解率 (ORR)、疾病控制率 (DCR)。Kaplan - Meier 法绘制生存曲线, 比较两组的中位无进展生存期 (mPFS)、中位总生存期 (mOS)、无进展生存期 (PFS)、总生存期 (OS)。多因素 Cox 回归模型分析相关预后因素。同时, 观察两组患者的不良事件 (AEs) 的差异。

结果: TACE 联合组的 PR 和 ORR 均显著高于单纯 TACE 组 (PR, 66.7% vs 41.7%, $P=0.027$; ORR, 71.4% vs 44.4%, $P=0.016$)。TACE 联合组与单纯 TACE 组的中位 PFS 分别为 7.4 个月 (95% CI: 4.8-10.0) 和 5.8 个月 (95% CI: 3.5-8.1), 具有统计学差异 ($P=0.028$)。TACE 联合组和单纯 TACE 组的中位 OS 分别为 17.3 (95% CI: 13.8-20.7) 个月和 19.3 (95% CI: 7.9-30.7) 个月。独立危险因素方面, 多因素分析提示胆红素 $>20 \mu\text{mol/L}$ 和多发肿瘤是 PFS 的独立危险因素, 而 CA199 和 ALT 高水平是 OS 的独立危险因素。副反应方面, 最常见的不良反应是腹痛、恶心和白蛋白减低等, 两组间无明显差别。

结论: 对于肝内胆管细胞癌 TACE 具有较好的疗效, 且 TACE 联合靶向或免疫治疗比单纯 TACE 具有更好的近期疗效, 并且不增加严重的不良反应发生率。

OR-0211

胸部 sDWI-CT 融合图像对肺结节的诊断价值研究

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目的: 通过对循环生成对抗网络 (CycleGAN) 进行迁移学习, 实现合成胸部磁共振伪弥散加权图像 (sDWI), 将胸部 sDWI 与胸部 CT 图像融合, 评估融合图像诊断良恶性肺结节的价值。方法: 数据集 1: 收集 4000 张头颅 DWI 图像、4000 张头颅 CT 图像。数据集 2: 收集 400 张胸部 DWI 图像、400 张胸部 CT 图像, 其中 400 张胸部 CT 图像含 120 个肺结节。首先, 将头颅 DWI 图像以及头颅 CT 图像输入 CycleGAN 进行训练, 由此得到的生成器 GCT-DWI 可以将头颅 CT 图像合成头颅 DWI 图像。其次, 将胸部 DWI 图像、胸部 CT 图像以及生成器 GCT-DWI 输入挖掘生成对抗网络 (mineGAN) 训练。mineGAN 可以将胸部 CT 合成胸部 sDWI 图像。然后将胸部 sDWI 图像与胸部 CT 进行基于傅立叶变换的图像融合并进行带通滤波。最后, 比较胸部真实 DWI 与 sDWI 图像之间像素值差异, 在两图像之间计算平均绝对误差 (MAE)、平均误差 (ME)、峰值信噪比 (PSNR) 和结构相似性 (SSIM) 以定量评估胸部 sDWI 质量, 结果用平均值 \pm 标准差表示。观察结节的信号特点, 采用 ROC 曲线评估胸部 sDWI-CT 融合图像诊断良恶性肺结节的效能。结果: 胸部 sDWI 图像与真实 DWI 图像 MAE 为 36.981 ± 0.989 , ME 为 16.882 ± 0.878 , PSNR 为 27.642 ± 3.4266 , SSIM 为 0.9527 ± 0.026 。恶性结节在 sDWI-CT 融合图像上大部分为低信号; 准确率为 0.932, 特异性为 0.974, 敏感性为 0.819, AUC 为 0.962。结论: mineGAN 可以实现对 CycleGAN 迁移学习, 胸部 sDWI 图像质量良好。胸部 sDWI-CT 融合图像对良恶性肺结节的诊断具有重要鉴别诊断价值。

OR-0212

基于对比增强 T1WI 和表观扩散系数直方图分析术前评估成人颅内室管膜瘤病理分级和瘤细胞增殖活性的价值

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目的: 探讨基于对比增强 T1WI (T1C) 和表观扩散系数 (ADC) 直方图分析术前评估成人颅内室管膜瘤病理分级和瘤细胞增殖活性的价值。

方法: 回顾性收集 2014 年 4 月--2023 年 7 月兰州大学第二医院 47 例经组织病理学证实的成人颅

内室管膜瘤患者。使用 FireVoxel 软件分别提取整个肿瘤 T1C 和 ADC 图像的直方图参数, 包括 minimum、maximum、mean、Perc.01、Perc.05、Perc.10、Perc.25、Perc.50、Perc.75、Perc.90、Perc.95、Perc.99、标准差 (SD)、方差、变异系数 (CV)、偏度、峰度和熵。采用独立样本 t 检验或 Mann-Whitney U 检验比较 2 级和 3 级成人颅内室管膜瘤各直方图参数间的差异。使用受试者工作特征曲线 (ROC) 和 Logistic 回归分析确定各参数的评估效能。Spearman 相关分析用于评估直方图参数与 Ki-67 增殖指数之间的关系。

结果: 与 2 级成人颅内室管膜瘤相比, 3 级成人颅内室管膜瘤 T1C 直方图参数中的 Perc.95、Perc.99、SD、方差、CV 和熵均显著升高 ($P<0.05$), ADC 直方图参数中的 minimum、mean、Perc.01、Perc.05、Perc.10、Perc.25、Perc.50 均显著降低, 而 CV 和熵均显著升高 ($P<0.05$)。在 T1C 和 ADC 直方图参数, 熵 (T1C) 和 Perc.10 (ADC) 分别具有较高的诊断性能, AUC 为 0.805 和 0.827, 结合熵 (T1C) 和 Perc.10 (ADC) 后, 诊断性能进一步提高, AUC 为 0.857。T1C 和 ADC 中重要的直方图参数均与 Ki-67 增殖指数之间存在显著相关性 ($P=0.001-0.044$)。

结论: 基于 T1C 和 ADC 的全肿瘤直方图分析是术前评估成人颅内室管膜瘤病理分级和瘤细胞增殖活性的有效手段, 可为临床治疗方案的选择提供参考依据。

OR-0213

Radiomics-based machine learning methods for volume doubling time prediction of pulmonary ground glass nodules with baseline chest CT

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Purpose: Reliable prediction of volume doubling time (VDT) is essential for the personalized management of pulmonary ground glass nodules (GGNs). We aimed to determine the optimal VDT prediction method by comparing different machine learning methods only based on the baseline chest CT images.

Materials and methods: Seven classical machine learning methods were evaluated in terms of their stability and performance for VDT prediction. The VDT, calculated by the preoperative and baseline CT, was divided into two groups with a cut-off value of 400 days. A total of 90 GGNs from three hospitals constituted the training set, and 86 GGNs from the fourth hospital served as the external validation set. The training set was used for feature selection and model training, and the validation set was used to evaluate the predictive performance of the model independently.

Results: The eXtreme Gradient Boosting showed highest predictive performance (accuracy: 0.890 ± 0.128 , AUC: 0.896 ± 0.134), followed by Neural Network (accuracy: 0.865 ± 0.103 , AUC: 0.886 ± 0.097). While regarding stability, Neural Network showed highest robustness against data perturbation [relative standard deviations (%) of mean AUC: 10.9%]. Therefore, Neural Network was chosen as the final model, achieving high accuracy of 0.756 in the external validation set.

Conclusion: Neural Network is a promising machine learning method to predict VDT of GGNs, which would assist in the personalized follow-up and treatment strategies for GGNs reducing unnecessary follow up and radiation dose.

OR-0214

基于 ASPECTS 分区梗死核心定量的急性缺血性脑卒中长期预后的精准预测

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目的: ASPECTS 评分是一种评价大脑中动脉区急性缺血性卒中 (Middle cerebral artery- Acute ischemic stroke, MCA-AIS) 的半定量工具, DWI-ASPECTS 检出敏感度及准确度高。本研究将基于 DWI 图像获取 ASPECTS 分区的 10 个梗死核心体积变量 (ASPECTS- VolDWI), 并将其与传统临床多维变量 (Multi-clinics) 联合建模, 以精准预测 MCA-AIS 的长期功能预后。

方法: 本研究是一项多中心的回顾性研究, 最终符合入组标准的 MCA-AIS 患者为 464 例; 使用 RealNow 软件获得基于 DWI 图像的 ASPECTS- VolDWI; 随访入住患者的 90d-mRS 评分作为长期功能预后分组标准 (预后良好: mRS \leq 2/预后不良: mRS $>$ 2); 使用 R (4.2.1 版) 进行统计分析。

结果: 基于 ASPECTS- VolDWI+Multi-clinics 相结合的逻辑回归模型取得最好的预测效能, AUC 为 0.878[0.847-0.909]、敏感度为 0.8075[0.744-0.861]、特异度 0.810[0.759 - 0.855]、准确率 0.809[0.769- 0.849]; Delong 检验显示 ASPECTS- VolDWI +Multi-clinics 联合建模的性能明显优于 ASPECTS- VolDWI ($p<0.001$) 与 Multi-clinics 模型 ($p<0.001$); 诺模图显示: 年龄、基线 NIHSS 评分、豆状核、尾状核及内囊后肢的梗死体积是最为重要的预测因子。

结论: 本研究提出了基于 ASPECTS 分区的梗死核心体积的精准定量, 这是 MCA-AIS 病情危重判定、治疗方案选择及预后精准预测的重要影像学定量指标; 在此基础上, 联合临床多维变量实现了 MCA-AIS 长期预后预测模型的构建及可视化。

OR-0215

基于靶向对抗学习构建的抗直肠伪影前列腺癌深度学习系统在真实临床情境下的应用

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目的: 本研究旨在开发一种基于 MRI 的, 能够抵抗直肠伪影的前列腺癌 (prostate cancer, PCa) 诊断模型。

材料与方法: 利用靶向对抗训练 (targeted adversarial training with proprietary adversarial samples, TPAS) 策略增强深度学习对抗直肠伪影的能力。使用包含 1500 个前列腺 MRI 的公共数据集 (Prostate Imaging: Cancer AI) 来训练模型和进行内部验证。回顾性纳入了三个医学中心的 2203 名前腺癌病变 MRI, 用于模型外部验证。并从上述患者中挑选了 1555 例没有伪影的病例, 加入类似直肠伪影的噪声来评估直肠伪影噪声对模型的干扰。通过接受者操作特征曲线下的面积 (AUC-ROC) 和精确率-召回率曲线下的面积 (AUC-PR) 来评估直肠伪影对这两种深度学习模型在患者和病变水平上的影响。

结果: 与对照模型相比, TPAS 模型在多中心验证数据集上在患者水平上的诊断性能提高了 6% (AUC-ROC: 0.87 vs. 0.81; $p<0.001$), 在病变水平上提高了 7% (AUC-PR: 0.84 vs. 0.77; $p=0.007$)。在面对直肠伪影干扰时, TPAS 模型的性能下降程度较对照模型更低 (Δ AUC-ROC: -17% vs. -19%; Δ AUC-PR: -18% vs. -21%)。在患有轻度 (AUC-ROC: 0.80 vs. 0.75; AUC-PR:

0.65 vs. 0.60)、中度 (AUC-ROC: 0.79 vs. 0.73; AUC-PR: 0.68 vs. 0.61) 和严重 (AUC-ROC: 0.75 vs. 0.57; AUC-PR: 0.69 vs. 0.59) 伪影的患者中, TPAS 模型表现优于对照模型。
结论: TPAS 模型可以减少 MRI 诊断 PCa 时的直肠伪影干扰, 从而在临床应用中提高其性能。

OR-0216

基于 MRI 影像组学特征预测高级别胶质瘤 C5AR1 基因表达水平及患者预后

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背景与目的:补体 C5a 受体 1(C5AR1)在与补体级联相关的固有免疫反应中起关键作用。最新研究表明, 它也在癌症进展中发挥作用。然而, C5AR1 在高级别胶质瘤(HGG)中的作用尚未见报道。我们通过影像组学方法预测 C5AR1 的表达, 评估其在 HGG 中的预后价值。

方法:本研究共收集 298 例 HGG 患者进行生物信息学分析, 其中 182 例患者具有 MRI 数据用于影像组学分析。我们采用 Kruskal-Wallis、Wilcoxon 符号秩和检验和 Spearman 相关分析探讨 C5AR1 表达与临床病理特征的关系。采用 Kaplan-Meier 和 Cox 回归分析 C5AR1 与预后的关系。通过 GO/KEGG 分析确定与 C5AR1 相关的关键信号通路。在影像组学分析中, 我们采用 mRMR 和 RFE 算法筛选影像组学特征。采用支持向量机(SVM)和 Logistic 回归构建预测模型。采用受试者工作特征(ROC)曲线、校准曲线和 DCA 评价模型的性能。

结果:C5AR1 基因在 HGG 患者中表达升高, 是 HGG 患者预后的独立因素(HR=3.984, 95% CI: 2.834~5.607)。GO/KEGG 分析显示 C5AR1 高表达富集了多条肿瘤相关通路。我们选择 2 个影像组学特征预测 HGG 患者 C5AR1 表达水平。在 SVM 模型中, 训练集 AUC 为 0.828, 测试集 AUC 为 0.808。在 Logistic 回归模型中, 训练集 AUC 为 0.824, 测试集 AUC 为 0.806。通过 SVM 模型计算的 rad-score 与 HGG 患者的总生存时间具有高度相关性($p<0.01$)。

结论:C5AR1 在高级别胶质瘤患者的进展和预后中起重要作用,提示 C5AR1 可能作为脑胶质瘤预后的生物标志物。基于机器学习和影像组学的模型能够无创、有效预测 HGG 患者 C5AR1 表达水平和预后。

OR-0217

Multimodal Classification Model for Gram-Positive and Gram-Negative Bacterial Pneumonia using Imaging and Clinical Features: Improving Antibiotic Treatment Decisions

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Purpose: This study aimed to develop and validate a classification model that combines imaging features and clinical characteristics to accurately identify patients with Gram-positive and Gram-negative bacterial pneumonia, assisting clinical physicians in empirical antibiotic treatment.

Materials and Methods: The study included patients with bacterial pneumonia who sought medical care at a tertiary hospital in China between 2010 and 2020. The patients were randomly divided into a training set and a validation set in an 8:2 ratio. The ResNet-18 model was used as the base model, and 512 features were extracted from the maximum lesion layer as deep features.

Spearman correlation and mutual information were employed for dimensionality reduction, and the XGBoost model was utilized to construct the imaging model. The GBM model served as the classifier for establishing the clinical model. A logistic regression algorithm was employed to construct an imaging-clinical fusion model based on the individual scores of the imaging model and the clinical model. The classification performance of the clinical model, imaging model, and fusion model was compared using the DeLong test.

Results: This study included data from 2423 patients with bacterial pneumonia. Among them, 563 cases were Gram-positive bacterial pneumonia, and 1860 cases were Gram-negative bacterial pneumonia. The imaging model and clinical model had AUCs of 0.719 and 0.827, respectively, in the test set. The fusion model achieved an AUC of 0.884 (95% CI: 0.868-0.898), sensitivity of 0.772, specificity of 0.822, and accuracy of 0.808 in the test set. The Delong test results demonstrated that the performance of the fusion model was slightly higher than that of the individual imaging or clinical models ($P < 0.05$). Nomogram results of the fusion model showed that clinical scores had the highest weight, and the fusion model exhibited good consistency between predicted probability and expected probability. Decision curve analysis (DCA) confirmed that the fusion model performed well in classifying bacterial pneumonia across most threshold probabilities.

Conclusion: In this study, we integrated multimodal data including imaging, laboratory tests, and clinical signs to classify gram-positive and gram-negative bacterial pneumonia. Our research demonstrates that the fusion of multiple modalities enhances the classification performance of the model.

Clinical Relevance Statement

The fusion model we have developed enables accurate classification of bacterial pneumonia in patients based on CT images, laboratory tests, and clinical signs. It holds significant clinical value in avoiding unnecessary antibiotic usage and provides timely information for guiding clinical decisions and improving patient prognosis.

OR-0218

基于多类别分割的肺间质性疾病 HRCT 影像征象的智能识别

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目的：使用基于多种注意力机制的 UNet 网络结构对 HRCT 上肺间质性疾病的多种影像征象进行多类别分割，来模拟临床影像医师对肺间质性疾病的 CT 诊断流程，初步探讨人工智能在 CT 肺间质性疾病中的应用。方法：回顾性分析由胸部影像专家进行人工标注的肺间质性疾病的胸部 HRCT 病例，将肺间质性疾病的 CT 征象分为 6 种：蜂窝、实变、磨玻璃、网格、肺气肿、非气肿样囊腔，标注病例共 48 例，标注的切片数量共 2908 张二维切片。首先利用阈值分割法将肺实质区域进行分割，将肺实质区域的图像裁剪出来，之后应用基于多种注意力机制的 UNet 网络结构，在裁剪后的区域上进行多类分割实验，应用五折交叉验证评估其分类准确率及召回率。结果：在所有标注的二维切片上进行训练，共 200 次迭代，利用阈值分割法将肺实质区域进行分割，在裁剪之后的区域上进行多类分割实验，应用五折交叉验证，准确率分别为 70.21%、63.47%、67.06%、65.89%、70.34%，平均准确率达 67.39%，召回率分别为 70.22%、78.19%、76.82%、76.30%、76.10%，平均召回率达 75.53%。结论：本研究利用人工智能的多类别分割方法，对 HRCT 上肺间质性疾病的多种影像征象进行识别，取得了较高的准确率及召回率，是实现肺间质性疾病 CT 影像人工智能辅助诊断的必要步骤，具有重要的应用价值。

OR-0219

Predicting Proliferative and Non-proliferative Hepatocellular Carcinoma Using EOB-MRI-based Deep Learning Model

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***Purpose:** Hepatocellular carcinomas (HCCs) are heterogeneous tumors, and the prognosis varies depending on the subtype. Two broad molecular classes of HCC have been proposed: a proliferative and a nonproliferative class. We aim to develop the deep learning model to perform preoperative assessments of HCC subtypes using gadoxetic acid-enhanced magnetic resonance imaging (EOB-MRI). The findings will provide a better understanding of HCC subtype preoperative prediction .

***Methods and Materials:** This retrospective cohort study evaluated patients with surgically resected treatment-naïve single HCC (≤ 5 cm) who underwent hepatic resection from January 2017 through December 2022 and preoperative gadoxetate-enhanced MRI. We constructed two deep learning models : tumor segmentation and HCC subtype classification.

The former involves utilizing TransUNet solely with hepatobiliary phase (HBP) images for tumor segmentation, while the latter stage employs a wider array of MR sequences such as T2WI, T1-pre, Early arterial phase, Late arterial phase, Portal venous phase and HBP . After obtaining the tumor segmentation, the multi-phase images are then cropped based on the segmentation results with a bounding box of 80 x 80 in the transverse plane to extract pertinent information about the tumor and its surrounding environment.

The cropped images are resized to 224 x 224 for further processing. For the HCC subtype classification, we introduce an expanding-compressing layer that precedes the ResNet-34 extraction module to accommodate multiple input channels. The expanding-compressing layer increases the input's dimensionality before compressing the resulting feature maps to three channels. The extracted features are then fed into an LSTM module to capture spatial relationships across slices, followed by a classifier to obtain a final prediction.

***Results:** A total of 268 patients (mean age, 55 years ± 7 ; 217 men and 51 women) were evaluated. Eighty-eight of the 268 HCCs (32.8%) were proliferative class HCCs (34 macrotrabecular-massive HCCs, 52 CK19-positive HCCs and two sarcomatoid HCC). For deep learning segmentation model in HBP, an average Dice coefficient of 95.6% in liver, an average Dice coefficient of 81.1% in HCC tumor were achieved. For deep learning HCC subtype classification model, an average sensitivity of 81.5%, an average specificity of 67.5%, an average Accuracy of 72.4%, and an average AUC of 79.1% were achieved.

***Conclusions:** This preliminary deep learning study demonstrated feasibility for automatic classifying proliferative and non-proliferative HCC with Gd-EOB-DTPA MRI.

OR-0220

多区域影像组学在直肠癌表征和预后预测中的性能比较

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目的: 影像组学可以揭示肿瘤的异质性。然而从感兴趣区中提取影像组学特征需要大量人工标注,这在全肿瘤 3D 标注中尤为明显。作为替代权衡, 2D 和矩形框标注可能是基于直肠癌影像组学研究中的首选。本研究通过三个预测任务 pT、pLNM、DFS, 综合比较在直肠癌 T2WI 上不同的人工标注方式 2D、3D、2D 矩形框 (2DBB)、3D 矩形框 (3DBB) 在直肠癌表征中的鉴别能力。

方法：回顾性纳入了 293 例直肠癌根治术后患者，按 7: 3 随机划分为训练集和测试集。分别从 2D、3D、2DBB、3DBB 提取影像组学特征。pT、pLNM 预测任务使用 Lasso-logistic 模型，DFS 预测任务使用 Lasso-Cox 模型。使用性能最好的标注方式放射评分与临床危险因素建立 nomograms 联合模型。

结果：在 pT 预测任务上，2D 和 3DBB 模型表现最好。测试集 2DpT(AUC=0.800)，3DpT(AUC=0.791)，2DBBpT(AUC=0.783)，3DBBpT(AUC=0.806)，NomopT(AUC=0.806)。在 pLNM 预测任务上，2D 和 3DBB 模型表现最好。测试集 2DpLNM(AUC=0.728)，3DpLNM(AUC=0.627)，2DBBpLNM(AUC=0.636)，3DBBpLNM(AUC=0.722)，NomopLNM(AUC=0.773)。在 DFS 预测任务上，3D 表现最好。测试集 2DDFS(AUC=0.788)，3DDFS(AUC=0.811)，2DBBDFS(AUC=0.791)，3DBBDFS(AUC=0.788)，NomoDFS(AUC=0.809)。

结论：研究发现，在这些预测任务中，基于 2D、3D 和矩形框标注方式性能和辨别能力相当，这表明劳动密集型 3D 标注影像分析没有显著改善预测性能。但 3D 方式仍然提供更全面的肿瘤信息，更适合需要提供更全面信息的预后预测任务。2D 方式排除其他因素如肿瘤边界和表观厚度的干扰，只提供肿瘤核心区域特征，更适合需要聚焦分析的诊断任务。此外，影像组学结合临床危险因素构建的 nomograms 使预测性能进一步提升，可以为临床决策提供依据。

OR-0221

人工智能非心电图门控 CT 冠状动脉钙化积分联合深度学习 MR 图像重建心肌延迟强化检出未识别心肌梗死

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目的 本研究旨在探索人工智能(artificial intelligence, AI)非心电图门控 CT 冠状动脉钙化积分(coronary artery calcification score, CACS) (AI-CACS)联合深度学习(deep learning, DL)MR 图像重建心肌延迟强化(late gadolinium enhancement, LGE_{DL})检出未识别心肌梗死的临床价值。

方法 前瞻性纳入 2022 年 3 月-2023 年 8 月因常规体检于武汉大学人民医院行非门控胸部 CT 平扫体检者 (年龄≥45y) 1679 例，自动获取 AI-CACS 的 Agatston 评分，对可疑 UMI 患者行 LGE_{DL} 心脏短轴位扫描。使用阈值技术获得心肌强化面积百分比(P_{area})，评估各测量值的组内及组间一致性。以临床诊断 UMI 为金标准计算 CACS、LGE_{DL} 和原始 LGE(LGE_O)的诊断准确性。

结果 最终纳入评估的可疑 UMI 志愿者 66 人 (男 48 例(72.73%)，年龄 56.17±8.65 岁)。Total-Agaston 对 UMI 诊断的 AUC 值为 0.759 (p<0.001)，对 UMI 诊断的最佳界值为 109.69。LGE_{DL} 和 LGE_O 对 UMI 的诊断准确率为 98.47%，敏感度为 77.11%，特异度为 99.84%。对于 2-10 倍标准差法，心肌 P_{area DL} 均高于 P_{area O} (P 值均<0.001)；对于半峰全宽法，P_{area DL} 略高于 P_{area O}，差异无统计学意义(p=0.12)；不同阈值法 P_{area} 测量值组内及组间一致性好(ICC>0.700，P 均<0.001)。

结论 人工智能非心电图门控 CT 冠状动脉钙化积分联合深度学习 MR 图像重建心肌延迟强化序列可检出体检人群中未识别心肌梗死，AI-CACS 联合 LGE_{DL} 可增加对 UMI 的诊断信心，对 UMI 风险分层及随访建议提供重要参考。

OR-0222

图像引导放疗中基于深度学习和结构保真性的超稀疏 CBCT 重建算法的构建和临床性能评估

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目的：在图像引导放射治疗（IGRT）中，锥形束 CT(CBCT)为常用的图像验证系统，治疗前 CBCT 扫描可以纠正患者摆位误差，提高治疗精度，但是也会给正常组织带来额外剂量，并且降低临床效率。减少 CBCT 扫描帧数可以有效降低 CBCT 辐射剂量，但是会增加图像噪声、伪影等。本研究引入定位 CT 信息，构建结构保真的 CBCT 先验图像，基于生成对抗网络(GAN)建立超稀疏采样 CBCT 重建模型(USCRM)，利用极少采样数据对头颈部 CBCT 进行高质量快速重建，并评估临床性能。

方法：实验随机选取四川大学华西医院放射物理技术中心 633 例头颈部放射治疗患者的计划 CT，并通过 CT-CBCT 投影模拟生成对应降采样 1/8, 1/16, 1/32 和 1/64 的结构保真的模拟 CBCT，形成 CT-CBCT 结构保真图像对，随机分为训练集（538 例），验证集（48 例）和模型测试集（47 例）。另外随机选取行 IGRT CBCT 扫描的 9 例头颈部患者共 39 例 CBCT_{FDK} 分别采用 1/8, 1/16, 1/32 和 1/64 降采样数据重建出 CBCT_{USCRM} 进行临床测试。将重建结果分别与传统 FDK 算法（FDK），基于代数重建方法(SART)进行对比评估。由两名肿瘤医生对图像进行主观评价。通过峰值信噪比 (PSNR)、结构相似度(SSIM)和下颌骨 Dice 相似性系数(DSC)定量指标进行客观评价。在 Eclipse 计划系统中将 CBCT_{USCRM}、全数据 CBCT_{FDK} 分别与计划 CT 进行刚性配准比较摆位误差。

结果：两名肿瘤医生一致认为重建图像质量达到临床要求。与 CBCT_{FDK} 和 CBCT_{SART} 相比，CBCT_{USCRM} 的 PSNR 和 SSIM 最大分别提升了 25 dB、81%和 15dB、14%；全数据、1/8 和 1/16 CBCT_{USCRM} 的下颌骨 DSC 与全数据 CBCT_{FDK} 没有差异。配准结果显示模型测试和临床测试最大摆位误差分别为 0.30 mm, 0.15°和 1.27 mm, 0.73°。

结论：基于深度学习和结构保真性的低剂量 CBCT 重建算法，能够通过减少 CBCT 扫描帧数的方式，在大幅降低 CBCT 剂量的同时仍能保持高质量图像重建。

OR-0223

基于 MRI 影像组学术前预测胶质母细胞瘤肿瘤浸润性 CD8+ T 细胞表达的研究

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目的：探讨术前使用基于 MRI 影像组学模型评估胶质母细胞瘤（GBM）患者肿瘤浸润性 CD8+ T 细胞表达的价值，为预测 GBM 免疫治疗后的预后提供依据。

方法：对 150 例 GBM 患者进行回顾性分析，使用免疫组织化学 (IHC) 染色评估来自患者的肿瘤组织样本中肿瘤浸润性 CD8+ T 细胞表达进行量化，并根据总生存时间将患者划分为 CD8 高表达组和 CD8 低表达组。从 T1C 和 T2 图像序列中为每位患者提取了 1185 个影像组学特征。使用方差阈值、最小冗余最大相关性 (MRMR)、最小绝对值收缩和选择算法 (LASSO) 进行特征选择。采用 XGBoost 作为分类器，建立临床-影像预测模型、影像组学预测模型、联合模型，使用接收者操作特征 (ROC) 分析，以评估分类器的诊断准确性。

结果：联合模型预测性能最好，训练集中 AUC 达到了 0.99，准确度为 0.99，敏感度为 1.00，特异度为 0.97，在验证集 AUC 达到了 0.84，准确度为 0.80，敏感度为 0.90，特异度为 0.60。

结论: 磁共振影像组学在评估 GBM 患者肿瘤浸润性 CD8+ T 细胞表达具有可行性, 有助于术前预测 GBM 患者的预后。

OR-0224

基于深度学习的肿瘤分割和总代谢肿瘤体积预测 对弥漫性大 B 细胞淋巴瘤患者预后的研究

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目的: 利用深度学习方法在全身 18F-FDG PET 扫描中自动分割弥漫大 B 细胞淋巴瘤 (DLBCL) 并验证分割模型的有效性, 利用该分割模型预测肿瘤总代谢体积 (pTMTV) 并验证其在预后中的价值。

方法: 本实验基于 AutoPET 公开数据集中 1014 例 PET/CT 图像 (其中 501 例含有精标注, 513 例为无肿瘤区域的健康对照) 进行模型预训练, 在来自瑞金医院的 160 例精标注 PET/CT 图像中进行 Fine-tune (其中训练集 127 例, 测试集 33 例)。基于 nnUNet 算法利用 PET 序列和 CT 序列建立双通道三维 U-Net 架构训练 DLBCL 病灶分割模型。用 Dice 相似系数 (DSC)、假阳性体积 (FP) 及假阴性体积 (FN) 评估分割模型性能。基于 DLBCL 的分割模型预测总代谢肿瘤体积 (pTMTV), 在 117 例一线治疗为 R-CHOP 的患者中, 用 Bland-Altman 检验及 Pearson 相关性分析与 Siemens syngo.via VB2.0 软件中病灶自动标记程序 Multi-foci Segmentation 测得 TMTV (gtTMTV) 进行校验, 用时间依赖 ROC 曲线求取截断值, 并进行生存及预后的分析。

结果: 基于 AutoPET 训练集进行预训练和瑞金训练集进行 Fine-tune 得到模型, 在测试集的平均 DSC、FP 和 FN 分别为 83.97、1.17 和 2.83。gtTMTV 和 pTMTV 的 Bland-Altman 分析同质性较佳, Pearson 相关性分析呈强相关 ($R^2 = 0.871$, $P < 0.001$), 时间依赖的 ROC 曲线将 pTMTV > 498.958 定义为高组, 且 pTMTV 升高被证明是 PFS 和 OS 的不良预后因素 (PFS: HR = 5.698, $P < 0.001$; OS: HR = 6.843, $P < 0.001$)。

结论: 利用 U-Net 模型可以准确地分割淋巴瘤病变, 并允许在 DLBCL 患者的 PET 扫描上全自动评估 TMTV。此外, pTMTV 是 DLBCL 患者生存的独立预后因素。

OR-0225

Energy Spectrum CT Volume Quantitative Based Radiomics Models Developed With Features of the Whole Liver and Liver Biopsy Area: Assessment of the Severity of Liver Fibrosis

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Objective: By extracting the quantitative volume features of the whole liver and liver biopsy area (right posterior lobe), a radiomics model based on energy spectral CT was constructed to compare the evaluation efficiency of the two models on the severity of liver fibrosis.

Methods: A retrospective analysis of 164 patients with liver fibrosis confirmed by pathology was performed. According to the Metavir scoring system, the patients were divided into non-advanced liver fibrosis group (F0-F2, n=78) and advanced liver fibrosis group (F3-F4, n=86). According to the ratio of 7 : 3, the patients were randomly divided into training set (n=115) and validation set (n=49). Based on the energy spectral CT images of portal vein whole liver (ROI_w) and liver tissue puncture area (ROI_b), the quantitative parameters of energy spectral CT volume and radiomics features were obtained. Valuable spectral CT parameters were obtained by univariate and binary logistic regression analysis. Radiomics features were screened by univariate analysis, Spearman correlation analysis and LASSO, and spectral radiomics models (ROI_w and ROI_b) were constructed by logistic regression (LR). ROC curve and calibration curve were used to evaluate and compare the diagnostic performance of the two models.

Results: A total of 8 optimal radiomics features were selected. In the training samples, the AUC of ROI_w and ROI_b radiomics models were 0.846, 0.887, the sensitivity were 0.821, 0.815, and the specificity were 0.826, 0.737, respectively. In the testing samples, the AUC of the ROI_w and ROI_b radiomics models were 0.817, 0.844, the sensitivity were 0.816, 0.723, and the specificity were 0.774, 0.852, respectively. There was no significant difference between the two radiomics models (P=0.716, DeLong test). The calibration curves of the two models showed good consistency.

Conclusion: Through the quantitative parameters of energy spectral CT volume in the whole liver and liver biopsy area, combined with radiomics features, the spectral radiomics model constructed has good performance in evaluating the severity of liver fibrosis, and the performance of the two models is comparable.

OR-0226

Structured Reporting and Deep Learning to Reduce Miss Rate of Initial MRI-detected Radiation-induced Temporal Lobe Injury of patients with nasopharyngeal carcinoma

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Objectives To construct and evaluate structured report (SR) and deep learning (DL) models for earlier radiation-induced temporal lobe injury (RTLI) detection, and assess radiologists' performance without and with SR or DL assistance.

Materials and Methods MRI of 3842 nasopharyngeal carcinoma patients receiving radiotherapy from January 2010 to June 2021 from 4 hospitals were retrospectively retrieved, and initial MRI with RTLI-findings were selected for the development SR and DL model, respectively. Two experts reviewed these MRIs, and the results were recorded in a SR introducing a temporal lobe field. Then, a DL model based on EfficientNet using contrast-enhanced T1- and T2 weighted MRIs to detect RTLI was developed. Patients from one center was divided into training (n=380 with 234 non-RTLI and 146 RTLI) and validation set (n=96 with 59 non-RTLI and 37 RTLI), and those from other institutions were used as external test set (n=1567 with 1353 non-RTLI and 214 RTLI).

Results In the external test set, the miss rate of initial MRI with RTLI-findings in original reports (OR) was 46.3%, which decreased to 26.6%, 9.8%, and 7.5%, respectively, after the use of three diagnostic approaches (SR-assisted, DL, and DL-assisted radiologists). Compared to OR, the radiologists achieved a higher accuracy (95.5% vs. 93.7%, $P=0.017$) and sensitivity (73.4% vs. 53.7%, $P<0.001$) when using SR. Compared to SR, DL model achieved comparable accuracy (96.3% vs. 95.5%, $P=0.25$) to SR with significantly improved sensitivity (90.2% vs. 73.4%, $P<0.001$). Assisted by DL model, radiologists achieved the highest accuracy (97.8% vs. 96.3%, $P=0.002$) and specificity (98.6% vs. 97.3%, $P=0.006$).

Conclusion A structured report introducing a temporal lobe field and a deep learning model with high diagnostic sensitivity led to improved performance of radiologists in detecting initial radiation-induced temporal lobe injury lesions.

OR-0227

基于动、静脉双期增强 CT 的胰腺囊性病变术前良恶性诊断深度学习模型

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目的：胰腺囊性病变（pancreatic cystic lesions, PCL）检出率逐年升高，良、恶性病灶间影像特征重叠，手术并发症发生率高达 30%。指南指出，PCL 临床管理的关键点之一在于术前准确识别恶性病灶。因此，我们开发了一种深度学习模型进行 PCLs 的术前无创良恶性诊断，并与医生诊断结果比较。

方法：回顾性分析 2014 年 6 月至 2020 年 1 月在北京协和医院因 PCLs 行薄层增强 CT 扫描的 393 例病灶的影像资料，纳入标准包括：（1）病灶有明确的病理学良恶性诊断；（2）增强 CT 检查在术前一个月内进行；（3）增强 CT 图像质量佳；（4）患者术前未进行治疗。将病灶按检查时间顺序分为训练集（良性=150 例，恶性=102 例）、验证集（良性=39 例，恶性=25 例）及测试集（良性=42 例，恶性=35 例）。由两名影像科医生在不知道病灶病理结果的情况下独立进行门脉期胰腺轮廓及病灶轮廓勾画，由一名高年资影像科医生对勾画的轮廓进行修正，而后通过 deedsBCV 算法将动脉期图像配准到门脉期图像上。模型训练前首先进行数据预处理，将患者动、静脉双期图像重采样到间隔为 0.75mm、0.75mm、1mm，而后将图像随机裁剪为包含感兴趣区的 256×256×256 像素的图片，同时将病灶轮廓和胰腺轮廓分为两个通道，连同动、静脉序列共 4 个通道输入模型。在训练集上构建 resnext50 模型，以胰腺轮廓及病灶轮廓为感兴趣区进行 PCLs 术前良恶性诊断，并在验证集上进行超参数选择，最后在测试集上测试模型对 PCLs 的术前良恶性诊断效能，并与高年资及低年资医生比较。

结果：在测试集上，以 0.412 为截断值，resnext50 模型对 PCLs 诊断的 AUC、准确性、敏感性 & 特异性分别为 0.888、0.831、0.771 和 0.881。高年资医生的准确性、敏感性 & 特异性为 0.857、0.829 和 0.881，低年资医生为 0.727、0.657 和 0.786。

结论：这项研究初步表明，基于动、静脉双期增强 CT 上胰腺及病灶轮廓的 resnext50 模型能够实现优于低年资医生的 PCLs 术前良恶性诊断，帮助恶性患者及早进行干预，避免良性患者过度治疗。

OR-0228

General purpose Large Language model to Professional Large Language Model on Chinese Medical Image Reports: ChatGPT4 vs. Locally Finetuned Large Language Models

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Background: Medical imaging description and diagnosis recommendation are two consecutive portions while writing an imaging report by professional radiologists. The latter represents not merely a summary, but an intricate medical correspondence and diagnosis derived from radiologists' expertise. Traditional Natural Language Processing (NLP) methods have struggled to yield satisfied performance in disclosing such implicit medical correspondence, due to their limited learning capabilities. The purpose of this work is to disclose such concealed medical

correspondence and generate high quality diagnosis recommendations based on image descriptions.

Method: 3714 abdominal CT are evenly collected in three groups. Each group was split into training, validation, and test datasets at a ratio of 9:1:1. Unlike conventional NLP tasks in text summarization and translation, special characters and numbers were not removed. All commas were replaced by semicolons to avoid grammatical issues with csv (comma separated values) files. Specific suffixes and prefixes were added to each image description to help a LLM learn the beginning and end of descriptions. The data was leveraged to conduct a full network wide fine-tune on a 4 V100-32GB GPU server.

Results: The evaluation, using ROUGE-L F1-scores to analyze relative sequence matches, yielded F1-scores of 0.664, 0.722, and 0.76 for the three test data groups, respectively. Notably, achieving F1-scores in the range of 0.6-0.7 is considered the upper limit of human capability in translation and summarization tasks. A specially designed metric (0-5) crafted by professional radiologists, resulted in scores of 4.31, 4.35, 4.7, surpassing corresponding outputs generated by chatGPT4 by 7.75%, 3.57%, 4.26% respectively.

Conclusion: Our model yields an average performance improvement of 5.19% compared to chatGPT4 in this specific task, which may further boost radiologists' work by providing standardized diagnosis recommendation template based on tens of years' departmental knowledge, and in turn save individual radiologists' time and improve the reports writing efficiency and quality.

OR-0229

基于影像组学和深度学习的肾癌 Leibovich 评分预测模型

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前言：肾透明细胞癌是一种常见的泌尿系统恶性肿瘤，其预后与肿瘤的分期和分级密切相关。Leibovich 评分是一种基于五个与远处转移相关的特征（肿瘤分期、肿瘤大小、区域淋巴结状态、核分级和肿瘤坏死状态）的预后模型，用于评估局限性肾透明细胞癌患者肾切除术后的远期生存率。根据分值的总和，患者可以分为低风险（0-2 分）、中风险（3-5 分）和高风险（6 分及以上）。因此，本研究旨在基于影像组学、深度学习和临床模型探索最佳的肾透明细胞癌 Leibovich 评分的二分类模型。

方法：本研究共纳入贵州省人民医院 169 例，遵义医科大学附属医院 121 例，TCGA 公共数据集 94 例共 384 例局限性肾透明细胞癌患者，根据 Leibovich 评分将其分为低危组（0-2 分）和中高危组（3-11 分）。首先基于训练集从 CT 图像中提取了 293 个影像组学特征和 2048 个深度学习特征，并使用 LASSO 方法进行特征选择。通过多变量逻辑回归分析，将与肿瘤诊断相关的常规影像学特征与影像组学评分和深度学习评分组合构建融合模型。通过绘制 ROC 曲线来评估模型的鉴别能力。结果：结果显示，临床-影像组学模型和临床-深度学习模型在训练集、验证集 1 和验证集 2 上均表现出较高的 AUC 值，分别为 0.845、0.887、0.846 和 0.875、0.866、0.852，明显优于而单纯的临床模型、影像组学模型和深度学习模型。此外，将影像组学评分和深度学习评分相结合，也能得到一个较好的二分类模型，其 AUC 值为 0.875、0.881、0.859。最后，将临床模型、影像组学评分和深度学习评分全部纳入模型构建，得到的 AUC 值为 0.875、0.870、0.848。结果显示影像组学-深度学习模型略优于临床-影像组学-深度学习模型，考虑其不受临床模型主观因素的影响，因此具有更好的稳定性和可重复性。

结论：本研究表明，基于影像组学-深度学习的模型能够有效地预测肾透明细胞癌 Leibovich 评分的危险程度，并提高临床模型的鉴别能力。这些模型有望为肾透明细胞癌患者提供更精准的个体化治疗方案。

OR-0230

基于深度学习的肺腺癌脑转移 EGFR 基因分型预测和 GTV 自动勾画的多尺度、多任务模型

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背景:准确预测表皮生长因子受体(EGFR)突变状态及肿瘤总体积(GTV)自动勾画是计算机辅助肺腺癌脑转移诊断的重要目标。然而,由于 MRI 中图像强度分布不均匀、边界模糊以及脑转移形状多变,这两项任务一直存在困难。现有的解决这些问题的方法主要依赖于单任务算法,忽略了这两个任务之间的相互依赖性。

方法:为了解决这些挑战,我们提出了一种多任务多尺度深度学习模型,能够同时实现 GTV 的自动勾画和 EGFR 突变状态的自动分类。具体而言,我们设计了一个由卷积自注意模块组成的多尺度自注意编码器,提取用于 GTV 分割解码器和 EGFR 基因分型分类器的共享空间和全局信息。然后,我们设计了一个由卷积模块和 Transformer 模块组成的 CNN-Transformer 混合分类器,将编码器所提取的全局信息和局部信息结合起来。在此基础上,利用多任务损失函数来解决任务的相关性和异质性问题,通过引入可学习权重来平衡两个任务的损失函数。

结果:188 例被诊断为肺腺癌脑转移的患者入组,用于训练模型和内部测试。实验结果表明,我们提出的模型取得了优异的性能,超越了单任务学习方法。我们提出的模型实现了平均 GTV 分割概率为 0.89,平均 EGFR 亚型准确率为 0.88。同时纳入了另外两家医院的 38 名肺腺癌脑转移患者作为外部验证数据集,取得了较好的测试结果。

结论:通过引入高效的特征提取模块、CNN-Transformer 混合分类器和多任务损失函数,多任务深度学习网络显著提高了 GTV 分割和 EGFR 基因分型任务的性能,可以同时实现高效的 EGFR 基因分型预测和 GTV 自动勾画。

OR-0231

多模态影像-病理整合在可切除性肺腺癌预后预测中的应用

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背景:为优化可切除性肺腺癌患者的预后分层,指导术后治疗决策,我们开发并验证了一个自动化

多模态影像-病理整合分析框架, 使用临床常规的胸部 CT 影像, 以及 H&E 染色的病理数字化全切片 (WSI) 图像, 对肺腺癌的肿瘤内异质性和肿瘤微环境进行了全面表征。

方法: 我们回顾性收集了来自四个中心的 1039 名 I-IIIa 期可切除性肺腺癌患者, 构成训练集 (N=303)、测试集 1 (N=197)、测试集 2 (N=228) 和特征测试集 (N=311)。我们从术前 CT 影像中提取 487 个来自肿瘤、瘤周 0-5、5-10、10-15、15-20mm 区域的影像组学特征, 并从手术病理 WSI 中提取 783 个来自肿瘤床、上皮、间质、癌细胞核的多尺度病理组学特征。我们用最佳多模态特征集构建了一个生存支持向量机模型, 称为影像-病理组学评分。我们评估了影像-病理组学评分对术后无病生存期 (DFS) 的预测性能, 并与影像组学评分、病理组学评分进行比较。

结果: 在调整临床病理危险因素后, 影像-病理组学评分提供了独立的预后信息 ($P<0.05$)。与影像组学评分、病理组学评分相比, 影像-病理组学评分对 DFS 的预测性能更好 (一致性指数, 训练集: 0.734、0.692、0.744, 测试集 1: 0.701、0.638、0.719, 测试集 2: 0.689、0.684、0.711)。将影像-病理组学评分与临床模型 (包括 TNM 分期、吸烟状况、血管侵犯) 整合后, 整合模型预测 DFS 的准确性进一步提高 (一致性指数, 训练集: 0.763、0.676, 测试集 1: 0.739、0.676; 测试集 2: 0.711、0.699, $P<0.001$)。在有复发高危风险因素的 IB 期肿瘤和 $>4\text{cm}$ 的 IIA 期肿瘤 (N=238) 中, 影像-病理组学评分与术后辅助化疗的 DFS 获益之间存在交互作用 ($P=0.032$)。影像-病理组学评分与多个预后/治疗相关的生物标志物有关联, 包括病变类型、分化程度、免疫表型和 EGFR 状态等。

结论: 多模态整合框架能有效利用 CT 影像和病理 WSI 的互补信息, 为全面表征肺腺癌提供了经济有效的选择。我们提出的影像-病理组学评分有稳健的预后预测能力, 能为术后治疗决策提供额外信息。

OR-0232

基于影像基因组学探索时空异质性在预测腔面型乳腺癌治疗敏感性中的作用: 一项多中心研究

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目的: 为了揭示时空异质性影像组学特征在预测腔面型乳腺癌治疗敏感性中的作用, 并挖掘东西方人群中稳定的预测特征, 探索其可解释性。

方法: 这项研究包括来自中国的发展队列 (FUSCC), 来自西方的验证队列 (DUKE、ISPY-1) 以及同时匹配影像和转录组数据的解释队列 (TCGA)。1) 我们提取了多尺度影像组学特征: 空间异质性特征 (瘤内亚区域、全瘤体、瘤周区域)、时序特征。在特征筛选过程中, 我们使用三种不同方法 (L1-based、RFE、tree-based) 选择最优特征, 并将基于不同机器学习方法中被重复筛选的特征组合成为第四类稳定特征。在模型建立过程中, 我们使用三种不同的分类器 (lasso, SVM, XGBoots) 与特征筛选方法进行交叉组合, 尝试寻找最佳模型。2) 我们在西方队列中进行了同样的特征筛选流程, 旨在寻找不同人群中依然具有稳定预测效能的特征。3) 最后, 我们在 TCGA 队列中使用生信分析解释特征背后的生物学意义。

结果: 在发展队列中, 稳定特征-XGBoots 的组合拥有最佳预测效能, 优于基于单一方法的模型 ($\text{AUC} = 0.82$ vs $0.66\sim0.73$), 结果在外部队列中得到验证 ($\text{AUC} = 0.75$ vs $0.61\sim0.72$)。此外, 我们发现 4 个影像组学特征是东西方人群共有的稳定特征。其中, 中等灌注亚区域中高灰度区域分布的比例、高灌注亚区域中相邻强度值出现的最大概率均与治疗有效呈负相关 ($r=-0.81, -0.75, P<0.05$)。低灌注亚区域和周围区域之间的对比度差异以及增强早期整个肿瘤的区域熵与治疗有效呈正相关 ($r=0.79, 0.83, P<0.05$)。来自亚区域的影像组学特征均富集到了细胞周期相关通路, 来自全瘤体的特征富集到了细胞坏死相关通路。

结论: 基于影像组学的时空异质性特征是在东西方人群中预测腔面型乳腺癌治疗反应的稳定影像生物标志物且与特征筛选方法无关。

OR-0233

基于基线水平不同乳腺影像学方法预测乳腺癌新辅助治疗疗效模型的建立及比较

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摘要:目的:评估基线水平 MRI、US、MG 三种影像学检查方法联合临床病理特征建立不同模型预测乳腺癌新辅助治疗病理完全缓解的价值。方法:回顾性分析 2016 年 1 月至 2020 年 12 月就诊于天津医科大学肿瘤医院并接受新辅助治疗的乳腺癌患者 397 例,共 411 侧病灶(其中 14 例是双乳癌)。按照检查时间分为训练集(312 侧)和验证集(99 侧)。对所纳入患者的临床资料及新辅助治疗前的乳腺 X 线摄影、超声、磁共振影像特征进行分析,采用 Mann-Whitney U 检验及 χ^2 检验进行单因素分析,再通过多因素 logistic 回归筛选预测因子,并按照不同检查方法分别构建预测模型。采用受试者操作特征曲线(ROC)及曲线下面积(AUC)比较不同模型预测 PCR 的效能;进一步用决策曲线(DCA)和校准曲线评估检查方法模型的净获益及校准能力。结果:临床模型训练集和验证集 AUC 值分别为 0.767、0.787;MRI、US、MG 对应的模型训练集和验证集的 AUC 值分别为 0.810、0.800、0.799 和 0.836、0.834、0.823;三者的联合模型的 AUC 值训练集和验证集分别为 0.842、0.793。在预测不同分子亚型乳腺癌的 PCR 中,US 模型在 luminal 型乳腺癌中的 AUC 值最高;MRI 模型预测三阴性乳腺癌 PCR 的效能明显优于 US 和 MG 模型;MG 模型的预测效能不同分子亚型中均较低,在 luminal 亚型中效能高于 HER2+和三阴性;MG+US+MRI 联合模型在 luminal 亚型中具有最高预测效能。结论:通过联合新辅助治疗前 MRI、US、MG 影像征象和临床特征建立的不同检查方法模型,均较单独临床模型提高了预测新辅助治疗病理完全缓解的效能,MRI 模型效能优于 US 和 MG 模型,MG+US+MRI 联合模型优于单一模型。在探究模型预测不同分子分型乳腺癌 PCR 中,luminal 亚型中,联合模型具有最佳的预测效能,略优于 US 模型;HER2+亚型中,联合模型具有最佳预测效能;三阴亚型中,MRI 模型具有最佳的预测效能。

OR-0234

CEM 量化特征联合形态学对不同分子分型乳腺癌的诊断价值

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目的:探讨对比增强乳腺 X 线摄影(contrast enhancement mammography, CEM)量化特征联合形态学对不同分子分型肿块型乳腺癌的诊断价值。
方法:回顾分析 2018 年 1 月-2022 年 12 月术前行 CEM 检查的肿块型原发乳腺癌。所有患者均行头尾(craniocaudal, CC)位(早期, T1)、内外斜(mediolateral oblique, MLO)位(晚期, T2)摄影,随后测量病灶与背景灰度值比值(the lesion to background grey value ratio, LBR)。并根据 LBR 在两个时相的变化量评估病灶动态强化特点。同时分析病灶 CEM 低能图及减影图形态学特征。最后以免疫组织化学结果为金标准,分析量化及形态学特征对不同分子分型乳腺癌的诊断价值。
结果:249 例患者全为女性,其中 Luminal A 型 56 例、Luminal B 型 149 例、HER2 过表达型 18 例及三阴性型 26 例。LBR、低能图肿块边缘、减影图肿块样强化边缘及肿块样强化内部特征在不同分子分型之间的差异具有统计学意义($P<0.05$)。LBR 在 Luminal A 型(LBR=0.9616)最低,而在 Luminal B 型(LBR=1.2971)最高。Luminal A 型及 Luminal B 型低能图肿块边缘多为毛刺(75.0% vs. 53.3%),而 HER2 过表达型及三阴性型肿块边缘多模糊(77.8% vs. 76.9%)。不同分子分型肿块样强化边缘均多为模糊。Luminal A 型肿块样强化内部多均匀,而其他类型均多不均匀。联合 LBR、低能图肿块边缘、肿块样强化边缘、肿块样强化内部特征诊断不同分子分型乳腺癌的 AUC 约 0.732,灵敏度、特异度及准确度分别为 71.6%、70.9%、72.5%。

结论: 综合 CEM (低能图+减影图) 形态学及 LBR 可一定程度鉴别不同分子分型肿块型乳腺癌。

OR-0235

Quantitative Apparent Diffusion Coefficient Metrics for MRI-only Suspicious Breast Lesions: Any Added Clinical Value?

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Background: Suspicious breast lesions (Breast Imaging Reporting and Data System, BI-RADS 4 or 5) detected only by magnetic resonance imaging (MRI) and invisible on other initial imaging modalities (MRI-only lesions) are usually small and poorly characterized in previous literature, thus making diagnosis and management difficult. This study aimed to investigate the clinical significance of quantitative apparent diffusion coefficient (ADC) metrics derived from conventional diffusion-weighted imaging (DWI) on evaluating MRI-only lesions.

Methods: A total of 90 suspicious MRI-only lesions were evaluated, including 51 malignant and 39 benign lesions. Morphological and kinetic characteristics of all lesions (termed BI-RADS parameters) were described according to the BI-RADS lexicon on dynamic contrast enhancing imaging. Minimum, maximum, and mean ADC values (ADCmin, ADCmax, ADCmean) were obtained by measuring the ADC map of DWI. ADC heterogeneity was then obtained by the following formula: $ADC_{heterogeneity} = (ADC_{max} - ADC_{min}) / ADC_{mean}$. Diagnostic performance of these parameters was assessed and compared using the receiver operating characteristic curve (ROC).

Results: Of the 90 MRI-only lesions, there were 45 masses and 45 non-mass lesions. Among BI-RADS parameters, only the two different kinetic patterns were significantly different between benign and malignant group ($P = 0.005$ and $P < 0.001$, respectively). The area under ROC (AUC) of combined significant ADC parameters (ADCmin, ADCmean, and ADCmax, all $P \leq 0.001$) was significantly higher than that of the two different kinetic patterns ($P = 0.006$ for both). For MRI-only masses, only ADCmean and ADCmax, among all BI-RADS and ADC parameters, had diagnostic value (combined AUC = 0.833). For non-mass lesions, size, distribution, ADCmin, and ADCmean were significantly different between benign and malignant group ($P = 0.004$, $P < 0.001$, $P = 0.001$, and $P < 0.001$, respectively). In addition, ADCmean had the highest diagnostic performance among all ADC parameters, regardless of mass or non-mass (AUC = 0.825 and 0.812, respectively). ADCheterogeneity showed no significant differences, no matter in mass or non-mass group ($P = 0.62$ and 0.43, respectively).

Conclusions: In differentiating MRI-only suspicious lesions, quantitative ADC metrics generally performed better than BI-RADS parameters, and ADCmean is still the best ADC parameter to distinguish MRI-only lesions.

OR-0236

Artificial intelligence model for diagnosis of breast lesions in contrast enhanced mammography: a multicenter study

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Objective: Early diagnosis of breast cancer prior to metastasis allows for increased efficacy in treatment and consequently leads to notable enhancements in survival rates. Early diagnosis of in situ and invasive carcinoma can develop different surgical and treatment plans for patients. We

aimed to establish an artificial intelligence (AI)-based method for preoperative diagnosis of breast lesions from contrast enhanced mammography (CEM) as well as to explore its biological mechanism.

Method: This retrospective study includes 1297 eligible patients who underwent CEM examination and histologically confirmed breast lesions at Yantai Yuhuangding Hospital from June 2017 to June 2020, divided into construction set ($n=1101$), internal test set ($n=196$). Four central datasets from Fudan University Cancer Center from May 2018 to May 2019, Guangdong Maternal and Child Health Hospital from April 2021 to June 2021, Beijing Cancer Hospital from May 2018 to July 2019, and Guilin Municipal Hospital of Traditional Chinese Medicine from July 2021 to July 2022) were used as pooled external test set ($n=133$). The primary lesions of low-energy and recombined images on cranial-caudal view were delineated by radiologists. The AI model adopted RefineNet as a backbone network, and an attention sub-network, named convolutional block attention module (CBAM), was built upon the backbone for adaptive feature refinement. An XGBoost classifier was used to integrate the refined deep learning features with clinical characteristics to perform diagnosis of benign and malignant of breast lesions. We further retrained the AI model to distinguish in situ and invasive carcinoma among breast cancer candidates. RNA-sequencing data from 12 patients were used to explore the underlying biological basis of the AI prediction. The model's performance was evaluated by the receiver operating characteristic (ROC) curve and was compared with other deep learning (DL) models, traditional radiomics models, and radiologists (R1 and R2).

Results: The mean age was 51.54 ± 11.61 years (range, 17–85 years old) in the construction set, 52.62 ± 11.36 years (range, 17–80 years old) in the internal test set, and 51.23 ± 10.42 years (range, 23–83 years old) in the pooled external test set. In the internal test set, the AI model combining refined deep learning features and clinical characteristics (age, lesion diameter) achieved an AUC of 0.928 (95% CI: 0.891–0.965), higher than those of the RefineNet+CBAM model (AUC: 0.897, 95% CI: 0.848–0.946, $P = .15$), RefineNet model (AUC: 0.857, 95% CI: 0.798–0.917, $P = .02$), ResNet+CBAM model (AUC: 0.880, 95% CI: 0.827–0.934, $P = .04$), ResNet model (AUC: 0.833, 95% CI: 0.771–0.900, $P = .001$), and the best performing radiomics model (logistic regression AUC: 0.783, $P < 0.001$). In the pooled external test set, the AI model achieved an AUC of 0.932 better than the best performing DL model (RefineNet+CBAM AUC: 0.893, $P = 0.04$) and the best performing radiomics model (logistic regression AUC: 0.674, $P = 0.003$). In the internal test set and the pooled external test set, the AI model achieved the best performance with an accuracy of 0.872 and 0.857, sensitivity of 0.857 and 0.903, PPV of 0.978 and 0.912, NPV of 0.639 and 0.677. The accuracy, specificity, specificity, PPV, and NPV of R1 increased by 0.067, 0.048, 0.134, 0.04, and 0.148 in the pooled external test set, respectively. Meanwhile, the accuracy, sensitivity, specificity, PPV, and NPV of R2 increased from 0.842 to 0.902, 0.893 to 0.942, 0.667 to 0.767, 0.902 to 0.933, and 0.646 to 0.793 in the pooled external test set, respectively. For differentiation between in situ and invasive carcinoma, our AI model showed AUCs of 0.824 and 0.788 in the internal test set and pooled external test set; an accuracy of 78.4% and 75.7%; a sensitivity of 83.3% and 70.0%; and a specificity of 78.2% and 76.3%. In addition, we tested the performance of the AI model on the different lesion diameter subgroups in the test sets, and showed that the AUCs of the AI model were 0.811, 0.886, and 0.943 for lesion diameters of ≤ 1 cm, 1–2 cm, and ≥ 2 cm subgroups in the internal test set and 1.000, 0.920 and 0.938 in the pooled external test set. Further the biological basis exploration revealed that the significant differences between the low- and high- risk group, and discovered the differentially expressed genes related to breast cancer, such as FHL1, GPM6B, RELN, and CXCL10. KEGG analysis inferred that several pathways such as ECM–receptor interaction, focal adhesion, and human papillomavirus infection were significantly upregulated in high-risk patients. From the enriched pathways based on the GO analysis, we found that these pathways were mainly enriched in extracellular matrix organization and structure organization.

Conclusion: The AI model we proposed that integrated refined deep learning features and clinical characteristics can efficiently and non-invasively identify benign and malignant breast lesions from CEM, surpassing traditional radiomics models, clinical models, and radiologists. Moreover, the biological mechanism of AI model is explained. In addition, the AI model can also distinguish in situ carcinoma from invasive carcinoma.

OR-0237

Can An Artificial Intelligence System Help Radiologists Improve the Assessment Accuracy of Initial BI-RADS 3 and 4A cases in mammograms?

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Purpose: To investigate whether a deep learning-based artificial intelligence (AI) system can assist radiologists to improve the assessment accuracy of initial BI-RADS (Breast imaging reporting and data system) 3 and 4A cases in mammograms.

Methods and Materials: We trained deep neural networks to detect lesions and predict the malignancy of the potential lesions on a large-scale mammogram data set. A total of 824 new patients (846 breasts) with BI-RADS 3 or 4A were included in this study. All these lesions had biopsy results and at least 2 years of follow-up, which were used as reference standard. The mammograms of MLO and CC views went through the AI system and the malignancy of the lesions were predicted. The higher risk score of the two views was selected to predict the malignancy of the lesion for the AI system. Six radiologists (Three junior radiologists <5y of experience, Three senior radiologists >5y of experience) split and retrospectively re-assessed the same cases without and with the assistance of the AI, respectively.

Results: The AUC of AI system (0.66) was higher than that of 3 junior radiologists (0.52, 0.40, 0.45) and lower than that of 3 senior radiologists (0.70, 0.73, 0.68). The AUC of all radiologists combined with AI model for category 3 and 4A lesions of BI-RADS was improved compared with radiologists diagnosis alone. The AUC of junior radiologists combined with AI system was significantly improved compared with that of diagnosis alone (AUC was increased to 0.74, 0.77, 0.77 respectively, Z value was 2.61, 3.42, 3.01, P values were all < 0.001), and the AUC of senior radiologists combined with AI system was not statistically significant compared with that of diagnosis alone (AUC was increased to 0.79, 0.78, 0.78, Z value was 0.23, 0.20, 0.41, P values were all > 0.05).

Conclusions: The deep learning-based AI system surpassed junior radiologists and significantly improved the performance of junior radiologists in the assessment of BI-RADS 3 and 4A lesions by reducing missed diagnosis and unnecessary biopsy.

OR-0238

Association between cumulative low-density lipoprotein cholesterol and brain white matter health: The META-KLS Study

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Background and Purpose: Limited information existed regarding the relationship between long-term exposure to low-density lipoprotein cholesterol (LDL-C) and brain white matter health. This study aimed to investigate the associations of cumulative LDL-C exposure with white matter microstructural integrity and white matter hyperintensity (WMH) burden.

Materials and Methods: This study included 1,114 community-dwelling participants aged 25-83 years based on KaiLuan Study. LDL-C level was assessed in interviews biennially from 2006 to 2018. Brain MRI were performed from December 2020 onward. We used generalized linear model to investigate the multivariate-adjusted associations of cumulative time-weighted average (TWA) LDL-C with global metrics of white matter microstructural integrity and WMH load.

Results: After full adjustments, per-SD rise in cumulative TWA LDL-C (in z-score, moderate high vs. low) was associated with increased fractional anisotropy (FA) ($\beta = 0.25$, 95% CI 0.10 to 0.40), decreased mean diffusivity (MD) ($\beta = -0.24$, 95% CI -0.37 to -0.10), axial diffusivity (AD) ($\beta = -0.18$, 95% CI -0.33 to -0.04), and radial diffusivity (RD) ($\beta = -0.24$, 95% CI -0.38 to -0.10). For age-specific analysis, these associations existed only for individuals in young adulthood and midlife. Disrupted white matter microstructural integrity were more susceptible to increased cumulative LDL-C in male participants. Besides, a higher burden of WMH was observed with high exposure for cumulative LDL-C for young adults only ($\beta = 0.16$, 95% CI 0.04 to 0.28).

Conclusion: Elevated cumulative LDL-C was associated with higher global FA and lower MD, AD, and RD, as well as higher burden of WMH. Our findings suggested that lipid lowering in youth and middle age may help maintain white matter microstructural integrity and reduce WMH burden.

OR-0239

Transcriptional substrates underlying functional connectivity profiles of subregions within the human sensorimotor cortex

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Background: The human sensorimotor cortex has multiple subregions showing functional commonalities and differences, likely attributable to their connectivity profiles. However, the molecular substrates underlying such connectivity profiles are unclear.

Methods: Here, transcriptome-neuroimaging spatial correlation analyses were performed between transcriptomic data from the Allen Human Brain Atlas and resting-state functional connectivity (rsFC) of 24 fine-grained sensorimotor subregions from 793 healthy subjects.

Results: Results showed that rsFC of six sensorimotor subregions were associated with expression measures of six gene sets that were specifically expressed in brain tissue. These sensorimotor subregions could be classified into the polygenic- and oligogenic-modulated subregions, whose rsFC were related to gene sets diverging on their numbers (hundreds vs. dozens) and functional characteristics. First, the former were specifically expressed in multiple types of neurons and immune cells, yet the latter were not specifically expressed in any cortical cell types. Second, the former were preferentially expressed during the middle and late stages of cortical development, while the latter showed no preferential expression during any stages. Third, the former were prone to be enriched for general biological functions and pathways, but the latter for specialized biological functions and pathways. Fourth, the former were enriched for neuropsychiatric disorders, whereas this enrichment was absent for the latter. Finally, although the identified genes were commonly associated with sensorimotor behavioral processes, the polygenic-modulated subregions associated genes were additionally related to vision and dementia.

Conclusion: These findings may advance our understanding of the functional homogeneity and heterogeneity of the human sensorimotor cortex from the perspective of underlying genetic architecture.

OR-0240

运动成瘾的神经机制：基于多模态磁共振成像的脑影像学研究

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目的：虽然规律的体育运动有益于身心健康，但过度的不可控制的体育锻炼对一个人的身心健康是有害的，并且可能产生运动成瘾行为。越来越多的证据表明，成瘾本质上是动机问题，同时压力、焦虑、抑郁等负性情绪也是运动成瘾发生和发展的潜在危险因素。然而，人们对运动成瘾的神经基础以及动机、负性情绪等影响运动成瘾的潜在神经心理学机制知之甚少。

材料和方法：本研究在 88 名具有运动成瘾症状的被试，采用基于体素的形态学方法分析结构 MRI 和功能 MRI，通过计算被试的大脑灰质体积和功能活动来研究运动成瘾的潜在神经机制，以及灰质结构、功能和运动成瘾三者之间的关系；为了探索运动成瘾的神经心理学机制，我们采用中介分析方法研究社会心理因素、脑影像以及运动成瘾之间的关系，探索三者之间的作用机制。以上所有分析均采用多重比较校正后具有显著统计学差异的结果。

结果：在结构 MRI 和功能 MRI 研究中我们发现，运动成瘾与右侧眶额回、左侧前扣带回、左侧辅助运动区的灰质体积呈显著负相关，其中右侧眶额回的灰质体积在能力动机、负性情绪和运动成瘾的关系间起中介作用。并且中介分析还发现左侧辅助运动区的功能通过影响其结构来影响运动成瘾。基于种子点的功能连接分析发现，运动成瘾与额顶叶功能连接呈显著负相关，并且左侧前扣带回-右侧缘上回的功能连接在左侧前扣带回的灰质体积和运动成瘾的关系中起中介作用。以上结果在性别、年龄、体重指数、家庭社会经济情况、一般智力、大五人格和全脑体积（或头动参数）作为协变量进行回归后仍然显著，这表明研究结果具有特异性。

结论：上述的研究结果表明，负性情绪、锻炼动机是运动成瘾的潜在危险因素，MRI 研究提示，眶额回、前扣带回、岛叶、纹状体等奖赏系统相关脑区的结构和功能的改变与运动成瘾显著相关。总之，本研究为运动成瘾的潜在神经心理机制提供了证据，揭示了运动成瘾可能存在奖赏相关的执行控制功能减低。

OR-0241

Cerebral hemodynamic and metabolic abnormalities in neonatal hypocalcemia: findings from advanced MRI

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Background and Purpose: NHC is the most common metabolic disorder, and whether asymptomatic disease should be treated with calcium supplements remains controversial. We aimed to quantify their global CBF and CMRO2 using physiological MRI and elucidate the pathophysiologic vulnerabilities of NHC.

Materials and Methods: A total of 37 consecutive NHC patients were enrolled. They were further divided into subgroups with and without structural MRI abnormalities, denoted as NHC-a (n=24) and NHC-n (n=13). Nineteen healthy neonates were enrolled as a control group. Brain physiological parameters determined using PC MRI, TRUST MRI, and brain volume, were compared between NHC (their subgroups) and controls. Predictors for NHC-related brain injuries were identified using multivariate logistic regression analysis and expressed as OR with 95% CI.

Results: NHC showed significantly lower CBF and CMRO2 compared with controls. Furthermore, the NHC-a (vs. controls or NHC-n) had significantly lower CBF and CMRO2. There was no significant difference in CBF and CMRO2 between NHC-n subset and controls. CBF and CMRO2 were independently associated with NHC. The ORs were 0.80 (95% CI, 0.65–0.99) and 0.97 (95% CI, 0.89–1.05) for CBF and CMRO2, respectively.

Conclusion: NHC with structural damage may exhibit lower hemodynamics and cerebral metabolism. CBF may be useful in assessing the need for calcium supplementation in asymptomatic NHC to prevent brain injury.

OR-0242

**早发型与晚发型阿尔茨海默病一体化
18F-AV-1451 PET/MR 研究**

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目的: 本研究比较早发型和晚发型阿尔茨海默病人群中一体化 tau PET/MR 成像中 tau 蛋白沉积和灰质萎缩的影像学表现, 寻找早发型阿尔茨海默病诊断的潜在影像学生物标志物。

方法: 回顾性分析在中国人民解放军北部战区总医院接受 PET/MR 检查的 AD 患者, 根据发病年龄分成早发型 AD (发病年龄在 60 岁以下) 和晚发型 AD 组 (发病年龄在 60 岁以上), 同时收集患者的临床资料, 所有受试者均为 A β PET 阳性, 对 EOAD 和 LOAD 组进行基于感兴趣区和基于体素的分析, 相关性分析用于评估患者的发病年龄与感兴趣区的 tau PET SUVR 值和灰质体积值的相关性。

结果: 34 名受试者被纳入, 其中 EOAD 13 人, LOAD 21 人。性别 (P=0.078) 和受教育程度 (P=0.591) 没有显著的组间差异。EOAD 组的 MoCA 评分显著减低, 基于 ROI 的分析显示, 较 LOAD 组相比, EOAD 组灰质体积在双侧顶叶显著减低, 双侧颞叶、额叶轻度减低。基于体素的形态学分析显示, EOAD 较 LOAD 相比, 在顶上小叶、楔前叶的灰质萎缩更为明显, 在后扣带回、楔前叶、外侧颞叶、丘脑的 tau 沉积更为明显, 且发病年龄与脑内 18F-AV-1451 放射性摄取存在显著的负相关。

结论: 多模态 PET/MR 显示, EOAD 较 LOAD 的灰质萎缩和 tau 蛋白负荷更严重, PET/MR 神经影像有助于探究 EOAD 的病理特征。

OR-0243

复发缓解型多发性硬化不同类型病灶中 氧摄取分数的变化:一项横断面和纵向研究

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目的: 通过氧摄取分数(OEF)比较复发缓解型多发性硬化(RRMS)患者不同类型病灶的氧代谢水平, 并且纵向分析各病灶亚型 OEF 和磁化率随时间的变化规律。另外, 探索病灶平均 OEF 与临床残疾之间的关联。

方法: 本研究共纳入 46 例 RRMS 患者和 41 名健康对照。OEF 图和定量磁化率图 (QSM) 由 3D 多回波梯度回波序列重建获得。根据增强 T1WI, 白质病灶被分为强化病灶 (CEL) 和非强化病灶。根据 QSM, 非强化病灶被分为顺磁性边缘病灶 (PRL)、高信号病灶和非高信号病灶。采用 Kruskal-Wallis 检验比较不同类型病灶的 OEF 和磁化率的差异 Wilcoxon 符号秩检验被用于纵向比较各病变亚型的 OEF 和磁化率的改变。采用 Spearman 相关评估病灶平均 OEF 与 MS 患者扩展残疾状况量表 (EDSS) 的关联。

结果: PRL 具有最高的磁化率, 其次为高信号病灶。CEL 和非高信号病灶的磁化率与 MS 患者看似正常的白质和健康对照的白质相似。PRL 的 OEF 低于其他类型病灶; 高信号病灶的 OEF 低于非高信号病灶。纵向分析显示, 随着时间的推移, PRL 的磁化率增加($P=0.001$), OEF 降低($P<0.001$); 非高信号病灶的磁化率和 OEF 无明显变化($P=0.837$, $P=0.122$)。然而, 高信号病灶可随着时间的推移转换为 PRL 和非高信号病灶。转换为 PRL 的高信号病灶体积增大($P=0.011$), OEF 降低($P=0.028$); 转换为非高信号病灶的高信号病灶体积减小($P=0.006$), OEF 升高($P=0.013$), 磁化率降低($P=0.016$)。另外, 相关分析显示病变平均 OEF 与 EDSS 评分呈显著负相关($\text{Rho}=-0.546$, $P<0.001$)。

结论: 本研究揭示了不同类型 MS 病灶在组织损伤和氧代谢方面的差异。此外, OEF 可能是评估 MS 患者临床残疾程度的潜在影像学生物标志物。这有助于我们进一步了解 MS 病灶演变的病理机制。

OR-0244

Interpretable and Intuitive Machine Learning Approaches for Predicting Disability Progression in Relapsing- Remitting Multiple Sclerosis Based on Clinical and Grey Matter Atrophy Indicators

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Objective To investigate whether clinical and grey matter (GM) atrophy indicators can predict disability in relapsing-remitting multiple sclerosis (RRMS) and to enhance the interpretability and intuitiveness of a predictive machine learning model.

Methods One hundred forty-five and 50 RRMS patients with structural MRI and at least 1-year follow-up Expanded Disability Status Scale (EDSS) results were retrospectively enrolled and placed in the discovery and external test cohorts, respectively. Six clinical and radiomics feature-based machine learning classifiers were trained and tested to predict disability progression in the discovery cohort and validated in the external test set. Partial dependence plot (PDP) analysis and a Shiny web application were conducted.

Results In the discovery cohort, 98 patients had disability stability, and 47 patients were classified as having disability progression. In the external test set, 35 patients had disability stability, and 15 patients had disability progression. Models trained with both clinical and radiomics features (area under the curve (AUC), 0.725-0.950) outperformed those trained with clinical (AUC, 0.600-0.740) or radiomics features only (AUC, 0.615-0.945). Among clinical + radiomics feature models, the logistic regression (LR) classifier-based model performed best, with an AUC of 0.950. The radiomics feature-only models showed fair performance, with AUCs ranging from 0.617 to 0.753 in the external test set. PDP analysis showed that female patients and those with lower volume, surface area, and symbol digit modalities test (SDMT) scores; greater mean curvature and age; and no disease modifying therapy (DMT) had increased probabilities of disease progression. Finally, a Shiny web application (<https://lauralin1104.shinyapps.io/LRshiny/>) was developed to calculate the risk of disability progression.

Conclusions Interpretable and intuitive machine learning approaches based on clinical and GM atrophy indicators can help physicians predict disability progression in RRMS patients for clinical decision-making and patient management.

OR-0245

基于核磁共振成像的影像组学用于评估成人和青少年弥漫性中线胶质瘤，伴 H3 K27 改变患者的预后

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目的：评估基于核磁共振成像的影像组学模型预测成人和青少年弥漫性中线胶质瘤，伴 H3 K27 改变患者总生存期的能力。

材料与方法：回顾性分析 2016 年 8 月至 2020 年 11 月期间在我院诊断为的 89 例弥漫性中线胶质瘤，伴 H3 K27 改变的患者，并按 7:3 的比例随机分为训练集和测试集。在构建预测模型前，从 T1 增强和 T2FLAIR 图像中提取肿瘤内和瘤周水肿区域的影像组学特征并进行筛选。通过单变量 Cox 回归分析筛选出与总生存期相关的临床特征，包括人口统计学信息、MRI 传统特征、治疗策略和病理结果。临床模型、放射组学模型和混合模型是通过多变量 Cox 回归分析和 10 倍交叉验证建立的，风险评分分别在训练集中计算，然后在测试集中验证。最终比较各模型间的随时间变化的平均 AUC 值和 C 指数，并对模型进行比较。此外，还利用 Kaplan-Meier 曲线对患者的总生存期进行分层。

结果：纳入的患者年龄在 12 至 70 岁之间，中位总生存期为 387 天，范围从 22 天到 1621 天不等。在构建放射组学模型时，共使用了来自 T1 增强的五个影像组学特征和来自 T2 FLAIR 的四个影像组学特征。对于临床特征，只有年龄、脑室下区是否受累和术后治疗方式等三个临床因素与 OS 相关。在测试集中，组合模型的 C 指数 (0.696) 和随时间变化的平均 AUC 值 (ad-AUC, 0.719) 最高。放射组学模型 (ad-AUC 差值为 0.081, $p < 0.001$) 和组合模型 (ad-AUC 差值为 0.105, $p = 0.002$) 在预测 OS 方面均优于临床模型。放射组学模型 ($p = 0.024$) 和组合模型 ($p = 0.011$) 能够对患者进行分层，识别高风险患者群体。

结论：基于磁共振成像的放射组学模型可以有效预测弥漫性中线胶质瘤，伴 H3 K27 改变的成人患者和青少年患者的总生存率，并能为临床因素提供额外的预测价值。

OR-0246

化学交换饱和转移频率重要性分析预测弥漫性胶质瘤 H3K27M 突变状态的价值

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目的 探讨化学交换饱和转移(CEST)频率重要性分析和传统酰胺质子转移成像(APTw)分析预测弥漫性胶质瘤 H3K27M 突变状态的价值。

方法 回顾性分析 28 例经病理确诊的弥漫性胶质瘤患者的临床与 MRI 资料。所有患者均行头颅磁共振 CEST 扫描。根据组蛋白 H3 突变状态分为 H3K27M 突变组和 H3K27M 野生组两组。采用 CEST 频率重要性分析方法获得区分肿瘤与正常脑组织间的 3.5ppm 处酰胺质子和-3.5ppm 处脂肪族质子频率重要性值。将肿瘤与正常脑组织 APTw 值相减后分别得到 Δ APT_w 的 10th 分位数、90th 分位数和平均值。采用 Mann-Whitney U 检验统计分析两组间 CEST 各参数差异。采用受试者操作特征(ROC)曲线评估各个参数的预测能力。

结果 28 例脑胶质瘤患者中, 突变组 7 例, 男 5 例、女 2 例, 年龄(28.1±10.9)岁; 野生组 21 例, 男 13 例、女 8 例, 年龄(53.0±14.5)岁, 年龄具有统计学差异($P<0.001$)。传统 Δ APT_w 的 10th 分位数、平均值、酰胺质子和脂肪族质子频率重要性值在两组间均具有统计学差异($P<0.05$)。弥漫性胶质瘤伴有 H3K27M 突变组的酰胺质子频率重要性值显著高于野生组(1.47±0.19 vs 0.55±0.40, $P<0.001$)。酰胺质子频率重要性值预测弥漫性胶质瘤 H3K27M 突变的 ROC 曲线下面积最大, AUC 为 1.00($p<0.001$)。酰胺质子频率重要性阈值为 1.30 时预测弥漫性胶质瘤 H3K27M 突变的灵敏度为 1.00, 特异度为 1.00。

结论 基于 CEST 的酰胺质子频率重要性值能有效预测弥漫性胶质瘤 H3K27M 的突变状态。

OR-0247

基于功率谱斜率分析方法对酒精使用障碍患者体素水平的全脑静息态 fMRI 研究

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目的 早期的神经影像学研究表明, 酒精使用障碍 (AUD) 患者的大脑异常活动与频率有关。然而, 目前尚缺乏直接捕捉多频段振幅的综合方法。本研究采用了一种新的度量指标-功率谱斜率 (PSS), 来探讨 AUD 患者全脑体素水平上的改变。

方法 本研究中共纳入 33 名 AUD 患者和 29 名年龄、性别、受教育年限、利手等相匹配的健康对照组 (HC 组)。两组均接受颅脑 3.0T MRI 检查, 获得常规像、静息态功能像和高分辨率 T1WI 结构像数据。使用 REST 软件对图像进行预处理, 预处理后的图像通过快速傅里叶变换产生每个体素时间序列的功率谱。在拟合之前, 将每个体素信号的功率除以所选频率范围(从 0.01 Hz 到 0.25 Hz)的平均幅度, 以标准化功率范围。计算并比较两组患者功率谱斜率的线性系数和幂律系数。使用受试者工作特征 (ROC) 曲线来检验 PSS 分析区分 AUD 和 HC 的能力。Spearman 相关性分析用于评估网络节点变化与临床参数密歇根酒精筛查量表 (MAST) 和酒精成瘾量表 (ADS) 的相关性。

结果 AUD 组和 HC 组的大部分大脑皮层都显示出负 PSS 值, 尤其是在视觉区域, 其斜率也比全脑平均值更陡峭, 而白质是发现 PSS 正值最多的区域。AUD 患者左侧中央前回的 PSS 两个指标均比对照组高。特定脑区的 PSS 差异显示出良好的曲线下面积 (AUC) (0.836-0.844), 以及良好的

敏感性 (83.3%-86.7%) 和特异性 (73.1%-76.9%)。MAST 或 ADS 评分与特定脑区的 PSS 值无明显相关性。

结论 作为一种新的分析方法, PSS 能在体素水平上很好地检测出 AUD 患者大脑中的局部异常活动, 可能成为未来 fMRI 研究中一种新的补充方法。

OR-0248

基于海马 MRI 和 PET 纹理分析的阿尔茨海默病早期诊断研究

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目的: 海马萎缩和葡萄糖代谢减低是诊断阿尔茨海默病 (Alzheimer's disease, AD) 的重要影像标志物。纹理分析是基于机器学习的图像分析方法, 通过图像各像素信号及分布等信息, 获取肉眼无法识别的局部纹理改变。然而, 海马多模态纹理特征对 AD 早期诊断的效能仍不清楚。本研究旨在探讨基于 3D T1WI 和 ^{18}F -FDG PET 的海马纹理特征对 AD 和遗忘型轻度认知障碍 (amnesic mild cognitive impairment, aMCI) 的诊断价值。

材料和方法: 本研究纳入 55 例 AD 患者, 60 例 aMCI 患者和 55 例健康对照 (health control, HC)。受试者经一体化 PET/MR 扫描得到 3D T1WI 和 ^{18}F -FDG PET 图像。以海马为感兴趣区提取 3D T1WI 和 ^{18}F -FDG PET 纹理特征, 包括原始特征及高阶特征, 即 LoG (Laplacian of Gaussian)、局部二值模式及小波特征。采用方差选择法、相关系数法和多因素回归分析筛选特征, 以五折交叉验证逻辑回归算法建立 3D T1WI、 ^{18}F -FDG PET 和组合模型并评估效能。通过 SHAP (shapley additive explanation) 分析特征的分类贡献度。

结果: AD 和 HC、aMCI 和 HC 分类中, ^{18}F -FDG PET 模型 (AUC: 0.941、0.951) 优于 3D T1WI 模型 (AUC: 0.801、0.833), 组合模型优于单模态模型, AUC 达 0.996、0.967。AD 和 HC 分类特征中, 6 个小波特征 (60.0%), 3 个 LoG 特征 (30.0%), 1 个原始特征 (10.0%)。aMCI 和 HC 分类特征中, 3 个小波特征 (37.5%), 2 个 LoG 特征 (25.0%), 2 个局部二值模式特征 (25.0%), 1 个原始特征 (12.5%)。其中以小波特征的占比最高, ^{18}F -FDG PET 特征贡献度最高。

结论: 基于 3D T1WI 和 ^{18}F -FDG PET 的多模态海马纹理分析有助于诊断 AD 和 aMCI, 其中 ^{18}F -FDG PET 优于 3D T1WI。纹理特征中小波特征具有重要价值, 有潜力成为 AD 早期诊断生物标志物。

OR-0249

Visualizing the habenula using 3T high-resolution MP2RAGE and QSM

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PURPOSE: Habenula (Hb) is a key node in regulating emotion-related behavior (Figure 1). Accurate visualization and reliable quantitative analysis of Hb are vital in psychiatric disorders. In order to obtain high-contrast habenula images and allow them to be compatible with clinical applications, this study compared 3.0T magnetization-prepared 2 rapid acquisition gradient echoes (MP2RAGE) and quantitative susceptibility mapping (QSM) with magnetization-prepared rapid gradient echo (MPRAGE) for Hb segmentation performance.

MATERIALS AND METHODS: Ten healthy volunteers were scanned twice with 3.0T MPRAGE and MP2RAGE, and once with QSM. Image quality and visibility of Hb anatomical features were analyzed by three radiologists using a 5-point scale. Contrast assessments of Hb and thalamus

were also performed. The reproducibility of the Hb volume from MPRAGE and MP2RAGE was evaluated using manual segmentation and the Multiple Automatically Generated Template brain segmentation algorithm (MAGeTbrain, Figure 2). T1 values and susceptibility were measured in whole Hb and Hb geometrical subregion using MP2RAGE-T1 mapping and QSM.

RESULTS: 3.0T MP2RAGE and QSM demonstrated clear boundaries and anatomical features of the Hb compared to MPRAGE, with a higher subjective scores, signal-to-noise and contrast-to-noise ratio (all $P < 0.05$, Figure 3 and Figure 4). Additionally, 3.0T MP2RAGE provided reliable Hb manual and MAGeTbrain segmentation volume estimates with greater reproducibility (Figure 5). T1 mapping derived from MP2RAGE was highly reliable, and susceptibility contrast was highly non-uniform within the Hb (Figure 6 and Figure 7).

CONCLUSION: We identified an optimized sequence combination (3.0T MP2RAGE combined with QSM) that may be useful for enhancing Hb visualization and more reliable quantitative data.

OR-0250

Altered brain iron depositions of SCA3: from pre-symptomatic to symptomatic stage

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Purpose:

To comprehensively investigate brain iron deposition alterations of SCA3 at different clinical stages in the precentral gyrus and brain nuclei, and their correlations with clinical symptoms and damaged fiber bundles.

Methods:

We prospectively investigated QSM of SCA3 [19 pre-symptomatic (5 females, $29.1 \pm 8.2y$) and 41 symptomatic (28 females, $39.5 \pm 10.4y$)] and 37 matched healthy controls (HCs) recruited from 2018.05 to 2021.01. Group susceptibility was cross-sectionally compared, and their associations between altered brain iron deposition with clinical symptoms and fractional anisotropy of the bilateral corticospinal tracts and cerebellar peduncles were explored.

Results:

Compared to HCs, except for the bilateral precentral gyrus, putamen, and thalamus, increased susceptibility in all the brain nuclei was observed in pre-symptomatic SCA3. Most of the supratentorial and the right dentate nuclei had significantly increased susceptibility in symptomatic than the pre-symptomatic stage and was partially correlated with disease duration and damaged cerebellar peduncles. The left substantia nigra (SN) demonstrated the highest diagnostic efficacy in identifying pre- and symptomatic SCA3. Notably, the susceptibility of red nuclei most significantly contributed to the parkinsonian symptom.

Conclusion:

Brain iron depositions abnormality is an early event of the SCA3's occurrence and development. The left SN might be a critical site for the disease starts and development, and it could be a promising imaging biomarker for disease diagnosis and surveillance.

OR-0251

Use of biomarkers from contrast-enhanced magnetic resonance imaging radiomics to predict chemotherapeutic response in primary central nervous system lymphoma

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Objectives To evaluate the utility of contrast-enhanced magnetic resonance imaging (CE-MRI) radiomics features to predict responses when treating primary central nervous system lymphoma (PCNSL) and establish a prediction model in patients with PCNSL who are treated with high-dose methotrexate (HD-MTX)-based chemotherapy.

Methods A total of 131 patients with PCNSL (101 in the training set and 30 in the testing set) who had had contrast-enhanced MRI scans were retrospectively analyzed. Pyradiomics was used to extract radiomics features, and the clinical variables of the patients were collected. Support Vector Machine (SVM) and Logistic Regression (LR) was used to establish the prediction model. The prediction performance of radiomics model, clinical model, and combined model was independently assessed and compared using Receiver Operating Characteristic (ROC) curves.

Results In total, 1598 features were extracted, and six of these were selected by T test and recursive feature elimination (RFE). In the test set, the area under the ROC curve was 0.868 (0.683, 0.967) for the combined prediction model, 0.857 (0.681, 0.957) for the radiomics model, 0.618 (0.413, 0.797) for the clinical prediction model. The combination of the radiomics signature with IL-2R had the highest predictive power, and the radiomics prediction model was also yield higher accuracy (80.0%).

Conclusions Our combined prediction model, including both radiomics signatures extracted from CE-MRI and serum IL-2R, may represent an effective way of stratifying patients with PCNSL before chemotherapy, and may thus help clinicians make better treatment decisions.

OR-0252

The deeper, The better? Efficacy of deep transcranial magnetic stimulation in spinocerebellar ataxia type 3

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【Objective】 This study aims to investigate the efficacy of deep transcranial magnetic stimulation (dTMS) in improving motor symptoms in patients with spinocerebellar ataxia type 3 (SCA3). **【Methods】** Thirteen SCA3 patients underwent 20 sessions of dTMS targeting the primary motor cortex (M1) and cerebellum respectively, which delivering for 5 consecutive days per week for 4 weeks (a total of 1200 pulses per session). Clinical outcomes included the Scale for the Assessment and Rating of Ataxia (SARA) and the International Cooperative Ataxia Rating Scale (ICARS). Outcome assessments were performed at baseline and on the last day of dTMS intervention. Statistical analysis were performed using SPSS software. **【Results】** Our findings suggest that patients receiving dTMS exhibited improvement in ataxia, with a 2.0-point decrease in SARA scores (95% confidence interval (CI)-2.43 to -1.54, $p < 0.001$) and a 3.8-point decrease in ICARS scores (95% CI-4.91 to -2.65, $p < 0.001$) compared to baseline data. Moreover, this study reports no severe adverse events from dTMS therapy. **【Conclusions】** This study reveals that dTMS can be a safe and effective intervention for the alleviation of ataxia in SCA3 and highlights its efficacy as a more enhanced rehabilitative approach compared to traditional TMS for SCA3 therapy.

OR-0253

Pericarotid fat density is associated with severity of cerebral small vessel disease

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Purpose: To determine the association between neuroimaging characteristics of cerebral small vessel disease (CSVD) and pericarotid fat density obtained by computed tomography angiography (CTA).

Materials and Methods: A total of 272 CSVD patients who underwent both carotid CTA and cranial magnetic resonance imaging (MRI) from Jan 2020 to Jan 2022 were recruited. Perivascular fat attenuation index (FAI) surrounding extracranial internal carotid artery (ICA) and neuroimaging markers of CSVD were evaluated. FAI surrounding extracranial ICA was quantified semi-automatically via a dedicated software. Neuroimaging markers of CSVD included lacunes, white matter hyperintensities (WMH), microbleeds (CMB), enlarged perivascular space (EPVS) and CSVD total score. The Correlations between pericarotid FAI and neuroimaging markers of CSVD were assessed using binary logistic regression (for lacunes, WMH and CMB) or ordinal logistic regression (for EPVS and CSVD total score). The receiver operating characteristic curve (ROC) analysis was used to evaluate the predictive role of FAI in CSVD patients between acute ischemia stroke (AIS) and non-AIS groups.

Results: Pericarotid FAI was significantly associated with the occurrence of lacunes and CMB, as well as WMH grades before and after controlling for confounding indicators (all $P < 0.05$). An increased pericarotid FAI was independently associated with a higher CSVD total score after adjusting for confounding indicators (mean FAI: $P < 0.001$; max FAI: $P < 0.001$). No difference was observed in FAI among different grades of EPVS after adjusting for clinical parameters. Altogether, 100 patients (36.8%) suffered from AIS, and patients with AIS had a significantly higher FAI value than those without AIS (mean FAI: $P = 0.045$; max FAI: $P = 0.007$). Compared with non-AIS group, FAI exhibited relatively higher diagnostic value for detecting larger CSVD total score in AIS group (AIS vs non-AIS: AUC = 0.769 vs 0.699 (mean FAI); AUC = 0.798 vs 0.747 (max FAI)).

Conclusions: Pericarotid FAI obtained from carotid CTA, a surrogate marker characterizing perivascular adipose tissue inflammation, is an adverse indicator related to severity of CSVD and incidence of AIS. These findings might assist in risk stratification and individual prevention of CSVD patients.

OR-0254

MRI histogram analysis of telomerase reverse transcriptase promoter mutation status in IDH-wildtype glioblastoma

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Purpose: To investigate the predictive value of preoperative magnetic resonance imaging (MRI) histogram analysis for evaluating telomerase reverse transcriptase promoter (pTERT) mutation status in IDH-wildtype glioblastoma (GBM).

Methods: The clinical and imaging data of 181 patients with IDH-wildtype GBM at our hospital between November 2018 and April 2023 were retrospectively assessed. We used the molecular sequencing results to classify the data sets into pTERT mutations (C228T and C250T) and pTERT-wildtype groups. Preoperative T1-weighted contrast-enhanced (T1C) histogram parameters of

patients with IDH-wildtype GBM were extracted using FireVoxel software. The T1C histogram parameters were compared between groups and correlated with conventional MRI features. Receiver operating characteristic (ROC) curve was used to assess histogram parameter performance.

Results: Patient age and percentage of necrotic area showed statistically significant differences between the pTERT mutation and pTERT-wildtype groups ($p < 0.05$). Among the T1C histogram features, the maximum, standard deviation, variance, coefficient of variation (CV), skewness, 5th, 10th, 25th, 95th and 99th percentiles were statistically significantly different between groups (all $p < 0.05$). When the CV was 3.19, the sensitivity, specificity and accuracy (80.30%, 72.90% and 77.90%, respectively) for predicting the pTERT mutation status reached their maximum values, with an area under the curve (AUC) of 0.775(0.702–0.848). Moreover, CV was positively correlated with the percentage of necrotic area (correlation coefficient: 0.825; $p < 0.05$). There were no significant differences in the T1C histogram parameters between the C228T and C250T groups (all $p > 0.05$).

Conclusion: T1C histogram parameters can be used as non-invasive quantitative parameters to assist in the preoperative clinical prediction of pTERT mutation status in IDH-wildtype GBM.

OR-0255

ASPECTS-based net water uptake outperforms target mismatch for outcome prediction in patients with acute ischemic stroke and late therapeutic window

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Purpose: To compare the prognostic value of net water uptake (NWU) and target mismatch (TM) on CT perfusion (CTP) in acute ischemic stroke (AIS) patients with late-time window. **Materials and Methods:** One hundred and nine consecutive AIS patients with anterior-circulation large vessel occlusion presenting within 6–24 hours from onset/last seen well were enrolled. Automated Alberta Stroke Program Early CT Score-based NWU (ASPECTS-NWU) was calculated from admission CT. The correlation between ASPECTS-NWU and CTP parameters was assessed. Predictors for favorable outcome (modified Rankin Scale score ≤ 2) at 90 days was assessed using logistic regression analysis. The ability of outcome prediction between ASPECTS-NWU and TM (an ischemic core < 70 ml, a mismatch ratio ≥ 1.8 , and an absolute difference ≥ 15 ml) was compared using receiver-operating-characteristic (ROC) curve.

Results: A higher level of ASPECTS-NWU was associated with a larger ischemic core ($r = 0.66$, $P < 0.001$) and a larger hypoperfusion volume ($r = 0.38$, $P < 0.001$). ASPECTS-NWU performed better than TM for outcome stratification (area under the curve [AUC, 0.738 versus 0.583, $P = 0.004$]) and was the only independent neuroimaging marker associated with favorable outcomes compared with CTP parameters (odds ratio, 0.73; 95% confidence interval [CI] 0.62–0.87, $P < 0.001$). An outcome prediction model including ASPECTS-NWU and clinical variables (National Institutes of Health Stroke Scale scores and age) yielded an AUC of 0.828 (95% CI 0.744–0.893; sensitivity 65.4%; specificity 87.7%).

Conclusion: ASPECTS-NWU performed better than TM for outcome prediction in AIS patients with late-time window and might be an alternative imaging biomarker to CTP for patient selection.

OR-0256

Performance evaluation of deep learning image reconstruction algorithm in low-dose whole brain CT perfusion examination of acute ischemic stroke: a feasibility study

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Purpose: To investigate the impact of deep learning image reconstruction (DLIR) algorithm on image quality and diagnostic parameters in low-dose whole brain CT perfusion.

Methods: We prospectively enrolled acute ischemic stroke (AIS) patients admitted within 24 hours of onset and underwent non-contrast CT and CTP examinations. Patients were randomly divided into two groups, and the scanning conditions of the two groups were the same except the tube current of CTP scanning. CTP scanning: 80kV, 150mA (conventional dose group (CD))/ 100 mA (low dose group (LD)). According to our previous research, we reconstructed images in the CD group with adaptive statistical iterative reconstruction-Veo 80% algorithm (ASIR-V80%), which is Group A, and we reconstructed CTP images in the LD group with ASIR-V80% (Group B), DLIR algorithms at medium (DLIR-M, Group C), and high levels (DLIR-H, Group D). The clinical features of the two groups including gender, age, height, weight, time of onset, NIHSS score at admission and underlying diseases were recorded and compared. Meanwhile, the subjective and objective image quality, perfusion parameters (including CBF, CBV, MTT, Tmax and TTP), diagnostic performance and radiation dose of the four groups of reconstructed images were compared.

Results: The mean effective radiation dose was 5.71 mSv and 3.80 mSv for the CD and LD protocols, respectively, with a statistically significant difference found between them ($P < 0.001$). There was no statistically significant difference in clinical baseline characteristics between CD and LD group. Compared to Groups B and C, the SD values decreased while SNR increased in Groups A and D ($P < 0.05$) for both gray matter (GM) and white matter (WM) regions. The overall objective image quality ranked from high to low: Group D = Group A > Group B > Group C, and the result of subjective scoring was the same. Perfusion parameters showed no significant difference between Groups A and D. In GM, the CBV value of Group B was lower than that of Group A ($P = 0.017$), while in WM, both Groups B and C had significantly higher CBF values and lower MTT values than Group A ($P < 0.05$). There was no statistical difference in absolute value between the maximum diameter of cerebral infarction and the standard reexamination measurement ($P > 0.05$).

Conclusions: Low-dose CTP combined with DLIR-H can improve image quality, facilitating over 30% radiation dose reductions without influencing CTP diagnosis parameters, including CBF and MTT, which can be applied in clinical practice.

OR-0257

胆碱能基底前脑系统在帕金森病姿势不稳/步态障碍及注意力障碍中的机制研究

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背景 帕金森病 (PD) 姿势不稳/步态障碍 (PIGD) 和认知功能损伤的病理生理机制尚不清楚, 而姿势步态控制以及认知功能均与胆碱能基底前脑系统 (cBF) 密切相关。

方法 本研究招募了 84 名 PD 患者和 82 名正常对照组 (NC), 参与者均接受了多模态磁共振扫描、运动和认知评估。扩散张量成像 (DTI) 用于检测 cBF 系统的结构异常, 通过 FreeSurfer 自动分割

cBF 核团, 并使用概率性纤维追踪其投射纤维束。为反映细胞丢失及细胞外自由水积聚, 我们量化了自由水分分数 (FWf), 并提取了 cBF 核团及其纤维束的 FWf 以及皮层胆碱能投射密度进行统计分析。

结果 PD 患者 cBF 核团的 FWf 明显高于 NC (P -value<0.001), 纤维束 FWf 也明显高于 NC (P -value =0.021), 且在枕叶 (P -value <0.001)、顶叶 (P -value<0.001) 和前额叶 (P -value =0.005) 的胆碱能皮层投射明显降低。在患者中, cBF 核团 FWf 升高与 PIGD 评分 ($r=0.306$, P -value=0.006) 以及连线测试 A (TMT-A) 时间增加显著相关 ($r=0.303$, P -value=0.007)。注意力 (TMT-A 时长) 部分中介了 cBF 核团 FWf 和 PIGD 评分之间的关系 (间接效应: $a*b=0.071$, 总效应: $c=0.256$, P -value=0.006)。

结论 我们的发现表明, PD 患者存在 cBF 系统整体退化, 涉及 cBF 核团、纤维束和皮层投射, 在认知与运动之间的互动中发挥重要作用。

OR-0258

动脉通过伪影能更简单识别颅内动脉粥样硬化狭窄患者短暂性脑缺血发作和卒中

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目的:比较高分辨率磁共振成像(HRMRI)和动脉自旋标记(ASL)成像对鉴别颅内动脉粥样硬化性狭窄患者短暂性脑缺血发作(TIA)和脑卒中的能力, 并建立动脉粥样硬化患者缺血性脑卒中的预测模型。
方法:回顾性分析 2020 年 10 月至 2021 年 12 月期间接受 HRMRI 和 ASL 成像的症状性动脉粥样硬化患者, 根据 DWI 检查有无梗死将其分为卒中组及 TIA 组, 所有患者均使用带有 32 通道头部线圈的 3.0 T 磁共振扫描仪(Ingenia CX, Philips Healthcare)进行成像。评估 HRMRI 图像上大脑中动脉最窄部位的血管腔和斑块特征, 并评估标记后延迟时间(PLDs) 分别为 1.5 和 2.5 s 时动脉通过伪影(ATAs)存在与否。采用多因素 logistic 回归分析, 结合临床因素、斑块差异特征和不同 PLD ATAs 的存在, 受试者工作特征(ROC)曲线用来评价不同模型的诊断效果。 $P<0.05$ 认为有统计学差异。

结果:共有 85 名参与者最终纳入研究, TIA 组 47 名患者, 卒中组 38 名。与 TIA 组相比, 卒中组高血压、高脂血症发生率、斑块负担、狭窄程度、增强比例、正性重构患病率、斑块内出血、1.5s ATAs 和 2.5s ATAs 存在的发生率明显更高 (p 均<0.005)。我们将斑块差异特征和 2-PLD ATAs 的存在与临床因素相结合, 建立了模型 1(临床危险因素+斑块特征)、模型 2(临床危险因素+ 2-PLD ATAs 存在)、和模型 3(临床危险因素+斑块特征+存在 2-PLD ATAs 存在)。模型 3 的诊断准确率高于模型 1 和模型 2 ($p<0.005$)。模型 1 和模型 2 的 AUC 差异无统计学意义($Z=0.612$, $p=0.541$)。模型 3 的敏感性、特异性、阳性预测值、阴性预测值和准确率分别为 92.11%、95.74%、94.59%、93.75%和 94.12%。

结论:ASL 在预测脑卒中方面比 HRMRI 提供了更简单的成像评估。此外, 斑块特征与血流动力学差异在鉴别卒中与 TIA 患者也是有效区分的生物学标记物。结合这些特征, 建立的预测模型具有良好的预测性能。

OR-0259

半剂量增强 T2FLAIR 肿瘤强化程度与血管渗透性的相关性研究

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目的：探讨脑转移瘤在 1/2-dose CE-T2 FLAIR 的强化程度与动态增强磁共振扫描血管渗透性参数的相关性。

方法：前瞻性纳入来我院就诊的 39 例脑转移瘤患者。所有患者于治疗前行平扫 T1WI、平扫 T2 FLAIR、DCE-MRI、1/2-dose CE-T2 FLAIR、1/2-dose CE-T1WI 以及 routine-dose CE-BRAVO 序列。测量所有转移灶的 DCE 定量参数值：Ktrans、Kep、Ve，以及转移灶在 1/2-dose CE-T2 FLAIR 中的 CR 值和 PI 值。病灶分组：（1）A 组，病灶在 1/2-dose CE-T2 FLAIR 的强化程度高于 routine-dose CE-BRAVO；B 组，两者强化程度相当；C 组，前者小于后者。（2）所有转移灶按直径及强化方式分为三组：a 组：直径<5mm 的病灶；b 组：直径≥5mm 的环形强化灶；c 组：直径≥5mm 的实性强化灶。（I）采用 Spearman 法分析所有病灶 Ktrans 值、Kep 值、Ve 值与 CR 值和 PI 值的相关性。（II）分别比较 Ktrans 值、Kep 值、Ve 值、CR 值与 PI 值在 ABC 三组之间的统计学差异。（III）比较 Ktrans 值在 abc 三组之间的统计学差异。

结果：（I）相关性分析：病灶 Ktrans 值与 CR 值、PI 值均呈中度负相关，相关系数 r 分别为-0.551 和-0.511。病灶 Kep 值与 CR 值呈高度负相关，相关系数 r=-0.708。（II）组间比较：A 组、B 组、C 组的 Ktrans 值、Kep 值三组间差异均有统计学意义（P<0.001）。ABC 三组的 CR 值与 PI 值均有统计学意义（P<0.001）；（III）abc 三组的 Ktrans 值差异有统计学意义，a 组与 b 组的 Ktrans 值均低于 c 组；ABC 组在 1/2-dose CE-T2 FLAIR 上 CR 值于 PI 值均有统计学意义（P<0.001）。

结论：脑转移瘤在 1/2-dose CE-T2 FLAIR 的强化程度与血管渗透性参数（Ktrans 和 Kep）呈显著负相关，转移瘤组织血管渗透性是 CE-T2 FLAIR 与 CE-T1WI 强化程度存在差异的重要原因。

OR-0260

基于深度学习的急性缺血性脑卒中多任务病灶分割及其对卒中预后预测的应用研究

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目的：急性缺血性脑卒中（AIS）梗塞灶体积和脑白质高信号（WMH）与临床预后密切相关，但临床缺乏对这两种病灶的精准定位、定量评估。本研究旨在建立一种基于深度学习自动分割梗塞病灶和 WMH 的影像模型，以期对 AIS 预后进行准确预测。

方法：回顾性分析 2008 年至 2022 年多中心数据(训练和验证数据集来自中大医院的训，独立测试数据集来自一项多中心脑卒中研究)，纳入的脑卒中患者均于发病 72 小时内获得 MRI 图像。采用多任务卷积神经网络(CNN)深度学习模型对 DWI 和 FLAIR 图像进行梗塞灶和 WMH 负荷的自动分割，并提取体积大小、位置等影像学特征。以 7 天和 90 天 mRS 评分为结局，建立包含影像和临床特征融合的预测模型，分别在内部(中大医院)和外部(多中心注册)数据集上检测模型性能，计算曲线下面积(AUC)。

结果：内部数据集包括 1179 名 AIS 患者，外部测试数据集包括 83 名患者。分割方法具有稳健性，其中梗塞病灶分割 Dice 得分为 0.90±0.03(训练集)和 0.90±0.02(测试集)，WMH 分割 Dice 评分在训练集和测试集中分别为 0.89±0.01 和 0.86±0.01。影像-临床融合模型在预测 7 天 mRS 得分方面的表现显著优于其他模型，在训练、验证和测试数据集上分别达到 0.82 (95% CI: 0.78-0.86)、0.80 (95% CI: 0.73-0.86)和 0.80 (95% CI: 0.70-0.90)。该模型在预测 90 天 mRS 得分表现出了最佳性能。

结论：本研究开发的影像分割方法稳健、适于临床转化，基于该方法建立的影像-临床特征融合模型在预测短期和长期 AIS 预后方面均表现最佳，为临床 AIS 的快速判别、预后预测提供了有力的手段。

OR-0261

白血病脑出血患者非对比增强 CT 标志物及短期预后模型的研究

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目的：使用非对比增强 CT（NCCT）标志物描述白血病患者脑出血病灶，并探讨语义特征在白血病患者脑出血早期死亡影像组学预后模型中的价值。

方法：回顾性分析 2007 至 2023 年间在北京大学人民医院由 CT 诊断为脑出血的 135 例白血病患者 CT 图像及临床资料，由 2 名专业放射医师评估脑出血灶语义特征并勾画 2D ROI 区。共收集了 67 个 CT 图像特征，由包含 4 种 CT 标志物（低密度征、混合密度征、岛征及边缘不规则征）的 11 种语义特征及基于影像组学方法提取的 56 种几何特征组成。将患者按短期预后分为两组，比较患者的基线资料，确定语义特征是否与不良预后相关。随后将数据分为训练集和测试集。在训练集中，采用单因素 logistics 方法、最小绝对收缩和选择算子(LASSO)和十则交叉验证进行临床实验室数据和 CT 图像特征筛选，分别得到当前特征集合的最优特征集，使用随机森林算法进一步构建临床模型和影像组学模型。最后对模型进行评估。

结果：(1)低密度征、岛征及边缘不规则征在白血病患者中的发生率（65.93%，46.67%，83.70 %）高于已有研究中自发性脑出血患者（31.2-44%，16.3%，46%），其中低密度征及岛征与其他研究中口服抗凝药患者发生率（52.6%，>50%）接近。(2)白血病患者脑出血病灶好发部位为幕上皮质下，40.74%表现为多发性病灶。(3)影像组学模型由 7 个特征构成，形状特征贡献度高于语义特征。(5)临床模型和影像组学模型的 AUC 值没有统计学差异（Delong test $p>0.05$ ）。影像学模型的校准曲线、DCA 曲线略优于临床模型。

结论：1. NCCT 标志物在白血病人人群中表现不同于其他脑出血人群。我们对白血病人 NCCT 标志物的研究填补了标志物通常只在自发性和口服抗凝药患者人群中研究的空白。2.影像组学模型表明，在白血病患者中，基于 2D ROI 的形状特征对短期预后模型的贡献度高于语义特征。3.基于 NCCT 图像特征构建的影像组学模型在预测白血病脑出血患者 7 天死亡风险方面略优于临床模型。

OR-0262

应用神经突方向离散度和密度成像量化肌萎缩侧索硬化症中丘脑及其连接性的微结构损伤

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目的：应用神经突方向离散度和密度成像（neurite orientation dispersion and density imaging, NODDI）评估肌萎缩侧索硬化症（amyotrophic lateral sclerosis, ALS）丘脑和丘脑-皮质连接的微观结构损伤。

方法：本项研究包括 47 名健康对照者和 43 名 ALS 患者，收集他们的结构和弥散加权磁共振数据。采用最先进的平行传输纤维束成像（parallel transport tractography），在个体空间识别丘脑-皮层

纤维束。然后,根据丘脑与事先定义的皮层(即前额叶/运动/感觉/颞叶/后顶叶/枕叶)区域的连接模式,将丘脑划分为六个亚区。在丘脑亚区、皮质亚区以及丘脑-皮质纤维束中,对以下 NODDI 指标做了组间比较:神经突方向离散度(orientation dispersion index, ODI)、神经突密度(neurite density index, NDI)和各向同性体积分数(isotropic volume fraction, ISO)。并且,利用这些指标作接收者操作特征曲线(receiver operating characteristic curve, ROC)分析和斯皮尔曼相关性(Spearman correlation)分析。

结果:在 ALS 患者中,与左侧运动皮层及其他运动外(如躯体感觉和枕叶)皮层连接的丘脑亚区 ODI 下降,ISO 上升(经 Bonferroni 校正, $P < 0.05$)。双侧丘脑-运动和丘脑-体感纤维束以及右侧丘脑-后顶叶和丘脑-枕叶纤维束的 NDI 下降(经 Bonferroni 校正, $P < 0.05$)。双侧丘脑-运动纤维束($P = 0.017$ 和 0.009)和左侧丘脑-体感纤维束($P = 0.029$)的 NDI 降低与疾病严重程度相关。在丘脑-皮质纤维束中,与传统的弥散张量成像指标相比,NDI 在组间比较中产生的效应量更高,ROC 曲线下的面积更大($P < 0.05$)。

结论:丘脑和丘脑-皮质连接的微结构损伤是 ALS 的特征。NODDI 提高了对 ALS 丘脑-皮质连接损伤的检测。

OR-0263

The association among individual gray matter volume of frontal-limbic circuitry, fatigue susceptibility, and comorbid neuropsychiatric symptoms following COVID-19

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Background: Fatigue is one of the most common and debilitating symptoms of COVID-19 infection and is often associated with comorbid sleep disturbance and psychological distress. This study aimed to identify structural brain markers of post-COVID fatigue and to further investigate the association between individual grey matter volume, fatigue susceptibility and comorbid neuropsychiatric symptoms.

Methods: Individuals who had experienced mild COV+ infection underwent neuropsychological testing ($n=335$) and MRI scans ($n=271$) within one month. Of these individuals, 191 (70.5%) were followed up three months after the infection. Additionally, 67 healthy controls underwent the same protocol during enrolment.

Results: The analysis of the whole brain revealed that there was no difference in grey matter volume during the acute phase between the study groups. In the COV+ group, however, fatigue severity was linked only to the volume of the right dorsal anterior cingulate cortex (dACC) and dorsolateral prefrontal cortex (DLPFC), which are both part of the frontal-limbic system. Furthermore, it should be noted that fatigue acted as a mediator in the associations observed between the volume of identified brain regions and COVID-related sleep, post-traumatic stress disorder (PTSD), and anxiety. It is important to highlight that the initial structural differences in the dorsolateral prefrontal cortex (DLPFC) observed during the early stage of recovery can predict fatigue symptoms three months after COVID-19 infection. This was confirmed through stepwise linear regression analysis.

Conclusion: Our findings offer novel evidence for the neuroanatomical basis of fatigue susceptibility and highlight fatigue as an important link from GMV in frontal-limbic regions to comorbid neuropsychiatric symptoms in early recovery from infection. This could facilitate public health interventions by enabling early detection of individuals at risk of developing post-COVID fatigue and targeting treatments to reduce the disease's long-term detrimental effects further.

OR-0264

应用人工智能压缩感知技术加速慢性缺血性脑血管病患者全脑 3D 酰胺质子转移成像

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目的：慢性缺血性脑血管病患者在未发生明确脑梗死的情况下，需要行全脑 3D 酰胺质子转移成像 (APT) 才能明确全脑的酸碱代谢情况，但目前全脑 3D APT 扫描时间长，不利于临床应用及转化。本研究旨在探究基于人工智能的压缩感知 (CS-AI) 技术对全脑 3D APT 质效的影响。

材料与方法：前瞻性纳入 2022 年 4 月-2023 年 4 月于四川大学华西医院就诊的慢性缺血性脑血管病患者 11 例。采集患者头部平扫 MRI、常规 3D-APT、CS-AI 3D-APT 及 CT 灌注 (CTP) 图像。扫描时，记录每例患者常规 3D-APT 和 CS-AI 3D-APT 的实际扫描时间。根据患者 CTP 图像上脑灌注的情况，分别在常规 3D-APT 和 CS-AI 3D-APT 图像上的脑灌注降低区和对侧正常表现脑白质区 (NAWM) 勾画感兴趣区 (ROIs)，测量其 APT 加权 (APT_w) 值，并计算图像信噪比 (SNR)、对比噪声比 (CNR) 及图像质量主观评分。使用配对 t 检验对比两种成像技术在 SNR、CNR 及扫描时间的差异，采用配对秩和检验评估图像质量主观评分间有无统计学差异。

结果：对于对侧 NAWM 而言，常规 3D-APT 和 CS-AI 3D-APT 图像的 SNR (4.53 ± 2.17 vs 4.30 ± 1.98 , $P=0.71$) 与 CNR (2.67 ± 2.23 vs 2.86 ± 1.49 , $P=0.82$) 均未表现出明显差异。对于灌注降低的脑组织而言，常规 3D-APT 和 CS-AI 3D-APT 图像的 SNR (3.29 ± 1.84 vs 4.21 ± 1.91 , $P=0.26$) 与 CNR (2.58 ± 2.38 vs 2.76 ± 1.20 , $P=0.81$) 同样未表现出明显差异。此外，两种 APT 图像的图像质量主观评分一致 ($3.5[3-4]$ vs $4[3-4]$, $P=0.71$)，但 CS-AI 3D-APT 的扫描时间比常规 3D-APT 明显更短 (896 ± 20 秒 vs 538 ± 13 秒, $P<0.001$)，扫描时间可节省约 6 分钟 (40%)。

结论：与常规 3D APT 相比，CS-AI 3D-APT 获得的慢性缺血性脑血管病患者头部图像质量相当，并能有效缩短扫描时间，提示其可能具有较好的临床应用前景。

OR-0265

Similar Transmembrane Water Exchange Rate but Different Transmembrane Pathway Patterns in Glioblastoma and Lung Cancer Brain Metastases

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Objectives: Water exchange rate and water transmembrane pathway are two important parts in the water homeostasis of tumor cells. This study aimed to explore the difference of water exchange rate and water transmembrane pathway in glioblastoma (GBM) and lung cancer brain metastases (LCBM) in vivo.

Materials and methods: From August 2018 to April 2021, forty patients who were diagnosed with GBM and forty-four patients with solitary LCBM were enrolled in this retrospective study. Water exchange rate (k_{io}) were evaluated by shutter-speed dynamic contrast enhanced MRI. Expression of aquaporin-4 (AQP4) and Na⁺-K⁺ ATPase were explored by immunohistochemical scores (from

0 to 6). Besides, Gene expression differences between AQP4 and Na⁺-K⁺ transporting ATPase interacting 1 (NKAIN1) in GBM and lung cancer were explored using Gene Expression Omnibus DataSets. Differences of kio and differences of AQP4 and Na⁺-K⁺ ATPase (or NKAIN1) expression between GBM and solitary LCBM were tested.

Results: kio was not significantly different between solitary LCBM and GBM (median [interquartile range]: 1.0s-1 [0.3,1.8] vs 0.9s-1 [0.3,2.9], $p=0.673$). AQP4 has a significantly higher immunohistochemical scores than Na⁺-K⁺ ATPase in GBM (5 [4,5] vs 3 [2,3], $p<0.001$), and a significantly opposite expressions in LCBM (3 [2,3] vs 5 [4,5], $p<0.001$). AQP4 gene has a significantly higher expression than NKAIN1 in GBM (3365 ± 2860 vs 257 ± 196 , $p<0.001$), while a significantly lower expression in lung cancer (4.05 ± 0.21 vs 5.75 ± 0.41 , $p<0.001$).

Conclusions: Both GBM and LCBM have a similar tumor-averaged water exchange rate. AQP4 may contribute more to water homeostasis than Na⁺-K⁺ ATPase in GBM and the same role of Na⁺-K⁺ ATPase in LCBM.

OR-0266

人类穹窿的寿命轨迹：超高分辨率弥散 MRI 研究

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背景和目的：穹窿是边缘系统的一部分并且构成 Papez 环路，参与记忆的形成与保留。尽管穹窿的功能如此重要，但有关其毕生轨迹及其与记忆的耦合严重缺乏研究。本研究应用世界首台 5T 高分辨弥散磁共振成像，旨在（1）研究穹窿结构连接与多领域认知参数的关联，以及（2）刻画穹窿老化的毕生轨迹。

材料与方法：总共招募 250 例 18-85 岁健康成人参与本研究，采集高分辨 MRI 及行为表型数据。使用高分辨弥散磁共振成像，跟踪穹窿结构连接及白质完整性，使用年龄段平均来计算群体水平穹窿连接模版，使用曲线拟合计算毕生轨迹，使用多元回归计算穹窿连接与多维度认知及行为参数的关联。

结果：（1）穹窿纤维束连接长度与整体认知及语义记忆相关，但与执行功能不相关；（2）穹窿连接呈现明显的年龄相关的非线性减低，特别是左侧比右侧减低更为明显。

结论：我们的数据提供了有关穹窿高分辨的结构连接模式及毕生演变模式，以及如何与高级认知（特别是记忆）的耦合，为理解穹窿结构连接的毕生轨迹及老化相关退变疾病提供了重要的观点。

OR-0267

The Multi-faceted Imaging Presentation of Cerebral Amyloid- β -Related Angiitis

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Objectives: Amyloid- β -related angiitis (ABRA) is a rare form of vasculitis. Early recognition is crucial for appropriate treatment and outcome improvement. We aimed to review a case with pathological confirmed ABRA and summarized its imaging characteristics by referring to literature. Methods: A 61-year-old female suffered from intermittent headache, nausea, and vomiting for 1 month and mental disorder for 1 week. Serial MRI scans and PET-CT from were acquired. Repeated CSF examination were also performed. Pathology were obtained at day 98 from symptom onset.

Result: The patient received steroid pulse therapy, antibiotic therapy, and anti-tuberculosis treatment, but the symptom did not show improvement. The serial MRI scans showed ischemic lesions, hemorrhagic lesions and meningeal enhancement with dynamic changes and progression. PET-CT at day 78 demonstrated palpable bilateral cortex F18 FDG uptake decrease. Repeated CSF examination demonstrated intracranial hypertension and protein elevation with normal cell count, normal glucose and chloride. Finally, ABRA was confirmed by pathology.

Discussion: Neuroimaging is crucial for ABRA's early diagnosis. In the absence of infection, ABRA should be heeded if a multi-faceted imaging appearance, including diffuse cortical hemorrhage, brain ischemia and meningeal enhancement, presented in elderly patients.

OR-0268

Quantitative pharmacokinetic parameter K^{trans} map assists in regional segmentation of nasopharyngeal carcinoma in dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI)

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Purpose: Accurate segmentation of nasopharyngeal carcinoma (NPC) lesion areas from dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) facilitates subsequent diagnostic and prognostic workups. Traditionally, anatomical DCE-MRI-based NPC segmentation using deep learning has achieved fair results but still needs further improvement. Hence, we investigate the incremental benefit of incorporating pharmacokinetic parameter maps into anatomical DCE-MR image segmentation tasks by taking advantage of the hemodynamic contrast between NPC and surrounding tissue.

Methods and Materials: In this paper, a pharmacokinetic parameter K^{trans} map of NPC is used as prior information and combined with anatomical DCE-MRI data to improve the performance of segmentation models. A novel model, multi-input branch residual U-Net (MBRU-Net), which extracts features from both anatomical DCE-MR images and K^{trans} maps and fuses them to improve the segmentation performance, is introduced. The effectiveness of the multibranch network is validated by comparing MBRU-Net with deep residual U-Net (ResU-Net) with DCE-MRI + K^{trans} data. Additionally, different models (U-Net, segmentation network (SegNet), recurrent residual U-Net (R2U-Net), and ResU-Net) are trained with DCE-MRI and DCE-MRI + K^{trans} data separately and compared to validate the effectiveness of multimodal data using the Dice coefficient (Dice).

Results: Our proposed MBRU-Net achieves the best Dice in this study ($67.39 \pm 15.79\%$), higher than ResU-Net's Dice (65.57 ± 17.52) based on DCE-MRI and K^{trans} data. U-Net, SegNet, R2U-Net, and ResU-Net achieve better results in terms of segmenting tumor regions with DCE-MRI + K^{trans} data than those of the corresponding models with DCE-MRI data alone, where U-Net has the best performance (DCE-MRI + K^{trans} : DCE-MRI = $66.31 \pm 17.80\%$: $61.10 \pm 24.14\%$).

Conclusions: It is beneficial to add a pharmacokinetic parametric (K^{trans}) map as prior information to the conventional anatomical MRI-based segmentation task, and multibranch network structures perform better than single-branch network structures in terms of NPC segmentation.

OR-0269

Causal associations of genetically determined tinnitus with neuroimaging traits: evidence from a Mendelian Randomization study

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Objective: Potential reverse causality and unmeasured confounding factors were common biases in most neuroimaging studies on tinnitus and central correlates. The causal association of tinnitus with neuroimaging features also remained unclear. The aim of this study was to investigate the causal relationship of tinnitus with alterations of neuroanatomical features using Mendelian randomization (MR).

Methods: Summary-level data from a genome-wide association study (GWAS) of tinnitus were derived from the UK Biobank ($n = 117,882$). GWAS summary statistics for four global-brain tissue and fourteen sub-brain grey matter volumetric traits were also obtained ($n = \text{up to } 33,224$). A bidirectional MR analysis was conducted to explore the causal relationship between tinnitus and neuroanatomical features at global-brain and sub-brain level.

Results: Genetic susceptibility to tinnitus was causally associated with increased white matter volume ($OR = 2.36$, 95% CI 1.03–5.39, $p = 0.04$) and total brain volume ($OR = 2.39$, 95% CI 1.05–5.46, $p = 0.04$) but inversely associated with cerebrospinal fluid volume ($OR = 0.36$, 95% CI 0.16–0.83, $p = 0.02$). Genetically determined smaller grey matter volume in the Left Heschl's Gyrus, Right Insular Cortex and larger grey matter volume in the posterior division of the Left Parahippocampal Gyrus may predict an increased risk for tinnitus ($OR = 0.98$, 95% CI 0.96–1.00, $p = 0.02$; $OR = 0.99$, 95% CI 0.98–1.00, $p = 0.02$; $OR = 1.01$, 95% CI 1.00–1.03, $p = 0.03$).

Conclusions: Volume alteration in several sub-regions in the grey matter was the cause of tinnitus. Reversely, genetic susceptibility to tinnitus was causally associated with increased white matter volume and total brain volume. Our findings provide bidirectional evidence for further elucidating the underlying pathophysiological mechanisms of tinnitus-related neuroanatomical abnormalities at the genetic level.

OR-0270

Altered dynamic brain activity and functional connectivity in thyroid-associated ophthalmopathy

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Background and Purpose: Although previous neuroimaging evidence has confirmed the brain functional disturbances in thyroid-associated ophthalmopathy (TAO), the dynamic characteristics of brain activity and functional connectivity (FC) in TAO were rarely concerned. The present study aims to investigate the alterations of temporal variability of brain activity and FC in TAO using resting-state functional magnetic resonance imaging (rs-fMRI).

Methods: Forty-seven TAO patients and 30 age-, gender-, education-, and handedness-matched healthy controls (HCs) were enrolled and underwent rs-fMRI scanning. The dynamic amplitude of low-frequency fluctuation (dALFF) was firstly calculated using a sliding window approach to characterize the temporal variability of brain activity. Based on the dALFF results, seed-based

dynamic functional connectivity (dFC) analysis was performed to identify the temporal variability of efficient communication between brain regions in TAO. Additionally, correlations between dALFF and dFC and the clinical indicators were analyzed.

Results: Compared with HCs, TAO patients displayed decreased dALFF in the left superior occipital gyrus (SOG) and cuneus (CUN), while showing increased dALFF in the left triangular part of inferior frontal gyrus (IFGtriang), insula (INS), orbital part of inferior frontal gyrus (ORBinf), superior temporal gyrus (STG) and temporal pole of superior temporal gyrus (TPOsup). Furthermore, TAO patients exhibited decreased dFC between the left STG and the right middle occipital gyrus (MOG), as well as decreased dFC between the left TPOsup and the right calcarine fissure and surrounding cortex (CAL) and MOG. Correlation analyses showed that the altered dALFF in the left SOG/CUN was positively related to visual acuity ($r = 0.409$, $P = 0.004$), as well as the score of QoL for visual functioning ($r = 0.375$, $P = 0.009$).

Conclusion: TAO patients developed abnormal temporal variability of brain activity in areas related to vision, emotion and cognition, as well as reduced temporal variability of FC associated with vision deficits. These findings provided additional insights into the neurobiological mechanisms of TAO.

OR-0271

多维度弥散磁共振成像在鼻咽癌中的应用： 一项探索性的横断面研究

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目的：评价多维度弥散 MRI (multidimensional diffusion MRI, Mdd-MRI) 在评估鼻咽癌 (nasopharyngeal carcinoma, NPC) 微观扩散特点的潜能，旨在探讨其在诊断和鉴别鼻咽癌病理亚型和 TNM 分期以及 EB 病毒 (EBV) 感染状态的应用价值。

方法与材料：本研究纳入了 66 例经组织学证实的 NPC 患者。使用多个 b 值进行 Mdd-MRI 数据采集，将原始数据转换并计算获得 4 个微观扩散指标，既：各向异性平均峰度 (MKa)、各向同性平均峰度 (MKi)、总平均峰度 (MKt) 和微观分数各向异性 (μ FA)。为了与宏观扩散特性进行比较，通过常规的扩散加权成像序列获得了表观扩散系数 (ADC)。使用独立样本 t 检验比较 NPC 组织和正常鼻咽组织之间的上述所有弥散参数的差异，同时比较这些参数在不同组织病理学类型、TNM 分期和 EBV 感染状态之间的差异。最好，将有差异的弥散参数与和 TNM 分期进行 Spearman 相关性分析。 $P < 0.05$ (双尾) 表示有显著性差异。

结果：肿瘤组织 ADC 值与正常鼻咽组织 ADC 值比较有显著性差异 ($P = 6.023e-11$)。微观弥散参数和 ADC 在不同原发肿瘤 T 分期 (T1-T4) 之间存在显著差异，且与 T 分期呈显著相关 (μ FA: $\rho = 0.52$, $P = 0.0001$; MKa: $\rho = 0.38$, $P = 0.002$; MKi: $\rho = 0.27$, $P = 0.03$; MKt: $\rho = 0.32$, $P = 0.009$ 和 ADC: $\rho = 0.36$, $P = 0.003$)。所有弥散参数在 N 分期、M 分期和 EB 病毒感染状态直接无显著组间差异 (均 $P > 0.05$)。

结论：微观弥散参数与 T 分期的关系反映了 Mdd-MRI 是有助于评价鼻咽癌组织的微观弥散特点。但是，在诊断 NPC、区分肿瘤病理亚型、N 期和 M 期以及预测 EBV 感染状态等方面的价值有限。

OR-0272

3D-pCASL 与 DWI 在鉴别 T1 期鼻咽癌及 淋巴组织增生的对照研究

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目的 对比三维准连续动脉自旋标记 (3D-pCASL) 与扩散加权成像 (DWI) 技术各定量参数在鉴别诊断 T1 期鼻咽癌 (NPC_{T1}) 及淋巴组织增生(LH)的应用价值。**方法** 选取经病理确诊及临床分期为 NPC_{T1} 的患者 12 例, 经病理确诊为 LH 的患者 35 例。所有患者均在治疗前接受鼻咽部 3D-pCASL 及 DWI 序列扫描, 测量所有患者病灶的血流量平均值 (BF_{mean})、最小值 (BF_{min})、最大值 (BF_{max}) , 并测量病灶与同侧翼外肌血流量比值的相对平均值 (RBF_{mean})、相对最小值 (RBF_{min}) 及相对最大值 (RBF_{max}) , 同时测量所有患者病灶表观扩散系数平均值 ADC_{mean}、最小值 ADC_{min}、最大值 ADC_{max}。分析 NPC_{T1} 组与 LH 组间各参数有无显著差异; 绘制受试者工作特征(ROC)曲线并计算曲线下面积(AUC), 以评价各参数的诊断效能。**结果** 相较于 LH 组, NPC_{T1} 组的 BF_{max}、RBF_{mean}、RBF_{min}、RBF_{max} 值更高, 差异有统计学意义 (P<0.05); 而 ADC_{mean}、ADC_{min}、ADC_{max} 值则无统计学差异 (P>0.05)。应用 BF_{max}、RBF_{mean}、RBF_{min} 及 RBF_{max} 值鉴别诊断的 AUC 分别为 0.807、0.729、0.779、0.874。**结论** 3D-pCASL 技术能够无创性反映 T1 期鼻咽癌与淋巴组织增生的血流灌注差异, 可作为一种鉴别 NPC_{T1} 和 LH 的有效方法, 其中 RBF_{max} 诊断效能最佳; 而 ADC 值难以区分 NPC_{T1} 和 LH 之间在水分子扩散方面的差别, 对鉴别诊断价值有限。

OR-0273

磁共振 T2-mapping 序列与纹理分析技术对 鉴别嗜酸性鼻窦炎伴鼻息肉价值的研究

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目的: 评估纹理分析及 T2 Mapping 序列对嗜酸性鼻窦炎伴鼻息肉 (eosCRSwNP) 和非嗜酸性鼻窦炎伴鼻息肉 (non-eosCRSwNP) 的诊断价值。

材料与方法: 研究纳入了 56 名接受鼻内镜手术的 CRSwNP 患者, 其中 eosCRSwNP 患者 36 名, non-eosCRSwNP 患者 20 名。所有患者术前进行包括 T1WI、T2WI 和 T2 Mapping 序列在内的 MRI 扫描。测量病灶至鼻孔前缘及鼻道底壁的距离作为 ROI 的术中定位标志。将 T2 Mapping 值和病理切片中不同细胞计数做相关性分析并计算 AUC。分别构建基于 T1WI 和 T2WI 纹理特征的模型。三个模型进行 Delong 检验比较不同模型间 AUC 差异。

结果: EosCRSwNP 患者病理组织中嗜酸性粒细胞多于 non-eosCRSwNP 患者, 而淋巴细胞少于 non-eosCRSwNP 患者, 病理组织 II 度水肿人数多于 non-eosCRSwNP 患者 (P 均<0.05)。eosCRSwNP 组 T2 Mapping 值显著高于 non-eosCRSwNP 组。患者 T2 Mapping 值与嗜酸性粒细胞计数呈正相关, 与淋巴细胞计数呈负相关。基于 T2 Mapping 的诊断模型 AUC 为 0.776, 区分 eosCRSwNP 和 non-eosCRSwNP 的 T2 值阈值为 168.2 ms, 敏感度为 0.899, 特异度为 0.600。T1WI 纹理特征 LR 模型 AUC 为 0.733, T2WI 纹理特征 LR 模型 AUC 为 0.747。基于 T2 Mapping 值、T1WI 和 T2WI 纹理特征的模型诊断性能无统计学差异 (P>0.05)。

结论: T2 Mapping 序列能够定量测量 CRSwNP 病灶的 T2 值, 其能够潜在的反应病灶内嗜酸性粒细胞的数量, 基于 T2 Mapping 序列的诊断模型对 CRSwNP 具有较高的诊断效能, 与常规序列纹理特征模型诊断效能相当, 但其简便、经济、直观的优势更有利于临床应用。

OR-0274

Immune-Related Visual Dysfunction in Thyroid Eye Disease: a Combined Orbital and Brain Neuroimaging Study

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Objectives: To investigate the pathological interplay between immunity and the visual processing system (VPS) in thyroid eye disease (TED).

Methods: A total of 24 active patients (AP), 26 inactive patients (IP) of TED, and 27 healthy controls (HCs) were enrolled. Orbital magnetic resonance imaging (MRI) and resting-state functional MRI (rs-fMRI) were conducted for each participant. Multiple MRI parameters of the intraorbital optic nerve (ON) were assessed. The amplitude of low-frequency fluctuations (ALFF) and regional homogeneity (ReHo) were calculated. Correlation analyses were carried out on the above parameters and clinical characteristics.

Results: Visual functioning scores differentiated between the AP and IP groups. The ON subarachnoid space and ON sheath diameter were significantly higher in AP than in IP. Six vision-related brain regions were identified in TED patients compared with HCs, including right calcarine (CAL.R), right cuneus (CUN.R), left postcentral gyrus (PoCG.L), right middle temporal gyrus (MTG.R), left superior frontal gyrus (SFG.L), and left caudate (CAU.L). The brain activity of MTG.R, SFG.L, and CAU.L differentiated between the AP and IP groups. The correlation analysis revealed a close association among the vision-related brain regions, MRI parameters of ON, and clinical characteristics in AP and IP, respectively.

Conclusions: Combined orbital and brain neuroimaging revealed abnormalities of the VPS in TED, which had a close correlation with immune statuses. Vision-related brain regions in TED might be possibly altered by peripheral immunity via a direct or indirect approach.

OR-0275

Development and validation of benign and malignant thyroid nodule risk stratification system based on MRI morphological features

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Objects: This study aimed to develop and validate MRI predictive models, comparing with ultrasound thyroid nodule image reporting and data system (TI-RADS) for preoperative diagnosis of thyroid nodules.

Methods: We retrospectively analysed 825 postoperatively pathologically confirmed thyroid nodules (508 benign and 317 malignant). After removing nodules with specific MRI features, 594 nodules were divided into training set (n = 397) and validation set (n = 197). Predictors and corresponding regression β coefficients were obtained from univariate and multivariate analyses based on the clinical and MRI morphological features within the training group. Utilizing the minimum B regression coefficient the integer multiples of it from other predictors, the risk score is determined. The risk score was then combined with MRI specificity features to

develop an MRI-based risk stratification system (RSS). The sensitivity, specificity, accuracy, positive predictive value (PPV), negative predictive value (NPV), area under the receiver operative characteristic curve (AUC) and net reclassification index (NRI) of the MRI-based RSS were calculated and compared with TI-RADS.

Results: Multivariate logistic regression revealed age (OR = 1.96, P = 0.101, B = 0.672), high signal intensity on T2WI (OR = 3.92, P = 0.003, B = 1.367), restricted diffusion (OR = 39.54, P < 0.001, B = 3.677), reversed halo sign in delay phase (OR = 19.26, P < 0.001, B = 2.958), cystic degeneration (OR = 4.44, P = 0.03, B = 1.490) and wash-out pattern (OR=3.04, P=0.009, B=1.112) were risk factors for malignant nodules, each assigned a risk scores of 2, 4, 11, 9, 4 and 3, respectively. The optimal cutoff value for the risk score was 12. The MRI-based RSS exhibited accuracy, sensitivity, specificity, PPV, NPV and AUC of 94.4%, 96.0%, 93.4%, 89.9%, 96.5% and 0.947, respectively. Notably, this performance surpassed that of TI-RADSs and the difference was statistically significant (DeLong test, P < 0.05). The MRI-based RSS demonstrated improved accuracy (NRI > 0) compared to TI-RADSs.

Conclusions: Our MRI-based diagnostic model for distinguishing between benign and malignant thyroid nodules demonstrated strong diagnostic performance, thereby enhancing the accuracy of TI-RADS.

OR-0276

高分辨率 CT 多平面重组及曲面重组对外伤性听力损伤、面瘫的诊断价值

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目的 探讨高分辨率 CT (HRCT) 听骨多平面重组 (MPR)、听骨链及面神经管曲面重组 (CPR) 在外伤性听骨链、面神经管损伤诊断中的应用价值。方法 对 139 例颞骨骨折后出现听力下降和/或面瘫的患者进行 HRCT 轴位扫描, 在 Philips EBW 工作站, 行听骨 MPR、听骨链、面神经管 CPR, 观察听骨链、面神经管损伤的位置、类型及邻近结构的累及情况。结果 139 例颞骨外伤后患者中, 听骨链损伤 80 耳 (80/139,57.55%), 面神经管骨折 40 耳 (40/139,28.78%), 听骨链损伤合并面神经管骨折 19 耳 (19/139,13.67%)。其中锤砧关节脱位 49 耳 (49/99,49.49%), 砧镫关节脱位 27 耳 (27/99,27.27%), 锤砧关节并砧镫关节脱位 21 耳 (21/99, 21.21%), 锤骨颈骨折 1 耳 (1/99,1.01%), 砧骨短突骨折 1 耳 (1/99, 1.01%); 面神经管迷路段骨折 6 耳 (6/59, 10.17%), 面神经管膝状神经窝骨折 19 耳 (19/59,32.20%), 面神经管鼓室段骨折 17 耳 (17/59,28.81%), 面神经管膝状神经窝并鼓室段骨折 11 耳 (11/59,18.64%), 面神经管迷路段、膝状神经窝、鼓室段并乳突段骨折 6 耳 (6/59,10.17%)。结论 HRCT 扫描结合 MPR、CPR 重组技术可清晰显示听骨、面神经管损伤情况, 为临床明确外伤后听力下降、面瘫患者的病因提供可靠的影像学参考依据。

OR-0277

Dark-blood computed tomography angiography combined with deep learning reconstruction for carotid artery wall imaging in Takayasu arteritis patients

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Objectives To evaluate the image quality of a newly developed dark-blood CTA imaging combined with deep learning reconstruction (DLR) for visualizing the carotid artery wall in Takayasu arteritis (TAK) patients, compared to delayed-phase CTA images with hybrid iterative reconstruction (HIR).
Materials & Methods

This prospective study continuously recruited fifty-three TAK patients (mean age: 33.8 ± 10.2 years; 49 females) who underwent head-neck CTA scans. Arterial and delayed phase images were reconstructed using HIR and DLR. The subtraction images of arterial phase from delayed phase were then added to the original delayed phase with a denoising filter to generate the final dark-blood images. Qualitative scores and quantitative parameters were computed and compared among three groups of images: Delayed-HIR, Dark-blood-HIR, Dark-blood-DLR. The vessel wall thickness of common carotid artery was measured and the inter-rater variability was evaluated.

Results When compared with Delayed-HIR, Dark-blood-HIR images demonstrated higher qualitative scores in terms of vascular wall display ability and diagnostic confidence index (all $p < 0.001$). These qualitative scores of Dark-blood-HIR can be further improved with DLR in terms of overall image noise, vascular wall display ability, and diagnostic confidence index (all $p < 0.001$).

In quantitative analysis, the CNRs between the vessel wall and lumen of Dark-blood-HIR images for bilateral carotid arteries and brachiocephalic trunk were significantly higher compared to those of Delayed-HIR (all $p < 0.05$). The CNRs of Dark-blood-DLR images were further increased for all the neck arteries than those of Dark-blood-HIR (all $p < 0.001$). The highest intraclass correlation coefficient (ICC) value between two raters for wall thickness measurements was obtained on Dark-blood-DLR image (ICC, 0.958; 95% CI: 0.927, 0.976).

Conclusion

Compared to Delayed-HIR CTA, dark-blood method combined with DLR improved CTA image quality and enhanced visualization of carotid artery wall in TAK patients.

OR-0278

合成 MRI 技术联合直方图分析在预测局部晚期鼻咽癌患者放化疗早期治疗反应中的价值

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目的: 早期监测鼻咽癌治疗反应对于调整临床治疗方案以及生存预测非常重要。本研究旨在探究合成 MRI (SyMRI) 联合直方图分析在预测鼻咽癌放疗后肿瘤残存中的价值。

方法: 此项前瞻性研究连续性的纳入了 42 例局部晚期的鼻咽癌患者, 所有患者均进行了标准治疗 (同步放化疗联合或不联合诱导化疗) 及规律随访。根据实体肿瘤反应评估标准, 两位放射科医生在治疗完成后 12 周进行评估。此研究一共有 16 和 26 例患者被分为残留组和非残留组。两名放射科医生分别在 SyT2WI 上勾画原发肿瘤的体积, 除外坏死和出血, 并提取直方图参数 (第 90 百分位数 (90th)、平均值 (Mean)、熵 (Entropy) 和平均绝对偏差 (MAD))。根据情况采用独立样

本 t、曼-惠特尼 U 或卡方检验。此外,使用多变量逻辑回归构建模型 (SyMRI 单模型、临床 (Clinic) 单模型、SyMRI+Clinic 模型和 TNM 分期模型)。最后构建列线图并绘制校准曲线 (n=1000)。Delong 检验用于比较模型性能。

结果:从 T1 图、T2 图和 PD 图得出的直方图参数均显示出极好的组间一致性 (ICC 均 ≥ 0.965)。在单变量分析中,非残留组 T2_90th、T2_Mean、PD_90th、PD_Mean 和 PD_Entropy 均高于残留组 (P 值均 ≤ 0.020)。经过多变量逻辑回归分析,纳入 PD_Mean 和 PD_Entropy 构建 SyMRI 单模型 (AUC: 0.834),纳入两个临床因素 (EBV DNA 水平和年龄) 构建 Clinic 单模型 (AUC: 0.745)。组合模型共纳入 PD_Mean、PD_Entropy、EBV DNA 水平和年龄,其 AUC 为 0.894。与 Clinic 单模型相比,组合模型的性能明显更高 (P=0.041),而与 SyMRI 单模型相比无明显差异 (P=0.165)。此外,组合模型比 TNM 模型显示出更高的预测性能 (AUC: 0.666, P=0.026)。

结论:治疗前的 SyMRI 参数为鼻咽癌的早期治疗反应评估提供了一种无创方法。SyMRI 和临床因素的组合模型可为个体治疗方案制定和预后预测提供参考价值。

OR-0279

18F-FDG PET/MR 在口腔癌中分期及复发检测中的临床应用

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目的:探讨 18F-FDG PET/MR 在评价口腔癌分期及复发检测中的临床应用价值。

方法:回顾性分析接受 18F-FDG PET/MR 检查的 31 名口腔癌患者的资料,由 2 名核医学科医师对 PET/MR 图像进行诊断评价。采用 Kappa 一致性检验评价口腔癌 PET/MR 分期和病理金标准的诊断一致性;采用诊断试验评价指标评估 PET/MR 对复发检测的应用价值。

结果:18F-FDG PET/MR 术前临床分期与金标准的诊断一致性较高 (Kappa 值=0.897)。PET/MR 检测复发的灵敏度为 100%,特异性为 94.3%,准确率为 95.4%,阳性预测值为 88%,阴性预测值为 100%。

结论:18F-FDG PET/MR 对口腔癌分期及复发检测具有较高的应用价值,有望成为一种准确、无创评估口腔癌患者病情的影像学检查方法。

OR-0280

Use of diffusion kurtosis imaging and dynamic contrast-enhanced MRI for differentiating parotid gland tumors

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Objectives:

To evaluate the diagnostic performance of combined diffusion kurtosis imaging (DKI) and dynamic contrast-enhanced MRI (DCE-MRI) for differentiating parotid gland tumors (PGTs).

Methods:

One hundred forty-two patients with PGTs verified by histopathology were enrolled. The patients were divided into four groups: malignant tumors (MTs), pleomorphic adenomas (PAs), Warthin tumors (WTs), and basal cell adenomas (BCAs). All MRI examinations were conducted using a 3T MRI scanner with a 20-channel head and neck coil. Quantitative parameters of DCE-MRI and DKI and their relative values were determined. Using the Kruskal-Wallis H test, post hoc test with Bonferroni correction, one-way analysis of variance (ANOVA) and post hoc test with LSD method, and the ROC curve for statistical analysis. Statistical significance was set at $p < 0.05$.

Results:

Only the combination of DKI and DCE-MRI parameters could reliably distinguish BCAs from other PGTs. PAs demonstrated the lowest K^{trans} value (0.09, [0.06-0.20] min^{-1}), relative K^{trans} (rK^{trans}) (-0.24, [-0.64, 1.00]), K_{ep} value (0.32, [0.22-0.53] min^{-1}), relative K_{ep} (rK_{ep}) (-0.71, [-0.81, -0.56]) and iAUC value (0.15, [0.09-0.26] $\text{mmol}\cdot\text{s}/\text{kg}$) compared with WTs, BCAs, and MTs (all $p < 0.05$). The D values of WTs and MTs were significantly lower than those of BCAs ($1.71 \pm 0.29 \times 10^{-3} \text{mm}^2/\text{s}$) (all $p < 0.001$). In addition, MTs had lower K_{ep} (0.71, [0.52-1.28] min^{-1}) value and lower K^{trans} (0.17 [0.10, 0.31] min^{-1}) value than WTs (all $p < 0.05$). The ROC curve demonstrated that the combination of the rK_{ep} and rK^{trans} values (AUC, 0.906), D value (AUC, 0.841), and K_{ep} value (AUC, 0.815) could provide higher diagnostic efficacy for stepwise identification of PAs, BCAs, and WTs.

Conclusions:

DKI and DCE-MRI can be used to differentiate PGTs quantitatively and can complement each other. Evaluation of the relative values of quantitative parameters is helpful to improve the ability of differential diagnosis.

OR-0281

安罗替尼联合放疗治疗伴瘤周水肿的 有症状脑转移瘤患者的回顾性队列研究

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目的 回顾性分析放疗期间有无联用安罗替尼治疗伴瘤周水肿的有症状脑转移瘤患者在放疗前后瘤周水肿和肿瘤体积的变化情况, 探讨安罗替尼在减轻瘤周水肿和控制肿瘤方面的疗效。

方法 回顾性收集 2018 年 11 月至 2022 年 6 月于福建医科大学附属第一医院放疗科就诊的所有脑转移瘤患者的相关资料。对放疗前后检查的颅脑 MR 资料, 于 T1 增强序列勾画每例患者的脑转移瘤的肿瘤体积, 于 FLAIR 加权序列勾画瘤周水肿体积, 于 T1 平扫序列勾画颅顶至第二颈椎上缘的颅骨内缘体积为全脑体积。主要观察指标: 肿瘤体积退缩率、水肿指数、水肿体积退缩率、病变体积退缩率及病变体积脑占比。组间差异性分析采用卡方检验以及 wilcoxon 秩和检验。采用多因素 logistic 回归分析放疗期间影响瘤周水肿及肿瘤体积的相关因素。

结果 共纳入 60 例脑转移瘤患者, 其中放疗联合安罗替尼组 14 例, 单纯放疗组 46 例; 男性 43 例, 女性 17 例。两组患者中位肿瘤体积退缩率分别为 75.8% 和 60.2%, 二者差异有统计学意义 ($P=0.043$)。两组患者中位水肿指数差值分别为 0.13 ± 0.22 和 0.02 ± 0.19 , 二者差异有统计学意义 ($P=0.043$)。两组患者的中位水肿体积退缩率分别为 88.0% 和 48.0%, 两组差异有统计学意义 ($P=0.003$)。两组患者的放疗前后中位病变体积脑占比差值分别为 9.18% 和 1.57%, 二者差异有统计学意义 ($P<0.001$)。两组患者的中位病变体积退缩率分别为 79.8% 和 50.5%, 两组间差异有统计学意义 ($P=0.003$)。多因素 logistics 回归分析显示放疗期间联用安罗替尼是放疗后瘤周水肿体积退缩率 ($OR=0.104$)、病变体积退缩率 ($OR=0.220$)、病变体积脑占比变化率 ($OR=0.030$) 的保护因素。

结论 安罗替尼联合放疗治疗有合并瘤周水肿的症状脑转移瘤患者, 可在放疗后早期快速缩小瘤周水肿和肿瘤体积。

OR-0282

An investigation of gray matter morphology and white matter integrity abnormalities in dysthyroid optic neuropathy using tract-based spatial statistics and surface-based morphometry study

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Purpose: To explore changes in the morphological and microstructural of grey and white matter beyond the eye and the visual pathways in DON patients.

Methods: We acquired magnetic resonance imaging from 42 DON patients and 42 well-matched healthy controls. Cortical thickness, cortical volume and area were measured using the surface-based morphometry (SBM) approach. We also evaluated DTI-metrics (fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD)) derived from diffusion spectrum imaging data using tract-based spatial statistics (TBSS). Correlations between alterations in brain structure and clinical symptoms were analyzed in all patients.

Results: Compared with controls, DON patients exhibited decrease cortical volume in precuneus and occipital pole. DON patients exhibited decrease cortical area in precuneus and precentral gyrus. DON exhibited widespread decreased FA value (Genu of corpus callosum, body of corpus callosum, anterior corona radiata superior corona radiata, posterior corona radiata and superior longitudinal fasciculus). MD, AD and RD showed no significant difference between DON patients and HC. In patient group, the FA value in the body of corpus callosum was positively correlated with visual acuity ($r = 0.446$, $P = 0.015$).

Conclusion: DON patients demonstrated reduced cortical volume and area structural alteration of precuneus, and cortical volume change in occipital pole. Microstructural alterations in brain white matter. Combined multimodal neuroimaging methods may provide a more comprehensive understanding of DON's pathological mechanism.

OR-0283

Clinical and imaging analysis of nerve sheath myxoma

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Objective: To improve the understanding of nerve sheath myxoma (NSM) and the accuracy of preoperative diagnosis by reviewing this case and literature.

Methods: A case of NSM of facial nerve confirmed by surgery and pathology in our hospital was collected, and 117 cases of NSM reported in the literature from 1996 to 2022 in China were collected, and their clinical and imaging characteristics were summarized.

Results: 1. After screening, there were a total of 89 reliable cases, including 40 males and 49 females. 2. The onset age ranged from 9 months to 75 years old, and the average onset age was 39.32 ± 14.22 years old. 3. There were 34 cases with clear onset site, among which 13 cases occurred in the limbs; 6 cases in the trunk; 6 cases in other parts. 4. 87 cases were single lesions, 2 cases were multiple. 5. Most of them are painless masses, which may increase gradually. 6. All patients underwent surgical resection, and the follow-up period ranged from 6 months to 5 years. No recurrence was found. 7. The maximum diameter of the tumor was 2.53 ± 2.23 cm, and the median was 1.2 cm.

Conclusion: The age of onset of the disease is wide, and the peak incidence is between 30 and 48 years old. There are slightly more women than men. The extremities are the most common sites of

disease, especially the fingers. The domestic and foreign literatures have not reported NSM occurring in the facial nerve, and this case is the first case. Most are solitary lesions. Tumors are generally small, grow slowly, and have a longer course of disease. Often a painless lump. On imaging, the lesions presented as soft tissue masses, with slightly hypointensity on T1WI and slightly hyperintensity on T2WI and DWI. The lesions showed obvious ring enhancement and delayed phase enhancement, and the contrast agent tended to fill in. When the tumor occurs in the facial nerve, there may be bone destruction of the facial nerve canal. The effect of surgical resection is good, and the overall recurrence rate is low.

OR-0284

Dixon MRI based quantitative parameters of extraocular muscles, intraorbital fat and lacrimal glands for staging thyroid-associated ophthalmopathy

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Purpose: To investigate the value of Dixon magnetic resonance imaging (MRI) based quantitative parameters of extraocular muscles (EOMs), intraorbital fat (IF) and lacrimal glands (LGs) in staging the patients with thyroid-associated ophthalmopathy (TAO).

Methods: Two hundreds of patients with TAO (211 active and 189 inactive eyes) who underwent Dixon MRI for pre-treatment evaluation were retrospectively enrolled, and divided into training cohort (169 active and 151 inactive eyes) and validation cohort (42 active and 38 inactive eyes). Maximum, mean, and minimum values of signal intensity ratios (SIRs), fat fraction (FF) and water fraction (WF) of EOMs, IF and LGs were measured and compared between active and inactive group in training cohort. Binary logistic regression analysis, receiver operating characteristic curves analyses and Delong test were used in further statistical analyses as appropriate.

Results: Active TAOs showed significantly higher EOM-SIRmax, EOM-SIRmean, EOM-SIRmin, IF-SIRmax, IF-SIRmean, LG-SIRmax, LG-SIRmean, EOM-WFmean, EOM-WFmin, IF-WFmax, IF-WFmean and LG-WFmean, and lower EOM-FFmax, EOM-FFmean, IF-FFmean, IF-FFmin and LG-FFmean than inactive TAOs (all $P < 0.05$). EOM-SIRmean, LG-SIRmean and LG-FFmean were found to be independently associated with active TAO (all $P < 0.05$). Combination of EOM-SIRmean, LG-SIRmean and LG-FFmean showed better performance than EOM-SIRmean alone in staging TAO in both training (AUC, 0.820 vs 0.793; $P = 0.016$) and validation (AUC, 0.751 vs 0.733, $P = 0.341$) cohort.

Conclusion: Dixon MRI based parameters of EOMs, LGs and IF are all useful for differentiating active from inactive TAOs. Integration of multiple parameters can further improve the staging performance.

OR-0285

Abnormal regional spontaneous neural activity and functional connectivity in thyroid-associated ophthalmopathy patients with different activity: a resting-state fMRI study

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Purpose: We aimed to evaluate the spontaneous neuronal activity and functional connectivity pattern variations using resting-state functional magnetic resonance imaging (rs-fMRI) measures, such as amplitude of low-frequency fluctuation (ALFF), fractional amplitude of low-frequency fluctuation (fALFF), and functional connectivity (FC), in patients with thyroid-associated ophthalmopathy (TAO).

Method: A total of 24 active TAO patients, 26 inactive TAO patients, and 27 matched healthy controls (HCs) were included. First, ALFF and fALFF were used to detect local neural activity changes, the MRI data were analyzed, and regions with group differences were taken as seeds. Second, FC analysis was performed to explore the altered connection between seeds and other brain regions. A correlation analysis was performed to assess the relationship between functional brain activity and clinical indices and neuropsychiatric behaviors.

Results: Compared to HCs, both active and inactive TAO patients exhibited significantly lower ALFF values in the right calcarine (Calcarine_R) and left postcentral gyrus (Postcentral_L). Active TAO patients also showed significantly higher ALFF values in the left caudate nucleus (Caudate_L) and increased fALFF values in the superior lobe of the right cerebellum (Cerebelum_Crus1_R). Moreover, both active and inactive TAO patients demonstrated decreased FC within the left postcentral gyrus (Postcentral_L) compared to HCs. Additionally, active TAO patients exhibited lower FC compared to inactive TAO patients. The ALFF values in the Calcarine_R of active TAO patients positively correlated with disease duration ($r = 0.5892$, $P = 0.0049$) and the Hamilton Anxiety Rating Scale (HARS) ($r = 0.5377$, $P = 0.0119$). Furthermore, the ALFF value in the Calcarine_R of inactive TAO patients negatively correlated with visual functioning ($r = -0.5449$, $P = 0.0072$), while the ALFF values in the Caudate_L of active TAO patients positively correlated with visual functioning ($r = 0.6496$, $P = 0.0014$).

Conclusions: We found that the Caudate_L and Cerebelum_Crus1_R related to motor control and coordination in active TAO patients exhibit significant compensatory mechanisms; whereas, the Calcarine_R and Postcentral_L related to visual and somatosensory cortices show varying degrees of impairment. Our findings complement the functional neural mechanism of TAO.

OR-0286

Apparent diffusion coefficient histogram analysis of adenoid cystic carcinoma: correlation with histopathology and the prediction of survival

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Introduction

Adenoid cystic carcinoma (ACC) is a rare malignancy that mainly rises from major and minor salivary glands, which was described as “one of the most biologically destructive and unpredictable tumors of the head and neck”, for having a distinct natural history characterized by slow-growing

but high frequency of local recurrence, perineural spread, and development of distant metastasis^{1, 2}.

The current study aimed to analyze the DWI histogram to construct a diagnosed model for distinguishing different subtypes of ACC. The usefulness of this model in predicting the survival of ACC was also assessed.

Method

MRI data of our institution were retrospectively reviewed. Inclusion criteria were (1) Primary ACC located in the head and neck region; (2) diagnosis of cases was confirmed by surgical pathology and pathological subtype were diagnosed; (3) all cases underwent the MR examinations within 2 weeks before surgery. And exclusion criteria were (1) patients who had received any treatment (biopsy, neoadjuvant chemotherapy, or prior radiotherapy) before the MR exam; (2) those who had other head and neck tumors previously or recurrent disease; (3) poor image quality because of artifacts.

In most ACCs, all three patterns coexist and are interleaved in such a manner that diagnosis depends on the pathologist's subjective interpretation. According to the definition, low-grade ACC consists of Perzin grade I (predominantly tubular, no solid) and II (predominantly cribriform, <30% solid). High-grade ACC thus consists of Perzin grade III (>30% solid component). Specimens were subdivided into low- and high-grade ACC for analysis.

All MR images were obtained from 3T MR scanners (Ingenia, Philips Medical Systems; MAGNETOM Vida, Siemens) with a 16-channel head and neck coil. Pre-enhancement MR sequences included axial T1WI, axial and coronal T2WI, and diffusion weighted imaging (DWI). DWI images were obtained by using a spin-echo echo-planar imaging sequence with b values of 0 and 800 sec/mm². Axial and coronal post-enhancement T1WI were obtained after administration of gadopentetate dimeglumine at a dose of 0.1 mmol/kg of body weight at an injection rate of 2 ml/s. The corresponding ADC map of were constructed by a monoexponentially fitting model with the b values of 0 and 800 sec/mm².

The preprocess and the feature extraction were implemented by PyRadiomics 3.0.1 and followed the Image biomarker standardization initiative (IBSI). All cases were resampled into an inner resolution of 0.56mmx0.56mm by a fit-to-original-grid approach and the ROI was re-segmented part by a 3-sigma approach. Considering the sequence is not quantitative, we normalized the sequence for each case respectively by Z-score. For the histogram analysis of ADC maps, we used the Ostu threshold algorithm to estimate the cut-off value for splitting the high- and low-ADC sub-regions. The 10%, 50%, 90%, the mean value of ADC values of each region were estimated. Then we used these features to develop the machine learning model to estimate the prediction of the ACC subtypes. Cox regression with multivariable analysis were used to construct the survival signature.

Result

The final study population was comprised of 107 cases (41 men, 66 women; mean age, 52.4 ± 13.5 years). The gender and the T stage were found significant differences between low- and high-grade groups with the $\chi^2=4.757$ ($P=0.029$) and $\chi^2=7.713$ ($P=0.007$), respectively. The median OS time was 27 months for all patients (range, 5–78 days). During the follow-up period, 27 patients (25.2%) had experienced a confirmed death.

The ADC values of all cases were distributed in a nearly normal fashion and the cut-off value was 1.3×10^{-3} mm²/s (figure 1). Based on the ROC analyses, the ADC_10th percentile and ADC_50th percentile values achieved higher diagnostic efficacy with an AUC of 0.821 and 0.804, a sensitivity of 94.4% and 83.3%, and specificity of 61.7% and 68.5%, for differentiating the low-grade group from a high-grade group at the cutoff value of 0.92×10^{-3} mm²/s and 1.10×10^{-3} mm²/s, respectively.

Cox proportional hazards model found that radiomic signature and tumor stage were significant predictors in ACC patients (radiomic signature: HR: 3.13, 95% CI:1.95–5.24, $P < 0.001$; stage: HR: 3.25, 95% CI: 1.01–2.35, $P = 0.042$).

Discussion

In this study, the results revealed significant differences in several radiomics features of DWI that could be used to predict the histological subgroup of ACC. The combination of radiomics parameters of DWI significantly improved the differentiating ability of subtypes than radiomics

parameters of DWI alone, which could potentially be used in clinical practice regarding the ACC evaluation before treatment. A diagnostic model was found useful not only in the diagnosis of the histopathological subgroup of ACC but also in the prediction of survival rate.

Conclusion

Histogram analysis of ADC values may be helpful for differentiating the subtypes of ACC, leading to improved targeted treatment and reduced morbidity.

OR-0287

不同颅内压状态下乙状窦源性耳鸣患者的临床特征分析

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目的 探讨高颅内压和正常颅内压状态下乙状窦源性耳鸣患者临床特征的差异。**方法** 收集 2019 年 10 月~2022 年 1 月就诊于首都医科大学附属北京同仁医院的乙状窦源性耳鸣患者。所有患者行一站式颞骨双期增强 CT (DPCT) 以及颅脑 MRV 检查。基于 DPCT 进行乙状窦源性耳鸣病因评价, 最终入选乙状窦源性耳鸣患者 66 例 (乙状窦沟骨板缺损 55 例, 乙状窦憩室 11 例)。基于颅脑 MRV 使用横窦狭窄指数 (ITSS) 方法进行颅内压评价, 对横窦进行分类 (0~4 量表值), 即 0 表示横窦无狭窄; 1 表示狭窄<33%; 2 表示狭窄 33~66%; 3 表示狭窄>66%; 4 表示发育不全或未发育。ITSS=左侧横窦狭窄程度的量表值×右侧横窦狭窄程度的量表值。当 ITSS≥4 时, 则认定为存在颅内高压; 当 ITSS<4 时, 则认定为颅内压正常。最终将患者分为高颅内压组 41 例, 正常颅内压组 25 例。回顾性分析两组患者的人口学资料、临床指标、耳鸣特征及血生化检查的差异。**结果** 高颅内压组和正常颅内压组身体质量指数 (BMI) 分别是 24.98 kg/m² (22.87 kg/m², 28.46 kg/m²) 和 24.01 kg/m² (20.34 kg/m², 25.03 kg/m²), 耳鸣障碍评估量表 (THI) 评分分别是 (45.59±23.47) 分和 (33.84±20.13) 分。高颅内压组的 BMI 和 THI 评分均明显高于正常颅内压组 (P 分别是 0.042 和 0.047)。两组间年龄、性别、左右利手、耳鸣侧别、平均动脉压 (MAP)、耳鸣持续时间、耳鸣频率、耳鸣响度及血生化指标均无显著性差异。**结论** 本研究发现高颅内压和正常颅内压的乙状窦源性耳鸣患者临床特征存在差异, 具体表现为高颅内压的耳鸣患者 BMI 和 THI 评分明显升高。深入了对乙状窦源性耳鸣的认知, 为临床医生针对不同特征的乙状窦源性耳鸣患者制定个性化治疗方案提供参考依据。

OR-0288

Whole-brain morphological network alterations in patients with H3K27M-altered diffuse midline glioma

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Objectives: H3K27M-altered diffuse midline glioma (DMG-A) is a malignant glioma that mostly affects children and adolescents, with a median survival of 11 months, the prognosis remains dismal. While previous research tended to focus on the tumor mass itself, often overlooking the structural and functional alternations in the entire brain induced by this entity. Actually, recent studies demonstrate that glioma is a whole-brain disease, as tumor cells spread far beyond the macroscopically visible lesion and form networks throughout the whole brain. However, little is known about the alterations in the morphological networks of the whole brain in patients with DMG-A. Thus, in the current study, we aimed to perform a comparative analysis of the topological properties of cortical thickness morphological networks in DMG patients with and without H3K27M alterations to elucidate their effects on whole brain.

Methods: High-resolution 3D T1 structural images were acquired from 70 DMG-A patients, 84 wild-type diffuse midline glioma (DMG-W) patients and 86 age- and sex-matched healthy controls (HC). Cortical thickness was extracted from 68 brain regions to construct the whole-brain structural covariance networks by calculating the Pearson correlation coefficients. The topological properties of these networks were analyzed by using graph theory. Network-based statistic (NBS) was employed to determine the connected subnetwork. Finally, the differences in nodal properties and network metrics between groups were compared using a non-parametric test. **Results:** Compared with HC, patients with DMG-A had smaller nodal efficiency in the lingual gyrus, insula, pericalcarine, parahippocampal gyrus and transversetemporal gyrus. Additionally, patients with DMG-W had smaller nodal degree and nodal efficiency in the insula, transverse temporal gyrus and visual cortex (i.e., lingual gyrus, pericalcarine, cuneus gyrus and lateraloccipital gyrus). NBS analysis revealed decreased morphological connections in the default mode network, sensorimotor network, salience network, auditory network and visual network, in both DMG-A and DMG-W group. Moreover, when compared DMG-A with DMG-W, DMG-A showed further decreased morphological connections in the whole brain network.

Conclusions: The decrease in nodal properties and connections in the whole-brain network of both DMG-A and DMG-W suggests a significant disruption of the topological organization of their structural covariance network (SCN). Furthermore, the connections of the whole-brain morphological network were further decreased in mutant patients compared to the wild type, indicating that the presence of H3K27M mutations may be associated with more aggressive whole-brain network damage. These findings provide new insights into the whole-brain tumor burden induced by DMG and may potentially aid in the tailoring and monitoring of DMG therapy.

OR-0289

多参数定量磁共振技术评估甲状腺相关眼病活动性

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【目的】研究旨在联合应用 Dixon 成像、T2 mapping 成像及扩散张量成像 (DTI) 在评价甲状腺眼病 (TAO) 患者眼眶内部的微结构变化并评估疾病活动性方面的能力

【方法】招募 30 例 TAO 患者及 15 例健康志愿者 (HC)，患者及健康志愿者在飞利浦 3.0T (使用 32 通道头线圈) 上接受 MRI 扫描，协议包括：轴位 T2WI、轴位 Dixon-T2WI、冠状位 T2WI、冠状位 Dixon-quant、冠状位 T2 mapping、冠状位 DTI。部分需行进静脉激素治疗的患者在治疗前行 MRI 检查。患者图像及数据在飞利浦工作站上进行后处理。同时由资深眼科医师与内分泌医师给患者行 CAS 评分，依据评分将患者分为活动组 (CAS>3) 和非活动组 (CAS≤2)。对患者及志愿者共 90 只眼睛进行图像分析及数据测量，测量结构包括眼肌、眼眶、泪腺及视神经，在冠状位 Dixon 和 T2 mapping 图像上完整勾画眼肌、泪腺及眼眶的轮廓，在冠状位 DTI 图像上完整勾画眼肌与视神经的轮廓。最终比较活动性患者、非活动患者及健康志愿者在定量数据上的差异，并评估活动期的诊断效率。

【结果】与对照组相比，TAO 眼外肌和泪腺的脂肪分数与水值显著升高 ($p<0.001$)；眼眶组织的脂肪分数与水值差异无统计学意义。活动性与非活动性患者间无明显差异。视神经的 FA 值与 ADC 值患者与对照组间相比显著升高。患者组内差异无统计学意义。眼肌 ADC 值在患者组内及对照组间差异有统计学意义，FA 只在对照组间差异有统计学意义。活动性患者与非活动性患者眼肌、眼眶、泪腺 T2 值差异均有统计学意义。影像数据与临床指标 (甲功五项) 联合的模型诊断效能最优 (AUC=0.945)。

【结论】Dixon、DTI、T2 mapping 辅助诊断 TAO 效果良好。T2 mapping 可以评估患者眼眶重塑情况，效能优于 Dixon 与 DTI。MRI 多参数定量与 CAS 评分有相关性，联合使用从多角度评估 TAO 的活动性，与临床指标结合的模型诊断效能更优。

OR-0290

基于深度学习模型实现在颈椎 MR 图像上对脊髓及椎管的自动测量

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目的：脊髓型颈椎病无症状或轻症患者应避免进行性脊髓损伤，早期诊断及治疗尤为重要。基于颈椎 MR 的脊髓及椎管测量可以量化诊断依据，有助于及时诊断。然而，测量严重依赖工具且耗时耗力，临床实际应用较少。因此，本研究拟探讨基于深度学习自动化测量颈椎 MR 脊髓和椎管的可行性。**方法：**回顾性连续收集 2021 年 1 月至 2021 年 12 月，在上海长海医院健康管理中心的 614 例被检者的颈椎 MR 平扫图像。其中，横断位 T2WI 图像 1194 张，矢状位 T2WI 图像 558 张。由一位低年资放射科主治医师（6 年）在每例被检者的矢状位 T2WI 图像和横断位 T2WI 图像上，使用 labelme 软件对脊髓和椎管进行手工分割，并测量计算脊髓最大受压程度、椎管最大狭窄程度、横截面积及压缩比。由一名放射科主任医师（25 年）对其标注及测量结果进行复核修改作为金标准。将所有图像按照 8: 1: 1 比例随机分为训练集 (n=487)、调优集 (n=61)、测试集 (n=61)，采用训练集数据训练 Swin Transformer 分割模型和关键点检测模型。由另一名高年资放射科主治医师（10 年）在测试集的矢状位 T2WI 图像和横断位 T2WI 图像上对脊髓和椎管进行手工分割，并测量计算作为人工组结果。在测试集中采用 Dice 相似系数 (DSC)、交并比 (IoU) 评价模型的分割效能，使用同类相关系数 (ICC) 方法比较模型组、人工组与金标准测量结果的一致性。**结果：**在测试集中 Swin Transformer 模型分割脊髓（横断位、矢状位）的 DSC 值 (%) 和 IoU 值 (%) 分别为 93.88%、94.48% 和 88.46%、89.53%，分割椎管（矢状位）的 DSC 值 (%) 和 IoU 值 (%) 分别为 86.21%、75.76%。在测试集中模型组与金标准的组间 ICC 值为 0.861，人工组与金标准的组间 ICC 值为 0.773，两者差异具有统计学意义 ($p < 0.001$)。**结论：**深度学习 Swin Transformer 模型对颈椎 MR 平扫图像自动化分割脊髓及椎管具有较高的准确性，模型测量结果与金标准测量一致性良好，为脊髓型颈椎病早期诊断量化依据的临床应用奠定了基础。

OR-0291

3D 酰胺质子转移成像 APT MRI 预测基线鼻咽癌的肿瘤(T) 分期

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目的：

基线鼻咽癌分期对临床诊断及放化疗有重要意义。我们旨在研究 3D APTw MRI 在预测鼻咽癌分级方面的潜在价值，与弥散加权成像 (DWI) 和 EBV DNA 相比，并确定 APTw MRI 多参数与鼻咽癌 (NPC) 分期之间的关联。

方法：

从 2022 年 6 月至 2023 年 2 月，所有经病理学分析确认为未经治疗、病变大于 1 厘米且 MRI 质量良好的鼻咽癌患者作为研究对象。所有参与者在术前进行了 3D APTw 成像扫描，使用 3.0 T 扫描仪，并进行了扩散加权成像 (DWI)。两位资深放射科医生根据 5 分 Likert 量表评估 APTw 图像的质量。然后对感兴趣区域 (ROI) 进行了复审和批准。从每个 ROI 中获取了平均 APT 值 (APTmean)、90th 百分位数 (APT90)、10th 百分位数 (APT10)、峰度、偏度和 ADC 值。

我们的研究使用相同的实验室方法在同一机构对所有患者进行了 EB 病毒 DNA 的测量。使用曼-惠特尼 U 检验生成接受者操作特征曲线来评估这些定量参数的诊断性能。

结果

76 名鼻咽癌患者 (平均年龄 49 岁 \pm 19[标准差]; 61 名男性, 15 名女性) 根据 AJCC/UICC TNM 第八版对患者进行了分期。56 例为高分期鼻咽癌, 20 例为低分期鼻咽癌。高分期鼻咽癌 (T3 和 T4) 的 APTmean 明显高于低分期鼻咽癌 (3.76 vs 2.83, $p=0.01$)。APT90、Skewness 和 Kurtosis 在高分期和低分期之间存在显著差异 (5.37 vs 4.37, $p=0.04$; 0.23 vs -0.02, $p=0.04$; 3.24 vs 2.69, $p=0.006$)。与 EBV DNA 相比, APTw 在区分低分期和高分期鼻咽癌方面的受试者工作特征曲线下面积 (AUC) 为 0.812 (0.694–0.931)。受试者间一致性: ICC 为 0.944 (0.938 < ICC < 0.95)。鼻咽癌高分期和低分期的 ADC 值没有显著差异 (0.70 vs 0.75)。

结论

联合 3D APT w 成像和 EBV DNA 有潜力改善鼻咽癌的组织学鉴别, 能更客观量化更准确区分低分级和高分级的鼻咽癌。

OR-0292

深度学习图像重建算法在来自全脑 CT 灌注的 脑 CTA 图像中的应用价值研究

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目的: 通过与常规扫描的 CT 血管造影 (CTA) 相比较, 评估深度学习图像重建 (DLIR) 算法在由 CT 灌注 (CTP) 动脉峰值期重建的 CTA 图像中的应用价值。

方法: 前瞻性纳入 39 例由 LVO 引起的 AIS 患者, 所有患者在症状出现后 24 小时内接受了头颅 CT 平扫、CTP 和 CTA 检查。使用 FBP、ASIR-V40%、ASIR-V80% 和三种不同强度水平的 DLIR (DLIR-L, M, H) 算法重建层厚为 0.625mm 的 CTP 动脉峰值期图像, 并将其与 ASIR-V80% 重建的常规 CTA 图像进行比较。在健侧轴位图像上, 于颈内动脉 (ICA) 虹吸部、大脑中动脉 M1 段 (MCA-M1) 和颞肌上绘制 ROI, 测量并比较对应的 CT 值、图像噪声值 (SD 值)、信噪比 (SNR) 和对比噪声比 (CNR)。主观评价包括图像噪声、血管边缘锐利度、小血管显示和整体图像质量。采用六分评分法对七组 CTA 图像的侧支循环进行评分。

结果: 七组 CTA 图像于 ICA 虹吸部、MCA-M1 和颞肌的 CT 值均无统计学差异 ($P>0.05$)。DLIR-M、DLIR-H 与常规 CTA 图像的 SD、SNR 和 CNR 相当 ($P>0.05$)。与常规 CTA 组相比, ASIR-V80% 组的 SD 值稍高, SNR 稍低 ($P<0.05$), 但 ASIR-V80%、DLIR-M 和 DLIR-H 三组之间无统计学差异 ($P>0.05$)。DLIR-M 和 DLIR-H 组图像的主观评分仅在小血管显示方面低于常规 CTA 组 ($P<0.05$)。ASIR-V80% 组的图像噪声和整体图像质量低于 DLIR-M 和 DLIR-H 组 ($P<0.05$), 三组的血管边缘锐利度和小血管显示无显著差异。每位患者六组重建 CTA 图像的侧支循环评分均与常规 CTA 图像一致。

结论: DLIR-H 和 DLIR-M 重建的 CTP 动脉峰值期图像的客观和主观图像质量与常规 CTA 图像相当, 优于 FBP 和 ASIR-V 算法。从 CTP 数据中重建 CTA 图像不仅可以避免多次扫描以减少辐射暴露和造影剂剂量, 且缩短了急性脑梗死患者的检查时间。

OR-0293

基于超声图像的甲状腺结节可解释性机器学习诊断系统构建与验证

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目的: 目前用于甲状腺结节风险分层的系统存在特异性低和活检率高的问题。最近, 机器学习模型被用于甲状腺结节超声辅助诊断, 但诊断过程缺乏可解释性。因此, 本研究旨在开发一个可解释的甲状腺结节机器学习在线诊断及管理系统。

方法: 本项回顾性研究纳入了经 FNAB 或手术病理确诊的 3965 个甲状腺结节, 其中 3098 个来自中心 1 的甲状腺结节被随机划分至训练集 ($n = 2168$) 和内部验证集 ($n = 930$)。867 个来自中心 2 的甲状腺结节被作为独立的外部验证集。从电子病历收集患者临床及实验室检查数据, 包括年龄、性别、甲状腺基础疾病及甲状腺激素水平。超声图像由两名具有 10 年以上经验的超声医生, 依据 ACR-TIRADS 指南对结节的成分、回声、形态、边缘和局灶性强回声共五个超声特征进行评估, 并测量结节的最大直径。使用随机森林 (RF)、支持向量机 (SVM) 和极端梯度提升 (XGBoost) 构建了基于超声特征和超声+临床特征的机器学习模型。并利用 SHAP 算法解析最优模型的诊断过程, 为机器学习模型提供全局及个体水平的可解释性。

结果: 在外部验证集中, 基于超声特征构建的 RF 模型 (命名为 Thy-Wise) 诊断效能最优。与 ACR-TIRADS 相比, Thy-Wise 在保持相近敏感性的同时, 取得了更高的 AUC (0.892 vs. 0.853, $P < 0.01$)、准确性 (82.8% vs. 73.4%) 和特异性 (79.7% vs. 66.9%), 并大幅降低了非必要 FNAB 率 (14.8% vs. 48.3%)。在超声特征的基础上加入临床特征, 所有机器学习模型的诊断效能及指导 FNAB 的可靠性均未提高。SHAP 特征重要性排序图显示边缘和局灶性强回声是 Thy-Wise 诊断过程中最重要的两个特征, SHAP 模型预测力图能直观可视化结节各个特征的取值对于模型诊断结果的影响方向及程度。

结论: Thy-Wise 模型能有效提高甲状腺结节超声诊断的准确性及推荐 FNAB 的可靠性, 基于 SHAP 的机器学习模型解释, 使临床医生能够更好地理解诊断背后的推理过程, 有助于模型的临床转化。

OR-0294

磁共振 T2mapping 技术对不同程度颞下颌关节功能紊乱综合征关节盘及周围韧带的定量研究

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目的旨在探讨 T2 mapping 在颞下颌关节功能紊乱综合征 (temporomandibular joint disorder, TMD) 关节盘及周围韧带早期改变中的应用, 以期阐明 TMD 关节盘损伤与周围韧带损伤的相互作用机制, 更好的揭示早期损伤的改变。

材料与方法前瞻性纳入 2023 年 3 月至 2023 年 9 月在云南大学附属医院口腔外科诊断为 TMD 患者, 且符合纳入及排除标准病例组 125 名、对照组 50 名。所试对象均行颞颌常规序列及 T2 Mapping 序列扫描。扫描后利用工作站处理后获得关节盘及周围韧带显示最佳层面伪彩图, 由我科两位影像医师采取双盲法对所试对象 MRI 图像进行分析评定, 按前移程度分 (正常上位、轻微前移、轻度前移、中度前移、重度前移); 按损伤程度分 (可复、不可复、骨关节病、骨关节合并可复、骨关节合并不可复)。分别在开、闭口位伪彩图上勾画关节盘及周围韧带 ROI, 获取 T2 值。采用独立样本 t 检验分别验证病例组与对照组关节盘及关节周围韧带 T2 值的差异; 多组间比较采用

单因素方差分析, 组间两两比较采用 Bonferroni 检验方法, 分别对闭口位及开口位不同移位/损伤程度与对照组 T2 值的差异进行比较, $P < 0.05$, 视为差异有统计学意义。

结果病例组与对照组关节盘及周围韧带 T2 值差异具有统计学意义, 均 $P < 0.05$; TMD 患者关节盘损伤常合并关节周围韧带损伤, 闭口位、开口位病例组与对照组关节周围韧带 T2 值差异具有统计学意义 (关节盘轻度前移、中度前移 T2 值均 $>$ 关节盘正常上位 T2 值); TMD 患者关节盘不同程度损伤关节周围韧带与对照组 T2 值差异具有统计学意义; 相同组别 TMD 患者不同取点平均 T2 值两两比较差异具有统计学意义; 颞后附着、下颌后附着 T2 值变化与双板区 T2 变化具有相关性。

结论颞颌关节紊乱综合征的患者常伴有关节盘周围韧带的损伤, T2 Mapping 技术可以通过观察关节盘及关节周围韧带 T2 值的变化, 定量的评估关节损伤的情况。

OR-0295

(2D BLADE) Turbo Gradient- and Spin-Echo in the evaluation of the sinonasal occupying lesions: A comprehensive comparison of image quality in (2D navigator) Readout-Segmented Echo-Planar imaging

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Objective: Diffusion-weighted imaging (DWI), as a non-invasive way to analyze the structures of biological tissues at a microscopic level, can be used as an effective method to evaluate sinonasal lesions. However, DWI in the sinonasal region is challenging because of its proximity to bone and skin, and the presence of a large air-bone-soft tissue interface in this region is prone to severe magnetization artifacts. The objective of this study was to investigate the feasibility of a two-dimensional (2D) turbo gradient- and spin-echo (TGSE) diffusion-weighted (DW) pulse sequence with non-Cartesian BLADE trajectory in the evaluation of sinonasal lesions, and to qualitatively and quantitatively compare the image qualities of TGSE BLADE with readout-segmented echo-planar imaging using parallel imaging and 2D navigator (RESOLVE).

Methods: A total of 48 patients with sinonasal occupying lesions were included in this prospective intra-individual study. In all patients, axial DW imaging, with prototype TGSE BLADE and commercially available RESOLVE with comparable imaging parameters, was performed at 3.0-T scanner (MAGNETOM Prisma, Siemens Healthcare, Erlangen, Germany). Two independent observers assessed the different sequences by qualitative imaging parameters (overall image quality, lesion conspicuity, distortion) and quantitative imaging parameters (geometric distortion ratio [GDR], signal-to-noise ratio [SNR], contrast). Furthermore, the apparent diffusion coefficient (ADC) values of the lesion and pons in the two sequences were compared. By visual evaluation, the overall image quality was classified from 1 (nondiagnostic image quality with severe artifacts) to 5 (excellent image quality with high-level anatomic details). Likewise, lesion conspicuity was classified on the basis of the lesion boundary and internal structure from 1 (unable to evaluate) to 5 (clearly visible). The geometric distortion of the overall image and lesion was classified from 0 (no distortion) to 4 (severe distortion). GDR was assessed by comparing the lengths of the head and lesion on the corresponding b0 images and the undistorted T2-weighted images. To compare the SNR, contrast and ADC values between two different sequences of DW images, circular regions of interest (ROIs) were drawn manually on the lesion, pons and background.

Results: A comparison of qualitative scores revealed that TGSE BLADE exhibited higher image quality ($P < 0.001$), lesion conspicuity ($P < 0.001$) and less geometric distortion ($P < 0.001$) than were observed for RESOLVE. Quantitative evaluations revealed that TGSE BLADE exhibited higher contrast ($P < 0.001$) and lower GDR ($P < 0.001$) than were found for RESOLVE, and SNR ($P < 0.001$) was lower than RESOLVE. The image ADC values of TGSE BLADE was lower than that of RESOLVE ($P < 0.05$). It was also found that the skull base, mastoid and orbits were better

displayed on TGSE BLADE with reduced susceptibility artifacts, distortion and blurring comparing to RESOLVE.

Conclusions: Compared with RESOLVE, TGSE BLADE significantly improved the image quality in evaluation of sinonasal occupying lesions by reducing the susceptibility artifacts, distortion and blurring. However, TGSE BLADE also has the disadvantage: the whole image intensity is slightly low, so that the anatomical details of the air-bone interface are not shown well, and this shortcoming should be improved in the future. TGSE BLADE DWI is still a promising imaging sequence in clinical MR exams for evaluation of sinonasal lesions.

OR-0296

Utility of machine learning for identifying stapes fixation on ultra-high-resolution CT

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Purpose: Imaging diagnosis of stapes fixation (SF) is challenging owing to a lack of definite evidence. We developed a comprehensive machine learning (ML) model to identify SF on ultra-high-resolution CT.

Materials and methods: We retrospectively enrolled 109 participants (143 ears) and divided them into the training set (115 ears) and test set (28 ears). Stapes mobility (SF or non-SF) was determined by surgical inspection. In the ML analysis, rectangular regions of interest were placed on consecutive axial slices in the training set. Radiomic features were extracted and fed into the training sessions. The test set was analyzed using 7 ML models (support vector machine, k nearest neighbor, decision tree, random forest, extra trees, eXtreme Gradient Boosting, and Light Gradient Boosting Machine) and by 2 dedicated neuroradiologists. Diagnostic performance (sensitivity, specificity and accuracy, with surgical findings as the reference) was compared between the radiologists and the optimal ML model by using the McNemar test.

Results: The mean age of the participants was 42.3 ± 17.5 years. The Light Gradient Boosting Machine (LightGBM) model showed the highest sensitivity (0.83), specificity (0.81), accuracy (0.82) and area under the curve (0.88) for detecting SF among the 7 ML models. The neuroradiologists achieved good sensitivities (0.75 and 0.67), moderate-to-good specificities (0.63 and 0.56) and good accuracies (0.68 and 0.61). This model showed no statistical differences with the neuroradiologists (P values 0.289–1.000).

Conclusions: Compared to the neuroradiologists, the LightGBM model achieved competitive diagnostic performance in identifying SF, and has the potential to be a supportive tool in clinical practice.

OR-0297

Assessment of lateral cervical lymph node metastasis in thyroid carcinoma by using the standard deviation of attenuation values on virtual monoenergetic images in dual-layer spectral detector computed tomography-a prospective study with external validation

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Purpose: To investigate the clinical value on standard deviation values of virtual monoenergetic images and other spectral parameters derived from the dual-layer spectral detector computed tomography (DLCT) in the diagnosis of the lateral cervical lymph node (LN) metastasis of thyroid carcinoma.

Methods and materials: A total of 194 consecutive patients with 266 lymph nodes, were involved in this prospective study. 193 LNs were used as training group, 43 LNs in 30 patients were used as internal validation group, and 30 LNs as external validation group. All the patients received unenhanced and dual-phase contrast-enhanced scanning in DLCT. Monoenergetic images at 40keV and 70keV (MoneE40 and MoneE70) in unenhanced, arterial, and venous phases (UP, AP and VP, respectively) were reconstructed. CT attenuation values and the corresponding standard deviation (SD, regarding image noise) of non-metastatic and metastatic lymph nodes on three phases MoneE images were recorded. Slope of the spectral Hounsfield unit curve, iodine concentration, normalized iodine concentration and effective atomic number on three phases were also measured and analyzed. Receiver Operating Characteristic (ROC) curves were utilized to analyze the effectiveness of multiple parameters in different phases of non-metastatic and metastatic LNs. Delong test was used to compare the area under curves (AUC) for different parameters. ICC value was analyzed for measurement repeatability.

Results: The quantitative parameters in both MoneE40 and MoneE70 images in both AP and VP in the metastatic group were all significantly higher than those in the group (all $P < 0.001$), but no significant difference in UP between the two groups (both $P > 0.05$). ICC value were more than 0.8 for the training group. The SD values in both MoneE40 and MoneE70 images in all three phases in the metastatic group were all significantly higher than the values in the non-metastatic group (all $P < 0.001$). The AUC of SD values in MoneE40 and MoneE70 images in AP, VP were 0.978, 0.939, 0.981 and 0.924, respectively, and had no significant difference between each two ROC curves (all $p > 0.05$). The AUC of venous SD in MoneE40 images in internal and external validation groups were 0.978 and 0.962, respectively.

Conclusion: The SD value in arterial or venous phases MonoE40 images has the potential to differentiate non-metastatic from metastatic lateral cervical LNs in patients with thyroid carcinoma.

OR-0298

基于双能量 CT 瘤内及瘤周血管异质性预测喉鳞状细胞癌患者诱导化疗后早期疗效

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目的: 基于双能量 CT (DECT) 表征喉鳞状细胞癌瘤内及瘤周血管增殖异质性, 并观察其不同 T 分期、不同位置喉癌的分布情况, 进而预测诱导化疗后的治疗反应。

方法: 回顾性收集 2018 年 7 月至 2021 年 12 月期间于天津市第一中心医院接受诱导化疗治疗的 104 例喉鳞状细胞癌患者。由 2 名分别具有 3 年及 10 年头颈部影像诊断经验的医生对患者 DECT 图像进行分析, 根据 RECIST 标准将患者分为缓解组和抵抗组, 使用诱导化疗前动、静脉期图像及碘图图像对瘤内及瘤周血管空间异质性进行评估, 通过观察动脉期图像肿瘤内部是否存在迂曲血管定义有无瘤内动脉, 通过分析肿瘤静脉期图像评估病灶瘤周强化连续性来定义假包膜的完整性。采用盲法对基线及诱导化疗后的图像进行判读, 并间隔四周后进行第二次评估, 行观察者内和观察者间的一致性分析。采用卡方检验及 Fisher 确切概率法观察患者肿瘤血管空间异质性与不同 T 分期、位置是否存在相关性, 多因素 Logistic 回归分析血管异质性是否与喉癌患者诱导化疗早期治疗反应独立相关。

结果: 瘤内动脉与假包膜征象在不同位置、不同 T 分期喉癌的分布存在异质性。瘤内动脉征象在 T 分期分布中存在显著差异, 在晚期 (T3-T4) 喉癌中的出现频率明显高于 T2 期, 在 T3 与 T4 期肿瘤中无显著差异; 假包膜连续性与不同位置的喉癌密切相关, 累及声门上型的肿瘤假包膜完整性较好。一致性分析发现瘤内动脉征象的观察者间一致性好于假包膜 (瘤内动脉, ICC>0.81, 一致性良好; 假包膜特征, ICC>0.71, 一致性中等)。进一步进行 Logistic 回归分析表明瘤内动脉、假包膜完整是诱导化疗后早期出现良好治疗反应的独立预测因子, 结果表明诱导化疗后缓解型喉癌动脉期图像上常可以观察到瘤内动脉, 而静脉期碘图更常出现完整假包膜。

结论: 首次基于 DECT 图像提出的瘤内动脉、假包膜两种征象与喉鳞状细胞癌 T 分期、位置显著相关, 并有助于预测诱导化疗后早期疗效。

OR-0299

Hemodynamic assessments of unilateral pulsatile tinnitus with jugular bulb wall dehiscence using 4D Flow MRI

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Objectives:

To investigate the hemodynamics of patients suffering from pulsatile tinnitus (PT) with jugular bulb wall dehiscence (JBWD) and compare them with those of patients with sigmoid sinus wall dehiscence (SSWD) and with volunteers.

Methods:

Eleven female unilateral PT patients with JBWD (JBWD group, 11sides), 22 age- and side-matched female patients with SSWD (SSWD group, 11sides), and 22 age-matched female volunteers (volunteer group, 36 sides) were enrolled. All participants underwent four-dimensional flow magnetic resonance imaging (4D Flow MRI). Maximum voxel velocity (V_{v-max}), maximum velocity (V_{max}), average velocity (V_{avg}), and average blood flow rate (Q) were measured in the transverse sinuses (TS), sigmoid sinuses (SS), and jugular bulb (JB). The vortex flow pattern was also

assessed. Fisher's exact test and Bonferroni correction were used for count data, the $p < 0.017$ was considered as statistically significant. Shapiro-Wilk test, one-way ANOVA, Kruskal-Wallis H test, paired-samples t-test and Wilcoxon matched-pairs signed-rank test were used for continuous variables depending on the distribution and variance of the data. The $p < 0.05$ and corrected $p < 0.05$ was considered as statistically significant.

Results

The area and Q of TS and JB on the symptomatic side were higher than those on the contralateral side in the JBWD group (all $p < 0.05$). The area was larger and velocities were lower in the JBWD group at the TS than the SSWD group (all corrected $p < 0.05$), and velocities were higher at the distal TS and SS than the volunteer group (all corrected $p < 0.05$). At the JB, the JBWD group also had higher Vv-max than the volunteer group (corrected $p < 0.05$). The occurrence rate of vortex at JB in the JBWD group was higher than both the JBWD and the volunteer groups ($p = 0.002 < 0.017$ and $p = 0.009 < 0.017$, respectively).

Conclusions

The blood flow of the intracranial venous sinus was different between the JBWD group and the SSWD group. The indicators that can differentiate include Vv-max, Vmax, Vavg, vortex, and TS cross-sectional area.

OR-0300

基于双能 CT 的列线图预测甲状腺乳头状癌大容量 中央区淋巴结转移的价值

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目的：基于双能 CT 定量参数构建列线图，探讨其预测大容量中央区淋巴结转移（hv-CLNM）的价值。

方法：回顾性分析 213 例经手术病理证实的甲状腺乳头状癌患者，根据颈部中央区淋巴结清扫术病理结果，将患者分为 hv-CLNM 组（74 例）和非 hv-CLNM 组（139 例）。常规的临床及影像征象包括性别、年龄、大小、病灶数量、病灶位置、纵横比及 BRAF 基因，双能 CT 定量参数由两名经验丰富的放射科医生测量并计算，包括动脉期及静脉期的碘浓度（IC）、标准化碘浓度（NIC）以及能谱曲线斜率（ λ_{HU} ），采用组内相关系数评估测量者组内及组间一致性。将两组之间具有统计学差异的变量纳入多因素 Logistic 回归分析，以筛选出甲状腺乳头状癌 hv-CLNM 的独立预测因素，比较各预测因素以及组合模型的预测效能，构建可视化列线图模型。校准曲线用于评估列线图的拟合度，决策曲线用于评估列线图的临床获益。

结果：多因素 Logistic 回归分析显示，病灶大小（OR=2.601，95%CI: 1.284~5.268）、动脉期 NIC（OR=6.423，95%CI: 1.863-22.146）、动脉期 λ_{HU} （OR=0.097，95%CI: 0.011-0.826）以及静脉期 NIC（OR=3.907，95%CI: 1.717-8.889）是甲状腺乳头状癌 hv-CLNM 的独立预测因素，P 均 <0.05 。组合模型预测效能高于各独立预测因素。校准曲线、决策曲线显示列线图预测结果与实际结果具有良好的一致性，且其临床获益较高。

结论：基于病灶大小、动脉期 NIC、动脉期 λ_{HU} 以及静脉期 NIC 构建的组合模型可有效预测甲状腺乳头状癌 hv-CLNM，并在一定程度上指导临床制定个性化治疗方案。

OR-0301

基于血栓放射组学预测颅内粥样硬化性闭塞的研究

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背景与目的: 颅内动脉硬化性闭塞 (ICAS-O) 是急性缺血性卒中 (AIS) 中常见的病因, 适用于机械取栓术的患者。一方面, 一线支架取栓术可能优于接触吸引术。另一方面, 通常需要进行补救治疗, 例如动脉内或静脉内应用替罗非班, 以及经腔内血管成形术和/或支架植入。增强 ICAS-O 的早期识别可能有助于决策制定。我们旨在探索术前基于血栓的放射组学模型对 ICAS-O 的预测价值。

方法: 共有 119 名来自两个中心的 AIS 患者被分类为培训和验证组。使用计算机断层扫描血管造影法对血栓进行分割, 然后自动计算 2153 个与血栓相关的放射组学特征。执行特征相关性分析, 与相关系数低于 0.9 的任何特征进行消除。在特征相关性分析后, 选择 L1 基础方法进行特征选择。C 越小, 保留的特征越少。为了基于本研究中包含的数据构建一个有效、稳健的模型, 我们将数据集划分为 70% 的训练集和 30% 的验证集。我们使用名为 Gradient Boosting 的机器学习模型。通过接收者操作特性曲线下的面积 (AUC) 来评估模型的性能。

结果: 由 CT 图像中的 20 个相关特征组成的放射组学标志达到了良好的校准 (所有 Hosmer-Lemeshow $p > 0.05$)。在训练集中, 模型的 AUC 为 0.999, 而在验证子集中的性能略有下降, 其 AUC 为 0.808。此外, 决策曲线分析验证了放射组学标志在两个外部队列中的临床效用。

结论: 对于前循环 AIS 患者, 基于血栓的放射组学作为检测 ICAS-O 的非侵入性工具展现出了前景。然而, 还需要进行额外的研究来验证其有效性。此项研究为我们提供了基于血栓放射组学预测颅内动脉硬化性闭塞的新视角, 其强大的预测能力使我们能够在治疗前对患者的病情进行更精确的评估, 从而制定更为合理和针对性的治疗方案。此外, 该研究还突显了机器学习在医学图像分析中的巨大潜力, 为未来的研究提供了有力的参考。希望在未来的研究中, 我们可以进一步拓展这一方法的应用范围, 为更多的患者带来实际的诊疗帮助。

OR-0302

24 周窄带声治疗前后特发性耳鸣患者脑沟深度的变化研究

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目的: 脑沟深度是基于表面分析方法的大脑皮层的定量测量指标之一, 本研究旨在探索特发性耳鸣患者接受 24 周窄带声音治疗前后大脑皮层脑沟深度的变化。

方法: 33 名特发性耳鸣患者在基线期 (未治疗期) 和 24 周的声音治疗接受了磁共振成像扫描。26 名年龄和性别匹配的健康对照组 (HC) 也在 24 周的间隔前后接受了两次扫描。所有参与者在 3.0T 的 MRI 扫描仪中采集了的高分辨率的三维结构像。使用 DPABISurf 工具箱对结构图像数据进行了预处理。耳鸣障碍量表 (THI) 评分被用来评估治疗前后耳鸣的严重程度。统计分析中使用了混合因素方差分析 (ANOVA) 和 Pearson 相关分析, 在事后分析中使用了 Student-Newman-Keuls 检验。

结果: 与 HC 组相比, 耳鸣组在基线期时, 左侧颞中回皮层 (medial temporal cortex, MTC) 和右侧躯体感觉运动皮层 (somatosensory and motor cortex, SMC) 的脑沟深度明显减低; 经过 24 周的窄带声音治疗后, 耳鸣组的左侧 MTC 和右侧 SMC 脑沟深度明显增加; 耳鸣患者组在治疗后与 HC 组之间的脑沟深度没有显著差异。

结论: 脑沟深度的重塑是声音治疗有效的影像学指标, 有统计学差异的脑区可能为有效治疗耳鸣提供有意义的神经影像学靶点。

OR-0303

3.0T 磁共振高清结合功能成像对青少年颞下颌关节盘复位手术前后的应用价值

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目的: 3.0T 磁共振(MRI)观察未经治疗的单侧颞下颌关节盘前移位患者的关节盘长度、盘-髁距离、髁突骨质及关节腔积液的变化,探讨其临床价值。

方法: 回顾性分析我院 2022 年 1 月份-2023 年 8 月份, 13-18 岁患者 386 例颞下颌关节盘前移位患者治疗前的 MRI 图像,分为可复性关节盘前移位组 261 例和不可复性关节盘前移位组 125 例,均采用 3.0T 磁共振,型号 Prisma ,64 通道头颈联合线圈。先扫描双侧颞下颌关节闭口横断位 T2WI-TSE-FS、闭口斜矢状位 PDWI-TSE-FS、闭口斜冠状位 PDWI-TSE-FS, 再让患者开口在双侧的上下磨牙之间放入口腔专用咬合器, 行双侧颞下颌关节张口斜矢状位 PDWI-TSE-FS 扫描。扫描参数: T2WI, TR 4300ms, TE 56ms; PDWI, TR 2500 ms, TE15 ms; 层厚 3mm, 层距 3 mm; 激励次数 3; 矩阵 364x512; 视野 14 cmx14 cm。

结果: 不可复组关节盘长度短于可复组 ($t = 4.001, P < 0.05$),不可复组盘髁距离长于可复组 ($t = -5.36, P < 0.05$)。可复组患侧关节盘长度短于健侧 ($t = 2.745, P < 0.05$);患侧盘髁距离长于健侧 ($t = -9.19, P < 0.05$);不可复组患侧关节盘长度短于健侧 ($t = -4.176, P < 0.05$);患侧盘髁距离长于健侧 ($t = 9.542, P < 0.05$)。不可复组更易发生髁突骨质改变 ($t = 37.354, P < 0.05$);2 组关节腔积液发生率比较差异无统计学意义 ($t = 0.038, P > 0.05$)。

结论: 两组均有关节盘长度缩短,盘髁距离增加; TMD (颞下颌关节紊乱) 患者应早期发现、早期诊断、早期采取干预措施,预防颞下颌关节骨关节病的发生;MRI 可清晰显示关节盘形态、髁突骨质改变及关节腔积液,为临床提供颞下颌关节紊乱不同时期的影像表现,对临床诊断与治疗提供可靠的影像信息。

OR-0304

Comparison of evaluation of locally advanced thyroid cancer R0/R1 resectability based on radiological CT scoring model and radiomics models: a two-center study

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Objectives

For patients with locally advanced thyroid cancer, R0/R1 resection demonstrated superior survival compared with R2 resection. Evaluating disease extent pre-operatively is critical for guiding optimal treatment and may help predict prognosis. However, there is no clear consensus on pre-operative assessment of R0/R1 resectability in locally advanced thyroid cancer. We aim to establish and validate a convenient model based on radiological CT to evaluate the resectability of locally advanced thyroid cancer and compare with classic radiomics approaches.

Methods

This two-center retrospective study included 95 locally advanced thyroid cancer patients from Shanghai Cancer Center Fudan University as training cohort and 31 patients from Zhejiang Cancer Hospital as independent validation cohort, who were categorized into the resectable and unresectable groups. Three radiologists scored the CT scans of each patient by evaluating the extension to recurrent laryngeal nerve (RLN), trachea, oesophagus, artery, vein, soft tissue. A 12-score radiological model were developed. Radiomics models were built based on Random Forest (RF), K-Nearest Neighbor (KNN), Logistic Regression (LR), Support Vector Machine (SVM). Receiver-operating characteristic (ROC) analysis was used to evaluate the performance of the models.

Results

In the training cohort, compromised RLN ($P<0.001$), trachea ($P=0.001$), oesophagus ($P=0.002$), artery ($P<0.001$), vein ($P=0.005$), and soft tissue ($P<0.001$) were predictors for unresectability. External validation of the radiological model reached an AUC of 0.875. The AUCs of the radiomics models based on RF, KNN, LR and SVM were 0.782, 0.810, 0.738 and 0.799 accordingly.

Conclusions

By evaluating the extension to RLN, trachea, esophagus, artery, vein, and soft tissue, we built a convenient model based on radiological CT scoring to evaluate the resectability of locally advanced thyroid cancer. Radiomics approaches including RF, KNN, LR and SVM were not inferior to the radiological CT scoring model.

OR-0305

Integrating Machining Learning and Multimodal Neuroimaging to Predict the Prognosis of Sudden Sensorineural Hearing Loss

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Purpose: About 1/3 patients with SSNHL have poor prognosis even after standard treatment. In this study, we aimed to establish prognostic biomarkers in SSNHL at the individual level and generate a predictive model of the prognosis of postoperative SSNHL with multimodal features derived from brain network properties and clinical features.

Methods and Materials:

- (1) Follow-up of the hearing outcome of patients with SSNHL 3 months later. According to prognosis, patients were divided into recovery group ($n=86$) and non-recovery group ($n=64$).
- (2) Support vector machine model, Logistic regression model, and Decision Tree model were separately used for outcome prediction after features selection based on GMV, diffusional metrics (FA, MD, AD, RD, LDH), and functional parameters (amplitude of low frequency fluctuation (ALFF), fractional ALFF (fALFF), regional homogeneity (ReHo)).
- (3) Besides, the predictive capabilities of models were evaluated by the area under ROC curve (AUC).

Results:

- (1) AUC of training set and testing set were 0.807 and 0.752 respectively in SVM model with GMV of right supramarginal gyrus, left cingulate gyrus, right cingulate gyrus, left striatum, right striatum and left cuneus were selected.
- (2) Based on diffusional metrics, AUC of training set and testing set were 0.762 and 0.775 respectively in LR model. After feature selection, five diffusional features remained which were LDH of right superior fronto-occipital fasciculus, LDH of body of corpus callosum, AD of right superior corona radiata, MD of left superior fronto-occipital fasciculus, and MD of left tapetum.
- (3) AUC of training set and testing set were 0.764 and 0.737 respectively in Decision Tree model with 6 functional parameters were selected which were ALFF of left olfactory cortex, right rolandic operculum, left caudate nucleus, left rolandic operculum, right temporal pole superior temporal gyrus and left inferior frontal gyrus, opercular part.

Conclusions: Combination of machine learning and multimodal MRI, our study provides validated evidence of 17 biomarkers for predicting the hearing outcome of unilateral SSNHL, which will be helpful in clinic application.

OR-0306

Extracellular volume fraction as a potential predictor to differentiate lung cancer from benign lung lesions with dual-layer detector spectral CT

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Objective: To evaluate the feasibility of extracellular volume fraction (ECV) derived from a dual-layer detector CT to differentiate lung cancer (LC) from benign lung lesions (BLLs).

Methods: Retrospectively, 128 patients with pathologically confirmed LC (n = 86) or BLLs (n = 42) were included. Conventional CT characteristics (including lesion size, shape, boundary, vascular convergence sign, lobulation, spiculation, pleural indentation and enlarged lymph node) and spectral CT parameters (including effective atomic number, electron density, extracellular volume fraction, iodine concentration, normalized iodine concentration, arterial enhancement fraction) were assessed. All patients' hematocrits were measured to correct contrast volume distributions in blood while calculating ECV. Chi-square test, Mann-Whitney U test, or a two-sample t-test were used to compare various types of variables. After performing a logistic regression analysis, conventional CT signs models (Model A), DLCT parameters models (Model B), combined diagnostic models (Model C), and ECV diagnostic models (Model D) were developed. The diagnostic effectiveness of each model was examined using the receiver operating characteristic (ROC) curve. The AUC of each model was compared using the Delong test.

Results: Certain conventional CT features (such as lesion size, lobulation, spiculation, pleural indentation, and enlarged lymph nodes) differed significantly between the two groups (all $P < 0.05$). Statistical differences were found in the following DLCT parameters (all $P < 0.05$): effective atomic number (Zeff) (nonenhancement), electron density (ED) (nonenhancement), extracellular volume fraction (ECV), iodine concentration (IC), normalized iodine concentration (NIC). Models A, B, C, and D had AUCs of 0.801, 0.805, 0.925, and 0.754, respectively. The AUC of Model D (ECV) showed no significant difference from that of Model A and B (Delong Test, $P > 0.05$).

Conclusion: The ECV derived from DLCT was feasible to differentiate LC from BLLs, broadening the scope of ECV in clinical research.

OR-0307

布鲁氏菌性脊柱炎影像诊断专家共识

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布鲁氏菌性脊柱炎是一种全球性的人畜共患的严重危害健康的感染疾病, 已成为危害公众健康的公共卫生问题。影像学监测对布鲁氏菌性脊柱炎的早期诊断、术前评价及疗效随访等方面发挥着不可替代的作用。当前影像学检查在布鲁氏菌性脊柱炎中缺乏诊断共识, 致使布鲁氏菌性脊柱炎的临床诊断与治疗随访过程中缺乏规范性, 为此由李宏军教授牵头联合全国多家医院著名专家, 运用循证医学方法, 查找与学习国内外最新与最佳的研究证据, 针对布鲁氏菌性脊柱炎影像学诊断原则、诊断依据、诊断标准及鉴别诊断来构建其共识, 为临床医师在布鲁氏菌性脊柱炎影像学诊断中提供可靠的诊断依据。

OR-0308

心脏磁共振扫描简介及伪影控制策略

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心脏磁共振检查可获得心脏的解剖, 功能, 灌注, 代谢及冠脉分布等综合信息。其无创、无辐射, 其多参数成像赋予其集结构、功能与组织学等“一站式”成像能力。CMR 新技术则能够揭示疾病的早期病理生理变化, 将在疾病的早期诊断、预后判断和危险分层中发挥重要指导作用。因此, 本次汇报将介绍心脏磁共振扫描简介及伪影控制策略, 以期提高心脏磁共振扫描水平, 发挥更大作用。

OR-0309

影像云在放射诊断质控工作中的应用价值

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医学影像学发展迅猛, 包括放射诊断、影像技术、介入放射等多门亚专业学科已经成为临床诊断、指导治疗、检测预后的重要辅助手段, 放射科医疗质量与质控管理也越来越受到影像和临床医生的高度重视。本着保障医疗安全及提高医疗影像质量的宗旨, 上海市放射诊断质控中心(以下称质控中心)于 2000 成立, 经过两届质控中心 10 多年的努力, 形成了上海放射诊断质控体系, 完成了上海放射诊断质控标准的修订等工作。然而质控中心对于各医院质控管理、培训、督查、数据填报等工作仍然停留在 10 多年前现场督查, 纸张记录, 人工统计结果, 集中大课培训等老方法, 对质控工作的效率, 质控结果的及时反馈和质控效果持续改进都是一种制约。2016 年公布的《医疗质量管理办法》的第三十九条对全国和地区的医疗质量管理部门的信息化建设有了明确指示。因此, 大数据时代来临的大背景下, 利用云技术, 建立一套全市统一的放射诊断质控云平台, 用信息化的手段优化质控中心工作, 实现质控数字化、质控平台化、质控智能化、数据标准化, 是打破放射诊断质控发展的关键举措。

OR-0310

吉林省医学影像质控中心关于网络共享平台建立完善前影像检查结果互认开展的道路探索

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目的: 搭建影像网络互认共享平台前期需要一定人力、财力和时间。吉林省影像科质控中心通过摸底调研和试点, 探索网络共享平台建立完善前影像检查结果互认开展的方式和经验

方法: 2022 年国家卫生健康委发布《医疗机构检查检验结果互认管理办法》的文件后, 吉林省医学影像科质控中心组织建立“省级质控中心—市区级质控中心—委员所在医疗机构—申请影像检查结果互认医疗机构”的微信联络群, 积极进行以“实现影像检查结果互认”为目标的摸底调研; 由头颈、

心胸、腹盆、骨肌专家组进行标准制定,通过云影像平台、网络传输、DICOM 数据刻录进行交互抽样考核,并记录纸质版评分表。

结果: 1.通过微信联络群、质控中心小程序上报结果并进行统计,包括 1) 吉林省医疗机构等级、数量、地区分布和占比,通过地区医疗机构数量和分布重新划分考核小组; 2) 医疗机构 CT、MR、DR 扫描仪器数量、厂家和地区分布排名,决定 DICOM 数据标注“JLHR”,同时互认项目在报告单上体现“吉林省 HR”; 3) 医疗机构具备云影像平台、DICOM 拷贝功能的数量和地区分布及排名; 4) 2022 年全省 102 项检查项目检查量统计、地区分布及排名,以及检查量排名靠前的检查项目类别。综合结果组织专家组发布了《关于印发九项吉林省医学影像互认质控标准和三项操作原则(2023 年版)的通知》,通过交互抽样考核通过第一批次三级试点单位 20 余家,医联体单位 2 家,民营医院 3 家。

结论: 在网络共享平台建立不完善的过程中, 1) 首先应通过已有的网站、微信群等方式尽可能的进行人员、设备、检查量的基础调研, 2) 同期组织人员制定质控标准, 3) 先试点质控中心委员单位抽样、交互考核,再逐级向三级医院、医联体医院、优质民营医院进行覆盖; 4) 统一三级医院影像 DICOM 检查结果会诊模式, 5) 号召二级医院医疗机构完善光盘刻录; 6) 酌情推进云影像平台。从而阶段性实现群众二次检查、重复花费、看病时间长的问题。

OR-0311

持续质量改进优化泌尿系 MSCT 图像质量的应用研究

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目的 采用持续质量改进方法,优化泌尿系 MSCT 图像质量。

方法 由科室技师长、高年资诊断医生及质控小组成员,根据相关指南及专家共识并结合科室情况,制定泌尿系 MSCT 扫描规范、图像后处理规范及图像质量控制评价标准。图像质控总分设置为 100 分,主要指标包括: 1、检查前准备环节(闭气配合、膀胱充盈、异物伪影、体位摆放、定位准确), 2、扫描环节(扫描范围,皮质期相,实质期相、排泄期相), 3、后处理环节(重建视野、重建范围、特殊重建、VR、CPR),各个指标设定相应分数;由质控负责人参照规范,并根据相关质控指标情况进行扣分;将总得分为 85 分以上的图像定义为优质,低于 85 分且高于 70 分的图像定义为合格,70 分以下定义为不合格。从 2021 年 6 月开始,由质控负责人每月抽取陆军特色医学中心放射科 50 例泌尿系 MSCT 图像进行质控,由技师长审核后,将质控结果与当月绩效挂钩;并每月召开质控分析会,质控人员通报当月质控情况,并运用 PDCA 管理工具,如鱼骨图、柏拉图等,分析较差图像的主要原因,制定预期改善目标,及下月重点质控指标。回顾性分析 2021 年 6 月至 2022 年 12 月每月的图像质控结果,统计图像优质率、合格率、不合格率,以及各项指标每月间的差异。

结果 图像优质率由 2021 年 6 月的 35%上升至 2022 年 12 月的 78%,差异具有统计学意义($P<0.05$)。图像合格率有 2021 年 6 月的 48%,降低至 2022 年 12 月的 17%,差异具有统计学意义($P<0.05$)。图像不合格率由 2021 年 6 月的 15%,降低至 2022 年 12 月的 5%,差异具有统计学意义($P<0.05$)。图像各项指标扣分情况每月均有下降。

结论 通过 PDCA 管理的持续质量改进方法,可以显著提高泌尿系 MSCT 图像优质率,降低不合格率;图像各项评价指标均有不同程度的提升,有效的改善了泌尿系 MSCT 的整体图像质量,为临床提供更优质精准的诊断。

OR-0312

基于深度学习构建颅脑 CT 图像质量智能量化评价体系的可行性研究

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目的

构建颅脑 CT 图像质量量化评价指标体系和基于深度学习的智能量化评价系统，实现快速、精准的颅脑 CT 图像质量自动化评价。

方法

通过文献回顾和专家论证，构建由图像质量维度、质量标准和量化指标组成的颅脑 CT 图像质量量化评价指标体系。由 5 名高年资放射科医生针对 315 份颅脑 CT 图像的质量维度和整体图像质量进行主观评分。利用基于 ResNet-50 的深度学习模型和线性回归分析构建图像质量智能量化评价系统。评价步骤包括：（1）利用基于 ResNet-50 的深度学习模型自动测量量化指标参数；（2）采用线性回归分析评估量化指标参数与质量维度评分之间的关系以及质量维度评分与整体图像质量评分之间的关系。采用组内相关系数（ICC）、Pearson 相关系数（r）和平均绝对差异（MAD）评估深度学习模型测量量化指标参数的准确性。采用配对样本 t 检验、Bland-Altman 图和 95% 一致性区间评估图像质量智能量化评价系统的性能。

结果

构建了由 7 个质量维度（摆位、布局、清晰度、对比度、噪声、异物、伪影）、11 条质量标准和 15 个量化指标组成的颅脑 CT 图像质量量化评价指标体系。深度学习模型测量量化指标参数的准确性较高（ICC = 0.71 ~ 1.00，r = 0.62 ~ 1.00，MAD = 0 ~ 56.85）。15 个量化指标参数与质量维度评分之间均有显著相关性（P 均 < 0.0001），7 个质量维度评分与整体图像质量评分之间均有显著相关性（P 均 < 0.0001）。图像质量智能量化评价系统预测评分与放射科医生评分之间无明显统计学差异（P > 0.05），Bland-Altman 分析结果显示两者差值在 95% 一致性区间内未呈现大小趋势的变化。

结论

构建了颅脑 CT 图像质量量化评价指标体系，具有系统性、全面性、客观性。构建了基于深度学习的颅脑 CT 图像质量智能量化评价系统，该系统在量化指标参数测量和图像质量评分方面具有较高的准确性，为大数据图像质量评价提供了可靠的自动化图像质量评价工具。

OR-0313

数字化 X 线标准化摄影操作视频在影像同质化中的应用

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目的 医学影像技术作为诊疗环节中的重要环节，致力于为临床提供及时、精准、有效的影像数据。针对不同类型疾病的检查需求，现已有上千项影像学检查医嘱。由于不同地区放射技术从业人员临床经验的差距，对于疾病诊断的掌握以及图像质量的把控标准均不统一，常常导致不同地区或不同医疗机构的检查结果不能互认。为了实现影像资料同质化，跨机构影像检查结果互认，拟制定标准化检查流程视频，建立摄影规范以及图像质控标准。

方法 从数字化 X 线摄影着手，按大纲整理-脚本撰写-视频拍摄-校正审核-成品推广应用的流程进行视频制作。大纲参考人民卫生出版社出版的《中华医学影像技术学》系列丛书并覆盖临床使用的常

规及特殊摄影位置，每期视频内容包括该摄影位置检查前准备、体位设计、摄影参数设计、图像质控、图像后处理以及临床应用等方面的操作规范。

结果 经过专家团队两年的制作，已完成头面部、胸腹部、躯干部、四肢骨关节、全长拼接摄影、乳腺摄影和检查注意事项共计 43 期规范化视频。

结论 视频过审后已通过各类平台推广应用，推进国内大型综合医院、医联体、基层医院建立统一的技术标准；同时应用于本科教学、毕业后教育、青年技师交流学习，助力专业技术人员提高及成长。

OR-0314

如何提高胎儿磁共振检查的成功率及图像质量

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背景与目的：胎儿磁共振检查是当超声检查发现胎儿异常，不能明确诊断胎儿疾病的进一步针对性检查，可以为临床医生提供更精确的产前诊断，是减小患儿出生缺陷的有效措施。由于胎儿磁共振检查无电离辐射、组织分辨率高、准确率高，近几年胎儿磁共振检查发展非常快，不仅开展胎儿磁共振检查的医院增多、胎儿磁共振检查的范围也不断扩大，从原来单纯的只开展胎盘、胎头检查，到目前扩展到胎儿全身各系统检查。目前缺少特别熟悉胎儿疾病的放射科医生，胎儿疾病的诊断更依赖扫描的图像质量，但胎儿磁共振检查成像时间较长、受胎动影响较大，如何提高胎儿磁共振检查的成功率以及保证图像质量是影像科技师工作的一个难点。文章从多个方面进行分析总结归纳经验，旨在提高胎儿磁共振检查的成功率以及图像质量。

方法：从胎儿磁共振检查的安全性、检查过程中的注意事项、检查过程中的难点、扫描方案及参数优化、图像质量控制以及社会人文关怀等方面进行分析总结，归纳提高胎儿磁共振检查成功率以及图像质量的经验。

结果：检查前对孕妇进行呼吸运动训练，检查过程中，遵循一个原则“尽量让孕妇舒服”；对于参数的设置原则：在保证能诊断疾病的前提下尽量缩短扫描时间，这些方法可以提高胎儿磁共振检查的成功率以及图像质量。

结论：在进行胎儿磁共振检查前，给孕妇多一些人文关怀，在保证能诊断疾病的前提下尽量缩短扫描时间，这会极大的降低孕妇的心理压力，胎动也可能会随之减少，从而推动检查的顺利进行，提高胎儿磁共振检查的成功率。

电子壁报

PO-0001

Functional Abnormalities of Cerebellum in Vascular Mild Cognitive Impairment

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Synopsis: The potential prevalence of vascular cognitive impairment (VCI) is high; early diagnosis and treatment is essential for disease prognosis. In this study, compared to healthy controls (HCs), there were differences of functional connectivity (FC) between the cerebellum and cerebral regions of VCI patients, mainly involving default mode network (DMN), sensorimotor network (SMN) and frontoparietal network (FPN). Furthermore, FC between multiple sub-regions in the cerebellum reduced in patients with VCI compared to HCs. These findings may expand our understanding of the neural mechanisms of VCI in the perspective of neurovascular coupling.

Objective: Recent neuroimaging studies have extensively described the atlas partitioning of the cerebellar cortex and its functional mappings related to cognitive function in cortical and subcortical brain regions. However, mappings of alterations in vascular cognitive impairment remains largely unexplored. This study aimed to perform functional FC analysis using high-resolution dissection mapping of the cerebellum, including the intra-cerebellar FC and cerebellar-cerebral FC, to investigate the potential associations between abnormal cerebellar connectivity and changes in cognitive function.

Materials and Methods: MRI data were collected on a 3.0T MR scanner (Signa 750w, GE Healthcare, USA). 72 VCI patients, including 38 small vessel mild cognitive impairment (SVMCI) and 34 post-stroke mild cognitive impairment (PSMCI), and 43 demographically matched HCs were included in this study. Changes of FC between sub-regions in the cerebellum and from each cerebellar sub-region to the cerebral seed points in VCI patients were calculated, and the association of these changes with cognitive function was examined.

Results: Compared with HCs, we found that VMCI patients had 11 cerebellar subregions showing significant differences (mainly decreases) in FC with brain regions in the default-mode network (DMN), sensory-motor network (SMN), and frontoparietal network (FPN). In the intracerebellar FC analysis, 47 (8%) cerebellar connections had significant intergroup differences, mainly a reduced magnitude of FC in VMCI patients. In the correlation analysis, higher Montreal Cognitive Assessment (MoCA) scores were correlated with stronger intracerebellar FC (left crus II–right lobule VI, left crus II–right lobule VIIb) and cerebellar-cerebral FC (right lobule X–left precuneus, vermal lobule IX–right inferior parietal lobule) in both the SVMCI and PSMCI groups.

Discussion and conclusion: Our results were consistent with recent studies of changes in cerebellum structure and function as VCI progresses. The finding of prominent intra-cerebellar and cerebellar-cerebral FC abnormalities in VCI patients adds to the evidence for a possible role of the cerebellum in cognitive processes. Patterns in FC changes in VCI patients and their correlations with neuropsychological measures may be a pathophysiological foundation for cognitive impairment, which provides new information to explore the involvement of the cerebellum in VCI that may aid the early diagnosis of VCI.

PO-0002

Altered Neurovascular Coupling in Patients with Vascular Cognitive Impairment: A Combined ASL-fMRI Analysis

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Abstract

Background and Objective:

This study aims to examine the role of neurovascular coupling (NVC) in vascular cognitive impairment (VCI) by investigating the relationship between white matter lesion (WML) burden, NVC, and cognitive deficits. Additionally, we aim to explore the potential of NVC as a tool for understanding the neural mechanisms underlying VCI.

Methods:

This study included thirty-eight small vessel disease cognitive impairment (SVCI) patients, 34 post-stroke cognitive impairment (PSCI) patients, and 43 healthy controls (HC). Comprehensive assessments, including neuroimaging and neuropsychological testing, were conducted to evaluate cognitive function. WML burden was measured and correlated with NVC coefficients to examine the relationship between white matter pathology and NVC. Mediation analysis was employed to explore the link relationship between NVC, WML burden, and cognitive function.

Results:

The present study showed that NVC was significantly reduced in the SVCI and PSCI groups compared with HCs at both whole-brain and brain region level. The analysis revealed notable findings regarding NVC in relation to WML burden and cognitive function in VCI patients. Specifically, reduced NVC coefficients were observed within higher order brain systems responsible for cognitive control and emotion regulation. Mediation analysis demonstrated that NVC played a mediating role in the relationship between WML burden and cognitive impairment.

Conclusions:

This study reveals the mediating role of NVC in the relationship between WML burden and cognitive function in VCI patients. The results demonstrate the potential of the NVC as an accurate measure of cognitive impairment and its ability to identify specific neural circuits affected by WML burden.

PO-0003

Dynamic Contrast-enhanced MRI Distributed Parameter Model in Identifying IDH Mutation and 1p/19q Codeletion in Patients With Glioma

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Introduction

Gliomas are the most common primary brain tumors in adults. The isocitrate dehydrogenase (IDH) genotype and 1p/19q codeletion status are two essential molecular markers that divide glioma into three groups: IDH wild-type, IDH mutant with 1p/19q non-codeletion, and IDH mutant with 1p/19q codeletion. The current available method for assessment of IDH and 1p/19q status is surgical biopsy along with subsequent genomic and proteomic analysis. The procedure has inherent

sampling error due to the tumor heterogeneity, inevitably resulting in erroneous determination. Furthermore, it is invasive, time consuming, and expensive. Dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) can assess blood-brain barrier (BBB) disruption and neovascularization in gliomas. These features reflect the variations in growth microenvironment and metabolic characteristics among different pathological subtypes of glioma to some extent. Previous research has demonstrated that DCE-MRI, employing the widely used Extended Tofts-Kety (exTofts) model, can predict the isocitrate dehydrogenase (IDH) genotype in gliomas. However, the utility of DCE-MRI in predicting the chromosome 1p/19q co-deletion status remains unexplored. This study aims to evaluate the potential of DCE-MRI, utilizing the distributed parameter (DP) model, in predicting the IDH genotype and chromosome 1p/19q co-deletion status in adult diffuse gliomas.

Materials and Methods

48 patients diagnosed with gliomas between April 2021 and April 2023 were retrospectively collected. All image processing was performed using a commercially available software (Mlalytics, FITPU Healthcare, Singapore), the median values of following kinetic parameters were yielded: transfer constant, K_{trans} (min^{-1}), fractional volume of extravascular extracellular space, V_e (mL/100 mL), plasma fractional volume, V_p (mL/100 mL) in exTofts, and blood flow, F (mL/min/100 mL), permeability-surface area product, PS (mL/min/100 mL), V_e and V_p in DP. Tumor region of interest (ROI) including tumor core was manually delineated. The differences of the parameters and mean age were compared between IDH-mutant and IDH-wildtype groups using independent t-test or Mann-Whitney U test according to the results of test for normality and homoscedasticity. The receiver operating characteristic (ROC) curves were utilized for assessing the performance of kinetic parameters. The same statistical tests were applied to examine the differences in parameters between IDH-mutant gliomas with and without 1p/19q co-deletion.

Results

V_e in extofts has the best performance in predicting IDH genotype ($AUC = 0.83$). F in DP has the best performance in predicting IDH genotype ($AUC = 0.79$). No parameter in extofts model shows significant difference between IDH-mutant gliomas with and without 1p/19q co-deletion.

Conclusion

Dynamic contrast-enhanced MRI distributed parameter Model is better in predicting the chromosome 1p/19q co-deletion status in adult diffuse gliomas.

PO-0004

Altered Dynamic Functional Connectivity of Insular Subdivisions in cigarette smokers

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Background: Insular subdivisions show distinct patterns of resting state functional connectivity with specific brain regions, each with different functional significance in chronic cigarette smokers. The goal of this study is to explore the altered dynamic functional connectivity (dFC) of distinct insular subdivisions in smokers. **Methods:** Resting-state BOLD data of 31 smokers and 27 sex- and age-matched non-smokers were collected. Three bilateral insular regions of interest (dorsal, ventral, and posterior) served as seeds for analyses. Sliding windows method was used to acquire the dFC metrics of different insular seeds. Support vector machine based on abnormal insular dFC was applied to classify smokers from non-smokers. **Results:** We found that smokers showed decreased dFC variance between the left ventral anterior insula with the right superior parietal cortex and left inferior parietal cortex, as well as increased dFC variance the right ventral anterior insula with the right middle cingulum cortex relative to non-smokers. Altered dFC variance of the right dorsal insula

and the right middle temporal gyrus in smokers was also found. Correlation analysis found the higher dFC between the right dorsal insula and the right middle temporal gyrus was associated with more smoker using years. The altered insular subdivision dFC can classify smokers from non-smokers with the accuracy of 89.66%, sensitivity of 96.30% and specificity of 83.87%. Conclusions: Our findings highlighted the abnormal patterns of fluctuating connectivity of insular subdivision circuits in smokers and suggested that these abnormalities may be potential biomarkers classifying smokers.

PO-0005

Altered insular functional activity in individual following electronic cigarettes

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Background: Smoking continues to be a burden to economies and healthcare systems across the world. One proposed solution to the problem has been e-cigarettes (e-cigs), however little is known about their potential health impacts. The study aimed to explore the impact of e-cigs on brain. **Methods:** We acquired the resting-state functional magnetic resonance imaging data from 93 chronic e-cigs users and 103 age- and sex- matched health controls (HC). Intrinsic oscillation was analyzed via regional homogeneity (ReHo) method at voxel-wise. The functional connectivity (FC) between the NAcc, VTA and insula was calculated at ROI-wise. The support vector machining classification model based on significant functional activity was used to identify e-cigs users from HCs. **Results:** Compared with HCs, chronic e-cigs users showed increased ReHo in the right rolandic operculum ($p < 0.05$, FDR corrected) and the right insula ($p < 0.05$, FDR corrected). At ROI-wise level, the significant group difference between e-cigs users and HCs in FC between NAcc, VTA and insula were found ($p < 0.05$, FDR corrected). Correlation analysis found a significant negative correlation between ReHo in the left NAcc and years of e-cigs ($r = -0.273$, $p = 0.008$, FDR corrected). Support vector machine based on all significant results can differentiate chronic e-cigs users from HCs with accuracy of 73.47%, AUC of 0.781, sensitivity of 67.74% and specificity of 78.64%. **Conclusions:** Dysregulated spontaneous activity and FC of addiction-related regions were found in chronic e-cigs users. It is suggested that e-cigs may have a negative health impact on brain and pose a risk of addiction.

PO-0006

Progression of hippocampal subfield atrophy and asymmetry in Alzheimer's Disease

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Background and purpose: Alzheimer's Disease (AD) affect hippocampus during progression, but currently there is no detail understanding of hippocampal regional vulnerability during disease. Determining the sequence in which hippocampal subfield become abnormal and its association with memory can provide important insights into AD progression.

Methods: In this study, we included 207 subjects: 86 mild cognitive impairment (MCI), 53 AD and 68 healthy controls from the Alzheimer's Disease Neuroimaging Initiative (ADNI). Participants underwent structural MRI scans to calculate the volume ratio and asymmetry index of hippocampal

subfields. Memory was scored using composite measures. We employed an event-based model to determine the sequence of occurrence of hippocampal subfield abnormal in MCI and AD cohorts. We assigned each patient to a specific event-based model stage, based on the number of their abnormal subfields. We used a combination of two-year follow-up MRI scans to demonstrate the longitudinal consistency and utility of the event-based model's staging system.

Results: In both MCI and AD groups, the event-based model estimated that the earliest atrophy occurs in hippocampal fissure, then spreading to other subregions and finally the subiculum. The sequence of asymmetry index (AI) increase beginning in the molecular and granule cell layers of the dentate gyrus (GC-ML-DG), cornus ammonis (CA) 4, the molecular layer (ML) in both MCI and AD. Longitudinal analysis performed using two years of follow-up data from baseline confirms efficacy of the model, as majority of the subjects move to later stages or remain stable with time. In addition, both subfield abnormal and event-based model stage were significantly correlated with patients' memory scores ($p < 0.05$).

Conclusion: We used a data-driven method to provide new insight into Alzheimer's disease hippocampal progression. The present model could aid to understanding of the disease stages, as well as track memory decline.

PO-0007

Alteration in Resting-state Effective Connectivity within the Papez Circuit in Presbycusis

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Background and purpose: Previous studies have suggested that the injuries to Papez circuit are linked with cognitive dysfunction in presbycusis. The aim of this study was to investigate abnormal alterations in resting-state effective connectivity within the Papez circuit and their association with cognitive decline in presbycusis patients.

Methods: Sixty-one presbycusis patients and 52 healthy controls (HCs) were included. The spectral dynamic causal modeling (spDCM) approach was used for resting-state effective connectivity analysis within the Papez circuit. The hippocampus (HPC), mamillary body (MB), anterior thalamic nuclei (ATN), anterior cingulate cortex (ACC), posterior cingulate cortex (PCC), entorhinal cortex (ERC), subiculum (Sub) and parahippocampal gyrus (PHG) were selected as the regions of interest. The fully connected model difference in effective connectivity between the two groups was assessed, and the correlation between effective connectivity alteration and cognitive scale was analyzed.

Results: We found that presbycusis patients demonstrated decreased effective connectivity from MB, PCC, and Sub to ACC relative to HCs, while higher effective connectivity strength was shown from HPC to MB, from ATN to PHG, and from PHG to Sub. The effective connectivity from PHG to Sub was significantly negatively correlated with Complex Figure Test (CFT)-delay score ($\rho = -0.259$, $p = 0.044$).

Conclusion: The results support and reinforce the role of abnormal effective connectivity within the Papez circuit in the pathophysiology of presbycusis-related cognitive impairment and reveal its potential as a novel imaging marker.

PO-0008

Changes of resting-state MRI in patients with sleep problems after COVID-19 infection

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Corona Virus Disease 2019 (COVID-19) infection is widespread, and many people have problems such as easy fatigue and sleep disturbance after COVID-19 infection. However, the changes in brain function associated with the development of sleep problems after COVID-19 infection remain unclear. To investigate the changes in brain function in the population with sleep problems after COVID-19. In current study, 32 patients who developed sleep problems after neocoronary were collected, as well as 22 gender- and education-year-matched controls, and all subjects were scaled to exclude emotional problems. As shown by resting-state magnetic resonance imaging the final results revealed that compared to the control group, the Low-frequency fluctuation (ALFF) values of the right putamen, part of the frontal lobe, extra-nuclear and the Lentiform Nucleus were significantly higher in the sleep problem group compared to the control group, while the ALFF values of the right inferior temporal gyrus. The ALFF values of the right inferior temporal gyrus were lower than those of the control group, and the functional connectivity of the putamen with the right postcentral gyrus, right parietal lobe, and right precentral gyrus was found to be reduced. This explains to some extent the changes in sleep-related brain areas in people with sleep problems after COVID-19. The COVID-19 infection can cause changes in sleep-related brain areas.

PO-0009

Comparison of Ruptured Intracranial Aneurysms Identification Using Different Machine Learning Algorithms and Radiomics

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Introduction: Different machine learning algorithms have different characteristics and applicable scenarios. Machine learning based on patients with intracranial aneurysm would benefit from the accurate prediction of aneurysm rupture, especially with objective features. Radiomics have been commonly applied in the prediction of intracranial aneurysm rupture. Given on the diversity of machine learning algorithms, a comprehensive evaluation of the current diversity features and machine learning algorithms would contribute to this topic. This study aims to predict ruptured intracranial aneurysms by radiomics models based on different machine learning algorithms and determine the best optimal radiomics model through the comparison. Determine whether there exist differences among the efficacy of diverse machine learning models and evaluate which machine learning algorithm is relatively more suitable for the identification of the rupture-prone aneurysms.

Methods: A total of 576 patients with intracranial aneurysm (192 ruptured ones, and 384 matched unruptured ones intracranial aneurysms) from two institutions centers were included, and were randomly divided into a training cohort and a validation cohort in a ratio of 7:3. Among which 403 patients were randomly chosen as the training cohort. Of the 109 radiomics features extracted from computed tomography angiography images, seven radiomics features stood out after independent sample t-test and elastic network regression analysis of total 109

extracted features from computed tomography angiography images. Then radiomics features and 12 commonly used machine learning algorithms including the decision-making tree, support vector machine, logistic regression, Gaussian Naive Bayes, k-nearest neighbor, Random forest, extreme gradient boosting, Bagging Classifier, Adaboost, Gradient boosting, Light Gradient Boosting Machine and Catboost, were applied to construct prediction models for predicting ruptured intracranial aneurysm. The predictive performance of all models was compared. Comparisons were conducted among them.

Results: In the validation cohort, the area under curve (AUC) values of models based on Adaboost, Gradient boosting, and Catboost for predicting ruptured intracranial aneurysm were 0.889, 0.883 and 0.864, respectively, with no significant difference among them. Of note, the performance of these models was, but significantly superior to that of the other nine models. The AUCs of Adaboost model in cross-validation were within the range of 0.842 to 0.918.

Conclusion: Radiomics models based on the boosting algorithms can be used to predict ruptured intracranial aneurysms. Under the same data condition, the prediction efficacy differed among machine learning algorithms, among which the boosting algorithms, especially the Adaboost algorithm, might be superior.

PO-0010

Predictive Value of Whole-brain CTP Combined with ABCD3 Score for Short-Term Stroke after TIA

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Objective:

To investigate the predictive value of combining Whole Brain CT Perfusion (WB-CTP) combined with the ABCD3 score in patients with transient ischemic attack (TIA).

Methods:

A total of 336 TIA patients with TIA underwent WB-CTP and ABCD3 score assessment within 48 hours of admission. Spearman correlation test was performed to analyze the relationship between the degree of vascular stenosis, relative perfusion values, and ABCD3 score. Logistic regression analysis was used to identify independent risk factors for secondary cerebral infarction. Receiver operating characteristic (ROC) curves were generated to evaluate the predictive value of relative cerebral blood flow (rCBF), degree of vascular stenosis, ABCD3 score, and the WB-CTP-ABCD3 combined model for secondary cerebral infarction after TIA.

Results:

Among the 336 TIA patients, 143 showed abnormal perfusion areas and 146 had responsible vessel stenosis. The degree of vascular stenosis, relative time-to-maximum (rTmax), and relative mean transit time (rMTT) were positively correlated with the ABCD3 score, while rCBF and relative cerebral blood volume (rCBV) were negatively correlated with the ABCD3 score. ROC curve analysis identified a cutoff value of 0.8205 for rCBF, with a sensitivity of 84.10% and specificity of 58.10% for distinguishing the cerebral infarction group from the non-cerebral infarction group. Furthermore, $rCBF \leq 0.8205$, degree of vascular stenosis, and ABCD3 score > 6 were identified as independent risk factors for secondary cerebral infarction in TIA patients within 90 days in TIA patients. The AUC of the WB-CTP-ABCD3 combined model for predicting secondary cerebral infarction within 90 days was 0.836.

Conclusion:

The combined model of WB-CTP-ABCD3 shows promise as a valuable method for predicting secondary cerebral infarction within 90 days following TIA.

PO-0011

Clinicopathological and radiological characteristics of false-positive and false-negative results in T2-FLAIR mismatch sign of IDH-mutated gliomas

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Abstract

Purpose:

To explore the clinicopathological and radiological characteristics associated with false-positive and false-negative results in the identification of isocitrate dehydrogenase (IDH) mutations in gliomas using the T2-fluid-attenuated inversion recovery (FLAIR) mismatch sign.

Methods:

In 1515 patients with cerebral gliomas, tumor location, restricted diffusion using diffusion-weighted imaging, and the T2-FLAIR mismatch sign were retrospectively analyzed using preoperative magnetic resonance imaging. Moreover, both the false-positive and false-negative results of the T2-FLAIR mismatch sign were obtained. Univariate and multivariate logistic analyses were performed to evaluate the risk factors associated with false-positive and false-negative results.

Results:

The overall false-positive rate was 3.5% (53/1515), and its independent risk factors were the patient's age (adjusted odds ratio [OR], 0.977; 95% confidence interval [CI], 0.957, 0.997; $p = 0.027$) and non-restricted diffusion (adjusted OR, 1.968; 95% CI, 1.060, 3.652; $p = 0.032$). The overall false-negative rate was 39.7% (602/1515); its independent risk factors were the patient's age (adjusted OR, 1.022; 95% CI, 1.005, 1.038; $p = 0.008$), 1p/19q co-deletion (adjusted OR, 3.334; 95% CI, 1.913, 5.810; $p < 0.001$), and telomerase reverse transcriptase promoter mutation (adjusted OR, 2.004; 95% CI, 1.181, 3.402; $p = 0.010$). For the mismatch sign in idiopathic IDH, the area under the receiver operating characteristic curve (AUC) was 0.602. The combined AUC for the T2-FLAIR mismatch sign and risk factors was 0.871.

Conclusions:

Clinicopathological and radiological characteristics can lead to the misinterpretation of IDH status in gliomas based on the T2-FLAIR mismatch sign. However, this can be avoided if careful attention is paid.

PO-0012

Altered brain structure and function after EC-T chemotherapy in patients with breast cancer: a longitudinal MRI study

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Objective:

The heterogeneity of the chemotherapy regimens can undermine the identification of cognitive impairment and underlying neural mechanisms in patients with breast cancer (BC). The EC-T chemotherapy regimen (epirubicin, cyclophosphamide, and docetaxel) is a standard approach for adjuvant treatment for BC patients. We aim to investigate the detrimental effects of the EC-T chemotherapy regimen on alteration in cognition, brain structure, and function in BC patients.

Methods:

By using individual high-resolution T1-weighted structural sequence and resting-state functional magnetic resonance imaging, 20 BC patients and 26 matched healthy controls were scanned before the EC-T chemotherapy at baseline (T1). All BC patients were also scanned after whole EC-T chemotherapy (T2). Gray matter volume (VBM) were used to assess changes in brain structure between-group differences. Amplitude of low-frequency fluctuation (ALFF) and regional homogeneity (ReHo) methods were used to evaluate the spontaneous brain activity between-group differences. A battery of neuropsychological tests was performed twice (T1 and T2) to assess an individual's cognitive function.

Results:

Compared with the T1, the BC patients at T2 exhibited a significantly poorer performance in attention, memory and executive function ($p < 0.05$). The volume of gray matter decreased at T2 compared with the T1 in breast cancer patients, mainly located in the left inferior frontal gyrus ($p < 0.001$, uncorrected), which was positively correlated with the score of the digit span test (backward) ($r = 0.519$, $p = 0.019$). Compared with the BC patients at T1, significantly lower ALFF values at T2 were showed mainly located in right posterior cingulate gyrus, and left precuneus, and increased ALFF values were showed in the left medial frontal gyrus ($p < 0.01$, Bonferroni corrected). Significantly lower ReHo values mainly located in left anterior cingulate gyrus, left medial cingulate gyrus, left piniform putamen, and right medial temporal gyrus in BC patients at T2 compared with T1 ($p < 0.01$, Bonferroni corrected). The lower ALFF values in right posterior cingulate gyrus were positively correlated with the short-term recall score of auditory verbal learning test ($r = 0.480$, $p = 0.032$) and the color trail test-A scores ($r = -0.488$, $p = 0.029$). The lower ReHo values in left anterior cingulate gyrus were positively correlated with the short-term recall scores ($r = 0.514$, $p = 0.014$) and immediate recall scores ($r = 0.480$, $p = 0.032$) of auditory verbal learning test.

Conclusion:

Our results suggest that structural and functional abnormalities in vulnerable brain regions exposed to the EC-T regimen may provide neuroimaging evidence to identify cognitive impairment induced by specific chemotherapy regimen.

PO-0013

Altered Functional Connectivity within the Brain Fear Circuit in Parkinson's Disease with Anxiety: A Seed-Based Functional Connectivity Study

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Objectives: Aimed to investigate whether there are abnormal changes in the functional connectivity (FC) between the amygdala with other brain areas, in Parkinson's disease (PD) patients with anxiety.

Methods: Participants were enrolled prospectively, and the Hamilton Anxiety Rating (HAMA) Scale was used to quantify anxiety disorder. Rest-state functional MRI (rs-fMRI) was applied to analyze the amygdala FC patterns among anxious PD patients, non-anxious PD patients, and healthy controls.

Results: Thirty-three PD patients were recruited, 13 with anxiety, 20 without anxiety, and 19 non-anxious healthy controls. In anxious PD patients, FC between the amygdala with the hippocampus, putamen, intraparietal sulcus, and precuneus showed abnormal alterations compared with non-anxious PD patients and healthy controls. In particular, FC between the amygdala and hippocampus negatively correlated with the HAMA score ($r = -0.459$, $p = 0.007$).

Conclusion: Our results support the role of the fear circuit in emotional regulation in PD with anxiety. Also, the abnormal FC patterns of the amygdala could preliminarily explain the neural mechanisms of anxiety in PD.

PO-0014

Ectopic invasive ACTH-secreting pituitary adenoma mimicking chordoma: a case report and literature review

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Abstract

Background Ectopic pituitary adenoma (EPA) is defined as a special type of pituitary adenoma that originates outside of the sellar region, is extra- or intra-cranially located, and without connection to normal pituitary tissue. EPA is extremely rare, with most cases presented as case reports or small case series. Due to nonspecific symptoms and laboratory indicators, the preoperative diagnosis, treatment and management for EPA remain challenging.

Case presentation Here, we report the imaging phenotype and pathological findings of a case of invasive EPA in a 47-year-old woman. A preoperative non-contrast CT scan revealed a 5.8×3.6×3.7 cm soft tissue mass located in the sphenoid sinus and clivus. MRI showed an ill-defined solid mass with heterogeneous signals on T1-weighted and T2-weighted images. The mass displayed infiltrative growth pattern, destroying bone of the skull base, invading adjacent muscles and encasing vessels. The patient underwent partial tumor resection via transsphenoidal endoscopic surgery. Pathological examination led to diagnosis of ectopic ACTH-secreting pituitary adenoma. Post-surgery, the patient received external beam radiotherapy.

Conclusion EPA with invasive growth pattern has rarely been reported. The imaging phenotype displays its relationship to the pituitary tissue and surrounding structures. Immunohistochemical examination acts as a crucial role in differentiating EPA from other skull base tumors. This case report adds to the literature on EPA by summarizing its characteristics alongside a review of the literature.

PO-0015

Structural degeneration and functional reorganization of visual cortex and visual subcortex in dysthyroid optic neuropathy

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Purpose: Dysthyroid-optic-neuropathy (DON) is the most severe complication of thyroid-associated-ophthalmopathy (TAO), which may lead to irreversible vision loss if treated untimely. This study aimed to investigate structural and functional alterations of visual-cortex (VC) and visual-subcortex (VS) in DON.

Methods: DON patients, TAO without DON patients and healthy controls (HC) were retrospectively selected from our hospital database. Clinical assessments included clinical activity scores (CAS), visual acuity (VA). Structural alterations included VC (primary, second, third and fourth VC) and VS (lateral-geniculate-nucleus, LGN) gray matter volume (GMV) through structural MRI. Functional alterations were analysed included functional-connectivity (FC) and dynamic functional connectivity (dFC strength, dFCS; dFC variability) based on VC and VS through rs-fMRI. Correlation analyses were used to assess the relationships between MRI alterations and clinical assessments.

Results: 30 DON patients, 40 TAO patients and 21 HC were enrolled in our study. DON showed reductions in GMV of VC and VS than TAO and HCs. Compared with TAO, DON showed decreased FC between left-primary VC to left-Temporal-Pole-Sup, increased dFCS between r-LGN

to r-BA19, l-BA37, l-precuneus. Compared with HC, DON showed decreased FC between r-primary VC to r-BA6 and l-BA38, decreased dFCS between l-third VC to l-BA7 and r-BA11. In DON, GMV of r-LGN, l-second, l-third, l-fourth VC exhibited correlations with VA ($r=0.43$; $r=0.38$; $r=0.38$; $r=0.50$, respectively). In addition, dFCS between r-LGN to l-BA37 was associated with CAS ($r=0.37$) and GMV of r-LGN ($r=0.37$). dFCS between r-third VC to r-BA11 positively correlated with GMV of r-third VC ($r=0.41$).

Conclusion: This study indicates the potential of structural and functional abnormalities at MRI within visual-cortex and subcortex as predictive indicators of DON and contributes to our comprehension of the degeneration of posterior visual pathway in DON.

PO-0016

Non-alcoholic fatty liver disease is associated with brain function disruption in type 2 diabetes patients without cognitive impairment

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Context: Type 2 diabetes (T2D) is frequently accompanied by non-alcoholic fatty liver disease (NAFLD), both of which are associated with cognitive impairment. However, whether and how NAFLD worsens brain damage in patients with T2D remains unclear.

Objective: This study aimed to investigate the neural statics and dynamics intrinsic activity of intra-/inter- network topology in T2D with NAFLD (T2NAFLD) and without NAFLD (T2noNAFLD), and assess the relationship with metabolism.

Methods: Fifty-six T2NAFLD patients, 78 T2noNAFLD patients, and 55 healthy controls (HC) were included. Participants had normal cognition and underwent functional MRI scan, clinical measurements and global cognition assessment. Independent component analysis was used to study frequency spectrum parameters, static functional network connectivity and temporal properties of dynamic functional network connectivity ($p < 0.05$, false discovery rate corrected). Statistical analysis included one-way analysis of covariance with post hoc analysis, partial correlation, and canonical correlation analysis.

Results: Our findings showed that: 1) T2NAFLD patients are more disordered in blood glucose and lipid metabolism, more severe insulin resistance and more obese than T2noNAFLD; 2) patients with T2D exhibit disruptive brain function, as evidenced by alteration in the intra-/inter-network topology, even in the absence of clinically measurable cognitive impairment; 3) T2NAFLD patients have a significantly greater reduction in frequency spectrum parameters of the cognitive executive network and visual network than T2noNAFLD; 4) altered brain function in patients with T2D is associated with post-prandial glucose, high-density lipoprotein cholesterol, waist-hip ratio and body mass index.

Conclusion: This study may provide novel insights into neuroimaging correlates for underlie pathophysiologic processes that brain damage in T2NAFLD. Given this, controlling blood glucose and lipid levels and body weight may reduce the risk of cognitive impairment in these patients.

PO-0017

Dimensional subtyping of first-episode drug-naïve major depressive disorder: A multisite resting-state fMRI study

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Background: Major depressive disorder (MDD) is a heterogeneous syndrome, and understanding its neural mechanisms is crucial for the advancement of personalized medicine. However, conventional subtyping studies often categorize MDD patients into single subgroup, neglecting the continuous interindividual variations. This implies a pressing need for a dimensional approach.

Methods: 230 first-episode drug-naïve MDD patients and 395 healthy controls undergoing resting-state functional magnetic resonance imaging (rs-fMRI) scans obtained from 5 sites via the Rest-meta-MDD project. A Bayesian model harmonizes categorical and dimensional perspectives of heterogeneity and was utilized to estimate latent factors based on the resting-state functional connectivity (RSFC) of MDD. Demographic and clinical variables were compared across these identified factors.

Results: We identified three latent factors with distinct but partially overlapping whole-brain hypo- and hyper-RSFC patterns. Most participants co-expressed multiple latent factors to varying degrees rather than a single factor. All factors shared abnormal RSFC involving the default mode network and frontoparietal network, but the directionality (hypo- or hyper-RSFC) partially differed across factors. All factors had comparable demographic and clinical variables.

Conclusions: These findings shed light on the interindividual variability in MDD and could form the basis for developing novel therapeutic approaches that capitalize on the heterogeneity of MDD.

PO-0018

Altered brain structure in patients with right hemifacial spasm: A multimodal brain structure study

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Objective: The anatomical alterations in the brain generated by hemifacial spasm (HFS) continue to be a source of contention. We evaluated changes in the brain microstructure associated with HFS and observed their relevance to clinical features.

Methods: 3.0T MRI was adopted to capture T1-weighted structural imaging and diffusion tensor imaging data from 36 HFS patients and 36 healthy controls. We employed voxel-based morphometry (VBM) and tract-based spatial statistics (TBSS) to identify gray matter volume (GMV) and disruptions in the white matter (WM). The severity of the spasm was determined via the Cohn grading system.

Results: A substantial decrease in GMV in the left Thalamus but an increase in GMV in the right Cerebellum IV-V in the HFS group, as analyzed by the VBM. Fractional anisotropy (FA) in the HFS group's left superior longitudinal fasciculus (SLF) has suffered from a substantial increase. Changes of GMV in left thalamus and FA in left SLF were correlated with disease duration and Cohn grading.

Conclusions: We identified altered regions of GMV in HFS patients characterized by decreased thalamic volume and increased cerebellar compensatory volume. Furthermore, it is concluded that the FA in the left SLF may be a critical neuronal marker for HFS.

PO-0019

Structure Alterations in left-sided trigeminal neuralgia: A voxel-based morphometry and diffusion tensor imaging study

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Background: The purpose of this study was to investigate the changes of brain structure in patients with primary trigeminal neuralgia (TN), and to further explore the relationship between these changes and the clinical manifestations of TN patients.

Methods: T1-weighted structural imaging and diffusion tensor imaging data were collected from 32 TN patients and 32 healthy controls using 3.0T MRI. Gray matter volume (GMV) and white matter destruction (WM) were identified using voxel-based morphometry (VBM) and tract-based spatial statistics. The correlations between structural metrics and visual analogue scale (VAS) and disease duration were analyzed.

Results: A substantial decrease in GMV in the right thalamus in the TN group, as analyzed by the VBM. Fractional anisotropy (FA) and radial diffusivity (RD) in the genu and body of corpus callosum (CC), anterior corona radiata (CR), and superior CR have suffered from a substantial increase and decrease, relatively. The changes of FA and RD in some of these altered brain regions were correlated with disease duration and VAS.

Conclusions: We found that the altered area of GMV in left TN patients was characterized by decreased thalamic volume. In addition, the FA and RD values of CC and CR have important value in evaluating the pain degree of TN patients.

PO-0020

The hierarchical organization of the precuneus captured by functional gradients

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Background: The precuneus shows considerable heterogeneity in multiple dimensions including anatomy, function, and involvement in brain disorders. Leveraging the state-of-the-art functional gradient approach, we aimed to investigate the hierarchical organization of the precuneus, which may hold promise for a unified understanding of precuneus heterogeneity. **Methods:** Resting-state functional MRI data from 793 healthy individuals were used to discover and validate functional gradients of the precuneus, which were calculated based on the voxel-wise precuneus-to-cerebrum functional connectivity patterns. Then, we performed a series of further analyses to explore the relationships of the precuneus functional gradients with cortical morphology, intrinsic geometry, canonical functional networks, and behavioral domains. **Results:** We found that the precuneus principal and secondary gradients showed dorsoanterior-ventral and ventroposterior-dorsal organizations, respectively. Concurrently, the principal gradient was associated with cortical morphology, and both the principal and secondary gradients showed geometric distance dependence. Importantly, precuneus functional subdivisions corresponding to canonical functional networks (behavioral domains) were distributed along both gradients in a hierarchical manner, i.e., from the sensorimotor network (somatic movement and sensation) at one extreme to the default mode network (abstract cognitive functions) at the other extreme for the

principal gradient and from the visual network (vision) at one end to the dorsal attention network (top-down control of attention) at the other end for the secondary gradient. Conclusion: These findings suggest that the precuneus functional gradients may not only provide mechanistic insights into the multifaceted nature of precuneus heterogeneity, but also have the potential to generate new hypotheses about neural mechanisms of neuropsychiatric disorders.

PO-0021

Decoupling of Gray and White Matter Functional Networks in Cognitive Impairment Induced by Occupational Aluminum Exposure: a case control study

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Background Aluminum (Al) is a low toxic and accumulative harmful substance that has neurotoxicity and a negative impact on human cognitive function. The goal of the present study was to investigate the neuro mechanisms of cognition impairment caused by occupational Al exposure.

Methods Resting-state functional magnetic resonance imaging was performed on 54 workers who were exposed to Al for more than 10 years. The level of Al was collected, and cognition was assessed by the Montreal Cognitive Assessment (MoCA). Then, the K-means clustering algorithm was used to identify functional gray matter (GM) and white matter (WM) networks. Two-sample t tests were performed between the cognition impairment group and control group to determine which differences in functional connectivity (FC) were significant.

Results Al was negatively correlated with the MoCA score. Participants with cognitive impairment showed decreased FC between the middle cingulum network (WM1) and anterior cingulum network (WM2) and between the executive control network (WM6) and limbic network (WM10). It is worth noting that decreased FCs were found between the executive control network (GM5) and WM1, WM4, WM6, and WM10. In addition, the FC of GM5-GM4 and WM1-WM2 was negatively correlated with TMT-A scores.

Conclusion The long-term accumulation of Al has a detrimental effect on cognition, and this damage is mainly related to the disconnection in executive control and limbic networks.

PO-0022

Evaluation of the Default Mode Network using Nonnegative Matrix Factorization in Patients with Cognitive Impairment Induced by Occupational Aluminum Exposure

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Aluminum (Al) is an important environmental pathogenic factor for neurodegenerative diseases, especially mild cognitive impairment (MCI). To evaluate the gray matter volume of structural covariance network alterations in patients with Al-induced MCI. Male subjects who had been exposed to Al for more than ten years were included in the present study. The plasma Al concentration, Montreal Cognitive Assessment (MoCA) score and verbal memory assessed by the Rey auditory verbal learning test (AVLT) score were collected from each participant. Nonnegative matrix factorization was used to identify the structural covariance network. The neural structural basis for patients with Al-induced MCI was investigated using correlation analysis and group

comparison. Plasma A β concentration was inversely related to MoCA scores, particularly AVLT scores. In patients with A β -induced MCI, the gray matter volume of the default mode network (DMN) was considerably lower than that in controls. Positive correlations were discovered between the DMN and MoCA scores, as well as between the DMN and AVLT scores. Together, long-term occupational A β exposure has a negative impact on cognition, primarily by affecting delayed recognition. The reduced gray matter volume of the DMN may be the neural mechanism of A β -induced MCI.

PO-0023

The Role of the Orbitofrontal Cortex in Exercise Addiction and Exercise Motivation: A Brain Imaging Study Based on Multimodal Magnetic Resonance Imaging

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Background Excessive exercise may also lead to exercise addiction (EXA), which is harmful to people's physical and mental health. Behavioral and neuroimaging studies have demonstrated that addictive disorders are essentially motivational problems. However, little is known about the neuropsychological mechanism of EXA and the effects of motivation on EXA.

Methods We investigated 130 regularly exercised participants with EXA symptoms to explore the neurobiological basis of EXA and its association with motivation. The correlation between EXA and gray matter volume (GMV) was evaluated by whole-brain regression analysis based on voxel-based morphometry. Then, regional brain function was extracted and the relationship between brain structure-function-EXA was analyzed. Finally, mediation analysis was performed to further detect the relationship between the brain, motivation, and EXA.

Results Whole-brain correlation analyses showed that the GMV of the right orbitofrontal cortex (OFC) was negatively correlated with EXA. The function of the right OFC played an indirect role in EXA and affected EXA via the GMV of the OFC. Importantly, the GMV of the right OFC played a mediating role in the relationship between ability motivation and EXA. These results remain significant even when adjusting for sex, age, body mass index, family socioeconomic status, general intelligence, total intracranial volume, and head motion.

Limitation The results should be interpreted carefully because only the people with EXA symptoms were included.

Conclusion This study provided evidence for the underlying neuropsychological mechanism of the important role of the right OFC in EXA and revealed that there may be a decrease in executive control function in EXA.

PO-0024

Abnormal alterations of cerebral blood flow and functional connectivity in Neuromyelitis Optica Spectrum Disorders

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Objective Studies have demonstrated that patients with Neuromyelitis Optica Spectrum Disorders (NMOSD) has abnormal brain function. Our study focused on elucidating the alterations of Cerebral Blood Flow (CBF) and Functional Connectivity (FC) in NMOSD patients who were negative in routine MRI scan.

Methods In this study, 24 patients with NMOSD and 25 demographically matched healthy controls (HCs) were studied for CBF and FC using a seed-based whole-brain FC analysis. Arterial Spin Labelling (ASL) were used to determine differential CBF regions in patients with NMOSD. A seed-based whole-brain FC analysis was performed for regions with significant CBF changes.

Results The results showed that the cerebral blood flow of bilateral occipital cortex was the most significant in NMOSD patients. Compared with HCs, CBF of bilateral calcarine fissure (CAL), right supplementary motor area (SMA) and right superior temporal gyrus (STG) were decreased in NMOSD patients, while the right middle temporal gyrus (MTG) were increased. We observed that the FC between the bilateral CAL and Olfactory (OLF) and that between the right SMA and left superior frontal gyrus (SFG), the right STG and cuneus (CUN) were increased in patients with NMOSD. While that between the right SMA and right postcentral gyrus (PoCG), the right STG and inferior parietal lobule (IPL) were decreased. We found a correlation between CBF of bilateral calcarine fissure and EDSS score in NMOSD patients.

Conclusions These findings suggested that CBF and FC were altered simultaneously in patients with NMOSD, which may provide additional information and insight regarding the pathophysiology of NMOSD from neuronal and vascular integration perspectives.

PO-0025

Altered static and dynamic functional network connectivity in individuals with subthreshold depression: a large-scale resting-state fMRI study

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Dynamic functional network connectivity (dFNC) is an expansion of static FNC (sFNC) that measures connectivity variation among brain networks. This study aims to investigate the changes of sFNC and dFNC strengths as well as temporal properties in individuals with subthreshold depression (StD). Forty-two individuals with subthreshold depression and 38 healthy controls were included in this study. Data-driven independent component analysis (GICA) was used to determine the target resting-state networks. Sliding window and k-means clustering analysis were used to obtain dFNC patterns and temporal properties for each subject. We compared sFNC and dFNC differences between the StD and HCs groups. Relationships between changes of FNC strength, temporal properties, and neurophysiological scores were evaluated by Spearman's correlation analysis. Regarding the analysis of sFNC, StD individuals showed altered FNC among four functional domains, mainly involving in executive control network (ECN), default mode network (DMN), sensorimotor network (SMN) and dorsal attentional network (DAN). For the dFNC analysis, 4 recurring FNC patterns were identified. When compared to HCs, StD had increased mean dwell time and fraction time in a weak connected state (state 4), which is associated with self-focused thinking status. In addition, StD demonstrated decreased dFNC strength between DMN-DAN in state 2. The sFNC strength (DMN-ECN) and temporal properties were correlated with HAMD-17 scores in StD individuals. Our study provides new evidence on aberrant time-varying brain activity and large-scale network interaction disruptions in StD individuals, which may provide novel insight to better understand the underlying neuropathological mechanisms.

PO-0026

The reduction of vitamin D in females with major depressive disorder is associated with worse cognition mediated by abnormal brain functional connectivity

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Low vitamin D is linked to major depressive disorder (MDD) through affecting the brain. Gender difference is apparent in MDD and vitamin D level. We aimed to examine the association between gender, vitamin D, clinical presentations, and brain functional connectivity in a large cohort of MDD patients and comparison subjects. Resting-state functional MRI data from 122 patients and 119 controls were collected to perform a combined analysis of functional connectivity density (FCD) and seed-based functional connectivity (FC). Peripheral venous blood samples were obtained to measure serum concentration of vitamin D (SCVD). Clinical presentations (symptoms profiles and cognition) were also assessed. We found an interaction of group and gender on SCVD in which MDD patients demonstrated lower SCVD than controls in females rather than males. Concurrently, lower SCVD was associated with worse cognitive performance (prospective memory and sustained attention). Compared with controls, female MDD patients showed reduced FCD and FC of the left middle frontal gyrus, which were related to lower SCVD. Importantly, these FCD and FC changes mediated the relationship between lower SCVD and cognitive dysfunction. Our findings suggest that functional connectivity abnormalities may serve as neural substrates underlying the associations between low vitamin D and cognitive impairments in female MDD patients, providing unique insight into treatment and prevention of MDD and its related cognitive dysfunction from the perspective of regulating circulating vitamin D.

PO-0027

Brain function mediates the association between low vitamin D and neurocognitive status in female patients with major depressive disorder

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Background: Vitamin D is engaged in various neural processes, with low vitamin D linked to depression and cognitive dysfunction. There are gender differences in depression and vitamin D level. However, the relationship between depression, gender, vitamin D, cognition, and brain function has yet to be determined.

Methods: One hundred and twenty-two patients with major depressive disorder (MDD) and 119 healthy controls underwent resting-state functional MRI and fractional amplitude of low-frequency fluctuations (fALFF) was calculated to assess brain function. Serum concentration of vitamin D (SCVD) and cognition (i.e. prospective memory and sustained attention) were also measured.

Results: We found a significant group-by-gender interaction effect on SCVD whereby MDD patients showed a reduction in SCVD relative to controls in females but not males. Concurrently, there was a female-specific association of SCVD with cognition and MDD-related fALFF alterations in widespread brain regions. Remarkably, MDD- and SCVD-related fALFF changes mediated the relation between SCVD and cognition in females.

Conclusion: Apart from providing insights into the neural mechanisms by which low vitamin D contributes to cognitive impairment in MDD in a gender-dependent manner, these findings might have clinical implications for assignment of female patients with MDD and cognitive dysfunction to

adjuvant vitamin D supplementation therapy, which may ultimately advance a precision approach to personalized antidepressant choice.

PO-0028

The protective effect of vitamin D supplementation on the brain of patients with major depressive disorder: A randomized controlled trial

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Background: Growing evidence points to the pivotal role of vitamin D in the pathophysiology and treatment of major depressive disorder (MDD). However, there is a paucity of longitudinal research investigating the effects of vitamin D supplementation on the brain of MDD patients.

Methods: We conducted a double-blind randomized controlled trial in 46 MDD patients, who were randomly allocated into either VD (antidepressant medication + vitamin D supplementation) or NVD (antidepressant medication + placebos) groups. Data of diffusion tensor imaging, resting-state functional MRI, serum vitamin D concentration, and clinical symptoms were obtained at baseline and after an average of 7 months of intervention.

Results: Both VD and NVD groups showed significant improvement in depression and anxiety symptoms, but with no significant differences between the two groups. However, a greater increase in serum vitamin D concentration was found to associate with greater improvement in depression and anxiety symptoms in VD group. More importantly, neuroimaging data demonstrated disrupted white matter integrity of right inferior fronto-occipital fasciculus along with decreased functional connectivity between right frontoparietal and medial visual networks after intervention in NVD group, but no changes in VD group.

Conclusions: These findings suggest that vitamin D supplementation as adjunctive therapy to antidepressants may not only contribute to improvement in clinical symptoms, but also help to preserve brain structural and functional connectivity in MDD patients.

PO-0029

Spin-Singlet Targeted Glutamate Proton Magnetic Resonance Radiofrequency Pulse Sequence Development and Preliminary Application

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Background Proton Magnetic Resonance Spectroscopy ($^1\text{H-MRS}$) can non-invasively measure the concentration of specific compounds in the selected voxel region of living tissue and thus infer the metabolic state of the corresponding brain region. Timely and accurate quantitative analysis of amino acids in vivo can aid in the early diagnosis of central nervous system diseases. The spectral signals of glutamate (Glu) and glutamine (Gln) obviously overlap in the curves obtained by $^1\text{H-MRS}$, which makes it very difficult to separate Glu signals. Therefore, it is very important to selectively isolate the signal of Glu in vivo to study the metabolic process of Glu in normal people and to determine its role in the progression of glioma.

Objective To verify the feasibility of applying targeted Glu sequence to different concentrations of Glu aqueous solution and clinical practice.

Methods 1) Using a 3.0T clinical MRI scanner, Glu-targeted ^1H -MRS pulse sequences were developed and tested to selectively detect Glu signals. The tests were performed in Glu aqueous phantom at different concentrations, and a conventional single voxel spectroscopy (SVS) PRESS sequence was scanned simultaneously to determine the reliability of the Glu signal isolated in the aqueous phantom. 2) The SVS PRESS sequence and the Glu-targeted ^1H -MRS pulse sequence were applied to healthy controls and glioma patients respectively, to determine the reliability of the Glu-targeted ^1H -MRS pulse sequence in clinical applications. The Glu spectral lines obtained from the above SVS PRESS sequence measurements were qualitatively compared with the Glu spectral lines fitted by the LCModel software.

Results The developed pulse sequence of Glu-targeted ^1H -MRS was applied to Glu aqueous phantom at different concentrations, different parts of healthy human brain and glioma patients, and the signals of Glu were selectively detected and isolated. The chemical shifts, peaks and waveforms of the obtained spectral lines all converged with the Glu spectral lines fitted by LCModel.

Conclusion The newly developed Glu-targeted ^1H -MRS pulse sequence can detect the Glu signal in the water model solution at different concentrations. It can be applied to the selective Glu-targeted detection of normal human brain and glioma patients.

PO-0030

Quantitative Study of Clinical Application of Spin-Singlet Targeted Glutamate Proton Magnetic Resonance Radiofrequency Pulse Sequence

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Background Conventional single voxel spectroscopy (SVS) proton magnetic resonance spectroscopy (^1H -MRS) is a non-invasive method for measuring cellular metabolism in tissues and organs. ^1H -MRS imaging combined with LCModel analysis software can be used to non-invasively detect changes in brain metabolites and quantitatively analyze the concentration of these metabolites. By continuously optimizing the scanning and post-processing techniques, we can also quantify metabolites with similar molecular structure and spectral characteristics, such as acetylaspartic acid (NAA), Glu/Gln, etc. However, there are many other post-processing analytical methods that can change the accuracy of ^1H -MRS metabolite quantification, and it is not clear to what extent the differences in analytical methods used to quantify ^1H -MRS data affect the quantitative results.

Objective The brain tissue and glioma of normal volunteers (Healthy controls, HCs) were detected by conventional voxel MRS, ^1H -MRS Glu targeted pulse sequence and LCModel, MATLAB and other post-processing software. The method of in vivo quantitative detection of Glu, quantitative detection of Glu in different lobes of normal brain and quantitative detection of Glu in glioma were investigated. To explore the feasibility of Glu quantification detected based on Glu-targeted ^1H -MRS pulse sequence as a biomarker for Glu metabolic imaging in human brain in vivo.

Methods From June 2022 to January 2023, 10 glioma patients (over 18 years old) were enrolled as the patient group and 28 healthy volunteers were recruited as the volunteer group. All subjects were scanned by SIEMENS 3.0T MRI (Prisma) system, including 3D-MRI axial scan, single voxel ^1H -MRS (PRESS) scan, and Glu-targeted ^1H -MRS scan. In normal subjects, frontal lobe, occipital lobe and basal ganglia were selected as voxel regions of interest (VOI). In the patient group, the VOI was located in the solid part of tumor. The spectral lines obtained by conventional voxel MRS detection were post-processed and semi-quantitatively determined by LCModel (SVS-LCModel method), and the spectral lines obtained by targeted Glu sequence were manually measured and semi-quantitatively determined by MATLAB (SSO-MATLAB method). The reliability of the two

quantitative detection methods was evaluated by Bland-Altman (B-A) method and coefficient of variation (CV) analysis, respectively. Pearson product-moment correlation coefficient (R) was used to calculate the correlation between Glu and total creatine (tCr) quantified by different detection methods, i.e. creatine (Cr) + creatine phosphate (Pcr). The quantitative values of Glu in the tumor area detected by two methods were compared with those in the normal frontal lobe area by two-sample t-test.

Results The quantitative results of SVS-LCModel in frontal lobe, occipital lobe and basal ganglia of volunteers were (1.275 ± 0.0987 ; 1.227 ± 0.1696 ; 1.040 ± 0.1335), the quantitative results of SSO-MATLAB were (0.690 ± 0.0742 ; 0.529 ± 0.1304 , 0.552 ± 0.1990), and the quantitative results of SVS-LCModel and SSO-MATLAB in the glioma area were (3.407 ± 0.6149) and (0.644 ± 0.3002), respectively. The semi-quantitative Glu values of the two methods in the frontal lobe, occipital lobe and basal ganglia region and glioma group were in good agreement with each other, among which the frontal lobe and occipital lobe had the best consistency. CV analysis also showed that the variation of frontal lobe and occipital lobe was the lowest, among which SVS-LCModel (frontal lobe: 7.74%, occipital lobe: 13.82%) was better than SSO-MATLAB (frontal lobe: 10.75%, occipital lobe: 24.65%). The results of correlation analysis of the two methods showed that there was a good correlation between frontal lobe and occipital lobe, but there was no correlation between basal ganglia and tumor area, and SVS-LCModel showed that the content of Glu in glioma area was significantly higher than that in normal frontal lobe (SVS-LCModel), and there was no significant difference in Glu content between glioma area and frontal lobe by SSO-MATLAB method.

Conclusion The quantitative detection of Glu of SSO-MATLAB in frontal lobe and occipital lobe of normal subjects has a better correlation with SVS-LCModel, and the reliability of semi-quantitative detection of Glu is better, but the reliability of quantitative detection of Glu in basal ganglia and glioma is not ideal, so it still needs to be improved.

PO-0031

Diffusion heterogeneity and vascular perfusion in tumor and peritumoral areas for prediction of overall survival in patients with high-grade glioma

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Objective: To evaluation of diffusion heterogeneity and vascular perfusion in tumor and peritumoral areas for prognostic prediction in high-grade glioma (HGG, WHO III/IV grade).

Methods: Forty patients with HGG underwent diffusion kurtosis imaging (DKI), intravoxel incoherent motion (IVIM), and arterial spin labeling (ASL) MRI before operation. After normalization, the parameters were divided into diffusion heterogeneity parameters (rD, rMD, rMK, rKr, rKa) and vascular perfusion parameters (rD*, rF, rCBF). Univariate and multivariate Cox regression analyses were used to evaluate associations between overall survival (OS) and the above parameters, clinical factors, and IDH1 status. The Mann-Whitney test was used to evaluate differences in the parameters between different IDH1 states.

Results: In the univariate Cox regression analysis, OS was significantly associated with tumor resection range, IDH1 status, tumor heterogeneity parameters (rD, rMD, rMK, rKr, rKa), and rCBF in tumor area (all $p < 0.05$). In addition, rD and rCBF measured in the peritumoral region were also predictors of poor OS (both $p < 0.01$). Multivariate Cox regression analysis indicated that rMK in the tumor area and rCBF in the peritumoral area (hazard ratio = 7.900 and 5.466, respectively, for each 0.1 increase in the normalized value) were independent predictors of OS.

Conclusion: The rMK of tumor area and rCBF of peritumoral area had independent predictive value for OS in patients with HGG.

Advances in knowledge: This study explored useful imaging biomarkers from the diffusion heterogeneity and vascular perfusion of tumor and peritumoral areas in HGG, which is useful to help clinician to make precise therapeutic plans, and predict the prognostic for glioma patients.

PO-0032

Histogram models of dynamic contrast-enhanced MR imaging in predicting progression of enhancing non-measurable disease after chemoradiotherapy in high-grade glioma

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Objectives

To investigate the potential of histogram models based on volume transfer constant (K^{trans}) between the plasma and extravascular extracellular space and extravascular volume (V_e) in predicting the progression of enhancing non-measurable disease (NMD) persisting after chemoradiotherapy following gross total resection in high-grade glioma (HGG) patients.

Methods

Dynamic contrast-enhanced MR images of patients who underwent temozolomide-based chemoradiation after gross total resection from January 2016 to May 2022 were analyzed retrospectively. The histogram features of K^{trans} and V_e of enhancing NMD were extracted and compared between the progression and non-progression groups. Histogram features with significant differences were included in binary logistic regression to construct histogram models of K^{trans} and V_e to predict progression in 2-3 months. Receiver operating characteristic curves were used to evaluate the prediction performance of different models (K^{trans} , V_e , and $K^{trans} + V_e$).

Results

A total of 97 HGG patients (mean age \pm standard deviation, 47.1 years \pm 12.1; 73 men) were enrolled, including 55 in the progression group and 42 in the non-progression group. The histogram model of K^{trans} (10th percentile + 90th percentile + skewness) showed an area under the curve (AUC) of 0.900 in predicting progression. The model of V_e (10th percentile + minimum + skewness) had an AUC of 0.879. Combining K^{trans} and V_e , the model (V_e _10th percentile + V_e _skewness + K^{trans} _ root-mean-squared) had an AUC of 0.927.

Conclusions

The histogram models based on K^{trans} and V_e can predict the progression of enhancing NMDs in HGG following chemoradiotherapy 2-3 months in advance.

PO-0033

Construction of Common Harmonic Waves on Major Depressive Disorder-A New Approach for Brain Network Analyses

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Objective Mounting evidence shows that neurological diseases can be understood as a disconnection syndrome where the large-scale brain network is progressively disrupted by neuropathological processes. Our proposed harmonic-based network analysis approach provides a new methodology to analyze these neuropathological changes in the progression of major depressive disorder (MDD).

Methods 55 patients with MDD and 46 normal controls (NC) were selected as subjects for the study. All participants underwent scanning with a 3.0T ultra-high-field MR scanner to obtain three-dimensional high-resolution T1-weighted image data. Nine morphological features (the number of vertices, gray matter volume, Gaussian curvature, fold index and et al) were constructed using the Freesurfer 5.3.0 tool to create brain networks. Common harmonic waves were obtained through the eigenvalue decomposition of the Laplacian matrix. Finally, Fisher's J score (the ratio of between-class mean to within-class variance) was calculated for harmonic energy between MDD subjects and healthy controls, comparing whether there were significant differences in harmonic energy of morphological features between MDD and NC in each harmonic wave.

Results There was no significant difference in total harmonic energy of the nine morphological features between the MDD and NC group. However, specific harmonic energy differed from the NC group, including 1) the number of vertices: harmonic wave 2, 6, 15, 44, and 57; 2) surface area: harmonic wave 2, 6, 16, and 57; 3) gray matter volume: harmonic wave 2, 12, 13, 15, and 57; 4) mean cortical thickness: harmonic wave 2, 19, 35, 36, and 44; 5) standard deviation of cortical thickness: harmonic wave 8, 21, and 42; 6) mean curvature: harmonic wave 26 and 57; 7) Gaussian curvature: harmonic wave 34, 40, 54, and 57; 8) fold index: harmonic wave 5, 16, and 21; 9) curvature index: harmonic wave 25, 32, 33, and 37. These data all showed significant difference ($P < 0.05$).

Conclusion These results confirm abnormal harmonic waves associated with the brain morphological network in MDD patients. It may related to the underlying mechanism of the brain network and provide a new insight for the following research.

PO-0034

Predicting IDH1 Expression using Computational Modeling of Interstitial Fluid Pressure in Glioblastoma

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Synopsis The immunohistochemistry features of glioblastoma have important influence on its occurrence and prognosis. Understanding the noninvasive detection of interstitial fluid pressure (IFP) and velocity (IFV) based on dynamic contrast enhanced (DCE)-MRI to explore the correlation between IFP and IFV with immunohistochemical markers of glioblastoma. The investigation demonstrates that IFP indicators have significant correlation with isocitrate dehydrogenase 1 (IDH1) expression and Ki-67 level of glioblastoma, and could help diagnose IDH1-mutation patients.

Summary of main findings

Computational modeling of IFP and IFV based on DCE-MRI has significant correlation with IDH mutation status and Ki-67 level of glioblastoma.

Introduction

Glioblastoma is the most common primary malignant tumor of central nervous system¹, which is characterized by extensive invasion, strong invasion and angiogenesis. Conventional MRI sequences could only reflect the anatomical information, morphological characteristics and enhancement mode of the tumor. Recently, computational models were established to simulate interstitial fluid pressure (IFP) and velocity (IFV) based on dynamic contrast enhanced (DCE)-MRI². Previous clinical studies have shown that the increase of IFP is closely related to the occurrence and prognosis of tumors³. At present, the gold standard for measuring IFP is wick-in-needle (WIN) method, but it is invasive⁴⁻⁶. The purpose of this study is to explore correlation of computational modeling of IFP and IFV based on DCE-MRI with immunohistochemistry markers (IDH1 expression and Ki-67 level) in glioblastoma, and explore the diagnosis performance for distinguishing IDH1-mutation patients.

Materials and Methods

Patients data between 2020 and 2021 meeting the following criteria were reviewed: (1) Pathologically confirmed glioblastoma; (2) Underwent DCE-MRI examination before surgery in a 3.0T MR scanner (uMR770, United Imaging Healthcare); (3) IDH1 expression and Ki-67 level were evaluated by immunohistochemistry of tumor samples after surgery. IDH1 expression (0: wild; 1/2/3: mutation +/++/+++) and Ki-67 level (0 ~ 100%) were evaluated by immunohistochemistry of tumor samples after surgery.

DCE-MRI based on transverse T1-weighted spoiled gradient-echo sequence were performed before, during and after the injection of contrast agent (CA) (gadodiamide injection, 0.2mL/kg, 3.5mL/s). 100 time-points were acquired during 4min 10s (temporal resolution 2.5s).

The permeability parameters were calculated from extended Tofts model (ETM)⁷.

$$C_t(t) = K_{trans} \int_0^t \exp(-k_{ep}(t-\tau)) C_p(\tau) d\tau + v_p C_p(t)$$

where K_{trans} is the volume transfer constant, v_p is the volume of extravascular extracellular space, k_{ep} is the transport rate constant of CA from the extravascular extracellular space, and $C_p(t)$ is the plasma CA concentration with time. Volume-of-interests were delineated manually including the whole tumor on late DCE images. The partial differential equation of IFP and IFV was formulated from the continuity equation and solved in MATLAB.

$$-KH \nabla^2 p_i = K_{trans} / \langle K_{trans} \rangle [L_p S/V (p_{eff} - p_i)] - L_p L_{SL}/V (p_i - p_L)$$

Where p_i is the pressure in interstitial space, p_{eff} is the effective pressure in vascular after considering tumor osmotic pressure, L_p is the hydraulic conductivity of the vessel wall; S/V is the surface to volume ratio of the capillary wall. The lymphatic clearance term $L_p L_{SL}/V$ is assumed to be zero in the brain. All modeling parameters were decided according to foreknowledge from previous studies^{2,8}.

Spearman's correlation was used to assess the relationship between IFP and IFV indicators (mean, standard deviation (SD), kurtosis, skewness) and immunohistochemistry markers. Mann-Whitney U test was used to compare the IFP indicators between IDH1-wild group and IDH1-mutation group. The receiver operating curve (ROC) curve analysis was performed to assess the diagnostic performance of IFP indicators in distinguishing IDH1-mutation patients from IDH1-wild. Significance criteria was $P < 0.05$ for all statistic results.

Results Fifty-two patients were included (mean age 56.9 ± 9.8 , 28 females). IFP and IFV mappings were obtained for each patient (an example in Figure 1). The IDH1 expression was significantly correlated with IFPmean ($P=0.019$, $r=-0.342$), IFPSD ($P=0.026$, $r=0.324$), IFPkurtosis ($P=0.04$, $r=-0.300$), and IFPskewness ($P=0.05$, $r=0.288$). Ki-67 level was correlated with IFPSD ($P=0.047$, $r=0.280$). No significance was found in other statistic results.

Compared to IDH1-wild group, IDH1-mutation group showed significantly lower IFPmean (1282 Pa vs 1215 Pa, $P=0.020$) and IFPkurtosis (3.944 vs 3.292, $P=0.030$), and significantly higher IFPSD (241 Pa vs 275 Pa, $P=0.024$) and IFPskewness (-1.199 vs -0.986, $P=0.045$). IFPmean had best diagnosis performance (AUC=0.713) among IFP indicators (Figure 2).

Discussion

This study found that computational modeled IFP were associated with the expression of IDH1 in glioblastoma. Previous studies have shown that DCE perfusion parameters such as Ktrans and Ve reflect vascular permeability and can be used to predict IDH mutation status of glioma⁹. IFP is closely associated with tumor permeability, and could be affected by the microvascular properties within the tumor. Compared with IDH mutant, IDH wild-type glioma has faster tumor cell proliferation, richer neovascularization and higher permeability. Ki-67 reflects the proliferation of tumor cells and can be used to distinguish low-grade glioma from high-grade glioma. Previous study reported that Ki-67 in high-grade glioma is higher than that in low-grade glioma¹⁰⁻¹¹. Therefore, IFP indicators have potential significance in predicting the molecular classification, tumor recurrence and prognosis of glioma.

Conclusion

IFP indicators calculated from DCE-MRI have significant correlation with the IDH mutation status and Ki-67 level, and hold potential to predict IDH1 mutant and IDH1 wild type of glioma.

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PO-0035

Alterations of cortical and subcortical structures in mild cognitive impairment

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Purpose: Grey matter changes are thought to be closely related to cognitive decline in mild cognitive impairment (MCI) patients but no consensus has yet emerged. The study aimed to explore the alterations of cortical and subcortical structures in MCI patients, and to investigate the association with cognitive assessment.

Methods: A total 24 MCI individuals and 22 normal controls (NCs) were included. Voxel-based morphometry (VBM) analysis and vertex-based shape analysis were used to analyze the volume and shape of subcortical nuclei, respectively. We also used surface-based morphometry (SBM) analysis through the Computational Anatomy Toolbox (CAT12) to compare cortical morphological changes between MCI and NCs. Relationships between abnormal changes of cortical and subcortical structures and cognitive assessment were investigated with spearman correlation analysis. Classification via support vector machine (SVM) was performed to evaluate whether MRI features could differentiate the MCI group with NCs accurately.

Results: Compared with NCs, MCI patients showed significant atrophy in the volume of left thalamus ($p = 0.011$), left hippocampus ($p = 0.006$), left amygdala ($p = 0.031$), right pallidum ($p = 0.009$) and right hippocampus ($p = 0.008$). Meanwhile, vertex-wise shape analysis showed inward deformation in the left amygdala in MCI group compared with NC ($p < 0.05$, FWE corrected). The SBM analysis revealed that MCI group exhibited significantly shallower sulci depth in the left hemisphere, predominantly in the fusiform, isthmus cingulate and superior frontal regions, and increased cortical gyrification index (GI) in the right frontal gyrus. Correlation analysis showed the positive correlation between adjusted right hippocampus volume and episodic memory, while negative correlation between the altered GI and memory performance in MCI group. The SVM result showed that sulci depth and gyrification index derived from SBM outperformed subcortical imaging features in MCI identification. Particularly, when combining the cortical and subcortical morphological metrics, SVM reached the best performance with an accuracy of 89% to classify the MCI from NC.

Conclusion: The study indicates that obvious grey matter structural changes occur in MCI patients. These morphological alterations may be the basis of the brain functional differences underlying MCI and could be helpful for the early identification and clinical diagnosis of MCI. These findings contribute to our understanding of the neural mechanisms underlying memory impairment in MCI.

PO-0036

Amygdala subnuclei volume predicts anxiety reactivity related to the COVID-19 pandemic

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Objective: The COVID-19 pandemic has seriously affected the mental health of the public and exacerbated psychological anxiety. The purpose of this study was to analyze the changes in anxiety status of individuals before and after COVID-19 pandemic, as well as the relationship between the baseline (before COVID-19 pandemic) structural and functional connectivity of brain regions associated with emotional processing and the changes in anxiety status of individuals before and after COVID-19 pandemic.

Methods: The State Trait Anxiety Inventory (STAI) was collected from 40 healthy young adults during the pandemic using a longitudinal follow-up study, and brain imaging data and baseline (daily) anxiety scores were obtained prior to the pandemic. The relationship between baseline amygdala subregion volume, cortical thickness (insula, anterior cingulate gyrus), amygdala-ventromedial prefrontal functional connectivity and anxiety scores and change rates before and after the pandemic were analyzed using a generalized linear mixed model.

Results: The STAI-S score of individuals during the COVID-19 pandemic increased significantly compared with that before the pandemic ($t=2.58$, $p=0.014$). The larger volume of the left central nucleus ($F=6.197$, $p=0.018$) and medial nucleus ($F=6.753$, $p=0.014$) of the amygdala at baseline, the smaller the change rate of state anxiety before and after the pandemic, and the sub-correlation was more obvious in young women.

Conclusions: These findings suggest that amygdala subregion volume is useful in predicting changes in individual anxiety levels caused by major stressful events, such as the current global health crisis. This helps us understand the neurobiological basis of anxiety susceptibility and may provide information for the development of targeted psychological and clinical interventions.

PO-0037

Systematically disrupted functional gradient of the cortical connectome in lifelong premature ejaculation

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Premature ejaculation (PE) is a major component of male sexual dysfunction. However, the finer topological relationships in terms of continuous spatial arrangement between these systems are still ambiguous. Connectome gradients provide the topological representations of human macroscale hierarchy in an abstract low-dimensional space by embedding the functional connectome into a set of axes. 28 right-handed PE patients (Age: 28.61 ± 4.48) and 17 normal control (Age: 26.519 ± 4.61) were included. Each participant had no neuropsychiatric disorder. Resting-state functional Magnetic Resonance Imaging (rs-fMRI) data and intravaginal ejaculatory latency time (IELT) scores were acquired from each participant. Considering the computing efficiency, ROI based gradient analysis was conducted using Schaefer 400 atlas. Group average cortical functional connectome matrices were constructed by computing the Pearson's correlation of vertices time series, resulting in a functional connectivity matrix (400×400) for each group. We then thresholded the matrix to retain the top 10% connections per row, in line with a series of previous studies. The gradient mapping process used the BrainSpace Toolbox (<http://github.com/MICA-MNI/BrainSpace>). We found the extended principal gradient revealed the excessive functional segregation between the default model network and somatosensory & auditory network in PE patients (Kolmogorov-Smirnov test, K-S stat = 0.11, $p = 0.015$). Furthermore, the connectivity profile of regions with abnormal principal gradients verified the disrupted functional hierarchy revealed by gradients. Moreover, altered gradient in the default model network and somatosensory & auditory network were significantly correlated with the intravaginal ejaculatory latency time ($p < 0.001$). Together, our findings provided a novel view of functional system hierarchy alterations, which facilitated a continuous spatial arrangement of macroscale networks, to increase our understanding of the functional connectome hierarchy in premature ejaculation.

PO-0038

Connectome-based Prediction of Global Cognition in Patients with Type 2 Diabetes

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Purpose

Patients with type 2 diabetes (T2D) have a high prevalence of cognitive decline, yet to date, there is no simple and quick method to measure cognitive performance. In this study, we performed brain connectome-based predictive modeling (CPM) to pursue “neural fingerprints” of global cognitive performance in T2D.

Materials and Methods

CPM with leave-one-out cross-validation was carried out to probe important functional networks that were predictive of global cognitive performance within the training set of 315 T2D patients. This model generalized to both 197 novel T2D patients in testing set 1 and 105 Alzheimer's Disease Neuroimaging Initiative (ADNI) participants in testing set 2. Furthermore, identified networks were applied to a subset of 58 subjects who completed a 12-16 week follow-up with different types of antidiabetic drug interventions. We also compared whether network strengths identified by the CPM model were significantly different between T2D with mild cognitive impairment (MCI) and without MCI. Age, sex, years of education, and body mass index were controlled as covariates.

Results

CPM predicted global cognition as indicated by a significant correlation between predicted and actual MoCA values ($r=0.501$, $P_{\text{perm}}=0.0002$, $\text{MAE}=1.544$). The connectivity edge predictive of global cognition was identified within and between networks implicated in sensorimotor, attention and visual perception. The identified model in training set was generalized to predict global cognition in independent testing set 1 ($r=0.508$, $P_{\text{perm}}=0.0002$, $\text{MAE}=2.014$) and testing set 2 ($r=0.311$, $P_{\text{perm}}=0.014$, $\text{MAE}=4.478$), suggesting the replicability of CPM approach. In addition, positive network strengths were significantly different between T2D with MCI and without MCI ($P<0.01$). The areas under the curves of the predicted values of the CPM model for diagnosing MCI were training set ($\text{AUC}=0.974$), testing set 1 ($\text{AUC}=0.752$), and testing set 2 ($\text{AUC}=0.776$). In the treatment sample, the change value of the positive network strength of the subjects with improved cognition was significantly higher than those without cognitive improvement.

Conclusion

These findings point to the feasibility of using the whole-brain functional connectome to predict global cognitive performance in T2D and provide evidence that individual differences in large-scale neural networks contribute to the diagnosis of cognitive impairment and cognitive improvement after treatment.

PO-0039

A clinical-radiomics machine learning framework tailored to predict clinical outcomes in patients with acute ischemic stroke

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Purpose: To develop and validate a machine learning model that enables prediction of clinical outcomes in patients with acute ischemic stroke (AIS) using radiomics features and clinical information.

Materials and Methods: We retrospectively analyzed data from 148 patients with AIS (training cohort, n=105; validation cohort, n=43) who underwent MRI examinations. According to the modified Rankin Scale (mRS) at 90-day after hospital discharge, the patients were stratified into good (mRS ≤ 2) and poor (mRS > 2) prognosis. A total of 1130 radiomics features were extracted from diffusion-weighted imaging, apparent diffusion coefficient, and cerebral blood flow images, respectively. Pearson correlation coefficient analysis and recursive feature elimination algorithm were applied to identify the optimal subset of features. Six machine learning classifiers with five-fold cross validation were compared to construct the single-layer radiomics signature. Logistic regression algorithm were leveraged to build the clinical model, radiomics model, and combined model. The discrimination, calibration, clinical usefulness of the integrated model were evaluated by the area under the curve (AUC), calibration curve, and decision curve analysis (DCA).

Results: The combined model integrating the fusion radiomics signature and clinical variables (location of vessel occlusion and diabetes) demonstrated better performance (AUC, 0.946; 95%CI: 0.924-0.967) than the clinical model (AUC, 0.570; 95%CI: 0.513-0.628; p<0.001) and fusion radiomics model (AUC, 0.919; 95%CI: 0.889-0.949; p=0.002). DCA indicated good clinical usefulness of the integrated model.

Conclusion: The clinical-radiomics model incorporating clinical variables and radiomics features performed well in predicting clinical outcomes of AIS patients, which can be used to guide personalized treatment.

PO-0040

Evaluating magnetic resonance imaging characteristics and risk factors for hemifacial spasm

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Objectives: The specific neurovascular compression (NVC) event responsible for the symptomatic manifestation of hemifacial spasm (HFS) remains difficult to assess accurately using MRI. We aim to evaluate the MRI characteristics of HFS and identify their risk factors for its development.

Methods: We retrospectively included 186 patients with HFS. The facial nerve was divided into attached segment, root detachment point, proximal cisternal segment and distal cisternal segment. NVC was categorized as contact or deformity. The presence, severity, and offending vessel type of NVC in each portion, and the orientation of the offending vessel around the facial nerve, were recorded. Conditional logistic regression analyses were performed to identify the risk factors associated with HFS occurrence.

Results: The attached segment, root detachment point, and proximal cisternal segment of the symptomatic nerve were more likely to conflict than those on the asymptomatic side (all $P < 0.05$). Both contact and deformity in the root detachment point (odds ratio = 19.98 and 37.22, respectively, $P < 0.05$) or attached segment (odds ratio = 4.99 and 252.52, respectively, $P < 0.05$) were risk factors for HFS. Deformity in the proximal cisternal segment was a risk factor for HFS (odds ratio = 256.58, $P < 0.05$), whereas contact was not ($P = 0.23$). Involvement of the anterior inferior cerebellar artery ($P < 0.05$) was a risk factor; the posterior inferior cerebellar and vertebral arteries was not.

Conclusions: This study demonstrates that location and severity of NVC are strongly associated with HFS occurrence. Different portions of the facial nerve respond differently to NVC. This study also indicates that each offending vessel has its own preferred conflict orientation. Our findings may improve the efficacy of MRI in the diagnosis of HFS.

PO-0041

Vasari-based features nomogram to predict the tumor-infiltrating CD8+ T cell levels in glioblastoma

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Background: Tumor-infiltrating CD8+ T cells play a key role in glioblastoma development, malignant progression, and recurrence. To establish nomograms based on the Visually AcceSable Rembrandt Images (VASARI) features of multiparametric magnetic resonance imaging (MRI) to determine the expression levels of tumor-infiltrating CD8+ T cells in patients with glioblastoma.

Materials and methods: Pathological and imaging data of 140 patients with glioblastoma confirmed by surgery and pathology were retrospectively analyzed. The levels of tumor-infiltrating CD8+ T cells in tumor tissue samples obtained from patients were quantified using immunohistochemical staining. Patients were divided into high and low CD8 expression groups. The MRI images of patients with glioblastoma were analyzed by two radiologists using the VASARI scoring system.

Results: A total of 25 MRI-based VASARI imaging features were evaluated by two neuroradiologists. The features with the greatest predictive power for CD8 expression levels were, cystic (OR, 3.063; 95% CI: 1.387, 6.766; $P = 0.006$), hemorrhage (OR, 2.980; 95% CI: 1.172, 7.575; $P = 0.022$), and ependymal extension (OR, 0.257; 95% CI: 0.114 0.581; $P = 0.001$). A logistic regression model based on these three features showed better sample predictive performance (AUC = 0.745; 95% CI: 0.665, 0.825; Sensitivity = 0.527; Specificity = 0.857).

Conclusions: The VASARI feature-based nomogram model can shows promise to predict the level of infiltrative CD8 expression in GB tumors noninvasively for earlier tissue diagnosis and more aggressive treatment.

PO-0042

AI-Based Automated Quantification of Arterial Stenosis in Head and Neck CT Angiography: A Comparison with Manual Measurements from Digital Subtraction Angiography and CT Angiography

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Purpose:

To evaluate the performance of artificial intelligence (AI) algorithm for automated quantification of arterial stenosis (AS) in head and neck CT angiography (CTA) using an independent bi-center dataset, with digital subtraction angiography (DSA) as the gold standard, and to compare it with manual measurements on CTA.

Materials and Methods:

Patients who received head and neck CTA and DSA between January 2019 and December 2021 were included in this retrospective analysis. The stenosis quantification was automatically evaluated by CerebralDoc based on CTA images. The quantitative performance of CerebralDoc per-lesion was evaluated across 0-100%, <50%, ≥50% and ≥70% thresholds. Sensitivity analysis including linear and logistic regression, and subgroup analysis was performed to identify influencing factors.

Result:

287 patients were analyzed. The intraclass correlation coefficients (ICCs) between CerebralDoc and DSA for ≥50% and ≥70% stenosis were excellent (0.955, 0.922, respectively), for 0-100% stenosis was good (ICC: 0.735), and for <50% stenosis was poor (0.056). For ≥50% and ≥70% stenosis of CerebralDoc and CTA manual measurements compared with DSA, ICCs were close (0.955 vs 0.994, $P < 0.001$; 0.922 vs 0.982, $P < 0.001$), and differences were small (0.258% vs 0.362%, $P < 0.05$; 0.369% vs 0.199%, $P < 0.05$). The sensitivity analysis revealed that specific locations (V1, V2, V3, V4) and slender vessel may be the primary influencing factors, with differences ranging from 15.551% to 44.238%.

Conclusion:

CerebralDoc exhibits excellent performance in automatically quantifying AS of ≥50% and ≥70% in head and neck CTA. However, further research is needed to improve its performance for <50% stenosis and to address the large or remarkable differences observed in specific locations and slender vessels.

PO-0043

Dynamic functional connectivity patterns associated with asymptomatic carotid stenosis

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Background: Carotid artery stenosis without transient ischemic attack or stroke is considered as “asymptomatic”. However, there is increasing evidence that these asymptomatic carotid stenosis (ACS) patients had cognitive impairment in tests of executive function, psychomotor speed, and memory. Previous studies on ACS were mostly based on static analysis. In reality, individuals engage in different mental states that cannot be experimentally controlled. Recent studies have shown that resting-state FC can vary considerably in different temporal scales. Time-varying

characteristics may represent spontaneous change of the potential network, so it may reveal neural mechanisms that cannot be discovered only by static resting-state FC. Dynamic functional network connectivity (dFNC) captures temporal variations of functional connectivity during magnetic resonance imaging (MRI) acquisition and its alterations have been associated with specific cognitive states, psychiatric conditions and neurological disorders, such as Alzheimer's disease and Parkinson's disease. Therefore, dFNC may be a suitable method to detect cognitive changes in ACS. This study assesses the relationships between dFNC and cognitive impairment with ACS.

Methods: To investigate the dFNC, 40 ACS patients with cognitive impairment were recruited from Tangdu Hospital and 40 healthy controls (HC) were matched to ACS patients regarding age, gender and education. All participants gave their written informed consent. Firstly, the image was preprocessed. After excluding the subjects whose head movements were greater than 3 degrees, the remaining 72 participants were used for subsequent analysis. Then, dFNC analysis was carried out, which was composed of three steps (Figure 1): (i) Group independent component analysis (GICA) was applied with spatial reference to resolve whole-brain resting-state fMRI data into 37 independent components (ICs) and then 18 ICs were selected; (ii) A sliding-window approach with graphical LASSO was used to compute dFNC among ICs (iii) k-means clustering method on the dFNC was used to confirm different brain states and the temporal properties.

Results: Eighteen ICs were broadly categorized based on anatomy and prior knowledge of their function into the following sub-categories: auditory network (AN), ventral attention network (DAN), default-mode network (DMN), control executive network (CEN), and visual network (VSN). Subsequently, five dFNC brain states were identified to characterize and compare dynamic functional connectivity patterns. The top 10 connections in which HC was stronger (Figure 2B) or weaker (Figure 2C) than ACS were displayed, respectively. Three of them showed weak connections (States 2, 3, and 4) and the other showed strong connections (States 1 and 5). The dFNC temporal features (Fractional rate, FR; Mean dwell time, MDT; Number of transitions, NT) between HC and ACS were shown in Figure 3. Significantly higher FR in State 3 (Figure 3A, $P < 0.001$, false discovery rate [FDR] < 0.05) and State 4 (Figure 3A, $P = 0.037$, FDR < 0.05), but lower in State 5 (Figure 3A, $P < 0.001$, FDR < 0.05) were observed in ACS group compared with HC group. Significantly higher MDT in State 3 (Figure 3B, $P = 0.008$, FDR < 0.05), but lower in State 5 (Figure 3B, $P < 0.001$, FDR < 0.05) were observed in ACS group compared with HC group.

Conclusions: This study revealed more common but less specific dFNC alterations in ACS patients, which indicated their decreased information processing and communication ability and may help us to understand their abnormal cognitive functions clinically. Further studies on dFNC changes could help to better understand the progressive dysfunction of networks between ACS cognitive states.

PO-0044

Individualized Prediction of Mild Cognitive Impairment Progression Based on Morphological and Network Features of Gray Matter

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Purpose: To develop radiomics models and a multipredictor nomogram for predicting the time to progression (TTP) from mild cognitive impairment (MCI) to Alzheimer's disease (AD).

Materials and methods: We included 162 MCI patients from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database in this study. Morphological and network features of gray matter from magnetic resonance imaging (MRI) scans were individually extracted to develop and

validate radiomics models and to create a multipredictor nomogram to predict MCI progression. The performance of each model was assessed by the concordance index (C-index).

Results: The C-indexes of the morphology-network and morphology-network-clinical models were 0.928 (95% confidence interval [CI]: 0.898-0.958) and 0.951 (0.928-0.974) in the training cohort and 0.844 (0.756-0.932) and 0.880 (0.817-0.943) in the validation cohort, respectively. A multipredictor nomogram with 3 predictors, which had high accuracy for individual progression prediction with a C-index of 0.951 (0.928-0.974), was established.

Conclusion: The prediction of individual progression from MCI to AD could be accurately conducted using the radiomics model of the morphology-network-clinical and multipredictor nomogram.

PO-0045

COVID-19 is associated with changes in brain function and structure: a multimodal meta-analysis of neuroimaging studies.

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The actual role of coronavirus disease 2019 (COVID-19) in brain damage has been increasingly reported, necessitating a meta-analysis to collate and summarize the inconsistent findings from functional imaging and voxel-based morphometry (VBM) studies. A comprehensive voxel-wise meta-analysis of the whole brain was conducted to identify alterations in functional activity and gray matter volume (GMV) between COVID-19 patients and healthy controls (HCs) by using Seed-based d Mapping software. We included 14 functional imaging studies (449 patients with COVID-19, 498 HCs) and 9 VBM studies (449 patients with COVID-19, 388 HCs) in the analysis. Overall, patients with COVID-19 exhibited decreased functional activity in the right superior temporal gyrus (STG) (extending to the right middle and inferior temporal gyrus, and insula), left insula, right orbitofrontal cortex (OFC) (extending to the right olfactory cortex), and left cerebellum compared to HCs. For VBM, patients with COVID-19 relative to HCs showed decreased GMV in the bilateral anterior cingulate cortex/ medial prefrontal cortex (extending to the bilateral OFC), and left cerebellum, and increased GMV in the bilateral amygdala (extending to the bilateral hippocampus and STG, and right striatum). Moreover, overlapping analysis revealed that patients with COVID-19 exhibited both decreased functional activity and increased GMV in the right STG. The multimodal meta-analysis suggests that brain changes of function and structure in the temporal lobe, OFC and cerebellum, and functional or structural alterations in the insula and the limbic system in COVID-19. These findings contribute to a better understanding of the pathophysiology of brain alterations in COVID-19.

PO-0046

Systematic Review and Meta-analysis: Multimodal Functional and Anatomical Neural Alterations in Autism Spectrum Disorder

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[Objective] This meta-analysis aimed to explore the most robust findings across numerous existing resting-state functional imaging and voxel-based morphometry (VBM) studies on the functional and structural brain alterations in patients with autism spectrum disorder (ASD). [Methods] A whole-brain voxel-wise meta-analysis was conducted to compare the differences in the intrinsic functional activity and gray matter volume (GMV) between patients with ASD and typically developing individuals (TDs) using Seed-based d Mapping software. [Results] A total of 23 functional imaging studies (786 ASD, 710 TDs) and 52 VBM studies (1728 ASD, 1747 TDs) were included. Compared with TDs, patients with ASD displayed resting-state functional decreases in the left insula (extending to left superior temporal gyrus [STG]), bilateral anterior cingulate cortex/medial prefrontal cortex (ACC/mPFC), left angular gyrus and right inferior temporal gyrus, as well as increases in the right supplementary motor area and precuneus. For VBM meta-analysis, patients with ASD displayed decreased GMV in the ACC/mPFC and left cerebellum, and increased GMV in the left middle temporal gyrus (extending to the left insula and STG), bilateral olfactory cortex, and right precentral gyrus. Further, patients with ASD displayed decreased resting-state functional activity and increased GMV in the left insula after overlapping the functional and structural differences. [Conclusion] The present multimodal meta-analysis demonstrated that ASD exhibited similar alterations in both function and structure of the insula and ACC/mPFC, and functional or structural alterations in the default mode network (DMN), primary motor and sensory regions. These findings contribute to further understanding of the pathophysiology of ASD.

PO-0047

The visual and attention network integration of migraine without aura patients in interictal period

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Objective

This study aimed to investigate the brain functional and topological alterations in interictal period of migraine without aura (MoA) patients.

Methods

Totally, 52 MoA patients and 41 age- and gender- matched health controls (HC) were included to explore the functional networks connectivity (FNC) using independent components (ICs) approach. Furthermore, the large-scale networks properties, dynamic functional networks connectivity (dFNC) and topological metrics, were conducted based on sliding-window approach. Finally, we assessed the relationships between clinical characteristics and abnormal dFNC changes among ICs using Pearson's correlation analysis.

Results

The FNC was consistently activated between dorsal attention network (DAN) and visual network (VN), salience network (SN) and frontoparietal network (FPN) during static stating of MoA patients. Negative connectivity was showed between default mode network (DMN) and auditory network (Aud), DMN and FPN. Four reoccurring clustered states were robustly constructed to compare dFNC patterns. We identified that MoA patients spent more time in a sparsely connected state

(State 4), and less time in densely connected state (State 2). Increased FNC between superior parietal lobule (SPL) and lingual gyrus (LG) was positively associated with MoCA scores. The dynamic FNC between superior occipital gyrus (SOG) and posterior central gyrus (PostCG) was positively correlated with headache intensity, and negatively associated with headache duration was explored between SPL and inferior parietal lobule (IPL). In state 4, higher local transfer information efficiency was indicated in MoA than HC.

Conclusions

Our study provided the evidence that brain networks integration of DAN and VN might play a part in interictal period, and allowed developing the underlying neuroimaging mechanism for MoA patients.

PO-0048

Analysis of magnetic susceptibility of thalamus in ischemic stroke using quantitative susceptibility mapping and fMRI

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Introduction

Dyskinesia is a common symptom that occurs after stroke. Despite the fact that most strokes do not occur in areas of the brain associated with move zone. The aim of this study is to investigate the post-stroke QSM changes in the three pairs of motor nuclei in the thalamus, and to reveal the effect of stroke on iron deposition in the ipsilateral thalamus and motor function

Methods

36 patients with stroke in the left hemisphere and 24 age-, sex- and education-matched healthy controls underwent QSM (In all patients, the lesions were not located in the thalamus).

The scanning parameters:

1) Gradient-echo EPI

TR 720 ms, TE 33.1 ms, flip angle 52 deg, FOV 208x180 mm (RO x PE), Matrix 104x90 (ROx PE), Slice thickness 2.0 mm; 72 slices; 2.0 mm isotropic voxels, Multiband factor 8, Echo spacing 0.58 ms, BW 2290 Hz/Px, Acquisition Time 14:33(min:sec)

2) OSM

TR=50ms, TE1/ATE/TE8=3.5ms/6ms/45ms, slice thickness=2

flip angle=15°, FOV=240mmx240mm, matrix size=256x256, bandwidth=240 Hz/Px, and slices=64, Acquisition Time 6:34(min:sec)

QSM image analysis:

The IronsmithQSM was used to generate the QSM graph (Valentinou Zachariou, University of Kentucky). IronsmithQSM is a comprehensive, fully automated pipeline for creating and processing Quantitative Susceptibility Maps (QSM), extracting QSM based iron concentrations from subcortical and cortical brain regions and evaluating the quality of QSM data using SNR measures and assessment of outlier regions on phase images.

Clinical variables of history of hypertension, diabetes, hyperlipidemia, smoking, degree of education and drinking in all patients were evaluated. The magnetic susceptibility of thalamus move nucleus (Ventral anterior, Ventral lateral and Ventral posterolateral nucleus) was assessed. Susceptibility was compared between the patients and controls. Patients and controls also performed self-controls. The t-test was used to compare the difference of QSM values between the two groups of subjects.

Results

In healthy controls, QSM values in right VA nuclei were significantly lower than those of the left ($P=0.0221$). In patients, the difference between the left and right VA nuclei disappeared ($P=0.121$). No such alterations were found in either VL or VPL nuclei in other healthy controls

and patients. We compared all bilateral thalamic motor nuclei in healthy controls with those in patients, except for the findings in the VA nuclei, nothing else was altered.

Conclusion

After a stroke in the left cerebral parenchyma, the susceptibility value of the left thalamus changes. QSM can detect weak changes in susceptibility value at the nucleus level, which may be used as a predictor of motor function in stroke rehabilitation.

PO-0049

Differentiation between cerebral alveolar echinococcosis and brain metastases with radiomics combined machine learning approach

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Abstract

Background: Cerebral alveolar echinococcosis (CAE) and brain metastases (BM) are similar in locations and imaging appearance. While, CAE is usually treated with chemotherapy and surgical treatment, BM is often treated with radiotherapy and targeted primary malignancy treatment. Accurate diagnosis is critical due to the vastly different treatment approaches for these conditions. **Purpose:** This study aims to investigate the effectiveness of radiomics and machine learning approaches on magnetic resonance imaging (MRI) in distinguishing CAE and BM. **Methods:** We have retrospectively analyzed MRI images of 130 patients (30 CAE, 100 BM, training set =91, testing set=39) who confirmed CAE or BM in Xinjiang medical university's first affiliated hospital from January 2014 to December 2022. Three dimensional tumors were segmented by radiologists from contrast-enhanced T1WI images on open resources software 3D Slicer. Features were extracted on Pyradiomics, further feature reduction was carried out using univariate analysis, correlation analysis, and least absolute shrinkage and selection operator (LASSO). Finally, we built five machine learning models, support vector machine, logistic regression, linear discrimination analysis, KNeighbors classifier, and Gaussian NB and evaluated their performance via several metrics including sensitivity (recall), specificity, positive predictive value (precision), negative predictive value, accuracy and the area under the curve (AUC). **Results:** The area under curve (AUC) of SVC, LR, LDA, KNN, and NB algorithms in training (testing) sets are 0.99 (0.94), 1.00 (0.87), 0.98 (0.92), 0.97 (0.97), and 0.98 (0.93) respectively. Nested cross-validation demonstrated the robustness and generalizability of the models. Additionally, the calibration plot and decision curve analysis demonstrated the practical usefulness of these models in clinical practice, with lower bias toward different subgroups during decision-making. **Conclusion:** The combination of radiomics and machine learning approach on contrast enhanced T1WI images could well distinguish CAE and BM. This approach holds promise in assisting doctors with accurate diagnosis and clinical decision-making

PO-0050

MRI-Based Machine Learning Fusion Models to Distinguish Encephalitis and Gliomas in Atypical Cases

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Objectives: This paper aims to compare the performance of the classical machine learning (CML) model and the deep learning (DL) model, and assess the effectiveness of utilizing fusion radiomics from both CML and DL in distinguishing encephalitis from glioma in atypical cases.

Methods: We analysed the axial FLAIR images of preoperative MRI in 116 patients pathologically confirmed as gliomas and clinically diagnosed with encephalitis. The 3 CML models (Logistic Regression, LR; Support Vector Machine, SVM; and Multi-Layer Perceptron, MLP), 3 DL models (DenseNet 121, ResNet 50, and ResNet 18) and a deep learning radiomics (DLR) models were established, respectively. The area under the receiver operating curve (AUC) and sensitivity, specificity, accuracy, negative predictive value (NPV) and positive predictive value (PPV) were calculated for the training and validation sets. In addition, a deep learning radiomics nomogram (DLRN) and a web calculator were designed as a tool to aid clinical decision-making.

Results: The best DL model (ResNet50) consistently outperformed the best CML model (LR). While the DLR model had the best predictive performance, with AUC, sensitivity, specificity, accuracy, NPV and PPV of 0.879, 0.929, 0.800, 0.875, 0.867 and 0.889 in the validation sets, respectively. Calibration curve of DLR model show good agreement between prediction and observation and the decision curve analysis (DCA) indicated that the DLR model had a higher overall net benefit than the other two models (ResNet50 and LR). Meanwhile, the DLRN and web calculator can provide dynamic assessments.

Conclusion: Machine learning (ML) models have the potential to non-invasively differentiate between encephalitis and glioma in atypical cases. Furthermore, combining DL and CML techniques could enhance the performance of the ML models.

PO-0051

Comparison of three coordinate based meta-analysis methods in functional magnetic resonance imaging

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Background: Studies obtained abundant findings with the maturity of functional magnetic resonance imaging (fMRI) technology. Meta-analysis has been widely applied as an effective tool for aggregating results from different studies. The image-based meta-analysis (IBMA) uses a complete statistical parameter map. In contrast, the coordinate based meta-analysis (CBMA) uses coordinates (x, y, z) after multiple comparison corrections reported in the article. At present, three CBMA methods are widely used: activation likelihood estimation (ALE), multi-level kernel density analysis (MKDA) and anisotropic effect size signed differential mapping (AES-SDM). This study intends to compare the three CBMA approaches with the IBMA method and explore the impact of liberal or strict thresholds on CBMA methods.

Methods: The resting state functional magnetic resonance imaging (rs-fMRI) data of 1725 subjects was obtained from Consortium for Reliability and Reproducibility (CoRR) dataset. The functional connectivity (FC) difference was compared between genders. The IBMA was applied based on the uncorrected whole brain T-maps and the three CBMA methods were conducted based on the

coordinates obtained from the corrected T-maps with different thresholds ($p < 0.05$, $p < 0.05$, $p < 0.005$, $p < 0.001$). The results of different CBMA were compared with IBMA result separately.

Results: AES-SDM showed better control over the false positive and false negative rates. And AES-SDM method is least affected by the thresholds. It can stably detect the consistent brain areas of brain functional connectivity differences between genders under eight thresholds, while MKDA and ALE can detect the consistent brain areas only under relatively liberal thresholds.

Conclusions: The IBMA could generate results preferred over CBMA. For the CBMA, a liberal threshold increases the false positive rate, but too strict a threshold is difficult to detect results and to miss the meaningful brain regions.

PO-0052

Brain functional connectivity alterations of Wernicke's area in patients with autism in multi-frequency bands: a mega-analysis

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Objective: Autism spectrum disorder (ASD), a set of heterogeneous biological and neurodevelopment conditions related to brain development that begin in early childhood, impacts how an individual perceives and socializes with others, leading to restricted, repetitive behaviors/interests, language regression, and other kinds of autism-specific language profiles that further affect social interaction. Suffering from the autism symptoms listed above, patients with ASD may come to the attention of healthcare providers and speech-language pathologists. Therefore, language-related brain research may deepen the understanding of the neural mechanism and the effective interventions of ASD. Wernicke's area, a traditional and classical brain region linked to language processing, impacts dysfunctions of language abilities hugely since it is the receptive language center and responsible for interactive verbal communication. In pursuit of a comprehensive understanding of the pathological mechanisms underpinning ASD from the perspective of language, the present study executed a mega-analysis.

Method: This analysis utilized the Autism Brain Image Data Exchange (ABIDE) dataset, encompassing data from 443 typically developing individuals (TD) and 362 patients with ASD. The primary objective was to identify frequency-specific alterations in functional connectivity (FC) using Wernicke's area as the seed region.

Results: The results found that in the conventional frequency band (0.01-0.08 Hz), ASD patients demonstrated increased FC in the right thalamus compared with TD, and the slow-5 frequency band (0.01-0.027 Hz) presented increased FC in the left cerebellum Crus II and right lenticular nucleus, pallidum.

Conclusion: The findings of the present research might provide new insight into the potential neural mechanisms of language impairments in ASD and might enlighten treatments that facilitate ASD patients' social and community engagement.

PO-0053

Tract based spatial statistics analysis of T2DM patients

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Objective:

TBSS technology was used to analyze the changes in the microstructure of white matter in T2DM patients, so as to explore the possible pathological changes and their rules in the white matter of T2DM patients, to analyze the possible clinical influence indicators of DTI parameters, to reveal the relevance of DTI parameters and cognitive scores, to provide imaging evidence and biological markers for in-depth interpretation and understanding of T2DM patients with brain microstructure change and neuropathologic mechanism.

Subjects and Methods:

A total of 72 volunteers were prospectively collected and divided into T2DM group and control group according to grouping criteria. There were 45 patients in T2DM group and 27 healthy controls. The clinical data and laboratory indicators of the subjects were recorded within one week before or after MRI scanning, including: age, gender, height (Ht), weight (Wt), hip circumference (HC), waist circumference (WC), waist hip ratio (WHR), waist height ratio (WHtR), Body mass index (BMI), blood pressure, education level (converted into education years), occupation, drinking history, smoking history, duration, fasting plasma glucose (FG), glycated hemoglobin (HbA1c), fasting Insulin (INS), low density lipoprotein (LDL), high density lipoprotein (HDL), total cholesterol (TChol), triglycerides (TG), and Homocysteic Acid (Hcy). HOMA - IR was used to calculate the insulin resistance index (IRI) according to FG and INS. The Mini - Mental State Examination (MMSE) and The Montreal Cognitive Assessment (MoCA) were used to assess the Cognitive status of all subjects. The California Verbal Learning Test (CVLT) and the Symbol Digit Modalities test (SDMT) were used to evaluate the two cognitive fields of memory and execution which were easily damaged in the early stage in T2DM. Philips Ingenia CX 3.0 T MR was used for MRI data acquisition of all subjects, including axial FFE T1 sequence, axial FFE T2 sequence, axial TSE Flair sequence, sagittal 3D T1 TFE sequence and axial DTI sequence (64 directions). In Linux OS (Oracle VM VirtualBox) environment, FSL software is applied to analyze FA, MD, I1 and I23 based on white matter skeleton. The general linear model was adopted, with age, gender and years of education as covariables, and the permutation test was used to carry out statistical analysis for each parameter between the two groups, and threshold free cluster enhancement (TFCE) correction method was used. $P < 0.05$ was considered as a significant difference.

Results:

Compared with HC group, FA values of bilateral anterior, posterior, superior part of corona radiata, and body of corpus callosum in the T2DM group were reduced ($P < 0.05$, TFCE corrected). MD values of several regions were increased ($P < 0.05$, TFCE corrected), mainly included bilateral superior fronto-occipital fasciculus, inferior fronto-occipital fasciculus, superior longitudinal fasciculus, left inferior longitudinal fasciculus, anterior, posterior and superior part of bilateral corona radiata, genu, body and splenium part of corpus callosum, right cingulum, anterior and posterior limb of left internal capsule, retrolenticular part of left internal capsule, left external capsule, posterior part of left thalamic radiation, anterior part of right thalamic radiation, bilateral corticospinal tract and left Fornix/Stria-terminalis ($P < 0.05$, TFCE corrected). I23 values of several regions were increased ($P < 0.05$, TFCE corrected), mainly included bilateral superior fronto-occipital fasciculus, inferior fronto-occipital fasciculus, superior longitudinal fasciculus, left inferior longitudinal fasciculus, anterior, posterior and superior part of bilateral corona radiata, genu, body and splenium part of corpus callosum, right cingulum, anterior limb of left internal capsule, retrolenticular part of left internal capsule, left external capsule, left tapetum, posterior part of bilateral thalamic radiation, and bilateral corticospinal tract. I1 values of T2DM group and control group showed no difference ($P > 0.05$, TFCE corrected). FA value was negatively correlated with HbA1c ($r = -0.255$, $P = 0.030$); MD value was positively correlated with age ($r = 0.245$, $P = 0.038$), HbA1c ($r = 0.391$, $P = 0.001$),

FG ($r = 0.358$, $P = 0.002$), WHtR ($r = 0.285$, $P = 0.015$), negatively correlated with CVLT correct number of free recall ($r = -0.304$, $P = 0.010$) and MoCA visuospatial score ($r = -0.244$, $P = 0.039$); I23 value was positively correlated with age ($r = 0.249$, $P = 0.035$), HbA1c ($r = 0.340$, $P = 0.004$), IRI ($r = 0.254$, $P = 0.033$), FG ($r = 0.338$, $P = 0.004$), WHR ($r = 0.356$, $P = 0.002$), and WHtR ($r = 0.393$, $P = 0.001$), negatively correlated with CVLT correct number of free recall ($r = -0.372$, $P = 0.001$), MMSE calculation and attention score ($r = -0.417$, $P = 0.000$), MMSE writing score ($r = -0.273$, $P = 0.020$).

Conclusion:

The integrity of white matter was damaged in T2DM patients, mainly involved corpus callosum, bilateral corona radiata, bilateral superior fronto-occipital fasciculus, inferior fronto-occipital fasciculus, superior longitudinal fasciculus, inferior longitudinal fasciculus, thalamic radiation and bilateral corticospinal tract. It mainly manifested as myelin sheath damage. DTI can detect the changes of white matter microstructure before abnormalities appear in conventional images and white matter atrophy, which is of great clinical significance for the early diagnosis of white matter microstructure impairment of T2DM.

PO-0054

Disrupted structural brain networks and structural-functional decoupling in first-episode drug-naïve adolescent major depressive disorder

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Purpose: Major depressive disorder (MDD) tends to emerge during adolescence, but the neurobiology of adolescent MDD is still poorly understood. This study aimed to explore the topological organization of white matter structural networks and the relationship between structural and functional connectivity in adolescent MDD. **Methods:** Structural and functional magnetic resonance imaging data were acquired from 94 first-episode drug-naïve adolescent MDD patients and 78 healthy adolescents. Whole-brain structural and functional networks were constructed for each subject. Then, the topological organization of structural networks and the coupling strength between structural and functional connectivity were analyzed. **Results:** Compared to controls, adolescent MDD patients showed disrupted small-world, rich-club, and modular organizations. Adolescent MDD patients had decreased nodal centralities in the medial part of bilateral superior frontal gyrus, bilateral hippocampus, right superior occipital gyrus, right angular gyrus, bilateral precuneus, left caudate nucleus, bilateral putamen, right superior temporal gyrus, and right temporal pole part of superior temporal gyrus. In addition, adolescent MDD patients had a decrease in the coupling strength between structural and functional connectivity. **Conclusions:** Our findings suggest widespread disruption of structural brain networks and structural-functional decoupling in adolescent MDD, potentially leading to reduced network communication capacity.

PO-0055

Altered single-subject gray matter structural networks in first-episode drug-naïve adolescent major depressive disorder

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Purpose: Although previous studies have demonstrated both structural and functional abnormalities in adolescent major depressive disorder (MDD) patients, how the topological organization of brain networks is affected is still unclear. Thus, this study aimed to investigate the gray matter (GM) structural topology in adolescents with MDD. **Methods:** Structural magnetic resonance imaging data were acquired from 100 first-episode drug-naïve adolescent MDD patients and 80 healthy controls (HCs). Whole-brain GM structural network was constructed for each subject, and a graph theory analysis was used to calculate the topological metrics of GM networks. **Results:** Adolescent MDD patients showed significantly lower cluster coefficient ($p = 0.008$) and local efficiency ($p = 0.033$) compared to HCs. Compared to controls, adolescent MDD patients showed higher nodal centralities in the bilateral cuneus, left lingual gyrus, and right middle occipital gyrus and lower nodal centralities in the bilateral dorsolateral superior frontal gyrus, bilateral middle frontal gyrus, right anterior cingulate and paracingulate gyri, bilateral hippocampus, bilateral amygdala, bilateral caudate nucleus, and bilateral thalamus (all $p < 0.05$, false discovery rate corrected). Nodal centralities of the hippocampus were negatively associated with symptom severity and illness duration. **Conclusions:** Our findings suggest disrupted topological organization of GM structural networks in adolescent MDD patients. Impaired local segregation and abnormal nodal centralities in the prefrontal-subcortical-limbic areas and visual cortex regions may play important roles in the neurobiology of adolescent-onset MDD.

PO-0056

Aberrant resting-state functional connectivity of the amygdala in non-alcoholic fatty liver disease with mild cognitive impairment

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Background: The amygdala (AMG) is a vital subcortical center that has been implicated in a variety of emotional/cognitive functions ranging from emotion generation, identification of emotional stimuli, and emotion regulation. Mild cognitive impairment (MCI) is commonly seen in patients with nonalcoholic fatty liver disease (NAFLD), but the neural mechanism is yet to be elucidated. This study used resting-state fMRI (RS-fMRI) to investigate the aberrant functional connectivity (FC) of the AMG in patients with MCI_NAFLD.

Methods: A total of 74 NAFLD patients and 62 demographic-matched healthy controls (HC) were enrolled. According to the Montreal Cognitive Assessment (MoCA) score, the patients were divided into two groups: 43 patients with MCI_NAFLD and 31 patients with nonMCI_NAFLD. All participants underwent a 3.0T RS-fMRI scan and psychological scale assessment, and the liver fat content and blood biochemical index were measured in the patients. After preprocessing RS-fMRI data, the AMG was taken as the region of interest (ROI) to perform whole-brain seed-based FC in the three

groups. One-way analysis of covariance (ANCOVA) and post-hoc t-tests were analyzed to compare FC values among the three groups. Correlation analyses were performed to evaluate the relationship between differing FC in NAFLD and clinical variables.

Results: Compared with the nonMCI_NAFLD group, the MCI_NAFLD group had increased FC between the right AMG and the right superior frontal gyrus (SFG), while reduced FC between the left AMG and the left SFG. In patients with NAFLD, the right AMG-related FC in the right SFG was correlated with the MoCA score and liver-controlled attenuation parameter (CAP), and the left AMG-related FC in the left SFG was positively correlated with MoCA scores. Compared with the HC group, both NAFLD groups had enhanced right AMG-related FC in the right insular and left AMG-related FC in the bilateral putamen/insula and left postcentral gyrus. In addition, patients with MCI_NAFLD patients also had increased left AMG-related FC in the midbrain and those without MCI had increased left AMG-related FC in the left middle temporal gyrus.

Conclusion: Dysregulated FC in regions involved in the frontal-limbic-mesencephalic loop plays an important role in the development of early cognitive dysfunction in patients with NAFLD, and the accumulation of visceral fat may exacerbate the degree of loop dysfunction.

PO-0057

Altered metabolites in the periaqueductal gray in COVID-19 patients with headache: a longitudinal MRS study

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Background: Headache is one of the most common symptoms of acute COVID-19 infection. However, its mechanisms remain obscure and there lack a study investigate the periaqueductal gray (PAG) in the COVID-19 headache.

Methods: Fifteen participants experience headache during the acute phase of COVID-19 were recruited. All subjects underwent twice proton magnetic resonance spectroscopy (1H-MRS) examinations focusing on the PAG before and after them were infected. Metabolite changes were investigated between pre- and post-infection groups.

Results: The combined glutamine and glutamate/total creatine ratio (Glx/tCr) was increased in the PAG after infection. The total choline/total creatine ratio (tCho/tCr) in the pre-infection group was negatively correlated with the days of headache during the acute phase of COVID-19.

Conclusion: The present study indicates that PAG play an important role in COVID-19 headache, thereby support the involvement of trigeminovascular system activation in the pathophysiology of COVID-19 headache.

PO-0058

Peak time delay in the ischemic core may predict poor functional outcome in acute ischemic stroke

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Background: Numerous clinical and radiological metrics have been suggested for predicting functional outcomes of acute ischemic stroke (AIS) patients with ambiguous results. The best metric to comprehensively evaluating the predictive prognosis value of CTP-derived imaging parameters in AIS is uncertain.

Purpose: To investigate the value of CTP source images, CTP, and CTP-derived time-density curve's (TDC's) parameters in determining clinical outcomes of AIS patients.

Methods: This retrospective study evaluated AIS patients with anterior circulation occlusion within 24 h from July 2017 to May 2022. We assessed the arterial (Menon et al.) and venous (cortical vein opacification) collaterals and recorded the CTP parameters. CTP-derived TDC's parameters were automatically generated and calculated after outlining the largest ischemic core area, accompanied penumbra and their contralateral healthy hemisphere. The relevant clinical information was collected. Final ischemic volume (FIV) and infarct growth volume (IGV) were determined at follow-up images. Univariate, multivariable regression analysis and receiver operating characteristic curves were further analyzed.

Results: 175 patients were included (median age, 66 years, interquartile range, 56-77 years; 111 men). Eighty-four patients had favorable outcomes (90-day mRS:0-2). Among all parameters, the peak time delay in the ischemic core demonstrated the highest diagnostic value (AUC: 0.74, 95%CI: 0.67, 0.80). A shorter peak time delay in the ischemic core and lower baseline NIHSS were independent predictors of favorable outcomes with high diagnostic values (AUC: 0.89, 95%CI: 0.84, 0.94). Besides, the peak density ratio in the ischemic core was an independent predictor of FIV ($\beta = 18.12$, $P < 0.001$) and IGV ($\beta = 15.47$, $P < 0.001$).

Conclusions: The peak time delay of the ischemic core is a promising imaging marker for functional outcomes prediction in AIS patients. The peak density ratio of the ischemic core is an essential factor in determining tissue fate.

PO-0059

Neuroimaging characteristics and long-term prognosis of myxoma-related intracranial diseases

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Purpose Myxoma-related intracranial diseases were rarely documented in history. The main purpose of our study is to provide a more comprehensive and detailed understanding of the pathogenesis, imaging features, surgical procedures and pathology of such patients through long-term follow-up.

Methods From March 2012 to July 2022, baseline information that included neuroimaging and neuropathology data from 12 cardiac myxoma patients with neurological symptoms were retrospectively analysed, and the treatment options were discussed. Nine patients underwent long-term postoperative follow-up.

Results Twelve cardiac myxoma patients with neurological symptoms were identified, and among them, 10 patients were postoperative patients who had undergone excision of cardiac myxoma, 5 patients had received craniotomy, and the others had received conservative treatment. Positive neuroimaging findings were found in all patients, including cerebral infarction (12/12, 100%), multiple intracranial aneurysms (8/12, 67%), and extravascular metastasis (6/12, 50%). After a long-term average follow-up of 27 months, an increased number of metastatic lesions or an enlargement of the intracranial aneurysms was found in 4 patients.

Conclusions Neuroimaging findings of myxoma-related intracranial lesions were diversified and usually presented as multiple cerebral infarction, aneurysm formation, focal intracranial haemorrhage and space-occupying lesions. Progress is over a long period of time after primary tumour resection. It is necessary for patients to be regularly examined within 2 years after cardiac myxoma resection using MRI+CTA/MRA/DSA in order to be ruled out. Stable and effective chemotherapy drugs are urgently needed.

PO-0060

The Detrimental Impact of Cerebral Small Vessel Disease on the Integrity of the Cholinergic System in Patients with Mild Cognitive Impairment

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Background: Cerebral small vessel disease (SVD) elevates the risk of mild cognitive impairment (MCI) progressing to Alzheimer's disease (AD), while cognitive decline frequently linked to cholinergic deficits. However, the influence of SVD on cholinergic system integrity during AD progression remains inadequately elucidated. This study seeks to examine the associations relationships between SVD, cholinergic deficits, and cognitive impairments in MCI patients through cross-sectional and longitudinal analyses.

Methods: We included 40 cognitively unimpaired (CU) subjects, 29 MCI patients without SVD, and 23 MCI patients with SVD. All participants underwent 4-year follow-ups, including cognition assessments and MRI scans. We measured nucleus basalis of Meynert (NBM) volume using T1-weighted images, and tracked cholinergic white matter (WM) pathways using diffusion tensor imaging. We employed mean diffusivity (MD) as a metric to assess the integrity of WM pathways. In the cross-sectional analysis, we compared cholinergic markers among three groups and examined associations between SVD burden, cholinergic markers, and cognitive performance using linear regression models. In the longitudinal analysis, we used linear mixed models to assess changes in cholinergic markers over time among the groups.

Results: After controlling for age, sex, education, and total intracranial volume, both MCI groups showed decreased NBM volume compared to the CU subjects, however, there was no significant difference between the two MCI groups. Furthermore, increased MD was observed in both medial and lateral pathways in MCI patients with SVD when compared to those without SVD and CU subjects. Longitudinally, there was no significant difference in NBM volume changes among the three groups over 4 years of follow-up. However, MCI patients with SVD showed a faster increase of MD in both medial and lateral pathways compared to CU subjects. Additionally, MCI patients without SVD also showed a faster increase in medial pathway MD compared to CU subjects. Correlation analyses demonstrated that cholinergic pathway integrity was associated with SVD burden and cognitive impairments across MCI patients.

Conclusions: Our work underscored the clinical significance of preserving cholinergic system integrity as a potential therapeutic avenue in mitigating cognitive decline in individuals with MCI and SVD.

PO-0061

High-resolution MR vessel wall imaging combined with ideal cardiovascular health for evaluating the occurrence of ischemic stroke

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Objective: To explore the relationship between high-resolution MR vessel wall imaging (HR-VWI) based plaque characteristics combined with ideal cardiovascular health (CVH) metrics and ischemic stroke attributed to middle cerebral artery (MCA) plaque.

Methods: Retrospective analyzed of 119 participants, 83 patients with high signal in the area of the MCA on diffusion-weighted imaging (DWI) were included in the symptomatic group, and the other 36 patients without high signal were included in the asymptomatic group. Plaque characteristics including degree of stenosis, enhancement ratio, intraplaque hemorrhage (IPH), and remodeling were measured and compared between groups. The CVH score and other clinical data were obtained. The association between these factors and ischemic stroke was investigated by univariate and multivariate analysis.

Results: Patients in symptomatic group showed significantly higher degree of stenosis (symptomatic vs. asymptomatic: 72.46% (54.01%, 87.69%) vs. 16.7% (28.61%, 61.81%), $p < 0.001$), plaque burden (symptomatic vs. asymptomatic: 0.81 (0.71, 0.91) vs. 0.73 (0.68, 0.81), $p = 0.001$), and enhancement ratio (symptomatic vs. asymptomatic: 0.94 ± 0.56 vs. 0.71 ± 0.40 , $p = 0.005$) than asymptomatic group. The prevalence of IPH in symptomatic group was significantly higher than asymptomatic group (symptomatic vs. asymptomatic: 41.0% vs. 5.6%, $p < 0.001$). Meanwhile, CVH score in asymptomatic group was significantly higher than that in symptomatic group ($p < 0.001$). Multivariate logistic regression analysis showed that degree of stenosis (OR = 1.066; 95% CI, 1.023–1.111), IPH (OR = 7.254; 95% CI, 1.167–45.029), and total CVH score (OR = 0.445; 95% CI, 0.298–0.665) were the independent characteristics associated with occurrence of ischemic stroke. ROC curve showed that the AUC values of degree of stenosis, IPH, and CVH score were 0.798, 0.677, and 0.859 respectively. The combined model achieved an AUC of 0.926.

Conclusion: The degree of stenosis and IPH of MCA identified on HR-VWI, as well as CVH score, were independently associated with ischemic stroke. Plaque characteristics combined with CVH may identify high-risk plaque and provide new insight for preventive treatment of ischemic stroke.

PO-0062

Energy spectral CT assessment of the anti-angiogenic effect of carbon ions on rat C6 gliomas

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Purpose: Exploring the value of energy-spectral CT in evaluating the role of carbon ion irradiation (CIR) in inhibiting angiogenesis of rat C6 gliomas.

Methods and Materials: Establishing 78 rat C6 glioma models. Before CIR, all rats were subjected to energy-spectral CT-enhanced scans and 6 rats were randomly selected as molecular pathology controls, the rest were randomly divided into three groups using different doses of carbon ions irradiation (0 Gy, 1 Gy and 2 Gy). Energy-spectral CT-enhanced scans on day 7, 14 and 21 after CIR to obtain the best single-energy CT value (CT_{70 keV}), iodine concentration (IC) and slope of the energy-spectral curve ($K_{(40-70 \text{ keV})}$) in the solid tumour area and to measure the tumour volume. Then, three rats were randomly selected for HE and immunohistochemical staining for HIF-1 α , VEGF, CD34, α -SMA at each time point in each group; three rats were randomly selected on day 7 and 14 after CIR to collect tumour tissues for the detection of vascular-associated protein expression by WB method.

Results: The tumour volume in the three groups still increased at 7 days after CIR, gradually decreased at 14 days in the 1 Gy and 2 Gy groups, and decreased significantly at 21 days in the 2 Gy group.

Compared with the 0 Gy group, the tumour blood perfusion was reduced in the 2 Gy group at 7 days after CIR, and CT_{70 KeV}, IC and $K_{(40-70 \text{ KeV})}$ decreased; at 14 days, CT_{70 KeV}, IC and $K_{(40-70 \text{ KeV})}$ decreased significantly in the 1 Gy and 2 Gy groups. There was a good correlation between the percentage of HIF-1 α , VEGF, CD34 and α -SMA positive cells and each quantitative parameter of the energy spectrum CT in each groups. The expression of vascular-related proteins in the 2 Gy group was gradually downregulated after CIR.

Conclusions: Quantitative parameters of energy spectral CT, including CT 70 KeV, IC and K (40-70 KeV), can be used as a non-invasive dynamic monitoring tool to respond to the inhibitory effect of carbon ions on angiogenesis in rat C6 gliomas.

PO-0063

Mild cognitive impairment in non-alcoholic fatty liver disease is associated with abnormal resting-state functional connectivity between the default mode network and regions within the reward system

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Background: Mild cognitive impairment (MCI) is commonly seen in patients with nonalcoholic fatty liver disease (NAFLD), but the neural mechanisms have not been elucidated. In this study, we used resting-state fMRI (RS-fMRI) to investigate the characteristics of spontaneous neural activity in NAFLD patients with MCI.

Methods: A total of 74 NAFLD patients and 62 demographic-matched healthy controls (HC) were enrolled. According to the Montreal Cognitive Assessment (MoCA) score, the patients were divided into two groups: 43 patients with MCI_NAFLD and 31 patients with nonMCI_NAFLD. All participants underwent 3.0T RS-fMRI scan and neurocognitive psychological assessment, and patients underwent liver MRI proton density fat fraction (PDFF) and blood biochemical indexes measurement. DPABI software was used to process the RS-fMRI data and obtain the whole brain amplitude of low-frequency fluctuations (ALFF) map. One-way analysis of covariance and post-hoc tests were used to compare the differences in ALFF maps among the three groups. The abnormal regions were selected as the regions of interest (ROI) to compare the differences in whole-brain seed-based functional connectivity (FC) between the two patient groups, and the correlation between abnormal FC values and clinical variables was analyzed.

Results: Compared with nonMCI_NAFLD patients, MCI_NAFLD patients had reduced ALFF values in the right cerebellum and right cuneus, and increased ALFF values in the left posterior cingulate gyrus (PCC), and the ALFF values in these different regions were significantly correlated with MoCA scores. Compared with nonMCI_NAFLD patients, MCI_NAFLD patients had enhanced FC between the left PCC and the left lingual gyrus, left parahippocampal gyrus, left medial orbitofrontal gyrus, left middle frontal gyrus, left postcentral gyrus and right postcentral gyrus, and reduced FC between the left PCC and the left insula and right supplementary motor area. Among them, the FC values between the left PCC and the regions related to the reward system were correlated with cognitive function, emotional symptoms, PDFF values and insulin function in NAFLD patients. In particular, the ALFF values of the PCC completely mediated the correlation between the FC values between the PCC and the orbitofrontal cortex and MoCA scores.

Conclusions: The development of cognitive impairment in patients with NAFLD may be closely related to the dysfunction of the default mode network and dopamine pathway, in which visceral fat accumulation and insulin dysfunction also play a crucial role.

PO-0064

A preliminary study on the application of AI to improve the efficacy of cerebral aneurysm detection by resident physicians with different years of training

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Objective:To explore the value of applying artificial intelligence to improve the efficacy of aneurysm detection by junior and senior resident-trained physicians. **Methods:** The data of 48 patients who underwent head and neck CTA examination in our hospital from December 2021 to February 2022 were retrospectively selected. The CTA was read by junior and senior resident-trained physicians using the independent method and AI-assisted method, and the diagnostic results and reading time were recorded. Paired chi-square test was used to compare the difference in the detection rate of aneurysm between independent method and AI-assisted method, and paired t-test was used to compare the difference in the reading time between the independent method and AI-assisted method. **Results:** The detection rate of aneurysm by junior resident-trained physician using AI-assisted method was 95.35% , which was significantly higher than the detection rate using independent method of 79.07% ($P < 0.05$). The detection rate of aneurysm by senior resident-trained physicians using AI-assisted method was 93.02%, which was slightly higher than the detection rate using independent method of 83.72%, but the difference was not statistically significant ($P > 0.05$). The time of reading head and neck CTA by AI-assisted method were significantly shorter than that by independent method, and the difference was statistically significant ($P < 0.001$). **Conclusion:** The application of AI by junior and senior resident-trained physicians can help improve the detection rate of cerebral aneurysm and shorten the reading time, and the application by junior resident-trained physicians is more effective.

PO-0065

Computed tomography imaging predictors of early neurologic deterioration and long-term functional outcomes in symptomatic acute ischemic stroke treated with thrombolysis

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Background: The aim of this study was to identify the clinical, laboratory, and radiological factors linked to early neurologic deterioration (END) and long-term functional outcomes in patients who have received thrombolysis treatment for symptomatic acute anterior circulation ischemic stroke. **Methods:** This study was conducted at the Stroke Center of Yancheng Third People's Hospital. From a comprehensive database comprising consecutive patients diagnosed with cerebrovascular ischemia, we retrospectively included patients with symptomatic anterior circulation large vessel stenosis or occlusion stroke who underwent intravenous thrombolytic therapy and multiparametric computed tomography (CT) scan, including noncontrast CT, CT angiography, and CT perfusion, before thrombolysis. Symptom severity was assessed at admission and 72 hours after using the National Institutes of Health Stroke Scale (NIHSS). The outcomes evaluated included the incidence of END following thrombolysis and the patient's 90-day postprocedure functional status as measured by the Modified Rankin Scale (mRS; with a score of 0–2 denoting a favorable outcome). We employed a binary logistic regression model to discern the clinical predictors of functional independence. A P value < 0.05 was considered statistically significant.

Results: There was a substantial correlation between the occurrence of END and unfavorable scores on the mRS at 90 days ($P<0.01$). The significant CT parameter predictors for END and an unfavorable 90-day mRS score were lower regional leptomeningeal collateral (rLMC) score ($P<0.01$), larger volume of perfusion lesion ($P<0.01$), infarct core ($P<0.01$), and ischemic penumbra ($P<0.05$). As shown by area under the receiver operator characteristic curves (AUCs) for predicting the long-term functional outcomes, the optimal thresholds of the rLMC score, perfusion lesion, infarct core, and ischemic penumbra were 17.5 (AUC =0.751; $P=0.01$), 90 mL (AUC =0.736; $P=0.01$), 14.5 mL (AUC =0.716; $P=0.01$), and 57.0 mL (AUC =0.712; $P=0.01$), respectively.

Conclusions: In patients with symptomatic acute anterior circulation ischemic stroke treated with thrombolysis, CT imaging parameters, including rLMC, perfusion lesions, infarct core, and ischemic penumbra, hold independent prognostic value for the development of END and long-term functional outcomes.

PO-0066

MR imaging characteristics of ‘diffuse hemispheric gliomas, H3 G34-mutant’ and possible differentiation from ‘glioblastomas, IDH-wildtype’ in adolescents and young adults

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Purpose: We aimed to report the clinicopathologic and neuroradiological features of diffuse hemispheric gliomas, H3 G34-mutant (DHGs-G34m), compare these characteristics to those of IDH-wildtype glioblastomas (GBMs-IDH-WT) in adolescents and young adults, and try to investigate the capacity of quantitative MRI variables in differentiating them.

Methods: Twenty-three patients with DHG-G34m and thirty GBMs-IDH-WT were recruited in this retrospective study. All patients underwent preoperative MRI. Clinical, radiological, and molecular data of DHGs-G34m were reviewed, and neuroimaging features were compared to those of GBMs-IDH-WT. Visually Accessible Rembrandt Images (VASARI) features were extracted based on preoperative MRI. The Kruskal-Wallis test was performed, and a logistic regression model was constructed to evaluate the differentiation diagnostic performance between DHG-G34m and GBM-IDH-WT. Subsequently, an open-source software named FeAture Explorer was performed to generate the machine learning pipeline and select important radiomics features that had been extracted with the PyRadiomics. Some metrics including sensitivity, specificity, and area under the curve (AUC) were used to evaluate the performance.

Results: The mean age of G34-mutant patients was 23.7 years, younger than GBM-IDH-WT patients (mean age, 30.9 years). The majority of G34-mutant cases were in the frontal, parietal, and temporal lobes, and demonstrated no or only a faint contrast enhancement, while 83% of GBMs-IDH-WT were seen in the frontal lobe and showed marked contrast enhancement. The radiomics features model (AUC=0.925) had better discriminatory performance between DHG-G34m and GBM-IDH-WT than the VASARI feature analysis (AUC=0.843).

Conclusions: DHGs-G34m occur most frequently in the frontal, parietal, and temporal lobes, and are associated with distinct radiological characteristics compared to GBMs-IDH-WT in adolescents and young adults. Successful identification can be achieved using either VASARI features or radiomics signature, which may provide assistance in clinical settings.

PO-0067

Impaired glymphatic system in pre-cirrhotic NAFLD patients: A pilot MRI study based on DTI-ALPS

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Background: Dysfunction of the glymphatic system (GS) has been associated with cognitive impairment. However, whether there are alterations in the GS of patients with non-alcoholic fatty liver disease (NAFLD) remains unclear. Therefore, this study aims to investigate alterations in GS function in patients with NAFLD and explore the relationship between these alterations and cognition.

Methods: Forty-three patients with pre-cirrhotic NAFLD (diagnosed by liver biopsy) and twenty-three age-, sex-, and education-matched controls underwent diffusion tensor imaging (DTI) examination and cognitive measurements. The DTI analysis along the perivascular space (DTI-ALPS) index, calculated from the DTI data, assessed differences in GS function between the two groups. Linear regression analysis examined the relationship between the ALPS index and Z-transformed cognitive scores. Spearman/Pearson correlation analysis was conducted for assessing the relationship of the ALPS index with clinical indicators.

Results: After adjusted for age, sex, and BMI, NAFLD patients exhibited significantly lower ALPS index and higher diffusivity of projection fibers in the direction of the y-axis than controls (both $p < 0.001$). In the NAFLD group, the ALPS index was significantly correlated with the Mini-Mental State Examination (MMSE) score (beta (95% CI) = 2.123 (0.156, 4.091), $p = 0.035$) and the clock drawing score (CDT) (beta (95% CI) = 4.233 (0.073, 8.393), $p = 0.046$) after adjusting for age, sex, body mass index, and education level. In addition, a significantly positive correlation between the ALPS index and VAT ($r = 0.353$, $p = 0.020$) after adjusting for age, sex, and BMI in NAFLD patients.

Conclusions: Patients with NAFLD exhibit glymphatic dysfunction prior to developing cirrhosis. Changes in the GS may affect cognitive performance in NAFLD. These findings contribute to understanding the mechanisms underlying cognitive impairment in NAFLD patients.

PO-0068

Difference of hierarchy and topology in individual gray matter network between MCI patients who converted to AD and who did not convert within 3 years

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Objective: The aim of our study was to explore the difference of individual gray matter (GM) network in mild cognitive impairment patients who converted (MCI-C) and who did not convert (MCI-NC) to Alzheimer's disease (AD) within 3 years at baseline.

Materials and Methods: 461 patients with MCI were collected from the Alzheimer's Disease Neuroimaging Initiative (ADNI), with 180 MCI-C patients and 281 MCI-NC patients. For each subject, individual GM network was constructed by using Kullback-Leibler divergence method based on 3D-T1 imaging. Then, gradient analysis and topological analysis were performed based on the individual GM network, and partial correlations was used to evaluate relationships between network properties and cognitive function as well as apolipoprotein E (APOE) $\epsilon 4$ alleles. Finally, a support vector machine (SVM) model was constructed to discriminate MCI-C group from MCI-NC group at baseline based on individual GM connectome.

Results: In gradient analysis, distribution of gradient scores of principal gradient in MCI-C group was more compressed than that in MCI-NC group, and gradient scores of left lingual gyrus, right

fusiform gyrus and left middle temporal gyrus increased in MCI-C group, compared with MCI-NC group ($p < 0.05$, FDR corrected). In topological analysis, significant differences of nodal efficiency in four nodes were also detected between the two groups. Muchmore, the gradient scores or nodal efficiency of above regions were found to be significant related with scores of neuropsychological tests, and gradient scores of left middle temporal gyrus were found to be positively related with the number of APOE $\epsilon 4$ alleles ($r = 0.192$, $p = 0.002$). Finally, by using SVM model, we obtained a balanced accuracy of 79.4% in the classification of MCI-C and MCI-NC patients ($p < 0.001$).

Conclusion: Hierarchy of whole-brain GM network in MCI-C group was more compressed than that in MCI-NC group, which may be related with the more serious cognitive impairment in MCI-C group. Muchmore, the gradient scores of left middle temporal gyrus were both related with the cognitive function and APOE $\epsilon 4$ alleles, which may be a potential biomarker to distinguish MCI-C and MCI-NC at baseline.

PO-0069

Baseline white matter dynamic functional connectivity reveals dysconnectivity and predicts the early treatment response in first-episode schizophrenia

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Objective

Schizophrenia (SZ) is associated with abnormal dynamic functional structure, which may affect the efficacy of early treatment. This experiment aimed to determine the prognostic predictive value of white matter dynamic functional connectivity (FC) of patients after early antipsychotic treatment.

Materials and Methods

Thirty-six patients with SZ, and 44 health control (HC) were included. This research has been approved by an ethical committee. Based on resting-state fMRI, sliding-window methods were used to analyze the patients' dynamic FC changes of white matter and the relationship with antipsychotic drugs efficacy, namely, to explore their predictive ability for early treatment response.

Results

Dynamic analysis showed that SZ patients had a relatively infrequent but strongly connected state I, and a more frequent but weaker state II. The overall incidence of these two states varied widely, with state II (71.09%) more frequent than state I (28.91%). Dynamic FC weakened was dominant in white matter brain regions such as the genu of the corpus callosum and the right corticospinal tract; dynamic FC was mainly weakened such as left anterior limb of internal capsule and right cingulum. The temporal properties of dynamic FC (window ratio, mean dwell time, number of transitions) were not significantly different between groups and were not significantly related to response status.

Conclusion

There are characteristic changes of dynamic FC in SZ patients, and the temporal characteristics may be not potentially related to the early treatment effect of SZ. Further research on the dynamic changes of white matter FC holds promise to understand the pathophysiological mechanism of SZ.

PO-0070

Application of 3D vessel wall high-resolution MR(3D VW-MR) imaging in Primary Angiitis of the Central Nervous System

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Purpose Vasculitis usually reveals a smooth, homogeneous, concentric arterial wall thickening and enhancement in three-dimensional vessel wall magnetic resonance imaging (3D VW-MRI). We compared 3D VW-MRI and MRA and provide diagnostic information on PACNS.

Material and Methods Seventeen patients diagnosed with PACNS were recruited from March 2020 to March 2022 in the first hospital of JLU. 3DVW-MRI and MRA were performed on all patients. 3D T1 VISTA protocol was performed on a 3.0T Ingenia MR Scanner. Three cases with particular imaging characteristics on 3D VW-MRI were explored, providing hints on the application of 3D VW-MRI in PACNS.

Results There were 12 cases (70.6%) combined with white matter involvement, 6 cases (35.3%) combined with the meningeal involvement, 2 case (11.8%) complicated with basal ganglia involvement and 2 cases (11.8%) complicated with spinal cord involvement. Cortical atrophy was identified in 6 cases (17.6%). There were 12 cases (70.6%) with the enhancement of the lesions and meningeal. The 3D Vessel Wall MR imaging showed uniform thickness in all patients (100%) with contrast enhancement of the vessel wall of the vasculitis artery. Imaging findings could be seen. The brain pathology in 3 cases, manifested as brain edema, partial necrosis or brain tissue loose, blood vessel wall thickening and perivascular lymphocytes.

Conclusion 3D-VW-MRI is now an optimal approach. Firstly, it provides a visualization of vessel wall and the lumen especially after the contrast agents. Second, the thickness is 1mm, MPR and CPR are helpful for demonstrating the specific vasculopathy and the whole-brain vasculature. 3D-VW-MRI showed uniform thickness of the involved vessel. Furthermore, according to the enhancement intensity after contrast, the c of PACNS could be evaluated. In conclusion, 3D-VW-MRI provides a more comprehensive information for detecting and diagnosing PACNS.

PO-0071

Prediction of CDKN2A/B homozygous deletion status in IDH-mutant astrocytoma by radiomics nomogram strategy

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Background :To construct an MRI-based radiomic nomogram to predict the CDKN2A/B homozygous deletion status in patients with IDH-mutant astrocytoma.

Methods :A total of 200 IDH-mutant astrocytoma (103 CDKN2A/B homozygous deletion and 97 CDKN2A/B non-homozygous deletion) were enrolled in the training cohort (n = 140) and the test cohort (n = 60) for the prediction of CDKN2A/B homozygous deletion. Total 1946 features were extracted from tumor edema and tumor parenchyma, respectively. A total of 3,992 features were obtained from T2 FLAIR (T2 fluid attenuation reversal) and T1WI + C (contrast T1WI). The Student's t-test and the Least Absolute Selection and Shrinkage Operator (LASSO) model were used to select a radiomics signature, and finally a radiomics nomogram was constructed using the age, gender information and the above features.

Results :Student's t-test concluded that the overall tumor radiomics constructed with tumor edema radiomics and tumor parenchyma radiomics has the best performance (AUC: training cohort = 0.951, test cohort = 0.779). CDKN2A/B homozygous deletion in IDH mutant astrocytoma was predicted by radiomics nomogram (C index: training cohort = 0.899, test cohort = 0.805). The clinical usefulness of the nomogram in predicting CDKN2A/B homozygous astrocytoma was further confirmed by decision curve analysis.

Conclusions :The nomogram, which combines age, gender, and radiomics features, offers a clinically useful approach to predict the status of CDKN2A/B homozygous deletion in IDH mutant astrocytoma, and facilitated MRI-based clinical decision-making in IDH mutant astrocytoma.

PO-0072

Study on brain function changes in patients with neurological depression based on resting state functional magnetic resonance imaging(rs-fMRI)

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Purpose To construct functional brain network using rs-fMRI and to compare the relationship between rs-fMRI changes and clinical scales in evaluating the depression. To provide imaging evidence for the diagnosis and pathogenesis of depression.

Material and Methods

24 patients with depression and 16 healthy controls (HC) were included. Initially, participants underwent medical history inquiries and were assessed using HAMA, 24 HAMD, PHQ-9, and GAD-7 scales. Subsequently, rs-fMRI data were collected, and brain functional networks were constructed based on fALFF, ReHo, and FC data, which help determine abnormalities in brain regions and functional connectivity. Image were processed on DPARSFA in Matlab (R2018b). General data were analyzed using SPSS 24.0. A two-sample T-test for group comparisons. For fALFF, ReHo, and FC data, one-sample T-tests were performed using dpadi software (Matlab R2018b) and SPM12, followed by a two-sample T-test between groups. We applied significance level of $P < 0.01$.

Results

Significant differences were found in HAMD, HAMA, PHQ-9, and GAD-7 scores between the two groups ($P < 0.05$). About 83% of patients primarily take physical symptoms as the primary complaint, including sleep disorders, dizziness, headaches, and memory loss, while 17% reported emotional symptoms firstly. In rs-fMRI images, the patient group had higher fALFF values in the left superior frontal gyrus, right cerebellum 6 area, and gyrus lingualis. The ReHo value was higher in the patient group in the right posterior central gyrus, right superior occipital lobe, and right angular convolution. Additionally, the patient group showed increased FC values in the right posterior central gyrus, right gyrus temporalis medius, left fusiform gyrus, left inferior temporal gyrus, and medial prefrontal cortex.

Conclusion

By comparing the value changes of fALFF, ReHo, and FC, we figure out that there are a significant number of differences in rs-fMRI between the groups.

PO-0073

The application of High-Resolution Vessel Wall MRI(HR-VW-MRI) in determining the stability of intracranial MCA and BA plaques

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Purpose

To study HR-VW-MRI imaging characteristics of intracranial MCA and BA plaques, and discriminate the stability of early intracranial MCA and BA plaques. To improve the detection rate of symptomatic intracranial artery plaques

Material and Methods

87 patients with acute ischemic stroke who visited the department of neurology of 1st Hospital of JLU from March 2017 to March 2019 were collected in the study. All the patients were performed with the HR-VW-MRI protocol. All of the VW-MRI examinations were performed on a 3 T Siemens Trio MR scanner. The remodelling ratio, eccentricity index and plaque range of MCA and BA plaques were compared using MRI-PlaqueViewTM. SPSS 19.0 statistical software was used for statistical analysis of the data. For quantitative data, t-test (for normally distributed data) or Mann-Whitney U test was used, and a chi-square test was used for qualitative data. $P < 0.05$ was considered statistically significant.

Results

87 patients with 116 plaques were included in this study. There were 80 plaques located in the MCA and 36 plaques found in the BA. Among MCA plaques, 22 were symptomatic, 7 were indeterminate, and 51 were asymptomatic. Among BA plaques, 13 were symptomatic, 14 were uncertain, and 9 were asymptomatic. Among all plaques, the eccentricity index of symptomatic plaques was 0.612 ± 0.618 , while that of asymptomatic plaques was 0.490 ± 0.619 ($p = 0.0005$). The plaque range in the symptomatic plaques was 125.9 ± 20.40 , while that of uncertain and asymptomatic plaques was 143.4 ± 23.62 ($p < 0.001$). That meant the symptomatic plaques had much higher eccentricity index and much much smaller plaque range.

Conclusion:

In this study, the characteristics of MCA and BA plaques in the early and middle stages included in the group were manifested as the symptomatic plaques prone to stroke with higher eccentricity index and smaller plaque range.

PO-0074

Structural and functional abnormalities of the insula subregions in patients with bulimia nervosa

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Abstract

Background: Bulimia nervosa (BN) is a complex and serious eating disorder with a clinically chronic course and recurrent episodes, which has been shown to be closely related to the brain dysfunction. The insula has also been commonly identified as an abnormal brain region in previous eating disorders related studies.

Methods: Structural magnetic resonance imaging (MRI) and resting-state functional MRI images were acquired from 54 BN patients and 56 healthy controls (HCs). Neuroimaging analysis methods including voxel-based morphometry (VBM), amplitude of low-frequency fluctuation (ALFF), slow-5

ALFF, fractional ALFF (fALFF), slow-5 fALFF, and functional connectivity (FC) were applied to investigate multimodal neuroimaging abnormalities of the insula between the BN patients and HCs. Partial correlation was then used to examine the relationships between neuroimaging findings and clinical features.

Results: Compared with the HCs, the BN patients exhibited decreased GMV of in the right dorsal anterior insula (dAI) and bilateral ventral anterior insula (vAI). BN patients showed significantly decreased slow-5 ALFF of bilateral dAI and left posterior insula (PI) and slow-5 fALFF of bilateral dAI, bilateral posterior insula (PI) and left vAI. Taking the insula subregions including the left dAI, the left PI, the left vAI, the right dAI, the right PI, the right vAI as regions of interest (ROIs), FC differences of the ROIs were observed in several brain regions between the two groups, which involves multiple functional areas including cognitive control, affect and body imaging processing. Furthermore, the decreased FC between the bilateral vAI and anterior cingulate gyrus and paracingulate gyri (ACG) and/or median cingulate and paracingulate gyri (DCG) were significantly correlated with the severity and abnormal eating behavior of BN.

Conclusions: Findings from our investigation suggest that the structural and/or functional abnormalities of the insula subregions are correlated with BN clinical features, which have implications for understanding neurobiological mechanisms underlying BN.

PO-0075

Association of the Glymphatic System with Motor Symptoms in Parkinson's Disease

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Background and objectives: Parkinson's disease (PD) is the second most common neurodegenerative disease, characterized by the aggregation of misfolded α -synuclein (α -syn) as its main pathological feature. Recent studies have shown that dysfunction of the glymphatic system, which serves as the cerebrospinal fluid transport system responsible for the metabolism of waste products in the brain leads to the accumulation of the associated proteins. Growing evidence links glymphatic dysfunction to PD, yet its imaging in motor symptoms remains unclear. This study aim to validate glymphatic system's connection to motor symptoms in PD patients in "OFF" (baseline) and "ON" (post-levodopa) states.

Methods: Retrospective study of 86 PD patients with 3.0-T MRI scans (July 2019-March 2021), assessing DTI-ALPS index (an index for diffusivity along the perivascular space) and perivascular spaces (PVSS). We analyzed the association between these metrics and UPDRSIII (the third part of the Unified Parkinson's Disease Rating Scale) scores using linear regression. Furthermore, the relationships with age, Hoehn&Yahr(H&Y) stage, Mini-mental State Examination (MMSE) scores were explored.

Results: Pre-levodopa, the UPDRSIII score was negatively correlated with the DTI-ALPS index ($p < .05$) and positively correlated with the PVSSs of the bilateral basal ganglia region (BG-PVSSs) ($p < .001$). When age was introduced as a covariate in the linear regression analysis, BG-PVSSs maintained a significant relationship with the "OFF" UPDRSIII scores ($p < .001$). Post-levodopa, the UPDRSIII scores were negatively correlated with the DTI-ALPS index ($p < .001$) and positively correlated with BG-PVSSs ($p < .001$). After introducing age as a covariate, the "ON" UPDRSIII scores maintained a significant negative linear relationship with the DTI-ALPS index ($p < .01$) and a positive linear correlation with BG-PVSSs ($p < .01$). Among the association between non-motor clinical parameters and DTI-ALPS Index and PVSSs, age correlated with DTI-ALPS index negatively ($p < .01$), with BG-PVSSs positively ($p < .001$). H&Y stage correlated with DTI-ALPS index ($p < .05$) and BG-PVSSs ($p < .05$) similarly. MMSE scores correlated with DTI-ALPS index positively ($p < .05$).

Conclusions: Study affirm a correlation between glymphatic dysfunction and motor symptoms in Parkinson's patients. Specifically, as the glymphatic impairment intensifies, the motor symptoms become more pronounced. Both the DTI-ALPS index and PVSs emerge as potential imaging biomarkers for the glymphatic system in PD.

PO-0076

Altered Voxel-Wise Degree Centrality of Brain Network in Chronic Rhinosinusitis Patients: A Resting-State Functional Magnetic Resonance Imaging Study

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Objective: Chronic rhinosinusitis (CRS) is a chronic inflammatory disorder of the paranasal sinus and nose. CRS patients have an increased risk of emotional and cognitive disorders. Although neuroimaging research has revealed alterations in the brains of CRS patients, the underlying causes of malfunction remain unclear. Here, we aim to explore the abnormal pathophysiological mechanisms in CRS patients using the voxel-wise degree centrality (DC) approach.

Methods: In this study, 26 CRS patients and 38 age- and sex-matched healthy controls (HCs) were enrolled for resting-state functional magnetic resonance imaging (rs-fMRI) scanning. The DC value was calculated using rs-fMRI data and correlated with clinical symptoms as well as with anxiety and depression scores in the CRS group. Moreover, a receiver operating characteristic (ROC) curve was used to classify the data.

Results: Compared with HCs, CRS patients indicated decreased DC values in the right precuneus and increased DC values in the left inferior temporal gyrus (ITG). In addition, a positive correlation between the DC values in the left inferior temporal gyrus and disease duration was observed. The results of the ROC curves indicated that the DC values of the right precuneus and the left ITG have the potential to be diagnostic imaging biomarkers for CRS.

Conclusions: Altered DC values in the precuneus and in the ITG in CRS patients may be involved in the pathophysiological mechanisms of brain dysfunction in those patients.

PO-0077

Research on radiomics in distinguishing anti myelin oligodendrocyte glycoprotein immunoglobulin G-associated disorder from aquaporin 4-immunoglobulin G-positive neuromyelitis optica spectrum disorder

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Objective

To develop and validate an individual radiomics nomogram for differential diagnosis of myelin oligodendrocyte glycoprotein immunoglobulin G-associated disorder (MOGAD) and aquaporin 4-immunoglobulin G-positive neuromyelitis optica spectrum disorder (AQP4+NMOSD). To provide a viable predictive model for early, rapid and accurate differential diagnosis of these two diseases.

Methods

21 patients with MOGAD and 63 patients with AQP4+NMOSD from the Qilu Hospital of Shandong University were retrospectively collected and enrolled as the primary cohort. 10 patients with MOGAD and 34 patients with AQP4+NMOSD from Huashan Hospital, Fudan University were enrolled as the external validation cohort. Radiomic features were extracted from the cervical spinal cord and brainstem lesions from the sagittal T2WI images. Then, filtering features by reducing dimensionality. Based on the selected features, the random forest (RF) model was constructed and the random forest radiomics score was calculated for each sample. The Rad score was then combined with the clinical characteristics to construct a logistic regression analysis model nomogram to differentiate MOGAD from AQP4+NMOSD. Calibration curves were plotted and the agreement between predicted and actual results was evaluated using the Brier test.

Results

The clinical and routine imaging features showed that the age, cervical lesions counts of the two patient groups had statistical significance ($P < 0.05$). The clinical features like the bladder, bowel dysfunction and lesions in the pons, midbrain had no statistically significant difference in the validation cohorts ($P > 0.05$). On the contrary, there was statistical significance in the primary cohorts ($P < 0.05$). AQP4+NMOSD patients showed a predominance of females in both the primary and validation cohorts, and the ratio of males to females in MOGAD patients was relatively similar. 11 radiomic features were extracted from an initial set of 1218 radiomic features, mainly reflecting lesion heterogeneity. Combining with clinical manifestations, age and lesion distribution, these features were used to construct a nomogram to discriminate MOGAD from AQP4+NMOSD. The area under the ROC curve (AUC) were 0.915 and 0.837 for the primary and validation cohorts respectively. The model exhibited good calibration (Brier Score 0.083 and 0.108 in the primary and validation cohorts, respectively).

Conclusions

Validated nomograms that include the radiomic features of brainstem and cervical cord lesions, age, and lesion distribution are useful in distinguishing MOGAD from AQP4 + NMOSD.

PO-0078

A Comparative Study: ASL and DSC Perfusion Imaging in Distinguishing Glioma Recurrence from Radiation-Induced Brain Injury using Machine Learning

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Abstract

Objective: This study aimed to evaluate the diagnostic efficacy of radiomics features extracted from dynamic susceptibility contrast (DSC) enhanced imaging and arterial spin labeling (ASL) in differentiating between radiation-induced brain injury (RIBI) and tumor recurrence (TR) in patients with diffuse gliomas.

Materials and Methods: A total of 131 patients with histopathologically confirmed diffuse gliomas, presenting with enhancing lesions after standard treatment, were included in this study for model development. Lesion segmentation was manually performed by two raters using ITK-SNAP on T1-weighted imaging (T1WI), T2-weighted imaging (T2WI), contrast-enhanced T1-weighted imaging (CE-T1WI), cerebral blood flow maps (CBF) from ASL, and relative cerebral blood flow maps (RCBF) from DSC. A total of 1130 radiomics features were extracted from the segmented areas of each imaging sequence. The intraclass correlation coefficient (ICC) assessed segmentation consistency between the two raters. Feature selection was conducted via t-tests, and an elastic net regression (ENR) algorithm combined with recursive feature elimination with cross-validation (RFECV) was used to identify the most optimal feature subset. Five machine learning classifiers were employed to establish radiomics models. Diagnostic performance was assessed using the

area under the curve (AUC) for single-parameter (CBF vs. RCBF), conventional (T1WI+T2WI+CE-T1WI), and multiparameter (conventional+CBF vs. conventional+RCBF) MRI radiomics models. The most optimal models were further validated in an independent validation set (N=37).

Results: Six features from CBF, five from RCBF, one from T1WI, one from T2WI, and six from CE-T1WI were identified as the most significant features. The K-nearest neighbor (KNN) classifier was selected as the optimal classifier. Both single-parameter MRI models, CBF (AUC 0.962) and RCBF (AUC 0.946), demonstrated satisfactory diagnostic performance, surpassing that of conventional MRI radiomics models (AUC 0.844). The incorporation of perfusion-derived features into conventional MRI models (conventional+CBF vs. conventional+RCBF, AUC 0.960 vs. AUC 0.971) resulted in improved diagnostic accuracy.

Conclusion: The integration of perfusion-derived features into conventional MRI radiomics models significantly enhanced diagnostic accuracy. ASL and DSC perfusion-weighted imaging exhibited strong consistency in distinguishing between RIBI and TR. Radiomics features derived from single perfusion parameters (CBF vs. RCBF), as well as when combined with conventional MRI (conventional+CBF vs. conventional+RCBF), demonstrated comparable diagnostic performance in distinguishing glioma recurrence from radiation-induced brain injury ($z=0.765$, $p=0.4441$; $z=0.756$, $p=0.4499$).

PO-0079

The prognostic value and biological significance of MRI CE-T1-based radiomics models in CNS5-identified GBM

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Objectives: Following the publication of the 2021 WHO Classification of CNS Tumors (CNS5), prognostic markers of patients with glioblastoma (GBM) (CNS5) need to be further explored. Radiomics is a non-invasive and reproducible method for the prognostic assessment of multiple solid tumors. The aims of the study were to explore the prognostic value and biological significance of MRI T1 - weighted enhancement (CE-T1) - based radiomics in GBM (CNS5).

Methods: The MRI CE-T1 tumor region was segmented, and radiomics features were extracted. The consistency analysis, univariate Cox regression and two machine learning algorithms were used for feature reduction. The radiomics prognostic model was established to calculate the radiomics score (RS) and independently external validated using bicenter radiotherapy cohorts. The enrichment analyses of the differential genes between RS-high and -low groups were implemented for biological significance exploration.

Results: A six-features radiomics prognostic model were built. High RS (HR=3.718, 95%CI: 2.222–6.220, $P<0.001$) was an independent risk factor for overall survival (OS) which was externally validated by two cohorts. RS was significantly correlated with DNA repair ($P=0.009$) and glycolysis ($P=0.001$) pathway enrichment scores. RS was associated with γ δT cell infiltration and the expression of LAG3.

Conclusion: The MRI CE-T1 based radiomics models can predict GBM (CNS5) prognosis noninvasively, which is relevant to DNA repair, and may guide the screening of radiosensitive populations.

PO-0080

Disrupted long-range connections is related to cognitive performance in patients with cerebral small vessel disease

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Purpose: We aimed to investigate whether the white matter hyperintensities (WMHs)-related disruptions in hub connectivity patterns are associated with connection distance and whether these disconnections mediate the relationship between WMHs and cognitive dysfunction in cerebral small vessel disease (SVD) patients with cardiometabolic risk factors.

Methods: We constructed comprehensive neuropsychological assessments and resting-state fMRI scans for 36 SVD patients with moderate to severe WMHs (Fazekas score ≥ 3) and 34 healthy controls. The voxel-based graph theory approach-functional connectivity strength (FCS) was employed to systematically investigate intrinsic functional connectivity patterns of whole-brain networks. Multiple linear regression and mediation analyses were applied to investigate the differences in global and nodal topological disruptions of brain functional network between groups. Partial correlation analysis was used to identify the relationship between functional connectivity and cognitive performances in the SVD group.

Results: The SVD patients performed significantly worse than the healthy controls in episodic memory ($p = 0.009$) and information processing speed ($p = 0.003$). We further observed that WMHs selectively targeted highly connected hub regions, mainly involving the medial and lateral prefrontal cortex, inferior parietal lobule, and insula. Furthermore, this impairment was contingent on connection distance, with the most prominent disruptions appearing in the long-range connections (e.g., 100 - 150 mm). Finally, these disruptions of hub connectivity (e.g., the long-range FCS in the left dorsolateral prefrontal cortex) positively correlated with the cognitive performance in SVD patients.

Conclusion: Our results emphasize that the disrupted long-range connections in WMHs is related to the cognitive performance in patients with SVD. This study advances our current understanding of the relationships between WMHs, abnormal connectivity patterns and cognitive impairment in SVD.

PO-0081

Longitudinal associations of cerebrospinal fluid α -synuclein with subcortical volumes differed between Parkinson's disease motor subtypes

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Background Heterogeneous brain atrophy and progression were found in Parkinson's disease (PD) motor subtypes. However, the relationship between these discrepancies and the longitudinal change of cerebrospinal fluid (CSF) α -synuclein is not very clear.

Objectives The current study mainly aimed to evaluate longitudinal changes of CSF α -synuclein, subcortical volumes, and motor and cognitive progression, as well as their relationships between PD motor subtypes.

Methods One hundred and twenty-two PD patients, including 87 tremor dominant PD (TD-PD) patients and 35 non-tremor dominant PD (nTD-PD) patients, completed clinical assessments, including motor and cognitive function, magnetic resonance imaging (MRI) scans and lumbar

punctures for CSF α -synuclein for a maximum total of three longitudinal annual visits (including baseline). A series of linear mixed-effects models were used to examine longitudinal changes in CSF α -synuclein, subcortical volume, and clinical progression between PD motor subtypes, as well as the correlation among CSF α -synuclein, subcortical volume, and clinical progression in TD-PD group and nTD-PD group separately.

ResultsThe CSF α -synuclein longitudinal concentration was significantly reduced in nTD-PD patients. Lower CSF α -synuclein at baseline was associated with faster right globus pallidus atrophy in nTD-PD patients and right thalamus enlargement in TD-PD patients longitudinally. Lower baseline CSF α -synuclein was correlated with faster cognitive deterioration in nTD-PD patients.

ConclusionsThe present study indicates that the consequences of α -synuclein aggregation on subcortical volume and cognitive function were distinct between nTD-PD and TD-PD groups. It provides us new insight to explore the pathophysiological processes and precisely pathogenesis targeted treatments between PD motor subtypes.

PO-0082

CT-based radiomics for differentiating intracranial contrast extravasation from intraparenchymal haemorrhage after mechanical thrombectomy

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Objective

To develop a nonenhanced CT-based radiomic signature for the differentiation of iodinated contrast extravasation from intraparenchymal haemorrhage (IPH) following mechanical thrombectomy.

Methods

Patients diagnosed with acute ischaemic stroke who underwent mechanical thrombectomy in 4 institutions from December 2017 to June 2020 were included in this retrospective study. The study population was divided into a training cohort and a validation cohort. The nonenhanced CT images taken after mechanical thrombectomy were used to extract radiomic features. The maximum relevance minimum redundancy (mRMR) algorithm was used to eliminate confounding variables. Afterwards, least absolute shrinkage and selection operator (LASSO) logistic regression was used to generate the radiomic signature. The diagnostic performance of the radiomic signature was evaluated by the area under the curve (AUC), accuracy, specificity, sensitivity, positive predictive value (PPV), and negative predictive value (NPV).

Results

A total of 166 intraparenchymal areas of hyperattenuation from 101 patients were used. The areas of hyperattenuation were randomly allocated to the training and validation cohorts at a ratio of 7:3. The AUC of the radiomic signature was 0.848 (95% confidence interval (CI) 0.780–0.917) in the training cohort and 0.826 (95% CI 0.705–0.948) in the validation cohort. The accuracy of the radiomic signature was 77.6%, with a sensitivity of 76.7%, a specificity of 78.9%, a PPV of 85.2%, and a NPV of 68.2% in the validation cohort.

Conclusions

The radiomic signature constructed based on initial post-operative nonenhanced CT after mechanical thrombectomy can effectively differentiate IPH from iodinated contrast extravasation.

PO-0083

Association of glymphatic system dysfunction with sleep disorders in Parkinson's disease

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Purpose: Abnormal accumulation of α -synuclein (α -syn) is a key pathological progress in Parkinson's disease (PD), which may relate to dysfunction of glymphatic system. Sleep disorder may lead to the aggregation of α -syn in PD, however the underlying mechanism has not been well investigated. This study aims to investigate glymphatic system and its relationship with sleep disorder and α -syn in PD by diffusion tensor image analysis along the perivascular space (DTI-ALPS).

Methods: This study included 126 untreated PD and 43 HCs from Parkinson's Progression Markers Initiative database. Sleep disorder was assessed by ESS and RBDSQ questionnaires. All subjects underwent MRI examination, including T1-weighted imaging (T1WI) and diffusion tensor imaging (DTI).

All DTI images used to create a population-specific DTI template by DTI-TK, and were normalized to the created template. Four spherical ROIs with radius = 5 mm were placed on bilateral projection and association fibers. DTI-ALPS metrics were then calculated: $DTI-ALPS = \frac{\text{mean}(D_{xxproj}, D_{xxassoc})}{\text{mean}(D_{yyproj}, D_{zzassoc})}$. Pearson correlation analysis was performed among DTI-ALPS, α -syn and sleep scales.

Results: According to ESS and RBDSQ tests, PD patients were divided into two groups: 50 with sleep disorders (male:34; mean age=63.4) and 76 without sleep disorders (male:46; mean age=60.9). No significant differences were found in gender, age and educated years among all groups.

The α -syn levels showed significant difference among PD with and without sleep disorders and HC (1655 vs. 1840 vs. 2170, $P < 0.001$). DTI-ALPS also showed significant differences (1.58 vs. 1.62 vs. 1.72, $P = 0.003$). DTI-ALPS was significantly correlated with α -syn in patients with sleep disorders ($P = 0.031$), but not in those without sleep disorders ($P = 0.227$) and HC ($P = 0.205$).

Conclusions: Sleep disorders can impair glymphatic system functions of PD patients, leading to accumulation of α -syn and disease progression. DTI-ALPS could be a potential imaging marker to predict disease progression in PD.

PO-0084

Periventricular gradient of normal-appearing white matter and its transcriptional signatures in normal aging and multiple neurological diseases

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Purpose

Recently, a periventricular gradient in normal-appearing WM (NAWM) microstructural integrity abnormalities that decreases with distance from the ventricular cerebrospinal fluid (CSF), has been identified in multiple sclerosis (MS, a classic chronic inflammatory demyelinating disease). The potential drivers of this phenomenon include external (e.g., a CSF soluble factor, leucocytes entering CSF through damaged blood-brain barrier, and ependymal processes) and intra-parenchymal pathophysiological mechanisms (e.g., susceptibility to hypoxia of axons and oligodendrocytes in periventricular venous watershed regions, tract-mediated effects of periventricular lesions, and microglial activation). Neurodegenerative (e.g., Alzheimer's disease [AD] and Parkinson's disease [PD]), cerebral small vessel (CSVD), and neuroinflammatory diseases (e.g., MS), are distinct diseases, but share several underlying pathological mechanisms and abnormal gene expression. These may result in shared microstructural integrity abnormalities. To date, periventricular gradients in NAWM abnormalities have only been reported in MS, but chronic inflammation such as that which in part underlies this in MS, has also been observed in other neurological diseases including AD, PD and CSVD.

In this study, given the potential for shared inflammatory mechanisms in MS, AD, PD, CSVD and normal aging, we hypothesized that the periventricular gradient of NAWM would be a common WM signature. To test this hypothesis, neurite orientation dispersion and density imaging (NODDI) was used to look for a periventricular gradient across multiple neurological diseases. To understand how this relate to focal damage and markers of neurodegeneration, associations with brain MRI measures (WMH, WM and grey matter [GM] volumes) were assessed. To assess clinical relevance, associations with cognitive scores were also investigated. With a view to further understanding the underlying mechanism of the periventricular gradient in NAWM, gene expression in normal aging and multiple neurological diseases was also explored.

Methods

This retrospective study collected clinical (age, sex, education, disease duration and cognitive tests) and MRI (FLAIR, T1WI and multi-shell high angular resolution diffusion imaging) data from 395 healthy controls (HCs), 335 patients with AD, 295 patients with PD, 161 patients with CSVD, and 221 patients with MS were initially collected. Additionally, the data of 642 healthy people (aged 18–88 years) from a public database provided by Cam-CAN were included. An additional independent prospectively designed replication cohort including 109 patients with AD, 88 with PD, 70 with CSVD, and 99 with MS was conducted to validate the findings.

Segmentations of the WMH, WM, GM, and CSF were performed. Multi-shell high angular resolution diffusion images were preprocessed using FMRIB Software Library. NODDI model fitting was performed using Accelerated Microstructure Imaging via Convex Optimization. Diffusion metrics including the neurite density index (NDI), orientation dispersion index (ODI), and free water fraction (isotropic volume fraction) mapping were obtained. In this study, NDI and ODI, which were sensitive to microstructural alterations in WM, were used. NAWM was segmented into concentric periventricular rings. Ten rings were adopted corresponding to a distance of 3 mm to 33 mm from the ventricle. The raw NODDI metrics in NAWM were extracted and averaged within each

concentric ring. HCs (from Tiantan hospital and public database) were split into three groups (younger [age ≤ 45 years], middle-aged [45 years < age ≤ 60 years], and older [age > 60 years]). For each NAWM ring, the normalized diffusion metric (z-score = [mean value of diffusion metrics - mean value of diffusion metrics in younger HC]/[standard derivation of diffusion metric in younger HC]) of the middle-aged and older HCs and patients was calculated and used to represent the alteration of diffusion metric compared to that in the younger HC group. Gene expression data were processed with a toolbox for working with the AHBA microarray expression data using the concentric rings calculated by the populational-level WM and ventricle mask in the MNI space.

linear mixed models (LMMs) were used to evaluate the relationship between normalized diffusion metrics and distance from the ventricle for NAWM, respectively. The normalized diffusion metric in each ring was treated as the dependent variable and the following variables were used as independent variables including fixed effect for age, sex, group and ring distance, interaction of group and ring distance, and random effects for ring distance in each individual and ring distance in each protocol (assessments of using protocols as covariates in LMM to minimize the potential impact of protocols on NODDI metrics).

The association of aging and the individual periventricular gradient was assessed through linear regression with age as independent variable, adjusting for sex, scanner-specific protocols, and whole brain NAWM normalized diffusion metric. Clinical relevance with brain degeneration and cognitive decline was assessed using linear regression, adjusting for age, sex, scanner-specific protocols, and whole brain NAWM normalized diffusion metric. For WMH volume, log-transformed was first applied. For WMV and GMV, total intracranial volume was adjusted by taking it as an additional covariate in the LMM.

Partial least square (PLS) regression was used to determine the relationship between the periventricular gradient of HC and neurological diseases and transcriptional features for all the 15329 genes. The first component of PLS (PLS1) was the linear combination of gene expression values that was most strongly correlated with the normalized diffusion metrics in the rings. The set of genes with an absolute value of Z-score > 5 and FDR adjusted p of 1%, either negative, PLS1-, or positive, PLS1+ was defined as the gradient associated gene list. The previous reported neurological disease associated GWAS genes from the DiseGeNET in Metascape was used. The overlapping genes of PLS1- and PLS1+ gene list and neurological disease-associated genes were identified. Whether the PLS1- or PLS1+ gene list shared enrichment pathways (Gene Ontology biological process, Kyoto Encyclopedia of Genes and Genomes and Hallmark Gene Sets), as well as immunologic signatures with polygenic risk for normal aging and neurological diseases, was tested using Metascape analysis. A multi-gene-list meta-analysis was performed to facilitate the understanding of pathways and immunologic signatures that are shared between, or selectively ascribed to, specific gene lists. Data from five different single-cell studies using postmortem cortical samples of human postnatal participants were used to obtain gene sets from each cell type. The gene set of each cell type was overlapped with the PLS1- and PLS1+ gene list to assign gradient-related genes obtained by PLS analysis to cell types.

Results Periventricular normalized NDI gradients were observed in the middle-aged HC, older HC, AD, PD, CSVD, and MS groups. The older HC group had a steeper gradient than the middle-aged HC group. The AD group had a steeper gradient than the middle-aged HC and PD groups. The CSVD group had a steeper gradient than the middle-aged HC, older HC, AD, PD and MS groups. The MS group had a steeper gradient than the middle-aged HC and PD groups. Periventricular normalized ODI gradients were observed in older HC, AD, PD, CSVD and MS groups. The AD group had a steeper gradient than the older HC, CSVD and MS groups. The PD group had a steeper gradient than the older HC, CSVD and MS groups. The CSVD group had a steeper gradient than the older HC group. The MS group had a steeper gradient than the older HC group.

The periventricular normalized NDI gradient was positively associated with age in the older HC, AD, PD and CSVD groups. The periventricular normalized ODI gradient was positively associated with age in the older HC, CSVD and MS groups. The periventricular normalized NDI gradient was positively associated with log-transformed WMH volume in the older HC, AD, PD, CSVD and MS groups; negatively associated with WMV in the middle-aged HC, older HC, CSVD and MS groups; and negatively associated with GMV in the AD, PD, CSVD and MS groups. The periventricular normalized ODI gradient was positively associated with log-transformed WMH volume in the older

HC group and negatively in MS group; positively associated with WMV in the middle-aged HC, older HC, AD, CSVD and MS groups; and negatively associated with GMV in the older HC and CSVD groups, while positively in MS group. The periventricular normalized NDI gradient was negatively associated with the Mini-Mental State Examination (MMSE) in the older HC and AD groups, and with the Montreal Cognitive Assessment (MOCA) in the AD group. The periventricular normalized ODI gradient was negatively associated with the MMSE in the older HC and CSVD groups, with the MOCA in the older HC and CSVD groups.

The normalized NDI-associated genes were identified according to the contribution of gene expression to the PLS first component (PLS1), which explained the 82.71%, 86.11%, 87.54%, 86.00%, and 90.08% variance ($p(\text{permutation}=5000) = 0.0188, 0.0072, 0.0032, 0.0046, 0.0016$) of the normalized NDI within the rings in the HC, AD, PD, CSVD, and MS groups, respectively. Finally, 119 NDI-PLS1- and 155 NDI-PLS1+ genes for the HC group, 239 NDI-PLS1- and 266 NDI-PLS1+ genes for the AD group, 252 NDI-PLS1- and 241 NDI-PLS1+ genes for the PD group, 256 NDI-PLS1- and 249 NDI-PLS1+ genes for the CSVD group, and 251 NDI-PLS1- and 244 NDI-PLS1+ genes for the MS group were identified.

The NDI-PLS1- genes were enriched in the AD and MS GWAS genes, and the NDI-PLS1+ genes were enriched in the AD and PD GWAS genes. Both the NDI-PLS1- and NDI-PLS1+ genes shared Gene Ontology and Kyoto Encyclopedia of Genes and Genomes pathways and Hallmark Gene Sets. The NDI-PLS1- genes involved common Gene Ontology biological processes (e.g., “response to oxygen levels”, “blood vessel morphogenesis”, “regulation of monocyte chemotaxis”, “positive regulation of cytokine production” and “response to interferon-beta”) and hallmark genes (e.g., “HALLMARK IL2 STAT5 SIGNALING”, “HALLMARK INTERFERON GAMMA RESPONSE”, “HALLMARK XENOBIOTIC METABOLISM” and “HALLMARK ADIPOGENESIS”). The NDI-PLS1+ genes involved common Gene Ontology biological processes (e.g., “regulation of ion transport”, “modulation of chemical synaptic transmission,” “regulation of signaling receptor activity”, “regulation of neuron projection development” and “negative regulation of neuron death”) and the Kyoto Encyclopedia of Genes and Genomes pathways (e.g., “synaptic vesicle cycle” and “neuroactive ligand-receptor interaction”). Both the NDI-PLS1- and NDI-PLS1+ genes were enriched in the up- or down-regulations of macrophage, T-cell, and B-cell. We observed that a majority of NDI-PLS1- genes were enriched in endothelial cells, while NDI-PLS1+ genes were enriched in neurons (including both excitatory neurons and inhibitory neurons). Replication of the periventricular gradient and its associated transcriptional signatures in normal aging and neurological diseases were obtained.

Conclusion

A periventricular gradient was observed in diffusion MRI measures with normal aging and in people with vascular and neurodegenerative neurological diseases. This raises the possibility of a shared mechanism, plausibly explained by a CSF-mediated factor affecting endothelial, synaptic, and immunologic functions.

PO-0085

A common brain network links aging and vulnerability to neurodegenerative diseases

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Background: Aging is also a primary risk factors for neurodegenerative diseases, but the neurobiological bases of the association between aging and neurodegenerative diseases at brain network level remain poorly understood.

Methods: We first constructed individual-level morphometric similarity networks in a large-scale, adult human lifespan populations ($n=3126$, aged 20-90 years old). Then we used independent component analysis (ICA) to split individual brain MSN into a set of network components, and model network component loading across the human lifespan to defining heterogeneous trajectories of age-related subnetwork. We further used spatial correlation to explore whether these age-related subnetworks can explain common or distinct network disruptions of various neurodegenerative disorders, including mild cognitive impairment (MCI, $n=70$), Alzheimer disease (AD, $n=335$), Parkinson disease (PD, $n=295$), cerebral small vessel disease (SVD, $n=161$) and multiple sclerosis (MS, $n=161$). The loading of each age-related network components was obtained on each neurodegenerative disorder by using spatial regression, and further correlated with the Mini-Mental State Examination (MMSE) score in each patient group. Finally, a comprehensive multimodal analysis combined with Neuromaps (<https://github.com/netneurolab/neuromaps>) was conducted to further uncover the multiscale biological drivers of each age-related subnetworks.

Result: The load of IC2 (age-related subnetwork2, dorsal attention network [DAN] integrate with sensorimotor network [SMN], while frontoparietal network [FPN] segregate with SMN) showed a negatively quadratic relationship with age (adjusted $R^2 = 0.16$, $p < 0.001$). The load of IC3 (age-related subnetwork3, DAN integrate with SMN, while the network segregation was less obvious) showed a negatively quadratic relationship with age (adjusted $R^2 = 0.12$, $p < 0.001$). The IC5 (age-related subnetwork5, default module network [DMN] integrate with DAN, while DAN segregate with SMN) showed a significant quadratic increase with increasing age (adjusted $R^2 = 0.16$, $p < 0.001$). The age-related subnetwork 5 was demonstrated heightened vulnerability to etiologically distinct clinical neurodegenerative disease, including MCI, AD, PD, SVD and MS ($r=0.36, 0.32, 0.58, 0.25$ and 0.32 , respectively, all $p < 0.001$). A comprehensive multimodal analysis combined with Neuromaps further uncover the distinct biological factors, such as regional T1/T2 ratio, gradient of functional connectivity, multiple neurotransmitters, glucose metabolism and cerebral blood flow, that driven the regional co-various pattern of age-related heterogeneous subnetworks.

Conclusion: We observed significant network organization of the human brain MSN across the lifespan, and highlight the age-related network vulnerability linked with the of neurodegeneration disorder at network level. Our finding provides an important understanding of the effect and risk of age on neurodegeneration disorder from a whole network perspective.

PO-0086

The Influence of Perivascular Spaces in the Basal Ganglia on Function Brain Activity in Parkinson's Disease

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Objective

To investigate the association between enlarged perivascular spaces (EPVS) in the basal ganglia (BG) and function brain activity in Parkinson's disease (PD).

Methods

We recruited 46 patients with PD (mean age 61.76 ± 7.95 years, 15 female) who underwent brain magnetic resonance imaging (MRI), Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) and Mini-Mental State Examination (MMSE). The number of BG-EPVS was counted on axial T2-weighted images. Then, patients were divided into 2 groups: a PD group with a low number (0–10) of EPVS (PD-EPVS–; $n = 26$) and a PD group with a high number (>10) of EPVS (PD-EPVS+; $n = 20$). The amplitude of low-frequency fluctuations (ALFF) acquired from resting-state functional MRI was used to analyze regional brain activity between PD-EPVS+ and PD-EPVS– groups. Spearson correlation analyses were conducted on the relationship between abnormal ALFF values and MDS-UPDRS-III and MMSE.

Results

In the PD-EPVS+ group, we found decreased ALFF in the Frontal_Sup_Medial_L and Cingulum_Mid_R. Which remained after Gaussian Random Field (GRF) correction at two-tailed voxel $p < 0.001$ and a clustering level of $p < 0.05$, was considered to be significant. There was a positive correlation between ALFF values in the Frontal_Sup_Medial_L and the MMSE score ($r=0.433$, $p<0.01$). However, abnormal brain areas did not correlate and the MDS-UPDRS-III.

Conclusion

BG-EPVS in PD patients may be associated with changes in brain neuron activity. This further explains that BG-EPVS may be a useful imaging marker for predicting cognitive decline in PD.

PO-0087

Imaging transcriptomics of brain functional alterations in multiple sclerosis and neuromyelitis optical spectrum disorder

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Background: The underlying transcriptomic signatures driving brain functional alterations in multiple sclerosis (MS) and neuromyelitis optical spectrum disorder (NMOSD) still unclear.

Methods: Regional fractional amplitude of low-frequency fluctuation (fALFF) values were obtained and compared between 209 MS patients, 90 AQP4+ NMOSD patients, 49 AQP4– NMOSD patients and 228 healthy controls from a discovery cohort. We used partial least squares (PLS) regression to identify the gene transcriptomic signatures associated with disease-related fALFF alterations. The biological process and cell type specific signature of the identified PLS genes were explored

by enrichment analysis. The correlation between PLS genes and clinical variables was explored. A prospective independent cohort was used to validate the brain fALFF alterations and the repeatability of identified genes.

Results: MS, AQP4+ NMOSD and AQP4- NMOSD showed decreased fALFF in cognition-related regions and deep grey matter, while NMOSD (both AQP4+ and AQP4-) additionally demonstrated lower fALFF in the visual region. The overlapping PLS1- genes (negatively correlated with decreased fALFF) were enriched in response to regulation of the immune response in all diseases, and the PLS1- genes were specifically enriched in the epigenetics profile in MS, membrane disruption and cell adhesion in AQP4+ NMOSD, and leukocyte activation in AQP4- NMOSD. For the cell type transcriptional signature, microglia and astrocytes accounted for the decreased fALFF. The fALFF-associated PLS1- genes directly correlated with EDSS of MS and disease duration across disorders.

Conclusion: We revealed the functional activity alterations and their underlying shared and specific gene transcriptional signatures in MS, AQP4+ NMOSD, and AQP4- NMOSD.

PO-0088

Dynamic Changes in Automatic Generated Quantitative Biomarkers and Correlation with Pathology type of Alzheimer's Disease – A Longitudinal Study

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INTRODUCTION

Alzheimer's disease resemblance atrophy index (AD-RAI) is an MRI-based machine learning-derived composite index reflecting the multi-region atrophy severity of AD. We investigated the association between the serial change in AD-RAI and other conventional MRI biomarkers (i.e., hippocampal volume (HV), hippocampal fraction (HF), brain parenchymal volume (BPV), and fraction (BPF)) among cognitive unimpaired (CU) and mild cognitive impairment (MCI) subjects with and without A+T+ (i.e., A β + and Tau+).

METHODS

We selected subjects from ADNI and included those aged 55 to 90 years, diagnosed with CU and MCI at baseline, and matched T1W scans and CSF during 4-year follow-up. A total of 168 subjects, including 108 non-converters and 60 converters, were recruited in total. The following data were extracted for further analysis: AD-RAI, HV, HF, BPV and BPF. We used a linear mixed-effects model (LMM) in SPSS 26.0 to explore the serial changes of the imaging biomarkers and pathology-type interaction effects over time.

RESULTS

In either converters or non-converters, AD-RAI with A+T+ increased significantly faster than non-A+T+ over time ($P < 0.05$), while HV and HF with A+T+ decreased significantly faster than non-A+T+ over time ($P < 0.05$, respectively). BPF with A+T+ decreased significantly faster than non-A+T+ over time only in converters ($P = 0.041$) but not in non-converters ($P = 0.186$). BPV with A+T+ did not show any significant change than that with non-A+T+ in both converters ($P = 0.594$) and non-converters ($P = 0.647$).

CONCLUSIONS

AD-RAI of subjects with A+T+ increased significantly faster than non-A+T+ over time while HV and HF of subjects with A+T+ decreased significantly faster than non-A+T+ over time. AD-RAI, HV, and HF outperform whole-brain biomarkers in reflecting the changes with progressive AD pathology.

PO-0089

Application of SMS-RESOLVE DWI technology combined with artificial intelligence diagnostic system in acute cerebral infarction

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Objective: To evaluate the image quality and diagnostic efficacy of MR simultaneous multi-layer acquisition (SMS) high-definition diffusion imaging (RESOLVE) technology combined with artificial intelligence diagnostic system for acute cerebral infarction imaging.

Method: 104 patients with acute cerebral infarction were collected using the MAGNETOM Vida 3.0T MRI and a 20 channel head and neck combined phased array coil. Each patient was scanned with three diffusion sequences: conventional diffusion weighted imaging (DWI), RESOLVE DWI, and SMS-RESOLVE DWI. The patient is in a supine position, with the head in the first position, and the positioning center is aligned with the center of the eyebrow line and the center of the coil. Scanning range: Axial scanning from the skull base to the top of the skull. Two highly experienced radiologists used a double-blind method to assess acute cerebral infarction DWI ($b=1000\text{s/mm}^2$). Use the Likert scale subjective evaluation of the display of lesions by images includes the sharpness of anatomical structures, degree of image deformation, degree of magnetic sensitivity artifacts, and overall image quality. Two weeks later, scored again and observed the consistency of the scores. The research group was scored by the artificial intelligence diagnosis system. Finally, compare the observer rating with the artificial intelligence rating. The evaluation criteria are as follows: 1. poor image definition, i.e. great image distortion or motion artifact; 2 points refers to poor image definition, that is, distortion or motion artifacts are relatively serious; 3: medium image definition, i.e. medium distortion or motion artifact; 4 points: good image clarity, that is, slight distortion or motion artifacts; 5 points for excellent image clarity, i.e. no distortion or artifact. Objectively measure the signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), signal-to-noise efficiency (SNRefficiency), minimum apparent diffusion coefficient (ADCmin), maximum apparent diffusion coefficient (ADCmax), and average apparent diffusion coefficient (ADCmean) of three types of DWI sequence images. Compare the subjective and objective evaluation differences of three DWI sequence images.

Results: In subjective evaluation, there was no significant difference between the diagnostic coincidence rates of the two observers and there was a strong consistency (Kappa value ≥ 0.75). Regardless of observer rating or artificial intelligence rating, the subjective image quality of SMS-RESOLVE DWI is superior to that of conventional DWI in all aspects and there is a statistical difference ($P < 0.05$). The subjective image quality of SMS-RESOLVE DWI and RESOLVE DWI is equivalent and there is no significant statistical difference ($P > 0.05$). In objective evaluation, for SNR and CNR, SMS-RESOLVE DWI was higher than conventional DWI and showed significant statistical differences. In artificial intelligence diagnostic system, there was no significant statistical difference between SMS-RESOLVE DWI and RESOLVE DWI ($P > 0.05$); There are significant statistical differences in SNRefficiency among the three technologies, with SMS-RESOLVE DWI having the highest SNRefficiency, RESOLVE DWI taking the second place, and conventional DWI having the lowest SNRefficiency. There was no significant difference in the ADCmin, ADCmax, and ADCmean of the three DWI sequences ($P > 0.05$). The image quality of SMS-RESOLVE DWI is better than that of conventional DWI. And the subjective image quality is equivalent to that of RESOLVE DWI under the condition of high SNRefficiency.

Conclusion: Acute cerebral infarction is a common disease with a high disability and mortality rate in China. Magnetic resonance DWI technology has a high diagnostic accuracy, but conventional DWI technology uses SS-EPI, which can cause magnetic sensitive artifacts, image blurring, deformation, and affect diagnostic efficiency. The RESOLVE DWI technology adopts a multiple excitation and segmented readout acquisition method, which can reduce image deformation and blurring caused by magnetic sensitivity, and display clear acute cerebral infarction lesions in the temporal lobe and near the skull base. SMS-RESOLVE DWI technology, on the basis of

RESOLVE DWI technology, uses multi-layer simultaneous acquisition technology, which can shorten the examination time without reducing image quality, improve the detection rate of subtle cerebral infarction lesions, and thus improve the diagnostic efficiency of AI. It is worth promoting in acute cerebral infarction imaging.

PO-0090

Application of perfusion weighted imaging technology combined with artificial intelligence diagnostic system in acute ischemic stroke

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Objective: To explore the image quality and diagnostic efficacy of perfusion weighted imaging technology combined with artificial intelligence diagnostic systems for acute ischemic stroke imaging.

Method: 104 patients with acute ischemic stroke were collected using the UNITED uMR780 3.0T MRI and a 24 channel head and neck combined phased array coil. The common scanning sequences include three-dimensional T1WI sequence scanning, T2 * WI sequence scanning, conventional diffusion weighted imaging (DWI) scanning, fluid attenuation inversion recovery sequence (FLAIR) scanning, and head and neck vascular imaging (MRA). 52 patients who underwent additional scanning that arterial blood proton spin labeling imaging (ASL) sequence scanning were selected as the observation group; 52 cases of dynamic magnetic sensitive contrast-enhanced perfusion imaging sequence (DSC) with conventional contrast agent injection were used as the control group. The images obtained from both groups were uploaded to the Fast-Stroke AI diagnostic system for analysis. Two senior radiologists used the double-blind method to subjectively score the pseudo color images processed by the two groups of sequence AI using the Likert scale, and observed whether the two groups of pseudo color images met the diagnostic requirements, and whether there were differences in image clarity, image distortion, and artifacts between the two groups. Two weeks later, scored again and observed the consistency of the scores. The evaluation criteria are as follows: 1. poor image definition, i.e. great image distortion or motion artifact; 2 points refers to poor image definition, that is, distortion or motion artifacts are relatively serious; 3: medium image definition, i.e. medium distortion or motion artifact; 4 points: good image clarity, that is, slight distortion or motion artifacts; 5 points for excellent image clarity, i.e. no distortion or artifact. Objective evaluation involves conducting inter group tests based on two sets of cerebral blood flow (CBF) parameters calculated by AI. SPSS statistical software was used to statistically analyze the data. The measurement data were expressed as mean \pm standard deviation, and t-test was used for comparison between groups; Kappa consistency test was performed on the subjective score results of two diagnostic physicians (kappa > 0.75 indicates good consistency, 0.4-0.75 indicates general consistency, and < 0.4 indicates poor consistency), with $P < 0.05$ as the difference with statistical significance.

Result: In subjective evaluation, the difference in scores between the two observers was not significant and there was strong to strong consistency (Kappa value ≥ 0.75). The subjective image quality of pseudo color images in ASL and DSC is equivalent and there is no significant statistical difference ($P > 0.05$). There was no significant statistical difference between the two groups of CBF parameters ($P > 0.05$).

Conclusion: Acute ischemic stroke is a common disease with high disability rate and case fatality rate rate in China at present. PWI technology has high diagnostic accuracy and can judge the existence of penumbra. The advantage of ASL sequence is not using contrast agents, but the early maturity of this technology is not high, and there is still a gap between it and DSC sequence comparison. Currently, ASL technology is developing rapidly, and AI diagnostic systems have good

diagnostic performance for both ASL and DSC sequences. The combination of the two is worth promoting in acute cerebral infarction imaging.

PO-0091

Structural and functional connectivity alteration patterns in different subregions of the cingulate gyrus in type 2 diabetes

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Objective: We aimed to explore the characteristic changes in the cortical thickness and functional connectivity (FC) patterns of different subregions of the cingulate gyrus in type 2 diabetes mellitus (T2DM) patients without mild cognitive impairment to reveal both structural and functional aspects of the role of the cingulate gyrus in the early cognitive impairment in T2DM.

Materials and methods: Fifty-six patients with T2DM and 60 healthy controls (HCs) underwent a neuropsychological assessment and sagittal 3-dimensional T1-weighted and resting-state functional MRI. The differences in cingulate cortex thickness were compared between patients with T2DM and HCs. We defined nine subregions of the cingulate gyrus as regions of interest (ROIs) to examine the differences in FC between the ROIs and the whole brain in two groups. Correlation analysis was performed to examine the relationship between cortex thickness and FC and the patients' clinical/cognitive variables.

Results: The cortical thickness of the cingulate gyrus was not significantly different between T2DM patients and HCs. However, the T2DM patients showed significantly decreased FC between the pACC and the bilateral hippocampus, but had significantly increased FC between the pACC and bilateral lateral prefrontal cortex (LPFC) and left precentral gyrus. In addition, the T2DM group showed significantly lower FC between the RSC and right cerebellar Crus I. Moreover, the FC between the pACC and the left hippocampus was negatively correlated with the FC between the pACC and left lateral prefrontal cortex (LPFC) ($r = -0.306$, $P = 0.022$).

Conclusions: The pACC and the RSC show dysfunctional connectivity in multiple brain regions before the appearance of structural abnormalities in T2DM patients without MCI. Notably, our findings suggest that the abnormal FC of the pACC with the bilateral hippocampus and LPFC may involve a neural compensatory mechanism for memory function, which providing valuable information and new directions for possible interventions for the cognitive impairment associated with T2DM.

PO-0092

Intracranial granulomatous inflammation caused by cryptococcal infection: a case report and literature review

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Purpose: Intracranial cryptococcal granuloma is a rare manifestation of central nervous system infection and familiarity with its imaging manifestations is crucial given its lethality and tendency to be missed or misinterpreted on imaging. Previous studies have shown that cryptococcal infections leading to cryptococcal meningitis are common, while cryptococcal granuloma has been reported less frequently. This article reports a case of intracranial granulomatous inflammation due to

Cryptococcus infection in an immunocompetent adult at our institution along with a literature review describing salient clinical and imaging characteristics.

Method: We report a case of intracranial granulomatous inflammation due to cryptococcus infection in an immunocompetent adult at our institution, emphasizing the features of imaging diagnosis of cryptococcal granulomas and reviewing the relevant case reports and literature review.

Result: Cryptococcal granuloma with peripheral edema and leptomeningeal enhancement is a more characteristic manifestation of cryptococcal granulomatous inflammation, which commonly occurs in the basal ganglia and parietal ventricles.

Conclusion: In conclusion, the possibility of cryptococcal infection should be considered in patients presenting with central nervous system-related symptoms such as headache, fever, and unexplained intracranial infections, especially in those with impaired immune system function. MRI is crucial to carefully analyze imaging signs to avoid missed diagnosis of cryptococcal granulomas, which is a rare sign, and timely cryptococcal-specific testing will help diagnose the cause of disease at an early stage and improve patient prognosis.

PO-0093

The White Matter Integrity and Functional Connection Changes of Fornix (cres)/Stria Terminalis in Individuals with Mild Cognitive Impairment Induced by Occupational Aluminum Expose

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Aims: Long-term aluminum (Al) exposure increases the risk of mild cognitive impairment (MCI). The aim of present study was to investigate the neural mechanisms of Al-induced MCI.

Methods: Individuals with occupational Al exposure > 10 years were enrolled and divided into two groups: MCI (Al-MCI) and healthy controls (Al-HC). Plasma Al concentrations and Montreal Cognitive Assessment (MoCA) score were collected for all participants. And diffusion tensor imaging (DTI) and resting-state functional magnetic resonance imaging (rs-fMRI) were used to examine changes of white matter (WM) and functional connectivity (FC).

Results: There was a negative correlation between MoCA score and plasma Al concentration. Compared with the Al-HC, fractional anisotropy (FA) value for the right fornix (cres)/stria terminalis (FX/ST) was higher in the Al-MCI. Furthermore, MCI participants exhibited decrease FC between the right FX/ST and right temporal pole, and also between the right sagittal stratum (SS) and anterior cingulate and paracingulate gyri (ACG) and inferior frontal gyrus, orbital part (ORB_inf). An open-loop pathway was formed by these WM and cortical areas.

Conclusions: Long-term Al exposure affects WM integrity and FC in the right FX/ST, which are associated with cognitive. These alterations may serve as potential neuroimaging marker for early diagnosis of MCI.

PO-0094

Local-to-remote brain function alterations in patients with thyroid-associated ophthalmopathy: a resting-state fMRI study

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Objectives: To explore the brain activity alterations in both local and remote brain functional interactions in patients with thyroid-associated ophthalmopathy (TAO) using the method combining regional homogeneity (ReHo) and functional connectivity (FC) analysis.

Methods: We recruited 44 patients with TAO and 23 age- and sex-matched healthy controls. Resting-state functional magnetic resonance imaging (rs-fMRI) data were collected. The ReHo values of the whole brain voxels were first calculated and compared them between the two groups. The brain regions with different ReHo values were defined as regions of interest (ROI). The FC analysis was secondly conducted between ROIs and the whole brain. The correlations among ReHo, FC values and clinical parameters were analyzed.

Results: Compared with healthy controls, patients with TAO showed increased ReHo values in the left posterior cingulate gyrus (PCG) and decreased ReHo values in the right orbital part of the inferior frontal gyrus (ORBinf) and the right middle temporal gyrus (MTG). The ROI-based FC analysis showed significantly increased FC values between the left PCG and the left precuneus and between the left PCG and the right PCG. The ReHo values in the right MTG were positively correlated with the Hamilton Anxiety Rating Scale (HARS, $r = 0.45$, $p = 0.034$).

Conclusion: Patients with TAO exhibit significant brain dysfunction in local and remote brain functional connectivity in brain regions mainly related to cognitive function, suggesting a possible neuroimaging marker of neuropsychological disorder in TAO.

PO-0095

Correlation of bBrain iron deposition correlates withand freezing of gait in Pparkinson's disease: a cross-sectional study

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Background: Quantitative susceptibility mapping (QSM) is a novel imaging method for detecting iron content in the brain. The study aimed determine whether the iron deposition in the brains of people with Parkinson disease (PD) is correlated with freezing of gait (FOG).

Methods: We retrospectively collected the data of 24 patients with PD from the Movement Disorders Program and 36 healthy controls (HCs) from January 2021 to December 2021. Clinical assessments included mental intelligence scales, Parkinson rating scales, motor-related scales, and clinical gait assessments. All exercise scales and gait assessments were performed in the "ON" and "OFF" states. Magnetic resonance imaging (MRI) data were collected using 3-dimensional fast low-angle shot sequences. We chose the bilateral red nucleus, substantia nigra, thalamus, putamen, caudate nucleus, and globus pallidus as regions of interest for QSM analysis.

Results: The iron deposition in the substantia nigra of the PD group was significantly higher than that of the HC group ($P < 0.01$). In the PD group, the iron deposition in the substantia nigra of patients

with FOG was significantly higher than that in patients without FOG ($P=0.04$). The iron deposition in the substantia nigra was positively correlated with the New Freezing of Gait Questionnaire ($P=0.03$). The scores for depression and anxiety of the PD group were significantly higher than those of the HC group, while the Berg balance scale score was significantly lower ($P<0.01$).

Conclusions: The iron deposition in the substantia nigra of patients with PD is increased compared with that of controls and is associated with FOG. QSM can be used to detect brain iron deposition in patients with PD, which would help to explore the mechanism of abnormal neurobiological activity in FOG.

PO-0096

Cerebellar morphometric evaluation of motor subtypes of distinguishes between Parkinson's disease motor subtypes

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Background and Purpose:

Morphometric MRI of Parkinson's disease (PD) with motor subtypes has demonstrated typical patterns of atrophy or volume loss in the supratentorial areas, but cerebellar morphometric alterations are still unknown. The present study aimed to assess cerebellar morphometric alterations between PD motor subtypes using voxel-based morphometry (VBM).

Materials and Methods:

Forty-nine PD patients (male:61.2%, mean age:60.04) and forty healthy controls (HCs) (male:55.0%, mean age:62.93) were prospectively recruited. All PD patients' movement disorders were evaluated by senior neurologists and were allocated to the tremor-dominant (TD) group ($n=17$) and postural instability and gait disorder-dominant (PIGD) group ($n=XX$). Twenty and thirty-two HCs with matched age and sex were assigned to TD and PIGD groups, respectively. A spatially unbiased atlas template of the cerebellum and brainstem (SUIT) based VBM was used to identify the cerebellar morphometric alterations among the above groups (TD vs HCs, PIGD vs HCs, and TD vs PIGD). The relationship between cerebellar morphometric alterations and clinical motor features was further analysed. All comparisons were set up applying $P < 0.001$ and an extent threshold (K) > 20 voxels.

Results:

Compared with HCs, TD subtype patients showed significantly decreased grey matter volume in the left lobules VIII. And patients with the PIGD subtype showed significantly decreased grey matter volume in bilateral lobule VIII. On the other side, in comparison with HCs, both PD motor subtypes with significantly increased grey matter volume of vermis IV and V; besides, the TD subtype showed significantly increased grey matter volume in the right lobule VI. However, there was no significant difference in the cerebellum in these two motor subtypes of PD patients. Further, irrespective of PD motor subtypes, a positive correlation was found in the right lobule Crus I and clinical features (H&Y stage).

Conclusion

Our findings highlight the involution of cerebellar morphometric alterations in the pathogenesis and heterogeneity of PD motor subtypes, which broaden the understanding of PD.

PO-0097

The Trends of Hippocampal Stratum Radiatum, Lacunosum, and Molecular Changes in the Alzheimer's Disease Continuum

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Background:

Alzheimer's disease (AD) is the most common cause of neurodegenerative dementia, characterized by progressive memory and cognitive decline. Accumulation of neurofibrillary tangles (NFTs) within the medial temporal lobe, particularly in the hippocampus, is one of the early pathological hallmarks of AD. Hippocampal volume measurement from MRI is an established biomarker for AD, despite its lack of specificity and lower sensitivity compared to amyloid positron emission tomography (PET) or cerebrospinal fluid biomarkers. Given the widespread use of MRI, assessing hippocampal volume has clinical significance for early screening of AD patients. However, its sensitivity in detecting preclinical AD patients is limited, necessitating a more sensitive MRI-derived biomarker.

Method:

The hippocampus is a complex structure with specialized subregions interconnected with distinct histological features. Subregional volumetric quantification has shown higher sensitivity in capturing subtle atrophy patterns compared to whole hippocampal volume. Autopsy studies in AD reveal that amyloid and tau pathology initiates in the entorhinal cortex (ERC) and peri-olfactory cortex, followed by the CA1 subfield, radiatum, lacunosum, and molecular (SRLM), and eventually spreads to broader cortical regions. SRLM, containing dendrites and axon bundles parallel to the CA surface and mixed with the molecular layer of the dentate gyrus (DG), serves as a critical pathway with glutamatergic inputs from CA3 and ERC, as well as numerous GABA interneurons regulating hippocampal network dynamics. Thus, SRLM involvement in the connections between CA1, CA3/ERC, and between the hippocampus and broader cortical areas makes it a potential preclinical AD biomarker.

This study utilized 3T T1 and T2 MRI images. Whole hippocampal volume was quantified using Freesurfer software from T1 images, and a semi-quantitative scoring system assessed hippocampal volume. T2 images were employed to evaluate the integrity of the Stratum Radiatum, Lacunosum, and Molecular (SRLM). A validated rating scale assessed the clarity of the hypo-intense line representing SRLM.

Results:

The study sample was constructed within a biological AD framework based on amyloid PET, including 178 amyloid-negative (A-) healthy elderly controls, 91 amyloid-positive (A+) cognitively healthy elderly, 90 A+ mild cognitive impairment patients, and 14 A+ AD patients. No significant age differences were observed among groups. The primary findings showed significant differences in SRLM, hippocampal volume visual scores, and hippocampal volume across the four groups. Post hoc comparisons revealed that only SRLM could distinguish between NC A- and NC A+ ($p < 0.05$, corrected), while SRLM, hippocampal volume visual scores, and hippocampal volume could differentiate between NC A- and MCI A+ and NC A- and AD A+. Correlation analyses across all subjects demonstrated significant associations between SRLM, hippocampal volume visual scores, hippocampal volume, and MMSE scores, CDR total scores, and amyloid SUVR ($p < 0.001$), with SRLM showing the strongest correlation with amyloid SUVR ($r = -0.38$).

Conclusion:

This study suggests that SRLM may serve as an effective biological marker for AD, aiding in the early screening of preclinical AD patients. Its sensitivity and correlation with amyloid deposition make it a promising candidate for further research in the field of AD biomarker development.

PO-0098

Aberrant brain structural–functional connectivity coupling associated with cognitive dysfunction in different cerebral small vessel disease burden

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BACKGROUND: Emerging evidence suggests that cerebral small vessel disease (CSVD) pathology changes brain structural connectivity and functional connectivity (FC) networks. Despite network-level SC and FC are closely coupled in healthy population, how SC-FC coupling and functional network changes correlated with neurocognitive outcomes in patients with different CSVD burdens remains largely unknown.

METHODS: Using multimodal MRI, we reconstruct whole-brain SC and FC networks for 54 patients with severe CSVD burden (CSVD-s), 106 patients with mild CSVD burden (CSVD-m) and 79 healthy controls. We then investigated the aberrant SC-FC coupling and functional network topology in CSVD and their correlations with cognitive dysfunction.

RESULTS: We found that compared with controls, CSVD-s patients exhibited significantly decreased whole-brain SC-FC coupling, and reduced modular SC-FC coupling, nodal efficiency of the bilateral amygdala and heschl gyrus within the auditory/motor and limbic/subcortical modules. Notably, for CSVD-s patients, whole-brain SC–FC coupling was positively correlated with MoCA and SDMT[h1] scores, and limbic/subcortical modular SC–FC coupling was negatively correlated with SCWT score, while global/local efficiency was positively correlated with AVLT score. For CSVD-m group, whole-brain and auditory/motor modular SC–FC couplings were positively correlated with SCWT and TMT scores, while global/local efficiency was positively correlated with AVLT and SDMT scores.

CONCLUSION: Our findings demonstrated that decreased whole-brain and module-dependent SC-FC couplings associated with reduced functional efficiency might underlie more severe burden and worse cognitive decline in CSVD patients. SC-FC coupling might provide a more sensitive neuroimaging biomarker of CSVD burden as well as new insights into the pathophysiologic mechanisms of the clinical development of CSVD.

PO-0099

Prognostic value of the baseline magnetic resonance score in patients with acute posterior circulation ischaemic stroke after mechanical thrombectomy

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AIM:To investigate the prognostic value of the composite posterior circulation ASPECTS-Collaterals(pcASCO) score, which combines Diffusion-Weighted Imaging(DWI)- posterior circulation Acute Stroke Prognosis Early CT Score (pcASPECTS) and the Magnetic Resonance Angiography(MRA)-collateral circulation score, at baseline among patients with acute posterior circulation ischaemic stroke after mechanical thrombectomy.

MATERIALS&METHODS:Patients with acute posterior circulation ischaemic stroke who underwent mechanical thrombectomy were retrospectively analysed. The DWI-pcASPECTS and MRA-collateral circulation score before treatment and the modified Rankin Scale(mRS) at 90 days after treatment were used as the endpoints. An mRS≤2 was defined as a good prognosis, and an mRS≥3

was defined as a poor prognosis. Multivariate logistic regression was used to analyse independent predictors of functional outcome 90 days after mechanical thrombectomy.

RESULTS: Mechanical thrombectomy was performed in 57 patients; 38 patients had a good prognosis, 19 patients had a poor prognosis and 33 patients were successfully recanalized. Univariate logistic regression found that National Institute of Health Stroke Scale (NIHSS) score (OR: 1.18, $p < 0.001$), pcASPECTS (OR: 1.91, $p = 0.028$) and pcASCO score (OR: 0.51, $p = 0.001$) were factors of good functional outcome. Receiver operating characteristic curve (ROC curve) analysis showed that the diagnostic efficiency of the NIHSS and pcASCO was better (AUC= 0.88, 0.83, $p < 0.05$) than that of the pcASPECTS (AUC=0.65). The prediction model was established by age, NIHSS and pcASCO, and the diagnostic efficiency of the prediction model was better (AUC=0.94).

CONCLUSIONS: The composite MR-pcASCO score can be used as an important predictor of the prognosis of patients with acute posterior circulation ischaemic stroke after mechanical thrombectomy.

PO-0100

The visual pathway: a valuable biomarker of disease duration and cognitive function in amyotrophic lateral sclerosis

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Objectives: To investigate the relationship between visual pathway and disease duration and cognitive function in patients with amyotrophic lateral sclerosis (ALS).

Methods: 31 ALS patients and 20 healthy controls were enrolled. Patients were categorized into the ALS-early and ALS-late groups according to disease duration. Edinburgh Cognitive and Behavioral ALS Screen (ECAS) was performed for all patients. Retinal nerve fiber layer (RNFL) thickness via optical coherence tomography (OCT), and fractional anisotropy (FA) and mean diffusivity (MD) of the optic nerve (ON), optic tract (OT), and optic radiation (OR) via diffusion tensor imaging (DTI) were compared between three groups. Associations between OCT or DTI parameters and clinical parameters were assessed by correlation analysis for patients.

Results: RNFL thickness was increased in ALS-early ($106.95 \pm 10.52 \mu\text{m}$, $P = 0.008$) but not in ALS-late ($102.67 \pm 11.70 \mu\text{m}$, $P = 0.510$) compared to controls ($98.23 \pm 14.41 \mu\text{m}$). FA and MD of ON were similar between three groups. OT-FA was decreased in both ALS-early (0.4784 ± 0.0508 , $P < 0.001$) and ALS-late (0.4785 ± 0.0572 , $P < 0.001$) compared to controls (0.5304 ± 0.0496). OR-MD was higher in ALS-late than controls ($0.9672[0.9417-1.0735]$ vs. $0.9241[0.8777-0.9810]$, $P = 0.027$). Executive domain of ECAS was negatively correlated with ON-FA ($r = -0.326$, $P = 0.010$) and positively correlated with ON-MD ($r = 0.353$, $P = 0.005$), OT-FA ($r = 0.269$, $P = 0.034$), and OR-FA ($r = 0.291$, $P = 0.022$).

Conclusions: Changes in the anterior and posterior visual pathway occurred in an earlier and later disease stage, respectively. DTI parameters of individual segments of the visual pathway were correlated with cognitive parameters, suggesting the mechanism of trans-synaptic degeneration in the cognitive dysfunction in ALS.

PO-0101

Temporal and topological properties of dynamic networks reflect disability in patients with neuromyelitis optica spectrum disorders

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Background: Approximately 36% of patients with neuromyelitis optica spectrum disorders (NMOSD) suffered from severe visual and motor disability (blindness or light perception or unable to walk) with abnormalities of functional networks. However, it remains unclear how functional networks are related to clinical disability in patients with NMOSD. Therefore, our study aims to explore the static strength, time-varying and topological properties of large-scale functional networks and their association with disability in patients with NMOSD.

Methods: A total of 30 NMOSD patients (37.70 ± 11.99 years) and 45 healthy controls (HCs, 41.84 ± 11.23 years) were recruited. All subjects underwent functional MRI and disability assessments. We constructed resting-state functional networks for subjects and evaluated between-group differences in the static strength and network temporal and topological properties of networks using analysis of variance. We also assessed their association with disability severity with Spearman's correlation coefficients. A receiver operating characteristic (ROC) curve was also generated to investigate the efficacy of abnormal measures in diagnosing NMOSD.

Results: Compared to HCs, NMOSD patients showed significant alterations in dynamic networks rather than static networks. Three dynamic states were defined, and State 1 was characterized by overall hypoconnectivity within and between networks. NMOSD patients showed increased fractional times ($P < 0.001$) and dwell times in State 1 ($P < 0.001$) with fewer transitions ($P = 0.028$) than HCs, and increased fractional times ($r = 0.400$, $P = 0.029$), higher dwell times ($r = 0.461$, $P = 0.031$) and fewer transitions ($r = -0.383$, $P = 0.049$) were related to more severe disability. ROC curve analysis indicated that the increased fractional and dwell times in State 1 could significantly distinguish NMOSD patients from HCs (area under the curve: 0.991, 0.996). Moreover, NMOSD patients exhibited altered small-worldness, decreased degree centrality and reduced clustering coefficients for hub nodes in dynamic networks ($P < 0.05$, false discovery rate corrected). Decreased clustering coefficients for the bilateral precuneus ($r = -0.387$, $P = 0.046$) and thalamus ($r = 0.406$, $P = 0.036$) were related to clinical disability in NMOSD patients.

Conclusion: Increased fractional time, higher dwell times with fewer transitions in the hypoconnectivity state in dynamic networks were associated with increased disability in NMOSD patients.

PO-0102

The disruption of network hierarchy patterns in bulimia nervosa revealing the brain information integration disorder

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Background:

Previous studies have demonstrated abnormalities in several specific networks of bulimia nervosa (BN), but whether and how the network hierarchy changes in BN remain unknown. This study aims to investigate the BN network hierarchy pattern alteration and its clinical relevance.

Method:

Connectome gradient analyses were applied to depict the network hierarchy pattern of BN patients ($n = 59$) and healthy controls (HCs, $n = 39$). Then we evaluated the network- and voxel-level gradient alterations of BN by comparing the gradient values in each network and each voxel between BN and HC groups. The association between the altered gradient values and clinical variables was explored.

Result:

Compared to the HCs, BN patients exhibited reduced gradient values in the dorsal attention network and increased gradient values in the subcortical network in the principal gradient, and had decreased gradient values in the ventral attention network and increased gradient values in the limbic network in the secondary gradient. Regionally, the regions with altered principal or secondary gradient values in BN patients were mainly located in the transmodal networks. In BN group, the gradient values of right inferior frontal gyrus in the principal gradient were negatively associated with external eating behavior.

Conclusion:

This study revealed the disordered network hierarchy patterns of BN, which suggested a disturbance of brain information integration from attention network and subcortical network to transmodal network in BN patients. These findings may provide insight into the neurobiological underpinnings for BN.

PO-0103

Glymphatic system impairment in dysthyroid optic neuropathy: relation with cerebrospinal fluid circulation in the optic nerve and visual function

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Purpose: To investigate the relationship between glymphatic system function in the brain and ocular cerebrospinal fluid circulation in patients with dysthyroid optic neuropathy (DON), and the correlation between glymphatic function and visual dysfunction.

Materials and Methods: The study included 35 patients with DON (age, 51.71 ± 9.56 years; 20 man), 32 TAO patients without DON (age, 47.41 ± 8.75 years; 15 man) and 30 healthy controls (HCs) (age, 48.87 ± 9.95 years; 16 man). The ALPS index is calculated by dividing the diffusion of water molecules along the perivascular space by the diffusion of free water molecules on DTI. The parameters of the optic nerve and its intrathecal cerebrospinal fluid circulation were also evaluated in all subjects. The relationship between the ALPS index and the parameters of cerebrospinal fluid circulation in the visual pathway and visual function was evaluated by correlation analysis.

Results: Both DON and thyroid-associated ophthalmopathy (TAO) without DON patients showed an overall lower diffusion along perivascular space (DTI-ALPS) index versus healthy controls and DON group was lower than TAO group (1.334 ± 0.168 vs 1.472 ± 0.157 vs 1.584 ± 0.217 , $P < 0.001$). In patients, lower diffusion along perivascular space index was associated with more enlarged optic nerve subarachnoid space ($r = -0.513, P < 0.001$), more swollen optic nerve ($r = -0.318, P = 0.009$) and more severe visual field defect ($r = 0.303, P = 0.023$).

Conclusion: The glymphatic system is impaired in TAO, especially in TAO with DON. Impaired glymphatic function was associated with measures of both swollen optic nerve and enlarged optic nerve subarachnoid space and reflects a more severe visual dysfunction. Glymphatic impairment may be a pathological mechanism underpinning TAO and DON. The dynamic interplay with other pathological substrates of the disease deserves further investigation.

PO-0104

The Impact of Magnetic Resonance-Guided Focused Ultrasound Thalamotomy on Gray and White Matter in Essential Tremor: A Neuroimaging Study

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Objective: Magnetic resonance-guided focused ultrasound thalamotomy of the ventral intermediate nucleus (VIM-MRgFUS) is a minimally invasive neuromodulation technique for drug-refractory essential tremor (ET). This study aims to investigate the changes in brain gray matter volume and white matter integrity in ET patients after VIM-MRgFUS.

Methods: Thirty-five ET patients who underwent unilateral VIM-MRgFUS were included in this prospective study. Images were obtained before and at 1 day, 1 week, 1 month, 3 months, and 6 months after surgery. Gray matter volumes and white matter integrity were analyzed using longitudinal segmentation, voxel-level paired t-tests, and ROI-based DTI analysis. The tremor symptoms were assessed preoperatively and at 1 month and 6 months postoperatively using the Clinical Rating Scale for Tremor.

Results: Thirty-two patients completed the 6-month follow-up. Voxel-level paired t-tests revealed that gray matter volume in the left fusiform gyrus, left temporal transverse gyrus, and left thalamus decreased significantly at 6 months postoperatively (voxel level $P < 0.001$, cluster-level $P_{FWE} < 0.05$). Reduction in the left thalamus volume was correlated with the tremor improvement ($P < 0.05$). ROI-based DTI analysis showed that the fractional anisotropy (FA) of genu of corpus callosum (GCC), left posterior limb of the internal capsule (LPIC), left and right superior cerebellar peduncle decreased, while the mean diffusivity, lateral diffusivity and axial diffusion of multiple brain regions increased after treatment ($P < 0.05$). Among them, the white matter integrity indexes of the GCC and LPIC all changed significantly, and were correlated with the tremor scale score change rate ($P < 0.05$).

Conclusion: VIM-MRgFUS affects the gray matter volume in the thalamus and audiovisual-related brain regions and the white matter integrity of remote areas. The reduction in the left thalamus volume can be used as a neuroimaging index to assess clinical outcomes.

PO-0105

Feasibility of MUSE DTI in the differentiation of spinal cord injury severity in cervical spondylotic myelopathy

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Objective: This study aimed to investigate the clinical diagnosis value of a novel protocol of MUSE-DTI in patients with cervical spondylotic myelopathy (CSM).

Methods: From August 2021 to March 2022, a total of 60 subjects (22-71 years) were enrolled, including 51 CSM patients and 9 healthy subjects. A 3.0T MR scanner (Sina Architect, GE Healthcare) performed the MUSE-DTI sequence on each subject. The cervical canal stenosis of subjects was classified from grade 0 to grade III according to the method of an MRI grading system. MD, FA, AD, and RD maps were generated by post-processing MUSE-DTI data on the GE workstation (ADW4.5, Functool 9.4.04b). Regions of interest (ROIs) were manually drawn at the C2 vertebral body level and C2/3-C6/7 intervertebral disc levels by covering the whole spinal cord. The clinical severity of myelopathy of subjects was assessed by the clinical Japanese Orthopedic Association scale (JOA).

Results: MUSE-DTI can acquire a high-resolution diffusion image compared to traditional DTI. FA values at MCL showed a decreasing trend from grade 0 to grade III, while the MD, AD, and RD values at MCL showed an overall increasing trend. Significant differences in MD, AD, and RD values were found between adjacent groups among grades I -III ($p<0.05$). At the C2 level, the AD values in CSM patients (grade I-III) were significantly lower than healthy controls (grade 0) ($P=0.019$). The clinical JOA score has a significant correlation with the MD ($P<0.001$), FA ($P=0.016$), AD ($P<0.001$), and RD ($P=0.001$) values at MCL.

Conclusion: MUSE-DTI displayed a better image quality compared to traditional DTI. MUSE-DTI parameters displayed a grade dependent trend. All the MUSE-DTI parameters at MCL were correlated with clinical JOA score. The AD values at C2 level can reflect the secondary damage of distal spinal cord. Therefore, MUSE-DTI could be a reliable biomarker for clinical auxiliary diagnosis of spinal cord injury severity in cervical spondylotic myelopathy.

PO-0106

Altered intersubject functional variability of brain white-matter in major depressive disorder and its association with gene expression profiles

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Background: Major depressive disorder (MDD) is a heterogeneous disorder with remarkable intersubject variability in clinical presentations and neurobiological substrates. Although the altered intersubject variability in functional connectivity (IVFC) within gray-matter has been reported in MDD, the alterations to IVFC within white-matter (WM-IVFC) and the molecular mechanisms associated with these changes remain unknown.

Methods: Based on the resting-state functional MRI data of discovery [(145 MDD patients and 119 healthy controls (HCs)] and validation cohorts (54 MDD patients, and 78 HCs), we compared the WM-IVFC between the two groups. We further assessed the meta-analytic cognitive functions related to the alterations. The altered regional WM-IVFC was used to classify MDD patients and predict clinical symptoms in patients. In combination with the Allen Human Brain Atlas, transcriptome-neuroimaging association analyses were further conducted to investigate gene expression profiles associated with WM-IVFC alterations in MDD, followed by a set of gene functional characteristic analyses.

Results: We found extensive WM-IVFC alterations in MDD compared to HCs, which were associated with multiple behavioral domains, including visual and sensorimotor processes, as well as higher-order functions. For clinical applications, the altered regional WM-IVFC could not only effectively distinguish MDD patients from HCs with an area under curve ranging from 0.889 to 0.901 across three classifiers, but also significantly predict depression severity ($r = 0.575$, $p = 0.002$) and suicide risk ($r = 0.384$, $p = 0.040$) in patients. Furthermore, MDD-related WM-IVFC changes spatially correlated with the expression of 1004 genes, which were enriched for synapse, neuronal system, and ion channel, and predominantly expressed in excitatory and inhibitory neurons. Our results obtained good reproducibility in the validation cohort.

Conclusion: These findings revealed intersubject functional variability changes of brain WM in MDD and its linkage with gene expression profiles, providing potential implications for understanding the high clinical heterogeneity of MDD.

PO-0107

Value of Alberta Stroke Program Early CT Score on venous-phase CT in predicting the final infarct core and clinical outcome of the patients with acute ischemic stroke after endovascular thrombectomy

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Objectives: To assess the value of Alberta Stroke Program Early CT Score (ASPECTS) on non-contrast CT (NCCT), arterial-phase CT (APCT) or venous-phase CT (VPCT) in predicting the final infarct core (IC) on follow-up diffusion weighted imaging (DWI) and the clinical outcome of the patients with acute ischemic stroke (AIS) after endovascular thrombectomy (EVT).

Methods: A total of 120 patients with AIS who underwent EVT in our center were retrospectively enrolled. Correlations between NCCT-ASPECTS, APCT-ASPECTS, VPCT-ASPECTS and follow-up DWI-ASPECTS were analyzed using Spearman rank correlation coefficient. Mean differences and limit of agreement (LoA) between NCCT-ASPECTS, APCT-ASPECTS or VPCT-ASPECTS and follow-up DWI-ASPECTS were assessed using Bland-Altman plots and intra-class correlation coefficient (ICC). Multivariate logistic regression and receiver operating characteristic curve analyses were used to identify the independent predictors, and evaluate their performances in predicting the clinical outcome.

Results: VPCT-ASPECTS was significantly related to follow up DWI-ASPECTS ($r = 0.846$, $ICC = 0.837$). The mean difference between VPCT-ASPECTS and follow-up DWI-ASPECTS was 0.0 (LoA, -2.1 to 2.1). Enrolled in the stepwise logistic regression model, NIHSS scores at admission (NIHSSpre) (odds ratio [OR], 1.162; 95% CI, 1.063-1.270; $P = 0.001$) and VPCT-ASPECTS (OR, 0.728; 95% CI, 0.535-0.991; $P = 0.044$) were the independent predictors of clinical outcome. The combined model integrating NIHSSpre and VPCT-ASPECTS showed an excellent performance in predicting clinical outcome (AUC, 0.807; sensitivity, 75.0%; specificity, 72.3%).

Conclusions: VPCT-ASPECTS might be a promising imaging biomarker to predict the final IC and the clinical outcomes of the patients with AIS after EVT.

PO-0108

The value of 3D T2-weighted TSE sequences in the differential diagnosis for spinal arteriovenous fistula and acute transverse myelitis

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OBJECTIVE: Spinal arteriovenous fistulas (SAVF) was often neglected and misdiagnosed as acute transverse myelitis (ATM) due to its insidious onset and non-specific clinical symptoms. This study aims to investigate the differential diagnostic value of high-resolution T2-weighted volumetric sequence (3D sampling perfection with application-optimized contrasts using different flip-angle evolutions [SPACE]) in patients with SAVF and ATM.

METHODS: Retrospectively analyzed the clinical and radiological findings of 32 SAVF patients and 32 ATM patients treated at our institutions from May 2018 to January 2023. They all underwent conventional spinal MRI and T2-SPACE examination, compared their performance in identifying lesions, to estimate the value of T2 SPACE sequence in the diagnosis of SAVF and ATM patients.

RESULTS: The clue of cauda equina area change (CEAC) in conventional MRI and T2-SPACE sequences is specific for the diagnosis of SAVF. The diagnostic model composed of perimedullary flow voids (PFV) and CEAC has good diagnostic performance (AUCMRI = 0.95; AUCSPACE = 0.935). Compared with conventional MRI, the T2-SPACE sequence has a higher detection rate, sensitivity, and negative predictive value for PFV and CEAC in SAVF patients, but lower specificity and positive predictive value. In T2 SPACE images, there are significant differences in the distribution range and quadrant, maximum diameter of the PFV vessels between SAVF and ATM patients. In addition, T2-SPACE sequence can determine the site of fistula in most SAVF patients preferably, and the inter-rater agreement was good in the assessment of the fistula.

CONCLUSION: The CEAC is a new and useful clue for the diagnosis of thoracolumbar SAVF. And T2-SPACE sequence can more intuitively observe the lesions of SAVF, has good differential diagnostic value for SAVF and ATM patients.

PO-0109

Changes in the corticospinal tract after acute and chronic attacks based on diffusion tensor imaging

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Background: To investigate the changes in the corticospinal tract (CST) after respective attacks of intracerebral hemorrhage (ICH) and amyotrophic lateral sclerosis (ALS) using diffusion tensor imaging (DTI).

Material and methods: We prospectively enrolled patients with different stages of ICH and those with ALS, who visited our neurological department between January 2019 and December 2020, in addition to healthy adults, who were recruited from the community. All participants underwent examination with a series of brain magnetic resonance imaging protocols, including routine sequencing, three-dimensional T1, and DTI of the whole brain. The mean fractional anisotropy (FA) of the ipsilesional and contralesional sides, calculated using the atlas and tract-based spatial statistics (TBSS), was used independently for the analysis.

Results: This study enrolled 49 patients with corona radiata and/or basal ganglia hemorrhage, 46 age and sex-matched patients with ALS, and 41 healthy controls. The CST FA value of the ipsilesional side was lower in patients with ICH compared to those with ALS and the controls ($P < 0.05$). The CST FA value of the contralesional side was lower in patients with ICH than that in the controls ($P < 0.05$), but no statistically significant difference was observed between the ICH and ALS groups ($P > 0.05$). The CST, cingulum hippocampus, uncinate fasciculus of the contralesional side, and cingulate gyrus of the ipsilesional side recovered gradually at different periods during the course of ICH, while the FA value of the cingulum hippocampus of the ipsilesional side decreased gradually over time.

Conclusion: Injury to the CST on the ipsilesional side was more severe in ICH than that in ALS, but on the contralesional side similar changes were observed between ICH and ALS based on FA.

PO-0110

Classification of Major Depressive Disorder Based On Integrated Temporal and Spatial Variability Features of Dynamic Brain Network

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Background: The dynamics of brain network has been a focus in the study of depression in recent years. However, most previous studies focused on single temporal dimension, while ignoring spatial dimensional information. The present study aimed to integrate temporal and spatial variability features of dynamic brain network for distinguishing patients with major depressive disorder (MDD) from healthy controls (HCs).

Methods: This multicenter study included a discovery cohort (119 MDD and 106 HCs) and a cross-site validation cohort (126 MDD and 124 HCs). The model integrating temporal and spatial variability features with separate feature selection method (MSFS) was proposed for MDD classification. The performance of the model was compared with the models using single temporal variability features (MTVF), single spatial variability features (MSVF), and integrated temporal and spatial variability features with the method of hybrid feature selection (MHFS). In addition, a linear regression model for assessing MDD symptom severity was established based on the integrated features.

Results: The optimal classification model, i.e., MSFS, achieved an accuracy of 0.933 and AUC of 0.946 in the discovery cohort, as well as the accuracy of 0.834 and AUC of 0.834 in the validation cohort. Moreover, the features with high discriminative power to distinguish MDD from HCs involved multiple widely concerned functional networks, particularly the visual and cognitive control networks. Additionally, we found that altered temporal and spatial variability could predict the severity of depression ($r = 0.640$, $p = 2.169 \times 10^{-6}$) and anxiety ($r = 0.616$, $p = 0.001$) in MDD.

Conclusion: Conclusion: Our study suggests that integrating temporal and spatial variability features can discriminate MDD from HCs with a high classification performance and that altered spatiotemporal dynamics may explain underlying neurobiological mechanism of MDD.

PO-0111

Automated Anterior Visual Pathway Segmentation in Magnetic Resonance Image by a Novel Convolutional Neural Network

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Background A wide variety of benign and malignant conditions may affect the anterior visual pathway (AVP) resulting in optic neuropathy. Accurate and robust segmentation of AVP has the capacity to play an important role in the differential diagnosis and severity assessment of these diseases.

Purpose To develop a reliable automated segmentation method for the anterior visual pathway by using a novel convolutional neural network.

Materials and Methods Adult patients with non-specific neurological symptoms who underwent 3.0T MRI were retrospectively included in this study from our hospital (inclusion period: January to September 2022). The anterior visual pathway was outlined as a reference for deep-learning segmentation training, optimization, and testing data. To address the limitation of traditional

convolutional networks in capturing global representations, we proposed a lightweight volumetric convolutional network called large and small network (LS-Net). The Dice similarity coefficient (DSC), Jaccard similarity index (Jac), precision, average symmetric surface distance (ASSD) and Hausdorff distance (HD) were used to evaluate the segmentation performance of U-Net model.

Results 161 adults (mean age, 44.99 years \pm 12.42 [SD]; 73 male) were included. In our dataset, the average DSC of LS-Net was higher than those of 3D UX-Net, Swin UNETR, and classic 3D U-Net (0.3%, 1.16%, and 3.31%, respectively). Our model has a parameter quantity of 54.71M, which is higher than that of TansBTS (32.99M) and 3D VNet (45.60M); however, the DSCs are higher (10.8% and 14.85%, respectively). This shows that LS-Net has good segmentation performance and a lower parameter quantity. We also observed that segmentation of the left and right optic nerves was relatively easy, and the chiasma and optic tracts were difficult because of their small volumes and complex surrounding anatomical structures.

Conclusion In this study we provide a novel lightweight volumetric convolutional network which having a small number of parameters, improving the accuracy of AVP segmentation than classic convolutional neural networks. This pipeline can be further used for lesion localization, differential diagnosis, and severity assessment of AVP related diseases.

PO-0112

Delineation of Target Volume for Radiotherapy of High-Grade Gliomas through Registration of Preoperative MR on Postoperative MR Images

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Background: Accurate delineation of gross tumor volume (GTV) in high-grade glioma (HGG) radiotherapy is challenging. We proposed a novel nonlinear registration method for registering preoperative MR images onto postoperative MR images.

Methods: The preoperative and postoperative MR images of 96 HGG patients were included in this retrospective study. Three commonly used registration methods and our proposed method were used to register preoperative MR images on postoperative MR images. Target registration error and Dice score were calculated to select the optimal registration method. Three radiation oncologists outlined the GTV on the registered (with optimal registration method only) and unregistered images, respectively. The concordance index (CI) and coefficient of variance (COV) were calculated. The number of cases and number of slices of GTV including surgical complication lesions were calculated.

Results: Among these four registration approaches, our proposed method had the lowest target registration error (2.22 ± 0.47 mm) ($P < 0.01$) and the highest Dice score (69.89 ± 5.47 %) ($P < 0.05$). The COV for the registered images (12.03 ± 6.11 %) was smaller than that on the unregistered images (17.07 ± 15.54 %) ($P < 0.05$); the CI on the registered images (66.69 ± 8.64 %) was larger than that on the unregistered images (59.70 ± 13.81 %) ($P < 0.05$). The GTV delineated on registered images included less surgical complication lesions ($P < 0.05$).

Conclusions: Our proposed nonlinear registration method could improve the interobserver consistency and accuracy of GTV delineation for radiotherapy in HGG.

PO-0113

Expression of p53 Combined with Ki-67 in IDH-wildtype Glioblastomas: Prediction by Apparent Diffusion Coefficient Values

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Background: The presence of p53 mutations combined with high Ki-67 expression can predict poor prognosis and overall survival in IDH-wildtype glioblastoma patients. Here, we used magnetic resonance imaging (MRI) features and apparent diffusion coefficient (ADC) values to predict the expression of p53 and Ki-67 in IDH-wildtype glioblastomas to inform clinical treatment.

Methods: We retrospectively collected clinical and imaging data for 103 IDH-wildtype glioblastoma patients in our hospital between June 2021 and February 2023. The datasets were divided into four groups: p53(+)/Ki-67(+), p53(+)/Ki-67(-), p53(-)/Ki-67(+), and p53(-)/Ki-67(-) according to mutant status of p53 and expression level of Ki-67. Six MRI morphological features and four ADC values for the tumor parenchyma were analyzed.

Results: Of the 103 patients, 21 had p53(-)/Ki-67(-), 12 had p53(+)/Ki-67(-), 28 had p53(-)/Ki-67(+), and 42 had p53(+)/Ki-67(+). Tumor location showed statistically significant differences among the 4 groups ($P < 0.05$). ADC parameters were negatively correlated with p53 and Ki-67 expression status and could distinguish the co-expression of p53 and Ki-67 ($P < 0.05$). In distinguishing between the p53(+)/Ki-67(+) and p53(-)/Ki-67(-) groups, when ADC_{min} was $0.85 \times 10^{-3} \text{ mm}^2/\text{s}$, the sensitivity, specificity and accuracy reached their maximum values of 61.90%, 92.90% and 82.54%, respectively.

Conclusion: The expression of p53 and Ki-67 in IDH-wildtype glioblastoma can be evaluated by ADC values. ADC values can be used as a non-invasive quantitative parameter to assist in the clinical diagnosis of IDH-wildtype glioblastoma molecular states.

PO-0114

Diagnostic value of adenohipophyseal magnetic resonance imaging features in girls with precocious puberty

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Background and Purpose

This study aimed to evaluate the diagnostic value of adenohipophyseal MRI features for precocious puberty (PP) in girls and also to establish a non-invasive diagnostic approach for easy implement in clinics.

Materials and Methods

A total of 126 girls (37, 57 and 32 girls clinically diagnosed as patients with central PP [CPP] and incomplete PP [IPP], and controls) were enrolled in this study. Data in the three groups were collected and analyzed using analysis of variance. Pearson correlation and stepwise multivariate linear regression analysis were used to examine the association and build prediction models. ROC analysis was used to evaluate the diagnostic efficacy.

Results

The values of adenohipophysis volume (aPV), adenohipophysis height (aPH), and signal-intensity-ratio (SIR), body height (Height), body weight (Weight) and seven laboratory testing characteristics were correlated closely with the activation status of the Hypothalamic-pituitary-

gonad axis in the different groups (all $P < 0.05$). Model 1 including aPV, Weight, and aPH and Model 2 including SIR, aPV, and Height were built to obtain predicted luteinizing hormone (LH) ($R^2 = 0.271$) and LH/FSH ($R^2 = 0.311$). ROC analysis showed the predicted LH, predicted LH/FSH, and aPV was the top three best predictors in distinguishing CPP group from controls (AUC=0.969, 0.949, and 0.938) while predicted LH/FSH was the best predictor in distinguishing CPP group from IPP and control group (AUC=0.829 and 0.828).

Conclusion

The main adenohypophyseal MRI features and the prediction models increase diagnosis efficiency for PP and offer a non-invasive and credible diagnostic method.

PO-0115

Predictive value of ADC histogram in preoperative peritumoral 2cm edema zone for spatial recurrence pattern of IDH wild-type glioblastoma

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[Abstract] Objective To evaluate the predictive value of preoperative apparent diffusion coefficient (ADC) histogram analysis of the 2cm peritumoral edema zone for spatial recurrence pattern of IDH wild-type glioblastoma (GB). **Methods** Retrospective analysis was performed on 50 patients with IDH wild-type GB treated with standard protocol and diagnosed by pathology and confirmed as tumor recurrence by regular follow-up MRI in our hospital from January 2012 to December 2021. The postoperative spatial recurrence patterns were divided into local recurrence group ($n=28$) and non-local recurrence group ($n=22$) according to whether the distance between the recurrence foci and the operative cavity was more than 2cm. The ADC images corresponding to the maximum level of tumor MRI enhanced axial planes was selected, Mazda software was used to outline the region of interest along the edge of the 2cm range of peritumoral edema for histogram analysis. The histogram parameters of the two groups with different spatial recurrence patterns were statistically analyzed, and the area under the curve (AUC) was obtained by receiver operating characteristic curve to evaluate the diagnostic efficacy. **Results** Among the 50 recurrent GB patients, progression-free survival (PFS) and overall survival (OS) in local recurrence group were both longer than those in the non-local recurrence group (median PFS: 6.6 vs 4.6 months; median OS: 15.4 vs 12.4 months), and the differences were statistically significant (PFS: log-rank $\chi^2=4.325$, $P=0.038$; OS: log-rank $\chi^2=4.022$, $P=0.045$). Variance, Kurtosis and Perc.90% of the 9 feature parameters extracted from ADC histogram were statistically significant differences between the two groups ($P < 0.05$). Specifically, Variance had the best diagnostic efficiency, with AUC of 0.804, a sensitivity of 75.00%, and a specificity of 81.82%. Among the four logistic regression models constructed based on the statistically significant parameters, the model constructed with the combination of variance, kurtosis and perc.90% had the best diagnostic efficiency, with AUC of 0.878, diagnostic sensitivity of 78.57%, and specificity of 86.36%, respectively. **Conclusions** The preoperative ADC histogram of 2cm peritumoral edema zone can be used as an imaging marker to predict the different spatial patterns of postoperative recurrence in IDH wild-type GB.

PO-0116

Synergistic effects of cerebral small vessel disease and deep gray matter iron deposition on cognitive impairment in hypertension

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Purpose : Cerebral small vessel disease (CSVD) and deep gray matters (DGMs) iron deposition often occur together in hypertensive patients, and CSVD was thought to be related to cognitive impairment. However, whether CSVD and iron deposition synergistically deleteriously impact cognition in hypertension remains unclear. We aimed to investigate the associations between CSVD, iron deposition, and cognitive impairment and whether iron deposition may mediate the association between CSVD and cognitive impairment.

Materials and Methods: A total of 69 hypertensive patients and 31 healthy volunteers with age, gender, and education years matched were included. All subjects underwent a strategically acquired gradient echo (STAGE) protocol. The multi-echo data were used to reconstruct quantitative susceptibility mapping (QSM), and susceptibilities were used to describe iron content from both global and regional perspectives. Global region (RI) susceptibilities of DGMs were measured, and age-related thresholds were used to determine high-iron content region (RII) susceptibilities. The CSVD was evaluated by visual assessment scales including white matter hyperintensity (WMH), cerebral microbleed, recent small subcortical infarct/lacune of presumed vascular origin, perivascular space, and brain atrophy. Based on the Montreal Cognitive Assessment (MOCA) scores, all subjects were divided into three groups: hypertension with cognitive impairment (HTN-CI, n=38), hypertension without cognitive impairment (HTN-NCI, n=31), and healthy controls (HCs, n=31). The effects of CSVD, iron deposition, and cognitive impairment were evaluated using a multivariate linear regression model with a significance level of 0.05. Finally, the mediation model was used to investigate the role of iron deposition on the relationship between CSVD and cognitive impairment.

Results: The susceptibilities showed significant differences in bilateral caudate nucleus (CN), thalamus (TH), and putamen (PU) among the three groups for RI or RII analysis (all $p < 0.05$), and bilateral CN's susceptibilities in HTN-CI were significantly higher than HTN-NCI ($p < 0.05$). The susceptibilities of DGMs were positively correlated with WMH scores, and the susceptibilities of left CN and red nucleus (RN) were positively correlated with the iron burden of microbleeds (all $p < 0.05$). The results of multivariate linear regression analysis showed that paraventricular WMH, cerebral microbleed, and susceptibilities of left PU were the influencing factors of total MOCA scores; cerebral microbleed were negatively associated with visuospatial-executive and language scores; and iron burden of microbleed, susceptibilities of left CN and PU were negatively associated with delayed memory scores (all $p < 0.05$). The susceptibilities of left PU accounted for 19.41% and 17.40% of mediating effects on the relationships of paraventricular WMH and cerebral microbleed with total MoCA scores, respectively.

Conclusion : CSVD and iron deposition had a synergistic deleteriously effect on cognitive impairment in hypertensive patients, and iron deposition of DGMs may partly mediate the effects of CSVD on cognitive impairment.

PO-0117

Case evidence of functional connectivity-guided repetitive transcranial magnetic stimulation for refractory irritable bowel syndrome

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Background: Transcranial magnetic stimulation (TMS) on the dorsolateral prefrontal cortex (DLPFC) can effectively regulate brain-intestinal interaction, but its efficacy and mechanism in irritable bowel syndrome (IBS) remains unknown. Recently, functional connectivity (FC) of the pregenual anterior cingulate gyrus (pgACC) has been proposed to be used for individualized localization of DLPFC targets and as a predictor of TMS efficacy. We investigated the effects of pgACC-DLPFC FC-guided TMS on gastrointestinal and emotional symptoms, and brain function in patients with refractory IBS.

Methods: Four patients with refractory IBS who had not improved with conventional therapy were given 20 TMS sessions over a month. Based on the baseline resting-state fMRI data, the site of the DLPFC that displayed stronger negative FC with the pgACC was selected as the individualized TMS target. Patients underwent three clinical assessments and MRI scans (RS-fMRI and MRS) at baseline, during and after treatment. Rectal manometry was performed before and after treatment. **Results:** The pain, gastrointestinal symptoms and negative emotions of IBS patients were gradually relieved. There was also a marked improvement in visceral sensitivity. RS-fMRI showed that the amplitude of low-frequency fluctuation (ALFF), fractional ALFF (fALFF), and regional homogeneity (ReHo) values of pgACC decreased, the ALFF and fALFF values of left DLPFC increased, and the FC value of pgACC-DLPFC increased. In addition, MRS showed a gradual increase in NAA/Cr and a decrease in Cho/Cr in pgACC and left DLPFC.

Conclusion: pgACC-DLPFC FC-guided rTMS is effective in improving gastrointestinal and emotional symptoms in patients with refractory IBS. In addition, it may regulate local neuronal spontaneous activity and metabolism, and promote connectivity between frontal and limbic regions.

PO-0118

Neuropsychological Insights into Exercise Addiction: The Role of Brain Structure and Self-Efficacy in Middle-Older Individuals

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Purpose: Exercise addiction (EXA) is a behavioral problem involving excessive exercise that can lead to structural brain changes and health problems. Concurrently, self-efficacy denotes an individual's capacity for exerting control their own conduct, and it may serve as a pivotal factor in molding an individual's exercise patterns. Hence, the objectives of this study encompass the investigation of atypical gray matter volume (GMV) among exercise addicts in the middle-older demographic, and to analyze the relationship between self-efficacy and physiological modifications alongside EXA.

Method: Structural magnetic resonance images and behavioral assessments were administered to the designated study population. Voxel-based morphological analysis was carried out using SPM12 software, and mediation analysis was employed to explore the potential neuropsychological mechanism of self-efficacy in relation to EXA.

Result: 133 patients with symptoms of EXA (male = 43, age 52.8611.78 years) were recruited. EXA were positively correlated with the GMV of right inferior temporal (ITG.R) and right hippocampus (HIP.R), and negatively correlated with the left Rolandic operculum (ROL.L). Self-efficacy has the potential to indirectly impact EXA by influencing the GMV of ITG.R, and it can also serve as a mediating variable in mediating the influence of the GMV of ITG.R on EXA.

Conclusion: This study elucidates the predictive significance of alterations in brain structure concerning EXA among middle-older adults, alongside the neurophysiological mechanism associated with self-efficacy in this context. This offers a robust scientific foundation for comprehending the intricacies of EXA and formulating intervention strategies aimed at enhancing the well-being of middle-older individuals.

PO-0119

Abnormal white matter along fibers by automated fiber quantification in patients undergoing hemodialysis

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Background: Abnormal white matter has been reported in patients with end-stage renal disease (ESRD). However, few studies have investigated the relationship between specific damage segments and cognition in ESRD. This study aimed to delineate white matter alterations in ESRD and its relationship with cognition.

Methods: A total of 36 patients undergoing hemodialysis and 25 healthy controls underwent diffusion tensor imaging (DTI) and a series of neuropsychiatric tests. Automated fiber quantification was used to extract distinct DTI indices, and the relationship between the specific segment of the white matter and clinical properties was investigated. Furthermore, a support vector machine was applied to differentiate patients with ESRD from healthy controls.

Results: Fractional anisotropy values decreased in multiple fiber bundles, including bilateral thalamic radiata, cingulum cingulate, inferior fronto-occipital fasciculus (IFOF), uncinate, Callosum_Forceps_Major/Callosum_Forceps_Minor (CFMaj/CFMin), and left uncinate from the tract level in patients with ESRD. Specific damaged segments were detected in 8 fiber bundles, including bilateral thalamic radiation, cingulum cingulate, IFOF, CFMin, and left corticospinal tract. Few alterations in these fiber bundles were correlated with cognition impairment and hemoglobin levels. The tract profiles of the left thalamic radiata and left cingulum cingulate could be used to differentiate hemodialysis patients from healthy controls, with an accuracy of 76.9% and 67.6%, respectively.

Conclusions: This study revealed white matter damage in hemodialysis patients. This damage occurred in specific segments of the tract, especially in the left thalamic radiata and left cingulum cingulate, which might become a new biomarker for patients with ESRD and cognition impairment.

PO-0120

Altered whole-brain resting-state functional connectivity and brain network topology in typhoon-related post-traumatic stress disorder

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Background: Altered resting-state functional connectivity has been found in patients with post-traumatic stress disorder (PTSD). However, the alteration of resting-state functional connectivity at whole-brain level in typhoon-traumatized individuals with PTSD remains largely unknown.

Objectives: To investigate changes in whole brain resting-state functional connectivity and brain network topology in typhoon-traumatized subjects with and without PTSD.

Design: Cross-sectional.

Methods: Twenty-seven patients with typhoon-related PTSD, 33 trauma-exposed controls (TEC), and 30 healthy controls (HC) underwent resting-state functional MRI scanning. The whole brain resting-state functional connectivity network was constructed based on the automated anatomical labeling atlas. The graph theory method was used to analyze the topological properties of the large-scale resting-state functional connectivity network. Whole-brain resting-state functional connectivity and the topological network property were compared by analyzing the variance.

Results: There was no significant difference in the area under the curve of γ , λ , σ , global efficiency, and local efficiency among the three groups. The PTSD group showed increased dorsal cingulate cortex (dACC) resting-state functional connectivity with the postcentral gyrus (PoCG) and paracentral lobe and increased nodal betweenness centrality in the precuneus relative to both control groups. Compared with the PTSD and HC groups, the TEC group showed increased resting-state functional connectivity between the hippocampus and PoCG and increased connectivity strength in the putamen. In addition, compared with the HC group, both the PTSD and TEC groups showed increased connectivity strength and nodal efficiency in the insula.

Conclusion: Aberrant resting-state functional connectivity and topology were found in all trauma-exposed individuals. These findings broaden our knowledge of the neuropathological mechanisms of PTSD.

PO-0121

Automated estimation of quantitative lesion water uptake as a prognostic biomarker for patients with ischemic stroke and large vessel occlusion

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Background and purpose: Net water uptake (NWU) is qualified as an imaging marker of brain edema. We aimed to investigate the ability of NWU as a predictor for the 90-day functional outcome in patients with acute ischemic stroke (AIS) and large vessel occlusion (LVO).

Materials and Methods: A total of 295 consecutive patients were retrospectively enrolled. Automated Alberta Stroke Program Early CT Score-based NWU (ASPECTS-NWU) was calculated on the admission CT. The relationship between ASPECTS-NWU and 90-day neurological outcome was assessed. The independent predictors of favorable outcome (modified Rankin Scale score \leq

2) were assessed using multivariate logistic regression analysis and ROC curves, and stratified by ASPECTS.

Results: Favorable 90-day outcomes were observed in 156 (52.9%) patients. ASPECTS-NWU (OR, 0.79; 95% CI, 0.70–0.90), National Institutes of Health Stroke Scale (NIHSS) scores (OR, 0.91; 95% CI, 0.87–0.96), age (OR, 0.96; 95% CI, 0.94–0.99), and vessel recanalization (OR, 7.78; 95% CI, 3.96–15.29) were independently associated with favorable outcomes at 90 days (all $p < 0.01$). A lower ASPECTS-NWU independently predicted a good prognosis, even in the subgroup of patients with low ASPECTS (≤ 5) ($p < 0.05$). An outcome prediction model based on these variables yielded an area under the ROC curve of 0.856 (95% CI, 0.814–0.899; sensitivity, 76.3%; specificity, 81.3%).

Conclusion: ASPECTS-NWU could independently predict 90-day neurological outcomes in patients with AIS and LVO. Integrating ASPECTS-NWU with clinical models could improve the efficiency of outcome stratification.

PO-0122

APOE4 aggravates self-propagating pattern of tau in brain

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Background: The Apolipoprotein E type 4 allele (APOE4) is the strongest genetic risk factor for Alzheimer's disease (AD), which is associated with the intracellular neurofibrillary tangles consisting of abnormally phosphorylated tau protein. However, it is still unclear how tau spreads between regions and the effect of APOE4 on the propagating pattern. Purpose: The aim of this study is to evaluate the effect of APOE4 on tau propagation in brains of individuals with AD.

Methods: A total of 456 subjects including 226 health controls (HC), 166 mild cognitive impairment (MCI), and 64 AD from the Alzheimer's Disease Neuroimaging Initiative (ADNI) were included in this study. Regional standard uptake value ratios (SUVRs) were calculated from the preprocessed 18F-AV1451 PET images. An individual-level network analysis method was applied to the SUVRs matrix to evaluate the tau propagating between brain regions. The propagating pattern was verified by group differences analysis and longitudinal data analysis. The effect of APOE4 was evaluated by compare the group differences between APOE4 carriers and not carriers in the three groups. **Results:** Group differences in HC, MCI, and AD showed that the tau network characteristics including connectivity, nodal efficiency, and global efficiency show a decreasing trend for NC, MCI, and AD. The longitudinal results verified the tau network pattern. Further, the APOE4 carriers had decreased connectivity, nodal efficiency, and global efficiency compared to the not carriers in MCI and AD. **Conclusions:** The accumulation of tau was regional independent which suggested that the tau accumulation in each brain regions was self-propagating once tau aggregates had formed in discrete brain areas. The APOE4 could aggravate the self-propagating pattern.

PO-0123

Increased T2 value may suggest the normal-appearing corticospinal tract degeneration following stroke with multiple overlapping-echo detachment quantitative magnetic resonance technology

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Background: Stroke patients commonly face challenges during clinical MRI examinations due to unconsciousness and involuntary movements. The study aims to address these challenges with a self-developed anti-motion, ultrafast, multiple overlapping-echo detachment (MOLED) quantitative magnetic resonance technology. Furthermore, with this technique, we seek to quantitatively detect potential damage of the corticospinal tract (CST) distal to the lesion following stroke, whose integrity is crucial for controlling random movements of the body and limbs.

Methods: A total of 79 patients with ischemic cerebral infarction underwent multimodal MRI, including MOLED. The MOLED technique's accuracy, reliability, and anti-motion were validated on phantoms and five healthy volunteers. Subsequently, we assessed motor dysfunction severity, ischaemic lesion volume, the T₂ values of CST, and the T₂ ratio (rT₂) between the ipsilesional and contralesional of the CST in patients. Motor dysfunction severity was assessed using the upper and lower limb motor function scores from the National Institutes of Health Stroke Scale (NIHSS).

Results: MOLED showed high accuracy ($P < 0.001$) and excellent repeatability, with a mean coefficient of variation of 1.11%, and accessed reliable quantitative results even under head movement: Mean_{diff}=0.28%, SD_{diff}=1.34%. Moreover, the T₂ value of the CST on the ipsilesional was significantly higher than the contralesional ($P < 0.001$), and a positive correlation was observed between rT₂ and the severity of motor dysfunction ($r_s = 0.575$, $P < 0.001$). Furthermore, rT₂ was able to predict post-stroke motor impairment, with the area under the curve (AUC) was 0.883.

Conclusions: The MOLED technique shows significant advantages for imaging in patients with involuntary movements. Additionally, the T₂ mapping detected alterations in the integrity of the CST, aiding in monitoring stroke-induced motor impairment.

PO-0124

High-resolution vessel wall imaging study of the correlation between intracranial atherosclerotic plaque remodelling patterns and diabetes mellitus

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Objective: To investigate the factors of intracranial atherosclerotic remodelling patterns and the relationship between intracranial atherosclerotic remodelling and diabetes mellitus using high-resolution vessel wall imaging (HR-VWI).

Methods: Ninety-four patients diagnosed with middle cerebral artery or basilar artery atherosclerosis were enrolled. Their basic clinical data were collected, and HR-VWI was performed. The vascular area at the plaque (VA MLN) and normal reference vessel (VA reference) were delineated and measured on image postprocessing software, and the reconstruction index (RI) was calculated. According to the value of the reconstruction index, the patients were divided into a

positive reconstruction group (PR group), intermediate remodelling group (IR group), negative reconstruction group (NR group), or positive reconstruction group (PR group) and nonpositive reconstruction group (N-PR group).

Results: There were statistically significant differences in the prevalence of diabetes and serum cholesterol levels among the PR group, IR group and NR group ($P < 0.05$). The prevalence of diabetes in the PR group was higher than that in the IR and NR groups, and the serum cholesterol level in the PR group was also higher than that in the IR and NR groups. There were significant differences in the prevalence of diabetes, triglycerides and cholesterol between the PR group and the N-PR group ($P < 0.05$). There were more diabetes patients in the PR group than in the N-PR group, and serum triglyceride and cholesterol levels were higher in the PR group than in the N-PR group. Logistic regression analysis showed that diabetes mellitus was an independent influencing factor in plaque-positive reconstruction.

Conclusion: HR-VWI can clearly show the morphology and signal characteristics of intracranial vascular walls and plaques. Intracranial atherosclerotic plaques in diabetic patients are more likely to show positive remodelling, suggesting poor plaque stability and a greater risk of stroke, and the results of this study provide a basis for ischaemic stroke prevention.

PO-0125

The axes among tobacco/alcohol, inflammation, and neuroimaging: a preliminary exploratory analysis

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Background: Tobacco and alcohol use are the most common addictive behaviors worldwide. Distinct modal metrics can reflect alterations in various aspects of addicts' brain characteristics via neuropsychiatric imaging. Nevertheless, the axes among inflammation, neural features, and nicotine/alcohol abuse are still unclear in humans.

Methods: In this study, genome-wide association studies of brain imaging-derived phenotypes including GMV, FA, and MD, substance use phenotypes, as well as inflammatory factors were analyzed by mendelian randomization method. Thus, we employed several MR techniques, such as weighted model, inverse variance weighting (IVW), MR-PRESSO, MR-Egger regression, and weighted median to investigate causal relationships among neuroimaging, addiction, and inflammatory phenotypes. Finally, mediation analyses were conducted.

Result: We revealed "cigarette per day—SDF-1A—cortical thickness of right cuneal cortex" and "IL-18—MD of left medial lemniscus—cigarette per day" pathways. In addition, after Bonferroni correction, there were forward relationships between age of initiation and default network SC [β : 0.0032, 95%CI (0.0016, 0.0048) PIVW = 0.0001], between cerebral global FC and smoking cessation [β : 25.4385, 95%CI (11.2399, 39.6371), PIVW=0.0004], as well as between MD of left medial lemniscus and cigarette per day [β : -0.0505, 95%CI (-0.0717, -0.0292), PIVW=3.1635 $\times 10^{-6}$], which will help the discovery of diagnostic or predictive makers and potential therapeutic targets.

Conclusion: Neuroimaging can reflect cognitive alterations and behavioral aberrance to some extent, and inflammation might take an important role in pathological processes as well as addiction initiation, which will help the discovery of diagnostic or predictive makers and potential therapeutic targets in addiction.

PO-0126

MRI radiomics for predicting intracranial progression in non-small cell lung cancer patients with brain metastases treated with epidermal growth factor receptor-tyrosine kinase inhibitors

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Objective To identify clinical and MRI radiomics predictors specialized for intracranial progression (IP) after first-line epidermal growth factor receptor (EGFR)-tyrosine kinase inhibitor (TKI) treatment in non-small cell lung cancer (NSCLC) patients with brain metastases (BMs).

Methods Seventy EGFR-mutated NSCLC patients with a total of 212 BMs who received first-line EGFR-TKI therapy were enrolled. Radiomic features were extracted from the BM regions on the pretreatment contrast-enhanced T1-weighted images, and the radscore of each BM was established based on the selected features. Furthermore, the radscore_mean derived from the average radscore of all included BMs in each patient was calculated. Univariate and multivariate logistic regression analyses were performed to identify potential predictors of IP. Prediction models based on different predictors and their combinations were constructed, and nomogram based on the optimal prediction model was evaluated.

Results Thirty-three (47.1%) patients developed IP, and the remaining 37 (52.9%) patients were intracranial progression-free. EGFR-19del mutation (OR 0.19, 95% CI 0.05–0.69), third-generation TKI treatment (OR 0.33, 95% CI 0.16–0.67) and radscore_mean (OR 5.71, 95% CI 1.65–19.68) were found to be independent predictive factors. Models based on these 3 predictors alone and in combination (combined model) achieved AUCs of 0.64, 0.64, 0.74, and 0.86 and 0.64, 0.64, 0.75, and 0.84 in the training and validation sets, respectively, and the combined model demonstrated optimal performance for predicting IP.

Conclusion The model integrating EGFR-19del mutation, third-generation TKI treatment and radscore_mean had good predictive value for IP after EGFR-TKI treatment in NSCLC patients with BM.

PO-0127

Structural and functional MRI markers for cognitive impairment in neuromyelitis optica spectrum disorders

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Purpose

To identify the imaging markers of cognitive impairment (CI) in NMOSD using multimodal MRI.

Materials and Methods

101 NMOSD patients and 43 age- and gender-matched healthy controls (HC) were prospectively recruited between January 2015 and May 2019. All patients underwent comprehensive

neuropsychological assessments and multimodal MRI including T2/FLAIR, 3D-T1, diffusion images and resting-state functional MRI. Structural MRI measures including white matter (WM) lesion volume, WM integrity (fractional anisotropy, FA), gray matter volume (GMV), and functional MRI measure (amplitude of low-frequency fluctuation, ALFF) were compared between CI and cognitive preserved (CP) groups. Receiver operating characteristic curve and binary logistic regression model were performed to determine the power of clinical and MRI measures for predicting CI status.

Results

Thirty-four patients (33.7%) were classified as CI. Both CI and CP patients showed decreased FA, GMV, and functional abnormalities compared to HC. Compared to CP patients, the CI patients showed decreased FA in the anterior corpus callosum, decreased GMV in bilateral thalamus, parahippocampal gyrus, gyrus rectus and right middle temporal gyrus. While CP patients showed increased ALFF in bilateral inferior parietal lobule (IPL) and left superior parietal lobule, CI patients had decreased ALFF in the right IPL, compared to HC. A combination of structural and functional MRI measures alongside with education level and age exhibited fair to excellent discriminative power ($AUC > 0.8$) for the discrimination between CI and CP. Binary logistic regression analysis predicted CI including GMV in right middle temporal gyrus ($\beta = 11.92$, $P = 0.014$) and ALFF in right IPL ($\beta = -12.56$, $P = 0.002$).

Conclusion

CI developed as the structural damage in deep GM, frontal and temporal lobes progressed and functional adaption failed. GMV in right middle temporal gyrus and ALFF in right IPL are promising imaging markers for predicting CI in NMOSD.

PO-0128

Visualization of the clearance mechanism on glial lymphatic pathway under different amyloid protein load via 9. 4T MR

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Abstract

Purpose: In the research framework proposed by the National Institute on Aging and Alzheimer's Association in 2018, $A\beta$ was considered as a biomarker to determine whether a person belongs to Alzheimer's disease (AD) continuum. And the clearance of amyloid protein β and τ deposited in the brain can be achieved through the glial system. The glial system, also known as aquaporin 4 (AQP4), can promote the exchange of cerebrospinal fluid (CSF) and interstitial fluid (ISF), which can clear amyloid β and τ protein from brain of AD patients. That is to say, the glial system represents an exciting new target for AD.

Methods: After injecting Gd-DTPA into the cerebellomedullary cistern of APP/PS1 mice aged 2, 4, 6, and 8 months, the first dynamic enhanced MRI (DCE) image was collected at 9.4T at 30 minutes, and then collected at every 15 minutes until 150 minutes after injection. Immunofluorescence was used to verify the expression of AQP4.

Result: In APP/PS1 mice model, 4-6 months old is the preclinical stage of AD. In this model, we observed the change process of CSF-ISF exchange rate from enhancement to damage, and AQP4 from polarization to depolarization. Interestingly, during the 4-6-month-old stage, the deposition rate of amyloid protein is the slowest, corresponding to the strongest exchange rate of CSF-ISF at 6 months old. Excitingly, we found for the first time in the APP/PS1 mice model that the damage to the ophthalmic lymphatic system occurs earlier than that of the cerebral lymphatic system. Subsequently, we used the new AQP4 inhibitor TGN-020 to demonstrate significantly impaired glial lymph CSF-ISF exchange.

Conclusion: The amount of amyloid protein deposition in APP / PS1 mice at 4-6 months of age may better activate this clearance pathway. For the first time, we found that the eye lymphatic system was damaged earlier than the brain lymphatic system in the APP / PS1 mice, and AQP4 plays an important role in the lymphatic clearance system. Therefore, it is speculated that this system can be used as a target for understanding and treating AD.

PO-0129

The relationship between rest tremor and fiber organization in Parkinson's disease and Essential tremor

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Background:

Rest tremor is a common movement disorder that can appear in many diseases, such as Parkinson's disease (PD), and essential tremor (ET). It is worth noting that, rest tremor is usually associated with slower progression in PD, whereas it is often associated with more severe progression in ET. However, the underlying white matter organization of rest tremor behind PD and ET remains unclear.

Methods:

This study included 57 ET (40 without rest tremor (ETWR), 17 with rest tremor (ETRT)) patients, 68 PD patients (34 without rest tremor (PDWR), 34 with rest tremor (PDRT)), and 62 normal controls (NC). We used fixel-based analysis (FBA) to evaluate the structural changes of white matter (WM) fiber in rest tremor in these different diseases.

Results:

The fiber-bundle cross-section (FC) of right non-decussating dentato-rubro-thalamic tract (nd-DRTT) and many other fibers outside the DRT pathway in ETWR were significantly higher than that in NC (false discovery rate (FDR) corrected: $P_{\text{left CGH}} = 0.016$, $P_{\text{left IFO}} = 0.024$, $P_{\text{left ILF}} = 0.016$, $P_{\text{left UNC}} = 0.024$, $P_{\text{right CGC}} = 0.016$, $P_{\text{right IFO}} = 0.024$, $P_{\text{right ILF}} = 0.024$, $P_{\text{right nd-DRTT}} = 0.027$). The fiber density and cross-section of left nigro-pallidal (SN-GP) in PDWR is significantly lower than that of NC (FDR corrected: $P = 0.048$), while the FC of bilateral SN-GP in PDRT is significantly lower than that of NC (FDR corrected: $P_{\text{left SN-GP}} < 0.001$, $P_{\text{right SN-GP}} < 0.001$). No significant difference in tract-of-interest fixel metrics between NC vs ETRT, PDWR vs PDRT, and ETWR vs ETRT.

Conclusion:

ET patients with single action tremor showed over-activation of fiber organization, but that is not the case in the patients with rest tremor, which may suggest the invisible damage of structural compensation when rest tremor appears. Except for the SN-GP that is degenerated in both PD, PD patients with rest tremor will not have worse fiber organization, that may indicate the benign behavior of rest tremor in PD. These findings provide new insight of differential influences of rest tremor on brain fiber architecture in ET and PD.

PO-0130

Association of abnormal segment in uncinate fasciculus with cognitive deficit in first-episode, treatment-naïve young adults with major depressive disorder

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Background: Cumulative evidence has consistently shown that white matter (WM) disruption is associated with cognitive decline in geriatric depression. However, studies investigating the association between these disturbances and cognitive deficit in untreated young adults with major depressive disorder (MDD) are sparse.

Method: Diffusion tensor images were performed on 60 first-episode, treatment-naïve young adult patients with MDD and 54 matched healthy controls (HCs). Automated fiber quantification was applied to calculate the tract profiles of fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD), and radial diffusivity (RD) to evaluate the WM microstructural organization. Pearson correlation analysis was performed to find the associations between the diffusion properties and cognitive performance.

Results: Compared with HCs, patients with MDD exhibited predominantly different diffusion properties in bilateral uncinate fasciculus (UF), corticospinal tracts (CSTs), left superior longitudinal fasciculus (SLF), anterior thalamic radiation (ATR). The FA of right UF was positively correlated with working memory. The MD of left UF was negatively correlated with working memory and positively correlated with the symptom severity. Additionally, a positive correlation between the MD of left CST and psychomotor speed was observed.

Conclusions: Our findings provided evidence of alterations in specific segments of brain WM tracts in first-episode, treatment-naïve young adults with MDD, which were associated with cognitive deficit.

PO-0131

Influence of different scanning conditions of CTP combined with deep learning image reconstruction algorithms on image quality and perfusion parameters

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Purpose: To evaluate the performance of deep learning image reconstruction (DLIR) algorithm in conjunction with lower tube current or lower tube voltage in whole brain CT perfusion (CTP) examination under reduced radiation dose.

Methods: 45 patients (age 60.04 ± 13.46 years, Group1) in this study underwent CTP examination at 80 kV and 150mA; 47 patients (age 62.85 ± 13.47 years, Group2) underwent CTP examination at 80 kV and 100mA; and 20 patients (age 59.21 ± 12.64 years, Group3) with CTP at 70 kV and 150mA. CTP datasets were reconstructed using FBP, ASIR-V40%, ASIR-V80%, and DLIR at medium and high levels (DLIR-M, H) for Group1(Group A-F) and ASIR-V80% and DLIR-H for Groups 2(Group G-H) and 3(Group I-J). Objective parameters such as CT values, image noise, signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR) of frontal, temporal, and parietal lobes were compared. Two radiologists subjectively evaluated perfusion pseudo-color images (CBF, CBV, Tmax, MTT, and TTP) according to Abels' scoring system. Additionally, corresponding perfusion parameters were measured and compared.

Results: The radiation doses of the three CTP scanning protocols in Groups 1, 2, and 3 were 5.70mSv, 3.81mSv, and 3.83 mSv, respectively. Within Group 1, as the reconstruction strength of ASIR-V and DLIR increased, image noise decreased, SNR and CNR increased. The trend in gray matter(GM) and white matter(WM) was consistent, but the improvement in WM was more significant. Group F had the highest SNR and CNR. Groups F, E, and C generated higher subjective scores. Different reconstruction algorithms did not affect the five perfusion parameters. Within Groups 2 and 3, the DLIR-H images showed lower SD values than ASIR-V80%, with higher SNR and CNR in WM ($P<0.05$ for Group G vs. H, Group I vs. J); there was no significant difference in GM; the subjective scores of DLIR-H images were higher than those of ASIR-V80% ($P<0.05$ for Group G vs. H, Group I vs. J). The objective and subjective image quality of DLIR-H images in Groups 2 and 3 were comparable to those of the ASIR-V80% group in Group 1 ($P>0.05$ for Group C vs. H vs. J). Groups G, I, and J showed significant differences in perfusion parameters compared to other groups, especially in decreased MTT and increased CBF values in the white matter region. The changes in Groups I and J were more significant among these three groups.

Conclusions: Low tube current scanning with the DLIR-H algorithm improves image quality without compromising perfusion parameter accuracy, but reducing tube voltage to 70kV lowers accuracy, especially for MTT and CBF. A larger sample size is needed for further study.

PO-0132

Value of whole-lesion histogram analysis of ADC and ASL in predicting the response to chemotherapy and prognosis of PCNSL

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Objective: To predict the response to methotrexate (MTX) chemotherapy and overall survival (OS) in primary central nervous system lymphoma (PCNSL) patient by the histogram parameters based on apparent diffusion coefficient (ADC) and arterial spin labelin (ASL)

Method: Thirty-six PCNSL patients treated with combined MTX-based chemotherapy regimens were retrospectively involved in this study. The patients were divided into response group and no-response group. The differences in Histogram parameters, including maximum, minimum, mean and the 5th, 10th, 25th, 50th, 75th 90th, and 95th percentiles of ADC and CBF images were analyzed between the two groups. The univariate and multivariate logistic regressions were performed to identify the independent predictors for MTX chemosensitivity. The predictive performance was assessed by the receiver operating characteristic (ROC). The Kaplan-Meier analysis and Cox regression were used to analyse the OS.

Results: The proportion of patients with age >60 and multiple lesions in no-response group was significantly higher than response group ($p<0.05$). ADCmax, ADCmean, ADC5-50 percentiles, CBFmax, CBFmean and CBF5-95 percentiles in response group were significantly higher than non-R patients (all $p<0.05$). Number of lesions (NL), ADCmax and CBF95 were independent predictive factors of chemotherapy response (all $p<0.05$) with the area under the ROC curve (AUC) of 0.741, 0.788 and 0.856 respectively. The combine model of ADCmax+CBF95+NL showed the best predictive performance with AUC of 0.963. The patients with CBF95 <57.98 ($\chi^2=4.460$, $p=0.035$) and multiple lesions ($\chi^2=6.396$, $p=0.011$) have significantly shorter OS. Multivariate Cox regression showed multiple lesions (HR, 3.796; 95%CI, 1.024-14.073; $p=0.046$) was an independent risk factor for poor OS.

Conclusion: ADC and CBF values are promising predictive factors of chemotherapy response and outcome in PCNSL patients .

PO-0133

Increased brain iron deposition in medication-overuse headache with quantitative susceptibility mapping

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Objective: To utilize quantitative susceptibility mapping (QSM), a pilot voxel-based technique, to estimate the iron accumulation level over the whole brain and reveal the possible neuromechanism of medication-overuse headache (MOH).

Methods: Thirty-seven MOH patients and 27 normal controls were enrolled in the study, and received both a multi-echo gradient echo MR sequence and a brain high resolution structural imaging. A voxel-based analysis was performed to detect the brain regions with altered iron deposition, and the quantitative susceptibility mapping value of the positive brain regions was extracted. The correlation analysis was calculated between the susceptibility value and the clinical variables.

Results: The brain regions with increased susceptibility value were located in bilateral substantia nigra (SN) (MNI coordinate: 8, -18, -14; -6, -16, -14) compared with NC (P value < 0.001), while the altered iron deposition had no significant correlation with clinical variables (P value > 0.05). The area under curve (AUC) of left SN was 0.734 and the cut-off value was set as 0.077 with sensitivity 72.97% and specificity 70.37%. Right SN presented an AUC of 0.699 and cut-off value was 0.084 with sensitivity 72.97% and specificity 62.96%.

Conclusion: The increased iron deposition could be observed on bilateral SN in MOH, which might provide a novel insight on the dysfunction mechanism of the mesocorticolimbic dopamine system in MOH, but needed further investigated. QSM technique could be considered as a non-invasive quantitative and effective tool to detect the brain iron deposition level in migraine neuroimaging.

PO-0134

Altered static and dynamic intrinsic brain activity in unilateral sudden sensorineural hearing loss

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Introduction: Sudden sensorineural hearing loss (SSHL) is a critical otologic emergency characterized by a rapid decline of at least 30 dB across three consecutive frequencies in the pure-tone audiogram within a 72-hour period. This audiological condition has been associated with alterations in brain cortical and subcortical structures, as well as changes in brain functional activities involving multiple networks. However, the extent of cerebral intrinsic brain activity disruption in SSHL remains poorly understood. The aimed of this study is to investigate intrinsic brain activity alterations in SSHL using static and dynamic fractional amplitude of low-frequency fluctuation (fALFF) analysis. **Methods:** Resting-state functional magnetic resonance imaging (fMRI) data were acquired from a cohort of SSHL patients (unilateral, $n = 102$) and healthy controls ($n = 73$). Static and dynamic fALFF methods were employed to analyze the acquired fMRI data, enabling a comprehensive examination of intrinsic brain activity changes in SSHL. **Results:** Our analysis revealed significant differences in static fALFF patterns between SSHL patients and healthy controls. SSHL patients exhibited decreased fALFF in the left fusiform gyrus, left precentral gyrus, and right inferior frontal gyrus, alongside increased fALFF in the left inferior frontal gyrus, left superior frontal gyrus, and right middle temporal gyrus. Additionally, dynamic fALFF analysis demonstrated elevated fALFF in the right superior frontal gyrus and right middle frontal gyrus among SSHL patients. Intriguingly, we observed a positive correlation between static fALFF in the left fusiform gyrus and the duration of hearing loss, shedding light on potential temporal dynamics

associated with intrinsic brain activity changes. Discussion: The observed disruptions in intrinsic brain activity and temporal dynamics among SSHL patients provide valuable insights into the functional reorganization and potential compensatory mechanisms linked to hearing loss. These findings underscore the importance of understanding the underlying neural alterations in SSHL, which could pave the way for the development of targeted interventions and rehabilitation strategies aimed at optimizing SSHL management.

PO-0135

Multilayer network analysis reveals instability of brain dynamics in untreated first-episode schizophrenia

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Aims: Although aberrant static functional brain network activity has been reported in schizophrenia, as have effects of antipsychotic exposure on static brain network function, little is known about how the dynamics of neural function are altered in first-episode schizophrenia and are modulated by antipsychotic treatment. This study aims to investigate the dynamic reconfiguration of the brain connectome in schizophrenia patients and the effects of one year of antipsychotic treatment on neural dynamics.

Method: We recruited 122 first-episode drug-naïve schizophrenia patients and 128 healthy controls (HCs) to obtain the baseline resting-state functional magnetic resonance imaging data, and 44 patients were rescanned after one-year of antipsychotic treatment. To characterize the dynamic topological configuration of the brain connectome, we applied multilayer network analysis to calculate the network switching rates between brain states. We compared switching rates of patients and HCs at baseline, and tested for changes after one-year of treatment.

Study Results: We detected significantly increased network switching rates in schizophrenia patients compared with HCs at baseline. This effect was observed mainly in the sensorimotor (SMN) and dorsal attention networks (DAN), and in temporal and parietal regions at the nodal level. Switching rates were reduced after one-year of antipsychotic treatment at the global level and in DAN. Switching rates at baseline at the global level and in the inferior parietal lobule were correlated with the treatment-related reduction of negative symptoms.

Conclusions: These findings suggest that instability of functional network activity plays an important role in the pathophysiology of acute psychosis in early-stage schizophrenia. The normalization of network stability after antipsychotic medication suggests that this effect may represent a systems-level mechanism for their therapeutic efficacy.

PO-0136

Static and Dynamic Functional Connectome Alterations in Drug-naïve Patients with Early Parkinson's Disease

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Purpose:

This study aimed to investigate static and dynamic functional connectivity changes in early stage drug-naïve Parkinson's disease (PD) patients compared to healthy control (HC) subjects.

Methods and Materials:

A case-control study of 65 PD patients and 80 HC participants were collected. All participants were underwent rs-fMRI and a series of questionnaires such as UPDRS-III, MMSE, MOCA, HAMA and HAMD to assess the severity of disease and the status of psychiatry. Then, the mean time series of 90 cortical or subcortical regions based on anatomical automatic labeling (AAL) atlas was extracted. The static functional connectome (SFC) was constructed by Pearson's correlation. The intra- and internetwork architecture of SFC were analysed at integrity level, network level and edge level by nine well-defined functionally brain networks. The dynamic functional connectome (DFC) was defined by clustering the BOLD phase-locking patterns obtained using leading eigenvector dynamics analysis (LEiDA) and characterized from a dynamic perspective by the occupancy, lifetime, and transition profiles of DFC patterns. The score of UPDRS-III, MMSE, MOCA, HAMA and HAMD reflecting the motor and non-motor symptoms of PD were collected for further regression analysis with SFC and DFC parameters.

Results:

For SFC analysis, reduced degree of functional connectivity were mainly observed in the visual (VSN), somatomotor (SMN), limbic (LBN), and deep gray matter networks (DGN) at integrity level in PD patients. Intra-network analysis indicated decreased functional connectivity in DGN, SMN, LBN, and ventral attention networks (VAN). Inter-network analysis indicated reduced functional connectivity in nine pairs of resting-state networks. At the edge level, the LBN was the center of abnormal functional connectivity ($p < 0.05$, FDR corrected). For DFC analysis, LEiDA results showed that PD group displayed a shorter lifetime ($p < 0.05$, FDR corrected) and lower probability ($P < 0.05$, FDR corrected) than the HC group in a characteristic of DFC mainly involving the DGN and SMN. For regression analysis of SFC parameters, MOCA score was associated with the intra-network functional connectivity strength (FC) of the DGN, and inter-network FC of the DGN-VAN. HAMA and HAMD scores were associated with the FC of the SMN and DGN, and either the LBN or VAN, respectively. For regression analysis of DFC parameters, the lower probability in the PD group was found to be negatively correlated with the HAMA and MOCA in a partial correlation analysis with years of education as a covariate.

Conclusions:

This study demonstrated the variation of whole brain static and dynamic functional connectome in drug-naïve patients with early PD compared with age-matched HC main focus on SMN, DGN, LBN and VSN, which may be relevant to the motor and non-motor symptoms in early PD. Meanwhile, the results reveal the changes of convergent and divergent intranetwork and internetwork connectivity patterns of drug-naïve patients with early PD from SFC analysis. What is more, a holistic understanding of brain function can only be gleaned if the temporal dynamics of FC is included.

PO-0137

CDCA2 is a prognostic biomarker of glioma patients and correlates with immune cell infiltration in the tumor microenvironment

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Background: Cell division cycle associated 2 (CDCA2) is crucial for cell cycle and cell proliferation, which is highly expressed in gliomas. However, the underlying mechanisms of the role of CDCA2 in gliomas remain unclear. This study assessed its predictive value and molecular function in gliomas with The Cancer Genome Atlas data. **Methods:** Kruskal-Wallis, Wilcoxon signed-rank test and logistic regression were used to analyze the association between CDCA2 expression and clinicopathological characteristics. The link between CDCA2 and prognosis was investigated using Kaplan-Meier and Cox regression analyses. We created a nomogram based on multivariate data from the Cox model to estimate effect of CDCA2 on prognosis. To reveal the signaling cascades linked to CDCA2, gene set enrichment analysis (GSEA) was performed. The CDCA2 expression of gliomas in Tissue microarrays was analyzed using immunohistochemistry. Furthermore, cell proliferation assays, flow cytometric analyses, and colony forming assays were performed to validate molecular function of CDCA2. **Results:** A substantial link was observed between CDCA2 gene expression and WHO grade, 1p/19q codeletion, IDH status, histological type, age, and primary treatment results. In univariate analyses, CDCA2 expression was associated with shorter overall survival [hazard ratio: 5.48; 95% CI: 4.05–7.42; and $P < 0.001$]. According to multivariate analyses, CDCA2 expression was associated with poor overall survival [hazard ratio: 2.098; 95% CI: 1.367–3.221; and $P < 0.001$]. GSEA results showed a number of cancer-associated pathways were differentially enriched in the group with high CDCA2 expression. The nomogram demonstrated effective prediction ability in glioma patients. Experimental results verified that CDCA2 knockdown inhibited glioma cell growth, colony formation and the cell cycle G1/S phase transition. **Conclusion:** CDCA2 may be a significant predictive factor in gliomas, since it affects cancer progression and prognosis.

PO-0138

Neuroimaging Insights: Structural Changes and Classification in Ménière's Disease

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Objectives: This study aimed to comprehensively investigate the neuroanatomical alterations associated with Ménière's disease (MD) using Voxel-Based Morphometry (VBM) and Surface-Based Morphometry (SBM) techniques. The primary objective was to explore nuanced changes in gray matter volume, cortical thickness, fractal dimension, gyrification index, and sulcal depth in MD patients compared to healthy controls (HC). Additionally, we sought to develop a machine learning classification model utilizing these neuroimaging features to effectively discriminate between MD patients and HC.

Design: A total of 55 patients diagnosed with unilateral MD and 70 HC were enrolled in this study. VBM and SBM were employed to analyze neuroimaging data and identify structural differences between the two groups. The selected neuroimaging features were used to build a machine learning classification model for distinguishing MD patients from HC.

Results: Our analysis revealed significant reductions in gray matter volume in MD patients, particularly in frontal and cingulate gyri. Distinctive patterns of alterations in cortical thickness were observed in brain regions associated with emotional processing and sensory integration. Notably, the machine learning classification model achieved an impressive accuracy of 84% in distinguishing MD patients from HC. The model's precision and recall for MD and HC demonstrated robust performance, resulting in balanced F1-scores. Receiver Operating Characteristic (ROC) curve analysis further confirmed the discriminative power of the model, supported by an Area Under the Curve (AUC) value of 0.92.

Conclusions: This comprehensive investigation sheds light on the intricate neuroanatomical alterations in MD. The observed gray matter volume reductions and distinct cortical thickness patterns emphasize the disease's impact on neural structure. The high accuracy of our machine learning classification model underscores its diagnostic potential, providing a promising avenue for identifying MD patients. These findings contribute to our understanding of MD's neural underpinnings and offer insights for further research exploring the functional implications of structural changes.

PO-0139

Inter-scanner Reproducibility of Volumetric Quantitative Susceptibility Mapping about Cerebral Subcortical Gray Nuclei at 3.0T MR

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Background: Quantitative susceptibility mapping (QSM) technique was a new quantitative magnetic technique to evaluate the cerebral iron deposition in clinical practice. Therefore, it would become important for the reproducibility of the susceptibility value at different MR scanner before the wide clinical application. The current study was aimed to investigate the reproducibility of the susceptibility of the subcortical gray nuclei at two different 3.0T MR scanner.

Methods: Cerebral magnitude and phase images of 21 normal subjects were acquired from a 3D multi-echo enhanced gradient recalled echo sequence at two different 3.0T MR scanner, and then the magnetic susceptibility images were generated by STI software. The brain structural images were obtained from a 3D T1 gradient echo sequence, which was used to coregistered with magnitude images and generated the normalized parameters, and then generated the normalized susceptibility images. The subcortical gray nuclei template was applied to extract the volumetric susceptibility value of the target nuclei. The intraclass correlation (ICC) and Bland-Altman method were used to evaluate the reproducibility.

Results: ICC value (95%CI) of the caudate, putamen and GP were 0.847(0.660~0.935), 0.848(0.663~0.935) and 0.838(0.643~0.931), respectively. The ICC value of the thalamus was 0.474(0.064~0.747). Ninety-five point two percent (20/21) of the difference points of the susceptibility located between the 95% LA for the caudate at the two different 3.0T MR scanner, while the less than 95% of the difference points of the susceptibility value located between the 95% LA for the putamen, globus pallidus and thalamus.

Conclusions: The current study identified that the caudate had the stable reproducibility of the volumetric susceptibility value, and the other basal ganglion nuclei should be cautious for the quantitative evaluation of the magnetic susceptibility value at different 3.0T MR scanner.

PO-0140

The altered perfusion changes of locus coeruleus in the patients with chronic migraine: a pilot 3D-PCASL study

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Background: The locus coeruleus (LC) played important role in the integration and regulation of pain. Numerous study demonstrated that acute nociceptive pain could activate LC producing spinal cord-mediated endogenous analgesia. However, roles of LC in chronic pain were difficult to define due to temporal dynamics of neuroplasticity. The current study was aimed to investigate the alteration of morphology and perfusion of LC in chronic migraineur (CM) using MR three-dimensional pseudo-continuous arterial spin labeling (3D PCASL) imaging, aiming to explore its correlation with migraine features.

Methods: Thirteen CM patients and 15 age and sex-matched normal controls (NC) were enrolled and undertook 3D PCASL and brain structural imaging. The cerebral blood flow (CBF) images were co-registered with the brain structural images, and the volume and CBF value of LC were extracted from the raw brain structural images and co-registered CBF images using an individual LC mask, which was obtained from the LC template under transformation by the inverse deformation field generated from the segmentation of the brain structural images. The independent sample t test and receiver operating characteristic (ROC) curve was used to investigate the altered volume and perfusion of the LC in CM patients.

Results: No statistical differences were found for the total volume of bilateral LC between CM patients and NC ($P > 0.05$). Compared with NC, CM patients presented with significant lower CBF value (43.91 ± 6.21 ml/100mg.min) compared with that of the NC groups (51.27 ± 10.11 ml/100mg.min) in the right LC ($P = 0.031$). Correlation analysis found a negative correlation between the CBF value of both sides of LC with duration of the disease (years). ROC analysis identified that the area under the curve was 0.749 (95% CI 0.563-0.935) with cut-off value 49.67 ml/100mg.min with sensitivity 53% and specificity 92%.

Conclusion: Hypoperfusion was observed in both sides of LC in CM. As the disease duration (DD) increased, the LC blood flow decreased progressively. These findings support the use of LC perfusion as a potential early diagnostic imaging biomarker for CM.

PO-0141

Structural characteristics of the thalamic nuclei in drug-naïve first-episode schizophrenia

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Objectives To explore the structural characteristics of thalamic nuclei and their changes after one-year antipsychotic treatments in a large cohort of antipsychotic-naïve patients with first-episode schizophrenia (FES).

Methods At baseline, 219 patients with FES and 199 healthy controls (HCs) were enrolled in this study. Each participant underwent MRI examination via a 3.0T scanner with an 8-channel head coil (General Electric, Signa). Among the patients, 58 received one-year antipsychotic treatments. Volumes of 25 thalamic nuclei for each brain hemisphere were extracted using Freesurfer. Baseline group differences (FES vs HCs) in thalamus volumes were tested by multivariate analysis of covariance. A paired T-test was performed to identify the volume changes between the baseline and the one-year follow-up in patients. The statistical significance threshold was set at $p < 0.05$, with Bonferroni correction for multiple comparisons. We also

examined associations of nuclei volumes with Positive and Negative Syndrome Scale (PANSS) scores and Global Assessment of Functioning (GAF) scores in patients at baseline.

Results At baseline, the FES group showed smaller volumes in bilateral laterodorsal and lateral posterior nuclei, the right pulvinar anterior nuclei, and the left pulvinar inferior nuclei. Additionally, the right ventral anterior magnocellular nuclei showed larger volume compared to HCs. Furthermore, the volume of the left pulvinar inferior nuclei was negatively correlated with PANSS negative scores and positively correlated with GAF scores. After one-year treatments, a smaller volume was observed in the right lateral geniculate and limitans nuclei.

Conclusions Our findings demonstrated structural alterations of thalamic nuclei in FES at the early stage of the illness, mainly involving the lateral and pulvinar subregions. It was challenging to determine whether short-term antipsychotic treatments disadvantage thalamus substructures in schizophrenia or not.

PO-0142

Hypoperfusion of periaqueductal gray as an imaging biomarker in chronic migraine beyond diagnosis: a 3D pseudo-continuous arterial spin labeling MR imaging

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Background: The periaqueductal gray (PAG) is at the center of a powerful descending antinociceptive neuronal network, and is a key node in the descending pain regulatory system of pain. However, less is known about the altered perfusion of PAG in chronic migraine (CM).

Objective: To measure the perfusion of periaqueductal gray matter, an important structure in pain modulation, in chronic migraine with a contrast agent-free and quantitative approach.

Methods: Three-dimensional pseudo-continuous arterial spin labeling (3D-PCASL) and brain structure imaging were performed in 13 patients with chronic migraine and 15 normal subjects. The inverse deformation field generated by brain structure image segmentation was applied to the midbrain PAG template to generate individualized PAG. Then the perfusion value of the periaqueductal gray area of the midbrain was extracted based on the individual PAG mask.

Results: Perfusion of PAG in CM patients (47.98 ± 8.38 ml/100mg·min) was significantly lower than that of the control group (59.87 ± 14.24 ml/100mg·min). Receiver operating characteristic curve analysis (ROC) showed that the area under the curve was 0.77(0.60, 0.94)(95%CI), and the cut-off value for the diagnosis of CM was 54.83ml/100mg·min with a sensitivity 84.60% and a specificity 60%.

Conclusions: Imaging evidence of the impaired pain conduction pathway in CM may be related with the decreased perfusion in the PAG, which could be considered as an imaging biomarker for the evaluation of the diagnosis and therapy.

PO-0143

Reduced functional connectivity induced by longitudinal alterations of structure and perfusion may be associated with cognitive impairment in patients on maintenance hemodialysis

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Aims: Hemodialysis (HD) leads to cognitive impairment; however, the pathophysiology of maintenance HD remains unclear. This study aimed to investigate the longitudinal alterations in gray matter volume (GMV) and cerebral blood flow (CBF) in patients on follow-up HD compared with baseline HD, examine the alterations in functional connectivity (FC) by defining co-changed brain regions as seed points, and investigate the correlation between the co-changed brain regions and neuropsychological test scores.

Methods: Twenty-seven patients with HD and 30 healthy controls were enrolled in this study. All participants underwent high-resolution T1-weighted imaging, arterial spin labeling, and functional MR imaging to measure GMV, CBF, and FC. The patients on HD were assessed at baseline and 3 years subsequently.

Results: The right and left medial superior frontal gyrus (SFGmed.L) exhibited significantly lower GMV and CBF in patients on follow-up HD compared with patients on baseline HD and lower FC between the SFGmed.L and left middle temporal gyrus (MTG.L). Decreased FC between the SFGmed.L and MTG.L was positively correlated with neuropsychological test scores in the follow-up HD group.

Conclusion: Reduced GMV and CBF may result in decreased FC between the SFGmed.L and MTG.L, which may be associated with cognitive impairment in patients on maintenance HD.

PO-0144

Associations between glymphatic function and A β , tau with cognition in Alzheimer's disease

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Objectives: The glymphatic system is related to β -amyloid (A β) and tau protein clearance from the brain in Alzheimer's disease (AD). This study aimed to investigate the associations between glymphatic function levels and abnormal A β , tau deposition in CSF and plasma, and neuropsychological function across the preclinical and clinical spectrum of AD.

Methods: Participants from the Alzheimer's Disease Neuroimaging Initiative (ADNI) cohort (n = 180) and our cohort (n = 127) underwent brain diffusion tensor imaging (DTI) examination and neuropsychological evaluation. According to their clinical diagnosis, the subjects of ADNI cohort were grouped into the following groups: cognitively normal (CN, n = 35), subjective memory concern (SMC, n = 28), mild cognitive impairment (MCI, n = 82), and AD dementia (n = 35), and the subjects of our cohort were grouped into the following group: CN (n = 25), SMC (n = 51), MCI (n = 32), and AD dementia (n = 19). The glymphatic activity was calculated by diffusion tensor image analysis along the perivascular space (ALPS). CSF A β 42 and pTau levels and plasma pTau level were measured in the ADNI cohort, and plasma A β 42 and pTau levels were measured in our cohort. ANOVA test was applied to investigate group difference in CSF and plasma biomarkers. The associations between the ALPS index and AD biomarkers with cognition were analyzed.

Results: In both cohorts, the ALPS index showed significant differences among the groups, and there was a positive correlation between the MMSE score and the ALPS index in the bilateral brain. The CSF A β 42 level was significantly associated with the ALPS index in ADNI cohort. The plasma A β 42 level was significantly associated with the ALPS index in our cohort. Furthermore, there was a significant association between the plasma pTau level and ALPS index in bilateral brain for both cohorts.

Conclusion: The ALPS index reflecting glymphatic activity has potential to be an effective AD biomarker.

PO-0145

Association of inflammatory cytokines with magnetic resonance imaging features of the brain in patients with depression

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Objective: To explore the relationship between inflammatory cytokines and cerebral magnetic resonance imaging (MRI) features in patients with depression.

Methods: Sixty depressed patients and sixty healthy controls (HCs) were included. Three-dimensional T1-weighted imaging and resting-state functional MRI were collected. Inflammatory cytokines in peripheral blood were measured. Correlation analyses were used to explore the relationships between inflammatory cytokines and imaging features in depressed patients. Seed-based functional connectivity (FC) analysis was performed. A receiver operating characteristic curve was drawn to evaluate the diagnostic performance of imaging features for diagnosing depressed patients.

Results: Interleukin-1 was positively correlated with gray matter volume (GMV) in the left putamen and negatively correlated with regional homogeneity (ReHo) and degree centrality (DC) in the left anterior cingulate cortex. Interleukin-6 was positively correlated with GMV in the right superior parietal lobule and ReHo in the left pallidum and putamen. Interferon- α was negatively correlated with DC in the left postcentral gyrus. The ReHo in the left pallidum in depressed patients was lower than that in HCs. The FCs based on the left pallidum as the seed in depressed patients were significantly reduced. The imaging features of the left pallidum have good performance (area under the curve: 0.891) for distinguishing depressed patients.

Conclusion: Inflammatory cytokines are associated with cerebral imaging features in patients with depression; abnormal imaging features of the left pallidum may be a potential neuroimaging biomarker of depression.

PO-0146

Characteristics of functional asymmetry and its association with age and sex in antipsychotic-naïve first-episode schizophrenia.

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Objective

To explore characteristics of functional asymmetry and its association with age and sex in a large sample of antipsychotic-naïve first-episode schizophrenia patients (AN-FES).

Methods

Two hundred and five AN-FES and 168 healthy controls (HCs) were recruited in this study. Functional imaging data was obtained for all participants using a 3.0 T MRI scanner (GE, Signa EXCITE). After data preprocessing and construction of within-hemispheric functional networks, we used Gretna to evaluate topological characteristics of these functional networks, and then asymmetry scores for each network metric were calculated. One-way analysis of covariance was used to test between-group differences in asymmetry score of each network metric. Linear and non-linear regression analyses were used to estimate the effects of age and sex on hemispheric

network properties with statistically significant group differences, by fitting linear and quadratic models.

Results

Four brain regions, including the supramarginal gyrus (SMG), medial superior frontal gyrus (MSF), medial orbitofrontal cortex (MOF), and middle cingulum, exhibited significantly reduced asymmetry scores for both nodal efficiency and degree in AN-FES compared to HCs. Regression analysis showed that the asymmetry of nodal efficiency and degree in the MOF and MSF fit a quadratic model over aging in AN-FES. In a subsequent sex-specific analysis, we found that the asymmetry of nodal efficiency and degree in the MSF followed a quadratic model over aging only in male patients. Similarly, a quadratic trajectory of hemispheric asymmetry of nodal degree in the MOF over aging was also observed in male patients.

Conclusion

The findings demonstrated significantly asymmetric abnormalities of local information transmission in the frontal-parietal regions in schizophrenia in the absence of antipsychotics, especially among male patients.

PO-0147

Detection of microstructural abnormalities of gray matter in migraineurs without aura using Mean Apparent Propagator (MAP) MRI

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OBJECTS

The mean apparent propagator (MAP) MRI is an advanced diffusion model proposed recently for brain microstructure imaging. In this study, the MAP-MRI model was applied in diagnosis of migraineurs patient without aura.

METHODS

Totally 25 MWoAs were recruited based on the International Classification of Headache Disorders 3rd edition criteria and were scanned during an interictal period. 25 age- and gender-matched healthy controls (HCs) were enrolled. All subjects underwent Magnetization Prepared Rapid Gradient Echo (MP2RAGE) and diffusion spectrum imaging (DSI) sequences on a 3T MR scanner. The DSI parameters were as follows: TR/TE= 5200/111 ms, FOV = 220×220 mm², slice thickness = 2 mm, voxel size = 2×2×2 mm³, GAPPA = 2, slice accelerated factor= 2, Δ/δ = 55.2/32.2 ms, q-space Cartesian grid sampling scheme is used with two b=0 and 98 diffusion images with different diffusion gradient directions and bmax= 3000 s/mm². The MAP-MRI parameters included the return-to-the-origin probability (RTOP), return-to-the-plane probability (RTAP), return-to-the-axis probability (RTPP), Q-space inverse variance (QIV), mean squared displacement (MSD). Paired-sample t-test was used to compare the difference between the patients with migraine and controls. P < 0.05 was considered statistically significant.

RESULTS

We included 25 MWoA and 25 controls (27 years±10.1; range, 17-49 years; 23 female; 2 men). Figure 1 and figure 2 shows the parameter maps of one healthy subject and migraineurs without aura, respectively. The RTOP, RTAP and RTPP in the bilateral superior frontal gyrus were significantly higher in the MWoAs than HCs (P< .05). MWoAs exhibited decreased RTPP in the left amygdala, hippocampus and bilateral olfactory cortex (P< .05). We also found lower the RTOP, RTAP and RTPP in the bilateral temporal pole and left heschi gyrus in the MWoAs (P< .05). The RTOP, RTAP in the bilateral anterior cingulate and paracingulate gyri were significant higher in the MWoAs than HCs, while the MSD in the right these regions were lower than HCs (P< .05). The

RTOP in the right para-hippocampal gyrus were significant higher in the MWOAs than HCs, while the MSD in the bilateral these regions were lower than HCs ($P < .05$).

CONCLUSION

MAP-MRI can reveal microstructural changes in multiple brain regions between patients with migraine and healthy controls. These findings further suggest involvement of the gray matter in the pathology of migraine without aura.

PO-0148

Morphometric dissimilarity between cortical and subcortical areas underlies cognitive impairment in first-episode, treatment-naïve patients with major depressive disorder

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Background: Major depressive disorder (MDD) often involves morphological alterations within the cortical-limbic system. Furthermore, the incoherent aging of cortical and subcortical regions underlies emerging cognitive function impairments in patients with MDD. However, these deviations remain largely unexplored to date. **Methods:** We adopted 8 cortical morphological features and 5 subcortical morphometric features to construct cortical-subcortical morphometric similarity network (MSN) with each morphometric feature being normalized from 133 first-episode, treatment-naïve patients with MDD and 130 age-, sex-, education level- and handedness-matched healthy controls (HCs). The cortical-subcortical MSN was constructed based on the Desikan and Aseg atlas (95 nodes), with each edge in the MSN representing the Pearson correlation between the morphometric profiles from each pair of nodes. Cognitive performance was assessed across three domains: attentional control, executive function, and cognitive flexibility. We utilized the Louvain community detection approach to generate an individual-level module arrangement. Moreover, we compared the edges within and between modules in patients with depression and HCs. A mixed linear model was employed to analyze the correlations between the abnormal edges and cognitive functions as well as depressive symptoms. **Results:** Based on the MSNs, each brain was clustered into seven modules with distinct cytoarchitecture and evolutionary relevance. Compared to the HCs, patients with MDD showed higher prefrontal-subcortical module dissimilarity (FDR corrected $p < 0.05$). The prefrontal-subcortical module dissimilarity was significantly positively related to executive function (FDR corrected $p < 0.05$). **Conclusion:** These results highlight prefrontal-subcortical morphometric dissimilarity as a potential biomarker for cognitive function impairment in patients with MDD and provide insights into brain aging.

PO-0149

Genotype-specific brain structural damage in Hereditary Spastic Paraplegia subtypes

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Objective: This study aimed to identify and compare the brain gray matter (GM) and white matter (WM) damage patterns in two subtypes of HSP (SPG4 and SPG5), and to investigate how cortical gene expression contributes to brain damage patterns in different subtypes of HSP patients, and

to explore the causal relationship between patterns of GM atrophy and WM microstructural damage in SPG4 and SPG5.

Methods: Forty-two patients with HSP (21 SPG4 and 21 SPG5 patients) and 42 sex- and age-match healthy controls underwent clinical and neuroimaging evaluations. The alterations of GM and WM pattern were compared between groups by applying Source-based morphometry (SBM) approach to GM images from 3D T1-weighted MRI and fractional anisotropy (FA) maps from diffusion tensor imaging. Spearman rank correlation was used to explore the spatial associations between gene expression maps for HSP associated genes (obtained from the Allen Human Brain Atlas) and cortical GM atrophy patterns in HSP subtypes. Mediation analysis was conducted to investigate the interplay between patterns of GM atrophy and WM microstructural damage. Correlations between clinical and WM or GM damage patterns were evaluated.

Results: Compared to controls, SPG4 and SPG5 patients showed similar and extensive WM microstructural damage, but different GM atrophy patterns. Cortical GM atrophy patterns in SPG4 and SPG5 were spatial correlation with corresponding gene expression maps (Spearman's ρ $r=0.297$, $p=0.008$; $r=0.396$, $p<0.001$, respectively). Mediation analysis indicated that GM atrophy patterns in HSP patients were mediated by WM microstructural damage. The patterns of WM microstructural damage were significant correlated with disease severity in HSP patients.

Conclusions: GM atrophy patterns were distinct between SPG4 and SPG5. GM atrophy in HSP subtypes were not only secondary to WM microstructural damage but also associated with disease related gene expression levels in cortical regions.

PO-0150

Aberrant structural-functional network coupling is associated with cognitive decline in patients with non-dialysis-dependent stage 5 chronic kidney disease

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Objective: This study aimed to investigate the brain network topology and functional-structural coupling characteristics in patients with non-dialysis-dependent stage 5 chronic kidney disease and the correlation between network changes and cognitive scores.

Methods: We prospectively performed diffusion tensor and resting-state functional magnetic resonance imaging on 40 patients with non-dialysis-dependent stage 5 chronic kidney disease and 47 healthy controls. Graph theory analysis of functional and structural connectivity was performed. Small-world properties and network efficiency properties were calculated, including characteristic path length, clustering coefficient, normalized clustering coefficient, normalized characteristic path length, small-worldness, global efficiency, and local efficiency. The SC-FC coupling characteristics and the association between Montreal Cognitive Assessment scores and graph-theoretical features were analyzed.

Results: For structural connectivity, the small-worldness ($P=0.009$), clustering coefficient ($P=0.018$), global efficiency ($P<0.001$), and local efficiency ($P=0.014$) were significantly lower in patients with non-dialysis-dependent stage 5 chronic kidney disease than in healthy controls, while characteristic path length ($P<0.001$) and normalized characteristic path lengths ($P<0.001$) were significantly higher in the patients than in healthy controls. For functional connectivity, the small-worldness ($P=0.008$), normalized clustering coefficient ($P=0.009$), global efficiency ($P=0.043$), and local efficiency ($P<0.001$) were lower in patients with non-dialysis-dependent stage 5 chronic kidney disease than in healthy controls; however, the characteristic path length ($P=0.021$) was higher in the patients than in healthy controls. Structural connectivity–functional connectivity coupling ($P<0.001$) was greater in patients with non-dialysis-dependent stage 5 chronic kidney disease than in healthy controls. The structural (clustering coefficient, local efficiency, global efficiency) and functional network parameters (small-worldness, normalized clustering coefficient, global efficiency)

of the patients with non-dialysis-dependent stage 5 chronic kidney disease were positively correlated with Montreal Cognitive Assessment scores; however, the characteristic path length of both structural and functional networks was negatively correlated with Montreal Cognitive Assessment scores.

Conclusions: All patients with non-dialysis-dependent stage 5 chronic kidney disease included in the study exhibited changes in their structural and functional brain network topology closely related to mild cognitive impairment. Structural connectivity–functional connectivity coupling was elevated in the patients compared with that in the controls. This may provide vital information for understanding and revealing the underlying mechanisms of cognitive impairment in patients with non-dialysis-dependent stage 5 chronic kidney disease.

PO-0151

Preliminary exploration of lumbosacral plexus DTI and further analysis of clinical characterization in anti-neurofascin 155 antibody-positive patients - a case series

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Purpose : This study aimed to enhance the understanding of characteristics of the anti-neurofascin 155 antibody-positive neuropathy. The goal were also to be the first to investigate whether lumbosacral plexus nerve Diffusion Tensor Imaging (DTI) can reflect the pathological changes of this nodopathy disease and to potentially differentiate anti-NF155 seropositive patients from Chronic Inflammatory Demyelinating Polyneuropathy (CIDP) patients. **Methods:** Data was retrospectively collected from 6 anti-NF155 seropositive patients and 14 CIDP patients who were hospitalised at our institution between January 2017 and December 2021. All patients underwent lumbosacral plexus DTI examinations to obtain Apparent Diffusion Coefficient (ADC) and Fractional Anisotropy (FA) values of the bilateral nerve roots (L3-S1). Differences were then analysed between the two groups. Detailed profiles were also collected for all 6 anti-NF155 seropositive patients. **Results**

DTI analysis revealed that CIDP patients had higher FA values (0.26 ± 0.046) and lower ADC values (1.59 ± 0.260), while anti-NF155 seropositive patients had lower lumbosacral plexus FA values (0.18 ± 0.020) and higher ADC values (2.02 ± 0.270). There were statistically significant variations in both FA ($p=0.001$) and ADC ($p<0.001$). Both the average protein concentration in cerebrospinal fluid (3661.83 ± 1333.675) mg/L and the average cross-sectional area of the bilateral lumbosacral plexus nerves (75.42 ± 20.673) mm² were significantly greater than average in anti-NF155 seropositive patients. **Conclusion:** Patients positive for anti-NF155 antibodies can be differentiated from those with CIDP using DTI. This distinction is marked by noticeably lower FA values and higher ADC values, which likely signify major pathophysiological differences between the two disorders. Patients with NF155 antibodies display distinct clinical and imaging characteristics that aid in the early identification of the disease.

PO-0152

Dynamic Individual-specific Functional Connectivity Changes in Disorder of Consciousness Patients

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Previous studies have identified abnormalities in large scale functional brain networks in disorder of consciousness (DoC), yet most of them were based on static functional connectivity. Until now, most studies of DoC have relied on applying group-level atlases when assessing individual-level functional data, may dilute important brain-behavior associations. We suggested that a dependence of brain dynamics on the state of consciousness based on individual functional network, which may serve as biomarkers of disease. Twenty-six DoC patients (thirteen minimally conscious state (MCS) and thirteen vegetable state (VS)) and 26 age and gender matched healthy controls were included in this study. An individual template was obtained using iterative parcellation approach and estimated using support vector regression. Then, resting-state functional MRI and a sliding-window approach, k-means clustering algorithm, graph theory analysis were used to study the dynamic functional connectivity. Finally, we used also support vector machines to analyze the efficiency of dFNC states in classifying MCS and VS patients. Here we reported the robust performance of individual network template to predict the CRS-R scores. Dynamic analysis suggested two distinct connectivity states across the entire group while DoC spent much more time in the state of more randomly organized interictal and inefficient network. There were significant differences in the temporal dynamic properties between the MCS, VS patients and the HCs. The number of transitions is positively correlated with the CRS-R scores of all DoC patients ($r=0.508$, $p=0.008$). There were also significant differences in graph properties between the three groups. DoC showed an large-scale disconnection pattern of DMN-centered. The difference between MCS and VS existed in diminished crossmodal connectivity rather than disorder of a single network, providing evidence for a global disconnection hypothesis. Our result stresses the necessity of examining global, top-down and cross-modal disconnection representing arousal, not only those associated with awareness.

PO-0153

Prognostic value of perivascular space and small-vessel disease neuroimaging measures in idiopathic normal pressure hydrocephalus

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Background Enlarged perivascular spaces (EPVS) and small-vessel disease (SVD) are overrepresented among patients with idiopathic normal pressure hydrocephalus (iNPH), but their neuroimaging markers in prognostic implications remains unclear. To explore the value of EPVS and SVD neuroimaging markers in predicting the postoperative prognosis for iNPH.

Methods This retrospective study included consecutive 66 patients with iNPH who underwent shunting surgery. Preoperative neuroimaging markers were evaluated with the EPVS count markers, white matter hyperintensities (WMH), total SVD score, modified total SVD score (mSVD), and Brain Atrophy and Lesion Index (BALI). We determined the predictive value of these neuroimaging markers at follow-up 1 and 2 years postoperatively using Mann-Whitney U test, receiver operating characteristic (ROC), and binary logistic regression models.

Results There were no significant differences in preoperative EPVS count markers, WMH volume, or total SVD score between the improved and non-improved groups at follow-up 1 and 2 years postoperatively. However, at 2 years of follow-up, the improvement and non-improvement groups differed significantly in BALI and mSVD in primary and secondary outcomes; the AUC values for ROC curves were 0.708 (95%CI: 0.546–0.840 $P=0.009$) for mSVD, 0.807 (95%CI: 0.654–0.913 $P<0.001$) for BALI scales; for mSVD score and BALI scales, the odds ratios after adjustments were both significant ($P=0.008$ and $P=0.045$, respectively).

Conclusions Proposed EPVS count markers have limited ability in predicting the prognosis of patients with iNPH after shunting. The prognostic role of BALI and mSVD in iNPH could be considered as biomarkers of long-term prognosis in patients of iNPH at follow-up 2 years postoperatively.

PO-0154

Mesenchymal stem cells with p38 mitogen-activated protein kinase interference ameliorate mouse ischemic stroke

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Abstract

Objective: Mesenchymal stem cells (MSCs) have been widely used in the treatment of ischemic stroke. However, factors such as high glucose, oxidative stress, and aging can lead to the reduced function of donor MSCs. The p38 mitogen-activated protein kinase (MAPK) signaling pathway is associated with various functions, such as cell proliferation, apoptosis, senescence, differentiation, and paracrine secretion. This study examined the hypothesis that the downregulation of p38 MAPK expression in MSCs improves the prognosis of mice with ischemic stroke.

Methods: Lentiviral vector-mediated short hairpin RNA (shRNA) was constructed to downregulate the expression level of p38 MAPK in mouse bone marrow-derived MSCs. The growth cycle, apoptosis and senescence of MSCs after infection were examined. A mouse model of ischemic stroke was constructed. After MSC transplantation, the recovery of neurological function in the mice was evaluated.

Results: Lentivirus-mediated shRNA significantly downregulated the mRNA and protein expression levels of p38 MAPK. The senescence of MSCs in the p38 MAPK downregulation group was significantly reduced, but the growth cycle and apoptosis did not significantly change. Compared with the control group, the infarct volume was reduced, and the neurological function and the axonal remodeling were improved in mice with ischemic stroke after transplantation of MSCs with downregulated p38 MAPK. Immunohistochemistry confirmed that in the p38 MAPK downregulation group, apoptotic cells were reduced, and the number of neuronal precursors and the formation of white matter myelin were increased.

Conclusions: Downregulation of p38 MAPK expression in MSCs improves the therapeutic effect in mice with ischemic stroke, an effect that may be related to a reduction in MSC senescence. This method is expected to improve the efficacy of MSCs in patients, especially in patients with underlying diseases such as diabetes, thus providing a basis for clinical individualized treatment for cerebral infarction.

PO-0155

Brain network hierarchy reorganization and neurotransmitter associations in deficit and non-deficit schizophrenia

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Background: Schizophrenia is a neurodevelopmental disorder with heterogenous, and deficit schizophrenia (DS) is a clinical subgroup with primary and enduring negative symptoms and impaired social function and emotional processing. Identifying potential biological difference of DS from non-deficit schizophrenia (NDS) may be a pressing need for treatment targets and mechanisms. Here, we investigated the brain functional hierarchy alteration by gradient-based approach in patients with DS and NDS respectively and their underlying molecular architecture.

Methods: 44 DS and 55 NDS patients, as well as 60 matched healthy control (HC) were included in this study. Gradient metrics were calculated using BrainSpace toolbox. Correlational analyses were subsequently conducted between gradient measures and symptom severity. Then we analyzed the spatial correlation between DS/NDS gradient distribution and density maps of 10 neurotransmitter derived by JuSpace toolbox to link the neuroimaging to underlying neurotransmitter information.

Results: Both DS and NDS patients exhibited compressed gradient patterns comparing to HC, with more severe disorganization in DS patients, suggesting reduced network differentiation. Correlational analyses further revealed contributed network of ventral attention network (VAN) was associated with depression symptom in DS patients, whereas the visual network (VIS) was related to total, general and paranoid scores in NDS patients. Moreover, spatial correlation of neurotransmitter analysis revealed that the gradient distribution of DS was primarily related with serotonergic system while those of NDS patients were predominantly associated with the dopamine system.

Conclusion: The current study offers converging evidence supporting the divergent of cortical hierarchy disorganization patterns in patients with DS and NDS, and further spatially relating possibly to the neurochemical metabolic differences. These findings are consistent with the hypothesis that DS is a separate subtype differ from NDS from neurodevelopmental perspective.

PO-0156

Increased functional synchronization between gray and white matter in posttraumatic stress disorder

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Background: Posttraumatic-stress disorder (PTSD) has been hypothesized to be a brain disorder involving alteration in white matter (WM) fiber tracts, leading to insufficient communication between WM and cortex. While previous studies have mainly examined the structural properties of WM in PTSD patients using magnetic resonance imaging (MRI) or diffusion tensor imaging, functional synchronization between gray matter (GM) and WM remained seldom investigated.

Methods: A total of 58 medication-naïve PTSD patients and 68 trauma-exposed controls without PTSD underwent resting-state functional MRI (rs-fMRI) and high-resolution T1-weighted imaging. The functional connectivity (FC) in 82 Brodmann areas within GM and 48 WM bundles, as well as between GM and WM were compared between these two groups. The correlations between

function in WM tracts with that in GM regions reflected the GM-WM functional synchrony. Furthermore, the associations between the identified abnormalities and symptom severity were also explored in PTSD group.

Results: Significantly increased GM-WM functional correlations were observed in PTSD group, primarily involving FC between the left posterior corona radiata, left thalamic radiation, left sagittal stratum, with several GM regions in the frontal and temporal lobes. Additionally, increased functional synchrony was observed between the right tapetum and temporal cortex, as well as between the right retrolenticular part of the internal capsule and temporal cortex, when compared with controls ($p < 0.05$, FDR corrected).

Conclusions: The increase in GM-WM functional synchrony in PTSD patients provides novel evidence of hyper-connectivity within the brain's system in this disorder. Specifically, the findings suggested greater involvement of the white matter (WM) in the left hemisphere in PTSD.

PO-0157

Multi-parametric radiomics of conventional T1 weighted and susceptibility-weighted imaging for differential diagnosis of idiopathic Parkinson's disease and multiple system atrophy

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Objectives

This study aims to investigate the potential of radiomics with multiple parameters from conventional T1 weighted imaging (T1WI) and susceptibility weighted imaging (SWI) in distinguishing between idiopathic Parkinson's disease (IPD) and multiple system atrophy (MSA).

Methods

A total of 201 participants, including 57 patients with IPD, 74 with MSA, and 70 healthy control (HCs) individuals, underwent T1WI and SWI scans. From the 12 subcortical nuclei (e.g. red nucleus, substantia nigra, subthalamic nucleus, putamen, globus pallidus, and caudate nucleus), 2640 radiomic features were extracted from both scan types. Three classification models—logistic regression (LR), support vector machine (SVM), and light gradient boosting machine (LGBM)—were used to distinguish between MSA and IPD, and among MSA, IPD, and HC groups based on T1WI features, SWI features, and a combination of both. Five-fold cross-validation was used to evaluate the performance of the models with metrics such as sensitivity, specificity, accuracy, and area under the receiver operating curve (AUC). During each fold, the ANOVA and least absolute shrinkage and selection operator (LASSO) methods were used to identify the most relevant subset of features for the model training process.

Results

The LGBM model trained by the features combination of T1WI and SWI exhibited the most outstanding differential performance in both the three-class classification task and the binary classification task, with an accuracy of 0.814 and 0.854, and an AUC of 0.904 and 0.881. The texture-based differences (GLCM) of the SN and the shape-based differences of the GP were highly effective in discriminating between the three classes and two classes, respectively.

Conclusions

Radiomic features combining T1WI and SWI can achieve a satisfactory differential diagnosis for PD, MSA, and HC groups, as well as for PD and MSA groups, thus providing a useful tool for clinical decision-making based on routine MRI sequences.

PO-0158

Mismatched signs in Glioma Grading by Contrast-Enhanced MRI and 3D-ASL Perfusion Imaging

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Purpose

To evaluate the performance of three-dimensional arterial spin labeling (3D-ASL) perfusion and contrast-enhanced MRI (CE-MRI) in glioma grading and attempt to explain the mismatched signs in 3D-ASL and CE-MRI.

Method

Forty-two cases, who had undergone 3D-ASL and CE-MRI pre-operations between 2015 and 2017, with pathologically confirmed glioma were enrolled. Sensitivity, specificity, positive and negative predictive value and diagnostic accuracy of 3D-ASL and CE-MRI were calculated respectively in grading gliomas. The mismatched cases between ASL and CE-MRI or imaging and pathology were analyzed further.

Results

The sensitivity, specificity, positive and negative predictive value and accuracy of 3D-ASL were similar to CE-MRI in differentiating low-grade from high-grade gliomas (0.89, 0.71, 0.86, 0.77, 0.79 for 3D-ASL; 0.82, 0.71, 0.85, 0.67, 0.81 for CE-MRI, respectively). Sensitivity, specificity, positive and negative predictive value and accuracy of combination of CE-MRI and 3D-ASL (0.95, 0.81, 0.91, 0.90, 0.83, respectively) were better than those of any single modality in distinguishing low-grade from high-grade gliomas, however there were no significant differences ($P>0.05$). There were 14 mismatched cases (about 1/3) including mismatched presentation between two imaging methods (11 cases) and mismatches between imaging and pathological grading (3 cases). The causes of mismatches between 3D-ASL, CE-MRI and pathology might be the different imaging mechanisms, degree of angiogenesis, dynamic development of glioma and the technique drawbacks of ASL.

Conclusions

Using a combination of ASL and CE-MRI could enhance the confidence of radiologists in glioma grading, however, they should be cautious and provide reasonable explanations for the mismatched signs between multimodality imaging.

PO-0159

Functional Alterations Associated with Tremor Help Identify Parkinson's Disease and Multiple System Atrophy: A Resting-State fMRI Study

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Objective: This study aims to investigate functional connectome alterations in patients with tremor due to Multiple System Atrophy (MSA) and Parkinson's Disease (PD), and to develop a differential diagnosis model based on these alterations for the classification of MSA and PD.

Methods: Resting-state fMRI data were collected from 55 MSA patients, 62 PD patients, both with tremors and 52 healthy controls (HCs). Percent amplitude of fluctuation (PerAF), seed-based functional connectivity (FC), and effective connectivity (EC) analyses were used to examine functional abnormalities in the brain. Support Vector Machine (SVM) was employed to construct the differential diagnosis model based on the identified functional alterations. Additionally, Spearman correlation analysis was performed to explore the relationship between functional abnormalities and tremors.

Results: Both MSA and PD patients with tremors showed similar activity changes in the bilateral Orbital part of the superior frontal[1] gyrus (ORBsup), CerebelumVIII (CRBL8), right rectus (REC), left CerebelumIV-V (CRBL45.L), and FC based on the seeds of PUT.L, CRBL8.R, and REC.R. These changes were more pronounced in MSA patients. However, MSA patients exhibited increased putamen activity and effective connectivity from the caudate (CAU) to the putamen, whereas PD patients showed decreased activity and effective connectivity in these regions. The SVM classification model demonstrated good performance, with the putamen being the most influential factor for classification. Furthermore, the functional alterations were correlated with tremors in both diseases.

Conclusion: The CTC circuits and BGN are involved in tremor disorders among MSA and PD patients. The activation of the putamen, involvement of the caudate, and pronounced changes in the CTC circuits in MSA patients may serve as important neurobiological markers, offering potential implications for prognosis and precise classification of MSA and PD patients.

PO-0160

Assessment of Glx and GABA levels in the Global Developmental Disability Children: A MRS Study

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This study aims to explore the correlation between brain neuro metabolites and clinical symptom scales in GDD and GDD+ASD. 11 children with GDD and 12 GDD +ASD children took MR scans, and completed the GABA and Glx spectroscopic acquisition. Results indicated that there is a significant difference in DQ language levels between GDD and GDD+ASD, and the GABA/Cr levels were significantly decreased in GDD+ASD compared with GDD. A positive correlation was observed between Glx/Cr and ADOS stereotype among all participants, and a clear link was observed between Glx/Cr and the sensory symptoms of ASD at both behavioral and perceptual levels.

PO-0161

Structural and functional alterations of motor-thalamus in different motor subtype of Parkinson's disease: An individual study

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Objective

This study aimed to investigate the structural and functional alterations occurring within bilateral premotor thalamus (mPMtha) in motor subtypes of Parkinson's disease (PD).

Methods

Sixty-one individuals with instability and gait difficulty (PIGD) subtype, sixty individuals with tremor-dominant (TD) subtype and sixty-six healthy controls (HCs) participated in the study. All participants underwent resting-state functional magnetic resonance imaging (rs-fMRI) and 3D T1-weighted (3DT1) scans. Functional connectivity (FC) analysis and Voxel-based morphometry (VBM) analysis were performed to evaluate the function and volume of mPMtha. Additionally, correlations between motor performance and FC values, volumes were examined separately. Support vector machine

(SVM) model based on FC values and thalamic volumes was conducted to assist in the clinical diagnosis of PD motor subtype.

Results

Compared with HCs and PIGD, TD subtype showed increased FC between the bilateral mPMth and left middle occipital gyrus (MOG), left inferior parietal lobule (IPL). While PIGD subtype demonstrated decreased FC between right mPMth and precentral gyrus (PreCG), supramarginal, IPL and superior parietal lobule (SPL). FC of bilateral mPMth with the identified regions were significantly correlated with motor performance scores in PD patients. The SVM classification based on FC values demonstrated a high level of efficiency (AUC=0.874). The volumes of the bilateral mPMth were indifferent among three groups.

Conclusion

We noted distinct FC alterations of mPMth in TD and PIGD subtypes, and these changes were correlated with motor performance. Furthermore, the machine learning based on statistically significant FC might be served as an alternative approach for automatically classifying PD motor subtypes individually.

PO-0162

Molecular Mechanisms Underlying Human Spatial Cognitive Ability Revealed with Neurotransmitter and Transcriptomic Mapping

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Spatial cognitive ability is closely associated with perception, spatial processing, and general intelligence. Mental rotation is an intrinsic dynamic and one of the most core spatial cognitive abilities. Although the brain underpinnings of mental rotation have been reported, the cellular and molecular mechanisms remain unexplored. Here, we used magnetic resonance imaging (MRI), a whole-brain spatial distribution atlas of 19 neurotransmitter receptors, transcriptomic data from Allen Human Brain Atlas, and mental rotation performances of 356 healthy individuals to identify the genetic/molecular foundation of mental rotation. We found significant associations of mental rotation performance with gray matter volume (GMV) and fractional amplitude of low-frequency fluctuations (fALFF) in primary visual cortex, fusiform gyrus, primary sensory-motor cortex, and default mode network. GMV and fALFF in these brain areas also exhibited significant sex differences. Importantly, we conducted analyses to correlate the spatial patterns of GMV or fALFF with mental rotation and the spatial distribution patterns of neurotransmitter receptors and transcriptomic data, identifying the related genes and neurotransmitter receptors associated with mental rotation. These identified genes are localized on the X chromosome and are mainly involved in trans-synaptic signaling, transmembrane transport, and hormone response. Our findings provide initial evidence for the neural and molecular mechanisms underlying spatial cognitive ability.

PO-0163

Functional Network Modularity Differences between Drug-Responsive and Drug-Nonresponsive Schizophrenia Patients

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Purpose: To explore the differences in baseline functional network module levels between drug-responsive and non-responsive schizophrenia patients (SZs) using functional magnetic resonance imaging (fMRI) combined with graph theory analysis.

Methods: Thirty-six first-episode schizophrenia patients and 36 matched healthy controls (HCs) were recruited. According to the drug treatment response after two weeks, the SZs were divided into non-responders and responders. The Positive and Negative Syndrome Scale (PANSS) was used to assess the severity of schizophrenia symptoms. The resting-state fMRI data of SZs and HCs were collected. The cerebral cortex was divided into seven modules based on the Yeo functional network. Graph theory analysis was used to calculate the modular topological properties of each functional network, and group comparisons were performed using one-way analysis of variance (ANOVA).

Results: Significant differences were found in the default module (DMN), somatomotor module (SMN), visual module (VIS), and subcortical module (SUB) between the HCs, drug-responsive SZs, and drug-nonresponsive SZs. The VIS, SMN and SUB had significantly lower intra-modular connectivity in the responder SZs compared to the non-responder group. The SUB-VIS inter-modular connectivity was significantly higher in the responder group, while the SUB-LIM, SUB-DMN, SUB-SMN, and SMN-DMN intermodular connectivities were significantly lower compared to the non-responder SZs. The SUB and SMN were significantly lower in the HCs compared to both the responder and non-responder SZs. The SMN-DMN and SUB-SMN inter-modular connectivities were significantly lower in the HCs compared to the non-responder SZs.

Conclusion: The topological properties of functional network modules at baseline may serve as imaging biomarkers for early prediction of treatment response in schizophrenia patients treated with antipsychotics.

PO-0164

Investigating the shared genetic architecture between chronic pain and cognition

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Abstract:

Background: It has been widely found that there is a correlation between chronic pain and functional changes. However, the underlying mechanisms are still unclear. The purpose of this study is to investigate whether there is an influence of genetic pleiotropy or an inherent causal relationship between them.

Method: We utilized GWAS data to investigate the genetic architecture of two traits: chronic multi-site pain and eight cognitive functional traits, including intelligence, memory, and reaction time etc. LDSC was employed to assess the genetic correlations between each pair of traits. SNP and gene analyses were carried out to examine pleiotropic genetic loci associated with the traits. Additionally, TWAS analysis was performed to investigate expression of the genes and the LCV model was employed to explore the potential causal relationship between the traits. Furthermore, enrichment

analysis was conducted to examine the tissue and cellular basis for the co-occurrence of these two conditions.

Results:We discovered a significant negative genetic correlation between chronic pain and most cognitive functions, particularly intelligence ($rg = -0.11$, $P = 7.77E-64$). Cross-phenotype analysis identified 150 pleiotropic loci, including 83 newly discovered ones and 20 loci with pleiotropic effects at the same genomic position as identified by COLOC. The LCV analysis indicated no causal relationship between chronic pain and cognitive functions. Combining the genetic analysis information, we found that the pleiotropic genes of multiple traits were enriched in brain tissues, predominantly in the prefrontal cortex.

Conclusions:Our findings enhance the understanding of the complex interplay between cognitive function and chronic pain from a genetic perspective, highlighting the importance of considering these genetic loci in future research and clinical decision-making. Furthermore, it emphasizes the significance of addressing chronic pain management approaches in managing cognitive decline.

PO-0165

Higher Baseline Subcortical Net Water Uptake in Computed Tomography Predicts Malignant Middle Cerebral Artery Infarction in Patients with Acute Ischemic Stroke

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Objective: Net water uptake (NWU) based on the Alberta Stroke Program Early Computed Tomography Score (ASPECTS) was recognized as a reliable indicator of brain edema. The objective of this study was to assess the predictive performance of ASPECTS-NWUs from different ASPECT regions in relation to the development of malignant middle cerebral artery (MCA) infarction.

Methods: Patients with acute ischemic stroke (AIS) of the MCA territory were retrospectively enrolled between January 2019 and July 2022. Patients were divided into two groups according to the follow-up CT after 24 to 48 hours: malignant and non-malignant infarction. NWUs were measured on diverse ASPECT regions on admission non-contrast CT, namely affected-ASPECTS-NWU (af-ASPECTS-NWU), subcortical-ASPECTS-NWU (sc-ASPECTS-NWU) and cortical-ASPECTS-NWU (c-ASPECTS-NWU). Baseline characteristics were collected for univariate analyses and multivariate regression analyses to explore the independent risk factors for malignant infarction. Receiver operating characteristic (ROC) curves were plotted and compared.

Results: 153 patients were included in the final analysis. Malignant MCA infarction was achieved in 42 (27.45%) patients and non-malignant was 111 (72.55%). Compared with the non-malignant group, higher baseline NIHSS score, af-ASPECTS-NWU, c-ASPECTS-NWU, sc-ASPECTS-NWU, and lower ASPECTS were noted in malignant infarction group (all $P < 0.001$). Multivariate logistic regression showed that only baseline sc-ASPECTS-NWU ($>3.6\%$) was a positive factor for malignant MCA infarction. The ROC analysis indicated the highest predictive value of sc-ASPECTS-NWU for indicating malignant infarction with the AUC 0.906.

Conclusion: Higher baseline sc-ASPECTS-NWU was a quantitative predictor for malignant MCA infarction in patients with AIS, which could be helpful for treatment decision.

PO-0166

Exploring cognitive loop decoupling in Nondialysis Patients with CKD based on multimodal MRI cross-modal coupling

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Objective: The aim of this study was to explore differences in neurovascular coupling in undialyzed chronic kidney disease (CKD) patients based on resting-state functional magnetic resonance imaging, three-dimensional pseudo-continuous arterial spin labeling, and quantitative magnetization rate mapping.

Methods: We prospectively performed resting-state functional magnetic resonance imaging, 3D pseudo-continuous arterial spin labeling and quantitative magnetization rate mapping in 43 patients with stage 1–4 CKD (CKD 1–4) and 69 nondialysis patients with stage 5 CKD (CKD 5ND) and 44 healthy controls (HCs) recruited. Voxel-based overall and regional Bold signal analysis [(amplitude of low-frequency fluctuation, ALFF), (regional homogeneity, ReHo)], cerebral blood flow (CBF) analysis, susceptibility value, and neurovascular coupling (CBF-ALFF, CBF-ReHo, susceptibility value - ALFF, and susceptibility value- ReHo) were analyzed. In addition, correlations between neuroimaging indices and Montreal Cognitive Assessment scores and clinical laboratory findings were analyzed.

Results: ALFF and ReHo in CKD5 ND and CKD1-4 patients were mainly dominated by a decrease in the default mode network region compared to HC; CBF in the right chiasmatic nucleus was increased and CBF in the middle temporal gyrus was decreased in CKD5 ND and CKD1-4 patients compared to HC; CBF in the left hippocampus and the left supraoccipital gyrus were elevated in CKD5 ND patients compared to those with the CKD1-4 group; sensitivity values were higher in the bilateral caudate nucleus, bilateral thalamus, and bilateral shell nuclei and lower in the bilateral hippocampus in both the CKD5 ND and CKD1-4 groups ($P < 0.05$, cluster-level FDR-corrected). At the whole-brain level, both the CKD1-4 and CKD5 ND groups demonstrated lower CBF-ALFF coupling coefficients, CBF-ReHo coupling coefficients and sensitivity compared with the HC -ALFF coupling coefficient. At the roi level, CKD5 ND patients showed lower CBF-ALFF coupling coefficients and CBF-ReHo coupling coefficients in the hippocampus and basal ganglia regions. In addition the above neuroimaging indices were significantly correlated with clinical presentation and Montreal cognitive score.

Conclusion: Neurovascular coupling is abnormal in non-dialyzed patients with chronic kidney disease, and these changes are associated with cognitive impairment in which susceptibility value - ALFF may serve as a biomarker for the early assessment of cognitive impairment in patients with chronic kidney disease, which may help to better understand the pathogenesis of cognitive impairment in chronic kidney disease.

PO-0167

Discriminating white matter degeneration patterns of cognitive impairment in Parkinson's disease and multiple system atrophy

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Objectives: The white matter (WM) degenerations have significant impact on cognitive performance. Whether their functioning is affected in a similar or distinct way by Parkinson's disease (PD) and multiple system atrophy (MSA) is not clear.

Methods: A total of 116 participants (37 patients with PD with mild cognitive impairment (PD-MCI), 37 patients with mild cognitive impairment (MSA-MCI), and 42 healthy controls (HC)) were enrolled and underwent diffusion tensor imaging and a battery of cognitive assessment. Three types of WM fibers, including association fibers, projection fibers, and thalamic fibers, were reconstructed using probabilistic fiber tracking method. Regression analyses were conducted between microstructural diffusion metrics and multiple cognitive domains. Support vector machine and Shapley Addictive exPlanations (SHAP) analyses identified the WM predictors of MCI.

Results: PD-MCI and MSA-MCI patients exhibited similar white matter disconnection pattern involving the thalamic radiations (anterior and superior thalamic radiation) and association fibers (forceps minor, uncinate fasciculus) compared to HC, though the WM deterioration was more severe in MSA-MCI group. Moreover, MSA-MCI patients manifested distinct WM impairment ranging to projection fibers (middle cerebellar peduncle, corticospinal tract), and cingulum bundle. Furthermore, the FA and MD value of the right anterior thalamic radiation showed significant correlation with global efficiency (FA: $B=0.69$, $P<0.001$, $VIF=1.31$; MD: $B=-0.53$, $P=0.02$, $VIF=2.50$). Diffusion metrics of impaired WM were significantly associated with cognitive subdomains. The MCI was predicted by WM signatures between PD-MCI and MSA-MCI (accuracy = 0.73; $P<0.01$). The most valuable predictor was the MD value of anterior thalamic radiation.

Conclusions: The MSA-MCI patients showed similar, yet more severe, as well as distinct WM deterioration pattern compared to the PD-MCI group, with affection of frontal-thalamic, cerebral-cerebellar, and frontal-limbic communications and to be associated with the cognitive domains. Our results may extend our knowledge of the neurobiological basis of cognitive impairment in Parkinsonian disorders.

PO-0168

MRI morphological differences comparing diffuse midline glioma - H3K27 mutation and near midline low grade glioma

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Background: In 2016, WHO identified a new molecular subtype, diffuse midline glioma with H3K27m mutation, which corresponds to grade IV. This study sought to examine the differences between diffuse midline gliomas and low-grade gliomas in MR imaging.

METHODS: Retrospective analysis of MRI images from 20 patients with midline low-grade line gliomas and 39 individuals with diffuse midline glioma-H3K27 mutation. The size, number and imaging characteristics of the tumors, including peritumoral edema, DWI and enhancement, lesion cystic necrosis, intratumoral hemorrhage, and T2WI mismatch sign were observed. T-test and chi-square test were used to describe the differences between them.

RESULTS: An independent sample t-test revealed that patients with DMG had younger mean ages than those with LGG ($P < 0.001$). The chi-square test revealed ($P < 0.001$) that the tumor size of DMG was much less than that of LGG. DWI and DMG enhancement were both significantly higher ($P < 0.001$). Additionally, Peritumoral edema showed statistical significance for DMG and LGG ($P < 0.05$).

CONCLUSION: Compared to low-grade gliomas in the midline region, diffuse midline gliomas with H3K27 mutation have specific MRI presentation and clinical features that can aid in identification and differential diagnosis.

PO-0169

MRI-based radiomics models for prediction of telomerase reverse transcriptase promoter mutation status in IDH-wildtype histological lower-grade astrocytoma

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Objective

Telomerase reverse transcriptase promoter (pTERT) status is crucial for prognosis prediction and individual management in patients with IDH wildtype (IDH-wt) histological lower-grade astrocytoma (LGA). The purpose of this study was to construct MRI-based radiomic models for prediction of pTERT status in IDH-wt LGA.

Methods

This retrospective study included 86 adult IDH-wt LGA patients with known TERT promoter mutation status (23 mutants, 63 wildtypes). Multiparameter MRI including T1WI, T1CE, T2WI, and FLAIR was performed on all patients. One hundred seven first-order, shape, and texture features were extracted from each sequence. Radiomics signatures models based on MRI were established with promising diagnostic performances. The prediction performance of different models was assessed by receiver operating characteristic curve analysis.

Results

In the test dataset, the accuracy of single sequence and multiparameter models were 0.731 (T1WI), 0.808 (T1CE), 0.731 (T2WI), 0.769 (FLAIR), and 0.923 (multiparameter model), respectively. Among all radiomics models, the multiparameter MRI-based model had the best predictive ability, with the area under the curve of 0.942 (0.918-0.967) in the training group and 0.925 (0.812-1.000) in the test group.

Conclusion

MRI-based radiomics signatures could be useful for predicting pTERT mutation status in IDH-wt LGA. A combination of multimodal MRI may improve the diagnostic performance.

PO-0170

MRI-based Radiomics Signatures for Predicting Ki-67, CD105, and VEGF Expression of IDH-mutant Astrocytoma

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Background: Immunohistochemical biomarkers are important for the clinical diagnosis and prognosis predicting of gliomas. The aim of this study was to evaluate the usefulness of radiomics models extracted from conventional MRI for predicting Ki-67, CD105 and VEGF expression status of IDH-mutant astrocytoma.

Methods: 83 pathologically confirmed IDH-mutant astrocytoma patients with known Ki-67, CD105 and VEGF status were retrospective reviewed. A total of 428 radiomics features was extracted from multiparameter MRI. Then, dimensionality reduction methods and classifiers were used to develop radiomic models for predicting the biomarkers of IDH-mutant astrocytoma. The diagnostic performance of radiomic models was evaluated using receiver operating characteristic curve (ROC) with area under the curve (AUC).

Results: For the radiomics model of Ki-67, AUC, accuracy, sensitivities, and specificities were 0.913, 0.897, 0.867, and 0.907 for training group, and 0.833, 0.880, 0.833, and 0.895 for test group, respectively. For the radiomics model of CD105, AUC, accuracy, sensitivities, and specificities were 0.870, 0.800, 0.900, and 0.745 for training group, and 0.820, 0.833, 0.875, and 0.813 for test group, respectively. For the radiomics model of VEGF, AUC, accuracy, sensitivities, and specificities were 0.916, 0.845, 0.840, and 0.849 for training group, and 0.721, 0.720, 0.818, and 0.643 for test group, respectively.

Conclusions: The radiomics features extracted from multiparameter MRI can predict Ki-67, CD105, and VEGF status. The radiomics models may serve as non-invasive methods for predicting Ki-67, CD105, and VEGF expression in IDH-mutant astrocytoma.

PO-0171

Plaque distribution in multi-cerebrovascular beds associates with acute cerebral infarction: A magnetic resonance imaging study

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Objective:

This study aimed to investigate the association between coexisting intracranial and extracranial carotid artery atherosclerotic plaque characteristics among different carotid segments and acute cerebral infarction (ACI) using 3D MRI.

Materials and Methods:

Patients with recently occurred cerebrovascular accident in anterior circulation (< 2 weeks) and presence of atherosclerotic plaque in at least one side of the carotid artery underwent multi-contrast MR vessel wall imaging and 3D time-of flight CMR angiography. The atherosclerotic plaques in intracranial artery and extracranial carotid segment were recorded. Coexisting characteristics of these plaques among different carotid segments was compared between patients with and without ACI and its association with ACI was determined.

Results:

121 patients (mean age: 62.0 ± 11.8 years; 89 males) were recruited. 100(82.6%) had acute cerebral infarction. The presence of coexisting cerebrovascular atherosclerosis (atherosclerotic plaques in carotid bulb segment of carotid artery) was found to be significantly associated with ACI patients compared to those without ACI (HR = 4.06, 95% CI, 1.50-11.02; $P = 0.006$, respectively). After adjusting for baseline confounding factors, this association remained statistically significant (HR = 3.27, 95% CI 1.15-9.33, $P = 0.027$, respectively). No significant association was found between intracranial stenosis coexistent with atherosclerotic plaque in other segments of carotid artery and vascular events (all $P > 0.05$).

Conclusion:

The co-existing cerebrovascular atherosclerotic disease with atherosclerotic plaque in the segment of carotid bulb is independently associated with ACI.

PO-0172

CBV Index could be a reliable predictor of the prognosis for acute ischemic stroke patients after EVT.

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Objectives: To assess the prognostic value of CBV index in patients with acute ischemic stroke (AIS) receiving computed tomography perfusion (CTP) beyond the time window after endovascular thrombectomy (EVT).

Methods: A retrospective enrollment was conducted on 137 patients at our center who received EVT for AIS of the anterior circulation beyond the time window. Parameters included clinical disease history, National Institutes of Health Stroke Scale (NIHSS), Modified Rankin Scale (MRS) score, ODT (onset-to-close time), DPT (door to puncture time), occluded vessel site, and core infarct volume. Multivariate logistic regression analysis was utilized to investigate acute ischemic stroke of the anterior circulation factors that impact the prognosis of EVT in patients. ROC curves were employed to analyze the predictive value of the combination of age, National Institutes of Health Stroke Scale (NIHSS) score on admission, recanalization, and CBV index on the prognosis in patients with anterior circulation AIS after EVT.

Results: The good prognosis group consisted of 60 patients, while the poor prognosis group consisted of 77 patients. Six parameters showed significant differences: age (63.6 ± 13.1 vs. 73.61 ± 10.3 , $p < 0.001$), NIHSSpre (10.5 ± 5.5 vs. 18.5 ± 7.5 , $p < 0.001$), ischemic core volume (7.1 ± 12.2 vs. 33.4 ± 51.3 , $p < 0.001$), CBV index (0.8 ± 0.3 vs. 0.7 ± 0.2 , $p < 0.001$), successful recanalization (95.0% vs. 79.2%, $p = 0.008$), and gender (71.7% vs. 51.9%, $p = 0.019$). Multivariate Logistic regression analysis showed that age (odds ratio [OR], 0.947; 95% CI, 0.908-0.987; $P = 0.011$), NIHSSpre (OR, 0.844; 95% CI, 0.780-0.910; $P = 0.001$), successful recanalization (OR, 6.466; 95% CI, 1.365-30.630; $P = 0.019$), and CBV index (OR, 30.348; 95% CI, 1.380-667.490; $P = 0.030$) were found to be independently associated with functional outcome in patients with AIS after EVT. The combined model of age, recanalization, NIHSSpre, and CBV index showed excellent predictive ability for clinical prognosis (AUC, 0.878; sensitivity, 83.3%; specificity, 81.8%), outperforming the model without CBV index (AUC, 0.861).

Conclusions: The CBV index improves the accuracy of prognostication after EVT in patients with anterior circulation AIS.

PO-0173

Evaluation of Kidney-Brain Axis and Ferroptosis Mechanism based on Multimodal Magnetic Resonance Imaging

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Aims: Acute kidney injury (AKI) has been associated with a variety of neurological problems, while the neurobiological mechanism remains unclear. In the present study, we utilized resting-state functional magnetic resonance imaging (rs-fMRI) and Diffusion Tensor Imaging to detect brain injury at an early stage and investigated the impact of microglia on the neuropathological mechanism of AKI.

Methods: Multi-modal MRI data were collected from AKI rats and the control group with a 9.4-Tesla scanner at 24, 48, and 72 h post administration of contrast medium or saline. The amplitude of low-frequency fluctuations (ALFF), Functional connectivity and Probabilistic fiber track were then compared across the groups at each time course. Additionally, flow cytometry, SMART-seq2 and pAAV-CAMKII-HChR2-mCherry-WFRE were employed to evaluate microglia. Furthermore, pathological staining and Western blot were used to analyze the samples.

Results: MRI results revealed that AKI led to a decreased ALFF in the hippocampus, particularly in the 48 h and 72 h groups. The connection between CA1 and prefrontal cortex decreased after AKI. Additionally, western blot suggested that AKI-induced the neuronal Ferroptosis at 48 h and 72 h. Flow cytometry and confocal microscopy images demonstrated that AKI activated the aggregation of microglia into neurons at 24 h, with a strong upregulation of M1 polarization at 48 h and peaking at 72 h, accompanying with the release of proinflammatory cytokines.

Conclusions: Our study demonstrated that microglia aggregation and inflammatory factor upregulation are significant mechanisms of AKI-induced neuronal Ferroptosis. We used multimodal MRI to detect the alterations in hippocampal function, which may provide a noninvasive method for the early detection of brain injury after AKI.

PO-0174

MEGA-PRESS Detects the Changes of Metabolite in Parkinson's Disease with Depression

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Purpose

To explore the changes of λ -aminobutyric acid (GABA), glutamate and glutamate (Glx) in depression in Parkinson's disease (DPD) using MEGA-PRESS, in order to provide new ideas for the potential pathogenesis and treatment of DPD.

Materials and Methods

Fifty-four primary PD patients and twenty-three healthy controls (HC) were included in this study. According to the Hamilton Depression Scale (HAMD), PD patients were classified into DPD (n=13) and non-depressed Parkinson's disease (NDPD) (n=45). All subjects underwent 3.0T head magnetic resonance scanning, including 3D T1WI and MEGA-PRESS sequence. 3D T1WI was used to obtain high-resolution three-dimensional brain structure images, and which was used to locate the volume of interest (VOI). The MEGA-PRESS sequence was performed in 18.48ml voxels

in the left thalamus and medial frontal cortex (MFC) respectively. All the data were processed using Gannet 3.1 to quantify GABA+ , Glx and Creatine (Cr) levels. Statistical analysis was performed to compare the concentration of metabolites such as GABA+ and the demographics in the three groups.

Results

The level of GABA+/Water was significantly lower in MFC of PD patients compared with HC ($p=.015$). GABA+/Water and GABA+/Cr of MFC levels were significantly lower in NDPD than that of DPD and HC ($p=.003$, $p=.015$), while there was no statistical difference between the DPD and HC. And there was no significant difference of metabolites level in the left thalamic among all groups ($p > .05$). However, MFC Glx levels were inversely correlated with depression severity in DPD ($r = -.696$, $p = .017$).

Conclusion

This study demonstrates decreased GABA+ in MFC in patients with primary Parkinson's disease. And DPD has higher GABA+ level in MFC than NDPD, while the concentration between DPD and HC has no difference. So that we conclude that MFC GABA plays a beneficial rather than a detrimental role in DPD, and that GABA may improve depressive symptom.

PO-0175

Combination of Hematoma and Perihematoma Tissue Radiomics Analysis on Baseline CT Scans Predicts Early Clinical Outcome of Conservatively Treated Spontaneous Cerebral Hemorrhage

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Objective:

To explore whether radiomic features of hematoma and perihematoma tissue can improve the accuracy of short-term clinical outcome prediction in patients with conservatively treated spontaneous cerebral hemorrhage.

Methods:

A total of 166 patients with a clinical and imaging diagnosis of spontaneous cerebral hemorrhage were included in this retrospective analysis. These patients were treated conservatively during their hospitalization. Patients were randomized into a training group (N=132) and a validation group (N=34) with a ratio of 8:2. Clinical outcome at 90 days after clinical treatment was assessed by the modified Rankin Scale (mRS), and was categorized as good outcome ($mRS \leq 2$) and poor outcome ($mRS > 2$). Radiomic features of hematoma and perihematoma tissues of 5mm, 10mm, 15mm were extracted from non-contrast computed cranial tomography (NCCT) images, respectively, and were downscaled by LASSO regression to construct a random forest model to predict the early clinical outcome of patients with cerebral hemorrhage under conservative treatment. The predictive performance of the radiomic features in different regions was assessed by subject working characteristic curves. Clinical factors were analyzed by single and multifactor logistic regression . Results: In the validation group, the mean area under the ROC curve (AUC) of the hematoma was 0.83, the AUC of the hematoma periphery in the 5mm, 10mm, 15mm was 0.79, 0.82, 0.77, respectively, and the AUC of the combined model of hematoma+perihematoma 10-mm was 0.79. The AUC of the hematoma model was significantly higher than that of the combined hematoma+perihematoma 10-mm model. The clinical-radiomics nomogram consisting of five independent predictors of hematoma volume, time from onset to first CT, breakthrough into the ventricle, gender, and AST/ALT on admission and Rad-score of the hematoma model were used

to assess 90-day outcome in patients with conservatively treated spontaneous cerebral hemorrhage.

Conclusions:

Radiomics analyses based on hematoma and perihematoma tissue in patients with conservatively treated spontaneous cerebral hemorrhage showed that a combined model of hematoma and perihematoma tissue did not necessarily provide a more accurate assessment of early clinical outcome in patients with conservatively treated spontaneous cerebral hemorrhage. Hematoma in patients with conservatively treated spontaneous cerebral hemorrhage remains the predominant therapeutic target.

PO-0176

Modular Edge Analysis Reveals Chemotherapy Caused Brain Network Changes for Lung Cancer Patients

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Purpose: Lung cancer patients after chemotherapy may have disconnected or weakened function connections within brain networks. The purpose of this study was to investigate the abnormality of brain functional network in lung cancer patients after chemotherapy by modular edge analysis.

Methods: Resting-state functional magnetic resonance imaging (Rs-fMRI) scans were performed in 40 post-chemotherapy and 40 non-chemotherapy patients and 40 healthy controls (HCs). All groups were age- and sex-matched. Then, modular edge analysis was used to assess changes in brain functional networks.

Results: In intra-modular connections, compared with the controls, the post-chemotherapy patients showed decreased connection strength in the occipital lobe module ($p < 0.05$). And compared with the non-chemotherapy group, the post-chemotherapy patients showed decreased connection strength in the subcortical module ($p < 0.05$). In inter-modular connections, compared with the controls, the post-chemotherapy patients showed decreased connection strength in the frontal-temporal lobe modules ($p < 0.05$). And compared with the non-chemotherapy group, the post-chemotherapy patients showed decreased connection strength in the subcortical-temporal lobe modules ($p < 0.05$).

Conclusions: These results suggest that chemotherapy can disrupt connections in the brain functional networks. To our knowledge, this is the first study to use modular edge analysis to report changes in brain functional brain networks associated with chemotherapy. Modular edge analysis may play an important role in predicting the clinical outcome for lung cancer patients after chemotherapy.

PO-0177

Topological characteristics changes in chronic tinnitus: A Resting-State Functional Magnetic Resonance Imaging Study

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Purpose: In this study, resting state functional magnetic resonance imaging (rs-fMRI) was used to explore the topological characteristics of brain connectivity in chronic tinnitus from the global and node level using the method of graph theory.

Method: We recruited 16 patients with chronic tinnitus and 16 healthy controls matched by age, and sex. All subjects underwent functional and structural MRI scanning, pure tone audiometry (PTA) and neuropsychological assessment. The AAL brain atlas was used to divide the cerebral cortex into 90 regions of interest (ROI) and further construct the correlation matrix to analyze the global properties and node properties. Global network properties included global efficiency (Eg), local efficiency (Eloc), clustering coefficient (Cp), characteristic path length (Lp) and small worldness. Nodal network properties included degree centrality (DC), betweenness centrality (BC), nodal efficiency (NLe), and nodal clustering coefficient (NCp).

Results: Global level analysis showed that Eg decreased and Cp, Lp increased in chronic tinnitus compared with HC. Small world property analysis showed that lambda increases and sigma decreases. Nodal level analysis showed that DC was decreased in right hippocampus, bilateral putamen and right pallidum in tinnitus patients compared with HC, and increased in the left inferior temporal gyrus, left precuneus, bilateral inferior occipital gyrus, and left middle occipital gyrus. The NCp was increased in the right cuneus. NE was decreased in the right orbit part of inferior frontal gyrus, right heschl gyrus, right insula, right hippocampus, bilaterally putamen and bilaterally pallidum in chronic tinnitus compared with HC, and increased in the right inferior occipital gyrus and left inferior temporal gyrus.

Conclusion: The topological properties of chronic tinnitus are altered suggesting that tinnitus patients have reduced brain network efficiency and changes in auditory, limbic and default mode networks. This study provides clues to the pathogenesis of tinnitus and tinnitus related diseases (eg: depression and anxiety).

PO-0178

Atlas-based analysis of diffusion imaging may predict efficacy of constraint-induced movement therapy with different training modes for motor function recovery in stroke rats

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Background: Constraint-Induced Movement therapy (CIMT) is a method of behavior-based neurorehabilitation that has demonstrated efficacy for chronic stroke. Atlas-based analysis (ABA), a method of whole brain white matter analysis based on an anatomical atlas, may be helpful in

evaluating obscure lesions in brain injury of stroke rats. The aim of this study was to predict efficacy of CIMT for motor function recovery in stroke rats using ABA diffusion methods.

Methods: Twenty-four male Sprague-Dawley (SD) rats were divided into two groups according to the brain injury with unilateral or bilateral CIMT rehabilitation training as follows: moderate group (unilateral/bilateral n=6/6), severe group (unilateral/bilateral n=6/6). Catwalk and diffusion MRI scans were conducted on the groups of rats at baseline, and at 7, 14 and 28 days after surgery, combining micro-PET to observe the metabolic levels of ^{18}F -FDG in various brain regions. Regions of interest (ROIs) analyses were conducted on 29 regions, independent anatomically, on the basis of the DTI atlas of the P72 rat brain. Statistical analyses of fractional anisotropy (FA) and mean diffusivity (MD) values were performed with a two-sample t test.

Results: Compared to baseline, FA and MD were decreased in the moderate group in the corpus callosum, fornix, right cerebral peduncle and the peripheral regions. Bilateral limb training can enhance the metabolic level of the nucleus accumbens in rats with severe cerebral ischemia in early stage.

Conclusions: Unilateral limb training can significantly enhance the interactive inhibitory effect of bilateral cortical sensory and motor areas in moderate group. Whereas bilateral training was more helpful in enhancing the interactive inhibitory effect of various brain regions in rats with severe cerebral ischemia. Atlas-based analysis of diffusion imaging may predict efficacy of multiple CIMT modes for motor function recovery in stroke rats with varying degrees of brain injury.

PO-0179

Prediction of meningiomas' critical molecular phenotype using the transverse relaxation time

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Purpose

Progesterone receptor (PR) is crucial to meningiomas as it is not only associated with the pathogenesis, but also indicates the aggressiveness and prognosis. T2 mapping has shown great promise in the explanation of pathological microstructure and tissue composition. In this study, we investigated the association of T2 and apparent diffusion coefficient (ADC) with PR expression.

Material and Methods

We enrolled 63 meningiomas patients totally (57.34 ± 9.60 years, 44 women). An experienced pathologist identified positive PR expression in 50 out of 63 meningiomas. All the MRI examinations were performed on a 3.0 T Prisma scanner. Whole-brain T2 maps were acquired within 32 s in a single scan using a novel single-shot ultrafast T2 mapping technique. Axial T2-dark-fluid imaging, diffusion-weighted imaging, and contrast-enhanced T1-weighted imaging were also performed for all patients. Two blind neuroradiologists manually delineated whole-tumor regions of interest on T2 maps using 3D Slicer (version 4.10.2, www.slicer.org), with their consensus as the final result. Necrosis, large vessels and calcification were excluded. Using a free application FeAture Explorer (FAE; <https://github.com/salan668/FAE>), we extracted the following histogram parameters: mean, median, maximum, minimum, ten percentiles (P10), 90 percentiles (P90), interquartile range (IQR), range, entropy, skewness, kurtosis, uniformity, and variance. Parameters were compared using independent t-test or Mann-Whitney U test. Multivariate logistic regression and receiver operating characteristic (ROC) analysis were performed to evaluate their diagnostic efficiency. The significance level of p value is 0.05.

Results

Compared to PR-negative meningiomas, there were significantly higher IQR, mean, median, maximum, P10, P90, range and entropy of T2 ($p = 0.001-0.049$) in PR-positive meningiomas, along with higher ADC kurtosis ($p = 0.022$). T2 IQR had the highest area under the ROC curve ($\text{AUC} =$

0.742) among all the T2 parameters and ADC kurtosis showed an AUC of 0.605. Notably, the combination of T2 and ADC exhibited the best diagnostic performance (AUC = 0.818).

Conclusion

This study suggested that T2 and ADC histogram parameters could be used to predict PR expression in meningiomas. Compared to ADC value, T2 may provide more detailed information about the tumor composition and microstructure of meningiomas. The multivariate logistic regression model combining T2 and ADC exhibited the best diagnostic performance.

PO-0180

Whole-Tumor Histogram Analysis of Synthetic MRI Predicts isocitrate dehydrogenase mutation status in gliomas

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Introduction: To investigate the potential value of whole-tumor histogram metrics derived from synthetic MRI in predicting isocitrate dehydrogenase (IDH) mutation status of gliomas.

Materials and methods: In this prospective study, 80 glioma patients were enrolled from September 2019 to June 2022. All patients underwent pre- and post-contrast synthetic MRI examination within 2 weeks before surgery. Immunohistochemistry staining or gene sequencing were used to assess IDH mutation status in tumor tissue samples. Whole-tumor histogram metrics, including T1, T2, proton density (PD), etc., were extracted from the quantitative maps, while radiological features were assessed by synthetic contrast-weighted maps. Basic clinical features of the patients were also evaluated. Differences in clinical, radiological, and histogram metrics between IDH-mutant type (IDH-M) and IDH-wild type (IDH-W) groups were analyzed using Student's t test, Mann-Whitney U test, Chi-square test or Fisher test. Variables with statistical significance in univariate analysis were included in multivariate logistic regression analysis to develop the combined model. Receiver operating characteristic and area under the curve (AUC) were used to assess the diagnostic performance of metrics and models.

Results: The histopathologic analysis revealed that of the 80 cases, 41 were classified as IDH-M gliomas and 39 as IDH-W gliomas. Compared to IDH-W gliomas, IDH-M gliomas showed significantly lower T1 (10th, mean, and median) and cPD (10th, 90th, mean, median, and maximum) values as well as higher cT1 (10th, mean, median, and minimum) values (all $P < 0.05$). The combined model (T1-10th + cT1-10th + age) was developed by integrating the independent influencing factors of IDH-M gliomas using the multivariate logistic regression. The diagnostic performance of this model (AUC = 0.872) was superior to the clinic-radiological model, which was constructed using age and enhancement degree (AUC = 0.822, $P = 0.035$).

Conclusion: The combined model constructed using histogram metrics derived from synthetic MRI could be a valuable preoperative tool to predict IDH mutation status in gliomas, and subsequently, could assist in the decision-making process of pretreatment.

PO-0181

Association between white matter hyperintensities and altered cerebral blood flow in maintenance hemodialysis patients: a longitudinal study

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Objectives: To explore changes in cerebral blood flow (CBF) and white matter in hemodialysis patients.

Methods: Thirty-three hemodialysis patients who underwent two brain MRI at an interval of three years and 33 age- and sex-matched healthy controls (HC) underwent structural and arterial spin-labeling MRI examinations. Intergroup differences in CBF in the gray matter, white matter, and whole matter, and regional white matter hyperintensities (WMH) were analyzed. Based on the changes in CBF between the baseline and follow-up groups, the hemodialysis patients were divided into two subgroups: an increased CBF group and a decreased CBF group. Differences in CBF and WMH between the subgroups and HC were analyzed.

Results: Patients undergoing hemodialysis exhibited increased cerebral watershed (CW) WMH, deep WMH, and periventricular WMH ($P < 0.01$). The CBF of patients with decreased CBF was higher than that of HC at baseline ($P < 0.025$) and lower than that of HC at follow-up ($P < 0.025$). Compared with the increased CBF group, obvious development of deep WMH was found in the decreased CBF group for the gray matter, white matter, and whole matter ($P < 0.025$).

Conclusions: WMH in hemodialysis patients were distributed in the deep white matter, periventricular white matter and CW, and progressed with the extension of hemodialysis duration. CBF in hemodialysis patients could manifest as both increased and decreased, and WMH in patients with decreased CBF developed severely with prolongation of hemodialysis duration.

PO-0182

Accurate staging of Cerebral Venous Sinus Thrombosis using T1 SPACE: clinical experience

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Synopsis:

This study aims to explore magnetic resonance High-resolution Variable Flip Angle Turbo-Spin-Echo(T1 SPACE) technique for accurate staging of Cerebral Venous Sinus Thrombus(CVT). CVT patients confirmed by Computed Tomographic (CT) were randomly divided into three groups according to the time from the onset of symptoms to T1 SPACE. Signal to Noise Ratio(SNR) and Contrast to Noise Ratio(CNR) between thrombus and gray tissues/white tissues were calculated on every thrombus segments and difference between different groups were analyzed. Results indicate that T1 SPACE has the potential to be a promising tool for accurate diagnosis and staging of CVT.

Introduction:

Cerebral Venous Sinus Thrombosis (CVT) is a rare, life-threatening central nervous system disease that affects young individuals frequently¹. Effective treatment of CVT requires accurate evaluation of thrombus distribution and stage. However, for the non-specificity clinical manifestation and variety imaging features at different stages, accurate staging of CVT is currently a major clinical challenge². Several imaging techniques, such as Computed Tomographic venography (CTV), could detect CVT effectively but it cannot be used for CVT staging but also has the limitation to

severe renal insufficiency for the use of iodine-based contrast medium. As the clinically approved CVT diagnosis standard, PC-MRV exhibits thrombus as filling defect, but it lacks of the ability to stage CVT³. High-resolution T1 SPACE imaging has demonstrated a super approach that can early detect CVT with a high diagnostic accuracy for it permits direct visualization of thrombus⁴. In this study, we sought to use T1 SPACE technique for accurate staging of CVT.

Method:

This study was approved by the Institutional Review Board. 44 consecutive CVT patients (33±15 years old, 28 males, 16 females), confirmed by Computed Tomography (CT), were enrolled. MRI data were collected on a MAGNETOM Prisma 3T MR scanner (Siemens Healthcare, Erlangen, Germany) with a 64-channel head coil, including routine head scan, PC-MRV, and high-resolution T1 SPACE. The routine head scan included Fast Low Angle Shot sequence (FLASH) and T2-weighted Turbo Spin Echo (TSE) sequence. Detailed parameters of PC-MRV and the high-resolution T1 SPACE were shown in table 1.

CVT patients were divided into 3 groups based on the duration of clinical onset: acute stage (group1, ≤3 days), subacute stage (group2, between 4 days and 15 days), chronic stage (group3, between 16 days and 30 days)⁵. Cerebral venous sinus images obtained from all patients were reviewed separately for 10 venous segments as follows: superior sagittal sinus, inferior sagittal sinus, right transverse sinus, right sigmoid sinus, left transverse sinus, left sigmoid sinus, straight sinus, confluence of sinuses, deep venous, and cortical veins.

Thrombus signals were measured by averaging three independent and equally distributed regions of interest (ROIs) on thrombus segment. Two kinds of CNRs were calculated between thrombus and brain tissues (mean of 4 ROIs), including thrombus to gray matter and thrombus to white matter. In addition, SNR was calculated between thrombus and background noise drawn out from four symmetrically distributed corners of T1 SPACE images.

Statistical tests were used to assess CNRs and SNR among two different stages. Data distribution was evaluated for normality with Kolmogorov-Smirnov test and homogeneity of variance was evaluated with Levene test. One-way analysis of variance (ANOVA) was used to assess differences among different stages and Least significant difference (LSD)-t test was used for multiple pairwise comparisons.

Results:

65 thrombi segments were confirmed by CT in total. In the end, there were 7 thrombi in group 1, 36 thrombi in group 2, and 22 thrombi in group 3. A detailed overview of the quantitative results of T1 SPACE was summarized in Table 2. SNR and CNR values were all significantly different between two adjacent stages for group1 and group2 (SNR:87±18 vs.173±45; CNR: thrombus to gray matter: 1.13±0.34vs.2.12±0.53; thrombus to white matter:0.84±0.17vs.1.62±0.39; both $p<0.000$), for group2 and group3 (SNR:173±45vs.140±40, $p=0.006$; CNR: thrombus to gray matter:2.12±0.53vs.1.75±0.52, $p=0.009$; thrombus to white matter:1.62±0.39vs.1.36±0.39; $p=0.013$), respectively.

Discussion:

Figure 1. shows that, signals of CVT on conventional MR T1-, T2- weighted images change mutably, so it is hard to stage thrombus. PC-MRV would be filling defect when venous sinus is thromboembolic or blood stasis, which may lead to misdiagnosis of venous sinus atresia/hypoplasia or stenosis⁶. For the selective visualization of CVT, T1 SPACE exhibits acute thrombus as isointense, subacute thrombus as hyperintense and chronic thrombus as hyperintense/ isointense compared with brain tissues while venous lumen signals are hypointense. So T1 SPACE is more direct and convenient to stage CVT. Furtherly, our findings show that the signals of CVT change is first up in about 3-5 days, stable in about 20 days and fall to isointense or venous revascularization finally. This is because that the T1 was shortened when erythrocyte lysis—oxidation of iron turned to paramagnetic Fe³⁺, and then were prolonged with organization of the thrombus and recanalization⁷.

Conclusion:

Our findings show that T1 SPACE technique provides a novel staging criteria of CVT, and can be a promising first-line staging tool.

PO-0183

Regional changes of neuromelanin and iron in the substantia nigra of early Parkinson's disease

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Objective: To investigate the changes of neuromelanin and iron in the substantia nigra subregion of early Parkinson's disease.

Methods: In this prospective study, 3D ME-MTC-NM sequence was performed in 30 patients with early PD and age-sex matched 70 healthy volunteers. Manual outlining and arithmetic methods were used to obtain neuromelanin accumulation, iron deposition and overlap regions. Using analysis of covariance, age was used as a covariate to compare the differences in volume, contrast ratio (CR) and/or susceptibility of the three sub-regions in early PD and healthy controls, and the receiver operating characteristic (ROC) curve was used to evaluate the diagnostic efficacy and the area under curve (AUC) was compared to determine the measurement index with optimal diagnostic efficacy.

Results: The volume ($P=0.023$) and CR ($P<0.001$) of neuromelanin accumulation regions in early PD patients were significantly lower than healthy controls (HC); the susceptibility in iron deposition regions was higher than that HC ($P=0.023$). The volume and CR of overlap regions were significantly lower in early PD patients than HC ($155.881\pm47.039\text{ mm}^3$, $176.671\pm37.367\text{ mm}^3$, $P=0.047$; 0.063 ± 0.034 , 0.133 ± 0.040 , $P<0.001$), while susceptibility was higher than HC (0.100 ± 0.020 , 0.091 ± 0.017 , $P=0.029$). The volume ($P=0.042$), CR ($P<0.001$) of neuromelanin accumulation regions and CR ($P<0.001$) of overlap regions could diagnosed early PD from HC, with AUCs of 0.650, 0.898, and 0.920, respectively. Of these, AUC for the CR in the overlap regions was significantly higher than the CR in the neuromelanin accumulation regions (0.920, 0.898, $P=0.018$).

Conclusion: The volume and CR of the overlap regions were reduced and the susceptibility was increased. In addition, the CR of the overlap region showed higher diagnostic efficacy in the diagnosis of early PD, suggesting that the reduced CR of the overlap regions may be a sign of early nigrostriatal degeneration in PD.

PO-0184

Based on CT plain scan, using 3D-Slicer to measure the effect of bleeding volume on the prognosis of posterior inferior cerebral aneurysm rupture

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Objective : To investigate the effect of 3D-Slicer based on CT scan on the prognosis of ruptured posterior inferior cerebral aneurysm.

Methods : A retrospective analysis of 18 patients with posterior inferior cerebral aneurysms admitted to our hospital from January 2018 to september 2023, excluding 6 cases of unruptured, untreated and followed up, and finally included 12 cases treated by surgical clipping or embolization. According to the modified Rankin score, they were divided into a good prognosis group and a poor prognosis group. According to the GCS score, they were divided into mild coma, moderate coma, and poisoning coma. The patient's gender, age, and aneurysm site were recorded. The

amount of subarachnoid hemorrhage, ventricular hemorrhage, and total bleeding were calculated, and their relationship with prognosis was analyzed.

Results : 7 cases had good prognosis and 5 cases had poor prognosis. There were 5 cases of mild coma, 2 cases of moderate coma and 5 cases of poisoning coma. Surgical clipping was performed in 10 cases and embolization in 2 cases. There was no significant difference in gender, age, admission GCS grade, subarachnoid hemorrhage, surgical method and prognosis. There were significant differences between the amount of intraventricular hematoma, the total amount of bleeding and the prognosis.

Conclusion : The amount of bleeding from posterior inferior cerebral aneurysm rupture has an effect on the prognosis. The amount of intraventricular hematoma and the total amount of bleeding in the poor prognosis group are higher than those in the good prognosis group.

PO-0185

Aberrant functional and causal connectivity of the amygdala in herpes zoster and postherpetic neuralgia patients

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Background: Resting-state functional magnetic resonance imaging (rs-fMRI) and Granger causality analysis (GCA) were used to observe the characteristics of amygdala and whole-brain effect connections in patients with herpes zoster (HZ) and postherpetic neuralgia (PHN) and to determine their relationship with clinical features.

Method: Rs-fMRI scans were performed on 50 HZ; 50 PHN; and 50 age-, sex- and education-year-

matched healthy controls (HCs). Bilateral amygdala subregions were used as seeds for functional connectivity (FC). GCA was used to analyze the effective connection of brain regions that were significantly different among groups. Then the correlation between FC, and GCA values and clinical indices was investigated.

Results: PHN had impaired FC between the amygdala subregion with the putamen, cortex, anterior cingulate cortex (ACC) to HCs and reduced FC of medial amygdala (MeA) with the parieto-occipital lobe and motor cortex to HZ;

HZ had reduced FC of the lateral amygdala (LA) with the insula to HCs. GCA values from the bilateral LA to the bilateral ACC, left MeA to the bilateral ACC and left putamen, and right ACC to the bilateral MeA were reduced in PHN patients compared to

HCs. Compared with HCs, the GCA values from the left MeA to the left ACC and right putamen were reduced in HZ. The GCA values from the amygdala subregion to the ACC were positively correlated with HAMA or HAMD scores in PHN.

Conclusion: PHN showed reduced FC between the amygdala subregions and cortico-putamen and decreased effective connectivity from the amygdala subregion to the ACC and putamen.

PO-0186

Altered small-world, functional brain networks in patients with lower back pain

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The purpose of this study is to investigate the functional network changes that occur in patients with lower back pain (LBP), and the link between LBP and the small-world properties of functional networks within the brain. Functional MRI (fMRI) was performed on 41 individuals with LBP and 57 age and gender-matched normal controls during the resting state. The severity of the pain in the individuals with LBP ranged from 5 to 8 on a 0–10 scale (0-no pain). Network-based statistics were performed to investigate the differences between the brain networks of individuals with LBP and the normal controls. Several small-world parameters of brain networks were calculated. These criteria reflect the overall network efficiency. The brain networks in the individuals with LBP due to herniation of a lumbar disc demonstrated a significantly longer characteristic path length as well as a lower clustering coefficient, global efficiency, and local efficiency compared to those in control subjects. We found that LBP patients tended to have unstable and inefficient brain networks when compared with healthy controls. In addition, LBP individuals showed significantly decreased functional connectivity in the anterior cingulate cortex, middle cingulate cortex, post cingulate cortex, inferior frontal gyrus, middle temporal gyrus, occipital gyrus, postcentral gyrus, precentral gyrus, supplementary motor area, thalamus, fusiform, caudate, and cerebellum. We believe that these regions may be involved in the pathophysiology of lower back pain.

PO-0187

Metaverse in Neuropsychiatric Imaging Research of Substance Use Disorders: A Promising Frontier

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Aims: Substance use disorders (SUDs) are global public health problems that require urgent attention. The metaverse medical paradigm is expected to open up novel ideas for inhibiting relapse to substances. We summarized the relevant researches in recent years, aiming to provide a reference for exploring more effective addiction treatment and personalized biomarkers in the future.

Methods: We conducted a review by searching electronic databases PubMed, Embase, and Google scholar for papers published until June 2023.

Results: We screened 387 abstracts and analyzed 48 articles, dividing them into two categories, the first category is used for neuroimaging studies based on metaverse cue exposure, and the second category is used to evaluate the efficacy of combining metaverse with withdrawal treatment.

Discussion: Metaverse technology presents a promising approach for providing effective education and psychological training without causing harm to patients and is a powerful and potential tool for evaluating and treating SUDs.

PO-0188

Impaired interhemispheric synchrony in Parkinson's disease patients with progressive cognitive impairment

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Objective: To elucidate functional interhemispheric coordination in Parkinson's disease (PD) with progressive cognitive impairment (pPD).

Methods: Forty-two PD with stable cognitive performance (sPD) patients, 26 pPD patients, and 19 healthy controls (HCs) were recruited. All subjects underwent T1-weighted and resting-state functional magnetic resonance imaging scanning. Voxel-mirrored Homotopic Connectivity (VMHC) value was applied to represent the synchrony of homotopic connections between hemispheres. The receiver operating characteristic curve analyses were performed, and area under the curve (AUC) was calculated.

Results: The pPD group showed decreased VMHC value in the superior temporal gyrus and inferior parietal lobule compared with sPD group. The pPD group showed a lower VMHC value in the postcentral gyrus. In addition, the VMHC value of these two regions also showed a positive correlation with cognitive function. the AUC of VMHC value of the superior temporal gyrus and inferior parietal lobule were 0.84 and 0.83, respectively.

Conclusion: The destruction of homotopic connectivity is related to cognitive impairment, and the VMHC value in superior temporal gyrus and inferior parietal lobule could be a potential neuroimaging feature discerning pPD patient.

PO-0189

Noninvasive Detection of Brain Glioma Temperature using Magnetic Resonance Spectroscopy: A Preliminary Study

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Abstract

Purpose Cerebral gliomas are the second most common type of primary central nervous system (CNS) tumor. However, many potential parameters of glioma still need to explore using MR. The aim of our study is to compare the temperature difference between the glioma tissue and normal tissue based on voxel using Magnetic Resonance Spectroscopy (MRS) thermometry.

Materials and Methods In this case-control study conducted between September 2022 and August 2023, and 22 glioma patients and 26 age- and sex-matched healthy controls were included. A total of 291 voxels were acquired and categorized into three groups based on voxels location, 138 normal voxels from healthy control (Group1), among glioma participants, 88 normal voxels from contralateral hemisphere of the lesion (Group2) and 65 voxels from lesion area (Group3), respectively. Conventional magnetic resonance imaging (MRI), including the pre-contrast T1-Weighted Image (T1WI), T2-Weighted Image (T2WI), Diffusion Weighted Imaging (DWI), T2-Fluid-Attenuated Inversion Recovery (T2-FLAIR), post contrast T1WI and MRS were performed in all participants. MRS data was analyzed by LCModel to estimate voxels temperature. All participants with glioma enrolled in this research received surgery operation, and the final diagnosis of participants with glioma was confirmed by histopathology. Statistical analysis was performed using R in Rstudio, $P < 0.05$ was considered to be statistically significant.

Results The mean age in years of Group1, Group2 and Group3 is 45.52 ± 13.19 , 45.49 ± 13.32 , and 46.13 ± 13.33 , respectively. The Kruskal-Wallis test demonstrated significant differences in the temperature between the three groups ($P < 0.001$). The Wilcoxon rank-sum test further showed that

the temperature of the glioma voxel was significantly lower compared to normal voxels in glioma patients ($P < 0.001$) and in healthy controls ($P < 0.001$), while the temperature of normal voxels between glioma participants and healthy controls did not show statistical difference.

Conclusion This study demonstrated abnormal temperature variations in glioma patients compared to normal brain tissue, offering potential insights for the diagnosis and clinical management of glioma patients.

PO-0190

Alteration of Static and Dynamic Intrinsic Brain Activity Induced by Short-term Spinal Cord Stimulation in Postherpetic Neuralgia Patients

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Introduction: Short-term spinal cord stimulation (stSCS) is an effective treatment for postherpetic neuralgia (PHN). However, how exactly stSCS affects time-dynamic intrinsic brain activity in PHN patients is not clear. The purpose of this study was to examine the static and dynamic variability of neural activity in PHN patients after stSCS. **Methods:** In this study, 10 patients with PHN underwent resting-state functional magnetic resonance imaging (rs-fMRI) at baseline and after SCS. The amplitude of low-frequency fluctuations (ALFF) and dynamic ALFF (dALFF) were used to investigate the static and dynamic variability of neural activity in PHN patients after stSCS. We additionally examined the associations between clinical parameters and functional changes in the brain. **Results:** There was a significant increase in dALFF in the left precuneus and right superior parietal gyrus, and a decrease in dALFF in the left inferior temporal gyrus, right rectus gyrus, left superior temporal gyrus, orbital part of right medial frontal gyrus, and orbital part of left superior frontal gyrus. There was significantly increased ALFF in the right inferior temporal gyrus, and decreased ALFF in the right lingual gyrus, left superior parietal gyrus, right superior parietal gyrus, and left precuneus. Furthermore, Pittsburgh sleep quality index scores were positively associated with dALFF changes in the left superior temporal gyrus and orbital part of left superior frontal gyrus. Hospital anxiety and depression scale scores and continuous pain scores exhibited significant negative correlation with dALFF changes in the right superior parietal gyrus. **Conclusion:** This study indicated that stSCS is able to cause dALFF changes in PHN patients, thus stSCS might alter brain functions to relieve pain, sleep, and mood symptoms. The findings provide new insights into the mechanisms of stSCS efficacy in the treatment of patients with PHN.

PO-0191

Gray matter morphological abnormalities are constrained by normal structural covariance network in OCD

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Purpose: A growing body of evidences reveal that abnormal gray matter morphology is constrained by normal brain network architecture in neurodegenerative and psychiatric disorders. However, whether this finding holds true in obsessive-compulsive disorder (OCD) remains unknown. In the current study, we aimed to investigate the association between gray matter morphological abnormalities and normal structural covariance network architecture in OCD. **Methods:** First, gray matter morphological abnormalities were obtained between 98 medicine-naïve and first-episode

patients with OCD and 130 healthy controls (HCs). Then, putative disease epicenters whose structural connectome profiles in HCs most resembled the morphological differences pattern were identified using a backward stepwise regression analysis. **Results:** A set of brain regions were identified as putative disease epicenters whose structural connectome architecture significantly explained 59.94% variance of morphological abnormalities. These disease epicenters comprised brain regions implicated in high-order cognitive functions and sensory/motor processing. Other brain regions with stronger structural connections to disease epicenters exhibited greater vulnerability to disease.

Conclusion: These results suggest that gray matter abnormalities are constrained by structural connectome and provide new insights into the possible pathological progression in OCD.

PO-0192

Cerebral blood flow changes and their genetic mechanisms in COVID-19: a combined neuroimaging and transcriptome study

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Objectives: Extensive studies have shown Coronavirus Disease 2019 (COVID-19) is a disease strongly associated with genetics, and neuroimaging studies have found that COVID-19 patients have reduced cerebral blood flow (CBF), but the relationship between CBF changes and gene expression remains unclear. Therefore, our study aims to explore the genetic mechanisms of CBF abnormalities in COVID-19.

Methods: From January to April 2023, this study prospectively collected 51 COVID-19 patients and 30 healthy controls (HCs). All subjects underwent arterial spin labeling (ASL) perfusion imaging, and the between-groups CBF changes were obtained by using a two-sample T test. In combination with the Allen Human Brain Atlas (<http://www.brain-map.org>), transcriptome-neuroimaging spatial association analyses were conducted to identify genes whose expression correlated with CBF changes in COVID-19 after strict multiple comparison and spatial autocorrelation corrections. These genes were analyzed on the COVID-19 Disease Portal (<http://geneontology.org/covid-19.html>) for a series of functional annotations.

Results: Compared to HCs, COVID-19 patients showed decreased CBF in the left superior temporal gyrus, middle frontal gyrus, inferior frontal gyrus and supplementary motor area (GRF corrected, voxel-level at $P < 0.001$, cluster-level at $P < 0.01$). Moreover, these CBF changes were spatially associated with the expression of 2918 genes. Further analysis of enrichment suggested that these COVID-19-related gene were highly associated with coronavirus infection and enriched in COVID-19-related important molecular functions (electron transfer activity, RNA binding and protein binding), biological processes (regulation of cell cycle, cellular process, and cytoplasmic translation) and cellular components. Meanwhile, these COVID-19-related genes are specifically expressed in brain tissue and neuronal cells of the adult cerebral cortex.

Conclusion: Our findings suggest a cerebral perfusion reduce in COVID-19 patients, which may be a consequence of complex interactions of a wide range of COVID-19-related genes.

PO-0193

Correlation between changes of brain ALFF and cognitive impairment in patients with neuropsychiatric lupus

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objective: To explore the relationship between brain function changes and clinical serological indicators and behavioral cognitive assessment in NPSLE patients, and to understand the pathogenesis of NPSLE from the perspective of imaging. **Methods:** The resting-state functional imaging data, clinical serological and behavioral cognitive assessment scores of 55 NPSLE patients and 32 HC patients were prospectively collected. The ALFF obtained from the analysis and processing were correlated with the serological data and behavioral cognitive assessment scores to find out the relationship between these data. **Results:** The average age of the NPSLE group was older than that of the HC group, and there were significant differences in education level, AVLT-H and TMT scores between the two groups. The NPSLE group showed increased brain activity in the insula, precentral gyrus and superior temporal gyrus, and decreased brain activity in the superior parietal gyrus. The ALFF of the insula was positively correlated with Anti- β 2gp1 antibody, and negatively correlated with Anti-nucleosome antibody and AVL-RC. The ALFF of the precentral gyrus was negatively correlated with AVL-I, AVL-SR and AVL-LR. The ALFF of the superior temporal gyrus is negatively correlated with AVL-RC. The ALFF of the left superior parietal gyrus was positively correlated with CRP. The ALFF of the right superior parietal gyrus was positively correlated with SLEDAI and negatively correlated with AVL-I. **Conclusion:** NPSLE patients show different brain activity changes in different brain regions, and the abnormal brain regions are correlated with some lupus antibodies, inflammatory factors and cognitive assessment, suggesting that the correlation between the three may provide insights into the pathogenesis of NPSLE.

PO-0194

Glioblastoma phenotypes based on MR imaging radiomic features had diversity recurrence patterns

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Objective: The recurrence or progression of glioblastoma (GBM) after treatment is inevitable. We sought to explore non-invasive radiomic characterization of MR could assist in reflection diverse patterns of GBM progression.

Methods: Three recurrence patterns (Rps), including local, diffusion and distant recurrence (83, 18, 11 cases, respectively), were categorized according to the spatial location and signal characteristics of recurrent lesions in conventional MRI images in 112 patients. Quantitative image features capturing the shape, texture, edge sharpness, wavelet features from the whole tumor (WT) were extracted. All the image features were analysed by consensus clustering with 10,000 iterations to classify GBM phenotypes. Median progression-free survival (PFS) and overall survival (OS) of Rps and radiomic-based phenotypes were estimated using Kaplan-Meier method. When comparing clinical features, including sex, age, boundary, non-enhancement region and enhancement-pattern (rim-like, irregular and solid enhancement) differences among phenotypes, we performed the Kruskal-Wallis test for continuous variables and the Fisher's exact test for categorical variables. Finally, regression analysis was used to obtain significant clinical parameters for each phenotype group.

Results: The median PFS (4.8 M, 8.9 M, 5.7 M, $P = 0.05$) and OS (12.3M, 21.0M, 12.5M, $P = 0.52$) of local, diffusion and distant recurrence. Three distinct radiomic-based phenotype, including phenotype 1-3 (each phenotype contained patients 58, 48, 6 cases respectively), emerged in our cohort. The median PFS (5.5M, 8.4M, 8.6M, $P = 0.05$) and OS (10.4M, 19.4 M, 10.0 M, $P = 0.016$) of phenotype 1- 3. We found that phenotype 1, 2 mainly includes local recurrence and diffusion recurrence, while distant recurrence was distributed in all three phenotype ($P = 0.03$). Univariate regression analysis showed sex, non-enhancement region and enhancement pattern had statistical significance for each phenotype. However, the non-enhancement region had significance in multiparameter regression analysis.

Conclusions: Phenotype based on non-invasive radiomic characterization of MR hold different recurrence or progression pattern after treatment.

PO-0195

Choroid Plexus Volume Change-A Candidate for a New Radiological Marker of PD

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Objects: This study aims to investigate the choroid plexus (CP) volume alterations in the early and advanced stage of Parkinson's disease (PD) patients

Methods: We enrolled 54 PD patients (PD-early stage, 33; PD-advanced stage, 21) and 48 healthy controls (HC). Freesurfer software was used for CP reconstruction and volumetric calculation on three-dimensional T1-weighted images data. Furthermore, we analysed the correlation between CP volume and gray matter volume, ventricular system and clinical variables

Results: Compared with HC, significant increased bilateral CP volume was observed in PD-early stage patients. In PD patients, the volume of bilateral choroid plexus was positively correlated with bilateral lateral ventricle, third ventricle, forth ventricle, and CSF. In addition, a significant negative correlation was found between the left choroid plexus volume and left amygdale volume. We also observed significant negative correlation between right CP volume and HAMD scores in PD patients

Conclusions: CP plays an important role in the pathogenesis of PD and can be regarded as a biomarker indicating PD in the early stage

PO-0196

Subdivisional Iron Deposition and “Swallow Tail Sign” of Substantia Nigra in Relapsing Remitting Multiple Sclerosis Patients with Different Disease Duration by Quantitative Susceptibility Mapping

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Objective To study the iron accumulation in SN subdivisions and the “swallow tail sign” in MS patients. Materials and methods Fifty-three RRMS patients (18 with DDs ≤ 5 years [Group Les], 17 with DDs 5-10 years [Group Mid], and 18 with DDs > 10 years [Group Mor]) and 37 controls (Group Con) underwent QSM. Each SN was divided into rostral anterior- and posterior-SN, caudal anterior- and posterior-SN. QSM values were measured in the anterior- and posterior-SN. “Swallow tail signs” of the SN were observed. Results The QSM values of the rostral pSNs were higher in

the Group Les than the Group Con ($P < 0.001$). The QSM values of the rostral pSN in the Group Mid were higher than the Group Con ($P < 0.05$). The QSM values of the rostral aSN in the Group Mid was higher than the Group Con ($P < 0.01$). The QSM values of the rostral aSN and pSN in the Group Mor were higher than the Group Con ($P < 0.05$). At the level of the caudal SN, the QSM values in the Group Mid were higher than the Group Con and the Group Les ($P < 0.05$). There were positive correlations between "swallow tail sign" scores and QSM values of the caudal pSN in the Group Mid and Group Mor ($P < 0.05$).

Conclusion This preliminary study providing objective evidence of the iron-related progression of SN subregions in RRMS patients with different DDs, and abnormal "swallow tail sign" may provide an additional imaging maker for MS patients.

PO-0197

Comparison of 7T TOF-MRA and 3T TOF-MRA in Assessment of Moyamoya Disease

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BACKGROUND Moyamoya disease (MMD) is a chronic cerebrovascular disease with progressive steno-occlusion of the internal carotid arteries and compensatory "puff of smoke" collateral network, which is a leading cause of stroke in pediatric and young patients. Digital subtraction angiography (DSA) is considered the gold standard for diagnosing and assessing MMD but invasively. Time-of-flight MRA (TOF-MRA) is widely accepted as a noninvasive diagnostic modality for evaluating MMD. 7T TOF-MRA enables the visualization of the smaller distal intracranial vessels, even the "puff of smoke" collateral network in MMD. We aim to compare 7T TOF-MRA and 3T images for MMD diagnosis.

METHODS 7T TOF-MRA and 3T TOF-MRA data from each patient were collected. 7T TOF-MRA acquisition by a 7T whole-body MR scanner (MAGNETOM Terra, Siemens Healthcare, Erlangen, Germany) equipped with an 8-channel transmitting and 32-channel receiving head coil. 3T TOF-MRA acquisition by a 3T whole-body MR scanner (Discovery MR750; General Electric, Milwaukee, WI, USA) with a 32/8-channel phased-array head coil. Image quality was rated from 0 to 5 (poor to good). Visualization of vascular disease was rated from 0 to 3 (poor to good). Grading the Houkin's grading system of each symptomatic hemisphere by using 7T TOF-MRA and 3T TOF-MRA. Grading the Suzuki staging system of each symptomatic hemisphere by using DSA.

RESULTS Seven MMD patients with 13 symptomatic hemispheres were enrolled (mean age, 40.42 years \pm 6.29, 4 men). The Image quality score of 7T TOF-MRA was better than 3T (4.86 ± 0.38 vs 4.71 ± 0.49). 7T TOF-MRA visualizes the small vascular excellent compared to 3T (3 vs 2.43 ± 0.53). The value 0.745 (95%CI, 0.579-0.911) of Kappa was good for Houkin's grading system assessment between 7T TOF-MRA and 3T. The results of Spearman's correlation showed that the correlation of the Suzuki staging system on DSA was strong with both Houkin's grading system grading on 7T TOF-MRA ($r_s=0.775$, $p=0.002$) and 3T ($r_s=0.695$, $p=0.008$).

CONCLUSION 7T TOF-MRA enables the visualization of the small vessel clearly for MMD patients in a noninvasive way better than 3T.

PO-0198

Predictive Value of Integrated PET/MR Indicators for Early Detection of Ischemic Brain Changes Following CAS Stenting

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Background and Objective: Carotid Artery Stenting (CAS) is an established treatment for carotid artery stenosis. New ischemic brain lesions on diffusion-weighted Images (DWI) appearing perioperatively are one of the common postoperative imaging manifestations, which may be related to the preoperative morphology of the vessel, plaque characteristics, and inflammatory uptake. Therefore, early identification and prediction of new ischemic brain lesions on DWI that may occur within the perioperative period (within 3 days) after CAS stenting are crucial for predicting high-risk patients for recurrent ischemic stroke.

Methods: In this retrospective study, 50 patients who underwent CAS were included. All participants received integrated carotid PET/MR examination before surgery and routine brain MR examination after treatment. Experienced clinicians determined the responsible carotid artery based on symptoms and record reviews. Lumen and outer wall boundaries were segmented on hrVWI, as well as atherosclerotic components, and complicated carotid artery plaques (AHA-lesion type VI) were defined by multi-sequence contrast enhancement. The standardized uptake value and the tissue-to-background ratio quantified the ^{18}F -NaF uptake, and the validated symptomatic carotid atheroma inflammation lumen-stenosis (SCAIL) score included stenosis severity and inflammation measured by PET. Welch, χ^2 , Wilcoxon, or Fisher tests were used to assess statistical significance. The primary outcome was new ischemic brain lesions on DWI, and a multivariate model was established to evaluate the relationship between imaging biomarkers and new infarction changes. **Results:** A total of 50 participants were included in the study (mean age, 65.2 years \pm 6.85 [SD]; 45 were male, 20 of whom had symptomatic carotid stenosis). Of these 50 participants, 33 (66%) exhibited new ischemic brain changes. The new ischemic brain lesions on DWI were located in (26%, 13/50) and/or beyond (38%, 19/50) the territory of the treated artery. In the adjusted model, higher SUV max (>2.86), thin fibrous cap, complicated carotid artery plaques was an independent predictor of new ischemic brain lesions, with an odds ratio (OR) of 9.1 (95% CI: 1.1, 77.8), 5.53 [1.08, 28.18], 7.06 [1.39, 35.87]. Further analysis revealed that the constructed predictive model had an area under the ROC curve (AUC) value of 0.79 for new ischemic brain lesions on DWI.

Conclusion: Integrated carotid PET/MR-related indicators can effectively predict the risk of new ischemic brain lesions on DWI during the perioperative period after CAS stenting, providing important references for early identification of high-risk patients for recurrent ischemic stroke after surgery. Further large-scale randomized controlled studies are necessary to validate the clinical application value of these indicators.

PO-0199

Resolving heterogeneity in depression using individualized structural covariance network analysis

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Objective: we aimed to identify individualized structural covariance aberrance with the help of individualized differential structural covariance network analysis (IDSCN).

Methods: T1-weighted anatomical images of 195 first-episode untreated patients with depression and matched healthy controls (HCs, $n = 78$) were acquired. We obtained IDSCN for each patient and identified subtypes of depression based on shared differential edges.

Results: patients with depression demonstrated tremendous heterogeneity in the distribution of differential structural covariance edges. Despite this heterogeneity, altered edges within subcortical-cerebellum network were often shared by most of patients. Two robust neuroanatomical subtypes were identified. Specifically, patients in subtype 1 often shared decreased motor network related edges. Patients in subtype 2 often shared decreased subcortical-cerebellum network related edges. Functional annotation further revealed that differential edges in subtype 2 were mainly implicated in reward/motivation related functional terms.

Conclusions: In conclusion, we investigate individualized differential structural covariance and identify that decreased edges within subcortical-cerebellum network are often shared by patients with depression. The identified two subtypes provide new insights into taxonomy and facilitate potential clues to precision diagnosis and treatment of depression.

PO-0200

Resolving heterogeneity in obsessive compulsive disorder through individualized differential structural covariance network analysis

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Objective: The high heterogeneity of obsessive compulsive disorder (OCD) denies attempts of traditional case-control studies to derive neuroimaging biomarkers indicative of precision diagnosis and treatment. To handle the heterogeneity, we uncovered subject-level altered structural covariance by adopting individualized differential structural covariance network (IDSCN) analysis.

Methods: The IDSCN measures how structural covariance edges in a patient deviated from those in matched healthy controls (HCs) yielding subject-level differential edges. One hundred patients with OCD and 106 HCs were recruited and whose T1-weighted anatomical images were acquired. We obtained individualized differential edges then clustered patients into subtypes based on these edges.

Results: Patients presented tremendously low overlapped altered edges while frequently shared altered edges within subcortical-cerebellum network. Two robust neuroanatomical subtypes were identified. Subtype 1 presented distributed altered edges while subtype 2 presented decreased edges between default mode network and motor network compared with HCs. Altered edges in subtype 1 predicted the total Yale–Brown Obsessive Compulsive Scale score while that in subtype 2 could not.

Conclusions: We depict individualized structural covariance aberrance and identify that altered connections within

subcortical-cerebellum network are shared by most patient with OCD. These two subtypes provide new insights into taxonomy and facilitate potential clues to precision diagnosis and treatment of OCD.

PO-0201

Prediction of meningioma subtypes using a novel single-shot ultrafast T2 mapping pulse sequence

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This study aims to explore the efficacy of ultrafast T2 mapping using Multiple Overlapping-Echo Detachment Imaging (MOLED) in predicting histological subtypes and Ki-67 index of WHO grade 1 meningiomas. Involving 75 patients, the study compared two different Region-of-Interest (ROI) placements for diagnostic efficiency. Results indicated that T2 histogram parameters could effectively differentiate meningothelial meningiomas from other subtypes in both ROIs ($P = 0.036$ - 0.001 for ROI1 and $P = 0.027$ - 0.001 for ROI2). T2 variance was especially effective, achieving the highest Area Under the Curve (AUC) for both ROIs. Importantly, no significant difference in diagnostic performance between the two ROI placements was found ($P = 0.875$). While the Ki-67 index, a marker for cell proliferation, didn't vary significantly among subtypes, it did show significant correlation with specific T2 histogram parameters. The study validates MOLED's clinical potential in preoperative tumor evaluation.

PO-0202

Mapping of iron deposition gradients in the nigrostriatal system in normal aging and Parkinson's disease

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Objective Degeneration of the nigrostriatal dopaminergic system is the main cause of Parkinson's disease (PD). In this study, the spatial changes (i.e., gradients) of iron deposition in substantia nigra (SN) and striatum were mapped to understand the basal ganglia degeneration in normal aging and PD.

Methods A total of 100 healthy young people, 171 normal elderly and 231 PD patients were enrolled in this study. The brain iron content of all subjects was measured by quantitative susceptibility mapping (QSM). An automatic procedure generate QSM functions along the main axis of a subcortical structure at the individual subject level was used to identify and quantify spatial gradients of iron deposition in individual human brains in vivo.

Results During normal aging, iron deposition along the three main axes of the striatum (caudate and putamen) was significant in almost all segments ($p < 0.05$), except for the most medial caudate nucleus (segment 1 of medial-lateral axis); Iron deposition along the three main axes of the SN was more significant in the anterior, posterior, medial, lateral, and dorsal segments ($p < 0.05$).

In PD patients, SN iron deposition was mainly concentrated in the central parts ($p < 0.05$) compared with normal elderly, and putamen iron deposition was found only in the most dorsal part (segment 7 of the ventral-dorsal axis). In addition, the iron content of the anterior, medial, ventral, and dorsal caudate nucleus was higher in normal elderly than in PD patients ($p < 0.05$).

Conclusion The preliminary results of our study reveal the spatial gradient of iron deposition in the nigrostriatal system in normal aging and PD in vivo, providing more subtle and profound insights into the pathological changes of subcortical nuclei during neurodegeneration.

PO-0203

Artificial Intelligence Imaging for Predicting High-Risk Molecular Markers of Gliomas

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Glioma is the most common primary malignant tumor of the central nervous system. The fifth edition of the World Health Organization Classification of Tumors of the Central Nervous System (WHO CNS5) published in 2021 incorporated high-risk molecular markers of gliomas, which can enhance the grade of gliomas and affect glioma patients' survival and prognosis. It is of great significance for the diagnosis and prognosis of gliomas to noninvasively predict glioma high-risk molecular markers. The current gold standard for determining the molecular type is genetic testing after biopsy, which is invasive and time-consuming. Magnetic resonance Imaging (MRI) is a noninvasive tool that can provide both structural and functional information about gliomas, but it is difficult to comprehensively reflect the high heterogeneity of gliomas. Artificial intelligence (AI) imaging can mine plentiful information and extract valid information from large quantities of medical images for quantitative analysis, providing important molecular information. Herein, we present an overview of AI imaging for predicting high-risk molecular markers of gliomas and discuss the challenges and future perspectives.

PO-0204

Impact of white matter hyperintensity location on outcome in acute ischemic stroke patients: a lesion-symptom mapping study

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Background To investigate the association between white matter hyperintensity (WMH) location and outcomes in patients with their first-ever acute ischemic stroke using lesion-symptom mapping.

Methods Patients with first acute ischemic stroke from September 2021 to September 2022 were recruited. Demographic, clinical, and neuroimaging data were collected at baseline, and modified Rankin Scale (mRS) scores were assessed at 90 days after stroke to evaluate functional outcomes. The association between the location of WMH and clinical outcomes was assessed at the voxel level using voxel-based lesion symptom mapping and further, at the region of interest level employing ordered logistic regression.

Results A total of 137 patients with first-ever acute ischemic stroke were included (mean age, 66 years \pm 13 [SD]; 91 male [66.4%]). Median admission National Institutes of Health Stroke Scale was 3 [IQR, 1-5]. Median total WMH volume was 10.17 cm³ [IQR, 5.36–21.36 cm³]. WMH were associated with poor mRS at 90 days. Specifically, WMH damage in Anterior limb of internal capsule (R), Anterior corona radiata (R), Superior corona radiata (L), Posterior thalamic radiation (L), External capsule (L), Superior fronto-occipital fasciculus (L), Inferior fronto-occipital fasciculus (R), Inferior fronto-occipital fasciculus (L) were implicated in poor mRS.

Conclusion

WMH topography provides valuable anatomical insights into post-stroke prognosis, with specific regions strategically impacting functional outcomes.

PO-0205

Diffusion along the perivascular space as a potential biomarker for glioma grading and IDH1 mutation status prediction

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Background: The diffusion tensor image analysis along the perivascular space (DTI-ALPS) may potentially reflect lymphatic dysfunction in glioma patients. The study aimed to explore the correlation of DTI-ALPS with glioma grade and isocitrate dehydrogenase 1 (IDH1) genotype, and to compare ALPS-index with other diffusion metrics.

Methods: In this study, 81 glioma patients and 31 healthy controls underwent diffusion MRI examination. The ALPS-index, fractional anisotropy (FA), mean diffusivity (MD) and mean kurtosis (MK) were calculated. Comparisons were made between the bilateral hemispheres and between patients and controls. Differences in grade and IDH1 status were compared after age adjustment. Then diagnostic performance of each metric was assessed by receiver operating characteristic (ROC) analysis.

Results: In glioma patients, the ALPS-index ipsilateral to glioma was significantly lower than the contralateral ALPS-index (1.417 ± 0.177 vs. 1.478 ± 0.165 , $P=0.002$), and the bilateral ALPS-index values in patients were significantly decreased compared with those in healthy controls. The ALPS-index was significantly higher in lower-grade gliomas (LrGGs) than that in glioblastomas (GBMs) (1.495 ± 0.151 vs. 1.320 ± 0.159 , $P<0.001$), and was significantly lower in IDH1 wild-type LrGGs than those in IDH1 mutant LrGGs (1.400 ± 0.185 vs. 1.530 ± 0.123 , $P=0.036$). FA, MD and MK also showed significant differences between LrGGs and GBMs, and between IDH1 mutant LrGGs and wild-type LrGGs ($P<0.05$). Furthermore, adding ALPS-index to FA, MD or MK improved the discrimination abilities compared to metric alone. ALPS-index combining MD had the highest area under the curve (AUC) of 0.854 in glioma grading, and had the highest AUC of 0.861 in IDH1 mutation prediction.

Conclusions: The reduced ALPS-index might reflect the tumor-caused lymphatic system impairment and ALPS-index could play a complementary role to conventional diffusion metrics in glioma grading and IDH1 genotyping.

PO-0206

Investigation of grey matter abnormalities in patients with idiopathic generalized epilepsy: A neurite orientation dispersion and density imaging study

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Purpose: Generalized abnormal brain discharges had been considered to be a main clinical features of patients with idiopathic generalized epilepsy (IGE) and may be associated with potential grey matter (GM) alternations. So we used the neurite orientation dispersion and density imaging (NODDI) model to determine the evidence of GM abnormalities in IGE patients.

Materials and methods: 19 IGE patients and 19 Health controls (HCs) were recruited in this study, clinical indicators and multi-shell diffusion images were collected for each participant. NODDI enabled to obtain parameters including neural density index (NDI), orientation dispersion index (ODI), and fractional anisotropy (FA) from diffusion images. Atlas-based analysis was used to

determine the diffusion abnormalities from each specific grey matter label and evaluate the correlations between GM alternations and clinical indicators. Finally, a robust machine learning model classified and ranked all GM features.

Results: IGE patients exhibited extensive reductions of NDI and ODI in GM. The decrease of NDI mainly concentrated in the prefrontal lobe, and the decrease of ODI almost accumulated in all the lobe. FA was only decreased in few GM. Moreover, the decreases of NDI and ODI in the GM especially the left orbitofrontal lobe were negatively correlated with the duration of IGE and the Quality of life in epilepsy-31 (QOLIE-31) scores. Machine learning indicated that the ODI in left margin superior gyrus may be a vital GM feature for IGE.

Conclusions: GM abnormalities, especially the decrease of neurite density and dispersion, are one of the characteristics of IGE and may reveal the neurophysiological mechanism of abnormal discharge in IGE patients.

PO-0207

Static changes in intrinsic brain activity in first-episode patients with obsessive-compulsive disorder

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Objective: Obsessive-compulsive disorder (OCD) is one of the top ten disabling diseases in the world and the fourth most common emotional disorder in clinical practice, with an annual prevalence rate of 1.1% -1.8% and a lifetime prevalence rate of about 1% -3%. However, the awareness rate of OCD among the general public (22.5%) and the treatment rate of OCD patients (34%) in China both are low. The most important reason is that the mechanism of OCD occurrence and development is not yet clear, this seriously hinders clinical diagnosis and treatment. Existing research has shown that drug use can affect changes in brain structure and function in patients with OCD. Our aim is to investigate the changes in brain neuronal functional activity during resting state in first-episode patients with OCD.

Method: 103 first-episode patients with OCD (49 females, average age 23.1 years) and 106 normal controls matched in age, gender, and education years (53 females, average age 23.1 years) were included. The resting-state functional magnetic imaging (rs-fMRI) scan was performed on a 3.0 Tesla MR scanner (Discovery MR750, General Electric, Milwaukee, WI, USA). All subjects were asked to close their eyes but to stay awake during the scan, without thinking about anything in particular. The rs-fMRI data were preprocessed by the Data Processing Assistant for Resting-State fMRI Analysis Toolkit (DPARSF), including deleting the first five volumes, removing head movements, spatial standardization, trending, time bandpass filtering, linear regression, spatial smoothing, and calculating frame level displacement at time points. Using a dual sample t-test, analyze whether there are statistically significant brain regions in the amplitude of low frequency fluctuation (ALFF) between the patient group and the control group.

Result: Compared with the control group, patients with OCD showed significant differences in left anterior cerebellar lobe (Number of voxels = 147, Peak MNI coordinate = 0, -48, -9, $t = -4.686$, $p < 0.001$), left medial frontal gyrus (Number of voxels = 59, Peak MNI coordinate = -12, -33, 63, $t = -4.705$, $p < 0.001$), left central posterior gyrus (Number of voxels = 44, Peak MNI coordinate = -42, -2, 57, $t = -4.633$, $p < 0.001$), right lingual gyrus (Number of voxels = 39, Peak MNI coordinate = 24, -57, -6, $t = -4.261$, $p < 0.001$) and right occipital lobe (Number of voxels = 33, Peak MNI coordinate = 30, -87, -9, $t = -4.259$, $p < 0.001$), which had reduced ALFF value, and no brain regions with elevated ALFF values were found.

Conclusion: First-episode patients with OCD exhibit spontaneous changes in neuronal activity in their brain regions during resting state, which may provide objective basis for further exploration of the pathogenesis and development of OCD.

PO-0208

The moderation effect of COVID-19 infection on the association between hyperarousal-related neural substrates and anxiety during the 1st wave of COVID-19 in China

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Objective—PTSD is characterised by three core clusters of posttraumatic symptoms, together with disturbances in emotion regulation. One of its core symptoms, hyperarousal, which appears to be a physiological overreaction to the trauma, may represent an individual genetic susceptibility phenotype that can vary between individuals, rather than an acquired deficit. The present study examined the relationship between hyperarousal-related brain structural differences and anxiety disorders that are highly comorbid with PTSD, with hyperarousal as a mediator of this relationship. This study also examined the participants' COVID-19 infection status as a moderating factor in the mediated model.

Method—The total sample of 310 participants underwent neuropsychological measures and MRI scans, including Individuals with mild SARS-COV2 infection (COV+) (n=245) during the acute infectious phase (<28 days) and 65 healthy controls (COV-). Data analysis was performed using the SPSS PROCESS macro.

Results—Results show that GMV of the ventral anterior cingulate cortex (VACC) is negatively associated with hyperarousal. Furthermore, hyperarousal fully mediated the relationship between GMV in the VACC and anxiety symptoms. In the moderated mediation model, an individual's infection status significantly moderates the indirect effect of GMV in the VACC on anxiety by strengthening the mediating effect of hyperarousal on anxiety, which has no significant effect on uninfected individuals.

Conclusion—Our results suggest that the hyperarousal factor of PTSD acts as an important link from GMV in the VACC to anxiety disorders. This may provide novel insights into the neuroanatomical basis of hyperarousal vulnerability and contribute to the early identification of individuals at high risk of developing anxiety in a stressful environment similar to the COVID-19 pandemic.

PO-0209

Improved Brain Structural Health Related to Body Weight and Waist-to-hip Ratio Loss Especially among Overweight and Obese adults

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Objective: This study aimed to examine the associations of long-term variability in general and central adiposity with neuroimaging metrics that approximate brain structural health.

Materials and Methods: This prospective cohort study recruited 1,114 participants aged 25-83 years from the META-KLS study, a subset of brain MRI acquisition within the Kailuan study. BMI and WHR variability during 12-year follow-up were calculated as the average slope incorporating all 7 biennial measurements respectively. We applied generalized linear models to investigate the associations of BMI and WHR variability with MRI markers of brain tissue volumes, white matter microstructural integrity, white matter hyperintensity, and cerebral small vessel diseases. **Results:**

Progressive weight gain during follow-up was associated with decreased global FA (beta = -0.19, 95% CI -0.35 to -0.02) and increased MD (beta = 0.16, 95% CI 0.01 to 0.31) and RD (beta = 0.18, 95% CI 0.03 to 0.33). Weight loss was also associated with a lower burden of PWMH (beta = -0.24, 95% CI -0.47 to -0.02) and a lower risk of moderate-to-severe BG-EPVS (odds ratio (OR) = 0.41, 95% CI 0.21 to 0.83). Among overweight populations, weight loss was linked with decreased volumes of WMH (beta = -0.47, 95% CI -0.79 to -0.15), PWMH (beta = -0.57, 95% CI -0.88 to -0.26), and DWMH (beta = -0.36, 95% CI -0.69 to -0.03), as well as lower risk of CSVD (OR = 0.22, 95% CI 0.08 to 0.62) and imaging markers of lacune (OR = 0.12, 95% CI 0.01 to 0.91) and moderate-to-severe BG-EPVS (OR = 0.24, 95% CI 0.09 to 0.61). Additionally, we observed that in adults classified as central obesity, WHR loss was positively associated with an increase in gray matter volume (beta = 0.50, 95% CI 0.11 to 0.89), hippocampus (beta = 0.62, 95% CI 0.15 to 1.09), and parahippocampal gyrus volume (beta = 0.85, 95% CI 0.34 to 1.37).

Conclusion: Progressive weight gain was associated with impaired white matter integrity. Weight and WHR loss were suggestively associated with improved general brain structural health. This present study contributes to a better understanding of the integrated relationship between variations in general and central adiposity and brain structural sub-health, especially in the early-stage prevention of adiposity causes of Alzheimer's disease, dementia, and stroke.

PO-0210

Disastrous Cerebral and Ocular Complications after Cosmetic Facial Filler Injections

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Purpose: To investigate the clinical and radiological features of severe cerebral and ocular complications caused by cosmetic facial filler injections.

Methods: Patients with cerebral or ophthalmic complications from facial augmentation with filler injections from January 2017 to August 2023 were retrospectively obtained. The clinical, computed tomography (CT), magnetic resonance imaging (MRI), and digital subtraction angiography (DSA) findings were described and analysed.

Results: The patients with facial cosmetic filler injections were composed of twelve women with a mean age of 38.5 years (range, 22–61 years). Injected materials included hyaluronic acid (n = 10) and autologous fat (n = 2), and injection sites were the nose region (n = 5), glabellar (n = 3), cheek (n = 3), and preorbital (n = 1), respectively. The affected arteries included the central (n = 6) or branch (n = 2) retinal artery, ophthalmic artery (n = 4), and supraorbital artery (n = 1). Multifocal cerebral infarction was found in 5 patients (41.7%), with multiple haemorrhagic transformations in one patient and subarachnoid haemorrhage in another. Plain head CT scans revealed no abnormalities. CTA showed right ophthalmic artery occlusion (OAO) in three patients (25.0%). DSA showed complete or partial OAO in two patients (16.7%) and one patient had an occlusion of the left middle cerebral artery (MCA) with an embolism.

Conclusion: Radiological examinations are crucial to demonstrating severe complications, and brain MRI is especially strongly suggested in patients with cosmetic filler-induced vision loss to identify asymptomatic cerebral infarctions. Extreme caution and care should be taken during facial injections by plastic surgeons.

PO-0211

The prevalence of abnormal brain morphology in neurological disorders

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Objective To quantify and depict specific global and regional brain involvement rates across various neurological diseases, including inflammatory demyelinating diseases, autoimmune diseases affecting the central nervous system (CNS), neurodegenerative diseases, and cerebrovascular disease.

Method Based on brain charts, we investigated multiple neurological diseases, including inflammatory demyelinating diseases (MS, NMOSD, and MOGAD), autoimmune diseases affecting the central nervous system (NPSLE), neurodegenerative diseases (MCI, AD, PD), and cerebrovascular disease (cSVD) about normative structural brain changes across the lifespan to examine the prevalence of global and regional MRI phenotypes. Extreme negative deviations of MRI phenotypes were defined by centile scores < 2.5%. Correlations between centile scores of neurological diseases and cognition scores (MMSE and MoCA) were analyzed.

Results The highest proportion of extreme negative deviations of regional MRI phenotype was the entorhinal cortex in AD, MCI and MS (37.5%, 12.9% and 12.0%, respectively), the precentral gyrus in PD (12.4%), the lateral occipital gyrus in NMOSD (8.7%), the parahippocampal gyrus in MOGAD (18.5%), precuneus in NPSLE (11.8%) and inferior parietal gyrus in cSVD (6.0%). Among disorders in each global MRI phenotype, the highest proportion of extreme negative deviations of GMV and meanCT was seen in AD patients (18.0% and 27.9%, respectively). The highest proportion of extreme negative deviations of sGMV and WMV was seen in MS patients (26.3% and 12.2%, respectively). The highest proportion of extreme negative deviations of TCV and SA was seen in MOGAD (11.8%) and NPSLE patients (11.8%), respectively. A greater number of extreme negative deviations were associated with worse cognitive function in multiple neurological disorders.

Conclusions Based on brain charts, multiple neurological disorders showed the distinct prevalence of structure alterations, spatial patterns and heterogeneity characteristics. Individualized normative maps of brain charts provide an important clinical tool for screening, preclinical/prodromal prognosis and monitoring.

PO-0212

The effect of LRRK2 mutations on the cholinergic system in manifest and premanifest stages of Parkinson's disease: a cross-sectional free-water imaging study

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Background: Markers of neuroinflammation exhibit elevated levels in some patients with LRRK2 Parkinson's disease (PD) compared with patients with idiopathic PD, suggesting possible differences in disease pathogenesis. An acetylcholinesterase PET study has suggested enhanced cholinergic activity and preserved cholinergic innervation in LRRK2 mutation carriers. Free-water imaging can predict and monitor dopamine system degeneration in patients with PD, and can also enhance the sensitivity of conventional diffusion tensor imaging (DTI) metrics for indexing neurodegeneration. We postulated that individuals with LRRK2 mutations might show abnormalities of free-water content in the cholinergic system using free-water imaging, even before the diagnosis of PD.

Methods: Between June, 2010, and May, 2023, we recruited participants from the Parkinson's Progression Markers Initiative (PPMI) study from 33 participating sites worldwide. LRRK2 carrier status was confirmed by genetic sequencing. We evaluated the effect of LRRK2 mutations on the cholinergic system (i.e. cholinergic basal forebrain and pedunculo pontine nucleus) in manifest and premanifest stages of PD using the free-water imaging. We compared free-water values between groups using ANCOVA, with adjustment for age based on the results of linear regression analysis. Then, the discriminative power of the free-water content was evaluated by receiver operating characteristic curve (ROC) analysis. In addition, partial correlation analyses were performed adjusting for age to determine the relationship between free-water content and clinical characteristics in PD patients.

Results: We recruited 27 patients with LRRK2 PD, 33 LRRK2 mutation carriers without PD, 281 patients with idiopathic PD, and 98 healthy controls. We noted significant between-group differences in free-water content in Ch4 ($p=0.003$). LRRK2 mutation carriers without PD had decreased free-water content in the Ch4 compared with healthy controls ($p=0.036$), and idiopathic PD patients ($p=0.001$); LRRK2 PD patients showed decreased tendency of free-water content in the Ch4 compared with idiopathic PD patients ($p=0.074$). Free-water content was associated inversely with age in all participants and healthy controls only. Furthermore, ROC analysis showed that free-water content in the Ch4 identified asymptomatic LRRK2 mutation carriers with a high specificity (84.7%). In addition, partial correlation analyses showed negative correlations between free-water content in the Ch4 and olfaction score in idiopathic PD patients ($p=0.013$, $r=-0.15$) and in pooled PD patients ($p=0.017$, $r=-0.137$).

Conclusion: LRRK2 mutation is associated with decreased free-water content in the Ch4 (also referred to as nucleus basalis of Meynert, nbM), which might suggest early and sustained attempts to compensate for LRRK2-related dysfunction. As an objective non-invasive and non-radiative neuroimaging technique, free-water imaging has the potential to be applied as an alternative imaging technique to PET to identify asymptomatic LRRK2 mutation carriers. In addition, increased free-water content in the nbM is associated with worse olfaction in PD patients.

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PO-0213

Cerebellar functional network topology and alterations in motor circuit connectivity in spinocerebellar ataxia type 3

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Objective To investigate the functional topological characteristics of cerebellar network connectivity and the role of functional connectivity (FC) in cerebellar-brain stem-thalamo-basal ganglia-cortical motor circuit in SCA3.

Materials and Methods Resting-state functional magnetic resonance imaging (rs-fMRI) from 17 SCA3 patients and 17 healthy controls (HCs) were analyzed using graph-theoretical approach for cerebellar functional network topology. Seed-based FC analyses at both voxel and region-of-interest levels were done for the cerebellar-brain stem-thalamo-basal ganglia-cortical motor circuit. Significant functional modifications of cerebellar network and motor circuit were correlated with disease duration, CAG repeats, and clinical scores.

Results SCA3 patients exhibited small-world organization, hierarchy manners and modular structures in cerebellar functional network, without significant topological changes. Modularity showed increased inter-modular connectivity between frontoparietal network and dorsal somatomotor network, and decreased intra-modular connectivity in cerebellar default mode network and the data-driven module2 in SCA3. Seed-based analyses for motor circuit demonstrated losses of dentate FC with left frontal cortex, pallidum FC with right thalamus, caudate

FC with left thalamus, red nucleus (RN) FC with bilateral thalamus. Within the motor circuit network, FC between thalamus and pallidum as well as thalamus and RN were lower. Further analysis showed significant correlations between aberrant FC alterations and CAG repeats, disease duration, and clinical scores.

Conclusion Our findings indicate a relatively preserved cerebellar functional topological architectures in SCA3, with specific modular alterations of cerebellar network and FC changes in key regions of motor circuit correlated to clinical variables, deepening the understanding of the cerebellar role in SCA3.

PO-0214

Changes in brain susceptibility in Wilson's disease patients: A quantitative susceptibility mapping study

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***Purpose:** To reveal changes in the susceptibility of the caudate nucleus (CN), putamen (Put), and globus pallidus (GP) in patients with neurological and hepatic Wilson's disease (WD) by quantitative susceptibility mapping (QSM).

***Methods and Materials:** We retrospectively analyzed brain MRI images of 33 patients diagnosed with Wilson's disease (WD) and 20 age-matched controls. All subjects underwent brain T1-weighted, T2-weighted, and QSM images using a 1.5T MRI scanner. The QSM maps were calculated using STISuite toolbox. The quantitative susceptibility of the CN, Put, and GP was analyzed using region-of-interest analysis on QSM maps. The differences among the neurological WD patients, hepatic patients, and controls were compared.

***Results:** Susceptibility values were significantly higher in all examined structures (CN, Put, GP) in patients with neurological WD compared to controls (all $P < 0.05$) and hepatic WD patients (all $P < 0.05$). No statistically significant differences were found in susceptibility values between patients with hepatic WD and controls (all $P > 0.05$).

***Conclusions:** The QSM technique is a valuable tool for detecting changes in susceptibility in the brain of WD patients, indicating abnormal metal deposition. Notably, our findings suggest that neurological WD patients exhibit more severe susceptibility changes than hepatic WD patients. Therefore, QSM can be utilized as a complementary method to detect brain injury in WD patients.

PO-0215

Histogram analysis of MR perfusion imaging for glioma genotyping

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Objectives To compare the diagnostic performance of histogram features of dynamic contrast enhanced (DCE) MRI and dynamic susceptibility contrast (DSC) MRI in predicting IDH, TERT, MGMT and 1p/19q genotyping and to explore their association with Ki-67 and microvascular density (MVD).

Methods Forty-four patients with brain glioma were enrolled prospectively from December 2020 to August 2022, which include 22 IDH mutant - 22 IDH wild type, 29 TERT mutant - 15 TERT wild type, 28 MGMT methylated - 16 MGMT unmethylated, 16 1p19q codeletion - 28 1p19q non codeletion. The volume transfer constant (K_{trans}), wash-out constant (k_{ep}), extravascular extracellular volume fraction (V_e), plasma volume fraction (V_p), area under the curve (AUC),

maximum concentration of contrast agent (Maxconc), maximum slope of the time signal curve (Maxslope) were calculated from DCE. Histogram features of whole tumor were extracted. The mean, maximum and minimum of relative cerebral volume (rCBV) of DSC were calculated. Immunohistochemical staining of Ki-67 and microvascular density (MVD) was performed. Comparisons between groups were performed according to different genotypes status. Spearman rank correlation was used to analyze correlation between histogram features and Ki-67, MVD.

Results A total of 44 participants (25 males, 19 females; mean age, 53.3 ± 14.5) with grade 2 ($n = 9$), grade 3 ($n = 14$), and grade 4 ($n = 21$) gliomas were included. The kep-skewness, rCBV-max, Ktrans-median and Ve-kurtosis, AUC-energy provided optimal differential diagnostic efficiency for IDH, TERT, MGMT and 1p19q, respectively (AUC=0.808, 0.725, 0.830, 0.862). The Ve - 5th and Ve - 90th have significant and positive correlation with Ki-67 and MVD ($p < 0.001$, $r = 0.699$, 0.738).

Conclusion Histogram features based on DCE-MRI and DSC-MRI can serve as imaging markers to predict glioma genotyping.

PO-0216

3-dimensional MR neurography shows unclear distal brachial plexus in amyotrophic lateral sclerosis (ALS): a case-control study

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Objective: To assess whether the display of unclear distal brachial plexus is different between amyotrophic lateral sclerosis (ALS) patients and healthy controls (HCs) and between ALS patients and chronic inflammatory demyelinating polyneuropathy (CIDP) patients.

Methods: 22 ALS patients, 15 CIDP patients and 19 HCs were evaluated on 3D MR neurography using a four-point grading scale by two neuroradiologists. Kruskal-Wallis test was used to assess the differences in nerve scored values. The differences in cross-sectional area (CSA) of brachial plexus nerve roots were assessed. The correlation between nerve scored values and ALSFRS-R (the revised ALS Functional Rating Scale) values, ALSFRS-UL values (upper limb score of ALSFRS-R) and duration of symptom of ALS patients was assessed.

Results: Interobserver agreement was excellent. There were statistically significant differences in nerve scored values between ALS patients and HCs ($P < 0.001$) and between ALS patients and CIDP patients ($P < 0.001$). The CSA of nerve roots was significantly larger in CIDP than in ALS and in HCs ($p < 0.001$). No difference was found between ALS patients and HCs. No clear correlation exists between the nerve scored values and ALSFRS-R values, ALSFRS-UL values and duration of symptom in ALS patients.

Conclusions: 3D MR neurography showed more unclear distal brachial plexus in ALS than in HCs and in CIDP, which reflect the pathophysiological changes of ALS. However, further prospective study is needed to ascertain whether the unclear distal nerve observed in 3D MR neurography can be helpful in diagnosing ALS and is associated with disease course and severity.

PO-0217

Neuromelanin magnetic resonance imaging of substantia nigra and locus coeruleus in Parkinson's disease with freezing of gait

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Background: The downregulation of monoamines, especially dopamine in substantia nigra (SN) and norepinephrine in locus coeruleus (LC), may be responsible for freezing of gait (FOG) pathological basis in Parkinson's disease (PD).

Methods: Thirty-two Parkinson's disease patients with freezing of gait (PD-FOG), 32 Parkinson's disease patients without freezing of gait (PD-NFOG) and 32 healthy controls (HC) underwent neuromelanin magnetic resonance imaging (NM-MRI). The volume, surface area and contrast to noise ratio (CNR) of SN and LC were measured and compared. The correlation analyses were conducted between the measurements of SN and LC with clinical symptoms. We plotted the receiver operating characteristic (ROC) curve and determined the sensitivity and specificity of the CNR of SN and LC for discriminating the PD-FOG from the PD-NFOG.

Results: Both PD-FOG and PD-NFOG showed decreased volume, surface area and CNR of SN compared with HC. The PD-FOG exhibited decreased volume and surface area of LC compared with both PD-NFOG and HC groups, and decreased CNR of LC compared with HC group. The volume, surface area and CNR of SN were negatively correlated with the Unified Parkinson's Disease Rating Scale part III scores. The illness durations in PD patients were negatively correlated with the volume, surface area of SN, while not the CNR. And the volume and surface area of LC were negatively correlated with new freezing of gait questionnaire scores. ROC analyses indicated that the area under the curve (AUC) was 0.865 and 0.713 in the CNR of SN and LC, respectively, in PD versus HC, whereas it was 0.494 and 0.637 respectively, in PD-FOG versus PD-NFOG. Among these, for discriminating the PD from the HC, the sensitivity and specificity in the CNR of the SN was 90.6 and 71.9%, respectively, when the cut-off value was set at 2.101; the sensitivity and specificity in the CNR of the LC was 90.6 and 50.0%, respectively, when the cut-off value for CNR was set at 1.411.

Conclusion: The dopaminergic changes in the SN were found across both PD-FOG and PD-NFOG, whilst LC noradrenergic neuron reduction was more evident in PD-FOG.

PO-0218

Clinical and radiological differentiation between Trousseau syndrome and cardiogenic embolism

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Objective: This study aimed to discuss the differentiation of clinical and radiographic characteristics between Trousseau syndrome and cardiogenic embolism, with acute multiple cerebral infarction as the main manifestation.

Methods: We retrospectively analyzed 69 patients with Trousseau syndrome and 105 patients with cardiogenic embolism who were treated at Shandong Provincial Hospital between August 2018 and October 2022. Patient clinical baseline data, laboratory tests, imaging, and other related data were collected for analysis.

Results: Between the two groups, diabetes, hemoglobin, triglyceride, low-density lipoprotein, C-reactive protein, creatinine, uric acid, D-dimer, and fibrin degradation products were significantly different ($P < 0.05$). In addition, multifactorial logistic regression analysis suggested D-dimer and

triglyceride as independent risk factors for Trousseau syndrome. The predominantly malignant cancer in the Trousseau syndrome group was digestive system cancer. Regarding the radiographic characteristics, the infarctions in the Trousseau syndrome group were widely distributed in multiple arterial supply areas. More importantly, bilateral anterior + posterior circulation was also an independent risk factor for Trousseau syndrome. However, in the cardiogenic embolism group, the infarctions were mostly located in a concentrated distribution of a single arterial supply area.

Conclusions: Trousseau syndrome and cardiogenic embolism are significantly different in many ways. When unexplained multiple cerebral infarctions occur in the cancer-prone age group, and there are abnormalities in lipids and D-dimer levels as well as infarction foci involving multiple arterial blood supply areas, it suggests a high probability of Trousseau syndrome.

PO-0219

Spinal cord change patterns in normal aging population and multiple neurological diseases

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OBJECTIVE To investigate the clinical relevance of spinal cord changes in the normal population and multiple neurological disorders including multiple sclerosis (MS), neuromyelitis optica spectrum disorders (NMOSD), Alzheimer's disease (AD), Parkinson disease (PD), and cerebral small vessel disease (CSVD).

METHOD The mean upper cervical cord area (MUCCA) and compression ratio (CR= anteroposterior diameter/transverse diameter) were obtained on 3D T1-weighted images using Spinal Cord Toolbox (SCT) and compared between disease groups and HC. The correlation of MUCCA with brain gray matter region and clinical variables was analyzed.

RESULTS The MUCCA was smaller in older (>60 years) than middle-aged HC (45~60 years), while there was no significant difference between middle-aged and young HC (≤45 years). MUCCA of patients in all disease groups except AD was smaller than age- and sex-matched HC. CR increased in group MS, decreased in group PD, and did not change significantly in group AQP4+NMOSD, AD, and CSVD. Among atrophied gray matter regions in comparison with HC, the strongest correlations with MUCCA were observed for atrophy of thalamus in MS, AQP4+NMOSD and AD, pallidum in PD, and accumbens in CSVD. MUCCA was associated with worse scores on the Mini-Mental State Examination (MMSE) and Expanded Disability Status Scale (EDSS) in MS, and MMSE, Montreal Cognitive Assessment (MOCA) in NMOSD, and MMSE in AD.

CONCLUSIONS Spinal cord atrophy is a common feature of normal aging and accelerates in neuroinflammatory, neurodegenerative, and vascular diseases. The morphology of spinal cord atrophy varies significantly in different diseases. MUCCA could serve as a generic inflammatory MRI marker in a wide range of neurodegenerative diseases.

PO-0220

Primary Ewing's sarcoma Peripheral Primitive Neuroectodermal Tumor of the lateral ventricle: a case report and literature review

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Background Ewing sarcoma (ES) and peripheral primitive neuroectodermal tumors (pPNETs) are extremely rare neoplasms, which is most frequently arises from skeletal bone. Central nervous system (CNS) involvement by Ewing sarcoma (ES) is rare, with an incidence of about 1 per 100 patients and to-date few case reports have been published in lateral ventricle.

Case Description We report a rare case of Lateral Ventricular PNET and highlight its neuroimaging features, outcome and literature review. The details are described below. A 40-year-old male was admitted to the hospital with headache, dizziness over half month, which aggravated in the last 3 days. MRI showed a 7.0×3.3×3.3cm Oval cyst solid mixed signal mass density lateral ventricle with mild peritumoral edema. The mass was successfully removed under neuro-navigation and electrophysiological monitoring. The entire mass was removed, and postoperative pathology indicated an ES pPNET diagnosis, with an EWSR1 gene rearrangement. Subsequently, the patient underwent disciplinary radiotherapy.

Conclusion The diagnosis of primary lateral ventricular ES/pPNETs depends on the comprehensive consideration of histological examination, immunohistochemical analysis, and genetic detection. The diagnosis of it by radiographical examination is often difficult because of its similarity to other brain tumors.

PO-0221

Assessment of acid-base metabolism in chronic ischemic brain tissue by amide proton transfer weighted imaging

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Objective: Application of magnetic resonance amide proton transfer weighted (APTw) imaging to explore the changes of acid and base metabolism in brain tissue of chronic ischemic cerebrovascular disease (CICVD) patients.

Methods: From January 2021 to July 2022, thirty-nine patients with CICVD in West China Hospital of Sichuan University were retrospectively included. All of these patients received computed tomography perfusion (CTP) imaging and APTw imaging. The APTw values were measured according to the site of impaired perfusion as shown by the CTP. Normal-appearing white matter (NAWM) in the ipsilateral cerebral hemisphere, contralateral cerebral hemisphere, and ipsilateral cerebellar hemisphere whose perfusion was normal were selected as references. The APTw signals of cerebral tissue with perfusion impaired were compared with NAWM APTw signals of cerebellum and cerebellum.

Results: The average APTw value of cerebral perfusion-impaired tissue was 0.40 ± 0.19 , and the minimum APTw value was 0.16 ± 0.27 . The average and minimum APTw values of cerebral tissue with perfusion impaired were significantly lower than those of ipsilateral cerebral hemisphere NAWM ($P < 0.001$), contralateral cerebral hemisphere NAWM ($P < 0.001$), and ipsilateral cerebellar hemisphere NAWM ($P < 0.001$). And the mean and minimum APTw values of NAWM in the cerebellar hemispheres on the same side of cerebral perfusion impaired tissue were significantly higher than those in the cerebellar hemispheres ($P < 0.001$).

Conclusions: APTw values reflect the pH level of acid-base metabolism in brain tissue. And this imaging technique can effectively detect the changes of brain microenvironment caused by impaired cerebral hemodynamics in patients with chronic ischemia.

PO-0222

Time-variant and Tissue-Level Collaterals Predict Perioperative Neurological Recovery and Clinical Outcomes of Patients with Endovascular Thrombectomy

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Purpose: Comprehensive collateral status assessment can provide deeper insights into the ischemic mechanism in patients with acute ischemic stroke (AIS). To investigate whether time-variant and tissue-level collateral characteristics can help to predict perioperative neurological recovery and clinical outcomes of patients with endovascular thrombectomy (EVT).

Materials and Methods: In this retrospective study, AIS patients with anterior large-vessel occlusion who underwent multiphase CT angiography (mCTA) and CT Perfusion (CTP) on admission and treated with EVT between May 2020 to Dec 2022 were enrolled. Time-variant collateral score was defined as the collateral score on color-coded summation maps (CSCC) of mCTA. Hypoperfusion intensity ratio (HIR) was derived from CTP. Multivariable logistic regression analysis was used to assess the association between CSCC, HIR and 90-day mRS. Mixed effect model was established to estimate the fixed effect of the time and collateral stratification on perioperative NIHSS.

Results: A total of 128 patients underwent EVT (97 men [75.78%]; median age, 64 years [interquartile range, 57-69 years]) were included. CSCC (OR, 0.502 [95% CI, 0.270-0.890]; $P = .02$) and HIR (OR, 50.601 [95% CI, 5.075-616.948]; $P = .001$) were independently associated with 90-day mRS. The area under the ROC curve of combined model was 0.828 (95% CI: 0.757, 0.898; $P < .001$). Mixed effect models revealed significant group \times time interaction effects ($P < .01$ at all time points) in HIR stratification, and it was the better indicator in determination of perioperative neurological recovery than CSCC stratification (akaike information criterion: HIR = 4600 vs CSCC = 4649).

Conclusion: CSCC and HIR could provide time-variant and tissue-level characteristics of collateral status to predict clinical outcomes of patients with EVT, and HIR stratification could provide more prominent information to predict the trend of perioperative neurological recovery.

PO-0223

Temporal region associated functional and effective connectivity relate to psychotic symptoms in drug-naïve first-episode adolescent-onset schizophrenia

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Objective: The objective of present study was to investigate the functional brain substrates of psychotic symptoms in patients with adolescent-onset schizophrenia (AOS).

Methods: Twenty-one patients with AOS and 20 healthy controls (HCs) were recruited and scanned with resting-state functional magnetic resonance imaging (rs-fMRI). They were matched in sex, age, and education level. Regional homogeneity (ReHo) was used to investigate the alteration in local connectivity between the diagnostic groups. Regions with significant ReHo changes in AOS patients was selected as “seeds” for further functional connectivity (FC) and Granger causality analysis (GCA), and the obtained functional brain measures were then related to psychotic symptoms in patients with AOS.

Results: Compared with HCs, the AOS group showed significantly increased ReHo in the right middle temporal gyrus (MTG), which was positively correlated with Positive and Negative Syndrome Scale-positive scores (PANSS-P) and Psychotic Rating Scales (PSYRATS) scores. With this seed, FC analysis further indicated that the AOS patients had significantly lower connectivity with the bilateral postcentral gyrus (PCG) but significantly higher connectivity with the right precuneus than healthy participants. The reduced FC between right MTG and bilateral PCG exhibited a significant positive correlation with PSYRATS scores. The GCA indicated a negative feedback effect from the seed area (the right MTG) to the left middle frontal gyrus (MFG), and also a negative feedback effect from right MFG to the seed area in AOS patients, but such effects did not significantly differ from HCs.

Conclusion: The right MTG showed abnormal local connectivity, and functional connectivity/effective connectivity with regions within default mode network that were correlated to the hallucination and delusion ratings, representing a pivotal substrate for psychotic symptoms in AOS.

PO-0224

Application of spinal subtraction and bone background fusion CTA in the accurate diagnosis and evaluation of spinal vascular malformations

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Background: Accurate pre-treatment diagnosis and assessment of spinal vascular malformations (SVMs) using spinal CTA are crucial for patient prognosis. But the post-processing reconstruction may struggle to fully visualize the lesions due to the complexity inherent in spinal anatomy.

Objective: To explore the application value of the spinal bone background fusion CTA (SBBFF-CTA) technique in precisely visualizing and localizing SVMs lesions.

Methods: In this retrospective study, patients (from Nov 2017 to Nov 2022) presenting symptoms similar to SVMs, were divided into diseased group (Group A) and non-diseased group (Group B). All patients underwent spinal CTA using Siemens dual-source CT. The MPR, routine bone

subtraction (RBS-CTA), and SBBFF-CTA images were obtained through Snygo.via and ADW4.6 post-processing reconstruction workstation. Multiple observers researched the following three aspects: (a) preliminary screening capability by MPR-CTA; (b) the accuracy and stability of the SBBFF-CTA technique; (c) diagnostic evaluation by three types of images. The diagnostic performance used receiver operating characteristics analysis, while reader or image differences used the Wilcoxon signed-rank test or the Kruskal-Wallis rank sum test.

Results: Sixty-three patients (Group A/B: 22/27 patients, mean age \pm SD, 44.0 years \pm 14.3/44.6 years \pm 15.2, 13/16 men) were evaluated. Junior doctors showed lower diagnostic accuracy/sensitivity using MPR-CTA (85.7%/77.3%) compared to senior doctors (93.9%/90.9% and 98%/95.5%). Short-term trained juniors achieved SBBFF-CTA image accuracy similar to experienced doctors ($P > 0.05$). In terms of visualization and localization of SVMs lesions (nidus/fistula, feeding artery, and drainage vein), both MPR and SBBFF-CTA outperformed RBS-CTA ($P = 0.000$). Compared to MPR, using SBBFF-CTA allowed less-experienced doctors to achieve superior diagnostic capabilities (comparable to experienced radiologists) more rapidly ($P < 0.05$).

Conclusion: The SBBFF-CTA technique exhibits excellent reproducibility and enables accurate pre-treatment diagnosis and assessment of SVMs with higher diagnostic efficiency, particularly for junior radiologists.

PO-0225

A chain multiple mediation model analysis reveals the distinct relationship among inflammation, white matter and recognition in individuals at different levels of risk for developing BD

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Objective: This study aims to investigate potential differences in plasma interleukin-6 (IL-6) levels, white matter microstructural (WM) alterations, and cognition between bipolar disorder (BD) offspring of parents with and without subthreshold mood symptoms. Additionally, we explore the inflammation-WM-cognition relationship to identify any distinctive patterns.

Methods: A total of seventy-six bipolar offspring were enrolled and divided into two groups based on the presence or absence of subthreshold mood symptoms: asymptomatic offspring (AO) ($n=41$) and symptomatic offspring (SO) ($n=35$). The groups were matched for age, sex, and education. DTI data were collected using a Philips Achieva 3T MR scanner, plasma IL-6 levels were measured using ELISA, and cognition was assessed using the MATRICS Consensus Cognitive Battery (MCCB) tool. To further understand the relationship between inflammatory factors, WM alterations, and cognition in AO and SO groups, a mediation chain model was employed. In the model, the group (AO=0, SO=1) served as the independent variable, BACS symbol coding scores as the dependent variable, IL-6 levels and FA values of forceps major as mediator 1 and mediator 2, respectively.

Results: The SO group exhibited higher IL-6 levels ($t=2.80$, $P=0.07$), lower BACS symbol coding scores ($t=-2.27$, $P=0.03$), and decreased FA values of forceps major (FM) ($t=-2.75$, $P=0.008$) compared to the AO group. In the mediation chain model, after adjusting for age and sex, the regression equation effect was significant ($R^2=0.34$, $F=12.51$, $P<0.01$). Bootstrapping analysis with 5000 iterations showed a direct effect from the group to the symbol coding scores of BACS as -5.6359 [-11.0182 to -0.2536]. Relative to the AO group, the indirect effects were found to be -0.003 [-0.1355 to 0.1512] from the IL-6 mediator to the symbol coding scores of BACS, -0.1844 [-0.4191 to -0.0284] from the IL-6 level to the FA value of FM, and -0.0597 [-0.1508 to -0.0082] for the mediated effect of IL-6 and FA values of FM mediators to the symbol coding scores of BACS, and the total indirect effect was -0.2443 [-0.4954 to -0.437].

Conclusion: In individuals with genetic risk for BD, inflammation and WM microstructure may jointly mediate the impact on cognition, regardless of symptomatic risk. These findings suggest distinct pathological characteristics at different levels of risk for developing BD.

PO-0226

Altered static and dynamic functional connectivity strength in adolescents with first-episode major depressive disorder and previous suicide attempts

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Objective A growing body of evidence showed that corticostriatolimbic system dysfunctions were linked to suicide behaviors in individuals with major depressive disorder (MDD). However, the neurobiological mechanism that makes depressed youths more vulnerable to suicide is poorly understood. Therefore, this study aimed to investigate the functional connectivity pattern in depressed adolescents with prior suicide attempts.

Methods A total of 115 depressed adolescents with and without prior suicide attempts (SA) and 35 age-, education-, and gender-matched healthy controls underwent resting-state functional imaging (R-fMRI) scans. The dynamic FCS (dFCS) variability and static FCS (sFCS) metrics were measured.

Results We found that the dFCS variability of the major depressive disorder with suicide attempts (MDD-SA) group was higher than that of the major depressive disorder without suicide attempts (MDD-NSA) group in the right caudate nucleus/pallidum, right anterior cingulate gyrus and left medial superior frontal gyrus, and the MDD-SA group showed higher sFCS values in the bilateral cuneus. dFCS variability of the left medial superior frontal gyrus and right anterior cingulate gyrus was significantly correlated with the SI intensity rating scores. Combining the altered dFCS and sFCS metrics could improve the classification performance for discriminating MDD-SA from MDD-NSA (area under the curve: 0.780).

Conclusion Our findings suggest that abnormal connectivity patterns in multiple brain regions involving cognition and emotion control, and self-referential processing are associated with the increasing risk of vulnerability to a suicide attempt in depressed adolescents. Furthermore, FCS could serve as a sensitive biomarker for revealing the neurobiological mechanisms underlying suicidal vulnerability.

PO-0227

Monitoring Bevacizumab-Induced Tumor Vascular Normalization by Intravoxel Incoherent Motion Diffusion-Weighted MRI

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Purpose: To serial monitor the vascular normalization time window of tumor antiangiogenesis treatment through intravoxel incoherent motion diffusion-weighted imaging (IVIM-DWI) and histopathological methods. **Study Type:** Exploratory animal study. **Population:** Sixty rat C6 glioma

models were randomly and equally divided into the control groups ($N = 30$) and bevacizumab treatment groups ($N = 30$). Twenty-five for magnetic resonance imaging (MRI) and five for electron micro_x0002_scope testing in each group. Field Strength/Sequence: T1-weighted imaging (T1WI), T2WI with a fast spin echo sequence and IVIM-DWI with a spin_x0002_echo echo-planar imaging sequence at 3 T. Assessment: IVIM-DWI quantitative parameters (f , D , D^* , and fD^*) were obtained on days 0, 2, 4, 6, and 8 after bevacizumab treatment. After MRI, the microvessel density (MVD), pericyte coverage, and hypoxia-inducible factor-1 α (HIF-1 α) were assessed. Electron microscope observation was performed at each time point. Statistical Tests: One-way analysis of variance and Student's t-tests were used to compare differences within and between groups. Spearman's correlation coefficient (r) assess the correlation between IVIM and pathological parameters. The intra_x0002_group correlation coefficient was determined to assess the repeatability of each IVIM parameter. Results: The IVIM-DWI perfusion parameters (f and fD^*) of the treated group were higher than the control group on days 2 and 4. Compared to the control group, MVD decreased on days 2 and pericyte coverage increased on days 4 in the treatment group. Electron microscopy showed that the tight junctions of the treatment group were prolonged on days 2–4. In the control group, f had the highest correlation with MVD ($r = 0.689$). In the treated group, f had a good correla_x0002_ tion with pericyte coverage ($r = 0.557$), HIF-1 α had a moderately positive correlation with f ($r = 0.480$) and fD^* ($r = 0.447$). Data Conclusion: The vascular normalization time window of bevacizumab treatment of glioma was days 2–4 after antiangiogenesis treatment, which could be monitored noninvasively by IVIM-DWI.

PO-0228

The effect of short-term antidepressant treatment on the functional connectivity strength in depressed adolescents with previous suicide attempts

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Objective Several studies have reported that antidepressants may increase or reduce the suicide risk in depressed adolescents, but no neuroimaging studies have been performed to investigate the underlying mechanism. The primary goal of the study was to investigate the effect of short-term antidepressant treatment on the functional connectome in depressed adolescents with previous suicide attempts.

Methods we collected resting-state fMRI (R-fMRI) data and clinical scales from 22 depressed adolescents with prior suicide attempts (MDD-SA) and 15 depressed adolescents without prior suicide attempts (MDD-NSA) at baseline and 4-week follow-up. The static and dynamic FCS metrics were measured separately.

Results The results suggested that short-term treatment with selective serotonin reuptake inhibitors (SSRIs) could reduce suicide ideation (SI) and depressive symptoms, and this effect was more prominent in the MDD-SA group. This changing pattern was consistent with that observed in imaging indices, that was, the alteration in sFCS values in the MDD-SA group before and after treatment involved a wider range of brain regions than that in the MDD-NSA group. In addition, the alterations of dFCS variability of the MDD-SA group and MDD-NSA group showed opposite patterns in the left middle temporal gyrus, left middle occipital gyrus, and left posterior central gyrus before and after treatment.

Conclusion The results suggested that short-term treatment with SSRIs could reduce SI and depressive symptoms. The intervention mechanisms of antidepressant therapy were different for depressed adolescents with and without suicidal behaviors. From the standpoint of fMRI, this work offers preliminary evidence for the protective effect of antidepressants on suicide risk in depressed youths.

PO-0229

Regional blood flow by 3D pseudo-continuous Arterial Spin Labeling as a predictor of headache and acute mountain sickness at high altitude in men and women

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Aim To investigate the difference of sea-level cerebral blood flow in men and women with high altitude headache (HAH) or not and with acute mountain sickness (AMS) or not after acute exposure to high altitude by 3D pseudo-continuous arterial spin labeling, and to select the best postlabeling delay (PLD) time for prediction in each group with or without HAH or AMS.

Methods A total of 49 volunteers recruited reached high altitude at 3658m by air after scanning of head magnetic resonance imaging (MRI) by ASL with three PLDs at sea level. The volunteers were divided into 4 groups due to their symptoms of HAH and AMS (Lake-Louise Score \geq 3) recorded at high altitude. Cerebral blood flow (CBF) of region of interests (ROIs) including bilateral cortex of frontal-parietal-temporal-insula (FPTI) lobe, cingulate, caudate nucleus head (CNH), putamen, occipital lobe, and cerebellar hemisphere was chosen for statistical analysis. The CBF ratio of left to right of the same anatomical part was recorded as rCBF. T-test or nonparametric test was used to determine the relation of CBF or rCBF and HAH or AMS. By univariable analysis, the significant variable was chosen as a predictor. And receiver of operator characteristic (ROC) curve was applied for diagnostic performance assessment of each difference-significant variable.

Results In men, sea-level CBF of HAH group were higher than non-HAH group in bilateral FPTI cortex, right cingulate, bilateral occipital cortex, bilateral cerebellar hemisphere ($p<0.05$); and rCBF of FPTI in HAH group were lower than non-HAH group (0.95 vs 1.03, $p<0.05$) (PLD with 2525ms); sea-level CBF of AMS group were higher than non-AMS group in bilateral FPTI cortex, bilateral cingulate, bilateral putamen, bilateral occipital cortex, bilateral cerebellar hemispheres ($p<0.05$). In women, sea-level rCBF of HAH group was higher than non-HAH group in the cerebellar hemisphere (1.02 vs 0.97, $p<0.05$); sea-level rCBF of AMS group was lower than non-AMS group in cingulate ($p<0.05$). CBF of right cerebellar hemisphere and right occipital lobe (PLD=2525ms) predicted best the HAH and AMS in men, respectively (AUC=0.892, $p<0.05$; AUC=0.871, $p<0.05$). RCBF of cerebellar hemisphere (PLD=1525ms) and cingulate (PLD=2025ms) was the best to predict HAH and AMS in women, respectively (AUC=0.808, $p<0.05$; AUC=0.753, $p<0.05$).

Conclusion Sea-level regional CBF differences between groups with high altitude headache or AMS and groups without high altitude headache or AMS could be distinguished by ASL with three PLDs. And the significance of different PLDs varies in AMS and HAH in men and women.

PO-0230

Automatic Segmentation of Choroid Plexus Based on Gaussian Mixture Model in First-Episode Drug-Naïve Schizophrenia

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Purpose: Inflammation dysfunction has been recognized as the pathophysiology of schizophrenia. Recent interest in choroid plexus has been stimulated by increased understanding of interactions between inflammation and schizophrenia. It remains unclear whether choroid plexus alteration is involved in schizophrenia, especially in first-episode patients before drug initiation.

Methods: Seventy-six first-episode drug-naïve schizophrenia patients and sixty-four matched healthy controls were enrolled in this study. Patients were assessed using the Positive and Negative Syndrome Scale and Global Assessment of Functioning. High-resolution T1-weighted images were acquired from all participants. Masks including voxels of cerebral spinal fluid, ventricular wall, and choroid plexus were extracted and then the Gaussian Mixture Model was used to segment the choroid plexus based on the intensity difference of the neighboring tissues. General linear model was used to compare choroid plexus volume between groups, with age and total intracranial volume as covariates. Partial correlation analysis was used to explore the relationship between choroid plexus volume and clinical symptoms, and between choroid plexus with brain measures including grey matter, white matter and lateral ventricular volumes, controlling for age and total intracranial volume. The significant level was set as $p < 0.05$.

Results: First-episode drug-naïve schizophrenia showed significantly larger choroid plexus volume compared with healthy controls ($p = 0.034$, $F = 4.58$). The choroid plexus volume was positively correlated with white matter volume ($p = 0.017$, $r = 0.28$) and lateral ventricular volume ($p < 0.01$, $r = 0.49$). No significant correlation was found between choroid plexus volume and clinical measures. **Conclusion:** Our findings revealed choroid plexus volume enlargement at first-episode state before drug initiation and its potential correlation with white matter and ventricular alterations, which may enhance our understanding of the illness biology of schizophrenia.

PO-0231

Baseline alterations and Acute Effects of Escitalopram on Amygdala Functional Connectivity in Youth at High-Risk for Bipolar Disorder

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Aims: Youth with a family history of bipolar disorder (BD), especially those who present with depression and/or anxiety symptoms, are at high-risk for developing BD and disrupted functional connectivity (FC) within the prefrontal-amygdala emotional network. Antidepressants are commonly used to treat depression and anxiety in youth. However, the neural effects of antidepressant exposure in these high-risk youth remain unknown.

Methods: We conducted a two-site, double-blind, placebo-controlled trial of escitalopram in youth (12-17 years old) with depression and/or anxiety disorder and with a first-degree relative with BD. At baseline, 121 youth with at least one first degree relative with BD-I and current moderate or severe depression and/or anxiety disorders, and 55 healthy controls (HC) without any first or second-degree relative with a mood or psychotic disorder were recruited. High-risk youths were

then randomized to receive psychotherapy plus escitalopram ($n=77$) or psychotherapy plus placebo ($n=44$) for up to 16 weeks.

A 3-Tesla scanner with an 8-channel phased-array head coil was used at each site to acquire resting-state functional images and anatomical images with the same parameters at baseline for high-risk youth and controls, and at 4-weeks after treatment initiation in high-risk youth. Two 5-minute functional runs used $TR = 2000$ msec and slice thickness = 3 mm. Image analysis was performed using SPM, CONN, and MATLAB. Preprocessing steps included discarding the initial 10 volumes, slice-timing, realignment, structural segmentation and normalization, functional normalization, outlier detection, and smoothing. Denoising was then performed, which applied linear regression of confounders, band-pass filtering, and linear detrending to remove unwanted motion, physiological, and other artificial effects from the BOLD signal. Next, the FC map between amygdala and voxels of the whole brain was generated for each youth, which was then taken to two second-level statistical analyses. The first was two-sample t-tests of amygdala-based FC with age, sex and site as covariates using thresholds $p < 0.001$ at voxel-level and $p < 0.05$ at cluster-level with False discovery rate (FDR) correction. The second was treatment (escitalopram or placebo)-by-time (baseline or week 4) interaction using a full-factorial analysis with age, sex, and site as covariates, and thresholds of $p < 0.005$ at the voxel-level and FDR-corrected $p < 0.05$ at the cluster-level. Connectivity values were extracted from clusters with significant treatment-by-time interactions, and post-hoc analyses were performed to calculate FC changes from baseline to week 4 in escitalopram and placebo groups separately.

Results: One hundred and six high-risk youth and 46 age- and sex-matched HC with usable data were included in the baseline analyses. High-risk youth had decreased left amygdala connectivity with left ventral prefrontal cortex (VLPFC) which extended to insula and superior temporal cortex (peak coordinate: $x=-46$, $y=16$, $z=-16$; cluster size=122; $t=4.78$; FDR-corrected $p=0.036$), and decreased right amygdala connectivity with bilateral dorsal anterior cingulate cortex (dACC, peak coordinate: $x=-4$, $y=26$, $z=14$; cluster size=217; $t=5.48$; FDR-corrected $p=0.002$) and right dorsolateral prefrontal cortex (DLPFC, peak coordinate: $x=22$, $y=52$, $z=14$; cluster size=129; $t=4.45$; FDR-corrected $p=0.014$) comparing to healthy controls.

Eighty-four high-risk youth with usable baseline and week 4 data were included, 50 of them received escitalopram and the other 34 received placebo. Significant treatment-by-time interactions were found between right amygdala and bilateral supplementary motor cortex (peak coordinate: $x=-2$, $y=-26$, $z=62$; cluster size=264; $F=20.18$; FDR-corrected $p=0.011$), left lateral occipital cortex including left fusiform gyrus (peak coordinate: $x=-44$, $y=-78$, $z=10$; cluster size=424; $F=16.97$; FDR-corrected $p=0.001$), and right occipital fusiform gyrus (peak coordinate: $x=32$, $y=-64$, $z=-6$; cluster size=197; $F=15.72$; FDR-corrected $p=0.032$). Post-hoc analyses showed these amygdala FCs significantly decreased in youth treated with escitalopram relative to youth who received placebo.

Conclusions: We found that depressed and/or anxious youth at high-risk for bipolar disorder had decreased amygdala connectivity in regions having important roles in emotion perception and regulation relative to healthy individuals. These findings suggest that brain functional connectivity within and between emotion processing and regulation networks are disrupted in youth at high-risk for bipolar disorder, indicating that these alterations may serve as potential targets for early intervention in this population. Additionally, we identified that amygdala connectivity with sensory and motor cortices decreased significantly in high-risk youth after four weeks of treatment with escitalopram and psychotherapy relative to those receiving four-weeks of placebo and psychotherapy. Further analyses will examine whether the significant effects of escitalopram on the interface among emotional, visual and motor networks are associated with subsequent behavioral and mood changes resulting from antidepressant treatment in this population.

PO-0232

Predicting Prognosis and Severe Complications for Acute Ischemic Stroke Using Clinical-CT Fusion Feature-Based Ensemble Machine Learning

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Purpose

To establish predictive models using clinical and quantitative imaging features for predicting the risk of futile recanalization (FR), malignant cerebral edema (MCE), and cerebral hernia (CH) in patients with acute ischemic stroke (AIS).

Methods

This prospective study included 110 patients who underwent mechanical thrombectomy (MT) and for whom successful recanalization was achieved. FR was defined as a 90-day modified Rankin Scale score >2 . Non-contrast CT and clinical information were used to construct five machine learning (ML) models fused into a logistic regression algorithm using the stacking method (LR-Stacking) to predict each classification task. The quantitative imaging features include the assessment results and radiomics information of lesions. Shapley Additive Explanation method was added to display crucial factors. Prediction performances for different ML algorithms were compared using area under the receiver operating characteristic curve (AUC) and decision curve analysis (DCA).

Results

A total of 61 patients (55.5%) experienced FR, 34 patients (30.9%) experienced MCE, and 22 patients (20.0%) experienced CH. In the prediction tasks of FR, MCE, and CH, the AUC of the LR-Stacking model based on clinical and image fusion features were 0.938, 0.889, and 0.986, respectively. Considering the results of the Delong test and DCA analysis, the performance and overall benefit of the LR-Stacking model based on clinical and image fusion features are higher than that of the LR-Stacking model based on clinical features. The results of SHAP analysis showed that the hypodensity volume and its proportion in the responsible blood supply area were the most significant risk factors affecting the poor prognosis of patients and had a strong predictive effect on FR, MCE, and CH.

Conclusion

The integrated machine learning model, LR-Stacking, constructed in this study, demonstrated excellent classification performance in predicting the risk of FR, MCE, and CH in AIS patients who underwent successful MT. Quantitative imaging features extracted from the first CT image within 24 hours postoperatively played a significant role in prognosis and prediction of severe complications in this AIS patient population. The hypodensity volume and its proportion in the responsible blood supply area were particularly significant in all three predictive tasks, while the hyperdensity volume provided substantial assistance to the model's predictions. The radiomics score showed statistically significant differences among different groups and were particularly helpful in predicting the risk of CH.

Based on readily available clinical and Non-contrast CT information, the integrated ML models developed in this study exhibited good predictive ability for prognosis and severe complications. We utilized SHAP technology to show the features' importance of the ensemble model, which enabled us to promptly determine the individual risk factors for adverse outcomes and improve the prognosis in patients with AIS.

PO-0233

Alterations of Diffusion Kurtosis Imaging Measures in Gait-related White Matter in Parkinson's Disease

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Objectives: Gait impairment is closely related to the quality of life of Parkinson's disease (PD) patients and can be used as one of the indicators to monitor the progression of this disease. However, the mechanism of gait impairment in PD is still unclear. Our study aimed to explore the alterations in brain microstructure in patients with PD and in healthy controls (HC) using diffusion kurtosis imaging (DKI) to identify correlation of gait impairment in the ON and OFF state of patients with PD respectively.

Methods: Twenty-four PD patients and 29 HC were included. We acquired magnetic resonance imaging (MRI) scans, and DKI images were processed. Preprocessing of diffusion-weighted data was performed with Mrtrix3 software, using a directional distribution function to track participants' main nerve fiber bundles. Quantitative gait and clinical scales were used to assess the status of medication ON and OFF in patients with Parkinson's disease. The DKI measures and clinical scales were assessed by calculating Pearson or Spearman's rank correlations. Correlations between DKI indicators and gait parameters were also analyzed by Pearson or Spearman's rank correlations.

Results: The Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) scores of the PD group were significantly higher than those of HC. Compared with the HC group, the PD group had significantly lower Berg Balance Scale (BBS) scores and higher Timed-Up and Go (TUG) values. In the PD group, the ON status reduced the TUG time and the scores of the International Parkinson and Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) part-III and MDS-UPDRS total scores. The velocity and step length of HC were higher than those of PD patients. No statistical difference in gait parameters in the status of ON and OFF in PD patients. The axial kurtosis (AK), mean kurtosis (MK), and radial kurtosis (RK) of the specific fibers was significantly higher in PD patients than HC. Six significant fibers are corticospinal tract, superior longitudinal fasciculus, cingulum, anterior thalamic radiation, forceps minor, and forceps major. The MK value was negatively correlated with the TUG scores in the ON and OFF state of PD patients. Within the patient group, lower AK, MK, and RK, whether in the status of ON or OFF, were associated with better motor performance, i.e. higher velocity, cadence, and stride length, and lower stride time.

Conclusions: Our findings highlight the role of microstructural neuroimaging alterations in PD patients' gait impairment and specific clinical features.

PO-0234

Unlocking the Link: How Hippocampal Glutathione-Glutamate Coupling Predicts Cognitive Impairment in Multiple Sclerosis Patients

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Cognitive impairment is a common symptom of multiple sclerosis and profoundly impacts quality of life. Glutathione (GSH) and glutamate (Glu) are tightly linked in the brain, participating in cognitive function. However, GSH-Glu couplings in cognitive brain regions and their relationship with cognitive impairment in relapsing-remitting multiple sclerosis (RRMS) have remained unclear. 41

RRMS patients and 43 healthy controls (HCs) underwent magnetic resonance spectroscopy to measure GSH and Glu levels in the posterior cingulate cortex, medial prefrontal cortex, and left hippocampus. Neuropsychological tests were used to evaluate the cognitive function. The Glu/GSH ratio was used to indicate the coupling between GSH and Glu and was tested as a predictor of cognitive performance. The results show that RRMS patients exhibited reduced hippocampal GSH and Glu levels, which were found to be significant predictors of worse verbal and visuospatial memory, respectively. Moreover, GSH levels were dissociated from Glu levels in the left hippocampus of RRMS patients. The hippocampal Glu/GSH ratio is significantly correlated with processing speed and has a greater predictive effect. Here we show the hippocampal Glu/GSH ratio could serve as an imaging marker sensitive to cognitive impairment in RRMS, providing novel evidence for the prompt implementation of preventive and treatment interventions.

PO-0235

Topological properties of brain functional network in Vertically transmitted HIV positive adolescents

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Purpose: To explore the topological properties of brain functional networks in vertical HIV-infected (HIV+) and HIV-exposed uninfected (HEU) adolescents.

Methods: Based on the graph theoretical analysis, resting-state functional MRI (rs-fMRI) was used to construct brain network connectivity in 15 HIV+ children (mean age, 13.87 years) and 35 HEU children (mean age, 13.06 years). We calculated the global and local measures and analyzed differences between two groups. Finally, betweenness was used to calculate the threshold and select the hubs of brain functional networks.

Results: The brain functional networks of two groups showed a typical small-world architecture. For the global properties, only clustering coefficient displayed significant difference between groups under a few sparsity. While the local properties showed significant difference between groups in multiple brain regions. Compared with HEU, some regions showed higher centrality in HIV+ children and more regions represented increased segregation of brain network. The HIV+ group detected 8 global hubs and 5 in the HEU group.

Conclusion: The brain functional networks of HIV + and HEU children showed typical small-worldness and increased segregation. We believe that the higher centrality of some nodes related to advanced cognition may guarantee the normal learning activities of HIV+ children. In the future, more attention needs to be paid into the long-term results of neurodevelopmental and cognitive abnormalities. It is necessary to conduct further longitudinal research and analysis.

PO-0236

Gender Specific Re-considered of default mode network (DMN) in insomnia disorder patients: evidence from resting state fMRI

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Insomnia disorder is known as trouble sleeping, in which there is predominant complaint of dissatisfaction with sleep quantity or quality, whether there is gender difference of DMN in different genders or not is unclear. **Method:** we recruited 30 insomnia disorder patients and 30 healthy subjects analyzed resting state fMRI. **Results:** There were significantly differences of DMN between

male and female in healthy control and insomnia group. Whether there are differences of brains function which affected by insomnia disorder in male and female groups or not is unclear. So, we separately analyze the difference between healthy control and insomnia disorder group in different gender. In male group, compared with healthy control, the FC between the left superior frontal gyrus and PCC increased in insomnia group, the FC between the left lobule VI of cerebellar hemisphere, right midbrain/bilateral thalamus and PCC decreased in insomnia group. And in female group, compared with healthy control group, the FC between the left middle frontal gyrus and PCC increased in insomnia group, the FC between the left middle temporal gyrus and PCC decreased in insomnia group. Conclusion: There were differences of DMN in healthy control group and insomnia disorder group, and insomnia disorder affects different brain regions of DMN in different gender, in male group, patients pay more attention to the self-awareness and coordination with the sensory system. The FC of lobules VI of cerebellar hemisphere and PCC decrease may one of cognitive and emotions dysfunction of insomnia disorder patients. While in female group, the FC between left middle frontal gyrus and PCC increase may one of Pathologic Physiology of working memory of insomnia disorder patients, The FC between left middle frontal gyrus and PCC increased means female patients pay more attention to the uncertainty things, this may one of reimbursement mechanism of female insomnia disorder patients physically exhausted. It would be better when we analyze insomnia disorder brain functions.

PO-0237

Classifying major depressive disorder and post-traumatic stress disorder via static and dynamic functional networks with machine learning

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Objective: Major depressive disorder (MDD) and post-traumatic stress disorder (PTSD) are common stress-related mental disorders with similar and distinct epidemiological and clinical features. The present study aimed to investigate the potential of static and dynamic functional networks for classification of MDD and PTSD based on resting-state functional MRI.

Materials and Methods: We recruited 56 patients with first-episode MDD, 48 PTSD patients, and 80 healthy controls (HC). First, the intrinsic connectivity networks were identified using group-level independent component analysis. Static functional network connectivity (FNC) were based on the entire scan time. Different FNC states were obtained using the sliding time window method and k-means clustering analysis. We extracted these static and dynamic FNC with significant differences among the three groups (NBS, FWER corrected, $p < 0.05$) as features. A linear kernel support vector machine (SVM) classifier was adopted, and the leave-one-out cross-validation strategy was used to evaluate the performance of the classifier.

Results: We identified 48 meaningful independent components, and 4 FNC states. Significant differences were found in static functional networks, and FNC in State 2 and State 4. The classifier based on State 2 showed the best performance for all classification settings (MDD vs. HC, PTSD vs. HC, and PTSD vs. MDD), with the accuracies of 82.05% (sensitivity=93.75%, specificity=73.91%), 88.14% (sensitivity=76.92%, specificity=91.3%) and 77.78% (sensitivity=84.62%, specificity=78.13%) respectively. The consensus features were involved in multiple functional networks, with the top 10 edge features with the highest weights mostly associated with cognitive-control, sensorimotor, default mode, and visual networks.

Conclusion: This study demonstrated that FNC features have good diagnostic potential for MDD and PTSD, providing a basis for the potential use of FNC features as objective clinical diagnostic criteria.

PO-0238

Reduced Diffusion Tensor Image Analysis Along the Perivascular Space (DTI-ALPS) Index in Neuromyelitis Optica Spectrum Disorder (NMOSD) Patients with Seropositive for AQP4-Antibody

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Objective: To investigate potential differences in activity of the glymphatic system between patients with Neuromyelitis Optica Spectrum Disorders (NMOSD) who are seropositive and seronegative for AQP4 antibody (NMOSD-AQP4+ and NMOSD-AQP4-) by measurement of the Diffusion Tensor Image Analysis Along the Perivascular Space (DTI-ALPS) index.

Methods: Thirty-nine patients with NMOSD, of whom 28 were NMOSD-AQP4+ and 11 were NMOSD-AQP4-, and 25 Healthy Controls (HC) were recruited for this study. The DTI-ALPS index was calculated from Diffusion Tensor Imaging (DTI) data and compared between groups. Potential correlations between DTI-ALPS index between clinical and MRI variables were also investigated.

Results: Compared to HC (Left: 1.69 ± 0.15 , Right: 1.58 ± 0.20), a significant bilateral reduction was observed in the DTI-ALPS index in NMOSD-AQP4+ patient group (Left: 1.48 ± 0.18 , Right: 1.41 ± 0.15) ($p < 0.05$, false discovery rate, FDR corrected), but not in NMOSD-AQP4- patient group (Left: 1.56 ± 0.16 , Right: 1.50 ± 0.13) ($p > 0.05$, FDR corrected). In NMOSD-AQP4+ group, the value of the DTI-ALPS index measured for the right side was negatively correlated with the total volume of lesions measured on T2-weighted images ($r = -0.626$), Pittsburgh sleep quality index ($r = -0.536$) and volume of right lateral ventricle ($r = -0.524$), and positively correlated with the volumes of left ventral diencephalon ($r = 0.565$), thalamus ($r = 0.582$) and accumbens ($r = 0.577$), and the value of the DTI-ALPS index measured for the left side was negatively correlated with the volumes of the third ventricle ($r = -0.611$) and choroid plexus ($r = -0.58$).

Conclusion: The significant reduction in DTI-ALPS index may indicate the impaired glymphatic function in NMOSD patients with seropositive for AQP4-antibody and may be related to brain morphology and affect sleep quality.

PO-0239

VR with eye-tracking to empower MRI in diagnosing of mild cognitive impairment

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Objectives: Alzheimer's disease (AD) is the common cause of dementia. AD progresses irreversibly and needs to be found in the early stage. MRI is the common examination assisting AD clinical diagnosis and hippocampal volume (HV) is a well-recognized AD biomarker in NIA-AA diagnostic criteria. However, HV is not sensitive enough in the early stage of AD. We aim to find effective virtual reality (VR) with eye-tracking biomarkers to empower HV in diagnosing early-stage AD, which includes mild cognitive impairment (MCI) and mild AD.

Methods:

Sixty early AD patients and 50 healthy controls were recruited and underwent neuropsychological assessment and MRI examinations. The VR with eye-tracking is a 5-mins computerized evaluation, which is used to evaluate multiple cognitive domains including attention, abstraction, calculation, executive function, memory and delayed recall memory in corresponding patterns. The automated structure tool and SPSS 26.0 was used in the analysis of the hippocampal variables and VR scores. We investigated the area under curve (AUC) of VR variables, HV, and hippocampal fraction (HF) and the conjoined models using a VR score (total VR score or an optimal domains VR score, respectively) and a hippocampal metric (HV or HF, respectively) based on the logistic regression.

Results:

The mean and standard deviation of MMSE in early AD is 27.2 ± 2.0 , which illustrates that patients belong to the early stage of the disease. The AUC of HV and HF was only 0.562 and 0.563, respectively, while the conjoined use of VR_Calculation and HV performed best (AUC = 0.725).

Conclusions:

VR with eye-tracking can empower hippocampal metrics in diagnosing MCI in early AD.

PO-0240

Cerebral Blood volume measurement at tumor microvasculature derived from local image variance of susceptibility weighted imaging in glioblastoma: correlation with IDH mutation status

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Purpose

This prospective study was aim to assess the clinical practice of rCBV value at tumor-microvasculature derived from local image variance (LIV) of susceptibility-weighted imaging (SW) for IDH genotype prediction in glioblastoma (GBM).

Methods and materials

Preoperative MRI examinations of 78 GBM patients with known IDH genotype were recruited. rCBV derived from DSC-MRI was computed and normalized against the contralateral unaffected white matter value. rCBV and SWI images were coregistered to MNI space. SWI-LIV were calculated according to the Steiner translation theorem. The LIV regions were then extracted as RO for rCBV measurement, The hot-spot ROI-based rCBV analysis was also conducted for confrontation. The discriminating potential for assessing IDH mutation status prediction was assessed by ROC curves.

Results

ROC analysis revealed that the rCBVs in SW-LIV regions had great ability to predict IDH genotype with a sensitivity of 82.05% and a specificity of 97.06% (AUC=0.955). The SWI-LIV based rCBV analysis has a superior diagnostic performance for IDH genotype prediction compared to hot-spot ROI method (difference between areas=0.077, Z-score= 1.697, p=.09)

Conclusion

Our study proven that rCBVs in SW-LIV regions has high prediction capabilities for IDH mutation status in GBM patients. As SWI hypointensity is high correlated with tumor microvasculature, SWI-LIV based ROI method is reliable to evaluate the hemodynamic change compared to hot-spot based method.

Limitations

The main imitation was lacking the micarovascular-related biopsy data or pathologic sampling to confirm the rCBV change in SWI-LIV regions.

PO-0241

The potential value of pseudo-continuous arterial spin labeling in reflecting cognitive performance for older adults with MRI-negative epilepsy

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Objective: We aimed to investigate the potential value of cerebral blood flow (CBF) measured by pseudo-continuous arterial spin labeling (PCASL) in indicating cognitive performance for older adults with MRI-negative epilepsy.

Methods: Older adults with MRI-negative epilepsy were recruited and administered a battery of neuropsychological tests, followed by the high-resolution T1 and ASL scan. Whole-brain voxel-based perfusion pattern of epilepsy with cognitive impairment was identified, and correlations between ROI-based CBF and domain-specific cognitive performance were conducted. Receiver operating characteristic curve was analyzed to examine the diagnostic value of ROI-based CBF in epilepsy with cognitive impairment.

Results: Eighty older adults with MRI-negative epilepsy (32 with cognitive impairment and 48 with normal cognition) were enrolled. Participants with cognitive impairment performed worse in MMSE score ($P = 0.015$), memory ($P = 0.009$), attention ($P = 0.007$), and executive function ($P = 0.003$). They exhibited decreased CBF in the bilateral middle frontal gyrus, bilateral superior frontal gyrus, bilateral precentral gyrus, left precuneus and right postcentral gyrus ($P < 0.05$, AlphaSim corrected, cluster-level). There were positive associations between mean CBF of the bilateral middle frontal gyrus and superior frontal gyrus and memory ($r = 0.202$, $P = 0.043$ for left and $r = 0.202$, $P = 0.043$ for right), and executive function ($r = 0.265$, $P = 0.032$ for left and $r = 0.263$, $P = 0.033$ for right). Mean CBF of the left precuneus was also positively correlated with executive function ($r = 0.262$, $P = 0.034$). The area under curve of the left middle frontal gyrus and superior frontal gyrus, right middle frontal gyrus and superior frontal gyrus, left precuneus and right postcentral gyrus in diagnosing epilepsy with cognitive impairment were 0.840, 0.805, 0.746, 0.703, respectively.

Conclusion: CBF measured by PCASL may be a useful indicator for cognitive performance in older adults with MRI-negative epilepsy.

PO-0242

Mixed brain perfusion pattern and its association with epilepsy duration: The application of arterial spin labeling in older people with epilepsy

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Purpose: We aimed to identify the brain perfusion pattern of older people with epilepsy by pseudo-continuous arterial spin labeling (PCASL), and find the association between cerebral blood flow (CBF) and duration of epilepsy.

Methods: A total of 80 older people with epilepsy and 40 healthy controls were recruited and administrated the high-resolution T1 and ASL magnetic resonance imaging (MRI) scan. We compared the perfusion differences between two groups on whole-brain voxel-based level, and conducted linear regression between ROI-based CBF and duration of epilepsy.

Results: Compared to healthy controls, older people with epilepsy exhibited decreased CBF in the bilateral middle temporal gyrus and inferior temporal gyrus, and increased CBF in the left supplementary motor area, right fusiform gyrus and left anterior cingulate and paracingulate gyri ($P < 0.05$, cluster-level, AlphaSim corrected). After adjustment for age of onset, gender, education, seizure frequency and number of anti-seizure medication types, we found lower CBF in areas of hypoperfusion significantly correlated with longer duration of epilepsy.

Conclusions: There was a mixed brain perfusion pattern in older people with epilepsy in relation to the epilepsy duration, suggesting the potential effectiveness of applying ASL in clinical practice of early diagnosis and evaluation of seizure activity and severity for epilepsy.

PO-0243

Exploring the Feasibility of Ultrafast, Single-Scan Quantitative Magnetic Resonance Imaging for Huntington's Disease Patients

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In this study, we tackle the challenge of acquiring clear Magnetic Resonance Imaging (MRI) scans from patients with Huntington's Disease, who often exhibit involuntary head movements. We employs a novel, ultrafast Multiple Overlapping Echo Separation (MOLED) pulse sequence to obtain high-quality images. The study involves both healthy volunteers and Huntington's patients, utilizing a 3 Tesla Philips Ingenia Elition imager and a complex readout scheme to isolate different types of overlapping echo signals in k-space. Preliminary results indicate that the MOLED-based fast quantitative scans successfully yield high-quality T2-mapping images, offering promise for more accurate diagnostics and future region-of-interest delineations in Huntington's patients.

PO-0244

Diffusion Tensor Imaging Analysis Along the Perivascular Space Index uncovers relationships of glymphatic dysfunction and cognitive progression in de novo Parkinson's disease

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Background: The glymphatic system is involved in the clearance of misfolded α -synuclein. In recent years, research on glymphatic system dysfunction in patients with Parkinson's disease (PD) has received much attention. However, the relationship between glymphatic system dysfunction and cognitive progression in PD is unclear.

Objectives: To investigate the correlation between glymphatic system function and cognitive progression in PD patients using along the perivascular space index based on diffusion tensor imaging (DTI-ALPS).

Methods: Data were collected from the Parkinson's Disease Progression Markers Initiative (PPMI) cohort of newly diagnosed, unmedicated, cognitively normal at baseline and followed for 5 years in patients with PD. PD patients were divided into PD-MCI nonconverters and PD-MCI converters according to whether they developed mild cognitive impairment (MCI) within 5 years. DTI data were post-processed to obtain the DTI-ALPS index. The DTI-ALPS index of PD-MCI nonconverters and PD-MCI converters were compared, and correlation analyses were performed between the DTI-ALPS index and clinical scales and cerebrospinal fluid metrics, and one-way and multifactorial logistic regressions were used to explore the effects of baseline glymphatic system function on cognitive progression.

Results: A total of 90 PD patients were included (57 PD-MCI nonconverters, 33 PD-MCI converters.) The DTI-ALPS index was lower in the PD-MCI converters than in the PD-MCI non-converters (1.280 ± 0.207 vs. 1.380 ± 0.219 ; $P = 0.029$). In PD-MCI nonconverters, DTI-ALPS index was negatively correlated with MoCA score ($r = -0.402$, $P = 0.002$). Baseline DTI-ALPS index was an independent predictor of cognitive progression in PD (OR, 0.094, $P=0.049$).

Conclusion: This study found that PD patients with slower cognitive progression may have compensatory enhancement of glymphatic system function. In addition, the DTI-ALPS index may be an independent predictor of cognitive progression in PD.

PO-0245

Value of diffusion kurtosis imaging in the hierarchical diagnosis of glioma

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Purpose

To investigate the value of diffusion kurtosis imaging in the hierarchical diagnosis of glioma.

Materials and Methods

The clinical and imaging data of 65 patients with glioma confirmed by pathology from 2018 to 2020 were retrospectively analyzed, including 29 patients with grade 2, 20 patients with grade 3, and 16 patients with grade 4. Patients underwent routine MRI and DKI scanning before surgery, measuring tumoral solid portion, peritumoral edema, and normal appearing white matter DKI parameter value, including fractional anisotropy (FA), mean diffusivity (MD), mean kurtosis (MK), axial kurtosis (Ka),

radial kurtosis (Kr). The DKI parameters correction was made (tumor or edema parameters values divided by normal appearing white matter value) to obtain the rFA (ratio of FA), rMD (ratio of MD), rMK (ratio of MK), rKa (ratio of Ka), rKr (ratio of Kr) value. Analysis of variance (ANOVA) or Mann-Whitney U test was applied to compare the differences in the corrected DKI parameters of gliomas of different histological grades, and the diagnostic value of each parameter value for the pathological grading of gliomas was analyzed by plotting the receiver operating characteristic (ROC) curve.

Results

Comparison of rMD and rKa in the tumor parenchyma area of gliomas with different pathological grades showed no statistically significant difference ($P > 0.05$). rMK and rKr of those with pathological grade 4 were significantly higher than those with grades 2 and 3 and the difference was statistically significant ($P < 0.05$), but the difference between rMK and rKr of grades 2 and 3 was not statistically significant ($P > 0.05$). The parameter values of rFA of grade 4 were higher than those of grades 2 and 3, but the difference was statistically significant only between grade 4 and grade 3 ($P < 0.05$). The differences in rMK and rKr between different grades of peritumoral edema area were statistically significant ($P < 0.05$), and the differences in the rest of the parameters were not statistically significant ($P > 0.05$). The results of the analysis of ROC curves showed that the tumor parenchyma area rMK, rKr, rFA and the peritumoral edema area rMK and rKr all had a higher diagnostic value of the pathologic grade 4 gliomas ($P < 0.05$), and the area under the ROC curve was 0.796 [95% confidence interval (CI): 0.660-0.932], 0.745 (95% CI: 0.592-0.897), 0.704 (95% CI: 0.575-0.833), and 0.755 (95% CI: 0.618-0.892), respectively, 0.694 (95% CI: 0.555 to 0.833).

Conclusions

DKI can noninvasively evaluate glioma grade. rMK, rKr and rFA values have high diagnostic value for grade 4 glioma, among which rMK has the highest diagnostic efficiency.

PO-0246

精神障碍神经影像国家自然科学基金青年项目申请书“解密”

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摘要:

目的: 国家自然科学基金是广大科技工作者获取科研经费的主要渠道, 本书收录了本磁共振成像科研团队中精神分裂症、抑郁症、木僵三个精神疾病方向负责人所撰写的国家自然科学基金青年项目申请书原文, 对申请书的撰写要点, 注意事项和技巧进行了生动而详尽的阐述, 对申请书的专家评审过程中的经验教训进行了深度的自我剖析与总结反思, 力求在青年项目申请过程中, 能够对初出茅庐的青年科技工作者、对申请书撰写评审有疑问者提供实用性的参考和借鉴, 帮助他们少走弯路, 提高申请书的写作水平和基金申请的成功率。

方法: 作者于 2018 年、2022 年先后获批国家自然科学基金青年项目 (基于影像组学策略的精神分裂症脑标记物及预后预测的 fMRI 研究) 与面上项目 (精神分裂症认知损害的大尺度机制及神经导航 rTMS 调控研究), 结合个人经验, 联合其他 5 位青年科技人员, 主编本书, 并获曹丰教授、印弘教授、李涛教授、林铮教授、刘军教授题跋。

结果: 《影像医学中的精神障碍: 国家自然科学基金青年项目申请书“解密”》于 2022 年出版, 销量 940 本, 捐赠图书馆及同行 160 本。

结论: 近年来, 国家自然科学基金委显著加强了对优秀青年人才的培养和支持, 对青年科学基金支持的力度逐年加大。本书由具有多年青年基金申请经验的几位科技工作者撰写而成, 主要围绕着影像医学中的精神疾病, 分为六章, 涉及《国家自然科学基金项目指南》节录、影像医学中的精神疾病项目申请经验、申请书原文及其审议意见与反思。结合他们在撰写, 审议过程中的宝贵经历“现

身说法”，不仅展示了他们的国家自然科学基金青年项目申请书原文，还对申请书的撰写要点，注意事项和技巧进行了生动而详尽的阐述。

PO-0247

非痴呆型血管性认知障碍患者海马表观弥散系数平均值研究

谈炎欢

常熟市中医院（常熟市新区医院）

【摘要】 目的 探讨非痴呆型血管性认知障碍（VCIND）患者两侧海马表观弥散系数平均值（ADCmean）与认知功能的关系。方法 对 43 例 VCIND 患者（VCIND 组）和 43 例条件匹配的志愿者（NC 组）行常规头颅 MRI 检查，测量两侧海马体积，以两侧海马作为感兴趣区（ROI），检测其 ADCmean 值并进行分析，将 VCIND 组和 NC 组的 ADCmean 值与 MoCA 评分进行相关分析。所有实验对象均为右利手。结果 1.VCIND 组和 NC 组两组组内和组间海马体积比较无明显差异（ $P>0.05$ ）。2.VCIND 组两侧海马 ADCmean 值均较 NC 组增高，差异有统计学意义（ $t=5.36$ ， $P<0.05$ ； $t=4.84$ ， $P<0.05$ ）。3.VCIND 组和 NC 组左侧海马 ADCmean 值均高于对侧，差异有统计学意义（ $t=6.16$ ， $P<0.05$ ； $t=5.29$ ， $P<0.05$ ）。4.VCIND 组两侧海马 ADCmean 值均与 MoCA 评分具有明显相关性（ $rs=-0.84$ ， $P<0.05$ ； $rs=-0.74$ ， $P<0.05$ ）。结论 在海马发生形态学改变之前，ADCmean 值可以从分子影像学角度准确、快速地反映 VCIND 患者海马水分子的扩散能力，ADCmean 值的升高提示海马存在微观结构的损伤，一定程度上可以反映 VCIND 患者认知功能的改变，可能是该病早期诊断的可靠的分子影像学依据。

PO-0248

非痴呆型血管性认知障碍患者海马氢质子磁共振波谱研究

谈炎欢

常熟市中医院（常熟市新区医院）

【摘要】 目的 应用氢质子磁共振波谱（Proton Magnetic Resonance Spectroscopy, $^1\text{H-MRS}$ ）技术，分析非痴呆型血管性认知障碍（Vascular Cognitive Impairment no Dementia, VCIND）患者两侧海马区物质代谢变化，及其与蒙特利尔认知功能（Montreal Cognitive Assessment, MoCA）评分的相关性。方法 对 22 名 VCIND 患者（VCIND 组）和 22 名条件匹配的志愿者（NC 组）行常规头颅 MRI 和 $^1\text{H-MRS}$ 检查，测量两侧海马体积，以两侧海马作为感兴趣区，检测其 N-乙酰天门冬氨酸（NAA）、胆碱复合物（Cho）、肌酸复合物（Cr）的相对浓度并进行分析。将 VCIND 组的 NAA/Cr、Cho/Cr 值与 MoCA 评分进行相关分析。所有实验对象均为右利手。结果 1.VCIND 组和 NC 组两组组内和组间海马体积比较无明显差异（ $P>0.05$ ）。2.VCIND 组两侧海马 NAA/Cr 值均较 NC 组显著降低，差异有统计学意义（ $P<0.05$ ）。两组间两侧海马 Cho/Cr 值比较无显著性差异（ $P>0.05$ ）；3.VCIND 组左侧海马 NAA/Cr 值低于对侧，差异有统计学意义（ $P<0.05$ ），NC 组两侧海马 NAA/Cr 值比较差异不明显（ $P>0.05$ ）。VCIND 组和 NC 组组内两侧海马 Cho/Cr 值比较均无明显差异（ $P>0.05$ ）；4.VCIND 组两侧海马 NAA/Cr 值均与 MoCA 评分具有明显相关性（ $P<0.05$ ），两侧海马 Cho/Cr 值与 MoCA 评分无明显相关性（ $P>0.05$ ）。结论 1.海马 $^1\text{H-MRS}$ 代谢物浓度的变化可在海马发生形态学改变之前，提示海马神经元损伤的存在；2. $^1\text{H-MRS}$ NAA/Cr 可以在一定程度上反映患者的认知功能改变，有助于本病的早期诊断、早期治疗。

PO-0249

多模态影像技术在脑泡状棘球蚴病中的诊断价值

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目的: 脑泡状棘球蚴病其囊内包虫幼虫可随脑脊液流动而移动, 对其诊断主要依赖于对脑脊液的动态检测。因此, 对脑实质多模态影像技术进行研究分析, 可以更好指导临床对泡状棘球蚴囊性病变的诊断与治疗。

方法: 选择 16 例泡状棘球蚴病患者, 所有病例均行 CT 平扫、增强, MRI 平扫、增强扫描。

结果: 16 例泡状棘球蚴病患者中, CT 平扫和增强检查均未见异常, 而 MRI 增强后病灶明显强化。

结论: 泡状棘球蚴病是一种包虫寄生于中枢神经系统引起的具有典型临床表现的慢性寄生虫疾病, 诊断时需要结合临床病史和脑脊液检查。MRI 可做为首选检查方法, 根据不同分期患者, 选用不同的 MRI 检查方案, 以提高其诊断正确率。

PO-0250

基于 CCTA 影像标记物和影像组学预测脑白质高信号的进展: 探索心脏和大脑之间的潜在相关性

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目的: 比较两种 CCTA 影像标记物(CT 血流储备分数 CT-FFR、冠状动脉周围脂肪衰减指数 pFAI)和影像组学标签预测脑白质高信号(WMH)进展效能。结合 CT-FFR、pFAI 和影像组学标签开发诺莫图用于预测 WMH 进展。**方法:** 收集浙江省人民医院 2019 年 1 月至 2022 年 5 月行冠脉 CCTA 和头颅 MRI 的 146 例冠心病患者资料, 随访第二次 MRI 有 63 名 WMH 进展患者, 将 146 名患者分为训练集(n=116)和内部验证集(n=30), 纳入杭州市中医院 80 名患者作为外部验证集。使用半自动软件从 CCTA 图像中计算 CT-FFR 和 pFAI 同时分割冠状动脉周围脂肪组织(PCAT)和全心肌(Myocardium)并提取影像组学特征, 筛选出最佳特征后利用不同机器学习算法对影像组学标签进行模型构建。分析临床因素、CT-FFR、pFAI 和两组标签确定 WMH 进展独立预测因素构建诺莫图。**结果:** 不同机器学习算法比较得出 XGBoost 算法中 PCAT 标签展现出较高预测 WMH 进展效能, 在训练集、内部验证集、外部验证集 PCAT 和 Myocardium 标签的 AUC 分别为 0.862、0.760、0.731 和 0.738、0.708、0.711, 同时对两种影像标记物比较发现 pFAI 比 CT-FFR 具有更高预测效能, 在训练集、内部验证集、外部验证集 pFAI 和 CT-FFR 的 AUC 分别为 0.799、0.787、0.762 和 0.625、0.726、0.682, 最终, 结合 CT-FFR、pFAI 和影像组学标签的诺莫图显示出最高预测效能, 在训练集、内部验证集、外部验证集的 AUC 分别为 0.918、0.846、0.893。**结论:** 对两种影像标记物和影像组学标签比较发现, pFAI 比 CT-FFR、PCAT 标签比 Myocardium 标签预测 WMH 进展效能更好。结合 pFAI、CT-FFR 和影像组学标签的诺莫图是一种识别 WMH 进展潜在工具。

PO-0251

基底节区对称性低密度病变的发病机理与 CT 诊断相关性

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【目的】探讨基底节区对称性低密度病变的发病机理，探讨其与 CT 诊断的相关性，为临床医生提供更好的诊断及治疗方案。

【方法】选取 2020 年至 2022 年在我院治疗的基底节区对称性低密度病变患者，共计 50 例。采用 CT 螺旋扫描对病变进行影像学分析，结合临床资料结果进行综合分析。

【结果】50 例患者中，男性 27 例，女性 23 例。年龄分布在 40 岁至 70 岁之间，平均年龄为 56 岁。CT 表现为基底节区对称性低密度影像，病变范围多为对称性，部分患者伴有轻度半侧性脑萎缩。病变多为脑动脉硬化所致的缺血性病变。与对照组比较，患者基础疾病中高血压、糖尿病、高脂血症、吸烟等因素的发生率明显较高。

【结论】基底节区对称性低密度病变的发病机理与脑动脉硬化有关，高血压、糖尿病、高脂血症、吸烟等因素是其发病的主要危险因素。CT 诊断可对基底节区对称性低密度病变进行准确的影像学诊断，为临床医生提供更好的诊断和治疗方案。

PO-0252

Mahalanobis 距离测量法：量化脑卒中患者白质变化与预测预后的新方法

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目的：脑卒中是一种异质性疾病，其临床表现与影像特征在个体之间存在差异，这给基于病例对照法的神经影像研究带来了挑战。标准化建模是一种衡量个体偏离正态模式程度的新兴方法，有望为此提供解决方案。本研究旨在组水平和个体水平上评估脑卒中引起的白质微结构异常，寻找可用于预后预测的特异性生物标志物。

方法：我们招募了 46 名缺血性脑卒中患者和 46 名性别与年龄匹配的健康对照者。卒中发作 7 天内进行扩散加权成像和临床评估。首先，使用自动纤维量化技术对 20 条主要纤维束的 100 个节点进行弥散参数的表征。随后，将每位患者与 46 名健康对照者建立的标准化模式对 7 条具有组间差异的纤维束进行 Mahalanobis 距离测量，并提取 Mahalanobis 距离偏差负荷 (Mahalanobis distance-based deviation loads, MaDDLs) 和多参数融合的 MaDDL_{multi}。最后，进行相关性分析和 logistic 回归分析，评估 MaDDLs 与功能评分之间的关系。

结果：我们观察到左侧皮质脊髓束、双侧额枕下束、左侧下纵束、双侧丘脑辐射和右侧钩束的白质微结构完整性受损。MaDDLs 与初始功能障碍之间的相关系数在 0.521 至 0.618 之间，其中最高的是 MaDDL_{multi}。此外，与单变量 MaDDLs 相比，MaDDL_{multi} 在预后预测方面展现出更好的性能 (AUC = 0.875, 敏感度 = 0.867, 特异度 = 0.839)。值得注意的是，与左侧皮质脊髓束 MaDDL 相比，MaDDL_{multi} 预测效果更佳 (综合判别改善指数 = 9.62%, P = 0.005)。

结论：MaDDL_{multi} 在评估功能障碍和预测预后方面潜力可观，对于个性化临床决策和卒中康复具有重大意义。更重要的是，我们提出的方法在分析异质性神经疾病方面具有广阔的应用前景。

PO-0253

初诊 GBA 相关帕金森病的神经递质变化特点

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目的: 目前 GBA 相关帕金森病 (GBA-related Parkinson's disease, GBA-PD) 的神经递质缺陷及其与认知障碍的关系尚不清楚。深入理解 GBA-PD 神经递质损伤, 尤其是在初诊未服药阶段, 有利于制定具有针对性的治疗方案。因此, 本研究旨在探索 GBA-PD 和特发性帕金森病 (idiopathic Parkinson's disease, iPD) 的神经递质紊乱模式及其与认知表现的相关性。

材料与方法: 本研究共招募 189 例初诊 PD 患者进行 GBA 基因测序。在 17 例 GBA-PD、100 例 iPD 和 32 例年龄和性别匹配的健康对照组 (healthy controls, HCs) 中, 采用基于体素的形态学 (voxel-based morphometry, VBM) 分析技术探索脑灰质体积 (gray matter volume, GMV) 的变化特点。使用涵盖各种神经递质图谱的 JuSpace 工具箱, 研究 GBA-PD 和 iPD 患者 (相对于 HCs) 的局部 GM 萎缩区域是否与特定神经递质的空间分布相关。

结果: 与 HCs 相比, GBA-PD 患者的右侧颞中回 (middle temporal gyrus, MTG) 存在显著的 GM 萎缩。右侧 MTG 体积与初诊 PD 患者的执行功能呈正相关。GBA-PD 和 iPD 的 GM 萎缩与血清素能的高分布、多巴胺能和乙酰胆碱能的低分布存在显著的空间相关性 ($p < 0.05$, FDR 校正)。认知领域的执行功能和语言也与血清素能、多巴胺能和乙酰胆碱能回路的 GMV 共定位强度相关。

结论: GBA-PD 和 iPD 患者的 GM 萎缩与多种神经递质显著相关, 包括血清素能、多巴胺能和乙酰胆碱能, 并且与执行功能和语言能力显著相关。这些发现可能为 GBA-PD 和 iPD 的病理生理过程和相关认知特征提供新的见解, 促进潜在的治疗靶点以改善 PD 管理。

PO-0254

II~III级颅内孤立性纤维瘤的 MRI 表征与病理特征分析

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目的 探讨基于 MRI 表征分析术前预测颅内孤立性纤维性肿瘤 (intracranial solitary fibrous tumor, ISFT) 病理分级的价值及其病理特征。

材料与方法 回顾性分析本院 55 例经过手术病理证实的 ISFT 患者 (27 例 II 级、28 例 III 级) 的临床、MRI 影像征象及病理资料, 比较 II 级与 III 级 ISFT 患者 MRI 表征及病理特征差异。两组间计量资料的比较采用独立样本 t 检验或 Mann-Whitney U 检验, 分类资料的比较采用 Pearson 卡方或 Fisher 精确检验。通过 logistic 回归分析对差异有统计学意义的 MRI 表征进行变量筛选构建综合模型, 并绘制受试者工作特征 (ROC) 曲线并计算曲线下面积 (AUC) 评价各参数及综合模型对 II 级与 III 级 SFT 鉴别诊断的价值。

结果 II 级与 III 级 ISFT 患者平均发病年龄相当, II 级与 III 级患者中男性患病率均较女性稍高, 组间差异分析发现 II 级与 III 级患者中 T2F lair 信号特征、DWI 信号特征、ADCmax、ADCmin、ADCmean、肿瘤分布位置、颅骨侵犯情况存在显著差异 (P 均 < 0.05); 通过二元 logistic 回归分析将 T2F lair 信号特征及 ADCmin 值纳入回归方程显示模型准确率为 90.9%, 同时 ROC 曲线显示 T2F lair 信号特征的 AUC 为 0.703 (0.558, 0.848)、ADCmin 值的 AUC 为 0.805。ISFT 患者免疫组化 STAT6 阳性率达 96%, 免疫组化 Ki-67 的表达在 II 级 10% (5%, 15%) 与 III 级 15% (10%, 20%) ISFT 患者中差异有统计学意义 ($P < 0.05$)。

结论 基于 MRI 表征分析获得的 T2F lair 信号特征及 ADCmin 值对 IⅡ级与Ⅲ级 ISFT 术前鉴别诊断具有较高价值, 有助于提高本病的影像分级诊断率, 且Ⅲ级 ISFT 患者免疫组化 Ki-67 的表达高于 IⅡ级。

PO-0255

全肿瘤表观扩散系数直方图分析鉴别微囊型脑膜瘤和颅内孤立性纤维性肿瘤的价值

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目的: 探讨全肿瘤表观扩散系数 (apparent diffusion coefficient, ADC) 直方图分析术前鉴别微囊型脑膜瘤 (microcystic meningioma, McM) 和颅内孤立性纤维性肿瘤 (solitary fibrous tumor, SFT) 的价值。

材料与方法: 回顾性分析兰州大学第二医院经手术病理证实的 18 例 McM 和 23 例 SFT 患者的术前 MRI 资料。记录每名患者的 MRI 语义特征 (包括位置、分叶征、坏死/囊变、瘤周水肿、瘤脑界面、邻近骨质变化、血管流空信号、增强模式和肿瘤直径)。同时使用 MaZda 软件在轴位 ADC 图像上进行全肿瘤勾画并进行直方图分析, 获得 Mean、Variance、Skewness、Kurtosis、Perc.01、Perc.10、Perc.50、Perc.90 和 Perc.99 等 9 个直方图参数。分类变量采用 χ^2 检验比较, 计量资料采用独立样本 t 检验或 Mann-Whitney U 检验比较。绘制受试者工作特征曲线分析各直方图参数的鉴别诊断效能。

结果: McM 和 SFT 组间 MRI 语义特征均无统计学差异 ($P > 0.05$)。SFT 直方图参数中的 Mean、Perc.01、Perc.10、Perc.50、Perc.90 和 Perc.99 均明显低于 McM 组, 且各参数间差异均具有统计学差异 ($P < 0.05$); 而两组间 Variance、Skewness、Kurtosis 的差异均无统计学意义 ($P > 0.05$)。ROC 分析结果显示 Perc.01 是鉴别 McM 和 SFT 的最佳参数, 相应的曲线下面积为 0.861, 敏感性、特异性和准确性分别为 78.26%、88.89% 和 82.93%。

结论: McM 和 SFT 组间 MRI 语义特征存在交叉重叠。ADC 直方图分析有助于术前区分 McM 和 SFT, 其中 Perc.01 的鉴别性能最佳。

PO-0256

人工智能技术评估脊髓小脑共济失调 3 型患者脑萎缩的应用价值

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目的: 基于人工智能 (artificial intelligence, AI) 技术评价脊髓小脑共济失调 3 型 (spinocerebellar ataxia type 3, SCA3) 患者脑萎缩程度, 探究其与疾病严重程度的相关性。方法: 收集 2019 年 9 月至 2022 年 4 月 SCA3 患者实验组 (SCA3 组) 23 例和健康对照组 (healthy control, HC 组) 24 例的临床资料和影像数据。使用国际合作共济失调严重程度评分量表 (international cooperative ataxia rating scale, ICARS) 评估 SCA3 患者共济失调严重程度。采用 AI 技术处理实验组和对照组的 3D-T1WI 磁共振影像数据, 分割及测量脑组织的体积及其体积百分比。统计分析 SCA3 患者脑组织结构改变与共济失调严重程度的相关性。结果: 两组间性别、年龄比较无统计学差异 ($P > 0.05$)。与

HC 组比较, SCA3 组额叶、颞叶、顶叶、枕叶、边缘叶、右侧大脑白质、皮层下灰质、小脑及脑干体积及体积百分比显著下降(多重假设检验校正后 $\text{adjusted } P < 0.01$)。SCA3 组的 ICARS 评分与患者的年龄呈正相关($r = 0.571$, $P = 0.004$), 与左侧小脑白质、小脑蚓部、延髓的体积及小脑白质、小脑蚓部、脑桥、延髓的体积百分比均存在负相关($P < 0.05$)。结论: SCA3 患者幕上以及幕下脑组织均存在萎缩, 其中苍白球萎缩最为显著, 提示其可以作为 SCA3 的影像标志物之一。

PO-0257

临床 5.0 T 超高场 MRI 磁敏感加权成像评估脑静脉及深髓静脉的价值

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目的:探讨 5.0 T 超高场 MR 磁敏感加权成像(SWI) 技术评估健康人群脑静脉及深髓静脉的价值。

方法:收集本院 2023 年 3 月至 5 月招募的健康成年人 50 名, 采用完全随机设计将其分为 3.0 T MR 组和 5.0 T MR 组, 每组 25 名。对所有受检者进行磁敏感加权成像 (SWI), 采用主观 Likert5 分量表评分对图像质量进行评估, 采用 3 分量表法对脑深髓静脉显示质量 [大脑大静脉 (VofG) 及其 3 段、大脑内静脉 (ICV) 及其 3 段、透明隔前静脉 (ASV) 及其 3 段、流入透明隔前静脉的深髓静脉 (DV of ASV)、流入尾状核横静脉的深髓静脉 (DV of TCV)、流入侧脑室内侧静脉的深髓静脉 (DV of TLV)] 进行评估。2 组间定量指标的比较采用独立样本 t 检验和 Mann-Whitney U 检验。

结果:50 名受检者中男 27 名、女 23 名。5.0 T MR 组图像的 SNR 值和 CNR 值高于 3.0 T MR 组, 差异有统计学意义 (t 分别为 23.62、21.45, $P < 0.001$), 但 5.0 T MR 组、3.0 T MR 组图像质量主观评分差异无统计学意义 [分别为 5.0 (5.0, 5.0)、5.0 (4.0, 5.0) 分, $Z = -1.46$, $P = 0.113$]。对脑深髓静脉的评估上, 3.0 T MR 组与 5.0 T MR 组 SWI 在 VofG 和 ICV 的显示均较好, 评分差异无统计学意义 ($P > 0.05$), 而在 ASV 的显示上 5.0 T MR 组图像均明显优于 3.0 T MR 组图像 ($P < 0.05$)。在 DV of ASV、DV of TCV、DV of TLV 的评估中发现 5.0 T MR 组对深髓静脉的显示均显著高于 3.0 T MR 组图像 ($P < 0.001$)。

结论:5.0 T 超高场强 MR SWI 技术扫描对脑静脉及深髓静脉显示优良, 这为构建脑髓质静脉网络提供了可能, 可用于脑静脉疾病的诊断和鉴别诊断。

PO-0258

基于白质结构及衍生的网络属性预测 MCI 进展为 AD 的机器学习研究

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目的:本研究旨在利用 DTI 技术识别可能导致 MCI 进展的纤维束损伤和白质网络改变, 其次, 在此基础上联合机器学习及临床特征构建综合模型用于预测 MCI 患者中可能进展为 AD 的高风险人群。

方法:从 ADNI 中纳入 173 例 MCI 患者, 其中 45 例在 4 年的随访中进展为 AD。每名患者使用 DTI 技术提取相关纤维束属性特征, 此外, 基于白质纤维束构建脑网络提取网络属性特征。使用 mRMR、Lasso 等降维方式对纤维束特征及网络特征进行降维构建白质标志物。将降维后的重要特征与有差异的临床特征进行相关性分析, 同时利用机器学习 (SVM、Bayes、Tree、

RandomForest 和 KNN) 方法结合多模态临床数据构建综合模型。使用十折交叉验证及 ROC 曲线评估模型性能。

结果: 基于多因素逻辑回归筛选出 CDRS 评分及 ADAS 评分、白质标志物作为独立预测因子构建综合模型, 综合模型在训练队列中的 AUC、敏感性和特异性分别为 0.938, 0.937 和 0.91。在测试队列中的 AUC、敏感性和特异性分别为 0.905, 0.923 和 0.872。Delong 检测显示综合模型相比 CDR 评分、ADAS 评分有统计学差异($p < 0.05$), 而与白质标志物评分之间无统计学差异($p = 0.341$)。此外, 右侧中央前回介数中心性与 CDR、ADAS 评分呈负相关($r = -0.203, -0.27, P = 0.025, 0.003$), 右侧颞下回的 PageRank 与 ADAS 呈负相关($r = -0.241; P = 0.008$)。右侧海马扣带回的 MD 值与 MMSE 评分呈负相关($r = -0.233, P = 0.001$)。左侧钩束的 FA 值与 MMSE 评分呈正相关($r = 0.246, P = 0.007$)。结论: 本研究结果表明, 新型的白质特征组合联合临床量表评分构建的预测模型可以识别可能进展为 AD 的高风险人群, 结合 SVM 可以使模型准确率大大提高, 这有助于 AD 的早期诊断。

PO-0259

乳腺癌术前化疗过程中脑静息态功能活动与类淋巴功能改变及相关性分析

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目的: 探究女性乳腺癌患者术前新辅助化疗后脑功能和类淋巴功能变化及其之间的相关性情况。

方法: 40 名健康女性被试(healthy participate, HP) 及 80 名女性乳腺癌患者被纳入本次研究, 80 名乳腺癌患者均进行术前新辅助化疗。应用 MMSE 和 DSST 评分评价被试认知水平, 应用 FACT-CogPCI 评分评估乳腺癌患者化疗前后认知功能的变化。应用 rsfMRI 获取反映被试大脑功能活动的 ALFF 及 fALFF 指标。应用 DTI 获取反映脑类淋巴功能的血管周围间隙指数(along perivascular space, ALPS)。分析乳腺癌患者化疗前后 ALFF、fALFF 及 ALPS 变化及相关性, 分析各指标与认知评分之间的相关性。

结果: 相比 HP 及化疗前, 乳腺癌患者化疗后 MMSE 及 DSST 评分减低, FACT-CogPCI 评分增高。相比 HP, 乳腺癌患者化疗前, 右侧小脑、左侧丘脑的中间脑核及双侧顶叶中回等脑区团块 ALFF 值减低。化疗后, 左侧颞极中部、左侧丘脑腹外侧核及右侧顶后中回团块 ALFF 值相比 HP 组减低。而乳腺癌患者化疗前(BS) 右侧舌状回、左侧镰切沟和右侧前额顶叶团块以及化疗后的右侧纺锤状回、左侧舌状回团块 fALFF 值相比 HP 组增高($pFDR-C < 0.001$)。化疗后, 乳腺癌患者双侧颞叶、枕叶及顶叶多个脑区的 ALFF 值与 PCI 评分呈正相关($pFDR-C < 0.001$)。化疗后 ALPS 指数相比 HP 增高(1.42 ± 0.29 vs $1.56 \pm 0.24, p = 0.011$), 同时 ALPS 指数与 FACT-CogPCI 评分呈正相关($r = 0.241, p = 0.04$)。与此同时化疗后左侧舌状回 ALFF 值与 ALPS 指数呈正相关($r = 0.69, p < 0.001$)。结论: 我们的研究结果提示, 大脑功能活动和类淋巴引流均参与化疗后认知功能改变的过程, 同时两者在这个过程中存在相互关联。

PO-0260

青年及青少年抑郁症患者自杀相关的大脑白质结构和网络异常

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目的：重度抑郁症患者的自杀风险明显高于普通人群和其他精神障碍人群。自杀行为和意念通常始于青春期/成年早期，此时不仅是身体、智力发生变化的关键发展阶段，也是与大脑功能和结构重组相关的认知和情感变化的过渡时期，因此阐明青春期/成年早期自杀行为的神经基础可能有助于自杀的早期识别和预防。本研究拟通过磁共振成像技术，从连接大脑各脑区的白质纤维微结构的异常和大脑白质结构的网络拓扑属性的改变来研究有自杀倾向的青年、青少年抑郁症患者的神经影像学改变，探究抑郁症患者自杀的神经影像学机制。

方法：本研究一共纳入了年龄和性别相匹配的 33 名健康对照 (HC)、33 名无自杀倾向的抑郁患者 (DS-) 和 33 名有自杀倾向的抑郁患者 (DS+)，年龄范围 15-25 岁。采用自动纤维量化 (AFQ) 的方法分析了三组被试的弥散成像数据，追踪了被试大脑的 20 条纤维，评估了各纤维 100 个节段的各向分数异性 (FA)、平均弥散率 (MD)、径向弥散率 (RD) 和轴向弥散率 (AD)。将基于弥散成像数据得到的大脑 FA 值构建大脑的白质结构网络，利用基于图论的方法分析脑网络的全局和节点拓扑属性。

结果：AFQ 分析发现三组之间有差异的纤维束包括小脑体、双侧额枕下束、左丘脑前辐射和左弓状束。基于图论的大脑白质结构网络的全局和节点拓扑属性分析发现，与 HC 组相比，DS+组的 λ 显著增高，与 HC 组相比，DS-组和 DS+组的 Cp 值均明显降低；节点拓扑属性的异常表现为 DS+组和 DS-组的右侧丘脑节点效率显著低于 HC 组。

结论：本研究表明，青年及青少年抑郁症患者的自杀行为不仅与大脑白质的结构异常有关，还涉及到复杂的结构网络，前额叶-边缘系统可能在抑郁症患者的自杀行为中有重要意义，这为未来抑郁症自杀行为可能的治疗靶点提供了新的证据，未来的研究可能需要使用更大的样本量和更复杂的网络分析。

PO-0261

Sy-MRI 联合 3D-ASL 成像技术在恶性胶质瘤中
预测 IDH 基因突变的应用研究马文富¹、吕瑞瑞²、孙萌¹、金一萱¹、郑佳瑞¹、王晓东²

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目的 探索集成 MRI(Synthetic MRI, Sy-MRI)联合三维动脉自旋标记 (three dimension-arterial spin labeling, 3D-ASL) 成像技术在恶性胶质瘤中预测异柠檬酸脱氢酶(isocitrate dehydrogenase, IDH) 基因突变的应用价值。

材料与方法 本研究共纳入具有完整病理及免疫组化的胶质瘤患者 60 例，术前均行 Sy-MRI 及 3D-ASL 扫描，将病例分为 IDH 突变型和 IDH 野生型。对 Sy-MRI 的各参数图与 3D-ASL 的相对脑血流量(relative cerebral blood volume, rCBF)图进行配准，测量肿瘤实体部分在上述参数图的信号。采用独立样本 t 检验比较 IDH 突变型和 IDH 野生型组间不同参数的差异，采用单因素逻辑回归分析 Sy-MRI 参数及 rCBF 在 IDH 突变中的预测价值，采用受试者工作特征(receiver operation characteristic, ROC)曲线评估各参数及其联合对 IDH 突变的诊断效能。结果均以双侧 $P < 0.05$ 为差异有统计学意义。

结果 IDH 突变型和野生型组在增强前 T1、增强后 T1、 $\Delta T1$ 、 $\Delta T2$ 及 rCBF 间差异有统计学意义(p 均 <0.05)；在增强前 T2 和增强后 T2 间差异无统计学意义(p 均 >0.05)。单因素逻辑回归分析显示增强前 T1、增强后 T1、 $\Delta T1$ 、 $\Delta T2$ 及 rCBF 对 IDH1 突变状态有较高的预测价值(p 均 <0.05)，而增强前 T2 和增强后 T2 无统计学上的预测价值(p 均 >0.05)。rCBF、 $\Delta T1$ 、 $\Delta T2$ 值独立诊断 IDH1 突变状态的 AUC 值分别为 0.801、0.749、0.770。上述三参数联合模型诊断 IDH 突变的 AUC 为 0.920。

结论 Sy-MRI 的定量弛豫成像和 3D-ASL 成像技术可作为术前无创预测 IDH 突变状态的新影像学指标。

PO-0262

糖尿病前期及 2 型糖尿病皮层萎缩与认知功能的相关性研究

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目的 本研究旨在探讨糖尿病前期和 2 型糖尿病患者大脑皮层的改变模式及其与认知功能的关系，以期探寻血糖代谢异常早期的影像标志物。

方法 本研究纳入 96 名 2 型糖尿病 (T2DM)、30 名糖尿病前期 (PDM) 以及 48 名正常对照 (NC)，对被试进行了认知功能测试、临床生化检查及高分辨率 3D-T1WI 磁共振扫描。使用 CAT12 软件进行基于体素的形态学分析和基于表面的形态学分析得到全脑灰质体积和皮层厚度、局部回指数等皮层结构参数，并比较 3 组间的差异，结果均使用 $P < 0.05$ 的阈值和 FWE 校正进行多重比较校正。进一步提取组间具有差异的参数，与生化指标及认知量表得分进行相关分析。

结果 与 NC 相比，PDM 右侧眶部额下回及左侧中央后回灰质体积减小 ($P < 0.05$, FWE 校正)，T2DM 患者出现更多灰质萎缩，特别是右侧颞上回、右侧眶部额下回、右侧颞中回及左侧中央后回，右侧前额叶皮层厚度减小 ($P < 0.05$, FWE 校正)。在血糖代谢异常被试中全脑灰质体积与胰岛素抵抗指数 ($r = -0.227$, $P = 0.012$) 及连线测试 A 得分 ($r = -0.250$, $P = 0.001$) 呈负相关，与数字广度-倒背得分呈正相关 ($r = 0.267$, $P = 0.003$)；皮层厚度与糖化血红蛋白 ($r = -0.181$, $P = 0.040$) 及餐后 2h 血糖 ($r = -0.272$, $P = 0.020$) 呈负相关，与餐后 2h 胰岛素 ($r = 0.236$, $P = 0.010$) 及胰岛 β 细胞功能指数 ($r = 0.207$, $P = 0.022$) 呈正相关。

结论 本研究发现糖尿病前期已存在脑区灰质萎缩，T2DM 患者出现更多的灰质萎缩，且与注意和工作记忆功能相关，因此皮层萎缩有可能是糖尿病相关脑损伤早期的影像标志物。这提示处于糖尿病前期的被试也应该严格控制血糖，早期干预有利于预防认知损害及改善预后。

PO-0263

人工智能在基于 CT 灌注原始图像重组头颅 CT 血管成像的应用

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目的 探讨利用人工智能软件从 CTP 原始图像中重组的 CTA 的临床应用价值。资料与方法 收集临床疑似缺血性脑血管病患者 60 例，所有患者均进行头颅 CT 平扫、CTA 与 CTP 检查，将 CT 灌注原始图像导入数坤脑灌注智能分析系统获得重组 CTA (即 CTPA)。以常规 CTA 扫描结果为参照，CTA 与 CTPA 组各分析 540 个节段血管，采用 Kappa 检验比较两者图像质量以及脑动脉狭窄显示的一致性。结果 图像质量主观评价发现 CTPA 图像显示脑动脉强化程度、脑动脉细节显示能力、图像噪声及静脉污染等与 CTA 相似。血管狭窄程度分析得出 CTA 和 CTPA 对脑内动脉显示具有很好的一致性，Kw 值均大于 0.75。共 540 个节段血管中，仅 15 个节段的血管存在 CTPA 与 CTA 显

示不一致的结果, 其中仅 2 个节段为低估血管狭窄程度, 余 13 个节段血管均为高估血管狭窄程度。结论 利用 AI 软件, 能方便、快捷地迅速从 CTP 灌注原始图像中重组出颅内动脉图像, 所得 CTPA 与常规 CTA 比较, 有较好的一致性, 能准确显示动脉狭窄和闭塞。

PO-0264

基于人工智能 CT 评估前循环大血管闭塞性急性缺血性脑卒中血管内治疗预后的影响因素

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目的: 探讨基于人工智能多模态 CT 评估前循环大血管闭塞性急性缺血性脑卒中(AIS-LVO)血管内治疗(EVT)预后的影响因素, 并构建预后预测模型, 旨在改善患者临床预后提供理论依据。

方法: 回顾性收集我院 114 例接受 EVT 的前循环 AIS-LVO 患者。收集患者的一般临床资料。治疗前所有患者均行颅脑 CT 平扫(NCCT)、颅脑 CT 血管成像(CTA)、脑 CT 灌注成像(CTP)检查。根据术后 3 个月改良 Rankin 量表(mRS)评分将患者分为预后良好组和预后不良组。采用单因素分析及多因素 Logistic 回归分析筛选前循环 AIS-LVO 患者 EVT 后预后的独立预测因素, 并构建基于临床因素、影像因素、临床联合影像因素的预后预测模型, 应用 ROC 曲线评估各模型的预测效能。

结果: 多因素 Logistic 回归分析显示, 回归临床模型显示年龄, 入院时 NIHSS 评分是预测卒中预后的独立预测因素, 该模型预测卒中预后的 AUC 为 0.899, 敏感度 72.9%, 特异度 90.9%。回归影像模型显示梗死核心体积, 侧支血管 Miteff 评分是预测卒中预后的独立预测因素, 该模型预测卒中预后的 AUC 为 0.914, 敏感度 81.3%, 特异度 89.4%。回归临床联合影像模型显示年龄, 入院时 NIHSS 评分, 梗死核心体积, 侧支血管 Miteff 评分是预测卒中预后的独立预测因素, 该模型预测卒中预后的 AUC 达 0.953, 敏感度 87.5%, 特异度 93.9%。DeLong 检验发现, 与临床联合影像模型相比, 临床模型($Z=-2.422$, $P=0.015$)、影像模型($Z=2.196$, $P=0.028$)预测能力较低, 差异有统计学意义。

结论: 年龄、入院时 NIHSS 评分、梗死核心体积及侧支血管 Miteff 评分是前循环 AIS-LVO 患者 EVT 后预后不良的独立预测因素。临床联合影像的预测模型能有效提高前循环 AIS-LVO 患者 EVT 术后预后预测效能。

PO-0265

大脑功能同伦的遗传机制: 一项基于转录组学和静息态功能磁共振的研究

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目的: 大脑半球间的沟通与协调主要由胼胝体调节, 对感觉运动等低级神经功能和语言注意等高级认知功能过程都至关重要。大脑功能同伦, 作为半球间沟通与协调的代表, 指大脑半球间几何结构对称的区域自发活动的高度同步性和功能共激活, 是大脑固有功能结构的基本特征之一。尽管大脑功能同伦极其重要, 但我们对其遗传机制仍知之甚少。本研究的目的是通过结合神经影像学 and 转录组数据来研究大脑功能同伦的遗传机制。

材料与方法: 采用来自 1 个发现数据集和 2 个独立的验证数据集的静息态功能磁共振数据计算镜像同伦连接(voxel-mirrored homotopic connectivity, VMHC)。这种方法量化了一侧半球的每个体素与另一侧半球的镜像体素之间的静息态功能连接, 用于表征大脑功能的同伦性。同时, 采用新开发的

标准化处理流程对艾伦人类大脑图谱的基因表达数据进行处理,得到标准化大脑基因表达数据。随后,对基因表达数据及 VMHC 进行转录组-神经影像学空间相关性分析,从而鉴定 VMHC 相关基因。最后,对 VMHC 相关基因进行全面的特征分析,包括功能注释、特异性表达分析、行为相关性分析及蛋白质-蛋白质网络分析。

结果:我们发现 1001 个基因的表达量在空间上与 VMHC 显著相关。功能富集分析表明,这些与 VMHC 相关的基因显著富集在与蛋白激酶活性、离子通道调节、突触功能等相关的生物功能以及许多神经精神疾病。同时,组织及细胞特异性表达分析表明,这些基因在大脑组织及多种类型的神经元和免疫细胞中都有特异性表达;时间特异性分析表明,这些基因几乎在大脑所有发育时期都特异性发挥作用。此外,VMHC 相关基因与多个行为域相关,包括视觉、执行力和注意力。最后,这些基因可以构建一个由 36 个具有重要功能的中枢基因支持的蛋白-蛋白相互作用网络。

结论:我们的研究表明,大脑半球间的交流和协调涉及复杂的多基因相互作用,具有丰富的功能特征。

PO-0266

垂体脓肿的诊断与鉴别诊断

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目的:垂体脓肿是一种罕见的鞍内感染性病变,发病率极低,多为病例报道,临床表现与其他垂体占位相比无特异性,多为头痛及相关的垂体功能紊乱。磁共振成像是诊断垂体脓肿必不可少的检查方法。通过本次的资料报告及相关的文献学习可以帮助影像科医生更好的了解疾病,提高诊断的准确性。

方法:回顾了垂体脓肿患者的临床资料(包括内分泌检查、外周血表现、脑脊液检查)、影像资料,并进行了相关疾病的文献复习。

结果:DWI 明显高信号,增强扫描呈囊壁厚薄均匀一致的明显强化,同时出现垂体柄增粗及明显强化对垂体脓肿具有提示性意义。需与垂体瘤囊变、颅咽管瘤、Rathke's 囊肿相鉴别。

结论:磁共振平扫结合增强扫描可以较为准确的诊断垂体脓肿,熟悉疾病的发病部位、发病机制、实验室检查、特征性影像表现及鉴别诊断,有助于提高影像科医师诊断的准确性。

PO-0267

椎管内节细胞神经瘤的 MRI 表现及文献复习

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目的:探讨椎管内节细胞神经瘤的临床表现及 MRI 特点,提高术前诊断该病的准确率。

方法:分析经本院手术病理证实的椎管内节细胞神经瘤的临床表现、影像特点,并结合文献复习,总结其诊断要点。

结果:椎管内节细胞神经瘤以颈段好发,沿椎间孔生长,与神经鞘瘤难鉴别。病灶 MRI 平扫 T1WI 呈等或稍低信号,T2WI 呈高信号,信号均匀或不均匀,增强扫描病灶强化或强化不明显。

结论:椎管内节细胞神经瘤有一定 MRI 特征性表现,进行准确诊断及鉴别诊断有重要意义。

PO-0268

抑郁症患者的功能及形态学脑网络构建与分析

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目的 对抑郁症(major depressive disorder, MDD)患者的功能及形态学脑网络进行构建并分析。**方法** 选取 55 例抑郁症(MDD)患者和 46 例正常对照(normal controls,NC)被试作为研究对象。所有受试在 3.0T 超高场 MR 仪进行扫描,获取全脑三维高分辨结构磁共振(structural MRI,sMRI)及静息态功能磁共振(resting-state dynamic functional MRI, rs-fMRI)图像数据,通过 DPARSF 工具箱构建脑功能网络,通过 Freesurfer 工具构建脑形态学网络。**结果** MDD 组全局功能脑网络特征与正常对照无显著差异,但局部形态学及功能脑网络特征区别于 NC 组,组间差异主要包括 1)形态学脑网络特征:左脑区颞横皮质区域灰质体积(gray volume, GrayVol)和表面积(surface area, SurfArea)显著大于健康对照($P<0.05$); 2)功能脑网络特征:默认模式网络(default mode network,DMN)中多个节点的功能连接(functional connectivity, FC)异常增加;其中,左脑区颞叶皮质与默认网络内其他节点及背侧注意网络(dorsal attention network, DAN)之间的功能连接(functional connectivity,FC)显著增强,局部拓扑指标中左脑区颞横皮质介数中心性增强($P<0.05$)。**结论** MDD 患者功能及形态学脑网络较正常对照存在差异,左脑区颞横皮质区域差异显著,可能其发病机制相关联。

PO-0269

对左背外侧前额叶皮层行 rTMS 治疗来改善尼古丁依赖: 一项静息态功能连接的纵向研究

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目的 评估对左背外侧前额叶皮层(LDLPFC)进行重复经颅磁刺激(rTMS)是否可以减少吸烟欲望并提高戒烟率,利用静息态脑网络方法来探究尼古丁依赖吸烟者 rTMS 治疗前后尼古丁相关成瘾环路感兴趣区的功能连接变化,深度挖掘其神经生物学机制。

方法 纳入 17 例寻求治疗的尼古丁依赖吸烟者(>每天 10 支烟),所有被试均进行吸烟严重度指数、尼古丁依赖评估量表(FTND)、明尼苏达烟草戒断症状量表(MNWS)、吸烟渴求简短问卷(sTCQ)等量表测试。参与者在两周内完成 10 次 mri 精准引导的 rTMS 治疗(采用定位帽定位,10Hz/100%,连续刺激时间 5s,间隔 20s,总时间 15min,总刺激数 1500 次),在治疗前、后分别采集静息态 BOLD 数据,以双侧伏隔核为种子点对全脑进行纵向功能连接分析。

结果 接受 rTMS 治疗的尼古丁依赖吸烟者在 2 周的疗程后尼古丁依赖程度显著降低($P<0.001$),烟草戒断症状改善($P<0.05$),吸烟渴望度显著减低($P<0.001$)。功能连接分析发现 rTMS 治疗后右侧伏隔核至右侧梭状回、楔叶、舌回、枕中回、枕下回及颞下回等脑区连接强度增加($P<0.05$, GRF 校正)。

结论 MRI 引导下对 LDLPFC 进行持续至少两周的 rTMS 治疗可显著减少尼古丁的依赖程度及改善烟草戒断症状,提高了戒烟的可能性。治疗前后右侧伏隔核功能连接的改变可能其有效戒烟的神经生物学机制之一。

PO-0270

CTA 联合 CTP 成像参数和血清生物学 对卒中复发事件的预测价值

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摘要：目的 探讨 CTP 联合 CTA 检查中影像参数和血清生物学指标在 3 个月和 1 年时预测卒中后复发事件的预后价值。方法 回顾性纳入 136 名神经内科首次诊断脑梗死的患者，患者接受了头颈 CTA+CTP 一站式检查和血清生物标志物检测，并对卒中复发事件的发生进行了三个月和一年的随访。复发事件被定义为缺血性中风、视网膜梗死、脑内出血、蛛网膜下腔出血及死亡。结果 在三个月和一年的随访中，卒中复发事件的发生率分别为 23.3%（32 例）和 36.7%（50 例）。半暗带体积（OR=1.010，P=0.029）、出院时 mRS 评分（OR=1.388，P=0.008）是三个月随访时卒中复发事件的独立危险因素；脂蛋白 a（OR=1.002，P=0.044）、血管狭窄程度（OR=1.489，P=0.029）、出院时 mRS 评分（OR=1.282，P=0.038）是一年卒中复发事件的独立危险因素。结论 在首次发生卒中的患者中，半暗带体积、出院时 mRS 评分和脂蛋白 a、血管狭窄程度及出院时 mRS 评分是 3 个月和 1 年随访卒中后复发事件有力的预测因素。

PO-0271

血管选择性动脉自旋标记对成人颅内侧支循环的研究

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目的：探讨 t-ASL 灌注成像评估成人大脑侧支循环的情况，并研究 t-ASL 灌注成像技术的临床应用价值。

方法：收集 50 名正常志愿者及临床上诊断为脑卒中的 18 名患者的影像数据，所有志愿者及脑卒中患者均进行 t-ASL 灌注成像、3D-ASL 脑灌注成像检查，所有脑卒中患者均进行 DSA 检查。经两位医师对于 t-ASL 灌注成像评估健康成人志愿者颅内侧支循环的一致性分析以及 t-ASL 灌注成像与 MRA 对于侧支循环一致性分析采用 Kappa 系数检验；t-ASL 灌注成像与 3D-ASL 脑灌注成像诊断健康成人颅内解剖变异的差异性分析则采用 χ^2 检验对比。分析脑卒中患者 DSA 与 t-ASL 对侧支循环形成评估的一致性，采用 Kappa 系数检验；对比 3.0T t-ASL 灌注成像与 3D-ASL 脑灌注成像对于脑卒中患者颅内侧支循环评估的准确度、敏感度、特异度，采用 χ^2 检验对比。P<0.05 表示差异有统计学意义。

结果：运用 t-ASL 灌注成像对健康志愿者颅内侧支循环分析：1.两位医师之间对于 t-ASL 的评估一致性良好（Kappa 值：0.876）；2. t-ASL 与 MRA 对正常成年人颅内侧支循环形成的评估一致性良好（Kappa 值：0.786）；3.t-ASL 灌注成像与 3D-ASL 灌注成像在评估正常志愿者灌注方面差异具有统计学意义（P<0.01）。

运用 t-ASL 灌注成像对脑卒中患者颅内侧支循环分析：1.DSA 与 t-ASL 对侧支循环形成的评估一致性较好（Kappa 值：0.679）；2.t-ASL 灌注成像在评估脑卒中患者侧支循环及灌注方面准确度、灵敏度高于 3D-ASL 灌注成像（P<0.05）。

结论：1.t-ASL 灌注成像能够评估单支血管灌注情况，为评估正常成人脑灌注方面提供更多信息。2.t-ASL 灌注成像评估脑卒中患者侧支循环优于 3D-ASL 脑灌注成像技术。

PO-0272

体素内不相干运动成像 (IVIM) 监测脑胶质瘤复发和治疗后反应的初步探讨

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目的: 探讨磁共振体素内不相干运动成像 (intravoxel incoherent motion, IVIM) 在监测脑胶质瘤复发和治疗后反应中的应用价值。材料和方法: 26 例脑胶质瘤患者 (15 例脑胶质瘤复发, 11 例治疗后反应) 在同步放化疗结束 2 月内行头部常规 MRI 扫描、增强扫描及多 b 值弥散加权扫描, 通过 IVIM 软件的双指数模型, 对图像后处理得到 standard ADC、slow ADC (D)、fast ADC (D*)、fraction of fast ADC (f) 的伪彩图, 分别测量病例异常强化区 standard ADC 值、D 值、D*值、f 值。采用两样本 t 检验比较两组各参数值是否存在差异, 受试者工作特性曲线 (ROC) 评估各参数值在脑胶质瘤复发和治疗后反应鉴别诊断的效能。结果: 复发组的强化病灶 standard ADC 值、D 值低于治疗后反应组, 差异有统计学意义 ($P < 0.05$)。ROC 曲线分析, 当 standard ADC 值、D 值曲线下面积分别为 0.703、0.788 时, 其阈值分别为 1.166、0.631, 敏感性分别为 54.5%、81.8%, 特异性分别为 86.7%、73.3%; 复发组的强化病灶 D*值、f 值均高于治疗后反应组, 差异有统计学意义 ($P < 0.05$)。ROC 曲线分析, 当 D*值、f 值曲线下面积分别为 0.752、0.758 时, 诊断阈值分别为 2.642、0.693, 敏感性分别为 66.7%、81.8%, 特异性分别为 81.8%、66.7%。结论: IVIM 可以监测脑胶质瘤复发和治疗后反应, 为脑胶质瘤患者在临床的进一步治疗提供影像依据。

PO-0273

磁共振 DTI 技术在内囊走行纤维束分析研究

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大脑的解剖结构与功能非常复杂。尤其投射纤维的走行与链接一直是脑科学关注的核心问题, 也是临床神经病学的定位和定性的基础。弥散张量成像 (diffusion tensor imaging, DTI) 是唯一可显示活体脑白质纤维束的无创性成像技术, 能够立体、直观的显示纤维束的走行变化。本研究采用 DTI 观察内囊纤维束的组成及毗邻关系。从而为了解内囊区域病变导致相应的临床症状打下了基础。对脑功能精准定位和制定精准康复计划有重要的指导意义, 尤其在功能神经外科领域有着广泛的应用前景。

PO-0274

通过自动纤维定量的无监督机器学习探索多发性硬化症的亚型

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目标: 本研究的主要目标是通过应用无监督机器学习技术, 对多发性硬化症 (MS) 的扩散张量成像 (DTI) 数据中的 WM 纤维束进行亚型分类。通过在这些 WM 纤维束中识别有意义的模式, 研究旨在揭示 MS 人群中隐藏的亚型。这些亚型可以为我们了解疾病的异质性及其对认知和残疾结果的影响提供洞察。

材料与方法: 本研究利用自动化纤维量化 (AFQ) 方法从一组 MS 患者的 DTI 数据中提取了 18 个 WM 纤维束。AFQ 自动分割 WM 纤维束并量化其特征, 包括分数异性 (FA)、平均弥散性 (MD)、轴向弥散性 (AD) 和径向弥散性 (RD)。应用无监督机器学习技术, 包括聚类分析, 对提取的特征进行分析, 以在 MS 人群中识别出不同的亚型。将临床数据, 包括认知评估和残疾评分, 与 DTI 指标结合起来, 以了解已识别亚型的影响。

结果: 分析揭示了 MS 人群中存在三种不同的亚型。这些亚型在临床特征和 DTI 指标方面存在显著差异。值得注意的是, 亚型之间 FA、MD、AD 和 RD 值的变化表明了 WM 完整性和微结构损伤的潜在差异。亚型 3 表现出最快的残疾进展和认知衰退, 而亚型 2 的进展速度较慢。亚型 1 介于两者之间, 显示出适度的残疾轨迹。

讨论: 在 MS 人群中识别出不同的亚型对于理解疾病异质性和个体化患者护理具有重要意义。亚型之间的 WM 完整性和微结构损伤差异的观察突显了这些参数作为预测疾病结果的生物标志物的潜力。亚型 3 中的较快残疾进展和认知衰退强调了早期识别和为这组患者量身定制干预措施的临床意义。

结论: 本研究证明了将无监督机器学习应用于 WM 纤维束数据进行 MS 患者亚型分类的可行性。已识别出的亚型在认知功能、残疾进展和 DTI 指标方面存在显著差异。这些发现为 MS 中的个体化治疗策略和预后预测铺平了道路。该研究强调了 WM 异常作为有价值的生物标志物, 用于指导临床决策并改善患者预后。

PO-0275

基于隐马尔科夫模型研究主观认知下降 人群脑动态活动特征及与空间导航的关联

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目的: 主观认知下降 (subjective cognitive decline, SCD) 与临床前阿尔茨海默病 (Alzheimer's disease, AD) 风险增加有关。以往神经影像学研究多采用脑静态分析, 然而人脑本质是一个动态的系统。空间导航障碍是临床前 AD 的一个被忽视的认知标志物, SCD 人群的脑动态活动特征及与空间导航的关联尚不清楚。

方法: 80 名 SCD 受试者和 77 名正常对照 (normal control, NC) 被招募并接受了认知量表评估、空间导航测试、脑磁共振成像扫描。采用隐马尔科夫模型, 推断出 12 种不同的脑活动状态。计算每位受试者在各个状态下的分数占比 (fractional occupancy, FO) 和平均停留时间 (mean dwell time, MDT), 以及状态之间的转移概率 (transition probability, TP)。比较 SCD 与 NC 组三种脑动态活动指标的组间差异, 并与空间导航距离误差进行相关性分析。最后, 评估脑动态活动特征和空间导航距离误差对 SCD 与 NC 的分类效能。

结果: 与 NC 组相比, SCD 组在状态 8 和状态 12 的 FO 显著升高 ($p < 0.05$, 错误发现率校正), 这两种状态在腹侧默认模式网络、后侧突显网络、视觉空间网络均表现出较低的激活程度。SCD 组在状态 7 的 FO 显著降低 ($p < 0.05$, 错误发现率校正), 状态 7 中全脑网络表现为高度激活状态。SCD 组从状态 1 到状态 7 的 TP, 以及从状态 7 到状态 10 的 TP 显著降低。结合脑动态活动特征和空间导航距离误差对 SCD 与 NC 进行分类, 曲线下面积为 0.854。

结论: SCD 人群脑动态活动显著改变, 表现为腹侧默认模式网络、后侧突显网络、视觉空间网络活动程度降低, 以及无法灵活地上调或下调脑功能活动, 这可能与空间导航功能减退相关。结合脑动态活动特征和空间导航行为学有助于临床前 AD 高风险人群的早期诊断。

PO-0276

去除环形强化 GBM 坏死相关炎症的影响区域是否可提高 MRI 定量研究中与感染性病变的鉴别能力?

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目的: 利用动态对比增强 (DCE) 和 DWI 分析去除 GBM 坏死相关炎症的影响区域是否可提高与感染性病变的鉴别诊断效能。**方法:** 回顾性分析本院临床或病理证实、且呈环形强化的 GBM 和颅内感染性病变。术前 2 周接受 3.0T MRI 平扫、T1W 增强、DWI 和 DCE 扫描。采用双盲的方式分别在 ADC 和 DCE 图像的病灶最大层面手动勾画 GBM 的整体环形强化区、厚壁毛玻璃样强化区、薄壁显著强化区和感染性病变的环壁作为感兴趣区。GBM 的厚壁毛玻璃样强化、薄壁显著强化和感染性病变的强化环壁分别定义为组 1、组 2、组 3。对具有组间统计学差异的参数进一步绘制 ROC 曲线, 根据约登指数得到最佳截断值、敏感度、特异度和准确度, 采用综合判别改善指数 IDI (Integrated Discrimination Index, IDI) 对联合诊断方法的改善情况进行评价。上述过程均采用 SPSS25.0 软件、R 软件 (version 4.0.2) 加载 pROC 软件包和 PredictABEL 软件包, $P < 0.05$ 表示结果具有统计学差异。**结果:** 三组强化环壁的 Ktrans、AUC、MAXslope 和 ADC 具有显著统计学差异 ($P < 0.05$); Vp、Kep、TTP、Ve 无显著统计学差异 ($P > 0.05$)。两两比较, 结果提示组 2 为 GBM 坏死相关炎症的影响区域。去除组 2 区域后, 勾画感染性病变的整体 ROI、分别勾画 GBM 整体强化环壁、厚壁毛玻璃样强化区作 ROI。前者定量 DCE 的 ROC 曲线下面积、灵敏度和特异度分别为 0.917, 1.000 和 0.900; ADC 联合对定量 DCE 的诊断效能无显著加权作用。只勾画 GBM 厚壁毛玻璃样强化区, ADC 联合定量 DCE 鉴别诊断效能最佳, ROC 曲线下面积达 0.967。**结论:** 去除环形强化 GBM 坏死相关炎症的影响区域可提高 MRI 定量研究中与感染性病变的鉴别能力。

PO-0277

基于纤维束自动定量法对遗忘型认知障碍患者脑白质纤维完整性改变的研究

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目的 采用纤维束自动定量法 (AFQ) 对遗忘型认知障碍患者 (aMCI) 的脑白质纤维束部分各向异性值 (FA) 及平均扩散率 (MD) 进行分析, 以研究其脑内白质纤维束逐点破坏的特点。**方法** 选取 2018 年 1 月-2019 年 3 月南京大学医学院附属鼓楼医院神经内科记忆门诊就诊的 20 例 aMCI 患者、22 例 naMCI 患者和年龄、性别、受教育程度匹配的 23 例正常认知对照组 (NC), 所有被试均进行 3.0T 磁共振扩散张量成像及高分辨 T1 加权成像扫描, 采用 AFQ 对全脑 20 根纤维束的 100 个节点进行 FA 及 MD 值定量分析。**结果** 与 naMCI 相比, aMCI 组右侧皮质脊髓束中间节段 (节点 33-60) 的 FA 值明显减低 ($t = -4.023, p < 0.000$, FWE 校正), 左侧扣带束海马部分的中间节段 (节点 41-61) MD 值明显增高 ($t = 2.408, p = 0.037$, FWE 校正)。与正常对照组相比, aMCI 患者左侧下纵束偏后部 (节点 24-46) ($t = -2.919, p = 0.006$, FWE 校正) 及左侧扣带束海马的中间节段 (节点 38-71) ($t = -3.878, p = 0.002$, FWE 校正) MD 值明显增高。**结论** 本研究首次对 aMCI 患者脑内 20 条纤维束进行 100 个节点定量分析, 提示了 aMCI 患者部分纤维束的特定节点会出现一定损伤; 此外, 不同的白质纤维束破坏模式各异; 较之前的其它类似研究明显改进了定量分析方法, 对进一步理解 aMCI 患者脑白质纤维束破坏模式具有重要价值。

PO-0278

2 型糖尿病患者认知障碍相关的脑自发活动 和功能网络动力学改变

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目的 探讨 2 型糖尿病 (T2D) 患者动态功能连接 (DFC) 改变及脑自发活动的动态特征及其与认知能力和生化特征的相关性。

方法 本研究包括 45 名健康对照 (HC) 和 102 名 T2D 患者, 将 T2D 患者根据有无轻度认知障碍 (MCI) 分为 T2-NC 组 (n=62) 和 T2-MCI 组 (n=40)。基于独立成分分析 (ICA) 设定 39 个独立成分, 划分为 7 个脑网络。基于滑动窗口法和 k-means 聚类, 分析组间动态功能连接的变化, 并比较特征参数。此外, 采用动态低频振幅 (dALFF) 和动态局部一致性 (dReHo) 评估局部神经活动动力学。同时评估了神经影像学指标与认知能力和生化特征之间的相关性, 采用受试者工作特征 (ROC) 曲线评价了脑动力学改变对 MCI 的诊断效能。

结果 最终得到 4 个功能连接状态: 局部强连接状态 (状态 1)、广泛的相互连接状态 (状态 2)、弱连接状态 (状态 3) 及强连接状态 (状态 4)。T2D 患者在状态 2 的平均停留时间增加 ($p = 0.048$), 在状态 4 的平均停留时间减少 ($p = 0.041$), 在状态 4 的分数窗口减少 ($p = 0.013$), 并且状态 2 和状态 4 之间的转换次数减少 ($p = 0.045$)。当统计效能为 0.8 时, 每组 88 个样本即可观察到 T2-NC 组和 T2-MCI 组之间有显著差异。与 HC 和 T2-NC 相比, T2-MCI 显示右侧岛叶的 dALFF 增加, 左侧距状裂周围皮层的 dReHo 增加。ROC 曲线显示, 综合所有有意义的指标 (包括 dALFF 及 dReHo 的变异系数、状态 2 的平均停留时间、状态 4 的平均停留时间、状态 4 的分数窗口和状态 2 至状态 4 的转换次数) 的曲线下面积 (AUC) 为 0.796 (95% CI = 0.711-0.881)。

结论 与 2 型糖尿病功能损害相关的 DFC 差异和自发脑活动的动态特征可能是预测临床进展、评估认知损的潜在生物标志物。

PO-0279

影像基因组学在胶质母细胞瘤免疫浸润特征评估 及预后预测中的应用研究

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目的:

肿瘤微环境和免疫细胞浸润 (ICI) 在胶质母细胞瘤 (GBM) 的发生、发展中扮演重要角色。本研究旨在通过转录组数据分析建立与 GBM 预后有关的 ICI 生物标志物, 探讨 ICI 特征与 GBM 肿瘤生物学特征之间的关系, 并基于影像基因组学分析构建影像-免疫特征预测及综合预后模型。

方法:

从三个数据库 (GEO, TCGA, CGGA) 中纳入共计 774 例 GBM 患者的基因表达和生存数据, 并划分为发现集 (TCGA+GEO, $n = 400$) 和独立验证集 (CGGA, $n = 374$)。在发现集中, 基于 CIBERSORT 和 ESTIMATE 工具包识别出 GBM 肿瘤 ICI 模式, 使用无监督聚类分析及主成分分析方法计算 GBM 患者个性化的 ICI 风险评分, 并将该评分在独立验证集 (CGGA) 中进行外部验证。基于 Pyradiomics 从肿瘤内和肿瘤周总共提取 5915 个放射组学特征。使用基于交叉验证的递归

消除来选择关键特征, 并使用支持向量机训练从影像到 ICI 特征的预测模型。使用成像和生存数据在独立数据集 ($n = 149$) 中检查已确定的放射基因组模型的预后价值。

结果:

结果表明, 较高的 ICI 风险评分通常预示患者较差的预后 (多变量风险比 MHR: 发现组=0.48, 验证组=0.63) 以及相对较高的免疫检查点相关基因的表达水平。而结合了 11 个放射组学特征的影像基因组学模型可以很好地区分具有不同 ICI 评分的肿瘤 (十折交叉验证 $AUC = 0.96$, 准确度 = 94%)。此外, 在外部独立影像验证队列 (NBH, $n=149$) 中, 该模型可以通过 GBM 患者的影像信息对患者进行无创预后分层。

结论:

基于转录组数据构建的 ICI 风险评分可以表征 GBM 免疫相关生物学过程, 能够作为一种有效的 GBM 患者预后生物标志物。而这种转录组水平的 ICI 特征可以通过影像基因组学分析进行无创评估, 构建出的模型在外部不同数据集中表现出良好预测能力。

PO-0280

单侧颞叶低级别胶质瘤患者健侧海马及其亚区结构的可塑性研究

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目的: 面对神经系统慢性损伤, 大脑可以表现出结构或功能水平的代偿模式。本研究基于慢性低级别胶质瘤患者的结构 MRI 数据, 探讨单侧颞叶低级别胶质瘤患者的健侧海马及其亚区的结构可塑性。

方法: 本研究共纳入 55 例患有单侧颞叶累及海马的低级别胶质瘤患者, 收集术前 3DT1 加权 MRI 图像。最终纳入左侧颞叶累及海马的胶质瘤(HipL)患者共 27 例, 右侧(HipR)28 例。此外还纳入 30 名年龄和性别相匹配的健康被试 (HC)。采用基于体素的形态学测量法(VBM)来量化患者健侧海马区域和三个对照脑区(额上回、尾状核和枕上回)的灰质密度差异。基于虚拟脑分割 (VBG) 技术对肿瘤病灶进行虚拟填充修复, 并使用 FreeSurfer 软件对修复后的结构图像进行健侧海马及亚区水平的分割, 并与 HC 进行统计分析, 计算海马及其亚区水平的体积差异。

结果: 与 HC 相比, HipL 和 HipR 组患者在对侧海马和海马旁回均表现出明显更大的灰质密度 (FWE corrected $p < 0.05$), 而在三个对照区域没有发现明显的改变。海马亚区体积分析显示, 与对照组相比, 患者组在海马亚区水平表现为特定亚区体积的增大, 包括 CA1 头、CA3 头、海马杏仁核过渡区(HATA)和海马伞。值得注意的是, 在 Bonferroni 多重比较校正 (19 次) 后, 患者对侧的 HATA 和海马伞亚区仍然保持统计显著性。

结论: 累及单侧海马区域的低级别胶质瘤浸润可以引起对侧海马灰质体积的显著增加。而 HATA 和海马伞在上述损伤引起的结构重塑过程中表现出良好的可塑性潜能。

PO-0281

人工智能重建在颅内 3D T1WI 成像中的应用价值

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目的：在压缩感知 (Compressed Sensing-Sensitivity Encoding, CS-SENSE) 采集技术的基础上，探索人工智能重建方式 (Artificial Intelligence, AI) 在 3D T1WI 图像 (T1 weighted imaging, T1WI) 中的应用。

方法：前瞻性收集 2021 年 5 月至 2022 年 10 月在南京鼓楼医院进行头颅磁共振检查的 52 例患者。每例患者均采集压缩感知因子为 3 和 6 的 3D T1WI (CS3、CS6)，同时进行人工智能重建，生成 AI3 及 AI6 图像。在四组图像中勾画感兴趣区，计算图像的信噪比 (signal to noise ratio, SNR) 及对比噪声比 (contrast to noise ratio, CNR)。从灰白质对比、深部核团轮廓、舌肌肉噪声、视神经清晰度四个方面对不同序列图像进行定性评估。对图像的 SNR 及 CNR 差异采用单因素重复测量方差分析，采用 Friedman 检验比较定性分析结果差异。

结果：在相同 CS 因子下，AI 重建图像 SNR、CNR 明显优于的常规 CS 重建图像 (SNR、CNR: AI3, 21.10 ± 1.09 , 12.77 ± 0.71 vs CS3, 17.51 ± 0.82 , 10.79 ± 0.52 , $PSNR < 0.001$, $PCNR \dots$; AI6, 20.61 ± 1.10 , 12.44 ± 0.75 vs CS6: 12.33 ± 0.47 , 7.34 ± 0.31 , $PSNR < 0.001$, $PCNR \dots$)。图像定性分析中，AI 重建图像的评分明显高于常规重建图像 (AI3: 2.95 ± 0.21 vs CS3: 2.93 ± 0.25 , $P < 0.001$; AI6: 2.94 ± 0.23 vs CS6: 1.85 ± 0.41 , $P < 0.001$)。

结论：与 CS3 相比，AI6 在保证图像分辨率的基础上，同时可以减少 48.78% 的采集时间。

PO-0282

基于螺旋成像技术的 TOF-MRA 在颅内小血管成像中的应用

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目的：以常规 TOF-MRA (压缩感知因子 4: MRA CS4) 为参考，探索基于螺旋成像技术的 MR 血管成像 (MRAspiral) 在颅内小血管成像中的可行性。

方法：2021 年 5 月 29 日至 2022 年 6 月 11 日，在 3.0T MR 系统 (Ingenia CX, Philips Healthcare, Best, Netherlands) 中前瞻性收集 49 例怀疑脑血管病变患者。MRACS4 和 MRAspiral (τ 分别为 4、6、8、12，其中 τ 为螺旋成像的采集窗口) 为采集序列。在大脑中动脉 (ACA)、大脑中动脉 (MCA)、大脑后动脉 (PCA) 的近段和远段绘制感兴趣区域。以胼胝体为背景计算对比度 (contrast ratio, CR) 值。图像质量和诊断的可行性定性分析由两名经验丰富的放射科医生分别进行。各 MRA 序列均采用单因素重复测量方差分析比较 CR 值的差异，Friedman 检验比较定性分析的结果。

结果：在远段分支，MRA τ 6 的 PCA (2.61 ± 1.09) 远段 CR 值低于 MRACS4 (3.16 ± 1.62) ($P = 0.014$)。其余 MRAspiral 图像的 CR 值 (MRA τ 4: 2.73 ± 1.45 , MRA τ 8: 2.78 ± 1.28 , MRA τ 12: 2.64 ± 1.43) 与 MRACS4 的无显著性差异 ($P > 0.05$)。在远段血管显示方面，MRA τ 4 (4.78 ± 0.41)、MRA τ 6 (4.77 ± 0.42) 及 MRA τ 8 (4.55 ± 0.52) 明显优于 MRACS4 的远段血管 ($P < 0.005$)。在颅内近段血管显影方面，MRACS4 显示优于 MRAspiral ($P > 0.005$)。

结论：与 MRACS4 相比，MRA τ 4、MRA τ 6 及 MRA τ 8 能明显改善远段颅内血管的显影，MRA τ 8 (2min7s) 同时可以减少 44.30% 的采集时间。

PO-0283

基于自动纤维量化分析方法识别遗忘型/ 非遗忘型轻度认知障碍：一项多中心研究

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目的：本研究旨在检测早期脑白质微结构的异常，来分别识别遗忘型（aMCI）和非遗忘型轻度认知障碍（naMCI）。

方法：本文从两个中心招募受试者，分别是南京大学医学院附属鼓楼医院（正常 NC 组 19 人，aMCI 组 23 人，naMCI 组 17 人）和南京市脑科医院（正常组 68 人，aMCI 组 66 人，naMCI 组 9 人）。我们首先通过自动纤维量化分析方法（AFQ）追踪大脑主要纤维束，将每条纤维束等分为 100 份，同时逐点比较三组的扩散参数。其次计算这些微观结构变化并利用支持向量机分别识别 aMCI 或 naMCI 患者。

结果：本研究发现三组受试者白质存在精细的点差异，且与认知障碍程度具有相关性。aMCI 和 naMCI 患者左上纵束的异常扩散特性在两个中心都出现，以此为分类特征在两个中心分别建立分类模型，并用另一个中心进行外部验证，经过比较发现鼓楼医院中心的数据建立的模型分类效果更佳（5 折内部验证中区别 aMCI 和 NC 组准确率=80.83%，灵敏度=75%，AUC=0.90；区别 naMCI 和 NC 组准确率=85.71%，灵敏度=83.33%，AUC=0.93）。跨中心的外部验证也获得类似较好的分类结果（区别 aMCI 和 NC 组准确率=71.64%，灵敏度=89.39%，AUC=0.87；区别 naMCI 和 NC 组准确率=67.52%，灵敏度=88.89%，AUC=0.91）。

结论：上述结果提示 AFQ 方法检测到的左上纵束白质微结构的病变具有普遍性，本项研究以此作为特征建立的分类系统能够实现跨中心的识别 aMCI 或 naMCI，在相关疾病的精准诊断和干预方面具有临床潜力。

PO-0284

利用 EEG 和 fMRI 从单模态到多模态研究阿尔茨海默病

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目的：阿尔茨海默病（AD）的早期诊断和分期在临床实践中至关重要。脑电（EEG）和功能磁共振成像（fMRI）提取的一些客观参数被广泛应用于 AD 的诊断。本文重点综述了从单模态到多模态研究 AD 连续体的不同技术，包括 EEG 和 fMRI，以及 EEG-fMRI，并讨论主要研究结果和未来可能的发展方向。

方法：我们对 PubMed、EMBASE 和 Web of Science 数据库中所有合格的原创英文研究文章进行了全面的文献检索，检索截止日期为 2022 年 5 月 31 日。

结果：单模态 EEG 和 fMRI 在 AD 连续体的研究中应用较为广泛，双模态 EEG-fMRI 的异步/同步采集逐渐展示出早期诊断的优势， α 节律与丘脑 BOLD 信号相关性的逐步降低可能贯穿于从年轻人到老年人到认知障碍的整个过渡过程；EEG 微状态与 BOLD 信号的相关性是否可作为 AD 病程转换的标志物还有待进一步研究。多模态 TMS-EEG-fMRI 一体化方法使精确和直接监测大脑振荡状态和信号在皮质-皮质下网络传播之间的因果依赖成为可能。MRI-PET-EEG 可在相同的心理和生理条件下，同时记录结构、功能、病理、代谢和电生理数据。

结论：同步 EEG-fMRI 采集在 AD 的早期诊断中展现出显著优势，但仍有一些不足需克服。早期识别脑功能损害，筛选 AD 高危人群，甚至定位神经退行部位，将是 EEG-fMRI 在老年人和认知障碍患者中的主要临床应用。即使 EEG-fMRI 具有较高的时空分辨率，也无法通过 EEG-fMRI 对静息态

分析或特定任务的分子过程进行表征。因此,未来综合分析脑网络、脑微观状态以及信息处理的动态过程,可以更好地理解疾病转化过程。

PO-0285

原发性早泄患者静息态 fMRI 脑网络研究: 基于表面皮层的度中心度

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目的:应用基于表面皮层的度中心度指标探讨早泄患者静息态脑功能网络属性的改变特点,并分析该特点与早泄患者临床症状的相关性。

方法:纳入符合入组标准的原发性早泄患者(患者组, n=36)及性别、年龄、受教育程度相匹配的正常对照组(对照组, n=22)。所有纳入研究的对象进行全脑静息态功能磁共振扫描,使用基于 MATLAB 软件的 dpabissurf 工具包对 fMRI 数据进行处理,进行基于表面皮层的度中心度(degree centrality,DC)分析,t 检验比较两组间 DC 值差异的脑区,并把差异脑区的 DC 值与临床症状进行相关分析。

结果:与对照组相比,患者组左侧楔前叶(MNI: x, y, z=-40,-71,-33)的 DC 值显著降低;右侧辅助运动区(SMA 区)(MNI: x, y, z=12,-8,46)的 DC 值显著升高,此外,IELT 和 CIPE 值与左侧楔前叶 DC 值呈正相关,与右侧 SMA 区 DC 值负相关。

结论:原发性早泄患者存在关键脑网络节点与相关脑区连接的异常并与临床症状密切相关,为神经介入治疗提供潜在的治疗靶点。

PO-0286

基于 APTw 成像感兴趣勾画的探讨构建脑胶质瘤分级的 临床诊断预测模型

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目的 探讨 APTw 图像感兴趣区的勾画对脑胶质瘤分级及鉴别诊断的意义,以及基于 APTw 成像构建预测脑胶质瘤分级的临床诊断预测模型。**方法** 回顾性分析 2019 年 7 月至 2023 年 5 月于南京大学医学院附属鼓楼医院行 MRI 检查及手术治疗的脑肿瘤患者 100 例。100 例患者中低级别胶质瘤 21 例,高级别胶质瘤 36 例,淋巴瘤 10 例,转移瘤 12 例,脑膜瘤 21 例。采取 3 种 ROI 勾画方式(勾画整个病灶、强化最显著区域、强化不明显或较弱区域)提取 APTw 信号强度的平均值和或最大值。采用卡方或独立样本 t 检验分析低级别与高级别胶质瘤、高级别胶质瘤与其他非胶质瘤类脑肿瘤之间性别、年龄及 APTw 信号强度的差异。选取高低级别胶质瘤组间有统计学差异的参数构建预测胶质瘤分级的二元 Logistic 诊断预测模型,并对模型进行评估及内部验证。**结果** 低级别与高级别胶质瘤组的年龄、性别、全肿瘤 APTw_max、全肿瘤 APTw_mean、强化最显著区 APTw_mean、强化不明显或较弱 APTw_mean 组间差异具有统计学意义(均 $P < 0.05$),构建的 Logistic 回归方程 $P = \exp(x) / (1 + \exp(x))$, $x = -4.318 - 0.087 \times \text{年龄} + 0.997 \times \text{全肿瘤 APTw_mean}$ 。该模型 Brier 得分为 0.137, AUC 为 0.881,截点值为 0.629,灵敏度为 0.833,特异度为 0.857,准确度为 0.819, Kappa 值为 0.622。高级别胶质瘤组和转移瘤组或淋巴瘤组组间比较差异无统计学意义;高级别胶质瘤组与脑膜瘤组的性别、全肿瘤 APTw_max、全肿瘤 APTw_mean 组间差异具有统计学意义(均 $p < 0.05$)。**结论** APT 成像对胶质瘤分级及鉴别诊断具有一定的价值;临床工作中更建议勾画

整个病灶提取 APTw 的平均信号强度；年龄及全肿瘤 APTw_mean 是预测脑胶质瘤分级的独立风险因素。

PO-0287

认知障碍血液标志物与痴呆影像学标志物的相关性研究

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目的：通过对认知障碍血液标志物的浓度检测及分类，探索与脑小血管病影像标志物之间的关系。
方法：收集 2020 年 9 月-2021 年 12 月期间以可疑认知障碍就诊于南京大学医学院附属鼓楼医院神经内科及老年科的患者，最后纳入同时进行了血液标志物检测及头颅 MRI 扫描的患者 358 例，男性 204 例，女性 154 例，平均年龄 72.61 ± 13.68 岁。记录 A β 42、pTau181 的检测浓度并进行分类，同时由影像医师记录脑白质高信号等级（Fazekas 分级）和内侧颞叶萎缩评定（MTA）量表，对影像指标判断结果用卡方检验比较组间差异。P<0.05 有显著统计学意义。
结果：A β 和 pTau181 同时阳性的患者内侧颞叶萎缩得分和脑白质损伤比 A β 和 pTau181 同时阴性患者显著增多。另外，男性的血液标志物与 MTA 评分相关性更高，女性的血液标志物即使都是阳性 MTA 评分也没有显著增加。男性和女性白质损伤评分均与血液标志物有关。男性血液中 A β 和 pTau181 浓度具有更高的一致性。
结论：认知障碍血液标志物（A β 42、p-Tau181）的浓度与痴呆影像学标志物之间存在相关性，且男性的相关性更高。

PO-0288

轻度认知障碍伴腔隙性脑梗死患者的脑自发活动异常 --静息态功能 MRI 研究

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目的：腔隙性脑梗死（LI）与认知能力下降和痴呆风险增加密切相关。轻度认知障碍（MCI）患者伴或不伴 LI 的自发性大脑活动模式是否存在不同仍不清楚。本研究旨在利用静息态功能磁共振成像（rs-fMRI）比较伴或不伴 LI 的 MCI 患者的自发性大脑活动模式。
方法：总共纳入 48 例 MCI 患者，包括 22 例伴 LI [MCI-LI] 和 26 例不伴 LI [MCI-no LI]，以及 28 例正常对照。所有被试行 rs-fMRI 检查，分析局部一致性（ReHo）和低频能量振幅（ALFF）指标，并行三组间组间比较；与神经心理学量表作相关分析。
结果：与 NC 组相比，MCI-LI 患者的楔前叶/楔叶及岛叶的 ReHo 降低，楔前叶/楔叶及额叶的 ALFF 降低；而颞叶的 ALFF 和 ReHo 值增高。MCI-no LI 组双侧海马和海马旁回的 ReHo 和 ALFF 值升高，额叶以及颞叶的 ALFF 和 ReHo 值降低。与 MCI-no LI 相比，MCI-LI 组存在额叶 ALFF 降低；楔前叶/楔叶及岛叶的 ReHo 降低；而颞叶的 ALFF 和 ReHo 值增高（ $p < 0.05$ ，AlphaSim 校正）。在 MCI-LI 患者中，内侧额叶的 ALFF 均值与 MoCA 评分存在相关性（ $r = 0.432$ ， $p = 0.045$ ）（Bonferroni 校正后具有临界意义）。
讨论：MCI-LI 中的脑自发活动模式与 MCI-no LI 不同。MCI-no LI 中存在的代偿机制在 MCI-LI 患者中可能会由于血管损伤而被破坏。

PO-0289

41 例脑干节细胞胶质瘤的影像特征分析

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目的 分析脑干节细胞胶质瘤的临床、影像及病理特征。**方法** 回顾性分析 2011 年~2021 年首都医科大学附属北京天坛医院 (38 例) 和赤峰市医院 (3 例) 共 41 例脑干节细胞胶质瘤的临床表现, 观察病变术前常规 MRI、CT 影像资料, 结合病理结果, 总结脑干节细胞胶质瘤的影像特点。**结果** 将病变按形态学分为囊实性、实性两类, 其中囊实性病例 24 例, 其中 2 例大囊伴附壁结节, 实性病例 17 例。增强扫描 29 例病变呈明显强化, 强化方式实性部分呈结节样、团块样、斑片状及环形强化, 囊性部分无强化, 或部分囊壁呈环形强化。本组病例中有 24 例病变实性部分靠近脑表面侧强化, 横轴位观察时呈特征性的“波浪状”或“新月形”表现。位于延髓病变 13 例, 矢状位呈特征性的“笔尖样”强化。CT 病变主要表现为等密度、稍低密度或低密度影, 1 例可见点条状的钙化。**结论** 儿童及青少年, 脑干的实性病变伴囊变, 瘤周水肿不明显, 增强扫描病变实性部分多明显强化, 并可见沿脑表面强化等特征性表现时, 诊断及鉴别诊断应考虑节细胞胶质瘤。

PO-0290

终末期肾病患者的体素镜像同伦连接改变及其与患者认知功能之间的关系

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目的 运用静息态功能磁共振 (rs-fMRI) 的体素镜像同伦连接 (VMHC) 方法探讨终末期肾病患者双侧大脑半球间静息态功能连通性变化及其与认知功能之间的关系。**方法** 纳入 35 例终末期肾病患者 (患者组) 及 25 例年龄、性别和受教育年限相匹配的健康志愿者 (对照组), 2 组受试者均于磁共振检查前 1 小时内完成蒙特利尔认知量表 (MoCA) 评估认知功能。采用 DPABI 软件的 Statistical Analysis 模块对两组标准化的 VMHC 参数图进行统计分析, 比较两组之间 VMHC 值差异的脑区, 并分析终末期肾病患者组 VMHC 值与 MoCA 总评分及亚项评分的相关性。**结果** 终末期肾病患者组 MoCA 量表总评分及注意、延迟回忆亚项评分显著低于对照组 ($P < 0.05$)。与对照组比较, 终末期肾病患者组双侧脑岛、中央后回、顶上回、顶下缘角回、缘上回、颞上回、颞极: 颞上回 VMHC 值显著减低 (GRF 校正, 体素水平 $P < 0.001$, 簇水平 $P < 0.05$), 未见 VMHC 值增高脑区。终末期肾病患者组双侧缘上回平均 VMHC 值与 MoCA 量表总评分呈正相关关系 ($r = 0.408$, $P = 0.015$), 双侧颞上回平均 VMHC 值与 MoCA 量表中延迟回忆亚项评分呈正相关关系 ($r = 0.526$, $P = 0.001$)。**结论** 本研究结果显示终末期肾病患者组与对照组相比, 其双侧脑岛、中央后回、顶上回、顶下缘角回、缘上回、颞上回、颞极: 颞上回 VMHC 值显著减低, 且与 MoCA 评分相关, 表明终末期肾病患者上述脑区双侧半球间功能协同性减弱, 可能是终末期肾病患者发生认知功能障碍的潜在因素之一。此研究结果也证实终末期肾病患者双侧大脑半球间存在镜像功能连接异常并与其认知功能障碍相关, 大脑半球的 VMHC 值或许可以成为早期诊断终末期肾病患者知功能障碍的指标之一。

PO-0291

基于体素内不相干运动成像的直方图分析鉴别高、低级别脑胶质瘤的价值

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目的：探讨基于体素内不相干运动成像 (IVIM) 的直方图分析术前鉴别脑高、低级别胶质瘤的临床价值。**方法：**回顾性分析 67 例经手术病理证实的脑弥漫性生长胶质瘤，其中高级别组 48 例，低级别组 19 例。分别比较高、低级别组胶质瘤灌注分数 (f)、假弥散系数 (D*)、真实弥散系数 (D) 及表观弥散系数 (ADC) 值的直方图特征差异，对满足正态分布及方差齐性的特征采用独立样本 t 检验进行分析，对不满足正态分布或方差不齐的特征采用 Mann-Whitney 秩和检验进行分析，然后绘制受试者工作特征 (ROC) 曲线评价 IVIM 多参数值的直方图特征鉴别高、低级别脑胶质瘤的效能。**结果：**高级别胶质瘤的 f 最大值、平均值、中位值、第 90 百分位数、第 75 百分位数及标准差显著大于低级别胶质瘤 (均 $P < 0.001$)。高级别胶质瘤的 D 最小值、第 10 百分位数及第 25 百分位数显著小于低级别胶质瘤 (P 值分别为 <0.001 、 <0.001 、 0.006)；标准差、不均匀度显著大于低级别胶质瘤 (P 值分别为 0.002 、 <0.001)。高级别胶质瘤的 ADC 第 10 百分位数显著小于低级别胶质瘤 ($P = 0.002$)；标准差、不均匀度显著大于低级别胶质瘤 (P 值分别为 0.001 、 <0.001)。ROC 曲线示 f 值的第 90 百分位数鉴别高、低级别胶质瘤的 ROC 曲线下面积最大 (0.900)，D 值的标准差对鉴别诊断的特异度最高 (94.7%)，ADC 值的不均匀度灵敏度最高 (95.8%)。**结论：**基于 IVIM 的直方图分析有助于脑胶质瘤术前分级，对临床治疗、预后评估具有一定的价值。

PO-0292

首发未治疗成年重性抑郁障碍患者大尺度静息态脑网络研究

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目的 探讨基于独立成分分析 (ICA) 法的大尺度脑网络研究对首发未治疗成人重性抑郁障碍 (MDD) 患者静息态脑网络 (RSNs) 内及网络间功能连接变化的价值。**方法** 招募 MDD 患者 23 例及健康志愿者 30 例，行静息态脑功能成像 (rs-fMRI) 检查。采用 ICA 法对 rs-fMRI 数据进行分析。采用 SPM-12、Gift 软件比较 MDD 组与 HC 组 RSNs 内及网络间功能连接强度的差异，采用 IBM SPSS statistic 25.0 进行 Pearson 相关分析评价 MDD 组 RSNs 内及网络间功能连接强度与 HAMD 17 评分的相关性。**结果** 与 HC 组相比，MDD 组内侧前额叶皮质 (mPFC) (MNI: x, y, z = -6, 54, 25) 内在功能连接强度显著增强；左侧角回 (AG) (MNI: x, y, z = -48, -66, 21)、左侧楔前叶 (PCu) (MNI: x, y, z = -6, -63, 33)、左侧背外侧前额叶皮质 (dlPFC) (MNI: x, y, z = -36, 12, 51) 及右侧前脑岛 (AI) (MNI: x, y, z = 36, 21, 0) 内在功能连接强度均显著减弱；MDD 组后默认网络 (pDMN) 与前默认网络 (aDMN) 间功能连接强度较 HC 组显著减弱 ($t = 2.206, P = 0.032$)，pDMN 与左额顶网络 (IFPN) 间功能连接强度较 HC 组显著增强 ($t = 2.318, P = 0.025$)。MDD 组 mPFC 内在功能连接强度、pDMN-IFPN 间功能连接强度与 HAMD-17 评分均呈正相关 ($r = 0.524, P = 0.010$; $r = 0.441, P = 0.035$)。**结论** 基于 ICA 法的大尺度脑网络研究能够发现首发未治疗成人 MDD 患者 RSNs 内及网络间功能连接异常，有望为临床 MDD 的诊治提供客观的影像学标记。

PO-0293

表观弥散系数的直方图特征与弥漫性胶质瘤组织学分级、Ki-67 增殖指数的对照研究

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目的：探讨表观弥散系数（ADC）的直方图特征鉴别弥漫性胶质瘤高、低级别的价值，并评价其与 Ki-67 增殖指数的相关性。方法：回顾性分析 67 例经术后病理证实的弥漫性胶质瘤（其中高级别组 48 例，低级别组 19 例）的影像学及病理学资料。比较高、低级别组弥漫性胶质瘤 ADC 值的多个直方图特征差异，对满足正态分布及方差齐性的特征采用独立样本 t 检验进行分析，对不满足正态分布或方差不齐的特征采用 Mann-Whitney 秩和检验，然后绘制 ROC 曲线以评价其 ADC 值直方图特征鉴别高、低级别胶质瘤的效能。采用 Pearson 相关分析评价 ADC 值的直方图特征与 Ki-67 增殖指数的相关性。结果：高级别胶质瘤的 ADC 最大值、标准差及不均匀度均显著大于低级别胶质瘤（P 值分别为 0.025、0.001、0.000）。高级别胶质瘤的 ADC 值第 10 百分位数、第 25 百分位数显著小于低级别胶质瘤（P 值分别为 0.002、0.029）。ROC 曲线示 ADC 值的不均匀度鉴别高、低级别胶质瘤的 ROC 曲线下面积最大（0.815），同时对鉴别诊断的灵敏度最高（95.8%），最大值、第 10 百分位数的特异度最高（均为 68.4%）。Pearson 相关性分析示 ADC 值的第 10 百分位数与 Ki-67 增殖指数呈负相关（ $r=-0.415$ ， $P=0.002$ ），不均匀度与 Ki-67 增殖指数呈正相关（ $r=0.343$ ， $P=0.008$ ）。结论：表观弥散系数的直方图特征有助于预测弥漫性胶质瘤的组织学分级、Ki-67 增殖指数，对胶质瘤临床治疗方案的选取具有一定的价值。

PO-0294

顺磁性边缘病灶对复发缓解型多发性硬化患者皮层厚度和灰白质对比度的影响

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目的：在复发性多发性硬化（MS）中，顺磁性边缘病灶（PRL）被认为是疾病进展的一种影像学标志物。本研究旨在探讨此类病变对复发缓解型 MS（RRMS）患者皮层厚度及灰白质信号强度比（GWR）的影响。

方法：本研究共纳入 82 名 RRMS 患者（40 名伴有至少 1 个 PRL，42 名不伴有 PRL）和 43 名健康对照（HC）。定量磁化率图（QSM）由 3D 多回波梯度回波序列重建获得。根据 QSM 上是否存在有顺磁性环围绕的慢性病灶，将 RRMS 患者分为 PRL 组和无 PRL 组。使用 FreeSurfer 软件处理图像，获得每个被试重建的皮层表面。GWR 由皮层表面将每个顶点的灰质信号强度（近灰白质交界的 35% 皮层厚度处采样）除以白质信号强度（灰白质交界下方 1mm 恒定距离处采样）获得。基于顶点-顶点的一般线性模型分析，比较 PRL 组、无 PRL 组和 HC 组的皮质厚度和 GWR 的差异。采用偏相关分析评估临床特征与 MRI 参数之间的关系。

结果：与 HC 相比，PRL 组的 RRMS 患者存在多个区域的皮质显著性变薄，以及更广泛区域的 GWR 增加。这两类区域既有重叠的部分，也有相互独立的部分。然而，在无 PRL 的 RRMS 患者中，只有少数区域出现显著的皮质厚度变化，没有区域表现出 GWR 的显著性改变。在与无 PRL 组的比较中，PRL 组患者的一些区域表现出了皮质厚度的变薄以及 GWR 的升高。相关性分析发现，在有 PRL 的 RRMS 中，仅 PRL 体积与平均皮层厚度呈显著负相关（ $r=-0.323$ ， $P=0.048$ ），PRL 体积和病灶总体积与平均 GWR 呈正相关（ $r=0.347$ ， $P=0.033$ ； $r=0.431$ ， $P=0.007$ ）。

结论: PRL 的存在可能为 RRMS 提供一个分型标准, 有助于早期判断患者的脑损伤程度和指导个体化治疗。GWR 可能是 MS 进展过程中病理改变的影像学生物标志物, 有助于进一步了解 PRL 存在下的脑损伤机制。

PO-0295

气味刺激下主观认知下降患者嗅觉神经环路的功能连接改变

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目的: 嗅觉障碍是阿尔茨海默病的早期特征。本研究目的是探讨特定气味刺激下的功能磁共振成像中主观认知下降患者嗅觉神经环路的功能连接改变。

材料与方法: 本研究共纳入 56 例正常对照和 57 例主观认知下降患者。所有受试者都接受了认知量表、嗅觉行为学评估和嗅觉任务功能磁共振成像。采用广义心理生理相互作用 (Generalized psychophysiological interaction, gPPI) 方法分析两组被试嗅觉神经环路功能连接的差异。

结果: 在特定气味刺激的嗅觉任务下, 主观认知下降患者双侧初级嗅觉皮层 (Primary olfactory cortex, POC) 与右海马之间的功能连接显著降低 (GRF 校正, 体素 $p < 0.01$, 聚类 $p < 0.05$); 而右侧海马与右侧额叶的功能连接显著增强 (GRF 校正, 体素 $p < 0.01$, 聚类 $p < 0.05$)。双侧 POC 与右侧海马的功能连接与记忆认知阈值呈显著正相关 ($r = 0.269$, $p = 0.043$)。

结论: 尽管主观认知下降患者的嗅觉行为学处于正常水平, 但嗅觉神经环路 (POC-海马-额叶) 的功能连接已经发生改变, 这可能是识别阿尔茨海默病早期风险人群的影像学标志物。

PO-0296

基于能谱多期 CTA 技术探讨其对颅内动脉瘤术后影像评估的临床价值

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目的: 应用能谱多期 CTA 检查, 探索颅内动脉瘤术后患者的 CTA 最优图像方案, 以实现同时评估责任血管通畅情况及侧枝循环开放情况。

方法: 收集自 2022 年 7 月—2023 年 7 月 40 例重庆医科大学附属第三医院颅内动脉瘤术后接受能谱 CT 头颈部 CTA 及侧枝循环分析的受检者 CT 影像图。记录患者的姓名、性别、年龄、发病部位、持续时间、各项实验室指标及入院以来的影像资料。排除: ①因患者制动不佳或有其他伪影干扰使得图像质量较差, 无法达到诊断标准的影像数据; ②CT 影像数据无法与 GE Fast Stroke 软件兼容;

③因为采集时相不佳, 无法准确按照多期 CTA 时相的 CT 影像数据。利用 GE aw 4.7 工作站重建出 VR、MIP、MPR 图, 再在 40-140 KeV 能量区间内, 间隔 10 个 KeV 能级重建图像, 并分别利用 GE Fast Stroke 软件重建生成 ColorViz 图, 两位高年资放射医师对 40-140 KeV 的 ColorViz 图进行主观评分, 其中 40 KeV 和 ≥ 100 KeV 图像质量较差被排除使用, 在 50-90 KeV 区间, 每间隔 5 KeV 重建 9 个能级的单能量图像, 分别对图像的噪声值(SD)、信噪比(SNR)、伪影指数(AI) 做客观统计学评价。

结果: 进行组间 SNR 比较, 其中 65 KeV 与 70 KeV、75 KeV 与 80 KeV 单能量能级比较, 差异有统计学意义 ($P < 0.05$), 其余组间比较差异无统计学意义; 在 60-65 KeV 区间, AI 指数较低、图像质量客观评价得分最高, 提示该范围单能量能级 ColorViz 图像对弹簧圈栓塞术后血管显示较佳, 能更准确评估颅内动脉瘤术后患者的责任血管通畅情况及侧枝循环开放情况。

结论: 在 60-65 KeV 单能量区间, 能谱多期 CTA 检查能更准确评估颅内动脉瘤术后患者责任血管通畅情况及侧枝循环开放情况。

PO-0297

不同阶段血脑屏障通透性参数预测动脉瘤性蛛网膜下腔出血后迟发性脑缺血和预后

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目的 探讨动脉瘤性蛛网膜下腔出血 (aSAH) 后 24 h 内和迟发性脑缺血 (DCI) 时间窗 (DCITW) 内的血脑屏障通透性参数 Ktrans 对 DCI 和术后 3 个月预后的预测价值。

方法 对本院前瞻性 aSAH 数据库进行回顾性分析, 共纳入 128 例 aSAH 患者。根据是否发生 DCI 将患者分为 DCI 组和非 DCI 组, 根据术后 3 个月改良 Rankin 量表将患者分为预后良好组 (改良 Rankin 评分 0-2 分) 和预后不良组 (改良 Rankin 评分 3-6 分)。分别比较入院时 Ktrans 和 DCITW 内 Ktrans (DCITW Ktrans) 在 DCI 组和非 DCI 组间以及预后良好组和预后不良组间的差异。同时, 分析 Ktrans 从入院到 DCITW 内的动态变化。在单因素分析的基础上, 采用多因素 Logistic 回归分析进行自变量筛选, 确定 DCI 发生和 3 个月预后不良的独立危险因素。

结果 DCI 组患者入院时 Ktrans (0.58 ± 0.18 vs 0.47 ± 0.12 , $P=0.002$) 和 DCITW 内 Ktrans (0.54 ± 0.19 vs 0.41 ± 0.14 , $P<0.001$) 均显著高于非 DCI 组。预后良好组入院时 Ktrans 和 DCITW Ktrans 也高于预后不良组, 但在入院时的差异无统计学意义 (0.53 ± 0.18 vs 0.49 ± 0.14 , $P=0.198$)。非 DCI 组和预后良好组的 Ktrans 从入院到 DCITW 内均显著降低。多因素 Logistic 回归分析显示入院 Ktrans ($OR=1.75$, 95%CI: 1.25-2.44, $P=0.001$) 是 DCI 发生的独立危险因素, 而 DCITW Ktrans ($OR=1.73$, 95%CI: 1.24-2.43, $P=0.001$) 是 3 个月预后不良的独立危险因素。

结论 入院时 Ktrans 升高与 DCI 的发生相关, 但与 3 个月预后无关; 而从入院到 DCITW 内评估 Ktrans 的动态变化可以预测患者术后 3 个月预后。

PO-0298

蛛网膜下腔出血早期脑水肿评分与临床预后的关系: 基于血脑屏障通透性参数的评估

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目的 探讨蛛网膜下腔出血早期脑水肿评分 (SEBES) 与血脑屏障通透性参数 Ktrans 之间的相关性, 及其对迟发性脑缺血 (DCI) 和术后 3 个月预后的预测价值。

方法 对本院前瞻性动脉瘤性蛛网膜下腔出血 (aSAH) 数据库进行回顾性分析, 共纳入 129 例 aSAH 患者。根据是否发生 DCI 将患者分为 DCI 组和非 DCI 组, 根据术后 3 个月改良 Rankin 量表将患者分为预后良好组 (mRS 0-2) 和预后不良组 (mRS 3-6)。同时, 分析 SEBES 和 Ktrans 从入院到 DCI 时间窗内的变化 (分别表示为 $\Delta SEBES$ 和 $\Delta Ktrans$)。采用 Spearman 相关系数和线性回归分析 SEBES 和 Ktrans 之间的相关性。此外, 采用多因素 Logistic 回归分析确定 DCI 和 3 个月预后的独立危险因素。

结果 SEBES 和 Ktrans 在入院时 ($\rho=0.64$, $P<0.001$) 和 DCI 时间窗内 ($\rho=0.65$, $P<0.001$) 均呈中度相关, 而 $\Delta SEBES$ 和 $\Delta Ktrans$ 呈强相关 ($\rho=0.70$, $P<0.001$)。线性回归分析显示 SEBES 每增加 1 分, 入院时 Ktrans 增加 0.080 ml/100ml/min (95%CI: 0.061, 0.100, $P<0.001$), DCI 时

间窗内 K_{trans} 增加 0.079 ml/100ml/min (95%CI: 0.064, 0.094, $P<0.001$)。总体上, SEBES 和 K_{trans} 从入院到 DCI 时间窗内均显著降低。多因素 Logistic 回归分析显示入院时和 DCITW 时间窗内 SEBES 分别是 DCI (OR, 1.92; 95%CI: 1.08, 3.43; $P=0.028$) 和预后不良 (OR, 3.87; 95%CI: 2.14, 6.99; $P<0.001$) 的独立危险因素。

结论: aSAH 后脑水肿严重程度与 BBB 破坏程度具有显著相关性。入院时和 DCI 时间窗内的 SEBES 分别为 DCI 和 3 个月预后的独立危险因素。

PO-0299

遗忘型轻度认知障碍患者海马亚区体积改变及与认知表现的相关性

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背景: 神经影像学研究表明, 遗忘型轻度认知障碍 (aMCI) 人群海马和海马亚区体积发生变化。然而, 用于区分 aMCI 和正常对照 (NC) 的海马亚区体积模型研究相对较少, 海马体积与整体认知评分之间的关系尚不清楚。

方法: 为此, 我们采集了 50 名 aMCI 患者和 44 名 NC 的高分辨 3D T1 MRI 序列。首先, 采用单变量一般线性模型分析海马亚区的体积差异。然后, 采用四种降维方法和四种机器学习方法的组合基于海马亚区体积区分 aMCI 和 NC。最后, 分析海马亚区相对体积与认知测试变量 (MMSE 和 MoCA) 的相关性。

结果: 两组海马尾、下托、CA1、前下托、分子层、GC-ML-DG、CA3、CA4、海马伞体积差异有统计学意义, 尤以左侧海马体积差异显著。左右海马机器学习分类器的最高曲线下面积 (AUC) 值分别为 0.678 和 0.701。左侧下托、左分子层、右侧下托、右 CA1、右分子层、右 GC-ML-DG、右 CA4 体积与 MoCA 评分呈正相关。

结论: 海马亚区体积可能是 aMCI 的一个预测指标。结果表明, 海马亚区体积在整体认知表现中起敏感作用。

PO-0300

特鲁索综合征相关脑梗死的影像学特征及危险因素分析

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目的: 探讨特鲁索综合征相关脑梗死患者的影像学特征、临床特点及相关危险因素, 提高对该疾病的认识, 为临床早期干预提供客观依据。

方法: 回顾性收集 2012 年 1 月至 2022 年 12 月的急性和/或亚急性期脑梗死的病例, 包括 41 例诊断为特鲁索综合征相关脑梗死的恶性肿瘤患者 (特鲁索综合征组) 和 62 例发病前后均无恶性肿瘤病史的大动脉粥样硬化型脑梗死患者 (对照组) 的影像学、临床及实验室检查等相关资料, 并进行统计分析。筛选特鲁索综合征相关脑梗死发生的独立危险因素。以 $P<0.05$ 为差异有统计学意义。

结果: 特鲁索综合征组患者的原发恶性肿瘤类型以肺癌最多, 病理类型以腺癌最多, 且多存在转移。特鲁索综合征组的脑梗死灶多分布在双侧前循环加后循环区域 ($P<0.05$); 且以同时累及脑叶皮层及皮层下为主 ($P<0.05$)。特鲁索综合征组患者的脑梗死传统危险因素的发生率低于对照组。特鲁索综合征组更易合并其他血栓栓塞事件发生 ($P<0.05$)。其 D-二聚体定量及 C 反应蛋白值高于, 红细胞计数、血红蛋白及血小板计数值低于对照组 ($P\leq 0.001$)。多因素 Logistic 回归分析显

示外周血 D-二聚体定量 (OR=1.001, P=0.004) 水平升高、C 反应蛋白 (OR=1.024, P=0.024) 水平升高、血小板计数 (OR=0.988, P=0.031) 降低是特鲁索综合征相关脑梗死发生的独立危险因素。

结论: 特鲁索综合征的原发恶性肿瘤类型以肺癌高发, 其中腺癌最常见。患者发病时恶性肿瘤多处于活跃状态或已发展至晚期, 且易合并其他血栓栓塞事件发生。特鲁索综合征相关脑梗死的影像学特征, 表现为多发、播散性、斑点、斑片状病灶, 易同时累及大脑半球脑叶皮层及皮层下, 其次是小脑区域, 病变累及两个以上血管区域最多见, “三流域征”具有特异性诊断价值。外周血 D-二聚体定量水平升高, C 反应蛋白水平升高及血小板计数降低是特鲁索综合征相关脑梗死发生的独立危险因素。

PO-0301

基于 FLAIR 血管高信号征构建急性缺血脑卒中 临床结局预测模型的研究

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目的: 基于 FVH 征象构建影像模型、临床模型、临床联合影像等三个预测模型, 寻找最佳预测模型来评估急性缺血脑卒中临床预后的情况。**方法:** 收集入院行一般治疗的急性前循环缺血性脑卒中患者 106 例。通过多因素逐步 Logistic 回归确定急性缺血性卒中预后不良发生的独立影响因素, 构建临床、影像、临床联合影像的预测模型, 应用 ROC 曲线评估临床、影像、临床联合影像模型的预测效能。**结果:** 多因素 Logistic 回归结果显示, 在临床因素中入院时 NIHSS 评分 (OR=0.573; 95% CI: 0.464~0.706; P<0.001) 为卒中预后不良的独立预测因子; 临床预测预后的模型 AUC 为 0.738 (95% CI: 0.644~0.831), 敏感度和特异度分别为 46.6%、91.7%。在影像因素中 DWI-ASPECTS 评分 (OR=6.098; 95% CI: 2.860~13.00; P<0.001)、FVH 评分 (OR=2.191; 95% CI: 1.199~4.003; P<0.001) 为卒中预后不良的独立预测因子; 影像预测预后模型的 AUC 为 0.856 (95% CI: 0.884~0.958), 敏感度和特异度分别为 75.9%、83.3%。在临床联合影像因素中入院时 NIHSS 评分 (OR=0.524, 95% CI: 0.371~0.741, P=0.001)、DWI-ASPECTS 评分 (OR=6.627, 95% CI: 2.097~20.947, P=0.001) 及 FVH 评分 (OR=3.018, 95% CI: 1.537~5.924, P=0.001) 均是急性缺血性卒中患者预后不良的独立预测因子; 临床联合影像的预测预后模型的 AUC 为 0.885 (95% CI: 0.823~0.946), 敏感度为 82.8%、特异度为 81.3%。**结论:** 临床联合影像的预测模型相较于临床模型或影像模型对于一般治疗的急性缺血性卒中患者有更好的预测效能。

PO-0302

能谱 CT 容积定量分析对急性脑梗死介入术后碘对比剂渗出和脑出血转化鉴别应用价值

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目的 本研究旨在通过能谱 CT 容积定量分析来对急性脑梗死介入术后颅内出现的异常高密度影进行鉴别分析, 探讨容积定量分析对此类异常影像的鉴别诊断作用。

方法 回顾性分析重庆医科大学附属第三医院 2021 年 5 月—2022 年 5 月收治的 26 例急性脑梗死介入术后即刻行能谱 CT 平扫出现颅内异常高密度影的急性脑梗死患者图像。以术后 24 h 常规 CT 复查结果为标准, 将 26 例颅内异常高密度影分为对比剂渗出组 (渗出组, 14 例) 和脑出血转化组

(出血组, 12 例)。利容积定量分析(利用容积再现从病灶体积分析)分别测量两组颅内异常高密度影及其周围正常脑白质的 CT 值、有效原子序数(effective atomic number, Eff-Z)、水(碘)浓度、碘(水)浓度, 血液(水)浓度, 并计算这些指标的相对值。组间比较采用 t 检验或秩和检验, 并对有统计学意义的指标行受试者工作特征(receiver operating characteristic, ROC)曲线分析。

结果 两组颅内异常高密度影容积 CT 比较, 差异无统计学意义($P=0.235$), 渗出组水(碘)浓度、血液(水)浓度小于出血组, Eff-Z、碘(水)浓度大于出血组($P<0.05$); 两组颅内异常高密度影周围正常脑组织的各 CT 指标无统计学差异($P>0.05$); 两组容积 CT 对比值无统计学差异($P>0.05$), 渗出组水(碘)浓度、血液(水)浓度对比值小于出血组, Eff-Z、碘(水)浓度对比值大于出血组($P<0.05$)。水(碘)浓度、碘(水)浓度、血液(水)浓度、Eff-Z 及各指标相对值对两组异常高密度影鉴别诊断的曲线下面积分别为 0.79、0.94、0.96、0.81、0.96、0.97。

结论 能谱 CT 容积定量分析能够对急性脑梗死介入术后颅内高密度影进行有效鉴别。

PO-0303

MRI 一阶特征在脑泡型包虫和脑转移瘤鉴别诊断中的研究

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【摘要】目的: 探究基于 MRI T1WI 增强序列的一阶特征在脑泡型包虫(Cerebral alveolar echinococcosis, CAE)和脑转移瘤(Brain Metastases, BM)鉴别诊断中的价值, 以提高两种疾病的鉴别诊断能力, 为临床提供术前准确、可靠的诊断依据。材料与方法: 回顾性分析新疆医科大学第一附属医院 2014 年至 2022 年在新疆医科大学第一附属医院神经外科经过手术并病理活检确诊为 CAE 和 BM 患者共 130 例, 其中 CAE 30 例, BM 100 例。首先分析两组疾病一般临床资料, 然后利用开源软件 3D Slicer 软件术前 T1WI 增强扫描(T1-CE)轴位图像勾画出病灶的感兴趣体积 VOI(volume of interest), 利用 Python 提取病灶第 10 百分位数, 第 90 百分位数, 中位数, 熵, 四分位数间距, 峰度, 最大值等 18 个一阶特征, 比较 CAE 与 BM 两种疾病的一阶特征参数并进行统计学分析, 观察比较各参数对疾病鉴别诊断的效能; 结果: CAE 与 BM 一般临床资料显示, CAE 与 BM 年龄及 BMI 无明显统计学差异, 本次研究结果显示 CAE 男性更多见($p<0.001$)。18 个一阶特征过滤高相关特征, 发现第 90 百分位数、熵、峰度、最小值、极差、均匀性、方差等 7 个特征有统计学差异, $p<0.05$, 七个特征联合分析诊断效能最佳, AUC 为 0.732, 敏感度为 79.5%、特异度为 61.1%、准确度为 72.3%; 逻辑回归分析, 熵 OR 值为 0.10, 95%置信区间为 0.01, 0.83, $p<0.05$ 。结论: 常规影像表现非常类似的 CAE 和 BM, 临床病史结合一阶特征可以明显提高鉴别诊断, 为临床提供重要的诊断依据。

PO-0304

成人型神经元核内包涵体病的 MRI 特征 (附 7 例报告及文献复习)

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目的 分析 7 例成人型神经元核内包涵体病(NIID)患者的 MRI 特征并文献复习。方法 回顾性分析杭州师范大学附属医院 2018 年 6 月-2023 年 6 月经皮肤活检确诊的 7 例成人型 NIID 的临床、病理及

影像资料,并综述多篇文献报道的 NIID 的影像特点。结果 7 例成人型 NIID 患者临床症状不一,主要表现为认知障碍、排尿障碍、肢体无力、发作性意识障碍;头颅 MRI 检查显示 6 例 (6/7) 扩散加权成像 (DWI) 可见皮质、髓质交界区高信号, 1 例 (1/7) 双侧基底节区出现斑片状 T2WI 高信号, 1 例 (1/7) 胼胝体侧体区出现液体衰减反转恢复序列 (T2 Flair) 高信号。成人型结论 NIID 病患者的临床表现多样, 中枢和周围神经系统均可受累, 头颅 MRI 具有特征性皮髓交界区典型“绸带征”, 结合皮肤活检发现细胞核内嗜酸性包涵体可以提示 NIID 的诊断。

PO-0305

缺血性卒中脑类淋巴系统功能受损与运动功能障碍的相关性研究

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目的: 本研究采用血管周围间隙扩散张量成像分析 (diffusion tensor image analysis along the perivascular space, DTI-ALPS) 的方法, 评估运动功能障碍的缺血性卒中 (Ischaemic Stroke, IS) 患者恢复期脑类淋巴系统的活性, 并探讨其与运动功能评分、皮质脊髓束完整性之间的关系。方法: 招募 20 例我院 2021 年 1 月至 2022 年 11 月卒中中心收治的缺血性卒中患者和健康成人各 20 例。卒中组均为左侧大脑半球皮质下单发病灶。记录所有参与者的人口学数据和临床量表资料。所有参与者行颅脑 MRI 扫描, 序列包括: 扩散谱成像和 T2 加权成像。计算侧脑室水平 DTI-ALPS 指数、皮质脊髓束 (corticospinal tract, CST) 各向异性分数 (fractional anisotropy, FA) 及轴向扩散系数 (axial diffusivity, AD) 并比较两组间各指标差异。分析卒中组 DTI-ALPS 指数与 Fugl-Meyer 评分、皮质脊髓束完整性之间的相关性。结果: 卒中组患侧 DTI-ALPS 指数明显低于对照组同侧 ($t=-3.88$, $P<0.001$); 卒中组患侧 DTI-ALPS 指数与运动功能评分 ($\rho=0.52$, $P=0.019$)、运动功能评分分级 ($\rho=0.50$, $P=0.024$) 和感觉评分 ($\rho=0.45$, $P=0.048$) 均呈正相关关系, 且与健侧皮 CST 的 FA ($R=-0.60$, $P=0.009$)、DA ($R=-0.67$, $P=0.002$) 呈负相关关系。结论: 缺血性卒中患者脑类淋巴系统受损。DTI-ALPS 可能成为缺血性卒中患者运动功能障碍的潜在 MR 生物标志物, 同时对缺血性卒中病理生理机制的研究提出了新的思路。

PO-0306

基于人工智能的多参数 MRI 无创鉴别脑转移瘤、脑胶质母细胞瘤和颅内原发中枢神经系统淋巴瘤

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研究背景: 临床工作中准确鉴别脑转移瘤 (Brain metastases, BM), 脑胶质母细胞瘤 (Glioblastoma, GBM)、颅内原发中枢神经系统淋巴瘤 (Primary central nervous system lymphoma, PCNSL) 和十分重要。然而, 多数人工智能 (Artificial intelligence, AI) 方法研究仅纳入两种肿瘤进行鉴别, 缺乏 AI 方法同时鉴别三种肿瘤的研究。

研究目的: 基于 AI 方法应用多参数 MRI 准确鉴别 BM、GBM 和 PCNSL。

研究方法: 本研究纳入了首都医科大学附属北京天坛医院 BM ($n=375$)、GBM ($n=391$) 和 PCNSL ($n=361$) 术前多参数 MRI 图像, 包括 T1w, T2w, FLAIR, ADC 和增强 T1。按照 7: 3 随机划分为训练集 ($n=788$) 和测试集 ($n=339$)。基于多参数 MRI 开发了一个全自动鉴别模型, 该模型包括肿瘤分割模型和肿瘤鉴别模型。把模型鉴别结果和低年资、高年资神经放射医生结果分别进行比较。然后, 低年资神经放射医生根据模型结果进行再次判读。

研究结果：该模型鉴别 BM、GBM 和 PCNSL 的准确度为 0.73，AUC 分别为 0.82、0.88、0.88，和高年资神经放射医生结果相似（准确度为 0.74，AUC 分别为 0.87、0.90、0.90），高于低年资神经放射医生（准确度为 0.6，AUC 分别为 0.6、0.73、0.71），低年资神经放射医生借助模型再次判读后结果提高（准确度为 0.70，AUC 分别为 0.71、0.81、0.77）。

结论：该模型基于多参数 MRI 无创鉴别 BM、GBM 和 PCNSL，鉴别结果和高年资神经放射医生相似，高于低年资神经放射医生，但可提高低年资神经放射医生的诊断水平。

PO-0307

DCE-MRI 定量和定性参数对脑胶质瘤 CDKN2A/B 纯合缺失的预测

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目的：细胞周期蛋白依赖性激酶抑制剂 2A/B（CDKN2A/B）纯合缺失是脑胶质瘤重要的预后因素，影响治疗策略的制定。本研究旨在探讨常规 MRI 图像参数结合动态对比增强磁共振（DCE-MRI）定量和定性参数是否可以预测脑胶质瘤中 CDKN2A/B 纯合缺失状态。方法：回顾性收集 2020 年 1 月至 2023 年 6 月南京鼓楼医院 77 例脑胶质瘤患者（平均年龄 \pm 标准差， 51.9 ± 17.4 岁；男性 43 名，女性 34 名；48 例无 CDKN2A/B 纯合缺失，29 例 CDKN2A/B 纯合缺失）的术前 MRI 数据，获得常规 MRI 特征、表观扩散系数（ADC）和 DCE-MRI 定性参数时间-强度曲线（TIC）类型、定量参数 Ktrans、kep、ve、vp 和 iAUC。分析两组患者各参数之间差异的显著性，纳入所有参数进行单因素 Logistic 回归，取有显著意义的参数建立多因素回归模型以预测 CDKN2A/B 纯合缺失状态，使用受试者工作特征曲线下面积（AUC）评估预测模型的判别性能。结果：两组之间年龄、病灶数量、囊变程度、强化程度、ADC、TIC 类型、Ktrans、ve、vp 和 iAUC 的差异具有统计学意义。在对所有胶质瘤患者的多变量分析中，年龄（比值比[OR]=1.098， $p=0.005$ ）和 Ktrans（OR=1.030， $p=0.01$ ）是 CDKN2A/B 纯合缺失的独立预测因素。相应模型的 AUC、准确性、敏感性和特异性分别为 0.90、81.8%、69.0%和 89.6%。结论：年龄和 Ktrans 可能是预测脑胶质瘤 CDKN2A/B 纯合缺失的有效参数，这为脑胶质瘤患者精确诊断和个体化治疗提供依据。

PO-0308

多模态影像融合技术在脑出血患者中的应用

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目的：脑出血具有发病急，死亡率和发病率是相对较高的特征。目前神经外科对于需要钻孔引流术的患者应用较多的是无框架立体定向机器人引导的血肿穿刺引流术，但该手术术前需要刻盘及手术费用较高，而利用多模态影像融合技术也可以完成血肿的精准穿刺引流。本研究主要目的是探讨多模态影像融合技术在脑出血患者中精准穿刺引流术的临床可行性及准确性。

方法：纳入我院 2023 年 1 月至 2023 年 8 月神经外科接受血肿穿刺引流术治疗的脑出血患者 100 例，术前均行 CT 平扫，然后利用西门子后处理软件 Syngo.via 软件的区域增长及颅骨分离的方式，重建出三维立体的血肿的虚拟现实模型，通过与神经外科医师沟通，确立穿刺点，在 VR 图像上通过冠状缝和矢状缝确定穿刺点，将穿刺点平移至 MPR 图像血肿中心层面，测量矢状位血肿中心层面穿刺点至血肿中心的距离，该距离为虚拟穿刺道，然后测量虚拟穿刺道和听眦线的夹角，术中外科医师可依据颅脑体表投影，确定穿刺点，穿刺角度为①平行于矢状面②虚拟穿刺道和听眦线的夹

角, 穿刺的深度为穿刺点至血肿中心的距离, 术后依据复查颅脑平扫 CT 以及联影 AI 软件, 判断引流的效率, 进而探讨多模态影像融合技术在脑出血患者中精准穿刺引流术的临床可行性及准确性。结果: 在 100 例脑出血的患者中, 利用西门子后处理软件 Sygo.via 基于区域增长及颅骨分离完成虚拟现实模型图像融合的时间 <5 分钟, 平均 3 分钟, 通过虚拟现实模型图像制定的手术方式, 可准确的将引流管尖端置于血肿中心的层面, 术后血肿的引流效率 (基于 AI) 在术后第二天可达 50%, 术后第三天可达 75%。

结论: 利用西门子后处理软件 Sygo.via 基于区域增长及颅骨分离完成虚拟现实模型所制定的血肿穿刺引流术, 可准确的将引流管尖端置于血肿中心层面, 血肿引流效率高。利用该技术不仅降低了患者的经济成本及社会医学的经济压力, 还实现了精准治疗, 改善了患者的预后。

PO-0309

2 型糖尿病患者皮层形态特征的 MRI 结构研究

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研究目的: 旨在应用 SBM 技术分析 T2DM 患者皮层特征, 以多参数、多维度反映 T2DM 患者皮层结构改变

材料方法: 收集 T2DM 患者 45 名, 健康对照 28 名。记录被试的年龄、性别、身高、体重、臀围、腰围、血压、教育水平、饮酒史、吸烟史、病程、空腹血糖、糖化血红蛋白、空腹胰岛素、高、低密度脂蛋白、总胆固醇、甘油三酯、同型半胱氨酸。使用 Philips Ingenia CX 3.0T MR 采集 3D T1 结构序列。应用 SPM 12 软件分析被试间皮层厚度、分形维 (FD)、回化指数 (GI) 及脑沟深度 (SD) 差异。使用简明精神状态量表、蒙特利尔认知评估量表、加利福尼亚词语学习测验、符号数字模式测验评估被试认知状态。采用 Pearson 相关分析分析具有显著性差异脑区皮层指标与人口学资料、化验指标及认知评分的相关性。 $P<0.05$ 视为差异有统计学意义

研究结果: T2DM 组被试左侧额中回下部等脑区的皮层厚度明显小于对照组 ($P<0.05$, FWE), 其中部分脑区皮层厚度与 HbA1c 及 FG 呈负相关 ($P<0.05$); 左侧额中回下部皮层厚度与 HDL 呈正相关 ($r=0.235$, $P=0.046$); 左侧额中回下部等脑区皮层厚度与记忆力、执行功能及注意力评分呈正相关 ($P<0.05$)。T2DM 组被试右侧额上回等脑区 FD 明显小于对照组 ($P<0.05$, FWE correction); 左侧眶额回外部 FD 大于对照组 ($P<0.05$, FWE); 右侧岛回等脑区 GI 明显小于对照组 ($P<0.05$, FWE)。组间 SD 差异未见明显统计学意义 ($P>0.05$)。大部脑区的 FD、GI 与糖化血红蛋白及空腹血糖呈负相关 ($P<0.05$); 部分脑区 FD、GI 与认知评分具有相关性

研究结论: T2DM 患者皮层厚度减低, 与糖化血红蛋白、空腹血糖升高、执行能力、记忆力等认知域认知评分相关。T2DM 患者部分脑区 FD、GI 降低, 主要累及额颞叶; 机体代谢水平影响皮层结构。

PO-0310

血管周围间隙扩散张量成像指数在评估帕金森病患者脑类淋巴系统功能中的价值

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目的: 探讨血管周围间隙扩散张量成像 (DTI-ALPS) 指数在评价帕金森病 (PD) 患者脑类淋巴系统功能中的价值。

方法:自帕金森病进展标记物研究项目(PPMI)基线数据库中选取诊断为 PD 的 153 例患者及 59 例健康志愿者(HC 组)纳入本研究,212 例被试的临床资料(包括多种认知和运动测试量表评分和脑脊液检查资料)和 MRI 资料完整.脑脊液生物标记物包括 A β 4 2、aGsyn、tGtau、pGtau、tG tau/A β 4 2 和 pGtau/A β 4 2.所有 MR 图像在 Siemens 3.0T 磁共振仪上完成采集.利用 FSL 及 ImageGJ 软件在每例被试的各向异性分数(FA)图上,分别在左侧大脑半球侧脑室体部水平的投射纤维区域、联合纤维区域及皮层下纤维区域勾画直径 5.0mm 的球形感兴趣区,测量每种纤维在 X、Y 和 Z 轴方向的扩散率,并根据公式计算 DTI-ALPS 指数.比较 PD 组与 HC 组之间 ALPS 指数值的差异,并分析 PD 患者 ALPS 指数与临床指标及脑脊液生物标记物之间的相关性.

结果:与 HC 组比较,PD 组 DTI G ALPS 指数值显著减低($Z=3.769, P<0.001$).PD 组 ALPS 指数与年龄呈负相关($r=-0.256, P=0.001$);在控制年龄、性别及受教育年限三个因素后,PD 组 ALPS 指数与 MDS-URDRS III 评分呈负相关($r=-0.245, P=0.002$),与脑脊液 pGtau 浓度呈负相关($r=-0.357, P<0.001$).

结论:DTI-APLS 指数可用于评估 PD 患者类淋巴系统功能受损情况,在探索 PD 相关发病机制方面具有较好的应用前景.

PO-0311

MRI 银杏叶征象对脊膜瘤与椎管内神经源性肿瘤的鉴别诊断价值

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目的 研究 MRI 银杏叶征象在脊膜瘤与椎管内神经源性肿瘤鉴别诊断中的应用价值,并初步探讨银杏叶征出现的机制。

方法 回顾性分析经病理诊断的 285 例椎管内神经源性肿瘤与 102 例脊膜瘤患者的临床资料。依据病理结果分为神经源性肿瘤与脊膜瘤两组。所有患者均接受脊柱增强 MRI 检查。在轴位增强 T1WI 图像上,对比分析两组间银杏叶征像出现情况,并计算银杏叶征像对两种疾病的鉴别诊断性能(敏感度、特异度、阳性预测值、阴性预测值)。对患者的手术录像进行回顾,分析银杏叶征出现的解剖学机制。

结果 神经源性肿瘤与脊膜瘤银杏叶征出现率分别为 0% ($n=0$) 与 12.7% ($n=13$), 差异有明显统计学意义 ($p<0.001$)。银杏叶征对脊膜瘤诊断的敏感度为 12.7%, 特异度为 100%, 阳性预测值为 100%, 阴性预测值为 76.2%。13 例出现银杏叶征的脊膜瘤中, 8 例 (61.5%) 位于颈段椎管, 5 例 (38.5%) 位于下胸段椎管, 0 例 (0%) 出现在上胸段、腰段椎管; 8 例位于脊髓左侧, 5 例位于脊髓右侧, 左右侧比例为 1.6:1。回顾手术录像发现, 银杏叶征出现的机制为脊膜瘤包裹齿状韧带所致, 齿状韧带存在于颈段、胸段脊髓左右两侧的蛛网膜下腔, 腰段未观察到。颈段、下胸段齿状韧带游离缘较上胸段的长, 可能为此处脊膜瘤容易出现银杏叶征的解剖学机制。

结论 MRI 银杏叶征像对脊膜瘤与椎管内神经源性肿瘤的鉴别诊断具有较高的鉴别诊断性能, 特异性出现在颈段、下胸段的脊膜瘤。本研究结果有待进一步验证。

PO-0312

基于结构性 MRI 的形态学测量区分脊髓小脑共济失调及多系统萎缩的诊断价值

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目的: 脊髓小脑共济失调 (SCAs) 和多系统萎缩 (MSA) 临床表现相似, 但疾病转归与预后显著不同, 早期准确区分两者尤为重要。前期研究表明 SCAs 和 MSA 均存在小脑和脑干的不同程度萎缩, 本研究拟探讨基于结构性 MRI 的形态学测量对两者的鉴别诊断价值。

方法: 收集于中山大学附属第一医院经基因诊断确诊的 SCAs 患者 86 例 (症状组 SCAs: 64, 症状前 SCAs: 22)、临床诊断为 MSA 47 例 (probable MSA)、健康对照 35 例 (HC), 采集 MRI 结构相及临床资料。SCAs 和 MSA 患者根据病程分为两组: <3 年和 3-7 年。三名具不同临床经验的观察者分别测量平枕骨大孔及 3-5 颈椎椎体上缘的脊髓前后径 (SC₀₋₃)、脑桥基底部 (a) 及被盖部前后径 (b) 和小脑上、中、下脚宽度, 其中一位观察者 2 个月后行重复测量, 计算观察者内及观察者间可重复性, 采用 t 检验、秩和检验、ROC 曲线及随机森林方法评估上述指标对同一病程阶段的 SCAs 与 MSA 的鉴别诊断价值。

结果: 指标具较高可重复性。病程 <3 年: SCAs 的 SC₀₋₃ 及 b 显著小于 MSA 和 HC ($P < 0.05$), 且相比 MSA, 症状前 SCAs 的 SC 和 SC₁ 已显著萎缩。ROC 示 SC 诊断价值最高 (AUC=0.90, 灵敏度: 78%, 特异度: 83%, cut-off 值: 8.0mm)。基于上述指标的随机森林模型表现出更高的诊断价值 (AUC=0.97), 其中 SC 贡献最大。进一步分析病程 3-7 年的 SCAs 与 MSA, SCAs 的 SC₀₋₃ 及 b 亦小于 MSA 和 HC ($P < 0.05$), ROC 示 SC₁ 诊断价值最高 (AUC=0.90, 灵敏度: 87%, 特异度: 87%, cut-off 值: 7.4mm)。随机森林进一步提升模型诊断价值 (AUC:0.95), 其中 SC₃ 的贡献最大。

结论: 结构性 MRI 的形态学测量可重复性好、不依赖于测量者临床经验, 可用于鉴别诊断 SCAs 与 MSA 且具有较高诊断价值。

PO-0313

表观扩散系数直方图分析在预测脑膜瘤复发风险中的价值

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目的 拟探讨融合常规 MRI 特征及表观扩散系数直方图参数的模型对脑膜瘤复发风险的预测价值。

材料与方法 回顾性收集我院 2017 年 1 月-2020 年 6 月期间经手术和病理证实的 72 例脑膜瘤患者, 根据是否在 2022 年 6 月之前复发分为复发组和未复发组。使用 MaZda 软件在肿瘤最大层面勾画感兴趣区并自动生成直方图参数, 基于直方图参数和常规 MRI 特征建立预测脑膜瘤复发的 Logistic 回归模型列线图, 通过校准曲线和决策曲线评估模型的预测效能, 绘制受试者特征工作曲线(receiver operating characteristic, ROC)评价其对脑膜瘤复发的诊断效能。

结果 肿瘤最大直径、坏死、增强均匀度、年龄、辛普森分级、肿瘤形状和 ADC 第一百百分位数 (ADCp1) 在两组间差异具有统计学意义 ($P < 0.05$), 其中后四项是复发的独立危险因素。结合这四个危险因素构建的模型预测效果最好, 其曲线下面积、准确性、灵敏度、特异性、阳性预测值和阴性预测值分别为 0.965 (0.892-0.994)、90.3%、92.6%、88.9%、83.3% 和 95.2%。校准曲线显示, 模型预测的复发概率与实际复发概率之间具有良好的一致性。决策曲线表明该模型具有良好的临床可用性。

结论 基于常规 MRI 特征及表观扩散系数直方图参数的模型能够直观可靠地预测脑膜瘤复发, 为临床治疗方案的选择和个体化治疗提供了指导依据。

PO-0314

表观扩散系数直方图分析术前鉴别纤维型脑膜瘤 与非纤维型脑膜瘤

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目的 探讨表观扩散系数 (apparent diffusion coefficient, ADC) 直方图分析在术前鉴别纤维型脑膜瘤与非纤维型脑膜瘤的价值。

方法 本研究回顾性分析 220 例经组织病理学确诊的 FM (fibroblastic meningiomas) 和 nFM (non-fibroblastic meningiomas) 患者的组织病理学及影像学资料。在轴位 ADC 图像上沿病灶边缘勾画整个肿瘤, 获得以下直方图参数 (均值、方差、偏度、峰度以及第 1、第 10、第 50、第 90 和第 99 百分位数)。采用单因素和多因素 logistic 回归分析确定鉴别 FM 和 nFM 的危险因素, 并采用受试者工作特征 (ROC) 曲线评估其术前鉴别 FM 和 nFM 的诊断效果。

结果 FM 组的均值、方差、第 50、第 90 和第 99 百分位数均低于 nFM 组 ($P < 0.05$), 肿瘤位置和性别差异有统计学意义 ($P < 0.05$)。多因素 logistic 回归分析结果显示, 第 99 百分位数 ($P < 0.001$) 和肿瘤位置 ($P = 0.007$) 是鉴别 FM 和 nFM 最有价值的参数, 将二者融合的诊断效能最佳, 其 AUC 值为 0.817 (95% CI, 0.759-0.866), 敏感性、特异性、准确性、阳性预测值和阴性预测值分别为 66.4%、83.6%、75.0%、80.2%和 71.3%。

结论 ADC 直方图分析可能有助于术前无创鉴别 nFM 和 FM, 第 99 百分位数融合肿瘤位置的诊断效果最好。

PO-0315

基于 MRI 弥散加权成像的影像组学特征预测急性缺血性脑卒中的短期预后

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目的: 基于急性缺血性脑卒中 (acute ischemic stroke, AIS) 弥散加权成像的影像组学特征, 构建 AIS 短期预后的预测模型。

方法: 回顾性分析 219 例 AIS 患者的 MRI 图像。采用 ITK-SNAP 软件分割 DWI 上高信号梗死区, 并应用 pyradiomics 进行影像组学特征提取和降维, 利用 SVM 分类器构建预后预测模型。

结果: 共筛选出 15 个系数非零的特征, 包括 2 个一阶特征, 4 个形状特征和 9 个纹理特征, ROC 曲线显示预测模型在训练集上的 AUC 为 0.897, 准确度为 0.840; 在测试集上的 AUC 为 0.835, 准确度为 0.795。

结论: 基于 MRI 的影像组学预测模型能够有效地评估 AIS 患者的短期预后, 可为临床决策提供有力支持。

PO-0316

经典三叉神经痛患者单次触痛后脑功能变化

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目的: 本研究拟通过研究经典型三叉神经痛(CTN)患者单次疼痛后多时间点局部一致性(ReHo)的时间变异性及频率(经典频段, 慢 2-慢 5 频段)两个维度的变化, 以明确 CTN 患者单次触痛后脑功能变化。

方法: 本研究最终共纳入 48 名 CTN 患者, 通过模拟患者日常生活中无害性动作触发疼痛。所有被试均行三次 rs-fMRI 扫描(包括触发疼痛前、触发疼痛后 5 秒内、触发疼痛后 30 分钟进行)。三次测量的差异通过重复测量的 ANOVA 进行分析。

结果: 与触发疼痛前比较, 经典频段中, 左侧距状裂、右侧枕中回的 sReHo 值逐渐升高; 双侧额中回、左侧楔前叶的 sReHo 值逐渐降低; 左侧角回、左侧中央后回的 sReHo 值在触痛后 5s 降低, 在触痛后 30min 升高; 右侧眶部及三角部额下回的 sReHo 值在触痛后 5s 升高, 在触痛后 30min 降低。慢 2 频段的左侧枕上回及慢 3 频段的左侧顶上小叶与经典频段发生改变的脑区不同, 慢 5 频段的脑区虽然涵盖在经典频段, 其中左侧楔前叶的变化趋势与其不一致。其余各频段发生变化的脑区均涵盖在经典频段中, 且相同的脑区变化趋势一致。与触发疼痛前比较, 脑干、左侧丘脑和右侧壳核的 dReHo 值在触痛后 5s 降低, 在触痛后 30min 升高, 右侧前扣带回的 dReHo 值在触发疼痛后逐渐升高。

结论: 1). CTN 患者经典频段多发脑区 sReHo 值发生改变; 2). 慢 2-慢 5 频段 sReHo 值发生变化的脑区与经典频段即有一定的差异又有重叠, 除慢 5 频段的左侧楔前叶, 余相同脑区的变化趋势一致; 3). dReHo 值和 sReHo 值发生变化的脑区不尽相同, 可对 sReHo 提供有益的补充。

PO-0317

增强型动脉自旋标记成像在帕金森病脑灌注损伤中的应用研究

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目的: 探讨增强型动脉自旋标记技术(eASL)对细化帕金森病(PD)患者脑血流灌注损伤的研究价值以及其多参数灌注特征在疾病诊断中的分类效能。

方法: 通过 eASL 和常规 ASL 获取 PD 患者及健康对照(HC)的灌注数据, 并对纳入受试者进行临床资料采集。使用基于 MATLAB 平台的 SPM12 软件包进行脑血流量(CBF)及动脉通过时间(ATT)的数据解析, 获得灌注参数(eASL: 校正 CBF、ATT; 常规 ASL: 未校正 CBF), 采用双样本 T 检验比较灌注参数的组间差异, 并应用 Spearman 相关分析差异脑区灌注参数值与临床评分的相关性。进一步基于灌注特征向量构建机器学习模型, 以评估各分类模型对 PD 的诊断效能。

结果: eASL 与常规 ASL 的获取的 CBF 均能构建出 PD 相关脑代谢网络模式。与未校正 CBF 相比, 校正 CBF 更为精准地探及运动相关责任脑区的灌注损伤, 表现为 PD 患者右侧丘脑、双侧中央前回、左侧中央后回等脑区的灌注增高。同时 PD 组左侧额中回的 ATT 值缩短。PD 组左侧壳核、左侧中央前回及左侧中央后回校正 CBF 值、左侧壳核未校正 CBF 值与运动功能评分呈显著正相关($p=0.487$, $P=0.003$; $p=0.582$, $P<0.001$; $p=0.398$, $P=0.020$; $p=0.471$, $P=0.005$), 右侧角回校正 CBF 值、左侧额中回 ATT 值与认知功能评分呈正相关($p=0.403$, $P=0.018$; $p=0.465$, $P=0.006$)。校正 CBF 特征向量对 PD 的诊断表现出较高的分类效价(AUC 0.85), eASL 灌注特征向量的多参数联合模型进一步提升了分类效能(AUC 0.87)。

结论: eASL 技术能够细化地呈现 PD 患者灌注损伤的责任脑区, 同时补充性提供 ATT 的异常改变, 有助于较为系统地理解 PD 患者脑代谢损伤的内在机制; 且多灌注参数的结合较好地实现了分类效能的提升, 为推进 PD 的临床诊断提供一定的研究依据。

PO-0318

基于 DTI 的衍生扩散参数预测轻度认知功能障碍疾病进展: 一种列线图的构建及验证

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目的: 构建并验证一个结合扩散张量成像 (DTI) 的衍生参数和临床相关特征的列线图, 用于预测轻度认知障碍 (MCI) 患者向阿尔茨海默病 (AD) 的进展。

方法: 对 121 例 MCI 患者的 MRI 和临床资料进行回顾性分析, 其中 32 例在 4 年的随访期内进展为 AD。这些 MCI 患者按照 7:3 的比例被分为训练组和测试组。从训练集中的 MCI 患者中提取 DTI 衍生参数, 并降维以构建影像生物标志物。然后, 结合 MCI 疾病进展的独立预测因子, 构建联合模型并生成列线图。最后, 基于测试集的数据, 使用受试者操作特征的曲线下面积 (AUC) 和决策曲线分析 (DCA) 曲线来评估列线图的诊断和临床疗效。

结果: 训练集和测试集中影像生物标志物的 AUC 分别为 0.81 和 0.84, 敏感性分别为 0.87 和 0.78, 特异性分别为 0.71 和 0.81。多元逻辑回归显示影像生物标志物、临床痴呆评分量表和阿尔茨海默病评估量表被选为独立的预测因素构建列线图。训练集和测试集中列线图的 AUC 分别为 0.89 和 0.91, 敏感性分别为 0.78 和 0.89, 特异性分别为 0.90 和 0.88。DCA 曲线表明, 列线图是预测 MCI 向 AD 进展的最有价值的模型, 它具有更多的净效益。

结论: 白质纤维束的变化可作为 MCI 疾病进展的影像学预测标志, 结合白质 DTI 衍生参数和相关临床特征构建列线图对 MCI 疾病发展具有重要的预测价值。

PO-0319

缺血半暗带定位和预测急性缺血性卒中进展

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目的在敏感性加权成像 (SWI) 上检测急性脑卒中患者的非对称性突出静脉 (APV) 可能预示脑灌注受损。目的: 探讨急性脑卒中患者 APVs 在识别缺血半暗带和预测卒中进展中的作用。方法 20 例在症状发作 24 h 内出现大脑中动脉缺血性梗死的患者, 按照包括弥散加权成像 (DWI) 的标准 MR 卒中方案成像序列进行 SWI。在初始 MRI 研究后至少 5 天获得随访 (FUP) FLAIR 图像。使用 Alberta 卒中程序早期 CT 评分 (ASPECTS) 分别确定初始 DWI、SWI 和 FUP 图像上的初始梗死面积、APV 范围和最终梗死面积。结果 10 例 DWI-SWI 不匹配患者中有 6 例发生 IG, 无 DWI-SWI 不匹配者发生 IG。阳性 DWI/SWI 错配与 IG 显著相关 ($2 = 8.57$, $p = 0.0138$, Cramer V = 0.65)。在 SWI ASPECTS 和 IGS 之间发现显著的负相关 ($rs = -0.702$, $p = 0.001$)。DWI-SWI 不匹配评分与 IGS 高度相关。($rs = 0.788$, $p = 0.000$)。结论 DWI-SWI 不匹配是缺血半暗带的一个指标, 如果不治疗, 是梗死扩展的预测因子。

PO-0320

MR 定量磁敏感图磁化率及纹理分析在评估帕金森病轻度认知功能障碍中的价值

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目的: 探讨基于脑 QSM 的磁化率及纹理分析评估 PD-MCI 的价值。方法: 纳入原发性 PD 患者 32 例 (PD 组), 分为 PD-MCI 组 16 例和 PD-NC 组 16 例, 招募 28 名健康志愿者为 HC 组。1. 比较 PD-MCI 组、PD-NC 组和 HC 组之间基于体素分析和基于 ROI 分析的 QSM 值的差异。2. 比较三组之间基于 ROI 分析的方差、峰度和偏度等纹理特征的差异。3. 采用 ROC 曲线分析 QSM 值、方差、峰度和偏度对 PD-MCI 的诊断效能。4. 分析 PD 组各 ROI 的 QSM 值与 MoCA-B 评分、UPDRS-III 评分之间的相关性。结果: 1. PD-MCI 组、PD-NC 组、HC 组之间基于体素的全脑 QSM 分析显示: 三组之间左侧海马旁回、黑质、红核等部位 QSM 值存在显著统计学差异。三组间基于 ROI 的 QSM 值分析显示: 黑质、红核、海马旁回、楔叶等部位 QSM 值 PD-MCI 组显著高于 HC 组; 海马的 QSM 值 PD-MCI 组显著高于 PD-NC 组和 HC 组; 眶额皮层、丘脑、壳核的 QSM 值 PD-MCI 组显著高于 PD-NC 组。2. 基于 ROI 的纹理分析显示: 三组之间的方差、峰度、偏度在黑质、内嗅皮层、丘脑、壳核、楔前叶、楔叶、尾状核头、眶额皮层等部位存在差异。3. 组间有差异的 ROI 中海马对鉴别 PD-MCI 和 PD-NC 具有最高的诊断效能。其中海马部位磁化率值联合纹理特征的 AUC 为 0.828 (P=0.002)。4. 相关分析显示: PD 组 QSM 值与 MoCA-B 评分呈负相关的 ROI 为黑质、红核、壳核、苍白球、海马和丘脑; PD 组 QSM 值与 UPDRS-III 评分呈正相关的 ROI 为壳核和杏仁核。结论: 1. 基于 QSM 的纹理分析能够定量评估 PD 大脑铁分布的特征。2. 海马部位联合磁化率值和纹理分析的指标对 PD-MCI 具有最优的诊断效能。3. 记忆、情绪等认知相关脑区的过量铁沉积可能是 PD-MCI 的神经病理机制。

PO-0321

多期 CT 血管造影对急性缺血性脑卒中血管内治疗短期预后的价值

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目的

分析急性缺血性脑卒中 (acute ischemic stroke, AIS) 患者的影像学特征和临床基线资料, 探讨 CT 血管造影对血管内治疗短期预后的价值。

方法

回顾性分析 2019 年 6 月至 2022 年 3 月复旦大学附属闵行医院接受血管内治疗的 AIS 患者 183 例。患者通过使用改良 Rankin 量表 (modified Rankin Scale, mRS), 分为预后良好 (mRS 0-2) 和预后不良 (mRS 3-6)。基于改良 Tan 评分系统评估多期 CTA 侧支循环状态。利用临床基线和影像学特征构建多变量逐步向前 logistic 回归模型。模型的性能通过曲线下面积 (area under curve, AUC) 评价。模型间 AUC 差异的统计重要性通过 DeLong 检验进行评估。

结果

183 例 EVT 患者中发病 90 天预后良好组 94 例, 预后不良组 89 例。逐步 Logistic 回归分析显示入院 NIHSS 评分和动脉晚期侧支循环是 AIS 患者短期预后的独立预测因素。动脉晚期侧支循环良好对 AIS 短期预后具有较高的特异性 (91.5%)。受试者工作特征曲线分析显示动脉晚期侧支循环良好

和入院美国国立卫生研究院卒中量表(National Institute of Health Stroke Scale, NIHSS)评分预测 AIS 患者血管内治疗短期预后良好的 AUC 分别 0.72 (0.65-0.79) 和 0.75 (0.68-0.81)。相比之下, 使用联合模型(AUC=0.79)时, AUC 显著高于单独预测因子。(Delong 检验, 均 $p < 0.05$)。

结论
动脉晚期侧支循环良好和入院 NIHSS 评分是 AIS 患者血管内治疗短期预后良好的独立预测因素。联合预测模型具有良好的诊断效能, 为临床治疗方案选择提供参考。

PO-0322

临床影像组学模型在预测急性缺血性脑卒中血管内治疗短期预后中的价值

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目的

探讨基于 CT 血管造影的影像组学特征预测急性缺血性脑卒中 (Acute Ischemic Stroke, AIS) 患者血管内治疗短期预后的价值。

方法

对 2019 年 6 月至 2022 年 3 月在复旦大学附属闵行医院连续接受血管内治疗的 159 例 AIS 患者进行回顾性分析。患者以 7:3 比例随机分为训练队列和验证队列。通过使用改良 Rankin 量表 (modified Rankin Scale, mRS), 对患者的功能恢复进行评估, 分为良好的预后 (mRS 0-2) 和不良的预后 (mRS 3-6)。由一名专门从事神经影像评估的团队成员使用开源的 ITK-Snap 分割软件(3.8.0 版本)手动勾画三维感兴趣区。采用 R 软件(4.2.0 版本)统计分析。通过采用最小的相关性和冗余度, 以及最小的绝对收缩有效地选择影像组学特征。通过多变量 Logistic 逐步回归法建立包含影像组学特征和临床参数的联合预测模型, 模型的可视化通过列线图实现。采用曲线下面积和拟合优度检验评价列线图的性能和稳定性。决策曲线分析估算临床有用性和净效益。

结果

最终筛选出 19 个系数非零的影像组学特征并构建影像组学分数模型, 训练队列和验证队列的曲线下面积分别为 0.79 (0.70-0.87) 和 0.70 (0.54-0.85)。联合影像组学分数和临床特征 (年龄、入院 NIHSS 评分、糖尿病、出院他汀) 构建的影像组学列线图模型在训练队列和验证队列的曲线下面积分别为 0.85 (0.77-0.92) 和 0.76 (0.62-0.91)。校准度在训练队列和验证队列分别为 $p = 0.35$ 和 $p = 0.18$ 。决策曲线分析显示良好的临床适用性。

结论

临床影像组学联合模型对预测 AIS 患者血管内治疗短期预后具有良好的诊断效能, 可为临床决策提供参考依据。

PO-0323

基于脑 MR 定量磁敏感图对帕金森病轻度认知功能障碍铁沉积协变网络特征的研究

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目的: 基于 QSM 构建铁沉积协变网络, 探索 PD-MCI 脑铁沉积的协变网络模式重构特征。

方法:1. 纳入原发性 PD 患者 71 例 (PD 组), 将其分为 PD-MCI 组 37 例和 PD-NC 组 34 例, 比较 PD-MCI 组、PD-NC 组之间人口统计学和一般资料的差异。2. 采集所有被试的头颅 MRI 数据, 进行 QSM 图像重建, 构建铁沉积协变网络, 分析协变网络的连边、全局拓扑属性和节点拓扑属性。3. 比较 PD-MCI 组和 PD-NC 组之间的铁沉积协变网络连边的差异。4. 比较 PD-MCI 组和 PD-NC 组之间铁沉积协变网络的全局和节点拓扑属性的差异。

结果:1. 本研究 PD-MCI 组、PD-NC 组之间年龄、性别及病程、H-Y 分级、UPDRS-III“关”期评分等差异无统计学意义 ($P>0.05$)。两组间 MoCA 评分存在统计学差异 ($P<0.001$)。2. 铁沉积协变网络连边分析显示: PD-MCI 组在右侧苍白球-右侧小脑齿状核、右侧苍白球-左侧壳核以及左侧海马-左侧黑质的铁沉积协变相关系数值显著高于 PD-NC 组 (均 $P<0.05$)。3. 铁沉积协变网络全局拓扑属性分析显示: PD-MCI 组和 PD-NC 组间的全局网络属性无显著差异。当稀疏度为 0.047 和 0.048 时, PD-MCI 组的聚类系数显著高于 PD-NC 组 ($P<0.05$)。4. 铁沉积协变网络节点拓扑属性分析显示: PD-MCI 组在左侧黑质、左侧内嗅皮层、左侧楔前叶和左侧壳核的节点介数显著低于 PD-NC 组 (均 $P<0.05$); PD-MCI 组在左侧齿状核的节点度显著低于 PD-NC 组 ($P<0.05$); PD-MCI 组在右侧眶额皮层的节点效率显著高于 PD-NC 组 ($P<0.05$)。

结论:

1. PD-MCI 患者的铁沉积协变网络拓扑属性发生了次优的重组, 更加偏向于规则化网络。
2. 基于 QSM 协变网络异常拓扑属性的改变可能是 PD-MCI 在大尺度铁代谢网络水平的神经病理机制。

PO-0324

一种新颖的用于预测颅内动脉瘤破裂的临床-影像组学评分诺莫图

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目的:本研究旨在通过验证不同模型的预测能力, 寻找更实用、更有效的预测颅内动脉瘤破裂的方法。

方法:回顾性分析 576 例 IA 患者的临床和影像学资料, 其中破裂的 IA 192 例, 未破裂的 IA 384 例。通过 t 检验和 Elastic-Net 回归选择从计算机断层血管造影(CTA)图像中提取的放射组学特征。放射组学评分(radscore)采用最优特征。通过多元回归选择炎症生物标志物。然后建立 radscore 模型、炎症模型、临床模型和临床-radscore 模型(C-R 模型)4 个模型。采用受试者工作特征曲线(ROC)评价各模型、各阶段及 ELAPSS 的性能。C-R 图显示了预测 IA 破裂风险的模型。

结果:5 个炎症特征、2 个放射学特征和 7 个放射组学特征与 IA 破裂有显著相关性。训练组 radscore、炎症模型、临床模型和 C-R 模型的 roc 下面积分别为 0.814、0.935、0.970 和 0.975, 验证组为 0.805、0.927、0.952 和 0.962。

结论:炎症模型对 IA 破裂风险的预测效果特别好, 结合放射学和放射组学特征进一步提高了其预测能力, 其中 C-R 模型的预测效果最好。C-R 图是一种比 phase 和 ELAPSS 更稳定和有效的工具, 用于单独预测 IA 患者的破裂风险。

PO-0325

基于静息态 fMRI 对帕金森病不同运动亚型患者脑网络节点功能连接属性改变的研究

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目的: 研究不同运动亚型帕金森病患者静息态功能磁共振的脑网络节点功能连接属性的变化特点及意义。

方法: 采集 77 例 PD 患者和 29 例健康对照者 (HC) 的静息态功能磁共振数据, PD 组根据统一帕金森病评定量表 (UPDRS) 相关评分分为震颤型 (TD) 43 例和姿势不稳/步态障碍型 (PIGD) 34 例。采用度中心度 (DC) 分析方法对所得数据进行分析, 观察不同亚型帕金森患者的脑网络节点功能连接属性变化, 通过协方差分析 (ANCOVA) 和 Post-Hoc t 检验进行组间比较。

结果: 与 HC 相比, TD-PD 患者双侧丘脑、双侧尾状核 DC 值升高; 双侧梭状回、双侧海马、双侧海马旁回、左侧眶额回、左侧额上回、左侧岛叶、左侧壳核、右侧颞下回、右侧额上回 DC 值减低; PIGD-PD 与 HC 相比, 右侧顶上/下小叶、左侧丘脑 DC 值升高; 左侧中央前/后回、左侧旁中央小叶、左侧枕中回、左侧缘上回、双侧辅助运动区、双侧扣带回 DC 值减低; TD-PD 与 PIGD-PD 相比, 双侧楔状叶、左侧楔前叶、双侧距状裂及其周围皮层、双侧辅助运动区、左侧中央前回、左侧旁中央小叶 DC 值升高; 左侧眶额回、左侧额中回、左侧背外侧额上回 DC 值减低。Pearson 相关分析发现, TD 评分与左侧壳核、左侧梭状回、左侧海马、左侧海马旁回 DC 值负相关, 未见明显正相关脑区。PIGD 评分与左侧辅助运动区、左侧颞中回 DC 值呈负相关, 未见明显正相关脑区。

结论: 两种亚型 PD 患者均存在默认网络相关脑区节点的 DC 减低, 不同亚型 PD 患者静息网络节点功能连接属性有着特异性的改变, TD-PD 患者的网络节点功能连接属性改变主要表现在基底节、丘脑等神经环路相关脑区, 而 PIGD-PD 患者则主要体现运动网络、视觉加工网络等相关脑区。静息态功能磁共振基于体素的度中心度功能连接分析方法为探索不同运动亚型 PD 患者的潜在发病机制提供了一种新的研究方法。

PO-0326

探讨脊膜瘤的少见及不典型 MRI 表现

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目的 探讨脊膜瘤的少见及不典型 MRI 表现。

方法 回顾性分析 102 例经病理确诊的脊膜瘤患者的首诊 MRI 资料。所有患者均行脊柱 MRI 平扫及增强检查。由 2 名资深放射医师对 MRI 资料进行评价, 包括肿瘤数目、大小、部位、生长方式、形态、信号及强化特点等。重点观察肿瘤是否存在跨椎间孔生长、多节段纵行生长、弥漫塑形性生长、银杏叶征等少见及不典型影像表现。将脊膜瘤典型 MRI 表现定义为发生于髓外硬膜下, 与硬脊膜关系密切的局限性占位, 增强扫描呈均匀明显强化伴或不伴脊膜尾征。

结果 102 例脊膜瘤中 94 例 (92.2%) 典型, 8 例 (7.8%) 不典型, 13 例 (12.7%) 出现少见银杏叶征象。8 例不典型脊膜瘤术前初步诊断时均误诊。不典型 MRI 表现主要为脊膜瘤生长方式不典型: 跨椎间孔生长呈哑铃状 4 例, 术前误诊为神经源性肿瘤; 多节段纵行生长 3 例, 术前误诊为脊髓胶质源性肿瘤; 弥漫塑形性生长 1 例, 术前误诊为淋巴瘤。出现少见银杏叶征象的 13 例脊膜瘤中, 8 例 (61.5%) 位于颈段椎管, 5 例 (38.5%) 位于下胸段椎管; 8 例位于脊髓左侧, 5 例位于脊髓右侧, 左右侧比例为 1.6:1。8 例生长方式不典型脊膜瘤中, 5 例 (62.5%) 出现特征性银杏叶征。

结论 不典型生长方式的脊膜瘤易被误诊, 注重脊膜瘤少见的特征性银杏叶征象, 有助于正确诊断。

PO-0327

基于体素内不相干运动扩散加权成像的影像组学列线图 预测脑胶质瘤 ATRX 基因状态

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目的 构建基于体素内不相干运动扩散加权成像 (IVIM-DWI) 的影像组学列线图预测脑胶质瘤 α -地中海贫血/智力低下 x 连锁 (ATRX) 基因的状态。**资料与方法** 回顾性分析 2017 年 1 月至 2023 年 5 月 85 例手术病理证实的脑胶质瘤患者的常规 MR 和 IVIM-DWI 资料, 其中, 男 46 例, 女 39 例, 年龄 18~87 (55 \pm 15) 岁, ATRX 基因野生型 36 例, 基因突变型 49 例。以 7: 3 比例划分为训练集 (N=61) 和测试集 (N=24), 使用 3d-slicer 软件勾画胶质瘤的 ROI, 分别勾画的肿瘤实质区 (rCET)、水肿区 (rE) 及坏死区 (rNec), 投影到 D、D* 及 f 序列, 每个 ROI 中提取出 1037 个特征, 每个患者共计 3111 个特征。采用最小冗余最大相关性 (mRMR) 算法、最小绝对收缩和选择算法 (LASSO) 对提取的特征进行筛选, 建立 Logistic 回归影像组学模型, 纳入年龄计算 Radscore, 构建临床-影像组学组合模型, 生成 Nomogram 图, 分别建立 D、D*、f 参数 3 个模型。采用受试者工作特征 (ROC) 和决策曲线分析 (DCA) 评价 3 个模型的预测效果。**结果** D 参数模型在训练集的 AUC 值为 0.97 (CI: 0.93-1.00), 验证集为 0.91 (CI: 0.79-1.00), 高于 D* 参数模型 (0.90、0.82) 和 f 参数 (0.89、0.91), 差异有统计学意义。**结论** 基于 IVIM-DWI 的影像组学列线图能有效预测胶质瘤 ATRX 基因状态, 以 D 参数效能最高。

PO-0328

帕金森病执行控制网络对运动调节作用的动态功能连接研究

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目的: 探讨帕金森病 (PD) 执行控制网络与运动相关脑网络间动态功能连接 (dFNC) 性的变化及其临床意义。**资料与方法:** 采集 50 例 PD 患者和 50 例健康对照静息态功能磁共振成像数据, 经独立成分分析法 (ICA) 提取执行控制网络、感觉运动网络、小脑网络和基底神经节网络, 基于滑动窗口相关法, 采用 k-means 聚类法识别可重复出现的瞬时功能连接模式, 评估各独立组分间的动态功能连接性变化, 然后计算 PD 患者 dFNC 时间特性与临床评分之间的关系。**结果:** 经动态分析得到 5 种重复出现的功能连接状态, 其中状态 2 和状态 3 发生率较高、停留时间更长, 呈现较为紧密的连接状态, 状态 1 的发生率较低、停留时间更短, 呈现较稀疏的连接状态。PD 患者和健康对照的执行控制网络与感觉运动网络、小脑网络和基底神经节网络间表现出 dFNC 强度的差异。此外, 状态 3 的 dFNC 时间特性与临床运动评分呈负相关。**结论:** PD 患者执行控制网络与运动相关脑网络间功能连接的变化及其时间变异性, 不仅证实了大脑网络连接模式的时变性和小脑参与 PD 的运动过程, 还说明高级别控制系统功能缺陷与 PD 运动症状的产生有关, 有助于进一步理解 PD 运动障碍发生的潜在机制。

PO-0329

16 例小脑胶质母细胞瘤影像及临床分析

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【摘要】 目的 探讨少见部位小脑胶质母细胞瘤的临床及影像特征, 为其临床诊治提供参考。方法 回顾性分析本院 2016 年 5 月至 2023 年 5 月间经手术及病理证实的 16 例小脑胶质母细胞瘤患者资料, 男性 10 例, 女性 6 例, 年龄 36~79 (69±11) 岁, IDH 突变型 1 例, IDH 野生型 7 例, NOS 型 8 例。分析患者临床及影像特征、治疗和术后情况等。结果 临床主要表现为头痛、头晕、共济失调伴或不伴呕吐, 临床病程较短 (1 周~6 月)。16 例肿瘤位于小脑表面 6 例, 余位于小脑深部; 单发病灶 12 例, 其中 8 例位于右侧小脑半球, 3 例位于左侧小脑半球, 1 例位于小脑蚓部; 多发病灶 4 例位于双侧小脑半球。肿瘤最长径 24~46 (35.7±6.6) mm。CT 表现为 9 例稍低密度, 5 例伴出血呈混杂密度, 1 例位于小脑表面呈脑膜瘤稍高密度。MR 表现为肿瘤实性部分 T1WI 呈等或低信号, T2WI 呈等或稍高信号, 病变与瘤周水肿分界不清, 16 例均有不同程度囊变坏死, 5 例伴出血, 增强 4 例呈团块状强化, 12 例不均匀花环状强化, 9 例伴小脑纤维束播散, 2 例伴软脑膜转移。12 例瘤周轻度水肿, 5 例瘤周中度以上水肿。5 例患者术后联合放化疗, 6 月后多模态 MRI 随访, 4 例无复发, 1 例术后 1 年边缘少许复发。结论 发生于小脑的胶质母细胞瘤少见, 但肿瘤的不均质性, 花环状强化, 瘤界不清, 瘤周水肿较转移瘤轻, 多发病灶和沿小脑纤维束播散等特征, 可对其作出预期影像学诊断。手术切除加同步放化疗是目前主要的治疗方法。

PO-0330

多发性硬化症患者深层灰质核团的多模态研究及其临床相关性: 一项多变量模式分析研究

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背景: 多发性硬化症 (MS) 患者的深部灰质 (DGM) 核受累, 并与临床症状密切相关。我们采用机器学习方法进一步探索多发性硬化症患者深部灰质核的微结构改变。

方法: 115 名多发性硬化症患者和 71 名健康对照组 (HC) 患者接受了脑磁共振成像检查。测量了各向异性分数 (FA)、平均扩散率 (MD)、定量易感值 (QSV) 以及尾状核 (CN)、普特门 (PT)、苍白球 (GP) 和丘脑 (TH) 的体积。基于机器学习算法的多变量模式分析被用于研究受损最严重的区域。局部相关分析用于研究 MRI 定量指标与临床神经评分之间的相关性。

结果: RRMS 组的 CN、PT、GP 和 TH 体积均低于 HC 组 (P 均 <0.001)。RRMS 组 CN、PT 和 GP 的 QSV 均高于 HC 组 (P 均 <0.05), TH 的 QSV 低于 HC 组 ($P < 0.001$)。RRMS 患者 CN 的 FA 低于 HC ($P < 0.001$), CN 的 MD ($P = 0.007$) 和 PT ($P = 0.020$) 高于 HC。基于 FA 的分类模型的曲线下面积为 0.83, 而基于 MD 和 QSV 的分类模型的曲线下面积分别为 0.93 和 0.81。蒙特利尔认知评估评分与 DGM 的体积相关, 扩展残疾状况量表评分与 GP 和 PT 的 MD 相关。

结论: 多发性硬化症患者 DGM 受累, 其中 CN 受累最严重。多发性硬化症患者 DGM 的萎缩主要影响认知功能, DGM 的微结构损伤主要与临床残疾相关。

PO-0331

急性轻度创伤性脑损伤的神经血管耦合异常研究

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目的 探究急性轻度创伤性脑损伤 (mTBI) 患者神经元活动与相应脑血流量变化的关系。

材料和方法 纳入 32 例 mTBI 患者和 37 例匹配良好的健康对照患者。扫描 T1 结构成像、静息态功能成像和动脉自旋标记灌注成像。使用 DPABI_5.0 (<http://rfmri.org/dpabi>) 和 SPM_12 (<https://www.fil.ion.ucl.ac.uk/spm/software/spm12>) 工具包对数据进行预处理; 一方面, 将计算得到的低频波动幅度 (ALFF)、比率低频波动幅度 (fALFF)、脑血流量 (CBF) 值进行双样本 t 检验; 另一方面, ALFF、fALFF 值分别和 CBF 值进行相关性分析, 得到的 ALFF-CBF、fALFF-CBF 相关性系数再进行双样本 t 检验; 最后将五个影像学指标中有组间差异的脑区与神经心理症状得分进行相关性分析。上述分析均采用错误发生率 (FDR) 对结果进行多重比较校正。

结果 与 HC 组相比, mTBI 组的 ALFF 值在右侧梭状回明显升高 ($P < 0.05$), fALFF 值在右侧直回和舌回明显升高 ($P < 0.05$)。mTBI 组 ALFF-CBF 值在左侧额下回与数字跨度向前试验呈正相关 ($r = 0.056$, $P < 0.05$), 在右侧角回和左侧颞横回与数字跨度向前试验呈负相关 ($r = -0.046$, $P < 0.05$); fALFF-CBF 值在右侧枕颞外侧回与数字跨度向后试验呈负相关 ($r = -0.041$, $P < 0.05$), 在右侧上边缘回与数字跨度向后试验和 MoCA 总分呈负相关 ($r = -0.053$, $P < 0.05$)。对于 CBF 值, 二者无统计学意义 ($P > 0.05$)。

结论 两组患者的数字跨度向前、向后试验评分和 MoCA 评分普遍高于对照组。这表明, 患者受伤后的语言、信息处理和记忆能力有所下降。同样, 这也反映在大脑的异常区域, 如控制感觉、情绪、记忆的颞横回、额下回和枕颞外侧回, 以及控制语言功能的角回和边缘上回。未来, 神经心理学评估和神经血管生物标志物可以结合起来监测治疗效果和认知障碍的进展。

PO-0332

QSM 联合 NODDI 研究帕金森患者脑铁沉积及微观结构变化特点

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目的: 采用定量磁敏感图及神经突方向离散度与密度成像探讨 PD 患者脑内铁沉积量与微结构随疾病进展的演变规律及其两者之间的关系。方法: 研究对象为 41 例 PD 患者 (PD 组) 并根据 Hoehn-Yahr 分级分为早期 PD 组 (PD-1) 和中晚期 PD 组 (PD-2) 以及 23 名健康对照组 (HC 组)。所有受试者进行 QSM 及 NODDI 序列扫描获得感兴趣区定量磁敏感值及 NODDI 相关参数值。采用单因素方差分析比较三组铁沉积量差异, 采用 Spearman 相关系数分析 QSM 与 NODDI 各参数间的相关性。结果: 与对照组相比, 多个核团存在不同程度的 Vic 值、Viso 值、ODI 值的降低及铁沉积量的异常升高。早期 PD 组中, 黑质及红核的 ODI 值、苍白球的 ODI 值及 Viso 值与对应核团的定量磁敏感值之间存在相关性 ($r = -0.532$, $P = 0.016$; $r = 0.514$, $P = 0.020$; $r = -0.516$, $P = 0.020$, $r = -0.479$, $P = 0.033$); 而中晚期 PD 组中, 壳核的 Vic 值、苍白球的 Vic 值及 ODI 值与对应核团的定量磁敏感值之间存在相关性 ($r = 0.610$, $P = 0.003$; $r = 0.575$, $P = 0.006$; $r = 0.508$, $P = 0.019$)。结论: 随着 PD 的病程进展, PD 患者脑内存在铁沉积量异常及微观结构改变, 且两者之间具有一定的相关性。

PO-0333

基于动脉自旋标记技术探讨原发性痛经患者脑血流量的研究

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目的 采用基于体素的形态学方法 (voxel-based morphometry, VBM) 及动脉自旋标记 (ASL) 技术, 探讨原发性痛经(primary dysmenorrhea, PDM)患者的脑血流量变化, 及其与临床量表评分进行相关性分析。方法 前瞻性纳入 31 例 PDM 患者和 32 例健康对照者, 在月经期第 1-3 天进行高分辨率 T1 结构像及全脑 ASL 扫描, 并采用疼痛视觉模拟量表 (VAS)、COX 痛经症状量表 (CMSS)、焦虑自评量表 (SAS)、抑郁自评量表 (SDS) 进行临床症状评估。采用 VBM 方法, 基于 Matlab 平台的 SPM8 软件的双样本 t 检验分析两组间脑血流量 (CBF) 有显著差异的脑区, 再采用 Pearson 相关性分析, 观察脑血流量差异脑区的 CBF 值与 VAS、CMSS、SAS、SDS 量表评分之间的相关性。结果 PDM 组与健康组在年龄、VAS、CMSS、SAS、SDS 量表评分的差异均有统计学意义 ($P<0.05$)。与健康对照组相比, PDM 组脑血流量增高的脑区主要包括左侧岛盖部额下回、左侧三角部额下回, 脑血流量减低的脑区包括右侧眶部额上回、右侧眶部额中回 ($P<0.001$, 团块水平 FDR 校正, $k\geq 60$)。相关性分析结果显示左侧三角部额下回 CBF 值与 VAS、CMSS 量表评分存在正相关。结论 基于 ASL 技术及 VBM 方法能够评估原发性痛经患者的脑血流灌注水平, 这些脑血流量改变的脑区主要位于痛觉传导通路, 为原发性痛经患者的诊治提供有价值的信息。

PO-0334

MR 总负荷评分联合 AI 脑分割对脑小血管病变相关的
认知障碍研究

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目的: 基于 MR 总负荷评分联合 AI 脑分割对脑小血管病变 (cerebral small-vessel disease, CSVD) 相关的认知障碍研究, 旨在将脑萎缩也纳入 CSVD 负荷中, 为 CSVD 患者的认知障碍提供更全面、有价值的预测模型。

方法: 收集延安市人民医院 2022 年 3 月-2023 年 8 月的 179 例 CSVD 患者, 根据蒙特利量表 (MOCA-B) 将患者分为有无认知障碍两组。根据《中国脑小血管病诊治专家共识 2021》标准进行 CSVD 总负荷评分, 利用人工智能脑分割对脑体积进行定量分析, 采用卡方检验、独立样本 t 检验或 Mann-Whitney U 检验比较两组间的临床及影像指标差异。采用二元 Logistic 回归分析得出与认知有关的独立危险因素。建立对于 CSVD 患者认知障碍的影像预测模型。

结果: 两组之间年龄、教育年限、有无高血压、既往中风史、中心粒细胞计数、腔隙灶 (LAC)、微出血灶 (CMB)、白质高信号 (WHM)、CSVD 总负荷评分及脑脊液相对体积有显著差异 ($p<0.05$), 其中教育年限、CSVD 总负荷评分与脑脊液相对体积是有无认知障碍的独立危险因素 ($p<0.05$)。CSVD 与脑脊液联合的影像预测模型较单个影像模型效能更好, ROC 曲线面积 (area under the curve, AUC) $AUC=0.844$ (95%CI:0.772~0.875), 临界值 0.72, 敏感性 0.667, 特异性 0.887, 具有较高的预测价值。

结论: 相较于单个负荷而言, CSVD 总负荷评分联合脑体积定量分析对于 CSVD 患者认知障碍的评估更全面, 更有预测价值。

PO-0335

基于 MRI 影像组学和机器学习的急性前循环非腔隙性梗死预后预测的研究

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目的急性前循环非腔隙性梗死 (AACNLI) 预后预测对该疾病的临床精准治疗意义重大。本研究旨在研发 AACNLI 预后预测模型, 探究导致预后不良的危险因素, 以提高该疾病疗效和整体预后。

材料与方法回顾性采集 372 例 AACNLI 住院患者的临床、影像、随访数据, 预后二分类参照 90d 改良 Rankin 量表。使用标注工具在 DWI 上分割缺血性脑卒中灶, 获得掩模 DWI、ADC、ADC620, 从 DWI、ADC、T2-FLAIR 抑脂图像中提取掩模的影像组学特征, 使用 12 种特征降维算法进行影像组学特征选择, 分别基于临床+传统影像变量和临床+传统影像+影像组学变量构建 9 种机器学习模型, 计算特征降维-机器学习算法组合的 AUC, 评价预后预测模型效能并验证。

结果在训练集和测试集 247 例 AACNLI 患者中, 预后良好 132 例, 预后不良 115 例, 两组在性别、年龄、吸烟史、冠脉硬化史、房颤史、心衰史、高脂血症史、卒中相关性肺炎 (SAP)、收缩压、TOAST 分型、OCSP 分型、入院 NIHSS、入院 GCS、发病 7d 内 NIHSSmax、CRP、D 二聚体、血糖、BNP、血栓负荷评分、DWI-ASPECTS 指标存在统计学显著差异。训练集中临床+传统影像+影像组学变量的特征降维与分类算法组合, 最小绝对收缩和选择算子-随机森林 (RF) 算法组合在三种掩模的 AUC 分别为 0.98、0.99、0.98, AUC 排序秩次总和最小, 表现最好。在三种掩模的 RF 模型中, 7d 内 NIHSSmax、卒中相关性肺炎、入院 GCS 位列预后预测模型特征值的前三位。

结论基于临床+传统影像+影像组学特征的 RF 模型能准确预测 AACNLI 发病 90 天预后, 7d 内 NIHSSmax、SAP、入院 GCS 是预后预测模型最重要的三个特征。基于掩模 ADC620 的 RF 模型 AACNLI 预后预测效能最好, 有助于筛选出预后不良的高风险患者, 明确预后不良的危险因素, 为临床精准治疗提供重要依据。

PO-0336

DWI 联合 3D-ASL 技术评估胶质瘤 IDH-1 突变状态

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目的: 本研究旨在探讨扩散加权成像 (Diffusion Weighted Imaging, DWI) 联合三维动脉自旋标记 (3D Arterial Spin Labeling, 3D-ASL) 技术在评估脑胶质瘤异柠檬酸脱氢酶-1 (Isocitrate Dehydrogenase 1, IDH-1) 突变状态的应用价值。

方法: 回顾性分析我院手术病理证实的 36 例脑胶质瘤患者的临床及影像学资料, 其中 IDH-1 突变型 16 例, IDH-1 野生型 20 例。所有患者均行常规磁共振平扫、增强序列、DWI 及 3D-ASL 检查。测量并分析平均表观扩散系数 (Mean Apparent Diffusion Coefficient, ADCmean) 和平均脑血流量 (Mean Cerebral Blood Flow, CBFmean), 数据标准化后使用相对平均表观扩散系数 (Ratio of ADC, rADC) 和相对平均脑血流量 (Ratio of CBF, rCBF) 比值进行统计分析。

结果: ①IDH-1 野生型胶质瘤 rADC 值 (1.12 ± 0.17) 显著低于突变型胶质瘤 rADC 值 (1.25 ± 0.16), 差异具有统计学意义 ($t=2.456$, $P<0.05$); ②IDH-1 野生型胶质瘤 rCBF 值 (2.29 ± 0.16) 显著高于突变型胶质瘤 rCBF 值 (2.03 ± 0.21), 差异具有统计学意义 ($t=-4.003$, $P<0.05$)。

结论: DWI 联合 3D-ASL 技术可作为一种评估脑胶质瘤 IDH-1 突变状态的新方法。

PO-0337

斜坡颅咽管瘤 1 例

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颅咽管瘤是一种生长缓慢的良性肿瘤，一般起源于鞍上，累及鞍下的占少数。从病理假说来看，有学者认为颅咽管起源于口腔外胚层，在胚胎发育早期外胚层向上凹陷形成 Rathke 囊，并随着蝶骨以及蝶鞍的发育在胚胎发育时期退化消失，所以颅咽管瘤可以发生在这一路径上的任何位置。有学者认为鞍下颅咽管瘤常涉及的区域包括鼻咽、鼻腔以及蝶窦、筛窦、上颌窦，而发生于斜坡的颅咽管瘤十分少见，目前国内报道中斜坡颅咽管瘤仅 5 例，但局限在斜坡的病例报告之前并未发现。因此我们在此报告了一例仅累及斜坡的颅咽管瘤，并对它其展开鉴别诊断。

PO-0338

无先兆偏头痛患者自发脑活动动态中异常的一致性： 多变量模式分析研究

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目的：静态和动态自发脑活动的变化已广泛应用于探索无先兆偏头痛（MwoA）患者脑功能改变。然而，MwoA 患者自发脑活动动态中一致性的变化仍然大部分未知，本研究旨在确定基于一致性指数进行 MwoA 严重程度的诊断和预测的可能性。材料和方法：第一组包括 32 名 MwoA 患者和 33 名匹配的健康对照组（HCs），验证组包括 36 名 MwoA 患者和 32 名 HCAs，进行了静息态 fMRI 扫描。计算了这些动态指标的体积级和体素级一致性，并基于支持向量机进行了多体素模式分析（MVPA），从 MVPA 结果中得到的脑区用于进一步的关联向量回归分析。结果：与 HCAs 相比，MwoA 患者的整个灰质体积级一致性较低，体积级一致性的平均值与偏头痛发作频率呈负相关。MVPA 结果显示，最具鉴别性的脑区为右侧丘脑、右侧小脑 Crus II、左侧岛叶、左侧前中央回、右侧楔状回和左侧枕上沟回。此外，体素级一致性的变化可以预测偏头痛发作频率。讨论：我们的结果表明，在脑区自发脑活动动态中的一致性变化可能是识别 MwoA 患者的重要特征，并具有预测个体严重程度良好潜力的。

PO-0339

慢性腰背痛中小脑到运动皮质的有效连接改变： 一项基于多变量模式分析和频谱动态因果建模的研究

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本研究使用基于静态和动态低频振幅分数（fALFF）分析的多体素模式分析（MVPA）和频谱动态因果建模（spDCM），探索慢性腰背痛（cLBP）中疼痛知觉的中枢处理机制。第一组包括 32 名 cLBP 患者和 29 名匹配的健康对照组（HCs），验证组包括 24 名 cLBP 患者和 22 名 HCAs，均进行了静息态 fMRI 扫描。将静态和动态 fALFF 的改变作为分类特征，区分 cLBP 患者和 HCAs。从 MVPA 结果中得到的脑区用于进一步的 spDCM 分析。我们发现，最具区别性的脑区，即有助于分类的脑区，包括右侧辅助运动区（SMA.R）、左侧副中央小叶（PCL.L）和双侧小脑 Crus II。随后，spDCM 结果显示，与 HCAs 相比，cLBP 患者的双侧小脑 Crus II 对 PCL.L 的兴奋性定向影响减弱，而从兴奋性定向影响转变为抑制性定向影响，且有效连接强度在中国式 Oswestry 腰椎功能障碍指

数问卷 (C-SFODI) 得分上呈现部分中介效应。我们的研究表明, 小脑及其与运动皮质之间减弱或抑制性的连接可能是 cLBP 疼痛知觉的潜在中枢处理机制, 并部分介导了功能障碍程度。

PO-0340

基于弥散张量成像的首发未治疗抑郁症患者 脑白质网络的初步研究

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目的: 基于弥散张量成像 (DTI) 技术和图论探讨首发未治疗抑郁症患者大脑白质网络全局和局部拓扑属性的改变, 从脑白质网络的角度来寻找首发未治疗抑郁症的影像学标志, 进而深入探讨抑郁症发病的神经病理学机制。

方法: 本研究纳入了 2022 年 01 月至 2023 年 04 月在吉林大学第一医院心理卫生科及神经内科确诊为抑郁症的门诊患者 30 例, 均为首发未治疗。选正常受试者 21 例。所有患者的诊断均符合 DSM-V 抑郁诊断标准。入组患者的 HAMD-17 评分均大于等于 14 分。采用 PHILIPS 3.0T MRI 对受试者行 T1 像和 DTI 的图像采集。对 DTI 数据进行预处理; 以 AAL 将大脑分为 90 个脑区, 基于 PANDA, 使用确定性纤维追踪算法构建大脑白质网络; 最后使用基于 MATLAB 2013b 的 Gretna 对脑白质网络的拓扑属性指标进行计算。使用 Shapiro-Wilk 法检验两组一般临床资料和拓扑属性指标的正态性。首先用 SPSS 25.0 对全局、局部属性指标进行两组组间差异比较, 当 $P < 0.05$ 时, 认为差异有统计学意义。对于节点属性指标, 为了控制假阳性率, 进行 FDR 多重比较校正。

结果 (1) 两组受试者的脑白质网络均存在小世界属性, 抑郁症组的聚类系数 ($P = 0.007$) 和网络局部效率 ($P = 0.008$) 减低。(2) 首发未治疗抑郁症患者在右侧眶部额下回 ($P = 0.011$)、左侧枕中回 ($P = 0.002$) 节点聚类系数减低; 右侧眶部额下回 ($P = 0.012$) 节点局部效率减低。

结论: (1) 与健康对照组相比, 首发未治疗抑郁症患者的脑网络的全局和局部拓扑属性部分发生了改变, 提示首发未治疗抑郁症患者的局部脑网络出现了异常改变, 而全局网络有所保留。(2) 首发未治疗抑郁症患者右侧眶部额下回的节点聚类系数、节点局部效率和左侧枕中回的节点聚类系数有异常, 提示该脑区与抑郁症的发生有关。

PO-0341

分辨率磁共振血管壁成像在原发性中枢神经系统 血管炎中的诊断价值

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目的: 通过分析原发性中枢神经系统血管炎 (PACNS) 在高分辨率磁共振血管壁成像 HR-VWI) 中的影像学特点, 并与 MRA 进行比较, 探索 HR-VWI 在 PACNS 中的诊断价值。

方法: 我们分析了 2018 年 1 月至 2022 年 12 月就诊于吉大一院神经内科的 PACNS 患者 18 例。所有患者均行 3.0T 磁共振 T1WI、T2WI、MRA 及 HR-VWI (平扫+增强) 检查。所有的检查结果由两位经验丰富的神经放射科医师和神经科医师进行判读及分析。数据均采用 SPSS21.0 进行统计学分析。计数资料用百分比表示, 两组间比较采用卡方检验。设定 $P < 0.05$ 表示有统计学意义。

结果: 18 例患者共 162 条大中血管, 包括双侧大脑前、中、后动脉、双侧椎动脉、基底动脉。HR-VWI (平扫+增强) 显示共 47 条大、中血管 (29.0%) 受累, 其中前循环 24 条 (14.8%), 后循环 23 条 (14.2%), 表现为受累血管管壁均匀、向心性增厚伴强化。而 MRA 只显示出 23 条

(14.2%)大、中血管受累,其中前循环 16 条(9.9%),后循环 7 条(4.3%),表现为相应血管管腔不同程度狭窄。MRA 阳性的 23 条血管在 HR-VWI 中也均为阳性。HR-VWI 的阳性检出率高于 MRA,差异具有统计学意义($P<0.05$)。

结论:HR-VWI 可以直接显示血管壁及管腔的情况,对 PACNS 的诊断具有重要价值,主要表现为受累血管管壁弥漫、均匀、向心性增厚伴强化。相比于传统的血管成像方法,如 MRA 等,HR-VWI 对异常血管的检出率更高,可以为 PACNS 的检测和诊断提供更全面的信息。因此,当临床怀疑 PACNS 时,应及时进行 HR-VWI 检查。

PO-0342

基于 VBM 及静息态 fMRI 对首发未治疗 抑郁症患者脑功能磁共振研究

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目的:运用基于体素的形态学分析方法(VBM)探究首发未治疗抑郁症患者的脑灰质体积变化,并以差异脑区作为种子点,分析全脑与其功能连接状态,探讨抑郁症脑灰质结构改变与脑功能连接之间的联系。

方法:抑郁症患者组病例选取 2020 年 8 月至 2022 年 10 月期间吉大一院神经内科门诊及心理卫生门诊的病患 30 例,均为首发未治疗。对照组选取健康者 22 例。患者符合 DSM-V 诊断标准,同时 HAMD ≥ 7 分。使用 PHILIPS 3.0T MRI 对受试者行 T1WI 及静息态脑功能磁共振成像(Rs-fMRI),行 VBM 分析,探究患者组灰质体积变化,对处理后的数据采取 AlphaSim 校正,当 $P<0.05$, cluster size >45 时认为差异有统计学意义,从而得到患者组内脑灰质体积发生变化的脑区。以上述脑区为种子点,采用 Rs-fMRI 方法,探究种子点与全脑的功能连接状态,对处理后的数据采取 FWE 校正,当 $P<0.05$, cluster size >201 时认为差异有统计学意义,从而显示抑郁症患者脑内功能连接值增强或减弱的相关脑区。

结果:(1)VBM 表明首发未治疗的抑郁症患者组灰质体积减小的脑区为:左侧颞中回、右侧岛叶、左侧枕上回、右侧背外侧额上回。(2)以右侧岛叶为种子点,发现首发未治疗的患者组脑内存在与该种子点功能连接增强的脑区为:内侧额上回和楔前叶。其他种子点未发现链接增强或减弱的脑区。

结论:(1)首发未治疗的抑郁病人灰质体积减小的脑区主要涉及额颞枕叶及岛叶,表明抑郁症的发生与多个脑区相关。(2)Rs-fMRI 发现患者组中功能连接状态发生改变脑区均属默认网络的重要组成部分,表明了默认网络对抑郁症有着重要作用。(3)脑灰质体积改变的脑区同时存在脑功能连接异常,表明脑结构与脑功能的异常在抑郁症的发生中相互作用。

PO-0343

基于 4D Flow MRI 成像技术的颅内静脉系统 血流动力学状态的初步研究

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目的：通过四维血流磁共振成像技术（4D Flow MRI）研究正常颅内静脉系统与伴随颅内压升高时静脉窦血栓（CVST）和特发性颅内高压（IIH）患者的血流动力学特征。

方法：纳入 2022 年 10 月至 2023 年 2 月吉大一院神经内科收治的高颅内压 CVST 和 IIH 患者 17 人（9 名 CVST+8 名 IIH 患者），纳入健康志愿者 14 人。均行 MRV 及 3D T1 VISTA 检查。因部分难以捕获血流信号，共 13 人（7 名 CVST+6 名 IIH 患者）4D Flow MRI 有效。用 SPSS 22.0，设定 $P<0.05$ 时有统计学意义。

结果：1、4D Flow MRI 显示健康者颅内静脉为层流。血流速度沿上矢状窦逐渐增加，且右侧血流参数值高于左侧。2、CVST 患者通过 4D Flow MRI 可以观察到血流复杂紊乱。血流动力学参数随脑脊液压力变化，呈负相关但无线性关系，较正常人低。CVST 患者血管再通后可见层流血流，且血流参数较复查前明显增加。3、IIH 患者的 4D Flow MRI 显示狭窄处的峰值速度及最大压力梯度大于上游，可见高速红色流线。狭窄下游的血流参数值较高可见射流样血流，狭窄附近可见同心圆样紊乱涡流。IIH 患者组参数均高于对照组，且跨狭窄处的峰值速度、最大压力梯度在两组间存在统计学差异（ $p<0.05$ ）。尽管上述指标与脑脊液压力无线性关系，但呈负相关。

结论：1、正常颅内静脉系统血流模式为层流，且右侧血管的参数值高于左侧，证明了存在优势引流。3、CVST 患者血流模式复杂，血流动力学参数低于正常人，且与颅内压负相关，血管再通后近似恢复正常。4、IIH 患者狭窄处及狭窄下游可见射流样血流，狭窄附近可见涡流。存在病理性压力梯度的 IIH 患者，跨狭窄处峰值速度、最大压力梯度数值均高于正常人，且与颅内压呈负相关。

PO-0344

磁共振多延迟动脉自旋标记技术对椎- 基底动脉扩张延长症患者脑血流灌注分析

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目的：比较椎-基底动脉扩张延长症（VBD）患者和健康志愿者脑血流灌注的差异；分析颅外颈内动脉、椎动脉血流速度是否会引起颅内血动力学变化；预测 VBD 患者后循环缺血性卒中发生的风险因素。

方法：本研究于 2021 年 1 月至 2022 年 1 月纳入中日友好医院放射科 32 名 VBD 患者。所有患者由 MRA 诊断为椎-基底动脉迂曲或扩张。同时招募 32 名健康志愿者作为对照组。所有受试者均行多延迟动脉自旋标记（multi-delay-ASL）技术扫描及颅外颈内动脉、椎动脉多普勒超声检查。应用 CereFlow 软件对数据进行后处理，获得平均脑血流量（mCBF）、动脉脑血容量（aCBV）和动脉到达时间（ATT）等脑灌注参数。采用独立样本 t 检验比较两组之间前循环（额叶、顶叶和脑岛）和后循环（枕叶、小脑）的差异。使用 t 检验比较两组之间颅外颈内动脉、椎动脉的收缩期峰值速度（PSV）、舒张末期速度（EDV）、平均收缩期峰值速度（mPSV）和平均舒张末期速度（mEDV）。应用多元线性回归分析两组中影响 mCBF 的危险因素。采用受试者特征曲线（ROC）预测 VBD 患者后循环缺血卒中发生可能性。

结果：病例组前、后循环的 mCBF 及 aCBV 均低于对照组；除双侧岛叶外 ATT 显著长于对照组（ $P<0.05$ ）。除椎动脉 mEDV 外颅外颈内动脉、椎动脉的血流速度在对照组和病例组之间存在显

著差异 ($P<0.05$)。在 VBD 患者中,椎动脉的 mPSV、mEDV 分别与枕叶和小脑的 mCBF 具有显著相关性 ($P<0.05$)。而在前循环中颈内动脉 EDV、颈内动脉 PSV 以及岛叶 ATT 分别与额叶、顶叶和岛叶 mCBF 具有相关性。在 VBD 患者中双侧枕叶及小脑 ATT 是预测后循环缺血性卒中的因素。

结论: VBD 导致前、后循环区域灌注不足,双侧枕叶及小脑 ATT 延长可预测后循环缺血性卒中发生。颅外血流可能会影响 VBD 患者后循环的颅内血流动力学状态。

PO-0345

磁共振波谱成像在急性颈内动脉闭塞模型大鼠中的应用

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目的

探讨磁共振波谱(magnetic resonance spectroscopy, MRS)成像在急性颈内动脉闭塞模型大鼠中早期诊断的可行性。

方法

将 15 只大鼠随机分为假手术组 (SHAM=5)、缺血 2 小时模型组 (CI2H=5) 与缺血 12 小时模型组 (CI12H=5), 模型组采用急性颈内动脉闭塞法建立大鼠缺血模型, 模型制备成功后分别于 2 小时、12 小时进行扩散加权成像与 MRS 扫描。测量三组大鼠的表观弥散系数、N-乙酰天门冬氨酸, 肌酸, 胆碱, 乳酸, 肌醇、脂质, 谷氨酰胺、谷氨酸、 γ -氨基丁酸组合, 并对三组大鼠大脑石蜡标本进行胞质紧密黏连蛋白 1 抗体、神经元特异性烯醇化酶、S-100 β 蛋白、细胞色素 C, 免疫组化检测, 并将有意义参数与 ZO-1、NSE、S-100 β 蛋白、CytC 进行 Spearman 相关性分析。

结果

CI12H 组 NAA 明显低于 SHAM 组与 CI2H 组 ($P<0.05$), SHAM 组 NAA 与 CI2H 无差异, 三组大鼠的 NAA 与 NSE 呈负相关 ($r=-0.800, P<0.001$); CI12H 组 Cho 明显高于 SHAM 组与 CI2H 组 ($P<0.05$), SHAM 组 Cho 与 CI2H 无差异, 三组大鼠 Cho 与 S-100 β 呈正相关 ($r=0.822, P<0.001$); SHAM 组 Lip 明显低于 CI2H 组 ($P<0.05$), 与 CI12H 组无差异, 三组大鼠 Lip 与 ZO-1 呈负相关 ($r=-0.768, P<0.001$); SHAM 组 Lac 明显低于 CI2H 组与 CI12H 组 ($P<0.05$), 三组大鼠 Lac 与 CytC 呈正相关 ($r=0.801, P<0.001$); CI12H 组右侧脑 ADC 值低于 SHAM 组 ($P<0.05$)、与 CI2H 组无差异。

结论

大鼠在 AICAO 发病 2 小时已出现 Lac、Lip 的异常变化, 早于 NAA、Cho、ADC 值的改变, RMS 扫描能早期发现 AICAO 大鼠大脑的物质改变, 能早于 DWI 发现急性缺血性脑卒中的发生, 对未来研究 DWI 阴性的 AICAO 提供新的无创性检测方法。

PO-0346

椎管内黏液乳头型室管膜瘤的 MRI 征象分析

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目的: 探讨椎管内黏液乳头型室管膜瘤的 MRI 征象, 提高本病术前影像诊断水平。方法: 回顾性分析本院经手术病理证实且影像资料及手术记录完整的 15 例黏液乳头型室管膜瘤的临床资料及影像表现。结果: 15 例黏液乳头型室管膜瘤均为单发病灶, 8 例位于腰 2 椎体附近, 15 例肿瘤呈中心性纵向生长, 平均长径为 (5.14 ± 2.92) cm, 13 例表现为规则的长椭圆形, 1 例表现为短椭圆形, 1

例形态不规则,对椎管后方骨质压迫、吸收呈“扇贝样”改变,但未累及椎间孔。12 例肿瘤与脊髓圆锥或马尾终丝分界不清,3 例对脊髓圆锥或马尾终丝推移。T1WI 平扫 14 例呈等信号(参照脊髓灰质),1 例呈低信号。T2WI 平扫 14 例为高信号,1 例为完全低信号,14 例肿瘤内部或边缘可见点状、条状及斑片状低信号,有 8 例肿瘤头端或尾端表现为“帽征”,且全部为马尾终丝区的肿瘤。5 例肿瘤内部可见囊变,2 例尾端囊变。T1WI 增强 15 例肿瘤实体均明显强化,10 例肿瘤表现为“蜂窝状”强化,1 例肿瘤 T2WI 显示为完全低信号,增强后环形强化。结论:椎管内黏液乳头型室管膜瘤在 MRI 上具有一定的特征性,结合临床资料,能提高术前诊断的准确性。

PO-0347

基于多组学因素的颅内动脉瘤破裂风险深度学习 预测模型的建立与验证:多中心队列研究

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摘要:颅内未破裂动脉瘤是一种较为常见,并且严重危及生命的疾病。随着影像学检查技术的进步以及全民健康意识的提高,越来越多的无症状颅内未破裂动脉瘤在破裂前被发现。颅内未破裂动脉瘤的早期管理依赖于尽早识别其中破裂风险或生长风险较高的不稳定动脉瘤,并对其进行及时手术治疗是颅内未破裂动脉瘤诊治过程中关键步骤。近年兴起的人工智能领域中的机器学习算法的应用已经有效的解决以上困难,但仍存在预测效能不足及外部验证缺乏。此外,人工智能领域的影像组学属于一个新开发的新兴分支,在神经系统及循环系统疾病中已被证实预测预后方面有重要作用。除此之外,深度学习算法技术在最近的研究中也被证实对比于传统统计学方法和机器学习算法来说,有着更准确的预测能力及数据处理能力。

方法:纳入 2014 年 1 月至 2018 年 12 月在中国两家医院经数字减影血管造影证实的颅内动脉瘤患者 1740 例(共 1809 个动脉瘤)。我们将数据集(医院 1)随机分为训练(80%)和内部验证(20%)。外部验证使用从医院 2 收集的独立数据进行。通过 logistic 回归基于临床、动脉瘤形态学和影像组学参数建立预测模型。此外,还建立了基于组合的多维度参数的深度学习模型预测颅内未破裂动脉瘤的破裂风险,并与其他模型进行了比较。

结果:逻辑回归模型 A(临床)、B(形态学)、C(影像组学)的 AUC 分别为 0.678、0.708、0.738(P 均<0.05)。组合多维度特征模型 D(临床和形态学)、E(临床和影像组学)、F(临床、形态学和影像组学)的 AUC 分别为 0.771、0.839、0.849。深度模型(AUC=0.929)优于机器学习(AUC=0.878)和逻辑回顾模型(AUC=0.849)。此外,深度模型在外部验证数据集(AUC 分别为 0.876 vs 0.842 vs 0.823)中也表现出良好的性能。

结论:影像组学参数在预测动脉瘤破裂风险中发挥重要作用。在整合临床、动脉瘤形态学和影像组学参数的多维度颅内未破裂动脉瘤破裂风险预测模型中,深度学习算法优于传统统计学方法。因此,它可以作为临床决策的有用工具,并实现颅内未破裂动脉瘤的有效管理。

PO-0348

复合双流注射法注射方案在头颈 CTA 检查中的应用价值

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目的:通过对碘对比剂复合双流注射方法在头颈 CTA 检查中的应用研究与常规头颈 CTA 检查技术对比,寻找到对比剂用量少且效果更优的检查方法。

方法: 1.设备与扫描参数: 128 层螺旋 CT, 矩阵 512×512, FOV 200mm。2.扫描范围: 包括主动脉弓至头顶。3.患者选择: 选取 2 月—8 月来我院进行头颈 CTA 检查的患者 100 例, 随机分为实验组与对照组, 每组 50 例。实验组采用复合双流注射方法, 对照组采用常规注射方法。4.对比剂注入方法: 选择患者右肘正中静脉建立静脉通道, 采用双筒高压注射器, 对比剂选用碘克沙醇 (320mgI/ml)。实验组采用药: 水=2.5:7.5, 以 4.5ml/s 的速率注射 20ml, 之后以 4.5ml/s 的速率注射纯对比剂 25ml, 之后药: 水=7:3 以 4.5ml/s 的速率注射 20ml, 最后以 5.0ml/s 的速率注射生理盐水 40ml; 对照组使用常规注射方法, 先注射 60ml 对比剂, 随后 40ml 生理盐水。使用团注追踪法, 实验组触发阈值为 80HU, 对照组触发阈值为 120HU, 两组检测层面均选择主动脉弓层面主动脉弓中下段作为感兴趣区 (ROI)。5.评价方法与标准: 由两位高年资医师采用双盲法对血管图像进行评价并打分。颅内动脉 CT 值不低于 200HU 为 1 分, 颈内动脉 CT 值大于 250HU 为 1 分, 颅内静脉及颈内静脉 CT 值低于 150HU 为 1 分, 上腔静脉伪影及右锁骨下静脉伪影消除或残留少许 (<右锁骨下静脉 1/3) 对血管质量不产生影响者为 1 分。

PO-0349

基于 DTI-ALPS 指数评价 AICI 患者的脑胶质淋巴系统功能

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目的: 利用沿血管周围间隙扩散张量成像(DTI-ALPS)评估急性缺血性脑梗死(AICI)患者的脑胶质淋巴系统(GS)功能变化。方法: 回顾性搜集徐州医科大学附属医院 2021 年 9 月至 2023 年 6 月诊断为 AICI 的 33 例患者和 33 例健康对照组(HCs)的临床及影像学资料, 采集所有被试者的 DTI 参数, 以计算 DTI-ALPS 指数, 用于评价 AICI 患者脑胶质淋巴系统的变化。结果: AICI 患者病灶侧大脑半球 DTI-ALPS 指数显著低于健侧($P<0.01$, $t = -3.11$), 也显著低于健康对照组($P<0.01$, $t = -5.20$), AICI 病灶的体积、病灶至测量层面的距离与病灶侧大脑半球 DTI-ALPS 指数均无显著相关性($P=0.38$; $P=0.24$)。结论: 利用 DTI-ALPS 指数能够评估 AICI 患者脑胶质淋巴系统功能变化, 且 AICI 患者脑胶质淋巴系统功能的损害在病灶同侧大脑半球。

PO-0350

DTI 鉴别腰神经损伤及疗效评估

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摘要: 目的: 探讨 DTI 在腰椎间盘突出症腰神经损伤状况的疗效评估。方法: 收集本院接收的将行手术治疗的腰椎间盘突出症导致腰神经损伤的患者 10 例, 健康人 4 例, 行核磁共振 DTI 扫描及图像后处理, 进行神经纤维束成像。分析患者 VAS 评分与腰椎间盘突出症导致受压侧水肿神经根 DTI 数值的相关性。并用 SPSS26.0 进行数据对比分析。结果: 水肿或脱髓鞘的神经根平均 DTI 参数值与对应同一层面健侧及健康人相应腰神经根平均 FA 值分别为 (0.348±0.046)、(0.211±0.040)、(0.204±0.051); ADC 值分别为 (1.652±0.030) 10⁻³mm²/s、(2.300±0.058) 10⁻³mm²/s、(2.256±0.031) 10⁻³mm²/s; RD 值分别为 (1.349±0.029) 10⁻³mm²/s、(2.017±0.045) 10⁻³mm²/s、(1.948±0.078) 10⁻³mm²/s; AD 值分别为 (2.266±0.045) 10⁻³mm²/s、(2.729±0.054) 10⁻³mm²/s、(2.744±0.033) 10⁻³mm²/s; 分别行成组 t 检验, 得出差异具有统计学意义 ($t=4.61$ 、 4.36 、 5.12 、 6.40 , $P<0.05$)。将其进一步进行两两比较, 健康对照组和病变组患者同侧对应的腰神经的平均 DTI 参数值存在差异 ($P<0.05$), 病变组 FA 值显著高于健康对照组, ADC 值、RD 值、AD 值显著低于健康对照组; 病变组健侧与患侧对应的腰神经的平均 DTI 参数值存在显著差异

($P<0.05$)，与上组类似；健康者神经根平均 DTI 参数值与腰神经受损或受压者健侧神经根的平均 DTI 参数值比较差异无统计学意义，($P>0.05$)，且病变组因腰椎间盘突出导致腰腿痛的 VAS 评分也与 DTI 数值呈规律相关性。结论：DTI 参数值能够有效评估腰椎间盘突出症导致的腰神经损伤程度及受压情况，有助于临床诊断。

PO-0351

双侧岛叶较低的灰质体积介导了超重肥胖对精神分裂症患者不良的精神效应

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背景：精神分裂症 (SZ) 和超重/肥胖患者均显示出类似的脑结构改变。由于合并超重肥胖常会恶化 SZ 患者的精神疾病预后，本研究旨在探讨超重/肥胖对 SZ 患者脑灰质体积 (gray matter volume, GMV) 的影响。

方法：本研究共纳入 250 名受试者，并将其分为四个亚组：合并超重/肥胖的 SZ 患者 (n=69, SZ-OWB)；体重正常的 SZ 患者 (n=74, SZ-NW)；合并超重/肥胖的健康对照 (n=54, HC-OWB)；体重正常的健康对照 (n=53, HC-NW)。所有受试者均接受高分辨率 T1 加权序列扫描，并应用阳性和阴性症状量表 (Positive and Negative Syndrome Scale, PANSS) 和蒙特利尔认知评估量表 (Montreal Cognitive Assessment, MoCA) 进行临床症状和认知功能评估。采用全脑基于体素的形态学分析方法检测受试者 GMV，并采用 2x2 的全因素方差分析以确定 SZ 疾病 (SZ vs. HC) 和超重肥胖 (NW vs. OWB) 的主效应及其交互作用。此外，采用相关性分析和中介效应模型分析差异脑区与 SZ 患者的精神病性症状和认知功能的关系。

结果：SZ 疾病主要效应位于右侧海马、双侧岛叶、直回、中部扣带回和丘脑 (SZ < HC)；而超重肥胖主要效应位于右侧杏仁核、左侧海马、双侧岛叶、左侧舌回和右侧颞上回 (OWB < NW)。本研究未发现显著的 SZ 疾病x超重肥胖的交互效应，但 SZ 疾病和超重肥胖均与双侧岛叶的 GMV 降低有关。进一步中介分析表明 BMI 通过双侧岛叶 GMV 减少间接加重 SZ 患者的阴性症状。

结论：本研究结果提示超重肥胖与 SZ 患者较低的 GMV 相关，并可能增加患者不利疾病进程的风险。

PO-0352

帕金森病冻结步态患者超直接通路功能连接与运动功能的关系

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目的

帕金森病 (PD) 患者中黑质纹状体多巴胺的耗竭影响许多广泛分布的神经回路，因此脑网络异常是 PD 神经病理学的一个组成部分。有学者提出丘脑底核的爆发放电完全依赖于运动皮层的输入，导致错误的重复输入信息从皮质-丘脑下核传到苍白球-丘脑-皮质环路，从而导致 PD 的运动症状。本研究探讨原发性帕金森病冻结步态 (FOG) 患者超直接通路功能连接改变 (FC) 及其与运动功能之间的关系。

方法

本研究对 25 名伴冻结步态 (PD-FOG) 的 PD 患者、35 名无冻结步态 (PD-nFOG) 的 PD 患者和 30 名健康对照者 (HC) 进行静息态功能磁共振 (Rs-fMRI) 检查。定义双侧 5 个感兴趣区 (ROI) 作为超直接通路种子点, 包括双侧初级运动皮层 (PreCG)、辅助运动区 (SMA)、丘脑底核 (STN)、苍白球内侧部 (Gpi) 及丘脑 (Tha)。利用 REST 软件计算基于体素水平 ROI 与全脑之间的 FC。采用 Bonferroni 多重比较校正进行单因素方差分析 (ANOVA), 以确定各组 (PD-FOG、PD-nFOG 和 HC) 之间 FC 的差异。采用 GRF 进行事后分析, 设置统计学意义的体素水平为 $P < 0.05/3$, 聚类水平为 $P < 0.05$, 聚类大小为 18 个体素。最后, 评估差异脑区 FC 与 PD 运动神经量表的关系。

结果

我们发现, 与 HC 相比, PD 患者超直接通路与双侧大脑半球部分脑区之间 FC 减低, 主要包括额上回、中央前后回、枕中回、顶上小叶、壳核、扣带旁回、缘上回、楔前叶、角回、颞上回及颞中回等, 其中, 左侧 Gpi 与左侧扣带旁回 FC 减低与 UPDRS-I 及 PDQ-39 评分负相关。另外, 与 PD-nFOG 相比, PD-FOG 患者超直接通路与局部脑区的 FC 增高, 包括右侧小脑后叶及枕中回, 其中, 左侧 Tha 与右侧枕中回的 FC 增高与右侧肢体 UPDRS-III 评分正相关。

结论

与 HC 相比, PD 患者超直接通路与双侧大脑半球部分脑区的 FC 减低, 并与运动功能减弱相关。与 PD-nFOG 相比, PD-FOG 患者超直接通路与局部脑区的 FC 增高, 并与右侧肢体运动功能减弱相关。本研究为超直接通路功能连接网络在伴冻结步态的帕金森病患者中运动能力减弱的作用提供新的见解。

PO-0353

阿尔茨海默病认知域特异性功能损害的网络连接标志物

栾颖

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背景: 认知域特异性功能障碍的异质性是阿尔茨海默病 (AD) 临床诊断的主要挑战。本研究验证了以下假设: tau 蛋白异常沉积区域的功能网络决定了区域 tau-PET 对特定认知领域的影响。本研究旨在确定区域 tau-PET 积累的静息态功能连接模式, 从而得到功能网络连接加权的认知域特异性 tau-PET 预测因子。

方法: 我们纳入了来自 ADNI 的 218 名淀粉样蛋白阳性老年人。我们将 tau-PET SUVR 升高的区域投影到健康的人类功能连接组 (Human Connectome Project, HCP) 模版上, 并应用偏最小二乘分析来识别与情景记忆、执行功能或语言表现相关的连接模式。所得到的网络功能连接对区域 tau-PET SUVR 进行加权, 我们将这些连接加权 tau-PET 标记物的预测效能与整体和内嗅皮层 tau-PET 值对不同域认知功能的预测效能进行比较。

结果: 偏最小二乘回归得到了特定认知领域损伤相关的 tau 沉积的不同连接模式。利用认知域特异性网络连接对 tau 蛋白沉积脑区 tau PET 值进行加权对相应认知域功能进行预测, 其预测效能显著优于用全脑 tau-PET SUVR 值及内嗅皮层 tau-PET SUVR 值的预测效能。

结论: 网络连接加权 tau-PET 是一种具有潜力的新型生物标志物, 在预测特定领域的认知障碍方面, 其性能优于标准 tau-PET 指标。

PO-0354

注意缺陷多动障碍男童 SNAP-25 基因 MnlI 多态性与静息态脑功能和工作记忆的相关性研究

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目的：研究注意缺陷多动障碍男童 SNAP-25 基因 MnlI 多态性与静息态脑功能和工作记忆的相关性，探讨 SNAP-25 基因 MnlI 多态性对 ADHD 儿童工作记忆的影响机制。

方法：采集 36 例 SNAP-25 基因 MnlI 多态性 TT 纯合子基因型 ADHD 男童（简称 TT 组）和 20 例 G 等位基因型 ADHD 男童（简称 TG 组）静息态脑功能数据，采用局部一致性方法进行数据分析，选择双侧大脑半球的背外侧额上回、内侧额上回、后扣带回、前扣带回、楔前叶、额中回作为感兴趣区，计算每个被试感兴趣区的 ReHo 峰值。采用 N-back 任务评估两组男童的工作记忆，包括 0-back、1-back 和 2-back 四组任务的正确率。对 TT 和 TG 两组内所有被试每个感兴趣区的 ReHo 峰值与 N-back 正确率进行 Spearman 秩相关分析。当 $P < 0.05$ 差异有统计学意义。

结果：（1）TT 组：0-back 正确率与左背外侧额上回 ReHo 峰值呈低度负相关（ $r = -0.382, P = 0.021$ ），1-back 正确率与右背外侧额上回 ReHo 峰值呈低度正相关（ $r = 0.359, P = 0.031$ ）；2-back 正确率与右背外侧额上回 ReHo 峰值呈低度正相关（ $r = 0.344, P = 0.04$ ）。（2）TG 组：0-back 正确率、1-back 正确率、2-back 正确率与所有感兴趣区的 ReHo 峰值均无相关性（ $P > 0.05$ ）。结论：SNAP-25 基因 MnlI 多态性对 ADHD 男童工作记忆具有不同的遗传效应，fMRI 可从神经网络角度解释其差异的脑功能基础。

PO-0355

酒精使用障碍患者自发脑活动的频率特异性改变

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目的 酒精使用障碍（AUD）是世界上最普遍的精神疾病之一，与公共卫生、社会、犯罪和心理健康等问题密切相关。早期的神经影像学研究表明，AUD 对大脑的结构和功能都有影响。然而，这些改变是否与不同的频段相关尚不清楚。本研究的目的是探讨 AUD 患者静息状态下自发脑活动的频率特异性改变，并评估这些改变与临床数据之间的相关性。

方法 纳入 33 名 AUD 患者和 29 名年龄、性别、受教育年限、利手等相匹配的健康对照组（HC 组）行常规磁共振成像、静息态功能磁共振成像和高分辨率 T_1WI 结构像扫描。计算六个频段（常规频段，0.01-0.08 Hz；slow-2, 0.198-0.25 Hz；slow-3, 0.073-0.198 Hz；slow-4, 0.027-0.073 Hz；slow-5, 0.01-0.027 Hz；and slow-6, 0-0.01 Hz）的低频振幅（ALFF）值，采用独立样本 t 检验比较两组间的差异。使用受试者工作特征（ROC）曲线来检验 ALFF 分析区分 AUD 和 HC 的能力，并将 ALFF 在多频段的参数值与临床参数密歇根酒精筛查量表（MAST）和酒精成瘾量表（ADS）评分进行相关性分析。

结果 共在四个频段中观察到 ALFF 值减少，且 ALFF 值减少的区域主要位于右侧额上回和额中回。slow-2 频段和 slow-6 频段的 ALFF 值没有明显差异。这些特定脑区的 ALFF 差异显示出良好的曲线下面积（AUC）（0.829-0.873），以及良好的敏感性（61.5%-100.0%）和特异性（63.3%-96.7%）。MAST 或 ADS 评分与这些特定脑区的 ALFF 值无明显相关性。

结论 AUD 患者大脑自发活动的改变具有频率特异性，对 AUD 患者自发脑活动的研究应考虑频段的影响。这一初步探索可为了解 AUD 的病理生理机制提供客观的影像学依据。

PO-0356

癫痫停药后复发患者的灰质形态网络异常

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目的

70%的新诊断癫痫患者在抗癫痫药物 (ASM) 治疗下可以获得缓解,但考虑到副作用和经济负担,获得长期癫痫缓解的患者将尝试减药治疗,或者完全停药。然而,约 49%的患者在停药后会出现癫痫复发。目前,对于 ASM 停药后癫痫复发的确切机制还不清楚。因此,本研究旨在探索停药后癫痫缓解与复发患者之间灰质网络的特征,以及这些网络特征与癫痫复发之间的关系。

方法

本研究纳入停药无癫痫发作的患者 24 例,复发的患者 22 例以及 46 例对照者。我们使用 DARTEL 软件对 3DT1 图像进行预处理,得到平滑和调制的灰质图像;随后,采用灰质容积的统计相似性来构建灰质斜变网络。然后,我们使用 GRETNA 工具箱来计算大脑灰质结构网络的全局 (小世界参数和网络效率参数) 及节点 (节点度和节点效率) 拓扑属性,采用 ANOVA 分析方法对 3 组间网络拓扑属性的进行比较;最后,将存在差异的网络属性与临床特征进行相关分析。

结果

(1) 在全局属性层面,与对照组相比,无复发组的局部效率减低,而复发组不仅全局和局部效率减低,其特征路径长度也增加。(2) 在节点属性层面,两患者组的节点中心性均有降低,复发组的受累节点较多,并且复发组右侧苍白球的节点中心性低于无复发组。复发组在右侧苍白球和左侧颞中回间的连接强度减低。(3) 相关分析显示,左侧后扣带回的节点中心性改变与癫痫患者的发病年龄呈正相关,并且在复发患者更加明显。

结论

在停用抗癫痫药物时,患者呈现出较弱的小世界化网络可能会具有更高的癫痫复发风险,而这种在全局水平上的异常模式可能是由节点的去中心化和涉及皮层和皮质下网络的节点间连接下降所致。更高度度的节点去中心化可能是由于活跃期和疾病持续时间的延长以及为控制癫痫而药物用量增加所致,但确切的机制有待进一步探讨。在停用抗癫痫药物后无癫痫复发者可能归因于这部分患者脑网络结构的恢复。

PO-0357

酒精使用障碍患者全脑功能连接及度中心性功能成像研究

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目的 酒精使用障碍 (AUD) 患者由于长期、过量饮酒导致大脑的结构和功能发生变化, AUD 已经成为不可忽视的社会与医学问题。然而,人们对酒精成瘾神经影像学机制的了解仍然有限。本研究旨在利用体素水平二值化度中心性 (DC)、加权 DC 和功能连接 (FC) 方法探讨 AUD 患者的大脑网络活动,从而研究酒精成瘾的神经影像学机制。

方法 本研究中共纳入 33 名 AUD 患者和 29 名年龄、性别、受教育年限、利手等相匹配的健康对照组 (HC 组)。使用二值化和加权 DC 方法与基于种子点的 FC 方法相结合来评估 AUD 的异常内在功能枢纽特征。Spearman 相关性分析用于评估功能连接变化与临床参数密歇根酒精筛查量表 (MAST) 和酒精成瘾量表 (ADS) 的相关性。

结果 AUD 组和 HC 组的二值化和加权 DC 的空间分布图大致相似。与 HC 组相比, AUD 组的左侧中央前回和左侧顶下缘角回的二值化和加权 DC 均有所减少。并且基于左侧中央前回和左侧顶下缘角回作为种子的二次功能连接分析显示, AUD 组的右侧颞下回、右侧颞中回、左侧背外侧额上回、

双侧顶下缘角回、左侧楔前叶、左侧舌回、右侧小脑_crus1/颞下回/枕下回和右侧顶上回的 FC 发生了变化。相关性分析显示, 右侧颞中回-右侧中央前回的 FC 与 MAST 评分呈负相关, 右侧顶下缘角回-左侧顶下缘角回的 FC 与 ADS 评分呈正相关。

结论 酒精使用障碍与多个脑区的局部异常活动有关。二值化 DC、加权 DC 和 FC 分析可能是检测 AUD 患者大脑活动的重要指标。在 AUD 患者中也观察到了 FC 的组间差异, 这些差异与症状的严重程度有关。这种耐人寻味的关联可能是一种未确定的机制, 也可能是结构和功能连接之间的一种补偿机制。这些发现将为未来的 AUD 研究提供一个新的方向。

PO-0358

基于动脉自旋标记技术探究左旋多巴治疗背景下帕金森病特异性运动灌注模式的预后预测价值

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目的本研究旨在通过动脉自旋标记 (ASL) 技术确定 PD 相关运动灌注模式, 并评估其对 PD 患者运动症状的左旋多巴反应性的预测作用。

材料与方法本研究共纳入 2 个独立的试验集与验证集, 试验集中有 179 名 PD 与 62 名年龄和性别匹配的正常对照 (NC); 验证集中有 36 名 PD 与 19 名 NC。试验集中的 72 名 PD 患者均进行了左旋多巴治疗并具有治疗前后的纵向临床运动数据 (随访时间 33.26 ± 20.20 个月)。基于 ASL 技术, 我们采用基于体素的比例子剖面模型-主成分分析 (SSM-PCA), 在基线时 OFF 状态下分别在两组间比较了 PD 和 NC 的临床变量以及 PD 相关灌注模式表达, 应用 Pearson 相关和分层多元线性回归分析最终确定了 PD 特异性运动灌注模式。此外, 我们通过该灌注模式中位值将 PD 患者分为高、低表达组, 将左旋多巴反应性定义为运动症状的改善程度, 改善程度低于 30% 定义为结局事件, 进行了多变量 Cox 回归和 Kaplan-Meier 生存分析, 以此来探究基线时 PD 患者特异性运动灌注模式能否预测随访期间的左旋多巴反应性。

结果基于 SSM-PCA 分析得到的主成分 1 (PC1) 最终被确定为 PD 特异性运动灌注模式, 其在 PD 组中的表达在试验集与验证集中均高于 NC (试验集 $P=0.017$, 验证集 $P=0.024$)。在试验集中基线时 PC1 的表达与 UPDRS III ($P=0.006$) 及其子症状 (中轴症状: $P<0.001$; 强直症状: $P=0.003$; 运动迟缓: $P=0.05$; 姿势症状: $P<0.001$) 相关, 而与震颤症状无关 ($P>0.411$)。

生存分析中发现 PC1 高表达组是中轴症状的不良预后因子, 基线时 PC1 表达越高, 伴中轴症状的 PD 患者随访时的左旋多巴反应性越差 ($P=0.046$), 且随着随访时间增加, 高低表达组的中轴症状改善程度趋于一致。而基线时 PC1 表达与随访过程中 UPDRS III、震颤、强直、运动迟缓和姿势症状改善均无相关性。

结论基于 ASL 技术的 PD 特异性运动灌注模式在基线时 OFF 状态下的表达模式能够预测 PD 患者随访早期中轴症状的左旋多巴反应性。该运动灌注模式可作为一种客观评价 PD 患者预后的候选生物标志物。

PO-0359

集成磁共振成像技术在多发性硬化患者脊髓病灶 检出中的应用价值

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目的：评价集成磁共振成像技术在多发性硬化患者脊髓病灶检出中的应用价值。方法：采集我院 35 例 MS 患者颈段脊髓的磁共振数据，分别扫描 SagT1WI、SagT2WI 序列及 Sag MAGIC（集成磁共振）序列。MAGIC 序列采集到的图像通过软件处理得到 10 组不同对比图，包括 T1WI、T2WI、PDWI、T1FLAIR、T2FLAIR、STIR、PSIR（相位敏感翻转恢复成像）、PSIR Vessel（PSIR 亮血成像）、DIR GM（双翻转灰质成像）、DIR WM（双翻转白质成像）。比较常规组与 MAGIC 组病灶检出率的差异。结果：常规 SagT1WI、SagT2WI 组共检出病灶 67 处，集成磁共振分解得到的 10 组对比图中，T1WI 组 62 处、T2WI 组 65 处、PDWI 组检出 89 处，T1FLAIR 组 66 处、T2FLAIR 组 68 处、STIR 组 76 处、PSIR 组 81 处、PSIR Vessel 组 91 处、DIR GM 组 89 处、DIR WM 组 63 处。PDWI 组、PSIR 组、PSIR Vessel 组、DIR GM 组与常规组检出率差别有统计学意义。其中 5 例患者常规组为阴性，集成磁共振组检出病灶。结论：集成磁共振成像技术能分解为多种权重对比图像，各权重图像联合诊断可有效提升 MS 患者脊髓病灶的检出率，有利于临床的诊疗。

PO-0360

血管源性脑白质高信号患者临床特征和 认知相关的纤维束成像研究

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目的：血管源性脑白质高信号（white matter hyperintensity, WMH）是脑小血管病最常见的神经影像学表现，与全脑白质微结构完整性的破坏有关。在 WMH 患者中，常可见高血压、高龄、肥胖、认知功能下降等多种临床特征。然而，这些临床特征是否与大脑中断的白质纤维束连接相关联，还需要进一步的研究。因此，本研究基于全脑水平探索了与 WMH 相关的白质纤维束通路，目的是确定与 WMH 临床特征相关的最具代表性的神经通路。

方法：本研究共纳入 WMH 组患者 16 例，健康对照组 20 例。首先对所有被试进行临床及一般资料采集，包括总体认知评估如蒙特利尔认知评估，与 WMH 高度相关的临床因子如高血压评分、体重指数等，接着对所有被试使用相同的 MR 扫描方案采集弥散数据。对采集获得的数据通过 DSI studio 软件首先进行连接分析，得到患者组全脑连接受损的白质通路，由于大多数评分彼此高度相关，接着使用主成分分析以分离解释总体评分变异的主成分，并最后测定与每个主要成分相关的白质束特定通路。

结果：1、WMH 组与对照组在认知评分存在显著差异（双样本 t 检验， $P < 0.001$ ）；2、在主成分分析中，高血压评分、认知评分和体重指数可以解释 87.196% 的评分方差；3、胼胝体前压部、下纵束、胼胝体前部及小脑中脚与高血压评分显著相关（ $FDR = 0.04$ ）。胼胝体前压部、左侧丘脑顶束、下纵束及左侧小脑与 MoCA 评分显著相关（ $FDR = 0.01$ ）。胼胝体前压部、额枕下束、扣带束、穹窿/伞部与 BMI 显著相关（ $FDR < 0.01$ ）。

结论：研究结果表明 WMH 患者涉及全脑白质纤维束连接改变，高血压评分、认知评分和体重指数是 WMH 患者的重要临床特征，高血压程度和较高的体重指数与 WMH 患者的白质纤维束局部失连接相关，同时可能有助于我们理解 WMH 相关的认知障碍。

PO-0361

基于 fMRI 动态低频振幅应用于帕金森病辅助诊断研究

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目的：利用帕金森病 (PD) 患者和健康对照 (HCs) 全脑动态低频振幅 (dALFF)，实现对 PD 与 HCs 的分类，进一步探索 dALFF 与 PD 病程的关系。**方法：**24 名 PD 患者和 24 名 HCs 接受 3.0T BOLD-fMRI 检查。使用 DPARSF 软件对原始数据处理，并计算出 dALFF。将 dALFF 载入 PRoNTo 软件包对 PD 及 HCs 进行分类计算，采用分类精度、ROC 及 AUC 对分类结果进行评价。利用偏相关分析观察感兴趣脑区 dALFF 与病程的相关性。**结果：**全脑 dALFF 对 PD 与 HCs 的分类精度达 93.75% ($p = 0.0002$, 置换检验 5000 次)，分类权重最主要的脑区为双侧楔前叶、双侧小脑半球。其中，左侧楔前叶 dALFF 变异系数与病程呈正相关 ($p = 0.001$, $r = 0.645$)。**结论：**利用 dALFF 能够较为理想的区分 PD 和 HCs，为临床辅助诊断 PD 提供影像学参考。左侧楔前叶自发脑活动的动态变异程度反映 PD 患者疾病的进程。

PO-0362

基于多模态 MRI 的多任务学习用于脑胶质瘤分割和 IDH 基因分型预测余璇¹、吴亚平¹、白岩¹、魏焕焕¹、王梅云^{1,2}

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目的：尽管脑胶质瘤多模式标准化治疗已在临床实践中得到广泛应用，但不同基因表型的 HGG 标准化治疗效果差异很大。异柠檬酸脱氢酶 (IDH) 是脑胶质瘤基因分型的重要分子指标，对脑胶质瘤的个体化治疗和临床预后判断具有重要意义。脑胶质瘤的预后依赖于 IDH 的突变状态，准确预测 IDH 突变对于指导治疗和评估预后至关重要。本研究目标是提出一种完全自动化的多任务学习方法，结合卷积神经网络 (CNN)，从术前磁共振成像 (MR) 中进行肿瘤自动分割并预测脑胶质瘤的 IDH 状态。

方法：本研究回顾了 225 例来自河南省人民医院与 500 例来自癌症成像档案的脑胶质瘤术前 MR 图像，基于 T1、T1 增强、T2、液体衰减反转恢复图像和扩散加权成像序列，开发一个全自动模型，该模型包括用于肿瘤分割的 CNN 和用于 IDH 状态预测的基于 CNN 的分类器，结合肿瘤分割任务和 IDH 基因分型任务的相关性，提取两个任务间的共享全局特征表示，研究同时提出一种多任务损失函数，自适应分配两个任务的权重，优化模型训练。

结果：多任务学习网络取得了良好的性能，超越了单任务学习网络和其他先进的多任务学习模型，该模型通过五折交叉验证在分割任务中得到了 89.34% 的 Dice 系数结果，在 IDH 预测任务中得到了 90.65% 的 AUC 结果，敏感性和特异性分别为 92.07%、89.23%。

结论：本研究提出的全自动多任务学习模型展示了作为一种在不同数据集中高度可重复和可推广的工具用于非侵入性分割脑胶质瘤和预测 IDH 状态的潜力，研究发现该模型对 IDH 突变病例具有更好的敏感性。

PO-0363

基于 STAGE 序列探究帕金森病患者脑深部核团微结构的改变

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目的

探究帕金森病(PD)患者的 T1、质子密度和 T2*值的变化,分析 T1、质子密度和 T2*值的变化是否能反映帕金森病 的发生,探讨其是否有助于帕金森病的预防和诊断。

材料与方法

前瞻性收集 41 例帕金森病患者和 38 例健康志愿者。MRI 检查采用 CX Signa HDXT 3.0T 型磁共振扫描仪,颅脑 MRI 分期扫描。经后处理后获得 T1、质子密度和 T2*图。

这些核团包括尾状核(CN)、壳核(PUT)、苍白球(GP)、丘脑(THU)、红核(RN)、黑核(SN)和齿状核(DN)。代表这些结构的感兴趣区域(ROI)由两名研究人员使用 SPIN(Signal Processing in NMR, SpinTech, Inc., Bingham Farm, MI, United States)在 T1、质子密度和 T2*图上手动追踪。所有平均值均由该软件自动测量。所有数据均采用 SPSS20.0 软件进行统计分析,并对各组数据进行正态分布检验。符合正态分布的用均值±标准差表示,不符合正态分布的用中位数(上、下四分位数)表示。采用独立样本 t 检验或 Mann-Whitney U 检验(不符合正态分布)比较 PD 组与对照组双侧大脑半球 T1、质子密度和 T2*的平均值,并用独立样本 t 检验或 Mann-Whitney U 检验检验左右侧的差异。P 值<0.05 被认为具有统计学意义。

结果

PD 组 CN、GP、RN 的 T1 值和 CN、PUT、THU、RN 的质子密度值显著低于对照组,而 DN 的 T1 值高于对照组。(P<0.05)(表 4-5)。

同时,与对照组相比,SN 的 T2*值显著降低,THU 明显升高。(P<0.05)(表 6)。

HC 组右侧 THU、DN 的 T1 值和右侧 DN 的质子密度值均显著低于左侧。PD 组患侧与健侧的 T1 质子密度和 T2*值无明显差异。(P<0.05)(表 1-3)。

结论

T1 和质子密度图在检测脑深部核团微结构变化方面具有潜在的应用前景和应用价值。T1、质子密度和 T2*值的变化可能反映了脑深部核团的结构变化。

PO-0364

基于聚类探究特发性震颤临床异质性的脑结构与功能磁共振基础

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背景:特发性震颤(ET)是临床上最常见的运动障碍性疾病之一。其典型表现是以持续 3 年以上的孤立性上肢动作性震颤为特征,伴或不伴有其他部位的震颤等。目前越来越多的证据表明 ET 也常常合并有精神、睡眠、认知、自主神经功能障碍等非运动症状。关于 ET 的临床表型在不同的个体之间具有很大的可变性,提示 ET 具有显著的临床异质性,不同的 ET 临床亚型可能反映了不同的神经生物学基础。

目的:本研究旨在基于 ET 的运动及非运动临床特征,利用数据驱动聚类分析的方法揭示 ET 临床异质性,并结合 DTI 及静息态功能 MRI 数据探讨其背后的神经生物学基础。

方法:本研究纳入了 103 名 ET 患者,基于运动症状(头面声震颤、双上肢震颤、双下肢震颤)和非运动症状(认知、抑郁、焦虑、夜间睡眠、日间嗜睡、自主神经功能),利用 K-means 方法对 103 名 ET 患者进行聚类分析,并结合人口统计学来定义 ET 的不同临床亚型。后续以 AAL_116 模板利用 DTI 数据构建脑结构网络以及利用 3T 静息态功能 MRI 数据探究 ET 不同亚型背后的脑结构与功能基础,并与临床症状进行相关性分析。

结果: K-means 聚类分析定义了两种 ET 亚型: 66 名 ET 患者被分类为“ET 未合并非运动症状”亚型, 37 名 ET 患者被分类为“ET 合并非运动症状”亚型。加权结构网络中全局集聚系数、特征路径长度、全局效率以及局部效率未发现显著差异; 3T 静息态功能磁共振分析提示: 两组 ET 亚型在右侧基底节区 (Peak MNI:12,12,0) 脑局部功能一致性 (ReHo) 指标具有显著统计学差异。与“ET 未合并非运动症状”亚型相比, “ET 合并非运动症状”亚型 ReHo 值显著降低, 并且与非运动症状综合评分 (NCO) 及临床症状全局综合评分 (GCO) 均呈负相关。

结论: 本研究基于 ET 运动和非运动症状, 利用数据驱动探索性地发现了其两种临床亚型及背后潜在的脑结构与功能改变, 这对未来更好地理解 ET 临床异质性背后的神经生物学基础提供了影像学依据。

PO-0365

单纯椎管内硬膜外海绵状血管瘤的 MRI 表现特点分析

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目的: 归纳总结单纯椎管内硬膜外海绵状血管瘤的 MRI 表现特点, 以提高术前诊断的准确率。方法: 回顾性分析 7 例经手术及病理证实的单纯椎管内硬膜外海绵状血管瘤的临床及 MRI 资料。结果: 7 例椎管内单纯椎管内硬膜外海绵状血管瘤, 位于胸段 4 例、腰椎段 3 例。肿瘤出现区域分别为脊髓或硬膜囊背侧(n=4)、外侧(n=1)、背侧和外侧 (n=2), 均累计相应节段椎间孔, 分为双侧椎间孔扩大 (n=3) 和单侧椎间孔扩大 (n=4), 所有病灶对临近骨质未侵犯。在所有 7 例患者中, 海绵状血管瘤大部分呈分叶状, 其中 3 例呈“T”型征, 病灶在 T1WI 图像上呈等信号, 在 T2WI 图像上呈高信号, 增强后呈较均匀性明显强化, 内部可见线条状低强化区域。结论: 单纯硬膜外海绵状血管瘤在 MRI 表现有着较为典型的征象: 分叶状轮廓 (大部分病变呈“T”型征), 占据椎管后部或椎间孔等区域, 椎间孔受累较普遍, 脊髓或硬膜囊受压或包绕、半包绕; 病灶于 T1WI 呈等信号, 于 T2WI 序列呈高信号, 增强后病灶大部分呈明显均匀强化, 内部见线条状低强化区。MRI 对单纯硬脊膜外海绵状血管瘤的检出和诊断具有重要作用。

PO-0366

慢性单侧大脑中动脉重度狭窄-闭塞患者脑灌注与脑小血管病总负荷的相关性

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目的 探讨症状性慢性单侧大脑中动脉重度狭窄-闭塞患者脑灌注状态与脑小血管病总负荷的相关性。方法 回顾性搜集 2015 年至 2018 年就诊于解放军总医院第一医学中心的 100 例症状性单侧大脑中动脉重度狭窄-闭塞 (狭窄程度 $\geq 70\%$) 患者 (女性 32 例 (32%)), 所有患者接受了多模态 MRI 检查。按照颅内供血动脉供血区在 ASL 上对 MCA 区域脑血流量进行定量测量, 比较 MCA 供血区域患侧与健侧脑血流量差异, 并与不同的脑小血管病总负荷评分进行比较; 根据相对脑血流量的差异, 分析不同灌注程度与其脑小血管病总负荷之间差异。结果 在单侧大脑中动脉狭窄患者中, 患侧的 MCA 供血区的脑血流量明显低于健侧 (患侧 $47.01 \pm 13.95 \text{ ml}/(100\text{g}\cdot\text{min})$, 健侧 $52.62 \pm 10.95 \text{ ml}/(100\text{g}\cdot\text{min})$, $t = -5.101$, $p = 0.000$); 将脑小血管病总负荷分为两组 (0-2 分为轻中度组, 3-4 分为重度组), 两组之间的 MCA 供血区域患侧脑血流量存在显著统计学差异 (轻中度组 $48.68 \pm 14.19 \text{ ml}/(100\text{g}\cdot\text{min})$, 重度组 $42.49 \pm 12.43 \text{ ml}/(100\text{g}\cdot\text{min})$, $t = 1.998$, $p = 0.048$); 将大脑中动脉供血区

域按相对脑血流量系数分为低灌注、等和高灌注两组, CSVD 两组之间 MCA 区域灌注状态存在差异并有统计学意义 ($\chi^2=5.163$, $P=0.023$); 多变量回归分析显示, CSVD 中重度组与患侧 MCA 脑低灌注状态相关 ((adjusted odds ratio) [aOR], 0.338 (95% CI, 0.122-0.936)), 而在各影像标志物中较重的 PWMH 评分与患侧 MCA 脑低灌注状态相关 (aOR, 0.148 (95% CI, 0.024-0.596))。结论 在症状性慢性单侧大脑中动脉重度狭窄-闭塞的患者中, 患侧脑血流量的减低受到脑小血管病的影响, 随着脑小血管病总负荷评分越高, 患侧 MCA 脑血流量相应有所下降。

PO-0367

大脑中动脉狭窄与脑小血管病影像标志物的相关性研究

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目的 探讨单侧大脑中动脉 (MCA) 狭窄程度与脑小血管病 (CSVD) 总负荷及其影像标志物之间的相关性。方法 回顾性分析 2015 年至 2019 年就诊于解放军总医院第一医学中心并接受了多模态 MRI 检查的慢性单侧大脑中动脉狭窄患者。根据 MCA 狭窄程度将患者分为重度狭窄-闭塞 (狭窄程度 $\geq 70\%$) 和轻中度狭窄 (狭窄程度 $< 70\%$) 两组, 比较两组间 CSVD 总负荷评分以及 CSVD 影像标志物之间的差异。结果 共纳入患者 261 例, 其中轻中度狭窄有 159 例, 男性 117 (73.6%) 例, 平均年龄 58.5 ± 12.5 岁; 重度狭窄-闭塞患者 102 例, 男性 70 例 (68.6%), 平均年龄 55.2 ± 11.9 岁。轻中度狭窄患者 CSVD 总负荷评分为 1 (0, 2), 重度狭窄-闭塞 CSVD 总负荷评分为 1 (1, 3), 两者之间比较后存在统计学差异 ($P=0.043$); 两组各影像标志物评分后相比较, 半卵圆中心血管周围间隙 ($P<0.001$)、腔隙 ($P=0.001$) 在两组之间存在统计学差异; 二元 logistics 回归分析显示, CSVD 总负荷评分 ($OR=1.3$, 95%CI 1.047–1.613, $P=0.017$)、半卵圆中心血管周围间隙评分 ($OR=2.099$, 95%CI 1.54–2.86, $P<0.001$) 和腔隙 ($OR=2.609$, 95%CI 1.294–5.261, $P=0.007$) 与重度狭窄-闭塞相关。结论 大脑中动脉狭窄程度与 CSVD 总负荷相关, 重度狭窄-闭塞的患者可能会有较高 CSVD 总负荷、更多的半卵圆中心血管周围间隙和腔梗。

PO-0368

四脑室区常见占位性病变的影像诊断

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室管膜瘤 (WHO II-III 级) 儿童多见, 5 岁前及 30 岁左右是两个发病高峰。部位: 儿童好发生于第四脑室, 成人好发生于侧脑室三角区常成不规则分叶状, 多靠近下髓帆 (四脑室下 $1/2$), 常突破脑室前后壁浸润脑干及小脑蚓部, 也可经侧孔/中央孔向桥小脑角区、小脑延髓池方向生长, 具有见缝就钻、塑型生长的特点, 常伴有梗阻性脑积水。肿瘤内钙化、囊变、出血多见。影像: 长 T1、长 T2 信号, 弥散多无受限; 增强扫描实性部分明显强化, 有时会有脑脊液环绕肿块的征象, 可有脑水肿。

脉络丛乳头状瘤 (WHO I 级) 起源于脉络丛上皮, 少见的良性肿瘤, 生长缓慢, 儿童好发于侧脑室三角区, 成人好发生于四脑室桑葚状或菜花状。影像: 等及长 T1、等及稍长 T2 信号; DWI 多扩散不受限或稍受限, 增强明显强化。脉络丛乳头状瘤很少侵犯脑组织, 一般不引起脑水肿, 但常引起脑积水。脑脊液生成和吸收紊乱 (交通性脑积水), 主要为肿瘤大小与脑积水程度不成比例, 较小肿瘤往往引起较重的脑积水。肿瘤直接导致脑脊液循环通路阻塞 (梗阻性脑积水)。

髓母细胞瘤 (WHO IV 级) 高度恶性, 好发于儿童, 男性多见。90% 以上的儿童患者肿瘤位于小脑蚓部及四脑室顶, 向前呈填充四脑室改变 (成人多位于小脑半球), 呈类圆形或类椭圆形, 以实性

成分为主（肿瘤细胞密集、核浆比高）。肿瘤内钙化、囊变、出血少见。影像：信号多较均匀，呈长 T1、等及稍长 T2 信号，DWI 呈高信号，ADC 信号减低，增强扫描呈不均匀轻至中度强化肿瘤的上方或前方可见脑脊液残留，有瘤周水肿，四脑室及脑干易受压变形移位，引起幕上梗阻性脑积水。易经脑脊液广泛种植转移（脑膜异常增厚强化或小结节状强化）。

胆脂瘤（表皮样囊肿）非真性肿瘤性病变。好发于桥小脑角区、四脑室、鞍上。沿临近脑沟、裂、池钻缝样生长，包绕神经和血管。影像：长 T1、长 T2 信号，DWI 呈不均匀明显高信号，ADC 值低于脑脊液、高于脑白质，无脑组织水肿，增强扫描无明显强化。肿瘤的上方或前方可见脑脊液残留，有瘤周水肿，四脑室及脑干易受压变形移位，引起幕上梗阻性脑积水

PO-0369

肝豆状核变性患者的静息态脑功能磁共振研究

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目的：研究肝豆状核变性患者在脑功能活动方面的差异，探索静息态脑功能局部内在活动差异脑区与临床化验指标血清铜、铜蓝蛋白及 24h 尿铜的相关性。

方法：纳入 2021 年 1 月至 2022 年 12 月经神经内科收治的 44 例 WD 患者，和 32 例健康对照组。所有研究对象均进行了静息态功能磁共振成像（rs-fMRI）和三维结构相（T1-3D）采集。计算每个对象的低频振幅（ALFF）、低频振幅比值（fALFF）及局部一致性（ReHo），评估各脑区的功能活动的差异。检验患者的血清铜、铜蓝蛋白及 24h 尿铜水平。使用 Spearman 相关分析对差异脑区与临床化验指标进行相关性分析。

结果：WD 组在小脑后叶、右侧丘脑、左侧岛叶、右侧岛叶、右侧尾状核、右侧楔前叶、右侧辅助运动区 ALFF 值高于对照组（ $t=6.9561$ 、 4.5234 、 4.837 、 4.915 、 4.9927 、 5.801 、 4.1159 ， $p<0.05$ ），右侧眶部额中回及右侧背外侧额上回 ALFF 值低于对照组（ $t=-5.3877$ 、 -4.8392 ， $P<0.05$ ）。左侧楔前叶及右侧中央前回的 fALFF 值低于对照组（ $t=-5.2992$ 、 -4.2872 ， $p<0.05$ ）。右侧楔前叶 ReHo 值高于对照组（ $t=6.8114$ ， $p<0.05$ ），左侧梭状回、右侧枕中回、左侧中央后回及右侧中央后回 ReHo 值低于对照组（ $t=-4.4128$ 、 -4.8129 、 -5.9576 、 -5.5242 ， $p<0.05$ ）。右侧辅助运动区 ALFF 值与血清铜呈负相关（ $r=-0.313$ ， $p=0.036$ ），左侧楔前叶 fALFF 值与 24h 尿铜呈正相关（ $r=-0.312$ ， $p=0.037$ ），与铜蓝蛋白呈负相关（ $r=-0.398$ ， $P=0.007$ ），右侧中央后回 ReHo 值与铜蓝蛋白呈负相关（ $r=-0.297$ ， $P=0.048$ ），右侧枕中回 ReHo 值与血清铜呈负相关（ $r=-0.297$ ， $P=0.048$ ）。

结论：WD 患者多个脑区存在静息态内部功能活动水平的升高和降低，其中右侧辅助运动区、左侧楔前叶内在自发活动水平的改变及右侧中央后回、右侧枕中回的局部神经元活动一致性降低与血清铜、24h 尿铜及铜蓝蛋白等临床化验指标存在相关性。

PO-0370

影像标志物频率：脑出血后血肿扩大的新预测指标

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背景：血肿扩大 (Hematoma expansion, HE) 是脑出血 (Intracerebral hemorrhage, ICH) 患者致残的重要原因。本研究旨在确定影像标志物频率 (Frequency of imaging markers, FIM) 对 HE 的影响并评估其性能。

方法：2018 年 1 月至 2022 年 8 月期间，六个中心连续纳入了发病后 6 小时内的幕上 ICH 患者。我们将 FIM 定义为影像标志物数量与发病至初始成像时间之比。我们进行了多变量分析以确定 FIM 与 HE 之间的关系。受试者工作特征曲线用于确定可预测 HE 的 FIM 最佳阈值。此外，还计算了 FIM 的灵敏度、特异度、阳性和阴性预测值 (Positive and negative predictive values, PPV 和 NPV) 以及曲线下面积 (Area under the curve, AUC)。

结果：共有 1488 名 ICH 患者符合纳入条件，其中 418 人发生了 HE。多变量分析显示，年龄 (odds ratio [OR] = 0.98, 95% confidence interval [CI]: 0.97-0.99)、男性 (OR = 1.73, 95% CI: 1.28-2.35)、格拉斯哥昏迷量表评分 (OR = 0.87, 95% CI: 0.83-0.92)、脑室内出血 (OR = 0.42, 95% CI: 0.28-0.62) 和 FIM (OR = 7.82, 95% CI: 5.86-10.42) 是 HE 的独立预测因素。FIM 水平的最佳临界点为 0.63，其预测 HE 的灵敏度、特异度、PPV、NPV 和 AUC 值分别为 0.69、0.89、0.71、0.88 和 0.83。

结论：FIM 是预测 HE 的重要指标。它是治疗 HE 和改善 ICH 患者管理的一个强大且易于操作的工具。

PO-0371

环境因素对人脑白质纤维各向异性分数的影响

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目的：

作为弥散张量成像数据最常用的指标之一，各向异性分数 (fractional anisotropy, FA) 测量了脑内水分子在任何单一方向上的流动性，反映了白质的微观结构完整性，能刻画髓鞘形成、纤维密度和一致性等方面。白质 FA 值的减低常常与一些疾病密切相关。许多环境因素可以影响人脑形态结构，然而，环境因素是否影响人脑白质 FA 值及其具体的影响模式仍然未知。

方法：

基于 32535 名被试的环境数据，通过确定性因子分析，共构建了 7 个外环境因子，包括多重剥夺指数、地形、交通、绿地和海岸的可及性、街道网络可及性、空气污染、住宅噪声污染。在此基础上，还进一步纳入了 6 个个体环境因子，包括家庭总收入、户外活动时间、手机使用时长、烟草的暴露量、饮酒频率和饮食评分。在脑影像层面，共纳入了 32535 名被试的 48 条白质纤维的 FA 数据。我们将数据分为发现集 (22575 人) 和验证集 (9960 人)，并在发现集数据和验证集数据中单独分析，评估了每个环境因素与 FA 之间的相关性。将在发现集中显著的关联并在验证集中通过验证的结果定义为可靠的结果。将常见的混杂因素置为协变量，包括年龄、性别、中心。

结果：

在发现集中，共得到环境因素与 FA 之间存在 20 对显著相关，并全部在验证集中通过验证。分别是多重剥夺指数与双侧小脑上脚、双侧大脑脚及右侧内侧丘系的 FA 值呈显著负相关；家庭总收入与双侧小脑上脚、双侧大脑脚、双侧内侧丘系、双侧外囊及右侧上纵束的 FA 值呈显著正相关；饮酒

频率与双侧小脑上脚、双侧内侧丘系及右侧皮质脊髓束的 FA 值呈显著负相关；户外活动时间与左侧小脑上脚的 FA 值呈显著负相关。

结论:

研究结果表明, 环境对白质 FA 值可以造成显著的影响, 尤其体现在小脑上脚、大脑脚及内侧丘系。剥夺指数的增加、饮酒频率的增加及户外活动时长的增加会导致对应纤维 FA 值的下降, 家庭收入的增加则有利于白质的完整性。这些影响可以进一步影响人脑健康, 并可能与部分疾病的发生发展有关。这些发现有助于阐明环境对人类大脑的影响, 并为更好的生活方式、环境优化提供指导。

PO-0372

发育过程中脑类淋巴组织间液分区引流的形式及其机制研究

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目的: 应用磁示踪法探究大鼠发育过程中脑深部类淋巴组织间液 (interstitial fluid, ISF) 引流及脑细胞外间隙 (Extracellular space, ECS) 结构的变化规律, 证实脑深部分区引流的结构基础及影响因素, 阐明发育过程中分区稳态的建立过程并初步探索其对脑功能发育的重要意义。

方法: 本研究运用磁示踪技术及 DECS-mapping 技术解析了 10-80 天发育不同阶段雄性 SPF 级 SD 大鼠的脑 ECS 结构及 ISF 功能变化及脑深部分区稳态建立过程, 之后应用荧光分子探针和光学成像技术验证。应用免疫组化、荧光及光学成像、电镜, 以及活体 DTI 成像等技术探究该分区屏障的结构基础。进一步应用 Morris 水迷宫、三厢交互、肢体放置、斜板实验及抓力实验等行为学检测方法, 探究分区屏障建立前后认知、社交等脑功能发育的情况。

结果: 在大鼠出生后 40 天脑内 ISF 引流途径发生明显改变。在 10-30 天的鼠脑尾状核区 ISF 向皮层和丘脑双向引流, 在 40 天时, 向丘脑区的引流停止, 向皮层区的引流依然保持, 这种引流与成年大鼠 ISF 引流一致。尾状核 ECS 的容积占比在 30 天时与成年一致, 通过光镜和电镜证实, 致密髓鞘纤维束是构成引流屏障的结构基础。在分区屏障建立后, 大鼠认知、社交、运动功能发育完善, 与成年大鼠相比无统计学差异。

结论: 本研究明确了脑 ISF 分区引流形成的时间, 阐明了活体状态下不同发育阶段脑深部 ECS 结构及其内 ISF 引流特征。证实了髓鞘发育成熟, 鼠脑分区稳态建立, 此时鼠脑的认知、社交、运动及感觉功能均发育完善, 提示分区稳态建立是脑功能发育的重要结构基础。

PO-0373

基于度中心度和格兰杰因果分析对慢性下腰痛患者的脑网络有效连接变化研究

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【目的】 采用度中心度 (DC) 和格兰杰因果分析 (GCA) 方法研究慢性下腰痛 (CLBP) 患者脑功能网络有效连接变化。【方法】 纳入 21 名 CLBP 患者及 21 名年龄、性别、受教育程度相匹配的健康被试, 行静息态功能磁共振扫描, 选取组间 DC 值有统计差异的脑区为种子点进行全脑体素 GCA 分析, 计算有统计学差异的脑网络参数值, 分析各网络参数值与视觉模拟评分 (VAS)、Oswestry 功能障碍指数 (ODI) 相关性。【结果】 CLBP 组与对照组比较, VAS 及 ODI 评分差异有统计学意义 ($p < 0.05$); DC 组间分析结果显示, 与对照组比较, CLBP 组右侧辅助运动区 DC 值降低 (GRF 校正, 体素水平 $p < 0.01$, 团块水平 $p < 0.05$, 双侧); GCA 组间分析结果显示,

CLBP 组右侧辅助运动区到全脑连接效应增强的脑区为左侧前扣带回, CLBP 组全脑到右侧辅助运动区连接效应减弱的脑区为右侧眶额皮层、左侧眶额皮层、左侧内侧额上回、左侧中扣带回、左侧颞中回 (GRF 校正, 体素水平 $p < 0.01$, 团块水平 $p < 0.05$, 双侧); 相关分析显示, 右侧右侧辅助运动区到左侧前扣带回的有效连接与 VAS、ODI 评分呈正相关, 余网络参数值与 VAS、ODI 评分呈负相关 ($p < 0.05$)。【结论】DC 反映了节点在整个大脑网络中的重要性, CLBP 患者右侧感觉运动区的 DC 值较健康组显著降低, 即这一脑区与其他脑区功能连接数量减低, 反映了 CLBP 患者存在运动执行及控制能力的损害。GCA 计算不同脑区网络之间的有效功能连接, CLBP 患者在涉及认知控制网络、疼痛网络、默认网络、突显网络等多个重要脑区间出现有效功能连接异常改变, 主要表现为左侧大脑半球为主的负性情绪/情感、疼痛调节网络的信息通路连接增强和认知控制网络信息通路连接减弱。且随着病情加重, 患者的负性情绪进一步加重, 认知控制能力进一步减退。这些结果为我们研究治疗 CLBP 的神经生理机制奠定了基础。

PO-0374

基于多参数 MRI 的机器学习检测原发性中枢神经系统淋巴瘤 BCL-6 过表达状态

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目的: 利用多参数磁共振机器学习技术检测原发性中枢神经系统淋巴瘤的 BCL-6 过表达状态

方法: 回顾性分析 2013 年 1 月至 2023 年 7 月在解放军总医院第一医学中心病理诊断为原发性中枢神经系统淋巴瘤 (Primary central nervous system lymphoma, PCNSL) 患者, 共纳入患者 65 例, 病灶 101 个。根据免疫组化信息, 将患者分为 BCL-6 过表达组 ($n_{\text{患者}}=40$, $n_{\text{病灶}}=72$) 与 BCL-6 非过表达组 ($n_{\text{患者}}=25$, $n_{\text{病灶}}=39$)。应用 ITK-SNAP 4.0 对术前 T2、T2Flair 及 ADC 图像进行感兴趣区勾画及特征的提取。通过 Python 代码调取 Pyradiomics 进行影像组学特征筛选, 每个序列提取 904 个特征。利用 t 检验与组内相关系数 (intraclass correlation coefficient, ICC) 筛选特征, 采用最小绝对收缩和选择算子对特征进行过滤。所有病例以 8: 2 随机分为训练组与测试组, 使用逻辑回归 (Logistic regression, LR)、支持向量机 (Support vector machine, SVM) 朴素贝叶斯 (Naive Bayes, NB)、近邻算法 (K-nearest Neighbor, KNN) 和多层感知器 (Multilayer Perceptron, MLP) 5 种分类器学习算法进行机器学习, 利用 AUC 值来评估影像序列联合分类器的检测性能, 获得最佳分类器。

结果: 基于影像组学的 30 个模型均可以不同程度的识别 BCL-6 过表达状态, 不同序列和分类器的组合可提高模型性能。多参数序列 (T2WI+T2Flair+ADC) 联合 SVM 机器学习的 AUC 最大, 在训练集与验证集检测 BCL-6 过表达分别为 0.945 (95%置信区间: 0.883-1.000) 及 0.865 (95%置信区间: 0.703-1.000), 准确率分别为 92.6%和 81.0%, 灵敏度分别为 98%和 92.7%, 特异度分别为 83.9%和 87.5%, 为最优机器学习模型。

结论: 多序列 MRI 图像的影像组学模型可无创检测 BCL-6 的过表达状态。

PO-0375

基于影像组学的多模态 MRI 成像技术在 脑胶质瘤基因分型中的应用

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目的: 探讨基于影像组学的多模态 MRI 成像技术在脑胶质瘤术前基因分型中的应用价值, 进而指导临床手术方案的制定以及对肿瘤患者预后疗效的评估。

方法: 收集我院 2021.10-2023.7 经手术病理证实的胶质瘤的患者 34 例, 所有患者均为新发肿瘤病例, 且术前未进行过放疗、化疗等治疗, 并根据最终病理结果将胶质瘤患者分为 IDH 基因突变阳性组 14 例和 IDH 基因突变阴性组 20 例; 所有患者均采集了多模态 MRI 序列 (T1WI、T2WI、T2-FLAIR 及 DWI、CE-T1WI), 使用 3D-Slicer 提取两组病人多模态磁共振各序列中的肿瘤病灶特征, 并用 Lasso 软件进行降维处理, 对降维后的特征再进行 logistic 多元回归相关性分析, 从而筛选出具有诊断价值且与胶质瘤 IDH 基因突变显著相关的影像组学特征, 最后运用受试者工作特征 (ROC) 曲线对特征参数的诊断效能进行分析。

结果: 在所有获得的影像组学特征中, CE-T1WI 序列提取特征中的 Gray Level Non-Uniformity Normalized (灰度非均匀归一化) 与胶质瘤 IDH 基因突变相关性最显著, 对胶质瘤的基因分型诊断效能最高, 其 ROC 的曲线下面积 (AUC) 为 0.898。

结论: 在多模态磁共振成像技术的基础上结合影像组学技术, 能够筛选出与胶质瘤的基因分型显著相关的影像组学特征, 其中 CE-T1WI 序列上筛选出的 Gray Level Non-Uniformity Normalized (灰度非均匀归一化) 参数对胶质瘤基因分型的诊断效能最高。

PO-0376

3D-ASL 联合 SWI 对急性缺血性脑卒中的长期预后评估价值

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目的: 对于急性脑梗死患者同时联合应用 ASL 和 SWI 成像技术, 对比分析其影像学表现, 探讨其能否为缺血性脑卒中诊断和预后评估提供新的见解, 最终提高对缺血性脑卒中患者的预后预测的准确性。**方法:** 纳入临床发病至接受 MRI 检查间隔 72h 内的急性脑梗死患者共 60 例, 所有患者采用 GE3.0T 磁共振成像系统行常规 MRI 序列 (T1WI、T2WI、DWI、FLAIR)、MRA、SWI 和 3D-ASL 检查。通过后处理得到 3D-ASL 伪彩图, 根据梗死核心区周围 3D-ASL 伪彩图上是否出现蛇形条状高信号, 将患者分为动脉传输伪影 (Arterial transit artifact, ATA) 阳性组和 ATA 阴性组; 通过 SWI 图观察梗死灶周围静脉显示情况, 将患者分为周围静脉增粗组和周围静脉正常组, 利用统计学分别计算与梗死面积、入院当日临床 NIHSS 评分及患者预后的相关性。3 个月后 mRS 评分为 0-2 分定义为预后良好, mRS 为 >2 分定义为预后较差。**结果:** 共 30 名患者预后情况较好 (mRS 评分 0-2 分), 30 名患者预后较差 (mRS 评分 >2 分)。出现 ATA 的患者共 19 名, 在预后较好的患者中出现 ATA 的患者为 15 名, ATA 阳性与预后较好有统计学意义 ($p < 0.05$), ATA 阳性与梗死灶面积及入院 NIHSS 评分无统计学意义 ($p > 0.05$)。未出现梗死周围静脉明显增粗的患者共 36 名, 预后较好的患者未出现周围静脉增粗的患者共 28 名, 未出现周围静脉增粗与预后较好有统计学意义 ($p < 0.05$), 与梗死灶面积及入院 NIHSS 评分无统计学意义 ($p > 0.05$)。同时有 ATA 阳性和梗死周围未出现周围静脉增粗的患者预后好于单独出现 ATA 阳性或单独出现梗死周围未出现周围静脉增粗的患者, 差异具有统计学意义 ($p < 0.05$)。**结论:** ASL 通过梗死核心周围区域血液灌注提示的信息, 能够真实客观呈现出血液动力学信息, SWI 能够显示梗死灶周围异常静脉, ASL 和

SWI 的联合,可以更好地评估侧支循环代偿建立状态以及缺血半暗带,对于了解急性脑卒中患者病情现状及长期预后评估提供客观依据,便于制定更加准确的治疗方案。

PO-0377

终末期肾病血液透析患者认知波动与静息态 MRI 脑损伤的相关性研究

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目的: 基于 rs-fMRI 的局部一致性 (ReHo) 方法探讨静息状态下终末期肾病 (end-stage renal disease, ESRD) 维持性血液透析 (maintenance hemodialysis, MHD) 患者透析后 1 小时、24 小时脑自发性活动变化及其与认知功能的相关性。方法: 对 21 例 MHD 患者透析后 1h、24h 和 21 例年龄、性别相匹配的健康志愿者 (HC) 采集 fMRI, 并对透析后 1h 及 HC 组行 MoCA 总体认知及多项专项认知功能测评、对透析后 24h 行 TMT_A、DST 专项认知功能测评, 并采集 MHD 患者透析后 1h 内生生化指标。采用 DPARSF 软件包计算 MHD 及 HC 组全脑 ReHo 统计图。采用独立样本 t 检验比较 MHD 与 HC 组的全脑 ReHo 值, 采用配对 t 检验比较 MHD 患者透析后 1h、24h 的全脑 ReHo 值, 提取 MHD 组具有显著差异脑区的 ReHo 值, 并与认知功能测试评分、生化指标行 Pearson 相关性分析, 以 $P < 0.05$ 为差异具有统计学意义。结果: MHD 患者透析后 1h、24h TMT_A 评分差异具有显著统计学意义 ($P < 0.001$)。与 HC 组比较, MHD 患者透析后 1h 左侧枕中回、右侧颞下回的 ReHo 值减低, 透析后 24h 右侧颞上回的 ReHo 值明显减低, 差异均具有显著统计学意义 ($P < 0.001$)。与 MHD 患者透析后 1h 比较, MHD 患者透析后 24h 右侧颞中回 ReHo 值升高, 差异具有统计学意义 ($P < 0.05$)。结论: ESRD 维持性血液透析患者在一个透析间期的不同时间段存在自发性脑活动的改变, 并伴认知功能的波动; 血液透析及透析后的继发反应可能是引起这些改变的主要因素。

PO-0378

深髓静脉评分与白质高信号负荷相关性研究

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目的: 探讨深部髓静脉 (DMV) 评分与白质高强度负荷 (WMH) 的相关性。

方法: 回顾性分析本院 130 例患者的临床及影像学资料, 分别在磁敏感图像上 (SWI) 和 FLAIR 图像上对 DMV 和基底节区高信号 Fazekas 评分 (PWMH)、深部脑白质高信号 Fazekas 评分 (DWMH) 进行评分, 应用 ITK-SNAP 软件对 WMH 进行体积测量, 分析 DMV 与 WMH Fazekas 评分和 WMH 体积的关系。

结果: 本研究共纳入 130 例患者, 平均年龄 60 ± 11 岁, 女性 61 例 (46.9%), 高血压 71 例 (54.6%), DMV 评分中位为 4 (1, 7), 平均 WMH 体积为 12.34 ± 12.54 ml。WMH 体积、PWMH 和 DWMH Fazekas 评分与年龄、DMVcore 相关 ($P < 0.05$), 高血压与 PWMH 和 DWMH Fazekas 评分相关 ($P < 0.05$), 但是与 WMH 体积无关 ($P > 0.05$)。多变量分析后, DMV 评分和年龄与 WMH 体积、PWMH 和 DWMH Fazekas 评分独立相关 ($P < 0.05$)。

结论: DMV 评分与 WMH 负担相关。

PO-0379

ADC 直方图分析和 ADC 直接测量法对 IDH1 突变型胶质瘤中 ATRX 基因突变的预测价值

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目的：应用表观弥散系数（ADC）直方图分析和 ADC 直接测量法预测成人异柠檬酸脱氢酶 1（IDH1）突变型胶质瘤中 α -地中海贫血/精神发育迟滞综合征 X 染色体相关蛋白（ATRX）基因突变的情况，并比较两种方法的诊断效能。

方法：本研究共纳入 71 例病理证实为弥漫性胶质瘤且 IDH1 基因分型为突变型的成人患者。他们均在我院行术前脑磁共振检查，获得 T1WI、T2WI、FLAIR 以及弥散加权成像（DWI）影像学数据。根据 ATRX 基因突变情况，30 例 IDH1 突变型胶质瘤患者被分为 ATRX 基因突变（IDH+/ATRX-）组，41 例被分为 ATRX 基因未突变（IDH+/ATRX+）组。参考 T2WI 和 FLAIR，在 ADC 图像上逐层勾画肿瘤实体成分的感兴趣区（ROI）来提取胶质瘤的全容积直方图参数。另外，将三个圆形 ROI 放置在 ADC 图肿瘤实体成分中视觉感知最低的部分，统计最小 ADC 值和平均 ADC 值。用受试者工作特征（ROC）曲线分析和曲线下面积（AUC）评价两种方法的诊断效能。

结果：IDH+/ATRX-组的 ADC 直方图参数中能量 ADC_{Energy} 、熵 $ADC_{Entropy}$ 、最大值 ADC_{Max} 、第十百分位数 ADC_{10th} 、第九十分位数 ADC_{90th} 、最大值 ADC_{Max} 、均值 ADC_{Mean} 、中值 ADC_{Median} 、四分位距 $ADC_{Interquartile\ Range}$ 、极差 ADC_{Range} 、平均绝对离差 ADC_{MAD} 、均方根 ADC_{RMS} 、方差 $ADC_{Variance}$ 以及直接测量法中的最小 ADC 值和平均 ADC 值均高于 IDH+/ATRX+组，差异具有统计学意义（ $P<0.05$ ）。ADC 直方图参数（ ADC_{90th} 、 ADC_{Energy} ）与直接测量法获得的平均 ADC 值相结合的 Logistic 回归模型对 IDH+/ATRX+和 IDH+/ATRX-的鉴别诊断效能最高（ $AUC=0.963$ ），灵敏度为 0.867，特异度为 0.976。

结论：ADC 直方图分析和 ADC 直接测量法对 IDH1 突变型胶质瘤中 ATRX 基因突变情况的预测具有潜在价值，两者结合的诊断效能更佳，有助于临床制定个性化诊疗方案。

PO-0380

颈内动脉迂曲与脑小血管病影像标志的关系研究

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目的：探讨颈内动脉迂曲与脑小血管病（cerebral small vessel disease, CSVD）影像标志及认知功能改变的相关性。

方法：前瞻性分析行头颈 MRA 检查发现颈内动脉迂曲指数（internal carotid tortuosity index, ICTI） ≥ 20 的 58 例 ICA 迂曲组患者，纳入同一时期 ICTI <20 且年龄、性别和受教育年限匹配的 59 例患者作为对照组。对所有受试者进行临床资料收集、认知功能评价及头颅 MRI 图像评价。对 CSVD 影像标志包括脑白质高信号（WMH）、扩大血管周围间隙（EPVS）及腔隙灶进行视觉评分，对 WMH 体积进行定量计算。比较 ICA 迂曲组与对照组间 WMH 体积、WMH 评分、EPVS 评分、腔隙灶及认知功能评分的差异。对 ICTI 与 WMH 体积、WMH 评分、EPVS 评分及 MoCA 量表评分进行相关性分析。依据 WMH 及 EPVS 严重程度不同，将 WMH 及 EPVS 分为 I 级、II 级。采用多因素 logistic 回归分析 II 级 WMH 和 II 级 EPVS 的独立危险因素。

结果：ICA 迂曲组侧脑室旁 WMH 体积（ $P=0.011$ ）及 WMH 总体积（ $P=0.011$ ）大于对照组，深部白质 WMH 体积在两组间无统计学差异（ $P=0.055$ ）。ICA 迂曲组 WMH 评分总分高于对照组（ $P=0.005$ ）。ICA 迂曲组基底节区 EPVS 评分（ $P=0.005$ ）及 EPVS 总分（ $P=0.008$ ）高于对照

组, 脑白质区 EPVS 评分在两组间无统计学差异 ($P=0.096$)。ICA 迂曲组 MoCA 量表评分低于对照组 ($P<0.001$), MMSE 量表评分在两组间无统计学差异 ($P=0.144$)。ICTI 与 WMH 体积 ($P=0.0035$)、WMH 评分 ($P<0.0001$) 及 EPVS 评分 ($P=0.0025$) 均呈正相关, ICTI 与 MoCA 量表评分呈负相关 ($P<0.0001$)。ICTI ($OR=2.068$, $P<0.001$; $OR=2.139$, $P<0.001$) 是 II 级 WMH 的独立危险因素。ICTI ($OR=1.806$, $P=0.002$) 是 II 级 EPVS 的独立危险因素。

结论: 颈内动脉迂曲度增加与脑白质高信号和扩大血管周围间隙的增多以及认知功能下降有关。

PO-0381

与认知功能障碍相关的脑小血管病患者异常神经血管耦合随访研究

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目的: 利用多模态磁共振成像技术, 研究与认知功能障碍相关的脑小血管病 (CSVD) 患者在 1-2 年的神经血管耦合 (NVC) 变化, 以纵向方式对 CSVD 患者发病机制进行表征, 为今后疾病的预防及治疗提供新思路。

方法: 分析在上海交通大学医学院附属仁济医院就诊的脑小血管病患者 42 例, 其中轻度认知障碍患者 (MCI) 22 例, 无认知障碍者 (NCI) 20 例。对所有受试者进行基线期和 1-2 年随访期共两次的神经心理学量表评估及静息态功能磁共振成像、三维伪连续性脉冲动脉自旋标记磁共振扫描。最终获得基线期和随访期的局部一致性 (ReHo) 及脑血流量 (CBF) 指标。通过 CBF-ReHo 相关系数评估全脑灰质、九个子网络模块以及局域脑区的神经血管耦合的变化。最后, 采用偏相关分析评估 NVC 改变与认知功能改变之间的关系, 控制性别、年龄和教育年限。

结果: 在 1-2 年随访期间, MCI 组腹侧注意力网络 (VEN) 和皮层下核团的神经血管耦合值显著降低, 默认模式网络 (DMN) 的神经血管耦合值异常升高。此外, NCI 患者颞上回、颞中回亚区的神经血管耦合值在随访期间显著降低, 且左侧颞上回亚区 NVC 的改变与整体认知表现的改变呈正相关。

结论: MCI 患者皮层下核团、VEN、DMN 的 NVC 仍处于随时间推移的进行性损伤过程中。MCI 患者的模块化 NVC 随着认知障碍的病程进展, 而相应的 NCI 变化不明显。此外, CSVD 患者 NVC 的改善可能有利于认知功能的改善。NVC 模式可被认为是监测 CSVD 中脑代谢、血流和神经环路变化等复杂病理的特异性和敏感性工具。CSVD 特定模块和局部 NVC 功能障碍与认知障碍的发展相关。结合 BOLD 和 ASL 方法, 对 CSVD 高危患者进行 NVC 特征分析可能有助于靶向药物和神经治疗的开发。

PO-0382

基于 NEPA 表观扩散系数值对高级别胶质瘤与孤立性脑转移瘤的鉴别价值

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摘要: 目的 探讨基于瘤周非强化区域 (NEPA) 表观扩散系数值对高级别胶质瘤与孤立性脑转移瘤的鉴别价值。方法 选取我院 2019 年 1 月至 2023 年 9 月期间收治的 48 例高级别胶质瘤及孤立性脑转移瘤患者资料进行回顾性分析, 分为胶质瘤组 (19 例) 和转移瘤组 (29 例), 所有患者治疗前均行 MRI 常规平扫、DWI 及增强检查。使用逻辑回归算法生成 meanADC_minADC 值联合参

数, 比较胶质瘤组与转移瘤组 meanADC 值、minADC 值及 meanADC_minADC 值组间差异, 通过受试者工作特征 (ROC) 曲线评价 meanADC 值、minADC 值及 meanADC_minADC 值对高级别胶质瘤与孤立性脑转移瘤的鉴别诊断价值, 采用 Delong 检验比较三种 ROC 曲线的诊断效能, 使用 Pearson 相关分析检验胶质瘤组与转移瘤组不同 ADC 值参数与瘤周距离的相关性。结果 胶质瘤组的 meanADC 值、minADC 值及 meanADC_minADC 值均小于转移瘤组 ($P<0.05$); meanADC 值、minADC 值及 meanADC_minADC 值鉴别高级别胶质瘤与孤立性脑转移瘤的 AUC 分别为 0.938、0.967 和 0.971, 当阈值取 $1.505\times 10^{-3}\text{mm}^2/\text{s}$ 、 $1.385\times 10^{-3}\text{mm}^2/\text{s}$ 和 0.568 时, 对应灵敏度和特异度分别为 96.6%和 84.2%、93.1%和 89.5%、89.7%和 94.7%, 三种 ROC 曲线的诊断效能无显著差异 ($P>0.05$); 胶质瘤组的 meanADC 值、minADC 值与瘤周距离呈正相关 ($r=0.336, P<0.05; r=0.476, P<0.01$), 转移瘤组的 ADC 值参数与瘤周距离不存在相关性 ($P<0.05$)。结论 瘤周非强化区域 meanADC 值、minADC 值及 meanADC_minADC 值在鉴别高级别胶质瘤与孤立性脑转移瘤中均表现出较好的诊断效能, 可为临床医生选择最佳治疗方案提供量化参考价值。

PO-0383

影像新型评分预测血管内再通成功的后循环卒中的预后

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摘要: 目的 探讨神经影像新评分在成功再通后急性椎基底动脉闭塞(VBAO)患者中的预后价值。方法 连续收集接受血管内治疗(EVT)并成功再通(改良的脑梗塞溶栓治疗(mTICI) 2b-3)的 VBAO 患者, 进行回顾性分析。基于基线 DWI 序列, 使用新型后循环评分(Novel-PC score)、急性卒中预后早期 CT 评分(pc-ASPECTS) 和脑干评分(BSS)分别评估后循环梗死情况。将 90 天改良 Rankin 量表评分(mRS)≤2 定义为良好结果。通过受试者工作特征(ROC)曲线分析来评估三种评分的预测价值。结果 共 83 例患者符合条件。功能独立组 (MRS≤2)与不良组之间 N-PCS 评分(中位数 [四分位数范围], 2[1-2]比 4[2-5]; $P<0.001$)有统计学意义。多因素 Logistic 回归分析显示, 年龄 (OR, 1.078; 95%CI, 1.02-1.14; $P=0.006$)、基线美国国立卫生研究院卒中评分 (NIHSS) (OR, 1.12; 95%CI, 1.04-1.20; $P=0.004$)和 Novel-PC score (OR, 2.65; 95%CI, 1.20-5.87; $P=0.016$)是预后良好的独立预后因素。结论 神经影像新评分可预测血管再通成功的 VBAO 患者预后。

PO-0384

基于 MEGA-PRESS 脉冲序列的白质高信号与执行功能相关性研究: 前扣带回皮层中 GABA 水平的中介作用

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目的

白质高信号(WMH)与认知功能领域, 特别是执行功能息息相关。大量研究表明颅脑灰质和白质具有密切关系, 皮层改变是导致 WMH 患者认知能力下降的中介因素。因此, 颅脑皮层对于 WMH 患者认知能力具有关键作用。 γ -氨基丁酸(GABA)作为中枢神经系统中重要的氨基酸神经递质,

对中枢神经系统的稳定至关重要。本研究旨在探讨 WMH 患者前扣带回皮层 (ACC)、后扣带回皮层 (PCC) 中的 GABA 水平,并探索其是否在 WMH 体积与执行功能间起到中介作用。

方法

本研究最终前瞻性纳入 87 名 WMH 患者,包括 46 名轻度和 41 名中-重度 WMH 患者。所有参与者均接受了神经心理学评估,并进行基于 MEGA-PRESS 序列的磁共振波谱扫描。对比了轻度、中-重度 WMH 患者两组间 ACC 和 PCC 内 GABA+/Cr、Glx/Cr 水平、全脑 WMH 体积以及执行认知领域的差异。采用偏相关分析探索 WMH 参与者中代谢物水平、全脑 WMH 体积和执行认知域的相关性。中介分析旨在进一步研究皮层内的 GABA 水平是否在 WMH 患者全脑 WMH 体积与执行功能间发挥中介作用。

结果

与轻度 WMH 患者相比,中-重度 WMH 患者的平均年龄较大 ($p=0.013$),执行功能差 ($p=0.004$),且中-重度 WMH 患者 ACC 中的 GABA+/Cr 低 ($p=0.034$)。在所有 WMH 患者中,全脑 WMH 体积与 ACC 中 GABA+/Cr 水平 ($r=-0.286$, $p=0.008$) 和执行功能 ($r=-0.397$, $p<0.001$) 呈负相关。两个感兴趣区域的 GABA+/Cr 与执行功能 (ACC, $r=0.342$, $p=0.001$; PCC, $r=0.241$, $p=0.027$) 存在显著正相关。此外,中介分析表明在 WMH 患者中,ACC 中的 GABA+/Cr 水平介导了全脑 WMH 体积与执行能力间的相关性 (间接效应 ab : effect= -0.020 , BootSE= 0.010 , 95% CI: -0.042 , -0.004)。

结论

ACC 中的 GABA+/Cr 水平在 WMH 患者执行功能中起关键作用,其可能成为 WMH 患者执行功能衰退发生和发展的保护因素或潜在靶点。

PO-0385

双能量 CT 对急性缺血性脑卒中血管内治疗术后梗死进展评估的价值

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目的 探讨双能量 CT (DECT) 在急性缺血性卒中(AIS)血管内治疗术后早期梗死进展评估中的临床应用价值,从而更好的指导临床后续治疗方案的选择和预后判断。

方法 连续收集 50 名 AIS 并接受血管内治疗的患者,于术后立即行 DECT 扫描,经后处理获得混合能量图(MIX),虚拟平扫图(VNC)及脑水肿图 (X-Map),经综合分析诊断,以术后 24~48h 随访 CT 平扫或磁共振 DWI 序列上急性梗死区域为标准进行对照,测量并计算 MIX、VNC 及 X-Map 序列上早期梗死区的平均组织密度及脑梗死对侧差异(CID),并采用 ROC 分析,计算最大约登指数用于截断分析各序列对早期梗死进展发现的敏感性、特异性;两名医师独立评估各序列与随访 CT 或 MRI DWI 序列 Aspect 评分一致性以及各序列主观梗死视觉对比度、图像噪声评分。

结果 与 MIX 和 VNC 相比, X-Map 图具有最低的平均梗死区密度 (X-Map: 21.95 ± 6.73 HU; VNC: 25.00 ± 3.90 HU; MIX: 30.83 ± 6.86 HU)、最高的 CID(X-Map: 13.21 ± 5.92 HU; VNC: 7.09 ± 3.24 HU; MIX: 3.05 ± 5.78 HU)和主观梗死视觉对比,但其图像噪声也最严重; X-Map 序列具有最高的梗死检出率 (AUC= 0.96 ; $p<0.01$), 敏感度为 93%和特异度为 88%,截断值 <30.5 Hu; 与随访 CT 或 MRI DWI 序列对照,两名医师对 VNC 上急性梗死区域 ASPECT 评分的 ICC 较 X-Map 和 MIX 更高 (0.88 vs 0.70 vs 0.20 ; 0.86 vs 0.72 vs 0.14)。

结论 利用双能量的 VNC 及 X-Map 序列可以较常规 CT 图像更好的评估急性缺血性卒中血管内治疗术后早期梗死的进展。

PO-0386

癫痫患者中胼胝体形态的改变

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目的：探讨癫痫患者中胼胝体的形态是否发生变化。

方法

参与者：45 例癫痫患者和 49 例人口统计学及合并症匹配的健康对照组。

MRI 场强/序列：3.0 T MR 扫描仪获取 3D T1-weighted

数据获取：计算正中矢状面胼胝体面积、周长、圆整度、长度及 Witelson 与 Hampel 方案各个亚分区的面积(Witelson 等人将胼胝体分为 7 个亚区，即 W1 = 嘴部，W2 = 膝部，W3 = 嘴体部，W4 = 前中体部，W5 = 后中体部，W6 = 峡部，W7 = 压部；Hampel 等人将 CC 划分为 5 个亚区，包括 H1 = 膝部，H2 = 前中体部，H3 = 后中体部，H4 = 峡部，H5 = 压部)。

统计检验：独立的两样本 T 检验、卡方检验、Mann-Whitney U 检验。p 值 < 0.05 认为有统计学意义。

结果：与对照组相比，癫痫患者胼胝体面积、圆整度、W1、W4、W5、W7、H1、H2、H3、H5 减少具有统计学意义，其中以 W4、H2 的差异最为显著；胼胝体周长、长度、W2、W3、W6、H4 的差异无统计学意义。

结论：相比于健康对照组，癫痫中胼胝体 W4、H2 面积的减少具有统计学意义。先前的文献提出胼胝体的完整性和大小与神经和精神疾病有关，如帕金森病、癫痫和精神分裂症，但目前的研究较少聚焦于癫痫中胼胝体的改变。在我们的初步研究中发现癫痫患者的胼胝体形态改变具有统计学意义，即胼胝体形态的改变也可能同样发生在癫痫病人中。未来的研究可以增加样本量以验证该结论并拓展研究，如癫痫患者中胼胝体的连接是否发生改变。

PO-0387

基于磁共振结构成像评价血管性认知障碍及其中医证型的相关性研究

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目的 分析基于体素形态学(Voxel Based Morphometry, VBM)指标与临床资料、中医证型之间的相关性，探究 VCI 患者的脑结构影像学特征及其规律。

方法 收集 2021 年 1 月-2022 年 12 月间我院诊断为 VCI 患者 217 例(男：111 例，女：106 例)。采用蒙特利尔认知量表对其认知障碍程度分级。根据中医辨证标准的证候分型主要分为瘀血阻络证、肾精亏虚证、肝肾阴虚证和痰浊阻窍证。分析认知障碍程度分级的脑结构影像学特点，并将结构影像学差异脑区与临床指标做相关性。进一步分析不同中医证候类型 VCI 患者的临床与结构影像特点。

结果 ①根据 MoCA 量表评分，将 217 患者分为轻、中、重三组。轻度组和中度组各 73 人，重度组 71 人。3 组颅脑总体积(TIV)、灰质总体积(GMV)差异均具有统计学意义($P < 0.05$)。3 组进行 TIV、GMV 的事后分析，并进行两两的对比，轻度组与重度组间 TIV、GMV 有显著性差异($P < 0.001$)；轻度组和中度组，以及中度组和重度组之间的 TIV 和 GMV 均无显著差异($P > 0.05$)。

②GMV 在轻度组与重度组差异脑区分布特点, 重度组为右颞下回、右颞中回, 右额中回、右额下回, 右海马、右补充运动区、左中央旁小叶脑灰质体积与轻度组相比明显缩小 ($P<0.001$)。将所有差异脑区的灰质体积与 MoCA 量表评分进行偏相关分析。患者脑灰质总体积、右海马区灰质体积、右额中回灰质体积、右补充运动区灰质体积与 MoCA 量表得分呈正相关 (P 值均匀 $P<0.001$)。

③中医证候分型无争议的患者包括瘀血阻络证、肾精亏虚证、肝肾阴虚证和痰浊阻窍证各 40 人。四种证候类型的 MoCA 评分之间差异有统计学意义 ($P<0.05$)。事后分析显示瘀血阻络证和肾精亏虚证、肝肾阴虚证、痰浊阻窍证之间的评分均有显著差异 ($P<0.05$)，而其余三种证候之间的 MoCA 评分差异没有统计学意义 ($P>0.05$)。

结论 ①右侧海马区、右侧额中回、右侧补充运动区在患者认知功能下降的过程中扮演潜在的神经标志物角色。

②不同证候类型的患者在实质性神经结构出现损害之前, 认知功能障碍已经出现差异。瘀血阻络证与轻度 VCI 的特点较为吻合。

PO-0388

静息态 fMRI 网络效率在 OSAHS 脑类淋巴系统与认知功能关联中的介导作用：一项 DTI-ALPS 研究

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目的：阻塞性睡眠呼吸暂停低通气综合征 (OSAHS) 是一种睡眠呼吸紊乱的疾病, 主要病因在于上呼吸道的部分或完全塌陷, 导致夜间睡眠期间出现间歇性低氧血症和再氧合现象。沿脑血管周围空间扩散张量图像分析 (DTI-ALPS) 能间接反映脑类淋巴系统功能受损情况。本研究旨在探索 OSAHS 中脑类淋巴系统功能的改变以及其对脑网络连通性的潜在影响。

方法：本研究共纳入了 20 名 OSAHS 患者和年龄、性别匹配的 18 名健康对照组 (HC)。所有被试均行 GE 3.0T 磁共振 DTI 和静息态 fMRI 检查, 并从 DTI 数据中计算 DTI-ALPS 指数, 从静息态 fMRI 数据计算脑网络属性指标。然后, 评估 OSAHS 患者和健康对照者之间 DTI-ALPS 指数和脑网络属性的差异, 并进行 DTI-ALPS 指数与临床特征之间的相关性分析。此外, 还探讨了脑网络效率在 OSAHS 患者脑类淋巴系统与认知功能关联中的介导作用。

结果：OSAHS 患者的 DTI-ALPS 指数显著低于正常对照 HC 组 (1.27828 vs. 1.49997, $p = 0.00024$)。线性回归分析表明, DTI-ALPS 指数独立影响认知功能 ($\beta = 0.396$, $p < 0.05$)。相关性分析结果显示, DTI-ALPS 指数与呼吸暂停低通气指数 (AHI) 呈负相关 ($r = -0.392$, $p = 0.041$), 与 MoCA 和 MMSE 量表评分正相关 ($p < 0.05$)。同时, 脑网络的全局效率 (Efficiency Global, Eg) 与 OSAHS 患者的 DTI-ALPS 指数正相关 ($r = 0.348$, $p = 0.039$)。此外, 中介效应分析显示, 全局效率 Eg 在脑类淋巴系统障碍对认知功能损害的影响中起到了部分中介作用 (间接效应为 7.03, 95%置信区间 3.98–10.76)。

结论：在 OSAHS 患者中, DTI-ALPS 指数降低, 表明 OSAHS 患者的脑类淋巴系统功能受损。脑类淋巴系统功能障碍可能通过干扰脑网络功能连接来影响 OSAHS 患者的认知功能, 同时也可能是 OSAHS 患者的潜在病理机制之一。DTI-ALPS 指数有望成为 OSAHS 的新兴影像标志物。

PO-0389

MRI 体素内非相干运动(IVIM)评价磁靶向引导骨髓间充质干细胞(BMSCs)治疗新生大鼠 HIBD 微血管密度(MVD)变化

孙闯

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Objective: This study aims to use IVIM to evaluate brain neovascularization in a rat HIBD model after BMSCs treatment. **Methods:** BMSCs were labeled with SPIO-PLL. SD rats were divided into five groups: sham operation group, HIBD group, SPIO-PLL labeled BMSCs group injected into the lateral ventricle, SPIO-PLL labeled BMSCs group injected into the rat tail vein, and magnetic guided BMSCs group injected into the lateral ventricle with SPIO-PLL labeled BMSCs group. MR IVIM was performed on rats in each group. **Results:** HIBD resulted in decreased perfusion fraction of IVIM, and BMSCs treatment could partially reverse the HIBD-induced decrease in perfusion fraction. HIBD resulted in a marked increase in MVD.

Conclusions: BMSCs can effectively enhance brain perfusion within one week after HIBD, which may prevent hypoxia-induced hyper-neovascularization.

PO-0390

基于 CT 灌注特征评估急性缺血性脑卒中患者静脉溶栓后出血转化的价值研究

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【摘要】 目的 探讨基于 CT 灌注特征评估急性缺血性脑卒中患者静脉溶栓后出血转化的价值。方法 回顾性分析 60 例静脉溶栓治疗的 AIS 患者临床及 CT 灌注特征, 根据随访结果分为出血转化组 (HT) 和无出血转化组 (non-HT)。对比 2 组患者临床资料和 CT 灌注参数, 脑血流量 (CBF)、脑血容量 (CBV)、对比剂平均通过时间 (MTT)、对比剂达峰时间 (TTP)、最大平均通过时间 (TMax) 和表面渗透性 (PS) 及其相对值的差异, 分析其与出血转化的相关性。结果 本组 60 例患者中, 发生出血转化 30 例, 未发生出血转化 30 例, 两组在性别、年龄、高血压、糖尿病、高胆固醇血症、发病至入院时间、梗塞部位供血区方面差异无统计学意义 ($P>0.05$)。出血组患者 PS、rPS 值较未出血组患者高, rCBV 较未出血组患者低, 差异有统计学意义 ($P<0.05$)。两组患者 CBF、rCBF、CBV、MTT、rMTT、TMax、rTMax、TTP、rTTP 差异无统计学意义 ($P>0.05$)。PS 与出血具有相关性 (相关系数 $r=0.360$, $P<0.05$), rPS 与出血具有显著相关性 (相关系数 $r=0.865$, $P<0.001$)。rCBV 与出血具有显著相关性 (相关系数 $r=-0.566$, $P<0.001$)。结论 头颅 CT 灌注成像中 PS 值可间接反映缺血性脑卒中患者脑梗死灶血脑屏障通透性, 评估静脉溶栓后出血转化风险具有一定价值。

PO-0391

双能量 CT 评估颈动脉支架最佳单能级研究

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目的 探讨双能量 CT (DECT) 观察颈动脉支架成形术 (CAS) 后支架内管腔的最佳单能级水平。

方法 回顾性分析 2018 年 1 月至 2022 年 12 月于上海交通大学医学院附属仁济医院在 DECT 上行颈部 CTA 检查的 40 例 CAS 术后随访患者的资料, 共 51 枚支架。重建常规 CT 图像和 40~190 keV (间隔 10 keV) 的 16 组虚拟单能量图像 (VMI+)。对各组图像质量进行客观和主观评估, 客观指标包括信噪比 (SNR)、对比噪声比 (CNR)、噪声 (N)。主观评估采用 5 级评分法。采用 Spearman 相关分析探索 SNR、CNR 与能级水平的相关性。组间分析采用 Kruskal-Wallis H 秩和检验, 组内两两比较采用 Dunn-Bonforoni 检验。采用 Friedman 检验比较各组图像质量主观评价的差异。结果 常规 CT 图像与 40~190 keV VMI+图像的 SNR、CNR 总体比较差异均有统计学意义 ($P<0.001$)。40~190 keV VMI+能级水平与 SNR、CNR 呈负相关 (SNR: $r=-0.763$, $P<0.001$; CNR: $r=-0.696$, $P<0.001$)。40 keV VMI+图像的 SNR 和 CNR 均优于常规组和 60~190 keV VMI+组 (P 均 <0.05)。40~50 keV VMI+的 SNR 和 CNR 优于常规组 (P 均 <0.001)。在噪声值比较中, 各组图像之间差异均具有统计学意义 ($P<0.001$), 40 keV VMI+的噪声与常规 CT 及各能级间有统计学差异 (P 均 <0.001), 40~50 keV VMI+的噪声高于常规组 (P 均 <0.05)。在主观评分比较中, 各组图像间差异具有统计学意义 ($P<0.001$)。40 keV VMI+评分高于 80~190 keV VMI+组 (P 均 <0.001), 常规组与 40~70 keV VMI+间无显著差异 (P 均 >0.05)。结论 双能量 CT 40 keV 单能级图像是观察 CAS 术后支架内管腔的最佳单能级水平。

PO-0392

肿瘤栖息弥散加权异质性量化预测胶质瘤预后的临床研究

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目的: 利用数据驱动聚类技术从 DWI 序列中识别出具有相似特征的灌注亚区, 并评估基于这些亚区的弥散异质性与胶质瘤患者预后的关系。

方法: 回顾性收集两家医院的 108 名胶质瘤患者接受了术前 MRI 检查, 分别被纳入研究队列和验证队列。我们采用 k 值为 2 ~ 32 的 k -means 聚类算法来识别一组具有相似灌注特征的体素。为了选择最优的聚类数量 (栖息地), 通过 100 次重复, 使用每个 k 值的平均 Calinski-Harabasz 分数和 Silhouette 系数对聚类结果进行评估。根据获得的栖息地的放射组学特征构建栖息地风险评分 (habitat risk score, HRS)。建立了 HRS, 临床, 联合栖息地和两种传统放射组学风险模型来预测患者无进展生存。使用每个风险评分的中位数截断值将患者分为低风险组和高风险组。

结果: 根据 Calinski-Harabasz 评分和 Silhouette 系数确定最优聚类数为 3 个。在栖息地 1 表现为弥散显著受限, 栖息地 2 表现出轻度受限, 而栖息地 3 表现出无明显受限。在复发的患者子区域中, 栖息地 1 最占优势(45%), 其次是栖息地 2(35%)和栖息地 3(20%)。根据该阈值将患者分为高危组 ($HRS \geq 1.6$) 和低危组 ($HRS < 1.6$), 低危组预后较好。较高的分级 ($p < 0.001$)、IDH 野生型 ($p < 0.001$) 与高风险相关。在验证队列中, 栖息地风险模型在不同风险模型中表现最好。

结论: 弥散异质性的分区量化是预测胶质瘤预后的有效方法, 不同分区与胶质瘤生物学行为密切相关, 栖息地的可视化可能有助于胶质瘤患者个性化决策。

PO-0393

基于影像组学整合模型预测帕金森病从正常认知到轻度认知功能下降

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目的: 本研究的目的是建立和验证一个影像组学整合模型与全脑磁共振成像 (MRI), 以预测帕金森无症候患者 (PD-NC) 可能进展为轻度认知障碍 (PD-MCI) 的高风险人群。

方法: 从 PPMI 数据库中分析了 183 例 PD-NC 患者, PPMI 数据库是一个多中心合作的 PD 开源数据库, 其中 50 例在 60 个月的随访期中进展为 PD-MCI 而归为进展组, 剩余 133 例归为非进展组。受试者被分为训练集 (n=129) 和测试集 (n=54)。对于每个患者, 基线 T1WI MRI 图像被自动分割为白质 (WM)、灰质 (GM) 和脑脊液 (CSF), 并从训练组中提取其影像学特征, 在降维之后使用逻辑回归建立影像组学特征。影像组学特征与 symptom1: Initial symptom (at diagnosis)-Resting Tremor 和蒙特利尔 (MoCA) 认知评估量表相结合, 用于构建联合模型。采用受试者工作特征 (ROC) 曲线和试验组数据分别评价模型的诊断准确性和可靠性。此外, 基于从 PD-NC 进展到 PD-MCI 的时间来评估该模型的临床预后功效。

结果: 逐步 Logistic 回归分析显示 symptom1、MoCA 量表和影像组学特征是 PD-NC 进展为 PD-MCI 的独立预测因子。根据其建成联合模型 ROC 曲线显示, 该模型在训练集和测试集的准确度分别为 0.82 和 0.79, 特异性值分别为 0.766 和 0.846, 灵敏度分别为 0.743 和 0.733。依据联合模型在训练组、测试组和全队列组中分类的低风险组和高风险组中的 MCI 进展人群数目均有统计学差异 ($P < 0.05$)。

结论: 基于全脑影像组学的整合模型能够准确识别和预测 PD-NC 患者中可能进展为 PD-MCI 的高危人群, 这可能为临床的筛查提供一种有效的工具。

PO-0394

脑白质疏松影响急性缺血性脑卒中病灶演变与临床结局

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研究目的: 探索脑小血管病 (CSVD) 对梗死病灶体积的影响, 并分析 CSVD、梗死体积及临床结局的关系。

研究方法: 回顾性大血管闭塞性急性缺血性脑卒中患者, 入院后立即行 CTP、CTA 检查, 5-7 天后行 MRI 检查。利用 CTP 获得基线梗死核心体积, 利用 CTA 评估侧支循环状态, 利用 MRI 评估 CSVD。基于 MRI 获得最终梗死体积, 并将梗死进展体积 (最终梗死体积减去基线梗死核心体积) 与基线梗死核心体积的比值大于 20% 定义为显著进展。随访 3 个月后的 mRS 评分, mRS ≤ 2 为预后良好。

研究结果: 研究纳入 362 (年龄: 71, [IQR]: 60-80) 例患者, 169 (46.7%) 例预后良好, 278 (76.8%) 例病灶显著进展

脑白质疏松与基线梗死核心体积 ($P=0.021$)、最终梗死体积 ($P<0.001$) 及梗死病灶进展体积 ($P<0.001$) 显著相关。脑白质疏松可以通过基线梗死核心体积间接影响病灶进展, 中介作用比例较小 (11.2%, $P<0.001$); 脑白质疏松可以通过梗死病灶进展体积间接影响最终梗死体积, 中介作用为 97.3% ($P<0.001$)。严重脑白质疏松 (OR 2.50, 95%CI 1.37- 4.68, $P=0.002$) 是病灶显著进展的独立危险因素。联合脑白质疏松总负担与临床资料构建梗死病灶显著进展预测模型 ($AUC=75.16\%$), 模型预测准确性显著高于无脑白质疏松的预测模型 ($AUC=71.13\%$)

($P=0.048$)。脑白质疏松可以通过最终梗死体积间接影响临床结局,中介作用为 51.0% ($P=0.04$)。

结论:重度脑白质疏松可以通过促进病灶进展间接扩大病灶范围,并进一步影响临床功能恢复。在预测病灶显著进展时,脑白质疏松可以显著提高预测准确性。

PO-0395

基于体素的形态学测量的非酒精性脂肪性肝病患者脑结构改变及其与认知功能的相关性分析

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目的:采用基于体素的形态学测量方法(VBM)检测非酒精性脂肪性肝病(NAFLD)患者脑灰质体积(GMV)的异常,并探讨其与认知功能之间的相关性。方法:对 74 例 NAFLD 患者和 62 例相匹配的健康被试(HC)行 3D-T1WI 结构像扫描、多维度认知量表(蒙特利尔认知评估[MoCA]、数字广度测试[DST]、连线测试[TMT])和医院焦虑抑郁情绪测量表(HAD)的评估。其中,NAFLD 患者均接受基于肝脏 MRI 扫描的质子密度脂肪分数(MRI-PDFF)和血液指标(包括空腹血糖,胰岛素抵抗、肝酶以及血脂水平)的测定。运用 DPABI 软件对结构像数据进行预处理后,采用 VBM 方法分析两组间 GMV 差异的脑区。对 NAFLD 组中差异脑区的 GMV 值与认知心理量表评分、MRI-PDFF 及血生化指标进行偏相关分析。结果:NAFLD 患者存在工作记忆、注意力、执行等认知功能的下降、伴有轻度焦虑抑郁症状以及肝功能、血糖和胰岛素功能的受损。与 HC 相比,NAFLD 患者存在双侧海马旁回/梭状回、双侧海马/苍白球、左侧颞中回、左侧中央后回、右侧辅助运动区及右侧小脑半球的 GMV 减低(GRF 校正,体素水平 $P<0.001$,团块水平 $P<0.05$)。未发现 NAFLD 患者存在 GMV 增高的脑区。在 NAFLD 组中,右侧梭状回的 GMV 值与腰臀比呈负相关,左侧海马旁回/梭状回的 GMV 值与 DST 得分呈正相关,双侧海马旁回/苍白球的 GMV 值与肝酶水平、甘油三酯水平呈负相关。结论:NAFLD 患者存在多个脑区灰质体积的萎缩。特别地,内侧颞叶的萎缩与 NAFLD 的认知功能障碍有关,并受患者肝功能损伤、血脂代谢紊乱的影响。

PO-0396

CSVD 相关认知障碍患者结构和功能网络的模块化分析

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目的 分析脑小血管病(CSVD)相关认知障碍患者的功能网络模块的连接改变和相应的结构基础。方法 收集我院门诊/住院 CSVD 病例,将 CSVD 病例分为认知正常组(CSVD-CN)和认知障碍组(CSVD-CI),又同期纳入了性别、年龄和教育程度相匹配的健康对照组(HC),利用 dpabi 软件将静息态功能磁共振进行预处理,利用 gretna 构建功能网络并进行标准化(fisher Z 转化),再 linux 系统利用 fs1 对弥散加权图像进行预处理,利用 PANDA 软件做概率性纤维追踪并构建结构网络,然后利用 gretna 软件对结构和功能连接进行模块化分析,模块化图谱参照 Brainnetome Atlas246 图谱,将大脑分为 7 大功能模块(视觉网络 VN、感觉运动网络 SMN、背侧注意网络 DAN、腹侧注意网络 VAN、边缘网络 LN、额顶网络 FPN、默认模式网络 DMN),比较三组的 7 大网络模块的结构的模块间和模块内连接改变差异,并与神经心理学量表做相关,得到 CSVD 相关认知障碍患者的功能网络模块连接改变,并找到其相应的结构基础。

结果 功能网络模块分析:CSVD-CN 组与 HC 组的功能模块分析无统计学差异;相对于 HC 组,CSVD-CI 组的 VN-FPN、DAN-LN 和 FPN-DMN 模块间的连接减低,SMN 和 VAN 模块内连接减

低,与认知功能相关;相对于 CSVD-CN 组,CSVD-CI 组 VN-FPN 的模块内连接增加,VAN 的模块内连接减低,与认知功能相关。

结构网络模块分析:相对于 HC 组,CSVD-CN 组在 VAN-FPN、VN-DMN 间的连接减少,VAN-FPN 模块间连接减少与患者的记忆功能成正相关,VN-DMN 模块间连接减少与视空间功能成正相关。相对于 HC 组,CSVD-CI 组在 DAN-LN 的模块间的连接增加,SMN、VAN 和 DMN 的模块内连接增加,与认知功能相关。相对于 CSVD-CN 组,CSVD-CI 组在 DAN-DMN 的模块间的连接增加,VN、VAN、FPN 和 DMN 的模块内连接增加,与认知功能相关。

结论 CSVD 相关认知障碍患者的功能网络的模块化连接改变有相应的结构基础,但并非完全一一对应。

PO-0397

男性亚急性期缺血性卒中患者脑类淋巴系统活性研究

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目的:本研究采用血管周围间隙扩散张量成像分析(diffusion tensor image analysis along the perivascular space, DTI-ALPS)的方法,评估运动功能障碍的缺血性卒中患者亚急性期脑类淋巴系统的活性,并探讨其与运动功能评分、皮质脊髓束完整性之间的关系。方法:招募 17 例我院 2021 年 1 月至 2022 年 11 月卒中中心收治的男性亚急性期缺血性卒中患者(卒中组,平均年龄 59.21 ± 9.92 岁)和 11 例男性健康成人(对照组,平均年龄 55.9 ± 7.21 岁)。卒中组均为左侧大脑半球皮质下发病灶。记录所有参与者的流行病学数据和临床量表资料,包括年龄、发病时间、Fugl-Meyer 评分等。所有参与者行颅脑 MRI 扫描,序列包括:DSI 和 T2 FLAIR 成像。计算侧脑室水平 DTI-ALPS 指数、同一层面皮质脊髓束(corticospinal tract, CST)各向异性分数(fractional anisotropy, FA)及轴向扩散系数(axial diffusivity, AD)。采用独立样本 t 检验比较两组间各指标差异。卒中组 DTI-ALPS 指数与 Fugl-Meyer 评分、CST 完整性间关系采用 Spearman 相关性分析。结果:男性卒中组患侧 DTI-ALPS 指数明显低于对照组同侧($P=0.001$)。男性卒中组患侧 DTI-ALPS 指数与运动功能评分($\rho=0.52$, $P=0.031$)、运动功能评分分级($\rho=0.53$, $P=0.028$)均呈正相关关系,且与健侧 CST 的 FA($R=-0.55$, $P=0.023$)、AD($R=-0.6$, $P=0.012$)呈负相关关系。结论:男性亚急性期缺血性卒中患者脑类淋巴系统功能受损,这些发现有助于进一步了解男性缺血性卒中的病理生理机制,并为缺血性卒中的替代治疗提供新的靶点。

PO-0398

夜班相关睡眠剥夺医生静息态 fMRI 局部一致性研究

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目的 应用静息态功能磁共振成像(resting state functional magnetic imaging, rs-fMRI)分析夜班相关睡眠剥夺医生大脑局部一致性变化的特征。

资料与方法 所有参与者均使用西门子 3.0 T (Prisma) 磁共振扫描仪及 64 通道头颈联合线圈进行扫描。所有参与者均配有泡沫垫和耳塞,以尽量减少扫描过程中的头部运动和噪音。静息态扫描期间要求所有参与者保持头部不动,睁开双眼,不想任何事情。Rs-fMRI 采用回波平面成像序列,共 600 个时间点,扫描参数:TR = 1000 ms, TE = 38 ms, 翻转角 = 52° , 视野(field of view, FOV) = 208×208 mm, 层厚 = 2 mm, 层数 = 72, 采集时间 = 610 s; 三维高分辨率 T1 结构像扫描参数如下:TR = 1540 ms, TE = 2.99 ms, 翻转角 = 9° , FOV = 224×224 mm, 层厚 = 1 mm, 层数

= 176, 采集时间 = 189 s。基于 Matlab R2021b 平台, 采用 DPABI V6.1 软件进行数据预处理并计算 ReHo。采用 DPABI 内置统计工具进行配对样本 t 检验, 分析夜班相关睡眠剥夺前后 ReHo 变化的脑区, 经 FDR 校正后 $P < 0.05$ 认为差异有统计学意义。

结果 夜班相关睡眠剥夺下 rs-fMRI 提示双侧小脑半球、右侧颞中回、距状回、左侧顶下小叶、楔前叶、中央前回等脑区局部一致性明显减弱; 双侧舌回、扣带回等脑区局部一致性明显增强。

讨论 静息态下夜班相关睡眠剥夺医生的大脑局部一致性存在特征性变化, 涉及认知和记忆相关的多个脑区, 可能为今后促进医生夜班相关睡眠剥夺后恢复的影像学靶点。

PO-0399

多序列深度学习合成头部 T1 增强图像

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目的:

多序列成像是磁共振成像的优势, 通过不同序列能够从不同方面反应病变的信息。对脑胶质瘤诊断时常增加扫描钆造影剂增强 T1 序列, 以便更好的进行级别诊断。在日常工作中, 患者初期可能由于特殊原因无法扫描 T1 序列, 例如过敏或者肾功能不全, 这种情况下, 如果能够基于合成增强后的序列将有助于诊断。直接通过增强前 T1 合成增强后 T1 效果不好, 我们相信, 利用多个序列信息将能更好的生成增强后的序列。

材料与方法:

本研究以无监督网络 DCLGAN 网络为基础网络。以 T1、T2 和 Flair 作为三个通道输入, T1 增强序列作为输出。基于对比学习和双重学习设置, 包含两个生成器和两个鉴别器。为了充分利用多序列 MRI 中的信息, 对生成器网络进行了改进: 1) 将注意力机制引入 ResNet 生成器, 通过对通道和空间重新调整并分配权重的方式使网络能够注意更细微的特征。2) 生成器的残差块采用空洞卷积, 在不增加参数量的情况下扩大感受野。基于 Patchwise 对比学习的图像生成, 采用噪声对比估计框架来最大化输入和输出的相应块之间的互信息。训练数据包括 402 例来自河南省人民医院脑胶质瘤磁共振数据, 预留 40 例作为测试集。选择有肿瘤的层面进行训练。对测试集结果, 由影像科医生采用 5 分制评价合成图像与实际增强图像的一致性, 采用 PSNR、SSIM、RMSE 评价客观一致性。

结果:

放射科医生对各个测试图像的一致性评分为 2.54 ± 0.51 , 还有待提高。客观结果 SNR 为 21.99, SSIM 为 0.87, RMSE 为 0.36。代表性结果如附件图 1 所示。

结论:

研究深度学习采用 T1、T2 和 Flair 图像, 可以合成钆增强 T1 图像, 能够为诊断提供辅助信息。本研究方法能为由于身体原因无法采集增强图像患者, 或者体检提示异常的患者提供合成的增强图像。

PO-0400

基于图论的方法研究不同病程耳鸣患者小世界功能网络拓扑属性的重组

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目的：耳鸣是一种复杂且涉及多因素的疾病，既往研究表明耳鸣的发生和发展不仅局限于听觉系统，还涉及到负责认知、注意等相关的脑区。耳鸣可根据病程分为新发耳鸣以及持续性耳鸣，我们的研究目的是研究耳鸣脑随着病程的延长，脑网络拓扑属性的改变。

材料与方法：我们采集了新发耳鸣组（ROT 组：30 例）、持续性耳鸣组（PT 组：30 例）及健康对照组（HC 组：30 例）rs-fMRI 数据以及临床数据，采用图论的方法研究三组被试脑功能网络拓扑属性的差异。首先利用 GRETNA 工具箱，使用 AAL 图谱将大脑划分为 90 个区域，并定义为大脑网络中的 90 个节点。然后提取每个节点的平均时间序列，并计算两个节点之间的皮尔逊相关系数。将这些相关系数连接矩阵定义为网络的边。稀疏度为 0.05-0.18，阈值区间为 0.01。最后对于每个稀疏度的大脑网络，我们计算了全局和节点网络指标、功能网络不同的模块的模块内及模块间连接，并进行三组之间比较，另外将以上指标与耳鸣临床数据进行相关性分析。

结果：我们的主要研究结果如下：（1）ROT 组相较于 PT 组在功能脑网络全局属性中，主要表现为特征路径长度的增大、聚类系数、小世界属性、网络局部效率的减低。（2）关于节点属性的指标，ROT 组及 PT 患者组较 HC 组左侧眶部额中回的度中心性减低。ROT 左侧中央后回的度中心性较 PT 以及 HC 组升高。其余几个节点，包括双侧嗅皮质、左侧尾状核、右侧豆状壳核的节点属性表现为度中心性的减低、以及节点效率及节点的局部效率减低。（3）功能脑网络的全局效率与耳鸣的频率相关，以及一些重要节点（包括双侧嗅皮质、左侧眶部额中回等）的部分节点属性与耳鸣的 VAS 评分、耳鸣导致的睡眠干扰、情绪等有相关关系。（4）改变的模块内和模块间连接主要发生在前额叶以及皮层下模块。

讨论：本研究结果表明耳鸣慢性化过程中存在脑功能网络的拓扑属性的变化，包括是新发耳鸣患者网络局部互连性及全局信息沟通能力的下降，一些重要节点功能的异常，包括左侧眶部额上回、左侧尾状核、双侧嗅皮质等。我们推测，耳鸣在新发耳鸣阶段会有全脑及部分节点连接属性的一些降低，而随着耳鸣病程的进展，大脑会逐步恢复或适应这些功能的重组。

PO-0401

2 型糖尿病患者脑功能连接梯度与认知功能相关性的研究

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目的

2 型糖尿病（T2DM）是我国糖尿病患者数最多的类型，由于长期暴露于高血糖和其他危险因素中，T2DM 患者可能在早期阶段就出现不同程度大脑功能和结构改变。但 T2DM 患者脑网络系统的空间分布及其之间的拓扑关系仍不清楚。本研究旨在利用梯度连接的方法，研究 T2DM 患者宏观网络功能层级结构变化及其与认知功能的关系。

方法

纳入 T2DM 患者 24 例及年龄、性别、受教育程度相匹配的健康对照 21 例，对 T2DM 患者进行 MMSE、MoCA 测试。所有被试均行静息态功能磁共振成像(rs-fMRI)扫描，采用非线性降维扩散图嵌入算法在 T2DM 患者和健康对照体素和网络水平上构建功能连接梯度，使用独立样本 T 检验比较两组受试者梯度值组间差异。提取有组间差异脑区和脑网络的梯度值与 T2DM 患者认知功能评分、病程、血糖浓度等临床变量进行偏相关分析（以年龄、性别、受教育程度作为协变量）。

结果

与对照组相比，T2DM 患者在不同体素和网络水平上的功能连接梯度改变。T2DM 患者第一梯度左、右侧中央沟盖、舌回、楔前叶及左侧楔叶的梯度值显著增高，左侧直回、右内侧额上回、角回、辅助运动区、额中回的梯度值显著降低(GRF 校正, $P < 0.05$)。第二梯度左侧中央前回、右侧中央旁小叶、中央前回的梯度值降低 (GRF 校正, $P < 0.05$)。T2DM 患者第一梯度视觉网络、感觉运动网络 (SMN)、背侧注意网络、腹侧注意网络(VAN)梯度值明显增加，在额顶网络(FPN)、默认网络的梯度值明显降低；第二梯度 SMN 的梯度值减低， FPN 的梯度值增高(FDR 校正, $P < 0.05$)。相

关分析发现,第一梯度左侧中央沟盖的梯度值变化与 MMSE 评分呈负相关($P=0.028$, $r=-0.479$),楔前叶/扣带回皮质的梯度值变化与病程呈负相关($P=0.027$, $r=-0.481$),VAN 的梯度值变化与 MMSE、MoCA 评分呈负相关($P=0.026$, 0.049 , $r=-0.484$, -0.435)。

结论

T2DM 患者的功能连接梯度存在改变并与认知功能和病程有关,增加了我们对 T2DM 患者宏观功能层级结构及病理生理学的理解,为 T2DM 患者脑功能改变提供客观影像依据。

PO-0402

质子磁共振波谱定量评估不同亚型的皮质发育畸形伴癫痫的代谢异质性

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目的:本研究旨在利用氢质子磁共振波谱(proton magnetic resonance spectroscopy, $^1\text{H-MRS}$)研究皮质发育畸形(malformations of cortical development, MCDs)的不同亚型可能存在神经代谢异常及代谢异质性。

方法:从 2018 年 8 月至 2021 年 11 月,在我院癫痫中心招募了 29 例 MCDs 伴癫痫的患者,其中 10 例患有灰质异位,10 例患有局灶性皮质发育不良,9 例患有多小脑回畸形,以及 25 例年龄和性别匹配的健康志愿者(对照组)。利用单体素 $^1\text{H-MRS}$ 点分辨波谱序列进行扫描,并采用 LCModel 软件进行后处理,获取 MCDs 患者的病灶区域和正常对侧区域(normal-appearing contralateral side, NACS)以及对照组的额叶区域代谢物的绝对浓度。然后分别对比 MCDs 患者组或各亚型的病灶侧和 NACS 侧与对照组额叶区域之间的各代谢物浓度的差异。

结果:MCDs 病灶区域相比 NACS 侧和对照组,氮乙酰天门冬氨酸浓度显著较低而肌醇浓度显著较高($P=0.002\sim 0.007$);MCDs 病灶相比对照组,胆碱和肌酸浓度显著较高($P=0.001\sim 0.016$)。此外,MCDs 组 NACS 的胆碱浓度高于对照组($P=0.015$)。在灰质异位的病灶区域,唯一的代谢改变是氮乙酰天门冬氨酸浓度降低(与对照组相比, $P=0.001$)。在局灶性皮质发育不良的病灶区域,代谢物浓度异常多于其他两种亚型,特别是与对照组或 NACS 相比,显示氮乙酰天门冬氨酸浓度降低而肌醇浓度增加($P=0.012\sim 0.042$)。在多小脑回畸形的病灶区域,肌酸(与对照组或 NACS 相比, $P=0.017\sim 0.021$)和谷氨酸/谷氨酰胺复合物(与 NACS 相比, $P=0.043$)浓度升高,而氮乙酰天门冬氨酸浓度正常。相关分析显示,MCDs 病变区域的肌酸浓度与癫痫发作频率呈正相关($r=0.411$, $P=0.027$)。

结论:基于 $^1\text{H-MRS}$,我们的研究结果表明 MCDs 的不同亚型之间存在不同的代谢特征,这可能与每个 MCDs 亚型病灶区域不同的细胞结构特性和功能有关。

PO-0403

癫痫伴偏头痛患者存在异常的脑代谢物改变

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目的：癫痫和偏头痛虽为两种独立的异质性疾病，但他们常常共同发生在同一患者中，两者在临床特征、发病诱因以及治疗方式等诸多方面存在一定的重叠和关联，表明两者之间的发病机制可能是相似的，因而容易共病，而共病会使疾病的诊断及治疗复杂化，影响患者的生活质量和预后，因此有必要研究癫痫共病偏头痛的发病机制，为临床预防及诊疗提供参考依据。本研究应用质子磁共振波谱探讨癫痫共病偏头痛患者在双侧背外侧前额叶的代谢变化，以期能从神经生化的角度理解两者的共病机制。

方法：2021 年 8 月至 2022 年 11 月，由华西医院癫痫中心的专业神经病学家诊断并连续纳入 24 例癫痫伴偏头痛患者、20 例癫痫不伴偏头痛患者以及 20 例年龄、性别及教育程度匹配的健康对照者进行研究，使用磁化制备快速梯度回波序列(MPRAGE)获得所有被试的高分辨率 T1 矢状位加权图像，再基于 T1 矢状位图重建出 T1 冠状位及轴位图，并在这三维视图上将感兴趣区定位在被试的双侧背外侧前额叶区域，再运用单体素点分辨光谱序列(PRESS)获得双侧背外侧前额叶的磁共振波谱数据，采用 LCModel 软件和 ANTs 高级归一化工具分别量化代谢物浓度和对代谢物浓度进行脑脊液校正。数据分析均采用 SPSS26.0 统计软件， $P<0.05$ 具有统计学意义。

结果：健康对照组和癫痫伴偏头痛组分别出现双侧背外侧前额叶的 NAA 和 Cho 水平的不对称，并都为左侧高于右侧；与对照组相比，在左侧背外侧前额叶中，癫痫伴偏头痛组和癫痫不伴偏头痛组均出现 NAA 水平的显著下降，且癫痫伴偏头痛组 NAA 浓度下降更多；在右侧背外侧前额叶中，癫痫伴偏头痛组较对照组 INS 显著减少；相关性分析显示，在癫痫伴偏头痛组中，右侧背外侧前额叶的 NAA 水平和双侧背外侧前额叶的 Cho 水平均与其偏头痛频率呈负相关。

结论：癫痫伴偏头痛患者在双侧背外侧前额叶中存在更多的代谢异常，表明其神经元及神经胶质细胞损伤、丢失更严重。这些发现从神经生物化学的角度揭示了癫痫与偏头痛共病的机制，并证实了双侧背外侧前额叶是可以反映癫痫与偏头痛共病患者脑代谢异常的重要脑区。

PO-0404

烟雾病患者联合血运重建术后脑网络中心度改变的静息态功能磁共振研究

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目的：

烟雾病 (moyamoya disease, MMD) 是一种病因不明的慢性血管性疾病，联合血运重建术 (combined revascularization surgery, CRS) 是目前普遍有效的治疗方式，可以改善烟雾病患者的脑血流和预后，然而 CRS 治疗与烟雾病患者脑网络变化之间的关系尚不清楚。本研究旨在探索 MMD 患者经过 CRS 治疗后脑网络的变化，并分析其与临床指标的关系。

方法：

本研究纳入南昌大学第一附属医院神经外科确诊的 MMD 患者 43 例，其中 23 例经过 CRS 治疗 (CRS 组)，20 例未经过 CRS 治疗 (non-CRS 组)，同时纳入 20 例健康对照者 (healthy controls, HCs) (HC 组)。所有被试均行静息态功能磁共振成像 (functional magnetic resonance imaging, fMRI) 扫描，此外，所有的 MMD 患者均进行了相关的临床检查。采用基于体素水平的度

中心度 (degree centrality, DC) 方法来评估全脑网络连接特征, 采用 ANOVA 方差分析比较三组间脑网络的差异, 并提取 MMD 患者差异脑区的 DC 值, 与各项临床指标进行相关性分析。

结果:

CRS 组与非 CRS 组烟雾病患者在默认模式网络(DMN)、中央执行网络(CEN)、显著性网络(SN)和双侧小脑的分布存在显著性差异。此外, 与非 CRS 组相比, CRS 组双侧小脑后叶的 DC 值升高。

(多重比较使用 GRF 校正, 簇水平 $p < 0.05$, 体素水平 $p < 0.005$)。相关性分析发现这些差异脑区的 DC 值与 MMSE、MoCA 和 AS 得分有显著的相关性。($p < 0.05$)

结论:

与未接受 CRS 治疗相比, 接受 CRS 治疗的 MMD 患者脑网络的损害会明显减轻, 且 CRS 治疗可以有效逆转 MMD 引起的双侧小脑后叶的功能网络损害, MMD 患者脑网络中心度的改变可为 CRS 治疗评估提供潜在的神经影像生物标志物。

PO-0405

中重度斑秃患者脑结构和功能磁共振成像初步研究

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背景:斑秃是一种由遗传和环境因素引起的自身免疫性疾病。目前尚无针对斑秃患者脑结构的研究。磁共振成像(MRI)技术可用于探讨斑秃患者脑结构的变化, 为了解斑秃的病理生理机制及其与社会心理因素的关系提供依据。

目的:利用磁共振成像技术(3DT1、BOLD)研究斑秃对中枢神经系统的影响, 探讨斑秃患者脑结构(全脑体积、灰质体积、白质体积、皮质厚度)以及脑功能的变化, 并分析这些结构变化与精神障碍(焦虑、抑郁、睡眠障碍)的关系。

方法:招募 2021 年 12 月至 2022 年 9 月来我科就诊的中重度斑秃患者 54 例, 健康对照 65 例。采用 HAMD、HAMA、PSQI 量表评估被试心理健康状况, 并对被试进行 3.0T-MRI 扫描。采用 t 检验比较斑秃患者组与健康对照组皮质厚度以及 ALFF 和 ReHo 的差异, 采用相关分析分析不同皮质厚度区域与 HAMA、HAMD、PSQI 评分的关系。

结果:1) 与健康对照组相比, 斑秃组患者 PSQI、HAMA、HAMD 评分均显著升高($P < 0.05$)。

2) 斑秃组右侧中央后回皮质厚度较薄($P < 0.01$), 右侧眶回和左侧颞上沟皮质厚度较厚($P < 0.001$)。

两组患者的全脑体积、灰质体积和白质体积均无显著差异。

3) 右侧眶回皮质厚度与 PSQI 评分呈正相关($r = 0.297$, $P = 0.029$), 右侧中央后回皮质厚度与 HAMA 评分呈正相关($r = 0.300$, $P = 0.029$), 左侧颞上沟皮质厚度与 HAMD 评分呈负相关($r = -0.302$, $P = 0.028$)。

4) ALFF 和 ReHo 结果: 斑秃患者双侧小脑均明显高于正常组 ($P < 0.001$)。

结论:本研究首次揭示中重度斑秃患者脑结构功能异常变化, 并可能与患者的焦虑、抑郁水平及睡眠质量受损有关。

PO-0406

基于血管周围间隙张量分析探究正常人脑双侧半球类淋巴系统与肠道短链脂肪酸之间的关系

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目的:通过血管周围间隙扩散张量 (DTI-ALPS) 指数探究正常人大脑双侧半球类淋巴系统功能与肠道短链脂肪酸之间的关系。

方法:招募 29 名健康志愿者纳入本研究, 采集所有被试的扩散磁共振图像, 通过 FSL 及 itk-snap 软件在双侧大脑半球侧脑室体部水平投射纤维及联合纤维上勾画 5.0mm 圆形感兴趣区, 测量感兴趣区内两种纤维在 X、Y、Z 轴方向上的扩散率, 并通过计算获得双侧大脑半球 DTI-ALPS 指数; 同时收集所有被试的粪便样本行短链脂肪酸检测, 对左右侧半球 ALPS 指数及相关纤维扩散率行配对样本 T 检验, 并将双侧半球 DTI-ALPS 指数、纤维扩散率与短链脂肪酸含量行 spearman 偏相关分析, $P<0.05$ 被认为具有统计学意义。

结果:左侧联合纤维在 Y 轴上的扩散率高于右侧联合纤维 ($P<0.05$)。右侧大脑 ALPS 指数与丙酸成正相关 ($r=0.44$, $P=0.022$)。右侧联合纤维 X 轴上的扩散率与丙酸成正相关 ($r=0.388$, $P=0.045$)。右侧投射纤维 y 轴上的扩散率与乙酸成正相关 ($r=0.569$, $P=0.002$)。与异丁酸及异戊酸成负相关 ($r=-0.458$, $P=0.016$; $r=-0.487$, $P=0.01$)。左侧联合纤维在 X 轴上的扩散率与丁酸成负相关 ($r=-0.39$, $P=0.045$)。

结论:健康中老年人淋巴系统功能及相关联合、投射纤维区域的扩散率与肠道短链脂肪酸之间存在联系。

PO-0407

基于顶点的形态学分析对帕金森病伴抑郁患者皮质下结构的形态改变及相关性研究

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目的:探讨皮质下灰质核团的形状在帕金森病 (PD) 伴抑郁患者中的改变特征及其与抑郁症状严重程度和临床资料的相关性。

材料与方法:本研究共招募了 40 名 PD 伴抑郁 (PDD) 患者, 26 名 PD 不伴抑郁 (PDND) 患者和 33 名健康对照组 (HC)。所有受试者行 3.0T MRI 头部扫描。使用 FMRIB 软件库的 FIRST 工具包进行基于顶点的形态学分析。将 15 个皮层下核团 (双侧伏隔核、尾状核、苍白球、丘脑、杏仁核、壳核和脑干) 进行自动分割。使用一般线性模型, 将年龄、性别及教育年限作为协变量, 利用 FSL 中的“Randomise”指令进行置换检验 (5000 次置换), 采用无阈值簇群增强方法对结果进行校正。提取具有显著差异区域的平均形变位移值用于后续偏相关分析, $P<0.05$ 表示有统计学意义。

结果:表 1 总结了人口统计学信息和临床数据。与 HC 组相比, PDD 组出现多个皮质下核团萎缩, 包括双侧海马 (左侧 $P=0.016$, 右侧 $P=0.043$)、双侧壳核 (左侧 $P<0.001$, 右侧 $P=0.001$)、双侧尾状核 (左侧 $P=0.019$, 右侧 $P=0.002$)、左侧伏隔核 ($P=0.013$)、右侧苍白球 ($P=0.002$)、右侧丘脑 ($P=0.028$)、右侧杏仁核 ($P=0.017$)。同时在双侧丘脑 (左侧 $P=0.024$, 右侧 $P=0.001$)、左侧壳核 ($P=0.01$)、右侧杏仁核 ($P=0.007$) 中发现局部膨胀区域。PDND 组与 HC 相比, 右侧壳核 ($P=0.015$)、右侧丘脑 ($P=0.016$) 局部萎缩, 同时在右侧丘脑 ($P=0.039$) 和右侧杏仁核 ($P=0.038$) 中存在小的膨胀区域。最后与 PDND 组相比, PDD 组中双侧丘脑 (左侧

$P=0.023$, 右侧 $P=0.04$) 存在广泛萎缩区域 (表 2-3, 图 1-2)。左侧伏隔核形状改变与汉密尔顿抑郁量表 (HAMD) 评分呈负相关 ($r=-0.377$, $P=0.021$), 右侧尾状核形状改变与病程呈负相关 ($r=-0.538$, $P=0.001$) (图 3)。

结论: 总之, PDD 患者出现多个皮质下核团表面形态萎缩, 同时也发现了部分核团存在局部膨胀区域。这些发现可能有助于进一步理解 PD 患者抑郁症状的潜在神经机制。

PO-0408

深度学习图像重建算法在急性缺血性脑卒中低剂量全脑 CT 灌注检查中的应用价值

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目的: 探讨深度学习图像重建 (DLIR) 算法对急性缺血性脑卒中 (AIS) 患者低剂量全脑 CT 灌注检查中图像质量和诊断参数的影响。

方法: 前瞻性纳入发病后 24 小时内接受头颅 CT 平扫和脑 CTP 检查的 AIS 患者, 所有患者随机分为两组, 两组除 CTP 扫描管电流不同外其余扫描条件均相同。CTP 扫描: 管电压 80kV, 管电流 150mA (常规剂量组 (CD)) / 100 mA (低剂量组 (LD))。根据之前研究, 采用 80% 自适应统计迭代算法 (ASIR-V80%) 重建 CD 组 CTP 图像并命名为 A 组, 采用 ASIR-V80%、DLIR-M 和 DLIR-H 算法重建 LD 组图像并分别命名为 B-D 组。记录并比较两组患者包括性别、年龄、身高、体重、发病时间、入院时 NIHSS 评分和潜在疾病等在内的临床特征, 同时对四组重建图像的主客观图像质量、灌注参数 (包括 CBF、CBV、MTT、Tmax 和 TTP)、诊断性能和辐射剂量进行比较。

结果: 共纳入 94 名患者, CD 组 47 名, LD 组 48 名。CD 和 LD 方案的平均有效辐射剂量分别为 5.71 mSv 和 3.80 mSv, 存在统计学显著差异 ($P<0.001$)。在不同条件下扫描的两组患者的临床基线特征没有统计学显著差异 ($P>0.05$)。与 B 组和 C 组相比, A 组和 D 组的灰质 (GM) 和白质 (WM) 区域的 SD 值均降低, SNR 增加 ($P<0.05$)。总体客观质量从高到低依次为: D 组=A 组>B 组>C 组, 主观评分的结果与之相同。A 组和 D 组之间的所有灌注参数均无统计学差异。在 GM 区域, B 组的 CBV 值低于 A 组 ($P=0.017$), 而在 WM 区域, B 组和 C 组的 CBF 值高于 A 组, MTT 值低于 A 组 ($P<0.05$)。脑梗死最大直径测量值与标准复查测量值之间差值的绝对值也无统计学差异 ($P>0.05$)。

结论: 低管电流 CTP 扫描结合 DLIR-H 算法可以在不影响灌注参数 (包括 CBF 和 MTT) 的前提下提高图像质量, 减少 30% 的辐射剂量, 可将此算法常规应用于脑 CTP 检查中。

PO-0409

深度学习图像重建算法结合低管电流或低管电压扫描在脑灌注检查中的应用价值

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目的: 评估深度学习图像重建 (DLIR) 算法结合较低管电流或低管电压在全脑 CT 灌注 (CTP) 检查降低辐射剂量中的应用价值。

方法: 除 CTP 外其他扫描条件均相同, CTP 检查: 组 1: 80 kV, 150mA, 共 45 例患者 (60.04 ± 13.46 岁); 组 2: 80 kV, 100mA, 共 47 例 (62.85 ± 13.47 岁); 组 3: 70 kV, 150mA, 共 22 例 (59.21 ± 12.64 岁)。组 1 采用滤波反投影算法 (FBP)、自适应迭代算法 (ASIR-V40%/80%)、

DLIR-L/M/H 重建 CTP 数据 (A-F 组); 组 2 (G-H 组) 和组 3 (I-J 组) 用 ASIR-V80%和 DLIR-H 重建。比较健侧额、颞和顶叶灰质(GM)和白质(WM)的 CT 值、噪声值 (SD)、SNR 和 CNR 等客观参数。两名放射医师根据 Abels's 评分对灌注参数(CBF、CBV、Tmax、MTT 和 TTP)行主观评估。测量并比较相应的灌注参数值。

结果:

三种 CTP 扫描的辐射剂量分别为 5.70、3.81 和 3.83 mSv。组 1 中, 随 ASIR-V 和 DLIR 重建强度增加, SD 减小, SNR 和 CNR 升高。GM 和 WM 的变化趋势一致, 但 WM 的图像改善更显著。F 组的 SNR 和 CNR 最高。F、E 和 C 组的主观评分较高。五种灌注参数值不受算法影响。

组 2 和组 3 中, DLIR-H 组的 SD 值均低于 ASIR-V80%组, WM 区域 DLIR-H 组的 SNR 和 CNR 高于 ASIR-V80%组(组 G vs. 组 H, 组 I vs. 组 J, $P<0.05$), 在 GM 中无显著差异; DLIR-H 组的主观评分高于 ASIR-V80 %组(组 G vs. 组 H, 组 I vs. 组 J, $P<0.05$)。

组 2 和组 3 中 DLIR-H 组的客观和主观质量与组 1 的 ASIR-V80%组相当(组 C vs. 组 H vs. 组 J, $P>0.05$)。与其他组相比, G 组、I 组和 J 组的灌注参数值有显著差异, 尤其是 WM 区域的 MTT 减少和 CBF 增加, 其中 I 和 J 组的变化更显著。

结论: 低管电流 CTP 扫描结合 DLIR-H 算法可在不改变灌注参数值的前提下提高图像质量, 但将管电压降低到 70kV 会降低灌注参数准确性, 尤其是 MTT 和 CBF。

PO-0410

银屑病病患者合并认知损害的大脑活性改变: 一项前瞻性队列的横断面分析

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目的: 我们前期研究发现银屑病患者常合并认知损害, 然而, 在认知能力下降的银屑病患者中, 其内在大脑活性和认知功能方面的关联尚不清楚。本研究旨在评估银屑病患者大脑活性的改变及其与认知损害的关系。

方法: 本研究共纳入 222 名年龄在 18-70 岁的银屑病患者和 144 名年龄和性别匹配的健康对照 (HC)。所有受试者均接受了大脑静息状态功能性磁共振成像 (rs-fMRI) 和神经心理学测量。通过低频波动幅度 (ALFF) 和基于种子的功能连接 (FC) 来分析 rs fMRI 数据的内在大脑活动。进行了大脑活性与认知评估结果之间的相关性分析。

结果: 与 HCs 相比, 银屑病患者在连线测试、数字广度测试和 Stroop 测试 (SCWT) 中的认知表现较差 ($P<0.05$), 银屑病患者左额上回、左额中上回和右楔前回的 ALFF 降低; 以及左中央旁小叶的 ALFF 增强 ($P_{FWE}<0.05$)。四个大脑区域的 ALFF 改变与认知评估结果之间也存在显著相关性 ($P<0.05$)。此外, 银屑病患者四个 ALFF 改变的大脑区域 (种子) 与左前额叶回、左前扣带回、左顶叶上小叶、右楔前回、左顶叶下小叶、右角回和双侧颞下回等默认模式网络 (DMN) 区域 ($P_{FWE}<0.05$)。

结论: 研究结果表明, 银屑病患者表现出 ALFF 改变和 DMN-前额叶回路内关键大脑区域的超连通性。银屑病患者这些自发脑活动改变可能与认知缺陷的病理生理机制有关。

PO-0411

基于 MRI 全脑定量分析对中、老年 2 型糖尿病合并高血压、高血脂脑结构的研究

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目的 基于深度学习算法定量分析 T2DM 患者合并高血压、高血脂的脑结构变化,探讨年龄与合并高血压/高血脂或合并症之间对脑萎缩的影响。为患者的个性化治疗提供影像学依据,降低该类患者的脑结构损伤,提高患者的生活质量。

方法 回顾性收集 2021 年 11 月-2023 年 6 月于延安大学附属医院心脑血管病院诊断的 T2DM 患者 (259 例) 的临床及影像学资料。根据年龄将受试者分为 41-60 岁和 61-80 岁两组,再根据血压及血脂将被试者分为五个亚组,即单纯 T2DM 组、T2DM + 高血脂组、T2DM + 高血压组、T2DM + 高血脂 + 高血压组,使用 U-AI (上海联影医疗科技有限公司,人工智能全脑定量分析软件技术) 计算不同组别 (全脑、双侧灰质、双侧白质、双侧脑脊液、双侧杏仁体、双侧尾状核、双侧壳核、双侧苍白球及双侧丘脑) 等脑结构容积的基础数据,定量分析 T2DM 与其并发症之间相互作用对人类大脑皮层下灰质核团体积差异。

结果 各亚组间年龄、性别差异无统计学意义 ($P > 0.05$),与单纯 T2DM 组相比,41-60 年龄组之间全脑灰质 (左/右)、尾状核 (左/右) 体积有所减小 ($P < 0.05$)。61-80 年龄组之间全脑体积 (左/右)、全脑灰质 (左/右)、尾状核 (左/右)、海马 (左/右)、丘脑 (左/右) 体积有所减小 ($P < 0.05$)。

结论 糖尿病合并高血压、高血脂是全脑灰质的影响因素,全脑定量体积参数可定量反映 T2DM 患者脑结构的损害,为 T2DM 患者早期脑结构损害个性化治疗提供影像学依据。

PO-0412

基于 TRACULA 技术对焦虑障碍患者的脑白质研究

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目的

焦虑障碍是一类以过度担心,运动性不安为主要表现的精神疾病,主要表现在胼胝体、上纵束等白质纤维的异常。现有白质纤维束追踪技术依赖已有图谱获取 ROI,存在个体图像配准不准确的局限性。新兴的基于解剖结构的纤维追踪 (Tracts Constrained by Underlying Anatomy, TRACULA) 技术充分考虑了个体纤维束周围的解剖分割信息,追踪效果受纤维连接和纤维交叉的影响较小,完整重建白质纤维束的敏感性和可靠性均已得到验证。本研究首次采用 TRACULA 技术探究焦虑障碍患者白质结构完整性的改变,及其与临床症状的相关性。

方法

纳入性别和年龄相匹配的 32 名焦虑障碍患者 (包括广泛性焦虑障碍和惊恐障碍) 和 20 名健康对照 (HCs),采集 3D-T1 结构像和 DTI 图像,并采用 GAD-7、HAMA-14、HAMD-17 评估被试的临床症状。采用 TRACULA 技术提取全脑 42 条白质纤维的部分各向异性分数 (FA)、平均扩散率 (MD)、径向扩散率 (RD) 和轴向扩散系数 (AD) 的加权平均值。采用协方差分析对每条纤维束的弥散指标进行组间比较,并将焦虑障碍组的弥散指标与临床量表评分进行偏相关分析,统计学阈值设置为 $p < 0.05$ (FDR 校正)。

结果

与 HC 相比, 焦虑障碍组的胼胝体体部中央区 FA 降低, RD、MD 升高; 前运动区 AD、MD 升高; 颞叶区 MD 升高; 右侧背侧扣带束的 FA 降低; 双侧背侧扣带束的 RD、MD 升高; 右侧上纵束 I 的 RD、MD 升高; 右侧上纵束 III 的 AD 升高。相关分析结果未通过 FDR 校正。

结论

本研究采用 TRACULA 技术发现了焦虑障碍患者胼胝体、上纵束等白质纤维异常改变, 实现了纤维精细的亚区定位。胼胝体体部亚区微结构改变提示患者左右额叶后部和顶叶半球间的信息交流可能存在障碍; 上纵束 I、III 白质微结构改变提示患者额上回与顶上小叶, 额下回与顶叶下部间的运动、记忆和情感功能受损。

PO-0413

基于 MRI 的放射组学、深度学习评分和临床病理影像参数预测 垂体瘤复发的 nomogram 模型研究

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目的 本研究拟联合多序列 MRI 的放射组学评分、深度学习评分和临床-病理学的相关危险因素, 构建预测垂体腺瘤术后复发的模型。**方法** 回顾性分析了 2012 年 6 月至 2017 年 6 月 128 例确诊为垂体腺瘤患者的术前头颅 MRI 资料和临床病理资料。根据复发情况、随访到目前为止 (5-10 年), 分为垂体腺瘤复发组 (58 例) 和垂体腺瘤未复发组 (70 例)。使用 3D-slicer 软件对患者术前冠状位 T2WI、矢状位 T1WI 和对比增强 T1WI (CE-T1WI) 图像进行手动分割描绘肿瘤并提取放射组学和深度学习 (基于 ImageNet 数据集的预训练模型-微调方法, 详细见正文方法部分) 特征。降维分析后筛选出 6 个与复发相关放射组学特征、2 个深度学习特征。然后, 应用线性的 linear SVM、rbf-SVM、KNN、LR、RF 和 XGBoost 算法对筛选出的特征建立预测模型。根据受试者工作特性 (ROC) 曲线下的面积, 我们选择模型性能最佳、表现最优的线性支持向量机计算每个患者的复发概率并予以评分来构建 Radiomics score (R-score)、deep learning score (DL-score)。最后, 将 R-score、DL-score 和经过单变量和多变量分析筛选出的临床病理学及影像学的独立危险因素相结合, 建立 R-score 模型、DL-score 模型、临床病理模型、影像学模型单一模型及联合模型。采用受试者工作特性 (ROC) 曲线评估、校准曲线和决策曲线分析, 评价其临床应用价值。结果 Ki-67 和肿瘤最大直径是垂体腺瘤复发的独立预测因子。建立的六个机器学习模型性能中模型性能最佳的是 linear SVM。在最后建立的多元逻辑回归模型中, 联合 nomogram 模型则在训练集 (AUC=0.907, 95%CI: 0.843-0.972) 和测试集 (AUC=0.883, 95%CI: 0.769-0.998) 中表现出更好的预测性能。决策曲线也显示 nomogram 具有良好的临床应用价值。**结论** 联合 nomogram 模型在垂体腺瘤术后复发预测具有良好性能, 可能有助于预测个体化预后, 帮助临床进行个性化术前治疗决策和提前规划术后辅助治疗

PO-0414

磁共振 3D-T1 高分辨序列在矢状窦旁脑膜瘤术前 诊断中的应用价值

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目的: 本研究比较 PCMRV 与基于延迟增强 3D-T1MPRAGE (CE-3D T1MPRAGE) 的动态实景渲染 (Cinematic Volume Rendering Technique, cVRT) 成像结果, 探讨基于 CE-3D T1MPRAGE 的

cVRT 成像矢状窦旁脑膜瘤(parasagittal meningioma, PSM)术前评估中的应用价值。材料和方法: 基于延迟 CE-3D T1MPRAGE 对大脑静脉系统及 PSM 进行 cVRT 可视化处理。评估 PSM 引流静脉及侧支循环形成情况, 计算术前 Sindou 分类准确率。结果: 共纳入研究 108 例 (男/女=32/75), 年龄范围 30-72 岁 (50 ± 10 岁)。经手术证实: Sindou 分类 I 型 53 例, II 型 4 例, III 型 5 例, IV 型 9 例, V 型 16 例, VI 型 21 例; WHO I 级 83 例, II 级 24 例, III 级 1 例。cVRT 图像矢状窦旁脑膜瘤 Sindou 分类诊断正确率达 89.81%, PCMRV 显示了矢状窦闭塞或者不同程度的狭窄, 难以实现对窦壁的观察及 Sindou 分类。Ki-67LI、SSTR2 阳性率 (99.07%, 107/108) 和 PR 阳性率 (96.29%, 104/108) 在 Sindou 6 分类中两两级别之间差异无统计学差异。cVRT 图像在 PSM 瘤周静脉的可视率 (106/108, 98.14%) 较 PCMRV (80/108, 74.07%) 高, 差异有统计学意义 (McNemar's 检验, $P < 0.001$); 浅静脉吻合侧支的可视率, 于 cVRT (99/108, 91.67%) 与 PCMRV (85/108, 78.70%) 相比差异有统计学意义 (McNemar's 检验, $P = 0.02$); 深静脉侧支的 cVRT 可视率 (59/108, 54.362%) 较 PCMRV (92/108, 85.18%) 明显降低, 差异存在统计学差异 (McNemar's 检验, $P < 0.001$)。结论: 基于增强延迟 3D T1MPRAG 的 cVRT 图像可将不同的组织进行颜色标记, 达到更直观、逼真的效果, 能够实现较为准确的 PSM Sindou 分类及浅静脉侧支、吻合支的显示, 为手术提供更准确的参考。

PO-0415

应用腰骶神经根 DTI 检测 II 型糖尿病周围神经病

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目的: 应用 DTI 技术对 II 型糖尿病周围神经病 (DPN) 患者的腰骶神经根进行成像, 分析腰骶神经根 DTI 参数的变化, 并将 DTI 参数与临床资料和神经电生理结果进行相关性分析, 综合评价腰骶神经根 DTI 对 DPN 诊断的价值。

方法: 应用 3.0T MRI 设备对 32 例 II 型糖尿病 DPN 患者和 28 例 II 型糖尿病非 DPN 患者的 L4、L5 和 S1 神经根进行 DTI 成像。对 DTI 数据进行神经追踪, 生成神经根的纤维束成像伪彩图, 得到神经根的分数各向异性 (FA) 和表观扩散系数 (ADC) 值, 并在两组之间进行比较。使用 ROC 曲线分析腰骶神经根 DTI 参数的诊断效能。使用 Pearson 相关性分析 DTI 参数与临床资料和神经电生理之间的关系。 $P < 0.05$ 认为具有统计学差异。

结果: DPN 患者的 L4~S1 神经根 DTI 参数与糖尿病非 DPN 患者相比有统计学差异 ($p < 0.01$), 即 FA 值降低, ADC 值升高。在检测糖尿病患者有无 DPN 方面, L5 神经根的 FA 值表现出了最高的诊断效能 ($AUC = 0.774$, 敏感度=75.9%, 特异度=70.8%)。在诸多临床资料中, DTI 参数与空腹胰岛素水平的相关性最强, FA 值与空腹胰岛素水平呈正相关 ($r = 0.485$, $p = 0.001$), ADC 值与空腹胰岛素水平呈负相关 ($r = -0.460$, $p = 0.002$), 此外, FA 和空腹血糖 ($r = -0.282$, $p = 0.030$) 以及 ADC 和糖化血红蛋白 ($r = 0.283$, $p = 0.028$) 之间也表现出了弱相关性。在神经电生理结果中, FA 和 ADC 值均和电生理结果有相关性 (所有 $p < 0.05$), 其中 FA 和神经传导速度的相关性最强 ($r = 0.512$, $p < 0.001$)。

结论: DTI 可以对糖尿病周围神经病患者的神经根病变进行定量的评价。DTI 不仅可以检测出糖尿病患者是否发生了周围神经损伤, 还可以对周围神经损伤的程度进行定量描述, 并有潜力评价 DPN 治疗后神经改变。

PO-0416

成人散发型神经元核内包涵体病的多模态影像学研究

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目的

本研究拟基于体素分析的方法,应用扩散峰度成像技术对神经元核内包涵体病患者脑灰质及白质微观结构的改变及与认知功能障碍的关系做进一步研究,并基于独立成分分析探究成人散发型神经元核内包涵体病患者脑功能连接的改变,希望为此疾病的神经病理学机制及早期诊疗提供新的影像学视角。

方法

回顾性纳入 2019.5-2023.3 月间在山东大学齐鲁医院神经内科确诊为神经元核内包涵体病(neuronal intranuclear inclusion disease, NIID)的 11 例患者和同期年龄、性别、受教育程度匹配的健康对照 20 人,收集神经心理学结果及颅脑 DKI 和 rs-fMRI 数据。获得平均扩散峰度(mean kurtosis, MK)、平行扩散峰度(axial kurtosis, AK)、垂直扩散峰度(radial kurtosis, RK)、峰度各向异性(kurtosis anisotropy, KA)灰质参数及各向异性分数(fractional anisotropy, FA)和平均扩散率(mean diffusivity, MD)白质参数,对受试者临床资料、DKI 参数值进行统计学分析,分析 NIID 患者与健康对照差异有统计学意义脑区的 DKI 值与神经心理学评分的相关性。然后基于独立成分分析探究 NIID 患者脑网络功能连接的变化。

结果

与健康对照相比,NIID 患者脑灰质区丘脑的 MK、RK 值降低,右侧海马的 RK、KA 值降低;前扣带回、岛叶、楔前叶的 AK 值降低,舌回的 KA 值减低;脑白质区额叶、顶叶及部分颞叶区白质 FA 降低,MD 广泛升高,未累及枕叶部分(FWE 校正, $p < 0.05$)。NIID 患者右侧脑灰质海马区 KA 值与 MoCA 评分呈正相关($r = 0.650$, $P = 0.030$),其他感兴趣区 DKI 值与神经心理学结果无明显相关性。此外,NIID 患者较健康对照相比多个脑网络的网络内及网络间功能连接减弱。

结论

NIID 患者表现出多个脑区微观结构的改变,白质比灰质改变更广泛,并且存在多个脑网络的功能连接减低,这些变化可能有助于 NIID 的病理生理学的解释,并作为监测 NIID 严重程度和进展的潜在指标,对早期诊断有一定的临床价值。

PO-0417

DTI 联合 T2 mapping 多参数 MRI 成像定量
分析正中神经对腕管综合征的诊断价值

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目的:探讨弥散张量成像(DTI)衍生参数联合 T2 定量成像(T2 mapping)的 T2 值对腕管综合征(CTS)患者诊断价值。

方法:前瞻性收集了 33 例经神经电生理检查确诊的腕管综合征确诊患者及 32 例健康对照组,所有受试者均行常规磁共振扫描、DTI 及 T2 mapping 扫描后,测量正中神经在豌豆骨层面、钩状骨层面两个层面的截面积(长径 \times 短径, CSA)、扁平率(短径/长径, MNFR)、DTI 衍生参数包括部分各向异性分数(FA)、表观扩散系数(ADC)、轴向弥散系数(AD)及径向弥散系数(RD)与 T2 值。采用独立样本 t 检验比较两组各参数值差异。建立多参数检测模型的 Logistic 回归方程并采用受试者工作特征(ROC)曲线评价各指标单独及联合检测对 CTS 的诊断价值。

结果: 在单因素分析中 CTS 组和健康对照组在两个层面的截面积、FA 值、ADC 值、RD 值、T2 值差异均有统计学差异 (P 均 <0.05), 其中 FA 值降低, ADC 值、AD 值、RD 值、T2 值及 CSA 均高于对照组。然后进行多变量逐步 Logistic 回归分析中, FA (OR, <0.001 ; 95%CI, <0.001 -0.226)、AD (OR, 4.148; 95%CI, 2.491-6.908)、T2 (OR, 1.321; 95%CI, 1.048-1.664)、CSA (OR, 1.543; 95%CI, 1.052-2.263) 值可作为独立诊断因子 (P 均 <0.05), 均为豌豆骨层面。用于诊断 CTS 的豌豆骨层面 FA 值、AD 值、T2 值、CSA 及联合参数的 AUC 值分别为 0.737、0.701、0.747、0.761、0.922, 联合参数诊断 CTS 的敏感度、特异度分别为 75.8%、69.5%。

结论: 腕掌部正中神经的 DTI 及 T2 mapping 各指标联合参数能明显提高 CTS 的诊断价值, MRI 定量参数在无创检测 CTS 方面具有较高的应用价值

PO-0418

基于 MRI 影像组学驱动的神经网络模型的 胶质瘤术前分级预测研究

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研究背景及目的: 脑胶质瘤是成人最常见的原发性中枢神经系统恶性肿瘤。具有复发率高、致残率高、生存率低的特点, 是全球难治性肿瘤之一, 严重影响到人类的生命健康。胶质瘤术前精准病理分级对患者治疗方案的确定和预后评估至关重要。既往研究主要聚焦在胶质瘤的二分类(即高级别与低级别胶质瘤)。据我们所知, 目前尚未有基于磁共振成像(MRI)影像组学的人工神经网络(ANN)模型对胶质瘤术前四分类(即 I、II、III 和 IV 级)的研究。

材料和方法: 本研究共纳入 272 例病理确诊脑胶质瘤患者。基于患者手术前的对比增强 T1 加权图像提取影像组学特征, 再根据其 与胶质瘤病理分级的相关性进行特征筛选。将它们按 3:1 的比例分配到训练组和验证组, 最后建立了一个用于术前脑胶质瘤病理分级(四分类)的人工神经网络模型。我们采用诊断混淆矩阵来直观地展示模型的诊断性能。

结果: 在提取的 530 个影像组学特征中, 选择纳入前 19 个特征后人工神经网络预测模型的诊断性能趋于稳定。此时, 训练集和测试集的平均总体诊断准确率分别为 91.28% 和 87.04%, 相应的变异系数(CV)为 0.0190 和 0.0272。训练集对 I、II、III 和 IV 级脑胶质瘤的诊断准确率分别为 91.9%、89.9%、92.1% 和 90.7%, 验证集的诊断准确率分别为 88.7%、87.1%、86.5% 和 86.9%。

结论: 基于 MRI 影像组学特征的人工神经网络模型为术前精准预测胶质瘤分级(四分类)提供了一种无创方法, 具有良好的准确性和稳定性。

PO-0419

多模态 CT 水摄取率对急性缺血性卒中发病时间的预测

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目的 分析不同发病时间组急性缺血性卒中患者临床基线数据及水摄取率的差异, 并探讨水摄取率(NWU)与发病时间的相关性, 旨在通过水摄取率预测急性缺血性卒中患者的发病时间。

方法 回顾性收集延安大学附属医院 2020 年 3 月至 2022 年 12 月入院的急性前循环缺血性卒中患者 206 例。根据发病至成像时间(4.5 小时、6 小时)进行不同分组, 采用独立样本 t 检验及 Mann-Whitney U 检验比较一般资料及水摄取率的差异; 使用 Pearson 或 Spearman 相关性分析水摄取率与发病时间的相关性。均以 $P < 0.05$ 时, 认为差异有统计学意义。

结果 本研究差异性分析显示,在纳入的 206 例患者中 79 人 (38.3%) 发病至成像时间在 4.5 小时内,127 人 (61.7%) 发病至成像时间在 4.5 小时后;105 人 (50.9%) 发病至成像时间在 6 小时内,101 人 (49.1%) 发病至成像时间在 6 小时后。不同分组之间性别、年龄、BMI、高血压、糖尿病、高脂血症、房颤、收缩压、舒张压、入院 NIHSS 评分、吸烟史及饮酒史差异无统计学意义 ($P>0.05$)。发病 4.5 小时内比发病 4.5 小时后的摄水率更低;发病 6 小时内比发病 6 小时后的摄水率更低。不同组别的差异均有统计学意义 ($P<0.05$)。相关性分析显示,水摄取率与发病时间呈中度正相关 ($r=0.674$, $P<0.01$)。

结论 急性缺血性卒中患者的发病时间对水摄取率有影响,并且两者呈中度正相关。因此,根据水摄取率可预测急性缺血性卒中患者的发病时间,这为急性缺血性卒中初诊患者的危险分层及诊疗提供了重要作用。

PO-0420

脊髓小脑共济失调 3 型脑白质结构运动网络改变的研究

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目的:探讨脊髓小脑共济失调 3 型在临床前期和共济失调期的脑白质结构运动网络变化,及其与疾病严重程度之间的关系。

材料与方法:纳入 20 例临床前期患者,20 例共济失调期患者与 20 例年龄和性别匹配的健康对照组 (HC)。使用 SARA 和 ICARS 量表评估疾病严重程度。受试者在 3.0T 磁共振上接受扩散磁共振成像扫描,并使用概率性纤维追踪构建脑白质结构运动网络。使用图论和基于网络的统计 (NBS) 在全局、边和节点水平对运动网络进行分析。此外,评估网络拓扑属性和病程、疾病严重程度之间的相关性。

结果:与 HC 组相比,临床前期患者的运动网络的同配性增加。与 HC 组比较,共济失调期患者的运动网络的同配性增加,但全局效率、全局强度和传递性降低。与临床前期患者相比,共济失调期患者的全局效率和全局强度都有明显的下降。与 HC 组比较,NBS 分析发现临床前期患者运动网络中结构连接被破坏的子网络,包括 11 个节点的 12 条边。相对于临床前期患者,发现共济失调期患者运动网络连接脑区之间的结构连接降低的子网路,涉及 22 个边和 16 个节点。相对于 HC 组,NBS 分析共济失调期患者运动网络中结构连接减低的子网络包括 38 个节点和 242 个边。与 HC 相比,临床前期患者的运动网络中存在 5 个脑区的节点强度明显降低,包括左侧壳核、右侧腹侧间脑、左侧小脑 I_IV 区、双侧小脑 V 区。与临床前期或 HC 相比,在共济失调期患者观察到运动网络内 44 个脑区的节点强度明显降低,主要包括双侧中央前回、基底节、丘脑和小脑部分区域。此外在共济失调期患者中观察到运动网络的传递性与 SARA 和 ICARS 评分之间存在负相关。

结论:脊髓小脑共济失调 3 型的脑白质结构运动网络的变化早于共济失调症状的出现,并随着疾病从临床前期进展到共济失调期,运动网络受累范围增大。脑白质结构运动网络的全局拓扑属性有望成为反映疾病进展的客观生物标志物。本文研究为 SCA3 的疾病病理生理变化提供新的见解。

PO-0421

帕金森病患者日间过度嗜睡静息态脑功能局部一致性改变研究

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目的 探讨帕金森病伴日间过度嗜睡 (PD-EDS) 患者静息状态下脑功能局部一致性 (ReHo) 的改变。方法 收集 56 例 PD 患者以及年龄、性别、教育程度相匹配的 25 例健康对照者 (HC) 的静息

态功能磁共振 (rs-fMRI) 数据, 根据 Epworth 嗜睡量表评分 (ESS) 将 PD 患者分为 PD 伴日间过度嗜睡 (PD-EDS) 27 例及 PD 不伴日间过度嗜睡 (PD-nonEDS) 29 例。采用基于 MATLAB 的 DPABI 软件进行处理数据处理, 通过协方差分析 (ANCOVA) 和 Post-Hoc t 检验比较 ReHo 的组间差异, 并采用 Pearson 相关分析计算差异脑区 ReHo 值与 ESS 评分的相关性。结果 PD-EDS、PD-nonEDS 及 HC 组的 ReHo 值有显著性差异, 组间 Post-Hoc t 检验显示, 与 HC 组比较, PD-EDS 组的左侧颞上回、左侧苍白球、左侧尾状核 ReHo 值减低, 右侧角回、右侧额上回 ReHo 值升高 ($p < 0.05$, FDR 校正); 与 PD-nonEDS 组比较, PD-EDS 组的左侧颞上回 ReHo 值减低, 左侧丘脑、左侧枕中回 ReHo 值升高 ($p < 0.05$, FDR 校正)。Pearson 相关分析结果显示左侧颞上回的 ReHo 值与 ESS 评分呈负相关, 相关系数为 -0.45, $p < 0.05$ 。结论 PD-EDS 患者脑内 ReHo 异常的脑区包括了基底节区及背侧注意网络相关脑区, 提示 EDS 的发生可能与这些脑区功能活动局部一致性异常有关, 有助于进一步探知 PD 伴发 EDS 的神经病理机制。

PO-0422

首发精神分裂症患者小脑有效连接改变及其治疗后的长期变化

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背景: 小脑功能连接障碍在精神分裂症病理中起关键作用。然而, 小脑有效连接中断的细节尚不清楚。

方法: 本研究纳入 180 例首发未用药精神分裂症患者(其中 54 例在治疗一年后被重新评估)和 166 例健康对照。对所有被试的静息态功能磁共振进行格兰杰因果分析, 其中, 小脑的 9 个功能系统(感觉运动系统、听觉系统、视觉系统、默认模式系统、扣带-岛盖系统、额-顶系统、注意力系统、语言系统、多模式系统)被定义为种子点。基线时观察到的有效连接改变($q < 0.05$, FDR 校正)在随访时被进一步评估, 并与精神症状改变进行相关分析。

结果: 在首发未用药精神分裂症患者中, 我们发现从小脑到大脑的信息投射增加(即从小脑注意和扣带-岛盖系统到双侧角回, 从小脑扣带-岛盖系统到右侧额下回)。相比之下, 从大脑到小脑(即从右侧颞下回、左侧颞中回、左侧壳核和右侧角回到小脑语言系统)和小脑内(即从小脑扣带-岛盖系统到右侧小脑 Crus II)的信息投射减少。在随访一年时, 只有部分从大脑到小脑的信息投射得以恢复, 其中从左颞中回到小脑语言系统的信息投射的恢复程度与一般精神病理症状的改变呈正相关($r = 0.3$, $p = 0.04$, $n = 47$)。

结论: 本研究发现表明, 在精神分裂症急性期, 从大脑到小脑的信息投射减少可能是一种与症状和药物有关的状态依赖性改变, 而来自小脑的信息投射增加可能反映了一种持续的病理特征。

PO-0423

急性脑梗死患者脑铁沉积的定量磁敏感图初步研究

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目的 采用磁共振定量磁敏感图(quantitative susceptibility mapping, QSM)测量急性脑梗死患者梗死核心、缺血半暗带、大脑深部灰质核团的铁含量。

材料与方法 纳入 90 例急性脑梗死患者, 采用 GE 3.0 T MR 进行 QSM 和常规 MRI 检查。将原始图像进行处理后得到 QSM 图像, 分别测量梗死核心、缺血半暗带和对侧正常脑组织的磁敏感值, 病侧和对侧尾状核、壳核、苍白球及丘脑的磁敏感值, 采用配对样本 t 检验比较两侧脑组织及灰质核团间磁敏感值的差异。再根据血管病变的部位, 将纳入患者分为大脑中动脉梗死组、颈内动脉梗死组、大

脑前动脉梗死组、大脑后动脉梗死组、椎基底动脉梗死组,采用单因素方差分析比较五组患者梗死核心、缺血半暗带及病侧灰质核团间磁敏感值的差异。

结果 90 例受试者梗死核心、缺血半暗带磁敏感值较对侧差异有统计学意义($P<0.05$),病侧尾状核、壳核和苍白球磁敏感值较对侧差异有统计学意义($P<0.05$),丘脑两侧磁敏感值差异无统计学意义($P>0.05$)。上述五组各组间差异均无统计学意义(P 值均 >0.05)。

结论 应用 QSM 技术发现急性脑梗死患者梗死核心、缺血半暗带较对侧正常脑组织增高,病侧灰质核团铁含量较对侧增高,进一步加深对急性缺血性脑卒中病理生理过程的认识,从而为临床治疗和改善缺血性脑卒中预后提供指导。

PO-0424

两条并行的 MOp-CP-SNr 环路单向调节 PD 运动障碍的机制研究

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帕金森病 (PD) 是一种多发的神经退行性疾病,以运动功能障碍为主要症状。继发性神经环路异常是导致 PD 症状发展的重要原因,但其中的环路机制尚不清楚。研究表明学习、巩固新习得的运动技能以及运动的准备、规划和执行等不同阶段的发生均依赖运动皮层和纹状体的可塑性。先前的研究采用光遗传技术特定调控了帕金森疾病模型小鼠的运动皮层至 CP 投射环路,发现小鼠的运动能力得到改善,表明该环路对于运动相关的神经退行性疾病具有重要作用。我们前期的工作发现初级运动皮层 (MOp) 前外侧区和中间内侧区中端脑内投射神经元投射至尾壳核 (CP) 的轴突纤维分别位于背侧和腹侧区域,但这两条不同投射环路对于运动功能的调控是否存在差异尚不清楚。本研究采用病毒示踪、光遗传、化学遗传学与磁共振成像等前沿技术,证实了这两条并行的 MOp-CP 环路在运动中发挥不同的单向调节作用。黑质网状部 (SNr) 是 MOp→CP 神经元的主要投射区域之一,当损伤 MOp-CP 环路时,CP 投射环路活动不同程度增加,其中 CP→SNr 环路最为显著。本文进一步明确了 SNr 是 MOp→CP 神经元在运动中发挥作用的关键下游核团,揭示 MOp-CP-SNr 环路可能是介导 PD 发生的关键环路。本研究深入阐明了 PD 运动功能障碍的神经环路机制,为临床治疗 PD 提供环路连接基础和精准定位参考。

PO-0425

毛细胞型星形细胞瘤影像学表现及病理特征分析

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目的 本研究旨在探讨毛细胞星形细胞瘤的影像学、病理学特征,进一步提高该疾病的诊断和鉴别能力,并探讨其预后。方法 回顾性分析 29 例病理证实的毛细胞星形细胞瘤患者的临床、影像及病理资料并总结其特征。结果 29 例病灶可分为实性型、囊实型、完全囊性型。实性成分在 CT 中呈等密度,在 MRI 中 T1WI 稍低信号, T2WI 稍高信号, FLAIR 稍高信号,囊性部分在 CT 中呈低密度,在 MRI 中 T1WI 低信号, T2WI 高信号, FLAIR 大部分为稍高、高信号。瘤周水肿表现幕上 $>$ 鞍区 $>$ 小脑。增强扫描实性部分明显强化,其内小囊变坏死不强化,大囊壁可强化或不强化。组织学上由致密区 (主要是肿瘤细胞及细胞间的 Rosenthal 纤维构成) 和疏松区 (星形细胞及多极细胞的退变产生的囊液) 组成,常见 Rosenthal 纤维和嗜酸性颗粒小体。免疫组化染色显示, GFAP (22/26)、Olig-2 (26/26)、S-100 (26/26) 呈阳性表达, Ki-67 增殖指数低 (绝大数为 1%-15%)。结论 毛细胞星形细胞瘤在幕上 (好发鞍区) 及幕下具有一定的特征,成人幕上多见,儿

童和青少年幕下多见。影像学不易与其它低级别胶质瘤鉴别,可以结合 DWI 和 FLAIR 以及组织细胞学特点,可确诊该病。该病预后良好,如完整切除,则无须放化疗,只需要定期复查即可。

PO-0426

有氧运动对阈下抑郁人群静息态脑功能动态特征的影响

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目的:探讨基于脑功能动态分析差异脑区和阈下抑郁人群有氧运动干预效果的潜在关联性。

方法:纳入 44 例阈下抑郁受试者(阈下抑郁组)和 34 例健康受试者(对照组),两组均进行 8 周中等强度的有氧运动干预,并于干预前后采集静息态功能磁共振图像。采用滑动窗技术进行动态 fALFF (dynamic fALFF, dfALFF) 和动态功能连接 (dynamic functional connectivity, dFC) 分析。通过 Spearman 相关性分析考察阈下抑郁组有氧运动干预前后差异脑区 dfALFF 和 dFC 值与心理量表评分之间的相关性。

结果:基线期,与健康对照组相比,阈下抑郁组两侧舌回、左侧枕下回和左侧颞中回的 dfALFF 值显著降低;后扣带回和右侧枕下回、右侧缘上回的 dFC 显著增强,后扣带回和右侧后扣带回、左侧中央旁小叶的 dFC 显著减弱。8 周有氧运动干预后,与健康对照组相比,阈下抑郁组左侧颞上回、右侧颞中回、左侧丘脑和右侧背外侧额上回的 dfALFF 值显著增高;后扣带回和右侧舌回、左侧额中回和左侧颞上回的 dFC 值显著增强,后扣带回和右侧颞中回、右侧中间扣带回的 dFC 值显著减弱。阈下抑郁组有氧运动干预后,右侧颞下回、左侧内侧额上回、左侧楔前叶和两侧壳核的 dfALFF 值较基线期显著增高;后扣带回和左侧内侧额上回、左侧楔前叶的 dFC 值较基线期显著增强,后扣带回和左侧梭状回和左侧颞中回的 dFC 较基线期显著减弱。健康对照组有氧运动干预后,右侧颞上回的 dfALFF 值较基线期显著增高,右侧舌回、左侧枕下回的 dfALFF 值较基线期显著降低;后扣带回和两侧距状回、右侧额下回三角部及左侧楔前叶的 dFC 值显著增强,后扣带回和右侧内侧额上回和右侧额中回的 dFC 值显著减弱。阈下抑郁组在基线期左侧舌回的 dfALFF 值和 PHQ-9 和 SAS 评分均呈正相关 ($r=0.300$, $P=0.048$; $r=0.368$, $P=0.014$); 有氧运动干预后右侧颞下回的 dfALFF 值与 SAS 评分呈正相关 ($r=0.317$, $P=0.036$)。

结论:静息态脑功能的动态特征分析有助于阐明阈下抑郁人群有氧运动干预前后脑功能的瞬时动态特性,且敏感性更高。

PO-0427

CSVD 相关认知障碍患者默认网络格兰杰因果连接分析

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目的 探讨 CSVD 患者的默认网络的格兰杰因果连接改变与认知障碍的相关性

方法 搜集 CSVD 患者 119 例,其中 CSVD 认知正常者 (CSVD-CN) 62 例,CSVD 认知障碍 57 例,性别、年龄、教育程度相匹配的健康对照组 109 例,利用 dpabi 软件对静息态功能磁共振进行预处理,选取 DMN 的 4 个主要节点作为感兴趣区 (ROI),提取 4 个 ROI 的时间序列信号,构建一个 4 个节点之间的完全连接的 GCA 模型 (共 12 个连接)。然后利用基于残差的 GCA 分析方法计算每个脑区间的 GCA 关系,再利用 gretna 做组间比较。

结果 CSVD-CN 组相对于 HC 组, LIPC 到 PCC 的信息流动减少, mPFC 到 RIPC 和 PCC 到 RIPC 的信息流动增加; CSVD-CN 与 CSVD-CI 的组间 GCA 模型比较无统计学差异; CSVD-CI 组相对于 HC 组, LIPC 到 PCC 信息流动减少,且与认知相关。

结论 CSVD 患者 DMN 的信息流动的改变与认知障碍相关。

PO-0428

一体化 PET/MR 评估心衰患者左室心肌应变与脑结构改变的相关性研究

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目的 心衰患者多合并脑损伤，合并脑损伤患者预后不良，但机制尚不清楚。本研究应用一体化 PET/MR 探究心衰患者左室结构功能损伤、脑结构改变的影像学特征及其关系。

方法 纳入左室心肌梗死导致心衰患者 51 例，及年龄、性别与患者组相匹配的健康志愿者 37 例。患者组先行 $^{13}\text{N-NH}_3\text{-H}_2\text{O}$ 心肌灌注显像和 ^{18}F -脱氧葡萄糖 (FDG) 心脏 PET/MR 检查，随后立即行脑 MR 检查，对照组仅行脑 MR 检查。记录两组临床基本信息及蒙特利尔认知评估 (MoCA) 评分。应用后处理工作站对心脏 PET 和 MR 图像进行分析，计算心功能参数、心肌应变参数包括整体径向应变 (GRS)、整体周向应变 (GCS) 和整体纵向应变 (GLS)。采用 17 段-5 分法判断心肌存活和心肌梗死，并计算心肌存活范围及心肌梗死范围。采用标准化脑分析软件 SPM12、CAT12 对脑 3D T1WI 数据分析，得到皮层厚度、沟深、皮质复杂度等脑结构参数，并比较两组脑结构参数差异。应用 Spearman 相关性分析评估脑结构改变、心脏影像学参数及 MoCA 之间的相关性 (校正临床基线资料及血管危险因素)。

结果 两组临床基本信息未见统计学差异，心衰组 MoCA 评分显著低于对照组 (22.7 ± 3.9 vs. 26.3 ± 1.8 , $P=0.001$)。与对照组相比，心衰组患者双侧海马旁回、颞上回、颞中回、额上回、额中回等脑区皮层厚度减低 (均 FDR 校正; 体素水平 $P<0.001$, 团块水平 $P<0.05$)。两组沟深及皮质复杂度未见统计学差异。以上减低脑区的皮层厚度与 MoCA 评分 (相关系数范围为 $0.49\sim 0.52$, P 均 <0.05) 及心肌应变参数 GCS (相关系数范围为 $-0.32 \sim -0.53$, P 均 <0.05) 呈显著相关, 与心功能参数、GRS、GCS 及梗死心肌、存活心肌范围等指标未见相关性 (P 均 >0.05)。

结论 心衰患者大脑皮层厚度减低, 且与认知功能及左室心肌应变减低存在相关性, 为心衰患者合并脑损伤提供影像学依据。

PO-0429

首发精神分裂症言语性幻听患者的小脑-丘脑-皮层功能和有效连接异常

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众所周知, 精神分裂症言语性幻听 (AVHs) 的患者丘脑功能受损。在精神分裂症 AVHs 患者中发现丘脑的过滤功能异常。然而, 在研究 AVHs 患者丘脑连接障碍时, 通常采用的是整体结构方法, 而哪个丘脑核是 AVHs 的关键结构仍不清楚。在此, 我们研究了初次发作精神分裂症 (FES) 且未经药物治疗的 AVHs 患者丘脑核团的基于体素的静息态功能连接 (rsFC)。此外, 该研究还应用动态因果模型计算效应连接, 并估计解释异常 rsFC 的因果关系。与无 AVHs 的 FES 患者 (NAVH) 和正常对照组相比, AVHs 患者双侧丘脑内侧枕核 (PuM) 与小脑之间的 rsFC 显著较弱。此外, 与正常对照组相比, AVH 组和 NAVH 组的双侧 PuM 核与大脑皮层之间的 rsFC 显著较强, 而右侧内侧膝状体核与大脑皮层之间的 rsFC 较弱。与 NAVH 组和正常对照组相比, 动态因果模型显示

AVH 组从左侧 PuM 核到右侧额下回的效应连接显著更强。这些研究结果表明, AVH 的丘脑关键结构是 PuM 核, 并提供了小脑-丘脑-皮层回路与 AVH 相关的直接证据。

PO-0430

基于 HR-VWI 评估的颅内动脉粥样硬化斑块稳定性与 2 型糖尿病患者血糖波动的相关性研究

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目的 探讨基于高分辨率磁共振血管壁成像 (HR-VWI) 评估的颅内动脉粥样硬化斑块稳定性与 2 型糖尿病 (T2DM) 患者血糖波动的相关性。**材料和方法** 回顾性纳入 2020 年 7 月至 2023 年 7 月间就诊于南通市第一人民医院的急性缺血性卒中 (AIS)/短暂性脑缺血 (TIA) 合并 T2DM 患者 203 例, 所有患者均在发病后 1 周内行颅内 HR-VWI 检查。收集患者临床资料[年龄、性别、血压、糖化血红蛋白 (HbA1c)、1,5-脱水葡萄糖醇 (1,5-AG) 等]。使用 HR-VWI 图像观察了双侧大脑前动脉 A1-2 段、大脑中动脉 M1-2 段、大脑后动脉 P1-P2 段、椎动脉 V4 段、基底动脉, 评估颅内动脉最狭窄处斑块特征 (斑块厚度、T1WI 高信号、强化程度、管腔狭窄率等)。根据血清 1, 5-AG 水平的二分位数将其分为血糖波动较大组 ($\leq 30.7 \mu\text{mol/L}$, 102 例) 和血糖波动较小组 ($> 30.7 \mu\text{mol/L}$, 101 例), 比较两组斑块特征差异。并根据颅内动脉最狭窄处斑块是否伴有 T1WI 高信号, 将患者分成 T1WI 高信号组 (88 例) 和非 T1WI 高信号组 (115 例)。采用二元 logistic 回归分析 T1WI 高信号的独立预测因子。结果 203 例患者中, 男 123 例、女 80 例, 年龄 29~85 岁, 1,5-AG 范围 3.0~207.5 $\mu\text{mol/L}$, 中位数 30.7 (13.8, 51.2) $\mu\text{mol/L}$, HbA1c 范围 5.37~14.05%, 中位数 7.9 (6.9, 9) %。血糖波动较大组的斑块 T1WI 高信号发生率高于血糖波动较小组 ($\chi^2=25.375$, $P<0.001$)。血糖波动较大组的斑块强化程度高于血糖波动较小组 ($\chi^2=6.757$, $P=0.009$)。血糖波动较大组的管腔狭窄率高于血糖波动较小组 ($Z=-2.118$, $P=0.034$)。二元 Logistic 回归分析显示, 1,5-AG (OR=0.971, $P=0.001$)、糖化血红蛋白 (OR=1.305, $P=0.01$) 是斑块 T1WI 高信号的独立风险因素。结论: 1, 5-AG、HbA1c 水平是 T2DM 患者颅内动脉粥样硬化斑块 T1WI 高信号的独立预测因子, 早期监测可能有助于发现高危斑块。

PO-0431

脑小血管病 NODDI 网络属性参数与认知功能相关性研究

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目的: 探讨脑小血管病的结构脑网络属性参数与认知功能相关性, 评估结构脑网络属性参数和 MMSE、MoCa 量表评分的相关性。

材料与方法: 本研究于 2021 年 4 月至 2022 年 11 月期间纳入 58 例脑小血管病患者, 其中 29 例为 CSVD 无认知功能障碍患者, 29 例为 CSVD 认知功能障碍患者。所有患者均测试 MMSE 和 MoCa 量表及进行磁共振常规序列、高分辨率 TIWI 和 NODDI 序列扫描。基于虚拟机内 mrtrix 的环境下进行 NODDI 数据预处理及构建结构脑网络。在 GRETNA 中计算脑网络拓扑参数 (全局参数和局部参数)。运用图论方法分析两组患者间的脑网络拓扑参数差异。基于网络的统计分析方法 (Network based statistical analysis, NBS) 分析脑网络结构连接改变。基于 spearman 分析结构脑网络拓扑参数与 MMSE 和 MoCa 量表的相关性。

结果: (1) CSVD 患者均表现出小世界属性。两组患者的 Sigma、Lambda 及 Gamma 均具有统计学差异。(2) CSVD 认知功能障碍患者的 Eloc 和 Cp 参数值与 MMSE 评分具有正相关。(3) Sigma、Lambda、Gamma 和 Lp 参数值与 MoCa 评分具有负相关, Eg 和 Eloc 参数值与 MoCa 评分具有正相关。

结论: 小世界属性的改变提示 CSVD 患者可能损伤了结构脑网络的完整性, 以及是患者认知功能损害的机制之一。Sigma、Lambda、Gamma 参数在 CSVD 认知功能障碍疾病中可作为临床辅助诊断的定量生理指标。

PO-0432

高分辨率 MRI 联合动脉自旋标记可以区分颅内狭窄的短暂性脑缺血发作和脑卒中

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目的: 本研究采用高分辨率磁共振成像 (HRMRI) 和动脉自旋标记 (ASL) 成像研究缺血性卒中和 TIA 患者大脑中动脉斑块特征和血流动力学的差异, 并建立缺血性卒中的预测模型。

方法: 回顾性收集 2020 年 10 月至 2021 年 12 月症状性动脉粥样硬化患者。所有患者均使用带有 32 通道头部线圈的 3.0 T 磁共振扫描仪 (Ingenia CX, Philips Healthcare) 进行成像。根据 DWI 上大脑中动脉区是否发生脑梗死分为 TIA 组和卒中组。在 HRMRI 图像上评估大脑中动脉最狭窄部位的血管腔和斑块特征, 并在 PLD 为 1.5s, 2.5s 时 ASL 图像上评估动脉通过伪影 (ATA) 存在与否。采用 Logistic 回归分析评估 TIA 组与卒中组的不同特征, 受试者工作特征 (ROC) 曲线评价不同模型的诊断效果, z 检验比较各模型的曲线下面积 (AUC)。采用 SPSS (version 26) 或 R (version 4.0.4) 进行统计分析。若 $p < 0.05$, 则认为差异显著。

结果: 共有 85 名参与者最终纳入研究, TIA 组 47 名患者, 卒中组 38 名。与 TIA 组相比, 卒中组高血压、高脂血症患者明显更多 (p 均 < 0.005)。卒中组斑块负担、狭窄程度、增强比例、正性重构患病率、斑块内出血、1.5s ATA 和 2.5s ATA 存在的发生率明显高于 TIA 组 (p 均 < 0.001)。多变量回归分析显示, 校正临床混杂因素后, 在区分缺血性卒中与 TIA 患者时, 正性重构、增强比和 2.5s-ATA 存在联合诊断的准确率高于上述单一特征。联合诊断的 AUC 显著高于正重构 ($Z=4.089$, $p < 0.001$)、增强比 ($Z=3.278$, $p < 0.001$) 和 2.5s-ATA 存在 ($Z=3.482$, $p < 0.001$)。3 个特征组合的敏感性为 89.47%, 特异性为 91.49%, 阳性预测值为 89.47%, 阴性预测值为 91.49%, 准确率为 90.59%。结论: 管腔正性重构、增强比和 2.5s-ATA 存在与缺血性卒中的相关性更强。此外, 我们还建立了 TIA 患者随后发生不可逆卒中的预测模型。本研究为 TIA 患者的早期风险分层和早期临床干预提供了科学依据。

PO-0433

利用 DCE- MRI 纹理分析鉴别诊断生长激素缺乏症和特发性矮小患者

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Purpose: To investigate the value of k_{ep} and k^{trans} maps in pituitary gland using DCE-MRI based on texture analysis in differentiating IGHD from ISS.

Method: 152 patients with clinical growth retardation, including 120 patients with clinical growth retardation, proved IGHD and 32 ISS patients. The features based on k_{ep} and k^{trans} were generated using OK software. ROC curves were used to evaluate the efficiency of texture features.

Results: Based on the texture analysis of K_{ep} maps, six features were significantly decreased, one feature was increased in IGHD group compared to ISS (all $P < 0.05$). The levels of growth hormone showed negative correlation with K^{trans} ($r = -0.306$, $P = 0.002$) in IGHD group.

Conclusions: Texture analysis of DCE-MRI in differentiating IGHD from ISS is feasible and noninvasive.

PO-0434

自闭症谱系障碍患者异常局部脑区功能和结构的改变

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目的：自闭症谱系障碍(ASD)常导致患者生活、交流困难。其发病机制仍不清楚。磁共振成像技术包括静息态功能磁共振(rs-fMRI)和3D-T1结构磁共振被广泛应用于揭示ASD患者局部脑区功能和结构改变。但之前关于ASD患者局部脑区研究多采用单一结构磁共振或rs-fMRI分析方法，很少将结构磁共振和rs-fMRI结合探索异常脑区及异常脑区功能和结构之间关系。本研究采用rs-fMRI结合3D-T1结构磁共振分析方法探索ASD患者局部脑区异常功能和结构改变。此外，提取异常脑区功能和结构指标，分析异常脑区结构和功能之间关系。以期深入理解ASD患者脑结构功能神经机制改变。

方法：招募50名ASD患者和30名年龄、性别匹配健康者。被试行头颅rs-fMRI和3D-T1结构磁共振扫描，使用自闭症诊断观察量表(ADOS)对ASD患者评估。rs-fMRI数据采用局部一致性(ReHo)和低频波动振幅(ALFF)算法及双样本t检验对比两组局部脑功能差异，3D-T1磁共振数据采用基于体素形态学分析(VBM)及两样本t检验比较两组局部脑灰质体积差异。采用Spearman's相关分析探索ASD患者异常脑区ReHo、ALFF、灰质体积与ADOS相关性。异常脑区功能指标和结构指标之间相关性。

结果：相比健康被试，ASD组ALFF值在丘脑显著降低，在左颞下回显著升高。ASD组ReHo值在左舌回、丘脑显著降低，在右额上回、左额中回显著升高。ASD组灰质体积在楔前叶显著增高。ASD患者异常右额上回、丘脑和左额中回ReHo与ADOS评分显著负相关($r = -0.186$, $p = 0.036$; $r = -0.19$, $p = 0.49$; $r = -0.211$, $p = 0.017$)。右额上回ReHo和灰质体积显著负相关($r = -0.183$, $p = 0.037$)，丘脑ALFF与灰质体积显著负相关($r = -0.204$, $p = 0.02$)。

结论：ASD患者局部脑区存在异常功能和结构改变，异常脑区改变与患者临床症状相关。部分异常脑区内部功能和结构存在显著负相关性，提示脑结构在一定范围内对异常脑功能可能具有限制性调节作用。这对于深入理解ASD患者的神经机制改变有着重要意义。

PO-0435

帕金森病患者黑质神经黑色素脱失与功能网络连接和运动障碍有关

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目的: 黑质致密部内的神经黑色素反映了多巴胺色素神经元的丢失, 并在一定程度上反映了帕金森病 (Parkinson disease, PD) 中黑质-纹状体和纹状体-皮层通路的功能障碍。本研究旨在探究神经黑色素减少所表现出的黑质变性与大规模功能脑网络之间的相互作用及其对帕金森病运动障碍的影响。

方法: 纳入 2021 年 7 月至 2022 年 8 月在华中科技大学同济医学院附属同济医院神经内科住院的 68 名 PD 患者, 同时在社区招募 32 名年龄和性别匹配的健康志愿者。通过神经黑色素敏感成像序列计算黑质内侧、中间和外侧亚区的对比噪声比来衡量黑质的完整性。通过静息态功能磁共振成像序列基于独立成分分析获得静息态功能网络间连接。最后我们对帕金森病患者的黑质变性、功能网络破坏和运动障碍进行了相关和中介分析。

结果: 与健康对照相比, 我们观察到 PD 患者黑质内的神经黑色素含量减少, 且网络间功能连接异常, 主要涉及基底节、感觉运动和额顶网络。相关分析显示神经黑色素含量的减少与背侧感觉运动网络与内侧视觉网络之间的连接以及背侧感觉运动网络与基底节网络之间的连接呈负相关。中介分析表明, 在黑质神经黑色素含量减少对帕金森病运动症状严重程度的影响中 36.0% 是由基底节网络和背侧感觉运动网络之间连接强度的增加所介导的 (中介效应 = -1.358, 95% 置信区间为 -2.997 ~ -0.147, $P < 0.05$)。

结论: 我们的证据表明黑质内神经黑色素减少可能通过影响运动相关网络之间的功能连接来调控运动损害的严重程度, 从网络退变角度增加了对帕金森病运动障碍机制的了解, 并为监测帕金森病进展和筛选神经调控适应征提供了潜在的影像学指标。

PO-0436

合并海马硬化的内侧颞叶癫痫中症状、结构和脑网络之间的关系

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目的: 探究合并海马硬化的内侧颞叶癫痫患者 (HS-mTLE) 脑灰质体积 (GMV) 的组间及个体差异, 通过研究 HS-mTLE 解剖学上灰质区域异质性是否能在功能上与共同的脑网络耦合, 从而为 HS-mTLE 提供结构病变与脑网络间的映射 (lesion-network mapping, LNM) 关系。

方法: 连续纳入 HS-mTLE 患者共 212 例 (排除合并其他结构性病变), 纳入年龄性别匹配的健康对照组共 565 例, 收集所有被试的临床资料及影像学资料 (包括常规序列、3D-T1WI 序列、BOLD 序列等)。收集所有癫痫患者的发作症状, 包括发作时意识程度、复杂部分性发作情况、先兆情况等。用 CAT12 软件对所有被试的 3D-T1WI 图像进行自动分割, 得到对应灰质。根据 HS 偏侧分为左、右两组, 用 SPM12 软件分别将两组患者与对照组进行 GMV 差异比较, 并将患者与对照组进行逐一 GMV 差异对比。将两组间 GMV 差异区域相加后与 HOA 脑功能模板相交, 制作为 GMV 差异脑区掩膜 (Mask)。用 DPARSF 软件将所有被试的 3D-T1WI 及 BOLD 图像配准于标准空间, 用 GREYNA 软件计算基于 Mask 的脑功能指标并比较结构差异脑区间的功能指标差异。将癫痫患者发作症状进行聚类分析, 将 GMV 差异脑区的脑功能指标与癫痫发作症状进行相关性分析。最后用另一中心数据 (患者组 65 例, 对照组 40 例) 进行重复性验证。

结果: 在组水平 GMV 对比中, HS-mTLE 患者的 GM 萎缩主要集中同侧额叶、内外侧颞叶、双侧丘脑及小脑 (FDR 校正, $P < 0.05$)。在个体水平上, 被试的 GMV 差异脑区并不完全重叠, 且部分与组水平差值结果不完全重叠。基于 GMV 差异脑区的网络指标提示在同一聚类症状中可敛入同一脑网络内。

结论: HS-mTLE 患者的结构与功能偏差不仅局限于颞叶, 还可导致其他脑叶的结构及脑网络指标异常。HS-mTLE 个体间 GMV 具有区域异质性是普遍特征, 但是结构差异不能完全解释其症状相关的病理生理机制。造成同类症状的差异脑区常位于同一脑功能网络中, 这为理解 HS-mTLE 症状的病理生理机制提供了新的视角。

PO-0437

脑梗死神经通路假性正常脑区的 MR-DKI 与病理学对照研究

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目的: 探讨皮质脊髓束通路脑梗死继发超早期华勒氏变性的磁共振扩散峰度成像 (DKI) 表现及其病理学基础。

方法: 收集常规 MRI 确认皮质脊髓束通路存在非急性期脑梗死的患者 56 例为临床病变组 (A1 组); 另收集常规 MRI 无阳性发现 24 例为临床对照组 (B1 组), 均行常规 MRI 及 DKI 扫描。避开常规 MRI 可见的梗死灶, 在病变侧下行纤维束通路的代表层面 (脑桥、内囊后肢前部、放射冠及皮层下) 测量 DKI 的 MK、Ka、Kr 值。通过光化学法建立 SD 大鼠大脑运动皮层缺血性损伤模型组 (A2 组, $n=20$) 以及 Sham 组 (B2 组, $n=5$), A2 组分别于第 1-4 周的时间点行 DKI 扫描并取脑做常规 HE、髓鞘 LFB、免疫荧光染色等病理学检查。

结果: A1 组脑桥的假性正常脑区 MK、Ka、Kr 值均较 B1 组不同程度升高, 且 MK 和 Kr 值具有显著性统计学意义 ($P < 0.05$); 内囊后肢前部的假性正常脑区仅 Ka 值较 B1 组升高具差异有统计学意义 ($P < 0.05$); 放射冠的假性正常脑区仅 MK 值较 B1 组升高具有显著性统计学意义 ($P < 0.05$); 皮层下的假性正常脑区与 B1 组相比, Ka 值降低和 MK、Kr 值升高, 且均具有显著性统计学意义 ($P < 0.05$), Ka 与 MK、Kr 值反转。A2 组常规 MRI 序列及病理 HE 染色均可发现运动皮层及皮层下稳定梗死灶; 病变侧放射冠、内囊、脑桥于第 2-4 周 MK 值较对侧镜像区升高具有显著性统计学意义 ($P < 0.05$), 髓鞘 LFB、免疫荧光染色均提示不同程度神经纤维髓鞘脱失; 而 A2 第 1 周组及 B2 组各 ROI 的 MK 值及病理学指标均未见统计学差异 ($P > 0.05$)。

结论: 脑梗死累及的神经通路存在假性正常脑区, 提示超早期华勒氏变性, DKI 可有效评估其微观变化并与病理学结果一致; 本研究为脑梗死的疗效评估及预后判断提供一种全新的精准的影像学手段。

PO-0438

原发性中枢神经系统淋巴瘤多模态 MRI 不典型表现及其病理学基础的探讨

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【摘要】目的：原发性中枢神经系统淋巴瘤 (Primary central nervous system lymphomas, PCNSLs) 的不典型影像表现常导致诊断延误，不同免疫功能下原发性中枢神经系统淋巴瘤影像表现不一，本文旨在探讨免疫功能正常人群 PCNSLs 不典型 MRI 表现及相关病理学基础。方法：回顾性分析 2017 年 8 月至 2022 年 8 月在我院经组织病理学诊断的原发性中枢神经系统淋巴瘤患者，所有患者均在我院进行了治疗前的核磁共振检查，实验室检查显示无免疫功能缺陷，排除复发性中枢神经系统淋巴瘤及继发性淋巴瘤。由两位医师分别对核磁共振影像图像进行判读。结果：31 例 CNSLs 中 19 例符合入选标准，男性 11 例，女性 8 例，年龄为(63±9)岁。所有病例均经组织学病理诊断为 B 细胞淋巴瘤，15 例为弥漫性大 B 细胞淋巴瘤。病灶单发 7 例，病灶两个 4 例，病灶 3 个及以上 8 例。不典型发病部位包括侧脑室、脑干、小脑半球，不典型影像表现包括病灶信号不均匀，合并出血及坏死；增强无强化，多发片状、线状强化；呈高灌注；无明显弥散受限。结论：中枢神经系统淋巴瘤表现不典型时容易误诊，多发病灶中更容易出现不典型表现，采用多模态 MRI 尤其是结合病变 ADC 值及 MRS 有利于疾病诊断。

PO-0439

脑小血管病患者豆纹动脉影像学特征与认知功能障碍的相关性研究

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目的：脑小血管病(CSVD)是血管性认知障碍(VCI)的最常见原因。豆纹动脉的可视化对于理解微血管病变的机制至关重要。本研究探讨在散发性 CSVD 患者中豆纹动脉 (LSAs)影像学特征与认知功能的关系。

方法：前瞻性招募 47 例 CSVD 患者，其中男 26 例、女 21 例，年龄 60~85 岁，依据蒙特利尔认知评估量表 (MoCA) 评分结果和教育年限，分为非 VCI 组 (12 例)、VCI 组 (35 例)，另选取同期健康老年人群作为对照组 (28 例)。三组被试均进行磁共振检查，包括常规序列和高分辨率血管壁序列(VWI)以及神经心理学测试评估，包括简易精神状态量表(MMSE)、汉密尔顿焦虑量表(HAMA)、汉密尔顿抑郁量表(HAMD)和 MoCA。利用常规序列评估每位被试是否存在腔隙、脑白质高信号、微出血和周围血管间隙扩大，并利用 VWI 序列测量 LSA 数量、总长度和平均曲折度。计量资料组间比较采用 t 检验，计数资料组间比较采用 χ^2 检验，多因素 logistic 回归分析 CSVD 患者出现认知功能障碍的危险因素，Pearson 或 Spearman 相关性分析豆纹动脉影像学特征与认知功能障碍的关系。

结果：VCI 组的 MMSE、MoCA、LSA 数量和 LSA 平均长度较非 VCI 组和 HC 组显著减低 (均 $P < 0.05$)；VCI 组的 HAMA 和 HAMD 明显高于非 VCI 组和 HC 组 (均 $P < 0.05$)；VCI 组的腔隙和脑白质高信号均显著多于非 VCI 组 (均 $P < 0.05$) (表 1)。LSA 数量的减少是 CSVD 患者出现 VCI 的独立危险因素 (OR = 0.51 95%CI = 0.27-0.97 $P = 0.039$; 表 2)。CSVD 患者中 LSA 数量和 LSA 总长度与 MMSE ($r = 0.36, 0.25$, 均 $P < 0.05$) 和 MoCA 评分 ($r = 0.44, 0.42$, 均 $P < 0.05$) 呈正相关 (表 3)。

结论: LSAs 与 CSVD 患者的整体认知功能障碍相关, LSA 数量是 CSVD 出现 VCI 的独立危险因素。

PO-0440

衰老过程中大脑结构网络拓扑属性的变化模式及 APOE 基因多态性对其影响的研究

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目的: 采用基于图论分析 (graph-based analysis) 方法研究衰老过程中全脑结构网络拓扑属性的变化, 并探索 APOE 基因在其中的作用。

材料与方法: 共纳入 599 例健康志愿者 (年龄范围 20-80 岁), 成了神经心理学量表, 多模态 MR 成像数据以及 APOE 基因型数据, 最终 436 例被试被分成 APOE 4-组 ($n = 374$) 和 APOE 4+组 ($n = 62$)。采用基于图论的复杂脑网络分析方法分析两组被试脑白质结构网络拓扑属性, 计算与量表评分之间相关性。

结果: 数字符号试验 (digit symbol test, DST) 与年龄呈负相关; 数字连接试验 (Number Connecting Test, NCT)、字色干扰测验 (Stroop Color Word Test): Stroop I、II 和 III 均与年龄正相关。APOE 4-组标准化聚类系数 (normalized clustering coefficient, γ) 和小世界属性 (small-world properties, σ) 均与年龄呈负相关; APOE 4+组标准化特征路径长度 (normalized characteristic path length, λ) 与年龄呈正相关。在 45-80 岁年龄段, APOE 4+组 λ 值显著高于 APOE 4-组。APOE 4+组度中心性 (degree centrality, D_c) 与年龄负相关的节点位于右侧缘上回, APOE 4+组节点效率 (nodal efficiency, N_e) 与年龄负相关的节点位于右侧后扣带回 (P 值均 < 0.0006 , 通过 Bonferroni 校正)。 λ 与 NCT 呈正相关, 右侧后扣带回 N_e 值与 DST 呈正相关, 与 NCT、Stroop I 和 Stroop II 呈负相关。

结论: APOE $\epsilon 4$ 携带者与非携带者全脑结构网络拓扑属性随年龄改变模式不同。APOE $\epsilon 4$ 携带者标准化特征路径长度随年龄增长而升高, 右侧后扣带回节点效率随年龄增长而下降, 与注意/执行功能和反应能力下降相关。这表明 APOE $\epsilon 4$ 等位基因对大脑老化有影响, 有可能加速大脑老化过程, 并且与注意/执行功能和反应能力相关。

PO-0441

基于 97ms 单体素 PRESS MRS 的胶质瘤相关性癫痫患者的肿瘤区代谢研究

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目的: 胶质瘤相关性癫痫在神经胶质瘤患者中呈高发状态, 然而其发作的相关机制复杂且不明确, 特别是与其相关的代谢物异常变化的研究还较少。本研究旨在通过使用回波时间 $TE = 97\text{ ms}$ 的单体素点分辨磁共振波谱 (PRESS MRS) 技术, 对脑胶质瘤区各代谢物进行定量分析, 从而帮助深化理解神经胶质瘤与其相关性癫痫的发病机制, 进而探寻潜在的可作为预测神经胶质瘤术前癫痫发作的脑代谢标记物。

方法: 本研究前瞻、序贯纳入于协和医院就诊的胶质瘤患者, 使用 PRESS 序列 ($TE = 97\text{ ms}$) 采集肿瘤区域的代谢物波谱。制作在 $TE = 97\text{ ms}$ 时, 包含多种脑代谢物的拟合基组, 并纳入到

LCModel 后处理软件中；最后通过使用该拟合基组，在 LCModel 中对采集到的 PRESS 波谱进行对应的代谢物的拟合定量。在本研究中，包括 2-羟基戊二酸 (2HG)、胱硫醚 (CTH)、 γ -氨基丁酸 (GABA)、总 N-乙酰基-L-天冬氨酸 (tNAA)、谷氨酸 (Glu)、肌酸 (Cr)、磷酸肌酸 (PCr) 等代谢物被准确定量。同时考虑到胶质瘤患者的临床和病理差异，本研究将患者的临床和病理信息进行了分类，最后将各类组别中的代谢物数据与癫痫发作的发生率进行了统计分析。

结果：在 114 例成人幕上神经胶质瘤患者中，31 名患者发生术前癫痫。术前癫痫发作与年龄小于 40 岁 ($P<0.001$)，肿瘤位于额部 ($P=0.038$) 及发生异柠檬酸脱氢酶 (IDH) 突变 ($P<0.001$) 显著相关。术前发生癫痫的患者瘤中 2HG 浓度显著高于没有发生癫痫的患者 (1.79 ± 1.02 Mm vs 0.54 ± 0.42 mM, $P=0.042$)。CTH、Cr 和 PCr 与术前癫痫的发生有明显相关性 ($P=0.015$)，而 Glu 和 tNAA 与术前癫痫的发作无明显相关。

结论：2HG、胱硫醚、肌酸、磷酸肌酸等代谢物的定量可能成为神经胶质瘤术前癫痫发作的生物标志。

PO-0442

探索听力损伤的轻度认知障碍患者脑皮层纵向变化模式

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研究背景：阿尔茨海默病 (AD) 是最常见的痴呆症类型，其临床表现为渐进的、不可逆的认知功能减退。年龄相关性听力损伤 (ARHL) 是 AD 可控的风险因素，若在早期进行听力矫正可达到早期预防 AD 或延缓 AD 进展的效果。同时轻度认知障碍 (MCI) 是正常老龄转向 AD 的前驱阶段。因此在 MCI 时期的早期干预、诊断可以有效延缓 AD 病程进展。然而，ARHL 虽然会增加患上 AD 的风险，但是并非所有患者都会进展为 AD，很大一部分患者的认知水平长期处于认知正常或 MCI 阶段。因此区分出认知稳定/进展的 ARHL 至关重要。MRI 具有可重复和非侵入的特点，已广泛应用于神经退行性疾病的早期诊断和预后评估。此外，以往研究通常笼统地将 HL 和 ARHL 混为一谈。但 HL 病因很多，而 ARHL 最常见的表现是双侧对称性感觉神经性 HL，以高频段损伤为主。因此，我们有必要对 ARHL 进行更严格的筛选，以消除其他类型 HL 的影响。在本研究中，我们通过严格定义 ARHL 的方式，根据临床诊断将 ARHL 人群分为稳定型和进展型，结合 MRI 探索 ARHL 的 MCI 患者大脑结构纵向变化模式。

研究方法：本研究纳入认知稳定型 (sMCI) 且听力健康 (HC) 的受试者 51 名，认知稳定型 ARHL 患者 20 名，认知进展型 (pMCI) ARHL 患者 21 名。所有受试者均有 3 个时间点的头颅结构像 MRI 数据，每次扫描间隔约 1 年。我们采用 Freesurfer 对大脑皮层进行分割。然后，我们采用重复测量方差分析探索三组人群大脑皮层的纵向变化模式。最后，我们采用 ROC 分析探索相关皮层是否能预测 ARHL 人群的认知变化情况。

研究结果：(1) 重复测量方差分析结果显示，pMCI+ARHL 组左侧内嗅皮层、左侧颞中回及双侧颞上回的皮层萎缩速度快于 sMCI+HC 组，pMCI+ARHL 组左侧海马旁回及左侧颞中回的皮层萎缩速度快于 sMCI+ARHL 组，sMCI+ARHL 组左侧颞横回、右侧颞上回及右侧颞中回的萎缩速度快于 sMCI+HC 组。(2) ROC 分析表明，与单个脑区相比，上述脑区的联合检测能更好预测 ARHL 人群认知进展情况。

结论：在 ARHL 人群中，认知进展的受试者和认知稳定的受试者的皮层萎缩模式不同。

PO-0443

低血糖脑病 MRI 影像学表现

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目的：探讨低血糖脑病的 MRI 影像学表现及相关诊断价值。

方法：收集华中科技大学同济医学院附属协和医院 2023 年收治的 1 例 30 岁经临床诊疗证实为低血糖脑病的女性患者的临床资料进行回顾性分析，其临床主要表现为突发昏迷，意识不清 6 天，患者有 1 型糖尿病病史，发病时测血糖为 2.5mmol/L，患者进行了血液、尿液的常规检查，并进行性了自身免疫性抗体检测，同时行 MRI 平扫+增强、MRA、MRV、DWI 及 MRS 扫描。分析其 MRI 影像学表现及相关诊断价值。

结果：患者 MRI 检查发现右侧半卵圆中心-放射冠、双侧海马及胼胝体压部条片状长 T1、高 T2-Flair 信号影，DWI 示病灶弥散受限表现，增强扫描未见明显强化，MRA 及 MRV 未见明显异常，MRS 将感兴趣区置于双侧海马区，海马区 NAA 峰减低，Cho 峰稍高。经治疗后患者症状好转出院。

结论：低血糖的临床表现没有特异性，可从行为改变、乏力、精神错乱到癫痫和意识丧失，即功能性大脑衰竭。其影像学表现提示低血糖脑病常常累及大脑皮质、基底节区、海马、胼胝体和双侧内囊等区域。T2 及 Flair 序列主要表现为病变区的高信号，这可能与脑部水肿和炎症有关；DWI 序列可能显示出病变区的高信号，这可能是由于低血糖引起的脑细胞水肿和炎症反应导致的；部分患者 MRI 增强可强化，这可能是由于低血糖引起的脑血管紊乱导致的。主要鉴别诊断包括缺血缺氧性脑病、克雅氏病、中暑、其他毒物代谢引起的病变如肝性脑病。需要注意的是，MRI 特征并非低血糖脑病的特异性表现，因为其他脑部疾病也可能表现相似的影像学特征。确诊低血糖脑病还需要结合临床症状、血糖水平和其他实验室检查结果进行综合评估。

PO-0444

3D APT 成像联合 IVIM MRI 对胶质瘤分级以及 IDH 突变状态的术前预测

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目的：使用 3D APT（酰胺质子转移）成像技术与 IVIM（体素内不相干运动）成像技术对脑胶质瘤进行分级以及 IDH（异柠檬酸脱氢酶）突变状态的术前预测，有助于指导临床为病人提供更合适的治疗方案，改善患者预后。

方法：术前对脑胶质瘤患者行 APT 成像技术、IVIM 成像技术及常规的 MRI 成像技术。应用 3D Slicer 软件和 MITK diffusion 软件获取脑胶质瘤的 APT 和 IVIM 直方图参数，提取两种成像参数中的最大值，最小值，平均值，中位数，第 10 百分位以及第 90 百分位。采集术后脑胶质瘤患者的病理结果，评估脑胶质瘤 WHO 分级和 IDH 突变状态。应用统计学方法分析 APT 和 IVIM 成像的直方图参数与胶质瘤的分级和 IDH 突变状态的相关性，并比较两种先进的成像技术的诊断效能。

结果：APT 参数在级别越高的胶质瘤中数值越大，IDH 野生型胶质瘤的 APT 参数大于 IDH 突变型胶质瘤的 APT 参数。IVIM 的三个参数可用于对胶质瘤的分级和 IDH 突变状态的预测。将 APT 参数与 IVIM 参数联合起来对胶质瘤的分级和 IDH 突变状态的评估时，诊断效能更高。

结论：APT 和 IVIM 是在细胞和分子水平上评估脑胶质瘤的两种有前途的分子功能成像技术，可以在术前无创地为患者提供更精确的诊断信息，这些重要的补充信息在预测胶质瘤分级和 IDH 突变状态方面很大的应用价值。

PO-0445

OGSE 联合 CEST 分析预测脑胶质瘤 IDH 突变张新利¹、符晓娜¹、陆珏¹、秦倩¹、王璇²、张肖肖³、汪晶¹

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目的

IDH (Isocitrate dehydrogenase) 基因分型对脑胶质瘤患者管理和预后具有重要价值, 先进的磁共振技术如振荡梯度自旋回波序列 (OGSE)、化学交换饱和转移 (CEST) 能够提供与肿瘤微结构、代谢改变相关的信息, 本研究旨在探究 OGSE 和 CEST 在术前脑预测胶质瘤 IDH 基因分型的潜能。

方法

前瞻性收集 2023 年 2 月至 2023 年 8 月 157 例疑诊脑肿瘤患者的常规 MRI (T1WI、T2-FLAIR、T1w-enhanced)、OGSE 及 CEST 图像, 经后处理由 OGSE 得到的参数包括: 细胞直径 (d)、细胞外水分子扩散系数 (Dex)、细胞内水分子体积分数 (Vin), 细胞密度 (Cellularity)、ADC0Hz、ADC17Hz、ADC33Hz、 Δ ADC1, Δ ADC2。由 CEST 得到的参数包括: 酰胺质子 (Amide)、ph、MTRrex_amide、amide/amine 等。采用独立样本 t 检验、Logistic 回归分析及 ROC 曲线评估 OGSE 和 CEST 的诊断效能。

结果

最终纳入 57 名病理证实为脑胶质瘤的患者 (IDH 突变型 16 例、IDH 野生型 41 例)。d、vin、cellularity、ADC0Hz、ADC17Hz、 Δ ADC1、 Δ ADC2、amide、ph、amide/amine、MTRrex_amide 在 IDH 突变组和野生组均具有显著差异 ($P < 0.01$)。其中, d、MTRrex_amide 分别获得 OGSE 和 CEST 的最佳诊断性能 (d: AUC=0.892, 敏感度 0.756, 特异度 0.938、MTRrex_amide: AUC=0.954, 敏感度 0.821, 特异度 0.999)。联合 MTRrex_amide、ph、amide、 Δ ADC1、 Δ ADC2、vin、cellularity 的多参数 Logistic 回归模型进一步提升了诊断效能 (AUC=0.992, 敏感度 0.974, 特异度 0.999)。

结论

本研究表明 OGSE 和 CEST 在鉴别 IDH 野生型和 IDH 突变型脑胶质瘤中具有很好的诊断价值, 两者联合使用能够进一步提高诊断效能。

PO-0446

脑小血管病中神经液体交互动力学改变的研究刘城霞¹、李元昊¹、朱文浩¹、杨时琪²、覃媛媛¹、田甜¹、张佳璇¹、张顺¹、朱文珍¹

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目的: 神经液体 (neurofluids) 对维持神经元及胶质细胞的稳定代谢微环境具有重要作用, 它包括血液、淋巴液、脑脊液等。本研究目的为探索脑小血管病 (cerebral small vessel disease, CSVD) 中潜在的神经液体交互动力学改变。

方法: 本研究连续纳入 41 例 CSVD 病例及 34 例正常对照, 两组受试者年龄、性别及教育年限均匹配。脑血流 (cerebral blood flow, CBF) 动力学采用伪连续动脉自旋标记 (pCASL) 成像评估。脑淋巴液动力学采用基于弥散张量成像的 diffusion tensor image analysis along the perivascular space (DTI-ALPS) 技术评估。脑室系统的脑脊液 (cerebrospinal fluid, CSF) 容积采用基于 3D BRAVO 的自动化软件评估。使用多元线性回归及交互分析来评估 CSVD 组与对照组之间的神经液体参数改变。使用线性回归分析评估年龄、性别、神经液体参数对脑白质高信号 (white matter

hyperintensities, WMHs) 容积的影响。使用偏相关分析评估神经液体参数与认知功能之间的相关性。

结果: 在 CSVD 组中, DTI-ALPS 指数与灰质区标准化 CBF 之间($P < 0.001$)、DTI-ALPS 指数与白质区标准化 CBF 之间($P = 0.002$)、脑室系统 CSF 容积与 DTI-ALPS 指数之间($P < 0.001$)、脑室系统 CSF 容积与灰质区标准化 CBF 之间($P = 0.025$)、脑室系统 CSF 容积与灰质区标准化 CBF 之间($P = 0.008$)的交互相关性与对照组显著不同。灰质区标准化 CBF 值与 WMHs 体积显著相关($P = 0.001$), 而协变量 DTI-ALPS 指数与脑室系统 CSF 容积则被排除 ($P > 0.05$)。经过 FDR 校正, 标准化 CBF、DTI-ALPS 指数、脑室系统 CSF 容积均与认知功能显著相关。

结论: 脑小血管病病人的神经液体交互动力学较正常老年人显著改变。明确神经液体动力学改变对阐明脑小血管病病理生理机制具有重要意义。

PO-0447

双能量 CT-脑卒中血栓鉴别应用

黄山

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AIS(急性缺血性脑卒中)是长期残疾和死亡的主要原因, 在过去十年中发病率不断上升。在所有中风中, 87%是缺血性中风, 10%是出血性中风(脑出血), 而 3%是蛛网膜下腔出血性(SAH)中风。根据最新的 AIS 患者早期管理指南, 标准治疗包括, 药物静脉溶栓和机械取栓。在开始任何治疗前, 应行 CT 平扫以排除颅内出血。而后行 CTP 和 CTA 或磁共振血管造影(MRA)与扩散加权磁共振成像(DWI)有助于确定缺血半暗带和相应的责任血管, 帮助选择血管内治疗与机械取栓的候选时机。

PO-0448

常见脑肿瘤的酰胺质子转移成像研究进展

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酰胺质子转移加权 (APT) 成像是一种特殊的化学交换饱和转移 (CEST) MRI 成像技术, 它是通过检测组织中内源性、低浓度移动蛋白和多肽中的酰胺质子与水中氢质子的交换速率从而在分子水平反映出细胞中蛋白质含量及酸碱度的变化。APT 成像已被应用于各类肿瘤性疾病 (如脑肿瘤、乳腺癌、膀胱癌和前列腺癌等) 及非肿瘤性疾病 (如中风、颅内感染、帕金森病等) 的临床研究及诊断中。随着对疾病更深入地研究发现 APT 成像可以在一定程度上弥补传统 MRI 在分子水平对疾病预测的不足。神经肿瘤学的最新进展已经将焦点从组织病理学分级转向了分子特征分析, 分子特征已被纳入世界卫生组织分类中。这就要求神经放射科医生不仅需要判断肿瘤的病理分级, 还需要做出一定分子特征的诊断及鉴别。APT 成像技术作为一种新兴的分子成像技术, 在评估常见脑肿瘤方面提供了较传统影像学检查更精确的信息, 有望实现对疾病分子水平的预测, 进而指导临床选择更合适的治疗和手术方案, 更精准地判断预后。另外, APT 成像技术无需使用对比剂, 避免了增强检查带来的肾功能不全, 以及频繁的增强检查带来的对比剂在脑内的沉积的风险。然而, APT 成像还存在一些技术上的问题和挑战, 需要进一步开发新的 APT MRI 脉冲序列、数据采集协议和数据处理方法, 实现高信噪比、全脑覆盖和较短的采集时间等。相信随着相关研究的不断深入, APT 成像将会更广泛地应用于临床脑肿瘤及其他疾病的诊断及鉴别诊断, 并在指导临床治疗方面发挥更重要的作用。

PO-0449

CT 后处理技术对脑静脉畸形的诊断价值

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研究目的：随着医疗设备的快速发展,CT 对神经系统疾病的诊断及复查起到了重要的作用,随 CT 在临床上的广泛运用静脉畸形的检出率明显增加,但有关 CT 血管成像在 CVM 诊断中的应用,特别是 CT 后处理技术的有效运用的文献报道极少。本文旨在通过不同的 CT 后处理技术使医生对脑静脉畸形的诊断更加具有信心。静脉畸形 (CVM) 是无动脉成分的血管畸形,由一簇脑内静脉汇聚到一个粗大的静脉,静脉缺乏平滑肌和弹力纤维,再扩张的血管之间有正常脑组织,占脑血管畸形的 3%。其特征性表现为多条静脉汇入一条扩张的静脉系统,流入浅、深静脉系统。影像学表现为典型的“水母头”样外观,以额顶叶多见。最近研究发现,CVM 发病率随年龄的增加而增加,静脉结构的改变和引流模式的变化有助于 CVM 的形成。因无特异性临床表现,CVM 多为偶然发现。而由 CVM 导致的静脉血栓形成可引起致命性静脉性梗塞,导致脑实质、脑室出血。而本文就探索 CT 血管造影的三种后处理技术对脑静脉畸形 (CVM) 的诊断价值做了研究。

材料与方法：在本单位回顾性选取 40 例患者,其中 20 例 CVM 阳性患者及 20 例 CVM 阴性患者,并对每例患者进行匿名,并分别对图像做容积再现 (VR)、全体积最大密度投影 (MIP) 及层块 MIP 处理,使用函数重新进行随机编号。最后组织 2 名放射科诊断医师分别三种后处理进行诊断,当出现分歧时由两位放射科诊断医师商量讨论重新进行评价,最终的诊断结果使用受试者操作特征 (ROC) 曲线评价各后处理技术对 CVM 的诊断能力。

结果：共对 40 例患者进行评估,其中 20 例患者被确诊为 CVM。VR、MIP、层块 MIP 后处理技术诊断 CVM 的灵敏度分别是 25%、30%、75%,特异度均为 100%。ROC 曲线显示曲线下面积分别为 0.625、0.650、0.875。层块 MIP 对静脉畸形的显示率明显高于 VR 及 MIP ($P<0.05$)。

结论：通过 2 名放射科医师的商量讨论后的诊断结果及 ROC 曲线分析 CT 后处理技术层块 MIP 诊断 CVM 是准确且敏感的方法,并且层块 MIP 较 VR 及 MIP 能发现更多 CVM 的特异征象。

PO-0450

净水摄取率联合双能量 CT 碘图预测急性前循环缺血性卒中患者 血管内治疗后预后的价值

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目的：本研究探讨净水摄取率联合双能量 CT 碘图预测急性前循环缺血性卒中患者血管内治疗后预后的价值。

方法：对 67 例接受血管内治疗的急性前循环缺血性卒中患者进行回顾性分析。根据术后双能量 CT 检查结果,将患者分为：无高密度组 ($n=26$)、有高密度组,将有高密度组分为造影剂外渗组 ($n=23$) 和造影剂外渗+出血组 ($n=18$)。根据 90 天 mRS,将患者分为预后良好组 ($n=37$, mRS 0-2) 与预后不良组 ($n=30$, mRS 3-6)。测量碘浓度、净水摄取率,比较组间的一般临床资料与影像资料。

结果：经过 Bonferroni 多重比较,造影剂外渗+出血组与无高密度组净水摄取率存在统计差异 ($P=0.009$)。造影剂外渗组与造影剂外渗+出血组碘浓度存在统计差异 ($z=3.389, P<0.001$)。预后良好组与预后不良组净水摄取率 ($z=2.837, P=0.005$) 及血管内治疗后出现高密度

($z=5.477, P=0.019$) 存在统计差异。其中, 血管内治疗后出现高密度的患者中预后良好组与预后不良组碘浓度存在统计差异 ($z=2.616, P=0.009$)。经过多因素 logistic 回归分析, 净水摄取率是预测急性前循环缺血性卒中患者血管内治疗后预后的独立预测因素。以不良预后为因变量构建 ROC 曲线, 净水摄取率的 AUC 为 0.703, 截断值为 3.35%, 敏感性 63%, 特异性 73%。

结论: 净水摄取率是预测急性前循环缺血性卒中患者血管内治疗后预后的独立预测因素。血管内治疗后脑内出现高密度是预后不良的预测因素。

PO-0451

基于深度学习网络识别并定量评估原发性脑出血 早期血肿周围水肿扩张

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目的: 开发一套集成专家智能的深度学习网络, 实现原发性脑出血 (Intracerebral hemorrhage, ICH) 的血肿、血肿周围水肿 (Perihematomal edema, PHE), 以及脑脊液 (Cerebral spinal fluid, CSF) 的精准识别, 评估早期血肿周围水肿扩张的危险因素。

方法: 回顾性收集了 506 例原发性脑出血患者的临床和影像学资料, 患者在发病 6 小时内进行了首次 NCCT 检查, 并在 48 小时内进行内随访。我们开发了一套集成专家智能的深度学习网络, 实现了对血肿, PHE, CSF 的全自动定量分析。我们计算了病灶侧脑脊液体积占全脑脑脊液体积比值 (CSF ratio), 并分析与早期 PHE 扩张(随访 48 小时内水肿体积增大大于 7ml)相关的影像及临床因素。

结果: 在 506 例 ICH 患者中有早期 PHE 扩大的是 192 例 (37.9%)。早期 PHE 扩大组和无早期 PHE 扩大组的年龄存在明显统计学差异 (63.5 vs 67 岁, $P=0.014$), 且早期 PHE 扩大组 mRS 评分明显高于非早期 PHE 扩大组 (4 vs 2, $P<0.001$)。早期 PHE 扩大组血肿体积 (35.64 vs 21.33 ml, $P<0.001$)、基线 PHE 体积 (15.98 vs 10.17 ml, $P<0.001$) 明显大于无早期 PHE 扩大组; 基线水平 CSF ratio 在早期 PHE 扩大组明显低于无早期 PHE 扩大组 (25.5 vs 27.54%, $P<0.001$)。经多因素逻辑回归分析, 筛选出早期 PHE 扩大相关的独立危险因素包括: 基线水平血肿体积 (OR 1.013; 95%CI, 1.007–1.019; $P<0.001$)、基线水平 PHE 体积 (OR 0.985; 95%CI, 0.974–0.997; $P<0.001$) 以及 CSF ratio (OR 0.985; 95%CI, 0.974–0.997; $P<0.01$)。

结论: 集成专家智能的深度学习网络能够精准分割、定量分析自发性脑出血血肿、血肿周围水肿以及脑脊液的体积, 筛选并评估出与自发性脑出血患者早期 PHE 扩大相关的独立危险因素。

PO-0452

基于 CT 的影像组学模型预测中小型血肿的血肿扩张的研究

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目的

基于血肿内部和周围影像组学特征以及临床数据构建预测血肿扩大(hematoma expansion, HE)的最优模型, 并比较其预测性能。

材料和方法

回顾性收集 406 例中小型脑出血患者的临床和影像学资料, 均在发病 6h 内接受首次 NCCT, 并在首次 NCCT 后 48h 内接受 CT 随访。我们以 7:3 的比例将数据随机分为训练集和测试集。从血肿内

和血肿周围区域提取影像组学特征。采用单因素和多因素 logistic 回归分析筛选临床和影像学因素。然后在训练集中使用 FAE 构建影像组学(单一或联合)模型、影像组学-影像模型和联合模型。采用受试者工作特征曲线和 Delong 检验评估不同区域的影像组学特征的预测效能。

结果

在训练中,血肿内和血肿周围特征的预测性能相当,受试者工作特征曲线下面积[AUC]分别为 0.613 和 0.645 ($p>0.05$)。通过纳入血肿内和血肿周围特征,在测试集中实现了 0.620 的 AUC。回归分析筛选出 5 个危险因素,包括 2 个影像学特征和 3 个临床特征。使用影像组学特征联合影像组学特征构建的影像组学-影像组学(RR)模型在测试集中的曲线下面积(AUC)为 0.744。结合 2 个临床预测因子和 RR 后,影像-影像组学-临床(RR-cl)模型鉴别早期 HE 的 AUC 为 0.768。RR-CL 模型的预测性能优于 RR 模型,而影像组学特征与临床-影像特征相结合的列线图预测性能最佳。Delong 检验表明,结合影像学因素(血肿体积和混合征)可以提高基于影像组学特征的诊断效能($p<0.05$)。而临床因素(发病至扫描时间、NEUT 和 PT 是最重要的影响因素)使得 RR-CL 在诊断效能上与 RR 模型相当。

结论

基于多变量、临床和影像学特征的 NCCT 模型可提高早期 HE 的鉴别能力。联合模型是识别有早期 HE 风险的 ICH 患者的最佳推荐模型。模型中 NEUT 可能提示血肿周围早期炎症反应。

PO-0453

多 PLD 3D-ASL 结合 DWI 在西宁地区急性期脑梗死患者对脑血流量评估方面的应用

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摘要:目的:探究评估 3D-ASL MRI 在西宁地区急性脑梗死患者中采用不同的多个标记后延迟时间对脑血流测量值的影响。方法:选择中老年急性脑梗塞患者 60 例(男 36 例,女 24 例);年龄 41~89 岁,平均 67 岁,ASL 采用三个标记后延迟时间(1525ms、2025ms、2525ms)在患病侧和相对侧的正常区域测量 CBF, DWI 序列采用 $b=1000s/mm^2$,并在患病侧和相对侧的正常区域测量 ADC。各组之间的每个脑区的 ADC 值及 CBF 值的比较使用独立的样本 t 检验。结果:比较 60 例受试者 ADC 值,患病侧 ADC 值平均值为 $(0.48\pm0.086)\times10^{-3}mm^2/s$,相对侧正常区域 ADC 值平均值为 $(0.97\pm0.172)\times10^{-3}mm^2/s$,患病侧 ADC 值均低于对侧正常区域 ADC 值,差异具有统计学意义($P<0.05$)。3D-ASL 使用不同 PLD 测量的患病侧 CBF 值与相对侧正常区域的 CBF 值进行比较, CBF 值在不同 PLD 的 3D-ASL 测量的患病侧低于相对侧正常区域的 CBF 值, $P<0.05$,差异具有统计意义。3D-ASL 使用不同 PLD 测量的患病侧 CBF 值相互比较, CBF 值在 PLD=1525ms 的更小,并且小于 CBF (PLD=2025ms), $P>0.05$,差异无统计意义,也小于 PLD=2525ms 的 CBF, $P<0.05$,差异具有统计意义, CBF (PLD=2025ms) 小于 PLD=2525ms 的值, $P>0.05$,差异无统计意义。3D-ASL 使用不同 PLD 测量的相对正常区域的 CBF 值相互比较, CBF (PLD=1525ms) 的测得值小于 PLD=2025ms 的 CBF, $P>0.05$,差异无统计学意义,并且小于 PLD=2525ms 测得的 CBF, $P<0.05$,差异具有统计意义, PLD=2025ms 的 CBF 小于 PLD=2525ms 的 CBF, $P>0.05$,差异无统计意义。结论: MRI 的 3D-ASL 在西宁地区急性脑梗死患者中使用不同的多个标记后延迟时间对脑血流测量评估中有一定影响, 3D-ASL 选取 PLD 为 2.0s、2.5s 时评估较为准确。

PO-0454

全身免疫炎症指数在成人高级别脑胶质瘤根治术后 预后评估的价值研究

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全身免疫炎症指数 (SII) 是一种基于外周血血小板、淋巴细胞和中性粒细胞计数的新型生物标志物, 已有研究显示, SII 与多种肿瘤的预后不良相关。然而, SII 在接受根治性手术的高级别脑胶质瘤成人患者中的预后价值尚不清楚。因此, 本研究的目的是评估 SII 在接受根治性手术的高级别脑胶质瘤成人患者预后中的应用价值。

PO-0455

比较弥漫中线胶质瘤-H3K27 突变和近中线低级别 胶质瘤的 MRI 形态学差异

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目的: 弥漫性中线胶质瘤-伴 H3K27m 突变被 2016 年 WHO 定义为一种新的分子亚型, 对应于 IV 级。本研究旨在探究弥漫中线胶质瘤与低级别胶质瘤之间 MR 成像的差异。

方法: 回顾性分析 39 例弥漫中线的胶质瘤-h3k27 改变和 20 例中线低级别胶质瘤患者的 MRI 图像。观察肿瘤的大小、数量及影像表现, 包括瘤周水肿、DWI 及增强等特征, 病变囊变坏死、瘤内出血、T2WI 错配征。采用 T 检验和卡方检验来描述两者间的差异。

结果: 独立样本 T 检验结果显示 DMG 患者的平均年龄要比 LGG 的要年轻 ($P < 0.001$)。卡方检验结果显示, DMG 的肿瘤大小相对要小于 LGG ($P < 0.001$)。DMG 的 DWI 和增强程度相对较高 ($P < 0.001$)。而 DMG 与 LGG 在 Peritumoral edema 有统计学意义 ($P < 0.05$)。

结论: 与中线区低级别胶质瘤相比, H3K27 改变的弥漫性中线胶质瘤的 MRI 表现和临床特点具有一定的特点, 有助于提高诊断和鉴别诊断水平。

PO-0456

基于体素内不相干运动成像的脑白质高信号微结构改变和严重程度 及认知功能减退相关性研究

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目的: 脑白质高信号 (WMH) 是一种常见与年龄和血管危险因素相关疾病, 与认知功能相关, 但目前对这种效应机制了解相对较少。利用体素内不相干运动成像 (IVIM) 技术, 探讨 WMH 区微循环及微结构改变并分析其定量参数与 WMH 严重程度及其与认知功能的相关性。

方法: 本研究共纳入 49 名 WMH 患者和 31 名健康对照组接受常规磁共振及 IVIM 检查, 以深部脑白质高信号 (DWMH), 侧脑室周围白质高信号 (PWMH) 和灶周正常脑白质 (NAWM) 为感兴趣区获得 IVIM 双指数模型参数: 实质扩散率 (D)、血管内扩散率 (D*) 和灌注分数 (f)。根据 Fazekas 评分, WMH 严重程度分为轻度或重度。WMH 组和对照组之间 IVIM 参数 (D, D*, f) 比较采用独立样本 t 检验或 Mann-Whitney U 检验。Kruskal-Wallis 检验或单因素方差分析用于比较 WMH 组不同感兴趣区 (DWMH、PWMH、NAWM) 的 IVIM 参数。WMH 轻重两组间 D、D*、f 值比较采用 Wilcoxon 秩和检验或独立样本 t 检验。所有参与者均接受了简易智能状态检查量表 (MMSE) 和蒙特利尔认知评估量表 (MoCA) 的评估。采用多元线性回归分析确定与认知功能相关的独立因素。

结果: 在不同感兴趣区 (DWMH、PWMH、NAWM), WMH 组 D 值显著高于对照组 (p 值均 <0.05)。WMH 患者组的不同感兴趣区 (DWMH、PWMH、NAWM) IVIM 参数 (D, D*, f) 差异显著, 具有统计学意义 (p 值均 <0.001)。WMH 重度组 DWMH 和 PWMH 区 D 值均高于轻度组, 差异具有统计学意义 (p > 0.05)。多元线性回归分析结果显示 DWMH 和 PWMH 中的 D 值影响认知功能 (p 值均 <0.05)。

结论: IVIM 双指数模型参数 D 值可作为 WMH 严重程度及认知功能障碍的定量生物标志物。

PO-0457

基于图论的复杂脑网络分析在急性期 mTBI 后躯体症状的研究

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目的: 基于图论的方法探讨轻度创伤性脑损伤 (mild traumatic brain injury, mTBI) 患者急性期的复杂脑网络变化及其与脑震荡后躯体症状之间的相关性。

方法: 前瞻性收集 43 例急性期 mTBI 患者及与其年龄、性别和教育程度相匹配的健康对照者 30 例, 对所有研究对象行神经心理学问卷测评、颅脑 MRI 常规检查、磁敏感加权成像 (Susceptibility Weighted Imaging, SWI) 及静息态功能磁共振成像, 分析两组间静息态脑网络全局属性及节点属性的差异, 及其与 Rivermead 脑震荡后症状问卷 (Rivermead Post-concussion Symptoms Questionnaire, RPQ) 得分之间的相关性。

结果:

图论的全局属性: 急性期 mTBI 患者和健康对照组的脑功能网络均具有小世界属性。两组间小世界属性 (P=0.635)、全局效率 (P=0.456) 与局部效率 (P=0.582) 及层级性 (P=0.406) 差异均无显著统计学差异。

图论的节点属性: 与健康对照组相比, 急性期 mTBI 组节点效率增加的脑区位于右侧眶部额上回、左侧额中回、右侧额中回、左侧岛盖部额下回、左侧三角部额下回、左侧顶上回、右侧顶下缘角回; 节点效率减低的脑区有右侧舌回 (P < 0.05)。左侧额中回与 RPQ 评分具有显著正相关 (P=0.041)。与健康对照组相比, 急性期 mTBI 组度中心性增加的脑区位于右侧眶部额上回、左侧额中回、右侧额中回、左侧三角部额下回、左侧顶上回、右侧顶下缘角回; 度中心性减低的脑区位于右侧楔叶、右侧舌回 (P < 0.05)。右侧额中回与 RPQ 评分呈显著正相关 (P=0.019)。

结论: 急性期 mTBI 组与健康对照组的全局属性均无显著统计学差异, 且两组的大脑网络均表现出经济的小世界属性。急性期 mTBI 患者涉及多个脑区节点属性的改变, 且与脑震荡后的相关躯体症状有关。

PO-0458

快眼动睡眠行为障碍对帕金森病脑白质微结构改变的纵向研究

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目的

快速眼动睡眠行为障碍 (RBD) 的存在可能是区分不同帕金森病 (PD) 亚型的特定临床表现, 但 RBD 对全脑特别是脑白质微结构的病理生理改变仍有待阐明。本研究旨在探讨 RBD 症状在 PD 疾病对脑白质微结构随时间改变的影响。

材料和方法

本研究前瞻性纳入 83 例 PD 患者, 所有患者进行了全面的临床评估以及弥散张量成像扫描, 平均随访时间为 2 年。在随访期间, 患者被分为(1) PD 合并 RBD (PD-RBD, n=43), (2) PD 不伴 RBD (PD-nonRBD, n=40)。我们应用基于纤维束的空间统计方法 (TBSS) 提取白质纤维束的扩散张量度量, 包括各向异性分数 (FA)、平均扩散率 (MD)、轴向扩散率 (AD) 和径向扩散率 (RD)。首先, 我们采用线性混合效应模型 (LME) 探究 PD-RBD 和 PD-nonRBD 患者的白质纤维结构随着随访时间的变化。然后, 我们探究了 PD-RBD 和 PD-nonRBD 两组与随访时间对白质纤维扩散张量变化的交互作用。最后, 我们研究了 PD-RBD 组白质微结构的变化与临床评估数据变化的关系。

结果

基线的临床评估数据与脑白质微结构在 PD-RBD 和 PD-nonRBD 组间没有显著差异。纵向随访分析发现, 在 PD-RBD 组, 其弥散参数 FA 在多个白质区域下降, 除了这些区域以外, MD 和 RD 在其他更广泛的白质区域升高, 而在 PD-nonRBD 组, AD 在多个白质区域上升, 只有在少数白质区域 FA 下降以及 RD 上升。交互分析进一步揭示, 与 PD-nonRBD 组相比, PD-RBD 组在多个白质区域 FA 下降更快。最后, 我们发现在 PD-RBD 组中下降的 FA 区域与随访中运动症状的进展相关。

结论

RBD 的存在提示在帕金森病脑内白质纤维束退变范围更广以及在一些区域退变速度更快, 并且这些区域与运动症状的进展相关, 我们的研究结果进一步加深了 RBD 对 PD 病理生理机制影响的理解。

PO-0459

帕金森病冻结步态患者静息脑功能活动及功能连接改变的研究

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目的: 观察帕金森病冻结步态患者静息状态下脑功能活动和功能连接的变化特点, 并探索冻结步态产生的神经病理机制。

方法: 采集 30 例 PD 患者和 16 例健康对照者 (HC) 的静息态功能磁共振数据, 根据冻结步态量表评分 (FOGQ) 将 PD 组分为 PD 伴冻结步态患者 (FOG(+)) 14 例和 PD 不伴冻结步态患者 (FOG(-)) 16 例。采用局部一致性 (ReHo) 分析方法对所得数据进行分析, 观察伴有和不伴有冻结步态 PD 患者的脑功能活动变化; 同时选择脚桥核 (PPN) 为种子点, 采用种子相关分析得到全脑中与脚桥核功能连接改变的区域。通过协方差分析 (ANCOVA) 和 Post-Hoc t 检验进行组间比较。

结果: 与 HC 相比, FOG(+)PD 的左侧颞下回、右侧舌回、双侧梭状回、右侧枕下回、右侧矩状裂及其周围皮层及右侧小脑 ReHo 减弱; 右侧额中回、右侧三角部额下回、右侧岛盖部额下回、右侧背外侧额上回、右侧中央前回及右侧辅助运动区 ReHo 增强; 与 FOG(-)PD 相比, FOG(+)PD 的右

侧中央前回、右侧额中回、右侧额下回及右侧辅助运动区 ReHo 增强, 未发现 ReHo 减弱的区域。在功能连接方面, 与正常对照组及帕金森病不伴冻结步态组相比, 帕金森病伴冻结步态组与 PPN 功能连接异常的脑区主要分布在皮质-脑桥核-小脑通路 (包括双侧小脑和脑桥) 以及视觉相关颞叶皮层 (包括右侧颞中回和右侧颞下回)。

结论: 帕金森病冻结步态患者存在异常的脑功能活动和功能连接, FOG (+) PD 患者脑内局部一致性异常的脑区包括了小脑、额叶以及视觉网路相关皮层; 同时通过观察双侧 PPN 与全脑的功能连接, 发现 PD FOG (+) 患者存在异常的 PPN 功能连接网络, 主要影响皮质-脑桥核-小脑通路和参与视觉信息处理相关皮层, 提示了 FOG 的产生可能涉及的潜在神经功能异常和损伤机制, 有助于我们进一步探知 FOG 的神经病理机制。

PO-0460

基于多体素质子磁共振波谱的重度抑郁症前扣带回皮质代谢异质性研究

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目的: 先前研究发现, 重度抑郁障碍 (major depressive disorder, MDD) 患者 ACC 区域功能存在异质性, 然而 MDD 患者 ACC 区域代谢是否存在异质性还鲜有研究。本研究旨在探讨 MDD 患者 ACC 区域代谢异质性及相关影响因素。

方法: 研究招募了 59 名首发未服药的 MDD 患者和 50 名健康对照作为研究被试, 在西门子 prisma 3.0 T 机器上行多体素 1H-MRS 扫描, 体素放置在 ACC 中。将 ACC 分为两个亚区: 前膝下扣带回皮质 (pACC) 和前中扣带回皮质 (aMCC)。用单因素方差分析和重复测量方差分析分析被试间和被试内代谢物浓度的变化, 并进一步计算 MDD 组神经代谢物浓度与人口学、临床特征之间的关系。

结果: 与正常对照组比较, MDD 患者 ACC 谷氨酸 (GLU) ($MDD=2.02\pm0.42$, $HC=1.88\pm0.42$, $p=0.006$)、肌醇 (MI) ($MDD=1.51\pm0.20$, $HC=1.42\pm0.15$, $p=0.003$) 含量均升高。在 MDD 组和正常对照组均测得 aMCC 的 GLU ($MDD: 26\%\pm9\%$, $HC: 17\%\pm18\%$, $p<0.001$) 和谷氨酰胺 (GLN) ($MDD: 22\%\pm4\%$, $HC: 16\%\pm4\%$, $p<0.001$) 低于 pACC, 而 aMCC 的 N-乙酰天冬氨酸 (NAA) 高于 pACC ($MDD: 22\%\pm6\%$, $HC: 21\%\pm7\%$, $p<0.001$)。与正常对照组相比, MDD 患者的 GLU 和 GLN 浓度梯度更显著。相关分析发现, MDD 组 aMCC 的 MI 与发病年龄呈正相关 ($r=0.41$, $p=0.002$)。

结论: 本研究发现, 与正常对照组相比, MDD 组 pACC 和 aMCC 的神经代谢物浓度的分布和梯度变化存在异常, 这表明 MDD 患者 ACC 区域存在代谢异质性。

PO-0461

基于 MRI 纹理分析评估穿支动脉性脑梗死发生临床症状进展的初步研究

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目的 探讨基于 MRI 纹理分析在穿支动脉性脑梗死患者发生临床症状进展中的预测价值。

方法 根据纳入与排除标准, 回顾性连续收集 2015 年 10 月至 2022 年 6 月浙江中医药大学附属第一医院以及 2018 年 2 月至 2022 年 4 月浙江大学附属杭州市第一人民医院收治的穿支动脉性脑梗死患

者的临床资料和 MRI 影像资料。并根据进展性脑梗死的定义将患者分为进展组 (PCI) 和非进展组 (NPCI)。使用 ITK-SNAP 软件在常规头颅 MRI 序列上对脑梗死病灶进行勾画, 并且将勾画完成的感兴趣区导入 GE Analysis Kit(AK)软件进行纹理特征的提取。对筛选出的纹理特征数据进行多因素 logistic 回归分析得到预测概率值, 并以此概率值进行建模, 最后, 通过绘制受试者工作特征曲线 (ROC) 下面积 (AUC) 来评估不同 MRI 序列所建立模型的预测效能。

结果 共纳入 184 例穿支动脉性脑梗死患者, 其中进展性脑梗死组 68 例、非进展性脑梗死组 116 例。在常规 T2WI、DWI、ADC 序列上提取的纹理特征包括: 灰度共生矩阵 (GLCM)、灰度游程矩阵 (GLRLM)、灰度相依矩阵 (GLDM)、灰度大小区域矩阵 (GLSZM) 以及峰度。其中在 T2WI 序列中预测模型的 AUC 值 0.759, 敏感性为 76.47%, 特异性为 68.10%; 在 DWI 序列中预测模型的 AUC 值为 0.706, 敏感性为 79.41%, 特异性为 58.62%; 在 ADC 序列中, 预测模型的 AUC 值为 0.699, 敏感性为 58.82%, 特异性为 75.86%, 在 T2WI、DWI、ADC 三组图像纹理特征联合建立的预测模型 AUC 值最高, 其值为 0.835, 敏感性为 82.35%, 特异性为 70.69%。

结论 基于 MRI 的纹理分析在预测穿支动脉性脑梗死发生临床症状进展方面具有一定的价值, 其中, 三组纹理特征联合建立的预测模型具有最高的预测效能, 该结果为判断穿支动脉性脑梗死患者是否会发生临床症状进展提供新方向, 且对制定个体化治疗方案具有一定的指导作用。

PO-0462

吸烟者内侧前额叶皮层 NAAG 水平与 尼古丁依赖评分的相关性研究

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背景和目的: 长期吸烟会导致心血管和呼吸系统疾病, 以及认知和神经损伤。研究表明, 尼古丁成瘾会引起大脑结构和功能的改变, 但关于吸烟者神经代谢变化的研究却很少。先进的 J-edited 1H 磁共振波谱技术(MEGA-PRESS)能够可靠地测定脑代谢物的局部浓度, 包括谷氨酸和 n-乙酰天冬氨酸(NAAG)的兴奋性神经递质和脑内抑制性神经递质 γ -氨基丁酸(GABA)。内侧前额叶皮层(mPFC)在认知行为、人格表达和社会行为中起着至关重要的作用。本研究旨在探讨尼古丁成瘾(NA)患者前额叶皮层脑神经递质的变化, 这可能有助于了解尼古丁成瘾的潜在代谢机制。方法: 选取 18 例 NA 患者和 22 例年龄和性别匹配的对照组纳入分析。编辑后的波谱在 MATLAB 软件上使用 Gannet 工具进行后处理和定量分析。参考肌酸信号定量测定 GABA、Glx 和 NAAG 水平。采用两独立样本 t 检验分析两组患者 NAAG、GABA、Glx 水平的差异。最后, 采用 Spearman 标准分析 GABA、Glx 和 NAAG 水平与临床特征评估量表(包括每日吸烟量、吸烟年龄、FTND 评分、RRSQ 评分和 BIS-11 评分)的相关性。结果: NA 组与 HC 组间 GABA、Glx、NAAG 水平差异无统计学意义。NA 组 mPFC NAAG 水平与尼古丁依赖法格斯特伦测验(Fagerstrom Test for Nicotine Dependence, FTND)评分有显著相关性。结论: J-edited 1H-MRS 实现了重叠代谢物信号的分离, 使我们能够直接准确地检测到特定脑区分离的代谢物信号。NAAG 是人类神经系统中第三常见的神经递质, 既往研究表明尼古丁成瘾者内侧前额叶的功能和结构发生改变。在本项研究中, 我们观察到 NA 患者内侧前额叶 NAAG 水平与尼古丁依赖显著相关。这说明 NAAG 的代谢在尼古丁依赖患者发病过程中发生了改变, NAAG 水平的改变可能是尼古丁依赖者成瘾行为形成的重要因素。

PO-0463

帕金森病前驱期伴随快速眼动睡眠行为障碍自由水成像变化的研究

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目的: 特发性睡眠障碍 (idiopathic REM sleep behavior disorder, iRBD) 是帕金森 (Parkinson Disease, PD) 前驱症状的标志之一, 是突触蛋白病的前驱阶段, 帕金森前驱阶段的非特异性症状使疾病在早期阶段诊断受限。本实验利用自由水成像 (Free Water Imaging, FWI) 技术构建的双张量模型来评估帕金森前驱期伴特发性睡眠障碍患者在黑质致密部及内侧苍白球自由水体积分数的改变, 以探究帕金森前驱期的神经影像标志物, 为帕金森疾病早期诊断治疗提供依据。

方法: 本研究的影像和临床数据来自于 Parkinson's Progression Markers Initiative 数据库 (PPMI www.ppmi-info.org/data)。收集年龄、性别匹配的 19 例 iRBD 患者和 28 例帕金森患者, 25 例健康对照 (Healthy Control, HC) 的弥散张量磁共振图像。利用 single-shell 算法处理 DTI 数据, 获得了 FWI 数据。并测量其双侧黑质致密部、红核、内外侧苍白球的 FW 值。使用 ANOVA 比较三组 (PD 组, iRBD 组, HC 组) FW 差异, 并进行事后检验, $p < 0.05$ 时表示具有统计学差异。

结果: PD 组、iRBD 组、HC 组三组间在左内侧苍白球 (ANOVA $p < 0.001$) 及左侧黑质致密部 (ANOVA $p < 0.001$) 均有显著性差异。其中在左内侧苍白球 PD 组 FW 显著大于 HC 组 ($p < 0.001$), 并大于 iRBD 组 ($p = 0.036$), 且 iRBD 组 FW 显著大于 HC 组 ($p = 0.007$); 在左侧黑质致密部, PD 组 FW 显著大于 HC 组 ($p < 0.001$), 并大于 iRBD 组 ($p < 0.001$), 且 iRBD 组 FW 显著大于 HC 组 ($p = 0.003$)。

结论: 内侧苍白球和黑质致密部中的自由水成像在帕金森病的前驱阶段与临床表现相关, 内侧苍白球及黑质致密部微观结构在早期神经退行性阶段已改变, 本研究有助于了解突触核蛋白病的早期和进行性病理变化。研究结果表明, 内侧苍白球黑质致密部的自由水成像有可能成为突触核蛋白病早期诊断、进展和神经影像有效标志物。

PO-0464

基于人工智能的 ASPECTS 评分各区域梗死对急性大血管闭塞取栓术后患者预后的影像

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目的: 探讨基于人工智能的 ASPECTS 评分 10 个区域的梗死占比与急性大血管闭塞机械取栓术后患者预后的关系。方法 收集我院 2021 年 1 月至 2023 年 6 月单侧急性大血管闭塞患者, 所有患者行血管内治疗前均进行头颅 CTP、头颅 CT 平扫检查。随访 90 天, 根据 mRS 评分将其分为预后良好组 ($mRS \leq 2$) 及预后不良组 ($mRS \geq 3$), 分析基于人工智能 ASPECTS 评分的 10 个区域各自梗死区占比与患者预后的关系。结果 纳入 78 例患者 (平均年龄 62.5 岁; 70.5% 为男性), 其中 53 例预后良好 ($mRS \leq 2$), 25 例预后不良 ($mRS \geq 3$)。Mann-Whitney U 检验显示两组之间的豆状核、尾状核、M6 区域梗死有统计学意义 ($P < 0.05$)。多因素 logistic 回归分析证实豆状核 ($OR = 1.02$; 95%CI 1.00~1.05; $P = 0.014$) 和 M6 区域 ($OR = 1.06$; 95%CI 1.02~1.10; $P = 0.004$) 梗死与预后

不良的可能性增加相关。结论 各 ASPECTS 评分区域对急性大血管闭塞机械取栓术后患者预后的影响不同, 在确定是否行机械取栓术前, 应考虑梗死部位。

PO-0465

自由水成像揭示帕金森病脑白质微观变化

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目的: 本研究使用弥散张量成像 (Diffusion Tensor Imaging, DTI) 技术, 应用单壳层 (Single-shell) 弥散模型生成自由水成像 (Free Water Imaging, FWI), 深入研究帕金森病 (Parkinson's Disease, PD) 患者全脑白质纤维在神经炎症、轴突髓鞘及萎缩性神经变性上的微观结构改变。本研究结合了 FWI 技术生成的自由水体积分数 (Free Water, FW), 定量评估脑白质结构的定向性与完整性。利用 FWI 构建的双张量模型评估帕金森病白质纤维束的神经炎性变化, 有助于进一步研究和了解帕金森病患者真正的结构功能改变, 对该疾病的早期诊断、治疗和预后评估具有决定性意义。

方法: 本研究所采集数据均来自 Siemens 3.0T Prisma 磁共振, 共采集 60 例 PD 患者, 以及年龄性别匹配的健康对照 (Healthy Controls, HC) 共 31 例的 DTI 数据。通过 single-shell 算法处理 DTI 数据, 获得了 FWI 数据, 使用对称图像标准化算法对所有 FWI 数据进行标准化。选取全脑 49 条纤维束作为感兴趣区域 (Region of interesting, ROI), 并比较 PD 患者与正常人的 FWI 值, $p < 0.05$ 时表示具有统计学差异。

结果: 研究表明 PD 患者在胼胝体膝部 ($p=0.001$)、双侧脊髓皮质束 (右侧 $p=0.046$, 左侧 $p=0.001$)、右侧内囊后肢 ($p=0.032$)、左侧外囊 ($p=0.009$) 以及双侧前放射冠 (右侧 $p=0.022$, 左侧 $p=0.012$)、双侧上放射冠 (右侧 $p=0.004$, 左侧 $p=0.002$)、双侧后放射冠 (右侧 $p=0.022$, 左侧 $p=0.006$)、双侧上纵束 (双侧 $p=0.001$)、右侧上额枕束 ($p=0.044$) 的 FW 值均显著高于 HC 组。

结论: 本研究结果强调了 FWI 在深入研究帕金森病患者脑白质微观结构方面的潜力, PD 中 FWI 的成像显示白质纤维束的神经退行性病变和神经炎性的相关性, 并为该疾病的病因、早期诊断、治疗和预后评估提供了重要线索。

PO-0466

非认知损害复发缓解型多发性硬化患者默认模式网络子系统的 MRI 研究

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目的 探讨非认知损害复发缓解型多发性硬化 (RRMS) 患者默认模式网络 (DMN) 的子系统灰质体积、子系统内部及之间功能连接的变化情况。**方法** 该研究为前瞻性研究。收集 2020 年 4 月至 2021 年 1 月在复旦大学附属华山医院诊治的 37 例非认知损害 RRMS 患者 (RRMS 组), 并同期纳入的 43 名健康志愿者 (HC 组)。RRMS 组患者均接受临床认知功能量表评分。所有受检者均接受大脑结构三维 T1WI 和静息态功能 MRI。DMN 被划分为核心 (CORE)、背内侧前额叶 (DMPFC)、内侧颞叶 (MTL) 三个子系统。通过空间标准化生成的灰质体积图提取三个子系统的灰质体积; 根据 Yeo's 17 网络定义 DMN 的 24 个兴趣区 (ROI) 并计算其功能连接值, 从而获取子系统内部和子系统间的功能连接平均值。采用独立样本 t 检验比较 RRMS 组和 HC 组的灰质体积

和功能连接的差异,采用 Spearman 偏相关分析子系统灰质体积与功能连接,以及子系统灰质体积和功能连接与临床相关量表评分的相关性。结果 与 HC 组相比,RRMS 组 DMN 三个子系统的灰质体积均显著降低 ($P<0.05$),而三个子系统内部及其之间的功能连接差异均无统计学意义 ($P>0.05$)。基于 ROI 水平,与 HC 相比,RRMS 组患者 DMN 子系统内 FC 值显著减低的脑区主要集中在 DMPFC 左背内侧前额叶皮层、DMPFC 右外侧颞叶皮层和 MTL 左内侧颞叶皮层 ($P<0.01$)。HC 组的 DMPFC 灰质体积与 DMPFC 内部功能连接呈正相关($r=0.326$, $P=0.040$);RRMS 组 CORE 灰质体积与 CORE 和 DMPFC 之间的功能连接呈正相关 ($r=0.363$, $P=0.038$),CORE 内部功能连接与记忆与执行筛查量表评分呈正相关 ($r=0.430$, $P=0.036$)。结论 非认知损害的 RRMS 患者 DMN 三个子系统均出现灰质萎缩,子系统 DMPFC 的结构与功能的无相关性,子系统 CORE 的功能连接可反映记忆执行状态,DMPFC 和 CORE 可能是非认知损害的 RRMS 患者神经变性和脑功能改变的重要脑区。

PO-0467

单侧颈内动脉或大脑中动脉严重狭窄或闭塞时大面积脑梗死脑预测新指标-ASPECTS 与 CS 评分

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目的 ASPECTS 评分已在 CTA 影像学检查方法中得到了广泛的应用,CS 评分系统在预测是否发生脑梗死方面灵敏性和特异性都很高(尤其是 MCA 供血区域的梗死)。目前对 ASPECTS 与 CTA-CS 来评估脑侧支循环的报道相对较少,本研究探讨 ASPECTS 与 CT 血管造影侧支评分(CTA-CS)系统联合评估对大面积脑梗死的临床预测。方法 回顾性分析 CTA 确诊为单侧颈内动脉或大脑中动脉重度狭窄或闭塞的脑梗死患者。采用受试者工作特征曲线(ROC)检验 ASPECTS 评分、CTA-CS 评分、ASPECTS 与 CTA-CS 评分对大面积脑梗死的预测能力。结果 单因素分析显示 ASPECTS 与 CTA-CS 评分两组间差异存在统计学意义 ($P<0.05$)。ROC 曲线检验结果显示,ASPECTS 评分、CTA-CS 评分、ASPECTS 与 CTA-CS 评分的 AUC 分别为 0.916 ($95\%CI=0.838\sim0.993$, $P<0.0001$)、0.910 ($95\%CI=0.823\sim0.997$, $P<0.0001$)、0.922 ($95\%CI=0.839\sim1.000$, $P<0.0001$),ASPECTS 与 CTA-CS 评分对大面积脑梗死预测价值优于 ASPECTS 或 CTA-CS,并确定最佳预测临界值为 20.5 分。结论 三种评估方法对预测大面积脑梗死都有一定的价值,但是 ASPECTS 与 CS 评估方法较其余两个价值更大,既 ASPECTS 与 CS 评估方法对判断发生大面积脑梗死的正确率更高。ASPECTS 与 CTA-CS 评分体系可预测侧支循环状态,提高单侧颈内动脉或大脑中动脉严重狭窄或闭塞时对大面积脑梗死的预测价值。

PO-0468

ASL 在静脉勃起功能障碍 (VED) MR 检查中的应用研究

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目的探讨动脉自旋标记 (arterial spin labeling,ASL) 序列在静脉勃起功能障碍 (venous erectile dysfunction ,VED) 患者应用价值。

方法回顾性分析 2020 年 6 月至 12 月在我院行颅脑 fMRI 检查的 75 名临床确诊为 VED 患者和 80 名健康志愿者的影像资料,进行 sag-3DT1,DTI,BOLD,ASL 序列扫描,基于之前对 VED 病人的研究 (与健康志愿者相比,VED 患者在大脑左侧中央后回和中央前回的皮质体积显著减少,右侧颞中回

的皮质体积显著增加。在大脑广泛区域观察到轴向扩散率 (AD)、径向扩散率 (RD) 和平均扩散系数增加), 对 VED 病人脑改变区域进行 ASL 研究。

结果在 VED 病人皮质体积减少区域脑血流量 (regional cerebral blood flow, CBF) 相应减少, 皮质体积增加区域 CBF 相应增加, 扩散增加区域 CBF 相应增加。VED 病人与健康志愿者 CBF 改变区域比较具有统计学差异。

在 VED 患者中观察到皮质体积和白质 (WM) 纤维结构变化, 其血流量 CBF 也发生改变, 并显示与临床症状和功能障碍持续时间显著相关。基于之前机器学习分析显示, 某些大脑区域的各种 CBF 改变, 可被视为 VED 患者和健康对照对象之间的可靠区分特征。

结论 ASL 可以有效评估 VED 病人大脑相应区域皮质体积改变的血管灌注情况, 为 VED 病人大脑研究提供了更多影像学信息, 同时能更好更精确的服务于临床。

PO-0469

定量磁敏感成像联合自由水成像在早期多系统萎缩与帕金森病鉴别中的价值

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目的: 探究定量磁敏感成像(QSM)联合自由水成像在早期多系统萎缩 (MSA) 与早期帕金森病 (PD) 灰质核团中的诊断价值。

方法: 研究对象为山东省立医院近四年确诊的 23 例早期 MSA 患者 (H-Y<2) 和 40 例早期 PD 患者 (H-Y<2)。纳入了 33 例相匹配的健康志愿者 (HC)。分别行 3DT1、QSM 及 DTI 序列扫描, 并手动勾画壳核 (PT) 及齿状核 (DN) 等感兴趣区, 比较三者平均磁化率及扩散系数。

结果: QSM 结果显示, 早期 MSA (PT: 0.13 ± 0.03 ; DN: 0.15 ± 0.04) 患者的 PT 及 DN 的磁化率值高于 HC (PT: 0.08 ± 0.03 $P < 0.001$; DN: 0.11 ± 0.03 $P = 0.024$) 和早期 PD (PT: 0.08 ± 0.03 $P < 0.001$; DN: 0.11 ± 0.03 $P = 0.006$)。自由水成像结果表明, 早期 PD 患者 (FWE-FA: 0.17 ± 0.02 FW: 0.13 ± 0.05) PT 的 FWE-FA、FW 的值要高于 HC (FWE-FA: 0.16 ± 0.01 $P = 0.008$; FW: 0.09 ± 0.01 $P = 0.006$); DN (0.11 ± 0.03) 只有 FW 的值高于 HC (0.09 ± 0.03 $P = 0.014$)。早期 MSA 患者 PT (FWE-FA: 0.19 ± 0.02 FW: 0.16 ± 0.07 $P < 0.001$) 的 FWE-FA、FW 的值均高于 HC (FWE-FA: 0.15 ± 0.01 $P < 0.001$; FW: 0.09 ± 0.01 $P < 0.001$); 早期 MSA 患者的 DN 的 FWE-FA 值高于 HC (0.32 ± 0.03 $P < 0.001$)。最后, 将早期 PD 与早期 MSA 进行比较, 发现早期 MSA 患者 (0.38 ± 0.04) DN 的 FWE-FA 值高于早期 PD (0.32 ± 0.05 $P < 0.001$)。ROC 曲线显示, DN 可以作为一个较好的标志物区分早期 PD 与 MSA, 且两种序列联合的诊断效能要大于单独任何一个序列 ($P < 0.001$; AUC=0.843)。

结论: 首先, 结果表明, 齿状核可能是早期 MSA 的易损靶点。另外, QSM 与自由水成像是良好的互补工具, 两者联合可以更好了解铁沉积及神经损伤在两种疾病之间复杂病理生理贡献。

PO-0470

帕金森病患者的脑白质微结构改变

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目的：采用扩散张量成像 (DTI) 基于纤维束追踪空间统计分析 (TBSS) 观察帕金森病 (PD) 患者脑白质结构的变化，探索 DTI 多参数变化与 PD 患者综合评分量表 (UPDRS) 评分升高具有显著相关的脑区。材料与方法：160 例 PD 患者及 99 例正常对照组行 DTI 检查，采用 TBSS 技术分析两组受试者脑白质纤维 DTI 的各相关参数，包括各向异性分数 (FA)、平均扩散系数 (MD)、轴向扩散系数 (AD)、平行扩散系数 (RD)，比较两组各 DTI 参数的差异，分析 PD 组有差异脑区的 FA、MD、AD、RD 值与临床 UPDRS 评分的相关性。结果：与对照组相比，PD 组多个脑白质区 FA 值降低，MD、AD、RD 值升高 ($P<0.05$)。PD 组较对照组有差异脑区的 FA 值、AD 值、RD 值与 UPDRS 评分均有相关关系 ($P<0.05$)；MD 值与 UPDRS 评分没有相关性。FA 值降低和 MD、RD 值升高并与 UPDRS 评分具有显著相关的脑区为胼胝体、左侧内囊前肢、左侧外囊，左侧上额枕束 ($P<0.05$)。结论：PD 患者存在脑白质结构的改变，可能是髓鞘脱失或轴突完整性受到破坏。

PO-0471

乳腺癌患者化疗早期的皮层表面形态学改变和癌症相关疲劳变化的关系：基于表面形态测量方法

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目的 研究乳腺癌患者化疗早期的皮层表面形态早期改变及其与癌症相关疲劳 (cancer-related fatigue, CRF) 的关系。材料与方法 选取 25 例首诊乳腺癌患者，分别在手术后化疗前 (T1)、化疗期间 (T2) 进行神经心理学测试和颅脑 3D-T1 加权数据采集。采用基于表面的形态学方法 (surface-based morphometry, SBM) 测量皮层表面形态结构在化疗期间的早期改变，并与 CRF 的纵向变化进行相关性分析。结果 与化疗前相比，乳腺癌患者在化疗早期的 CRF、抑郁、焦虑测量评分变化具有统计学意义 ($P<0.05$)。化疗期间乳腺癌患者皮层表面形态的多个参数值较化疗前发生了早期改变，差异有统计学意义 ($P<0.05$)，参数值减少的脑区包括：顶叶 (双侧楔前叶、右侧缘上回、右侧中央后回)、枕叶 (双侧楔叶、左侧距状皮层) 的皮层厚度减少，顶叶 (双侧顶下小叶、右侧缘上回、右侧顶上小叶及中央后回)、颞叶 (双侧梭状回及颞下回、右侧颞上回)、枕叶 (双侧枕外侧回、右侧楔叶、右侧距状皮层) 的沟深减少，左侧枕叶 (枕外侧回)、右侧额叶 (额上回、前中额叶及额下回)、右侧顶叶 (缘上回及顶下小叶) 的分形维数减少；参数值增大的脑区有：左侧枕叶 (枕外侧回及楔叶)、右侧顶叶 (缘上回、顶上小叶及顶下小叶)、右侧颞叶 (颞中回、颞下回及颞上回后部) 的皮层褶皱指数增大。与化疗前相比，化疗早期右前中额叶分形维数的改变与 CRF 的纵向变化呈负相关 ($r = -0.628, P = 0.001$)。结论 乳腺癌患者的皮层表面形态在化疗期间即可发生早期改变，并与 CRF 的变化相关。

PO-0472

基于合成磁共振成像技术对帕金森病患者 临床亚型分型的价值研究

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目的

应用合成磁共振技术分析帕金森病（PD）患者在不同核团弛豫值上的改变，并探讨其与临床症状之间的相关性，辅助 PD 早期诊断及病情监测。

方法

应用合成磁共振序列对 50 例 PD 患者及 30 例健康对照组（HC）进行扫描，并根据主要症状将 PD 患者分为强直少动组（n=20）及震颤组（n=26），使用 MAGIC 软化勾画感兴趣区得到双侧尾状核、壳核、苍白球、丘脑枕核、红核、黑质的 T1、T2 及质子密度（PrD）值，比较 PD 组与 HC 组以及强直少动组与震颤组之间的差异。

结果

PD 组与 HC 组相比，尾状核头 T2 值减低（ $P<0.01$ ），PrD 值减低（ $P<0.01$ ）；尾状核体 T1 值增高（ $P<0.01$ ），PrD 值增高（ $P<0.01$ ）；壳核 T1 值增高（ $P<0.01$ ），T2 值减低（ $P<0.01$ ），PrD 值增高（ $P<0.01$ ）；苍白球 T1 值增高（ $P<0.01$ ），PrD 值增高（ $P<0.01$ ）；丘脑枕核 T1 值增高（ $P<0.01$ ），T2 值增高（ $P<0.01$ ）；红核 T1 值增高（ $P<0.05$ ），T2 值减低（ $P<0.01$ ），PrD 值增高（ $P<0.01$ ）；黑质 T2 值减低（ $P<0.01$ ），PrD 值增高（ $P<0.01$ ）。PD 患者强直少动组与震颤组相比，尾状核头 T1 值增高（ $P<0.01$ ），T2 值增高（ $P<0.05$ ），PrD 值增高（ $P<0.01$ ）；壳核 T1 值增高（ $P<0.01$ ），T2 值增高（ $P<0.05$ ），PrD 值增高（ $P<0.05$ ）；丘脑枕核 T1 值增高（ $P<0.01$ ），PrD 值增高（ $P<0.01$ ）；黑质 PrD 值减低（ $P<0.05$ ）。

结论

通过合成磁共振成像技术观察到 PD 患者与健康人之间以及不同临床症状的 PD 患者之间均存在不同核团弛豫值的差异，因此合成磁共振成像技术对 PD 的早期诊断以及病情分析具有一定的提示意义。

PO-0473

NODDI 预测脑胶质瘤 IDH-1 基因状态效能分析

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目的：研究神经突方向离散度与密度成像（neurite orientation dispersion and density imaging, NODDI）预测脑胶质瘤异柠檬酸脱氢酶（isocitrate dehydrogenase, IDH-1）基因状态的效能。方法：收集新疆医科大学第一附属医院 45 例胶质瘤患者作为研究对象，其中男 20 例，女 30 例，所有受试者均在术前行常规 MRI 及 NODDI 扫描，得到的 NODDI 原始数据传入到西门子后理工作台进行相应的后处理，将处理后的图像导入相应的后处理软件，有经验的放射科医师勾画肿瘤实质相邻最大的三个层面作为 ROI，取得各个参数（ICVF、ODI、ISO）的均值。用独立样本 t 检验或 Mann-Whitney 秩和检验分别比较高、低级别组和不同 IDH-1 状态各扩散参数值的差异。进一步对有统计学意义差异的参数进行 Logistic 回归分析，评价其鉴别脑胶质瘤 IDH-1 基因突变状态的诊断效能，并获得受试者工作特征（ROC）曲线。结果：本研究最终纳入 45 例患者作为研究对象，其中野生型 31 例（68.89%），突变型 14 例（31.11%）。多因素 Logistic 回归分析显示 ICVF（OR=0.978、95%CI=0.957-0.999、 $P<0.001$ ）、肿瘤分级（OR=0.252、95%CI=0.083-0.796、 $P=0.015$ ）是 IDH-1 基因分析的独立影响因素。肿瘤分级曲线下面积 AUC=0.910，95%CI=0.813-1.000，ICVF

的曲线下面积 $AUC=0.871$, $95\%CI=0.759-0.983$ 。NODDI 参数中 ICVF 具有最佳的诊断效能。结论:胶质瘤肿瘤分级、NODDI 成像参数值有助于脑胶质瘤的 IDH 基因分型判断, 其中 ICVF 的敏感性 & 特异性均较高且曲线下面积较大。

PO-0474

臂丛 MRN 在诊断脱髓鞘合并轴索损伤 CIDP 中的应用

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目的: 探讨臂丛磁共振神经成像在诊断脱髓鞘合并轴索损伤的慢性炎性脱髓性多发性神经根神经病 (CIDP) 中的应用价值。

方法: 收集我院 2016-2021 年确诊的 CIDP 患者 29 例, 根据神经电生理检查分为脱髓鞘组及脱髓鞘合并轴索损伤组。在臂丛磁共振神经成像 (MRN) 图像上测量所有患者臂丛神经根 (C5-C8) 最大直径以及神经-肌肉 T2WI 信号强度比, 收集所有患者的临床资料, 做组间差异性分析和组内相关性分析, 并绘制 ROC 曲线。

结果: 脱髓鞘合并轴索损伤组 CIDP 臂丛神经根最大直径大于脱髓鞘组, C5 ($P=0.011$)、C6 ($P=0.046$)、C8 ($P=0.001$) 具有统计学差异, ROC 分析结果显示, C8 神经根的最大直径具有较好的诊断效能 ($AUC=0.851$, 相应的阈值为 $4.36mm$)。脱髓鞘合并轴索损伤组 CIDP 患者 C6 ($r=0.634$, $P=0.02$)、C7 ($r=0.605$, $P=0.029$) 神经根最大直径与脑脊液蛋白水平呈中度正相关, C7 ($r=-0.567$, $P=0.043$) 神经根最大直径以及 C8 ($r=-0.598$, $P=0.031$) 神经根的神经-肌肉 T2WI 信号强度比与发病年龄呈中度负相关。

结论: 臂丛 MRN 有助于识别脱髓鞘合并轴索损伤的 CIDP 病人, C8 神经根的最大直径可能具有较好的诊断效能。

PO-0475

基于深度学习与影像组学诊断原发性三叉神经痛的应用研究

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目的 本研究拟使用深度学习的方法对三叉神经进行定位、分析, 并用影像组学的方法鉴别 CTN 患者与健康人群。方法 招募了 165 名 CTN 患者以及性别、年龄与之相匹配的健康对照 175 名。所有被试都完成了磁共振扫描。使用 VB-Net 对所有被试双侧三叉神经脑池段进行定位、分割, 然后用影像组学的方法进行特征提取、降维、特征选择、模型构建和模型评估。结果 对 CTN 患者和健康对照进行分析, 发现 12 个权重较大的纹理特征, 且两组之间的 Rad_score 有显著统计学差异 ($p < 0.05$)。讨论 影像组学与临床诊断 CTN 具有结论一致性, 而影像组学更为客观、敏感, 是临床诊断 CTN 以及评估 CTN 患者三叉神经改变的一种可靠的神经生物学指标。

PO-0476

未破裂颅内动脉瘤血管内介入栓塞术患者疾病 不确定感的潜在类别分析

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摘要 目的 了解未破裂颅内动脉瘤血管内介入栓塞术患者疾病不确定感的潜在类别，并探讨不同潜在类别患者疾病不确定感之间的特征差异。方法 便利选取 2021 年 4 月-2023 年 4 月于郑州大学第一附属医院住院的 188 例行颅内动脉瘤血管内介入栓塞患者为研究对象，采用一般资料调查表和疾病不确定感量表对其进行调查。采用潜在类别分析将患者疾病不确定感进行分类，多元 logistic 回归分析探讨各影响因素对其不同分型的影响。结果 未破裂颅内动脉瘤血管内介入栓塞术患者疾病不确定感得分为（81.9±11.51）分，未破裂颅内动脉瘤血管内介入栓塞术患者疾病不确定感可分为高不确定感组（43.6%）、中等不确定感组（36.2%）、低不确定感组（20.2%）。性别、文化程度、动脉瘤数量是未破裂颅内动脉瘤血管内介入栓塞术患者疾病不确定感的影响因素（均 $P < 0.05$ ）。结论 未破裂颅内动脉瘤血管内介入栓塞术患者疾病不确定感可分 3 个潜在类别，医务人员应针对不同特征人群实施精准干预，以降低患者的疾病不确定感，从而提高治疗依从性和患者整体健康水平。

PO-0477

慢性主观性耳鸣患者的多层脑功能网络研究

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目的 本研究拟利用多层网络技术对于慢性主观性耳鸣患者的静息态磁共振数据进行处理分析，以寻找具有一定动态特征的相关节点参数。**方法** 本研究选取 28 例慢性主观性耳鸣患者作为耳鸣组以及与之相匹配的 39 例健康志愿者作为对照组。在对所有受试者完善相关耳科以及神经精神科测试后，进行磁共振数据采集，并对数据进行预处理、动态功能连接分析、多层模块化与网络转换率分析。最后将磁共振数据结果与相关临床资料进行统计分析比较。结果 耳鸣组与对照组间整体模块化系数 Q 无显著差异（ $P > 0.05$ ）。而与对照组相比，耳鸣组在双侧前扣带回（ $P < 0.001$ ）以及右侧海马区（ $P < 0.01$ ）的网络转换率显著减低。耳鸣组右侧海马区的网络转换率与耳鸣病程时间呈负相关（ $r = 0.576$ ， $P = 0.003$ ）。结论 利用多层分析方法发现，慢性主观性耳鸣患者前扣带回与海马区对于信号的调节能力改变，可能影响了内部心理加工、记忆情绪等过程，而海马区的变化可能与病程的长短相关。

PO-0478

黎、汉族缺血性脑卒中患者 AS 分布差异及其危险因素分析

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目的：探讨黎、汉族缺血性脑卒中患者脑血管颅内、外段粥样斑块（AS）的分布差异以及其相关危险因素。

方法：对我院就诊的 1352 例黎、汉族患者，根据 MRI 检查结果分为缺血性脑卒中及非缺血性脑卒中，在根据 CTA 检查结果分为颅内段 AS 组、颅外段 AS 组、颅内外同时 AS 组及正常组，随后收

集患者病史资料（包括年龄、性别、吸烟史、饮酒史、高血压病、糖尿病、生化指标如 TC、TG、HDL-C、LDL-C 等）进行统计学分析。

结果：黎族缺血性脑卒中患者的单纯颅外动脉 AS 检出率明显高于汉族缺血性脑卒中患者， $P<0.01$ 。经 Logistic 回归分析显示，黎族单纯颅外动脉 AS 的危险因素有饮酒（OR=8.80）、高血压（OR=6.80）和年龄（OR=0.76）；汉族单纯颅外动脉 AS 的危险因素有年龄（OR=0.9）、高血压（OR=5.66）、糖尿病（OR=5.4）。黎族缺血性脑卒中单纯颅外动脉 AS 组的糖尿病患者比例明显低于汉族缺血性脑卒中单纯颅外动脉 AS 组，而有饮酒史患者比例明显高于汉族缺血性脑卒中单纯颅外动脉 AS 组， $P<0.05$ 。

结论：脑血管颅外段 AS 所致黎族缺血性脑卒中患者明显高于汉族人群，并且其危险因素与饮酒史有重要关系。

PO-0479

临床-语义-放射组学列线图模型预测自发性脑出血早期血肿扩大：包含脑室出血的修订版本的探讨

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背景及目的：早期血肿扩大（hematoma expansion, HE）已被确定是脑出血不良预后的独立预测因子。目前 HE 的相关研究大多基于传统的定义，即只关注脑实质内血肿体积的变化，但既往相关临床研究均未改善脑出血患者的预后。包含脑室内血肿扩张的修订版本血肿扩张（revised hematoma expansion, RHE）定义近期被提出并用于筛选具有早期血肿扩大风险的患者。目前 RHE 的影像组学相关模型预测能力仍不清楚。本研究旨在开发和验证一种基于非强化 CT 的临床-语义-放射组学列线图模型，以识别入院时有 RHE 的幕上自发性脑出血（sICH）患者。

方法：本次双中心回顾性研究中，回顾了 467 例脑出血患者的数据（训练集=299；测试集=77；外部验证队列=91）。基于逻辑回归机器学习方法构建放射组学模型、临床-语义模型和组合模型。采用最小绝对收缩和选择算子（LASSO）进行 5 倍交叉验证。此外，还构建了经典的 BRAIN 评分系统来预测 RHE。采用 ROC 曲线和决策曲线分析（DCA）评价模型的预测性能。

结果：放射组学特征加入临床-语义模型显著提高了 RHE 的预测性能，临床-语义-放射组学列线图模型在训练集（AUC=0.94），测试集（AUC=0.84）及外部验证集（AUC=0.83）中的表现均明显高于单纯的放射组学模型及临床-语义模型，且具有统计学差异（均 $P<0.05$ ）。传统 BRAIN 评分系统的预测效能显著低于其他 3 个模型（训练集 AUC=0.71， $P<0.05$ ）。

结论：临床-语义-放射组学列线图模型能够有效准确地预测早期 RHE，明显优于传统 BRAIN 评分系统，有助于临床更加精准的选择早期血肿扩张的治疗队列。

PO-0480

CSVD 相关认知障碍默认网络的结构网络属性分析

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目的 探索脑小血管病（CSVD）相关认知障碍默认网络障碍的结构基础

方法 搜集我院就诊 CSVD 患者 77 例，其中 CSVD 伴认知障碍（CSVD-CI）34 例，CSVD 认知正常（CSVD-CN）33 例，同期收集性别、年龄和教育程度匹配健康对照组 66 例，每个被试均进行常规头颅平扫，3d-T1 和弥散加权像（ $b=0,1500,3000$ ）扫描，在 Linux 系统利用 fsl 对弥散加权成像进行预处理，然后利用 DiffusionKit 软件的 HARDI 的 CSD 方法进行体素内建模，再进行纤维束追踪，

然后利用 **Briannetome Atlas** 图谱进行 2 步配准后构建 **DMN** 结构网络, 最后利用 **gretna** 软件对 **DMN** 结构网络进行网络属性分析。

结果 相对于健康对照组: **CSVD-NCI** 组的左眶回_2 的节点介数降低; 右眶回_6 的节点效率降低 ($p < 0.05$, **FDR** 校正); 两组的小世界属性、全脑的全局和局部效率、度值、节点的局部效率和最短路径无统计学差异 ($p > 0.05$)。相对于健康对照组: **CSVD-CI** 组的全脑的全局效率和局部效率降低; **CSVD-CI** 组的左眶回_1、右眶回_2、右眶回_6、左扣带回_7 的节点度值下降; **CSVD-CI** 组的左眶回_1、左颞上回_6、左扣带回_7 的节点效率下降; **CSVD-CI** 组的左扣带回_7 的节点局部效率降低 ($p < 0.05$, **FDR** 校正)。两组的节点介数、最短路径和小世界属性无统计学差异 ($p > 0.05$)。在 **CSVD** 组中, 伴认知障碍组 (**CSVD-CI**) 的全脑的局部效率较无认知障碍患者的降低 ($p < 0.05$) , 两组的全脑的全局和局部效率、节点介数和度值、节点效率和节点的局部效率、最短路径、小世界属性无统计学差异 ($p > 0.05$)。

结论 **CSVD** 患者默认网络的内部结构改变与认知障碍相关。

PO-0481

随机生存森林模型在成人弥漫性胶质瘤预后分析中的应用

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目的: 应用随机生存森林模型探索临床和影像组学特征对成人弥漫性脑胶质瘤 (ADG) 的预后风险评估的价值。

方法: 回顾性收集公开数据库 **TCIA** 具有配对术前 **MRI** 检查和预后资料的被试。基于开源工具自动分割胶质瘤, 随后利用 **Pyradiomics** 软件包进行影像组学特征的提取。整合被试的年龄、术前 **KPS** 评分及分子突变等资料为临床资料, **MRI** 组学特征为组学资料。**RSF** 通过 **Python** 工具包 **PySurvival** 实现 (8:2=训练集: 测试集), 使用 **Python** 代码进行网格搜索寻找模型的超参数以获得最适合的 **RSF** 模型, 使用 **C-index** 和综合 **brier** 分数 (**IBS**) 进行评估。基于每个被试的预后危险分数 **Risk score** 和最重要的特征, 再使用 **R** 语言中的 **survminer** 包得到最佳阈值划分为预后相关的高低风险组。

结果: 70 名 **ADG** 纳入本研究, 其中 **WHO2/3/4** 级分别为 22/23/35 名, 女/男=30/40 名; 平均年龄为 46.31 岁; 中位总生存期为 19.22 个月; 术前 **KPS** 评分平均为 81.95 分。

临床模型 model1 超参数为: **num_trees**=21,**max_depth**=2,**min_node**=2 ; **C-index**=0.833[95%CI,0.827-0.840],**IBS**=0.126[95%CI,0.124-0.128]。

组学模型 model2 超参数为: **num_trees**=42,**max_depth**=7,**min_node**=3 ; **C-index**=0.786[95%CI,0.779-0.794],**IBS**=0.147[95%CI,0.145-0.149]。

综合模型 model3 超参数为: **num_trees**=22,**max_depth**=5,**min_node**=2 ; **C-index**=0.820[95%CI,0.814-0.827],**IBS**=0.140[95%CI,0.137-0.142]。三个模型划分的高低风险组的预后均有显著组间差异。

结论: **RSF** 模型能对 **ADG** 的预后风险进行较好预测, 临床资料和临床资料整合临床组学资料的模型预测效果均优于单独的组学特征模型。该结果需进一步在大样本研究中验证。

PO-0482

精神分裂症不同皮层下结构亚型的表观遗传学异常模式研究

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目的: 认知功能障碍是精神分裂症的突出表现, 与患者预后密切相关, 具有显著异质性。我们近期一项研究提示基底节、丘脑等皮层下核团的解剖结构特征有助于识别认知损害不同的病程中后期精神分裂症患者, 即此类患者可根据皮层下结构体积异常模式差异被分为 2 种不同认知损害的亚型。此外, 精神分裂症是一种多基因遗传病, 既往研究提示罹患该障碍个体伴有中枢和外周的 DNA 甲基化异常, 且与认知损害有关。因此, 本文的目的是探索精神分裂症不同皮层下结构亚型患者是否存在 DNA 甲基化异常模式差异及其是否受疾病阶段的影响。

方法: 纳入行颅脑磁共振结构像扫描的两组队列: (1) 病程中后期精神分裂症患者 52 例和健康对照 51 例, 以及 (2) 首发精神分裂症患者 37 例和健康对照 51 例。根据前期研究所采用的无监督与有监督相结合机器学习算法, 对两组患者分别进行基于皮层下结构体积的亚型划分, 在每个队列中评估不同患者亚型及健康对照之间的认知功能差异。对上述受试者的外周血进行 DNA 甲基化测定, 比较不同亚型与健康对照组之间的 DNA 甲基化差异, 对前 5000 个显著差异位点进行基于生物学过程的富集分析。

结果: 与前期发现类似, 本研究的两组患者均分为 2 个亚型: 亚型 1 以皮层下结构受损为特征, 亚型 2 则表现为基底节体积增大(病程中后期)或未见显著改变(疾病早期); 疾病中后期 2 个亚型患者伴有显著认知功能差异, 而疾病早期患者则无显著亚型间认知功能差异。不同亚型患者的表观遗传学异常模式各异: 对于疾病中后期患者来说, 亚型 1 与健康对照之间存在 133204 个显著 DNA 甲基化差异位点, 主要涉及神经系统发育、解剖结构形成等通路, 而亚型 2 与健康对照间仅有 34 个显著差异位点; 在疾病早期患者中, 亚型 1 与健康对照之间有 424 个显著的 DNA 甲基化差异位点, 而亚型 2 与健康对照之间存在 17031 个显著的差异位点, 后者涉及突触后结构调节等通路。

结论: 精神分裂症不同皮层下结构亚型患者的 DNA 甲基化异常模式存在差异, 且此种差异具有动态性、受到了疾病阶段的影响。

PO-0483

基于 3D 高分辨率磁共振成像的机器学习对颅内犯罪斑块的准确识别

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背景: 识别颅内犯罪斑块、明确斑块特征对于预防和治疗卒中具有重要意义。

目的: 基于机器学习的三维(3D)高分辨率磁共振成像(HRMRI)开发高风险斑块模型。

方法: 纳入了 52 例有症状性颅内动脉狭窄并完成 HRMRI 检查的患者。在这些患者中, 有 25 个和 27 个斑块被分别确定为症状性和无症状性斑块。通过使用 T1 加权图像(T1WI)和对比增强 T1WI(CE-T1WI)的影像组学特征, 以临床和影像医生诊断为标准, 根据绘制的 ROI, 提取高维影像组学特征, 将影像组学标签带入到逻辑回归模型, 构建具有线性支持向量分类(线性 SVC)的高危斑块影像组学模型。

结果: 从每个 HRMRI 图像斑块区域提取 11 个 RFs 构建影像组学模型。影像组学的预测模型在交叉验证集和测试集上的 ROC 曲线, AUC 分别是 0.972; 0.905。模型 DCA 曲线下面积(0.267), 说明模型有较好的决策性能。

结论: 基于 3D HRMRI 的放射组学模型能准确区分症状性和无症状性颅内动脉斑块。

PO-0484

单侧颞叶癫痫伴海马硬化患者双侧类淋巴功能障碍及其与病程的关系

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目的：采用沿血管周围间隙的弥散张量成像分析 (DTI-ALPS) 技术评估单侧颞叶癫痫 (TLE) 合并海马硬化 (HS) 患者双侧半球类淋巴系统的功能变化。

方法：回顾性选取湘雅医院神经外科 61 例单侧 TLE-HS 患者和 53 例健康对照 (HCs)。利用同一台西门子 Prisma 3T MR 设备进行 DTI 数据采集，并计算 DTI-ALPS 指数。然后通过组间比较和相关分析分别评估 TLE-HS 患者和 HC 之间 DTI-ALPS 指数的差异以及 TLE-HS 患者的 DTI-ALPS 指数与癫痫临床特征 (包括年龄、发病年龄、癫痫发作持续时间和神经心理学评分等) 之间的关系。

结果：与 HCs 的双侧平均值相比，TLE-HS 患者的患侧和对侧 DTI-ALPS 指数均显著降低 (HCs 双侧均值: 1.49 ± 0.116 , TLE-HS 患侧: 1.41 ± 0.172 , $p = 0.006$; TLE-HS 对侧: 1.42 ± 0.158 , $p = 0.015$)。此外，TLE-HS 患者的患侧 DTI-ALPS 指数与病程呈显著负相关 ($r = -0.352$, $p = 0.005$)。

意义：本研究表明，TLE-HS 患者存在着类淋巴系统功能障碍，提示类淋巴系统作为 TLE-HS 新的治疗靶点的广阔前景。此外，患侧 DTI-ALPS 指数与疾病持续时间呈显著负相关，进一步提示了早期有效干预措施的重要性。

PO-0485

原发性帕金森病和多系统萎缩帕金森型患者小脑改变的磁共振成像研究

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背景：小脑病变会导致运动和非运动功能障碍，可能是多系统萎缩帕金森型 (MSA-P) 和特发性帕金森病 (IPD) 患者的重要鉴别诊断依据。本研究旨在探索 MSA-P 和 PD 患者在全小脑和小脑各亚区体积方面的差异，并进一步探索小脑亚区萎缩对临床运动和非运动症状解释偏倚的贡献。

方法：本研究总共纳入 35 名 MSA-P 患者、50 名 PD 患者和 53 名健康志愿者，所有被试进行临床运动和非运动症状的评估和结构性磁共振扫描。使用小脑特异性的“空间无偏倚小脑模板 (SUIT)”的方法探索小脑体积的改变。进一步使用分层多元线性回归分析，以评估小脑全脑、前叶、后叶和各亚区小脑萎缩与临床运动/非运动症状损伤之间相关性。

结果：SUIT 分析显示，与健康对照组 (HC) 相比，PD 和 MSA-P 患者均显示出较低的小脑体积，但在 MSA-P 患者中，小脑萎缩更为严重。回归分析显示，小脑容量改变参与了两种患者运动和认知症状。在 MSA-P 患者中，较低的小脑前叶体积预测了较差的运动表现 (主要是共济失调和步态冻结)，而较低的小脑后叶体积预测了较差的认知表现 (主要是视觉空间和执行功能)。小脑 Crus I 叶和小脑 Lobules VI 的灰质体积的减少可作为是 MSA-P 和 PD 鉴别诊断独立的影像学标志物。

结论：特定小脑叶的萎缩解释了 MSA-P 和 PD 患者运动和认知功能障碍症状的差异，且可能作为二者鉴别诊断的重要生物标志物。对小脑的进一步研究为 MSA-P 和 PD 的临床功能障碍的病理生理机制方面提供了更多的见解。

PO-0486

大脑外观正常烟雾病患者皮层下核团形态及灌注分析

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目的：利用 FSL 及 Freesurfer 分析大脑外观正常烟雾病患者皮层下核团的形态（形状、体积）与正常人的差异及其与灌注的关系。

方法：前瞻性收集 10 例进行 3D_mprage 及 DSC 扫描的大脑外观正常烟雾病患者作为病例组，在公共数据库(SALD)中选择 20 例年龄、性别相匹配的被试作为对照组。通过 Freesurfer 的 recon-all 计算两组皮层下核团（尾状核、苍白球、壳核、丘脑、杏仁核、海马）的体积及颅内体积，使用 FSL 内的 FIRST 进行双侧核团的形状（Shape）分析，Shape 分析中使用了 FSL 的 Glm 统计模型，年龄、性别及颅内体积作为协变量，采用置换检验（TFCE）进行团块水平的校正，迭代次数为 5000 次。通过独立样本 T 检验分析两组被试的基底核体积与颅内体积的比值的差异。使用 FSL 的 applywarp 函数对 DSC 的 CBF 参数图进行 MNI 标准空间配准，通过 aparc 脑模板提取相应核团的 CBF 值，并用小脑进行标准化，标准化后参数记为 nCBF，皮尔逊相关用于分析体积有统计学意义的核团的 nCBF 与体积相关性。

结果：烟雾病组双侧尾状核、双侧苍白球、双侧壳核体积相对对照组增大（ $p<0.05$ ）有统计学意义，双侧丘脑、双侧杏仁核及海马体积平均值大于对照组，但 $p>0.05$ ，皮下核团的 Shape 分析发现双侧尾状核大约 80% 的边缘、双侧苍白球约 70% 边缘、双侧壳核约 50% 的边缘呈膨胀改变，双侧丘脑前缘及内侧缘约 30% 的边缘呈膨胀改变，右侧杏仁核及左侧海马约 30% 边缘呈膨胀改变，左侧杏仁核及右侧海马约 20% 的边缘为萎缩改变。双侧尾状核体积与 nCBF 存在正相关（ $p<0.05$ ），双侧苍白球及壳核的体积与 nCBF 亦存在正相关（ $p<0.05$ ），双侧丘脑、杏仁核及海马体积与 nCBF 的相关性无统计学意义。

结论：烟雾病组基底（中央核团）核团（尾状核、苍白球、壳核、丘脑）相对正常人可能存在膨胀（Shape 分析发现）、增大（体积分析发现）的改变，中央基底核团的膨胀及增大与发现的灌注增高相吻合，而外周核团（杏仁核、海马）未发现膨胀、增大及与灌注存在相关性，因此，基底核区核团的膨胀、增大可能与灌注增高有关。

PO-0487

肌萎缩侧索硬化症不同皮层起源皮质脊髓束纤维分枝受损：
神经突方向离散度和密度成像研究

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目的：利用神经突方向离散度和密度成像（neurite orientation dispersion and density imaging, NODDI）研究肌萎缩侧索硬化症（amyotrophic lateral sclerosis, ALS）中不同皮层起源的皮质脊髓束（corticospinal tract, CST）纤维分枝的微观结构损害情况。

方法：使用 39 例 ALS 患者和 50 例对照组的扩散加权成像数据来估计 NODDI 和扩散张量成像（diffusion tensor imaging, DTI）模型。构建起源于初级运动区（primary motor area, M1）、前运动皮层、初级感觉区和辅助运动区（supplementary motor area, SMA）的 CST 纤维分枝的精细图谱。计算 NODDI 指标（神经突密度指数[neurite density index, NDI]和方向离散度指数[orientation dispersion index, ODI]）和 DTI 指标（各向异性分数[fractional anisotropy, FA]和平均/轴向/径向扩散率[mean/axial/radial diffusivity, MD/AD/RD]）。

结果: ALS 患者的 CST 纤维分枝 (尤其是起源于 M1 的纤维分枝) 微观结构完整性损害 (表现为 NDI、ODI 和 FA 降低以及 MD、AD 和 RD 升高), 这与疾病严重程度相关。与其他扩散指标相比, NDI 具有最大的效应量, 并且其反映 CST 纤维分枝受损的程度最大。Logistic 回归分析发现, 与其他纤维分枝和 CST 整体相比, NDI 在起源于 M1 的 CST 纤维分枝中具有最高的诊断效能。

结论: CST 纤维分枝 (尤其是来源于 M1 的纤维分枝) 微观结构受损是 ALS 的主要特征。NODDI 和 CST 纤维分枝分析结合可以提高 ALS 的诊断效能。

PO-0488

脑小血管病患者中白质自由水的升高速率与白质纤维退变相关: 一项纵向研究

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目的 脑小血管病(CSVD)是导致认知下降及痴呆的最重要的血管因素。近期, 自由水(FW)作为 CSVD 的新兴影像标志物而受到广泛关注, 越来越多的研究表明了白质自由水(WM FW)与认知能力及疾病严重程度的相关性。然而 WM FW 在 CSVD 患者中升高的病理生理机制尚未明了。因此, 在本研究中, 我们旨在通过对 CSVD 患者的数据进行纵向分析, 探索 WM FW 与 CSVD 主要病理机制(白质纤维退变和组织低灌注)之间的关系。

方法 本研究回顾性纳入了 80 名 CSVD 患者, 所有受试者均进行了两次及以上的多模态 MRI 扫描。我们采用表观纤维密度(AFD)代表纤维退变的程度, 采用脑血流量(CBF)代表组织灌注情况。将所有时间点均表现为白质高信号(WMH)的白质区域定义为稳定的 WMH(sWMH), 所有时间点均非 WMH 的白质区域定义为稳定的表现正常白质(sNAWM)。我们采用相关分析和线性混合效应模型, 来探索在白质区域及其分区(sWMH、sNAWM)内 FW 的纵向改变情况, 以及 AFD/CBF 和 FW 之间的关系。

结果 在 WM、sWMH、sNAWM 中, FW 随时间持续增加(all $p < 0.001$)。与 sNAWM 相比, sWMH 的 FW 增加更快(0.018 vs 0.005, $p < 0.001$)。在 WM、sWMH、sNAWM 中, FW 与 AFD 均呈负相关($r = -0.68$; $r = -0.58$; $r = -0.65$; all $p < 0.001$), FW 与 CBF 均呈负相关($r = -0.39$, $p < 0.001$; $r = -0.28$, $p = 0.02$; $r = -0.30$, $p = 0.01$), 基线 AFD 均能够预测 FW 的纵向改变($SE = -0.04$, $p = 0.01$; $SE = -0.05$, $p = 0.04$; $SE = -0.04$, $p = 0.04$), 而基线 CBF 均不能预测 FW 的纵向改变。

结论 在脑小血管病人群中, 白质自由水随时间持续性升高, 白质纤维退变会加速其升高, 而白质区域低灌注则与其无关。

PO-0489

心源性栓塞型急性缺血性卒中 4D-CTA 影像特征

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背景: 急性缺血性卒中中心源性栓塞的识别对血管内治疗和抗凝治疗的决策具有重要意义。我们旨在探讨心源性栓塞型急性缺血性卒中四维计算机体层血管成像(4D-CTA)影像特点, 并评估这些特征是否可以协助卒中病因分类。

方法: 回顾性分析了 2020 年 7 月至 2022 年 2 月在重庆医科大学第一附属医院入院的 294 例急性缺血性卒中患者的影像学资料。筛选出大脑中动脉 M1/M2 段闭塞, 伴/不伴颅内段颈内动脉闭塞的患者 110 例, 用于计算血栓负荷评分和侧支循环评分, 其中血栓近段和远端清晰的 88 例患者被用于

测量血栓长度。采用时间最大密度投影 (timeMIP) 和最大密度投影 (MIP) 后处理图像评估血栓特征。利用 Mann-Whitney U 检验比较心源性栓塞组和非心源性栓塞患者的各项血栓特征。采用二元逻辑回归评估血栓影像特征与心源性栓塞分型的关系。受试者特征工作曲线被用于检验血栓特征识别心源性栓塞分型的诊断效能。

结果:年龄、脑血管疾病高危因素、导致心源性栓塞的高危/中危因素、血栓长度、血栓负荷评分和侧支循环评分在心源性栓塞组和非心源性栓塞组之间有显著差异 ($P<0.05$)。二元逻辑回归结果显示, 心源性栓塞分型与 MIP-血栓长度显著相关[优势比 (OR), 1.15; 95%置信区间 (CI): 1.02-1.29; $p<0.05$], tMIP 血栓长度(OR, 1.18; 95% CI: 1.02-1.36; $p<0.05$), tMIP-血栓负荷评分(OR, 3.96; 95% CI: 1.08-14.58; $p<0.05$)。MIP 血栓长度识别心源性栓塞分型 ROC 曲线下面积为 0.75 (95% CI: 0.65-0.84, $P<0.05$), 截断值为 >7.4 mm。tMIP 血栓长度识别心源性栓塞 ROC 曲线下面积为 0.72 (95% CI: 0.61-0.81, $P<0.05$), 截断值为 >5.4 mm。

结论:MIP 图像一定程度上高估了血栓长度和负荷。在血栓特征中, 血栓长度可以作为识别心源性栓塞型急性缺血性卒中的影像学标志。

PO-0490

慢性脑桥梗死患者脑灰质体积及结构协变网络的异常改变

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前瞻性纳入 2014 年 10 月至 2021 年 6 月我院收治的首发单侧慢性期 PI 患者作为病例组, 同时纳入年龄、性别及受教育年限相匹配的健康受试者作为正常对照组。收集受试者高分辨率三维 T1 结构 MRI 图像及行为学评分。采用基于体素的形态学分析和双样本 t 检验探索组间 GMV 的差异。以 GMV 差异脑区作为种子点, 构建 SCN 探索 PI 患者结构协变模式的异常。采用 Spearman 秩相关分析差异脑区 GMV 与行为学评分的相关性。共纳入 60 例 PI 患者, 其中左侧 PI 33 例, 右侧 PI 27 例, 同时纳入 34 例健康对照者。与正常对照组比较, 左侧 PI 组双侧小脑后叶 GMV 显著缩小, 右侧 PI 组左侧小脑前后叶及右侧小脑后叶 GMV 均显著缩小 (高斯随机场校正, 体素水平 $P<0.001$, 簇水平 $P<0.05$, 簇体素 >20), 且左侧小脑前后叶及右侧小脑后叶 GMV 值与患者运动功能评分存在显著相关性 ($P<0.05$)。此外, 与正常对照组相比, 右侧 PI 组存在更广泛的协变脑区且协变脑区间结构连接数量显著增多 (簇类错误校正, $P<0.05$, 簇体素 >20)。

PO-0491

3.0T 高分辨率磁共振管壁成像显示豆纹动脉的研究

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目的: 豆纹动脉的形态特征被认为与年龄、高血压、脑卒中和认知障碍密切相关。高分辨率磁共振管壁成像是无创管壁成像技术, 通常用于血管可视化。传统的 3.0T 高分辨率磁共振管壁成像技术, 由于扫描时间长、分辨率有限难以实现豆纹动脉的可视化。本研究探讨基于压缩感知加速技术的 3.0T 高分辨率磁共振管壁成像技术应用于豆纹动脉显示的成像效果和可行性。

材料与方法: 本研究经吉林大学第一医院伦理委员会批准, 并获得所有受试者的书面知情同意。患者在 3T 西门子 MR 扫描仪上进行检查。该方案由 3D 高分辨率 TOF MRA 和 3D SPACE 序列组成。采用冠状面最大强度投影(MIP)或最小强度投影(MinIP)重建 TOF MRA 和 3D SPACE 图像, 层厚为 20mm。由两名经验丰富的放射科医生统计豆纹动脉的数量及长度, 在冠状面 MIP 或 MinIP 测量豆纹动脉的最大长度

结果:

4 名患者纳入本研究, 豆纹动脉数量 4-8 支, 豆纹动脉最大长度 37.7-58.0mm。本研究的结果证明了基于压缩感知加速技术的 3.0T 高分辨率磁共振管壁成像技术应用于豆纹动脉显示的可行性和临床可应用性。

结论: 基于压缩感知加速技术的 3.0T 高分辨率磁共振管壁成像技术能够有效、准确的显示豆纹动脉, 极大的缩短扫描时间, 有利于临床应用及推广。

PO-0492

精神分裂症与阿尔茨海默病之间的共同遗传结构初步研究

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目的: 精神分裂症 (SCZ) 和阿尔茨海默病 (AD) 均属于遗传度较高的神经精神疾病, 其发病机制是由大量的遗传变异、各种各样的环境暴露共同作用的结果。流行病学研究发现二者之间经常存在症状重叠, 比如认知功能障碍是 SCZ 患者的核心特征, AD 患者晚期亦会出现精神类症状。然而, 关于两者共享的分子遗传机制尚不清楚。

方法: 本研究基于可公开获取的 130644 例 SCZ 和 455258 例 AD 患者的欧洲人全基因组关联研究 (GWAS) 统计数据, 利用条件性错误发现率 (condFDR) 来检测出更多的 SCZ、AD 显著相关的遗传位点, 利用联合条件性错误发现率 (conjFDR) 方法找到具体的 SCZ、AD 疾病共享位点。

结果: 我们观察到 SCZ 与 AD 间存在显著的遗传相关性 ($r=0.097$, $P=0.026$)。使用 condFDR 方法 ($P<0.01$), 发现 268 个与 SCZ 显著相关的 SNPs, 其中 78 个是新发现的仅与 SCZ 相关的 SNPs; 发现 125 个与 AD 显著相关的 SNPs, 其中 55 个是新发现的仅与 AD 相关的 SNPs。此外, 采用 conjFDR 方法 ($P<0.05$) 检测到 16 个 SCZ 与 AD 的共享位点; 其中 8 个 SNPs 具有一致的遗传风险效应方向。上述等位基因效应方向出现明显的混合模式, 表明两者疾病的遗传风险存在多效性。

结论: 本研究揭示了 SCZ 与 AD 之间共享的遗传风险位点, 有助于进一步理解这两种疾病的分子生物学基础, 为我们更好地理解这两种疾病临床症状及影像学表现的重叠提供新思路。

PO-0493

基于增强 T1WI 的直方图分析在区分侵袭性垂体瘤和非侵袭性垂体瘤的鉴别诊断价值

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目的: 根据垂体瘤 knosp 分级, 探讨基于对比增强 T1WI (contrast-enhanced T1 weighted imaging, CE-T1WI) 直方图分析区分侵袭性垂体瘤和非侵袭性垂体瘤的价值。

材料和方法: 回顾性分析 2021 年 1 月至 2023 年 9 月就诊于河南省人民医院, 经组织病理学验证的 40 例非侵袭性垂体瘤 (0、I、II 级) 及 28 例侵袭性垂体瘤 (III、IV 级) 资料。采用 3D slicer 软件对肿瘤最佳层面勾画感兴趣区 (region of interest, ROI), 行灰度直方图分析, 提取 8 个直方图参数, 包括 Perc.10%、Perc.90%、峰度、平均值、中位数、最大值、最小值、方差。两组间计量资料的比较采用独立样本 t 检验或 Mann-Whitney U 检验。绘制受试者工作特征 (receiver operating characteristic curve, ROC) 曲线, 并计算曲线下面积 (area under the curve, AUC) 评估相关参数对于侵袭性垂体瘤和非侵袭性垂体瘤的诊断效能。

结果: 侵袭性垂体瘤和非侵袭性垂体瘤两组肿瘤, 在 CE-T1WI 直方图参数中, Perc.10%、Perc.90%、平均值、中位数、最大值、最小值、方差有统计学意义, P 值分别为 0.007、0.034、0.012、0.014、0.021、0.019、0.004。其 ROC 曲线下面积、敏感度、特异性分别为 0.693 (0.893、0.500)、0.652 (0.821、0.450)、0.680 (0.929、0.425)、0.676 (0.929、0.425)、0.665 (0.679、0.675)、0.668 (0.786、0.525)、0.704 (0.536、0.850)。

结论: 基于 CE-T1WI 直方图对侵袭性垂体瘤和非侵袭性垂体瘤的区分存在很大的价值, 在一定程度上有助于对患者制定最佳治疗方案, 提高诊断的准确率以及预后效果。

PO-0494

基于系统性红斑狼疮的脑结构-功能耦合的磁共振研究

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目的 探讨 SLE 患者脑灰质体积及功能连接的变化。方法 前瞻性纳入 65 例 SLE (35 例 NPSLE, 30 例 non-NPSLE) 患者为病例组, 同期纳入 31 例健康人作为对照组, 行功能磁共振检查, 并完成简易精神状态量表(MMSE)、蒙特利尔认知评估量表 (MoCA)、医院焦虑抑郁量表(HADS-A、HADS-D)、运动和认知功能疲劳量表(FSMC-M、FSMC-C)及实验室检查(C3、C4、IgA、IgM、IgG)。运用基于体素的形态学测量(voxel-based morphometry, VBM)方法对脑灰质体积进行分析, 并选择 NPSLE 与 non-NPSLE 灰质体积差异脑区为感兴趣区(region of interest, ROI)进行全脑功能连接的分析。分析 SLE 差异脑区灰质值及 FC 值与神经心理学量表及临床指标的相关性, 并探索他们的诊断效能。结果 与 HC 比, NPSLE 患者左侧眶部额下回、右侧回直肌、右侧颞横回、左侧眶内额上回、右侧眶内额上回体积减小 (FDR 校正后 $P < 0.05$); 与 HC 比, non-NPSLE 患者左侧眶部额下回、左侧眶内额上回、右侧眶内额上回、右侧颞横回灰质体积减小 (FDR 校正后 $P < 0.05$); 与 non-NPSLE 患者比, NPSLE 患者左侧眶部额下回、右侧回直肌、右侧颞横回体积减小 (FDR 校正后 $P < 0.05$)。功能连接分析显示, NPSLE 患者右侧颞横回与双侧中央后回功能连接减低 (FWE 校正后 $P < 0.05$)。右侧眶内额上回灰质值与 FSMC-C 负相关 ($r = -0.401, p = 0.023$); 右侧眶内额上回灰质值与 FSMC-M 负相关 ($r = -0.374, p = 0.035$); 右侧颞横回-左侧中央后回 FC 值与病程负相关 ($r = -0.390, p = 0.027$)。SLE 差异脑区灰质值及功能连接值具有较高的诊断效能。结论 SLE 患者多个脑区灰质体积减小, 同时与部分脑区功能连接减低, 这可能是其认知及情绪障碍的神经病理基础之一, 具有一定的临床意义。

PO-0495

视神经脊髓炎前视路扩散张量成像研究

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目的: 使用基于 fixel 的分析 (FBA) 评估视神经脊髓炎谱系疾病 (NMOSD) 的视神经至外侧膝状体的前视路损伤特点, 并探究 NMOSD 视神经炎急性发作期扩散张量成像能否预测患者视力预后。方法: 研究纳入了视神经炎发作 ≥ 6 个月的稳定期 NMOSD 患者 (NMOSD-ON), 同时纳入性别、年龄匹配的健康对照和无视神经炎发作史的 NMOSD 对照组 (NMOSD-NON 组)。后依据稳定期结果, 继续招募视神经炎发作急性期的 NMOSD 确诊患者 (NMOSD-AON 组)。最终纳入 NMOSD-ON 组 20 例, NMOSD-NON 组 19 例, 健康对照组 20 例, NMOSD-AON 组 20 例。分别将视神经、视束均分为 10 段, 每段从前至后分别编号 1-10, 视交叉单独为 1 段, 使用 FBA 分析每段的 FD 值、FC 值和 FDC 值。使用一般线性模型比较各组之间前视路各子段的 FBA 测量值, 校正

年龄和性别。使用偏相关分析评估 FBA 测量值和 OCT 检查结果及临床参数的相关性。使用 Spearman 相关性分析探究视神经炎急性发作期 FBA 参数与基线数据及 6 个月视力的关系。结果：与健康对照组相比，NMOSD-ON 组视束的第 4-8 子段 FD 值、FDC 值显著降低 ($P < 0.05$)，视神经各子段 FD、FC、FDC 值均较健康对照低，但无统计性差异。NMOSD-NON 组与健康对照组相比，FBA 测量值未见显著差异。相关性分析显示 NMOSD 患者视交叉和视束的平均 FD 值、视神经的 FC 值、视交叉的 FDC 值和平均 GCIPL 厚度呈正相关。视交叉的 FD 值和平均 RNFL 厚度存在相关性。NMOSD-AON 组急性期视束的 FD、FC 和 FDC 值与恢复期视力显著相关。结论：NMOSD 前视路损伤主要位于视束后部，FD 值减低提示纤维密度的减低。FBA 参数与 OCT 检查结果可建立相关性，提示 FBA 分析可作为潜在的前视路损伤评估标记物。视束的急性期 FBA 参数可能对患者 6 个月视力预后提示作用。

PO-0496

NMOSD 患者扣带皮层神经递质紊乱的磁共振波谱研究

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目的 视神经脊髓炎谱系障碍 (NMOSD) 在东亚人群中的发病率高达 3.5/10 万人。约 29-67% 的 NMOSD 患者存在认知障碍。并且 NMOSD 同时存在大脑结构、功能的重构。但是其神经化学基础尚不清楚。本研究将对 NMOSD 认知相关脑区的递质含量进行检测，并探索其与认知损害的关系。方法 我们应用短回波点分辨波谱 (PRESS) 和编辑波谱序列 (HERMES)，分别检测了 35 例 NMOSD 患者和 41 名健康对照组 (HC) 的前扣带皮层 (ACC)、后扣带皮层 (PCC) 和枕叶皮层 (OC) 中的 GABA、GLU、GSH 含量，并进一步对各脑区的兴奋抑制平衡 (E/I) 进行定量分析。此外，评估了所有受试者的认知功能和情绪状态。我们进一步通过独立样本 t 检验探索 NMOSD 组与 HC 组三个脑区递质含量的差异，通过偏相关分析探索 NMOSD 组三个脑区递质含量与认知指标的关系。结果 与 HC 组相比，NMOSD 的一般认知水平 (MoCA)、连线测试 A、B (TMT-A、TMT-B) 的成绩较差 ($p < 0.05$)，而焦虑得分增加 ($p = 0.015$)。神经递质方面，NMOSD 的 ACC 和 PCC 存在 GABA 水平降低 ($p < 0.01$)，Glu 水平升高 ($p = 0.017$)，GSH 水平升高 ($p = 0.002$)。NMOSD ACC 和 PCC 的 E/I 比值升高 ($p = 0.002$)。并且，NMOSD PCC 的 GABA 含量与焦虑呈负相关 ($r = -0.499$, $p = 0.006$)，E/I 比值与焦虑呈正相关 ($r = 0.434$, $p = 0.027$)。PCC 的 GSH 水平与 TMT_A 呈负相关 ($r = -0.442$, $p = 0.027$)。结论 我们发现 NMOSD 患者 ACC、PCC 脑区存在 GABA 含量降低，GLU、GSH 含量升高和 E/I 失衡，提示其脑内存在 GABA 能系统、GLU 能系统的紊乱。而 PCC 的 E/I 值与 NMOSD 的焦虑显著相关，提示 E/I 失衡可能是 NMOSD 患者情绪障碍的潜在代谢因素。NMOSD 患者 PCC 的 GSH 与认知显著相关，提示 PCC 的 GSH 含量可以用作预测 NMOSD 患者认知功能下降的预测因子，而抑制 NMOSD 患者的氧化应激水平可以保护其认知功能。

PO-0497

磁共振脊髓 CE-MRA 成像技术在硬脊膜动静脉瘘诊断中的应用价值

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目的：评估 MRI 脊髓 CE-MRA 成像技术在硬脊膜动静脉瘘中的诊断效能。

方法：回顾性收集在湘雅医院 2021 年 1 月 1 日至 2023 年 7 月 31 日期间进行了脊髓常规 MRI 及 CE-MRA 检查的病例 74 个，并均在 MRI 检查后 90 天内进行了 DSA 或手术。CE-MRA 包括高空间分辨率（2 期）及高时间分辨率（17 期）扫描。

结果：74 个病例中硬脊膜血管畸形 49 例，无血管畸形 25 例；常规 T2WI 共有 6 例假阴性、3 例假阳性病例；CE-MRA 共有 13 例假阳性、无假阴性病例。CE-MRA 诊断脊髓血管畸形的敏感性、特异性分别为 100%、48%，常规 T2WI 诊断硬脊膜血管畸形的敏感性、特异性分别为 87.8%、88%。所有血管畸形在 CE-MRA 上均得到正确诊断及定位，供血动脉在 CE-MRA 上均得到清晰显示，并且能够连续获得动脉期及静脉期图像，以及脊髓血管性疾病的静脉引流模式。

结论：MRI 脊髓 CE-MRA 技术是一种针对硬脊膜血管畸形可靠的检查方法，具有较高的敏感性，能清晰显示供血动脉，为 DSA 或手术的术前诊断和定位提供可靠的影像学依据。

PO-0498

基于新分型的帕金森病脑白质微结构改变及相关病理机制研究

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背景：帕金森的临床表现和预后具有明显的异质性，新分型是对人口统计学，遗传信息，运动症状和非运动症状进行聚类分析后，总结出的综合的全面的分类标准。但目前尚未有研究阐明 PD 新分型中不同亚型所表现出的不同临床症状的发病机制。因此本研究的目的是探索帕金森不同亚型脑白质微观结构的差异。

方法：本研究的横向数据涉及 PPMI 数据库中初诊时的帕金森患者：68 例轻度运动为主型，18 例弥漫恶化型，以及 45 例健康对照组，纵向数据涉及 PPMI 数据库中基线帕金森数据对应的随访 1 年后的 50 例轻度运动为主型，13 例弥漫恶化型，40 例健康对照组。Tract-based spatial statistics (TBSS) 用于对基线时和随访后的 DTI 参数值进行组间比较，年龄，性别，家族史，教育水平作为协变量矫正。对所有参与者的临床状况评估采用同一套运动及非运动症状量表。

结果：在运动症状，快动眼睡眠，自主神经功能症状，视觉空间觉，执行能力，思维流畅性，识别分歧能力此类领域中，弥漫恶化型与另外两组相比有显著的功能障碍。TBSS 分析显示，弥漫恶化型帕金森患者的径向扩散系数 AD 存在异常，这些部位涉及右侧皮质脊髓束，右侧额枕下束，右侧胼胝体压部；弥漫恶化型的轴向扩散系数 RD 存在广泛脑白质异常，并与语言流畅性和执行功能相关。随访 1 年后各亚型间 DTI 参数的变化无显著差异。

结论：开展基线时的 DTI 研究有助于在帕金森初诊时早期识别弥漫恶化亚型，本研究发现的白质纤维束异常有助于深入理解弥漫恶化型帕金森患者的发病机制。需要有更长时间的随访数据支持探究帕金森病各亚型间的进展差异。

PO-0499

基于静息态 fMRI 研究主观认知下降患者动态低频振幅与空间导航障碍的相关性

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目的 比较主观认知下降患者 (subjective cognitive decline, SCD) 与健康对照组 (normal control, NC) 动态自发性脑活动差异, 以及与认知量表、空间导航能力 (spatial navigation, SN) 的相关性, 以探究 SCD 患者空间导航障碍的发生机制。

方法 招募接受静息状态功能性磁共振成像 (resting-state functional magnetic resonance imaging, rs-fMRI) 的 SCD 患者 (n=72), 以及年龄、性别和教育程度匹配的 NC (n=67)。采用滑动时间窗口方法分割 rs-fMRI 时间序列, 采用独立样本 t 检验比较两组间动态低频振幅 (dynamic amplitude of low frequency fluctuation, dALFF) 差异。利用计算机空间导航障碍测试系统对两组人群进行空间导航能力测验。采用 Pearson 相关分析探讨 SCD 组 dALFF 值的变化与认知表现、空间导航能力的相关性。

结果 与 NC 组相比, SCD 组在 SN 测试中表现更差, 在右侧楔前叶、左侧楔叶 dfALL 变异性减低 ($t=3.41, 3.12, P<0.05$, FDR 校正), 在右侧枕中回、右侧角回 dfALL 变异性升高 ($t=4.51, 3.36, P<0.05$, FDR 校正)。SCD 组右侧楔前叶 dALFF 时间变异性与自我空间导航 ($r=-0.341, P=0.025$)、延迟空间导航 ($r=-0.286, P=0.035$) 及记忆功能 ($r=-0.332, P=0.009$) 呈负相关, 左侧枕中回 dALFF 时间变异性与语言功能 ($r=0.339, P=0.015$)、视空间功能 ($r=0.343, P=0.008$) 呈正相关。

结论 右侧楔前叶、左侧枕中回 dALFF 时间变异性异常改变可能是 SCD 患者出现认知障碍、空间导航障碍的神经生物学基础, 这可能是早期识别 SCD 患者潜在的影像标志物。

PO-0500

mTBI-DSANet:使用多层功能连接网络诊断轻度创伤性脑外伤的深度自我注意模型

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目的: 通过构建深度学习模型 mTBI- DSANet , 探索其对轻度创伤性脑外伤 (mTBI) 诊断的效能。

方法: 1、被试: 69 名 mTBI 患者和 60 名健康被试。mTBI 被试纳入标准包含:(1)格拉斯哥昏迷量表;(2)意识丧失的最大时间;(3)头颅常规 CT 未见明显颅内血肿;(4)损伤持续时间小于 3 天;(5)无多发骨折等其他严重身体损伤;(6)右利手。排除标准有:(1)头部外伤史;(2)颅内血肿或脑挫伤;(4)吸毒、酗酒或吸烟;(5)精神障碍;(6)磁共振检查禁忌症;(7)怀孕或计划怀孕。选取与 mTBI 被试相匹配的健康被试作为正常对照。2、数据采集及处理: 使用配备 15 通道头部线圈的飞利浦 3.0T 磁共振扫描仪, 使用 SPM12、REST1.8 在 MATLAB2013a 上完成数据预处理。3、计算低阶功能连接网络 (LoFCN), 高阶功能连接网络 (tHoFCN), 关联高阶功能连接网络 (aHoFCN), 构建 mTBI-DSANet。4、比较 mTBI-DSANet 与现有的机器学习模型对于不同 FCN 组合在准确度、灵敏度、特异性、精密度和 F 评分的表现。

结果: 1、使用 mTBI-DSANet 对不同的 FCN 组合评价, LoFCN+ aHoFCN 组合在准确度、灵敏度、特异性、精密度和 f 评分方面表现最佳; 2、基于 LoFCN+ aHoFCN 组合, mTBI-DSANet 与其他机

器学习模型在准确性、灵敏度、特异性、精度、f 评分几个指标比较, 效能更优异; 3、k-fold 交叉验证方案验证了 mTBI-DSANet 的稳健性。

结论: mTBI- dsanet 框架基于自注意机制, 可以捕获多级神经网络的特征, 用于 mTBI 诊断。实验结果表明:1、tHoFCN 和 aHoFCN 有利于 mTBI 的诊断;2、LoFCN 与 tHoFCN 或 aHoFCN 的组合, 特别是 LoFCN+ aHoFCN 的组合, 可以大大提高 mTBI 的诊断性能;3、LoFCN+ aHoFCN 组合的 mTBI-DSANet 在 10 倍交叉验证中准确率为 0.834, 灵敏度为 0.833, 特异性为 0.840, 精密度为 0.858,F-score 为 0.834, 显著优于其他同类机器学习模型。

PO-0501

双层探测器光谱 CT 对于减少脑动脉瘤术后患者 CTA 金属伪影干扰的研究

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光谱 CT 技术可以达到“同源、同时、同向”的要求, 为准确地能量解析提供保障, 可以达到去除线束硬化伪影的最佳效果。脑动脉瘤病人术后复查 CTA 评估血管管腔及术区并发症时,常受到金属夹及弹簧圈伪影的干扰, 金属伪影使得病人血管管腔狭窄被高估, 并降低术区脑组织的影像质量, 给临床医师带来很大困扰, 因此选择一种新的方法减少这种伪影是临床工作中亟待解决的问题。目的: 探讨是否双层探测器光谱 CT 对于减少脑动脉瘤术后患者 CTA 金属伪影干扰。方法: 收集中南大学湘雅医院 8 月在飞利浦 IQon 双层探测器光谱 CT 进行脑部 CTA 扫描的动脉瘤术后患者 20 例, 基于重建 CT 数据获得常规混合能量图(PI)、加入 O-MAR 的 PI(MAR 图)、70~200 keV VMI 及其与 O-MAR 融合图(VMI-MAR 图);计算低密度和高密度伪影指数(AI)及脑组织噪声值(SD),并针对伪影严重程度及植入物周围组织清晰度进行主观评分;比较不同图像 AI、SD 和主观评分差异, 评估 VMI 联合 O-MAR 去除金属伪影的价值。结果 VMI 及 VMI-MAR 图中, 多数 AI 及 SD 随能级升高而下降, 且能级越高越趋于平稳; VMI 中, 部分 AI 及 SD 随能级升高而先降低后升高; AI 和 SD 均于 190 keV VMI-MAR 图中最低, VMI-MAR 图主观评分最高。结论 双层探测器光谱 CT VMI 联合 O-MAR 有助于去除脑动脉瘤术后患者 CTA 金属伪影干扰。

PO-0502

基于高分辨率 DWI 的垂体腺瘤诊断应用研究

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目的: 本研究在包含 T1 (T1WI) 加权成像、T2 (T2WI) 加权成像及普通 T1 (CE-T1WI) 对比增强成像的临床常规成像的基础上应用了同时多层激发分段读出 (SMS-RESOLVE) 弥散加权成像 (DWI) 的新技术, 从主、客观评价的角度探讨新技术的可行性, 并对其扫描结果进行定量分析及药代动力学分析, 以进一步探讨其在垂体腺瘤诊断中的应用价值。

方法: 本研究最终纳入 11 例垂体腺瘤患者进行相关研究。对纳入研究的所有患者均使用 Siemens Vida 3T 磁共振设备行常规序列 T1WI、T2WI、CE-T1WI 和 SMS-RESOLVE DWI 新序列的扫描, 并收集临床数据及影像学数据进行分析。

对 SMS-RESOLVE DWI 在垂体腺瘤影像学诊断中的应用进行研究: 将主观评价结果与临床常规使用的 CE-T1WI 序列进行统计学分析对比, 同时记录并分析其客观评价结果。对 SMS-RESOLVEDWI 序列图像上正常垂体组织与垂体腺瘤的相对信号强度 rDWI 进行统计学分析。利用

前述影像学参数定量分析结果中有统计学差异者绘制 ROC 曲线, 并记录相关结果以评估其诊断效能。对数据进行统计分析处理: 记录其曲线下面积、敏感度、特异度、约登指数及最佳截断值以评估其诊断效能。

结果: 对 SMS-RESOLVE DWI 序列的扫描结果进行分析: CE-T1WI 与 SMS-RESOLVE DWI 组间的主观评价评分均无统计学差异($P>0.05$)。2 位阅片者在该序列冠状位图像上对病灶直径的测量结果均具有一致性($P<0.01$)。在高 b 值($b=1000s/mm^2$)SMS-RESOLVE DWI 上, 在垂体腺瘤与正常垂体组织、不同类型的垂体腺瘤以及区分泌乳素瘤与无功能垂体腺瘤的差异性评价中, $P<0.01$, 表明 SMS-RESOLVE DWI 序列其对于区分正常垂体组织和垂体腺瘤及区分不同类型的垂体腺瘤均具备一定的诊断效能。

结论: 高 b 值 SMS-RESOLVE DWI 可以有效区分正常垂体组织与垂体腺瘤, 并在区分不同类型的垂体腺瘤中具备一定的诊断效能, 有望成为无需注射造影剂的垂体腺瘤影像学检查方法。

PO-0503

颅脑动脉曲折率与脑小血管病总体负担评分的相关性研究

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目的: 探讨颈内动脉、基底动脉曲折率与脑小血管病(CSVD)神经影像和总体负担评分的相关性。

方法: 纳入 2020 年 0 至 2022 年两周内行头颈 CTA、头颅 MRI 检查并符合《中国脑小血管病诊治专家共识 2021》的 CSVD 患者 (总体负担评分 1-4 分), 纳入 0 分患者作为对照。收集所有研究对象的临床基线资料。将 CTA 图像导入后处理工作站, 测量左右颈内动脉, 基底动脉长度及最短距离, 计算曲折率 (TI)。采用两独立样本 t 检验和卡方检验比较对照组和病例组的基线资料, 并对有差异的指标行多因素 logistics 回归分析。将四项神经影像标志物包括腔梗 (LIs)、脑微出血 (CMBs)、脑白质高信号 (WMH)、血管周围间隙扩大 (EPVS) 分为 0、1 分组, 分析两组间血管曲折率差异和相关性。按总体负担评分将病例组分为低、高分组, 分析两组间血管曲折率差异和相关性。结果: 最终纳入 103 例受试者, 对照组 30 例, CSVD 病例组 73 例 (低分组 42 例, 高分组 31 例)。1. 对照组与病例组之间的临床基线资料比较: 相较于对照组, 病例组高龄、有高血压及饮酒史的病例占比更高, 甘油三酯 (TG)、低密度脂蛋白胆固醇 (LDL-c) 更高, 基底动脉、左右颈内动脉长度、左颈内动脉曲折率 (LICA TI)、右颈内动脉曲折率 (RICA TI) 值更大 ($P<0.05$)。2. CSVD 各神经影像评分与血管迂曲的相关性: Lis 评分 1 分的患者, L/RICA TI 更高, CMBs 评分 1 分的患者, LICA TI 更高, WMH 评分 1 分的患者, L/RICA TI 更高, EPVS 评分 1 分的患者, 患者 L/RICA TI 更高, 上述 $P<0.05$ 。(5) 各项神经影像标志物相关性分析中, Lis 与 LICA TI 的 rs 为 0.42, EPVS 与 LICA TI 的 rs 值为 0.41, 余指标 rs 介于 0.3~0.4 之间。3. CSVD 总体负担评分与血管迂曲的相关性: L/RICA TI 与 CSVD 总体负担评分呈正相关, rs 值分别为 0.51, 0.46。结论: 年龄、高血压、饮酒史是 CSVD 的危险因素。颅脑动脉曲折率越高, 四项神经影像严重程度越高; ICA TI 与 CSVD 总体负担评分存在正相关。

PO-0504

低强度聚焦超声对于化疗相关认知障碍大鼠模型的神经调控研究

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[目的] 观察低强度聚焦超声对于化疗相关认知障碍大鼠模型的治疗效果并探索其神经调控机制。[材料和方法] 采用顺铂构建认知障碍大鼠模型, 基于对海马关键脑区进行亚区分割, 结合认知行为学及组织病理学检测用于评价顺铂化疗后的疗效情况; 筛选神经影像标志物用于分析其与生物学行为指标的相关性, 并基于网络动力学角度探索 LIFUS 神经调控机制, 基于分子生物学角度探索 LIFUS 治疗相关神经生物学机制。[结果] 水迷宫实验与新颖物体识别实验在 LIFUS 治疗组具有统计学差异。模型组在治疗前、后比较, 左侧 CA2、CA3, 双侧边缘内嗅皮层的 MD 值具有组间统计学差异; LIFUS 组在治疗前、后比较, 左侧 DG、双侧 PAS 的 MD 值具有组间统计学差异; 右侧 PAS 的 AD 值具有组间统计学差异; 右侧 CA2、双侧 DG、双侧 PAS 及左侧 MEC 具有组间统计学差异。模型组、假治疗组及 LIFUS 治疗组大鼠脑海马区树突棘密度显著降低; LIFUS 组大鼠脑海马区树突棘密度明显提高。模型组、假治疗组大鼠脑海马区出现髓鞘丢失增多, 银染颜色减淡。LIFUS 组大鼠海马区出现髓鞘丢失减少, 银染颜色加深。模型组、假治疗组大鼠脑海马区凋亡细胞数显著增多, LIFUS 组大鼠海马区凋亡细胞数显著减少。左侧 DG、左侧 PAS、右侧 PAS 的 MD 指标, 右侧 PAS 的 AD 指标, 左侧 DG、左侧 MEC 及右侧 DG 和 PAS 的 RD 指标, 均与潜伏期呈正相关; 右侧 CA2 的 RD 指标与新颖物体识别指数呈正相关。LIFUS 治疗组大鼠在部分脑区出现磁共振功能影像的平均可控性与模态可控性改变。CA2 亚区 GFAP 阳性数量在对照组与模型组间具有统计学差异, 阳性细胞面积在对照组与模型组间具有统计学差异; NeuN 阳性细胞相对值在模型组与对照组及模型组与治疗组间有统计学差异, 阳性细胞面积在对照组与模型组间具有统计学差异。[结论] 顺铂化疗大鼠模型出现认知障碍且 LIFUS 可以在一定程度上改善化疗大鼠的认知。LIFUS 组在治疗前、后的神经影像指标变化与生物学行为改变具有相关性。LIFUS 治疗效果的生物学机制主要体现在可以逆转化疗大鼠模型海马神经元与神经纤维损伤, 改善化疗大鼠模型海马组织细胞凋亡情况。

PO-0505

扩散谱成像评价伴轻度认知障碍的 2 型糖尿病患者
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目的: 通过磁共振扩散谱成像 (DSI) 评价 2 型糖尿病 (T2DM) 患者脑白质微结构变化及其与轻度认知功能障碍 (MCI) 的关系。

方法: 收集性别及教育相匹配 T2DM 伴 MCI 患者 (n=21)、T2DM 不伴 MCI 患者 (n=18) 及健康志愿者 (n=20), 进行认知评分、血生化检查和 DSI 扫描。运用 MoCA 量表和 MMSE 量表对各组进行认知评分, 应用 DSI Studio 软件处理 DSI 数据获得 GFA、QA、MD 值。所有数据采用 SPSS 26.0 软件分析, $P < 0.05$ 差异有统计学意义。

结果: T2DM 伴 MCI 组左侧钩束、双侧海马、左侧上纵束、右侧皮质脊髓束 GFA 值, 双侧钩束、双侧上纵束 QA 值低于对照组, 右侧钩束、双侧上纵束、双侧海马、双侧皮质脊髓束 MD 值高于对照组 ($P < 0.05$)。T2DM 不伴 MCI 组右侧皮质脊髓束 GFA 值、双侧皮质脊髓束的 QA 值低于对照组, 右侧皮质脊髓束 MD 值高于对照组 ($P < 0.05$)。T2DM 伴 MCI 组右侧钩束、双侧海马、左侧上纵束 GFA 值, 双侧海马、双侧皮质脊髓束 QA 值低于 T2DM 不伴 MCI 组, 右侧钩束、右侧海马、

右侧上纵束 MD 值高于 T2DM 不伴 MCI 组($P<0.05$)。左侧海马和右侧海马 GFA 值 AUC 分别为 0.854 和 0.878, 敏感性 & 特异性分别为 76.2%、85.7%; 77.8%、90.5%。左侧海马和右侧海马 QA 值的 AUC 分别为 0.733、0.743, 敏感性 & 特异性分别为 71.4%、66.7%; 71.4%、66.7%。左侧海马和右侧海马 MD 值的 AUC 分别是 0.706 和 0.664, 敏感性 & 特异性分别为 57.1%、83.3%; 90.5%、38.9%。

结论: T2DM 伴 MCI 患者脑白质纤维束完整性破坏, 海马 GFA 值具有较高的诊断效能, 是评估 T2DM 认知功能障碍较敏感的神经影像学标记物。

PO-0506

探索新冠病毒感染后急性期疲劳易感风险人群 先天大脑结构差异基础

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背景: 疲劳是新型冠状病毒感染后最常见的症状之一, 通常合并有睡眠和心理障碍。本研究旨在确定新冠感染后疲劳的大脑影像标志物, 并进一步探讨个体大脑灰质体积、疲劳易感性和合并神经精神症状之间的关系。

方法: 轻型新冠感染患者 (COV+) 在 1 个月内接受了神经心理学测评 (335 人) 和大脑磁共振成像扫描 (271 人), 其中 191 人 (70.5%) 在感染后 3 个月接受了随访。67 名未感染新冠的健康被试在新冠患者入组阶段完成了相同的行为学评估与磁共振扫描方案。

结果: 全脑分析显示, 急性期新冠感染患者与未感染被试之间在大脑灰质体积 (grey matter volume, GMV) 没有差异。并且在新冠感染组, 患者的疲劳严重程度与右侧背侧前扣带回皮层 (dorsal anterior cingulate cortex, dACC) 和背外侧前额叶皮层 (dorsolateral prefrontal cortex, DLPFC) 的体积相关, 而这两个皮层主要涉及额叶-边缘系统。此外, 疲劳在 dACC 和 DLPFC 与新冠感染后睡眠障碍、创伤后应激障碍 (PTSD) 和焦虑症状之间的关系中起到了中介作用。最后, 逐步线性回归进一步表明, 新冠感染恢复早期的 DLPFC 结构差异可以预测新冠感染 3 个月后的疲劳症状。

结论: 我们的研究结果不仅为疲劳易感性的神经解剖学基础提供了新的证据, 更强调疲劳是大脑额叶-边缘系统的灰质体积与感染后早期合并有神经精神症状之间的重要联系。这可能有助于将来公共卫生干预措施的实施, 即早期识别新冠感染后疲劳易感与持续性人群, 并有针对性地进行疲劳干预, 以进一步减少长新冠的不良影响。

PO-0507

两种常春藤征的评分预测烟雾病患者的脑血流储备受损

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背景与目的: 脑血流储备 (CVR) 的受损程度是烟雾病患者是否需要手术干预的重要指标, 但是目前测量 CVR 的方法临床普适性较低。本研究尝试通过常规磁共振 (T1 增强和 T2-FLAIR 图像) 的两种常春藤征改良 ASPECTS 评分来预测烟雾病患者的 CVR 的受损程度。

材料和方法: 回顾性分析 14 例烟雾病患者的影像学数据, 每例患者在手术前均完成了常规的磁共振检查和 XeCT 的 CVR 测量。两种常春藤征由三名放射科医师进行改良 ASPECTS 评分。计算每例患者的 T1WI 增强和 T2-FLAIR 常春藤征的最大评分和加和评分。使用 XeCT 测量 CVR 作为金标

准。使用 ICC 方法计算三名医师评分之间一致性。采用方差分析的方法比较各组之间的差异。采用 ROC 曲线计算常春藤征的最大评分和加和评分预测大脑半球内的 CVR 的效能, CVR 的阈值分别使用 -20%、-15%、-10%、-5%、0%、5%、10%、15%、20%。

结果: 三名医师在 T1Z 增强和 T2-FLAIR 常春藤征评分之间一致性均较好 (T1 增强: ICC=0.778, $P < 0.001$; T2-FLAIR: ICC=0.814, $P < 0.001$)。T1WI 增强常春藤加和评分为 9 时预测 CVR 小于 10% 效能最高 (AUC=1.000); FLAIR 常春藤加和评分为 3 时预测 CVR 小于 -10% 效能最高。

结论: T1WI 增强和 T2-FLAIR 常春藤评分均可以预测 CVR 的受损程度, T1WI 增强的常春藤较 T2-FLAIR 出现早, T2-FLAIR 常春藤征评分大于 3, 提示 CVR 已有明显失代偿。

PO-0508

扩散加权成像及灌注成像评估原发性中枢神经系统淋巴瘤短期化疗效果的研究

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研究目的: 使用治疗前 PCNSL 患者的扩散加权 (Diffusion-Weighted Imaging, DWI) 及动脉自旋标记技术 (Arterial Spin Labeling, ASL) 图像预测短期化疗效果。

研究材料及方法: 从 PACS 系统中收集 2013 年 11 月至 2022 年 6 月的 PCNSL 患者并随访其治疗情况。通过手工测量最小 ADC 值 (minimum Apparent Diffusion Coefficient, ADCmin)、对侧正常白质区 ADC 值 (ADC of Normal White Matter, ADCn)、计算 ADCmin/ADCn 比值 (ADCmin to ADCn Ratio, rADC)、最小脑血流 (minimum Cerebral Blood Flow, CBFmin)、对侧正常白质区 CBF 值 (CBF of Normal White Matter, CBFn)、计算 CBFmin/CBFn 比值 (CBFmin to CBFn Ratio, rCBF); 同时手动分割 ADC 及 ASL 图上肿瘤区域并使用 Python 提取影像组学特征。使用 T 检验过滤特征, 弹性网络结合递归消除法筛选特征。最后使用的 6 种机器学习算法进行建模, 5 折检验进行内部验证。

研究结果: 在我们的队列研究中, MSKCC 分级 ($p = 0.005$)、病灶数目 ($p < 0.001$)、病灶的坏死/囊变 ($p = 0.013$) 与治疗有效性相关; rCBF 可以有效地区分 MTX 治疗后的缓解者和无反应者 (AUC=0.70±0.07)。在影像组学模型中, ADC+ASL 组中模型效能最好的是逻辑回归模型 (AUCmean=0.95±0.08)。加入其他特征后 (MSKCC 分级、病灶数目及瘤病灶的坏死/囊变), 整体而言复合模型效能优于单纯使用影像特征的模型; 在 rCBF+其他特征模型中最佳模型为邻近算法模型 (AUCmean=0.87±0.08); 在影像组学+其他特征中, 在 ADC+ASL+其他特征组中朴素贝叶斯算法 (AUCmean=0.97±0.04)。

研究结论: DWI 及 ASL 成像可作为化疗前预测疗效的有效手段, 为临床治疗方案的选择提供更多的参考信息。

PO-0509

一例神经元核内包涵体病个案分享

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目的: 神经元核内包涵体病 (NIID) 是一种罕见的神经退行性疾病, 临床表现高度可变, 常伴多系统受累, 可出现运动障碍、自主神经功能障碍、周围神经病变和认知障碍等症状。本研究分享一例 NIID 个案。

方法：一名 62 岁女性患者，因行走不稳 2 年伴记忆力下降 2 月余入院。行走时稍前倾，步幅稍窄，四肢协调感稍差，入院蒙特利尔认知评估量表 (montreal cognitive assessment, MoCA) 13 分 (中度认知障碍)。患者感染新冠后感症状加重，并出现记忆力下降，以近事遗忘为主，出现食欲下降、味觉改变并反复呕吐。患者入院完成颅脑 MRI 检查和实验室检查。

结果：MRI 示双侧额顶叶、侧脑室旁白质大片状稍长 T1 稍长 T2 信号，DWI 示双侧额顶叶皮髓质交界区 (额叶为著) 对称飘带样高信号，ADC 呈等高信号，边缘较清，增强扫描脑实质及脑膜未见明确异常，SWI 及 MRS 未见明确异常考虑 NIID。基因检测示 NOTCH2NLG-GGC 重复片段次数 115 (>65 个异常重复扩增提示 NIID)，考虑 NIID。左小腿皮肤组织病理示表皮及汗腺细胞核内偶见嗜酸性包涵体倾向 NIID。根据临床病史、影像检查和实验室检查结果，该患者诊断为 NIID。

结论：我们分享了一例 NIID 个案，该患者出现了运动障碍、自主神经功能障碍及认知障碍等症状，影像学可见标志性飘带征。对于临床中出现类似症状的患者，需要考虑 NIID 的可能。

PO-0510

中缝背核在甲基苯丙胺成瘾中的发挥的作用

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中缝背核 (DRN) 位于中脑导水管周围灰质的腹侧是脑内最大的五羟色胺能核，同时还包含多巴胺能、谷氨酸能和 γ -氨基丁酸能神经元，投射到大脑的广泛区域。动物研究发现 DRN 参与奖赏处理及多种物质成瘾的神经机制。但其在甲基苯丙胺 (methamphetamine, MA) 成瘾中的作用和机制仍在很大程度上尚不清楚。此外，之前的研究是在动物水平上进行的，因此中缝背核在人类物质成瘾中的作用也没有明确。对 MA 成瘾患者 (MA 成瘾组, $n=46$) 及健康对照者 (健康对照组, $n=46$) 的静息态功能磁共振成像数据进行分析，将中缝背核选定为感兴趣区域 (region of interest, ROI) 构建了基于种子点的脑功能连接网络 (functional connectivity, FC)，比较两组之间的 FC 差异。研究发现 DRN 与包括枕叶视觉皮层在内的多个脑区的功能连接异常增强。MA 诱导的 DRN 与视觉皮层等多个脑区的异常功能连接可能与 DRN 参与的成瘾机制有关。

PO-0511

急性大脑中动脉闭塞取栓术后恶性脑水肿发生的影像学及临床、实验室预测因素分析

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目的 探讨急性大脑中动脉闭塞性脑梗死患者介入取栓治疗术后发生恶性脑水肿的影像学及临床、实验室预测因素。

方法 本研究回顾性分析 2019 年 3 月-2022 年 2 月于我院确诊为急性大脑中动脉闭塞性脑梗死且通过介入取栓术后成功再通的 203 名患者，分析其影像、临床与实验室资料，探讨介入取栓术后恶性脑水肿的预测因素。根据脑梗死介入取栓术后是否发生恶性脑水肿分为恶性脑水肿组 (54 例) 与非恶性脑水肿组 (149 例)。影像学分析采用量化评价，采用 ASPECTS 评分、取栓后 PHCT 评分和 ASITN/SIR 侧支系统评分。多因素 Logistic 回归分析，探讨影响脑梗死介入取栓治疗后恶性脑水肿发生的危险因素，通过 ROC 曲线，评价影像量化评分联合临床、实验室指标对恶性脑水肿早期预测的最佳模型。

结果 (1) 恶性脑水肿组 NIHSS 评分、FBG、Hcy、血小板、D-二聚体、NT-proBNP 水平、ASITN/SIR 侧支系统评分、PHCT 评分高于非恶性脑水肿组 ($P<0.05$)，ASPECTS 评分低于非恶性脑水肿组 ($P<0.05$)，差异均有统计学意义。

(2) 多因素 Logistic 回归分析显示 NIHSS 评分、FBG、D-二聚体、NT-proBNP、ASPECTS 评分、ASITN/SIR 侧支系统评分、PHCT 评分与脑梗死介入取栓术后恶性脑水肿发生密切相关，属于独立危险因素。

(3) ROC 曲线显示 ASPECTS 评分、PHCT 评分、D-二聚体、NT-proBNP 预测效能较高，术前 ASPECTS 评分、D-二聚体、NT-proBNP 联合术后 PHCT 评分预测急性大动脉闭塞性脑梗死介入取栓术后恶性脑水肿的发生的预测效能明显高于各项指标单独预测及术前指标联合预测。

结论 (1) ASPECTS 评分、ASITN/SIR 侧支系统评分、PHCT 评分、NIHSS 评分、FBG、D-二聚体、NT-proBNP 均属于危险因素，与脑梗死介入取栓术后恶性脑水肿发生具有紧密相关性；

(2) 术后 PHCT 评分和术前 ASPECTS 评分、D-二聚体、NT-proBNP 四者联合对预后具有更高的预测价值。

PO-0512

“披头散发征”--神经梅毒树胶样肿型

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目的：神经梅毒被称为“万能模仿者”，临床与影像表现多样，其中树胶样肿型更是因其罕见鲜有报道，诊断较为困难，本研究提出了一种神经梅毒树胶样肿型的影像征象“披头散发征”（即 MR 增强图像上病灶病缘呈散乱的线样改变，边界模糊，多位于病灶单侧，呈偏心性，也可广泛分布于病灶表面，形似披散的头发），以提高其影像诊断准确率。

方法：对我院经临床确诊的 5 例神经梅毒树胶样肿型的影像资料及中、外文献报道的含有效 MR 资料的约 43 例个案进行回顾性分析。

结果：存在“披头散发征”表现的比例在我院临床确诊病例约为 80% (4/5)，在文献报道的个案中占比约为 37%-58% (16-25/43)。

结论：“披头散发征”可以为神经梅毒树胶样肿型的诊断起到重要的提示作用，为临床治疗提供指导，降低误诊率。

PO-0513

3D-ASL 联合 DKI 在鉴别脑胶质瘤复发和假性进展中的应用价值

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目的：探讨三维动脉自旋标记(three dimensional-arterial spin labeling, 3D-ASL)及扩散峰度成像(diffusion kurtosis imaging, DKI)单独和联合应用在鉴别脑胶质瘤复发和假性进展中的诊断价值。

方法：收集 2019 年 1 月-2022 年 3 月在山西医科大学第一医院进行手术切除后行同步放化疗并出现新的或增多的强化病灶的 42 例脑胶质瘤患者进行回顾性分析，所有患者在复查时均行 MRI 平扫及增强、3D-ASL、DKI 检查，根据二次手术病理结果或随访结果分为肿瘤复发组 (26 例) 和假性进展组 (16 例)，分析 3D-ASL 和 DKI 的相关参数(rCBF、rFA、rKA、rKR、rMK、rMD)，对有统计学意义的参数绘制受试者工作特征(receiver operating characteristic,ROC)曲线，对比单独应用

和联合应用的曲线下面积(area under curve, AUC)、敏感度及特异度, 评估 3D-ASL 及 DKI 单独和联合应用在鉴别脑胶质瘤复发和假性进展中的诊断价值。

结果: 在增强病灶中, 复发组的 rCBF、rKA、rKR、rMK 高于假性进展组, rMD 低于假性进展组, 差异具有统计学意义, rCBF、rKA、rKR、rMK、rMD 的 AUC 分别为 0.909、0.702、0.700、0.885、0.697, rCBF 和 rMK 表现出良好的诊断性能。多元 logistics 回归显示 rMK 联合 rCBF 的诊断性能最好, 优于任一参数, AUC 为 0.942, 敏感度为 92.3%, 特异度为 87.5%; 在瘤周水肿中, 复发组的 rCBF 和 rMK 高于假性进展组, 差异具有统计学意义, rCBF 和 rMK 的 AUC 分别为 0.696、0.640。

结论: 3D-ASL 和 DKI 联合诊断的性能优于单一成像技术, 能够更好地鉴别脑胶质瘤复发和假性进展, 并为临床决策的实施提供指导意义。

PO-0514

单侧颞叶癫痫患者的拓扑结构改变

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目的:探讨单侧颞叶癫痫伴海马硬化的拓扑结构异常变化。

方法:选取 38 例颞叶癫痫 (TLE) 患者和 19 例年龄、性别匹配的健康对照 (HC), 进行静息状态功能磁共振成像(fMRI)检查。基于 fMRI 数据构建被试全脑功能网络。比较左、右侧 TLE 和 HC 患者的功能网络拓扑特征。

结果:与 HC 相比, 左侧 TLE 患者的聚类系数、整体效率和局部效率(Eloc)降低, 右侧 TLE 患者的 Eloc 降低。左侧 TLE 患者的 6 个与基底神经节(BG)网络或默认模式网络(DMN)相关的区域以及右侧 TLE 患者的 3 个与奖励/情绪网络或腹侧注意网络相关的区域的节点中心性发生了变化。右侧 TLE 患者在 DMN 相关的 4 个区域表现出较高的整合性(缩短的节点最短路径长度), 而在右侧颞中回表现出较低的分离性(降低的节点局部效率和节点聚类系数)。左侧 TLE 与右侧 TLE 比较, 整体参数无显著差异, 但左侧海马旁回和左侧苍白球的节中心性降低。

结论:全脑功能网络拓扑特性在 TLE 中被破坏。左侧 TLE 网络效率较低;右侧 TLE 在全局效率上保持不变, 但在容错性上中断。左侧 TLE 致痫灶外基底神经节网络中拓扑中心性异常的节点未在右侧 TLE 中发现。右侧 TLE 在 DMN 区域有一些最短路径长度减少的节点作为补偿。这些发现为侧化 TLE 提供了新见解。

PO-0515

基于 TBSS 对抑郁症患者白质结构改变的弥散张量成像研究

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目的:抑郁症是一种常见的精神疾病, 近年来, 精神放射学允许对神经精神病患者的大脑进行无创性的研究。弥散张量成像(DTI)是一种基于磁共振成像的神经成像方法, 可以推断体内脑结构连接的特性。运用纤维束追踪的空间统计学技术(TBSS)探讨抑郁症患者(DD)患者的脑白质微观结构的损害。

方法:前瞻性获取 50 例 DD 患者和 50 例健康对照(HC)的 DTI 图像。采用 TBSS 来评估两组间白质(WM)异常的体素差异, 部分各向异性 (FA)、平均弥散率 (MD)、径向扩散系数 (RD) 及轴向扩散系数 (AD) 进行组间比较。在进行 TBSS 处理之前, 先对 DTI 数据采用脑功能磁共振 (FMRIB) 软件库(FSL)进行预处理。使用 FSL 中的 TBSS 进行提速统计分析, 将所有 FA 地图在空间上对齐到 1mm × 1mm × 1mm FMRIB58 FA 标准空间, 对 FA 图进行平均以创建平均 FA 图像, 然后对其

进行骨架化以生成平均 FA 骨架。然后将所有受试者的对齐 FA 图投影到该骨架上。然后将相同的平均 FA 骨架应用于 MD, AD 和 RD 图像进行统计分析。所有 DD 组患者再扫描之前做了 HAMA 量表和 MoCA 量表, 并且进行了生化指标的采集: 包括促肾上腺皮质激素、皮质醇和生长激素。分析了 DTI 各参数与生化指标及抑郁评分量表之间的关系。

结果: 与 HC 组相比, DD 组的 FA 值显著降低, 主要发生在上纵束、下纵束、额枕下束及大钳。此外, DD 患者可观察到广泛且对称的深部 WM 损伤, 并伴有 AD 值、RD 值、MD 值升高。偏关性分析显示, FA 值与 HAMA 评分量表中的精神性焦虑和认知障碍呈现显著负相关($r=-0.293, p=0.049$; $r=-0.327, p=0.027$), MD 值与认知障碍呈现显著正相关($r=0.327, p=0.027$), AD 值与 MoCA 评分呈显著正相关($r=0.313, p=0.034$), 与 MoCA 量表中的视空间与执行能力呈显著正相关($r=0.329, p=0.025$)。

结论: 本研究结果表明, TBSS 技术作为可信度较高的最新扩散张量成像研究方法, 可以发现抑郁症患者脑白质微结构的损伤, 并且这种损伤与精神性焦虑、认知障碍、MoCA 评分水平相关。

PO-0516

基于多参数 MR 的遗传性痉挛性截瘫 5 型脊髓微结构变化纵向随访研究

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目的 遗传性痉挛性截瘫型 5 (SPG5) 是一组少见的以下肢进行性痉挛性截瘫为特点的神经系统退行性病变, 现已有临床研究使用多种降胆固醇药物治疗 SPG5, 因此寻找可用于评估该病的预后及监测疗效的影像标记物具有重要临床意义。前期磁共振研究提示 SPG5 患者脊髓萎缩及微结构损伤, 但其随疾病进展的变化情况尚不清楚。本研究基于多参数磁共振观察 SPG5 患者一年随访的脊髓微结构变化, 评估 SPG5 患者临床及脊髓影像的纵向改变, 探寻 SPG5 患者随访的影像标记物。

材料与方法 采集 SPG5 患者基线与一年随访的颈胸段脊髓结构像、DTI、T1 mapping 及 SPRS。通过 Spinal Cord Toolbox 软件提取 C1-T9 椎体节段脊髓截面积、左右径、前后径及 C2-T5 椎体节段脊髓白质 (WM)、后索 (DC) 及双侧皮质脊髓束 (CST) 这四个区域各向异性分数 (FA)、平均扩散程度 (MD)、轴向扩散程度 (AD)、径向扩散程度 (RD) 值及 T1 值, 分别通过配对样本 t 检验及 Wilcoxon 秩和检验比较 SPG5 患者基线与一年随访 SPRS 评分、脊髓截面积、左右径、前后径、脊髓 DTI 参数 (FA、MD、RD、AD 值) 及 T1 值的差异。

结果 11 名 SPG5 患者 (中位年龄 29 岁, 3 名女性, 8 名男性) 完成一年的影像及临床随访, 患者 SPRS 随访一年后与基线之间差异无统计学意义 ($P=1.000$)。SPG5 患者的颈胸段脊髓结构, 包括脊髓截面积、前后径、左右径随访前后无统计学差异; SPG5 患者基线与一年随访的 C2-T5 椎体节段脊髓白质、后索及双侧皮质脊髓束这四个区域的 FA、MD、AD、RD 及 T1 值差异均无统计学意义, 但是分析随访前后的具体数值, 发现颈段 C2-C7 脊髓 DTI 数据的变化具有一定趋势, 而胸段脊髓这些数据的变化趋势不明显。C2-C6 椎体水平脊髓 FA 值均较一年前减低, RD 值较前增高; 而 MD 值、AD 值及 T1 值无论在颈段还是胸段脊髓, 变化趋势均不明显。

结论 多参数脊髓磁共振随访为 SPG5 进展缓慢提供了影像学证据, FA 及 RD 值可能可作为 SPG5 患者随访的潜在影像标记物。

PO-0517

首发未经药物治疗的强迫症患者内在脑活动的静态变化

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目的：强迫症是临床中第四常见的情感障碍类精神疾病，然而我国普通民众对强迫症的知晓率低（22.5%）、患者就诊率低（34%），最重要的原因是强迫症的发生发展机制尚不明确，这严重阻碍了临床上的诊断和治疗。现有的研究已经证明药物的使用会影响强迫症患者脑的结构和功能的改变。我们旨在探究首发未经治疗的强迫症患者静息状态下脑神经元功能活动的改变。

方法：纳入首发未经治疗的强迫症患者 103 例（女性 49 例，平均年龄 23.1 岁）以及年龄、性别、受教育年限相匹配的正常对照组 106 例（女性 53 例，平均年龄 23.1 岁）。使用 3.0 T（GE Discovery MR750, General Electric, Milwaukee, WI, USA）磁共振机器，在患者静息状态下扫描获得功能磁共振脑影像，由静息态 fMRI 数据处理助手分析工具包（DPARSF）进行预处理，包括删除前五卷、去除头动、空间标准化、趋势化处理、时间带通滤波、线性回归、空间平滑、计算时间点的帧级位移等，采用双样本 t 检验，分析患者组与对照组的低频振幅（amplitude of low-frequency fluctuation, ALFF）是否存在有统计学差异的脑区。

结果：与对照组相比，强迫症患者在左侧小脑前叶（体素值=147，峰值坐标=0, -48, -9, $t = -4.6861$, $p < 0.001$ ）、左额内侧回（体素值=59，峰值坐标=-12, -33, 63, $t = -4.7051$, $p < 0.001$ ）、左侧中央后回（体素值=44，峰值坐标=-42, -2, 57, $t = -4.6327$, $p < 0.001$ ）、右舌回（体素值=39，峰值坐标=24, -57, -6, $t = -4.261$, $p < 0.001$ ）和右枕叶（体素值=33，峰值坐标=30, -87, -9, $t = -4.2578$, $p < 0.001$ ）等脑区的 ALFF 值降低，未发现存在 ALFF 值升高的脑区。

结论：首发未经治疗的强迫症患者静息状态下存在脑区的自发脑神经元活动的改变，这可能为进一步探究强迫症的发生发展机制提供了客观依据

PO-0518

多延迟动脉自旋标记技术在慢性血管狭窄/闭塞患者中脑灌注评估中的应用价值

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目的 采用单延迟时间三维准连续式动脉自旋标记及多延迟动脉自旋标记对单侧前循环动脉慢性闭塞或严重狭窄的患者进行全脑灌注成像，评价多延迟 ASL 对单侧前循环动脉闭塞后脑灌注评估的应用价值。

方法 前瞻性收集于我院神经内科收治的经颅脑磁共振血管成像、头颈 CT 血管成像诊断为单侧前循环动脉严重狭窄/闭塞（ $\geq 70\%$ ）并且未进行溶栓及血管内治疗的患者 34 例，其中男 23 例，女 11 例，年龄 33~81 岁，平均 60.1 ± 2.4 岁，所有受试者均行常规平扫、3DpCASL 及 MDASL，并人工手动绘制感兴趣区测量脑灌注参数，包括 CBF_{2020ms}、cCBF、ATT、rATT 及 aCBV。利用配对 t 检验比较两者 CBF_{2020ms} 及 cCBF 差异，独立样本 t 检验比较患者狭窄侧 ATT 及对侧 rATT 差异，采用 Kappa 一致性检验判断两位观察者对异常区域灌注判断结果一致性。

结果 34 例患者中，10 例单、多延迟 ASL 灌注结果一致（显示低灌注 8 例，低灌注伴局部高信号表现 2 例），24 例灌注结果不完全一致（3 例单延迟显示正常灌注，3 例多延迟显示低灌注，21 例单

延迟显示低灌注伴局部高信号,多延迟显示低灌注)。两位观察者间具有较好的一致性(Kappa 系数=0.788,显著性 $P<0.001$)。在显示低灌注方面,多延迟 ASL(94.1%)比单延迟 ASL(23.5%)更具优势。多延迟 ASL 示动脉狭窄侧 ATT 值高于对侧 rATT 值 ($1625.1\pm213.5\text{ms}$ vs. $1207.1\pm235.85\text{ms}$, $P<0.0001$),差异具有统计学意义。在 21 例单延迟显示低灌注伴局部高信号、多延迟表现为低灌注中,狭窄侧 $\text{CBF}_{2020\text{ms}}$ 值显著高于 cCBF ($38.9\pm11.7\text{ml}/100\text{g}/\text{min}$ vs. $21.0\pm6.6\text{ml}/100\text{g}/\text{min}$, $P<0.00001$)。结论 多延迟动脉自旋标记获得多参数 cCBF 及 ATT 联合 aCBV 可以更敏感准确地评估单侧前循环动脉慢性闭塞或严重狭窄导致的脑组织灌注的变化,能够更加精准地指导临床诊治。

PO-0519

基于非增强 CT 的影像组学识别动脉致密征阴性急性单侧前循环大血管闭塞的研究

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【摘要】目的 探究基于非增强 CT (NCCT) 的影像组学识别动脉致密征 (HAS) 阴性的急性单侧前循环大血管闭塞 (LVO) 的价值。方法 回顾性收集经血管成像 (MRA/CTA/DSA) 检查证实的急性单侧前循环 LVO 且表现为 HAS 阴性的患者 80 例,共 160 根血管;以每例患侧 LVO 段及正常侧对应节段血管作为感兴趣区,共提取 108 个影像组学特征。使用最小绝对收缩和选择算子 (LASSO) 筛选关键特征,采用 5 折交叉验证法构建预测 LVO 的影像组学模型。通过受试者工作特征曲线下面积 (AUC) 评价预测性能,并使用 Delong 检验进行各模型受试者工作特征曲线 (ROC) 间的比较;最后通过临床决策曲线 (DCA) 分析评估影像组学模型的应用价值。结果 最终筛选出 6 个关键特征构建支持向量机 (SVM)、光梯度提升机 (LightGBM)、梯度提升 (GradientBoosting) 及自适应提升算法 (AdaBoost) 4 种影像组学模型。SVM 模型的 AUC 为 0.688 (95% CI 0.4971~0.8779),精确度为 0.688;LightGBM 模型的 AUC 为 0.787 (95% CI 0.6196~0.9546),精确度为 0.781;GradientBoosting 模型的 AUC 为 0.654 (95% CI 0.4567~0.8519),精确度为 0.688;AdaBoost 模型的 AUC 为 0.707 (95% CI 0.5147~0.8993),精确度为 0.750。DeLong 检验显示 LightGBM 与 GradientBoosting 间的 AUC 存在显著统计学差异 ($P=0.0398$),余模型间表现无明显统计学差异 ($P>0.05$)。DCA 分析显示 LightGBM 模型表现较好。结论 基于 NCCT 的影像组学对于识别 HAS 阴性的急性单侧前循环 LVO 具有较好的诊断效能。

PO-0520

神经精神狼疮患者脑局部自发神经元活动的静息态功能磁共振成像研究

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目的 探讨神经精神狼疮患者脑功能改变及其与认知功能和情绪的相关性。方法 纳入 2020 年 6 月至 2022 年 9 月南京医科大学附属泰州人民医院收治的 46 例系统性红斑狼疮患者,根据是否具有神经精神症状分为神经精神狼疮组 (NPSLE 组,26 例) 和非神经精神性狼疮组 (非 NPSLE 组,20 例),采用 rs-fMRI 计算平均局部一致性 (mReHo) 和平均分数低频振幅 (mfALFF),简易智能状态检查量表 (MMSE) 评价整体认知功能,运动和认知功能疲劳量表 (FSMC) 评价运动和认知

疲劳, 医院焦虑抑郁量表 (HADS) 评价焦虑和抑郁情绪; Pearson 相关分析和偏相关分析探讨神经精神狼疮患者各脑区 mReHo 值和 mALFF 值与神经心理学测验评分的相关性。结果 NPSLE 组患者 MMSE 评分 ($Z=-3.934$, $P=0.000$) 低于非 NPSLE 组, FSMC-运动 ($t=2.016$, $P=0.050$) 和认知 ($t=2.055$, $P=0.046$)、HADS-焦虑 ($Z=-2.424$, $P=0.015$) 和抑郁 ($Z=-2.731$, $P=0.006$) 评分高于非 NPSLE 组。与非 NPSLE 组相比, NPSLE 组患者右侧背外侧额上回、右侧枕中回、右侧中央后回、右侧顶下缘角回、右侧颞下回 mReHo 值降低, 右侧枕中回、右侧中央后回 mfALFF 降低 (FDR 校正; 体素水平 $P<0.001$, 团块水平 $P<0.05$)。相关分析显示, 神经精神狼疮患者右侧中央后回 mReHo 值 ($r=-0.483$, $P=0.017$) 和 mfALFF 值 ($r=-0.504$, $P=0.012$) 与 HADS-抑郁评分呈负相关; 右侧顶下缘角回 mReHo 值与 FSMC-运动 ($r=-0.475$, $P=0.019$) 和认知 ($r=-0.414$, $P=0.044$) 评分呈负相关; 右侧颞下回 mReHo 值与 FSMC-认知评分呈负相关 ($r=-0.427$, $P=0.037$)。结论 神经精神狼疮患者存在多脑区局部神经元活动异常, 且神经功能与神经心理学测验评分密切相关。

PO-0521

基于三重脑网络与小脑-大脑环路的网络内与网络间功能连接分析在多系统萎缩轻度认知功能障碍中的研究

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目的: 基于三重脑网络, 探究多系统萎缩 (MSA) 患者轻度认知功能障碍 (MCI) 的脑网络作用模式。方法: 纳入伴轻度认知功能障碍的 MSA 患者 (MSA-MCI) 70 例、认知功能正常的 MSA 患者 (MCI-NC) 66 例及健康对照组 (HC) 63 例。对三组被试行静息态功能磁共振扫描, 并进行神经心理学量表评估, 包括对整体认知功能的评分以及对执行、视空间、注意力、记忆力、语言功能五个认知域的细化评估。基于三重脑网络模型以及小脑-大脑环路在 MSA-MCI 中的作用, 应用独立成分分析方法提取三组被试内在连接网络, 包括左中央执行网络 (LCEN)、右中央执行网络 (RCEN)、前默认网络 (aDMN)、后上默认网络 (spDMN)、后下默认网络 (ipDMN)、突显网络 (SN) 以及小脑网络 (CN)。基于各内在连接网络对三组网络网络内与网络间相互作用改变进行功能连接 (FC) 分析与组间比较; 在各内在连接网络选取核心脑区, 基于感兴趣脑区 (ROI) 进行 ROI 间的 FC 分析与组间比较。将异常的网络内 FC、网络间 FC 与 ROI 间 FC 与整体认知功能及各认知域得分进行相关性分析。结果: 与 MSA-NC 组相比, MSA-MCI 组在 RCEN、ipDMN、spDMN 与 CN 存在网络内 FC 改变; 与 MSA-NC 组相比, MSA-MCI 组在 LCEN 与 aDMN、CN 与 RCEN 及 SN 与 RCEN 间存在相互作用减弱; LCEN 与 ipDMN 间相互作用增强; 与 MSA-NC 组相比, MSA-MCI 组在左侧额中回与右侧岛叶、右侧角回与左内侧额上回、右侧角回与右侧岛叶、右小脑 CrusI 与左侧楔前叶存在 FC 减低, 左侧小脑 VI 区与左内侧额上回 FC 增强。相关性分析结果显示, 网络内 FC 与 MSA 患者的整体认知功能、执行功能及注意力评分相关; 网络间 FC 与整体认知功能及注意力评分相关; ROI 间 FC 与整体认知功能及注意力评分相关。结论: MSA-MCI 存在三重脑网络网络内与网络间相互作用的异常, 以及 CN 对 CEN 及 ipDMN 调控作用的损伤, CN 与 aDMN 间存在代偿作用。其中 CEN 在 MSA-MCI 认知功能相关的脑网络作用模式中占据核心位置。

PO-0522

胶质母细胞瘤 IDH 野生型伴 TERT 启动子突变的 MRI 表现

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目的 探讨胶质母细胞瘤 IDH 野生型伴 TERT 启动子突变的 MRI 影像学特征。

方法 回顾性分析 30 例手术及病理、免疫组织化学、分子基因检测证实 TERT 启动子突变的胶质母细胞瘤 IDH 野生型患者临床表现及影像学资料, 对肿瘤部位、形态及在 MRI 各序列中的信号及强化方式等影像学特点进行分析总结。

结果 患者 30 例, 其中男 16 例, 女 14 例; 皆为成人, 年龄范围在 31~70 岁。30 例胶质母细胞瘤 IDH 野生型伴 TERT 启动子突变患者中 7 例为 TERT 启动子区域 C250T 突变, 23 例为 TERT 启动子区域 C228T 突变。12 例位于颞叶, 6 例位于额叶, 3 例位于顶叶, 1 例位于枕叶; 8 例累及两个及多个脑叶。30 例患者肿瘤形态不规则, 边界不清晰, 其中 5 例病灶内出血, 27 例肿瘤内可见囊变、坏死, 22 例中、重度瘤周水肿。30 例患者皆行 DWI 检查, 20 例患者行磁共振波谱成像 (MRS), 28 例肿瘤增强扫描后可见明显不均匀环状、斑片状强化。

结论 胶质母细胞瘤 IDH 野生型伴 TERT 启动子突变具有特定的影像学特征, 肿瘤好发于额颞叶, 易坏死、囊变, 中心坏死明显, 部分肿瘤可见出血, 增强扫描呈明显不均匀环状、斑片状强化。瘤周水肿明显, 弥散明显受限, ADC 呈低信号。磁共振波谱成像 Cho/NAA 比值常大于 3, 并出现明显的乳酸峰或脂质峰。这些影像学特征为临床诊断提供重要信息, 可为临床治疗方法制定及疾病预后提供帮助。

PO-0523

基于 MRI 镜像翻转图像构建影像组学模型鉴别高级别胶质瘤和单发性脑转移瘤

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目的: 探讨基于 MRI 镜像翻转图像的影像组学模型鉴别高级别胶质瘤 (high-grade gliomas, HGG) 和单发性脑转移瘤 (solitary brain metastasis, SBM) 的价值。材料与方法: 回顾性分析经病理证实或临床随访诊断为 HGG 和 SBM 患者 124 例, 其中 HGG 52 例, SBM 72 例, 通过完全随机方法按 7: 3 分为训练组 (86 例) 和验证组 (38 例)。搜集所有患者的 MRI 图像信息, 选取 T1WI 增强图像作为原始基准序列并手动勾画全瘤体感兴趣区域 (area of interest, ROI), 通过 MATLAB 软件对 T1WI 增强图像进行空间标准化以使得颅脑左右轮廓对称, 并规定中线为对称轴将 ROI 进行镜像翻转, 从而获得肿瘤侧 ROI₁ 和镜像侧正常脑实质 ROI₂, 并放射组学特征提取, 将两组特征代数相减获得新的特征集并命名为 D₁, 将肿瘤提取的特征集命名为 D₂。使用 Z-Score 标准化分别对 D₁ 和 D₂ 进行统一量度, 皮尔森相关系数进行数据降维、递归特征消除和逻辑回归进行特征筛选和影像组学模型构建。通过受试者工作特征曲线 (receiver operating characteristic, ROC) 的曲线下面积 (area under the curve, AUC) 和准确度 (accuracy, ACC) 评价模型效能。结果: 分别从 D₁ 和 D₂ 数据集中筛选 13 个和 8 个放射组学特征用于影像组学模型构建, 基于 D₁ 数据集构建的模型 M₁ 在训练组中效能与基于 D₂ 构建的模型 M₂ 效能相仿 (AUC: 0.941 vs. 0.937, ACC: 0.895 vs. 0.895), 但是验证组 M₁ 模型优于 M₂ 模型 (AUC: 0.935 vs. 0.878, ACC: 0.895 vs. 0.878), 并且 M₁ 模型整体稳定性优于 M₂。通过 MRI 镜像翻转技术可以将肿瘤区域和对侧正常区域进行对比, 其构建的模型整体效能优于基于肿瘤构建的模型。结论: 基于 MRI 镜像翻转图像的影像组学模

型能够很好的 HGG 和 SBM, 并且通过特征的不同间接反映了肿瘤分化的差异性, 从而能够很好的解释肿瘤的异质性, 能够为临床术前诊断和治疗方案选择提供一定参考价值。

PO-0524

睡眠相关过度运动性癫痫的局部大脑皮层厚度变薄和异常皮质折叠

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目的:睡眠相关过度运动性癫痫 (sleep-related hypermotor epilepsy, SHE) 是一种特殊类型的局灶性癫痫, 其神经生物学因素如皮质表面结构改变尚不清楚。本研究试图基于结构磁共振成像 (magnetic resonance imaging, MRI), 采用基于表面的形态学分析 (Surface-Based Morphometry, SBM) 方法研究 SHE 患者的神经形态学异常及其与临床特征的关系。

方法:前瞻性招募 69 例 SHE 患者和 69 例健康志愿者 (对照组), 并使用三维磁化准备快速梯度回波 (Magnetization Prepared Rapid Gradient Echo, MPRAGE) 序列进行脑结构 T1 加权像采集。使用计算机解剖分析工具箱 (computational anatomy toolbox, CAT12) 对脑结构 MRI 图像进行处理, 重建出大脑的表面形态, 并提取大脑皮层指标 (皮层厚度、皮层局部脑回指数、局部分形维数和脑沟深度)。采用双样本独立样本 t 检验进行组间比较统计分析, 采用错误发现率 (Family Wise Error, FWE) 进行多重比较校正, 以 $P < 0.05$ 认为具有统计学意义, 获得显著差异脑区。将显著差异脑区的脑皮层指标值与 SHE 病程和癫痫发作频率行 Pearson 或 Spearman 相关性分析 ($P < 0.05$)。

结果:与健康对照组相比, SHE 患者的左侧顶下小叶、右侧顶上小叶、双侧枕叶外侧、左侧梭状回和左侧舌回皮层厚度显著变薄 ($P = 0.00001 \sim 0.00004$), 以及 SHE 患者的右侧中央前回和右侧中央后回脑沟深度显著降低 ($P \leq 0.00001$)。然而, 皮层局部脑回指数、局部分形维数在 SHE 组和对照组之间比较无明显统计学差异 ($P > 0.05$)。相关分析显示, 左侧顶下小叶的皮质厚度改变与 SHE 病程呈负相关 ($r = -0.325$, $P = 0.006$)。

结论:我们的研究揭示了 SHE 患者存在区域性皮层厚度变薄和皮质折叠异常, 并可能与过度运动症状发作的临床特征有关。这些皮层形态变化可能为理解 SHE 的癫痫网络紊乱和潜在的神经病理机制提供一定研究基础。

PO-0525

强迫症患者的白质微观结构异常和灰质体积改变: 基于坐标的荟萃分析

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目的: 利用坐标相关数据进行综合荟萃分析, 探讨强迫症 (obsessive-compulsive disorder, OCD) 患者的白质 (white matter, WM) 微结构和灰质体积 (gray matter volume, GMV) 的异常。

方法: 我们回顾了 46 篇经同行审批的发表在 PubMed, Web of Science, Scopus 等数据库上的关于强迫症患者的脑结构改变的文章, 包含 1348 例强迫症患者和 1318 例性别、年龄、教育程度等相匹配的对照志愿者。我们使用基于弥散张量成像的 23 篇研究比较强迫症患者和健康对照组之间 WM 分数各向异性 (fractional anisotropy, FA) 的差异, 并进一步探究了基于纤维束示踪的空间统计分析 (tract-based spatial statistics, TBSS) 和基于体素分析 (voxel-based analysis, VBA) 两种方法的结果是否存在差异。此外, 我们还利用基于体素的形态测量学 (voxel-based morphometry, VBM) 方法的 21 篇研究来探索强迫症 GMV 的变化, 并比较成人和青少年之间的不同。

结果: 在汇总荟萃分析中, WM 研究结果显示, 与对照组相比, 强迫症患者右豆状核 (壳核) 的 FA 较高, 胼胝体、左脑岛、右小脑 (半球小叶)、右直回和左顶下回的 FA 较低; 然而, 在亚组分析中, 胼胝体在的 TBSS 和 VBA 亚组中 FA 值均降低, 但左侧额下回 (眶部) 的 FA 值下降仅存在于 TBSS 亚组中。此外, 我们发现强迫症患者的 GMV 在左纹状体和左中央前回显著增加, 在右额下回三角部、右颞上回和右海马显著降低; 与青少年相比, 成年患者左豆状核壳核的 GMV 增加。

结论: 荟萃分析显示强迫症患者存在 WM 微结构异常和 GMV 改变, 这些变化可能与该疾病的病理生理机制有密切的关系。

PO-0526

磁共振扩散峰度成像鉴别影像表现不典型的胶质瘤与脑炎

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目的 评估 MR 扩散峰度成像 (diffusion kurtosis imaging, DKI) 在鉴别影像表现不典型的胶质瘤与脑炎中的价值。

材料与方法 回顾性分析 68 例患有影像表现不典型的胶质瘤或脑炎患者的影像学资料, 所有患者在术前或保守治疗前均行 MRI 常规序列及多 b 值扩散加权成像 (Diffusion-weighted imaging, DWI) 序列扫描。用 NeuDiLab 软件处理 DWI 图像, 获得平均峰度 (mean kurtosis, MK)、平均扩散系数 (mean diffusivity, MD) 以及各向异性分数 (fractional anisotropy, FA) 参数图及 $b=0$ s/mm² 的扩散图像 (B0)。用 ITK-SNAP 软件在 B0 图像上手动勾画肿瘤的感兴趣容积 (volume of interest, VOI), 将其配准到其他参数图上。用 FAE 软件提取各参数图的平均值。根据病理检查或脑脊液检查结果将患者分为胶质瘤组和脑炎组。采用卡方检验、独立样本 t 检验及 Mann-Whitney U 检验比较两组患者的一般资料、常规 MRI 表现及 DWI 参数的差异。计算 Cohen's d 值评估 DWI 各参数的效应量。绘制受试者工作特征 (receiver operating characteristic, ROC) 曲线, 计算曲线下面积 (area under the curve, AUC)、灵敏度、特异度和准确率, 并用 Delong 检验比较各参数的鉴别诊断效能。

结果 共 61 例患者被纳入研究, 包括 39 例 WHO II 级胶质瘤患者、22 例脑炎病变患者。MK 鉴别脑炎组和胶质瘤组的 AUC 为 0.859, 当阈值取 0.598 时, 其敏感度为 87.2%, 特异度为 77.3%。DKI 模型的诊断表现优于 DTI。

结论 DKI 有助于鉴别诊断影像表现不典型的胶质瘤与脑炎。

PO-0527

运动锻炼对海马亚区体积作用的结构磁共振研究

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目的：运动锻炼被认为是很有前景且低成本的预防策略来促进脑健康，其中缓解人类海马衰退是运动锻炼的相关益处之一。海马是大脑中重要的多功能脑区，由高度特异神经细胞群体组成的非同质结构，具有不同的锥体神经元密度、突触结构和不同的皮质区域连接模式。因此解析运动锻炼对人类海马的精确亚区解剖结构影响，有助于理解运动如何调控大脑结构的可塑性。

方法：招募年龄 30-60 岁，至少持续 2 年以上的规律运动跑步史，平均每周跑量 30 km 以上，每周需要训练 4-5 次，至少参与 2 次及其以上全程马拉松比赛的业余马拉松跑者 73 名（男性 42 名、女性 31 例）。同时招募健康久坐对照组 52 名（男性 30 名、女性 22 例），利手、性别、年龄、教育程度与业余马拉松组相匹配。在 GE 3.0T 750W 磁共振仪上进行 T1WI 结构像数据采集。基于 FreeSurfer 6.0 版本软件自动分割 T1WI 解剖图像，计算整个左右海马的体积和左右 12 个亚区体积，分别为 CA1、CA2-3、CA4、海马伞、DG、海马-杏仁核过渡区、海马尾、分子层、旁下托、前下托、海马下托、海马裂。

结果：通过 FreeSurfer 6.0 软件处理我们将海马整体分割成如下亚区：分别为 CA1、CA2-3、CA4、海马伞、DG、海马-杏仁核过渡区、海马尾、分子层、旁下托、前下托、海马下托、海马裂（图 1）。基于海马亚区体积分析，我们发现业余马拉松跑者组左侧总海马 ($p < 0.001$, $\eta^2 = 0.115$)、左侧 CA1 ($p < 0.001$, $\eta^2 = 0.107$)、左侧 CA2-3 ($p = 0.002$, $\eta^2 = 0.080$)、左侧 CA4 ($p < 0.001$, $\eta^2 = 0.116$)、左侧 DG ($p < 0.001$, $\eta^2 = 0.124$) 及左侧分子层 ($p < 0.001$, $\eta^2 = 0.108$) 亚区体积明显大于健康久坐对照组，余海马亚区没有呈现出明显的差异（图 2）。

结论：我们发现业余马拉松跑者组的左海马亚区体积更大，提示运动锻炼引起的大脑结构可塑性改变具有不对称性。运动锻炼干预有助于预防与年龄相关的海马退化和保持大脑健康，成为主动健康的重要技术手段。

PO-0528

自身免疫性胶质纤维酸性蛋白星形胶质细胞病的临床表现和影像学特征

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目的：分析自身免疫性胶质纤维酸性蛋白星形胶质细胞病(GFAP-A)的临床和影像学特征，提高对该疾病的认识。

方法：我们回顾性地纳入了自 2017 年以来我院所有脑脊液中 GFAP 抗体检测呈阳性的患者，收集相关临床资料和影像学数据，分析具有特点的临床表现和影像学特征。

结果：CSF 中 GFAP-IgG 检测呈阳性的患者 36 例。发病的中位年龄为 41.5 岁，82.4%为男性。61.8%有发热，47.1%有头痛，14.7%存在神经自身抗体，2.9%合并肿瘤。最常见的表现是脑膜脑脊髓炎（38.3%），其次是脑膜脑炎（35.3%）。41.2%有运动障碍，以震颤最常见（29.4%），其他临床表现包括视物模糊（14.7%）和周围神经系统受累（11.8%）。76.5%CSF 有核细胞数升（淋巴细胞升高为主），79.4%CSF 蛋白升高，50%低钠血症。MRI 常表现为幕上软脑膜强化（45.5%）、脊膜强化（54.5%）；侧脑室周围放射线样强化为特征性表现（42.4%），可出现基

底节区 (45.5%) 及丘脑病变 (27.3%)。脊髓炎以长节段 (55.6%) 及横贯性病变 (51.9%) 最常见, 多位于胸段 (25.9%), 22.2% 累及脊髓全长, 病灶边界模糊呈斑点状强化。

结论: CSF GFAP-IgG 检测对疾病诊断具有重要意义; GFAP-A 临床具有异质性, 常合并低钠血症, 头颅、脊髓、视神经 MRI 有一定特点, 可辅助诊断; 糖皮质激素治疗效果良好。

PO-0529

合成 MRI 联合基于多重灵敏度编码 DWI 鉴别胶质瘤复发和治疗相关改变的应用研究

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目的: 探讨合成 MRI (synthetic MRI) 定量参数联合基于多重灵敏度编码 DWI (MUSE-DWI) 鉴别胶质瘤复发和治疗相关改变的应用价值。

材料与方法: 本研究于 2020 年 9 月-2022 年 11 月期间, 依据纳排标准收集我院胶质瘤全切除术行完整放化疗, 定期 MRI 随访出现新发强化灶患者 45 例。所有患者均行 MUSE-DWI、synthetic MRI 及 T1FLAIR+C 序列。入组病例根据修订版脑胶质瘤治疗反应评估标准 (mRANO) 分为复发组 (26 例) 和治疗相关改变组 (19 例)。采用 GE ADW4.7 工作站衍生的 ADC 图和 MAGiC 软件获取的 synthetic MRI 定量图, 两名神经影像诊断医师以双盲法参照 T1WI+C 图于 ADC 图、synthetic MRI 定量图勾画 ROI 测量强化区 ADC 值及增强前、后 T1 值 (T₁-pre、T₁-post)、T2 值 (T₂-pre、T₂-post)。采用独立样本 t 检验或 Mann-Whitney U 检验比较 synthetic MRI 定量参数和 ADC 值的组间差异, 采用二元 logistic 回归及受试者工作特征 (ROC) 曲线评估单参数及其联合的诊断效能。

结果 1. Synthetic MRI 参数及 ADC 值组间比较: 复发组 T₁-pre 高于治疗相关改变组 (P<0.05), T₁-post 和 ADC 值低于治疗相关改变组 (P<0.05), 两组间 T₂-pre、T₂-post 无统计学差异 (P>0.05)。2. 单参数分析时, ADC 值诊断效能最高 (AUC=0.878), 其次是 T₁-post、T₁-pre, AUC 分别为 0.783、0.745。T₁-pre、T₁-post 联合时, 诊断效能较单参数提高 (AUC=0.850), 多参数联合模型 (T₁-pre+T₁-post+ADC) 诊断效能最高 (AUC=0.901)。

结论: 本研究利用 synthetic MRI 提供组织特征信息的定量参数的优势, MUSE-DWI 技术减少几何失真提供高分辨率图像的优势, 两种技术构建弛豫定量参数联合 ADC 值的多参数模型, 能有效鉴别胶质瘤复发和治疗相关改变, 为临床诊疗提供影像学依据。

PO-0530

基于脑体积的影像组学模型在磁共振阴性癫痫分类中的应用研究

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目的: 磁共振阴性癫痫患者因难以定位致痫灶, 常难以获得手术治疗, 因此本研究拟使用脑体积参数构建影像组学分类模型, 以了解其在磁共振阴性癫痫分类任务中的价值。

方法: 回顾性收集 2020-2022 年就诊于我院的癫痫患者及健康人 T1MPRAGE 图像, 分别纳入患者组和对照组, 使用 Freesurfer 软件的 recon-all 工具进行基于 Desikan-Killiany 和 Destrieux 图谱自动全脑体积分割, 将分割得到的结果用于影像组学模型的训练和验证, 模型训练结果使用 ROC 曲线的曲线下面积、敏感度、特异度表示。

结果: 共获得了双侧大脑半球 128 个脑区体积, 使用递归特征消除法 (RFE) 来选择特征并使用随机森林法进行模型训练后, 确定了基于 11 个特征的模型, 其中年龄、双侧杏仁核以及估计的全脑

体积是该模型贡献度前四位的特征参数, 该模型在验证集上获得了最高的 AUC。AUC 和准确率分别可以达到 0.756 和 0.718。

结论: 使用脑体积构建的影像组学模型可以用于磁共振阴性癫痫的分类任务, 能够为进一步寻找致痫灶位置提供优质证据。

PO-0531

急性缺血性脑卒中侧支循环建立的神经影像学评估

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在急性缺血性脑卒中中, 侧支循环是维持处于风险脑组织血流量的关键, 并且能延长治疗时间窗、增加血管再通率及降低出血转归。目前已经证实, 良好的侧支循环与更小梗死体积、更好的长期预后明显相关。因而早期对侧支循环进行准确而完整地评估有着重要意义。随着现代影像技术的发展, 为评估急性脑梗死侧支循环的建立提供了重要手段, 文中就急性脑梗死侧支循环建立的影像学检查技术和方法作一综述, 旨在为合理的选择影像学检查方法提供依据。

PO-0532

脊髓小脑共济失调 3 型患者的脉络丛增大与基因及其临床表现的相关性研究

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目的: 探讨脊髓小脑共济失调 3 型患者的脉络丛 (CP) 结构与基因及其临床表现的相关性。

方法: 本研究为前瞻性对照研究, 共招募了 66 名基因确诊 SCA3 患者和 50 名人口统计学匹配的健康对照 (HCs) 进行 MRI 扫描, 所有 SCA3 患者进行了 Scale for the Assessment and Rating of Ataxia (SARA)、International Cooperative Ataxia Rating Scale (ICARS) 评估; Freesurfer 对脑区进行分割。所有的统计分析使用 SPSS 软件 26.0 版本 (IBM) 进行。用协方差分析比较 CP 体积差异; 对 SCA3 确诊患者进行基因 (CAG)、量表及脑区体积之间的偏相关分析。中介分析探索 CAG 到 SARA 之间的因果关系; 采用 ROC 曲线分析 SCA3 两组差异性脑结构体积对 Pre-SCA3、Sym-SCA3 分类的预测价值。

结果: 41 例健康志愿者 (41.73 ± 12.62) 和根据 SARA 量表分为的 Pre-CA3 组 12 人 (36.58 ± 14.50)、Sym-SCA3 组 44 人 (42.48 ± 12.45) 纳入研究。HC 组、Pre-CA3 组、Sym-SCA3 组的 CP 体积依次增大。HC 组、Sym-SCA3 组之间的 CP 体积存在显著性差异 ($P < 0.05$); CP 体积与脑干、前中扣带皮层、中央扣带皮层呈现负相关 ($P < 0.05$)。CP 体积与脑脊液, 侧脑室, 三脑室和四脑室呈现正相关 ($P < 0.05$)。CP 和临床变量部分: CP 体积与 CAG、SARA、ICARS 正相关 ($P < 0.05$)。在基因影响 SARA 路径中, CP 可作为中介变量脑干的调节变量。

结论: 本研究首次探索了 SCA3 CP 体积较正常人的扩大且其与基因及运动功能表现存在相关性。CP 在 SCA3 运动脑区的退行性改变中发挥了中介调节作用, 并在区分 sym-SCA3、pre-SCA3 中具有良好表现。研究为脑营养和免疫在 SCA3 的疾病进展机制以及其它退行性疾病研究提供了一个新的视角。

PO-0533

Rs-fMRI 评价 tDCS 改善脑梗死后图命名功能的功能连接研究

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目的 采用静息态功能磁共振成像(rs-fMRI)技术对不同时期脑梗死后失语患者经颅直流电刺激(tDCS)治疗前、后语言相关脑区激活变化进行研究,从影像学的角度探讨图命名功能的损伤及恢复机制。

方法 选取 28 例脑梗死后失语患者,其中急性期(AP)16 例,恢复期(RP)12 例,采用 tDCS 刺激患者语言相关脑区,分别于治疗前、后行 rs-fMRI 检查及失语量表评分,观察患者相关脑区功能连接(FC)的变化。

结果 梗死后失语患者双侧大脑半球存在多个脑区与 Wernick 区 FC 减低,优势半球更为明显。经过 tDCS 治疗后,AP 组和 RP 组患者双侧额颞叶 FC 显著升高,且 AP 组患者双侧颞枕叶 FC 较治疗前升高。RP 组治疗前 FC 升高的左侧颞叶在治疗后 FC 减低。

结论 功能磁共振技术可对 tDCS 治疗前后脑梗死失语患者图命名能力的脑网络改变进行精准、无创的评估。急性期患者早期 tDCS 干预可能对视觉通路的功能代偿起到更加积极的作用。非优势半球的语言功能相关脑区激活可能只是一种短期内神经功能代偿机制。

PO-0534

基于甲基化信息的精分分裂症免疫相关亚型

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背景: 表观遗传学变化是精神分裂症临床异质性的可能分子来源。既往的研究在精神分裂症患者中发现一个与炎症或免疫失调相关的亚型。但是,这个亚型是否稳定存在于首发未治疗的精神分裂症(FES)患者以及接受过长期疾病治疗的精神分裂症(LTS)患者中,目前仍不清楚。

方法: 本研究使用 Illumina 850k 芯片对 FES 和 LTS 患者及其相应健康对照的血液样本进行表观基因组全谱分析。采用非负矩阵因子分解(NMF)和 k 均值聚类分析方法对精神分裂症患者的甲基化信息进行异质性分析,并检验两个队列的分型结果的一致性。

结果: 本研究在 FES 被试中确定了一种亚型患者(47.5%),这个亚型在与免疫细胞活性相关基因位点具有广泛甲基化水平改变,并且其中性粒细胞比例显著增高。此外,FES 队列的聚类结果在 LTS 队列中得到了验证,两个队列的表观遗传学和临床特征高度一致。

结论: 本研究在 FES 和 LTS 两个队列中,证实精神分裂症患者的具有一个免疫相关亚型,并且具有高度的一致性。其特征表现为与免疫功能相关的基因甲基化谱的广泛改变以及较严重的临床症状。这一发现表明针对精神分裂症患者亚群的免疫治疗策略具有较好的前景。

PO-0535

多模态 CT 水摄取率预测急性缺血性脑卒中发病时间的价值

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目的: 应用多模态 CT 分析不同发病时间缺血性脑卒中患者一般资料及水摄取率 (Net water uptake, NWU) 的差异, 并分析 NWU 在识别不同发病时间的诊断效能。

方法: 回顾性采集延安大学附属医院 2020 年 3 月至 2022 年 12 月入院的急性前循环缺血性脑卒中患者 206 例。根据患者发病时间 (4.5h、6h) 进行分组, 采用独立样本 t 检验、Mann-Whitney U 检验或者卡方检验分析两组指标之间有无显著差异。再做绘制患者 NWU 在不同分组 (4.5h、6h) 的工作特征曲线 (Receiver operating characteristic curve, ROC), 分析 NWU 识别不同发病时间的诊断效能及最佳临界值, 并比较曲线下面积 (Area under the curve, AUC)、灵敏度、特异度。

结果: 分析显示, 两组患者年龄、性别、BMI、高血压病、冠心病、房颤、糖尿病、吸烟、饮酒及基线 NIHSS 评分差呈无统计学意义 (均 $P>0.05$), 发病时间在 4.5 小时以内患者的 NWU 低于发病时间在 4.5 小时后患者的 NWU, 不同组别的差异均有统计学意义 (均 $P<0.05$)。NWU 识别症状出现 4.5 小时内患者的 AUC 为 0.861 (95% 可信区间: 0.811-0.911, $P<0.001$), 截断值为 15.95%, 敏感度为 76.4%, 特异性为 86.1%。NWU 识别症状出现 6 小时内患者的 AUC 为 0.825 (95% 可信区间: 0.768-0.882, $P<0.001$), 截断值为 17.55%, 敏感度为 72.3%, 特异性为 83.8%。

结论: 急性缺血性脑卒中患者的发病时间可以通过水摄取率判断, 通过 ROC 曲线, 发现 NWU 对不同发病时间的卒中患者具有较高的识别能力。NWU 可以很好预测急性缺血性脑卒中患者的发病时间, 为急性缺血性脑卒中初诊卒中患者的分层及治疗提供重要价值。

PO-0536

孤独症谱系障碍动态功能连接的应用及研究进展

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目的: 自闭症谱系障碍 (ASD) 是一种异质性神经发育障碍, 核心症状表述为社交、互动障碍和受限、重复行为。近几十年来, 全球儿童和青少年 ASD 的患病率已攀升至 0.7 - 1.5 %。该病对患者及其家庭及社会带来巨大负担。本文旨在提供一个全面的描述 DFC 在 ASD 中应用的方法, 并指出我们认为最有希望的未来发展方向以及 DFC 在 ASD 应用分析的优点和不足之处。

方法: 本文主要通过对 Web of science、PubMed、中国知网以及万方数据库等检索相关文献, 以“孤独症谱系障碍”、“孤独症”、“自闭症”、“磁共振”、“动态功能连接”、“功能连接”、“autism spectrum disorder”、“dynamic functional connectivity”等作为关键词对文献进行检索、筛选、归纳、整理。

结果: 动态功能连接 (DFC) 被认为是揭示 ASD 患者中特定功能改变更有效且更可靠的方法。最近许多关于 ASD 患者的动态功能连接相关研究成果, 主要有 ASD 患者的后扣带回 (PCC) 和中颞极之间的 DFC 高于典型对照; ASD 患者内侧额上回和颞极的 DFC 增加; ASD 患者的注意网络 (AN) 和默认模式网络 (DMN) 之间的 DFC 显著高于 TC; 与正常对照组相比, ASDs 患者在右侧背外侧前额叶 (DLPFC) 与左侧梭状回/舌回之间、DLPFC 与颞上回之间、右侧额眼区 (FEF) 与左侧额中回之间、FEF 与右侧角回之间、左侧顶内沟与右侧颞中回之间的 DFC 显著增加。此外, 观察到 DFC 变化与症状严重程度之间的显著关系。

结论: DFC 可以准确捕捉 FC 随时间的波动, 揭示不同 FC 状态之间的转换, 从而反映出 ASD 发作的产生和传播的潜在机制, 以及与认知、行为障碍的关系, 可以在 ASD 中发挥预测、诊断和治疗作用。

PO-0537

胶质母细胞瘤 2021 版 WHO 分类变化与影像诊断进展

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目的: 通过对 2021 版 WHO CNS 分类变化的了解, 结合影像学表现, 探讨胶质母细胞瘤的影像学诊断进展, 为临床医生提供更准确的诊疗依据。

方法: 归纳总结 2021 版 WHOCNS 分类在胶质母细胞瘤的变化; 回顾性分析 2016 年 1 月-2022 年 12 月 44 例经病理证实胶质母细胞瘤的影像表现, 总结其常见与关键征象; 并对近期相关影像研究文献分析。

结果: 2021 版 WHO CNS 分类引入更多分子学特征与信息, 强调整合诊断和分层报告的重要性, 新定义了多种肿瘤类型和相关亚型, 纳入更多新的诊断技术; 胶质母细胞瘤取消了“胶质母细胞瘤, IDH 突变型”的命名, 其诊断应符合成人患者、弥漫性星形细胞瘤以及仅限于 IDH-野生型, 同时须符合以下表现之一: 坏死、微血管增生、7 号染色体扩增和 10 号染色体缺失、TERT 启动子的突变、EGFR 基因扩增。

44 例患者均行 MRI 检查, 包括男 29 例、女 15 例, 年龄 20-77 岁, 平均年龄约 55.6 岁。43 例均位于幕上(额颞叶 35/43, 顶枕叶 6/43, 中线 2/43), 1 例位于脑室系统沿脑室壁蔓延生长, 与淋巴瘤表现类似致术前误诊; 肿瘤异质性导致内部坏死、出血常见, 不规则厚壁环形强化及灶内拉网状/絮片状强化是较具特征性征象, 实性成分高灌注提示微血管丰富、增生, 同时高灌注是区别胶质母细胞瘤术后复发与假性进展或放射性脑坏死的重要征象依据之一; 肿瘤区域 Cho/NAA 比值通常>2.5; 另外肿瘤跨中线生长亦是肿瘤较具特征的生长方式。

最新研究表明, MGMT 启动子甲基化对于胶质母细胞瘤的治疗选择与预后相关, 具有 MGMT 启动子甲基化预示烷化剂化疗有效并且能改善预后; 有学者通过波谱成像 MRS、影像组学等技术手段术前提示胶质母细胞瘤是否具有 MGMT 启动子甲基化从而为临床提供新的诊断依据, 具有较大的临床应用意义。

结论: 胶质母细胞瘤 2021 版 WHO CNS 分类的变化, 为我们更准确地诊断和治疗胶质母细胞瘤提供了重要的指导意义, 影像学尤其是 MRI 在胶质母细胞瘤的诊断中具有重要地位, 而功能成像及影像组学在分子水平、基因层面为临床提供了预测手段。

PO-0538

自闭症和多动症共病的儿童及青少年脑灰质不对称性改变

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背景: 尽管自闭症(ASD)和多动症(ADHD)共病 (ASD + ADHD)率很高, 但其潜在的神经生物学基础仍不清楚。脑结构的偏侧化改变已分别在 ASD 和 ADHD 中得到证实, 使结构偏侧化成为表征 ASD + ADHD 神经生物学特征的候选指标。目的: 本研究的目的是评估及比较 ASD + ADHD、ASD 无 ADHD (ASD-only)患者和正常对照(TDc)的灰质(GM)体积偏侧化改变。方法: 本研究纳入了 111 例 ASD 和 211 例 TDc 的高分辨率 T1 加权数据。ASD 组包括 48 例 ASD + ADHD 和 63 例 ASD-only。我们还评估了脑-行为关系以及年龄对 GM 偏侧化的影响。结果: 我们发现, 与 TDc 相比, ASD + ADHD 和 ASD-only 患者既存在共同的灰质体积偏侧化改变, 也各自具有特异性的脑改变。这一发

现表明, ASD+ADHD 既不是 ASD 的内表型, 也不是 ASD 的附加改变, 而是一种完全不同的神经功能疾病。此外, 与 ASD-only 相比, ASD + ADHD 在负责执行功能和心理理论的前额叶区域表现出灰质体积偏侧化改变。此外, 内侧额叶/内侧眶额回的不对称指数与 ASD + ADHD 患者的社会反应量表评分呈负相关。我们还发现年龄对 GM 偏侧化有显著影响。结论: 本研究可能为 ASD + ADHD 的神经生物学基础提供脑结构上的见解。

PO-0539

联合弥散加权成像的临床多模态磁共振成像组学模型 在术前预测脑膜瘤脑侵犯的价值

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背景: 脑侵犯是诊断 WHO 2 级脑膜瘤的一个独立诊断标准, 术前预测脑膜瘤的脑侵犯对治疗决策至关重要。先前研究报道基于结构磁共振成像的影像组学模型可以用于脑膜瘤脑侵犯的评估, 但功能成像影像组学模型用于脑膜瘤脑侵犯的研究仍未见报道。在此, 我们联合弥散加权成像、结构磁共振成像的组学特征和临床信息构建多种预测模型, 用于术前评估脑膜瘤的脑侵犯情况。

方法: 回顾性收集 2013 年至 2022 年间 723 例经病理确诊的脑膜瘤患者进行研究。从结构磁共振成像 (T2-FLAIR、T1WI、对比增强 T1WI)、弥散加权成像 (DWI) 和表观弥散系数 (ADC) 中提取脑瘤界面区的放射学特征。采用随机森林、主成分分析筛选组学特征。运用支持向量机、线性判别分析和逻辑回归分别构建结构 MRI 模型 (Ms)、弥散 MRI 模型 (Md)、临床模型 (Mc)、结构-弥散 MRI 模型 (Ms-d)、结构 MRI-临床模型 (Ms-c)、弥散 MRI-临床模型 (Md-c)、结构-弥散 MR-临床模型 (Ms-d-c)。使用受试者操作特征曲线分析评估了各模型的性能。利用 Bootstrap 法 (1000 个样本) 估算 95% 的置信区间。运用综合判别改进 (IDI) 指数比较不同模型的诊断效能。

结果: 结构-弥散 MR-临床模型共纳入结构磁共振成像的 15 个放射组学特征、DWI 的 9 个放射组学特征以及瘤周水肿体积。在所有模型中, 结构-弥散 MRI-临床模型在预测脑侵犯方面表现最佳, 其训练集 AUC 为 0.945 (95% CI: 0.922 至 0.968), 测试集 AUC 为 0.935, (95% CI: 0.892 至 0.979), 加入 DWI 组学特征可显著提高模型在预测脑膜瘤的效能 (IDI = 9.14%; $p < 0.001$)。

结论: 联合弥散加权成像的临床多模态磁共振成像组学模型可以用于术前评估脑膜瘤的脑侵犯, DWI 组学特征在预测肿瘤脑侵犯方面具有重要价值。

PO-0540

首发未用药青少年精神分裂症基于双侧楔前叶的功能 及有效连接的网络异常

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目的: 应用基于兴趣区相关性的方法探索青少年首发精神分裂症患者静息状态下双侧楔前叶功能及有效连接的异常改变。**方法:** 纳入符合 DSM-5 中精神分裂症诊断标准的首发未用药青少年精神分裂症患者 21 例以及具有年龄、教育程度、性别相匹配 21 例健康对照组。对被试者的临床症状评估

采用精神症状评定量表 (PSYRAT) 和 PANSS。所有被试者均进行静息态功能磁共振成像扫描, 以双侧楔叶为种子点进行功能及有效连接分析, 计算其与全脑的功能连接图, 并分析功能连接强度与临床症状的相关性。结果: 在功能连接方面, 患者组双侧楔前叶与左侧额中回的功能连接明显高于健康对照组 ($P<0.001$, FWE 校正, 簇水平 $P<0.05$); 在有效连接方面, 与健康对照组比较, 患者组表现出从种子区到左侧额中回的有效连接减弱。相关分析结果显示, 患者组从双侧楔前叶到左侧额中回有效连接减低与 PANSS 总评分呈正相关($r=0.45$, $P<0.041$)。结论: 首发青少年精神分裂症患者静息态下双侧楔前叶功能连接及有效连接网络模式存在异常, 其中双侧楔前叶与左侧额中回的有效连接减弱与患者精神症状相关。

PO-0541

急性一氧化碳中毒患者自发脑活动的动态变化

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目的 一氧化碳中毒(carbon monoxide, CO)是全球最常见的中毒之一, 可导致多器官功能受损, 以中枢神经系统为主。既往有很多研究应用 rs-fMRI 技术分析 CO 中毒患者大脑活动的静态特征, 脑活动在时间维度上的动态变化特征关注较少。本研究的目的是探讨 CO 中毒患者大脑自发活动的动态变化情况, 并进一步探究这些变化是否与临床症状相关。

方法 本研究共招募了 26 名 CO 中毒患者以及 25 名健康志愿者, 对所有研究对象进行了 rs-fMRI 扫描, 采用 MMSE、MoCA-B 评估受试者的认知功能。基于 DPABI V4.3 的 TDA 工具箱, 采用滑动时间窗的方法计算所有参与者的动态局部一致性(dynamic regional homogeneity, dReHo)。采用双样本 t 检验对 dReHo 指标的组间差异进行比较, 同时利用高斯随机场(gaussian random field, GRF)方法进行多重比较校正(voxel $p<0.001$, cluster $p<0.05$)。随后, 本研究进一步分析了 CO 中毒患者异常脑区的 dReHo 值是否与认知状态存在相关性, 统计显著性水平设定为 $p<0.05$ 。

结果 与健康对照组相比, CO 中毒患者左侧颞下回和左侧额上回的 dReHo 值显著增加, 并且左侧颞下回的 dReHo 值与 MMSE 和 MoCA-B 评分呈显著负相关($r=-0.505$, $p=0.009$; $r=-0.483$, $p=0.012$)。此外, CO 中毒患者右侧丘脑、右侧海马旁回和右侧额上回的 dReHo 值与健康对照组相比明显减低。

结论 本研究探究了 CO 中毒患者大脑自发活动的动态特征, 发现 CO 中毒患者存在脑自发活动动态指标的异常, 并且异常的 dReHo 值与 MMSE 和 MoCA-B 评分呈负相关, 表明与患者的认知功能损害有一定相关性, 可能有助于进一步探究 CO 中毒的病理生理机制及预测患者预后的标记物。

PO-0542

帕金森病伴冻结步态的脑网络层次结构紊乱

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引言: 人脑网络是一个层次结构的组织。在帕金森病伴步态冻结(PD-FOG)中, 网络层次是否以及如何被破坏尚不清楚。此外, 患有 FOG 的 PD 患者的脑网络层次变化与临床量表之间的关系尚不清楚。本研究的目的是探讨 PD-FOG 网络层次的变化及其临床意义。

方法: 本研究通过连接组梯度分析 31 例 PD-FOG、50 例 PD-NFOG 和 38 例健康对照(HC)的脑网络层次结构。通过比较 PD-FOG 组、PD-NFOG 组和 HC 组各网络梯度值的不同来评估网络层次的变化。我们进一步研究了网络梯度值与临床量表之间的动态变化关系。

结果: 在第二个梯度上, PD-FOG 组显著性/腹侧注意网络-A (SalVentAttnA)网络梯度显著低于 PD-NFOG 组, 而两个 PD 亚组的默认模式网络-C 梯度均显著低于 HC 组。在第三个梯度中, PD-FOG 组的躯体运动网络-A 梯度明显低于 PD-NFOG 组。此外, 降低的 SalVentAttnA 网络梯度值与 PD-FOG 患者更严重的步态、跌倒风险和冻结步态相关。

结论: PD-FOG 脑网络层次结构紊乱, 这种紊乱与冻结步态的严重程度有关。本研究为 FOG 的神经机制提供了新的证据。

PO-0543

基于 NCCT 影像组学在预测前循环缺血性脑卒中静脉溶栓后出血转化中的价值

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目的 探讨 NCCT 影像组学联合临床危险因素预测前循环 AIS 患者 rt-PA 静脉溶栓后有无 HT 的价值
方法 回顾性分析 2018.10 至 2022.7 我院神经内科就诊并接受 rt-PA 静脉溶栓治疗的前循环 AIS 患者。将符合纳入和排除标准的患者随机分为训练集和验证集。训练集中, 将患者临床基线资料、发病至溶栓时间及入院时 NIHSS 评分采用卡方检验、Fisher 确切概率法、秩和检验及二分类 Logistic 逐步回归分析, 得出临床独立危险因素并建立临床模型。NCCT 图像上进行梗死区的勾画及影像组学特征的提取, 使用 ICCs、mRMR 以及 LASSO 对提取的影像组学特征进行降维筛选, 建立影像组学模型。最后将影像组学模型与临床模型结合建立联合预测模型, 并采用列线图的形式呈现。通过校正曲线和决策曲线分析对模型的校准度及临床实用价值进行评价。

结果 最终手机患者共计 298 例, 按照 6.5: 3.5 的比例随机分为训练集 (n=197) 和验证集 (n=101), 训练集与验证集之间临床因素均无统计学差异 (P 均>0.05)。临床模型包括患者是否伴有高血压、房颤以及入院时 NIHSS 评分, 模型在训练集、验证集中的 AUC 值分别为 0.733 (95%CI, 0.639-0.828)、0.679 (95%CI, 0.546-0.813)。保留 7 个特征构建影像组学模型, 模型在训练集和验证集中的 AUC 值分别为 0.728 (95%CI, 0.628-0.829)、0.680 (95%CI, 0.532-0.827)。将临床模型与 NCCT 影像组学模型联合获得联合预测模型, 训练集和验证集中的 AUC 值分别为 0.815 (95%CI, 0.736-0.895)、0.799 (95%CI, 0.683-0.915)。Delong 检验显示联合模型的诊断效能高于临床模型及影像组学模型, 校正曲线表明联合模型的预测结果与实际情况一致性较高。DCA 显示在大部分阈值 (0.17-1.0) 范围内, 联合预测模型净收益较高。

结论 NCCT 影像组学模型联合临床危险因素构建的联合模型对预测前循环 AIS 患者 rt-PA 静脉溶栓后有无 HT 有较高的诊断效能, 对临床治疗决策有一定的参考价值

PO-0544

Application of spinal subtraction and bone background fusion CTA in the accurate diagnosis and evaluation of spinal vascular malformations

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Background: Accurate pre-treatment diagnosis and assessment of spinal vascular malformations (SVMs) using spinal CTA are crucial for patient prognosis. But the post-processing reconstruction may struggle to fully visualize the lesions due to the complexity inherent in spinal anatomy.

Objective: To explore the application value of the spinal bone background fusion CTA (SBBFF-CTA) technique in precisely visualizing and localizing SVMs lesions.

Methods: In this retrospective study, patients (from Nov 2017 to Nov 2022) presenting symptoms similar to SVMs, were divided into diseased group (Group A) and non-diseased group (Group B). All patients underwent spinal CTA using Siemens dual-source CT. The MPR, routine bone subtraction (RBS-CTA), and SBBFF-CTA images were obtained through Snygo.via and ADW4.6 post-processing reconstruction workstation. Multiple observers researched the following three aspects: (a) preliminary

screening capability by MPR-CTA; (b) the accuracy and stability of the SBBFF-CTA technique; (c) diagnostic evaluation by three types of images. The diagnostic performance used receiver operating characteristics analysis, while reader or image differences used the Wilcoxon signed-rank test or the Kruskal-Wallis rank sum test.

Results: Sixty-three patients (Group A/B: 22/27 patients, mean age \pm SD, 44.0 years \pm 14.3/44.6 years \pm 15.2, 13/16 men) were evaluated. Junior doctors showed lower diagnostic accuracy/sensitivity using MPR-CTA (85.7%/77.3%) compared to senior doctors (93.9%/90.9% and 98%/95.5%). Short-term trained juniors achieved SBBFF-CTA image accuracy similar to experienced doctors ($P > 0.05$). In terms of visualization and localization of SVMs lesions (nidus/fistula, feeding artery, and drainage vein), both MPR and SBBFF-CTA outperformed RBS-CTA ($P = 0.000$). Compared to MPR, using SBBFF-CTA allowed less-experienced doctors to achieve superior diagnostic capabilities (comparable to experienced radiologists) more rapidly ($P < 0.05$).

Conclusion: The SBBFF-CTA technique exhibits excellent reproducibility and enables accurate pre-treatment diagnosis and assessment of SVMs with higher diagnostic efficiency, particularly for junior radiologists.

PO-0545

卒中后认知障碍背外侧前额叶微结构对自发性脑活动的高度限制性

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背景: 结构解耦指数量化了脑区的结构-功能依赖程度, 提供了一种新的认知信号大脑组织特征, 然而卒中后认知障碍认知信号损伤模式仍不清楚。因此, 我们探索卒中后认知障碍患者认知信号与行为相关的空间分布神经影像学病理机制。

方法: 我们采集了 27 卒中后认知障碍患者和 27 名性别、年龄相匹配的健康对照静息态功能性磁共振和弥散张量成像数据。弥散数据构建的结构连接组在图频域中分解为谐波, 并将功能信号(每个时间点的 fMRI)投影到结构谐波所跨越的空间中。然后功能信号滤波为低和高的结构图频率, 分别得到解耦和耦合的信号分量, 其比值即为结构解耦指数。此外, 使用简易智力状态检查量表和蒙特利尔认知评估量表评估认知功能。统计学分析采用双样本 T 检验和相关性分析。

结果: 与健康对照对比, 经 Bonferroni 多重比较校正后 ($p < 0.0001$), 卒中后认知障碍患者双侧的背外侧前额叶 (包括左侧 8BL、9p, 右侧 i6-8, 双侧 s6-8)、左侧运动辅助区 (6ma), 双侧颞中回 (V3CD)、左侧运动前区 (PEF、55b) 和顶上小叶 (7PC) 解耦指数明显减低; 进一步相关性分析表明, 右侧背外侧前额叶 (i6-8: $r = -0.52$, $p = 0.005$; s6-8: $r = -0.43$, $p = 0.025$) 与简易智力状态检查量表评分明显负相关。

结论: 卒中后认知障碍患者认知信号损伤不仅累及运动、听觉等低阶功能区域, 而且影响背外侧前额叶、顶上小叶等高阶功能区域, 表现为耦合增加和神经活动受下方结构高度限制。右侧背外侧前额叶神经活动受限可能是卒中后认知障碍认知损伤神经影像学病理基础, 进一步证实了右侧背外侧叶作为卒中后认知障碍神经调控靶区的神经机制, 可能为今后精准神经调控提供了更精细的解剖靶点。

PO-0546

WHO2-3 级胶质瘤恶性转化的临床及 MRI 特征分析

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目的 分析发生恶性转化的 WHO 2~3 级胶质瘤患者的临床、病理、MRI 表现,探讨预测胶质瘤发生恶性转化的临床及 MRI 特征。**方法** 回顾性分析 24 例发生恶性转化的 WHO 2~3 级胶质瘤患者的临床资料,包括患者的临床病史、MRI 表现、组织病理结果、分子病理特征,并与同期的 14 例未发生恶性转化的 WHO 2~3 级胶质瘤患者的上述资料进行比较。**结果** 恶性转化组患者首次诊断时平均年龄 39.0 ± 11.0 岁,男:女比例约为 1.67:1。首次诊断时病程 3~730 天,中位时间 20 天。无进展生存时间 (MPFS) 6~99 月,中位时间 37 月;WHO 2 级肿瘤与 WHO 3 级肿瘤比例约为 1.7:1。复发未转化组患者首次诊断时平均年龄 36.9 ± 10.9 岁;男:女比例约为 1.8:1。首次诊断时病程 0.17~2555 天,中位时间 30 天。MPFS 5~87 月,中位时间 33 月;WHO 2 级肿瘤与 WHO 3 级肿瘤比例约为 0.27:1。临床表现为头痛、恶心、呕吐等颅高压症状及癫痫等神经功能缺损表现。恶性转化组与复发未转化组肿瘤 WHO 分级、分型有显著统计学差异 ($P < 0.05$),两组间年龄、性别、肿瘤部位、数目、肿瘤异质性、强化程度、瘤周水肿程度、临床症状、首次诊断时病程、MPFS 均无显著统计学差异 ($P > 0.05$)。**结论** 胶质瘤的 WHO 分级、分型与恶性转化相关,组织学诊断为 WHO 2~3 级的星形细胞瘤可能因其为 IDH1/2 野生型,更容易发生恶性转化。尽管可用于预判胶质瘤恶性转化的有价值参数较少,但密切关注患者临床及影像特征仍是提示肿瘤恶性程度、预判恶性进展的重要方法,在胶质瘤的病理诊断中更多体现分子特征,能对预判恶性转化提供重要参考。

PO-0547

脑膜瘤术后复发并存高级别胶质瘤一例

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摘要:目的 探讨颅内相邻部位脑膜瘤合并高级别胶质瘤相关发病机制以及总结相关影像学表现。**方法** 回顾性分析 1 例经病理学诊断为相邻部位脑膜瘤合并胶质瘤患者的临床及影像资料,并进行相关的文献复习。**结果** 患者术前 MRI 示左侧额顶叶异常信号灶,与相邻部位不规则增厚硬脑膜关系密切。手术切除肿瘤,术后病理学诊断为合体细胞型脑膜瘤 (WHO I 级) 合并高级别胶质瘤 (WHO IV 级)。**结论** 颅内相邻部位脑膜瘤合并高级别胶质瘤十分罕见,其两者发病机制尚不清楚,两者同时或相继发生目前多以统计学上的巧合来解释。影像学对该疾病定位、定性及临床手术评估具有一定的诊断价值,但病理及活检仍是该疾病诊断的“金标准”。因此临床在术前可根据相关影像学特征了解肿瘤良恶性、生长位置及邻近关系,来选择合理的手术方式,从而尽可能减少患者手术创伤。

PO-0548

基于 DTI 探讨终末期肾病继发性甲旁亢患者认知及脑白质损伤

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目的 探讨 ESRD 伴 SHPT 患者认知及脑白质微观结构损伤 **方法** 25 名 ESRD 合并 SHPT 患者 (SHPT 组) 及 25 名 ESRD 不伴甲旁亢患者 (ESRD 组) 行磁共振 DTI 检查、进行 MMSE 认知量表评估, 收集相关临床血清学指标, 比较两组间 MMSE 总评分、血清学指标、各向异性分数 (FA)、平均扩散率 (MD)、轴向扩散率 (AD) 和径向扩散 (RD) 的差异, 分析 SHPT 组 MMSE 总评分、血清学指标与差异性脑区 DTI 参数的相关性。 **结果** 与 ESRD 组相比, SHPT 组 MMSE 总评分明显减低, 血清钙水平略升高, 维生素 D 水平明显减低。SHPT 组多个脑区 FA 值及 AD 值减低, 包括大脑半球、小脑及脑干, 且大脑半球异常脑区以右侧分布为主, 部分脑区 RD 值升高, 且 SHPT 组血清钙水平、磷酸盐水平及肌酐水平与部分脑区 FA 值及 AD 值减低呈正相关, 血清磷酸盐水平与部分脑区 RD 值升高相关, 认知水平与血清 iPTH 水平呈负相关 (P 均 <0.05); 其他指标未见明显统计学差异 (P 均 >0.05)。 **结论** 本研究显示 ESRD 合并 SHPT 患者的脑白质微观结构及认知功能均出现损伤, 且脑白质微结构损伤范围广泛, 以轴突损伤为主, 具有右侧大脑半球偏侧性, 且与患者血清钙、磷酸盐、肌酐水平相关。

PO-0549

眼球运动障碍诊断定位与影像检查方法研究进展

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本文是通过文献分析法, 针对眼运动神经病变引起的眼球运动障碍的病因、定位诊断和影像检查成像方法进行综述, 对临床工作中眼运动神经病变引起的眼球运动障碍诊断定位和有效影像检查方法提供有益参考。眼球运动障碍是临床常见的疾病表现, 除眼外肌本身病变导致的情况外, 眼运动神经, 包括动眼神经、滑车神经及外展神经病变原因导致的眼球运动障碍更为高发。眼运动神经异常依据解剖定位可以分为脑干眼运动神经核区病变, 例如脑干梗塞、出血、肿瘤性病变、炎性脱髓鞘性病变、外伤等, 临床表现除眼球运动障碍外会经常伴随肢体运动障碍等。定位在眼运动神经脑池段情况, 常常会累及不只一条颅神经, 常见的病变有颅内感染累及颅神经脑池段, 恶性肿瘤脑膜转移时累及颅神经, 再者是颅神经本身起源的神经源性肿瘤、外伤引起的颅神经脑池段牵拉等。定位在海绵窦区、眶上裂区的眼运动神经病变, 常见病变包括颈动脉动脉瘤、颈动脉夹层、颈动脉-海绵状瘘、海绵状窦血栓形成、梗死、感染、肿瘤(内在或外在)、Tolosa-Hunt 综合征和眼麻痹性偏头痛。定位在眶内段眼运动神经损伤的情况, 常见病变有感染/炎症, Tolosa-Hunt 综合征, 肉芽肿性, 肿瘤性(外源性或内源性)和外伤性, 骨折累及眶上裂。其中区分病变在海绵窦区、眶上裂区和眶尖区的鉴别点在于视神经是否受累, 三叉神经第二支是否受累。从眼球运动障碍的临床表现和伴随症状得出眼运动神经病变定位, 再针对性应用 CT 和 MR 检查显示出病变情况, 其中 CT 检查针对外伤时累及眶骨时或被检查者对 MRI 有禁忌时比较有优势, 不同病变部位 MRI 检查选择成像方位不同, 其中两个序列对于显示眼运动神经病变比较重要, 压脂 T2 序列和 3D 薄层 T1 对比增强序列, 一个是可以在高信号脑脊液衬托下显示颅神经, 另一个是在颅神经病变时显示异常强化。从而更好的显示出颅神经病变。

PO-0550

超高分辨磁共振 T2WI：面神经炎可视化诊断新技术

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目的 探讨磁共振超高分辨 T2 成像对面神经炎的诊断价值。方法 对 50 例面神经炎患者行磁共振超高分辨 T2 成像。通过后处理工作站行 MIP 及 CPR 重建后观察面神经的炎症情况。测量患侧及健侧的平均信号强度。结果 50 例面神经炎患者中,有 43 例能在磁共振图像上观察到面神经炎症,鼓室段 15 例,乳突段 23 例,腮腺段 32 例,鼓室-乳突段均受累 10 例,乳突-腮腺段均受累 7 例,鼓室-乳突-腮腺段均受累 3 例。结论 磁共振超高分辨 T2 成像有助于清楚显示面神经炎及病变累及情况。

PO-0551

基于术前 MRI 影像组学对 IDH 野生型胶质母细胞瘤患者总生存期的预测

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目的本研究旨在开发一种适用于异柠檬酸脱氢酶 (IDH) 野生型胶质母细胞瘤 (GBM) 患者进行术前预后预测的影像组学模型,并为不同患者的临床决策提供个性化帮助。

方法根据 2021 年世界卫生组织中枢神经肿瘤的分类,从武汉大学中南医院以及癌症基因组图谱 (TCGA)/癌症影像档案 (TCIA) 公共数据库中获 142 名 IDH 野生型 GBM 患者的临床及影像资料,随机分为训练组和验证组,其中训练组中有 100 名患者,验证组中有 42 名患者。首先,采用单变量 Cox 回归分析筛选出与其总生存期相关的具有意义的临床特征。然后在 T1 加权增强图像 (CE-T1WI)、T2 加权图像 (T2WI) 和 T2 加权液体衰减反转恢复 (T2-FLAIR) 核磁共振成像图像上,勾画肿瘤最大范围 (包括肿瘤区域及肿瘤周围水肿区域) 作为感兴趣区 (ROI)。从 ROI 中提取影像组学特征。随后,进行特征选择和影像组学特征的构建。通过整合影像组学特征和选定的临床因素,以建立组合模型。用 Kaplan-Meier 分析验证模型的判别能力,用 C 指数 (C-index) 评价预测的一致性。最后,生成影像组学特征+临床特征诺模图进行个性化预后分析,然后使用校准曲线进行验证。

结果临床特征分析筛选出 4 个危险因素。ICC、斯皮尔曼相关分析、单变量 Cox 和 LASSO-Cox 分析相结合,选择出了 8 个影像组学特征,构成了影像组学标签。影像组学模型和组合模型均能将患者分为低风险和高风险两组,结果具有显著差异 (训练组和测试组分别为 $P<0.001$ 和 $P<0.05$),并获得了良好的预测一致性 ($C\text{-index}=0.74\text{-}0.86$)。此外评估模型预测和实际观测之间的差异,在一年生存率和两年生存率方面,校准图显示了良好的一致性。

结论对于最新分类为 IDH 野生型 GBM 患者,影像组学是一种独立的术前无创预测预后工具。结合影像组学特征和临床因素构建的组合诺模图,可以预测 IDH 野生型 GBM 患者的预后情况。

PO-0552

不同饮食依从性 2 型糖尿病患者抑制控制的神经电生理活动特点

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目的：抑制控制作为饮食行为调节的重要因素，越来越受到业界关注。但研究主要聚焦于健康人群、饮食失调人群、超重或肥胖患者以及限制性饮食人群等，较少涉及像糖尿病这类需要长期严格执行饮食管理的慢性病患者群体。因此，本研究旨在探讨不同饮食依从性 2 型糖尿病患者抑制控制的神经电生理活动特点，为揭示不同饮食依从性糖尿病患者的抑制控制差异提供客观指标，从而揭示抑制控制对饮食依从性影响的神经机制。方法：采用 2（组别：饮食依从性高、低组） \times 2（刺激：高、低热量食物图片）混合研究设计。采用 2 型糖尿病患者饮食行为依从性测评量表测量患者的饮食依从性；采用高、低热量食物图片改编的 Go/No go 任务测量食物相关抑制控制能力；采用 32 导脑电记录系统记录脑电信号，电极参照国际标准 10-20 系统放置。选择 CPz 为在线参考电极，GND 为地线，所有电极电阻均保持在 5K Ω 以下，采样率为 1000Hz。以 61 例住院 2 型糖尿病患者为研究对象。纳入标准：①病程 \geq 6 个月；②年龄 \geq 18 周岁；③初中及以上文化程度；④手指能做按键反应；⑤MoCA 量表得分 \geq 25 分；⑥知情同意并自愿参与本研究。排除标准：①既往有脑血管疾病史或其它中枢神经损伤的疾病及病史；②孕妇或伴有严重基础疾病等特殊人群；③伴有严重并发症者；④实验中途退出者。采用独立样本 t 检验、卡方检验、重复测量方差分析以及混合设计方差分析等统计学方法进行统计分析。结果：高饮食依从性组患者比低饮食依从性组在额叶脑区和中央脑区诱发更大的 P2 差异波幅（ $p=0.019, 0.011$ ）；高饮食依从性组患者比低饮食依从性组诱发更大的 P3 差异波幅（ $p=0.015$ ）。结论：饮食依从性高的 2 型糖尿病患者诱发更大的 P2 和 P3 脑电波，说明患者对食物的注意偏向和反应抑制能力更强。这提示，抑制控制对饮食依从性具有影响作用，通过抑制控制干预有望改善患者的饮食依从性，这具有重要的临床应用价值。

PO-0553

阿尔兹海默症和帕金森病轻度认知障碍功能脑网络连通性改变的异同：一项基于独立成分分析的研究

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背景：阿尔茨海默病（AD）和帕金森病（PD）是两种常见的神经退行性疾病，它们在导致认知功能障碍方面具有一定的异质性，可能涉及到不同的病理生理机制。轻度认知障碍（MCI）是正常衰老和痴呆症之间的中间阶段，也是临床疾病干预的关键时间窗口。本研究旨在探讨 AD-MCI 和 PD-MCI 两种疾病在轻度认知功能障碍阶段的脑网络改变。

方法：我们招募了 33 名 AD-MCI 患者、55 名 PD-MCI 患者和 34 名健康志愿者（HC），并对他们进行了静息态磁共振成像和神经心理评估。我们采用独立成分分析（ICA）方法来研究认知相关网络的变化特征。通过单因素方差分析比较了三组受试者在网络内和网络间功能连接方面的差异，以探索不同疾病导致的认知功能障碍在网络水平上的功能连接变化。

结果：网络间功能连接分析显示（FDR 校正， $P<0.05$ ），AD-MCI 和 PD-MCI 患者与 HC 相比，表现出网络间功能连接的增加和减少。具体而言，AD-MCI 患者的网络间功能连接减少主要出现在默认模式网络（DMN）内部以及 DMN 网络与执行网络（ECN）之间。PD-MCI 患者的网络间功能连接减少主要位于凸显网络（SN）和 DMN 网络之间。此外，AD-MCI 患者表现出 SN 网络与语言网络（LN）之间的功能连接增强，而 PD-MCI 患者的网络连接增强主要出现在显性网络内部。值得注意

的是，PD-MCI 患者与 AD-MCI 患者之间的 SN 网络以及 SN 网络与左侧执行控制网络（LECN）之间的功能连接存在显著差异。在网络内功能连接分析方面，AD-MCI 患者和 PD-MCI 患者在多个认知相关网络内的多个脑区的活动存在统计学上的差异（FDR 校正， $P < 0.05$ ）。

结论：AD-MCI 患者的脑网络变化主要集中在 DMN 网络，而 PD-MCI 患者的变化主要集中在 SN 网络。这些研究结果为更深入地理解这两种疾病在早期认知功能障碍阶段的病理生理机制提供了重要的神经网络基础。这些发现有望为未来的诊断和治疗策略提供更多的见解。

PO-0554

磁共振广义 T2-FLAIR 错配征象在诊断星形细胞瘤（IDH 突变型）及预测分子状态中的临床价值

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目的 探讨广义 T2-FLAIR 错配征象能否作为星形细胞瘤（IDH 突变型不伴 1p/19q 共缺失）的 MRI 影像标志物，以提高对该类型胶质瘤的术前诊断水平及预测分子状态。

方法 回顾性分析 158 例经病理证实且有完整术前常规 MRI 影像（T1、T2、FLAIR 序列）的星形细胞瘤（IDH 突变不伴 1p/19q 共缺失）的完整术前常规 MRI 影像资料，由 2 名中枢神经影像医师独立依据伦勃朗视觉感受图像（visually accessible Rembrandt images, VASARI）特征集的标准进行影像学特征的定量分析。运用 Kappa 检验评价 2 名医生对影像学特征评分结果的一致性。总结并扩展狭义 T2-FLAIR 错配征为广义错配征。运用 Logistic 回归分析及受试者工作特征（receiver operating characteristic, ROC）曲线分析评价广义 T2-FLAIR 错配特征对于星形细胞瘤（IDH 突变不伴 1p/19q 共缺失）的诊断效能。

结果 扩展定义的广义 T2-FLAIR 错配征包含三种类型，即完全 T2-FLAIR 错配，部分 T2-FLAIR 错配，FLAIR 高信号环伴环内不匹配。2 名中枢神经影像医师 VASARI 特征评分的一致性较好（Kappa 值：0.737~0.960）。将狭义 T2-FLAIR 错配征扩展为广义错配征，并作为星形细胞瘤（IDH 突变不伴 1p/19q 共缺失）诊断标准时，相对于狭义错配征，诊断敏感度提高了 50%，特异性没有受到明显影响。广义 T2-FLAIR 不匹配征对于星形细胞瘤（IDH 突变不伴 1p/19q 共缺失）的诊断具有统计学意义（ $P < 0.05$ ），可以作为独立预测危险因素，诊断效能较高，ROC 曲线下面积（area under curve, AUC）为 0.840。

结论 广义 T2-FLAIR 错配征可以作为星形细胞瘤敏感性、特异性较高的 MRI 成像标志物，并可以术前非侵入性的预测星形细胞瘤的 IDH 突变不伴 1p/19q 共缺失的分子状态。

PO-0555

常规磁共振 T2 微囊聚集区及囊变间隔/囊壁 T2-FLAIR 不匹配征象在诊断星形细胞瘤（IDH 突变型）及预测分子状态中的临床价值

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目的 探讨 T2 微囊聚集区及囊变间隔/囊壁 T2-FLAIR 不匹配征象能否作为星形细胞瘤（IDH 突变型不伴 1p/19q 共缺失）的 MRI 影像标志物，以提高对该类型胶质瘤的术前诊断水平及预测分子状态。

方法 回顾性分析 158 例经病理证实且有完整术前常规 MRI 影像 (T1、T2、FLAIR 序列) 的星形细胞瘤 (IDH 突变不伴 1p/19q 共缺失) 的完整术前常规 MRI 影像资料, 由 2 名中枢神经影像医师独立依据伦勃朗视觉感受图像 (visually accessible Rembrandt images, VASARI) 特征集的标准进行影像学特征的定量分析。运用 Kappa 检验评价 2 名医生对影像学特征评分结果的一致性。运用 Logistic 回归分析及受试者工作特征 (receiver operating characteristic, ROC) 曲线分析评价 T2 微囊聚集区及囊变间隔/囊壁 T2-FLAIR 不匹配征象对于星形细胞瘤 (IDH 突变不伴 1p/19q 共缺失) 的诊断效能。

结果 2 名中枢神经影像医师 VASARI 特征评分的一致性较好 (Kappa 值: 0.737~0.960)。T2 微囊聚集区及囊变间隔/囊壁 T2-FLAIR 不匹配征象对于星形细胞瘤 (IDH 突变不伴 1p/19q 共缺失) 的诊断具有统计学意义 ($P<0.05$), 可以做为独立预测危险因素, 诊断效能较高, ROC 曲线下面积 (area under curve, AUC) 为 0.779。

结论 T2 微囊聚集区及囊变间隔/囊壁 T2-FLAIR 不匹配征象可以作为星形细胞瘤的成像标志物, 并可以术前非侵入性的预测星形细胞瘤的 IDH 突变不伴 1p/19q 共缺失的分子状态。

PO-0556

经胼胝体结构连接的毕生轨迹研究: 一项 5T 超高场高分辨多模态磁共振脑成像研究

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背景与目的: 胼胝体是连接左右半球的最大白质纤维束, 不同区域包含不同的纤维密度及髓鞘水平, 反映不同的特化功能, 并提供半球间的整合和信息传输, 参与利手、语言、运动等功能。越来越多的研究指出, 胼胝体形态学可能是预测神经退行性病变的重要指标, 但不同胼胝体区域是如何连接左右半球, 以及胼胝体的毕生轨迹演变, 依然不太清楚。本研究利用世界首台 5T 超高场 MRI 磁共振采集 18-90 岁健康成人高分辨、多模态脑成像数据, 以及行为、认知评分数据和临床数据。旨在 (1) 理解群体水平胼胝体不同分区如何连接半球皮层区域; (2) 刻画经胼胝体结构连接的毕生发展轨迹。

材料方法: 总共招募 250 例 18-90 岁健康成人参与本研究, 采集高分辨多模态 5T MRI 脑成像数据及行为、认知评分数据和临床数据。所有受试者在 MRI 扫描七天内参加了认知测试, 主要涉及整体认知包括 MMSE 及 MoCA, 注意力与执行功能包括数字符号转换测试, 记忆包括雷氏语音记忆的即时回忆和延迟回忆。此外, 所有受试者在 MRI 扫描当天还填写了在线问卷, 主要包括睡眠、精力、水和酒精饮用等信息。根据 W 和 H 分区, 以及 100 个等份分区, 跟踪正中矢状位胼胝体亚区的结构连接及纤维束定量。使用年龄段平均计算群体水平经胼胝体结构连接, 使用曲线拟合计算经正中矢状位胼胝体亚区连接的毕生轨迹。

结果: 经正中矢状位胼胝体呈现明显的区域性结构连接变异, 前后部分密集连接额顶网络, 中间躯干部分连接体感运动皮层。在毕生轨迹分析中, 这些连接呈现明显的非线性下降, 特别是以 58-63 岁为拐点。

结论: 我们的数据提供了有关胼胝体高分辨结构连接的皮层连接模式及毕生轨迹演变模式, 为理解半球间整合的毕生轨迹及老化相关退变疾病提供了重要的观点。

PO-0557

裕固族双语大脑灰质结构动态变化的 VBM 研究

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【摘要】目的：利用体素的形态学分析 (voxel-based morphometry, VBM) 方法分析裕固族双语与汉族非双语大脑灰质结构变化，探讨裕固族双语认知及大脑灰质体积差异的动态变化机制。

材料与方法：本研究收集了 29 名熟练使用裕固族语-汉语及性别、年龄、受教育程度相匹配的 25 名汉族非双语的健康成年人行磁共振 3D-T1WI 序列扫描并行 VBM 全脑灰质体积分析，利用双样本 T 检验比较两组的灰质体积差异，并与 MoCA 量表行认知相关性分析，最后利用 VBM 灰质体积差异脑区行中介分析揭示裕固族双语大脑灰质体积的动态变化机制。

结果：基于 VBM 分析显示，裕固族语-汉双语组右侧顶下小叶、双侧颞中回、左侧背侧丘脑及右侧直回灰质体积明显高于汉族非双语组，组间差异有统计学意义 (FWE 校正, $P < 0.05$)；右侧颞中回灰质体积与 MoCA 量表评分呈正相关。中介分析揭示左侧丘脑及右侧直回主要介导双侧颞中回灰质体积增加，且双侧颞中回都受左侧丘脑的间接或直接介导。

结论：裕固族双语与汉族非双语大脑灰质体积存在明显差异，第二语言的习得会导致大脑皮层灰质微观结构的改变，且裕固族双语大脑灰质体积差异存在相关动态变化机制。

PO-0558

右侧扣带回与帕金森病患者步态和认知功能障碍的相关性研究

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目的：本研究旨在通过高角度分辨率扩散成像(HARDI)评估帕金森病(PD)患者扣带回纤维束的变化，并探讨平均各向异性(FA)值与心理行为学指标及步态指标的相关性。

方法：24 例 PD 患者和 29 例健康志愿者(HC)纳入本研究。对于每个参与者，在 3.0TMRI 扫描仪上用采集 HARDI 序列及 MPAGE 高分辨 3D 结构像。利用 Mtrix3 软件进行扩散加权数据预处理，利用方向分布函数追踪 PD 患者的主要神经纤维束，并进行了自动化纤维定量分析。采用 20 英尺长的计算机化 Zeno 步道步态评估毯进行客观的步态评估，量化步速、步幅、步幅时间和步频，以自我选择步速(SSP)和快步速(FP)进行评估。定量记录 PD 患者服用左旋多巴类药物开期 (ON) 和关期 (OFF) 状态下的步态和临床指标。比较 PD 组与 HC 组的临床指标特点、步态特点及白质纤维束特点，分析 FA 值与心理行为学指标及步态指标的相关性。

结果：右侧扣带回的 34-58 段纤维束的 FA 值与简易精神状态检查(MMSE)、Berg 平衡量表(BBS)-OFF 期、BBS-ON 期的得分呈正相关；与 MDS-UPDRS-III-ON 期得分呈负相关。在步态指标的分析中，在 ON 和 OFF 两期，FA 值与步频和节奏域的速度、步频和步幅时间均显著相关($P < 0.05$)。

结论：使用 HARDI 数据可以获得详细而准确的右侧后扣带回节段性纤维，可以为 PD 的治疗提供了重要而具体的神经影像学信息与临床心理行为学评估方法。HARDI 结合神经认知和步态评估可能是诊断帕金森病步态和认知障碍的有价值的神经影像学及生物学标志物。

PO-0559

顺磁性环能够鉴别多发性硬化与伴有皮层下梗死和白质脑病的常染色体显性遗传性脑动脉病吗？

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目的：

研究显示顺磁性环病灶（PRL）在高达 50% 以上的多发性硬化（MS）患者中存在，代表含有嗜铁小胶质细胞的慢性活动期 MS 病灶，在除 Susac 以外的脑病中罕见，被认为是诊断 MS 的有利的特异性指标。伴有皮层下死和白质脑病的常染色体显性遗传性脑动脉病（CADASIL）常显示累及脑皮层下、侧脑室周围和脑干的点片状弥漫状脑白质 T2 高信号，是 MS 的一个强大的鉴别诊断。本研究的目的是探讨顺磁性环征象是否能提高 MS 与 CADASIL 的鉴别诊断效能。

材料方法：

回顾性分析 2018-2023 年我院符合 2017 年 McDonald 标准的 MS 患者和基因确诊的 CADASIL 患者的临床和影像资料，需含有至少一次磁敏感加权成像(SWI)检查。MRI 采集利用 3T 扫描仪，序列包括常规平扫（矢状位 T1WI，轴位 T1WI、T2WI 和 FLAIR）及 SWI。对常规平扫上显示出的颅内病灶，在 SWI 的相位图上评估是否为 PRL，并对颅内出血、微出血灶进行评估。PRL 被定义为相位图上有低信号边缘和等/稍高信号中心的病灶。

结果：

24 例 CADASIL（51.87 岁 \pm 10.37，15 位女性）、46 例 MS（33.61 岁 \pm 4.71，32 位女性）患者纳入研究。19 例（79.1%）CADASIL 患者检测到 PRL，18 例（75%）检测到微出血灶且其中 12 例（66.7%）微出血灶数目大于 10 个，5 例（20.8%）检测到陈旧出血灶。16 例（34.8%）MS 患者检测到 PRL，没有 MS 患者检测到出血或微出血灶。CADASIL 患者的 PRL 在平扫上表现为 T1 低信号、T2 高信号、FLAIR 外高内低的“腔隙”改变；而 MS 的 PRL 在平扫上表现为 T1 低信号、T2 高信号、FLAIR 高信号的“斑块”改变。

结论：

在 CADASIL 这种多发白质受累的疾病中，也有较高比例的 PRL 存在，PRL 存在与否并不能有利地鉴别出 CADASIL 与 MS。

PO-0560

脑卒中机械取栓后颅内高密度征的双能 CT 应用

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目的 探讨双能 CT 技术在急性缺血性脑卒中（AIS）机械取栓术后颅内高密度征中的应用价值。方法 前瞻性连续收集成功机械取栓术后出现颅内高密度征患者 61 例，于术后 1h 内行双能 CT 头颅平扫获得碘叠加图像（IOM）、虚拟平扫图像（VNC），于术后 24h~48h 行常规头颅 CT 平扫随访，将其结果作为诊断标准。分析双能 CT 鉴别颅内高密度征为颅内出血的敏感性、特异性、符合率、阳性预测值和阴性预测值。测量双能 CT 融合图像（MIX）高密度区平均 CT 值，评估 CT 值对出血转化的预测能力。结果 61 例颅内高密度患者中男性 32 例，女性 29 例，平均年龄（62.93 \pm 8.47）岁。其中诊断碘剂合并出血 28 例，在随访中均被证实，其中 13 例血肿范围明显扩大，碘剂外渗 33 例，其中 9 例随诊中发现高密度持续存在，6 例出现出血转化。双能 CT 诊断早期颅内出血的敏感

性 75.7%、特异性 100%、阳性预测值 100%、阴性预测值 72.7%，符合率 85.2%。出血性转化患者较无出血性转化患者 CT 显著增高 (124.13 ± 58.32) HU vs (78.32 ± 29.92) HU; $p=0.002$)。当 CT 值 >104 HU，高度提示患者存在出血转化风险，其 AUC 0.840，敏感性 77.3%，特异性 86.0%，95%CI 0.612-0.928。结论 双能 CT 可早期鉴诊脑卒中机械取栓后高密度出血，并可一定程度预测其出血转化风险。

PO-0561

MOG 抗体阳性脑炎 3 例病例分析

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目的：对抗髓鞘少突胶质细胞糖蛋白 IgG 抗体 (MOG-IgG) 相关疾病 (MOGAD) 病例进行分析，探讨其影像特点。

方法：收集 2021 年 1 月至 2022 年 1 月在大连医科大学第一附属医院住院的 3 例 MOGAD 患者的临床资料及影像学资料并分析。

结果：病例 1，患者男，33 岁，以癫痫、认知障碍和睡眠障碍为主要症状，无肿瘤病史。脑部 MRI 显示 (图 1) 双侧额叶和扣带回区域皮质肿胀，T2 加权图像 (T2WI) 和液体衰减反转恢复 (FLAIR) 呈高信号，弥散加权成像 (DWI) 呈稍高信号。双侧额叶软脑膜强化。在磁共振波谱 (MRS) 上，这些病变显示 N-乙酰天冬氨酸 (NAA) 峰略有下降，胆碱化合物 (Cho) 和肌酸 (Cr) 峰增加 (Cho/Cr: 1.38; Cho/NAA: 1.17; NAA/Cr: 1.17)。灌注成像示双侧额叶和扣带回血流量减少。血清 MOG 抗体阳性，脑脊液和血清抗 IgLON5 抗体阳性。病例 2：患者男，14 岁，以癫痫、意识不清为主要症状。脑部 MRI 未见明显异常。血清 MOG 抗体阳性。病例 3：患者女，16 岁，头痛伴抽搐为主要症状。脑部 MRI (图 2) 显示右侧大脑半球额顶颞叶皮层及大脑镰旁皮层肿胀，T2WI 和 FLAIR 呈高信号病变，DWI 呈稍高信号，增强扫描未见明显强化。血清 MOG 抗体阳性。

结论：MOGAD 影像学表现多种多样。当脑部 MRI 显示多处疑似炎症性疾病的皮层病变时，也需要提示两种抗体共存。

PO-0562

无症状颈动脉狭窄认知下降的 MRI 神经影像研究

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随着人均寿命的延长和老龄化社会的加剧，血管性痴呆日渐成为一个主要的临床挑战和公卫防控重点。其中构成血管性痴呆风险的一个重要因素是颈动脉狭窄。过去半个世纪，血管内介入和药物强化治疗已经大大降低无症状颈动脉狭窄年卒中风险，但与此同时，这类患者相关的认知损害风险大大增加，成为新的临床终点事件。即便临床上无症状的颈动脉狭窄也伴随着特定认知领域的损害，因此理解认知损害的神经基础成为重要的临床任务。国际学界开始指出，需要根据认知损害和老化重新定义无症状颈动脉狭窄，主要难题是如何识别高风险群体，以及理解认知损害的神经基础。

在过去五六年，我们使用 MRI 神经影像手段，围绕一个核心问题——无症状颈动脉狭窄认知损害的神经基础展开研究，分别从形态结构、功能、血流动力学、多模态病损灶定位等展开研究。特别是在国家自然科学基金青年项目的支持下，以及国内首批 5T 超高场 MRI 的投入使用，投稿人和团队开展了深入的研究，新近发表了多篇相关的论文。主要包括 (1) 单侧重度无症状颈动脉狭窄如何影响脑形态结构，包括皮层形态学、半球结构不对称性、个体化皮层脑网络、胼胝体的形态学和连接及海

马完整性等; (2) 功能成像研究, 主要关注如何影响人脑大尺度脑网络功能架构、半球功能整合与特化、皮层-皮层下交互、血流动力学架构等的刻画等; (3) 多模态成像指标及脑网络连接组的构建, 包括多模态脑网络图论指标的汇聚、脑白质高信号与微出血负荷定量等。这些研究为理解重度无症状颈动脉狭窄这一临床上“无症状”但是已经呈现特定认知领域损害提供了神经影像基础, 为这类患者的脑损害全貌提供多角度的脑影像信息。

PO-0563

高 b 值下双指数、峰度、分数阶微积分和伽马分布扩散模型在表征脑胶质瘤异质性上的诊断价值评价研究

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目的: 目前只有少数研究比较高 b 值下不同扩散模型在脑胶质瘤上的诊断表现[1], 而分数阶微积分和伽马分布模型尚未得到很好的研究和比较。对于胶质瘤而言, 异柠檬酸脱氢酶 1 (IDH-1) 基因的突变发挥了重要作用, 并是重要的预后指标[2]。本研究拟比较高 b 值下的双指数、峰度、分数阶微积分和伽马分布扩散模型在表征胶质瘤异质性的表现, 包括胶质瘤分级, 预测异柠檬酸脱氢酶-1 (IDH-1) 突变状态。

材料和方法: 前瞻性纳入病理证实的胶质瘤患者 52 例。在联影 790 3.0T 磁共振上, 使用不同的扩散模型 (双指数、峰度、分数阶微积分和 gamma 分布扩散模型) 分析具有 12 个 b 值 (0-3000 s/mm²) 的单次扩散回波平面成像扫描数据。使用接受者操作特征 (ROC) 分析评估和比较每个单独的扩散参数及其组合在胶质瘤分级和预测 IDH-1 突变状态中的表现。

结果: 在胶质瘤分级中, 每个扩散参数的最大曲线下面积 (AUC) 范围为 0.834 至 0.901, 峰度模型参数平均峰度 MK 显示最高的 AUC (0.901)。用于预测 IDH-1 突变状态的各个参数的 AUC 范围从 0.825 到 0.849, 其中 MK 和伽马分布参数 mode 均显示最高的 AUC (0.849)。对于扩散参数的组合, FROC 参数 D、 β 和 μ 的组合在胶质瘤分级 (0.901) 和预测 IDH-1 突变状态 (0.882) 中显示出最高的 AUC。

讨论: 研究发现峰度和 FROC 模型似乎更倾向于对胶质瘤进行分级和预测 IDH-1 突变状态, 这可能是由于具有连续扩散系数的分区 DWI 模型可能比双指数模型更强大。

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PO-0564

扩散-弛豫谱成像用于脑胶质瘤分级研究

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目的: 开发用于术前预测的非侵入性影像工具仍然是必要的。扩散-弛豫谱成像 (Diffusion-Relaxation Correlation Spectrum Imaging, DR-CSI) 已经被用于前列腺[1]和胎盘的诊断[2], 本研究通过使用扩散-弛豫谱成像, 对胶质瘤进行分级和评估, 并与伽马分布扩散模型[3]进行比较。

材料和方法: 前瞻性纳入病理证实的胶质瘤患者 45 例, 其中低级别 14 例, 高级别 31 例。在联影 790 3.0T 磁共振上进行扫描具有多个 b 值 (0-3000 秒/mm²) 的 3.0 T 单次扩散回波平面成像, 并使用 4 种不同的回波时间分别采集。将 DR-CSI 计算得到的联合 T2-ADC 谱分数 (fa、fb、fc) 分

别在肿瘤核心和肿瘤周围区域量化,与伽马分布扩散模型衍生的谱分数(f1、f2、f3)进行比较,以分别对胶质瘤进行分级。同时计算了一维扩散谱和 T2 谱。使用接受者操作特征(ROC)分析评估和比较每个谱参数及其组合在胶质瘤分级的表现。

结果:高级别胶质瘤的 fa_core、fd1_core、fd3_core、ft1_core、f1_core、fa_peri 和 f3_peri 显着高于低级别胶质瘤,而高级别胶质瘤的 fb_core、fc_core、fd2_core、f2_core 和 fb_peri 显着低于高级别胶质瘤低级别胶质瘤($P<0.05$)。ROC 分析显示,在肿瘤核心区域,fa_core 在胶质瘤分级中的曲线下面积最高(0.979),而在瘤周区域,fb_peri 的 AUC 最高(0.756)。

讨论:扩散-弛豫谱成像相比于传统扩散模型,可以提高胶质瘤分级准确性。

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PO-0565

记忆主诉人群在新冠感染及“脑雾”后的丘脑结构特征分析

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目的:大量证据表明新冠病毒感染后“脑雾”会对患者生活造成持续影响,而感染后丘脑的改变在不同研究中结果存在争议,本研究目的为探索新冠感染及出现脑雾症状后丘脑结构的变化。

方法:对北京大学深圳医院具有记忆主诉的受试者进行 MRI 及神经心理学量表检查(MMSE 及 MoCA)。根据新冠感染情况及症状分为脑雾组(BF 组)、新冠感染后非脑雾组(nBF 组)及无新冠阳性征象组(对照组)。脑雾定义为新冠感染后新出现集中注意力困难、记忆力下降、解决问题能力下降等症状,持续超过 3 个月,或原有上述症状,持续超过 3 个月且较感染前明显加重。共纳入 74 人(62%为女性),中位年龄 62(58, 67)岁,其中 BF 组 13 人, nBF 组 49 人,对照组 12 人。基于脑医生结构分析软件和 SPSS24.0 进行组间差异性分析及事后检验。比较三组间丘脑结构、MMSE 及 MoCA 评分的差异。

结果:BF 组及 nBF 组双侧丘脑体积均大于对照组:BF 组左侧丘脑体积为 $5.188\pm0.596\text{cm}^3$ ($P=0.004$)、nBF 组为 $5.123\pm0.414\text{cm}^3$ ($P=0.001$),对照组为 $4.572\pm0.480\text{cm}^3$; BF 组右侧丘脑体积为 $5.568\pm0.586\text{cm}^3$ ($P=0.001$), nBF 组为 $5.378\pm0.421\text{cm}^3$ ($P=0.001$),对照组为 $4.820\pm0.541\text{cm}^3$ 。nBF 组、BF 组与对照组之间 MMSE (26.458 ± 6.277 、 26.923 ± 3.067 、 25.167 ± 4.218 , $P=0.124$)、MoCA (23.979 ± 4.164 、 23.385 ± 4.052 、 22.333 ± 5.087 , $P=0.558$) 评分无统计学差异,各组间年龄($P=.710$)、性别($P=0.774$)构成无统计学差异。nBF 组感染-成像间隔为 153(122, 201)天, BF 组感染-成像间隔为 153(122, 201)天, 163(128, 210)天,两组间差异无统计学意义($z=-0.763$, $P=0.446$)。

结论:与对照组相比,新冠病毒感染超过 3 个月时存在双侧丘脑体积较大的情况。且未发现脑雾症状和该变化有关。这与部分先前研究结果一致,具体病理生理机制及未来转归仍需进一步探索。

PO-0566

异常共激活模式动态特征与帕金森病脑加速老化有关

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目的：老龄化已被公认为是神经退化的最强风险因素，而帕金森病（Parkinson's disease, PD）往往会加速大脑衰老的轨迹。本研究旨在探索 PD 对大脑结构老化和大规模功能网络时间动态的影响。

方法：纳入 2021 年 7 月至 2022 年 8 月在华中科技大学同济医学院附属同济医院神经内科住院的 62 名 PD 患者，同时在社区招募 32 名年龄和性别匹配的健康志愿者。首先通过预先训练的以 T1 加权结构影像数据作为输入的 U-Net 模型来计算全局和局部脑龄差值来评估大脑老化程度。然后利用聚类算法确定了整个大脑的六种共激活模式（Coactivation pattern, CAP），以捕捉 PD 患者和健康对照的神经网络活动。共激活模式的动态特征包括每一个 CAP 所占的时间分数、持续性、出现次数和转换概率。我们通过一般线性模型评估了脑龄差值和 CAP 指标的组间差异。最后，对组间局部脑龄差值图和 CAP 图进行了空间相关性分析，以揭示 PD 功能改变可能的解剖学基础。

结果：与健康对照（-3.73 岁）相比，PD 患者（+1.93 岁）的全局脑龄差明显升高，大部分脑区的局部脑龄差也显著升高，其中以额叶、颞叶、岛回、中央前回和壳核的偏离度最高。相关分析显示全局脑龄差与 PD 的症状严重程度和病程相关。此外，我们还研究了与 PD 相关的 CAP 指标异常。具体来说，PD 患者在以默认模式网络和额顶网络激活为特征的 CAP 以及以感觉运动网络和显著网络激活为特征的 CAP 中停留时间较少，在这些 CAP 和其他 CAP 之间转换的频率也较低。空间相关性分析表明，局部脑龄加速的模式与以感觉运动网络和显著网络激活为特征的 CAP 具有显著的空间相似性。

结论：这些结果揭示了大脑结构加速老化与大脑网络动态异常之间的关系，可为神经退行性疾病所涉及的神经理病理学机制提供新的见解，并为改变疾病进展提供新的治疗靶点。

PO-0567

扩散加权成像联合扩散峰度成像在脑胶质瘤 IDH 基因分型的预测研究

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目的通过扩散加权成像（diffusion-weighted imaging, DWI）联合扩散峰度成像（diffusion kurtosis imaging, DKI）预测脑胶质瘤异柠檬酸脱氢酶(isocitrate dehydrogenase, IDH)基因状态。

材料与方法回顾性分析 2018-2020 年经病理证实的 60 例脑胶质瘤患者的临床、影像资料，其中 IDH 突变型 30 例，IDH 野生型 30 例。患者术前均行常规 MRI、DWI 及 DKI 扫描，测量肿瘤实质区和同层面正常脑白质区的 DWI 参数表观扩散系数（ADC）以及 DKI 参数扩散各项异性分数（FA）、平均扩散系数（MD）、平均扩散峰度（MK）、轴向扩散峰度（Ka）、径向扩散峰度（Kr），将肿瘤实质区测量值除以对侧正常脑白质区测量数值，获得校正后参数，得到相对 ADC 值（rADC）和相对扩散各项异性分数(rFA)、相对平均扩散系数（rMD）、相对平均扩散峰度(rMK)、相对轴向扩散峰度（rKa）、相对径向扩散峰度(rKr)值。应用两独立样本 t 检验比较 IDH 突变型和 IDH 野生型组间校正后 DWI 及 DKI 参数差异，绘制受试者工作特征（receiver operating characteristic, ROC）曲线分析各参数值的诊断价值。

结果 IDH 野生型肿瘤实质区 rMK、rKa、rKr 值均高于 IDH 突变型，但仅 rMK 值两者之间差异有统计学意义($P<0.05$)，rADC 值和 rMD 值低于 IDH 突变型，两者之间差异有统计学意义($P<0.05$)，rFA 值两者之间差异没有统计学意义($P>0.05$)。ROC 曲线分析结果显示，rADC 和 rMD 对 IDH 基因状

态具有预测价值, ROC 曲线下面积分别为 0.64 和 0.69, rADC 联合 rMD 值预测 IDH 基因状态的曲线下面积为 0.70。

结论 rADC 和 rMD 值有助于判断 IDH 基因状态, rADC 联合 rMD 值可提高诊断效能。

PO-0568

2 型糖尿病患者丘脑亚区体积的改变

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目的 探索 2 型糖尿病患者丘脑亚区体积改变。

方法 收集 2 型糖尿病患者 (22 例) 与之相匹配的健康受试者 (24 例)。采用美国 Discovery MR 750 3.0 T 磁共振扫描仪 (32 通道头部线圈) 采集每位受试者高分辨-T1WI, 采用 Freesurfer 将单侧丘脑分割成 25 个亚区。比较组间临床资料 (年龄、性别) 的差异, 采用 MANCOVA 分析比较组间丘脑亚区体积的差异, 以年龄、性别、颅脑总体积为协变量。采用偏相关分析评估糖尿病组丘脑亚区体积与临床资料 (血糖水平、病程) 的相关性。

结果 2 型糖尿病组、健康对照组间年龄及性别无显著性差异。相比健康对照组, 糖尿病组双侧丘脑内侧膝状核和左侧中央外侧核体积缩小 (P 均 <0.05 , FDR 校正), 双侧腹内侧核体积较健康对照组增大 ($P < 0.05$, FDR 校正)。双侧丘脑内侧膝状核、左侧中央外侧核及双侧腹内侧核体积与血糖水平及糖尿病病程无相关性。

结论 2 型糖尿病患者丘脑亚区体积改变主要位于双侧内侧膝状核、腹内侧核及左侧中央外侧核。

PO-0569

基于功率谱斜率分析方法对酒精使用障碍患者体素水平的全脑静息态 fMRI 研究

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PO-0570

Persistent Proatlantal Intersegmental Artery(PPIA): Are Consideration Based On MSCTA

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Abstract

Background: Persistent proatlantal intersegmental artery(PPIA) is a rare permanent carotid-basilar anastomosis. MSCTA has become the primary non-invasive imaging technique for evaluation of cephalic and cervical vascular anatomy.

Purpose: To investigate the MSCTA imaging characteristics of PPIA and its clinical values, so then to provide a new classification method based on posterior circulation blood supply.

Material and Methods: The imaging and clinical data of 11 patients with PPIA diagnosed by MSCTA through combined head and neck scanning were analyzed retrospectively.

Results: The incidence of PPIA was 0.01%. Used classification according to the starting position of PPIA, type I of PPIA were 2 cases (18.2%), type II of PPIA were 9 cases (81.8%). Classification

according to blood supply of posterior circulation, type 1 of PPIA were 4 cases (36.4%), type 2 of PPIA were 4 cases (36.4%), type 3 of PPIA were 1 case (9.1%), type 4 of PPIA were 2 cases (18.2%). Among the 11 PPIA patients, ipsilateral vertebral artery absence were 11 cases, contralateral vertebral artery dysplasia were 3 cases and absence was 1 case, persistent artery dysplasia were 2 cases, and basilar artery dysplasia were 2 cases. In addition, there were 2 patients with aneurysm, 1 patient with cerebral infarction, and 1 patient with PAVF.

Conclusion: The new classification method of PPIA is more conducive to the evaluation of the posterior circulation blood supply. In addition, using MSCTA to diagnose PPIA can reduce the missed diagnosis of other cephalic and cervical vascular diseases, and provide a more comprehensive imaging evaluation for interventional and surgical operations.

PO-0571

Non-Contrast CT Radiomics and Machine Learning for Outcomes Prediction of Patients with Acute Ischemic Stroke Receiving Conventional Treatment

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Purpose: Accurate prediction of outcomes for patients with acute ischemic stroke (AIS) is crucial for clinical decision-making. In this study, we developed prediction models based on non-contrast computed tomography (NCCT) radiomics and clinical features to predict the modified Rankin Scale (mRS) six months after hospital discharge.

Method: A two-center retrospective cohort of 240 AIS patients receiving conventional treatment was included. Radiomics features of the infarct area were extracted from baseline NCCT scans. We applied Kruskal-Wallis (KW) test and recursive feature elimination (RFE) to select features for developing clinical, radiomics, and fusion models (with clinical data and radiomics features), using support vector machine (SVM) algorithm. The prediction performance of the models was assessed by accuracy, sensitivity, specificity, F1 score, and receiver operating characteristic (ROC) curve. Shapley Additive exPlanations (SHAP) was applied to analyze the interpretability and predictor importance of the model.

Results: A total of 1454 texture features were extracted from the NCCT images. In the test cohort, the ROC analysis showed that the radiomics model and the fusion model showed AUCs of 0.705 and 0.857, which outperformed the clinical model (0.643), with the fusion model exhibiting the best performance. Additionally, the accuracy and sensitivity of the fusion model were also the best among the models (84.8% and 93.8%, respectively).

Conclusions: The model based on NCCT radiomics and machine learning has high predictive efficiency for the prognosis of AIS patients receiving conventional treatment, which can be used to assist early personalized clinical therapy.

PO-0572

Multimodal quantitative magnetic resonance imaging of the thalamus in tinnitus patients with different outcomes after sound therapy

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Aims: This study systematically investigated structural and functional alterations in the thalamus and its subregions using multimodal magnetic resonance imaging (MRI) and examined its clinical relevance in tinnitus patients with different outcomes after sound therapy (narrowband noise). **Methods:** In total, 60 patients with persistent tinnitus and 57 healthy controls (HCs) were recruited. Based on treatment efficacy, 28 patients were categorized into the effective group and 32 into the ineffective group. Five MRI measurements of the thalamus and its seven subregions, including gray matter volume, fractional anisotropy, fractional amplitude of low-frequency fluctuation, and functional connectivity (FC), were obtained for each participant and compared between the groups. **Results:** Patients in both the groups exhibited widespread functional and diffusion abnormalities in the whole thalamus and several subregions, with more obvious changes observed in the effective group. All tinnitus patients had abnormal FC compared with the HCs; FC differences between the two patient groups were only observed in the striatal network, auditory-related cortex, and the core area of the limbic system. We combined the multimodal quantitative thalamic alterations and used it as an imaging indicator to evaluate prognosis before sound therapy and achieved a sensitivity of 71.9% and a specificity of 85.7%. **Conclusion:** Similar patterns of thalamic alterations were identified in tinnitus patients with different outcomes, with more obvious changes observed in the effective group. Our findings support the tinnitus generation hypothesis of frontostriatal gating system dysfunction. A combination of multimodal quantitative thalamic properties may be used as indicators to predict tinnitus prognosis before sound therapy.

PO-0573

Study on CT Value of Lingual Thyroid

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Abstract Objective: The objective of the study was to identify the typical imaging features (CT values) of lingual thyroid to facilitate the diagnosis.

Methods: This was a retrospective single-institutional study, with 11 lingual thyroid cases, 28 patients with other lesions at the base of the tongue (control group) and 28 normal orthotopic thyroid controls (normal controls). Nonenhanced and contrast-enhanced CT values were measured.

Results: The mean nonenhanced and contrast-enhanced CT values (\pm SEM) in lingual thyroid were significantly ($P=0.000$) higher than those in control group. All except for two ectopic thyroids (proved to be 1 nodular goiter and 1 Hashimoto's thyroiditis) had attenuation greater than 60HU on nonenhanced CT and 100HU on contrast-enhanced CT. There was no statistical significance between lingual thyroid and normal controls in nonenhanced CT values ($P=0.051$). The mean contrast-enhanced CT values in lingual thyroid were significantly ($P=0.029$) lower than those in normal controls.

Conclusions: In most cases, lingual thyroid can be distinguished from other lesions at the base of the tongue for its characteristic high CT values, although its CT appearance can be affected when pathological cases occur. Lingual thyroid had a lower CT value than normal orthotopic thyroid on contrast-enhanced CT. It may be related to the high proportion of subclinical hypothyroidism in lingual thyroid.

PO-0574

Analysis of clinical and imaging features of carotid web patients with ischemic cerebrovascular disease

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Abstract To investigate the clinical and imaging features of carotid web(Caw) patients with asymptomatic,transient ischaemic attack (TIA) ,ipsilateral acute ischemic stroke (AIS) .**Methods** Patients diagnosed with carotid webs by CT angiography (CTA),which were retrospectively selected and divided into three groups(asymptomatic Caw group, TIA Caw group and ipsilateral AIS Caw group), according to the occurrence of acute ischemic change.**Results** A total of 76 Caw patients were diagnosed, including 26 asymptomatic Caw, 22 TIA Caw , 19 AIS Caw and 9 other cerebrovascular disease. There were 59 males and 17 females. There was a statistical significance in hypertension, smoking and high-density lipoprotein levels (asymptomatic Caw vs TIA , asymptomatic Caw vs AIS , $P < 0.05$). There was a statistical significance in diabetes (TIA vs asymptomatic Caw, TIA vs AIS , $P < 0.05$). In the comparison of three groups of carotid webs image features including axial length, oblique sagittal length, angle and stenosis, only stenosis had statistical significance (asymptomatic Caw vs AIS , $P < 0.05$). Age, sex, systolic blood pressure, diastolic blood pressure, total cholesterol level, triglyceride level, low density lipoprotein level, carotid webs (axial length, oblique sagittal length, angle) had no statistical significance ($P > 0.05$). **Conclusion** Carotid web is more common in males. Carotid web patients with associated risk factors such as hypertension, diabetes, smoking and high-density lipoprotein levels may be more liable to the occurrence of TIA and AIS .Carotid stenosis caused by carotid webs,which is also closely related to AIS.

PO-0575

Correlation of traditional Chinese medicine syndrome differentiation with CT imaging characteristic of nasopharyngeal carcinoma

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Purpose:

To investigate the relationship between TCM syndrome differentiation and CT imaging characterization for the integration of Chinese and modern medical approaches in the treatment of NPC.

Materials and Methods:

A total of 49 patients with pathologically confirmed NPC were enrolled in this study. Prior to treatment, TCM syndrome typing, computed tomography (CT) imaging were performed on all patients. All patients were classified into 4 types (the lung heat congestion type, the liver stagnation and phlegm coagulation type, the blood static blocking collaterals type, the deficiency both qin and blood type) according to TCM syndrome differentiation standard. The correlation between TCM syndrome types and the CT imaging was assessed by Chi-square.

Results:

The liver stagnation and phlegm coagulation type (LSPC) accounted for the highest proportion at 42.9% (21/49), followed by the lung heat congestion type (LHC) with 26.5% (13/49), the deficiency both qin and blood type (DBQB) with 18.4% (9/49) and the blood static blocking collaterals type

(BSBC) with 12.2 % (6/49). CT imaging demonstrated a higher incidence of cervical lymph node metastases and otitis media in the LSPC and the QBQB patients [cervical lymph node metastases: 2/13 (15.4% for LHC) vs. 16/21 (76.2 for LSPC) vs. 3/6 (50% for BSBC) vs. 6/9 (66.7% for QBQB), $P<0.05$; otitis media: 2/13 (15.4% for LHC) vs. 12/21 (57.1% for LSPC) vs. 2/6 (33.3% for BSBC) vs. 7/9 (77.8% for QBQB), $P<0.05$], while the QBQB patients were more prone to skull base invasion [1/13 (7.7% for LHC) vs. 3/21 (14.3% for LSPC) vs. 2/4(50% for BSBC) vs. 8/9 (88.9% for QBQB), $P<0.05$]. TCM syndrome types showed no statistical difference in the unilateral or bilateral location of tumor, the invasion of parapharyngeal space and peripheral muscle invasion (all $P>0.05$).

Conclusions:

CT imaging demonstrated a higher incidence of cervical lymph node metastases and otitis media in the LSPC type and the DBQB type, while the DBQB were more prone to skull base invasion.

PO-0576

Feasibility of the mDIXON method for estimation the parotid gland fat fraction in Sjögren's syndrome

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Objectives: SS characterized by irreversible varying degrees of fat deposition, the objective of this study is to explore the feasibility of estimating fat fraction (FF) in parotid glands with Sjogren's syndrome using the mDIXON method.

Methods: Conventional MRI and mDIXON-Quant were performed on 62 parotid glands (case group) in 31 SS patients and 62 parotid glands (control group) in 31 healthy volunteers with age and mean body mass index matching. The FF values of the two groups were compared, and the changes of FF values with different degrees of fat deposition were analyzed.

Results: The FF value of parotid gland in the case group was significantly higher than that in the control group (35.7 ± 15.7 , 28.3 ± 16.1 , respectively, $P=0.008$). The FF value in the case group increased gradually from no significant fat deposition in the early stage (32.1 ± 4.8) to significant fat substitution (73.0 ± 4.9).

Conclusions: The FF values obtained by the mDIXON method are a new method that can quantitatively assess the extent of SS parotid gland lesions.

PO-0577

Prediction the risk of local recurrence in nasopharyngeal carcinoma patients based on multiparametric MRI

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Abstract

Objective: This study aims to predict the occurrence of local tumor recurrence from the magnetic resonance imaging (MRI) results of routine follow-up treatment with nasopharyngeal carcinoma (NPC).

Methods: This study retrospectively analyzed the clinical and Magnetic resonance imaging(MRI) data of 39 locally recurring nasopharyngeal carcinoma(NPC) patients and 96 non-recurring NPC patients. A predictive score model using the Logistic regression analysis was designed to minimize the possible independent risk factors in the model. In addition, the receiver operator characteristic (ROC) curve was used to test the accuracy of the prediction model.

Results: Compared to the Tx stage and T0 stage, T3-T4 stage increased the recurrence risk of NPC patients (OR=5.793, 95%CI 1.111, 30.202). Compared with individuals without nasopharyngeal cavity(NC) lesions, NC lesions increased NPC recurrence risk (OR=10.393, 95%CI 3.376, 31.999) .

Conclusion: T-stage and NC lesions are key risk factors for local recurrence in NPC patients. The predictive scoring model based on T staging and NC lesions has a good diagnostic power for predicting local recurrence of nasopharyngeal carcinoma, and can provide clinicians with individualized recurrence prediction probability.

PO-0578

Feasibility of 8 mL iodinated contrast media in cerebral computed tomographic angiography with a dual-layer spectral detector

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Objectives The purpose was to evaluate the feasibility of using extremely low contrast media volume and injection rate in cerebral computed tomography angiography on dual-layer spectral detector computed tomography.

Methods In this prospective study, forty patients were randomly enrolled to be group A (8 mL contrast media with 1 mL/s flow rate), then matched the same number of cases to group B (40 mL contrast media with 4 mL/s flow rate). The virtual monoenergetic images at 40-70 keV (virtual monoenergetic image 40-virtual monoenergetic image 70) with 10 keV interval in group A and polychromatic conventional images in two groups were reconstructed. computed tomography attenuation, image noise, contrast-to-noise ratio and signal-to-noise ratio were evaluated in the internal carotid artery and middle cerebral artery. Subjective image quality was assessed on a five-point scale.

Results In group A, the mean subjective image quality score, computed tomography attenuation and contrast-to-noise ratio of internal carotid artery, and middle cerebral artery were the highest on virtual monoenergetic image 40. The mean noise on virtual monoenergetic image 40-70 were all lower than polychromatic conventional images in group A (all $P < 0.05$). The average subjective image quality score, computed tomography value of internal carotid artery, middle cerebral artery, and cerebral parenchyma on virtual monoenergetic image 40 in group A were similar to those on polychromatic conventional images in group B ($P > 0.05$). The mean signal-to-noise ratio and contrast-to-noise ratio of internal carotid artery, and middle cerebral artery on virtual monoenergetic image 40 in group A were significantly higher than those on polychromatic conventional images in group B.

Conclusions Cerebral computed tomography angiography on virtual monoenergetic image 40 with 8 mL contrast media and 1 mL/s injection rate could provide diagnostic image quality.

PO-0579

Dual-Energy CT-based intratumoral and peritumoral radiomics can preoperatively predict initial recurrence risk in papillary thyroid cancer

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Background: Accurate evaluation of initial recurrence risk in papillary thyroid carcinoma (PTC) is of deep clinician concern. Intratumoral and peritumoral radiomics on dual-energy CT (DECT) provides an effective approach to investigate the vascular heterogeneity of target tumors at multiple scales. **Objective:** To explore the value of intratumoral and peritumoral radiomics on DECT for preoperatively predicting initial recurrence risk in PTC.

Materials and Methods: Total 236 PTC patients (training set, 165; validation set, 71) from July 2020 to June 2021 were retrospectively enrolled. Semiautomatic tumor segmentation was performed in the intratumoral and the peritumoral region with 2.5 mm outer and inner distance to the tumor boundary on unenhanced, arterial, and venous phase mixed images and iodine maps. Three corresponding rad-scores were built (rad-score [VOI^{whole}], rad-score [VOI^{outer layer}], and rad-score [VOI^{inner layer}]), respectively. Multivariate logistic regression was used to establish three radiomics models (radiomics model 1-3) incorporating the three rad-scores with other risk factors, and compared with the clinical model alone. A radiomics model that achieved the optimal performance was presented as a nomogram. Nomogram performance was assessed by predictive performance, calibration, and clinical utility.

Results: Rad-score (VOI^{outer layer}) and rad-score (VOI^{inner layer}) both significantly outperformed rad-score (VOI^{whole}) (training set, $P=0.036$, $P=0.001$; validation set, $P=0.044$, $P=0.011$). Three radiomics models all significantly surpassed the clinical model. Radiomics model 2 and 3 based on peritumoral rad-scores significantly preceded radiomics model 1 based on intratumoral rad-score (training set, $P=0.039$, $P<0.001$; validation set, $P=0.037$, $P=0.034$). A radiomics nomogram incorporating tumor size, tumor site, and rad-score (VOI^{inner layer}) was constructed with the optimal performance (training set, AUC=0.877; validation set, AUC=0.876). Good calibration, clinical utility, and performance stability of the nomogram was confirmed.

Conclusion: DECT-based radiomics analysis, especially performed in the peritumoral region, is useful for preoperative prediction of initial recurrence risk in PTC.

PO-0580

Value of arterial spin label technique on 3.0 T MR scanner in evaluating blood flow of thyroid glands in healthy adults

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Objective To investigate the feasibility and reproducibility of using three-dimensional arterial spin labeling (3D-ASL) technique to evaluate the thyroid blood flow (TBF) of healthy adults and compare the difference in TBF between subjects with different gender and age. **Methods** In this prospective study, 100 healthy adult subjects were enrolled from November 2018 to June 2019 in Chinese Academy of Medical Sciences Cancer Hospital, Shenzhen Hospital. All of subjects received thyroid 3D-ASL MRI scanning, but several subjects were excluded for analysis for reason including intolerance to examination ($n=1$), overt artefacts ($n=11$), abnormality detected in thyroid gland

during conventional structure MRI ($n=15$), resulting in 73 subjects included. Two attending radiologists independently evaluated the quality of ASL images and measured the TBF in upper, middle and lower poles of each lobe in thyroid gland bilaterally. Cohen's kappa was used to test the agreement in image quality between 2 radiologists, while intraclass correlation (ICC) analysis was implemented to evaluate the consistency in TBF measurements. Univariate variance analysis was used to compare the TBF in upper, middle and lower pole of thyroid gland unilaterally, and student t-test was performed to test the difference in TBF between two lobes, or in the same lobe but between different gender or age groups. Results For image quality, 2 radiologists have good agreement ($\text{kappa}=0.753$, $P<0.001$). In terms of TBF, consistency was moderate in the lower pole of left lobe between 2 radiologists ($\text{ICC}=0.648$, $P<0.001$), but good in the remaining parts of thyroid gland (all $\text{ICC}>0.75$, $P<0.001$). Unilaterally, TBF in the middle pole was significantly higher than those in the upper or lower pole ($P<0.001$), but no significant difference was found between the upper and lower pole ($P>0.05$). Regardless of upper, middle or lower pole, TBF in the right lobe was higher than the counterpart in the left lobe ($t=6.182$, 6.294 , 4.896 respectively, $P<0.001$). Between male subjects ($n=31$) and female subjects ($n=42$), no significant difference was found in the corresponding upper, middle or lower pole of thyroid lobe unilaterally ($P>0.05$). As for age group, TBF in the middle pole of thyroid gland was higher in the middle age group (45—59 years old, $n=12$) than that in the young adult group (18—44 years old, $n=61$) ($t=3.868$, $P=0.003$ for the left lobe, and $t=2.647$, $P=0.022$ for the right lobe), but no significant difference was found in the upper or lower pole of the unilateral thyroid lobe ($P>0.05$). Conclusion ASL can accurately measure blood flow perfusion in the thyroid gland with good reproducibility.

PO-0581

The Role of Multidetector CT Angiography in the assessment of disease activity in Takayasu's Arteritis

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Objective To explore the clinical application value of computed tomography angiography (CTA) in evaluating the disease activity of Takayasu arteritis (TA).

Methods Sixty-one consecutive patients with TA from January 2010 to December 2021 were included in this study. Demographic and clinical characteristics, acute-phase reactants (APRs) and CTA indicator parameters were recorded. The value of CTA in identifying disease activity was evaluated, using Erythrocyte Sedimentation Rate (ESR) as a reference. A disease activity evaluation model was constructed to compare the benefits of the new model with ESR and Kerr scores by evaluating the consistency index (C-index), the net reclassification index (NRI) and the integrated discriminant index (IDI).

Results In total, 29 (47.54%) cases showed active disease. The C-index of ESR to indicate disease activity was 0.778 (95% CI: 0.635, 0.874). The new activity assessment model combining ESR, maximal wall thickness and perivascular fat density (PFD) showed significant improvement in C-index over the ESR method (0.902 vs 0.778, $P<0.01$; NRI 0.948, $P<0.01$; and IDI 0.204, $P<0.01$). In addition, the new model demonstrated a significant superiority over the Kerr score in terms of the C-index (0.902 vs 0.771, $P<0.05$), NRI (1.142, 95% CI: 0.730, 1.556, $P<0.01$) and IDI (0.300, 95% CI: 0.187, 0.423, $P<0.01$).

Conclusions A novel CTA-based method that involves combining ESR with maximal wall thickness and PFD demonstrated superiority in identifying active TA compared with conventional methods.

PO-0582

Increased brain iron in patients with thyroid-associated ophthalmopathy: a whole-brain analysis

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Objectives: To investigate the whole-brain iron deposition alternations in patients with thyroid-associated ophthalmopathy (TAO) using quantitative susceptibility mapping (QSM).

Methods: Forty-eight patients with TAO and 33 healthy controls (HCs) were enrolled. All participants underwent brain magnetic resonance imaging scans and clinical scale assessments. QSM values were calculated and compared between TAO and HCs groups using a voxel-based analysis. A support vector machine (SVM) analysis was performed to evaluate the performance of QSM values in differentiating patients with TAO from HCs.

Results: Compared with HCs, patients with TAO showed significantly increased QSM values in the bilateral caudate nucleus (CN), left thalamus (TH), left cuneus, left precuneus, right insula and right middle frontal gyrus. In TAO group, QSM values in left TH were positively correlated with Hamilton Depression Rating Scale (HDRS) scores ($r = 0.414$, $p = 0.005$). The QSM values in right CN were negatively correlated with Montreal Cognitive Assessment (MoCA) scores ($r = -0.342$, $p = 0.021$). Besides that, a nearly negative correlation was found between QSM values in left CN and MoCA scores ($r = -0.286$, $p = 0.057$). The SVM model showed a good performance in distinguishing patients with TAO from the HCs (area under the curve, 0.958; average accuracy, 90.1%).

Conclusions: Patients with TAO had significantly increased iron deposition in brain regions corresponding to known visual, emotional and cognitive deficits. QSM values could serve as potential neuroimaging markers of TAO.

PO-0583

Differential diagnosis of MRI Multi-sequence Imaging Technology in NAION and DON

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Aims: To evaluate the value of magnetic resonance imaging (MRI) multi-sequence imaging technology in the differential diagnosis of acute non-arteritic anterior ischaemic optic neuropathy (NAION) and demyelinating optic neuritis (DON).

Methods: All patients underwent MRI orbital scanning, diffusion-weighted imaging (DWI), T1-weighted imaging (T1WI)-enhanced imaging, and enhanced examination. The clinical and MRI imaging features of the two groups were analysed by two doctors.

Results: The area under the curve of the diagnostic model with the single-index 'central bright spot sign' added to the age and sex basic model was the largest (92.93%). The diagnostic model with the central bright spot sign was statistically different from the basic model of age and sex.

Conclusion: The central bright spot sign on T2-weighted imaging-fluid attenuated inversion recovery can distinguish acute NAION from DON. The diagnostic model which combined age, sex, and central bright spot sign had the best diagnostic efficacy for differential diagnosis of NAION and DON in the acute stage.

PO-0584

Effect of different body position design on X-ray Grating Artifacts in Thyroid-Enhanced CT

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[Abstract] Objective Objective To improve the artifacts of thyroid enhanced ct by changing the position design. Methods An indwelling needle was placed in the right elbow vein and divided into conventional group A (bilateral arm sagging), group B (left arm lift), C (right arm lift) and D (bilateral arm lift). The four groups were rated subjectively by two high-year physicians, and the ratings of the four groups were compared using the chi-square test. The CT and SD values of the upper neck cartilage of plain scan, artery and vein; the CT and SD values of the thyroid and the CT and SD values of the neck and the C T and S D values of the common carotid artery and the total carotid artery. The four groups were compared using ANOVA and multiple comparisons. Results Subjective evaluation: 2.97 in upper neck group A, 2.23 in group B, 2.37 in group C and 1.77 in group D. Group A in each period, improved B and C and improved D except B and C; 0.93 points in lower neck A, 1.97 in B, 1.8 in C and 1.83 in D. Routine group A of each stage image was inferior to each improvement group, with a statistically significant difference and no significant difference between each improvement group. Objective evaluation: the signal to noise ratio of sternocleidomastoid muscle in the upper neck was significantly larger than the improvement group, no significant difference between improvement groups B and C but greater than the improvement group D; There was no statistical difference between the groups in the lower neck artery period, and the contrast signal to noise ratio of the thyroid and fat gaps in the conventional groups was significantly smaller than that of the improvement groups; the subclavian vein, subclavian artery and common carotid artery. Conclusion The image quality of thyroid enhanced CT, with single arm holding as the best position.

PO-0585

Radiographic analysis of desmoplastic fibroma of the jaw bones

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Objective: To analyze the clinical manifestations and radiographic features of desmoplastic fibroma (DF) in order to achieve better understanding of this disease.

Methods: The clinical and imaging findings of 17 patients with DF were retrospectively analyzed. 16 patients with enhanced CT, 1 patient with plain CT, 27 patients with enhanced MR.

Results: Among the 17 patients, 11 were male and 6 were female. Patient age ranged from 4 years old to 64 years old with a mean of 20.27 years old. The main clinical manifestations were painless mandibular mass and difficult to open mouth. All cases were in the mandibles, mainly located in the corner of the mandibles. The image is dissolved expansion and partial compression and erosive bone destruction, with soft tissue mass, central or eccentric growth. All cases had "tree root-like" bony ridges. The imaging presentations were divided into 3 types: expansile destruction (n=6), osteolytic destruction (n=6), and parosteal destruction (n=5). Lesions showed moderate/marked enhancement after contrast-enhanced scanning. All cases have no calcification and periosteal reaction. MR showed isointense or hypointense on T1 weighted images, hypointense on T2 weighted images. The mean ADC value was $1.2 \times 10^{-3} \text{mm}^2/\text{s}$. The TIC type of 3 cases was type I, and 2 cases with type II.

Conclusions: DF is aggressive and easy to relapse, so it is important to recognize DF radiology features. CT, MR and functional examination can reflect the tissue composition of the lesion, and provide an important basis for the correct preoperative diagnosis.

PO-0586

Preoperative Prediction of Pathologic Response to Neoadjuvant Immunotherapy in Resectable Locally Advanced Head and Neck Squamous Cell Carcinoma Using Multiparametric MRI

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Rationale and Objectives Reliable preoperative prediction of pathologic response to Neoadjuvant immunotherapy of patients with head and neck squamous cell carcinoma (HNSCC) could guide clinical selection and the patients could also be spared from ineffective and unnecessary toxicity.

The aim of this study was to evaluate the value of quantitative changes in MR imaging after neoadjuvant immunotherapy in predicting pathologic response in resectable locally advanced HNSCC patients.

Materials and Methods

Fifteen patients with resectable locally advanced HNSCC who were recruited in the prospective phase Ib clinical trial were included in the current retrospective analysis. In this current analysis, patients have underwent contrast-enhanced MRI and diffusion-weighted MRI scanning before neoadjuvant immunotherapy and radical resection of the tumor respectively. Response to neoadjuvant immunotherapy was based on histopathological evaluation of the resected specimen. The volume of the primary tumour and the value of the apparent diffusion coefficient (ADC) was measured. Fisher's exact test and the Mann-Whitney U-test were used to compare the two groups of treatment response (good response and poor response).

The area under the receiver operating characteristic curve

(ROC) was used to calculate the capacity of relative changes in ADC value and tumor volume to discriminate between different pathologic response groups.

Results
Good response was found in 33.3% of all patients. Relative changes in primary tumour volume ($\Delta V_{\text{primary}}$ $p=0.001$) and in DW-MRI parameters ($\Delta \text{ADC}_{\text{primary}}$ $p=0.03$) after neoadjuvant immunotherapy were significantly different between the groups of good response and poor response. When the relative changes in tumor volume were used to predict treatment response, the area under the curve (AUC) was 0.98, with 100% sensitivity and 90% specificity. Change in ADC value achieved an AUC of 0.89 with a sensitivity of 100% and a specificity of 71% for the prediction of treatment response.

Conclusion
Changes in tumour volume and ADC value after neoadjuvant immunotherapy can help identify patients with good response to neoadjuvant immunotherapy in HNSCC.

PO-0587

The prevalence of malleus-tympanum synostosis on ultra-high-resolution CT: A preliminary study

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Purpose To determine the prevalence of malleus-tympanum synostosis (MTS) in different individuals via 0.1 mm ultra -high-resolution CT (U-HRCT).

Methods This retrospective study evaluated U-HRCT scans with 0.1 mm thickness of 1587 ears from 1122 subjects from October 2020 to March 2022. MTS was detected in subjects with normal ears, subjects with different types of hearing loss (HL), and subjects with various causes of conductive HL. The prevalence of MTS was calculated and statistically compared between subjects with normal ears and with different types of HL, as well as between subjects with various causes of conductive HL. The correlation between MTS and age or gender was calculated using the Mann–Whitney U test.

Results The prevalence of MTS was 2.8% (16/577), 3.4% (12/352), 7.2% (27/374), and 13.7% (39/284) in subjects with normal, mixed HL, sensorineural HL, and conductive HL ears, respectively. MTS was more common in subjects with HL than in subjects with normal ears ($p < 0.001$), and significant differences were shown between mixed and sensorineural HL groups ($p = 0.023$), between mixed and conductive HL groups ($p = 0.001$), and between sensorineural and conductive HL groups ($p = 0.006$). The prevalence of MTS was 83.9% (52/62), 34.8% (23/66), 12.6% (61/483), 7.5% (8/107), and 6.9% (7/102) in subjects with conductive HL with tympanosclerosis, definite middle ear malformations, otitis media, otosclerosis, and middle ear cholesteatoma, respectively. Besides, MTS was found in 18.8% (6/32) of subjects with unexplained conductive HL, 3 of whom were confirmed as having malleus fixation by surgery. No correlation was shown between MTS and age ($p = 0.41$) or gender ($p = 0.70$) in subjects with normal ears.

Conclusion MTS is a new sign that can be clearly visualized on an ultra-high-resolution CT with 0.1 mm thickness. The prevalence of MTS was 2.8% and 7.7% in subjects with normal ears and with HL, respectively. It may be asymptomatic, or may be associated with conductive HL.

PO-0588

Quantitative evaluation of diffusion-weighted MRI for differentiating benign and malignant thyroid nodules larger than 4 cm

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Purpose: We aimed to diagnose the benign or malignant of thyroid nodules larger than 4 cm by quantitative analysis of diffusion-weighted imaging (DWI).

Methods: 82 thyroid nodules were investigated retrospectively and divided them into benign ($n = 62$) and malignant groups ($n = 20$). Quantitative features like DWI and apparent diffusion coefficient (ADC) signal intensity standard deviation (DWI_{SD} and ADC_{SD}), DWI and ADC signal intensity ratio (DWI_{SIR} and ADC_{SIR}), mean ADC and minimum ADC value (ADC_{mean} and ADC_{min}) and ADC value standard deviation (ADC_{VSD}) were calculated. Univariate and multivariate logistic regression were conducted to identify independent predictors, and develop a prediction model. We performed receiver operating characteristic (ROC) analysis to determine the optimal threshold of risk factors, and constructed combined threshold models. Diagnostic performance including area under the ROC curve (AUC), accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), unnecessary biopsy rate of all models were calculated and compared with the American College of Radiology Thyroid Imaging Reporting and Data System (ACR-TIRADS) result.

Results: Two independent predictors of malignant nodules were identified by multivariate analysis: $DWISIR$ ($P = 0.007$) and ADC_{min} ($P < 0.001$). The AUCs for prediction model, combined threshold of $DWISIR$ and ADC_{min} , combined threshold of $DWISIR$ and ADC_{SIR} and ACR-TIRADS were 0.946 (0.896-0.996), 0.875 (0.759-0.991), 0.777 (0.648-0.907) and 0.722 (0.588-0.857). The combined threshold of $DWISIR$ and ADC_{min} had the lowest unnecessary biopsy rate of 0%, compared with 56.3% for ACR-TIRADS.

Conclusion: Quantitative DWI demonstrated favorable malignant thyroid nodule diagnostic efficacy. Combined thresholds of $DWISIR$ and ADC_{min} greatly reduced the unnecessary biopsy rate.

PO-0589

Thyroid Imaging Reporting and Data System with MRI Morphological Features for Thyroid Nodules: Diagnostic Performance and Unnecessary Biopsy Rate

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Objects To assess MRI-based morphological features in improving the American College of Radiology Thyroid Imaging Reporting and Data System (ACR-TIRADS) for categorizing thyroid nodules.

Methods A retrospective analysis was performed on 728 thyroid nodules (453 benign and 275 malignant) that postoperative pathology confirmed. Univariate and multivariate logistic regression analyses were used to find independent predictors of MRI morphological features in benign and malignant thyroid nodules. The improved method involved increasing the ACR-TIRADS level by one when there are independent predictors of MRI-based morphological features, whether individually or in combination, and conversely decreasing it by one. The study compared the performance of conventional ACR-TIRADS and different improved versions.

Results Restricted diffusion and reversed halo sign were identified as independent risk factors for malignancy in thyroid nodules (OR=45.1, 95% CI=23.2-87.5, $P<0.001$; OR=38.0, 95% CI=20.4-70.7, $P<0.001$). The areas under the receiver operating characteristic curves (AUCs) for both the conventional and four improved ACR-TIRADSs were 0.887 (95% CI: 0.862-0.911), 0.945 (95% CI: 0.928-0.963), 0.947 (95% CI: 0.929-0.965), 0.945 (95% CI: 0.928-0.963) and 0.951 (95% CI: 0.934-0.967), respectively. The unnecessary biopsy rates for the conventional and four improved ACR-TIRADSs were 62.8%, 30.0%, 27.1%, 26.8% and 29.1%, respectively, while the malignant missed diagnosis rates were 1.1%, 2.5%, 2.9%, 4.4% and 1.2%.

Conclusions MRI morphological features with ACR-TIRADS has improved diagnostic performance and reduce unnecessary biopsy rate while maintaining a low malignant missed diagnosis rate.

PO-0590

Application Value of Radiomics Approach in predicting Chromosomal Arms 1p/19q in Low-Grade Gliomas

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Objective: This study is to evaluate the value of radiomics in predicting the 1p/19q status of LGG based on T2-weighted MR images.

Methods: All study patients (n=82) from the Cancer Genome Atlas (TCGA) data portal who had pre-operative MRI images and biopsy proven 1p/19q status consisting either no deletion or co-deletion were included. We manually segment the tumors in 3D mode layer by layer on T2-weighted images, and extract 396 radiomics features including Histogram, Gray Level Co-occurrence Matrix (GLCM), Grey Level Size Zone Matrix (GLSZM), Run Length Matrix (RLM), Form Factor and Haralick. We divided the non-deleted and co-deleted patients into two independent cohorts as training cohort and validation cohort in a ratio of 7:3. The least absolute shrinkage and selection operator (LASSO) logistic regression model was used for further feature screening and 7 features with non-zero coefficients in the logistic regression model were selected in the training cohort. A formula was generated using a linear combination of selected features that were weighted by their respective LASSO coefficients. A radiomics score was calculated for each patient by the

formula to reflect the 1p/19q status. The performance of the radiomics signature was evaluated using the area under curve (AUC) of receiver operating characteristic curve. We performed decision curve analysis (DCA) within training and validation cohorts to assess the clinical usefulness of the signature.

Result: This study included 34 non-deleted and 48 co-deleted LGG. 7 features with non-zero coefficients were chosen from 396 candidate features to build a radiomics model that significantly correlated with the 1p/19q status. The model showed good calibration and discrimination in the training cohort, with an AUC of 0.754 (95% CI: 0.623-0.884), sensitivity of 79% and specificity of 74%. In the validation cohort, the AUC was 0.757 (95% CI: 0.547-0.967) with sensitivity of 80% and specificity of 71%. DCA for the radiomics label in the training cohort showed that using the radiomics label to predict 1p/19q status added more benefit than treating either all or no patients if the threshold probability was between 0.14 and 0.90.

Conclusion: The radiomics label can be used as a noninvasive method to predict the 1p/19q status of LGG for clinical decision of optimal therapy options.

PO-0591

Evolution of radiation-induced temporal lobe injury after intensity-modulated radiation therapy in nasopharyngeal carcinoma: a large cohort retrospective study

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Background: Previous studies have demonstrated conflicting findings regarding the initial magnetic resonance imaging (MRI) signs of radiotherapy-induced temporal lobe injury (RTLTI) and the evolution of different RTLTI patterns.

Purpose: To evaluate the initial MRI findings and evolution of RTLTI in patients with nasopharyngeal carcinoma.

Materials and Methods: Data of patients with RTLTI were retrospectively collected from two hospitals between January 2011 and December 2021. The injured lobes were categorized into three patterns based on initial MRI findings: isolated white matter lesions (WMLs), isolated contrast-enhanced lesions (CELs), and a combination of WMLs and CELs. The latency period, appearance, and temporal changes in WMLs and CELs were evaluated.

Results: A total of 913 patients with RTLTI with 1092 injured lobes were included in this study, constituting 640 men and 273 women, with a mean age of 43 ± 12.7 years. The numbers of isolated WMLs, isolated CELs, and combined WMLs and CELs identified at the first MRI detection were 7(0.6%), 172(15.8%), and 913(83.6%), respectively. The evolution of bilateral RTLTI was different in the same patient, and that of unilateral RTLTI combined with WMLs and CELs also occurred asynchronously. The time intervals from the initial MRI detection of isolated WMLs, isolated CELs, combined WMLs, and CELs to the last negative MRI scan were 8.6, 8.9 and 11.0 months, respectively. A significant difference was observed in the time intervals between the three patterns ($H = 14.287$, $P = 0.001$). Age and the time interval between the first RTLTI detection and the previous negative MRI examination were independent factors influencing the initial MRI signs of RTLTI.

Conclusion: WMLs and CELs can manifest as the earliest and sole MRI abnormalities in patients with RTLTI. Shorter intervals between MRI examinations may reveal more information about the natural history of RTLTI.

PO-0592

Age-related changes in computed tomography density of thyroid gland in children: a single-centre retrospective study in Northern China

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Objective: The thyroid gland normally presents as a hyperdense organ on non-contrast computed tomography (CT) in adults. The correlation between thyroid gland CT density and its functional status has been studied; however, little is known regarding its density in children with normal thyroid functions. We aimed to assess the correlation between thyroid gland CT density and age in children with normal thyroid functions.

Methods: We enrolled 74 patients who had normal thyroid functions within 1 month before or after undergoing neck or cervical spine CT for trauma, neck masses, congenital diseases, and airway stenosis. Their CT images were retrospectively analyzed by two independent radiologists. Based on age, patients were divided into four groups: infant, preschool-aged, school-aged, and adolescence groups.

Results: Patients with thyroid gland hypodensity in the infant group (70%, 14/20) were significantly more numerous than those in preschool-aged (25%, 4/16), school-aged (20%, 5/25), and adolescence (15.4%, 2/13) groups ($P = 0.007$, 0.001 , and 0.002 , respectively, Fisher's exact test). The mean CT density of the thyroid gland was also lower in the infant group compared to the densities in other age groups. There was a weak positive correlation between thyroid CT density and age ($r = 0.264$, $P = 0.023$, linear regression analysis).

Conclusions: Thyroid CT density is related to age in children. The thyroid gland normally has a low density on non-contrast CT in most infants with normal thyroid function.

PO-0593

Diagnostic Value of Cochlear Nerve Characteristics for Occupational Noise Induced Hearing Loss

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Objective: To explore the diagnostic value of cochlear nerve characteristics in the diagnosis of occupational noise-induced hearing loss (NIHL).

Methods: This prospectively observational study included patients with NIHL, patients with noise exposure, and healthy volunteers at Tianjin Occupational Diseases Prevention and Treatment Hospital between January 2021 and September 2022. Multi-planar reconstruction of bilateral cochlear nerves was performed to extract the cochlear nerves characteristics, including the long diameter, short diameter, average diameter, length-to-diameter ratio, cross-sectional area, and perimeter of the cochlear nerves at three different planes, and the diagnostic value for NIHL were evaluated by area under the receiver operating characteristic curve (AUC).

Results: The NIHL ($n=27$, 24 males, aged 47.9 ± 6.2 years), noise-exposed ($n=41$, 34 males, aged 46.9 ± 6.7 years), and healthy control ($n=27$, 23 males, aged 48.0 ± 6.1 years) groups were included. In bottom plane, the short diameter (0.55 ± 0.15 vs. 0.75 ± 0.16 mm), long diameter (0.83 ± 0.18 vs. 1.07 ± 0.23 mm), average diameter (0.69 ± 0.15 vs. 0.91 ± 0.18 mm), area (0.39 ± 0.15 vs. 0.72 ± 0.21 mm²), and perimeter (2.33 ± 0.48 vs. 3.08 ± 0.58 mm) of the NIHL group were significantly lower than those of the noise-exposed group (all $P < 0.05$). The area of bottom plane showed best diagnostic value, with AUC of 0.921 (95% CI: 0.855-0.987).

Conclusion: Cochlear nerve characteristics might be helpful in the diagnosis of NIHL, and the area of bottom plane showed best diagnostic value.

PO-0594

The changes of iron load in specific brain areas lead to neurodegenerative disease of the central nervous system

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Background: Central nervous system degenerative diseases refer to a group of diseases caused by chronic progressive degenerative degeneration of central nervous tissues, including Parkinson's disease (PD), Alzheimer's disease (AD), Huntington disease (HD), amyotrophic lateral sclerosis (ALS), multiple sclerosis (MS), etc. At present, the causes of these diseases have not been clearly studied, which brings great pain and burden to patients and their families, and challenges to social health burden.

Aim: Mendelian randomization (MR) was used to reveal the causal effect of iron load (SWI display) in some brain regions on degenerative diseases of the central nervous system.

Methods: Our brain imaging data were from a genome-wide association study based on 39691 head multimodal imaging samples in UK Biobank. Our aim was to explore Susceptibility weighted imaging (SWI), which represents the iron load of tissues and its impact on degenerative diseases of the central nervous system. We selected brain regions with genetic significance and stability for analysis, which are mainly distributed in basal ganglia, thalamus and limbic system. For AD, we selected 63926 samples from Alzheimer's Disease Genetics Consortium (ADGC), European Alzheimer's Disease Initiative (EADI) and other institutions. For PD, the data was from the International Parkinson's Disease Genomics Consortium, while the data for ALS was from a genome-wide association study based on 84694 people. For MS, the data was from 115803 gene data of the International Multiple Sclerosis Genetics Consortium. For Pick disease, data from 3024 multicenter researchers were studied in 2010. For Vascular dementia, more than 200000 European population cohorts were selected and divided into four subtypes. Finally, the inverse variance weighting was used as the main estimate, while MR Pleiotropy RESidual Sum and Outlier, MR Egger and weighted median were used to detect heterogeneity and pleiotropy.

Results: Through 399 screening of permutations and combinations, a total of nine positive results were presented to us. However, the iron load in these brain areas has a positive or negative or unrelated relationship with the occurrence of neurodegenerative diseases. For AD and PD, the increase of iron load in some brain regions is the cause of lesions. Right pallidum was significant for AD, and right caudate, left caudate and right accumbens were significant for PD. However, for MS and vascular dementia, the reduction of iron load was statistically significant. The right and left chambers are meaningful to MS, the left hippocampus plus right hippocampus is meaningful to Vascular dimensionia (Mixed), and the left thalamus and left accumbens plus right accumbens are meaningful to Vascular dimensionia (Subcortical).

Conclusion: Iron load changes lead to many neurogenic diseases, rather than diseases leading to iron load changes, which is both causal and reveals the relationship between time sequence. The increase or decrease of iron load in different brain regions has a causal effect on the occurrence of different degenerative diseases of the central nervous system, which is crucial for the understanding of the pathogenesis and exploration of treatment of this kind of disease.

PO-0595

Changes in apparent diffusion coefficient values of the parotid gland before and after treatment in patients with primary Sjögren's syndrome

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Objectives: To investigate the changes in the apparent diffusion coefficient (ADC) values of the parotid gland before and after treatment in patients with primary Sjögren's syndrome (pSS), to correlate these changes with laboratory indicators, and to evaluate the utility of ADC values when combined with laboratory indicators for assessing changes in the inflammatory activity of the parotid parenchyma in patients with pSS.

Methods: Twenty-three patients with pSS underwent routine magnetic resonance imaging and diffusion-weighted imaging of the parotid glands before and after treatment. The ADC values were measured for the parotid parenchyma and spinal cord on the same slice, and the ratio (ADCR) was calculated. We analyzed the change rate of ADCR ($\Delta\text{ADCR}/\text{ADCR}$ before treatment) to determine its efficacy in evaluating changes in inflammatory activity. Logistic regression analysis was used to combine the change rate of ADCR with that of Laboratory indicators with significant changed.

Results: After treatment, we observed an increase in ADCR values (from 1.022 ± 0.098 to 1.131 ± 0.097) and a decrease in the rheumatoid factor (RF) (from 44 to 33). When the cutoff value for the change rate of ADCR was set at 0.059, the area under the curve (AUC) was 0.822, with a sensitivity of 80% and specificity of 88.9% for assessing changes in inflammatory activity.

Conclusion: ADC values can be a marker for evaluating changes in pathological status of parotid gland in patients with pSS before and after treatment, and the combination of ADCR and RF change rates may improve the accuracy of assessing changes in inflammatory activity.

PO-0596

Structural and functional brain changes after glucocorticoid therapy in thyroid-associated ophthalmopathy

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Purpose: To investigate the brain structural and functional alterations in patients with thyroid-associated ophthalmopathy (TAO) before and after glucocorticoids therapy, using voxel-based morphometry (VBM) as well as resting-state functional magnetic resonance imaging (fMRI) with amplitude of low-frequency fluctuation (ALFF) and regional homogeneity (ReHo).

Methods: Between 2019 and 2022, 32 patients with TAO and 23 healthy controls were recruited to undergo pre-therapy MRI scans in. Intravenous glucocorticoid therapy was administered to all patients. Twenty-six of the patients were available for rescanned MRI three months after the end of therapy. The VBM, ALFF and ReHo methods were used to evaluate the brain structural and functional differences.

Results: Before therapy, TAO patients showed significantly decreased gray matter volume in left orbital part of superior frontal gyrus (ORBsup) and medial superior frontal gyrus (SFGmed) than healthy controls. Patients had higher ALFF values in bilateral gyrus rectus and olfactory cortex as well as lower values in bilateral cuneus. Besides, the patients showed decreased ReHo values in bilateral lingual gyrus. After therapy, increased gray matter volume in left anterior cingulate

gyrus and SFGmed, increased ALFF values in bilateral cuneus and superior occipital gyrus, as well as increased ReHo values in bilateral SFGmed were found in TAO patients compared to the pre-therapy cohort. Compared to controls, decreased gray matter volume in left ORBsup was observed in post-therapy TAO patients.

Conclusion: Our results indicated that TAO might cause functional and structural deficits in the visual and emotional regions of the brain, with recovery in the former and partial restoration in the latter after effective glucocorticoid therapy. These findings may lead to a deeper understanding of the pathophysiological mechanism behind TAO.

PO-0597

Time-dependent diffusion magnetic resonance imaging for the characterization of parotid gland tumors: a pilot study

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Abstract

Objective To investigate the utility of quantitative parameters derived from time-dependent diffusion magnetic resonance imaging (td-dMRI) in the characterization of parotid gland tumors.

Materials and Method Thirty-nine patients with parotid gland tumors were prospectively enrolled, including 24 patients with polymorphic adenomas (PAs), 8 patients with Warthin's tumors (WTs) and 7 patients with malignant tumors (MTs). td-dMRI was scanned in the pre-surgery MRI evaluation. Intracellular volume fraction (Vin), mean cell size (d), extracellular diffusion coefficient (Dex) and cellularity were obtained based on Imaging Microstructural Parameters Using Limited Spectrally Edited Diffusion model, and compared among three groups. One-way ANOVA, Kruskal-Wallis test and receiver operating characteristic (ROC) curves analyses were performed in statistical analysis as appropriate.

Results Significant differences were found on all Td-dMRI- derived parameters among PAs, WTs and MTs (all $p < 0.05$). Vin was the sole parameter that showed significant differences in all subgroup comparisons (PAs vs. WTs, < 0.001 ; PAs vs. MTs, $p = 0.031$; WTs vs. MTs, $p = 0.047$). When employing Vin of 0.267, 0.231, and 0.260 as the threshold value, respectively, optimal performances could be obtained for differentiating PAs from WTs (area under the ROC curve [AUC], 0.932; sensitivity, 0.917; specificity, 0.875), differentiating PAs from MTs (AUC, 0.744; sensitivity, 0.833; specificity, 0.714), and differentiating WTs from MTs (AUC, 0.750; sensitivity, 0.875; specificity, 0.714).

Conclusions The microstructural parameters derived from td-dMRI, especially Vin, might be promising imaging biomarker for characterizing parotid gland tumors.

PO-0598

Impact of Hashimoto's thyroiditis on the dual-energy CT quantitative parameters and its performances in diagnosing metastatic cervical lymph nodes in patients with papillary thyroid cancer

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Background: To evaluate the impact of Hashimoto's thyroiditis (HT) on dual-energy CT (DECT) quantitative parameters of cervical lymph nodes (LNs) and their performances in preoperatively diagnosing metastatic cervical LNs in patients with papillary thyroid cancer (PTC).

Methods: A total of 480 LNs from 233 PTC patients were classified into four groups (HT+/LN+, HT+/LN-, HT-/LN+ and HT-/LN- group). DECT quantitative parameters including iodine concentration (IC), normalized IC (NIC), effective atomic number (Zeff) and slope of the spectral curve (λ HU) in arterial phase (AP) and venous phase (VP) were compared. Receiver operating characteristics (ROCs) curves were performed to evaluate DECT parameters' diagnostic performance in differentiating metastatic from non-metastatic LNs in HT- and HT+ groups.

Results: Compared to HT-/LN+ group, HT+/LN+ group exhibited lower values of DECT parameters (all $p < 0.05$). Conversely, compared to HT-/LN- group, HT+/LN- group showed higher values of DECT parameters (all $p < 0.05$). In HT+ group, if using a AP-IC of 1.850 mg/mL as the threshold value, optimal diagnostic performance (AUC, 0.757; sensitivity, 69.4%; specificity, 71.0%) could be obtained. The optimal threshold value of AP-IC in HT- group was 2.050 mg/mL. By contrast, in HT- group, AP-NIC demonstrated the highest AUC of 0.988, when employing a optimal threshold of 0.243. The optimal threshold value of AP-NIC was 0.188 in HT+ group.

Conclusion: HT affected DECT quantitative parameters of LNs and subsequent the diagnostic threshold. When using DECT to diagnose metastatic LNs in patients with PTC, whether HT was coexistent should be clarified considering the different diagnostic threshold.

PO-0599

Predicting Response to Immunotherapy in Head and Neck Cancers via a CT-based Radiomics Model

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Objective: To investigate whether radiomics models derived from pretreatment CT could help to predict response to immunotherapy in head and neck cancer (HNC).

Methods: Retrospectively, a total of 40 patients with measurable HNC were included. The patients were divided into responder and non-responder groups according to the comparison of pre-treatment and post-treatment CT findings. Radiomics features were extracted from pre-treatment CT, and significant features were selected to construct differentiating models using machine learning methods. The area under the curve (AUC), sensitivity and specificity were calculated to quantify the predictive efficacy.

Results: The feature of 'Minor Axis Length' showed the best predictive efficiency, with an AUC of 0.726. A total of 7 features were selected to build models upon machine learning methods. By

comparing different machine learning based models, the neural network model achieved the best predictive ability, with an AUC of 0.864, a sensitivity of 82.5%, and a specificity of 82.5%.

Conclusion: The pretreatment CT-based radiomics model showed good performance in predicting response to immunotherapy in HNC. Pretreatment CT-based radiomics model might provide an alternative approach for the selection of patients who benefit from immunotherapy.

PO-0600

Diagnosis of Major Depressive Disorder Based on individualized brain function and structural connectivity

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Objective:

Major depressive disorder (MDD) exhibited substantial inter-individual variations in both neuroanatomy and neurophysiology. Nonetheless, the majority of previous neuroimaging studies have relied on the application of population-based brain templates, neglecting the distinctive brain network characteristics present in individuals. As compared to a single modality, multimodal imaging better investigate the interrelationships between brain networks in patients with depression. In this study, we aimed to determine whether the combination of both helps to improve classification performance by extracting individualized functional connectivity features and structural connectivity features. Going further, an in-depth understanding of MDD-related pathophysiological mechanisms underlying MDD is imperative to facilitate the diagnosis and treatment of depression.

Methods:

This study prospectively recruited 142 MDD patients and 127 well-matched healthy controls. First, by leveraging data analysis methods to extract subject-individualized functional and structural connectivity features. Then, we performed a fusion of the extracted individualized features, and further used support vector machines for classification and diagnosis to discriminate individuals with MDD from HCs. Finally, we also utilized features after fusion to establish a linear regression model to predict the severity of symptoms in patients with MDD. This study provided insight into understanding the pathophysiological mechanisms underlying MDD and provided potential quantitative neuroimaging biomarkers for MDD diagnosis.

Results:

Through feature fusion, independent components and mixing coefficients of each modality were generated. Based on the normality of the mixing coefficients, a two-sample t-test was conducted for each independent component (IC) to identify components that differentiate between groups. We discovered a joint group discriminant independent component with significant differences in both modalities. At the same time, we also found the components that only show significant group differences in a single mode. In rs-fMRI, there were two independent components with group differences. Also, we found components that showed significant group differences only in a single modality. The multi-modal fusion analysis of structural and functional magnetic resonance imaging processed extracted features of brain regions containing differences between groups. These fusion features significantly improved the classification efficiency, achieving high precision in cross-group differentiation.

Conclusion:

In summary, our study showed that individualized functional and structural connectivity-based characterization significantly improves the ability to discriminate depression. In this prospective study, we integrated multimodal neuroimaging data into the machine learning method. We identified complementary information between SC and FC that informs possible neural linkages. Combining DTI and rs-fMRI data, we investigated the neuropathological features of MDD patients from the perspective of functional-structural connectome coalescence. This article not only leveraged the

advantages of each imaging modality through multimodal data fusion but also explored the inter-relationships between brain networks in MDD patients, providing more supplementary information and comprehensive understanding of MDD diseases.

PO-0601

Synthetic MRI for early prediction of treatment response to chemoradiotherapy in advanced nasopharyngeal carcinoma: combination with clinicopathological characteristics

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Objectives: To explore the feasibility of synthetic MRI (syMRI) and its combination with clinicopathological characteristics for early prediction of treatment response to chemoradiotherapy (CRT) in advanced nasopharyngeal carcinoma (ANPC).

Materials: ANPC patients treated with CRT from September 2020 to June 2022 were retrospectively enrolled and categorized into response group (RG, n=95) and no-response group (NRG, n=32) based on RECIST 1.1. The quantitative parameters from pretreatment syMRI (T1, T2, PD) were compared between RG and NRG. The independent predictive factors were applied to create a multi-parameter model by logistic regression analysis. Internal validation data set was performed to verify the prediction model. The syMRI-derived parameters and clinicopathological characteristics were correlated with treatment response by spearman correlation.

Results: T1, T2 and PD values in NRG were significantly lower when compared with RG (all $P < 0.05$). Logistic regression analysis showed each of T1, T2, PD, EBV-DNA, clinical stage, and Ki-67 had significant relationships with CRT response (all $P < 0.05$). The corresponding multi-parameter model incorporating these six variables provided excellent prediction performance, with AUC, sensitivity, specificity, and accuracy of 0.947, 90.48%, 90.91%, and 90.80%. Moreover, by combining all syMRI and clinicopathological variables, a separate multi-parameter model was generated, indicating a further improved prediction performance, with AUC, sensitivity, specificity, and accuracy of 0.972, 95.24%, 90.91%, and 92.00%. The internal validated data set also demonstrated excellent prediction performance. In addition, negative correlation of T1, PD values, and positive correlation of EBV-DNA, ENE, clinical stage, Ki-67 were revealed with treatment response (all $P < 0.05$).

Conclusions: syMRI may be used for early prediction of CRT response in ANCP. The multi-parameter model by incorporating the syMRI and clinicopathological characteristics factors could serve as a novel tool in early prediction of CRT response.

PO-0602

Study on the lateral pterygoid muscle status after artificial temporomandibular joint replacement

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Abstract. The purpose of this study was to explore the status of the lateral pterygoid muscle (LPM) after detachment in artificial temporomandibular joint replacement (TJR) surgery. Patient clinical and computed tomography imaging data were collected before and after unilateral artificial TJR with LPM detachment. The volume of the LPM on the operated and unoperated sides was measured before and after surgery (at 1, 3, 6, 12 months) using ProPlan CMF 3.0 software. The volumes of the LPM on both sides, the patient's mandibular movements, quality of life (QoL), and pain and diet scores (visual analogue scales) were evaluated and compared at the different follow-up stages. Ten patients were included in the study. After surgery, the volume of the operated LPM was significantly reduced to 60.78% at 3 months ($P = 0.007$), and gradually stabilized to 51.58% at 6 months ($P = 0.025$) and 54.68% at 1 year postoperative ($P = 0.002$). There were no significant LPM volume changes on the unoperated side ($P = 0.67$). Lateral movement of the operated joint was significantly reduced ($P = 0.021$) and correlated with the LPM volume change after surgical detachment ($P = 0.042$). The LPM shrank after detachment in the artificial TJR surgery and the muscle detachment affected the movement of the replaced joint.

PO-0603

The value of spiral CT in evaluating primary maxillofacial ameloblastomas

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Objective: To explore the value of 64-slice spiral CT in evaluating primary maxillofacial ameloblastomas. **Methods:** 112 patients who suffered from primary maxillofacial ameloblastomas confirmed by pathology were performed with spiral CT preoperatively. The pathological classification included 70 solid/multicystic, 35 unicystic, 6 desmoplastic and 1 extraosseous/peripheral tumors. The post-processing of CT images included multiplanar reformation (MPR) and volume rendering (VR). Meanwhile, CT values were measured in the region of interest (ROI) in these tumors to analyze the features of the contrast enhancement of the tumors. **Results:** The spiral CT features of primary maxillofacial ameloblastomas were multilocular and cystic-solid mostly. There were contrast enhancements in cystic wall, septa and solid regions. And the enhancement of cystic wall could be mural nodular. The degrees of enhancement of 85% tumors were more than 50%. The edges were clear and company with linear scleroses mostly. The expansile changes of the bones, the thinning or destruction and interruption of the adjacent bone cortexes were found in the lesions commonly. Most tumors led to the changes of the adjacent tooth. **Conclusions:** The features of primary maxillofacial ameloblastomas could be shown clearly with spiral CT, which can provide more information for guiding clinical treatment.

PO-0604

Percutaneous core needle biopsy of deep suprahyoid head and neck lesions with CT-guided: study of diagnostic performance and factors associated with diagnostic failure.

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Object: The purpose of this study was to evaluate diagnostic accuracy and factors associated with diagnostic failure of core needle biopsy (CNB) with CT-guided in deep suprahyoid head and neck lesions.

Materials and methods: The records of 204 patients underwent CT-guided CNB were retrospective reviewed. CT-guided CNB was conducted for pathological diagnosis with the use of 18-G coaxial biopsy needles. Diagnostic accuracy for the diagnosis of lesions were calculated by comparing the biopsy results with the operative specimen or based on treatment response and clinical follow-up more than 6 months. Factors associated with biopsy failure was identified by chi-square test logistics regression of procedure characteristics and lesion features.

Result: All 204 specimens were considered adequate for diagnosis. No immediate or delayed procedural complications were encountered. Sensitivity, specificity and accuracy were 89.2% (141/158), 97.8% (45/46) and 91.2% (186/204), respectively. Lesions with poorly margins or pre-procedural diagnostic imaging were the potential factor for diagnostic failure.

Conclusion: CNB with CT-guidance is an effective procedure for tissue diagnosis of patient with primary deep suprahyoid head and neck and skull base lesions.

PO-0605

CT and MRI features of sinonasal teratocarcinoma: a preliminary analysis of 12 cases

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Purpose: The study aimed to investigate imaging features of the sinonasal teratocarcinoma (SNTCS) on computed tomography (CT) and magnetic resonance imaging (MRI).

Methods: Twelve cases with histopathologically confirmed SNTCS were retrospectively reviewed. All patients underwent CT and MRI scans. Imaging features, such as tumor morphology, margin, range, internal structure, bony change, signal intensity, enhancement changes, and lymph node characteristics on CT and MRI, were evaluated. Apparent diffusion coefficient (ADC) values were also measured.

Results: Seven cases were located in the nasal cavity and ethmoid sinus region, and five cases were in the nasal cavity. All tumors were irregular in morphology and had ill-defined boundaries with no obvious calcification or ossification. On CT imaging, all cases showed obvious bone resorption destruction. On MRI, all cases demonstrated heterogeneous enhancement. Tortuous small vessels within tumor were detected in 8 lesions. The mean ADC for SNTCS was approximately 800 mm²/s.

Conclusion: CT and MRI can provide important clues for the preoperative diagnosis of sinonasal teratocarcinoma.

PO-0606

Brain white matter variation in patients with obstructive sleep apnea-hypopnea syndrome with diffusional kurtosis imaging

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Objective To explore the changes of brain white matter of the patients with obstructive sleep apnea-hypopnea syndrome (OSAHS) with magnetic resonance diffusional kurtosis imaging (DKI). **Methods** 38 patients with OSAHS were examined by polysomnogram (PSG) from November 2017 to June 2021, and 32 non-OSAHS controls matched in gender and age. All the subjects were scanned by DKI. To find different encephalic regions through comparing kurtosis fractional anisotropy (KFA) values of all encephalic regions between the two groups, and to analysis the relationship between the KFA values of the different encephalic regions in OSAHS patients and the apnea-hypopnea index (AHI) and lowest saturation oxygen (LSO2) in PSG. **Results** The KFA values of white matter fiber tracts in corpus callosum, bilateral corona radiata, cingulate gyrus, right superior cerebellar peduncle and inferior cerebellar peduncle of OSAHS group were obviously lower than control group ($P < 0.05$). The Pearson correlation between AHI and the KFA values of corpus callosum, left posterior corona radiata, right anterior corona radiata, cingulate gyrus, right superior cerebellar peduncle, right inferior cerebellar peduncle in OSAHS group were all negative ($r = -0.476, -0.495, -0.486, -0.583, -0.346, -0.330$, $P < 0.05$), and the Pearson correlation between LSO2 and the KFA values of corpus callosum, left posterior corona radiata, right anterior corona radiata, cingulate gyrus, right superior cerebellar peduncle, right inferior cerebellar peduncle in OSAHS group were all positive ($r = 0.458, 0.521, 0.505, 0.476, 0.353, 0.381$, $P < 0.05$). After controlling for age and body mass index (BMI), the partial correlation between AHI and the KFA values of corpus callosum, left posterior corona radiata, right anterior corona radiata, cingulate gyrus in OSAHS group were also negative ($r = -0.344, -0.380, -0.406, -0.537$, $P < 0.05$), and the partial correlation between LSO2 and the KFA values of corpus callosum, left posterior corona radiata, right anterior corona radiata, cingulate gyrus, right superior cerebellar peduncle in OSAHS group were also positive ($r = 0.366, 0.406, 0.446, 0.404, 0.342$, $P < 0.05$). **Conclusions** Recurrent apnea and hypoxemia at night of OSAHS patients can cause damage to white matter fibers in parts of encephalic regions.

PO-0607

Comparison the Diffusion Metrics of Single-shell and Two-shell Neurite Orientation Dispersion and Density Imaging in Human Brain

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Purpose

To quantitatively compare the diffusion metrics from single-shell and two-shell protocols of neurite orientation dispersion and density imaging (NODDI) in normal human brain and infarcted brain tissues.

Material and Methods

NODDI data of brain were obtained in 18 ischemic stroke patients and 12 healthy volunteers. Each subject underwent two-shell multi-directional diffusion MRI sequence scans to obtain single-

shell protocols (Shellb1000 and Shellb2000) and two-shell protocol (Shellb1000+2000). Based on these data, the corresponding parametric maps of neural protrusion density (NDI), orientation dispersion (ODI), and each homogeneous water molecule (FISO) were obtained. For healthy volunteers, white matter templates (JHU-DTI atlas) and gray matter templates (AAL116 atlas) were selected. For ischemic stroke patients, two-dimensional region of interest (2d-ROIs) of the infarcted brain region was obtained by ITK-snap software. Linear regression, interclass correlation coefficient (ICC) and Bland–Altman plots were used to calculate coefficients of determination (R^2) and best fit lines, and to compare each diffusion metric (NDI, ODI and FISO) of ROIs from the three protocols (Shellb1000, Shellb2000, and Shellb1000+2000) in patients group and healthy controls.

Results

The R^2 values were 0.95 (Shellb1000 versus Shellb1000+b2000) and 0.99 (Shellb2000 versus Shellb1000+b2000), while the slopes of best fit lines were 0.97 (Shellb1000 versus Shellb1000+b2000) and 1.03 (Shellb2000 versus Shellb1000+b2000) for ODI values, based on the white matter JHU-DTI atlas. ICC analysis of single-shell and two-shell ODI showed “excellent” for the JHU-DTI atlas (ICC =0.983), the AAL116 atlas (ICC =0.909) and the infarction regions (ICC =0.950). From a Bland–Altman analysis of brain atlas and even infarcted region, the mean differences of the metrics of ODI for the three protocols were all found to be less than 0.05.

Conclusion

In conclusion, the ODI values from single-shell and two-shell protocols of NODDI were with a good consistency, suggesting that protocol Shellb1000 may estimate the ODI values as well as two-shell protocol Shellb1000+b2000. This has potential clinical value for reducing the scan time in patients with poor conditions and for analyzing ODIs from single-shell diffusion data in retrospective studies.

PO-0608

Evaluation of MR imaging findings in differentiating Granular Cell Tumor from Solitary Fibrous Tumor in the orbit

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Purpose: Orbital GCT, a rare tumor, used to be misdiagnosed as orbital SFT preoperatively but varied in prognosis and treatment. Thus, we aim to explore the MR imaging findings in distinguishing these two diseases.

Materials and Methods: Magnetic resonance imaging including T1-weighted, T2-weighted, contrast-enhanced MR imaging and diffuse weighted imaging was performed in 10 patients with GCT and 19 patients with SFT in the orbit confirmed by pathology. Two radiologists assessed the location, size, shape, margin, signal intensity, homogeneity, enhancement degree, enhancement pattern and the average ADC value of the tumors.

Results: For conventional MRI, location, signal intensity on T2WI, enhancement pattern and ADC values were significantly different between orbital GCTs and SFTs ($p < 0.05$).

Conclusion: Hypointense on T2WI, homogeneous enhancement pattern and lower ADC values played a crucial role in differentiating orbital GCTs from SFTs. These characteristics at some extent reflect the nature of tumors and help differential diagnosis when diseases mimic each other.

PO-0609

Assessment of a Deep Learning Image Reconstruction Algorithm's Effectiveness on CT Angiography Generated from Whole-Brain CT Perfusion

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Objective To compare the image quality and diagnostic accuracy of CT angiography (CTA) images reconstructed from CT perfusion (CTP) arterial peak phase using deep learning image reconstruction (DLIR) algorithm with adaptive statistical iterative reconstruction-Veo (ASIR-V) and filtered back projection (FBP) in patients with acute ischemic stroke (AIS) due to anterior circulation large vessel occlusion (LVO).

Methods This prospective study involved 39 patients with AIS caused by LVO who underwent non-contrast CT, CTP, and CTA examination within 24 hours of symptom onset. CTP arterial peak phase images with a thickness of 0.625mm were reconstructed using FBP, ASIR-V40%, ASIR-V80%, and DLIR with three levels (low, medium, and high) and compared to conventional CTA images reconstructed with ASIR-V80%. ROIs were drawn on the internal carotid artery (ICA) siphon, M1 segment of the middle cerebral artery (MCA-M1), and temporalis in contralateral axial images. CT values, image noise, SNR, and CNR were measured and compared. Subjective evaluation included image noise, edge sharpness of vascular lumen, display of small blood vessels, and overall image quality. Collateral circulation of seven CTA image groups was scored using Bijoy K M et al six-point scoring system.

Results CT values of the ICA siphons, MCA-M1, and temporalis showed no statistical significance among all seven CTA image groups. Noise, SNR, and CNR were comparable among DLIR-M, DLIR-H, and conventional CTA images. While noise in ASIR-V80% was slightly higher and SNR lower than conventional CTA images ($P < 0.05$), no statistical difference was found among ASIR-V80%, DLIR-M, and DLIR-H ($P > 0.05$). FBP had the highest noise and lowest SNR and CNR. The images of DLIR-M and DLIR-H were slightly worse than those of conventional CTA images only in the display of small blood vessels ($P < 0.05$). ASIR-V80% CTA images showed slightly inferior image noise and overall image quality compared to DLIR-M and DLIR-H ($P < 0.05$), with no significant difference in edge sharpness or small blood vessel visibility. Collateral circulation scores of the six reconstructed CTA images for each patient were consistent with conventional CTA images.

Conclusions The objective and subjective image quality of CTP arterial peak phase images reconstructed by DLIR-H and DLIR-M were equivalent to conventional CTA images, and superior to FBP and ASIR-V algorithms. Intracranial CTA images reconstructed from CTP reduced the dosage of contrast agent and radiation dose. The CTP arterial peak phase images reconstructed by DLIR may be helpful to detect small responsible blood vessels. Reconstructing CTA images from CTP data not only reduces radiation exposure and contrast agent dose by avoiding multiple scans but also shortens the examination time for patients with acute cerebral infarction.

PO-0610

Color duplex ultrasonography characteristics and clinical factors associated with recanalization in patients with unilateral extracranial vertebral artery dissection

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Background and purpose Aimed to determine the predictive value of color duplex ultrasonography (CDU) features for recanalization rate of VAD, we systematically investigated the predictors and time course for complete recanalization in patients with unilateral extracranial VAD in the context of medical treatment.

Methods A total of 113 consecutive patients with a confirmed diagnosis of unilateral extracranial VAD by HRMRI were investigated retrospectively. To explore the dynamic development of dissection, CDU follow-ups were performed at 1, 3, 6, and 12 months. According to the results of CDU examination at 12 months, patients were recruited and divided into the complete recanalization and non-complete recanalization groups. At 12 months, a favorable functional outcome was defined as modified Rankin Scale score ≤ 2 . On CDU, the initial lesion location, as well as a variety of signs of dissection such as the presence of an intimal flap, double lumen, intramural hematoma, and other quantitative parameters of each dissected segment were reviewed, respectively. Multiple logistic regression was used to explore the association between clinical, initial imaging features of extracranial VAD and complete recanalization at 12 months.

Results Among 109 patients who matched the inclusion criteria, 91 (83.5%) achieved a favorable outcome at 12 months. The estimated rate of complete recanalization of extracranial VAD was 4.6% (5/109) at one month, 35.8% (39/109) at 3 months, 67.0% (73/109) at 6 months, and 71.6% (78/109) at 12 months. Overall, there were 78 patients in the complete recanalization group and the remaining 31 patients without complete resolution of arterial abnormalities. In multivariate analyses, intramural hematoma and lumen occlusion on CDU remained associated with complete resolution of VAD. After adjusting for age, gender, hypertension, LDL-C, hs-CRP, High Monocyte, clinical presentations, PC-ASPECT, and Initial NIHSS, lumen occlusion were still an independent risk factor for complete recanalization, with odds ratios of 15.63 (95% CI, 3.56-68.59, $P < 0.001$), whereas intramural hematoma substantially increased the likelihood of complete recanalization, with odds ratios of 0.03 (95% CI, 0.01-0.19, $P < 0.001$).

Conclusions CDU has proven to be a reliable tool for diagnosis and follow-up of extracranial VAD. Our results suggest that recanalization of unilateral extracranial VAD occurs primarily within the first 6 months. Initial occlusion reduce the likelihood of complete recanalization, whereas intramural hematoma increases it.

PO-0611

Relationship of Neutrophil-to-Lymphocyte Ratio with Carotid Plaque Vulnerability in Patients—an exploratory research based on Histopathology

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Background and objective: Vulnerable plaques of carotid atherosclerosis had been proved to be significantly related to ischemic stroke events. This study aimed to explore the correlation between

inflammation related indicators and vulnerable plaques and to search for indicators that can predict carotid plaque instability.

Methods: Patients with ischemic stroke or transient ischemic attack (TIA) were analyzed as the study group from January 2019 and December 2020. All patients were confirmed by carotid doppler ultrasonography (CDU) and other imaging examinations that there were atherosclerotic plaques in the responsible vessels leading to vascular stenosis. Simultaneously we collected patients who underwent carotid endarterectomy (CEA) as the neurosurgery control group (CEA group) and health examination patients as the healthy control group. All patients were categorized into stable and vulnerable plaque groups based on the characteristics of plaque assessed by CDU. Application of Logistic Regression to Analyze the Correlation between inflammatory related indicators such as NLR (neutrophil-to-lymphocyte ratio), and vulnerable plaques. HE staining was used to analyze the characteristics of plaques in the neurosurgery group.

Results: In study group, age (1.123;1.14-1.33), BMI (1.51;1.10-2.09), systolic blood pressure (1.07;1.02-1.12), HDL-C (0.06;0.01-0.58), and NLR (1.048;0.95-1.15) were independent risk factors for the formation of carotid plaque. While NLR was independent risk factors for carotid plaque vulnerability (2.40; 1.47-3.92). The ultrasonic and pathological characteristics of carotid plaques in CEA group had strong consistency. We found that inflammatory cells were more inclined to gather around the ruptured fiber cap of vulnerable carotid plaques.

Conclusions: Inflammation runed through the whole process of the formation and development of carotid atherosclerotic plaques, especially in the process of plaque vulnerability. NLR was expected to effectively predict vulnerable carotid plaque for patients and is easier to obtain in clinical.

PO-0612

Integration of optical and optoacoustic scanning system for depicting residual nasopharyngeal carcinoma and guiding surgery

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Detecting residual nasopharyngeal carcinoma (rNPC) can be difficult because of the coexistence of occult tumors and post-chemoradiation changes, which poses a challenge for both radiologists and surgeons using current imaging methods. Currently, molecular imaging that precisely targets and visualizes particular biomarkers in tumors may exceed the specificity and sensitivity of traditional imaging techniques, providing the potential to distinguish tumors from non-neoplastic lesions. Here, we synthesized a HER2/SR-BI-targeted tracer to efficiently position NPC and guide surgery in living mice. This bispecific tracer contained two parts: IRDye 800 CW, as an imaging reagent for both optical and optoacoustic imaging, and a fusion peptide (FY-35) as the targeting reagent. Both in vitro and in vivo tests demonstrated that the tracer had higher accumulation and longer retention (up to 48 h) in tumors than a single-targeted probe, and realized sensitive detection of tumors with a minimum size of 3.9 mm. By visualizing the vascular network via a customised handheld optoacoustic scan, our intraoperative fluorescence molecular imaging system provides accurate guidance for intraoperative tumor resection. Integrating the advantages of both optical and optoacoustic scanning in intraoperative image-guided system, this method holds promise for depicting rNPC and guiding salvage surgery.

PO-0613

Can we find the potential biomarkers of vulnerable carotid plaque in patients with type 2 diabetes? An exploratory research based on predictive models

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Background and Objective: Type 2 diabetes mellitus (T2DM) caused by insulin resistance (IR) results in elevated blood glucose levels, whose harmful effects in vivo environment including the damage to the intima of vessels and the formation of atherosclerotic plaques, particularly vulnerable plaques, which results in stenosis or even occlusion of blood vessels. The triglyceride-glucose index (TyG index) is a simple proxy for IR, how it may predict vulnerable carotid plaques in T2DM patients warrants further investigation. In light of this, the study aims to establish a predictive model to search for biomarkers of T2DM patients.

Methods: 333 patients diagnosed with T2DM were assessed the carotid plaque by multimodality imaging and then divided into 3 groups (no plaque, stable or vulnerable plaque) by the vulnerability and into 4 groups by TyG quartiles. Logistic regression models were constructed. In principal component analysis, lipid variables were reconstituted and calculated with TyG to form a new variable named TyG-C. The AUC was calculated and the cut-off value was analyzed.

Results: 1. The OR of the TyG index quartile for vulnerable plaques group increased with stratification, but lost statistical significance after controlling for covariates; 2. TyG, HDL-C and LDL-C interacted positively and negatively, respectively, and the reconstituted variables TyG-C calculated as $TyG-C = (0.397 \times LDL-C) + (-0.745 \times HDL-C) + (0.787 \times TyG \text{ index})$, was statistically significant risk factors in vulnerable plaque group; 3. ROC showed that the AUC of TyG-C in the vulnerable plaque was the largest. When the TyG-C is greater than 7.51, T2DM patients are more likely to suffer from carotid plaque, and when the TyG-C is greater than 7.82, the carotid plaques in T2DM patients are more likely to be vulnerable.

Conclusion: This study produced the model for predicting vulnerable carotid plaque in T2DM patients and demonstrated that TyG-C in peripheral blood as a marker for assessing carotid plaque vulnerability, that was more accurate than the TyG index in T2DM patients.

PO-0614

Is Arterial Spin Labeling necessarily low perfusion for cavernous hemangioma? A case of hyperperfusion cavernous hemangioma.

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Introduction: Differentiating between extracerebral cavernous malformation and meningiomas in the cavernous sinus area poses a challenge due to the influence of skull base bone and gas. It is crucial to distinguish between these conditions before surgery as their treatment differs. **Methods:** Non-contrast head CT, pre and postcontrast brain MRI, ASL with PLDs of 1.5s and 2.5s were used. Image analysis and data processing were performed using the GE AW4.6 workstation's Functool software, and the CBF map was automatically generated by ASL. **Conclusions:** Cavernous sinus venous malformations are characterized by increased capillary masses without direct arterial supply, resulting in low perfusion. On the other hand, meningiomas receive arterial blood supply and often exhibit high perfusion. ASL can be useful in distinguishing between these tumor types. In our specific case of cavernous sinus venous malformation, ASL

imaging revealed hyperperfusion, which is different from the conventional acute manifestation of ASL in cavernous vessels. This finding should be considered. Discussion: Hyperperfusion on ASL can occur when cavernous sinus venous malformation is associated with arteriovenous fistula malformation.

PO-0615

Application of double low-dose head and neck CT angiography using 60keV monoenergetic based on detector-derived spectral CT

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Purpose

To explore the value of 60keV monoenergetic imaging combined with double low-dose protocol in head and neck CT angiography by using detector-derived spectral CT.

Methods

A total of 60 patients who underwent head and neck angiography with spectral CT scanner were prospectively enrolled and randomly divided into control group ($n = 30$) and study group ($n = 30$). The control group used 120 kVp tube voltage and conducted a personalized full contrast dose protocol ($25 \times \text{bodyweight} \times 10 \div \text{Iodine concentration}$) with the flow rate of contrast dose / 10. The study group used 100kVp low tube voltage and low contrast dose protocol ($18 \times \text{bodyweight} \times 10 \div \text{Iodine concentration}$), with the flow rate of contrast dose/7. Moreover, the study group reconstructed 60keV monoenergetic images by the raw data. The contrast agent dosage, radiation dose, subjective and objective image quality were compared between the two groups.

Results

Compared with the control group, contrast dose in the study group was reduced by about 23.2%, and the effective radiation dose was reduced by about 30.8%. The SNR of common carotid artery, C1 segment of internal carotid artery, C4 segment of internal carotid artery, V3 segment of vertebral artery, and basilar artery in the study group were higher than those in the control group (all $p < 0.05$). There was no significant difference in CNR and subjective images quality evaluation between the two groups.

Conclusion

Detector-based spectral CT achieves 60keV monoenergetic images in clinical routine, which allows to reduce the amount of contrast agent and radiation dose by 23% and 30% under routine head and neck CTA examinations, and there is no compromise in image quality.

PO-0616

The value of detector-derived spectral CT parameters in identifying high-risk plaques in carotid atherosclerotic plaques

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Purpose

To explore the value of detector-derived spectral CT parameters combined with double low-dose protocol in identifying high-risk plaques in carotid atherosclerotic plaques

Methods

A total of 60 patients who underwent head and neck angiography with spectral CT scanner were prospectively enrolled. They were used 100 kVp low tube voltage and conducted a personalized low contrast dose protocol ($18 \times \text{bodyweight} \times 10 \div \text{Iodine concentration}$) with the flow rate of contrast dose /7. ROIs were placed on Low attenuation plaque [lipid-rich necrotic core (LRNC), intraplaque hemorrhage (IPH)], and calcified plaque on CTA images. For each ROI, attenuation was recorded for polyenergetic images; total thickness of plaque; attenuation spectrum curve slope; Iodine concentration; and Z-effective value was recorded. DLCTA parameters were compared among plaque components.

Results

106 plaques were analyzed. All parameters (CTPI, total thickness of plaque; attenuation spectrum slope; Iodine concentration; Z-effective value) showed significant differences between vulnerable plaques and the other components (all $p < .005$). ROC curve analysis showed that attenuation spectrum slope had the highest Area Under Curve (AUC) in identifying vulnerable plaques among the all parameter CT images.

Conclusion

DLCTA showed strong performance in differentiating vulnerable plaques from other components. Slope of energy spectrum curve of spectral CT can be used to identify vulnerable plaques before operation, which has high diagnostic efficacy and can provide reference for the treatment and prognosis of patients. And the amount of contrast agent and radiation dose were reduced under routine head and neck CTA examinations

PO-0617

Gender differences in lateral pterygoid muscle in patients with anterior disk displacement

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Objective: To use quantitative MRI to assess gender differences in lateral pterygoid muscle (LPM) characteristics in patients with anterior disk displacement (ADD).

Methods: Lateral pterygoid muscle of 51 patients diagnosed with temporomandibular joint disorders (TMD) who underwent T1-weighted Dixon and T1-mapping

sequences

were retrospectively analyzed. There were 34 female patients (10 with bilateral normal position disk [NP]; 24 with bilateral ADD) and 17 male patients (eight with bilateral NP; nine with bilateral ADD) among them. After controlling for age, differences in fat fraction, T1 value, volume and histogram features related to gender and disk status were tested with 2-way

ANCOVA or Quade ANCOVA with Bonferroni correction.

Results: Volume of LPM in NP was significantly smaller than that of ADD ($p < 0.001$).

Fat fraction of LPM in females with NP was significantly higher than males with NP ($p < 0.05$). Females with ADD showed a significantly higher T1 value ($p < 0.05$), and higher intramuscular heterogeneity than males with ADD.

Conclusions: Lateral pterygoid muscle in female TMD patients presented more fatty infiltration in the NP stage and might present more fibrosis in the ADD stage compared with males. Together, this leads to more serious intramuscular heterogeneity during the pathogenesis of ADD in females.

PO-0618

Nodular fasciitis in the head and neck: CT imaging findings

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Purpose: The purpose of this study was to describe the CT imaging findings of nodular fasciitis occurring in the head and neck region.

Methods: We retrospectively reviewed CT images of nodular fasciitis with pathologic correlation in 23 cases (11 men and 12 women; age range, 11-82 years) collected between August 2003 and October 2015 from our pathologic database. All of the CT images were retrospectively evaluated with respect to the location, size, relationship to fascia, enhancement, and enhancement pattern by 2 experienced radiologists.

Results: All patients presented with a palpable mass in the head and neck that was noticed 13 months earlier: 22 in the face and the remaining one in the occipital scalp. All lesions appeared as a discrete mass on imaging, ranging from 0.6 cm to 3.2 cm in diameter (mean, 1.55 cm). 15 masses were located in the subcutaneous tissue adjacent to fascia; 8 were at the subcutaneous/muscular border; however, all were in contact with fascia and 22 lesions showed a fascial tail on CT. 23 lesions, all of which appeared benign. 19 lesions were solid, and 4 lesions were partly or completely cystic in appearance. 13 lesions were well defined, whereas 10 lesions were ill defined. 14 of 15 lesions showed moderate to marked diffuse enhancement, whereas the remaining lesion demonstrated. Four cystic lesions showed peripheral, nodular, or rimlike enhancement.

Conclusion: Although rare, nodular fasciitis occurs as a discrete solid or cystic mass in the head and neck, depending on the predominant stromal components. When one sees a head and neck mass with a superficial location with fascial tail and moderate to marked enhancement on CT , nodular fasciitis should be included in the differential diagnosis, especially in patients with a recently developed, rapidly growing mass and a history of recent trauma.

PO-0619

Synthetic MRI plus FSE-PROPELLER DWI for differentiating malignant from benign head and neck tumors: A preliminary study

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Background: Preoperative classification of head and neck (HN) tumors remains challenging, especially distinguishing early cancerogenic masses from benign lesions. Synthetic MRI offers a new way for quantitative analysis of tumors. The present study investigated the application of synthetic MRI and stimulus and fast spin echo diffusion-weighted imaging with periodically rotated overlapping parallel lines with enhanced reconstruction (FSE-PROPELLER DWI) to differentiate malignant from benign HN tumors.

Materials and Methods: Forty-eight patients with pathologically confirmed HN tumors were retrospectively recruited between August 2022 and October 2022. The patients were divided into malignant ($n = 28$) and benign ($n = 20$) groups. All patients were scanned using synthetic MRI and FSE-PROPELLER DWI. T1, T2, and proton density (PD) values were acquired on the synthetic MRI and ADC values on the FSE-PROPELLER DWI.

Results: Benign tumors showed higher ADC, T1, and T2 values compared to malignant tumors (all $P < 0.05$), while no differences were seen for PD values. ROC analysis showed that T2+ADC had optimal diagnostic performance vs. T1, T2, and PD alone in differentiating malignant from benign lesions (all $P < 0.05$); yet, the difference in AUC between ADC and T2+ADC or T2 did not reach statistical significance.

Conclusion: Synthetic MRI and FSE-PROPELLER DWI can quantitatively differentiate malignant from benign HN tumors. T2 value is comparable to ADC value, and T2+DC values could improve diagnostic efficacy.

PO-0620

Multimodal Ultrasound Imaging Diagnosis of Carotid Body Tumor: A Single Center Exploratory Study based on Histopathology

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Background and Objective : Though carotid body tumors (CBTs) are rare which are typically asymptomatic, with a low rate of biochemical functionality. The risk of surgery is high when the tumor is high. Therefore, early diagnosis and accurate assessment of Shamblin typing are particularly important. The purpose of this study is to evaluate carotid body tumors and the Shamblin type using multimodal ultrasound imaging and to compare it with postoperative histopathology.

Methods: We reviewed data of 21 CBT resection patients in our hospital from March 2015 to August 2023 and 12 cases met the inclusion criteria with complete data. We compared blood biochemical indexes of them with the normal and then performed Shamblin classification by ultrasound (US) and compared the consistency with magnetic resonance imaging (MRI) used Kappa value, and tested difference through Paired t-test between the carotid bifurcations differences on both sides of the patients in Shamblin group II and III by ultrasound, observed the blood supply of the tumor. Finally, ultimately validated by digital

subtraction angiography (DSA) and hematoxylin-eosin (HE) staining results of surgically obtained tumor tissue.

Results: Blood biochemical indicators of two groups had no significant difference. The consistency of US and MRI diagnostic classification, $Kappa=0.860$, $P<0.001$. US and MRI had good consistency in the assessment and classification. There was statistical significance in the bilateral carotid bifurcation difference between the Shamblin group II and Shamblin group III, $P=0.0027$. Color Doppler Imaging showed abundant blood flow signals and nutrient vessels in the tumor, which was confirmed by DSA and HE stains results.

Conclusion: CBTs are hard to diagnose by blood biochemical modalities, and US can accurately diagnose Shamblin type which match MRI results through the characteristics of abundant blood flow and increased bilateral carotid bifurcation differences, it was verified by pathology. Multimodal ultrasound imaging detection can play the role of preoperative evaluation and management of CBTs.

PO-0621

Development and Validation of Radiomics Models of Pretreatment MRI-determined Metastatic Lymph Nodes for Prognostic Prediction in Nasopharyngeal Carcinoma: Evaluation with Three Regions of Interest Delineation

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Abstract

PURPOSE: Accurate prediction of nasopharyngeal carcinoma (NPC) prognosis is important for treatment. This study aimed to evaluate the performance of radiomics pretreatment using magnetic resonance imaging (MRI)-determined metastatic lymph nodes models to predict NPC prognosis with three delineation methods.

METHODS: Newly diagnosed patients with non-metastatic NPC with available MRI data were enrolled in this retrospective study. Radiomics features were extracted from all lymph nodes (ALN), largest lymph node (LLN), and largest slice of the largest lymph node (LSLN) to generate three radiomics signatures. The radiomics signatures, clinical model, and radiomics-clinic merged models were developed in training cohort for predicting overall survival (OS). Harrell's concordance index (C-index) was used to evaluate the model's discrimination. Bootstrap repeat sampling with 1000 iterations and the paired t-test were used to calculate the P values.

RESULTS: Between January 2010 and November 2012, 376 and 188 patients were retrospectively analyzed in the training and internal validation cohort; 165 eligible patients were analyzed as a temporal validation cohort after November 2012. The LSLN signature demonstrated better accuracy for OS prediction (C-index [95% confidence interval]: 0.762[0.760–0.763]) than the ALN (0.737 [0.736–0.739]) and LLN (0.705 [0.703–0.706]) signatures. The LSLN nomogram combining clinical factors demonstrated better performance than the other merged models (all $p<0.05$).

CONCLUSION: The LSLN signature with clinical factors predicted OS with high accuracy and robustness using pretreatment MR-determined metastatic lymph nodes, providing a new tool for treatment planning in NPC.

PO-0622

Grading and Prognostic Value of Paranasal Sinus Invasion in Nasopharyngeal Carcinoma: Proposed Modification in Current T Classification

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Purpose: Our study aimed to evaluate the prognostic value of paranasal sinus involvement (PSI) in NPC and to explore its suitable position in the current AJCC staging system.

Methods: Pretreatment MRI of 1317 patients with NPC treated with intensity-modulated radiotherapy (IMRT) between January 1, 2010, and January 31, 2013, were reviewed retrospectively. Survival was compared between patients with PSI-slight (sinus bone wall erosion only) and PSI-severe (tumor penetration into sinus cavity). Multivariable analysis was performed to identify the independent predictors of survival.

Results: The study included 1317 patients (median age 46 years; range, 11-78 years; 964 men, 353 women). PSI-slight was present in 15.2% (200/1317) patients and PSI-severe in 20.0% (263/1317) patients. Overall survival (OS), distant metastasis-free survival (DMFS), locoregional recurrence-free survival (LRFS), and progression-free survival (PFS) were significantly lower in patients with PSI-severe (all $P < .05$). In multivariable analysis, PSI-severe was an independent negative prognostic factor for OS, DMFS, LRFS, and PFS ($P < 0.05$ for all). The 96 AJCC T3 category patients with PSI-severe were reclassified as T4 category. The revised T staging had significantly better predictive value (higher C-index) than that the AJCC system for survival (OS, 0.661 vs. 0.652, $P < 0.001$; DMFS, 0.655 vs. 0.650, $P = 0.02$).

Conclusion: PSI-severe is an independent negative prognostic factor in nasopharyngeal carcinoma, which is recommended to be classified as T4 category in the 8th AJCC staging system for NPC.

Part II: Study about the Prognostic value of Structured Report based on Pre-treatment MRI of Nasopharyngeal carcinoma

Purpose: To establish a prognostic model of nasopharyngeal carcinoma (NPC) based on the pre-treatment MRI structured report and to verify its effectiveness.

Methods: This study was approved by the institutional review board, with waiver of the need for informed consent. 792 consecutive non-metastatic NPC patients treated with intensity-modulated radiotherapy (IMRT) were enrolled, retrospectively. Clinical data and the MRI features from structured reporting system of the cohort were collected. Patients were randomly assigned to training ($N=528$) and internal validation ($N=264$) cohorts at a 2:1 ratio via computer software-generated random numbers. Cox proportional hazards regression method, least absolute shrinkage and selection operator (LASSO) method regression model and stepwise regression analysis were performed for building prognostic models based on structured report. Univariable and multivariable Cox proportional hazards regression method were used for independent prognostic factors selection of clinical data and TNM staging system. The endpoints of our study were OS, DMFS, LRFS and PFS. We built nomograms integrating MRI features of structured report with clinical features, and nomograms integrating features of TNM staging system with clinical features. The predictive accuracy of our nomogram models were determined by concordance index (C-index), and were compared with the nomogram models combining clinical features with tumor-node-metastasis (TNM) staging system. The results were validated using bootstrap resampling and a test cohort study of 264 patients.

Results: Nomograms of OS, DMFS and PFS were constructed based on the MR features of the structured report combined with clinical features, nomogram of LRFS was constructed based on the MR features of the structured report alone. The nomograms based on structured report's features exhibited a good prediction performance. The C-index for training cohort and test cohort

of the nomograms that constructed by structured reports' feactures are OS: 0.771 (95% CI:0.710-0.831) and 0.751 (95% CI: 0.671-0.832), DMFS:0.746 (95% CI:0.644-0.848) and 0.712 (95% CI:0.650-0.774), LRFS:0.730 (95% CI:0.666-0.794) and 0.654 (95% CI:0.539-0.768), PFS:0.698 (95% CI:0.651-0.745) and 0.694 (95% CI:0.620-0.768) , respectively. The C-index for training cohort and test cohort of the nomograms that constructed by TNM staging system and clinical feactures are OS: 0.756 (95% CI: 0.683-0.830) and 0.718 (95% CI: 0.656-0.779) 、DMFS: 0.754 (95% CI: 0.673-0.8835) and 0.668 (95% CI: 0.599-0.737) 、LRFS: 0.621 (95% CI: 0.545-0.697) and 0.531 (95% CI: 0.410-0.652) (nomogram of LFRS was conctructed by T+N categories) 、PFS: 0.671 (95% CI: 0.602-0.742) and 0.625 (95% CI: 0.571-0.680) , respectively. The C-index for training cohort and test cohort of the nomograms that constructed by TNM staging system are OS: 0.720 (95% CI: 0.633-0.787) and 0.689 (95% CI: 0.622-0.756) 、DMFS: 0.727 (95% CI: 0.644-0.810) and 0.652 (95% CI: 0.582-0.722) 、LRFS: 0.611 (95% CI: 0.538-0.685) and 0.524 (95% CI: 0.406-0.642) (nomogram of LFRS was conctructed by T category) 、PFS: 0.668 (95% CI: 0.598-0.737) and 0.617 (95% CI: 0.563-0.671) , respectively. The performance of the nomograms we built that based on structured report were better than the prognostic models based on TNM staging system combined with clinical features or not. Significant differences were observed between the predictive models based on the structure report, and TNM staging system combined with clinical features (P-values were OS: 0.009; DMFS: 0.02; LRFS: 0.02; PFS: 0.003, respectively); the performance of the nomograms constructed by structured report were better than the nomograms constructed by TNM staging system as well (OS: 0.001; DMFS: 0.002; LRFS: 0.02; PFS: 0.002, respectively) . The nomograms based on structured report's features outperformed TNM staging system in predicting prognosis of NPC patients.

Conclusions: The prognostic model baseds on the pre-treatment MRI structured report features showed a satisfactory prediction performance. The use of pre-treatment MRI structured report system in clinical diagnosis may aid individualized treatment strategies of NPC patients and improve the survival rate.

PO-0623

Study about the Prognostic value of Structured Report based on Pre-treatment MRI of Nasopharyngeal carcinoma

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Purpose: To establish a prognostic model of nasopharyngeal carcinoma (NPC) based on the pre-treatment MRI structured report and to verify its effectiveness.

Methods: This study was approved by the institutional review board , with waiver of the need for informed consent. 792 consecutive non-metastatic NPC patients treated with intensity-modulated radiotherapy (IMRT) were enrolled , retrospectively. Clinical data and the MRI features from structured reporting system of the cohort were collected. Patients were randomly assigned to training (N=528) and internal validation (N =264) cohorts at a 2:1 ratio via computer software-generated random numbers. Cox proportional hazards regression method, least absolute shrinkage and selection operator (LASSO) method regression model and stepwise regression analysis were performed for building prognostic models based on structured report. Univariable and multivariable Cox proportional hazards regression method were used for independent prognostic factors selection of clinical data and TNM staging system. The endpoints of our study were OS, DMFS, LRFS and PFS. We built nomograms integrating MRI features of structured report with clinical features, and nomograms intergrting features of TNM staging system with clinical features. The predictive accuracy of our nomogram models were determined by

concordance index (C-index), and were compared with the nomogram models combining clinical features with tumor-node-metastasis (TNM) staging system. The results were validated using bootstrap resampling and a test cohort study of 264 patients.

Results: Nomograms of OS, DMFS and PFS were constructed based on the MR features of the structured report combined with clinical features, nomogram of LRFS was constructed based on the MR features of the structured report alone. The nomograms based on structured report's features exhibited a good prediction performance. The C-index for training cohort and test cohort of the nomograms that constructed by structured reports' features are OS: 0.771 (95% CI: 0.710-0.831) and 0.751 (95% CI: 0.671-0.832), DMFS: 0.746 (95% CI: 0.644-0.848) and 0.712 (95% CI: 0.650-0.774), LRFS: 0.730 (95% CI: 0.666-0.794) and 0.654 (95% CI: 0.539-0.768), PFS: 0.698 (95% CI: 0.651-0.745) and 0.694 (95% CI: 0.620-0.768), respectively. The C-index for training cohort and test cohort of the nomograms that constructed by TNM staging system and clinical features are OS: 0.756 (95% CI: 0.683-0.830) and 0.718 (95% CI: 0.656-0.779), DMFS: 0.754 (95% CI: 0.673-0.8835) and 0.668 (95% CI: 0.599-0.737), LRFS: 0.621 (95% CI: 0.545-0.697) and 0.531 (95% CI: 0.410-0.652) (nomogram of LRFS was constructed by T+N categories), PFS: 0.671 (95% CI: 0.602-0.742) and 0.625 (95% CI: 0.571-0.680), respectively. The C-index for training cohort and test cohort of the nomograms that constructed by TNM staging system are OS: 0.720 (95% CI: 0.633-0.787) and 0.689 (95% CI: 0.622-0.756), DMFS: 0.727 (95% CI: 0.644-0.810) and 0.652 (95% CI: 0.582-0.722), LRFS: 0.611 (95% CI: 0.538-0.685) and 0.524 (95% CI: 0.406-0.642) (nomogram of LRFS was constructed by T category), PFS: 0.668 (95% CI: 0.598-0.737) and 0.617 (95% CI: 0.563-0.671), respectively. The performance of the nomograms we built that based on structured report were better than the prognostic models based on TNM staging system combined with clinical features or not. Significant differences were observed between the predictive models based on the structure report, and TNM staging system combined with clinical features (P-values were OS: 0.009; DMFS: 0.02; LRFS: 0.02; PFS: 0.003, respectively); the performance of the nomograms constructed by structured report were better than the nomograms constructed by TNM staging system as well (OS: 0.001; DMFS: 0.002; LRFS: 0.02; PFS: 0.002, respectively). The nomograms based on structured report's features outperformed TNM staging system in predicting prognosis of NPC patients.

Conclusions: The prognostic model baseds on the pre-treatment MRI structured report features showed a satisfactory prediction performance. The use of pre-treatment MRI structured report system in clinical diagnosis may aid individualized treatment strategies of NPC patients and improve the survival rate.

PO-0624

Preliminary study of dual-energy CT parameters combined with inflammatory indicators to predict cervical lymph node metastasis in papillary thyroid cancer

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Abstract

Purpose: Patients with papillary thyroid cancer (PTC) who develop cervical lymph node metastasis (CLNM) usually exhibit a poor prognosis. The purpose of this study was to screen for predictors of CLNM in PTC and to construct a predictive model to guide the surgical approach in patients with PTC.

Method: Preoperative energy-spectral CT images of 114 patients with pathologically confirmed PTC between July 2019 and April 2023 were retrospectively analyzed, and all patients were randomly divided into a training and validation group in a 2:1 ratio, and then the training and

validation groups were further divided into lymph node metastasis and non-metastasis groups. The dual-energy CT parameters (IC, NIC, λ HU) of the venous stage cancer foci were measured and calculated, and the clinical data of the patients were also collected and analyzed. The independent influencing factors for predicting CLNM were determined by univariate and multivariate logistic regression analysis, and the prediction models were constructed. The clinical benefits of the model were evaluated using decision curves, calibration curves, and ROC curves.

Results: The mean values of IC, NIC, and λ HU in the metastatic group were 33.18 ± 6.89 , 0.71 ± 0.14 , and 3.82 ± 0.84 , respectively. And the mean values of IC, NIC, and λ HU in the non-metastatic group were 31.20 ± 7.43 , 0.66 ± 0.13 , and 3.60 ± 0.87 , respectively. The statistical results show that NIC, dNLR, PNI, gender, and tumor diameter were independent predictors of CLNM in PTC, and the AUC of nomogram was 0.898 (95% CI: 0.829-0.966), and the calibration curve and decision curve showed that the prediction model had good predictive effect and clinical benefit, respectively.

Conclusion: The nomogram constructed based on dual-energy CT parameters (NIC), inflammatory prognostic indicators (dNLR, PNI), gender and tumor diameter has high clinical value in predicting CLNM in PTC patients, and can provide a reference for the selection of surgical modalities in PTC patients.

PO-0625

Associations between pericarotid fat density and image-based risk characteristics of carotid plaque

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Objectives: In this study, we aimed to evaluate the associations between pericarotid fat density (PFD) and various risk characteristics of carotid plaque.

Methods: We retrospectively evaluated consecutive patients who were subjected to both high-resolution MRI and carotid artery CT angiography CTA at our institution between January 2016 and April 2021. The section of the carotid artery with the most severe lumen stenosis was selected from each patient for analysis. Two separated regions of interest (ROI) (each with an area of 2.5 mm² and located at least 1 mm from the outer margin of the carotid artery wall) were defined in the perivascular fat tissue. The mean value of PFD (mean HU) was measured on the plaque side and the same axial non-plaque side. Then, the bilateral difference (D-value HU) was calculated (plaque side mean HU minus non-plaque side mean HU). According to carotid plaque risk characteristics (American Heart Association VI type [AHA VI], intraplaque hemorrhage [IPH], thinning and/or rupture of the fibrous cap [TRFC], lipid-rich necrotic core [LRNC], and calcification [CA]), the associations between PFD and five different risk characteristic subgroups were analyzed. The Student's t-test, Mann-Whitney U test, and Chi-square test were used to compare differences between different risk subgroups. Receiver operating characteristic (ROC) curve analysis was used to evaluate the predictive efficacy of PFD for carotid plaque risk characteristics. $P < 0.05$ was considered statistically significant.

Results: A total of 71 eligible patients (mean age 61.25 ± 10.35 years, 57 male) were examined in this study. For the plaque side and the non-plaque side, the mean PFD values were -36.25 ± 20.65 HU and -66.87 ± 15.00 HU, respectively. In the non-AHA VI and AHA VI subgroups, the values for the mean HU of the plaque side were -49.50 ± 20.53 and -33.55 ± 19.78 , respectively ($P = 0.014$). The D-value HU was higher for the AHA VI group compared to the non-AHA VI group (33.61 ± 16.72 vs. 15.91 ± 14.52 , respectively; $P = 0.001$). Compared to the non-IPH subgroup, the IPH subgroup had a higher mean HU value for the plaque side (-47.68 ± 18.26 vs. -29.63 ± 19.16 , respectively; $P < 0.001$) and a higher D-value HU (17.80 ± 13.27 vs. 38.03 ± 15.46 , respectively; $P < 0.001$). Compared to the low risk non-TRFC subgroup, the TRFC subgroup had a higher D-value HU (24.51 ± 16.16 vs. 33.55 ± 17.65 , respectively; $P = 0.042$). The D-value of PFD was found to be a significant predictor of both AHA VI classification (AUC: 0.79; SE: 64.41%; SP: 83.33%; $P = 0.0001$) and IPH (AUC: 0.83; SE: 88.89%; SP: 65.38%; $P < 0.0001$).

PO-0626

The multi-slice CT features and preliminary analysis of plemorphic adenoma and low-grade malignant plemorphic adenoma of parotid

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Purpose: To investigate the CT findings and imaging diagnosis of parotid plemorphic adenoma (PA) and low-grade malignant PA. **Methods:**CT scanning features in 45 cases (48 lesions) of parotid PA patients confirmed by surgery and pathology were retrospectively analyzed. All of these lesions were diagnosed as benign tumors through multislice CT before the operation.**Results:**33 benign lesions and 15 low-grade malignant PA. Tumor location, tumor size(average maximum diameter: Benign group $2.10 \pm 0.79\text{cm}$, Low-grade malignant group $2.64 \pm 1.45\text{cm}$), integrity of the tumor envelope and strengthening degree in assessment gradation of the tumors was not helpful. Lesions of the fuzzy boundaries (benign group 3/33, low grade group 10/15), irregular shape (benign group 8/33, low grade group 9/15), uneven density (benign group 11/33, lowgrade group 13/15) and angioid enhancement at the margin of capsule (benign group 6/33, low grade group 10/15) are statistically significant differences ($P < 0.05$).**Conclusion:** CT examination is helpful for the diagnosis of parotid plemorphic adenoma and judging its benign or malignancy, instructing clinical treatment and estimateing prognosis.

PO-0627

Radiological evaluation of the tympanic segment of the chorda tympani nerve visualization by ultra-high resolution CT

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Objective

The aim of this study was to identify the course and anatomic variants of the tympanic segment of the chorda tympani nerve (CTN) on ultra-high resolution CT (U-HRCT).

Methods

Fifty-five healthy participants (28 males and 27 females, mean age 32 years) with 104 ears were prospectively included. The tympanic segment was divided into four portions: the periannular, postero-malleus (PM), malleus and antero-malleus (AM). The length of the periannular portion was measured and the tympanic segment was categorized into three types based on the entry point and trajectory of the periannular portion. Four points of interest (the beginning and ending of the PM and AM portions) were chosen to carry out the distance measurement in relation to the tip of the malleus manubrium.

Results

The tympanic tract of the CTN was identified in all cases. The length of the periannular portion was measured $2.6 \pm 1.16\text{ mm}$. The attached type of the tympanic segment was the most frequent type (86.5%). Overall, the PM portion ascended in a medial-anterior direction and the AM portion descended in an antero-medial course through the tympanic cavity. The start of the PM and AM portions on the right side located at a more lateral location. The end of the PM portion and the start of the AM portion of male was posterior to those of female.

Conclusions

U-HRCT allows detailed identification of the tympanic segment of the CTN. Novel segmental classification of the tympanic segment on CT is proposed herein to provide detailed description of the nerve tract and its anatomic variants. Preoperative evaluation of the tympanic segment provides insight into safe nerve management in terms of reducing the risk of iatrogenic injury.

PO-0628

Malleus in the tympanic cavity: spatial location in normal middle ears based on ultra-high-resolution computed tomography

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Purpose:

To establish the spatial location of the malleus in normal ears using ultra-high-resolution computed tomography.

Methods:

Imaging data of 117 patients (117 normal ears) from September 2020 to July 2021 were reviewed. The spatial location of the malleus was quantified by the distances between the malleus and anatomic landmarks on the tympanic cavity walls. Confounding factors (middle cranial fossa depth and mastoid pneumatization degree) were measured. Distances were compared in terms of age (18–29, 30–44, 45–59, 60–74, and ≥ 75 years), laterality, and sex.

Results:

The largest and smallest distances between the malleus and tympanic cavity walls were head-facial nerve (2.03 ± 0.36 mm) and anterior process-anterolateral wall (0.38 ± 0.12 mm) distances. The head-superior wall distance in 2 ears and head-anterior wall distance in 4 ears measured 0, presenting as strip-like high attenuation connecting the malleus and the tympanic cavity walls. The middle cranial fossa depth was 4.01 ± 1.98 mm. Among the 97 ears with full coverage, 2, 20, 19, and 56 ears showed hypopneumatization, moderate pneumatization, good pneumatization, and hyperpneumatization of the mastoid, respectively. No age- or sex-related differences were found, but the handle-medial wall distance was greater on the right (2.04 ± 0.45 mm) than on the left (1.84 ± 0.54 mm, $P = 0.039$).

Conclusion:

The spatial location of the malleus in normal ears provided a basis for identifying subtle changes in the spaces surrounding the malleus for diagnosing middle ear diseases and understanding the underlying pathology.

PO-0629

A Novel Imaging Scoring Method for Identifying Facial Canal Dehiscence: An Ultra-High-Resolution CT Study

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Objectives: Facial canal dehiscence (FCD), typically found in the tympanic segment, is a risk factor for facial nerve injury. An imaging scoring method was proposed to identify FCD based on ultra-high-resolution CT.

Methods: Forty patients (21 females and 19 males, mean age 44.3 ± 17.4 years), whose tympanic facial canal (FC) was examined during otological surgery, were divided into the FCD group ($n = 29$) and the control group ($n = 11$) based on surgical findings. Imaging appearance of tympanic FC was scored 0-3: 0 = no evident bony covering, 1 = discontinuous bony covering with linear deficiency, 2 = discontinuous bony covering with dotted deficiency, and 3 = continuous bony covering. Both lateral and inferior walls were assigned a score as L_{FCD} and I_{FCD} , respectively. An FCD score was calculated as $L_{FCD} + I_{FCD}$. The diagnostic value of FCD score was tested using ROC curve.

Results: The inter-observer agreement was moderate for the lateral wall (Cohen's κ coefficient 0.416, 95% CI 0.193–0.639), and good for the inferior wall (Cohen's κ coefficient 0.702, 95% CI 0.516–0.888). In the FCD group, the most common appearance for both walls was discontinuous bony covering with linear deficiency ($L_{FCD} = 1$, 22/29, 75.9%; $I_{FCD} = 1$, 15/29, 51.7%). An FCD score less than 4 was associated with 82% sensitivity and 93% specificity for predicting FCD with an AUC of 0.928).

Conclusions: Using the proposed scoring method, FCD score <4 could identify FCD of the tympanic segment with high concordance with surgical findings.

PO-0630

Correlation Between Condylar Structure and Temporomandibular Articular Disc Injury in Adolescents

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Rationale and Objectives: To explore the relationship between condylar structure and temporomandibular joint disc injury in adolescents by statistical methods.

Methods: A total of 94 temporomandibular joints were studied in 47 patients who underwent MRI examination of TMJ in our hospital. For them, a 3.0T MRI scan was performed with conventional sequences, as well as 3D-CUBE T2 and T2-mapping sequences. Maximum left-right and antero-posterior diameters of condyles were measured by multi-plane recombination (MPR) on 3D-CUBE T2 sequence images, whose product and quotient were also calculated. Qualitative and quantitative indicators were included for evaluation of articular disc injury. By reading the films of conventional sequences comprehensively, articular disc displacement was qualitatively classified into non-displacement (ND) group, reducible displacement (RD) group and non-reducible displacement (NRD) group. The T2 value of the articular disc was measured on the T2-mapping sequence as a quantitative indicator. Four parameters of condylar structure and 2 indicators of articular disc injury were analyzed by statistical method.

Results: There were statistically significant differences in three structural parameters of the condyle (left-right and antero-posterior diameters and their products) among the ND, RD and NRD groups ($P < 0.001$), and the corresponding mean values were ranked in descending order: $ND > RD > NRD$. The left-right and antero-posterior diameters and their products were slightly positively correlated with the T2 values of the articular disc ($r = 0.262$, $r = 0.317$, $r = 0.386$, $P < 0.05$).

Conclusion: The left-right diameter, antero-posterior diameter and product of the condyle decreased with aggravation of TMJ disc injury, they can be used as the indirect imaging features of temporomandibular disorder.

PO-0631

Value of MRI histogram parameters in differentiating benign from malignant submandibular gland tumors

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Background: Presurgical differentiation of benign and malignant submandibular gland (SMG) tumors is particularly important for surgical strategy.

Purpose: To explore the value of magnetic resonance imaging (MRI) histogram parameter from T2-weighted imaging (T2WI) and apparent diffusion coefficient (ADC) maps to differentiate between benign and malignant SMG tumors.

Material and Methods: MR images of 57 patients with pathologically confirmed SMG tumors (42 benign, 15 malignant) were analyzed retrospectively. Conventional MRI and diffusion-weighted imaging were undertaken before treatment. Histogram parameters of whole tumors derived from axial T2WI and ADC maps were evaluated and compared between benign and malignant groups, including mean, median, 10th percentile, 90th percentile, inhomogeneity, skewness, and kurtosis. A multivariable logistic regression model was employed and analysis of receiver operating characteristic (ROC) curves was undertaken.

Results: Multivariate logistic regression analysis showed that T2WIInhomogeneity and ADC90 were independent risk factors for discriminating between benign and malignant SMG tumors. The malignant group presented significantly higher T2WIInhomogeneity ($p = 0.012$) and lower ADC90 ($p = 0.001$) compared with those in the benign group. T2WIInhomogeneity, ADC90 and combined model achieved AUCs of 0.718, 0.799 and 0.911, with sensitivities of 86.67%, 66.67% and 86.67% and specificities of 54.76%, 92.86% and 85.71%, respectively.

Conclusions: T2WIInhomogeneity and ADC90 are valuable for the differential diagnosis of benign and malignant SMG tumors, and both of them had good interobserver repeatability.

PO-0632

Prognostic prediction in patients with primary DLBCL of the CNS using MRI-based radiomics

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Background.

Primary central nervous system (CNS) lymphoma is a rare form of extra-nodal non-Hodgkin lymphoma with poor prognosis. The objective of this study was to examine the potential of MRI-based radiomic signature as an adjunctive tool to the traditional clinical prognostic factors for predicting the prognosis of patients with Primary diffuse large B-cell lymphoma of the central nervous system (PCNS-DLBCL).

Methods.

The radiomics model was developed based on a retrospective analysis of 169 PCNS-DLBCL patients who underwent pretreatment MRI exams, and 4227 radiomics features were obtained from

enhanced T1-weighted (CE-T1WI), fluid attenuation inversion recovery (FLAIR), and apparent diffusion coefficient (ADC) MRI sequences. Imaging features were selected using a LASSO (least absolute shrinkage and selection operator) logistic regression model with 10-fold cross-validation to construct a radiomic signature for predicting progression-free survival (PFS) and overall survival (OS). Cox proportional hazards models were constructed for clinical, radiomics, and combined clinical and radiomics models. To ensure the dependability and stability of these models, an internal cohort comprising of 72 individuals and an external cohort consisting of 32 individuals were employed to validate their performance. Notably, the effectiveness of these models was assessed via clinical decision curves and the consistency index (CI).

Results.

The development of PFS and OS prediction models established the selection of 17 significant radiomic features. Radiomics score was an independent predictor of better outcome for both PFS (hazard ratio: 2.588(2.053-3.263), $P < 0.001$) and OS (hazard ratio: 2.612(2.056-3.319), $P < 0.001$) on multivariate analysis. The C-index of the combined clinical and radiomics model was higher performance in the training (PFS, $C = 0.741$ [95% CI: 0.697-0.786]; OS, $C = 0.793$ [95% CI: 0.752-0.835]), internal validation (PFS, $C = 0.652$ [95% CI: 0.571-0.733]; OS, $C = 0.730$ [95% CI: 0.655-0.806]), and external validation cohorts (PFS, $C = 0.785$ [95% CI: 0.638-0.933]; OS, $C = 0.775$ [95% CI: 0.640-0.910]) than any single clinical or radiomics model for OS and PFS. The decision curve analysis (DCA) results revealed that the combined model provided the highest net benefit across a wider range of appropriate threshold probabilities for predicting PFS and overall survival OS.

Conclusion.

Incorporating clinical and conventional MRI prognostic variables into a multi-sequence MR-based radiomics model can effectively enhance the predictability of PCNS-DLBCL prognosis. The combined clinical and radiomics model displayed superior performance as compared to NCCN-IPI and Conventional imaging models and maintained its robustness across different centers. These findings provide a promising approach for prognostic evaluation and treatment planning for PCNS-DLBCL patients.

PO-0633

Reduced Local Segregation of Single-Subject Gray Matter Networks in Unilateral Sudden Sensorineural Hearing Loss

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Objective: To explore topological abnormalities of single-subject gray matter networks in patients with unilateral sudden sensorineural hearing loss (SSNHL) in the acute phase.

Materials and Methods:

(1) One hundred and fifty-eight patients with unilateral SSNHL and 136 age-, gender-, and education-matched healthy controls (HCs) were recruited to undergo pure tone audiometry (PTA) and 3D-T1 examination. (2) Individual morphological brain networks were constructed with using interregional similarity in the distribution of regional gray matter volume (GMV) in terms of the Kullback-Leibler divergence measure after preprocessing by voxel-based morphometry (VBM).

(3) Both the global (standardized clustering coefficient, standardized characteristic path length, small-worldness, clustering coefficient, characteristic path length, and global efficiency, local efficiency) and nodal network metrics (nodal centrality and hubs) were calculated by graph theory analysis.

(4) Independent-samples t test was performed to identify group differences in topological properties.

Results:

(1) The gray matter network in both unilateral SSNHL and HC were typically organized as small-world networks. At the global level, SSNHL patients displayed decreased standardized clustering coefficient, clustering coefficient and local efficiency ($P < 0.05$) compared with HCs.

(2) At the nodal level, SSNHL exhibited altered nodal centrality in left superior frontal gyrus, parahippocampal gyrus, caudate nucleus, superior occipital gyrus and right lenticular nucleus ($P < 0.05$). Altered hubs located in right superior temporal gyrus, inferior frontal gyrus and left olfactory cortex.

Conclusions: The reduced segregation of network indicates individual gray matter networks in unilateral SSNHL shifted toward randomization. And the altered nodal centrality involving auditory network and non-auditory networks of patients with unilateral SSNHL were found in the acute phase.

PO-0634

Accuracy of transverse sinus stenosis score predicting intracranial hypertension in patients with unilateral pulsatile tinnitus as the initial symptom

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Purpose: To assess the accuracy of the transverse sinus stenosis (TSS) score for detecting intracranial hypertension (ICH) or idiopathic intracranial hypertension (IIH) in patients exhibiting initial symptoms of unilateral pulsatile tinnitus (PT).

Methods: Data from patients with unilateral PT who received CT venography and lumbar puncture between January 2020 and May 2023 was examined. Two observers evaluated six methods, including three previously published and three adapted, with inter-observer agreement assessed. The TSS score of each method was compared between patients with and without ICH and between patients with and without IIH.

Results: The mean cerebrospinal fluid (CSF) pressure in patients with unilateral PT is $234.49 \pm 54.69 \text{ mmHg}$, with 73.0% above 200 mmHg and 44.4% above 250 mmHg . The method utilizing the cross-sectional area at the transverse sinus 2cm from the torcular as a reference and the product of bilateral TSS score as the score reference had the highest inter-observer agreement ($\kappa = 0.821$). There was no statistical difference in TSS score between patients with and without ICH or IIH using the abovementioned six methods.

Conclusions: A quantitative method utilizing area, product, and reference location at the transverse sinus 2cm from the torcular yields the most reliable TSS score. However, these scores do not effectively screen for ICH or IIH in patients with PT.

PO-0635

Morphological remodeling of the repaired sigmoid sinus bone wall in patients with pulsatile tinnitus following successful surgical reconstruction: an ultra-high resolution CT study

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Purpose: To evaluate morphological changes in the repaired sigmoid sinus bone wall following successful surgical reconstruction in patients with pulsatile tinnitus (PT) using ultra-high-resolution CT (U-HRCT).

Methods: Data were retrospectively analyzed from eight female patients with PT who presented with sigmoid sinus anomalies on pre-operative CT angiography and underwent sigmoid sinus wall reconstruction primarily with autologous bone powder and had no recurrence. Isotropic 0.1mm U-HRCT scans were conducted within three days and then again more than six months post-surgery. We compared the patients with regards to the integrity, relative density, extent and shape of the repaired wall and its fusion with residual bone.

Results: Of the ten PT patients, one (10%) achieved complete fusion of the repaired wall with the residual bone, eight (80%) experienced partial fusion, and one (10%) exhibited complete separation. Four patients (40%) showed sigmoid sinus wall dehiscence on the second U-HRCT. The presence of a gap between the repaired wall and residual bone in the initial U-HRCT was associated with poor fusion between the repaired wall and residual bone in the subsequent U-HRCT scan ($\chi^2=16.296$, $p<0.001$, $\phi=0.903$). The repaired wall shrank from the periphery to the center, and the density increased in all patients ($p<0.001$). The repaired wall compressed into the sigmoid sinus retracts over time, reshaping into a naturally curved sigmoid sinus sulcus.

Conclusion: Morphological remodeling is a typical characteristic of the repaired sigmoid sinus wall in PT patients. Short-term incomplete repair may imply poor fusion over the medium to long term, but this is not correlated with recurrence.

PO-0636

An MRI-based radiomics nomogram for predicting cervical esophagus invasion in hypopharyngeal squamous cell carcinoma

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Background Accurate detection of cervical esophagus invasion (CEI) in HPSCC is challenging but crucial. We aimed to investigate the value of magnetic resonance imaging (MRI)-based radiomics for predicting CEI in patients with HPSCC.

Methods This retrospective study included 151 HPSCC patients with or without CEI, which were randomly assigned into a training ($n = 101$) or validation ($n = 50$) cohort. A total of 750 radiomics features were extracted from T2-weighted imaging (T2WI) and contrast-enhanced T1-weighted imaging (ceT1WI), respectively. A radiomics signature was constructed using the least absolute shrinkage and selection operator method. Multivariable logistic regression analyses were adopted to establish a clinical model and a radiomics nomogram. Two experienced radiologists jointly evaluated the CEI status based on morphological findings. Areas under the curve (AUCs) of the models and readers were compared using the DeLong method. The performance of the nomogram was also assessed by its calibration and clinical usefulness.

Results The radiomics signature, consisting of five T2WI and six ceT1WI radiomics features, was significantly associated with CEI in both cohorts (all $p < 0.001$). The radiomics nomogram combining the radiomics signature and clinical T stage achieved significantly higher predictive value than the clinical model and pooled readers in the training (AUC 0.923 vs. 0.723 and 0.621, all $p < 0.001$) and validation (AUC 0.888 vs. 0.754 and 0.647, all $p < 0.05$) cohorts. The radiomics nomogram showed favorable calibration in both cohorts and provided better net benefit than the clinical model.

Conclusions The MRI-based radiomics nomogram is a promising method for predicting CEI in HPSCC.

PO-0637

Carcinoma ex pleomorphic adenoma of major salivary glands: CT and MR imaging findings

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Objectives: To describe the CT and MR imaging characteristics of primary carcinoma ex pleomorphic adenoma (Ca-ex-PA) in major salivary glands and present more information for recognizing this malignancy.

Methods: 210 patients with primary Ca-ex-PA in major salivary glands (167 in the parotid gland, 36 in the submandibular gland, 7 in the sublingual gland) underwent CT and MR imaging (plain and contrast-enhanced scans) prior to surgical management and histopathologic examination. The CT and MR imaging findings of this condition were retrospectively reviewed and correlated with their pathological types: noninvasive carcinoma (type I, 37 cases), minimally invasive carcinoma (type II, 18 cases), and widely invasive carcinoma (type III, 155 cases). The binary Logistic regression analysis was used to analyze the independent influencing factors of morphology and boundary for differentiating between type I/II and type III of CA-ex-PA, and the sensitivity, specificity and positive predictive value were calculated. Differences in ADC values between type I/II and type III of Ca-ex-PA were calculated by independent sample t-tests.

Results: On CT and MR imaging, there were 190/210 cases (90.4%) identified as lobular, 201/210 cases (95.7%) with enhancement, and 171/210 cases (81.4%) with inhomogeneous after contrast administration. Calcification within the mass was shown in 76 of 192 cases (39.6%) on plain CT examination. Of 55 neoplasms with type I and II, 38 (69.1%) were presented as round or oval and 42 (76.4%) as well-defined margins. Of 155 neoplasms with type III, 101 (65.1%) were presented as irregular form and 108 (69.7%) as uneven margins or with partial uneven margins. The mean ADC value of CA-ex-PA (22 cases) in major salivary glands was about $0.93 \times 10^{-3} \text{mm}^2/\text{s}$, and there was no significant difference in mean ADC value between type I/II and type III of this neoplasm. Cervical lymph node metastasis and distant metastasis were found in 66 patients (31.4%, type III) and 32 patients (15.2%, type I in 1; type II in 1; and type III in 30), respectively.

Conclusions: Most Ca-ex-PA is characterized by an irregular, lobular, and inhomogeneous enhanced neoplasm with uneven margin or partial uneven margin on CT and MR imaging, which is frequently corresponding with type III. And a round or

oval mass with well-defined margin usually correlates with type I and II. Morphology and boundary are important basis for distinguishing type I/II and type III tumors. Calcification within the neoplasm shown on CT may be regarded as a specific sign for indicating this malignancy. Low ADC value is an important manifestation of this neoplasm. Ca-ex-PA with type III is more likely to have cervical lymph node metastasis and distant metastasis.

PO-0638

Preliminary study of arterial spin labeling technique to assess blood perfusion of thyroid parenchyma and mass lesions

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Objective: To investigate the feasibility of arterial spin labeling (ASL) technology to evaluate thyroid parenchyma and mass blood supply in routine clinical practice by comparing with enhanced thyroid CT examination.

Methods: The data of patients with thyroid mass lesions who underwent thyroid enhanced CT scan and thyroid MR examination including ASL technique in our hospital between August 2022 and September 2023 were retrospectively collected. ASL image quality was independently scored by two radiologists. Thyroid blood flow (TBF) for thyroid mass and normal thyroid parenchyma were measured. CT values for normal thyroid and thyroid mass were measured on plain, arterial phase, and venous phase CT. The agreement of image quality scores of the two radiologists was analyzed by Kappa test. The consistency of TBF in thyroid parenchymal and mass lesions was analyzed by intra-group correlation coefficient (ICC). The correlation between enhanced CT value and TBF value in normal thyroid and thyroid mass was evaluated by Pearson correlation.

Results: A total of 69 patients with thyroid mass underwent both enhanced thyroid CT and thyroid ASL MR perfusion, and the final surgical pathology was confirmed. Among them, 1 patient was excluded due to esophageal cancer invasion of thyroid, 3 cases had lesions below 5mm, 1 case had diffuse thyroid tumor and 3 cases were excluded without adequate ASL label, and a total of 57 cases were enrolled with 60 thyroid masses. The image quality scores of the two radiologists were consistent well ($\kappa=0.706$, $P<0.001$). ICC between two physicians in measuring TBF of thyroid parenchymal and thyroid mass lesion was 0.832, 0.666 ($P<0.001$), respectively. The correlation between TBF and CT enhancement value of thyroid parenchyma was fair ($r=0.340$, $p=0.007$), while the correlation between TBF and enhanced CT value of thyroid mass lesion was substantial ($r=0.767$, $P<0.001$).

Conclusion: Thyroid ASL technology can non-invasively quantify the blood perfusion of normal thyroid and thyroid mass lesions with good reproducibility, which may be more capable than thyroid-enhanced CT in reflecting the real blood flow perfusion of thyroid parenchyma and masses.

PO-0639

Relationship between the ultra-high-resolution computed tomography score of oval window region involvement and audiometry in otosclerosis

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Objective To assess the relationship between the ultra-high-resolution computed tomography (U-HRCT) score of oval window region (OWR) involvement and audiometry in otosclerosis.

Materials and Methods This retrospective, single-center, cross-sectional study enrolled patients with clinically suspected otosclerosis who underwent U-HRCT examination. The analysis included 71 ears from 50 patients (13 men, 37 women; mean age, 38.0 [34.0-49.8] years). The ears were divided into the conductive hearing loss group (group A, 20 ears) and mixed hearing loss group (group B, 51 ears). The CT scores of bone involvement around the oval

window (0, none; 1, <25%; 2, 25%-50%; 3, 50%-75%; 4, >75%) and stapes footplate involvement (0, none; 1, <50%; 2, >50%) were evaluated and summed to obtain the CT score of OWR involvement. The Mann-Whitney U test was used to compare the difference in the distribution of the CT score of OWR involvement between groups A and B. Spearman's rank correlation analysis was performed to evaluate the association between the CT score of OWR involvement and the mean air conduction (AC), bone conduction (BC) and air-bone gap (ABG). After establishing the dummy variable, further univariate linear regression analysis was performed to investigate the degree to which the CT score of OWR involvement could predict the audiometry result with the highest correlation coefficient.

Results The CT score of OWR involvement in group B was significantly higher than that in group A ($p=0.014$). The correlation coefficients between the CT score of OWR involvement and the mean AC, BC, and ABG threshold were 0.74 ($p<0.001$), 0.52 ($p<0.001$), and 0.48 ($p<0.001$), respectively. Dummy variables were set by designating the CT score of 3 points as reference because it had the highest frequency distribution in the sample. Univariate linear regression analysis showed that the CT score of OWR involvement was correlated with the AC and yielded the following equation: $Y_{AC} = 56.307 - 21.307X_{\text{Score}=1} - 8.307X_{\text{Score}=2} + 5.221X_{\text{Score}=4} + 11.888X_{\text{Score}=5} + 18.381X_{\text{Score}=6}$ ($R=0.776$, $R^2=0.602$, $p<0.001$)

Conclusions U-HRCT possesses the ability to clearly depict the footplate of the stapes and annulus ligament. The U-HRCT-derived OWR involvement score of otosclerosis could reflect the type and degree of hearing loss.

PO-0640

The Impact of Submandibular Glands Protection on xerostomia by Diffusion-Weighted Imaging in Nasopharyngeal Carcinoma Patients

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Purpose: To determine the impact of sparing submandibular glands (SMGs) on alleviating xerostomia and the functional dynamics of the irradiated parotid glands (PGs) and sublingual glands (SLGs) by diffusion-weighted imaging.

Methods: 97 participants underwent 9 rounds of DWI scans before IC (pre-IC), pre-radiation (pre-RT), the midpoint of radiation (mid-RT), the end of radiation (post-RT), 1, 3, 6, 9, 12 (12m-RT) months following radiation. Apparent diffusion coefficient of SMGs (ADCSMG), PGs (ADCPG), and SLGs (ADCSLG), xerostomia questionnaire scores (XQ), and saliva flow rate measures under unstimulated (uSFR) and stimulated condition (sSFR) were documented.

Results: ADCPG, ADCSMG, ADCSLG, and XQ showed a rapid increase with a top at 3m-RT followed by regression, whereas uSFR and sSFR had the reverse trend. The change rate of ADC correlated with the dose to PGs, SMGs, and SLGs, as well as uSFR, sSFR, and XQ scores ($p<0.05$ for all, except for uSFR with ADCPG ($p=0.063$)). Main group for ADCPG, uSFR, and sSFR were significant (p values were 0.028, 0.000, 0.000 respectively); ADCPG in SMG sparing group was lower while uSFR, and sSFR were higher than those in the SMG-unsparing group. Simple group for ADCSMG, ADCSLG (all $p<0.05$ from mid-RT to 12m-RT), and XQ (all $p<0.001$ at mid-, 6m-, 9m-, and 12m-RT) were significant; ADCSMG, ADCSLG, and XQ were lower in the SMG-sparing group. **Conclusions:** SMG protection has a great impact on the functional retention of PGs and SLGs, resulting in alleviating xerostomia and improving quality of life.

PO-0641

Retrolaminar migration as a complication of intraocular silicone oil injection detected on unenhanced head CT.

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AIM: To investigate the clinical and radiologic features of retrolaminar migration silicone oil (SiO) and observe the dynamic position of ventricular oil accumulation in supine and prone head computed tomography (CT).

METHODS: For this retrospective study, twenty-nine patients who had a history of SiO injection treatment and underwent unenhanced head CT were included from January 2019 to October 2022. It was divided into cases of migration-positive and negative groups. Clinical history and CT features were compared using Whitney U and Fisher's exact tests. The dynamic position of SiO was observed within the ventricular system in supine and prone. CT images were visually assessed for SiO migration along the retrolaminar involving pathways for vision (optic nerve, chiasm, and tract) and ventricular system. All values for variables were expressed as mean \pm standard deviation.

RESULTS: Intraocular SiO migration was found in 5 of the 29 patients (17.24%), with SiO at the optic nerve head (n=1), optic nerve (n=4), optic chiasm (n=1), optic tract (n=1), and within lateral ventricles (n=1). The time interval between SiO injection and CT examination of migration-positive cases was significantly higher than that of migration-negative patients (22.8 ± 16.5 vs 13.1 ± 2.6 months, $P < 0.001$). The hyperdense lesion located in the frontal horns of the right lateral ventricle migrated to the fourth ventricle when changing the position from supine to prone.

CONCLUSION: The clinician and radiologist should be aware of migration routes. The supine combined with prone examination is the first-choice method to confirm the presence of SiO in the ventricular system.

PO-0642

Study in intracranial hemodynamic assessment based on four dimensional flow MRI (4D flow MRI) for unruptured aneurysm

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Objective: This study aims to investigate the feasibility and clinical significance of employing four-dimensional flow magnetic resonance imaging (4D flow MRI) for assessing blood flow in unruptured intracranial aneurysms.

Methods: A retrospective analysis was conducted on 10 unruptured intracranial aneurysms (involving 10 patients) located at the anterior communicating artery, confirmed by digital subtraction angiography (DSA) performed at our Stroke Center from March 2021 to April 2023. Original data for these 10 aneurysms, including the cross-sectional area of the feeding artery, aneurysm neck diameter, and aneurysm size, were obtained. Computational fluid dynamics (CFD) was used to calculate hemodynamic parameters, including through-plane velocity, maximum through-plane velocity, average velocity, maximum velocity, and average and maximum instantaneous blood flow rates. Subsequently, all 10 patients with aneurysms underwent magnetic resonance vascular imaging and 4D flow MRI processing. This resulted in velocity vector fields, streamlines, shear rates, wall shear stress, oscillatory shear index, and three-dimensional blood flow pathlines for the 10 aneurysm cases. The average blood flow velocity at the aneurysm neck was extracted, and the normalized root mean square error (NRMSE) and linear correlation coefficient (R²) were calculated between the two methods. Finally, velocity distribution maps at the maximum cross-sectional area of the aneurysms were compared.

Results: Comparative analysis between 4D Flow MRI and CFD revealed similar flow patterns within the feeding artery and within the aneurysm sac. The average flow velocity at the aneurysm neck exhibited good agreement. The mean normalized root mean square error (NRMSE) for the average flow velocity at the neck of the 10 aneurysms was 0.08452, with a mean R2 value of 0.90132. This demonstrated a consistent distribution of high-velocity regions.

Conclusion: There is a strong concordance between the measurements obtained from 4D Flow MRI and the computational results from CFD. 4D Flow MRI offers a comprehensive assessment of hemodynamics and is a non-invasive examination, providing more precise data. This enhances the accuracy in assessing the risk of aneurysm rupture and prognosis.

PO-0643

Preoperative differentiated imaging of vagal nerve and sympathetic cervical schwannomas based on Diagnosis Score and vascular displacement nomogram

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Objective The purpose of this study was to propose and validate a Diagnosis Score and vascular displacement nomogram for the preoperative differentiation of VNCS from SCCS in the neck by CT and MR.

Methods 46 patients with VNCS and 64 patients with SCCS were analyzed retrospectively. Patients were divided into a training set ($n = 77$) and validation set ($n = 33$). The tumors were evaluated with their location, size, laterality and relationship to the vessels. The variables that had clinical significance in the final multivariate logistic regression model were built into Diagnosis Score and nomogram. The efficiency of the Diagnosis Score were evaluated and validated on the training and validation datasets.

Result No significant difference was observed for patient age, sex and tumor location, size, laterality between the two groups. In the upper neck, ICA/ECA and ICA/IJV splaying were significantly associated with SCCS ($p=0.000$) and VNCS ($p=0.000$), respectively. Five features were used to establish the Diagnosis Score. The threshold value of diagnosis score is 0.235. The imaging nomogram combined imaging features showed favorable preference value for differentiating VNCS from SCCS in the upper neck, with AUCs of 0.953 and 0.939 for the training set and validation set, respectively.

Conclusion ICA and IJV splaying frequently predicts VNCS. Medial and anterior ICA displacement is more likely to be VNCS. The Diagnosis Score and vessels displacement nomogram showed favorable predictive efficacy for differentiating VNCS from SCCS in the neck.

PO-0644

Prediction of glioma IDH status and VEGF expression levels using auto-machine learning with whole brain morphologic features combined with multiregional radiomics

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Background: Glioma is a systemic disease that can induce micro and macro alternations of the whole brain. Isocitrate dehydrogenase (IDH) and vascular endothelial growth factor (VEGF) is proven prognostic marker and antiangiogenic therapy in glioma. We aimed to preoperatively predict IDH status and VEGF expression levels in glioma by applying Pycaret, an automated machine learning (autoML) approach combined with whole brain morphologic features and multiregional radiomics using MRI.

Materials and Methods: This retrospective study recruited 80 glioma patients with IDH wildtype (IDHwt) and high VEGF expression levels, 102 patients with IDH mutation (IDHmut) and low VEGF expression levels. Firstly, U-net network was applied to automatically segment glioma subregion and whole tumor. Next, the virtual brain grafting combined with Freesurfer was used to enable successful brain parcellation and compute whole brain morphologic features including cortical thickness, LGI and subcortical volume in individual glioma patients. Radiomics features were extracted from four glioma regions, including whole tumor, enhanced tumor, necrosis and edema region based on gadolinium-enhanced 3D T1-weighted images (Gd-3DT1WI). Pycaret was used to construct the optimal machine learning pipeline for predicting IDH mutation and VEGF expression level. Finally, the performance of models based on each feature set were compared to identify the best model with its top-performing features.

Results: Among the radiomics models, the whole tumor model achieved the best performance (accuracy 0.79, AUC 0.86), while, the combination of whole brain morphologic features had a superior predictive performance (accuracy 0.82, AUC 0.88). The features contributed most in predicting model including the right caudate volume, left middle temporal cortical thickness, first-order statistics (root mean squared, 90th Percentile), shape (major axis length, surface/volume ratio) and gray level cooccurrence matrix (GLCM).

Conclusions: Pycaret based on whole brain morphologic features combined with glioma radiomics yielded the highest accuracy in predicting IDH mutation and VEGF expression levels, indicating that morphologic abnormalities induced by glioma were associated with tumor biology.

PO-0645

Quantitative analysis of orbital soft tissue for the detection of Dysthyroid Optic Neuropathy in patients with Thyroid-Associated Ophthalmopathy, based on 3D Cube FSE-flex.

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Objective: To evaluate the ability of volume and water fraction (WF) of orbital soft tissue for predicting dysthyroid optic neuropathy (DON).

Methods: This retrospective study included 60 patients with TAO (27 with DON, 33 without DON) who underwent 3D Cube FSE-flex MRI. Volume and water fraction of extraocular muscles (EOM), orbital fat, eyeball, optic nerve, and lacrimal gland were compared between patients with and without DON. A logistic regression analysis was conducted to determine the risk factors associated

with DON. In addition, we performed receiver operating characteristic curve (ROC) analysis and correlation analysis between magnetic resonance imaging (MRI) parameters and ophthalmic features.

Results: We investigated 116 orbits (53 and 63 with and without DON, respectively). Extraocular muscle volume (EOMV), water fraction of extraocular muscles (EOM-WF), and water fraction of orbital fat (OF-WF) were significantly higher in the DON group than in the TAO group. A larger EOMV (OR = 1.555) and greater OF-WF (OR = 1.190) were associated with a higher risk of DON. A model that combined EOMV and OF-WF was efficient in predicting DON in TAO patients (AUC=0.843; sensitivity = 0.698, specificity = 0.810). EOMV was positively correlated with clinical activity scores ($p < 0.001$, $r = 0.468$).

Conclusions: Edema of the orbital fat and enlargement of the EOM are significant risk factors for the development of DON. The combination of EOMV and OF-WF can be used as a valid radiological marker to identify DON.

PO-0646

Four-Dimensional Flow Magnetic Resonance Imaging (4D Flow MRI) Technique in the Study of Hemodynamics of Intracranial Cerebral Arteriovenous Malformations

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Objective: To explore the feasibility and clinical value of applying Four-Dimensional Flow Magnetic Resonance Imaging (4D Flow MRI) technology in the assessment of blood flow in intracranial cerebral arteriovenous malformations (AVMs)."

Methods: A retrospective analysis was conducted on 14 patients with clinically significant unilateral intracranial arteriovenous malformations (AVMs) confirmed by digital subtraction angiography (DSA) at our Stroke Center from January 2022 to July 2023. Data on vascular characteristics of the 14 lesions and the contralateral normal vessels were obtained, including the size of the AVM nidus, cross-sectional area of feeding arteries, diameter of draining veins, and the presence of collateral circulation. Computational fluid dynamics (CFD) was employed to calculate hemodynamic parameters (such as the lesion site's plane velocity-to-maximum plane velocity ratio, average velocity, maximum velocity, and average and maximum instantaneous blood flow rates).

All 14 patients with 14 AVM lesions and their contralateral normal vessels underwent repeat magnetic resonance vascular imaging and 4D Flow MRI processing. This yielded velocity vector fields, streamlines, shear rates, wall shear stress, oscillatory shear index, and three-dimensional blood flow pathlines within the diseased vessels. Blood flow velocities at the lesion site were extracted, and the normalized root mean square error (NRMSE) and linear correlation coefficient (R2) were calculated to assess the agreement between the two measurements. Finally, differences in the velocity distribution maps of feeding arteries and contralateral normal vessels were compared, with a focus on exploring the hemodynamic factors related to AVM hemorrhage."

Results: Comparative analysis between 4D Flow MRI and CFD revealed similar flow patterns within the lesion site. Higher shear rates and wall shear stress in the feeding arteries of the lesions were associated with a greater propensity for AVM hemorrhage.

Conclusion: There is a strong concordance between the measurements obtained through 4D Flow MRI and the calculations from CFD. 4D Flow MRI can comprehensively assess the hemodynamics of intracranial AVMs, offering non-invasive examination and providing more precise data to guide clinical surgical approaches. It holds significant clinical utility.

PO-0647

Predictive Factors and the Development of a Clinical Scale for Futile Recanalization Following Endovascular Therapy in Patients with Large Anterior Vessel Occlusion

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Purpose

Cerebrovascular accidents or strokes remain a leading cause of morbidity and mortality worldwide. Among patients presenting with acute ischemic stroke (AIS) due to large vessel occlusion, endovascular therapy (EVT) offers a promising therapeutic strategy. Yet, there exists a subset where EVT might not result in functional independence despite recanalization - a phenomenon termed as 'futile recanalization'. Recognizing this challenge, our study ventured to investigate potential predictors of this undesirable outcome and subsequently formulate a streamlined prediction scale to guide clinicians in decision-making.

Patients and Methods

A detailed retrospective assessment of 145 AIS patients suffering from anterior circulation large vessel occlusion was undertaken. These patients had been subjected to EVT at our center spanning a period from March 2016 to December 2021. Our definition of 'futile recanalization' encompassed those patients who, despite undergoing EVT within the recommended therapeutic window, failed to achieve functional independence at the 90-day mark, as gauged by the modified Thrombolysis in Cerebral Infarction score (mTICI) benchmarks of 2b or 3.

Results

To enhance the utility and ease of clinical application, quantitative parameters were transformed into binary categories, hinged on optimal cutoff values deduced from ROC analysis. Multivariable logistic regression pinpointed several significant predictors: NIHSS score, D-Dimer levels, Platelet (PLT) count, B-type Natriuretic Peptide (BNP), and the mismatch ratio as evidenced on CT perfusion scans. All these were found to be independent predictors of futile recanalization (all with $p < 0.05$). From this, a concise 5-item scale was established. The efficacy of this scale was noteworthy, reflected by AUC values of 0.916 (95% CI 0.861–0.954) and 0.846 (95% CI 0.779–0.899) for the training and validation groups, in that order.

Conclusion

The devised scale emerges as a promising tool in the pre-EVT evaluation phase. It can potentially delineate AIS patients more likely to gain from the intervention, enhancing therapeutic precision. However, it's crucial to underscore that for its universal clinical acceptance, a broader validation incorporating a larger patient sample becomes imperative. Such refined predictive measures can pave the way for reducing the occurrence of futile recanalizations, thereby optimizing patient outcomes and channeling the clinical benefits of EVT towards those most likely to benefit.

PO-0648

Nomograms Based on Multiparametric MRI Radiomics Integrated with Clinical-Radiological Features for Predicting the Response to Induction Chemotherapy in Nasopharyngeal Carcinoma

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Objective: To establish nomograms integrating multiparametric MRI radiomics with clinical-radiological features to identify the responders and nonresponders to induction chemotherapy (ICT) in nasopharyngeal carcinoma (NPC).

Methods: We retrospectively analyzed the clinical and MRI data of 168 NPC patients between December 2015 and April 2022. We used 3D-Slicer to segment the regions of interest (ROIs) and the "Pyradiomic" package to extract radiomics features. We applied the least absolute shrinkage and selection operator regression to select radiomics features. We developed clinical-only, radiomics-only, and the combined clinical-radiomics nomograms using logistic regression analysis. The receiver operating characteristic curves, DeLong test, calibration, and decision curves were used to assess the discriminative performance of the models.

Results: A total of 14 optimal features were finally selected to develop a radiomic signature, with an AUC of 0.891 (95% CI, 0.825–0.946) in the training cohort and 0.837 (95% CI, 0.723–0.932) in the validation cohort. The nomogram based on the Rad-Score and clinical-radiological factors for evaluating tumor response to ICT yielded an AUC of 0.926 (95% CI, 0.875–0.965) and 0.901 (95% CI, 0.815–0.979) in the two cohorts, respectively. Decision curves demonstrated that the combined clinical-radiomics nomograms were clinically useful.

Conclusion: Nomograms integrating multiparametric MRI-based radiomics and clinical-radiological features could non-invasively discriminate ICT responders from non-responders in NPC patients.

PO-0649

Nomogram based on multiparameter MRI radiomics Integrated with Clinical Features for Predicting the Response to Induction Chemotherapy in Nasopharyngeal Carcinoma

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Purpose To investigate the performance of nomogram based on multiparametric MRI combined with clinical factors for predicting the response to induction chemotherapy in locoregionally advanced nasopharyngeal carcinoma (LA-NPC). **Materials and Methods** The clinical and imaging data of 184 patients with LA-NPC from July 2014 to April 2022 were retrospectively analyzed. All patients were randomly stratified into training (n=110) and testing (n=74) cohorts at 3:2 ratios. We used 3D-Slicer to segment the regions of interest and "Pyradiomic" package to extract features. Multivariate logistic regression analysis were applied to identify predictive clinical factors. Least absolute shrinkage and selection operator (LASSO) was performed to select features.

We developed clinical-only, radiomics-only, and the combined clinical-radiomics nomograms using logistic regression analysis. The receiver operating characteristic curves, DeLong test, calibration, and decision curves were used to assess the discriminative performance of three models.

Results T stage (OR=0.335, P=0.001), enhanced degree of the foci (OR=5.177, P=0.003) were identified as the independent predictors for ICT response. A total of 15 radiomics features were selected to develop a radiomic signature. The ROC curves showed that nomogram model yielded the best predictive performance compared with clinical or radiomics models (AUC for training group: 0.922 vs. 0.748, 0.851; for testing group: 0.918 vs. 0.782, 0.843), and there were statistically significant differences of the AUC values between combined model and the other two models (DeLong test, $P < 0.05$). DCA displayed that the level of net clinical benefit of the nomogram was higher than that of the single clinical or radiomics model. **Conclusion**

Nomograms integrating multiparametric MRI-based radiomics and clinical-radiological features could non-invasively discriminate ICT responders from non-responders and provide a basis for personalized treatment of LA-NPC patients.

PO-0650

Hemodynamic changes in transverse-sigmoid sinus junction following effective surgical reconstruction for unilateral pulsatile tinnitus with sigmoid sinus wall anomalies: a 4D flow MRI analysis

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Objective: To compare the hemodynamic changes in the transverse-sigmoid sinus junction (TSSJ) before and after surgical reconstruction in patients with unilateral pulsatile tinnitus (PT) associated with sigmoid sinus wall anomalies (SSWAs) using 4D flow MRI.

Methods: The data of patients who complained of unilateral pulse-synchronous PT, were confirmed to have ipsilateral SSWAs by preoperative CT, and underwent sigmoid sinus wall reconstruction were retrospectively analyzed. Nineteen patients who underwent pre- and postoperative 4D flow MRI, had PT eliminated or significantly alleviated after at least 6 months of follow-up were recruited, including 6 patients with sigmoid sinus wall dehiscence and 13 with diverticulum. Quantitative and qualitative hemodynamic data, including bilateral velocity and net flow upstream and downstream of the TSSJ as well as vortexes in the TSSJ, were obtained and compared before and after surgery.

Results: Significant differences were observed only in the ipsilateral upstream average velocity (V_{avg}) and contralateral downstream maximum velocity (V_{max}) before and after treatment ($p=0.01$, $p'=0.01$). No significant changes were noted in other quantitative indicators. Among the 19 cases, 17 exhibited vortexes on the surgical side before surgery, of which 9 cases displayed vortex disappearance and 8 cases showed a reduction in vortex intensity postsurgery. Vortexes were observed in all 13 cases with diverticulum before surgery but disappeared after surgical intervention. The high-speed jet remained unchanged in 16 cases of TSS before and after treatment.

Conclusions: Sigmoid sinus wall reconstruction seems to lack a significant hemodynamic impact on the TSSJ. This observation implies a relative safety associated with the procedure, while the persistent risk of recurrence is attributable to abnormal hemodynamic impact on the reconstructed bony wall.

PO-0651

Exploring the hemodynamic mechanisms of symptomatic changes in venous pulsatile tinnitus during follow-up

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Objective: The aim of this study is to clarify the change of symptom severity over time in VPT patients and to explore predictive factors for tinnitus severity changes in non-surgical VPT patients.

Method: This study included 59 unilateral VPT patients and 51 healthy volunteers. 4D Flow MRI was used to evaluate the hemodynamic status of the transverse and sigmoid sinuses, and temporal bone HRCT was used to evaluate the size of sigmoid sinus wall dehiscence (SSWD). Baseline, 1-month and 6-month Tinnitus handicap inventory follow-up. Analyze the impact of baseline hemodynamic characteristics and the size of SSWD on the severity of symptoms in patients during follow-up and its predictive significance.

Result: Compared to healthy volunteers, VPT patients had higher peak velocity ($P < 0.001$), wall shear stress ($P < 0.001$), and energy loss ($P < 0.001$). During the follow-up period, most VPT patients experienced worsening symptoms in 1 month ($P = 0.001$) and 6 month ($P < 0.001$). The stepwise linear regression model shows that the baseline peak velocity can be used as independent risk factor for the severity of tinnitus in both 1-month follow-up ($\beta = 0.545$, $P < 0.001$) and 6-month follow-up ($\beta = 0.699$, $P < 0.001$). Logistic model displays SSWD ($\beta = 0.179$, $P = 0.018$) and peak velocity ($\beta = 0.030$, $P = 0.040$) can be used as an independent predictor of symptom exacerbation in VPT patients.

Conclusion: Most non-surgical intervention VPT patients have poor prognosis. Higher peak velocity and SSWD can predict the worsening of tinnitus symptoms in VPT patients after 6 months. The use of 4D Flow MRI technology to explore the predictive factors of dynamic changes in tinnitus symptoms in VPT patients provides a powerful reference for clinical treatment decision-making.

PO-0652

Free-breathing 3D Stack-of-Stars GRE (StarVIBE) for Detection of Extranodal Extension in Head and Neck Cancer: An Image Quality and Diagnostic Performance Study

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Background: This study aims to evaluate the image quality of cervical lymph nodes and the diagnostic performance of detecting extranodal extension (ENE) using free-breathing 3D Stack-of-Stars GRE (StarVIBE), characterized by the reduction of motion artifacts.

Methods: Eighty consecutive patients underwent StarVIBE before neck dissection at an academic center. Conventional Dixon-VIBE was available in 28 patients in the cohort for image quality comparison. A total of 73 suspicious metastatic lymph nodes from 40 patients were found based on morphology and enhancement pattern on StarVIBE. Sensitivity (SN), specificity (SP), and odds ratios were calculated for each MR feature from StarVIBE to predict pathologic ENE.

Results: StarVIBE exhibited significantly superior image quality, signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR) for enlarged lymph nodes compared to Dixon-VIBE. The MR findings of "invading adjacent planes" (SN, 0.54; SP, 1.00) and "matted nodes" (SN, 0.72; SP, 0.89)

emerged as notable observations. The highest diagnostic performance was attained by combining these two features (SN, 0.93; SP, 0.89).

Conclusions: This study confirms that StarVIBE offers superior image quality compared to Dixon-VIBE, and it can accurately diagnose ENE by utilizing a composite MR criterion.

PO-0653

Exploration of MRI T2 Mapping Image Application in Articular Disc Displacement of the Temporomandibular Joint in Adolescents

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A total of 45 and 63 patients, who had articular disc displacement with and without reduction, respectively, were assigned to the experimental groups, and 57 participants with normal articular discs of the temporomandibular joint were considered as the control group. All participants in the three groups underwent MRI. T2 mapping was performed in the oblique sagittal plane. The regions of interest (ROIs) for the T2 relaxation time maps of the disc were selected manually. The performance of morphological and structural changes and quantitative parameters in MRI T2 mapping image artifacts were statistically compared.

Results: In the control group, the mean T2 value was 39.284 ± 5.634 ms, in the group of disc displacement with reduction, the mean T2 value was 33.634 ± 4.235 ms, and in the group of disc displacement without reduction, the mean T2 value was 30.982 ± 3.205 ms. The T2 mapping values of the experimental groups, together with different morphological structures, were significantly lower than were those of the control group.

Conclusion: MRI T2 mapping enables a more accurate evaluation of TMD severity. Sequentially, it helps provide a more reliable medical imaging basis for classifying diagnosis and evaluation in clinical practice.

PO-0654

Application of deep learning in temporomandibular joint imaging and diagnosis of temporomandibular joint disc displacement

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Introduction Irrecoverable articular disc displacement is a common clinical disease with a high incidence, resulting in clinical symptoms such as restricted opening and mandibular joint pain on the affected side. Severe cases can cause facial deflection, which is one of the culprits of facial deflection. Conservative treatment was the main method for retractable anterior disk displacement. Severe irretrievable disc displacement will require surgery. Clinically, temporomandibular joint (TMJ) anterior disk displacement is the most common, which is usually divided into reversible anterior disk displacement and irreversible anterior disk displacement.

MRI is considered to be the gold standard for evaluating the dish-condylar relationship and soft tissue changes in the TMJ. T1-weighted imaging (T1WI), T2-weighted imaging (T2WI) and proton density-weighted imaging (PDWI) based on fast spin echo sequences are commonly used for diagnosis. PDWI showed the articular disc clearly, and T2WI was use to observe the articular effusion and condylar bone marrow structure. Images in both the mouth-opening and -closing

positions need to be collected. The traditional MR scan takes about 5 minutes, during which patients suffer from pain and discomfort and physiologically induced swallowing in the mouth-open position usually causes motion artifacts.

Deep learning(DL) technology overturns the traditional image filtering and fourier transform by directly transform raw K-space data to denoised MR images [2]. It can remove noise more cleanly without loss of low-frequency details of signal, and improve the signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of images. Meanwhile, the scanning time is shortened to avoid motion artifacts. In this study, we tried to use DL to accelerate the scan of TMJ disk on the premise of ensuring image quality, so as to improve patient experience and facilitate diagnosis.

MethodsExperiments were performed on a 3T GE MRI scanner (SIGNATM Premier, GE Healthcare, Waukesha, WI) with the conventional and deep Learning reconstruction protocol (DL Recon) , the parameters are shown in Table 1. Twelve patients (a total of 16 joints) aged 13–71 years were recruited. Three basic sequences, oblique sagittal (OSag) T1-weighted imaging (T1WI) and proton density-weighted imaging (PDWI) with closed mouth, oblique coronal (OCor) T2-weighted imaging (T2WI) with closed mouth, and OSag PDWI with opened mouth, were selected in combination for testing. In the OSag PDWI with closed mouth, three regions of interest (ROIs), the condyle, the disc , and external wing muscle were analyzed. The signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR) of the articular disc, condyle, and external wing muscles were calculated and analyzed using independent sample t-tests and one-way analysis of variance. Two senior radiologists scored the images subjectively.

ResultsAs shown in Table 1, in the conventional scanning protocol, the scanning time is 5 min 2 sec, while in the DL protocol, the total time is 2 min 52 sec. The SNR and CNR of all sequences in DL protocol are higher than those of the corresponding conventional ones. In Table 2, the SNR and CNR of articular disk, condyle, and external wing muscle in the DL protocol are also higher than those in the conventional protocol, even though the time has been shortened in DL. In particular, DL image of the articular disc was four times SNR than the conventional images while condyle was improved 4 times than conventional images in OSAG PDWI with mouth-closing. Moreover, the image displays an better Edge sharpness and improved the Partial Volume Effects by DL Recon (Figure 1). The DL images showed clear images in both reversible and irreversible anterior disk displacement (Figure 2), in which the Edge sharpness, fluid brightness, and contrast resolution were very helpful for diagnosis.

Discussion & ConclusionDL Recon is based on a deep convolution residual encoder network trained from a database of more than 10,000 images to reconstruct high-resolution and high-SNR images. The DL Recon network is embedded into a new reconstruction path running in parallel with the regular reconstruction to generate two sets of image series simultaneously from a set of original MR Data.

In this work, TMJ imaging based on DL Recon can well display all structures including articular disc, condyle, and external wing muscle. It is very helpful to diagnose the disease in this area. In the diagnosis of temporomandibular joint disc displacement, better image quality can be guaranteed while accelerate the scan. This is beneficial for improving the patient experience and for diagnosing with less-experience clinicians.

PO-0655

Magnetic resonance radiomics analysis for differentiating parotid neoplasms: A two-center study

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Objectives Preoperative differentiation parotid benign tumors (BT) and malignant tumors (MT), and pleomorphic adenomas (PA) and Warthin tumors (WT) is critical to treatment decisions. The purpose of this study was to develop and validate a fused model obtained by screened radiomics scores, clinical and magnetic resonance (MR) images features for the preoperative differentiation of BT from MT, and PA from WT.

Methods A total of 200 patients (160 in training set and 40 in testing set) with BT =133 (PA, n =87; WT, n = 46) and MT= 67 were enrolled. Radiomics features were extracted from fat-saturated contrast enhanced T1-weighted image (fs-CE-T1WI). A radiomics model and a radiomics score (Rad-score) were constructed and calculated. A clinical model was built based on demographics and MR image features. A fused model combining the Rad-score, demographics and MR image features was constructed using multivariate logistic regression analysis. The diagnostic performance of the three models using ROC curves on the training and testing sets.

Results Radiomics signature consists of 10 key features from MR image was used to distinguish BT and MT. The fused model incorporating the radiomics model and clinical model had an AUC value of 0.87 (0.82-0.90) in the training set and 0.78 (0.73-0.83) in the testing set. 10 key features from MR images were used to build the radiomics signature in the identification of PA and WT. The fused model incorporating the radiomics model and clinical model had an AUC value of 0.97 (0.95-0.99) in the training set and 0.85 (0.89-0.92) in the testing set. Decision curve analysis showed that the two fused models outperformed the radiomics models in terms of clinical usefulness.

Conclusions The fused model obtained by screened Rad-score, clinical and MR image features performed well for differentiating BT from MT, and may aid in the clinical decision-making process.

PO-0656

Explore the Value of Quantitative MRI Parameters of lacrimal gland in predicting Treatment Response to Intravenous Glucocorticoid Therapy for Thyroid-Associated Ophthalmopathy

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Objective

To investigate the value of morphological parameters, histogram parameters obtained from T2 Mapping and FS T2 Mapping in predicting the therapeutic effect of IVGC in patients with moderate to severe active TAO.

Materials and methods

A total of 72 patients diagnosed with active, moderate-to-severe TAO, including 39 patients in the responsive group and 33 patients in the unresponsive group, were enrolled. Baseline clinical characteristics, morphological parameter (i.e., lacrimal gland herniation) and histogram parameters derived from T2 mapping with FS or without FS of lacrimal gland were compared between the two groups. The histogram parameters obtained from conventional T2 mapping and FS T2 mapping of

the extraocular muscles were also used to build predictive models. Independent predictors of treatment response to IVGC were identified using multivariable analysis. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the predictive performance of the prediction models.

Results

Multivariate analysis showed that gender, smoking, course of disease, LGH, the first percentile of LG FS T2 relaxation time, and kurtosis of FS T2 relaxation time in extraocular muscles were independent predictors of therapy. The predictive model combining lacrimal gland parameters, extraocular muscle parameters and clinical indicators was significantly better than the prediction model constructed using only extraocular muscle parameters and clinical indicators. The combined model, had an optimized area under the ROC curve of 0.821, 84.6% sensitivity, and 71.2% specificity, which were significantly superior to the model without LG parameters($p = 0.027$).

Conclusion

Lacrimal gland parameters complement models that use only extraocular muscle parameters and baseline clinical indicators.

PO-0657

Assessment of low-dose paranasal sinus CT imaging using a new deep learning image reconstruction technique in children compared to adaptive statistical iterative reconstruction V (ASiR-V)

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Purpose: To compare the effects of deep learning image reconstruction (DLIR) and adaptive statistical iterative reconstruction V (ASiR-V) on image quality in low-dose computed tomography (CT) of paranasal sinuses in children. **Methods:** Low-dose CT scans of the paranasal sinuses in 25 pediatric patients were retrospectively evaluated. The raw data were reconstructed with three levels of DLIR (high, H; medium, M; and low, L), filtered back projection (FBP), and ASiR-V (30% and 50%). Image noise was measured in both soft tissue and bone windows, and the signal-to-noise ratios (SNRs) and contrast-to-noise ratios (CNRs) of the images were calculated. Subjective image quality at the ethmoid sinus and nasal cavity levels of the six groups of reconstructed images was assessed by two doctors using a five-point Likert scale in a double-blind manner. **Results:** The patients' mean dose-length product and effective dose were 36.65 ± 2.44 mGy·cm and 0.17 ± 0.03 mSv, respectively. (1) Objective evaluation: 1. Soft tissue window: The difference among groups in each parameter was significant ($P < 0.05$). Pairwise comparisons showed that the H group's parameters were significantly better ($P < 0.05$) than those of the 50% post-ASiR-V group. 2. Bone window: No significant between-group differences were found in the noise of the petrous portion of the temporal bone or its SNR or in the noise of the pterygoid processes of the sphenoids or their SNRs ($P > 0.05$). Significant differences were observed in the background noise and CNR ($P < 0.05$). As the DLIR intensity increased, image noise decreased and the CNR improved. The H group exhibited the best image quality. (2) Subjective evaluation: Scores for images of the ethmoid sinuses were not significantly different among groups ($P > 0.05$). Scores for images of the nasal cavity were significantly different among groups ($P < 0.05$) and were ranked in descending order as follows: H, M, L, 50% post-ASiR-V, 30% post-ASiR-V, and FBP. **Conclusion:** DLIR was superior to FBP and post-ASiR-V in low-dose CT scans of pediatric paranasal sinuses. At high intensity (H), DLIR provided the best reconstruction effects.

PO-0658

The effects of transverse sinus stenosis and trans-stenotic pressure gradient on the hemodynamics at the transverse-sigmoid sinus junction

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Objective To explore the effects of transverse sinus stenosis (TSS) and trans-stenotic pressure gradient (TPG) on the hemodynamics at the transverse - sigmoid sinus junction (TSSJ).

Methods Computed tomography venography of one patient with pulsatile tinnitus (PT) was used to construct a personalized venous sinus model. Different levels of TSS (0/25/ 50/ 75%) and TPG (2/ 5/ 8/ 11/ 14/ 17/ 20 mmHg) were used to constructed for steady-state computational fluid dynamics (CFD) simulation in a group of finite element models. The distributions of the wall pressure, maximum wall pressure (Pmax) and blood flow pattern (velocity vector or velocity streamline) were calculated to evaluate the hemodynamic changes.

Results The Pmax1 was located in the upper and lateral part of the TSSJ, regardless of different levels of TSS or/and TPG. As TSS level increased, the wall pressure at TSSJ decreased linearly as $y = 896.808 - 540.395 \times \text{TSS}$ ($R^2 = 0.994$, $p = 0.003$); the blood flow velocity increased; the medial blood flow pattern tended to be disordered. As TPG level increased, the wall pressure at TSSJ increased linearly as $y = -35.704 + 100.603 \times \text{TPG}$ ($R^2 = 0.998$, $p = 0.000$); the high pressure range expanded; the blood flow velocity increased; when the TPG exceeded 11 mmHg, the medial blood flow pattern was smooth.

Conclusion The Pmax location of TSSJ may not change with the levels of TSS and/or TPG, which may increase linearly with decreased TSS and/or increased TPG. The blood flow velocity may increase with increased TSS and/or TPG.

PO-0659

Predicting treatment response to multitarget tyrosine kinase inhibitors neoadjuvant chemotherapy in locally advanced thyroid cancer using noninvasive radiomics biomarkers: integration of five clinical trials

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Abstract

Purpose

Multitarget tyrosine kinase inhibitor demonstrated antitumor activity in radioiodine-refractory differentiated thyroid cancer and medullary thyroid cancer. We aimed to develop and validate noninvasive model based on radiomics to predict the efficacy of multitarget tyrosine kinase inhibitors before neoadjuvant therapy in patients with locally advanced thyroid cancer.

Materials and methods

This two-center study consisted of 58 prospective patients with locally advanced thyroid cancer who received multitarget tyrosine kinase inhibitors in the neoadjuvant setting from 5 phase II clinical Trials. Pre-contrast CT and standard post-contrast CT machine learning classifiers and integration classifiers were designed as three separate classifiers. In each classifier, dataset was randomly split into training and independent testing group on a 7:3 ratio, accordingly subjected to a 10-fold cross validation. After normalization, best feature subsets were selected by Pearson correlation coefficient (PCC) and recursive feature elimination (RFE), whereupon a radiomics classifier was

built with random forest. The discriminating performance was assessed with the area under receiver-operating characteristic curve (AUC).

Results

The AUC of pre-contrast CT classifier was 0.782. The AUC of standard post-contrast CT classifier was 0.766. The AUC of the integration model was 0.851.

Conclusion:

Integration of pre- and standard post-contrast CT machine learning classifier could help to predict the efficacy of multitarget tyrosine kinase inhibitors before neoadjuvant therapy in patients with locally advanced thyroid cancer.

PO-0660

基于 DWI 及 ADC 的影像组学模型对 甲状腺结节良恶性的预测价值

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目的：探究基于 DWI 和 ADC 图像的影像组学特征鉴别甲状腺结节良恶性的价值。

材料与方法：回顾性分析我院经病理证实且行 DWI 检查的 140 名甲状腺结节患者(共 148 个甲状腺结节，良性 50 个，恶性 98 个)的临床和影像资料。对 DWI 和 ADC 图像进行感兴趣区勾画及组学特征提取，采用 t 检验、最小绝对收缩和选择算子(LASSO)算法和相关性分析进行特征筛选，使用 K 最近邻 (KNN)、支持向量机 (SVM)、随机森林 (RF) 和逻辑回归 (LR) 四个分类器建模，包括 DWI 模型、ADC 模型和联合模型，并对模型进行验证。应用受试者操作特征 (ROC) 曲线的曲线下面积 (AUC) 评价影像组学模型预测甲状腺结节良恶性的效能。

结果：经过特征筛选，10 个 DWI 特征和 18 个 ADC 特征被用于构建模型。在基于同一分类器构建的不同模型之间比较，除了基于 RF 分类器的联合模型 (AUC=0.809) 仅次于 ADC 模型 (AUC=0.825) 外，基于 KNN、SVM 和 LR 三个分类器的联合模型表现都要优于单独的 DWI 模型和 ADC 模型。在独立验证集中，LR 联合模型表现出了最佳的模型预测效能 (AUC=0.885)，优于其他 3 种分类器构建的联合模型 (SVM: AUC=0.867; KNN: AUC=0.846; RF: AUC=0.809)。

结论：基于 DWI 和 ADC 图像影像组学模型有助于鉴别甲状腺结节良恶性。

PO-0661

中枢神经细胞瘤 fMRI 表现及 ADCmin 与 Ki-67 相关性分析

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目的：通过中枢神经细胞瘤 (central neurocytoma, CNC) 的常规及功能磁共振特征，提高影像诊断准确率，并对 ADC 值与 Ki-67 进行相关性分析，确定 ADCmin 值与 CNC 增殖活性的关系。方法：回顾性分析 13 例经手术病理证实中枢神经细胞瘤患者磁共振和病理资料，并通过分析 ADC 值与 Ki-67 表达相关性，确定 ADCmin 值与 CNC 增殖活性的关系。结果：12 例典型 CNC 位于透明隔孟氏孔区，WHO II 级，1 例非典型 CNC 主体位于右侧侧脑室后角，颅内及脊髓多发播散，WHO III 级。CNC 形态不规则，均呈分叶状 (13/13)，以宽基底附着透明隔 (11/13)；并发脑积水 (10/13)。肿瘤内显示血管流空信号 (9/13)，囊变 (13/13)。DWI 均为高信号 (12/12)，ADCmin (0.708±0.221×10⁻³mm²/s)；SWI 均出现低信号 (10/10)；PWI 均呈高灌注 (10/10)，增强扫描轻度强化 (6/13)、中度强化 (7/13)。10 例行 MRS 检查显示 Cho 峰升高，NAA 峰降

低, Cho/NAA (7.1 ± 3.9) 及 Cho/Cr (4.4 ± 1.6) 比值均增高, Gly/MI 峰升高 (8/10)。ADCmin 与 Ki-67 表达具有相关性, $P<0.05$, 相关系数 R^2 为 0.618。结论: 中枢神经细胞瘤为富血供肿瘤, 其位置及影像表现具有一定特征, ADCmin 值与 CNC 增值活性呈正相关, 对 CNC 术前诊断及评估提供一定帮助。

PO-0662

耳蜗管长度与耳蜗大小的相关性分析

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目的

利用 HRCT 多平面重建耳蜗标准方位图像并测量耳蜗的相关径线,以探讨耳蜗管长度与耳蜗相关径线间的关系,为植入电极的选择提供参考。

方法

收集本院 1-7 岁行颞部 CT 肉眼诊断内耳骨性结构正常的 SNHL 患儿 50 例 (100 耳)。利用多平面重建技术(MPR)得到耳蜗标准方位图像,测量耳蜗相关径线,由两名医师 A 和 B 分别测量后取均值所得,包括耳蜗底转长径 (BL)、耳蜗底转宽径 (BW)、耳蜗高度 (CH)、底转的宽度 (RW),曲面重建 (CPR) 测量耳蜗管长度 (CL)。采用 SPSS 21 统计软件分析影响蜗管长度的相关径线,并与传统计算的蜗管长度比较。

结果

(1)两个医生对所测量的信度指数 ICC 均大于 0.75。

(2)耳蜗底转长径 (BL)、耳蜗底转宽径 (BW) 以及耳蜗高度 (CH) 与耳蜗管长度 (CDL) 之间存在显著的正相关关系 (P 值分别为 0.001、0.002 和 0.008); (3)传统计算的耳蜗管长度 (CL) 与测量的耳蜗管长度比较之间有明显的差异 ($P<0.05$)。

结论

儿童耳蜗的个性化标准化径线测量可靠性良好,耳蜗底转长径 (BL)、耳蜗底转宽径 (BW) 和耳蜗高度 (CH) 均与蜗管长度 (CDL) 正相关,而蜗管长度的测量对于电极植入的选择有重要意义。

PO-0663

Revolution CT 70kV 低管电压联合等渗碘对比剂在头颈心 “一站式”CT 血管成像中的应用价值

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目的 探讨正常体质量指数的中老年患者采用 Revolution CT 70kVp 低管电压联合等渗碘对比剂 (碘克沙醇 320mgI/mL) 在头颈心“一站式”CT 血管成像中的应用价值。方法 连续收集 50 例接受头颈心“一站式”CT 血管成像的患者并按随机数字表法分为 2 组。A 组管电压 70kVp, 碘克沙醇 320mgI/mL; B 组管电压 100kVp, 碘美普尔 400mgI/mL, 对比剂剂量均按 0.7mL/kg 计算。比较 2 组患者图像质量的客观评价和主观评分指标、辐射剂量和摄碘量。结果 A 组冠状动脉主干及分支血管 (升主动脉根部、右冠状动脉、左冠状动脉及回旋支)、头颈部动脉 (颈总动脉、颈内动脉及大脑中动脉 M1 段) 的平均 CT 值和 SD 值均高于 B 组, 差异具有统计学意义 ($P<0.05$); 但 A 组图像的 SNR 及 CNR 与 B 组比较, 差异无统计学意义 ($P>0.05$)。A、B 两组冠状动脉 CTA 和头颈部 CTA 的图像质量均无统计学差异 ($P<0.05$); 2 名医师对冠状动脉和头颈部血管图像质量的主观评分一致性好 (分别为 0.839、0.719 和 0.762、0.749)。与 B 组相比, A 组冠状动脉 CTA 的有效辐射剂量

ED 显著降低约 68.68%，头颈部 CTA 的 ED 显著降低约 65.75%，患者摄碘量显著降低约 21.23% (P 均 <0.001)。结论 采用 Revolution CT 70kVp 低管电压联合等渗碘对比剂在中老年患者头颈心“一站式”CT 血管成像中具有较好的应用价值，能显著降低辐射剂量和摄碘量。

PO-0664

全肿瘤表观扩散系数直方图在腮腺分泌性癌与腺泡细胞癌中的鉴别价值

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目的：探讨全肿瘤表观扩散系数 (ADC) 直方图在鉴别腮腺分泌性癌 (SC) 与腺泡细胞癌 (AciCC) 中的应用价值。方法：回顾性分析 6 例 SC 和 14 例 AciCC 的 MRI 资料。两名放射科医生采用 Firevoxel 软件，在 DWI 图像上沿着病灶的边缘逐层勾画感兴趣区 (ROI)，包括囊变、坏死区域，ROI 略微小于病灶的大小以减少部分容积效应的影响，组内相关系数用于检测两位医师之间的测量可重现性，同时将两名医师测量结果的平均值用于统计学检测。比较两组肿瘤 ADC 直方图参数的差异，绘制受试者操作特征 (ROC) 曲线分析具有显著差异的参数以明确鉴别 SC 和 AciCC 的最佳 ADC 直方图参数。结果：ADC 直方图各参数的组内相关系数为 0.942-0.999。两组肿瘤 ADC 的平均值、最大值、第 5、25、50、75、95 百分位数值、偏度的差异具有统计学意义 (P <0.05)，其中偏度在鉴别 SC 和 AciCC 中的特异度最高、达 92.86%，曲线下面积 (AUC) 0.774，敏感度 66.67%，准确度 85.00%；第 95 百分位数值值的 AUC 最大，AUC 为 0.917，敏感度为 100.00%，特异度 78.57%，准确度 85.00%。结论：全肿瘤 ADC 直方图能够有效地鉴别腮腺 SC 和 AciCC，并以第 95 百分位数值值的鉴别诊断效能最高。

PO-0665

基于脑 CT 灌注评估头颈部动脉狭窄

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目的：应用 320 排 CT 一站式 CTA-CTP 动态容积灌注成像技术，探讨头颈部动脉狭窄的脑血流动力学改变，分析头颈部动脉狭窄程度与脑灌注成像表现的关系。

方法：163 例经颈动脉 CTA 或 CE-MRA 及头颅 CTA 诊断为单侧颈动脉系统狭窄的患者纳入本研究中。所有患者均行脑 CTP 检查。经灌注后处理软件，分别得到相对脑血流量 (rCBV) 图、达峰时间 (TTP) 图、相对脑血流量 (rCBF) 图、平均通过时间 (MTT) 图及灌注参数值。根据头颈部动脉狭窄程度将头颈部动脉分为轻、中及重度狭窄组，对各组灌注表现进行定性和定量研究，分析各灌注参数中的敏感性指标；分析单侧头颈部动脉狭窄程度与灌注参数的相关性。

结果：80 例颈内动脉狭窄患者纳入本研究，年龄 44-90 岁。其中轻度组 25 例，男 15 例，女 10 例。中度组 41 例，男 28 例，女 13 例。重度组 14 例，男 8 例，女 6 例。83 例大脑中动脉狭窄患者纳入本研究，年龄 44-90 岁。轻度组 46 例，男 30 例，女 16 例。中度组 12 例，男 5 例，女 7 例。重度组 25 例，男 10 例，女 15 例。组间年龄、性别及患有高血压、糖尿病患者比例差异均无统计学意义 (P >0.05)。各组间灌注参数图的定性、定量诊断显示，共 21 例颈内动脉狭窄和 33 例大脑中动脉出现灌注异常，颈内动脉狭窄患者患、健侧 TTP 差异有统计学意义 (P <0.05)，大脑中动脉狭窄患者患、健侧 rCBV、MTT、TTP 差异有统计学意义 (P <0.05)，颈内动脉狭窄程度与患、健侧 rCBV 增加率、rCBF 增加率、MTT 增加率无相关性 (P >0.05)，与患、健侧 TTP 增加率有相关

性 ($P<0.05$)。而大脑中动脉狭窄程度还与患、健侧 rCBV 增加率、MTT 增加率有相关性 ($P<0.05$)。

结论:CTP 是评价颈动脉系统狭窄后脑组织血流动力学改变的敏感方法, 其中 TTP 是评价脑灌注异常的最敏感指标, 与动脉狭窄程度呈正相关。

PO-0666

头颈部动脉粥样硬化斑块周围血流动力学改变的研究

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目的: 血流动力学因素在动脉粥样硬化斑块的形成和发展中起到重要作用。计算流体力学(CFD)可以显示和分析动脉狭窄处血液动力学状态, 近年来常被应用于血管疾病中。本研究拟应用计算机数值模拟技术, 对特定的头颈部动脉粥样硬化斑块进行血流动力学研究, 观察头颈部动脉粥样硬化斑块周围血流动力学分布, 探讨颅内动脉粥样硬化患者斑块周围血流动力学改变与脑组织灌注的关系。方法: 17 例经头颈动脉 CTA 诊断为颈内动脉中重度狭窄及 10 例经颈动脉 MRA 及头 CTA+CTP 诊断为大脑中动脉中度狭窄的患者纳入本研究中, 所有血管均行 CFD 后处理, 得出壁面切应力 (WSS)、血流速度、管壁压力 (pressure)、血流储备分数 (FFRCFD) 等参数值, 其中大脑中动脉狭窄患者均行 CTP 检查。经灌注后处理软件, 分别得到 CTP 的 rCBV 图、TTP 图、rCBF 图、MTT 图及灌注参数值。

(1) 分析 CFD 结果, 比较颈内动脉中重度狭窄组与 WSS、血流速度、pressure、FFRCFD 等值之间的关系;

(2) 分析大脑中动脉狭窄处与正常血管的血流动力学变化情况, 分析大脑中动脉中度狭窄患者脑灌注异常与 CFD 各参数的相关性。

结果: (1) 对于 17 例颈内动脉狭窄患者进行 CFD 模拟血流动力学, 发现颈内动脉狭窄程度与 WSS、血流速度、FFRCFD 差异有统计学意义 ($P<0.05$)。

(2) 10 例大脑中动脉狭窄患者较对侧正常血管, WSS、血流速度、pressure 差异均有统计学意义 ($P<0.05$)。10 例患者中 CTP 阳性组 (6 例) 较阴性组 (4 例), WSS、血流速度、pressure、FFRCFD 均较大, 其中 WSS 差异具有统计学意义 ($P<0.05$)。

结论: 头颈部动脉粥样硬化狭窄伴有明显的血流动力学改变, 血流壁面切应力的增加可能是引起颅内动脉粥样硬化斑块破裂的危险因素。

PO-0667

先天内耳畸形的 CT 和 MRI 诊断及其临床价值

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目的 探讨先天内耳畸形的 CT 和 MRI 表现及其临床价值。方法 回顾性分析我院 2014 年 6 月至 2022 年 10 月收治的 34 例 (55 耳) 先天性内耳畸形的 CT 和 MRI 图像。结果 依据 2017 年 Sennaroglu 对内耳畸形的分类标准, 本次病例中 Michel 畸形 2 例 (2 耳), 初始听泡 1 例 (2 耳)、耳蜗未发育 2 例 (3 耳), 共同腔型 6 例 (10 耳), 耳蜗发育不全 4 例 (6 耳), 囊状耳蜗-前庭畸形 (IP-1) 3 例 (3 耳), Mondini 畸形 (IP-2) 7 例 (14 耳), X 连锁耳聋 (IP-3) 2 例 (4 耳), 前庭导水管扩大 9 例 (16 耳), 前庭畸形 4 例 (6 耳), 半规管畸形 6 例 (7 耳), 蜗神经发育不良 4 例 (8 耳), 蜗神经缺如 3 例 (5 耳)。结论 高分辨率 CT 和 MRI 检查都能诊断先天性内耳畸形, 但 MRI 能够判断听神经的发育及内耳膜迷路的异常程度。

PO-0668

合成 MRI 成像和酰胺质子转移成像在鼻腔鼻窦良恶性病变鉴别中的临床应用

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目的：基于鼻腔鼻窦组织来源复杂，一些良性的鼻腔鼻窦病变也可与恶性病变的影像表现相似。因此单从形态学表现上难以鉴别。基于此，本研究利用合成 MRI 成像和 APT 成像获取一系列定量参数，探究其在鼻腔鼻窦良恶性病变鉴别的诊断效能。

方法：回顾性分析 2022.3 月至 2023.5 月在西安交通大学第二附属医院就诊并经病理证实的 40 例鼻腔鼻窦病变患者的临床及影像学资料。所有患者均接受合成 MRI 和 APT 成像检查，手动勾画感兴趣区，使用 PyRadiomics 软件提取病变定量参数：T1、T2、PD 以及 MTRasym (3.5 ppm) 的直方图参数。采用独立样本 t 检验及 Mann-Whitney U 检验评估良恶性组间各参数之间的差异。利用受试者工作特性曲线法分析有统计学意义的各参数的鉴别诊断效能。应用组内相关系数分析数据测量的可重复性。

结果：恶性组病变 T1-mean, T1-10th, T2-mean, T2-10th, PD-mean, PD-10th, PD-90th 均明显低于良性组 ($P < 0.05$)；MTRasym-mean (8.02 ± 4.75) vs (4.28 ± 2.45) % 高于良性组 ($P < 0.05$)。良恶性组间各参数的偏度和峰度差异均无统计学意义 ($P > 0.05$)。ROC 曲线分析示：T2-10th + MTRasym-10th 具有最高的 AUC 值，具有较高的诊断效能。结论：基于 T1、T2、PD 以及 MTRasym (3.5 ppm) 的多参数组合预测模型可以更有效的鉴别鼻腔鼻窦良恶性病变。

PO-0669

MRI 影像组学鉴别眼眶海绵状血管瘤及神经鞘瘤的价值

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目的：探讨 MRI 影像组学在眼眶海绵状血管瘤和神经鞘瘤鉴别诊断中的价值。

材料与方法：回顾性纳入来自 2 家医院的 300 例患者。来自医院 1 的所有患者被随机分为训练队列 ($n=139$) 和验证队列 ($n=69$)，来自医院 2 的患者被纳入外部测试队列 ($n=92$)。从 T2WI 和增强 T1WI 图像中分别提取 750 个特征。采用最小绝对收缩和选择算子 logistic 回归构建影像组学标签。采用逐步 logistic 回归分析确定独立预测因素。使用准确性评估影像组学模型的性能，并基于 McNemar's 检验与 2 名放射科医师的诊断表现进行比较。

结果：联合 T2WI 与增强 T1WI 的影像组学标签区分两种肿瘤表现最佳，在训练组、验证组和测试组的准确性分别为 95.7%、92.8% 和 90.2%，其 AUC 值分别为 0.97、0.98 和 0.96。在 3 个队列中，两名医师的阅片表现类似或稍低于影像组学标签，分类准确为 87.0% ~ 90.2%。在影像组学标签的辅助下，两名医师在所有队列中的准确性均提高，尽管仅在训练组中放射科医师 1 观察到显著性差异 ($P=0.039$)。

结论：T2WI 和增强 T1WI 的联合影像组学标签可以辅助医生鉴别眼眶海绵状血管瘤和神经鞘瘤。

PO-0670

常规 MRI 影像组学评估口腔舌癌肿瘤浸润淋巴细胞水平的应用价值

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目的：探索基于机器学习的常规 MRI 影像组学分析用于预测口腔舌癌肿瘤浸润淋巴细胞（TIL）水平的可行性。

材料和方法：回顾性分析 2015 年 7 月至 2022 年 7 月期间就诊于上海九院，经病理证实的 68 例口腔舌癌患者的 MRI 及病理资料。通过术后标本 HE 染色来评估肿瘤基质淋巴细胞的比例，基于中位值（60%）将患者分为高 TILs 组（30 例）和低 TILs 组（38 例）。分别基于 T2WI 及增强 T1WI 图像手动勾画全瘤 ROI。使用 Pyradiomics 软件从每个序列中提取 750 个影像组学特征。通过观察者间一致性分析、共线性分析及基于最大相关最小冗余算法（mRMR）特征选择进行数据降维。两序列单独及联合分别筛选出 6 个最佳特征。使用随机森林、逻辑回归、支持向量机、朴素贝叶斯分类器来构建 TILs 水平的预测模型。采用 10-折交叉验证来评估模型的预测表现。

结果：基于单一序列特征构建模型预测口腔舌癌 TIL 水平，增强 T1WI 优于 T2WI，最大曲线下面积（AUC）分别为 0.820 和 0.754。两序列联合筛选的最佳特征包含 1 个 T2WI 和 5 个增强 T1WI 特征，所有特征均具有显著的组间差异（ p 值均 <0.05 ）。基于这些特征，采用逻辑回归分类器构建模型效果最佳，AUC 值为 0.846，准确性为 80.9%。

结论：常规 MRI 影像组学结合机器学习可为口腔舌癌 TILs 水平的术前评估提供一种可行的工具。

PO-0671

大数据人工智能时代头颈部影像学的优化与提升（专题讲座）

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目的：头颈部影像学在头颈部疾病诊疗和筛查方面发挥着非常重要的作用，尤其是功能磁共振和能谱 CT 等新技术的应用更进一步提升了其应用价值，但检查序列越来越多、检查和后处理及分析时间越来越长，如何在大数据人工智能时代优化与提升头颈部影像学是具有较大挑战性的新课题。方法：在坚持以人民健康为中心、坚持以病人为中心的指导原则下，探索通过大数据和人工智能方法来实现。结果和结论：1、优化影像检查流程和序列；2、减少检查等候时间和扫描时间及后处理时间；3、提升影像诊断、治疗前后评估与预测能力；4、提升头颈部影像学卫生经济学价值，促进头颈部影像学高质量发展。

PO-0672

Mikulicz 病的临床及 MRI 特征分析

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目的：本研究回顾性分析 Mikulicz 病（MD）的临床、MRI 及病理特征，探讨 MRI 对该病的诊断价值。

材料和方法：回顾性分析我院 2020 年 1 月至 2022 年 12 月经病理诊断证实的 34 例 MD 患者，分析其临床资料、MRI 影像表现及病理特征，包括症状、受累部位、MRI 信号强度、强化方式、累及范围、免疫组化指标等。

结果：（1）临床资料：入组患者中，男 6 例，女 28 例，平均年龄（49.8±10.7）岁。临床表现多为眼睑肿胀，部分患者伴有眼睛干涩、眼眶疼痛、眼红等。（2）病变位置：25 例表现为双侧泪腺发病，9 例单侧发病，其中 6 例累及左侧泪腺，3 例累及右侧泪腺。34 例患者中，14 例病变累及眼睑，5 例累及眼外肌，2 例分别累及眼球及颌面部软组织。（3）眼眶 MRI 平扫检查影像学特征：34 例患者中，MRI 均表现为泪腺弥漫性增大，所有患者的受累泪腺组织均表现为 T1WI 等信号，27 例表现为 T2WI 等信号，5 例 T2WI 高信号，2 例 T2WI 略低信号。DWI 呈等/高信号，ADC 值为 $0.88 \times 10^{-3} \text{ mm}^2/\text{s}$ 。（4）眼眶 MRI 增强检查影像学特征：3 例患者增强扫描后受累组织呈不均匀强化；25 例患者病变部位呈轻-中度强化，9 例呈明显强化。其中，8 例接受眼眶动态增强扫描，6 例患者的时间-信号强度曲线表现为速升流出型，2 例表现为速升平台型。（5）MD 治疗与随访：所有患者均接受了眶内病损切除术+术后糖皮质激素治疗法，随访至 2023 年 3 月有 2 例患者复发。

（6）MD 病理学检查特征：免疫组化结果显示，34 例患者均表现为 CD20（+）、CD3（+）、CD21（+）、CD38（+）、CD138（+）。

结论：Mikulicz 病 MRI 表现多样，以双侧泪腺受累常见，呈 T1WI 等信号、T2WI 等信号，伴轻中度均匀强化，易与淋巴瘤混淆，MRI 可准确显示病变累及的范围，为临床诊断提供一定的指导意义。

PO-0673

CT 与 MRI 在中枢神经系统神经母细胞瘤诊断中的价值及影像征象分析

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CT 与 MRI 在中枢神经系统神经母细胞瘤诊断中的价值及影像特征分析

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摘要：目的 针对电子计算机断层扫描（CT）及磁共振成像（MRI）在中枢神经系统神经母细胞瘤诊断中的价值，并对其影像学特点进行分析。方法 回顾性选取遵义医科大学附属医院在 2018 年 1 月至 2022 年 12 月期间所收治的疑似中枢神经系统神经母细胞瘤患者 60 例，所有患者行 CT、MRI 检查及病理组织活检。比较病理组织活检检查与 CT 检查、MRI 检查方式的检出结果；比较 CT 检查、MRI 检查的诊断效能；并进行相关影像学特征的分析。结果 60 例疑似中枢神经系统神经母细胞瘤患者经病理组织活检检查后，确诊为阳性 47 例，阴性 3 例。CT 检查诊断为阳性 35 例，阴性 25 例，其中仅有 33 例确诊为中枢神经系统神经母细胞瘤患者；MRI 检查诊断为阳性 48 例，阴性 12 例，其中仅有 47 例确诊为中枢神经系统神经母细胞瘤患者；MRI 检查下的灵敏度、准确度均高于 CT 检查，差异存在明显统计学意义（ $P < 0.05$ ）；但两种检查方式的特异度相比，差异无明显统计学意义（ $P > 0.05$ ）。结论 临床上应用 CT、MRI 均可有效检出中枢神经系统神经母细胞瘤患者的阳性情况，但其中 MRI 具有更高的灵敏度、准确度，临床上可根据患者自身情况选择相应的检查方式应用于患者的辅助检查，便于后续治疗。

PO-0674

基于 3D real IR 序列评估梅尼埃病内淋巴积水与听力损失关系

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目的：探究梅尼埃病（Meniere's disease, MD）内淋巴积水与听力损失特征的关系。方法：回顾性分析 2019 年 4 月至 2022 年 5 月就诊于首都医科大学附属北京友谊医院并确诊为梅尼埃病的 35 例患者（40 耳）。所有患者均行三维真实重建反转恢复（three-dimensional real inversion recovery, 3D real IR）序列的内耳磁共振成像（magnetic resonance imaging, MRI）钆造影检查以及纯音测听检查，参照 2011 年 Gurkov 等提出的判定标准评估有无内淋巴积水、类型及程度。根据纯音测听结果得出平均听阈、临床分期以及中频和高频听阈。比较不同类型内淋巴积水间平均听阈以及临床分期差异，分析不同程度内淋巴积水与平均听阈以及临床分期的相关性，进一步分析耳蜗底转、中转积水程度与高频、中频听力损失的相关性。结果：前庭和耳蜗混合积水的平均听阈和临床分期高于单纯耳蜗或单纯前庭积水（ P 均 <0.05 ），单纯耳蜗或单纯前庭积水与未积水的平均听阈和临床分期均无统计学差异（ P 均 >0.05 ）。前庭积水分级与平均听阈、临床分期以及低频、中频、高频听阈值均无明显相关性（ P 均 >0.05 ）。耳蜗积水分级与平均听阈、临床分期均呈正相关（ r 值分别为 0.470 和 0.438， P 均 <0.01 ），与低频、中频听阈值也呈正相关（ r 值分别为 0.640 和 0.454， P 均 <0.01 ），与高频听阈无明显相关（ $P>0.05$ ）。耳蜗底转积水分级与高频听阈无显著相关（ $P>0.05$ ），中转积水分级与中频听阈正相关（ $r=0.454$ ， $P=0.003$ ）。结论：基于 3D real IR 序列的内淋巴积水类型和部位可用于提示 MD 患者听力损失的程度。

PO-0675

磁共振成像测量脑血管反应性的系统评价

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脑血管反应性(CVR)磁共振成像(MRI)探测脑血流动力学变化对血管舒张刺激的反应。CVR 与血管健康密切相关，因此是研究脑卒中、小血管疾病和痴呆等脑血管疾病的关键参数。MRI 可以在体内测量 CVR，但文献中提出了几种不同的方法，不同的脉冲序列，硬件要求，刺激和图像处理技术。我们系统地回顾了截至 2020 年 6 月使用 MRI 测量 CVR 的出版物，确定了 235 篇相关论文。我们总结了采集方法、实验参数、使用的硬件和 CVR 量化方法、调查的临床人群以及相应的 CVR 总结措施。CVR 在许多疾病如狭窄闭塞性疾病、痴呆和小血管疾病中都有研究，患者的 CVR 通常低于健康对照组。血氧水平依赖(BOLD)采集与固定激励 CO₂ 气体或末潮汐 CO₂ 强迫刺激是最常用的方法。以尾潮 CO₂ 为回归量对 MRI 信号进行一般线性建模是计算 CVR 最常用的方法。我们对 CVR 测量方法和应用的调查将帮助研究人员确定良好的实践，并为未来共识建议的发展提供客观信息。

PO-0676

中耳相关解剖结构的影像定量测量在耳硬化诊断中的价值 HRCT 定量测量与耳硬化症手术相关解剖结构的研究

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【摘要】目的 探讨在中耳相关解剖结构的影像定量测量在耳硬化症诊断中的应用价值。方法 回顾性分析 42 例耳硬化症患者和 42 名正常对照者的颞骨 HRCT 图像，多平面重建并通过标准化处理后测量并评估前庭窗及圆窗各径长，比较两者间的差异，同时绘制 ROC 曲线评估各径长对耳硬化症的诊断效能。结果 耳硬化症患者冠状位前庭窗宽、外口径及横断位圆窗宽深低于对照组 ($P < 0.05$)，其 AUC 值 (曲线下面积) 分别为 0.906 ($P < 0.001$)、0.910 ($P < 0.001$) 及 0.641 ($P < 0.001$)。结论 前庭窗及圆窗的影像定量数据对耳硬化症的诊断具有重要应用价值。

PO-0677

多层螺旋 CT 后处理重建技术对耳硬化症的术前诊断应用价值及对术后听力的评估

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目的:

探讨多层螺旋 CT 重建技术对于耳硬化症的术前预测、影像分型、病灶范围及镫骨底板厚度与听力障碍关系、镫骨小窗技术术后短期与中期的听力效果关系。

方法:

选取 2017 年 1 月~2022 年 6 月在我院就诊并且于外院行耳内镜下行人工镫骨植入术的耳硬化症患者 72 例 (138 耳)，所有患者均行多层螺旋 CT 检查，结合患者术前临床资料及术中资料，进行多平面重建 (MPR)、曲面重建 (CPR) 图像分析，观察病变的影像学表现及其特征，测量镫骨底板厚度，总结多层螺旋 CT 重建技术对耳硬化症的术前诊断价值及术后听力改善情况以及比较病灶范围大小、镫骨底板厚度与听力测试图是否一致。

结果:

72 例 (138 耳) 患者，均无流脓史及中耳、内耳先天发育畸形；双侧患病 66 例 (132 耳)，单侧 6 例 (6 耳，其中左耳 5 例，右耳 1 例)；多层螺旋 CT 重建技术显示混合型 14 耳，蜗型 4 型，窗型 120 耳，重建图像病灶范围大小与听力测试图无相关性，镫骨底板厚度与听力障碍程度有线性相关性；镫骨小窗技术并非百分之百改善听力：5 例 (6.94%) 患者术后听力改善不明显 (术前气导均值 51 ± 11 dB，术后两个月气导均值 47 ± 9 dB，术后半年气导均值 53 ± 14 dB)；4 例 (5.56%) 患者术后听力未好转，随着时间推移听力逐渐加重 (术前气导均值 51 ± 7 dB，术后两个月气导均值 54 ± 18 ，术后半年气导均值 68 ± 13 dB)，63 例 (87.5%) 患者术后听力有所改善，随着时间的推移听力逐渐好转 (术前气导均值 62 ± 12 dB，术后两个月气导均值 52 ± 10 dB，术后半年气导均值 36 ± 9 dB)。

结论:

多层螺旋 CT MPR、CPR 重建技术能够清晰显示耳硬化症病变范围，直接测量镫骨底板厚度来间接评估听力障碍，提高术前诊断阳性率，降低术前漏诊率；镫骨小窗技术对大多数患者的听力有不同程度的改善的趋势。

PO-0678

Logistic 回归联合 ROC 曲线对不同病理亚型 Castleman 病的彩色多普勒超声表现的初步研究

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目的：采用 Logistic 回归联合 ROC 曲线分析不同病理亚型 Castleman 病 (CD) 之间的彩色多普勒超声特点，提高超声诊断率。

方法：回顾性分析 2018 年 1 月至 2022 年 12 月于我院确诊的 21 例 CD 患者【分为 17 例透明细胞亚型 (HV 型)、4 例浆细胞亚型 (PC 型) 两组】的性别、年龄、发病部位等临床表现，收集病灶的是否有淋巴结形态、内部高回声分隔特点、是否有大血管穿入等彩色多普勒超声表现，运用单因素分析得到有明显统计学意义的指标，建立 Logistic 回归模型联合 ROC 曲线分析不同病理亚型 CD 的彩超特点。

结果：①两组患者的性别、厚径 (HV 型 $2.16 \pm 1.18\text{cm}$ 、PC 型 $1.13 \pm 0.22\text{cm}$)、内部高回声分隔、是否有大血管穿入具有明显差异 ($P < 0.05$)；②将上述有统计学意义的 4 个指标作为自变量纳入 Logistic 回归分析，以病理亚型为因变量，根据协变量 P 值删除是否有大血管穿入 ($P = 0.434$) 这一变量后，对余下的三个自变量赋值进行 Logistic 回归分析，多因素回归分析显示女性、厚径、内部高回声分隔三者的 Odd Ratio(OR)值分别为 0.071、14.0、0.044，可得出回归方程： $\text{Logit}(P) = -1.447 - 2.639 * \text{性别} (1=\text{男}; 2=\text{女}) + 2.639 * \text{厚径赋值} (>1.4\text{cm}=1; <1.4\text{cm}=2) - 3.114 * \text{是否内部高回声分隔} (1=\text{否}; 2=\text{是})$ ；③绘制性别、厚度赋值、内部高回声分隔及多参数回归模型的 ROC 曲线，四条 ROC 曲线的 AUC 分别为 0.787、0.787、0.816、0.926，通过 ROC 曲线形态与 AUC 证实多参数回归模型鉴别不同亚型 CD 的彩超表现具有较高的临床价值。

结论：基于性别、厚度、内部高回声分隔三者的回归方程有助于不同病理亚型 CD 之间的彩超特征鉴别，当 CD 患者为女性，彩超显示病灶厚径较大、内部见高回声分隔时应考虑为透明细胞亚型可能。

PO-0679

内淋巴积水与外淋巴强化征象联合对梅尼埃病的鉴别诊断价值

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目的 探讨经静脉内耳延迟增强 MRI 检查评估内淋巴积水 (EH) 和外淋巴强化 (PE) 征象对梅尼埃病 (MD) 与眩晕相关其他内耳疾病的鉴别诊断价值。方法 回顾性分析 55 例眩晕患者的内耳延迟增强三维快速液体衰减反转恢复序列 (3D-CUBE-FLAIR) 图像，评估有无 EH 及积水程度分级，对 PE 征象进行视觉及定量评估。结果 MD 组 19 例，共 20 只患耳，75.00% (15/20) 显示 EH，50.00% (10/20) 显示 PE，45.00% (9/20) 同时显示 EH 及 PE 征象。眩晕相关其他内耳疾病组即非 MD 组 36 例，共 45 只患耳，20.00% (9/45) 显示 EH，55.56% (25/45) 显示 PE，13.33% (6/45) 同时显示 EH 及 PE 征象。出现单纯 EH 征象两组差异有统计学意义 ($P < 0.001$)，出现单纯 PE 征象两组差异无统计学意义 ($P = 0.678$)，同时出现 EH 和 PE 征象两组差异有统计学意义 ($P = 0.005$)。单纯 EH 征象诊断 MD 的敏感度、特异度、阳性预测值及阴性预测值分别为 75.00%、80.00%、62.50%、87.80%，单纯 PE 征象的各项值分别为 50.00%、44.44%、28.57%、66.67%，联合 EH 和 PE 征象的各项值分别为 45.00%、86.67%、60.00%、78.00%。结论 联合 EH 和 PE 征象能提高经静脉内耳延迟增强 MRI 检查对 MD 诊断的准确性，有助于鉴别 MD 与眩晕相关其他内耳疾病。

PO-0680

能谱 CT 最佳单能量伪彩图联合 MPR 在臂丛神经显像中的初探

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目的：探讨能谱 CT 最佳单能量图像联合多平面重组在臂丛神经显像中的价值。

方法：收集 2019-2020 年就诊于重庆医科大学附属第三医院因上肢感觉或运动功能异常行头颈部能谱 CT 检查的患者 31 例图像，测量包括 45、50、55、60、65Kev 值的单能量图像以及混合能量的图像，在冠状位上邻近上下 3 个层面勾画 ROI，计算臂丛神经、斜方肌的 CT 平均值，通过公式 $CNR = (CT \text{ 值肌肉} - CT \text{ 值神经根} / SD \text{ 肌肉})$ 的绝对值，分别计算各单能量下的最佳对比噪声比，再通过最佳单能量曲线分析，找到具有最佳 CNR 时的 Kev 值，再将具有最佳 Kev 值的单能量图像与混合能量图像进行统计学分析，并对图像质量进行主观评分。

结果：与混合能量图像相比，最佳单能量图像联合 MPR 重组技术在臂丛神经的图像质量有所提高，能更好地显示臂丛神经的走行以及与周围肌肉组织的关系。

结论：能谱 CT 的最佳单能量结合 MPR 及伪彩图对臂丛神经的显示具有一定的应用价值。

PO-0681

**八通道颈动脉表面线圈与十六通道头颈相控阵线圈
在颈部磁共振中的应用比较**

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目的：探讨八通道颈动脉表面线圈与十六通道头颈相控阵线圈在 3T 磁共振颈部成像的临床应用比较。方法：回顾性分析 2022 年 7 月至 2023 年 4 月我科飞利浦 ingenia CX 3T 磁共振设备扫描完成的患者 657 例，其中 432 患者采用飞利浦 16 通道头颈线圈检查分为 A 组（对照组），其中 225 例患者采用 8 通道颈动脉线圈分为 B 组（实验组）。分别测量并比较甲状腺、胸锁乳突肌、咽后壁、皮下脂肪的 SNR 及 CNR，由两名经验丰富的影像学诊断医师评价影像质量。结果：SNR 显示的甲状腺、胸锁乳突肌、皮下脂肪实验组均高于对照组具有明显的统计学差异 $P < 0.05$ ，咽后壁实验组低于对照组具有统计学意义 $P < 0.05$ ；CNR 显示的甲状腺、胸锁乳突肌、皮下脂肪实验组均高于对照组具有明显的统计学差异 $P < 0.05$ ，咽后壁实验组低于对照组具有统计学意义 $P < 0.05$ 。主观评价实验组影像质量评分高于对照组。结论：八通道颈动脉表面线圈与十六通道头颈相控阵线圈在 3T 磁共振颈部扫描时，对于鼻咽部以下颈部显示时八通道颈动脉表面线圈优于十六通道头颈部相控阵线圈，可以优先选择。

PO-0682

应用屏气配合指令在头颈 CTA 检查中的应用价值

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目的 探讨应用屏气配合指令对于头颈部 CTA 检查的临床使用价值。方法 分析我院 2020 年 7 月到 12 月间采用 Philips 256 层螺旋 CT (Brilliance i CT) 行头颈部 CTA 扫描的 1740 例病人,所有患者均采用示踪法进行扫描,监测平面均在扫描的起始层面,触发阈值为 100HU。其中 836 名触发阈值后直接扫描的患者标记为 A 组,904 名触发阈值后设置屏气配合指令进行扫描的患者标记为 B 组。

所有患者的图像由两名主管技师进行观察,并记录图像是否存在吞咽运动伪影、血管搏动伪影。分别计算 A、B 两组吞咽运动伪影、血管搏动伪影的发生率。结果 B 组吞咽运动伪影及血管搏动伪影的发生率明显低于 A 组,差异有统计学意义。结论 在头颈部 CTA 检查中应用屏气指令能明显减少图像吞咽运动伪影及血管搏动伪影的发生,减少因为这两种伪影造成的重复扫描,获得更多的优质图像,具有临床应用价值。

PO-0683

基于双源 CT 70KeV 图像影像组学评估结甲背景下微小乳头状癌的诊断价值

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目的 探讨基于双源 CT 单能量 70KeV 图像影像组学模型评估结甲背景下微小乳头状癌的诊断价值。

方法 回顾性收集马鞍山市人民医院术前经双源 CT 评估、经手术病理证实的 85 例患者(共 97 处病灶,其中 55 处结节性甲状腺伴微小乳头状癌和 42 处单纯性结节性甲状腺肿)的临床和影像学资料。用 Syngo.via 生成平扫、动脉期及静脉期 70KeV 图像,导入深睿医疗多模态科研平台,勾画甲状腺病灶感兴趣区,共提取 6459 个影像组学特征。利用 F-检验筛选组学特征。利用 logistic 回归建立基于组学特征的诊断模型。应用受试者操作特性(ROC)曲线评估模型预测结节性甲状腺肿伴发微小乳头状癌的效能。

结果 基于多因素 logistic 回归,将特征降维后的最佳 14 个放射组学特征建立放射组学模型。在训练集和验证集的 AUC 值分别为 0.875、0.795。

结论 基于双源 CT 检查单能量 70KeV 图像影像组学对评估结甲背景下微小乳头状癌具有良好的诊断效能。

PO-0684

探究 AI 底层数据重建算法与传统迭代重建算法对超低剂量头颈 CTA 扫描图像质量的影响

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目的 探究不同比例的 AI 底层数据重建算法对超低剂量头颈 CTA 扫描图像质量的影响。

方法 收集 2023 年 3 月至 2023 年 7 月西安大兴医院进行头颈 CTA 扫描患者 60 例。随机分为两组各 30 例,两组均使用相同的扫描条件,采用 70kV, 150mAs 进行扫描,迭代重建低剂量组记为 A 组,为组 B,经 AI 算法 ClearInfinity 重建的图像记为 B 组。由两名高年资医师对 A 组与 B 组图像采用 5 分法进行主观评价打分,出现意见不统一时,引入第三名医生进行判断。由其他两名高年资诊断医师对患者头颈血管的狭窄程度进行诊断,分为正常,轻度,中度及重度狭窄。将所有图像导入 AI 诊断软件中进行血管识别(左右椎动脉及颈内动脉,大脑中动脉,大脑前后动脉)及血管狭窄程度诊断。将诊断结果与 AI 诊断结果进行对比。

结果 A 组主观评分均值为 4.18 ± 0.52 ,与 B 组评分均值 4.61 ± 0.51 呈现出显著差异($P < 0.05$)。两组血管经 AI 软件进行血管识别的准确度均为 100%。A 组经 AI 软件诊断狭窄程度与医师诊断结果相比,准确率为 50%,10.50%的狭窄程度被低估,39.52%的狭窄程度被高估。B 组准确率为 55.72%,9.20%的狭窄程度被低估,33.10%的狭窄程度被高估。卡方检验结果显示,A 组诊断狭窄效能较 B 组低,有显著差异($p < 0.05$)。

结论与迭代算法相比 AI 算法 ClearInfinity 可以更好的提高图像质量, 超低剂量头颈 CTA 无论是配合迭代算法还是 AI 算法, 均会对 AI 诊断软件的诊断准确度产生影响, 但 AI 算法诊断效能更理想, 可以替代迭代重建算法。

PO-0685

基于 CT 血管造影的血管周围脂肪衰减指数是识别颈内动脉粥样硬化罪魁祸首斑块炎症的生物标志物

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背景: 基于 CT 血管造影 (CTA) 分析的血管周围脂肪衰减指数 (FAI) 可动态反应冠状动脉粥样硬化斑块炎症的变化, 因此可用于识别罪魁祸首斑块。然而, 它尚未应用于颈内动脉 (ICA) 中。本研究旨在评估 FAI 在测量斑块炎症和识别颈内动脉粥样硬化罪魁祸首斑块中的价值。

研究方法: 我们回顾性分析了 2019 年 1 月至 2022 年 3 月期间在我院接受颈部 CTA 检查的颈内动脉粥样硬化患者。根据临床诊断结果分为罪魁祸首斑块组和非罪魁祸首斑块组。我们比较了罪魁祸首斑块组和非罪魁祸首斑块组的斑块类型、斑块体积、斑块负荷和基线数据, 以及最大狭窄处、非狭窄处和整个 ICA 的 FAI。逻辑回归用于评估 ICA 中罪魁祸首斑块的成像标记。使用接收者操作特征曲线 (ROC) 确定 FAI 对双侧 ICA 动脉粥样硬化狭窄患者的罪魁祸首斑块分类的诊断准确性。

结果: 罪魁祸首斑块组 (平均年龄为 64.78 岁 \pm 8.17 岁; 84 名男性) 和非罪魁祸首斑块组 (平均年龄为 66.72 岁 \pm 7.51 岁; 80 名男性) 分别是 101 人和 94 人。在非罪魁祸首斑块组中, 最大狭窄部位和整根血管周围的 FAI 均低于罪魁祸首斑块组 ($P < 0.05$)。在双侧颅外 ICA 狭窄患者中, 动脉粥样硬化性狭窄程度联合最大狭窄处 FAI 的 ROC 分析在预测罪魁祸首斑块方面表现优秀 ($AUC = 0.863$, $P < 0.001$)。

结论: FAI 的无创测量可用于评估和识别 ICA 罪魁祸首斑块的局部炎症, 有助于监测动脉粥样硬化斑块的炎症进展。此外, 最大狭窄部位的 FAI 与狭窄程度联合可以无创预测 ICA 的罪魁祸首斑块, 为风险分层提供了一种新的监测方法, 帮助识别卒中风险患者并指导有针对性的治疗。

PO-0686

海绵状血管瘤的动脉自选回波 (ASL) 一定是低灌注吗?

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目的: 由于颅底骨质和气体的影响, 海绵窦区的海绵状血管瘤和脑膜瘤难以鉴别。由于两者治疗方法不同, 所以利用影像学方法对两者进行鉴别将有助于术前准备以及术式选择。

方法: 该患者使用头颅 CT 平扫、头颅 MRI 平扫加增强以及动脉自旋回波 (ASL) 序列。图像分析和数据处理使用 GE AW4.6 工作站的 Functool 软件进行, 并通过 ASL 自动生成 CBF 图像。

结果: 海绵状血管瘤多是由增加的毛细血管团构成, 没有直接的供血动脉, 因此 ASL 常表现为低灌注。而脑膜瘤有明确的供血动脉, 因此常表现为高灌注。ASL 有利于两者的鉴别。此例患者常规影像学表现更倾向于海绵状血管瘤, 但是由于颅底结构复杂且 ASL 表现为高灌注, 最后影像诊断考虑为脑膜瘤。术后病理证实为海绵状血管瘤。

讨论: 当海绵状血管瘤合并动静脉瘘时, ASL 常表现为高灌注, 因此本例患者可能是由于合并动静脉瘘。由于海绵状血管瘤常合并相关的血管畸形, 所以我们要提高对高灌注海绵状血管瘤的认识。

PO-0687

双层探测器光谱 CT 多参数分析对甲状腺乳头状癌初始复发风险的预测价值

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目的 探讨双层探测器光谱 CT (DLCT) 多参数分析对甲状腺乳头状癌 (PTC) 初始复发风险的预测价值。**方法** 回顾性分析经手术病理证实的 102 例 PTC 患者的临床和影像资料 (低危 75 例; 中高危 27 例)。纳入分析的临床信息包括年龄、性别、身体质量指数 (BMI)、是否合并结节性甲状腺肿、是否合并桥本氏甲状腺炎及术前甲状腺功能。形态学特征包括病灶的大小、位置、形状、纵横比、与包膜接触程度、钙化和囊变。测量动静脉期病灶 DLCT 定量参数包括碘浓度 (IC)、标准化碘浓度 (NIC)、有效原子序数 ($Z_{\text{eff-c}}$)、标准化有效原子序数 ($NZ_{\text{eff-c}}$)、电子云密度 (ED)、40-200keV 单能图像 CT 值和能谱曲线斜率 (λ_{HU})。分别采用卡方检验、t 检验或 U 检验比较低危和中高危患者组在计数及计量资料间的差异。利用二元 logistic 回归分别构建基于临床和形态学特征的临床模型、DLCT 定量参数模型及两者联合模型, 并采用受试者工作特性 (ROC) 曲线评估预测效能。**结果** 低危和中高危患者在性别、病灶大小 (轴位长径)、病灶大小 (轴位短径) 及病灶钙化特征的差异具有统计学意义 ($P=0.022$; $P=0.001$; $P=0.002$; $P=0.024$)。中高危患者病灶的动脉期 IC、动脉期 $Z_{\text{eff-c}}$ 、动脉期 λ_{HU} 、动脉期 $\text{CT}_{40\text{keV}}$ 、静脉期 NIC、静脉期 $NZ_{\text{eff-c}}$ 均显著低于低危患者 ($P=0.013$; $P=0.017$; $P=0.016$; $P=0.015$; $P=0.002$; $P=0.002$)。联合模型预测效能最佳 (曲线下面积为 0.857), 且显著优于临床模型 (曲线下面积为 0.720, $P=0.004$) 及 DLCT 定量参数模型 (曲线下面积为 0.774, $P=0.046$)。**结论** 基于病灶的 DLCT 多参数分析能有效预测 PTC 患者的初始复发风险, 且联合临床和病灶形态学特征能进一步提高预测准确性。

PO-0688

CT 影像特征机器学习预测模型对甲状腺乳头状癌的预测价值

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目的: 建立甲状腺乳头状癌 (papillary thyroid carcinoma, PTC) CT 影像特征 3 种机器学习预测模型, 运用 SHAP (shapley additive explanations) 值分析最佳模型中各 CT 特征在模型中的贡献度。

方法: 回顾分析经病理证实的 426 例 440 枚 PTC 的 CT 影像特征, 并与 467 例 528 枚结节性甲状腺肿 (nodular goiter, NG) 对比, 评估咬饼征、增强后范围缩小/模糊、微钙化和形态不规则 4 个 CT 特征在 2 者中的分布。将 PTC 和 NG 的 CT 影像资料以 8:2 的比例随机分为训练和测试集, 采用极端梯度提升 (XGBoost)、随机森林 (RF) 和支持向量机 (SVM) 构建 3 个机器学习模型。通过受试者工作特征曲线下面积 (area under the curve, AUC)、准确率、F1 评分等, 筛选出最佳模型。使用 SHAP 值解释最佳模型中各 CT 特征对模型贡献度。

结果: 440 枚 PTC 和 528 枚 NG 的 CT 特征中, 咬饼征、增强后范围缩小/模糊、微钙化和形态不规则分别为 326 枚和 30 枚、363 枚和 106 枚、158 枚和 53 枚、354 枚和 52 枚 (P 值均 <0.001)。XGBoost、RF 和 SVM 构建的机器学习模型在训练集上的 AUC、准确度、F1 评分范围分别为 0.884~0.925、0.867~0.871、0.844~0.854, 在测试集上为 0.869~0.923、0.845~0.871、

0.803~0.845, 其中 XGBoost 模型在测试集上诊断效能最高。4 个 CT 特征中, 形态不规则的绝对 SHAP 值最高, 对诊断 PTC 为正向贡献。结论: XGBoost 机器学习模型诊断 PTC 的效能最高; CT 特征中, 形态不规则对诊断 PTC 贡献度最高且为正向贡献。

PO-0689

合成 MRI 对腮腺肿瘤性病变的鉴别诊断价值

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目的: 探讨基于合成 MRI 技术生成的弛豫参数在鉴别腮腺常见肿瘤的应用价值。方法: 回顾性收集 2022 年 05 月至 2023 年 01 月在我院经病理确诊为腮腺肿瘤的 59 例患者纳入本研究。所有受试者均于治疗前行常规 MRI 和合成 MRI 序列, 并测量肿瘤全域 T1、T2 和 PD 值。比较各定量弛豫参数在腮腺多形性腺瘤、Warthin 瘤和恶性肿瘤间的差别。各弛豫参数的诊断效能和比较使用受试者工作特征曲线 (Receiver operating characteristic ROC) 和 DeLong 检验。结果: 腮腺多形性腺瘤的 T2 值大于腮腺恶性肿瘤 ($P < 0.05$), 腮腺多形性腺瘤和恶性肿瘤的 T1 值、T2 值和 PD 值均大于 Warthin 瘤 (P 均 < 0.05)。T2 值鉴别腮腺多形性腺瘤和恶性肿瘤的曲线下面积 (The area under the ROC curve, AUC) 为 0.794; T1 值鉴别腮腺 Warthin 瘤和恶性肿瘤的 AUC (0.939) 高于 T2 值 (0.873, $P=0.341$) 和 PD 值 (0.927, $P=0.891$); T2 值鉴别腮腺多形性腺瘤和 Warthin 瘤的 AUC (0.968) 高于 T1 值 (0.931, $P=0.360$) 和 PD 值 (0.876, $P=0.120$)。结论: 基于合成 MRI 技术的定量弛豫参数有助于鉴别腮腺多形性腺瘤、Warthin 瘤和恶性肿瘤。

PO-0690

动态 X 线摄技术在寰枢椎脱位症的应用研究

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目的: 研究动态 X 摄影技术, 在寰枢椎脱位症诊断应用的初步探讨。

方法: 收集 2019 年 1 月-2022 年 10 月, 因外伤引起的颈部向一侧倾斜头部转向受限且行动尚可的患者 50 例, 年龄 35-65 岁, 男女无差异。采用柯尼卡 Aero C80 动态数字摄影系统采集图像, 患者保持站立, 去除照射部位异物, 生殖器及腺体防护, 采用张口低头、抬头及后仰站位。SID200cm, 根据体厚: 管电压: 75-85KV, 管电流: 150-200mA, 采集时间: 3-6s, 附加滤过: 0.5Al+0.1Cu (mm), 训练张口位移动节律后拍摄动态图像 8fps/s。术前采集 2 次完整完整张口低头、抬头及后仰位时间的图像, 通过 KINOSIS 工作站进行评估。

结果: 50 例患者寰枢椎半脱位 43 例, 确诊 43 例, 显示寰枢椎半脱位、脱位及寰齿间距增宽程度 ($>3\text{mm}$)。假性脱位 6 例, 寰枢椎移位程度及寰齿间距无明显变化; 1 例因配合度等个体差异诊断不明确。统计结果具有统计学意义 ($P < 0.05$)。

结论: 动态 DR 数字成像机通过动态采集图像, 经后处理重建分析, 可得到更多位置及动力位连续的动态影像, 可更准确判断寰枢椎脱位症位移程度及寰枢关节间隙 (寰齿间距) 动态变化, 与传统 DR 张口位、侧位相比, 可减少技师摆位对后期成像的主观判断影响, 提高了图像准确性, 可逐帧观察每个细节体位图像, 为临床诊疗提供更好的影像数据支撑。

PO-0691

双能 CT 定量参数对甲状腺微小乳头状癌 cN0 淋巴结转移的特征分析

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目的：部分术前淋巴结阴性(cN0)的甲状腺微小乳头状癌(PTMC)患者可发现颈淋巴结转移，其危险因素尚不清楚。本研究旨在探讨 cN0 PTMC 患者发生颈部淋巴结转移的临床及双能 CT 影像及定量分析危险因素，有助于筛查 cN0 PTMC 患者中发生颈部淋巴结转移的高风险人群，以进行预防性颈部淋巴结清扫术。

方法：本研究回顾性研究纳入 2020 年 4 月至 2023 年 5 月在我院接受手术的病理诊断为 cN0 PTMC 的患者。根据是否存在颈部淋巴结转移对患者进行分组。对比两组淋巴结临床、影像特征及双能 CT 定量参数的差异。单变量及多变量分析与颈部淋巴结转移相关的临床、影像特征及双能 CT 定量参数危险因素，通过 logistic 回归分析建立风险预测模型，并采用受试者工作特征曲线(ROC)评价其预测能力。

结果：最终纳入 433 例患者，其中 173 例(40%)为颈部淋巴结转移阳性，男性 82 人，女性 351 人。多变量分析显示，男性、年龄 ≤ 45 岁、靠近背膜、不规则边界是颈部淋巴结转移的临床和影像独立危险因素，双能 C T 定量参数中，转移淋巴结动脉期和静脉期 NIC、Zeff-c、 λ HU 是独立危险因素。由以上风险因素组成的风险预测模型中，动脉期 NIC 联合临床及影像特征的诊断效能最显著，AUC 为 0.788，敏感性为 69.6%，特异性为 74.4%。

结论：在 cN0 PTMC 淋巴结转移诊断中，可在双能 CT 影像学特征分析基础上联合定量参数分析，可有效提升对发生颈部淋巴结转移的高风险人群的检出效果，有助于确定是否需要预防性颈部淋巴结清扫术。

PO-0692

腮腺木村病的 MRI 影像 ADC 值和动态增强特征分析

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目的 分析总结腮腺木村病的 MRI 影像特征，并探讨表观扩散系数 (apparent diffusion coefficient, ADC) 值及动态增强特征在木村病诊断中的作用，提高诊断准确性。方法 回顾性分析 15 例经病理验证为腮腺木村病患者的临床资料及 MRI 影像，观察病灶的位置及信号特征，测量 ADC 值及动态增强曲线。结果 15 例患者中男性 12 例，女性 3 例，年龄 14~73 岁，其中 12 例实验室检查有嗜酸性粒细胞增多。根据病灶形态可分为边界清晰的结节状病变和边界不清的弥漫病变，同一患者可同时存在结节状病变和弥漫病变。15 例病灶中 2 例以结节病灶为主，7 例以弥漫病灶为主，6 例介于二者之间；7 例仅累及单侧，8 例同时累及双侧；12 例伴有单侧或双侧颈部淋巴结肿大，3 例颈部淋巴结肿大不明显。弥漫病灶可同时累及颊部、耳后皮下组织，与肌肉组织相比，弥漫病灶 T1WI 呈等或稍高信号，T2 压脂呈高信号，DWI 弥散受限，ADC 值为 $(1.15 \pm 0.28) \times 10^{-3} \text{mm}^2/\text{s}$ ，增强扫描弥漫病灶内可见多发留空小血管影，动态增强曲线多为 I 型（缓慢上升型）。结节病灶多位于腮腺，与肌肉组织相比，结节病灶 T1WI 呈等信号，T2 压脂呈高信号，DWI 明显弥散受限，结节病灶的 T2 及 DWI 信号均高于弥漫病灶，ADC 值为 $(0.65 \pm 0.11) \times 10^{-3} \text{mm}^2/\text{s}$ ，增强扫描结节病灶均呈均匀强化，动态增强曲线多为 II 型（平台型）。颈部肿大淋巴结信号特征及强化特点与腮腺结节病灶类似。结论 木村病可累及腮腺及皮下，同一患者中往往同时存在弥漫病灶

和结节病灶两种形态，二者 ADC 值及动态增强曲线不同，是木村病较为特征的影像学表现，结合嗜酸性粒细胞增高的实验室检查结果，可以提高木村病诊断的准确性。

PO-0693

超高分辨力 CT (U-HRCT) 与高分辨力 CT (HRCT) 诊断窗型耳硬化症敏感性的对比研究

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目的：比较超高分辨力 CT (U-HRCT) 与高分辨力 CT (HRCT) 诊断单纯窗型耳硬化症的敏感性。方法：回顾性纳入 2015 年 8 月至 2022 年 7 月由我院耳鼻喉科疑诊耳硬化症，行术前 CT 检查排除其他病因，手术证实镫骨固定的患者 85 例/耳，其中仅行 U-HRCT (0.1mm 层厚)、HRCT (0.67mm 层厚) 检查者分别为 20 耳、45 耳，同时行两种检查者 20 耳。由不了解临床及手术情况的普通影像医生、头颈影像医生分别评估 CT 诊断报告上对窗型耳硬化症的检出情况，分别比较两组医生、两类仪器对窗型耳硬化症诊断敏感性的差异。

结果：头颈影像医师基于 U-HRCT、HRCT 敏感性分别为 100% (40/40)、89.2% (58/65)，差异有统计学意义 ($p=0.042$)。常规影像医师基于 U-HRCT、HRCT 诊断耳硬化症的敏感性分别为 87.5% (34/40)、41.5% (27/65)，差异有统计学意义 ($p=0.000$)；基于 HRCT，常规影像医师诊断耳硬化症的敏感性显著低于头颈影像医师 ($p=0.000$)，常规影像医师基于 U-HRCT 与头颈影像医师基于 HRCT 诊断耳硬化症的敏感性无显著差异 ($p=0.026$)；在同时行上述两种检查的患者中，UHRCT 显示病变范围小于 1mm 者共 5 例，头颈方向医师基于 HRCT 诊断此类病变的敏感性为 40% (2/5)，低于头颈方向医师基于 HRCT 对 1mm 以上病变的诊断能力 (14/15)。

结论：U-HRCT 可提升窗型耳硬化的诊断敏感性和报告同质性，有潜成为临床疑诊耳硬化症的筛查手段。

PO-0694

基于动态对比增强磁共振成像的纹理特征预测鼻咽癌 放化疗疗效的价值

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目的：本研究拟探讨基于 DCE-MRI 的纹理特征预测鼻咽癌原发灶放化疗疗效的价值。

方法：回顾性分析治疗前行鼻咽/颈部 DCE-MRI 检查且病理证实的 49 例鼻咽癌患者，根据治疗 6 个月后随访的 MR 和/或病理，将患者按疗效分为两组：预后差组（残留或复发）和预后好组（无残留和复发）。对 DCE-MRI 图像进行重建，获得渗透性参数图，并导入 3D Slicer 软件，由两名影像诊断医师逐层勾画感兴趣区域，对分割后的图像进行纹理特征提取（图 1、2）。

结果：

- 1、两名观察者测量的 DCE-MRI 功能图纹理特征参数具有一致性 (ICC 值均 >0.75) (见表 1)。
- 2、纹理特征在评估预后差组与预后好组 NPC 中的比较：预后好组 MinimumKtrans 信号强度、JointAverageKep 大于预后差组，而 AutocorrelationKtrans、JointAverageKtrans、SumAverageKtrans、AutocorrelationKep、SumAverageKep 值均小于预后差组，差异有统计学意义 (P 均 <0.05)，(见表 2)。而 Ve 信号强度图的纹理参数无差异性。

3、纹理特征评估 NPC 疗效效果的诊断效能: Ktrans 及 Kep 信号强度图纹理参数鉴别 NPC 疗效的 ROC 分析 (见表 3)。以 Kep 信号强度的 Autocorrelation、JointAverage、SumAverage 的 3.9974、1.9994、3.9987 为阈值预测 NPC 疗效的曲线下面积最大, 为 0.684, 敏感度为 81.48%, 特异度为 59.09% (见图 3)。

结论:

- 1、基于 DCE-MRI 的纹理特征对疗前预测鼻咽癌放化疗疗效有潜在价值。
- 2、DCE-MRI 的纹理特征中的 Autocorrelationkep、JointAveragekep、SumAveragekep 在评估预后差组与预后好组 NPC 具有更高的鉴别诊断效能。

PO-0695

计算机断层扫描对嗅窝深度的 Keros 分类

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目的: 根据 Keros 分类, 使用计算机断层扫描 (CT) 对嗅窝深度进行评估, 并探讨不同性别及左右侧嗅窝深度的差异。方法: 对 2022 年 6 月至 2023 年 1 月接受了副鼻窦 CT 平扫的 551 例患者进行了回顾性研究, 由两名放射科医生使用 PACS 软件进行评估。结果: 在研究人群中, 男性 342 人 (62.1%), 女性 209 人 (37.9%)。研究人群右侧平均深度为 4.9 mm, 左侧为 5.2 mm。左右两侧差异有统计学意义 (P 值 < 0.05)。在右侧 Keros 分型中, I 型 166 例 (30.1%), II 型 368 例 (66.8%), III 型 17 例 (3.1%); 左侧 Keros 分类中, 131 例 (23.8%) 为 I 型, 392 例 (71.1%) 为 II 型, 28 例 (5.1%) 为 III 型。男性右侧 Keros 分类 I 型 93 例 (27.2%), II 型 239 例 (69.9%), III 型 10 例 (2.9%); 女性右侧 I 型 73 例 (34.9%), II 型 114 例 (54.5%), III 型 22 例 (10.5%)。男性患者左侧 Keros 分类 I 型 83 例 (24.3%), II 型 216 例 (63.2%), III 型 43 例 (12.6%), 女性左侧 I 型 48 例 (22.9%), II 型 136 例 (65.1%), III 型 46 例 (22.0%)。Keros 分类嗅窝深度的总体平均值: I 型为 3.3mm, II 型为 5.6 mm, III 型为 8.6 mm; 左侧 I 型为 3.1 mm, II 型为 5.6 mm, III 型为 8.5 mm; 右侧分别为 3.2mm、5.5mm、8.8mm。男性受试者中, 在女性受试者中。此外, Keros 分类与性别、右侧 (p 值 = 0.002) 和左侧 (p 值 = .001) 变量之间存在显著差异。结论: 我们的研究表明, Keros II 型是最常见的, 其次是 I 型, 然后是 III 型。男性、女性两侧都是 II 型最多见, 男性 II 型右侧多于左侧, 女性 I 型右侧多于左侧, III 型男性、女性均左侧多于右侧。

PO-0696

泪腺 IgG4 相关性病变与炎性假瘤及淋巴瘤的动态增强核磁共振图像定量参数对比分析

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目的 探讨动态增强 MRI (Dynamic contrast-enhanced magnetic resonance imaging, DCE-MRI) 定量参数应用于泪腺 IgG4 相关性病变 (Immune globulin G4-related lacrimal disease, IgG4-RLD) 预判及其与淋巴瘤和炎性假瘤鉴别的价值。方法 收集 2010 年 9 月至 2021 年 12 月期间经病理证实 IgG4-RLD、淋巴瘤以及炎性假瘤患者资料; 其中, 以 IgG4-RLD 为研究对象, 淋巴瘤和炎性假瘤为对照组。采用方差分析、LSD 检验、秩和检验比较三组结果 (Ktrans、Kep、Ve) 差异以及采用 ROC 曲线分析上述结果对于预判 IgG4-RLD 效能, $p < 0.05$ 认为有统计学意义。结果 1、IgG4-RLD 和淋巴瘤、炎性假瘤在 Ve 有统计学差异 ($p < 0.05$); 2、预判 IgG4-RLD 效能: (1) Ktrans:

AUC=0.545, $p=0.5924$; (2) Kep: AUC=0.54, $p=0.6351$; (3) Ve: AUC=0.545, $p=0.5816$; (4) 三参数联合 AUC=0.62, $p=0.1381$ 。结论 Ve 有助于 IgG4-RLD 和淋巴瘤、炎性假瘤的鉴别; 上述任一 DCE-MRI 定量参数预判 IgG4-RLD 效能较低, 而三参数 (Ktrans、Kep、Ve) 联合预判 IgG4-RLD 效能较高。

PO-0697

三维 T2 加权快速梯度回波神经成像判断腮腺内面神经与肿瘤解剖关系的价值

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目的: 评价三维 T2 加权快速梯度回波成像 (three-dimensional T2-weighted imaging fast field echo imaging, T2WI-3D-FFE) 在显示腮腺内面神经 (intraparotid facial nerve, IFN) 和定位肿瘤方面的实用性。

方法: 回顾性纳入了 79 名接受 3D-T2WI-FFE 检查患者的磁共振数据。3D-T2WI-FFE 图像由两名放射科医生独立通过曲线平面重建进行处理。IFN 显示的图像质量以 0-3 分的进行评分。根据直接和两种间接方法[面神经线 (FNL) 和下颌后静脉线 (RMVL)]将肿瘤位置分类为深叶或浅叶。手术定位被认为是最终标准。计算每种方法定位腮腺病变的诊断准确度、敏感度和特异度, 并使用 McNemar 检验进行比较。

结果: 在重建的 3D-T2WI-FFE 图像上, IFN 的主干、颞面干和颈面干显示率分别为 100%、65.8% 和 58.2%。直接法定位深叶病变的诊断准确率、敏感性、特异性、阳性预测值和阴性预测值分别为 96.2%、88.9%、91.7%、80%、98.6%。3D-T2WI-FFE 序列的敏感度及特异度显著优于 FNL ($p < 0.05$), 敏感度优于 RMVL ($p = 0.015$)。肿瘤与 IFN 主干之间的关系在 93.67% 的图像中被正确预测。

结论: 3D-T2WI-FFE 可术前提供腮腺内面神经与相邻结构的详细形态学信息。

PO-0698

CTA 源图像上颈动脉周围脂肪定量与斑块 MRI 易损特征的相关性研究

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【摘要】目的 研究 CTA 源图像颈动脉周围脂肪密度与颈动脉斑块易损特征的相关性。方法 回顾性分析 2016 年 8 月至 2021 年 5 月在徐州医科大学附属医院连续行颈动脉高分辨率 MRI 和颈动脉 CT 血管造影检查的患者。选择颈动脉斑块最大的层面测量, 在颈动脉周围脂肪组织、颈部皮下脂肪组织中分别放置两个感兴趣区域 (ROI) 测量平均颈动脉周围脂肪密度 (PFD) 和颈部皮下脂肪密度 (CSFD), 在同层面使用同种方法测量对侧 (斑块或非斑块侧) 的平均 PFD、CSFD。根据颈动脉斑块的易损特征 (斑块内出血 [IPH]、纤维帽变薄和/或破裂 [TRFC]、富含脂质坏死核心 [LRNC]), 分析 PFD、CSFD 及 PFD/CSFD 与三个不同风险特征亚组之间的相关性。使用 Student t 检验、Mann-Whitney U 检验和卡方检验来比较不同风险亚组之间的差异。 $P < 0.05$ 认为差异具有统计学意义。结果 本研究共纳入 79 例患者, 患者平均年龄 61.2 ± 10.1 岁。与非 LRNC 亚组相比, LRNC 亚组斑块侧 PFD /CSFD 较低 ($P=0.010$)。与非 TRFC 亚组相比, TRFC 亚组斑块侧 PFD 较高 ($P=0.002$), TRFC 亚组斑块侧 PFD /CSFD 较低 ($P=0.004$)。与非 IPH 亚组相比, IPH 亚

组斑块侧 PFD 较高 ($P<0.001$)，IPH 亚组斑块侧 CSFD 较高 ($P=0.013$)，IPH 亚组斑块侧 PFD/CSFD 较低 ($P<0.001$)。PFD、CSFD 与 IPH ($P=0.004$ 、 $P=0.016$) 显著相关。结论 PFD、CSFD 及 PFD/CSFD 与颈动脉斑块易损特征具有相关性，其中 PFD、CSFD 与 IPH 显著相关，因此，PFD、CSFD 有可能被用作斑块不稳定性的影像标志物。

PO-0699

探究脑白质高信号与年龄的因果关联： 一项来自孟德尔随机化的证据

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目的:探究脑白质高信号与年龄之间的因果关联，探索脑白质高信号体积与年龄之间的回归关系。

方法: 我们的大脑成像数据来自一项全基因组关联研究，该研究基于英国生物银行的 39691 个头部多模式成像样本，这其中就包括我们所需要的脑影像学特征即脑白质高信号体积。我们的目的是探索脑白质高信号体积与年龄之间的因果与回归关系。而关于年龄的全基因组关联研究 (Genome-Wide Association Studies, GWAS) 数据则来源于基于 11856 的欧洲人群，有关年龄的单核苷酸多态性 (Single Nucleotide Polymorphism) 为 9851867 个。我们应用双向孟德尔随机化研究方法来分析二者的因果关联。并采用主效应回归法建立脑白质高信号体积与年龄之间的回归关系。同时，对于孟德尔随机化的结果我们进行水平多效性与异质性分析，来保证结果的稳定与可靠。

结果: 在双向的孟德尔随机化分析中，脑白质高信号与年龄之间存在因果关联 (IVW, $\beta=0.151$, $P<0.05$)，而且大于 35 岁后二者呈现正向相关 (相关系数 >1)。孟德尔随机化的结果进行水平多效性与异质性分析均表示结果稳定可靠 ($P>0.05$)。

结论:脑白质高信号体积与年龄高度相关，且存在回归关系，应注意白质的高信号体积与人体衰老密切相关，且在一定年龄范围存在较强的回归关系。

PO-0700

探索多参数脑 MRI 表型与年龄之间的因果关系： 来自孟德尔随机化的证据

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目的: 探讨脑影像学改变与年龄之间的因果关系。

方法: 我们使用双样本孟德尔随机化 (MR) 方法。首先，我们基于英国生物库和年龄 GWAS 数据获得了脑成像表型 GWAS 数据。然后，我们筛选并协调了两个数据库基因以获得工具变量，并使用逆方差加权模型 (IVW) 来确定大脑成像表型与年龄之间的因果关系。我们分析的脑成像表型数据主要来自 T1, T2, DTI 和 SWI 序列，并计算了每个大脑区域的相关参数。最后，我们对 MR 结果进行了异质性和水平多效性验证。

结果: 年龄可导致白质高信号体积增加 (IVW, $\beta=0.151$)。对于弥散图像，小脑下脚 ($L1\beta=-0.128$, $OD\beta=0.173$)，脑脚 ($L1\beta=-0.136$)，额枕上束 ($ISOVF\beta=0.163$) 和边缘系统内的纤维 (扣带回海马，内囊前肢，穹窿嵴终末) 显示出不同程度的损伤和变化。同时，延髓外侧沟、眶内侧沟 (嗅沟) 的表面积以及额叶和颞叶部分区域的皮质厚度也减少 (IVW, $p<0.05$)。

结论: 从因果关系的角度来看，随着年龄的增长，衰老会导致大脑脚和小脑脚之间的白质完整性和连通性以及皮质边缘系统受损。同时，额叶和颞叶经常经历多次萎缩，改变皮质形态。

PO-0701

脊髓型颈椎病 C2/3 颈髓神经元退行性改变与脑灰质体积萎缩相关性研究

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目的：脊髓型颈椎病（Cervical spondylitis myelopathy—CSM）是常见的非创伤性脊髓损伤疾病。除颈髓局部受压外，脊髓型颈椎病还可能导致受压点上段 C2/3 颈髓神经元和脑灰质神经退行性改变。以往针对 CSM 颈髓神经元退行性改变与脑皮质神经元丢失的研究通常都是单独进行探讨。少有研究关注颈髓受压点以上 C2/3 颈髓神经元退化与脑灰质体积（Gray matter volume—GMV）萎缩间的关系。探索 C2/3 神经元退行性改变与脑 GMV 萎缩间的关系有助于寻找脊髓型颈椎病远端神经退行性改变机制的初步线索。

方法：40 例 CSM 患者和 28 例健康对照的两套图像被采集：（1）3D MERGE T2*WI，用于评估颈髓灰白质萎缩；（2）3D BRAVO T1WI，用于计算脑 GMV。使用脊髓工具箱软件计算 C2/3 颈髓形态学测量指标（颈髓横截面面积[CSA]，灰质面积[GMA]，白质面积[WMA]），并进行双样本 T 检验组比较。采用基于体素的形态测量学方法分析两组的脑 GMV。随后计算 CSM 组 C2/3 颈髓形态学测量指标与脑 GMV 改变之间的 Pearson 相关系数。

结果：与对照组相比，CSM 组 C2/3 CSA 和 WMA 显著降低。CSM 组右侧扣带中回 GMV 显著升高，右侧中央后回和左侧补充运动区 GMV 显著降低。CSM 组左侧补充运动区和右侧扣带中回 GMV 与 C2/3 CSA 和 WMA 呈正相关。

结论：相比对照组，CSM 组 C2/3 CSA 和 WMA 显著减少，与以往报道 CSM 随着时间进展颈髓受压点以上 C2/3 神经元缓慢且持续的退行性改变相一致。在疾病发展过程中，神经元退行性改变过程影响传入传出运动感觉通路，导致运动与感觉障碍。从左侧补充运动区到脊髓减少的皮质脊髓投射被认为在 CSM 远端神经元发生退行性改变过程中起到关键作用。C2/3 CSA 和 WMA 萎缩与左侧补充运动区 GMV 丢失之间的正相关表明颈髓上段和脑皮质神经退行性改变表现出一致的变化模式。CSM 组减少的 C2/3 WMA 与升高的右侧扣带中回 GMV 呈显著相关性可能是由于颈髓上段和脑皮质神经元自适应可塑性机制来抑制脊髓受压所导致的临床损伤。

PO-0702

基于 CT 宽探测器系统采用高清体积重建提高颅底图像质量

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目的：在 16cm 宽探测器 256 排 CT 系统中采用高清体积重建算法(VHD)评价颅底图像质量。

材料和方法：前瞻性纳入 40 名成人（第 1 组）在 16cm 宽探测器 256 排螺旋 CT 扫描仪上进行头部 CT 平扫。测量延髓、小脑、脑干、基底节区和半卵圆中心（用作背景）的 CT 值及其标准差（SD），计算信噪比（SNR）和伪影指数（AI）： $AI = \sqrt{SD2ROI} - SD2（半卵圆中心）$ 。将这些值与第 2 组中 40 名成人（在 64 排 VCT 上进行头部 CT 平扫）的值进行比较。所有受试者均采用 120 kVp 和 1.0 秒旋转时间进行扫描，并调整管电流使两个系统具有相近的 CT 剂量指数(CTDI)。结果：两组受试者年龄、枕骨结节厚度、前后径、横径差异无统计学意义。与 64 排 CT 相比，256 排 CT 的图像噪声（HU）在延髓区降低了 27%（ 4.39 ± 0.68 vs. 6.00 ± 1.10 ），在小脑区降低了 24%（ 4.48 ± 0.51 vs. 5.86 ± 0.57 ），脑干区 33%（ 4.14 ± 0.51 vs. 6.17 ± 0.74 ），基底节区 39%（ 3.84 ± 0.58 vs. 6.30 ± 1.19 ），半卵圆中心区 28%（ 3.16 ± 0.37 vs. 4.36 ± 0.42 ），这四个区域的信噪比分别提高了 43%、42%、76%和 65%。此外，256 排 CT 的伪影指数显著降低，延髓降低 25%（ 2.95 ± 0.95 vs. 3.95 ± 0.95 ）。

vs. 3.93 ± 1.61), 小脑降低 20% (3.05 ± 0.93 vs. 3.83 ± 0.88), 脑干降低 40% (2.54 ± 0.92 vs. 4.26 ± 1.14), 基底节区降低 54% (2.00 ± 1.14 vs. 4.33 ± 1.83)。

结论: 与相似辐射剂量下, 与 64 排 CT 系统相比, 在 256 排宽探测器 CT 采用 VHD 重建算法能显著改善颅底图像的噪声和伪影。

临床相关性: 在与 64 排 CT 保持相似的剂量情况下, 在具有 VHD 的宽探测器 CT 上可以获得更好的颅底图像, 以克服锥束和散射等物理挑战。

PO-0703

新冠感染后嗅觉障碍患者的内嗅皮层灰质体积异常

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目的: 新冠病毒感染后出现嗅觉障碍已成为一种常见的临床表现, 但其发病机制仍不清楚。灰质体积是评估脑结构和功能的常用指标之一。本研究旨在探索新冠感染后嗅觉障碍患者与健康对照的脑灰质体积差异, 并使用机器学习算法对其进行分类, 以便深入了解新冠感染后嗅觉障碍的大脑病理生理机制。

方法: 收集新冠感染后嗅觉障碍患者 36 例, 健康对照 36 例。均行 T&T 嗅觉测试 (包括察觉阈和辨别阈值)、嗅觉主观评分 (VAS 评分)、以及 Zung 焦虑自评量表 (self-rating anxiety scale, SAS) 和 Zung 抑郁自评量表 (self-rating depression scale, SDS)。并且行高分辨 T1 磁共振扫描。使用 Freesurfer 进行预处理, 基于 DK 脑模板得到嗅觉障碍患者和健康对照的 34 个脑区灰质体积, 然后进行差异分析得到差异脑区, 对差异脑区结果进行多重比较校正。使用差异脑区体积和 T&T 评分、VAS 评分、SAS、SDS 评分等临床量表进行相关分析。基于差异脑区体积, 使用机器学习算法对嗅觉障碍患者和健康对照进行分类, 利用曲线下面积 (AUC) 评估其准确性。

结果: 患者和健康对照在性别、年龄、受教育程度没有差别。新冠感染后嗅觉障碍患者内嗅皮层的灰质体积变小, 与健康对照存在差别 ($P = 0.02$, Bonferroni 校正)。将其与临床量表进行相关分析, 发现内嗅皮层体积与 T&T 评分 (察觉阈) 呈正相关 (Spearman $r = 0.33$, $P = 0.048$), 说明患者的嗅觉察觉能力越低, 内嗅皮层的体积越大。使用机器学习算法对嗅觉障碍患者和健康对照进行分类, 结果表明使用 K 最近邻算法在测试集得到了最佳的 AUC 值, 为 0.819。

结论: 本研究发现新冠感染后嗅觉障碍患者与健康对照在内嗅皮层灰质体积方面存在差异, 这可能是大脑通过内嗅皮层代偿作用的体现。

PO-0704

高分辨率 CT 联合 MRI 对内耳畸形的诊断及评价

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目的 探讨高分辨率 CT (HRCT) 联合 MRI 对内耳畸形的诊断价值。方法 回顾性分析 82 例内耳畸形患者的 HRCT 及 MRI 资料, 行内耳结构、面神经管的 HRCT MPR、CPR 重建及内听道 MRI 斜矢状位重建, 对内耳畸形进行归类, 并评估面神经管及蜗神经发育情况; 采用连续性校正卡方检验比较内耳畸形与蜗神经发育的关系。结果 内耳畸形共 142 耳, 67 耳行 MRI 检查。2 耳 Michel 畸形, 3 耳耳蜗未发育, 4 耳共同腔畸形, 5 耳耳蜗发育不良, 4 耳不完全分隔 I 型 (IP-I), 61 耳不完全分隔 II 型 (IP-II), 6 耳不完全分隔 III 型 (IP-III), 28 耳前庭、半规管畸形, 26 耳前庭导水管扩大, 3 耳内听道畸形。19.72% (28/142) 有面神经管异常。38.81% (26/67) 蜗神经发育不良

(CND)；重度内耳畸形 CND 明显高于轻度内耳畸形 ($P=0.000$)。结论 HRCT 联合 MRI 可以准确诊断内耳畸形，并能有效评估面神经管及蜗神经发育情况。

PO-0705

18F-FDG PETMRI 对鼻咽癌骨转移的评估价值

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目的：本研究旨在评估氟脱氧葡萄糖 (18F) 正电子发射断层扫描/磁共振成像 (18F-FDG PET/MRI) 在检测鼻咽癌骨转移中的作用。

方法：2018 年 5 月至 2022 年 5 月，58 名经组织学证实的 NPC 患者接受了 18F-FDG PET/MRI 和 99mTc-MDP 全身骨显像进行肿瘤分期。除头部外，骨骼系统分为四组：脊柱、骨盆、胸部和四肢。

结果：58 例患者中有 9 例 (15.5%) 证实有骨转移。在基于患者的分析中，PET/MRI 和骨显像之间没有统计学差异 ($P=0.125$)。一名进行超级扫描的患者被证实有广泛和弥漫性骨转移，并被排除在基于病变的分析之外。在 57 名患者中，所有 48 个转移灶在 PET/MRI 中均呈阳性，其中只有 24 个转移病灶在骨显像中呈阳性 (脊柱：8 个，胸部：0 个，骨盆：11 个，四肢：5 个)。在基于病变的分析中，观察到 PET/MRI 比骨显像更敏感 (灵敏度 100.0%对 50.0%； $P<0.001$)。

结论：与 99mTc-MDP 全身骨显像相比，18F-FDG PET/MRI 在鼻咽癌分期中对骨转移的病灶检出更敏感。

PO-0706

增强 CT 值对桥本甲状腺炎合并甲状腺乳头状癌中央区淋巴结转移的诊断价值

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目的 探讨增强 CT 值对桥本甲状腺炎 (Hashimoto's thyroiditis, HT) 背景下甲状腺乳头状癌 (papillary thyroid cancer, PTC) 中央区淋巴结转移 (central lymph nodes metastasis, CLNM) 的诊断价值。方法 回顾分析经手术及病理证实的 209 例 PTC 患者的中央区淋巴结，将其分为 HT 组与 non-HT 组，其中 HT 组淋巴结 77 枚 (52 枚阴性和 25 枚阳性) 和 non-HT 组淋巴结 132 枚 (74 枚阴性和 58 枚阳性)。在增强 CT 图像上测量淋巴结 CT 值，通过受试者工作特异度曲线分析增强 CT 值在两组中的最佳阈值及相应敏感度、特异度。结果 两组阳性淋巴结增强 CT 值分别为 (103.2 ± 21.1) Hu 和 (101.9 ± 25.4) Hu ($t=0.232$, $P>0.05$)，两组阴性淋巴结增强 CT 值分别为 (72.0 ± 15.8) Hu 和 (68.5 ± 10.9) Hu ($t=-1.377$, $P>0.05$)。HT 组与 non-HT 组增强 CT 值的曲线下面积分别为 0.882 和 0.918，最佳阈值分别为 78.8 Hu 和 74.7 Hu，相应诊断两组 CLNM 的敏感度分别为 92.0% 和 91.4%，特异度分别为 67.3% 和 77.0%。结论 增强 CT 值对 HT 组和 non-HT 组 CLNM 均具有较高的诊断效能，且两者诊断效能相近，为早期临床制定个性化治疗方案提供理论依据。

PO-0707

基于 DECT 的放射组学预测状甲状腺癌 BRAF V600E 突变

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Introduction: This study developed and validated a dual-energy computed tomography (DECT)-based radiomics model for the preoperative prediction of papillary thyroid carcinoma BRAF V600E mutation.

(英文摘要字符过多无法放在此处, 请见摘要附件, 字符 1999)

PO-0708

基于 MRI 的后循环血管形态学因素与单侧突发感音神经性耳聋发生及预后的相关性研究

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目的: 评估基于 MRI 的后循环血管形态学因素与单侧 SSNHL 发生及预后的相关性。

方法: 收集我院 2019 年 4 月至 2021 年 11 月诊断为单侧 SSNHL 并入院治疗的患者的内耳 MRI 3D-T2WI 及增强 3D-T1WI 图像, 分析后循环血管及其形态学特征, 包括: 椎动脉 (vertebral artery, VA) 优势、偏曲的方向, 基底动脉 (basilar artery, BA) 偏曲的方向, 小脑前下动脉 (anterior inferior cerebellar artery, AICA) 优势和血管环的类型; 横窦-乙状窦 (transverse-sigmoid sinus, TS-SS) 和岩下窦 (inferior petrosal sinus, IPS) 优势。并收集患者的一般特征、听力学检查和出院前患者听力恢复情况。

结果: 共有 96 名单侧 SSNHL 患者纳入研究。大多数患者两侧 VA、AICA、TS-SS 及 IPS 不对称 (>85.0%), 多数患者存在 VA 和 BA 偏曲 (>70%)。AICA 血管袢分型中, 左、右耳 Kazawa IA 和 IIA 型、Chavda I 型占多数 (>75%)。随着 VA、BA 偏曲的方向由同侧向对侧改变, 同侧 SSNHL 比例显著增加 ($P<0.05$), 随着 AICA 优势由同侧向对侧改变, 对侧 SSNHL 比例显著增加 ($P=0.005$)。预后相关性方面, 随着患侧 VA 从细到粗的变化, 单侧 SSNHL 疗效的改变呈线性趋势 ($P=0.007$), 且为正相关 (Spearman 相关系数为 0.270), 随着 IPS 由细到粗的改变, 从有效到无效的改变呈线性趋势 ($P=0.026$), 且呈负相关 (Spearman 相关系数为-0.227)。

结论: 患耳椎基底动脉对侧偏曲、同侧 AICA 发育纤细与 SSNHL 发生存在一定相关性, 患耳同侧 VA 优势及同侧 IPS 发育不良多提示预后不良。本研究进一步强调了在 SSNHL 临床诊疗过程中后循环动静脉形态学评估的重要性。

PO-0709

基于“少阳疏泻”探讨针刺风池（阳陵泉） 穴位对前庭性偏头痛毒损脑络机制的多模态影像学研究

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前庭性偏头痛 (vestibular migraine, VM) 是一种反复发作逐渐加重头晕/眩晕、偏头痛相关的常见疾病, 人群总患病率约 2.7%, 其中 21.4% 有家族性 VM 病史。本团队前期研究发现 SLC1A3 基因编码的胶质细胞转运体 EAAT1 代谢异常, 可导致大脑中谷氨酸 (Glu) 过度积累造成兴奋毒性, 导致皮层扩散抑制 (CSD) 和前庭神经-丘脑-皮层通路障碍而诱发 VM。同时, 我们的前期研究发现

后循环血流动力学异常头晕/眩晕患者 fMRI 改变涉及前庭通路及相关脑区灰质体积，针刺少阳经风池穴位，可多节点的调节前庭、视觉和运动相关脑区功能活动，并调整双侧大脑半球前庭和视觉中枢相关脑区局部活动和信息整合；ASL 及 IVIM 序列提示针刺风池治疗头晕/眩晕具有调节微循环灌注效应。据此，本项目初步研究结果提示，针刺风池穴位能通过“少阳疏泻”作用，改善前庭相关脑区的微循环，调节兴奋毒性 Glu 的释放和清除过程，对以“头晕/眩晕、偏头痛”为主要证候的前庭性偏头痛有治疗作用的科学假说，采用静息态 fMRI 技术观察 VM 发现患者脑功能活动变化和灰质体积改变的特点，以探讨患者头晕/眩晕、头痛的微结构基础与中枢病理机制；同时运用 ASL 和 IVIM 成像，发现了 VM 发病的微循环基础，观察针刺风池的干预发现对 ASL 和 IVIM 成像所萃取的脑微循环的改变均有影响，即可能是针刺治疗 VM 的微循环效应；同样采用 DTI 和 MRS 成像技术，观测到 VM 患者的神经传导和谷氨酸代谢状态，以探讨针刺风池穴治疗 VM 毒损脑络的微观基础。通过系列研究，从“少阳疏泻”和“毒损脑络”角度阐明针刺对 VM 的治疗作用，为针刺的神经保护作用提供科学依据。

PO-0710

鼻腔及鼻窦骨化性纤维瘤多模态影像学诊断价值

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【摘要】 目的：分析鼻腔及鼻窦骨化性纤维瘤多模态影像学特征，以提高诊断的准确性。方法：对经病理证实的 27 例鼻腔及鼻窦骨化性纤维瘤患者的临床资料进行回顾性分析，比较其 CT 和 MRI 的形态学及功能学影像学特征。所有病例均行 CT 平扫及 MRI 平扫与增强，其中 17 例行 MRI 动态增强扫描。结果：27 例中病变中心位于右侧筛窦 17 例，双侧筛窦及鼻腔 7 例，左侧额窦 3 例。所有病变均呈膨胀性生长，17 例形态不规则呈分叶状，10 例形态规则呈类圆形；病变边界均清晰，周围结构不同程度受压。CT 表现：病灶表现为类圆形或不规则高密度肿块影，周边出现完整或不完整骨性包壳，其内密度不均匀，含有不同程度钙化，肿块呈膨胀性生长，周围组织受压变形但分界清楚。MRI 表现：27 例中有 20 例肿瘤实性部分于 T1WI 呈等信号，7 例呈低信号；于 T2WI 上 20 例呈低信号，7 例呈高信号。27 例中 20 例信号不均匀，于 T2WI 上夹杂片状高信号影；20 例继发囊变，于 T1WI 上呈低信号，T2WI 呈高信号。增强后肿块实性部分轻中度强化，囊性部分无强化，囊壁及间隔明显强化。多模态影像学诊断阳性率例数多于单行 CT 平扫或 MRI 平扫（ $P < 0.05$ ）。结论：多模态影像学不仅可准确显示鼻腔及鼻窦骨化性纤维瘤的发病部位、大小、形态、内部结构及邻近组织结构的侵及范围，还可以反应肿瘤内部功能学特征，可明显提高诊断准确率。

PO-0711

合成 MRI 技术成像质量评估：在鼻咽癌中的初步研究

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目的：合成 MRI 技术（SyMRI）在一次扫描中可生成多个对比加权图像，包括 T1 加权成像（T1WI）和 T2 加权成像（T2WI）。在脑部和直肠癌中的研究发现 SyMRI 图像（包括 T1WI、T2WI 和 FLAIR）可满足基本临床需求。因此，本研究旨在比较鼻咽癌患者常规与合成 T1WI 和 T2WI 的成像质量。

方法：此项前瞻性研究共纳入 59 名经鼻咽镜确诊的鼻咽癌患者。SyMRI 在造影剂注射前进行。

患者图像质量由两名放射科医生（分别有 21 年和 3 年的肿瘤诊断经验）评估。患者及图像顺序随机。采用 Likert 5 分量表对以下 4 个因素进行评估：1) 病变边缘锐利度（1=不锐利；2=稍锐利；3=中等锐利；4=很锐利；5=非常锐利）；2) 病变显示度（1=难以发现；2=几乎识别不了；3=可识

别; 4=容易发现, 对比度良好; 5=对比度极佳); 3)运动伪影 (1=严重, 难以诊断; 2=稍严重, 可诊断; 3=中等; 4=轻微; 5=无伪影); 4)整体图像质量 (由上述三个因素相加, 1=不可接受; 2=较差; 3=中等; 4=好; 5=极佳)。至于整体图像质量, 评分 ≥ 3 则被认为临床可接受。

采用 Wilcoxon 符号秩检验比较常规与合成 T1WI 和 T2WI 的图像质量评分。两位放射科医生评分间一致性用 Kappa 值评估 (0.21-0.40, 一般; 0.41-0.60, 中等; 0.61-0.80, 良好; 0.81-1.00, 优秀)。

结果: 常规与合成图像质量评分的观察者间一致性为良好或优秀 (Kappa: 0.637-0.919)。常规 T2WI/FS 和合成 T2WI 在病变边缘锐利度、病变显示度、运动伪影和整体图像质量方面的差异没有统计学意义 (P: 0.074-0.835)。然而, 常规 T1WI 图像质量高于合成 T1WI (P 值均 ≤ 0.007)。在整体图像评分方面, 所有合成 T1WI 和 T2WI 图像评分均 ≥ 3 分, 这表明 SyMRI 图像在临床实践中是可接受的。值得注意的是, SyMRI 的 T2WI 带有脂肪模块, 在进行常规 T2WI/FS 与合成 T2WI 比较时, 需要考虑脂肪抑制的影响。

结论: 合成 T1WI 和 T2WI 图像可用于鼻咽部的临床评估, 具有良好的应用前景。

PO-0712

胆脂瘤型中耳炎 HRCT 诊断价值

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利用颞骨薄层 HRCT 多平面重组 (MPR) 及曲面重组 (CPR) 技术评价胆脂瘤型中耳炎患者听骨链 (OC) 破坏情况。方法 将 34 例 40 耳手术病理证实为胆脂瘤型中耳炎患者 CT 轴位、MPR 及 CPR 图像对听骨链破坏的显示情况并与术中对照, 评价各方法的灵敏性与特异性。结果 MPR 重建对锤骨破坏敏感性 & 特异性均为 100%, MPR 重建及 CPR 重组对砧骨破坏敏感性分别为 97.1% 及 91.2%, 特异性均为 100%, MPR 重建及 CPR 重组对镫骨破坏敏感性 & 特异性均为 88.9% 及 84.2%, MPR 重建对锤砧关节骨破坏显示敏感性 & 特异性均为 100%, CPR 重组对砧镫关节骨质破坏敏感性 & 特异性均为 100%。结论 HRCT MPR 及 CPR 技术可以评估胆脂瘤型中耳炎患者听骨链破坏情况, 为外科手术的可行性提供可靠的影像学参考数据。

PO-0713

3.0T MRI 联合低浓度对比剂 CE-MRA 和灌注成像在急性缺血性脑卒中的应用价值

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目的 探讨在 3T MRI 联合低浓度对比剂增强磁共振血管成像 (CE-MRA) 和动态磁敏感灌注成像 (DSC-PWI) 在急性缺血性脑卒中的应用价值。方法 收集南京市第一医院 2017 年 10 月-2018 年 3 月急性脑卒中患者 30 例, 所有患者均接受低浓度对比剂 CE-MRA 和 DSC-PWI 成像, 并于 24 小时内接受数字减影血管造影 (DSA) 检查。CE-MRA 和 DSC-PWI 均使用半剂量对比剂浓度 (0.05mmol/kg)。通过与 DSA 对照, 评估 CE-MRA 对血管狭窄诊断的准确性。CE-MRA 诊断血管狭窄及 DSC-PWI 诊断不匹配区的观察者间一致性检验使用 Kappa 分析。结果 CE-MRA 对头颈动脉低级别 (<50%) 及高级别 (>50%) 狭窄诊断的敏感性、特异性、阳性预测值、阴性预测值分别为 82.4%、100%、100%、93.8% 及 100%、82.4%、93.8%、100%。CE-MRA 诊断动脉狭窄及

DSC-PWI 诊断不匹配区观察者之间一致性均好 (分别为 $\kappa=0.87$ 、 $\kappa=0.86$)。结论 3T MRI 联合低浓度对比剂 CE-MRA 和 DSC-PWI 是一种可行的急性缺血性脑卒中 MRI 扫描方案

PO-0714

双期增强 CT 对桥本甲状腺炎合并微小乳头状癌 中央组淋巴结转移的预测价值

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【摘要】目的 探讨双期增强 CT 对合并桥本甲状腺炎 (Hashimoto's thyroiditis, HT) 的微小乳头状癌 (Papillary thyroid microcarcinoma, PTMC) 中央组淋巴结转移 (Central lymph node metastasis, CLNM) 的预测价值。**方法** 回顾性分析经手术及病理证实的 74 例 108 枚合并 HT 的 PTMC 中央组淋巴结影像资料, 每个中央组取强化最明显淋巴结作为研究对象, 其中阳性 29 枚, 阴性 79 枚。分别测量淋巴结动脉期和静脉期 CT 值, 通过受试者工作特征度曲线 (Receiver operating characteristic, ROC) 获得淋巴结动脉期、静脉期 CT 值的最佳阈值及相应的敏感度、特异度来评估二者的诊断效能。**结果** 29 枚阳性淋巴结和 79 枚阴性淋巴结动脉期 CT 值分别为 ($78.6 \pm 24.8 \text{Hu}$) 和 ($58.7 \pm 16.8 \text{Hu}$) ($t = -4.756$, $P < 0.05$), 静脉期 CT 值分别为 ($79.1 \pm 17.2 \text{Hu}$) 和 ($67.0 \pm 14.9 \text{Hu}$) ($t = -3.349$, $P < 0.05$)。动脉期和静脉期 CT 值在预测 CLNM 的 AUC 值分别为 0.728 和 0.715, 当最佳阈值分别为 55.4Hu 和 76.4Hu 时, 敏感度分别为 89.7% 和 69.0%, 特异度分别为 46.8% 和 74.7%。二者联合预测 CLNM 的 AUC 值为 0.742, 敏感度和特异度分别为 72.0% 和 71.0%。动脉期和静脉期 ICC 分别为 0.926 和 0.892。结论 双期增强 CT 值可一定程度上预测 HT 合并 PTMC CLNM 情况, 动脉期 CT 值敏感度高于静脉期, 而静脉期 CT 值特异度高于动脉期, 二者联合可进一步提高预测 CLNM 的诊断效能。

PO-0715

SHAP 值在 XGBoost MRI 模型中鉴别腮腺恶性肿瘤 与 Warthin 瘤的价值

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【摘要】目的 探讨 SHAP 值在 XGBoost MRI 模型中鉴别腮腺恶性肿瘤 (Malignant Tumor, MT) 与 Warthin 瘤 (Warthin Tumor, WT) 的价值。**方法** 回顾分析经手术病理证实的 22 例 22 枚 MT 和 38 例 51 枚 WT 的 MRI 资料, 分析瘤体形态、强化方式和位置, 以及 T1WI、T2WI、FS-T1WI、FS-T2WI 影像征象, 经单因素分析筛选有统计学意义的征象, 纳入极端梯度提升 (Extreme Gradient Boosting, XGBoost) 模型, 使用受试者工作特征曲线下面积 (Area under the curve, AUC)、敏感度、特异度评价模型诊断效能。再通过 SHAP (SHapley Additive exPlanations) 值进行模型分析, 明确各 MRI 征象在模型中的权重。**结果** 22 枚 MT 和 51 枚 WT 中, 渐进性强化 ($P < 0.05$)、形态不规则 ($X^2=20.707$, $P < 0.05$)、非尾叶 ($X^2=8.911$, $P < 0.05$)、T2WI 高信号 ($X^2=7.581$, $P < 0.05$)、FS-T1WI 等低信号 ($P < 0.05$)、FS-T2WI 高信号 ($X^2=9.016$, $P < 0.05$) 对鉴别 2 者有统计学意义, 且均更常见于 MT 中。将 6 项单因素纳入 XGBoost 模型分析得出

AUC 为 0.847, 敏感度为 77.3%, 特异度为 92.2%; 6 种 MRI 征象绝对平均 SHAP 值为 0.20~0.99, 其中形态不规则权重最大。**结论** 腮腺 MT 与 WT 的 MRI 征象 XGBoost 模型对 2 者的鉴别诊断有重要意义, SHAP 值可对模型中各征象的权重进行量化分析, 明确不同征象的诊断效能。

PO-0716

探究深度学习图像重建和金属伪影减少算法在颌面部 CT 中减少金属植入物伪影价值的研究

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目的: 本研究旨在将深度学习图像重建 (DLIR) 和金属伪影减少 (MAR) 算法相结合, 探究其在不同扫描条件下对带有金属植入物的 CT 图像质量的影响。

方法: 使用设计用于图像质量评估的猪颌面部模型, 在三个剂量水平 (CTDIvol: 20/10/5mGy) 下获取数据。原始数据使用滤波背投影 (FBP)、Veo 自适应统计迭代重建 (AV50) 和 DLIR (TrueFidelity™) 进行重建, DLIR 分为低、中和高三个水平。在不同组织 (近/远脂肪、近/远肌肉、近/远骨) 中选择感兴趣区域 (ROI), 包括有和没有金属植入物和伪影的层面。计算信噪比 (SNR)、对比度噪声比 (CNR) 和金属伪影指数 (MAI), 并由两名有经验的放射科医生在 5 分制 Likert 量表上评估主观图像质量。

结果: (1) 在相同的扫描条件下, 五种算法在不同组织的 Hounsfield 单位 (HU) 值之间没有显著差异。然而, DLIR-L、DLIR-M 和 DLIR-H 的标准差小于 FBP 和 AV50 ($P<0.05$)。 (2) 与 FBP 和 AV50 相比, DLIR 显示出更好的噪声减少效果 ($P<0.05$)。在三种组织中, SNR 的顺序为 DLIR、FBP 和 AV50 呈递减趋势。CNR 在脂肪和肌肉中的顺序为 DLIR、AV50 和 FBP, 骨骼除外。FBP 在近、远脂肪中的 MAI 最高。 (3) 两名观察者在所有三种组织类型中评价具有 MAR 的重建算法具有比没有 MAR 的算法更低的伪影分数 ($P<0.01$, 骨骼的远影和光晕除外, $P=1.0$)。随着 DLIR 水平的增加, 伪影减少的程度更好 ($P<0.05$), 两名观察者一致认为与 FBP 和 AV50 相比, DLIR 在伪影减少方面表现更好。主观图像质量的顺序为 DLIR、AV50 和 FBP ($P<0.01$)。

结论: DLIR 和 MAR 算法的结合可以提高图像质量并显著减少金属伪影, 具有更高的临床应用价值。

PO-0717

不同大小单灶甲状腺乳头状癌中央组淋巴结转移临床风险因素预测研究

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目的 探讨影响单灶甲状腺乳头状癌 (papillary thyroid carcinoma, PTC) 中央组淋巴结转移 (central lymph node metastases, CLNM) 的临床风险因素, 评价年龄在不同性别及桥本氏甲状腺炎 (Hashimoto's thyroiditis, HT) 合并状态下对 CLNM 的预测价值。**方法** 回顾分析 4115 例单灶 PTC 患者的临床资料, 依据肿瘤大小分甲状腺微小乳头状癌 (papillary thyroid microcarcinoma, PTMC) (≤ 10.0 mm) 和 PTC (> 10.0 mm), 通过多因素分析确定影响 CLNM 的独立预测因素, 并均分为男性组、女性组、HT 组、non-HT 组 4 个亚组, 经受试者工作特异度曲线下面积 (area under the curve, AUC) 寻找各亚组中发生 CLNM 的最佳年龄阈值及诊断效能。**结果** PTMC 和 PTC 发生 CLNM 比例分别为 27.2% (937/3451) 和 58.9% (391/664)

($c_2=256.565$, $P < 0.050$)。肿瘤较大 ($OR=1.230$)、男性 ($OR=2.085$)、年龄较大 ($OR=0.960$)、HT ($OR=0.697$) 均与 PTMC 发生 CLNM 的独立相关, PTC 中仅男性 ($OR=1.460$)、年龄较大 ($OR=0.963$) 与 CLNM 独立相关。亚组分析显示 PTC 中男性、HT、non-HT 亚组年龄预测 CLNM 的 AUC 均高于 PTMC, 分别为 $0.642 \sim 0.689$ 和 $0.635 \sim 0.659$; 女性、HT、non-HT 亚组在 PTC 中的年龄阈值均低于 PTMC, 分别为 $38.5 \sim 39.5$ 岁和 $41.5 \sim 42.5$ 岁。结论 PTMC 组中, 男性、肿瘤较大是 CLNM 的危险因素, 年龄较大和 HT 是保护因素, PTC 组中, 男性和年龄较大分别是 CLNM 的危险和保护因素; 在不同性别及 HT 合并状态下, PTMC 和 PTC 患者发生 CLNM 年龄存在一定差异, 正确认识这些差异, 对提供个性化临床治疗具有重要意义。

PO-0718

临床和双能 CT 特征对甲状腺乳头状癌侧颈区淋巴结转移的预测价值

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目的: 探讨临床和双能 CT 特征对甲状腺乳头状癌 (PTC) 侧颈区淋巴结转移 (LLNM) 的预测价值。方法: 回顾性分析术前双能 CT 检查、经病理证实的 263 例 PTC 患者的临床和影像资料。纳入分析的临床和 CT 图像特征包括年龄、性别、甲状腺功能指标、病灶位置、病灶大小、病灶是否合并钙化及囊变。测量平扫和动静脉期双能 CT 定量参数, 包括碘浓度 (IC)、有效原子序数 (Zeff-c)、标准化碘浓度 (NIC)、标准化有效原子序数 (NZeff-c)、双能指数 (DEI) 和能谱曲线斜率 (λHU)。比较 LLNM 组和非 LLNM 组间临床和双能 CT 特征差异。应用受试者工作特性 (ROC) 曲线评估临床特征、双能 CT 特征和两者联合模型的效能, 并计算曲线下面积 (AUC)、灵敏度和特异度。结果: 男性、甲状腺球蛋白异常、甲状腺球蛋白抗体异常、病灶位于上极、病灶最大短轴径 $>10mm$ 、病灶合并钙化的 PTC 患者更容易出现 LLNM (p 均 < 0.05)。LLNM 组动静脉期 IC、NIC 和 DEI 均显著高于非 LLNM 组 (p 均 < 0.05)。联合模型预测效能最高 (AUC 为 0.773; 灵敏度 84.1%; 特异度 65.3%), 其次是双能 CT 特征模型 (AUC 为 0.745; 灵敏度 79.9%; 特异度 67.4%), 两者均优于临床特征模型 (AUC 为 0.642; 灵敏度 62.6%; 特异度 65.3%; p 均 < 0.05)。结论: 相较于临床特征, 双能 CT 特征对 PTC 患者侧颈区淋巴结转移具有更高的预测价值, 两者联合可进一步提高预测效能。

PO-0719

基于个体化脑功能和结构连接对抑郁症诊断的研究

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目的: 抑郁症 (MDD) 患者在神经解剖学和功能上存在着显著的个体差异。但以往大多数神经影像学研究依赖于应用群体水平的大脑模板, 而忽略了个体中存在的大脑网络特征, 个体之间的大脑连接也存在很大差异。相比较单一模态, 利用多模态神经成像特征可以更好来研究抑郁症患者大脑网络之间的相互关系。本研究旨在通过提取个性化的功能连接特征和结构连接特征, 确定两者的结合是否有助于提高分类性能。深入了解 MDD 相关病理生理机制, 以辅助抑郁症的诊断与治疗。

方法: 本研究招募了 142 名重度抑郁症患者和 127 名匹配良好的健康对照者。我们利用数据分析方法提取受试者个体化的功能连接和结构连接特征。将提取的个体化特征进行特征融合, 再进一步使

用支持向量机进行诊断。此外,我们对群体判别 IC 的混合系数与临床数据(包括 HAMD 和 MoCA)进行相关分析,还利用融合后的特征建立线性回归模型,预测 MDD 患者症状严重程度。

结果:通过对每个组分的混合系数进行双样本 t 检验,我们发现一种联合组判别独立成分(IC3),其在两个模态中都存在显著差异。DTI 中存在一个独立成分具有群体鉴别性,即 IC7,同时 rs-fMRI 中有两个独立成分具有组区别性,分别为 FNC-IC10 和 FNC-IC12。融合后的特征使区分患者和对照者的效率显著提高,实现了跨群体区分的高精度。

结论:本研究表明,相比于原始大脑连接,基于个体化的连接组特征可以显著提升诊断抑郁症的能力。本文通过多模态数据融合不仅利用了每种成像方式的优势,而且还探究了 MDD 患者大脑网络之间的相互关系,提供了更多的补充信息,为 MDD 疾病提供更全面的理解。

PO-0720

能谱 CT 单能量技术优化头颈部 CTA 图像质量的研究

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目的 探讨宝石能谱 CT 单能量技术对头颈部 CTA 图像质量优化的临床价值。

方法 选取本院拟行头颈联合 CTA 患者 28 例,采用能谱扫描,其中体重指数(BMI) $\leq 23\text{kg/m}^2$ 用 GSI-51 协议, BMI $> 23\text{kg/m}^2$ 用 GSI-1 协议。扫描完成后,分别重建 60keV、65keV、70keV、75keV、80keV 共 5 组单能量图像,将图像传入 AW4.6 工作站,进行 MPR、VR、CPR 重建。由两名有经验的医师对两组图像质量进行 4 分制主观评分,应用 Kappa 检验比较观察者间评分的一致性;测量主动脉弓、双侧颈总动脉、双侧颈内动脉、双侧大脑中动脉、胸锁乳突肌、脑实质的 CT 值,及双侧颈总动脉、双侧颈内动脉、胸锁乳突肌、脑实质的 SD 值,双侧对称性动脉求其 CT 值、SD 均值,计算出颈部血管的信噪比(SNR)、对比噪声比(CNR)。采用单因素方差分析比较 5 组图像的 CNR、SNR、主观评分,组间对比采用 LSD 检验。

结果 两位医师对两组图像评价结果的一致性较好(Kappa 值均 > 0.800)。获得最佳 CNR 的最佳单能量水平为 60-65keV。5 组图像的 SNR、CNR 及主观评分,差异有统计学意义(p 均 < 0.05),60keV 组和 65keV 组的 SNR、CNR 及主观评分最高,SNR 分别为颈总动脉(66.42 ± 18.84 、 68.04 ± 13.67)、颈内动脉(42.42 ± 13.08 、 43.10 ± 12.98)、大脑中动脉(45.51 ± 12.47 、 45.52 ± 11.47);CNR 分别为颈总动脉(77.22 ± 24.10 、 75.92 ± 24.04)、颈内动脉(77.31 ± 25.47 、 76.03 ± 25.04)、大脑中动脉(39.97 ± 11.99 、 39.45 ± 11.05);主观评分分别为 3.64 ± 0.49 、 3.61 ± 0.50 ,且二者之间无统计学差异(p 均 > 0.05)。

结论 单能量图像约在 60-65keV 可以获得最佳 CNR 的头颈 CTA 图像,宝石能谱 CT 能够提高头颈 CTA 图像质量。

PO-0721

CT 多参数测量预测甲状腺相关眼病视神经病变: 种简单快速的识别方法

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背景:甲状腺眼病视神经病变(DON)可致盲致畸,临床诊断需要多种检查且易和其他疾病混淆,延误病情,亟需快速且可及性高的判断方法。

目的:通过测量甲状腺眼病(TED)患者的眼外肌影像学参数,分析眼外肌影像学参数与疾病严重程度进展的关系,为临床诊断评估 DON 患者建立预测模型。

方法: 回顾性研究了 59 眼 DON 和 107 眼中重度 TED 患者的眼外肌影像学测量参数。采用 ITK-SNAP 对患者的眼眶 CT 图像进行三维重建, 基线垂直于硬腭, 在冠状位 CT 的眶下裂入口平面进行四条直肌和上斜肌长短径、面积及与视神经距离测量。将眼外肌测量参数与疾病严重程度进行相关性分析, 并以此建立 DON 诊断预测模型。

结果: 经差异性分析可知, 中重度 TED 患者和 DON 患者的性别($P<0.001$)、年龄($P<0.001$)、总面积($P=0.001$)、内直肌截面积($P<0.001$)、内直肌截面长径($P<0.001$)、内直肌厚度($P<0.001$)、内直肌截面积/眼眶截面积($P<0.001$)、外直肌-视神经距离($P=0.003$)、上直肌截面积($P<0.001$)、上直肌宽度($P<0.001$)等指标有显著差异。男性、较厚的上直肌和上直肌距离视神经较近是 DON 的重要危险因素, 联合诊断 DON 的二元 Logistic 回归的 ROC 曲线下面积 AUC 值为 0.870, 灵敏度为 78.95%, 特异度为 84.76%, 准确度为 80.86%。

结论: 在眶下裂后出现的冠状面 CT 中, 具有较厚的上直肌、上直肌距离视神经较近的男性 TED 患者具有较高风险进展为 DON, 本研究中采用的单层测量方法及预测模型可作为一种简单可靠的方法辅助临床快速判断患者进展为 DON 的可能性, 及早进行进一步的视觉相关检查以及干预治疗, 防止患者出现不可逆的视功能损害。

PO-0722

内耳畸形和耳蜗神经缺陷对极重度感音神经性听力 损失儿童听觉语言网络发育的影响

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重度先天性感音神经性听力损失(SNHL)阻碍儿童语言发育。人工耳蜗植入和听觉脑干植入可以提供部分听觉, 但语言发展的结果可能会有所不同, 特别是对于内耳畸形和/或耳蜗神经缺陷(IEM&CND)的患者。目前通过临床影像学的目视检查来评估外周听觉结构, 但这种方法对于手术规划和预后判断存在不足。中枢听觉通路由于其精细的皮质下结构, 在体内进行检查也具有挑战性。以往利用功能磁共振对声音的反应定位皮质下听核的尝试并不适用于重度听力损失患者, 因为在这些患者中无法检测到听觉脑干反应, 因此无法在功能磁共振中捕捉到相应的血氧信号。在这项研究中, 我们开发了一种利用结构和扩散 MRI 来定位听觉通路的新方法。我们使用基于 FIXEL-BASED ANALYSIS 的方法来研究外周结构正常的 SNHL 儿童和 6 岁以下 IEM&CND 儿童的听觉语言网络结构发展。我们的研究表明, 语言通路比中枢听觉通路对周围听觉状况更敏感, 这突出了早期干预对深度 SNHL 儿童及时提供语音输入的重要性。此外, 我们还提出了从耳蜗到听觉-语言网络的全面术前评估, 具有良好的临床应用前景。

PO-0723

基于融合多参数 DECT 的亚区生境技术预测 晚期喉癌无进展生存期的临床研究

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目的: 基于 DEC 多参数进行代谢亚区划分的方法(生境分析) 对晚期喉癌患者进行无进展生存期预测

资料和方法: 回顾性收集于 2018 年至 2021 年间在南开大学附属一中心医院进行手术治疗且经病理证实为喉癌的患者共计 118 例。患者在治疗前进行 DECT 检查。采用随机分组的方式(7:3)将

118 例患者分为训练组和验证组。利用 3D-slicer 图像勾画肿瘤全域,得到肿瘤感兴趣区域 (ROI) 后,利用无监督聚类 k-means 算法将肿瘤分为不同亚区。提取不同亚区域的影像组学特征。进行特征降维,用来筛选出有意义的特征,进而预测患者 PFS。对不同亚区的单位碘浓度进行比较。

结果:训练组与验证组之间临床特征基线并无显著的统计学差异 ($p>0.05$)。与从整个肿瘤中提取纹理特征构建的影像组学模型相比,运用生境分析法生成不同亚区纹理特征所构建的模型能够更好地预测喉癌患者的 PFS (训练组 AUC 分别为 0.85 和 0.78)。不同聚类亚区碘浓度分布特征存在显著差异。

结论:我们开发了基于 DECT 不同亚区的生境影像组学模型,它可以对晚期喉癌患者的无进展生存期分层,不同亚区的血管异质性有助于患者生存分层分析。

PO-0724

结节性甲状腺肿的中医证候要素与 CT 平扫特征及灌注参数的相关性研究

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目的:探讨双源 CT 平扫及灌注成像在结节性甲状腺肿中医辨证分型中的应用价值。方法:搜集结节性甲状腺肿患者 92 例,依据中医证型进行分组,总结不同证型结节性甲状腺肿的 CT 平扫特征,分析灌注成像参数。纳入健康志愿者 25 例作为正常组,比较结节性甲状腺肿与正常组,以及各中医证型结节性甲状腺肿的血流量、血容量、表面通透性 (PS)、平均通过时间 (MTT)。结果:92 例中,气滞组 31 例,痰凝组 25 例,血瘀组 16 例,阴虚组 20 例。气滞组多为单发结节,边界清楚;痰凝组多为多发结节,边界一般欠清楚,常有多发钙化灶;血瘀组多边界清楚,病变组织内常有点状钙化;阴虚组多发性结节多见。血瘀组的血流量、血容量与正常组比较,差异均有统计学意义 (均 $P<0.05$);气滞组的 PS 与正常组比较,差异有统计学意义 ($P<0.05$);MTT 组间比较,差异均无统计学意义 (均 $P>0.05$)。结论:双源 CT 平扫及灌注成像可为结节性甲状腺肿的中医辨证分型提供可参考的客观指标。

PO-0725

基于常规影像联合弥散加权成像影像组学 在鼻腔鼻窦良恶性病变鉴别中的应用

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目的:探讨基于常规影像联合弥散加权成像 (diffusion weighted imaging, DWI) 影像组学特征鉴别鼻腔鼻窦良恶性病变的能力。

材料与方法:我院经病理证实的 105 例鼻腔鼻窦恶性病变患者和 95 例鼻腔鼻窦良性病变患者被纳入本研究,并随机分为训练组和验证组 (7:3)。基于常规影像及 DWI 进行影像组学特征提取并降维,建立影像组学诊断模型并计算影像组学评分。采用受试者工作特征 (Receiver operating characteristic, ROC) 曲线评估影像组学评分的诊断效能。对包含 60 名患者的炎症组进行内部验证。结果:基于轴位 T2WI、增强 T1WI 及 ADC 图像,共提取 4065 个组学特征并筛选出 18 个特征用于影像组学模型建立,其中包含 11 个小波特征。组学模型在训练组及验证组均显示较高的诊断效能, AUC 分别为 0.929 和 0.893。

结论: 基于常规 MR 联合 DWI 影像组学特征可以作为一种无创的、客观定量的方法术前鉴别鼻腔鼻窦良恶性病变。

PO-0726

基于影像学无创性评价高颅压准确性的对比分析

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目的 对比无创性评价颅内压的不同影像学方法, 探讨优势与不足。**方法** 收集 2019 年 10 月~2022 年 1 月就诊于首都医科大学附属北京同仁医院的颅高压患者 15 例, 均为女性, 平均年龄 (38.47±9.20) 岁。所有患者行腰椎脑脊液穿刺测量颅内压, 并完成颅脑 CTV、颅脑 MRV 以及包括斜冠状面视神经脂肪抑制 FSE T2WI MR 的颅脑 MRI 检查。基于横窦狭窄指数 (ITSS)、颅脑形态学特征 (包括后巩膜扁平、部分空蝶鞍、联合狭窄评分 CSS<4) 定性评价颅内压增高与否。基于视神经周围蛛网膜下腔宽度 (OSASW) 定性和定量评估颅内压增高与否。ITSS 方法通过颅脑 MRV 观察硬脑膜窦, 对横窦进行分类 (0~4 量表值), 即 0 表示横窦无狭窄; 1 表示狭窄<33%; 2 表示狭窄 33~66%; 3 表示狭窄>66%; 4 表示发育不全或未发育; ITSS=左侧横窦狭窄程度的量表值×右侧横窦狭窄程度的量表值。当 ITSS≥4 时, 认定为存在颅高压; 当 ITSS<4 时, 认定为颅内压正常。基于 OSASW 定量计算公式为: 颅内压 (mmHg) =16.95×OSASW + 0.39×BMI + 0.14MAP-20.9。**结果** 基于 ITSS 方法和颅脑形态学特征定性诊断颅内压增高的准确率分别为 100% 和 93.3%。基于 OSASW 定性诊断颅内压增高的准确率为 86.7%, 定量计算颅内压值为 210.83±28.04mmH₂O, 与腰椎穿刺测量颅内压值 (222.33±31.67mmH₂O) 之间无显著性差异 (t=1.053, P=0.301), 但与腰椎穿刺测量颅内压值相比, 基于 OSASW 测量的颅内压值平均降低 11.5±3.63mmH₂O。**结论** ITSS 是诊断颅内压增高准确性最高的无创性影像学方法, 可定性诊断颅内压有无增高, 然后再应用 OSASW 测量颅内压, 在此数值基础上增加 11.5±3.63mmH₂O 可作为定量评价颅内压的参考值。

PO-0727

3D 高分辨磁共振黑血管壁成像用于评估颈动脉闭塞应用研究

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背景和目的: 颈动脉闭塞是引起缺血性脑卒中的一个重要原因。传统管腔成像技术 (如 CTA、MRA、DSA) 仅可评估闭塞近端血管特征, 无法评估闭塞段及远端血管结构特征。通过使用高分辨磁共振黑血管壁成像评估颈动脉闭塞, 分析图像特征, 以更好地为临床治疗提供信息。

方法: 选取我院 2021 年 1 月-2023 年 4 月 DSA 下行颈动脉造影确诊为颈动脉闭塞患者 32 例并收集整理患者病史资料。所有患者均在 3.0T MR 下行颈动脉 T1-SPACE 序列平扫及增强扫描。通过管壁成像图像评估闭塞起始端位置及信号特定、闭塞段长度范围和闭塞段信号特征、闭塞段血管壁增厚及强化特征。

结果: 32 例颈动脉闭塞患者中, 有症状患者 23 例, 占比约 71.9%, 无症状患者 9 例, 占比约 28.1%; 闭塞段起始端位于颈总动脉 1 例, 颈内动脉 C1 段 27 例, C2 段 2 例, C5 段 1 例, C6 段 2 例。闭塞近端斑块内高信号 4 例, 混杂信号 28 例。闭塞段管腔高信号 12 例, 稍低信号 13 例, 流空信号 7 例, 管腔塌陷 19 例, 管壁增厚 30 例, 管壁明显强化 28 例。管壁成像显示闭塞段长度范围与 DSA 一致的 5 例, 占比约 21.9%, 而 27 例患者管壁成像显示闭塞长度明显小于 DSA 结果。

结论: 高分辨磁共振黑血管壁成像可用于精准显示颈动脉闭塞长度及闭塞段信号特征, 为临床进一步手术治疗提供了准确的参考依据。

PO-0728

基于 Dixon MRI 的全眼眶多参数评估甲状腺眼病活动性

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目的: 磁共振成像 (MRI) 常被用来评估甲状腺眼病 (TED) 活动性。TED 累及眶内多个结构的病理改变, 而以往的研究主要集中在眼外肌或其他单一结构。本研究旨在探讨基于 Dixon MRI 全眼眶多参数对 TED 疾病活动性的诊断价值。

方法: 回顾性纳入 49 例 TED 的患者, 根据临床活动性评分 (CAS) 和 MRI 综合评价将其分为活动期 27 例, 静止期 22 例。所有患者均行 Dixon MRI 轴位和冠状位 MRI 检查。测量眼外肌、眶内脂肪、泪腺的水分数、脂肪分数, 以及眶内脂肪厚度及泪腺突出度。对眶内每个结构的影像参数采用单因素 logistic 回归分析, 将 $P < 0.05$ 的参数分三个组织单独以及联合纳入多因素 logistic 回归模型。采用受试者工作特征 (ROC) 曲线评价单个结构和多个结构联合的模型对于评估 TED 活动性的效能。

结果: 单因素 logistic 回归分析显示, 上直肌水分分数 ($P = 0.018$)、内直肌脂肪分数 ($P = 0.029$)、眶内脂肪水分分数 ($P = 0.004$)、泪腺突出度 ($P = 0.012$) 差异有统计学意义 ($P < 0.05$)。多因素 logistic 回归分析得出眼外肌、眶内脂肪、泪腺的曲线下面积 (AUC) 值分别为 0.774、0.771 和 0.729。将眶内三个结构的 4 个影像参数联合建模, 最终 AUC 为 0.909 (95%CI: 0.828 ~ 0.990; 敏感性, 85.2%; 特异性, 90.9%)。

结论: Dixon MRI 能较好地评估眼眶多个结构, 联合眼外肌、眶内脂肪、泪腺影像学参数可显著提高 TED 疾病活动性评估的诊断价值, 有助于临床医师做出合理的决策。

PO-0729

IQon 光谱 CT 碘密度图影像组学对甲状腺乳头状癌颈部淋巴结转移的诊断价值

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目的 探讨基于 IQon 光谱 CT 碘密度图的影像组学对甲状腺乳头状癌 (PTC) 颈部淋巴结转移的诊断价值。**方法** 回顾性分析 116 例 PTC 患者的 347 枚淋巴结 (205 枚非转移和 142 枚转移淋巴结), 按照 7 : 3 的比例分为训练集和验证集。在碘密度图上手动勾画淋巴结并提取其影像组学特征, 通过最小绝对收缩和选择算子 (LASSO) 回归方法进行组学特征选择和影像组学标签建立。采用 logistic 回归建立基于淋巴结 CT 图像特征 (模型 1)、组学特征 (模型 2) 和两者联合 (模型 3) 的诊断模型。将模型 3 用列线图直观表示, 采用 ROC 曲线及曲线下面积 (AUC) 评估 3 个模型诊断效能。**结果** 模型 1 由淋巴结短径、强化程度、钙化和囊变 4 个特征构成。LASSO 回归共筛选出 9 个组学特征并建立了影像组学标签 (模型 2)。模型 3 由淋巴结的强化程度、钙化、囊变和影像组学标签构成。在训练集和验证集, 模型 3 均具有最优的诊断效能 (AUC 为 0.94、0.91)。**结论** 基于 IQon 光谱 CT 碘密度图的组学分析对 PTC 颈部淋巴结转移具有较好的诊断效能。

PO-0730

多模态磁共振成像评估不同程度 TMD 患者翼外肌信号异常的价值

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目的 通过多模态磁共振（常规 MRI、T1WI-Dixon、T2 mapping）评估不同程度颞下颌关节紊乱病（temporomandibular disorders, TMD）患者翼外肌信号改变，评价 TMD 患者翼外肌脂肪浸润和水肿程度与 TMD 损伤程度的相关性，探讨 T1WI-Dixon 及 T2 mapping 技术在 TMD 患者周围肌肉评估的应用价值。

方法 前瞻性纳入我院初诊 TMD 患者 95 例共 190 个颞下颌关节及正常对照组 25 例共 50 个颞下颌关节，使用 3.0T MRI 对颞下颌关节进行常规序列、T2 mapping 及 T1WI-Dixon 序列扫描。将纳入的颞下颌关节按关节盘位置分组：健康对照组、正常位病例组、可复性前移位病例组和不可复前移位病例组。由两位观察者采用独立盲法在功能序列测量翼外肌 T2 值和脂肪分数（fat fraction, FF）。采用组内相关系数评估两名观察者测量结果的一致性。采用单因素方差分析方法分析各组翼外肌的 T2 值、FF 值之间的差异，用 LSD-t 方法比较每两组之间的差异， $P<0.05$ 为差异有统计学意义。采用斯皮尔曼相关检验评价 T2 值、FF 值与程度分级之间的相关性。

结果 两名观察者获得良好的一致性（ $ICC>0.75$ ）。健康对照组、正常位病例组、可复性前移位病例组和不可复前移位病例组翼外肌的 T2 值依次升高〔（ 35.69 ± 3.06 ）ms、（ 37.97 ± 2.16 ）ms、（ 39.30 ± 2.27 ）ms、（ 40.63 ± 4.71 ）ms; $F=56.378, P<0.001$ 〕，组间两两比较差异有统计学意义（ $P<0.05$ ）；FF 值依次升高（ 9.47 ± 1.51 、 11.15 ± 1.99 、 12.26 ± 2.57 、 16.09 ± 3.47 ; $F=22.50, P<0.001$ ），组间两两比较差异有统计学意义（ $P<0.05$ ）。FF 值、T2 值与 TMD 程度分级的相关性较好，相关系数分别是 $rs(FF)=0.656$ 、 $rs(T2)=0.285$ ，均有统计学意义（ $P<0.05$ ）。

结论 T2 mapping 及 Dixon 成像技术可定量和无创地评估肌肉脂肪浸润和水肿程度，在评价不同程度 TMD 患者翼外肌损伤中具有很好的应用价值。

PO-0731

外中耳畸形伴咽鼓管全程扩大畸形的 CT 表现

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目的：研究外中耳畸形伴咽鼓管全程扩大畸形患者的 CT 特征。**材料与方法：**回顾性分析 19 例（20 耳）外中耳畸形伴咽鼓管全程扩张畸形患者的临床、CT 资料，与 50 例外中耳畸形、咽鼓管无扩大患者对比；测量扩大咽鼓管骨性段横径、长度、咽鼓管总长度、软骨段与骨性段夹角、软骨段与水平面夹角，并与正常耳对比。**结果：**①根据扩张咽鼓管与鼓室关系分为相通组、不通组，二组均显示男性好发、左侧好发，半面短小畸形发生率高。②CT 表现为咽鼓管呈长管状含气管腔，11 耳（55%，相通组 4 耳，不通组 7 耳）咽鼓管在颅底区分叉，上部骨管向前上延申至蝶骨体，下部向下延续为咽鼓管软骨段，沟通鼻咽腔，6 耳伴蝶骨体乳突样气房。③中耳畸形较对照组更严重，尤其不通组；相通组中耳炎发生率低于对照组，不通组 4 例曾患扩张咽鼓管炎症。④与正常耳对比，咽鼓管扩大畸形患者骨性段较长，而总长度较短，不通组尤甚；骨性段与软骨段角度缩小、软骨段与水平面角度增大。**结论：**外中耳畸形伴咽鼓管全程扩大畸形罕见，男性好发、左侧好发，患侧半

面短小畸形发生率高, 中耳畸形较普通外中耳畸形更严重, 尤其不通组。相通组中耳炎发生率明显低于普通外中耳畸形, 不通组可能伴扩张咽鼓管炎症, 体位引流可辅助治疗。

PO-0732

乙状窦源性耳鸣伴正常颅压患者的脑脊液改变

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目的: 探讨乙状窦源性耳鸣伴正常颅压患者的脑脊液流量、流速及体积的改变。**方法:** 入选 2019 年 10 月~2022 年 1 月就诊于首都医科大学附属北京同仁医院的乙状窦源性耳鸣伴正常颅压患者 25 例, 年龄、性别相匹配的正常健康志愿者 35 例。基于 Q-FLOW 序列分析两组在脑脊液流量、流速方面的差异。基于 sT1W_3D 序列分析两组在脑脊液体积方面的差异。**结果:** 乙状窦源性耳鸣伴正常颅压患者和正常健康志愿者相比, 平均速度、峰值速度明显减低 (P 分别是 0.039 和 0.003), 平均流量增高 ($P=0.000$)。两组的返流分数和脑脊液体积均无显著性差异。**结论:** 乙状窦源性耳鸣伴正常颅压患者和正常健康志愿者在脑脊液流量、流速方面存在差异, 具体表现为乙状窦源性耳鸣患者平均速度、峰值速度明显减低, 脑脊液体积无显著性差异。

PO-0733

基于快速自旋回波 TSE-DWI 序列对急性大脑后循环缺血性脑卒中的诊断价值研究

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目的: 分别对临床拟诊为急性大脑后循环缺血性脑卒中患者进行单次激发平面回波 (single short echo planar imaging, ss-EPI) DWI 序列和快速自旋回波 (turbo spin echo, TSE) DWI 序列扫描, 比较两种序列的图像质量、诊断准确性和对病变区域脑组织的表观弥散系数 (apparent diffusion coefficient, ADC) 测量的影响。**方法:** 选取 42 例符合中国中华医学会制定的缺血性脑卒中诊治指南标准的患者, 自发病 72 小时以来, 接受头部 MRI 平扫+MRA 扫描后, 行单次激发平面回波 (EPI-DWI) 序列, 由两位中级以上高年资诊断医师诊断结果为大脑后循环区域部分脑组织可疑弥散受限, 或未发现明显病灶但有相应受损神经定位与临床症状者, 进一步行快速自旋回波 (TSE-DWI) 序列扫描。对比两种序列的扫描图像质量, 分别测量比较可疑病变区域脑组织的 ADC 值, 并取得两组图像的有效检出率, 然后将所得的结果进行配对样本 Wilcoxon 符号秩检验, 分析比较二者之间 ADC 值的统计学差异。**结果:** 通过对比在随访中证实了的梗塞病例, 发现常规 EPI-DWI 组中, 部分患者由于颅底骨伪影严重, 图像磁敏感伪影较大、显示欠清, 从而增加了诊断难度和准确度, 其中准确诊断病灶 34 例, 常规 DWI 序列的有效检出率为 80.9%; 同理, TSE-DWI 组中准确诊断 39 例, 有效检出率为 92.8%, 明显大于 EPI-DWI 组。TSE-DWI 序列的梗塞区域脑实质 ADC 值 $[(0.423 \pm 0.043) \times 10^{-3} \text{mm}^2/\text{s}]$ 低于 EPI-DWI 序列 $[(0.595 \pm 0.051) \times 10^{-3} \text{mm}^2/\text{s}]$, 差异有统计学意义 ($P < 0.005$)。**结论:** TSE-DWI 序列较常规 DWI 序列可以科学有效地减少颅底骨伪影的影响, 提高图像清晰度, 增加诊断信心和准确率, 进而帮助临床医生坚定治疗方案的抉择。

PO-0734

腮腺黏液表皮样癌 MRI 表现

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目的 分析腮腺黏液表皮样癌 (MEC) 的常规 MRI 和 DWI 表现。**方法** 回顾性分析 42 个经病理证实的腮腺 MEC 的术前 MRI 资料, 评估肿瘤的位置、形态、边界、大小、均质程度、信号特征、ADC 值、强化方式、包膜及与周边结构的关系。**结果** 41 例 MEC 患者中 40 例为单侧单发肿瘤, 1 例患者为单侧双发肿瘤, 21 个病灶位于腮腺浅叶, 21 个跨深浅叶。病灶最长径为 $2.5\text{cm} \pm 1.0\text{cm}$, 其中 28 个肿瘤形态不规则, 28 个边界不清, 3 个病灶存在包膜。病灶多表现为等 T1 长 T2 信号, 7 个病灶中 T2 明显高信号区出现分隔状、环状极低信号; ADC 值约 $1.05 \pm 0.17 \times 10^{-3} \text{mm}^2/\text{s}$; 增强后呈中度-明显强化。14 例病灶侵犯周围结构, 3 例发生淋巴结转移。**结论** 腮腺 MEC 的 MRI 表现具有一定的特征性, 有助于准确判断肿瘤的范围及侵犯的结构, 为临床手术方式的选择提供有用的信息。

PO-0735

基于规范建模方法研究梅杰综合征和面瘫患者脑区灰质体积差异

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目的: 本研究旨在探究梅杰综合征 (MS)、面瘫 (FP) 和健康对照组 (HC) 之间不同脑区的灰质体积差异, 以揭示梅杰综合征和面瘫的神经机制。

方法: 本研究招募了来自中日友好医院神经外科的 53 名 FP 患者、31 名 MS 患者以及 102 名 HC。对于 MS 患者, 使用 Burke-Fahn-Marsden 肌张力障碍评定量表(运动部分)(BFMDRS-M)和眼睑痉挛残疾指数 (BSDI) 评估严重程度。对于 FP 患者, 使用多伦多面部分级系统量表 (TFGS) 评估面部功能。通过 3.0T 磁共振成像获取高分辨率结构图像, 并使用 mri_qc 工具包生成数据质量报告。皮质厚度分析使用 Freesurfer 6.0 处理结构图像, 计算 Desikan-Killiany 图谱的 34 个脑区体积。规范建模基于国际上数十个研究共同研发的脑图表 (Brainchart), 估计了来自中日友好医院的每个被试的差异百分位数。使用四种机器学习分类算法 (随机森林、支持向量机、极限梯度提升和最近邻) 对 FP-CN, MS-CN 和 FP-MS 进行分类建模。

结果: 本研究重新匹配了 FP、MS 和 HC, 使其在年龄和性别上保持一致: FP 组 (年龄: 43.6 岁) 和对应的 HC 组 (年龄: 41.2 岁), 以及 MS 组 (年龄: 58.3 岁) 和对应的 HC 组 (年龄: 52.1 岁)。在 FP 和 MS 患者比较中, 灰质体积在前扣带回尾部 ($P=0.032$)、前扣带回头部 ($P=0.002$) 和枕外侧 ($P=0.028$) 存在差异 (Bonferroni 校正)。在 FP 患者中, 前扣带回尾部与连带运动评分呈显著相关关系 ($r=-0.30$, $P=0.036$), 在 MS 患者, 前扣带回尾部与 BMDRS-嘴部分 ($r=-0.40$, $P=0.014$)、BMDRS-口下颌部分 ($r=-0.37$, $P=0.036$) 和 BMDRS 总分 ($r=-0.33$, $P=0.047$) 呈显著相关关系。规范建模研究发现, 低于 2.5% 的 MS 和 FP 患者中, 前扣带回尾部、颞上沟和枕外侧显示出异常。此外, 使用差异脑区特征进行机器学习分类, 结果表明 AUC 均达到了 0.8 以上。**结论:** 本研究揭示了面瘫、梅杰综合征和健康人之间的脑区体积差异, 前扣带回尾部被证明是重要的脑区。

PO-0736

基于能谱 CT 碘图的影像组学诊断甲状腺乳头状癌 颈部淋巴结转移的价值

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目的：探讨基于能谱 CT 碘图的影像组学特征对甲状腺乳头状癌患者颈部转移性淋巴结的诊断价值。
方法：收集术前两周行颈部能谱 CT 检查的甲状腺乳头状癌患者，共纳入 117 枚转移性和 176 枚非转移性淋巴结，按照 3:1 的比例随机分为训练集和验证集。从静脉期碘图中提取并筛选淋巴结的影像组学特征。采用 Logistic 回归分别建立影像组学模型、CT 图像特征模型及联合模型，并绘制列线图将联合模型可视化。各模型的诊断效能、校准能力及临床实用性分别通过 ROC 曲线、校准曲线及决策曲线分析评估。结果：联合模型在训练集和验证集中均表现出最佳的诊断效能，其次是影像组学模型，且两者显著优于 CT 图像特征模型 ($P<0.05$)。所有模型均显示出良好的校准能力，决策曲线分析表明列线图的临床实用性优于其余两种模型。结论：能谱 CT 的影像组学特征在诊断甲状腺乳头状癌淋巴结转移方面表现出良好的性能，联合 CT 形态学特征后诊断效能进一步提高，可作为辅助临床决策的有用工具。

PO-0737

梅尼埃病患者前庭及耳蜗内淋巴积水程度 与临床分期之间的相关性研究

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目的 探讨梅尼埃病患者前庭及耳蜗内淋巴积水程度与临床分期之间的相关性。
方法 选取 161 例梅尼埃病患者共 172 耳，对所有患者均行内耳钆造影 MRI 及纯音听阈检查，依据患耳纯音听阈检查结果进行临床分期，并将前庭及耳蜗内淋巴积水程度与临床分期进行相关性分析。
结果 本实验 161 例患者（共 172 耳）的前庭与耳蜗内淋巴积水部位所致听力损失程度之间存在显著差异；前庭与耳蜗不同积水程度与梅尼埃患者临床分期之间均存在正相关性 ($P<0.05$)。
结论 梅尼埃病患者前庭及耳蜗内淋巴积水部位和积水程度与患者临床分期之间存在相关性，依靠内耳磁共振钆造影检查评估的前庭及耳蜗内淋巴积水部位及积水程度变化可以为患者临床分期提供帮助。

PO-0738

小唾液腺癌在多形性腺瘤中的影像学表现

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目的：描述小唾液腺癌在多形性腺瘤中的 CT 和 MRI 影像学特征，并分析各种特征与病理分型的相关性。
方法：收集 43 例经手术病理证实的小唾液腺癌在多形性腺瘤中，其中 39 例术前行增强 CT 检查，1 例行平扫 CT 检查，4 例行增强 MRI 检查，2 例同时行增强 CT 和 MRI 检查。回顾性分析 CT 和 MRI 表现，并将其与病理分型相关联：非侵袭性癌（I 型，11 例）、微侵袭性癌（II 型，5 例）和侵袭性癌（III 型，27 例）。通过 t 检验计算 I/II 型和 III 型之间肿瘤最大径的差异。采用卡方检验分析 I/II 型和 III 型之间肿瘤形态、边界、内部结构、骨质侵犯和颈部淋巴结转移等情况与病理分型的相关性。
结果：43 例小唾液腺癌在多形性腺瘤中，18 例位于腭部，11 例位于颊部，5 例位于咽旁间隙，5 例位于上颌骨，2 例位于上颌窦，1 例位于舌根，1 例位于下颌骨。83.7%（36/43）的肿瘤边缘呈

分叶状；81.4% (35/43) 内部出现囊变或坏死，呈现不均匀强化；37.2% (16/43) 可见钙化灶；25.6% (11/43) 出现邻近骨质压迫性吸收。75% (12/16) 的 I/II 型肿瘤形态规则（圆形或卵圆形），77.8% (21/27) 的 III 型肿瘤形态不规则。93.8% (15/16) 的 I/II 型肿瘤边界清楚，66.7% (18/27) 的 III 型肿瘤边界模糊。59.3% (16/27) 的 III 型肿瘤出现溶骨性骨质吸收。通过 t 检验分析，I/II 型肿瘤平均最大径小于 III 型， $P < 0.05$ 。通过卡方检验显示肿瘤的形态、边界、溶骨性骨质吸收这三种影像特征与病理分型相关， $P \leq 0.001$ 。4 例 III 型肿瘤侵犯颅内。颈部淋巴结转移共 5 例（1 例 I 型，4 例 III 型）。肺转移 1 例（II 型）。

结论：大部分小唾液腺癌在多样性腺瘤中的 CT 和 MRI 表现以分叶状，不均匀强化为特征。I/II 型肿瘤多呈圆形或卵圆形、边界清楚；III 型肿瘤多数形态不规则、边界模糊且更易出现溶骨性骨质破坏；形态、边界和溶骨是区分 I/II 型和 III 型肿瘤的重要依据。肿瘤内钙化可视为癌在多样性腺瘤中的特异性征象。

PO-0739

抑郁症区域结构-功能连接耦合及其与基因表达谱的关联分析

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背景：结构-功能连接 (Structural-Functional connectivity, SC-FC) 耦合最近已被用于描述抑郁症结构拓扑特性的功能动力学，然而，SC-FC 耦合在人脑内具有明确的层次结构。当前的研究忽略了 SC-FC 耦合的区域变异性和其背后的生物学机制，早期精准诊断仍然是临床工作中的难题。

材料与方法：采集 135 名健康对照和 163 名抑郁症患者 DTI 和 rs-fMRI。使用 Spearman 等级相关构造每个区域的网络间和网络内 SC-FC 耦合；提取差异区域 SC-FC 耦合作为特征，基于 SVM 构建机器学习预测模型；采用偏最小二乘法回归算法进行跨样本基因空间相关分析，并对相关基因进行功能富集分析。

结果：抑郁症患者表现出眶部额下回、补充运动区、枕中回、中央旁小叶、豆状壳核、豆状苍白球和颞上回的 SC-FC 耦合减弱，顶上回和顶下缘角回的 SC-FC 耦合增强。基于差异区域 SC-FC 耦合实现了较好的分类性能 (AUC=0.9)。发现 42 个过表达和 157 个低表达基因构成了抑郁症患者区域 SC-FC 耦合相关基因列表。GO 生物学过程包括 RNA 聚合酶 II 启动子转录的正、负调控，细胞内信号转导，蛋白磷酸化，凋亡过程。

结论：基于区域的 SC-FC 耦合可作为抑郁症早期诊断新的生物学标志物，神经影像学和转录组学之间存在一定的相关性，富集分析进一步解释了与抑郁症相关的生物学途径。

PO-0740

多灶性甲状腺乳头状癌高容量淋巴结转移临床风险因素研究

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目的 探讨年龄、性别和桥本甲状腺炎 (Hashimoto's thyroiditis, HT) 对多灶性甲状腺乳头状癌 (multifocality Papillary thyroid carcinoma, m-PTC) 高容量淋巴结转移 (high-volume lymph node metastases, HVM) 的预测价值。方法 回顾性分析 566 例多灶性甲状腺微小乳头状癌 (multifocality Papillary thyroid microcarcinoma, m-PTMC; $d \leq 10\text{mm}$) 及 381 例 m-PTC ($d > 10\text{mm}$) 的临床病理资料, 通过单因素及多因素分析不同年龄、性别、HT、瘤体数目和大小下的 HVM 情况。结果 566 例 m-PTMC 和 381 例 m-PTC 中, 发生 HVM 的比例分别为 4.6% (26/566) 和 21.5% (82/381) ($\chi^2=64.588$, $P<0.05$)。单因素分析显示, m-PTMC 和 m-PTC 组中, 男性和女性发生 HVM 的比例分别为 15.3% (11/72) 和 3.0% (15/494) ($\chi^2=21.487$, $P<0.05$)、33.2% (35/106) 和 17.1% (47/275) ($\chi^2=11.492$, $P<0.05$)。HVM 阳性及阴性组的中位年龄分别为 41.0 岁和 47.5 岁 ($Z=-2.128$, $P<0.05$)、37.5 岁和 48.0 岁 ($Z=-4.987$, $P<0.05$)。瘤体最大径中位值分别为 7.0mm 和 6.0mm ($Z=-2.558$, $P<0.05$)、17.5mm 和 15.0mm ($Z=-2.871$, $P<0.05$)。最大径和年龄预测 m-PTMC 和 m-PTC 组 HVM 的阈值分别为 8.8mm 和 19.5mm、38.5 岁和 44.5 岁。多因素分析显示, 瘤体最大径较大、男性和年龄较轻均为 m-PTMC 和 m-PTC 发生 HVM 的独立风险因素, 优势比 (OR) 分别 3.027 和 2.378、5.398 和 1.909、3.889 和 3.136。结论 m-PTC 组发生 HVM 比例高于 m-PTMC 组; 最大径较大、男性和年龄较轻均是 m-PTMC 和 m-PTC 发生 HVM 的独立风险因素, 但最大径及年龄阈值存在一定差异。

PO-0741

高分辨率磁共振血管壁成像技术在诊断
头颈动脉夹层中的应用价值

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目的 分析高分辨率磁共振 (high-resolution magnetic resonance imaging, HR-MRI) 成像用于评价头颈动脉夹层的可重复性, 探讨高分辨率血管壁成像技术在诊断头颈动脉夹层中的应用价值。方法 回顾性分析 2019 年 7 月—2023 年 4 月间于龙华区人民医院就诊的确诊头颈动脉夹层病人 28 例, 使用飞利浦 Ingenia 3.0T 磁共振扫描仪和 16 通道头部线圈。检查包括常规头颅 MRI, 3D-时间飞跃法磁共振血管造影 (time of flight magnetic resonance angiography, 3D-TOF MRA) 及 HR-VWI, 扫描序列包括 T1WI、T2WI、FLAIR、弥散加权成像 (diffusion-weighted imaging, DWI) 和 3D-VISTA T1WI。由 2 名放射科医生对 CTA 和 HRMRI 影像进行双盲分析, 评价内容包括发病部位、有无内膜片、双腔征、壁内血肿、血肿累及范围、管腔有无狭窄或闭塞等。计算 CTA 和 HR-VWI 在血管节段水平诊断夹层的准确性。结果 28 例病人中共诊断 31 支血管存在夹层 (3 名病人为双侧), 其中累及颈内动脉 10 支、椎动脉 20 支、大脑中动脉 1 支。CTA 正确诊断 10 支血管存在夹层 (10/31, 敏感度 32.3%), 其中 3 个血管节段见双腔征。HRMRI 正确诊断 30 支血管存在夹层 (30/31, 敏感度 96.8%), 其中 21 支血管见壁内血肿, 16 支血管见双腔征, 12 支可见强化内膜瓣; 20 支见管腔狭窄或闭塞。观察者内与观察者间对斑块强化等级评价一致性高 ($Kappa > 0.75$)。结论 高分辨率血管壁成像评价头颈动脉夹层的可重复性好, 可显示头颈动脉夹层的管壁特征, 可作为动脉夹层诊断和随访的一线检查技术。

PO-0742

双期增强 CT 对甲状腺乳头状癌淋巴结转移的诊断价值： 强化值、比值和差值的对照研究

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摘要：探讨淋巴结平扫和双期增强（动脉期和静脉期）CT 值、淋巴结双期增强 CT 值与肌肉和淋巴结平扫 CT 值的比值与差值、淋巴结动脉期 CT 值/静脉期 CT 值比值对甲状腺乳头状癌（Papillary Thyroid Carcinoma, PTC）淋巴结转移的诊断效能。

方法：回顾分析 84 例 143 枚 PTC 转移阳性与 132 例 172 枚转移阴性淋巴结的 CT 平扫、动脉期和静脉期影像资料，所有淋巴结均经手术病理证实。测量淋巴结和同侧胸锁乳突肌平扫、动脉期和静脉期 CT 值，计算淋巴结双期增强 CT 值与胸锁乳突肌 CT 值、淋巴结平扫 CT 值的比值与差值，以及淋巴结动脉期 CT 值/静脉期 CT 值比值，通过操作者执行曲线（ROC），寻找鉴别 PTC 淋巴结转移的最佳 CT 值阈值和相应的诊断效能。

结果：143 枚阳性淋巴结和 172 枚阴性淋巴结平扫 CT 值、动脉期 CT 值和静脉期 CT 值分别为 46.8 ± 8.9 和 42.6 ± 6.0 ($P < 0.001$)、 111.9 ± 33.3 和 66.1 ($56.8, 76.9$) ($P < 0.001$)、 99.07 ± 23.3 和 75.5 ± 14.0 ($P < 0.001$)，其中动脉期 CT 值对淋巴结转移具有最高的诊断效能，AUC、敏感度和特异度分别为 0.877、0.901 和 0.769。淋巴结动脉期 CT 值与胸锁乳突肌 CT 值、平扫淋巴结 CT 值的比值和差值对淋巴结转移诊断的 AUC、敏感度和特异度范围分别为 (0.838~0.88)、(0.907~0.959) 和 (0.692~0.755)，静脉期分别为 (0.719~0.817)、(0.773~0.860) 和 (0.50~0.568)，淋巴结动脉期 CT 值/静脉期 CT 值分别为 0.751、0.837 和 0.494。

结论：在双期增强 CT 对 PTC 颈部淋巴结转移的鉴别诊断中，动脉期具有更高的诊断效能，但鉴于特异度较低，需要结合临床和其他影像学征象综合判断。

PO-0743

两种体素内非相干运动弥散加权成像在鼻咽癌中的对比研究： 自旋回波技术和平面回波技术

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目的：体素内非相干运动弥散加权（Intravoxel incoherent motion diffusion-weighted, IVIM）磁共振成像相关灌注参数在头颈部肿瘤的表征和预测中有极大潜力。以往鼻咽癌患者的 IVIM 成像选用平面回波技术 EPI，磁敏感伪影影响极大。本研究通过评估 IVIM 两种成像技术-自旋回波 TSE 和 EPI 在鼻咽癌区域的定性和定量指标，比较两者之间的优劣性。

方法：30 例鼻咽癌患者接受了治疗前分期 MRI 检查（16 通道头颈部线圈，Ingenia 3.0T），序列包含 TSE-IVIM 和 EPI-IVIM。对 IVIM 图像四个解剖结构进行主观和客观的评估，包括鼻咽病变区域、鼻甲、第三颈段脊髓和颞极。主观评价指标（磁敏感伪影、几何畸变、病变显著性和整体图像质量的五点量表）施行相关样本的 Wilcoxon 符号秩检验。定量指标，包括 SNR、CNR、ADC 和 IVIM 衍生参数 (D , f , D^*) 施行配对 t 检验。Bland-Altman 和变异系数 (CV) 用于分析 ADC 和 IVIM 衍生参数之间的可重复性和稳定性。

结果：TSE-IVIM 在鼻咽病变区域、鼻甲和颞极的主观评价指标上明显优于 EPI-IVIM (p 值均小于 0.001)，而在脊髓方面无显著差异。TSE-IVIM 脊髓和颞极的客观评价指标 (SNR 和 CNR) 显著低于 EPI-IVIM，而在鼻咽病变区域和鼻甲无显著性差异。TSE-IVIM 的 f 值在鼻咽病变中显著低于 EPI-IVIM，脊髓 TSE-IVIM 的 ADC 和 D^* 值显著高于 EPI-IVIM。Bland-Altman 分析显示两成像技术

在鼻咽病变区域和鼻甲的一致性 (LoAs) 范围很广。EPI-IVIM 的 ADC 及 IVIM 相关参数 CV 值较大, 值变化范围较 TSE-IVIM 大。

结论: TSE-IVIM 在鼻咽病变区域和鼻甲区表现出更好的图像质量和更稳定的定量参数, 在图像主观评分和信噪比不显著降低的情况下, 可见的磁敏伪影和图像畸形显著减少。由于在鼻咽区域两个序列之间的 f 值和 CV 不同, 并存在较宽 LOAs, 我们建议在鼻咽病变患者的 IVIM 评估中使用 TSE 技术。

PO-0744

颈部血管超声与高分辨率磁共振成像评估 单侧颅外段椎动脉夹层的一致性研究

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目的 探讨颈部血管超声 (CDU) 与高分辨率磁共振成像 (HRMRI) 评估单侧颅外段椎动脉夹层 (VAD) 的一致性。

方法 1. 回顾性连续纳入 2017 年 1 月至 2023 年 3 月在苏州大学附属第一医院卒中中心就诊, 因突发颈部或后枕部疼痛、有颈部外伤或按摩史、头痛伴随出现神经功能障碍等临床疑似颈部动脉夹层的患者 493 例, 入院经一站式计算机断层扫描 (CT) 排除 33 例, CDU 及 DSA 排除 328 例, 最终纳入临床高度怀疑为单侧 VAD 的患者 132 例, 同期行 CDU 与三维 HRMRI 检查 (间隔 ≤ 48 h), 并以三维 HRMRI 检查结果作为参考标准, 采用 Kappa 一致性检验分析 CDU 评估单侧颅外段 VAD 的敏感度、特异度及准确性。2. 通过 CDU 与 HRMRI 分别观察并记录颅外段 VAD 夹层病变部位及影像征象等, 采用北美症状性颈动脉内膜切除试验 (NASCET) 方法计算血管狭窄程度, 并将二者检查结果进行 Kappa 一致性分析。

结果

1. 一致性分析: 132 例患者中, 124 例经 HRMRI 确诊为单侧颅外段 VAD 者, 中位年龄为 38 (33, 48) 岁, 其中男性 57 例 (46.0%)。CDU 评估单侧颅外段 VAD 的阳性率为 93.2% (123/132), HRMRI 的阳性率为 93.9% (124/132), 二者一致性很强, Kappa 为 0.87 ($P < 0.001$); 以 HRMRI 为参考标准, CDU 检查颅外段 VAD 的敏感度为 99.2%, 特异度为 87.5%, 准确率为 86.7%。2. CDU 与 HRMRI 影像征象: VAD 最常见的发病部位为椎动脉的椎间段; 两者评估双腔征、腔内血栓、夹层动脉瘤、管腔不规则、病变部位及血管狭窄程度均一致性很强, Kappa 值分别 1.00、0.80、0.85、0.88、0.94、0.89 (均 $P < 0.001$); 两者评估壁内血肿一致性较强, Kappa 值为 0.79 ($P < 0.001$), 且 HRMRI 观察强化壁内血肿为 17.7%; 两者评估内膜撕裂征一致性中等, Kappa 值为 0.58 ($P < 0.001$)。

结论

CDU 能够有效地评估颅外段 VAD 的不同影像征象, 为早期诊治及定期随访提供可靠的影像学依据。

PO-0745

磁共振纹理分析在头颈部良恶性肿瘤中的鉴别诊断价值

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目的 评估磁共振纹理特征分析在头颈部良恶性肿瘤鉴别诊断中的价值。方法 纳入解放军总医院海南医院 30 例头颈部良性肿瘤及 30 例头颈部恶性肿瘤患者, 对术前磁共振 T2WI 图像进行灰度共生矩阵纹理分析 (纹理参数包括角二阶矩、对比度自相关、逆差距及熵), 选取病变实性部位采用感

兴趣法进行测量。统计方法采用独立样本 t 检验、Mann-Whitney U 检验、二元 Logistic regression 分析及受试者工作特征曲线 (receiver operating characteristic curve, ROC) 分析。结果 恶性组对比度 (18.839 ± 12.291) 显著低于良性 (40.007 ± 32.238) ($T = 3.36$, $P = 0.002$), 而恶性组自相关及逆差距 [$0.017(0.006, 0.091)$] 及 0.292 ± 0.101 显著高于良性组 [$0.008(0.001, 0.132)$] 及 0.222 ± 0.096] ($Z = 2.706$, $P = 0.007$; $T = 2.752$, $P = 0.008$)。两组之间角二阶矩及熵无显著差异 ($Z = 1.587$, $P = 0.113$ 及 $T = 1.376$, $P = 0.176$)。对比度、自相关及逆差距的 ROC 曲线下面积分别为 0.722、0.703 及 0.711, 其二元 Logistic regression 方程为 $Y = -0.05076 * \text{Contrast} + 31.3318 * \text{Correlation} + 5.4226 * \text{IDM} + 0.5444$ (截断值为 0.5), 判断为良性肿瘤的正确率为 50.00%, 判断为良性肿瘤的正确率为 73.33%, 总正确率为 61.67%, 其阳性预测值的 ROC 曲线下面积为 0.758。结论 磁共振 T2WI 纹理特征参数对比度、自相关及逆差距可以用来鉴别头颈部良恶性肿瘤。

PO-0746

血管超声及高分辨率磁共振成像评估颈动脉粥样硬化斑块易损性的可行性研究

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目的 探讨颈部血管超声 (CDU) 与高分辨率磁共振成像 (HRMRI) 评估颈动脉粥样硬化斑块 (AP) 性质的可行性。方法 回顾性连续纳入 2017 年 8 月至 2020 年 12 月于苏州大学附属第一医院卒中中心因急性缺血性卒中或短暂性脑缺血发作等就诊患者 85 例, 运用 CDU 及 HRMRI 评估颈部血管狭窄与否、狭窄程度及责任血管的粥样斑块性质。CDU 根据 AP 形态、回声、纤维帽完整与否、有无溃疡等评估斑块性质。HRMRI 参照 AHA 修正后动脉粥样硬化斑块 MRI 分型标准评估斑块性质。以 HRMRI 评估结果作为无创“金标准”, 将患者分稳定斑块组和易损斑块组。采用卡方检验、t 检验和 Mann-Whitney U 检验分别分析两组患者的临床及影像学资料。绘制 CDU 评估 AP 易损性的受试者工作特征 (ROC) 曲线, 得出曲线下面积、敏感度、特异度、约登指数。并用 Cohen's Kappa 值计算 CDU 和 HRMRI 评估 AP 易损性的一致性。结果 1、CDU 评估易损斑块占 54.1% (46/85), 根据 ROC 曲线得出 CDU 评估颈动脉易损斑块的 AUC 值为 0.921, 敏感度为 89.8%, 特异度为 94.4%, 约登指数为 0.842。2、计算 Cohen's Kappa 值得出 CDU 与 HRMRI 评估 AP 性质的一致性最强 (Kappa 值=0.833, $p < 0.05$) 3、CDU 与 HRMRI 评估颈动脉易损斑块有关特征: 脂质坏死核/斑块内出血、钙化、溃疡型斑块、血栓形成、纤维帽状态 (不完整/破裂/薄) Kappa 值分别为 0.905、0.875、0.839、0.822、0.719。结论 CDU 及 HRMRI 均为评估 AP 易损性的有效方法, 必要时可联合运用, 能够更加准确为治疗方案的选择提供更充分的依据。

PO-0747

基于碘图的光谱 CT 多模态参数成像在甲状腺乳头状癌中的诊断价值

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目的 评估光谱 CT 定量增强成像在甲状腺乳头状癌 (papillary thyroid carcinoma, PTC) 中的诊断价值。方法 回顾性分析 59 例行颈部光谱 CT 增强的患者能谱基数据 (spectrum base image, SBI), 采用 Multiphase 软件生成动脉增强分数 (arterial enhancement fraction, AEF) 图和细胞外容积 (extracellular volume fraction, ECV) 图, 并测量病灶和正常甲状腺组织的 AEF 及 ECV

值。统计学采用曼-惠特尼 U 检验 (Mann-Whitney U test) 进行组间比较, 采用受试者工作特征 (receiver operating characteristic, ROC) 曲线对 AEF 及 ECV 的诊断效能进行评估, 并对曲线下面积 (area under the curve, AUC) 进行 Z 检验。结果 甲状腺乳头状癌病变的 AEF[42.30(15.40,100.00)] 及 ECV 值 (37.52±9.50) 显著低于正常甲状腺组织的 AEF[51.30(21,100.00)]及 ECV 值[52.80(33.60,84.50)] (UAEF = 1311.00, PAEF = 0.02; UECV = 394.50, PECV < 0.0001)。AEF、ECV 及 AEF 联合 ECV 诊断 PTC 的 AUC 分别为 0.623、0.887 及 0.907, 约登指数分别为 0.271、0.661 及 0.678。AEF 及 ECV 联合诊断 PTC 的模型为 $Y = -0.033 \times \text{AEF} - 0.185 \times \text{ECV} + 10.084$ ($Y > 0.697$ 诊断 PTC)。结论: 光谱 CT 定量参数 AEF 联合 ECV 对 PTC 的诊断具有较高价值, 可以作为诊断 PTC 的影像学标志物。

PO-0748

增强 CT 和 MRI 在鉴别鼻腔鼻窦鳞状细胞癌与淋巴瘤的应用探究

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目的 探讨鼻腔鼻窦鳞状细胞癌 (SCC) 和淋巴瘤 (NHL) 在增强 CT 和 MRI 的影像特征, 分析不同影像特征在鼻腔鼻窦 SCC 与 NHL 中的鉴别效能。方法 回顾性分析 2016 年 9 月至 2023 年 6 月在昆明医科大学第一附属医院行鼻窦增强 CT 和 (或) 鼻窦增强 MRI 检查并经手术及病理检查证实的 35 例 SCC 与 36 例 NHL 患者影像学及临床资料, 观察分析肿瘤起源部位、肿瘤最大直径、CT 密度、MRI 信号强度、增强强化程度、肿瘤内部坏死、临近骨质破坏、对周围组织的侵犯、扫描范围内是否有颈部淋巴结转移等影像表现特征, 采用受试者操作特征 (ROC) 曲线及曲线下面积 (AUC) 分析不同影像学特征在鼻腔鼻窦 SCC 和 NHL 的鉴别诊断效能。结果 鼻腔鼻窦 SCC 与 NHL 的肿瘤起源部位、CT 及 MRI 强化方式、肿瘤内部坏死、周围骨质破坏以及颈部淋巴结转移 5 个影像学特征组间差异具有统计学意义 ($P < 0.05$), AUC 分别为 0.681、0.629、0.570、0.903、0.885、0.600; 肿瘤内部坏死、周围骨质破坏的 AUC 较大 (AUC 均 > 0.7), 鉴别诊断效能较高。将肿瘤内部坏死、周围骨质破坏两者联合, 联合影像表现的 AUC 为 0.948, 具有较高的鉴别诊断准确度, 鉴别鼻腔鼻窦 SCC 和 NHL 的敏感度和特异度分别为 88.2%、92.3%。结论 肿瘤起源部位、CT 及 MRI 强化方式、肿瘤内部坏死、骨质破坏以及颈部淋巴结转移有助于鼻腔鼻窦 SCC 与 NHL 的鉴别, 尤其是出现肿瘤内部多发坏死、周围骨质吸收破坏时, 应优先考虑鼻腔鼻窦 SCC 的可能。增强 CT 和 MRI 有助于鼻腔鼻窦 SCC 与 NHL 的鉴别, 联合使用有助于提高鉴别诊断效能。

PO-0749

IVIM-DKI 定量参数诊断口腔癌颈部淋巴结转移可行性的初步研究

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【摘要】目的 探讨体素内不相干运动-扩散峰度成像 (intravoxel incoherent motion-diffusion kurtosis imaging, IVIM-DKI) 定量参数诊断口腔癌 (oral cavity cancer, OCC) 颈部淋巴结转移的可行性和价值。方法 本研究回顾性收集 2023 年 2 月至 2023 年 8 月期间临床、磁共振成像 (magnetic resonance imaging, MRI) 资料完整且术后经病理证实的 29 例口腔癌患者, 共计纳入转移淋巴结 15 枚, 非转移淋巴结 31 枚。测量和记录相应淋巴结的 IVIM-DKI 定量参数, 包括真扩散系数 D、伪扩散系数 D*、灌注分数 f、平均扩散率 MD、平均扩散峰度 MK。采用 Mann-Whitney U 检验比较口腔癌颈部淋巴结转移组与非转移组间定量参数的差异, 通过受试者工作特征

(receiver operating characteristic, ROC) 曲线评价 IVIM-DKI 各参数鉴别转移淋巴结和非转移淋巴结的诊断效能, 通过逐步逻辑回归筛选出独立预测因子。结果 转移淋巴结组与非转移淋巴结组 D 值、f 值、MD 值具有统计学差异 ($P < 0.05$), 转移淋巴结组与非转移淋巴结组 D*值、MK 值无统计学差异。D 值、f 值、MD 值在 ROC 曲线中曲线下面积 (area under the curve) AUC 分别为 0.754、0.824、0.714, 分别以 $0.88 \times 10^{-3} \text{mm}^2/\text{s}$ 、27.77%、 $1.52 \times 10^{-3} \text{mm}^2/\text{s}$ 为阈值, 诊断淋巴结转移的敏感度分别为 66.67%、86.67%、40.00%, 特异度分别为 77.42%, 70.97%, 93.55%。结论 IVIM-DKI 定量参数 D 值、f 值、MD 值对颈部淋巴结转移具有良好的诊断效能, 其中 f 值是鉴别转移和非转移淋巴结的独立预测因子。

PO-0750

基于 CTA 影像组学的机器学习模型评估 出血性颈动脉斑块的研究

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目的: 出血性颈动脉斑块/斑块内出血 (IPH) 与缺血性脑卒中的发生关系最为密切, 是症状性颈动脉狭窄患者脑卒中发生及复发的独立危险因素。本研究的目的是以组织学为金标准, 比较基于 CTA 影像组学的机器学习方法与高分辨 MRI 成像在识别出血性颈动脉斑块中的能力。

方法: 本研究从 2021 年 9 月至 2023 年 6 月, 收集接受颈动脉 CTA 检查并计划进行颈动脉内膜切除术的患者 (患者术前均进行 CTA 及 HR-MRI 检查), 大部分患者患有短暂性脑缺血发作 (TIA) 或缺血性卒中; 术后得到病理切片, 切片用石蜡包埋, 并获取其免疫组化标本, 得到其组织学横断面; 根据组织学特点将切片分为出血性和非出血性两种。通过观察斑块的整体形态特征, 并结合已知位置和距离, 匹配所有颈动脉 CTA 横断面。进行影像组学分析, 建模; 比较组学与常规方法对斑块内出血的预测。

结果: 本实验共纳入了 77 名患者, 共分析了 109 个横断面。患者的中位年龄为 63.5 岁, 男性患者有 49 名, 占比 65%。有 50% 的患者有脑血管相关临床症状, 其中卒中占比 33%, 短暂性脑缺血发作占比 17%。本研究使用 mRMR 和 LASSO 两种特征选择方法来选择特征。首先进行 mRMR 去除冗余和不相关特征, 保留 30 个特征。然后进行 LASSO, 进而达到特征选择的目的, 选择优化后的特征子集构建最终模型。在特征数量确定后, 选择最具预测性的特征子集, 并计算相应的系数, 本研究共保留了 30 个特征参数。Radscore 是通过对所选特征的系数加权求和来计算的, 并将实验组及对照组的得分在训练集和验证集上进行比较, 说明机器学习模型在识别 IPH 和非 IPH 组别中是有差异的。训练集及验证集的 AUC 值分别为 0.86 和 0.80, 表明颈动脉 CTA 图像影像组学参数的机器学习分析能够有效识别颈动脉出血性斑块。

结论: 本研究构建基于颈动脉 CTA 影像组学的机器学习模型, 有助于提高卒中预测和识别靶向治疗的高危人群。

PO-0751

T2WI 信号值与最小表观弥散系数 (ADC) 对腮腺良恶性肿瘤的鉴别诊断价值

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目的 评估 T2WI 信号及最小表观弥散系数 (ADC) 对腮腺肿瘤性病变的鉴别价值。

方法 回顾性分析 2018 年 8 月-2023 年 4 月手术病理证实的腮腺肿瘤性病变 82 例（多形性腺瘤 52 例，腺淋巴瘤 17 例，恶性肿瘤性病变 11 例）影像资料，以同层面腮腺、皮下脂肪及脊髓为基准，测量每例最大病灶与腮腺、脊髓及皮下脂肪的 T2WI 信号比值（SIRp,SIRc,SIRf），测量病灶最小 ADC，比较多形性腺瘤、腺淋巴瘤及恶性肿瘤组间 SIRp,SIRc,SIRf 及最小 ADC 的区别，通过 ROC 曲线比较各参数鉴别诊断效能。

结果 纳入 82 例患者，男 46 例，女 36 例，平均年龄（40.1±12.1）岁，其中多形性腺瘤 52 例，腺淋巴瘤 17 例，恶性肿瘤性病变 11 例（黏液表皮样癌 7 例，转移性鳞状细胞癌 2 例，腺样囊性癌 1 例，基底细胞癌 1 例）。腺淋巴瘤组男性患者显著多于女性患者（ $P<0.001$ ），腺淋巴瘤组年龄显著大于多形性腺瘤组及恶性肿瘤性病变组（ $P<0.001$ ， $P=0.014$ ）。多形性腺瘤组 SIRp,SIRc,SIRf 及 ADC 均显著高于腺淋巴瘤组及恶性肿瘤性病变组（ $P<0.001$ ， $P<0.001$ ），腺淋巴瘤组 SIRf 低于恶性肿瘤性病变组（ $P<0.05$ ）。SIRp,SIRc,SIRf 及 ADC 鉴别诊断多形性腺瘤与腺淋巴瘤 AUC 分别为 0.876、0.887、0.946、0.969；SIRp,SIRc,SIRf 及 ADC 鉴别诊断多形性腺瘤与恶性肿瘤 AUC 分别为 0.886、0.828、0.796、0.926；SIRp,SIRc,SIRf 及 ADC 鉴别诊断腺淋巴瘤与恶性肿瘤 AUC 分别为 0.532、0.655、0.799、0.650。

结论

SIRp,SIRc,SIRf 及 ADC 对多形性腺瘤与腺淋巴瘤、多形性腺瘤与恶性肿瘤性病变均具有较好的鉴别诊断效能，SIRf 有助于腺淋巴瘤与恶性肿瘤性病变的鉴别诊断。

PO-0752

原发性帕金森症患者视频透视吞咽造影检查与进食评估问卷调查工具评分—10（EAT-10）相关性探究

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目的：视频透视吞咽造影检查（VFSS）在原发性帕金森症患者中误吸程度评分、吞咽困难评分与临床进食评估问卷调查工具评分—10（EAT-10）的相关性探究。

方法：回顾性分析我院 2019 年 4 月-2022 年 6 月临床诊断为 PD，共纳入 44 例，男 29 例，女 15 例，平均年龄（65.64±14.89）岁。所有患者均完成（VFSS）并 EAT-10 评估，比较吞咽困难及误吸程度评分与 EAT-10 各项评分及总分 Pearson 相关系数及显著性，以 $P<0.05$ 具有统计学差异。

结果：44 名患者 VFSS 误吸评分、吞咽困难评分分别为（1.14±1.34）、（1.41±0.54），误吸评分、吞咽困难评分间高度相关（Pearson=0.839， $P<0.001$ ）。VFSS 误吸评分与 EAT-10 中因吞咽问题使体重减轻、影响就餐、吞咽药片费力、吞咽时感到紧张、该 4 项总分、EAT-10 总分具有显著正相关，Pearson 相关系数及显著性分别为（0.409,0.006）、（0.367,0.014）、（0.320,0.034）、（0.309,0.041）、（0.395,0.008）（0.326,0.031）；VFSS 误吸评分与 EAT-10 中其他项吞咽液体费力、吞咽固体费力、吞咽有疼痛、影响进食时快感、吞咽时有异物感、吃东西会咳嗽无显著相关性。吞咽困难评分与 EAT-10 中因吞咽问题使体重减轻、吞咽时感到紧张、该 2 项总分、EAT-10 总分具有显著正相关性，Pearson 相关系数及显著性分别为（0.389,0.009）、（0.312,0.040）、（0.395,0.008）、（0.302,0.047），与 EAT-10 总分其他项不具有显著相关性。

结论：VFSS 误吸评分与 PD 患者的体重减轻、影响就餐、吞咽药片费力、吞咽时感到紧张、4 项总分相关性较高，是评估误吸程度的重要指标。吞咽困难评分与体重减轻、吞咽时感到紧张、该 2 项总分相关性较高，是评估 PD 患者吞咽困难的有效指标。综上所述，VFSS 检查中误吸评分、吞咽困难评分可较好反应 PD 患者的吞咽障碍问题，可发现 EAT-10 评分未发现的渗漏、误吸，二者结合检查对临床具有重要意义。

PO-0753

低血糖脑病的 MRI 影像学表现

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目的：探讨低血糖脑病的 MRI 影像学表现及相关诊断价值。

方法：收集华中科技大学同济医学院附属协和医院 2023 年收治的 1 例 30 岁经临床诊疗证实为低血糖脑病的女性患者的临床资料进行回顾性分析，其临床主要表现为突发昏迷，意识不清 6 天，患者有 1 型糖尿病病史，发病时测血糖为 2.5mmol/L，患者进行了血液、尿液的常规检查，并进行性了自身免疫性抗体检测，同时行 MRI 平扫+增强、MRA、MRV、DWI 及 MRS 扫描。分析其 MRI 影像学表现及相关诊断价值。

结果：患者 MRI 检查发现右侧半卵圆中心-放射冠、双侧海马及胼胝体压部条片状长 T1、高 T2-Flair 信号影，DWI 示病灶弥散受限表现，增强扫描未见明显强化，MRA 及 MRV 未见明显异常，MRS 将感兴趣区置于双侧海马区，海马区 NAA 峰减低，Cho 峰稍高。经治疗后患者症状好转出院。

结论：低血糖的临床表现没有特异性，可从行为改变、乏力、精神错乱到癫痫和意识丧失，即功能性大脑衰竭。其影像学表现提示低血糖脑病常常累及大脑皮质、基底节区、海马、胼胝体和双侧内囊等区域。T2 及 Flair 序列主要表现为病变区的高信号，这可能与脑部水肿和炎症有关；DWI 序列可能显示出病变区的高信号，这可能是由于低血糖引起的脑细胞水肿和炎症反应导致的；部分患者 MRI 增强可强化，这可能是由于低血糖引起的脑血管紊乱导致的。主要鉴别诊断包括缺血缺氧性脑病、克雅氏病、中暑、其他毒物代谢引起的病变如肝性脑病。需要注意的是，MRI 特征并非低血糖脑病的特异性表现，因为其他脑部疾病也可能表现相似的影像学特征。确诊低血糖脑病还需要结合临床症状、血糖水平和其他实验室检查结果进行综合评估。

PO-0754

T1 mapping 和 RESOLVE-DWI 鉴别诊断腮腺肿瘤的价值

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目的 比较 MR 纵向弛豫时间成像 (T1 mapping) 及扩散加权成像 (DWI) 在腮腺良恶性肿瘤鉴别诊断中的价值。方法 回顾性分析 116 例治疗前接受常规 MRI、DWI 和 T1 mapping 检查并经病理证实的腮腺肿瘤患者，其中 81 例为良性肿瘤 (53 例多形性腺瘤、16 例腺淋巴瘤、12 例其它肿瘤)，35 例为恶性肿瘤，分别于增强前及注入对比剂 6 分钟后采集 T1 mapping 图像，测量肿瘤增强前 T1 值 (T1pre)、增强后 T1 值 (T1post) 及表观扩散系数 (ADC) 值，计算增强前后 T1 差异 ($\Delta T1$)、T1 值变化率，比较 $\Delta T1$ 、T1 值变化率及 ADC 值组间差异，并绘制受试者工作特征 (ROC) 曲线。结果 腮腺良性肿瘤的 $\Delta T1$ 、T1 值变化率及 ADC 值均高于恶性肿瘤，差异有统计学意义 (P 均 < 0.05)， $\Delta T1$ 、T1 值变化率及 ADC 值鉴别腮腺良、恶性肿瘤的 AUC 分别为 0.646、0.646 和 0.802。多形性腺瘤、腺淋巴瘤与恶性肿瘤两两比较显示 $\Delta T1$ 、T1 值变化率及 ADC 值差异均有统计学意义 (P 均 < 0.01)。 $\Delta T1$ 、T1 值变化率及 ADC 值鉴别多形性腺瘤与腺淋巴瘤的 AUC 分别为 0.940、0.912 和 0.981， $\Delta T1$ 、T1 值变化率及 ADC 值鉴别多形性腺瘤与恶性肿瘤的 AUC 分别为 0.765、0.761 和 0.892， $\Delta T1$ 、T1 值变化率及 ADC 值鉴别腺淋巴瘤与恶性肿瘤的 ROC 曲线下面积分别为 0.875、0.804 和 0.534，ADC 值鉴别诊断腺淋巴瘤与恶性肿瘤的效能低于 $\Delta T1$ ，差异有统计学意义 ($P < 0.01$)，其余组间差异无统计学意义。结论 T1 mapping 和 DWI 对鉴别诊断腮腺肿瘤均具有一定价值，在腺淋巴瘤和恶性肿瘤的鉴别上，T1 mapping 优于 DWI。

PO-0755

第三代双源 CT 能谱纯化技术在泪道造影中的应用

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摘要：目的探讨第三代双源 CT 能谱纯化技术在泪道造影中的可行性。方法前瞻性选取 50 例行 CT 泪道造影扫描的患者，用随机数字表法分为低剂量组和能谱纯化组，每组 25 例，2 组的管电压和管电流分别为 100 kVp、80 mAs（低剂量组）和 Sn100 kVp、300 mAs（能谱纯化组）。测量 2 组患者图像的玻璃体、眶脂体和皮肤外空气 CT 值、噪声，记录设备显示的辐射剂量数值，并计算对比噪声比（CNR）和有效剂量品质因子（FOM）。组间各部位的 CT 值、噪声、CNR、FOM 和辐射剂量的差异用独立样本 t 检验进行比较，组间图像质量主观评分差异用非参数 Wilcoxon 符号秩和检验比较。结果组间图像质量主观评分、玻璃体噪声、空气 CT 值、空气噪声、玻璃体 - 空气 CNR 差异均无统计学意义（P 值均 > 0.05）。组间玻璃体 CT 值（29.47 HU ± 4.58 HU vs 23.81 HU ± 5.04 HU, P = 0.027）、眶脂体 CT 值（-107.00 HU ± 12.95 HU vs -97.05 HU ± 9.21 HU, P = 0.024）、眶脂体噪声（13.61 ± 3.30 vs 15.97 ± 2.78, P = 0.014）、玻璃体 - 眶脂体 CNR（10.01 ± 2.31 vs 8.51 ± 2.09, P = 0.015）、玻璃体 - 空气 FOM（19703.75 ± 6579.46 vs 43613.89 ± 18014.61, P < 0.01）、玻璃体 - 眶脂体 FOM（334.44 ± 157.37 vs 622.89 ± 321.20, P < 0.01）及辐射剂量的差异均有统计学意义。结论第三代双源 CT 能谱纯化技术在 CT 泪道造影可获得满意的图像质量，同时大幅降低了辐射剂量。

PO-0756

T2 mapping 及分段读出 DWI 鉴别诊断腮腺肿瘤的价值

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目的 探讨 T2 mapping 及分段读出 DWI（RESOLVE-DWI）在腮腺肿瘤鉴别诊断中的价值。**方法** 回顾性分析 2018 年 6 月至 2021 年 7 月经病理证实的 166 例腮腺肿瘤患者治疗前的 T2 mapping 及 RESOLVE-DWI 资料，其中多形性腺瘤 76 例，Warthin 瘤 29 例，基底细胞腺瘤 11 例，恶性肿瘤 50 例。测量肿瘤的 T2 值、ADC 值并比较组间差异，运用受试者工作特征（ROC）曲线评价 T2 值、ADC 值及二者联合（T2+ADC）鉴别诊断腮腺肿瘤的价值，并计算相应的曲线下面积（AUC）。结果 多形性腺瘤、Warthin 瘤、基底细胞腺瘤与恶性肿瘤之间 T2 值、ADC 值差异有统计学意义（P 均 < 0.01），两两比较，Warthin 瘤与恶性肿瘤的 T2 值及基底细胞腺瘤与恶性肿瘤的 T2 值、ADC 值之间的差异无统计学意义（均 P > 0.05），其余各组间 T2 值、ADC 值差异均有统计学意义（均 P < 0.05）。T2 值、ADC 值、T2+ADC 鉴别腮腺多形性腺瘤与 Warthin 瘤、多形性腺瘤与基底细胞腺瘤、多形性腺瘤与恶性肿瘤、Warthin 瘤与基底细胞腺瘤、Warthin 瘤与恶性肿瘤的 AUC 分别为 0.893、0.999 和 0.999，0.691、0.728 和 0.725，0.839、0.867 和 0.885，0.865、0.966 和 0.959，0.631、0.695 和 0.693。ADC 值和 T2+ADC 鉴别多形性腺瘤与 Warthin 瘤的诊断效能显著高于 T2 值（均 P < 0.05），其余各组间差异均无统计学意义（均 P > 0.05）。结论 T2 mapping 可以定量鉴别诊断腮腺肿瘤，T2 值与 ADC 值的诊断效能基本相当。

PO-0757

单侧颅外段颈内动脉夹层患者卒中事件的预测因素:一项单中心探索性研究

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Objective:

This study aimed to compare the diagnostic value of carotid Doppler ultrasound (CDU) and high-resolution magnetic resonance imaging (HRMRI) and investigate the correlation between imaging features and stroke in EICAD.

Methods:

Patients with suspected EICAD were admitted. The imaging features of EICAD were reviewed and compared between CDU and HRMRI. Then patients were grouped into stroke and non-stroke groups. Multivariate regression models were used to determine the association between imaging features of EICAD with stroke.

Results:

A total of 153 patients were included. Excellent agreement was found between CDU and HRMRI. In multivariable logistic regression analysis, the presence of IMH and intraluminal thrombus on CDU had a significantly increased risk of stroke.

Conclusion:

CDU may be the preferred choice for patients with a high suspicion of EICAD.

PO-0758

S-MAR: 一种能有效评估动脉瘤介入术后载瘤动脉的血管情况的去金属伪影技术

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目的:临床检查中, 动脉瘤介入术后的弹簧圈金属伪影对于载瘤动脉的血管评估存在很大的干扰。S-MAR 是一种结合了金属伪影去除(MAR)、光谱 CT 和减影算法的新技术手段, 用来消除金属伪影的影响, 并在既往的研究中证实具有良好的去金属伪影的视觉效果。本研究基于 DSA 的参照下, 从量化的角度评估 S-MAR 技术对于载瘤动脉血管的显示, 并比较其与 DSA 的一致性。

方法:回顾性分析 128 例颅内动脉瘤血管内栓塞治疗后行双层探测光谱 CT 的患者。术中发现线圈 143 例, 支架 25 例, 98 例动脉粥样硬化。重建常规 CT 图像(CI)、VMI(范围:40- 200 KeV)和虚拟非增强图像(VNC)。然后将这些图像使用 O-MAR 技术处理后得到 CI_{MAR}、VMI_{MAR}和 VNC_{MAR}图像, 由 VNC_{MAR} 和 VMI_{MAR} 之间的相减得到 S-MAR。由后处理站自动计算载瘤血管直径(VD)、狭窄率(RS)和评估残余动脉瘤内造影增强(RICE)。线圈伪影评分(CA 评分)作为定性图像分析, 由两名放射科医生分别确定。采用配对样本 t 检验分析 S-MAR 和 DSA 对于载瘤动脉管腔评估的差异。P 值 <0.001 表示有统计学意义。

结果: S-MAR 与原始图像、多能级图像及单纯使用 MAR 技术的图像相比, 表现出明显更好的去除金属的效果(基于 CA 评分的对比, P<0.001)。原始图像对于载瘤动脉的血管直径、血管狭窄率存在很大的误差, 影响判断是否存在残余动脉瘤的评估, S-MAR 在对于载瘤动脉的血管直径、血管狭窄率的评估方面与 DSA 的结果相比具有很高的一致性(k=0.89)。

结论: S-MAR 能够有效去除动脉瘤介入术后弹簧圈金属伪影的干扰, 并能有效评估血管情况, 与 DSA 具有很高的一致性。

PO-0759

人工耳蜗植入术前后影像学评价及其价值

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目的

研究人工耳蜗植入术前影像学评估和术后电极影像学评价的方法及其临床应用价值。

材料与方法

搜集临床拟做人工耳蜗植入的患者 43 例, 表现为双侧不同程度感音神经性聋。所有患者术前行 MSCT 和 MRI 检查。对感兴趣耳做 MIP 重建。垂直于内耳道长轴做 MPR 重建, 得到听神经轴位图像。分析其影像表现, MSCT 着重分析中耳乳突、颈静脉球、乙状窦、面神经管和内耳结构, MRI 着重分析听神经。其中 23 例进行了人工耳蜗植入, 术后所有患者 7~10 天均行 MSCT 检查及 VRT 重建, 12 例患者术后同时做了 X 线平片检查, 采用经眶位和耳蜗位拍片。

结果

43 例术前患者中内耳形态正常 20 例, 内耳病变 23 例, 其中内耳畸形 20 例 (39 耳), 骨化性迷路炎 3 例 3 耳。20 例内耳正常者均做了人工耳蜗植入手术, 双侧颈静脉球高位选程度较轻的一侧耳手术, 单侧颈静脉球高位选对侧耳手术, 乙状窦前置选择对侧耳手术。23 例内耳病变患者中 3 例进行了人工耳蜗植入手术, 1 例为 IP-I 畸形, 2 例为单纯前庭导水管扩大。

术后 MSCT 横断面图像上电极表现为点状高密度影, VRT 图像清晰显示了电极与耳蜗之间精确的空间立体关系。术后 X 线平片上每对电极可分辨, 但不能显示电极与耳蜗的精确空间位置关系。7 例显示电极数目与手术记录一致, 5 例所示电极数目较手术记录少。

结论

人工耳蜗植入术前 MSCT 和 MRI 检查非常重要, MSCT 在显示中耳乳突、颈静脉球高位、乙状窦位置、面神经管位置、立体显示内耳方面优于 MRI, 而 MRI 在显示听神经正常与否有重要价值。二者结合, 可指导手术适应症和电极类型的选择、预测术中可能出现的困难和术后可能出现的并发症。MSCT 结合 VRT 清晰、直观、准确的显示电极在耳蜗内的形态和位置, 能准确显示大部分病例植入电极数目, 是人工耳蜗植入术后观察电极直观准确的方法。X 线平片费用少、放射剂量低, 仅能粗略估计电极在耳蜗内的位置。

PO-0760

个案报道: 鼻咽部错构瘤 1 例

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目的 探讨 1 例鼻咽部错构瘤的临床及 CT 影像特征, 以提高对本病的认识及诊断。

方法 回顾性分析 1 例经病理证实的鼻咽部错构瘤病人, 分析其临床表现, 病理基础及影像表现。

结果 患者以“咽部肿物”收入院; 患者于半年前体检时发现咽部有一肿物, 时有咽干、咽痒、咽部异物感, 无咽痛、发热, 无吞咽困难及进食呛咳, 无鼻部出血回缩涕中带血。入院查体: 电子鼻咽镜下见左侧鼻咽侧壁肿物。颈部 CT 平扫及增强扫描示: 口咽、喉咽左侧壁纵行圆柱状混杂密度灶, 病灶以脂肪密度为主, 其内可见条状软组织密度影, 大小约 1.1×0.9×8cm, 向上达左侧侧隐窝, 向下与延续至食道胸 1 椎体下缘水平, 增强扫描病灶中心软组织成分轻度强化, 病灶向口咽及鼻咽腔凸出, 与周围结构分界清楚; 全麻下行鼻内镜下左侧鼻咽部肿物切除术+后鼻孔成形术, 术中见: 咽部肿物来源于左侧鼻咽部咽鼓管咽口外侧壁, 向下延伸至口咽、喉咽, 达食道; 术后病理回报: 肿瘤由纤维、横纹肌、脂肪组成, 表被覆鳞状上皮, 考虑为错构瘤 (鼻咽部)。

结论 鼻咽部错构瘤为罕见良性增生性病变,临床多以体检发现,当病灶较大时可出现咽干、咽痒、咽部异物感等临床表现。**CT** 影像特征提示病灶为良性病变, **CT** 值多样, 含有脂肪、软组织等多种成分, 增强后其内软组织成分强化而脂肪不强化, 病灶密度及强化方式与病理组织成分密切相关。

PO-0761

双层 探测器 CT 在淋巴瘤患者中评估淋巴结的诊断价值

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目的: 本研究旨在评估双层探测器 **CT** (DLCT) 在淋巴瘤患者中淋巴结 (LN) 阳性识别方面的诊断性能。

方法与材料: 回顾性纳入了 78 例经组织学证实的淋巴瘤患者, 获得 1165 个 LN, 这些患者在治疗前均接受了 DLCT 和 18F-FDG PET/CT 检查。根据 18F-FDG PET/CT 结果作为参考标准, 病例被分为 LN 阴性组和 LN 阳性组。然后按 7:3 的比例将 LN 随机分为训练组 (809 例) 和验证组 (356 例)。对分类变量或定量参数采用 Chi-square 检验、t 检验或 Mann-Whitney U 检验, 比较 LN 阴性组和 LN 阳性组患者的临床特征和定量参数, 包括能谱参数: 曲线斜率 (λ HU)、动脉期 (AP) 和静脉期 (VP) 图像上的碘浓度 (IC)。在训练组通过 10 倍交叉验证进行多变量逻辑回归分析, 建立最有效的预测模型。曲线下面积 (AUC) 用于评估预测模型的诊断价值, AUC 的差异通过 DeLong 检验分析。此外, 预测模型还在验证组中进行了验证。使用类内相关系数 (ICC) 对 LN 进行了重复性分析。

结果: 在训练组中, 与其他参数相比, 长径 (LD) 作为独立因素在区分 LN 阳性和 LN 阴性方面的 AUC 最高 ($p=0.006$ 至 $p<0.001$), 而 LD 和 λ HU-AP 共同作用的预测模型的 AUC 显著进一步升高 (AUC 为 0.816, $p<0.001$)。而验证组中预测模型的 AUC 为 0.786。所有参数的重复性都很好到非常好 ($ICC>0.75$)。

结论: DLCT 的形态学和功能参数的结合可能是检测淋巴瘤 LN 阳性的潜在成像生物标记物。

PO-0762

基于 CT 多期三维纹理分析在腮腺良恶性肿瘤鉴别诊断中的价值

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目的: 探讨 CT 多期图像三维纹理特征对腮腺良恶性肿瘤鉴别的应用价值。方法: 回顾性收集了 158 例腮腺肿瘤患者, 其中良性肿瘤 107 例, 恶性肿瘤 51 例。将病例按 7:3 的比例随机分为试验组和训练组。采用 uAI Research Portal V1.1 (Shanghai United Imaging Intelligence, Co., Ltd.) 纹理分析软件对 CT 多期图像上整个肿瘤的感兴趣区域 (ROI) 进行纹理分析, 并通过软件自带的组学特征提取方法, 结合最大最小归一化、L1 范数规范化预处理, 构建 AdaBoost、二次判别分析、K 近邻和随机森林模型。根据特征曲线 (ROC) 下面积 (AUC)、敏感度、特异性和准确率对病灶进行分析, 评价其疗效。结果: 鉴别腮腺肿瘤良恶性纹理特征组学分析;在 AdaBoost 模型中, 有意义的是 AUC, 动脉期、静脉期及平扫的 AUC (95% CI) 分别是 0.702, 0.608 和 0.659;在二次判别分析模型中, 有意义的是灵敏度, 动脉期、静脉期及平扫的灵敏度分别为 0.809, 0.756 和 0.665;在随机森林模型中, 有意义的是特异度, 动脉期、静脉期及平扫的特异性分别为 0.95, 0.95 和 0.927;在 K 近邻模型中, 有意义的是准确率, 动脉期、静脉期及平扫的准确率分别为 0.72, 0.715 和 0.712。综上所述, K 近邻模型的各项指标综合比较结果相对较好。结论: 基于 CT 多期三维纹理分析技术对腮腺良恶性肿瘤鉴别有一定价值, 且动脉期优于平扫期和静脉期。

PO-0763

CT 减影图像影像组学模型在鉴别腮腺多形性腺瘤和腺淋巴瘤的价值

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目的：探讨基于 CT 图像灰度相减和放射组学特征相减构建影像组学模型鉴别腮腺多形性腺瘤（pleomorphic adenoma, PA）和腺淋巴瘤（adenolymphoma, AL）的价值。材料与方法：回顾性分析经组织学病理证实为 PA 和 AL 患者各 55 例，并使用完全随机方法按 7:3 比例分为训练组（76 例）和验证组（34 例）。将 CT 平扫和动脉期图像进行配准，达到解剖点匹配后使用基于 Python 的减影算法将平扫与动脉期图像进行灰度相减得到减影图像，手动勾画平扫、动脉期和减影图像三组图像的全瘤体并生成感兴趣区域（area of interest, ROI）从而提取三组放射组学特征，其中将减影图像所提取特征集命名为数据集 D1，将动脉期特征和平扫特征代数相减得到新的特征集命名为数据集 D2。使用 Z-Score 标准化分别对 D1 和 D2 进行统一量度，皮尔森相关系数进行数据降维、多因素方差分析和支持向量机进行特征筛选和构建影像组学模型。通过受试者工作特征曲线（receiver operating characteristic, ROC）的曲线下面积（area under the curve, AUC）和准确度（accuracy, ACC）评价模型效能。结果：分别从 D1 和 D2 数据集中筛选 14 个和 10 个放射组学特征用于影像组学模型构建，通过图像灰度相减所构建的模型 M1 的效能优于通过特征相减所构建的模型 M2，M1 训练组效能与 M2 相仿（AUC: 0.941 vs.0.925, ACC: 0.910 vs.0.895），但是验证组 M1 优于 M2（AUC: 0.938 vs.0.882, ACC: 0.912 vs.0.853），并且 M1 模型整体稳定性优于 M2。结论：基于 CT 减影图像构建影像组学模型鉴别 PA 和 AL 方面优于平扫和动脉期的特征相减，模型的稳定性也更加，通过减影可以突出特征差异性，从而更好的寻找肿瘤差异和异质性，能够为临床术前诊断和治疗方案选择提供一定参考价值。

PO-0764

基于不同感兴趣区勾画方法的 T2 mapping 眼外肌定量测量在 Graves 眼病分期中的应用价值

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目的：探讨基于不同感兴趣区勾画方法的 T2 mapping 眼外肌定量测量在 Graves 眼病(Graves' ophthalmopathy, GO)分期中的价值。

方法：连续纳入 56 例 GO 患者，根据患者的临床活动度评分分为活动性 GO 或非活动性 GO。采用两种不同感兴趣区勾画方法在冠状位 T2 mapping 上测量眼外肌的 T2 弛豫时间(T2 relaxation time, T2RT)，分别获得 T2RT-mean 和 T2RT-max 值。采用独立样本 t 检验、Spearman 相关分析、受试者工作特征(receiver operating characteristic, ROC)曲线分析、多重 ROC 比较和组内相关系数进行统计学分析。

结果：活动性 GO 的 T2RT - mean 和 T2RT - max 值均显著高于非活动性 GO ($P < 0.001$)。T2RT-mean 和 T2RT-max 值与临床活动度评分 ($r_s = 0.73, 0.69, P < 0.001$)呈正相关。ROC 结果显示分别以眼外肌 T2RT-mean 值 ≥ 83.40 ms, T2RT ≥ 111.85 ms 判断 GO 处于活动期的诊断效能最优（曲线下面积分别为 0.822、0.827，灵敏度分别为 92.2 %、67.2 %，特异度分别为 58.3 %、

83.3 %)。T2RT-mean 与 T2RT-max 的曲线下面积差异无统计学意义($P = 0.751$)。测量 T2RT-mean 和 T2RT-max 值的观察者间一致性分别为优秀和良好, 组内相关系数分别为 0.954 和 0.882。结论: 眼外肌的 T2RT-mean 和 T2RT-max 值可用于 GO 的活动性评估。从观察者间一致性及诊断性能两者综合考虑, T2RT-mean 值在 GO 分期中具有较高的应用价值。

PO-0765

Multi-vane 技术用于腮腺肿瘤弥散加权成像的图像质量评价

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目的评价 Multi-vane 技术和 Splice 技术在腮腺磁共振弥散加权成像的图像质量

方法收集 54 例腮腺肿瘤患者磁共振影像学资料, 行腮腺 MR 扫描, 使用飞利浦 IngeniaCX3.0TMRI 扫描, 采用头颈线圈, 扫描范围包括腮腺和颌下腺

四个序列的详细采集参数如下:

DWI-BS: 50 层, 总采集时间= 5:42 分钟

TSE SPLICE MV: 50 层, 总采集时间= 3:35 分钟

TSE SPLICE: 50 层, 总采集时间= 5:12 分钟

TSE: 50 层, 总采集时间= 3:46 分钟

以 T2 加权成像作为参考, 在高 b 值的 T2WI、DWI-BS、TSE SPLICE、TSE SPLICE MV、TSE 图像上, 选取病变最大截面沿边缘勾画病变面积, 变形程度定义为肿瘤最大截面在 DWI 上的面积变化百分率。同时分别测定 ROI 的面积和 SD 值, 并记录标准差。此外, 测定图像对比度进行视觉评估, 基于 4 分制的 Likert 量表 (1-差, 4-优秀)。内容包括: 组织解剖学细节, 图像边缘锐利度和解剖结构变形。4 分: 优秀的图像质量, 解剖结构清晰, 没有噪声或结构变形; 3 分: 较好的图像质量, 解剖结构清晰, 有少许噪声或结构变形; 2 分: 可接受的图像质量, 解剖结构尚可分辨, 有较多的噪声或结构变形; 1 分: 图像质量差, 没有诊断价值。

同时分别测定四个序列的病变信号值、ADC 值, 并记录其标准差。此外, 测定四个序列的图像信噪比, SNR 定义为病变信号值与其标准差的比值。

使用 SPSS 进行统计分析。数据描述采用平均值±标准差表示。数据分析使用 t 检验, P 值≤0.05 认为具有统计学差异。

结果 TSE SPLICE MV 序列在腮腺磁共振成像的图像变形程度小, 与 DWI-BS 序列相比, 两种序列在图像变形程度上具有显著差异 ($p<0.05$)。

主要结果数据, 使用 Multi-vane 技术同 DWI-BS 相比有不同程度的优化

- 1、同 DWI-BS 相比病变变形程度明显变小
- 2、ADC 值无差异
- 3、TSE SPLICE MV 序列图像质量好, 对比度高

结论 TSE SPLICE MV 图像质量最好, 速度慢。Multi-vane 结合 SPLICE 扫描技术可更好的评估腮腺肿瘤。

PO-0766

两类罕见颈内动脉发育异常 3 例报道

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目的: 分析颈内动脉侧移位与迷走颈内动脉的影像特点及二者的鉴别要点

方法: 运用颞骨 HRCT、颈部 CTA 及 MRA 评估颈内动脉发育异常类型

结果: 本文发现 3 例颈内动脉发育异常病例, 病例 1 为迷走颈内动脉患者, 病例 2、3 为颈内动脉侧移位患者, 均在我院行 CT 及 MR 相关检查。病例 1 为 42 岁男性, 因漏诊于术中注射利多卡因过程中出现癫痫大发作, 终止手术后追问病史, 患者具有搏动性耳鸣, 与脉搏节律一致, 耳镜见右鼓膜紧张部前下穿孔, 其内有黄豆大小淡红色肿物, 表面光滑有搏动。重阅 CT 图像显示: 右侧颈内动脉管走行迂曲, 外侧部分与鼓室间骨性间隔缺损, 中鼓室肿块与颈动脉管内软组织密度相连, 且右侧下鼓室小管扩大, 随后行 MRA 显示右侧颈内动脉走行迂曲, 其膝部向后外侧移位呈直角, 表现为特征性的反 7 字形, 结合 CT 及 MRA 诊断为迷走颈内动脉。病例 2 为 56 岁男性, 左耳搏动性耳鸣两年, 近一年加重, 外院 CT 及 MRI 检查疑为鼓室球瘤, 耳镜检查显示左耳鼓膜完整呈蓝紫色, 鼓膜周边明显搏动。颞骨 HRCT 显示左侧中耳腔及乳突蜂房内可见软组织密度影, 病变组织包绕听小骨; 左侧颈内动脉膝部与鼓室间骨性间隔缺损, 颈内动脉向外侧移位超过耳蜗低转中点垂直线, 突入鼓室。CTA 显示左侧颈内动脉较对侧增粗, 其膝部较对侧向外侧移位。临床行耳内镜下鼓膜切开探查并置管, 耳屏取软骨膜铺于裸露的骨性外耳道。病例 3 为 36 岁女性, 右侧搏动性耳鸣, 行颞骨 HRCT、颈动脉 CTA 及 MRA 示: 双侧颈内动脉岩骨内段向外侧移位, 其膝部均超过耳蜗底转裸露于鼓室腔, 以右侧为著。左侧颈内动脉全段纤细, 左侧下鼓室小管增宽, 左侧下鼓室动脉显影不良。影像诊断双侧颈内动脉侧移位并左侧颈内动脉发育不良。

结论: 颞骨 HRCT、颈动脉 CTA、MRA 检查, 对诊断颈内动脉发育异常及评估其类型, 阐明搏动性耳鸣的病因具有重要价值。

PO-0767

基于多模态影像组学联合机器学习模型在预测甲状腺乳头状癌颈部淋巴结转移中的价值

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【摘要】目的 构建基于超声、CT 影像组学联合机器学习模型, 评估其预测甲状腺乳头状癌 (PTC) 颈部淋巴结转移 (CLNM) 中的价值。方法 回顾性分析 198 例经手术病理证实 PTC 患者, 其中 CLNM 组 97 例, 无 CLNM 组 101 例, 所有患者术前均接受甲状腺超声和 CT 扫描, 按照 7: 3 的比例随机分为训练集和测试集。采用单因素和多因素回归分析 PTC 患者发生 CLNM 的临床独立风险因素, 构建临床风险模型。基于超声和 CT 图像提取并筛选最优影像组学特征, 分别使用逻辑回归 (LR)、支持向量机 (SVM)、随机森林 (RF)、极度随机树 (ET)、K 邻近算法 (KNN)、监督学习集成模型 (Light GBM)、Gradient Boosting、AdaBoost、XGBoost、前馈神经网络多层感知器 (MLP) 等 8 个机器学习模型构建 PTC 患者 CLNM 影像组学预测模型。绘制受试者工作特征曲线 (ROC) 评估模型效能, 筛选出最优影像组学模型与临床风险模型构建诺模图模型 (Nomogram), 应用决策曲线分析 (DCA) 对比不同模型的临床获益。结果 SVM 模型在 8 种机器学习模型中表现最优。临床模型、SVM 模型及诺模图模型在训练集中的 AUC 分别为 0.770, 0.951, 0.960, 测试集中的 AUC 分别为 0.747, 0.857, 0.890。DCA 显示 SVM 模型和 nomogram 模型具有较高的临床净收益。结论 基于多模态影像组学联合机器学习模型可以更准确的区分 PTC 患者是否发生 CLNM 具有一定的临床应用价值

PO-0768

T2 mapping 不同测量方法在甲状腺相关眼病活动性评估中的应用

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目的: T2mapping 在甲状腺相关眼病 (TAO) 活动性评估及不同测量方法的诊断效能。

方法: 回顾性分析 22 例 TAO 患者共 43 个眼眶的临床及影像信息 (一个眼眶因图像伪影较重被排除), 根据 TAO 活动性评分 (CAS) 对每侧眼病活动情况分别评分, ≥ 3 分为活动组。对所有眼眶行 3.0T MR 冠状位 T2mapping 扫描, 并使用 3 种方法分别测量 T2 值: 1, T2hot: 信号最高的单只眼肌内勾画较小 ROI 测量最高 T2 值; 2, T2mean: 信号最高的单只眼肌的整个截面 T2 均值; 3, T2sum/4: 单侧眼眶四条眼肌肌腹层面 T2 值的平均数。采用曼-惠特尼 U 检验、斯皮尔曼相关分析及 ROC 曲线分析 3 种方法测量结果对 TAO 活动性的诊断效能。由另一名医师对图像进行重复测量, 应用组内相关系数对两次测量结果进行一致性检验。

结果: T2hot、T2mean 和 T2sum/4 与 CAS 均呈中等程度正相关, T2mean 与 CAS 相关性最强 ($r=0.66$), 活动组 T2hot、T2mean 和 T2sum/4 均大于非活动组, 差异有统计学意义。ROC 曲线显示 T2hot、T2mean 和 T2sum/4 对 TAO 活动性均有一定的诊断效能, T2mean 诊断效能最佳, $AUC=0.868$, 截断值 94.25ms 时判断活动性敏感度为 75%, 特异度为 89.5%。观察者间一致性评价结果显示 T2sum/4 一致性最好 ($ICC=0.958$), T2hot 则较差 ($ICC=0.754$)。

结论: T2mapping 序列的三种测量方法得出的 T2 值均可用于 TAO 的活动性评估。T2mean 在仅有单只眼肌受累时即可被监测到, 而 T2sum/4 在炎症早期并不敏感, T2RThot 与 CAS 的相关性及最差, 提示小 ROI 的 T2hot 不能很好的反映炎症的整体状态。综上 T2mean 与 CAS 的相关性最强、诊断效能最高、观察者间一致性较好, 是 T2mapping 定量测量评估 TAO 活动性的最佳指标。

PO-0769

颈动脉周围脂肪密度与急性缺血性脑卒中事件的相关性研究

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目的 分析颈动脉周围脂肪密度与急性脑梗塞事件的相关性。方法 回顾性分析于我院同时进行颈动脉 CTA、颅脑 MRI 检查的患者临床及影像资料。由两名放射科医生, 分别在 PACS 上测量颈动脉 CTA 斑

块侧、对侧血管周围脂肪密度 (Pericarotid fat density, PFD)。选择颈动脉斑块最大层面, 分别计算斑块侧、非斑块 PFD、PFD 差值 [$\Delta PFD (HU) = \text{斑块侧 PFD} - \text{非斑块侧 PFD}$]。将患者分为急性脑梗塞组、非急性脑梗塞组; 轻中度狭窄组 (10%-69%)、重度狭窄组 (70%-100%)。急性脑梗塞患者又分为梗塞同侧、梗塞对侧亚组。分别比较临床实验室指标、PFD 的组间差异。采用 SPSS 19.0 进行数据处理。计数资料采用 χ^2 检验; 计量资料两组间比较采用 t 检验或 Mann-Whitney U 检验; 使用配对样本 T 检验比较急性脑梗塞的梗塞同侧及梗塞对侧的 PFD。P<0.05 认为差异具有统计学意义。结果 本研究共纳入 71 例患者, 患者平均年龄 61.3 ± 10.4 岁。急性脑梗塞组患者颈动脉 PFD 差值 (ΔPFD) 高于非急性脑梗塞组, 分别为 34.2 HU、25.5HU, 差异具有统计学意义 (P=0.039)。急性脑梗塞患者梗塞同侧颈动脉 PFD (-32.6 ± 20.5 HU) 高于梗塞对侧颈动脉 PFD (-66.8 ± 16.1 HU), 差异具有统计学意义 (P<0.001)。重度狭窄患者的 PFD 差值 (ΔPFD) 高于轻中度狭窄患者, 差异具有统计学意义 (P=0.013)。结论 颈动脉 PFD 的量化分析与急性脑梗塞事件相关, PFD 可能与斑块的易损性相关, 可以作为血管周围炎症的替代标志物。

PO-0770

刀锋技术快速梯度自旋回波扩散加权成像在鼻腔鼻窦病变评估中的应用:与分段读出平面回波扩散加权成像图像质量的综合比较

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目的: 探讨刀锋技术快速梯度自旋回波扩散加权成像 (TGSE BLADE DWI) 在鼻腔鼻窦占位性病变评估中的可行性, 并定性和定量比较 TGSE BLADE DWI 与分段读出平面回波扩散加权成像 (RESOLVE DWI) 的图像质量。

方法: 本研究前瞻性纳入 48 例鼻腔鼻窦占位性病变患者, 所有患者均在 3.0T MR 扫描仪上使用具有相似成像参数的 TGSE BLADE DWI 和 RESOLVE DWI 进行横断位扩散加权成像。两名放射科医师通过定性成像参数(整体图像质量、病变显著性、畸变)和定量成像参数(几何畸变比[GDR]、信噪比[SNR]、对比度)评估两种序列的图像质量。同时比较两组序列中病变和脑桥的表观扩散系数值(ADC)。

结果: 定性评分比较显示 TGSE BLADE DWI 比 RESOLVE DWI 具有更高的整体图像质量($P<0.001$)、病变显著性($P<0.001$)和更少的几何畸变($P<0.001$)。定量评价显示 TGSE BLADE DWI 比 RESOLVE DWI 具有更高的图像对比度($P<0.001$)和更低的 GDR($P<0.001$), 但 TGSE BLADE DWI 的 SNR 低于 RESOLVE DWI($P<0.001$)。病变和脑桥的 ADC 值在 TGSE BLADE DWI 图像中低于 RESOLVE DWI($P<0.05$)。

结论: 与 RESOLVE DWI 相比, TGSE BLADE DWI 能够有效降低图像磁敏感伪影和几何畸变, 更准确地显示正常解剖结构和病变组织, 改善鼻腔鼻窦区域扩散加权成像图像的质量。

PO-0771

基于 CTA 成像探究急性脑梗死患者形成颈动脉高危斑块的危险因素

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目的: 本研究以计算机断层血管造影 (CTA) 成像技术为基础, 探究急性脑梗死患者形成颈动脉高危斑块的危险因素, 为临床诊疗及预防提供有力的依据。

方法: 选择回顾性分析我院 2022 年 01 月-2023 年 01 月收治的急性脑梗死患者 156 例, 进行颈部动脉 CTA 检查, 对 CTA 图像进行评估, 根据其是否存在高危斑块分为高危斑块组及稳定斑块组, 收集两组患者临床资料及生化资料, 并采用单因素及多因素 Logistic 回归分析, 探究急性脑梗死患者颈动脉高危斑块形成的相关危险因素。

结果: 在 200 例急性脑梗死患者中, 高危斑块患者 101 例, 稳定斑块患者 99 例。根据 t 检验、U 检验、卡方检验结果显示, 两组之间的 HDL-C、高尿酸血症、糖尿病、高水平同型半胱氨酸、吸烟史、既往心梗史的差异具有统计学意义 ($P<0.05$), 其余因素的差异不具有统计学意义。再根据单因素及多因素 Logistic 回归模型结果显示, 高尿酸血症、糖尿病、高水平同型半胱氨酸、吸烟史、既往心梗史是急性脑梗死患者颈动脉高危斑块形成的独立危险因素 ($OR>1$, $P<0.05$), 而性别及 HDL-C 不是颈动脉高危斑块形成的独立危险因素。

结论: 1、高尿酸血症、糖尿病、高水平同型半胱氨酸、吸烟史、既往心梗史是急性脑梗死患者颈动脉高危斑块形成的独立危险因素。

2、CTA 能够有效识别颈动脉高危斑块特征, 能够对颈动脉高危斑块性质进行较好的评估。

关键词

脑卒中；颈动脉斑块；CTA；糖尿病；高尿酸血症；同型半胱氨酸

PO-0772

基于超高分辨力 CT 的镫骨环韧带及镫骨肌腱影像解剖初步研究

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目的：基于超高分辨力 CT (U-HRCT) 分析正常镫骨环韧带 (AL) 及镫骨肌腱 (ST) 影像解剖。
方法：回顾性分析 2020 年 9 月至 2021 年 8 月首都医科大学附属北京友谊医院 258 例 304 耳正常耳的 U-HRCT 资料，观察镫骨底板形态、AL 显示率、ST 附着点及与镫骨长轴夹角。采用卡方检验或独立样本 t 检验比较不同年龄及性别以上指标的差异。
结果：镫骨底板边缘形态分为尖角状、结节状及平直状。前端最常见形态为尖角状 (52.3%，159/304)；后端、上缘及下缘最常见者为平直状，分别占 50.0% (152/304)、91.8% (279/304)、98.0% (298/304)。AL 下缘显示率为 100.0% (304/304)，前端和上缘显示率均为 99.3% (304/304)，后端显示率较低 (81.9%，249/304)。81.9% (304/304) 的 ST 末端附着于镫骨头-颈。附于镫骨后弓的 ST 与镫骨长轴夹角 $[(92.9 \pm 9.1)^\circ]$ 大于附于镫骨头-颈者 $[(89.3 \pm 10.3)^\circ]$ ， $t = -2.378$ ， $P = 0.018$ 。后端 AL 显示率在女性 (87.5%，126/144) 高于男性 (78.1%，89/114)， $\chi^2 = 4.074$ ， $P = 0.044$ 。
结论：U-HRCT 能够清晰显示正常耳镫骨底板、AL 及 ST。正常镫骨底板边缘形态、AL、ST 影像所见具有规律性，为该区隐匿性病变的精准诊断提供参照。

PO-0773

基于超高分辨力 CT 的砧镫关节影像解剖初步研究

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目的：基于超高分辨力 CT (U-HRCT) 分析正常砧镫关节 (ISJ) 影像解剖。
方法：回顾性分析 2020 年 9 月至 2021 年 8 月行超高分辨力 CT (U-HRCT 检查) 的耳鼻喉科患者 258 例，正常耳共计 304 侧。于 U-HRCT 图像设置 ISJ 标准观察层面，描述其解剖特征，并比较不同年龄及性别的 ISJ 解剖形态差异。
结果：88.2% (268/304) 砧镫关节清晰可见，11.8% (36/304) 模糊可见；47.7% (145/304) 砧镫关节表现为低密度，40.8% (124/304) 为部分骨性密度，11.5% (35/304) 为骨性密度。 ≤ 30 岁及 > 30 岁中 ISJ 解剖特征未见显著差异 (均 $P > 0.05$)。男性镫骨头-豆状突外侧距离、豆状突长径数值均大于女性，分别为 $[0.93 (0.81, 1.02)]$ mm 比 $[0.87 (0.74, 0.96)]$ mm， $Z = -2.870$ ， $P = 0.004$ 、 $[0.66 (0.55, 0.77)]$ mm 比 $[0.59 (0.51, 0.69)]$ mm， $Z = -2.825$ ， $P = 0.005$ ，关节间隙宽度 (即二者差值) 则未见显著差异。砧骨豆状突-镫骨头夹角在男性 $[129.8 (119.8, 148.9)^\circ]$ 显著大于女性 $[137.9 (126.3, 155.6)^\circ]$ ， $Z = -2.942$ ， $P = 0.003$ 。
结论：U-HRCT 可清晰显示正常 ISJ，后者影像解剖学为 ISJ 病变的影像诊断及术前评估提供基础。

PO-0774

MRI 对儿童眼眶的规范化评估及其临床意义

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目的：利用磁共振成像（MRI）评估各年龄组儿童正常眼眶结构的标准数值，为儿童眼部外伤性、感染性、内分泌性以及肿瘤性疾病的影像学诊断奠定基础。方法 回顾性收集行眼眶 MRI 增强扫描且表现正常的儿童患者 130 例，其中男 67 例，女 63 例，并根据年龄分为四组：第 1 组：1-24 个月；第 2 组：25-48 个月；第 3 组：49-120 个月；第 4 组：121-216 个月；分别测量角膜、巩膜到颞间线（IZL）、眶间线的距离，以及视神经、各组眼外肌的直径。结果 各年龄组儿童角膜、巩膜到颞间线（IZL）、眶间线的距离以及视神经、眼外肌直径的差异具有统计学意义，其中角膜到颞间线（IZL）、眶间线的距离整体随年龄增大而增大，巩膜到颞间线（IZL）、眶间线的距离整体随年龄减小而减小，视神经、眼外肌直径大小整体随年龄增大而增大。结论：根据年龄将儿童患者分组，确定不同分组儿童眼眶 MRI 中眼球相对于 IZL 以及眶缘连线的位置、眼外肌及视神经正常直径范围，这种标准数值量表可以作为评估儿童患者眼眶 MRI 的指南，从而为儿童眼眶疾病的影像诊断奠定基础。

PO-0775

甲状腺乳头状癌高容量淋巴结转移临床风险因素研究： 单发与多发乳头状癌对比分析

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目的：探讨性别、年龄及桥本氏甲状腺炎对最大径 $> 10.0\text{mm}$ 的单发甲状腺乳头状癌（papillary thyroid carcinoma, PTC）和多发 PTC 患者高容量淋巴结转移（high-volume central lymph node metastases, HVM）的预测价值。

方法：回顾性分析 680 例单发 PTC 和 373 例多发 PTC 的临床和病理资料，依据性别和 HT 合并状态将 2 组均进一步分为 HT、non-HT、女性和男性亚组，通过受试者工作特异度曲线下面积（area under the curve, AUC），寻找年龄在各亚组中预测 HVM 的最佳阈值及相应的诊断效能。

结果：680 例单发 PTC 和 373 例多发 PTC 中，发生 HVM 的比例分别为 8.8%（60/680）和 14.2%（53/373）（ $P < 0.05$ ）。单因素分析显示，单发 PTC 组中男性和女性发生 HVM 的比例分别为 13.0%（25/192）和 7.2%（35/488）（ $Z = 5.859$, $P < 0.05$ ），多发 PTC 组分别为 24.5%（25/102）和 10.3%（28/271）（ $Z = 12.220$, $P < 0.05$ ）；单发 PTC 组瘤体中位直径分别为 15.0mm 和 18.0mm（ $Z = -2.702$, $P < 0.05$ ），多发 PTC 组分别为 23.0mm 和 27.0mm（ $Z = -1.482$, $P = 0.139$ ）。多因素分析显示，男性、瘤体大小和年龄 ≤ 36.5 岁是 PTC 发生 HVM 的独立风险因素，优势比（odds ratios, OR）分别为 1.859、1.017 和 2.839。亚组分析显示，单发和多发 PTC 组中 non-HT 亚组预测 HVM 的年龄阈值和 AUC 分别为 36.5 岁和 32.5 岁、0.647 和 0.709，女性亚组分别为 32.5 岁和 43.0 岁、0.680 和 0.670。

结论：多发 PTC 组发生 HVM 比例高于单发 PTC 组，男性、瘤体大小和年龄 ≤ 36.5 岁是发生 HVM 的独立风险因素，且在不同性别及合并 HT 状态下，年龄预测单发 PTC 组和多发 PTC 组 HVM 的阈值和效能存在一定差异。

PO-0776

基于 T2WI 的纹理分析和磁敏感加权成像 鉴别诊断腮腺常见良性肿瘤

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目的评估基于 T2WI 的纹理分析及磁敏感加权成像 (SWI) 鉴别多形性腺瘤 (PA) 和 Warthin 瘤 (WT) 的作用。方法和材料回顾纳入 37 名在 3.0T MRI 接受 T2WI 和 SWI 检查扫描的患者 (21 名 PA 和 16 名 WT) (Ingenia CX, Philips Healthcare, the Netherlands)。两名放射科医生回顾性评估了其 MRI 序列。在 3D Slicer 软件上使用 T2 加权脂肪抑制图像进行纹理分析 (TA)，并在 SWI 最小强度投影图像上 (SWI-MinP) 中评估肿瘤内磁敏感信号强度 (ITSS)。TA 的 ROI 被绘制为尽可能完全覆盖每个层面上的病变，不包括坏死和血管。计算直方图参数，包括平均值、中位数值、熵、偏度、峰度、最大值、最小值和第 10、90 个百分位数。通过组内相关系数 (ICC) 评估观察者间的可靠性 (如 $ICC > 0.75$ ，则一致性良好)。两名观察者的平均值用于后续分析。使用独立样本 t 检验或 Mann-Whitney U 检验来比较 PA 和 WT 之间直方图参数和 ITSS 的差异。根据受试者工作特征曲线 (ROC) 分析诊断效能。采用 Logistic 法结合 ITSS 计算 TA 参数的对应曲线下面积 (AUC)。结果两个观察者之间的观察者间可靠性良好。WT 的平均值、熵显著低于 PA，偏度和峰度值显著高于 PA ($p < 0.05$)。PA 和 WT 的 ITSS 等级差异具有统计学意义 ($p < 0.05$)。均值、熵、偏度、峰度和 ITSS 的 AUC 分别为 0.779、0.726、0.754、0.687 和 0.718。熵和 ITSS 的联合 AUC 可以提高诊断性能，这与 ITSS 鉴别能力相比有统计学差异 ($p = 0.04$)。结论均值、熵、偏度、峰度和 ITSS 可以识别 PA 和 WT。四个直方图参数和 ITSS 的组合可以提高诊断效能。

PO-0777

定量磁共振成像在评估甲状腺相关眼病的疾病活动和 严重程度中的应用价值

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目的：甲状腺相关眼病 (TAO) 的准确分期，对于治疗选择至关重要。临床上目前以临床活动评分 (CAS) 来确定疾病活动性，传统 MRI 在分期上的作用有限。我们采用定量成像方法，意图对 TAO 进行更加精准的分期。

方法：回顾性选取了 40 例 TAO 患者，专科医师评价其 CAS 评分。影像方面，对患者进行了常规 MRI、脂肪分数 (IDEAL-IQ 序列)、T1 ρ 和 T2mapping 扫描。在 T1FLAIR 序列中测量了眶内脂肪 (OF) 的体积，在 IDEAL-IQ 序列测量了上直肌 (SR)、下直肌 (IR)、内直肌 (MR)、外直肌 (LR) 和上斜肌 (SO) 以及 OF 的脂肪分数，并测量了 SR、IR、MR、LR 及 SO 的体积。在 T1 ρ 序列及 T2 mapping 序列测量各眼外肌的 T1 ρ 值及 T2 弛豫时间。使用独立样本 t 检验和 Spearman 相关性分析进行统计分析。

结果：活动组 (CAS ≥ 3) 和非活动组 (CAS < 3) TAO 患者之间眶内脂肪体积没有显著差异 ($p = 0.816$)，眶内脂肪体积与 CAS 评分无相关性 ($p = 0.2$)。各眼外肌的脂肪分数在活动组和非活动组中均有显著差异 (所有 $p < 0.05$)，OF 的脂肪含量在活动组中降低，但统计学未表现出显著性。IR 的 T2 弛豫时间在活动组中较高 ($p = 0.03$)。各眼外肌脂肪分数随着 CAS 评分提高而降低 (所有 $p < 0.05$)，OF 脂肪分数随 CAS 评分提高而降低 ($p = 0.03$)。SR、IR、LR 的体积随 CAS 评分增加而增大 (所有 $p < 0.05$)。IR、MR 和外直肌 (LR) 的 T1 ρ 随着 CAS 提高而增加，MR 和 LR 的 T2 弛豫时间随着 CAS 提高而增加 (所有 $p < 0.05$)。

结论: 眶内脂肪体积可能无法区分 TAO 的活动性和严重程度。眼外肌的定量磁共振成像 (MRI) 参数, 包括脂肪分数 (反应眼外肌脂肪化程度) 及 T1 ρ (反应纤维化程度), 可以提供准确的参数来描述 TAO 的活动性和严重程度, 从而帮助选择适当的治疗方案。眼眶脂肪在活动的病人中可能因炎症浸润等因素导致脂肪含量减低或水肿程度增加, 这或许可以解释一部分眼部症状产生的原因。需要更多的案例参与到分析中, 并进行长期随访以评估定量 MRI 在预测 TAO 进展和预后方面的作用。

PO-0778

经颞浅动脉-大脑中动脉搭桥术前后烟雾病患者的脑血流 4D flow 分析

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目的: 使用 4D flow 磁共振成像技术对经颞浅动脉-大脑中动脉搭桥术前后的烟雾病患者进行脑血流分析, 为重建术后评估提供新思路。**方法:** 前瞻性招募 13 例经 DSA 确诊为烟雾病或烟雾综合症的患者 (24-60 岁)。所有患者均在手术前行常规头颅磁共振扫描与 4D flow 磁共振扫描。使用 QFlow 4D 软件获取颈内动脉、大脑前动脉、大脑中动脉、大脑后动脉、基底动脉以及桥血管的血流量与峰值速度。将狭窄闭塞严重侧作为患侧, 比较同患侧各支血管脑血流量的差异、手术前后各时间点总脑血流量的变化、比较桥血管颅内段与颅外段血流量是否具有差异。流量及峰值流速测量值采用 Wilcoxon 符号秩和检验进行比较。**结果:** 术后对侧颈内动脉血流量较术前明显下降 (术后 96.97 ± 69.87 ml/min, 术前 124.65 ± 70.72 ml/min) 且差异具有统计学意义 $P=0.017$ 。其他血管血流量值无明显变化。桥血管颅外段与颅内段血流量值分别为 80.78 ± 58.30 、 108.80 ± 78.97 ml/min, 差异具有统计学意义 ($P=0.028$)。术前术后脑总血流量分别为 417.83 ± 202.17 、 484.17 ± 161.73 ml/min, 术后呈现明显增高趋势, 统计学无差异。患侧大脑后动脉峰值速度术前术后分别为 69.77 ± 18.07 、 55.46 ± 7.36 cm/s, 呈现降低趋势, 差异具有统计学意义 ($P<0.05$)。术后对侧颈内动脉血流量在总脑血流量中的占比由原来 42.16% 变为 32.12%, 术后基底动脉血流量在总脑血流量中的占比由原来 49.64% 变为 43.65%, 术后桥血管血流量在总脑血流量中的占比为 15.29%。**结论:** 4D flow MRI 提供了一种全面、无创的方法评价血流动力学。经颞浅动脉-大脑中动脉搭桥术后桥血管可以部分补偿较严重侧闭塞或狭窄的颈内动脉血流量的损失, 同时减轻相对健侧颈内动脉与基底动脉的代偿行为。这些血流参数值可能有助于改善患者术后评估方式。

PO-0779

高分辨 CT 结合 MRI 对颅底软骨肉瘤的诊断价值分析

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目的: 探讨高分辨 CT (HRCT) 结合 MRI 对高分化颅底软骨肉瘤的诊断价值。**方法:** 回顾性分析经病理证实的 10 例颅底软骨肉瘤患者的 HRCT、MRI 图像, MRI 序列包括常规 T1WI、T2WI、弥散加权成像、动态增强磁共振成像 (DCE-MRI)。HRCT 用于观察瘤内特征性骨质钙化及周围骨质破坏情况, 并通过面神经管曲面重建 (CPR) 图像直观地观察面神经管受累情况。MRI 常规扫描主要观察病灶的位置、形态、大小、信号特征、累及范围及与周围软组织的关系; 弥散加权成像测量病灶的表观弥散系数, DCE-MRI 成像测量病灶增强的时间-信号曲线 (TIC) 类型。**结果:** HRCT 显示 10 例均出现虫蚀样骨质破坏区, 10 例病灶内均出现钙化, 钙化表现为斑点状、不规则斑片状; 面神经管 CPR 图像直观显示 6 例病灶累及面神经管鼓室段、乳突段。MRI 图像上

所有肿瘤形态不规则,与周围组织分界清晰,T1WI 呈不均匀等或等低信号,T2WI 呈不均匀高信号,平均大小约 3.9cm×3.0cm×3.9cm,增强扫描呈中度或明显不均匀强化。10 例中,7 例病灶主体位于颈静脉孔区、2 例病灶主体位于颞骨乳突部、1 例病灶主体位于颞下窝区。肿瘤累及周围主要结构包括颈静脉孔区 (n=8)、颞骨乳突部 (n=7)、面神经管鼓室段及乳突段 (n=6)、舌下神经管 (n=5)、中耳 (n=4)、桥小脑角区 (n=3)、咽旁间隙 (n=2)、颈动脉间隙 (n=1)、内听道 (n=1)、下颌骨 (n=1);其中 2 例患者出现患侧舌肌萎缩、1 例患者出现患侧颈阔肌及胸锁乳突肌萎缩。10 例病灶弥散加权成像显示弥散不受限,表观弥散系数平均值为 $2.35 \times 10^{-3} \text{mm}^2/\text{s}$ 。10 例病灶 DCE-MRI 的 TIC 均呈持续上升型 (I 型)。

结论:颅底高分化软骨肉瘤的 HRCT 和 MRI 影像学表现具有明显的特征,此外 HRCT 面神经管 CPR 可直观地显示面神经管受累情况,因此 HRCT 结合 MRI 检查对于术前诊断及治疗具有重要的参考价值。

PO-0780

临床-常规影像特征和 MRI 影像组学模型对 腮腺良恶性肿瘤的预测研究

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目的

本研究旨在构建腮腺良恶性肿瘤的术前无创预测模型,以解决传统影像学表现重叠混淆、穿刺活检结果不理想和活检导致肿瘤复发的问题。主要研究目标如下:(1)综合临床因素、常规影像学 and 磁共振成像影像组学,建立高准确度的腮腺良恶性肿瘤预测模型;(2)采用非刚性图像配准和 T1 加权图像定义感兴趣区,并运用新兴的最小冗余最大相关算法进行特征筛选,以目标提升模型的准确性和应用范围。

方法

本研究利用 2015 年至 2023 年暨南大学附属第一医院首诊的 92 例腮腺肿瘤患者数据,结合单变量、多变量分析和机器学习,构建了一个基于磁共振成像和临床因素的高准确度预测模型。图像配准和勾画使用 ITK-GREEDY 和 ITK-SNAP,通过 Python 进行图像预处理和特征提取。采用组内相关系数、Mann-Whitney U 检验以及最小绝对值收缩和选择算子和最大相关最小冗余算法进行特征降维和筛选。数据集经随机分组和四折交叉验证划分,模型则基于支持向量机和逻辑回归构建,性能评估以验证集为标准。

结果

本研究采用了三种不同的预测模型对腮腺肿瘤进行评估。基于临床与常规影像学因素的模型识别出位置、周围组织浸润和淋巴结异常为独立危险因素,其受试者工作特征曲线下面积 (AUC) 为 0.81,准确率为 0.89。影像组学联合支持向量机-最大相关最小冗余 (SVM-mRMR) 模型的 AUC 值为 0.91,准确率为 0.85,但显示欠拟合现象。联合临床与影像组学因素的综合模型进一步优化了预测性能,其 AUC 为 0.92,准确率为 0.90。总体而言,综合模型在诊断恶性肿瘤方面具有较高的准确性。

结论

本研究成功地构建了一个基于磁共振成像、临床因素和影像组学的腮腺肿瘤预测模型。该模型在验证组中的诊断性能显著,肿瘤内外特征均具有重要的诊断价值,为提高腮腺良恶性肿瘤的诊断准确性提供了科学依据。

PO-0781

基于双能 CT-形态学列线图鉴别 Bethesda III、IV 类甲状腺结节良恶性的价值

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目的 探讨联合双层光谱检测器 CT (dual-layer spectral detector CT, SDCT) 定量参数与形态学特征鉴别 Bethesda III、IV 类甲状腺结节良恶性的价值。

方法

回顾性收集 2021 年 8 月至 2023 年 5 月重庆市人民医院具有术后病理结果的 75 例 Bethesda III、IV 类甲状腺结节患者的 SDCT 图像, 其中良性组 28 例, 恶性组 47 例。SDCT 定量参数包括动脉期和静脉期标准化碘浓度 ($NIC=IC_{\text{甲状腺结节}}/IC_{\text{颈动脉}}$)、能谱曲线斜率衰减 (λHU)、标准化有效原子序数 ($NZ_{\text{eff}}=Z_{\text{eff 甲状腺结节}}/Z_{\text{eff 颈动脉}}$)。形态学特征包括微钙化、增强后模糊、形态不规则、甲状腺包膜不连续。通过单因素分析比较良性和恶性组 SDCT 定量参数和形态学特征。采用多因素回归分析确定 Bethesda III、IV 类甲状腺恶性结节的独立危险因素, 并利用 logistic 回归构建形态学特征模型和 SDCT 定量参数-形态学特征联合模型。通过 Delong 检验比较不同模型的诊断效能。基于诊断效能最优的模型构建列线图。运用受试者工作特征曲线、校准曲线和决策曲线评估模型诊断效能。

结果

多因素二元 logistic 回归分析结果显示动脉期 NIC、增强后模糊是 Bethesda III、IV 类甲状腺恶性结节的独立危险因素 (P 均 <0.05)。基于此构建的列线图诊断效能优于增强后模糊 ($AUC: 0.798$ vs 0.658 , $P<0.05$)。敏感度为 87.2%, 特异度为 57.1%。校准曲线显示列线图实际和预测概率之间具有较好的一致性。决策曲线分析表明, 列线图模型较形态学模型的临床获益高。

结论

基于双能 CT-形态学列线图可以有效鉴别 Bethesda III、IV 类甲状腺结节良恶性。

PO-0782

探讨智能快速磁共振重建技术在头颅检查中的应用

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目的 探讨智能快速磁共振重建技术在头颅检查中的应用价值。**方法** 收集疑颅脑病变行头颅 MR 平扫患者 50 例, 将扫描后常规图像 (常规组) 行智能快速磁共振重建后获智能快速重建组图像, 分别对两组图像进行评估, 包括客观评分: 感兴趣区的平均信号强度、SD、SNR 及 CNR, 以及主观评分和图像的诊断效能等。**结果** 与常规图像组相比, 智能快速重建组图像颅内感兴趣区的 SD、SNR、CNR 均存在统计学差异 ($t=8.14$, $p<0.05$; $t=7.73$, $p<0.05$; $t=8.05$, $p<0.05$), 智能快速重建组图像的 SD 降低 28.24%, SNR 提高 42.71%, CNR 提高 49.11%; 而两组图像感兴趣区的平均信号强度无统计学意义 ($t=1.21$, $p>0.05$); 常规扫描组及智能快速重建组在主观评分上具有统计学差异 ($Z=5.09$, $p<0.05$), 智能快速重建组主观评分更高; 此外, 两组图像对病变检出率无统计学差异 ($p>0.05$)。**结论** 智能快速磁共振重建技术在头颅磁共振扫描中能明显提高图像质量, 且不改变组织信号强度, 具有潜在提高 MR 头颅扫描成功率、缩短扫描时间的临床应用价值。

PO-0783

头颈部 CTA 中 GSI Assist 单能量成像结合个体化对比剂注射方案的应用研究

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目的 探讨能谱 CT 智能 mA 匹配技术 (GSI Assist) 结合个体化对比剂注射方案行头颈部 CTA 单能量成像降低辐射剂量和碘摄入量的可行性。**方法** 收集临床行头颈部 CTA 检查的患者 66 例, 男 42 例, 女 24 例, 年龄 30~90 岁, 随机分为常规组 (A 组, 33 例) 和 GSI 组 (B 组, 33 例)。A 组采用管电压 120kVp, 管电流 400mA; 对比剂 95ml, 流速 4.5ml/s。B 组采用 GSI 扫描模式, 管电压 80~140kVp 瞬切, 管电流使用 GSI Assist 模式设置, NI=15HU; 应用个体化对比剂注射方案: 300mg I/kg, 4.0ml/s; 重建 60keV 单能量图像, 统计两组辐射剂量和对比剂剂量。在 AW4.7 工作站由两位观察者对动脉重建图像进行主观评分, 比较评分一致性; 测量两组轴位图像颈总动脉 (CCA)、颈内动脉 C1 段 (ICA C1)、大脑中动脉 M1 段 (MCA M1) 和胸锁乳突肌的 CT 值及 SD 值, 计算各血管 SNR 和 CNR, 进一步比较图像质量主客观评估的组间差异。**结果** 两位观察者主观评分一致性良好 ($Kappa=0.87$), 两组图像质量评分差异无统计学意义 ($P>0.05$), 均能满足诊断要求。B 组颈内动脉和大脑中动脉血管 CT 值均高于 A 组 ($P<0.05$), 但 B 组背景 SD 值高于 A 组 ($P<0.05$)。除 B 组左侧颈内动脉、大脑中动脉 SNR 值高于 A 组外 ($P<0.05$), 其它各动脉 SNR 和所有动脉 CNR 值均无组间统计学差异 ($P>0.05$)。与 A 组相比, B 组容积 CT 剂量指数 (CTDIvol)、剂量长度乘积 (DLP)、有效剂量 (ED) 和碘摄入量分别下降 22.45%、20.63%、20.66%、30.18% ($P<0.05$)。**结论** 采用 GSI Assist+60keV 成像结合个体化对比剂注射方案可以在保证图像满足诊断要求的同时, 有效降低头颈 CTA 辐射剂量和碘摄入量。

PO-0784

异位甲状旁腺腺瘤的 CT 影像学表现及临床价值

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【摘要】目的 : 探讨多层螺旋 CT 诊断异位甲状旁腺腺瘤的临床价值及 CT 影像表现, 以提高异位甲状旁腺腺瘤术前诊断的准确性。**方法** : 回顾性分析经手术和病理证实的 22 例异位甲状旁腺腺瘤的临床资料及 CT 影像学表现, 8 例患者行颈部 CT 增强+胸部 CT 增强及平扫, 13 例患者行颈部+胸部 CT 增强扫描, 1 例患者颈部+胸部 CT 增强+MRI 平扫, 22 例患者均行甲状腺超声检查, 19 患者行甲状旁腺放射性核素 (MIBI) 成像。**结果** : 22 例患者中病灶位置分别为: 上纵隔气管食管左右侧旁 16 例, 中纵隔主动脉弓-肺动脉主干之间 1 例, 前中纵隔胸腺内 2 例, 左侧颈部 1 例; 病灶大小位于 5.4mm×8.6mm-29.3mm×16.2mm 之间, CT 平扫呈软组织密度, 22 例患者 CT 增强扫描均呈明显强化, CT 值位于 87HU-219HU 之间, 其中 5 例见坏死及囊变。其中发现 CT 增强检查、甲状旁腺放射性核素成像均发现病灶并能准确定位, 8 例胸部 CT 平扫均漏诊病灶, 甲状腺超声中 16 例发现病灶, 6 例未发现病灶。**结论** : 异位甲状旁腺腺瘤好发于上纵隔胸骨上窝, CT 增强表现呈明显强化, 病灶较大者易坏死囊变, 但缺乏一定特征的 CT 征象。CT 增强扫描对异位甲状旁腺腺瘤定位诊断具有重要价值, 临床提示具有原发甲状旁腺功能亢进患者, CT 发现明显强化病灶时, 影像学应考虑到异位甲状旁腺腺瘤诊断。CT 平扫易漏诊, 临床怀疑该诊断时均应做 CT 增强扫描。

PO-0785

一种罕见的头颈部神经内分泌肿瘤-磷酸盐尿性间叶肿瘤的 CT 和 MR 表现

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【目的】探讨磷酸盐尿性间叶肿瘤 (PMT) 的 CT 和 MR 影像特征。【方法】回顾性分析 2016 年 12 月至 2021 年 6 月在中山大学附属第一医院经病理确诊为 PMT 的 9 例患者的临床及影像资料。【结果】共 9 例 PMT (男 7 例, 女 2 例) 患者, 中位年龄为 41 岁 (32-50 岁)。所有患者均有全身骨质疏松, 7 例有全身多发骨折。所有患者血磷减低、碱性磷酸酶 (ALP) 水平升高, 血钙正常; 5 例 1,25(OH)₂-VitD₃ 水平降低。9 例病灶中 5 例 (55.56%) 位于下肢, 2 例 (22.22%) 位于上肢, 2 例 (22.22%) 位于头颈部; 5 例发生在骨组织内, 4 例发生在软组织内。所有病灶 ⁶⁸Ga-DOTANOC PET/CT 均呈阳性, 其中 7 例行 ¹⁸F-FDG PET/CT 检查 6 例呈阳性。CT 表现为高密度或软组织密度, 病灶较大时会出现溶骨性骨质破坏; MR 表现为 T1WI 等-低信号, T2WI 信号多变, T2WI 压脂多呈稍高-高信号; CT/MR 增强扫描多为明显强化。【结论】PMT 发病率低, 起病隐匿, 但临床及影像学具有一定的特点, 掌握这些特点并综合临床表现、实验室及影像学检查对 PMT 的定位和准确诊断至关重要。

PO-0786

光谱 CT 鉴别慢性化脓性中耳炎与中耳胆脂瘤的价值

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目的 探讨基于双层探测器光谱 CT 鉴别胆脂瘤型中耳炎与肉芽肿型中耳炎的最佳参数及诊断效能。方法 回顾性分析我院经双层探测器光谱 CT 常规平扫的慢性化脓性中耳炎患者共 50 例, 所有病例均经病理证实, 中耳胆脂瘤 27 例、肉芽肿型中耳炎 23 例, 分析两组病灶平扫影像学表现及多个能谱参数。采用受试者操作特征曲线获得各参数的诊断价值及阈值, 用曲线下面积 (AUC)、敏感度和特异度来评估其诊断效能。结果 (1) 在 HRCT 影像学表现方面, 两组病灶在乳突分型及病灶周围骨质破坏情况差异有统计学意义 ($P < 0.05$)。 (2) 平扫 CT 值、有效原子序数 (effective atomic number, Z_{eff})、能谱曲线对中耳胆脂瘤与肉芽肿型中耳炎鉴别均有一定价值, 有效原子序数的诊断效能 (AUC 0.955 敏感度 86.7%, 特异度 100%) 最高。在 40-140keV 水平单能量下, 两组病灶在 40-80keV 水平单能量下 CT 值差异有统计学意义 ($P < 0.05$), 而 90-140keV 水平单能量下 CT 值差异无统计学意义 ($P > 0.05$)。结论 双层探测器光谱 CT 可以通过多个光谱参数对胆脂瘤型和肉芽肿型中耳炎进行鉴别诊断, 其中有效原子序数与常规平扫 CT 值、不同水平单能级 CT 值、能谱曲线相比具有较高的诊断效能。

PO-0787

CT 直方图提高甲状腺癌微钙化检出率的可行性研究

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回顾性分析 130 例甲状腺癌患者的临床及影像资料, 将 130 例甲状腺癌按照超声显示有无微钙化, 分为微钙化组阳性组和微钙化阴性组, 其中阳性组 87 例, 阴性组 43 例。首先进行两组间临床特征分析, 计数资料采用卡方检验, 计量资料采用独立样本 t 检验。应用 MaZda 软件对两组数据 CT 图像上的 ROI 进行直方图分析, 提取直方图参数最小值、最大值、均值、方差、偏度、峰度、第 1 位百分数、第 10 位百分数、第 50 位百分数、第 90 位百分数、第 99 位百分数。采用独立样本 t 检验或 Mann-Whitney U 检验选出差异有统计学意义的直方图参数, 绘制受试者工作特征曲线 (ROC) 评估的直方图参数预测甲状腺癌微钙化的敏感性、特异性和准确率, 并使用 ROC 曲线下面积 (AUC) 评价预测效能。对临床特征及直方图参数构建联合诊断模型, 并绘制 ROC 曲线和列线图, 评估模型预测的敏感性、特异性和准确性, 并绘制校准曲线及决策分析曲线评价模型的效能。

【结果】1. 微钙化阳性组和微钙化阴性组临床特征比较: 两组间甲状腺癌患者的年龄、病灶长径存在统计学差异, 年龄 ≤ 45 岁, 长径 $> 1\text{cm}$ 发生微钙化的几率更大。2. 微钙化阳性组和微钙化阴性组直方图参数比较: 最小值、最大值、方差、偏度、峰度、第 1、10、99 百分位数中差异具有统计学意义, 其中最小值、第 1、10 位百分数微钙化阳性组低于微钙化阴性组, 而最大值、方差、偏度、峰度、第 99 百分位数微钙化阳性组高于微钙化阴性组。峰度的 AUC 为 0.851, 敏感度、特异度、准确性分别为 94.3%、69.8%、86.2%。3. 构建临床特征和直方图参数的联合模型, 训练集和测试集模型的敏感度、特异度和准确性分别为 94.3%、82.6%、86.5% 及 75.0%、88.9%、84.6%。

【结论】1. 甲状腺癌微钙化与患者年龄、病灶长径存在相关性。2. CT 直方图参数对于提高甲状腺结节微钙化的检出率具有一定价值。3. 临床特征联合直方图参数构建模型, 可提高甲状腺癌微钙化检出率。

PO-0788

侧颅底区病变类型及其 CT 和 MRI 特征分析

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目的: 探讨侧颅底区不同病变类型及其 CT 和 MR 特征。方法: 回顾性分析经手术病理证实的侧颅底区病变的临床表现和 CT/MRI 特点, 包括病灶周围骨质破坏、病灶密度与 MRI 平扫及增强的信号特点, 及病灶的位置、大小和边界。结果: (1) 侧颅底区病变可有相同的临床表现。(2) 常见病变部位及类型, 颞骨下方: 颈静脉球体瘤、颈静脉孔区神经鞘瘤; 颞骨: 转移瘤、外耳道癌、中耳癌、面神经瘤、鼓室球体瘤、骨巨细胞瘤、朗格汉斯细胞组织细胞增生症、巨细胞修复性肉芽肿; 颞骨上方: 三叉神经瘤、脑膜瘤; 颞骨后方: 听神经瘤、内淋巴囊肿瘤。(3) 常见肿瘤的 CT 与 MRI 特点: 朗格汉斯细胞组织细胞增生症, 虫噬状骨质破坏, 无硬化边, 可伴死骨; 骨巨细胞瘤, 可明显囊变; 巨细胞修复性肉芽肿, 可伴多个液平面; 胆脂瘤, DWI 特异性高信号; 脑膜瘤, 骨质增生、可钙化, 硬脑膜尾出现; 神经鞘瘤, “哑铃”形; 副神经节瘤, “盐胡椒”征、渗透性骨质破坏; 软骨样肿瘤, 典型的软骨样弧形基质和环状钙化。结论: 侧颅底区不同类型病变有一定特征性, CT 与 MRI 结合应用有助于术前鉴别诊断。

PO-0789

四维血流磁共振成像 (4D flow MRI) 技术在颅内未破裂动脉瘤的血流动力学研究

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目的 探索四维血流磁共振成像 (4D flow MRI) 技术在颅内未破裂动脉瘤的血流评估中应用的可行性及临床价值。

方法 回顾分析 2021 年 3 月至 2023 年 4 月于我院卒中中心行 DSA 检查证实位于大脑前交通动脉 10 例未破裂动脉瘤 (10 位患者), 得到 10 例动脉瘤原始数据 (载瘤动脉管壁横截面积、动脉瘤口直径、动脉瘤大小) 并通过计算流体力学 (computational fluid dynamics, CFD) 得到血流动力学参数 (通过动脉瘤平面速度、最大通过平面速度、平均速度、最大速度、平均及最大瞬时血流量)。10 位患者 10 例动脉瘤均再次行磁共振血管成像及 4D flow MRI 技术处理, 最终得到 10 例动脉瘤速度矢量场、流线、剪切速率、壁面剪切应力, 振荡剪切指数, 根据流速计算并显示 10 个病例的三维血液流动迹线 (Pathline); 提取动脉瘤颈部平均血流速度并计算两者之间的归一化均方根误差 (normalized root mean square error, NRMSE) 和线性相关系数 (R2); 最后比较动脉瘤最大截面处的速度分布图。

结果 4D Flow MRI 和 CFD 对比结果显示, 血液在载瘤动脉和瘤体内部的流动状态相似。瘤颈部平均流速符合较好。10 例动脉瘤颈部平均流速的 NRMSE 均值为 0.08452, R2 均值为 0.90132。显示出一致的高流速区域分布。

结论 4D Flow MRI 的测量结果和 CFD 的计算结果之间具有较好的一致性, 4D Flow MRI 可全面评估血流动力学, 且为无创检查, 能够提供更多精确数据, 提高评估动脉瘤破裂风险和预后的准确性。

PO-0790

四维血流磁共振成像 (4D flow MRI) 技术在血流导向装置植入术后血流动力学研究

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目的 探索四维血流磁共振成像 (4D flow MRI) 技术在血流导向装置 (flow diverter, FD) 植入术后血流评估中应用的可行性及临床价值。

方法 回顾分析 2021 年 1 月至 2023 年 5 月于我院卒中中心行血流导向装置 (flow diverter, FD) 植入术患者 8 例, 术前所有患者经 DSA 证实单侧大脑中动脉狭窄且临床症状明显, 得到 8 例患者 8 根病变血管及对侧正常血管的原始数据 (动脉管壁横截面积、病变部位狭窄程度、斑块情况、侧枝循环形成) 并通过计算流体力学 (computational fluid dynamics, CFD) 得到血流动力学参数 (通过病变部位平面速度、最大通过平面速度、平均速度、最大速度、平均及最大瞬时血流量)。8 位患者 8 根病变血管及对侧正常血管共计 16 根血管均再次行磁共振血管成像及 4D flow MRI 技术处理, 最终得到 16 根血管速度矢量场、流线、剪切速率、壁面剪切应力、振荡剪切指数, 根据流速计算并显示 8 根病变血管的三维血液流动迹线 (Pathline); 提取病变部位血流速度并计算两者之间的归一化均方根误差 (normalized root mean square error, NRMSE) 和线性相关系数 (R2); 8 位患者 8 根病变血管行血流导向装置 (flow diverter, FD) 植入术 1 月后再次行 DSA 复查及 4D flow MRI 复查, 得

到血流动力学参数与术前对比, 采用配对 t 检验和组间 X^2 检验, 最终获得术前与术后 4D Flow MRI 和 CFD 对比结果。

结果 4D Flow MRI 和 CFD 对比结果显示, 血液在病变部位的流动状态相似; 病变血管平均流速符合较好。植入 FD 前、后血流模式改变 4D Flow MRI 的测量结果和 CFD 的计算结果二者相符。

结论 4D Flow MRI 的测量结果和 CFD 的计算结果之间具有较好的一致性, 4D Flow MRI 可全面评估血流动力学, 且为无创检查, 能够提供更多精确数据, 可用于评估 FD 植入, 有较高临床应用价值。

PO-0791

侧颅底巨细胞修复性肉芽肿的影像特点分析

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目的 分析总结发生于侧颅底的巨细胞修复性肉芽肿(giant cell reparative granuloma, GCRG)的影像表现特点, 以提高对该病的认识及诊断准确率。**方法** 回顾分析 6 例经手术病理证实的侧颅底 GCRG 患者的 CT、MRI 及临床资料, 分析侧颅底 GCRG 的影像表现特征。**结果** 6 例患者均为单侧病变(左侧 2 例, 右侧 4 例), 均以颞骨鳞部为中心生长, 累及范围包括颞骨、蝶骨、颞颌关节及颞弓; CT 均表现为膨胀性溶骨性骨质破坏, 边缘较清, 6 例均可见病变周围骨质增生硬化, 邻近部分骨质硬化、增粗; 病变内见斑点状不规则高密度影(为钙化、骨化或者残存骨), 多位于靠近边缘部分。MRI 表现为 T1WI 以等低信号为主, 1 例可见短 T1 出血信号影; T2WI 多表现为以低信号为主的混杂信号影, 2 例可见明显高信号; 均未见到明显液-液平面; MRI 增强呈不均匀中度到明显强化。5 例病变延伸至中颅窝, 对邻近颞叶呈推压改变, 邻近中颅窝底脑膜增厚强化。**结论** 发生于侧颅底的病变呈溶骨性骨质破坏伴周围骨质增生硬化, MRI 平扫以低信号为主时, 要考虑到 GCRG 的可能; 病变边缘骨质增生硬化具有特征性, 可与骨巨细胞瘤鉴别。

PO-0792

MRI 多参数成像对鼻咽癌放射治疗后腮腺放射性损伤的研究

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【摘要】目的: 通过研究鼻咽癌病人放疗前后动态增强磁共振成像(dynamic contrast-enhanced MRI, DCE)半定量参数值、表观扩散系数(apparent diffusion coefficient, ADC)值、多回波 Dixon 技术定量测得的质子密度脂肪分数(proton density fat fraction, PDFF)的变化, 探讨参数变化与腮腺放射性损伤的关系。**方法:** 前瞻性选取经病理证实的鼻咽癌患者 25 例, 所有患者放疗前及放疗结束 4 周后行 DCE-MRI、MRI-DWI、MRI 多回波 Dixon 序列扫描, 分别测量放疗前后左右腮腺的流入率(wash in rate, WIR)、达峰时间(time to peak, TTP)、增强曲线下初始面积(Initial area under curve, iAUC)、ADC 值、PDFF, 评估并记录患者口干程度, 研究腮腺 MR 各参数的变化情况与腮腺体积萎缩率、辐射剂量、口干程度的相关性。**结果:** 所有参数放疗前后均有明显统计学差异($P < 0.05$), 口干等级与放射剂量明显正相关($P < 0.05$), TTP 与 iAuc 与腮腺萎缩率呈明显正相关($P < 0.05$), WIR、PDFF 与腮腺萎缩率没有明显相关性($P > 0.05$), ADC 值与放射剂量明显相关($r = 0.521$, $P < 0.001$)。**结论:** MRI 多参数成像中 ADC 值、DCE 参数值 TTP 及 iAUC 可以无创评估腮腺放疗后损伤程度。

PO-0793

低剂量联合全模型迭代重建技术 IMR 对比迭代重建技术 iDose4 在头颈部 CT 血管成像中对图像质量的影响分析

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目的:比较在 100k Vp 的低管电压下 IMR 和 120kVp 管电压下的 iDose4 的头颈部 CT 血管成像的图像质量,探讨 iDose4 和低管电压下 IMR 对头颈血管病灶显示的影响。

方法:收集行头颈部 CT 血管成像的患者 30 例,扫描管电压为 100/120kVp,用 IMR-2、IMR-3、iDose42、iDose44、iDose46 五种重建模式重建静脉期薄层的原始数据。客观评价:测量静脉期的主动脉弓、左右颈总动脉、左右颈内动脉及左右大脑中动脉的 CT 值及标准差,计算上述区域的信噪比、对比噪声比和血管周围脂肪密度分辨率。主观评价:根据图像的噪声、脑实变、脑出血、血管钙化和 ROI 的解剖位置的显示、图像质量和诊断信心,由三名医生按照 1-5 分对各模式重建图像主观评价。最后综合主客观评价选出低剂量下质量较优的重建模式,与常规剂量 IMR-1 重建的图像进行比较。

结果:1.五种模式下主动脉弓等上述部位的 CT 值差异没有统计学意义($P>0.05$)。所有组织的噪声值按 IMR-3、IMR-2、iDose46、iDose44、iDose42 的顺序减少($P<0.05$),头颈血管病灶的 SD 值在各组间有统计学意义($F=3.210, P=0.018$)。头颈血管病灶的 SNR 值按照 iDose46、iDose44、IMR-2、iDose42、IMR-3 的顺序减少($P<0.05$)。深度学习重建强度的增加,病灶 CNR 也依次增加,iDose46 最高,各血管组织 CNR 值也逐渐升高,五种模式下脂肪密度分辨率差异有统计学意义($H=15.955, P=0.002$),iDose46 最高。2.常规剂量结合 iDose42 与低剂量结合 IMR-1 重建图像相比下 SD 值降低,SNR、CNR 值升高以及血管周围脂肪密度分辨率也增加,两组间有统计学意义($P<0.05$),常规剂量下 iDose42 针对噪声、细小结构的主观评分低于低剂量下 IMR-1 的图像,两组间有统计学意义。结论:与 iDose4 相比,IMR 可以改善头颈血管成像的图像质量,低剂量下的 IMR 与常规剂量下的 iDose4 技术均可较好完成扫描及诊断任务,但 IMR 技术较 iDose4 技术更具一定优势。

PO-0794

基于临床及 CT 危险因素的列线图预测甲状腺乳头状癌患者术后复发风险的价值研究

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目的 评估基于临床病理及 CT 图像形态学危险因素构建的列线图个体化预测甲状腺乳头状癌 (PTC) 患者术后复发风险的价值。

方法 横断面研究。回顾性分析 2012 年 1 月至 2015 年 12 月于中国医学科学院肿瘤医院行 CT 检查的 338 例 PTC 患者的临床病理及 CT 图像资料。复发定义为手术后发现经病理学/细胞学证实的或由影像学检查确定的甲状腺癌病灶。使用留出法将患者按 7:3 的比例随机分为训练集和验证集,训练集中通过单因素分析筛选出的 P 值 ≤ 0.1 的因素纳入多因素 logistic 回归分析 (向前步进法),获得与 PTC 复发相关 ($P<0.05$) 的独立危险因素。使用 logistic 回归法联合所有独立危险因素构建列线图,绘制受试者工作特征曲线,计算曲线下面积 (AUC) 和特异度、灵敏度、准确度评估列线图预测 PTC 患者术后复发风险的效能。绘制校准曲线,探究列线图预测复发与临床实际复发的相符程度。

结果 本研究 338 例患者中,共 81 例患者在手术后出现复发。分析发现年龄 ($P = 0.003$)、肿瘤侵犯甲状腺周围组织 ($P = 0.029$)、淋巴结 CT 长径 ($P = 0.009$) 及转移淋巴结数目 ($P = 0.012$)

是 PTC 复发的独立危险因素。上述 4 个因素所构建的列线图在训练集的 AUC 为 0.757 (95%置信区间[CI]: 0.678~0.837), 特异度 87.8%, 灵敏度 58.6%, 准确度 80.7%; 在验证集中 AUC 为 0.846 (95% CI: 0.751~0.942), 特异度 79.2%, 灵敏度 78.3%, 准确度 79.0%。校准曲线表明列线图预测复发具有较高的准确性, 临床应用效果较好。

结论 年龄、肿瘤侵犯甲状腺周围组织、淋巴结 CT 长径及转移淋巴结数目是 PTC 患者术后复发的独立危险因素, 基于此构建的列线图对于个体化预测 PTC 术后复发具有较高的价值。

PO-0795

基于临床因素及 MRI 特征的评分模型预测脑桥旁正中梗死早期神经功能恶化的价值

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目的 探讨基于临床因素及 MRI 特征的评分模型对脑桥旁正中梗死 (PPI) 的早期神经恶化 (END) 的预测价值。方法 采用回顾性队列研究设计, 选择 2019 年 1 月至 2023 年 6 月在东莞市人民医院收治的 163 例脑桥旁正中梗死患者作为研究对象。根据是否发生 END 将其分为 END (35 例) 组和非 END 组 (128 例)。筛选可能的临床因素及 MRI 特征后基于预测价值进行赋分建立评分模型, 并绘制受试者工作特性 (ROC) 曲线, 计算曲线下面积 (AUC)、灵敏度、特异度和约登指数。结果 同型半胱氨酸水平、梗死灶最大面积、脑白质疏松分级、病灶平均 ADC 值、病灶分布位置是脑桥旁正中梗死发生早期神经功能恶化的独立危险因素 ($P < 0.05$), 根据 OR 值进行赋分, 分别为 1、1、3、1、4, 建立评分模型, 该模型预测不良临床结局的 AUC 值为 0.910, 当分值 ≥ 6 , 灵敏度为 0.743, 特异度为 0.898。结论 基于临床因素及 MRI 特征的评分模型对于脑桥旁正中梗死的早期神经恶化有一定的预测价值。

PO-0796

扩散峰度成像和动态增强磁共振成像对腮腺肿瘤良恶性的鉴别诊断价值

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目的: 探讨扩散峰度成像 (diffusion kurtosis imaging, DKI) 和动态增强磁共振成像 (dynamic contrast-enhanced MRI, DCE-MRI) 在腮腺肿瘤良恶性鉴别诊断中的价值。

方法: 回顾性分析经病理证实的 142 例腮腺肿瘤患者资料, 其中良性肿瘤 98 例, 恶性肿瘤 44 例。治疗前均采用 Siemens 3.0 T skyra MRI 扫描仪及头颈联合线圈, 行常规 MRI 扫描及 DKI 和 DCE-MRI 检查。测量 DCE-MRI (对比剂的容量转移常数, K^{trans} ; 速率常数, K_{ep} ; 血管外细胞外间隙容积比, V_e) 和 DKI (扩散峰度, K ; 扩散系数, D) 的定量参数, 并计算定量参数的相对值 [相对值 = (患侧值 - 正常侧值) / 正常侧值], 比较组间各参数的差异。并且基于 logistic 回归分析进行参数组合用于鉴别诊断腮腺肿瘤。运用受试者工作特征曲线 (receiver operating characteristic curve, ROC 曲线) 曲线评价各参数及组合值鉴别诊断腮腺肿瘤的价值, 并计算相应的曲线下面积 (AUC)。 $P < 0.05$ 是差异具有统计学意义的标准。

结果: 腮腺良性肿瘤的 K 值、相对 K 值显著低于恶性肿瘤, 腮腺良性肿瘤 D 值、相对 D 值、相对 K_{ep} 值显著高于恶性肿瘤 (P 值均 < 0.01), 余 DCE-MRI 参数在两者之间均无明显差异。 D 值、相对 D 值、 K 值、相对 K 值、相对 K_{ep} 值鉴别诊断腮腺良性与恶性肿瘤 ROC 曲线下面积分别为 0.758,

0.688, 0.778, 0.743, 0.655。基于 logistic 回归分析进行参数组合后, K 值+相对 K 值, D 值+相对 K 值这两个组合得到了较前更高的 AUC, 分别为 0.781 和 0.787。

结论: 扩散峰度成像有助于腮腺肿瘤良恶性的鉴别, 但是动态增强磁共振成像在腮腺肿瘤良恶性的鉴别能力不如扩散峰度成像。定量参数相对值能够在一定程度提高扩散峰度成像和动态增强磁共振成像对腮腺肿瘤良恶性的鉴别能力。

PO-0797

基于超高分辨率 CT 的内耳骨性解剖与梅尼埃病的相关性研究

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目的: 基于超高分辨率 CT (ultra-high resolution computed tomography, U-HRCT) 探讨内耳相关骨性解剖与梅尼埃病的相关性。

方法: 回顾性收集我院 24 例 MD 患者资料, 这些患者均进行了颞骨 U-HRCT 检查和内耳钆造影。其中单侧 20 例, 双侧 4 例, 共 28 耳, 男性 15 例, 女性 20 例, 平均年龄 57.41 ± 13.45 岁。按照 1:1 的比例纳入性别、年龄相匹配的 24 例无耳部症状的 U-HRCT 受试者为对照组。基于 U-HRCT 观察前庭导水管全程显影情况, 测量球囊隐窝、前庭、外半规管骨岛大小。基于内耳 MR 钆造影评估内淋巴积水程度。分析 MD 组与对照组间内耳骨性结构差异情况, 分析前庭导水管显影评分 (1 分-未显示, 2 分-模糊, 3 分-清晰) 与积水程度的相关性。

结果: MD 患侧中前庭导水管未显示、模糊和清晰分别占比 (9/28)、(12/28) 和 (7/28), 正常对照组分别占比 (2/48)、(17/48) 和 (29/48), 两组之间的显影分布存在明显统计学差异 ($P < 0.05$)。MD 耳的前庭导水管显影评分为 1.00 (0.00, 1.75), 正常对照组的评分 2.00 (1.00, 2.00), MD 耳的前庭导水管显影评分显著低于正常对照组 ($P < 0.05$)。MD 患侧的平均前庭长径和短径、骨岛面积、球囊最大前后径和深度分别为 5.81 ± 0.43 mm、 2.14 ± 0.42 mm、 9.77 ± 2.60 mm²、 2.46 ± 0.44 mm 和 0.63 ± 0.19 mm, 正常对照组的平均前庭长径和短径、骨岛面积、球囊最大前后径和深度分别为 5.74 ± 0.26 mm、 2.29 ± 0.37 mm、 9.53 ± 2.31 mm²、 2.40 ± 0.38 mm 和 0.57 ± 0.15 mm, 两组之间内耳骨性指标均无明显统计学差异 ($P > 0.05$)。MD 侧耳的耳蜗和前庭积水程度与前庭导水管的显影评分均明显相关 ($P < 0.05$)。

结论: 内耳膜迷路积水不影响前庭骨性结构, 前庭导水管狭窄可能与梅尼埃病有关。

PO-0798

动脉自旋标记成像在干燥综合征腮腺损伤评估与诊断中的价值

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摘要目的: 探讨动脉自旋标记 (arterial spin labeling, ASL) 技术在干燥综合征 (sjögren's syndrome, SS) 诊断及腮腺损伤评估中的应用价值。

材料与方法: 前瞻性纳入 2021 年 8 月至 2022 年 10 月首次确诊的 SS 患者 54 例, 健康志愿者 35 例, 所有患者及健康志愿者接受双侧腮腺常规 MRI 及 ASL 检查, 随后在 ASL 伪彩图与 T1WI 融合图像中手动绘制感兴趣区 (region of interest, ROI), 得到腮腺的血流量 (blood flow, BF)。由两位医生将 SS 患者按照 MRI 形态学分级标准分为 0-4 级。采用非参数 Mann-Whitney U 检验比较健康志愿者与 SS 患者 BF 的差异性, 对于不同 MRI 形态学分级间 BF 的比较, 采用 Kruskal-Wallis

test, 采用 Spearman 秩和检验分析腮腺 MRI 形态学分级与 BF 的相关性。采用 Logistic 回归联合受试者工作特征 (receiver operating characteristic, ROC) 曲线评价 MRI 形态学分级、BF 及二者联合对 SS 患者的诊断效能。

结果: 0-3 级 SS 患者的 BF 均高于健康志愿者, 差异有统计学意义 ($P<0.05$), 4 级 SS 患者的 BF 与健康志愿者差异无统计学意义 ($P=0.699$)。腮腺 MRI 形态学分级 (0-3 级) 与 BF 呈强相关 ($r=0.785$, $P<0.001$)。基于 BF 的诊断效能 ($AUC=0.863$) 高于 MRI 形态学分级 ($AUC=0.806$), 但差异无统计学意义 ($P=0.09$), BF 与 MRI 形态学分级联合诊断的 AUC ($AUC=0.930$) 高于单独 MRI 形态学分级或单独 BF, 差异存在统计学意义 ($P<0.001$)。

结论: BF 对 SS 患者的诊断效能较高, BF 与 MRI 形态学分级联合能够提高诊断效能, 基于 ASL 技术获得的 BF 定量参数在 SS 患者腮腺损伤评估与诊断中具有一定意义, 是一种常规 MRI 诊断的重要补充工具。

PO-0799

双能量 CT 在缺血性卒中患者脑动脉机械取栓术后鉴别出血及对比剂外渗中的应用

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目的: 探讨 Siemens 第三代 Force 双源 CT 虚拟平扫 (Virtualnon-contrast, VNC) 技术对缺血性卒中患者介入治疗后发生出血或对比剂外渗的鉴别诊断价值。方法: 回顾性分析我院 2021 年 10 月至 2023 年 2 月 173 例缺血性卒中患者介入治疗术后, 1 小时内利用双源 CT 双能量成像技术行头颅 CT 扫描, 将薄层图像传至 Siemens Syngo. Via VB10 工作站, 使用双能量软件处理并重建虚拟平扫 (VNC) 和碘分布 (IOM) 图像, 根据 VNC 和 IOM 图像不同组合分为: 1、出血, 即 VNC 图像上存在高密度灶, 而 IOM 图像上未见高密度灶; 2、出血合并对比剂外渗, 即 VNC 和 IOM 图像上均可见高密度灶; 3、对比剂外渗, 即 VNC 图像上无高密度灶, 而 IOM 图像上存在。以术后 24 至 72 小时的影像学随访检查和最终临床诊断结果为标准, 评价双能量 CT 成像鉴别介入术后出血及对比剂外渗的敏感性、特异性、误诊率、漏诊率、阳性预测率、阴性预测率、诊断准确率。结果: 173 例患者中, 双能量 CT 诊断单纯对比剂外渗的敏感性 100%、特异性 92.38%、误诊率 7.62%、漏诊率 0、阳性预测值 88.24%、阴性预测值 100%、诊断准确率 95.15%; 双能 CT 诊断对比剂外渗合并出血的敏感性 77.14%、特异性 99.23%、误诊率 0.07%、漏诊率 22.86%、阳性预测值 96.43%、阴性预测值 94.16%、诊断准确率 94.55%。结论: 双能量 CT 虚拟平扫技术能有效鉴别在神经介入术后造成的对比剂外渗或是再出血, 对指导临床治疗决策及患者预后评估具有很大的意义。

PO-0800

3D MRI 影像组学模型在颞下颌关节紊乱病患者翼外肌受损情况及严重程度的应用研究

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目的 探讨 MRI 影像组学在评估颞下颌关节紊乱病 (temporomandibular joint disorder, TMD) 患者翼外肌受损情况及严重程度中的作用, 为临床治疗提供支持。

资料与方法 对 174 位患者双侧颞下颌关节行 MRI 扫描, 除去不符合纳入标准的图像, 共得到 313 侧颞下颌关节影像, 将影像数据导入 Radcloud 平台。根据颞下颌关节盘是否移位分为正常组及移位组, 在矢状位 PDWI 图像上逐层勾画翼外肌感兴趣区 (region of interest, ROI), 后将勾画的所有 ROI 融合成三维容积感兴趣区。按照 8:2 将数据集随机分为训练集与测试集, 分别采用方差阈值法、单变量选择法及最小绝对收缩和选择算法筛选组学特征。使用支持向量机 (Support Vector Machine, SVM) 和逻辑回归 (Logistic regression, LR) 分类器训练模型, 绘制受试者工作特征曲线 ROC (Receiver operation characteristic) 曲线。测量移位组关节盘移位程度, 将移位组病例分为轻度组、中度组及重度组, 按照上述方法提取组学特征, 并进行降维处理。使用一对一方法, 建立了基于 SVM 或 LR 的 TMD 翼外肌损伤程度三类预测模型, 绘制 ROC 曲线。计算上述模型下训练集和测试数据的准确性、敏感性、特异性、精确率、F1-score、受试者工作特征曲线下面积 AUC (Area Under the ROC Curve) 及其 95%CI 以评估模型的性能。

结果 313 侧颞下颌关节中, 关节盘正常组占 33.5%; 移位组占 66.5%。移位组内轻度组占 29.8%; 中度组占 33.2%; 重度组占 37.0%。正常组、异常组 SVM 鉴别模型训练组、测试组 AUC 值分别为 0.80、0.77; LR 鉴别模型为 0.87、0.79。严重程度 SVM 鉴别模型为 0.80、0.77; LR 鉴别模型为 0.87、0.79。

结论 3D MRI 影像组学模型可初步作为 TMD 患者翼外肌功能评价的工具, 协助临床医生知悉患者翼外肌受损情况的演变进程, 有助于关节盘复位锚固术松解关节盘前附着时, 权衡对翼外肌上头附着点的松解程度。

PO-0801

Kartagener 综合征的多层螺旋 CT 诊断 (附 4 例报告)

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目的 探讨 Kartagener 综合征 (Kartagener syndrome, KS) 的高分辨率 CT 表现, 提高对该病的诊断准确率。**方法** 回顾性分析 4 例 Kartagener 综合征患者的胸部及副鼻窦 MSCT 表现, 总结其 CT 表现特点。**结果** 4 例 Kartagener 综合征中, 完全型 3 例, 不完全型 1 例。所有病例均有全内脏转位, 表现为胸腹腔脏器均转位, 呈镜面像。心尖、主动脉弓及降主动脉右位; 双肺解剖结构与正常解剖呈镜面改变, 呈现左位中间段支气管、左位水平裂。肝脏、胆囊位于腹腔右侧; 脾脏、胃泡位于腹腔左侧。4 例患者均有不同程度支气管扩张, 其中 2 例患者呈现左肺中叶膨胀不全并支气管扩张。1 例出现左肺上叶舌段及右肺下叶支气管扩张。1 例出现双肺下叶细支气管炎。3 例完全型 KS 患者中 2 例合并上颌窦炎, 1 例合并全组副鼻窦炎。结论 Kartagener 综合征影像学检查均有内脏转位、支气管扩张, 伴或不伴副鼻窦炎, 是临床诊断的主要检查方法。

PO-0802

基于平扫 CT 影像组学对自发性脑出血短期内 血肿扩大风险的预测研究

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目的：建立基于平扫 CT 图像脑出血周围水肿带的影像组学模型，并将其与临床模型、影像征象模型及联合模型进行比较，用以预测自发性脑出血患者短期内血肿扩大的风险。研究方法：回顾性分析了 2014 年 1 月至 2021 年 1 月就诊于我院经临床证实的自发性脑出血患者 139 例，所有患者均在发病后 12h 内进行了首次头 CT 平扫，复查 CT 时间在入院后 72h 内。血肿扩大定义为血肿相对体积增加 $>33\%$ 或绝对体积增加 $>6\text{ml}$ 。应用 LIFEx 软件勾画脑出血周围水肿带区域，提取纹理特征并构建影像组学模型。两位放射科医生共同评估影像征象。采用逻辑回归分析确定血肿扩大的独立危险因素。比较临床模型、影像征象模型、影像组学模型及联合模型的预测效能。构建 ROC 曲线评价模型的优劣并使用德隆检验评估模型间的差异。结果：139 例患者中有 51 例 (36.69%) 出现了短期血肿扩大。糖尿病、PLT、APTT、血肿边缘不规则、漩涡征、混杂密度征在血肿扩大组与非血肿扩大组之间具有显著差异 ($P<0.05$)。在临床模型中，糖尿病是 HE 的独立预测因子，训练集和验证集 AUC 分别为 0.673、0.781。在影像征象模型中，混杂密度征、漩涡征是 HE 的独立预测因子，训练集和验证集 AUC 分别为 0.698、0.763。影像组学模型表现最佳，训练集 AUC 值为 0.845，95% CI: 0.765-0.924，灵敏度：0.722，特异度：0.855；验证集 AUC 值为 0.787，95% CI: 0.641-0.933，灵敏度：0.733，特异度：0.769。联合模型相较临床模型、影像征象模型、影像组学模型均表现出更高的效能，训练集和验证集 AUC 分别为 0.899、0.944。结论：糖尿病、PLT、混杂密度征、漩涡征、影像组学评分是短期内血肿扩大的独立预测因素。基于头平扫 CT 构建的影像组学模型可以有效预测 ICH 患者短期血肿扩大。与临床模型、影像征象模型、影像组学模型相比，基于上述三者的联合模型在预测 HE 方面表现出更好的性能。

PO-0803

腮腺 T2mapping 磁共振成像在干燥综合征中的应用价值研究

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目的：干燥综合征(SS)是一种病因不明的系统性自身免疫性疾病。T2mapping 技术分别能够从组织结构细微变化方面无创定量地评价 SS 患者的腮腺腺体相关改变，目前国内外鲜有 T2mapping 技术关于 SS 患者腮腺损伤的研究。本研究旨在探讨 T2mapping 技术在 SS 患者腮腺损伤评估及早期诊断的应用价值。

研究方法：本研究前瞻性纳入中国医科大学附属盛京医院 2021 年 8 月至 2022 年 10 月首次确诊的 SS 患者 54 例，健康志愿者 30 例，所有 SS 患者及健康志愿者接受双侧腮腺常规磁共振成像 (MRI) 及 T2mapping 检查。在 T2mapping 图像中手动绘制感兴趣区，得到 T2 值及 T2 值标准差，由两位医生将 SS 患者按照 MRI 形态学分级标准分为 0-4 级。比较 SS 患者与健康志愿者各参数的差异性采用非参数 Mann-Whitney U 检验，非参数 Kruskal-Wallis 检验用于比较相邻 MRI 形态学分级间各参差差异，Spearman 秩相关检验用于分析腮腺 MRI 形态学分级与 SS 患者各参数的相关性。Logistic 回归联合受试者工作特征 (ROC) 曲线用于评价 T2mapping 各参数鉴别健康志愿者与早期 SS 患者的诊断效能。

结果：SS 患者的腮腺 T2 值及 T2 值标准差高于健康志愿者 ($P<0.05$)，0-4 级 SS 患者腮腺的 T2 值及 T2 值标准差均高于健康志愿者 ($P<0.05$)。腮腺 MRI 形态学分级与 T2 值呈中等正相关

($r=0.547$, $P<0.001$), 腮腺 MRI 形态学分级与 T2 值标准差呈中等正相关 ($r=0.622$, $P<0.001$)。T2 值的 AUC 为 0.810, 敏感度为 79%, 特异度为 70%; T2 标准差的 AUC 为 0.649, 敏感度为 64%, 特异度为 65%。

结论: 腮腺的 T2 值及 T2 值标准差能够鉴别健康志愿者与 SS 患者, T2 值及 T2 值标准差可以体现不同程度脂肪沉积 SS 患者腮腺的相应改变, T2 值及 T2 值标准差三者联合可以提高诊断效能。T2mapping 技术在 SS 患者腮腺损伤评估与早期诊断中具有一定意义。

PO-0804

DCE-MRI 及 DKI 在鼻咽癌诱导化疗联合同步放化疗中的应用

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目的: 探讨 DCE-MRI 及 DKI 定量参数单独和联合应用在预测鼻咽癌诱导化疗联合同步放化疗近期疗效中的价值。方法: (1) 自 2021 年 1 月至 2022 年 12 月回顾性收集 47 例经鼻咽镜活检病理证实为鼻咽癌的初诊患者, 所有患者接受诱导化疗联合同步放化疗前均行鼻咽部 DCE-MRI 及 DKI 序列扫描。(2) 飞利浦星云后处理工作站上测量 DCE-MRI 中的定量参数, 包括 K^{trans} 、 K_{ep} 、 V_e 、 V_p 。应用 MRlcroGL 及 MITK Diffusion 软件测量 DKI 中的定量参数, 包括 MD、MK。随访患者整个疗程结束的 6 个月后 MRI 检查结果。根据 RECIST1.1 评估近期疗效, 入组患者被分为治愈组和不完全治愈组。(3) 运用 SPSS26.0 软件进行统计分析, 对于计量资料组间比较采用 t 检验; 对于计数资料性别、TNM 分期、AJCC 分期 (分类变量、定性数据) 组间比较采用 χ^2 检验。在 Kolmogorov-Smirnov 检验获得的正态分布结果的基础上, 采用独立样本 t 检验或 Mann-Whitney U 检验分析两组治疗前 DCE-MRI 和 DKI 各参数的差异。通过 Logistic 回归和受试者工作特性曲线分析来检验单独及联合使用 DCE-MRI 和 DKI 参数在预测鼻咽癌近期疗效中的诊断效能。当 $P<0.05$ 认为差异有统计学意义。结果: (1) 治愈组的治疗前 K^{trans} 、 K_{ep} 值较不完全治愈组高 ($t=2.490$, $P=0.017$; $t=2.260$, $P=0.029$), 治愈组的治疗前 MD 值较不完全治愈组低 ($t=2.602$, $P=0.012$), 两组间的治疗前 K^{trans} 、 K_{ep} 和 MD 值均具有统计学差异。(2) 治疗前 K^{trans} 、MD 联合及 K^{trans} 、 K_{ep} 、MD 联合 AUC 最大, 均为 0.778, $P=0.01$ 。结论: 治疗前 DCE-MRI 中的 K^{trans} 和 K_{ep} 值及 DKI 中的 MD 值能够对鼻咽癌患者诱导化疗联合同步放化疗结束后 6 个月的疗效进行预测, 其中 K^{trans} 值预测效能更高。与单独使用 DCE-MRI 或 DKI 序列相比, DCE-MRI 与 DKI 序列联合应用可以获得更高的诊断准确性, 为鼻咽癌个体化治疗提供有力的支持和影像学依据。

PO-0805

能量 CT 在头颈癌诊断和随访中的临床价值

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头颈癌是临床常见和重大疾病, 准确地早期诊断、治疗后的精准随访与评估对制定个体化治疗方案、改善患者预后具有重要的意义。

能量 CT 近年来发展迅速。除了提供传统的解剖学信息外, 能量 CT 还能提供很多定量参数与图谱, 为头颈癌的诊断、鉴别诊断、随访监测提供了新方法和新理论。

因此, 本文旨在结合近年来的文献进展和团队的临床、科研工作经验, 讨论能量 CT 在头颈癌诊断和随访中的临床价值。

PO-0806

MARS 成像技术在颅内动脉瘤血流导向装置术后的应用

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目的：探讨 MARS 成像技术在颅内动脉瘤血流导向装置术后 CTA 中的临床应用价值。

方法：对 20 例颅内动脉瘤介入血流导向装置术后患者，在 GE Revolution APEX 上行 MARS 去金属伪影 CTA 成像，同时重建常规组作为对照组。比较常规组和 MARS 组图像的对比噪声比(CNR)以及主观图像质量评分，比较两组周围软组织的可视化差异。

结果：常规组和 MARS 组客观和主观数据间有统计学意义。与常规组对比,MARS 组的 SD 值、AI 值及主观评分差异均有统计学意义($P<0.05$);MARS 组可显著提高周围软组织的可视化。

结论：Mars 成像技术能有效去除血流动力学装置金属伪影,提高图像质量，显示颅内动脉瘤术后周围组织细微结构。

PO-0807

**腮腺中酰基质子转移成像 B1 强度调整：
一种图像质量调整策略及肿瘤检测可行性评估**伍晓倩、苏童、陈钰、徐振潭、王小奇、胡格丽、王云婷、张竹花、张涛、金征宇
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目的：在以往的研究中，应用酰胺质子转移加权 (APT_w) 成像方案评估肿瘤和腮腺时，不均匀性和高信号伪影仍然是一个障碍。本研究旨在提高 APT_w 成像质量，并评估具有不同 B1 值的 APT_w 图像检测腮腺肿瘤的可行性。

方法：共有 35 例腮腺肿瘤患者参与本研究。4 例患者因严重运动 (n=2) 或牙齿金属伪影 (n=2) 排除。患者在 3.0T 扫描仪上接受了三个序列的 T2WI 和 3D TSE APT_w 成像 (B1=2 μ T、1 μ T 和 0.7 μ T 对应 APT 1、2、3 序列)。由两名放射科医生独立评估，使用 4 分量表 (1=差，4=优) 最终确定 APT_w 图像质量的完整性和高信号伪影。比较了三个序列的图像质量，获得可评估组 (完整性得分>1) 和可信任组 (完整度得分>1 和高信号得分>2) 再在两组中进行正常腮腺组织和肿瘤的 APT_{mean} 比较。

结果：APT2 和 APT3 序列中肿瘤和腮腺的高信号伪影均少于 APT1 (均 $p<0.05$)。随着 B1 值的降低，APT2 中的肿瘤的完整性不如 APT1，APT3 中的肿瘤完整性低于 APT2 (分别为 $p=0.021$ 和 0.002)。在 APT1 序列中，肿瘤的 APT_{mean} 高于腮腺，但并不显著 (3.18% \pm 2.74% 对 2.21% \pm 2.12%， $p=0.014$)，但 APT_{mean} 差值 (APT_{mean}1-APT_{mean}2) 有显著差异 (2.59% \pm 2.48% 对 0.75% \pm 1.20%， $p=0.001$)。

结论：应用较低的 B1 值可以消除腮腺成像的高信号伪影，但也可能损害完整性；组合不同的 APT_w 序列可能提升肿瘤检测的可行性。

PO-0808

血管壁磁共振成像 3D 及 2D 序列评估大脑中动脉狭窄度的价值

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分别比较磁共振高分辨率血管壁成像 (Magnetic resonance high-resolution blood vessel wall imaging HR-MR-VWI) 3D 及 2D 序列与数字减影血管造影 (Digital subtraction angiography DSA) 评估大脑中动脉 (middle cerebral artery MCA) 狭窄率的一致性并评价其对重度狭窄及闭塞的诊断效能。资料与方法:回顾性收集 2022 年 03 月 01 日~2023 年 08 月 31 日期间接受 HR-MR-VWI 检查证实大脑中动脉狭窄和闭塞并行 DSA 手术的 80 名患者, 2 名神经放射及介入医师对纳入图像分别进行了测量方法的一致性评估, 在一致性良好的情况下, 其中 1 名高年资神经放射诊断医师对 HR-MR-VWI 3D 及 2D 多序列图像用 WASID 直径法计算 MCA-M1 段的狭窄率, 依据血管的狭窄率评估其狭窄度, 1 位高年资神经介入医师依据 WASID 直径法对纳入病例的 DSA 图像进行 MCA-M1 段评估其狭窄度, 利用一致性相关系数 (CCCs) 法评估 HR-MR-VWI 多序列与 DSA 测量 MCA-M1 段狭窄率之间的一致性; 并绘制 ROC 曲线, 评估 3D 及 2D 多序列图像诊断 MCA-M1 段重度狭窄 (狭窄率 $\geq 70\%$) 及闭塞的最佳诊断效能。结果: 2 名神经放射及介入医师测量方法的一致性良好, HR-MR-VWI 多序列与 DSA 的总体一致性非常好, CCC=0.924; HR-MR-VWI 多序列与 DSA 评估 MCA-M1 段闭塞的诊断效能 ROC 曲线下面积 (AUC) 为 0.820; HR-MR-VWI 多序列评估 MCA-M1 段重度狭窄的诊断效能 ROC 曲线下面积 (AUC) 分别为 3D 平扫=0.597、3D 强化=0.616、2D 平扫 T1WI =0.571、2D 平扫 T2WI =0.554、2D 强化 T1WI =0.625。结论: HR-MR-VWI 的 3D 及 2D 序列评估 MCA-M1 狭窄率与 DSA 比较总体一致性非常好, 评估 MCA-M1 段闭塞的诊断效能良好, 评估 MCA-M1 段重度狭窄的诊断效能中等。

PO-0809

眼眶孤立性纤维瘤影像表现及病理分类对照分析

唐言

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目的 探讨分析眼眶孤立性纤维瘤 (SFT) 的常规 MRI、DWI、DCE-MRI 影像特点及病理、临床特征, 提高对该病的影像诊断正确率。方法 回顾性分析我院 2011 年~2022 年 24 例经手术病理证实的眼眶 SFT 的临床特点、病理学、MRI 图像等资料。MRI 图像包括平扫、DWI、DCE-MRI, 并获取时间-信号强度曲线 (TIC)、测量峰值强化指数 (CIpeak)、最大强化率 (ERmax) 和流出率 (WR); DWI b 值取 0、1000 s/mm², 测量病灶的表观扩散系数 (ADC) 值。结果 24 例眼眶 SFT 均为单发病变, 其中 3 例为复发患者, 病理上非典型 SFT 1 例。患者男女比例 13: 6, 年龄 22 岁~74 岁。临床表现眼球突出 20 例, 眼睑肿胀 10 例, 视力下降、视物重影、模糊 9 例, 溢泪 8 例, 眼球运动受限 5 例。影像病变位置上 3 例发生于肌锥内间隙, 14 例发生于肌锥外间隙, 7 例发生于跨肌锥内外间隙; 形状上 18 例肿瘤影像形态较规则, 呈类圆形、类椭圆形, 6 例肿瘤形态不规则, 最大径 2.5~5.5cm。常规信号特点相对于脑灰质, T1WI 上呈等、稍低信号, T2WI 上呈等、稍低或稍高信号 (4 例内见囊样信号), 22 例病变于肿瘤边缘或内部有流空血管影, 1 例伴有骨质破坏。增强后所有病灶明显较均匀一致强化 (共 4 例内见囊样无强化信号区)。DCE-MRI 获取的 TIC 曲线呈速升平台型或速升缓降型, CIpeak 0.95 \pm 0.23, ERmax 1.37 \pm 0.54, WR 6.58% \pm 3.66%, 平均 ADC 值为 (1.08 \pm 0.30) $\times 10^{-3}$ mm²/s, 4 例易复发、低度恶性潜能 ADC 值 (0.7~1.0) $\times 10^{-3}$ mm²/s, 平均 (0.85 \pm 0.13) $\times 10^{-3}$ mm²/s。结论 眼眶 SFT 见于成人, 好发于中青年男性, 临床表现多以眼球突出或眼睑肿胀多见, 眼眶单发肿块, 常规 T2WI 以等、稍低信号、边缘或内部流空血

管影较具特征性,联合 C_lpeak、ER_{max}、WR、TIC 类型及 ADC 值有助于眼眶 SFT 影像诊断正确率,其中 ADC 值低于 1.0×10⁻³mm²/s 提示恶性潜能。

PO-0810

IgG4 相关性疾病累及中耳的临床、病理与影像学表现

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目的 总结 IgG4 相关性疾病(IgG4-RD)累及颞骨中耳的临床特点及 CT 表现,以提高对该病的认识。方法 回顾性分析 7 例经手术病理确诊为 IgG4-RD 患者的临床表现、实验室资料、CT 表现、病理结果等。结果 与渗出性中耳炎相比, IgG4-RD 中耳炎临床表现无明显特异性; 白细胞计数及分类无异常,血清 IgG 水平升高,尤其是 IgG4 显著升高; CT 表现为中耳鼓室内软组织影,包绕听小骨、鼓膜增厚、覆盖前庭窗等; 鼓室内软组织病理学表现为大量淋巴细胞及浆细胞浸润和纤维化;糖皮质激素及免疫抑制剂治疗有效。结论 IgG4-RD 累及中耳乳突临床症状缺乏特异性,CT 表现鼓膜增厚,鼓室及乳突窦内肉芽肿样软组织影,双侧发病、鼓室内软组织密度不均匀,不伴有听小骨及邻近骨质破坏缺损,常伴有泪腺及鼻窦多器官累及有一定特征,易误诊或漏诊,需提高对该病的认识。

PO-0811

干燥综合征腮腺超声评分与 MRI 脂肪分级的相关性研究

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目的: 探讨干燥综合征(Sjögren's syndrome, SS)患者腮腺超声评分与 MRI 脂肪分级的相关性,提高对 SS 超声图像的认识。方法: 收集 28 例 SS 患者行双侧腮腺超声扫查及 MRI, 分别根据超声声像图和 MRI 脂肪沉积程度进行评分或分级, 分析二者的相关性和一致性。结果: 超声评分与 MRI 脂肪分级有很高的相关性(Spearman's 相关系数 $r_s=0.927$, $P=0.000$)和一致性(Kappa 值为 0.706, $P=0.000$)。结论: SS 患者腮腺超声评分与 MRI 脂肪分级具有很高的相关性和一致性,二者都是评价 SS 患者腮腺的病损程度的重要影像手段。

PO-0812

CTA-confirmed aortic in-stents floating thrombus after endovascular stenting

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Background: Aortic in-stents floating thrombus (ASFT) is a rare complication after the stenting. CTA examination is recommended as the preferred imaging examination. The evolution of ASFT on CTA imaging and the treatment options remain under investigations.

Purpose: To study the imaging manifestations on computed tomography angiography (CTA), so as to make a definitive, timely diagnosis and to explore the safe and effective treatment options.

Materials and Methods: The imaging features of ASFT confirmed by CTA were retrospectively analyzed, such as the location, morphology, size, concomitant and dynamic changes during the

follow-up. The main laboratory tests before and after the surgery were recorded and the treatment protocol was also involved.

Results: Totally, 1626 cases were screened, and 10 cases were enrolled. The incidence rate of ASFT was 0.62% (10/1626). The higher trend was demonstrated in FIB, PT and D-dimer level before the surgery, while only the D-dimer level increased during the postoperative period ($P < .001$). Twenty-one ASFTs were detected by the CTA examination during the follow-up. The imaging manifestation of ASFT could be divided into 3 different types. Type 1, striated, irregular, or sheet-like in appearance, usually to be short. Type 2, striped in appearance with the head and tail of the thrombus connected to the inner wall of the stent. Type 3, a free-floating middle section in the cavity with one or multiple attachment points to the thickened inner stent wall. There were 7, 11, 3 ASFTs were classified as type 1, 2, 3, respectively. Spleen infarction occurred in 1 patient when ASFT developed. During the follow-up, the thrombus in 6 patients disappeared, while the lesions remained stable in 4 patients. Renal infarction occurred in 1 case. No new-onset ASFT occurred, and no patients died.

Conclusion: ASFT is an extremely rare disease. The concomitant disorders and postoperative hemodynamic changes could be the likely cause of ASFT. CTA examination presented as a safe and preferred imaging modality for evaluating the evolution and prognosis of ASFT. Conservative treatment may be a useful and effective option.

PO-0813

Analysis of Multislice Spiral CT Coronary Angiography Diagnosis of Vieussens Artery Ring, Coronary Pulmonary Fistula, and Aneurysm Triple Syndrome

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[abstract]

Background: The Vieussens arterial ring is a collateral pathway between the left and right conus branches of the coronary artery, often accompanied by coronary pulmonary artery fistula and aneurysm. MSCT coronary angiography has become the main non-invasive coronary artery imaging technology, providing detailed three-dimensional imaging of coronary arteries.

Objective: To explore the diagnostic value of multi-slice spiral CT angiography for Vieussens arterial ring, coronary pulmonary artery fistula, and aneurysm triple syndrome.

Method: A retrospective analysis was conducted on patients who had undergone coronary artery CTA and had Vieussens arterial ring, coronary pulmonary artery fistula, and aneurysm. The original images and clinical data were collected, and various post-processing techniques were performed on the original images, including multiplanar reconstruction (MPR), curved surface reconstruction (CPR), maximum density projection (MIP), and volume reconstruction (VR). The diameter of the pulmonary artery fistula and aneurysm were measured and recorded.

Result: Among the 22 patients with Vieussens arterial ring, 20 were complicated with coronary pulmonary artery fistula. Among them, there were 18 cases with "jet sign" and 14 cases with "thick staining sign" at the pulmonary artery fistula opening; There were 20 cases of combined aneurysms. There were 18 patients with Vieussens arterial ring, coronary pulmonary artery fistula, and aneurysm triple syndrome. Clinical manifestations included chest pain in 4 cases, palpitations in 7 cases, dyspnea in 4 cases, and asymptomatic symptoms in 4 cases. The mean length and 95% confidence interval of pulmonary artery fistula were (3.3 ± 1.3) mm and 2.6-3.9mm, while the mean length and 95% confidence interval of aneurysm were (15.0 ± 11.6) mm and 8.8-21.1mm.

PO-0814

CT-Based Radiomic Nomogram for the Prediction of Chronic Obstructive Pulmonary Disease in Patients with Lung cancer

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Rationale and Objectives: To develop and validate a model for predicting chronic obstructive pulmonary disease (COPD) in patients with lung cancer based on computed tomography (CT) radiomic signatures and clinical and imaging features.

Materials and Methods: We retrospectively enrolled 443 patients with lung cancer who underwent pulmonary function test as the primary cohort. They were randomly assigned to the training ($n = 311$) or validation ($n = 132$) set in a 7:3 ratio. Additionally, an independent external cohort of 54 patients was evaluated. The radiomic lung nodule signature was constructed using the least absolute shrinkage and selection operator algorithm, while key variables were selected using logistic regression to develop the clinical and combined models presented as a nomogram.

Results: COPD was significantly related to the radiomics signature in both cohorts. Moreover, the signature served as an independent predictor of COPD in the multivariate regression analysis. For the training, internal, and external cohorts, the area under the receiver operating characteristic curve (ROC, AUC) values of our radiomics signature for COPD prediction were 0.85, 0.85, and 0.76, respectively. Additionally, the AUC values of the radiomic nomogram for COPD prediction were 0.927, 0.879, and 0.762 for the three cohorts, respectively, which outperformed the other two models.

Conclusion: The present study presents a nomogram that incorporates radiomics signatures and clinical and radiological features, which could be used to predict the risk of COPD in patients with lung cancer with one-stop chest CT scanning.

PO-0815

CT whole lung radiomics nomogram: a potential biomarker for lung function evaluation and identification of COPD

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Purpose: To explore the performance of CT-based whole lung radiomics for the discrimination chronic obstructive pulmonary disease (COPD) from the normal subjects in five centers.

Materials and Methods: A total of 2785 subjects with pulmonary function test from five hospitals were enrolled in this retrospective study, and classified into normal subjects and COPD patients. Radiomic features were extracted from the whole lung volume. The least absolute shrinkage and selection operator logistic regression was applied for feature selection and radiomics signature construction. A radiomics nomogram combining the radiomics score and clinical factors were established. The receiver operating characteristic curve and decision curve analysis (DCA) were used to evaluate the predictive performance of the radiomics nomogram in the training cohort, internal validation, and independent external validation cohorts.

Results: Eighteen radiomics features collected from whole lung volume were applied in the construction of a radiomics model. The area under the curve (AUC) of our radiomics model in the training, internal and independent external validation cohorts was 0.89(0.87-0.91), 0.874(0.84-0.90) and 0.85(0.82-0.87), respectively. Moreover, the nomogram integrating radiomics score, age, gender, height, and smoking status, yielded better performance in the above three cohorts (AUC 0.89, 0.87 and 0.85, respectively). The model clinical usefulness was verified through DCA.

Conclusions: The CT-based whole lung radiomics, with an intuitive presentation of nomogram, showed good performance to identify COPD with high accuracy in this multicenter study.

PO-0816

Correlation between features of intra-nodular vessels and tumor invasiveness of lung adenocarcinoma presenting as ground-glass nodules: A deep learning 3D reconstruction algorithm-based quantitative analysis on non-contrast CT images

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Purpose: To evaluate the role of quantitative features of intra-nodular vessels based on deep learning (DL) in distinguishing pulmonary adenocarcinoma invasiveness.

Materials and Methods: This retrospective study included 512 confirmed ground glass nodules (GGNs) from 474 patients with 241 precursor glandular lesions (PGL), 126 minimally invasive adenocarcinomas (MIA), and 145 invasive adenocarcinomas (IAC). The pulmonary blood vessels were reconstructed on non-contrast CT (NCCT) images using DL-based region-segmentation and region-growing techniques. The presence of intra-nodular vessels was evaluated based on the automatic calculation of vessel prevalence, vascular categories, and vessel volume percentage. Further comparisons were made between invasive groups by the Mantel-Haenszel chi-square test, chi-square test, and ANOVA.

Results: The detection rate of intra-nodular vessels in PGL (33.2%) was significantly lower than that of MIA (46.8%, $p = 0.011$) and IAC (55.2%, $p < 0.001$), while the vascular categories were similar (all $p > 0.05$). Vascular changes were more common in IAC and MIA than in PGL, mainly in increased vessel volume percentage ($12.4 \pm 19.0\%$ vs $6.3 \pm 13.1\%$ vs $3.9 \pm 9.4\%$, $p < 0.001$). The average intra-nodular artery and vein volume percentage of IAC ($7.5 \pm 14.0\%$ and $5.0 \pm 10.1\%$) was higher than that of PGL ($2.1 \pm 6.9\%$ and $1.7 \pm 5.8\%$) and MIA ($3.2 \pm 9.1\%$ and $3.1 \pm 8.7\%$), with statistical significance (all $p < 0.05$).

Conclusions: The quantitative analysis of intra-nodular vessels on NCCT images demonstrated that the GGNs with increased internal vessel prevalence and volume percentages had higher possibility of tumor invasiveness.

PO-0817

Radiomic features add incremental benefit to conventional radiological feature-based differential diagnosis of lung nodules

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Purpose

To investigate the incremental benefit of radiomic features to radiological feature-based differential diagnosis between benign and malignant lung nodules.

Materials & Methods

From May 2017 to March 2021, 393 patients with 465 pathologically confirmed lung nodules (benign: malignant = 205: 260) were enrolled. Based on manually segmented lung nodules, 1409 radiomic features were extracted. Sixteen radiological features were obtained. The least absolute shrinkage and selection operator (LASSO) was used to select the most informative features from the radiomic features set and radiological features set separately. Support vector machine (SVM) and logistic regression (LR) were used to build the models (radiomic model, radiological model, and combined model). Receiver operating characteristic (ROC) analysis was used to evaluate model performance with the area under the curve (AUC) compared using the DeLong test.

Results

After feature selection, six radiological features, including shape, vascular convergence sign (type III), margin, density, pleural traction sign, and spiculation, and nine radiomic features (2 first-order statistics features and 7 texture features) were selected. In the independent testing, radiological models had insignificantly higher AUCs than the corresponding radiomic models for both the SVM classifier (AUC: 0.803 vs. 0.773, $P = 0.635$) and LR classifier (AUC: 0.818 vs. 0.742, $P = 0.229$). However, they had significantly inferior performance than that of the corresponding combined models for both the SVM classifier (AUC: 0.803 vs. 0.871, $P = 0.015$) and LR classifier (AUC: 0.818 vs. 0.871, $P = 0.034$).

Conclusion

Radiomic features could add incremental benefit to conventional radiological feature_x0002_based differential diagnosis.

PO-0818

Risk Stratification Study of Non-calcified Coronary Plaques based on CT Pericoronary Adipose Tissue Measurement

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Objective To investigate the relevance of risk stratification of non-calcified plaques from different perspectives based on pericoronary fat attenuation index measurements.

Methods The CT angiography images and clinical data of 269 hospitalized patients with suspected coronary heart disease were retrospectively collected and divided into four groups according to the degree of luminal stenosis, including 60 patients in the normal group, 103 patients in the mild group, 63 patients in the moderate group and 43 patients in the severe group (only non-calcified plaques were present in the coronary arteries of the lesion group). The CT value, long diameter and short diameter of non-calcified plaque were measured. They were divided into three groups according to the CT attenuation value of plaques, including 21 patients in the low-attenuation group (CT value ≤ 30 HU), 84 patients in the medium-attenuation group ($30 < \text{CT value} \leq 50$ HU), and 104 patients in the high-attenuation group ($50 < \text{CT value} \leq 120$ HU). They were also divided into 106 patients with significant stenosis ($\geq 50\%$ stenosis) and 103 patients with nonsignificant stenosis ($< 50\%$ stenosis) according to whether coronary luminal stenosis caused by non-calcified plaques was clinically significant. According to whether $\text{FAI} \geq -70.1$ HU, 86 patients were divided into FAI high-risk group ($\text{FAI} \geq -70.1$ HU) and 183 patients into FAI low-risk group ($\text{FAI} < -70.1$ HU). Pericoronary adipose tissue was extracted and corresponding FAI values were obtained on digital coronary CT angiography image analysis software. To analyze the correlation between coronary artery non-calcified plaque and pericoronary fat measurement under different morphological parameters; The correlation between coronary non-calcified plaques under different morphological parameters and pericoronary fat measurements was analyzed; the differences in gender, age, plaque CT value, plaque diameter and clinical metabolic factors between the high-risk and low-risk groups of FAI were analyzed.

Results There were significant differences in sex, age, systolic blood pressure and FAI between the normal coronary artery group and the diseased group ($P < 0.05$). The FAI value in the diseased group was significantly higher than that in the normal group. The increase of luminal stenosis was positively correlated with the short diameter of non-calcified plaques ($R_s = 0.543$, $P < 0.05$), FAI value ($R_s = 0.534$, $P < 0.05$) and systolic blood pressure ($R_s = 0.156$, $P < 0.05$), and negatively correlated with plaque CT value ($R_s = -0.430$, $P < 0.05$). There was no significant correlation between different degrees of coronary artery stenosis and diastolic blood pressure, total cholesterol, triglyceride, low-density lipoprotein, high-density lipoprotein, uric acid, and fasting blood glucose. There were significant differences in FAI values between non-calcified plaques with different degrees of stenosis ($P < 0.05$), and there were significant differences in FAI values between the mild group and the moderate and severe groups ($P < 0.05$), but there was no significant difference in FAI values between the moderate and severe groups ($P > 0.05$). There were significant differences in FAI values between non-calcified plaques with different CT attenuation values ($P < 0.05$), and there were significant differences in FAI values between the low-attenuation group and the medium and high attenuation groups ($P < 0.05$), but there was no significant difference in FAI values between the medium attenuation group and the high attenuation group ($P > 0.05$). There was no gender difference in FAI value and the degree of coronary luminal stenosis between the significant stenosis group and the non-significant stenosis group ($P > 0.05$). There were significant differences in plaque short diameter, plaque CT value and FAI value around the plaque between the two groups ($P < 0.05$). The critical value of FAI value between the two groups was -69.5 HU. There was no significant difference in age and plaque long diameter between the two groups ($P > 0.05$). Men in the high-risk group of coronary FAI accounted for a higher proportion, plaque CT values in the high-risk group of FAI were lower than those in the low-risk group of FAI ($P < 0.05$), plaque short diameter in the high-risk group of FAI was higher than that in the low-risk group of FAI ($P < 0.05$), and plaque short diameter ROC area under the curve (AUC) was 0.659 [95% confidence interval (CI) 0.583 ~ 0.734].

Conclusion Based on the FAI value, a functional level risk stratification assessment of non-calcified coronary plaques can be performed, which is expected to predict the severity of coronary artery disease and the occurrence of acute coronary syndromes.

PO-0819

Solid Nodular Non-small Cell Lung Cancer: Spectral CT for Preoperative Diagnosis of N2 Station Lymph Nodes Metastasis

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Objective: To evaluate the diagnostic value of spectral CT for the preoperative diagnosis of N2 station lymph nodes metastasis in solid nodular non-small cell lung cancer (NSCLC).

Materials and Methods: For this retrospective study, dual-phase contrast agent-enhanced CT was performed in patients with NSCLC from September 2019 to September 2022. Quantitative spectral CT parameters measurement were performed by 2 radiologists independently. Logistic regression analysis and Delong test were performed.

Results: 60 NSCLC patients (mean age, 62.85 years \pm 8.49, 44men) were evaluated. A total of 121 lymph nodes (38 with metastasis) were enrolled. There was no significant difference in the slope of the spectral Hounsfield unit curve (λ Hu) on arterial phase (AP) or venous phase (VP) between primary lesions and metastatic lymph nodes ($P>0.05$), but significant difference in VP λ Hu between primary lesions and non-metastatic lymph nodes ($P<0.001$). The CT40KeV, λ Hu, normalized iodine concentration (nIC), normalized effective atomic number (nZeff) measured during both AP and VP were significantly lower in metastatic lymph nodes than in non-metastatic lymph nodes ($P<0.05$). The short diameter (S) of metastatic lymph nodes was higher than non-metastatic lymph nodes ($P<0.001$). Area under the curve (AUC) for S performed the highest (0.788) in diagnosing metastatic lymph nodes. When combined with VP λ Hu, VP nZeff, AUC increased to 0.871.

Conclusion: Spectral CT is a complementary means for the preoperative diagnosis of N2 station lymph nodes metastasis in solid nodular NSCLC. The combined parameters have higher diagnostic efficiency.

PO-0820

CT-Based Whole Lung Radiomics Nomogram: A Tool for Identifying the Risk of Cardiovascular Disease in Patients with Chronic Obstructive Pulmonary Disease

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Rationale and Objectives: To evaluate the value of CT-based whole-lung radiomics nomogram for identifying the risk of cardiovascular disease in patients with chronic obstructive pulmonary disease.

Materials and Methods: 974 patients with COPD were divided into a training cohort (n=402), an internal validation cohort (n=172) and an external validation cohort (n=400) from three hospitals. Clinical data and CT findings were analyzed. Radiomics features of whole lung were extracted from the non-contrast chest CT images. A radiomics signature was constructed with algorithms. Combined with the radiomics score and independent clinical factors, multivariate logistic regression analysis was used to establish a radiomics nomogram. ROC curve was used to analyze and evaluate the prediction performance of the model.

Results: Age, weight, BMI, and gender were the independent clinical factors. 1218 features were extracted and reduced to 15 features to build the radiomics signature. In the training cohort, the combined model (area under the curve [AUC], 0.731) showed better discrimination capability ($p < 0.001$) than the clinical factors model (AUC, 0.605). In the internal validation cohort, the combined model (AUC, 0.727) performed better ($p=0.032$) than the clinical factors model (AUC, 0.629). In the external validation cohort, the combined model (AUC, 0.725) performed better ($p < 0.001$) than the clinical factors model (AUC, 0.690). Decision curve analysis presented the radiomics nomogram outperformed the clinical factors model in terms of clinical usefulness.

Conclusion: The CT-based whole lung radiomics nomogram has the potential to identify the risk of cardiovascular disease in patients with chronic obstructive pulmonary disease.

PO-0821

The characteristics of emphysema and pulmonary perfusion derived from spectral CT in smokers

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Abstract

Objective:

To investigate the value of iodine maps from spectral dual-layer detector CT(DLCT) in assessing lung perfusion changes in smokers.

Method:

Forty-eight patients (19 smokers and 29 non-smokers) who underwent dual-phase contrast enhanced scans on a DLCT(Spectral 7500, Philips Healthcare, Best, the Netherlands) and pulmonary function test(PFT) were retrospectively collected. Emphysema were evaluated qualitatively and quantitatively on non-contrast images. Iodine maps at arterial phase image were reconstructed for qualitative and quantitative assessment of perfusion reduction or defect (PD). Emphysema and PD was scored visually according to the method of Goddard Score at bilateral lung fields of three anatomic levels(on the slice of the aortic arch, the carina, and the aperture of the inferior pulmonary veins). The scores were calculated based on the ratio of the abnormality occupied in the pulmonary field of each slice as seen below: point 0, lesion scope <5%; point 1, 5%≤lesion scope≤25%; points 2, 25%≤lesion scope≤50%; points 3, 50%≤lesion scope≤75%; points 4, 75%≤lesion scope. The sum of scores at bi-lung fields at 3 levels for each patient was calculated. The iodine density(ID) of PD and thoracic aorta were measured respectively(IDdefect, ID thoracic aorta), then calculating the ratio as the normalized ID (nID). Emphysematous parenchyma was defined as the lung attenuation less than -950HU. Emphysema index(EI) was calculated at whole lung level. FEV1% and FEV1/FVC of all patients were recorded. The differences of the emphysema and PD visual scores, IDdefect, nID, EI were analyzed by ANOVA between smokers and non-smokers. Correlations between emphysema, PD and FEV1%, FEV1/FVC were evaluated by Spearman correlation analysis.

Results:

The PD visual scores on ID images was significantly higher in smokers compared with that in non-smokers(7(IQR,6-9) vs 6(IQR,3.75-6), $p=0.014$), while no significantly difference was found for emphysema visual scores (1(IQR,0-5.5) vs 1(IQR,0-2.5), $p=0.402$). Both IDdefect and nID of PD were significantly lower in smokers compared with non-smokers(0.53(IQR,0.38-0.69) vs 0.78(IQR,0.59-1.14), $p=0.003$; 0.04(IQR,0.03-0.06) vs 0.06(IQR,0.04-0.07), $p=0.029$), while no significantly difference was found for EI(4.30(IQR, 3.15-7.20) vs 2.10(IQR, 0.725-6.025), $p=0.061$). Besides PD visual scores were negatively correlated with FEV1%($r=-0.61$, $P=0.025$) and FEV1/FVC($r=-0.62$, $P=0.024$) for smokers.

Conclusion:

In compared with emphysema, the iodine map derived from DLCT showed more sensitive to evaluate the pulmonary abnormalities in smokers.

PO-0822

Comparison of deep learning and radiomics-based machine learning methods for the identification of chronic obstructive pulmonary disease on low-dose CT images

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Purpose: To establish five prediction models with deep learning and radiomics-based machine learning approaches in the identification of COPD on low-dose CT images and to compare the relative performance of different models to find the best model for identify COPD.

Method: This retrospective analysis included 1221 subjects (169 COPD patients and 855 control subjects). Five prediction models, including CT-based radiomics features, chest CT image, quantitative lung density parameters and clinical questionnaire features, were used as identification of COPD by deep learning (DL) or machine learning (ML). Model 1 was constructed by CT-based radiomics features by ML. Model 2 was constructed by the combination of the CT-based radiomic features, lung density parameters and questionnaire features by ML. Model 3 was constructed by CT images only by DL. Model 4 was constructed by the combination of CT images, lung density parameters and questionnaire features by DL. Model 5 was constructed by the combination of CT images, CT-based radiomic features, lung density parameters and clinical questionnaire features by DL. Performance was compared by accuracy, sensitivity, specificity, the highest negative predictive value (NPV), PPV (precision) and the area under ROC curve (AUC) for five prediction models. Comparisons among the AUC of different models were performed using DeLong Test.

Result: 107 radiomics features were extracted from each subject's CT images, 17 lung density parameters were acquired by quantitative measurement and 18 selected questionnaire features were recorded in this study. Model 2 achieved the highest AUC of 0.74, while model 4 achieved the lowest AUC of 0.57 in the test set. Model 2 also has the highest sensitivity of 0.80, the highest accuracy of 0.78 and NPV of 0.32. Its performance of AUC outperforms the model 1 and model 4 with statistical significance ($p=0.02$; $P=0.02$ respectively).

Conclusion: The results show that the identification ability of CT-based radiomics features combined with lung density parameters and questionnaire features using ML methods is better than that of the chest CT images-based DL methods. It is more suitable and beneficial for COPD identification.

PO-0823

Development and validation of CCTA-based radiomics signature for predicting coronary plaques with rapid progression

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BACKGROUND: Rapid plaque progression (RPP) is associated with a higher risk of acute coronary syndromes compared to gradual plaque progression. We aimed to develop and validate a coronary computed tomography angiography (CCTA) based radiomics signature (RS) of plaques for predicting RPP.

METHODS: A total of 214 patients who underwent serial CCTA examinations from two tertiary hospitals (development group, 137 patients with 164 lesions; validation group, 77 patients with 101 lesions) were retrospectively enrolled. Conventional CCTA-defined morphological parameters (e.g.,

high-risk plaque characteristics and plaque burden) and radiomics features of plaques were analyzed. RPP was defined as an annual progression of plaque burden $\geq 1.0\%$ on lesion-level at follow-up CCTA. RS was built to predict RPP using XGBoost method.

RESULTS: RS significantly outperformed morphological parameters for predicting RPP in both the development group (area under the curve [AUC] 0.82 vs 0.74; $P=0.04$) and validation group (AUC 0.81 vs 0.69; $P=0.04$). Multivariable analysis identified RS (odds ratio: 2.35; 95% confidence interval, 1.32 to 4.46; $P=0.005$) as an independent predictor of subsequent RPP in the validation group after adjustment of morphological confounders. Unlike unchanged RS in the non-RPP group, RS increased significantly in the RPP group at follow-up in the whole dataset ($P<0.001$).

Conclusions: The proposed CCTA-based RS had a better discriminative value to identify plaques at risk of rapid progression compared to conventional morphological plaque parameters. These data suggest the promising utility of radiomics for predicting RPP in a low-risk group on CCTA.

PO-0824

The differential computed tomography features between small benign and malignant solid solitary pulmonary nodules with different sizes

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Background Computed tomography (CT) has been widely known to be the first choice for the diagnosis of solid solitary pulmonary nodules (SSPNs). However, the smaller the SSPN is, the less the differential CT signs between benign and malignant SSPNs there are, which brings great challenges to their diagnosis. Therefore, this study aimed to investigate the differential CT features between small (≤ 15 mm) benign and malignant SSPNs with different sizes.

Material and Methods CT data of 794 patients with small SSPNs (≤ 15 mm) were retrospectively analyzed. SSPNs were divided into benign and malignant groups, and each group was further classified into three cohorts: cohort I (diameter ≤ 6 mm), cohort II (6 mm $<$ diameter ≤ 8 mm), and cohort III (8 mm $<$ diameter ≤ 15 mm). The differential CT features of benign and malignant SSPNs in three cohorts were identified. Multiple logistic regression analyses were conducted to identify independent factors for predicting benign SSPNs.

Results In cohort I, polygonal shape and angulation sign were more common in the benign group, whereas upper-lobe distribution was more common in the malignant group (all $P < 0.05$); Multiparametric analysis showed that angulation sign (adjusted odds ratio [OR]: 12.379; 95% confidence interval [CI]: 2.691–56.939; $P = 0.001$) was the most effective factor for predicting benign SSPNs, with an AUC of 0.735 (95% CI: 0.627–0.844; $P = 0.001$) and accuracy of 78.35%. In cohort II, polygonal shape and angulation sign were more common in benign SSPNs, whereas lobulation, pleural retraction, and air bronchogram were observed more frequently in malignant SSPNs (all $P < 0.05$); Multiparametric analysis showed that polygonal shape (OR: 9.537; 95% CI: 1.180–77.061; $P = 0.034$); the absence of lobulation (OR: 0.000; 95% CI: 0.000–NA; $P = 0.998$) and pleural retraction (OR: 0.296; 95% CI: 0.105–0.834; $P = 0.021$) were independent predictors of benign SSPNs, with an AUC of 0.749 (95% CI: 0.660–0.838; $P < 0.001$) and accuracy of 74.58%. In cohort III, angulation sign, calcification, halo sign, and satellite lesions were favor of benign lesions, while lobulation, air space, pleural retraction, bronchial truncation, and air bronchogram were favor of malignant SSPNs (all $P < 0.05$); Multiparametric analysis showed that angulation sign (OR: 4.106; 95% CI: 2.189–7.702; $P < 0.001$); calcification (OR: 3.889; 95% CI: 1.408–10.744; $P = 0.009$); halo sign (OR: 6.135; 95% CI: 2.757–13.649; $P < 0.001$); satellite lesions (OR: 6.060; 95% CI: 2.936–12.509; $P < 0.001$); and the absence of lobulation (OR: 0.065; 95% CI: 0.025–0.167; $P < 0.001$), air space (OR: 0.427; 95% CI: 0.225–0.811; $P = 0.009$), pleural retraction (OR: 0.265; 95% CI: 0.160–0.439; $P < 0.001$), bronchial truncation (OR: 0.147; 95% CI: 0.080–0.269; $P < 0.001$),

and air bronchogram (OR: 0.317; 95% CI: 0.183–0.549; $P < 0.001$) were independent predictors of benign SSPNs, with an AUC of 0.873 (95% CI: 0.845–0.901; $P < 0.001$) and accuracy of 80.14%.

Conclusion In conclusion, the differential CT signs vary between benign and malignant SSPNs with different sizes. Clarify the differential CT features based on different diameter ranges may help to minimize ambiguities and discriminate those benign SSPNs from malignant ones.

PO-0825

Applying of 7 T Cardiac Magnetic Resonance Imaging to investigate the effect of sodium selenite on right ventricular structure and function secondary to pulmonary arterial hypertension

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Purpose: The condition of the right ventricle secondary to the onset of pulmonary arterial hypertension (PAH) is a crucial factor that affects the prognosis of PAH. Selenium, due to its antioxidant stress, anti-inflammatory, and pro-apoptotic properties, may be involved in the condition. However, the specific effects of Sodium selenite (SE) on the right ventricle secondary to PAH and the related mechanisms are yet to be proven. In this study, we aimed to investigate the effects of SE on RV structure and function secondary to PAH by cardiac magnetic resonance (CMR) and to elucidate its properties mentioned above

Materials and Methods: Sixty-two SD rats were housed for 7 months at the Qinghai-Tibet Plateau with hypobaric hypoxic environment and divided into four groups: CON, MCT, MCT+SE and MCT+SI. The model of MCT/Hypoxia induced PAH was established by intraperitoneal injection 60 mg/kg of monocrotaline (MCT). 0.7 mg/kg of SE and 5 mg/kg of sildenafil were given to the MCT+SE group and MCT+SI. Then, all groups of rats underwent CMR imaging to evaluate RV function, strain and edema. Eventually, the sample of blood, heart and lung were obtained for relevant tests

Results: Compared with the MCT group, SE intervention significantly elevated RV ejection fraction (51.98 ± 7.88 vs 61.30 ± 6.09), global longitudinal (-12.90 ± 3.53 vs -18.05 ± 3.43) and circumferential (-20.46 ± 2.47 vs -22.67 ± 1.32) strain. However, there was no significant difference in T2 relaxation time between groups. Additionally, the blood biochemical results showed that superoxide dismutase and glutathione peroxidase were significantly higher, while malondialdehyde. These findings may be related to upregulate the expression of NRF2 and HO-1, as verified by PCR, immunohistochemical and WB assay

Conclusion: Our study shows that SE treatment was found to significantly increase RVEF, GLS, and GCS by CMR. This may be related to the upregulation of NRF2 and HO-1 expression and the alleviation of oxidative stress damage

PO-0826

Aerodynamic simulation of small airway resistance: a new imaging biomarker for chronic obstructive pulmonary disease

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Purpose:

To develop a novel biomarker (RSA) for early detection of chronic obstructive pulmonary disease (COPD) using a combination of pulmonary function test (PFT) and computational fluid dynamics (CFD) based on CT data.

Materials and Methods:

24 subjects who underwent chest CT scans and pulmonary function tests between May 2020 and December 2020 were enrolled retrospectively. Subjects were divided into three groups: normal (10), high-risk (6), and COPD (8). Airway resistance, FEV1, FEV1/FVC and FEV1 % predicted were main pulmonary function indicators considered in this study. The airway from the trachea down to the sixth generation of bronchioles was reconstructed by a 3D slicer. The small-airway resistance (RSA) and RSA as a percentage of total airway resistance (RSA%) were calculated by CFD combined with PFT. The correlation between RSA and other parameters was analyzed using Pearson's correlation coefficient.

Results:

Visualization of the airway aerodynamics revealed that airflow velocity in the trachea and the mean pressure-drop across the reconstructed airway model were both greater in the control group than in the high-risk group and the COPD group. The RSA and RSA% were significantly different among the three groups ($p < 0.05$) and related to the FEV1 % predicted ($r = -0.52$, $p = 0.009$; $r = -0.58$, $p = 0.003$) and the FEV1/FVC ($r = -0.59$, $p = 0.003$; $r = -0.54$, $p = 0.007$).

Conclusion:

Airway CFD combined with PFT is a valuable method for estimating the small-airway resistance, where the derived RSA will aid in the early diagnosis of COPD.

PO-0827

Chronic Obstructive Pulmonary Disease Rat Models: comparison of different construction methods using in/ex vivo micro-CT

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Purpose: To evaluate and compare the COPD rat models, established by smoking, protease instillation and the combination of them, in terms of inflammation, imaging and pathology. And to compare in vivo CT and ex vivo CT in the evaluation of COPD.

Materials and Methods: Rat models of COPD were established by smoking, protease instillation and the combination of them. Following that, the body weight and the levels of MMP-9 and IL-10 were measured. In addition, in/ex vivo micro-CT examination and pathological examination were used to assess %LAA (-700/-928), mean alveolar area (MAA), and mean linear intercept (MLI).

Results: The weight gain of rats in the smoking group and the protease instillation combined smoking group was slower than that in the control group since the 7th week ($P < 0.05$). Compared with the control group, the protease instillation group and the protease instillation combined

smoking group had lower levels of IL-10 and higher levels of MMP-9 during the early modeling phase ($P < 0.05$), whereas MMP-9 levels were higher in the smoking group during the latter modeling phase ($P < 0.05$). Emphysema was first observed on the ex vivo micro-CT and pathological images at the 4th week of modeling, which was confirmed by quantitative imaging and pathological analysis. The degree of lung tissue damage was higher in the protease instillation combined smoking group than in the smoking group and the protease instillation group.

Conclusion: Smoking combined with protease instillation can accelerate the COPD process. Ex vivo micro-CT is more sensitive than in vivo micro-CT in evaluating the effectiveness of rat COPD models.

PO-0828

Baseline CT-based Whole Lung Radiomics Phenotype Predicts the Survival of Chronic Obstructive Pulmonary Disease

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Objective: To evaluate the associations between baseline CT-based whole lung radiomics phenotype consensus clustering of COPD patients and clinical, laboratory, and pulmonary function test and predict the survival of patients.

Materials and Methods: A total of 479 consecutive patients with COPD from two hospitals between September 2015 and August 2022 with follow-up longer than 12 months and baseline chest CT scans were retrospectively included. Whole-lung radiomic analysis was performed on baseline CT images, and COPD severity was classified as Global Initiative for Chronic Obstructive Lung Disease (GOLD) I–II or GOLD III–IV. Patients were classified into clusters based on their radiomics features using consensus clustering, and clusters were compared with clinical, laboratory, PFT, and overall survival (Kruskal–Wallis test for continuous data, χ^2 or Fisher's exact test for categorical data, Kaplan–Meier curves, and log-rank test for overall survival). Cluster analysis was performed on the entire cohort and the COPD severity subgroups.

Results: There were 362 males and 117 females with a median age of 68.68 ± 10.11 years old and a mean follow-up of 45.58 ± 19.07 months. Three radiomic clusters were also identified. Cluster 1 was associated with higher globulin, lower forced vital capacity (FVC), and lower total lung capacity (TLC). Cluster 2 was associated with higher vital capacity and lower FEV1/FVC. Cluster 3 was associated with higher FEV1/FVC, higher FVC, and higher TLC, along with lower erythrocyte sedimentation rate and lower globulin. Cluster 3 showed a high risk of death not only within the entire cohort (log-rank test, $P = 0.049$) but also within the GOLD III–IV subgroup (log-rank test, $P < 0.0001$).

Conclusion: Baseline CT-based whole-lung radiomic consensus clustering could independently predict cumulative mortality risk in patients with COPD and enable the identification of associations between radiomic features and clinical, laboratory, and PFT parameters.

PO-0829

Acquired immunodeficiency syndrome-associated pulmonary Kaposi sarcoma: computed tomography staging and clinical prognosis

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【Abstract】

Background: As an AIDS-defining malignancy, the incidence of Kaposi sarcoma (KS) is expected to increase as the survival rate of HIV-infected patients increases. Both endobronchial and transbronchial biopsy have a diagnostic yield of only 26–60%. This study reports computed tomography (CT) images and corresponding staging of pulmonary KS, providing reference for promoting clinical diagnosis and prognosis.

Materials and Methods: Retrospectively collected medical records and CT images of 93 AIDS-KS patients, 53 of whom had confirmed pulmonary KS and were followed up for 3/6/12 months. The CT findings of pulmonary KS (pKS) were analyzed by two physicians using lung CT images when the time diagnosis of pKS and after the end of the first course of therapy.

Results: Among the 53 cases, 51 cases were found to have cutaneous KS, 41 cases were found to have digestive tract KS. The CT findings of AIDS-associated pKS could be divided into I: bronchovascular thickening stage (6 cases); II: nodular stage (24 cases); and III: confluent consolidation stage (23 cases). The prognosis of 39 cases of pKS after the first course of therapy was as follows: stage I: 100% improved; stage II: 70.6% improved, 23.5% advanced, and 5.9% no response; stage III: 72.2% improved, 22.2% advanced, and 5.6% no response. Survival analysis showed that there was no statistically significant difference in clinical prognosis after 3, 6, and 12 months of follow-up for different stages of pulmonary KS.

Conclusion: Recognizing CT manifestation and staging of pulmonary KS is of help to guide clinical diagnosis early and mastery of the disease course to achieve disease control and symptom relief of quality of life.

PO-0830

CT-based Radiomics Predictive Model for Spread Through Air Space of IA Stage Lung Adenocarcinoma

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Purpose: To construct a radiomics model based on computed tomography (CT) scans to predict the presence of spread through air spaces (STAS) in stage IA Lung adenocarcinoma, compared with the traditional clinical model.

Materials and Methods:

The study was approved by the institutional review boards and included 317 patients (median age, 57.21 years; range, 45.84–68.61 years) with pathologically confirmed stage I lung adenocarcinoma. A total of 122 patients (38.5%) were diagnosed as STAS by pathology after the operation. Two experienced radiologists independently segmented the lesions through MITK and extracted 1791 radiomic features by Python. Single-factor T-test or Mann-Whitney U-test and least absolute shrinkage and selection operator (LASSO) were used to screen for radiomic signatures related to

STAS. This study constructed a radiomics model, a clinical model and a combine model which combining radiomic and clinical features. Model performance was evaluated using the area under the receiver operating characteristic curve (AUC).

Results:

By single-factor analysis, 4 clinical features and 13 radiomic features were significantly associated with STAS. The three model (the clinical, the radiomics and the combine model) achieved predictive efficacy, with an AUC of 0.841, 0.897 and 0.939 in training, respectively. And in testing set, the AUC of 0.784, 0.851 and 0.876, respectively. The combine model also achieved best accuracy, sensitivity, specificity, ppv, and npv, reaching 0.914, 0.887, 0.985, 0.933 and 0.767, respectively.

Conclusion:

The combine model based on the radiomic and clinical features of preoperative chest CT could be used to preoperatively diagnose the presence of STAS in stage IA lung adenocarcinoma and has an excellent diagnostic performance.

PO-0831

Preoperative Left Atrial Reservoir Strain Derived from Cardiac Magnetic Resonance-Feature Tracking as an Independent Predictor of Outcome in Patients with Hypertrophic Obstructive Cardiomyopathy Following Surgical Myectomy

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Purpose: Left atrial (LA) enlargement and dysfunction are frequently seen in patients with hypertrophic obstructive cardiomyopathy (HOCM). Feature tracking (FT) allows sensitive quantification of LA functional remodeling regardless of LA size. However, the association of preoperative LA strain assessed by cardiac magnetic resonance (CMR)-FT with the late outcome of HOCM patients after surgical myectomy remains unknown. This study aims to investigate the prognostic value of preoperative FT-derived LA strain among patients with HOCM following septal myectomy.

Methods and Materials: In this retrospective, single-center study, 802 adult patients with HOCM who underwent septal myectomy from January 2010 through December 2017 were included. All patients underwent preoperative CMR with complete clinical outcome follow-up. Preoperative LA phasic strains were measured using CMR-FT. Primary endpoint included all-cause mortality, heart transplantation, unscheduled hospitalization for heart failure, and stroke. Secondary endpoint included all-cause mortality and heart transplantation.

Results: Of the 802 patients in this study, 116 experienced primary endpoints, 38 experienced secondary endpoints, and 18 experienced SCD/aborted SCD during a median follow-up of 56.7 (IQR, 40.2-78.6) months. Among all LA volumetric and functional parameters, LA reservoir strain held the best performance for predicting the occurrence of adverse outcomes. Compared with the group with LA reservoir strain > 22.9% (median), the annual event rate of primary endpoint (4.2% vs. 1.7%, $P < .0001$), secondary endpoint (1.5% vs. 0.4%, $P = .0005$), and sudden cardiac death (SCD) (0.7% vs. 0.2%, $P = .047$) was significantly higher in the group with LA reservoir strain \leq 22.9%. In multivariable Cox proportional hazards regression analysis, LA reservoir strain \leq 22.9% was independently associated with primary endpoint (HR 1.98, 95%CI 1.26-3.11, $P = .003$) and secondary endpoint (HR 3.71, 95%CI 1.73-7.92, $P = .001$). Incorporating LA reservoir strain, the

performance of the 2014 HCM Risk-SCD score improved for sudden cardiac death prediction (C-statistic: from 0.62 to 0.69; log-likelihood: from -110.31 to -108.27, $P=0.04$).

Conclusions: In patients with HOCM undergoing septal myectomy, reduced preoperative LA reservoir strain assessed by CMR-FT is independently associated with postoperative adverse outcomes. LA reservoir strain shows the potential to optimize the risk stratification of SCD incidents in patients with HOCM after surgical myectomy.

PO-0832

Spatial-Temporal Heterogeneity of Tumor Immune Microenvironment: A Paired Primary Tumor and Brain Metastases of Non-small cell lung cancer Samples Study

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Purpose: To investigate whether there is spatial-temporal heterogeneity in the tumor immune microenvironment (TIME) in the primary tumors (PTs) and brain metastases (BMs) of non-small cell lung cancer (NSCLC) and to explore the correlation between the radiomics features and immune markers of NSCLC PTs and BMs.

Materials and methods: In total, 13 pairs of resected NSCLC PTs and BMs were included from June 2017 to May 2022. The expression levels of programmed death ligand 1 (PD-L1), cytokeratin 19 (CK19), and CD20 and the number of CD8+ tumor-infiltrating lymphocytes (TILs) in the PTs and BMs of NSCLC were calculated through multiple immunofluorescence (mIF) and digital image analysis to quantify changes in the TIME. Furthermore, we extracted the radiomics features of the PTs and BMs of NSCLC and assessed their associations with immunomarkers.

Results: Paired PTs and BMs showed a significant change in the density of CD8+ TILs ($p = 0.013$). The level of PD-L1 was not statistically significant in the paired PTs and BMs of NSCLC ($p = 1.000$). There was a correlation between the density of CD8+ TILs and the expression level of PD-L1 in the PTs ($R^2=0.4351$, $p=0.0142$). The standardized CT radiomics values in the PTs of NSCLC were correlated with the expression level of PD-L1 in BMs ($r=0.7455$, $p=0.0112$). The standardized CT and MRI radiomics values were correlated with CD8+ TIL density in BMs ($r=0.70$, $p=0.0204$; $r=-0.6545$, $p=0.0336$), as was the standardized CT/MRI radiomics value ($r=0.6364$, $p=0.0402$).

Conclusion: There is spatial and temporal heterogeneity in the TIME of the PTs and BMs of NSCLC, especially in terms of CD8+ TILs. Therefore, the spatiotemporal heterogeneity of the TIME should be considered in treatment decision-making. In addition, radiomics features are related to immune markers, potentially providing a noninvasive way to predict changes in the immune microenvironment in brain metastases.

PO-0833

The value of coronary CT in the evaluation of septal branches in hypertrophic cardiomyopathy

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Purpose

Septal branch characteristics in patients with hypertrophic cardiomyopathy (HCM) were assessed by coronary computed tomography angiography (CCTA) examination with a view to assisting in the clinical preoperative evaluation of patients requiring chemical ablation.

Methods

The study retrospectively included 50 patients with clinical guideline-confirmed HCM into the HCM group, and 50 people without hypertrophic cardiomyopathy were included as a control group; the two groups were matched for age, sex, and Coronary Artery Disease-Report and data system(CAD-RADS) classification. End-diastolic data were assessed after full phase reconstruction of all patients's data. The total diameter and length of the septal branches were measured, and the number and origin of the septal branches were recorded separately for each person. Descriptive statistics were used for the baseline data of HCM patients; Graphpad 9.0 software was applied to statistically analyze the imaging data of both groups.

Results

Thirty-five (70%) of the HCM patients were male and 15 (30%) were female, age 46.54 ± 13.32 , BMI 25.17 ± 3.643 , WHO in class III-IV were 35 (70%), 34 (68%) had symptoms of chest tightness, shortness of breath, and 27 (54%) had symptoms of chest pain. Eleven (22%) of the HCM patients showed 1 spacer branch, 29 (58%), showed 2 septal branches 10 (20%) showed 3 septal branches; in the control group 19 (38%) could not be evaluated because of the small size of the septal branches, 22 (44%) showed only 1 septal branch, 6 (12%) showed 2 septal branches, and 3 (6%) showed 3 septal branches. The diameter of the septal branches in the HCM patients was larger than that of the control group, with a statistically significant difference ($p < 0.001$), and the septal branch diameter in the HCM patients was larger than that of the control group, with a statistically significant difference ($p < 0.001$), and the total length of the septal branch was larger than that of the control group, with a statistically significant difference ($p < 0.001$), but there was no statistically significant difference in the distribution of the origin of the septal branch between the two groups.

Conclusions

Compared with the non-HCM population, the HCM population had a greater number of septal branches, larger diameters, and longer lengths, but there was no difference in the distribution of septal branch origins between the two groups. This suggests that there may be a compensatory blood supply to the septal branches in HCM, and these features may be suggestive for the preoperative evaluation of patients requiring chemical ablation.

PO-0834

Non-contrast cardiac computed tomography-derived mitral annular calcification scores in mitral valve disease

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Background and aims: Mitral annular calcification (MAC) by computed tomography (CT) is reported as an independent predictor of poor outcomes. However, it currently remains unclear if quantitative MAC parameters provide more value for mitral valve disease (MVD) management, therefore, we examined the prognostic value of MAC-scores using non-contrast cardiac-CT in MVD-patients.

Methods: Between January 2020 and December 2021, we prospectively enrolled 300 consecutive patients with MVD (MAC-present=80 and MAC-absent=220) undergoing preoperative cardiac-CT and mitral valve (MV) surgery. Non-contrast cardiac-CT images were used to qualitatively detect MAC (present or absent) and evaluate MAC-scores. For analyses, we also collected baseline clinical data, intra-operative conversion (from MV repair to MV replacement) and follow-up arrhythmia data.

Results: Compared with the MAC-absent group, MAC-present patients were older (62 ± 7 vs. 58 ± 9 years, $p < 0.001$), mostly women (55% vs. 39.5% , $p = 0.017$), and also had aortic valve calcification (57.5% vs. 23.2% , $p < 0.001$), mitral stenosis (82.5% vs. 61.8% , $p < 0.001$), atrial fibrillation (AF, 30% vs. 11.8% , $p < 0.001$), and larger left atrial end-diastolic dimension [LADD, $49(44-56)$ vs. $46(41-50)$, $p = 0.001$]. Furthermore, MAC-present patients underwent more MV replacements (61.8% vs. 82.5% , $p = 0.001$) and experienced a higher intra-operative conversion prevalence (11.8% vs. 61.3% , $p < 0.001$). Multiple logistic regression analyses showed that the female gender [odds ratio (OR)/95%confidence interval (CI)/ $p = 2.001/1.042-3.841/0.037$] and MAC-scores

(OR/95%CI/p=10.153/4.434–23.253/ $p<0.001$) were independent predictors of intra-operative conversion. During a follow-up of 263 ± 134 days, MAC-present patients had more arrhythmias (42.5%vs.9.5%, $p<0.001$). Also, MAC-scores [hazard ratio (HR)/95%CI/p=6.841/3.322–14.089/ $p<0.001$] and LADD (HR/95%CI/p=1.039/1.018–1.060/ $p<0.001$) were independently associated with arrhythmias by Cox regression analyses.

Conclusions: Non-contrast cardiac CT-derived MAC-scores showed high risk for intraoperative conversion and follow-up arrhythmias in MVD-patients.

PO-0835

Cardiac magnetic resonance assessment of left ventricular myocardial strain and remodeling in essential hypertensive patients with asymptomatic hyperuricemia

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Objective: This study used cardiac magnetic resonance (CMR) to investigate whether asymptomatic hyperuricemia (HU) was associated with further changes of left ventricular (LV) function and structure in patients with essential hypertension.

Methods: A total of 210 essential hypertension patients, comprising 86 with asymptomatic hyperuricemia [hypertension (HU+) group] and 124 without hyperuricemia [hypertension (HU-) group], and 65 controls were included in this study. Conventional LV function parameters and global LV myocardial strain parameters, namely, LV radial peak strain (GRPS), circumferential peak strain (GCPS), longitudinal peak strain (GLPS), were measured using CMR and compared among the three groups. Pearson correlation and regression analyses were conducted to assess the relationship between the physiological-biochemical index and CMR parameters in hypertensive patients of different genders.

Results: While ejection fraction did not show significant changes, LV GLPS decreased gradually from the normotensive control group to the hypertension (HU-) group and further to the hypertension (HU+) group. Furthermore, the LV GCPS and LV GRPS of the hypertension (HU+) group were lower than those of the control group. LV mass index (LVMI) and LV remodeling index (LVRI) increased gradually from the control group to the hypertension (HU-) group and then to the hypertension (HU+) group. Serum uric acid (SUA) was significantly correlated with LV GRPS, GCPS, GLPS and LVMI. Multiple regression analyses demonstrated that SUA was independently associated with LV GLPS. In male hypertensive patients, there was a close relationship between SUA and LVMI and LVRI, while such relationship did not appear in female patients.

Conclusions: The coexistence of HU suggests a further reduction in LV motor function in hypertensive patients. In patients with hypertension, there is a significant correlation between the decrease in LV myocardial strain and the increase in SUA levels. Additionally, the effect of elevated uric acid on LV remodeling may vary by gender.

PO-0836

Placental Transmogrification of lung misdiagnosed as cystic lung cancer: a case report

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A 57-year-old man with no past medical history, a 2-cm thin-walled cystic solid nodule with a benign morphology in the lower lobe of the right lung was found during a chest CT examination, but was suspected as a cystic lung cancer because of its inhomogeneous separations and papillary structures inside. The patient subsequently underwent segmentectomy, histopathology revealed that the papillary structures resembling placental villi, immunohistochemical stain for CD-10, CK7, TTF-1, SMA and CD34 were positive in clear cells, suggesting placental transmogrification of the lung (PTL).

PTL is a very rare benign cystic lesion of the lung, which was first described in 1979 as a subtype of bullous emphysema (1). However, PTL does not have any placental function, the name comes from its similar pathological morphology to that of the placenta (1). Its etiology and pathogenesis is still unknown, which maybe congenital, or associated with emphysematous lesions or pulmonary fibrochondromatous hamartomas (2). Clinically, PTL occurs most commonly in men aged 20-50 years old, accompanied with pneumothorax or chronic obstructive lung disease as the main symptom (3). Radiologically, PTL mainly shows as bullous lesions (pattern I), which were often misdiagnosed as bullae or emphysema, or presents as mixed thin-walled cystic solid nodule (pattern II) or solitary nodule (pattern III) but very rarely, which were often misdiagnosed as congenital cystic adenomatoid malformation, cystic tumors or hamartoma (4). The imaging findings of the case we reported was typical of pattern II, which is helpful to broaden the diagnostic thinking of radiologists for pulmonary cystic lesions and has instructive enlightening significance in the future. Surgical resection of PTL is the most curative treatment to relieve the patient's symptoms and improve respiratory function, and the follow-up is necessary and important to evaluate for recurrence (5).

PO-0837

Comparison of Clinical Radiomics Nomogram and Deep Convolutional Neural Network Model in Discriminating Atypical Pulmonary Hamartoma From Atypical Lung Adenocarcinoma

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Objectives To evaluate the value of clinical radiomic nomogram (CRN) and deep convolutional neural network (DCNN) model in distinguishing atypical pulmonary hamartoma (APH) from atypical lung adenocarcinoma (ALA).

Methods A total of 307 patients were retrospectively recruited from two institutions. Patients in institution 1 were randomly divided into the training (N = 184: APH = 97, ALA = 87) and internal validation sets (N = 79: APH = 41, ALA = 38) in a ratio of 7:3, and patients in institution 2 were assigned as the external validation set (N = 44: APH = 23, ALA = 21). A CRN model based on multivariate logistic regression and a DCNN model were established, respectively. Performances of two models were compared by delong test and receiver operating

characteristic (ROC) curves. In addition, we also conducted a human-machine diagnosis capability competition to evaluate the value of AI in the Lung-RADS classification.

Results The areas under the curve (AUCs) of DCNN model were higher than that of CRN model in the training, internal and external validation sets (0.983 vs 0.968, 0.973 vs 0.953, and 0.942 vs 0.932, respectively), however, the differences were not statistically significant ($p = 0.23, 0.31$ and 0.34 , respectively). With a radiologist-AI competition experiment, AI tended to downgrade more Lung-RADS categories in APH and affirm more Lung-RADS categories in ALA than radiologists.

Conclusions The DCNN model performed relatively better than the CRN model in distinguishing APH from ALA, and outperformed the radiologist in evaluating the Lung-RADS classification of target lesions.

PO-0838

Predictive value of epicardial adipose tissue for early left ventricular dysfunction in patients with suspected coronary artery disease

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Purpose: To investigate the relationship between epicardial adipose tissue (EAT) and myocardial strain and the severity of coronary artery disease (CAD), and to evaluate the predictive value of EAT parameters in early left ventricular (LV) diastolic dysfunction.

Methods: 170 patients with suspected CAD who underwent both coronary computed tomography angiography and echocardiography were enrolled in 2020. LV global strains were calculated using commercial software. Epicardial adipose tissue was defined as adipose tissue between -190 HU and -30 HU in the visceral pericardium from the level of pulmonary artery bifurcation to the apical level. EAT volume and average attenuation values were measured. LV diastolic dysfunction was determined by echocardiography.

Results: The mean age of the participants was 56.65 ± 12.64 years, and 57.65% were male. EAT volume and mean attenuation values were significantly correlated with CAD severity. EAT volume was significantly positively correlated with global longitudinal strain (GLS) ($r = 0.313, P < 0.01$), and EAT attenuation values were positively correlated with global circumferential strain and GLS ($r = 0.236, 0.164$, respectively, both $P < 0.05$). Age ($\beta = 0.125, OR = 1.134, P < 0.01$) and EAT volume ($\beta = 0.019, OR = 1.019, P = 0.018$) are independent predictors of LV diastolic dysfunction. Age combined with EAT volume improves the diagnostic efficacy of left ventricular diastolic dysfunction.

Conclusions: EAT parameters can reflect the severity of CAD. EAT volume is capable to predict early LV diastolic dysfunction. Compared with GLS, EAT volume may be able to predict LV diastolic dysfunction earlier.

PO-0839

Vaccination effect on patients with Delta variant of COVID-19 pneumonia: A study of longitudinal dynamic chest CTs using artificial intelligence model

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The Delta variant of COVID-19 has been emerged and spreads globally since May 2021 and reported in more than 70 countries. The status of the vaccination, symptom onset time, and imaging signatures in the infected population have not been fully investigated and clarified. This study included 131 patients who were infected with the Delta variant of COVID-19. After screening, 106 patients with 458 follow-up CT scans were retrospectively selected and divided into complete and incomplete vaccination groups (66 and 40 patients, respectively). Imaging features were automatically extracted, and infection distribution in lung fields and progression pattern tendency were investigated. Furthermore, we extracted the most related clinical and imaging features to establish a vaccination-status classification model. An independent testing dataset with 55 patients from another inpatient ward was enrolled to evaluate the generalizability of the model. The severity of infection in lung and lung fields of the complete vaccination group was overall lower than those of the incomplete vaccination group. A relatively earlier peak CT abnormality was found on days 8-11 in the complete vaccination group than in incomplete vaccination group on days 12-15 after the first positive PCR time. The vaccination-status classification model achieved the highest performance with an AUC of 0.929, accuracy of 0.864 in the testing set, and an AUC of 0.858, accuracy of 0.727 in the independent testing set. In summary, compared to the incomplete vaccination group, the fully vaccinated patients had milder CT abnormalities and earlier peak time for chest impairment. Also, the vaccination status shows determinable through imaging and clinical features.

PO-0840

Accuracy of artificial intelligence-based coronary artery calcium scoring in non-gated low-dose chest CT

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Objectives: To evaluate the risk category performance of artificial intelligence-based coronary artery calcium score (AI-CACS) software used in non-gated chest computed tomography (CT) on three types of thickness (1mm, 3mm, 5mm) images, considering the manual method as the standard.

Methods: A total of 112 patients who underwent both chest CT and electrocardiogram (ECG)-gated non-contrast enhanced cardiac CT with the same equipment at the same time in the study. AI-CACS software was based on a deep learning algorithm and was trained on multi-vendor, multi-scanner, and multihospital anonymized data from the chest CT database. The AI-CACS was automatically obtained from chest CT data by the AI-CACS software, while the manual CACS was obtained from cardiac CT data by the manual method. The correlation of the AI-CACS of different thicknesses and manual CACS, concordance rate and kappa value of the risk categories determined by the four methods were calculated. The risk category performance of the AI-CACS for dichotomous risk categories bounded by 0, 100 and 400 was assessed.

Results: The correlation of the AI-CACS of three different thicknesses (1mm, 3mm, 5mm) with the ECG-CT CACS were $p = 0.973(p < 0.001)$, $0.941(p < 0.001)$, $0.834(p < 0.001)$, respectively. The Bland-Altman plot (manual CACS minus AI-CACS of three different thicknesses) showed three

mean differences of -6.5,15.4,53.1, respectively and 95% limits of agreement of -95.0 to 81.9, -96.6 to 127.4, -187.8 to 294.0, respectively. The agreement of risk categories for the CACS was kappa (κ) = 0.868($p < 0.001$), 0.772($p < 0.001$), 0.412 ($p < 0.001$), respectively, and the concordance rate was 91%, 84.8%, 62.5%. As dichotomous risk categories bounded by 0, 100 and 400, area under the curve of the AI-CACS of three different thicknesses were 0.996 vs. 0.900 vs. 0.785, 0.993 vs. 0.995 vs. 0.975, and 0.995 vs. 1.000 vs. 0.981, respectively.

Conclusions: The 1mm-AI-CACS could accurately quantify CACS as well as categorize risk. Acceptable agreement will enable one-stop chest screening and risk assessment of cardiovascular diseases for healthy physical examining personnel.

PO-0841

Differentiation of solid nodular pulmonary cryptococcosis and pulmonary adenocarcinoma based on intranodal and perinodal enhanced CT radiomics

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Objective: We aimed to evaluate the role of intranodal and perinodal regional radiomics features in diagnosing nodal pulmonary cryptococcosis (PC) and lung adenocarcinoma (LAC) and to construct nomogram for the preoperative diagnosis of both diseases.

Materials and Methods: We retrospectively recruited 300 patients with pathologically and clinically confirmed PC and LAC. Regions of interest were outlined and radiomics features were extracted from thin-layer enhanced venous phase CT images. Redundant features were filtered using the Pearson/spearman correlation coefficient and the least absolute shrinkage and selection operator (lasso) method, and clinical radiology features were screened by univariate and multivariate analysis. Clinical radiology (C-R), intra-nodal radiomics (Intra-RS), peri-nodal radiomics (Peri-RS), interfacial transition zone radiomics (ITZ-RS), and combined clinical plus radiomics (Combine) were constructed using logistic regression. The performance of these models was assessed by evaluating the area under the receiver operating characteristic curve (ROC) (AUC), and the clinical decision curve was used to assess the clinical utility of these models.

Results: The AUC of the ITZ-RS model was higher than that of the Intra-RS and Peri-RS models (training set: 0.91 vs. 0.86 vs. 0.76; validation set: 0.89 vs. 0.85 vs. 0.70), and the three features of age, bronchial inflation sign, and pleural retraction were screened by multifactor analysis to form the C-R model. Combining ITZ-RS features and C-R features to build the Combine model and constructing the nomogram showed the best classification performance with AUCs of 0.94 and 0.91 in the training and validation sets, respectively.

Conclusion: Our proposed interface transition zone radiomics features showed good differential diagnostic performance in nodular pulmonary cryptococcosis and lung adenocarcinoma, and the constructed combined model nomogram is likely to be a powerful tool for the preoperative diagnosis of nodular PC and LAC in clinical practice.

PO-0842

Applicability of Multiphase-CTA Imaging with Pulmonary Artery Monitoring in Preoperative Evaluation of Left Atrial Appendage Closure

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Purpose: To evaluate the applicability of multi-phase left atrial appendage(LAA) CTA by monitoring pulmonary artery before percutaneous left atrial appendage closure with row 320 wide-body detector MSCT.

Methods: A total of 110 cases were retrospectively analyzed in 47 cases were examined with single-phase CTA by monitoring superior vena cava (SVC) as control group and 63 cases were examined with multi-phase LAA-CTA by monitoring pulmonary artery (PA) as study group. The statistics are blew: 1.We compared different monitoring sites with various phases scanning periods in image quality of contrast enhanced left atrial appendage. 2.The differences in diagnostic results between multi-phase LAA-CTA by monitoring pulmonary artery and two-dimensional transesophageal echocardiography (2D-TEE). 3.We analyzed the differences in thrombus and poor filling areas of the left atrial appendage between two groups.

Results: 1.The 95% confidence interval range of CT value of thrombus viscosity areas in the control group was greater than that in the study group,and the thrombus viscosity areas in the study group showed ascending slightly enhanced. 2. In study group,the mean CT value of left atrial appendage filling and the diagnostic accuracy were better than those of control group ($P<0.01$). 3.The study group was able to reduce the incidence of poor filling of left atrial appendage and precisely displayed its shape. ($P<0.01$).

Conclusion: The multi-phase scanning method of monitoring pulmonary artery with row 320 wide-body detector MSCT can accurately evaluate the filling and blood flow viscosity of left atrial appendage. It plays a good suggestive and diagnostic role in the investigation of space occupying and contrast medium filling shape before left atrial appendage clusion.In short,the multi-phase scanning method of monitoring pulmonary artery with row 320 wide-body detector MSCT is a simple and easy imaging technique.

PO-0843

Use ResViT Framework to identify COVID-19 pneumonia with Delta variant of SARS-CoV-2 from COVID-19 pneumonia based on Chest CT

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Background:

Coronavirus disease 2019 (COVID-19) with Delta variant of SARS-CoV-2 has occurred in many countries since it was announced by WHO on 11 May 2021. It is very important to identify the type of COVID-19. Intelligent diagnosis methods based on imaging tools have attracted much attention, but existing works seldom study the Delta variant. Therefore, we propose a ResViT based on CT images to diagnose Delta variant from COVID-19 and normal controls.

Methods:

We collect 3D CT images from total 2285 subjects, including 390 Delta cases from Nanjing, 818 Covid-19 cases from six medical centers, and 1077 normal cases from three medical centers. Besides, part of Covid-19 cases and normal cases are collected from online public dataset.

Based on collected 3D CT images, we propose a deep learning framework (ResViT) to achieve the diagnosis task. The proposed ResViT can be divided into three parts: the 3D Convolutional Neural Networks (CNN), the transformer encoder, and the multi-layer perceptron (MLP). First, the 3D CNN extracts feature maps from chest CT images. The convolution kernels slide over input images with overlap and can extract fine-detailed local features. Second, the feature maps are reshaped and fed to the transformer encoder, which is used to learn the global representations between feature maps through the self-attention mechanism. Finally, the MLP outputs the classification scores of normal controls, COVID-19, and the Delta variant.

Results:

ResViT is trained on the training dataset and have shown excellent results across all the classes on the independent testing dataset. It surpasses other deep learning methods and obtains the best results of accuracy as 96.17% for three classification task Delta vs. Covid-19 vs. NC.

Conclusion:

The deep learning framework (ResViT) can detect COVID-19 pneumonia with Delta variant of SARS-CoV-2 from COVID-19 pneumonia based on Chest CT.

PO-0844

Association of liver Multi-parameter Quantitative Metrics Determined by Dual-Layer Spectral Detector CT With Coronary Plaque Scores: A Preliminary Study

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Objective: To explore potential impacts of liver quantitative metrics measured by dual-layer spectral detector CT (SDCT) on the extent and severity of coronary artery plaques.

Methods: Patients who underwent an unenhanced SDCT scan of the upper abdomen and coronary computed tomography angiography (CCTA) were enrolled. The segmental stenosis score (SSS) and segmental involvement score (SIS) were used to evaluate the extent and severity of plaques and then grouped by SIS and SSS. Liver fat quantification were assessed by polychromatic images and spectral metrics of the liver represented by virtual mono-energetic images at 40keV and 70keV, the slope of spectral attenuation curve and effective atomic number (written as CT40keV, CT70keV, λ HU and Zeff, respectively). Logistic regression model was used to evaluate the influencing factors of high SIS and SSS.

Results: 644 patients were enrolled, including low SIS (<5) group (n=451), high SIS (≥ 5) group (n=193), low SSS (<5) group (n=461) and high SSS (≥ 5) group (n=183). Except for the CT70poly value (p=0.115) differ no significant differences in SSS group, other liver spectral steatosis metrics were significantly different between SIS and SSS groups (All p<0.05). Compared with other spectral metrics, Zeff was more closely correlated with the SIS and SSS. Zeff was divided into four groups according to the interquartile interval. Compared with the patients in the lowest quartile of Zeff, the adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for SIS were 2.401 (1.284–4.493), 3.215 (1.661–6.224), and 4.126 (2.152–7.911) for those in the second, the third, and the fourth quartile of Zeff, whereas the corresponding ORs (95% CI) for SSS were 2.098 (1.130–3.894), 3.078 (1.602–5.916), and 3.582 (1.876–6.840) for the upper three quartiles of Zeff, especially among these who were < 60 years old, male and visceral adipose tissue (VAT)/subcutaneous adipose tissue (SAT) < 1.18.

Conclusions: The quantitative parameter Zeff from SDCT, was an independent factor of the extent and severity of coronary artery plaques. Liver fat quantification may be useful for evaluating risk and prognosis of coronary artery disease.

PO-0845

Incremental Prognostic Value of CT-Based Liver Radiomics Signature over Coronary Computed Tomography Angiography Findings in Patients with Diffuse Coronary Artery Disease

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Objectives : To explore the correlation between liver radiomics score (Rad-score) and the occurrence of major adverse cardiac events (MACE) in patients with diffuse coronary artery disease (CAD), as well as the additional risk stratification benefits for prognosis.

Materials and Methods: This retrospective analysis involved 238 patients with diffuse CAD who underwent upper abdomen CT and coronary computed tomography angiography (CCTA). Basic clinical data, adverse CCTA plaque findings and radiomics score of the liver were collected. Adverse CCTA plaque findings, defined as obstructive and/or high-risk plaque. MACE was the composite of cardiac death, acute coronary syndrome, and late revascularization. Selecting a 2 * 2cm square VOI in the right lobe of the liver for radiomics feature extraction. Radiomics signature was constructed by univariate and multivariate cox analysis and the least absolute shrinkage and selection operator algorithm (LASSO). Cox survival analysis is performed to assess the ability of Rad-score for predicting MACE and determine whether adding Rad-score to Framingham risk score (FRS) and adverse CCTA findings could improve predictive value of MACE in diffuse CAD. The C-index, net reclassification index (NRI) and Integrated discrimination improvement (IDI) were calculated to further confirm the incremental value of liver Rad-score for predicting MACE in diffuse CAD.

Results: MACE was observed in 34 (14.3%) patients. The MACE (+) group had higher Rad-score than MACE (-) group (1.21 ± 1.43 vs. -0.20 ± 1.11 , $P < 0.001$). After adjusted for FRS and adverse findings, multivariable cox regression analysis illustrated that liver Rad-score (HR: 5.942, 95% CI: 2.540-13.902, $P < 0.001$) was independent risk factors for MACE in diffuse CAD. Adding liver Rad-score to FRS and adverse CCTA plaque findings model significantly improved NRI (0.434, 95% CI: 0.228–0.665, $p < 0.001$), IDI (0.196, 95 % CI: 0.052–0.341, $p = 0.007$) and showed the highest discrimination index (C-statistics, 0.834).

Conclusions: In diffuse CAD patients, liver Rad-score was significantly associated with MACE and could improve the predictive value of MACE above FRS and CCTA adverse findings, which could provide incremental value for prognosis and early prevention of diffuse CAD.

PO-0846

The value of COPD prediction based on the quantitative features of CT mediastinal window and lung window image

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Reason: analysis based on computed tomography (CT) shows the potential for diagnosis and surveillance of chronic obstructive pulmonary disease (COPD). However, COPD is a respiratory disease involving different degrees of abnormal pulmonary parenchyma, and its diagnostic gold standard is still lung function test. Clinical and imaging challenges remain in the early screening and diagnosis of COPD. Because different CT lung windows and mediastinal windows are used between the studies, and the features and parameters obtained are also different, it is not known

whether different CT sequences and feature selection will affect the prediction performance. The purpose of this study was to compare the evaluation of COPD by pulmonary function test and computed tomography (CT). Based on the depth learning method, the quantitative characteristics such as CT value, percentage of low attenuation area (%LAA) and airway parameters of 0-4 grade on lung window and mediastinal window were automatically segmented and measured, respectively, to compare the performance of the two sequences in predicting COPD.

Methods: We conducted a retrospective study on the CT images of 79 cases of obstructive pulmonary disease and the CT images of 148 normal subjects in the second affiliated Hospital of Dalian Medical University from 2012 to 2021. According to the guidelines for the diagnosis and treatment of chronic obstructive Pulmonary Disease, the gold standard of diagnosis is that $FEV_1 < 2021$ or $FEV_1/FVC < 70\%$ in lung function examination is considered to have completely irreversible airflow limitation. Resample the inspiratory phase CT images to the volume of 1mm voxels and segment the lungs and 0-4 airway (NeuLungCare, Neusoft Medical Systems Co., Ltd., China.). The CT value, % LAA and 0-4 grade bronchial wall thickness and diameter of left and right lungs were extracted from mediastinal window and lung window respectively. 53 unique quantitative CT-based features are extracted from each CT image, as shown in figure 1. 53 unique features based on quantitative CT are extracted from each CT image. Kolmogorov Smirnov test and lasso feature dimensionality reduction method are used to test and evaluate 53 features of two CT sequences with three machine learning classifiers (SVM, Logical Regression, XgBoost): training / test segmentation, 70% of the queues as training queues and 30% of queues as test queues. The area under the curve (AUC) of the subject's working characteristic curve was used to evaluate the performance of the model, and delongtest showed the significance between the mediastinal window model and the lung window model.

Results: A total of 227 participants were evaluated (nasty 148 had no COPD, nasty 79 had COPD). There was no significant difference between gender groups (no COPD=48.6%; COPD = 36.9%; $p=0.11$). Among the 53 features extracted from lung window images screened by lasso, 5 features showed high contribution to predicting copd, namely, LAA910 of left lung, maximum thickness of grade 0 bronchial wall, maximum diameter of grade 0 bronchial wall, average diameter of grade 3 bronchial wall and maximum diameter of grade 4 bronchial wall. Among the 53 features extracted from mediastinal window images, 7 features showed high contribution to predicting copd after screening by lasso, which were LAA910 of left lung, LAA950 of left lung, LAA950 of upper lobe of right lung, LAA950 of middle lobe of right lung, pi10 of whole lung, maximum diameter of bronchial wall of grade 0 and percentage of bronchial wall area of grade 3.

The prediction AUC of XGBoost, SVM and logical regression for copd on lung window images were 0.8611 (95 CI:0.5870-0.7776), 0.8250 (95 CI:0.6196-0.8138) and 0.8102 (95 CI:0.5692-0.7718), respectively, the accuracy was 0.7391, 0.7536 and 0.6957, and the specificity was 0.8444, 0.8222, 0.7778, respectively. The sensitivity is 0.5417, 0.6250 and 0.5417 respectively. The prediction AUC of XGBoost, SVM and logical regression for copd on mediastinal window images were 0.9000 (95 CI:0.7859-0.9398), 0.8824 (95 CI:0.7287-0.8958) and 0.8269 (95 CI:0.6739-0.8467), respectively, the accuracy was 0.8986, 0.8406 and 0.7971, and the specificity was 0.9556, 0.9333, 0.9111, respectively. The sensitivity was 0.7917, 0.6667 and 0.5833, respectively. Overall, the AUC values of various feature selection and different classification models based on CT images are between 0.81 and 0.90. When XGBoost classifier is used to analyze the features of mediastinal window and lung window, and the first seven features selected based on lasso are retained, the best model for diagnosing COPD (AUC=0.90) is produced.

Conclusion: the quantitative characteristics of CT images are highly correlated with the results of pulmonary function test, which can replace pulmonary function test to diagnose and screen COPD to a certain extent. Different machine learning classifiers have different prediction effects on COPD. We find that the machine learning model based on the image feature analysis method based on mediastinal window and lung window shows acceptable performance.

PO-0847

Assessment of myocardial bridging and the pericoronary fat attenuation index on coronary computed tomography angiography: predicting coronary artery disease risk

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Background: The fat attenuation index (FAI) is a radiological parameter that represents pericoronary adipose tissue (PCAT) inflammation, along with myocardial bridging (MB), which leads to pathological shear stress in the coronary vessels; both are associated with coronary atherosclerosis. In the present study, we assessed the predictive value of FAI values and MB parameters through coronary computed tomography angiography (CCTA) for predicting the risk of coronary atherosclerosis and vulnerable plaque in patients with MB.

Methods: We included 428 patients who underwent CCTA and were diagnosed with MB. FAI values, MB parameters, and high-risk coronary plaque (HRP) characteristics were recorded. The subjects were classified into two groups (A and B) according to the absence or presence of coronary plaque in the segment proximal to the MB. Group B was further divided into Groups B1 (HRP-positive) and B2 (HRP-negative) according to the HRP characteristic classification method. The differences among the groups were analysed. Multiple logistic regression analysis was performed to determine the independent correlation between FAI values and MB parameters and coronary atherosclerosis and vulnerable plaque risk.

Results: Compared to the subjects in Group A, those in Group B presented greater MB lengths, MB depths and muscle index values, more severe MB systolic stenosis and higher FAI values (all $P < 0.05$). In multivariate logistic analysis, age (OR 1.076, $P < 0.001$), MB systolic stenosis (OR 1.102, $P < 0.001$) and FAI values (OR 1.502, $P < 0.001$) were independent risk factors for the occurrence of coronary atherosclerosis. Compared to subjects in Group B2, those in Group B1 presented greater MB lengths and higher FAI values (both $P < 0.05$). However, only the FAI value was an independent factor for predicting HRP (OR 1.641, $P < 0.001$).

Conclusion: In patients with MB, MB systolic stenosis was associated with coronary plaque occurrence in the segment proximal to the MB. The FAI value was not only closely related to coronary atherosclerosis occurrence but also associated with plaque vulnerability. FAI values may provide more significant value in the prediction of coronary atherosclerosis than MB parameters in CCTA.

PO-0848

Clinical value of fast left atrial long-axis strain in predicting atrial fibrillation in patients with apical hypertrophic cardiomyopathy

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Purpose: To investigate the clinical value of cardiac magnetic resonance fast long-axis strain (CMR-LAS) in predicting atrial fibrillation (AF) in patients with apical hypertrophic cardiomyopathy (AHCM).

Methods and Materials: 98 patients with AHCM (54 pure-AHCM and 44 mixed-AHCM) and 29 healthy controls underwent conventional CMR imaging. LAS semi-automatically tracks the length analysis between the midpoint of the LA posterior wall and the left atrioventricular junction through the LAS plate of the post-processing software CVI42 workstation (version 5.13.7) and evaluates

three strain parameters, including reservoir (ϵ_s), conduit (ϵ_e), and booster (ϵ_a). The endpoint event was set as AF. A new joint predictor was constructed by fitting multiple predictors through a logistic regression model; The area under the receiver operating characteristic (ROC) curve (AUC) of each original index was compared with the ROC curve of each subject, and the optimal threshold was determined at the maximum value of the Yoden index.

Results: During a median follow-up of 34 months (IQR, 18-52 months), 12 patients (12.2 %) reached the endpoint event, including 3 pure and 9 mixed patients. Among patients with AHCM, those who developed AF were older ($58.17 \pm 11.78y$ vs. $49.7 \pm 11.25y$). In patients with AHCM, the average left ventricular myocardial mass index (LVMI) was 86.56 ± 16.29 g/m², and the median left ventricular maximum wall thickness (LVWT) was 16 mm.

Compared with the normal control group and AHCM without AF patients, AF patients had increased left atrial volume (LAVI max 67.35 ± 15.20 ml/m² vs. 46.96 ± 12.67 ml/m² vs. 37.29 ± 8.01 ml/m²; LAVI min 49.96 ± 11.87 ml/m² vs. 30.14 ± 12.12 ml/m² vs. 14.70 ± 4.09 ml/m²), left atrium decreased ejection fraction (TLAEF 37.76 ± 17.7 % vs. 46.58 ± 11.94 % vs. 62.02 ± 4.36 %). The ϵ_s (34.86 ± 3.95 %, 26.27 ± 6.18 %, 15.12 ± 4.36 %), ϵ_a (18.57 ± 3.16 %, 14.80 ± 4.28 %, 8.17 ± 2.03 %) and ϵ_e (16.29 ± 2.32 %, 11.47 ± 3.26 %, 6.95 ± 3.23 %) of the control group, without AF group and AF group showed a downward trend ($P < 0.001$). Multivariate logistic analysis showed that ϵ_s and LAVImin were joint predictors of AF. The AUC of AF predicted by the logistic regression model with the joint predictor fitted with the two variables, ϵ_s , and LAVI min, was 0.976 (95% CI: 0.948~1.000), which was higher than that of the two predictors individually, which were (0.933 (95% CI: 0.870~0.996)) and (0.882 (95% CI: 0.790~0.973), respectively.). The sensitivity of predicting AF was 91.7% and the specificity was 94.2% when the optimal threshold value of the joint predictor was determined as 0.236 with the maximum value of the Yoden index, which was about 0.859.

Conclusions: The LAS technique quantitatively assesses LA myocardial strain and detects early subclinical dysfunction in patients with AHCM, and LAS in combination with LAVI metrics has potential value in predicting the development of AF and guiding early clinical intervention.

PO-0849

Risk Factor Analysis for Major Mediastinal Vessel Invasion in Thymic Epithelial Tumors Based on Multi-slice CT Imaging

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Objective: To explore the characteristics and risk factors for major mediastinal vessel invasion in different risk grades of thymic epithelial tumors (TETs) based on computed tomography (CT) imaging, and to develop prediction models of major mediastinal artery and vein invasion.

Methods: One hundred and twenty-two TET patients confirmed by histopathological analysis who underwent thorax CT were enrolled in this study. Clinical and CT data were retrospectively reviewed for these patients. According to the abutment degree between the tumor and major mediastinal vessels, the arterial invasion was divided into grade I, II, and III (< 25%, 25 – 49%, and $\geq 50\%$, respectively); the venous invasion was divided into grade I and II (< 50% and $\geq 50\%$). The degree of vessel invasion was compared among different defined subtypes or stages of TETs using the chi-square tests. The risk factors associated with TET vascular invasion were identified using multivariate logistic regression analysis.

Results: Based on logistic regression analysis, male patients ($\beta = 1.549$; odds ratio, 4.824) and the pericardium or pleural invasion ($\beta = 2.209$; odds ratio, 9.110) were independent predictors of 25% artery invasion, and the midline location ($\beta = 2.504$; odds ratio, 12.234) and mediastinal

lymphadenopathy ($\beta = 2.490$; odds ratio, 12.06) were independent predictors of 50% artery invasion. As for 50% venous invasion, the risk factors include midline location ($\beta = 2.303$; odds ratio, 10.0), maximum tumor diameter larger than 5.9 cm ($\beta = 4.038$; odds ratio, 56.736), and pericardial or pleural effusion ($\beta = 1.460$; odds ratio, 4.306). The multivariate logistic model obtained relatively high predicting efficacy, and the area under the curve (AUC), sensitivity, and specificity were 0.944, 84.6 %, and 91.7 % for predicting 50% artery invasion, and 0.913, 81.8 %, and 86.0 % for 50% venous invasion in TET patients, respectively.

Conclusion: Several CT features can be used as independent predictors of $\geq 50\%$ artery or venous invasion. A multivariate logistic regression model based on CT features is helpful in predicting the vascular invasion grades in patients with TET.

PO-0850

Diagnostic value of radiological features and hemodynamic parameters of combined V / Q SPECT / CT and CT angiography in patients with nonthromboembolic pulmonary hypertension

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Purpose The aim of this study was to describe radiological features of nonthromboembolic pulmonary hypertension (NTEPH) combined V/Q SPECT/CT with CT Angiography. Furthermore, we tried to identify independent radiological variables to evaluate hemodynamic changes in NTEPH, and aimed to use non-invasive methods to replace right-sided heart catheterization(RHC).

Materials and methods A total of 182 patients (80 group I, 22 group II, 53 group III, 3 group V and 24 control group) suspected of having NTEPH who underwent imaging and hemodynamic evaluation in cardiology department of the First Affiliated Hospital of CQMU from February 2014 to June 2023 were retrospectively reviewed. Radiological features included pulmonary vascular, Cardiac, Systemic vascular, Parenchymal and V/Q SPECT/CT findings. Hemodynamic assessment involved (in) the mean pulmonary artery pressure (MPAP), pulmonary vascular resistance (PVR) and others. Differences in radiological features were determined using the Kruskal Wallis test and Fisher exact test. Following a univariate analysis, associations of hemodynamic parameters with radiological parameters were evaluated by multiple linear stepwise regression. The most vital features were used to make the best predictive model. Eventually, the established radiomics model was tested with an additional 41 patients.

Result With regard to CT features, the study revealed that bronchial hypertrophy, diffuse centrilobular ground glass nodule, mosaic perfusion classification 3, PH by visual perfusion assessment favored the diagnosis of group I. whereas mosaic perfusion classification 4, perfusion defects1(VQ1) favored the diagnosis of group III. Multiparametric analysis indicated that P/A, Pulmonary artery calcification, Peripheral tortuous vessels, Right ventricle diameter, Right ventricle free wall thickness, Centrilobular ground glass nodule, global perfusion defects (VQ3) were the independent predictors of MPAP. While Right ventricle free wall thickness, Centrilobular ground glass nodule, Peripheral tortuous vessels, pulmonary artery morphology2, Mosaic perfusion classification2, Bronchial hypertrophy were the independent predictors of PVR. In addition, we made a prediction equation, the correlation coefficient (r) of MPAP is 0.737 in the development cohort, center1, 0.715 in the external validation cohort, center2; the correlation coefficient (r) of PVR is 0.687 in the development cohort, center1, 0.608 in the external validation cohort, center2.

Conclusion Our results confirmed the diagnostic value of CTPA with V/Q SPECT/CT in evaluating patients with NTEPH, and opened a horizon to a new method in assessing hemodynamic changes in patients with NTEPH using radiological parameters, especially when right-sided heart catheterization (RHC) is not possible or contraindicated.

PO-0851

Pulmonary Circulation Coupling Index: A Novel Non-Invasive Marker for Prognosis in Pulmonary Hypertension Secondary to Heart Failure

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Objectives: Due to the complex underlying pathophysiological mechanisms, few studies have investigated non-invasive prognostic predictors in patients with pulmonary hypertension (PH) secondary to heart failure. This study aimed to valid a non-invasive marker we developed, named pulmonary circulation coupling index (PC-CI), which integrates left atrial booster function and right ventricular (RV) deformation could contribute to understand the complex mechanics of the uncoupling of left ventricle-PC and PC-right ventricle.

Methods: In this retrospective study, consecutive patients with PH due to heart failure who underwent cardiac MRI between December 2010 and December 2021 were enrolled. The composite endpoints were all-cause death, heart-lung transplantation, and left ventricular assist device implantation. Survival estimates were calculated by Kaplan-Meier curves and Cox regression analyses.

Results: A total of 174 patients with PH secondary to HF, with a mean age of $53.2 \text{ years} \pm 14.9$ [SD], and including 90 men, were included in the final analysis. During a median follow-up of 31.9 months, 58 patients with PH reached the endpoints. RV longitudinal strain had a fair-to-moderate correlation with pulmonary artery pressure ($r: 0.446-0.507$, all $p < 0.05$) and pulmonary vascular resistance ($r = 0.509$, $p = 0.006$). Active left atrial ejection fraction showed strong correlation with oxygen consumption at anaerobic threshold ($r = 0.769$, $p < 0.001$) and peak oxygen consumption ($r = 0.769$, $p < 0.001$). After adjusting for systolic blood pressure, PC-CI is an independent predictor for adverse events beyond the individual variables under consideration (C-statistic: 0.744). The estimated adjusted hazard ratio for patients with $\text{PC-CI} \leq 4.5$ was 2.5 (95%CI: 1.1-5.7, $p = 0.031$) when compared with those with $\text{PC-CI} > 4.5$.

Conclusions: Using cardiac MRI, a novel non-invasive marker we developed are of basic pathophysiological and clinical relevance in PH due to HF. The standardized index of active left atrial ejection fraction and RV longitudinal strain may be worthy of consideration for assessment disease severity and prognosis in patients with PH secondary to heart failure.

PO-0852

Solitary lung adenocarcinoma: follow-up CT, pathological-molecular characteristics, and surgical prognosis for different morphological classifications

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Objective: In our clinical experience, SLADCs with different morphological appearances may exhibit different natural courses, pathological and molecular characteristics, and survival prognoses. A good understanding of these features may allow clinicians to choose the optimal treatment strategy and prognostication. We aimed to investigate the dynamic changes during follow-up computed tomography (CT), histological subtypes, gene mutation status, and surgical prognosis for different morphological presentations of solitary lung adenocarcinomas (SLADC).

Methods: This retrospective study compared dynamic tumor changes and volume doubling time (VDT) in 228 patients with SLADC (morphological types I–IV) who had intermittent growth during follow-ups. The correlation between the morphological classification and histological subtypes, gene mutation status, and surgical prognosis was evaluated.

Results: Among the 228 patients, 66 (28.9%) were classified as type I, 123 (53.9%) as type II, 16 (7%) as type III, and 23 (10.1%) as type IV. Type I had the shortest VDT (254 days), followed by types IV (381 days) and III (501 days), and then type II (993 days) ($p < 0.05$ each). Type I had a greater proportion of solid/micropapillary-predominant pattern than type II, and the lepidic-predominant pattern was more common in type II and III than in type I ($p < 0.05$ each). Furthermore, type II and IV SLADCs were correlated with positive epidermal growth factor receptor mutation ($p < 0.05$ each). Lastly, the Kaplan–Meier curves showed that the disease-free survival was longest for patients with type II tumors, followed by those with type III and IV tumors, and then those with type I tumors ($p < 0.001$ each).

Conclusion: A good understanding of the natural progression and pathological-molecular characteristics of different morphological SLADC types can help make accurate diagnoses, develop individual treatment strategies, and predict patient outcomes.

PO-0853

Clinical and Non-contrast Computed Tomography Characteristics and Disease Development in Patients with Benign Pulmonary Subsolid Nodules with a Solid Component ≤ 5 mm

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Objective: Familiarity with the computed tomography (CT) features of benign pulmonary subsolid nodules (SSNs) can facilitate early diagnosis and enhance management. We aimed to evaluate the clinical and non-contrast CT features of patients with benign SSNs with a solid component ≤ 5 mm and their development trends via follow-up CT.

Methods: We retrospectively collected 436 patients who had SSNs with a solid component ≤ 5 mm, including 69 with absorbable benign SSNs (ABs), 70 with nonabsorbable benign SSNs (NBs), and 297 with malignant SSNs (Ms). The clinical and imaging characteristics among groups were compared. Multiple logistic regression analyses were performed to identify the independent predictors for differentiating them. An external validation cohort to determine the models' efficiency

comprised 151 patients from another center. Furthermore, the developing trend of benign SSNs during follow-up CTs was carefully analyzed.

Results: Patients with AB were younger and exhibited respiratory symptoms more frequently than those with M ($p < 0.017$). The frequency of nodules detected during follow-up CT was in the following order: ABs > NBs > Ms ($p < 0.017$). NBs were smaller than Ms; ill-defined margins were more frequent in ABs than in NBs and Ms ($p < 0.017$). Benign SSNs exhibited irregular shape, target sign, and lower CT values more frequently than Ms, whereas the latter demonstrated bubble lucency more commonly than the former ($p < 0.017$). Furthermore, ABs showed more thickened interlobular septa and satellite lesions than Ms and Ms had more pleural retraction than ABs ($p < 0.017$). Model 1, 2, and 3 for distinguishing different types of SSNs had areas under the curve (AUCs) of 0.748, 0.920, and 0.824, respectively. Furthermore, the external validation cohort obtained AUCs of 0.790, 0.912, and 0.794 for Model 1, 2, and 3, respectively. Follow-up CT showed nodule progression in four benign SSNs.

Conclusions: The three types of SSNs with a solid component ≤ 5 mm have different clinical and imaging characteristics and a small number of benign SSNs can progress resembling malignancy.

PO-0854

SARS-CoV-2 Omicron Variant Infection Imaging Progression under Low Respiratory Viral Load

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Objective: In our clinical practice, we found that many patients infected with Omicron demonstrated imaging progression (IP) even after their RT-PCR results had become negative for SARS-CoV-2. In particular, a few patients progressed to severe disease because of inadequate attention to symptom aggravation. We aimed to investigate the computed tomography (CT) findings of SARS-CoV-2 Omicron variant in relation to respiratory viral loads determined by cycle threshold values in reverse-transcription polymerase chain reaction (RT-PCR).

Methods: From October 2022 to November 2022, 74 hospitalized patients with Omicron were included in this retrospective study. The radiological features, CT involvement scores in relation to the respiratory viral load, and factors associated with imaging progression (IP) after the RT-PCR results turned negative were analyzed.

Results: The most common CT patterns of Omicron were multiple round-like/patchy ground-glass opacity (GGO) or mixed GGO in the peripheral or diffuse areas. The grading of CT involvement scores exhibited an inverse pattern compared to viral loads from day 1 to day 8 and from day 13 to day 20 after diagnosis. Among the 65 patients with complete imaging data, 45 (69.23%) showed IP, with symptoms improved in 34 and aggravated in 11. Patients with IP were older than those with non-IP (NIP); the erythrocyte sedimentation rates, procalcitonin levels, and D-dimer levels on admission of patients with IP were significantly higher than those of patients with NIP, whereas the immunoglobulin G antibody level on admission and CT involvement score on initial CT of patients with IP were significantly lower than those of patients with NIP (all $P < 0.05$).

Conclusion: For patients with Omicron, the IP of lung abnormalities is common when the viral load decreases. Under these circumstances, paying more attention to changes in symptoms may contribute to better patient management and the mitigation of severe pneumonia.

PO-0855

Presurgical prediction of occult lymph node metastasis in early-stage small cell lung cancer based on intra- and peritumoral contrast-enhanced CT-based radiomics: A multicenter study

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Purpose: To predict occult lymph node metastasis (OLM) in early-stage (clinical stage T1~2N0M0) small cell lung cancer (SCLC) patients in a noninvasive manner by using machine learning models that combine clinical parameters with intratumoral and peritumoral radiomic features.

Materials and Methods: This retrospective analysis included early-stage SCLC who underwent systematic lymph node dissection across four centers from January 2014 to September 2022. For each lesion, two ROIs were defined using the gross tumor volume (GTV) and peritumoral tumor volume of 15 mm around the tumor (PTV). We extracted 1595 enhanced CT-based radiomics features from the and the GTV and PTV individually. Five predictive models were constructed. The performances of the models were evaluated using standard metrics such as the area under the curve (AUC), accuracy, sensitivity, specificity, calibration curve, and decision curve analysis (DCA). A nomogram demonstrating practical value in clinical practice was developed, incorporating clinical parameters and rad_score (GTV and PTV radiomic features).

Results: A total of 242 patients (186 men, 56 women) with 242 lesions (OLM-negative, 160; OLM-positive, 82) were included and the rate of OLM positivity in all patients was 33.884% (82/242). The combined model, which integrated three radiomics features (constructed from GTV and PTV) and two clinical parameters (smoking status and location), showed powerful predictive ability. The maximum AUC value was 0.772 in the external validation cohort better than any other models. The nomogram exhibited favorable predictive performance and further assisted radiologists in enhancing diagnostic accuracy.

Conclusion: The combined model had the best diagnostic performance and a significant generalization effect in distinguishing positive OLM and negative OLM of early-stage SCLC patients noninvasively.

PO-0856

Clinicopathological and CT features associated with recurrence of stage IA invasive lung adenocarcinoma after sub-lobar resection

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Objective To investigate the correlation between clinicopathological and CT features of stage IA invasive lung adenocarcinoma (ILADC) and recurrence after sub-lobar resection. **Methods** The study included 307 patients with stage IA ILADC who underwent preoperative chest CT scan and sub-lobar resection from January 2011 to June 2020, of which 38 patients relapsed within three years after operation and 269 patients did not relapse. The clinical and CT features were compared between recurrent group and non-recurrent group. Independent prognostic factors for recurrence were identified by binary logistic regression analysis. An external validation cohort to test the

model's efficiency comprised 94 patients from another center. **Results** For clinicopathological characteristics, elderly patient, men, smokers and those with micropapillary/solid-predominant adenocarcinomas were more frequently observed in recurrent group than non-recurrent group (all $p < 0.05$). For preoperative CT features, Compared to non-recurrent group, patients having tumors with big size ($\geq 1.9\text{cm}$), solid-predominant density, spiculation, type II pleural tag, pleural adhesion, vascular convergence sign and peripheral fibrosis were more frequently observed in recurrent group (all $p < 0.05$). However, no significant differences in other CT features including tumor location, lobulation, air bronchogram, air space and type I pleural tags between the two groups (all $p > 0.05$). Binary logistic regression analysis showed that tumor size, density, spiculation, type II pleural tag and pleural adhesion were the most effective variations associated with recurrence, with an area under the curve (AUC) of 0.929. An external validation cohort had an AUC of 0.972. were independent risk factors for poor prognosis of patients with stage IA ILADC after sub-lobar resection. **Conclusion** Clinicopathological and CT characteristics are helpful to evaluate the prognosis of patients with stage IA ILADC after sub-lobar resection.

PO-0857

Impact of Mitral Regurgitation on Right Ventricular Dysfunction and Biventricular Interaction in Hypertensive Patients Evaluated by Cardiac Magnetic Resonance Feature Tracking

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Purpose: Hypertension can coexist with mitral regurgitation (MR). This study aimed to evaluate the impact of MR on right ventricular (RV) deformation impairment and investigate biventricular interaction in hypertensive patients with MR [HTN(MR+)].

Materials and methods: In total, 141 hypertensive patients without MR [HTN(MR-)], 59 HTN(MR+) patients and 67 age- and sex-matched controls were retrospectively enrolled and underwent cardiac magnetic resonance examination. The HTN(MR+) group was categorized into mild ($n=24$), moderate ($n=21$), and severe ($n=14$) regurgitation subgroups based on the calculated mitral regurgitant fraction. RV mass and volume index, ejection fraction and biventricular myocardial strains, including global radial (GRS), circumferential (GCS) and longitudinal (GLS) peak strains were analyzed and compared among different groups.

Results: The HTN(MR-) patients exhibited a significant decrease in biventricular GLS and increased RV mass index, while maintaining RV volume index and ejection fraction compared to controls. The HTN(MR+) group demonstrated a significant increase in RV volume and mass index, reduced ejection fraction and biventricular strains in comparison to the HTN(MR-) group. The moderate regurgitation group showed significantly reduced biventricular strains compared with the HTN(MR-) group. The severe regurgitation group showed significantly impaired biventricular strain compared with the mild regurgitation group. Multivariable linear regression analysis revealed that left ventricular GRS, GCS, and GLS were independent of RV GRS, GCS, and GLS, indicating biventricular interaction.

Conclusion: MR may aggravate RV deformation impairment in hypertensive patients. Left ventricular strain parameters were independent influencing factors of the RV strain parameters. It is vital to evaluate the effect of MR on RV dysfunction among hypertensive cases, which may facilitate clinical management and prognostic improvement.

PO-0858

Prediction of high-grade histological subtypes of stage I A lung adenocarcinoma based on CT radiomics model

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Purpose: This study aimed to investigate the value of CT radiomics model in predicting high-grade histological subtypes of stage I A lung adenocarcinoma (LADC).

Materials and Methods: A total of 236 patients with stage I A LADC were included, who were divided into low-grade group (n=112) and high-grade group (n=124) according to the pathological grading system, and randomly divided into training and validation sets according to a ratio of 7:3. Minimum redundancy maximum relevance and least absolute shrinkage and selection operator regression were used to screen the radiomics features. Multivariate logistic regression was used to screen independent predictors from baseline clinical data and traditional CT signs. The radiomics, clinical and clinical-radiomics models were established, respectively. Receiver operating characteristic curve curves were used to evaluate the model's predictive performance, decision curve analysis (DCA) to evaluate the model's clinical net benefit, and calibration curves to evaluate the model's goodness of fit.

Results: Eight radiomics features were significantly correlated with the high-grade group of LADC. The clinical-radiomics model combined with baseline clinical data, traditional CT signs and radiomic features had the best discriminant ability in predicting high-grade histological subtypes of LADC. In the training and validation sets, the areas under the curve were 0.950 (95% CI, 0.919-0.982) and 0.950 (95% CI, 0.910-0.973), respectively. DCA analysis showed that the clinical-radiomics model had better net clinical benefit.

Conclusion: Clinical characteristics combined with radiomics features were helpful for preoperative noninvasive prediction of high-grade LADC in stage IA.

PO-0859

The value of dual-energy spectral CT in differentiating mass pulmonary tuberculosis and peripheral lung cancer

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Purpose: This study aimed to analyze the value of dual-energy spectral CT in differentiating mass pulmonary tuberculosis and peripheral lung cancer. **Materials and Methods:** A total of 240 cases of mass pulmonary tuberculosis (n=80) and peripheral lung cancer (n=160) confirmed by surgery and pathology in our hospital from January 2018 to March 2022 were collected. All patients underwent dual-phase enhanced chest CT scans under the energy spectrum scanning mode. The energy spectral CT parameters include CT40keV value, CT70keV value, iodine (water) concentration (IC), water (iodine) concentration (WC), effective atomic number (Zeff) and energy spectral curve slope [$\lambda = (CT40keV - CT70keV) / 30$]. All data were measured during the arterial phase (AP) and venous phase (VP). The two-category variables were tested by Chi-square test, and the comparison between groups was performed using an independent sample t test. The area under the receiver operating characteristic curve (AUC), sensitivity, specificity, and accuracy were used to assess diagnostic performance. **Results:** Age and carcinoembryonic antigen were statistically different between the two groups ($P < 0.05$), while sex, smoking history and tumor location were not

statistically different between the two groups ($P > 0.05$). There were significant differences in spectral CT quantitative parameters (CT40keV value, CT70keV value, λ , Zeff, and IC) between the two groups ($P < 0.05$) during the AP and VP. However, WC was not statistically different between the two groups ($P > 0.05$). ROC curve analysis showed that the AUC in the AP and VP was 90.9% (95% CI, 0.873-0.945) and 83.4% (95% CI, 0.780-0.887), respectively. The highest diagnostic performance (AUC, 97.6%; 95% CI, 0.961-0.991) was obtained by combining the AP and VP. Conclusion: Dual-energy spectral CT can well differentiate between mass pulmonary tuberculosis and peripheral lung cancer

PO-0860

Granzyme B PET Imaging Inflammation and Remodeling in Myocardial Infarction

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Purpose The aim of this study was to evaluate whether granzyme B (GzmB) targeted positron emission tomography (PET) imaging agent (⁶⁸Ga-grazytracer) could characterize the cardiac inflammation and remodeling in myocardial infarction (MI).

Methods MI rats were performed GzmB-targeted PET/CT on 1, 3, 6, 14, 28 post-operative days. Autoradiography, Masson stain, immunohistochemical and Elisa were tested to verify the inflammatory response and remodeling after MI in vitro. Rats were treated with GzmB-inhibitor Z-IETD-FMK to improve cardiac remodeling. Cardiac function tests were performed by echocardiograph 6 weeks after MI.

Results The highest uptake of ⁶⁸Ga-grazytracer on day 3 after MI (0.294 ± 0.03 %ID/g at 3 days vs. 0.115 ± 0.01 %ID/g in sham group, $P < 0.001$). Immunohistochemical showed significantly higher expression of GzmB and CD8, in line with PET/CT imaging result. Autoradiography showed that ⁶⁸Ga-grazytracer accumulation was observed in the infarcted myocardium. The ⁶⁸Ga-grazytracer uptake of treated rats were significantly reduced compared with MI groups (0.199 ± 0.01 %ID/g vs. 0.261 ± 0.02 %ID/g; $P < 0.05$). Echocardiographic showed that left ventricular ejection fraction was lower in MI than in ischemia reperfusion group. GzmB-inhibitor treatment was shown to be effective in improving cardiac function without significant shortening of infarct size.

Conclusions: This study demonstrated the potential for using ⁶⁸Ga-grazytracer imaging to delineate adverse inflammatory response and pathological cardiac remodeling, which can help to predict heart function. PET/CT imaging-guided therapy may reduce myocardial injury and improve heart function in myocardial infarction.

PO-0861

Lung CT prediction of mortality in patients with severe influenza A H1N1 virus and ARDS

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Objectives: The relationship between chest computed tomography (CT) findings and intensive care unit (ICU) mortality in influenza A (H1N1) patients with acute respiratory distress syndrome (ARDS) has not been thoroughly investigated. This study aims to assess the predictive value of CT severity score in predicting in-hospital mortality for these patients.

Methods: Between March 1, 2016, to December 31, 2020, a retrospective enrollment of 345 confirmed ARDS patients was conducted. The total CT score and individual CT abnormality scores were respectively calculated based on the extent of lobar involvement ((0:0%; 1, < 5%; 2:5–25%; 3:26–50%; 4:51–75%; 5, > 75%; range 0–5; global score 0–25)). Demographics, laboratory findings, and short-term outcomes (survival or non-survival) were recorded. Prediction models were derived through logistic regression analysis, and model performance was evaluated using the area under the receiver operating characteristic curve (AUC) and compared by DeLong's test.

Results: A total of 72 patients diagnosed with ARDS due to H1N1 infection were finally included, with 56 survivors and 16 non-survivors. The univariate analysis revealed that, compared with survivors, non-survivors were more frequently found with older age, comorbid diabetes, prolonged prothrombin time (PT), elevated fibrinogen and Alanine Amino Transferase, coinfection, use of ECMO as well as higher total CT score and CT scores of GGO, reticular lesion, bronchial dilation, architectural distortion, higher percentages of consolidation volume and average lung density (all $p < 0.05$). The multivariate logistic analysis revealed that age, coinfection and total CT score were the most important and significantly independent prognostic factors for patients' mortality. ROC curve analysis showed that use of clinical variables combined with CT features (area under the ROC curve = 0.985) was superior to use of clinical variables alone (area under the ROC curve = 0.904) ($p = 0.013$).

Conclusions: Total CT severity score may be a potential quantitative indicator for predicting the mortality of patients with ARDS resulting from H1N1 infection. The optimal predictive performance was observed in the combined CT and clinical models.

PO-0862

Individualized Prediction of Solitary Sub-Solid Pulmonary Nodules Progression based on CT Semantic and Clinical Features: A 3-year Follow-Up Study

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Purpose: Estimating the time to progression (TTP) of sub-solid pulmonary nodules (SSNs) is crucial to the successful management of them during follow-up. The purpose of this retrospective cohort study is to develop and validate a progressive prediction model for SSNs.

Methods: A total of 126 cases who met inclusion and exclusion criteria were included in the study. The primary endpoint of our study was TTP of SSNs. Baseline characteristics were assessed in terms of clinical and CT semantic features. Kaplan-Meier analysis and COX regression analysis were performed to determine the relationship between SSNs TTP and factors from the entire data set. The nomogram was constructed based on the result of multivariate analysis and internal validation was performed using the bootstrapping. The nomogram's performance was assessed with the C-index, calibration curves, and decision curve analysis (DCA).

Results: The median follow-up time of population was 42.5(21.5) months. On Kaplan-Meier analysis, patients with higher or positive values of the indices had higher cumulative progression rate ($p < 0.05$). Multivariate Cox regression models identified diameter, CTR, morphology and VDS as independent risk factors of TTP, these predictors were included in the final model to estimate individual probabilities of progression in the 3 years, which performed well in the discrimination (the C-index was 0.901 [95%CI:0.830–0.981] and 0.875 [95%CI: 0.805-0.942] in the training and internally validation sets).

Conclusions: Our radiological semantic features nomogram is a promising and favorable prognostic biomarker for predicting progression and may aid in clinical risk stratification and decision-making for SSNs.

PO-0863

The Study of the Enhancement Effect of AI-Assisted Software on Detection of Rib Fractures by Resident Physicians in Fatigued States

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Objective: To explore the enhancement effect of AI assisted software on the detection of rib fracture by resident physicians in fatigue state. **Methods:** The data of 86 patients with rib fractures who underwent CT examination from January 2021 to May 2022 were retrospectively analyzed. The resident physicians perform CT readings in the following three methods: mode A was independent reading in normal state, mode B was independent reading in fatigue state (i.e., after working 8 hours a day), and mode C was AI-assisted reading in fatigue state, with an interval of 4 weeks between the three modes of reading. Comparison of the detection rate and reading time of rib fractures in different reading modes by resident physicians. **Results:** The detection rate of rib fractures by independent reading in the fatigued state of resident physicians was significantly lower and the reading time was significantly longer than that of independent reading in the normal state, and the differences were statistically significant ($P < 0.05$, respectively). The detection rate of rib fractures by applying AI-assisted reading in the fatigue state of resident physicians was significantly higher and the reading time was significantly shorter than that of independent reading in the fatigue state, and the differences were statistically significant ($P < 0.05$, respectively). The detection rate of rib fractures by AI-assisted reading in the fatigue state of resident physicians has exceeded the level of their normal state, and the reading time has been significantly shortened, and the differences were statistically significant ($P < 0.05$, respectively). **Conclusion:** The detection efficiency of rib fractures by resident physicians in fatigue state was significantly lower than that in normal state, but the detection efficiency of rib fractures by resident physicians in fatigue state could be significantly improved with the assistance of AI, and even exceeded the level of their normal state.

PO-0864

CT quantification of pulmonary function and compensation after lobectomy and segmentectomy in patients with lung cancer

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Objective: This retrospective study aimed to compare the effects of video-assisted thoracic surgery (VATS) lobectomy and segmentectomy on postoperative pulmonary function and compensatory changes in patients undergoing lung cancer surgery.

Methods: A total of 120 patients (82 VATS lobectomy, 38 VATS segmentectomy) were assessed for demographic characteristics, baseline pulmonary function, tumor volume, T stage, and histological grade. Postoperative pulmonary function and compensatory changes [percentage of the well-aerated lung to total/unilateral lung volume (WAL%) and non-operated lung (NOL)] were measured at multiple time points up to two years. Logistic regression analysis identified factors associated with WAL% decline after one year.

Results: Both VATS lobectomy and segmentectomy led to a decrease in pulmonary function, with no significant difference in the extent of decline between the two groups (all $P > 0.05$). Lobectomy

triggered a more pronounced compensatory response, characterized by increased ipsilateral NOL volume over time. Segmentectomy induced minimal compensatory changes and had a minimal impact on pulmonary function. Factors associated with decreased pulmonary ventilation after one year differed between the lobectomy and segmentectomy groups. In the lobectomy group, a higher preoperative WAL% of ipsilateral NOL (OR: 1.073; 95% CI: 1.017-1.133; P=0.010) was associated with a higher risk of decline in pulmonary function, whereas in the segmentectomy group, the only influencing factor was the preoperative contralateral mean lung density (MLD) (OR: 0.932; 95% CI: 0.884-0.984; P=0.010).

Conclusion: VATS lobectomy and segmentectomy demonstrate comparable decline in postoperative pulmonary function, with lobectomy inducing a greater compensatory response, while segmentectomy minimally affects pulmonary function.

PO-0865

Radiomics Analysis of Peri-coronary Adipose Tissue from Baseline CCTA Enables Prediction of Coronary Plaque Progression

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Objective: The relationship between plaque progression and PCAT radiomics has not been comprehensively evaluated. Therefore, we aim to predict coronary plaque progression with radiomics features derived from PCAT on baseline CCTA and evaluate their incremental value over quantitative plaque characteristics.

Materials and Methods: Between January 2009 and December 2020, 500 patients with suspected or known coronary artery disease (CAD) who underwent serial CCTA ≥ 2 years apart were retrospectively analyzed and randomly stratified into a training and a testing dataset with a ratio of 7:3. Plaque progression was defined with annual change in plaque burden exceeding the median value in the entire cohort. Quantitative plaque characteristics and radiomics features of PCAT were extracted from baseline CCTA. Then we built three models including quantitative coronary plaque characteristics (Model 1), PCAT radiomics features (Model 2) and the combined model (Model 3) to compare the prediction performance evaluated by AUC.

Results: The quantitative plaque characteristics of the training set showed that the values of noncalcified plaque volume (NCPV), fibrous plaque volume (FPV), lesion length (LL), PCAT attenuation were larger in the plaque progression group than in the non-progression group ($p < 0.05$ for all). In multivariable logistic analysis, NCPV and PCAT attenuation were independent predictors of coronary plaque progression. PCAT radiomics exhibited significantly superior prediction over quantitative plaque characteristics both in the training (AUC 0.814 vs. 0.615, $p < 0.001$) and testing (0.736 vs. 0.594, $p = 0.007$) datasets.

Conclusions: NCPV and PCAT attenuation were independent predictors of coronary plaque progression. PCAT radiomics derived from baseline CCTA achieved significantly better prediction than quantitative plaque characteristics.

PO-0866

Preoperative prediction of perineural invasion in esophageal squamous cell carcinoma based on CT radiomics nomogram: a multicenter study

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Objective: To investigate the value of computed tomography (CT) radiomics nomogram in the preoperative prediction of perineural invasion (PNI) in esophageal squamous cell carcinoma (ESCC) through a multicenter study. Esophageal Cancer is an extremely aggressive tumour that currently ranks sixth among cancer-related death¹. It is divided into two pathological types: esophageal squamous cell carcinoma (ESCC) and esophageal adenocarcinoma. ESCC is the predominant pathological type of esophageal cancer worldwide, accounting for 80% of esophageal cancer cases, with a higher incidence in East Asia, East Africa, and South America². Surgery remains the dominant treatment modality for resectable esophageal cancer; however, its overall therapeutic efficacy remains suboptimal. The 5-year survival rate after surgery is approximately 15–40%³, and more than half of the patients experience recurrence within 1–3 years after lesion resection⁴⁻⁶. Owing to unsatisfactory clinical outcomes after surgery for ESCC, accurate preoperative risk assessment and stratification are essential for optimising treatment options. In this context, the identification of high-risk ESCC patients based on biomarkers and pathological parameters is crucial for enhancing pre-treatment decision-making in order to improve the efficacy of treatment and survival rate of patients. Perineural invasion (PNI) is a pathological process characterised by tumour cells invading the peripheral nerve structures and spreading along the nerve sheath⁷. PNI is an independent dissemination pathway for the invasion and metastasis of esophageal cancer that not only participates in the process of tumour development but also promotes tumour recurrence and metastasis⁸. PNI is one of the biomarkers associated with the recurrence and prognosis of esophageal cancer⁹. Esophageal cancer patients with PNI are at a higher risk of recurrence and have poorer prognoses⁸. Neoadjuvant therapy can reduce the rate of PNI positivity in patients¹⁰ and improve prognosis¹¹. The Chinese Society of Clinical Oncology (CSCO) guidelines¹² for esophageal cancer in the 2022 edition state that after endoscopic mucosal resection for superficial esophageal cancer, if the pathological evaluation reveals T1b or T1a stage with concurrent PNI, additional esophageal resection is needed. Moreover, studies¹³ also suggest that esophageal tumours infiltrating the submucosa (T1b) or deeper, and exhibiting other tumour features that increase the probability of lymph node involvement, such as invasion around lymphatic vessels or nerves, poorly differentiated histology, and multiple high-grade lesions, should be treated with esophageal resection instead of endoscopic therapy. Therefore, accurate prediction of PNI would be beneficial in selecting esophageal cancer patients who would benefit from preoperative neoadjuvant chemotherapy or in choosing personalized surgical approaches to avoid unnecessary additional surgeries for patients. However, currently, the diagnosis of PNI mainly relies on preoperative biopsies or postoperative pathological analysis. Biopsies are invasive and only provide localized samples, making it challenging to reflect tumour heterogeneity and possibly leading to missed diagnoses. Postoperative pathology is performed after surgery, thus not guiding preoperative clinical decisions. Therefore, there is a need for a reliable and accurate preoperative method to predict PNI, which would aid in identifying high-risk recurrent ESCC patients and provide a basis for their preoperative decision-making. Nowadays, enhanced computed tomography (CT) has a certain degree of clinical value in displaying lesion size, lesion boundary, and the relationship between the lesion and adjacent tissues in ESCC. However, conventional contrast-enhanced CT scans cannot reveal subtle peripheral nerve structures and thus fail to detect PNI status in ESCC patients. Radiomics is an emerging quantitative image analysis method that can consider the entire tumour as the research object and construct models using algorithms for high-throughput data mining to make quantitative predictions or differential assessments for research purposes¹⁴⁻¹⁸. Recently, a series of research advances in radiomics have been made to predict the PNI of tumours. For example, Chen et al.¹⁹ established a CT-based radiomics nomogram that achieved good

performance in preoperatively predicting the PNI in colorectal cancer with the area under the curve (AUC) of 0.88, and Zheng et al. 20 showed high diagnostic efficiency (AUC=0.82) in predicting the PNI in patients with gastric cancer using radiomics features combined with clinical factors. However, only few studies have focused on the value of CT radiomics in predicting PNI in esophageal cancer. This study aimed to investigate the value of a CT-based radiomics nomogram in predicting PNI, which can be used to individualise the prediction of PNI status and improve preoperative decision-making in ESCC patients.

Methods: We retrospectively collected postoperative pathological data of 360 ESCC patients with definite PNI status (131 PNI-positive and 229 PNI-negative) from two centres. Radiomic features were extracted from the arterial-phase CT images, and the least absolute shrinkage and selection operator and logistic regression algorithm were used to screen valuable features for identifying the PNI status and calculating the radiomics score (Rad-score). A radiomics nomogram was established by integrating the Rad-score and clinical risk factors. A receiver operating characteristic curve was used to evaluate model performance, and decision curve analysis was used to evaluate the predictive performance of the radiomics nomogram in the training, internal validation, and external validation sets.

Results: Twenty radiomics features were extracted from a full-volume tumour region of interest to construct the model, and the radiomics nomogram combined with radiomics features and clinical risk factors was superior to the clinical and radiomics models in predicting the PNI status of ESCC patients. The area under the curve values of the radiomics nomogram in the training, internal validation, and external validation sets were 0.856 (0.794–0.918), 0.832 (0.742–0.922), and 0.803 (0.709–0.898), respectively.

Conclusion: In this study, we developed and validated a CT radiomics nomogram for noninvasive individual preoperative identification of PNI status in patients with ESCC based on multicentre data, which helps improve preoperative management and treatment selection for patients. The study findings demonstrate that radiomics features extracted from CT images can be used as preoperative indicators to predict positive PNI. The selected features were primarily composed of Laplace of Gaussian (LoG) and wavelet features. LoG feature parameters can extract texture features with significant discriminatory power from multiple spatial ranges, as well as smooth images and remove noise, thereby improving the efficiency of capturing phenotypic features related to tumour heterogeneity. Similarly, wavelet features can reflect multi-frequency information at different scales that cannot be identified by the naked eye and quantify tumour heterogeneity. Compared to the first-order histogram feature, LoG and wavelet features are less affected by the imaging method and its parameters, and they contain high-dimensional information of the image, which can provide more valuable information about tumour heterogeneity. In addition, they can reveal valuable information regarding the PNI status of the lesion. Among the features extracted in this study, the wavelet feature (wavelet-HLL_firstorder_Maximum) had the most significant predictive value. Firstorder_Maximum refers to the maximum grey-level intensity in the ROI. In addition, a higher value represents a higher complexity of the ROI, which indirectly reflects greater spatial heterogeneity and invasiveness of the tumour. This study used a full-volume ROI to extract features, which can reflect richer and more comprehensive information about tumour heterogeneity and better quantify the internal heterogeneity of tumours. Therefore, the radiomics nomogram constructed by delineating the full-volume ROI in this study had good stability and predictive performance. This study's multifactorial analysis demonstrated that cT stage and cN stage are independent clinical predictors of PNI, indicating a significant correlation between tumour infiltration depth, lymph node metastasis, and PNI. As T stage and N stage increase, tumour cell proliferation and invasiveness intensify, leading to an elevated risk of perineural invasion in ESCC patients, consistent with previous research findings^{22,30}. Our investigation revealed that ESCC patients with a low AGR have a higher PNI positivity rate. Plasma albumin and globulin are two important components of human plasma that reflect the nutritional status of the body and correlate with chronic inflammatory responses^{31,32}. Moreover, a low AGR can be used as a marker of chronic inflammatory responses³². In a chronic inflammatory environment, the body secretes a variety of inflammatory chemokines, which promote tumour growth and infiltration by signalling to cancer cells and remodelling the local microenvironment³³. A previous study has shown that the depth of ESCC invasion (pT) is strongly related to positive PNI ($p < 0.001$)³⁰. As the depth of tumour

invasion increases, ESCC is more likely to develop PNI. AGR, a marker of chronic inflammatory response, reflects the cumulative exposure to various pro-inflammatory cytokines, suggesting the depth of tumour infiltration, and indirectly indicates the PNI status of ESCC patients. Multivariate regression analysis showed that cT stage, cN stage and AGR is an independent risk factor for PNI in patients with ESCC. Therefore, we combined the Rad-score with clinical risk factors (cT, cN and AGR) to construct a nomogram. Our results showed that the nomogram further improved the power of predicting PNI in ESCC compared to radiomics or clinical models. This was validated in both internal and external validation sets, suggesting that CT-based radiomics nomogram plays an important role in predicting PNI in ESCC patients, providing an important adjunctive value for individualised treatment of these patients. This study established that a CT-based radiomics nomogram can preoperatively and noninvasively predict the PNI status of ESCC patients. The nomogram constructed by combining the cT, cN, AGR and Rad-score in this study improved the prediction performance. Each influencing factor was quantified into a specific score based on its contribution to the outcome event in the nomogram. The total score was then matched to the outcome scale to obtain individual risk probabilities for PNI. The DCA further confirmed that the nomogram yielded a higher overall net benefit than the clinical model. These results suggest that the nomogram, when combined with clinical data and radiomics features, can provide additional, more personalised information for the preoperative prediction of PNI status in ESCC patients, thereby providing a reference for personalised treatment. In summary, the easy-to-use nomogram constructed in this study can be used to calculate the risk of PNI for each patient under different preoperative clinical scenarios and assist in clinical decision-making. The radiomics nomogram based on CT has excellent predictive ability; it can non-invasively predict the preoperative PNI status of ESCC patients and provide a basis for preoperative decision-making.

PO-0867

MRI features of thymic extranodal marginal zone mucosa-associated lymphoid tissue lymphoma

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Objective: To explore the MRI features of thymic extranodal marginal zone mucosa-associated lymphoid tissue (MALT) lymphoma for improving the MRI diagnostic ability of this disease. **Methods:** A total of 19 patients (3 males and 16 females; age from 29 to 68 years, average age 46.5 years) with thymic MALT lymphoma confirmed by histopathology from November 2013 to July 2021 in Tangdu Hospital were enrolled retrospectively. Nineteen patients underwent chest non-enhanced MRI and DWI scans, and 11 of them underwent dynamic enhanced MRI scan at the same time. The MRI features were evaluated independently by two chest radiologists in double-blinded manner, including tumor size, morphology, homogeneity, the extent of cystic change, apparent diffusion coefficient (ADC) value, and so on. Subsequently, we analyzed the inter-observer agreement of these MRI features. **Results:** Thymic MALT lymphoma varied in size and the longest diameter ranged from 2.3cm to 13.9cm, with an average length of (7.0 ± 3.2) cm. Three lesions (15.8%) appeared as regular shapes and were small in size; 16 lesions (84.2%) were irregular and showed long spindle or arrow-like shapes. All 19 lesions had clear boundaries and no peritumoral edema. Two lesions (10.5%) showed homogeneous signal intensity and were small in size; 17 lesions (89.5%) were heterogeneous with varying degrees of cystic change, including mild cystic change in 4 lesions (21.1%) and obvious cystic change in 13 lesions (68.4%). Eleven lesions underwent enhanced MRI scans and showed heterogeneous enhancement. Lymphadenectasis were found in 3 cases (15.8%), 2 of which showed cystic changes; tumors invaded pericardium in 2 cases (10.5%); no encased vessel, pleural effusion, pericardial effusion, pleural or pericardial metastasis in 19 cases. The solid component of tumor showed hyper-intensity on DWI, which was higher than that of pectoralis major at the same level. The ADC value of thymic MALT lymphoma ranged from

$1.01 \times 10^{-3} \text{ mm}^2/\text{s}$ to $1.97 \times 10^{-3} \text{ mm}^2/\text{s}$, with an average of $(1.76 \pm 0.31) \times 10^{-3} \text{ mm}^2/\text{s}$. Conclusions: Thymic MALT lymphoma is a low-grade malignant entity and more common in middle-aged and elderly woman. Thymic MALT lymphoma has certain characteristic MRI features, which is usually contain cystic changes to varying degrees.

PO-0868

Ability of apparent diffusion coefficient value and DWI-based texture features to differentiate between thymic carcinomas and primary anterior mediastinal lymphomas

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Objectives: We aimed to evaluate the ability of apparent diffusion coefficient (ADC) value and texture features based on diffusion-weighted imaging (DWI) to differentiate between TC and PAML, histological subtypes of TC, and histological subtypes of PAML.

Methods: Clinical and MRI data for 165 patients with TC or PAML were retrospectively collected in this study. ADC value was calculated based on two different b values (0 and 1000 sec/mm²) and 75 texture features were extracted from DWI images for each patient. MRI morphologic features were also evaluated by two thoracic radiologists. Multivariate logistic regression analysis were performed to develop a multi-layer model for discriminating TC from PAML. The diagnostic performances were compared by receiver operating characteristic analysis and Delong test.

Results: At multivariate analysis, ADC value and two DWI-based texture features (Energy and Small area emphasis) were identified as independent predictors for differentiating TC from PAML, and they achieved better discriminative performances than MRI morphologic features. Integrating DWI-based texture features into a multi-layer model with age, MRI morphologic features, and ADC value had the highest discriminative ability, with a sensitivity, specificity, and area under the curve of 81.9%, 90.1%, and 0.922, respectively. Additionally, ADC value and certain DWI-based texture features also showed significant differences among TC subtypes and among PAML subtypes, respectively.

Conclusions: This proof-of-concept study indicates that ADC value and DWI-based texture features could serve as noninvasive and efficient imaging biomarkers for the differentiation of TC from PAML. **Advances in knowledge:** Integrating DWI-based texture features into a multi-layer model with age, MRI morphologic features, and ADC value could significantly improve the diagnostic ability in differentiating TC from PAML, which might be used to decrease the high rate of invasive surgical procedures in patients with PAML.

PO-0869

Observing pectinate muscles and discriminating pectinate muscles from thrombus of left atrial appendage in patients with atrial fibrillation with enhanced CT and TEE

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Objective: Enhanced CT and TEE were used to classify the morphology of left atrial appendage pectinate muscles and discriminate special morphology of left atrial appendage pectinate muscles from left atrial appendage thrombus in patients with atrial fibrillation.

Methods: A total of 8200 patients were collected from 2016 to 2023.6, including 5300 males and 2900 females. The age is from 25 to 85 years old, the mean age is 55 years old. Philips EPIC7C color Doppler ultrasound was used with ultrasound probe X7-2T and frequency of 5 to 7 MHz. Absolute diet was kept for 12 hours and 1~2 oral anesthesia was taken before TEE examination. TEE examination was done about 10 minutes later. The depth of the insertion probe is about 25~35cm from the incisor, and the morphology of left atrial pectinate muscle was carefully observed from 0~135 degrees, using 2D, 3D, pulse and color Doppler. Enhanced CT was performed using a 256-slice CT scanner (Brilliance CT, Philips Medical Systems, Cleveland, USA). Detailed scanning parameters were listed as follows: tube voltage, 120 kVp; detector collimation, 128 × 0.625 mm; pitch, 0.16; rotation time, 0.27 s; slice thickness, 0.9 mm;

section increment, 0.45 mm. Tube current was set using the ECG-based tube current modulation technique. About 60~70 mL of iodine contrast agent was injected at a rate of 4.5~5.5 mL/s via a high-pressure injector, followed by a 20~30 mL flush of saline at the same rate. Virtual reality vessels images without bone can be depicted through a postprocessing workstation. Both examination methods were completed in three days. The special types of left atrial appendage pectinate muscles were carefully identified, and differentiated from left atrial appendage thrombus. **Results:** According to the characteristics such as morphology, distribution and direction, pectinate muscle can be classified as four types:

1. Regular type: pectinate muscle, which is looked like a comb, arranges orderly. This kind of pectinate muscle is accounted for 45%.

2. Sparse type: the number of pectinate muscles is rare, which is only 2~3, and the morphology of it is short. The left atrial appendicular wall is relatively smooth. This type of pectinate muscles are accounted for 15%.

3. Irregular type: this kind of pectinate muscles are arranged disordered. Both of the thickness and length are irregular. Some pectinate muscle is large enough to occupy a big part of left atrial appendage. When such large pectinate muscle is accompanied by calcification, it may have some impacts on releasing the occlusion device during left atrial appendage occlusion process. This type of pectinate muscle is accounted for 25%.

4. Cluster-distribution type:

The pectinate muscles of those patients have a special shape, which is emitted a short pectinate muscle on the surface of the myocardial tissue, usually within 0.5~1.5cm of the left atrial appendage roof or lateral wall. Without carefully discrimination, the short pectinate muscle on the surface of this thickened myocardial tissue can be easily misdiagnosed as left atrial appendage thrombus in beginners. This type of pectinate muscle is accounted for 15%.

For this kind of pectinate muscle, we need to distinguish it from the left atrial appendage thrombus. Pectinate muscles in enhanced CT show similar Hounsfield with myocardium, also they show similar echo with myocardium in ultrasound. Sometimes, this part of myocardium exists several(2-4) small pectinate muscles. Besides, ultrasound can show pectinate muscles move synchronized with myocardium too.

Conclusion: Enhanced CT combined with transesophageal ultrasound to classify the morphological characteristics of patients with atrial fibrillation has practical value in clinical therapy.

PO-0870

Correlation Between Radiomics Features and Ki-67 Expression in Non-Small-Cell Lung Cancer

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Objective: The association between radiomics features of non-small cell lung cancer and Ki-67 expression level remains unclear. To develop a radiomics signature based on CT image features to estimate the expression level of Ki-67 in non-small cell lung cancer.

Methods: A total of 107 non-small cell lung cancer patients, who underwent non-enhanced and contrast-enhanced CT scan in our hospital from May 2016 to November 2018, including 38 males and 69 females, aged 38 to 82 years old (median 57 years old). All the non-small cell lung cancers were confirmed by histopathological examination and undergone Ki-67 expression level test within 2 weeks after CT examination, including 58 cases of low Ki-67 expression and 49 cases of high Ki-67 expression, which were retrospectively analyzed and were divided into training (n=75) and validation cohorts (n=32) in a ratio of 7:3. The arterial phase images were imported into the AW4.6 workstation to manually delineate region of interest (ROI) of the entire-tumor of lung cancer. Each ROI included 396 radiomics features including Histogram, Gray Level Co-occurrence Matrix (GLCM), Grey Level Size Zone Matrix (GLSZM), Run Length Matrix (RLM), Form Factor, Haralick. In this study, the least absolute shrinkage and selection operator (Lasso) logistic regression (LLR) model was used for further feature screening, and 11 features with non-zero coefficients were selected. A formula was generated using a linear combination of selected features that were weighted by their respective regression coefficients. A radiomics score was calculated for each patient by the formula. Then multivariate logistic regression analysis was then combined with clinical information to screen out independent risk factors for predicting Ki-67 expression level. The predictive accuracy of the radiomics signature was quantified by the area under curve (AUC) of receiver operator characteristic (ROC) curve in both the training and validation cohorts. The Hosmer-Lemeshow test was performed to evaluate the calibration degree of the radiomics. We performed decision curve analysis (DCA) to assess the clinical usefulness of the radiomics signature.

The performance of the radiomics signature was evaluated using the area under curve (AUC) of receiver operating characteristic curve. We performed decision curve analysis (DCA) within training and validation cohorts to assess the clinical usefulness of the signature.

Results: Eleven radiomics features were chosen from 396 candidate features to build a radiomics label that significantly correlated with Ki-67 expression level. The model showed good calibration and discrimination in the training cohort, with an AUC of 0.856 (95%CI: 0.736-0.977), sensitivity of 94 % and specificity of 70%, calibration degree of 0.588. In the validation cohort, AUC was 0.842 (95% CI: 0.684-0.967), sensitivity was 91%, and specificity was 79%, calibration degree of 0.175. The gender difference between Ki-67 high expression and low expression was statistically significant ($P<0.05$), and there were no significant differences in age and pathological type ($P>0.05$). Using multivariate logistic regression model, radiomics signature were considered to be independent predictor of Ki-67 expression level in non-small cell lung cancer. DCA for the radiomics signature in the training cohort showed that if the threshold probability was between 8% and 99%, then using the radiomics signature to predict Ki-67 expression level added more benefit than treating either all or no patients.

Conclusions: The radiomics signature based on CT image features is helpful to predict the expression of Ki-67 in non-small cell lung cancer lesions, which can provide a non-invasive technique for assessing the invasiveness and prognosis for non-small cell lung cancer.

PO-0871

Impaired Right Atrial Function in Pulmonary Hypertension Assessed with Myocardial Deformation before Right Ventricle Systolic Dysfunction

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Background: Pulmonary hypertension (PH) patients with right ventricle systolic dysfunction (RVSD) is common, which is associated with more serious clinical characteristics and poorer prognosis. Early detection of PH before RVSD can prevent treatment failure. This study was to assess the characteristics of right atrium(RA) function with myocardial deformation in the early stage of PH before RVSD and during the progression of PH using cardiac magnetic resonance feature tracking(CMR-FT).

Methods: 96 precapillary PH patients, including 36 without RVSD(PH-nonRVSD) and 60 with RVSD(PH-RVSD), were studied and compared with the health control group of 20 healthy volunteers. RA reservoir function(RA total strain ϵ_s and strain rate SRs), conduit function(RA passive strain ϵ_e and strain rate SRe), and booster pump function(RA active strain ϵ_a and strain rate SRa) were evaluated, as well as the right ventricle (RV) global longitudinal(GLS). The parameters of RA volume and right atrial emptying fraction(RAEF) were accessed. The RV morphological and functional parameters were also acquired.

Results: Compared to the health controls, ϵ_s , ϵ_e , SRs, and SRe were significantly decreased in PH-nonRVSD(all $P < 0.05$) without significant morphological changes in both RA and RV(all $P > 0.05$). Both ϵ_s and ϵ_e were significantly correlated with right ventricular ejection fraction(RVEF), RV GLS, pulmonary vascular resistance, brain natriuretic peptide, cardiac index, and 6-minute walk distance. The receiver operating characteristic analysis demonstrated the superior performance of ϵ_e beyond RV GLS in differentiating PH-nonRVSD and health controls. ϵ_a , SRa, total RAEF showed no significant difference between PH-nonRVSD and health controls, whereas they were reduced in PH-RVSD($P < 0.001$).

Conclusions: RA function derived from CMR-FT has the potential role in detecting the right-sided heart dysfunction before RVSD and monitoring the disease progression in patients with precapillary PH.

PO-0872

Roles of Free-breathing GRASP-DCE and IVIM Diffusion MRI for Identification of the subtypes of Lung Tumors

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Purpose

Our study aims were to assess the diagnostic value of quantitative dynamic contrast-enhanced MRI (DCE-MRI) and intravoxel incoherent motion (IVIM) diffusion weighted (DWI) magnetic resonance imaging (MRI) for indeterminate the subtypes of lung tumors, and to explore the relationship between DCE-MRI and IVIM.

Methods

A total number of 32 patients (33 lesions) were included in our study, and all the patients were divided into 4 groups, which are Adenocarcinoma, Squamous carcinoma, SCLC and benign lesions, according to the pathological results. All MR exams were performed on a 3 T MRI scanner (MAGNETOM Vida, Siemens Healthcare). Dynamic contrast-enhanced MR data were acquired GRASP during free breathing, and reconstructed with a temporal resolution of 2.9 sec/phase for

the first 26 periods and 7.6 sec/phase for the left 30 periods. The parameters of IVIM DWI with individual shimming were: TR/TE =4200/44ms, slice thickness = 6mm, slices = 20, b = 0, 50, 100, 150, 200, 400, 600, 800 sec/mm².

Results

There were 32 patients with 4 benign SPL and 29 LCs: 6 small cell carcinomas (SCLC), 7 squamous cell carcinomas (SCC), and 16 adenocarcinomas (Adeno-Ca). For all the calculated DCE maps, Ve values in the group of Adeno-Ca and benign were significantly higher than that of the SCLC group. For the IVIM model, the IVIM-D showed significantly lower value in the Adeno-Ca than that in benign lesions. The area under the ROC curve of the mean ADCs is 0.893, According to the Pearson correlation test, significant correlation was observed between f value and Ve with correlation coefficient $r=0.38$ ($p<0.05$) in Adeno-Ca group and no significant correlation in SCC group ($p>0.05$).

Conclusion

ADCs had highest diagnostic accuracy among various IVIM and DCE MRI parameters in Identification malignancy in solid pulmonary lesions. In our study, we found an optimal cutoff point is 1.940×10^{-3} mm²/s.

PO-0873

Exploratory study of the clinical value of cystic airspaces in nonsolid lung adenocarcinoma on CT

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Objective: To study the correlation between clinical data, CT image characteristics, and histopathology of patients with three types of nonsolid lung adenocarcinoma.

Methods: In total, 2146 patients with pathologically confirmed nonsolid lung adenocarcinoma in 3 hospitals in Anhui and Zhejiang were retrospectively analyzed from July 2017 to June 2022. The patients were divided into three groups according to their status of lung adenocarcinoma associated with cystic airspaces (LACA): the LACA0 group (no cystic airspaces, 1821 patients), the LACA1 group (cystic airspace diameter of <5 mm, 208 patients), and the LACA2 group (cystic airspace diameter of ≥5 mm, 117 patients). The relationships between the patients' clinical data (e.g., sex, age, and smoking status) CT image characteristics (e.g., location, lobulation, and long-axis diameter), and postoperative pathology were evaluated by univariate and multivariate analyses.

Results: In the LACA2 group, 66 (56.4%) patients were male, 57 (48.7%) patients' lesions occurred in the lower lobe, 45 (38.5%) patients' lesions were associated with pulmonary disease, 99 (84.6%) patients had lobular signs, and 50 (42.8%) patients had postoperative pathology findings of papillary, solid, or micropapillary adenocarcinoma. Multivariate logistic regression showed that sex, lobulation, long-axis diameter, location, and pulmonary disease were independent risk factors for LACA2.

Conclusion: When nonsolid nodules containing large cystic airspaces in the lower lobe are found on CT in men with pulmonary disease, the patients should stop follow-up and undergo elective surgery.

PO-0874

A comparative study of synthetic Hct and intravenous Hct for calculating cardiovascular magnetic resonance-derived extracellular volume

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Abstract

Objective: To obtain accurate and convenient myocardial extracellular volume (ECV) calculated by intravenous hematocrit (Hct) and synthetic Hct in cardiac magnetic resonance (CMR).

Methods: A total of 839 subjects over 18 years of age who with CMR scans from June 2018 to July 2021, and a Hct measurement within 24 hours of the CMR scan were retrospectively analyzed. The 413 subjects from 2018 to 2020 were enrolled in the derivation cohort to derive our local sex-specific models for synthetic Hct. The remaining 426 patients from 2020 to 2021 were enrolled in the validation cohort to access the agreement and correlation of conventional ECV (ECV₀) with ECV calculated by different venous Hct (ECV₁₋₇, ECV_{>7}, and ECV_{closest}) and by Hctsyn (ECV_{syn}). The factors including patients' characteristics, LV morphological and functional parameters affecting the accuracy of ECV_{syn} were assessed and an applicability usage scenario for synthetic Hct to calculate ECV was defined.

Results: Local sex-specific models for synthetic Hct were derived with moderate correlation ($R^2=0.332$ in female, $R^2=0.423$ in male, $P<0.001$). In the validation cohort, ECV₁₋₇ and ECV_{closest} had the best correlation and smallest bias with ECV₀ ($R = 0.959$ and 0.951 , bias= 0.02% and -0.03%), whereas ECV_{>7} and ECV_{syn} had a good correlation and minimal bias with ECV₀ ($R = 0.924$ and 0.929 , bias = 0.11% and 0.05%). When using an absolute 2% error as the standard, the performance of ECV₁₋₇ was best, which accuracy was 81.0%, followed by ECV_{closest} (78.8%), ECV_{>7} (77.2%) and ECV_{syn} (70.7%). Lower and higher Hct and decreased LVEF was associated with underestimation of ECV.

Conclusion: We recommend that the time interval between Hct and CMR scan could be extended to seven days for ECV calculation. Synthetic ECV should be used with caution, especially for patients with extremely low or high Hct and decreased cardiac function.

PO-0875

Evaluation of therapeutic effect of myocardial infarction patch by cardiac magnetic resonance imaging

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Background

Ventricular aneurysm is easy to form due to ventricular remodeling after myocardial infarction, but there is a lack of effective treatment in clinic at present. In recent years, the treatment concept of "heart patch" has been gradually popular. Patches made of polymer materials covered the lateral epicardium of infarcted myocardium could provide mechanical support for the damaged myocardium and prevent the occurrence of ventricular aneurysm. Cardiac magnetic resonance (CMR) can quantitatively evaluate myocardial fibrosis and evaluate cardiac function. In this study, CMR was used to analyze the morphology and function of the heart in pigs with myocardial

infarction before and after treatment with the patch, so as to objectively evaluate the therapeutic effect of the patch.

Materials and methods

Female Bama miniature pig was subjected to video-assisted thoracoscopic ligation of the left anterior descending coronary artery, and the success of modeling was judged by ECG. The pigs in the control group directly closed the thoracic cavity after ligation of the coronary artery, while the pigs in the patch group underwent patch implantation after successful modeling, and then closed the thoracic cavity. The CMR scan included pre-surgery, 2 and 8 weeks post-surgery. Data analysis was performed using CVI 42 software, including left ventricular ejection fraction, LGE% and left ventricular strain analysis. The CMR was completed and the animal was euthanized and the heart was taken for histological staining including TTC, HE, Masson and Sirius red.

Results

CMR showed that the local ventricular wall of the pigs in the control group became thinner and formed ventricular aneurysm, while the ventricular wall of the pigs in the patch treatment group still maintained a certain thickness, and patches of epicardium could be observed with low signal intensity. Compared with the control group, the pigs in the patch group had higher left ventricular ejection fraction, higher corresponding segmental strain index, and lower LGE percentage ($P < 0.05$). Pathological staining showed that the area of myocardial fibrosis in the patch group was smaller than that in the control group ($P < 0.05$).

Conclusion

CMR can noninvasively evaluate the therapeutic effect of cardiac patches and is a valuable imaging examination for quantitative analysis of the functional effects of biological materials.

Clinical application

Imaging plays an important role in evaluating the therapeutic effects of biomaterials. Based on non-invasive analysis of cardiac morphology and function, CMR evaluates the efficacy of myocardial infarction patches and objectively evaluates the feasibility of this new concept of patch treatment, which provides reference value for clinical prevention of ventricular aneurysm after myocardial infarction.

PO-0876

Estimation of mean pulmonary arterial pressure and pulmonary vascular resistance using CMR in connective tissue disease-associated pulmonary arterial hypertension

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Background: Cardiac magnetic resonance (CMR) is a promising non-invasive tool for assessing pulmonary arterial hypertension (PAH). This study aimed to estimate mean pulmonary arterial pressure (mPAP) and pulmonary vascular resistance (PVR) by CMR metrics using right heart catheterization (RHC) as gold standard in connective tissue disease-associated PAH (CTD-PAH). Methods: Consecutive 70 patients diagnosed as CTD-PAH who underwent both CMR and RHC within 7 days from September 2017 to April 2023 were respectively enrolled. Ventricular volumes, functions, morphological, and T1 mapping parameters, as well as main pulmonary artery (MPA) hemodynamics data, were measured. Spearman correlation analysis was used to assess the relationship between CMR and RHC parameters. Segmental linear regression analysis was employed to identify the threshold of mPAP changes, and predictive models for mPAP and PVR were developed using regression analysis.

Results: Ventricular mass index (VMI), interventricular septal (IVS) angle, and IVS curvature were highly correlated with mPAP ($r = 0.74, 0.72$, and -0.71 respectively, all with $P < 0.01$), and VMI exhibited a strong positive correlation with PVR ($r = 0.72, P < 0.01$). Segmented linear regression revealed a pivotal RVEF threshold at 21%. When $RVEF > 21\%$, VMI, free-wall distance change (SFD), IVS curvature and MPA/ ascending aorta (AAo) diameter ratio were independently correlated with mPAP ($P < 0.05$). A CMR model for predicting mPAP was established: $31.167 + (16.400 * VMI) - (19.254 * IVS \text{ curvature}) - (6.971 * SFD) + (10.709 * MPA/AAo \text{ diameter ratio})$. Another CMR model for predicting PVR was developed: $11.798 + (16.723 * VMI) - (10.662 * IVS \text{ curvature}) - (0.045 * RVESVI) - (5.074 * RV \text{ SV/ESV})$.

Conclusions: CMR parameters can be established the models for estimating mPAP and PVR in CTD-PAH patients. It could provide a non-invasive method for assessment pulmonary arterial hemodynamics during the management of CTD-PAH.

PO-0877

Prediction of microvascular obstruction by coronary artery angiography score after acute ST-segment elevation myocardial infarction

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Background: Some coronary artery angiography (CAG) scores are associated with the no-reflow phenomenon after percutaneous coronary intervention (PCI) in patients with acute ST-segment elevation myocardial infarction (STEMI). However, quality evidence regarding the association between the CAG scores and microvascular injury is still needed. Our study aimed to validate the ability of the CAG scores in predicting microvascular obstruction (MVO) detected by cardiac magnetic resonance (CMR) imaging.

Methods: From October 2020 to October 2021, 141 consecutive patients with acute STEMI who underwent primary PCI and CMR were retrospectively reviewed. CMR imaging was performed between 3 and 7 days after PCI. The patients were divided into MVO and non-MVO group based on the CMR results. Three CAG scores (SYNTAX score, SYNTAX II score and Gensini score) were used to assess the severity of coronary artery atherosclerotic burden.

Results: A total of 122 patients were included (mean age 60.6 ± 12.8 years). MVO occurred in 51 patients (41.8%). Patients with MVO had higher SYNTAX scores, SYNTAX II scores and Gensini scores than those without MVO (all $p < 0.001$). The Gensini score ($r = 0.567, p < 0.001$) showed the strongest correlation with infarction size than SYNTAX score ($r = 0.521, p < 0.001$) and SYNTAX II score ($r = 0.509, p < 0.001$). The areas under the receiver operator characteristic curves of SYNTAX score, SYNTAX II score and Gensini score for predicting MVO patients were 0.726, 0.774 and 0.807. In multivariable regression analysis, peak troponin I (odd ratio [OR] = 1.236, $p = 0.001$) and SYNTAX II score (OR = 11.636, $p = 0.010$) were identified as independent predictors of MVO.

Conclusions: In patients with acute STEMI undergoing primary PCI treatment, the peak troponin I and SYNTAX II score may be an independent predictor of MVO.

PO-0878

Application value of cardiac magnetic resonance image fusion technique in patients with acute myocardial infarction

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Background: Diffusion-weighted imaging (DWI) is feasible for detecting acute myocardial edema in patients with acute myocardial infarction (AMI). However, cardiac motion artifacts can cause severe attenuation or loss of DWI signal in well-contracting myocardial segments. Our study aimed to investigate the application value of cardiac magnetic resonance (CMR) image fusion technique in patients with AMI.

Methods: Patients with AMI who underwent percutaneous coronary intervention and CMR were prospectively enrolled. Image fusion was performed on cardiac cine imaging and DWI. Using late gadolinium enhancement (LGE) as the reference standard, the acute myocardial edema diagnostic efficiency, image quality score and correlation with infarct size were compared between DWI and cine-DWI.

Results: A total of 52 patients with AMI were enrolled in this study. No significant difference was found in the positive rate of acute myocardial edema diagnosis between DWI and cine-DWI (92.3% vs. 96.2%, $p = 0.500$). Cine-DWI had higher normal and overall myocardial scores than DWI (all $p < 0.001$); no significant difference was observed in edematous myocardial score between DWI and cine-DWI ($p = 0.239$). Compared with DWI ($r = 0.826$, $p < 0.001$), the edema area measured using cine-DWI had a stronger correlation with the infarct size measured using LGE ($r = 0.905$, $p < 0.001$).

Conclusions: Compared with DWI, the fusion image base on cine and DWI improved the image quality, and its edema area had a stronger correlation with the infarct size measured using LGE.

PO-0879

Improvement in coronary microvascular dysfunction evaluated by cardiac magnetic resonance in patients with hypertrophic obstructive cardiomyopathy after transapical beating-heart septal myectomy

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Background: Coronary microvascular dysfunction (CMD) is a pathophysiological mechanism underlying hypertrophic obstructive cardiomyopathy (HOCM). However, few studies have investigated the potential effect of transapical beating-heart septal myectomy (TA-BSM) on coronary microvascular function. This study aimed to evaluate coronary microvascular function in HOCM after TA-BSM using cardiac magnetic resonance (CMR) and to investigate the determinants of improvement in coronary microvascular dysfunction.

Materials and Methods: 28 patients with HOCM who underwent TA-BSM were prospectively enrolled in this study from March 2022 to April 2023. All patients received CMR before and after TA-BSM. CMR-derived parameters were compared, including the maximum wall thickness, native T1 value, T2 value, late gadolinium enhancement (LGE), and perfusion indexes (Slopemax,

Timemax, and SImax). Univariate and multivariate linear regression identified variables associated with the rate of Slopemax change.

Results: Compared with the preoperative parameters, left ventricular function and myocardial perfusion were significantly improved after TA-BSM (all $P < 0.05$), although still lower than in healthy controls. In the analysis of the myocardial perfusion parameter rate of change, the rate of Slopemax change was the most significant ($P = 0.002$) in HOCM. In the multivariable regression analysis, age (adjusted $\beta = 0.551$), weight of the resected myocardium (adjusted $\beta = 0.191$), maximum wall thickness (adjusted $\beta = -0.406$), LGE (adjusted $\beta = 0.260$), and Δ left ventricular outflow tract (LVOT) pressure gradient (adjusted $\beta = -0.123$) were significantly associated with the rate of Slopemax change in HOCM ($P < 0.05$ for all).

Conclusion: Coronary microvascular dysfunction in both hypertrophic and non-hypertrophic myocardial segments was improved in patients after TA-BSM. Microcirculatory perfusion evaluated by CMR can be a potential tool to evaluate the improvement of CMD in HOCM.

PO-0880

Early reverse remodeling of left heart morphology and function evaluated by cardiac magnetic resonance in hypertrophic obstructive cardiomyopathy after transapical beating-heart septal myectomy

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Purpose: Early assessment of cardiac morphology and function after myectomy is essential for noting the surgical effect and planning subsequent treatment. This study aimed to evaluate the early morphology and function of the left heart in hypertrophic obstructive cardiomyopathy (HOCM) after transapical beating-heart septal myectomy (TA-BSM) using cardiac magnetic resonance (CMR).

Materials and methods: Between April 2022 and January 2023, HOCM patients who underwent CMR before and three months after TA-BSM were prospectively and consecutively enrolled in the study. Preoperative and postoperative cardiac morphological and functional parameters, including those for the left atrium (LA) and left ventricle (LV), were compared. Healthy participants with a similar age and sex distribution were enrolled for comparison. Pearson or Spearman correlation analysis was used to investigate the relationships between the parameters and the left ventricular remodeling index (LVRI). Last, univariate and multivariate linear regression identified variables associated with the left ventricular mass index (LVMI) and LVRI.

Results: Forty-one patients (mean age \pm standard deviation, 46 ± 2 years; 27 males) and 41 healthy control participants were evaluated. Eighteen (43.9%) HOCM patients were classified as having a sigmoid septum, and 23 patients had a reverse septal curvature. LA size and function were significantly improved postoperatively, but still worse than healthy controls. Compared to before the operation, left ventricular wall thickness, left ventricular ejection fraction (LVEF), LVMI, and LVRI decreased after TA-BSM (all $p < 0.001$). The left ventricular end-diastolic volume index (LVEDVI) and left ventricular end-diastolic diameter (LVEDD) decreased in patients with a sigmoid septum. However, it increased in those with a reverse septal curvature (both $p < 0.001$). In addition, both preoperative and postoperative LVRI was positively correlated with LVMI ($r = 0.734$ and 0.853 , both $p < 0.001$) and maximum wall thickness ($r = 0.679$ and 0.676 , both $p < 0.001$), respectively. In the multivariable analysis, the weight of the resected myocardium (adjusted $\beta = 0.476$, $p = 0.005$) and Δ mitral regurgitation degree (adjusted $\beta = -0.245$, $p = 0.040$) were associated with Δ LVRI. Last, the Δ LVOTG (adjusted $\beta = 0.436$, $p = 0.018$) and baseline LVMI (adjusted $\beta = 0.323$, $p = 0.040$) were independently associated with greater left ventricular mass regression after TA-BSM.

Conclusion: Following TA-BSM, HOCM patients showed early reverse remodeling of left heart morphology and function.

PO-0881

Inter-observer Consistency on Subsolid Nodule Follow-up Recommendation Based on NCCN Guidelines in Low-Dose CT Lung Cancer Screening

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Abstract

Background: This study aimed to assess inter-observer agreement on NCCN guideline-based follow-up recommendation in subsolid nodules from low-dose computed tomography (LDCT) screening.

Methods: A retrospective collection of LDCT reports from 2014–2017 for lung cancer screening was conducted using the radiology information system and keyword searches, focusing on subsolid nodules. A total of 110 LDCT cases containing subsolid nodules were identified. Two senior radiologist provided standardised follow-up recommendation. Follow-up recommendation was categorized into four groups (12-month, 6-month, 3-month, and 0-month). To ensure overall balance and representativeness of the follow-up categories, 60 scans from 60 participants were included (distribution ratio 2:2:1:1). Cases were categorised into follow-up recommendation groups by five observers following NCCN guideline. Fleiss's kappa statistic was used to evaluate inter-observer agreement.

Results: Overall accuracy rate for follow-up recommendation among five observers was 72.3%. Chest radiologists' overall agreement was significantly higher than radiology residents ($p < 0.01$). Agreement was moderate among all five observers (Fleiss kappa = 0.437). The average Cohen kappa value for all paired readers was 0.603 (0.489–0.716). Chest radiologists achieving substantial agreement, with Cohen kappa = 0.655 (0.503–0.807), while the average Cohen kappa value among radiology residents was 0.533 (0.501–0.565). Most cases with discrepancies were related to the identical risk-dominant nodules (73.5%). A higher proportion of part-solid nodules was a risk factor for discrepancies. Of the 600 paired readings, substantial discrepancy were observed in 4.8% (29/600) of the cases.

Conclusion: In subsolid nodules, Category evaluation of observer follow-up recommendation based on NCCN guideline achieved moderate consistency. Disagreements were mainly caused by measurement and type disagreements of identical risk-dominant nodules. Part-solid nodules was a contributor for discrepancies in follow-up recommendation. In the management of subsolid nodules, substantial management discrepancies were observed in 4.8% of the cases.

PO-0882

Characterization and clinical significance of right cardiac chamber remodeling in patients with connective tissue disease analysis by tissue tracking cardiac magnetic resonance imaging

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Purpose:

This study focused on the changes of impaired right atrial (RA) and RV strain parameters derived from cardiac magnetic resonance feature-tracking (CMR-FT) in patients with connective tissue disease (CTD) and their association with other clinical factors.

Methods:

A total of 110 patients with CTD and 56 age- and sex-matched healthy controls who underwent CMR imaging were retrospectively included. CMR-FT was used to evaluate the RA longitudinal strain and strain rate (SR) parameters as well as RV global systolic peak strain and strain rate in circumferential and longitudinal directions for each subject. Univariable and multivariable linear regression analyses were used to analyze the clinical factors related to RA and RV strain parameters.

Results:

CTD patients had lower RA reservoir strain (ϵ_s), conduit strain (ϵ_e), conduit strain rate (SR ϵ), and RV global circumferential strain (GCS) than controls (all $p < 0.05$), and RV GCS remains impaired even in CTD patients with preserved RVEF ($\geq 45\%$) (-17.48 ± 3.85 vs. -18.92 ± 2.99 , $p = 0.035$). The decreased RV GCS significantly associated with the presence of pulmonary arterial hypertension (PAH) ($\beta = 0.259$, $p = 0.015$). Patients with idiopathic inflammatory myopathy (IIM) had significantly higher RA and RV strain and strain rates than non-IIM, except for RA booster strain (ϵ_a). Non-IIM was independent association with ϵ_s ($\beta = -0.265$, $p = 0.009$), ϵ_e ($\beta = -0.285$, $p = 0.003$), and RV global longitudinal strain ($\beta = 0.284$, $p = 0.006$) in all CTD patients. The elevated serum uric acid level also had an independent correlation with ϵ_s and ϵ_e ($\beta = -0.200$ and -0.216 , all $p < 0.05$).

Conclusions:

RA and RV strain parameters were significantly impaired in CTD patients, which independently correlated with the variety of CTD, presence of PAH, and serum uric acid level. There was an incremental value of RV GCS to detect the RV function alterations in CTD patients even with preserved RVEF, which might be a more effective tool for clinical disease monitoring.

PO-0883

The value of pulmonary magnetic resonance imaging-based radiological characteristics and texture analysis in the differentiation of benign and malignant pulmonary necrotic lesions

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Objective: To explore the value of pulmonary magnetic resonance imaging (MRI) radiological characteristics and MRI-based texture analysis in differentiating benign and malignant pulmonary necrotic lesions.

Materials and Methods: Data of 104 patients with pulmonary necrotic lesions were retrospectively analyzed. The clinical and radiological characteristics of the patients were analyzed retrospectively using the Chi-square test or Mann-Whitney U test. Two volume of interest (VOIs) were defined in the T2-weighted imagin(T2WI) and apparent diffusion coefficient(ADC) images of each patient, respectively. Texture features were extracted from each VOI and used to train different machine learning algorithms. Model performance was evaluated using receiver operating characteristic (ROC) curves and the area under the curve (AUC).

Result: The result showed that only the wall thickness of the necrotic lesion is an independent predictor of malignant necrotic lesions with multivariate analysis. Twenty features including radiologic features, first-order histogram features and texture features were selected to establish the combined model. The best performing model was linear discriminant analysis (LDA), which achieved an AUC of 0.918 in the test set and 0.916 in the train set.

Conclusion: We demonstrated that combining MRI radiological characteristics with MRI-based texture features can be used to accurately distinguish benign and malignant pulmonary necrotic lesions. This may assist in clinical decision-making by a non-invasive approach.

PO-0884

Natural History and Clinical Characteristics of Subsolid Pulmonary Nodules in Pediatric Patients

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Purpose: To investigate the natural course of subsolid nodules (SSNs) in pediatric patient population and to gain some insights on how to follow them up

Materials and Methods: From January 2010 to December 2020, patients age of 18 years or younger were retrospectively reviewed and assessed. The incidence of interval growth, clinical, radiologic and pathological features and follow-up outcomes of these SSNs were investigated.

Results: A total of 35 patients (median age, 17 years; range, 13–18 years; 16 women) with 52 SSNs (including 49 pure ground glass nodules [pGGNs] and three part-solid nodules [PSNs]) were analyzed and evaluated. Two of the 52 SSNs (3.8%) (one PGGN, one PSN) showed interval growth. The PSN showed an increase in nodule size, without changing in size of the solid component. The PGGN showed centripetal growth from reversed halo sign to a homogeneous ground glass nodules filled with higher ground glass opacity, who continued follow-up. The intervals from initial CT examination to growth were 20 and 12 months, respectively. Four SSNs (7.7%) (three PGGNs and one PSN) in four patients were disappeared within 2~7 months during follow-up. Among the twenty-one SSNs (18 PGGNs, 3 PSNs) in nineteen studied individuals were underwent pulmonary resection, eight IVAs, seven minimally invasive adenocarcinomas, five adenocarcinomas in situ and one bronchiolar adenoma. All patients survived without recurrence.

Conclusion: Only 4% of SSNs in children and adolescents with no history of malignancy showed subsequent growth. The much higher likelihood these persistent SSNs in pediatric patients that represents a primary lung tumor than metastasis or infectious causes, should be follow-up with long interval and appropriate surgical treatment after thoughtful discussion.

PO-0885

Restoring sinus rhythm reverses Left atrial remodeling in patients with atrial fibrillation and reduce LA fibrosis progression detected by LGE-MRI

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BACKGROUND Atrial fibrillation (AF) is the most common sustained arrhythmia in clinical practice with its prevalence increasing along with the age of the population. Although the left atrial (LA) diameter has consistently been identified as a strong prediction of AF, the relationship between LA myocardial fibrosis and AF recurrence still remains unclear.

OBJECTIVES This study sought to determine the left atrial (LA) structural, functional and histological changes in patients with AF after treatment, and explore the relationship between atrial remodeling and recurrence of atrial fibrillation utilizing cardiovascular magnetic resonance (CMR).

METHODS A total of 27 consecutive patients with AF were studied at baseline and 3-6month follow-up after conservative treatment with specific drugs. The LA function, strain and LA-LGE were quantitatively analyzed and compared between AF recurrent and non AF recurrent group during sinus rhythm by cardiac magnetic resonance (CMR) late gadolinium enhancement (LGE) and feature_x0002_tracking, respectively. LA fibrotic burden was derived from the images using commercially available ADAS 3D-LA software. Local image intensity ratio (IIR) of the LA was calculated as the absolute pixel intensity to mean blood pool intensity ratio. The upper limit of normal IIR was 1.20; IIR values higher than 1.32 were considered dense scar of core zone. Image intensity ratio values between 1.2 and 1.32 identified interstitial fibrosis of border zone.

RESULTS During follow-up, 17 (63.0%) patients with non-AF recurrence had a decreased LA fibrotic burden in the border zone after treatment ($P < 0.05$). However, there was no difference in the degree of left atrial fibrosis in patients with AF recurrence before and after treatment, whether in the core or border zone. The LA reservoir (LA total EF, $p < 0.05$) and booster function (LA active EF, LA active strain(Ea), LA peak late-negative strain rate(SRa): all $p < 0.05$) were all increased in patients of the two groups after treatment, while LA conduit pump function of non-AF recurrence was preserved.

CONCLUSIONS Actively maintaining sinus rhythm can reverse cardiac remodeling and reduce the degree of fibrosis by rescuing some myocardium in the border zone, while dense scar in the core area is irreversible. Therefore, management of AF should focus on restoration of SR in clinical practice.

PO-0886

The Use of Fully-Automatic On-site CT Derived Fractional Flow Reserve in Patients with Coronary Artery Disease: A Prospective Real-World Multicenter Randomized Controlled Trial

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Background: The growing use of coronary CT angiography (CCTA) in patients with coronary artery disease (CAD) results in an increased referral rate for invasive coronary angiography (ICA). CCTA-derived fractional flow reserve (CT-FFR) improving ICA efficiency and clinical outcomes over CCTA alone remains insufficiently evidenced in the real-world setting.

Objectives: To compare the effectiveness of CCTA+CT-FFR with CCTA alone as an initial strategy for guiding the downstream care of patients with stable CAD.

Methods: In total 5,410 patients were randomly assigned with 1:1 to a strategy of initial testing with both CCTA and a novel, fully automatic, one-click, on-site CT-FFR (CCTA+CT-FFR) or CCTA alone for guiding downstream care. No any other interventions were taken. The primary endpoint was the ICA rate at 90 days. The secondary endpoint was major adverse cardiovascular events (MACE) during 90 days and 1-year follow-up.

Results: Over a median of 103 days follow-up period, ICA was performed in 269 of 2,689 patients (10.0%) in the CCTA+CT-FFR group and 332 of 2,697 patients (12.3%) in the CCTA alone group (absolute risk difference: -2.30; $P=0.006$). 90-day (0.5% versus 0.8%; $P=0.143$) and 1-year MACE (2.9% versus 3.0%; $P=0.742$) were similar between both groups. However, the CCTA+CT-FFR group had fewer cardiac events than CCTA alone group (0.5% vs. 1.2%; adjusted hazard ratio: 0.47; $P=0.019$) at 1-year follow-up duration.

Conclusions: CT-FFR added to CCTA led to a fewer ICA rate during 90 days follow-up and lower a 1-year cardiac events incidence than CCTA alone in the real-world setting.

PO-0887

Artificial intelligence based fully-automated one-click on-site CT-FFR: Development and validation from multicohort China CT-FFR studies

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Currently clinically available coronary CT angiography (CCTA) derived fractional flow reserve (CT-FFR) is time-consuming and complex. We propose a novel artificial intelligence-based fully-automated, one-click, on-site CT-FFR technology, which combines the automated coronary plaque segmentation and luminal extraction model with reduced order 3D computational fluid dynamics. A total of 463 consecutive patients with 600 vessels from updated China CT-FFR study in cohort 1 underwent CCTA and invasive FFR within 90 days were collected for diagnostic performance evaluation. For cohort 2, a total of 901 chronic coronary syndromes patients with index CT-FFR and clinical outcomes at a median 35 months follow-up were retrospectively analyzed. In cohort 3, the association between index CT-FFR from triple-rule-out CTA and major adverse cardiac events in patients with acute chest pain in the emergency department were further evaluated. The diagnostic accuracy of this CT-FFR in Cohort 1 was 0.82 with an area under the curve of 0.82. Compared with the manually dependent CT-FFR techniques, the operation time of this technique was substantially shortened by 3 times and the number of clicks from about 60 to 1. This CT-FFR has highly successful (> 99%) calculation rate and also provides superior predictor for major adverse cardiac events than CCTA alone both in patients with chronic coronary syndromes and acute chest pain. Thus, the novel artificial intelligence-based fully-automated, one-click, on-site CT-FFR technique can function as an objective and convenient tool for coronary stenosis functional evaluation in the real-word clinical setting.

PO-0888

Cardiac valve assessment with cardiovascular magnetic resonance imaging at 5 Tesla: a comparison study with 3 Tesla

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Purpose: The purpose of this prospective study was to explore the feasibility of cardiac valve imaging at 5 T and evaluate the practical performance at 5 T for cardiovascular magnetic resonance (CMR) imaging as compared with 3 T.

Methods: Twenty healthy volunteers were prospectively recruited. Gradient-echo (GRE) CINE imaging was performed on each healthy volunteer at 5 T and 3 T and compared with balanced steady-state-free-precession (bSSFP) CINE imaging at 3 T. Additionally, GRE CINE scans with higher spatial resolution were performed at 5 T. For all CINE scans at both fields, each slice was acquired with routine ECG gating and end-expiratory breath-holding. Subjective image analysis of mitral valves, tricuspid valve, aortic valve and pulmonary valve was performed by two experienced radiologists using a four-point Likert scale.

Results: 5 T GRE CINE imaging demonstrated improved image quality with higher contrast between the valve leaflets and blood pool, and comparable artifacts when compared with 3 T GRE CINE imaging, and it also showed excellent capability for high resolution (1.0 × 1.0 × 6.0 mm³) imaging. Compared to 3 T bSSFP cine imaging, 3 T GRE CINE imaging achieved improved image quality with higher contrast between the valve leaflets and blood pool.

Conclusions: The initial study proved that 5 T MRI provides anatomical images of the cardiac valve with superior image quality when compared to 3 T MRI.

PO-0889

CT-guided percutaneous transthoracic needle biopsy of ground-glass opacity lesions: how to limit non-diagnostic sampling?

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Objectives: To construct a nomogram model for predicting non-diagnostic results after CT-guided percutaneous transthoracic needle biopsy (PTNB) of ground-glass opacity (GGO) lesions.

Methods: Patients who underwent PTNB of persistent GGO lesions between November 2017 and February 2021 were selected retrospectively. In the training cohort, predictive factors were determined by univariate and multivariate analyses. Based on these factors, a predictive nomogram model was established. The performance of the model was validated by using a time-based validation cohort.

Results: A total of 323 patients underwent PTNB of GGO lesions in the training (n=256, mean age 64.4 ± 9.1 years, M/F=98/158) and validation (n=67, mean age 64.5 ± 10.0 years, M/F=30/37) cohorts. The overall incidence of non-diagnostic biopsy results was 13.6% (training cohort, n=34; validation cohort, n=10). In the training cohort, multivariate analysis revealed that the solid component (odds ratio [OR]=0.952, 95% confidence interval [95%CI] 0.910–0.996, $p=0.032$), needle tip not within the target (OR=6.149, 95%CI 2.396–15.776, $p<0.001$), and pathological sampling length <4 mm (OR=9.879, 95%CI 4.074–23.956, $p<0.001$) were predictive factors for non-diagnostic biopsy results of GGO lesions. The area under the receiver operating characteristic curve was 0.845 (95%CI 0.780–0.911) in the training and 0.771 (95%CI: 0.604–0.938) in the validation cohort.

Conclusion: The solid component of the GGO lesion, needle tip not within target, and pathological sampling length <4 mm were independent predictive factors for non-diagnostic results of GGO lesions. This predictive model may assist biopsy operators in limiting non-diagnostic biopsy results of GGO lesions.

PO-0890

Left atrial strain assessed with cardiac magnetic resonance feature-tracking to predict left ventricular adverse remodeling following ST-segment elevation myocardial infarction

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Purpose: Cardiac magnetic resonance feature-tracking (CMR-FT) allows quantitative assessment of left atrial (LA) strain, while little is known about the clinical relevance of LA strain in patients with first-time ST-segment elevation myocardial infarction (STEMI). The study aimed to investigate the potential utility of LA strain assessed with CMR-FT to predict left ventricular adverse remodeling (LVAR) after STEMI.

Methods: Patients with first-time STEMI treated by primary percutaneous coronary intervention were consecutively enrolled in the prospective observational study. CMR was obtained at 5 days and 4 months. LVAR was defined as an increase in the LV end-diastolic volume of $> 20\%$ from baseline to 4 months. Logistic regression analyses were performed to identify the predictors of LVAR.

Results: A total of 90 STEMI patients were analyzed, of which 20 developed LVAR at 4 months. At baseline, patients with LVAR showed more severe myocardial injury (infarct size [IS] and

microvascular obstruction), increased LA volume, and reduced LA strain (all $P < 0.05$). Notably, from baseline to 4-month follow-up, significant changes in LA phasic function occurred in non-LVAR group (all $P < 0.05$), not in LVAR group. In multivariate logistic regression analyses, IS, LA reservoir strain and booster strain were independent predictors of LVAR. The combination of IS, LA reservoir strain and booster strain could optimally predict the LVAR with the highest area under the curve of 0.843.

Conclusion: Post-STEMI patients with LVAR had impaired LA strain and displayed less recovery from cardiac function compared with non-LVAR patients. IS, LA reservoir strain and booster strain have predictive value for the development of LVAR within 4 months following STEMI.

PO-0891

Clinical Prognostic Assessment of ischemic heart disease Patients based on Combined Analysis of Infarct Myocardium by CMR and Viable Myocardium by SPECT/PET

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Object: To evaluate the prognostic value of combined assessment of infarct myocardial area by cardiac magnetic resonance imaging (CMR) and viable myocardium by gated ^{99}Tcm -MIBI SPECT and ^{18}F -FDG PET in patients with ischemic heart disease (IHD).

Background: Ischemic heart disease is a cardiovascular condition often accompanied by infarct myocardium and viable myocardium, the extent of which can impact the clinical outcome. While individual studies have investigated the prognostic implications of infarct myocardium or viable myocardium, the combined predictive value of these factors in ICM patients remains less explored.

Methods: Retrospectively included 74 patients with IHD who underwent SPECT, PET, and CMR examinations within 2 weeks at Beijing Anzhen Hospital, from January 2017 to August 2020. The extent of myocardial infarction and viable myocardium was assessed, and patients were grouped accordingly. The primary endpoint was all-cause death. The secondary endpoint is major adverse cardiovascular events (MACEs), defined as cardiovascular death or nonfatal myocardial infarction. Cox univariate and multivariate models were employed to analyze the independent risk factors for all-cause death. Survival analysis of risk factors was conducted using Kaplan-Meier curves and log-rank tests.

Results: Among 74 patients (91.8% male; 56.65 ± 10.02 years), according to the extent of infarct myocardium and viable myocardium, there were 10 cases (13.5%), 17 cases (23.0%), 17 cases (23.0%) and 30 cases (40.5%) in Group A, Group B, Group C and Group D, respectively. During follow-up 30.9 (16.7, 45.7) months, 11 (14.8%) patients died. The survival rates in Group A, Group B, Group C, Group D were 100%, 100%, 100%, 63.3%, respectively, $\log\text{-rank}\chi^2=21.842$, $P<0.001$. 17 (22.9%) patients experienced a MACE. The event rates in Group A, Group B, Group C, Group D were 0%, 5.9%, 17.6%, 43.3%, respectively, $\log\text{-rank}\chi^2=18.044$, $P<0.001$. Multivariate Cox regression analysis showed that combination of infarct myocardium and viable myocardium was the only independent predictor for all-cause death ($\text{HR}=16.926$, 95%CI: 1.379-207.724, $P=0.024$) and MACEs ($\text{HR}=4.096$, 95%CI: 1.876-8.942, $P<0.001$).

Conclusions: Combined assessment of infarct myocardium by CMR and viable myocardium by SPECT and PET could improve the risk stratification in patients with IHD.

PO-0892

The value of a new CT left ventricular functional index in obstructive hypertrophic cardiomyopathy

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Purpose To investigate the feasibility of CT-based feature tracking technology to quantify left ventricular myocardial strain (MS) and its significance in patients with hypertrophic obstructive cardiomyopathy (HOCM). **Materials and Methods** The study was retrospective and included HOCM patients who underwent cardiac coronary angiography (CCTA) from March 2019 to December 2021 at the Department of Radiology, First Affiliated Hospital of the Air Force Military Medical University, in addition to randomizing those who were negative for CCTA among those who visited the hospital with suspected coronary artery disease. Routine cardiac function parameters and MS parameters were quantified separately in the two populations by post-processing software, and differences in cardiac function parameters obtained between the two study groups were analyzed using statistical methods. **Results** Compared to the control group, conventional LV function parameters such as maximum LV wall thickness, LV mass, LV mass index, LV ejection fraction, LV end-diastolic volume and stroke volume were significantly increased in the HOCM group (25.25 ± 7.13 vs 8.68 ± 1.29 、 198.04 ± 101.01 vs 91.62 ± 16.3 、 102.58 ± 47.7 vs 47.15 ± 6.27 、 77.09 ± 8.85 vs 73.83 ± 6.08 、 132.87 ± 33.52 vs 117.77 ± 29.99 、 102.43 ± 29.90 vs 86.19 ± 19.58 , $P < 0.05$), while end-systolic LV volume and cardiac output were not statistically significant between the two groups (30.45 ± 13.69 vs 31.58 ± 13.04 、 6.86 ± 1.93 vs 6.05 ± 2.02 , $P > 0.05$). The global longitudinal and radial strain values were significantly reduced, whereas the global subendocardial circumferential strain values were significantly increased (-44.16 ± 3.98 vs -41.21 ± 6.71 , $P < 0.05$). **Conclusion** The MS parameters quantified by the CT-FT technique are superior to LV ejection fraction in quantifying LV function, with longitudinal strain having the highest sensitivity and specificity for early myocardial function impairment, and the technique is reproducible, promising to be a new index for the assessment of myocardial function in patients with HOCM.

PO-0893

Application of CT Technology in Early Cardiac Function Assessment and Differential Diagnosis: The Crucial Role of Myocardial Strain Parameters in Hypertrophic Cardiomyopathy and Hypertensive Heart Disease

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Abstract:

Objective: Hypertrophic cardiomyopathy (HCM) and hypertensive heart disease (HHD) both involve myocardial hypertrophy. Traditional imaging methods face challenges in distinguishing between these two diseases and are not sensitive enough to detect early cardiac functional impairments. Therefore, this study aims to explore the feasibility of using myocardial strain (MS) parameters obtained through CT technology to assess early left ventricular (LV) and left atrial (LA) function in HCM and HHD and to evaluate their capabilities in differentiating between these two diseases, providing valuable insights for clinical practice.

Materials and Methods: This study included 300 adult subjects with negative results in coronary computed tomography angiography (CCTA) conducted between September 2020 and April 2023

at the Air Force Medical University Xijing Hospital. Participants were categorized into HCM, HHD, and healthy control groups according to specific criteria. Subsequently, post-processing software was utilized to quantify LV and LA morphological characteristics, traditional cardiac functional parameters, and MS parameters in these three groups. Statistical analysis was performed to compare differences between these parameters and their abilities in distinguishing between the two diseases.

Results: In comparison to the HHD group, the HCM group exhibited varying degrees of reduction in absolute MS values of both LV and LA (LVMyoGCS: -22.92 ± 4.29 vs. -20.75 ± 3.75 ; LVEndoGCS: -35.96 ± 7.73 vs. -31.93 ± 7.74 ; LVGRS: 35.96 ± 7.73 vs. 31.93 ± 7.74 ; LAGCS: 28.39 ± 4.51 vs. 21.26 ± 6.83 ; all $p < 0.05$). Notably, longitudinal strain reduction was the most significant (LVMyoGLS: -20.19 ± 2.71 vs. -16.64 ± 2.46 ; LVEndoGLS: -24.28 ± 3.50 vs. -20.75 ± 4.33 ; LAGLS: 32.17 ± 4.75 vs. 23.91 ± 7.27 ; all $p < 0.05$). Multivariate logistic regression analysis demonstrated that the combination model of LVMyoGLS, LAGLS, and LVWT had the largest area under the ROC curve, reaching 0.930 (sensitivity: 88%, specificity: 83%).

Conclusion: The results of this study indicate that MS parameters obtained through CT technology can be used to accurately assess early cardiac functional impairments in both LV and LA in patients with HCM and HHD. Importantly, LA dysfunction may occur before LV impairment, with longitudinal strain damage being particularly evident. The combination model of LVMyoGLS, LAGLS, and LVWT exhibits superior capabilities in differentiating between these two diseases. These findings hold the potential to provide more precise diagnostic and therapeutic guidance in clinical practice.

PO-0894

Application of computer-aided diagnosis for NCCN-based Follow-up Recommendation in subsolid nodules: effect on inter-observer agreement

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Abstract

Background: To assess the impact of Computer-Aided Diagnosis (CAD) on inter-observer agreement in the follow-up management of subsolid nodules.

Methods: A dataset comprising 60 cases of subsolid nodules was constructed based on the National Cancer Center's lung cancer screening data, ensuring a balanced representation of all follow-up management categories. Five observers independently assessed all Low-Dose Computed Tomography (LDCT) scans and assigned follow-up management strategies to each cases based on NCCN guideline, both with manual measurements and CAD assistance. The CAD system presented all nodules larger than 3mm and automatically provided measurements of nodule size, nodule type, and predicted lung cancer risk. Inter-observer agreement was analyzed using the Fleiss kappa statistical method to assess consistency among multiple observers. The linearly weighted Cohen's kappa test was used to measure the consistency between paired observers.

Results: Five observers' agreement for NCCN follow-up management categorization was at a moderate level when measured manually, with Fleiss' kappa = 0.437 (95% confidence interval, 0.388, 0.487). Utilizing CAD assistance led to a notable enhancement in agreement, achieving a substantial consensus with a Fleiss' kappa value of 0.623 (95% CI: 0.573-0.673). the average Cohen kappa value was rising from 0.603(0.489-0.716) to 0.733 (0.673-0.793) for all paired observers. After using CAD, the proportion of major and substantial management discrepancies decreased from 27.5% (165/600) to 15.8% (95/600) and 4.8% (29/600) to 1.5% (9/600), respectively ($p < 0.01$; $p < 0.01$). In 23 cases of lung cancer presenting as part-solid nodules,

CAD significantly reduced substantial management differences (overall sensitivity, 82.6% vs. 92.2%; $p < 0.05$).

Conclusion: The application of CAD significantly improves inter-observer consistency in the follow-up management strategy of subsolid nodules. It also demonstrates the potential to reduce substantial discrepancies in lung cancer cases and elevated the sensitivity in detecting lung cancer cases presenting as part-solid nodules.

PO-0895

Left Atrial Strains in Discriminating Phenocopy Diseases from Hypertrophic Cardiomyopathy: A CMR Study

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Objective

Uncommon inherited phenocopy diseases that mimic the clinical features of hypertrophic cardiomyopathy (HCM) had been increasingly recognized in clinical practice, including most prominently Fabry disease and Danon disease. Thus, this study aimed to investigate the potential clinical value of left atrial (LA) strains derived from cardiac magnetic resonance (CMR) feature tracking to discriminate Fabry cardiomyopathy (FC) and Danon cardiomyopathy (DC) from HCM.

Methods

Forty-two consecutive subjects (15 FC, 12 DC, and 15 HCM) from January 2018 to June 2023 who underwent 3T CMR were retrospectively enrolled. Comprehensive clinical evaluation and imaging investigation were obtained, including measurements of LA reservoir, conduit strain, and booster strain. The intra- and inter-observer reproducibility of the LA strain parameters were assessed in all the groups and compared. ROC curve analysis was performed to determine the diagnostic performances of the strain parameters in discriminability.

Results

The intra- and inter-observer reproducibility of the LA strains were excellent in the 3 groups (range of interclass correlation coefficients: 0.82–0.95). Patients with FC and DC showed a more prominent decrease of LA reservoir, conduit strain, and booster strain in comparison to individuals with HCM ($P < 0.001$ and $P = 0.002$, respectively). However, LA reservoir and booster strain was not significantly different between FC and DC ($P = 0.12$ and 0.25). The LA conduit strain demonstrated an independent and additive value in discriminating FC and DC from HCM. ROC curve analyses showed that the differential diagnostic performances of the LA conduit strain in discriminating FC and DC from HCM were good (AUC = 0.856; 0.914; respectively).

Conclusion

LA strains are promising diagnostic indicators to distinguish phenocopy diseases of FC and DC from HCM with high accuracy. LA conduit strain showed the highest diagnostic accuracy among all the LA strains.

PO-0896

CT, MRI imaging features and misdiagnosis of bronchogenic cyst

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Objective

To explore CT and MRI features and misdiagnostic reason of bronchogenic cyst.

Methods

Clinical and imaging data of 61 patients with pathologically confirmed bronchogenic cysts were retrospectively collected. 61 patients underwent plain CT scans in which 39 underwent contrast-enhanced CT scans. 1 patient received plain MR scans. 10 patients received both plain and contrast-enhanced MR scans.

Results

All the 61 cases were solitary masses. 52 roundish cases and 9 lobulated or irregular were recorded. 26 cases were located in the anterior mediastinum, 2 in the middle mediastinum, 20 in the posterior mediastinum, each 3 in lung, abdominal cavity and adrenal gland, each 1 in thyroid gland, chest wall, neck and stomach. Calcification of cyst wall occurred in 10 cases. On plain CT scans 11 lesions showed water-like density (0~20Hu) and 50 showed soft tissue-like density (21~80Hu). On T1WI, five cases showed slightly hyperintense, 4 showed isointense and 2 showed slightly hypointense. 11 lesions on T2WI showed hyperintense. 6 cases showed hypointense and 5 showed slightly hyperintense on DWI. 11 cases on ADC sequence showed hyperintense. 4 cases without enhancement and 6 with marginal mild enhancement were observed on contrast-enhanced MR scans. 14 were misdiagnosed as thymoma, 8 as neurogenic tumors, 5 as lymphangiomas, each 1 as lung cancer, pulmonary tuberculosis, gastrointestinal stromal tumor, adrenal adenoma and teratoma.

Conclusion

The attenuation values of BC on CT are generally higher than 20Hu, which primarily causes clinical imaging misdiagnosis. The uncertainty of the location of BC remains a challenge of diagnosis for radiologists.

PO-0897

Septal involvement of myocardial fibrosis in fulminant myocarditis survivors after ECMO treatment

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Purpose

To detect the segmental tissue changes of acute myocardial injury with CMR in fulminant myocarditis (FM) survivors after extracorporeal membrane oxygenation (ECMO) treatment by comparing with common virus myocarditis (CVM).

Materials and Methods

In this retrospective single-center study, twenty-four FM survivors after ECMO and 35 CVM who underwent cardiac MRI between June 2018 and January 2023 were enrolled. Global and segmental (AHA model segments 1-16) late gadolinium enhancement (LGE%) of myocardium were assessed. Logistic regression analysis was used to distinguish the difference of tissue characteristics by MRI between two groups. Receiving Operating Characteristics (ROC) and Precision-Recall (PR) analysis were performed to determine the value of segmental LGE to evaluate the myocardial fibrosis features in FM survivors.

Results

The global LGE% was significantly higher in FM survivors compared to that in CVM. In FM survivors, the basal anteroseptal segment (Segment 2) had the highest LGE% among 16 segments and higher extent of LGE% in septal than no-septal segments (24.76% [Inter Quartile Range (IQR), 5.66%-46.02%] vs. 8.36% [IQR, 1.48%-20.16%], $p<0.001$). In the segment 2, the LGE% in FM group was obviously higher than CVM group (42.73% [IQR, 25.72%-60.06%] vs 2.93% [IQR, 0.14%-11.74%], $p<0.001$). Conversely, LGE% showed significantly lower value in FM group in segment 11 (5.59% [IQR, 5.58%-13.59%] vs. 11.79% [IQR, 3.90%-27.03%], $p=0.047$). Among 16 segments, higher LGE% in segments 2 (basal anteroseptal) and 14 (apical septal) were independent values to distinguish the myocardial injury. Combination of segments of 2 and 14 presented the different fibrosis between FM and CVM with AUC of 0.940 by ROC and AUC of 0.924 by PR analysis respectively.

Conclusion

In contrast to the mid inferolateral wall (Segment 11) being most easily involved in patients with CVM, the inter-ventricular septal area is most commonly affected and most severely involved by LGE in FM survivors after ECMO treatment. It reflected the distinguished septal involvement of myocardial fibrosis, which may be a potential cause of higher incidence of malignant arrhythmia in FM patients.

PO-0898

Cardiac MRI for detecting acute myocardial injury of fulminant myocarditis survivals in adults

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Purpose

To detect the acute cardiac changes in FM survivors after ECMO treatment and to demonstrate its significant differences from CVM by CMR. In addition, our study aimed to determine the correlation between CMR tissue characteristics and cardiac biomarkers to provide reference information for clinical practice.

Materials and Methods

This retrospective study enrolled 59 patients with clinically diagnosed AM who underwent CMR from June 2018 to January 2023, including 35 patients with CVM and 24 patients with FM. CMR parameters reflecting myocardial tissue characteristics including native T1, T2 and extracellular volume (ECV) of myocardium were assessed. Percentage of late gadolinium enhancement (LGE%) of myocardium was also taken into final analysis. Statistical analysis included the independent sample t test, Mann-Whitney U test and logistic regression analyses. The correlation of factors with response variables was then fitted into different mathematical models. A two-sided P-value < 0.05 was considered statistically significant.

Results

The values of T1-based imaging parameters were significantly higher in FM group (native T1: 1389.7 ± 114.0 ms vs 1319.3 ± 95.0 ms, $p=0.013$; ECV: $35.6\% \pm 5.5\%$ vs $31.3\% \pm 5.5\%$, $p=0.005$). Also, the burden of LGE was significantly higher in FM group (16.4% [IQR, 12.4%-25.3%] vs 11.0% [IQR, 4.5-14.1%], $p=0.001$). In contrast, no difference was observed among the two groups in terms of T2 value (45.0 ± 5.0 ms for FM vs 44.5 ± 5.3 ms for CVM, $p=0.707$). Furthermore, LGE% provided the best performance for observing the difference of myocardial injury in FM from in CVM (AUC: 0.763). Cubic relationships were relative best fit correlations to evaluate the nonlinear relationships of LGE% against logcTnT ($p=0.001$) and logNT-proBNP ($p=0.005$). By calculating the extreme point, cTnT value between 70 and 300 ng/L indicated a relative stable LGE% of 10.8% and cTnT value exceeding 300ng/L exhibited a rapid upward trend of LGE%.

Conclusion

In summary, our study demonstrated that all global T1 based parameters other than T2 were significantly increased indicating severe fibrosis but similar edema of myocardium in FM when compared with CVM. Furthermore, the LGE percentage was the most important factor for detecting the difference of myocardial injury. In addition, myocardial fibrosis keeps consistent with cTNT between 70-300ng/L and increases rapidly with cTNT exceeding 300ng/L in FM and CVM patients.

PO-0899

Assessing the efficiency of eligibility criteria for low-dose lung screening CT in China according to current guidelines

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Abstract

Objectives: To compare the efficiency of eligibility criteria recommended by four lung cancer screening (LCS) guidelines in the Chinese population.

Materials and methods: Between 2005 and 2022, 31,394 asymptomatic individuals were screened using low-dose computed tomography (LDCT) at the Cancer Hospital of the Chinese Academy of Medical Sciences. Demographic data, relevant lung cancer risk factors, were collected. The efficiency of the LCS for each guideline criteria was expressed as the efficiency ratio (ER). The inclusion rates, lung cancer detection rates, and screening efficiencies based on the different eligibility criteria of the four guidelines were comparatively analyzed. The four guidelines are as follows: CGSL, International Early Lung Cancer Action Program (I-ELCAP), National Comprehensive Cancer Network (NCCN), and US Preventive Services Task Force (USPSTF).

Results: Of 31,394 participants, 298 (155 women, 143 men) were diagnosed with lung cancer. For CGSL, NCCN, USPSTF and I-ELCAP guidelines, the inclusion rates were 19.0%, 9.5%, 9.3%, and 73.0%, respectively, the lung cancer detection rates were 29.2%, 16.4%, 14.8%, and 86.6%, respectively. Among the four guidelines, 73.0% of screening participants met the International Early Lung Cancer Action Program (I-ELCAP) eligibility criteria, but it has the lowest ER of 1.13%. The NCCN eligibility criteria had a maximum ER of 1.64% across the four guidelines; however, only 16.4% of lung cancer participants and 1.0% of women met the eligibility criteria. Males and females significantly differed in eligibility based on the criteria of the four guidelines ($P < 0.001$).

Conclusions: LCS efficiency is unsatisfactory, regardless of whether domestic or foreign guidelines were chosen, especially because a significant number of non-smoking women did not meet the eligibility criteria defined by smoking and age. However, for opportunistic screening, the I-ELCAP guideline recommended LCS eligibility criteria that are more likely to capture high-risk individuals and avoid missed lung cancer diagnoses. Further research is needed to investigate the eligibility criteria of the guidelines for the Chinese population, particularly sex disparities in LCS eligibility.

PO-0900

Predicting MET exon 14 skipping mutation in pulmonary sarcomatoid carcinoma by whole-tumour texture analysis combined with clinical and conventional contrast-enhanced computed tomography features

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Abstract

Objectives: To predict the MET exon 14 (METex14) skipping mutation in pulmonary sarcomatoid carcinoma (PSC) patients by whole-tumour texture analysis combined with clinical and conventional contrast-enhanced computed tomography (CECT) features.

Materials and methods: This retrospective study included 56 patients with PSC diagnosed by pathology. All patients underwent CECT before surgery or other treatment, and both targeted DNA- and RNA-based next-generation sequencing (NGS) were used to detect METex14 skipping mutation status. The patients were divided into two groups: METex14 skipping mutation and nonmutation groups. Overall, 1316 texture features of the whole tumour were extracted. We also collected 12 clinical and 20 conventional CECT features. After dimensionality reduction and selection, predictive models were established by multivariate logistic regression analysis. Models were evaluated using the area under the receiver operating characteristic curve (AUC), and the clinical utility of the model was assessed by decision curve analysis.

Results: METex14 skipping mutation was detected in 17.9% of PSCs. Mutations were found more frequently in those (a) who had smaller long- or short-axis diameters ($P<0.05$); (b) who had had lower T stages (I, II) ($P<0.05$); and (c) with pseudocapsular or annular enhancement ($P<0.05$). The combined model based on the conventional and texture models yielded the best performance in predicting METex14 skipping mutation with the highest AUC (0.89). The conventional and texture models also had good performance (AUC =0.81 conventional; =0.88 texture).

Conclusions: Whole-texture analysis combined with clinical and conventional CECT features may serve as a noninvasive tool to predict the METex14 skipping mutation status in PSC.

PO-0901

Effects of Diabetes Mellitus on Left Ventricular Function and Deformation in Patients with Restrictive Cardiomyopathies: A 3.0T CMR Feature Tracking Study

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BackgroundDiabetes mellitus (DM) is the most common metabolic disease worldwide and a significant risk factor for adverse cardiovascular events. At the same time, the additive effects of DM on left ventricular (LV) deformation in restrictive cardiomyopathy (RCM) cohort remain unclear. Accordingly, we aimed to investigate the additive effects of DM on LV deformation in patients with RCM.

Materials and methods

One hundred thirty-six RCM patients without DM [RCM(DM-)], 46 with DM [RCM (DM+)], and 66 age- and sex-matched control subjects who underwent cardiac magnetic resonance (CMR) scanning were included. LV function, late gadolinium enhancement (LGE) type, and LV global peak strains (including radial, circumferential, and longitudinal directions) were measured. The determinant of reduced LV global myocardial strain for all RCM patients was assessed using

multivariable linear regression analyses. The receiver operating characteristic curve (ROC) was performed to illustrate the relationship between DM and decreased LV deformation.

Results

Compared with normal controls, both RCM (DM -) and RCM(DM+) patients presented increased LV end-diastolic index and end-systolic volume index and decreased LV ejection fraction. LV GPS in all three directions and longitudinal PDSR progressively declined from the controls to the RCM(DM-) group to the RCM(DM+) group (all $p < 0.05$). DM was an independent determinant of impaired LV GPS in the radial, circumferential, and longitudinal directions and longitudinal PDSR ($\beta = -0.217, 0.176, 0.253$, and -0.263 , all $p < 0.05$) in RCM patients. The multiparameter combination including DM showed an AUC of 0.81 (95% CI = 0.75–0.87) to predict decreased LV GLPS and an AUC of 0.69 (95% CI = 0.62–0.76) to predict decreased LV longitudinal PDSR.

Conclusions DM had an additive deleterious effect on LV dysfunction in patients with RCM, especially diastolic dysfunction in RCM patients, indicating the importance of early identification and initiation of treatment of DM in patients with RCM.

PO-0902

Quantitating myocardial fibrosis using extracellular extravascular volume determined from computed tomography myocardial perfusion imaging

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Purpose: To investigate the feasibility of using extracellular extravascular volume (EEV) derived from computed tomography (CT) perfusion imaging (VPCT) and extracellular volume quantification with single-energy subtraction CT (ECV-SECT) for quantifying myocardial fibrosis.

Material and Methods: 17 patients with suspected and known coronary artery disease underwent CT examination. The EEV was derived from dynamic whole-heart myocardial perfusion imaging (EEV-VPCT), and the ECV was calculated from late-enhanced images 5 min after bolus contrast injection by subtracting the non-contrast baseline. The late gadolinium enhancement on cardiac magnetic resonance imaging was used as a reference.

Results: In total, 11 patients and 73 segments exhibited positivity for LGE on CMR imaging. The segments were classified into three groups: fibrotic segments (group I, $n = 73$), nonfibrotic segments in LGE-positive patients (group II, $n = 103$), and segments in LGE-negative patients (group III, $n = 80$). ECV-SECT, EEV-VPCT, myocardial blood flow (MBF), and myocardial blood volume (MBV) significantly differed among groups (all $P < 0.05$). ECV-SECT was significantly higher and EEV-VPCT, MBF, and MBV were significantly lower in fibrotic myocardial segments than in nonfibrotic ones (all $P < 0.01$). ECV-SECT and EEV-VPCT independently affected myocardial fibrosis. The capability of EEV-VPCT to diagnose myocardial fibrosis was equivalent to that of ECV-SECT (area under the curve: 0.798 vs. 0.806, $P = 0.844$). EEV-VPCT of $< 10.3\%$ indicated myocardial fibrosis.

Conclusion: EEV-VPCT is actually first-pass distribution volume that can feasibly be used to quantify myocardial fibrosis. Furthermore, the diagnostic efficacy of EEV-VPCT is comparable to that of ECV-SECT.

PO-0903

Impact of a Novel Whole-Heart Motion-Correction Algorithm on Non-Contrast Cardiac CT Images and Coronary Artery Calcium Scores

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Purpose: To evaluate the impact of a new whole-heart motion-correction algorithm (SnapShot Freeze 2, SSF2) on non-contrast cardiac CT images and the coronary artery calcium scores (CACS).

Materials and Methods: 100 consecutive patients were prospectively included to undergo ECG-gated CT CACS scanning. Images were reconstructed with both standard (STD) algorithm and SSF2. CACS was calculated by a semi-automatic software. Image noise and signal-to-noise ratio (SNR) of the aortic root were measured. Two radiologists co-evaluated the subjective image quality of coronary arteries and calcified plaques using a 5-point scale and 3-point scale, respectively.

Results: CACS of 278 vessels with calcified plaques in 100 patients were calculated. The overall median (range) Agatston score, volume score and mass score of SSF2 were 172.3(307.9), 138(252.9) and 38.3(65.6), respectively, lower than 193.4(342.0), 160.0(284.8) and 39.3(74.4) of STD (all $P < 0.001$). SSF2 provided lower noise (17.4 ± 2.7 VS. 18.5 ± 2.9 HU, $P < 0.001$) and higher SNR (2.90 ± 0.58 VS. 2.70 ± 0.55 , $P < 0.001$) than those of STD. The subjective image quality scores of SSF2 group were significantly higher than that of STD group (all $P < 0.001$).

Conclusion: The new whole-heart motion-correction algorithm improves non-contrast cardiac CT image quality, lowers CACS, and shows a potential for increasing CACS accuracy.

PO-0904

Feasibility and Utility of Dark-blood Images Derived from Dual-Energy Cardiac Computed Tomography on Evaluating the Left Atrial Fibrosis: A Preliminary Study

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Purpose: Left atrial fibrosis (LAF) has been considered an irreversible form of left atrial (LA) wall remodeling, associated with the progression of atrial fibrillation (AF), but non-invasive detection of LAF remains challenging for AF. Our aim is to determine the feasibility of dual-energy cardiac computed tomography (DE-CCT) on quantitative and qualitative evaluation of LAF in patients with AF, using the three-dimensional late gadolinium enhancement cardiac MRI (3D-LGE CMR) as reference.

Materials and Methods: This retrospective study included patients with AF who underwent contemporaneous LA-CMR and DE-CCT between Jan 2022 and March 2023. These scans were performed 30 and 5 minutes after injection of the corresponding contrast agent respectively and the presence of LAF was evaluated in seven LA segments. Regarding DE-CCT, dark-blood images were generated for qualitative evaluation by three-material deposition by replacing the first material (iodine) as the content of a region of interest placed in the LA for each patient. Iodine maps were also generated by postprocessing 'HeartPBV', and the iodine values (Hounsfield Units, HU) for LA-wall was measured and recorded via matching the dark-blood series with better visualization. Two independent radiologists reviewed dark-blood images and 3D-LGE images, and the location and

number of LAF were compared. The P-value of the iodine value difference between LA-wall subgroups were calculated by one-way analysis of variance with Tukey's multiple comparison test.

Results: A total of 36 patients (mean age, 60.86 ± 11.72 years; 24 males) were included, all of whom had at least one segment of LA-CMR enhancement, 17 (47.2%) of which had persistent AF. Using the 3D-LGE segment as the gold standard for LAF, the dark-blood images manifested a moderately matched with sensitivity, specificity, and accuracy of 66.20% (94/142 segments), 100% (110/110 segments), and 80.95% (204/252 segments), respectively. The intraclass correlation coefficient of iodine values measured by radiologists was 0.701, and the iodine values of the abnormal LA wall, normal LA wall, and blood pool indicated a gradually increasing trend (mean iodine values: 30.58 ± 16.15 HU, 72.12 ± 21.51 HU, 87.00 ± 20.02 HU, $P < 0.001$). Moreover, this mismatch between DE-CCT and LA-CMR mainly occurs in the atrial septum and left inferior pulmonary venous sinus, accounting for up to 88.89% (32/36 patients) and 80.56% (29/36 patients) respectively.

Conclusion: DE-CCT may provide a novel potential technique for quantitative and qualitative estimation of left atrial fibrosis in patients with atrial fibrillation.

PO-0905

Investigating the Peri-Saphenous Vein Graft Fat Attenuation Index on Computed Tomography Angiography: Relationship with Progression of Venous Coronary Artery Bypass Graft Disease and Temporal Trends

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Purpose

To clarify the fat attenuation index (FAI) change trend of peri-saphenous vein graft (SVG) and determine the association between FAI and graft disease progression based on CCTA images.

Materials and Methods

Patients with venous coronary artery bypass grafts (CABGs) were consecutively enrolled in this retrospective study. In study 1, 72 patients who had undergone 1, 3, and 5 years of CCTA examinations without graft occlusion were recruited, and generalized estimation equation was used to analyze the peri-SVG FAI change trend over time. In study 2, 42 patients with graft disease progression and 84 patients as controls were propensity score-matched and enrolled. Graft disease progression found at the 3-year follow-up CCTA examination was considered as the endpoint. Generalized linear mixed model, area under curve and continuous net reclassification improvement (NRI) were used for assessing the associations with progression. The FAI of the proximal right coronary artery (pRCA) was also measured.

Results

In study 1, both the FAI of pRCA and SVG decreased over time. In study 2, the 1-year CTA-derived FAI of grafts and graft anastomosis were independent indicators of graft disease progression at the 3-year CCTA follow-up (graft: odds ratio [OR] = 3.116; 95% confidence interval [CI] = 1.264–7.681, $P = 0.014$; graft anastomosis: OR = 4.944, 95% CI = 2.160–11.314, $P < 0.001$). Moreover, inclusion of the graft anastomosis FAI significantly improved reclassification compared with the entire graft FAI (graft anastomosis FAI: continuous NRI = 0.638, 95% CI: 0.345–0.931, $P < 0.001$).

Conclusions

A synchronism was found in the FAI change trend between native coronary artery and venous graft, which both decreased over time. The CCTA-derived FAI of venous grafts showed the potential of

demonstrating SVG disease progression and graft anastomosis served as the optimal measured location.

PO-0906

Development and Validation of a Preoperative Contrast-Enhanced-CT-Based Model to Predict 7 Histologic Types of Solid Pulmonary Tumors

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Background: To develop and validate a contrast-enhanced CT based model for predicting histologic types of solid pulmonary tumors in clinical patients.

Methods: From January 2011 to July 2020, 1224 pathologically confirmed solid pulmonary tumors at two centers. The patients in TMUCIH center were randomly divided into two cohorts (708 development cohort, 304 internal validation cohort). The 212 patients in SHSMU center were set as external validation cohort. Twenty-three clinical and contrast-enhanced CT characteristics were included in multinomial multivariable logistic regression model.

Results: Totally 1224 preoperative patients with a solitary pulmonary solid tumor were collected from two independent institutions in China (median size, 27.0 [IQR, 18.0-38.0] mm; mean age, 57.6 [SD, 9.4] years; man, 59.2%). The mean AUCs of the model for predicting 7 histologic types were 0.95, 0.94, 0.92, and the accuracy of the model for predicting malignant and benign were 0.88, 0.86, 0.89 in the three cohorts, respectively.

Conclusions: Clinical information (age, gender) and contrast-enhanced CT characteristics were important features in multinomial multivariable logistic regression model for classifying histologic types of solid pulmonary tumors.

PO-0907

Contrast-enhanced CT-based radiomics machine-learning classifiers to differentiate Histologic Types of Solid Lung Tumors

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Objective

This study is aimed to develop and validate the best prediction model based on CT radiomics features combined with clinical-radiological signatures for histological classification of solid lung tumors preoperatively.

Methods

A primary dataset of 940 patients from the TMUCIH center was randomly divided into a development cohort and an internal validation cohort. The clinical-radiological signatures and radiomics features were extracted from contrast-enhanced CT images, followed by the dimension reduction of the features. The best radiomics signature was selected and combined with clinical-radiological features to establish a combined model for the classification of 7 histologic types. The AUC curve was used to assess the diagnostic performance of the model in the development and validation cohorts, separately.

Results

Ten clinical-radiological signatures and ten radiomics features were used to construct the multinomial multivariable logistic regression model, which showed different predictive values and were used to generate equations with relative weights for the classification of histologic types. ROC analysis showed that combined model were predictive in histological classification. The mean AUC for histological classification was 0.97 and 0.96 in the development and validation cohort, respectively. When determining the malignancy of tumors based on histologic types, the mean AUC of the model was 0.88 and 0.90, respectively.

Conclusions

We demonstrated that utilizing the combined model constructed by clinical-radiological characteristics and radiomic signatures could not only effectively stratify histologic types of solid lung tumors, but also enabled accurate assessment of tumor malignancy. Such a model has the potential to avoid unnecessary surgery for patients and to guide clinical decision making for preoperative treatment.

PO-0908

A nomogram based on intratumoral and peritumoral radiomics and clinical-radiological features for the preoperative prediction of spread through air spaces in patients with clinical stage IA non-small cell lung cancer: A Multicenter Study

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PURPOSE: To investigate the value of intratumoral and peritumoral radiomics and clinical-radiological features for predicting spread through air spaces (STAS) in patients with clinical stage IA non-small cell lung cancer (NSCLC).

METHODS: A total of 336 NSCLC patients from our hospital were randomly divided into the training cohort (n=236) and the internal validation cohort (n=100) at a ratio of 7:3, and 69 patients from external hospitals were collected as the external validation cohort. Univariate and multivariate analyses were used to screen clinical-radiological features and construct a clinical model. The GTV, PTV5, PTV10, PTV15, PTV20, GPTV5, GPTV10, GPTV15, and GPTV20 models were constructed based on intratumoral and peritumoral (5mm, 10mm, 15mm, 20mm) radiomics features. Additionally, the radscore of the optimal radiomics model and clinical-radiological predictors were used to construct a combined model and plot a nomogram. Lastly, the ROC curve and AUC value were used to evaluate the diagnostic performance of the model.

RESULTS: Tumor density type (OR=6.738) and distal ribbon sign (OR=5.141) were independent risk factors for the occurrence of STAS. The GPTV10 model outperformed the other radiomics models, and its AUC values were 0.887, 0.876, and 0.868 in the three cohorts. The AUC values of the combined model constructed based on GPTV10-Radscore and clinical-radiological predictors were 0.901, 0.875, and 0.878. DeLong test results revealed that the combined model was superior to the clinical model in the three cohorts.

CONCLUSION: The nomogram based on GPTV10-Radscore and clinical-radiological features exhibited high predictive efficiency for STAS status in NSCLC.

PO-0909

Prediction of major adverse cardiovascular events by coronary artery calcification using cancer-screening LDCT in an asymptomatic population

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Objectives To evaluate the potential application of coronary artery calcification (CAC) in identifying individuals at risk of major adverse cardiovascular events (MACE) on the basis of low-dose CT (LDCT) combined with clinical characteristics.

Methods We consecutively enrolled 933 asymptomatic participants who underwent LDCT scans and received the baseline questionnaire. The syngo.via software automatically scored the degree of CAC within the coronary artery. T-test and Mann-Whitney U test were performed to outline the CAC distribution. The association between CAC combined with the questionnaire and the risk of MACE occurrence was evaluated by logistic regression. ROC curves and the DeLong test were used to determine the efficiency of the prediction model.

Results CAC was detected in 361 individuals among the 933 participants, with a higher detection rate in males and the highest frequency in the left anterior descending artery. Most CAC-positive cases had CAC scores ≤ 100 and were detected mainly in a single branch. The positive rate of each branch and the proportion of multi-branch disease increased with risk grades. CAC, diabetes mellitus, and smoking were confirmed as predictive factors for MACE occurrence based on multivariate analysis. The odds ratio (OR) of MACE occurrence was 2.58 and 6.36 when $0 < \text{CAC} \leq 100$ and $\text{CAC} > 100$, respectively. The OR of MACE occurrence was 10.43 for diabetes mellitus and 2.40 for smoking. The AUC value of the logistic regression model (established by CAC, diabetes mellitus, and smoking) for predicting MACE was 0.85, which confirmed a significantly higher efficiency than that of each risk factor alone (AUC was 0.74 for CAC, 0.69 for diabetes mellitus, and 0.72 for smoking, respectively) ($P < 0.01$).

Conclusions CAC is frequently found in screening the asymptomatic population. LDCT-based CAC score combined with clinical covariates could cost-effectively predict the risk of MACE occurrence.

Abbreviations: MACE, major adverse cardiovascular events; CAD, coronary artery disease; CAC, Coronary artery calcification; LDCT, low-dose computed tomography; NCD, non-communicable chronic diseases; CBLAST, the Colorectal, Breast, Lung, Liver, And Stomach cancer Screening Trial; LM, left main artery; LAD, left anterior descending artery; LCX, left circumflex artery; RCA, right coronary artery; CAG, coronary angiography; EAT, epicardial adipose tissue.

PO-0910

Evaluating cardiac injuries in young adults following moderate Omicron infection using cardiovascular magnetic resonance imaging

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Background: After recovering from Omicron infection, some patients reported cardiac discomfort. We utilized cardiovascular magnetic resonance (CMR) imaging to identify the characteristics of cardiac injuries in these individuals.

Method: This prospective study included 38 young adults who recovered from moderate Omicron infection and underwent CMR and laboratory testing during the course of infection. CMR scanning protocols included conventional (cine, late gadolinium enhancement [LGE]) and quantitative mapping (T1 mapping and extracellular volume [ECV]) sequences.

Results: Cardiac function, LGE lesions, native T1, and ECV were quantitatively evaluated and compared with 31 age- and sex-matched controls. The end-diastolic volume (EDV), stroke volume (SV), right ventricular end-diastolic volume (RVEDV), right ventricular end-systolic volume (RVESV) significantly decreased in all participants (all $P < 0.05$). Abnormal LGE findings were observed in 20 patients (52.6%), 42.1% of which were noted in the mid-wall and distributed at the basal septal segments (2, 3) in the short axis view. Global native T1 and ECV were significantly higher in infected patients than in controls (median [interquartile range]: native T1 1,248.9 ms [1,228.5–1,265.5 ms] vs. 1,207.9 ms [1,198.5–1,239.3 ms]; ECV 34.8% [29.0%–39.5%] vs. 30.1% [27.0%–32.5%]; $p = 0.001$ and $p < 0.005$, respectively). Myocardial injury indices were all within normal range.

Conclusions: Despite normal cardiac troponin levels, CMR revealed cardiac injuries following Omicron infection that included impaired cardiac function, focal fibrosis in LGE, and enhancement of T1 and ECV. These findings indicate the need to monitor for myocardial sequelae following Omicron infection.

PO-0911

Predictive value of CT and 18F-FDG PET/CT features on spread through air space in lung adenocarcinoma

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Purpose We retrospectively analyzed preoperative CT and 18F-FDG PET/CT features to predict spread through air space (STAS) in lung adenocarcinoma.

Methods Between February 2022 and April 2023, 100 patients (108 lesions) who underwent surgery for clinical lung adenocarcinoma were enrolled. All these patients underwent 18F-FDG PET/CT, thin-section chest CT scan, and pathological biopsy. Univariate and multivariate logistic regression was used to analyze CT and 18F-FDG PET/CT image characteristics. Receiver operating characteristic (ROC) curve analysis was performed to identify a cut-off value.

Results The subjects consisted of 48 males and 52 females with a mean age of 62.7 years. 60 lesions (55.6%) were positive for STAS, and 48 lesions (44.4%) were negative for STAS. The STAS-positive was frequently observed in acinar predominant, however, STAS-negative was also frequently observed in minimally invasive adenocarcinoma. Univariable analysis results revealed that CT features (including nodule type, maximum tumor diameter, maximum solid component diameter, consolidation tumor ratio, pleural indentation, and lobulation, spiculation) and all 18F-FDG PET/CT image characteristics was statistically significant difference in STAS-positive and STAS-negative lesions. And multivariate logistic regression results showed that the maximum tumor diameter (OR: 2.656; 95%CI: 1.673, 4.218) and SUVmax (OR: 1.348; 95%CI: 1.180, 1.541) were the independent influencing factors of CT and 18F-FDG PET/CT in STAS, respectively. The area under the curve of maximum tumor diameter and SUVmax is 0.68 (95% CI 0.58-0.78) vs. 0.82 (95% CI 0.74-0.90). The cut-off value for maximum tumor diameter and SUVmax are 2.35 vs. 5.05 with a sensitivity of 50.0% vs. 68.3% and specificity of 81.2% vs 87.5%, which showed that SUVmax was superior to the maximum tumor diameter.

Conclusion We found the radiological features of SUVmax to be the best model for predicting STAS. These radiological features could predict STAS with excellent specificity but inferior sensitivity.

PO-0912

A CT-based whole-lung radiomics nomogram in distinction of severity of chronic obstructive pulmonary disease

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Objective: To develop and validate a radiomics nomogram on the basis of clinical and whole-lung computed tomography (CT) radiomics features to stratify chronic obstructive pulmonary disease (COPD) severity. **Methods:** A total of 1099 patients with COPD (including 308, 132, and 659 in the training, internal validation, and external validation sets, respectively), confirmed by pulmonary function test, were enrolled from two institutions. The whole-lung radiomics features were obtained after a fully automated segmentation. Thereafter, a clinical model, radiomics signature, and a radiomics nomogram incorporating radiomics signature as well as independent clinical risk factors were constructed and validated. In addition, receiver-operating characteristic (ROC) curve, area under the ROC curve (AUC), decision curve analysis (DCA), and the DeLong test were used for performance assessment and comparison. **Results:** In comparison with clinical model, both radiomics signature and radiomics nomogram outperformed better on the stratification of COPD severity in the training, internal and external validation set. The AUC of radiomics nomogram integrating age, height and Radscore, was 0.865 (95%CI, 0.818-0.913), 0.851 (95%CI, 0.778-0.923), and 0.781 (95%CI, 0.740-0.823) in the three sets, which was higher than that of radiomics signature (0.857, 95%CI, 0.808-0.906; 0.850, 95%CI, 0.779-0.921; 0.774, 95%CI, 0.731-0.817, respectively) but not significantly different ($P > 0.05$). Decision curve analysis demonstrated the superiority of the radiomics nomogram in terms of clinical usefulness. **Conclusions:** The present work constructed and verified the novel, diagnostic radiomics nomogram for identifying the severity of COPD, showing the added value of chest CT to evaluate not only the pulmonary structure but also the lung function status.

PO-0913

Cardiac magnetic resonance T2 mapping for evaluating myocardial edema in patients with advanced chronic kidney disease

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Purpose

The aim of this study was to assess changes in myocardial edema in patients with advanced chronic kidney disease (CKD) over the course of different disease processes using T2 mapping.

Methods

We prospectively recruited 45 CKD patients who estimated glomerular filtration rate (eGFR) < 59 ml/min/1.73 m². All participants with CMR scans were performed on a 3.0T MRI scanner (Philips Ingenia, Philips Healthcare, Cleveland, Ohio, USA) for the acquisition of myocardial T2 mapping. T2 mapping (Gradient Recalled and Spin Echo sequences) was performed at identical mid short-axis levels. Typical T2 acquisition parameters: ECG triggered, flip angle 90°, voxel size $2 \times 2 \times 10$ mm, slice thickness 10 mm. Motion correction and fitting were performed to estimate coefficients of the decay function, which were then used to estimate T2 times. Commercially available dedicated software CVI42 (version 5.14, Circle Cardiovascular Imaging Inc., Calgary, Canada) was used to analyze the T2 value. We classified CKD as stage 3, stage 4, and stage 5 according to eGFR 30-59 ml/min/1.73m², 15-29 ml/min/1.73m², and < 15 ml/min/1.73m². The Shapiro-Wilk test assessed the normality of the data. Analysis of variance using Kruskal Wallis test.

Results

The T2 values for patients with CKD stages 3-5 were 49.6 ± 4.14 ms; 52.4 ± 3.83 ms; 55.53 ± 5.1 ms, respectively. T2 values were significantly higher in CKD stage 5 than in CKD stage 3 (55.53 ± 5.1 ms vs. 49.6 ± 4.14 ms, $p = 0.002$).

Conclusion

Myocardial T2 time increased with progressive CKD severity, which can help assess the association between the CKD disease process and myocardial edema.

PO-0914

Deep Learning Prediction of Survival in Patients with Heart Failure Using Chest Radiographs

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Objectives : To develop and validate a deep learning survival prediction model using chest radiographs (DLSPCR) in patients with heart failure.

Materials and methods : The study retrospectively enrolled a cohort of 353 patients with heart failure who underwent chest radiographs at our institution between March 2012 and March 2017. The dataset was randomly divided into training ($n=247$) and validation ($n=106$) datasets at a 7:3 ratio. Univariate and multivariate Cox analysis were applied to the training dataset to develop clinical and imaging survival prediction models. The DLSPCR algorithm was trained and the selected clinical parameters were incorporated into DLSPCR (DLSPinteg). Discrimination performance was evaluated by using the time-dependent area under the receiver operating characteristic curves (TD AUC) at 1, 3, and 5-year survival. Goodness of fit was assessed using the Hosmer-Lem show test.

Results : Older age, higher N-terminal pro-B-type natriuretic peptide (NT-ProBNP), systolic pulmonary artery pressure (sPAP) >50 mmHg, New York Heart Association functional class (NYHA) III-IV, no hypertension, and cardiothoracic ratio (CTR) ≥ 0.62 predicted poor prognosis in patients with heart failure. DLSPCR had better performance at predicting 5-year survival than the imaging Cox model in the validation cohort (AUC: 0.757 vs 0.561, $P=0.01$). DLSPinteg outperformed the clinical Cox model (AUC: 0.818 vs 0.674, $P=0.03$) and imaging Cox model (0.818 vs 0.561, $P<0.001$). Moreover, DLSPinteg was slightly higher than DLSPCR (0.818 vs 0.757, $P=0.06$), although the difference was not statistically significant.

Conclusions : Deep learning models using chest radiographs can predict survival in patients with heart failure with acceptable accuracy.

PO-0915

Imaging and pathology of resected pneumonic-type lung adenocarcinoma: A comparative study

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Objective: To analyze the CT and pathological characteristics of surgically resected pneumonic-type adenocarcinoma (P-ADC), and to explore the corresponding histopathological basis of CT findings of P-ADC.

Methods: From January 2015 to October 2022, the clinical, imaging and pathological data of pneumonic-type adenocarcinoma on CT who underwent surgical resection were analyzed. The CT findings of P-ADC were correlated with pathology. Chi-square test or Fisher exact probability method were used to compare the clinical, imaging and pathological data. **Results:** A total of 62 patients with p-ADC were included, including pure mucinous adenocarcinoma (33 cases), mixed mucinous adenocarcinoma (20 cases), non-mucinous adenocarcinoma (9 cases). The main CT features were consolidation + ground glass opacity (44 cases), consolidation (17 cases), and pure ground glass (1 case). Associated abnormalities: nodule (9 cases), air bronchial sign (52 cases), cystic airspace (30 cases), crazy-paving sign (16 cases), thickened intralobular septum (22 cases), thickened interlobular septum (3 cases), and lymph node metastasis in 8 patients were included. The thickened interlobular septum ($\chi^2=13.813$, $P < 0.001$) was statistically significant in P-ADC patients with ground glass, when nodules appeared on CT, there was a statistically significant difference between the three groups of mucinous adenocarcinoma, mixed mucinous adenocarcinoma and non-mucinous adenocarcinoma ($\chi^2=10.604$, $P=0.003$), and there was a statistically significant difference between the two groups of mucinous adenocarcinoma and non-mucinous adenocarcinoma ($\chi^2=7.312$, $P=0.013$). Nodules were found in 6 of the 19 patients with micropapillary components, and the difference was statistically significant compared with other pathological types ($\chi^2=10.334$, $P=0.008$). The difference was statistically significant when the proportion of ground glass density in P-ADC patients with papillary components was more than 50% (8 cases) ($\chi^2=7.838$, $P=0.017$). **Conclusion** The pathological types of P-ADC can be mucinous or non-mucinous, which mainly contain papillary or micropapillary subtypes and spread through airspace.

PO-0916

Coronary artery calcium score combined with sleep quality predicts major adverse cardiovascular events: The Multi-Ethnic Study of Atherosclerosis

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Background: Both coronary artery calcium score (CACS) and sleep quality have predictive value for major adverse cardiovascular events (MACEs). However, the predictive value of radiographic measures, including the coronary artery calcium score (CACS), and sleep quality is unclear.

Objective: This study aimed to compare the predictive value of imaging factors and sleep quality for MACEs.

Methods: In The Multi-Ethnic Study of Atherosclerosis (MESA), 978 participants without cardiovascular disease completed coronary computed tomography (CT) and cardiac magnetic resonance imaging (CMR) between 2010 and 2013, along with 7 days of wrist actigraphy and one night of polysomnography for sleep assessment, and were prospectively followed up in 2016. MACEs included nonfatal and fatal cardiovascular events. Univariate and multivariate Cox regression were used to analyze traditional cardiovascular risk factors, imaging parameters, and sleep-related factors to evaluate risk factors for MACEs. The predictive values of imaging factors and sleep factors were compared.

Results: A total of 978 patients (mean age 67.4 ± 8.8 years; 978 persons). During a mean follow-up of 4.8 ± 0.8 years, MACEs occurred in 46 patients (4.7%). CACS > 400 (HR: 8.531, $P < 0.001$), sleep efficiency (HR: 0.972, $P < 0.004$), SaO₂ (HR: 1.025, $P=0.007$) 1.025(1.007-1.044) were independent predictors of MACEs. Imaging parameters combined with sleep factor had predictive value for MACEs, and imaging factors (C-index: 0.804) had incremental predictive value for MACEs. **Conclusions:** Calcium score, sleep efficiency, and nocturnal oxygen saturation $< 90\%$ were predictors of MACEs, but only imaging factors had increasing prognostic value. Compared with

sleep factors, imaging evidence, especially CACS, has more predictive value in predicting the risk of MACEs.

PO-0917

To evaluate the application value of combining low energy images in dual-energy spectral CT with a new adaptive statistical iterative reconstruction (ASIR-V) to improve the image quality of bronchial arteries.

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PURPOSE : To evaluate the application value of combining low energy images in dual-energy spectral CT with a new adaptive statistical iterative reconstruction (ASIR-V) to improve the image quality of bronchial arteries.

METHOD AND MATERIALS: We retrospectively analyzed patient images in contrast-enhanced CT scans using dual-energy spectral imaging mode. The monochromatic images in the 40-70 keV energy range (every 10keV) and reconstructed with the combination of ASIR-V with weightings of 40%, 60% and 80% were analyzed. A circular region-of-interest (ROI) with 2.8 mm² was placed at the center of bronchial artery, and on the vertical muscle as background to measure CT value and standard deviation and to calculate signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) for the artery, set as group B, group A as the control group (system default 120Kvp-like single energy group) of labyrinthine artery for objective evaluation. Two radiologists Use 5 points also evaluated the subjective score in terms of the sharpness and clarity of displaying bronchial arteries and their branches. The data collected were analyzed statistically and subjective scores were checked for consistency.

RESULTS: With the decrease of single energy, the CT value and noise of the bronchial arteries increased. Joint ASIR-V effectively reduced the image noise and increased the CNR and SNR group weights. 80% ASIR-V combined with 40keV BA (CT: 1385.75±317.79; CNR: 145.51±111.9; SNR: 43.76±34.97) was superior to 120Kvp-like combined with 40% ASIR-V BA (CT: 416.55±91.285; CNR: 43.93±27.79; SNR: 28.14±19.28), P-value <0.05; Subjective image quality reached a maximum at 40 keV, 50 keV combined with 80% ASIR-V binding.

CONCLUSION: The 40keV dual-energy spectroscopy combined with 80% ASIR-V monochromatic images on subjective and objective scores increases the contrast between the bronchial arteries and the surrounding tissue to optimize the image quality of the bronchial arteries.

CLINICAL RELEVANCE/APPLICATION: The 40keV dual-energy spectroscopy combined with 80% ASIR-V monochromatic images can show the length, number, origin, branching, shape, diameter and wall condition of the bronchial artery. The clinical treatment of various lung diseases and the evaluation of their efficacy provide helpful help.

PO-0918

CT-FFR versus Aortic valve Calcification Scores: Prediction of Clinical Outcomes after Transcatheter Aortic Valve Replacement

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BACKGROUND: CT angiography-derived fractional flow reserve (CT-FFR) and aortic valve calcification scores (AVCS) had prognostic values for clinical outcomes after transcatheter aortic valve replacement (TAVR) in patients with aortic valve diseases. However, the superior prognostic value between CT-FFR and AVCS remains unclear.

OBJECTIVES: This study was to compare prognostic values of CT-FFR and AVCS for major adverse cardiac events (MACE) (nonfatal myocardial infarction, unstable angina, cardiac death, or heart failure admission) after TAVR.

METHODS: Consecutive symptomatic patients with severe aortic valve diseases undergoing coronary CT before TAVR were retrospectively enrolled. The clinical factors, CT-FFR and AVCS were used to evaluate risk factors for MACE by using univariable and multivariable Cox regression analysis. The prognostic value of CT-FFR compared with AVCS was also analyzed.

RESULTS: A total of 251 patients were enrolled (mean age, 67 ± 10 years; 176 men). During a mean follow-up of 36.8 ± 14.8 months, 60 patients (23.90%) experience MACE. $AVCS \geq 2000$ (HR: 1.836, $P < 0.05$) and $CT-FFR \leq 0.8$ (HR: 2.504, $P < 0.05$) were independent predictors of MACE. The risk of MACE was significantly increased when presented $CT-FFR \leq 0.8$ and $AVCS \geq 2000$. CT-FFR (C-index: 0.685) but not AVCS (C-index: 0.658, $P = 0.031$) showed incremental prediction value for MACE.

CONCLUSIONS: CT-FFR and AVCS were predictors of MACE after TAVR, but only CT-FFR presented incremental prognostic value. Adding CT-FFR into the risk prediction of patients undergoing TAVR is worth consideration.

PO-0919

Thoracic First-Pass Perfusion Imaging for Detecting Emboli in Acute Pulmonary Embolism with Varying Risk Stratification: A Retrospective Analysis Using Detector- Based Functional CT

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Objective This study aims to explore the performance of detector-based functional CT imaging to evaluate the degree of pulmonary perfusion defect in clinical risk stratification.

Methods This study retrospectively included 50 patients diagnosed as pulmonary embolism from February 2023 to April 2023. Multi-parameter functional CT was used for pulmonary angiography (CTPA). According to the simplified clinical risk stratification score of pulmonary embolisms, the patients were divided into low risk group (28 cases) and medium risk group (22 cases). The thoracic first-pass perfusion images were post-processed by utilizing iodine density (ID), effective atomic number (Zeff) and ID-Zeff fusion images (ID-Zeff), respectively. The Mastora score was used to evaluate the area of low perfusion areas in each group, and receiver operating characteristic (ROC) curves were plotted for each group. Area under curve (AUC) were calculated to compare the

diagnostic efficacy of each group in evaluating the risk stratification (medium or low) of risk acute pulmonary embolism.

Results Among the 50 patients, the Mastora scores of each group were: ID maps (low risk group 14 ± 5.2 , medium group 22 ± 4.5), Zeff maps (low risk group 16.5 ± 4.8 , medium group 24 ± 5.2). ID-Zeff maps (18.5 ± 4.8 in the low-risk group and 26 ± 5.8 in the medium group). Compared to the CI images (AUC 0.78, sensitivity 76%, specificity 82%), ID maps (AUC 0.86, sensitivity 86%, specificity 88.5%), the Zeff maps (AUC 0.882, sensitivity 89%, specificity 89%), and the ID-Zeff maps (AUC 0.905, sensitivity 89%, specificity 91%) has the highest predictive capabilities in low- to medium- risk patients with acute pulmonary embolism.

Conclusions The thoracic first-pass perfusion generated by ID-Zeff fusion images based on multi-parameter functional CT may improve the prediction capabilities in different risk patients with acute pulmonary embolism. This provides additional imaging evidence for risk stratification and short-term prognosis assessment of patients with acute pulmonary embolism.

PO-0920

Myocardial injury has occurred in HCM patients with preserved ejection fraction

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Objective:

Cardiotoxicity caused by smoking is associated with increased risk of heart failure and death. However, the relationship between smoking and left ventricular injury in patients with HCM (Hypertrophic Cardiomyopathy) is unclear. Therefore, this study hypothesized that smoking would exacerbate myocardial strain injury in patients with HCM.

Methods:

A total of 89 HCM patients with preserved ejection fraction and 37 healthy controls, who underwent CMR (Cardiac Magnetic Resonance) between January 2021 and March 2023, were included in the study. The HCM patients were divided into the smoking cohort (HCM-Smoking (+), n=30) and the non-smoking cohort (HCM-Smoking (-), n=59). CMR left ventricular strain parameters (including GLS (global longitudinal strain), GCS (global circumferential strain), GRS (global radial strain)) were calculated and comparisons between multiple groups were performed using analysis of variance (ANOVA).

Results:

HCM patients had significantly lower parameters in left ventricular GRS [(27.81 ± 9.65) vs (39.55 ± 7.60)] and GLS [(-10.93 ± 3.28) vs (-14.81 ± 2.61)] ($P < 0.05$) than healthy controls. Then, compared to the non-smoking group, the smoking group had lower parameters in left ventricular GRS [(23.76 ± 6.05) vs (29.87 ± 10.50)] and GLS [(-9.89 ± 3.51) vs (-11.46 ± 3.05)] despite normal LVEF ($P < 0.05$).

Conclusion:

Smoking produces myocardial strain injury in HCM patients with preserved ejection fraction, especially in GRS and GLS. This observation provides the evidence of heart damage caused by cigarette smoking.

PO-0921

Right Ventricular Myocardial Deformation Assessment by Magnetic Resonance-Feature Tracking in Takayasu's Arteritis-Pulmonary Artery Involved Patients Without Pulmonary Hypertension

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Objective: Pulmonary artery involved (PAI) is a subtype of Takayasu arteritis (TA). Persistently elevated pulmonary arterial pressure in TA-PAI patients leads to pulmonary hypertension (PH), and eventually cardiac death. Thus, the early detection of right ventricular myocardial injury before the onset of PH is crucial but remains a major challenge in clinical practice. Therefore, the current study aimed to explore the potential of right ventricular global peak longitudinal and circumferential strain (RVGLS and RVGCS, respectively) in detecting right ventricular myocardial damage in TA-PAI patients without PH.

Methods: The retrospective study enrolled a total of 103 TA patients, of whom 51 were TA non-PAI patients and 52 were TA-PAI patients (34 without PH and 18 with PH). We also included 58 sex- and age-matched healthy volunteers (HVs). Magnetic resonance (MR)-feature tracking derived deformation indices from steady-state free precession rest cine at 3.0 T, including the RVGLS, RVGCS and global strain rate, were measured.

Student's t test, intra- and inter-observer variabilities, one-way ANOVA followed by Games-Howell post hoc method, Pearson correlation analysis, and univariable and multivariable linear regression analysis were performed properly.

Results: Compared with the healthy volunteers, the TA-PAI patients had similar RVGCS but impaired RVGLS. Although the TA-PAI patients without PH had a similar RV ejection fraction (RVEF) with HV (non-PH $45.1 \pm 5.3\%$ vs. HV $44.5 \pm 3.5\%$, $p = 0.799$), RVGLS (non-PH $19.6 \pm 1.9\%$ vs. HV $25.6 \pm 3.1\%$, $p < 0.001$) was significantly decreased and RVGCS (non-PH $14.8 \pm 2.5\%$ vs. HV $13.0 \pm 2.6\%$, $p = 0.004$) increased. The TA-PAI patients with PH had significantly poorer RVGLS (PH $14.8 \pm 3.4\%$ vs. non-PH $19.6 \pm 1.9\%$, $p < 0.001$) and RVGCS (PH $10.0 \pm 2.4\%$ vs. non-PH $14.8 \pm 2.5\%$, $p < 0.001$) than did those without PH.

Conclusions: Right ventricular myocardial injury was detected in the TA-PAI patients without PH. MR-feature tracking may be an effective method for detecting early cardiac damage in the TA-PAI patients without PH.

PO-0922

Differentiation of mass-like thymic hyperplasia from thymic tumors using MR quantitative fat fraction technique in adulthood

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Purpose: To evaluate the efficacy of MRI proton density fat fraction (MRI-PDFF) for distinguishing mass-like thymic hyperplasia from low-risk thymomas and thymic lymphomas in adulthood.

Materials and Methods: Seventy-one subjects with thymic hyperplasia or thymic tumors underwent conventional thorax MRI and IDEAL-IQ (iterative decomposition of water and fat with echo asymmetry and least-squares estimation quantization) sequence at our institution before biopsy or surgery. Mean fat fraction (FF) values were measured and compared for the differences among thymic hyperplasia, low-risk thymomas, and thymic lymphomas groups using one-way ANOVA, and further post hoc multiple comparisons were performed with the Bonferroni test (equal variances

assumed) and Dunnett's T3 test (equal variances not assumed). Receiver operating characteristic (ROC) curve analysis was used to distinguish thymic hyperplasia from thymic epithelial tumors and thymic lymphoma, and compared the AUCs of the two methods using the Delong test.

Results: The study group consisted of 22 men and 49 women with a mean age of 39.68 ± 15.72 years (range, 18–78 years), including 30 cases of mass-like thymic hyperplasia, 28 cases of low-risk thymomas, and 13 cases of thymic lymphomas. The FFhotspot in patients with mass-like thymic hyperplasia is significantly higher than that in patients with low-risk thymomas and thymic lymphomas (26.41 (15.66-37.66) % vs. 1.78 (1.06-2.67) % vs. 1.93 (1.35-2.30) %, $p < 0.001$). The FFtotal in patients with thymic hyperplasia is significantly higher than that in patients with low-risk thymomas and thymic lymphomas (27.67 (14.19-37.67) % vs. 2.21 (1.37-3.11) % vs. 2.44 (1.85-4.57) %, $p < 0.001$). However, there was no significant difference in FFhotspot ($P=0.830$) or FFtotal ($P=0.832$) between low-risk thymomas and thymic

lymphomas. ROC curve analysis showed that FFhotspot had an AUC of 0.998 ($P<0.001$), with a cutoff of $\leq 9.51\%$ fat fraction yielding 100% sensitivity and 95.10% specificity, and FFtotal had an AUC of 0.994 ($P<0.001$), with a cutoff of $\leq 9.42\%$ fat fraction yielding 96.70% sensitivity and 97.60% specificity. There was no significant difference between two methods to distinguish thymic hyperplasia from thymic tumor with AUC ($P < 0.001$).

Conclusions: MRI-PDFF technique provide accurate fat quantitative parameters and can be used to differentiate mass-like thymic hyperplasia from low-risk thymomas and thymic lymphomas.

PO-0923

Dynamic changes in aortic dimension during the cardiac cycle analyzed by ECG gated computed tomography

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Purpose: To characterize the difference in aortic dimensions between systole and diastole phases with ECG-gated computed tomography angiography (CTA), and to determine whether other parameters such as area or perimeter in comparison to diameter could potentially provide more accurate size reference for stent selection.

Methods: The ECG-gated CTA imaging of 90 patients during the cardiac cycle were reviewed. We measured the maximum diameter, the minimum diameter, the lumen area, the lumen perimeter, and the diameter derived from the lumen area at three anatomical locations (level A: 1 cm proximal to the innominate artery; Level B: 1 cm distal to the left common carotid artery; Level C: 1 cm distal to the left subclavian artery). The changes of each parameter between systole and diastole phases at each level were compared.

Results: The mean age of the patients was 60.9 ± 12.4 years. There was a considerable difference in the aortic dimensions of each measurement parameter between the systolic and diastolic phases ($P < .001$). The maximum aortic diameter in the diastole phase is greater than that in the systole phase in 2.2%-7.8% of patients at the three levels. The maximum changes between the cardiac cycle in the maximum aortic diameter, minimum aortic diameter, area, perimeter and diameter derived from lumen area at the three locations were as follows: level A (18.8%, 16.2%, 8.1%, 3.8%, 4.4%), level B (6.4%, 14.6%, 7.3%, 8.4%, 7.7%), level C (4.9%, 7.1%, 8.4%, 6.8%, 6.0%). The mean change in percentage is the smallest in the diameter derived from lumen area at all the three levels compared to the area, perimeter, and the maximum aortic diameter (1.4% vs 2.6% vs 1.5% vs 1.9 at level A, $P < .01$; 1.4% vs 2.6% vs 1.7% vs 1.8% at level B, $P < .01$; 1.6% vs 3.5% vs 1.9% vs 1.7 at level C, $P < .01$).

Conclusion: The aortic dimensions change during the cardiac cycle are significant. The aortic diameter based on the lumen area over other measurement parameters may provide a better evaluation for selecting the size of the stent.

PO-0924

Feasibility study of free breathing ultrashort echo time for lung MRI at 1.5T

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***Purpose:**

To investigate the clinical feasibility of free breathing ultrashort echo time (Spiral-UTE) lung MRI compared to routine enhanced-volumetric interpolated breath-hold examination (VIBE) for follow-up patients at 1.5T.

***Methods and Materials:**

This study was approved by local ethics committee, and all subjects provided written informed consent. A total of 17 oncology patients completed MRI and CT with a maximum of 7 days between the two studies. Gd-DOTA enhanced and unenhanced spiral-UTE sequence during free-breathing (research application) and enhanced VIBE sequence during breath-holding were scanned at 1.5T for lung follow-ups. Enhanced spiral-UTE was scanned 3~4 minutes after contrast injection following the completion of routine clinical examination. Two experienced radiologists evaluated image quality in consensus with a 5-point scale (4, excellent; 0, poor) regarding CT as the reference standard. Quantitative comparison of image quality was performed using SNR and CNR.

***Results:**

Spiral-UTE outperformed VIBE with a statistically significant difference ($p < 0.05$). Notably, there was no statistical difference in vessel visualization between unenhanced and enhanced spiral-UTE. Enhanced spiral-UTE was found to be the best for depicting pulmonary vessels, outperforming unenhanced spiral-UTE and enhanced VIBE. Regarding apparent SNR and CNR, there were significant difference among enhanced and unenhanced UTE and VIBE ($p < 0.001$). Enhanced spiral-UTE provided the best SNR, while spiral-UTE obtained the highest CNR, with no statistical difference between enhanced and unenhanced spiral-UTE methods ($p = 0.498$).

***Conclusions:**

Spiral-UTE provides a free-breathing technique with superior image quality compared to routine enhanced-VIBE with high quality visualization of the pulmonary anatomy.

PO-0925

Predicting lymph node metastasis in non-small cell lung cancer based on peritumoral radiomics model

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Purpose: To investigate the incremental value of predicting lymph node metastasis in non-small cell lung cancer (NSCLC) lung cancer based on peritumoral volume (PTV) radiomics model.

Materials and methods: A retrospective analysis of 167 patients who underwent CT thin-section scans within 2 weeks before surgery and had pathologically confirmed purely solid nodular or mass-like NSCLC from April 2012 to May 2022 and were randomized in a 7:3 ratio into training and test data sets. Two regions of interest (ROI) of 3 mm PTV and gross tumor volume (GTV) were outlined for 167 lesions in 167 cancer patients using 3D Slicer (version 5.0.3) under a lung window (window

width, 1500 HU; window level, -500 HU) of non-enhanced computed tomography (NCECT). The voxel size was adjusted to 1mm×1mm×1mm, and the original images were resampled. The Radiomics software package that comes with the software was used to extract radiomics features, and intra-group and inter-group correlation coefficient assessment (ICC), correlation analysis, gradient boosting decision tree (GBDT) and logistic regression were used for radiomics feature screening and construction of PTV and GTV radiomics models.

Results: Radiomics model created by 3mm PTV (training: AUC = 0.651; test: AUC = 0.607) has better diagnostic performance than radiomics model of GTV (training: AUC = 0.630; test: AUC = 0.596).

DISCUSSION: This study shows that the radiomics model of 3mm PTV in NCECT is better to the GTV radiomics model in predicting lymph node metastasis in patients with pure solid nodules or mass-like NSCLC. In NSCLC, it is critical to determine preoperatively whether lymph node metastasis is present or not, which determines the surgical approach and subsequent clinical treatment decisions. There are related studies claiming that the peritumor microenvironment provides value for clinical assessment of the aggressive biological behavior of tumors, and there are also studies showing that PTV radiomics can improve the classification of adenocarcinomas and benign granulomas on CT images. Our study also confirms this idea that the diagnostic efficacy of a 3mm PTV radiomics model is superior to that of a GTV radiomics model, and therefore preoperative diagnostic aid for NSCLC lymph node metastasis by PTV radiomics.

PO-0926

Factors associated with underestimation of left ventricular strain obtained from single-shot compressed sensing cine imaging using cardiac magnetic resonance

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Purpose: Left ventricular (LV) global strain values from compressed sensing (CS) cine imaging of cardiovascular magnetic resonance (CMR) are significantly underestimated compared with those from conventional segmented cine imaging (regarded as gold standard). This study aimed at exploring the associated factors of underestimation of LV strain from CS cine CMR.

Methods: Patients underwent echocardiography and 3T CMR using single-shot CS cine and a standard segmented cine. The patients were divided into different groups in terms of wall thickness (thinned <6mm, normal 8-12mm and thickened >15mm) and ejection fraction (EF) using echocardiography. We calculated the absolute and relative differences in LV global peak strains (GPSs) between CS and segmented cines, and assessed the associated factors of reduced GPSs on CS cine.

Results: Among 62 patients (mean age, 50±16 years; heart rate, 71±13 beats/min), 19 had normal wall thickness, 22 had thinned myocardium, 21 had thickened myocardium. LV systolic dysfunction (EF <50%) was found in 31 patients. Absolute differences of LV GPSs between two cines were significantly different among wall thickness groups and EF groups (all P <0.05), while relative differences in GPSs were not related to LV wall thickness or EF. In stepwise multivariable analysis, EF and heart rate remained associated with absolute decline in GPSs from CS cine (adjusted β -coefficient: from 0.262 to 0.503, P<0.05), however, only heart rate was connected with relative underestimation in global circumferential and longitudinal strains from CS cine (circumferential: β = 0.302, P = 0.017 and longitudinal β = 0.322, P=0.011). Increasing EF and heart rate augment underestimation in GPSs on CS cine as compared with GPSs on segmented cine.

Conclusion: Absolute reduced GPSs from CS cine are associated with EF and heart rate, and only heart rate is connected with relative decline in GPSs which is easier to correct the model.

PO-0927

CTPA in the assessment of right heart dysfunction and adverse prognosis in pulmonary embolism.

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Background and purpose

CTPA is the non-invasive gold standard test for diagnosing PE which is widely used in clinical practice. This study is dedicated to exploring the application value of CTPA parameters in PE patients with RVD and adverse prognoses. Combined with clinical indicators, a prognostic model was constructed to provide valuable prognostic information while making a qualitative diagnosis.

Methods

The 172 patients diagnosed with PE were enrolled, including 77 and 95 in the RVD and non-RVD groups, respectively; 60 and 112 in the SAEs and control groups, respectively, within 30 days of occurrence. Univariate and multivariate regression analyses were performed, respectively. Build prediction models, and compare and evaluate prediction effectiveness.

Results

Model 1, which includes RV/LV>1 ($P=0.031$), PAD>29mm ($P=0.053$), NT-Pro BNP>971pg/ml ($P<0.001$), to predict the occurrence of RVD in PE patients. The sensitivity and specificity were 94.81% and 74.74% respectively (AUC=0.890, 95% CI: 0.834-0.933); model 2, including four factors which of RV/LV>1 ($P<0.001$), NT-Pro BNP>1443pg/ml ($P=0.001$) and sPESI>1' ($P=0.006$), to predict the occurrence of SAEs. The sensitivity and specificity were 86.00% and 75.00% respectively (AUC=0.830, 95% CI: 0.765-0.883).

Conclusions

Model 1 and Model 2 have significant clinical significance in predicting RVD within 48h and SAEs in PE patients within 30 days.

PO-0928

Baseline chest CT based radiomics to predict short-term growth of incidental pulmonary nodules: a multicenter study: a multicenter study

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Purpose: Chest low-dose CT (LDCT) screening has proven its utility in the early detection and reduction of the mortality risk of lung cancer, and the short-term follow-up CT decides further management of pulmonary nodules. This study aims to develop and externally-validate a baseline CT-based radiomics signature and compare its performance with clinical-radiological features for predicting the short-term growth of incidental pulmonary nodules.

Materials and Methods: This retrospective study consecutively included 460 (growing: 60; non-growing: 400) PNs from three centers (training, $n = 272$, test1, $n = 92$, and test2, $n = 96$). A 30% increase in mass (volume \times CT-value) on short-term follow-up CT was used as the ground-truth (growth). Radiomic features were extracted from semi-automated contours on baseline CTs. Balanced sub-cohorts were created over 100 iterations for feature selection by random undersampling, and random oversampling was used for modeling. The performance of the logistic-regression model was evaluated using the area under the receiver-operating-characteristic curve (AUC), confusion matrix, calibration, and decision curve analysis (DCA).

Results: A radiomics signature based on 'glszm_ZoneEntropy' and 'shape_Sphericity' yields an AUC of 0.95 (95% confidence interval: 0.87, 1.00) in test1 and 0.89 (0.83, 0.96) in test2. The

prediction of the radiomics signature was significantly different with diameter ($p = .014$ and $p < .001$) and volume ($p = .003$ and $p < .001$) on the test1 and test2 datasets, while no significant differences with mass on two datasets ($p = .109$ and $p = .108$). DCA showed radiomics had higher clinical benefit on the threshold range (0.01 to 0.92) than using diameter, volume, and mass alone.

Conclusion: We indicate that the mass has better predictive performance than the diameter and volume for predicting the short-term growth of the pulmonary nodules. Furthermore, our radiomic signature outperformed than the diameter, volume, and mass and provided more clinical-benefits for patients with incidental pulmonary nodules.

PO-0929

Combined anatomical MRI differentiates pulmonary invasive adenocarcinoma from tuberculoma in noncalcified nodule: a retrospective comparison of CT with MRI

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Purpose: Magnetic resonance imaging (MRI), as a non-ionizing modality, can be a complementary tool for nodules assessment. This study is aimed to evaluate the potential of the combined conventional and modified anatomical MRI sequences for differential diagnosis of invasive adenocarcinoma (IAC) and tuberculoma.

Materials and methods: Sixty-seven patients (median 54 years, range 18-82 years) with 82 noncalcified nodules (mean 19.56 ± 6.85 mm, range 7-30 mm) underwent non-contrast enhanced CT and MRI (T1WI-starVIBE, T1WI-VIBE, T2WI-TSE-fBLADE). Two radiologists independently assessed nodule dimensions and morphologic features (including margin, morphology, lobulation, spiculation, cavity, air bronchogram, pleural indentation). Comparison of categorical variables was performed using Chi-square test. The inter-method agreement of morphologic features assessment by CT and MRI sequences were compared using Kappa test. Multivariate logistic regression analyses were applied to identify independent predictors to IAC. ROC analysis was performed to investigate the differential diagnosis capability. The AUC values for the models conducted by CT and MRI were compared using ROC curve analysis.

Results: A total of 38 IACs and 44 tuberculomas were identified. Readers 1 and 2 underestimated the nodules mean diameter with T1WI-starVIBE (T1WI-VIBE, T2WI-TSE-fBLADE) by 0.86 ± 1.71 mm (1.19 ± 2.06 mm, 0.15 ± 1.96 mm) and 0.99 ± 1.75 mm (1.27 ± 2.04 mm, 0.19 ± 1.91 mm). The inter-method agreements between MRI and CT were "fair" to "excellent" in the evaluation of morphological features except for spiculation ($0.318 \leq \text{Kappa} \leq 0.895$). Compared with the tuberculoma group, the IAC group was significant with unclear margin (T1WI-starVIBE and T1WI-VIBE), irregular morphology (CT and MRI), lobulation (CT and MRI), spiculation (T1WI-starVIBE and T2WI-TSE-fBLADE) and air bronchogram (CT, T1WI-starVIBE and T1WI-VIBE) ($P < 0.05$). The AUC value for the logistic model by the combination of CT and MRI was 0.867 (sensitivity 73.68%, specificity 86.36%; reader 1) and 0.877 (sensitivity 76.32%, specificity 86.36%; reader 2) and was significantly higher than that by T1WI-starVIBE ($P=0.002$) and T1WI-TSE-fBLADE ($P=0.027$) (reader 1), as well as higher than that by CT ($P=0.045$) and T1WI-starVIBE ($P=0.003$) (reader 2).

Conclusion: The combined conventional and modified anatomical MRI sequences has diagnostic potential in distinguishing pulmonary IAC from tuberculoma.

PO-0930

Association of Coronary CT Angiography-derived Plaque Parameters and White Matter Hyperintensity

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Objective To explore the correlation between plaque parameters based on coronary artery CT angiography (CCTA) and overall white matter hyperintensity (WMH) and different regions.

Methods A retrospective analysis was conducted on the data of 392 patients who underwent CCTA and cranial MRI examinations. Fazekas score was recorded to assess the WMH degree, and coronary artery stenosis was also assessed and coronary artery disease (CAD) was defined to be present when stenosis was more than 50%. The clinical model (model 1) and radiology model (model 2) were developed with logistic regression. The combine model (model 3) was based on clinical characteristics and CCTA-derived parameters. The performance of these models was evaluated with area under the receiver operating characteristic curve (AUC) and compared using DeLong's test internally and externally.

Results Compared with the patients with mild WMH, the patients with severe WMH showed older age (64.1 ± 10.5 vs 70.6 ± 8.2 , $p < 0.001$), larger plaque burden (0.68 ± 0.15 vs 0.28 ± 0.31 , $p < 0.001$), higher Agatston Score (369.50 [IQR, $132.50 - 775.40$] vs 0.00 [IQR, $0.00 - 25.10$], $p < 0.001$), and CAD (80.90% vs 8.60% , $p < 0.001$). The performance of model 1, model 2, model 3 was supported by AUCs of 0.785 , 0.896 , 0.948 , 0.953 , respectively. These models existed statistical significance in WMH (model 1 vs model 2, $p < 0.001$, model 1 vs model 3, $p < 0.001$, model 2 vs model 3, $p = 0.183$, respectively).

Conclusions Our study indicated that individuals with older age, larger plaque burden, higher Agatston Score, and CAD are more likely to have severe white matter hyperintensity. The influencing factors of high matter hyperintensity in periventricular and deep location were not exactly the same, possibly due to different potential mechanisms that lead to cerebral lesions in two regions. This finding supports the thing that many similarities in the pathological processes involved in the heart and the brain vascular dysfunction.

PO-0931

The alterations and significance of computed tomography pulmonary angiography derived parameters in elderly patients with acute pulmonary embolism

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[Abstract] Objective To explore the alterations and significance of computed tomography pulmonary angiography (CTPA)-derived parameters in elderly patients with acute pulmonary embolism (APE). **Methods** According to the pulmonary artery obstruction index (PAOI), patients with APE were divided into A1 (PAOI $\geq 30\%$, $n = 57$) and A2 (PAOI $< 30\%$, $n = 40$) groups. Participants without APE were placed into B group ($n = 170$). The left atrial (LA) and left ventricular (LV) parameters among the three groups were compared and the parameter changes in 44 patients with APE were analyzed before and after treatment. The correlation between APE severity and parameters was analyzed by correlation analysis. **Results** The left to right diameters (LR) of LA, and LR \times anteroposterior diameters (AP) of LA and LV: A1 $<$ A2 $<$ B; LR of LV: A1 $<$ A2, B; AP of LA and LV: A1, A2 $<$ B. After treatment, the LR and LR \times AP of LA and LV were significantly enlarged in the A1 group, and the LR of the LV and the LR \times AP of the LA and LV were enlarged in the A2 group. APE severity had closer association with the LR \times AP ($r = -0.557$) and LR ($r = -0.477$) of LA. **Conclusion** With the increase in obstruction degree, elderly patients had smaller

LA and LV, and the LR and LR × AP of LA were significantly decreased, which contributes to in-time risk stratification.

PO-0932

Diffuse Myocardial Fibrosis in Inflammatory bowel disease - Insights from ECV derived from dual-energy contrast-enhanced Computed Tomography

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Background: Inflammatory bowel diseases (IBD) not only affects the gastrointestinal (GI) tract but also may involve many other organs of the body, including cardiovascular complications. Diffuse myocardial fibrosis can be detected noninvasively by using ECV quantification on contrast-enhanced Computed Tomography (CT).

Objectives: The goal of this study was to assess the diffuse myocardial fibrosis in IBD using dual-energy contrast-enhanced CT and the association of extracellular volume (ECV) with disease duration.

Methods: 42 IBD patients (20 women; mean age 25 ± 8 years) and 42 matched control subjects (20 women; mean age 26 ± 7 years) underwent dual-energy contrast-enhanced CT and ECV was measured. ECV values were evaluated at the middle of left ventricular septum on venous phase images.

Results: The mean ECV was $32.6 \pm 4.6\%$ in IBD group, and significantly higher than ECV ($27.5 \pm 3.8\%$) in control subjects ($P < 0.001$). ECV was correlated with the disease duration.

Conclusions: Subclinical cardiovascular disease is frequent in IBD, especially myocardial fibrosis. ECV derived from contrast-enhanced CT can provide potential added value as a biomarker for disease monitoring and study of therapies aimed at reducing myocardial fibrosis in IBD.

PO-0933

Diagnostic value of texture analysis based on native T1 mapping of cardiovascular magnetic resonance in differentiating hypertrophic cardiomyopathy subtypes and hypertensive heart disease

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Objective: To assess the use of texture analysis (TA) based on native T1 mapping from cardiovascular magnetic resonance (CMR) in the diagnosis of patients with non-apical hypertrophic cardiomyopathy (HCM), apical HCM and hypertensive heart disease (HHD) compared with left ventricular cardiac function and strain analysis.

Methods: In this study, 184 patients were retrospectively collected, including 61 patients with HHD, 74 patients with non-apical HCM, and 49 patients with apical HCM. All patients were subjected to a standardized clinical scan protocol using a 1.5-T scanner. Dedicated commercial software (version 5.13.5, CVI42, Circle, Calgary, Canada) was used to semi-automatically generate the left ventricular intracardial and epicardial contours from cine imaging. Left ventricular cardiac function and strain parameters were calculated after manual correction. The left ventricular endocardial and epicardial contours of the native T1 maps were automatically generated by open-source software

(3D Slicer, version 4.11), which imported into commercial software (Artificial Intelligence Kit, version V3.2.0.R, GE Healthcare) for texture feature extraction, selection and diagnostic models building after manual correction.

Results: For differentiating between patients with non-apical HCM and HHD, combining five texture features from native T1 mapping (Gray-level co-occurrence matrix_Cluster Shade, First Order_Kurtosis, First Order_Skewness, First Order_90Percentile, Gray-level co-occurrence matrix_Difference Variance) provided accuracy of 74.4% in the feature selection group and 61.5% in the test validation group. Compared with the TA combination model or the combination model with left ventricular cardiac function and strain parameters, the combination of selected texture features, cardiac function and strain parameters showed a greater area under the curve (AUC) (feature selection group: 0.907, test validation group: 0.826, $P < 0.05$). For differentiating between patients with apical HCM and HHD, the combination of selected texture features, cardiac function and strain parameters showed a greater AUC compared with using texture features alone or the combination of left ventricular cardiac function and strain parameters in the feature selection group (0.931 vs. 0.788 vs. 0.882, $P < 0.05$). And the combination of selected texture features, cardiac function and strain parameters showed a greater AUC compared with the combination of left ventricular cardiac function and strain parameters in the test validation group (0.811 vs. 0.712, $P < 0.05$).

Conclusion: TA based on native T1 mapping can help differentiate between patients with non-apical HCM, apical HCM and HHD with high diagnostic accuracy. Combining TA based on native T1 mapping with left ventricular cardiac function and strain analysis may provide incremental value in differentiating between patients with non-apical HCM and HHD.

PO-0934

Comprehensive analysis of the effects of altitude on the structure and function of the rat heart

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Purpose: To investigate the effects of different altitude environments on cardiac structure, function, and microcirculatory perfusion in rats. In addition, the expression of myocardial hypoxia-inducible factor 2 α (HIF-2 α) and vascular endothelial growth factor (VEGF) was analyzed to understand the underlying molecular mechanisms. Methods: Thirty 4-week-old male SD rats were randomly divided into a plain group (Chengdu, 500 m above sea level), a medium-altitude group (Xining, 2,200 m above sea level), and a high-altitude group (Mado, 4,200 m above sea level), and were transported to laboratories within the corresponding regions to be housed for 24 weeks. After 24 weeks, rats were incubated for 24 weeks in the laboratories of the corresponding regions using blood parameters (erythrocyte count RBC, hemoglobin HGB, hematocrit HCT, and mean corpuscular volume MCV), myocardial perfusion parameters (mean blood volume MBV, mean blood flow MBF, time to peak TTP, and mean time to passage MTT), pulmonary artery pressure (PA), cardiac histopathology (HE staining), and immunohistochemistry of HIF-2 α and VEGF expression were used to assess the effects of altitude on cardiac structure and function.

Results: Blood parameters (RBC, HGB, HCT, MCV) increased significantly with altitude exposure compared with the plains group ($P < 0.001$). Myocardial perfusion parameters (MBV, MBF, TTP, MTT) and PA also showed highly dependent changes. Scatterplot analysis showed a negative correlation between WBC count and MCV, and a positive correlation between MBF and MTT. Histopathologic analysis showed a disturbed arrangement of cardiomyocytes and vacuolar degeneration with significant pathological changes. The expression of immunohistochemical HIF-2 α and VEGF also showed a significant upward trend with increasing altitude ($P < 0.05$).

Conclusion: Exposure to different altitudes significantly affected cardiac structure, function, and microcirculatory perfusion in rats. The increase in altitude led to significant changes in blood

parameters, including increases in RBC, HGB, HCT, and MCV. These changes suggest an adaptive response of the organism to hypoxic conditions.

PO-0935

Using CMR-based tissue tracking strain to study the effects of prolonged exposure of aged male rats to a hypobaric and hypoxic environment at high altitude

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Aims: This study was intended to evaluate the feasibility and reproducibility of using CMR-based tissue tracking strain for analysis of bi-ventricular function in aged rats under prolonged exposure to plateau hypoxia.

Methods and results: Male Sprague-Dawley rats aged 18-month-old were divided into the experimental group and the control group. The former was raised on the Qinghai-Tibet Plateau, China, at an altitude of 4250 m while the latter was housed in the plain at an altitude of 500 m, hence the names “the plateau rats” and “the plain rats”, respectively. Cardiovascular magnetic resonance (CMR) was performed to acquire short-axis images of the left ventricle (LV) and the right ventricular (RV) at a 7.0 T preclinical MR scanner (Bruker, Ettlingen, Germany) using the cardiac coil and cine sequence for the plateau rats at the baseline and after 2 months in either a plateau or a plain environment. CMR tissue tracking (CMR-TT) metrics of biventricular global and segmental strain were derived using a cardiac analysis software (cvi42 version 5; Circle Cardiovascular Imaging). Biochemical detection and histological tests were later performed to evaluate myocardial changes.

Results: Group analysis of the baseline and exposed CMR parameters revealed significant increase in RV end-systolic and end-diastolic volumes, RV end-diastolic mass and a decrease in RV ejection fraction (RVEF). The plateau group showed preserved LVEF, which, however, was lower than that showed by controls ($57.14\% \pm 1.20\%$ vs. $60.35\% \pm 1.06\%$, $P = 0.0588$). Left ventricle radial strain (LRSSAX), left ventricle circumferential strain (LCSSAX), right ventricle radial strain (RRSSAX) and right ventricle circumferential strain (RCSSAX) of the plateau group were all significantly lower than that of the control group, and regional strains of the interventricular septum and right ventricle were also true ($P < 0.05$, respectively). Biochemical analysis revealed that compared with controls, the plateau rats had higher levels of cardiac oxidative stress, inflammatory factors and cTn-I but a lower level of serum testosterone. Histologically, there was a significant difference in myocardial damage and fibrosis between the plateau rats and controls in RV but none in LV. Additionally, Pearson analysis showed that RVEF was moderately correlated with RRSSAX and RCSSAX ($r = 0.6126$, $P = 0.0342$; $r = -0.6384$, $P = 0.0255$) whereas RRSSAX and RCSSAX were positively correlated with LRSSAX and LCSSAX ($r = 0.7685$, $P = 0.0035$; $r = 0.7913$, $P = 0.0022$), respectively.

Conclusion: The decreased interventricular septum strain and ventricular interdependence may be a mechanism for LV dysfunction in the plateau rats. CMR-TT identifies bi-ventricular dysfunction in aged hearts exposed to high altitude hypoxia.

PO-0936

Serum uric acid is associated with impaired right atrial strain derived from cardiovascular magnetic resonance feature tracking in connective tissue disease

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Purpose:

Serum uric acid (SUA) is considered a marker of inflammation as well as a potential independent risk factor for cardiovascular disease. This study investigates the association of SUA and the right atrial (RA) phasic function derived by cardiac magnetic resonance feature-tracking (CMR-FT) in CTD patients.

Methods:

We consecutive and retrospective enrolled 104 CTD patients, including 31 with hyperuricemia and 73 with normouricemia, and were compared with 52 age- and sex-matched healthy controls. All individuals underwent CMR imaging and measured SUA levels. Hyperuricemia was defined as SUA of females $\geq 340 \mu\text{mol/L}$ and males $\geq 420 \mu\text{mol/L}$. RA longitudinal strain and strain rate parameters corresponding to reservoir, passive, and booster phases derived by CMR-FT were evaluated for each subject. The association of SUA with RA phasic function was explored by Spearman's rank correlation and multiple linear regression analyses with adjustment for clinical risk factors.

Results:

CTD patients had significantly higher SUA levels as well as a lower RA reservoir strain (ϵ_s), conduit strain (ϵ_e) and conduit strain rate (SRe) (all $p < 0.05$) than healthy controls. Among CTD groups, patients with hyperuricemia had significantly impaired RA conduit function compared with patients with normouricemia (RA passive ejection fraction: 18.40 ± 9.34 vs. 25.52 ± 11.34 , $P = 0.004$, ϵ_e : $21.48 [11.80, 31.02]$ vs. $27.54 [18.44, 37.99]$, $P = 0.028$, SRe: -1.66 vs. -2.50 , $P = 0.003$). The elevated SUA levels were correlated with impaired RA reservoir and conduit strain parameters (absolute value of $R = 0.284-0.350$, all $P < 0.05$). In adjusted multiple linear regression analyses, the SUA levels also had independent determinants with ϵ_s ($\beta = -0.205$, $P = 0.035$), ϵ_e ($\beta = -0.220$, $P = 0.025$), and SRe ($\beta = 0.210$, $P = 0.030$), respectively.

Conclusions:

Serum uric acid may be a potential risk factor of subclinical RA dysfunction and is independently associated with impaired RA strain in CTD patients.

PO-0937

Application Value of Spectral CT Multi-Parameter Imaging in the Detection of Emboli and Assessment of Thrombus Burden in Acute Pulmonary Embolism

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Objective: This study aims to investigate the efficacy of spectral CT multi-parameter (Spectral Based Image) imaging compared to regular CT (rCT) imaging in the detection of emboli and assessment of thrombus burden in acute pulmonary embolism (PE).

Methods: 102 suspected pulmonary embolism (PE) patients who underwent dual-layer spectral CT (DLCT) pulmonary angiography (CTPA) were prospectively enrolled. Spectral data

were reconstructed into conventional images (CI), iodine density maps (ID), effective atomic number (Z-eff) maps, and ID-Zeff fusion maps (ID-Zeff). The detection rate of acute PE in each group was evaluated, and the diagnostic efficiency for PE was assessed using receiver operating characteristic (ROC) curves and area under the curve (AUC) for each type of image. The diagnostic efficiency for PE was evaluated separately in pulmonary lobes and main left and right pulmonary arteries, pulmonary segmental arteries, and subsegmental pulmonary arteries. In diagnosed acute PE patients, the total number of thrombi and the number of thrombi detected in three level of pulmonary artery were counted, and the thrombus burden was compared among groups using the Qanadli (Q) score. Independent sample t-tests and chi-square tests were used for quantitative and qualitative data, respectively.

Results: Among the 102 suspected PE patients, a total of 63 cases were diagnosed based on imaging, laboratory tests, and clinical data. Among them, the CI, ID, Z-eff, and ID-Zeff respectively diagnosed 53, 55, 60, and 60 cases. The ID-Zeff image (AUC: 0.989, sensitivity: 97%, specificity: 100%) significantly improved the detection rate of PE compared to the CI image (AUC: 0.892, sensitivity: 84%, specificity: 94%). The total number of thrombi detected by the CI image and each spectral image group in each three level of pulmonary artery were as follows: CI (172, 25, 75, 72), ID (217, 25, 82, 100), Z-eff (222, 25, 85, 112), and ID-Z-eff (230, 25, 85, 120). The Q scores for each spectral image group were as follows: CI (15.64±5.28), ID (19.25±6.42), Z-eff (19.87±6.86), and ID-Zeff (20.46±6.6). The Q scores in each spectral image group were statistically significant compared to the CI group ($p < 0.001$).

Conclusion: DLCT multi-parameter ID-Zeff maps exhibit better detection rates and thrombus detecting efficacy in PE compared to CI images, especially in subsegmental PE. Additionally, the ID-Zeff map provides more accurate Q scores.

Clinical significance: ID-Zeff imaging can use the wedge-shaped perfusion defect region to detect subsegmental and micro thrombi, significantly improving the detection efficacy of peripheral micro emboli in PE. This provides more accurate imaging data for the precise assessment of thrombus burden, risk stratification, and prognosis prediction.

PO-0938

The value of MR BLADE T2WI contrast ratio combined with DWI in evaluating the pathological grade of solid lung adenocarcinoma

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[Abstract] Objective To investigate the value of MR T2WI combined with diffusion weighted imaging (DWI) in predicting the pathological grading of solid lung adenocarcinoma. Methods The clinical and imaging data of 153 cases of solid lung adenocarcinoma (82 males, 71 females, mean age 63.2 years) confirmed by pathology in our hospital from January 2017 to May 2022 were retrospectively analyzed. According to the pathological grading system proposed by the International Association for the Study of Lung Cancer in 2020, adenocarcinoma was divided into low-grade group and high-grade group (the low-grade group was G1 and G2, and the high-grade group was G3). Koyama et al. proposed to use T2CR, that is, the T2 signal intensity of lung mass/nodule, by T2 signal intensity of the right rhomboid muscle: contrast ratio (CR) = signal intensity (SI) of lung nodule / SI rhomboid muscle. Two experienced radiologists independently read the MR images and measured the T2 contrast ratio (T2CR) and apparent diffusion coefficient (ADC) values. Mann-Whitney U test were used to compare the general characteristics (sex, age, maximum diameter), T2CR and ADC values between the two groups, and non-parametric Kruskal-

Wallis test was used to calculate whether there were differences in T2CR and ADC values between the five adenocarcinoma subtypes. Receiver characteristic curve (ROC) and area under curve (AUC) were used to analyze the efficacy of each parameter in differentiating the pathological grade of lung adenocarcinoma. Z-test was used for comparison between AUC. Results Among 153 patients with adenocarcinoma, 103 were low-grade adenocarcinoma and 50 were high-grade adenocarcinoma. There was good agreement between T2CR and ADC observers between two radiologists (0.948, 0.929). All the parameters did not conform to normal distribution ($p < 0.05$). The ADC value of the high-grade adenocarcinoma group was lower than that of the low-grade adenocarcinoma group ($p=0.004$), and the T2CR value was higher than that of the low-grade adenocarcinoma group ($p=0.011$). There were statistically significant differences in maximum diameter and gender between the two groups ($p < 0.001$, $=0.005$), and no statistically significant differences in age between the two groups ($p=0.980$). Among the five types of adenocarcinoma subtypes, only the lepidic and the micropapillary had statistical differences in ADC values ($p=0.047$), and the rest had no statistical differences ($p > 0.05$). The AUC of ADC and T2CR values for distinguishing high-grade adenocarcinoma from low grade adenocarcinoma were 0.645 and 0.627, respectively. The AUC, sensitivity, and specificity of combined T2CR, ADC, sex and maximum diameter were 0.778, 70% and 75%, respectively, compared with T2CR and ADC alone, the diagnostic efficiency was improved ($p=0.008$, $z=2.624$; $p=0.007$, $z=2.679$). Conclusion non-enhanced MR can predict the pathological grade of solid lung adenocarcinoma non-invasively, and provide imaging basis for accurate treatment of lung cancer.

PO-0939

Risk Stratification by chest pain symptoms in patients with zero coronary artery calcium (CAC) Score Results From the CREATION-CHINA Study

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BACKGROUND: Coronary artery calcium (CAC) is an established predictor of future major adverse cardiovascular events (MACE), and 0 CAC score patients have a favorable prognosis. The usage has been proven in asymptomatic individuals but is rarely used in symptomatic patients.

OBJECTIVES: Our study aimed to assess the prognostic value of chest pain symptoms in patients with 0 CAC score. **METHODS:** This study recruited consecutive patients suspected of CAD who underwent both a CAC scan and coronary computed tomography angiography (CCTA). Kaplan-Meier and Multivariable Cox proportional hazards models were used to assess the risk of MACE according to chest pain symptoms.

RESULTS: There were 13,145 patients with 0 CAC score (57.0% men; mean age 54.6 ± 10.3 years). During a median follow-up of 3.5 years, MACE was reported in 69 (0.9%) patients without chest pain and 81 (1.4%) with chest pain ($P=0.008$). Chest pain symptom is an independent risk factor for the prognosis of 0 CAC score people (adjusted HR=1.750, 95% CI: 1.264-2.422, $P<0.001$). Chest pain symptoms can increase the risk of MACE events in patients with plaque (adjusted HR=2.078, 95% CI: 1.447-2.984, $P<0.001$) and obstructive CAD (adjusted HR=2.505, 95% CI: 1.622-3.870, $P<0.001$) in CCTA. The median MACE time is shorter in patients with typical angina than in those who only have chest pain symptoms (790.5 vs 1319 days, $p<0.001$).

CONCLUSIONS: Chest pain symptoms can reclassify MACE risk in 0 CAC score patients, especially in those with plaques and obstructive CAD in CCTA. The median MACE time is shorter in those patients with typical angina.

PO-0940

Incremental impact of coronary obstruction on right ventricular systolic and diastolic dysfunction in type 2 diabetes mellitus patients: assessed by CMR feature tracking

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Background: Obstructive coronary artery disease is a prevalent macrovascular complication in patients with type 2 diabetes mellitus (T2DM), which are at increased risk for cardiovascular morbidity and mortality. This study aimed to investigate the impact of coronary obstruction on right ventricle (RV) systolic and diastolic function in T2DM patients, and explore independent predictors of reduced RV function.

Methods: Cardiac magnetic resonance (CMR) scanning was performed on 274 T2DM patients {161 patients without OCAD [T2DM(OCAD-)] and 113 with [T2DM(OCAD+)]} and 83 control subjects. CMR-derived parameters, including RV structure, function, global strains [including systolic peak strain (PS), peak systolic (PSSR) and diastolic strain rate (PDSR) in radial, circumferential and longitudinal directions] were measured and compared among observed groups. Univariable and multivariable linear regression analyses were performed to identify independent predictors of RV dysfunction.

Results: Compared to the control subjects, T2DM (OCAD-) patients exhibited reduced RV systolic and diastolic function, as evidenced by a decrease in all RV global strains except for radial PS, PSSR, and PDSR (all $P < 0.05$). T2DM(OCAD+) patients showed a significantly more severe impairment of RV systolic and diastolic function than T2DM(OCAD-) patients and control subjects (all $P < 0.05$). The presence of OCAD was independently correlated with reduced GCPS ($\beta = -0.149$, $P < 0.05$), the radial ($\beta = -0.204$, $P < 0.001$) and the longitudinal PS ($\beta = -0.155$, $P < 0.05$) in the context of T2DM. Among T2DM(OCAD+) patients, Gensini score was associated with decreased GCPS ($\beta = -0.388$, $P < 0.001$).

Conclusions: Coronary artery obstruction in the context of T2DM exacerbated RV systolic and diastolic dysfunction. The presence of OCAD and Gensini score were independent predictors of decreased RV function.

PO-0941

Predictive value of imaging and clinical feature models for Chest CT severity of severe acute respiratory syndrome coronavirus 2 breakthrough infection

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Objective We aim to analyze the chest CT severity of novel coronavirus disease 2019 (COVID-19) pneumonia, and to establish and validate a predictive model of COVID-19 pneumonia severity based on radiological and clinical information. **Methods** A consecutive cohort of 787 confirmed COVID-19 patients were retrospectively recruited from the emergency department of the First Medical Center of the People's Liberation Army General Hospital. People were randomly divided into training ($n = 551$) and test ($n = 236$) cohorts. Clinical and imaging information of patients in the training and validation cohorts were analyzed. We used two feature selection method, Max-

Relevance and Min-Redundancy (mRMR) and Least absolute shrinkage and selection operator (LASSO) to select the feature. and three models of clinical information, radiological score (radscore), and nomogram were developed by multivariate logistic regression, combining radiological and clinical information. Clinical usage was evaluated by receiver operating characteristic (ROC) curves. **Results** Three radiologic characteristics (band, consolidation, crazy paving) and 1 clinical feature (platelet count) were identified to be significantly different. Three diagnostic models achieved an area under the curve value as high as 0.55 (95% CI 0.43-0.67). The nomogram model yielded a maximum AUC of 0.64 (95% CI 0.56-0.71) in the training cohort with the highest accuracy and specificity. **Conclusions** A model composed of radiologic and clinical features has an excellent performance for prediction of COVID-19 pneumonia. It provides a reference for evaluating patients; prognosis and selecting treatment programs.

PO-0942

Radiomics-Based Myocardial Fibrosis Prediction in Patients with Hypertrophic Cardiomyopathy Using Cardiac Magnetic Resonance Cine Imaging

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OBJECTIVE Myocardial fibrosis is an independent risk factor for major adverse cardiac events (MACE) in patients with Hypertrophic Cardiomyopathy (HCM). As the gold standard non-invasive modality, cardiac magnetic resonance (CMR) late gadolinium enhancement (LGE) scanning is one of the conventional CMR sequences for myocardial fibrosis screening of HCM patients. However, nearly 50% HCM patients are estimated to have no fibrosis during their lifetime, unnecessarily LGE scanning may cause serious MACE events due to the gadolinium accumulation. Moreover, nearly half an hour scanning time of LGE sequence may also make uncomfortable for HCM patients. Thus, this study will construct a myocardial fibrosis prediction model based on another conventional CMR sequences, CMR cine sequence, for HCM patients.

METHOD From January 2009 to December 2022, 723 HCM patients who underwent LGE and CMR cine scanning were retrospectively recruited. Patients were divided into LGE(+) and LGE(-) groups according to whether they had myocardial enhancement in least one segment (632/91). Radiomics features were extracted from entire LV myocardium across all timepoints in short-axis cine views. Prediction Model was constructed using support vector machine method with 5-folds cross validation.

RESULTS After feature selection and model construction, the radiomics model exhibited a better myocardial fibrosis prediction performance with accuracy, sensitivity, specificity, and area under curve of 0.77, 0.78, 0.76 and 0.77, respectively. After adding clinical CMR features, the performance of combined model was further improved, with accuracy, sensitivity, specificity, and area under curve of 0.81, 0.81, 0.80 and 0.80, respectively. Four features were finally remained.

CONCLUSION Results suggested that by using radiomics-based model, CMR cine sequence had the potential for myocardial fibrosis detection. The four selected features may be involved in pathogenesis of myocardial fibrosis in patients with HCM.

PO-0943

Deep Learning in Interstitial Lung Disease: Classification and Prognostic Insights

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Interstitial lung disease (ILD) comprises a broad and diverse range of parenchymal lung disorders, contributing significantly to morbidity and mortality. There is a frequent disagreement between radiologic read, pathologic interpretation, and multidisciplinary discussion consensus. Therefore, establishing a definitive diagnosis of ILD using current techniques and criteria poses a considerable challenge. High-resolution computed tomography (HRCT) plays a vital role in characterizing the imaging patterns and predicting the prognosis of ILD. However, the substantial overlap radiographic findings make accurately diagnosing ILD in HRCTs difficult, even for seasoned radiologists. Recently, deep learning (DL), a strategy which can automatically learn important characteristic features and patterns hiding behind the CT images, has shown great potential in identifying and predicting the prognosis of ILD. In this review, we aimed to summarize the latest DL applications in the ILD classification and prognosis evaluation. Additionally, we addressed the challenges to clinical implementation and presented our insights on advancing this field forward.

PO-0944

Financial and clinical outcomes of CT-MPI+CCTA versus CCTA-guided strategy in patients suspected of CCS

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Objectives: To compare the financial and clinical outcomes of CT myocardial perfusion imaging (CT-MPI) + coronary CT angiography (CCTA)-guided versus CCTA-guided strategy in patients suspected of chronic coronary syndrome (CCS).

Materials and Methods: This study retrospectively included consecutive patients suspected of CCS and referred for CT-MPI+CCTA-guided and CCTA-guided treatment. The details of medical costs of downstream invasive procedures, hospitalization, and medications were recorded. All patients were followed up for major adverse cardiac events (MACE) at a median time of 22 months.

Results: A total of 1335 patients (559 in the CT-MPI+CCTA group and 776 in the CCTA group) were finally included. In the CT-MPI+CCTA group 129 patients (23.1%) underwent ICA and 95 patients (17.0%) received revascularization. In the CCTA group 325 patients (41.9%) underwent ICA whereas 194 patients (25.0%) received revascularization. An addition of CT-MPI in the evaluation strategy markedly reduced the healthcare expenditure, compared with the CCTA guided strategy (USD 1441.36 vs. USD 232.91, $p < 0.001$). After adjustment for potential cofounders after inverse probability weighting, the CT-MPI+CCTA strategy was significantly associated with lower medical expenditure [adjusted cost ratio (95% CI) for total costs: 0.77 (0.65-0.91), $p < 0.001$]. In addition, there was no significant difference regarding the clinical outcome between the two groups (adjusted HR= 0.97; $p = 0.878$).

Conclusions: CT-MPI combined with CCTA considerably reduced medical expenditures in patients suspected of CCS, compared to the CCTA strategy. Moreover, this functional + anatomical imaging modality led to a lower rate of invasive procedures with a similar long-term prognosis.

PO-0945

Microvascular myocardial ischemia in diabetic patients without obstructive coronary stenosis and its association with angina

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Objectives: To investigate the incidence of microvascular myocardial ischemia in diabetic patients without obstructive coronary artery disease (CAD) and its relationship with angina.

Materials: Diabetic patients with intermediate-to-high pretest probability of CAD were prospectively enrolled. Non-diabetic patients with intermediate-to-high pretest probability of CAD were retrospectively included as controls. Patients underwent dynamic computed tomography myocardial perfusion imaging (CT-MPI) and coronary computed tomography angiography (CCTA) for quantification of coronary stenosis, myocardial blood flow (MBF), and extracellular volume (ECV). The rate of patients with microvascular myocardial ischemia, defined as any myocardial segments with mean MBF ≤ 100 mL/min/100mL, in patients without obstructive CAD (i.e., CAD-RADS grade 0-2 at CCTA) was obtained. Various quantitative parameters were compared between the diabetic and non-diabetic patients without obstructive CAD. Multivariable analysis was used to determine the association between microvascular myocardial ischemia and angina symptom in diabetic patients without obstructive CAD.

Results: One hundred and fifty-two diabetic patients (mean age: 59.7 ± 10.7 ; 77 males) and 266 non-diabetic patients (62.0 ± 12.3 ; 167 males) were enrolled, in whom CCTA revealed 113 and 155 patients without obstructive CAD, respectively. For patients without obstructive CAD, the mean global MBF was significantly lower in diabetic patients (152.8 mL/min/100mL vs. 170.4 mL/min/100mL, $p < 0.001$) whereas the mean ECV was significantly higher in diabetic patients (27.2% vs. 25.8%, $p = 0.009$). Among patients without obstructive CAD, the incidence of microvascular myocardial ischemia (36.3% [41/113] vs. 10.3% [16/155], $p < 0.001$) and interstitial fibrosis (69.9% [79/113] vs. 33.3% [8/24], $p < 0.001$) were significantly higher in diabetic patients than in non-diabetic controls. The presence of microvascular myocardial ischemia was independently associated with angina symptom (adjusted odds ratio=3.439, $p = 0.037$) in diabetic patients without obstructive CAD.

Conclusion: Dynamic CT-MPI + CCTA revealed a high incidence of microvascular myocardial ischemia in diabetic patients without obstructive CAD. The presence of microvascular myocardial ischemia was strongly associated with angina in those patients.

PO-0946

Long-term prognostic value of CT-based high-risk coronary lesion attributes and radiomic features of pericoronary adipose tissue in diabetic patients

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Aims: To investigate the long-term prognostic value of coronary computed tomography angiography (CCTA)-derived high-risk attributes and radiomic features of pericoronary adipose tissue (PCAT) in diabetic patients for predicting major adverse cardiac event (MACE).

Methods and results: Diabetic patients with intermediate pre-test probability of coronary artery disease were prospectively enrolled and referred for CCTA. Three models (model-1 with clinical parameters; model-2 with clinical factors+CCTA imaging parameters; model-3 with the above parameters and PCAT radiomic features) were developed in the training cohort (835 patients) and tested in the independent validation cohort (557 patients) with a median follow-up of 39.7

months. 1392 patients (mean age: 61.4 ± 11.1 years, 791 males) were included and MACEs occurred in 108 patients (7.8%). Multivariable Cox regression analysis revealed that HbA1c (HR=1.13, $p=0.043$), coronary calcium Agatston score (HR=1.01, $p=0.037$), obstructive stenosis (HR=3.75, $p<0.001$) and high-risk plaque (HR=1.86, $p=0.043$) were the independent predictors for MACE whereas none of PCAT radiomic features showed predictive value. In the training cohort, model-2 demonstrated higher predictive performance over model-1 according to time-dependent AUC whereas model-3 did not show incremental value over model-2. The C-index of model-2 was significantly larger than that of model-1 (C-index = 0.80 vs. 0.68, $p<0.001$) while the C-index of model-3 was equivalent to that of model-2 (C-index = 0.81 vs. 0.80, $p=0.32$). Similar findings were found in the validation cohort.

Conclusion: The combined model (clinical and CCTA high-risk anatomical features) demonstrated high efficacy in predicting MACE in diabetes. PCAT radiomic features failed to show incremental value for risk stratification.

PO-0947

Application of deep learning reconstruction in chest prone position scanning

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Aim To explore whether deep learning reconstruction (DLR) could maintain image quality and reduce radiation dose in prone position scanning, when compared with hybrid iterative reconstruction (hybrid-IR) in early interstitial lung disease (ILD) patients.

Methods 21 early ILD patients were prospectively enrolled. All patients accepted two scans: high resolution CT (HRCT), and low dose CT (LDCT). HRCT images were reconstructed with hybrid-IR (Adaptive Iterative Dose Reduction 3-Dimensional [AIDR3D], standard setting), and LDCT images were reconstructed with DLR (Advanced Intelligence Clear-IQ Engine [AiCE], lung/bone, mild/standard/strong setting). Image noise, streak artifact, overall image quality, visualization of normal and abnormal features of ILD were evaluated.

Results Radiation dose of LDCT was reduced 65.1% compared with HRCT. Objective image noise of reconstructed LDCT images was 33.0% to 111.8 % of HRCT, and signal-to-noise ratio (SNR) was 0.88 to 3.12 times of the latter ($p<0.001$). LDCT-AiCE was not significantly different from HRCT in overall image quality and normal lung structures assessment. LDCT-AiCE (bone, strong) showed significantly weaker recognition of bronchiectasis and/or bronchiolectasis than HRCT-AIDR3D ($p<0.05$). No significant difference was found in visulation of GGO, architectural distortion, reticulation and honeycombing between LDCT-AiCE (all settings) and HRCT-AIDR3D.

Conclusion DLR was promising to keep image quality and reduce radiation dose in prone scanning in early ILD.

PO-0948

The value of coronary computed tomography angiography for suspected acute coronary syndrome patients with intermediate concentration hs-cTnI and ruled out myocardial infarction in emergency

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Background: The updated 2023 European Society of Cardiology (ESC) guidelines indicate that coronary computed tomography angiography (CCTA) in patients with suspected acute coronary syndrome (ACS) did not improve one-year clinical outcomes. However, the application value of CCTA for suspected ACS stratified based on high sensitivity cardiac troponin I (hs-cTnI) value is uncertain.

Objectives: To explore the value of CCTA on rates of 30 days' invasive coronary angiography (ICA) and one-year major adverse cardiovascular events (MACEs) including all-caused death, myocardial infarction, unplanned revascularization in suspected ACS patients who had hs-cTnI within intermediate concentration (5 ng/L to 99th percentile) and ruled out myocardial infarction presenting to emergency department (ED).

Methods: Between November 2017 to January 2019, suspected ACS patients who had intermediate hs-cTnI concentrations and ruled out an acute heart attack were included in ED. Patients were categorized into CCTA group and no CCTA group according to whether they underwent CCTA testing. Patients in both groups were propensity score matched at a ratio of 1:3. Matching variables used were sex, age, hs-cTnI values, body mass index, smoking history, hypertension, hyperlipidemia, diabetes, peripheral artery disease, cerebrovascular disease and family history of coronary artery disease. Survival curves were generated using the Kaplan-Meier method and compared using the log-rank test.

Results: After propensity score matching (PSM) for confounder adjustment, 136 patients (62.0 [53.0, 71.0] years, 75.7% men) underwent CCTA and 404 did not (62.0 [55.0, 68.0] years, 75.5% men). Patients in CCTA group had less likely to have ICA in 30 days than no CCTA group (91 [66.9%] vs 368 [91.1%]; $P < 0.001$), and CCTA provide a clear diagnosis (acute aortic dissection, cardiomyopathy, pulmonary embolism, valvular heart disease, deep cardiac muscle bridge) for 22 patients who had a nonobstructive etiology in the CCTA group. No statistical difference in matched two group was found in MACEs rate at one year ($n = 12$ [8.9%] in CCTA group vs $n = 35$ [8.6%] in no CCTA group; $P = 0.97$).

Conclusions: In suspected ACS patients ruled-out myocardial infarction and with intermediate troponin concentration, CCTA examination not only reduced the rates of invasive angiography, but also provided the clear diagnoses of intermediate raised levels of hs-cTnI in non-obstructive patients. Although CCTA did not alter one-year clinical outcomes, the application of CCTA for this specific population is safe and reliable.

PO-0949

Can deep learning improve image quality of low dose CT: a prospective study in interstitial lung disease

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Objectives To investigate whether deep learning reconstruction(DLR) could keep image quality and reduce radiation dose in interstitial lung disease(ILD) patients compared with HRCT reconstructed with hybrid iterative reconstruction(hybrid-IR).

Methods 70 ILD patients were prospectively enrolled and underwent HRCT (120kVp, automatic tube current), and LDCT (120kVp, 30mAs) scans. HRCT images were reconstructed with hybrid-IR (Adaptive Iterative Dose Reduction 3-Dimensional[AIDR3D], standard-setting); LDCT images were reconstructed with DLR (Advanced Intelligence Clear-IQ Engine[AiCE], lung/bone, mild/standard/strong setting). Image noise, streak artifact, overall image quality, visualization of normal and abnormal features of ILD were evaluated.

Results The mean radiation dose of LDCT was 38% of HRCT. Objective image noise of reconstructed LDCT images was 33.6% to 111.3% of HRCT, and signal-to-noise ratio (SNR) was 0.9 to 3.1 times of the latter ($p<0.001$). LDCT-AiCE was not significantly different from or even better than HRCT in overall image quality and visualization of normal lung structures. LDCT-AiCE (lung, mild/standard/strong) showed progressively better recognition of ground glass opacity than HRCT-AIDR3D($p<0.05$, $p<0.01$, $p<0.001$), and LDCT-AiCE (lung, mild/standard/strong; bone, mild) was superior to HRCT-AIDR3D in visualization of architectural distortion ($p<0.01$, $p<0.01$, $p<0.01$; $p<0.05$).

Conclusion Deep learning reconstruction could effectively reduce radiation dose and keep image quality in ILD patients compared to HRCT with hybrid-IR.

PO-0950

Radiomic model based on Coronary CT Angiography to assess myocardial perfusion function in patients with Chronic Total Occlusion

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Purpose

Accurate assessment of myocardial perfusion function and survival in chronic total occlusion(CTO) patients can help clinicians more objectively evaluate the benefit of percutaneous coronary intervention in CTO patients. Nuclear myocardial imaging and cardiac magnetic resonance are often used to assess the degree of myocardial ischemia. However, both of them are much less clinically applicable than coronary CT angiography(CCTA). Therefore, we aimed to investigate the significance of the radiomics features of CCTA to assess myocardial activity in patients with CTO.

Materials and methods

Fifty-six patients with CTO confirmed by invasive coronary angiography (ICA) and examined by Single Photon Emission Computed Tomography, (SPECT) from 2020-2021 were retrospectively included. Myocardial perfusion function was divided into approximately normal and abnormal myocardial perfusion group, non-infarction group and myocardial infarction group according to the degree of ischemia, using SPECT as the reference standard. Myocardial segments were divided

according to the AHA17 segmentation method, and the radiomic information of each myocardial segment was automatically outlined and extracted. The mRMR method was applied to screen the radiomic features and establish a random forest model. The area under the subject operating characteristic (ROC) curve (AUC) and sensitivity, specificity, and precision-recall curves were used to evaluate the classification efficacy of the model.

Result

The most relevant radiological features differed between groups with approximately normal and abnormal myocardial perfusion and between groups with non-infarcted myocardial perfusion and infarcted myocardium. The random forest model had high diagnostic accuracy in discriminating both abnormal myocardial perfusion and myocardial infarction (AUC:0.719,0.849).

Conclusion

CCTA radiomics features have a good stratified diagnostic value for myocardial perfusion function in patients with CTO.

PO-0951

Effect of lesion characteristics on diagnostic accuracy of CT-FFR: exploring indications for CT-FFR

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Objectives: To investigate the effect of lesion-related factors on the diagnostic performance of fractional flow reserve (FFR) derived from coronary computed tomography angiography (CCTA; CT-FFR).

Materials and Methods: This clinical trial analyzed 306 patients with 30% – 90% stenosis undergoing CCTA and invasive FFR from 5 centers. The target lesions were assigned into different lesion characteristics (target vessel, lesion location, lesion length, bifurcation lesion, and coronary calcification) subgroups. Diagnostic performance (accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under receiver operating characteristics curve (AUC)) of CT-FFR identifying ischemia were calculated and compared in all sub-groups.

Results: A total of 306 patients (68% male; mean age: 59.3 ± 9.7 years) with 353 target vessels were included. The overall vessel-based diagnostic accuracy, sensitivity, specificity, PPV, NPV, and AUC of CT-FFR were 87.3%, 87.5%, 87.0%, 84.8%, 89.4%, 0.87. Absence of bifurcation lesion group possessed the higher NPV of CT-FFR than presence of bifurcation lesion group (92.5% vs. 81.8%, $p = 0.031$). Whereas there was no statistically significant difference in diagnostic performance of CT-FFR among different target vessel, lesion location, lesion length, and coronary calcification sub-groups (all $p > 0.05$).

Conclusion: This prospective multicenter clinical trial supported CT-FFR as a powerful noninvasive functional assessment tool for coronary lesions with different lesion characteristics, involving target vessel, lesion location, lesion length, and coronary calcification. While the diagnostic performance of CT-FFR was negatively affected by the presence of bifurcation lesions.

PO-0952

CT radiomics-based models in the differential diagnosis of inflammatory and malignant pulmonary nodules with typical or atypical signs

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Background: When pulmonary inflammatory lesions grow locally and appear as nodules on imaging, they must be differentiated from malignant nodules. Inflammatory and malignant nodules with atypical signs are difficult to diagnose clinically.

Purpose: To evaluate radiomics models based on CT images for distinguishing inflammatory and malignant pulmonary nodules with typical or atypical signs.

Patients and Methods: This retrospective study included 333 patients with malignant pulmonary nodules (Mn) and 161 patients with inflammatory pulmonary nodules (In) who were pathologically diagnosed between January 2017 and February 2022. According to whether the CT signs of pulmonary nodules were typical (typical: A or atypical: B), they were further divided into typical malignant pulmonary nodules (MnA), atypical malignant pulmonary nodules (MnB), typical inflammatory pulmonary nodules (InA) and atypical inflammatory pulmonary nodules (InB). Group 1 (MnA/InA), group 2 (InA/MnB), group 3 (MnA/InB) and group 4 (MnB/InB) were obtained by pairwise comparison. Clinical models, radiomics models and nomogram models were established for each group. The model performance was evaluated by the area under the curve (AUC), accuracy, sensitivity and specificity. The AUCs of the models were compared by using the DeLong test.

Results: In group 1, five radiomics features and three clinical independent predictors (sex, eccentricity, HU mean) were selected. In group 2, five radiomics features and three clinical independent predictors (sex, age, HU mean) were selected. In group 3, three radiomics features and three clinical independent predictors (sex, RECIST diameter, HU mean) were selected. In group 4, ten radiomics features and three clinical independent predictors (sex, age, HU mean) were selected. In the training set, the AUC values of all models in the four groups ranged from 0.77 to 0.89. In the test set, the AUC values ranged from 0.63 to 0.82. In each group, the nomogram model had the highest diagnostic efficiency (training set: AUCs ranged from 0.83 to 0.89, test set: AUCs ranged from 0.69 to 0.82) and had high accuracy, sensitivity and specificity. For group 3, the nomogram model had the best diagnostic ability (training set: AUC, 0.83; 95% CI [0.75-0.90]; accuracy, 0.72; sensitivity, 0.70; specificity, 0.84. test set: AUC, 0.82; 95% CI [0.70-0.94]; accuracy, 0.65; sensitivity, 0.96).

Conclusion: The nomogram model was useful in diagnosing inflammatory and malignant nodules with typical or atypical signs, especially those with malignant signs, yielding a better classification performance than the radiomics and clinical model.

PO-0953

Effect of nitroglycerin administration on the diagnostic performance of machine-learning fractional flow reserve derived from computed tomography angiography

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Objectives: Nitroglycerin administration prior to examination improves stenosis assessment of coronary CT. However, whether nitroglycerin influences CT-derived fractional flow reserve (CT-FFR; FFR) evaluation remains unclear. We aimed to investigate the effect of nitroglycerin on diagnostic performance of CT-FFR.

Methods: In this retrospective study, 107 consecutive patients suspected of coronary artery disease with nitroglycerin administration prior to CT in 2019 were matched to 107 patients without nitroglycerin in 2016. All patients underwent coronary CT and invasive FFR in a month. Vessel-based and patient-based accuracy and diagnostic performance of CT-FFR were compared between the two groups, as well as image quality and coronary evaluability.

Results: A total of 214 patients (56 ± 9 years, 155 men) with 237 target vessels were analyzed, including 120 vessels in nitroglycerin and 117 in non-nitroglycerin group. Per-vessel based accuracy of CT-FFR was higher in nitroglycerin group (80.0% vs. 68.4%, $p = 0.041$). On a per-patient basis, nitroglycerin administration improved the accuracy (83.2% vs. 68.2%, $p = 0.011$), specificity (82.7% vs. 61.9%, $p = 0.014$), PPV (83.6% vs. 58.6%, $p = 0.004$), and AUC (0.83 vs. 0.71, $p = 0.03$) of CT-FFR. Vessel diameters (LADs: 3.1 mm vs. 2.9 mm; LCXs: 2.9 mm vs. 2.7 mm; RCAs: 3.7 mm vs. 3.4 mm) and number of evaluable coronary arteries (11.0 vs. 8.0) were larger in nitroglycerin group (all $p < 0.05$).

Conclusions: Nitroglycerin administration prior to coronary CT has positive effects on diagnostic performance of CT-FFR.

PO-0954

Arrhythmogenic right ventricular cardiomyopathy: distribution of late gadolinium enhancement and prognostic assessment by cardiac magnetic resonance

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Abstract

Background: Arrhythmogenic right ventricular cardiomyopathy (ARVC) is an inherited cardiomyopathy with multiple phenotypes. It can lead to ventricular arrhythmias and sudden cardiac death. The segmental distributing characteristics of late gadolinium enhancement (LGE) in ARVC patients remain unknown. Additionally, the prognostic value of cardiac magnetic resonance (CMR) in ARVC patients is not yet fully understood.

Methods: This study retrospectively analyzed 124 patients with ARVC who underwent a CMR scan (period 2016–2021). They were divided into two groups based on whether the left ventricular free wall was affected: the right dominant variants (Group 1, $n=75$) and the biventricular dominant variants (Group 2, $n=49$). Imaging features and the distribution of LGE were collected as well as their clinical and laboratory data. Patients were followed up for a median of 22 months (range 1–82) for the composite endpoint of a heart transplant and all-cause death. The purpose of our study

is to explore the distribution pattern of late gadolinium enhancement (LGE) in ARVC patients as well as the predictive value of multiple CMR parameters on adverse cardiovascular outcomes.

Results: 75 right dominant subjects (age 30.3 ± 10.6 y, 33% female) and 49 biventricular dominant controls (age 30 ± 14 y, 31% female) were included. LV global circumferential strain (GCS) and global longitudinal strain (GLS), RV global radial strain (GRS) and GLS were lower in rTOF patients ($p < 0.01$ for all). LVEF and LVESVi were significantly associated with all LV global (2D and 3D) systolic strain parameters and RV global 2D radial and circumferential strain. After a median follow-up of 1.7 years (range 0.3-4.6 years), there were 3 deaths and 3 heart transplants. By Cox-regression analysis, LVGCS and LVGLS were both independent predictors of the composite endpoint.

Conclusion: CMR shows high diagnostic value for ARVC patients in different phenotypes. Multiple CMR parameters show predictive value on adverse clinical events. LVEF, LV-GCS and left atrial GLS are independent predictors of the composite endpoint of death and heart transplant.

PO-0955

The combined effects of diabetes and its comorbidities on lower extremity peripheral artery disease: A computed tomography angiography study

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Background and aims: The underlying combined effect of diabetes mellitus (DM) and its comorbidities on peripheral artery disease (PAD) is unclear. This study aimed to determine the effect of DM and its comorbidities on the burden of lower extremity PAD based on the global limb anatomic staging system (GLASS) stage using computed tomography angiography (CTA).

Methods: Data from 166 consecutive patients with DM and 166 matched controls who had undergone lower extremity CTA examination were analyzed. Arterial calcification (ACal), femoropopliteal grade, infrapopliteal grade, and overall GLASS stage were evaluated and compared at per-patient and per-artery levels.

Results: On the per-patient level, the DM group had a number higher of patients with ACal $> 0\%$ (117/166 vs. 49/166, $p < 0.001$), and lower extremity vascular GLASS stage $\geq I$ (141/166 vs. 104/166, $p < 0.001$) and were more likely to have bilateral lower extremity involvement (110/141 vs. 45/104, $p < 0.001$) than controls. On the per-artery level, age, DM, diabetic foot, dyslipidemia, hypertension, and renal insufficiency were associated with severe ACal (all $p < 0.05$). Smoking (odds ratio [OR] = 2.68, $p = 0.001$), hypertension (OR = 2.66, $p = 0.001$), and renal insufficiency (OR = 4.33, $p < 0.001$) were associated with an increased risk of stage $\geq I$, and dyslipidemia (OR = 1.76, $p = 0.022$; OR = 1.67, $p = 0.047$) and renal insufficiency (OR = 4.25, $p < 0.001$; OR = 3.83, $p < 0.001$) were associated with an increased risk of stage $\geq II$ and stage III, respectively.

Conclusions: DM is related more frequently to lower extremity ACal, PAD, and bilateral lower extremity involvement, and its comorbidities increase the burden of lower extremity PAD, among which dyslipidemia and renal insufficiency significantly increase the risk of severe PAD in the context of DM.

PO-0956

Machine learning prediction of obstructive coronary artery disease in PLWH: a new model based on HIV-specific factors.

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Objectives: The traditional models for evaluating the pretest probability of obstructive coronary artery disease (CAD) are only applicable to the general population. However, people living with HIV (PLWH) experience a higher CAD risk. We aim to develop a machine learning (ML) model to predict obstructive CAD ($\geq 50\%$ stenosis) on coronary CT angiography (CCTA) in the subclinical PLWH.

Methods: We compared the RF model established by random forests with traditional models (CAD consortium basic, CAD consortium clinical, CONFIRM score, and Genders clinical model) in a retrospective cohort of PLWH who underwent CCTA. In addition, we used logistic regression to build the LR model for comparison with the RF model. Predictive performance of the above models was evaluated according to DeLong et al.

Results: Overall 304 PLWH (age 48 ± 11 years, 91.1% males) were analyzed, of whom 64 (21.1%) had obstructive CAD. The RF model (AUC of 0.914) had the highest discrimination for obstructive CAD compared with the LR model, CAD consortium basic, CAD consortium clinical, CONFIRM score, and Genders clinical model (AUC of 0.827, 0.772, 0.754, 0.753 and 0.753, respectively). $P < 0.05$ for all comparisons.

Conclusion: The RF model incorporating cardiovascular risk factors and HIV-specific factors can more accurately estimate the pretest likelihood of obstructive CAD in PLWH than traditional models. In clinical practice, the use of such a model can improve risk stratification in HIV populations and help guide downstream management.

PO-0957

The relationship between quantitative parameters of pericoronary adipose tissue and coronary artery plaque types based on spectral CT

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Purpose: Dual-layer spectral detector computed tomography (SDCT) can derive multiple parameter images, which can be used for multiple quantitative parameter measurement. This study aimed to assess the relationship between quantitative parameters of pericoronary adipose tissue (PCAT) and coronary artery plaque types based on spectral CT.

Methods: Patients with coronary atherosclerosis disease were collected and underwent coronary CT angiography (CCTA) with SDCT. They were divided into three groups based on the plaque type at the most stenotic lumen: calcified plaque (CP), non-calcified plaque (NCP) and low-density non-calcified plaque (LD-NCP). Peri-plaque fat attenuation index (FAI) of the most stenotic lumen were measured on conventional image (120kVp), virtual mono-energetic images (VMI) from 40 keV to 100 keV and virtual non-contrast image (VNC). The slope of spectral attenuation curve (λ) at 40-70 keV interval, 40-100 keV interval and 70-100 keV interval were calculated, respectively. Effective atomic number (ZEFF) of peri-plaque PCAT was measured meanwhile.

Results: 231 coronary arteries with plaques and lumen stenosis were finally enrolled, of which 66 vessels with CP, 92 vessels with NCP and 73 vessels with LD-NCP. Peri-plaque FAI_{120kVp}, FAI_{VMI}, FAI_{VNC}, λ and ZEFF_{PCAT} were significantly different in the three groups ($P < 0.05$).

Among the multiple quantitative parameters of PCAT, LD-NCP group was higher than NCP group, and NCP group was higher than CP group.

Conclusion: Quantitative parameters of peri-plaque PCAT derived from spectral CT is closely related to plaque types of coronary. It is a potential non-invasive examination method in assessing the high-risk plaque and plaque vulnerability, especially on non-contrast images.

PO-0958

Evaluation of peri-plaque pericoronary adipose tissue attenuation in coronary atherosclerosis using spectral CT

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Purpose: Pericoronary adipose tissue (PCAT) is a biomarker of coronary inflammation. This study aimed to evaluate which of the fat attenuation index (FAI) at proximal part of the most stenosis lumen or peri-plaque PCAT is more valuable in evaluating coronary atherosclerosis.

Methods: Patients with coronary atherosclerosis were enrolled and underwent coronary CT angiography (CCTA) with dual-layer spectral detector CT (SDCT). Plaque type was classified as calcified plaque (CP), non-calcified plaque (NCP) and low-density non-calcified plaque (LD-NCP). Lumen stenosis was classified as mild stenosis, moderate stenosis and severe stenosis. Proximal and peri-plaque fat attenuation index (FAI) of the most stenotic lumen were measured both on conventional image (120kVp) and virtual mono-energetic images (VMI) from 40 keV to 100 keV. The slope of spectral attenuation curve (λ) at 40-70 keV interval, 40-100 keV interval and 70-100 keV interval were calculated, respectively.

Results: 231 coronary arteries with plaques and lumen stenosis were finally enrolled. Proximal and peri-plaque FAI increased with the stenotic degree of coronary artery. Peri-plaque FAI_{120kVp} and FAI_{VMI} were significantly higher in severe stenotic vessels than in mild and moderate stenotic vessels ($P < 0.05$), while λ of proximal and peri-plaque PCAT attenuation were not statistically different ($P > 0.05$), neither was the proximal FAI of vessels with different degrees of stenosis ($P > 0.05$). Peri-plaque FAI_{120kVp}, FAI_{VMI}, and λ were significantly higher in LD-NCP and NCP than in CP ($P < 0.01$). The values were the highest in LD-NCP group. Proximal FAI_{120kVp} and FAI_{VMI} were also significantly different in different plaque types ($P < 0.05$), but the highest FAI values were in NCP group. λ of proximal PCAT attenuation were not statistically different in different plaque types ($P > 0.05$).

Conclusion: Peri-plaque PCAT has much value in assessing coronary atherosclerosis than proximal PCAT. Peri-plaque PCAT attenuation is expected to be used for evaluation of plaque vulnerability and hemodynamic characteristics.

PO-0959

Cardiac MRI-based study of characteristic quantitative parameters in uremic cardiomyopathy patients

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AIMS: Left ventricular hypertrophy is the most common manifestation of cardiomyopathy caused by chronic kidney disease (CKD). This study aimed to find out the characteristic cardiac magnetic resonance imaging (CMR) signatures in uremic cardiomyopathy (UC) patients compared with hypertensive, hypertrophic cardiomyopathy patients and healthy controls.

METHODS: This retrospective study included 53 patients with UC, 39 patients with essential hypertension (HTN), 30 patients with hypertrophic cardiomyopathy (HCM) and 30 healthy controls who underwent routine CMR at the First Hospital of China Medical University from June 2016 to March 2023.

RESULTS: UC patients demonstrated significantly higher native myocardial T1 and T2 values compared with the other three groups. UC patients revealed significantly higher GCS, RLSR and CLSR compared with HCM and HTN patients, whereas all these three parameters were lower in the patient groups than controls. According to Pearson correlation coefficient, there was a significant correlation between T1 and T2 values in UC patients ($r=0.511$, $p<0.001$) while no correlations were shown in other three groups. T1, RLSR and GCS (AUC 0.711, 95% CI: 0.604-0.819; AUC 0.706, 95% CI: 0.597-0.815; AUC 0.706, 95% CI: 0.591-0.821; respectively, $P<0.01$ for all) were discriminators for UC and HTN patients. T1, T2, RLSR and CLSR (area under ROC curve (AUC) 0.719, 95% confidence interval (CI): 0.598-0.841; AUC 0.730, 95% CI: 0.617-0.843; AUC 0.774, 95% CI: 0.663-0.885; AUC 0.718, 95% CI: 0.600-0.836; respectively, $P<0.01$ for all) were discriminators for UC and HCM patients.

CONCLUSIONS: Our findings revealed several characteristic CMR signatures in UC patients. Native T1 and T2 was significantly raised and had a significant correlation in UC patients compared with other groups. They enable clinicians to further distinguish the causes of cardiac hypertrophy in CKD patients so that the patients will be treated more appropriately.

PO-0960

Quantitative evaluation of diffuse myocardial fibrosis in patients with hypertension by late iodine enhancement quantified extracellular volume fraction based on Dual-layer Spectral Detector CT

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Purpose: To quantify the severity of diffuse myocardial fibrosis in patients with hypertension by extracellular volume fraction (ECV) derived from late iodine enhancement (LIE) via Dual-layer Spectral Detector CT (SDCT).

Materials and methods: The validation group consisted of 1 patient with aortic stenosis, 3 with hypertension and 6 healthy subjects. All subjects completed cardiac magnetic resonance (CMR) and SDCT examination, and CMR-ECV and CT-ECV were calculated by T1 mapping and LIE images, respectively, and were compared. Then, 25 subjects with hypertension were included as the case group, which were divided into two subgroups based on left ventricular ejection fraction (LVEF), hypertensive patients with preserved LVEF ($LVEF \geq 50\%$, $n=14$, Gp) and patients with reduced LVEF ($40\% < LVEF < 50\%$, $n=11$, Gr). 20 subjects without heart disease and hypertension were enrolled as the control group (Gc). Patients and controls underwent LIE to calculate CT-ECV according to the American Heart Association 16-segment models. Statistical analysis included paired t-test, Bland-Altman analysis, intra-class correlation coefficients (ICC), independent samples t test, Welch ANOVA test and Kruskal-Wallis test.

Results: In the validation group, there were no significant difference between CT-ECV and CMR-ECV (29.66 ± 4.17 vs 29.38 ± 4.57 , $P>0.05$) and CT-ECV correlated with CMR-ECV ($r=0.946$, $P<0.001$). CT-ECV matched well with CMR-ECV with insignificant bias (0.3%; 95% CI: -2.4% to 2.9%). The inter- and intra-observer agreement for CT-ECV were 0.902 and 0.946, respectively. Compared with the control group, the CT-ECV were increased in patients with hypertension 28.72 (1.97) vs. 27.00 ± 1.32 , $P<0.05$. Based on subgroup analysis, compared with the control group, the CT-ECV were only increased in the patients with reduced LVEF 29.97 (1.68) vs. 27.00 ± 1.32 , $P<0.05$, but not in the patients with preserved LVEF 28.37 (2.51) vs. 27.00 ± 1.32 , $P>0.05$.

Conclusions: CT-ECV derived from LIE via SDCT is a reliable imaging marker with good repeatability for quantifying diffuse myocardial fibrosis. Furthermore, CT-ECV was found to be increased in hypertensive patients with reduced LVEF.

PO-0961

Artificial intelligence for segmentation and classification of lobar, lobular, and interstitial pneumonia using case-specific CT information

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Objective: Pneumonia can be anatomically classified into lobar, lobular, and interstitial types, each associated with different pathogens. Utilizing artificial intelligence to determine the anatomical classifications of pneumonia and assist in refining the differential diagnosis may offer a more viable and clinically relevant solution. This study aimed to develop a multi-classification model capable of identifying the occurrence of pneumonia in patients by utilizing case-specific CT information, categorizing the pneumonia type (lobar, lobular, and interstitial pneumonia), and performing segmentation of the associated lesions.

Methods: Sixty-one lobar pneumonia patients, 60 lobular pneumonia patients, and 60 interstitial pneumonia patients were consecutively enrolled at our local hospital from June 2020 and May 2022. All selected cases were divided into a training cohort (n=135) and an independent testing cohort (n=46). To generate the ground truth labels for the training process, manual segmentation and labeling were performed by three junior radiologists. Subsequently, the segmentations were manually reviewed and edited by a senior radiologist. Artificial intelligence models were developed to automatically segment the infected lung regions and classify the pneumonia. The accuracy of pneumonia lesion segmentation was analyzed and evaluated using the Dice coefficient. Receiver operating characteristic curves were plotted, and the AUC (Area Under the Curve), accuracy, precision, sensitivity, and specificity were calculated to assess the efficacy of pneumonia classification.

Results: Our artificial intelligence model achieved a Dice coefficient of 0.743(95%CI: 0.657-0.826) for lesion segmentation in the training set and 0.723(95%CI: 0.602-0.845) in the test set. In the test set, our model achieved an accuracy of 0.927(95%CI: 0.876-0.978), precision of 0.889(95%CI: 0.827-0.951), sensitivity of 0.889(95%CI: 0.827-0.951), specificity of 0.946(95%CI: 0.902-0.990), and AUC of 0.989 for pneumonia classification. We trained the model using labels annotated by senior physicians and compared it to a model trained using labels annotated by junior physicians. The Dice coefficient of the model's segmentation improved by 0.014, increasing from 0.709(95%CI: 0.589-0.830) to 0.723(95%CI: 0.602-0.845), and the AUC improved by 0.042, rising from 0.947 to 0.989.

Conclusions: In conclusion, our study presents a robust multi-task learning model with substantial promise in enhancing the segmentation and classification of pneumonia in medical imaging.

PO-0962

Development and validation of a Nomograph based on CAC and clinical features for diagnosis of obstructive coronary artery disease in Military Personnel

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Objective: Objective To explore the associations between military cardiovascular risk factors, coronary artery calcium score (CACS), and obstructive coronary artery disease (CAD), as well as the incremental value of CAC, and whether intuitive and accurate models for the diagnosis and prediction of obstructive coronary artery disease (OCD) can be developed and validated.

Methods: The 4498 military personnel who were undergoing coronary CT angiography (CCTA) excluded patients with poor image quality and a history of percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), resulting in the inclusion of 3859 military personnel. For all patients, the degree of luminal stenosis and CACS are measured. Obstructive coronary artery disease is defined as $\geq 50\%$ stenosis on CCTA. According to CACS, patients are divided into four groups: CACS=0, $0 < \text{CACS} \leq 100$, $101 < \text{CACS} \leq 400$, and $\text{CACS} > 400$. Mann-Whitney U test, Kruskal-Wallis H test, logistic regression model and ROC curve are used for statistical analysis. The model built on CAC was compared with a cardiovascular risk factor model, and then the CAC model was compared with a CAC+ cardiovascular risk factor model to assess the continuity and classification of the model for net reclassification improvement (NRI) and integrated discrimination improvement (IDI). A nomogram is generated based on the multivariate logistic regression analysis, to identify potential predictors associated with obstructive coronary artery disease. The performance of the nomogram is evaluated for discrimination, calibration, and clinical utility.

Results: Age, gender, diabetes mellitus, dyslipidemia, hypertension, current smoking, and drinking are all risk factors for the development of obstructive CAD (OR=1.083, $P < 0.0001$; OR=1.582, $P = 0.001$; OR=3.308, $P < 0.0001$; OR=5.496, $P < 0.0001$; OR=4.789, $P < 0.0001$; OR=2.021, $P < 0.0001$; OR=2.330, $P < 0.0001$). Compared with CAC=0, $0 < \text{CACS} \leq 100$, $101 < \text{CACS} \leq 400$, and $\text{CACS} > 400$ are risk factors for obstructive CAD (OR=8.739, $P < 0.0001$; OR=45.193, $P < 0.0001$; OR=199.752, $P < 0.0001$). CACS has incremental value for cardiovascular risk factors (NRI=0.191, $P < 0.001$). Military data from 2927 training set are analyzed to build the nomogram. Obstructive CAD is associated with 7 factors: age, gender, hypertension, Diabetes mellitus, $0 < \text{CAC} \leq 100$, $101 < \text{CAC} \leq 400$, and $\text{CAC} > 400$. The model achieves a concordance index of 0.899 and has a well-fitted calibration curve and good clinical application value.

Conclusion: In the military population, age, gender, diabetes and hyperlipidemia are all risk factors for coronary artery obstruction disease. CACS has incremental value for cardiovascular risk factors. Nomograms incorporating CACS have high accuracy in predicting obstructive CAD.

PO-0963

Myocardial Extracellular Volume Fraction from Late Iodine Enhancement with Spectral Detector Computed Tomography for Risk Stratification in Non-ischemic Heart Failure

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Purpose:

Our previous study demonstrated that CT-ECV derived from LIE can serve as an excellent alternative to CMR-ECV in noninvasively quantifying diffused myocardial fibrosis. We will further explore the potential of CT-ECV derived from late iodine enhancement (LIE) via using dual-layer spectral detector computed tomography (SDCT) for disease risk stratification in patients with non-ischemic heart failure (NIHF).

Methods and Materials:

Eighty-two NIHF patients (52±13 years, 21 female) underwent SDCT. CT-ECV was calculated based on LIE images according to AHA's 16-segmentation. Clinical data of NIHF patients were reviewed and patients were followed up for primary clinical endpoints, the primary clinical endpoint was the first occurrence of a major adverse cardiovascular event (MACE), which included hospital admission for heart failure and all-cause mortality. Receiver operating curve (ROC curve) and area under curve (AUC) were used to evaluate the prediction model. ROC curve and Yoden index determine the optimal cut-off value of CT-ECV. Kaplan-Meier curve and log-rank test were used to analyze the relationship between MACE and CT-ECV of patients with NIHF.

Results:

Clinical outcome data were collected from 82 patients with NIHF after a median follow up of 10 months (interquartile range: 5 to 13). Final status check was performed during March 2023, and 7 patients lost follow-up. 31 (41.3%) of the 75 patients with MACE, including 28 (37.3%) patients were hospitalized for heart failure, and all-cause mortality occurred in 3 (4%) patients. The ROC curves demonstrated CT-ECV ≥ 31.28 % to be the optimal cut-off point for MACE with 83.9% sensitivity, 75% specificity and the area under the ROC curve = 0.863 (95% CI 0.782 to 0.944). Kaplan-Meier survival curves and Log-rank test demonstrate that NIHF patients with CT-ECV ≥ 31.28% had higher probability of MACE than NIHF patients with CT-ECV < 31.28%.

Conclusions:

CT-ECV derived from Late Iodine enhancement can assist in risk stratification in patients with non-ischemic heart failure.

PO-0964

Incremental prognostic value of myocardial radiomics derived from coronary CTA over clinical and CTA findings in patients with stable angina: a multicenter study

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Objective To investigate additional risk stratification benefits of myocardial radiomics derived from coronary CTA (CCTA) over clinical and CTA findings in patients with stable angina.

Methods A total of 977 patients (mean age 64.2±10.3 years; 45% male; training/test cohort, 683/294) with stable angina who underwent CCTA were retrospectively included from three hospitals. The endpoints of this study were major adverse cardiovascular events (MACE). Clinical features (baseline demographics, cardiovascular risk factors, and medications) and CTA findings (segment stenosis score [SSS], segment involvement score [SIS], three-vessel plaque score [TVPS], and severe proximal plaque score [SPPS]) were analyzed to identify the independent predictors. The left ventricular myocardium was segmented from CCTA images, and the radiomics features were extracted and assessed to build a radiomics signature (RS). A radiomics nomogram was constructed by combining the independent clinical and CTA predictors with the RS. The performance of the models was evaluated with concordance index (C-index), hazard ratio (HR), time-dependent area under the receiver operating characteristics curve (time-AUC), and clinical usefulness.

Results During a median follow-up of 3.6 years, MACE was observed in 122 (12.5%) patients. Age, body mass index, dyslipidemia, and SPPS were proven as independent predictors for MACE (C-index, 0.677, test cohort). The RS was significantly associated with MACE (C-index, 0.718; HR, 4.154, test cohort). By adding the RS to the clinical and CTA predictors, the radiomics nomogram provided a higher C-index (0.768, test cohort), higher time-AUCs, and higher clinical net benefit. In subgroup analyses in patients with diabetes mellitus and hypertension, the RS had additive predictive value for MACE over the clinical and CTA findings.

Conclusion In patients with stable angina, evaluation of CCTA-derived myocardial radiomics enables more accurate prediction of patients at higher risk of MACE.

PO-0965

Predicting Lymphovascular Invasion in Non-Small Cell Lung Cancer Using Deep Convolutional Neural Networks on Preoperative Chest CT

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Purpose: To investigate the predictive capability of various models within a deep neural network framework for identifying lymphovascular invasion (LVI) in chest CT images of non-small cell lung cancer (NSCLC).

Materials and Methods: This retrospective observational study included a series of consecutive patients who underwent surgical resection for NSCLC and received pathologically confirmed diagnoses. The cohort was randomly divided into a training group comprising 70% of the patients and a validation group comprising the remaining 30%. Four distinct deep convolutional neural network (DCNN) prediction models were developed, incorporating different combination of two-dimensional (2D) and three-dimensional (3D) CT imaging features as well as clinical-radiological data. The predictive capabilities of the models were evaluated by receiver operating characteristic curves (AUC) values and confusion matrices. The Delong test was utilized to compare the predictive performance among the different models.

Results: A total of 3,034 patients with NSCLC were recruited in this study including 2,832 adenocarcinomas, 138 squamous cell carcinoma, 46 adenosquamous carcinoma, and 18 other subtypes. In the validation cohort, the Dual-head Res2Net_3D_23F model achieved the highest AUC of 0.869, closely followed by the models of Dual-head Res2Net_3D_3F (AUC, 0.868), Dual-head Res2Net_3D (AUC, 0.867), and EfficientNet-B0_2D (AUC, 0.857). There was no significant difference observed in the performance of the EfficientNet-B0_2D model when compared to the Dual-head Res2Net_3D_3F and Dual-head Res2Net_3D_23F.

Conclusion: Findings of this study suggest that utilizing deep convolutional neural network is a feasible approach for predicting pathological lymphovascular invasion in patients with NSCLC.

PO-0966

Left Ventricular Entropy is a novel predictor of major adverse cardiac events (MACE) in patients with coronary atherosclerosis: A multi-center study

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AbstractObjectives: To investigate the incremental prognostic value of left ventricular (LV) entropy in a large multi-center population with coronary atherosclerotic heart disease (CAD).

Background: Current risk stratification of patients with CAD is imprecise and not accurate enough.

Methods: A total of 314 CAD patients who underwent cardiovascular magnetic resonance (CMR) late gadolinium enhancement (LGE) at two medical centers in China between October 2015 and July 2022 were included in this study. Additionally, the 193 patients under 3.0T field also underwent CMR T1 mapping. LV entropy and extracellular volume (ECV) were calculated from the LGE image of LV myocardium, and major adverse cardiac events (MACE) were analyzed.

Results: Among 314 patients, 110 experienced MACE during a median follow-up of 13 months. The risk of MACE was significantly increased in the high entropy group (log-rank $P < 0.001$). Entropy maintained an independent association with MACE in a multivariable model including left ventricular ejection fraction (LVEF) and LGE (HR=1.78; $P = 0.001$). In addition, the primary endpoint events prognostic value was significantly improved by adding LV entropy to the baseline multivariable model (C-statistic improvement: 0.785-0.818, Delong test: $P = 0.001$). Similarly, among 193 3.0T field patients, adding LV entropy to the multivariable baseline model significantly improved the prognostic value of the model for MACE (C-statistic improvement: 0.820-0.898, Delong test: $P = 0.004$).

Conclusion: CMR-assessed LV entropy is a powerful independent predictor of MACE in patients with CAD, incremental to common clinical and CMR risk factors, including LVEF, LGE, Native T1 and ECV.

PO-0967

Entropy for the Assessment of Myocardial Fibrosis in Non-ischemic Cardiomyopathy

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Abstract

Background: Entropy of left ventricular (LV) wall can predict cardiac adverse events. However, its mechanistic insights and the underlying link of entropy with markers of myocardial fibrosis were unclear.

Objectives: This study aimed to explore the correlation between entropy of LV wall derived from late gadolinium enhancement (LGE) and imaging markers of myocardial fibrosis, including native T1 and extracellular volume (ECV) fraction in non-ischemic cardiomyopathy (NICM).

Methods: A total of 602 subjects with NICM and 106 age and gender-matched healthy controls who underwent cardiac magnetic resonance (CMR) were retrospectively enrolled. The correlation between native T1/ECV and LV entropy was measured in NICM patients and the ability of LV entropy for detecting myocardial fibrosis was estimated.

Results: LV wall entropy was positively correlated with both native T1 and ECV ($r = 0.430$ and $r = 0.533$, respectively; $p < 0.001$) in all NICM patients. In subgroups of dilated cardiomyopathy (DCM), hypertrophic cardiomyopathy (HCM), left ventricular noncompaction (LVNC) and hypertensive heart disease (HHD) patients, LV entropy also showed moderate to strong positive correlation with

native T1 and ECV ($p < 0.05$). Furthermore, the diagnostic performance of entropy between low ECV in LGE-negative patients and healthy controls were considerable ($AUC = 0.95$, $p < 0.001$). Conclusion: LV entropy exhibited comparable ability as native T1/ECV in the display of myocardial fibrosis, and therefore diffuse myocardial fibrosis in NICM may be reliably assessed by LV entropy. In addition, LV entropy could detect diffuse myocardial fibrosis earlier than native T1 and ECV in NICM.

PO-0968

Coronary computed tomography angiography compared with standard of care for evaluation of NSTEMI-ACS: a meta-analysis of randomised controlled trials

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Purpose: 2020 ESC guidelines for non-ST-segment elevation acute coronary syndrome (NSTEMI-ACS) updates that coronary CT angiography (CCTA) is the class I recommendation to exclude ACS when there is a low-to-intermediate likelihood of coronary artery disease (CAD) and when cardiac troponin and/or ECG are normal or inconclusive. The aim is to perform a meta-analysis comparing CCTA with standard-of-care (SOC) approach on management and clinical outcomes in evaluation of patients suspected of NSTEMI-ACS.

Method: We systematically search Pubmed, Embase, and Cochrane for randomized controlled trials (RCT) that compared CCTA vs SOC in patients with acute chest pain to the emergency department (ED) and suspected/confirmed NSTEMI-ACS. End points evaluated are incidence of hospital readmissions, repeat ED visits, referral to invasive coronary angiography (ICA), revascularization, and major adverse cardiac events (MACE). Pooled odds ratio (OR) and their 95% confidence intervals (CI) are calculated using random-effects models.

Result: Seventeen RCTs with 9210 patients (CCTA: 4872, SOC: 4338) were included. No statistically significant difference was noted between two arms with regards to hospital readmissions (OR 0.80, 95%CI 0.55–1.16, $P=0.24$, $I^2=51\%$), repeat ED visits (OR 0.99, 95%CI 0.78–1.26, $P=0.96$, $I^2=49$), MACE (OR 1.02, 95%CI 0.77–1.36, $P=0.88$, $I^2=31$) and referral to ICA (OR 1.25, 95%CI 0.95–1.65, $P=0.11$, $I^2=73$). However, significantly higher rates of revascularization (OR 1.42, 95%CI 1.09 - 1.85, $p=0.009$) were observed in the CCTA arm (Figure). Conclusion: In patients suspected of NSTEMI-ACS, CCTA increases revascularization rate and does not improve clinically relevant patient outcomes compared with SOC.

PO-0969

Myocardial viability under various ischemic burdens in chronic total occlusions: a stress-cardiac magnetic resonance study

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Objectives: This study aimed to analyze each myocardial segment's ischemic burden, scarring, function, and viability by late gadolinium enhancement (LGE) imaging and stress perfusion CMR using adenosine, and provide a basis for assessing myocardial viability before revascularization in patients with CTO.

Methods: This study prospectively recruited 80 patients from our hospital between August 2021 and August 2022. All patients had scanning prior to revascularization. Two experienced radiologists evaluated the volume of perfusion defects at rest and pressure for each segment as a percentage of the total volume of that corresponding segment. Moreover, segments without perfusion defect were defined as the no ischemic group, segments with a perfusion defect of $\leq 50\%$ were defined as a low ischemic burden group, and segments with a perfusion defect of $> 50\%$ were defined as a high ischemic burden group. "Segmental wall thickening (SWT)" was defined as the absolute difference between the end-diastolic and end-systolic wall thickness. Finally, viability was defined by dysfunctional myocardium (< 3 mm segmental wall thickening [SWT]) and $\leq 50\%$ late gadolinium enhancement (LGE).

Results: A total of 445 segments in the CTO territory were analyzed, scar tissue was found in the CTO territory, with LGE evident in 18.2% of CTO segments totaling $> 50\%$. Among the different ischemic burden groups, there were significant differences in LGE volume ($p < 0.01$), and the trend of SWT was consistent with the degree of myocardial ischemia. The incidence of $\leq 50\%$ LGE and viable myocardium was higher in segments of the no ischemia and low ischemic burden groups. However, there was no significant difference in the incidence of dysfunctional myocardial segments among the three groups ($P > 0.05$).

Conclusions: Stress MRI parameters can accurately and in detail assess myocardial viability and function, so multi-parameter joint assessment of CTO patients by stress MRI will help in treatment decisions.

PO-0970

Right Ventricular Function Predicts Outcome in Heart Failure with Preserved Ejection Fraction: Strain Analysis Derived from MR Feature-Tracking

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Background: Left ventricular (LV) strain derived from cardiac magnetic resonance feature tracking (CMR-FT) has emerged as a powerful predictor of poor prognosis in patients with heart failure with preserved ejection fraction (HFpEF). Right ventricular (RV) function is an independent determinant of patient clinical status and prognosis in cardiovascular diseases; however, limited data are available on the prognostic value of RV function assessed by strain analysis in patients with HFpEF. The purpose of this study is to evaluate the association between RV strain parameters derived from CMR-FT and primary composite outcomes (all-cause death or heart failure hospitalization) in patients with HFpEF.

Methods: Patients with HFpEF who underwent CMR examination between January 2010 and September 2012 were retrospectively enrolled. FT strain analysis was performed to measure LV, left atrial (LA), and RV strain parameters (strain and strain rate). The correlations between strain parameters and other CMR-derived variables were analyzed by linear regression. The association between variables and clinical outcomes was assessed by Cox proportional regression and Kaplan-Meier survival analysis. Receiver operating characteristic (ROC) analysis was performed to determine the best cut-off value for strain parameters.

Results: A total of 299 consecutive patients with HFpEF (59 ± 11 years; 97 women) were enrolled in this study. The LV and RV strain parameters of all patients were analyzed. RV global circumferential strain (RV-GCS) was weakly but significantly correlated with LV ejection fraction ($r = -0.303$, $P < 0.001$), LA ejection fraction ($r = -0.193$, $P < 0.001$), RV ejection fraction ($r = -0.267$, $P < 0.001$), and RV end-systolic volume ($r = 0.242$, $P < 0.001$). During a median follow-up of 11.0 years (interquartile range, 10.5-11.7 years), 153 patients reached the primary composite outcomes. In multivariable Cox regression analysis, impaired RV-GCS ($> -16.6\%$) was the only strain

parameter associated with a greater rate of all-cause death or heart failure hospitalization (hazard ratio, 2.0 [95% CI: 1.3, 3.1]; $P = .003$) after adjusting for multiple clinical and CMR-derived variables.

Conclusion: RV-GCS derived from CMR-FT was an independent predictor of adverse clinical outcomes in patients with HFpEF, and it provided incremental prognostic value over traditional clinical and CMR-derived risk markers.

PO-0971

急性心梗 PCI 术后心脏 MRI 室壁运动分析

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目的: 研究急性心梗 PCI 术后心脏 MRI 节段性室壁运动变化及其对预后的预测价值。**材料和方法:** 本研究获得医院伦理委员会批准, 患者书面知情同意。18 例急性心梗患者接受 PCI 及常规内科治疗, 对所有患者行基线、6 个月、12 个月随访心脏增强 MRI 检查, 其中 12 例患者完成 12 个月随访检查。扫描采用 GE Signal HDXT 1.5T MRI 机, 序列采用左室短轴位电影序列, 2D 延迟增强序列。造影剂采用 Gd-DTPA, 0.2mmol/kg, 流率: 4.0ml/s, 10-15 分钟延迟。所得图像在 report CARD4.0 中行左室射血分数及左室舒张末期容积及梗死区域治疗 ROI, 总体 ROI 及 ROI% 计算。

在 SEGMENT 软件中左室壁内外边界被自动描记, 经过人工微调后, 自动计算室壁运动数据并生成 17 段牛眼图, 节段性室壁运动参数包括: 最大膨胀速度 (瞬时最大速度)、最大收缩速度 (瞬时最大速度)、峰值充盈率时膨胀速度、峰值射血率时收缩速度、最大壁厚、平均收缩末期壁厚, 平均舒张末期壁厚, 壁厚分数及心肌容积等。统计分析在 SPSS13.0 中采用 T 检验和相关分析。

结果: 18 例患者中, 男 14 例, 女 4 例, 年龄中位数 59 岁。全部梗死区域隶属左冠状动脉供血区, 分布于 AHA 第 7-15 节段。统计分析发现基线和 6 月比较, 最大收缩速度 (瞬时最大速度) 和峰值充盈率时膨胀速度于梗死段和非梗死段均存在显著性差异。梗死区基线最大收缩速度 (瞬时最大速度) 和充盈率时膨胀速度均减低, 6 月后恢复最好, 12 月随访二者均减低, 但未出现显著性差异。6 月梗死段较非梗死段最大壁厚存在显著性差异; 梗死段最大壁厚增加。在随访中心肌容积持续下降, 这一趋势于梗死段心肌更为显著。基线与 6 个月左室舒张末期容积与左室射血分数负相关:

($p=0.001$, $r=-0.632$, $r=-0.750$), 与 ROI、总体 ROI 正相关 ($p=0.001$, $r=0.650$, 0.615 ; $r=0.652, 0.492$)。基线与 6 个月比较, 左室射血分数与 ROI、ROI% 负相关 ($p=0.001$, $r=-0.590$, -0.624 , $r=-0.617, -0.661$)。12 月左室舒张末期容积与总体 ROI 正相关 ($p=0.001$, $r=0.870$), 左室射血分数与 ROI 负相关 ($p=0.011$, $r=-0.790$)。

结论: 利用 CMR 对急性心梗 PCI 术后进行节段性室壁运动定量评价是可行的。最大收缩速度和峰值充盈率时膨胀速度可能成为评价心脏泵血功能损害的敏感指标。

Purpose: To find out changes in segmental ventricular wall motion and value of prognostic predication with cardiac MRI in acute myocardial infarction after PCI.

Material and method: Institutional ethics committee approval and written informed consent were obtained. 18 consecutive patients with acute myocardial infarction underwent routine medical and PCI therapy. All 18 patients were performed baseline, 6 months follow-up with cardiac MRI. 12 patients fulfilled 12 months follow-up. Examination was performed in GE Signal HDXT 1.5T. Scan sequences used short-axis left ventricular view in FIESTA. The derived images were processed with SEGMENT in workstation. The ventricular wall motion was described by maximal expansion velocity (temporal max), maximal contraction velocity (temporal max), expansion velocity at peak filling rate (PFR), contraction velocity at peak ejection rate (PER), maximal wall-thickness (temporal max), mean end diastole wall-thickness, mean end systole wall-thickness, wall-thickening, fractional wall-thickening and myocardial volume. Statistics procedure used SPSS 13.0, including T-test and correlation analysis.

Result: 18 patients were studied including 14 male and 4 female, media age was 59yr. All infarction zones belong to left coronary artery supply and located in 7-15 segments. In SEGMENT the margin

of myocardium were depicted automatically and revised manually. The motion data were calculated. Statistics analysis revealed Baseline compared with 6 months follow-up the maximal contraction velocity (temporal max) showed significant differences. The two indicators in infarct segments of baseline all decrease then recovered in 6 months follow up and decreased again in 12 months but no significant differences. Maximal wall thickness (temporal max) between infarct and non infarct segments existed significant difference in 6 months follow-up and infarct segments had larger wall-thickness. Myocardial volume decreased continuously in follow-up duration, the trend was more obvious in infarct than non infarct segments. Correlation analysis revealed in baseline and 6 months follow up, LVEDV showed negative correlation with LVEF ($P=0.001$, $r=-0.632$, $r=-0.750$); LVEDV showed positive correlation with ROI and total ROI ($P=0.001$, $r=0.650$, 0.615 ; $r=0.652, 0.492$). LVEF showed negative correlation with ROI% ($P=0.001$, $r=-0.590$). 12 months follow up LVEDV showed positive correlation with total ROI ($P=0.001$, $r=0.870$); LVEF showed negative correlation with ROI ($P=0.011$, $r=-0.790$).

Conclusion: Quantitative evaluation of ventricular wall motion with cardiac MRI in acute myocardial infarction after PCI is available. Contraction and expansion velocity may be sensitive indicators for pump function impairment evaluation.

PO-0972

Association between thoracic skeletal muscle size and adverse outcomes in diabetes patients with heart failure and reduced ejection fraction: Quantitative analysis of sarcopenia by using cardiac MRI

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Background: Sarcopenia is associated with poor quality of life and adverse outcomes. Recent evidence suggests that axial thoracic skeletal muscle size could be used as a surrogate to assess sarcopenia in heart failure with reduced ejection fraction (HFrEF). Since diabetes mellitus (DM) is one of the most common comorbidities with HFrEF, we aimed to explore the potential association of axial thoracic skeletal muscle size with left ventricular (LV) remodeling and determine its prognostic significance in this condition.

Methods: A total of 243 diabetes patients with HFrEF were included in this study. Bilateral axial thoracic skeletal muscle size was obtained using cardiac MRI. Patients were stratified by the tertiles of axial thoracic skeletal muscle index (SMI). LV structural and functional indices, as well as amino-terminal pro-B-type natriuretic peptide (NT-proBNP), were measured.

Results: Patients in the lowest tertile of thoracic SMI displayed a deterioration in LV systolic strain in three components, together with an increase in LV mass and a heavier burden of myocardial fibrosis (all $P < 0.05$). Moreover, thoracic SMI ($\beta = -0.26$; $P < 0.001$), rather than body mass index ($\beta = -0.04$; $P = 0.55$), was independently associated with the level of NT-proBNP. The median follow-up duration was 33.6 months (IQR, 20.4-52.8 months). Patients with composite endpoint events showed a lower thoracic SMI (40.1 [34.3, 47.9] cm^2/m^2 vs. 45.3 [37.3, 55.0] cm^2/m^2 ; $P < 0.05$) but a similar BMI ($P = 0.76$) compared with those without composite endpoint events. Reduced thoracic SMI indicated a higher risk of adverse clinical outcomes (hazard ratio: 0.95; 95% confidence interval: 0.92-0.99; $P = 0.01$).

Conclusions: With respect to diabetes patients with HFrEF, thoracic SMI is a novel alternative for evaluating sarcopenia that can be obtained by a readily available routine cardiac MRI protocol. A reduction in thoracic skeletal muscle size predicts poor outcomes in the context of DM with HFrEF.

PO-0973

Comparative analysis of coronary atherosclerosis score based on coronary CT angiography between hypertension patients with and without type 2 diabetes mellitus

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Purpose:

This study compares CT-based Leaman score (LeSc) and Leiden score in addition to common coronary computed tomography angiography (CCTA) characteristics between type 2 diabetes mellitus (T2DM) and non-diabetic individuals with hypertension.

Methods and Materials:

From January 2018 to December 2022, a total of 1954 patients, including 1000 T2DM and 954 non-diabetic individuals with hypertension found to have coronary plaques on CCTA were retrospectively enrolled. Coronary plaque types, lumen stenosis (score 1: stenosis < 25%; score 2: 25%~49% stenosis; score 3: 50%~69% stenosis; score 4: 70%~99% stenosis; score 5: total occluded; obstructive stenosis: >50%), and diseased vessels (range: 1-4) and segment (range: 1-17) were assessed; any presence of obstructive stenosis was defined as obstructive disease; segment stenosis score (SSS, sum of stenosis score), CT-based Leaman score, and Leiden score were calculated for each patient. Any presence of each plaque type, obstructive stenosis, involved vessel >2, segment involvement score (SIS) >4, SSS>6, CT-LeSc >5 and Leiden score >5 were compared between T2DM and non-diabetic patients. Univariate and multivariate analysis were used for analysing.

Results:

Overall, strong positive correlations between any two of SSS, CT-LeSc and Leiden score was found in all hypertension patients ($r=0.888-0.988$). In this study, hypertension patients with T2DM had more calcified plaques (2.14 ± 2.24 vs 1.52 ± 2.01), partially calcified plaques (2.86 ± 2.84 vs 2.42 ± 2.60), nonobstructive (4.21 ± 2.43 vs 3.65 ± 2.40) and obstructive stenosis (1.24 ± 2.21 vs 0.78 ± 1.50), and obstructive disease (39.6% vs 34.2%), and had higher SIS (5.5 ± 3.1 vs 4.4 ± 3.0), SSS (10.4 ± 8.6 vs 7.7 ± 7.1), CT-LeSc (9.4 ± 5.6 vs 7.9 ± 5.1) and Leiden score (13.8 ± 7.6 vs 11.5 ± 7.1) (all P values <0.05). When adjusted for confounding factors, hypertension patients with T2DM had higher risks of calcified coronary plaques [odds ratio (OR) =2.127; P <0.001], obstructive disease (OR=1.299; P=0.031), involved vessel >2 (OR=1.511; P=0.001), SIS >4 (OR=1.651; P<0.001), SSS >6 (OR=1.478; P=0.001), CT-LeSc >5 (OR=1.638; P<0.001) and Leiden score >5 (OR=2.115; P<0.001). Whether in male or female and ≤ 70 or >70 years old, T2DM was an independent risk factor for calcified plaques, involved vessel >2, SIS >4, SSS >6, CT-LeSc >5 and Leiden score >5 (all P values <0.05) in hypertension patients. Only in male or >70 years old, T2DM was an independent risk factor for obstructive disease (both P values <0.05).

Conclusions:

CT-LeSc and Leiden score might be useful for coronary atherosclerosis assessment for hypertension patients. T2DM is related to the presence of calcified plaques, obstructive disease, and more extensive coronary artery atherosclerosis plaques.

PO-0974

Protective Effects of High-Altitude Hypobaric Hypoxia on Myocardial Infarction: A 7.0T Cardiovascular Magnetic Resonance Study in a Rat Model

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Purpose: The impact of high-altitude hypobaric hypoxia on myocardial infarction (MI) cardioprotection is a subject of ongoing research in cardiovascular studies. This investigation aimed to assess the potential protective effects of high-altitude hypobaric hypoxia in a rat model of MI using 7.0T cardiovascular magnetic resonance (CMR) strain analysis.

Materials and Methods: A cohort of 40 rats were randomly distributed into four groups (10 rats per group): plain sham operation control (PSO), plain myocardial infarction operation control (PMO), high-altitude sham operation control (HSO), and high-altitude myocardial infarction operation group (HMO). Rats assigned to high-altitude groups were transported to institution 1 (altitude: 4,250 m), while those in the plain group were sent to institution 2 (altitude: 500 m). The rats underwent acclimatization to their specific environments under standard animal laboratory conditions for three months before initiating the experimental procedures. Four weeks into the modeling process, CMR was employed to assess cardiac function and left ventricular (LV) structural alterations following interventions. Strain analysis was performed to evaluate myocardial wall motion, thereby assessing the protective effects of high-altitude hypobaric hypoxia on MI.

Results: The HMO group displayed a marked improvement in LV function compared to the PMO group (LVEF, HMO vs. PMO = $45.80 \pm 7.53\%$ vs. $33.51 \pm 5.80\%$, $P = 0.021$). Regional strain measurements, such as anterior segmental circumferential strain (ACS, HMO vs. PMO = $-17.07 \pm 2.12\%$ vs. $-8.90 \pm 3.94\%$, $P = 0.038$), anterior segmental longitudinal strain (ALS, HMO vs. PMO = $-12.22 \pm 1.96\%$ vs. $-8.05 \pm 1.24\%$, $P = 0.041$), and anterior segmental radial strain (ARS, HMO vs. PMO = $24.08 \pm 1.74\%$ vs. $16.17 \pm 2.14\%$, $P = 0.003$), exhibited significant differences between the HMO and PMO groups. Additionally, histological evaluations showed a decrease in myocardial injury and fibrosis in the HMO group compared to the PMO group.

Conclusion: The findings of this investigation suggest that high-altitude hypobaric hypoxia provides a protective effect on MI in a rat model. These results enhance our understanding of the potential therapeutic benefits of high-altitude settings for patients at risk of MI and encourage further exploration into the underlying mechanisms and prospective clinical applications.

PO-0975

Paeoniflorin Alleviates Myocardial Infarction-Induced Ventricular Remodeling in High-Altitude Hypobaric Hypoxia: Insights from a 7.0T Cardiovascular Magnetic Resonance Strain Analysis Rat Model

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Purpose: Investigating the cardioprotective effects of paeoniflorin on myocardial infarction (MI)-induced ventricular remodeling in high-altitude hypobaric hypoxia environments is of great interest in cardiovascular research. This study aimed to evaluate the potential protective role of paeoniflorin in a rat model of MI-induced ventricular remodeling under high-altitude hypobaric hypoxia using 7.0T cardiovascular magnetic resonance (CMR) strain analysis.

Materials and Methods: Sixty rats were randomly allocated to six groups (10 rats per group): plain sham operation control (PSO), high-altitude sham operation control (HSO), high-altitude myocardial infarction operation group (HMO), and low-dose, middle-dose, and high-dose paeoniflorin treatment groups. Rats in the high-altitude groups were transported to institution 1 (altitude: 4,250 m), while the plain group rats were transported to institution 2 (altitude: 500 m). The rats acclimatized to their respective environments under standard animal laboratory conditions for three months before undergoing experimental procedures. After four weeks of modeling, CMR was employed to assess cardiac function and left ventricular (LV) structural changes post-interventions. Strain analysis was performed to determine the protective effects of paeoniflorin on MI-induced ventricular remodeling in the high-altitude hypobaric hypoxia rat model.

Results: Paeoniflorin treatment groups (low-dose, middle-dose, and high-dose) demonstrated a dose-dependent enhancement in LV function compared to the HMO group. Regional strains, encompassing circumferential, longitudinal, and radial strains, showed significant differences between the paeoniflorin treatment groups and the HMO group. Additionally, histological analyses revealed reduced myocardial injury and fibrosis in the paeoniflorin treatment groups relative to the HMO group.

Conclusion: This study's findings indicate that paeoniflorin exerts a protective effect on MI-induced ventricular remodeling in a high-altitude hypobaric hypoxia rat model. These results contribute to understanding the potential therapeutic advantages of paeoniflorin for patients at risk of MI in high-altitude environments, promoting further research into the underlying mechanisms and possible clinical applications.

PO-0976

Comparison of the T2 effects of three T1 mapping sequences of the myocardium at 3T and 1.5T

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Purpose

To compare the T2 effects of three T1 mapping sequences of the myocardium at 3T and 1.5T.

Materials and Methods

We measured native T1 values by three T1 mapping sequences (FFM, MPI and LONG) and T2 values of 630 consecutive subjects (patients and healthy volunteers) in a mid-ventricular short axis slice by regions of interest (ROIs) placed conservatively within the septal myocardium. Correlations between myocardial T1 and T2 values were analyzed.

Results

Native T1 values differed significantly depending on the sequence, with MPI providing consistently higher mean values than FFM and LONG, LONG providing higher mean values than FFM (all $p < 0.001$). T1 by FFM, MPI and LONG in the total population, disease group, non-ischaemic cardiomyopathy group were all weakly related to T2 at 3T. The correlation coefficient of MPI were the highest in the total population and disease group, but there is no significant difference in correlation coefficients (all $p > 0.05$). Similarly, T1 by FFM, LONG in the total population, disease group, NICM group were all weakly-moderately related to T2 at 1.5T. In the control group, only T1 by MPI was moderately and positively related to T2 ($r=0.469$, $p=0.037$). In the ischaemic cardiomyopathy group, only T1 by MPI was weakly and positively related to T2 ($r=0.334$, $p=0.011$). In the stress condition, T1 by FFM and MPI was weakly and positively related to T2 ($r=0.280, 0.210$, $p=0.001, 0.012$, respectively).

Conclusion

The T2 effects existed in three T1 mapping sequences of the myocardium in varying degrees, we should consider the potential bias from T2 when analyzing the abnormal T1 values of myocardium.

PO-0977

Artificial intelligence software for coronary CT angiography can significantly underestimate the extent and amount of coronary stenosis: A preliminary study.

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Purpose

To compare the automated diagnostic results of coronary stenosis provided by artificial intelligence (AI) software for coronary CT angiography (CCTA) with those of coronary angiography (CAG).

Materials and Methods

This retrospective study included 123 consecutive patients with CAG-confirmed severe stenosis or occlusion (stenosis $\geq 70\%$) in at least one vessel. The same set of CCTA raw images of the patients were simultaneously sent to two commercial AI software (K-software and M-software) servers for analysis. The maximum degree of stenosis of the left main (LM), left anterior descending (LAD), left circumflex (LCX) and right coronary artery (RCA), number of stenosed vessels, number of vessels with stenosis $\geq 70\%$ were recorded and compared.

Results

The maximum degree of stenosis of LAD, LCX and RCA calculated by both software are lower than that of CAG (all $p < 0.001$), with the measurements in M-software being lower than those of K-software (all $p < 0.001$). The number of vessels with stenosis and vessels with stenosis $\geq 70\%$ provided by both software are significantly less than that shown by CAG (all $p < 0.001$). On Spearman correlation analyses analysis, the degree of stenosis measured by two software is significantly correlated in LM, LAD, LCX and RCA ($r=0.431, 0.350, 0.618, 0.522$, respectively; $p < 0.001$). On Bland-Altman analysis, the mean difference (95% limits of agreement) between CAG and K-software in LM, LAD, LCX and RCA is 9%(5%-13%), 23%(19%-27%), 34%(29%-39%), 18%(13%-22%), respectively. The mean difference (95% limits of agreement) between CAG and M-software in LM, LAD, LCX and RCA is 14%(10%-19%), 51%(47%-55%), 56%(51%-60%), 51%(47%-56%), respectively.

Conclusion

The degree of coronary artery stenosis automatically measured by AI software was significantly lower than the results of CAG, and AI software identified significantly fewer stenosed vessels than CAG.

PO-0978

Differential Diagnosis of Pulmonary Embolism Embolism Detection in Different Risk Stratification Using Spectral Multiparameter CT Imaging

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Purpose: This study aims to explore the differential diagnostic value of spectral based imaging in detecting pulmonary embolism emboli in different risk stratification using spectral CT.

Method: This study retrospectively included 50 patients diagnosed with pulmonary embolism from February 2023 to April 2023. Spectral CT pulmonary angiography (CTPA) was performed, and pulmonary embolism burden was evaluated based on pulmonary embolism risk stratification

combined with pulmonary embolism index Qanadli and Mastora scores. The patients were divided into a low-risk group of 10, a medium risk group of 20, and a high-risk group of 20. Invite two imaging doctors with ten years of work experience to screen and record the number of emboli in three groups of patients. Apply the Philips post-processing platform to reconstruct spectral data and compare the differences in the number of emboli in conventional CT images (CI), iodine density and effective atomic number fusion images. Draw Receiver Operating Characteristic (ROC) and Area Under Curve (AUC) to determine the diagnostic efficiency of Qanadli and Mastora scores in clinical risk stratification. Qualitative data adopts chi square test, while quantitative data adopts Spearman rank correlation coefficient and t-test.

Result: Among the 50 patients, the number of emboli observed by CI was 50 in the low-risk group, 60 in the medium risk group, and 70 in the high-risk group. The number of emboli observed by ID-Zeff images was 55 in the low-risk group, 65 in the medium risk group, and 75 in the high-risk group. The ID-Z off plot (100% specificity/97% sensitivity) has a better detection ability for thrombus than the CI plot (94% specificity/84% sensitivity, $p < 0.01$), indicating better detection ability for thrombus. There was a significant difference in the pulmonary embolism index between the low-risk group and the high-risk group (Qanadli: 15.6%, 38.8%, 40.1%, $p < 0.001$,

Mastora: 10.44%, 30.68%, 45%, $p < 0.001$). The Qanadli and Mastora scores can effectively differentiate the risk stratification of pulmonary embolism.

Conclusion: Compared to conventional CT, the application of spectral multi parameter CT can improve the detection rate of pulmonary embolism emboli. To provide more imaging support for the clinical early diagnosis, treatment strategy formulation, and prognosis prediction of pulmonary embolism patients with different risk stratification.

PO-0979

CT-derived global longitudinal strain as a novel predictor of cardiovascular events in patients with stable angina

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Background: CT-derived evaluation of strain, based on CT feature tracking (CT-FT), has appeared as a novel technique that enables coronary CT angiography (CCTA) to provide additional information regarding cardiac function. While CT-derived strain on coronary artery disease (CAD) has rarely been reported.

Objective: To assess CT-derived left ventricular strain in patients with stable angina and its relationship with the incidence of major adverse cardiac events (MACE).

Methods: A total of 303 individuals who underwent CCTA due to stable angina with a median follow-up period of 428 days were prospectively included in this cohort. CT-derived left ventricular strain was quantitatively analyzed for all the patients. The following strain parameters were obtained: global longitudinal strain (GLS), global radial strain (GRS), global circumferential strain (GCS), and ejection fraction (EF). Coronary stenosis and risk factors were also obtained. In addition, the incidence of MACE was defined as a myocardial infarction, hospitalization for unstable angina, unplanned coronary revascularization, and all-cause death.

Results: Thirty-three patients (10.9%) suffered a MACE during follow-up time. Multivariate analysis identified that GLS was different in MACE group and no MACE group (-17.49 ± 2.37 vs. -19.22 ± 2.79 , $p < 0.001$). Patients with severe coronary stenosis, diabetes mellitus and higher GLS had a significantly higher incidence of MACE (all $p < 0.05$). Coronary stenosis (hazard ratio [HR] = 8.48, $p = 0.01$), diabetes mellitus (HR = 3.07, $p = 0.02$), and GLS (HR = 4.91, $p = 0.02$) were independent predictors of MACE. A conjunctive model comprising GLS, coronary stenosis, and risk factors results in the higher predictive efficacy than risk factors alone ((AUC: 0.86 vs. 0.75, $p = 0.01$)).

Conclusions: Among patients with stable angina, those with MACE had higher GLS than those without. Also, patients with higher GLS had an increased risk of MACE.

PO-0980

Densely calcification and total luminal occlusion in both lower limbs

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A 71-year-old woman presented with paresthesia and weakness in both legs and with a 2-month history of gangrene in the left leg. This patient have none history of diabetes, dyslipidemia and increased pulse pressure, and have normal mineral metabolism and renal function.

Volume rendering of non-contrast enhanced computed tomography showed marked calcification of the wall of the common iliac arteries, the both femoral arteries (Panels A, yellow arrows) and the both dorsal arteries (Panels B, yellow arrows). These findings were confirmed on computed tomography angiography (CTA), which showed femoral arteries calcification (Panel C, yellow arrows) and collateral circulation of the lower limbs (Panel C, red arrows). Evidence of a densely calcification of dorsal arteries (Panel D, yellow arrows) and arterial occlusion of lower extremity (Panel D, green arrows) was noted on CTA, and the patient successfully underwent the treatment of left femoral-posterior tibial artery bypass, left femoral-deep artery bypass and deulceration of left foot.

At 6-month follow-up, the bypass of femoral-posterior tibial artery was occluded of this patient, and surgical procedures of drug-eluting stent implantation was implanted. Aside from attention to mineral metabolism and cardiovascular risk factors, the etiology of vascular calcification in this patient remains uncertain.

PO-0981

The qualitative and quantitative parameters of dual-layer spectral detector CT plain scan predicting the invasiveness of ground-glass adenocarcinoma

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Purpose: To explore the predictive value of qualitative and quantitative parameters of dual-layer spectral detector CT plain scan on the invasiveness of ground-glass nodules (GGNs).

Materials and methods: 557 patients with total 778 GGNs, who underwent preoperative dual-layer spectral detector CT scan were included retrospectively. According to invasiveness by pathology, the nodules were divided into two groups: non-invasive adenocarcinoma (non-IA, n=202) group, which included atypical adenomatous hyperplasia and adenocarcinoma in situ and invasive adenocarcinoma (IA, n=576) group which included minimally invasive adenocarcinoma and invasive adenocarcinoma. The qualitative parameters included GGN interface, lobulation, spiculation, pleural retraction, bubble-like lucency, air bronchogram and vascular abnormality. The quantitative parameters included nodule size, effective atomic number (Zeff) value, CT value and electron density value (ED value). The nodule size, Zeff, and ED value of the lesion were measured on dedicated workstation (IntelliSpace Discovery). Diagnostic performance was evaluated by receiver operating characteristic (ROC) curve analysis.

Results: Significant differences were found in nodule shape, interface, lobulation, spiculation, pleural retraction, bubble-like lucency, air bronchogram, vascular abnormality, size, CT value, Zeff and ED value between non-IA and IA groups ($P < 0.05$). The nodule ED value [odds ratio(OR)=1.157, $P < 0.001$], interface (OR=0.196, $P < 0.001$), bubblelike lucency (OR=0.293, $P < 0.001$), pleural retraction (OR=0.354, $P=0.009$) and vascular abnormality (OR=0.371, $P < 0.001$) were independent predictors for diagnosing invasive adenocarcinoma. The analysis of ROC curves showed that the AUC of the combination of five independent predictors was 0.862, the sensitivity and specificity for predicting GGN invasion were 71.35% and 85.64%.

Conclusion: The combination of qualitative and quantitative parameters of dual-layer spectral detector CT plain scan can effectively evaluate the invasiveness of GGNs.

PO-0982

Prediction and Discrimination of Pre-Invasive Lesions and Minimally Invasive Adenocarcinoma from Invasive Adenocarcinoma Utilizing Advanced Ultra-HRCT Radiomic Features of Ground-Glass Nodules

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Objective: The objective of this study was to utilize advanced Ultra-HRCT radiomic features to predict and differentiate pre-invasive lesions and minimally invasive adenocarcinoma (MIA) from invasive adenocarcinoma (IAC) presenting as ground-glass nodules (GGNs). The application of Ultra-HRCT, with its superior anatomical depiction surpassing conventional CT by providing a spatial resolution of 0.5mm and a thickness of 0.5mm with a 512×512 matrix, has been well-documented in the literature. Its diagnostic potential offers more detailed information, enabling better follow-up recommendations and treatment decisions. Moreover, studies have extensively explored the utility of Ultra-HRCT in distinguishing different pathological types of lung cancer. Therefore, our study aimed to harness the power of Ultra-HRCT radiomic features to achieve our objectives.

Materials and Methods: This retrospective study included 102 GGNs, which were divided into training ($n=61$) and test ($n=41$) datasets. All GGNs were pathologically confirmed as pre-invasive lesions, minimally invasive adenocarcinoma (MIA), or invasive adenocarcinoma (IA). Radiomic features were extracted from automatically annotated regions of interest. Features were selected using a filtering algorithm to construct the radiomics model. Three classifiers, namely, Support Vector Machine, Logistic Regression, and Random Forest, were tested for the model's performance. Accuracy, sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC) were used to evaluate the model's performance on both the training and test datasets.

Results: The radiomics model consisted of two features selected from a pool of 1781 extracted features. The support vector machine classifier achieved an AUC of 0.983 (training) and 0.981 (test). The logistic classifier yielded AUCs of 0.987 (training) and 0.984 (test). The random forest classifier demonstrated AUCs of 1.000 (training) and 0.974 (test), indicating the best performance among the classifiers. Remarkably, the model exhibited excellent calibration when validated with the test dataset by the logistic regression classifier.

Conclusion: By leveraging Ultra-HRCT radiomic features of ground-glass nodules, our study successfully demonstrated the potential to predict and differentiate invasive adenocarcinoma (IAC) from pre-invasive lesions and minimally invasive adenocarcinoma (MIA) before surgery. The logistic regression classifier provided reliable calibration, thereby offering valuable recommendations for follow-up or treatment in clinical practice.

PO-0983

Relationship between epicardial fat volume on cardiac CT and atherosclerosis severity in three-vessel coronary artery disease: a single-center cross-sectional study

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Background: The ideal treatment strategy for stable three-vessel coronary artery disease (CAD) patients are difficult to determine and for patients undergoing conservative treatment, imaging evidence of coronary atherosclerotic severity progression remains limited. Epicardial fat volume (EFV) on coronary CT angiography (CCTA) has been considered to be associated with coronary atherosclerosis. Therefore, this study aims to evaluate the relationship between EFV level and coronary atherosclerosis severity in three-vessel CAD.

Methods: This retrospective study enrolled 252 consecutive patients with three-vessel CAD and 252 normal control group participants who underwent CCTA between January 2018 and December 2019. A semi-automatic method was developed for EFV quantification on CCTA images, standardized by body surface area. Coronary atherosclerosis severity was evaluated and scored by the number of coronary arteries with $\geq 50\%$ stenosis on coronary angiography. Patients were subdivided into groups on the basis of lesion severity: mild (score = 3 vessels, $n = 85$), moderate (3.5 vessels \leq score < 4 vessels, $n = 82$), and severe (4 vessels \leq score ≤ 7 vessels, $n = 85$). The independent sample t-test, analysis of variance, and logistic regression analysis were used to evaluate the associations between EFV level and severity of coronary atherosclerosis.

Results: Compared with normal controls, three-vessel CAD patients had significantly higher EFV level (65 ± 22 mL/m² vs. 48 ± 19 mL/m²; $P < 0.001$). In patients with three-vessel CAD, there was a progressive decline in EFV level as the score of coronary atherosclerosis severity increased, especially in those patients with a body mass index (BMI) ≥ 25 kg/m² (75 ± 21 mL/m² vs. 72 ± 22 mL/m² vs. 62 ± 17 mL/m²; $P < 0.05$). Multivariable regression analysis showed that both BMI (OR: 3.40, 95%CI: 2.00 - 5.78, $P < 0.001$) and the score of coronary atherosclerosis severity (OR: 0.49, 95% CI: 0.26 - 0.93, $P < 0.05$) were independently related to the change of EFV level.

Conclusion: Three-vessel CAD patients do have higher EFV level than the normal controls. While, there may be an inverse relationship between EFV level and the severity of coronary atherosclerosis in patients with three-vessel CAD.

PO-0984

Prognostic value of left atrial longitudinal strain by cardiac magnetic resonance feature tracking in atrial fibrillation patients with mitral valve disease

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AIM: To evaluate the prognostic value of left atrial global longitudinal strain (LAGLS) in atrial fibrillation (AF) patients with mitral valve disease (MVD).

MATERIALS AND METHODS: In this single-center retrospective study, 48 consecutive AF patients with MVD who underwent cardiac magnetic resonance (CMR) before surgery were enrolled. The LAGLS was assessed by cine-CMR images and feature tracking (CMR-FT) technique. Logistic

regression and receiver operating characteristic analysis were performed to identify the value of LAGLS in predicting atrial tachyarrhythmias recurrence after surgery.

RESULTS: The LAGLS level of the total patients was 4.4 (interquartile range: 2.7 to 9.2)%. The LAGLS was significantly associated with many evaluation parameters of severity of disease, including biventricular volumetric function, LA ejection fraction, and the European System for Cardiac Operative Risk Evaluation II score (all $P < 0.05$). Multivariate Cox analysis showed that LAGLS (hazard ratio = 0.52, 95% confidence interval[CI]: 0.31, 0.87; $P = 0.013$) was an independent predictor of atrial tachyarrhythmias recurrence after adjustment for LA diameter, LA and biventricular ejection fraction, etiology of MVD (rheumatic or degenerative), and surgical procedure (valve surgery alone or valve surgery combined with Maze IV). The optimal cutoff value of LAGLS was 4.1% for predicting recurrent atrial tachyarrhythmias (sensitivity 81.8%, specificity 78.4%) and the area under the curve was 0.854 (95%CI: 0.711, 0.996, $P < 0.001$).

CONCLUSION: CMR-FT-derived LAGLS may act as a novel noninvasive imaging biomarker with which to evaluate the severity of disease and offer independent prognostic information for atrial tachyarrhythmias recurrence after surgery in AF patients with MVD.

PO-0985

New Whole-Heart Motion Correction Algorithm Enables Diagnostic CT of Aortic Valve and Coronary Arteries in Systolic Phase for Transcatheter Aortic Valve Implantation Candidates

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Objectives: To investigate the ability of new generation snapshot freeze (NGSSF) algorithm in improving diagnostic image quality of both aortic valve and coronary arteries for transcatheter aortic valve implantation (TAVI) candidates in TAVI planning CT.

Methods: Sixty-four TAVI candidates underwent TAVI planning CT were enrolled. Scans from coronary CT angiography were reconstructed at 20%, 30%, 40%, and 75% R-R cardiac phases with NGSSF and standard (STD) algorithm. In each phase, following parameters were compared: aortic valve measurements and their reproducibility; image quality of aortic valve and coronary arteries. The diagnostic accuracies of TAVI planning CT for coronary artery stenosis in 30% R-R phase with NGSSF and STD algorithms were calculated in 47 out of 64 patients with invasive coronary angiography as reference standard.

Results: For subjective image quality evaluation, the excellent rate for aortic valve improved from 25.0% to 93.8% and the interpretable rate for coronary arteries increased from 20.3% to 95.3% in the 30% phase images with NGSSF compared with images with STD. For the detection of $>50\%$ coronary artery stenosis, the 30% phase images with NGSSF provided a sensitivity of 90%, specificity of 81.48%, negative predictive value of 91.7%, and positive predictive value of 78.3% on a per-patient basis; While images with STD, had a corresponding results of 95.0%, 33.33%, 90.0%, and 51.4%, respectively.

Conclusions: NGSSF significantly improves image quality for both aortic valve and coronary arteries compared with STD for TAVI patients of all heart rates. NGSSF enables the accurate measurement for aortic valve and satisfactory diagnostic performance for coronary arteries stenosis in the same systolic phase for TAVI planning.

PO-0986

Deep Learning Image Reconstruction for Transcatheter Aortic Valve Implantation Planning Computed Tomography using Low-kVp and Low-Contrast-Medium Protocol: Image Quality, Diagnostic Performance and Radiation Dose Assessment

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Objective: To assess the image quality, dose reduction potential and diagnostic performance of low tube voltage with high-strength deep learning image reconstruction (DLIR-H) for transcatheter aortic valve implantation (TAVI)-planning CT in comparison with conventional imaging protocols.

Methods: We prospectively enrolled 128 patients who were referred to TAVI-planning CT. Patients were randomly divided into two groups: DLIR-H group (n=64) with contrast injection rate of 28mgI/kg/s, and conventional group (n=64) with contrast injection rate of 40mgI/kg/s. Radiation dose, contrast volume, contrast injection rate, and image quality were compared between the two groups. The diagnostic performance of TAVI planning CT for coronary artery stenosis was calculated using invasive coronary angiography as the gold standard.

Results: There was a significant reduction in radiation dose ($4.94 \pm 0.39 \text{ mSv}$ vs. $7.93 \pm 1.20 \text{ mSv}$), contrast volume ($45.28 \pm 5.38 \text{ mL}$ vs. $63.26 \pm 9.88 \text{ mL}$) and contrast injection rate ($3.1 \pm 0.31 \text{ mL/s}$ vs. $4.9 \pm 0.2 \text{ mL/s}$) in DLIR-H group compared to the conventional group (all $p < 0.010$). For diagnostic performance, TAVI planning CT in the DLIR-H group provided 100% sensitivity, 92.1% specificity, 100% negative predictive value (NPV), and 84.2% positive predictive value (PPV) on a per-patient basis for the detection of $> 50\%$ stenosis. In the conventional group, for the detection of $> 50\%$ stenosis, TAVI planning CT provided 94.7% sensitivity, 95.3% specificity, 97.6% NPV, and 90.0% PPV on a per-patient basis.

Conclusion: The combination of low tube voltage and DLIR-H in TAVI-planning CT provides improved image quality while significantly reducing radiation and contrast volume with no influence on the diagnostic performance of coronary artery stenosis in comparison with the conventional protocol.

PO-0987

Role of quantitative DCE-MRI parameters and ECV in differentiating non-small cell lung cancer subtypes and predicting lymph node metastasis

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Objective To investigate the value of dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) parameters and extracellular volume fraction (ECV) in the diagnosis of non-small cell lung cancer (NSCLC) subtypes and prediction of lymph node metastasis.

Methods Retrospective study. Clinical and MRI data of 70 patients diagnosed with NSCLC by pathological examination from September 2020 to December 2022 at the Provincial Hospital of Shandong First Medical University were included. Among them, there were 55 males and 15 females, aged 45-74 years. Patients all underwent DCE-MRI and enhanced T1 mapping within 1 week prior to treatment. The quantitative parameters transfer constant (K_{trans}), flux rate constant (K_{ep}), extravascular volume fraction (V_e) were measured. Venous blood was collected from the patient within 3 days of the MRI scan, and the patient's hematocrit was then measured. Detection of T1 values based on T1 mapping is used to calculate ECV. Patients were divided into adenocarcinoma group (41 cases) and squamous carcinoma group (29 cases) according to their NSCLC pathological typing. The patients were divided into the group with metastasis (28 cases) and the group without metastasis (42 cases) according to the presence or absence of lymph node metastasis. Observation indexes: (1) Comparison of clinical baseline information such as gender, age, degree of tumor differentiation, and maximum diameter of lesions in different groups of patients; (2) To compare the consistency between observers in detecting quantitative DCE-MRI parameters and ECV results; (3) Comparison of quantitative DCE-MRI parameters and ECV between different groups of patients; (4) To analyze the diagnostic efficacy of parameters that differ between subgroups for the typing of NSCLC and the predictive efficacy for the metastatic status of NSCLC lymph nodes; (5) To analyze the correlation between the quantitative parameter V_e of DCE-MRI and ECV.

Results (1) There was no statistically significant difference in age, degree of tumor differentiation, and maximum tumor diameter between the adenocarcinoma group and the squamous carcinoma group (all P values > 0.05), and the difference in gender between the two groups was statistically significant (P < 0.05). The differences in gender, age, degree of tumor differentiation, and maximum tumor diameter between the lymph node metastasis group and the patients without metastasis group were not statistically significant (all P values > 0.05). (2) Inter-observer agreement in detecting quantitative DCE-MRI parameters and ECV: ICC_{K_{trans}}=0.815, ICC_{K_{ep}}=0.835, ICC_{V_e}=0.871, ICC_{ECV}=0.853. Good agreement was identified between observers. (3) The quantitative DCE-MRI parameters K_{trans}, K_{ep} and V_e in the adenocarcinoma group were 0.23 (0.19, 0.29), 0.79 (0.60, 0.90) and 0.32 (0.24, 0.45), respectively, which were higher than those in the squamous carcinoma group (0.14 (0.12, 0.20), 0.61 (0.52, 0.78) and 0.25 (0.20, 0.38), all with statistically significant differences (Z=-4.763, -2.212, -2.438, all P values < 0.05), and no statistically significant differences in ECV between the two groups (P > 0.05). The ECV of the group with metastasis was 0.33±0.07, which was higher than that of the group without metastasis, which was 0.26±0.06, and the difference was statistically significant (t=-4.436, P<0.001). The differences in the quantitative parameters K_{trans}, K_{ep} and V_e of DCE-MRI between the two groups were not statistically significant (all P values > 0.05). (4) In the adenocarcinoma and squamous carcinoma groups, K_{trans}, K_{ep}, and V_e were selected with statistically significant differences to analyze the diagnostic efficacy of NSCLC subtypes, and K_{trans} had the best diagnostic efficacy, with an AUC of 0.836 (95%CI 0.743-0.929) and a sensitivity of 68.3% and specificity of 86.2% for the

diagnosis of adenocarcinoma and squamous carcinoma when the cut-off value was 0.208. In the group with and without lymph node metastasis, the difference in ECV between the two groups was statistically significant, and thus its predictive performance for the lymph node metastasis status of NSCLC was analyzed. The AUC of ECV was 0.764 (95% CI 0.652-0.877). When the cutoff value was 0.293, the sensitivity of ECV in predicting lymph node metastasis was 64.3% and the specificity was 81.0%. (5) There was no correlation between ECV and V_e in NSCLC ($r_s=0.071$, $P=0.558$).

Conclusion The differences of DCE-MRI parameters K_{trans} , K_{ep} , and V_e in adenocarcinoma and squamous carcinoma were statistically significant. K_{trans} was helpful in diagnosing the subtype of NSCLC, and ECV was valuable in predicting lymph node metastasis in NSCLC.

PO-0988

Evaluation of the effect of bariatric surgery on left ventricular function in obese subjects using cardiac magnetic resonance feature tracking

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Objective: Obesity is one of the major cardiovascular risk factors and increases the risk of cardiovascular disease. Bariatric surgery is not only an effective treatment for obesity, but also may improve obesity-caused cardiac structural and functional abnormalities. At present, there were few studies on structural and functional longitudinal changes in obese subjects after weight loss, and the effect of bariatric surgery on cardiovascular in obese subjects still needed to be further explored. The purpose of this study was to investigate the longitudinal changes of left ventricular function in obese subjects after weight loss by laparoscopic sleeve gastrectomy using cardiac magnetic resonance feature tracking (CMR-FT).

Materials and Methods: Obese subjects who underwent laparoscopic sleeve gastrectomy for weight loss in West China Hospital of Sichuan University from December 2020 to July 2022 were prospectively enrolled. Preoperative cardiac magnetic resonance (CMR) examination was performed on obese subjects and clinical data were collected. CMR and clinical follow-up were performed at 1 month and 6 months after bariatric surgery for weight loss. CVI 42 software was used to analyze CMR cine images, and conventional cardiac function parameters and myocardial strain parameters were obtained. Conventional cardiac function parameters included left ventricular end-diastolic volume (LVEDV), left ventricular end-systolic volume (LVESV), left ventricular mass (LVmass), left ventricular ejection fraction (LVEF). Myocardial strain parameters included global peak circumferential strain (GCS), global peak radial strain (GRS) and global peak longitudinal strain (GLS). One-way repeated measures ANOVA or Friedman test was used for the comparison of obesity subjects at baseline, and at 1 month and 6 months after bariatric surgery. $P < 0.05$ was considered to be statistically significant.

Results: A total of 58 obese subjects [body mass index (BMI) $36.25 (9.47) \text{ kg/m}^2$] were included in this study, among which 43 obese subjects were followed up at 1 and 6 months after bariatric surgery. At 1 and 6 months after bariatric surgery, compared with baseline, the blood pressure, blood lipid level, blood glucose level of obese subjects were significantly improved (all $P < 0.05$). Comparing with baseline, the LVEDV, LVmass were decreased at 1 month and 6 months (all $P < 0.05$). At 1 month after bariatric surgery, LVEF and strain parameters showed no significant changes (all $P > 0.05$). At 6 months after bariatric surgery, although LVEF showed no significant changes ($P > 0.05$), GCS ($-18.71 \pm 1.92\%$ vs. $-17.84 \pm 2.04\%$, $P = 0.046$) and GLS ($-18.28 \pm 1.68\%$ vs. $-17.19 \pm 1.93\%$, $P = 0.039$) in obese subjects have significantly improved from baseline.

Conclusion: After bariatric surgery, although LVEF showed no significant change, the left ventricular subclinical function in obese subjects has improved. Cardiac magnetic resonance feature tracking is helpful to observe the improvement of subclinical myocardial function in obese subjects after bariatric surgery.

PO-0989

A preliminary study of accelerated mDIXON for segmented coronary adipose tissue evaluation in patients with suspected coronary artery disease

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Purpose: Pericoronary adipose tissue (PCAT) has been suggested to contribute to the development of coronary artery disease (CAD). Dysfunctional PCAT can secrete pro-inflammatory adipokines and inflammatory cytokines which is closely associated with the development of coronary intima inflammation and the formation of coronary plaque, and also positively correlated with coronary artery stenosis, degree of calcification and plaque progression. Meanwhile, plaque composition and degree of stenosis in CAD can be valuable for risk stratification and prognosis of CAD. The evaluation of PCAT should be translated to novel clinical diagnostic tools for coronary heart disease.

The current preferred method for quantitative assessment of pericoronary adipose tissue (PCAT) is computed tomography (CT), but it is not suitable for follow-up examination because of its radiation. A coronary magnetic resonance angiography (MRA) method, recently, using a three-dimensional modified Dixon-sequence (3D-mDixon) was introduced and validated, to separate water from fat signals by the chemical shift of protons, which allows for more accurate volumetric quantification of PCAT volume. Meanwhile, to speed up scanning without compromising image quality, we used the compressed sensing artificial intelligence (CSAI) framework which combines deep learning (DL) and CS techniques to optimize the CS reconstruction algorithm while performing denoising and shortening the scanning time.

We sought to quantitatively analyze segmented pericoronary adipose tissue (PCAT), including PCAT volume and fat-fraction, in patients with known or suspected coronary artery disease (CAD) using a deep learning-based compressed sensing (CS) accelerated modified Dixon (mDIXON) sequence, as well as determine their relation with coronary plaque characters assessed by coronary computed tomography angiography (CCTA).

***Methods and Materials:** We included 35 symptomatic patients with CAD (111 arteries with plaque, 169 without plaque). They underwent cardiac magnetic resonance (CMR) to evaluate segmented PCAT volume and fat-fraction of 8 coronary segments. We manually traced the segmented PCAT volume, and calculated the fat fraction of the segmented PCAT by formula. We compared the segmented PCAT volume and fat-fraction across 8 coronary segments with different plaque types and degrees of stenosis defined with CCTA and explored the relationship between them using Kruskal - Wallis H test and One-way analysis of variance (ANOVA) testing.

***Results:** The coronary segments with plaques had a higher segmented PCAT volume and fat-fraction than those without plaques. Meanwhile, segmented PCAT volume around mixed plaques was larger than non-calcified or calcified plaques ($p = 0.014$ and $p < 0.001$). There was a moderate correlation between the segmented PCAT volume and plaque type ($r = 0.493$, $p < 0.001$). The fat-fraction had similar results ($r = 0.480$, $p < 0.001$).

***Conclusions:** The non-contrast-enhanced, whole-heart coronary MRA framework with CSAI is able to measure segmented PCAT volume and fat-fraction. The segmented PCAT volume is more significantly associated with the coronary plaque characters than fat-fraction.

PO-0990

Intranodular and Perinodular Radiomic Features on Lung CT Images Distinguish Pulmonary Cryptococcosis from Lung Adenocarcinoma.

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Objective To investigate the value of a radiomics prediction model based on intranodal and perinodal CT images of CT radiomic features in distinguishing pulmonary cryptococcosis from lung adenocarcinoma. **Methods** A total of 194 patients (94 cases of pulmonary cryptococcosis and 100 cases of pulmonary adenocarcinoma) confirmed by surgical or puncture pathology in Ningbo No. 2 Hospital between January 2019 and February 2023 were retrospectively analysed and randomly divided into a training set and a test set in a ratio of 7:3. Three-dimensional volumetric areas of interest (VOIs) within and 5 mm around the nodule were outlined by 3D Slicer, and their radiomic features were extracted separately. The minimum redundancy maximum relevance (mRMR) and least absolute shrinkage and selection operator (LASSO) methods were used to downscale and select features. Statistically significant indicators were screened by one-way logistic regression and further incorporated into the multifactor logistic regression model. Support Vector Machine (SVM) was used to construct the clinical model, the intranodal image-based radiomics model, the perinodal image-based model, the intranodal-and-perinodal-image-based radiomics model, and the combined model (i.e., a model based clinical images and the radiomic features extracted from both intranodal and perinodal images). The diagnostic efficacy of each model was evaluated by receiver operating characteristic (ROC) curve. **Results** In the test set, the areas under the ROC curves (AUC) of the clinical model, the intranodal image-based radiomics model, the perinodal image-based model, the intranodal-and-perinodal-image-based radiomics model, and the combined model were 0.84, 0.88, 0.85, 0.90, and 0.94, respectively. **Conclusion** The combined model based on clinical imaging features, intranodal and perinodal radiomics features can improve the ability of differentiating pulmonary cryptococcosis from adenocarcinoma of the lung.

PO-0991

Differentiating subcentimeter pulmonary metastases in differentiated thyroid cancer patients by integration of machine learning and deep learning: A retrospective, multicenter study

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Background: Diagnosing subcentimeter pulmonary metastases in indeterminate pulmonary nodules is crucial for patients with differentiated thyroid cancer. We aim to develop and validate novel integration models combining machine learning and deep learning for diagnosing subcentimeter pulmonary metastases in differentiated thyroid cancer patients.

Methods: Models were developed in a primary center included 1244 subcentimeter pulmonary metastases on CT. Lesions were randomly assigned (7:3) to training or internal validation. Integration models based on machine learning were built with selected radiomics features and deep learning features and compared with classic machine learning models or deep learning models to classify the indeterminate subcentimeter lung nodules as pulmonary metastases or benign nodules. External validation contained 161 subcentimeter differentiated thyroid cancer pulmonary metastases in two independent centers. Stepwise validation was further performed according to

the nodule's largest diameter in order to test models' generalization ability for subcentimeter nodules of different sizes.

Results: Among all the machine learning models, the support vector machine showed the best discrimination in external validation, with a 0.910 AUC and a 0.935 AUC in internal validation. The deep learning model also showed good discrimination, with a 0.952 AUC in internal validation and a 0.893 AUC in external validation. All the integration models were significantly better than machine learning or deep learning alone, with the best AUC of 0.969 and 0.967 in internal validation and external validation, respectively. Stepwise validation demonstrated that with the PM diameter decreasing from 9mm to 2mm, the AUC initially remained stable and gradually decreased in all models and the integration models were the most stable.

Conclusions: The novel integration models combining traditional radiomics and deep learning features provided noninvasive discrimination of subcentimeter pulmonary metastases from benign pulmonary nodules, even with minimal sizes, and was more effective than machine learning or deep learning alone.

PO-0992

Differentiation of inflammatory pseudotumor and malignant pulmonary nodules using first-pass enhanced time to peak (TTP) with dual-input volume CT perfusion

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AbstractObjectives To investigate whether the parameter of first-pass enhanced time to peak (TTP) can be used to distinguish single inflammatory pseudotumor from malignant solitary pulmonary nodules (SPNs) with dual-input body volume CT perfusion (DI-CTP).

Methods Ninety-eight consecutive patients with pathological proved were enrolled: twenty-five patients with inflammatory pseudotumor and seventy-three patients with malignant SPNs (30 patients with adenocarcinoma, 27 with squamous cell carcinoma, and 16 with pulmonary metastases). Pulmonary artery flow (PF), bronchial artery flow (BF), the perfusion index (PI, $PI=PF/PF+BF$), and time-density curve (TDC) were obtained by the DI-CTP analysis, and total perfusion (TLP, $TLP=PF+BF$) were calculated. The first-pass TTP was derived from TDC and was measured. Intraobserver and interobserver agreement for DI-CTP parameters were calculated using intraclass correlation coefficients (ICC); The perfusion parameters were analyzed among squamous cell carcinoma, adenocarcinoma, pulmonary metastases, and inflammatory pseudotumor. Their values in diagnosing malignant SPNs and inflammatory pseudotumors were evaluated by receiver operating characteristic (ROC) curves analysis.

Results Intraobserver and interobserver agreement measures with ICC showed high agreement between the measurements ($ICC=0.92-0.98$, all $P<0.01$) and both different observers ($ICC=0.92-0.97$, all $P<0.01$). The parameters (PF, TLP, PI, TTP) between squamous cell carcinoma, adenocarcinoma, pulmonary metastases, and inflammatory pseudotumors had significant differences (all $P<0.01$). Significant differences existed between inflammatory pseudotumors and malignant SPNs in parameters (PF, TLP, TTP, all $P<0.01$). The AUC of TTP was 0.987, more significant than that of the other perfusion parameters. When $TTP=18.10$ s was used as the cutoff value for predicting benign and malignant nodules, the sensitivity and specificity were 92% and 97.3%, respectively.

Conclusions The parameters (TTP) in inflammatory pseudotumors are significantly lower than that of malignant nodules, which enables better differentiation of inflammatory pseudotumors and malignant SPNs.

PO-0993

量化 LDCT 肺癌筛查方案并探寻筛查年龄的边界

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目的 鉴于肺癌筛查的专家共识未提及普通人群，本文定义决策指数用于量化 LDCT 肺癌筛查方案，基于量化数值对普通人群筛查肺癌的行为进行评估并探寻筛查年龄的边界。

方法 将 LDCT 检出肺癌并完成手术治疗看作收益，并将 LDCT 诱发癌症看作减益，其他情况忽略不计，则 LDCT 筛查过程可以抽象为特定的投资或博弈（赌博）游戏。LDCT 筛查肺癌的过程中涉及两个重要参数：年龄别发病率 p_1 和终身可归因的患癌风险（the lifetime attributable risk, LAR），即癌症 LAR 发病概率 p_2 。参考凯利公式建立数学模型，推导并定义筛查决策指数（decision index, DI） $DI=(p_1-p_2)/(p_1+p_2)$ ，用于量化 LDCT 筛查肺癌的行为或方案。在各年龄分别计算人群行单次或规律性 LDCT 筛查的决策指数，根据指数大小划分等级并给出筛查建议。

根据模型原理，只有 DI 大于 0.5 的方案才值的进行肺癌筛查，并且越接近 1 越稳妥，因此根据 DI 数值将筛查建议划分为四个等级：小于等于 0.5，则不推荐；在 0.5 至 0.6 之间，勉强可以；0.6 至 0.8 之间，可以筛查；大于等于 0.8，则推荐筛查。

结果 普通人群单纯因筛查肺癌而接受 LDCT 检查时，建议男性筛查开始年龄不小于 46 岁，女性不小于 51 岁。普通人群 58 岁以前不宜行每年一次 LDCT 筛查肺癌；如果有规律性筛查肺癌的意愿，建议两年一次，对于有强烈筛查意愿的人群建议男性从 50 岁，女性从 60 岁开始筛查，对于中等筛查意愿的人群男性从 60 岁，女性从 70 岁开始筛查。

结论 本研究定义的决策指数可以用于量化 LDCT 筛查肺癌的行为、根据筛查频率和筛查年龄制定筛查方案。不建议普通人群过早实施规律性 LDCT 筛查。

PO-0994

静息和负荷磁共振心肌应变在缺血性心脏病 中诊断价值的动物实验研究

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目的：心脏磁共振特征追踪技术是一种无创、定量评估心肌整体、局部形态改变及运动异常的新兴技术，被认为可以比左室射血分数更早期的识别心肌异常。本研究拟通过构建缺血性心脏病猪模型，以冠状动脉造影和病理作为参照，探究静息和负荷心肌应变对缺血性心脏病的诊断评估价值，预期结果有望实现无需对比剂即可无创筛查缺血及梗死心肌。

材料与方法：采用美国肌缩窄法建立猪缺血性心脏病模型。对实验动物进行静息、负荷 CMR 成像（包括电影序列和心肌灌注成像）及晚期钆对比剂增强扫描。以冠状动脉造影和病理为参照，分别定义正常、远端、缺血和梗死心肌节段，并通过受试者工作特征（receiver operating characteristic, ROC）曲线评估静息和负荷心肌应变对心肌梗死和缺血的诊断准确性。

结果：共纳入 11 头缺血性心脏病猪模型和 5 头健康假手术组猪。即使在静息状态下，应变参数也与心肌缺血和心肌梗死有关（所有 $P<0.05$ ）。所有检测梗死心肌的应变参数的 ROC 曲线下面积（AUC）均大于 0.900（ $P<0.05$ ）。应变检测缺血心肌的 AUC 值分别为：静息和负荷纵向应变（LS）：0.906（95%CI：0.850，0.946）和 0.847（95%CI：0.782，0.899）；静息和负荷周向应变（CS）：0.763（95%CI：0.690，0.826）和 0.716（95%CI：0.639，0.784）；静息和负荷径向应变（RS）：0.758（95%CI：0.683，0.822）和 0.663（95%CI：0.583）。热图显示所有静息和负荷应变与负荷心肌血流量和心肌灌注储备均呈轻至中度相关（所有 $P<0.05$ ）。

结论: 左室心肌应变对缺血心肌和梗死心肌都具有较高的诊断评估价值, 有望在无需负荷药物及对对比剂的条件下, 成为疑诊缺血性心脏病患者进行侵入性检查、输注造影剂的“守门人”。

PO-0995

CT 联合临床特征的列线图预测临床 IA 期非小细胞肺癌气腔播散的价值

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目的 探讨基于术前 CT 及临床特征的列线图预测临床 IA 期 NSCLC 气腔播散 (STAS) 的价值。

方法 回顾性收集 2019.09 至 2022.08 我院术后有病理评估 STAS 状态的临床 IA 期 NSCLC 336 例, 依据病理报告的 STAS 情况分为阳性组和阴性组, 按照 7:3 的比例将数据集随机划分为训练集 236 例和内部验证集 100 例, 外院 69 例作为外部验证集。记录患者年龄、性别、癌胚抗原等 8 项临床资料; 定量测量肿瘤最大径、实性成分最大径、计算实性成分占比; 定性分析包括肿瘤的密度类型、形态、边缘、边界、内部结构及邻近结构等 17 项 CT 特征。在训练集中, 以单因素分析比较两组患者的临床及 CT 特征的差异, 将 P 值 < 0.1 的变量进行多因素 logistic 回归分析, 筛选最佳预测变量, 构建预测模型, 绘制列线图并进行模型内外部验证。采用 ROC 曲线及 AUC 值来评估模型的区分度, 以 H-L 检验和校准曲线来评价模型的拟合优度, 决策曲线来分析模型的临床应用价值。

结果 多因素 logistic 回归分析筛选出的最佳预测变量包括性别、癌胚抗原、实性成分占比、密度类型、远端带状影, 其中肿瘤密度类型、远端带状影为预测 STAS 状态的独立危险因素。基于上述变量, 分别构建由性别、癌胚抗原组成的临床模型, 由实性成分占比、密度类型、远端带状影组成的 CT 模型以及综合模型来预测 STAS。DeLong 检验结果表明综合模型在三个队列优于临床模型, 在外部验证集优于 CT 模型, 其在三个队列中的 AUC 值为 0.874、0.822、0.810。H-L 检验表明, 综合模型在三个队列中均拟合良好, 校准曲线显示综合模型预测概率值与真实情况具有较好的一致性。决策曲线显示综合模型较临床模型和 CT 模型具有更好的临床应用价值。

结论 CT 及临床特征构建的列线图对术前判断临床 IA 期 NSCLC STAS 状态具有较高的诊断效能, 可为胸外科医师选择最佳手术方式提供指导帮助。

PO-0996

CT 在高原慢性阻塞性肺疾病患者中的评估价值

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摘要: 目的 探讨 CT 指标在高原稳定期慢性阻塞性肺疾病患者中的诊断价值以及与肺功能、症状相关性。方法: 采用随机抽样法抽取四川省阿坝州红原县 ≥ 40 岁常驻人群 456 人, 通过纳排标准从中筛选出稳定期 COPD 患者 53 名及健康人群 53 名。收集受试者基线资料并完善肺功能检查、胸部高分辨率 CT 扫描、采集 CAT、mMRC 评分。比较两组患者 CT 指标, 使用 ROC 曲线评估 CT 指标对慢阻肺的诊断价值, 采用 Spearman 检验了解 CT 指标与肺功能、症状评分、急性加重次数的相关分析。采用多元线性回归分析肺功能的影响因素。结果: 慢阻肺组 %LAA-950、WA%、TDR 均较正常对照组高, 且差异有统计学意义。ROC 显示, %LAA-950、WA%、TDR 三个指标在高原慢阻肺中均有诊断价值 (P 均 < 0.05)。三个指标均与舒张前 FEV1% pred、MEF25、MMF、MEF50 呈负相关, 与 1 年急性加重次数、CAT 评分、MMRC 评分及 COPD 分级呈正相关。多元线性回归分析显示影响 FEV1% pred 的主要因素包括 %LAA-950 ($\beta = -1.427$, $P = 0.000$)、WA%

($\beta=-0.863$, $P=0.000$)。结论: CT 指标与高原稳定期慢阻肺患者肺功能、一年急性加重次数、症状评分、COPD 相关性良好,具有一定的诊断价值。

PO-0997

基于定量 CT 诺模图对支气管扩张咯血风险的预测研究

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目的: 本研究旨在建立和验证基于定量 CT 建立的诺模图以预测支气管扩张咯血发生的风险。**方法:** 回顾性收集 233 例支气管扩张患者的一般资料及定量 CT 指标,采用分层随机抽样方式按照 6:4 比例分为训练集 ($n=133$) 和验证集 ($n=100$),根据 2 年内随访有无发生咯血分为两组。在训练集中通过多因素逐步 Logistic 回归以确定支气管扩张咯血发生的独立危险因素,构建诺模图。并使用校准曲线评价模型的拟合优度,采用受试者工作特征 (receiver operating characteristic, ROC) 曲线评价模型的预测效能,并采用决策曲线分析 (decision curve analysis, DCA) 评价模型的临床应用价值。**结果:** 多因素 Logistic 回归结果显示吸烟史、累及支气管总支数、最大扩张支气管横截面积、最大扩张支气管扩张程度是支气管扩张咯血发生的独立危险因素。诺模图在训练集和验证集中均显示出良好的校准和区分能力,ROC 曲线下面积 (AUC) 在训练集中为 0.951 (95%CI: 0.914~0.989),在验证集中为 0.956 (95%CI: 0.918~0.994)。决策曲线分析表明其具有临床实用价值。**结论:** 基于定量 CT 构建的诺模图对支气管扩张咯血风险具有良好的临床预测效能,并得到了可靠验证。

PO-0998

基于脂肪衰减指数对冠状动脉非钙化斑块的风险分层预测

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目的 探讨冠状动脉非钙化斑块形态学参数与周围脂肪衰减指数 (FAI) 的相关性研究。**方法** 回顾 269 例拟诊冠心病住院患者的 CCTA 图像及临床资料,按管腔狭窄程度分正常组 60 例,病变组 (轻度组 103 例、中度组 63 例和重度组 43 例),其中有意义狭窄组 106 例 (狭窄程度 $\geq 50\%$) 和无意义狭窄组 103 例 (狭窄程度 $< 50\%$),病变组仅选取单支及单发性非钙化斑块。按斑块 CT 值分为低衰减组 21 例 (CT 值 ≤ 30 HU)、中等衰减组 84 例 ($30 < \text{CT 值} \leq 50$ HU)、高衰减组 104 例 ($50 < \text{CT 值} \leq 120$ HU)。以 FAI 是否 ≥ -70.1 HU,分为 FAI 高危组 (FAI ≥ -70.1 HU) 86 例、FAI 低危组 (FAI < -70.1 HU) 183 例。探讨冠状动脉非钙化斑块部分形态学参数与 FAI 相关性;分析 FAI 高危组与 FAI 低危组各参数间的差异。**结果** 冠状动脉狭窄程度与斑块短径 ($R_s=0.543$, $P<0.05$)、FAI ($R_s=0.534$, $P<0.05$)、收缩压 ($R_s=0.156$, $P<0.05$) 呈正相关,与斑块 CT 值 ($R_s=-0.430$, $P<0.05$) 呈负相关。轻度狭窄组与中、重度狭窄组 FAI 差异有统计学意义 ($P<0.05$),但中度组与重度组 FAI 差异无统计学意义 ($P>0.05$)。斑块低衰减组与中、高衰减组 FAI 差异具有统计学意义 ($P<0.05$),但中等衰减组与高衰减组 FAI 差异无统计学意义 ($P>0.05$)。有意义狭窄组与无意义狭窄组在斑块短径、斑块 CT 值及 FAI 差异有统计学意义 ($P<0.05$),两组间 FAI 临界值为 -69.5HU。冠状动脉 FAI 高危组较低危组男性占比高、斑块 CT 值低、斑块短径较大 ($P<0.05$),两组间斑块 CT 值、斑块短径的临界值分别为 21.5HU、1.95mm。**结论** 基于 FAI 能对冠状动脉非钙化斑块进行功能学水平风险分层评估,有望对冠心病严重程度及急性冠状动脉综合征的发生进行预测。

PO-0999

肺部 HRCT3D 重建联合 LDH 和 CRP 诊断难治性支原体肺炎的早期识别

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目的:

探讨肺部高分辨率 CT 三维重建 (HRCT3D) 联合血清乳酸脱氢酶 (LDH) 和 C 反应蛋白 (CRP) 对难治性支原体肺炎的早期诊断价值。

方法:

选择 2020 年 1 月至 2022 年 12 月期间收治的 100 例确诊为难治性支原体肺炎患者作为研究对象, 采用 HRCT3D 技术对其肺部进行三维重建, 并分析其影像学表现。同时, 检测患者血清 LDH 和 CRP 水平, 并与 50 例健康对照组进行比较。通过统计学方法分析 HRCT3D 重建结果与 LDH、CRP 水平之间的相关性, 并评估其在难治性支原体肺炎早期诊断中的应用价值。

结果:

HRCT3D 重建结果显示, 难治性支原体肺炎患者肺部出现多发斑片状高密度影像, 呈现为散在、局灶性或弥漫性分布。与健康对照组相比, 难治性支原体肺炎患者血清 LDH 和 CRP 水平明显升高 ($P<0.05$)。此外, HRCT3D 重建结果与 LDH、CRP 水平呈正相关 ($P<0.01$)。结合 HRCT3D 重建结果和 LDH、CRP 水平, 对难治性支原体肺炎的诊断敏感性和特异性分别为 92% 和 86%。

结论:

肺部 HRCT3D 重建技术联合血清 LDH 和 CRP 水平具有较高的难治性支原体肺炎早期诊断价值, 可提高该疾病的诊断准确性和早期干预的能力。

PO-1000

基于深度学习量化 CT 图像评估 COVID-19 患者严重程度及病情转归预测研究

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目的: COVID-19 自 2019 年 12 月首次出现以来, 席卷全国, 对世界医疗和经济造成巨大影响, 这也使得许多地方医疗资源出现急剧短缺甚至不堪重负, 为最大化挽救患者生命提出了严峻挑战。因此, 在入院初期快速高效地评估重症患者的不良进展并预测危重患者的死亡风险, 有助于实现患者的早期监测、分级治疗, 对节省医务人员时间和合理配置资源意义重大。本研究旨在利用深度学习对 CT 图像进行量化分析, 以评估 COVID-19 肺炎患者的疾病严重程度及对患者病情转归的预测。

方法: 纳入 115 例在 2022 年 12 月至 2023 年 1 月期间因感染 COVID-19 病毒发生新冠肺炎的患者, 使用深度学习软件 (Siemens Healthineers, German) 对薄层 CT 图像进行处理, 以获得定量数据, 包括严重程度 (双肺分数相加, 严重: >15 ; 非严重: ≤ 15)、肺体积、病灶体积及百分比、高密度病灶 (≥ 200 HU) 体积及百分比, 病灶平均 HU 和标准差。并记录患者年龄、性别、吸烟史、是否合并基础疾病 (包括慢性肾病、糖尿病、高血压、COPD 等)。采用多变量方差分析和多元逻辑回归对数据进行分析处理, 以评估对患者病情影响的利/不利因素。

结果: 本研究共计纳入 115 例患者, 其中初诊重症患者 8 例 (双肺评分 >15)、非重症患者 107 例 (双肺评分 ≤ 15); 不合并基础疾病患者 15 例, 合并基础疾病患者 100 例。利用多变量方差分析

(MANOVA) 和多元逻辑回归对数据进行分析, 结果显示定量特征 (如不透明度评分、肺不透明度体积和百分比等) 在预测初患者预后情况方面具有统计学差异 ($P<0.001$)。

结论: 基于深度学习的 CT 肺炎分析实现了对新冠肺炎肺炎患者进行精准的肺部分割, 并确定患者结局和 ICU 入院需求。其可以为当前的放射学报告提供额外的定量信息, 为放射科医生对患者疾病严重程度的定性评估, 及预测患者的疾病预后情况提供了更多可参考信息。

PO-1001

基于 CT 影像组学的集成学习模型对 非小细胞肺癌脑转移预测研究

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目的:

脑转移 (BM) 是非小细胞肺癌 (NSCLC) 患者最常见的并发症。本研究旨在利用胸部 CT 影像组学和临床特征, 开发一个集成学习模型, 预测晚期 NSCLC 患者 3 年内发生 BM 的概率。

方法:

这项回顾性研究纳入了 537 例 IIIA-IVB 期 NSCLC 患者, 其中 290 例发生了 BM, 247 例未发生 BM。将患者随机分为训练队列和验证队列, 比例为 7: 3。通过使用术前胸部 CT 图像计算了 1106 个影像组学特征, 以解码原发性肺癌的成像表型。为了降低影像组学特征的维度, 采用基于 Lasso 正则化方法的递归特征消除方法, 在去除低方差特征后选择最佳图像特征。使用 XGBoost 分类器的集成学习算法通过融合影像组学特征和临床特征进行模型训练和建立预测模型。最后, 采用 Kaplan-Meier (KM) 生存分析评估影像组学-临床模型生成的预测得分的预后价值。

结果:

融合模型在训练队列和验证队列中的受试者工作特征曲线下面积分别为 0.91 ± 0.01 和 0.89 ± 0.02 , 高于影像组学模型和临床模型。通过 KM 生存分析发现, 我们模型生成的风险评分在两个队列中对 BM 无转移生存 (BMFS) 和总生存期 (OS) 具有显著的预后价值 ($P<0.05$)。

结论:

我们的结果表明: (1) 融合影像组学和临床特征可以提高预测 BM 风险的性能, (2) 影像组学模型比临床模型具有更高的性能, (3) 影像组学-临床融合模型对预测 NSCLC 患者的 BMFS 和 OS 具有预后价值。

PO-1002

基于 3D 多任务深度影像组学的非小细胞肺癌 EGFR 基因突变状态预测

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目的:

EGFR 基因突变状态预测对于非小细胞肺癌的治疗方案和预后具有重要的价值。本研究开发了基于 CT 影像的 3D 多任务深度影像组学模型, 预测非小细胞肺癌的 EGFR 基因突变状态。

方法:

从本中心回顾性收集了 818 名经过手术病理确认的非小细胞肺癌患者,按照 8:2 的比例分为训练集和测试集,并从 TCIA 公共数据集中手机 131 名符合要求的患者作为外部测试。首先,对每个肺肿瘤的中心点坐标进行标记,并手动勾画肿瘤的边界;然后,运用一系列图像预处理技术对原始 CT 影像进行预处理,主要包括图像重采样,灰度值标准化等,根据肿瘤的中心点坐标从 CT 影像中剪切出 96×96×96 像素大小的三维肿瘤区域。其次,运用三维残差网络构建多任务深度学习预测模型,采用 Focal 损失函数降低不同样本数量不平衡对模型的影响。其中,深度学习模型包括肺肿瘤分割和 EGFR 基因突变预测两个任务。最后,在提取肺肿瘤传统影像组学特征的基础上,融合深度图像特征和影像组学特征构建多任务深度影像组学预测模型。

结果:

3D 多任务深度影像组学模型在两个测试集上的曲线下面积 (AUC) 为 0.86 和 0.80,显著高于单任务深度学习模型和传统影像组学模型 ($P<0.05$)。预测评分在 DFS 和 OS 预测方面具有显著效能 ($P<0.005$)。

结论:

基于 CT 影像的多任务深度学习模型能够快速无创性的预测非小细胞肺癌 EGFR 基因突变状态,未来可以辅助临床提供更为准确的 EGFR 基因检测结果。

PO-1003

基于冠状动脉 CT 血管成像的左心房测量参数对慢性肾病患者肾功能的评价

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目的 评价基于冠状动脉 CTA (CCTA) 测得的左心房、左心耳形态和功能参数与慢性肾病 (CKD) 患者肾功能的相关性。方法 回顾性分析行 CCTA 的 CKD2~4 级组及 CKD5 级组患者各 75 例,并选取肾功能正常的对照组 75 例,收集临床资料及常规超声心动图参数左室射血分数 (LVEF) 和二尖瓣口舒张期 E 峰与室间隔 e 峰的比值 (E/e')。采用图像后处理软件测得左心房最大、最小容积 (LAVmax、LAVmin) 及左心耳最大、最小容积 (LAAVmax、LAAVmin),并计算左心房及左心耳的射血分数 (LAEF、LAAEF)。采用单因素方差分析、秩和检验或 χ^2 检验比较组间各项指标的差异,采用 Pearson 相关分析及多元线性回归分析左心房参数与 eGFR 之间的相关性。结果 CKD5 级组较 CKD2~4 级组及对照组、CKD2~4 级组较对照组间的左心房功能参数 LAEF 及 LAAEF 显著减低 ($P<0.001$),CKD5 级组的左心房形态参数 LAVmax、LAVmin、LAAVmax 及 LAAVmin 较对照组显著增大 ($P<0.01$),但较 CKD2~4 级组增大不显著。左心房功能参数 LAEF 及 LAAEF 与 eGFR 呈正相关 ($r=0.395$ 和 0.414 , $P<0.001$),且为独立相关 ($P<0.01$)。结论 CCTA 左心房测量功能参数 LAEF 及 LAAEF 与 CKD 患者的肾功能独立相关,为早期评估、早期干预 CKD 患者诊治提供影像学量化指标。

PO-1004

基于增强 CT 深度学习影像组学术前预测胸腺瘤风险分类

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目的 探讨基于增强 CT 深度学习影像组学术前预测胸腺瘤风险分类的价值。**方法** 回顾性纳入弋矶山医院 139 例胸腺瘤患者为训练集, 池州市人民医院与芜湖市第二人民医院 81 例患者为验证集。根据 WHO 简化病理分型分为低风险组 (A、AB、B1 型胸腺瘤) 137 例及高风险组 (B2、B3 型胸腺瘤) 83 例。基于增强 CT 静脉期图像提取手工影像组学特征与深度学习影像组学特征, 降维筛选最优特征构建影像组学标签评分。单因素与多因素 logistic 回归分析筛选预测胸腺瘤高风险的影像学独立危险因素, 利用逻辑回归 (LR)、随机森林 (RF)、决策树 (DT) 及支持向量机 (SVM) 分别建模, 选择最佳模型为输出模型, 通过受试者工作特征 (ROC) 曲线下面积 (AUC) 及净重新分类指数 (NRI) 评估模型的效能。构建列线图将模型可视化, 校准曲线及临床决策曲线评价模型的校准度与临床适用性。**结果** 四种机器学习构建模型的 AUC 分别为训练集 LR: 0.899、RF: 0.835、DT: 0.897、SVM: 0.860; 验证集 LR: 0.889、RF: 0.830、DT: 0.905、SVM: 0.858。训练集及验证集 RF 与 LR 及 DT 比较差异有统计学意义 ($P < 0.05$), 余模型比较差异无统计学意义 ($P > 0.05$)。校准曲线表明模型的预测概率与观测概率具有较高一致性, DCA 显示当阈值概率为 0~0.93 (训练集)、0~0.82 (验证集) 时临床均有获益。训练集与外部验证集列线图与影像学模型比较差异均有统计学意义 ($P < 0.05$), 与 Radscore 比较差异无统计学意义 ($P > 0.05$)。列线图相较于 Radscore 模型效能均有改善, 训练集 NRI 为 7.5% ($P = 0.007$), 外部验证集 NRI 为 5.3% ($P = 0.020$)。**结论** 基于增强 CT 深度学习影像组学术前实现了胸腺瘤的准确风险分类。

PO-1005

影像组学联合 CT 特征预测胸膜下 临床 IA 期肺腺癌脏层胸膜侵犯的价值

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【目的】

评估基于瘤体及瘤周肿瘤全体积影像组学特征及 CT 特征构建的列线图预测临床 IA 期肺腺癌脏层胸膜侵犯 (VPI) 的价值。

【资料与方法】

回顾性收集本院诊断为临床 IA 期肺腺癌 404 例病例作为内部数据集, 依据病理报告的 VPI 情况分为阳性组和阴性组, 以 7: 3 的比例随机划分为训练集和内部验证集。于外院诊断为临床 IA 期肺腺癌 80 例患者作为外部验证集。以多因素 logistic 回归分析筛选与 VPI 相关的 CT 特征中最佳预测变量组合构建临床模型。基于平扫 CT 图像中瘤体全体积、瘤体外扩 5 mm, 10 mm, 15 mm 范围的瘤体+瘤周全体积的 VOI 各提取 1218 个影像组学特征以构建影像组学模型, 命名为 GTV, GPTV5, GPTV10 和 GPTV15 影像组学模型, 以最优组学模型的 Radscore 和相关 CT 特征采用多因素 logistic 回归构建综合模型并绘制列线图。在验证集中采用 ROC 曲线及 AUC 值来评估该模型的区分度。

【结果】

临床模型中的实性成分最大径、胸膜凹陷征、有无实性成分接触胸膜及血管集束征是临床 IA 期肺腺癌患者 VPI 的 CT 特征独立危险因素。在训练集、内部验证集和外部验证集中 GPTV10 影像组学模型的 AUC 值分别为 0.855、0.842、0.842，以 GPTV10 影像组学模型效能最优。基于 GPTV10-Radscore 和 CT 特征构建的综合模型在训练集、内部验证集和外部验证集中 AUC 值分别为 0.894、0.828 及 0.876。在训练集上综合模型预测效能优于 GPTV10 影像组学模型 ($P<0.05$)，在外部验证集中综合模型预测效能优于临床模型 ($P<0.05$)，在内部验证集中三个模型的 AUC 值差异无统计学意义 ($P>0.05$)。

【结论】

基于 GPTV10 影像组学特征及相关 CT 特征（实性成分最大径、胸膜凹陷征、有无实性成分接触胸膜及血管集束征）的列线图可有效术前预测临床 IA 期肺腺癌患者的 VPI 状态。

PO-1006

影像组学联合 CT 特征预测胸膜下实性成分占比 $\leq 50\%$ 的磨玻璃结节型肺腺癌浸润性的价值

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【目的】

评估基于瘤体及瘤周肿瘤全体积影像组学特征及 CT 特征构建的列线图预测胸膜下实性成分占比 (CTR) $\leq 50\%$ 的磨玻璃结节型肺腺癌浸润性的价值。

【资料与方法】

回顾性收集本院诊断为临床 IA 期肺腺癌、与胸膜存在接触且 CTR $\leq 50\%$ 的磨玻璃结节患者 247 例作为内部数据集，按病理类型分为微浸润型肺腺癌 (MIA) 和浸润型肺腺癌 (IAC)，以 7: 3 的比例随机划分为训练集和内部验证集。收集外部三家医院共 47 例患者作为外部验证集 ($n=47$)。以多因素 logistic 回归分析筛选与 VPI 相关的 CT 特征中最佳预测变量组合构建临床模型。基于平扫 CT 图像中瘤体全体积、瘤体外扩 5 mm, 10 mm, 15 mm 范围的瘤体+瘤周全体积的 VOI 各提取 1218 个影像组学特征以构建影像组学模型，命名为 GTV, GPTV5, GPTV10 和 GPTV15 影像组学模型，以最优组学模型的 Radscore 和相关 CT 特征采用多因素 logistic 回归构建综合模型并绘制列线图。在验证集中采用 ROC 曲线及 AUC 值来评估该模型的区分度。

【结果】

临床模型中的肿瘤最大径、实性成分占比是预测胸膜下 CTR $\leq 50\%$ 的磨玻璃结节型肺腺癌患者浸润性的 CT 特征独立危险因素 (P 均 <0.05)。以 GPTV10 影像组学模型效能最优。基于 GPTV10-Radscore 和相关 CT 特征构建的综合模型在训练集、内部验证集和外部验证集中 AUC 值分别为 0.912, 0.874 及 0.892。在训练集上综合模型预测效能优于临床模型 ($P<0.05$)，在内部验证集中三个模型的 AUC 值差异无统计学意义 ($P>0.05$)，在外部验证集中综合模型及 GPTV10 组学模型的预测效能均优于临床模型 ($P<0.05$)。

【结论】

基于 GPTV10 影像组学特征、肿瘤最大径和实性成分占比构建的综合模型可有效术前预测胸膜下 CTR $\leq 50\%$ 的磨玻璃结节型肺腺癌的浸润性。

PO-1007

CT 肺血管定量参数对 COPD 高危人群判定和诊断价值的研究

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目的：本研究旨在探讨 CT 肺血管定量参数诊断 COPD 及判断高危人群的价值，并分析肺血管重塑参数与肺功能间的相关性。方法：回顾性分析上海市同济医院接受胸部 CT 检查和肺功能检测的 1126 例受试者的临床及影像资料，根据肺功能指标进行分组。定量测量所有受试者的胸部 CT 肺血管参数。分析①3 组人群的基本资料和 4 个肺功能参数间的差异；②分析 3 组人群的 18 个肺血管定量参数间的差异；③分析 CT 肺血管参数与肺功能参数的相关性。结果：①性别及各项肺功能参数在 3 组间均有统计学差异，年龄在组间有统计学差异，3 组间 BMI 差异无统计学意义。②距胸膜 9、15mm 的 Ntotal/LSA 在 3 组间均有统计学差异；距胸膜 9、15、21mm 的 NCSA<5、Ntotal、LSA 和距胸膜 15、21mm 的 VAtotal，距胸膜 21mm 的 Ntotal/LSA 以及 TBV、BV5 和 BV10 在组间有统计学差异，距胸膜 9mm 的 VAtotal 在 3 组间差异无统计学意义。③高危组中，距胸膜 9mm 的 Ntotal/LSA、VAtotal 与部分肺功能参数呈正相关；各胸膜距离下的 NCSA < 5、Ntotal、LSA、Ntotal/LSA 和 TBV、BV5、BV10 与部分肺功能参数呈负相关。COPD 组中，距胸膜 9mm 的 NCSA<5、Ntotal 与 DLCO SB、DLCO/VA 呈正相关，除了 Ntotal/LSA 与肺功能各参数均存呈正相关外，余肺血管参数与部分肺功能参数呈负相关。结论：胸部 CT 定量成像可有效评价 COPD 患者及高危人群的肺血管变化，且肺血管 CT 定量参数有可能区分 COPD 及高危人群，为 COPD 早期诊断提供新的途径。

PO-1008

CT 肺血管定量参数对 COPD 影像表型的鉴别诊断价值

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目的：本研究旨在分析 COPD 患者不同影像表型的 CT 肺血管定量参数差异。方法：回顾性分析接受胸部 CT 检查和肺功能检测的 372 例 COPD 患者的临床资料及胸部 CT 图像，根据 AEM 视觉分型法分为 A 型 272 例，E 型 60 例，M 型 40 例，分析①3 种表型患者的所有受试者的胸部 CT 肺血管参数，基本资料和 4 个肺功能参数间的差异；②分析 3 种表型患者的 18 个肺血管定量参数间的差异。结果：（1）①3 组表型受试者的性别、年龄、BMI 及肺功能参数在组间有统计学差异；②3 组表型受试者在距胸膜 9mm、15mm 及 21mm 的 LSA 和 Ntotal/LSA 在 A 型和 E 型、A 型和 M 型之间差异有统计学意义；距胸膜 15mm 和 21mm 的 NCSA<5 在总体及两两比较之间差异均有统计学意义。距胸膜 15mm 的 Ntotal 在 A 型和 E 型之间差异有统计学意义，VAtotal 在 E 型和 M 型之间差异有统计学意义。距胸膜 21mm 的 Ntotal、VAtotal 在 A 型和 E 型、A 型和 M 型之间差异有统计学意义。TBV 在 A 型和 E 型、A 型和 M 型之间差异有统计学意义；BV10 在 A 型和 E 型间差异有统计学意义。距胸膜 9mm 的 NCSA<5、Ntotal、VAtotal 以及 BV5 在三组间差异均无统计学意义。结论：不同影像表型 COPD 患者肺血管定量参数存在差异，肺小血管数量在影像表型的区分中具有重要意义。胸部 CT 肺血管定量参数有助于 COPD 患者影像表型评估，为疾病精准诊疗和病人预后评估提供有益的补充。

PO-1009

不同严重程度的新型冠状病毒感染患者在肺血容量分布上的差异

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目的：基于 2022 年底我国 Omicron 流行期间北京市地区的 COVID-19 患者影像数据，探究不同严重程度的新型冠状病毒感染患者在肺血容量分布上的差异。

方法：本研究回顾性收集了 2022 年 11 月至 2023 年 1 月到本院就诊的 Omicron 感染患者的临床数据和 CT 影像。根据《新型冠状病毒感染诊疗方案（试行第十版）》将患者分为轻型、中型、重型和危重型，其中轻型和中型记为 MM 组（Mild/Moderate），重型和危重型记为 SC 组（Severe/Critical）。一名具有 20 年胸部影像诊断经验的放射科医生对患者 CT 图像中的肺炎程度进行了定性评分，同时采用深度学习模型分割图像中的肺叶、肺炎和肺血管等区域，分析并提取肺血容量分布等定量指标。采用 T 检验、U 检验、卡方检验和 Fisher 检验对两组患者的定性 CT 评分及定量 CT 指标进行统计学检验，采用 Pearson 相关性分析探究肺炎程度与肺血管容量分布之间的关系。

结果：本研究共入组 921 名经过 PCR 或抗原检测确诊的 Omicron 感染患者，其中 MM 组 755 人，平均年龄 58 岁，男性 348 人；SC 组 166 人，平均年龄 74 岁，男性 112 人。与 MM 组相比，SC 组肺炎严重程度的定性评分更高（MM vs. SC, 2.1 vs. 5.4, $P<0.001$ ），且 BV5%（MM vs. SC, 44% vs. 32%, $P<0.001$ ）和 BV10%（MM vs. SC, 61% vs. 49%, $P<0.001$ ）等反应肺部微血管血容量的指标显著低于 MM 组。同时两组患者均呈现下肺区域微血管损失>上肺区域的倾向，对于 SC 组患者来说，右肺上叶、中叶和下叶的 BV5%分别为 37%、32%和 24%，左肺上叶和下叶的 BV5%分别为 38%和 27%，存在显著性差异（ $P<0.001$ ）。肺炎程度定性评分与肺血容量分布指标的 Pearson 相关性系数为 0.71。

结论：与轻型和中型患者相比，重型和危重型的新冠病毒感染患者的肺部微血管血容量损失更加严重，且下肺区域血容量损失程度大于上肺区域，同时肺血容量损失与肺炎严重程度相关。

PO-1010

食管鳞状细胞癌胸椎骨折与放射治疗的相关性研究

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【摘要】目的 探讨食管鳞状细胞癌(esophageal squamous cell carcinoma, ESCC)患者发生胸椎骨折与接受放射治疗(radiotherapy, RT)的相关性。**方法** 回顾性分析经病理证实为 ESCC 的 602 例患者的临床和 RT 相关参数。根据术后随访期间胸椎是否发生骨折，将患者分为骨折组与非骨折组。用单因素及多因素 Cox 模型分析发生胸椎骨折的危险预测因素。**结果** 经中位随访 24 个月后，有 54 例患者发生胸椎骨折。单变量分析表明，单个椎体的椎体受射剂量每增加 5 Gy 以及 RT 次数每增加 1 倍是椎体骨折的危险因素。多因素 Cox 回归分析显示，在调整临床危险因素后，RT 仍是胸椎骨折的独立的危险因素。在常规临床危险因素 Cox 模型中加入 RT 相关参数(椎体受射剂量和 RT 次数)及平均椎体 HU 值，显著提高了预测椎体骨折的 c2 值(均 $P<0.001$)。**结论** 本研究结果表明，ESCC 行 RT 过程中椎体受射剂量和 RT 次数的增加是发生椎体骨折显著预测因子。联合椎体剂量、RT 分数和椎体 HU 值可以为 ESCC 患者提供最佳的风险分层依据。

PO-1011

肺充气状态对亚实性肺结节影像组学特征稳定性的影响

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目的：探讨肺充气状态对亚实性肺结节 CT 影像组学特征稳定性的影响。

材料和方法：回顾性纳入 2018 年 8 月至 2021 年 7 月在我院同时行低剂量双气相（吸气相和呼气相）胸部 CT 的 230 名患者，共计 255 个亚实性肺结节。放射科医生 1 对 230 名患者的双气相图像中的亚实性肺结节进行手动勾画；另外，从 230 名患者中随机选取 30 名患者，由放射科医生 2 对这 30 名患者的亚实性肺结节进行手动勾画；间隔 1 个月时间，由放射科医生 1 对这 30 名患者的亚实性肺结节进行二次手动勾画。使用组学软件提取影像组学特征，通过组内相关系数（Intraclass correlation coefficient, ICC）对勾画结果进行一致性检验，将观察者间一致性和观察者内一致性较好（ $ICC > 0.75$ ）的特征纳入进一步分析。通过 ICC 对吸气相图像和呼气相图像上亚实性肺结节的影像组学特征进行一致性检验，统计改变肺充气状态导致一致性由较好降级为中等（ $0.4 < ICC \leq 0.75$ ）或较差（ $ICC \leq 0.4$ ）的特征数量，比较不同类别影像组学特征间发生 ICC 降级的数量差异。

结果：观察者间一致性平均值和观察者内一致性平均值均达到较好，分别为 0.854 和 0.849。在 1218 个特征中保留一致性较好的 997 个特征。吸气相和呼气相图像的亚实性肺结节影像组学特征一致性平均值达到中等，为 0.683。一致性较差的组学特征中纹理特征占比最多。改变肺充气状态使亚实性肺结节发生一致性降级的组学特征百分比达到 45.44%（453/997），发生一致性降级的纹理特征多于一阶特征。

结论：改变肺充气状态会影响亚实性肺结节 CT 影像组学特征的稳定性，纹理特征是受影响最明显的特征，进行结节纹理特征研究时，应充分考虑肺充气状态的影响。

PO-1012

肺充气状态对不同类别亚实性肺结节 CT 定量参数的影响

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目的：探讨肺充气状态对不同类别亚实性肺结节常规计算机断层成像（Computed tomography, CT）定量参数的影响。

材料和方法：回顾性纳入 2018 年 8 月至 2021 年 7 月在我院同时行低剂量双气相（吸气相和呼气相）胸部 CT 筛查的 230 名受试者，共计 255 个亚实性肺结节，获取患者双气相 CT 图像中的结节定量参数（结节长轴直径、短轴直径、平均直径、表面积、体积和密度），计算呼气相定量参数与吸气相定量参数变化之比，标记为定量参数变化率【（定量参数呼气相-定量参数吸气相）/定量参数吸气相】。将结节按照不同密度分为部分实性结节组和纯磨玻璃密度结节组、按照不同直径分为直径 $\leq 10\text{mm}$ 组和直径 $> 10\text{mm}$ 组以及按照不同肺叶分为上叶结节组（左肺上叶和右肺上叶）和下叶结节组（左肺下叶、右肺中叶和右肺下叶），比较不同密度、直径和肺叶间结节定量参数变化率的统计学差异。

结果：部分实性结节组和纯磨玻璃密度结节组间的结节长轴直径变化率不存在统计学差异，其余结节定量参数变化率均存在统计学差异（ P 均 < 0.05 ）。直径 $\leq 10\text{mm}$ 结节组和直径 $> 10\text{mm}$ 结节组间的所有结节定量参数变化率均不存在统计学差异（ P 均 > 0.05 ）。下叶结节组的结节密度变化率大于上叶结节组（ $P < 0.001$ ），其余结节定量参数变化率均不存在统计学差异（ P 均 > 0.05 ）。

结论：纯磨玻璃密度结节的大部分 CT 定量参数较部分实性结节更易受肺充气状态的影响；改变肺充气状态对不同直径亚实性肺结节影响相同；下肺叶亚实性肺结节的结节密度较上肺叶亚实性肺结节更易受肺充气状态的影响。

PO-1013

社区筛查人群低剂量 CT 参数反应图的定量分析及其与吸烟的关系：一项横断面研究

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目的：基于不同肺功能分组的参数反应图 (PRM) CT 定量参数探讨社区筛查吸烟人群肺体积、密度和小气道的变化。

方法：纳入 2018 年至 2021 年完成了吸气和呼气胸部计算机断层扫描 (CT) 并匹配成功的参加胸部三大疾病筛查的社区吸烟者 1995 例。受试者被分为正常组 ($FEV_1/FVC \geq 0.70$, 预测 $FEV_1\% \geq 72\%$)、高危 COPD 组 ($FEV_1/FVC \geq 0.7$, 预测 $FEV_1\% < 72\%$) 和 COPD 组 ($FEV_1/FVC \leq 0.70$, 预计 $FEV_1\% < 22\%$)，三组根据吸烟史进一步分为从不吸烟者、现吸烟者和既往吸烟者。用计算机软件自动提取 PRM 定量参数。使用单因素方差分析或 Kruskal-Wallis 检验比较两组之间 PRM 定量参数的差异。

结果：COPD 高危组 PRMLV 和 PRMNormalV% 均低于正常组 ($P < 0.05$)，COPD 高危组与正常组中 PRMEmphV、PRMEmphV%、PRMfSADV 和 PRMfSADV% 差异无统计学意义 ($P > 0.05$)。在高危 COPD 人群中现在吸烟者的 PRMLV、PRMEmphV、PRMEmphV%、PRMfSADV 和 PRMfSADV% 高于从不吸烟者 ($P < 0.05$)。现在吸烟者的 PRMNormalV% 低于从不吸烟者 ($P < 0.05$)。先前吸烟者的 PRMfSADV% 高于不吸烟者 ($P > 0.05$)，目前吸烟者的 PRMEmphV% 和 PRMfSADV% 高于从不吸烟者 ($P < 0.05$)。

结论：COPD 高危人群正常肺组织容量和肺容量的百分比降低。吸烟对肺小气道的损害可能是不可逆转的。

PO-1014

HRCT 定量参数对 COPD 早期诊断价值研究

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【目的】探讨利用胸部高分辨率计算机断层扫描 (HRCT) 测量的定量参数在慢性阻塞性肺疾病 (COPD) 的早期诊断以及 COPD 高危人群识别方面的价值。【资料与方法】回顾性纳入 2015 年 1 月至 2020 年 08 月上海市同济医院和长征医院 670 名同时具有肺功能检查和胸部 HRCT 图像的患者。根据 GOLD 指南定义的肺功能指标进行分组：正常组 ($FEV_1/FVC > 70\%$, $FEV_1\% \geq 95\%$)、高危组 ($FEV_1/FVC > 70\%$, $80\% < FEV_1\% < 95\%$) 及 COPD 组 ($FEV_1/FVC < 70\%$)；正常组 150 例、高危组 156 例、COPD 组 363 例 (GOLD I 105 例、GOLD II 131 例、GOLD III+IV 128 例)。用 COPD 专用分析软件测量肺气肿及小气道共计 13 个参数，探究 HRCT 定量参数与肺功能参数的相关性。【结果】第 6-8 代支气管气道参数与正常组 $FEV_1\%pred$ 显著相关 (均 $P < 0.05$, $rL/A-6=0.168$, $rL/A-7=0.203$, $rL/A-8=0.208$)。高危组内仅第 5、8 级支气管参数与 $FEV_1\%pred$ 显著相关 (均 $P < 0.05$, $rL/A-5=0.184$, $rL/A-8=0.212$)。GOLD III+IV 组所有气道参数均与 $FEV_1\%pred$ 显著相关 (均 $P < 0.05$)。且第 5-8 级支气管参数与 $FEV_1\%$ 相关系数依次递减，说明 GOLD III+IV 组内，较大的气道较小气道影响 $FEV_1\%$ 程度更加显著。【结论】以 FEV_1 为基础的 COPD 分期与患者的气道病变及肺气肿程度相关。在 COPD 临床前期，小气道重塑显著影响 $FEV_1\%$ 水平，而在 COPD 中晚期，中型呼吸道 (而不是小气道) 重塑及肺气肿程度影响 $FEV_1\%$ 水平。

PO-1015

光谱 CT 不同扫描方案及重建算法对体模肺结节图像质量的影响

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目的：评估光谱 CT 不同扫描方案及重建算法对体模肺结节图像质量的影响。

方法：应用西门子光谱 CT 对胸部体模进行不同 kv/mAs 扫描方案，体模中包含 12 个不同直径、密度的肺结节，扫描包括 14 种单能、8 种双能方案，重建算法包括滤波反投影(FBP)、高级迭代重建算法(ADMIRE) 3 级及 5 级。由两名医师分别独立测量不同扫描方案及重建算法下图像质量指标：对比噪声比 (CNR)、剂量校正后噪声 (FOM)、空气噪声 (空气 SD)。固定扫描方案，比较不同重建方法下图像质量的差异；固定重建算法，分别比较单能和双能不同扫描方案下图像质量的差异。

结果：观察者间一致性较好。所有扫描方案之间 CNR 比较有统计学差异 ($P<0.05$)，两两比较发现 Flash Sn100kV-10mAs 和 120kV-150mAs 之间存在差异。在 120kV/10mAs 的扫描方案下，CNR 和空气 SD 在 FBP、ADMIRE-3 及 ADMIRE-5 三种重建算法间无统计学差异 ($P>0.05$)；在重建 ADMIRE 3，单能扫描方案 (120kV-150mAs、120kV-30mAs、Sn100kV-20mAs、Flash Sn100kV-20mAs) 及双能 (90/Sn150kV-40mAs)、90/Sn150kV-20mAs、70/Sn150kV-90mAs、70/Sn150kV-60mAs) CNR、FOM 更高。

结论：光谱 CT 不同扫描方案中，Flash Sn100kV-10mAs 扫描方案的图像质量最佳，同时辐射剂量明显降低；此外，在固定重建方法 ADMIRE 3 时，最佳推荐扫描方案为 70/Sn150kV-60mAs。

PO-1016

基于深度学习技术的早期 COPD 诊断模型研究

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【目的】利用胸部 HRCT 图像进行特征提取和分析，建立深度学习模型，识别 COPD 的高危人群以及对 COPD 患者进行智能化诊断和 GOLD 分级。

【资料与方法】回顾性纳入 2015 年 1 月至 2020 年 08 月上海市同济医院和长征医院 2142 名同时具有肺功能检查和胸部 CT 平扫的患者。本部分共纳入人群 2142 例。训练集有 1499 例，其中正常组 182 例、高危组 461 例、COPD 组 856 例 (GOLDI=167, GOLDII=459, GOLDIII=169, GOLDIV=61)。验证集有 214 例，其中正常组 28 例、高危组 78 例、COPD 组 108 例 (GOLDI=15, GOLDII=59, GOLDIII=26, GOLDIV=8)。测试集有 429 例，其中正常组 61 例、高危组 127 例、COPD 组 241 例 (GOLDI=41, GOLDII=135, GOLDIII=47, GOLDIV=18)。本研究建立利用 HRCT 图像早期 COPD 的 3D-CNN 深度学习诊断模型。

【结果】基于高分辨率 CT (HRCT) 图像的深度学习结果显示，模型对正常组及高危组进行分类的精确率为 0.72，召回率为 0.73，F1 分数为 0.73，AUC 为 0.75；对非 COPD 组及 COPD 组进行分类的精确率为 0.87，召回率为 0.84，F1 分数为 0.85，AUC 为 0.85；而对 COPD 组内 (GOLDI、GOLD II、GOLD III+IV) 进行分类的准确率和 AUC 分别仅为 0.61 和 0.68。

【结论】CNN 可以根据 CT 图像识别 COPD 肺实质结构变化，从而推断肺功能，确定 COPD 的存在 (AUC=85%) 和严重程度。肺功能正常的人群中，高危人群被 CNN 预测的正确率达到 73%。本研究表明，卷积神经网络 (CNN) 可以通过临床常用的吸气相 CT 进行图像分析实现 COPD 早期诊断，从而提供一种有效的替代方法。

PO-1017

基于光谱及双源 CT 的扫描参数及重建算法肺结节测量的对比：体模研究

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目的：探讨光谱及双源 CT 设备不同的扫描参数及重建算法的辐射剂量及对体模肺结节测量准确性的影响。

方法：对体模肺结节进行 CT 扫描，分为 A 组（飞利浦 128 层光谱 CT）、B 组（西门子 128 层双源 CT），测量、计算对比噪声比（CNR）、剂量校正后噪声（FOM）及空气噪声（AN），每次扫描的辐射剂量。对比光谱及双源 CT 设备的扫描参数、重建算法，比较两组之间图像质量的差异。在图像质量无差异的前提下，固定辐射剂量为 1mSv、0.5mSv、0.3mSv 左右亚组，测量计算以上参数；同时，记录肺结节位置、性质、计算长径的测量误差百分比(APE)。

结果：A、B 组不同扫描方案及重建算法均不影响肺结节的测量结果（ $P>0.05$ ）。在图像质量无差异的前提下，辐射剂量为 1mSv 左右，A 组 120 keV -30mAs (60,70,100keV)使用 IR(R2)重建算法，肺组织 SD、CNR、FOM 较高；当辐射剂量固定在 0.5mSv 左右，A 组 120 keV -10mAs 使用 IR(R2)重建算法 CNR、FOM 显较高；辐射剂量固定在 0.3mSv 左右，A 组 100 keV -10mAs 使用 IR(R2)重建算法 CN、FOM 较高。在图像质量无差异的前提下，辐射剂量为 1mSv 左右，A 组使用 120 keV -30mAs (80-90keV)联合 FBP,Idose4/5,iRR2 重建算法下直径 APE 较低；0.5mSv 左右，A 组 120 keV -10mAs 所有重建算法下直径 APE 较低；0.3mSv 左右，A 组 100 keV -10mAs 使用 Idose4/5,FBP 重建算法下直径 APE 较低。

结论：在不影响肺结节的测量准确性的前提下，飞利浦 128 层光谱 CT 的 100 keV -10mAs 扫描参数，使用 IR(R2)、Idose4/5 重建算法，辐射剂量最低，有望建议作为常规肺结节 CT 筛查的优化方案。

PO-1018

对比剂分段注射法对胸部增强 CT 减轻上腔静脉伪影的价值

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目的 探讨胸部 CT 增强采用对比剂分段注射法对减轻上腔静脉伪影的价值。方法 选择 2022 年 5 月至 2023 年 3 月重庆医科大学附属第一医院行多排螺旋 CT 胸部增强检查患者 200 例(BMI23~26，体重 50~75kg，排除心功能不良)。设备为 GE Discovery 64 排螺旋 CT，对比剂选用 320mgI/mL，常规进行胸部 CT 平扫后选择对比剂智能追踪/实时增强监测法完成胸部 CT 增强检查：碘总量按 320mgI/kg 体重计算，按是否采用对比剂分段注射法分为 A、B 两组，每组均为 100 例：A 组为对照组，采用对比剂+生理盐水推注模式，对比剂维持注射时间设计为 20s，生理盐水维持注射时间设计为 10s（25~40mL），注射速率均为：2.5~3.7mL/s；B 组采用对比剂分段注射法，第一段推注纯对比剂，总量按体重计算出的剂量减 10mL，注射速率按基于体重算出的对比剂总量除 20s 得出，第二段推注 25mL40%混合对比剂（含 10mL 纯对比剂），第三段推注 25~30mL 生理盐水，均使用第一段相同的注射速率；监测气管分叉层面下 1cm 的降主动脉主干，注射对比剂 12s 后开始监测，触发阈值设置为 150HU，扫描完成后分别测量气管分叉层面下 1cm 的上腔静脉、右肺动脉主干、降主动脉 CT 值，并计算各组各血管测量平均值。结果 三组病例的上腔静脉 CT 值分别为：457.21±15.29HU，316.55±12.69HU；右肺动脉主干 CT 值分别为：273.62±13.36HU，226.72±9.33HU；降主动脉 CT 值分别为 322.53±11.28HU，291.46±7.63HU。结论 对比 2 组各血管测量平均值，采用对比剂分段注射法完成胸部 CT 增强检查，上腔静脉强化幅度有相当程度降低

(141HU 左右), 有利于减轻上腔静脉伪影干扰, 肺动脉强化幅度略有增高, 降主动脉强化幅度趋于平稳, 能提供病灶与周围组织的较好对比。

PO-1019

小剂量团注测试多兴趣区选择对确定 CTPA 扫描延迟时间的价值

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目的 探讨小剂量团注测试多兴趣区选择对确定 CTPA 扫描延迟时间的价值。**方法** 选择院行多排螺旋 CT 肺动脉成像 (CTPA) 检查患者 2 我 87 例 (BMI23~26, 排除心功能不良)。设备为 GE 64 排螺旋 CT, 对比剂选用 400mgI/ml, 常规完成胸部平扫后行小剂量对比剂团注测试获取肺动脉达峰时间: 对比剂 4ml+生理盐水 20ml, 注射速率: 4~4.5ml/s, 监测气管分叉层面下 1cm 的右肺动脉主干, 注射对比剂 4s 后开始监测, 分别选择右肺动脉及降主动脉作为兴趣区, 获取肺动脉及降主动脉达峰时间, 据此计算主动脉、肺动脉达峰时间差值, 选择差值为 4.5s、6s 各 80 例入组。CTPA 正式扫描: 根据体重使用对比剂 15~25ml+生理盐水 45~50ml, 注射速率: 4~4.5ml/s, 扫描延迟时间: 达峰时间+经验值, 根据主、肺动脉达峰时间差值及所加的经验值不同将 160 例患者分为 A、B 两组, 2 组经验值分别设置为 1s、2s, 扫描完成后测量气管分叉层面下 1cm 的上腔静脉、右肺动脉主干、升主动脉、降主动脉 CT 值, 并计算各组各血管测量平均值。结果 2 组病例的上腔静脉 CT 值分别为: $419.53 \pm 17.22\text{HU}$, $302.65 \pm 11.32\text{HU}$; 右肺动脉主干 CT 值分别为: $243.61 \pm 10.46\text{HU}$, $279.35 \pm 16.51\text{HU}$; 升主动脉 CT 值分别为: $45.76 \pm 5.28\text{HU}$, $53.27 \pm 8.62\text{HU}$; 降主动脉 CT 值分别为 $41.52 \pm 2.47\text{HU}$, $46.29 \pm 3.23\text{HU}$ 。结论 对比 2 组各血管测量平均值, 根据小剂量测试获取的主、肺动脉达峰时间差值, 确定 CTPA 扫描延迟时间时应适当变化, 差值为 4.5s, 选择肺动脉达峰时间加 1.5s 经验值, 差值为 6s, 选择肺动脉达峰时间加 2s 经验值, 据此完成 CTPA 检查, 肺动脉强化幅度更高, 上腔静脉伪影干扰更小, 升主动脉及降主动脉强化幅度更低, 后处理图像上肺动脉显示更佳。

PO-1020

基于 DL 的 T2 黑血成像(ACS T2-DB)在心脏磁共振中的应用价值

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目的: 评估基于 DL 的 T2 黑血成像 (ACS T2-DB) 在心脏磁共振中的应用价值。**方法:** 本研究前瞻性的搜集了 9 名心力衰竭患者接受心脏磁共振成像。临床指征包括扩张型心肌病 (n=8) 和高血压性心脏病 (n=1)。所有 CMR 扫描均在配有专用心脏线圈的 3T 扫描仪上进行。所有患者在呼气后屏气状态下接受常规 T2WI-DB 和 ACS T2W-DB 短轴扫描。图像评估: 两名放射技师分别在短轴图像的室间隔上和左心室中池上独立划定感兴趣区域 (ROI), 以获得相应的平均值和标准差 (SD) 值并计算 SNR 和 CNR。一位具有 10 年 CMR 诊断经验的放射科医生盲目评估了常规 T2W-DB 和 ACS T2W-DB 的图像质量, 并记录了运动伪影, 包括左心室信号丢失和运动伪影。统计分析均使用 SPSS V23.0 进行。分析前对两名观察者的 SNR 和 CNR 进行平均, 并使用配对 t 检验评估传统 T2W-DB 和 ACS T2W-DB 的差异。ICC 用于评估 SNR 和 CNR 的观察者间一致性。P<0.05 被认为具有统计学意义。结果: ACS T2W-DB 的总屏气时间 ($50.0 \pm 9.1\text{s}$) 比常规 T2W-DB ($79.6 \pm 13.5\text{s}$, $P<0.001$) 缩短了 36%。与常规 T2W-DB 相比, ACS T2W-DB 显示出更好的 SNR (常规 vs ACS 50.0 ± 19.0 vs 67.6 ± 33.3 , $P=0.038$) 和 CNR (常规 vs ACS 47.8 ± 19.0 vs 77.9 ± 29.2 ,

$P=0.038$)。在伪影评估中,9 名患者中有 4 名在常规 T2W-DB 上显示出明显的伪影,而 9 名患者只有 1 名在 ACS T2W-DB 中显示出明显伪影。两名放射技师在常规 T2W-DB 和 ACS T2W-DB 中测量的 SNR 和 CNR 结果均具有良好的一致性(所有放射技师的 ICC 均大于 0.6)。结论:ACS T2-DB 序列不仅可以显著缩短屏气时间,而且可以通过减少心力衰竭患者的运动伪影来提高图像质量。

PO-1021

心脏磁共振钆延迟增强灰血技术提高心肌梗死检出能力的应用

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【目的】评估心脏磁共振钆延迟增强(LGE)灰血技术对心肌梗死的检出能力。【资料与方法】前瞻性收集 2021 年 1 月至 2022 年 1 月在华中科技大学同济医学院附属同济医院确诊为心肌梗死或心肌梗死复查患者 50 例,所有患者均行心脏磁共振 LGE 亮血和灰血技术扫描,所有图像纳入本次评估范围。使用 4 点量表法对 2 种技术的图像质量和心肌梗死检出可信度进行评分,并比较 2 种技术的整体图像质量和心肌梗死检出可信度。分别比较 LGE 亮血和灰血技术图像的梗死心肌与左心室血池、梗死心肌与正常心肌、正常心肌和左心室血池的对比率(CR)和对比噪声比(CNR)。2 名观察者对 LGE 灰血和亮血技术图像质量的评价以及 CR 和 CNR 的评价均进行一致性分析。

【结果】LGE 灰血与亮血技术图像质量评分差异无统计学意义($t=1.895$, $P=0.058$),但是 LGE 灰血技术在心肌梗死检出可信度优于亮血技术($t=5.281$, $P<0.001$)。图像客观定量分析中,与 LGE 亮血技术比较, LGE 灰血技术的梗死心肌/血池的 CNR 和 CR 均较高($Z=3.113$ 、 3.606 , $P<0.01$),而梗死心肌/正常心肌的 CNR 较低($Z=3.06$, $P=0.002$)。2 名观察者对 LGE 灰血和亮血技术的图像质量和心肌梗死检出可信度评分具有良好的一致性(Kendall's τ_b 均 >0.7)。2 名技师所测值计算得到的 CR 和 CNR 具有较好的一致性(组内相关系数均 >0.7)。【结论】LGE 灰血技术在保证高质量 CMR 图像的前提下,明显提高了梗死心肌与血池的对比,从而提高心肌梗死特别是心内膜下心肌梗死的检出能力,为临床心梗随访提供可靠依据。

PO-1022

人工智能在非门控胸部 LDCT 平扫冠脉钙化积分危险分层的预测价值探讨

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目的 探讨深度学习在非门控胸部低剂量 CT (Low-dose Computer Tomography, LDCT) 平扫冠脉钙化积分 (Coronary artery calcium score, CACS) 危险分层的预测价值。方法 由推想医疗科技有限公司搭建深度学习平台并训练非门控胸部低剂量 LDCT 平扫 CACS 模型,模型训练集由上海长征医院 102 例非门控胸部 CT 平扫纵隔窗有冠脉钙化者组成,其中高危者 32 例、中危者 41 例、低危者 29 例。训练集中所有病例均进行非门控胸部 LDCT 平扫和门控 CT 平扫,以心电门控 CT 平扫评估的 CACS 危险分层为金标准,对非门控胸部 CT 平扫纵隔窗冠脉钙化进行标记,输入标记后采用交替训练方法进行深度学习训练。模型测试集由武汉同济医院 50 例非门控胸部 CT 平扫组成,同时将深度学习法中的非门控胸部 CT 扫描所评估的 CACS 与心电门控 CT 扫描所评估的 CACS 进行比较,并采用分类准确率、组内相关系数值、kappa 系数和时间来评估模型的性能。结果 采用深度学习模型确定了 26 例高危组,14 例中危组和 7 例低危组,模型平均正确率为 94%,与心电门控 CT

平扫评估的 CACS 一致性 kappa 值为 0.899。结论 深度学习模型能够较为准确地评估非门控胸部 CT 平扫的 CACS 及其危险分层,具有一定的临床应用价值。

PO-1023

基于人工智能的肺磨玻璃结节内血管定量特征与肺腺癌侵袭性之间的相关性研究

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目的:探讨基于深度学习(DL)的结节内血管定量特征在鉴别肺腺癌侵袭性中的作用。

材料和方法:本回顾性研究包括 474 例确诊的 512 例磨玻璃结节,其中 241 例为前驱腺体病变,126 例为微浸润腺癌,145 例为侵袭性腺癌。采用基于深度学习的区域分割和区域生长技术,在胸部 CT 平扫图像上重建肺血管并自动计算结节内血管发生率、血管种类和血管体积百分比。采用 Mantel-Haenszel 卡方检验、卡方检验和方差分析比较两组间的差异, $P < 0.05$ 定义为有统计学意义。结果:前驱腺体病变内血管发生率(33.2%)明显低于微浸润腺癌(46.8%, $p = 0.011$)和浸润性腺癌(55.2%, $p < 0.001$),而不同浸润程度的肺结节内血管种类相似(均 $p > 0.05$)。与前驱腺体病变相比,浸润性腺癌和微浸润腺癌内的血管改变更为常见,主要表现为血管体积百分比增加($12.4 \pm 19.0\%$ vs $6.3 \pm 13.1\%$ vs $3.9 \pm 9.4\%$, $p < 0.001$)。浸润性腺癌的结节内动、静脉体积百分比($7.5 \pm 14.0\%$ 和 $5.0 \pm 10.1\%$)高于前驱腺体病变($2.1 \pm 6.9\%$ 和 $1.7 \pm 5.8\%$)和微浸润腺癌($3.2 \pm 9.1\%$ 和 $3.1 \pm 8.7\%$),差异均有统计学意义($p < 0.05$)。

结论:基于深度学习的肺磨玻璃结节内血管的定量分析表明,结节内血管发生率和体积百分比增加的磨玻璃结节可能具有更高的肿瘤侵袭性。

PO-1024

探讨肺腺癌纯磨玻璃样结节(pGGN)的 CT 纹理特征与半乳糖凝集素-9(Gal-9)表达的相关性

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目的:探讨肺腺癌纯磨玻璃样结节(pGGN)的 CT 纹理特征与半乳糖凝集素-9(Gal-9)表达的相关性。

方法:首先用 KM Plotter 数据库中的数据集 "203236_s_at" 进行生存分析,分析 Galectin-9 表达水平对肺腺癌患者预后的影响。随后对 2018 年 10 月至 2020 年 6 月在辽宁省肿瘤医院收治的 87 例 CT 表现为 pGGN 的原发性肺腺癌患者的资料进行回顾性分析,资料包括患者的一般临床特征、Gal-9 表达水平及 CT 纹理特征(平均 CT 值、最大 CT 值和 Δ CT)。所有患者经病理诊断为原发性肺腺癌,并接受了增强 CT 检查。

结果:Gal-9 的高表达与肺腺癌患者较短的总生存期(overall survival, OS)和首次进展时间(first progression, FS)显著相关。尤其是在接受化疗的肺腺癌患者中,Gal-9 高表达时 OS 缩短。34.15%的 Gal-9 阴性患者表现为肿瘤中/低分化,而在 Gal-9 阳性患者中这一比例高达 74.47%。65.21%的 Gal-9 阳性患者肿瘤 TMN 分期为 III/IV 期,显著高于阴性患者(24.39%)。Gal-9 阳性组的平均 CT 值、 Δ CT 高于阴性组,最大 CT 值低于阴性组。患者的平均 CT 值和 Δ CT 与 Gal-9 的 IHC 评分正相关($R=0.803$, $p < 0.001$; $R=0.752$, $p < 0.001$),而最大 CT 值与 Gal-9 的 IHC 评分

负相关 ($R=-0.471$, <0.001)。最大 CT 值的 AUC 为 0.856 (95%CI, 0.778-0.935, $p<0.0001$)，用最大 CT 值预测 Gal-9 表达水平的 cut-off 值为 -433.071，灵敏度为 87.8%，特异度为 73.9%。结论：Gal-9 可能是预测肺腺癌预后的有效指标。增强 CT 的最大 CT 值可能是 pGGN 肺腺癌 Gal-9 表达水平的潜在预测因素。

PO-1025

心脏占位诊断与鉴别

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心脏占位发生率较低，但是一旦发生，需要我们影像科医生进行精准诊断与鉴别，心脏占位可以按照病理类型分类，也可以按照累及的心房心室分类。本次汇报通过我科一例病例，系统回顾心脏占位的类型及影像表现，帮助临床医生更好地进行鉴别。

PO-1026

基于 Delta 影像组学模型预测 NSCLC 新辅助免疫治疗疗效

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目标：目前尚无可靠的预测可切除（II-III 期）非小细胞癌（NSCLC）新辅助免疫治疗病理反应的标志物。本研究旨在探究影像组学特征变化，即 Delta 影像组学特征是否有潜力预测 NSCLC 患者新辅助免疫治疗的显著病理缓解（MPR）。

方法：纳入全国三家医院的 206 例 IIA-IIIIB 期 NSCLC 患者（武汉协和医院=164 例；湖北省宜昌中心医院=21 例；河南省安阳肿瘤医院=21 例），这些患者接受了新辅助化疗免疫治疗和手术治疗。武汉协和医院的病例被随机分为训练数据集和测试数据集，比例为 0.7:0.3。湖北省宜昌中心医院和河南省安阳肿瘤医院数据被用作两个独立的外部验证数据集。获取治疗前（基线）和手术前两次增强 CT 扫描图像。Delta 影像组学特征被定义为基线和术前影像组学特征之间的相对净变化。进而建立了 Delta 影像组学模型和治疗前 CT 影像组学模型，同时评估免疫相关反应评估实体瘤标准（iRECIST）对预测 MPR 的性能，结合 Delta 影像组学特征和 iRECIST 建立混合模型。

结果：超过一半患者（51.5%）在新辅助免疫治疗后出现 MPR。在预测 MPR 上，Delta 影像组学模型在训练、测试和两个外部验证数据库中的曲线下面积（AUC）分别为 0.768、0.732、0.833 和 0.716，显示出比术前治疗影像组学模型（0.644、0.616、0.475 和 0.608）更好的预测性能。与 iRECIST 标准（0.624、0.572、0.650 和 0.466）相比，结合 Delta 影像组学特征和 iRECIST 的混合模型在四组中对 MPR 的预测具有更高的 AUC 值，分别为 0.777、0.761、0.850 和 0.670。

结论：与治疗前 CT 影像组学模型和 iRECIST 标准相比，Delta 影像组学模型在可切除的 II-III 期 NSCLC 新辅助化疗免疫治疗术前预测 MPR 方面显示出最佳的诊断性能。

PO-1027

T2 mapping 识别肥厚型心肌病患者心肌损伤的可行性研究

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目的 既往研究报道 T2 mapping 技术可识别肥厚型心肌病的心肌水肿。本研究拟针对 HCM，探讨 T2 mapping 测量的 T2 值与心肌损伤之间的相关性。

方法 本研究前瞻性纳入了 50 名无冠心病和炎症性心肌病史的 HCM 患者。所有患者均接受了 3T CMR 检查，包括电影、钆对比剂延迟强化 (LGE)、T1 mapping 以及 T2 mapping 序列，测量每个患者的全心 T2 值、ConSept T2 值(中段室间隔 ROI)、最大及最小节段 T2 值。同时，每位患者均接受超敏心肌肌钙蛋白 I (hs-cTnI) 检测，hs-cTnI>0.016pg/ml 定义为心肌存在活动性损伤。此外，20 名基线分布与患者组相似的健康志愿者作为对照组。

结果 HCM 患者组中，25 例 (20 名男性，50±13 岁) hs-cTnI 升高，25 例 (17 名男性，49±14 岁) hs-cTnI 处于正常范围。相较于 hs-cTnI 正常组，hs-cTnI 升高组的最大 T2 值、最小 T2 值、全心 T2 值、ConSept T2 值、全心 T1 值以及 ConSept T1 值更高 (P 均<0.05)。ConSept T2 值 (r = 0.52, P <0.001)、LGE 范围 (r = 0.52, P <0.001) 均与 hs-cTnI 呈弱相关。在所有 T1 及 T2 参数中，ConSept T2 值识别肥厚型心肌病心肌损伤的效能最高 (AUV=0.83)。在多因素 logistic 回归分析中，在 7 个校正模型中分别纳入了左室射血分数、左室舒张末容积指数、最大室壁厚度、左室心肌质量指数、LGE 范围、T1 全心值以及 ConSept T1 值，ConSept T2 值仍然与升高的 hs-cTnI 即心肌损伤相关 (P<0.01)。

结论 本研究证实了 T2 mapping 在检测 HCM 活动性心肌损伤的可行性。ConSept T2 值与升高的 hs-cTnI 密切相关，这在体识别 HCM 患者的心肌损伤提供了影像学证据。

PO-1028

**非小细胞肺癌患者术后脑转移的风险：
影像组学及临床病理特征分析**

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目的：回顾性收集 IIB-IIIIB 期非小细胞肺癌患者病例，构建患者影像组学特征和临床病理特征的联合模型，预测非小细胞肺癌患者术后脑转移的风险。

资料和方法：本研究回顾性收集 2015 年 10 月至 2019 年 12 月在我院行肺癌手术切除，术后病理分期为 IIB-IIIIB 期的非小细胞肺癌患者 333 例 (脑转移患者 97 例，无脑转移患者 236 例)，按 7:3 的比例将患者随机分为训练集和验证集。从每个患者术前胸部 CT 图像中提取原发肿瘤及瘤灶周围的影像组学特征，使用最小绝对收缩选择算子 (least absolute shrinkage and selection operator, LASSO) 进行影像组学特征选择，利用单变量及多变量 COX 回归分析筛选临床病理特征，利用五种机器学习分类器分别构建影像组学模型、临床病理特征模型及两者联合的模型。最后构建整合影像组学特征、临床病理特征的诺谟图。通过受试者工作特征曲线 (receiver operating characteristic curve, ROC) 下面积 (area under curve, AUC)、校准曲线和决策曲线分析来评价模型的性能。AUC 的比较采用 DeLong 试验。

结果：影像组学联合临床病理特征的模型效能显著优于单一的模型，校准曲线显示联合模型的预测概率与脑转移的实际观测概率吻合较好。联合模型比临床模型和影像组学模型获得更高的净效益。联合模型中，所构建的机器学习模型中以 Ida 模型的效能最高 (AUC 为 0.95)。在影像组学模型中，增加瘤周影像组学特征，预测模型的效能得到显著提高，且差异具有统计学意义。

结论: 结合原发病灶和瘤灶周围的影像组学特征及临床病理特征的机器学习模型可以帮助早期预测 IIB-IIIIB 期 NSCLC 患者术后脑转移的发生风险, 筛选出脑转移的高风险人群, 为辅助临床医生为患者进行治疗及制定随访计划提供帮助。

PO-1029

肺动脉鞘血肿与急性 Stanford A 型 主动脉夹层近期预后相关性研究

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目的 探讨 CTA 发现肺动脉鞘血肿 (HPS) 与急性 Stanford A 型主动脉夹层 (ATAAD) 近期预后的相关性。方法 回顾性分析河南省胸科医院 2019 年 1 月至 2022 年 10 月间共计 288 例经 CTA 及临床诊断 ATAAD 患者的影像学及病例资料, 将肺动脉鞘血肿、心包积液、灌注不良综合征等 14 个可能与死亡相关的因素逐个进行单因素分析, 单因素分析有意义的变量纳入多因素 Logistic 回归分析, 对其中有统计学差异的参数进一步做 ROC 曲线分析。结果 单因素分析发现 HPS 等 7 个因素有统计学意义 ($P < 0.05$), 进一步多因素分析提示 HPS 致肺动脉直径受压程度 $\geq 50\%$ ($OR = 6.88$, $P = 0.04$)、年龄 ($OR = 1.12$, $P < 0.01$)、术前伴灌注不良综合征 ($OR = 6.16$, $P < 0.01$)、心包积液 ($OR = 4.39$, $P = 0.04$) 是患者院内死亡的独立危险因素, 手术或介入治疗为保护因素 ($OR = 0.17$, $P < 0.01$), ROC 曲线显示联合预测概率的曲线下面积 (AUC) 为 0.96, HPS 致肺动脉受压程度 AUC 为 0.84, 差异有统计学意义 ($P < 0.01$)

PO-1030

探究心肌灌注储备与氧化应激及病理学指标之间的相关性: 一项针对 2 型糖尿病兔的心血管磁共振研究

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目的: 探讨基于负荷心脏磁共振 (CMR) 成像的心肌灌注储备指数 (MPRI) 评估 2 型糖尿病 (T2DM) 兔心肌微循环障碍的价值及其与氧化应激及病理学指标之间的联系。

方法: 本研究随机将新西兰大白兔分为对照组 ($n = 7$)、T2DM 5 周组 ($n = 6$)、10 周组 ($n = 7$) 以及 15 周组 ($n = 7$)。所有兔均接受 3.0T CMR 灌注成像, 分别获得静息及三磷酸腺苷 (ATP) 负荷下短轴位中间层面图像, 在室间隔处绘制感兴趣区域并测量 MPRI 值。随即处死家兔, 行 Masson 染色得到胶原体积分数 (CVF), 免疫组化 CD31 染色得到微血管密度 (MVD)。测定心肌室间隔组织氧化应激标志物水平。采用 Pearson 或 Spearman 探究 MPRI 与病理及氧化应激指标的相关性, 并构建多元线性回归模型评估 MPRI 的影响因素。以 MVD、CVF 中位数为阈值分为两组, 采用 ROC 曲线评估 MPRI 在鉴别不同病理学指标水平 (高于中位数与低于中位数) 的效能。

结果: MPRI 与 MVD ($r = 0.562$, $p < 0.01$), SOD ($r = 0.402$, $p = 0.041$), CVF ($r = -0.492$, $p < 0.01$) 呈显著相关性。多元回归分析发现 MVD 是预测心肌 MPRI 下降的独立影响因素 ($\beta = 0.562$, $p = 0.002$, $R^2 = 0.288$)。此外, MVD 小于中位数水平 ($t = 3.202$, $p = 0.004$) 与 CVF 高于中位数水平 ($t = 3.074$, $p = 0.005$) 组的 MPRI 值显著减小, MPRI 鉴别不同 MVD、CVF 水平 (高于中位数与低于中位数) 的曲线下面积 (AUC) 分别为 0.799 (95%CI 0.629~0.969) 和 0.783 (95%CI 0.609~0.957)。

结论: 基于 CMR 的 MPRI 可有效评估 T2DM 兔心肌微循环障碍, 且是鉴别 T2DM 个体低中危和高危病理状态的一个有价值的指标, 该研究为揭示 T2DM 心肌灌注障碍的发病机制和影响因素提供了科学依据。

PO-1031

基于冠状动脉 CT 血流储备分数预测老年冠心病患者远期结局的研究

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【摘要】目的 评估冠状动脉 CT 血流储备分数 (CT-FFR) 在预测老年冠心病患者远期结局中的价值。**方法** 回顾性分析 2018 年 4 月至 2019 年 3 月在东部战区总医院的一项基于冠状动脉 CT 血管成像 (CCTA) 和 CT-FFR 的前瞻性观察性研究, 基于患者 CCTA 数据分析所有病变血管的斑块特征并测量 CT-FFR 值。通过 Cox 比例风险回归模型、Kaplan-Meier 生存曲线及受试者工作特征曲线分析斑块特征及 CT-FFR 与主要不良心血管事件 (MACE, 定义为全因死亡、非致死性心肌梗死以及紧急血运重建) 之间的关系。**结果** 330 例老年冠心病患者 (中位年龄 67 岁; 年龄范围, 60-90 岁; 62.7% 为男性) 纳入本研究, 中位随访时间为 2.9 年, 共 35 例 (10.6%) 患者发生 MACE。冠状动脉狭窄程度 $\geq 50\%$ 或 CT-FFR ≤ 0.8 的患者发生 MACE 风险明显增高 ($P < 0.05$)。无 MACE 组和 MACE 组之间病变血管斑块特征均无显著统计学差异 (P 值均 > 0.05)。单因素 Cox 分析显示糖尿病、吸烟、狭窄程度 $\geq 50\%$ 及 CT-FFR ≤ 0.8 是发生 MACE 的危险因素 (P 值均 < 0.1), 经多因素 Cox 分析校正后, 仅 CT-FFR ≤ 0.8 是发生 MACE 的独立危险因素 ($HR = 17.037$; $95\%CI [5.060-57.358]$; $P < 0.001$)。此外, 基于 CT-FFR 的风险预测模型显著优于基于 CCTA 的风险预测模型 (C 指数为 0.820 vs 0.696 ; $P < 0.001$)。结论 CT-FFR ≤ 0.8 是预测老年冠心病患者远期 MACE 的重要独立危险因素。根据 CT-FFR 值进行临床风险分层, 可能优化老年冠心病患者的预后管理策略。

PO-1032

计算机断层扫描心肌灌注成像与心理应激检测焦虑和阻塞性冠心病患者心肌缺血

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目的: 心理应激可导致焦虑和阻塞性冠心病患者心肌缺血。动态计算机断层扫描心肌灌注 (CT-MPI) 可用于定量测量心肌血流动力学的变化。本研究的目的是使用动态 CT-MPI 结合精神压力源测量患有阻塞性冠状动脉疾病 (AOCAD) 的焦虑症患者和患有焦虑症但没有阻塞性冠状动脉疾病 (ANOCAD) 的患者的患者的心肌血流量 (MBF)。

方法: 对 30 例 AOCAD 患者和 30 例 ANOCAD 患者进行分析。使用 17 段模型, 分别记录 ANOCAD 患者主要冠状动脉 (包括左前降支、左主干冠状动脉、左旋支和右冠状动脉) 的静息期 MBF 和应力期 MBF。对于 AOCAD 患者, 根据冠状动脉 CT 血管造影术, 将至少一条活动血管中管腔狭窄超过 50% 的心肌节段定义为靶区。其余心肌节段被定义为非靶区。分别记录靶区和非靶区的静息期 MBF 和应力期 MBF。

结果: 与 ANOCAD 患者相比, AOCAD 患者更有可能出现局部 MBF 降低 ($p < 0.05$)。ANOCAD 的患者在应激期的总 MBF 和主干冠状动脉 MBF 均低于休息期 (均 $p < 0.05$), 但在静息期或应力期各主要冠状动脉的 MBF 无显著差异 ($p = 0.25$, $p = 0.15$)。AOCAD 患者在静息期和应力期靶区的

MBF 均低于非靶区, 应力期目标区 MBF 低于静息期 (均 $p<0.05$), 在非目标区域, 休息期和压力期的 MBF 没有显著差异 ($p=0.73$)。AOCAD 是精神压力后焦虑患者 MBF 有限降低的独立预测因素 (优势比: 4.03, 95%置信区间: 1.04-15.56, $p<0.05$)。

结论: ANOCAD 患者在精神压力下 MBF 的下降是弥漫性的, 而 AOCAD 患者的 MBF 下降是局部的。AOCAD 是精神压力下局部 MBF 降低的独立预测因子。动态 CT-MPI 结合精神压力源可用于检测焦虑患者的 MBF 变化。

PO-1033

肺 NUT 癌 CT 影像诊断及鉴别诊断 (附 1 例肺 NUT 癌报道)

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目的: 探讨肺 NUT 癌的临床表现、CT 诊断及鉴别诊断, 总结其影像学特征, 提高临床医生对该病的认识。方法: 回顾性分析我院 1 例罕见肺 NUT 癌的临床特征, 并结合相关文献讨论。结果: 患者为女性, 年龄 32 岁, 间断咯血 3 月。胸部 CT 增强示左肺上叶舌段肿块, 肿瘤最大直径为 6.3cm, 边界清晰, 密度不均, 增强中度不均匀强化, 伴纵膈及左肺门淋巴结转移, 初步考虑左肺上叶中央型肺癌。支气管镜病理活检: 左肺上叶小圆细胞恶性肿瘤伴出血及片状坏死, NUT (+), Ki67 (60%+)。分子检测: 肺 NUT 癌, 存在 BRD4-NUTM1 融合基因断裂。随访 1 月肿块增大, 密度不均较前更明显, 6 月后肿块持续性增大并出现胸膜广泛转移。结论: 肺 NUT 癌是一种罕见且分化程度极低的高度恶性肿瘤, 好发于年轻人, 以右肺多见, CT 表现有一定特征性, 影像需与其他原发病理类型肺癌 (鳞癌、腺癌及小细胞癌等) 相鉴别, 确诊依赖于组织病理学、免疫及和基因检测。

PO-1034

异基因造血干细胞移植术后慢性移植抗宿主病患者肺部影像评估

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【摘要】目的 分析成人慢性移植抗宿主病 (cGVHD) 患者肺部 CT 异常影像学表现并结合临床资料, 对 cGVHD 肺部的异常得到有助于诊断及鉴别的信息。资料与方法 收集*院 2018 年 10 月至 2020 年 10 月行异基因造血干细胞移植 (allo-HSCT) [51] 术后出现 cGVHD 临床表现的患者 162 例, 对其胸部 CT 图像征象[病变位置、分布、磨玻璃密度 (GGO)、实变、网格影、结节影、支气管扩张、胸腔积液、气体潴留、气胸或纵膈积液]进行总结并比较肺 GVHD 与肺部感染的影像差异。结果[52] 162 例患者中胸部 CT 影像表现正常 6 例, 异常 156 例, 其中感染性肺部并发症 153 例, 非感染肺部并发症 3 例, 感染性肺部并发症患者中病毒感染 7 例, 细菌感染 5 例, 真菌感染 50 例, 混合感染 34 例, 病原学不明 57 例。肺部细菌感染常见局限实变, 病毒感染多见 GGO 与弥漫分布网格, 真菌感染多散发结节, 肺 GVHD 常见气体潴留、支气管扩张、支气管壁增厚, 合并闭塞性细支气管炎的相关征象者 36 例。结论 临床确诊成人 cGVHD 患者, 绝大多数均有肺部影像异常, 以感染为主要病因, 有部分比例的患者同时具有肺部 cGVHD 的影像表现, 影像结合临床有助于肺部并发症的诊断与鉴别。

PO-1035

基于人工智能定量评估结缔组织病相关间质性肺疾病严重度的研究

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目的：结缔组织病相关间质性肺疾病（CTD-ILD）是间质性肺疾病的主要类型，也是结缔组织病常见且严重的并发症。本研究试图通过人工智能肺炎分割系统分别评估左右肺感染体积和百分比、以及对感染成份进行分析比较，从而建立一个系统评价 CTD-ILD 的定量分析方法。

材料与方法：本研究共入组患者 128 例，其中男 28 例，女 100 例，年龄为 58.6 ± 11.2 岁。本研究入组患者均测量了 FVC% 和 DLCO% 预测值，并分为轻、中及重度。结合 TEI 和肺功能结果，将 CTD-ILD 分为轻度组和重度组。人工智能得到的参数有：全肺、左肺及右肺体积、感染体积和百分比、感染成份 ≤ -750 Hu 体积和百分比、感染成份 $-750 \sim -300$ Hu 体积和百分比、感染成份 $-300 \sim -49$ Hu 体积和百分比以及感染成份 ≥ 50 Hu 体积和百分比。独立样本 t 检验和 ROC 分析鉴别两组肺炎参数。方差分析和 LSD 检验比较感染成份。Spearman 秩和检验比较参数与肺功能等级的相关性。

结果：根据主观评估结合肺功能检查，分为轻度组 52 名和重度组 76 名。重度组体积均显著小于轻度组（ $P \leq 0.001$ ）。重度组感染体积和百分比均显著大于轻度组（ $P \leq 0.001$ ）。ROC 曲线示全肺、左肺及右肺感染体积和百分比指标具有较高诊断价值（AUC 值均 > 0.700 ）。感染成份 $-750 \sim -300$ Hu 体积及百分比显著大于 ≤ -750 Hu、 $-300 \sim -49$ Hu 和 ≥ 50 Hu 体积和百分比（P 值均 < 0.001 ）， ≤ -750 Hu 和 $-300 \sim -49$ Hu 体积和百分比显著大于 ≥ 50 Hu 体积和百分比（P 值均 < 0.001 ）。全肺、左肺及右肺体积与肺功能指标呈显著负相关，全肺、左肺及右肺感染体积和百分比、各感染成份体积和百分比均与肺功能等级呈显著正相关。

结论：本研究提供了一个系统定量评估 CTD-ILD 患者的新方法，可用于患者的严重度评估。

PO-1036

基于 CT 纹理分析及血常规指标联合预测模型在浸润性肺腺癌病理亚型鉴别中的应用

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目的：探讨浸润性肺腺癌病理亚型与 CT 影像学特征的关系，评估 CT 影像学特征、纹理参数及血常规指标联合预测模型对病理亚型的鉴别诊断价值。

方法：回顾性分析我院 2017 年 2 月至 2019 年 4 月经手术病理证实为浸润性肺腺癌的 222 例患者 CT 特征、纹理参数及血常规检查资料。按照第四版世界卫生组织（WHO）胸部肿瘤分类标准，将病理亚型分为贴壁生长为主型（lepidic predominant adenocarcinoma, LPA）组和非 LPA（non-LPA, n-LPA）组。采用 Mann-Whitney U 检验分析连续变量在 LPA 组和 n-LPA 组间的差异。采用受试者操作特征（receiver operating characteristic, ROC）曲线评价鉴别效能。采用回归分析和机器学习算法建立多参数模型。

结果：共纳入 222 例患者，LPA 组 49 例，n-LPA 组 173 例。训练集单因素分析中，6 个 CT 定性参数、5 个 CT 定量参数、23 个 CT 纹理参数和 2 个血常规检查参数在 LPA 组和 n-LPA 组间均存在显著性差异（ P 均 < 0.05 ）。多参数 logistic 回归分析中，结节型/肿块型、空泡征、Mean、SD (CT 纹理)、Mode、Min、Percentile 25th、Entropy GLCM 10 和白细胞是预测 n-LPA 的独立影响因子（ P 均 < 0.05 ）。基于回归模型建立的区分 LPA 组和 n-LPA 组间的曲线下面积（area under the

curve, AUC) 为 0.881, 在验证集中 AUC 值为 0.954。训练集中, 采用随机森林法 (random forest, RF) 的多参数模型鉴别诊断效能优于其他机器学习算法, AUC 值为 0.793。

结论: 本研究建立并验证了区分 LPA 及 n-LPA 的多参数模型, 该多参数模型联合了 CT 影像学特征、纹理参数及血常规指标, 并取得了较好的诊断效能。

PO-1037

VHP 技术在颈动脉、冠脉 CTA“一站式”扫描中的应用与价值

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目的: 探讨 320 排 CT 在颈动脉 CTA 和冠脉 CTA 检查中使用可变螺距法 (VHP) “一站式”扫描与常规方法扫描相比图像质量和辐射剂量上的差异。方法: 收集我院临床怀疑颈动脉疾病、冠心病史行颈动脉、冠脉 CTA 检查患者 50 例, 随机分成 A、B 两组。A 组使用 VHP 法, 从足往头侧扫描, 先经心脏处开启心电监护模式, 至气管分叉处后自动切换大螺距扫描 (Fast)。B 组患者分两天行常规冠脉 CTA 容积扫描及颈动脉螺旋扫描。测量两组图像主动脉根部、冠脉开口 (右冠)、颈动脉 (包括颈动脉开口、颈动脉分叉)、基底动脉及颈静脉层面的 CT 值。由两名有经验的放射科医生对图像质量评价并进行统计学分析, 同时比较两组图像的质量、对比剂用量及辐射剂量。结果: 两组颈静脉 SNR、CNR、CT 值及 SD 值均有统计学差异 ($P < 0.001$), 其中 B 组颈动脉的主观评分 (3.65 ± 0.49) 相较于 A 组 (2.73 ± 0.45) 高 33.7%, 其余两组图像质量评价无统计学差异 ($P > 0.05$)。在患者辐射剂量、对比剂用量上, A 组 ($992.94 \pm 177.43 \text{ mGy.cm}$)、($60.06 \pm 11.22 \text{ ml}$) 相较于 B 组 ($1077.35 \pm 117.36 \text{ mGy.cm}$)、($100.50 \pm 9.79 \text{ ml}$) 降低了 7.8%、40.2% 有统计学差异 ($P < 0.001$)。结论: VHP 技术下的颈动脉、冠脉 CTA “一站式”扫描可以在不影响临床诊断且保证图像质量的前提下一次完成所需检查, 大幅度降低患者对比剂用量及辐射剂量, 具有较高的临床应用价值。

PO-1038

基于 CTA 及临床资料预测急性主脉夹层患者围手术期死亡风险

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目的: 利用急性主动脉夹层 (acute aortic dissection, AAD) 患者围手术期死亡的风险因素建立一个有效的死亡风险预测评分模型。

方法: 回顾性收集 2013 年 2 月-2021 年 7 月经遵义医科大学附属医院诊治且围手术期死亡的 AAD 患者 60 例纳入死亡组; 随机收集同时期治疗好转的 AAD 患者 210 例纳入未死亡组。分析两组患者围手术期内首次计算机断层血管造影 (computed tomographic angiography, CTA) 成像数据、临床基线资料以及入院第一次的血清生物标志物资料, 筛选出患者围手术期死亡的独立预测因素, 建立死亡风险预测模型并对模型效能进行评价。

结果: 经单因素差异性比较分析、多因素 Logistic 回归分析后得出 AAD 围手术期死亡的七个独立危险因素: A 型主动脉夹层、夹层破口形态不规则、假腔增强-平扫 CT 差值减小、血红蛋白降低、尿酸升高、门冬氨酸转氨酶升高及主动脉夹层未进行手术治疗。利用上述独立危险因素建立列线图预测模型, 且该预测模型受试者工作特征曲线 (receiver operating characteristic, ROC) 曲线下面积为 0.882, 具有优秀的预测效能。

结论: 本研究成功地建立了一种简单、有效、快捷的 AAD 患者围手术期死亡风险评估模型。利用上述独立危险因素建立的列线图预测模型有助于评估 AAD 患者围手术期的死亡风险,具有一定的临床应用价值。

PO-1039

基于 CT 影像组学的计算机辅助鉴别周围型肺癌与肿块/结节型肺结核的研究

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目的: 通过影像组学方法对周围型肺癌和肿块/结节型肺结核 CT 影像进行辅助鉴别。

研究与方法: 回顾性收集辽宁省肿瘤医院 2017 年 8 月到 2018 年 12 月及沈阳市胸科医院 2017 年 9 月到 2018 年 10 月经病理证实为周围型肺癌的患者 206 例,肺结核的患者 277 例,共 483 例患者。对肺窗 CT 影像通过 ITK-SNAP 软件进行病灶区域人工分割,然后通过 Pyradiomics 软件对得到的 ROI 提取影像组学特征,训练构建四种分类器模型,即支持向量机 (SVM)、随机森林 (RF)、logistic 回归分析 (LR) 及朴素贝叶斯 (NB) 模型,并绘制 ROC 曲线,以评估模型对周围型肺癌和肿块/结节型结核的辅助鉴别能力。采用基于 Inception v3、VGG 16 和 VGG 19 框架的卷积神经网络 (CNN) 对数据进行自动学习和分析,鉴别周围型肺癌和肿块/结节型肺结核,绘制 ROC 曲线。

结果:

从图像中提取特征,并用双样本 t 检验选出具有显著统计学差异的特征,最终得到 20 个特征。建立 SVM、RF、LR 及 NB 四种预测模型,鉴别。SVM、RF、LR 及 NB 模型在测试集的 AUC 曲线下方的面积大小分别为 0.96、0.96、0.97 及 0.92;敏感度分别为 0.78、0.76、0.79 及 0.69。通过 CNN 建立的 inception v3、VGG 16、VGG 19 三种模型,得出测试集的 AUC 分别为 0.92、0.94、0.94,敏感度分别为 0.89、0.83、0.86。

结论: 基于胸部 CT 平扫提取的影像组学特征在鉴别周围型肺癌、肿块/结节型肺结核两种疾病具有一定价值。卷积神经网络对于鉴别周围型肺癌、肿块/结节型肺结核也有较高的应用价值。这两种方法均可以实现对周围型肺癌与肿块/结节型肺结核快速无创性的鉴别诊断,对临床医生的诊断和治疗提供了很大的帮助,为患者减轻病痛及经济负担,提高生活质量。

PO-1040

晚期肺癌患者免疫相关肺炎的临床及影像学表现

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目的:

本研究对使用免疫检查点抑制剂 (immune checkpoint inhibitors, ICIs) 治疗并发生免疫相关肺炎 (checkpoint inhibitor pneumonitis, CIP) 的晚期肺癌患者的临床及影像学表现进行回顾性分析。

方法:

收集 2018 年 1 月至 2022 年 10 月本院接受 ICIs 治疗 (PD-1/PD-L1) 的晚期肺癌患者 564 例,其中 61 名患者诊断为 CIP。分析 CIP 患者的临床表现、影像学表现及治疗疗效情况。

结果:

本研究中,肺癌患者接受 ICIs 并发生 CIP 的发生率为 10.82%。CIP 的发病时间为 3 天至 15 个月不等,中位时间 3.0 个月。发生 CIP 的患者中,腺癌 (32 例)、TNM 分期 IV 期 (47 例)、老年

(中位年龄 62 岁)、吸烟(42 例)、男性(48 例)、联合治疗(43 例)患者多见。肿瘤细胞阳性比例评分结果中,表达阳性患者更多见(16 例)。CTCAE 分级 1-2 级患者约占 2/3,5 级患者(6 例),死亡率 9.84%。随分级越高影像学表现加重。CIP 以多病灶(32 例)、周围(41 例)分布为主,累及双肺、多个肺叶,病灶多边界模糊(占比 58 例)。发生 CIP 患者影像学表现大多为隐源性机化性肺炎模式,过敏性肺炎模式少见。疗效评估中,肿瘤缓解、稳定及进展患者病例数分别为 19 例、22 例及 18 例,疾病控制率达 67.21%(41/61),发生 CIP 的多数患者仍在 ICIs 治疗中获益。

结论:

CIP 具有复杂的临床及影像学表现,甚至导致患者生命危险,但晚期肺癌患者发生 CIP 也可能与 ICIs 治疗的疗效呈正相关。本文对接受 ICIs 治疗的晚期肺癌患者发生 CIP 进行探讨,希望为临床医生制定 ICIs 治疗计划和 CIP 的及时发现、及早治疗提供指导和帮助。

PO-1041

基于 CT 影像深度学习技术的肺部良性病变 与早期肺腺癌的鉴别诊断研究

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【研究目的】本研究旨在探索深度学习技术在 CT 上表现为磨玻璃结节的肺部良性病变与早期肺腺癌的鉴别诊断中的应用价值,引入迁移学习的训练方法,建立并验证基于受试者临床特征与结节 CT 形态学特征的逻辑回归模型、基于受试者肺结节原始 CT 影像的深度学习模型以及整合二者的融合深度学习模型,并比较各鉴别诊断模型的诊断效能。【研究方法】

本研究回顾性分析了来自两个中心的,有明确病理诊断的 867 例肺 GGN,其中良性病变 112 例、肺腺癌 755 例。我们建立了 3 种自动诊断模型:1) 基于受试者临床特征和结节 CT 形态学特征的逻辑回归模型(CLRM);2) 仅基于肺结节原始 CT 影像的深度学习模型(IDM);3) 联合原始 CT 影像、临床特征和 CT 形态学特征的融合模型(FDM)。我们使用了迁移学习策略进行模型训练以解决样本数量不足的问题,提高模型的泛化性。在内部和外部测试集中分别分析比较各模型的诊断效能。此外,本研究使用外部测试集病例设立了人工对照组。【结果】

基于患者临床特征和结节 CT 形态学特征的 CLRM 在内部测试集中表现良好,其受试者工作特性曲线下面积为 0.80,然而其在外部测试集中表现不佳,AUC 仅为 0.62,稳定性不佳。不使用迁移学习策略的模型表现都不理想。IDM-TL 取得了不错的诊断效能,而 FDM-TL 在内部测试集和外部测试集中表现稳定,都显示出了最好的诊断效能,且其在外部验证集中获得的特异性显著优于人工对照组。【结论】

本研究建立的基于肺结节 CT 影像的深度学习诊断模型中,使用迁移学习策略的 IDM-TL 和 FDM-TL 都具有帮助放射科医生更好地鉴别肺 GGN 中的良性病变与早期腺癌的能力。其中 FDM-TL 的诊断效能更好,能提高放射科医生诊断特异性,降低肺部良性病变被误诊为肺腺癌的概率,降低过度治疗带给患者的负面影响,为外科医生制定更个性化的肺 GGN 患者后续随访和手术方案提供了一种无创、快速的计算机辅助诊断方法。

PO-1042

心血管磁共振特征追踪技术预测糖尿病性射血分数保留型心力衰竭的不良结局

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目的:心脏 MRI 的特征跟踪技术 (CMR-FT) 可以预测射血分数保留型心力衰竭 (HFpEF) 的不良结局。HFpEF 中合并糖尿病(DM)的患病率约为 45%。糖尿病作为心血管重要危险因素之一, 已被证实与死亡率增加和心衰入院有关, 但 CMR-FT 应变分析在糖尿病性 HFpEF 患者中的预后价值的数值有限。本研究旨在通过 CMR-FT 评价糖尿病性 HFpEF 的心肌功能障碍, 并探讨其预后价值, 分析是否存在可独立预测糖尿病性 HFpEF 的应变参数。

方法:这项回顾性研究纳入 2010 年 1 月至 2016 年 12 月期间接受心脏 MRI 检查的 HFpEF 患者, 并且分为糖尿病性 HFpEF 和非糖尿病性 HFpEF。主要结局包括随访期间全因死亡或心力衰竭住院治疗, 比较糖尿病患者和非糖尿病患者的特征和结局, Cox 比例风险回归模型确定 MRI-FT 应变分析与糖尿病性 HFpEF 主要结局之间的相关性。

结果:共纳入 335 例 HFpEF 患者, 其中糖尿病型 HFpEF 患者 191 例(58.7 岁 \pm 10.8 岁; 男性, 137 人)。应变分析显示糖尿病性 HFpEF 患者左心室功能不全较非糖尿病性 HFpEF 更为严重。中位随访时间为 10.2 年(四分位数范围:8.0~11.3 年), 91 例糖尿病性 HFpEF 患者和 56 例非糖尿病型 HFpEF 患者发生了主要结局。糖尿病是 HFpEF 患者不良预后的显著独立预测因子。在糖尿病性 HFpEF 中, 单变量 Cox 回归分析显示 MRI-FT 衍生的应变参数(整体纵向、径向、周向应变和整体收缩、舒张纵向应率)与主要结局显著相关。多变量 Cox 回归分析中, 在调整多个临床和影像学变量后, 整体纵向应变每降低 1%, 不良事件风险增加 9.1%($P=0.008$)。

结论:在 HFpEF 中, 糖尿病亚型患者心肌功能障碍更为严重。在糖尿病性 HFpEF 中, 通过 CMR-FT 得到的整体纵向应变与不良结局相关, 在临床指标和常规影像指标的基础上提供附加的预后价值。

PO-1043

基于迁移学习构建鉴别活动性肺结核及社区获得性肺炎胸片的卷积神经网络模型

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目的 基于迁移学习构建鉴别活动性肺结核(APTB)及社区获得性肺炎(CAP)胸片的卷积神经网络(CNN)模型并验证。

方法 回顾性收集 715 例 APTB 及 513 例 CAP 患者的胸片, 按照 5: 3: 2 比例随机分为训练集(614 例)、验证集(369 例)及测试集(245 例)。采用 VGG16、Xception、ResNet50 及 MobileNet 四种预训练网络进行迁移学习。训练完成后分别选择四个预训练网络在验证集准确率最高的模型作为最优模型, 评价四个最优模型在测试集的区分度、校准度及使患者的净获益情况。

结果 训练完成后, VGG16 和 ResNet50 拟合较好, Xception 和 MobileNet 出现了过拟合。分别将上述四种网络在验证集准确性最高的模型应用于测试集, 结果表明 VGG16 最优模型的 AUC(0.983)均高于其他网络, 差异均有统计学意义($P<0.05$)。校准曲线表明该模型的校准度较好。决策曲线分

析表明四种网络的最优模型均在较大概率阈值范围内可使患者净获益, 其中 VGG16 的最优模型使患者的净获益程度最大。

结论 迁移学习技术对于鉴别 APTB 及 CAP 胸片有较高的分类性能, 其中 VGG16 的性能在四种预训练网络中性能最高, 有在大规模体检中发挥作用的潜力。

PO-1044

鉴别活动性肺结核及社区获得性肺炎 3D 卷积神经网络模型的开发和验证: 基于胸部 CT

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目的 基于胸部 CT 训练用于鉴别活动性肺结核(APTB)及社区获得性肺炎(CAP)的 3D 卷积神经网络(3D-CNN)模型, 并在内部及外部测试集验证。

方法 回顾性收集影像中心 A(n=432)及影像中心 B(n=61)的 APTB 及 CAP 患者的胸部 CT 图像, 将影像中心 A 的数据分为训练集、验证集及内测试集, 来自影像中心 B 的数据作为外部测试集。3D-CNN 构建采用 Keras(版本:2.7.0)深度学习框架。3D-CNN 在训练完成后选择在验证集准确率最高的模型作为最优模型, 分别应用于两个测试集。另由两名影像科医师对两个测试数据集进行了独立诊断。比较 3D-CNN 最优模型与两名影像科医生鉴别 APTB 及 CAP 胸部 CT 图像的区分度、校准度以及使患者的净获益情况。

结果 3D-CNN 最优模型在内部测试集的准确率为 0.989, 外部测试集为 0.934。在两个测试集的 AUC 均高于两名影像科医生, 差异均有统计学意义(all $p < 0.05$), 且有很高的校准度。决策曲线分析结果表明 3D-CNN 最优模型使患者的净获益程度均明显高于两名影像科医生。

结论 3D-CNN 鉴别 APTB 及 CAP 胸部 CT 图像有较高的分类性能, 从影像学视角为鉴别此类患者提供了新的自动化快速诊断方法。临床相关性/应用 3D-CNN 的应用, 从影像学视角为鉴别 APTB 及 CAP 患者提供了新的自动化快速诊断方法。

PO-1045

基于双气相配准定量 CT 评估 COPD 患者空气潴留

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目的: 分析配准指标与肺功能检测指标和呼吸双气相平均肺密度比 (MLDex/in) 之间的关系, 探讨配准指标在评估 COPD 患者肺功能方面的价值。

方法: 回顾性收集 87 例 COPD 患者的资料。将 CT 双气相数据导入“数字肺”平台, 获得功能性小气道病变区域百分比 (fSAD%)、肺气肿区域百分比 (Emph%)、正常区域占全肺体积百分比 (Normal%)、空气潴留指数 (ATI) 和 MLDex/in 五个定量指标。患者在 CT 检查后 3 天内且症状稳定时行肺功能检查 (PFT), 包括 FVC、FEV1%和 FEV1/FVC。组间比较采用单因素方差分析或 Kruskal-Wallis H 检验。评估采用 Spearman 相关分析。对 MLDex/in 与 fSAD%、Emph%及 ATI 的关系进行多元逐步回归分析。采用 ROC 曲线分析 ATI 对 COPD3/4 级的诊断价值。

结果：组间 fSAD%、Emph%、Normal%、ATI 和 MLDex/in 的差异均有统计学意义。ATI 与 FVC、FEV1%和 FEV1/FVC 间的相关性均具有统计学意义；fSAD%与 FVC、FEV1%和 FEV1/FVC 间的相关性均具有统计学意义；Emph%与 FEV1%和 FEV1/FVC 间的相关性均具有统计学意义。ATI、fSAD%及 Emph%与 MLDex/in 呈正相关（ r 分别为 0.96、0.86、0.53）。多元逐步回归分析结果显示，MLDex/in 与 ATI、fSAD%之间均存在线性回归关系， β 值分别为 0.64 和 0.36。GOLD1/2 级的 ATI 与 FEV1%呈负相关（ $r=-0.45$ ），与 MLDex/in 呈正相关（ $r=0.94$ ）。ROC 曲线分析结果表明，ATI 预测 COPD3/4 级的 AUC 为 0.81（临界值为 0.54）。

结论：ATI 与 MLDex/in 之间具有良好相关性，可以在一定程度上反映肺功能，是评估 COPD 的相对敏感指标，有望成为评估 COPD 严重程度的辅助指标。

PO-1046

基于患者临床指标构建列线图来预测 A 型夹层患者在院死亡风险

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目标

本研究旨在通过基于临床指标构建的列线图来筛选 A 型夹层患者在院死亡的危险因子。

方法

患者与方法：回顾性选取了 2015 年 1 月到 2020 年 12 月烟台毓璜顶医院收治的 287 例斯坦福 A 型主动脉夹层患者的临床资料，按 7:3 的比例分为建模组(203 例)和验证组(84 例)。采用单因素及多因素 logistic 回归分析危险因素并构建列线图。利用受试者工作特征 (ROC) 曲线、校准曲线、Hosmer-Lemeshow 检验和决策曲线分析 (DCA) 评估了列线图在预测 A 型夹层患者在院死亡风险方面的预测性能。

结果

个体化预测列线图中包含的预测因子包括 BMI、治疗方式、血小板总数、白细胞总数、总胆固醇。该列线图具有良好的鉴别能力，AUC 指数为 0.904（训练集 H-L 检验值为 0.956），校准效果良好。在验证队列中应用列线图仍然具有良好的鉴别能力（AUC 指数为 0.807，H-L 检验值为 0.601）和良好的校准能力。决策曲线分析表明，放射组学列线图具有临床价值。

结论

本文介绍的基于临床指标的列线图可筛选斯坦福 A 型主动脉夹层患者在院死亡的危险因素，预测发生在院死亡的风险。因此，它可能有助于临床决策。

PO-1047

基于增强 CT 影像组学列线图预测胸腺上皮性肿瘤侵袭性

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【摘要】目的：探讨基于增强 CT 影像组学列线图预测胸腺上皮性肿瘤侵袭性的价值。方法：回顾性分析 155 例经病理证实为胸腺上皮性肿瘤患者的临床及影像学资料，按照 7:3 随机分训练组（ $n=108$ ）及验证组（ $n=47$ ）。使用 ITK-SNAP 软件基于增强 CT 静脉期图像提取影像组学特征；采用最小绝对收缩和选择算子算法 (LASSO) 回归对特征进行降维，筛选最优特征建立影像组学标签，并计算标签得分 (Rad-score)；单因素及多因素 logistic 回归分析筛选独立危险因素，分别构建影像特征模型、Rad-score 和影像组学联合模型，并绘制影像组学联合模型列线图；使用受试

者工作特征 (ROC) 曲线下面积 (AUC) 分别评价 3 种模型的诊断效能; DeLong 检验比较各模型间诊断效能; 校正曲线评价列线图的拟合优度; 决策曲线 (DCA) 评价列线图的临床净收益。结果: LASSO 回归筛选出 16 个最优组学特征。单因素及多因素 logistic 回归分析发现肿瘤形态、周围组织侵犯及 Rad-score 为独立危险因素。列线图的 AUC 在训练组及验证组分别为 0.852、0.831, 与影像特征模型比较差异具有统计学意义 ($P < 0.05$); 与 Rad-score 比较训练组差异具有统计学意义 ($P < 0.05$), 验证组差异无统计学意义 ($P > 0.05$)。DCA 显示列线图模型训练组的阈值概率在 0.08~0.88 时临床均有获益。结论: 基于增强 CT 影像组学列线图能够有效预测胸腺上皮性肿瘤侵袭性。

PO-1048

非小细胞肺癌 CT 征象与 ROS1 重排的相关性研究

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目的: 探究非小细胞肺癌 CT 征象与 ROS 原癌基因 1 (ROS1) 重排状态的相关性, 目的是寻找 ROS1 基因重排的预测因素, 为肺腺癌的靶向治疗提供参考。

材料和方法: 回顾性分析 2014 年 11 月至 2019 年 4 月经病理证实的 92 例肺腺癌患者 (95 个病灶) 的术前胸部 CT 表现。所有病灶均接受 ROS1 状态检测, 并在治疗前进行了胸部 CT 检查。根据 ROS1 重排状态, 将患者分为两组, 即 ROS1 重排组 (33 例) 和 ROS1 野生型组 (59 例, 63 个病灶)。两个放射科诊断医生独立的评估患者特征和影像学特征。采用方差分析 (ANOVA)、卡方检验或 Fisher 精确检验来区分两组患者的临床和 CT 特征。结果: ROS1 重排患者和 ROS1 野生型患者之间在 3 个 CT 特征, 即癌性淋巴管炎 ($P=0.018$)、N1 区淋巴结 ($P=0.021$) 和 N2 区淋巴结 ($P=0.027$) 中有显著差异。ROS1 重排患者明显比 ROS1 野生型患者年轻。两组在性别、吸烟史方面无统计学差异。

结论: 虽然 ROS1 重排肿瘤与 ROS1 野生型肿瘤存在很大的重叠, 但是我们发现 ROS1 重排肿瘤表现出独特的影像学特征, 可以帮助临床医生选择患者进行基因检测和随后的靶向治疗。

PO-1049

急性主动脉夹层合并无菌性胆囊炎的影响因素探讨

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目的: 探讨急性主动脉夹层合并无菌性胆囊炎的临床特征及危险因素。

方法: 急性主动脉夹层患者 461 例, 依据是否发生无菌性胆囊炎分为并发无菌性胆囊炎组和未并发无菌性胆囊炎组。统计记录所有患者一般资料、影像学资料, 分析急性主动脉夹层合并无菌性胆囊炎患者的临床特征及无菌性胆囊炎的危险因素。

结果: 461 例中有 46 例合并无菌性胆囊炎, 发生率为 10.0% (其中 A 型 36/262, B 型 10/199); 单因素分析结果显示, A 型主动脉夹层组中两组年龄、性别相比, 差异有统计学意义 ($P < 0.05$); 是否累及左或/和右冠状动脉开口相比, 差异有统计学意义 ($P < 0.05$), 是否累及腹腔干开口相比, 差异无统计学意义 ($P < 0.05$)。

结论: 未累及冠状动脉的 A 型夹层更易诱发胆囊炎, 临床需重点关注并予以相应治疗, 以控制疾病进展。

PO-1050

可变螺距技术在肿胀手综合症 CT 血管成像中的应用价值

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目的：探讨可变螺距 (Variable Helical Pitch, VHP) 技术在肿胀手综合症 CT 静脉血管成像中的应用价值。

方法：回顾性选取本院 2020 年 5 月至 2023 年 5 月 80 例行双上肢静脉 CT 成像患者，其中单、双侧病变各 40 例。将上述患者按照单、双侧位置进行平均分组，VHP 技术为 A 组，常规技术为 B 组，单侧病变采用间接法注射对比剂，双侧病变采用直接法注射对比剂，所有患者 CT 检查完均接受经皮腔内血管成形术 (Percutaneous Transluminal Angioplasty, PTA)，随后将 CT 血管成像的诊断结果与数字减影血管造影 (Digital Subtraction Angiography, DSA) 进行对比，由 2 名有经验的外周血管医生进行诊断，一致性采用 Kappa 分析， $Kappa > 0.85$ 认为一致性良好。记录并分析两组辐射剂量。

结果：在诊断效能评价中，中心静脉病变方面，A 组正确率为 98.32%，B 组为 82.08%，结果有统计学差异 ($P < 0.05$)；在非中心静脉病变方面，A 组为 96.80%，B 组 96.42%，诊断效能无统计学差异 ($P > 0.05$)。A 组与 B 组辐射剂量无显著差异 ($P > 0.05$)。

结论：VHP 技术在上肢静脉 CT 成像中，可以在不增加辐射剂量的前提下，诊断效能较常规技术明显提升，值得在临床中大力推广应用。

PO-1051

应用增强 CT 评估瘤内血管特征对胸腺上皮性肿瘤亚型的诊断价值

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目的：基于增强 CT 探讨不同病理亚型胸腺上皮性肿瘤 (thymic epithelial tumor, TET) 的瘤内血管分布及增强特征，以提高对 TET 亚型的鉴别诊断能力。

方法：回顾性分析经病理证实的 124 例 TET 患者的临床及 CT 特征，CT 特征包括肿瘤大小、位置、轮廓、强化均质性、程度及高峰期、有无内部多结节状强化及低密度分隔带、有无瘤内血管、瘤内血管形态、血管数、血管位置、有无内乳动脉包绕，对各亚型 CT 特征进行组间比较，并将各亚型临床及 CT 特征行单因素及多因素分析，构建 Logistic 回归模型，采用 ROC 曲线评估各模型及单因素特征对各亚型 TETs 的诊断效能。

结果：在各亚型间，瘤内血管发生率、血管形态、血管数、血管位置、内乳动脉包绕率、瘤内多结节状强化、低密度分隔带、强化程度及最大强化值的差异具有统计学意义 ($P < 0.05$)。强化均质性、强化高峰期的差异无统计学意义 ($P < 0.05$)。多因素分析提示，A 型胸腺瘤的独立预测因素为：最大强化值 $> 34\text{HU}$ 、无瘤内血管、轮廓光整；AB 型胸腺瘤的独立预测因素为：内部多结节状强化、最大强化值 $> 24\text{HU}$ 、轮廓光整、有瘤内血管；B 型胸腺瘤独立预测因素为：最大强化值 $\leq 21\text{HU}$ 、无瘤内血管、分叶状轮廓、重症肌无力症状、年龄。胸腺鳞状细胞癌的独立预测因素包括内乳动脉包绕、不均匀强化方式。多因素分析未发现对诊断胸腺神经内分泌肿瘤 (thymic neuroendocrine tumor, TNET) 有统计学意义的独立预测因子，但瘤内分支状血管对 TNET 有较高预测效能 (AUC, 0.841)。除 TNET 外，Logistic 回归模型对各亚型均有较高诊断效能 (AUC 值均 > 0.85)。

结论：TET 各亚型瘤内血管特征及强化特征不同，联合临床、CT 增强及血管特征的 Logistic 回归模型比单因素特征对各亚型具有更高诊断效能。

PO-1052

阿里海拔 4500 米高原肺水肿计算机断层扫描特征分析

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[摘要]目的：分析高原肺水肿的 CT 表现，提高 CT 诊断准确率。方法：本研究回顾性分析 200 例经临床诊断为高原肺水肿患者的胸部 CT 影像资料，分析不同病情阶段肺内病灶的数量、位置、分布、密度及形态，总结 CT 对高原肺水肿的诊断价值。结果：（1）病变分期：早期 26 例（13%）、进展期 105 例（52.5%）、重症期 32 例（16%）及转归吸收期 37 例（18.5%）四期。（2）病变部位：早期累及单侧肺 20 例（76.9%），累及双侧肺 6 例（23%）；早期累及右肺 21 例（80.7%），累及左肺 5 例（19.2%）；进展期累及单侧肺 19 例（18%），累及双侧肺 86 例（81.9%）；进展期累及右肺 79 例（75.2%），累及左肺 26 例（24.7%）；重症期累及单侧肺 2 例（6.2%），累及双侧肺 30 例（93.7%）；重症期累及右肺 32 例（100%），累及左肺 30 例（93.7%）；转归吸收期累及单侧肺 30 例（81%），累及双侧肺 7 例（18.9%）；转归吸收期累及右肺 30 例（81%），累及左肺 14 例（37.8%）。（3）CT 表现：研究发现早期 HAPE 胸部 CT 表现为局限斑片状磨玻璃影。进展期 HAPE CT 多表现为磨玻璃影向云絮状密度增高影转变。重症爆发期 CT 影像可见“白肺”表现，右肺多重于左肺。转归吸收期此期病变 CT 表现与早期表现类似，经过治疗后可完全吸收。结论：胸部 CT 影像检查是高原肺水肿的重要诊断方法之一，尤其对早期或不典型病例更是重要的诊断依据。

PO-1053

开发和验证基于增强 CT 的深度迁移学习及临床-影像组学联合模型来鉴别胸腺瘤与胸腺囊肿：一项多中心研究

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目的：本研究旨在评估深度迁移学习及临床-影像组学在鉴别胸腺瘤与胸腺囊肿中的可行性及有效性。

材料与方法：从中心 1 回顾性收集经病理证实为胸腺瘤的 105 例和 91 例胸腺囊肿患者的临床和影像资料（训练队列：n=137；内部验证队列：n=59），来自中心 2 的 68 例胸腺瘤及胸腺囊肿患者构成独立外部验证队列。基于静脉期胸部增强 CT 进行感兴趣区勾画，并构建 8 种深度迁移学习模型。从患者的静脉期 CT 感兴趣区中提取影像组学特征并通过最小绝对收缩与选择算子等方法进行特征筛选。使用单因素分析、多因素逻辑回归筛选临床-常规影像学特征。6 种机器学习分类器被用于构建影像组学模型、临床-常规影像学模型。将上述模型中所纳入的特征进行前融合以构建联合模型，并绘制列线图。使用受试者工作特征曲线的曲线下面积（AUC）、校准曲线和决策曲线分析分别评估模型的区分度、校准度和临床收益。采用德隆检验比较各模型之间的 AUC。使用 K-means 聚类方法对患者病灶进行亚区划分，采用传统组学方法提取特征并筛选，通过相关性分析比较影像组学模型及深度迁移学习模型对病灶内部异质性反映能力。

结果：基于深度迁移学习模型的 Densenet 169 性能表现最佳，在内外验证集中 AUC 分别为 0.933 和 0.962。分类器在影像组学模型的内外验证集中 AUC 分别为 0.965 和 0.959。分类器 LightGBM 在临床-常规影像学模型中 AUC 分别为 0.805 和 0.839。联合模型在内外验证集中 AUC 分别为 0.933 与 0.945。德隆检验的结果显示，在内外验证队列中，影像组学模型、深度迁移学习模型及联合模型性能均优于临床-常规影像学模型。相关性分析结果表明影像组学比深度迁移学习能够更好量化胸腺瘤与胸腺囊肿内部异质性差异。

结论: 所开发的深度迁移学习模型及联合模型在鉴别胸腺囊肿与胸腺瘤时可达到良好的诊断效果, 可作为一种潜在的工具辅助临床医生决策。

PO-1054

有无隐球菌脑膜炎的隐球菌肺炎的临床及 CT 特征比较

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目的 探讨有无隐球菌脑膜炎 (cryptococcal meningitis, CM) 的隐球菌肺炎 (pulmonary cryptococcosis, PC) 患者的临床及 CT 特征差异, 以期为 CM 的早期诊断提供更多的预警指标。

方法 回顾性分析 2014 年 1 月至 2022 年 6 月于我院经肺部穿刺活检或手术病理证实的 87 例 PC 患者的临床及 CT 资料, 其中 38 例合并 CM (脑膜炎组), 49 例不合并 CM (对照组), 比较两组临床及 CT 特征的差异。

结果 ①临床特征比较: 脑膜炎组免疫功能受损病史、CD4 细胞比例降低及 CD4/CD8 比值降低的发生率均显著高于对照组, 差异均有统计学意义 (p 均 <0.05); 两组患者的年龄、性别构成比、吸烟史、CD3 及 CD8 细胞比例降低的发生率差异均无统计学意义 (p 均 >0.05)。②CT 征象比较: 脑膜炎组空洞、胸内淋巴结肿大的出现率均显著高于对照组, 而晕征、充气支气管征的出现率显著低于对照组, 两组差异均有统计学意义 (p 均 <0.05); 两组病灶分布、CT 分型、病灶数目、毛刺征、分叶征、胸膜牵拉征及胸腔积液的出现率差异均无统计学意义 (p 均 >0.05)。③结论 有无合并 CM 的 PC 患者的临床及 CT 特征存在差异, 当 PC 患者有免疫功能受损病史、细胞免疫功能异常、肺内病灶出现空洞且无晕征及充气支气管征、伴胸内淋巴结肿大时需高度警惕 CM 的发生, 尽早筛查并及时调整治疗方案, 从而改善患者预后。

PO-1055

磁共振心肌初始 T1 值和细胞外容积分数对 心肌淀粉样变性患者的预后评估价值

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目的: 探讨心脏磁共振心肌初始 T1 值和细胞外容积分数 (ECV) 在心肌淀粉样变性 (CA) 患者中的预后评估价值。

方法: 连续收集 2017 年 7 月至 2021 年 10 月 CA 患者 38 例 (平均年龄 59 ± 11 岁), 所有患者均接受了 3.0T-CMR 检查, 扫描序列包括心脏电影、T1 mapping、LGE 成像。将 T1 mapping 图像导入后处理软件 (CVI42 v5.11.3), 获取左室整体心肌初始 T1 值和 ECV。此外, 收集所有患者的一般临床资料及实验室检查资料, 并对纳入研究的患者本人或家属每隔 3 个月进行定期电话随访, 随访起点为明确病理诊断的时间, 主要观察终点事件为全因死亡。利用 Kaplan-Meier 分析和 Cox 比例风险模型评估心肌初始 T1 值和 ECV 与 CA 患者死亡的相关性。

结果: 在中位随访 27 (16、37) 个月后, 有 12 例 CA 患者死亡。Kaplan-Meier 分析结果显示, 心肌初始 T1 值和 ECV 升高与 CA 患者预后不良密切相关, $ECV > 44\%$ 和心肌初始 T1 值 $> 1389ms$ 的 CA 患者的生存率显著低于 $ECV \leq 44\%$ 和心肌初始 T1 值 $\leq 1389ms$ 的患者 (Log-rank $P < 0.001$), 且与 LGE 的存在无关。在逐步多变量 Cox 回归模型中, 调整了年龄、性别、NT-proBNP、肌钙蛋白 T、梅奥分期、LGE、左室射血分数 (LVEF)、左室舒张末期容积指数 (LVEDVi)、左室收缩末期容积指数 (LVESVi)、左室心肌质量指数 (LVMI) 及左室每搏输出量 (LVSV) 后, ECV[风险

比 (HR) = 1.37, 95%CI: 1.09-1.73, P=0.008]和心肌初始 T1 值 (HR=1.01, 95%CI: 1.00-1.02, P=0.037) 仍然是 CA 患者全因死亡率的独立预测因子。

结论: 心肌初始 T1 值和 ECV 升高会增加 CA 患者的死亡风险, 两者是 CA 患者死亡率独立预测因子, 可作为 CA 患者预后评估的重要指标。

PO-1056

肺血栓栓塞症 CTPA 假阳性诊断常见原因分析及影像表现

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目的: 分析肺血栓栓塞症 CT 肺动脉造影 (computed tomography pulmonary angiography, CTPA) 假阳性诊断的常见原因, 以降低 PTE 的误诊率。**方法:** 收集我院 62 例 PTE 假阳性诊断病例的 CTPA 资料, 观察肺动脉 CTPA 表现, 分析误诊原因并对其进行分型。**结果:** 肺血栓栓塞 CTPA 假阳性诊断的常见原因包括: (1) 呼吸运动及心脏传导搏动伪影引起的假阳性诊断 (17.74%, 11/62): 假性栓子表现为紧贴肺动脉管壁一侧的窄带状稍低密度影, 常累及多支血管。(2) 上腔静脉内高浓度对比剂引起的硬射线伪影导致假阳性诊断 (8.06%, 5/62): 表现为上腔静脉内对比剂浓度较高, 周围见放射状分布的条纹状低密度影, 累及邻近右肺动脉或右肺上叶肺动脉。(3) 把肺门淋巴结误诊为栓子 (12.90%, 8/62): 假性栓子常位于肺动脉分叉处, 邻近肺动脉管壁轮廓光整, 未见明显充盈缺损。(4) 肺血管阻力局限性增高所致假阳性诊断 (27.42%, 17/62): 表现为肺动脉期肺动脉腔内条片状低密度影, 主动脉期扫描该条片状低密度影消失, 邻近肺组织内常见慢性炎症或伴有同侧胸腔积液。(5) 心血管功能差、肺循环减慢所致假阳性诊断 (16.13%, 10/62): CTPA 表现为肺动脉远端分支强化程度减低, 腔内对比剂充盈不良。(6) 纵隔及肺门淋巴结肿大压迫邻近肺动脉所致假阳性诊断 (9.68%, 6/62): CTPA 表现为肺门及纵隔多发淋巴结增大、钙化, 邻近肺动脉管腔受压狭窄, 多见于尘肺及肺结核患者。(7) 将支气管黏液栓误诊为肺动脉血栓 (8.06%, 5/62): 表现为肺动脉走行区条状无强化低密度影, 近端与支气管相连, 周围见肺动脉分支伴行。**结论:** 肺栓塞 CTPA 假阳性诊断的类型多样, 正确识别各型误诊病例的图像特点, 规范扫描方案, 优化扫描策略, 掌握正确的分析方法, 有助于降低 PTE 的假阳性诊断率。

PO-1057

双能量肺部扫描技术“一站式”评估急性肺栓塞及肺灌注对于临床的应用价值

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目的: 研究双能量 CT 一站式扫描对于急性肺栓塞及肺缺血性灌注分析对于临床的应用价值体现。**方法:** 收集 30 例 D-二聚体高并临床高度怀疑为急性肺栓塞患者进行双能量肺灌注成像, 采用 SOMATOM Force CT 进行双能扫描, 通过 Syngo VIA 工作站中双能量+血管及 DE Lung PBV (双能量肺血容量灌注分析) 得到 CT 肺血管成像 (CTPA) 及双能量肺血容量灌注分析 (DE Lung PBV) 融合图像, 以叶为单位观察肺动脉内有无栓子, 并进行记录栓子的位置及数目并分析栓子栓塞后各肺叶血流灌注情况进行分析记录其灌注异常位置。**结果:** 对 30 例患者溶栓一周后复查再行肺栓塞及肺灌注情况进行对比分析, 并观察栓子情况及肺血流灌注情况进行愈后评估其中 23 名患者基本恢复正常肺动脉干及远端分枝未见明显栓子, 血容量灌注基本恢复正常, 其于 7 名患者因个体差异较大未能完全恢复, 统计结果具有统计学意义, 与

此同时发现此方法可以消除上腔静脉伪影并可观察胸主动脉区域是否有夹层为患者其它病情消除隐患。

结论：一站式双能量肺血容量灌注分析不但可以解决肺动脉成像还可以定量评估肺组织的血流灌注情况，这是一种功能成像，肺部组织血流灌注的减低，可以间接证明责任血管的栓塞情况，对肺动脉栓塞的检出有及高的敏感度，并且可对治疗效果和愈后进行评估。

PO-1058

肺部恶性肿瘤经支气管镜下射频消融术后 CT 影像表现及疗效评价

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目的 描述肺部恶性肿瘤经支气管镜下射频消融（RFA）术后 CT 影像学特征及其随时间的演变，探讨不同影像特征与 RFA 术后疗效之间的相关性，以早期准确评估局部疗效，提高肿瘤局部控制率。
方法 收集 2021 年 1 月至 2021 年 12 月于广州医科大学附属第一医院对肺部病灶行支气管镜下射频消融（RFA）治疗的 41 例患者（44 个病灶）的临床及影像资料，于病灶水平定性评估 RFA 术后不同时间点消融区的影像表现，消融区形态学表现分为八种类型：实变、磨玻璃影、反晕征、空洞、结节/肿块、纤维条索、胸膜增厚、肺气肿。根据《影像引导下热消融治疗原发性和转移性肺部肿瘤临床实践指南-2021 年版》评估局部疗效。采用卡方检验或 Fisher 精确检验分析治疗前后影像学特征与术后疗效之间的相关性，以 $P < 0.05$ 为差异有统计学意义。

结果 44 个病灶中，3 个鳞癌，31 个腺癌，10 个无病理分型；肿瘤最大直径平均 (2.07 ± 0.79) cm。RFA 术后 24 小时，消融区最常见的影像表现是实变（97.7%，42/43）、磨玻璃影（95.3%，41/43）、反晕征（60.5%，26/43）；术后 1 个月，消融区表现为实变、磨玻璃影及反晕征的频率有所减低，可出现胸膜增厚（65.1%，28/43）及空洞（32.6%，14/43），而结节/肿块、纤维条索、肺气肿较少见；术后 3-12 个月内，最常见表现为不规则结节/肿块影，其次是纤维条索。31 个病灶评估为完全消融，13 个病灶为不完全消融/局部进展。术前病灶最大直径、胸膜凹陷征、病灶与血管接触、术后 GGO 最小宽度与术后疗效差异具有统计学意义（ $P < 0.05$ ）。

结论 肺部经支气管镜下 RFA 术后 CT 影像表现复杂多变，定期 CT 随访有助于识别典型的消融后影像表现与肿瘤残留或复发，以指导临床后续治疗。术前病灶最大直径 ≥ 2 cm、胸膜凹陷征、病灶与血管接触、术后 GGO 最小宽度 < 5 mm 与不完全消融/局部进展相关。

PO-1059

MRI 影像组学对非小细胞肺癌纵隔淋巴结转移的预测价值

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目的 建立基于常规 MRI 序列的影像组学模型，比较不同模型预测非小细胞肺癌（NSCLC）纵隔淋巴结（MLN）转移的效能。

方法 回顾性收集 2012 年 10 月至 2022 年 5 月南通市第一人民医院 90 例 NSCLC 患者的术前 MRI 数据，根据手术病理结果分为 MLN 阳性（52 例）和阴性组（38 例），采用完全随机法按照 7: 3 比例将患者分为训练集和内部验证集，盐城第一人民医院的 31 例患者数据作为外部验证（阳性 9 例，阴性 22 例），放射科医师采用半自动逐层勾画原发病灶，提取基于 T1WI、T2WI、高 b 值扩

散加权成像 (DWI) 及表观扩散系统 (ADC) 图像的组学特征, 由超参数搜索在 F Test、L1 Based (L1 正则)、Tree Based (树模型) 等特征筛选法中选择最佳方法用于降维, 分别建立逻辑斯特回归模型、朴素贝叶斯、随机森林、随机梯度下降法等 11 种模型, 计算受试者操作特征曲线 (ROC) 和曲线下面积 (AUC)、准确度、敏感度和特异度来评估模型的性能, 识别出最优模型。结果 在不同序列中决策树、逻辑斯特回归、支持向量机模型的预测性能都表现良好, 其中基于 T2WI 图像构建的 SVM 模型效能最佳, 训练集、内部验证集及外部验证集 AUC 分别达 0.98、0.73、0.72。

结论 MRI 影像组学对 NSCLC 纵隔淋巴结转移鉴别存在一定价值, 以基于 T2WI 模型表现最优。

PO-1060

探讨分别基于肺活量测定与参数响应图定义的小气道功能性障碍人群的肺结构差异

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目的: 肺活量测定和参数响应图 (parametric response mapping, PRM) 虽然都已有相关的病理证据支持其在评估小气道功能性障碍 (small airway dysfunction, SAD) 的有用性, 但由于原理不同, 两者定义的 SAD 人群间肺结构是否存在差异尚未被报道过。本研究旨在分析两种方法定义的 SAD 人群的肺结构差异, 并建立相应的预测模型。

方法: 前瞻性纳入了 388 名符合条件的参与者, 均进行了肺活量测定和吸气-呼气胸部 CT 扫描。用力呼气流量低于预期值的 65% 为肺活量测定定义的 SAD, 而 PRM 中功能性小气道疾病的体积百分比 (PRMfSAD) 大于 20% 为 PRM 定义的 SAD。比较两种方法定义的 SAD 的临床资料及影像学特征, 并基于逻辑回归模型的结果构建预测模型。

结果: 通过肺活量测定定义了 122 名 SAD, 通过 PRM 定义了 158 名。CT 视觉评估中, 肺气肿、炎症性 SAD 和支气管壁增厚分别在两种方法所定义的 SAD 病人中都有较高的出现频率 ($P < 0.001$)。定量 CT 显示, 肺活量测定诊断的 SAD 具有更厚的气道壁 ($P < 0.001$), 更小的管腔 ($P = 0.011$) 及更少的气管分支 ($P < 0.001$), 而 PRM 定义的 SAD 在血管横截面积和直径上更小, 不过小血管数量却更多。逻辑回归分析显示年龄、男性、肺气肿、支气管壁增厚和分支数量是肺活量测定定义的 SAD 的预测因素, 而年龄、男性性别、BMI、炎症性 SAD、肺气肿和横截面积小于 1mm^2 的血管体积百分比 (BV1/TBV) 是 PRM 定义的 SAD 的预测因素, 各自拟合的预测模型曲线下面积 (area under curve, AUC) 值分别为 0.839、0.808。

结论: 由肺活量测定定义的 SAD 与气管关系紧密, 由 PRM 定义的与肺小血管关系紧密。基于临床资料和影像学特征的模型对于两种方法所定义的 SAD 均有较好的预测价值, 为 SAD 的筛查提供了另外途径。

PO-1061

基于低剂量呼-吸双相胸部 CT 对肺结节定量参数测量的研究

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目的: 评价肺组织、不同性质肺结节在呼吸双相 CT 上各定量参数及变化率的差异, 探讨肺充气程度对肺及肺结节各参数的影响。

方法: 收集 133 例在术前行低剂量呼吸双相胸部 CT 的肺结节患者, 共 138 个肺结节。分别测量深吸气末和深呼气末全肺、双侧肺及各肺叶的肺功能参数 (肺容积和肺密度)。吸气相与呼气相参数的变化率记为 $(E-I)/I$ 。评估肺上部、肺下部间肺参数变化的肺充气敏感度, 分析肺结节在不同肺充气状态下的变化趋势。各定量参数采用 t 检验或秩和检验进行比较。采用 Pearson 相关或 Spearman 等级相关分析各参数之间的相关性。

结果: 呼吸双相中肺下部容积、密度的变化大于肺上部 ($p < 0.01$), 肺下部容积 $(E-I)/I$ 、密度 $(E-I)/I$ 分别为 47.2%、18.1%。呼气相 CT 显示实性结节、非实性结节体积分别减少 2.0%、14.4%, 密度增加 19.5%、14.4%。呼吸双相中肺下部实性结节的密度大于肺上部 ($p < 0.01$), 肺下部非实性结节的密度 $(E-I)/I$ 、体积 $(E-I)/I$ 以及长径 $(E-I)/I$ 大于肺上部 ($p < 0.01$)。非实性结节密度 $(E-I)/I$ 在良、恶性结节间具有统计学差异 ($p = 0.038$), 结节体积 $(E-I)/I$ 、长径 $(E-I)/I$ 及短径 $(E-I)/I$ 无统计学差异 ($p > 0.05$)。非实性结节中原位腺癌、微浸润性腺癌和浸润性腺癌的结节长径 $(E-I)/I$ 存在相关性 ($p = 0.009$, $r = 0.290$), 结节体积 $(E-I)/I$ 、密度 $(E-I)/I$ 及短径 $(E-I)/I$ 不存在相关性 ($p > 0.05$)。结论: 呼吸双相非实性结节体积和密度同步变化, 而实性结节体积和密度不同步变化。肺下部实性结节的密度和非实性的结节密度、体积、长径更容易受到呼吸的影响。密度 $(E-I)/I$ 可能有助于非实性结节良、恶性鉴别, 长径 $(E-I)/I$ 对评价非实性结节的恶性程度有一定的参考价值。

PO-1062

CMR 参数定量技术在心肌梗死中的临床应用价值探索

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目的: 探讨心脏磁共振弛豫定量技术在诊断心肌梗死患者中的临床应用价值。方法: 收集经冠脉造影诊断为心肌梗死的患者 23 名, 纳入梗死组; 以及年龄匹配的健康志愿者 29 名, 纳入对照组。采用 3.0 T 磁共振仪结合心脏线圈进行扫描, 扫描序列包括电影成像、T2WI、延迟强化、增强前 T1 mapping (Native T1)、T2 mapping (Native T2) 及增强后 T1 mapping (Post T1) 序列。扫描完成后, 先经 CVI42 后处理软件分析获得左心室心功能参数; 再通过延迟增强图像的异常强化区域, 勾画感兴趣区域并测量 T1、T2 值, 带入血细胞比容计算 ECV; 对上述数据进行统计学分析, 比较两组间的差异, $P < 0.05$ 差异有统计学意义。结果: 梗死组的左室舒张末容积、左室收缩末期容积、左室射血分数与对照组对比均降低, 差异有统计学意义 ($P < 0.001$); 梗死组的心脏每搏输出量、心输出量与对照组对比无明显差异, 差别无统计学意义 ($P > 0.05$); 另外, 梗死组的 Native T1 (1265.91 ± 60.86 ms), Native T2 (69.69 ± 12.71 ms), ECV ($35.16 \pm 2.59\%$), 较对照组 Native T1 (1071.75 ± 43.77 ms), Native T2 (52.06 ± 5.93 ms), ECV ($30.39 \pm 3.18\%$) 均升高, 差异有统计学意义 ($P < 0.05$); 梗死组 Post T1 (439.82 ± 24.86 ms) 较对照组 Post T1 降低 (505.82 ± 62.069 ms), 差异有统计学意义 ($P < 0.05$)。通过延迟强化确定梗死区, 用定量参数的 ROC 结果分析得出, Native T1 的诊断价值最高 ($AUC = 0.939$)。结论: CMR 弛豫定量技术可以帮助准确诊断梗死区域并量化其参数, 为早期、精确诊断心肌梗死提供影像学依据。

PO-1063

CT 影像特征在预测非小细胞肺癌免疫联合化疗治疗疗效中的价值

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目的: 本研究旨在免疫联合化疗治疗前分析 CT 图像特征, 预测其在非小细胞肺癌治疗的疗效评价。
方法: 收集患者经免疫联合化疗治疗后, 分为有效组及非有效组, 分析治疗前影像图像特征, 定性和定量的 CT 图像由两位放射学家独立评估, 主要评估以下影像特征: 长径、短径、CT 值、形态(“分叶征”、团块、不规则形、类圆形)、清晰度(清晰、欠清、模糊)、磨玻璃影、阻塞性改变、“毛刺征”)、血管征、坏死、钙化、血管穿行、支气管征、空洞、血管、“胸膜凹陷征”、淋巴结肿大、肺内转移、远处转移等。

结果: 共有 50 例患者最终纳入研究, 中位随访时间为 13 个月, 有效组有 31 例(有效率达 62%), 非有效组有 19 例。肿瘤的大小(长、短径), 以及是否淋巴结、肺内、远处转移, 对于疗效无显著差异。肿瘤内部的特征分析(CT 值、坏死、钙化、瘤内血管穿行、支气管充气征)等征象, 其差异亦无统计学意义。仅只有肿瘤周边的影像特征中“血管征”在无效组病例中较有效组出现的更多, 且两者间具有统计学差异。肿瘤周边其他特征(形态、毛刺、胸膜凹陷、阻塞性肺炎等)亦没有存在显著差异。

结论: 免疫联合治疗在进展期肺癌中具有较好预后效果, CT 检查的随访作为最常规的检查方法, 通过肿瘤的影像特征, 尤其是血管征可较好预测其治疗疗效, 对于临床的提示及方案的制定具有较好的便携的参考价值。

PO-1064

右心畸形为主先心病术后左心房功能的 CMR 研究

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目的 探讨心脏 MRI(CMR)评估常见右心畸形先心病术后患儿左心房功能的价值。

方法 回顾性分析 2019 年 1 月至 2021 年 10 月于我院接受 CMR 的左心室射血分数(EF)保留的先心病术后患者 162 例(TOF 术后组 94 例、PS 术后组 32 例、PA/VSD 术后组 36 例)。对照组为 30 例患儿性别、年龄匹配的正常志愿者。基于 CMR 图像, 采用后处理软件使用双平面面积长度法测量左心房容积指数, 包括最大、最小及收缩前容积指数(LAVI_{max}、LAVI_{min} 及 LAVI_{preA}); 获得左心房功能参数包括储存期、管道期、收缩期的 EF、应变、应变率。

结果 与对照组比较, 先心病组的 LAVI_{max} 均下降, LAVI_{min}、LAVI_{preA} 无统计学差异。功能参数中, 管道期和收缩期应变率在 4 组间无统计学差异。TOF 术后组所有储存功能参数、管道期 EF 和应变均下降, 收缩期 EF 升高, 收缩期应变下降($P < 0.05$); PS 术后组仅储存期应变率下降($P < 0.05$); PA/VSD 术后组所有储存功能参数、管道期 EF 和应变均下降, 收缩功能未见明显异常。PS 术后组的储存期 EF、应变和管道期 EF、应变均高于 TOF 术后组和 PA/VSD 术后组($P < 0.05$)。先心病术后组的储存期 EF 均与储存期应变及应变率和管道应变呈中度相关。RVEF 较低($< 50\%$, $n=61$)的患者与 RVEF 较高($\geq 50\%$, $n=101$)的患者相比, 储存期和管道期功能参数均显著降低。

结论 在左心室 EF 保留的 TOF、PS 和 PA/VSD 术后患儿中, 左心房功能已发生异常, 可能可以早期提示左心室舒张功能不全, 且与右心室功能密切相关。TOF 和 PA/VSD 术后患儿的左心房储存功能和管道功能均下降, 收缩功能表现不同; PS 术后患儿的左心房储存和管道功能优于 TOF 和 PA/VSD 术后患儿。CMR 可以在左心房结构扩大之前, 早期发现左心房的功能异常。

PO-1065

基于心脏 MR 组织特征成像的 2 型糖尿病早期心肌损伤定量评价 及其与心外膜脂肪厚度关系的研究

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目的：应用心脏 MR T1 mapping 技术及特征追踪心肌应变成像研究左心室射血分数 (left ventricular eject fraction, LVEF) 保留型 2 型糖尿病 (Type 2 diabetes mellitus, T2DM) 患者是否存在早期心肌损伤, 同时研究其与心外膜脂肪 (epicardial adipose tissue, EAT) 厚度的关系。材料与方法：回顾性纳入 T2DM 患者 (T2DM 组) 10 例和健康志愿者 (正常对照组) 10 例, 所有研究对象均进行 3.0 T CMR 检查, 扫描序列包括心脏电影及 T1 mapping。通过 CVI42 后处理软件测量 LV 心功能参数、心肌应变及 LV 心肌 T1 值, 及细胞外容积 (extracellular volume, ECV)。分析 T2DM 组与正常对照组的临床参数、心脏 MR 参数的差异。同时, 在四腔心电影和基底段短轴面电影的舒张末期对 EAT 的厚度进行测量, 包括右侧房室沟 (RAVG)、左侧房室沟 (LAVG)、前室间沟 (AIVG)、上室间沟 (SIVG)、下室间沟 (IIVG) 和右心室游离壁外 EAT, 并且分析 T2DM 组和正常对照组之间 EAT 厚度的差异, 并与血糖、左心室心肌 T1 值和 ECV 值进行相关性分析。结果：发现与正常对照组比较, T2DM 组的初始 T1 值及 ECV 值均较高, 左室心肌整体径向、环向应变均明显减低 (所有 $P < 0.05$) ; T2DM 组的 RAVG、LAVG、SIVG 和 RVFW 的 EAT 厚度明显高于对照组, 且 RAVG、LAVG 和 RVFW 的 EAT 厚度与血糖浓度呈中度正相关 (所有 $P < 0.05$) , RVFW 的 EAT 厚度与左心室整体初始 T1 值中度正相关 ($P = 0.022$) 。结论：心脏 MR 测量的 LV 心肌 T1 值、ECV 及心肌应变可作为评价 T2DM 患者早期心肌损伤的影像学参数。房室间沟 EAT 的厚度与血糖水平相关, 且 RVFW 的 EAT 有可能与左心室心肌纤维化有关。

PO-1066

左心房应变在 II 期轻链型心脏淀粉样变中的预后价值

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目的：左心房 (left atrial, LA) 功能障碍在心脏淀粉样变发生发展中的作用逐渐受到重视。然而, LA 功能在梅奥 II 期轻链型心脏淀粉样变 (light-chain cardiac amyloidosis, AL-CA) 中的预后价值仍然未知。本研究旨在评估 LA 应变在梅奥 II 期 AL-CA 患者中的预后价值。方法：前瞻性地纳入进行心脏磁共振检查的梅奥 II 期 AL-CA 患者。终点是全因死亡, 进行 Cox 回归分析和 Kaplan-Meier 生存分析以确定变量与结局间的关系。结果：本研究共纳入 131 名梅奥 II 期 AL-CA 患者, 37 名患者 (28%) 达到终点 (中位随访: 28 [IQR: 10-50] 月)。血清生物标志物、细胞外体积 (extracellular volume, ECV)、左心室射血分数、左心室应变和 LA 应变均可预测结局 ($P \leq 0.02$)。在多因素模型中, 左心房储存应变仍然与结局显著相关 (HR: 0.910 [95% CI: 0.868, 0.954; $P < 0.001$])。在已知的预后因素基础上加入 LA 储存应变, 可显著改善模型的区分度 (Harrell's C-index: NT-proBNP + ECV = 0.392; Harrell's C-index: NT-proBNP + ECV + LA 储存应变 = 0.403) 和重新分类 (net reclassification index: 0.106; $P < 0.001$)。结论：LA 储层应变是梅奥 II 期 AL-CA 患者预后的独立预测因素, 优于左心室射血分数和左心室纵向应变, 并且对 ECV 具有增量预后价值。LA 应变评估应纳入到梅奥 II 期 AL-CA 患者的风险分层中。

PO-1067

基于共识聚类分析非小细胞肺癌的术后无复发生存期

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目的：本研究旨在评估基于瘤内联合瘤周的 CT 影像组学共识聚类是否能对非小细胞肺癌 (NSCLC) 患者进行有效风险分层并预测术后无复发生存期 (RFS)。

材料与方法：回顾性分析了自 2014 年 12 月至 2020 年 4 月经病理确诊的 NSCLC 外科手术患者的数据。对 CT 图像进行预处理后，提取瘤内联合瘤周 9mm 区域的 CT 影像组学特征。应用主成分分析 (PCA) 对患者的影像组学特征进行降维处理并采用共识聚类对影像组学特征进行聚类分析。比较簇群之间的人口统计学特征、常规影像学特征、病理组织学特征、基因蛋白和免疫生物标志物表达状态。Cox 比例风险回归分析用于评估临床危险因素与术后 3 年 RFS 之间的相关性。采用 Kaplan-Meier 生存分析探索簇群之间的生存差异。

结果：共 266 名患者被纳入本研究，共识聚类确定了 3 个簇群 (簇 1: n=111, 簇 2: n=61, 簇 3: n=94)。病理 TNM 分期、病理 T 分期、病理类型、细胞程序性死亡-配体 1 (PD-L1) 和细胞程序性死亡-受体 1 (PD-1) 的表达状态、淋巴血管侵犯 (LVI) 等在 3 个簇群之间存在明显差异 (所有 $P < 0.05$)。Kaplan-Meier 生存分析显示，不同簇群之间的 RFS 存在显著统计学差异 ($P < 0.001$)，簇 1、簇 2 和簇 3 的术后 3 年无复发生存率分别为 76.4%，45.6% 和 41.5%。当在多变量 COX 回归分析中纳入与 NSCLC 患者预后相关的临床危险因素时，影像组学簇群是重要预后因素，与来自簇 1 的患者相比，簇 2 ($P=0.002$, HR: 2.533, 95%CI: 1.395-4.599) 和簇 3 患者 ($P < 0.001$, HR: 3.745, 95%CI: 2.231-6.286) 的术后 3 年 RFS 更低。

结论：基于瘤内联合瘤周的 CT 影像组学共识聚类可对 NSCLC 患者进行术后复发风险分层，可作为一种能有效评估 NSCLC 患者预后的手段。

PO-1068

基于 CT 纹理分析预测急性肺栓塞短期预后的研究

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目的 探讨基于 CT 纹理分析定量预测急性肺栓塞 (APE) 患者短期预后的价值。**方法** 回顾性收集我院行 CT 肺动脉成像 (CTPA) 的 79 例 APE 患者 CTPA 图像及临床资料。依据临床结局分为预后良好组 (n=56) 和预后不良组 (n=23)，记录患者的影像学参数 RV/LV 比值、Qanadli 指数，提取血栓纹理特征，使用 R 软件对数据进行 Logistic 回归分析，并绘制 ROC 曲线、校准曲线和临床决策曲线评估纹理特征参数、RV/LV 比值、Qanadli 指数等在预测 APE 患者预后不良中的效能。

结果 RV/LV ≥ 1.0 、Qanadli 指数和纹理特征参数 GLSZM-GLN 是 APE 患者短期预后不良的独立预测因素。RV/LV ≥ 1.0 、Qanadli 指数、GLSZM-GLN 预测 APE 不良预后的 AUC 值分别为 0.826 (0.725-0.902)，0.922 (0.839-0.970)，0.867 (0.772-0.933)。**结论** 基于 CT 血栓纹理分析、RV/LV ≥ 1.0 和 Qanadli 指数能够评估 APE 患者短期预后不良，并有一定的临床应用价值。

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PO-1069

基于瘤内及瘤周影像组学模型对肺癌淋巴结转移、Ki-67 表达水平的预测研究

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目的 探究肿瘤及肿瘤周围的影像组学模型对肺癌淋巴结转移、Ki-67 表达水平的预测效能。**方法** 本研究为回顾性研究，收集绵阳市第三人民医院及遂宁市中心医院的肺癌患者共计 157 例，依据患者术中取得淋巴结病理标本进行淋巴结转移的病理判断，依据患者肿瘤 Ki-67 表达水平的高低将患者分为 Ki-67 高表达 (Ki-67 \geq 25%)、Ki-67 低表达 (Ki-67 $<$ 25%)；同时收集所有患者的胸部 CT 平扫、动脉期、静脉期图像，由两名不同年资的放射科医师利用 3D-slicer 软件依据瘤体、距离肿瘤 2mm、4mm、6mm、8mm、10mm 进行逐层手动勾画，生成感兴趣区 (ROI)，并进行影像特征的提取采用 Lasso 回归分析的方法对特征进行降维，将筛选出来的特征采用机器学习方法分别建立基于瘤体、瘤周 2mm、4mm、6mm、8mm、10mm 的影像组学模型，各模型预测效能使用受试者工作特征曲线 (ROC) 来评价。结果 在对 Ki-67 表达水平预测的各个模型中，动脉期瘤体图像所构建出的影像组学模型对 Ki-67 表达水平的预测效能最高，AUC 为 0.817 (特异度为 0.820、灵敏度为 0.745)，高于动脉期各个距离的瘤周图像、平扫及静脉期的瘤体、瘤周模型的预测效能；在对淋巴结转移预测的各个模型中，静脉期瘤周 4mm 模型所构建出的影像组学模型对有无淋巴结转移的预测效能最高，AUC 为 0.887 (特异度为 0.780、灵敏度为 0.958)，高于静脉期瘤体及其余瘤周、动脉期、平扫瘤体及瘤周模型的预测效能。结论 对于肺癌 Ki-67 的表达，瘤周影像组学模型并不能提高其预测效能；而对淋巴结转移的预测，静脉期瘤周 4mm 影像组学模型能够提高其预测效能。

PO-1070

冠脉 CTA 评估的不同斑块类型及其与冠状动脉周围脂肪组织的体积和衰减的关系

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目的 基于冠状动脉计算机断层扫描 (Coronary computed tomography angiography, CCTA) 探讨稳定型冠状动脉疾病 (Coronary artery disease, CAD) 患者中不同斑块类型与冠状动脉周围脂肪组织 (Pericoronary adipose tissue, PCAT) 体积和衰减之间的关系。**材料与方法** 共收集了 321 名接受过 CCTA 检查的稳定型 CAD 患者。斑块类型由两位分别具有 10 年和 8 年心血管诊断经验的放射科医生通过对 CCTA 图像的视觉分析进行评估。使用半自动软件分别测量了斑块周围、斑块所在节段和近端冠状动脉的 PCAT 体积和 CT 衰减值。比较不同类型斑块在冠状动脉近端、斑块所在节段和斑块周围的 PCAT 体积和衰减值是否存在统计学差异。结果 在本研究中，包含 218 名男性，103 名女性。共纳入 552 个病变，其中包括 299 个钙化斑块 (Calcified plaques, CP)、174 个非钙化斑块 (Non-calcified plaques, NCP) 和 79 个混合斑块 (Mixed plaques, MP)。两位放射科医生对 PCAT 体积和衰减值的测量结果一致性较好 (所有 ICC 值均大于 0.80)。不同斑块类型的斑块周围 PCAT 体积差异有统计学意义 ($P<0.001$)，而冠状动脉近端和斑块所在节段的 PCAT 体积无明显差异 ($P>0.05$)。此外，斑块周围和斑块所在节段的 PCAT 衰减值在不同斑块类型之间有显著统计学差异 ($P<0.001$)，而冠状动脉近端 PCAT 衰减值无显著差异 ($P>0.05$)。

PO-1071

融合 CT 图像和临床变量的深度残差网络预测肺腺癌的侵袭性

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目的

开发一种基于 ResNet50 架构的深度残差学习网络 (DRLN)，用于区分浸润性腺癌 (IA) 和显示磨玻璃结节 (GGN) 的原位浸润性腺癌 (AIS) 或微小浸润性腺癌 (MIA)。

研究方法

回顾性地从四个中心获得了 430 名患者的常规 CT 图像、临床数据和血清肿瘤标记物数据，共发现 431 个 GGN。采用一系列预处理技术，如图像重采样、重新缩放和裁剪、数据增强等，对原始 CT 图像进行处理，生成新的训练图像和测试图像。DRLN 是基于 ResNet50 架构和支持向量机 (SVM) 分类器构建的。ResNet50 是一种深度神经网络，由 49 个卷积层和 1 个全连接层组成。输出层由 3 个节点组成，用于识别 3 个腺癌病例。最后，将 DRLN 的预测性能与两位放射科医生的预测性能进行了比较。

结果

所提出的模型获得了最高的准确率 (72.2%)、精确率 (95.6%)、召回率 (72.2%)、加权平均 F1 分数 (40%)、净现值 (96%)、MCC 值 (73.1%) 和宏观平均接收者操作特征曲线下面积 (AUC) 值 (87%)。这优于无临床信息模型的准确率 (64.9%) 和放射科医生的准确率 (分别为 49.7% 和 52.5%)。即使与资深放射科医生相比，建议的模型和不带临床信息的模型在所有指标上都取得了更好的分类性能，这表明 ResNet50 的有效性。

结论

DRLN 在判断 GGN 的侵袭性方面取得了良好的分类效果。

PO-1072

基于冠状动脉 CTA 的冠周脂肪影像组学特征结合机器学习对冠状动脉支架内再狭窄的诊断性能研究

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目的：基于冠脉 CT 血管造影 (CCTA) 提取冠周脂肪 (PCAT) 的影像组学特征，评估其对冠脉支架内再狭窄 (ISR) 的诊断价值。

方法：回顾性纳入接受过冠脉支架植入后复查 CCTA 并同期接受冠脉造影术 (ICA) 的患者。根据 ICA 结果，将病例分为 ISR 组和非 ISR 组。计算支架周围脂肪衰减指数 (FAI) 及支架周围 PCAT 容积并提取影像组学特征。将所有样本按 7:3 的比例随机分为训练集和验证集进行机器学习模型的开发和验证。使用五种不同的机器学习算法：包括逻辑回归 (LR)、随机森林 (RF)、随机梯度下降 (SGD)、支持向量机 (SVM) 和 XG-Boost 构建影像组学模型、临床模型以及临床-影像组学相结合的综合模型。使用受试者工作特征曲线 (ROC) 评价各模型的诊断性能。对于支架直径 $\leq 3\text{mm}$ 的病例进行亚组分析。

结果：本研究最终共纳入 165 例患者的 214 支血管，其中 ISR 组 79 支血管，非 ISR 组 135 支血管。ISR 组支架周围 FAI 高于非 ISR 组 (-79.8 ± 10.7 Vs. -82.1 ± 8.3 , $P=0.107$)，ISR 组支架周围 PCAT 容积低于非 ISR 组 (1189.7 ± 639.8 Vs. 1271.1 ± 653.4 , $P=0.376$)。支架置入时长与 ISR 显著相关 ($OR=1.02$, $P<0.001$)。SGD 算法在影像组学模型中表现最佳，曲线下面积 (AUC) 在训练集和验证集分别为 0.73 和 0.69。RF 算法在综合模型中表现最佳，训练集和验证集的 AUC 分别

为 0.85 和 0.79。在支架直径为 ≤ 3 mm 的亚组分析中,表现最佳的影像组学模型的 AUC 在训练集和验证集分别为 0.93 和 0.82,表现最佳的综合模型在训练集和验证集分别为 0.93 和 0.85。

结论:基于 CCTA 的 PCAT 影像组学特征结合机器学习方法具有识别冠状动脉 ISR 的潜力,尤其是对于支架直径 ≤ 3 mm 的支架具有更好的诊断性能。

PO-1073

cT1N0M0 期肺癌的影像学表现和分子生物标记物相关性分析

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目的 研究 T1N0M0 期肺磨玻璃结节的影像学表现和分子生物标志物。材料与方法: 选取 2013 年 3 月至 2019 年 12 月期间 221 例 T1N0M0 肺腺癌患者中 CT 显示 GGO 的 237 个病灶,包括 52 例原位腺癌(AIS)、42 例微创腺癌(MIA)和 141 例浸润性腺癌(IAC)。对 AIS-MIA-IAC 组之间或 AIS&MIA 组与 IAC 组之间的临床人口学数据、影像学特征和生物标志物进行了分析。统计分析采用单变量逻辑回归、多变量线性回归和相关分析。结果: 共纳入 221 名患者(中位年龄 59 岁;四分位数范围 51-67 岁;88 名男性)。在 AIS-MIA-IAC 比较中,CT 值、磨玻璃密度结节直径(DGGN)、部分实性结节直径(Dsolid)、合并肿瘤比率(CTR)、结节类型、形状、边缘、气泡、邻近结构、TTF-1 和表皮生长因子受体(EGFR)均有显著差异(均 $P < 0.05$)。在 AIS&MIA 和 IAC 比较中,性别、吸烟和 CEA 也有显著差异(均为 $P < 0.05$)。单变量逻辑回归分析显示,性别、CT 值、DGGN、Dsolid、CTR、类型、形状、边缘、气泡、TTF-1 和表皮生长因子受体(EGFR)特征是显著的危险因素(均 $P < 0.05$)。多变量逻辑回归分析显示,CT 值、DGGN 和气泡是独立的危险因素。该模型的 AUC、灵敏度、特异性和准确性分别为 0.880、0.787、0.854 和 0.814。TTF-1 与 CT 值、DGGN、Dsolid 和 CTR 呈中度相关。表皮生长因子受体与 CT 值、DGGN 和 Dsolid 呈中度相关。结论 CT 值、DGGN、气泡等 CT 特征和表皮生长因子受体(EGFR)、TTF-1 等生物标记物有助于确定肺腺癌的浸润范围,从而支持早期肺腺癌患者的及时诊断和个体化治疗。

PO-1074

“双低”技术联合不同重建算法在超重患者 CCTA 成像中优化图像质量的应用价值

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目的: 探讨深度学习重建算法(DLIR)、基于多模型迭代重建(ASIR-V)和滤波反投影法(FBP)在超重患者“双低”冠状动脉 CT 血管成像中优化图像质量的应用价值。

方法: 前瞻性收集我院 52 例行 CCTA 扫描的超重患者,体质量指数(BMI)为 25.1 kg/m²-28 kg/m²,采用 80 kVp 管电压,智能管电流,噪声指数为 30,对比剂用量 0.5mL/Kg,注射平台期 9s,监测肺动脉和降主动脉,降主动脉阈值 250HU,两点相交手动出发,进行图像采集。扫描完成后,每例患者重建 FBP、50%ASIR-V、DLIR-M、DLIR-H 四组图像,并测量主动脉根部、右冠状动脉近端、左冠脉回旋支近端、前降支近端及心包脂肪的 CT 值和噪声(SD 值),计算冠状动脉信噪比(SNR)和对比噪声比(CNR),由两名具有五年以上工作经验的影像科医生采用 5 分法对图像质量进行双盲法主观评分。

结果：在客观图像质量评价中，4 组重建图像 AO、LCX、RCA、心包脂肪 CT 值间差异无统计学意义 ($P>0.05$)。四组重建图像 SD 值、SNR 值和 CNR 值间差异存在显著统计学意义 ($P<0.05$)，随着四组重建算法 FBP、50%ASIR-V、DLIR-M、DLIR-H 依次变化，图像 SD 值逐渐降低，SNR 值和 CNR 逐渐升高，其中 DLIR-H 组 SD 值最低、SNR 值和 CNR 值最高。在主观图像质量评价中，两名医师对图像质量主观评分一致性很好 (κ 值=0.900, $p<0.001$)，其中 DLIR-M 组与 DLIR-H 组主观评分高。

结论：“双低”技术联合 DLIR-H、DLIR-M 重建可以显著提升超重患者 CCTA 图像质量且优于 ASIR-V 50% 和 FBP。

PO-1075

比较冠状动脉 CT 血管成像和临床风险评分在疑诊冠心病患者他汀类药物决策中的作用

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背景：目前指南推荐在一级预防中使用临床风险评分作为他汀类药物决策的证据，而冠状动脉 CT 血管成像 (CCTA) 在他汀类药物分配中的作用仍未知。

目的：本研究旨在比较 CCTA 和临床风险评分对疑诊冠心病 (CAD) 患者他汀类药物分配的影响。

方法：在接受了 CCTA 检查的 8040 名疑诊冠心病患者中，我们评估了按汇总队列方程 (PCE) 和 CCTA 解剖结果 (无斑块、非阻塞性 CAD 和阻塞性 CAD) 分层的主要不良心血管事件 (MACE) 风险。MACE 定义为全因死亡、急性心肌梗死、血运重建和卒中的复合事件。

结果：在 3.8 年的中位随访期内，316 名入组患者发生了 MACE。根据 CCTA 结果进行分层后，不同 PCE 分层的事件发生率无明显差异 ($P>0.05$)。与 PCE 所识别的人群相比，CCTA 发现了风险较低的人群 (0.3% 对 1.8%) 和风险较高的人群 (21.8% 对 9.0%)。在被推荐使用他汀类药物的人群中 (PCE 风险 $\geq 7.5\%$)，32.5% (1025/3151) 的患者事件风险很低 (0.3%)，且没有斑块。而在未被推荐使用他汀类药物 (PCE 风险 $< 5\%$) 的患者中，4.8% (179/3718) 的患者具有阻塞性 CAD，事件风险高 (17.3%)。

结论：在接受 CCTA 检查的疑诊 CAD 患者中，与 PCE 相比，CCTA 获得的解剖学结果在指导他汀类药物决策方面起着更重要的作用。

PO-1076

基于能谱 CT 单能量图像影像组学模型预测 NSCLC 患者 EGFR 突变状态

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目的：本研究旨在探讨基于能谱 CT 单能量图像的影像组学特征对非小细胞肺癌患者表皮生长因子受体基因突变状态的预测价值，比较是否存在最佳单能量水平，并建立基于最佳单能量水平的 NSCLC 患者 EGFR 突变预测模型。

方法：本研究回顾性分析了经临床病理证实的 95 例 NSCLC 患者的影像学资料。通过能谱 CT 后处理 workstation 在 40-140keV 下每隔 10keV 重建一组单能量图像，共重建了 11 组单能量图像。使用 ITK-snap 软件在 70keV 水平主动脉期轴位图像上逐层勾画感兴趣区 (ROI)，完成后将 ROI 同步到其余 10 组单能量水平图像上。利用 Radiomics Feature Extractor 软件对 11 组单能量图像进行影像组学定量特征提取。使用 R 软件对特征进行最小绝对收缩和选择算子 (The least absolute shrinkage

and selection operator, LASSO) 筛选, 基于所选特征, 构建预测 NSCLC 患者 EGFR 基因突变的影像组学模型。使用受试者工作特征曲线 (Receiver operating characteristic, ROC) 来评价 11 组单能量图像影像组学模型预测 EGFR 基因突变的效能, 选择最佳单能量水平。

结果: 基于 11 组单能量图像, ROC 曲线下面积分别为 0.711、0.521、0.721、0.733、0.698、0.781、0.724、0.754、0.713、0.760、0.715, 除 50keV 外, 基于其余 10 组单能图建立的影像组学模型均具有良好的预测效能, 在 90keV 水平上预测效能较高。

结论: 在本研究中, 90keV 是预测 NSCLC 患者 EGFR 突变状态的最佳单能量水平, 可以为 NSCLC 患者的 EGFR 基因突变状态检测提供一种高效、无创、准确的成像方法, 实现对肿瘤生物学行为的评估。

PO-1077

复杂肺动脉闭锁伴室间隔缺损合并肺动脉起自冠状动脉一例

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目的

探讨复杂肺动脉闭锁合并肺动脉起源异常的影像表现。

方法

回顾性分析 1 例肺动脉闭锁患者的临床资料及影像特征, 并复习相关文献。

结果

患者, 女, 36 岁, 体弱, 平时面色略呈青色, 劳累时面色加深, 严重时呈紫色。体检: 口唇青紫, 双肺无干湿啰音。门诊心脏彩超: 先天性心脏病, 法乐氏四联症, 室间隔缺损, 主动脉骑跨, 肺动脉闭锁不排除, 右房右室增大, 右室壁增厚, 二尖瓣关闭不全 (轻度), 主动脉瓣关闭不全, 舒张功能减低。门诊先心病 CT 增强成像: 室间隔缺损, 主动脉骑跨, 左冠状动脉扩张, 肺动脉闭锁, 肺动脉起源异常。

PO-1078

基于临床、增强 CT 影像组学构建影像组学列线图模型预测胸腺瘤危险分类

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目的: 基于临床、增强 CT 影像组学构建影像组学列线图, 评估其在预测胸腺瘤危险分类中的价值。

方法: 回顾性分析 133 例经病理证实的胸腺瘤患者, 男 63 例, 女 70 例; 其中低危组胸腺瘤 (LRT) 42 例, 高危组胸腺瘤 (HRT) 55 例, 胸腺癌 (TC) 36 例, 将患者分为研究组 1 (LRT 和 HRT, $n=97$) 和研究组 2 (HRT 和 TC, $n=91$), 每个研究组按 7: 3 比例随机分为训练集和测试集。利用 3Dslicer 软件逐层勾画每位患者 CT (平扫、动脉期及静脉期) 图像中胸腺瘤区域的感兴趣区, 从中提取并筛选最佳影像组学特征, 构建影像组学模型; 以单因素及多因素 logistic 回归分析筛选胸腺瘤组织学分型相关的临床及 CT 特征, 构建临床模型; 最后构建联合影像组学特征及临床、CT 特征的影像组学列线图 (联合模型)。绘制受试者工作特征曲线, 计算曲线下面积 AUC, 评价各模型预测胸腺瘤危险分类的效能, 以决策曲线 DCA 对比其临床获益。结果: 研究组 1, 筛选出性别及动脉期 CT 值构建临床模型, 其训练集 ($AUC=0.80$, $95\%CI$ 0.69-0.91) 和测试集 ($AUC=0.66$, $95\%CI$ 0.45-0.88) 对低危组和高危组胸腺瘤的预测效能较低, 影像组学模型及联合模型训练集和测试集的 AUC 值分别为 0.92、0.91 及 0.92、0.92, 均高于临床模型 (P 均 <0.05), DCA 显示联

合模型的临床获益高于临床模型；研究组 2，筛选出 5 个有意义的临床特征及 9 个最佳影像组学特征，以此构建的临床模型训练集和测试集的 AUC 值分别为 0.89、0.84，影像组学模型训练集和测试集的 AUC 值分别为 0.94、0.94，联合模型在训练集（0.97，95%CI 0.94-1）和验证集（0.98，95%CI 0.94-1.00）中均表现优异，联合模型、组学模型与临床模型的 AUC 值均无统计学差异（ P 均 >0.05 ），DCA 显示联合模型的临床获益高于临床模型。结论：联合临床、增强 CT 影像组学构建的影像组学列线图模型能很好的区分低危组胸腺瘤、高危组胸腺瘤和胸腺癌，且联合模型临床获益较高，尤其在高危组胸腺瘤和胸腺癌的鉴别诊断中具有较好的预测潜力。

PO-1079

精准调控斑块微环境的碳酸钙基纳米递药平台的 抗动脉粥样硬化研究

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目的 现有临床治疗策略缺乏对动脉粥样硬化（AS）斑块微环境的调控可能是近十多年来心血管疾病（CVD）死亡率不降反升的重要原因。本研究旨在研发一种新型的、能对 AS 斑块微环境进行多重调控的纳米治疗体系，优化 AS 治疗策略，降低 CVD 死亡率。

方法与结果 将胆固醇（COD）氧化酶和 CaCO_3 纳米粒负载于双分子层脂质体之中，并用 VHPK 多肽对其进行表面修饰。通过 CaCO_3 纳米粒的 pH 响应性改善 AS 斑块内的微酸微环境，除了防止泡沫细胞表面的 ABCA1 蛋白在酸性环境下被降解之外，也为序贯的 COD 定向催化胆固醇提供了有利的微碱性微环境。COD 对 AS 斑块内的胆固醇进行定向分解后产生代谢产物 4-胆甾烯-3-酮，可介导泡沫细胞表面 ABCA1、ABCG1 的上调、促进胆固醇外排，对巨噬细胞炎症表型进行重编辑，使其向 M2 型巨噬细胞极化，实现 AS 斑块微环境的全面、多重调控。此外，VHPK 靶头的修饰增加了药物对 AS 斑块的靶向性和亲和性，从而进一步提升此碳酸钙基纳米递药系统的效能。

结论 本碳酸钙基纳米递药平台安全、高效、具有临床转化潜力，为动脉粥样硬化综合治疗策略提供了新的思路。

PO-1080

亚实性肺小结节浸润性腺癌相关危险因素 研究及临床预测模型建立

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研究目的：

明确 CT 上表现为 $\leq 1\text{cm}$ 亚实性结节的浸润性肺腺癌的相关危险因素，并应用机器学习的方法建立预测模型以辅助早期肺癌的临床决策。

研究方法：

收集自 CT 上表现为 $\leq 1\text{cm}$ 亚实性结节的腺体前驱病变及肺腺癌患者共 169 例（200 个肺结节），分析其临床资料（包括年龄、性别、吸烟史、肿瘤史、家族史），CT 征象（包括位置、大小、密度、病灶边缘、瘤肺界面、病变内部及周围）及病理（腺体前驱病变，MIA 及 IAC）资料，将结节按病理分为 IAC 及非 IAC 两组。对两组患者的临床资料及结节 CT 征象进行对照分析，并进行单因素和多因素分析，筛选出 IAC 的独立危险因素。将结节按 0.7:0.3 的比例随机拆分为训练集和验证集，选择随机森林算法，利用递归式特征消除法筛选出的预测因子建立模型。使用 ROC 曲线分析

确定模型训练集及验证集的准确性。定性资料采用卡方检验，正态分布的连续型变量用 t 检验，非正态分布的连续型变量采用 Wilcoxon 检验。预测模型构建中的数据分析使用 R 语言。

结果：

在 200 个平均直径 $\leq 1\text{cm}$ 的肺腺癌 SSNs 中，有 25.5% 结节的病理为 IAC，149 个结节病理为非 IAC，包括 66 个腺体前驱病变及 83 个 MIA。两组患者在吸烟，结节大小，结节为混杂磨玻璃结节，实性成分占比，真实实性成分结节及结节出现分叶、毛刺、异常血管、空气支气管征、胸膜凹陷的差异有统计学意义 ($P < 0.05$)。通过单因素和多因素回归分析确定为 IAC 的独立危险因素为吸烟，结节大小，mGGN，实性成分占比 >0.5 及结节出现分叶。RFE 法筛选的预测因子为患者年龄，性别，肿瘤史，结节平均直径，结节密度分类，实性成分占比，实性密度分级，结节位置，结节出现胸膜凹陷、空泡、毛刺、空气支气管征、血管穿行。基于随机森林算法对 IAC 的预测因子建立预测模型，训练集和验证集曲线下面积分别为 0.9899 和 0.84。

结论：

1. $\leq 1\text{cm}$ 的亚实性肺小结节中存在部分 IAC；
2. 患者吸烟，结节大小，mGGN，CTR >0.5 及分叶征是 $\leq 1\text{cm}$ 的 IAC 的独立危险因素；
3. 使用临床资料和 CT 征象作为预测因子构建的随机森林模型能较好的对 $\leq 1\text{cm}$ 的 IAC 进行预测。

PO-1081

基于机器学习算法建立对体检发现的 亚实性肺小结节生长模式的临床预测模型研究

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研究目的：

探讨体检胸部 CT 上首次发现 $\leq 1\text{cm}$ 亚实性结节 (SSN) 的动态随访并确定与结节生长相关的临床及影像学危险因素，制定预测模型以辅助肺结节个体化管理。

研究方法：

收集我院体检患者中行胸部 CT 检查时，首次发现直径小于 1cm 的亚实性肺结节 (SSN) 并随访 24 个月，结节持续存在的患者共 151 人 (166 个结节)。分析其临床 (年龄、性别、吸烟史、肿瘤史、家族史) 及影像 (位置、大小、密度、病灶边缘、瘤肺界面、病变内部及周围) 资料，按结节的生长情况分为生长组及非生长组。生长组分为两个亚组，结节增大和实性成分增加，分别进行对照分析。然后进行单因素和多因素分析，确定出与结节生长相关的独立危险因素。将结节按 0.7:0.3 的比例随机拆分为训练集和验证集，选择随机森林算法，利用递归式特征消除 (RFE) 法筛选出的预测因子建立模型。并用 ROC 曲线评估预测模型的准确性。定性资料采用卡方检验，正态分布的连续型变量用 t 检验，非正态分布的连续型变量采用 Wilcoxon 检验。临床预测模型构建中的数据分析使用 R 语言。

结果：

166 个 SSNs 中生长组共 36 个结节 (21.68%)。生长组与非生长组中患者的年龄、性别和既往有吸烟史存在统计学差异 ($P < 0.05$)。结节大小，密度分类，结节有无分叶、空气支气管征、血管穿行和异常血管改变的差异在两组中具有统计学意义 ($P < 0.05$)。通过单因素与多因素回归分析确定与结节生长相关的独立危险因素为患者年龄，吸烟，结节为 mGGN，结节出现血管穿行及异常血管改变。RFE 法筛选的预测因子为患者年龄、性别、吸烟、结节平均直径、结节密度分类、结节出现胸膜凹陷、空泡、毛刺、空气支气管征及异常血管，基于随机森林模型对预测因子建立预测模型，其 AUC 在训练集和验证集分别为 0.9944 和 0.7393。

结论：

1. 患者年龄，吸烟，结节为 mGGN，结节出现血管穿行及异常血管是 $\leq 1\text{cm}$ 亚实性结节生长的独立危险因素；

2. 使用临床资料和 CT 征象作为预测因子构建的随机森林模型能较好的对 $\leq 1\text{cm}$ 亚实性结节生长情况进行预测;
3. 以体检人群作为目标人群设立预测模型可以对肺结节的个体化、精准化诊疗提供帮助。

PO-1082

基于双瞬切能谱 CT 虚拟平扫与常规平扫在肺内部分实性结节图像质量的对照研究

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目标

探讨使用双瞬切能谱 CT 重建得到的虚拟平扫评估肺内部分实性结节的可行性, 并将其性能与真实平扫图像进行比较。

方法

前瞻性搜集我院 46 例孤立性肺内部分实性结节 (PSN) 患者, 进行肺部常规平扫和能谱 CT 双期增强检查, 采用双瞬切能谱后处理技术重建得到双期 (动脉期、静脉期) 虚拟平扫图像。在常规真实平扫 (TNC) 和虚拟平扫图像中测量 PSN 和同侧竖脊肌 (ESM) 的 CT 值和噪声 (SD) 以及病变直径。计算了 PSN 的信噪比 (SNR, $\text{CTPSN} / \text{SDPSN}$) 和对比度噪声比 (CNR, $(\text{CT ESM} - \text{CTPSN}) / \text{SDESM}$)。记录 TNC 和 VNC 模式下的有效辐射剂量。两位经验丰富的放射科医生使用 5-point 量表 (1, 差; 2, 一般; 3, 适中; 4, 良好; 5, 优秀)。采用非参数检验比较不同扫描阶段图像的主观、客观参数和有效辐射剂量。Kappa 检验用于评估组间主观评分的一致性。

结果

动/静脉期 VNC 图像的客观评价指标直径、CT 值、SD、SNR 及 CNR 与 TNC 直径、CT 值、SD、SNR 及 CNR 图像比较, 无统计学差异 ($P=0.926/0.948/0.87/0.88/0.656$)。主观评分方面, 两名观察者主观评分在动脉期 VNC 与静脉期 VNC/TNC 之间比较, 组间差异有统计学意义 (P 观察者 1 值 $=0.004 / <0.001$; P 观察者 2 值 $=0.003 / <0.001$)。TNC 图像主观评分均值最高; 静脉期 VNC 图像主观评分高于动脉期主观评分; 三组图像 Kappa 值分别为 73%; 63%, 72%。主观评分一致性较强。VNC 模式有效辐射剂量小于常规模式 ($P<0.001$), 约降低了 30%。

结论

双瞬切能谱增强静脉期虚拟平扫技术可提供与 TNC 相似的图像质量, 且能明显减少患者辐射剂量。

PO-1083

基于 CCTA 的冠状动脉周围脂肪影像组学模型预测主要心血管不良事件: 前瞻性队列研究

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目的: 探究基于冠状动脉周围脂肪 (PCAT) 的影像组学模型对于主要心血管不良事件 (MACE) 的风险预测能力。**方法:** 前期研究回顾性收集 2016 年 1 月至 2020 年 12 月发生 MACE 事件的 205 例患者进行病例对照研究, 建立 PCAT 影像组学模型。本研究进一步连续性纳入 440 例确诊冠心病或疑似冠心病患者进行外部验证。根据 PCAT 影像组学分析结果将患者划分为高风险组 (214 例) 和低风险组 (226 例), 其中高风险组男性 146 例, 平均 (62.01 ± 10.75) 岁, 低风险组男性 162 例, 平均 (58.85 ± 11.30) 岁, 通过电话、调阅病例等方式随访 MACE 事件。**结果:** 随访平均时间

15.68 个月, 共发生 MACE79 例, 其中高危组 54 例, 低危组 25 例, 在校正了性别、高血压病史、糖尿病病史、总胆固醇、甘油三酯等指标后, 多因素 Logitic 回归分析显示高龄为 MACE 发生的危险因素 (OR=1.07, 95%CI:1.02~1.13, P=0.008), Cox 回归生存分析显示 PCAT 高风险组发生 MACE 风险明显增高 (HR=2.40, 95%CI:1.46~3.85,P<0.001)。FAI 高风险组则没有统计学差异 (P=0.879), PCAT 影像组学模型对于 MACE 的发生有良好的预测及危险分层能力。**结论:** 基于 PCAT 的影像模型对 MACE 的预测和危险分层有较高的应用价值, 在回顾性研究和前瞻性研究中均得到了验证, 且明显优于基于 PCAT 密度建立的模型。

PO-1084

嗜酸性肉芽肿性多血管炎肺部受累 CT 影像征象

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目的 回顾性分析嗜酸性肉芽肿性多血管炎 (EGPA) 肺部受累的 CT 影像征象, 以提高 EGPA 患者的诊断水平为临床提供依据。

材料与方法 本研究回顾性分析了 58 例 2015 年 9 月至 2023 年 4 月于广州医科大学附属第一医院确诊为 EGPA 患者的影像学检查资料, 从气道改变 (广泛的支气管壁增厚、树芽征、空气潴留、支气管痰栓)、肺实质改变 (小结节、斑片状磨玻璃影、实变影)、肺间质改变 (肺小血管纹理增粗、小叶间隔增厚)、肺外病变 (纵隔淋巴结肿大、胸腔积液、胸膜增厚、鼻窦炎症) 四个方面, 总结 EGPA 的影像征象。

结果 男性患者为 27 例 (47%), 女性患者为 31 例 (53%), 年龄 19~72 岁, 中位年龄为 46.5 岁。气道改变方面, 其中表现为广泛支气管壁增厚为 51 例 (88%), 支气管痰栓为 42 例 (72%), 树芽征为 35 例 (60%), 空气潴留为 21 例 (36%)。肺实质改变方面, 其中表现为斑片状磨玻璃影为 36 例 (62%), 小结节为 21 例 (36%), 实变影为 17 例 (29%)。肺间质改变方面, 其中表现为肺小血管纹理增粗 49 例 (84%), 小叶间隔增厚为 5 例 (9%)。肺外病变方面, 其中表现为纵隔淋巴结肿大 25 例 (43%), 胸腔积液为 5 例 (9%), 仅有 2 例 (3%) 伴有胸膜增厚。其中 54 例患者在胸部 CT 检查的前后 3 天内进行鼻窦 CT 检查, 52 例 (96%) 表现为鼻窦炎, 其中 23 例 (44%) 为全组副鼻窦受累。

结论 EGPA 的影像学表现虽然多种多样, 但也有一定的特异性。EGPA 患者肺部受累时, 常表现为广泛支气管壁增厚、支气管痰栓形成、树芽征、斑片状磨玻璃影、肺小血管纹理增粗、纵隔淋巴结肿大, 并同时伴有鼻窦受累。

PO-1085

自身免疫病相关免疫抑制宿主肺部机会性感染临床特点分析

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目的: 自身免疫病患者使用糖皮质激素、免疫抑制剂等药物后易发生免疫抑制, 继发肺部机会性感染。本研究分析自身免疫病患者继发肺部机会性感染的临床特征, 探讨影响患者 28 天预后的危险因素。

方法: 本研究纳入 2015 年 9 月 1 日至 2022 年 12 月 31 日期间入住苏州大学附属第一医院呼吸与危重症医学科, 诊断自身免疫病继发肺部机会性感染的患者共 119 例。回顾性分析两组患者临床特征、实验室检查及影像学检查结果, 探讨影响患者 28 天疾病预后的危险因素。

结果: 研究纳入 119 例患者, 分为存活组和死亡组。两组患者在性别、年龄上均无统计学差异。引起免疫抑制的基础疾病、其他基础疾病(糖尿病、高血压) 和烟酒史构成上无统计学差异。在入院临床表现如呼吸困难, 死亡组患者占比较存活组更高($P<0.05$), 死亡组患者入院 PSI 评分高于存活组 ($P<0.05$)。死亡组患者较存活组入院时实验室检查相关指标变化较为显著($P<0.05$)。本研究共 36 例患者入院后完善了肺泡灌洗液宏基因组二代测序, 结果提示两组患者在各种病原体占比上无统计学差异。在影像学分布及特点方面, 组间比较无统计学差异。死亡组较存活组入院后使用无创呼吸机、有创机械通气及住院期间呼吸治疗升级比例显著增加 ($P<0.05$)。在抗微生物治疗方面, 入院后患者初次使用抗菌药物组间比较无明显差异。在使用广覆盖机会性感染药物方面, 死亡组应用比例较存活组显著升高($P<0.05$)。住院期间死亡组患者较存活组糖皮质激素平均每日使用剂量显著增加 ($P=0.004$)。将入院 24h 抗曲霉菌治疗、入院 PSI 评分和糖皮质激素每日使用剂量这三个因素纳入多因素 Logistic 分析, 提示入院 PSI 评分和糖皮质激素平均每日使用剂量是影响 28 天预后的危险因素, 入院 24h 抗曲霉菌治疗为保护性因素。

结论: 自身免疫病相关免疫抑制宿主机会性感染后 28 天内死亡的患者入院呼吸困难更明显, 实验室检查相关指标变化更为显著。入院 24h 使用抗曲霉治疗为影响 28 天预后的保护性因素, 入院 PSI 评分、糖皮质激素平均每日使用剂量是危险因素。

PO-1086

临床与能谱 CT 参数联合预测 N0 期非小细胞肺癌淋巴血管侵犯

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目的:探讨能谱 CT 定量参数对 N0 期非小细胞肺癌淋巴血管侵犯的预测价值, 建立预测模型并绘制诺莫图, 辅助临床术前治疗决策。

方法: 本研究回顾性分析了 2019 年至 2022 年 12 月术前行能谱 CT 扫描的 107 例 N0 期非小细胞肺癌患者。临床特征包括年龄、性别、生化指标、血清肿瘤指标和免疫组织化学指标。影像学特征包括肿瘤位置、肿瘤边界、分叶征、毛刺征、空泡征、支气管充气征、血管集束征和胸膜凹陷征。能谱 CT 参数包括单能量 CT 值、有效原子序数(Eff-Z)、碘浓度(IC), 计算归一化碘浓度(NIC)。组间计算差异采用 χ^2 检验、t 检验和 U 检验。然后, 使用最小绝对收缩和选择算子(LASSO)和多元 logistic 回归选择独立预测因子, 建立预测模型并绘制诺莫图。采用 ROC 曲线、校正曲线和决策曲线分析评价预测效果和临床应用价值。

结果: 107 例 N0 期非小细胞肺癌患者中有 41 例存在淋巴血管侵犯。两组患者性别、TIF-1、淋巴细胞计数差异有统计学意义($P<0.05$)。动、静脉期能谱 CT 参数 40-90keV、Eff-Z、IC 和 NIC 等影像学指标在两组之间存在显著差异($P<0.05$)。其中动脉期 70keV 的 AUC 值最高 (0.71)。经 LASSO 回归选择动、静脉期的 70keV、90keV 和 Eff-Z 6 个变量构建模态图。临床-能谱 CT 模型的 AUC 为 0.93 (95%CI: 0.88~0.98)。敏感性和特异性分别为 0.89 和 0.88。模型具有良好的校正效果, DCA 结果表明该模型比最佳单变量模型具有更高的净效益。

结论: 性别、TIF-1、淋巴细胞计数及能谱 CT 参数 (动、静脉期 40-90keV、Eff-Z、IC 和 NIC) 在淋巴血管侵犯状态上存在差异。基于临床特征和双期 70keV、90keV、Eff-Z 的诺莫图有助于术前确定非小细胞肺癌的淋巴血管侵犯状态。

PO-1087

高原慢性低氧环境下大鼠心指数和右心室肥厚指数的研究

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目的: 探究不同海拔地区大鼠心指数、右心与体重占比和右心与全心质量占比的改变情况。方法: 选取雄性 Sprague-Dawley (SD) 大鼠 (4 周龄) 21 只, 随机分三组, 一组运送至成都地区 (海拔高度约 450m, 7 只), 定义为平原组, 一组运送至西宁地区 (海拔高度约 2200m, 7 只), 定义为中度海拔组, 一组运送至玛多地区 (海拔高度约 4300m, 7 只), 分别饲养至 28 周龄, 之后运送至高原医学实验室, 测量体重, 分离心脏器官并称重, 获得心指数、右心与体重占比 (定义为右心室肥厚指数-1)、右心与全心质量占比 (定义为右心室肥厚指数-2), 对分组数据进行统计学分析。结果: 1、与平原组比较, 中度海拔组体重明显减低 ($P < 0.05$), 心指数、右心与体重占比、右心与全心质量占比明显增加 ($P < 0.05$); 高海拔组体重、全心质量、右心质量明显减低 ($P < 0.05$), 右心与体重占比、右心与全心占比明显增加 ($P < 0.05$); 2、与中度海拔组比较, 高海拔组体重、全心质量、右心质量明显减低 ($P < 0.05$), 右心与体重占比、右心与全心占比明显增加 ($P < 0.05$)。结论: 随着海拔高度的增加, 大鼠体重减轻, 全心质量趋向减低, 右心结构已发生改变, 右心与体重占比增大, 右心与全心占比增大。

PO-1088

基于治疗前 CT 的放射组学模型预测非小细胞肺癌新辅助化疗联合免疫治疗的主要病理反应

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目的: 本研究旨在建立基于治疗前 CT 提取的瘤内和瘤周特征的放射组学模型, 以预测非小细胞肺癌 (NSCLC) 患者接受新辅助化疗联合免疫治疗的主要病理反应 (MPR)。

方法: 回顾性分析来自两个中心 (SRRSH 和 ZCH) 接受新辅助化疗联合免疫治疗的非小细胞肺癌患者 148 例。使用 SRRSH 数据集 ($n=105$) 作为训练组和内部验证组。从治疗前的 CT 中提取瘤内 (T) 和瘤周区域 ($P1=0-5\text{mm}$, $P2=5-10\text{mm}$, $P3=10-15\text{mm}$) 的放射组学特征, 并通过组内和组间相关系数 (ICC) 和最小绝对收缩和选择算子 (LASSO) 进行特征选择。然后利用机器学习算法建立了上述四个单一 ROI 模型和一个联合放射组学 (CR: $T+P1+P2+P3$) 模型。采用 logistic 回归分析选择临床因素, 构建放射组学-临床 (CRC) 联合模型, 随后在外部中心 ZCH ($n=43$) 进行验证。通过德隆检验、校正曲线和决策曲线分析对模型的性能进行评价。

结果: 所有患者中, 98 例 (66.2%) 患者达到 MPR。组织病理类型是唯一的临床独立危险因素。单一 ROI 模型 T、P1、P2 和 P3 在内部验证组预测 MPR 的 auc 分别为: 0.619、0.712、0.662 和 0.741。CR 模型在内部验证集中表现出较好的预测性能 ($AUC=0.810$), 优于 4 个单一 ROI 模型, 且明显优于模型 T ($AUC=0.810$ vs 0.619 , $p < 0.05$)。通过在 CR 模型中加入临床独立危险因素, 构建 CRC 模型, 其预测能力最佳 ($AUC=0.814$)。此外, CRC 模型在独立的外部测试集中获得了令人满意的性能 ($AUC=0.768$, 95% CI: 0.62-0.91)。

结论:我们建立了一种结合瘤内、瘤周特征和组织病理类型的联合模型, 为选择适合新辅助化疗联合免疫治疗的 NSCLC 患者提供了一种有效的方法。

PO-1089

基于心脏磁共振右心室-肺动脉耦联参数在评估 CTD-PH 危险分层中的研究

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目的: 探讨基于心脏磁共振 (CMR) 右心室-肺动脉耦联 (VAC) 参数在评估结缔组织疾病相关肺动脉高压 (CTD-PH) 危险分层中的应用价值。方法: 回顾性分析 2018 年 6 月至 2022 年 4 月期间 62 例 CTD-PH 患者临床及 CMR 资料, 根据危险分层将其分为组 1 (低危及中低危患者) (n=39 例) 和组 2 (中高危及高危患者) (n=23 例), 并对患者的左右心室容积、功能参数、左心室心肌组织学参数及 VAC 进行分析, 寻找用于预测 CTD-PH 危险分层的最佳模型。结果: 右心室容积功能参数和右心室插入部的组织学参数在两组 PH 患者的差异有统计学意义 ($P<0.05$)。右心室舒张末期容积指数 (RVEDVI) 和 VAC 具有独立预测效能, 联合 RVEDVI 和 VAC 具有最高的预测准确性 ($AUC=0.839$, $95\%CI: 0.735-0.944$, $P<0.001$)。结论: 右心室相关的容积、功能参数和右心室插入部的组织学参数可用于评估 CTD-PH 危险分层, 联合 RVEDVI 和 VAC 可提高评估危险分层的准确性。

PO-1090

应用影像组学技术预测结缔组织病相关间质性肺病的可逆性

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目的: 采用影像组学技术从基线 CT 图像预测结缔组织病相关间质性肺病 (connective tissue disease-associated interstitial lung disease, CTD-ILD) 的可逆性。

方法: 在这项回顾性研究中, 选取 2016 年 1 月至 2022 年 6 月于我院行多次 (≥ 2 次) 胸部 HRCT 检查的 CTD-ILD 确诊病例, 且 CT 图像上可见高密度区域 (high attenuation area, HAA)。将入选病例按照 7:3 的比例随机分为训练集及验证集。将两肺分为 6 个肺区, 根据 HAA 范围变化情况的主观评价结果将基线 CT 图像的 HAA 分为可逆组及稳定组。对基线 HAA 分别采用视觉评价及组学分析来进行可逆性分组评价。组学分析的步骤如下: (1) 阈值法 ($-600 \sim -250$ HU) 分割图像; (2) 软件提取特征; (3) Boruta 及随机森林算法筛选特征并建立组学模型; (4) 输出组学分数 (Rad-score)。采用多因素逻辑回归分析选取 HAA 可逆性的独立预测因素。

结果: 本研究共纳入 164 例 CTD-ILD 患者, 随机分为训练集 115 例、验证集 49 例。共有 608 个肺区发现 HAA, 其中 288 个肺区为可逆组 (训练集 198、验证集 90)、320 个肺区为稳定组 (训练集 223、验证集 97)。采用影像组学技术筛选得到 7 个与 HAA 可逆性相关性最为显著的特征。多因素逻辑回归分析发现 Rad-score 及部分形态学参数为 HAA 可逆性的独立预测因素, 并分别建立形态学模型、组学-形态学联合模型。对于基线 HAA 可逆性的预测效能, Rad-score 的曲线下面积 (area under the curve, AUC) 分别为训练集 0.749、验证集 0.728, 形态学参数模型 AUC 分别为训练集 0.883、验证集 0.838。与形态学模型相比, 组学-形态学联合模型可提高预测效能, AUC 分

别为训练集 0.908, 验证集 0.864。形态学模型及组学-形态学联合模型两个模型之间的差异显著 (训练集及验证集均 $P<0.001$)。

结论: 形态学参数和影像组学特征均可有效预测 CTD-ILD 的可逆性, 两组参数联合模型可提高预测效能。

PO-1091

基于 HRCT 影像组学预测早期肺腺癌高级别亚型的研究

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目的: 探讨基于 CT 的瘤内及瘤周影像组学模型对早期浸润性肺腺癌中高级别亚型的预测价值。

方法: 回顾性收集经手术病理证实为早期浸润性肺腺癌的 236 例患者为研究对象, 根据病理结果是否含有微乳头/实体成分, 将其分为高危组 (112 例), 低危组 (124 例), 将所有患者按照 7:3 的比例随机分为训练组和验证组。在术前 CT 图像上分别勾画 GTV、PTV_3mm、PTV_6mm 获得 ROI1、ROI2、ROI3, 并提取影像组学特征。采用 MRMR 及 LASSO 筛选影像组学特征, 并分别建立 GTV 模型、PTV_3mm 模型、PTV_6mm 模型、瘤内+瘤周模型 (GPTV_3mm 模型、GPTV_6mm 模型), 筛选最优组学模型, 并获得其 Rads-core。基于多因素 Logistic 回归, 从临床数据、传统放射学特征中筛选特征, 建立最优临床-放射学模型。使用多因素逻辑逐步向后回归分析, 依据 AIC 原则将临床独立预测因子和 Rad-score 结合, 构建联合模型。使用受试者工作特征曲线 (ROC) 曲线评估模型的诊断性能, 决策曲线分析 (DCA) 评估模型的临床净收益, 校准曲线和 H-L 检验评价模型的拟合优度。

结果: 临床、放射学特征中结节类型、病灶最大径、空泡征及性别与高级别成分显著相关, 由此构建的临床-放射学模型在训练组和验证组的 AUC 分别为 0.833、0.761。影像组学模型中, GTV 模型的 AUC 分别为 0.934、0.929; PTV_3mm 模型的 AUC 分别为 0.900、0.882; PTV_6mm 模型的 AUC 分别为 0.879、0.864; GPTV_3mm 模型的 AUC 分别为 0.926、0.922; GPTV_6mm 模型的 AUC 分别为 0.930、0.900。各组学模型之间 AUC 比较差异无统计学意义, 由于 GTV 模型在验证组中准确度最高, 联合模型采用 GTV-Rad score 进行计算。联合模型的表现优于单纯临床-放射学模型, 训练组和验证组 AUC 分别为 0.945、0.943。DCA 分析显示联合模型具有更好的净临床效益。

结论: 基于 CT 放射学特征结合影像组学特征的联合模型在预测早期肺腺癌的高级别成分中具有较好的诊断效能, 可能为临床诊治提供参考。

PO-1092

CT 引导下经皮纵隔肿块穿刺活检中胸骨通路的临床应用

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目的: 评价 CT 引导下经皮纵隔肿块穿刺活检术中胸骨通路的可行性和安全性

方法: 回顾分析 2021 年 1 月到 2022 年 12 月间在我科行 CT 引导下经皮经胸骨纵隔穿刺活检术的 34 例病例。穿刺术由两名 5 年以上临床经验的放射医师共同完成, 参照术前 CT 或 MR 增强图像制定穿刺方案, 采用 CT 引导徒手穿刺方法, 局部浸润麻醉, 穿刺使用 18g 半自动软组织活检针和相应 17g 同轴针, 均切割取材 2~3 次送病检。收集患者基本信息、临床病史, 术中术后并发症情况以及穿刺一次成功率、样本充足率。

结果: 33 例 (97.06%) 一次穿刺成功, 患者术中未诉任何不适; 无需要临床干预的并发症 (0%) 发生, 胸骨后或肋间少量积血 2 例 (5.88%), 纵隔微量气肿 1 例 (2.94%), 无咳血无气胸出现。结论: CT 引导下经皮经胸骨纵隔肿块穿刺活检技术可行, 并发症风险可控而且创伤小, 可以克服既往穿刺盲区, 扩大穿刺适应症, 使更多患者受益。

PO-1093

基于冠状动脉 CT 血管成像左冠脉前降支斑块定量参数与左心功能的相关性研究

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目的: 利用冠状动脉 CT 血管成像及斑块定量分析技术对左冠状动脉前降支斑块主要成分进行定量分析, 并探讨其与左心功能指标之间的相关性。

方法: 回顾性分析 2018 年 9 月至 2019 年 10 月在南通大学附属医院因初诊冠心病行 CCTA 和冠状动脉造影检查的患者共 421 例, 纳入 CAG 证实存在单支 LAD 狭窄的患者 72 例, 所有患者均行斑块成分定量分析及左心功能参数评估, 测量斑块的特征参数, 包括斑块总体积 (TPV)、脂质斑块体积 (LPV)、脂质斑块占比 (LPR)、纤维斑块体积 (FPV)、纤维斑块占比 (FPR)、钙化斑块体积 (CPV) 及钙化斑块占比 (CPR), 并与左心功能参数如左心室射血分数 (LVEF)、左心室舒张末期容积 (LVEDV)、左心室收缩末期容积 (LVESV) 及左心排出量 (LVCO) 行 Pearson 相关性分析。

结果: Pearson 相关性分析显示: LVEF 与 LPV、FPV、LPR 及 FPR 之间存在负相关。LVESV 与 LPV、FPV 之间存在正相关, 与 LPR 及 FPR 之间存在正相关。LVEDV 同样与 LPV、FPV、LPR 及 FPR 之间存在正相关。CPR 与 LVEF 呈正相关, 与 LVESV 及 LVEDV 之间均为负相关。LVCO 与各成分斑块体积及比例均无相关性, 差异无统计学意义 ($P>0.05$)。CPV 与左心功能参数均无相关性, 差异无统计学意义 ($P>0.05$)。

讨论: 研究显示, 冠脉斑块成分与心肌缺血之间存在相关性, 根据本研究数据可得, LVEF 与 LPV、FPV、LPR 与 FPR 之间存在负相关, 可能机制为脂质坏死核心的氧化及局部炎症反应, 引起血管内皮功能障碍, 从而抑制冠状动脉血管舒张并加重心肌低灌注。

LVESV 及 LVEDV 均与 LPV 及 LPR 之间正相关, 可能是在心肌缺血代偿期首先表现为心肌肥厚型重构, 此时心室肌收缩能力减弱, LVESV 增大, 而随着心肌缺血的加重, 心室肌舒张能力亦开始减退, 心腔扩张, LVEDV 增加。

CPR 与 LVEF 呈正相关, 与 LVESV 及 LVEDV 呈负相关, 可能机制是由于陈旧性斑块通常表现为钙化斑块, 它的存在可能为斑块表面维持了一定的机械稳定性, 对维持区域心肌的血流灌注起到了一定的作用。

PO-1094

CMR 定量评估非梗阻性肥厚型心肌病左房功能的应用研究

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目的: 应用心脏磁共振特征追踪技术对非梗阻性肥厚型心肌病 (NOHCM) 患者进行左房应变分析来评估左房功能, 并探究 NOHCM 对左房、左室结构与功能的影响。

方法: 回顾性分析我院 2020 年 1 月至 2022 年 12 月 58 例非梗阻性肥厚型心肌病患者 (NOHCM 组)、30 名健康对照者 (NC 组) 临床资料, 应用 CVI42 软件测量左房的整体功能参数包括储备功

能参数 (总应变[ϵ_s]、峰值正向应变率[SRs]、左房总射血分数[LATEF])、导管功能参数 (被动应变[ϵ_e]、早期峰值负向应变率[SRe]、左房被动射血分数[LAPEF]) 和收缩功能参数 (主动应变[ϵ_a]、晚期峰值负向应变率[SRe]、左房主动射血分数[LAAEF])；左房大小参数包括左房容积指数 (LAVI)；左室功能参数包括左室射血分数、左室心输出量和左室心脏指数；左室大小参数包括左室最大室壁厚度、左室心肌质量指数 (LVMI)、左室舒张末期容积指数和左室收缩末期容积指数。比较二组间上述参数的差异、NOHCM 组左室心肌不同肥厚部位的患者上述参数的差异、左房大小正常的 NOHCM 患者与健康对照者左房功能参数的差异，以及左房应变参数与其他左房、左室结构和功能参数之间的相关性。

结果：NOHCM 组的左室最大室壁厚度、LVMI、LAVI 均明显高于 NC 组 ($P < 0.05$)，NOHCM 组的左房功能参数均明显低于 NC 组 ($P < 0.05$)。左室心肌不同肥厚部位的 NOHCM 患者的左室最大室壁厚度存在统计学差异 ($P < 0.05$)，其他的左房、左室结构和功能参数均无统计学差异 ($P > 0.05$)。左房大小正常的 NOHCM 患者的 LATEF、LAPEF、 ϵ_s 、 ϵ_e 、SRs、SRe 明显低于 NC 组 ($P < 0.05$)，而 LAAEF、 ϵ_a 和 SRa 之间无统计学差异 ($P > 0.05$)。

所有受试对象左房各时相的应变参数和射血分数相关性强 ($r > 0.7$)。

结论：与健康对照组相比，NOHCM 患者的左房各时相功能均下降。在左房增大之前，NOHCM 患者的左房储备和导管功能下降，而收缩功能正常。左房各时相功能的受损与左室的肥厚部位无关。左房各时相的应变参数与射血分数相关性强。

PO-1095

心脏磁共振特征追踪技术定量右心房功能对扩张型心肌病患者预后后的预测价值

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目的：应用心脏磁共振特征追踪技术 (CMR-FT) 定量评价扩张型心肌病 (DCM) 患者右心房功能，探讨右心房心肌应变参数对该类人群不良预后的预测价值。

材料与方法：多中心回顾性纳入 2010 年 6 月至 2022 年 5 月于浙江中医药大学附属第一医院、浙江大学医学院附属第二医院和浙江大学医学院附属邵逸夫医院完成心脏磁共振 (CMR) 检查的 526 例 DCM 患者。应用 CVI42 后处理软件获得右房储存应变 (ϵ_s)，右房管道应变 (ϵ_e) 和右房泵应变 (ϵ_a)。主要临床终点定义为心源性死亡或猝死和心脏移植，次要临床终点包括主要临床终点、心衰住院和危及生命的心率失常。采用限制性立方条样图、Kaplan-Meier 生存曲线和 Cox 比例风险回归模型评估右心房心肌应变参数的预后价值，并通过 Harrell's-C 指数、似然比检验和净重分类指数比较不同 Cox 回归模型以确定右心房心肌应变的增量预后价值。

结果：在 41 个月的中位随访时间内，分别有 79 名和 214 名 DCM 患者达到主要临床终点和次要临床终点。限制性立方条样图结果显示 ϵ_s 和 ϵ_e 均与主要临床终点和次要临床终点密切相关，而 ϵ_a 与其无关。Kaplan-Meier 生存曲线表明无论 $\epsilon_s >$ 或 $< 19.05\%$ (基于中位数)， $\epsilon_e < 7.85\%$ (基于中位数) 均增加患者发生不良终点事件的风险。在多变量 Cox 回归模型中， ϵ_e 是主要临床终点 (风险比 [HR], 0.82 [95%CI: 0.77-0.88], $P < 0.001$) 和次要临床终点 (HR, 0.88 [95%CI: 0.86-0.91], $P < 0.001$) 的独立预测因素。将 ϵ_e 加入其他独立预测因素 (NYHA 心功能分级、延迟钆增强和左室射血分数等) 建立的预后模型，可显著提高模型对不良终点事件的预测能力。

结论：CMR-FT 获得的右心房 ϵ_e 是 DCM 患者不良预后的独立预测因素，可为传统临床和 CMR 危险因素提供增量预后价值。

PO-1096

心肌梗死患者基于 CMR-FT 评价的三维机械离散与心电参数的相关性研究

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目的: 探讨心肌梗死(MI)患者基于心脏磁共振组织特征跟踪技术(CMR-FT)评价的机械离散 (LVMD) 与心电参数的相关性。

方法: 纳入 2015 年 01 月-2022 年 10 月经我院临床及 CMR 确诊的 MI 患者, 根据随访结果分为室性心律失常 (VA) 组和无 VA 组。左室功能参数包括 LVEF、LVEDV、LVESV、应变参数衍生参数 LVMD-C、LVMD-L。统计学采用独立样本 t 检验、Mann-Whitney U 秩和检验及卡方检验比较两组患者的基线资料、左室功能、应变参数及心电参数, 运用 Spearman 相关性分析两组 LVMD-C、LVMD-L 与 QTc 间期、QRS 间期、JTp 间期、TPe 间期及 iCEB 的相关性。

结果: 最终纳入 167 例 MI 患者, VA 组 37 例, 无 VA 组 130 例, 中位数随访时间为 25 (15-40) 个月。两组患者的 Spearman 相关性分析显示, LVMD-C 与 QTc 间期 (VA,rs=0.552; 无 VA,rs=0.443)、QRS 间期 (VA,rs=0.558; 无 VA,rs=0.379)、TPe 间期 (VA,rs=0.520 无 VA,rs=0.288)呈正相关; LVMD-L 与 QTc 间期、QRS 间期、TPe 间期呈正相关。LVMD-C 与 JTp 间期 (VA,rs=-0.535; 无 VA,rs=-0.342)、iCEB (VA,rs=-0.586; 无 VA,rs=-0.449)呈负相关; LVMD-L 与 JTp 间期、呈负相关; LVMD-C、LVMD-L 与 iCEB 相关性最强。VA 组患者 LVMD-C、LVMD-L 与心电参数的相关性均高于无 VA 组患者。

结论: 在 MI 患者中, CMR-FT 评价的 LVMD-C、LVMD-L 与心电参数 QTc 间期、QRS 间期、及 TPe 间期均呈正相关, 且这种相关性在 VA 患者中更为明显, 这表明 LVMD-C、LVMD-L 随着 QTc 间期、QRS 间期、TPe 间期的延长而延长。LVMD-C、LVMD-L 与 JTp 间期和 iCEB 呈负相关, 且这种相关性在 VA 患者中更为明显, 这表明 LVMD-C、LVMD-L 随着 JTp 间期的延长、iCEB 的增加而减小。本研究揭示了机械离散参数与心肌的电生理改变具有相关性。

PO-1097

不同类型 ANCA 相关性血管炎胸部影像特征及其免疫抑制治疗 后预后探究

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目的: 探讨 MPO、PR3ANCA 相关性血管炎的胸部影像特征, 以及经过治疗后胸部影像特征的改变, 并

分析影像与预后之间的关系。

方法: 回顾性分析 2019 年 1 月至 2022 年 12 月期间在我院首次明确诊断为 ANCA 相关血管炎并有肺部受累患者的临床资料及胸部 CT 影像表现。将 84 例患者分为 MPO、PR3 两组。所有患者于本院行胸部 CT 检查, 对患者的一般临床资料、胸部 CT 图像进行收集统计, 分组对比分析。将患者按照有无合并肾功能不全分为两组, 对两组间的胸部 CT 图像进行比较分析。除合并伴有重度肾功能不全 (肾功能不全 4 期、5 期/eGFR<30ml/min) 的患者外, 余 67 例患者均于本院接受免疫抑制治疗 (诱导期: 激素+环磷酰胺; 缓解期: 激素+免疫抑制剂), 收集患者治疗后 6 个月内的末次胸部 CT 图像, 与首次 CT 图像进行比较分析。记录患者一年内复发、死亡情况, 建立电子数据库, 用多因素 Logistic 回归分析法分析复发的相关危险因素。

结果:

1、本研究共纳入患者 84 例, 其中 MPO-ANCA 阳性组 58 例, PR3-ANCA 阳性组 26 例。MPO-ANCA 阳性组起病时较 PR3-ANCA 阳性组更易有关节、肌肉痛的临床表现 ($P<0.05$)。

2、MPO-ANCA 阳性组胸部 CT 更易表现为间质性肺疾病、支气管扩张, PR3-ANCA 阳性组患者胸部 CT 更易表现为结节、肿块 ($P<0.05$)。合并伴有肾功能不全的患者 43 例, 相对于肾功能正常组患者胸部 CT 表现为胸腔积液的比例高 ($P<0.05$)。

3、行免疫抑制治疗患者 67 例, 治疗后胸部 CT 表现为结节、肿块及磨玻璃影多减轻或消失, 而表现为间质性肺疾病及支气管扩张多无显著变化。复发患者 49 例, PR3-ANCA 阳性组较 MPO-ANCA 阳性组更易复发 ($P<0.05$), 胸部 CT 表现为胸腔积液的比例较为复发组高 ($P<0.05$)。

结论:

MPO-ANCA 阳性组、PR3-ANCA 阳性组之间临床首发症状及影像表现有差异, 合并伴有肾功能不全的患者胸部 CT 表现较特异。不同影像表现病例经免疫抑制治疗后反应不同, 应用胸部 CT 影像可为其预后提供参考。

PO-1098

心脏 MR 在冠状动脉慢血流患者中的初步研究

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目的 探讨冠状动脉慢血流(CSF)患者心脏 MR(CMR)评价的左室结构功能、心肌静息灌注及心肌应变的改变。方法 回顾性收集我院经冠脉血流帧数(TFC)诊断为 CSF 且一周内行 CMR 检查的患者 35 例(CSF 组), 同期纳入健康对照组 21 例。比较两组间基线资料、左室结构功能参数、静息灌注参数及心肌应变参数的差异, 左室结构功能参数包括左室收缩末容积(ESV)、左室舒张末容积(EDV)、左室收缩末容积指数(LVESVi)、心肌质量指数(LVMi)、左室射血分数(LVEF)等; 静息灌注参数包括最大上升斜率(upslope)、最大信号强度达峰时间(TTM)、信号强度最大值(SImax); 左室心肌应变参数包括径向应变(GRS)、周向应变(GCS)和纵向应变(GLS)。进一步明确 TFC 与心肌应变参数的相关性。结果 与对照组相比, CSF 患者体重指数、低密度脂蛋白胆固醇和甘油三酯水平及高血压患病率增高 ($P<0.05$)。CMR 评价的 ESV、EDV、LVM、LVESVi、LVMi 均较对照组增高, LVEF 减低 (63.92 ± 7.10 vs 57.37 ± 9.03 , $P<0.05$)。静息心肌灌注显示 CSF 组 SImax、upslope 较对照组减低。左室心肌应变参数 GRS、GCS 和 GLS 均较对照组明显减低 ($P<0.05$)。进一步相关分析前降支(LAD)和回旋支(LCX)的 TFC 和 GLS 呈负相关 ($P<0.05$)。结论 CSF 虽然 LVEF 正常, 但已存在结构功能改变, 包括心肌质量增加、舒张功能减退、静息灌注和心肌应变减低, 且心肌应变与 TFC 呈负相关。因此, CMR 有助于对 CSF 患者早期心脏结构功能改变的评价。

PO-1099

胸膜气囊型孤立性纤维瘤的 CT 诊断

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【摘要】目的 分析胸膜气囊型孤立性纤维瘤(SFT)的 CT 表现, 总结其 CT 征象, 提高胸膜气囊型孤立性纤维瘤的 CT 诊断准确率。方法 回顾性分析 71 例经手术病理证实的胸膜孤立性纤维瘤的 CT 表现, 其中肿瘤边缘或中央坏死囊变形成气囊型孤立性纤维瘤 13 例 (18.3%), 分析病灶的大小、形态、密度、与胸膜及肺实质的关系、肿瘤内血管及强化特征。结果 71 例胸膜孤立性纤维瘤中男性 35 例、女性 36 例; 年龄 24~75 岁, 中位年龄 56 岁, 良性 64 例, 恶性 6 例 (8.5%); 位于左下胸腔胸膜 22 例, 右下胸腔胸膜 13 例, 两下胸腔胸膜占 49.3% (35/71), 均可见肋膈角

塑形征；前胸壁胸膜 6 例，侧胸壁胸膜 9 例，后胸壁胸膜 8 例，肺尖胸膜 3 例，叶间裂胸膜 10 例；病灶长径约 1cm~25cm 不等。13 例胸膜气囊型孤立性纤维瘤中男性 7 例、女性 6 例；年龄 45~68 岁，中位年龄 58 岁，良性 12 例，恶性 1 例；肿瘤边缘破溃不规则小气囊者 7 例，肿瘤边缘溃疡伴较大类圆形气囊者 3 例，肿瘤外侧多发肺气肿者 2 例，肿瘤内气囊伴壁结节者 1 例；CT 增强后肿瘤呈不均匀轻中度强化，较大肿块内可见增粗迂曲血管影。结论 胸膜孤立性纤维瘤以两下胸腔多见、均见肋膈角塑形征，肿瘤内可见不规则的粗大迂曲血管，但肿瘤实质强化多不明显；部分肿瘤边缘或肿瘤内可见坏死囊变形成部分气囊样病灶；胸膜气囊型孤立性纤维瘤比较少见，易误诊，但多具有胸膜孤立性纤维瘤的其他影像特征，结合其他 CT 征象可提高胸膜气囊型孤立性纤维瘤的诊断准确率。

PO-1100

心肌应变对肥厚型心肌病患者左心室舒张功能评估的应用价值

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目的 探讨心脏磁共振特征追踪技术评价肥厚型心肌病 (HCM) 患者左心室舒张功能的价值。方法 该研究为回顾性分析，筛选 2018 年 1 月 1 日至 2021 年 11 月 31 日在宁夏医科大学总医院放射科行心脏磁共振检查的 HCM 患者及健康对照组，共纳入 51 例 HCM 患者及 37 例健康对照者。两组人群均进行了 3.0T 磁共振常规电影序列扫描。采用 CVI42 后处理软件测量 HCM 组及对照组左心室基本功能参数、整体各向峰值应变及舒张期应变率；采用独立样本 t 检验或 Mann-Whitney U 检验对两组人群影像学参数进行比较，并对左心室整体峰值应变及舒张期应变率进行 ROC 分析。结果 HCM 组年龄范围 21~75 岁，平均年龄 43.3 岁，其中男性 39 例；健康对照组年龄范围 23~61 岁，平均年龄 40.0 岁，其中男性 22 例。对于左心室整体峰值应变，HCM 组径向、周向、纵向均显著小于对照组，差异均有统计学意义[径向：26.6 (15.4) 比 32.5 (18.9)，周向：-17.1±4.0 比 -20.0±3.1，纵向：-8.1±3.0 比 -11.8±3.5，单位：%，P≤0.01]；对于整体舒张期峰值应变率，HCM 组径向、周向、纵向均显著小于对照组，差异均有统计学意义[径向：-1.6 (1.2) 比 -2.3 (1.5)，周向：0.8 (0.4) 比 1.2 (0.4)，纵向：0.5 (0.3) 比 0.7 (0.3)，单位：1/s，P≤0.01]；ROC 分析显示，整体纵向峰值应变阈值≥-9.53 时，对舒张功能不全的诊断敏感性为 74.51%，特异性为 72.97%。结论 左心室整体峰值应变及舒张期应变率的降低对评价肥厚型心肌病患者舒张功能障碍存在一定价值，其中整体纵向峰值应变对舒张功能障碍具有较高的诊断效能。

PO-1101

肺动脉铸型技术结合显微 CT 成像定量评价慢性黏液阻塞性肺病小鼠肺血管重塑的功能-影像研究

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目的：黏液阻塞性气道疾病会导致肺灌注异常，但在显微成像水平下对血管重塑的研究却很少。我们的目的是优化血管铸型技术，在 Scnn1b-Tg (TG) 囊性纤维化 (cystic fibrosis, CF) 样肺病小鼠模型中生成肺血管树的显微 CT 成像 (Micro-CT) 高分辨率图像，并进行三维 (3D) 量化分析。

方法: 选取 2 周、6 周及 10 周龄的 CF 样 TG 小鼠及其同窝野生型 (WT) 阴性对照鼠, 对其进行肺动脉插管, 通过微注射泵 (Harvard Apparatus) 以既定流速 (2 周龄为 10 $\mu\text{l}/\text{min}$, 6 周及 10 周龄为 30 $\mu\text{l}/\text{min}$) 注射 Microfil MV-120 聚合物 (Flowtech Inc, Carver, MA) 对肺血管进行铸造, 随后对取出的肺标本进行完全硬化后, 以 9 微米体素大小的高分辨率采集 Micro-CT 图像 (SykScan1176, Bruker)。使用 VGSTUDIO MAX (Volume Graphics GmbH, Germany) 对图像进行 3D 血管树整体定量评估, 并在每个肺标本中选取 30 个末端分支样本, 计算血管体积分数 (fractional vessel volume, FVV) 和血管表面密度 (vascular surface density, VSD)。

结果: 共对 83 只 WT 小鼠和 55 只 Scnn1b-Tg 小鼠采用改良肺动脉铸造技术, 成功率约为 70%。共有 42 只小鼠 (每个年龄组的 TG 和同窝 WT 均为 7 只) 被选中进行图像评估。在 6 周和 10 周龄组, TG 的 FVV 较 WT 明显减低 ($P<0.001$)。与 WT 组相比, TG 小鼠的 VSD 在 2、6 和 10 周龄组均显著减低 ($p<0.001$)。

结论: 初步研究结果表明在小鼠黏液阻塞性肺部疾病模型中, 血管重塑在发病早期即已开始发生, 以外周肺血管床减少为特征表现。

PO-1102

基于 CT 形态和能谱定量指标预测非小细胞肺癌 新辅助免疫治疗反应的研究

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目的: 开发和验证一种基于 CT 形态和能谱定量指标, 以预测非小细胞肺癌 (NSCLC) 新辅助免疫治疗的反应。

方法: 20 名患者从临床试验中接受新辅助免疫治疗 (西妥昔单抗+帕博利珠单抗+卡铂对 IIIA/IIIB NSCLC, ClinicalTrials.gov, #NCT04326153)。在治疗期间进行 2-4 次 CT 扫描, 然后接受根治性肺癌切除+纵隔淋巴结清扫手术。使用 IntelliSpace Portal (版本 10, 飞利浦医疗系统, 荷兰 Best) 的多模式肿瘤跟踪模块 (MMTT) 计算基线和术前末次 CT 检查的形态定量指标 (长轴、短轴、长 X 短轴、体积、最大三维直径和最大面积), 这些形态定量成像指标缓解率按 (末次-基线) / 基线计算。其中 2 例患者行能谱 CT 扫描, 可获得能谱定量指标 (病灶内碘浓度, 标准化碘浓度 (NIC), $\text{NIC} = \text{IC}_{\text{病灶}} / \text{IC}_{\text{胸主}}$)。根据病理缓解是否达到 100% 作为金标准, 将患者分为完全缓解 (PCR) 组和非 PCR 组。统计分析基于 MedCalc 软件 (版本 20.115)。

结果: PCR 组有 9 名患者 (56 ± 9 岁, 8 男), 病理缓解率为 100%。相比之下, 非 PCR 组有 11 名患者 (57 ± 9 岁, 11 男), 病理缓解率在 30%–95% 之间。两组间的所有 CT 形态定量指标缓解率均存在统计学差异 (Mann-Whitney U 检验, $p<0.0001$)。但单因素和多因素分析未发现统计学显著差异的形态定量指标 ($P>0.05$)。与其他指标相比, 体积预测病变缓解的 AUC 为 0.576, 敏感性为 88.9%, 特异性为 44.5%, 表现较好。通过将所有形态定量成像指标缓解率纳入逻辑回归分析, AUC 达到 0.636。在新辅助免疫治疗后, 能谱扫描病灶的平均碘值及 NIC 均减低, 与术后病理完全缓解相符。

结论: 尽管 CT 形态定量指标在预测 NSCLC 新辅助免疫治疗反应方面不够理想, 但体积是一个相对有价值的指标。CT 能谱定量指标可能在 NSCLC 新辅助免疫治疗的术前评估中具有潜在应用价值。

PO-1103

肺黏膜相关淋巴组织淋巴瘤 CT 诊断

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目的: 探讨原发性肺黏膜相关淋巴组织(mucosa-associated lymphoid tissue, MALT)淋巴瘤的临床及多排螺旋 CT(multi-detector CT, MDCT)影像学表现。

方法: 回顾性分析华中科技大学同济医学院附属同济医院自 2015 年 1 月至 2023 年 6 月确诊的 43 例肺黏膜相关淋巴组织淋巴瘤的临床表现及影像学特点。

结果: 43 例 MALT 淋巴瘤患者中男 23 例、女 20 例, 年龄(61.28 ± 10.68)岁, 年龄范围为 36~80 岁。27 例患者无特异性临床症状, 为体检发现, 8 例患者胸闷, 7 例患者咳嗽, 4 例患者咳痰, 1 例患者发热, 1 例患者呕血, 1 例患者咯血, 1 例患者胸痛。MDCT 影像示 20 例患者双肺受累, 23 例患者单肺受累; 5 例患者为肺炎实变型, 27 例 MDCT 表现为结节/肿块, 11 例 MDCT 表现为混合型; 19 例病灶可见支气管充气征, 2 例病灶可见钙化, 2 例病灶可见空洞, 9 例患者可见胸腔积液, 4 例患者可见淋巴结肿大。

结论: 原发性肺 MALT 淋巴瘤患者临床表现缺乏特异性, MDCT 影像表现多样化, 但以肺内实变影及结节、肿块型多见。若患者为中老年男性, 肺内病灶以实变影、结节、肿块影合并空气支气管征、血管造影征时, 特别是抗感染治疗无效, 且未找到肺癌、肺结核等依据时, 应考虑到原发性肺 MALT 淋巴瘤的可能性, 但其最终确诊需要依靠病理组织学。

PO-1104

伴空洞的非结核分枝杆菌肺病与继发性肺结核的 CT 表现对比分析

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目的 探讨伴空洞的非结核分枝杆菌肺病与继发性肺结核的 CT 表现差异。方法 回顾性分析 2019 年 6 月至 2022 年 3 月重庆市公共卫生医疗救治中心经临床及实验室检查确诊伴空洞的非结核分枝杆菌肺病患者 26 例(观察组)及继发性肺结核患者 40 例(对照组)的 CT 表现, 并进行统计学分析。结果 观察组发生支气管扩张、静脉曲张型及囊状支气管扩张、肺部病灶钙化, 肺体积缩小、肺气肿、薄壁空洞、空洞邻近胸膜增厚均多于对照组, 差异有统计学意义(χ^2 分别为 6.226、18.284、13.239、20.027、17.483、14.786、11.899, P 均 <0.05); 观察组大结节影(直径 $\geq 10\text{mm}$), 结节周围浸润、单发空洞、厚壁空洞、纵隔淋巴结肿大、心包积液均少于对照组, 差异有统计学意义(χ^2 分别为 9.448、9.259、7.321、14.786、3.994、4.692, P 均 <0.05)。观察组支气管扩张 ≤ 2 叶的发生率低于对照组, 差异有统计学意义($\chi^2=6.340, P<0.05$), 支气管扩张 ≥ 3 叶的发生率高于对照组, 差异有统计学意义(χ^2 分别为 8.139、11.860, $P<0.05$); 观察组静脉曲张型及囊状支气管扩张 ≥ 3 叶的发生率高于对照组, 差异有统计学意义(χ^2 分别为 6.431、4.835, $P<0.05$)。结论 伴有空洞的非结核分枝杆菌肺病患者薄壁空洞、肺体积缩小、肺气肿、双肺广泛静脉曲张型及囊状支气管扩张多于继发性肺结核, 有助于二者的鉴别。

PO-1105

能谱 CT 成像评价食管静脉曲张破裂出血 TIPSS 术后的食管微循环情况

包如意

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目的通过能谱 CT 成像测量有效碘含量 (eIC)，定量评价经颈静脉肝内门体分流术 (TIPSS) 治疗食管静脉曲张破裂出血 (EVB) 的疗效。方法和材料 18 名接受 TIPSS 治疗的食管静脉曲张出血患者，排除心肺相关疾病，在 EVB 前和治疗 2 周和 6 个月后，接受 GSI 扫描。测量食管下部食管壁 eIC 值，通过 t 检验定量评估了 EVB 治疗前后 eIC 值的差异。结果 EVB 前、治疗 2 周后和 6 个月后，下食管食管壁的平均 eIC 值分别为 $38.00 \pm 11.7 \text{ mg/ml}$ 、 20.64 ± 9.60 和 $22.18 \pm 4.62 \text{ mg/ml}$ 。EVB 前的平均 eIC 值显著高于治疗 2 周后 ($t=2.13$, $p=0.04$) 和治疗 6 个月后 ($t=3.14$, $p=0.03$)。治疗后 2 周和 6 个月之间没有统计学差异。结论本研究的结果表明，食管壁的有效碘含量可能反映食管血流灌注，这有助于在 TIPSS 术后评估和食管静脉曲张出血患者的随访中定量评估食管血流变化。食管静脉曲张破裂出血是肝硬化患者的重要并发症。TIPSS 是治疗危及生命的胃食管静脉曲张出血的有效方法。更好地定量评估潜在肝硬化的变化有助于指导其预后评估和随访。

PO-1106

基于心脏磁共振组织追踪技术定量分析糖尿病对高血压患者左心房及左心室心肌应变的叠加影响

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目的：基于心脏磁共振组织追踪技术 (CMR-FT) 分析高血压合并糖尿病患者左心房及左心室心肌应变，探讨糖尿病对高血压患者心肌应变的叠加影响。

方法：回顾性纳入 2019 年 9 月至 2022 年 5 月经大连医科大学附属第二医院心内科诊断为高血压的患者 50 例及高血压合并糖尿病的患者 79 例，分为高血压组、高血压合并糖尿病组，另纳入同期 93 名健康志愿者作为对照组。所有入组患者及志愿者左心室射血分数均正常 ($\text{LVEF} > 50\%$)。获取各组心脏磁共振图像，使用 cvi42 图像后处理软件进行分析，比较三组之间左心房及左心室结构、功能及心肌应变参数间的差异。统计学方法采用单因素方差分析、单变量和多变量线性回归， $p < 0.05$ 为差异有统计学意义。

结果：高血压合并糖尿病组左心房管道功能应变 (LA-Ee)、储备功能应变率 (LA-SRs) 及管道功能应变率 (LA-SRe) 显著低于对照组，差异有统计学意义 ($p < 0.05$)。高血压合并糖尿病组左心室整体纵向应变 (GLS)、整体周向应变 (GCS)、心尖段纵向应变 (GLS-apical) 显著低于对照组及高血压组，差异有统计学意义 ($p < 0.05$)。高血压合并糖尿病组左心室中间段纵向应变 (GLS-mid)、基底段周向应变 (GCS-basal) 显著低于对照组 ($p < 0.05$)。此外，高血压合并糖尿病组左心室舒张期径向 (PDSR-R) 及周向 (PDSR-C) 峰值应变率显著低于对照组及高血压组，差异有统计学意义 ($p < 0.05$)。高血压组与对照组左心房及左心室心肌应变参数均无统计学意义 ($p > 0.05$)。多因素线性回归分析显示：高血压合并糖尿病 ($b = -0.816$, $p < 0.001$)、甘油三酯 (TG) ($b = -0.352$, $p < 0.001$) 及性别 ($b = -0.798$, $p = 0.003$) 对 GLS 的影响有统计学差异；高血压合并糖尿病 ($b = -1.732$, $p = 0.024$)、性别 ($b = -4.646$, $p < 0.001$) 及高密度脂蛋白 (HDL) ($b = 5.372$, $p = 0.014$) 对 LAEs 的影响有统计学差异。

结论：CMR-FT 测量的心肌应变可定量反映糖尿病对高血压患者左心功能的叠加影响。

PO-1107

基于双能 CT 影像组学预测非小细胞肺癌靶向治疗疗效

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摘要：目的 基于双能量计算机断层扫描(DECT)图像,开发并验证一种结合影像组学特征、临床参数、CT 影像学特征、碘相关参数的列线图预测非小细胞肺癌 (NSCLC) 靶向治疗疗效。j 方法 收集 2020 年 1 月至 2023 年 6 月遵义医科大学第二附属医院胸部肿瘤科接受靶向治疗非小细胞肺癌患者 104 名,患者随机分为 7:3 的训练组 (n=73) 和验证组 (n=31),收集患者治疗前临床参数,从两组动脉期和静脉期的单能量影像(100KV 和 140KV)中提取原发灶的影像组学特征,从混合 120KVCT 图像分析每个病灶影像学特征(毛刺征、空泡征等),通过 Liver VNC 获取碘图记录病灶相关参数如碘浓度 (IC)、归一化碘浓度 (NIC)、能谱衰减曲线斜率等。基于提取及筛选最优影像组学特征,计算影像组学评分。以单因素分析及多因素 logistic 回归分析筛选 NSCLC 靶向治疗疗效的独立预测因素,建立预测模型;基于独立预测因素构建联合列线图模型。采用受试者工作特征曲线评估模型预测效能,DeLong 检验各模型 AUC 差异,以校准曲线分析模型的拟合度,以决策曲线分析评估模型的临床获益。结果 本研究共有 65 名腺癌患者和 39 名鳞癌患者纳入研究。在 7 个构建模型中,结合临床参数、影像特征及影像组学特征的综合模型(AUC:模型 7=0.87)比单个临床模型或影像学特征模型(AUC:模型 1=0.76,模型 2=0.72,模型 3=0.68, p 均<0.05)具有更高的 AUC。将临床特征、影像学特征、影像组学特征分别两两组合建立模型(AUC:模型 4=0.81、模型 5=0.79、模型 6=0.83, p 均<0.05),联合列线图模型预测结果与实际结果的一致性较好,且其临床获益较高。结论 基于 DECT 影像组学构建的联合列线图模型可有效预测 NSCLC 靶向治疗疗效。

PO-1108

叶内型肺隔离症合并曲霉感染 1 例

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【摘要】回顾性分析 1 例肺隔离症合并肺曲霉病的临床表现、诊治过程,并复习相关文献,总结两者的关系及影像诊断依据、鉴别诊断。中老年男性,发现肺部阴影 1 年余、咳嗽 2 天,行胸部 CT 发现左肺下叶空洞性病变,增强扫描呈轻中度强化,并发现来源于降主动脉的异常供血血管,考虑叶内型肺隔离症,后经手术及疏忽病理证实为叶内型肺隔离症合并曲霉菌感染;通过复习分析相关文献,本列患者临床及影像表现与文献报道基本符合。胸部 CT 平扫加增强扫描并图像后处理重建作为首选的简单、经济且创伤小的确诊方法,同时需要与肺炎、肺不张及肺肿瘤等相鉴别。结论:肺隔离症合并肺曲霉病比较少见,临床工作中容易漏诊、误诊,积极、准确的影像学及病理学检查有助于疾病的诊断,手术治疗效果确切。

PO-1109

肺部良恶性混合磨玻璃结节实性成分的 CT 特征比较

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目的 探讨良恶性混合磨玻璃结节 (mGGO) 及恶性 mGGO 中微浸润腺癌 (MIA) 和浸润性腺癌 (IAC) 实性成分 CT 特征的差异。方法 将我院 313 例 mGGO 分为良性组 (95 例) 和恶性组 (218 例), 比较两组临床及实性成分的 CT 特征, 另将恶性组分为 MIA 组 (118 例) 和 IAC 组 (100 例), 比较两组实性成分的 CT 特征。将上述有统计学差异的 CT 特征构建 Logistic 回归模型, 利用 AUC 评估其效能。结果 ①良、恶性组临床特征比较: 与良性组相比, 恶性组以老年女性及不吸烟患者多见, 两组差异有统计学意义 (P 均 <0.001)。②良、恶性组实性成分 CT 特征比较: 良性组单发者占比较高, 而恶性组多发者占比较高, 两组差异有统计学意义 ($P < 0.001$)。对于单发者, 恶性组实性成分形态不规则、偏心分布、与血管及胸膜相连的发生率高于良性组, 两组差异均有统计学意义 (P 均 <0.05); 同时, 恶性组实性成分 CT 值高于良性组, 而相对 CT 值低于良性组, 两组差异均有统计学意义 (P 均 <0.001)。Logistic 回归分析示实性成分形态不规则、CT 值较高为恶性 mGGO 的独立预测因子, 该模型诊断恶性 mGGO 的 AUC、准确度、敏感度和特异度分别为 0.772、70.65%、74.40% 及 65.00%。③恶性组中 MIA 与 IAC 实性成分 CT 特征比较: MIA 单发者占比较高, 而 IAC 多发者占比较高, 两组差异有统计学意义 ($P < 0.001$)。对于单发者, IAC 组实性成分偏心分布的出现率显著高于 MIA 组, 其面积、比例及 CT 值较 MIA 组更高, 而相对 CT 值更低, 两组差异有统计学意义 ($P < 0.05$)。Logistic 回归分析示实性成分偏心分布、面积较大为 IAC 的独立预测因子, 该模型预测 IAC 的 AUC、准确度、敏感度和特异度分别为 0.865、83.47%、87.90%、68.20%。结论 良恶性 mGGO、MIA 和 IAC 实性成分 CT 特征不同。

PO-1110

双能 CT 定量参数在预测实性肺腺癌气道播散状态的性能研究

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目的: 确定实性肺腺癌气道播散状态与 DECT 定量参数关系。方法和材料: 回顾性收集 2021 年 1 月至 2021 年 6 月接受手术治疗的 52 名实性肺腺癌患者, 并对气道播散状态进行评估。采用二元 Logistic 回归分析和受试者工作特征曲线来分析 DECT 定量参数 (IC_A 、 IC_V 、 NIC_A 、 NIC_V 、 Z_A 、 Z_V 、 λ_A 、 λ_V) 和 CT 特征 (最大直径、周围不透明影、空气支气管影、胸膜凹陷)。结果: 共有 52 例患者 (平均年龄: 57.0 岁, 年龄范围: 38-78 岁), 包括 35 名男性 (平均年龄: 58.7 岁, 年龄范围: 45-58 岁) 和 17 名女性 (平均年龄: 55.0 岁, 年龄范围: 38-67 岁) 纳入研究, 其中 25 例患者气道播散阳性, 27 例患者气道播散阴性。气道播散与 CT 特征之间没有关联, 而与 IC_A 、 NIC_A 和 IC_V 有关。且 IC_A 和 NIC_A 是预测气道播散的独立危险因素, 二者联合预测 AUC 值为 0.89, 敏感性为 0.84, 特异性为 0.89。结论: DECT 定量参数 (IC_A 和 NIC_A) 是预测气道播散的独立危险因素, 两者联合预测性能最佳。

PO-1111

3 例肺部血管内大 B 细胞淋巴瘤的病例报道及影像回顾

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目的: 血管内大 B 细胞淋巴瘤是非霍奇金淋巴瘤的一种罕见亚型, 临床表现及实验室检查无特异性, 且预后极差。本研究旨在对肺部血管内大 B 细胞淋巴瘤患者的胸部 CT 影像表现进行探讨和回顾。

方法: 收集本院 2010 年 1 月~2023 年 7 月, 肺穿刺活检病理确诊为肺部血管内大 B 细胞淋巴瘤, 且临床资料及影像检查完整的患者, 共 3 例。回顾性分析了 3 例患者的胸部影像学表现及其临床资料, 并结合既往文献报道中的肺部血管内大 B 细胞淋巴瘤的胸部 CT 影像进行了影像回顾。

结果: 3 例患者 (男性 2 例, 女性 1 例, 年龄 51~65 岁), 2 例有咳嗽等呼吸系统症状, 1 例主要以腹泻等消化道症状为主要表现。实验室检查显示 3 例均出现乳酸脱氢酶升高。胸部 CT 显示 3 例均表现为双肺磨玻璃影。其中 2 例为双肺多发边界清晰的磨玻璃结节, 伴实性结节; 另 1 例表现为双肺膜玻璃密度片状影; 胸腔积液者 1 例; 肺门及纵隔区域淋巴结均未见肿大。其中 2 例行 ^{18}F FDG-PET 检查, 均表现为肺部病灶 FDG 摄取升高 (SUVmax 分别为 1.9 和 1.7)。1 例患者在接受 R-CHOP 治疗后, 规律复查胸部 CT, 磨玻璃影明显改善, 逐渐消失。进一步对既往肺部血管内大 B 细胞淋巴瘤的文献报告及本院 3 例患者, 共 26 例 (男 15 例, 女性 11 例, 年龄: 35~84 岁), 进行胸部 CT 影像学回顾, 其中 14 例患者表现为双肺多发或弥漫磨玻璃浸润影 (53.8%); 5 例为双肺多发边界清晰的磨玻璃密度结节影 (19.2%), 7 例患者的胸部 CT 影像无明显异常表现 (26.9%)。

结论: 肺部血管内大 B 细胞淋巴瘤患者胸部 CT 影像主要表现为双肺磨玻璃影, 且以边界不清的磨玻璃浸润多见。而 ^{18}F FDG-PET 对该病的诊断敏感性高。因此, 对于临床高度怀疑肺部血管内大 B 细胞淋巴瘤的患者, 结合 ^{18}F FDG-PET 检查, 能够为肺部血管内大 B 细胞淋巴瘤的早期诊断及鉴别提供关键的信息, 极大改善患者的预后。

PO-1112

基于非阈值法测量冠状动脉周围脂肪组织平均密度在冠状动脉粥样硬化斑块评估中的应用

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目的: 探讨非阈值法测量冠状动脉周围脂肪组织平均密度 (PCAT_{MA}) 的可行性, 并进一步探讨 PCAT_{MA}、脂肪衰减指数 (FAI) 与冠状动脉粥样硬化斑块之间的相关性。

方法: 前瞻性纳入 138 名行冠状动脉 CT 血管成像 (CCTA) 的患者, 无斑块组患者 63 例 98 个节段, 斑块组患者 75 例 95 个节段, 并依据斑块类型分为钙化斑块、非钙化斑块和混合斑块亚组。采用非阈值法在无斑块节段周围测量与血管壁不同距离 (0.50mm、0.75 mm、1.00 mm、1.25 mm、1.50 mm、1.75 mm、2.00 mm) 的冠状动脉周围脂肪组织 (PCAT) 密度, 同时测量所有可评估节段的 PCAT_{MA} 和 FAI。

结果: 在最靠近冠状动脉管壁的区域, PCAT 密度较高 ($P < 0.001$), 随着与管壁距离的增加, PCAT 密度逐渐降低, 距管壁 0.75mm 范围以外的 PCAT_{MA} 差异无统计学意义 ($P > 0.05$)。在无斑块组中, 冠状动脉不同分支间的 PCAT_{MA} 和 FAI 差异均无统计学意义 ($P > 0.05$); 右冠状动脉近段 (pRCA) 的 FAI 较右冠状动脉中段 (mRCA) 更高, 且差异有统计学意义 ($p = 0.03$); 近端节段的 PCAT_{MA} 和 FAI 均高于远端节段, 但差异无统计学意义 ($P > 0.05$)。与无斑块组相比, 非钙化斑

块 (NCP) 和混合斑块 (MP) 节段的 $PCAT_{MA}$ 更高, 且差异有统计学意义 ($P<0.05$), 但 FAI 无显著差异 ($P>0.05$)。此外, 在不同类型斑块中 $PCAT_{MA}$ 和 FAI 差异均无统计学意义 ($P>0.05$)。结论: 距离血管壁 0.75mm 范围以外的 $PCAT$ 密度趋于稳定, 不易受血管壁的影响。基于非阈值法测量 $PCAT_{MA}$ 具有良好的可行性及可重复性。与无斑块的冠状动脉节段相比, 非钙化斑块和混合斑块节段显示出更高的 $PCAT_{MA}$ 值, 表明 $PCAT_{MA}$ 检测冠状动脉轻度狭窄性病变周围脂肪密度的变化可能比 FAI 更为敏感。

PO-1113

双气相配准 CT 在异基因造血干细胞移植后闭塞性细支气管炎综合征的初步研究

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[目的]采用吸气和呼气 CT 图像配准定量指标评估异基因造血干细胞移植后合并闭塞性细支气管炎综合征 (BOS) 患者的肺病变, 探讨双气相配准 CT 定量分析在 BOS 诊断中的价值。

[方法]提出一种结合角点特征和互信息的肺部双相 CT 影像配准方法。首先对 CT 影像进行预处理, 包括去噪和灰度标准%化; 随后利用 FAST 角点检测器算法在两个相位的图像中检测出角点特征, 提取图像的关键结构信息; 最后, 通过配准算法将吸气相与呼气相 CT 影像进行空间对齐, 将空间和几何结构信息与强度信息相结合, 完成图像配准。配准后的图像进行肺实质分割, 然后中计算功能参数, 包括 PRMfSAD、PRMEmph、PRMNormal。采用 Spearman 相关检验做相关分析。最后采用受试者工作特征(ROC)曲线分析 CT 参数的诊断效能。

[结果]CT 图像分析显示, 与基于互信息的局部最大值寻找 (LMI) 方法相比, 我们的方法在配准中的平均配准误差为 1.43, 而 LMI 的平均配准误差分别为 1.56, 表明该方法能够准确有效地实现双相 CT 影像的配准。研究纳入 190 例患者, 其中肺功能数据完整者 70 例, PRMfSAD 和 FEV1%、FEV1/FVC 的相关系数分别为 -0.452、-0.493, $p<0.001$ 。确诊 BOS 者 42 例, 对 BOS 组和 NonBOS 组患者的 CT 参数和肺功能参数进一步分析显示, BOS 患者 PRMfSAD 与 FEV1/FVC 的相关系数有统计学意义 ($P<0.01$), PRMfSAD 与 FEV1%的相关系数并无有统计学意义 ($p>0.05$); 而 NonBO 患者的 PRMfSAD 与 FEV1%和 FEV1/FVC 的相关系数均无统计学意义 ($p>0.05$)。对 PRMfSAD 的在 BOS 诊断中的诊断效能采用 ROC 曲线分析, 结果显示, PRMfSAD 诊断 BOS 的最佳临界值 cutoff=0.2048 (AUC=0.771, 敏感度 86.0%, 特异度 66.7%)。

[结论]本文提出的方法能够准确对双气相 CT 图像进行配准, 基于该算法的 CT 定量参数 PRMfSAD 与 PFTs 指标 FEV1/FVC%之间具有良好的相关性, 能够反映肺功能状态, 是评估 BOS 小气道病变的相对敏感的指标。

PO-1114

心脏磁共振评估健康女性超重和肥胖人群 左心房心肌应变及应变率的初步研究

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目的：本研究旨在使用心脏磁共振（cardiac magnetic resonance, CMR）衍生的左心房（Left atrium, LA）心肌应变(myocardial strain, MS)及应变率（strain rate, SR）参数评估超重和肥胖女性，以及女性人群身体质量指数 BMI(body mass index)与 LA MS、SR 相关性。

方法：对 40 例成人女性的 CMR 数据进行了回顾性分析。根据 BMI 分为两组：正常组 BMI < 24 kg/m²，超重和肥胖组 BMI ≥ 24 kg/m²。在标准二腔、四腔长轴视图中，使用软件 Medis 对 LA MS、SR 进行分析。LA MS 包括：整体纵向应变（global longitudinal peak strain, GLS）、整体圆周应变（global circumferential peak strain, GCS）。其中 LA GLS 包括储存功能[储存应变 GLS Reservoir, 峰值正 SR（SR Reservoir）]、管道功能[管道应变（GLS Conduit），峰值早期负 SR（SR Conduit）]和泵血功能[泵血应变（GLS Booster），峰值晚期负 SR（SR Booster）]。结果：所有女性进行 CMR 分析是可行的。LA MS 及 SR 可重复性良好。与 BMI 正常组相比，超重和肥胖组 GLS Reservoir、GLS Conduit、SR Conduit 显著降低（均 P < 0.05）。BMI 与 SR Conduit 呈显著负相关（r = -0.409, P = 0.009）。

结论：肥胖和超重组表现出 LA 储能和导管功能受损，且随着 BMI 增加，LA SR conduit 逐渐下降，这表明女性超重和肥胖可能导致 LA 早期舒张功能受损。

PO-1115

基于定量 CT 评估慢性阻塞性肺疾病患者肺气肿严重程度 与骨质疏松的相关性研究

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目的：既往研究发现 COPD 患者肺气肿程度与 OP 存在密切相关。故本研究基于胸部定量 CT、双能 X 线骨密度测量，以及 COPD 患者主要临床特征分析：1) COPD 组与对照组间的临床特征、肺气肿程度、OP 程度的差异性；2) 探讨肺气肿严重程度与 OP 之间关联性，通过 ROC 曲线建立预测肺气肿患者合并 OP 的临界值，为临床综合诊疗 COPD 提供依据。

方法：第一部分：120 例 COPD 患者为观察组，60 例健康者为对照组。实验一阐明两组间临床特征、肺气肿及 OP 程度是否有差异。严格汇总两组年龄、性别、体重指数、LAA%及骨密度值。第二部分：在实验一基础上，探讨 COPD 患者肺气肿严重程度与 OP 之间是否存在相关性。通过肺气肿 CT 定量参数 LAA%评估 COPD 患者严重程度。采用 S-W 或 K-S 检测数据的正态性。采用 Spearman 秩相关分析法分析骨密度值与 LAA%的相关性，根据多因素 Logistic 回归分析评估定量 CT 参数 LAA%是否具有诊断 COPD 患者合并 OP 的价值，并通过 ROC 曲线下面积评估其诊断效能，最后探寻 LAA%预测 OP 的最佳临界值。

结果：

第一部分：年龄、LAA%及骨密度值在两组间差异有统计学意义(P < 0.05)。性别、BMI 在两组间差异无统计学意义(P > 0.05)。

第二部分：年龄在 COPD 亚组间均无统计学意义(P > 0.05)。性别仅在重度与轻度组间有统计学意义(P < 0.05)。吸烟仅在与轻度组相比较，中、重度组有统计学意义(P < 0.05)。糖皮质激素、骨

密度值在 COPD 亚组间比较均有统计学意义 ($P < 0.05$)。COPD 患者肺气肿严重程度与骨密度值呈负相关 ($r = -0.867$, $P < 0.05$)。通过 Logistic 回归分析, 仅 LAA% 是诊断 COPD 患者是否合并 OP 的独立预测因子。ROC 曲线结果: LAA% 预测 OP 的 AUC 为 0.950 ($P < 0.001$), 最佳临界值为 19.7%。

结论:

- 1) COPD 患者骨密度值低于健康人, OP 发生率较健康人高。
- 2) COPD 患者 OP 发生率与肺气肿严重程度呈正相关。当 LAA% 大于 19.7%, 提示 COPD 患者可能合并 OP。

PO-1116

骨肉瘤合并自发性气胸肺转移灶的 CT 表现

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目的:探讨骨肉瘤合并自发性气胸肺转移灶的 CT 表现, 寻找可能导致自发性气胸发生的影像学特征。

方法:本研究纳入 2016 年 1 月至 2021 年 12 月在我院经病理证实的肺转移性骨肉瘤患者 123 例。记录患者的人口统计数据, 以及原发骨肉瘤的位置和大小。此外, 肺转移性骨肉瘤的 CT 表现, 如单发或多发结节/肿块、钙化、累及胸膜和空洞, 也被记录在案。从确诊为骨肉瘤到随后发生肺转移的时间也被记录下来。

结果:自发性气胸 30 例, 单侧气胸 18 例, 双侧气胸 12 例。出现气胸的骨肉瘤肺转移组与未出现气胸组相比, 从确诊为骨肉瘤到随后发生肺转移的中位时间缩短 (6 个月 vs. 9 个月, $p = 0.031$)。合并气胸的肺转移瘤表现为多发结节或肿块 (39/42 vs. 123/178, $p < 0.001$), 更多的空洞和胸膜受累 (23/42 vs. 19/178, $p < 0.001$; 38/42 vs. 63/178, $P < 0.001$)。钙化/骨化在肺转移瘤中很常见 (123/220, 55.9%), 但在合并气胸与否中无显著差异。多因素 logistic 回归分析显示, 肺转移灶空化和胸膜累及与自发性气胸显著相关, 优势比为 9.786 (95% CI: 2.597, 36.883; $P = 0.001$) 和 18.182 (95% CI: 4.992, 66.225; $P < 0.001$)。

结论:自发性气胸可能发生在肺转移灶靠近胸膜的位置, 随空洞的发生和破裂而发生。此外, 合并气胸的患者, 肺转移灶往往进展。建议这些患者定期进行胸部 x 线摄影以进行监测。

PO-1117

新型冠状病毒肺炎患者发病早期胸部影像学表现

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目的 探究新型冠状病毒肺炎(COVID-19)患者发病早期胸部影像学征象。方法 回顾性分析丰城市人民医院 2022 年 12 月 10 日-2 月 1 日 50 例确诊 COVID-19 患者胸部 HRCT 影像资料。结果 50 例确诊患者中, 49 例出现不同程度影像学改变, HRCT 上大部分病灶呈早期改变 (78%), 部分呈进展期 (20%); 病灶分布以两肺下叶为主 (58%), 多累及多个肺叶、肺段, 以胸膜下分布为甚 (92%), 少数沿支气管血管束分布 (6%); 病变形态以斑片状多见 (84%), 部分呈结节状 (24%); 病灶主要呈磨玻璃样密度 (84%), 部分伴实变 (28%), 纯实变未见; 病灶内可见细小血管增粗, 支气管壁增厚, 可见“空气支气管征” (50%)、“铺路石征” (60%)、“晕征” (24%)。结论 新型冠状病毒肺炎发病早期胸部 HRCT 表现具有一定特征性, 病灶多位于两肺下叶外带且以胸膜下分布为主, 多表现为斑片状磨玻璃样密度, 少数呈晕结样改变, 部分伴有实变, 病变内细小血管增粗、支气管壁增厚, 可见“空气支气管征”、“铺路石征”、“晕征”。

PO-1118

探索单次屏气压缩感知心脏磁共振电影序列在
评估左右心室应变中的可行性

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研究目的:

压缩感知 (compressed sensing, CS) 电影可提供与常规平衡稳态进动 (balanced steady-state free precession, bSSFP) 心脏磁共振 (cardiovascular magnetic resonance, CMR) 电影类似的 心脏容积指标。基于 CMR 特征追踪 (feature tracking, FT) 技术, 电影序列还可用于心肌应变评估, 但扫描参数及造影剂对 CS 电影应变分析的影响仍不明确。本研究旨在探索单次屏气 CS 电影序列左右心室应变结果的影响因素。

材料与方法:

本研究共纳入 102 名患有不同心血管疾病患者 (男性 75 人, 女性 27 人, 平均年龄 46.5 ± 17.1 岁)。每位患者均接受四组 CMR 电影序列扫描, 包括作为参考的常规多次屏气 bSSFP_{ref} 电影序列、增强前后具有相同翻转角的单次屏气 CS 电影序列 (CS₄₅ 和 eCS₄₅) 和增强后 70° 翻转角的单次屏气 CS 电影序列 (eCS₇₀)。采用双侧配对 t 检验和 Wilcoxon 符号秩检验进行数据统计。

研究结果:

CS 电影序列获得的左右心室全局径向应变 (global radial strain, GRS)、全局周向应变 (global circumferential strain, GCS) 和全局纵向应变 (global longitudinal strain, GLS) 值均低于常规 bSSFP_{ref} 电影序列 ($p < 0.001$)。基于 CS₄₅ 和 eCS₇₀ 电影序列的左心室 GRS 和 GCS 值无显著差异, 同时 eCS₄₅ 和 eCS₇₀ 电影序列评估的右心室 GRS、GCS 和 GLS 值也未见差异。CS₄₅ 和 eCS₄₅ 电影序列的应变评估结果表明, 使用对比剂会导致右心室和左心室的 GRS 和 GCS 值降低 ($p < 0.001$), 对 GLS 值无影响。

结论:

CS 电影序列评估的左右心室 GRS、GCS 和 GLS 值始终比常规 bSSFP 电影序列低。右心室 CS 电影的 GRS、GCS 和 GLS 值不受翻转角和钆对比剂影响, 钆对比剂对左心室 GRS 和 GCS 值的影响可通过增加翻转角来补偿。CS 电影评估心肌应变的临床应用仍需进一步探索。

PO-1119

特发性肺纤维化的大螺距高分辨 CT 扫描优势

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目的: 特发性肺纤维化 (IPF) 是一种以慢性、进行性、不可逆性肺纤维化为特征的弥漫性间质性肺疾病, 是特发性间质性肺炎最常见的亚型。患者多表现为干咳、呼吸困难、发绀、杵状指等非特异性临床表现, 双肺底闻及 Velcro 啰音, 肺功能呈限制性通气功能障碍伴不同程度的弥散障碍。导致患者在扫描时不能很好的配合吸气闭气口令, 故采用大螺距 Flash 扫描模式, 提高图像质量。

方法: 前瞻性连续纳入 2022 年 1 月-5 月于河南省胸科医院采用西门子 Drive 双源 CT 扫描特发性肺纤维化患者 80 例, 随机分为 A、B 两组, 每组 40 例。A 组为 Flash 模式下的胸部 CT 平扫, B 组为常规 CT 平扫。A、B 两组共同扫描参数 (采用自动管电压和自动管电流技术, 采集层厚: 128×0.6mm, 重建层厚: 5mm 和 1mm, 间距: 0, 扫描方向: 头-足, 迭代重建强度 3, 肺窗算法: I70f 非常锐利 ASA, 肺窗窗宽窗位: Lung, 纵隔窗算法: I30f 中等平滑, 纵隔窗窗宽窗位: Mediastinum。A 组特殊扫描参数 (螺距: 3.0, 球管旋转时间: 0.28s); B 组特殊扫描参数 (螺距:

1.2, 球馆旋转时间: 0.5s)。扫描后图像传至西门子 syngo.via 后处理工作站, 分别做主观与客观评价。主观评价有三名高年资诊断医生对图像质量进行主观评价, 按照纵隔、大血管、胸膜、胸壁软组织、肺段及亚段支气管显示的清晰度、解剖结构细节清楚、颗粒均匀、无伪影评价等级为优; 反之解剖结构细节不清晰、颗粒不均匀、有伪影评价等级为差; 若介于二者之间评价等级为中等。客观评价采用测量标准差 (SD) 与 CT 值统计分析评价。

结果: A、B 两组间标准差 (SD) 与 CT 值差异无统计学意义, 但在主观评价中 A 组图像质量明显高于 B 组图像质量。

结论: 特发性肺纤维化患者大多不能良好的配合吸气闭气口令, 导致常规 CT 胸部平扫呼吸运动伪影较大。Flash 模式下的胸部 CT 平扫, 即使患者不能配合吸气闭气口令, 亦可良好显示双下肺解剖结构, 左心缘无心脏搏动伪影。由此可见, 西门子 Drive 双源 CT 的 Flash 模式下胸部 CT 扫描, 更加适合特发性肺纤维化患者的胸部检查, 具有较高的临床价值。

PO-1120

CMR 联合心肌应变技术在房颤患者左房纤维化评估中的初步研究

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目的: 探讨 3D 延迟增强心脏磁共振 (CMR) 联合心肌应变技术在房颤患者左房纤维化评估中的价值

材料与方法: 前瞻性收集分析我院 2022 年 1 月至 2023 年 5 月, 80 例拟行消融术及术前 CMR 检查阵发或持续性房颤患者 (PaAF, PeAF) 的左房储存功能、管道功能、升压泵功能、总应变 ϵ_s 、被动应变 ϵ_e 、主动应变 ϵ_a 及相应应变率 (SRs、SRe、SRa)。以房壁与血池的信号程度之比 (IIR) 为参考, 定量分析左房壁强化范围及程度。应用独立 t 检验、曼-惠特尼 U 检验及多因素逻辑回归分层房颤类型并建模。

结果: PeAF 与 PaAF 相比, 总容积、球形率、舒张末期容积、收缩末期容积明显增加 ($P<0.05$), 左房储存功能、管道功能、升压泵功能、 ϵ_s 、 ϵ_e 、 ϵ_a 、SRs、SRe、SRa 均显著降低 ($P<0.001$); 在延迟增强 20min 及 30min 后, PeAF 组强化心肌 (IIR>1.2)、瘢痕心肌 (IIR>1.32)、间质纤维化 (IIR 1.2~1.32) 的面积及占比均高于 PaAF 组。多因素逻辑回归显示, 在临床指标亚组中, BMI (OR 1.195, $P=0.012$) 和 CHA2DS2-VASC 评分系统 (OR 1.471, $P=0.008$) 是 PeAF 的独立危险因素, 其预测效能 AUC 为 0.753 ($P<0.001$); 在心肌应变亚组中, ϵ_s (OR 0.749, $P<0.001$) 及左房管道功能 (OR 1.079, $P=0.038$) 是房颤分类的独立预测因素, 其 AUC 可达 0.927 ($P<0.001$); 在延迟扫描亚组中, 20min 左房强化总面积 (OR 1.080, $P<0.001$) 及间质纤维化百分比 (OR 1.377, $P<0.001$) 是分层 PeAF 及 PaAF 的独立危险因素, 其 AUC 可达 0.933 ($P<0.001$); 而综合上述参数后的模型 AUC 高达 0.957 ($P<0.001$), 其独立预测因素分别为 ϵ_a (OR 0.709, $P=0.024$) 和 30min 左房强化总面积 (OR 1.060, $P=0.005$)。

结论: 术前无创 CMR 联合心肌应变技术可定量并可视化左房纤维化, 为手术规划及术中电生理导航的融合提供重要的影像学依据。

PO-1121

2 型糖尿病患者肺小血管重构的 CT 定量研究

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糖尿病作为最常见的代谢性疾病与肺小血管重构关系显著，其机制可能包括内皮细胞功能紊乱、平滑肌细胞增殖、成纤维细胞活化和胶原沉积等。而这种复杂过程是否可以通过影像学手段进行监测尚不清楚。本研究使用 CT 定量分析方法分析 2 型糖尿病患者肺小动脉的结构改变，旨在为疾病肺小动脉监测提供监测手段，早期发现肺动脉高压。回顾性收集 2 型糖尿病患者胸部 CT 50 例，符合临床诊断标准。排除标准①肺内感染，肿瘤，胸腔积液，肺间质纤维化；②年龄小于 20 岁或大于 60 岁。③合并 COPD，哮喘，心血管疾病。根据患者年龄性别匹配影像未见明显异常的对照组 43 例。收集两组患者胸部 CT 并进行 CT 定量分析。包括全肺（-200--700）密度百分比，肺气肿定量，全肺血管、支气管、肺体积分割定量，小气道（ $\leq 2\text{mm}$ ）周围肺小动脉的数量及平均横截面积。对比两组之间差异。结果发现糖尿病患者组小气道周围血管平均横截面积/数量显著低于对照组（ $P < 0.05$ ）；全肺（-200--700）密度百分比及肺血管体积大于对照组。而支气管体积及肺容积在糖尿病组与对照组之间无差别。结论：2 型糖尿病的肺部损伤可用 CT 定量分析发现，CT 图像上表现为（-200--700）密度区域增多，可类似肺间质性改变。肺小动脉损伤可能是监测此类变化的敏感指标。

PO-1122

瘤周结节 CT 定量特征预测胸腺上皮肿瘤危险度

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目的 探讨瘤周结节的 CT 定量特征对预测胸腺上皮肿瘤危险度的价值。资料与方法 回顾性分析 108 例经病理诊断为胸腺上皮肿瘤的患者。根据 WHO 胸腺肿瘤分类，将患者分为高危组和低危组。定量 CT 特征包括瘤周结节的长径、体积、质量、瘤周结节及与主瘤灶距离。使用 Mann-Whitney U 检验评估这些特征的价值，并使用受试者操作特征曲线确定阈值。结果 108 例胸腺上皮肿瘤中有 45 例 CT 可见瘤周结节，高危组 30 例和低危组 15 例。不同观察者间一致性较好（相关系数 $\text{ICC}=0.886-0.907$ ）。高危组瘤周结节的长径、体积和质量均大于低危组（ $P < 0.05$ ），与主瘤灶距离组间差异无统计学意义（ $P > 0.05$ ）。CT 定量特征中，瘤周结节的质量在预测胸腺上皮肿瘤危险度方面具有最佳的诊断效能，对应的阈值为 27.84 mg（曲线下面积 $\text{AUC}=0.89$ ，敏感性 83.3%，特异性 87.5%，准确性 85.3%）。结论 瘤周结节的 CT 定量特征对预测胸腺上皮肿瘤的危险度有一定价值，尤以质量最佳。

PO-1123

心脏磁共振组织追踪技术及容积-时间曲线评估无明显并发症肥胖成人的舒张功能障碍:一项前瞻性研究

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目的: 采用心脏磁共振组织追踪技术及容积-时间曲线测量左心室 (left ventricular, LV) 和左心房 (left atrial, LA) 功能来全面评估无明显并发症肥胖成人的舒张功能以及评估这些功能指标与体脂分布的关系。

方法: 前瞻性纳入 49 例无明显并发症的轻到中度肥胖受试者 (体重指数: $29.8 \pm 1.8 \text{ kg/m}^2$) 和 43 例健康对照 (体重指数: $20.2 \pm 1.6 \text{ kg/m}^2$)。测量两组的 LV 应变指标 (峰值收缩期及舒张期应变率)、LV 容积-时间曲线指标 (峰值充盈率及射血率指数) 和 LA 应变指标 (总应变及应变率、被动应变及应变率和主动应变及应变率) 并进行比较。采用双能 X 射线吸收测定仪测量体脂分布。多变量线性回归评价体脂分布与左室舒张功能指标的相关性。

结果: 比起健康对照, 肥胖受试者的舒张功能指数, 包括 LV 周向及纵向峰值舒张期应变率 ($1.3 \pm 0.2 \text{ s}^{-1}$ vs. $1.5 \pm 0.3 \text{ s}^{-1}$, $0.8 \pm 0.2 \text{ s}^{-1}$ vs. $1.1 \pm 0.2 \text{ s}^{-1}$, 所有 $P < 0.05$)、峰值充盈率指数 ($3.5 \pm 0.6 \text{ s}^{-1}$ vs. $3.9 \pm 0.7 \text{ s}^{-1}$, $P = 0.012$) 以及 LA 总应变及应变率 ($46.4 \pm 8.4\%$ vs. $51 \pm 12\%$, $1.9 \pm 0.5 \text{ s}^{-1}$ vs. $2.3 \pm 0.5 \text{ s}^{-1}$; 所有 $P < 0.05$) 和被动应变及应变率 ($30.8 \pm 8.0\%$ vs. $35.5 \pm 9.8\%$, $3.1 \pm 0.8 \text{ s}^{-1}$ vs. $3.5 \pm 1.0 \text{ s}^{-1}$; 所有 $P < 0.05$) 下降。肥胖组与对照组 LA 主动应变及应变率的差异无统计学意义。多变量线性回归分析表明, 躯干脂肪与 LA 被动应变 ($\beta = -0.520$) 和 LV 周向峰值舒张期应变率 ($\beta = -0.417$) 独立相关; 内脏脂肪和外周脂肪与 LV 纵向峰值舒张期应变率独立相关 ($\beta = -0.342$, $\beta = 0.376$); gynoid 区域脂肪与 LA 总应变 ($\beta = 0.384$) 和 LV 峰值充盈率 ($\beta = 0.285$) 独立相关。结论: 无明显并发症的肥胖成人出现亚临床舒张功能障碍而不是收缩功能障碍。中心脂肪分布 (躯干脂肪及内脏脂肪) 与舒张功能呈负相关, 而周围脂肪分布 (外周脂肪及 gynoid 区域脂肪) 与舒张功能呈正相关。

PO-1124

肺气肿、气道及肺血管与肺癌风险相关的定量 CT 评估

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目的: 在肺癌筛查人群中确定肺气肿、气道壁增厚、肺血管的定量 CT 测量是否与肺癌风险相关。

方法: 回顾性分析 132 例经病理确诊的肺癌筛查患者的 CT 图像, 其中 83 名被诊断为恶性肺结节, 49 名为良性结节。测量两组全肺及肺结节所在肺叶的肺气肿 (吸气相体素指数小于 -950 HU 肺容积占总肺容积百分比 LAA-950%)、气道壁增厚 (第 3 至 7 代管壁面积百分比 (WA%)) 及假定气管内周径为 10 mm 时管壁面积的平方根 (Pi10))、全肺及各个肺叶的肺血管体积百分比 (IPVV%), 比较良性肺结节组和恶性肺结节组这些测量值的差异。结果: 肺气肿、气道及肺血管的定量 CT 测量值与肺癌发生的风险无关。结论: 肺气肿、气道及肺血管的定量 CT 测量与肺癌发生的风险无关, 表明其对临床风险分层没有潜在的实用价值。

PO-1125

基于胸部增强 CT 的影像组学模型在鉴别周围型肺癌和肺炎性假瘤中的研究价值

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【摘要】目的：探讨基于 CT 影像组学模型在肺炎性假瘤和周围型肺癌鉴别诊断中的应用价值。**方法：**回顾性分析本院 2018-2022 年经穿刺活检病理证实为肺炎性假瘤和周围型肺癌的患者，收集 81 例患者治疗前的 CT 影像资料，其中良性组 27 例，恶性组 54 例，随机分为训练集 54 例和测试集 27 例，运用 3D-Slicer 软件采用手动分割提取影像组学特征并使用 LASSO 方法降维，建立影像组学标签。经过多因素逻辑回归筛选，对有意义的影像特征及影像组学标签等相关变量建立影像组学诺模图诊断模型，使用受试者工作特征曲线 (ROC) 及其曲线下面积 (AUC) 对其诊断效能进行评价。**结果：**经过降维，17 种最具相关性的影像组学特征被用于建立影像组学标签，在训练集和测试集 AUC 分别为 0.728、0.767；影像组学诊断模型在训练集和测试集中 AUC(0.788, 0.922) 均大于非影像组学模型(0.682, 0.718, $P<0.05$)，且同时具有较高的校准度和临床应用价值。**结论：**基于 CT 平扫影像组学模型对肺炎性假瘤和周围型肺癌的诊断效能良好，具有简便、可靠的临床实用价值。

PO-1126

改良后左心房 CTA 检查在左心耳封堵术前的评估

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摘要：**目的：**探讨西门子 Force 双源 CT 使用改良后技术行左心房 CTA 检查在左心耳封堵术 (PCLAA) 前的评估价值。**方法：**前瞻性收集我院 2022 年 1 月—2023 年 7 月 72 例拟行左心耳封堵术，采用改良后技术行左心房 CTA 患者。改良型技术：在常规动脉期扫描后 (对比剂：0.7ml/kg，流速 4.0ml/s) 延迟 30 秒行低剂量容积扫描；注射方案：在常规注射完后延迟 6-8 秒 (BMI 越小时间越短) 遵循低速、长时间原则，持续注射对比剂：0.2ml/kg，流速 1.0ml/s。观察左心耳形态分型、血栓情况及评估与植入封堵器选择的相关性。**结果：**经后处理工作站将左心耳形态分型：鸡翅型 (37 例，51.4%)、菜花型 (16 例，22.2%)、风向标型 (14 例，19.4%)、仙人掌型 (5 例，6.9%)；外侧法测量左心耳开口长径与封堵器最终选择有显著相关性 ($r=0.968$)，差异无统计学意义 ($P>0.05$)。动脉期显示左心耳血栓 23 例 (占 31.9%)，延迟期显示左心耳血栓 7 例 (占 9.7%)，两者有统计学意义 ($P<0.05$)。**结论：**改良后左心房 CTA 可以更好的观察左心耳的解剖信息、鉴别左心耳的血栓情况，为 PCLAA 术前提提供封堵器植入重要数据，具有较高的临床可行性和应用价值。

PO-1127

CT 影像组学在转移性 EGFR 突变型非小细胞肺癌患者靶向治疗 前预测 T790M 耐药发生的应用价值及风险评估

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目的 评估 CT 影像组学在预测转移性非小细胞肺癌患者一线表皮生长因子受体 (epidermal growth factor receptor, EGFR) 酪氨酸激酶抑制剂治疗前发生 T790M 耐药突变的风险预测的价值。

材料和方法 回顾性收集 162 名转移性非小细胞肺癌患者的临床和 CT 影像资料, 训练集共纳入 113 例病例, 测试集纳入 49 例病例。在平扫 CT 和增强 CT 上对肺癌层面进行逐层手动标注并提取影像组学特征。本研究先通过最大信息系数筛选出前 200 个特征, 之后通过 LASSO 算法进行进一步特征筛选, 并计算影像组学特征得分, 同时结合两期得分构建诺莫图, 以预测患者 14 个月内发生 T790M 耐药的可能, 并在独立测试集上测试。同时延长随访时间, 记录每位患者 T790M 耐药的发生时间, 评估诺莫图对耐药风险分层的能力。模型效能通过 ROC、DCA 和校准曲线进行评价, 并通过 Kaplan-Meier 生存分析评估诺莫图与 T790M 发生时间的相关性。

结果 患者基线临床病理资料在两组中并无明显统计学差异。分别从平扫 CT 和增强 CT 筛选出 4 个和 10 个影像组学特征。平扫 CT 模型在训练集和测试集上 AUC 值分别为 0.730 (95% CI: 0.643–0.818) 和 0.622 (95% CI: 0.415–0.829), 增强 CT 模型在训练集和测试集上 AUC 值分别为 0.803 (95% CI: 0.693–0.913) 和 0.752 (95% CI: 0.570–0.935), 诺莫图表现最佳, AUC 值分别为 0.828 (95% CI: 0.717–0.937) 和 0.853 (95% CI: 0.727–0.979)。独立测试集上的患者再根据诺莫图的最佳阈值分为耐药高危组和低危组。Kaplan-Meier 曲线表明, 根据诺莫图的影像组学得分的高危和低危组之间的 T790M 发生时间存在明显差异 ($p=0.00029$)。

结论 基于转移性 EGFR 突变型非小细胞肺癌患者靶向治疗前的 CT 影像组学特征可有效提供预后信息, 并对患者耐药风险实现精准预测, 多模态放射组学诺莫图具有成为临床潜在预测工具的能力。

PO-1128

耐多药肺结核影像组学研究进展

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目的: 耐多药结核病 (multidrug-resistant tuberculosis, MDR-TB) 是全球卫生安全面临的重大挑战。早期的识别耐多药结核病患者增加了治疗成功的可能性并可有效地阻断传播。因此, 本研究旨在探讨 CT 影像组学在 MDR-TB 中的诊断价值。

材料和方法 本课题前期回顾性收集来自两家医院的 454 例活动性肺结核患者的资料, 根据征象不同, 将其主要分为三个队列: 树芽征队列 (训练集: 295 例, 测试集: 102 例)、结节队列 (训练集: 302 例, 测试集: 97 例) 和联合队列 (训练集: 261 例, 测试集 81 例)。基于树芽征和结节层面进行手动标注, 包括病灶周围的卫星灶, 由对胸部影像诊断丰富的医生进行勾画并由另一名具有 10 年以上胸部 CT 诊断经验的医生进行确认, 两位医生并不知最终对结核病的诊断。通过 PyRadiomics 软件从医学影像数据中提取标准化的影像组学特征进行特征提取。本研究先通过最大信息系数分别在树芽征和结节队列进行特征筛选, 筛选出前 200 个特征, 之后通过递归特征消除算法进行进一步特征筛选。将在结节和树芽征中筛选出的特征分别通过随机森林算法在联合队列中构建影像组学模型, 并在测试集上进行测试。最后将两者影像组学特征联合, 构建联合预测模型。通过 SPSS 和 Python 进行统计学分析。定性资料分析通过卡方检验进行, 定量资料通过 Mann-Whitney U 检验分析, 模型效能通过 ROC 曲线进行评价。

结果 在训练集上,MDR-TB 和 DS-TB 患者在年龄上具有明显的统计学差异 ($P<0.05$),但在测试集上无明显统计学差异,其余特征均无明显统计学差异。我们最终分别从树芽征、结节队列筛选出 16、15 个影像组学特征以构建模型。三个模型均表现优异,树芽征影像组学模型在训练集和测试集上表现良好,AUC 值分别为 0.877 和 0.786,结节影像组学模型表现最佳,AUC 值分别为 0.933 和 0.855,联合模型 AUC 值分别为 0.911 和 0.820。

结论 综上所述,基于树芽征和结节的影像组学模型可有效鉴别 DS-TB 和 MDR-TB,因此该模型有望成为一种 MDR-TB 的初筛诊断方法。

PO-1129

淋巴管肌瘤病患者囊性病变的定量分析和基于 CT 成像预测气胸的影像组学方法

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目的:

淋巴管肌瘤病 (LAM) 是一种罕见的转移性肿瘤,根据病变的严重程度,LAM 患者肺内的囊肿分布呈散在或累及整个肺,导致进行性呼吸困难,有时会出现气胸,大约三分之二的患者会在其临床病程中发生气胸,70%的女性会发生同侧或对侧复发性气胸。因此,气胸的复发是 LAM 预后的重要因素。本研究旨在评价淋巴管平滑肌瘤病患者的临床特征和影像学特征,并使用基于胸部计算机断层扫描 (CT) 图像的影像组学模型评估气胸复发的预后价值。

方法:

共入组 2015 年 8 月至 2021 年 5 月在我院行胸部 CT 检查的 101 例 LAM 患者。在患者接受 CT 平扫后,测量患者的肺囊肿体积。所有患者均通过电话随访至 2021 年 10 月,随后影像学检查出现气胸被定义为复发。对于气胸复发预测,我们首先使用预先训练的 U-net 深度学习模型,然后,我们使用 Python 包 pyradiomics v3.0.1 提取影像组学特征。我们首先将数据集分为两部分:70%组成训练集,30%组成测试集。使用 Pycaret 软件包中的去除多重共线性方法进行特征选择。使用 10 倍交叉验证对 70%的训练集进行训练,并选择具有最高平均交叉验证准确度评分的模型。对于影像组学特征,选择的模型是 adaboost 分类器,对于临床特征,选择的模型是随机森林分类器。然后将所选分类器拟合到所有训练数据上。最后,我们将影像组学和临床模型纳入 30%的测试集。

结果:

无气胸复发患者的双肺下叶肺囊肿体积比例 (23.50 ± 15.17 vs. 16.90 ± 11.31 , $P = 0.025$) 显著高于气胸复发患者。此外,气胸复发组和无复发组之间的胸腔积液存在统计学显著差异 ($P = 0.004$)。使用 ROC 曲线分析两种模型预测气胸复发的性能。影像组学模型 (AUC, 0.752;95%可信区间分别为 0.580 和 0.924; $P = 0.004$) 显示出比临床模型更好的预测效果 (AUC, 0.527;95%可信区间分别为 0.286 和 0.769; $P = 0.825$)。

结论:

双肺下叶囊性病变和胸腔积液的出现是 LAM 患者气胸复发的重要原因。肺部影像组学特征是预测 LAM 患者气胸复发的一种有前途的工具。

PO-1130

基于冠状动脉 CT 血管造影的冠状动脉钙化评分预测 脑白质高信号的进展--可行性和准确性

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摘要

背景 冠状动脉钙化 (Coronary artery calcification, CAC) 是动脉粥样硬化的一项可靠的衡量指标,也是中风和痴呆的预测因素。由于动脉粥样硬化在全身具有系统性特点,冠状动脉疾病 (Coronary artery disease, CAD) 通常与亚临床脑血管疾病共存。冠状动脉钙化评分 (CAC score) 可能是预测 CAD 患者脑白质高信号进展的有前途的工具。

目的 本研究旨在利用冠状动脉钙化评分预测 CAD 患者脑白质高信号的进展,并探究冠状动脉钙化评分与不同脑区脑白质高信号体积进展之间的关联。

材料和方法 在本研究中,我们评估了 2018 年 3 月至 2023 年 2 月期间接受冠状动脉计算机断层扫描血管造影 (CCTA) 和两次 MRI 扫描的 137 例 CAD 合并 WMH 患者。患者分为进展组 (n = 66) 和非进展组 (n = 71)。我们收集了人口统计、临床和影像数据进行分析。使用逻辑回归确定 WMH 进展的独立危险因素。开发并评估了三个预测 WMH 进展的模型。最后,根据患者的 CAC 总分 (0 ≤ 至 100 分、100 ≤ 至 400 分和 ≥ 400 分) 将患者分组,比较 9 个脑区的 WMH 变化。

结论 酒精滥用、最大 pFAI、CT-FFR 和 CAC 风险等级独立预测 WMH 进展 (p < 0.05)。联合模型具有较好的性能 (训练:AUC = 0.878, 95% CI: 0.790, 0.938; 验证:AUC = 0.845, 95% CI: 0.734, 0.953)。增加的 CAC 风险等级显著改变了全脑、胼胝体、额叶、顶叶和枕叶的 WMH 体积 (p < 0.05)。

总结: 基于冠状动脉 CT 血管造影获取的 CAC 评分,结合特定的危险因素,可以准确预测 CAD 患者脑白质高信号的进展。并且患者的总体脑白质、胼胝体、额叶、顶叶以及枕叶区域的脑白质高信号的体积进展与 CAC 风险等级相关联。

PO-1131

冠脉 CTA-FFR 与 CAD-RADS 评分相关性分析

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研究目的: 探讨冠脉 CTA 血流储备分数 (FFR) 与 CAD-RADS 评分的相关性。方法: 选取 2023.2.14~2023.4.14 在东南大学附属中大医院行冠脉 CTA 检查的患者 397 例,根据 FFR_{CT} 值分为 FFR_{CT} ≤ 0.8 组和 FFR_{CT} > 0.8 组; 冠状动脉狭窄程度按照 CAD-RADS 评分分为 (0~4) 共计 5 个亚组, CAD-RADS0: 冠脉未见异常; CAD-RADS1, 轻微狭窄 1%~24%; CAD-RADS2, 轻度狭窄 25%~49%; CAD-RADS3: 中度狭窄 50%~74%; CAD-RADS4: 重度狭窄 75%~99%。结果: FFR_{CT} 值 ≤ 0.8 组 (133 例), 其中未见狭窄 7 例 (7/133), 轻度狭窄 0 例, 轻度狭窄 9 例 (9/133), 中度狭窄 49 例 (49/133), 重度狭窄 68 例 (68/133)。FFR_{CT} 值 > 0.8 组 (264 例); 其中, 未见狭窄 114 例 (114/264), 轻度狭窄 34 例 (34/264), 轻度狭窄 72 例 (72/264), 中度狭窄 42 例 (42/264), 重度狭窄 2 例 (2/264)。CAD-RADS0: FFR_{CT} 值 = 0.90 ± 0.04; CAD-RADS1, FFR_{CT} 值 = 0.93 ± 0.04; CAD-RADS2, FFR_{CT} 值 = 0.89 ± 0.06; CAD-RADS3, FFR_{CT} 值 = 0.81 ± 0.09; CAD-RADS4 FFR_{CT} 值 = 0.66 ± 0.08, CAD-RADS1、2、3、4 组间 FFR_{CT} 值差异具有统计学意义 (P < 0.001)。FFR_{CT} 值与 CAD-RADS 评分呈明显负相关, Pearson 相关系数为 -0.666, p < 0.001。结论: 冠脉 CTA-FFR 与 CAD-RADS 评分呈明显负相关, CAD-RADS 评分越高, 管腔狭窄程度越

明显，冠脉血流储备分数越低，CTA-FFR 联合 CAD-RADS 评分可用于冠脉中重度狭窄 3-4 分患者心肌缺血的辅助诊断。

PO-1132

基于常规肺部 CT 应用深度学习评估肺功能

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研究背景：肺部 CT 检查广泛应用于肺癌筛查及肺部疾病诊断，但肺功能检查相对繁琐耗时，有大量肺功能受损人群未能早期发现。

研究目的：基于常规肺部 CT 应用深度学习评估肺功能。

研究方法：回顾性纳入 500 例同时行肺部 CT 及肺功能检查患者（两项检查间隔时间 <1 周），以肺功能为参照标准，分为肺功能正常组 210 例，肺功能异常组 290 例，应用深度学习构建肺功能异常筛查模型。以肺功能吸入支气管舒张剂后 $FEV1/FVC < 70\%$ 为参照标准，分为 COPD 组 130 例，非 COPD 肺功能异常组 160 例，构建 COPD 筛查模型。

另外纳入 150 例同时行肺部 CT 及肺功能检查患者，作为外部测试集（肺功能正常组 50 例，异常组 100 例，COPD 组 30 例，非 COPD 肺功能异常组 70 例），验证模型诊断效能。

研究结果：肺功能异常筛查模型 $AUC=0.917$ ，COPD 筛查模型 $AUC=0.735$ 。

研究结论：基于常规肺部 CT 应用深度学习构建的肺功能评估模型能够快速准确的筛查出肺功能受损患者，COPD 筛查模型效能较高，可用于大规模人群筛查。在不增加患者任何负担的前提下，提供功能信息的定性诊断。

PO-1133

基于胸部平扫和临床参数的主动脉夹层预测模型的建立与初步验证

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目的 建立并验证一种基于胸部 CT 平扫征象结合临床参数的主动脉夹层（AD）预测模型。

方法 回顾性收集行胸部 CT 平扫并短期内行胸主动脉 CTA 的胸痛病人 322 例，其中男 222 例、女 100 例，平均年龄（ 60.6 ± 13.2 ）岁。按 7 颐 3 的比例采用完全随机法将病人分为训练集（225 例，其中 AD 105 例）与验证集（97 例，其中 AD 45 例）。采用单因素分析和多因素 Logistic 回归分析筛选 CT 平扫征象及临床参数中 AD 的危险因素，并建立临床模型、影像模型及联合的 Logistic 回归预测模型，采用受试者操作特征（ROC）曲线、特异度、敏感度评估模型的预测效能，以筛选最佳预测模型。采用 Delong 检验比较各模型的曲线下面积（AUC），通过一致性指数（C 指数）评估预测模型的区分度。采用 Hosmer-Lemeshow 检验评价模型的校准度。

结果 Logistic 回归分析显示男性、D-二聚体升高、管腔内线样高密度和钙化斑块内移为 AD 的独立危险因素（均 $P < 0.05$ ）。联合的 Logistic 回归预测模型的 AUC 高于临床模型、影像模型（均 $P < 0.05$ ），联合模型的诊断效能最佳；在训练集中模型的 AUC 为 0.937，敏感度 91.4%，特异度 82.5%；在验证集中模型的 AUC 为 0.933，敏感度 95.6%，特异度 82.7%。联合预测模型具有较好的区分度（训练集：C 指数=0.937，验证集：C 指数=0.933）和较好的拟合效果（训练集： $X^2=3.081$ ， $P=0.687$ ；验证集： $X^2=2.199$ ， $P=0.821$ ；均 $P > 0.05$ ）。校准曲线显示联合模型预测的 AD 发生风险与胸主动脉 CTA 得到的结果有较好的一致性。

结论 建立基于胸部 CT 平扫征象结合临床参数的 AD 个体化 Logistic 回归预测模型, 有助于快速筛查和早期识别 AD 病人

PO-1134

基于能谱 CT 定量参数预测肺不张病因

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目的 探讨能谱 CT 定量参数鉴别诊断结核相关纵隔纤维化致肺不张与肺癌肺不张的价值。材料与方法 回顾性分析 109 例肺不张患者的胸部能谱 CT 增强扫描图像, 经支气管镜活检病理结果将其分为结核相关纵隔纤维化组 (n=77) 和肺癌组 (n=32), 测量中央气道阻塞处及隆突下淋巴结平扫及增强双期 (肺动脉期与主动期) CT 值 (CT40keV、CT70keV)、有效原子序数 (Z_{eff})、5 对基物质 (碘-水、钙-水、碘-钙、HAP-水、碘-HAP) 浓度, 计算能谱曲线斜率 (λ 70keV) 和双期基物质浓度比、CT40keV 比值、CT70keV 比值。首先将测量得到的 87 个能谱定量参数, 使用 LASSO 回归分析筛选最优能谱参数, 应用 logistic 回归分析建立能谱参数预测模型。其次, 最优能谱定量参数联合常规影像特征及临床特征建立综合预测模型。结果 最优能谱参数分别是: 中央气道阻塞处双期 CT40keV 比值 (OR=39.88, 95%CI: 5.64-425.31, P=0.001)、淋巴结双期标准化碘浓度比值 (OR=252.1, 95%CI: 15.2-813.1, P<0.001) 和淋巴结肺动脉期 HAP (碘) 浓度 (OR=1.082, 95%CI: 1.02-1.15, P=0.01), 最优能谱参数预测肺不张病因的 AUC 值为 0.863(95%CI: 0.784-0.922), 敏感性 67.53%, 特异性 90.62%。综合预测模型由上述最优能谱参数、中央气道阻塞处淋巴结平扫 CT 值、纵隔淋巴结肿大融合评分和肺内结核后遗灶组成, 其预测肺不张病因的 AUC 为 0.965(95%CI: 0.911 - 0.991), 敏感性 98.71%, 特异性 84.32%。结论 能谱 CT 定量参数联合平扫常规影像学特征可有效鉴别结核相关纵隔纤维化与肺癌所致肺不张。

PO-1135

深度学习图像重建在提高肺部 CT 图像质量的临床应用研究

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目的: 深度学习图像重建(Deep Learning Image Reconstruction, DLIR)是一种基于深度神经网络的图像重建新技术, 该方法有望在图像质量上优于现有的迭代重建技术。本研究的目的是评价 DLIR 重建的图像的图像质量和噪声, 并与 FBP、ASIR-V40%重建的图像进行比较。

方法: 回顾性选取本院 60 例 COPD 筛查患者胸部 CT 原始数据, 采用 FBP 重建 (A 组)、ASIR-V40%重建 (B 组)、DLIR-M 重建 (C 组)、DLIR-H 重建 (D 组), 共计获得 4 组图像。测量 4 组图像肺组织、主动脉、肌肉、胸椎、空气的 CT 值和 SD 值, 并计算各组织的信噪比 (SNR) 和对比噪声比 (CNR)。两名有工作经验的医师采用双盲法对图像噪声、伪影和诊断信心、整体图像质量进行 5 分制主观评分, 两名医师的评分结果一致性行 Kappa 检验。对 4 组图像的指标进行统计学分析。

结果: 4 组图像肺组织、主动脉、肌肉、胸椎、空气的 CT 值无显著性差异 (P>0.05), 但噪声值有统计学差异 (P<0.05), 不同重建算法对图像噪声有明显影响。4 组图像各组织的 SNR 和 CNR 均有统计学差异 (P<0.05), 其中 D 组的 SNR 和 CNR 最高, A 组的最低。两名医师的主观评分一致性较好 Kappa 值范围为 0.781-0.884。4 组图像的图像噪声、伪影和诊断信心、整体图像质量评分存在显著差异 (P<0.05), C、D 组的主观评分高于 A、B 组的, C 组与 D 组之间主观评分对比无差异 (P>0.05)。

结论: 深度学习重建算法可以降低胸部 CT 图像噪声, 提供更高的图像质量, 增强医生的诊断信心, 具有较大的降低辐射剂量潜能。

PO-1136

基于冠状动脉 CTA 的血流储备分数 对 2 型糖尿病合并冠心病患者预后的预测价值

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目的 探究基于冠状动脉 CT 血管成像 (CCTA) 的血流储备分数 (CT-FFR) 对 2 型糖尿病 (T2DM) 合并冠心病 (CAD) 患者预后的预测价值。方法 回顾性收集 2014 年 1 月~2018 年 12 月确诊为 T2DM 且 CCTA 斑块直径狭窄率 $\geq 25\%$ 的患者。采用全自动化方法测量斑块远端 2-4 cm 的 CT-FFR 值。以主要心血管不良事件 (MACE) 作为研究终点。采用 Cox 风险比例回归筛选有统计学意义的因素, 并计算风险比 (HR) 和 95% 可信区间 (CI), 进一步构建传统模型和传统+CT-FFR 模型。用 C 指数和时间依赖受试者工作特征曲线 (ROC) 评价模型的预后表现。结果 共 170 例患者被纳入研究, 其中 52 人出现 MACE。性别 (HR=2.27, 95% CI 1.00-5.17, $P=0.050$)、不稳定型心绞痛 (HR=2.09, 95% CI 1.17-3.75, $P=0.013$) 和 CT-FFR (HR=0.02, 95% CI 0.00-0.15, $P<0.001$) 是 T2DM 合并 CAD 发生 MACE 的独立预测因子。CT-FFR ≤ 0.8 的患者发生 MACE 风险是 CT-FFR >0.8 患者的 3.86 倍 (调整后 HR, 95% CI 2.00-7.42, $P<0.001$)。在传统模型上加入 CT-FFR, C 指数从 0.70 提高至 0.74 (ΔC 指数=0.05, 95% CI 0.00-0.09)。传统+CT-FFR 模型 1-5 年的 ROC 曲线下面积 (AUC) 均高于传统模型。结论 CT-FFR 可提高 2 型糖尿病合并冠心病患者 MACE 的预测能力。

PO-1137

胸部 SMARCA4 缺失的未分化肿瘤的 CT 及 18F-FDG PET/CT 表现

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目的

探讨胸部 SMARCA4 缺失的未分化肿瘤 (SMARCA4-deficient undifferentiated tumor, SMARCA4-UT) 的 CT 及 ^{18}F -FDG PET/CT 表现。

方法

回顾性分析经手术或穿刺活检病理证实的 25 例胸部 SMARCA4-UT 的影像资料, 25 例患者均行胸部 CT 平扫, 其中 22 例行胸部 CT 增强扫描; 14 例行 ^{18}F -FDG PET/CT 检查。观察病灶的分布部位、病灶最大径、形态、边缘情况 (边界是否清晰, 有无分叶、毛刺、胸膜牵拉)、病灶内部情况 (有无钙化、空洞、坏死)、强化表现 (平扫、动脉期、静脉期 CT 值、强化程度、病灶内是否有强化血管影)、有无合并阻塞性炎症、支气管包埋受累情况、肺门和/或纵隔淋巴结肿大情况、最大标准化摄取值 (SUVmax)。

结果

25 例 SMARCA4-UT 中, 中央型 11 例, 周围型 14 例。病灶最大径 0.6~11.7cm, 平均 $5.30\pm 2.83\text{cm}$ 。25 例均表现为边界清晰的单发结节或肿块, 25 例边缘分叶, 25 例毛刺征, 24 例胸膜牵拉。5 例平扫密度较均匀, 坏死 20 例, 钙化 2 例。增强扫描后无明显强化 7 例, 轻度强化 9

例, 中度强化 4 例, 明显强化 2 例。25 例出现瘤内血管影。22 例可见支气管包埋或受累。17 例合并肺门和/或纵隔淋巴结肿大。20 例合并阻塞性炎症。14 例 PET/CT 检查病灶内 SUVmax 范围 3.2~27.5, 平均 15.4±6.2。

结论

胸部 SMARCA4-UT 多表现为边界清晰、边缘分叶伴毛刺的单发结节或肿块, 体积较大, 增强扫描多呈无明显强化或轻度强化, 瘤体内出现血管影及坏死, 支气管多受累、包埋, 氟代脱氧葡萄糖 (^{18}F -FDG) 呈明显高摄取。

PO-1138

评估磨玻璃结节样肺腺癌在随访 CT 过程中的生长速率和相关性分析

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目的: 本研究旨在分析纯磨玻璃结节样肺腺癌出现生长后的生长速率, 以及基线定量特征与生长速率之间的相关性。

方法: 这项研究回顾性纳入了 CT 随访超过 1 年并且出现间隔生长的 pGGN (pure ground-glass nodule) 样肺腺癌。最终纳入 29 名患者 (31 个 pGGNs), 手术病理证实为 17 个浸润性非粘液腺癌 (invasive non-mucinous adenocarcinoma, IA) 和 14 个微浸润腺癌 (minimally invasive adenocarcinoma, MIA)。在所有结节的初始和末次 CT 上进行三维半自动分割, 获得直径、CT 值、体积和质量, 并计算体积、质量的增长率 (体积增长率, VGR; 质量增长率, MGR)、体积倍增时间 (VDT) 和质量倍增时间 (MDT)。比较 IA 和 MIA 之间的生长速率及增长率。将所有结节根据 VDT=1000 天的阈值分为生长快 (VDT<1000 天, n=18) 组和生长慢组 (VDT>1000 天, n=13), 比较两组间的基线临床特征及影像特征的差异。

结果: 31 个生长肺腺癌的中位 VDT 和 MDT 是 923.7 (范围, 351.2-4004.5) 天和 960.6 (范围, 337.9-4092.5) 天, 对应的中位 VGR 和 MGR 均为 1.4。IA 的平均 VDT 和 MDT 是 746.2 天和 783.9 天, 均显著快于 MIA (平均 VDT, 1739.7 天; 平均 MDT, 1748.9 天) (p 均 = 0.001)。31 名患者年龄与 MDT 之间存在显著负相关 ($r = -0.432$, $p = 0.015$)。在 MIA 亚组中, VDT 和 MDT 与初始平均 CT 值之间存在显著正相关 (VDT, $r = 0.684$, $p = 0.007$; MDT, $r = 0.763$, $p = 0.002$)。生长快组和生长慢组之间只有年龄在两组之间存在显著差异 ($p = 0.028$), 其余临床及影像特征均无统计学意义。

结论: 表现为 pGGN 的 IA 生长速率显著快于 MIA。患者年龄与肺腺癌的 MDT 存在显著负相关, 并且在生长快慢组之间存在显著差异。初始平均 CT 值与 MIA 的 VDT、MDT 都存在显著正相关。

PO-1139

多参数 CMR 对缩窄性心包炎诊断及预后的增量价值

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目的: 本研究旨在探讨多参数心脏磁共振成像 (CMR) 对缩窄性心包炎 (CP) 的诊断及影响预后的因素。方法: 回顾性分析 34 例连续性 CP 患者和 32 例对照组。CMR 获得了心脏形态、功能和组织特征的信息。

结果: 与对照组相比, CP 患者心脏结构和功能明显受损。与对照组相比, CP 患者左心房 (LA) 整体周向应变、LA 整体纵向应变、左室 (LV) 整体纵向应变、左室整体周向应变、左室整体径向应变、

右室纵向应变、右心房(RA)整体周向应变和 RA 整体纵向应变均降低($p < 0.001$)。CP 患者的心外膜脂肪组织(EAT)体积显著高于对照组(57.6 ± 13.0 vs 45.2 ± 9.2 , $p < 0.001$)。在中位随访 19 个月(四分位数间距:4-24 个月)期间, 3 例患者行心包切除术, 10 例患者因心力衰竭住院。在 Cox 比例风险模型分析中, EAT 是随访期间主要事件的唯一独立预测因子(HR, 1.189;95% CI, 1.096-1.2902; $P < 0.001$)。

结论:CP 患者表现为心脏结构和功能受损, 以及双房和双室心肌应力受损。CMR 量化的 EAT 是唯一具有预后价值的独立预测因子。定量 CMR 是一种有价值的诊断和预后的影像学方法。

PO-1140

应用临床及 CT 影像学特征预测肺粘液腺癌 Ki-67 增殖指数的研究

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目的 本研究基于 CT 平扫图像对肺粘液腺癌 (Lung mucinous adenocarcinoma, LMAC) 进行临床参数及影像特征分析, 探索这些参数对 LMAC 中 Ki-67 指数的预测性能, 以期术前用无创方式评估肿瘤的增殖与预后。

方法 回顾性收集经胸外科手术病理证实为 LMAC 患者共计 119 例。记录所有病例的临床特征 (年龄、性别等), 并由放射科医生记录影像学特征, 包括分布、形态、肿瘤-肺界面、空气支气管征、分页征、空泡征、毛刺征及胸膜牵拉征象。随后, 手动测量 LMAC 的定量特征, 包括直径和 CT 值。将 LMAC 分为 Ki-67 低表达组 (Ki-67 增殖指数 $< 20\%$) 和 Ki-67 高表达组 (Ki-67 增殖指数 $\geq 20\%$)。具有显著统计学差异的计量资料进行受试者工作特征曲线 (Receiver operating characteristic curve, ROC) 分析并评估其敏感性、特异性和曲线下面积 (Area under ROC curve, AUC)。

结果 119 例 LMAC 包括 Ki-67 低表达组有 80 例 (67.23%), Ki-67 高表达组有 39 例 (32.77%)。Ki-67 高表达组的男性患者占比高于 Ki-67 低表达组 (53.85% vs. 37.50%, $P = 0.029$)。Ki-67 高表达组的直径明显长于 Ki-67 低表达组 (2.08cm, 1.44~3.09cm vs. 1.49cm, 1.07~2.04cm), Ki-67 高表达组的 CT 值也高于 Ki-67 低表达组 (-105.67HU, -228.29~-39.95HU vs. -213.09HU, -320.33~-92.73HU) (p 均 < 0.05)。在 ROC 曲线分析中, 直径的 AUC 值最大, AUC 值 (95%CI) 和截断值分别为 0.677 (0.576~0.778), 1.92cm, 敏感性和约登指数分别为 0.615, 0.725 和 0.340。Spearman 相关性分析显示直径与 Ki-67 表达具有正相关性 ($r = 0.209$, $p = 0.023$)。结论 直径相比 CT 值对预测 LMAC 中 Ki-67 的表达程度具有相对较高的潜力, 并且与 Ki-67 表达存在显著正相关。

PO-1141

首诊肺结节病 CT 影像学征象的聚类分析

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目的: 本研究的目的是根据肺结节病的 CT 影像学表现对肺结节病进行分型, 并探讨各个表现型的结节病患者的肺功能是否存在差异。

方法: 本研究纳入了 146 名临床确诊的结节病患者。所有患者均进行了胸部 CT 检查, 并且在检查前未进行激素治疗。根据 CT 的影像学表现, 提取出以下表现: 支气管血管束增粗 (0 无, 1 存在)、结节 (单个肺叶内: 0 无结节, 1 结节稀疏 (0~20 个), 2 结节多发 (20~100 个), 3 结节弥漫分

布 (大于 100 个), 并将 6 个肺叶 (左肺上叶舌段算一个肺叶) 的评分相加)、实变 (肺内实变: 0 无, 1 以磨玻璃斑片影为主, 2 以大于一个次级肺小叶为主, 3 以大片实变为主)、总体肺实变 (将各个肺叶内实变的评分相加)、支气管壁增厚 (0 无, 1 存在)、支气管狭窄 (0 无, 1 存在)、胸腔积液 (0 存在、1 单侧、2 双侧)、淋巴结肿大 (0 无, 1 存在, 2 淋巴结肿大并相互融合)、淋巴结直径 (纵隔或肺门最大淋巴结的短径)、小叶间隔增厚 (单个肺叶内: 0 不存在, 1 占比 0~25%, 2 占比 25~50%, 3 占比 50~75%, 4 占比 75~100%, 将各个肺叶的得分相加)。对这些患者的评分进行 K-means 聚类分析, 并对各个类型的患者的肺功能 (FVC、FEV1、FEV1/FVC、DLCO) 进行比较, 判断组间是否存在差异。

结果: 根据聚类分析结果将结节病的 CT 影像学表现分为四型。I 型: 以淋巴结轻度肿大为主, 占 25.3% (37 例)。II 型: 以淋巴结肿大并相互融合为主, 占 30.1% (44 例)。III 型: 双肺改变以弥漫分布结节为主, 占 35.6% (52 例)。IV 型: 双肺改变以实变为主, 占 8.9% (13 例)。这四种类型的患者肺一氧化碳弥散量 (DLCO) 差异具有统计学意义 ($P=0.001\leq 0.05$), 其中 I 型与 II 型 ($P=0.031\leq 0.05$)、I 型与 III 型 ($P=0.02\leq 0.05$)、I 型与 IV 型 ($P=0.000\leq 0.05$) 及 II 型与 IV 型 ($P=0.018\leq 0.05$) 的 DLCO 有统计学意义。

结论: 根据肺结节病患者的 CT 表现可以将肺结节病分为 4 型, 这四种类型的患者的弥散功能差异具有统计学意义, 考虑可以根据肺结节病的影像学分型来指导临床的后续治疗。

PO-1142

基于 CT 组学预测表现为纯磨玻璃结节肺腺癌的 Ki-67 表达

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目的 探讨表现为纯磨玻璃结节 (pure ground-glass nodules, pGGNs) 的浸润性腺癌中, CT 放射组学征象预测 Ki-67 表达的可行性和有效性。

方法 共 120 例组织病理学证实的浸润性腺癌 (invasive non-mucinous adenocarcinoma, IA) 患者接受了 CT 扫描。CT 扫描后 2 周内测定 Ki-67 增殖指数 (Ki-67 proliferation indices, PI)。两位经验丰富的胸部放射科医生评估了主观 CT 影像特征, 并测量了定量 CT 特征。手动勾画感兴趣区域的体积, 并通过 3D-slicer 软件从 CT 图像中提取放射组学特征。采用 Spearman 相关分析剔除冗余数据。采用梯度增强决策树 (Gradient Boosting Decision Tree, GBDT) 算法确定最佳放射组学特征。结合 GBDT 算法选择的候选变量建立多元 Logistic 回归模型, 预测 Ki-67 的表达水平。ROC 曲线用于确定预测模型的性能。

结果 Ki-67 低表达组与高表达组的临床特征、主观及定量 CT 表现差异均无统计学意义 (P 均 >0.05)。基于 CT 的放射组学特征显示了中等的诊断性能。训练集和测试集的 AUC 分别为 0.705 (敏感性 0.640, 特异性 0.640) 和 0.680 (敏感性 0.545, 特异性 0.682)。

结论 如果不能根据临床和传统 CT 影像特征预测 Ki-67 PI, 放射组学标记可以成为一种无创性和个性化的辅助诊断工具, 用于术前预测表现为 pGGNs 的 IAC 的 Ki-67 PI。

PO-1143

基于 CT 影像组学联合营养成分参数预测食管鳞癌患者术后 3 年无进展生存期和总生存期：一项多中心研究

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背景：营养成分参数是与食管癌的预后有关的临床危险因素，并且可以预测各种癌症的总生存期（OS）和无进展生存期（PFS），从而可以进行早期干预。本研究旨在探讨 CT 衍生的身体营养成分参数与食管鳞状细胞癌患者术后 3 年 OS 和 PFS 之间的关联，并最终结合 CT 影像组学特征构建联合模型以提高模型的预测价值。

材料与方法：回顾性收集来自 3 个机构的 662 例经术后病理证实的食管鳞癌患者。其中机构 1 与 2 中患者以 7:3 的比例随机分为训练队列(n=402) 和内部验证队列 (n=172)，机构 3 的患者被用作外部验证队列 (n=88)。勾画第三腰椎层面骨骼肌、皮下脂肪和内脏脂肪，并计算相应的骨骼肌指数、骨骼肌密度、皮下脂肪面积和内脏脂肪面积。使用单、多因素 Cox 回归分析预后的独立危险因素。最小绝对收缩和选择算子算法和 COX 回归用于构建影像组学模型。使用校准曲线和一致性指数评估各模型的预测效能。Kaplan-Meier 曲线分析高、低风险组的生存情况。

结果：多因素 COX 回归分析显示，肌肉减少症为 PFS (HR=1.60, 95%CI: 1.18-2.17, P<0.001) 和 OS (HR=1.61, 95%CI: 1.13-2.30, P<0.001) 的独立预后因素。结合临床独立危险因素和放射组学特征的联合模型获得了最佳的预测效能。该模型对于 PFS 的一致性指数在内、外部测试队列中分别为 0.758 (95%CI: 0.702-0.814)，0.738 (95%CI: 0.652-0.824)；对于 OS 的一致性指数在内、外部测试队列中分别为 0.746 (95%CI: 0.690-0.802)，0.728 (95%CI: 0.616-0.841)。联合模型的 Kaplan-Meier 曲线分析显示，预测高、低风险患者的 PFS 和 OS 中，高风险患者生存期均明显短于低风险患者。

结论：肌肉减少症与食管鳞癌患者的 PFS 与 OS 均显著相关。通过结合肌肉减少症与 CT 影像组学特征构建的联合模型，可以进一步提高对食管鳞癌患者术后 3 年 PFS 和 OS 的预测准确性，同时有助于更精确地进行患者术后风险分层。

PO-1144

珠海地区经外周静脉置入中心静脉置管头端位置异常原因分析

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目的 调查珠海地区经外周静脉置入中心静脉导管尖端位置异常的发生率并分析可能的原因。

方法 回顾分析 2020 年 1 月至 2022 年 4 月间进行经外周静脉置入中心静脉导管（PICC）的临床资料，主要包括置管的原因、置管的路径、导管尖端位置异常的发生率等。

结果 共入组 2481 例患者，以肿瘤患者为主，占比约 95.45% (2368/2481)，大部分穿刺贵要静脉置管 (89.36%，2217/2481)，以左上肢置管为主 (80.77%，2004/2481)，其次为右上肢 (18.02%，447/2481)，下肢占 1.21% (30/2481)。导管尖端位置异常（异位+过深）的发生率为 12.21% (303/2481)，其中导管尖端过深入右心 276 例，导管尖端异位 27 例（折曲 6 例，尖端位于颈内静脉、头臂静脉、锁骨下静脉分别为 8 例、8 例、5 例）。经左上肢置管导管尖端异位的发生率为 1.05% (21/2004)，右上肢为 1.12% (5/447)，差异无统计学意义 (P=0.8021)，另外一例异位病例为经下肢置管。左上肢置管导管尖端过深的发生率为 10.52% (211/2004)，右上肢置管的发生率为 14.54% (65/447)，差异有统计学意义 (P=0.0295)。过深病例中导管尖端与上腔静脉与右心房交界点的距离约 5mm-95mm（平均约 26.6±14.8mm）。导管头端异位在培训

导师、学员的发生率分别为 0.95% (18/1898)、1.54% (9/583)，差异无统计学意义 ($P=0.2256$)，而导管尖端过深在导师、学员组的发生率分别为 9.54%、16.30%，差异有统计学意义 ($P=0.000$)。

结论 珠海地区 PICC 以上肢置管为主，导管尖端位置异常主要为尖端过深入右心房，左上肢置管导管尖端位置异常的发生率低于右上肢。导管尖端位置异常的发生率与操作者的技术和经验相关。

PO-1145

建立 CT 影像组学列线图模型在孤立性肺结节型肺隐球菌病和肺癌鉴别诊断中的应用

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目的 建立基于 CT 的影像组学列线图模型用于鉴别诊断孤立性肺结节型肺隐球菌病(PC)和肺癌(LC)的可行性。**方法** 回顾性分析 2015 年 1 月-2023 年 8 月我院确诊表现为孤立性肺结节型肺隐球菌患者 86 例和肺癌患者 145 例，评估其临床特征和影像学特征。根据患者的薄层 CT 轴位平扫图像资料，提取病灶纹理特征，对其进行特征选择，获得 PC 组与 LC 组之间存在显著差异的特征参数。按 7:3 比例将所有样本分为训练集和测试集，采用 LASSO 算法以较优特征参数建立预测模型，对训练集数据进行评估，之后于测试集数据进行验证。经过多变量 Logistic 回归分析，构建了具有临床特征、CT 形态学征像、影像组学特征的影像组学列线图模型。我们计算了各种模型中的性能评估参数，如敏感性、特异性、准确性、阴性预测值(NPV)和阳性预测值(PPV)。采用受试者工作特征(ROC)曲线分析，评估模型的鉴别诊断效能。**结果** 我们从每张 CT 图像中提取了 1316 个影像组学特征。经 LASSO 算法降维后筛选出 4 个具有鉴别意义的影像组学特征。收集临床特征共计 13 个，经单因素分析及多因素 Logistic 回归分析后，发现性别、年龄、结节位置、患者免疫状态、分叶征、毛刺征、胸膜牵拉征、支气管充气征是区分 PC 和 LC 方面的 8 个因素 ($P < 0.05$)。影像组学模型、临床模型及混合模型预测效能：训练集中 AUC 分别为 0.839、0.807 和 0.857，测试集中 AUC 分别为 0.746、0.723 和 0.824。DeLong 检验显示，与临床模型和列线图相比的 AUC 之间存在显著性差异($p < 0.0001$)。**结论** 基于 CT 影像组学特征和临床危险因素的临床-影像组学列线图，可用于鉴别诊断孤立性肺结节型肺隐球菌病和肺癌。

PO-1146

自身免疫性 IgG4 相关肺疾病的 CT 表现及文献复习

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目的 分析 IgG4 相关肺疾病的临床、CT 表现。**方法** 回顾性分析 3 例 IgG4 相关肺疾病的临床资料，并复习相关文献，观察其临床、CT 表现。**结果** 3 例 IgG4 相关肺疾病 (3 例均为男性，年龄分别为 50、63、63 岁)，1 例表现为发热伴咯血 1 月，1 例表现为干咳、气喘 2 周、1 例表现为头痛、腹痛 10 天，无呼吸相关症状；2 例血清 IgG4 升高，3 例均接受 CT 平扫及增强扫描，3 例表现为结节及肿块，3 例存在肺内间质性病变 (2 例网格影，1 例磨玻璃密度影)，2 例纵隔及双肺门区淋巴结肿大，1 例合并多系统受累 (胰腺、双肾)。 **结论** IgG4 相关疾病累及肺组织少见，CT 可以表现为间质性病变、结节或肿块，可合并纵隔及双肺门淋巴结肿大，综合临床 IgG4 升高，对其诊断具有重要的价值。

PO-1147

成人肺朗格汉斯细胞组织细胞增生症高分辨率 CT 视觉评分及定量分析与常规肺功能的相关性研究

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目的 探讨胸部高分辨率 CT (HRCT) 视觉评分及定量分析评估成人肺朗格汉斯细胞组织细胞增生症 (PLCH) 的价值。

方法 回顾性分析 2014 年 8 月至 2021 年 12 月北京协和医院经病理组织学证实确诊的 51 例成人 PLCH 患者的胸部 HRCT 及肺功能检查资料。由 2 名影像医师采用主观视觉评分法评估患者 HRCT 图像中结节、囊腔病变累及范围, 并根据不同评分将结节病变分为 3 组, 囊腔病变分为 4 组。应用全自动后处理软件, 三维定量分析肺部低衰减区容积占全肺总容积比例 (LAA%)。记录肺功能通气、容量、弥散等指标。采用 Spearman 秩相关性分析病变视觉评分、LAA% 与肺功能检查各指标的相关性。采用 Kruskal-Wallis 非参数检验对结节和囊腔病变不同评分组的肺功能指标进行分析。

结果 51 例患者 HRCT 图像均可见结节和囊腔病变。HRCT 结节病变视觉评分与肺功能指标无相关性 ($P>0.05$), 不同结节评分组间比较肺功能指标差异均无统计学意义 ($P>0.05$)。囊腔病变视觉评分与 FEV₁%pred、FEV₁/FVC、D_LCO%pred、D_LCO/V_A%pred、D_LCOc%pred、D_LCOc/V_A%pred 存在负相关 ($r=-0.393$ 、 -0.491 、 -0.347 、 -0.330 、 -0.373 、 -0.346 , $P<0.05$), 且不同囊腔评分亚组肺功能指标差异均有统计学意义 ($P<0.05$)。LAA% 与 FEV₁/FVC、D_LCO%pred、D_LCO/V_A%pred、D_LCOc%pred、D_LCOc/V_A%pred 存在负相关 ($r=-0.278$ 、 -0.378 、 -0.418 、 -0.395 、 -0.451 , $P<0.05$)。

结论 PLCH 患者 HRCT 结节病变视觉评分与肺功能无相关性, HRCT 囊腔病变视觉评分及定量分析可一定程度评估患者肺通气及弥散功能的损害程度。

PO-1148

基于冠脉 CTA 的冠状动脉周围脂肪组织 CT 衰减预测冠脉搭桥术后桥血管闭塞

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目的: 计算机断层扫描血管造影术对冠状动脉周围脂肪组织的衰减是一种新的冠状动脉炎症的非侵入性成像生物标志物。我们观察了术前和术后冠状动脉周围脂肪组织的衰减 (PCATa) 的变化, 并评估了冠状动脉搭桥术后 1 年内桥血管闭塞的 PCATa 的预测值。

方法: 研究人群包括在 2018 年 2 月至 2023 年 4 月期间接受选择性冠状动脉搭桥术的 121 名连续患者。在术前 (1-10 天)、术后 (4-25 天) 和术后 6 个月、12 个月的随访时间进行计算机冠状动脉断层摄影血管造影术。右冠状动脉 (RCA)、左前降支 (LAD) 和左旋支 (LCx) 的 PCATa 在四个时间点使用半自动化软件对每位患者进行评估。单因素方差分析用于比较每个时间点的多组 PCATa 值及三支冠状动脉之间的 PCATa 值。根据随访 12 个月结果分为闭塞组及非闭塞组, 闭塞组与非闭塞组之间 PCATa 值比较采用独立样本 t 检验。计算受试者操作特征曲线、敏感性和特异性曲线、曲线下面积和 95% 置信区间。

结果: 共有 78 例患者在术前和术后四个时间点接受了计算机断层冠状动脉血管造影检查。PCATa RCA、PCATa LAD 和 PCATa LCx 在术后 (4-25 天) 最高 (PCATa LAD: -73.48 ± 5.84 ; PCATa LCx: -71.86 ± 6.17 ; PCATa RCA: -70.71 ± 6.49)。三支冠状动脉之间 PCATa 值差别无统计学意义。闭塞组和非闭塞组术后 (4-25 天) 的 PCATa 值具有统计学意义, 闭塞组更高 (PCATa LAD: -69.53

± 4.73 ; PCATa LCx: -68.09 ± 6.77 ; PCATa RCA: -65.69 ± 5.65)。ROC 曲线显示, 术后 (4-25 天) PCATa 值具有很强的预测闭塞的能力 (LAD AUC=0.727, LCx AUC=0.734, RCA AUC=0.793)。结论: 显示冠状动脉搭桥术前后的 PCATa 值呈动态变化。术后高 PCATa (4-25 天) 可以预测一年内桥血管闭塞。未来的研究应该评估这种成像生物标志物是否可以预测长期桥血管闭塞, 以便通过调节药物治疗来预防桥血管闭塞。

PO-1149

CT-FFR 和冠状动脉钙化评分对经导管主动脉瓣置换术后临床事件的预测价值

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背景: CT 血流储备分数 (CT-FFR) 和冠状动脉钙化评分 (CACS) 对主动脉瓣疾病患者接受经导管主动脉瓣置换术 (TAVR) 后的临床结局具有预测价值。然而, CT-FFR 和 CACS 之间的增量预后价值尚不清楚。

目的: 比较 CT-FFR 和 CACS 对 TAVR 术后不良临床事件的预测价值。

方法: 回顾性纳入 TAVR 术前接受冠状动脉 CT 检查的重度主动脉瓣疾病患者。采用单变量和多变量 Cox 回归分析不良临床事件的危险因素, 包括临床危险因素、CT-FFR 和 CACS。还分析了 CT-FFR 与 CACS 相比的增量预后价值。

结果: 共纳入 290 例患者 (平均年龄 68 岁 ± 10 岁; 204 名男性)。在平均 43 ± 12 个月的随访期间, 80 例患者 (27.59%) 发生了不良临床事件。CACS > 100 (HR: 0.302-0.667, P 均 < 0.05) 和 CT-FFR ≤ 0.75 (HR: 2.436, P < 0.001) 是不良临床事件的独立预测因子。当出现 CT-FFR ≤ 0.75 和 CACS > 100 时, 出现不良临床事件的风险显着增加。CT-FFR (C-index: 0.665) 而非 CACS (C-index: 0.654, P = 0.021) 对预测不良临床事件有增量预后价值。

结论: CT-FFR 和 CACS 是 TAVR 术后不良临床事件的预测指标, CT-FFR 在预测不良临床事件中有增量预后价值。

PO-1150

CCTA 定量的冠状动脉周围炎症与不同运动状况之间的关系

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背景: 稳定型冠状动脉疾病 (CAD) 患者的运动类型和强度与冠状动脉炎症之间的关系尚不清楚。因此, 本研究评估了冠状动脉计算机断层扫描血管造影 (CCTA) 量化的冠状动脉炎症与 CAD 患者的运动强度和模式之间的关系。

方法: 对 2020 年至 2023 年期间接受 CCTA 的患者进行回顾性研究。我们计算了右冠状动脉 (RCA) 的冠状动脉周围脂肪衰减指数 (FAI), 作为冠状动脉炎症的标志物。我们比较了两组患者的 FAI 值升高的危险因素, 并使用方差分析和限制性三次样条描述了不同运动持续时间与 RCA-FAI 之间的关系, 进一步随访后比较了不同运动时间患者的运动强度及冠脉炎症情况。

结果: 本研究共纳入了 1222 例患者, 其中 774 例冠心病患者为冠心病组, 448 例冠脉正常患者为健康对照组。冠心病组患者高血压、吸烟、家庭收入、体重指数 (BMI) 高密度脂蛋白 (HDL)、低密度脂蛋白 (LDL)、空腹血糖是 RCA-FAI 值升高的危险因素。冠心病患者运动量不同之间的 RCA-FAI 有明显差异。在校正相关因素后, RCA-FAI 与跑步和有氧运动的运动时间呈 “U” 型关系。同时短时间高强度运动对降低冠心病冠状动脉炎症更有价值。

结论: RCA-FAI 与预测 CAD 的运动密切相关。适当的体育锻炼可降低冠状动脉周围炎症和冠状动脉粥样硬化风险。然而, 过长时间或强度过大的运动可能会加剧冠状动脉炎症反应, 增加患 CAD 的可能性或导致猝死。

PO-1151

基于 MRI 随访扫描预测 COPD 患者偶发肺结节的长期转归—— 一项多中心临床试验

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研究目的: 通过多中心同时开展对 COPD 患者的两轮胸部磁共振成像 (MRI), 研究 MR 对检测和管理 COPD 患者偶发肺结节的能力, 建立 COPD 患者肺结节转归预测模型。

研究方法: 大于 40 岁的 COPD 患者在同一天接受胸部增强 MRI、非增强低剂量计算机断层扫描 (LDCT) 以及肺功能检测和一系列临床生活质量调查问卷, 并于至少 3 年后进行相同随访扫描。两位影像医师独立阅读两轮 CT 及 MRI 随访数据, 提取 MRI 和 LDCT 中结节影像学指标, 并以一致的 CT 结果作为结节转归的参考标准。根据结节转归及临床资料, 将差异指标纳入多因素 Logistic 回归分析, 获得结节转归的独立相关因素, 构建严格 ($P < 0.05$) 和宽松 ($P < 0.25$) 结节转归预测模型。

研究结果: 共 567 名 COPD 患者 (525 个结节) 纳入第一轮筛查和 241 名患者 (共 255 个结节) 参与第二轮随访。MRI 对实性结节的识别能力明显优于亚实性和磨玻璃, 敏感性和阳性预测值 (PPV%) 达 61.6% 和 67.5%。T1WI、T2WI、增强 T1WI 序列的敏感性及其 PPV% 均随着结节直径增加而增大 (65.78%-100%), 并且 MRI 增强扫描识别结节的敏感性明显高于平扫 (81.98% vs. 65.8%)。MRI 对结节的 RADS 评级与 LDCT 间一致性基本达到完美 ($\kappa = 0.70-1.00$ 和 $0.69-1.00$)。RADS 评级、结节个数、分叶征、CTA 评分纳入严格 MRI 预测模型 (AUC=0.88, 95%CI: 0.81-0.95), 进一步纳入年龄、结节位置、SGRQ、EQ5D 生成宽松模型 (AUC=0.96, 95%CI: 0.92-0.99)。两模型间比较: AUC 面积不存在差异 ($P = 0.05$), 净重新分类指数 (NRI) = 37.8%, $P = 0.07$, 综合判别改善指数 (IDI) = 0.15, $P < 0.01$ 。宽松 MRI 模型与 CT 模型间不存在差异 ($P > 0.05$)。

结论: 由增强 MRI 提取的影像特征及临床指标构建的宽松 Logist 模型可以对 COPD 患者偶发结节的转归起到较好的预测作用, 值得临床推广应用。

PO-1152

基于肺 CT 平扫的心外膜下脂肪与冠心病合并心力衰竭患者预后的相关性分析

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目的：探讨心外膜下脂肪（epicardial adipose tissue, EAT）相关参数对冠心病合并心力衰竭患者预后的预测价值。

方法：连续性纳入 2021.01.01 至 2021.05.31 就诊于我院，临床诊断为冠心病合并心力衰竭，并在我院进行了肺部平扫 CT 检查的患者，根据其左室射血分数（Ejection fraction, EF）分为射血分数降低型心力衰竭（HFrEF）组、射血分数轻度降低型心力衰竭（HFmrEF）组及射血分数保留型心力衰竭（HFpEF）组，收集临床资料及实验室检查信息。应用 Riaseg 医学图像分割软件，由 1 名具有 5 年工作经验的心内科医师在肺平扫 CT 图像上手动分割心包壁层轮廓，上缘为肺动脉干分叉水平，下缘为心脏底部，然后由一名具有 10 年心血管影像诊断经验的放射科医师对分割图像进行审核，最后根据脂肪组织的阈值-190~-30Hu，分割出 EAT，并获得其体积及平均密度值。使用 SPSS 26.0 进行统计分析。随访患者 1 年的主要不良心血管事件，评价各亚组 EAT 体积与平均密度绝对值对预后的预测价值。P<0.05 被认为差异具有统计学意义。

结果：本研究共纳入 441 名患者，其中 HFrEF 组 83 人，HFmrEF 组 88 人，HFpEF 组 270 人。年龄、高血压、甘油三酯水平是 EAT 体积和平均密度的独立影响因素（P<0.05），EAT 平均密度绝对值与 EF 值呈正相关（P<0.001），与左房前后径和左室舒末径呈负相关（P<0.001；P<0.001）；EAT 体积与 EF 呈负相关（P=0.011），与左房前后径和左室舒末径呈正相关（P<0.001；P<0.001）。共随访到 385 名患者，三个心衰亚组预后存在显著差异（P<0.001）。EAT 体积对 HFrEF 组和 HFmrEF 组预后存在预测价值（P=0.023；P=0.028）。

结论：年龄、高血压、甘油三酯水平为冠心病合并心力衰竭患者心外膜下脂肪的独立影响因素。EAT 体积可以有效评价冠心病合并心力衰竭患者中非 HFpEF 患者发生 MACE 事件的风险，EAT 体积越大，MACE 事件发生率越高。

PO-1153

基于定量 CT 分析吸烟与年龄对无症状健康男性小气道病变的交互影响

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目的：采用参数效应图(PRM)分析无症状健康男性的胸部 CT 图像，探讨小气道病变是否受到吸烟和衰老交互作用的影响。

材料与方法：回顾性纳入无症状健康男性 93 例，其中包括吸烟者 62 人，不吸烟受试者 31 人。所有患者均接受深吸气末和呼气末胸部 CT 检查与肺功能测定。通过 PRM 方法得出小气道病变区域百分比（PRM^{fSAD}%）。根据不同年龄阶段及是/否吸烟进行分组。采用单因素方差分析或 Kruskal-Wallis H 检验比较各组差异，组间比较采用独立样本 t 检验或 Kruskal-Wallis H 检验。采用 Spearman 秩相关检验分析 CT 定量指标与肺功能参数的相关性。采用多元线性回归分析探究小气道病变的影响因素，运用简单效应分析探讨年龄与是/否吸烟的交互作用。

结果: 三组间吸烟指数、FVC 及 PEF 差异具有统计学意义。随着年龄组增大, $PRM^{fSAD\%}$ 逐渐增大 ($p < 0.05$)。在不同年龄分组中, 吸烟能够增加 50 至 59 岁组与 60 至 69 岁组中的 $PRM^{fSAD\%}$ ($P < 0.05$)。小于 50 岁组中是/否吸烟均不能改变 CT 定量结果 ($P > 0.05$)。 $PRM^{fSAD\%}$ 与 FEV1/FVC 相关, 与 FEV1% 不相关。在不同年龄分组中, 60 至 69 岁组年龄是 $PRM^{fSAD\%}$ 的正向影响因素 ($P < 0.05$)。在是/否吸烟分组中, 吸烟是 $PRM^{fSAD\%}$ 的正向影响因素。在不同年龄组下是/否吸烟亚组中, 50 至 59 岁组吸烟是 $PRM^{fSAD\%}$ 的正向影响因素 ($P < 0.05$)。年龄和是/否吸烟在 $PRM^{fSAD\%}$ 间有交互作用 ($P < 0.05$)。

结论: CT 定量指标能准确测量无症状健康男性肺内小气道疾病, 在不同年龄阶段和是/否吸烟中存在交互影响。在 50-69 岁无症状健康男性中, 年龄和吸烟是小气道疾病的影响因素, 在 60 至 69 岁之间, 年龄增长比吸烟对无症状健康男性的小气道病变贡献更大。

PO-1154

基于 1.5T 心脏磁共振的中国儿童心脏、主动脉和肺动脉正常值参考范围

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目的: 心脏磁共振 (CMR) 技术是评估小儿心脏疾病的重要工具。目前报道的儿童心脏大小和肺动脉宽度的参考值的样本量较小, 并且缺乏中国儿童数据。本研究旨在基于 CMR 技术建立中国儿童的双心室容积、心功能、室壁厚度和主肺动脉宽度的参考值。

方法: 本研究纳入无心血管病史的 0-15 岁中国儿童, 行 1.5T 心脏磁共振电影 (b-SSFP 序列) 扫描。基于标准化的不同切面, 测量双心室和左房容积, 左室壁厚度, 双室心功能和主肺动脉宽度。

应用 lambda-musigma [LMS] 方法, 绘制了不同年龄层的参考百分位曲线。

结果: 150 例健康儿童 (年龄: 0-15 岁, 80 例男童, 70 例女童) CMR 数据被分为 3 组 (0-5 岁, 6-10 岁, 11-15 岁)。在 10 岁以前, 双室容积 (男性 LVEDV: 25 [20-30] mL, RVEDV: 23 [18-31] mL; 女性 LVEDV: 22 [21-24] mL, RVEDV: 23 [21-26] mL, $P = 0.324$) 室壁厚度 (男性, LVMT: 4mm [2-7]; 女性 3mm [2-6], $P = 0.159$) 和主动脉宽度 (男性, 10mm [9-15]; 女性, 9mm [8-16] $P = 0.572$) 肺动脉宽度 (男性, 9mm [8-12]; 女性, 6mm [7-12], $P = 0.572$) 在性别群体之间不存在差异; 10 岁以后, 男性的双室容积和室壁厚度数值较女性更高 (所有 p 值 < 0.001)。此外, 双室容积、室壁厚度和主肺动脉宽度随着年龄增长呈显著上升趋势 (所有 p 值 < 0.001), 而心功能在不同年龄组之间无明显差异 ($p = 0.451$)。

结论: 本研究提供了性别和年龄特异的中国健康儿童心脏磁共振参考范围, 旨在为未来临床儿童心肌病早期监测和未来研究提供定量标准依据。

PO-1155

胸部低剂量 CT 应用深度学习重建算法在胸部病变诊断中的可行性研究

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目的 探讨胸部 LDCT 应用深度学习算法 (DLR) 对于图像质量改善和胸部病变诊断评估的可行性。

方法 前瞻性纳入 60 名成人患者进行胸部常规 CT 和 LDCT 检查。常规 CT 图像用混合迭代重建算法 (HIR) 进行重建, LDCT 图像用 HIR 和 DLR 进行重建。1 名医师分别记录常规 CT 和 LDCT 的

辐射剂量,在隆突水平的气管腔内选取感兴趣区并测量其 CT 值和标准差,用于评价图像噪声和信噪比 (SNR)。2 名胸部影像医师按照 Likert 5 分制对肺部主要解剖结构 (肺裂、近端支气管及血管、外周支气管及血管、胸膜及胸膜下结构) 图像质量和异常病变 (肺结节、肺密度减低影、肺密度增高影、肺纤维灶和气道病变) 的 CT 特征进行主观评估。采用 Kruskal-Wallis 非参数检验对 3 组图像的主观和客观评分进行分析,若总体存在差异,则用 Bonferroni 校正检验进行组内两两比较。结果 LDCT 的辐射剂量 ($0.29\pm 0.03\text{mSv}$) 显著低于常规 CT ($2.05\pm 0.65\text{mSv}$) ($P < 0.001$)。常规 CT、LDCT HIR-Str 和 LDCT DLR-Str 的图像噪声分别为 33.9 ± 4.7 、 39.6 ± 4.3 和 $31.2\pm 3.2\text{HU}$ ($P < 0.001$)。显示肺部主要解剖结构,LDCT DLR-Str 图像明显优于 LDCT HIR-Str 图像 ($P < 0.001$),与常规 CT 图像无统计学差异 ($P > 0.05$)。LDCT DLR-Str 在评估实性结节、肺密度增高影、肺纤维灶和气道病变方面与常规 CT 相当 (P 均 > 0.05)。LDCT DLR-Str 对磨玻璃结节和肺密度减低影的显示优于 LDCT HIR-Str,但劣于常规 CT (P 均 < 0.05)。

结论 在辐射剂量减少 86% 的情况下,DLR 可以有效地减少图像噪声,提高图像质量,且显示肺部病变优于 HIR。除了磨玻璃结节和肺部低密度影外,LDCT DLR 对肺部病变的显示效果可与常规 CT 相当。

PO-1156

探讨超低剂量胸部 CT 不同重建算法对 AI 肺炎定量和图像质量的影响

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目的:探讨超低剂量条件下滤波反投影 (FBP)、自适应统计迭代重建 (ASIR-V) 40%、深度学习图像重建 (DLIR) 不同重建算法对人工智能影像辅助肺炎定量分析 (uAI-Discover-NCP) 和图像质量的影响。

方法:纳入 43 例肺炎复查者,根据 BMI,分为体重正常或较轻者、超重者、肥胖者,分别采用不同的管电流 (10、20、35mA) 行超低剂量 CT (ULDCT) 扫描。原始数据分别采用 FBP、ASIR-V40%、DLIR-M、DLIR-H、DLIR-H+E2 重建,共获得 5 组图像。测量空气、肺组织、胸主动脉、肩胛下肌、胸椎的 CT 值、噪声 (SD) 值,计算信噪比 (SNR)。两名资深影像医师对 5 组图像整体质量及肺炎显示进行 5 分制评分,并行 Kappa 一致性检验。图像导入 CT 影像辅助肺炎分析软件进行分析,记录肺炎指数、肺炎体积、肺炎体积百分比、肺炎质量及肺炎质量百分比。采用重复测量方差分析或 Friedman 秩和检验比较各组肺炎定量参数、感兴趣区的 CT 值、SD 值、SNR 值及主观评分的差异。

结果:5 组图像在空气、肺组织、胸主动脉、肩胛下肌、胸椎体感兴趣区 CT 值差异均无统计学意义 ($P > 0.05$); 而 SD 及 SNR 的总体差异有统计学意义 ($P < 0.05$),其中 DLIR-H 组的图像噪声最低、SNR 最高,与其他四组相比,差异均有统计学意义 ($P < 0.05$)。两名医师对各组图像的主观评分一致性较好 ($\text{Kappa} = 0.726 \sim 0.920$),5 组图像的整体质量、肺炎显示评分总体差异有统计学意义 ($P < 0.001$),其中 DLIR-H 与 DLIR-H+E2 组差异无统计学意义 ($P > 0.05$)。5 组图像肺炎定量参数 (肺炎指数、肺炎体积及肺炎体积百分比、肺炎质量及肺炎质量百分比) 总体差异均无统计学意义 ($P > 0.05$)。

结论:超低剂量扫描条件下,影像辅助肺炎定量分析结果不受重建算法的影响。与滤波反投影 (FBP)、自适应统计迭代重建 (ASIR-V) 40% 相比,高强度深度学习图像重建算法能显著降低图像噪声、明显提升图像质量,对肺炎复查有较大的优势。

PO-1157

胸部首过灌注成像检测不同风险分层的急性肺栓塞中的栓塞

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目的 本研究探讨基于多参数光谱 CT 成像在急性肺栓塞临床风险分层中评估肺灌注缺损程度的性能。

方法 回顾性分析 2023 年 2 月至 2023 年 4 月诊断为肺栓塞的 50 例患者。多参数功能 CT 用于肺动脉造影 (CTPA)。根据肺栓塞的简化临床风险分层评分, 将患者分为低风险组 (28 例) 和中风险组 (22 例)。分别利用碘密度 (ID)、有效原子序数 (Zeff) 和 ID-Zeff 融合图像 (ID-Zeff) 对胸部首过灌注图像进行后处理。Mastora 评分用于评估各组低灌注区的面积, 并绘制各组的受试者操作特征 (ROC) 曲线。计算曲线下面积 (AUC), 以比较各组在评估风险急性肺栓塞的风险分层 (中等或低) 方面的诊断效果。

结果 50 例患者中, 各组 Mastora 评分分别为: ID 图 (低危组 14 ± 5.2 , 中危组 22 ± 4.5)、Zeff 图 (低危险组 16.5 ± 4.8 , 中危对照组 24 ± 5.2)、ID-Zeff 图 (低风险组 18.5 ± 4.8 , 中危对照组 26 ± 5.8)。与 CI 图像 (AUC 0.78, 灵敏度 76%, 特异性 82%) 相比, ID 图 (AUC 0.86, 灵敏度 86%, 特异性 88.5%)、Zeff 图 (AUC 0.882, 灵敏度 89%, 特异性 89%) 和 ID-Zeff 图在急性肺栓塞的中低风险患者中具有较高的预测效能。

结论 基于多参数功能 CT 的 ID-Zeff 融合图像生成的光谱多参数图像可显著提高对不同风险急性肺栓塞患者的预测能力。为急性肺栓塞患者的风险分层和短期预后评估提供了额外的影像学证据。

PO-1158

基于肝/脾 CT 值诊断的非酒精性脂肪肝对
中晚期非小细胞肺癌患者免疫疗效的影响

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目的: 探讨基于肝/脾 CT 值诊断的非酒精性脂肪肝 (NAFLD) 对中晚期非小细胞肺癌 (NSCLC) 患者使用免疫检查点抑制剂 (ICIs) 疗效的影响。

方法: 回顾性收集 2020 年 3 月至 2023 年 7 月首次就诊于华中科技大学同济医学院附属协和医院的 III 期、IV 期 NSCLC 患者的临床和影像学资料, 确保其治疗前至少行一次 CT 扫描。共 479 名患者, 通过测量基线时的肝/脾 CT 值, 将患者分为 NAFLD 组 (肝/脾 CT 值 ≤ 1 , 118 例) 及非 NAFLD 组 (肝/脾 CT 值 > 1 , 361 例), 对患者进行随访, 获取患者的总生存期 (OS)、无进展生存期 (PFS)、客观缓解率 (ORR) 和疾病控制率 (DCR), 利用单因素和多因素 Cox 比例风险回归分析患者的临床、疾病进展及生存资料, 评估两组间的免疫治疗疗效, 并进行亚组分析, 构建森林图, 以评估不同亚组内免疫治疗效应的差异。

结果: NAFLD 组与非 NAFLD 组均有较高的 DCR, 分别为 94% 与 92% ($p=0.20$), 两组的 ORR 分别为 38.1% 与 44.9% ($p=0.45$), 两组之间的疗效没有差异。在单因素分析中, NAFLD 对 OS ($p=0.85$) 与 PFS ($p=0.79$) 没有显著影响。同时, 研究证实年龄是影响治疗疗效的重要因素, 老年患者的生存率低于年轻患者 (HR 1.54, 95%CI 1.06, 2.23, $p=0.02$)。此外, 肺癌患者的低短期反应率 (HR 2.04, 95%CI 1.46, 2.84, $p<0.001$) 和生存率 (HR 1.80, 95%CI 1.13, 2.86, $p=0.01$) 与初诊时肺癌的分期有关。

结论: 在 NSCLC 患者中, 基于肝/脾 CT 值定义的 NAFLD 在 ICIs 治疗后没有导致生存或疾病进展的变化。

PO-1159

基于双层探测器光谱 CT 定量参数及常规 CT 特征列线图评估肺浸润性非黏液腺癌高级别亚型的价值

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目的 探讨双层探测器光谱 CT 定量参数联合常规 CT 特征列线图在评估肺浸润性非黏液腺癌高级别亚型(HGP)中的价值。

方法 回顾性分析 2022 年 2 月至 2023 年 5 月苏州大学附属第一医院 71 例经手术切除且病理证实为肺浸润性非黏液腺癌患者的临床及影像学资料, 将其分为 HGP 组和非 HGP(non-HGP)组。分析评估病灶的大小、形态、密度、内部征象、边缘、胸膜牵拉征等常规 CT 特征及病灶的碘浓度(IC)、电子云密度(ED)、标准化碘浓度(NIC)等光谱 CT 定量参数。采用单因素方差分析筛选出差异有统计学意义的参数并通过多因素 logistic 回归分析筛选出 HGP 的独立危险因素, 构建常规 CT 特征模型、光谱 CT 定量参数模型及联合模型, 并绘制列线图。采用受试者操作特征(ROC)曲线下面积(AUC)评估各模型性能, AUC 比较采用 DeLong 检验。决策曲线(DCA)评估模型的临床净获益。

结果 HGP 组与 non-HGP 组在病灶密度、分叶征、毛刺征、IC_{AP}、IC_{VP}、NIC_{AP}、ED_{AP} 及 ED_{VP} 之间的差异均有统计学意义($P<0.05$)。多因素 logistic 回归分析表明, 常规 CT 特征中病灶密度($OR=15.452$, 95%CI% 4.246-56.235, $P<0.001$)和分叶征($OR=7.069$, 95%CI% 1.618-30.883, $P=0.009$)、光谱定量参数中 ED_{AP} ($OR=1.183$, 95%CI 1.064-1.315, $P=0.002$)和 IC_{VP} ($OR=0.231$, 95%CI 0.072-0.744, $P=0.014$)是预测 HGP 的独立危险因素。所构建的常规 CT 特征模型、光谱 CT 定量参数模型及联合模型的 AUC 分别为 0.835、0.890 和 0.915, 其中联合模型的诊断效能优于常规 CT 特征模型 ($P=0.008$), 灵敏度和特异度分别为 85.0%和 83.87%。DCA 分析表明列线图模型对比常规 CT 特征模型临床获益率更高。

结论 基于双层探测器光谱 CT 定量参数及常规 CT 特征的列线图模型可有效预测肺浸润性非黏液腺癌高级别亚型, 优于常规 CT 模型, 可以作为术前无创诊断 HGP 的可靠方法。

PO-1160

癌症中的免疫检查点抑制剂: 动脉粥样硬化性心血管疾病事件风险和冠状动脉钙化进展增加

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背景: 免疫检查点抑制剂 (ICI) 为癌症治疗的进步做出了显著贡献, 改善了许多晚期癌症患者的临床结果。临床前和临床研究均表明 ICI 与动脉粥样硬化及其相关心血管事件相关; 然而, 这种联系背后的确切机制尚未阐明。

方法: 回顾性研究纳入 2020 年 3 月 1 日至 2022 年 4 月 30 日在武汉协和医院诊断为 III 期或 IV 期非小细胞肺癌 (NSCLC) 的患者。在基线及治疗后 3、6 和 12 个月的随访胸部 CT 扫描期间, 对一部分患者的冠状动脉钙 (CAC) 体积和评分进行了评估。该研究的主要终点是动脉粥样硬化性心血管疾病 (ASCVD) 事件的发生, 包括心肌梗死、冠状动脉血运重建和缺血性中风。次要终点是治疗后三个时间点的 CAC 进展。

结果：总体而言，心血管研究队列共纳入了 1,458 名患者（487 名 [33.4%] 接受 ICI 治疗，971 名 [66.6%] 未接受 ICI 治疗）。在整个随访期间（中位随访 23.1 个月），非 ICI 组发生了 24 起 ASCVD 事件（4.9%），非 ICI 组发生了 14 起 ASCVD 事件（1.4%）。CAC 影像研究队列共有 246 名患者（113 名 [45.9%] 接受 ICI 治疗，133 名 [54.1%] 未接受 ICI 治疗）。在 ICI 组中，CAC 体积/分数从 93.4 mm³/96.9（基线）增加至 104.7 mm³/105.5（3 个月）、116.7 mm³/121.0（6 个月）和 125.1 mm³/132.8（12 个月）。在非 ICI 组中，CAC 体积/分数从 70.1 mm³/68.8（基线）增加至 72.4 mm³/80.4（3 个月）、81.8 mm³/88.8（6 个月）和 84.4 mm³/87.9（12 个月）。ICI 启动后，心血管事件和 CAC 进展均增加。

结论：ICI 治疗与较高的 ASCVD 事件发生率和显著增加的 CAC 进展相关。对于有心血管危险因素的个体，包括在胸部 CT 扫描中偶然检测到冠状动脉钙化斑块的个体，在免疫治疗之前应谨慎行事。

PO-1161

冠状动脉周围脂肪组织衰减对心功能的影响： 基于 Revolution CT 的回顾性评价

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目的

冠状动脉炎症的检测和量化可能有助于冠状动脉疾病（CAD）患者的早期诊断及治疗，甚至可能有助于冠状动脉斑块进展的推进，而尚无研究分析阐明冠脉炎症对冠心病患者心功能改变的促进作用。因此，本研究的目的是通过分析 PCAT 的几个定量参数与患者心功能参数之间的关系，明确冠脉炎症与冠心病患者心功能改变是否有关联。

方法和材料

我们回顾性地招募了 253 名通过 Revolution CT 进行冠状动脉计算机断层扫描（CCTA）诊断为稳定型 CAD 的患者，包括 96 名经超声检查心功能异常患者，157 名心功能正常的患者。两位独立的盲目放射学家使用半自动软件对 CCTA 图像中斑块周围 PCAT 的脂肪衰减指数（FAI）进行了量化，患者心脏超声检查结果共检查三次，对结果取平均值，平均值位于正常范围外认为患者存在心脏功能障碍。对上述不同患者之间的临床特征和 PCAT 定量参数进行了比较。

结果

在入选的参与者中，119 人是男性，134 人是女性。所有参与者的平均年龄为 53（41 至 64）岁。在年龄、性别、体重指数、是否高血压、高血脂、高血糖以及药物史等方面均没有观察到组间差异。心功能异常组患者的 LAD 段、RCA 段 FAI 值、平均 FAI 值、斑块周围 FAI 值均高于心功能正常组（ $P < 0.001$ ）。心功能异常组的 RCA 段 FAI 值和 LAD 段 FAI 值低于心功能正常组，RCA 段 FAI 值与射血分数、短轴收缩率之间存在负相关，LAD 段 FAI 值与心脏指数呈负相关，并且受到患者狭窄程度的影响。在患者斑块长度，斑块体积，斑块脂质成分含量等协变量矫正后，随着 FAI 值降低，CL 与 FAI 呈“U”型关系。主成分分析显示，根据 RCA 段 FAI 值可以将心功能异常的 CAD 患者与心功能正常的 CAD 患者进行聚类。

结论

FAI 值不仅可以作为指示 CAD 进展的生物传感器，PCAT 的定量参数还可以对患者心功能改变做出一定程度的预测。与其他筛查方法相比，基于 CCTA 测量的 PCAT 衰减值不仅可以无创且准确地检测冠状动脉炎症。同时可以在一次检查内同时对患者心功能的改变做出预警，让一些慢性 CAD 患者在常规复查时注意到潜在的心功能改变，这有助于临床改善 CAD 患者的预后。

PO-1162

肺动脉与升主动脉内径比值对接受使用免疫检查点抑制剂治疗的非小细胞肺癌患者的预后价值

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背景：免疫检查点抑制剂（ICI）的广泛使用导致越来越多的副作用和不良事件。有研究表明 ICI 的使用会增加肺动脉与升主动脉内径（PAD/AoD）比值。但尚不清楚 PAD/AoD 比值的不同进展程度是否会对患者预后造成影响。本研究通过基于肺部增强 CT 的 PAD/AoD 比值来评估使用 ICI 的晚期非小细胞肺癌(NSCLC)患者的预后。

方法：回顾性收集 2020 年 3 月至 2023 年 9 月首次就诊于华中科技大学同济医学院附属协和医院的 III 期或 IV 期 NSCLC 患者的临床和影像学资料。通过胸部增强 CT 扫描图像分别评估患者基线及治疗后最近一次的 PAD/AoD 比值。结果包括客观缓解（ORR）、疾病控制率(DCR)、无进展生存期(PFS)和总生存期（OS）。

结果：共 441 名患者纳入研究，包括 221 名 PAD/AoD 比值进展严重患者及 220 名进展不严重患者。两组患者的基线资料没有显著差异。与非严重进展组相比，严重进展组的 DCR 较低且具有统计学意义(87.8% vs. 96.0%, $P = 0.005$)。同时，严重进展组的 ORR 也较低，尽管没有达到统计学差异(87.5% vs. 96.0%, $P = 0.063$)。在 22.0 个月的中位随访期间，严重进展组有 85 名（38.5%）患者死亡，非严重进展组有 30 名(7.3%)患者死亡。与非严重进展组相比，严重进展组具有更短的 PFS (HR: 1.48 [95% CI, 1.14 to 1.93]; $P = 0.003$) 和 OS(HR: 3.50 [95% CI, 2.30 to 5.30]; $P < 0.001$)。

结论：ICI 治疗扩大了肿瘤患者 PAD/AoD 比值，且更严重的进展程度与更差的预后相关。在随期间对 PAD/AoD 比值进行评估应该是患者 ICI 治疗过程的一部分。

PO-1163

基于瘤内及瘤周影像组术前预测临床 T1 期浸润性肺腺癌的内脏胸膜侵犯：一项多中心的研究

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目的 本研究将尝试建立基于瘤内及瘤周影像组学预测浸润性肺腺癌内脏胸膜侵犯的模型，并且进行独立的外部验证。方法 回顾性收集了 3 家医学中心的 317 例经手术病理确诊的伴有胸膜牵拉征象的浸润性肺腺癌患者的 CT 影像及临床资料，中心 1 的 109 例患者和中心的 100 例患者一起按 7:3 比例随机分为训练集（147）和内部验证测试集（62），中心 3 的 108 例患者作为独立的外部验证集。通过单变量分析、多变量分析、Spearman 相关分析、最小冗余最大相关（mRMR）和最小绝对收缩率和选择运算符（LASSO）用于特征选择。构建并比较临床 CT 语义模型、瘤内影像组学模型、瘤周影像组学模型和瘤内-瘤周影像组学模型。通过计算受试者工作特征曲线下面积（AUC）等指标来评估模型效能，使用决策曲线分析（DCA）来评估模型的临床应用价值。结果 瘤内模型在测试集中表现出最高的性能（AUC = 0.825, 95% CI: 0.789-0.855），高于瘤周模型（AUC = 0.787, 95% CI: 0.755-0.817）、瘤内-瘤周模型（AUC = 0.715, 95% CI: 0.671-0.759）和临床 CT 语义模型（AUC = 0.527, 95% CI: 0.488-0.565），在独立的外部验证集中瘤内模型仍是最高（AUC = 0.819, 95% CI: 0.790-0.848），表明模型具有较强的泛化能力，校准曲线和决策曲线证实

了瘤内影像组学模型的准确度和临床实用性。结论 基于 CT 的肿瘤内影像组学特征对临床 T1 期浸润性肺腺癌的内脏胸膜侵犯有较好的预测能力, 可以为临床诊断及外科治疗方案提供一定的参考依据, 帮助改善患者的预后。

PO-1164

基于胸部定量 CT 探究新型冠状病毒感染患者 俯卧位治疗前后肺结构的变化

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目的: 基于胸部定量 CT 测量探讨新型冠状病毒感染患者俯卧位治疗前后肺结构变化。

方法: 选取 2022 年 12 月-2023 年 2 月延安大学附属医院收治的 50 例新型冠状病毒重症感染患者应用俯卧位治疗患者。回顾性分析俯卧位治疗前后的胸部定量 CT 相关指标和患者动脉血氧分压 (PaO₂)、动脉血氧饱和度 (SaO₂)、氧合指数 (PaO₂ / FiO₂)。采用 SPSS 26 对所收集数据进行统计学处理与分析, 符合正态的计量资料用 $\bar{x} \pm s$ 表示, 不符合正态的计量资料用 M (Q1, Q3) 表示, 多组间比较用 Kruskal-Wallis H 检验, 两组间比较用 Mann-Whitney U 检验。采用 ROC 曲线分析定量 CT 指标的诊断效能。将 P<0.05 有统计学意义。

结果: 患者行俯卧位治疗后, Kruskal-Wallis H 检验显示 PaO₂ (H=27.745 P<0.001)、SaO₂ (H=29.357 P<0.001)、PaO₂ / FiO₂ (H=28.295 P<0.001)、肺炎体积 (H=6.884 P=0.032)、肺炎体积占肺容积百分比 (H=6.281 P=0.043)、肺炎体积平均质量 (H=6.569 P=0.011) 与治疗前比较差异有统计学意义, ROC 曲线分析示肺炎体积曲线下面积 0.639 (P=0.010)、肺炎体积占肺容积百分比曲线下面积 0.632 (P=0.014)、肺炎体积平均质量曲线下面积 0.637 (P=0.011), 结果有统计学意义。

结论: 新型冠状病毒感染患者俯卧位治疗前后胸部定量 CT 及氧合功能变化明显, 胸部定量 CT 可以对新型冠状病毒感染患者治疗疗效提供有力的影像学依据, 值得在临床工作中推广。

PO-1165

4D FLOW CMR 分析儿童室性期前收缩左心室血流特征

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目的: 应用四维血流心血管磁共振 (4D FLOW CMR) 对室性期前收缩 (PVC) 患儿左心室血流特征进行分析, 评估左心室血流成分与左心室功能及 PVC 负荷的关系。

方法: 前瞻性收集 2023 年 6 月至 8 月就诊于我院确诊为 PVC 患儿共 9 例 (年龄: 8±2.9, 男: 5 例), 并收集接受 CMR 检查的无心肺疾病儿童 5 例做为对照组 (年龄: 8±3.8, 男: 2 例)。所有患儿均于 3 天内行 24 小时动态心电图检查及 CMR 测定左心室功能及血流。采用平衡稳态自由进动序列采集心脏电影序列, 测定左心室舒张末期容积、收缩末期容积、射血分数 (LVEF)、每搏输出量等功能参数, 采用三维回顾性心电图触发导航仪门控 4D FLOW 序列进行全心血流扫描, 测定左心室直接血流百分比 (LVPDF)、延迟射血血流百分数 (LVPDEF)、保留流入量血流百分数 (LVPRI) 和残余血流百分数 (LVPRV)。

结果: PVC 患儿 LVPDF、LVPDEF、LVPRI 和 LVPRV 分别为 36.03%±5.59%、23.16%±4.49%、22.98%±3.57%、17.82%±4.6%, 对照组分别为 44.41%±4.00%、22.60%±3.07%、20.41%±4.71%、12.57%±2.51%; PVC 患儿 LVPDF 显著低于对照组 (p<0.01)。PVC 患儿组 LVPDF 与

LVPDEF 及 LVPRV 与 LVEF 均呈负相关趋势 ($r=-0.585$, $P=0.098$; $r=-0.636$, $P=0.066$); (LVPDF+LVPDEF) 为 $(59.19\pm 4.69)\%$, 与 LVEF 呈显著正相关 ($r=0.824$, $P<0.001$), 且 LVEF 与 (LVPDF+LVPDEF) 之间差异无统计学意义 ($P=0.759$)。PVC 患儿 LVPDF 与 PVC 负荷呈显著负相关 ($r=-0.671$, $P=0.048$)。

结论: 4D FLOW CMR 能够在自由呼吸状态下测定 PVC 患儿的左心功能。PVC 患儿左心直接血流减少, 且左心室直接血流与左心室功能、PVC 负荷相关, 是评价 PVC 患儿左室功能及室性期前收缩负荷的重要指标。

PO-1166

基于 CT 体素形态测量法建立列线图预测 COPD 的严重程度

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目的 探讨基于体素的 CT 定量指标, 分析慢性阻塞性肺疾病(COPD)严重程度相关的危险因素, 建立个体化预测重度 COPD 的列线图模型。

方法 收集自 2020 年 5 月至 2021 年 9 月纳入延安大学附属医院行双气相扫描及肺功能检查确诊的 COPD 患者, 最终符合条件的 COPD 患者共计 118 例。按照 COPD(GOLD)严重程度分级(组), 将患者分为轻度 COPD 组(GOLD I、II 级): 66 例; 重度 COPD 组(GOLD III、IV 级): 52 例。比较轻度/重度 COPD 组双气相配准 CT 定量指标及临床指标。用 SPSS 及 R 软件进行统计分析, 建立列线图模型, 分析重度 COPD 的独立危险因素。

结果 双气相配准 CT 定量指标小气道疾病区域百分比(fsad%), 肺气肿区域百分比(Emph%)在轻度 COPD 组和重度 COPD 组之间存在显著差异, 重度 COPD 组高于轻度 COPD 组。同时随着 COPD 严重程度增加, 肺功能指标 FVC、FEV1%pred 和 FEV1/FVC%均下降; 重度 COPD 组吸烟指数高于轻度 COPD 组, 与之对应重度 COPD 组 fSAD%和 Emph%高于轻度 COPD 组; 通过多因素 Logistic 回归分析发现, 吸烟指数、fSAD%、Emph%及正常肺组织 Normal%是重度 COPD 的独立风险因子, 基于上述 4 项危险因素, 建立预测重度 COPD 的风险模型, 影响患者死亡风险权重从高至低的因素依次为: Normal%、Emph%、fSAD%和吸烟指数, 一致性指数 (C-index) 0.786 (95%CI: 0.704~0.867), 灵敏度 0.673, 特异度 0.788, 曲线下面积 (AUC) 为 0.786; 通过校准图对列线图预测模型进行内部验证, 校准图显示模型校准曲线与标准曲线接近。

结论 基于体素的 CT 定量能够准确预测 COPD 严重程度, 通过 Normal%、Emph%、fSAD%和吸烟指数的独立危险因素, 建立的预测 COPD 严重程度的列线图模型, 具有良好的诊断效能和准确度, 对甄别轻度 COPD 和重度 COPD、制定个体化干预方案具有指导意义。

PO-1167

冠心病患者合并高尿酸血症与左心室重构的相关性研究

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目的: 研究冠心病患者伴高尿酸血症与左心室重构的关系。

方法: 收集 2023 年 5 月-9 月心内科确诊为冠心病患者 43 例, 其中冠心病合并高尿酸血症患者 23 例 (A 组), 不合并尿酸升高患者 20 例 (B 组)。纳入标准: 临床确诊为冠心病患者; 患者入院后禁食富含嘌呤食物 1 天后清晨采集静脉血; 使用 3.0T Vida 西门子核磁共振进行心脏核磁增强扫描; 使用 QIC 软件分析心脏左心室重构相关指标, 包括: 射血分数 (%); 舒张末期容积 (ml); 舒张

末期容积指数 (ml/m²);收缩末期容积 (ml);收缩末期容积指数 (ml/m²);重构指数 (m/edv)。排除标准: 严重心脏瓣膜疾病; 肥厚性心脏病; 扩张性心脏病; 心脏淀粉样变性患者。应用 SPSS20 统计软件进行 t 检验分析。

结果: A 组患者在血清尿酸值明显高于 B 组, 差异具有统计学意义 ($P<0.05$)。A 组患者在射血分数 (%); 舒张末期容积 (ml);舒张末期容积指数 (ml/m²);收缩末期容积 (ml);收缩末期容积指数 (ml/m²);重构指数 (m/edv) 较 B 组明显差异, 差异具有统计学意义 ($P<0.05$)。

结论: 冠心病患者伴高尿酸血症患者, 血尿酸升高可能是左心室重构的影响因素。

PO-1168

基于冠状动脉 CTA 评估斑块特征及血流动力学变化对急性冠状动脉综合症的预测价值

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目的 探讨联合冠状动脉病变的解剖学严重程度、斑块形态学及定量特征和血流动力学变化对 ACS 的预测价值。

方法 对 2017 年 6 月~2020 年 12 月在宁夏医科大学总医院行 CCTA 检查的 458 例疑似冠心病患者进行了平均 3.9 年的随访, 最终共 56 例患者出现 ACS, 并采用倾向评分匹配法 ($n=1:4$) 筛选出同期性别及年龄相匹配的 204 例无 ACS 患者作为对照组, 最终研究对象共包括 56 例 ACS 患者 (包含 56 处责任病变) 和 204 例对照组 (包含 229 处非责任病变)。基于病变水平, 对比分析责任病变和非责任病变间冠状动脉病变的解剖学特征、斑块特征及 CT-FFR 的差异, 采用 COX 比例风险回归分析计算不同病变特征的 HR 及 95%CI。并采用 ROC 曲线计算单个及联合指标组成模型的灵敏度、特异度、PPV、NPV、AUC 及 95%CI。

结果 基于病变水平对比不同病变特征的差异, 结果如下: (1) 责任病变与非责任病变在解剖学和功能学等各项指标的对比中存在显著差异。责任病变的管腔直径狭窄率、非钙化斑块负荷及 Δ CT-FFR 值显著高于非责任病变, 低密度斑块和点状钙化的发生率高于非责任病变, 而钙化斑块体积、CT-FFR、最小管腔面积 (MLA) 显著低于非责任病变 (P 均 <0.05)。 (2) Δ CT-FFR (HR: 3.03) 是未来发生 ACS 的最重要危险因素, 其次是钙化斑块负荷 (HR: 2.80,)、MLA (HR: 2.56) 及低密度斑块 (HR: 2.15); (3) 预测模型 (包括低密度斑块、非钙化斑块负荷、MLA、 Δ CT-FFR) 对 ACS 事件的预测能力 (AUC: 0.865, 95%CI: 0.820-0.903) 最高。联合上述指标的模型的敏感度、特异度、PPV、NPV 分别为 78.57%、81.66%、51.20%、94.00%。

结论 Δ CT-FFR ≥ 0.06 、最小管腔面积 $\leq 2.94\text{mm}^2$ 、非钙化斑块负荷 $\geq 39.5\%$ 以及低密度斑块的出现提示未来发生 ACS 的风险高。结合斑块解剖学和功能学对冠状动脉病变的综合评估可以提高对未来 ACS 发生风险高的易损斑块的识别, 从而提高对 ACS 的预测价值。

PO-1169

基于 CMR 评价急性 STEMI 患者心肌内出血对左室动力学的影 响

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目的: STEMI 再灌注后心肌内出血 (IMH) 会加重心肌损伤, 血流动力学 (HDF) 同时反映心肌动力学功能及血流与心肌的相互作用, 本研究旨在明确 STEMI 后心肌内出血与 HDF 的关系, 探讨心梗后 IMH 通过影响左室动力学功能引起远期左室不良重构的潜在机制。

方法: 26 例急性 STEMI 患者分别于 PCI 术后 72h 内 (急性期) 和 6 个月 (慢性期) 行 CMR 检查。根据急性期 CMR 分为 IMH 组 ($n=13$, 57.2 ± 9.8 岁) 和非 IMH 组 ($n=13$, 53.0 ± 6.9 岁)。采用 Medis 软件进行后处理, 测量左室 HDF、LVEDV、LVEF、LGE 范围、心肌节段应变、ECV 等指标。通过 L-S HDF、A-B HDF 及 L-S/A-B HDF 比评估 HDFs 分布, HDFs 参数在整个心跳过程中计算, 包括收缩期和舒张期。

结果: 急性期两组间 HDF、ECV 及应变指标无显著差异, 慢性期 IMH 组 A-B 及 L-S HDF 均较非 IMH 组低 ($10.1[7.2-13.0]\%$ vs. $13.8[10.9-16.7]\%$, $1.8[1.3-2.3]\%$ vs. $2.7[2.0-3.4]\%$, $p<0.01$), 且受损较急性期显著加重 ($1.11[0.27-1.95]\%$ vs. $0.01[-0.66-0.68]\%$, $2.51[0.47-4.55]\%$ vs. $0.11[-2.24-2.46]\%$, $p<0.01$)。IMH 组梗死区及毗邻区 ECV 值较非 IMH 组明显增大 (58.0% vs. 38.1% , 41.4% vs. 32.2% , $p<0.01$), 且 IMH 组梗死区及远隔区 ECV 值持续增高 (46.0% vs. 58.0% , 31.7% vs. 36.4% , $p<0.01$), IMH 组梗死区 RS 及 CS 显著减低 (11.8% vs. 22.1% , -8.1% vs. -14.2% , $p<0.01$)。

结论: HDF 指标可反映急性 STEMI 患者 PCI 术后心肌动力学动态改变, 心肌内出血可引起左室动力学功能持续显著减低, 这与心梗后心肌内出血患者心肌应变减低及纤维化程度持续加重一致, 可能与远期左室不良重构有关。

PO-1170

不同采集方式的 4D Flow 技术对左心室腔内 血流速度测量的比较研究

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目的: 评价局部区域性 4D Flow 技术和全心 4D Flow 技术在左心室腔内血流速度测量的可靠性与一致性, 为临床提供更为准确测量心腔血流的方法。

方法: 收集 2022 年 3 月 1 日-2022 年 5 月 31 日在宁夏医科大学总医院放射科行心脏磁共振检查健康志愿者 31 例 (男=16, 女=15), 年龄 20-30 岁, 同时行超声心动图检查。应用 CVI42 软件测量左心室功能参数, 分别测量和比较局部区域性 4D Flow 图像和全心 4D Flow 图像上收缩期主动脉瓣上、瓣下的血流峰值速度和压力梯度, 以及舒张期二尖瓣血流峰值速度。使用 ICC 相关系数进行超声与磁共振、以及区域性 4D Flow 和全心 4D Flow 图像测量结果的一致性分析。

结果: 心功能参数分析中, 超声心动图与心脏磁共振一致性较高 ($ICC>0.7$)。血流速度分析: 超声心动图、三腔心 4D Flow 与全心 4D Flow MRI 各瓣膜血流速度, 男女之间结果没有显著性差异 ($P>0.001$); 超声心动图与 4D flow CMR 两种扫描方法: 收缩期主动脉瓣上、瓣下峰值速度、主动脉压力梯度, 舒张期二尖瓣 E、A 峰峰值速度一致性较高 ($ICC\geq 0.6$); 三腔心与全心 4D flow MRI 以上速度结果一致性更高 ($ICC>0.75$)。

结论: 局部区域性 4D Flow 技术和全心 4D Flow 技术都可以实现对瓣膜血流速度及压力梯度的可靠评估, 并与超声心动图之间有良好的良好一致性, 但 4D Flow 技术对心腔内血流显示更为直观, 并对复杂流体的速度、压力、容积等信息进行定量测量和分析, 能提供更多的临床所关心的血流动力学指标, 因此 4D Flow 技术可作为一种新的方法对心腔内血流实现可视化与精准测量, 为更好服务于临床。

PO-1171

囊腔类肺癌 CT 影像学特征及其与病理相关性分析

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目的 分析囊腔类肺癌的 CT 影像学特征, 并探讨其与病理相关性, 旨在提高术前诊断准确率并为临床提供有价值的预后信息。方法 回顾性收集 CT 表现为肺内含囊腔病灶并经手术病理证实为肺癌的 108 例患者的临床及术前影像资料, 依据腺癌病理亚型将其分为不同预后危险组, 分析 CT 影像征象在不同预后危险组间的差异并构建预测模型。结果 108 例囊腔类肺癌中腺癌 106 例, 鳞癌 1 例, 腺癌局灶鳞癌分化 1 例。106 例肺腺癌中依据其病理亚型分为低危组 45 例、中高危组 61 例。肺腺癌低危组与高危组的病灶大小、囊壁厚度、壁结节、实性成分差异有统计学意义 ($P < 0.05$), 多因素二元 Logistic 回归分析显示病灶平均径 ($OR = 1.084$, $P < 0.05$)、囊壁厚度 ($OR = 3.036$, $P < 0.05$) 为独立危险因素, 该模型 AUC 值 0.768, 诊断灵敏度和特异度分别为 70.5%、73.3%。结论 囊腔类肺癌更多见于肺腺癌, 联合病灶平均径和囊壁厚度的 CT 影像特征有助于判断肺腺癌不同病理亚型的预后分组。

PO-1172

3mm 和 6mm 瘤周放射组学模型预测非小细胞肺癌的淋巴结转移效能

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目的: 评估基于不同尺度瘤周体积 (PTV) 放射组学模型提高预测非小细胞肺癌 (NSCLC) 淋巴结转移的准确性方法。

材料与方法: 回顾性分析 2012 年 4 月至 2022 年 5 月期间接受 CT 薄层扫描、术前 2 周内病理确诊为纯实性结节或肿块样 NSCLC 的 167 例患者, 按 7:3 的比例随机分为训练数据集和测试数据集。在非增强计算机断层扫描 (NCECT) 的肺部窗口 (窗口宽度, 1500 HU; 窗口水平, -500 HU) 下, 使用 3D Slicer (5.0.3 版) 为 167 名癌症患者的 167 个病灶勾勒出 3 mm PTV 和 6mm PTV 两个感兴趣区 (ROI)。体素大小调整为 $1\text{mm} \times 1\text{mm} \times 1\text{mm}$, 并对原始图像进行了重新采样。使用该软件自带的放射组学软件包提取放射组学特征, 并使用组内和组间相关系数评估 (ICC)、相关分析、梯度提升决策树 (GBDT) 和逻辑回归等方法进行放射组学特征筛选, 构建 3mm PTV 和 6mm PTV 放射组学模型。

结果: 3mm PTV 建立的放射组学模型 (训练: $AUC = 0.651$; 测试: $AUC = 0.607$) 比 6mm PTV 放射组学模型 (训练: $AUC = 0.624$; 测试: $AUC = 0.365$) 具有更好的诊断性能。

结论: 本研究表明, NCECT 中的 3mm PTV 放射组学模型在预测纯实性结节或肿块样 NSCLC 患者的淋巴结转移方面优于 6mm PTV 放射组学模型。大多数研究者通过肿瘤总体积 (GTV) 的放射组学预测淋巴结转移与否, 而我们倾向 PTV 的放射组学信息是否能够预测非小细胞肺癌淋巴结转移情况。针对不同尺度的 PTV 放射组学研究层出不穷, 但关于通过原发灶及原发灶周围的放射组学信息来预测淋巴结转移的研究较匮乏。我们的研究针对 3mm 和 6mm 这两种瘤周尺度放射组

学进行建模, 最终发现 3 毫米 PTV 放射组学模型的诊断效果优于 6mm PTV 放射组学模型, 我们猜测, 可能 6mm 瘤周所包含的正常肿瘤组织成分范围较广, 而 3mm 的瘤周更加接近于原发灶, 所包含的肿瘤信息较为丰富, 因此 3mm PTV 放射组学相较于 6mm PTV 对 NSCLC 淋巴结转移的术前诊断更加具有辅助作用。

PO-1173

深度学习 (DLR) 与混合迭代 (HIR) 重建算法联合 CE-boost 后处理技术对下肢静脉 CTV 图像质量影响的对比探究

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目的: CT 下肢静脉成像 (CTV) 往往强化效果不佳, 对比剂增强技术 (CE-boost) 可回顾性提升血管强化效果。本研究旨在评估深度学习重建 (DLR)、混合迭代重建 (HIR) 及 DLR 和 HIR 三次 CE-boost 对 CTV 图像客观、主观图像质量影响。

方法: 2021.06-2022.10 纳入 70 名患者, 年龄 (49.63 ± 14.70) 岁。使用佳能 CT 扫描机, 平扫、增强扫描方案均为 100kVp、噪声指数 8.8, HIR (A 组) 和 DLR (B 组) 重建层厚、层间距均为 1.0mm、0.8mm。经减影软件可获得 1-3 次减影后 HIR 和 DLR 图像。分别测量下腔静脉 (IVC)、股静脉 (FV) 和腘静脉 (PV) CT 值, 计算 SNR、CNR, 并由两名医师采用双盲法进行主观评估 (图像噪声 3 分法、静脉强化效果及整体图像质量均用 5 分法), 并记录辐射剂量。

结果: 原始增强图像和 1-3 次减影图像 IVC 的平均 CT 值 (HU) 为 (146.65 ± 17.44)、(199.01 ± 26.22)、(277.28 ± 39.80)、(393.73 ± 61.91), IVC、FV 和 PV 平均衰减在 2 组间无统计学差异。1-3 次 CE-boost 图像 IVC、FV 和 PV 衰减分别是原始图像的 1.3 (1.31-1.36)、1.8 (1.76-1.89) 和 2.6 (2.42-2.68) 倍。DLR、3 次 DLR CE-boost 图像的噪声 (HU) 分别为 (12.47 ± 2.67)、(8.99 ± 3.08)、(10.42 ± 5.76)、(14.71 ± 11.18) 明显低于 HIR 和 HIR CE-boost 图像 (21.28 ± 3.74)、(21.71 ± 5.65)、(26.59 ± 9.03)、(36.42 ± 15.01) (P 均 < 0.05)。DLR、DLR-CE-boost 图像 SNR、CNR、主观图像质量明显高于对应的 HIR、HIR-CE-boost 图像 (P 均 < 0.05)。

结论: 与 HIR、HIR CE-boost CTV 图像相比, DLR、DLR-boost 可在较低辐射剂量、较低对比剂用量, 获得满足临床诊断的优质图像, 值得临床应用。

PO-1174

增强 CT 放射组学模型: 能否为预测非小细胞肺癌的淋巴结转移提供增量价值

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目的: 比较增强 CT (CECT) 和非增强 CT (NCECT) 的放射组学模型 (RM) 预测非小细胞肺癌 (NSCLC) 淋巴结转移的诊断效能。

材料与方法: 回顾性分析 2012 年 4 月至 2022 年 5 月期间接受 CT 薄层扫描、术前 2 周内病理确诊为纯实性结节或肿块样 NSCLC 的 167 例患者, 按 7:3 的比例随机分为训练数据集和测试数据集。使用 3D Slicer (5.0.3 版) 为 167 名癌症患者的 167 个病灶在肺部窗口 (窗口宽度, 1500 HU; 窗口水平, -500 HU) 下, 从 NCECT 和 CECT 图像中在整个病变上逐层勾勒出感兴趣区域 (ROI), 并去除空腔区域及周围大血管。体素大小调整为 $1\text{mm} \times 1\text{mm} \times 1\text{mm}$, 并对原始图像进行重新采样。

使用该软件自带的放射组学软件包提取放射组学特征, 并使用组内和组间相关系数评估 (ICC)、相关分析、梯度提升决策树 (GBDT) 和逻辑回归等方法进行放射组学特征筛选, 构建 NCECT-RM 和 CECT-RM。

结果:CECT 建立的 RM (训练: $AUC = 0.664$; 测试: $AUC = 0.652$) 比 NCECT 放射组学模型 (训练: $AUC = 0.63$; 测试: $AUC = 0.596$) 具有更好的诊断性能。

结论: 本研究表明, CECT 放射组学模型在预测纯实性结节或肿块样 NSCLC 患者的淋巴结转移方面优于 NCECT 放射组学模型。大多数研究者通过 NCECT 的放射组学信息对肿瘤的相关信息进行分析, 而我们更倾向于发掘 CECT 的放射组学信息的有用性。基于 CECT 的放射组学的应用越来越广泛。相关研究表明, 碘增强成像比非增强成像的纹理分析能够更好地预测肺腺癌的侵袭性。虽然也有研究表明基于平扫 CT 的放射组学模型相比, 基于增强 CT 的放射组学模型在识别肺部良恶性结节方面没有带来额外的价值。但对于 CECT 在预测非小细胞肺癌的淋巴结转移这方面研究较少。我们的研究针对 CECT 和 NCECT 放射组学信息进行建模, 发现 CECT 放射组学模型在预测非小细胞肺癌淋巴结转移的诊断效能方面优于 NCECT 放射组学模型。

PO-1175

基于心脏 MRI 评估肥厚型心肌病与压力负荷对心肌重塑的交互作用

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目的: 为研究压力负荷增加对于肥厚性心肌病 (hypertrophic cardiomyopathy, HCM) 患者左心室形态、功能及组织特征的影响, 揭示 HCM 患者病理状态下的心肌对于压力负荷增高的重塑模式, 指导临床对伴有 HTN 的 HCM 患者的诊断与治疗。

方法: 回顾性收集 PACS 系统中 HCM 患者的心脏磁共振图像, 序列包括电影序列、T1 Mapping 及延迟强化, 使用 CVI42 后处理软件获得心功能参数、左心室心肌应变参数、T1 Mapping 参数, 并使用增强前、后的 T1 Mapping 生成细胞外容积分布图 (extracellular volume fraction, ECV)。将患者按照伴或不伴有高血压为分类标准分为两组进行比较分析。

结果: 在纳入的 35 名 HCM 患者中, 16 名 (46%) 患者伴有高血压, 两组患者的左室射血分数 (left ventricular ejection fraction, LVEF) 无显著差异 ($50.21\% \pm 15.11$ 比 $58.22\% \pm 11.12$, $P=0.08$), 但心指数 (Cardiac index, CI) 发生了显著的下降 (2.39 ± 0.87 比 2.93 ± 0.64 , $P=0.045$)。伴高血压的 HCM 组的峰值整体纵向应变 (peak global longitudinal strain, PGLS) 和峰值整体周向应变 (peak global circumferential strain, PGCS) 损伤 (分别为 -9.21 ± 2.91 比 -11.58 ± 2.83 , $P=0.032$; -14.28 ± 3.82 比 -18.47 ± 2.54 , $P=0.002$), 而并未发现左心室峰值整体径向应变 (peak global radial strain, PGRS) 的显著差异。左心室增强前、后 T1 值以及 ECV 均未发现显著差异。

结论: 合并高血压的 HCM 患者心肌射血功能、左心室顺应性较单纯 HCM 患者损伤加重, 这可能会影响 HCM 患者的远期预后。传统检测心功能的指标 LVEF 不能发现这种差异, CI 和 PGLS、PLCS 是一种检测这种损伤的更灵敏的工具。

PO-1176

光谱 CT 多参数成像定量分析在评估浸润性肺腺癌病理分级中的应用价值

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目的 探讨光谱 CT 多参数成像评价浸润性肺腺癌 (ILA) 病理分级的价值。**方法** 回顾性分析 2019 年 7 月至 2022 年 7 月在解放军总医院海南医院经术后病理证实并行光谱增强 CT 扫描的 61 例实性 ILA 患者资料, 并根据 2020 年国际肺癌研究协会提出的 ILA 病理分级系统进行分组, G1、G2 级为低级别组 (31 例), G3 级为高级别组 (30 例)。比较低级别组与高级别组的临床特征 (性别、年龄、吸烟史、分期)、形态学参数 (肿瘤大小、分叶征、毛刺征、空气支气管征、空泡征及胸膜凹陷征), 光谱参数 [碘浓度 (IC)、标准化碘浓度 (NIC)、有效原子序数 (Zeff)、单能量 CT 值 (CT_{40keV}、CT_{70keV})、曲线斜率 K 值 (40-70keV)], 并利用 Multiphase 软件生成细胞外容积 (ECV) 图, 测量病灶的 ECV 值, 后期计算动脉期联合参数 (AP_{all})、静脉期联合参数 (CP_{all})。绘制受试者工作特征曲线 (ROC) 计算曲线下面积 (AUC) 分析各参数鉴别 ILA 病理分级的效能, AUC 间比较采用 Z 检验。**结果** 低级别组 ILA 的形态学参数与高级别组无明显差异。低级别组 IC、NIC、Zeff、ECV 值在动脉期及静脉期均显著高于高级别组 [其中代表参数为: 动脉期 Zeff: 8.10±0.14 比 7.91±0.16; 静脉期 Zeff: 8.13±0.20 比 8.03±0.15] (P 均<0.05)。ROC 曲线分析显示, 动脉期 IC、NIC、Zeff、ECV 值诊断效能优于静脉期, AUC 值 (动脉期: 0.776、0.740、0.831、0.768 vs. 静脉期: 0.749、0.725、0.702、0.732), 动脉期联合参数 AP_{all} 诊断效能优于单独参数, AUC、特异度、敏感度分别为 0.855、83.3%、83.9%。**结论** 光谱 CT 多参数成像定量分析有助于 ILA 病理分级, 动脉期 Zeff、IC、NIC、ECV 值诊断效能优于静脉期, 动脉期联合参数诊断效能优于单独参数。

PO-1177

不同病理级别囊腔型肺腺癌的临床及影像特征分析

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摘要: **目的** 探讨不同病理级别囊腔型肺腺癌的临床及影像特征。**方法** 回顾性分析本院 2016 年 3 月至 2022 年 10 月共计 68 例经病理证实的 3 种病理级别囊腔型肺腺癌的临床及影像学特点。**结果** 68 例囊腔型肺腺癌均为单发病灶, 病理以浸润性腺癌为主, 多见于中老年男性, 多数无症状, 好发于两肺外带, 平均直径 2.1±1.0cm, 壁结节以磨玻璃结节多见。不同病理级别囊腔型肺腺癌在囊壁形态、囊腔形态及有无分隔均存在差异 (P<0.05), 恶性征象包括空气支气管征 16 例 (23.5%)、血管穿行征 65 例 (95.6%)、血管集束征 17 例 (25%)、毛刺征 30 例 (44.1%)、分叶征 35 例 (51.5%)、胸膜牵拉征 36 例 (52.9%), 研究结果发现病理级别越高, 病灶表现的恶性征象越多、越明显。Mascalchi 形态分型中以 III 型最多见。**结论** 不同病理级别的囊腔型肺腺癌临床表现无特异性, 囊壁及囊腔的 CT 特征有诊断价值, 恶性征象及生长方式有一定特点。掌握其影像特点可提高诊断率, 有助于病变的早期定性。

PO-1178

能谱纯化技术联合 ADMIRE 重建算法在超低剂量 CT 肺功能定量中应用的前瞻性探究

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目的 探究超低剂量 CT (ULDCT) 能谱纯化 (SPS) 技术用于定量诊断肺气肿的可行性

方法 应用三代双源 CT, 纳入 70 例肺气肿患者, 分别行常规低剂量 CT (LDCT) 及 ULDCT, LDCT 120kV, CARE 4D, 预设值 50mAs; ULDCT Sn150kV, 其他参数同 LDCT。用滤波反投影算法 (FBP) 重建 LDCT 图像 (LDCT-FBP 组), FBP (ULDCT-FBP 组)、高级模型迭代重建 ADMIRE 1~5 级重建 ULDCT 图像 (ADMIRE 1~5 组), 层厚、层间距均为 1.0mm, 使用 Pulmo 3D 测量各组图像参数, 记录机器自动生成的 CTDI、计算 ED。单因素方差分析对比各组定量结果, 辐射剂量对比采用配对样本 t 检验。

结果 LDCT-FBP 组 TLC、MLD 与 ULDCT 各组均无统计学差异 (FTLC=0.071, PTLC=0.999; FMLD=0.444, PMLD=0.849)。随 ADMIRE 等级增高, ULDCT 各组 EI、Perc 15 逐渐下降, LDCT-FBP 组、ULDCT-FBP 组、ULDCT-ADMIRE 1~5 组 EI (%) 分别为 (3.96±3.34)、(7.86±4.42)、(6.78±4.15)、(5.73±3.84)、(4.76±3.46)、(3.65±2.94)、(2.63±2.57), Perc 15 (HU) 分别为 (-919.21±21.00)、(-929.80±16.97)、(-926.65±16.06)、(-923.22±17.12)、(-919.95±21.38)、(-917.40±20.18)、(-915.14±16.06), LDCT-FBP 组与 ULDCT-ADMIRE 3~5 组 EI、Perc 15 无统计学差异 (P 均 > 0.05)。ULDCT 辐射剂量 CTDI(mGy·cm) (0.91±0.30)、ED(mSv) (0.36±0.13) 明显低于 LDCT (4.30±1.53)、ED (1.73±0.65), 有效剂量 ED 降低约 78%。

结论 ULDCT 采用 SPS 技术联合 ADMIRE (3~5 级) 迭代重建算法可用于肺气肿定量, 并能大幅度降低受检者 ED。

PO-1179

MSCT 对 Stanford B 型主动脉夹层破裂的诊断价值

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目的: 评价 Stanford B 型主动脉夹层破裂的 MSCT 表现, 探讨 MSCT 在主动脉夹层破裂中的诊断价值; 方法: 回顾性分析 Stanford B 型 38 例主动脉夹层破裂患者 (A 组) MSCT 图像, 分析主动脉破裂 CT 表现, 并与 38 例 Stanford B 型主动脉夹层非破裂组 (B 组) 进行对比; 评价指标包括: 破口处主动脉直径、夹层破裂部位、真假腔大小、主动脉管壁、假腔血栓、主动脉周围情况、胸腔积液; 结果: A 组与 B 组年龄无显著性差异; 夹层破裂部位为主动脉弓降部小弯侧 31 例, 破裂位于降主动脉为 7 例, 二者具有显著性差异; A 组破口处主动脉直径、假腔均大于 B 组且有显著性差异, B 组假腔内血栓较 A 组多且有显著性差异, A 组均见主动脉管壁不规则, 局部见“鸟嘴”或尖角状突起; A 组主动脉周围间隙模糊, 周围见高密度血肿, 部分假性动脉瘤形成, 血肿的分布和密度可提示主动脉破裂的部位; A 组胸腔积液较 B 组多且有显著性差异。结论: MSCT 作为快速、无创的检查方法, 能准确显示主动脉夹层破裂及其范围、并发症, 对于主动脉夹层先兆破裂具有重要价值, 对于临床手术方案的选择具有重要参考意义。

PO-1180

胸内原发滑膜肉瘤的 CT 表现及预后因素分析

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目的 探讨胸内原发滑膜肉瘤 CT 表现及预后相关因素。方法 回顾性分析河北医科大学第四医院 2016 年 1 月至 2023 年 5 月经手术或穿刺病理证实的 14 例胸内原发滑膜肉瘤患者的临床、影像资料及随访结果。结果 病变长径为 2.1~17.8cm，类圆形者 6 例，不规则形者 8 例。边缘清楚者 10 例，模糊者 4 例。边缘分叶者 9 例，其中深分叶 4 例。病变密度均不均匀。病变均呈不均匀强化，轻-中度强化者 10 例，明显强化者 4 例。7 例病变可见瘤内血管影。5 例胸膜-肺病变均合并胸腔积液。1 例支气管病变合并阻塞性肺不张及胸腔积液，1 例纵隔病变侵犯心包合并心包积液。所有病例均无淋巴结肿大。随访时间 3~79 个月，2 例失访。总体生存期为 3-51 个月。12 例 IPSS 中，死亡者 6 例（50%），均因复发/转移死亡；存活者 6 例（50%），其中 3 例存在复发/转移。结论 胸内原发滑膜肉瘤的 CT 表现具有一定的特异性，且对于肿瘤的预后评估具有重要参考价值。

PO-1181

无冠心病患者的不同临床特征与通过冠脉 CTA 量化的冠状动脉周围脂肪组织衰减增加值之间的关系

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目的 使用冠状动脉 CT 血管造影（Coronary computed tomography angiography, CCTA）来测量冠状动脉周围脂肪组织（Pericoronary adipose tissue, PCAT）衰减增加值，以早期识别高风险的临床特征，并探索无冠心病（Coronary artery disease, CHD）患者 PCAT 衰减增加值与不同临床特征之间的关系。材料与方法 回顾性收集 2020 年 7 月至 2022 年 7 月期间于我院行 CCTA 检查的符合条件的无 CHD 患者，共 785 名。记录每位患者的临床数据如年龄、性别、是否吸烟等。基于 CCTA 图像，使用全自动软件量化每位患者左前降支（LADPCAT）、左回旋支（LCXPCAT）和右冠状动脉（RCAPCAT）近段的 PCAT 衰减增加值。使用单变量和多变量分析，以确定不同临床特征与 LADPCAT、LCXPCAT 和 RCAPCAT 升高之间的关系。结果 单变量分析显示体重指数（Body mass index, BMI）与 LADPCAT（ $rs=0.109$, $P=0.002$ ）、LCXPCAT（ $rs=0.076$, $P=0.032$ ）和 RCAPCAT（ $rs=0.083$, $P=0.019$ ）呈正相关。此外，烟龄和饮酒史与 LADPCAT 呈正相关（ $rs=0.099$, 0.165 ; $P=0.006$, 0.000 ）。高脂血症与 LADPCAT（ $rs=0.089$, $P=0.012$ ）和 RCAPCAT（ $rs=0.334$, $P=0.000$ ）呈正相关，而使用他汀类药物与 RCAPCAT（ $rs=-0.145$, $P=0.000$ ）呈负相关。多变量分析显示，LADPCAT 的重要决定因素是 BMI（ $\beta=0.359$, $P=0.001$ ）、烟龄（ $\beta=2.612$, $P=0.002$ ）、饮酒史（ $\beta=4.106$, $P<0.001$ ）和高脂血症（ $\beta=1.664$, $P=0.027$ ）。并且，LCXPCAT 与 BMI 相关（ $\beta=0.218$, $P=0.024$ ），而 RCAPCAT 与高脂血症（ $\beta=6.110$, $P<0.001$ ）和使用他汀类药物（ $\beta=-3.338$, $P<0.001$ ）相关。

PO-1182

定量 CT 肺功能检查用于小气道疾病：图像质量控制和外部验证

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目的:评估定量 CT 肺功能检查(QCT-PFT)中呼吸协调性对定量分析结果及小气道疾病(SAD)诊断准确性的影响,并对定量 CT 参数进行外部验证。

材料与方法:回顾性收集同时行 QCT-PFT 和金标准呼吸流量测定的 306 例患者。设计客观图像质量评分系统:呼吸努力程度(Degree of respiratory effort, DRE) = 吸气与呼气 CT 扫描的肺总量差值(TLC insp - TLC exp) / 用力肺活量(forced vital capacity, FVC)。根据 DRE 值将图像质量按百分位数分布等分为 3 个切面:组 1(低质量:DRE \leq 0.39)、组 2(一般质量:0.40 \leq DRE \leq 0.69)、组 3(高质量:DRE \geq 0.70)。采用受试者工作特征曲线(ROC)分析比较功能性气体捕获(fGT)对 3 组 SAD 的诊断效能。以 DRE 作为校正因子校正诊断 SAD。

结果:在高质量组中,fGT 诊断 SAD 的曲线下面积(AUC)为 0.88 (95% CI: 0.80 ~ 0.96)。在中等质量组中,fGT 诊断 SAD 的 AUC 为 0.76 (95% CI: 0.65 ~ 0.86)。在低质量组中,fGT 诊断 SAD 的 AUC 为 0.58 (95% CI: 0.46 ~ 0.70)。在中等质量组中,校正后的 fGT 增加,AUC 增加到 0.87 (95% CI: 0.79 ~ 0.95)。低质量组校正因子失效。

结论:本研究设计了合理的评价图像质量的客观指标。通过对 DRE 评估的高质量数据进行必要校正,可以提高 QCT-PFT 对 SAD 的诊断效能,为 QCT-PFT 的质量控制和进一步应用提供了一种简单有效的方法。

PO-1183

成人肺炎性肌纤维母细胞瘤 CT 特征与病理对照

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目的:结合病理探讨肺部炎性肌纤维母细胞肿瘤 (inflammatory myo-Fibroblastic tumor, IMT) 的 CT 特征以提高本病的认识及诊断水平。

资料与方法:结合病理回顾性分析经手术证实的 7 例肺部 IMT 的影像、临床资料并复习文献。

结果:7 例患者均单发,6 例为周围型,1 例位于左肺下叶跨基底段支气管壁腔内外生长。3 例病理为黏液/血管型,包含 1 例囊实性肿物,囊性成分规则,2 例实性结节,3 例均呈中度或明显强化;2 例病理为梭形细胞丰富型,包含 1 例部分实性结节,1 例实性结节,呈明显强化;2 例病理为纤维型,包含 1 例囊实性肿物,囊性成分不规则,1 例实性结节,边缘见长毛刺,2 例均呈轻度强化。4 例有分叶。3 例瘤-肺交界清楚,3 例瘤-肺交界毛糙,1 例瘤-肺交界模糊。2 例侵及胸膜,1 例侵及支气管壁。7 例均钙化及转移。

结论:肺 IMT 是一种少见的交界性肿瘤,不同病理类型 CT 特征略有不同,具有一定特征性,确诊需病理及免疫组化检查。

PO-1184

单次短屏气法在冠状动脉 CT 减影血管成像中的应用

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[摘要]

目的 冠状动脉 CT 血管成像技术用于评价冠状动脉钙化节段及植入支架节段管腔狭窄的能力有限，主要因钙化及支架的硬化伪影所致，而减影冠状动脉 CT 血管成像技术可将两次扫描图像数据相减，以避免硬化伪影的影响，该方法已成熟应用于头颈部血管检查，减少了颅骨和椎骨的影响，使后处理过程简单有效，但因心脏搏动的影响，使其在心血管领域发展滞后。第二代东芝 320 层 CT 将 Registration 配准软件应用于减影冠状动脉 CT 血管成像，使病灶对位更精确，但需要较长的屏气时间，因此部分患者难以完成，导致该技术仍未广泛应用于临床。本研究采用改良单次短屏气法，探究其在减影冠状动脉 CT 血管成像的应用及对成像质量的影响。

方法 运用单次屏气法，尽可能推迟减影冠状动脉 CT 血管成像第一次扫描的时间。分别后处理第二次扫描图像和减影后图像，采用 4 分制对同一患者常规冠状动脉 CT 血管成像(CCTA)及减影 CCTA (S-CCTA)图像质量进行评价。

结果 21 例患者的平均屏气时间为 10.34 ± 1.07 秒。用 4 分制对 18 例患者的 90 个冠脉钙化节段及 3 例患者 5 枚支架的图像质量进行评估，常规 CCTA 和 S-CCTA 钙化节段平均图像质量评分分别为 2.48 ± 0.70 分、 3.47 ± 0.69 分 ($P < 0.001$)。常规 CCTA 和 S-CCTA 支架平均图像质量评分分别为 1.84 ± 0.23 分、 2.75 ± 0.29 分 ($P < 0.05$)，差异有统计学意义。

结论 减影冠状动脉 CT 血管成像技术有两次屏气法和单次屏气法 2 种方式，前者是指通过两次屏气扫描分别获得两张图像，但两张图像无法完全匹配，可能会导致配准错误；单次屏气法是指通过一次屏气获得两张图像，减少了配准误差，但传统单次屏气法需 20~40 s，部分患者无法完成；改良的单次短屏气减影冠状动脉 CT 血管成像技术可减少屏气时间至 <12 秒，且较冠状动脉 CT 血管成像技术提高图像评估质量。

PO-1185

肺定量 CT 不同呼吸屏气状态下肺结节测量的差异分析

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目的：通过肺 CT 定量分析测量肺结节在双气相肺 CT 扫描中的大小、密度、形态的变化情况。方法：回顾性分析 2022 年 6 月—2022 年 9 月 182 例患者进行双气相 CT 扫描的图像。我们设计了一个定量评价图像质量的标准，屏气的努力程度 (DRE)，并使用 DRE 将图像质量分成低、中、高质量三组。比较低、中、高质量组的 CT 定量参数和肺结节相关参数。结果：三组不同图像质量的肺结节体积存在显著差异 ($P = 0.005$)。在实性肺结节中，低质量组与高质量组的肺结节平均密度 ($P = 0.006$)、体积 ($p < 0.001$) 存在显著差异。在磨玻璃结节中，三组图像质量的肺结节平均密度存在显著差异 ($P = 0.013$)。在部分实性结节中，低质量组与高质量组的肺结节平均密度存在显著差异 ($P = 0.037$)。在不同部位的肺结节中，右肺中叶肺结节的体积在不同呼吸屏气状态下存在显著差异。结论：肺结节在定量 CT 扫描的不同屏气状态下的形态、密度差异可能会影响病灶的随访。因此通过定量分析和图像质量控制，判断不同图像质量对肺结节测量的影响程度，能够在结节的随访过程中提供更有价值的诊断和评价。

PO-1186

胎儿肺先天发育性疾病 MRI 表现的个案报道及回顾性分析

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目的：胎儿肺先天发育性疾病是比较少见的肺发育性疾病，早期诊断并及时干预有利于提高患儿的存活率。本研究针对相关时间段内的胎儿肺先天发育性疾病进行个案报道及回顾性分析。

材料与方法：收集 2016 年 1 月至 2020 年 12 月在我院就诊的 23 例诊断为肺隔离症或先天性肺气道畸形的胎儿患者，其中 3 例患儿出生后行外科手术治疗。所有胎儿均行磁共振（Magnetic resonance imaging, MRI）检查，回顾性分析其临床表现、MRI 影像资料并进行随访。MRI 影像评估包括测量病灶大小、观察有无异常供血动脉。

结果：23 例胎儿患者均为母体中晚期孕行 MRI 扫描检查发现，母体孕周为 22-33 周。3 例患儿出生后行外科手术证实，其中 1 例为叶内型肺隔离症（Pulmonary sequestration, PS），1 例为先天性肺气道畸形（Congenital pulmonary airway malformation, CPAM），1 例为先天性膈膨升（Congenital diaphragmatic eventration, CDE）。其余 20 例无随访结果（其中 10 例为引产，10 例为失访）。3 例患儿中 1 例先天性膈膨升为本院外科手术治疗证实，术前诊断为肺隔离症，余 2 例为本市另外两家三甲医院手术治疗证实。3 例患儿中，1 例 PS 及 1 例 CPAM 病灶位于右肺下叶，另 1 例 CDE 病灶位于左肺下叶；1 例 PS 患儿异常供血动脉起自胸主动脉。

结论：MRI 检查无辐射、无创，有较好的软组织分辨率，可多参数、多平面成像，对胎儿肺先天发育性疾病具有一定的临床诊断价值。

PO-1187

探讨深度学习重建算法在改善 CTPA 图像质量中的价值

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目的：比较滤波反投影重建算法（FBP）、常规迭代重建算法（ASiR-V）及深度学习重建算法（DL）在肺动脉 CT 血管成像（CTPA）中对图像质量的影响。

方法：回顾性分析 2023 年 7 月至 2023 年 8 月于我院行 CTPA 扫描的 50 例患者的临床及影像资料，其中男性 30 例，女性 20 例，平均年龄 64.3 ± 13.0 岁，管电压 120kV，对比剂用量 35ml，扫描数据分别进行 FBP、ASiR-V60%、ASiR-V80%、深度学习中档（DL-M）、深度学习高档（DL-H）重建。分别于肺动脉主干、左肺动脉干、右肺动脉干及肺动脉主干层面竖脊肌放置 ROI，测量 CT 值及图像噪声；分析比较五种重建算法 CT 值、图像噪声、信噪比（SNR）、对比噪声比（CNR）、主观图像质量评分。对于 CT 值、噪声、SNR 及 CNR，采用 Kolmogorov-Smirnov 检验进行正态性检验，符合正态分布采用单因素方差分析，对不符合正态分布的采用 Kruskal-Wallis 检验进行分析，两两比较采用 LSD 法。采用 Mann-Whitney U 检验比较图像主观评分，采用 ICC 检验对两名医师主观图像评分一致性进行分析，以 $P < 0.05$ 为差异具有统计学意义。

结果：所有图像均满足临床诊断要求。五种重建算法的肺动脉主干、右肺动脉干、左肺动脉干的 CT 值差异均无统计学差异（ $P > 0.05$ ）；5 组重建算法的肺动脉主干、右肺动脉干及左肺动脉干的噪声、SNR、CNR 差异均有统计学意义；深度学习重建组肺动脉主干、右肺动脉干及左肺动脉干图像噪声显著低于 FBP 重建及 ASiR 重建，但 SNR 及 CNR 值显著高于 FBP 重建及 ASiR 重建；深度学习重建组图像主观质量评分较 FBP 组及 ASiR 重建组显著提高。

结论：与 FBP 及 ASiR 重建相比，深度学习重建算法可以显著提高图像质量。

PO-1188

基于双源 CT 下人工智能 CT 血流储备分数联合冠状动脉周围脂肪衰减指数对高海拔地区冠状动脉粥样硬化性心脏病的评估及预测

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目的 分析基于双源 CT 下人工智能 CT 血流储备分数 (FFR) 联合冠状动脉周围脂肪衰减指数 (FAI) 对高海拔地区冠状动脉粥样硬化性心脏病的评估及预测。方法 选取 2021 年 10~12 月于我院行冠脉 CT 血管造影 (CTA) 检查的 63 例疑似冠心病患者, 以冠脉 CTA 结果将患者分为血管狭窄率 $\geq 50\%$ 组与血管狭窄率 $< 50\%$ 组。比较冠脉狭窄程度、CT-FFR 与冠脉周围 FAI 检查结果; 根据冠脉血管钙化程度分组, 比较轻中度钙化组、重度钙化组中血管狭窄率 $\geq 50\%$ 组与 $< 50\%$ 组的 CT-FFR、冠脉周围 FAI 检查结果, 分析各组间 CT-FFR 与冠脉周围 FAI 单独与联合的诊断效能。结果 本研究 63 例患者中共检查 79 支冠脉血管, 血管狭窄率 $\geq 50\%$ 组共 24 支血管, 血管狭窄率 $< 50\%$ 组 55 支。血管狭窄率 $\geq 50\%$ 组与血管狭窄率 $< 50\%$ 组的病变长度差异无统计学意义 ($P > 0.05$), 单支血管冠脉狭窄率的差异具有统计学意义 ($P < 0.05$)。血管狭窄率 $\geq 50\%$ 组的 CT-FFR 低于血管狭窄率 $< 50\%$ 组, 冠脉周围 FAI 高于血管狭窄率 $< 50\%$ 组 ($P < 0.05$)。63 例患者中, 冠脉血管轻中度钙化 47 例, 重度钙化 16 例。轻中度钙化组中血管狭窄率 $\geq 50\%$ 组冠脉狭窄率高于血管狭窄率 $< 50\%$ 组, CT-FFR 低于血管狭窄率 $< 50\%$ 组 ($P < 0.05$)。重度钙化组中血管狭窄率 $\geq 50\%$ 组 CT-FFR 低于血管狭窄率 $< 50\%$ 组, 冠脉周围 FAI 高于血管狭窄率 $< 50\%$ 组, 两组冠脉狭窄率差异无统计学意义 ($P > 0.05$)。ROC 曲线显示, CT-FFR+冠脉周围 FAI 对血管钙化的诊断效能相对于两者单独检查有显著提升 ($P < 0.05$)。结论 CT-FFR 对重度钙化血管诊断效能较低, 联合冠脉周围 FAI 能为血流异常的冠心病患者提高诊断价值。

PO-1189

基于 CT 放射组学应用于预测抗-MDA5 阳性皮损炎患者的快速进展性间质性肺病和全因死亡

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目的: 评估基于 HRCT 放射组学用于预测抗-MDA5 阳性皮损炎相关间质性肺病 (MDA5+ DM-ILD) 快速进展型间质性肺病 (RP-ILD) 和总体生存率的有效性, 并探讨不同感兴趣区域 (ROI) 对放射组学分析的影响。方法: 从 2014 年 8 月至 2022 年 3 月, 在两个中心回顾性纳入了 189 例 MDA5+ DM-ILD 患者, 分为训练组 ($n=119$)、内部验证组 ($n=41$) 和外部验证组 ($n=29$)。从四个 HRCT 区域的放射组学特征中生成了四种风险评分。使用受试者工作特征曲线下面积、校准曲线和决策曲线评估模型的性能。随访的终点是全因死亡。使用 Kaplan-Meier 曲线、Mantel-Haenszel 检验和 Cox 回归进行生存分析。结果: 在中位随访时间 31.6 个月 (四分位数范围: 12.9-49.1 个月) 内, 有 24 名患者失去随访, 46 名患者死亡 (27.9%, 46/165)。基于完整双肺靶区的风险评分在内部验证组和外部验证组分别获得了 0.869 和 0.905 的 AUC。在内部验证组和外部验证组, 该评分表现优于临床-放射学模型和诺莫图, AUC 分别为 0.882 和 0.916。基于诺莫图评分将患者分为低风险组和高风险组, 高风险组患者的死亡风险显著高于低风险组患者。结论: 该评分表可以预测 MDA5+ DM-ILD 中的 RP-ILD, 并且是全因死亡的独立预测因子。基于双侧肺区域的风险评分在四个不同 ROI 的评分中显示出更高的预测能力。

PO-1190

光谱 CT 联合不同呼吸屏气状态改善心力衰竭患者肺动脉 CTA 图像质量的可行性研究

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目的：探讨不同的呼吸屏气状态对光谱 CT 定量评价心力衰竭患者肺动脉 CTA 图像质量的影响及改善图像质量的可行性。方法：前瞻性纳入 33 例接受肺动脉 CTA 的疑似肺栓塞的心力衰竭患者。我们设计了 3 种呼吸屏气状态：吸气，呼气，平静呼吸。对比分析肺动脉主干及左右分支的成像质量。我们对 40-70 keV 的图像整体质量、图像噪声、图像清晰度进行了 Likert 量表 5 分发评价。采用方差分析(ANOVA)和 kruskal-wallis 检验对结果进行比较。2 名医师测量的肺动脉主干、左右分支动脉的增强 CT 值和图像质量主管评分的组内一致性采用 ICC 评价。结果：吸气屏气时，肺动脉主干及左右分支肺动脉的增强 CT 值在 40keV 时的 3 种呼吸屏气状态中最高，平均 CT 值分别约为 273 ± 95 HU, 269 ± 88 HU, 263 ± 98 HU ($P < 0.05$)。2 名放射科医师测量肺动脉主干、左右分支动脉增强 CT 值的组内一致性 ICC 分别为 0.863, 0.810, 0.877, 评价图像整理质量、图像噪声、图像清晰度的组内一致性 ICC 分别为 0.945, 0.910, 0.928。结论：在心力衰竭患者的肺动脉 CTA 检查中，采用吸气屏气联合 40keV 单能级观察可以获得最佳的图像质量。

PO-1191

冠心病患者内脏脂肪与代谢综合征相关性研究

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目的：通过双源 CT 测量冠心病患者心周及胸部大血管周围脂肪容积，以探讨心周及胸部大血管周围脂肪容积与代谢综合征之间的相关性。

方法：收集门诊怀疑冠心病的患者 521 例，进行冠状动脉 CT 血管造影检查，并根据 CHD 诊断标准，选择临床确诊 CHD 的患者入组，最终入组的 CHD 患者共 397 例。签署知情同意书，询问高血压、糖尿病、高血脂病史，测量身高、体重、收缩压及舒张压，计算体重指数。嘱空腹 12 小时后，抽取患者外周血以测定甘油三酯、高密度脂蛋白、空腹血葡萄糖。使用双源 CT 首先行心脏平扫，测量心包脂肪容积 (pericardial fat volume, PeCFV)、心外膜脂肪容积 (epicardial fat volume, EFV)、心旁脂肪容积 (paracardial fat volume, PaCFV)、胸主动脉旁脂肪容积 (perivascular fat volume, PVFV)。再行冠状动脉 CTA 检查，评价患者冠脉狭窄程度。统计分析。

结果：MS 组与非 MS 组相比，男性比女性更易发生 MS，差异具有统计学意义 ($P < 0.05$)；50-60 岁年龄组冠心病患者更易发生 MS，差异具有统计学意义 ($P < 0.05$)。MS 患者的心周及胸部大血管周围脂肪容积明显高于非 MS 患者，差异具有统计学意义 ($P < 0.05$)。按冠脉狭窄程度分组后，随冠状动脉狭窄程度的增加，MS 组患者 PeCFV 和 EFV 相应增加，除 1 度与 2 度患者之间 PeCFV 和 EFV 的差异无统计学意义 ($P > 0.05$)，其余各组两两比较，差异均具有统计学意义 (均 $P < 0.05$)；狭窄程度为 4 度患者的 PaCFV 和 PVFV 与 1-3 度比较，差异具有统计学意义 (均 $P < 0.05$)，而 1-3 度间两两比较，PaCFV 和 PVFV 的差异无统计学意义 (均 $P > 0.05$)。

结论：CHD 患者的内脏脂肪容积与 MS 各项指标有相关性。CHD 合并 MS 的患者心周及胸部大血管周围脂肪容积显著高于无 MS 的患者。在 CHD 合并 MS 患者中，心周及胸部大血管周围脂肪容积与冠状动脉狭窄程度正相关，尤其以 EFV 最具有临床价值。因此，心周及胸部大血管周围脂肪容积不但能预测 MS，也能判断 CHD 的预后情况。

PO-1192

肺癌 C T 多期增强扫描的影像学特征与 特异性标记物表达相关性以及联合诊断价值研究

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方法 2016 年 2 月至 2021 年 2 月接受治疗的 760 例确诊原发性肺癌患者为研究对象并搜集其临床诊断资料,另选取 500 例健康体检者为对照组。对肺癌患者及正常人体血清中 C12 多肿瘤特异性标记物进行定量检测。按照瘤体直径分为大于 5 cm 的 621 例,不超过 5 cm 的 139 例;分为中央型肺癌 344 例和周围型肺癌 416 例;分为有坏死空洞征象的 188 例,无坏死空洞征象的 572 例;分为有毛刺征象的肺癌 210 例,无该征象的 550 例;有深分叶征象的肺癌 249 例,无深分叶征象的肺癌 511 例。以分析 C T 的影像学特征与该血清特异性标记物的表达相关性并评估联用诊断价值。结果 肺癌组多肿瘤标记物中糖链抗原 199 (CA199)、糖链抗原 242 (CA242)、神经元特异性烯醇化酶 (NSE)、癌胚抗原 (CEA)、铁蛋白 (Fe)、人绒毛膜促性腺激素 (HCG)、甲胎蛋白 (AFP)、癌抗原 125 (CA125)、癌抗原 153 (CA153) 的值显著高于对照组,两组差异有显著性 ($P < 0.05$);而两组间前列腺特异性抗原 (PSA)、游离型前列腺特异性抗原 (FP-SA) 和生长激素 (HGH) 的含量差异无显著性 ($P > 0.05$)。将肺癌患者根据 C T 影像学特征再分组比较 C12 多肿瘤特异性标记物水平,结果显示肿瘤大于 5 cm 患者与肿瘤不足 5 cm 的患者组间、有无坏死空洞组间、有无毛刺征象组间、有无深分叶征象组间差异均有显著性 ($P < 0.05$);而 C T 影像学特征中的不同病灶部位组间 C12 特异性标记物无显著差异 ($P > 0.05$)。结论 肺癌 C T 多期增强扫描影像学特征中的肿瘤大小、有无坏死空洞、毛刺征象、深分叶征象与 C12 多肿瘤特异性标记物的表达有相关性,不同病灶部位则与特异性标记物表达无关。可将 C T 影像与特异性标记物联用,有利于更准确地诊断疾病。

PO-1193

气管主支气管良性肿瘤的多排螺旋 CT 评价

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目的 气管支气管良性肿瘤起源于粘膜上皮、粘膜下涎腺和管壁间叶组织,且以间叶组织来源占大多数,临床发病率较低。为此总结了气管主支气管良性肿瘤的多排 CT 表现,并结合文献进行综合分析。

方法 回顾性分析经手术病理证实的 32 例气管主支气管良性肿瘤,男性 18 例,女性 14 例,年龄范围 10-82 岁,均以非特异性呼吸道症状就诊。多形性腺瘤 3 例,神经鞘瘤 4 例,炎性肌纤维母细胞瘤 4 例,脂肪瘤 9 例,错构瘤 7 例,血管瘤 3 例,平滑肌瘤、支气管软骨瘤各 1 例。

结果 肿物位于气管 14 例,位于左主支气管 8 例,位于右主支气管 10 例,肿物大小为 0.5-3.6cm。多排螺旋 CT 表现为息肉样、类圆形或菜花状 24 例,边缘光整;呈不规则形分叶状 8 例。平扫密度均匀 15 例,均匀强化 8 例,无明显强化 14 例,脂肪与软组织成分并存 18 例。腔内生长型 22 例,其中宽基底 12 例;腔外生长型 3 例,其中 2 例呈“冰山”样改变。纵隔淋巴结肿大 5 例,伴阻塞性肺炎、肺不张及肺气肿 12 例。纵隔淋巴结肿大 5 例,均存在阻塞炎变或不张,手术清扫结果无恶性证据及周围侵犯。病变邻近气道管壁均未见明确增厚。

结论 气管主支气管良性肿瘤有一定的特征性,以腔内规则肿块多见。多排螺旋 CT 及其后处理可直观显示肿瘤的组织构成、范围和与邻近结构的关系:对于结节或肿块内部构成特征、有无伴随管壁增厚有助于良恶性鉴别、定性诊断及治疗方案制定。

PO-1194

肿瘤位置在预测直径小于 2cm 肺腺癌隐匿性淋巴结转移中的应用价值

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目的:术前准确识别肺腺癌患者的隐匿性淋巴结对于选择手术方式及患者预后至关重要,既往研究主要集中于临床及影像特征的观察,对于肿瘤所在位置与隐匿性淋巴结转移之间的关系相对缺乏。因此,本研究采用了肿瘤与胸膜的关系来对肿瘤所在位置进行定义,即测量肿瘤边缘距三类胸膜 (纵隔胸膜、非纵隔胸膜 (脏层胸膜、叶间胸膜)) 的垂直距离,记录最近的胸膜类型及最短距离,以此评估其对隐匿性淋巴结转移预测的意义,并联合其他临床影响参数,无创性预测直径小于 2cm 肺腺癌隐匿性淋巴结转移。

方法:回顾性分析 2016 年 1 月至 2020 年 6 月期间接受肺叶切除术加淋巴结清扫的 249 例患者的临床、影像及位置关系资料,术后病理均证实为肺腺癌。根据是否发生隐匿性淋巴结转移将其分成阳性组 (发生隐匿性淋巴结转移) (n=85 例) 和阴性组 (未发生隐匿性淋巴结转移) (n=164 例),使用单因素 logistics 回归筛选出与隐匿性淋巴结转移显著的相关因素,建立临床影像预测模型;再纳入有意义的位置关系,与上述传统模型对比预测效能。 $P<0.05$ 被认为有统计学差异。

结果:研究表明,与胸膜的位置关系在两组患者的差异有统计学意义 ($P<0.05$),其余有意义的临床、影像参数包括 CEA、肿瘤直径、CTR (肿瘤最大实性成分与肿瘤直径的比值)、肿瘤质地 (实性/磨玻璃)、支气管血管束增厚。单因素分析显示肿瘤直径、质地、支气管血管束增厚、与胸膜的位置关系与隐匿性淋巴结转移相关,以此建立 ROC 曲线。据此所建立的传统的临床影像模型 AUC 值为 0.783;联合位置关系所建立的模型 AUC 值为 0.978。

结论:基于肿瘤与胸膜的位置关系在直径小于 2cm 的肺腺癌隐匿性淋巴结转移上有预测价值;与传统的影像临床模型相比,联合位置关系的模型预测效能更高。

PO-1195

迭代重建技术在胸廓软骨扫描中的运用价值

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[摘要]目的 探讨第三代双源 CT 低管电压扫描联合高级建模迭代重建 (advanced modeled iterative reconstruction, ADMIRE) 技术在胸廓 (肋软骨) CT 检查中的应用价值。方法 收集临床拟行胸廓 CT 检查患者 70 例,体质指数为 18 kg/m^2 [$\text{BMI} \leq 24 \text{ kg/m}^2$],随机分为 A、B 两组,每组各 35 例;A 组:常规管电压 100kV 扫描,开启自动光电流调节技术 (CARE DOSE-4D),常规滤波反投影法 (FBP) 重建图像;B 组:低管电压 80kV 扫描,开启自动光电流调节技术 (CARE DOSE-4D),采用 ADMIRE 重建图像,强度选择 3 级。比较 A、B 两组图像质量包括 (平均 CT 值、噪声 SD、信噪比 (SNR) 和对比噪声比 (CNR) 以及) 客观评分和辐射剂量。结果 A、B 两组图像质量及主观评分比较差异无统计学意义 ($P>0.05$);辐射剂量比较, B 组 (0.56 ± 0.17) mSv 较 A 组 (1.47 ± 0.41) mSv 减少约 62%,较差异有统计学意义 ($P<0.05$)。结论 低管电压扫描联合高级建模迭代重建技术在胸廓检查中,在保证图像质量同时能有效降低辐射剂量,值得临床推广运用。

PO-1196

非酒精性脂肪肝与冠状动脉 CT 血流储备分数相关性的研究

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【摘要】目的 探讨非酒精性脂肪肝 (NAFLD) 与冠状动脉 CT 的血流储备分数 (CT-FFR) 之间的关系。方法 搜集 2016 年 01 月至 2018 年 12 月期间因疑似冠状动脉疾病行 CCTA 的 340 例患者。根据胸/腹部 CT 检查结果分为 NAFLD (病例组) 及非 NAFLD 组 (对照组)。比较两组一般资料、斑块性质、高危斑块特征以及 CT-FFR ≤ 0.8 的差异。采用二元 Logistic 回归分析 NAFLD 与 CT-FFR 之间的相关性。结果 NAFLD 患者的糖尿病及高脂血症患病率高, 天冬氨酸氨基转移酶 (AST)、丙氨酸氨基转移酶 (ALT)、谷氨酰转肽酶 (GGT) 和尿酸水平高于非 NAFLD 者, 差异均具有统计学意义 ($P < 0.05$)。NAFLD 患者非钙化斑块及高危斑块均高于非 NAFLD 患者 ($P < 0.05$), CT-FFR ≤ 0.8 在 NAFLD 患者中更常见 ($P < 0.05$)。在多变量 logistic 分析中, 调整传统心血管危险因素、钙化斑块、部分钙化斑块、高危斑块及阻塞性斑块后, NAFLD 仍与 CT-FFR ≤ 0.8 独立相关 (OR, 2.283; 95% CI: 1.156-4.507; $P = 0.017$)。结论 总之, 我们证明 NAFLD 与基于 CCTA 测量的 CT-FFR 相关, 独立于传统心血管危险因素。

PO-1197

不同扫描剂量 (常规剂量及低剂量)
下标准卷积核对肺结节测量及显示的影响

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目的 探讨胸部常规剂量及低剂量下标准重建卷积核的多模型自适应统计迭代重建算法 (AV STND) 对肺结节测量准确性及显示的影响。方法 对内置有直径 5、8、10 mm 实性及磨玻璃结节的胸部模型进行常规剂量 (100kVp、Smart mA, CTDI_{vol} = 3.27 mGy) 和低剂量扫描 (100kVp、40 mA, CTDI_{vol} = 0.84 mGy), 分别采用 ASiR-V 算法的肺卷积核 (AV LUNG) 和标准卷积核 (AV STND) 进行肺窗图像重建。测量并计算不同重建图像的总噪声、结节的信噪比 (SNR) 及对比噪声比 (CNR), 对照结节标称值计算结节平均 CT 值偏差度和体积偏差度, 并对图像噪声、支气管血管束锐利度、结节的可见度进行主观评价。结果 1. 在胸部常规剂量及低剂量下, AV STND 均较 AV LUNG 图像噪声更低, 实性及磨玻璃结节的 SNR 与 CNR 更高, 图像噪声评分更高, 而 AV LUNG 重建图像的支气管血管束锐利度均更高 (P 均 < 0.05); 2. 在胸部常规剂量及低剂量下, AV STND 图像测得实性结节平均 CT 值偏差度更小 (P 均 < 0.001), AV LUNG 图像测得磨玻璃结节平均 CT 值偏差度更小 (P 均 < 0.001); AV LUNG 图像测得实性及磨玻璃结节体积偏差度均小于 AV STND (P 均 < 0.05); 3. 常规剂量下, 两种图像在磨玻璃结节的可见度间的差异无统计学意义 (P 均 > 0.05), 而在低剂量下 AV STND 图像的磨玻璃结节可见度评分更高 (P 均 < 0.001); 在胸部常规剂量及低剂量下, 两种卷积核图像在实性结节可见度的评分差异均无统计学意义 (P 均 > 0.05)。结论 在胸部常规剂量及低剂量条件下, AV STND 算法提升了肺窗图像质量, 提高了结节测量准确性, 改善了低剂量下磨玻璃结节的显示情况。

PO-1198

光谱 CT 定量参数鉴别纵隔高危胸腺瘤

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目的：分析高危胸腺瘤的光谱 CT 特征，探索光谱 CT 定量参数中的碘浓度 (IC) 及有效原子序数 (Zeff) 作为高危/低危胸腺瘤鉴别诊断参数的临床可行性。方法：回顾性分析本院 51 例经手术病理切片证实的胸腺瘤患者的光谱 CT 增强的影像资料。用圆形 ROI 对胸腺瘤的最大层面进行勾画，勾画时尽量覆盖整个病灶，同时避开血管、坏死、钙化以及囊变，利用 ROI 复制功能实现 IC 和 Zeff 图同一位置淋巴结的测量，同时记录碘密度值和有效原子序数值，并测量胸腺瘤的长径及短径。用圆形 ROI 对淋巴结同一层面的主动脉进行勾画并测量其 IC 及 Zeff 值进行标准化计算。结果：23 例为低危胸腺瘤，28 例为高危胸腺瘤。高危胸腺瘤组的 nIC 及 nZeff 显著高于低危胸腺瘤组 ($P < 0.001$)。Logistics 单变量回归显示，nZeff 具有最高的 OR 值 (3.69, 95%CI: 1.83-7.46, $P < 0.001$)，nIC 的 OR 值为 2.55 (95%CI: 1.67-3.91, $P < 0.001$)。结论：在胸腺瘤患者中，光谱 CT 定量参数 nIC 和 nZeff 可以更好地识别高危胸腺瘤，为高危胸腺瘤的诊断和治疗提供了更有效的参考价值。

PO-1199

持续存在肺纯磨玻璃结节血管分型预测结节未来生长趋势

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目的 预测持续存在肺纯磨玻璃结节 (pure ground glass nodules, pGGNs) 在未来是否生长的有助于制定科学合理的随访计划。磨玻璃结节-血管分型 (GGN-vessel relationship, GVR) 可进一步对 pGGNs 进行恶性程度分层，但 GVR 能否预测 pGGNs 的未来生长趋势还缺乏深入研究。方法 回顾性分析我院从 2018 年 1 月至 2020 年 12 月 179 例患者体检发现的 179 个 pGGNs 的临床及 CT 资料，所有病例均随访超过 3 年或者虽不足 3 年但是结节出现增长，增长定义为结节体积增大超过 25% 或出现实性成分。分析结节的临床特征，包括 GVR 在内的 CT 定性特征和 CT 定量特征。采用单因素及多因素 Cox 回归分析 pGGNs 的临床，CT 定性及定量特征与结节是否生长的关系。临床，CT 定性及定量特征预测 pGGNs 的 3 年内生长的诊断效能采用曲线下面积 (area under the ROC curves, AUC) 及敏感度，特异度进行评价，AUC 之间的比较采用 Delong 检验。结果 随访中共有 72 例 pGGNs 出现生长。年龄 (HR: 1.034, 95%CI: 1.009-1.059)，平均 CT 值 (HR: 1.003, 95%CI: 1.000-1.005) 和 GVR (HR: 2.515, 95%CI: 1.985-3.231) 为预测 pGGNs 生长的独立危险因素。55 个 pGGNs 的生长发生在 3 年内，年龄 > 54 岁，平均 CT 值 > -650 HU 和 GVR III/IV 型在预测结节 3 年内生长的 AUC 分别为 0.629 (95%CI: 0.554 - 0.700), 0.677 (95%CI: 0.603 - 0.745) 和 0.841 (95%CI: 0.779 - 0.891)，GVR III/IV 型的 AUC 明显高于年龄 > 54 岁和平均 CT 值 > -650 HU ($p < 0.001$)；敏感度分别为 0.618, 0.655 和 0.855；特异度分别为 0.855, 0.619 和 0.653。结论 pGGNs 具有更高的年龄，平均 CT 值和 GVR 分型更容易出现生长，GVR 分型是预测 pGGNs 未来生长趋势的最重要危险因素。

PO-1200

心脏磁共振特征跟踪对非缺血性扩张型心肌病 恶性室性心律失常诊断价值的初步研究

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目的:非缺血性扩张型心肌病(NIDCM)合并恶性室性心律失常(MVA)患者预后差,心源性猝死风险高。虽然 MVA 的诊断通过心电图(ECG)是直接的,但这些患者的潜在心室力学异常是未知的。本研究旨在初步探讨心脏磁共振特征跟踪(CMR-FT)对扩张型心肌病 MVA 的价值。

方法:本回顾性研究将符合纳入标准的 NIDCM 患者分为 MVA 组和非 MVA 组(纳入时间为 2018 年 1 月至 2022 年 9 月)。测试了整体纵向应变(GLS)、整体周向应变(GCS)和整体径向应变(GRS)等心肌应变参数的观察者间一致性。比较两组间 GLS、GCS、GRS、左室射血分数(LVEF)、心电图 t 峰-倾向间期及脑钠肽(BNP)的变化。进行单因素和多因素受试者工作特征(ROC)曲线分析,计算这些参数预测 NIDCM MVA 的 ROC 曲线下面积(AUC)、截止点、敏感性和特异性。

结果:共纳入 NIDCM 患者 161 例(MVA 组 54 例)。GLS、GCS 和 GRS 具有良好的观察者间一致性(ICC>0.80)。MVA 组的绝对 GLS、GCS、GRS、LVEF 均低于非 MVA 组($P < 0.001$), $T_{peak-Tend}$ 和 BNP 较高($P < 0.001$)。单因素 ROC 曲线分析显示, GLS、GCS、GRS 对 MVA 有一定的诊断价值(AUC 分别为 0.795、0.802、0.754)。其中, GCS 具有较高的敏感性和特异性(GCS 0.796/0.776, GLS 0.778/0.757, GRS 0.741/0.692)。多因素 ROC 曲线分析显示 GLS 联合 GCS(AUC = 0.810)、GCS 联合 GRS(AUC = 0.802)、GLS 联合 GRS(AUC = 0.787)、GLS、GCS 联合 GRS(AUC = 0.810)。

结论:CMR-FT 测量的心肌应变参数(尤其是 GLS 和 GCS)具有一定的诊断价值,能反映 NIDCM 合并 MVA 的潜在心室运动异常。

PO-1201

基于心脏电影序列的放射组学预测扩张型心肌病的预后

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目的:评估基于 CMR 造影后增强电影序列的放射组学方法在预测扩张型心肌病预后方面的价值。

方法:2013 年 9 月至 2018 年 3 月,我们前瞻性地招募了 401 名 DCM 患者(训练集:281;验证集:120)进行 CMR 成像。主要终点是全因死亡率和心脏移植,次要终点是主要终点和心力衰竭再入院的组合。我们进行了两个靶区的勾画:整个心脏和心肌。放射组学特征均是在连续层面的左心室短轴电影图像上进行提取的(Rad I 模型来自全心靶区, Rad II 模型来自心肌靶区)。我们利用多因素回归方法在临床和 CMR 因素中寻找独立预后因素,并建立单独的临床模型及 CMR 模型。然后,为了提高单独 Rad I/II 模型的预测效能,我们将临床因素和/或 CMR 因素加入到组学模型中,构建新的模型。模型的性能用受试者工作特性曲线下的面积(AUCs)进行比较。Kaplan-Meier 曲线、对数秩检验和 Cox 回归用于生存分析。

结果:在 25.4 个月的中位随访期间(四分位间距:17.4–40.9 个月),分别有 65 名和 141 名患者经历了主要终点和次要终点。对于全心/心肌靶区,他们各自的 Rad I/II-临床-CMR 模型的性能最好,在训练和验证数据集中的 AUC 分别为 0.843/0.836 和 0.846/0.835 ($p < 0.05$)。Rad I-Clinical-CMR 模型将患者分为低风险组和高风险组,在训练集[HR=3.868; 95%CI=2.088-7.164; $P < 0.001$]和验证集(HR=6.122; 95%CI=2.170-17.27; $P < 0.001$)中,高风险组的无事件生存率比低风险组差。对于 Rad II 临床 CMR 模型中,在训练集[HR=7.741; 95%CI=3.910-15.32; $P < 0.001$]和验证集

($HR=4.844$; $95\%CI=1.966-17.27$; $P<11.94$) 中, 高风险组的无事件 (主要终点) 生存率比低风险组差。

结论: 无论对于全心靶区还是心肌靶区, 复合模型也就是 Rad I/II-临床-CMR 模型在预测扩张型心肌病患者的全因死亡率、心脏移植和心力衰竭再入院方面表现出优异的性能, 这有助于个体化风险分层和临床决策。

PO-1202

基于心脏 CT 增强的影像组学分析预测严重主动脉瓣狭窄患者 TAVI 术后左心室不良重构的价值

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目的: 基于 TAVI 术前心脏增强 CT 图像, 构建影像组学模型预测严重主动脉瓣狭窄患者术后左心室不良重构。

方法: 本研究对 273 例于 2019 年 1 月-2022 年 12 月在四川大学华西医院行 TAVI 的患者进行回顾性分析, 所有患者均由经胸超声心动图证实为重度主动脉瓣狭窄, 且术后超声随访 3 个月以上以评估左心室重构情况。将 202 例非不良重构和 71 例不良重构病例随机分为训练组 ($n=220$) 和验证组 ($n=53$)。不良重构被定义为左心室舒张末期容积增加基线值的 15% 或左心室射血功能降低 10%。运用 3d slicer 软件在心脏 CT 舒张期图像上分割包括左心室壁和乳头肌的感兴趣区。采用最小绝对收缩和选择算子 (LASSO) 回归降低计算复杂度并防止过拟合, 通过五折交叉验证法分别筛选学关联度最高的影像组学特征和临床特征。采用受试者工作特征曲线 (ROC) 和决策曲线分析评估模型的性能。

结果: 通过 LASSO 回归, 共筛选 12 个影像组学特征和 5 个临床特征, 分别构建了影像组学模型、临床模型和 Nomogram。临床模型、影像组学模型和 Nomogram 在训练集中的 AUC 依次为 0.760 ($95\%CI$, 0.741 - 0.780)、0.799 (0.777 - 0.827) 和 0.859 (0.841 - 0.888)。在验证集中的 AUC 依次为 0.755 ($95\%CI$, 0.684 - 0.837)、0.766 ($95\%CI$, 0.686 - 0.836) 和 0.837 ($95\%CI$, 0.785 - 0.869)。与临床模型和影像组学模型相比, Nomogram 表现出更优的诊断效能。

结论: 基于影像组学的分析, 对重度主动脉瓣狭窄患者 TAVI 术后左心室不良重构具有良好的预测效能, 对重度主动脉瓣狭窄患者治疗方案的制定具有重要的参考价值。

PO-1203

联合深度学习-机器学习术前精准预测 IA 期肺腺癌气腔内播散: 人机对比研究

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目的: 在 2015 年由 kadadota 研究小组首次提出气腔内播散 (spread through air spaces, STAS) 是肺腺癌的新型浸润方式, 是肺腺癌预后不良的独立预测因子。本研究拟通过联合深度学习和传统机器学习方法, 开发基于胸部薄层 CT 图像的预测模型, 以术前精准预测 IA 期肺腺癌患者 STAS 状态。

材料和方法: 本次研究从单位一招募了 1035 名经病理证实的 IA 期肺腺癌患者 (59.68 ± 10.03 岁, 481 名女性, 554 名男性), 其中 498 名患者 STAS 阳性, 537 名患者 STAS 阴性。从单位二招募

了 99 名患者 (59.58±8.57 岁, 51 名女性和 48 名男性) 作外部验证集。本文开发一个基于 3D 残差网络 (ResNet) 的深度学习模型 (DLM), 并通过五倍交叉验证法对模型进行性能的评估。筛选出 9 个临床特征来建立传统的机器学习模型 (MLM)。本次研究通过曲线下面积 (AUC) 来比较三种模型 (DLM、MLM 和融合模型) 的诊断性能, 并通过 DeLong 检验来进行各个模型之间的差异是否显著。再纳入高级、中级和低级三组医生分别对外部验证集的数据进行评估, 并与上述模型进行对比。

结果: 在预测 STAS 的外部验证集中, DLM 模型的 AUC 为 0.766 (灵敏度: 0.742, 特异度: 0.695, 准确度: 0.713), MLM 模型的 AUC 为 0.789 (灵敏度: 0.689, 特异度: 0.780, 准确度: 0.745), 而融合模型的 AUC 为 0.806 (灵敏度: 0.768, 特异度: 0.698, 准确度: 0.725)。在外部验证集中, 融合模型显著优于 DLM 模型 ($P=0.016$) 和 MLM 模型 ($P=0.029$)。高级医生的评估准确度、灵敏度和特异度分别是 0.73、0.64 和 0.80; 中级医生的评估准确度、灵敏度和特异度分别是 0.70、0.59 和 0.79; 低级医生的评估准确度、灵敏度和特异度分别是 0.59、0.48 和 0.77。

结论: 基于 3D ResNet 的 DLM 模型和 MLM 模型可用于术前预测 IA 期肺腺癌患者的 STAS, 且基于 DLM+MLM 的融合模型在预测 STAS 风险方面具有更明显优势, 而且其准确度超过中级医生水平。

PO-1204

基于定量 CT 评估中高危及急性肺栓塞的研究

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目的 观察不同危险等级急性肺栓塞患者实验室和定量 CT 检测结果的变化, 探讨定量 CT 对中高危及急性肺栓塞的诊断效能, 为临床鉴别中高危及急性肺栓塞提供新的途径。

资料与方法 回顾性收集确诊急性肺栓塞患者 143 例, 其中低危 ($n=87$) 和中高危 ($n=55$) APE。收集临床指标及实验室指标, 采用“数字肺”肺血栓自动检测工具, 采集肺栓塞栓子的定量 CT 指标。差异采用 t 检验或 Mann-Whitney U 检验, 定量 CT 指标与 APE 风险分类相关参数的相关性分析采用 Spearman 秩相关分析。采用 ROC 曲线评价临床、实验室和 CT 指标对中高危及急性肺栓塞患者的预测价值。

结果 低危与中高危及急性肺栓塞组比较年龄、舒张压在两组之间有统计学差异 ($P<0.05$), 性别及临床症状在两组之间无显著性差异 ($P>0.05$); 中高危及急性肺栓塞组较低危组 D-二聚体、天冬氨酸氨基转移酶 (AST)、直接胆红素 (DBIL)、血糖、尿酸、N 末端-B 型钠尿肽前体 (NT-proBNP)、RV/LV、PAOI 高 ($P<0.05$), 较低危组血小板计数 (PLT)、动脉血氧分压 (PO₂) 和动脉血二氧化碳分压 (PCO₂) 低 ($P<0.05$), 中高危及急性肺栓塞组定量 CT 栓子总体积、总血栓面积/管腔面积、总最大附壁长度较低危组高 ($P<0.001$)。Spearman 秩相关分析结果显示, 定量 CT 指标与 APE 风险分类相关参数均呈正相关 ($P<0.05$), 在多变量 Logistic 回归分析中, 栓子总体积与中高危及急性肺栓塞有显著且独立的相关性 ($OR=1.259, P<0.001$)。ROC 曲线分析显示, 栓子总体积对中高危及急性肺栓塞有较好的诊断价值 ($AUC=0.809$), 与 PAOI ($AUC=0.753$) 和 D-二聚体 ($AUC=0.633$) 相比。

结论 基于定量 CT 指标栓子总体积对中高危及急性肺栓塞有较好的诊断价值, 可以为临床诊断中高危及急性肺栓塞提供新的途径。

PO-1205

冠脉 CTA 量化的冠状动脉周围脂肪衰减 与冠状动脉疾病严重程度之间的关系

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目的 探讨冠状动脉周围脂肪衰减指数 (FAI) 值与使用冠状动脉计算机断层扫描血管造影术 (CCTA) 测量的冠状动脉疾病 (CAD) 严重程度之间的关系。**材料与方法** 本研究回顾性地纳入了 428 名符合条件并在我院接受了 CCTA 检查的 CAD 患者。对 CCTA 图像上的 CAD 严重程度 (包括阻塞性狭窄和广泛病变)、节段狭窄和受累评分 (SSS、SIS) 以及 CAD-RADS 分级进行了评估。使用全自动软件量化了左前降支 (LAD)、左回旋支 (LCX) 和右冠状动脉 (RCA) 的 FAI 值。使用单变量和多变量回归模型评估了 FAI 值与 CAD 严重程度之间的关系。结果 单变量分析表明, 性别和目前吸烟与 FAIRCA 值升高有关 (均为 $P<0.05$), 而 CAD 严重程度与之无关 (均为 $P>0.05$)。不仅性别、吸烟和高血压等临床因素与 FAIRCA 值升高有关, 阻塞性狭窄、SIS 和 SSS 等评估 CAD 严重程度的指标也与 FAIRCA 值升高有关 (均 $P<0.05$)。多变量分析表明, 在校正了其他常规心血管危险因素和 CCTA 成像特征的影响后, 目前吸烟是 FAI 值升高的独立危险因素 (比值比 [OR]=0.569, 0.458, and 0.517; all $P<0.05$), 而 SSS (OR=1.041, $P=0.027$) 是 FAIRCA 值升高的独立危险因素。结论 在对常规心血管风险因素和 CCTA 成像特征进行校正后, 只有 SSS 是 FAIRCA 值升高的独立风险因素。

PO-1206

心脏磁共振评价的二尖瓣环平面收缩期位移: 心肌梗死后风险分层的一个可靠指标

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目的: 探讨心脏磁共振 (cardiac magnetic resonance, CMR) 评价的二尖瓣环平面收缩期位移 (mitral annular plane systolic excursion, MAPSE) 对心肌梗死 (myocardial infarction, MI) 患者主要心血管不良事件 (major adverse cardiovascular events, MACE) 的预测价值。

方法: 本研究为历史性队列研究, 纳入 2015 年 7 月至 2022 年 6 月经 CMR 检查并确诊为 MI 的患者, 根据随访结果分为无 MACE 组和 MACE 组。采用 CVI 42 后处理软件在电影序列获得左室功能参数, 包括 LVEF、侧壁 MAPSE、间壁 MAPSE、平均 MAPSE。采用 Bland-Altman 分析评估 MAPSE 测量的一致性。采用独立样本 t 检验、Wilcoxon 秩和检验及卡方检验比较两组患者的基线资料及 CMR 参数。利用单因素及多因素 Cox 回归分析确定 MI 患者 MACE 的风险因素, 并建立预测模型。通过综合判别改进指数和净重分类计算验证模型中指标的增量预测价值。

结果: 纳入 165 例 MI 患者, 最终入选 103 例 (No-MACE 组 61 例, MACE 组 42 例)。No-MACE 组患者的 LVEF 和 MAPSE 明显高于 MACE 组患者。LVEF 和 MAPSE 均是 MI 后 MACE 发生的有效指标。MACE 的风险随着 LVEF 和 MAPSE 的增加而降低。对于心肌梗死后 MACE 的风险预测, 与模型 I (年龄) 相比, 模型 II (年龄+LVEF) (卡方值 4.0 vs. 22.7, $p<0.001$) 和模型 III (年龄+MAPSE) (卡方值 4.0 vs. 31.4, $p<0.001$) 具有显著的增量预测值。与模型 II 相比, 模型 III (卡方值为 22.7 vs. 31.4, $p=0.003$) 也具有显著的增量预测性。MAPSE 的最佳临界值为 9.70mm。

结论: CMR 评价的 MAPSE 是心肌梗死患者 MACE 发生的有效预测因子, MAPSE 具有显著的增量预测价值, 有助于为 MI 患者提供更全面的风险分层。

PO-1207

探讨极低辐射剂量联合 Pulmo 3D 技术在肺炎患者肺部 CT 检查中的应用价值

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目的：探讨第三代双源 CT 能谱纯化技术 (Sn100kV) 扫描方式联合 Pulmo 3D 图像后处理技术在肺炎患者中肺部 CT 检查中的应用价值。**方法：**前瞻性收集 30 例 BMI<30kg/m² 且短期内欲复查肺部 CT 的肺炎患者，初次检查采用常规 CARE Kv 扫描方式联合 CARE Dose 4D 自动管电压技术行胸部 CT 检查，复查时采用能谱纯化技术 Sn100kV 扫描方式联合 CARE Dose 4D 自动管电压技术行胸部 CT 检查，扫描完成后对原始数据均采用 ADMIR (Strength=3) 迭代算法重建。检查结束后通过西门子 Singo Via Vb20 图像后处理工作站，使用 Pulmo 3D 技术分析 Sn100kV 图像疾病主观显示能力及图像客观定量分析信息。通过独立样本 T 检验比较患者两次检查的辐射剂量、信噪比、对比噪声比等，通过配对 T 检验比较患者真实肺功能参数及 Pulmo 3D 技术获得的模拟肺通气量参数。采用 Mann-Whitney U 检验比较两次图像主观质量评分及疾病诊断信心得分，通过 Kappa 检验对两组图像主观质量评分做一致性分析。**结果：**Sn100kV 组图像肺窗、纵膈窗 SNR、CNR 及图像主观质量评分均低于 CARE kv 组，但两组图像对疾病诊断信心评分无统计学差异 ($P>0.05$)，且 Sn100kV 组图像辐射剂量显著低于 CARE kv 组，较之减少了 90% 以上 ($P<0.05$)。两组图像主观评价结果一致性优秀 ($Kappa=0.831$, $P>0.05$)。通过 Pulmo 3D 技术获得的模拟肺容量与患者真实肺容量无统计学差异 ($P>0.05$)，Pulmo 3D 技术获得的疾病分布伪彩图更能直观反映病变累计范围及程度。**结论：**第三代双源 CT 能谱纯化技术 Sn100kV 扫描模式可以在极低的辐射剂量下获得与常规扫描模式同等诊断信心得分的图像质量，Pulmo 3D 图像后处理技术获得的疾病分布伪彩图能直观反映病变累计范围及程度，两种技术相结合在肺炎患者密切随访肺部 CT 检查中具有极大的临床应用价值。

PO-1208

“双低”技术联合高权重深度学习重建在冠状动脉血管成像中的应用价值

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目的：探讨“双低”技术联合高权重深度学习重建算法在冠状动脉血管成像中降低辐射剂量、减少对比剂剂量的应用价值。

方法：选择疑似冠心病患者 90 例，BMI<25 kg·m² 的患者分为两组，每组 45 例，A 组采用 120kv，智能毫安，噪声指数 (NI) 20，对比剂剂量 kgx0.8ml；B 组采用 70Kv 智能毫安，噪声指数 (NI) 30，对比剂剂量 kgx0.5，两组均以 9S 的平台期注射对比剂，监测降主动脉，阈值为 250HU，到达阈值后自动触发，延迟 1.5s 进行扫描，扫描结束后 A 组采用 50%权重基于多模型自适应统计迭代重建 (50%ASIR-V)，B 组采用高权重深度学习重建 (DLIR-H)。由两位工作经验丰富的医师采用五分法对图像质量进行双盲主观评价。在两组图像上分别测量主动脉根部、右冠状动脉近端、左回旋支近端、左前降支近端及心包脂肪 CT 值及 SD 值，计算 SNR 和 CNR。比较两种重建算法图像 CT 值、噪声、SNR、CNR、辐射剂量和对比剂剂量。

结果：B 组 DLIR-H 重建 AO、LAD、LCX、RCA 及心包脂肪的 CT 值显著高于 A 组 50%ASIR-V，差异有统计学意义 ($P<0.001$)，B 组 DLIR-H 重建 AO、LAD 及 RCA 的 SD 值显著低于 A 组 (P

<0.05)。B 组 DLIR-H 重建算法 AO、RCA、LAD 与 LCX 的 CNR 值、SNR 值显著高于 A 组 50%ASIR-V，且差异有统计学意义 ($P<0.001$)。两组冠状动脉图像质量主观评分均满足诊断要求，两名医生主观评分一致性好 (κ 值=0.85, $p<0.001$)，B 组图像主观评分高于 A 组且差异有统计学意义 ($P<0.001$)。B 组有效辐射剂量及对比剂剂量均显著低于 A 组且差异有统计学意义 ($P<0.001$)，且 B 组对比剂用量 (31.24 ± 3.58) mL 和辐射剂量 (1.35 ± 0.50) mSv 较 A 组 (49.51 ± 5.21) mL、 4.18 ± 1.78 mSv 分别降低了 36.9% 和 67.7%。

结论：对于 BMI $<25\text{ kg}\cdot\text{m}^2$ 的患者，“双低”技术联合 DLIR-H 重建算法可以显著降低 CCTA 辐射剂量和对比剂用量，并可获得较好的冠状动脉血管图像。

PO-1209

超低剂量胸部 CT 结合深度学习重建行肺结节评估的可行性研究

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目的：探讨超低剂量 CT (ULDCT) 扫描条件下采用深度学习重建 (DLIR) 行肺结节评估的可行性，并比较其与 ULDCT 基于自适应统计迭代重建 40% (ASIR-V40%) 及标准剂量 CT (SDCT) ASIR-V40% 的图像质量、结节检出率以及结节征象显示能力。

方法：纳入本院肺结节复查患者 42 例。所有患者分别采用标准剂量 CT 检查 (SDCT) 和超低剂量 CT 检查 (ULDCT)，SDCT 采用 120kVp，自动管电流，ULDCT 根据患者 BMI ($\text{BMI}\leq 18.4\text{ kg}/\text{m}^2$ 、 $18.5<\text{BMI}<23.9\text{ kg}/\text{m}^2$ 、 $\geq 24\text{ kg}/\text{m}^2$) 分别采用 10mA、20mA、35mA 扫描，管电压与 SDCT 相同。SDCT 采用 ASIR-V40% 重建 (A 组)，ULDCT 分别采用 ASIR-V40% 重建 (B 组) 和 DLIR-H 重建 (C 组)，共获得 3 组图像。记录两次扫描的辐射剂量和 3 组图像检出结节数。测量 3 组图像肺组织、主动脉、肌肉的 CT 值和噪声值 (SD)，并计算各组织的信噪比 (SNR)。2 名资深放射医师采用双盲法对 3 组图像肺总体图像质量及肺结节征象进行 5 分制主观评分。对 3 组图像的定量指标和主观评分进行统计学分析。

结果：两种扫描方式的辐射剂量分别为 $3.38\pm0.97\text{ mSv}$ 、 $0.25\pm0.08\text{ mSv}$ ，ULDCT 相较于 SDCT 辐射剂量降低约 92.6%，差异有统计学意义 ($P<0.05$)。3 组图像的肺组织、主动脉、肌肉的 SD 值和 SNR 均有统计学差异 ($P<0.05$)，C 组图像各组织的 SD 值低于 B 组，而 SNR 高于 B 组，与 A 组对比无统计学差异 ($P>0.05$)。3 组图像肺结节检出数量均为 87 个，其中具有毛刺、分叶、胸膜牵拉、空洞或空泡、血管穿行征象的结节个数分别为 31 个、28 个、22 个、18 个、14 个。3 组图像的总体图像质量、肺结节征象主观评分有统计学差异 ($P<0.05$)，其中 C 组总体图像质量和肺结节征象主观评分优于 B 组 ($P<0.05$)，与 A 组对比无差异 ($P>0.05$)。

结论：超低剂量胸部 CT 结合深度学习重建能够获得与 SDCT ASIR40% 相当的图像质量，且对结节的检出及征象显示良好，临床可以用于对肺结节的评估。

PO-1210

心脏磁共振 T1 mapping 联合应变技术在心肌淀粉样变和肥厚型心肌病的诊断及鉴别的应用研究

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目的: 探讨磁共振 T1 mapping 联合应变技术在心肌淀粉样变性 (CA) 和肥厚性心肌病 (HCM) 患者临床检查中的应用并分析其差异

方法: 回顾性分析 2019 年 3 月至 2022 年 12 月在我院诊治并行心脏磁共振 (CMR) 的 30 例心肌淀粉样变患者 (CA 组)、30 例肥厚型心肌病患者 (HCM 组) 及 30 名健康志愿者 (对照组) 资料, 扫描序列包括心脏电影、T1 mapping、钆对比剂延迟强化 (LGE), 通过心脏电影成像及 CVI42 后处理软件测量出心功能参数及形态学参数, 使用 T1mapping 模块计算出左心室整体及各节段 (基底段、中间段、心尖段) 心肌初始 T1 值、细胞外体积分数 (ECV), 在应变模块中测量出左心室整体及各节段 3D 径向应变 (RS)、周向应变 (CS)、纵向变 (LS) 值及相应的峰值收缩期应变率 (PSSR) 及峰值舒展期应变率 (PDSR), 计算上述参数各组间的差异。

结果: 心肌形态学及心功能参数中, 左心室质量、心率 CA 组高于 HCM 组, 左心室射血分数及左心室壁厚度 CA 组低于 HCM 组, 差异均具有统计学意义 ($P<0.05$), 其余各参数组间无明显差异; 应变参数中, CA 组整体、基底部、中间部、心尖部各应变参数 (RS、CS、LS 及其相应的 PSSR、PDSR) 均低于 HCM 组, 差异具有统计学意义 ($P<0.05$); CA 组总体、基底部、乳头肌部、心尖部心肌初始 T1 值及 ECV 值均高于 HCM 组, 差异具有统计学意义 ($P<0.05$)。

结论: CA 患者的心肌初始 T1 值及 ECV 值升高较 HCM 患者更为明显, 心肌应变较 HCM 患者下降更为明显, 因此磁共振 T1 mapping 联合应变技术在评估 CA 与 HCM 患者心肌纤维化、心脏整体及局部功能运动情况具有一定诊断价值。

PO-1211

IQon 能谱 CT 在评价吸烟人群肺部血流情况中的价值探讨

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目的: 应用 IQon 能谱 CT 成像对正常人肺部血流状况进行分析, 证实能谱 CT 成像方法及多参数对肺部血流状况研究的可行性并探讨能谱 CT 对吸烟患者肺部血流情况进行评估的价值及意义。

研究方法: 选取本院 2021 年 6 月至 2023 年 3 月, 40—60 岁青壮年 15 年以上吸烟与不吸烟且同时排除合并肺部感染性病变、肺部间质病变及 COPD 病史及相应临床症状的患者各 50 例。运用 IQon 能谱 CT 增强下双期扫描能谱数据包对肺部灌注灌注情况进行评估, 首先确定把肺组织仰卧位作为观察体位, 于冠状及轴位并将肺组织沿重力方向等分为 3 个冠状层面, 即腹侧、气管隆突水平、背侧; 同时将双肺在头足侧方向上, 从上到下等分为上、中、下三部分; 再将左右肺在横断面上, 分别从外侧到内侧等分为外、中、内三个层面。在动脉期单个层面上每个部位分别均匀地测量 3 个不同感兴趣区域的标准碘密度值及单能级 40keV 下图像肺部 CT 值, 并利用原子序数融合图对肺部灌注情况进行整体评价。应用 SPSS18.0 软件, 采用方差分析、Spearman 相关性分析及配对 t 检验进行统计学分析。

研究结果: 1. 吸烟及非吸烟者全肺标准碘浓度值有明显差异, 尤其在单能级 40keV 的碘密度值下更为明显, 而常规肺部 CT 值在二者上无明显差异。2. 肺部标准碘密度值与肺功能相关指标 FEV1、FEV1% 预计值及 FEV1/FVC 成正相关性。3. 患者肺部标准碘浓度值与吸烟指数具有明显相关性。

研究结论: 1. 能谱 CT 增强两期灌注扫描可以较准确地反映整体及局部肺组织的血流灌注分布状况并可能成为综合评估吸烟患者肺功能的一个指标。2. 能谱 CT 灌注成像发现: 正常生理状态下, 肺血流在重力方向上成梯度分布, 背侧血流较丰富; 距离肺门血管越近血流越丰富。3. 吸烟患者肺部血流状况发生改变且与不吸烟患者存在明显差异。

PO-1212

超低剂量扫描条件下深度学习重建对计算机辅助检测系统肺结节定量分析影响

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目的：探讨深度学习重建算法（DLIR）在超低剂量扫描条件下（ULDCT）对肺结节 CT 影像辅助检测软件（CAD）肺结节定量分析的影响。

方法：纳入肺结节复查患者 46 例。所有患者分别采用标准剂量 CT（SDCT）和 ULDCT 检查。SDCT 采用基于多模型的自适应统计迭代重建 40%（ASIR-V40%），ULDCT 分别采用 ASIR-V40% 和 DLIR-H 重建图像，共获得 3 组图像（A 组、B 组、C 组）。记录两次扫描辐射剂量。将 3 组图像导入肺结节 CT 影像辅助检测软件（CAD）进行分析，测得每个肺结节长径、横径、密度、体积、危险度以及结节分类等参数。两名医生对 3 组肺结节图像质量进行 5 分制评分。根据肺结节密度将结节分为实性结节、钙化结节、磨玻璃结节 3 大类。将 3 组图像不同种类肺结节 CAD 定量分析数据及肺结节图像质量评分进行统计分析。

结果：ULDCT 的有效辐射剂量低于 SDCT，有统计学差异（ $P < 0.05$ ）。46 例患者共计检出肺结节 86 个，其中实性结节 40 个、钙化结节 24 个、磨玻璃结节 22 个。3 组图像实性和钙化结节长径、横径、体积、危险度无统计学差异（ $P > 0.05$ ）；A 组实性结节密度与 B 组对比有统计学差异（ $P < 0.05$ ），与 C 组对比无统计学差异（ $P > 0.05$ ）；A 组钙化结节密度与 C 组对比有统计学差异（ $P < 0.05$ ），与 B 组对比无统计学差异（ $P > 0.05$ ）。3 组图像磨玻璃结节长径、横径无统计学差异（ $P > 0.05$ ）；A 组磨玻璃结节密度、体积与 C 组对比有统计学差异（ $P < 0.05$ ），与 B 组对比无统计学差异（ $P > 0.05$ ）；A 组磨玻璃结节危险度与 B 组对比有统计学差异（ $P < 0.05$ ），与 C 组对比无统计学差异（ $P > 0.05$ ）。3 组图像不同种类肺结节图像质量评分有统计学差异（ $P < 0.05$ ），A 组与 B 组对比有差异（ $P < 0.05$ ），与 C 组对比无差异（ $P > 0.05$ ）。

结论：超低剂量扫描结合 DLIR-H 重建对实性结节定量分析与常规 CT 基本一致，但其会低估钙化结节密度和磨玻璃结节体积，高估磨玻璃结节密度，而所有结节的危险度和图像质量与常规 CT 无差异，因此临床中能使用超低剂量扫描结合 DLIR-H 重建对肺结节进行定量分析。

PO-1213

肺泡蛋白沉积症的 CT 表现及预后分析

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目的：肺泡蛋白沉积症（PAP）是一种病因不明的罕见疾病，以表面活性物质代谢受损为特征。部分患者治疗后仍科技残存病变，少数患者进展为终末期肺纤维化，本研究研究目的是通过连续 CT 观察肺部异常病变的变化，以期预测 PAP 患者临床改善因素及预后。

方法：45 例患者（25 例男性，20 例女性），年龄 23~54 岁。在基线和随访 CT 扫描上评估 PAP 的范围和分布（中位数，38 个月；范围，6-84 个月）。肺功能（PFT）测量包括用力肺活量（FVC），1 秒用力呼气量（FEV1），1 秒用力呼气量与用力肺活量（FEV1 / FVC）之间的比值，以及一氧化碳肺单次呼吸弥散能力（DLCO）。将临床表现改善的患者与表现出进展或无变化的患者的临床特征、基线和最终随访 CT 表现以及 PFT 结果进行比较。采用 Fisher 精确检验比较分类变量；采用 Mann-Whitney U 检验比较连续变量，以确定可预测 PAP 临床改善的临床或 CT 特征。

结果: PAP 患者的 CT 平扫最常见的影像学表现为磨玻璃密度影 (100%);其次为小叶间隔增厚 (86.7%)。重要的是,最终随访 CT 扫描显示肺部病变严重程度减低 ($n=30$),其中包括病变完全消失 ($n=6$);肺部病变无变化 ($n=10$);肺部病变加重 ($n=5$)。在 2 例患者可见牵引性支气管扩张和肺部结构扭曲。在单变量和多变量分析中,肺部病变总体程度的变化是 PAP 临床改善的预测因素 (优势比: 52.540; $P=0.031$)。

结论: 大多数 PAP 患者在随访中仍有病变残存,但是,进展为肺间质纤维化较为罕见。连续 CT 检查观察肺部病变异常的总体变化可以预测患者的临床改善程度。

PO-1214

基于 CCTA 的定量斑块分析评估不同斑块特征与腔内衰减梯度的相关性

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目的: 研究腔内衰减梯度与冠心病患者斑块特征的相关性以评估不同斑块对局部及整体管腔腔内衰减梯度的影响。

方法与材料: 我们回顾性纳入了 80 名通过冠状动脉计算机断层造影 (CCTA) 及有创冠状动脉造影诊断为慢性冠状动脉疾病的患者,排除了因肿瘤性病变、糖尿病、高血压、高血脂、急慢性炎症造成的血流动力学改变而影响腔内衰减梯度 (TAG) 测量结果的患者,纳入其中最小狭窄程度 $>24\%$ 且只存在单一斑块的 LAD、LCX 及 RCA。其中 38 个斑块位于冠脉近段,25 个斑块位于冠脉开口处,23 个斑块位于冠脉中段,19 个斑块位于冠脉远段。三名独立的盲态放射科医生在 CCTA 图像上使用半自动化软件对斑块长度、斑块体积、最小管腔、最狭窄程度、及分别用斑块去除算法和中心线算法评估的斑块周围 TAG、斑块前 TAG、斑块后 TAG 进行量化取平均值。比较不同斑块特征对于 TAG 的影响及两种算法的差异。

结果: 在登记的参与者中,48 人为男性,32 人为女性。所有参与者的平均年龄为 60 岁 (39 至 82 岁)。在年龄、性别、体重指数危险因素方面没有观察到组间差异。斑块所在冠脉分支、斑块体积、最小管腔、最狭窄程度对于管腔 TAG 影响存在显著差异 ($P<0.001$),位于不同节段斑块对于斑块后 TAG 基于该管腔整体 TAG 的变化存在显著差异 ($P<0.001$),而对于斑块处 TAG 的变化无明显差异 ($P>0.05$);斑块去除算法与中心线算法的 TAG 测算存在显著差异 ($P<0.001$)。斑块越接近冠脉开口处,对斑块后 TAG 影响越小。中心线算法较斑块去除算法 TAG 测算更具有统计学意义。可以通过斑块所在部位及斑块本身特点评估管腔中血流动力学变化情况,以推测冠脉供血及斑块后续进展。

PO-1215

CMR 全定量心肌灌注评价川崎病患儿心肌灌注损伤:与左心室重构的关系

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目的: 将全定量心肌灌注运用于川崎病患儿,评价其心肌灌注损伤及其影响因素,并探究与左心室重构的关系。

方法：纳入我院就诊的川崎病 (KD) 患儿和年龄、性别匹配的对照共 120 名。全定量灌注成像采用双团注的方案。通过后处理获得左心室整体和三支冠状动脉供血区域的心肌血流量 (MBF)，根据患儿的收缩压和心率校正得到 MBFcor。统计学方法采用单因素方差分析和多元线性回归等。

结果：共纳入 KD 患儿 87 名 (男：60 例，年龄 7.49 ± 2.15 岁)，冠状动脉扩张患儿 45 例 (51.7%)，急性期患儿 25 例 (28.7%)；纳入对照儿童 33 例 (男：22 例，年龄： 8.22 ± 2.81 岁)。KD 的左心室整体 MBFcor 较对照组降低 (2.23 ± 0.50 vs. 2.48 ± 0.67 , $P=0.031$)。急性期患儿的左心室整体 MBFcor 较对照组降低 (2.08 ± 0.54 vs. 2.48 ± 0.67 , $P<0.05$)。中-巨大型冠状动脉瘤 (CAA) 患者的左心室整体 MBFcor 和有中-巨大型 CAA 的左前降支及左回旋支供血区域的 MBFcor 较冠状动脉未扩张及小型 CAA 患者和对照组的整体和相应冠状动脉供血区域均降低 (all $P<0.05$)，且其扩张程度 (Z 值) 与相应的 MBFcor 相关 (global: $r=-0.305$, $P=0.004$; LAD: $r=-0.299$, $P=0.005$; LCX: $r=-0.298$, $P=0.005$)。多元线性回归显示，KD 患儿的年龄、病程及冠状动脉扩张程度 (Z 值) 与整体 MBFcor 相关。KD 的左心室整体 MBFcor 与径向及轴向峰值应变 (PS) 的绝对值呈正相关 (radial: $r=0.233$, $P=0.035$; circumf.: $r=0.259$, $P=0.019$)，与左心室质量指数 (LVMI) 及左室重构指数 (LVRI) 呈负相关 (LVMI: $r=-0.268$, $P=0.012$; LVRI: -0.391 , $P<0.001$)。

结论：CMR 全定量心肌灌注能定量评价川崎病的心肌灌注异常。KD 的心肌灌注损伤与患儿的病程和冠状动脉扩张相关，且可能会导致左心室功能和左心室重构的异常。

PO-1216

基于深度学习模型非门控胸部 CT 左心房容积测量： 和心电门控 CT 手动测量比较

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目的：

左心房三维结构不规则，手动分割定量测量困难且耗时，在非门控胸部 CT 上测量尤其具有挑战性。本研究旨在与心电门控心脏 CT 手动测量比较，验证基于深度学习的方法在非增强胸部 CT 上定量左心房容积的准确性。

方法：

2021 年 1 月 1 日至 2022 年 12 月 31 日，5000 例已知或疑似冠状动脉疾病患者接受了标准心电图门控心脏 CT 检查，其中 1000 例患者同期接受了常规非对比非门控胸部 CT 检查，用于肺癌筛查或常规体检等其他诊断目的。心电图门控心脏 CT 与非门控胸部 CT 的中位时间间隔为 0 天 (四分位数间距 [IQR] 0-2 天)。排除标准包括：金属植入术，严重运动伪影，无薄层数据。最终，900 例患者被纳入本研究。

所有符合纳入标准的患者心脏增强 CT 图像和肺部 CT 图像被传入专用工作站 (西门子, SyngoVia VB20)，由两名具有十年以上心血管 CT 诊断的医师独立使用手动分割的方法提取左心房三维构型并定量容积；同时，使用基于改进的 3D U-Net 深度学习模型深度学习算法的模型完成心脏各腔室的自动分割和体积测量。

结果：

深度学习算法自动测量的左心房容积与在专门心电门控的心脏 CT 上的手动测量值具有高度相关性 (Spearman 系数=0.90, $P<0.001$) Bland-Altman 分析显示，相对于心电门控 CT 手动测量，深度学习算法胸部非增强 CT 扫描倾向于低估左心房容积 (平均差值约 3.84ml)，平均组内相关系数为 0.96 ($P<0.01$)，显示出高度一致性。

结论：

与基于心电门控的心脏 CT 手动测量相比，深度学习算法在非门控胸部 CT 扫描中定量测量 LAV 是准确和可靠的。深度学习算法能够显著提高左心房容积测量效率和准确性，有望为临床医生提供更准确的 LAV 定量测量工具。

PO-1217

MR-T2 刀锋伪影校正技术联合 DWI 对局灶性机化性肺炎与周围型肺癌的鉴别诊断价值研究

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目的：探索联合 MR-T2 加权成像（T2 weighted imaging, T2WI）与扩散加权成像（Diffusion weighted imaging, DWI）对局灶性机化性肺炎（Focal organizing pneumonia, FOP）与周围型肺癌（Peripheral lung cancer, PLC）的鉴别诊断价值。资料与方法：本回顾性研究共纳入 72 例 FOP、PLC 患者（50 个男性，平均年龄为 64.7 岁，22 个女性，平均年龄 64.9 岁），两组各 36 例。两名经验丰富的放射科医师独立阅读 MR 图像，并分别测量 T2 对比度比（T2 contrast ratio, T2 CR）及表观扩散系数（Apparent diffusion coefficient, ADC）值；使用配对 t 检验来比较两组间的 T2CR 与 ADC 值，使用 ROC 曲线来评估 MR-T2WI 与 DWI 的诊断效能。结果：两名放射科医师对 T2CR 与 ADC 值观察者间一致性良好（ICC 值分别为 0.951、0.955）；FOP 组 T2CR 和 ADC 值均显著大于 PLC 组（ p 均 <0.001 ），T2CR 与 ADC 值的阈值分别为 2.29 和 $1048 \times 10^{-6} \text{mm}^2/\text{s}$ ；联合 ADC 与 T2CR 值较单独使用二者诊断准确性及 AUC 提高（准确性：86.1% vs 84.7%、73.6%，AUC：0.924 vs 0.879、0.740）（ $p < 0.05$ ）。使用 ADC 值诊断 FOP 正确者 33 例，PLC 正确者 28 例；单独使用 T2CR 诊断 FOP 正确者 20 例、PLC 正确者 33 例；联合 T2CR 与 ADC 值对 FOP 诊断正确 29 例、PLC 诊断正确 33 例。结论：联合 T2CR 与 ADC 值有助于鉴别 FOP 与 PLC，诊断效能高于单独使用二者。

PO-1218

基于自动全肺分割的 CT 放射组学模型对肺功能下降人群的预测价值研究

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基于自动全肺分割的 CT 放射组学模型对肺功能下降人群的预测价值研究

目的：

本研究旨在建立基于自动全肺分割算法的 CT 放射组学模型，评估其在预测患者肺功能下降方面的能力。

方法：

回顾性收集 2020 年 6 月至 2023 年 3 月在本中心行胸部 CT 及肺功能检查的患者（间隔时间小于 1 月），排除 CT 图像质量不佳、大片炎症、积液等影响影像组学特征提取的患者后，共纳入 432 名患者。将肺功能检查结果为慢性阻塞性肺疾病（COPD, chronic obstructive pulmonary disease, 定义为 $\text{FEV1}/\text{FVC} < 0.7$ ）和保留比值受损肺功能（Preserved-ratio Impaired Spirometry, 定义为 $\text{FEV1}/\text{FVC} \geq 0.7$, $\text{FEV1}\%_{\text{pre}} \geq 0.8$ ）的患者定义为肺功能下降（ $N=241$ ），其余为肺功能正常（ $N=191$ ）。使用联影智能科研平台进行全肺 ROI 勾画，并提取放射组学特征，用最小绝对值收敛和选择算子（LASSO）进行特征筛选，使用 13 种分类器（AdaBoost、决策树、逻辑回归、XGBoost 等）进行模型构建，使用五折交叉验证进行模型效能检验。利用受试者工作特征曲线（ROC, Receiver operator characteristic curve）及曲线下面积（AUC, Area under curve）评估预测模型的效能。

结果：所有分类器中，使用逻辑回归算法得到了最佳放射组学模型，其预测肺功能下降的 AUC 在训练集与测试集中分别为 0.900 (95%CI: 0.869-0.934) 和 0.836 (95%CI: 0.752-0.924)。

结论：基于自动全肺分割的 CT 放射组学模型能预测患者是否存在肺功能下降，有助于在临床工作中筛查 PRISm 及 COPD 患者。

关键词：

慢性阻塞性肺疾病；保留比值受损肺功能；影像组学；机器学习

PO-1219

急性 Stanford A 型主动脉夹层患者 30 天内死亡率的预测模型

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目的：德国急性 A 型主动脉夹层术后 30 天院内死亡评分系统 (GERAADA Score) 和欧洲心脏手术风险评分系统 (EuroSCORE II) 的有效性尚不清楚，我们的目的是验证这两个模型的预测精度。构建一个模型来预测急性 Stanford A 型主动脉夹层(ATAAD)患者 30 天内的死亡风险。

方法：在 2019 年 6 月至 2023 年 6 月期间在我院接受手术治疗的 ATAAD 患者，根据术后 30 天内是否发生死亡分为死亡组和生存组。计算患者的 GERAADA Score 和 EuroSCORE II，评估预测死亡率和实际死亡率。比较两组间器官灌注不足、心包积液以及冠脉相关的参数等。筛选独立预测因素并建立 ATAAD 患者 30 天内死亡的预测模型。绘制受试者工作特征曲线和决策曲线来评价模型的性能，并通过 DeLong 检验对模型进行比较。

结果：本研究共纳入 109 名患者，死亡组 35 人，存活组 74 人。死亡组的冠状动脉周围脂肪组织衰减在左前降支 (-67.5 ± 2.26) 和右冠状动脉 (-61.21 ± 1.81) 均高于生存组 (-74.45 ± 1.11 , $P=0.009$; -67.90 ± 1.72 , $P=0.019$)。逻辑回归分析显示升主动脉长度和心包积液是 ATAAD 患者 30 天内死亡的独立预测指标。我们构建 4 个模型，GERAADA Score (模型 1)；EuroSCORE II (模型 2)；模型 1、升主动脉和心包积液 (模型 3) 以及模型 2、升主动脉和心包积液 (模型 4)。模型 1 ($AUC=0.683$) 和模型 2 ($AUC=0.599$) 对夹层患者死亡率的预测价值相同 ($P>0.05$)。模型 3 ($AUC=0.832$) 和模型 4 ($AUC=0.818$) 的结果分别与模型 1 和模型 2 有显著差异 ($P<0.05$, DeLong 检验)。决策曲线表明，模型 3 可以进一步发展为一种定量工具，用于随后预测 ATAAD 患者 30 天内死亡率，我们以诺莫图的形式呈现。

结论：GERAADA Score 和 EuroSCORE II 预测效能相同。模型 3 可以提高 ATAADA 患者 30 天死亡率的预测能力。该模型可以对 ATAAD 患者进行危险分层并指导临床决策。

PO-1220

基于深度学习对肥胖患者行低剂量 CCTA 成像的应用价值

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目的：探讨基于深度学习重建算法对肥胖患者行低剂量冠状动脉 CTA 成像的应用价值。

资料与方法：纳入 BMI ≥ 28 kg/m² 人群行冠状动脉 CTA 检查患者 100 例，随机分为对照组跟研究组，每组 50 例。对照组采用常规管电压 120kV 及对比剂剂量 (BMI $\times 1.5$)；研究组采用低管电压 100kV 及低对比剂剂量 (BMI $\times 1.5 \times 0.8$)，ASiR-V50%重建及 DLIR-H 重建。CCTA 主观图像质量评价：依据国际心血管 CT 学会冠状动脉分段标准，两名 5 年以上的心血管 CTA 工作经验的主治医师以上的医生分别对每段血管进行评分按照 5 分法对各组的图像质量进行评价。CCTA 客观图像质量评价：分别测量 A、B 两组中 ASiR-50%、DLIR-H 重建后图像的主动脉根部、左主干、三支冠状

动脉近段 CT 值,以主动脉根部邻近脂肪组织的 CT 值作为背景 CT 值、SD 值为背景噪声,以主动脉根部 SD 值为图像噪声。分别计算血管的信噪比和对比噪声比, $SNR = \text{管腔强化 CT 值} / \text{管腔 SD}$; $CNR = (\text{管腔强化 CT 值} - \text{背景 CT 值}) / \text{背景 SD}$ 。

结果:客观评价:两组的 DLIR-H 组噪声 (SD) 均低于 ASIR-V 组,信噪比 (SNR)、对比噪声比 (CNR) 均高于 ASIR-V 组,差异具有统计学意义,两组 DLIR-H 进行比较发现,主动脉根部的噪声,研究组均高于对照组,比较有统计学差异,两组 CNR 比较均无统计学差异,此外两组在主动脉根部的 SNR 分别为研究组 26.5 ± 6.0 、对照组 25.0 ± 5.7 ,研究组高于对照组,比较无统计学差异,反应了虽然降低管电压后图像的噪声有所增加,但图像客观质量并没有降低,达到了 120kV 常规管电压相同的图像效果。主观评价:DLIR-H 组主观图像质量评分明显高于 ASIR-V 组,比较有统计学差异。2 名医师评价图像质量的一致性较高。研究组 ($3.3 \pm 1.1 \text{mSv}$) 较对照组 ($4.2 \pm 1.2 \text{mSv}$) 的辐射剂量降低约 21%。

结论:肥胖患者在 100kV 低管电压下行 CCTA 检查具有可行性,并可有效降低辐射剂量及对比剂用量,且 DLIR-H 具有最高主观评分,图像客观评价指标较 ASIR-V 优越。

PO-1221

急性心肌梗死后非缺血远程心肌应变的影响因素研究

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目的:

探究急性心肌梗死 (Acute Myocardial Infarction, AMI) 病人经皮冠状动脉介入治疗 (Percutaneous Coronary Intervention, PCI) 后远程心肌 (Remote Myocardium, RM) 的收缩功能情况,并探讨其影响因素。

方法:

研究选取 2018 年 11 月至 2023 年 7 月于沧州市中心医院诊断为急性心肌梗死行急诊 PCI 治疗且 2 周内行心脏磁共振 (Cardiac Magnetic Resonance, CMR) 检查的病人。收集病人临床数据、冠脉造影图像、实验室检查结果、各节段周向应变等参数。根据心肌的 CMR 成像表现及相对关系定义梗死心肌和远程心肌。根据 CMR 特征追踪技术 (Feature Tracking, FT) 识别的远程心肌峰值周向应变值将病人分为 RM 应变受损组和 RM 应变保留组。应用统计学方法对 RM 功能异常相关因素进行分析。

结果:

- 1.入组 141 例病人,54 例发生 RM 周向应变受损。共识别 423 个 RM 节段,其中 102 个节段周向应变受损。
- 2.单因素关联性分析显示,RM 应变受损组与 RM 应变保留组组间的年龄 ($P=0.035$)、高脂血症史 ($P=0.049$)、罪犯血管分布情况 ($P<0.001$) 的差异均有统计学意义。
- 3.将单因素关联性分析中有统计学意义的变量,即年龄、高脂血症史、罪犯血管分布情况以及 CMR 识别的微循环情况作为自变量纳入多因素 Logistic 回归分析示年龄 ($P=0.021$)、既往有高脂血症史 ($P=0.035$) 对远程心肌周向应变的影响具有统计学意义。相较于罪犯血管为左前降支的患者,罪犯血管为回旋支者及右冠者发生远程心肌周向应变受损的风险将分别提高 21.62 倍 ($P<0.001$) 和 3.64 倍 ($P=0.001$)。

结论:

- 1.急性心肌梗死后远程心肌收缩功能可能会受损。
- 2.相较于罪犯血管为左前降支的患者,罪犯血管为回旋支者及右冠者更容易发生远程心肌收缩功能受损。
- 3.年龄的增加会阻碍远程心肌收缩功能受损的发生,既往患有高脂血症促进远程心肌收缩功能受损的发生。

PO-1222

18F-FDG PET/CT 和血清肿瘤标志物对 非小细胞肺癌肿瘤突变负荷的预测价值

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目的：肿瘤突变负荷（Tumor mutational burden, TMB），定义为肿瘤基因组每个编码区域的体细胞突变总数，是一种有前景的免疫治疗应答生物标志物。然而由于检测困难（侵入性操作、无法获得有效穿刺样本或重复取样、测序昂贵等），TMB 尚未在临床上广泛应用。本研究旨在探讨 18F-FDG PET/CT 代谢指标和血清肿瘤标志物是否可以作为非小细胞肺癌 TMB 的潜在替代，在临床无法检测 TMB 时通过非侵入性方法预测 TMB 水平并指导免疫治疗。

方法：在这项回顾性研究中，我们纳入了 129 例（男性 78 例，女性 51 例）在 2018 年 3 月至 2022 年 9 月期间我院接受基线 TMB 和血清肿瘤标志物检测以及 18F-FDG PET/CT 扫描的非小细胞肺癌患者。患者分为高 TMB 组（TMB ≥ 10 mutations/Mb, 27 例）和非高 TMB 组（TMB < 10 mutations/Mb, 102 例）。应用二元逻辑回归分析确定高 TMB 的独立预测因子。在对数尺度上进行线性回归分析确定 TMB 水平的独立预测因子。并对腺癌、EGFR+腺癌、EGFR-腺癌和鳞状细胞癌进行亚组分析。

结果：对于腺癌，高 TMB 组的所有代谢指标（SULpeak、SULmax、SULmean、MTV、TLG）均显著高于非高 TMB 组；吸烟（OR=27.08, P=0.018）、EGFR+（OR=0.03, P=0.033）、KRAS+（OR=7.98, P=0.083）、高 CEA（OR=33.56, P=0.029）和高 CA125（OR=13.68, P=0.030）是高 TMB 的独立预测因子；所有代谢指标和 TMB 值在对数尺度上呈显著的正线性相关关系，其中 SULpeak 是 TMB 值的独立预测因子。然而，在鳞状细胞癌中没有发现与 TMB 显著相关的代谢指标和血清肿瘤标志物。

结论：18F-FDG PET/CT 代谢指标和血清肿瘤标志物可以预测腺癌的 TMB 水平，在临床无法检测 TMB 时可以作为 TMB 的潜在替代，通过非侵入性方法指导免疫治疗。

PO-1223

双肺多发结节罕见病例分享

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肺部 CT 与 PET-CT 均存在误诊。肺部 CT 检查：双肺散在沿支气管血管束分布的结节，大小约 0.32-0.74cm，增强扫描呈轻度强化。提示：双肺多发结节影，待除外转移癌；PET-CT 提示：双肺多发结节，考虑转移癌。右肺上叶磨玻璃结节，代谢不高，考虑周围型肺癌。行全麻胸腔镜下探查术。术中送检：右肺上叶楔形切除肺组织 1 块，重 17g，体积 7.06cm*2.51cm*2.32cm，肺组织内及胸膜下见灰白色结节数枚，直径 0.41cm-0.67cm。免疫组化结果显示：AE1/AE3 (-)，CD31(+), CD34 (+)，CK7 (-)，EMA (-)，FLI-1(+), Vimentin(+), Ki-67(约+2.00%) 术后病理：右肺上叶肺组织内多个结节，形态上倾向上皮样血管内皮瘤，伴玻璃样变性坏死。

PO-1224

多参数胸部 CT 在评估结缔组织疾病相关 肺动脉高压预后中的价值

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摘要

目的: 基于胸部 CT 探讨肺血管参数、肺间质性改变、食管扩张程度及心包积液等肺高压参数在预测结缔组织疾病相关肺动脉高压 (CTD-PAH) 预后中的价值。

方法: 回顾性分析 2010 年 5 月至 2021 年 4 月在南京医科大学第一附属医院风湿免疫科经超声心动图诊断的 158 例 CTD-PAH 患者的临床资料和影像资料。测量并评估所有患者的胸部 CT 肺高压参数, 包括主肺动脉直径 (MPAd)、升主动脉直径 (AAOd) 和降主动脉直径 (DAOd) 以及右肺动脉直径 (RPAd)、左肺动脉直径 (LPAd)、间质性肺疾病评分、主动脉弓上食管冠状径、主动脉弓下食管冠状径、心包积液和胸腔积液。主要研究终点为全因死亡。采用单因素和多因素 COX 风险预测模型寻找不良预后的危险因素, 危险因素以风险比及其 95% 置信区间表示; 通过时间依赖的受试者工作特征 (ROC) 曲线寻找预测患者预后相关指标的阈值; 采用 Kaplan-Meier 方法计算患者的生存率。

结果: 多因素 COX 回归分析显示年龄、MPAd、间质性肺疾病评分及心包积液是 CTD-PAH 患者全因死亡的独立危险因素。时间依赖的 ROC 曲线结果提示, MPAd 和间质性肺疾病评分预测 CTD-PAH 患者预后相对应的最佳阈值分别为 37.70 mm 和 2 分。MPAd>37.70mm 联合肺间质性改变评分≥2 分的患者预后更差, $P\leq 0.0001$ 。

结论: 基于胸部 CT 参数 MPAd、间质性肺疾病评分及心包积液是结缔组织疾病相关肺动脉高压患者不良预后的独立危险因素, MPAd 联合间质性肺疾病评分可以更好识别临床预后不良的 CTD-PAH 患者。

PO-1225

双源 CT 冠脉成像在老年冠心病临床诊断中的有效性研究

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目的 分析老年冠心病诊断中应用双源 CT 冠脉成像的诊断有效性, 探讨该技术的临床应用价值, 总结患者对于双源 CT 冠脉成像检查的满意度和该技术的正确应用方式。

方法 自 2022 年 7 月至 2023 年 3 月筛选本院检查的老年冠心病患者, 全部患者均确诊为冠心病, 年龄在 60 周岁及以上。纳入其中 58 例展开分析, 保持组间均衡性的前提下将患者随机分组, 抽签 1 比 1 划分对照组、实验组实施不同的诊断方法。对照组 29 例患者接受常规冠脉造影检查, 实验组 29 例患者实施双源 CT 冠脉成像检查, 检查工具为西门子双源炫速 CT Somatom Flash。收集全部患者检查结果, 分析冠状动脉分支、冠状动脉节段诊断结果。

结果 实验组检出左主干病变、左前降支病变、左回旋支病变、右冠状动脉病变的例数分别为 9 例、21 例、19 例、17 例, 分别占比 31.03%、72.41%、65.52%、58.62%, 对照组左主干病变、左前降支病变、左回旋支病变、右冠状动脉病变的例数分别为 3 例、15 例、10 例、9 例, 占比分别为 10.34%、51.72%、34.48%、31.03%, 实验组检出率均高于对照组, 差异可见统计学意义, $P<0.05$ 。实验组对冠状动脉分支诊断准确率、灵敏度、特异度分别为 93.55%、97.82%、94.10%, 高于对照组准确率、灵敏度、特异度分别为 67.74%、61.25%、70.40%, 差异可见统计学意义, $P<0.05$ 。实验组对于检查的非常满意、满意、不满意例数分别为 15 例、13 例、1 例, 分别占比 51.72%、44.83%、3.45%, 总满意度为 96.55% (28/29), 对照组检查的非常满意、满意、不满意例数分别为 10 例、12 例、7 例, 各占比 34.48%、41.38%、24.14%, 总满意度为 75.86% (22/29), 研究组检查总满意度高于对照组, 差异可见统计学意义 ($P<0.05$)。

结论 双源 CT 冠脉成像诊断老年冠心病效果较好, 具备较高的诊断特异性、敏感性和准确性, 对于冠状动脉分支、冠状动脉节段诊断结果准确, 操作简便、安全可靠。同时, 该检查适用于无法开展高级别诊断技术的基层医疗机构推广和应用, 患者满意度较为理想。

PO-1226

肺癌化疗后耶氏肺孢子菌肺炎 1 例

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目的：本文旨在描述一名有肺腺癌病史并接受化疗的老年男性患者，出现咳嗽、咳痰和间断性咳黄痰的症状，同时伴有胸闷和气喘，经实验室检查和影像学检查后被诊断为耶氏肺孢子菌肺炎（PCP）的病例。

方法：对患者的临床表现、实验室检查、影像学检查和呼吸道病原体二代测序结果进行综合分析，并回顾相关文献，探讨 PCP 的影像学表现与其它疾病的鉴别要点。

结果：患者有肺腺癌化疗史，出现咳嗽、咳痰和间断性咳黄痰的症状，伴有发热和呼吸困难。实验室检查显示白细胞总数增加，中性粒细胞比例增加，红细胞数量减少。呼吸道病原体二代测序显示肺孢子菌属相对丰度较高。胸部 CT 表现为双肺散在斑片影和磨玻璃影，局部呈蜂窝状改变，上叶见囊状透亮影，纵隔及双肺门见多发肿大淋巴结。经治疗后，病情较前稍有好转，发热及咳嗽、咳痰症状改善，复查肺部 CT 双肺病变较前有好转。

结论：耶氏肺孢子菌肺炎（PCP）是一种间质性浆细胞肺炎，通常见于免疫功能极低的患者。诊断 PCP 时应注意结合临床病史和其他临床表现，与其他疾病进行鉴别。

PO-1227

术前误诊的良性肺结节与典型恶性肺结节的预测研究

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目的：探讨术前误诊为恶性的良性肺结节的临床影像特征，并将其与典型恶性肺结节进行对比分析，建立临床模型预测肺结节的恶性概率。

方法：回顾性分析我院 2019 年 1 月至 2022 年 3 月有病理证实的术前误诊的良性肺结节 243 例、典型恶性肺结节 378 例。收集患者的临床影像资料，采用多因素逻辑回归分析筛选恶性结节的独立预测因素，建立临床预测模型评估恶性肿瘤的概率。另收集 2022 年 4 月至 8 月期间我院有术后病理结果的 50 例肺结节临床影像资料以验证本模型的预测效能，并与 PKUPH 模型、梅奥模型相比。

结果：术前误诊的 243 例良性肺结节患者，女性患者占 53.1%，年龄范围为 17~81（ 54.7 ± 10.5 ）岁。影像学上，实性结节占 71.2%，位于肺裂周围结节占 63.8%，呈圆形/类圆形结节占 58.8%。多因素逻辑回归分析明确结节恶性病变的 8 个独立预测因素：年龄、肿瘤标志物、直径、体积平均 CT 值、边界是否清楚、与肺裂位置关系、分叶、胸膜凹陷征（ $P < 0.05$ ）。本研究模型在验证组中的受试者工作特征曲线下面积为 0.815，大于 PKUPH 模型（0.785, $P=0.776$ ）及梅奥模型（0.502, $P=0.012$ ）的曲线下面积。

结论：术前易误诊的良性肺结节，女性居多，发病年龄偏小，影像学以圆形/类圆形、位于肺裂周围的实性成分为主。本研究所建立的预测模型对肺结节的恶性概率有较好预测效能，从而为减少良性肺结节的术前误诊提供帮助。

PO-1228

肺动脉血栓 CT 值与急性肺栓塞介入溶栓治疗疗效的相关性研究

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目的 分析肺动脉血栓 CT 值与急性肺栓塞 (Acute pulmonary embolism, APE) 患者介入溶栓治疗疗效的关系。方法 回顾性分析 2018 年 1 月至 2022 年 12 月于我院行 CT 肺动脉造影 (CT pulmonary angiography, CTPA) 检查诊断肺栓塞的患者 89 例。在薄层 (层厚 1.5mm) 轴位 CTPA 图像上选取最大一枚栓子的最大层面, 沿栓子边缘内侧 1mm 处勾画圆形感兴趣区, 测量栓子的 CT 值。选取 T4 椎体水平左侧肩胛下肌测量其平均 CT 值, 计算肺动脉血栓 CT 值/左侧肩胛下肌 CT 值比值。根据溶栓治疗前后 CTPA 检查结果, 计算溶栓治疗前、术后肺动脉 Qanadli 栓塞指数差 (Δ Qanadli 栓塞指数, Δ Q)。根据 Δ Q 的中位数, 将患者分为血栓溶解较好组 (Δ Q>50%)、血栓溶解较差组 (Δ Q \leq 50%), 比较两组间肺动脉血栓的 CT 定量参数差异。采用 SPSS 21.0 软件对数据进行分析, 将 $P<0.1$ 的单因素变量纳入多因素 Logistic 回归分析。肺动脉血栓 CT 值与 Δ Q 相关关系采用 Spearman 相关性分析。以 $P<0.05$ 为差异有统计学意义。结果 单因素分析显示, 肺动脉血栓 CT 值、血栓 CT 值/左侧肩胛下肌 CT 值在血栓溶解较好组、血栓溶解较差组间均具有统计学差异, P 值均 <0.05 。将两组间 P 值 <0.1 的单因素变量 (血栓 CT 值、血栓 CT 值/左侧肩胛下肌 CT 值、性别), 纳入多因素 Logistic 回归分析。多因素分析结果显示, 相对于血栓 CT 值 ≤ 53.47 HU 的患者, 血栓 CT 值 > 53.47 HU 的患者预测血栓溶解较好组的 OR 值为 9.175 (95% CI = 0.937~89.846, $P=0.057$)。肺动脉血栓 CT 值与 Δ Q 存在正相关关系 ($r=0.365$, $P=0.000$)。结论 肺动脉血栓 CT 值可以在一定程度上预测半定量 Qanadli 栓塞指数作为标准的 APE 患者介入溶栓治疗效果。肺动脉血栓 CT 值越高, 患者溶栓治疗效果越好。

PO-1229

肺腺癌 CT 放射组学与 Ki-67 表达的相关性研究

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目的: 探讨基于薄层 CT 扫描的肺腺癌患者的放射组学特征与 Ki-67 增殖指数 (proliferation index) 之间的关系。方法: 回顾性收集我院 2022 年 5 月-2023 年 5 月术前行薄层 CT 扫描, 术后病理证实为肺腺癌并进行了免疫组化检查具有明确 Ki-67 阳性指数的 167 例患者, 根据浸润程度分为浸润组 (131 例) 和非浸润组 (36 例), 由 2 名放射科医师使用开源软件 3D-Slicer 对术前 CT 病灶进行勾画并提取组学特征。统计分析后得到 Ki-67 的最佳临界值, 并以 Ki-67 再次分组, 统计分析后得到可预测 Ki-67 不同状态的显著放射学特征, 确定其与 Ki-67 之间的相关性。结果: 不同浸润程度的肺腺癌患者的性别、病灶直径及不同 Ki-67 PI 差异具有统计学意义 ($P=0.03$ 、 $P<0.01$ 、 $P<0.01$)。16 个放射学特征与 Ki-67 状态显著相关。多变量逻辑回归分析确定反方差、短轴和伸长率是 Ki-67 PI 的独立预测因素。反方差、熵、偏度、伸长率 ($P<0.01$ 、 $P=0.02$ 、 $P=0.03$ 和 $P=0.01$) 与 Ki-67 PI 呈正相关。反方差的高 Ki-67 状态的 AUC 为 0.737, 截止值为 0.47, 显著高于熵、偏度和伸长率 ($P=0.02$ 、 $P=0.03$ 和 $P=0.02$)。结论: 基于薄层 CT 扫描的部分放射组学特征可以作为肺腺癌患者 Ki-67 状态的无创预测指标, 其中反方差在预测 Ki-67 高表达状态时预测效能最佳。

PO-1230

早期肺腺癌 CT 异常形态血管形成的病理机制研究

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目的：本研究基于大鼠早期肺腺癌模型及人肺腺癌样本，通过检测早期肺腺癌供血血管形成方式和血供来源，揭示早期肺腺癌致异常形态血管形成的病理机制及影像特征演变规律。

方法：使用 12 只 Wistar 大鼠建立原发性早期肺腺癌模型，分别于造模第 100、140 和 180 天，各对 4 只大鼠进行 micro-CT 肺血管成像，并与病理切片对照观察早期肺腺癌血供来源。回顾性收集 209 例人肺腺癌纯磨玻璃结节的胸部 CT 平扫图像及蜡块标本，根据浸润程度分为不典型腺瘤样增生/原位腺癌组、微浸润腺癌组和浸润性腺癌组。在 CT 图像中定量分析距离肺腺癌边缘 2cm 范围内的血管分支。对人肺腺癌病理切片进行 CD31、细胞黏合素 C 及 CD34/过碘酸雪夫免疫组化染色，并计数肿瘤内共生血管、套叠式和出芽式血管生成及血管生成拟态。在 SK-LU-1 和 A549 肺腺癌细胞培养上清液诱导下，检测肺动脉内皮细胞 (PAECs) 和支气管动脉内皮细胞 (BAECs) 的增殖、迁移和成管能力，并通过共生血管粘附实验检测两种肺腺癌细胞对 PAECs 和 BAECs 的粘附能力。

结果：12 只大鼠共计发现 157 个肿瘤，其中 139 个可见一支或多支肺动脉直接进入或肿瘤紧贴肺动脉生长，但全部肿瘤内外均无支气管动脉分布。人肺腺癌 CT 血管定量分析显示，随着浸润性进展，结节内外肺动脉血管体积、血管体积分数，血管厚度、血管分支数量、血管节点数及肺动脉体积比均出现不同程度增长 ($P<0.05$)。全部 209 例肺腺癌内外均未见支气管动脉分布。三组肺腺癌间血管共生计数和血管生成发生率均具有统计学差异 ($P<0.05$)，而血管生成拟态发生率不具统计学差异 ($P=0.523$)。三组肺腺癌组内血管共生、血管生成及血管生成拟态的发生率均存在统计学差异 ($P<0.001$)，且均以血管共生发生率最高。在肺腺癌细胞培养上清液诱导下，BAECs 较 PAECs 具有更强的增殖、迁移和成管能力 ($P<0.05$)，而共生血管粘附实验显示肺腺癌细胞粘附于 PAECs 的数量和粘附面积均明显大于 BAECs ($P<0.05$)。

结论：早期肺腺癌主要依赖血管共生作用从肺动脉获取血供，在此过程中可导致肺腺癌内血管结构呈现异常形态。

PO-1231

CCTA 减影技术结合冠状动脉人工智能辅助诊断系统的诊断效能分析

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目的：探究 CCTA 减影技术的应用能否提升冠状动脉人工智能辅助诊断系统识别冠状动脉狭窄的诊断效能，并进一步探究该系统在不同类型斑块中的诊断效能。

方法：本研究为多中心研究，纳入于 2021 年 1 月到 2021 年 12 月期间同时行 CCTA 和 DSA 检查的患者。按冠状动脉 18 节段模型记录人工智能辅助诊断系统识别常规 CCTA 和减影 CCTA 时冠状动脉狭窄的 CAD-RADS 分级。人工评估常规 CCTA 和减影 CCTA 的图像质量，按 4 分法进行， ≥ 3 分看做图像可诊断；记录引起冠状动脉狭窄的斑块是否含有钙化成分，分为钙化斑块和非钙化斑块；评估病变长度，分为非弥漫性病变 (< 20 mm) 和弥漫性病变 (≥ 20 mm)。计算常规 CCTA 和减影 CCTA 识别冠状动脉明显狭窄 ($\geq 50\%$) 的诊断准确性，并进一步比较人工智能辅助诊断系统在不同斑块亚组中的诊断效能。 $P < 0.05$ 认为是差异具有统计学意义。

结果: 共纳入 91 例患者, 其中女性 29 例。冠状动脉人工智能辅助诊断系统共识别出 606 个存在斑块的节段, 其中 421 个节段的图像质量可诊断。CCTA 减影技术的应用提高了患者水平的诊断效能 (0.76 vs. 0.94, $P = 0.02$), 也提升了图像质量可诊断节段的诊断效能 (0.71 vs. 0.82, $P < 0.001$); 但如果所有节段均纳入, 常规 CCTA 和减影 CCTA 之间的 AUC 差异无统计学意义。在斑块亚组分析时, CCTA 减影技术的应用提高了非弥漫性钙化病变的诊断准确性 (0.69 vs. 0.82, $P = 0.001$), 而对于弥漫性钙化斑块、非钙化斑块无明显提升。

结论: CCTA 减影技术的应用提高了冠状动脉人工智能辅助诊断系统识别冠状动脉明显狭窄的诊断效能, 特别是对非弥漫性钙化斑块有提升。

PO-1232

CT-FFR 用于糖尿病患者主要心血管不良事件的预测

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摘要

目的 探讨计算机断层扫描血流储备分数 (CT-FFR) 在糖尿病患者中的预后价值, 并建立关于主要心脏不良事件 (MACE) 的风险分层模型。

背景 计算机断层扫描血管成像衍生的血流储备分数 (CT-FFR) 是一种无创生理检测方式, 可根据 CCTA 数据对血流限制性狭窄进行功能评估。然而, CT-FFR 在糖尿病患者中的预后价值还缺乏相应的证据。

方法 前瞻性地招募了具有冠心病中等验前概率的糖尿病患者。所有患者均接受冠状动脉计算机断层扫描, 并随访至少 2 年。在由 957 名患者组成的训练队列中建立了两个模型: 模型 1 包括临床和常规影像学参数, 模型 2 包括上述参数+CT-FFR。一个由 411 名患者组成的内部验证队列和一个由 429 名患者组成的独立外部测试队列用于验证所提出的模型。

结果 本研究最终纳入了 1797 例患者 (平均年龄: 61.0 ± 7.0 岁, 1031 例男性)。随访期间, 7.18% 的患者 (129/1797) 发生了 MACE。多因素 Cox 回归分析显示, CT-FFR ≤ 0.80 (危险比 [HR]=4.534, $P < 0.001$)、HbA1c (HR=1.142, $P = 0.015$) 和低密度斑块 (LAP) (HR=3.973, $P = 0.041$) 是 MACE 的独立预测因素。在训练队列中, Log-likelihood-test 显示模型 1 和模型 2 之间存在统计学意义 ($p < 0.001$)。模型 2 的 C-index 明显大于模型 1 (C-index=0.82 [0.77-0.87] vs. 0.80 [0.75-0.85], $p = 0.021$)。在内部验证和外部测试队列中也发现了类似的结果。

结论 CT-FFR 是糖尿病队列中 MACE 的一个强有力的独立预测因子。结合 CTFFR、LAP 和 HbA1c 的模型在预测 MACE 方面表现出色。

关键词 糖尿病 冠状动脉计算机断层扫描 血流储备分数 高危斑块

PO-1233

4D-CT 血管量化评价临床应用初步研究

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目前对血管疾病的诊断主要通过对患者病灶区域医学影像的观察和分析, 得到解剖学信息。但是血管病变的关键指标, 比如血管弹性的薄弱情况, 斑块的软硬, 血管壁力学特性和血流动力学的信息等, 均无法准确量化, 而这些指标在临床诊断和血管疾病预后中都具有非常重要的参考意义。

本研究结合 4D-CTA 图像识别技术等开展在体组织生物力学特性识别技术的研究, 主要包括: 基于图像处理技术研究血管的个性化四维建模、前处理技术; 采用有限应变插值法和反向有限元分析方法, 研究组织应力、应变计算方法和全场材料特性回归识别技术, 可以计算切除前、模拟切除后和实际切除后的血流流体力学图, 通过术前模拟, 可以减少手术时间, 降低患者术后并发症发生率。

PO-1234

合并颈动脉严重狭窄的急性主动脉 A 型夹层 患者急诊术后影像学疗效评估

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目的 评价急性 A 型主动脉夹层 (acute type A aortic dissection, ATAAD) 患者单侧症状性颈总动脉累及血运重建术后脑灌注 CT 参数的变化, 并确定颈动脉夹层及 CT 脑灌注的关系。

方法 收集 2015 年 1 月至 2019 年 12 月期间, 55 例 ATAAD 且单侧症状性颈动脉累及患者, 在行主动脉全弓置换手术及颈动脉血运重建术前后接受了颈-主动脉 CTA 及颅脑 CT 灌注扫描。根据颈动脉累及 CT 特征分成三组: 颈动脉真腔闭塞组 (闭塞组, 20 例), 颈动脉夹层并再破口组 (再破口组, 19 例) 以及颈动脉假腔内存在血栓组 (血栓组, 16 例)。计算平均通过时间 (MTT)、脑血容量 (CBV) 和脑血流量 (CBF)。评估三组患者手术前的绝对和相对灌注值, 并与治疗后的值进行比较。观察病变侧颈动脉手术前后特征变化 (治愈情况)。

结果 1) 术前单因素 ANOVA 分析结果表明, 三组患者病侧大脑半球的脑血流流量 (cerebral blood flow, CBF) 值存在组间差异 ($F=4.792$, $p=0.012$), 经 post-hoc 分析, 闭塞组的 CBF 均值最低, 且低于血栓组 ($p=0.01$)。2) 术后单因素 ANOVA 分析表明, 三组患者病侧大脑半球的 CBF 值 ($F=4.970$, $p=0.011$) 及脑血容量 (cerebral blood volume, CBV) 值 ($F=3.933$, $p=0.024$) 存在组间差异, 经 post-hoc 分析, 破口组的 CBF 值低于闭塞组 ($p=0.022$) 和血栓组 ($p=0.033$); 破口组的 CBV 值低于血栓组 ($p=0.027$), 且有低于闭塞组的趋势 ($p=0.154$); 闭塞组和血栓组之间 CBF 和 CBV 无显著差异。3) 三组患者手术前后病侧大脑半球的脑灌注值均有相应改善。4) 三组患者术前病侧大脑半球的脑灌注指标均显著差于对侧大脑半球, 术后仅破口组病侧指标显著差于对侧指标。

结论 颈总动脉累及 ATAAD 患者手术后脑灌注情况均有不同程度的改善, 但颈总动脉夹层再破口患者术后无论是颈总动脉解剖变化还是脑灌注改善情况均差于真腔闭塞组和血栓组。

PO-1235

双层探测器光谱 CT 在与胸膜接触的纯磨玻璃结节中鉴别浸润性癌和微浸润性癌的价值

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目的: 基于双层探测器光谱 CT 平扫定量参数联合形态学特征, 在与胸膜接触的纯磨玻璃结节 (pure ground-glass nodules with pleural contact, P-pGGNs) 中鉴别浸润性腺癌 (invasive adenocarcinoma, IAC) 和微浸润性腺癌 (microinvasive adenocarcinoma, MIA)。方法: 回顾性收集术前行双层探测器光谱 CT 胸部平扫, 表现为与胸膜接触的纯磨玻璃结节 (P-pGGNs) 且手术病理证实为 MIA 和 IAC 患者 104 例 (111 个 P-pGGNs), 分为 IAC 组 ($n=33$) 和 MIA 组 ($n=78$)。

测量结节长径、短径及三维 CT 值、电子云密度和有效原子序数值。临床资料包括性别和年龄；形态学特征包括结节形状、边界及分叶、毛刺、胸膜牵拉、空泡、空气支气管和血管异常征。比较 IAC 与 MIA 组形态及定量参数，筛选独立预测因素；ROC 曲线评价及比较各独立预测因素以及联合预测模型的诊断效能。结果：与 MIA 组相比，IAC 组结节多表现不规则、边界模糊，且更易出现分叶、毛刺、空泡、空气支气管和血管异常征 ($P < 0.05$)。IAC 组年龄、结节长径、短径、三维 CT 值和 ED 值均高于 MIA 组 ($P < 0.05$)。Logistic 回归分析结节三维 CT 值和 ED 值、长径、形状、分叶征及空泡征是 IAC 的独立预测因子。联合预测模型 AUC 高达 0.953，灵敏度 90.91%，特异度 89.74%。结论：双层探测器光谱 CT 平扫多定量参数联合形态学特征构建预测模型鉴别与胸膜接触的纯磨玻璃结节的 IAC 和 MIA 具有较高准确性。

PO-1236

双层探测器光谱 CT 定量参数对非小细胞肺癌 EGFR 突变的预测价值

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目的 评估双层探测器光谱 CT (DLCT) 定量参数在非小细胞肺癌 (NSCLC) 患者表皮生长因子受体 (EGFR) 突变状态中的预测价值。

方法 前瞻性收集我院 2021 年 12 月至 2022 年 11 月期间行 EGFR 突变检测的 NSCLC 患者，根据基因检测结果将患者分为 EGFR 突变组和 EGFR 野生组。采用 DLCT 动脉期 (AP) 和静脉期 (VP) 双期扫描，记录患者基线资料、病灶常规 CT 影像特征和光谱图像定量参数，包括碘浓度 (IC)、虚拟平扫值 (VNC)、无水碘值 (INW)、光谱衰减曲线的斜率 (λ_{HU})、有效原子序数 (Zeff)、40keV 和 100keV 水平虚拟单能级图像值 (VMI)，计算动脉增强分数 (AEF) 和增强程度 (ED)，并测量胸主动脉 IC，计算标准化 IC (NIC) 和标准化 AEF (NAEF)。分析比较两组间的定量参数与 NSCLC 患者 EGFR 突变状态的相关性。

结果 入组 92 例 NSCLC 患者，EGFR 突变 69 例 (75.0%)。单因素分析显示，两组间的一般临床特征、常规 CT 影像特征、AEF、NAEF、Zeff (AP)、 λ_{HU} (AP) 以及双期 VMI (40keV) 和 VMI (100keV) 的差异均无统计学意义 ($p > 0.05$)。双期 IC、NIC、INW、ED 以及 Zeff (VP) 和 λ_{HU} (VP) 与 EGFR 突变状态呈显著相关 ($p < 0.05$)，其中 INW (VP) 特异性最高 (95.65%)，AUC 为 0.855 (95% CI: 0.768, 0.942)。多因素 logistic 回归分析显示，INW (AP) 和 NIC (VP) 是预测 NSCLC 患者 EGFR 突变状态的两个显著预测因素，其中 NIC (VP) 预测 NSCLC 患者 EGFR 突变的效能最高 (AUC: 0.897, 95% CI: 0.816 ~ 0.951)，敏感性为 79.71%，特异性为 86.96%，准确性 81.52%。

结论 NIC (VP) 可能是预测 NSCLC 患者 EGFR 突变的一个潜在的定量 DLCT 参数。

PO-1237

免疫检查点抑制剂相关心肌炎的心脏磁共振表现初探

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目的：报道并总结本中心免疫检查点抑制剂 (ICIs) 相关心肌炎的心脏磁共振 CMR 表现及相关功能参数，探讨 CMR 成像对 ICIs 相关心肌炎的诊断价值。**方法**：回顾性收集本中心确诊的 ICIs 相关心肌炎病例。入组标准：经心肌活检或临床确诊为 ICIs 相关心肌炎；于我院行 CMR 检查，且图像质量合格。定量诊断使用 CVI42 软件，指标包括 LVEF、CO、CI、EDV/BSA、ESV/BSA、SV/BSA。

定性诊断由 2 名 CMR 诊断经验分别为 10、18 年的放射医师共同判定, 包括是否存在运动异常、是否存在心肌水肿、是否存在心肌延迟强化 LGE、LGE 分布特点等。

结果: 1、一般情况: 最终入组 27 例, 其中 2 例经心肌活检证实, 25 例临床确诊。27 例患者中, 男性 19 例, 女性 8 例; 年龄 63.30 ± 10.87 岁; 身高 169.93 ± 6.83 cm; 体重 68.09 ± 13.62 kg; BMI 23.45 ± 3.61 kg/m²。2、CMR 分析: 27 例患者 CMR 增强表现完全正常比例为 40.7% (11/27)。2.1 LVEF: 正常 ($> 50\%$) 比例为 88.9%; CO: 5.02 ± 1.25 l/min; CI: 2.81 ± 0.67 l/min/m²; EDV/BSA: 68.29 ± 16.96 ml/m²; ESV/BSA: 31.18 ± 14.37 ml/m²; SV/BSA: 37.10 ± 8.11 ml/m²。2.2 心肌运动不良发生率 37.0%, 心肌水肿发生率 33.3%, LGE 发生率 44.4%。2.3 LGE 阳性的 12 例患者 LGE 分布情况: 基底部分、中部、心尖部 LGE 发生率 100%、33.3%、41.7%; 侧壁、间隔壁、下壁、前壁 LGE 发生率 75%、58.3%、50% 8.3%; 心肌中层、心外膜下、心内膜下 LGE 发生率 66.7%、50%、41.7%。结论: 本中心 27 例 ICI 相关心肌炎患者中 LVEF 大部分正常, CMR 表现正常的比例约为 40.7%, 出现心肌水肿、LGE 的比例分别为 33.3%、44.4%, LGE 出现比例较高的位置是基底部分、侧壁和间隔壁、心肌中层, 中部和心尖部、前壁出现比例较低, 结果尚有待更大样本量的验证。

PO-1238

深吸气与深呼气下肺 CT 在肺非实性结节随访中价值的研究

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目的: 通过对肺深吸气与深呼气引起的肺非实性结节定量参数的变化研究, 探讨深吸气与深呼气下肺 CT 在肺非实性结节随访中的价值。

方法: 前瞻性分析研究 2023 年 1 月 22 日至 2023 年 5 月 21 日于华中科技大学同济医学院附属协和医院就诊的 60 例共 68 个非实性肺结节患者, 均使用螺旋 CT 对患者进行肺部深吸气末与深呼气末 CT 扫描, 在后处理工作站分别使用肺密度和肺结节软件对呼吸气图像进行评估, 对两种呼吸情况下的同一非实性肺结节进行体积和密度大小的测量。得到 CT 定量指标: 吸气相非实性结节体积及肺体积、呼气相非实性结节体积及肺体积、吸气相非实性结节密度及肺密度、呼气相非实性结节密度及肺密度、非实性结节体积变化率: (呼气-吸气)/吸气。

结果: 吸气相的所有肺体积参数都大于呼气相, 且差异具有统计学意义($p < 0.001$); 呼气相的肺密度明显大于吸气相, 且差异具有统计学意义($p < 0.001$); 吸气相上非实性结节各轴向上大小和体积均大于呼气相, 且差异具有统计学意义 ($P = 0.006$, $p < 0.001$); 呼气相上非实性结节密度大于吸气相, 且差异具有统计学意义 ($P < 0.001$); 非实性结节体积变化率 V (呼气-吸气)/吸气大于密度变化率 D (呼气-吸气)/吸气, 且差异具有统计学意义 ($P < 0.001$)。

结论: 同一大小的肺结节在深吸气与深呼气下进行的肺 CT 扫描有着不同的大小和密度, 因此在肺非实性结节的随访中应尽量做到每次呼吸气的一致, 且在呼气情况下非实性结节体积变化程度大于密度变化, 因此不建议使用深呼气相扫描用于肺非实性结节的随访。深吸气下肺 CT 扫描能最大程度减少不同随访中肺非实性结节体积与密度的变化, 其训练方式较深呼气更加方便快捷, 对肺非实性结节的随访具有重要意义。

PO-1239

老年侵袭性肺真菌感染病临床影像预测模型的建立及评价： 一项多中心研究

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背景: 侵袭性肺部真菌感染 (IPFI) 的早期准确诊断对于老年患者的有效抗真菌治疗至关重要。

方法: 根据病例-对照研究设计方案, 收集 2016 年 1 月 1 日至 2021 年 9 月 30 日于我科住院的老年患者 174 例侵袭性肺部真菌感染和 190 例肺部非真菌感染患者的临床、影像资料并进行分析。以我院 364 名患者为训练集, 以 2020 年 9 月 1 日至 2022 年 9 月 31 日在陆军军医大学第二附属医院住院的 104 名肺部感染患者为验证集。通过二元 Logistic 回归分析, 采用 R 软件包构建列线图预测模型, 并通过受试者工作曲线 (ROC)、曲线下面积 (AUC)、校准曲线、DCA 曲线等对模型的有效性和应用价值进行评价。

结果: 基于低白蛋白血症、糖尿病、COPD 急性发作、入院后营养不良、入院前广谱抗生素抗感染史、右肺下叶、左肺上叶、左肺下叶、磨玻璃影、空气支气管征、实变共 11 个因素构建列线图 ($R^2=0.862$, $C-index=0.981$, 95 CI: 0.970~0.992)。该模型的 The Hosmer-Lemeshow test 结果表明, 模型拟合性较好 ($p=0.980$)。训练集的 $AUC=0.981$, 外部验证集的 $AUC=0.785$ 。临床影像模型 ($AUC=0.981$), 并优于单独的临床 ($AUC=0.919$) 和放射学 ($AUC=0.932$) 模型。

结论: 基于 11 个因素建立的侵袭性肺部真菌感染临床影像预测模型, 其准确性较高。为临床医生对老年侵袭性肺部真菌感染患者提供了早期预测和及时管理提供了一个准确、有效的工具。

PO-1240

基于胸部 CT 图像的深度学习算法评估 肺腺癌的组织学微血管密度

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目的: 本研究旨在探索和验证基于胸部计算机断层扫描 (computed tomography, CT) 图像的深度学习算法, 以预测肺腺癌微血管密度的可行性。

方法: 回顾性收集了我院 107 例及外院 45 例经手术切除的肺腺癌患者的胸部 CT 图像 (平扫及肺动脉期、主动脉期和静脉期三期增强图像), 分别组成训练组及验证组数据集。对所有术后肺癌组织病理切片行 CD34 标记染色检测微血管密度 (MVD), 包括 microvessel area (MVA)、microvessel Samples (Samples)。利用基于深度学习算法的 phigo-LK 软件分别计算平扫及三期增强 CT 图像的肿瘤 MVD 值 (CT-MVD), 同时测量肺癌的平扫 CT 值 (CT_{UE})、三期增强后的 CT 强化值 (CT_{CE}) 及 CT 净强化值 (CT_{NE}), 分析 CT-MVD、 CT_{UE} 、 CT_{CE} 及 CT_{NE} 与 CD34-MVD 参数 (MVA、Samples) 的相关性。并将肿瘤大小分为两组: $\leq 3cm$ 和 $> 3cm$ 组, 按肿瘤密度分为纯磨玻璃结节组 (pGGN)、混合磨玻璃结节组 (mGGN) 组及实性结节组 (SN), 比较不同组间 MVA、Samples 有无统计学差异。

结果: 深度学习算法基于 CT 平扫及三期增强图像得出的肺癌 CT-MVD 与 MVA、Samples 均呈线性正相关, 与 MVA 在训练组和验证组的相关系数分别为 $r: 0.665-0.859$ 和 $r: 0.652-0.846$ ($p<0.05$), 与 Samples 在训练组和验证组的相关系数分别为 $r: 0.339-0.591$ 和 $r: 0.352-0.577$ ($p<0.05$), 其中均以静脉期的相关性最强。 CT_{UE} 和 CT_{CE} 与 MVA 呈弱相关 ($r\leq 0.4$, $p<0.05$),

与 Samples 无相关性 ($p>0.05$)。CT_{NE} 与 CD34-MVD 参数无相关性 ($p>0.05$)。不同结节密度组间的 CD34-MVD 参数有明显差异 (均 $p<0.05$)，但不同结节大小组间的 CD34-MVD 参数差异无统计学意义。

结论: 本研究初步肯定了基于胸部 CT 图像的深度学习算法能够在体无创评估肺腺癌微血管生成状态的临床应用潜力，静脉期图像的相关性最高。

PO-1241

4D Flow MRI 技术评价急性心肌梗死患者左心室局部血流动能的初步研究

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目的: 应用 4D Flow MRI 技术初步探究急性心肌梗死患者左室腔内局部血流动能参数

方法: 对 30 名急性心肌梗死患者和 20 名年龄及性别匹配的健康对照者进行回顾性研究，所有受试者均完成心脏电影、对比剂延迟增强成像和 4D Flow 成像。急性心肌梗死患者进一步分为两个亚组: 梗死节段组和非梗死节段组。动能参数与左室舒张末期容积相关联，以获得左室平均动能、最小动能、收缩期动能、舒张期动能、E 波峰值动能、A 波峰值动能以及平面内动能的比例。采用独立样本 t 检验或 Mann-Whitney u 检验比较健康对照组与急性梗死组的差异，配对样本 t 检验或 Wilcoxon 配对样本秩和检验比较健康对照组和急性梗死组左室腔血流动能参数的组内差异。

结果: 在健康对照组中，左室腔同一层面内间隔壁处血流动能最大，前壁与后壁心腔血流动能参数差异无统计学意义。与健康对照组相比，急性心肌梗死组左心室平均动能 ($10.7\mu\text{J/mL}\pm 3.2$ vs. $14.7\mu\text{J/mL}\pm 3.6$, $p<0.001$)、收缩期动能 ($14.6\mu\text{J/mL}\pm 5.1$ vs. $18.8\mu\text{J/mL}\pm 3.9$, $p=0.003$)、舒张期动能 ($7.8\mu\text{J/mL}\pm 2.5$ vs. $10.5\mu\text{J/mL}\pm 3.8$, $p=0.018$) 及 E 波峰值动能 ($9.7\mu\text{J/mL}\pm 4.9$ vs. $20.9\mu\text{J/mL}\pm 7.7$, $p<0.001$) 显著降低。急性心肌梗死组的梗死节段与非梗死节段相比，梗死节段组的平均动能降低而平面内动能比例显著增加。

结论: 应用 4D Flow MRI 技术可定量评价左心腔局部血流动能参数。健康人群中左心腔同一层面不同节段的血流动能参数是有差异的，急性心肌梗死患者中梗死节段心腔的平均动能降低而平面内动能比例增加。

PO-1242

双源 CT 优化心电图脉冲编辑技术在左心功能评估中的应用

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目的 评估双源 CT 优化心电图脉冲编辑 (Pulsing) 技术在行冠状动脉 CT 造影 (CCTA) 检查同时测量左心功能的准确性、图像质量及辐射剂量。方法 连续选取 2022 年 8 月~2022 年 12 月在南通市第一人民医院采用 CCTA 优化 Pulsing 技术评估左心功能的患者 36 例，入组患者 Pulsing 范围 R-R 间期 65%~75%；另外，选取 CCTA 检查 Pulsing 范围 R-R 间期 0%~100% 患者 24 例作为对照，所有入组患者均在 1 周内行经体表二维超声心动图检查，以心超测量左心功能指标作为参考标准，评估优化 Pulsing 技术测量左心功能的准确性、图像质量及辐射剂量。结果 实验组和对照组的性别、年龄及 BMI 差异无统计学意义 ($P>0.05$)。实验组和对照组的右冠 (RCA)、左主干 (LM)、左前降 (LAD)、左回旋支 (LCX) 的 CT 值、信噪比 (SNR) 及主观评分差异无统计意义 ($P>0.05$)。实验组 DLP (132.4 ± 56.0) mGy·cm、ED (1.85 ± 0.78) mSv 明显低于对照组

DLP(348.4 ± 120.5)mGy·cm、ED (4.88 ± 1.69) mSv ($P < 0.05$)。实验组的 CCTA 图像和超声心动图测量的射血分数 (EF) (65.4 ± 13.6 、 64.8 ± 10.9)、左室舒张末期容积指数 (EDVI)、左室收缩末期容积指数 (ESVI) 差异无统计学意义 ($P > 0.05$)。CCTA 图像和超声心动图测量 EF、EDVI 和 ESVI 有很好的的一致性 (ICC = 0.908、0.812、0.888, $P < 0.001$)，Pearson 相关性分析显示两组数据有很好的相关性 ($r = 0.849$ 、0.700、0.818, $P < 0.001$)。结论 以超声心动图为参考标准，优化 Pulsing 技术 CCTA 的图像可以准确评价左室心功能，并取得很好的图像质量，且能有效的降低患者的辐射剂量，在心血管检查中具有重要价值。

PO-1243

类风湿关节炎相关间质性肺病的定量评价：纵向研究

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目的：本研究通过分析 CT 定量指标在类风湿关节炎相关间质性肺病 (RA-ILD) 患者中的变化，探索 CT 定量技术在 RA-ILD 随访中评估疾病进展的价值。

方法：分析 RA-ILD 随访队列患者 90 名的 HRCT 图像 180 例。影像诊断医师以是否出现新的影像征象或原有征象进展范围是否超过 20% 为标准，判断疾病变化情况，将患者分为进展组和非进展组。并使用“数字肺”数据分析平台分析患者 CT 图像获得定量指标。定量指标包括首次和随访过程中的犬吠体积 (TLV)、全肺密度、密度直方图、肺纤维化指标 (LAA-200 ~ -700%) 以及周围血管数量 (TNV) 和面积 (TAV)。以诊断医师主观评判作为参考标准，比较定量参数在基线扫描和随访过程中的变化，并分析定量数据结果与主观评价结果的关系。

结果：进展组与非进展组患者 CT 定量数据变化值比较发现，进展组定量数据中的 TLV、LAA-200 ~ -700%、TNV 和 TAV 的变化值均大于非进展组，差异具有统计学意义 ($P < 0.05$)。具体表现为随访过程中进展组的 TLV 减小、LAA-200 ~ -700% 增大、TNV 和 TAV 减小，且具有显著的统计学差异 ($P < 0.0001$)；而非进展组病例的定量指标 TNV 和 TAV 也存在变化，表现为 TNV 和 TAV 均减小，具有显著的统计学差异 ($P < 0.0001$)，血管指标可能比主观评价更具敏感性。

结论：CT 定量分析指标能发现并量化 RA-ILD 随访过程中疾病的进展，和主观评价结果具有一致性。且定量数据能够发现 RA-ILD 肺部细微结构的改变，是主观评价结果的补充。

PO-1244

基于光谱 CT 冠周脂肪定量参数与冠状动脉狭窄程度相关性研究

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目的：双层探测器光谱 CT 衍生的多参数成像能够提供多个定量参数。本研究旨在评价基于光谱 CT 冠周脂肪定量参数与冠状动脉狭窄程度的相关性。

方法：收集临床可疑冠状动脉粥样硬化患者并进行光谱 CT 冠状动脉血管成像 (CCTA)。将患者按照管腔狭窄程度分为三组：轻度狭窄、中度狭窄、重度狭窄。分别测量常规图像、40~140keV 虚拟单能图像、虚拟平扫图像上管腔最狭窄处冠周脂肪的衰减及斑块周围冠周脂肪的有效原子序数，计算 40~70keV、40~100keV 及 70~100keV 三个能量区间的衰减曲线斜率。

结果：231 支冠状动脉存在粥样硬化斑块及管腔狭窄纳入研究，其中 123 支轻度狭窄，69 支中度狭窄，39 支重度狭窄。在三组中，常规图像、虚拟单能图像、虚拟平扫图像上斑块周围的冠周脂肪衰减及有效原子序数均差异显著 ($P < 0.05$)，而三个能量区间的衰减曲线斜率不具有显著性差异。

($P>0.05$)。在冠周脂肪的多个定量参数中, 重度狭窄组的数值最高, 其次为中度狭窄组, 轻度狭窄组的数值最低。

结论: 基于光谱 CT 的斑块周围冠周脂肪定量参数与冠状动脉的狭窄程度密切相关。当冠状动脉斑块影响管腔狭窄程度评价时或者在非对比增强图像上, 多参数评价具有较高的应用价值。

PO-1245

双层探测器光谱 CT 定量参数检测肺腺癌中的表皮生长因子受体突变的价值

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目的 本研究旨在探讨双层探测器光谱 CT (DLCT) 定量参数对肺腺癌表皮生长因子受体 (EGFR) 突变状态识别的诊断性能。

方法 前瞻性收集我院 2022 年 1 月至 2022 年 9 月期间行 EGFR 突变检测的肺腺癌患者, 根据基因检测结果将患者分为 EGFR 突变组和 EGFR 野生组。采用 DLCT 平扫 (UP)、动脉期 (AP) 和静脉期 (VP) 三期胸部动态扫描, 记录患者基线资料、病灶常规 CT 影像特征和光谱定量参数, 包括碘浓度 (IC)、无水碘值 (INW)、光谱衰减曲线的斜率 (λ_{HU})、有效原子序数 (Zeff)、40keV~100keV 水平虚拟单能级图像值 (VMI); 测量胸主动脉的 IC、Zeff 值, 计算标准化 IC_1 (NIC_1)、标准化动脉增强分数 $_1$ (NAEF $_1$) 和标准化 Zeff (NZeff); 排除 UP 病灶的本底的 IC 值, 获得 NIC_2 和 NAEF $_2$ 。分析比较两组间各类定量参数与 EGFR 突变状态的相关性。

结果 共入组 64 例患者, EGFR 突变 44 例 (63.8%)。除了 NAEF $_1$ ($p=0.152$)、NAEF $_2$ ($p=0.213$) 和动静脉期 VMI (40keV~100keV) (均 $p>0.05$) 以外, EGFR 突变组的定量参数均显著高于 EGFR 野生组 ($p<0.001$)。其中, IC (AP)、 NIC_1 (AP)、 NIC_2 (AP)、 λ_{HU} (AP) 和 NZeff (AP) 预测效能均显著高于 VP 所对应的定量参数 ($p<0.001$), 曲线下面积分别为 0.887、0.824、0.755、0.888 和 0.822, 但动静脉期的 NIC_2 与 NIC_1 在 EGFR 突变组和 EGFR 野生组之间均无显著差异 (均 $p>0.05$)。

结论 多种 DLCT 定量参数对肺腺癌患者 EGFR 突变状态有一定预测效能。

PO-1246

紧贴胸膜的肺部实性结节 CT 鉴别诊断研究

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目的: 肺部紧贴胸膜的实性结节 (solid pleura-attached nodules, SPAN) 并不常见, 目前对其研究和理解还不够透彻。本研究旨在确定鉴别良恶性 SPAN 的临床和 CT 特征。

材料和方法: 从 2017 年 1 月到 2023 年 3 月, 回顾性纳入共 295 名患者共 300 个 SPAN (128 个良性和 172 个恶性)。分析患者的临床及 CT 资料, 对比良恶性 SPAN 的临床及影像学表现, 通过对比分析寻找二者之间的差异。

结果: 良性和恶性 SPAN 在患者年龄、吸烟史、临床症状、CT 特征、结节-胸膜交界面、邻近胸膜改变、周围伴发病变和淋巴结肿大方面存在显著差异。多因素分析显示, 吸烟史 (比值比 [OR], 2.016; 95% 置信区间 [CI], 1.037-3.919; $p=0.039$)、紧贴纵隔胸膜 (OR, 3.325; 95% CI, 1.235-8.949; $p=0.017$)、结节直径 (>15.6 mm) (OR, 2.266; 95% CI, 1.161-4.423; $p=0.016$), 与胸膜窄基底紧贴 (OR, 6.035; 95% CI, 2.847-12.795; $p<0.001$), 同时出现肺

门和纵隔淋巴结肿大 (OR, 4.971; 95% CI, 1.526-16.198; $p=0.008$) 是恶性 SPAN 的独立预测因素, 该模型的曲线下面积 (AUC) 为 0.890 (敏感性, 82.0%, 特异性, 77.3%) ($p<0.001$) 结论: 在有吸烟史的患者中, 紧贴纵隔胸膜、较大的 (直径 $>15.6\text{mm}$)、有分叶征的、窄基底的或同时伴有肺门和纵隔淋巴结增大的 SPAN 为恶性的可能性较大。

PO-1247

基于肺部 CT 的影像组学特征预测 EGFR 突变型肺腺癌患者脑转移

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目的: 肺腺癌患者发生脑转移 (Brain metastasis, BM) 的概率约为 45%-52%, 其中以 EGFR 突变型肺腺癌最常见。肺癌脑转移瘤患者的预后差, 因此, 筛选出 BM 风险较高的肺癌患者进行预防性治疗有重要的临床价值。本研究旨在探讨基于肺部 CT 的影像组学特征预测 EGFR 突变型肺腺癌脑转移的价值。

方法: 回顾性分析 2020 年 1 月至 2022 年 12 月期间在福建医科大学附属第一医院经病理证实为 EGFR 突变型肺腺癌患者的影像学资料及临床资料。将所有研究对象分为 BM 组和非 BM 组。将所有病例以 8:2 随机分为训练集和测试集, 筛选出 851 个稳定的影像组学特征。使用 6 种机器学习分类器进行模型训练。选取具有组间差异的临床危险因素用于构建临床预测模型。联合训练集中组间具有统计学差异的临床特征与影像组学预测值进行联合模型构建。采用 ROC 曲线评估模型的预测效能。模型之间的性能比较用 DeLong 检验进行。决策曲线用于评估各预测模型的临床实用性。使用斯皮尔曼相关系数评估影像组学模型预测值与 Ki-67 表达水平之间的关系。

结果: 本研究共纳入 198 例患者, 其中 72 例患者发生脑转移。临床模型、影像组学模型、联合模型在训练集和测试集中预测 BM 的 AUC 分别为 0.730 和 0.647、0.989 和 0.865、0.963 和 0.896。在训练集中, 影像组学模型、联合模型的 AUC 均高于临床模型 ($Z=6.362$ 、 6.689 , P 均 <0.001); 在测试集中, 联合模型的 AUC 高于临床模型 ($Z=2.778$, $P<0.05$), 而影像组学模型、临床模型间 AUC 差异无统计学意义 ($Z=2.030$, $P=0.137$)。在训练集和测试集中影像组学模型与混合模型之间均无明显差异 ($Z=1.999$ 、 0.994 , P 均 >0.05)。Spearman 相关性分析结果表明病灶影像组学模型预测值与 Ki-67 表达水平有关 ($\rho_{\text{spearman}}=0.143$, $P<0.05$)。

结论: 基于临床资料、肺部 CT 影像组学特征以及二者联合的模型都可用于预测 EGFR 突变型肺腺癌脑转移。其中, 联合模型能够显著提高脑转移预测能力。影像组学模型预测值与 Ki-67 表达水平相关。

PO-1248

阻塞性睡眠呼吸暂停综合征致左室结构及 功能改变相关心脏磁共振研究

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目的: 基于心脏磁共振 (CMR) 成像方法探讨阻塞性睡眠呼吸暂停综合征 (OSAS) 所致左心室结构及功能改变。方法: 排除重大心血管病后, 选取 OSAS 患者 24 例 (呼吸暂停低通气指数 [AHI] ≥ 5 次/时), 健康对照组 20 例 (AHI <5 次/时) 进行非增强 CMR 检查。左室结构及功能指标包括左室最大室壁厚度 (MWT)、左室质量指数 (LVMI)、左室舒张末期质量与容积比值

(LVMVR) 及心指数 (Ci)、射血分数 (LVEF) 等; 基于特征追踪心脏磁共振技术 (CMR-FT) 得到心肌整体应变指标包括长轴应变 (GLS)、径向应变 (GRS) 及环向应变 (GCS); 同样基于 CMR-FT 获得左房容积、射血分数及应变力指标间接反映左室舒张功能。组间比较观察左室结构及功能的组间差异; 多变量线性回归旨在发现独立影响左室结构指标 LVMi 和 LVMVR 相关危险因素。

结果: 除 9 例 OSAS 患者 (37.5%) 合并存在高血压外, 所有受试者均不存在其他心血管疾病及相关危险因素。左室常规收缩功能指标如 Ci、LVEF 及反映亚临床左室收缩能力的应变指标 GLS、GCS、GRS 组间比较中均无明显统计学差异; 左房指标在组间同样无明显统计学差异; 然而在 OSAS 患者中, 代表左室结构指标如 LVMi ($P<0.001$), LVMVR ($P<0.001$) 及 MWT ($P<0.05$) 显著高于正常对照组。多变量线性回归分析, 发现存在 OSAS 是引起 LVMi、LVMVR 指标升高的相关危险因素。结论: 本研究显示首诊 OSAS 患者在发生左心室功能受损前就已经存在心脏结构的相关改变; 同时 OSAS 患者存在向心性重构趋势; 进一步分析表明, OSAS 是独立引起 LVMi 及 LVMVR 升高的危险因素。

PO-1249

临床-影像学模型预测冠状动脉中度狭窄患者基于冠状动脉 CT 造影所获无创血流储备分数 ≤ 0.8 及预后作用

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目的 建立临床-影像学模型, 观察其预测冠状动脉中度狭窄患者基于冠状动脉 CT 造影所获无创血流储备分数 (CT-FFR) ≤ 0.8 的效能, 探究 CT-FFR < 0.8 对冠状动脉中度狭窄患者预后的预测作用。方法 回顾性分析行冠状动脉 CT 血管成像 (CCTA) 提示冠状动脉中度狭窄并行冠状动脉造影 (ICA) 的冠心病患者 302 例, 将其分为缺血组和非缺血组。以单因素及多因素 logistic 回归分析筛选 CT-FFR ≤ 0.8 的独立影响因素, 构建临床-影像学模型, 评价其预测 CT-FFR ≤ 0.8 的效能。进行随访, 采用多因素 Logistic 回归分析 CT-FFR < 0.8 与患者发生主要不良心血管事件 (MACE) 的相关性。

结果 单因素及多因素 logistic 回归分析结果显示, RDW 升高、高同型半胱氨酸血症、典型心绞痛、LAD 病变及多支血管病变为冠状动脉狭窄患者 CT-FFR ≤ 0.8 的危险因素; 基于上述因素建立的临床-影像学模型的数据拟合 ($P=0.46$) 及泛化能力 ($Kappa=0.45$) 均可, 预测概率接近实际概率线及理想线, 其预测冠状动脉狭窄患者 CT-FFR ≤ 0.8 的曲线下面积为 $0.83[95\%CI (0.76, 0.94)]$, 敏感度为 77.23%, 特异度为 83.12%。

结论: 基于 RDW 升高、高同型半胱氨酸血症、典型心绞痛、LAD 病变及多支血管病变的临床-影像学模型预测冠状动脉狭窄患者 CT-FFR ≤ 0.8 的效能较佳。CT-FFR < 0.8 对冠状动脉中度狭窄患者 MACE 事件有重要预测作用。

PO-1250

7.0T 心脏磁共振用于慢性肾脏病大鼠心功能改变的基础研究

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目的: 慢性肾脏病 (CKD) 常伴随心脏结构与功能改变, 称为 CKD 相关心肌病。心脏磁共振 (CMR) 用于 CKD 相关心肌病的研究较为缺乏。此外, 基于 CMR 组织追踪 (CMR-FT) 技术的心

肌应力评估在该类型疾病中具有潜在价值。本研究通过建立 CKD 大鼠模型,探讨沙库巴曲缬沙坦 (ARNi) 在缓解 CKD 为心肌结构和功能损伤的治疗效果和潜在机制,并进一步评估 CMR 用于 CKD 大鼠心脏结构和功能损伤的动态监测和疗效评价作用。

方法:通过 5/6 肾切除法建立 CKD 大鼠模型及假手术组。模型建立第四周时,评估模型建立是否成功。将 CKD 大鼠随机分为假手术组 (Sham 组)、CKD 组及药物干预组 (ARNi) (n=20/组)。第四周时间点开始开始药物干预 (50mg/kg 溶于玉米油),CKD 组仅给予同体积玉米油。术前、术后 4、10、16 及 20 周对大鼠进行 CMR 检查,评估各时间点心脏结构和功能改变,并在不同时间点进行心、肾病理检查以及血液学检查。20 周时检测心肌炎症、氧化应激和凋亡情况。

结果:CKD 模型大鼠各时间点体重、收缩压、肌酐和尿素氮均较对照组显著降低 ($P < 0.05$),术后第 4 周,CKD 大鼠左心室舒张末期容积、左心室收缩末期容积以及左心室质量指数比 Sham 组均显著增高 ($P < 0.05$)。第 10 周时间点,药物干预组左心室舒张末期容积、心室质量指数已较 CKD 组明显降低 ($P < 0.05$)。治疗结束时,即第 20 周,ARNi 组大鼠左心室各 CMR 指标较均较 CKD 组明显降低,和 Sham 组相比无明显差异 ($P > 0.05$)。20 周时,大鼠心肌纤维化染色半定量结果显示,CKD 组胶原容积指数显著高于 Sham 组和 ARNi 组 ($P < 0.05$)。心肌 SOD、MDA 以及 TNF- α 指标在 CKD 组均显著增高 ($P < 0.05$)。左心室应力指标 LVGRS、LVGCS 和 LVGLS 与胶原容积指数具有较好的相关性。

结论:CKD 大鼠可见心肌结构及功能改变,随时间进展逐渐加重。ARNi 可明显缓解心肌重构,潜在机制可能与其控制血压、减轻炎症、氧化应激和凋亡;CMR 具有 CKD 心肌改变动态监测和疗效评价的价值。

PO-1251

薄层 CT 图像上“微网格征”在预测肺纯磨玻璃结节侵袭性中的价值研究

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目的:评价胸部薄层 CT 图像上“微网格征”在预测肺纯磨玻璃结节 (pGGN) 侵袭性中的应用价值,为 pGGN 的临床决策提供有价值的参考信息。

材料与方法:在 2015 年 1 月至 2022 年 4 月期间,本项回顾性研究总计纳入 795 例患者 (平均年龄 53.4 ± 11.1 岁;男性 254 名,女性 541 名),在薄层 CT 上总计 876 个 pGGN 接受了手术切除并得到病理学确诊。两名有经验的胸部放射科医生独立阅读患者胸部 CT 平扫薄层图像,对 pGGN 的一系列特征进行评估,包括直径、密度、分布位置、形状 (规则/不规则)、空气支气管征、空泡征、内部血管改变、分叶征、毛刺征、边界 (清晰/不清晰)、胸膜凹陷和“微网格征” (定义为结节内交织成类似网状的多个细小线状阴影);意见不一致时通过协商得到解决。在病理评估中评估“微网格征”与病变侵袭性之间的关系。

结果:病理学性质方面,876 个 pGGN 中包括 163 个非肿瘤病变和 713 个肿瘤性病变[323 个非典型腺瘤性增生或原位腺癌 (AAH/AIS), 250 个微浸润腺癌 (MIA), 140 个浸润性腺癌 (IAC)]。不同类型病变中,在 0.0% 的非肿瘤性病变、0.0% 的 AAH/AIS、6.8% 的 MIA 和 54.3% 的 IAC 中检测到“微网格征”的存在。ROC 分析发现,“微网格征”诊断 MIA 或 IAC 的敏感性为 24.0%,特异性为 100.0%,单纯诊断 IAC 的敏感性为 54.3%,特异性为 97.7%。在包括所有 CT 特征的多变量回归分析中发现,“微网格征”是 IAC 的重要独立预测因子 ($OR=3.64$, $p=0.001$),但不是 MIA/IAC 的独立预测因子。

结论：在薄层 CT 图像上，pGGN 中的“微网格征”对评估病灶侵袭性具有较高的特异性，是诊断 IAC 的独立预测因子，对于指导 GGN 的风险评估和后续处理具有重要价值。临床实践中，对于存在网格征的 pGGN 应首先考虑为 IAC，相应的随访周期和随访间隔应缩短以及及时发现其进展情况。

PO-1252

炎症细胞浸润和相对密度与肺非肿瘤性磨玻璃结节边界表现的相关性研究

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目的：探讨肺部非肿瘤性磨玻璃结节（GGN）在 CT 图像上各种边界表现的相关影响因素。

材料和方法：从 2015 年 1 月到 2022 年 3 月，共 280 名患者 318 个非肿瘤性 GGN 纳入本研究。分别评估炎症细胞浸润程度和结节相对密度（ ΔCT ）与病变边界表现之间的相关性。

结果：以纤维组织增生和/或炎症细胞浸润为主要病理表现的非肉芽肿性结节（283，89.0%）是最常见的非肿瘤性 GGN，其次是肉芽肿性结节（28，8.8%）。对于非肉芽肿性 GGN，有较多和少/无炎症细胞浸润者在 137 边界清晰且边缘光滑的结节中分别为 15 (10.9%)和 122 (89.1%)例，在 65 例边界清晰但边缘毛糙的结节中分别为 16 (24.6%)和 49 (75.4%)例，在 47 例边界不清但 ΔCT ($>151HU$)较高的结节中分别为 43 (91.5%)和 4 (8.5%)例，在 34 例边界不清但 ΔCT ($<151HU$)较低的结节中分别为 4 (11.8%)及 30 (88.2%)例。炎症细胞较多的病例在边界清晰的结节中占比与其在 ΔCT 较低且边界不清的结节中占比相似（ $P = 0.587$ ），但明显低于其在 ΔCT 较高且边界不清的结节中的占比（ $P < 0.001$ ）。在肉芽肿性结节中，边界不清且 ΔCT 较高者（16，57.1%）最常见，且（7/8，87.5%）常在短期随访中出现变化。

结论：非肉芽肿性病变是最常见的非肿瘤性 GGN，其不同的边界表现与炎症细胞浸润程度和结节-正常肺密度差密切相关。

PO-1253

基于 HRCT 图像对纤维化性间质性肺疾病的定量分析研究

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目的 基于 CT 定量分析技术，探讨肺纹理及肺血管在纤维化性间质性肺疾病中相较于健康人及 COPD 病人的差异，分析 CT 定量参数对疾病诊断及严重程度评估的临床价值。方法 本研究为回顾性研究。搜集 2019 年 1 月至 2023 年 3 月确诊的中度纤维化性间质性肺疾病（F-ILD）患者 50 例，男 32 例，女 18 例，平均年龄（ 65.1 ± 10.6 ）岁；GOLD II 级 COPD 患者 50 例，男 30 例，女 20 例，平均年龄（ 64.6 ± 11.8 ）；健康对照组 50 例，男 34 例，女 16 例，平均年龄（ 64.9 ± 9.6 ）岁。所有患者均行胸部 CT 检查及肺功能检查，每次两项检查时间间隔不超过 2 周。使用 AVIEW 后处理工作站进行定量分析，对肺纹理和肺血管进行分割、量化，得到 CT 定量参数：全肺容积、不同模式肺纹理占比、 N_{total}/LSA 、 $N_{<5mm^2}/LSA$ 等，所有 CT 定量参数均进行体表面积（BSA）标化。纤维化视觉评估与定量分析的一致性采用卡帕一致性检验；采用单因素方差分析比较各组之间 CT 定量参数和肺功能指标；Pearson 相关性分析检验 CT 定量参数与肺功能指标之间的相关性。结果 与 F-ILD 组相比，COPD 组的 FEV1 显著降低，FVC、TLC 显著升高，差异具有统计学意义（ $P < 0.05$ ）。CT 定量参数 N_{total}/LSA 、 $N_{<5mm^2}/LSA$ COPD 组明显低于 F-ILD 组与健康对照组；F-ILD 组高于健康对照组，差异均具有统计学意义（ $P < 0.05$ ）。F-ILD 组 N_{total}/LSA 、 $N_{<5mm^2}/LSA$ 与肺功能参数呈负相关性（ $r = -0.21 \sim -0.59$ ），COPD 组与肺功能参数呈正相关性（ $r = 0.24 \sim 0.47$ ）；F-ILD 组

全肺容积与肺功能呈正相关性 ($r=0.36\sim0.54$)，COPD 组与肺功能呈负相关性 ($r=-0.39\sim-0.69$)。蜂窝影、网格影、磨玻璃影百分比与肺功能参数呈负相关性 ($r=-0.41\sim-0.57$)、与 CPI 呈正相关性 ($r=0.71、0.74$)。结论肺血管定量参数与肺纹理分析能够较好的反映 F-ILD 和 COPD 患者疾病严重程度，可能会在临床治疗方案的选择以及预后的评价中发挥重要的作用。

PO-1254

基于 CT 影像组学预测肌炎相关性间质性肺疾病抗 MDA5 抗体阳性

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目的

结合影像组学得分、肺功能参数、临床风险因素及建立联合预测列线图对肌炎相关性间质性肺 (IIM-ILD) 患者抗 MDA5 抗体阳性进行预测。

方法

回顾性分析 123 例 IIM-ILD 的临床影像资料。利用 3D Slicer 软件及其插件 PyRadiomics 对 CT 图像病灶进行半自动勾画并提取影像组学特征。按照 7:3 的比例随机将所有患者分为训练集及验证集。采用最小绝对收缩和选择算子 (LASSO) 从训练集中筛选最佳的影像组学特征并计算得到影像组学评分 (Radscore)。通过单因素和多因素回归分析筛选独立预测因子建立联合模型并绘制列线图。计算 Radscore、临床模型以及联合预测模型的 AUC 值，比较三种模型间的 AUC 值差异。利用决策曲线分析 (DCA) 评估联合模型的临床实用性。

结果

经过筛选 6 个影像组学特征参与建立 Radscore。单因素和多因素回归分析结果显示发现呼吸困难、DLCO、KL-6 与 Radscore 为独立预测因子，并基于 4 个独立因素建立联合模型。联合模型在训练集与验证集中的 AUC 分别为 0.875、0.793，均高于 Radscore 和临床模型，决策曲线分析显示联合模型在 0.1~0.8 阈值范围内表现出了良好的临床实用性。

结论

基于 CT 影像组学开发的列线图在预测 IIM-ILD 患者抗 MDA5 抗体阳性中具有一定优势，能够为临床提供一种快捷、无创且有效的预测手段。

PO-1255

CT 低密度征在鉴别肺部炎性和恶性肿瘤样病变的敏感性和特异性研究

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目的：低密度征 (HyS) 与肺部真菌感染有关，但在许多肺部非真菌性病变中也很常见。本研究旨在确定增强 CT 扫描 (CECT) 在鉴别肺部炎性和恶性肿瘤样病变中的价值。

方法：从 2013 年 1 月至 2021 年 1 月，回顾性评估病理确诊的 199 个肺部炎性病变 (ILs) 和 236 个恶性病变 (MLs) 患者的临床和 CT 资料。分析和比较 MLs 和 ILs 中 HyS 的 CT 特征，评估 HyS 是否有助于区分 MLs 和 ILs。

结果：ILs 和 MLs 患者在年龄和肿瘤标志物方面有显著差异 ($P<0.05$)。与 MLs 相比，ILs 中 HyS 的更常见 (62.81% vs. 28.81%; $P<0.0001$)。在 ILs 中，更多的 HyS 表现为单一、圆形或椭圆形，

边界清楚, 强化程度 (ΔCT) 较低。Logistic 回归分析显示, 边界不清、周围伴有纤维条索、有边界清晰的 HyS 和 HyS 的 $\Delta CT < 9.5HU$ 是预测 ILs 的独立指标。纳入 HyS 的 CT 特征后, 预测 ILs 的模型曲线下面积 (AUC) 从 0.953 增加到 0.986, 敏感性为 96.03%, 特异性为 94.03% ($P=0.0027$)。

结论: HyS 在 ILs 中比在 MLs 中更常见。在 CECT 上肺部肿块内出现单发、规则、边界清晰、 $\Delta CT < 9.5 HU$ 的 HyS 高度提示其为 ILs。HyS 结合其他形态学特征可提高肺部肿块样病变的诊断准确性。

PO-1256

通过新冠肺炎 (COVID-19) 住院患者的治疗前胸部 CT 表现预测肺纤维化的早期结局

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目的: 旨在通过结合新冠肺炎住院患者治疗前胸部 CT 扫描以预测患者在短期随访期间肺纤维化的结局, 以及通过实验室检查结果确定肺纤维化发展的预测因素。

方法: 回顾性地收集分析了因新冠肺炎 (COVID-19) 感染的住院患者的胸部 CT 影像学资料和临床生化检查。每名患者至少进行了两次胸部 CT 扫描。根据治疗后最后一次胸部 CT 中的纤维化证据将患者分为纤维化组和无纤维化组。使用定量 CT 评分评估患者肺部的受累的严重程度, 并根据治疗前胸部 CT 的 CT 评分预测肺纤维化的结果。进行多元 Logistic 回归分析肺纤维化的危险因素。

结果: 395 例新冠肺炎患者中 205 例出现肺纤维化改变, 其中重症患者 81% 的重症患者和 19% 的普通型患者出现肺纤维化改变。ROC 曲线显示: 胸部 CT 评分和严重程度评分预测肺纤维化方面表现出色 (AUC 分别为 0.878、0.882)。Logistic 回归分析显示, C 反应蛋白 (OR: 1.093, CI: 1.022-1.170, $p=0.01$)、中性粒细胞 (OR: 5.469, CI: 1.429-20.931, $p=0.013$) 和 D-二聚体 (OR: 1.773, CI: 1.079-20.914, $p=0.024$) 是肺纤维化的危险因素。

结论: 新冠肺炎住院患者的首次治疗前胸部 CT 可以用于评估疾病肺纤维化的结局, 且肺纤维化更可能发生在临床症状更重的患者中, 特别是炎症指标高的患者中。

PO-1257

I 期非小细胞肺癌术前 CT 影像学特征与预后的关系

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目的: 探究临床 I 期非小细胞肺癌术前 CT 影像学特征与预后的关系。方法: 收集本院 2016 年 1 月至 2017 年 12 月间具备完整术前增强 CT 检查图像且术后病理符合临床分期 I 期的 417 例非小细胞肺癌患者的影像及术后病理资料。采用查阅病例资料及电话回访的方式进行随访, 随访开始日期为手术日期, 截止日期为 2022 年 7 月。收集并分析患者年龄 (≤ 60 岁/ > 60 岁)、性别 (男/女)、肿瘤位置、肿瘤类型 (中央型肺癌/周围型肺癌)、肿瘤密度 (实性/部分实性/纯磨玻璃)、肿瘤边缘特征 (分叶征/毛刺征/胸膜凹陷征)、瘤周静脉与肿瘤的结构关系及瘤周静脉直径 (直径 $\leq 3.05mm$ /直径 $> 3.05mm$) 并结合其 5 年无病生存期 (DFS), 以评估患者的预后情况。本研究中数据采用 SPSS 26.0 软件进行数据处理分析, 采用 Kaplan-Meier 曲线及多因素 COX 比例风险模型进行生存分析, $P < 0.05$ 为差异有统计学意义。结果: 本研究共纳入 417 例临床 I 期非小细胞肺癌患者, 中位随访时间为 59 个月 (四分位距, 56-64 月), 随访时间内出现复发转移或死亡 48 例,

无病生存 369 例, 累积无病生存率为 88.5%。单因素分析结果显示: 肿瘤分期、肿瘤位置、肿瘤类型、肿瘤密度、胸膜凹陷征、毛刺征、瘤周静脉与肿瘤的结构关系及瘤周静脉直径等因素与患者预后无病生存期相关 ($P<0.05$)。进一步将以上 8 个因素纳入多因素 COX 比例风险模型进行生存分析, 结果显示: 肿瘤分期、肿瘤位置、胸膜凹陷征、瘤周静脉与肿瘤的结构关系及瘤周静脉直径等 5 个因素与 I 期非小细胞肺癌患者术后的 5 年无病生存期相关 ($P<0.05$)。结论: 本研究阐明了肿瘤分期、肿瘤位置、胸膜凹陷征、瘤周静脉与肿瘤的结构关系及瘤周静脉直径等 5 个因素是 I 期非小细胞肺癌患者术后不良预后的独立危险因素。

PO-1258

良恶性斑片状磨玻璃影的薄层 CT 鉴别诊断研究

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目的: 本研究旨在探讨良恶性斑片状磨玻璃影 CT 特征的差异, 以提高其鉴别诊断。

方法: 在 2016 年 1 月至 2021 年 9 月间, 回顾性纳入经术后病理确诊或随访诊断的 226 例患者总计 247 例斑片状磨玻璃影 (GGO) (良性 103 例, 恶性 144 例)。分析患者的临床和 CT 资料, 比较良恶性病变的 CT 特征。采用二元逻辑回归分析揭示恶性病变的预测因素。

结果: 与良性斑片状 GGO 的患者相比, 恶性者年龄较大 ($P < 0.001$), 恶性肿瘤史发生率较低 ($P = 0.003$), 且多为女性 ($P = 0.012$)。在 CT 图像上, 恶性和良性斑片状 GGO 在位置、分布、密度类型、内部支气管改变及其边界方面差异均有统计学意义 ($P < 0.05$)。二元逻辑回归分析显示, 恶性 GGO 的独立预测因子如下: 患者年龄 ≥ 58 岁 [OR, 2.175; 95% CI, 1.135-6.496; $P = 0.025$], 位于上叶 (OR, 5.481; 95% CI, 2.027-14.818; $P = 0.001$), 沿支气管血管束分布 (OR, 12.770; 95% CI, 4.062-40.145; $P < 0.001$), 实性成分中心分布 (OR, 3.024; 95% CI, 1.124-8.133; $P = 0.028$), 和边界清晰 (OR, 5.094; 95% CI, 2.079-12.482; $P < 0.001$)。

结论: 在老年患者 (≥ 58 岁) 中, 边界清晰的斑片状 GGO, 中心可见实性成分, 位于上叶, 并沿支气管血管束分布应高度怀疑为恶性肿瘤。

PO-1259

基于计算机断层扫描肺动脉造影自动三维血管参数测量在肺动脉高压危险分层中的价值探究

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目的: 肺动脉高压 (PAH) 患者早期进行危险分层评估有助于临床治疗决策, 使病情达到或维持低危状态是指南提出的治疗目标。本研究旨在探讨基于计算机断层扫描肺动脉造影 (CTPA) 图像使用内部开发的自动三维血管参数测量软件对 PAH 患者危险分层的评估价值。

方法: 我们回顾收集了 51 例于 2019 到 2022 年在本中心经右心导管插入术确诊的 PAH 患者。根据 2021 中国肺动脉高压诊断与治疗指南中提出的危险分层量表对以上患者进行危险分层, 将患者分为了低危、中危、高危患者, 并根据指南的治疗目标, 将患者分为低危组 ($n=15$) 和中高危组 ($n=36$)。通过使用内部开发的自动三维血管参数测量软件对这些患者的 CTPA 图像进行处理, 对 PAH 患者的近远端动脉直径、长度和容积等参数进行测量, 探究了低危患者与中高危患者之间肺动脉参数的差异性, 采用 logistics 多因素回归分析得出中高危 PAH 患者的危险因素, 并计算出 ROC 曲线下面积 (AUC 值) 进行评价。

结果：对两组 PAH 患者的相关动脉参数进行了分析，发现 PAH 患者的近远端动脉直径、容积具有统计学差异，中高危患者的肺动脉干远端最小直径、肺动脉干容积、右肺动脉容积及左肺动脉近端最小直径等参数高于低危患者，并具有统计学差异。多因素 logistics 回归分析结果显示肺动脉干容积 $>17.63\text{ml}$ 和右肺动脉容积 $>14.78\text{ml}$ 分别大于是中高危患者的独立预测因素，受试者工作特征曲线下面积(AUC)为 0.79 和 0.75。

结论：基于 CTPA 图像自动三维动脉参数测量有助于快速简便对低危 PAH 患者和中高危 PAH 患者的划分，对于临床治疗决策具有重要价值。

PO-1260

双层探测器光谱 CT 单能量联合低对比剂量在冠状动脉和静脉 “一站式”成像中的应用价值

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我们的研究旨在探讨在低造影剂的双层光谱探测器计算机断层扫描 (SDCT) 上对冠状动脉和静脉进行“一站式”成像的可行性。

材料与方法：65 名疑似冠状动脉疾病患者接受了双层光谱探测器 CT (Spectral CT 7500, 飞利浦) 冠状动脉 CT 血管造影术 (CTA)。扫描参数为：准直器， $128 \times 0.625\text{ mm}$ ；kVp，120；mAs，600；旋转时间，0.27 s。造影剂以 4.5 ml/s 的速度分 3 个阶段注入：9 ml 造影剂和生理盐水 30%:70% 混合，然后是 0.8 ml/kg 造影剂，最后是 30 毫升生理盐水冲洗，同步进行冠状动脉和静脉双重成像。通过定义升主动脉的 ROI，在信号衰减达到 100 HU 的预定阈值后 8 秒开始扫描。生成了基于迭代模型重建 (IMR) 的常规 120 kVp 图像以及 40 keV、50 keV、60 keV 和 70 keV 的虚拟单色图像 (VMI)。图像分析由两名独立的放射科医生进行。在 120 kVp 图像上对冠状动脉进行主观（伪影、噪音和整体质量）和客观（衰减）评估。对 VMI 和 120kVp 图像上的冠状静脉进行主观（噪声、对比度、清晰度、伪影和整体质量）和客观（衰减、噪声、信噪比 (SNR) 和对比度-噪声比 (CNR)) 比较。

结果：941 个冠状动脉节段的平均分数大于 4 分。与 120 kVp 图像相比，40 - 60 keV VMI 图像的主观静脉对比度、清晰度和整体图像质量明显更好 ($p < 0.05$)。40 - 70 keV VMI 的主观和客观噪声明显更好 ($p < 0.05$)。客观衰减、信噪比和 CNR 在 40 - 60 keV VMI 上明显更高 ($p < 0.05$)。

结论：本研究证实了使用低剂量造影剂的光谱 CT 进行冠状动脉和静脉“一站式”成像的可行性。利用 SDCT 获取的 120 kVp 多色图像和低 kV VMI 可分别评估冠状动脉和静脉，其中 40 kV 图像被定义为冠状静脉显像的最佳水平图像，在冠状动脉疾病诊断和心脏介入治疗中具有重要的临床意义。

PO-1261

4D-FLOW 技术结合 CMR 一站式评估 BAV 患者升主动脉血流动力学特点及亚临床左心室功能障碍

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目的: 主动脉二瓣化畸形 (BAV) 是最常见的先天性心脏病之一, 具有很高的病死率和死亡率。本研究旨在: 1) 应用三维三方向相位对比磁共振 (4D Flow MRI) 技术结合常规 CMR 一站式综合评估 BAV 患者升主动脉血流动力学特点及左心室的结构和功能改变; 2) 探索 BAV 患者升主动脉血流动力学变化特点与左心室心肌损害程度的相关性, 指导临床诊断、手术选择和预后。

方法: 前瞻性收集武汉市协和医院经临床及超声确诊为 BAV 患者 (无其他瓣膜疾病) 23 例以及健康志愿者 25 例行 3.0T (Skyra) 心脏一站式 MR 检查及主动脉 4D FLOW 扫描。所有 CMR 图像应用 CVI 后处理软件进行分析。获取左室容积数据、左室整体纵向 (GLS)、周向 (GCS) 和径向 (GRS) 心肌收缩应力和左室心肌细胞外容积 (ECV) 值。分析升主动脉、主动脉弓、降主动脉多个层面的血流流速、流量、跨瓣压差、血流模式和 3D 壁面切应力 (WSS) (最大收缩期 WSS、时间-平均 WSS)。比较两组间左室的 ECV 值、心肌收缩应变以及主动脉血流动力学参数的差异, 并分析其相关性。

结果: BAV 组和对照组左室射血分数无显著差异, 且 BAV 患者均无延迟强化。和对照组相比, BAV 组左室 GCS 显著降低, ECV 值显著升高, $p < 0.01$ 。BAV 患者的血流模式以右手螺旋流 (14/23) 和涡流 (5/23) 常见。BAV 组主动脉瓣跨瓣压差、反流分数、平均及峰值流速和流量均显著高于对照组; $p < 0.05$ 。和对照组相比, 主动脉球部、升主动脉及主动脉弓最大收缩期 WSS 和时间-平均 WSS 均显著降低, $p < 0.01$ 。多变量回归分析显示, BAV 患者 GLS ($r = 0.43$, $p = 0.019$)、ECV ($r = 0.56$, $p = 0.001$) 与升主动脉最大收缩期 WSS 独立相关。

结论: 心功能正常的 BAV 患者早期已经存在升主动脉血流动力学的异常改变, 并可能存在亚临床左室收缩功能障碍和心肌纤维化, 且其与升主动脉 WSS 独立相关。4D Flow MRI 可以三维可视化直观评估主动脉血流动力学特点, 结合常规 CMR 一站式检查, 为指导临床早期诊断、预防、是否手术及手术方式选择提供了可靠的无创影像学检查方法。

PO-1262

基于 CCTA 冠周脂肪衰减指数构建冠心病 MACE 风险列线图预测模型的研究

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【目的】 (1) 探讨基于 CCTA 测量冠周脂肪衰减指数是否是冠心病 MACE 发生风险的独立危险预测因子; (2) 探讨基于 FAI 构建列线图模型对冠心病 MACE 发生风险的预测价值。

【方法】 回顾性纳入昆明医科大学第一附属医院心内科 2018 年 10 月-2022 年 9 月诊断为冠心病并经 CCTA 检查的患者 258 例。收集所有研究对象的临床资料, 根据随访结果分为 MACE 组和无 MACE 组。利用数坤公司冠脉 CT 造影图像分析软件, 自动勾画三支主干近段距血管壁外膜 4mm 管状范围内的脂肪组织, 并计算 FAI 值。由 2 名具有 5 年以上心血管诊断工作经验的放射科医生独立评价三支血管狭窄程度及斑块性质。利用 Logistic 回归分析筛选冠心病 MACE 的独立危险预测因子, 构建列线图模型, 分别采用 ROC 曲线、校准曲线评价模型的区分度和校准度, 采用 Bootstrap 重抽样法进行内部验证, 绘制临床决策曲线评价模型的临床适用性。

【结果】最终纳入 258 例冠心病患者 MACE 组 50 例，无 MACE 组 208 例。两组患者性别、年龄、BMI、冠脉病变支数、狭窄程度分级、斑块性质、FAI 有显著统计学差异 ($P < 0.05$)。Logistic 回归分析显示，中度狭窄、重度狭窄、LAD-FAI、LCX-FAI、RCA-FAI 是冠心病 MACE 发生的独立危险预测因子 (均 $P < 0.05$)。纳入冠心病 MACE 发生风险的所有相关危险因素构建列线图预测模型并进行验证。列线图 ROC 曲线的 AUC 为 0.971，敏感度 90.0%，特异度 95.2%，相较于 LAD-FAI、LCX-FAI 和 RCA-FAI 具有较好的区分度和较高的预测效能。校准曲线显示该模型具有较好的校准度。内部验证显示模型具有较好的预测稳定性和一致性。临床决策曲线显示阈值概率在 0.0%~94.5% 时，模型拥有较高的净获益和较好的临床适用性。

【结论】(1) 基于 CCTA 测量 FAI 是冠心病 MACE 发生风险的独立危险预测因子，其中 LAD-FAI 是最佳独立危险预测因子，最佳临界值 -79.5HU；(2) 基于 FAI、狭窄程度分级、年龄及 BMI 构建的冠心病 MACE 风险列线图预测模型具有较好的区分度和一致性，临床应用价值较高。

PO-1263

心脏磁共振特征追踪技术在 LGE 阴性的扩张型心肌病患者危险分层及预后评估中的作用

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目的：利用心脏磁共振 (CMR) 评估 LGE 阴性的扩张型心肌病 (DCM) 患者的左室心肌形变情况，探讨 strain 在 LGE 阴性的 DCM 患者中的作用，并且利用 strain 结合不同区间的 LVEF 对 DCM 患者进行新的危险分层。

方法：本研究共纳入 2012 年 10 月-2022 年 10 月间经临床诊断为 DCM 并接受 CMR 检查的 LGE 阴性的患者 300 例。分析 DCM 总体及各亚组患者之间的各基线指标、左心室整体径向峰值应变 (PS)、周向 PS 及纵向 PS 之间的差异；同时，将全因死亡率、心脏移植作为主要终点事件，将心力衰竭再入院、室性心律失常、植入植入型心律转复除颤器 (ICD) 或心脏再同步治疗 (CRT) 作为次要终点事件。

结果：LVEF < 20% 的 DCM 患者径向 PS、周向 PS 及纵向 PS 较 LVEF = 20-35%、LVEF > 35% 的患者组明显减低；在患者的单变量 Cox 回归分析中，BSA、LBBB、CK、LVEF、GRS、GLS、GCS 与主要终点的相关性最强 ($P < 0.001$)；多因素逐步分析的结果表明，在 LVEF < 20% 的患者中，只有 GLS 是主要终点事件危险因素，并且独立于 LVEF。

结论：基于 CMR-FT 成像能够评估 DCM 患者早期心脏功能损伤的程度，结合不同区间的 LVEF 对 DCM 患者进行新的危险分层，能够帮助临床治疗 LGE 阴性的 DCM 病人。

关键词：心脏磁共振；扩张型心肌病；特征追踪技术；应变

PO-1264

双层光谱探测器 CT 虚拟平扫代替常规平扫的可行性研究在主动脉夹层支架术后的应用

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目的 探讨双层光谱探测器 CT (dual-layer spectral detector CT) 在主动脉支架术后行主动脉 CT 血管成像时，虚拟平扫 (virtual non-contrast, VNC) 代替常规平扫 (true non-contrast, TNC) 的可行性。

方法 回顾性分析 30 例在双层光谱探测器 CT 上行主动脉 CTA 的光谱基图像 (spectral based images, SBI) 数据, 在后处理工作站将 CT 主动脉血管图像重建为虚拟平扫 (VNC) 图像。扫描参数: 管电压 100 kVp, 采用管电流自动控制技术自动调节 (100~300 mAs), 对比剂注射流速 5.0ml/s, 总量 1.0ml/kg。图像支架结构部分和非支架部分分别采用 Likert 5 分制进行评分。客观评价: 支架部分血管, 在支架起始处、中段和末端分别测量 CT 值和 SD 值, 以及支架的厚度。非支架部分血管, 测量升主动脉、降主动脉、腹主动脉以及对应层面肌肉的 CT 值和 SD 值, 计算图像的 SNR 和 CNR。记录平扫、血管成像的辐射剂量。

结果: VNC 图像支架结构评分 (4.51 ± 0.43) 优于 TNC (4.13 ± 0.51) 图像 ($P < 0.01$), 非支架部分的血管图像质量评分差异无统计学意义 ($P > 0.01$)。VNC 支架起始处厚度、中段厚度和末端厚度与 TNC 差异有统计学意义 ($P < 0.001$)。VNC 与 TNC 支架各段 CT 值差异有统计学意义 ($P < 0.05$), VNC 的 CT 与 SD 值低于 TNC ($P < 0.05$), SNR 和 CNR 差异有统计学意义 ($P < 0.05$)。非支架部分 VNC 与 TNC 的 CT 值有较好的一致性 (Bland-Altman 分析一致性界限为 10 HU 时界外数据点占比 $\leq 5\%$)。VNC 的 SD 值低于 TNC, SNR 和 CNR 差异有统计学意义 ($P < 0.05$)。

TNC 占总 DLP 的 49.8% ($421.32/844.77$), 有效剂量为 (6.32 ± 1.12) mSv。

结论: 基于双层光谱探测器 CT 的 VNC 图像对于支架结构的显示优于 TNC, 且噪声较 TNC 更低, 对于主动脉支架术后行 CTA 扫描的患者, 可减少一次平扫, 有效降低辐射剂量。

PO-1265

超低管电压联合高权重深度学习图像重建算法在冠脉 CT 血管成像“双低”扫描中的应用价值

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目的 探讨超低管电压(70kVp)联合高权重深度学习图像重建 (high-strength deep learning image reconstruction, DLIR-H) 技术降低冠脉 CT 血管成像辐射剂量与对比剂用量的临床价值。**方法** 收集 72 例临床拟行冠状动脉 CTA 检查的患者, 随机分为 A、B 两组, 每组各 36 例。A 组扫描方案:70kV, 智能 mA 调节技术, 噪声指数 (noise index, NI) 为 30HU; 对比剂总量 16mg/kg/s, DLIR-H 重建。B 组扫描方案:120kV, 智能 mA 调节技术, NI 为 22HU, 对比剂总量 32mg/kg/s, 50%ASIR-V 重建。两组均以 10s 的对比剂注射持续时间计算对比剂注射流速。对两组图像质量进行主观评分和客观评价。图像质量主观评分采用 5 分法, 信噪比和对比噪声比用于图像质量客观评估。结果 两组图像质量主观评分满足诊断要求, A 组图像质量的主观评分优于 B 组, 差异有统计学意义 ($P < 0.001$)。A 组的背景噪声 SD 值 (12.36 ± 2.86) 明显低于 B 组 (19.06 ± 2.43), 差异有统计学意义 ($P < 0.001$); A 组冠状动脉各分支血管 RCA、LAD 和 LCX 的 SNR (36.40 ± 11.71 , 35.01 ± 10.95 , 35.32 ± 11.33) 明显高于 B 组 (20.77 ± 3.76 , 20.33 ± 3.46 , 20.15 ± 3.34), 差异有统计学意义 (P 均 < 0.001); A 组冠状动脉各分支血管 RCA、LAD 和 LCX 的 CNR (48.47 ± 13.61 , 47.08 ± 12.72 , 47.38 ± 13.12) 明显高于 B 组 (26.25 ± 4.79 , 25.82 ± 4.54 , 25.64 ± 4.15), 差异有统计学意义 (P 均 < 0.001)。A 组对比剂平均用量 22.87 ± 4.06 mL 和辐射剂量 0.82 ± 0.15 mSv 较 B 组 48.64 ± 7.09 mL、 2.23 ± 0.93 mSv 分别降低了 53% 和 63.2%。**结论** 与传统扫描方案相比, 超低管电压联合高权重深度学习图像重建算法行 CCTA 扫描, 图像质量优, 患者接受的辐射剂量与对比剂总量均明显降低。

PO-1266

基于 CCTA 多参数评估冠状动脉非钙斑性狭窄缺血风险价值初探

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目的 探讨冠状动脉非钙化斑块周围脂肪衰减指数 (FAI) 与无创性 CT 血流储备分数 (FFR_{CT}) 及斑块参数间的关系。**方法** 回顾性收集 395 例拟诊冠心病住院患者的冠状动脉 CT 血管造影图像及临床相关资料, 根据管腔狭窄程度分为正常组 131 例, 病变组 (轻度组 140 例、中度组 78 例和重度组 46 例), 病变组均仅选取单支及单发性非钙化斑块。测量斑块定量指标 (包括斑块短径、长径、CT 值)、提取斑块周围 FAI 值及斑块远段 2.5cm 处 FFR_{CT} 值。根据斑块 CT 值分为低衰减组 24 例 (CT 值 \leq 30 HU)、中等衰减组 101 例 (30<CT 值 \leq 50HU)、高衰减组 139 例 (50<CT 值 \leq 120HU)。探讨冠状动脉狭窄程度、斑块参数和 FAI 与 FFR_{CT} 的关系, 通过受试者工作特征曲线评估对非钙化斑块导致的缺血性狭窄的诊断效能。**结果** 冠状动脉狭窄程度与年龄 (Rs=0.277, P<0.05)、斑块短径 (Rs=0.257, P<0.05)、FAI (Rs=0.548, P<0.05)、收缩压 (Rs=0.128, P<0.05) 呈正相关, 与 FFR_{CT} (Rs=-0.387, P<0.05) 呈负相关; 正常组与轻、中、重度组 FAI 差异均有统计学意义 (P<0.05), 轻度组与中、重度组 FAI 差异有统计学意义 (P<0.05), 但中度组与重度组 FAI 差异无统计学意义 (P>0.05)。非钙化斑块 CT 值与 FAI 呈负相关 (Rs=-0.241, P<0.05)。FFR_{CT} \leq 0.80 组与 FFR_{CT}>0.80 组在病变狭窄程度、斑块 CT 值、斑块周围 FAI 差异均有统计学意义 (P<0.05), FFR_{CT} \leq 0.80 组管腔狭窄程度更重、斑块 CT 值更低、斑块周围 FAI 值更高, 两组间 FAI 临界值为-69.5HU, 斑块 CT 值 ROC 曲线下面积 (AUC) 为 0.406 [95% 置信区间 (CI) 0.338~0.474], FAI 值 ROC 曲线下面积 (AUC) 为 0.793 [95% 置信区间 (CI) 0.739~0.846]。**结论** 冠状动脉非钙化斑块周围 FAI 较高者发生缺血性狭窄风险性更大, 基于斑块参数、FAI 及 FFR_{CT} 能够对冠状动脉非钙化斑块导致的心肌缺血具有一定的诊断价值。

PO-1267

基于人工智能的冠状动脉钙化积分算法在非门控胸部 CT 中的应用价值及影响因素分析

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目的: 探讨人工智能软件在非门控胸部平扫 CT 的冠状动脉钙化积分测量中的应用价值及其影响因素。

方法: 回顾性纳入 237 名在一个月内心行冠状动脉 CT 血管造影和非门控胸部 CT 的患者, 分别由低、高年资的放射科医生进行心电门控心脏 CT 平扫钙化勾画 (此两组分别记为门控-L、门控-H), 通过 CACS 软件获取 Agatston 分, 以门控-H 组 CACS 作为金标准。采用基于人工智能的非门控胸部 CT 钙化积分软件获得 Agatston 积分, 记为 AI 组; 由低年资放射科医生检查 AI 计算结果并进行相应的修正, 记作 AI+L 组。记录上述 4 组每例患者的 CACS 计算时间。采用 Spearman 相关分析、Bland-Altman 一致性分析比较门控-L、AI、AI+L 组 CACS 与门控-H 组 (金标准组) 的一致性。采用 Kappa 检验评估门控-L、AI、AI+L 组与门控-H 组 CACS 危险度分层的一致性。还分析了心率和 BMI 对 AI-CACS 危险度分层的影响。P<0.05 为差异有统计学意义。

结果: AI 组计算 CACS 所需时间为 42.0s (37.0~46.0s); AI+L 组计算 CACS 所需时间为 60.0s (51.5~68.0s)。以门控-H 组 CACS 为金标准, 门控-L、AI、AI+L 组 CACS 与门控-H 组 CACS

相关性好, 相关系数 (r) 分别为 0.99、0.65、0.98, P 值均小于 0.01。Bland-Altman 图显示门控-L、AI+L 组 CACS 与门控-H 组 CACS 的一致性较 AI 组好。门控-L、AI+L 组 CACS 危险度分层一致性较 AI 组好, Kappa 系数 (κ) 分别为: 0.73、0.89、0.36, P 值均小于 0.01。AI+L 组 CACS 危险度分层准确率为 92.0%, 显著优于门控-L 组及 AI 组。心率对 AI 软件 CACS 危险度分层准确性有显著影响; BMI 则无明显影响。

结论: 基于胸部平扫 CT 的 AI 与医生协同阅片模式显著提升了评估及危险分层的准确性, 更适用于临床冠心病患者风险等级的筛查。此外, 心率偏高会对 AI 软件 CACS 危险分层产生负面影响, 该结果为今后软件优化提供了依据。

PO-1268

CT 左心室功能学新指标在肥厚型心肌病中的应用价值: 早期心功能评估和鉴别诊断

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目的 由于肥厚型心肌病 (HCM) 和高血压性心脏病 (HHD) 均存在心肌肥厚, 传统影像学方法在区分这两种疾病方面存在一定困难, 且对早期左室功能损伤不敏感。因此, 本研究的目的是探讨基于 CT 技术所获得的心肌应变 (MS) 参数在评估 HCM 和 HHD 早期左室功能的可行性, 以及该参数区分这两种疾病的能力, 为临床提供参考。

资料与方法 本研究纳入了 2021 年 12 月至 2023 年 1 月期间在空军军医大学西京医院接受心脏冠状动脉血管成像检查, 结果呈阴性的 205 名成年受试者。根据各组标准将受试者分为 HCM、HHD 和健康对照组。随后使用后处理软件对三组人群的左室形态学特征、传统心功能参数以及 MS 参数进行了量化。采用统计学方法比较这些参数之间的差异, 以及对这两种疾病的鉴别能力。

结果 相较于健康对照组, HCM 与 HHD 组的 MS 绝对值均有不同程度降低 (MyoGCS, -25.80 ± 3.74 vs. -23.00 ± 4.49 vs. 21.03 ± 4.97 ; EndoGCS, -40.95 ± 8.13 vs. -35.86 ± 7.90 vs. 31.85 ± 9.16 ; GRS, 81.26 ± 37.76 vs. 66.99 ± 18.37 vs. 55.31 ± 23.19 , P 均 < 0.001), 其中以纵向应变降低最为显著 (MyoGLS, -23.03 ± 3.84 vs. -19.86 ± 2.22 vs. 15.47 ± 4.28 ; EndoGLS, -30.35 ± 5.35 vs. -25.01 ± 3.62 vs. 21.92 ± 8.16 , P 均 < 0.001)。多元 logistic 回归分析结果显示 MLVWT、LVMI 和 MyoGLS 组合模型的 ROC 曲线下面积最大, 为 0.93 (灵敏度: 97%, 特异度: 83%)。

结论 本研究结果表明, 基于 CT 所获得的 MS 参数可以用于精确评估 HCM 和 HHD 患者的早期左室功能损伤, 其中以纵向应变的损伤最为显著。所得参数中 MLVWT、LVMI 和 MyoGLS 的组合模型在区分这两种疾病时效果最佳。这些发现有望为临床提供更准确的诊断和治疗指导

PO-1269

双层探测器光谱 CT 对 stage I 期肺腺癌 PD-L1 表达的预测价值—开发和验证一种新的列线图

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目的: 我们研究了光谱 CT (SDCT) 定量和定性参数、临床标记物与 stage I 期肺腺癌 PD-L1 表达之间的潜在关联, 同时提出了一种术前个体化鉴别的列线图。

方法: 通过分析术后病理诊断为浸润性非粘液性肺腺癌患者的 SDCT 参数及 PD-L1 表达情况, 并根据 PD-L1 表达量是否为 1% 分为阳性组和阴性组。然后, 半自动提取定量及定性参数, 一个回顾性

集合 (N=356) 中随机选择的训练队列 (80%) 和验证队列 (20%)，用于开发和内部验证预测模型收集的放射学和生物标记物特征，通过单变量分析降低特征维度，使用 logistic 回归建立了预测 PD-L1 表达的列线图，并利用受试者工作特征 (ROC) 曲线评价了模型的预测效能。

结果: 纳入了 356 名参与者，包括阴性组 (n=202) 和阳性组 (n=154)。经过单因素分析后，有 18 个参数仍与 PD-L1 表达相关，对 AUC> 为 0.6 的显著性参数进行多元回归分析，最终确定的 CT.value (AUC=0.627, P=0.033)、CT40kev.a (AUC=0.642, P=0.025)、Zeff.a (AUC=0.756)、ED.a (AUC=0.641)、ED.v (AUC=0.607) (均 P < 0.001) 和 TK1 (AUC=0.601, P=0.026)、Dsolid (AUC=0.632, P=0.04) 为 stage I 期肺腺癌 PD-L1 表达的独立危险因素。通过结合以上 7 个有价值的预测因子，建立了一个 SDCT 参数-临床列线图，观察到在训练 (AUC=0.853) 和验证 (AUC=0.824) 组中具有令人满意的辨别能力，临床决策曲线 (DCA) 也识别出在大范围的阈值概率范围内具有最高的净收益，临床影响曲线 (Clinical Impact Curve, CIC) 表明了此列线图的临床有效性。在模型比较中，列线图比单独的任何变量具有更高的区分精度。

结论: 基于 SDCT 定量参数可以预测 PD-L1 在早期肺腺癌中的表达，其中 Zeff.a 作用突出，结合 TK1 建立了的列线图显示出优异的预测性能和良好的校准，可以促进非侵入性预测 PD-L1 表达的个体化风险。

PO-1270

基于心脏磁共振影像组学联合临床因素对肥厚型心肌病并发室性心律失常的预测价值

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目的 探讨基于心脏磁共振 (CMR) 不同区域心肌的影像组学特征及相关临床因素在预测肥厚型心肌病 (HCM) 者并发室性心律失常 (VAs) 中的价值。方法 收集 2018 年 1 月 1 日至 2023 年 5 月 31 日的 122 例确诊 HCM 者的 CMR 图像及临床资料。根据 24 小时动态心电图结果将其分为合并 VAs 组 (40 例) 与未合并 VAs 组 (82 例)。按照 7:3 的比例随机分为训练集及测试集。选择从二尖瓣水平至心尖部的左心室短轴末增强平衡式稳态自由进动序列，以舒张末期壁厚 (EDWT) 为基础，将 HCM 者心肌分为肥厚区域 (无 HCM 家族史, EDWT≥15 mm; 有 HCM 家族史, EDWT≥13 mm) 与非肥厚区域 (无 HCM 家族史, EDWT<15 mm; 有 HCM 家族史, EDWT<13 mm)。在左心室短轴位各层面心肌的心室舒张末期对全室壁心肌、肥厚区域心肌、非肥厚区域心肌进行感兴趣区勾画及影像组学特征提取、采用 Mann-Whitney U 检验、递归特征消除法及最小绝对收缩与选择算法进行影像组学特征筛选、选出最优特征集、计算影像组学评分、构建左心室全室壁心肌影像组学模型、左心室肥厚区域心肌影像组学模型、左心室非肥厚区域心肌影像组学模型。通过 Logistic 回归筛选临床危险因素建立临床因素模型。构建结合临床危险因素和不同兴趣区影像组学特征的左心室全室壁心肌联合模型、左心室肥厚区域心肌联合模型、左心室非肥厚区域心肌联合模型。采用准确度、敏感度、特异度、阳性预测值、阴性预测值和受试者工作特征曲线下面积 (AUC) 及 DeLong 检验评估和比较模型间的预测效能; 使用列线图将联合模型可视化, 并通过 H-L 检验及校正曲线评估联合模型拟合程度; 通过决策曲线分析观察各模型的临床实用性。结果 在训练集中, 3 个联合模型的 AUC 值 (0.89、0.98、0.98) 均高于与其 ROI 相同的影像组学模型 (0.74、0.85、0.86) (P<0.05), 亦高于临床因素模型 (0.81) (P<0.05)。结论 基于 CMR 不同区域心肌的影像组学特征结合相关临床因素构建的联合模型在预测 HCM 者合并 VAs 风险方面效能更佳, 可为临床决策提供指导。

PO-1271

基于 MOLLI 序列和 SMART1 序列的对比剂注射前心肌 T1mapping 成像诊断心肌病效能的初步比较研究

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目的：比较基于 MOLLI 序列与基于 SMART1 序列的心肌 T1mapping 成像诊断心肌病效能的差异；
方法：自 2021 年 04 月至 2022 年 12 月连续对 35 例因临床疑似心肌病在我院行心脏磁共振检查的住院患者同时行对比剂注射前 MOLLI 和 SMART1 序列扫描，并同期对 8 例健康对照行心脏非对比剂注射 MOLLI 和 SMART1 序列成像。以患者出院诊断为金标准进行对比剂注射前 MOLLI 和 SMART1 mapping 诊断心肌病有无的 ROC 曲线分析、比较；

结果：最终纳入出院诊断为表现为对比剂注射前心肌 T1 值升高的心肌病患者 21 例（其中心肌炎 8 例，高血压性心脏病 4 例，扩张性心肌病 3 例，心力衰竭 2 例，儿茶酚胺性心肌病 1 例，尿毒症性心肌病 1 例，缺血性心肌病 1 例，心肌致密化不全性心肌病 1 例），健康对照 8 例。基于 SMART1 序列的患者与健康对照人群对比剂注射前心肌 T1 值差异具有统计学意义（ $1547.13 \text{ ms} \pm 89.90 \text{ ms}$ VS $1463.23 \text{ ms} \pm 82.63 \text{ ms}$ ， $P < 0.01$ ），当选择 1515.35 ms 为诊断界值时，其诊断心肌病的特异性及敏感性分别为 73.8%，67.8%，ROC 曲线下面积为 0.756（95%CI: 0.711-0.802）；基于 MOLLI 序列的患者与健康对照人群对比剂注射前心肌 T1 值差异具有统计学意义（ $1266.57 \text{ ms} \pm 67.84 \text{ ms}$ VS $1210.74 \text{ ms} \pm 59.27 \text{ ms}$ ， $P < 0.01$ ），当选择 1246.95 ms 为诊断界值时，其诊断心肌病的特异性及敏感性分别为 74.6%，65.4%，ROC 曲线下面积为 0.734（95%CI: 0.685-0.782）。两种成像序列心肌 T1 值诊断心肌病 ROC 曲线下面积差异无统计学意义（ $Z=0.869, P=0.385$ ）

结论：基于 MOLLI 与基于 SMART1 序列的心肌 T1mapping 成像诊断心肌病的效能无差异。

PO-1272

基于 CCTA 的肝脏影像组学联合冠脉多参数模型对急性冠脉综合征预测价值的研究

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目的：探究基于冠状动脉 CT 血管成像（CCTA）的肝脏影像组学联合冠脉多参数模型对疑似冠心病患者未来 3 年内发生急性冠脉综合征（ACS）的预测价值。

方法：回顾性收集 2013 年 1 月至 2020 年 12 月于我院因疑似冠心病接受 CCTA 检查的患者，所有入组患者均具备完整的临床资料及 3 年以上随访记录。将行 CCTA 检查后 3 年随访期内发生 ACS 事件的患者纳入 ACS 组（ $n=104$ ），将 3 年随访期内未发生 ACS 事件的患者，根据年龄、性别、体质指数、传统心血管危险因素和基线治疗用药情况与 ACS 组进行 1:1 匹配，纳入对照组（ $n=104$ ）。后将两组患者以 8:2 的比例随机分为训练集（ $n=166$ ）和测试集（ $n=42$ ）。于 CCTA 检查扫及肝脏最大层面手动勾画一直径约 2cm 的感兴趣区，提取并筛选最佳肝脏影像组学特征构建肝脏影像组学模型（Model 1）；评估 ACS 组罪犯斑块及对照组狭窄程度最高的斑块定量及定性特征，并测量相应斑块周围脂肪衰减指数，筛选出最佳预测因子构建冠脉多参数模型（Model 2）；加和平均 Model 1 和 Model 2 构建联合模型（Model 3）。绘制受试者工作特征（ROC）曲线比较不同模型对疑似冠心病患者未来 3 年内发生 ACS 事件的预测能力，绘制决策曲线比较不同模型的临床应用价值。

结果: ROC 曲线表明: Model 1 (AUC=0.692 [95%CI:0.531-0.852]) 对疑似冠心病患者未来 3 年内发生 ACS 事件的预测效能略低于 Model 2 (AUC=0.749 [95%CI:0.600-0.898]), 两者的差异无统计学意义 ($P=0.59$)。与 Model 2 相比, Model 3 的预测效能略有提升 (AUC=0.771 [95%CI:0.627-0.915]), 但两者差异无统计学意义 ($P=0.79$)。决策曲线表明: Model 3 的临床效益略高于 Model 1 和 Model 2。

结论: 基于 CCTA 的肝脏影像组学特征可为 ACS 事件发生提供额外的预测信息。联合模型对疑似冠心病患者未来 3 年内发生 ACS 事件具有较高的预测能力, 可为冠脉多参数模型提供一定增量预测价值, 有助于 ACS 患者的风险分层。

PO-1273

深度学习重建算法结合 70KVp 管电压在肺部 CT 扫描中的可行性: 肺部膜体研究

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目的: 研究深度学习重建 (DLIR) 算法结合超低管电压 (70KVp) 对肺部 CT 扫描图像质量及辐射剂量的影响。**方法:** 对标准体型仿真肺部膜体进行扫描, 按照管电压的不同分为 120KVp 组和 70KVp 组。120KVp 组采用自适应统计迭代重建 (adaptive statistical iterative reconstruction-Veo, ASiR-V, 30%) 算法; 70KVp 组采用深度学习重建 (DLIR) 算法, 重建出不同权重 (DLIR-M、DLIR-H、DLIR-H+LU) 组。两组管电流均采用 100mA, 余参数设置相同, 分别对膜体进行 10 次扫描并重建 1.25mm 图像, 记录两侧肺组织内相同位置的 CT 值、皮下脂肪噪声 (SD)、CTDI, 计算信号噪声比 (SNR)、辐射剂量 (ED), 两名拥有超过 5 年的胸部诊断工作经验的放射科医生使用 1-5 分的评分系统对所有的图像进行了评估, 并对数据进行统计学分析。**结果:** 120KVp 组和 70KVp 组图像 CT 值均无统计学差异 ($P>0.05$); 两组图像的 SD、SNR 和图像质量评价有统计学差异 (均 $P<0.05$), 其中 70KV 组图像的皮下脂肪噪声明显低于 120KVp 组, 70KVp-DLIR-M 和 70KVp-DLIR-H 肺组织内噪声低于 120KVp 组, 70KVp-DLIR-M+LU 组图像肺部噪声略高于 120KVp 组。然而, 70KVp-DLIR-M+LU 组和 120KVp 组图像质量评价无统计学意义, 均可以提供更好的锐利度, 清晰地显示肺纹理的结构和分支; 70KVp 组的辐射剂量相比 120KVp 组降低了 85% (0.43 ± 0.01 vs. 3.03 ± 0.06 mSv, $P<0.05$)。结论: DLIR 算法结合管电压 70KVp 在标准体型肺部膜体 CT 扫描中明显地降低了图像噪声和辐射剂量, 采用图像增强滤波 lung (LU) 重建模式可以提供常规肺部扫描的诊断图像质量。

PO-1274

心脏磁共振 T1 mapping 联合特征追踪技术在 LGE 阴性的肥厚型心肌病中的应用价值

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目的: 探究心脏磁共振 (CMR) T1 mapping 技术联合特征追踪 (FT) 技术在钆对比剂延迟增强 (LGE) 阴性的肥厚型心肌病 (HCM) 患者心肌纤维化和心肌形变中的诊断效能与预测价值。**方法:** 连续收集诊断为 HCM 且 CMR 检查为 LGE 阴性的患者 17 例及健康志愿者 28 例, 所有研究对象均进行 CMR 扫描, 所有图像均上传至 Cvi42 后处理软件, 分析心功能参数、native T1 值、细胞外间质容积分数 (ECV)、T2 值及左室整体纵向应变 (GLS)、周向应变 (GCS) 和径向应变

(GRS) 峰值等指标之间的差异; 采用受试者工作特征 (ROC) 曲线分析各参数诊断效能。结果: 与正常对照组相比, HCM 组左室射血分数 (LVEF) 降低, 收缩期/舒张期的心肌质量升高, 差异具有统计学意义 ($P<0.05$); 左心室整体、基底部、心尖部 native T1 值、ECV 值及中间部 T1 值均升高 ($P<0.05$); GCS、GRS、GLS 峰值均降低, 差异具有统计学意义 ($P<0.05$)。整体 ECV 值的曲线下面积 (AUC) 为 0.812、灵敏度为 0.818、特异度为 0.727、约登指数为 0.545, 提示整体 ECV 值诊断效能最高 ($P<0.05$)。结论: LGE 阴性患者的 HCM 患者的整体、基底部、中间部、心尖部 native T1 值及 ECV 值升高, 提示 HCM 患者存在不同程度的弥漫性纤维化; LGE 阴性的 HCM 患者 GLS、GRS、GCS 均下降, 提示 CMR-FT 技术可以较早地反映心肌形变及心收缩功能受损。

PO-1275

基于 CCTA 的冠脉周围脂肪组织放射组学对未来 5 年内发生不良心血管事件的预测价值

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目的 本研究旨在探讨基于冠状动脉 CT 血管造影 (CCTA) 的冠脉周围脂肪组织 (PCAT) 放射组学特征是否可以评估冠心病患者未来 5 年内发生不良心血管事件的预测价值。**方法** 回顾性收集在我院接受 CCTA 检查且临床疑诊为冠心病的患者, 将 5 年内发生主要不良心血管事件 (MACE) 的 189 例患者作为病例组, 对同期数据库内未发生 MACE 事件并且年龄性别等相匹配的人群作为对照组 (189 例)。所有患者以 8:2 的比例随机分成训练集 ($n=302$) 和验证集 ($n=76$)。最后, 我们分别构建了左前降支、左回旋支和右冠状动脉的 PCAT 放射组学模型及三支冠脉的综合 PCAT 放射组学模型, 同时, 我们还分析了所有患者的 PCAT 感兴趣区域周围的脂肪衰减并建立 FAI 模型, 采用 ROC 曲线及校准曲线评估所有模型的预测效能。**结果** 从基于 CCTA 的 PCAT 放射组学特征中最终筛选出综合模型共 17 个特征、LAD-PCAT 组学模型共 14 个特征、LCX-PCAT 模型共 8 个特征以及 RCA-PCAT 组学模型共 20 个特征, 通过 Logistic 回归分析构建各自的放射组学模型。在训练集中, 综合模型、LAD-PCAT、RCA-PCAT 以及 LCX-PCAT 放射组学模型各自的曲线下面积 (AUC) 分别为 0.833、0.792、0.784、0.762, 在内部验证集中, 各模型的 AUC 分别为 0.821、0.756、0.760、0.724, FAI 模型的 AUC 值较差 (0.642, 0.531)。综合模型在评估未来 5 年内发生 MACE 事件的预测价值优于三支单独冠脉及 FAI 模型, 综合模型与其他模型相比, 训练集和验证集的 AUC 均具有统计学意义 ($P<0.05$)。在三支单独冠脉组学模型的差异性分析中, Delong 检验表明 LCX-PCAT 组学模型与其他模型具有统计学差异, 而其余单支冠脉模型之间并没有统计学差异 ($P>0.05$)。结论 基于 CCTA 的冠脉周围脂肪组织放射组学可以预测未来可能发生不良心血管事件的人群, 并且三支冠脉的 PCAT 放射组学综合模型预测效能最好, FAI 模型在此研究中预测效能最差, 单支冠状动脉 PCAT 组学模型评估不良心血管事件的预测价值有待进一步研究。

PO-1276

双能量 CT 检测心肌瘢痕特征构建陈旧性心肌梗死患者预后模型

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【摘要】目的 利用双能量 CT 检测心肌瘢痕特征, 评估其对陈旧性心肌梗死 (MI) 患者的预后价值, 并构建列线图模型。方法 连续纳入 2019 年 11 月~2022 年 12 月在南通大学第二附属医院行冠脉 CTA+双能心肌延迟强化 (LIE-DECT) 的陈旧性 MI 患者, 所有入组患者采用 40keV 单能谱+ (Mono+) 进行重建, 在左室短轴位图上评估心肌受累心肌节段数、受累心肌评分及心肌瘢痕程度。所有入组患者进行临床终点事件随访, 探讨 DECT 检测心肌瘢痕特征与心血管事件 (MACE) 发生的关系, 并构建模型, MACE 定义为心衰再住院、恶性心律失常, 心源性死亡。结果 在中位随访 24.6 (14.4, 35.2)个月期间, 纳入的 240 例陈旧性 MI 患者中, 有 69 例 (28.7 %) 患者发生心血管事件。Kaplan-Meier 分析显示, 受累心肌节段数、受累心肌评分及心肌瘢痕程度的增加与 MACE 发生相关 (log-rank $P<0.01$), 受累心肌节段数 >4 、受累心肌评分 >6 及心肌瘢痕程度大于 10% 的患者 MACE 发生率明显高于对照组。COX 比例风险回归模型显示, 调整混杂因素, 发现受累心肌节段数, 受累心肌评分及心肌瘢痕程度是发生 MACE 重要的独立危险因素。所构建列线图模型能够很好的预测陈旧性 MI 患者 MACE 的发生, 显示出良好的校准和区分能力, 受试者工作特征 (ROC) 曲线下面积 (AUC) 为 0.862(95%CI:0.830~0.887)。结论 受累心肌节段数, 受累心肌评分及心肌瘢痕程度是陈旧性 MI 患者 MACE 发生的重要的预测因子, 可作为临床陈旧性 MI 预后评估的重要指标。

PO-1277

双能量 CT 检测心肌瘢痕特征对陈旧性心肌梗死患者发生主要心血管事件的预测

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【摘要】目的 评估双能量 CT 检测心肌瘢痕特征与陈旧性心肌梗死 (MI) 患者未来发生心血管事件的关系。方法 连续纳入 2019 年 11 月~2022 年 12 月在我院行冠脉 CTA+双能心肌延迟强化 (LIE-DECT) 的陈旧性心梗患者, 所有入组患者采用 40keV 单能谱+ (Mono+) 进行重建, 在左室短轴位图上评估心肌受累心肌节段数, 受累心肌评分及心肌瘢痕程度。所有入组患者进行终点事件随访, 探讨 DECT 检测心肌瘢痕特征与主要心血管事件 (MACE) 发生的关系, MACE 定义为心衰再住院、恶性心律失常, 心源性死亡。结果 最终纳入陈旧性 MI 患者 240 例, 中位随访时间 24.6 (14.4, 35.2)个月, 发生 MACE 69 例, 占 28.75 %。发生 MACE 患者的受累心肌节段数 [6 (4.5, 8)]、受累心肌评分 [23 (11, 43.5)] 及心肌瘢痕程度 [12% (7%, 13%)] 明显高于未发生心血管事件的患者 [3 (2, 4)]、[4 (3, 8)] 及 [4% (2%, 6%)] , $P<0.01$ 。多元 logistic 回归分析显示, 调整混杂因素, 心肌瘢痕节段数 (OR=1.423, 95% CI 1.319-1.536, $P<0.01$)、受累心肌评分 (OR=1.044, 95% CI 1.035-1.054, $P<0.01$)、心肌瘢痕程度 (OR=1.321, 95% CI 1.209-1.467, $P<0.01$) 是陈旧性 MI 患者发生 MACE 的预测因子。受试者工作特征 (ROC) 曲线显示受累心肌节段数、受累心肌评分及心肌瘢痕程度均可以很好的预测陈旧性心肌梗死患者 MACE 的发生 (AUC=0.886, $P<0.01$)、(AUC=0.876, $P<0.01$) 及 (AUC=0.884, $P<0.01$)。结论 LIE-DECT 40keV Mono+图检测受累心肌节段数、受累心肌评分及心肌瘢痕程度与陈旧性 MI 患者发生 MACE 相关, 可作为评估陈旧性 MI 临床预后的重要指标。

PO-1278

基于深度学习算法下严重冠状动脉钙化血管成像及应用研究

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目的: 严重冠状动脉钙化在 GE Revolution Apex CT 进行冠状动脉 CTA 血管成像, 应用深度学习算法结合图像滤过方式血管重建临床应用的可行性及优势。

方法: 我们将身体质量指数(BMI)正常的实验对象(BMI=18.5—23.9kg/m²)纳入研究标准。排除标准: 碘对比剂过敏严重心律不齐, 急性心衰及严重肝肾功能损害。

扫描方法冠状动脉 CTA: 冠状动脉 CTA 扫描范围: 16cm 探测器包含全部心脏, 扫描方向: 由头侧向足侧, 管电压 100kV, 自动管电流 600-900mA, 噪声指数 11.0, 扫描层厚 0.625mm, 层间距 0.625mm, 球管旋转时间 0.28s, 矩阵 512×512, 使用 160mm×0.625mm 探测器, 宽度 16cm, 1Beat 模式, 检查时间 0.7s, 重建最佳舒张期和收缩期。对所得图像首先使用 SSF 二代软件进行冠状动脉冻结技术, 并导入 GE AW4.7 工作站进行重建, 在重建中将含有深度学习算法的原始图像再次经过边缘强化等级 2 的滤过方式进行图像处理, 最终得到诊断要求的影像图像。辐射剂量计算记录患者检查时的容积 CT 剂量指数(CTDIvol)、剂量长度乘积(DLP), 并计算其有效剂量(ED), ED=DLP×k 系数胸部 0.0140)。

图像质量评价: 冠状动脉 CTA 主动脉根部左主干层面(450±50)HU, 又心无对比剂残留。由 5 名经验丰富的医生进行评估。

结果: 深度学习算法结合图像滤过重建对严重冠状动脉钙化的患者检查远远优越与普通重建算法, 对图像诊断及管腔内狭窄程度评估准确率大幅提升全可满足影像诊断需求和临床诊治标准。

结论: 1、深度学习算法结合图像滤过重建对钙化严重冠状动脉患者有着显著诊断提升。2、GE Revolution Apex CT 冠状动脉 CTA 扫描图像质量优, 准确率高, 对比剂少, 辐射剂量低。

PO-1279

基于实性结节影像组学的肺隐球菌病和浸润性腺癌鉴别

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目的: 探索影像组学结合传统影像分析方法对鉴别表现为实性结节的隐球菌病和浸润性腺癌的价值以提高诊断准确性。

材料和方法: 收集手术或穿刺病理证实的表现为实性结节的 39 例肺隐球菌病及 58 例浸润性腺癌 CT 图像, 分别由有 4 年和 10 年工作经验的放射科医师通过随机双盲法运用传统影像学分析方法对上述病例进行诊断, 并统计其影像学征象如分叶, 毛刺, 晕征及胸膜凹陷等。使用肺结节自动检测分割算法在 CT 图像上获取病变的三维容积感兴趣区 (VOI)。利用 PyRadiomics 工具对所有 VOI 区域进行重采样和原始图像预处理并进行组学特征提取。在 Dr.Wise 科研平台上对已提取的组学特征进行特征清洗、筛选, 建立影像组学模型。最后由 10 年工作经验医师结合组学模型结果重新进行诊断, 比较两者结合前后的诊断准确性。

结果: 4 年和 10 年工作经验医师对隐球菌结节诊断的病理符合率分别为 35.89% 和 46.15%, 浸润性腺癌结节病理符合率分别为 93.10% 和 96.55%。两组间年龄, 结节最大径, 延迟期 CT 值和延迟期强化幅度出现显著性差异 ($p < 0.05$)。隐球菌组较浸润性腺癌组年龄小, 结节最大径小, 延迟期强化不如腺癌明显且幅度低 ($P = 0.001$)。浸润性腺癌较隐球菌结节更易出现胸膜凹陷征 ($P = 0.001$) 和分叶征 ($P = 0.011$), 而毛刺征两者无显著性差异 ($P = 0.156$), 隐球菌结节更多出现晕征 ($P = 0.024$)。每个病灶共提取 100 个影像组学特征, 在 L1 正则化特征筛选后共纳入 17

个组学特征建模, 所建立 LogisticRegression 模型训练集和验证集的 AUC 分别为 0.9057 和 0.8643。模型对两组结节的诊断准确率分别为 69.23%和 82.38%, 10 年诊断经验医师结合组学模型重新阅片后, 隐球菌结节诊断准确率提高到 76.92%, 浸润性腺癌诊断准确性相同 (96.55%)。结论: 影像组学模型结合传统影像学可提高表现为实性结节的肺隐球菌病的诊断准确性, 尤其对诊断困难的肺隐球菌结节提供帮助。

PO-1280

左心耳血流淤滞 CT 征象预测房颤患者 主要不良心血管事件的发生风险

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【摘要】目的 本研究旨在利用 CT 检测左心耳早期血流淤滞征象来预测心房颤动(AF)患者发生主要不良心血管事件 (MACE, 定义为心源性脑卒中、全因死亡及心衰再住院) 的风险。**方法** 本研究选择回顾了 2020 年 1 月 1 日~至 2021 年 12 月 31 日在南通大学第二附属医院做行心脏 CT (CCT) 检查的连续住院患者 1783 名, 筛选出选择左心耳 (LAA) 早期充盈缺损 (FD) 的心房颤动患者 AF 患者 166 名。通过测量左心耳 LAA 充盈缺损容积与左心耳 LAA 容积的比值 (VFD/VLAA)、左心耳 LAA 形态、左心耳 LAA 充盈缺损区域 CT 值与升主动脉 CT 值的比值 (LAAFD/AA), 来预测 MACE 的发生风险, MACE 定义为心源性脑卒中、全因死亡及心衰再住院。**结果** 最终纳入 167 名 LAA 早期充盈缺损的心房颤动患者中位随访时间 27.3 (22.0,32.9) 月, 发生 MACE 34 例, 占 20.5%, 其中有 10 名患者发生心源性脑卒中, 1 名患者发生全因死亡, 23 名患者发生心衰再住院; 。Kaplan-Meier 曲线证明高的 VFD/VLAA (≥ 0.435) 与低的 LAAFD/AA (< 0.260) 的房颤患者 MACE 发生率更高 (log-rank 检验, $P < 0.01$)。COX 比例风险回归模型显示, 调整混杂因素, 高的 VFD/VLAA、低的 LAAFD/AA 是房颤患者发生主要不良心血管事件风险的危险因素。**结论** 房颤患者高的 VFD/VLAA、低的 LAAFD/AA 是发生主要不良心血管事件风险的独立危险因素预测因子, 可作为评估房颤 AF 患者预后评估的重要指标。

PO-1281

非心电图门控自由呼吸大螺距 Flash 扫描在左心耳肺静脉 CT 扫描中的应用

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【摘要】目的: 左心耳封堵术前需评估肺静脉和左心耳, 本研究旨在探讨快速低剂量扫描在此类患者中的应用价值。**方法:** 收集 56 例 A 组肺静脉左心耳 CTA 数据, 大螺距扫描, 检无需呼吸配合和心电图门控; 收集 58 例 B 组数据, 采用心电图门控螺旋扫描, 两组其他条件一致, 对比剂量 A 组为 0.8ml/kg, 注射流率 4~5ml/s, B 组量为 1.2ml/kg, 注射流率 4~5ml/s。在后处理工作站进行 MPR、VR、MIP 等重建, 观察左心耳内有无血栓, 形态, 测量左心耳口径, 肺静脉的形态及其变异情况, 所得结果与图 TEE 对比。**结果** A 组左心耳形态分别为鸡翅型 23 例、仙人掌型 19 例、风向标型 9 例、菜花型 7 例; 18 例血栓形成, 与 TEE 相比诊断符合率为 94.8%, 敏感度 88.3%, 特异度分别为 97.4%; B 组左心耳形态分别为鸡翅型 21 例、仙人掌型 18 例、风向标型 10 例、菜花型 7 例, 9 例血栓形成。与 TEE 相比诊断符合率为 96.3%, 敏感度 90.3%, 特异度分别为 98%, $P < 0.05$, 差异无统计学意义辐射剂量及对比剂 A 组明显低于 B 组。**结论** 由于双源 CT 超快速扫描能极大的减少

运动伪影,可以在自然呼吸和不施加心电门控的情况下获得优质的图像,为此类患者提供了更加高效、安全的术前检查方式,值得在临床运用中进行推广。

PO-1282

3D 打印技术指导复杂冠心病小切口微创冠脉搭桥的应用研究

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目的 分析基于冠状动脉 CTA 数据 3D 打印技术指导复杂冠心病进行小切口微创冠脉搭桥手术的应用价值。方法 回顾性分析 2021 年 8 月-2023 年 4 月空军军医大学西京医院 78 例复杂冠心病患者行小切口微创冠脉搭桥手术的临床资料,其中基于冠脉 CTA 进行 3D 打印重建术前计划的 35 例为 3D 组,以传统方法术前计划的 43 例为常规组。记录两组患者手术情况,评估术后监护相关指标及预后情况,并统计术后不良事件。结果 两组患者年龄、性别、体重指数及合并基础病无明显统计学差异 ($P>0.05$)。两组患者手术成功率均为 100%,3D 组均成功行小切口微创冠脉搭桥术,常规组 4 例患者中转正中开胸冠脉搭桥手术;3D 组术中出血量、手术时间及输血量较常规组减少 ($P<0.02$),3D 组术后引流量、输血、呼吸机辅助时间、监护室时间也较常规组减少 ($P<0.05$);对于两组中成功开展小切口微创冠脉搭桥的患者,6 个月随访不良事件发生率差异无统计学意义 ($P>0.05$)。结论 采用基于冠脉 CTA 资料进行 3D 打印重建进行术前指导,可使复杂冠心病小切口冠脉搭桥手术更具象化,可能减少术中出血和术后输血,缩短手术时间、呼吸机时间和监护室停留时间,可能是更理想的术前评估方式。

PO-1283

Erdheim-Chester 病 (Erdheim-Chester disease, ECD) 影像诊断与鉴别

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【病例资料】

患者男,54 岁,外伤后右侧颞部疼痛 6 天,车祸致左侧肢体擦伤病史 10 多天,6 天前患者无明显诱因感右侧颞部持续性钝痛,无头晕,无恶心呕吐,四肢活动可,在家未行任何处置,无头晕,无恶心、呕吐,四肢活动可,急来我院急诊科就诊,行头部 CT 提示硬膜下血肿,发病以来,意识清楚,无四肢抽搐及口吐白沫,无心慌、胸闷、气短,饮食、夜休可,大小便正常。既往高血压病史 10 年,最高血压 180/100mmHg,口服酒石酸美托洛尔、硝苯地平治疗,血压控制可;升主动脉瘤病史 1 月;脑梗死病史 5 年,遗留左侧面瘫、左侧肢体无力;无肝炎、结核、疟疾病史,无心脏病史,无糖尿病、精神疾病史,无手术、输血史,无食物、药物过敏史,系统回顾无其他系统疾病,预防接种史不详;父母均去世,死因不详,3 兄 2 姐体健,2 女体健。否认家族性遗传病史。体格检查:T:36.3℃,P:70 次/分,R:17 次/分,Bp:140/80mmHg。右侧膝关节 X 线检查示:右侧股骨下段及胫骨上段髓腔密度增高(图 1A、1B)。CTA 示:主动脉全程扩张,周围见鞘样软组织包绕,呈“穿大衣的主动脉”,腹腔干动脉、双肾动脉及肠系膜上下动脉起于包鞘,远端管腔充盈不良,双肾皮质强化弱,呈“毛发征”(图 1E),肾周脂肪间隙模糊,腹膜后见不规则软组织影,双肺小叶间隔均匀增厚(图 1C);MRI 提示右侧硬膜下血肿,双侧视神经明显梭形增粗,双侧眼球突出,神经垂体未见明确显示,追问病史询及患者既往患尿崩症[1],查体见患者颈部皮肤隆起,呈淡黄色,直径约 0.5cm。经宝鸡市中心医院专家及安贞医院教授会诊,结合影像学、临床、病理及实验室结果,诊断为 Erdheim-Chester 病 (Erdheim-Chester disease, ECD)。

PO-1284

光谱 CT 参数变化预测食管癌新辅助化疗 联合免疫治疗的病理完全缓解

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目的：探索光谱 CT 定量参数变化预测食管癌新辅助化疗联合免疫治疗（NCPI）后病理完全缓解（pCR）的价值。

方法：前瞻性收集分析 2023 年 1 月至 8 月 NCPI 前后均行光谱 CT 增强扫描（IQon Spectral CT）的食管鳞癌患者 32 例，根据新辅助治疗后食管癌根治术病理结果分为病理完全缓解（pCR）组与非病理完全缓解（N-pCR）组。在 Philips 后处理工作站三期薄层图像上勾画病灶 ROI，生成平扫、动、静脉期有效原子序数（ZeffF /ZeffA /ZeffV）；动、静脉期碘密度（IDA/IDV）；动、静脉期电子云密度（EDA/EDV），计算标准化碘密度（NID = ID 病灶/IDA 主动脉）、动脉增强分数（AEF = NIDA/NIDV×100%）。再于单能量图像上勾画病灶 ROI，获得病灶动、静脉期光谱曲线斜率（ λA 、 λV ）。计算以上 NCPI 前后各参数变化量 Δ （参数前-参数后），采用受试者工作特征（ROC）曲线评价各参数变化评估 NCPI 疗效的效能。

结果：NCPI 后 pCR 者 13 例，N-pCR 者 19 例，组间 Δ NIDV、 Δ ZeffF、 Δ ZeffA、 Δ ZeffV、 Δ EDA、 Δ λV 差异均有统计学意义（P 值均<0.05）。ROC 曲线显示：上述参数曲线下面积（AUC）分别为：0.84, 0.73, 0.73, 0.76, 0.75, 0.84；将以上 6 个参数建立联合模型，ROC 曲线下面积为 0.95，最大约登指数为 0.79，此时阈值为 0.46,其敏感度为 84.6%,特异度为 94.7%。

结论：利用光谱 CT，通过定量分析病灶光谱 CT 静脉期标准化碘密度，平扫、动、静脉期有效原子序数，动脉期电子云密度及静脉期光谱曲线斜率，可预测食管癌 NCPI 后病理完全缓解，联合参数模型预测效能较高。

PO-1285

磁共振扩散峰度成像在鉴别非小细胞肺癌术前 纵隔淋巴结转移的应用研究

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目的 探讨磁共振扩散峰度成像（DKI）在鉴别非小细胞肺癌（NSCLC）术前纵隔淋巴结转移的诊断价值。资料与方法 回顾性搜集 CT 检查发现肺部占位患者，进一步行 DKI 序列扫描，根据病理结果将 NSCLC 患者纵隔淋巴结分为转移组和非转移组。采用两独立样本 t 检验（正态分布）或 Mann-Whitney U 检验（非正态分布）比较转移及非转移组淋巴结 DKI（D、K 值）和 ADC 值全域直方图参数的差异；采用受试者工作特征(ROC)曲线评估直方图参数的诊断效能并确定最佳阈值，采用 DeLong 法比较各直方图参数 AUC；采用 Spearman 秩相关分析全域直方图参数与转移淋巴结的相关性。结果 本研究纳入 80 例 NSCLC 患者，术中共清扫纵隔淋巴结 274 枚，病理诊断为非转移性 240 枚，转移性 34 枚；MRI 检查因显示不清或图像质量不佳排除 42 枚，最后共检出 232 枚，其中转移 34 枚，非转移 198 枚。转移性淋巴结的 D 值及 ADC 值（mean、10th percentile、90th percentile、IQR、max、min、range、energy、entropy）、D 值（median、variance）、K 值（max、min、Kurtosis、Skewness）显著低于非转移淋巴结，而 D 值（uniformity、skewness）、K 值（mean、90th percentile、IQR、median）、ADC 值（Kurtosis、uniformity、variance）显著高于非转移组。D 值和 ADC 值中大部分直方图参数与转移性淋巴结呈负相关，而 K 值中大部分直方图参数则呈正相关。对比分析各联合全域直方图多参数 AUC 发现 D 值的 AUC 高于 K 值及 ADC

值, 并且联合全域直方图多参数 AUC 显著高于 D、K 值及 ADC 值诊断效能最高的单一直方图参数的 AUC ($P<0.05$)。结论 DKI 全域直方图参数可有效鉴别 NSCLC 术前纵隔淋巴结转移, 其诊断效能高于传统 DWI 序列; 全域直方图分析法突破了传统分析法的局限性, 对淋巴结的异质性评估以及患者个体化治疗提供了更多影像依据, 有助于临床决策。

PO-1286

基于胸部 CT 测量部分胸部呼吸肌体积变化的方法 评估重症监护病房获得性肌无力

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目的: 危重症获得性肌无力 (intensive critical unit-acquired weakness, ICU-AW) 是重症监护病房的常见并发症, 可继发于导致危重症的各种疾病。本研究通过建立胸部 CT 测量部分肋间呼吸肌体积变化评估 ICU 获得性肌无力及其预后。

方法: 回顾性收集了 462 名东南大学附属中大医院重症监护室患者的临床资料及住 ICU 期间两次胸部 CT 图像。使用 ITK-SNAP 软件测量患者在 ICU 期间两次肋间呼吸肌体积的变化并计算变化的百分比。为了验证该方法的可重复性, 两位研究者分别对 10 名体检者的 CT 图像进行呼吸肌体积的勾画, 其中一名研究者间隔一周后进行重新勾画。测量的方法为设定呼吸肌厚度为 1cm, 在冠状面上选取测量的范围为双侧第 3-8 肋间肌及前锯肌。肋间呼吸肌体积减少大于 10% 的患者定义为 ICU 获得性肌无力组 (ICU-AW 组), 小于 10% 的患者定义为非 ICU 获得性肌无力组 (非 ICU-AW 组)。评估两组患者的一般资料及临床结局 (28 天死亡率、ICU 死亡率、住院死亡率)。使用单变量和多变量逻辑回归分析进行变量筛选, 分析 ICU 获得性肌无力的危险因素。

结果: 观察者间相关系数 ($ICC=0.895$ 95%CI:0.652-0.973 ; $P<0.001$) 和观察者内相关系数 ($ICC=0.933$ 95%CI:0.761-0.983; $P<0.001$) 均表明了该方法测量呼吸肌体积可重复性很好。根据呼吸肌体积变化定义的 ICU-AW 组 与非 ICU-AW 组 28 天死亡率、ICU 死亡率、住院死亡率有差异 (9.4% vs 20.2%, $p=0.002$; 10.6% vs 25.2%, $p<0.001$; 12.2% vs 28.4%, $p<0.001$)。多变量逻辑回归分析显示 CT 定量呼吸肌体积变化是 ICU 获得性肌无力的独立危险因素。

结论: 本研究基于胸部 CT 测量肋间呼吸肌的方法具有一定可行性, 可以将胸部肌肉快速流失的患者识别出来。胸部 CT 定量肋间呼吸肌体积变化是评估 ICU-AW 的一种有效的新方法, 能有效识别 28 天死亡率、ICU 死亡率、住院死亡率更高的患者, 帮助临床做出最佳的治疗决策。

PO-1287

基于左心室不同区域心肌 CMR 影像组学模型预测肥厚型 心肌病并发室性心律失常

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目的 探讨基于心脏磁共振 (CMR) 不同区域心肌的影像组学特征预测肥厚型心肌病 (HCM) 者并发室性心律失常 (VAs) 中的价值。方法 收集 2018 年 1 月 1 日至 2023 年 5 月 31 日的 122 例确诊 HCM 者的 CMR 图像。根据 24 小时动态心电图结果将其分为合并 VAs 组 (40 例) 与未合并 VAs 组 (82 例)。按照 7:3 的比例随机分为训练集及测试集。选择从二尖瓣水平至心尖部的左心室短轴末增强平衡式稳态自由进动序列, 以舒张末期壁厚 (EDWT) 为基础, 将 HCM 者心肌分为肥厚区域

(无 HCM 家族史, EDWT \geq 15 mm; 有 HCM 家族史, EDWT \geq 13 mm) 与非肥厚区域 (无 HCM 家族史, EDWT $<$ 15 mm; 有 HCM 家族史, EDWT $<$ 13 mm)。在左心室短轴位各层面心肌的心室舒张末期对全室壁心肌、肥厚区域心肌及非肥厚区域心肌 3 个感兴趣区进行勾画及影像组学特征提取、采用 Mann-Whitney U 检验、递归特征消除法及最小绝对收缩与选择算法进行影像组学特征筛选、选出最优特征子集, 通过一般逻辑回归分别构建左心室全室壁心肌影像组学模型、左心室肥厚区域心肌影像组学模型及左心室非肥厚区域心肌影像组学模型。采用准确度、敏感度、特异度、阳性预测值、阴性预测值和受试者工作特征曲线下面积 (AUC) 及 DeLong 检验评估和比较模型间的预测效能; 通过决策曲线分析观察各模型的临床实用性。结果 各模型在训练集及测试集的 AUC 值均高于 0.80; 在训练集及测试集中, 左心室非肥厚区域心肌影像组学模型的 AUC 值 (训练集: 0.89; 测试集: 0.79) 小于左心室肥厚区域心肌影像组学模型 (训练集: 0.96; 测试集: 0.95) 及左心室全室壁心肌影像组学模型 (训练集: 0.98; 测试集: 0.93) ($P<0.05$), 左心室肥厚区域心肌影像组学模型与左心室全室壁心肌影像组学模型的 AUC 值无明显统计学差异 ($P>0.05$)。结论 基于左心室肥厚区域心肌的影像组学模型和基于左心室全室壁心肌的影像组学模型在预测 HCM 者并发 VAs 风险方面效能更高, 可为 HCM 者危险分层及预后评估方面提供有用信息。

PO-1288

基于 ct 衍生的整体纵向应变可作为稳定型心绞痛患者 心血管事件的一种新的预测因子

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背景: 基于 CT 特征跟踪 (CT-FT) 的 CT 衍生应变评估已经成为一种新的技术, 使冠状动脉 CT 血管造影 (CCTA) 能够提供有关心功能的额外信息。而其与冠状动脉疾病 (CAD) 的应变之间关系却很少被报道。

目的: 探讨稳定型心绞痛患者 CT 来源的左心室应变及其与主要不良心脏事件 (MACE) 发生率的关系。

方法: 本队列共纳入 303 例因稳定型心绞痛而行 CCTA 治疗的患者, 中位随访时间为 428 天。对所有患者的 CT 衍生性左心室应变进行定量分析。得到了以下应变参数: 整体纵向应变 (GLS)、整体径向应变 (GRS)、整体周向应变 (GCS) 和射血分数 (EF)。同时也获得了冠状动脉狭窄和危险因素。此外, MACE 的发生率被定义为心肌梗死、因不稳定型心绞痛住院、非计划性的冠状动脉血管重建术和全因死亡。

结果: 33 例 (10.9%) 患者在随访期间发生了 MACE 检查。多因素分析发现, MACE 组和无 MACE 组的 GLS 存在差异 (-17.49 ± 2.37 vs. -19.22 ± 2.79 , $p < 0.001$)。严重冠状动脉狭窄、糖尿病和 GLS 较高的患者 MACE 发生率显著升高 (均 $p < 0.05$)。冠状动脉狭窄 (危险比[HR] = 8.48, $p = 0.01$)、糖尿病 (HR = 3.07, $p = 0.02$) 和 GLS (HR = 4.91, $p = 0.02$) 是 MACE 的独立预测因子。由 GLS、冠状动脉狭窄和危险因素组成的联合模型比单独的危险因素具有更高的预测效果 (AUC: 0.86 vs. 0.75, $p = 0.01$)。

结论: 在稳定型心绞痛患者中, MACE 患者的 GLS 水平高于非 MACE 患者。此外, GLS 水平较高的患者发生 MACE 的风险也有所增加。

PO-1289

恶性血液病肺真菌感染的 CT 诊断与高通量测序的对照分析

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目的：探讨多层螺旋 CT 及宏基因组二代测序(mNGS)技术应用于恶性血液病(HM)肺真菌感染的诊断价值；分析 CT 影像学征象、两种检查方式特点及两者联合以期提高 HM 肺真菌感染的早期诊断准确率。

方法：收集 70 例序贯化疗期间成人 HM 疑似肺真菌感染的患者资料，行肺 CT 扫描及血液样本 mNGS 测序，以中后期痰培养结果为临床诊断金标准。采用诊断试验分析 CT 和 mNGS 与痰培养的关系，绘制受试者工作特征(ROC)曲线计算两项指标灵敏度、特异度及曲线下面积(AUC)值；当使用 CT 和 mNGS 两指标联合诊断时，通过 Logistic 回归分析模型建立新变量 CT+mNGS，绘制新变量 ROC 曲线得出 AUC 值，将 AUC 值与 CT 及 mNGS 的结果比较；并简要分析 HM 真菌性肺炎的影像学特征。

结果：在回顾性纳入的 70 例 HM 患者中，男、女占比为 1: 0.56，中位年龄 42.5 岁。HM 真菌肺炎患者的影像特征见：多叶段受累居多，表现为结节影 14 例、晕征或空洞 11 例、磨玻璃影 9 例、实变影 6 例、空气新月征 5 例、肿块影 3 例；另出现肺斑索、淋巴结增大等 12 例。CT 印象诊断为 HM 真菌性肺炎 19 例，mNGS 检测得出 HM 真菌性肺炎 17 例。ROC 曲线结果表明，CT 与 mNGS 在 HM 真菌性肺炎诊断中的灵敏度分别为 50%和 40%，特异度分别为 76.67%和 78.33%，AUC 值分别为 0.633 和 0.592；当 CT 与 mNGS 联合诊断时，得到新变量灵敏度为 80%，特异度为 65%，AUC 值为 0.706；将新变量 AUC 值分别与 CT 和 mNGS 的 AUC 值比较得出，两者 P 值分别为 0.2154 和 0.2414，均>0.05，表明新变量与 CT 和 mNGS 间诊断价值的差异不具有统计学意义。

结论：肺部 CT 在 HM 肺真菌感染早期快速诊断中具有良好的临床实用价值；并在随诊复查、监测病情变化方面具有明显优势，为患者早期抗感染治疗争取了时间，具有时效性。mNGS 对 HM 肺部真菌感染病原体检出具有较高的特异性，帮助临床判断感染类型。CT 联合 mNGS 检测在 HM 患者早期真菌肺炎判断中，具有较高灵敏度，相对单一检查手段提高了诊断效能，并为 HM 真菌性肺炎的早诊早治与合理用药提供理论依据。

PO-1290

心脏磁共振自由呼吸运动校正人工智能电影序列在
心力衰竭患者中的临床应用

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目的

通过评估自由呼吸运动校正人工智能 (free-breathing with motion correction artificial intelligence, FB-MOCO AI) 电影序列的图像质量、双心室体积和功能参数，探讨其在心力衰竭患者心脏磁共振检查中应用的可行性。

材料与方法

前瞻性连续纳入 2022 年 8 月至 2023 年 5 月期间来我院进行心脏磁共振检查的心力衰竭患者 29 例。所有患者均行常规屏气电影和 FB-MOCO AI 电影序列的心脏短轴面扫描。对两种电影序列采集的图像进行整体图像质量评分 (5 分法)，并测量双心室容积和功能参数以及左心室舒张末期质量 (left ventricular end-diastolic mass, LVEDM) 进行定量分析。

结果

FB-MOCO AI 电影序列的总扫描时间 ($14.3s \pm 1.9s$) 比常规屏气电影 ($79.2s \pm 11.4s$) 明显缩短 ($P < 0.001$)。FB-MOCO AI 电影 (4.4 ± 0.5) 的总体图像质量评分与常规屏气电影 (4.3 ± 0.7) 相当, 差异无统计学意义 ($P = 0.343$)。两种电影序列间所有测量的双心室容积和功能参数以及 LVEDM 差异均无统计学意义 (P 值均 > 0.05)，并且有强相关性和一致性。

结论

与常规屏气电影序列相比, 心衰患者中 FB-MOCO AI 电影序列扫描时间明显缩短并且提供了相当的图像质量、心室容积和功能指标, 有潜力替代心衰患者的常规电影序列应用于临床。

PO-1291

胸部骨骼肌指数对非小细胞肺癌免疫治疗患者预后的评估价值

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目的: 肌少症是指肌肉质量减少、肌力减弱和肌肉功能减退, 被证实是恶性肿瘤患者预后的一个重要预测因素。存在肌少症营养不良的肺癌患者, 往往生存时间较短。基于 CT 图像的骨骼肌指数 (Skeletal muscle index, SMI) 检测简便, 能客观反映肌肉减少情况, 但既往 SMI 需要评估腰 3 椎体层面肌肉, 而大多数非小细胞肺癌的免疫治疗复查, 不太可能单独进行腹部 CT 扫描。因此, 本研究旨在使用胸部 CT 计算骨骼肌指数, 探讨胸部 SMI 对非小细胞肺癌免疫治疗生存时间的影响。

方法: 回顾性分析 242 例非小细胞肺癌患者的免疫治疗相关临床及 CT 影像资料。在患者治疗前的胸部 CT 图像上, 选择胸 5 椎体为中心层面, 通过半自动化分割 CT 值在 -29~150HU 范围内的肌肉组织获得 SMI。SMI 通过计算骨骼肌面积与身高平方的比值 (cm^2/m^2), 并根据年龄进行校正。SMI 低于性别特异性下四分位数时归为肌少症组, 采用 Kaplan-Meier 法绘制生存曲线, 并采用对数秩检验分析其差异。

结果: 肌少症男性 SMI 为小于 $39.92cm^2/m^2$, 女性 SMI 为小于 $30.98cm^2/m^2$ 。肌少症患者与非肌少症患者的年龄没有显著统计学差异。肌少症患者中男性和女性的总生存时间均明显低于非肌少症患者。Kaplan-Meier 分析结果表明 T5 水平获得的 SMI 与非小细胞肺癌较差的无进展生存时间相关。

结论: 胸部骨骼肌测量也可用于肌少症的评估, 胸部 CT 以 T5 水平为中心获取的 SMI 是预测非小细胞肺癌免疫治疗预后的独立预测因素。

PO-1292

基于机器学习预测非小细胞肺癌新辅助化疗后的病理反应

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目的: 新辅助化疗在非小细胞肺癌 (NSCLC) 患者中的疗效存在差异, 然而目前尚缺乏有效的无创预测标志物。本研究旨在利用 CT 影像组学建立并验证模型, 以预测 NSCLC 在新辅助化疗后的病理反应。

方法: 回顾性收集本院 2013 年 4 月至 2021 年 10 月接受新辅助化疗并手术的 130 例 IB~III 期 NSCLC 患者, 将其按 7:3 随机分为训练集和独立测试集。从新辅助化疗前最近一次的 CT 影像中提取瘤体及瘤周区域的影像组学特征, 然后用 Pearson 相关性分析及递归特征消除法 (recursive feature elimination, RFE) 选择特征后用机器学习算法 Auto-encoder (AE) 建立模型并利用 ROC 曲线验证模型的区分度, 并用校准曲线及临床决策曲线评估模型的校准度及临床效能。最后, 根据模型对患者的预测概率进行风险分层, 并分析不同风险组患者的生存情况及术后辅助化疗在不同风险组中的作用。

结果: 本研究选择 9 个影像组学特征用于建立模型, 以预测 NSCLC 患者在新辅助化疗后是否达到病理完全缓解。该模型在训练集的 AUC 为 0.874 (95% CI: 0.780 - 0.968), 在测试集中的 AUC 为 0.876 (95% CI: 0.757 - 0.996)。校准曲线及临床决策曲线显示该模型具有良好的校准度 (Hosmer-Lemeshow 检验, $p = 0.763$) 及潜在的临床应用前景。在生存分析中, 高低风险组的 OS($p = 0.011$)及 DFS($p = 0.017$)差异显著。在低风险组中, 术后辅助化疗能显著改善患者生存($p = 0.041$), 但在高风险组中, 术后辅助化疗对患者生存无显著影响($p = 0.56$)。

结论: 本研究首次利用瘤内及瘤周影像组学特征, 成功预测了 NSCLC 新辅助化疗后是否能够达到病理完全缓解, 并预测患者生存期。

PO-1293

冠脉狭窄部位冠周脂肪 CT 图像三维组学特征与心肌缺血的相关性及其预测心肌缺血的诊断价值

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目的: 探索特定区域冠脉周围脂肪组织三维组学特征预测心肌缺血的价值, 建立基于 CT 图像放射组学的鉴别心肌缺血的预测模型。

方法: 回顾性分析 2018 年 1 月至 2022 年 10 月在多家医院行冠脉造影同时行 FFR 测量的 262 例患者 (306 支病变血管), 所有患者均在冠脉造影前 2 周内行冠脉增强 CT 检查。应用 ITK-SNAP 软件勾画冠脉狭窄段周围等冠脉直径的区域, 勾画完成后融合成三维 ROI, 提取其中 CT 值介于 -190 至 -30 的数据为目标冠脉周围脂肪数据, 构建基于 CT 图像的心外膜脂肪影像组学预测心肌缺血的模型, 并验证其效能。所有患者同时测量狭窄处斑块数据, 包括斑块特征 (N=10) 和心外膜脂肪组织特征 (N=3)。具体包括: EAT 总体积、EAT 平均密度、PVAT-CT 平均密度、斑块总体积、斑块钙化体积 (CT 指数大于 130)、斑块钙化比例、斑块脂质体积 (CT 指数介于 -30 到 30 之间)、斑块脂质比例、斑块纤维体积 (CT 指数介于 -31 到 130 之间)、斑块纤维比例、狭窄程度、重构指数、偏心指数。13 个常规特征构建常规特征模型, 同时把这些常规特征纳入到组学特征中构建联合模型, 分别评估不同模型的预测价值。

结果: 共有 124/306 条血管出现功能性缺血 (FFR ≤ 0.80)。在训练组 (ROC) 曲线下面积 (AUC): 0.770 vs 0.732, $P < 0.05$) 和测试组 (AUC: 0.740 vs 0.696, $P < 0.05$) 两方面, 放射组学模型在区分缺血和非缺血方面均优于传统模型。在训练组 (AUC: 0.810 vs 0.732, $P < 0.05$) 和测试组 (AUC: 0.809 vs 0.696, $P < 0.05$) 中, 联合模型在区分缺血和非缺血方面的表现明显优于传统模型。三个模型均显示出良好的校准度, Hosmer-Lemeshow 试验的所有 P 值均大于 0.05。当应用于临床决策时, 联合模型比传统模型和 PCAT 放射组学模型对患者显示出更多的净效益。

结论: 冠脉周围脂肪放射组学模型可以预测心肌缺血。在病变定量常规特征中联合冠脉周围脂肪放射组学可提高功能相关冠状动脉疾病的预测能力, 提示冠脉周围脂肪的影像指标与心肌缺血明显相关。

PO-1294

基于心脏磁共振影像组学对肥厚型心肌病的价值研究

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目的 初步探索基于心脏磁共振 (CMR) 影像组学揭示肥厚型心肌病 (HCM) 者心肌与健康人群心肌影像组学特征差异的临床应用价值。**方法** 回顾性收集 2018 年 1 月 1 日至 2022 年 12 月 31 日 122 例确诊 HCM 者及 72 例健康者的 CMR 影像资料。以舒张末期壁厚 (EDWT) 为基础, 将 HCM 者心肌分为肥厚区域 (无 HCM 家族史, $EDWT \geq 15$ mm; 有 HCM 家族史, $EDWT \geq 13$ mm) 与非肥厚区域 (无 HCM 家族史, $EDWT < 15$ mm; 有 HCM 家族史, $EDWT < 13$ mm)。在 CMR 未增强平衡式稳态自由进动序列左心室长轴位两腔心、四腔心二尖瓣口水平切面对 HCM 者左心室壁心肌和健康人群相同解剖部位室壁心肌进行相同大小感兴趣区勾画及影像组学特征提取, 对相同解剖部位的健康人心肌、HCM 者的肥厚区域心肌及非肥厚区域心肌行影像组学特征组间比较。采用 Mann-Whitney U 检验、递归特征消除法及最小绝对收缩与选择算法筛选出最优特征子集并通过 SVM 分类器建立影像组学模型; 计算准确度、敏感度、特异度、阳性预测值 (PPV)、阴性预测值 (NPV) 及受试者操作特征曲线下面积 (AUC) 分别评价各模型效能。结果 HCM 者肥厚区域心肌、非肥厚区域心肌与健康人群左心室相同解剖部位心肌的影像组学特征对比模型鉴别效果良好; 各模型训练集的 AUC 值、准确度、敏感度、特异度、PPV 及 NPV 均不低于 0.90、0.79、0.80、0.76、0.78、0.79; 测试集的 AUC 值、准确度、敏感度、特异度、PPV 及 NPV 均不低于 0.90、0.81、0.73、0.69、0.75、0.67。结论 影像组学模型不仅在 HCM 者肥厚区域心肌、非肥厚区域心肌与健康人群心肌的识别中具有良好效能, 且能很好区分 HCM 者肥厚区域心肌与非肥厚区域心肌。这说明影像组学方法可用于揭示 HCM 者不同病变状态心肌组织的微观差异, 为心肌组织学改变的影像评估提供了潜在且敏感的新技术, 有助于心肌疾病的精准诊断、评估和治疗。

PO-1295

探讨深度学习图像重建算法在肝脏低剂量 CT 扫描中的应用价值

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目的 比较基于深度学习图像重建算法 (DLIR)、自适应统计迭代算法 (ASIR-V) 重建的肝脏低剂量 CT 图像质量, 探讨 DLIR 算法在肝脏低剂量 CT 扫描中的应用价值。**方法** 纳入 96 例行上腹部 CT 普通扫描的患者, 随机分配至常规剂量组和低剂量组, 各 48 例。常规剂量组噪声指数为 8, 采用自适应统计迭代算法 (ASIR-V, 30%) 进行图像重建, 记为 ND-ASIR-V; 低剂量组噪声指数为 15, 采用 ASIR-V30%、DLIR-M、DLIR-H 进行图像重建, 分别记为 LD-ASIR-V、LD-DLIR-M、LD-DLIR-H。测量肝脏 CT 值、噪声值 (SD), 计算信噪比 (SNR)、对比噪声比 (CNR)。采用单因素方差分析比较各组图像的客观评价指标, 采用 Bonferroni 法进行两两比较。结果 各组图像肝脏 CT 值差异无统计学意义。SD 值、SNR、CNR 差异有统计学意义。LD-DLIR-M 和 LD-DLIR-H 两组图像噪声均低于 ND-ASIR-V30% 组、LD-ASIR-V30% 组 ($p < 0.05$), LD-DLIR-M 和 LD-DLIR-H 两组图像 SNR、CNR 均高于 ND-ASIR-V30% 组、LD-ASIR-V30% 组 ($p < 0.05$)。DLIR 图像的主观评分高于 ASIR-V30% 图像, 其中 DLIR-H 降噪效果最好, 图像质量最好。相对于 ND 组, LD 组的辐射剂量减少了 33.42%。结论 DLIR 能够在降低辐射剂量的同时保持良好的图像质量, 在肝脏低剂量 CT 检查中具有有良好的临床应用价值。

PO-1296

18F-FDG PET/MRI 多参数预测非小细胞肺癌淋巴结转移

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目的: 评估多参数 18F-FDG PET/MRI 在预测非小细胞肺癌 (NSCLC) 淋巴结转移中的价值。

方法: 70 名非小细胞肺癌患者被纳入本研究, 其中男 34 例、女 36 例, 以术后病理结果是否有淋巴结转移为标准分为两组: 转移组 30 例, 非转移组 40 例, 其中包括鳞癌 32 例, 腺癌 38 例。所有患者均在治疗前接受一体化 18F-FDG PET/MRI (uPMR 790; UIH, 中国上海) 检查, 采用 12 通道相控阵体线圈。PET 代谢参数包括最大标准摄取值 (SUVmax)、肿瘤代谢体积 (MTV) 和糖酵解总量 (TLG)。通过多 b 值 DWI 单指数、双指数、拉伸指数模型获取表面扩散系数 (ADC), 真实水分子的扩散系数 (Dt), 假性扩散系数 (Dp) 及灌注相关体积分数 (f), 扩散分布系数 (DDC) 和扩散异质性指数 (α)。采用 t 检验或 Mann-Whitney U 检验评价 LNM 组和非 LNM 组之间各参数的差异。Spearman 相关性分析评价各参数之间的相关性。用 ROC 曲线评价各参数的诊断性能, 用 Delong 检验比较各参数的 ROC 曲线下面积(AUC)是否有统计学差异。采用组内相关系数(ICC)评价观察者之间的一致性。

结果 淋巴结转移组的 α 、SUVmax、MTV 和 TLG 高于非淋巴结转移组, ADC、Dt 和 DDC 低于非淋巴结转移组 (P 均 <0.05)。两组之间的 f 和 Dp 差异不显著 (P 均 >0.05)。a 与 TLG、MTV 和 SUVmax 均呈轻度正相关, DDC 与 SUVmax 呈轻度负相关, 余扩散相关参数与代谢相关参数均无明显相关性。在预测非小细胞肺癌淋巴结转移方面, PET 代谢参数和 DWI 扩散参数的联合显示出最高的 AUC (0.838), 其次是 TLG (0.790)、MTV (0.778)、 α (0.775)、Dt (0.723)、DDC (0.715)、SUVmax (0.69) 和 ADC (0.689)。

结论: PET 代谢参数和 DWI 扩散参数可作为术前预测 NSCLC 淋巴结转移的可靠影像学指标。此外, 扩散参数和代谢参数的联合应用可以提高对 NSCLC 淋巴结转移的诊断效能。

PO-1297

肺动脉发育不良患者体一肺侧支分布规律及形态学特征分析

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目的 总结肺动脉发育不良患者体一肺侧支 (Aorta-pulmonary collateral arteries, APCAs) 的分布规律及形态学特征。

方法 回顾性分析 2012 年 3 月至 2022 年 12 月 98 例我院手术确诊且合并 APCA 形成患者的计算机断层血管造影图像原始资料并结合重建图像, 记录并总结 APCAs 数量、分布规律及形态学特征。

结果 1. 全组 98 例患者中共发现 APCAs 234 支, 平均 2.39 支/例。本组病例 APCAs 起源以胸主动脉中段为主 (85 支, 36.32%), 其次为胸主动脉上段 (64 支, 27.35%)、下段 (32 支, 13.68%)、主动脉弓上血管 (24 支, 10.26%)、主动脉弓 (20 支, 8.55%)、腹主动脉 (6 支, 2.56%) 及升主动脉 (3 支, 1.28%)。

本组病例中, I 型支气管动脉分支来源的 APCAs 共发现 7 支 (占 2.99%); II 型主动脉直接分支共发现 192 支 (约占 82.05%); III 型主动脉间接分支的 APCAs 共发现 35 支 (占 14.96%)。本组病例共发现开口狭窄的 APCAs 14 支 (占 5.98%), 大部分 APCAs 走行迂曲且具有分支, 发现的支数分别为 220 支 (占 94.02%) 和 183 支 (占 78.21%)。

2. 本组病例发现 APCAs 开口起自近心面 (113 支, 占 48.29%) 和起自侧面 (121 支, 占 51.71%)。
3. APCAs 与肺动脉连接方式分为中心融合为主 (411 分支, 占 61.07%)、远端融合 (196 支, 占 29.12%) 和单独分布 (66 支, 占 9.81%)。

结论 在肺动脉发育不良的患者中, APCAs 起源部位以胸主动脉中段为主, 其次依次为胸上段、下段和主动脉弓上血管和主动脉弓, 腹主动脉、升主动脉最少。体肺侧支类型以直接体肺分支占绝大多数, 间接体肺分支较少, 支气管动脉来源分支最少。体肺侧支大部分起始部开口无明显狭窄, 狭窄者比例较小, 但应引起注意。进入肺组织前大部分 APCAs 走行迂曲, 且具有分支。绝大部分体肺侧支起源于血管近心面, 其次为侧面, 未见起源于背心面侧支。体肺侧支与肺动脉融合方式以中心性融合为主, 其次为周围性, 单独供应者较少, 弥漫融合者罕见。

PO-1298

ST 段抬高型心肌梗死患者 MR 心外膜脂肪体积与微循环障碍的关系

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目的: 本研究旨在评估 ST 段抬高型心肌梗死患者心外膜脂肪组织与心脏磁共振检测的微循环障碍体积之间的相关性。

方法: 共有 129 名成功接受经皮冠状动脉介入治疗的 ST 段抬高型心肌梗死患者入选。由一名训练有素的医生记录每位患者的临床特征, 包括基线资料、心血管危险因素、实验室检查数据和血管造影参数。所有患者在介入治疗后 1 周内接受心脏磁共振检查, 以评估梗死面积、微循环障碍体积和心外膜脂肪的分布。所有心脏磁共振数据均传输至 Q-MASS MR 8.1 成像系统, 并由两名影像学专家分别进行分析, 他们并不知晓患者的血管造影和其他临床数据。

结果: 与没有微循环障碍的 ST 段抬高型心肌梗死患者相比, 存在微循环障碍的 ST 段抬高型心肌梗死患者的肌钙蛋白 T 峰值水平更高、中性粒细胞淋巴细胞比率和 C 反应蛋白更高、梗死面积更大, 左室射血分数更低。总心外膜脂肪容积、心外膜脂肪质量指数、左房室心外膜脂肪容积, 左房室心外膜脂肪质量指数和左房室沟心外膜脂肪厚度与微循环障碍的发生显著相关。伴有微循环障碍的 ST 段抬高型心肌梗死患者的左房室心外膜脂肪质量指数显著大于无微循环障碍的心梗患者 ($24.72 \pm 5.049 \text{ g/m}^2$ vs $18.63 \pm 3.670 \text{ g/m}^2$, $P < 0.001$)。多变量 logistic 回归分析表明, 中性粒细胞淋巴细胞比率、肌钙蛋白 T 峰值水平和左房室心外膜脂肪质量指数是微循环障碍形成的独立预测因子。左房室心外膜脂肪质量指数可用于预测微循环障碍的发生 (曲线下面积 0.83 [95% CI: 0.760 to 0.895]; $P < 0.001$)。

结论与讨论: 左房室心外膜脂肪质量指数是微循环障碍的独立预测因子。使用心脏磁共振测量心外膜脂肪的各项参数可用于心梗危险分层, 并可能成为开发新疗法以减少 ST 段抬高型心肌梗死患者心肌再灌注损伤的一个潜在靶点。在心梗患者中快速确定高心外膜脂肪质量指数的人群, 在这些患者中, 可以开展一些针对心外膜脂肪的靶向治疗, 以减轻心肌损伤。

PO-1299

食管平滑肌瘤伴梗死、囊变误诊 1 列报道

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患者, 女性, 57 岁, 主咳嗽、咳痰、喘息 1 月余, 伴发热 4 天入院行胸部 CT 检查。

影像表现: 后纵隔食管走行区见梭状囊实性灶, 呈等/稍低密度, CT 值 15~48Hu, 边界清楚, 邻近降主动脉形态未见异常, 未见受压、变窄, 邻近左侧肺叶部分受压、肺不张改变, 病灶大小约为 $67 \times 69 \times 80 \text{ mm}$ (前后 \times 左右 \times 上下), 图 2 及图 3 增强扫描囊性部分未见强化, 实性部分轻度强化; 病灶呈尖角状与右侧食管壁分界不清; 食道吞钡下段见弧形受压, 黏膜完整。

本病例误诊原因, 病灶呈梭状, 大部分囊性变, 密度较低, 未见强化, 而实性成分少, 病灶呈轻度强化, 影像诊断定位及定性有一定难度。

PO-1300

CT 引导下难治性气胸封堵治疗: 一项单中心回顾性研究

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安徽省胸科医院

方法: 2022 年至 2023 年安徽省胸科医院 20 例难治性气胸患者 (男性 14 例, 女性 6 例, 均位年龄 58.15 ± 17.73 岁) 接受了术前胸部 CT 平扫及支气管胸膜瘘三维重建, 后续进行 CT 引导下经皮穿刺封堵治疗。难治性气胸的病因: 10 例肺大泡破裂引起的支气管胸膜瘘, 7 例为肺结核继发空洞、支气管扩张引起的支气管胸膜瘘; 2 例为肺恶性肿瘤累及胸膜引起支气管胸膜瘘, 1 例为肺恶性肿瘤行微波消融后引起。所有患者治疗后均复查胸部 CT 或平片评估治疗效果, 记录相关并发症。

结果: 20 例患者经过治疗后均获得临床治愈, 气胸完全消失, 瘘口封闭, 所有患者均摆脱负压吸引及闭式引流。其中 13 例患者经过 1 次治疗, 5 例患者经过 2 次治疗, 2 例患者经过 3 次治疗。所有患者封堵材料为医用胶 (1 瓶, 0.5ml) 及碘化油 (3-8ml, 均位 3.75 ± 1.33 ml) 混合物, 其中有 3 例患者在使用医用胶及碘化油封堵前, 释放弹簧圈进行了先行填充。术中 5 例患者出现刺激性咳嗽, 手术结束后均消失。术后 1 例患者出现了较为严重的胸膜反应, 表现为治疗侧背部疼痛, NRS 疼痛评分 5 分, 予以止痛等对症治疗后 2 天好转。

结论: CT 引导下经皮穿刺封堵术对于难治性气胸是一项安全有效的治疗方式, 临床治愈率高, 并发症少, 能够反复多次进行, 尤其适用于自发性气胸术后复发, 基础状态差不适合手术的患者。

PO-1301

多层螺旋 CT 或 PET-CT 假阳性致肺结节误切的影像学征象分析及原因分析

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目的: 探讨病理结果为炎性肉芽肿, 而多层螺旋 CT 或 PET-CT 误诊为恶性的肺结节, 通过分析其误诊原因及影像学征象对于评价肺结节良性与恶性价值及意义分析

方法: 选取日期 2017 年 1 月份~2023 年 1 月份期间就诊于解放军总医院, 临床诊断为肺结节的患者, 且均行肺部多层螺旋 CT 或 PET-CT 影像学检查, 最终肺结节均行外科手术切除, 最终病理结果均为炎性肉芽肿病变的 400 份病例进行分组, 根据肺部多层螺旋 CT 或 PET-CT 影像学检查结果为良性结节与恶性结节, 将病例分为两组, 诊断为良性结节病理共 109 份, 诊断为肺癌病例共 291 份, 诊断为肺癌的病例定义为误诊病例, 对两组结节的影像学征象进行对照统计学分析, 分析其影像学误诊原因及最终导致误切的原因

结果: 影响多层螺旋 CT 或 PET-CT 假阳性致肺结节误切的原因分析, 其中既有影像科医生对于肺结节征象认识不足的原因, 也有临床医生对于肺结节管理策略和随访策略的认识薄弱的原因, 其二者经过统计学分析, 均具有统计学意义

结论: 肺小结节 PET-CT 无法区分炎性肉芽肿及恶性肿瘤; 毛刺征不能作为良性病变炎症及肿瘤的鉴别诊断; 切勿单纯通过多层螺旋 CT 二维图像粗略判定结节的性质, 三维重建综合分析对肺结节良性判定意义更大; 结节随访时间短, 未能严格遵守肺结节管理策略及随访策略, 是临床误切的重要原因之一

PO-1302

应用病理全切片分析亚实性肺腺癌的放射病理相关性： 一项前瞻性临床研究

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目的：探讨亚实性肺腺癌在薄层 CT 上的放射学和病理学相关性，特别是玻璃样（GGO）区域和实质成分区域的组织学特征。

方法：这是一项前瞻性临床研究（NCT05252676）。亚实性肺腺癌标本切除后制备数字化病理全切片。确定了放射学和病理学相似的切片并进行匹配。对于匹配较好的切片，在病理学切片上绘制放射学上的实质和 GGO 区域。将放射学肿瘤和实质成分的大小与病理学肿瘤和浸润部分的大小进行比较。评估放射学实质和 GGO 区域的肺腺癌的组织学特征。

结果：从 2020 年 10 月至 2022 年 8 月，分析了 102 例非黏液性肺腺癌患者（男性 33 名女性 69 名）。平均年龄为 58 ± 9.6 岁（范围 36-78 岁）。有 20 个纯 GGO 和 82 个部分实性结节。有 1 个原位肺腺癌（AIS），32 个微浸润性肺腺癌（MIA）和 69 个浸润性肺腺癌。放射学肿瘤直径大于病理学肿瘤直径（对于所有患者： $23.43 \pm 8.54\text{mm}$ vs $19.07 \pm 8.12\text{mm}$, $p=0.000$ ；对于匹配的切片： $20.07 \pm 8.35\text{mm}$ vs $17.21 \pm 7.83\text{mm}$, $p=0.000$ ），而放射学实质成分直径小于病理学浸润部分直径（所有患者： $8 \pm 6.80\text{mm}$ vs $10.5 \pm 8.15\text{mm}$, $p=0.000$ ；匹配的切片： $5.1 \pm 6\text{mm}$ vs $8.3 \pm 7.52\text{mm}$, $p=0.000$ ）。对于纯 GGO 肿瘤，贴壁，腺泡和乳头亚型分别为 100%，84.2%和 47.4%，无微乳头或实体亚型存在。对于部分实性肿瘤，在 GGO 区域，贴壁，腺泡，乳头和微乳头亚型分别为 100%，83.3%，57.1%和 11.9%，无实体亚型存在。在实质区域，贴壁，腺泡，乳头，微乳头和实体亚型分别为 19%，95.2%，59.5%，26.2%和 2.3%。部分实性肿瘤中有 7 个 STAS，2 个淋巴侵袭和一个胸膜侵袭。

结论：对于亚实性肺腺癌，放射学肿瘤大小大于病理学肿瘤大小，但实质成分大小小于病理学浸润成分大小。对于纯 GGO 肿瘤，除了贴壁亚型外，还存在浸润成分，主要是腺泡和乳头亚型，无微乳头或实体亚型存在。对于部分实性肿瘤，GGO 区域存在贴壁，腺泡，乳头和微乳头亚型，而实质区域存在腺泡，乳头，微乳头和实体亚型。

PO-1303

基于术前临床影像特征识别 I 期肺腺癌 复发危险因素的多维度分层研究

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目的：识别 I 期肺腺癌术后复发的独立危险因素，并基于性别和结节类型进行分层分析，探讨男性与女性、部分实性与实性病变预后危险因素的异同。

方法：回顾性分析 2014 年 1 月至 2017 年 6 月于中国医学科学院肿瘤医院接受根治性切除术的 379 例病理 I 期肺腺癌患者的临床、影像及病理资料，复阅术前 CT 图像并进行术后随访。采用 Cox 回归分析识别无复发生存期（Relapse-free survival, RFS）的独立预测因素。分别基于性别、结节类型将纳入对象分层，行 Cox 回归分析以探索不同亚组中复发危险因素的差异。

结果：中位随访时长 70.4 个月，共 60 例患者在随访中复发。年龄（HR: 1.04, $P=0.015$ ）、毛刺征（HR: 4.55, $P=0.002$ ）、临床 T 分期（HR: 2.49, $P<0.001$ ）、肿瘤大小（HR: 2.81,

$P=0.022$) 和实性成分占比 (consolidation tumor ratio, CTR) (HR: 2.49, $P=0.016$) 是 RFS 的独立预测因素。基于性别分层后的结果显示, 在女性亚组中, 肿瘤大小 (HR: 3.97, $P=0.046$)、CTR (HR: 3.38, $P=0.024$) 和毛刺征 (HR: 4.81, $P=0.017$) 是 RFS 的独立术前预测因子; 而在男性亚组中, 临床 T 分期 (HR: 3.80, $P<0.001$) 和毛刺征 (HR: 5.57, $P=0.024$) 是 RFS 的独立术前预测因子。基于结节类型分层的结果显示, 在部分实性结节亚组中, 肿瘤大小 (HR: 1.14, $P<0.001$)、CTR (HR: 2.40, $P=0.004$) 和毛刺征 (HR: 4.95, $P=0.021$) 是 RFS 的独立术前预测因子; 而在实性结节亚组中, 临床 T 分期 (HR: 3.27, $P<0.001$) 和年龄 (HR: 1.09, $P<0.001$) 是 RFS 的独立术前预测因子。

结论: RFS 的独立预测因素在不同性别的患者、不同类型的病变间存在差异。在部分实性结节亚组和女性亚组中, 全肿瘤大小和 CTR 是 RFS 的独立术前预测因子。在实性结节亚组中, 临床 T 分期和年龄是 RFS 的独立术前预测因子。

PO-1304

联合 CCTA 影像参数及临床构建缺血性心脏病患者冠状动脉侧支循环形成的预测模型

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目的: 本研究目的是建立一个结合临床和 CCTA 参数来预测缺血性心脏病 (IHD) 患者良好的冠状动脉侧支循环 (CCC) 的预测模型。

材料与方法: 本研究回顾性分析了 634 例经冠状动脉造影 (CAG) 诊断为严重狭窄或闭塞, 并在 CAG 术前 2 个月内接受 CCTA 治疗的 IHD 患者。根据 CAG 的结果, Rentrop 分级为 2-3 的患者为 CCC 形成良好, 而 Rentrop 分级为 0-1 的患者为 CCC 形成不良。最后, 纳入 80 例 CCC 形成良好的患者, 随机选择 80 例年龄和性别匹配的 CCC 形成不良的患者作为对照组。收集完整的临床资料, 并测量冠状动脉周脂肪衰减指数 (FAI) 和 CT-分数血流储备 (CT-FFR)。CT-FFR 测量包括病变特异性 CT-FFR (测量位置在狭窄远端 2 厘米)、血管特异性 CT-FFR (测量位置在最远端血管直径 2 mm) 和 Δ CT-FFR (病变近端和远端 CT-FFR 的差异)。分析这些临床和影像学参数与良好 CCC 的相关性和预测价值。

结果: CCC 形成良好患者的 RCA 近段 FAI、 Δ CT-FFR 和病变特异性 CT-FFR 与对照组相比存在统计学差异 [-78.49 ± 10.92 HU vs -73.54 ± 8.92 HU、0.09 (0.060, 15)、0.13 (0.10, 0.16)、0.67 (0.62, 0.73) 和 0.66 (0.59, 0.70), $P=0.002$ 、0.001、0.027]。Spearman 相关分析显示 Beta 受体阻滞剂使用和病变特异性 CT-FFR 与 CCC 形成良好呈正相关 ($r=0.282$ 、0.176, $P=0.001$ 、0.026), RCA-FAI、 Δ CT-FFR 与 CCC 形成良好呈负相关 ($r=-0.233$ 、-0.25, $P=0.003$ 、0.001)。多因素逻辑回归分析显示, Beta 受体阻滞剂的使用、RCA-FAI 和 Δ CT-FFR 构建的联合模型预测 IHD 患者 CCC 形成良好的 AUC 值为 0.747, 敏感度为 65.00%, 特异度为 80.00%。

结论: 通过 CCTA 检测的 FAI 和 CT-FFR 与 CCC 相关, 联合使用 Beta 受体阻滞剂、RCA-FAI 和 Δ CT-FFR 有助于无创评估 IHD 患者中 CCC 的程度。

PO-1305

血尿酸水平对左心功能的影响： 一项心脏磁共振组织追踪技术研究

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目的：已有研究证实血清尿酸（SUA）的增加会影响心肌功能。本研究旨在探讨 SUA 对左心功能的影响。

方法：纳入 2019 年 9 月至 2022 年 5 月就诊于我院心内科左心室射血分数正常，且接受过心脏磁共振（CMR）检查的 307 例患者。按照 SUA 四分位数将患者分为四个独立的亚组。获取患者 CMR 检查图像，使用 cvi42 图像后处理软件评估左心房（LA）和左心室（LV）的结构、功能及心肌应变参数。统计方法采用独立样本 t 检验、非参数秩和检验、 χ^2 检验、单因素方差分析、单变量和多变量线性回归， $P < 0.05$ 为差异有统计学意义。

结果：患者平均年龄为 54.05 ± 10.10 岁，56.7% 为男性。年轻男性更容易患高尿酸血症。此外，随着 SUA 四分位数升高患者的身体质量指数（BMI）、舒张压、血清甘油三酯（TG）升高，高密度脂蛋白（HDL-C）降低（ $P < 0.05$ ）。随着 SUA 四分位数的升高，患者左室收缩末期容积（LV-ESV）及舒张末期容积（LV-EDV）逐渐增大，左心室质量（LVM）、左室质量指数（LVMI）及左室重构指数逐渐升高（ $P < 0.05$ ），而 LV 整体纵向应变（GLS）、心尖部纵向应变、整体径向应变（GRS）（心尖部、中间部、基底部）、整体周向应变（GCS）（心尖部、中间部、基底部）、周向舒张期峰值应变率降低（ $P < 0.05$ ）。然而，不同尿酸分级亚组的 LA 应变参数没有明显差异（ $P > 0.05$ ）。单变量线性回归证明高尿酸血症与 LV 心肌应变参数（GLS、GRS、GCS、收缩期峰值应变率、舒张期峰值应变率等）受损相关（ $P < 0.05$ ）。对单变量分析中具有统计学差异的因素（包括血压、心率、年龄、BMI、HbA1C、HDL-C、TG 等）进行校正的多变量线性回归分析结果表明，高尿酸血症是 LV 心肌应变（GRS、GCS、心尖部及中间部 GRS、心尖部及中间部 GCS）受损的独立影响因素（ $P < 0.05$ ）。

结论：高尿酸血症是左心室心肌应变的独立影响因素，其中 GRS、GCS 受累最严重，尤其是中间部和心尖部。

PO-1306

基于冠脉衰减指数评估降糖治疗对二型糖尿病冠脉炎症的影响

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背景：二型糖尿病患者具有高心血管风险，炎症是糖尿病和心血管疾病发病机制中的重要共同通路。我们旨在基于冠脉衰减指数（Fat Attenuation Index）评估二型糖尿病患者和非糖尿病患者的冠状动脉炎症，以及降糖治疗对糖尿病患者冠脉炎症的影响。

方法：回顾性的纳入了来自武汉两家三级医院的 1908 名患者，（武汉中心医院的 548 名二型糖尿病患者和 795 名非糖尿病患者以及梨园医院的 174 名二型糖尿病患者和 391 名非糖尿病患者）收集了患者的临床资料和 CCTA 图像，并测量冠脉三支近端周围的冠脉衰减指数，以评估冠状动脉炎症。使用 1:1 倾向性匹配，比较了糖尿病患者和非糖尿病患者的 PCAT 衰减值，以及降糖治疗和未降糖治疗的糖尿病患者的 PCAT 衰减值，并进行多元线性回归进一步分析了多种降糖治疗对糖尿病患者冠脉炎症的影响

结果：未接受降糖治疗的二型糖尿病患者基于冠脉衰减指数评估的右冠脉炎症显著高于非糖尿病患者（ $p = 0.001$ ），接受降糖治疗的糖尿病患者冠脉衰减指数与非糖尿病患者无显著差异。在多元线性回归模型中，降糖治疗与二型糖尿病患者基于冠脉衰减指数评估的右冠脉炎症减少有关；在多种

降糖药物中,二甲双胍与左前降支低衰减值显著相关($\beta=-2.988, p=0.013$),而糖尿病患病年限与左前降支高衰减值显著相关($\beta=0.202, p=0.023$)。

结论:二型糖尿病患者右冠状动脉衰减指数显著高于非糖尿病患者。降糖治疗可能对减轻二型糖尿病患者基于冠脉衰减指数评估的右冠脉炎症产生积极影响,在多种降糖药物中,二甲双胍对改善糖尿病患者的左前降支炎症可能有帮助。

PO-1307

基于胸部 CT 探究新型冠状病毒肺炎病灶体积与多系统的关系

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目的:基于胸部 CT 图像,探讨新型冠状病毒患者肺部病灶体积与内分泌系统、淋巴系统、循环系统、骨肌系统及人体脂肪等多系统的相关性。

方法:回顾性分析北京 COVID-19 数据库 230 例患者入院时的胸部 CT 图像,经人工智能肺炎辅助诊断软件定量测算全肺病灶体积。分别选取甲状腺、脾脏作为内分泌系统及淋巴系统的代表器官,应用软件测定甲状腺左、右叶与脾脏的最大横截面积、甲状腺与脾脏的平均密度和体积、脾厚径及脾最长径;测算心胸比、肺动脉主干及下腔静脉最大径、主肺动脉比;测算冠状动脉、主动脉、颈动脉钙化积分;测算胸椎平均骨质密度、腹部及腹腔内脂肪面积。采用 Spearman 秩相关对上述指标与肺部病灶体积之间的相关性行统计学分析。

结果:冠状动脉、主动脉钙及颈动脉的钙化积分均与肺部病灶体积间存在相关性($r=0.22, P<0.00$; $r=0.4, P<0.001$; $r=0.31, P=0.018$),心胸比、肺动脉主干直径、升主动脉直径与肺部病灶体积间有相关性($r=0.41, P<0.001$; $r=0.23, P<0.001$; $r=0.28, P<0.001$);腹主动脉短径、下腔静脉短径、下腔静脉/腹主动脉直径比与肺部病灶体积间有相关性($r=0.40, P<0.001$; $r=0.14, P=0.035$; $r=-0.19, P=0.003$);甲状腺密度、脾脏厚径、脾脏平均密度与肺部病灶体积间有相关性;胸椎平均骨密度、皮下脂肪面积、腹腔内脂肪面积、肝脏平均脂肪分数与肺部病灶体积间有相关性。

结论:肺部病灶体积与多系统存在相关性,进一步表明 COVID-19 是累及多系统的全身性疾病;病灶与多系统具有相关性,这在疫情防控常态化背景下对快速量化、评估疾病的全身严重程度具有重要意义。

PO-1308

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目的:本研究旨在根据 2022 年 ESC/ERS 肺动脉高压指南评估 CTPA 心血管参数对慢性血栓栓塞性肺动脉高压(CTEPH)的预测价值。

方法:回顾性纳入中日友好医院 2018 年 1 月至 2023 年 3 月内疑似 CTEPH 患者 201 例,以国内现行肺动脉高压指南及新指南将其分为 3 组:mPAP \leq 20mmHg 对照组(63 例)、mPAP $>$ 20mmHg CTEPH 组(138 例)和 mPAP \geq 25mmHg CTEPH 组(123 例),对 CTPA 心血管参数进行组间比较,运用二元 logistic 回归分析评估 CTEPH 的心血管参数的独立预测因素,并对各参数进行受试者操作特征曲线分析。并探究与现有国内肺动脉高压诊断标准之间的异同。

结果:主肺动脉干直径、右心房横径及面积、双心室横径及面积、右心室游离壁厚度和室间隔偏转角在 CTEPH 及对照组中均具有显著统计学差异($P<0.05$)。其中主肺动脉干直径的诊断效能最

强 ($AUC=0.934$)，室间隔角与平均肺动脉压 ($r=0.745$, $P<0.01$)、肺血管阻力 ($r=0.700$, $P<0.05$) 和 NT-pro BNP ($r=0.633$, $P<0.05$) 呈正性较强相关。在新指南中，二元 logistic 回归分析显示主肺动脉干直径、右心室游离壁厚度和室间隔偏转角 (脊柱室间隔角、室间隔角、左室游离壁角) 是 CTEPH 诊断的独立危险因素 ($P<0.05$)。

结论：CTPA 测量的主动脉直径和室间隔偏转角可作为 2022 年 ESC/ERS 指南中 CTEPH 的独立危险因素，能够有效地判断病人的右心功能状况和预后。此外，在重建四腔心层面上，右心房结构也具有不亚于右心室的评估价值。本研究为新指南下 CTEPH 的早期诊断和制定合理的治疗方案奠定基础。

PO-1309

基于影像及临床资料的列线图对肺腺癌病理亚型的预测价值

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目的 探讨 CT 影像学资料联合临床资料对鉴别肺浸润性非黏液腺癌不同病理亚型的价值。**方法** 纳入浙江省肿瘤医院肺浸润性非黏液腺癌的患者 313 例，依据预后将其分为中低风险组和高风险组，收集其临床资料及 CT 影像学资料并进行统计学分析，分别建立影像学模型和联合模型，绘制列线图，使用 ROC 曲线、校准曲线、DCA 曲线以及 10 折交叉验证对模型进行评价，使用 Delong 检验对 AUC 进行比较。**结果** 两组间临床资料 (性别、吸烟、NSE、CA125、CEA)、CT 影像学资料 (密度、长径、短径、实性成分长径、实性比例、钙化、毛刺、分布、空泡征、月牙铲征及空气支气管征) 差异有统计学意义 (P 值 <0.1)。对 CT 影像学资料进行多因素分析后，长径、实性成分长径、实性比例、空气支气管征差异有统计学意义 (P 值 <0.05)，建立影像学模型，AUC 为 0.879 (95%CI: 0.840, 0.918)；对临床资料及 CT 影像学资料进行多因素分析，吸烟、NSE、长径、实性成分长径、实性比例、空气支气管征差异有统计学意义 (P 值 <0.05)，建立联合模型，AUC 为 0.899 (95%CI: 0.863, 0.934)。**结论** CT 征象及血清肿瘤学指标对鉴别肺浸润性非黏液腺癌的中低风险和高风险具有显著的预测价值，结合本实验所建立模型可以更好地了解患者病情。

PO-1310

基于冠脉 mDIXON 序列对疑似冠状动脉疾病患者的分节段冠状动脉周围脂肪组织评估的初步研究

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目的: 冠状动脉周围脂肪组织 (PCAT) 被认为与冠状动脉疾病 (CAD) 的发展有关。功能紊乱的 PCAT 可分泌促炎脂肪因子和炎性细胞因子，与冠状动脉内膜炎症的发生和斑块的形成密切相关。同时，斑块组成和狭窄程度对冠心病的危险分层和预后有价值。PCAT 的评估应转化为冠心病的新型临床诊断工具。

目前定量评估 PCAT 的首选方法是计算机断层扫描 (CT)，但由于其辐射，不适合随访检查。最近，一种冠状动脉磁共振血管造影 (MRA) 方法被引入并验证，该方法使用三维改良的 Dixon 序列 (3D-mDixon)，通过质子的化学位移将水和脂肪信号分离，从而可以更准确地定量 PCAT 体积。同时，为了在不影响图像质量的情况下加快扫描速度，我们使用了压缩感知人工智能 (CSAI) 框架，该框架结合了深度学习 (DL) 和 CS 技术，优化了 CS 重建算法，同时进行了去噪并缩短了扫描时间。

我们试图使用 CSAI 加速改良的 mDixon 序列, 定量分析已知或疑似 CAD 患者的节段 PCAT, 包括 PCAT 体积和脂肪分数, 并确定它们与冠状动脉计算机断层血管造影(CCTA)评估的冠状动脉斑块特征的关系。

方法和材料:我们纳入 35 例有症状的 CAD 患者(111 例有斑块, 169 例无斑块)。他们接受心脏磁共振(CMR)评估 8 个冠状动脉节段的 PCAT 体积和脂肪分数。我们手工跟踪分割后的 PCAT 体积。我们比较了由 CCTA 定义的不同斑块类型和狭窄程度的 8 个冠状动脉节段的 PCAT 体积和脂肪分数, 并使用 Kruskal - Wallis H 检验和单因素方差分析(ANOVA)检验探讨了它们之间的关系。

结果:有斑块的冠状动脉节段 PCAT 体积和脂肪分数高于无斑块的冠状动脉节段。同时, 混合斑块周围的分节段 PCAT 体积大于非钙化斑块和钙化斑块($p = 0.014$ 和 $p < 0.001$)。分节段 PCAT 体积与斑块类型有中度相关($r = 0.493$, $p < 0.001$)。脂肪分数也有类似的结果($r = 0.480$, $p < 0.001$)。

结论:全心冠状动脉 MRA 框架与 CSAI 能够定量分析分段 PCAT 体积和脂肪分数。与脂肪分数相比, 分节段的 PCAT 体积与冠状动脉斑块特征的相关性更显著。

PO-1311

绝经后射血分数保留型心衰患者心外膜脂肪特征及其与心肌纤维化之间的关系

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目的: 研究绝经后射血分数保留型心衰 (heart failure with preserved ejection fraction, HFpEF) 患者心外膜脂肪 (epicardial adipose tissue, EAT) 的特征及其与心肌纤维化之间的关系。

材料与方法: 研究共纳入 72 例绝经后 HFpEF 患者和 70 例绝经后非心衰患者, 通过钙化积分图像测量 EAT 体积和密度, 通过双能 CT 延迟强化得到的碘图测量计算得出心肌细胞外容积分数 (myocardial extracellular volume, ECV), 该参数可定量评估心肌间质性纤维化。利用超声心动图得到心脏结构和功能参数。

结果: 绝经后 HFpEF 患者的 EAT 体积、体积指数、密度和 ECV 均显著高于对照组($p < 0.05$)。多因素 logistic 回归分析显示, 在校正年龄、体重指数、高血压、糖尿病、房颤、血脂异常等因素后, 绝经后女性的 EAT 密度及 ECV 增加仍与 HFpEF 发生相关($p = 0.002$, $p = 0.002$)。在所有入组对象中, EAT 密度与 EAT 体积指数呈负相关 ($r = -0.321$, $p < 0.001$), 在校正年龄、体重指数、高血压、糖尿病、房颤、血脂异常等因素后, HFpEF 组中 EAT 的密度与 EAT 体积指数的相关性弱于非心衰组(standardized coefficient, HFpEF: $\beta = -0.26$, $p = 0.037$ vs. Non-HF: $\beta = -0.66$, $p < 0.001$, pinteraction = 0.035)。ECV 部分介导了 EAT 密度与 HFpEF 发生间的关系[effect = 0.188, 95% confidence interval (CI) (0.094, 0.296)], 中介效应占总效应的比例为 47.7%。

结论: 绝经后 HFpEF 患者的 EAT 体积、体积指数、密度和 ECV 值均明显高于非心衰对照组。HFpEF 患者与非心衰患者的 EAT 体积指数与密度之间的关系密切程度存在差异。ECV 在绝经后患者 EAT 密度和 HFpEF 之间的关系中起到部分中介作用。

PO-1312

CT 大重建矩阵联合重建算法对肺结节诊断的应用价值

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目的：探讨 CT 大重建矩阵 1024×1024 联合 Karl 迭代重建算法对肺结节诊断的应用价值。资料与方法：前瞻性收集 2021 年 10 月-2022 年 5 月于大连医科大学附属第一医院行胸部 CT 检查患者 500 例，对 CT 扫描图像原始数据进行分组重建。A 组采用常规 512×512 矩阵结合 Karl5 级重建；B 组采用 1024×1024 大重建矩阵结合不同等级 Karl 算法重建，获得 4 个亚组。测量主动脉弓上方的气管腔内（气管区）及左肺上叶无血管区（肺实质）的 CT 值和 SD 值，计算 SNR。两位医师采用独立双盲法对 A、B 两组肺部总体图像质量进行 5 分制评价。对 B 组中图像质量最佳的亚组与 A 组进行病灶显示情况比较，并对病例进行追踪，依据手术病理结果，比较诊断效能。结果：A、B 组的肺实质 CT 值差异无统计学意义 ($t=-0.456\sim1.056$, $P>0.05$)，B 组组内随 Karl 等级升高，气管和肺实质 SD 值逐渐下降，SNR 值逐渐升高 ($F=675.002\sim2020.903$, $P<0.05$)。两名放射科医师对各组图像质量的主观一致性较好 ($Kappa=0.796\sim0.987$, $P<0.05$)，B 组各项主观评分均高于 A 组 ($Z=-15.361\sim-6.465$, $P<0.05$)，B4 组主观评分最高。A 组和 B4 组在部分实性结节 ($\leq 3mm$) 和实性结节 ($6.1mm\sim\leq 3cm$) 的显示清晰度差异无统计学意义 ($Z=-2.000$ 、 -0.378 , $P>0.05$)；相较于 A 组，B4 组结节显示清晰率提升了 12%~100%。结节征象上仅胸膜凹陷征显示差异无统计学意义 ($\chi^2=2.143$, $P>0.05$)。以 47 例患者手术病理结果为金标准，B4 组诊断准确率为 65.11%，优于 A 组 38.88% ($\chi^2=4.674$, $P<0.05$)。结论：大重建矩阵和 Karl 算法的联合应用可获得较优的图像质量，有利于肺结节诊断。

PO-1313

双能量 CT 定量心肌细胞外容积预测射血分数保留心衰患者再住院风险

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目的：利用双能量 CT 延迟强化扫描 (LIE-DECT) 测量的心肌细胞外容积 (ECV)，作为心肌间质纤维化 (MIF) 的指标，评估其对射血分数保留心衰 (HFpEF) 患者的再住院风险预测价值。

材料与方法：收集 2019 年 11 月至 2021 年 10 月诊断为 HFpEF 患者 202 例 (平均年龄 69.5 ± 9.2 岁)，所有患者均接受了冠状动脉 CTA (CCTA) 和 LIE-DECT 扫描。将碘图和红细胞压积值输入后处理软件，自动计算出 ECV；利用碘图判断心肌内有无缺血型 LIE 存在。临床终点事件定义为患者入院行 CCT 后因心血管病变再入院。Kaplan-Meier 分析和 Cox 比例风险回归模型评估 ECV 和 HFpEF 患者再住院的相关性。

结果：在中位随访 8.2 (4.4, 14.4) 个月期间，55 例患者在住院行 CCT 检查后再次住院。Kaplan-Meier 分析显示，HFpEF 患者出院后再住院风险随着 ECV 升高而显著增加 ($\log\text{-rank } P=0.038$)。ECV 值 $\leq 30\%$ 的 HFpEF 患者再住院风险低，独立于缺血型 LIE 存在。调整临床危险因素和心脏超声测量结果，包括年龄、体重指数 (BMI)、吸烟史、高血压、糖尿病、血脂异常、左室射血分数 (LVEF)，左室质量指数 (LVMMI)、左室舒张末期容积指数 (LVEDVI)、左室收缩末期容积指数 (LVESVI) 和左房容积指数 (LVAI)，ECV 仍然是 HFpEF 患者再住院事件发生的重要独立预测因子 [风险比 (HR) = 1.139; 95%CI: 1.058~1.226], $P=0.001$ 。

结论：LIE-DECT 碘图测量的 ECV 作为 MIF 的替代指标，是 HFpEF 患者再住院风险发生的重要的独立预测因子，可作为临床 HFpEF 预后评估的重要指标

PO-1314

基于心脏磁共振 cine 图像和 T1 map 的放射组学特征的可重复性研究

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目的：探究非增强的 CMR-cine 图像和 T1 map 中心肌放射组学特征的可重复性。

方法：回顾性纳入 50 例 HCM 患者，由两名观察者手动勾画整个 cine 舒张末期图像的左室心肌和平扫 T1 map 左室心肌作为感兴趣区域，利用 Pyradiomics 包进行特征提取。观察者内以及观察者间的差异使用组内相关系数 (intra correlation coefficient, ICC) 进行评价，当 ICC > 0.75 时，认为具有较好的一致性。在心肌厚度影响因素方面，以最大室壁厚度 (maximum wall thickness, MWT) 的中位数值 20 mm 为界将患者划分为两组 (MWT ≤ 20 mm 和 MWT > 20 mm)，并采用卡方检验进行两组间的差异性比较。

结果：在 cine 图像中，组内、组间、组内+组间 ICC > 0.75 的放射组学特征数量分别是 1450/1688 (85.9%)、1405/1688 (83.2%)、1366/1688 (80.9%)。在 T1 map 中，组内、组间、组内+组间 ICC > 0.75 的放射组学特征数量分别是 1035/1688 (61.3%)、959/1688 (56.8%)、907/1688 (53.7%) (表 1)。两种图像中 ICC > 0.95 的特征数目最多，其次是 ICC 在 0.90~0.95 范围的特征 (图 1)。考虑心肌厚度时，在 cine 图像中，组内 ICC 提示 MWT > 20 mm 组心肌放射组学特征的可重复性高于 MWT ≤ 20 mm 组 (P = 0.001)，而组间和组内+组间 ICC 统计结果显示 MWT ≤ 20 mm 和 MWT > 20 mm 两组的可重复性特征数量无明显统计学差异 (P > 0.05)。但在 T1 map 中，MWT > 20 mm 组心肌放射组学特征的可重复性明显高于 MWT ≤ 20 mm 组 (P < 0.001) (表 2，图 2)。

结论：大部分基于 cine 图像的放射组学特征 (> 80%) 在 HCM 患者中具有很好的可重复性，且明显高于平扫 T1 map。心肌厚度对 T1 map 的影响更大，心肌越厚的组别，其放射组学特征的可重复性越好。

PO-1315

基于配对肺部影像数据集的跨模态图像合成：MRI-to-CT

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目的：本研究旨在开发一种基于 ZTE 的多参数 MRI 影像的跨模态 (ZTE MRI-to-CT) 图像合成深度学习网络，能够从肺部 MRI 生成临床诊断及肿瘤分割所需的高分辨率合成 CT。

方法：在 42 名非小细胞肺癌患者的 126 幅 ZTE MRI 及其配对真实 CT 影像数据集上进行实验。在图像预处理、标准数据增强后利用预训练的处理管道构建跨模态循环生成对抗网络 (Cycle GAN) 的深度学习模型，在合成过程中输入相邻影像图片，并确保 MRI 和 CT 合成之间一致性的循环损失函数利用，将 ZTE 多参数 MRI 图像转换为高分辨率 CT 合成图像，并与 U-Net 级联以分割肺实质和肺部肿瘤。两名高年资的影像专家作为观察者手动分割肺部真实 CT 图像作为合金标准，分别阅读肺部 MRI 和合成 CT 图像后以结构化报告形式对图像质量、影像特征进行评估并以四分法评估诊断信心，采用组内相关系数 (ICC) 统计图像质量、诊断内容及诊断信心评分的一致性。使用 Dice 相似系数 (DSC)、Hausdorff 距离度量计算分割精度。所有合成 CT 通过量化图像相似度公式计算 (均方误差 MSE、峰值信噪比 PSNR 和平均结构相似度 MSSIM) 验证模型合成 CT 的准确性。

结果：两位观察者对合成 CT 的空间几何和噪声水平方面表现出极佳的满意度。相较于 MRI，合成 CT 提高了两位观察者在影像特征评估及诊断信心方面的一致性。与观察者 CT 分割进行定量比较，合成 CT 的平均 Dice 得分为 92 ± 1.5 ，与 CT 注释的比较得出了 1.8 ± 1.2 毫米的标志定位误差。真实 CT 与合成 CT 的结构相似指数(MSE、PSNR、MSSIM)均值(\pm 标准差)分别为 0.95 ± 0.011 、 78.36 ± 10.12 、 0.00121 ± 0.00029 、 30.12 ± 1.43 、 0.86 ± 0.041 。

结论：我们开发了一种基于深度学习的跨模态 (ZTE MRI-to-CT) 图像合成方法来提高肺部肿瘤诊断能力和诊断信心，并促进图像精准分割。合成 CT 与原始 CT 的相似度指标和临床评价结果保证了所提方法的可用性。

PO-1316

人工智能无创血流储备分数(FFRCT)联合 CCTA 斑块特征对 冠心病研究价值

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目的：基于机器深度学习无创血流储备分数(FFRCT)，结合 CCTA 斑块成分定量分析，比较急性冠脉综合征(ACS)与慢性冠脉综合征(CCS)两组参数的差异，评估对冠心病诊断价值。方法：回顾性收集两组各 22 例行 CCTA 检查，分析冠脉斑块成分特征和 FFRCT 血流动力学特征。结果：ACS 组纤维斑块体积和百分比(FPV、FPV%)、脂样斑块体积和百分比(LPV、LPV%)、非钙化斑块体积和百分比(NCPV、NCPV%)、总斑块体积和百分比(TPV、TPV%)以及血流储备分数差值(Δ FFRCT)显著高于 CCS 组，血管/斑块体积比值(L/P)和 FFRCT 低于 CCS 组，差异具有统计学意义(P 均 < 0.01)；ACS 组的 FFRCT、 Δ FFRCT 的 AUC(0.96 和 0.93，95%CI 0.92~0.99 和 0.88~0.97，P<0.001) 大于斑块体积百分比(0.79，95%CI 0.68~0.91，P<0.001)和斑块体积(0.78，95%CI 0.56~0.81，P<0.05)，上述参数联合 AUC 升高(0.97)，有统计学意义(P<0.001)。结论：FFRCT 联合 CCTA 的斑块成分特征对 ACS 与 CCS 有一定的鉴别，为临床提供更好的冠心病危险分层和治疗

PO-1317

基于双能低剂量 CT 的影像组学对肺磨玻璃结节良恶性的预测价值

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目的：探讨基于双源低剂量 CT 的影像组学对肺部磨玻璃结节良恶性的预测价值。方法：回顾性纳入 160 例磨玻璃结节患者的临床及影像学资料。根据穿刺或病理结果将其分为良性组(40 例)、AIS 组(40 例)、MIA 组(40 例)、IAC 组(40 例)，记录动、静脉期相同管电压(80、100、140KeV)下病灶的 CT 值，基于双源 CT 碘图测量病灶的碘浓度，并计算相应的标准化碘浓度(NIC)。采用单因素方差分析其临床资料；采用多因素逻辑回归分析各组的影像学资料。使用 3D-slicer 软件勾画病灶 ROI，采用组内相关系数 ICCs 对特征进行降维、筛选，分类器选择 RF、SVM 及 KNN，绘制 ROC 曲线，采用 DeLong 检验比较各参数的 AUC，筛选出效能最优的分类器，初步建立磨玻璃结节良恶性诊断的预测模型。最后，联合差异有统计学意义的管电压所对应的 CT 值、NIC、独立危险因素及筛选出的最优分类器建立 3 种组合模型，分析各组合模型评估磨玻璃结节良恶性的敏感性、特异性及准确率。结果：4 组间临床资料的差异无统计学意义(P>0.05)。各组间静脉期 80KeV 下的 CT 值、NIC 比较，CTAIS<CTMIA<CTIAC，NIC AIS<NIC MIA<NIC IAC，

差异均有统计学意义 ($P<0.05$)；组间其余静脉期各管电压下的 CT 值比较，差异均无统计学意义 ($P>0.05$)。多因素回归结果显示毛刺征象、供血血管类型是预测磨玻璃结节良恶性的独立危险因素；ROC 曲线结果显示当分类器选择 SVM 时预测效能最优，组合模型 A、B、C 的敏感度分别为 0.761、0.683、0.788，特异度分别为 0.722、0.668、0.741，准确率分别为 0.772、0.731、0.795。结论：基于双源低剂量 CT 影像组学特征可以预测磨玻璃结节的良恶性，当将静脉期 80KeV 下的 CT 值、NIC 与影像学特征联合建立综合模型时，预测效能较高。

PO-1318

急性肺动脉栓塞预测模型的建立与验证

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目的：建立并验证急性肺动脉栓塞 (acute pulmonary embolism, APE) 的预测模型。

方法：回顾性纳入 2015 年 2 月-2020 年 8 月河南中医药大学第一附属医院怀疑 APE 行 CT 肺动脉成像 (CT pulmonary artery imaging, CTPA) 的患者作为训练集，按照训练集：验证集 7:3 的比例前瞻性收集 2020 年 9 月-2023 年 8 月的本院患者作为验证集，根据 CTPA 及临床诊断将其分为肺栓塞组及非肺栓塞组。收集病人的临床资料，包括基线、临床症状和体征、病史、血常规、动脉血气、凝血功能、下肢超声等 75 项指标，采用单因素 Logistic 回归、LASSO 及多因素 Logistic 回归分析筛选 APE 的危险因素并构建预测模型，以列线图的形式展示。在训练和验证集中，模型的校准度采用受试者工作特征 (ROC) 曲线、校准曲线及 Hosmer-Lemeshow (H-L) 拟合优度检验评估；并绘制决策曲线评估模型的临床应用性。

结果：本研究最终纳入 752 例患者，训练集 526 例 (男 288 例，年龄 68 ± 20 岁)，验证集 226 例 (男 129 例，年龄 66 ± 22 岁)。多因素 Logistic 回归分析显示紫绀、C 反应蛋白升高、中性粒细胞升高、肌酸激酶同工酶 (CK-MB) 升高、谷氨酰转移酶升高、PCO₂ 下降、D-二聚体升高、凝血酶时间延长、下肢静脉超声阳性为 APE 的独立危险因素。该模型在训练集的 AUC 为 0.925 (95% CI: 0.835-0.850)，验证集 AUC 为 0.918 (95% CI: 0.788-0.885)。训练集 H-L 拟合优度检验 ($\chi^2 = 29.148$, $P = 0.001$)，验证集 H-L 拟合优度检验 ($\chi^2 = 8.038$, $P = 0.530$)，证明模型校准度良好；决策曲线分析证明模型在训练及验证集中具有很好的临床应用性。该模型的准确度 0.92，敏感度 0.84，特异度 0.85，诊断效能均高于各个独立危险因素。

结论：紫绀、C 反应蛋白、中性粒细胞、CK-MB、谷氨酰转移酶、PCO₂、D-二聚体、凝血酶时间、下肢静脉超声阳性是 APE 的独立危险因素。该模型具有良好的效能，有助于早期精准诊断 APE。

PO-1319

Radiogenomic-based multi-omic analysis reveals imaging intratumor heterogeneity phenotypes and therapeutic targets

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Purpose:

To investigate whether the intratumor heterogeneity (ITH) could be assessed by heterogeneity-related MRI radiomics features and whether the patient subpopulations with distinct imaging heterogeneity harbor particular biological characteristics.

Material and Method:

A total of 1991 patients from three independent datasets were incorporated in this study. Cohort 1 (Fudan University Shanghai Cancer Center [FUSCC] dataset) comprised 929 primary breast cancer patients treated at FUSCC between August 2009 and May 2015. Cohort 2 (DUKE dataset) contained 922 breast cancer patients with matched radiomics and follow-up data from the TCIA-DUKE dataset. Cohort 3 (TCGA dataset) consisted of 140 breast cancer patients with matched radiomics and transcriptomic sequencing data ($n=121$) from the TCIA-TCGA dataset. Cohort 1 was collected to identify imaging heterogeneity and prognostic significance; validate the correlation among IITH, genomic heterogeneity and cellular heterogeneity; and determine the biological hallmarks of imaging heterogeneity. Cohorts 2 and 3 were curated to validate the prognostic power and biological traits of IITH, respectively.

we selected radiomics features most correlated with imaging heterogeneity as imaging heterogeneity-related features according to the definition of the PyRadiomics package. For first-order features, we selected features characterizing the variation in intensity values, and for textural features, we selected features depicting heterogeneous or homogeneous textural patterns. Finally, 42 radiomics features (9 first-order features and 33 texture features) were identified as heterogeneity-related features. 1968 features were initially contained in the clustering analysis.

We performed similarity network fusion (SNF; using the R package “SNFtool” 21) to identify distinct imaging heterogeneity phenotypes. Median absolute deviation (MAD) was used to assess variability of heterogeneity-related radiomics features where $\text{mad} > 1$ was defined as high inter-sample variability. Top 203 variable features (40 first-order and 163 textual features) were used in this clustering analysis. A tumor heterogeneity index (HI) was then calculated for each individual, defined as the arithmetic sum of z-score normalized positive features and the opposite value of negative features, whereby a higher HI represents higher IITH and vice versa.

Sample processing for genomic DNA and total RNA extraction, multi-omics sequencing procedures and bioinformatic operations including whole exome sequencing, copy number alterations, RNA sequencing, as well as generation and analysis metabolomics and lipidomics data were also calculated.

Student's t test, Wilcoxon's test and Kruskal-Wallis test were used to compare continuous variables. Prior to the comparisons, the normality of the distributions was tested with the Shapiro-Wilk test. Pearson's chi-squared test and Fisher's exact test were employed for the comparison of unordered categorical variables. To explore the association between imaging phenotypes and survival, Kaplan-Meier analysis and Cox proportional hazards model were employed. Difference of survival between groups was evaluated by the log rank test. In general, tests were two-sided and $p < 0.05$ was regarded as statistical significance unless otherwise specified. All statistical analyses were performed using R software (version 4.1.1).

Results:

Identification of IITH

We found that high-IITH group tumors exhibited higher T stages (Cohort 1, $p = 0.075$; Cohort 2, $p < 0.001$; Cohort 3, $p = 0.032$) and N stages (Cohort 1, $p = 0.493$; Cohort 2, $p = 0.004$; Cohort 3, $p = 0.035$) and consisted of fewer ER- and PR-positive tumors ($p \leq 0.001$ in Cohort 1 and Cohort 2). Then, we calculated the HI score of each sample. Correspondingly, a greater HI indicated greater imaging heterogeneity. Representative DCE-MRI images indicated that images with high IITH exhibited a highly heterogeneous enhancement pattern, while low-IITH samples were much more homogeneous. Overall, we developed a radiomics signature to identify distinct IITH statuses in large multicenter radiomics cohorts of breast cancer.

Discovery and validation of the prognostic value of IITH

With the long clinical follow-up period of the discovery cohort, we discovered the prognostic value of IITH. High-IITH patients presented significantly poorer RFS (log rank $p = 0.004$). A multivariable Cox proportional hazards model showed that high IITH was an independent poor prognostic indicator after adjusting for well-known prognostic factors (tumor size, positive lymph nodes, lymphovascular invasion status and clinical subtype) (hazard ratio [HR] 2.15, [95% confidence interval [CI] 1.22-3.80], $p = 0.008$). Surprisingly, IITH was also an indicator of OS for breast cancer patients (log rank $p = 0.004$). Its prognostic value was internally validated in the discovery cohort by randomly spitting the cohort in a 2:1 ratio ten times and testing the prognostic power of IITH in each subcohort. Furthermore, we externally validated the prognostic power in the DUKE cohort. As

described before, we identified high- and low-IITH patients in the DUKE dataset, and we found that high-IITH patients had a worse RFS than low-IITH patients (log rank $p = 0.003$). Moreover, multivariable Cox analysis validated the independent prognostic value of IITH in the DUKE cohort (HR 1.79 [95% CI 1.01-3.18], $p = 0.046$). In conclusion, we uncovered the independent outcome-predictive power of IITH subtypes.

Correlation of IITH with genomic and pathological ITH

To verify the robustness of IITH, we sought to compare phenotypic IITH with other assessment methods of ITH, such as microscopic genomic heterogeneity and mesoscopic cellular morphological heterogeneity. A higher MATH value indicates higher genomic heterogeneity. High-IITH patients were more genomically heterogeneous than low-IITH patients ($p = 0.049$). Additionally, we calculated tumor mutational burden (TMB) and neoantigen load and found that higher TMB ($p = 0.005$) and neoantigen load ($p = 0.043$) were present in high-IITH patients.

From whole-slide images of H&E-stained tumor samples, we extracted 14 morphological features and 9 textual features of tumor cells. Among these morphological and textual cellular features, Variation of Curvature was the most significantly different between high- and low-IITH groups, indicating that differences in IITH between the high- and low-IITH groups were mainly contributed by the ITH of nuclear curvature ($p = 0.009$). In summary, DCE-MRI image-derived IITH was consistent with genomic and pathological ITH evaluation.

Genomic, transcriptomic and metabolomic alterations related to IITH

To investigate the biological basis of the prognostic disparity between high- and low-IITH tumors, we performed multiomics analysis to uncover their molecular distinction. We did not observe many significantly differential high-frequency somatic mutations and copy number variations between high- and low-IITH tumors. In particular, high-IITH tumors exhibited a widely dysregulated metabolism comprising upregulation of fatty acids, amino acids, organic acids, nucleosides, and glycogen.

We ranked all the enriched pathways by NES and obtained the most enriched biological processes in the high- and low-IITH groups. These results revealed divergent biological characteristics of the two patient subgroups, wherein high-IITH tumors were metabolically exuberant and were confronted with oxidative stress and low-IITH tumors lacked explicit characteristics, with DNA damage repair more common in this population.

Collectively, transcriptomic and metabolomic analyses elucidated that tumors with high imaging heterogeneity were a phenotype of cancer with high malignancy and dysregulated metabolism, which endowed these tumor cells with a high tendency toward ferroptosis.

Ferroptosis is a biological hallmark and potential therapeutic target for high-IITH tumors

We further investigated the most prominent molecular process identified in the transcriptomic analysis. Consistently, the crucial factors of ferroptosis, such as ROS, iron metabolism and lipid anabolism, were highly enriched in high-IITH tumors. To confirm the hypothesis that ferroptosis is significantly upregulated in high-IITH tumors, we performed integrated multiomics analysis. These results suggested that while ferroptosis was initiated in tumors with high imaging heterogeneity, cancer cells activated some compensatory processes to inhibit this programmed cell death as a self-protective mechanism. Consequently, we could block these suppressive processes, such as the thioredoxin pathway, to induce ferroptosis in high-IITH tumors. In summary, we identified ferroptosis activity in tumors with high IITH through integrated analysis and proposed underlying therapeutic targets for these patients with a poor prognosis.

Conclusion

In summary, in this multicenter radiogenomics cohort study, we identified the distinct phenotypes of ITH assessed by DCE-MRI radiomics features and their prognostic value. Furthermore, with genomic, transcriptomic, metabolomic and digital pathological data, we comprehensively validated this heterogeneity assessment method from mesoscopic to microscopic scales and revealed the biological behavior in tumors with high IITH. Notably, we reported ferroptosis as a vulnerability of breast cancers with high IITH and as a promising target in the era of precision oncology.

PO-1320

The value of subregion-based radiomics of contrast-enhanced mammography in differentiating the HER2-enriched and non-HER2-enriched invasive breast cancers: A double-center study

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Purpose: To explore the value of subregion-based radiomics of contrast-enhanced mammography (CEM) in differentiating the HER2-enriched and non-HER2-enriched invasive breast cancers.

Methods: A total of 323 female patients from two medical centers were enrolled. All the patients were divided into the training, internal validation, and external validation cohorts. After whole tumor segmentation of the largest lesions in the CEM recombined images, a two-step clustering strategy was proposed to partition the tumor into multiple subregions. First, over-segment pixels with similar intensity and local entropy into superpixels by k-means clustering at the patient level. Second, merge similar superpixels within the same tumor into subregions by hierarchical clustering at the population level. Subsequently, 851 radiomics features were extracted from the entire tumor and each subregion, respectively. According to the optimal radiomics features selected by one-way analysis of variance and LASSO regression, the whole tumor-based and tumor subregion-based radiomics models were constructed by using the XGBoost classifier. The overall performance of radiomics models was evaluated by the AUCs and 95% CIs.

Results: Three spatially distinct and phenotypically consistent subregions were identified in each tumor. In contrast to the whole tumor-based radiomics models, the tumor subregion-based radiomics models showed significantly higher AUCs in both the internal ($p < 0.010$) and the external validation cohorts ($p = 0.020$). In the internal validation cohort, the AUCs of the whole tumor-based and the subregion-based radiomics models were 0.74 (95% CI: 0.63-0.81) and 0.83 (95% CI: 0.72-0.91), respectively. In the external validation cohort, the AUCs of the two models were 0.71 (95% CI: 0.60-0.80) and 0.81 (95% CI: 0.70-0.91), respectively.

Conclusion: Subregion-based radiomics of CEM exhibited potential for differentiating the HER2-enriched and non-HER2-enriched invasive breast cancers.

PO-1321

Voxelwise mapping of DCE-MRI time-intensity-curve profiles enables visualizing and quantifying hemodynamic heterogeneity in breast lesions

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Objective:

To propose a novel model-free data-driven approach based on the voxelwise mapping of DCE-MRI time-intensity-curve (TIC) profiles for quantifying and visualizing hemodynamic heterogeneity and to validate its potential clinical applications.

Materials & Methods: From December 2018 to July 2022, 259 patients with 325 pathologically confirmed breast lesions who underwent breast DCE-MRI were retrospectively enrolled. Based on the manually segmented breast lesions, the TIC of each voxel within the 3D whole lesion was classified into 19 subtypes based on wash-in rate (nonenhanced, slow, medium, and fast), wash-out enhancement (persistent, plateau, and decline), and wash-out stability (steady and unsteady), and the composition ratio of these 19 subtypes for each lesion was calculated as a new feature set (Type-19). Compared with the three-type TIC classification and semiquantitative parameters, Type-

19 features were used to build a machine-learning model to differentiate lesion malignancy and classify histologic grades, proliferation status, and molecular subtypes.

Results: The Type-19 feature-based model significantly outperformed models based on the three-type TIC method and semiquantitative parameters both in distinguishing lesion malignancy (AUC = 0.875 vs. 0.831, $P = 0.01$ and 0.875 vs. 0.804, $P = 0.03$), predicting tumor proliferation status (AUC = 0.890 vs. 0.548, $P = 0.006$ and 0.890 vs. 0.596, $P = 0.020$), and classifying molecular subtypes (AUC = 0.697 vs. 0.548, $P = 0.009$ and 0.697 vs. 0.534, $P < 0.001$), but not in predicting histologic grades ($P = 0.820$ and 0.970).

Conclusion: In addition to conventional methods, the proposed computational approach provides another novel model-free data-driven approach to quantify and visualize hemodynamic heterogeneity.

PO-1322

Early prediction of pathologic complete response to neoadjuvant chemotherapy using multi-phases DCE-MRI by Siamese network in breast cancer: a prospective longitudinal study

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Objective: To predict pCR in the early stage of neoadjuvant chemotherapy (NAC) using longitudinal dynamic contrast-enhanced (DCE)-MRI by Siamese network (SN) and propose the isochronous proportional sampling (IPS) method to address the issue of rational selection of DCE-MRI phases.

Methods: This prospective longitudinal study recruited participants with breast cancer who underwent NAC, and DCE-MRI before NAC and after two cycles of NAC from March 2022 to December 2022. Firstly, constructing a clinical model based on Boruta and XGBoost. Secondly, four SN models were built based on the different phases of DCE-MRI which were selected by IPS method (SN-1 with peak enhanced phase, SN-2 with 10% phases, SN-3 with 20% phases, and SN-4 with 30% phases). Finally, four integrated models were constructed by combining the clinical and SN model's features. The model performances were compared by the Delong test, net reclassification improvement (NRI) test, and integrated discrimination improvement (IDI) test.

Results: A total of 162 participants (mean age: 50.88 years \pm 7.96) were enrolled. The clinical model achieved an AUC of 0.760 (95% confidence interval: 0.630, 0.890). As the IPS phases increased, the AUCs of SN and integrated models improved. The SN-3 and integrated-2~4 showed significantly higher AUCs than the clinical model (Delong test: all $P < 0.05$). The integrated-3 model showed the best pCR prediction performance with AUCs of 0.949 (95% confidence interval: 0.873, 1.000), which was higher than that of the integrated model with only using single timepoint DCE-MRI (NRI and IDI test: all $P < 0.05$).

Conclusion: The longitudinal multi-phases DCE-MRI based on the Siamese network demonstrates promise for predicting pathological complete response in breast cancer.

PO-1323

Differentiation of Triple-negative and HER2 Positive Breast Cancer Using DISCO CE-MRI

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Introduction the purpose of this work was to implement the aforementioned method to analyze triple-negative vs. non-triple-negative along with HER2 positive vs. HER2 negative cancer lesions, and evaluate the role of quantitative and semi-quantitative parameters in the molecular typing of breast cancer.

DISCO CE-MRI A 3.0-T MR scanner (GE SIGNA™ Premier 3.0T) with a 16-channel phased-array body coil was used for all subjects. DISCO CE-MRI was performed for each participant with a scanning time of about 1 minutes 40 seconds. Detailed scan parameters are presented in Table 1. Gd-DTPA (0.15 mmol/kg) was injected intravenously with a high pressure syringe at a flow rate of 3.0 ml/s, and then rinsed with 20ml normal saline.

Results There were statistical differences in Ktrans, kep, vp, TTP, MAX Conc, AUC and MAX Slope between the triple-negative and non-triple-negative breast cancer groups. The results showed that kep and TTP had diagnostic value for triple-negative breast cancer by binary logistic regression. The ROC curve showed that the diagnostic efficacy of combined parameters ($1.804 \times \text{kep} + 4.802 \times \text{TTP}$, AUC = 0.956, $P < 0.001$) was higher than single parameters, kep (AUC = 0.870, $P = 0.024$) and TTP (AUC = 0.928, $P = 0.002$).

Ktrans, kep, ve, vp, TTP, MAX Conc, AUC and MAX Slope had statistical differences between the HER2 positive and HER2 negative breast cancer groups. The ROC curve showed that kep has diagnostic value in HER2 positive breast cancer (AUC = 0.832, $P = 0.002$)

Conclusion Our results are encouraging and suggest that parameters derived from DISCO CE-MRI could be reliable quantitative biomarkers for the differential diagnosis of triple-negative breast cancer, as well as HER2 positive breast cancer.

PO-1324

External validation of multiparametric MRI-based decision rules for characterizing breast lesions and comparison to Kaiser score and BI-RADS category

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Objectives To externally validate published multiparametric MRI (mpMRI)-based decision rules for characterization of breast lesions and compare to Kaiser score and BI-RADS category.

Methods 206 patients with 218 pathology-proven breast lesions (99 malignancies) were included in this retrospective study from January 2018 to May 2018. Two radiologists blind to pathological results evaluated lesions according to the three mpMRI-based decision rules (Kim2018, Istomin2020, Zhong2022) and Kaiser score. BI-RADS category based on the readers' experiences was retrieved from radiology reports and was also analysed. Diagnostic performance was calculated and compared for the four decision rules and BI-RADS category. The unnecessary biopsy rate for BI-RADS 4 lesions using the four decision rules was calculated.

Results The area under curve (AUC) of mpMRI-based decision rules (0.81-0.84) was significantly lower than BI-RADS category (0.91) and Kaiser score (0.94) (all $p < 0.005$). The mpMRI-based decision rules achieved higher sensitivity (100%) than Kaiser score (91.9%) ($p = 0.003$) and BI-RADS category (96.0%) ($p = 0.679$), but the specificity (21.0-31.8%) was significantly lower than

Kaiser score (87.4%) and BI-RADS category (64.7%) (all $p < 0.001$). All decision rules yielded lower performance for non-mass enhancement (NME) (AUC: 0.64-0.84) than mass (AUC: 0.86-0.96). The unnecessary biopsy rate for BI-RADS 4 lesions was 9.8% (Istomin2020), 12.2% (Zhong2022), 14.6% (Kim2018) and 70.7% (Kaiser score).

Conclusion MpMRI-based decision rules showed good performance for breast lesions characterization, but inferior to Kaiser score and BI-RADS category. The specificity of mpMRI-based decision rules needed to be improved though the sensitivity was high.

PO-1325

Radiomics model based on multi-sequence MRI for accurate diagnosis of complex cystic breast lesions

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Objective: To establish radiomic models for accurate diagnosis of complex cystic breast lesions.

Methods: T2 and DCE images of 142 complex cystic breast lesions from 130 patients were included in the study. Manually sketch the ROI along the edge of the lesion, and then automatically expand it by 1-3mm to obtain 3 outward expanded ROIs, further segmentation is performed inside the lesion to obtain the central and peripheral sub region ROI. Establish diagnostic models based on different ROIs and optimize the best model.

Results: The diagnostic model based on T2 1mm outward expansion ROI and T2 intra tumor segmentation central subregion ROI has superior diagnostic performance, with AUC of 0.96 and 0.89 in training and validation cohorts, respectively. The diagnostic model based on DCE 3mm outward expansion ROI and DCE intra tumor segmentation of surrounding subregion ROI has superior diagnostic performance, with AUC of 0.98 and 0.94 in training and validation cohorts, respectively. The fusion of T2 and DCE models yielded the final diagnostic model with the best diagnostic performance, with AUC of 0.98 and 0.96 in training and validation cohorts, respectively.

Conclusions: We have established a radiomic model based on T2 and DCE images which can diagnose complex cystic breast lesions accurately. It can assist clinicians in making correct diagnoses, especially when there are difficulties in conventional imaging diagnosis or conflicts between different imaging examinations.

PO-1326

Application of Magnetic Resonance Imaging Radiomic Analysis in Differential Diagnosis of Benign and Malignant Breast Lesions

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Objective To evaluate the differential diagnosis of benign and malignant breast lesions by radiomic analysis based on T1-weighted and contrast-enhanced magnetic resonance imaging (CE-MRI), and assessment the diagnostic performance.

Materials and Methods 587 breast lesions, including 404 malignant lesions and 183 benign lesions were retrospectively collected. Three experienced radiologists manually delineated the region of

interest (ROI) of the lesions, and 65 quantitative radiomic features were automatically extracted from T1WI and CE-MRI, respectively. First, Dimensionality reduction of features was conducted, prediction models for diagnosis of benign and malignant lesions were built based on both sequences by logistics regression analysis. Second, the diagnosis performance was evaluated by ROC curve and the radiomics score of the two models were superposed by generalized linear regression. Finally, the weights of the two models were compared and evaluated by nomograms. Results The diagnostic accuracy of radiomic models built by T1WI and CE-MRI was 71.2% and 83.1%, the AUC was 0.742 and 0.887, respectively. The sensitivity was 0.636 and 0.820, and the specificity was 0.740 and 0.855, respectively.

Conclusion Radiomic analysis can be used for distinguishing benign and malignant breast lesions, and the diagnostic efficacy of the model built by CE-MRI was superior to the model built by T1WI. Therefore, radiomic analysis with CE-MRI is expected to become the basic identification tool to aid clinical diagnosis.

PO-1327

Preliminary analysis of the correlation between multi-parameters MRI and ctDNA of breast cancer

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Objective This study sought to investigate the correlation between ctDNA(circulating tumor DNA, ctDNA) of breast cancer and multi-parameters MRI.

Methods Baseline puncture samples of 56 cases of breast cancer were enrolled to observe the expression status of ctDNA between pCR(pathological complete response, pCR) and non-pCR groups. SPSS software was used to analyze the ctDNA differences between pCR and non-pCR groups, and the correlation between the quantitative parameters of IVIM-DWI and DCE-MRI and the expression status of ctDNA was analyzed. $P < 0.05$ was considered statistically significant.

Results Liquid biopsy results of 42 patients were included in the analysis, including 11 cases of pCR (26.19%) and 31 cases of non-pCR (73.81%). The expression status of ctDNA was significantly different between pCR and non-pCR groups ($p < 0.001$). There was no significant correlation between the expression status of ctDNA and the quantitative parameters of IVIM-DWI and DCE-MRI ($p > 0.05$).

Conclusion The expression status of ctDNA was correlated with pCR in NAC of patients with breast cancer, but there was no correlation between multi-parameters MRI and baseline ctDNA.

PO-1328

A Multiparametric MRI-based Radiomic Model for Stratifying Postoperative Recurrence in Luminal B Breast Cancer

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Abstract

Purpose: To develop an MRI-based radiomics model to assess the likelihood of recurrence in Luminal B breast cancer, with the aim of clinical risk stratification and treatment decision-making.

Methods: The study analyzed medical images and clinical data from 244 patients with Luminal B breast cancer,. Of 224 patients, 35 had experienced recurrence and 209 had not of whom 35 had experienced recurrence and 209 had not. The patients were randomly divided into the training set (51.5 ± 12.5 years old; $n = 171$) and the test set (51.7 ± 11.3 years old; $n = 73$) in a ratio of 7:3. The study employed univariate and multivariate Cox regression along with the least absolute shrinkage and selection operator (LASSO) regression methods to select radiomic features and calculate a risk score. A combined model was constructed by integrating the risk score with the clinical and pathological characteristics.

Results: The study identified two radiomic features (GLSZM and GLRLM) from DCE-MRI were used to calculate a risk score. The AUCs were 0.860 and 0.868 in the training set, and 0.816 and 0.714 in the testing set for 3- and 5-year recurrence risk, respectively. The combined model incorporating the risk score, pN, and endocrine therapy showed improved predictive power, with AUCs of 0.857 and 0.912 in the training set and 0.943 and 0.945 in the testing set for 3- and 5-year recurrence risk, respectively. The calibration curve of the combined model showed good consistency between predicted and measured values.

Conclusion: Our study developed an MRI-based radiomic model that integrates clinical and radiomic features to assess the likelihood of recurrence in Luminal B breast cancer. The model shows promise for improving clinical risk stratification and treatment decision-making.

PO-1329

Based on Contrast-Enhanced Mammography Radiomics Analysis for Preoperative Prediction of Breast Cancer Molecular Subtypes

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Background: Preoperative prediction of breast cancer molecular subtypes can help guide individualised clinical treatment of breast cancer patients who cannot be operated on immediately. The study aimed to investigate the diagnostic efficacy of preoperative prediction of molecular subtypes of breast cancer by contrast-enhanced mammography (CEM) radiomic features.

Methods: This retrospective two-centre study included women suffering from breast cancer who underwent CEM preoperatively between August 2016 to May 2022. We finally included a total of 386 lesions in 356 patients, and the lesions were grouped into training ($n=162$), internal test ($n=160$) and external test sets ($n=64$). Radiomics features were extracted from low-energy (LE) images and recombined (RC) images, followed by features selected by minimum redundancy-maximum relevance (mRMR) and recursive feature elimination (RFE) algorithms. Three dichotomous tasks were established based on postoperative immunohistochemical results: Luminal vs. non-Luminal, human epidermal growth factor receptor (HER2)-enriched vs. non-HER2-enriched, and triple-negative breast cancer (TNBC) vs. non-TNBC subtypes. For each dichotomous task, the radiomics models for LE, RC and the LE+RC combined model were built by support vector machine (SVM) classifier. The prediction performance of radiomics models was assessed by the area under the receiver operator characteristic (ROC) curve (AUC). Then calculate accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) for the models. DeLong's test was utilized for comparing the AUCs.

Results: Radiomics models based on CEM to predict molecular subtypes of breast cancer has a good performance. The LE+RC combined model achieved the best performance compared to the LE model and RC model in the test set. The LE+RC combined model predicted Luminal, HER2-enriched, and TNBC subtypes with AUC values of 0.93, 0.89, and 0.87 in the internal test set, and with AUC values of 0.82, 0.83 and 0.69 in the external test set respectively. In addition, the LE model performs more satisfactorily than the RC model.

Conclusion: CEM radiomics features can effectively predict molecular subtypes of breast cancer preoperatively, and the LE+RC combined model has the best predictive performance.

PO-1330

Mammography-based deep learning radiomics for the prediction of upgraded ductal carcinoma in situ

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Background: Establishing a non-invasive and efficient preoperative prediction model for upgraded ductal carcinoma in situ (DCIS) is important for the individualized management. **Purpose:** This study aims to develop a deep learning radiomics nomogram (DLRN) based on mammography for the preoperative prediction of upgraded DCIS. **Methods:** Retrospectively enrolled 336 patients diagnosed by needle biopsy from January 2015 to November 2022, and were divided into training (n=252) and test (n=84) sets. Independent predictors in clinical data, X-ray imaging, pathology and immunohistochemical results were screened. Deep learning (DL) and hand-crafted radiomic (HCR) features of the lesions were extracted respectively. Construct and validate a DLRN based on independent predictors and HCR-DL combined features for the prediction of upgraded DCIS. **Results:** Ki-67 \geq 14% and high nuclear grade were independent predictors of upgraded DCIS (P<0.05). The DLRN based on independent predictors and combined features accurately predicted upgraded DCIS, with the area under the operator characteristic curve (AUC) of 0.931 (95% CI: 0.899, 0.962) in the test set and good calibration. The DLRN outperformed the clinical model and DLR model (P<0.001, as per DeLong test) in the training and test sets. DLR features had the maximum predictive weight in the DLRN. Decision curve analysis (DCA) confirmed the clinical usefulness of the DLRN. **Conclusion:** The mammography-based deep learning radiomic nomogram exhibits excellent performance in predicting upgraded DCIS and offers valuable insights for personalized treatment.

PO-1331

Mean Apparent Propagator-MRI: A Novel Diffusion-Based Approach for Quantitative Assessment of Tumor-Stromal Ratio in Breast Carcinoma

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Background: Tumor stroma is a critical component of the tumor microenvironment. Tumor-stromal ratio (TSR) can be used as an indicator for therapeutic response and prognosis in patients with breast cancer.

Purpose: To determine whether diffusion quantitative metrics from the mean apparent propagator (MAP)-MRI outperformed apparent diffusion coefficient (ADC) value in assessing the TSR status of breast carcinoma.

Materials and Methods: From August 2021 to October 2022, 271 participants were prospectively enrolled (ClinicalTrials: NCT05159323) and underwent breast diffusion spectral imaging and diffusion-weighted imaging. MAP-MRI metrics and ADC value were derived from the diffusion MRI data. All participants were divided into high-TSR (stromal component < 50%) and low-TSR groups (stromal component \geq 50%) based on pathologic examination. Multivariable logistic regression was

used to identify the independent variables for distinguishing TSR status. The area under the receiver operating characteristic curve (AUC) and sensitivity, specificity, and accuracy were compared between the MAP-MRI metrics and ADC value by the Delong test and McNemar test, respectively.

Results: One-hundred-and-eighty-one female participants (mean age, 48.56 years \pm 10.12 [SD]) were included. All the diffusion metrics differed between the high-TSR and low-TSR groups ($P < 0.001$ to $P = 0.013$). Radial non-Gaussianity [NGRad] from MAP-MRI was an independent variable for discriminating high-TSR and low-TSR groups, with a higher AUC (0.796; 95% CI: 0.729, 0.852 vs. 0.608; 95% CI: 0.533, 0.679; $P < 0.001$), specificity (75.5%; 95% CI: 66.0, 83.5 vs. 48.0%; 95% CI: 38.0, 58.2; $P < 0.001$), accuracy (74.0%; 95% CI: 67.0, 80.3 vs. 58.6%; 95% CI: 51.0, 65.8; $P < 0.001$), while a similar sensitivity (72.2%; 95% CI: 60.9, 81.7 vs. 72.2%; 95% CI: 60.9, 81.7; $P > 0.999$) as compared with ADC value.

Conclusion: MAP-MRI could serve as a better approach than ADC value in evaluating the TSR status in patients with breast carcinoma.

PO-1332

Discrimination between HER2-Overexpressing, -Low-Expressing, and -Zero-Expressing Statuses in Breast Cancer using Multiparametric MRI-based Radiomics

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Objectives: To explore the performance of multiparametric MRI-based radiomics in discriminating different human epidermal growth factor receptor 2 (HER2) expressing statuses (i.e., HER2-overexpressing, HER2-low-expressing, and HER2-zero-expressing) in breast cancer.

Methods: 771 breast cancer patients from two institutions were retrospectively studied. 581 patients from Institution I were divided into a training dataset ($n_1 = 407$) and an independent validation dataset ($n_1 = 174$); 190 patients from Institution II formed the external validation dataset. All patients were categorized into HER2-overexpressing, HER2-low-expressing, and HER2-zero-expressing groups based on pathologic examination. Multiparametric (including T2-weighted imaging with fat suppression [T2WI-FS], diffusion-weighted imaging [DWI], apparent diffusion coefficient [ADC], and dynamic contrast-enhanced [DCE]) MRI-based radiomics features were extracted and then selected from the training dataset using the least absolute shrinkage and selection operator (LASSO) regression. Three predictive models to discriminate HER2-overexpressing vs. others, HER2-low expressing vs. others, and HER2-zero-expressing vs. others, were developed based on the selected features. The model performance was evaluated using the area under the receiver operating characteristic curve (AUC).

Results: Eleven radiomics features from DWI, ADC, and DCE, one radiomics feature from DWI, and seventeen radiomics features from DWI, ADC, and DCE were selected to build three predictive models, respectively. In training, independent validation, and external validation datasets, radiomics models achieved AUCs of 0.809, 0.737 and 0.725 in differentiating HER2-overexpressing from others, 0.779, 0.778 and 0.782 in differentiating HER2-low-expressing from others, 0.889, 0.867 and 0.813 in differentiating HER2-zero-expressing from others, respectively.

Conclusions: Multiparametric MRI-based radiomics model may preoperatively predict HER2 statuses in breast cancer patients.

PO-1333

The longitudinal changes in functional MRI during neoadjuvant chemotherapy can predict treatment response early in patients with HER2-positive breast cancer

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Purpose: To investigate whether longitudinal changes in functional MRI can predict early response to neoadjuvant chemotherapy (NAC) for HER2-positive breast cancer (BC) and to further establish quantitative models based on these features.

Methods: A total of 166 HER2-positive BC patients from three centers were included. MRI was performed at baseline and after two cycles of NAC (early post-NAC). Clinicopathological characteristics were enrolled. MRI features were evaluated at baseline and early post-NAC, as well as longitudinal changes in functional MRI, including changes in the longest diameter (LD) of the tumor (Δ LD), apparent diffusion coefficient (ADC) values (Δ ADC), and time-signal intensity curve (TIC) (Δ TIC). The patients were divided into a training set ($n=96$), an internal validation set ($n=32$), and an independent external validation set ($n=38$). Univariate and multivariate logistic regression analyses were used to identify the independent indicators of pCR, which were then used to establish the clinicopathologic model, baseline MRI model, early MRI model, changes MRI model, and combined model. The AUC was used to evaluate the predictive power of the different models, and calibration curves were used to evaluate the consistency of the prediction of pCR in different models.

Results: The baseline MRI features did not predict pCR in univariate analyses (all $p > 0.05$). Ultimately, four models were enrolled in this study, including the clinicopathologic model, early MRI model, changes MRI model, and combined model. The LD of the tumor after two cycles of NAC (OR=0.943, 95% CI=0.890-0.998, $p=0.042$), Δ ADC (OR=1.004, 95% CI=1.002-1.007, $p=0.008$), and Δ TIC (OR=1.283, 95% CI=1.459-12.574, $p=0.002$) were identified as the best predictors of NAC response. The combined model constructed by the combination of LD at early post-NAC, Δ ADC, and Δ TIC showed good predictive performance in the training set (AUC=0.85), internal validation set (AUC=0.81), and external validation set (AUC=0.80), which performed better than the other three models in all sets.

Conclusions: The changes in functional MRI can predict early treatment response for HER2-positive BC and may be helpful for individualized treatment planning.

PO-1334

MRI findings of primary highly-invasive B-cell lymphoma of male breasts: a case reportLiyan Qiu, Jingfeng Zhang, Jianjun Zheng
NINGBO NO.2 HOSPITAL**Introduction**

Primary breast lymphoma is a rare extranodal primary lymphoma, accounting for only 0.05~0.53% of breast malignant tumors and 1.7~2.2% of all extranodal primary non-Hodgkin lymphomas. It is even rarer in men. Breast lymphoma is mostly non-Hodgkin lymphoma, mainly derived from B cells. The imaging findings are complex and diverse, lack specificity, and are easily misdiagnosed as breast cancer or benign tumors (such as fibroadenomas). Imaging of primary breast lymphoma, especially magnetic resonance imaging, is rarely reported.

Case report

A 74-year-old man presented to the surgical department because of the progressive enlargement of bilateral breasts for more than one month. Physical examination: male breast, symmetrical diffuse enlargement on both breasts, unclear boundary, moderate activity, and no tenderness. No obvious enlarged lymph nodes were found in the armpits and clavicles on both sides. Ultrasound findings: mixed space occupying lesions in bilateral breasts, with a diameter of about 18 mm, as a fusion of multiple echogenic areas with clear boundaries, and strip blood flow signals visible inside, suggesting that the mixed space occupying lesions in bilateral breast are BI-RADS 4A. Breast MRI findings: male breast with diffuse nodular distribution on both glands, clear boundaries, partially fused, no burr at the edges, involving the whole gland; slightly hypointense signal on T1WI and slightly hyperintense signal on T2WI, sharply hyperintense signal on DWI ($b=1000$); reduced ADC signal, restricted diffusion, and ADC value= $0.622 \times 10^{-3} \text{mm}^2/\text{s}$. Dynamic contrast enhanced MRI images showed a distinct early-homogeneous-enhancement of the lesions, while the delayed images indicated a mild decrease in the amplitude of enhancement. The time-signal intensity curves were either washout type or plateau type. A strip of edema signal shadow (appeared long on both T1WI and T2WI) was observed in bilateral posterior breast space. The above findings suggest diffuse nodular signal abnormalities in both mammary glands, therefore the initial diagnostic impression is malignant tumor, with a high probability of lymphoma. BI-RADS: 5. Coarse needle aspiration biopsy of right breast tumor was performed under ultrasound guidance. Pathological findings: (right breast) highly aggressive B-cell lymphoma. In combination with immunohistochemical markers, further consideration can be made: 1. double-hit/three-hit lymphoma; 2. CD5 positive diffuse large B-cell lymphoma. (Wax block) (Right breast): CD20 (+), PAX-5 (+), CD10 (-), Bcl-6 (-), Mum-1 (+), Bcl-2 (+90%), Ki-67 (+90%), C-myc (+90%), CD3 (-), CD5 (+), CD21 (-), CD23 (-), TdT (-), CD30 (-), P53 (normal coloring), PD-1 (-), CD19 (+weak), CyclinD1 (-), EBER (-), Her2 BC (0), ER (-), PR (-), E-Cadherin (-), p63+CKpan (-), CK5/6 (-), GATA-3 (-), CD79a (+), CD43 (+).

Discussion

Primary lymphoma of the breast is a tumor of the blood system. It is more common in women and rare in men in this case. Clinically, an enlarged, painless, and palpable mass is the first manifestation, whereas this case presents with a diffuse enlargement of both breasts, which is rare. Imaging findings lack specificity and are prone to misdiagnosis. The literature reports that radical surgery does not confer a survival benefit on patients, but is associated with a poor prognosis. At present, a combination of surgery, chemotherapy and radiotherapy is mostly used. Therefore, it is necessary to improve the radiographic understanding of primary lymphoma of the breast and to avoid surgical intervention other than excisional biopsy. Biopsy or postoperative pathology remains an effective means of confirming the diagnosis, however cytology does not allow for accurate staging and grading of NHL and whole-body PET/CT is usually recommended for proper staging. Combined with this case and previous literature, MRI of primary breast lymphoma has some meaningful imaging signs: unilateral or bilateral onset, mass or infiltrative type, clear lesion boundaries, confluent lesions, few burrs; equal or slightly hypointense signal on T1WI and slightly hyperintense signal on T2WI; early homogeneous enhancement, plateau or washout types predominant on TIC; significant increase in the DWI signal and significant decrease in ADC values. It should be mentioned that posterior interstitial breast oedema, a malignant sign in this case, is not specific, and it can also be seen in other malignant tumors of the breast.

Conclusion

Primary lymphoma of the breast is rare and has certain features on MRI, and radiologists and clinicians should raise awareness of the disease to avoid unnecessary surgical treatment.

PO-1335

Whole-tumor Histogram Analysis of Multiparametric Breast Magnetic Resonance Imaging to Differentiate Pure Mucinous Breast Carcinomas from Fibroadenomas with High-signal Intensity on T2WI.

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Purpose

To investigate the utility of whole-tumor histogram analysis based on multiparametric MRI in distinguishing pure mucinous breast carcinomas (PMBCs) from Fibroadenomas (FAs) with strong high-signal intensity on T2-weighted imaging (T2-SHi).

Material and methods

The study included 20 patients (mean age, 55.80 ± 15.54 years) with single PMBCs and 29 patients (mean age, 42.31 ± 13.91 years) with single FAs exhibiting T2-SHi. Two radiologists performed whole-tumor histogram analysis between PMBC and FA groups with T2-SHi using multiparametric MRI, including T2-weighted imaging (T2WI), diffusion weighted imaging (DWI) with apparent diffusion coefficient (ADC) maps, and the first (DCE_T1) and last (DCE_T4) phases of T1-weighted dynamic contrast-enhanced imaging (DCE) images, to extract 11 whole-tumor histogram parameters, respectively. Histogram parameters were compared between the two groups to identify significant variables using univariate analyses, and their diagnostic performance was assessed by receiver operating characteristic (ROC) curve analysis and logistic regression analyses. Pearson's correlation coefficients were used to analyse the correlations between histogram parameters and Ki-67 expression.

Results

For T2WI images, mean, median, maximum, 90th percentile, variance, homogeneity, and entropy significantly differed in PMBCs and FAs with T2-SHi (all $p < 0.05$), yielding a combined area under the curve (AUC) of 0.927. For ADC maps, entropy was significantly lower in FAs with T2-SHi than in PMBCs ($p = 0.028$). In both DCE_T1 and DCE_T4 sequences, FAs with T2-SHi showed significantly higher minimum values than PMBCs ($p = 0.007$ and 0.023 , respectively). The highest AUC value of 0.956 (sensitivity, 0.862; specificity, 0.944; positive predictive value, 0.962; negative predictive value, 0.810) was obtained when all significant histogram parameters were combined.

Conclusions

Whole-tumor histogram analysis using multiparametric MRI is valuable for differentiating PMBCs from FAs with T2-SHi.

PO-1336

Comparison of Radiomics-Based Machine-Learning Classifiers for Pretreatment Prediction of Pathologic Complete Response to Neoadjuvant Therapy in Breast Cancer.

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Background:

In recent years, machine learning (ML) classifiers have gradually been used to establish high-performance predictive models for pathological complete response (pCR) in breast cancer after neoadjuvant therapy (NAT). However, few studies have compared the effectiveness of different ML classifiers. This study investigated the ability of radiomics models based on pre- and post-contrast first-phase T1 weighted images (T1WI) to predict breast cancer pCR after NAT and compared the performance of different ML classifiers.

Methods: In this retrospective study, 300 patients from the Duke-Breast-Cancer-MRI dataset who underwent neoadjuvant therapy (NAT) were included, including pCR (n=76) and non-pCR (n=224) cases. These patients were randomly divided into training and validation groups at a ratio of 8:2. Radiomics features were extracted from pre- and post-contrast first-phase T1WI images of each patient. The radiomics model was built using features selected through the Spearman correlation analysis and the Least Absolute Shrinkage and Selection Operator (LASSO) algorithm after normalization. Support vector machine (SVM), random forest (RF), extraTrees, decision tree (DT), k-Nearest Neighbor (KNN), extreme gradient boosting (XGBoost), light gradient boosting machine (LightGBM) were used as classifiers. Receiver operating characteristic (ROC) curves were used to assess the predictive performance of the radiomics models.

Results:

Out of the seven classifiers used, the LightGBM classifier performed best in predicting breast cancer pCR, with an AUC of 0.813 in the validation group (95% CI: 0.697-0.928, accuracy 78.3%, sensitivity 46.7%, specificity 100.0%). During subgroup analysis, RF achieved the highest AUC in pCR prediction in luminal breast cancers (0.859, 95% CI: 0.710-1.000, accuracy 85.9%, sensitivity 68.8%, and specificity 83.3%), and DT yielded the highest AUC in pCR prediction in triple negative (TN) breast cancers (0.909, 95% CI: 0.790-1.000, accuracy 88.2%, specificity 81.8%, accuracy 100%).

Conclusion:

Overall, the LightGBM-based radiomics model demonstrated superior performance in predicting breast cancer pCR, while Random Forest (RF) and Decision Tree (DT) displayed promising results in predicting pCR for luminal and TN breast cancers, respectively, during subgroup analysis.

PO-1337

Effect of MicroRNA-766 Promotes Proliferation, Chemoresistance, Migration, and Invasion of Breast Cancer Cells

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Introduction: Breast cancer (BCa) remains the most common cancer in women worldwide. It has been shown that microRNAs (miRs) play essential roles in tumorigenesis and progression in many types of cancers, including BCa. We assessed the role of miR-766 on the proliferation, chemosensitivity, migration, and invasion of BCa cells.

Materials and Methods: The effect of miR-766 on the proliferation of MCF-7 and T47D BCa cells was evaluated using the MTT assay. The function of miR-766 on the migration and invasion of MCF-7 and T47D cells was examined using Transwell migration and Matrigel invasion assays. Protein expression was evaluated by Western blot. The role of miR-766 on 5-fluorouracil-induced apoptosis in MCF-7 and T47D cells was determined using the Caspase-Glo3/7 assay. A sub_x0002_cutaneous tumor xenograft was performed to examine the effect of miR-766 on tumor growth in vivo. **Results:** Upregulation of miR-766 improved the proliferation, invasion, and migration of BCa cells. Furthermore, miR-766 reduced the sensitivity of MCF-7 and T47D cells to 5-fluorouracil treatment. The tumor xenograft experiment showed that miR-766 promoted BCa growth in vivo. miR-766 decreased 5-fluorouracil-induced apoptosis by regulation of BAX and Bcl-2 expression. miR-766 also affected the epithelial-mesenchymal transition by altering

E_x0002_cadherin, N-cadherin, SNAIL, and vimentin expression in MCF-7 and T47D cells. Further study showed that the expression of phosphatase and tensin homolog and phosphorylated AKT in MCF-7 and T47D cells had changed after aberrant expression of miR-766. Conclusion: miR-766 displayed important roles in tumorigenesis and progression in BCa cells and might act as a potential biomarker to predict the chemotherapy response and progression in BCa.

PO-1338

Classification of asymmetry in mammography via the DenseNet convolutional neural network

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Purpose: To investigate the effectiveness of a deep learning system based on the DenseNet convolutional neural network in diagnosing benign and malignant asymmetric lesions in mammography.

Methods: Clinical and image data from 460 women aged 23–82 years (47.57 ± 8.73 years) with asymmetric lesions who underwent mammography at Shenzhen People's Hospital, Shenzhen Luohu District People's Hospital, and Shenzhen Hospital of Peking University from December 2019 to December 2020 were retrospectively analyzed. Two senior radiologists, two junior radiologists, and the DL system read the mammographic images of 460 patients, respectively, and finally recorded the BI-RADS classification of asymmetric lesions. We then used the area under the curve (AUC) of the receiver operating characteristic (ROC) to evaluate the diagnostic efficacy and the difference between AUCs by the Delong method.

Results: Specificity (0.909 vs. 0.835, 0.790, $\chi^2=8.21$ and 17.22, $p<0.05$) and precision (0.872 vs. 0.763, 0.726, $\chi^2=9.23$ and 5.22, $p<0.05$) of the DL system in the diagnosis of benign and malignant asymmetric lesions were higher than those of junior radiologist A and B, and there was a statistically significant difference between AUCs (0.778 vs. 0.579, 0.564, $Z = 4.033$ and 4.460, $p < 0.05$). Furthermore, the AUC (0.778 vs. 0.904, 0.862, $Z = 3.191$, and 2.167, $p < 0.05$) of benign and malignant asymmetric lesions diagnosed by the DL system was lower than that of senior radiologist A and senior radiologist B.

Conclusions: The DL system based on the DenseNet convolution neural network has high diagnostic efficiency, which can help junior radiologists evaluate benign and malignant asymmetric lesions more accurately. It can also improve diagnostic accuracy and reduce missed diagnoses caused by inexperienced junior radiologists.

PO-1339

A machine learning approach based on multiparameter MRI to identify the risk of non-sentinel lymph node metastasis in patients with early-stage breast cancer

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Objectives It has been reported that early breast cancer patients with 1-2 positive sentinel lymph node (SLN) have a lower risk of non-sentinel lymph node (NSLN) metastasis and can not benefit from axillary lymph node dissection (ALND). The purpose of this study was to develop the potential of machine learning (ML) based on multiparameter MRI (mpMRI) and clinical factors for predicting the risk of NSLN metastasis in early breast cancer.

Methods This retrospective study included 144 patients with 1-2 positive SLN breast cancer. mpMRI morphologic findings and the detailed demographical characteristics of the primary tumor and axillary lymph node (ALN) were extracted. The logistic regression (LR), support vector machine (SVM), extreme gradient boosting (XGBoost) and random forest (RF) algorithm models were established to predict the risk of NSLN metastasis. The prediction efficiency of ML-based model was evaluated. Finally, the relative importance of each input variable was analyzed for the best model.

Results Of all patients, 55.6% (80/144) patients developed NSLN metastasis. 24 imaging features and 14 clinicopathological features were analyzed. XGBoost algorithm had the strongest prediction efficiency with area under curve (AUC) of 0.881 and 0.781 in the training set and test set, respectively. Five main factors for metastasis of NSLN were found which included histological grade, cortical thickness of lymph node (LN), fatty hilum of LN, short axis of LN and age.

Conclusions Machine learning model incorporating mpMRI features and clinical factors can predict NSLN metastasis with high accuracy for early breast cancer and provide predictive information for clinical protocol.

PO-1340

Assessment on contrast-enhanced CBBCT lexicons for breast cancers: A comparative study with mammography and MRI

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Purpose: To investigate the lexicons and evaluation standards for contrast enhanced cone-beam breast computed tomography (CE-CBBCT) by comparing the agreement with mammography or breast MRI for semantic features evaluation.

Methods and Materials: In this retrospective study, we enrolled the patients who underwent preoperative CE-CBBCT, breast MRI and mammography from December 2017 to April 2021, and were pathologically confirmed with breast cancer. A set of imaging features of breast cancer were evaluated by consensus double reading referring to the breast imaging reporting and data system (BI-RADS) atlas as guidance, with a wash-out period of 2 weeks, including breast composition category, background parenchymal enhancement (BPE), lesion focality, lesion type, morphology features, kinetic feature and microcalcification characteristics. The agreements between CE-CBBCT and another two modalities were calculated by weighted Kappa or Kappa coefficient, to determine the reliability for application of corresponding lexicons to CBBCT images. Then, we evaluated the reproducibility of these lexicons by inter-reader agreement assessment.

Results: A total of 200 malignant lesions were enrolled. The detection rate of CE-CBBCT, breast MRI and mammography were 100.00% (200/200), 99.50% (199/200), and 98.50% (197/200). The agreement on breast composition category with mammograms (Kappa=0.753) was higher than that on breast MRI (Kappa=0.626), while the BPE level showed substantial degree with breast MRI (Kappa=0.624). Compared to breast MRI, CE-CBBCT images showed almost perfect agreement on lesion type identification (Kappa=0.805), and substantial agreement on morphology and enhancement assessment (mass: Kappa=0.639-0.721; non-mass enhancement, NME: Kappa=0.602-0.617). Compared to mammograms, non-contrast enhanced CBBCT (NCE-CBBCT) showed almost perfect agreement on microcalcification detection (Kappa=0.958) and substantial agreement on features evaluation (Kappa=0.710-0.738). The inter-reader agreement showed substantial to almost perfect on CBBCT features evaluation (Kappa=0.648-0.876).

Conclusion: CE-CBBCT images combined the morphology and part of hemodynamic features on MRI images and microcalcification characteristics on mammograms, indicating that the corresponding BI-RADS lexicons could be used to describe CE-CBBCT characteristics associated with breast cancers better for comparative imaging development.

PO-1341

Diagnostic Performance of Unenhanced MR Imaging for assessment of normal-sized nodal staging in Breast cancer

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Objective To prospectively assess the diagnostic performance of axillary T1-weighted (T1W) and diffusion-weighted (DW) magnetic resonance imaging (MRI) in the detection of axillary lymph node metastases in patients with breast cancer staged as N0 with preoperative cross-sectional imaging. **Methods** Fifty patients were included. Patients with no enlarged lymph nodes on preoperative cross-sectional images who were scheduled for sentinel lymph node biopsy (SLNB) or axillary lymph node dissection (ALND) were enrolled. All patients were examined with a 3-T MRI unit, and examinations included high-spatial-resolution axillary T1W imaging without fat suppression and DW imaging ($b = 50$, and 800 sec/mm^2). Two radiologists independently scored each normal-sized nodes on a confidence level, first on T1W images, then on DW images. Two researchers independently measured the mean apparent diffusion coefficient (ADC) of each lymph node. Diagnostic performance parameters were calculated on the basis of per-node and per-patient validation.

Results With respective per-node and per-patient validation, T1W imaging had a specificity of 83%–84% and 53%–58%, sensitivity of 86% and 93%, negative predictive value (NPV) of 97% and 95%–97%, positive predictive value (PPV) of 42%–44% and 48%–51%, and area under the receiver operating characteristic curve (AUC) of 0.85–0.86 and 0.73–0.76, with good interobserver agreement ($k = 0.75$). Addition of DW imaging resulted in comparable diagnostic performance. There was no significant difference between mean ADC values of benign and malignant lymph nodes.

Conclusions High-spatial-resolution axillary T1W imaging exhibit good diagnostic performance for normal-sized nodes metastasis of patients with breast cancer diagnosed as N0 with conventional cross-sectional imaging techniques.

PO-1342

Differentiating Benign and Malignant Proliferative Breast Lesions Using a Continuous-Time Random-Walk (CTRW) Diffusion Model

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Purpose

The high b-value DWI with a continuous-time random-walk (CTRW) diffusion model has been thought as useful for probing intravoxel tissue heterogeneity in cancer imaging. So the purpose of our study was to test whether high b-value DWI with a CTRW diffusion model could be used for classification of benign and malignant proliferative breast lesions.

Methods

From May 2021 to March 2022, 100 patients (all female) ranging in age from 33 to 82 years (mean age: 52 years) were included in this study. Their breast MRI examination were all performed using 3T MR system (uMR790, United Imaging Healthcare, Shanghai, China) with high b-value diffusion. They all had suspicious lesions in breast MRI described as BI-RADS 4 at least and pathologically confirmed with benign or malignant status by biopsy. Echo-planar diffusion-weighted imaging (DWI) was conducted using 11 b-values ($b = 0, 50, 100, 200, 400, 800, 1200, 1500, 2000, 2500, 3000$ s/mm²) with total scan time 6 min 13 s covering the whole breast. The ROI containing the entire tumor, excluding necrotic areas, was drawn on the slice with the maximum diameter of tumor. Three CTRW model parameters, including an anomalous diffusion coefficient D_m , and two parameters related to temporal and spatial diffusion heterogeneity α and β , respectively, were obtained. The ADC was also calculated using 2 b-values ($b = 0, 800$ s/mm²) by the same ROI. D_m , α , β and ADC were compared between benign and malignant group by Mann–Whitney U test and receiver operating characteristic (ROC) analysis was performed.

Results

This study included 87 breast cancer and 13 benign breast lesions (6 adenopathy, 3 intraductal papilloma, 2 fibroadenoma and 1 granulomatous mastitis). The D_m , α and ADC were significantly lower for malignant breast lesions [D_m : 1.081 (0.517, 1.819) $\mu\text{m}^2/\text{ms}$; α : 0.805 (0.435, 0.999); ADC: 1.178 (0.589, 1.992) $\mu\text{m}^2/\text{ms}$] than benign breast lesions [D_m : 1.452 (0.950, 2.024) $\mu\text{m}^2/\text{ms}$; α : 0.905 (0.755, 0.964); ADC: 1.632 (1.054, 2.180) $\mu\text{m}^2/\text{ms}$] ($p < 0.001$). The β between benign [β : 0.877 (0.745, 0.927)] and malignant [β : 0.842 (0.681, 1.000)] breast lesions were not significantly different ($p = 0.280$). The sensitivity, specificity, accuracy, and area-under-the-curve (AUC) of using the combination of the D_m and α were 95.4%, 69.2%, 92.0% and 0.858 for benign and malignant breast lesion classification, similar with D_m (AUC=0.828), α (AUC=0.815) and ADC (AUC=0.821) alone ($p > 0.05$).

Conclusion

It is feasible to use high b-value DWI with a CTRW Model in classification of benign and malignant proliferative breast lesions.

PO-1343

Does biopsy influence effectiveness of radiomics in the classification of benign lesions and cancers on breast MRI?

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PURPOSE

To assess robustness of radiomic features extracted from DCE-MR images acquired pre- or post-biopsy for classification of breast lesions as benign or malignant and to compare to previous results for breast lesions imaged at a different center.

METHOD AND MATERIALS

Dynamic contrast-enhanced magnetic resonance (DCE-MR) images of 602 breast lesions (283 benign lesions and 248 malignant cancers imaged pre-biopsy, 17 benign lesions and 54 malignant cancers imaged post-biopsy) were acquired under HIPAA/IRB compliance. The lesions were segmented automatically using a fuzzy c-means method. Radiomic features describing shape, morphology, kinetics and texture were extracted using previously reported CADx methods. Feature distributions with respect to biopsy condition were compared using the Kolmogorov-Smirnov statistic. For classification of lesions as benign or malignant, areas under the ROC curve (AUC) were determined for each feature using 2000 bootstrap iterations. Median of AUC and confidence interval for difference in AUC were determined for each feature by biopsy condition and compared

using correction for multiple comparisons. The results were compared to those in a previous study of 361 cases (92 benign and 30 luminal A pre-biopsy lesions; 40 benign and 199 luminal A post-biopsy lesions) collected at a different imaging center, wherein all features failed to demonstrate significant difference in median AUC for the classification task.

RESULTS

Seven features of malignant cancers (irregularity, variance of radial gradient histogram, five texture features) demonstrated significant difference in features compared pre- and post-biopsy, while one feature of benign lesions (irregularity) demonstrated significant difference. All features failed to demonstrate significant difference in median AUC.

CONCLUSION

Radiomic features extracted from DCE-MR images failed to show significant differences in AUC performance in classifying breast lesions as benign or malignant and may be robust for use in this task. This independent finding validates similar results in classification of breast lesions as benign or luminal A in images acquired at a different medical center.

CLINICAL RELEVANCE/APPLICATION

Classification of breast lesions by extracted radiomic MRI signatures might not be sensitive to biopsy condition.

PO-1344

Using machine learning to assess tumor metastatic lymph nodes and Ki-67 expression aggressiveness from breast MRI using a large clinical dataset of 300 cancers

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PURPOSE

To evaluate quantitative MRI radiomics in the task of identifying metastatic versus nonmetastatic axillary lymph nodes and Ki-67 expression aggressiveness.

METHOD AND MATERIALS

Our research involved a HIPAA-compliant, DCE-MRI database of 300 breast cancer cases. The average age was 47.2 years with a standard deviation of 9.6 years and a range from 25 to 77 years with a median of 47 years. The clinical cohort included 48 low Ki-67 expression (Ki-67 proliferation index < 14%) and 252 cases with high Ki-67 expression (Ki-67 proliferation index \geq 14%), indicating a range of tumor aggressiveness. The cohort also included 93 cases with axillary lymph node metastasis and 201 cases without metastasis. The images had been obtained with a gadodiamide-enhanced T1-weighted spoiled gradient-recalled acquisition in the steady state sequence. Primary lesions underwent computerized radiomic analysis in which tumor segmentation and extraction were automatically conducted on an existing CADx workstation. These computer-extracted features included MRI-based phenotypes from six categories: size, shape, morphology, enhancement texture, kinetics, and enhancement-variance kinetics. Radiomic features were input to a Bayesian artificial neural network classifier (BANN) and underwent leave-one-case-out cross validation. Area under the ROC curve (AUC) served as the figure of merit in the classification tasks.

RESULTS

In the task of identifying Ki-67 expression and lymph node status, the analyses of the various radiomic phenotypes yielded AUCs ranging from 0.50 (se = 0.05) to 0.69 (se = 0.04). The Ki-67 MRI-based tumor signature produced an AUC value of 0.71 (se = 0.04). In the task of assessing the status of axillary lymph.

PO-1345

Comparison of magnetic resonance guided core needle biopsy and vacuum-assisted biopsy in breast lesions

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Objective: The purpose of this study was to retrospectively analyze the diagnostic value of magnetic resonance-guided core needle biopsy (CNB) and vacuum-assisted biopsy (VAB) for suspicious breast lesions.

Methods: Between August 2019 and December 2022, 36 consecutive women (mean age 45.77 ± 10.25 years; age range 22-66 years) with a total of 37 MRI-detected suspicious lesions (BI-RADS 4-5) were performed MR-guided breast lesion biopsies, 13 CNB cases and 24 VAB cases were retrospectively evaluated. The final pathology diagnosis after surgery or the results of at least six months of follow-up for benign lesions were considered the gold standard. The following parameters were evaluated and compared for the two methods: accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), false positivity, and false negativity. Then, the operation time, intraoperative and postoperative complications were compared.

Results: Technical success was achieved in all biopsies. CNB showed 84.62% (11/13) diagnostic accuracy, 60% (3/5) sensitivity, 100% (8/8) specificity and 100% (3/3) PPV, 80% (8/10) NPV whereas VAB revealed 100% (24/24) diagnostic accuracy, 100% (6/6) sensitivity, 100% (18/18) specificity and 100% (6/6) PPV, 100% (18/18) NPV. VAB required significantly longer biopsy time than CNB (39.83 ± 8.51 min vs 27.77 ± 5.36 min), the difference was statistically significant ($P < 0.001$). No severe complications such as massive bleeding and infection occurred intraoperative or postoperative in the two groups.

Conclusion: Compared with CNB, VAB is the optimal biopsy technique because of the substantially significant advantages in accuracy, sensitivity and negative predictive value of pathological diagnosis. The distribution of malignancy rate were not significantly different between the two groups.

PO-1346

Application Value of Cone-beam Breast Computed Tomography, Mammography and MRI for Diagnosing Breast Cancer

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Objective: To compare the diagnostic efficiency of breast lesions based on cone-beam breast computed tomography (CBBCT), mammography (MG) and MRI, to conduct stratified analysis according to patients' age, breast density and the type of lesions, so as to provide reference for physicians and patients.

Methods: Patients who received non-contrast enhanced CBBCT (NCE-CBBCT), contrast enhanced CBBCT (CE-CBBCT), MG and MRI before treatment in a single-center were reviewed.

All lesions were confirmed by pathology or regarded as benign by at least one-year's follow-up. Three radiologists read all images and diagnosed visible lesions referring to the 5th BI-RADS. Taking pathological results as the gold standard and BI-RADS 4b as the cut-off point, AUCs, sensitivities, specificities, positive predictive values (PPVs), negative predictive values (NPVs) were calculated to evaluate the diagnostic efficiency. Subgroup analysis were conducted according to patients' age, breast density and the type of lesions. Percentage was used to display the diagnostic accuracy for pTis and pT1 breast cancer. DeLong's test, McNemar's test or continuity correction formula were used to compare the statistical difference between above indicators. Intraclass correlation coefficient (ICC) was used to evaluate the consistency of diagnosis between three radiologists.

Results: A total of 208 female patients (233 lesions) were included, with a median age of 48 years. Among enrolled lesions, 177 were malignant and 56 were benign. Detection rate of NCE-CBBCT, CE-CBBCT, MG and MRI were 95.7%, 100%, 88.0%, 97.0%. In the total sample, AUCs based on NCE-CBBCT, CE-CBBCT, MRI were 0.918, 0.965, 0.964, they were both superior to MG (AUC=0.865; all $p < 0.05$), and on CE-CBBCT and MRI were superior to NCE-CBBCT ($p = 0.007$, $p = 0.011$). Sensitivities based on NCE-CBBCT (94.4%), CE-CBBCT (98.9%) and MRI (85.9%) were both higher than MG (97.7%, all $p < 0.05$), and CE-CBBCT was 4.5% higher than NCE-CBBCT ($p = 0.008$). NPV based on CE-CBBCT (95.4%) was higher than MG (60.9%, $p = 0.042$), but other indicators between each modality were comparable (all $p > 0.05$). In subgroup analysis, sensitivities based on NCE-CBBCT (98.7%), CE-CBBCT (100%) and MRI (98.7%) were higher than MG (83.1%, $p < 0.05$) in 41-50 years old group, and on CE-CBBCT and MRI (both 98.4%) were higher than MG (87.3%, $p = 0.016$) in > 50 years old group; sensitivities based on NCE-CBBCT (94.6%), CE-CBBCT (99.3%) and MRI (98.0%) were both higher than MG (84.6%, all $p < 0.05$) in dense breast group, but there were no statistical difference compared to NCE-CBBCT and CE-CBBCT ($p > 0.05$); sensitivity based on NCE-CBBCT (90.3%) was 15% higher than MG ($p = 0.001$) in non-calcification group, other indicators were both comparable in each subgroups (all $p > 0.05$). Each modalities had comparable accuracy for diagnosing pTis stage breast cancer in both dense and non-dense breasts (all $p > 0.05$). The diagnostic accuracy based on CE-CBBCT and MRI (both 98.2%) for pT1 stage in dense breasts were higher than MG (68.2%, $p = 0.001$). ICCs for diagnosis between three physicians were at least good (ICC=0.698-0.971, $p < 0.001$).

Conclusion: The diagnostic efficiency of NCE-CBBCT, CE-CBBCT and MRI are both superior to MG, which is mainly reflected in 41-50 years old women with dense breast, and above three modalities can both increase the diagnostic sensitivity for non-calcification lesions, especially for CE-CBBCT and MRI. The diagnostic accuracy for pT1 stage breast cancer in dense breasts based on CE-CBBCT and MRI are both high, indicating that it's recommended to supplement CE-CBBCT or MRI examination for those suspicious positive people but have negative result on MG. The diagnostic efficiency based on CE-CBBCT and MRI are comparable, indicating CE-CBBCT can become an alternative method for people with contraindications to MRI.

PO-1347

Mammography-Based Nomogram for Predicting Malignant Risk of Breast Suspicious Microcalcifications

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Aim: To establish a mammography (MG)-based nomogram for predicting malignant risk of breast suspicious microcalcifications (MCs).

Materials and Methods: The patients with breast suspicious MCs detected by MG and underwent surgical excisional biopsies at our hospital from January 2016 to June 2021 were retrospectively analyzed. Univariate and multivariate analyses were used to identify potential risk factors. Then,

we developed a nomogram for predicting malignant risk of breast suspicious MCs. Finally, the receiver operating characteristic (ROC) curve, decision curve analysis (DCA) curve, and calibration curve were used to evaluate discrimination, accuracy, and practicability of the nomogram.

Results: A total of 464 patients were enrolled in this study with a malignancy rate of 39.7%. Multivariate analyses showed that maximum diameters、morphology and distribution of MCs were independent risk factors for malignant breast MCs. Based on the above independent risk factors, the nomogram was constructed for predicting malignant risk of breast suspicious MCs. The sensitivity, specificity, accuracy and the area under ROC curve (AUC) value for nomogram were 0.625, 0.950, 0.816 and 0.834 (95%CI:0.758-0.910) in the training set and 0.719, 0.945, 0.857 and 0.876(95%CI:0.833-0.919) in the validation set, respectively. The calibration curves and the DCA indicated a satisfactory predictive accuracy and clinical applicability.

Conclusions: A novel nomogram integrating maximum diameters、morphology and distribution of MCs for predicting malignant risk of breast suspicious MCs was successfully established. Our nomogram could help clinicians preoperatively make individual diagnoses and make appropriate clinical decisions.

PO-1348

Mammography-Based Radiomic Nomogram for Predicting Malignant Risk of Breast Suspicious Microcalcifications

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Aim To establish a mammography (MG)-based radiomic nomogram for predicting malignant risk of breast suspicious microcalcifications (MCs).

Methods 496 patients with histologically confirmed BI-RADS category 4 suspicious MCs were randomly divided into the training set (n=346) and the validation set (n=150). Radiomics features was extracted from the craniocaudal (CC) and mediolateral oblique (MLO) images. Least absolute shrinkage and selection operator (LASSO) algorithm were used to select radiomics features, then radiomics score (rad-score) was calculated. Univariate analysis was used to identify malignant MCs-related clinical independent risk factors. Multivariate logistic regression was used to establish a clinical-radiomics model by incorporating rad-score and clinic factors. A nomogram was developed to visualize the clinical-radiomics model. The receiver operating characteristic (ROC) curve、calibration curve and decision curve analysis (DCA) were used to evaluate the performance of the nomogram.

Results The rad-score was consisted of 29 optimal radiomics features. We developed a nomogram by incorporating rad-score, menopause status, MCs morphology and distribution, the area under the curve (AUC) value of the combined model was 0.929 (95%CI:0.896-0.962) for the validation set. The calibration curves and DCA indicated the combined model had favorable calibration and clinical utility.

Conclusion The combined model could be considered as a potential imaging marker to predict malignant risk of breast suspicious MCs.

PO-1349

Prediction of HER2 Status in Breast Cancer by Mammographic Radiomics Features and Clinical Characteristics: A Multicenter Study

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Objectives: To preoperatively evaluate the human epidermal growth factor 2 (HER2) status in breast cancer using radiomics features extracted from digital mammograph (DM) and clinical characteristics.

Methods: This study included a cohort of 1512 Chinese women, with invasive ductal carcinoma of no special type (IDC-NST), from two different hospitals (1332 from Institution A, used for training and testing the models, and 180 women from Institution B, as the external validation cohort). The Gradient Boosting Machine (GBM) was employed to establish radiomics model and multiomics model using radiomics features and clinical characteristics. Model efficacy was evaluated by the area under the curve (AUC).

Results: The number of HER2 positive patients in the training, testing and external validation cohort was 245(26.3%), 105 (26.3.8%) and 51(28.3%), respectively, with no statistical differences among the three cohorts ($P = 0.842$, Chi-square test). The radiomics model, based solely on the radiomics features, achieved an AUC of 0.814 (95% CI: 0.784-0.844) in the training cohort, 0.776 (95% CI: 0.727-0.825) in the testing cohort and 0.702 (95% CI: 0.614-0.790) in the external validation cohort. The multiomics model, incorporated radiomics features with clinical characteristics, consistently outperformed the radiomics model with AUC values of 0.838 (95% CI: 0.810-0.866) in the training cohort, 0.788 (95% CI: 0.741-0.835) in the testing cohort, and 0.722 (95% CI: 0.637-0.811) in the external validation cohort.

Conclusions: Our study demonstrates that a model based on radiomics features and clinical characteristics has the potential to accurately predict HER2 status of breast cancer patients across different centers.

PO-1350

Automatic deep learning method for detection and classification of breast lesions in dynamic contrast-enhanced magnetic resonance imaging

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Purpose: The purpose of this study was to develop a deep learning-based system with a cascade feature pyramid network for the detection and classification of breast lesions in dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI).

Methods: This retrospective study enrolled 191 consecutive patients with pathological confirmed breast lesions who underwent preoperative magnetic resonance imaging (MRI) at the Second Affiliated Hospital of Xi'an Jiaotong University. Patients were randomly divided into a training set

comprising 153 patients with 126 malignant and 27 benign lesions and a validation set containing 38 patients with 31 malignant and 7 benign lesions under 5-fold cross-validation. Two radiologists annotated the location and classification of all lesions. After augmentation with pseudo-color image fusion, MRI images were fed into the developed cascade feature pyramid network system, feature pyramid network, and faster region-based convolutional neural network (CNN) for breast lesion detection and classification, respectively. The performance on large (>2 cm) and small (≤ 2 cm) breast lesions was further evaluated. Average precision (AP), mean AP, F1-score, sensitivity, and false positives were used to evaluate different systems. Cohen's kappa scores were calculated to assess agreement between different systems, and Student's t-test and the Holm-Bonferroni method were used to compare multiple groups.

Results: The cascade feature pyramid network system outperformed the other systems with a mean AP and highest sensitivity of 0.826 ± 0.051 and 0.970 ± 0.014 (at 0.375 false positives), respectively. The F1-score of the cascade feature pyramid network in real detection was also superior to that of the other systems at both the slice and patient levels. The mean AP values of the cascade feature pyramid network reached 0.779 ± 0.152 and 0.790 ± 0.080 in detecting large and small lesions, respectively. Especially for small lesions, the cascade feature pyramid network achieved the best performance in detecting benign and malignant breast lesions at both the slice and patient levels.

Conclusions: The deep learning-based system with the developed cascade feature pyramid network has

the potential to detect and classify breast lesions on DCE-MRI, especially small lesions.

PO-1351

Use of Dixon in magnetic resonance breast contrast-enhanced T1 weighted imaging for mastectomy patients at 3T

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Background: For patients with complete breast resection, conventional contrast-enhanced T1-weighted imaging (CE-T1WI) with frequency-selective spectral attenuated inversion recovery (SPAIR) provides limited fat suppression on the postoperative side due to the uneven skin surface, inhomogeneous tissue environment, and frequency-selective feature of the SPAIR scheme, leading to difficulties in precise diagnosis. This study aimed to investigate the image quality and performance of the Dixon method compared with SPAIR in breast CE-T1WI for mastectomy patients.

Materials and Methods: A total of 114 consecutive postmastectomy female patients were enrolled to undergo CE-T1WI with SPAIR and Dixon breast scans, and 60 female patients who had not performed any breast surgeries were randomly selected retrospectively as the control group. Subjective scores were rated using a 5-point scale. Objective parameters, including CNR, edge sharpness, and signal uniformity were measured and calculated. The Wilcoxon rank-sum test and Kappa statistic were used.

Results: The subjective scores of T1WI with SPAIR in the control group were all significantly better than those with SPAIR on the postoperative side of mastectomy patients ($P < 0.01$). Dixon outperformed SPAIR with significantly better subjective scores in regards to uniformity and degree of fat-suppression, anatomical structures depiction, lesion conspicuity, and axillary visibility ($p < 0.05$) in both post- and non-operative sides and bilateral axillary areas. The objective parameters of Dixon were significantly better than those of SPAIR.

Conclusion: The Dixon method provided better image uniformity and higher fat suppression efficiency, and showed significant advantages in delineating the anatomical structures, with better axillary and lesion visibilities, especially on the completely removed breast side.

PO-1352

MRI Radiomics for the Preoperative Evaluation of Lymphovascular Invasion in Breast Cancer: A Meta-Analysis

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Purpose: To evaluate the ability of preoperative MRI-based radiomic features in predicting lymphovascular invasion (LVI) in patients with breast cancer.

Methods: PubMed, Embase, Web of Science, Cochrane Library databases, and four Chinese databases were searched to identify relevant studies published up until June 15, 2023. Two reviewers screened all papers independently for eligibility. We included diagnostic accuracy studies that used radiomics-MRI for LVI in patients with breast cancer, using histopathology as the reference standard. Quality was assessed using the Quality Assessment of Diagnostic Accuracy Studies 2 and Radiomics Quality Score. Overall diagnostic odds ratio (DOR), sensitivity, specificity and area under the curve (AUC) were calculated to assess the prediction efficacy of MRI-based radiomic features in patients with breast cancer. Spearman's correlation coefficient was calculated and subgroup analysis performed to investigate causes of heterogeneity.

Results: Eight studies comprising 1685 female patients were included. The pooled DOR, sensitivity, specificity, and AUC of radiomics in detecting LVI were 23 [confidence interval (CI) 16,32], 0.89(0.86,0.92), 0.82 (0.78,0.86), and 0.83(0.78,0.87), respectively. The meta-analysis showed significant heterogeneity among the included studies. No threshold effect was detected. Subgroup analysis showed that more than 200 participants, radiomics with clinical factors, semiautomatic segmentation method and peritumoral or intra- and peritumoral model [DOR: 28(18,42), 26(19,37), 34(16,70), 40(10,156), respectively] could improve diagnostic performance compared with less than 200 participants, only radiomics, manual segmentation method, and tumor model [DOR: 16(7,37), 21(6,73), 20(12,32), 21(13,32), respectively].

Conclusion: Our meta-analysis showed that preoperative MRI-based radiomic features performs well in predicting LVI in patients with breast cancer. This noninvasive and convenient tool may be used to facilitate preoperative identification of LVI in breast cancer.

PO-1353

The specific manifestations of ultrasound and mammography to predict the malignancy of primary architectural distortion detected on mammography

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Objective To evaluate the detailed mammographic, ultrasonic and clinical features that may contribute to the prediction of malignancy in the presentation of architectural distortion (AD) on mammography.

Materials and methods We performed a retrospective study of consecutive female patients with architectural distortion on screening or diagnostic mammography from January 2015 to

December 2018. All the mammographic and ultrasonic imaging findings and pathology outcomes were reviewed. The t-test or Mann-Whitney U test was used to analyze the continuous variables, and the Chi-squared test or two-tailed Fisher's exact tests was used to analyze the categorical variables. Univariate and multivariate logistic regression analysis were conducted to assess the potential risk factors for ADs with malignant pathologic outcomes. $P < 0.05$ was considered statistically significant.

Results A total of 344 patients with 346 lesions were enrolled finally, with an average age of 47.40 ± 10.07 years. The PPV of architectural distortion for malignancy was 65.9% (228/346). The most common finding was invasive ductal carcinoma with or without lobular features (149/346, 43.06%) and the most common non-malignancy was radial scar or complex sclerosing lesions (48/346, 13.87%). Our study showed a trend that palpable architectural distortion on mammography being more likely to represent malignancy (141/169, 83.43%) than non-palpable architectural distortion (87/177, 49.15%) ($p < 0.001$). There was a trend toward pure architectural distortion being less likely to represent malignancy (111/187, 59.4%) than architectural distortion with associated other mammographic findings (117/159, 73.58%), and the difference was statistically significant ($p = 0.005$). 343 cases with 345 AD lesions had sonographic correlate to the architectural distortion detected on mammography. And the most common types of ultrasound findings were non-mass like hypoechoic area (217/345, 62.90%). There was a trend that AD lesions with sonographic correlate as non-mass like hypoechoic area and mass were more likely to represent malignancy than those with sonographic correlate as architectural distortion and other abnormalities, with a significantly statistical difference ($p < 0.001$). The results of logistic regression analysis showed that the occupying effect score of 3 on ultrasound was an independent risk factor for indicating malignant AD (OR = 172.332, 95% CI 52.148-569.496, $p < 0.001$).

Conclusion The occupying effect score on ultrasound maybe a strong independent predictor of malignancy of mammographic architectural distortion. And targeted "second-look" ultrasound can improve the detection of correlate ultrasound abnormality for AD, especially some nonmass-like lesions.

PO-1354

Benign and Malignant Mucocele-Like lesion of the Breast: Imaging Features

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OBJECTIVE To analyzed the mammographic, sonographic and MRI imaging features of Mucocele-Like lesion (MLL), and especially highlight the MR findings.

MATERIALS AND METHODS Pathology database in our hospital was searched for diagnosed MLL of the breast between January 2017 and June 2022. All mammographic and MRI images were independently reviewed by two radiologists according to the BI-RADS, and final features and diagnosis were reached by consensus. All sonographic images were retrospectively analyzed by an experienced ultrasound expert based on the US BI-RADS.

RESULTS Eighteen patients with 19 lesions were included in this study. The manifestations of MLL on mammography were distributed as follows: 7 masses (41.2%; 3 associated with calcifications), 5 asymmetry (29.4%; 4 with calcifications), 4 calcifications (23.5%) and 1 architectural distortion (5.9%). Of the 17 lesions, calcifications were seen in 64.7% of cases. The manifestations of MLL on ultrasonography were distributed as follows: 10 masses (6 cystic solid masses, 2 cystic masses and 2 solid masses), 6 heterogeneous echo areas, 1 calcification and 1 duct dilatation. The MRI finding of MLL were as follows: one negative, 4 masses and 6 non-mass enhancement (NME). Among the 4 masses, 3 lesions shape were irregular and showed inhomogeneous high signal on T2WI and showed no obvious enhancement.

CONCLUSION Calcifications are seen in most MLL of the breast on mammography. Ultrasonography often shows cystic solid mass. MRI finding of MLL are characterized as irregular

masses with obvious high signal on T2WI and showed no obvious enhancement. These findings are nonspecific, MLL are hard to diagnosis only by imaging findings.

PO-1355

Differential diagnosis of benign and malignant breast calcification by contrast-enhanced spectral mammography

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Objective Mammography exhibits a high degree of sensitivity in detecting microcalcifications. However, certain breast lesions present solely as calcifications, lacking mass or structural distortion. Consequently, qualitative diagnoses rely on the distribution and morphology of calcifications. In cases of suspicious malignant calcification (BI-RADS 4), Dual-Energy Contrast Enhanced Spectral Mammography (CEM) can furnish information regarding the blood supply to breast tissue in calcified regions. This study endeavors to investigate the potential of DE-CESM to enhance the accuracy of qualitative diagnoses for microcalcifications of BI-RADS 4.

Methods From June 2021 to October 2022, all patients who underwent CEM and were diagnosed with suspicious malignant calcification (BI-RADS 4) on low-energy images were included in this study. All diagnoses were subsequently confirmed via surgical pathology. Two experienced radiologists independently evaluated both the low-energy images and the CEM silhouette images. The low-energy images characterized calcifications by their morphology and distribution type, categorizing them into low-risk and high-risk groups. The CEM silhouette images documented whether or not the calcified area exhibited enhancement. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of diagnosing malignant calcification based on low-energy images alone or in combination with CEM images were compared between groups. The additional diagnostic performance of CEM images for BI-RADS 4 calcifications was also evaluated.

Results Of the 67 pathologically confirmed lesions, 32 were malignant and 35 were benign. Using histopathology as the gold standard, the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy of diagnosing malignant calcifications based solely on low-energy images were 68.7% (22/32), 88.5% (31/35), 53.6% (22/41), 86.1% (31/36), and 79.1% (53/67), respectively. The sensitivity, specificity, PPV, NPV, and accuracy of diagnosing malignant calcifications using a combination of CEM silhouette images were 90.6% (29/32), 97.1% (34/35), 82.8% (29/35), 97.1% (34/35), and 94.0% (63/67), respectively. The sensitivity, PPV, and accuracy of DE-CESM in diagnosing malignant calcifications were significantly higher than those of low-energy images alone ($P < 0.05$).

Conclusion CEM can enhance the diagnostic efficiency of BI-RADS 4 calcifications, particularly for calcifications with low-risk morphology or distribution. CEM can also accurately locate calcification points and areas of enhancement, providing reliable clinical value for preoperative stereotactic localization of suspicious calcifications.

PO-1356

Breast Galactography with Contrast-enhanced mammography (CEM)—An innovative attempt

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Objectives: This study used CEM protocol in galactography for the first time. To evaluation the application value of Contrast-enhanced mammography (CEM) in breast galactography.

Materials and Methods: 24 patients with pathological nipple discharge were examined using CEM-galactography and MRI. CEM-galactography presents two kinds of images per breast and per view— low-energy image and recombined image. Evaluation of the images created with the different imaging modalities was done by 3 investigators with varying levels of experience with complementary breast diagnostics (8 ,9 and 21 years), and their evaluations were compared with the histological findings. AGD differences were analyzed by Mann-Whitney U test.

Results: The average age of the 24 patients was 45.9 years. The average glandular dose (AGD) of CEM-galactography (median:1.65 mGy) was 21.8% higher than low-energy imaging (1.29 mGy) ($P<0.001$) in CC view, while the AGD of CEM-galactography (1.65 mGy) increased by 21.8% compared with low-energy imaging (1.29 mGy) ($P<0.001$) in ML view. Their evaluations were compared with the histopathological assessment of the surgical specimens resected from the 24 patients. There were 4 cases of intraductal carcinoma, 5 cases with ductal carcinoma in situ 11 cases with intraductal papilloma and 4 cases with duct ectasia. The recombined image generated by CEM showed that the size of the lesion was closer to that of histopathological findings.

Conclusions: CEM-galactography can better display the size of the lesions and the details of the catheter branch than the low-energy image. It could be a useful complementary procedure for the diagnosis of breast anomalies and could herald a new aissance of this method. Compared with low-energy imaging, the investigators achieved better results with recombined image, as confirmed by histopathological findings.

PO-1357

Preoperative Prediction of Axillary Lymph Node Metastasis in Breast Cancer Based on Dynamic Contrast-Enhanced MRI including the Entire Axilla

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Purpose: To noninvasively predict axillary lymph node metastases(ALNM) in breast cancer using dynamic contrast-enhanced (DCE) magnetic resonance imaging (MRI) tumoral and entire axillary radiomic features combined with or without clinicopathologic characteristics of the primary tumor.

Methods: A total of 149 patients confirmed early-stage breast cancer between May 2020 and March 2023 were randomly divided (7:3) into training and vaidation cohorts. All patients underwent preoperative MRI scans, were treated with surgery and sentinel lymph node biopsy or ALN dissection, and were pathologically examined to determine the ALNM status. A total of 851 radiomic features were extracted for each patient from both tumor and axilla. The prediction models were built with the training set using logistic regression on the most significant radiomic features in the training set combined with or without clinicopathologic characteristics. The models were evaluated by discrimination, calibration, and clinical application and compared using DeLong test.

Results: The axillary-radiomic model performed the best with AUCs of 0.759 (95% CI: 0.661-0.857) and 0.739 (95% CI: 0.588-0.889) in the training and validation cohorts, respectively. The tumoral-radiomic model performed with AUCs of 0.733 (95% CI: 0.637-0.830) and 0.650 (95% CI: 0.483-0.818), respectively. After combining clinical features, including Menopausal status and TNM stage, the combined model in the validation cohort showed good calibration and excellent performance for ALN detection (AUC=0.928). Decision curve analysis demonstrated that the combined model were clinically useful.

Conclusion: This is the preliminary attempt to demonstrate the feasibility of using entire axillary radiomics to predict ALN metastasis in breast cancer preoperatively. The combined model could effectively help the ALNM diagnosis.

PO-1358

Accuracy of cone-beam breast CT for assessing breast cancer tumor size - comparison with breast MRI

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Purpose: To evaluate the accuracy of cone-beam breast CT (CBBCT) and MRI in the assessment of tumor size and to analyse the factors influencing the discordance.

Methods: The patients with breast cancer were reviewed retrospectively. Two radiologists assessed the CBBCT and MRI features and measured the tumor size with a two-week washout period. Intraclass correlation coefficient (ICC) and Bland-Altman analyses were used to assess inter-observer reproducibility and agreement based on CBBCT, MRI and pathology. Univariate analyses of differences in clinical, pathological and CBBCT/MRI features between the concordant and discordant groups was performed using the t-test, Mann-Whitney U-test, chi-square test and Fisher's exact test. Multivariate analyses were used to identify factors associated with discordance of CBBCT/MRI with pathology.

Results: A total of 115 patients were enrolled. The reproducibility and the agreement ranged from moderate to excellent (ICC=0.607-0.983). ROC analyses showed that the cut-off values of CBBCT-pathology and MRI-pathology discordance were 2.25 cm and 2.65 cm, respectively. CBBCT/MRI-pathology concordance were significantly associated with the extent of pathology, lesion type, presence of calcification, HER-2 status and fatty infiltration ($p<0.05$). In lesions containing calcification, the difference of CBBCT-pathology was significantly smaller than MRI-pathology ($p=0.021$). Non-mass-enhancement (NME) was the main predictor of CBBCT- or MRI-pathology discordance (OR=3.293-6.469, $p<0.05$), and HER-2 positivity was a predictor of CBBCT-pathology discordance (OR=3.514, $p=0.019$).

Conclusion: CBBCT and MRI have comparable accuracy in measurement of tumor size, and CBBCT is advantageous in assessing the size of calcified lesions. NME and HER-2 positivity are significant predictors leading to discordance between CBBCT-pathology.

PO-1359

Dual-layer detector spectral CT based iodine density for the diagnosis of benign and malignant breast masses: compare with BIRADS categories in mammography

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Purpose: To compare the diagnostic accuracy of benign and malignant breast masses using dual-layer detector spectral CT (DLCT) based iodine density (ID) versus BIRADS categories in mammography.

Methods and Materials: A total of 34 patients with breast masses proved by pathology underwent venous phase (VP) contrast enhanced DLCT scan and digital mammography. The patients were classified into two groups (malignant group, n=18; benign group, n=16). The ID was extracted and normalized to the ID in the aorta (NIDVP). BIRADS categories in mammography were performed by three radiologists for all lesions respectively. Receiver operating characteristic (ROC) curves, sensitivity, and specificity were compared.

Results: BIRADS category of 1, 2, 3, 4A, 4B, 4C, 5 of breast masses were 0, 1, 5, 9, 8, 11, 0 cases respectively. The area under the curve (AUC) of area NIDVP and BIRADS categories respectively were 0.816 and 0.910, while 95% confidence interval were 66.40%-96.80% and 80.30%-100.00%, respectively. With a threshold of 0.21 for NIDVP, and 3.5 for BIRADS categories, the sensitivity, specificity value were 88.90%, 68.75% and 88.90%, 87.50%, respectively.

Conclusion: DLCT based ID was observed to perform equally with BIRADS categories in mammography in the differentiating between benign and malignant breast masses.

PO-1360

Prediction of Risks in Ductal Carcinoma in Situ with Micro-invasion based on Clinicopathological and Imaging Features

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Purpose: To establish a predictive model that accurately identifies ductal carcinoma in situ with micro-invasion based on preoperative clinicopathological and imaging features.

Methods: Retrospectively collected consecutive women who underwent preoperative mammography and breast MRI including dynamic contrast-enhanced imaging and diffusion-weighted imaging between June 2018 and February 2022 from a single institution and yielded the diagnosis of postoperative-proven DCIS and DCISM. A total of 149 patients were represented as the development set while a subsequent prospective validation set of 97 patients was recruited between March 2022 and April 2023. The independent risk factors were identified by using multivariable logistic regression analysis. The nomogram was established. The Kruskal-Wallis or X² test was used. **Results:** Multivariate logistic regression analysis displayed the independent risk factors for DCISM were P63 status (odds ratio [OR], 0.26; 95% confidence interval [CI], 0.09–0.72; P=0.009), necrosis (OR, 6.00; 95% CI, 2.25–15.99; P<0.001), Ki-67 proliferation index (OR, 6.46; 95% CI, 2.35–17.82; P<0.001) and minimum apparent diffusion coefficient (OR, 11.82; 95% CI, 4.10–34.04; P<0.001) in the development set, all of which were used to construct a predictive model presented as the form of a nomogram. Among the women who underwent surgery, 52 out of 149 (35%) in the development set and 36 out of 97 (37%) in the validation set were diagnosed with

DCISM. The predictive model combining the independent risk factors showed the areas under the receiver operating characteristic curve (AUC) at 0.91 (95% CI: 0.85, 0.95) in the development set and 0.90 (95% CI: 0.82, 0.95) in the validation set. **Conclusion:** The Nomogram to predict DCISM of patients with preoperative clinicopathological and imaging features is an effective tool that may improve the surgical plan for DCIS with or without micro-invasion.

PO-1361

Establishment of segmentation and classification model of breast tumors based on bilateral asymmetrical detection

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Objectives: The purpose of this study was to develop a deep learning model for the segmentation and classification of breast tumors by embedding the algorithm of bilateral breast asymmetry and combining the advantages of contrast-enhanced mammography (CEM), so as to improve the diagnostic accuracy of breast cancer.

Methods: A total of 500 patients undergoing CEM examination and concurrent surgical treatment were enrolled in this study. The proposed deep learning model is called ERAssNet model. The ERAssNet model utilized four recombination (RC) and two low energy (LE) images to segment the breast lesion area and accurately evaluate the malignancy. It used three modules to analyze bilateral views of the affected and contralateral sides, extract morphological features, and integrate image texture features. The results of the BiERAssNet model were compared with the results of state-of-the-art (SOTA) models, such as UNet model, TransUNet model, etc.

Results: The model corrected 18% of incorrect malignant classifications compared to radiologists. Compared to the SOTA models, in the lumps classification task, the area under the curve (AUC) of the model is the largest, which is 0.9141. In terms of breast mass segmentation, the dice accuracy of UNet model and TransUNet model was 0.77 and 0.84, while the dice accuracy of this model was improved to 88.18%.

Conclusion: We embedded the diagnosis algorithm of bilateral breast asymmetry and combined the advantages of CEM examination to establish a deep learning model, which could be superior to the existing SOTA model, and improve the diagnostic accuracy of breast cancer.

PO-1362

Tumour size change based on early DCE-MRI treatment for predicting neoadjuvant efficacy in breast cancer and the construction of an integrated clinical prediction model

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OBJECTIVE: To explore the value of tumour size change in early stage of treatment based on breast dynamic-enhanced magnetic resonance (DCE-MRI) for predicting pathological complete remission (pCR) after neoadjuvant therapy (NAT) for breast cancer, as well as the construction of a clinically comprehensive prediction model by combining with meaningful clinicopathological indicators. **METHODS:** A retrospective analysis was performed on 117 breast cancer patients who underwent breast DCE-MRI both before NAT and after 2 cycles of treatment from April 2019 to December 2021 in Jiangxi Province Cancer Hospital. They were randomly divided into training set and test set according to the ratio of 7:3, and divided into pCR group and non-pathological complete remission (non-pCR) group according to the pathological results at the end of NAT. Based on DCE-

MRI images, the relative regression value of the maximum diameter of the tumour before and after treatment (Diameter%) was calculated, and the relative reduction value of the volume of the tumour before and after treatment (Volume%) was calculated by semi-automatic outlining of the three-dimensional region of interest with the 3Dslicer software; the prediction models of Diameter% and Volume% were constructed respectively. The general data of the patients were statistically analysed, and the indicators that were meaningful in the one-way analysis were selected and then screened and reduced by the stepwise regression method, so as to construct the logistic regression clinical comprehensive prediction model, and to draw the column line diagram. The diagnostic efficacy of the above models was evaluated and compared.

Results: The AUC values of the Diameter% prediction model were 0.71 and 0.77 for the training set and the test set, respectively; and the AUC values of the Volume% prediction model were 0.68 and 0.80 for the testing set; the AUC values of the ER, PR, HER2 status, Ki67 index, molecular typing, Diameter%, and Volume% were statistically different between the training set pCR group and the non-pCR group. statistically different, and ER, HER2 status, Ki67 index, and Diameter% were screened by stepwise regression for constructing a clinically comprehensive model, which had the highest AUCs (0.86, 0.83), and whose ability to predict pCR in the test set was improved by 19.31% and 23.18% compared with the Diameter% and Volume% prediction models, respectively ($P=0.035, 0.005$) in the test set, and its clinical calibration curve showed that the model had good efficacy in predicting pCR. CONCLUSION: DCE-MRI-based changes in the size of tumours in the early stage of treatment can be a biomarker for non-invasive prediction of NAT outcome; and the clinically integrated prediction model constructed by Diameter%, ER, HER2 status, and Ki67 index has a high clinical application value for early prediction of pCR.

PO-1363

Identify molecular subtypes in breast cancer using time-dependent diffusion MRI based microstructural mapping

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Background: Time-dependent diffusion MRI (td-dMRI) has the potential to characterize tumor cell properties; however, its performance in identifying molecular subtypes of breast cancer is unknown. Purpose: To explore the feasibility of td-dMRI based microstructural mapping for noninvasive identification of molecular subtypes of breast cancer.

Materials and Methods: We prospectively enrolled participants with invasive breast cancer who underwent td-dMRI between February 2021 and December 2022. Four td-dMRI microstructural parameters and three conventional apparent diffusion coefficient measurements were estimated and compared among three molecular subtypes. Shapley additive explanations were used for unbiased evaluation the contribution of each parameter to model performance, and then we combined the top contributors to identify each molecular subtype. The predictive performance was assessed through area under the receiver operating characteristic curve (AUC) analysis and compared using the DeLong, net reclassification improvement (NRI) and integrated discrimination improvement (IDI) tests.

Results: The analysis included 337 patients (mean age: 52.32 years \pm 10.32 [standard deviation]) who were randomly divided into training and validation groups (236 and 101 patients, respectively). In the training and validation groups, the cellularity achieved the highest predictive performance for identifying luminal (AUC: 0.77 [95% CI: 0.71, 0.83] and 0.79 [95% CI: 0.70, 0.88]), human epidermal growth factor receptor-2 (AUC: 0.78 [95% CI: 0.71, 0.84] and 0.79 [95% CI: 0.66, 0.92]), and triple negative breast cancer (AUC: 0.63 [95% CI: 0.54, 0.72] and 0.69 [95% CI: 0.58, 0.80]), outperforming conventional apparent diffusion coefficient measurements (IDI test: all $P < 0.05$). In luminal subtype, combining cellularity and diameter significantly improved the predictive performance than using cellularity alone both in training (AUC: 0.80 [95% CI: 0.74, 0.85]) and validation groups (AUC: 0.82 [95% CI: 0.73, 0.89]) (NRI and IDI tests: all $P < 0.05$).

Conclusion: Time-dependent diffusion MRI-based microstructural mapping is effective for identification of molecular subtypes of breast cancer.

PO-1364

Tomoelastography complementing diffusion-weighted imaging for the prediction of pathological complete response to neoadjuvant chemotherapy in patients with breast cancer: A prospective longitudinal study

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Background: MRI is widely used for predicting pathologic complete response (pCR) in breast cancer but less knowledge about the role of combining apparent diffusion coefficient (ADC) and tomoelastography.

Purpose: To gain further knowledge about temporal trends of neoadjuvant chemotherapy (NAC)-associated ADC and biomechanical parameters quantified with tomoelastography and predict pCR. Materials and Methods: In this prospective longitudinal study, participants with breast cancer who received NAC were enrolled from February 2021 to May 2022. Participants underwent breast MRI at pre-NAC (T1), after 2 cycles (T2), 4 cycles (T3), and 6 cycles of NAC (T4). ADC, shear-wave-speed (c) and loss-angle (ϕ) quantifying stiffness and fluidity were obtained and compared by generalized estimating equation. Predictive performance was assessed with area under the receiver operating characteristic curve (AUC) analysis.

Results: A total of 109 participants (mean age, 50.15 years \pm 7.86 [standard deviation]) were enrolled, 29 participants experienced pCR. The ADC showed a significant upward trend in total participants, c and ϕ decreased significantly among total participants and three molecular subgroups (all $P < 0.001$). For predicting pCR, ADC combined with c and ϕ achieved the highest predictive performance at T3 (AUC, 0.803; 95% confidence interval [CI]: 0.715, 0.874), better than either ADC ($P = 0.006$) or c ($P = 0.043$) alone. In Luminal B subtype, ϕ at T3 was highly predictive of pCR (AUC, 0.832; 95% CI: 0.703, 0.921), while combining ADC, c and ϕ at T2 achieved the highest predictive performance in human epidermal growth factor receptor 2-enriched (AUC, 0.771; 95% CI: 0.531, 0.921) and triple negative breast cancer subtypes (AUC, 0.864; 95% CI: 0.678, 0.965).

Conclusion: During the course of NAC, the increase in ADC and decreases in stiffness and fluidity were more significant in patients with pCR, combining ADC and biomechanical properties at mid-NAC could predict pCR with good accuracy.

PO-1365

A Robust Deep Learning Framework for Automatic Molecular Subtypes Assessment in Breast Cancer Based on MRI: a Multicenter Study

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Background Accurate prediction of molecular subtype enables personalized treatment for breast cancer.

Purpose To build a novel deep learning framework using pretreatment dynamic-contrast enhanced (DCE) MRI for lesion segmentation and automatic molecular subtypes assessment in breast cancer without any human interaction and validate the robustness by multicenter data.

Methods In this multicenter study, eligible patients who had biopsy-proven breast cancer were recruited. And their pretreatment breast DCE-MRIs were collected for analysis. We designed an automatic segmentation model for lesions from DCE-MRI, using the 3D-ResU-Net as the backbone. We used dice to evaluate the lesion segmentation performance. Moreover, we further proposed an ensemble molecular subtypes classification model (Ensembled ResNet) merging both 2D and 3D features from lesion from a training cohort. The accuracy of Ensembled ResNet for the prediction of molecular subtypes in breast cancer was verified in one internal and two external validation cohorts. Model performances were evaluated using area under the curve (AUC).

Results Between January 2015 and January 2021, 632 patients were retrospectively recruited. Our proposed segmentation method had high accuracy among the three validation cohorts (dice scores: 0.8606, 0.8530, 0.8451) and four molecular subtypes (dice scores: 0.8525, 0.8432, 0.8290, 0.8559). Ensembled ResNet had favourable accuracy for the prediction of Luminal A subtypes (AUC of 0.7485), Luminal B subtypes (AUC of 0.6854), HER2-enriched subtypes (AUC of 0.7792) and triple negative breast cancer (AUC of 0.7999), superior than 2D-ResNet, 3D-ResNet and radiomics models in all validation datasets (with all $p < 0.05$, except for the comparison between Ensembled ResNet and the 2D-ResNet model in Luminal B and TNBC subtypes).

Conclusions Our proposed novel deep learning framework can fully automatically assess molecular subtypes with high accuracy and robustness in patients with breast cancer. And this proposed framework may be a noninvasive decision-making tool with great potential in clinical application.

PO-1366

Extracellular volume fraction derived from routine chest dual-energy CT for the characterization of breast tumor: Comparison with apparent diffusion coefficient and validation against histopathological findings

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Background: Tumor aggressiveness and therapeutic response are influenced not only by cancer cells but also by the extracellular matrix in tumor microenvironment, which can be quantified by extracellular volume (ECV) fraction derived from dual-energy CT (DECT).

Purpose: To investigate the feasibility of using routine chest DECT-derived ECV fraction for the characterization of breast tumor, compared to apparent diffusion coefficient (ADC) and validated against histopathological findings.

Methods: The ECV fraction and ADC value were retrospectively assessed in patients with breast tumor using routine chest DECT and breast MRI, respectively. The diagnostic performance in

predicting the histopathological characteristics [benign vs. malignant, invasive carcinoma vs. ductal carcinoma in situ (DCIS)], immunohistochemical biomarker status and pathological complete response (pCR) status. Histopathological sections (H&E staining) were analyzed to assess histopathological ECV by digital image analysis. Pearson's correlation analysis was used to correlate between DECT-derived ECV and histopathological ECV fractions.

Results: This study included 271 patients, with 314 breast lesions (61 benign and 253 malignant). The ECV fraction and ADC value showed comparable area under the curve (AUC) for distinguishing benign from malignant lesions (0.777 and 0.822, $p = 0.123$) and invasive carcinoma from DCIS (0.640 and 0.727, $p = 0.115$). There were significant differences in ECV fraction between different hormone receptor and Ki67 states ($p = 0.001 \sim 0.014$), while ADC values only differed among various Ki67 states ($p < 0.001$). The ECV fraction was lower ($p = 0.007$), while the ADC value was higher ($p = 0.013$) in the pCR than in the non-pCR group, with an AUC value of 0.748 and 0.730 ($p = 0.887$), respectively. There was a positive correlation between DECT-derived ECV and histopathological ECV fractions ($r = 0.615$, $p < 0.01$).

Conclusions: Routine chest DECT-derived ECV fraction is a viable quantitative imaging biomarker for the characterization of breast tumor.

PO-1367

Clinical Study on the Prediction of ALN Metastasis Based on Intratumoral and Peritumoral DCE-MRI Radiomics and Clinicoradiological Characteristics in Breast Cancer

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Abstract

Objective: To investigate the value of predicting axillary lymph node (ALN) metastasis based on intratumoral and peritumoral dynamic contrast-enhanced MRI (DCE-MRI) radiomics and clinicoradiological characteristics in breast cancer. **Methods:** A total of 473 breast cancer patients who underwent preoperative DCE-MRI from Jan 2017 to Dec 2020 were enrolled. These patients were randomly divided into training ($n=378$) and testing sets ($n=95$) at a ratio of 8:2. Intratumoral regions (ITR) of interest were manually delineated and peritumoral region of 3 mm (3mmPTR) were automatically obtained on images. Radiomics features were extracted and ALN status-related radiomics features were selected by Mann-Whitney U test, Z-score normalization, variance thresholding, K-best algorithm and least absolute shrinkage and selection operator (LASSO) algorithm. Clinicoradiological risk factors were selected by logistic regression, which were also used to construct predictive models combined with radiomics features. Then 5 models were constructed, including ITR, 3mmPTR, ITR+3mmPTR, clinicoradiological and combined (ITR+3mmPTR+clinicoradiological) models. The performance of the models were assessed by sensitivity, specificity, accuracy, F1score and the area under the curve (AUC) of receiver operating characteristic (ROC), calibration curves and decision curve analysis (DCA). DeLong test was used to compare the AUC differences among the models. **Results:** A total of 2264 radiomics features were extracted from each regions of interest (ROI), 3 and 10 radiomics features were selected for the ITR and 3mmPTR respectively. 5 clinicoradiological risk factors were selected by logistic regression, including lesion size, human epidermal growth factor receptor 2 (HER2) expression, status of vascular cancer thrombus and MR reported-ALN status, time-signal intensity curve (TIC) type. In the testing set, the combined model showed the highest AUC (0.839), specificity (74.2%), accuracy (75.8%) and F1Score (69.3%) among the 5 models. DCA showed it had the greatest net clinical benefit compared to the other models. **Conclusion:** The intra- and peritumoral radiomics models based on DCE-MRI could be used to predict ALN metastasis in breast cancer, especially for the combined model with clinicoradiological characteristics showing promising clinical application value.

PO-1368

Synthetic MRI and Apparent Diffusion Coefficient (ADC) Measurement in Breast Tumor: Effect of Region-of-Interest Methods on Quantitative Values and Diagnostic Ability

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Purpose: To investigate the difference in synthetic MRI and apparent diffusion coefficient (ADC) measurements of differently shaped regions of interest (ROIs) in breast tumors, and to investigate the diagnostic ability of differently shaped ROIs in differentiating benign from malignant breast tumors.

Materials and Methods: One hundred and ten patients with breast tumors with a solid component were evaluated. The patients underwent magnetic resonance (MR) examinations including Synthetic MRI (MAGiC) and diffusion-weighted imaging using a 3.0T MR system. Two readers measured quantitative synthetic MRI and ADCs using four ROI methods: round, square, freehand, and whole tumour volume (WTV) ROIs. The interclass correlation coefficient (ICC) and repeated-measures analysis of variance were used to assess their measurement reliability and to compare quantitative synthetic MRI and ADCs for each ROI method. Receiver operating characteristic curve analysis and unpaired t-test on each ROI were used to differentiate benign and malignant breast tumors and assess the diagnostic ability.

Results: All ROI methods of mean values showed good or excellent correlations (0.72–0.93). ADC, T2 and PD values differed significantly between the benign and malignant lesions ($P < 0.05$). When using the square ROI, the mean, minimum and maximum values of ADC and T2 maps were the highest. The optimal cutoff mean values of square ROI for ADC, T2 and PD maps in differentiating benign and malignant tumors were $1.25 \times 10^{-3} \text{ mm}^2/\text{s}$, 91.32msec and 83.03pu respectively. The ADCs in the different ROI methods showed the highest areas under the curve. Mean, minimum and maximum ADCs, T2s and PDs from all ROIs showed significant differences between benign and malignant tumors ($P < 0.05$).

Conclusion: The ROI shape influences quantitative synthetic MRI and ADC values and the optimal cutoff their values for differentiating benign from malignant breast tumors.

PO-1369

Prediction of Pathological Complete Response to Neoadjuvant Chemotherapy in Breast Cancer using a Deep Learning–Machine Learning Fusion Approach

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Objectives: To build and validate deep learning (DL) and machine learning (ML) fusion models to evaluate the pathological complete response (pCR) to neoadjuvant chemotherapy (NAC) in breast cancer based on longitudinal Magnetic Resonance Imaging (MRI) images and clinical features.

Methods: We proposed a deep learning model based on long short-term memory (LSTM) network to capture the sequential information in longitudinal dynamic contrast-enhanced (DCE) MRI images, using public dataset from I-SPY2 trial of The Cancer Imaging Archive ($n=255$). Longitudinal DCE-MRI scans were retrospectively enrolled in patients with breast cancer who received NAC followed

by surgery at center A (n=150). Clinical, imaging, and clinical-imaging models were constructed by obtaining the clinical and imaging features from center A; five ML algorithms were used as classifiers. We then combined the LSTM model's prediction probabilities with the clinical and imaging features to build the fusion model. Model classification performance were evaluated using the area under the receiver operating characteristic curve (AUC), decision curve analysis (DCA), and the calibration curve.

Results: Compared with the ML models and LSTM models, the fusion model achieved the best performance for pCR prediction in the test set with a good level of calibration. The optimal classifier (random forest) exhibited high predictive performance in the test set, yielding an AUC 0.937 (95% CI: 0.823-0.988), accuracy 0.866, sensitivity 0.714 and specificity 0.935. DCA confirmed that, compared with the ML models, LSTM models, the fusion model presented the greatest net benefit. For the optimal model, the top features for predicting pCR were LSTM model's prediction, peritumoral edema on T2WI (post-NAC) and HER2 status.

Conclusions: A fusion model that combined longitudinal DCE-MRI images and clinical-imaging features showed good performance for predicting pCR to NAC in patients with breast cancer, which could guide physicians' selection for NAC treatment.

PO-1370

Histogram Analysis of Diffusion-weighted Imaging with a Fractional Order Calculus Model in Breast Cancer: Diagnostic Accuracy and Correlation with Prognostic Factors

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Background

This study explored the diagnostic accuracy of diffusion-weighted imaging (DWI) with a fractional order calculus (FROC) model in differentiating breast lesions and the correlation between FROC-derived diffusion parameters and prognostic factors and molecular subtypes in breast cancer.

Methods

This retrospective study included 147 patients confirmed by histopathology. All patients underwent breast DWI with multi-b values (0, 50, 100, 200, 400, 800, 1200, and 2000 s/mm²) based on simultaneous multi-slice (SMS) readout-segmented echo-planar imaging (rs-EPI) at 3.0T MR scanner. The histogram metrics of mono and FROC DWI-derived parameters were compared between the benign and malignant groups and the groups with different prognostic factor statuses. The histogram results of each DWI-derived parameters among the different molecular subtypes were compared. The diagnostic performance of apparent diffusion coefficient (ADC) and FROC-derived parameters in differentiating benign and malignant breast lesions were assessed.

Results

The parameters of ADC-median, DFROC-mean and DFROC-median had similar diagnostic performance. The values of ADC-mean, DFROC-10%, DFROC-mean, DFROC-median, β FROC-10%, β FROC-mean, and β FROC-median were significantly lower in the ER-positive group compared with ER-negative group. The tumors with PR-negative showed significantly higher β FROC-10%, β FROC-mean, and β FROC-median values than those with PR-positive. The values of DFROC-skewness, β FROC-10%, and β FROC-mean showed significant differences in differentiating the triple-negative subtype and the Luminal subtype.

Conclusions

The histogram analysis of diffusion parameters based on the FROC model showed similar diagnostic performance for identifying breast lesions compared with the conventional ADC.

Additionally, the FROC-derived parameters provided more information about the prognostic factors and molecular subtypes of breast cancer.

PO-1371

Application of Breast Cancer Heterogeneity Combined with Visual Features of MR Images in Predicting Lymph Node Metastasis of cN0 Breast Cancer

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Purpose

To explore the application value of breast cancer heterogeneity information together with visual features of magnetic resonance (MR) images in the prediction of axillary lymph node metastasis (ALNM) in cN0 stage breast cancer.

Materials and Methods

The clinical, pathological and imaging data of 284 female breast cancer patients who underwent preoperative breast-enhanced MRI examinations and surgical treatments at Jilin Cancer Hospital from January 2016 to June 2020 were retrospectively analyzed. In the heterogeneity analysis, the intensities of each voxel in the lesion in three different phases were extracted. The three phases were pre-contrast injection phase, contrast enhancement phase and the delayed phase. The heterogeneity information of the lesion was quantified according to equation (1).

(1)

Patients were randomly divided into the training group ($n = 199$) and validation group ($n = 85$) in the ratio of 7:3. Six machine learning (ML) models, including logistic regression, random forest, naive Bayes algorithm, decision tree, k-nearest neighbors (KNN) algorithm and support vector machine model, were used to process the data of the two groups. The efficacy of each ML model for the diagnosis of ALNM in breast cancer patients was analyzed using the receiver operating characteristic (ROC) analysis, and the best model was selected according to the area under the curve (AUC) of the validation group. The clinical benefit of the best model was evaluated by the decision curve analysis (DCA).

Results

A total of 66 patients with positive axillary lymph nodes and 218 patients with negative axillary lymph nodes were identified. Each lesion was analyzed to obtain 4 parameters of heterogeneity, which were the volume percentage of the persistent type (type I), the volume percentage of the plateau type (type II), the volume percentage of the washout type (type III), and the quantitative value of heterogeneity. Among the six ML models, the random forest model demonstrated the highest AUC (0.802) in the validation group for the diagnosis of ALNM in breast cancer, with the accuracy, specificity and sensitivity of 79.1%, 14.5%, and 99.0%, respectively. In the training group, the AUC was 0.594, with accuracy, specificity and sensitivity being 73.5%, 93.1%, and 7.7%, respectively. The results of DCA based on the random forest model showed clinical benefit was in the range of 0.6 to 1.0 in the training group, while in the range of 0.7 to 1.0 in the validation group.

Conclusion

The ML prediction models based on the heterogeneity information combined with visual features of MR images of breast lesions can help identify the ALNM in cN0 stage breast cancer patients, among which the diagnostic efficacy of the random forest model is superior.

PO-1372

MRI and clinicopathological features in HER2-low versus HER2-zero breast cancer treated with neoadjuvant therapy

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Objectives

Breast cancer with low human epidermal growth factor receptor 2 (HER2-low) expression is attracting attention due to progress in anti-HER2 antibody-drug conjugates. This study aims to explore differences in clinicopathological and MRI characteristics, as well as prognosis, between HER2-zero and HER2-low breast cancer subgroups.

Methods

We analyzed clinicopathologic and MRI data of patients with breast cancer who underwent surgery after neoadjuvant therapy. Univariable and multivariable analyses were used to assess differences between the HER-zero and HER2-low subgroups. Disease-free survival (DFS) was calculated using the Kaplan-Meier method, and the log-rank test was used to compare the survival curves.

Results

A total of 516 patients were included in the analysis: 167 (32.4%) and 349 (67.6%) patients had HER2-zero and HER2-low disease, respectively. The HER2-low group had more hormone receptor (HR)-positive patients (81.7% versus 59.3%, $P<0.001$), and higher expression of estrogen receptor (ER) was linked to higher HER2 expression ($P<0.001$). The signal enhancement ratio (SER) had a statistical difference between the HER2-zero and HER2-low groups ($P=0.042$) in both the whole cohort and the HR-negative subset. The HER2-zero group had a higher proportion of patients who achieved pathological complete response (pCR) (31.1% vs 18.1%, $P<0.001$), but HER2 status did not significantly affect the pCR rate in HR-negative or HR-positive patients. There was no significant difference in DFS between HER2-zero and HER2-low subgroups ($P=0.261$).

Conclusions

This study was insufficient to support the theory that HER2-low breast cancers had distinct clinicopathological, MRI features and prognosis compared to HER2-zero cancers treated with neoadjuvant therapy.

PO-1373

Classification of MRI-only suspicious breast lesions: Development and validation of a nomogram combining MRI features and apparent diffusion coefficient histogram.

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Rationale and Objectives:

Suspicious breast lesions (Breast Imaging Reporting and Data System [BI-RADS] 4 or 5) detected only by magnetic resonance imaging (MRI) and invisible on other initial imaging modalities (MRI-only lesions) are usually small and poorly characterized in previous literature, thus making diagnosis and management difficult. We aimed to develop and validate a nomogram combining clinicoradiologic features and apparent diffusion coefficient (ADC)-based histogram parameters for differentiating MRI-only suspicious lesions.

Materials and Methods:

We retrospectively included 90 patients who underwent breast MRI and had MRI-only suspicious lesions between May 2017 and August 2023 and were randomly divided into training ($n = 62$) and validation ($n = 28$) cohorts. The clinical information and MRI features (including kinetic pattern) of each patient were reviewed and analyzed, and the ADC maps obtained from DWI of each patient were subjected to histogram analysis and then 17 histogram parameters were extracted. Univariate analysis and multivariate logistic regression analysis were performed to identify significant variables associated with predicting MRI-only malignant lesions, which were then included in the

nomogram. The diagnostic performance of significant variables and the nomogram was evaluated and compared by the area under the receiver operating characteristic (ROC) curve (AUC) and DeLong's test. The validation cohort is used to test the diagnosis performance of the nomogram.

Results:

In univariate analysis, marginal ($P = 0.02$) and kinetic pattern ($P = 0.002$) were significantly different between benign and malignant MRI-only lesions; ADC_Energy ($P = 0.04$), ADC_Entropy ($P = 0.001$), ADC_Range ($P = 0.03$), and ADC_Uniformity ($P = 0.01$) were significantly greater in the malignant group than in the benign group. In multivariate analysis, the kinetic pattern in clinicoradiologic features ($P = 0.004$, odds ratio [OR] = 2.268) and ADC_Entropy in histogram parameters ($P = 0.003$, OR = 6.49) were significant variables associated with the differentiation of the MRI-only suspicious lesions. Combined ADC_Entropy and kinetic pattern yielded an AUC of 0.820, sensitivity of 80.65%, and specificity of 77.42%, which was higher than any single variable alone. The C-index values for the nomogram were 0.820 (95% confidence interval [CI]: 0.702-0.906) for the training cohort and 0.728 (95% CI: 0.528-0.878) for the validation cohort.

Conclusion: ADC-based histogram parameters could potentially aid in the classification of MRI-only suspicious lesions. The nomogram combining kinetic pattern and ADC_Entropy may be a simple and noninvasive tool for diagnosing MRI-only lesions.

PO-1374

时间依赖扩散加权成像联合同步多层激发技术在乳腺病变良、恶性诊断价值中的探索研究

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目的: 探索 TDD 成像联合 MB 技术在乳腺良、恶性病变诊断中的可行性及诊断价值。方法: 前瞻性收集 2021 年 2 月至 2022 年 7 月期间本院 45 例临床疑诊为乳腺疾病的患者。TDD 包括两种成像方案包括一种使用 MB, 另一种不使用 MB。所有患者均行了 MB 扫描方案, 其中 17 例患者同时进行了 TDS 两种扫描方案。通过 IMPULSED 双室模型计算细胞定量参数 (D、Vin、Dex、Cellularity)。计算不同扩散时间下的 ADC 值。对 non-MB 与 MB 组图像质量进行主、客观评分。对两组方案的 IMPULSED 细胞定量参数及 ADC 值的一致性比较采用 bland-altman、配对 t 检验、M-U 检验 (P 值 < 0.01 被认为有统计学意义)。采用二元 logistic 回归构建细胞定量参数和衍生 ADC 值的联合诊断模型。用 ROC 曲线计算 IMPULSED 细胞定量参数和衍生 ADC 值和联合诊断模型对乳腺恶性和良性肿瘤的鉴别诊断效能。结果: IMPULSED 定量参数和衍生 ADC 值在两种扫描方案中无统计学差异 ($P > 0.01$)。使用 MB 方案的总扫描时间比不使用 MB 方案的总扫描时间缩短了 8'36"。Vin 和 Cellularity 的 AUC 最高分别为 0.80 和 0.79。ADC-PG1000、ADC%N2 的 AUC 分别 0.75、0.80。联合模型 Model 1 和 Model 2 的 AUC 分别是 0.81 和 0.83。结论: 采用 MB 技术在基于 TDS 的乳腺 MR 成像中对定量测值无影响, 在得到更多参数的情况下, 提高检查效率和图像质量。在 IMPULSED 细胞定量参数中, 细胞内体积分数 (Vin) 和细胞密度 (Cellularity) 在乳腺良恶性病变诊断中具有更好的诊断性能。在衍生 ADC 中, ADC-PG1000、ADC%N2 诊断乳腺良恶性病变的特异性和敏感性最高。衍生 ADC 值的联合模型 Model 2 较单个衍生 ADC 值对乳腺病变良恶性诊断的效能均有提高。

PO-1375

酰胺质子转移技术联合 T1 mapping 和

DWI 成像鉴别乳腺肿块型病变的价值

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目的: 探索酰胺质子转移技术联合 T1 mapping 和 DWI 成像在鉴别乳腺肿块型病变良恶性的诊断价值。**方法:** 53 例 MR 上表现为乳腺肿块型病变的患者, 结果均有病理证实 (22 个良性病灶和 31 个恶性病灶), 患者分别行 APT、T1 mapping 及 DWI 序列扫描。计算并比较乳腺良恶性病变的 APT SI mean 值、打药前、后 T1 mapping 值的变化率和平均 ADC 值。用二元 Logistic 回归分别建立三种成像技术两两联合、三者联合的诊断模型并绘制其 ROC 曲线计算曲线下面积。**结果:** 乳腺肿块型病变中恶性病灶的 APT SI mean 值、T1 mapping 变化率均高于良性病灶 (3.63 ± 1.20 vs. 1.71 ± 1.66 , $P < 0.05$), ($0.68 \pm 0.18\text{ms}$ vs. $0.44 \pm 0.23\text{ms}$, $P < 0.05$); 乳腺恶性病灶的平均 ADC 值低于良性病灶 ($0.99 \pm 0.43 \text{ mm}^2/\text{s} \times 10^{-3}$ vs. $1.42 \pm 0.37 \text{ mm}^2/\text{s} \times 10^{-3}$, $P < 0.05$)。APT、T1 mapping 和 ADC 三者联合的诊断效能最高 (AUC 为 0.94, 95% 置信区间: 0.88-1.00)。打药前后 T1 mapping 变化率具有最高约登指数 0.79, APT 具有最高敏感度 95.45%, 而 ADC 值具有最高特异性 80.65%。**结论:** APT 和 T1 mapping 成像技术可用于乳腺肿块型病变的良恶性诊断。APT、T1 mapping 和 DWI 三种成像技术的联合诊断模型可以明显提高其对乳腺肿块型病变的诊断效能。

PO-1376

乳腺 MRI 在乳房再造术后残余腺体评估的临床价值研究

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目的: 应用乳腺 MRI 探究乳腺癌全乳切除术及乳房再造术后残留腺体皮瓣厚度与残留腺体量之间的相关性, 并对残余腺体量和皮瓣厚度进行定量评估和分析。

方法: 对 2017 年 1 月至 2022 年 1 月期间于我院进行的 500 例术后乳腺 MRI 检查进行了回顾性分析, 最终纳入了 367 名女性病人共计 436 例乳腺全乳切除及乳房再造术的乳腺 MRI 图像。将待测乳腺 MRI 图像分为外上、内上、外下、内下及乳头后方五个区域, 两位影像医生分别记录五个标准位置的残余腺体、测量皮瓣厚度并计算各位置残余腺体出现的频率, 最后统计两位医生结果的一致性 (组间一致性); Fisher 精确检验、student t 检验和组内一致性分析用于评估可重复性。

结果: 436 例乳腺全乳切除及乳房再造术的乳腺 MRI 图像中, 残余腺体出现概率约 20%, 并且在 NSM 后比 SSM 出现残余腺体频率更高 (50% vs. 13%, $p = 0.003$)。与残余腺体存在独立相关的变量有皮瓣厚度 ($p < 0.001$)、患者身高 ($p < 0.03$)、乳房切除适应证 ($p < 0.001$)、乳房切除类型 (SSM, NSM 和 TM)。乳腺癌保乳术后 (尤其是 NSM 术后) 残余腺体的发生率相对较高, 部分个体中未切除的纤维腺体组织比例较高。

结论: 通过乳腺 MRI 检查发现乳腺全乳切除及乳房再造术后残余腺体出现的概率表明, 基于 MRI 的跨学科手术计划应该考虑到残余腺体的数量、位置和分布。这种术前规划, 将来可能会提高 NSM 和 SSM 术后的安全性, 减少复发率, 提高患者预后。

PO-1377

多模态 MRI 对非肿块型乳腺钙化病变的诊断价值

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目的: 探讨多模态磁共振成像技术 (MRI) 对乳腺 X 线非肿块型钙化病变的诊断价值。

方法: 回顾性分析 2020 年 1 月至 2023 年 3 月在辽宁省肿瘤医院就诊经乳腺 X 线摄影检查诊断为非肿块型钙化病变, 且 MRI 呈非肿块样强化的 149 例患者的临床及影像资料。所有病例均采用 GE 1.5T 超导磁共振检查, 序列包括 T1WI、T2WI、抑脂、弥散加权成像 (DWI)、动态增强。分析乳腺背景实质强化(BPE)程度及良恶性病灶的强化分布方式 (段样、区域、局灶及弥漫分布)、DWI 信号、时间-信号强度曲线 (Time-intensity curve, TIC), 并采用 $b=800 \text{ s/mm}^2$, 在工作站生成的 ADC 图, 设置 3~5 个 ROI 测量病变强化区域的表现弥散系数 (ADC 值), 取其平均值为终值。以病理结果为金标准, 计算 MRI 的诊断效能。

结果: 本研究 149 例患者中, 包含 105 例乳腺癌 (恶性组) 和 44 例乳腺良性病变 (良性组)。单因素分析结果显示, 乳腺背景实质强化(BPE)、病灶的强化分布方式、DWI 及 TIC 曲线与病变良恶性之间差异均有统计学意义 (χ^2 值分别为 5.668、50.686、22.732、38.847, P 值 <0.05), 其中强化分布方式、DWI 及 TIC 曲线差异显著 (P 值为 $0.000 < 0.001$)。良性组病灶 ADC 值中位数为 $(1.270 \times 10^{-3} \text{ mm}^2/\text{s})$, 高于恶性组病灶 ADC 值 $(1.065 \times 10^{-3} \text{ mm}^2/\text{s})$ ($P=0.000 < 0.001$)。采用二元 Logistic 回归分析建立良恶性诊断模型, 并对回归模型的预测概率进行 ROC 分析, 取得回归模型的曲线下面积 (AUC)、灵敏度、特异度、阳性预测值、阴性预测值及准确度, 分别为 0.912、95.0%、70.0%、88.8%、84.8%、87.9%。

结论: 对于非肿块型乳腺钙化病变, 多模态磁共振成像技术具有较高的鉴别诊断价值。

PO-1378

多模态磁共振联合 X 线摄影对非肿块型乳腺钙化病变的诊断价值

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目的: 探讨多模态磁共振成像技术(MRI) 联合乳腺 X 线摄影 (mammography, MG)对非肿块型乳腺钙化病变的诊断价值。

材料与方法: 回顾性分析 2020 年 1 月至 2023 年 3 月在辽宁省肿瘤医院就诊 MG 表现为非肿块型钙化病变, 且 MRI 呈非肿块样强化的 149 例患者的临床及影像资料。以病理结果为金标准, 将单因素分析有统计学意义的征象纳入多因素回归分析中, 分别建立 MG、MRI 及联合检查的预测模型, 并利用 ROC 分析评价其诊断效能。

结果: 149 例患者中, 105 例为恶性病变, 44 例为良性病变。单因素分析结果显示, 两组病变的钙化形态、分布特点及是否有伴随征象(结构扭曲、局灶不对称致密影、同侧乳头凹陷和皮肤增厚)之间的差异具有统计学意义($P < 0.05$); 乳腺背景实质强化(BPE)、强化分布方式 (段样、区域、局灶及弥漫分布)、DWI 信号、TIC 曲线类型及 ADC 值与病变良恶性之间差异均有统计学意义($P < 0.05$)。多因素回归分析结果显示, MG 的诊断敏感度、特异度、PPV、NPV、诊断准确率及 AUC 分别为 84.8%、65.9%、85.6%、64.4%、79.2%及 0.787。MRI 的诊断敏感度、特异度、PPV、NPV、诊断准确率及 AUC 分别为 95.0%、70.0%、88.8%、84.8%、87.9%及 0.912。MG 联合 MRI 检查中, 诊断敏感度、特异度、PPV、NPV、诊断准确率及 AUC 值分别为 94.0%、75.0%、90.4%、83.3%、88.6%及 0.945。MRI 联合 MG 诊断的 ROC 曲线下面积明显高于 MG 单独诊断, 差异有统计学意义($P < 0.05$)。

结论: 对于非肿块型乳腺钙化病变, MRI 与 MG 联合应用可以提高诊断准确率, 具有较高的诊断效能。

PO-1379

分析磁共振扩散峰度成像在乳腺良恶性病变鉴别诊断中的价值

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目的 研究磁共振扩散峰度成像在乳腺良恶性病变鉴别诊断中的价值。**方法** 回顾分析 2020 年 4 月-2021 年 4 月期间在我院诊治的 74 例乳腺病变患者, 经手术病理证实供 82 个病灶, 其中良性 46 个 (41 例), 恶性 36 个 (33 例), 所有患者均进行双侧乳腺的常规 MRI 检查和 DKI 扫描, 观察比较乳腺良恶性病变组织平均峰度系数 (MK)、横向峰度系数 (AK)、径向峰度系数 (RK)、平均扩散系数 (MD)、径向扩散系统 (RD)、各向异性系数 (FA), 并采用受试者工作特征 (ROC) 曲线评价上述指标对乳腺良恶性疾病鉴别诊断的敏感度、特异度。**结果** 恶性病灶 MK、AK、RK、FA 值均高于良性病灶, MD 低于良性病灶, 差异有统计学意义 ($P<0.05$), RD 与良性病灶比较, 差异无统计学意义 ($P>0.05$); 以术后病理为金标准对 DKI 检查 MK、AK、RK、FA、MD 各值做鉴别乳腺良恶性疾病的 ROC 曲线分析, MK 敏感度均大于 AK、RK、FA、MD, 特异度 AK 大于 MK、RK、FA、MD。**结论** 磁共振扩散峰度成像在乳腺良恶性病变鉴别诊断中具有重要的价值, 且 MK、AK、MD 指标均具有较高的敏感度、特异度, 可作为乳腺良恶性病变鉴别诊断的重要参考指标。

PO-1380

基于超声和乳腺 X 线的深度学习模型预测乳腺癌无病生存率的研究

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目的: 建立基于乳腺 X 线、超声和临床数据的深度学习模型预测乳腺癌的无病生存率, 并验证其预测效能。

方法: 收集患者乳腺 X 线、超声图像和临床数据。使用 ResNet50 基于乳腺 X 线、超声图像建立深度学习模型。使用 cox 比例风险模型从基于乳腺 X 线、超声特征和临床数据特征中选择影响乳腺癌预后的独立影响因素。结合深度学习模型和独立影响因素建立联合模型。

结果: 共纳入 1420 例患者。影响乳腺癌预后的独立影响因素包括年龄、新辅助化疗、HER2、肿瘤位置、血流、可疑钙化和大小。我们建立了四个模型: 超声深度学习模型、X 线深度学习模型、超声-X 线深度学习模型和联合模型。基于乳腺 X 线、超声图像和独立影响因素的联合模型具有最高的预测性能 (训练组 AUC=0.873, 测试组 AUC=0.785)。

结论: 基于乳腺 X 线、超声和临床数据的深度学习模型有潜力成为预测乳腺癌预后的预测工具。

PO-1381

锥光束乳腺 CT 对于乳腺癌不同分子亚型的鉴别诊断价值

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目的: 探讨锥光束乳腺 CT 对于乳腺癌不同分子亚型的鉴别诊断价值

方法: 收集解放军总医院第一医学中心首诊乳腺肿块的女性患者 60 例, 术前接受 CBBCT 检查, 术后手术病理证实为乳腺癌并进行免疫组化分型, 对病变各种影像特征进行分析, 对于乳腺癌不同分子亚型是否存在相关性及其差异。

结果: Luminal A 型 7 人(100%)纤维腺体为致密型, Luminal B 型 33 人(97.1%), HER-2 型 10 人(71.4%), TN 型 4 人(80%), 分布上存在统计学差异($\chi^2=8.581$, $P=0.035$)。患者肿块体积中位数 Luminal A 型为 1.39, Luminal B 型为 5.04, HER-2 型为 6.5, TN 型为 21.11, 肿块体积上差异存在统计学意义($Z=8.103$, $P=0.44$)。对比剂增强后 Luminal A 型 3 人肿块表现为均匀强化(42.9%), 3 人表现为混杂强化(42.9%), 1 人表现为环形强化(14.3%); Luminal B 型 7 人肿块表现为均匀强化(21.2%), 25 人表现为混杂强化(75.8%), 1 人表现为环形强化(3%); HER-2 型表现为均匀强化和混杂强化分别为 2 人(14.3%)和 12 人(85.7%); TN 型表现为混杂强化和环形强化分别为 3 人(60.0%)和 2 人(40.0%), 肿块内部强化特征分布存在显著差异, 具有统计学意义($\chi^2=14.71$, $P=0.023$)。Luminal A 型 0 人(0%)存在钙化, Luminal B 型 12 人(35.3%), HER-2 型 7 人(50.0%), TN 型 0 人(0%), 患者在存在钙化情况的分布上存在统计学差异($\chi^2=7.942$, $P=0.047$)。

结论: 乳腺癌不同分子亚型在 CBBCT 影像表现上是多种多样的, 其中乳腺纤维腺体类型、肿块体积、肿块内部强化特征、钙化等特征有助于区分乳腺癌各分子亚型, CBBCT 对于乳腺癌不同分子亚型的鉴别诊断具有重要价值。

PO-1382

光谱 CT 多参数成像对乳腺肿瘤检查的应用

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目的: 光谱 CT 多参数成像对乳腺病变的检出, 对乳腺癌病灶及腋窝淋巴结性质的鉴别和诊断。**方法:** 选取来我院就诊, 经钼靶摄影确定乳腺肿物并伴有腋窝淋巴结肿大的 22 例患者, 年龄 30~60 岁, 行光谱 CT 增强检查。常规图像-动脉期轴位: 显示乳腺内占位病变, 边缘不规则, 边界范围显示不清晰。多参数成像显示: 单能级 40keV-动脉期图像, 软组织对比度明显增高, 乳腺病变及腋窝淋巴结边界范围显示清晰, 分别记录肿瘤及淋巴结的 CT 值。有效原子序数融合图-动脉期, 观察乳腺占位病变及淋巴结的大小、边界、范围, 分别记录有效原子序数值。碘密度融合图-动脉期, 测量乳腺病灶及淋巴结的碘密度值, 观察血供丰富情况。动脉期光谱曲线分析, 寻找与感兴趣乳腺病灶同源的腋窝淋巴结。分别对检出的乳腺病灶和同源性淋巴结进行穿刺。**结果:** 17 例患者单发乳腺病灶, 同侧同源性淋巴结 2 个(10 例患者)淋巴结 1 个(7 例患者), 穿刺病理结果为乳腺癌伴腋窝淋巴结转移。3 例患者双乳腺病灶, 双侧同源性淋巴结 2 个(左右各一), 穿刺病理结果为 2 例乳腺癌伴双侧腋窝淋巴结转移, 1 例单侧乳腺癌无腋窝淋巴结转移。2 例患者为单发乳腺良性肿瘤, 腋窝淋巴结为反应性增生。乳腺肿瘤及腋窝淋巴结检出率为 100%, 乳腺癌确诊率为 91%, 腋窝淋巴结确诊率为 86%。**结论:** 光谱 CT 的单能 40keV 图可以明显提升碘强化效果, 可显著提高病变的检出率、可视化。多参数成像的碘密度融合图可以定量测量病灶及可疑转移淋巴结的摄碘率, 为乳腺病灶和可疑转移淋巴结提供了精确的定量数据分析。有效原子序数融合图可以测量病灶有效原子序数, 为乳腺病灶、正常乳腺腺体、可疑转移淋巴结、炎性淋巴结等鉴别从精准物质成分分析的角度提供了精确定量数据分析, 并有助于区分癌组织与腺体组织。光谱曲线为乳腺癌病变区与正常腺体、乳腺癌病变区与腋窝可疑转移淋巴结的同源性判断均提供了清晰、明确的可视化曲线和强有力的统计学依据。

PO-1383

不同年龄及月经状态女性正常乳腺动态增强 MRI 半定量参数值变化

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【摘要】 目的 探讨不同年龄及月经状态女性正常乳腺动态增强 MRI 半定量参数（最大强化率，ERmax，最大上升斜率，Slopemax）的变化特征及其临床意义。方法 收集 2020 年 8 月至 2022 年 11 月皖南医学院弋矶山医院因自觉“包块”、不适 MRI 检查乳腺健康 332 例受试者资料，根据年龄分为低年龄组（n=107），中年组（n=114），高年龄组（n=111）。根据不同月经状态将受试者分为月经期（n=49）、增殖期（n=77）、分泌期（n=94）和绝经后（n=112）。在西门子后处理站中勾画感兴趣区(ROI)，生成 TIC 并计算动态增强 MRI 半定量参数（ERmax，Slopemax），比较不同年龄及月经状态的乳腺动态增强 MRI 半定量参数（ERmax，Slopemax）的差异。结果 不同年龄正常乳腺的动态增强 MRI 半定量参数（ERmax，Slopemax）差异有统计学意义（ $P<0.05$ ）；高年龄组与低年龄组的差异均有统计学意义（ $P<0.05$ ），中年组与低年龄组、高年龄组差异均无统计学意义（ $P>0.05$ ）。不同月经状态的正常乳腺组织，动态增强 MRI 半定量参数（ERmax，Slopemax）差异均有统计学意义（ $P<0.05$ ）；绝经后与月经期、分泌期的差异均有统计学意义（ $P<0.05$ ），Slopemax 增殖期与绝经后的差异有统计学意义（ $P<0.05$ ），ERmax 增殖期与绝经后的差异无统计学意义（ $P>0.05$ ），月经期、增殖期及分泌期两两比较差异无统计学意义（ $P>0.05$ ）。结论 不同年龄及月经状态正常女性乳腺动态增强 MRI 半定量参数（ERmax，Slopemax）的变化及个体之间的变异度较大，利用动态增强 MRI 半定量参数诊断女性乳腺疾病时应考虑不同年龄及月经状态下的基线动态增强 MRI 半定量参数变化。

PO-1384

DBT 和超声对小肿块（ $\leq 20\text{mm}$ ）的诊断价值对比研究

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目的：对比 DBT 和超声对 $\leq 20\text{mm}$ 的小肿块的诊断价值

材料方法：回顾性分析 2021 年 7 月至 10 月在我院就诊行乳腺 DBT 和超声检查且病灶最大径小于等于 20mm 的肿块 110 例，由两名诊断医生参照 BI-RADS 诊断标准对 DBT 图像和超声图像进行诊断，以病理结果为金标准，影像诊断为 4A 及 4A 以下病灶为良性符合，4B 及 4B 以上病灶为恶性符合。通过受试者工作特性（ROC）曲线比较 DBT 和超声对小肿块的诊断价值，Z 检验比较曲线下面积。

结果：共 107 名患者 110 个肿块纳入研究，其中良性 48 个，恶性 62 个。DBT 对 $\leq 20\text{mm}$ 小肿块的诊断效能高于超声，AUC 分别为 0.911 和 0.802，两者差异有统计学意义（Z 值为 2.533，P 值为 0.011）；对于 $\leq 10\text{mm}$ 的更小肿块，DBT 的诊断价值仍高于超声，AUC 分别为 0.972 和 0.722，差异有统计学意义（Z 值为 2.676，P 值为 0.007）；对于 10~20mm 之间的肿块，虽然 DBT 诊断的 AUC（0.880）略高于超声（0.817），但两者无统计学差异（Z 值为 1.298，P 值为 0.194）。

结论 DBT 对 $\leq 20\text{mm}$ 的小肿块的诊断价值高于超声，且肿块越小，DBT 的优势越明显。

PO-1385

基于瘤内，瘤周和 BPE 影像组学预测乳腺癌新辅助化疗病理完全反应：多种机器学习算法

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目的：基于瘤内、瘤周和 BPE 构建及验证一个多区域磁共振影像组学模型用于预测乳腺癌新辅助化疗后病理完全反应。为明确以 BPE 为代表的肿瘤周围微环境影响新辅助化疗疗效提供理论依据。

方法: 对 133 例进行新辅助化疗的乳腺癌患者进行回顾性分析, 其中包括病理明确的 pCR 患者 49 例。从每例患者的 T1WI、增强及减影序列中分别提取瘤内、瘤周及 BPE 区域的影像组学特征, 降维后获取与临床结局最相关的特征, 之后基于剩余特征通过不同区域的组合使用多因素逻辑斯回归选取最优特征集, 应用多种机器学习方法构建预测模型。我们使用工作特性曲线进行模型性能评价, 最终选取最优模型, 并使用 SHAP 分析进一步解析构建模型的特征与临床输出结局的关联。

结果: 基于瘤内、瘤周及 BPE 构建的标志物中, BPE 获得了最优的预测效能, 在瘤内、瘤周基础上, 增加 BPE 后, 诊断效能也得到了提高。三区域联合构建的标志物具有最佳性能, 其 AUC 在训练组和测试组中的诊断效能分别为 0.838 和 0.789, 准确性分别为 0.796 和 0.775, 敏感性分别为 0.794 和 0.733, 特异性分别为 0.797 和 0.800。而基于三个区域的特征使用 XGboost 构建的机器学习模型具有最佳性能, 其 AUC 在训练组和测试组中的诊断效能分别为 0.891 和 0.861, 准确性分别为 0.86 和 0.825, 敏感性分别为 0.882 和 0.8, 特异性分别为 0.847 和 0.84。依据 SHAP 分析, LZ_log.sigma.2.0.mm.3D_glcml_ClusterShade_T12 对模型的预测能力贡献最大。

结论: 加入 BPE 区域影像组学分析后提高了乳腺癌新辅助化疗 pCR 的预测准确性, 提示肿瘤周围微环境可以影响新辅助化疗疗效。

PO-1386

乳腺 X 线摄影引导下导丝定位在乳腺簇状钙化病变的应用

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[摘要] 目的 乳腺 X 线摄影引导下导丝定位穿刺在乳腺簇状钙化病变的临床应用研究。方法 乳腺影像报告及数据系统分类 (BI-RADS) 分类为 4B 类和 5 类的簇状钙化病变的患者 50 例, 采用乳腺 X 线摄影定位下穿刺的方法, 导丝留置于簇状钙化目标病变区, 在导丝引导下进行手术切检, 切除标本再次钼靶摄片, 确认钙化灶完全切除后, 送至病理组织学检查。结果 乳腺钼靶摄片发现簇状钙化病变的 50 例患者均一次性导丝定位成功, 手术均完整切除。病理检查: 恶性病灶 38 例, 良性病灶 12 例。结论 乳腺 X 线摄影引导下导丝定位活检技术可以帮助外科医生准确切除超声和 MR 图像上无法显示的簇状钙化病灶, 从而帮助确定病变性质, 提高早期乳腺癌的检出率。

PO-1387

乳腺断层摄影与全数字乳腺摄影在乳腺癌诊断中的价值对比

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【目的】探讨乳腺断层摄影与全数字乳腺摄影在乳腺癌诊断中的价值对比

【方法】随机抽取我院 2023 年 5 月之前病理结果确诊为乳腺癌，且在我科接受过全数字影像摄影的患者 50 例，随机抽取我院 2023 年 5 月以来病理结果确诊为乳腺癌，且在我科接受过乳腺断层摄影的患者 50 例，对比两组检查的影像学表现及检查结果。

【结果】全数字乳腺摄影组检查出包块边界清晰的情况优于全数字乳腺摄影组。两组对比差异显著 ($P<0.05$)，全数字乳腺摄影组检查出包块包块毛刺征、血管穿入征的情况优于全数字乳腺摄影 ($P<0.05$)。

【结论】乳腺断层摄影的影响对病灶的影像学表现更为清晰，在乳腺癌诊断中较全数字乳腺摄影具有更高的价值。

PO-1388

基于多模态 MRI 影像组学区分非化脓性乳腺炎
与炎性乳腺癌研究

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目的：探讨基于多模态 MRI 影像组学在非化脓性乳腺炎与非肿块型乳腺癌中的诊断价值。

方法：收集 2017 年 6 月~2022 年 4 月于浙江中医药大学附属第一医院行乳腺 MRI 扫描的患者 222 例。以 7:3 的比例随机将患者分配至训练集 ($n=155$) 和验证集 ($n=67$)。逐层手动勾画 MRI 图像 DWI、ADC、DCE (第 2 期) 的病灶区域并从中提取影像组学特征。依次利用单因素分析、mRMR 及 LASSO 算法对影像组学特征降维，筛选出重要性排名靠前的特征，并将其与相应系数进行加权求和公式，以此计算每位患者的影像组学评分 (radiomics score, Radscore)。采用单因素 Logistic 回归分析寻找区别非化脓性乳腺炎与非肿块型乳腺癌的临床危险因素。最后使用多因素 Logistic 回归构建基于临床危险因素和 Rad-score 的联合模型，绘制列线图。通过受试者工作特征 (receiver operating characteristic, ROC) 曲线下面积 (area under curve, AUC)、特异度、敏感度、准确度评估预测性能。

结果：单因素和多因素 Logistic 回归分析显示，年龄 ($OR=0.945$, $95\%CI=0.913\sim 0.975$, $P=0.001$)、乳晕或皮肤增厚 ($OR=4.881$, $95\%CI=1.949\sim 13.446$, $P=0.001$) 是区分乳腺炎和乳腺癌的影响因素的独立危险因素，其构建的临床模型在验证集的 ROC 曲线下面积 (AUC) 为 0.79。19 个影像组学特征被选择用于构建影像组学标签，其在验证集的 AUC 为 0.88。将该标签与临床模型结合获得联合模型，其在验证集的 AUC 为 0.89。临床决策曲线显示，联合模型的临床实用性最优。

结论：联合乳腺多模态 MRI 影像组学和临床危险因素构建的列线图模型可用于区分非化脓性乳腺炎与炎性乳腺癌。

PO-1389

非对比增强 MRI 在评价数字乳腺 x 线 BI-RADS 0 类病变中的价值

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背景:数字乳腺 x 线片(DMs)对 BI-RADS 0 类病变的良恶性诊断具有重要意义。我们比较了非对比增强磁共振成像 MRI 和动态对比增强磁共振成像(DCE-MRI)对他们的诊断性能。我们试图通过 3 种 MRI 序列来评估 BI-RADS 0 类病变:STIR、STIR 结合高 b 值扩散加权成像(STIR-DWI)和 DCE-MRI。方法:我们回顾性分析了 2014 年 1 月至 2019 年 6 月 112 例患者中的 114 例乳腺 DM 不可触及 BI-RADS 0 类病变。所有患者均行 STIR、STIR-DWI 和 DCE-MRI 检查。两名乳腺放射科医生分别读取单个序列(STIR, DWI, DCE-MRI)和成对序列(STIR-DWI)来检测 DMs 中 BI-RADS 0 类病变。根据 MRI 影像、临床和病理资料相结合的最具价值的比较指标,采用受试者工作特征曲线分析来评估诊断性能。

结果:114 个病灶(患者中位年龄 47 岁;病灶中位大小为 19mm), STIR 漏检 32 例(48.5%), STIR-DWI 漏检 9 例(13.6%), DCE-MRI 漏检 3 例(4.5%)。我们研究的主要发现是 STIR-DWI 和 DCE-MRI 的诊断准确性高于 STIR ($P<0.01$)。STIR-DWI 的准确率更高(曲线下面积[AUC]= 0.858;敏感性=87.8%)高于 STIR (AUC=0.754;敏感度=51.5%),而表现与 DCE-MRI 相当(AUC=0.884;敏感性=95.5%)。

结论:STIR-DWI 是一种非对比增强 MRI 技术,在未触及 BI-RADS 0 类病变中,对良恶性病变的诊断效果与 DCE-MRI 相同。因此,STIR-DWI 可提高乳腺癌筛查的安全性和有效性,尤其是在 DMs 中未触及 BI-RADS 0 类病变。

PO-1390

致密性乳腺 1.5T 磁共振 DWI 成像时 b 值的选择

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目的 探讨致密性乳腺 1.5T 磁共振 DWI 成像时 b 值的选择。方法 纳入 2019 年 1 月至 2020 年 1 月于本院就诊的 64 例致密性乳腺女性,采集 T2 和 DWI 序列,弥散敏感因子 b 值分别取 600s/mm²、800s/mm²、1200 s/mm²,对比不同 b 值下的图像信号强度比(SIR)、噪声比(CNR)、表观弥散系数(ADC)及对病灶与周围乳腺组织边界的显示情况,以病理结果为诊断金标准,计算诊断的敏感性、特异性、准确率。结果 所纳入的 64 例受试者中,经临床相关检查共计发现病灶 89 个,MR 共检出病灶 83 例,检出率 93.25%,远高于乳腺 x 线检查 (46.06%), b 值分别取 600s/mm²、800s/mm² 时的 SIR、CNR 高于 1200 s/mm², b 取 800s/mm²、1200s/mm² 时对边界的判读优于 b 值取 600s/mm²。随 b 值的上升,周围乳腺组织、良恶性病灶的 AUC 值均下降,对于同一病灶,与周围乳腺组织相比,病灶的 Δ AUC 在不同组间无明显差异, b 取 800s/mm²、1200 s/mm² 时的敏感性和准确性高于 600s/mm² 组,组间特异性均没有显著差异。结论 1.5T 磁共振 DWI 成像可以作为致密性乳腺筛查的有力补充手段,综合图像质量和诊断效能的考量, b 值取 800s/mm² 较为合适。

PO-1391

相位编码方向对乳腺弥散加权成像图像质量的影响

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目的：研究相位编码方向对乳腺弥散加权（DWI）成像图像质量的影响。方法：收集我院 2022 年 2 月—2022 年 7 月行乳腺磁共振检查的患者 100 例，其中研究组 50 例，对照组 50 例。研究组患者行 DWI 后前位（P-A）相位编码方向扫描，对照组行 DWI 前后位（A-P）相位编码方向扫描，分析对比两组图像几何失真率、相位位移伪影发生率和图像信噪比（SNR），采用两独立样本 t 检验和卡方检验进行统计分析。结果：研究组乳腺长径平均拉伸率：右乳为 6.75%，左乳为 6.92%；乳腺横径平均拉伸率：右乳为 4.14%，左乳为 3.79%。对照组乳腺长径平均拉伸率：右乳为 13.82%，左乳为 16.12%；乳腺横径平均拉伸率：右乳为 8.26%，左乳为 9.56%。采用两独立样本 t 检验对右乳长径、横径，左乳长径、横径进行统计学分析，研究组形变率均小于对照组（P 右乳长径、P 右乳横径、P 左乳长径、P 左乳横径 <0.05 ）。研究组相位位移伪影发生率为 14.0%，对照组相位位移伪影发生率为 62.0%，采用卡方检验进行统计学分析，研究组相位位移伪影发生率明显小于对照组（ $P<0.05$ ）。研究组 SNR 平均值为 2.30，对照组 SNR 平均值为 2.53，采用两独立样本 t 检验进行统计学分析， $P=0.278$ ，研究组与对照组 SNR 差异无统计学意义（ $P>0.05$ ）。结论：乳腺磁共振 DWI 后前位（P-A）相位编码方向图像质量明显优于前后位（A-P）相位编码方向图像质量，更加有利于乳腺病变的显示与诊断。

PO-1392

基于超声和乳腺 X 线影像学特征预测乳腺癌分子亚型和预后的研究

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目的：基于临床病理学资料、超声和乳腺 X 线影像学特征建立预测乳腺癌分子亚型和预后的模型。方法：收集乳腺癌患者的临床病理学资料、超声和乳腺 X 线影像学特征，并随访其预后结果。使用 Kaplan-Meier 生存曲线评估无病生存率。使用单变量和多变量分析选择与乳腺癌分子亚型和预后结果相关的独立影响因素。基于独立影响因素采用逻辑回归模型和 COX 比例风险回归模型分别建立预测乳腺癌不同分子亚型和预后结果的模型。

结果：本文共纳入 1546 例患者，建立了一个分类模型和六个预后模型：分类模型、综合模型、Luminal A 模型、Luminal B 模型、HER-2 过表达模型、三阴性乳腺癌模型、非三阴性乳腺癌模型。训练组和验证组的分类模型的 AUC 分别为 0.715 和 0.721。Luminal A 模型的 C 指数最高，训练组为 0.772，测试组为 0.654。HER-2 过表达模型的 1、3、5 年无病生存率的 AUC 最高，训练组分别为 0.868、0.726、0.752，测试组分别为 0.721、0.712、0.732。

结论：基于临床病理学资料、超声和乳腺 X 线影像学特征的模型有可能预测乳腺癌的不同分子亚型和无病生存率。

PO-1393

基于基线影像学征象及临床病理参数预测三阴性乳腺癌 无进展生存期的应用价值

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目的 探讨基线影像学征象和临床病理参数对三阴性乳腺癌 (triple negative breast cancer, TNBC) 无进展生存期 (progression-free survival, PFS) 的预测价值。**方法** 回顾性分析 2017 年 7 月至 2022 年 10 月昆明医科大学第一附属医院经病理证实的 TNBC 患者的临床、病理及影像学资料, 严格按照纳排标准筛选, 最终入组 67 例。收集患者相关临床资料、影像学征象 (包括乳腺断层融合成像、磁共振成像) 及病理参数, 采用单因素和多因素 Cox 比例风险回归分析确定 PFS 的独立风险因素, Kaplan-Meier 生存曲线和 log-rank 检验分析参数间差异。**结果** 单因素分析结果显示: 临床相关参数中, 病灶最大径线 $\geq 5\text{cm}$ 、III-IV 期是 TNBC 患者 PFS 的独立风险因素 ($P < 0.05$); MRI 征象中, 致密腺体、病灶位于乳晕后区、非平行生长、病灶边缘不规则伴毛刺、环形强化、侵犯邻近结构、灶周水肿是 TNBC 患者 PFS 的独立风险因素 ($P < 0.05$); 病理参数中, 术后淋巴结分期、Ki-67 $> 30\%$ 、神经/脉管侵犯是 TNBC 患者 PFS 的独立风险因素 ($P < 0.05$); 雄激素受体阳性是 TNBC 患者 PFS 的保护因素 ($P < 0.05$)。多因素分析结果显示, 病灶边缘不规则伴毛刺、非平行生长及神经/脉管受侵是 TNBC 患者 PFS 的独立风险因素 ($P < 0.05$)。病灶边缘不规则伴毛刺、非平行生长、神经/脉管侵犯 TNBC 患者的 PFS Kaplan-Meier 生存曲线差异有统计学意义 ($P < 0.05$)。**结论** 病灶边缘不规则伴毛刺、非平行生长及神经/脉管侵犯是 TNBC 患者 PFS 的独立风险因素, 基线影像学征象和临床病理参数对 TNBC 患者的 PFS 具有一定的预测价值。

PO-1394

MRI 影像学征象对乳腺癌保乳术中切缘阳性的预测价值

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目的: 通过探讨术前乳腺癌的 MRI 相关影像学征象, 评估 MRI 对保乳术中肿瘤切缘阳性的预测诊断价值。**方法:** 回顾性分析我院 2022 年 9 月-2023 年 7 月有完整术前 MRI 资料且首次手术为保乳术的 177 例浸润性乳腺癌进行研究, 根据术中病理的切缘情况分为切缘阳性组 (29 例) 和切缘阴性组 (148 例)。分析病例资料的术前 MRI 图像, 收集包括乳腺纤维腺体类型, 同侧背景实质强化类型, 对侧背景实质强化类型, 病灶类型, 肿块形态, 肿块边缘特征, 病灶最长径, 肿块型病灶强化特点, 病灶周围的血管征象, 病灶周围是否存在其他病变, 动态增强曲线特征, 非肿块样强化病灶分布特征、病灶周围伴有 DCIS、肿瘤周围多发点状强化、患侧病灶周围是否存在多发点状血管征象等 MRI 特征以及基本的临床信息、病理特征。通过单因素比较两组间各种 MRI 特征和基本临床信息、病理特征的差异, 再将单因素分析有统计学意义的 MRI 特征进行多因素 Logistic 回归分析, 采用受试者操作特征 (ROC) 曲线评价回归模型对保乳术中切缘阳性的预测诊断价值。**结果:** 本组研究的保乳术中切缘阳性率为 16.4% (29 / 177 例)。单因素分析结果显示, 在 MRI 特征中, 有多中心病灶 ($P=0.011$); 病灶周围存在其他病变 ($P<0.001$) 是保乳术中切缘阳性的预测特征; 在基本临床、病理特征中, HER2 阳性表达 ($P=0.048$) 是保乳术中切缘阳性的预测因素。多因素回归分析结果显示, 肿块型周围存在其他病灶 ($P=0.006$), 肿瘤周围多发点状强化 ($P<0.001$), 患侧病灶周围是否存在多发点状血管征象 ($P<0.05$), 是保乳术中切缘阳性最有预测价值的 MRI 特征。病灶周围伴有 DCIS ($P<0.001$), 是保乳术中切缘阳性最有预测价值的病理特征。**结论:** 部分术前 MRI 特征和病理特征可以对浸润性乳腺癌保乳术中切缘阳性情况进行预测。

PO-1395

酰胺质子转移成像和扩散加权成像在 预测乳腺癌预后因素中的价值

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目的: 探讨酰胺质子转移(APTw)成像在评估乳腺癌预后因素中的价值, 评价 APTw MRI 能否增加扩散加权成像(DWI)对乳腺癌的诊断价值, 以指导个体化治疗策略。

材料和方法: 回顾性分析连续 2019 年 1 月至 2022 年 12 月经病理确诊为浸润性乳腺癌患者 82 例。所有受试者术前行多参数 MRI 检查, 包括 APTwMRI 和 DWI。统计分析采用 t 检验、单因素方差分析、Spearman 相关分析和 ROC 分析, $P < 0.05$ 为有统计学意义。

结果: 乳腺癌病理分级 III 级比 II 级具有更高的 APTw 值(3.10 ± 1.24 vs 1.92 ± 0.83 ; $P = .000$)和更低的 ADC(源自 DWI)值[(0.82 ± 0.12) $\times 10^{-3}$ mm²/sec vs (0.98 ± 0.14) $\times 10^{-3}$ mm²/sec; $P = .000$]。鉴别乳腺癌病理分级 III 级和 II 级的 APTw 和 ADC 值的受试者工作特征曲线下的面积(AUC)是相似的(分别为 0.78 和 0.81; $P = .65$)。ADC 联合 APTw 值的诊断性能进一步提高($AUC = 0.87$)。APTw 值与肿瘤直径、Ki-67 指数呈正相关(分别为 $r = 0.263$; $P = .017$, $r = 0.327$; $P = .003$), 与 ER 表达呈负相关($r = -0.416$; $P = .000$); 与淋巴血管侵犯、淋巴结状态、HER-2 表达和 PR 表达无相关性($P > 0.05$)。ADC 值在肿瘤直径、ER 及 PR 表达、HER-2 表达、Ki-67 指数、淋巴血管侵犯和淋巴结状态中差异无统计学意义($P > 0.05$)。单因素方差分析显示 APTw 值在区分 luminalA、luminalB (HER-2 阴性)、luminalB (HER-2 阳性)、HER-2 过表达型和三阴性乳腺癌上具有统计学意义($F = 3.790$; $P = .007$)。其中, luminalA 和 HER-2 过表达型($P = .019$)、luminalA 和三阴性乳腺癌($P = .029$)之间的 APTw 值差异有统计学意义。而 ADC 值在分子亚型上差异无统计学意义($P = .161$)。

结论: APTw 成像具有评估乳腺癌预后因素的潜力。APTw 成像联合 DWI 能够提高乳腺癌组织病理学分级的诊断效能。

PO-1396

BRCA 基因突变型与正常乳腺癌患者间 MRI 影像特征的差异及对预后的预测价值

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背景: BRCA 基因在乳腺癌发病和精准治疗中的作用已得到广泛认识, 但基因检测的花费和耗时较高。本文尝试探索乳腺癌患者人群中 MRI 特征与 BRCA 基因突变的关系, 及对预后的预测价值。

方法: 收集包括 BRCA1 基因突变 38 例, BRCA2 基因突变 38 例, 以及 BRCA 基因野生型患者 168 例共计 244 例在本院诊断治疗的乳腺癌患者的临床病理资料、活检前 MRI 扫描图像和术后辅助治疗后的预后资料。采用卡方检验和多因素 logistic 回归分析 BRCA 基因突变型与正常乳腺癌患者间临床病理特征及 MRI 特征的差异, 采用多因素 cox 回归分析 MRI 特征和 BRCA 基因状态对乳腺癌患者预后的预测效果。

结果: 分子分型(luminal 型、Her2 过表达型、TNBC 型, $p < 0.001$)、BPE(轻微、轻度、中度、明显, $p = 0.007$)及强化曲线(I/II 型、III 型, $p = 0.010$)均是区分乳腺癌患者中 BRCA 基因野生型及 BRCA1/2 基因突变型的独立影响因素。分期较晚($p = 0.001$)、邻近淋巴结转移($p = 0.006$)、

高 BPE 水平($p=0.029$)、a 或 b 腺体型 ($p<0.001$) 的乳腺癌患者预后较差, 但 BRCA 基因突变状态仅在单因素分析中存在预测乳腺癌患者预后的趋势。

结论: BRCA 基因突变型和正常乳腺癌患者间分子分型、BPE 和强化曲线特征存在差异, 淋巴结转移状态、疾病分期、腺体致密度和 BPE 特征是乳腺癌预后的独立预测因素, 但 BRCA 基因突变状态预测预后不显著。

PO-1397

X 线三维立体定位引导下乳腺病变真空辅助旋切技术的经验体会

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目的: 总结乳腺病变真空辅助旋切技术在乳腺隐匿病灶活检、治疗中的经验总结。

方法: 收集 2021 年 6 月—2023 年 5 月在我院进行 X 线引导下病变真空辅助旋切患者, 共 62 例, 病灶共 62 处, 年龄 34-65 岁, 平均 (45.5 ± 6.63) 岁, 均为女性。所有患者术前均进行乳腺 X 线检查, 表现为单纯钙化者 60 例, 表现为钙化伴肿块者 2 例。根据 BI-RADS 分类均为 4 类 (BI-RADS 4A 44 例, BI-RADS 4B 15 例, BI-RADS 4C 3 例)。利用全数字化立体定位系统进行病变定位, 并根据实际情况进行微调, 局部麻醉并行小切口置入旋切针, 再次进行 X 线摄片确定旋切针位置后取得组织, 取得病理学结果。

结果: 除 1 例患者目标病变取得较少外, 其余 61 例均成功取得较多目标病变, 1 例患者术后出现血栓性静脉炎, 1 例患者出血较多, 其余患者均未出现明显不良反应。术后病理良性病变 51 例, 恶性病变 11 例 (导管内癌 8 例, 浸润性癌 3 例)。

结论: 能够取得较多的目标病变是旋切成功的关键, 当患者钙化范围较大时, 选择钙化最为聚集的部分进行活检。旋切时采用侧卧位, 用海绵垫对患者背部进行支撑、固定, 同时在患者双腿间放置棉被, 可以让患者身体处于放松状态, 较大程度避免患者移动。对于乳房较小及乳房弹性差的患者, 在局麻时注入添加肾上腺素的生理盐水, 可以有效增加乳腺厚度和乳腺组织弹性。乳房内侧血管较多, 尽量选择从外侧进针, 可以减少血管损伤可能; 术中若患者出血较多, 除加压外, 可给予少量止血剂进行治疗。乳腺旋切术后最常见的并发症血肿形成, 在旋切后利于旋切针的抽吸功能对术区进行充分抽吸, 针退出后对患者乳房进行挤压, 将残留血液尽量挤出, 同时使用胸部加压绷带, 可以最大限度的防止血肿产生。

PO-1398

基于磁共振成像影像组学构建的 21 基因检测复发风险预测模型 评估 ER+/HER2-乳腺癌预后的探索研究

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目的: 探究基于磁共振肿瘤内部和瘤周影像组学特征建立的乳腺癌复发风险预测模型, 是否可以用于评估 ER+/HER2-乳腺癌患者无病生存期 (disease-free survival, DFS)。

方法: 本部分研究对象包含两个队列的患者。回顾自 2017 年 4 月至 2019 年 3 月在我院就诊的 ER+、HER2-乳腺癌患者资料, 筛选出进行乳腺 21 基因检测、并有术前乳腺 MRI 扫描的患者纳入模型构建组。另回顾自 2012 年至 2016 年在本院就诊且确诊为单侧可切除 ER+/HER2-乳腺癌的患者资料, 筛选出有术前乳腺 MRI 检查、且在本院行保乳手术或乳腺全切手术、术后行 EC-wP 或 EP-wP 方案化疗和至少 5 年内内分泌治疗的患者纳入预后组。在动态对比增强末期 (CL) 图像上手动分割病灶感兴趣体积 (VOI), 并复制到 T2WI 图像上, 再运用膨胀算法获得瘤周 VOI (肿瘤周围 4 mm 环形

区域)和膨胀 VOI (包含肿瘤内部和瘤周 4 mm 区域)。选取预测效能较高的模型,将预后组患者特征带入模型,获得 3 组预测复发风险评分(predRS)。使用 Kaplan-Meier 曲线描述不同 predRS 分组患者生存过程,并使用 Log-rank 检验比较组间差异,使用 predRS 和有意义的单因素联合构建 COX 回归模型。

结果:模型构建组共入组 159 名患者,训练组 111 名(低危组 34 名,高危组 77 名),验证组 48 名(低危组和高危组分别为 24 名)。预后组共纳入 111 名研究对象,平均随访时间为 49.6 个月,共有 18 例患者出现复发,平均复发时间为 30.9 个月,总体复发转移率为 16.2%。Kaplan-Meier 曲线显示,3 个模型 predRS 高危组与低危组患者生存差异具有统计学意义($P < 0.05$)。单因素 Log-rank 检验显示,病灶大小、手术方式和肿块边缘有统计学意义($P < 0.05$)。COX 回归模型显示,3 个 predRS 分组均对生存时间的影响具有统计学意义($P < 0.05$),且 predRS 与复发风险呈正相关。

结论:基于肿瘤内部和瘤周影像组学特征,联合临床影像学特征所建立的 RS 预测模型,可作为评估乳腺癌患者复发风险的潜在生物学指标。

PO-1399

磁共振成像瘤周影像组学预测 ER+/HER2-乳腺癌 21 基因检测复发风险评分的价值研究

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目的:运用 DCE 和 T2WI 瘤周影像组学特征,联合 MRI 影像学特征、临床信息,建立 21 基因检测复发风险预测模型。

方法:回顾自 2017.4-2019.3 来我院就诊 ER+/HER2-乳腺癌患者资料,筛选进行 21 基因检测并有术前 MRI 检查患者。按时间顺序及 7:3 比例将患者分为训练组和验证组。以 21 基因检测复发风险评分(RS)26 分为临界值,将患者分为低危组($RS < 26$)和高危组($RS \geq 26$)。在 DCE 增强后末期图像(CL)上手动分割感兴趣体积(VOI),并将其复制到 T2WI 上。运用 Python 3.7 对 VOI 轮廓进行自动向外膨胀,膨胀范围为瘤周 2 mm、4 mm、6 mm、8 mm 和 10 mm。VOI 膨胀后,可同时获得环形瘤周区域 VOI 和膨胀 VOI。提取各 VOI 影像组学特征,并进行 z-score 标准化处理。采用 Pearson 相关系数筛选法、RFE 进行特征筛选,运用 SMOTE 对训练组患者进行重采样,使用 SVM 构建预测模型。分别在 CL、T2WI 序列上建立模型,再选择较优模型,联合肿瘤内部和临床影像学特征,构建融合模型(特征融合法和 logistics 融合法)。

结果:共入组 159 名患者,训练组 111 名(低危组 34 名,高危组 77 名),验证组 48 名(低危组和高危组分别为 24 名)。随着瘤周范围逐渐增大,各瘤周模型和膨胀模型效能变化趋势相似:瘤周 4 mm 范围模型效能高于或等于瘤周 2 mm 范围模型效能,从瘤周 4 mm 至 10 mm,模型效能逐渐下降。在所有瘤周模型中,T2WI 序列 4 mm 环形瘤周模型效能最高($AUC = 0.66$),与肿瘤内部、临床影像特征融合后(特征融合法和 logistics 融合法),模型效能均有提升,其中,logistics 融合模型效能最高, $AUC = 0.75$ 。各膨胀模型中,CL 序列 4 mm 膨胀模型和 T2WI 序列 4 mm 膨胀模型效能较高, AUC 分别为 0.69 和 0.68,加入临床影像特征后,效能进一步提高($AUC = 0.74$, $AUC = 0.72$)。

结论:MRI 瘤周影像组学特征在评估 ER+/HER2-乳腺癌复发风险方面具有潜在价值,其中瘤周 4 mm 范围模型效能最高。

PO-1400

磁共振成像影像组学预测 ER+/HER2-乳腺癌 21 基因检测复发风险评分的价值研究

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目的：运用 DCE 与 T2WI 序列影像组学特征，联合影像学表现、临床信息建立 21 基因检测复发风险预测模型，并评估其预测效能。

方法：回顾 2017 年 4 月至 2019 年 3 月间在我院行 21 基因检测 ER+/HER2-乳腺癌患者资料，筛选出有术前 MRI 检查的患者名单。按时间顺序及 7:3 比例将患者分为训练组和验证组。根据 2021 版 NCCN 指南，以 21 基因检测复发风险评分 (RS) 26 分为临界值，将患者分为低危组 (RS < 26) 和高危组 (RS ≥ 26)。根据 2013 版乳腺影像报告和数据系统标准对患者图像进行评估并记录。在 DCE 增强后末期图像 (CL) 上手动勾画感兴趣体积 (volume of interest, VOI)，并将 VOI 复制到 T2WI、增强前 (C0)、增强后第一期 (CF)、增强中期 (CM) 图像上。提取各序列影像组学特征，并进行 z-score 标准化处理。采用 Pearson 相关系数筛选法和递归特征消除法进行特征筛选，运用合成少数类过采样技术对训练组患者进行重采样，使用线性支持向量机 (support vector machine, SVM) 构建 RS 预测模型。绘制受试者工作特征 (receiver operating characteristic, ROC) 曲线，计算 ROC 曲线下面积 (area under the ROC curve, AUC)，评估模型预测效能。

结果：共入组 159 名患者，其中，训练组 111 名，验证组 48 名。训练组中，低危患者为 34 名，高危患者 77 名；验证组中，低危和高危患者人数均为 24 人。在 DCE 相关模型中，CF (AUC = 0.66)、CL (AUC = 0.65) 模型预测效能相对较高；DCE 与 T2WI 联合模型中，CL + T2 模型测试集 AUC 为 0.71，将临床影像特征纳入后，CL + T2 + 临床影像模型诊断效能进一步提升 (AUC = 0.74)，该模型准确性、灵敏度、特异度分别为 0.63、0.79 和 0.46。

结论：磁共振成像影像组学特征在评估 ER+/HER2-乳腺癌复发风险方面具有潜在价值，DCE 和 T2WI 序列融合模型可提高预测效能。

PO-1401

第一部分 磁共振成像影像学特征预测 ER+/HER2-乳腺癌 21 基因检测复发风险评分的价值研究

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目的：探究乳腺 MRI 影像学特征与 21 基因检测复发风险评分 (recurrence score, RS) 相关性，并建立复发风险预测模型。

方法：收集 2017.4-2019.3 在我院进行 21 基因检测 ER+/HER2-乳腺癌患者的资料，筛选出有术前 MRI 检查的患者拟入组。以 RS 26 分为临界值，将患者分为高危组 (RS ≥ 26) 与低危组 (RS < 26)。运用卡方检验、Fisher's 检验或 Mann-Whitney 检验比较磁共振成像影像学特征在 RS 高危组与低危组间差异。运用多元 logistics 回归对有统计学意义特征构建模型，并绘制受试者工作特性 (ROC) 曲线、森林图、决策曲线和校准曲线。按照时间顺序，以 7:3 比例将患者分为训练组和验证组，使用 Pearson 相关系数筛选法和递归特征消除法进行特征筛选，运用合成少数类过采样技术进行重采样，使用 4 种不同机器学习模型算法构建模型 (线性支持向量机、随机森林、决策树和 k 近邻)，运用 ROC 曲线评估模型效能。

结果：共入组 159 名患者，其中低危组为 58 名，高危组为 101 名。在临床特征中，PR 状态表现出组间差异 (P = 0.017)，低危组 PR+ 患者占比更高。在磁共振成像影像学特征中，肿块边缘表现

出组间差异 ($P = 0.008$)，低危组肿块多表现为边缘毛刺 (64.8%)，高危组肿块多表现为边缘不规则 (54.7%)。将 PR 状态和肿块边缘纳入多因素 logistics 回归模型，PR+与 PR-相比，PR+患者复发风险相对低，OR 值为 0.110 ($P = 0.038$)；边缘毛刺的肿块与边缘不规则肿块相比，边缘毛刺的肿块复发风险相对低，OR 值为 0.343 ($P = 0.004$)。logistics 回归模型 AUC 为 0.67，校准曲线和决策曲线表明，该模型校准性能良好且具有一定临床实用性。以 7:3 划分后，训练组纳入 111 名患者 (低危组 34 名，高危组 77 名)，验证组纳入 48 名患者 (低危组和高危组均为 24 名)。4 种机器学习模型 AUC 范围为 0.64~0.69，支持向量机和随机森林模型预测效能相对较高。结论：磁共振成像影像学特征在评估乳腺癌患者复发风险方面具有潜在价值。

PO-1402

合成 MRI 联合酰胺质子转移成像对乳腺癌诊断的临床价值探讨

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目的：评估合成 MRI(synthetic magnetic resonance imaging, syMRI) 与酰胺质子转移成像(amide proton transfer,APT)技术在乳腺癌中的诊断价值及联合诊断效能。

方法：

回顾性分析 2022 年 7 月至 2023 年 7 月在南昌大学第二附属医院检出的 125 例经穿刺活检或手术病理证实的乳腺肿块类病灶，包括 88 个恶性病变(恶性组)及 37 个良性病变(良性组)。所有患者均行 T1WI、T2WI、动态对比增强(DCE-MRI)、syMRI 及 APT 扫描。由两位放射诊断医师分别对 syMRI 定量参数图及 APT 图像勾画感兴趣区(ROI)，进行相应的后处理,测量并记录相关定量参数。测量包括增强前后的 T1、T2、质子密度(PD)值及非对称磁化转移率(magnetization transfer asymmetry,MTRasym)。通过组内相关系数(ICC)评估观察者间测量的一致性。采用受试者工作特征(ROC)曲线评价 syMRI 与 APT 参数的阈值及诊断效能，通过二元 Logistic 回归分析将两个序列参数进行联合并评估其诊断效能。采用 Delong 检验比较 ROC 曲线下面积(AUC)的差异。

结果：

乳腺恶性组的 T2-pre 值、T2-post 值均低于良性组,差异存在统计学意义(P 值均 <0.05)，其余参数差异均无统计学意义(P 均 >0.05)。恶性组的 MTRasym 值低于乳腺良性组,两组间差异具有统计学意义($P<0.01$)；syMRI、APT 成像及 syMRI+ APT 成像曲线下面积 (AUC) 分别为 0.884、0.897、0.968。

结论：

合成 MRI 和酰胺质子转移成像技术能够用于乳腺良性病变与乳腺癌的鉴别诊断，两种成像技术联合应用诊断模型可以进一步提高乳腺癌的诊断准确率,对临床制定相关诊疗方案具有重要的指导意义。

PO-1403

酰胺质子转移技术联合乳腺体层成像诊断乳腺肿块样病变的价值

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目的：

比较乳腺体层成像(digital breast tomosynthesis,DBT)及酰胺质子转移成像(amide proton transfer,APT)技术在乳腺肿块性病变中的诊断价值及联合诊断效能。

方法：

回顾性分析 2023 年 1 月至 2023 年 7 月于南昌大学第二附属医院检出的 128 例经穿刺活检或手术病理证实的乳腺肿块类病灶，包括 88 个恶性病变(恶性组)及 40 个良性病变(良性组)；两名放射科

医师对 APT 图像进行相应的后处理,测量并记录相关定量参数,得到非对称磁化转移率(magnetization transfer asymmetry,MTRasym)值。对术前 DBT 检查的 BI-RADS 分类结果、各影像学征象,采用独立样本 t 检验和 Wilcoxon 秩和检验,分析上述 DBT 的影像学征象;比较组间病灶 MTRasym 定量值在各组间的差异是否具有统计学意义($P<0.05$)。针对组间差异有统计学意义的参数,纳入二元 Logistic 回归分析不同预测模型对乳腺肿块类病变的诊断效能。

结果:

DBT 的影像学征象中,肿块形态、肿块边缘、是否伴结构扭曲,是否伴钙化在病理良恶性之间的差异存在统计学意义(P 值均 <0.05)。乳腺恶性组的 MTRasym 值低于乳腺良性组,两组间差异具有统计学意义 ($P<0.01$); APT 和 DBT 均能用于区分乳腺良恶性肿瘤,其中 DBT 诊断的敏感度、特异度和准确率分别为 81%、87%、83.75%,APT 诊断的敏感性、特异性和准确性分别为 90.51%、93.2%、90.15%。经 logistic 回归分析, DBT+APT 联合模型的诊断效能最高, AUC 为 0.942。

结论:

APT 和 DBT 成像技术可用于乳腺肿块样病变的良恶性诊断,尤其是可以提高对 BI-RADS 4 类肿块的诊断准确性。二者联合应用可以进一步提高乳腺癌的诊断准确率,可作为传统临床 MRI 方法的补充方法,有望用于有增强检查禁忌证患者的补充检查手段。

PO-1404

MRI 在最大径 $<3\text{cm}$ 三阴性乳腺癌和纤维腺瘤中的鉴别诊断价值

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目的 分析最大径 $<3\text{cm}$ 三阴性乳腺癌 (TNBC) 与纤维腺瘤 (FA) 的 MRI 图像特征,探讨 MRI 对 TNBC 与 FA 的鉴别诊断价值。

方法 回顾性分析经病理证实最大径 $<3\text{cm}$ 的 37 例 TNBC 与 36 例 FA 患者 MRI 图像,采用 χ^2 检验和 t 检验比较两组 MRI 形态学表现、TIC 曲线类型及 ADC 值的差异;以病理结果为金标准,绘制 ADC 值的非参数法 ROC 曲线。

结果 37 例 TNBC 共 37 个病灶,36 例 FA 共 39 个病灶。TNBC 组平均年龄 (45.2 ± 10.4) 岁,FA 组平均年龄 (30.4 ± 8.4) 岁,差异具有统计学意义 ($P<0.05$)。与 FA 组相比,TNBC 组病灶形态多为不规则形 (83.78%), $T_2\text{WI}$ 高信号为主 (56.76%), $T_2\text{WI}$ 常无低信号分隔 (97.29%), 增强扫描早期快速强化 (97.29%), 多呈不均匀强化 (94.59%) 及边缘环形强化 (67.57%), 常伴囊性坏死 (62.16%) 及瘤周水肿 (67.56%), TIC 多为 III 型 (64.86%), 除 $T_2\text{WI}$ 信号,其他均有统计学差异 ($P<0.05$)。TNBC 组平均 ADC 值为 (1.104 ± 0.13) $\times 10^{-3} \text{ mm}^2/\text{s}$, 低于纤维腺瘤组的平均 ADC 值 (1.613 ± 0.16) $\times 10^{-3} \text{ mm}^2/\text{s}$, 且组间差异具有统计学意义 ($P<0.05$)。ROC 曲线分析显示,诊断最大径 $<3\text{cm}$ TNBC 的平均 ADC 值截断值为 $1.239\times 10^{-3} \text{ mm}^2/\text{s}$, 曲线下面积 (AUC) 为 0.997, 灵敏度为 94.6%, 特异度为 100%。

结论 MRI 形态学表现、动态增强 TIC 曲线类型及 ADC 值对三阴性乳腺癌及纤维腺瘤具有鉴别诊断价值。

【关键词】三阴性乳腺癌; 纤维腺瘤; 磁共振成像; 表观扩散系数; 时间-信号强度曲线

PO-1405

MRI 引导下乳腺病变真空辅助旋切活检术的临床应用

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目的: 探讨 MRI 引导下乳腺病变真空辅助旋切活检术的临床应用价值。

方法: 回顾性分析 2019 年 09 月-2022 年 12 月在我院因乳腺 MRI 可疑病变 (BI-RADS 4、5 类) 行 MRI 引导下真空辅助旋切活检 (vacuum-assisted biopsy,VAB) 的患者 27 例共 27 个病变。采用 3.0T MRI 扫描仪、开放式乳腺穿刺线圈、磁共振兼容活检穿刺定位架及 MRI 兼容耗材。记录病变的影像学特征、活检病理结果及恶性病变术后最终病理结果; 观察其取材成功率、活检病理准确性及术中、术后并发症情况。

结果: 所有病例均一次性成功取样并取得病理学结果, 活检成功率 100% (27/27)。5 个 (18.52%) 病变表现为肿块样强化; 22 个 (81.48%) 病变表现为非肿块样强化。平均操作时间 39.92 ± 8.34 min。活检诊断为恶性病变 7 个 (25.93%); 非典型导管增生 2 个 (7.40%); 良性病变 18 个 (66.67%)。所有活检诊断为恶性病变或非典型导管增生的患者进一步行外科手术切除, 活检结果与术后病理结果相一致, 未出现组织学低估情况; 良性病变中, 2 例乳腺炎性病变半年随访病变缩小, 其余随访未见明显变化, 中位随访时间 10 个月 (6 个月-24 个月)。1 例患者在术中出现迷走神经反应症状, 主要由精神紧张引起, 经休息、心理安抚后很快恢复。

结论: 对于乳腺 MRI 检查发现的疑似病变, MRI 引导真空辅助旋切活检技术能够安全、精准、有效地完成组织取样以用于病理学评估, 病理诊断准确性高且并发症少, 值得临床应用推广。

PO-1406

基于多序列 MRI 的组学模型用于鉴别呈平台型的 乳腺良恶性病变的研究价值

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目的 探讨 MRI 多序列的影像组学模型鉴别 DCE-TIC 呈平台型乳腺良恶性病变中的价值, 分析 MRI 多序列联合组学模型的鉴别能力。方法 回顾性分析 2022 年 2 月至 2023 年 3 月经病理证实且在 DCE-TIC 呈平台型 88 例乳腺病变患者, 良性 24 例, 恶性 64 例。选取患者 MRI-T2WI 抑脂序列、MRI-DCE 第 7 期增强图像、DWI、DWI-ADCs 图像三维病灶逐层面图像勾画感兴趣区, 提取 2286 特征, 采用 5-折交叉验证方法将样本随机分为训练集和测试集, 通过最小绝对收缩与选择算子 (least absolute shrinkage and selection operator, LASSO) 及机器学习方法进行特征降维, 筛选出一组最优特征, 通过最大最小归一化做预处理, 采用高斯过程 (GP)、随机森林 (RF)、逻辑回归 (LR) 建立 MRI 单一序列及联合序列影像组学模型, 采用受试者工作特征 (receiver operating characteristic, ROC) 曲线评估模型的诊断效能, 分析各模型对乳腺良恶性病变鉴别能力。并使用校准曲线及决策曲线评价预测模型的临床实用性。结果 多序列影像组学模型应用高斯过程 (GP) 分类器的训练集受试者工作曲线 (ROC) 的曲线下面积 (AUC)、灵敏度、特异度、准确性、阳性精确率、阳性 F1-score 分别为 0.942、0.979、0.739、0.909、0.901、0.938, 测试集分别为 0.903、0.934、0.621、0.843、0.860、0.894。校准曲线及决策曲线显示应用 GP 联合模型具有临床应用价值。结论 本研究开发了一个基于早期 DCE、DWI 和 ADC 多序列影像组学高斯过程 (GP) 模型来分析 DCE-TIC 呈平台型乳腺良恶性病变的诊断价值, 有望助力影像医生提高对该类乳腺疾病的术前鉴别诊断能力。

PO-1407

男性乳腺经典型粘液癌伴皮肤破溃一例

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本文报道 1 例男性乳腺经典型粘液癌伴皮肤破溃，患者男性 2 年前无意中发现右侧乳晕后区黄豆大小肿物，活动度可，质地稍硬，无发热及肿痛，近来自觉肿物逐渐增大，并逐渐出现皮肤红斑并破溃。MRI 平扫及增强检查显示，右侧乳腺体积增大，右侧乳腺中央区见异常信号肿块影，大小约 48mm×56mm×56mm，形态呈分叶状，其内可见分隔，T1WI 呈低信号，T2WI 及 T2 压脂呈明显高信号，DWI (b=800) 及 ADC 均呈高信号，边界清楚，肿块周围见少量可疑腺体信号。动态增强扫描呈肿块样强化，内部强化不均质，呈缓慢渐近性强化，强化逐渐向病灶中央填充，TIC 曲线呈流入型曲线，右侧乳头形态失常，并与肿块分界不清，邻近皮肤欠光整。病理诊断为粘液腺癌，经典型，II 级，癌组织侵犯乳晕乳头皮肤。

PO-1408

ER 阳性/HER2 阴性乳腺癌 Ki-67 高低表达的鉴别： 四种 MRI 扩散模型的对比研究

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目的：拟用非侵入性的单指数扩散加权成像(DWI)、连续时间随机游走(CTRW)、分数阶微积分(FROC)和扩散峰度成像(DKI)四种磁共振扩散模型探索弥散多参数一阶特征对 ER 阳性/HER-2 阴性乳腺癌 Ki-67 表达的诊断价值。

方法：从 2020 年 5 月至 2023 年 8 月，本研究回顾性收集 101 名行标准手术方案的 ER 阳性/HER-2 阴性乳腺癌患者。所有患者在术前均接受多 b 值扩散加权磁共振成像检查，并生成九个相应弥散模型参数图 (DWI_ADC、DKI_D、DKI_K、FROC_D、FROC_β、FROC_μ、CTRW_D、CTRW_α 和 CTRW_β)。以动态增强 MRI 为参照，在 ADC 图上标注感兴趣区 (ROI) 并复制到其他参数图上，随后分别提取四个扩散模型的单个参数图的直方图特征。使用来自单个扩散模型的多个参数图以及来自四个扩散模型的组合参数进行 Logistic 回归分析。受试者工作特征曲线(ROC)用于评估两种不同建模策略的诊断效能。

结果：与低 Ki-67 组相比，高 Ki-67 组的 DWI_ADC_{90%}、FROC_D_{90%}、FROC_μ_{90%}、偏度、DKI_D_{90%}、DKI_K_{偏度}和 CTRW_D_{90%}的值显著降低；DWI_ADC_{峰度}、FROC_D_{峰度}、FROC_μ_{峰度}、CTRW_α_{90%}、CTRW_D_{峰度}、DKI_D_{峰度}和 DKI_K_{10%、峰度}的值显著升高(p 均<0.05)。四个扩散模型均表现出良好的诊断效能 (AUC=0.697-0.776, 95%CI:0.598-0.853, p 均<0.05)，其中 CTRW 模型在区分 Ki-67 表达方面性能最佳 (AUC=0.776, 95%CI:0.683-0.853, p<0.001)，而联合四个扩散模型的组合参数图诊断效能最高 (AUC=0.834, 95%CI:0.747-0.901; p<0.001)，并且与 DWI 模型相比，组合模型显示出更好的诊断性能(Delong p=0.031)。

结论：四种磁共振扩散模型中，CTRW 模型对诊断 Ki-67 表达出更佳性能。基于四种扩散模型的联合诊断模型在鉴别乳腺癌 Ki-67 表达方面具有最高的诊断价值。

PO-1409

基于多参数 MRI 深度学习模型术前预测 乳腺癌腋窝淋巴结转移的研究

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目的：建立术前预测乳腺癌腋窝淋巴结转移的多参数 MRI 模型，进而探讨深度学习方法对乳腺癌腋窝淋巴结转移的诊断价值。

方法：回顾分析了 252 例非特殊型浸润性乳腺癌的临床资料和术前轴位 T2WI、DWI 和 DCE-MRI 图像，以病理结果为参考标准，分为腋窝淋巴结转移(axillary lymph node metastasis, ALNM)组和腋窝淋巴结未转移(Non-ALNM)组。由 2 名专业方向为乳腺影像诊断的医师确定肿瘤的位置、大小和边界。当出现争议时，由一位具有十五年诊断经验的高级医生独立决定。使用 Matlab 软件对全部患者的轴位 T2WI、DWI 和 DCE-MRI 原始图像中的 ROI 进行逐层分割，并将分割后的 ROI 统一为 224×224 大小，然后进行图像归一化处理，作为 T2WI、DWI 和 DCE-MRI 模型的输入，这些模型均以 ResNet 50 网络为基础。全部数据集随机分为训练集和测试集(训练集 n=202 例,包括 78 例 ALNM、124 例 Non-ALNM；测试集 n=50 例,包括 20 例 ALNM、30 例 Non-ALNM)。采用 SPSS 22.0 和 MedCalc 20.0 进行统计分析。使用模型评估指标评价各模型对腋窝淋巴结转移的诊断性能，包括准确度、灵敏度、特异度、阳性预测值、阴性预测值、ROC 曲线和 AUC 值。不同模型间的 ROC 曲线进行 DeLong 检验, $P < 0.05$ 为差异有统计学意义。

结果：在测试集中，ALNM 组和 Non-ALNM 组在年龄、肿瘤大小、肿瘤边缘、TIC 曲线类型、组织学分级、雌孕激素受体及 HER2 状态方面没有显著差异。在测试集上评估乳腺癌的腋窝淋巴结状态，T2WI 模型的准确度为 0.880, AUC 值为 0.937；DWI 模型的准确度为 0.640, AUC 值为 0.690；DCE-MRI 模型的准确度为 0.680, AUC 值为 0.702。T2WI 模型与 DWI 模型及 DCE-MRI 模型的 AUC 值相比, P 值均小于 0.05(P 值分别为 0.0034、0.0060)。

结论：基于乳腺磁共振图像的传统深度学习模型具有术前评估腋窝淋巴结状态的能力, T2WI 模型在此方面优于 DWI 和 DCE-MRI 模型。

PO-1410

青年乳腺癌影像特征与预后因素的相关性研究

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目的 分析青年乳腺癌（发病年龄≤40 岁）影像特征与预后因素的相关性。

方法 回顾性分析 2014 年 1 月至 2020 年 4 月在上海交通大学医学院附属新华医院确诊乳腺癌患者的资料，将年龄≤40 岁的患者纳入分析。收集病灶的乳腺 X 线摄影表现 (MG)、超声表现及乳腺磁共振 (MRI) 表现，并针对预后因素（淋巴结转移、组织学分级、分子分型）进行相关性分析。

结果 共收集青年乳腺癌 128 例。103 例 (80.5%) 因触及肿块就诊，105 例 (82.0%) 为浸润性导管癌（非特殊类型）。组织学分级高的肿块更倾向于在 MR 上表现为形态不规则 ($P=0.03$)，在超声上表现为不均匀回声或囊实性 ($P=0.02$)。伴有淋巴结转移者更倾向于在 CDFI 上见穿入血流或者周围血流信号 ($P=0.02$)。≥2cm 的病灶在超声上更易表现为形态不规则 ($P=0.02$)，边缘不清 ($P<0.01$)，及不均匀回声或囊实性 ($P=0.01$)，更倾向于在 CDFI 上见穿入血流或者周围血流信号 ($P<0.01$)。HER2 过表达者更倾向于在 MG 上见可疑钙化 ($P<0.01$)，在 MRI 上表现

为圆形或类圆形的肿块 ($P=0.01$)，在超声上表现为不均匀回声或囊实性 ($P=0.04$)。Ki-67 高表达者更倾向于在 CDFI 上见穿入血流或者周围血流信号 ($P=0.02$)。ER 受体阴性者较阳性者在 CDFI 上更易出现穿入血流或者周围血流信号 ($P=0.04$)。

结论 青年乳腺癌在 MRI、MG 和超声上的表现与预后因素相关，有利于指导临床进行个性化治疗。

PO-1411

T2 mapping 联合 mDixon Quant MRI 在需手术年轻女性乳腺良恶性疾病中的应用价值

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目的：探讨 T2 mapping 结合 mDixon-Quant MRI 在定量评估需要手术的年轻女性 (≤ 40 岁) 良性和恶性乳腺疾病中的价值。

材料与方法：回顾性分析了 2020 年 5 月至 2023 年 6 月在我院接受病理确诊的 44 例患者 (≤ 40 岁) (1 组：25 例恶性病变，2 组：19 例良性病变) 的数据。所有患者均在手术前两周在 3.0 T MR 扫描仪上进行了 MRI 检查，MR 序列包括 T2 mapping、mDixon-Quant 和 DCE-MRI (详细参数见表 1)。两名放射科医生采用双盲法测了 T2 mapping 图像上病灶的 T2 值，以及 mDixon-Quant 成像图像上的脂肪分数 (FF) 值和 $R2^*$ 值。采用类内相关系数 (ICC) 评估两位观察者测量的一致性，采用独立样本 t 检验或 Mann-Whitney U 检验比较两组间各参数的差异。使用接收器操作特征曲线 (ROC) 评估各参数鉴别良性和恶性疾病的效果。DeLong 检验用于比较 ROC 曲线下面积 (AUC) 之间的差异。 $P < 0.05$ 被认为差异具有统计学意义。

结果：两位观察者的测量结果一致性良好 ($ICC > 0.80$)。两组对侧纤维腺组织的 FF 值和病变的 $R2^*$ 值无明显差异 ($P > 0.05$)。第 1 组的 FF 值和 T2 值低于第 2 组 ($P < 0.05$)。FF 值、T2 值及其组合 (FF+T2) 区分恶性和良性乳腺疾病的 AUC 值分别为 0.713、0.777 和 0.853。DeLong 检验结果表明，FF+T2 的诊断性能优于任何单一参数 ($P < 0.05$)。详见表 2-3 和图 1。

结论：T2 mapping 联合 mDixon-Quant MRI 可显著提高预测性能，在年轻女性乳腺疾病患者术前预测中应用前景良好。T2 mapping 和 mDixon-Quant MRI 对定量评估年轻女性的良性和恶性乳腺疾病很有价值。

PO-1412

基于多参数 MRI 影像组学评估年轻女性乳腺癌高复发风险因素的价值

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目的：探讨基于多参数 MRI 组学特征对年轻女性 (≤ 40 岁) 乳腺癌高复发风险因素 (脉管侵犯，组织学分级，Ki-67 表达水平) 的预测价值。

材料与方法 回顾性分析 41 例经组织病理学证实的年轻女性乳腺癌患者。所有患者按照脉管侵犯 (有/无)，组织学分级 (高级别/低级别)，Ki-67 表达水平 (高表达/低表达) 分别进行分组。应用 FS-T2WI、ADC、FF 图和动态增强 MRI (90s) 四种图像进行影像组学特征提取，采用 3Dslicer 对图像病变进行分割并对各序列提取 107 个影像组学特征，以上特征经 ICC、t 检验/U 检验，spearman 相关性分析，最小绝对收缩和选择算子 (least absolute shrinkage selection operator, LASSO) 降维筛选后，剩余特征采用多因素 logistic 回归分别建立各序列模型及多序列融合

模型。上述模型采用受试者工作特征(receiver operating characteristic,ROC)曲线分析各模型的预测效能,并采用 DeLong 非参数检验比较曲线下面积(area under the curve,AUC)的差异。 $P<0.05$ 被认为差异具有统计学意义。

结果 在预测脉管侵犯中 T2WI, ADC, FF, DCE 及联合模型的 AUC 值分别为 0.821、0.698、0.845, 0.778, 0.889。其中联合模型高于其与单独模型,但只有与 DWI 相比差异具有统计学意义。在预测组织学分级中 T2WI, ADC, FF 及联合模型的 AUC 值分别为 0.730、0.723、0.843, 0.853。联合模型虽高于单独模型,但差异不具有统计学意义。在预测 Ki-67 表达水平中 T2WI, ADC, FF 及联合模型的 AUC 值分别为 0.786、0.790、0.852, 0.842。FF 模型对高于其它模型,但差异不具有统计学意义。详见表 1 和图 1。

结论 多参数 MRI 影像组学特征对术前预测年轻乳腺癌高复发风险因素前景良好。在预测脉管侵犯和组织学分级中,联合模型较优于其它模型。在预测 Ki-67 表达水平中,FF 模型较优于其它模型。

PO-1413

多模态特征融合模型在预测肿块型乳腺癌术后复发风险中的应用

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目的:探讨多模态特征融合列线图在预测乳腺癌术后复发风险中的价值,为临床新辅助化疗方案选择以及内分泌治疗时间确定等进行决策,改善患者预后。

材料和方法:回顾性分析 2014 年 1 月~2022 年 6 月市一院、市中医院、市三院行乳腺 MR 的且经手术或穿刺病理证实为恶性,并且有免疫组化结果的患者,参照乳腺癌术后复发评分(中国抗癌协会乳腺癌诊治指南与规范 2021 年版)将患者分为低中度风险组、高风险组。市一院病例作为训练集和测试集按 8:2 随机划分,单因素分析评估乳腺癌术后复发风险与临床危险因素、常规 MR 特征之间的关系,多因素 Logistics 确定术后复发风险的预测因子。AUC 用于评价模型的诊断效能。Delong 检验比较不同模型 AUC 差异, Hosmer-Lemeshow 检验来评估模型校准度。 $P<0.05$ 有统计学差异。

结果:纳入市一院 310 个病灶,其中高风险 87 个,平均年龄 56.66 ± 13.35 岁。市中医院及市三院 54 个病灶,高风险 18 个,平均年龄 58.83 ± 10.34 岁。(2)两组病例在病灶最大径、绝经状态、T2WI 瘤周水肿、脉管内癌栓以及 ER、PR、HER-2、Ki-67 表达差异有统计学意义(P 均 <0.05)。所有序列组学特征包括 7 个 FF, 12 个 GLCM, 2 个 GLSZM 和 1 个 GLDM 特征,共 22 个组学标签建立 LR 模型,训练集、测试集及外部验证集 AUC 分别是 0.786、0.765、0.744。Rad-score (OR=4.547)、背景实质轻度强化 (OR=0.265)、背景实质中度强化 (OR=0.377)、淋巴细胞计数 ($\geq 1.7\times 10^9$) (OR=0.481) 是术后复发风险的危险因素,多模态融合模型 AUC 在训练集、测试集及外部验证集中分别为 0.588、0.744、0.784,诊断效能最高。使用列线图对融合模型可视化, Hosmer-Lemeshow 校准曲线显示较好的校准度,模型在训练集与外部验证集中与实际概率拟合程度较高 ($P=0.764, 0.139$)。

结论:Rad-score 是预测乳腺癌术后复发风险的潜在生物标志物,多模态融合模型列线图预测乳腺癌术后复发风险,有助于精准医疗以及改善预后。

PO-1414

分数阶微积分模型扩散加权成像结合多层同时加速技术对乳腺良恶性病变应用价值研究

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目的 探讨分数阶微积分 (fractional-order calculus,FROC) 模型扩散加权成像结合多层同时 (simultaneous multi-slice,SMS) 加速技术对乳腺良恶性病变的鉴别诊断价值。**材料与方法** 回顾性分析 2021 年 1 月-2022 年 12 月在本院接受乳腺 MRI 扫描的 124 例患者 (141 枚病变), 所有患者均应用 3.0T 磁共振行两组多 b 值 (14 个 b 值、最高 b 值 3000s/mm²) 扩散加权成像(diffusion weighted imaging,DWI) 扫描, 一组为常规单次激发平面回波成像(single-shot echo planar imaging,SSEPI-DWI), 另一组为 SMS-SSEPI-DWI。采用独立样本 t 检验或 Mann-Whitney U 检验比较良恶性病变组的图像质量评分、ADC 值和 FROC 模型参数值 (D、 β 、 μ)。并利用受试者工作特性(receiver operating characteristic,ROC)曲线评价各参数的诊断效能。应用 Bland-Altman 图评估两组 DWI 衍生参数间的一致性。结果 乳腺恶性病变的 ADC、D、 β 值均低于良性组, 差异具有统计学意义 ($p<0.05$), 恶性病变的 μ 值高于良性组, 差异具有统计学意义 ($p<0.05$)。在 SSEPI-DWI 和 SMS-SSEPI-DWI 序列序列中, D 值 AUC 最大, β 值诊断敏感性最高, D 值特异性最高。Bland-Altman 图显示两组 DWI 序列衍生的相对应参数值均无偏倚, 具有良好的一致性。结论 基于 SMS-SSEPI-DWI FROC 模型可以在临床可接受时间内提供良好的图像质量和病变特征参数值, 与 SSEPI-DWI 相比, 其在鉴别乳腺良恶性病变方面具有一致的诊断性能, D 值和 β 值表现出较好的诊断性能。

PO-1415

基于空间异质性的影像基因组学模型预测三阴性乳腺癌病理完全缓解及预后

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目的: 三阴性乳腺癌(TNBC)的异质性影响患者对新辅助化疗的反应和预后。我们旨在 DCE-MRI 上表征肿瘤的空间异质性, 开发影像基因组学模型精准预测病理完全缓解(pCR)和预后。

材料与方法: 本研究回顾性纳入接受新辅助治疗的 TNBC 患者作为影像组学开发队列($n = 315$), 其中同时具有遗传学数据的患者被纳入影像基因组学开发队列($n = 98$)。来自 DUKE 数据库的患者构成外部验证队列($n = 50$)。利用瘤体、瘤内亚区域和瘤周区域的特征来表征空间异质性。选择特征后, 通过逻辑回归建立了三个影像组学模型。通过进一步整合病理和基因组学特征, 建立了两种融合模型(PRM:病理-影像组学模型; GPRM:基因-病理-影像组学模型)。采用 AUC 和决策曲线分析评估模型性能。采用 Kaplan-Meier 曲线和多因素 Cox 回归评估模型的预后价值。

结果: 对于影像组学模型, 表征空间异质性的多区域模型在训练集、内部和外部验证集中表现出更好的预测性能, AUC 值分别为 0.87、0.79 和 0.74。GPRM 在训练集($AUC=0.97$, $P=0.015$)和验证集中($AUC=0.93$, $P=0.019$)预测 pCR 的性能最佳。多区域影像组学模型、PRM 和 GPRM 具有根据无病生存期分层患者的能力, 预测的非 pCR 与不良预后相关($P = 0.034$ 、0.001 和 0.019)。

结论:影像学空间异质性可以有效预测 TNBC 的 pCR 及预后。影像基因组学模型有潜力成为一种有价值的生物标志物来提高预测性能。

PO-1416

基于深度学习对乳腺 X 线摄影钙化的分割及良恶性分类

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目的

本研究探讨基于深度学习建立乳腺 X 线摄影图像 (FFDM) 钙化分割模型, 进一步探索深度学习在钙化良恶性鉴别中的应用价值, 并将结果与有经验的放射科医师进行对比。

方法

回顾性收集北京大学深圳医院明确有钙化的 392 例病例用于乳腺钙化分割模型训练, 每个病例包含 CC 和 MLO 位 FFDM。回顾性收集北京大学深圳医院 2020 年 1 月 1 日至 12 月 31 日明确有钙化及病理结果的 400 例用于乳腺钙化良恶性分类模型训练。收集北京大学深圳医院 2021 年 1 月 1 日至 12 月 31 日 193 例用于外部验证。

分割模型: 将 CC 及 MLO 位图像分组, 采用 U-Net 深度学习模型进行病灶分割。先由放射科医师 A 对输出结果进行评估并分类记录, 以红绿色标签分别代表良恶性钙化。将钙化按分布区域勾画, 以区域为单位判断良恶性。再由另 1 名高年资医师 B 进行审核。

良恶性二分类模型: 先标注数据格式, 在原始图像上划分良恶性钙化区域。对图像实现扩增, 用十倍交叉验证完成训练, 并选择最佳模型。

以 Dice 系数对分割模型预测出的钙化区域进行判断。计算 ROC 曲线下面积判断深度学习模型对乳腺钙化良恶性二分类的鉴别效能。

结果

乳腺钙化分割及分类模型对钙化区域的预测示意图见图 1

图 a 示右乳 MLO 原始图, 图 b 示模型预测绿色标签钙化为恶性; 图 c 示左乳 CC 原始图, 图 d 示蓝色区域划分钙化区, 预测绿色标签钙化为恶性, 乳头后方、内、外侧象限的红色标签钙化为良性。CC 位和 MLO 位图像上钙化分割的 AUC 为 0.795 和 0.809 (表 1); 分类模型的 AUC 为 0.923 和 0.935 (表 2)

钙化良恶性分类模型在外部验证集上对恶性钙化的预测 AUC 在 CC 和 MLO 位为 0.750 和 0.704, 对良性钙化的预测 AUC 在 CC 和 MLO 位为 0.704 和 0.601 (表 3 和表 4)

结论

本研究建立的乳腺钙化分割及分类模型在检测钙化和预测钙化的良恶性方面是可行的, 分类模型在恶性上更优, 可以有效提示临床医师, 减少漏诊。

PO-1417

乳腺 MRI 动态增强中表观扩散系数图像纹理分析变化在鉴别乳腺良恶性病变中的诊断价值

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目的：探索乳腺 MRI 动态增强前后 ADC 图纹理特征参数变化在乳腺良恶性病变鉴别中的诊断价值。

方法：回顾性分析 2021 年 1 月至 2022 年 12 月在达州市中心医院放射科进行乳腺磁共振动态增强扫描患者，所有患者临床数据完整。通过评估 ADC 图的背景信号强度与标准差、病灶与正常组织的信号强度、信噪比和对比噪声比，来研究动态增强对 ADC 图像质量的影响。通过 3D_Slicer 在乳腺磁共振 ADC 图中提取病灶的纹理特征，筛选出受动态增强影响的纹理特征参数及在乳腺病变良恶性鉴别中具有诊断价值的纹理特征参数。通过 ROC 曲线、校准曲线和决策曲线评估该纹理特征模型的诊断效能和临床收益。构建含有临床语义特征和纹理特征参数的临床语义-纹理特征联合模型以鉴别乳腺病变良恶性，以诺莫图展示各影响因素的预测性能和风险性，并通过内部数据进一步验证该联合模型在乳腺病变良恶性鉴别的诊断效能。

结果：本研究发现磁共振动态增强可以在不影响 ADC 图像质量的前提下改变不同组织结构的信号特征，发现共 138 项纹理特征参数在动态增强前后差异具有统计学意义 ($p < 0.05$)，其中 7 项纹理特征可鉴别乳腺病变良恶性具有统计学意义 ($p < 0.05$)。这些参数鉴别乳腺病变良恶性的 AUC 分别为 0.764、0.725、0.735、0.757、0.751、0.646 和 0.716，联合 AUC=0.856 (0.743-0.968)、具有良好的预测性能，该纹理特征模型具有统计学意义 ($p < 0.05$)、拟合度较好，且具有良好的临床使用净效益。构建含有临床语义特征和纹理特征的临床语义-纹理特征联合模型，通过诺莫图清晰地观测各变量之间的关系及相应预测值和风险性。该联合模型在内部数据集中具有良好的乳腺病变良恶性鉴别能力，其 AUC=0.953 (0.918-0.987)，明显优于纹理特征模型。

结论：乳腺 MRI 动态增强前后 ADC 图纹理特征参数变化在乳腺良恶性病变鉴别中具有良好的鉴别能力，当联合相应临床语义特征下具有更佳的鉴别能力，可推广应用于临床。

PO-1418

基于乳腺磁共振 ADC 图影像组学鉴别乳腺病变良恶性的多维联合模型应用场景可行性研究

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目的：探索基于 ADC 图影像组学参数的多维模型在乳腺病变良恶性鉴别中的应用场景及可行性。

方法：回顾性分析 2021 年 1 月至 2022 年 12 月在达州市中心医院放射科进行乳腺磁共振动态增强扫描患者，所有患者临床数据完整。读取所有病例临床语义特征，3D_Slicer 分割磁共振 ADC 图病灶并提取影像组学特征。秩和检验初步筛选参数，LASSO 分析进行降维、并计算影像组学积分。逐步回归法消除冗余、构建临床语义-组学模型，诺莫图展示各变量的预测性能和风险性。ROC 曲线、校准曲线和决策曲线评估临床语义-组学模型的诊断效能和临床收益。以 7:3 比例构建训练集和测试集，分别对比不同多维模型在训练集和测试集中的诊断效能。

结果：本研究发现年龄、病灶形态、大小、TIC 曲线类型、边界、瘤周水肿、弥散情况及 ADC 值在乳腺病变良恶性鉴别中诊断价值欠佳，AUC 分别为 0.654、0.706、0.670、0.797、0.568、0.678、0.692 和 0.721。LASSO 分析筛选出的 12 项组学参数间部分存在一定相关性，组学参数联合模型在鉴别乳腺病变良恶性的 AUC 为 0.854 (0.800-0.909)。消除冗余的临床语义-组学模型包含年龄、病灶形态、大小、TIC 曲线类型、瘤周水肿、弥散情况、ADC 值、

Wavelet_LHL_firstorder_90Percentile 和 radscore。该临床语义-组学模型鉴别乳腺病变良恶性的 AUC 为 0.972 (0.947-0.997)，明显优于组学参数模型 ($p<0.01$)。在乳腺病变良恶性鉴别中，临床语义特征识别经验缺乏者根据病灶的弥散情况联合组学参数具有较好的诊断效能 (AUC=0.878)，无法进行磁共振增强者通过其他临床语义特征联合组学参数具有非常良好的诊断效能 (AUC=0.949)，DWI 序列检查受影响时通过其他临床语义特征联合组学参数亦具有非常良好的诊断效能 (AUC=0.951)。

结论：通过充分利用 ADC 图的影像组学参数鉴别乳腺病变良恶性具有良好的诊断效能，尤其是针对缺乏临床经验者、无法进行磁共振增强检查时或弥散序列判别受到限制时，该方法在临床上具有更广泛的应用前景。

PO-1419

乳腺 CEM 环形强化肿块的临床病理特征及良、恶性鉴别

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目的：分析乳腺 CEM 环形强化病变的影像病理特征，提高环形强化病变的诊断准确性。方法：分析 46 例经 CEM 检查表现为环形强化，且经手术病理活检证实的乳腺病变的临床影像病理资料。将病变分为良性组和恶性组，对比两组之间的差异性特征。计算有统计学差异指标诊断的敏感性、特异性、阳性预测值 (PPV) 和阴性预测值 (NPV)，单独评估每个指标的诊断能力。结果：良恶性组在肿块形态学及增强特征上均具有显著差异。病变的形态、边缘、强化程度、环壁厚度及内壁情况都显示出了较好的诊断能力。恶性病变明显强化多见 (17/22)，良性轻度强化多见 (11/24)。良性组环壁多较薄 (16/24)，恶性组厚壁多见 (20/22)。恶性强化内壁多不光整 (5/24 vs 18/22, $P<0.001$)。恶性病变实性成分多大于 20%。形态规则、薄环壁及内壁光整提示良性病变可能大，NPV 分别为 88.2%，88.9%，88.6%。是否伴随可疑钙化具有最高的 PPV (100%)。结论：通过对病变的 CEM 形态学特征和强化特征，我们可以对环形强化病变的良恶性有很好的鉴别。

PO-1420

入院常规光谱 CT 术前无创评估乳腺癌的价值探讨

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目的 探讨入院常规中双能探测器光谱 CT 用于术前无创评估乳腺癌的价值。方法 选取经病理证实乳腺癌患者 96 例，收集其临床、影像学及病理资料，包括雌激素受体 (ER)、孕激素受体 (PR)、人类表皮生长因子受体-2 (HER-2) 及细胞增殖相关核抗原 (Ki67)。收集患者多参数图像，定量参数包括标准化 CT 值 (NCT)、标准化碘浓度值 (NIC) 和 keV-CT 值曲线 (λ HU) 及有效原子序数 (Zeff)，定性参数包括病灶形态是否规则、边缘有无毛刺、肿瘤强化程度是否均匀、病灶内部有无钙化及肿瘤最大直径。采用统计分析各参数与免疫组化指标的相关性，筛选出独立危险因素建立模型并采用 ROC 评估其诊断效能。结果 ER 阴性患者动脉期 Zeff、 λ HU、NIC 及静脉期 NCT、Zeff、 λ HU 均高于阳性患者 ($P<0.05$)，且 ER 阳性患者多表现为钙化及边缘有毛刺 ($P<0.05$)，PR 阳性患者动脉期 λ HU、NIC、静脉期 NCT 低于阴性患者 ($P<0.05$)，同时 PR 阳性患者多表现为钙化 ($P<0.05$)。其中动脉期 λ HU 用于鉴别 ER 及 PR 表达的 AUC 最高达 0.805、0.695；HER-2 阳性患者动脉期 NCT、静脉期 NIC、Zeff、 λ HU 均高于阴性患者 ($P<0.05$)，其中静脉期 NIC 预测 HER-2 表达的 AUC 最高达 0.738；Ki-67 阳性患者静脉期 λ HU 高于阴性患者 ($P<0.05$)。采用二元 Logistic 回归筛选出动脉期 λ HU、Zeff 及病灶有无钙化为评估 ER 的独立危险因素，联合上述

三个独立危险因素构建的联合模型 AUC 可达 0.889, 其灵敏度为 0.816, 特异度为 0.850。结论 双能探测器光谱 CT 多参数可用于术前无创评估乳腺癌, 为患者的诊疗及预后提供新的思路。

PO-1421

乳腺 X 线摄影中“结构扭曲”的综合影像诊断与对比研究

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【摘要】: 目的 分析结构扭曲的 X 线摄影 (钼靶)、磁共振成像 (magnetic resonance imaging, MRI) 及超声表现, 结合病理结果, 探讨各影像检查诊断乳腺结构扭曲病变的价值。方法 回顾性分析 48 个经乳腺 X 线摄影检出结构扭曲病灶的 X 线 (全数字化乳腺摄影 FFDM 及数字乳腺断层摄影 DBT)、超声及 MRI 资料, 以病理结果为标准, 对各影像诊断方法良恶性结构扭曲征象特点的差异性及诊断价值进行比较。结果 共纳入 48 个结构扭曲病灶, 经病理证实 29 个为恶性病变, 19 个为良性病变。28 个恶性结构扭曲 DBT 显示为不对称形态, 良恶性病灶形态学差异有统计学意义 ($\chi^2=30.262$, $P<0.01$), 26 个恶性结构扭曲表现为中心高密度, 良恶性病灶中心密度差异有统计学意义 ($\chi^2=29.689$, $P<0.01$)。良恶性结构扭曲有无微钙化差异无统计学意义。48 个结构扭曲病灶 MRI 表现肿块强化 26 个, 非肿块强化 17 个, 点状强化 3 个、无强化 2 个, 良恶性结构扭曲强化类型分布差异无统计学意义。恶性结构扭曲 TIC 类型多为平台型 (11 例) 和流出型 (12 例), 良恶性结构扭曲 TIC 类型差异有统计学意义。48 个结构扭曲病灶超声表现: 9 个 (18.75%) 病灶区域未探及异常, 28 个 (58.33%) 表现为回声不均匀、形态不规则的低回声肿块, 7 个 (14.58%) 表现为腺体结构扭曲、紊乱, 4 个 (8.33%) 表现为卵圆形/圆形低回声肿块, 良恶性结构扭曲超声表现差异无明显统计学意义 ($P>0.05$)。将影像学表现 \geq BI-RADS 4 类作为可疑恶性诊断, 以病理检查结果为标准, X 线摄影、超声、MRI 诊断乳腺良恶性结构扭曲的 ROC 曲线下面积分别为 0.582, 0.426, 0.764, 三者的诊断效能具有显著性差异 ($P<0.01$)。结论 相较于 X 线摄影与超声, MRI 检出局部结构扭曲病变敏感度和特异度较高, 明显提高了病变的诊断符合率, 能为临床医师手术方案的决策提供重要依据。

PO-1422

ER 阳性、Her2 阴性、淋巴结阴性的早期浸润性导管癌 X 线征象与 21 基因检测结果间的相关性分析

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目的: 探究 ER 阳性、Her2 阴性、淋巴结阴性的早期浸润性乳腺癌患者的 X 线影像特征与 21 基因检测结果间的相关性。**方法:** 回顾性收集了 282 例于 2017 年 9 月至 2019 年 6 月在复旦大学附属肿瘤医院进行过乳腺 X 线检查以及 21 基因检测的 ER 阳性、Her2 阴性、淋巴结阴性的早期浸润性乳腺癌患者 (单侧) 资料。首先, 对 21 基因复发风险评分的分布情况采用 Shapiro-Wilk 检验。然后, 采用单因素和多因素有序 logistic 回归分析 X 线征象与 21 基因检测复发风险评分 (Recurrence Score, RS) 分级的相关性, 采用单因素方差分析 X 线征象与 RS 分值的相关性。**结果:** Shapiro-Wilk 检验结果表明 282 例患者的 21 基因复发风险评分数据服从正态分布。经单因素有序 logistic 回归分析 X 线征象与 RS 分级的相关性后发现, 钙化形态和肿块边缘存在显著差异 ($P<0.05$)。在包含肿块密度、肿块形态、肿块边缘、病理类型、组织学分级的多因素有序 logistic 回归分析表明, 肿块密度和肿块边缘与 RS 分级显著相关。另外, 在包含钙化形态、钙化分布、病理类型、组织学分级的多因素有序 logistic 回归分析表明, 钙化形态和组织学分级与 RS 分级显著相关。综上, 单因

素和多因素分析结果一致表明, 肿块边缘和钙化形态与 RS 分级有统计学显著相关性。进一步的单因素方差分析对回归分析结果进行检验, 发现边缘模糊肿块的平均 RS 值为 33.6, 与边缘清楚 (18.4)、毛刺 (24.9)、小分叶 (27.3)、遮蔽 (23.1) 间都存在统计学差异。不定形钙化和点状钙化的 RS 均值间也有显著差异。**结论:** 乳腺 X 线影像中的钙化形态和肿块边缘具有成为 21 基因检测的影像标志物的潜力, 为临床医生对患者进行个体化治疗方案的决策提供强有力的帮助。

PO-1423

基于超声图像的自动化可复用深度学习 (AutoRDL) 框架预测 乳腺癌新辅助化疗疗效及腋窝淋巴结转移

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目的: 早期无创预测乳腺癌新辅助化疗疗效和腋窝淋巴结状态有助于优化患者个体化治疗方案。本研究旨在基于不同质量的超声图像利用自动且可重复使用的深度学习 (AutoRDL) 框架预测病理完全缓解 (pCR) 和腋窝淋巴结转移 (ALNM)。

方法: 本研究回顾性分析三家医院 2567 名经病理确诊的乳腺癌患者, 分别为中心 1 (训练和测试)、中心 2 (外部验证集 1) 和中心 3 (外部验证集 2)。针对中心 2 的图像质量明显低于其他中心的问题 (平均分辨率: 262×370、625×847、571×763 像素), 利用迭代细化的超分辨率 (SR3) 进行处理。AutoRDL 框架包括病灶检测网络和预测网络, 其中接受新辅助化疗或直接手术的患者分别用于 pCR 和 ALNM 预测任务。采用峰值信噪比 (PSNR) 和结构相似性指数 (SSIM) 评估图像重建效果。平均精度值 (mAP) 用于评估病灶检测性能。预测模型包括临床模型、图像模型和融合模型, 通过 AUC、混淆矩阵、校准曲线和决策分析等多维度全面评估模型效能。

结果: 最终纳入 2556 名患者进入病灶检测任务, 其中 1409 和 792 名患者分别进入 pCR 和 ALNM 预测任务。通过 SR3 实现中心 2 图像质量的提高, PSNR 和 SSIM 分别为 28.11 和 0.93。在病灶检测任务中, 验证集 mAP 为 0.88-0.92。在 pCR 预测任务的外部验证集中, 基于中心 2 处理后的图像的融合模型 post-SR3 (AUC: 0.833) 预测结果优于融合模型 pre-SR3、图像模型 post-SR3、图像模型 pre-SR3 和临床模型 ($p<0.05$)。同样, 在 ALNM 预测任务的外部验证集 1 中, 基于 SR3 处理后图像的融合模型 post-SR3 (AUC: 0.825) 性能超过融合模型 pre-SR3、图像模型 post-SR3、图像模型 pre-SR3 和临床模型 ($p<0.05$); 在外部验证集 2 中, 融合模型 (AUC: 0.819) 同样优于临床和图像模型 ($p<0.05$)。

结论: 本研究所提出的 AutoRDL 框架, 可自动化乳腺癌病灶检测及 pCR 和 ALNM 的预测, 为治疗决策提供参考。通过克服成像系统的分辨率限制, 即使在基层医院和资源有限的医疗环境中也同样适用。

PO-1424

基于 CEM 的多任务迁移学习网络系统对乳腺癌患者新辅助化疗反应的早期预测

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目的：针对当前乳腺癌患者新辅助化疗（NAC）反应的早期预测难题，本研究旨基于对比增强乳腺 X 线摄影（CEM）图像开发一个多任务迁移学习网络系统早期预测 NAC 反应，以指导乳腺癌患者个体化治疗决策。

方法：回顾性纳入 2018 年 7 月至 2023 年 5 月期间来自烟台毓璜顶医院和桂林市中医院的 528 例接受 NAC 并具有术前 CEM 图像的乳腺癌患者，样本分为训练集、内部测试集和外部测试集。一个基于迁移学习的 RefineNet 分割网络和两个 Xception 分类网络的多任务系统被开发，并用于执行肿瘤分割和个体化的逐级反应预测任务。根据 Miller-Payne (MP) 分级标准，Xception-1 首先被训练用于预测良好的反应（MP: 3-5），然后训练 Xception-2 用于预测病理完全反应。此外，为了揭示网络系统潜在的生物学机制，本研究基于 RNA 测序数据执行了基因分析。使用 Dice 相似系数（DSC）评估分割性能，并使用热图，接受者操作特征曲线下面积（AUC）评估分类性能。

结果：本研究构建的多任务迁移学习网络系统基于分割任务在内部测试集中实现的 DSC 为 0.888 ± 0.101 ，外部测试集中为 0.867 ± 0.132 ；在逐级反应预测任务中，Xception-1 在内部测试集和外部测试集中分别实现了 AUC 为 0.864 (95%CI:0.832-0.887) 和 0.859 (95%CI:0.827-0.876)，Xception-2 实现的 AUC 为 0.855 (95%CI:0.826-0.881) 和 0.874 (95%CI:0.852-0.896)。最后，基于多任务迁移网络系统的生物学机制探索发现，较高的深度学习得分与免疫相关通路和促进微环境中的抗肿瘤免疫细胞浸润有关。

结论：本研究构建的多任务迁移学习网络系统能够早期预测 NAC 反应，在指导乳腺癌患者个体化治疗决策中发挥重要作用。

PO-1425

基于深度学习的全自动化管道系统在 CEM 图像病灶分割和分类中的研究

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摘要

目的：针对当前手动分割病灶的局限以及解决乳腺病变术前难以准确定性的问题，本研究将分析探讨基于深度学习的全自动化管道系统在对增强乳腺 X 线摄影（CEM）图像上实现病灶分割和分类中的临床应用和价值。

方法：回顾性纳入烟台毓璜顶医院术前行 CEM 检查的患者 1710 例，分别采用 RefineNet, Xception 为亚网络并融合金字塔池化模块（PPM）构建一个全自动化的管道系统实现对乳腺病灶的分割和分类。对于系统的测试主要分为 3 个阶段，首先基于本院的一个数据集进行内部评估，然后在复旦肿瘤医院和广东省妇幼保健医院的 97 例患者中进行泛化性能测试。为了适应临床需求，本研究基于敏感度和特异度为评估指标探讨了在该系统辅助下对 6 名放射科医生诊断性能的改善。另外基于乳腺影像报告和数据系统（BI-RADS）的分类，进一步研究了系统辅助下医生对 BI-RADS 4 类的调整。最后，模拟真实的临床诊疗环境，在烟台毓璜顶医院的前瞻性环境中对系统进一步测试以及辅助临床价值的评估。

结果: 本研究构建的全自动化管道系统在内部数据集、2 个外部医院构成的外部测试集、前瞻性数据集中的敏感度分别为 97%、96%和 93%, 特异度分别为 50%、70%和 61%。该系统在 2 个外部医院和前瞻性数据集中的性能均优于 6 名放射科医生的性能 (p 均 <0.05), 在系统的辅助下, 放射科医生在 2 个数据集中的敏感度分别提高了 1.5%和 1.8%, 特异度提高了 2.7%和 2.7%。另外, 基于管道系统的辅助策略, 在 2 个数据集中共有 5 个患者的 BI-RADS 4A 类别被降级, 24 个患者的 BI-RADS 4 类别被升级, 因此, 这部分患者的临床管理策略可以被重新考虑。

结论: 基于深度学习构建的全自动化管道系统在 CEM 图像的病灶分割和分类中表现出了良好的性能, 能够很好地缓解当前研究面临的分割耗时以及分类困难的问题, 对临床有一定辅助价值和推广价值。

PO-1426

DWI 联合 DCE-MRI 影像组学特征术前预测乳腺癌 HER-2 低表达

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【摘要】目的:探讨基于动态增强磁共振成像 (dynamic contrast enhanced MRI, DCE-MRI) 和扩散加权成像 (diffusion weighted imaging, DWI) 影像组学特征术前预测乳腺癌人表皮生长因子受体 2 (human epidermal growth factor receptor-2, HER-2) 低表达的临床应用价值。方法:回顾性收集 299 例 2017 年 1 月~2020 年 12 月经我院病理证实为乳腺癌患者的首次 MRI 及临床病理资料, 根据免疫组织化学 (Immunohistochemistry, IHC) 及荧光原位杂交 (fluorescence in situ hybridization, FISH) 检测结果将患者分为 HER-2 低表达组 ($n=144$) 和 HER-2 非低表达组 ($n=155$); 按照 8:2 的比例随机分为训练集 ($n=239$) 和测试集 ($n=60$)。采用 ITK-SNAP 软件手动逐层勾画 DCE-MRI 和 DWI 图像上病灶的感兴趣区 (region of interest, ROI), 并提取所勾画 ROI 的影像组学特征。采用 Mann-Whitney U 检验、Z 分数归一化、方差阈值、K 最佳和 LASSO 算法筛选特征, 以排列组合形式应用多种分类器算法建立 DCE-MRI、DWI 及二者联合预测模型。应用受试者工作特征曲线 (receiver operating characteristic, ROC) 的曲线下面积 (Area under the curve, AUC)、敏感度、特异度、准确度评估模型的预测效能。结果: 基于 DCE-MRI、DWI、二者联合模型术前预测 HER-2 低表达的 AUC 值在训练集和测试集中分别为 0.754、0.775、0.843 和 0.774、0.645、0.795。结论: 基于 DCE-MRI、DWI 组学特征模型均可术前无创性预测乳腺癌 HER-2 低表达状态, 且以二者联合模型预测效能最佳, 可为临床乳腺癌治疗方案的选择提供参考。

PO-1427

多层分段读出平面回波弥散加权成像在乳腺 良恶性病变鉴别诊断中的应用

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目的: 研究同时段多层分段读出平面回波弥散加权成像 (simultaneous multi-slice readout-segmented echo planar imaging SMS-RESOLVE) 技术在乳腺 MRI 成像中应用的可行性, 并比较其与传统 RESOLVE-DWI 在乳腺良恶性病变鉴别中的诊断效能。

方法: 从 2020 年 8 月到 2021 年 10 月, 30 名志愿者 (平均年龄 40.96 岁), 及 51 名患者接受了乳房 MRI 检查。使用 3.0T 磁共振及 18 通道相控阵乳房线圈对所有患者进行乳腺 MRI 成像。在所

有 51 名患者中, 24 名患者 (平均年龄 46.9 ± 11.4 岁) 发现了恶性病变, 27 名患者 (平均年龄 38.2 ± 8.6 岁) 检出了良性病变。所有病变均经活检组织病理学证实, 并纳入本研究进行最终分析。除了标准乳腺 MRI 扫描方案外, 患者还使用了 SMS-RESOLVE DWI 序列和传统 RESOLVE-DWI 序列进行双侧乳腺弥散成像。对图像质量、信噪比 (SNR)、病灶对比噪声比 (CNR)、病灶的表观扩散系数 (ADC) 等进行评估。

结果: 与传统的 RESOLVE-DWI 相比, 高分辨率 SMS-RESOLVE 采集显著提高了图像信噪比 (平均值 20.84 vs 7.55 , $p < 0.001$)。SMS-RESOLVE 序列在图像细微结构、清晰度和整体图像质量这三个指标中的得分显著高于 RESOLVE 序列 (4.03 vs 3.47 , $p = 0.002$; 4.43 vs 3.90 , $p < 0.001$; 和 4.13 vs 3.60 , $p = 0.002$;)。SMS-RESOLVE 的 ADC 值略低于常规 RESOLVE, 但两个序列之间没有显著性差异 ($1.56 \times 10^{-3} \text{ mm}^2/\text{s}$ vs $1.57 \times 10^{-3} \text{ mm}^2/\text{s}$, $p = 0.78$;)。SMS-RESOLVE 在乳腺病灶的良恶性诊断中具有更高的诊断效能 (AUC 值 0.986 vs 0.980 ; $p = 0.74$)。

结论: 具有高空间分辨率的 SMS-RESOLVE DWI 可以提供更高的信噪比和图像质量, 显著提高乳腺图像质量, 并具有区分乳腺良恶性病变的能力。

PO-1428

基于多区域 DCE-MRI 的深度学习网络在乳腺癌患者腋窝淋巴结新辅助化疗反应的预测

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目的: 早期预测腋窝淋巴结阳性乳腺癌患者对新辅助化疗的治疗反应有助于及时调整腋窝淋巴结清扫方案。我们的目标是开发和验证一个多任务深度学习网络 (FAIS-DL), 基于新辅助化疗早期的肿瘤和腋窝淋巴结 DCE-MRI 图像预测腋窝淋巴结的病理完全缓解。

方法: 在这项多中心、前瞻性队列研究中, 从 2013 年 12 月 16 日至 2021 年 3 月 05 日, 中国六家医院共回顾性纳入 1145 例活检证实的伴有腋窝淋巴结转移的乳腺癌患者, 并分为训练队列、外部验证队列和前瞻队列。接受全周期新辅助化疗并有手术病理结果的患者被纳入。排除的关键标准是缺少 DCE-MRI 图像和或临床病理特征。本文提出的多任务网络由两个信息互补的子网络组成, 实现了多区域特征的集成。我们使用多变量 logistic 回归分析构建临床模型作为基线。并与临床模型进行比较。

结果: 培训队列 633 例患者来自烟台毓璜顶医院和毒复旦大学肿瘤医院。分别选取桂林市中医医院 228 例、北京肿瘤医院 75 例、青岛大学附属医院 68 例以及滨州医学院附属医院 43 例患者作为独立的外部验证队列。在内部、外部和前瞻验证队列中, FAIS-DL 得出的受试者工作特征曲线 (AUC) 值分别为 0.986 (95%CI: $0.977-0.995$)、 0.902 (95%CI: $0.856-0.948$) 和 0.957 (95%CI: $0.924-0.990$), 显著高于临床模型 (AUC: $0.524-0.588$, P all < 0.05)。此外, 共有 512 名来自外部和前瞻性检测组的 ALN 转移乳腺癌患者接受了 ALND。如果根据这些患者的 FAIS-DL 结果进行 ALND, 则不必要的 LND 发生率将从 56.4% 降低到 14.9% , 最终获益率将从 52.14% 增加到 88.35%

结论: FAIS-DL 能够预测腋窝淋巴结性乳腺癌患者新辅助化疗早期的腋窝病理完全反应, 这可以指导临床医生调整治疗方案。

PO-1429

3D-APT 预测乳腺癌不同分子分型疗效的价值研究

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背景：目前国内外关于 APT 在乳腺癌新辅助治疗疗效方面的研究总体较少，且尚未有 APT 对不同分子分型乳腺癌疗效的预测研究。

目的：利用 3D-APTWI 技术研究接受新辅助治疗的不同分子分型的乳腺癌患者的相关参数及变化，从而评估与预测新辅助治疗疗效，为实现不同分子分型的个体化治疗方案提供理论基础。

材料与方法：回顾性分析 2021 年 4 月至 2023 年 9 月间经病理证实 145 例接受新辅助治疗的乳腺癌患者，所有患者均在新辅助治疗前、4 周末接受常规乳腺动态增强 MR 扫描及 3D-APTWI 成像；主要测量指标为 NAT 前及 4 周末的肿瘤大小（肿瘤长径）、ADC 值、MTR_{asym} 值等，并统计 ER、PR、HER2 和 Ki-67 增殖指数等指标的表达水平。采用卡方检验、独立样本 t 检验比较各组分子分型的 MHR 和 NMHR 组的临床基线特征；采用配对样本 t 检验、Wilcoxon 检验比较治疗前、后各参数值差异；采用独立样本 t 检验、Mann-Whitney U 秩和检验比较各参数值的组间差异；选择具有统计学意义的参数绘制受试者工作特征曲线，利用曲线下面积 AUC 来评估相应参数的诊断效能；Delong 检验用于分析各参数的 AUC 是否存在统计学差异。

结果：应用 3D-APT 序列进行研究，可在相同时间内获得更多层图像，较 2D-APT 可提供更多信息，且可以针对乳腺癌不同分子分型进行疗效和预后的预测。

PO-1430

辐射剂量管理系统在乳腺摄影组成及乳腺实质构成对平均腺体吸收剂量的影响研究中的应用

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背景：乳腺是对辐射致癌最敏感的器官之一，乳腺辐射剂量的准确评估及乳腺 X 线摄影检查低剂量化一直是临床研究的方向。与西方国家女性相比，中国女性在乳腺相关特征方面存在一些差异，包括乳腺腺体较为致密和乳腺相对较小等。我们使用 Radimetrics™（辐射剂量管理系统）研究了乳腺摄影组成及乳腺实质构成对全视野数字化乳腺 X 线摄影（Full Field Digital Mammography, FFDM）检查中平均腺体吸收剂量（Mean Glandular Dose, MGD）的影响。

方法：从 2020 年 7 月至 2021 年 7 月，随机收集 533 例患者的 2138 份 FFDM 图像，评估乳腺 X 线摄影乳房组成。我们使用 Radimetrics™（辐射剂量管理系统）分析了受检者年龄，乳房压迫力（N），乳房压缩厚度（mm），管电压（kVp），管电流（mAs），乳腺实质构成与 MGD 的相关性。在腺体辐射剂量高于诊断参考水平（第四四分位数，≥75%）的受检者中，我们分析了辐射增加的原因。

结果：2138 幅 FFDM 图像 MGD 为 $2.00\text{mGy} \pm 0.32\text{mGy}$ ，乳腺摄影组成参数管电压、管电流、乳房压迫力与每幅图像的 MGD 呈正相关（ $P < 0.05$ ）；相比之下，受检者年龄及乳房压迫力与每幅图像的 MGD 呈负相关（ $P < 0.05$ ）。“致密型”组的 MGD 显著高于“非致密型”组（ $P < 0.05$ ），“致密”组的年龄低于“非致密”组（ $P < 0.05$ ）。

结论：通过该研究结果，对于年轻及致密型乳房的女性，我们需要制定更加谨慎的检查方案，实现更舒适的检查过程并保证辐射剂量与图像质量之间的平衡。同时，Radimetrics™ 在全视野数字化乳腺 X 线摄影检查中用于收集受检者各项检查数据和分析与辐射剂量相关因素的实用性及有效性是肯定的。我们将继续应用 Radimetrics™ 帮助我们在临床工作中控制 X 线检查辐射剂量，并进一步扩大统计分析范围，实现 DR、CT、MRI、XA 等成像设备的多方面管理。

PO-1431

基于 DCE-MRI 治疗早期肿瘤大小变化预测乳腺癌新辅助疗效及临床综合预测模型的构建

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目的：探讨基于乳腺动态增强磁共振（DCE-MRI）的肿瘤治疗早期大小变化用于预测乳腺癌新辅助治疗（NAT）后病理完全缓解（pCR）的价值，以及联合有意义的临床病理指标构建临床综合预测模型。方法：回顾性分析 2019 年 4 月到 2021 年 12 月江西省肿瘤医院 117 例 NAT 前及治疗 2 周期后均行乳腺 DCE-MRI 检查的乳腺癌患者。按照 7: 3 比例随机分成训练集与测试集，根据 NAT 结束后病理结果分为 pCR 组与非病理完全缓解（non-pCR）组。基于 DCE-MRI 图像计算治疗前后肿瘤最大径相对退缩值（Diameter%），通过 3Dslicer 软件半自动勾画三维感兴趣区计算治疗前后肿瘤体积相对缩小值（Volume%）；分别构建 Diameter%与 Volume%预测模型。对患者的一般资料进行统计学分析，选取单因素分析有意义的指标再通过逐步回归法筛选变量，构建逻辑回归临床综合预测模型，并绘制列线图。对上述模型诊断效能进行评估、比较。结果：Diameter%预测模型在训练集与测试集的 AUC 值分别为 0.71、0.77；Volume%预测模型的 AUC 值为 0.68、0.80。训练集 pCR 组与 non-pCR 组的 ER、PR、HER2 状态、Ki67 指数、分子分型、Diameter%、Volume%存在统计学差异，通过逐步回归法筛选出 ER、HER2 状态、Ki67 指数和 Diameter%用于构建临床综合模型，其 AUC 最高（0.86、0.83），在测试集中其预测 pCR 的能力较 Diameter%、Volume%预测模型分别改善了 19.31%、23.18%（ $P=0.035$ 、 0.005 ），其临床校准曲线显示模型预测 pCR 的效能良好。结论：基于 DCE-MRI 的肿瘤治疗早期大小的变化可为无创性预测 NAT 结局的生物标记物；Diameter%、ER、HER2 状态及 Ki67 指数构建的临床综合预测模型对于早期预测 pCR 具有较高的临床应用价值。

PO-1432

DBT 影像组学预测乳腺癌腋窝淋巴结转移的应用

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目的：探讨术前数字乳腺断层 X 线摄影(Digital Breast Tomosynthesis, DBT)影像组学预测乳腺癌腋窝淋巴结（Axillary lymph nodes, ALN）转移的应用价值。

方法：搜集我院 218 例经病理证实为乳腺癌患者的 DBT 图像及其临床资料，利用 ITK 软件逐层勾画原发病灶的感兴趣区域(Region of Interest, ROI)，使用 AK 软件自动提取包括基于强度及形状的一阶特征、基于纹理的二阶特征及高阶特征等在内的 ROI 影像组学特征，并利用最小冗余最大相关算法、最小绝对收缩和选择算子逻辑回归算法筛选得到最佳特征，从而根据乳腺拍摄所涉及体位应用支持向量机分类器构建多种模型，即 CC 模型、MLO 模型及双体位联合模型。同时本研究将患者年龄、肿瘤位置、肿瘤横径、肿瘤内有无钙化、是否伴有毛刺、BI-RADS 分类、家族史及月经史等临床资料进行统计学分析，构建临床模型，以此进一步联合影像组学特征构建诺莫图，并通过决策曲线分析(Decision Curve Analysis, DCA)预测模型在不同阈值概率下的净效益情况，以评价模型的预测性能。

结果：最终共筛选出 7 个最佳影像组学特征参与建模，CC 模型、MLO 模型及联合模型所得 AUC 在训练集和验证集中分别为 0.803 及 0.787、0.810 及 0.798、0.833 及 0.820，联合模型展现出更好的预测性能。通过逻辑回归分析得出病灶内钙化情况与 ALN 转移存在相关性，因此基于临床危险

因素所构建的临床模型在训练集和验证集中 AUC 分别为 0.611 及 0.606, 远不及影像组学模型的预测结果, 而将临床因素和影像组学模型联合所构建的诺莫图在训练集和验证集中 AUC 为 0.856 及 0.844, 与单纯影像组学模型相比, 诺莫图展示出更优效能, 并且通过 DCA 曲线可以看出, 阈值落在 0.23-0.60 区间时, 诺莫图可获得最高净效益值。

结论: DBT 影像组学模型可作为一种经济有效且非侵入性方法用于评估乳腺癌 ALN 转移情况, 并且研究中加入临床特征构建模型可以进一步提高对患者个体化风险的准确预测, 为预后判断和临床决策提供了更可靠的参考信息。

PO-1433

T1、T2 弛豫图一阶特征变化对不同亚型乳腺癌新辅助化疗反应的早期预测价值

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目的: 本研究使用合成 MRI 生成的 T1、T2 弛豫图, 旨在评估新辅助化疗早期其一阶特征变化对预测不同分子亚型乳腺癌的新辅助治疗后病理反应的价值。

方法: 从 2019 年 3 月至 2021 年 10 月, 本研究前瞻性招募了 200 名在本院行标准的新辅助化疗+手术的治疗方案的乳腺癌患者, 所有患者在新辅助化疗基线和早期后均接受乳腺 MRI 检查, 生成合成 T1、T2 弛豫图和质子密度 (PD) 图, 提取 22 个全肿瘤的一阶特征并计算其变化率 ($\Delta\%$)。新辅助治疗反应分为病理无反应 (pNR), 病理部分反应 (pPR) 和病理完全反应 (pCR)。使用 Spearman 等级相关分析全部患者的各特征变化与治疗反应之间的关系, 并进一步在三种分子亚型内分析其相关性。受试者工作特征曲线用于评估参数的诊断效能。

结果: 本研究共纳入 75 名 luminal-HER2 阴性, 85 名 HER2 阳性和 40 名三阴性乳腺癌 (TNBC) 患者。在所有患者中, T1、T2、PD 的一阶特征变化与治疗反应呈轻-中度正相关 ($r=0.217-0.486$, p 均 <0.001)。HER2 阳性亚型中, T1 一阶特征变化与治疗反应的相关性最高 ($r=0.386-0.565$, $p<0.001$); 对于区分 pCR 和 pNR, $\Delta\%T1-75\%$ 诊断效能最高, AUC 分别为 0.798 (95%CI 0.705-0.890, $p<0.001$) 和 0.832 (95%CI 0.732-0.933, $p<0.001$)。TNBC 亚型中, T2 一阶特征变化与治疗反应的相关性最高 ($r=0.490-0.563$, $p\leq 0.001$); 对于区分 pCR, $\Delta\%T2-05\%$ 的诊断效能最高 (AUC=0.836, 95%CI 0.705-0.968, $p<0.001$)。HER2 阴性亚型中, T1 弛豫图 10/25/50% 变化与 pNR 相关 ($r=0.329-0.416$, $p<0.001$), 其中 $\Delta\%T1-25\%$ 诊断效能最高 (AUC=0.733, 95%CI 0.622-0.845, $p<0.001$)。

结论: 合成 MRI 生成的 T1、T2 弛豫图的一阶特征早期变化可以预测不同分子亚型乳腺癌对新辅助化疗的治疗反应, T1 和 T2 弛豫图分别适用于 HER2 阳性和 TNBC 亚型。

PO-1434

基于对比增强乳腺 X 线摄影影像组学对 BI-RADS 4A 类病变的诊断价值

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目的: 本研究基于对比增强乳腺 X 线摄影 (CEM) 影像组学特征建立模型, 以期提高 BI-RADS 4A 类病变的诊断准确率, 减少不必要的良性活检。

方法：回顾性分析行 CEM 检查的数字乳腺断层摄影 (DBT) 诊断为 BI-RADS 4A 类病变 99 例患者的临床资料。按照 7:3 的比例将患者随机分成训练集(69 例)和测试集(30 例)；手动标注全部病例 ROI。采用 F 检验进行特征筛选，建立影像组学模型，计算患者的影像组学评分 (Rad-score)。使用受试者操作特征 (ROC) 曲线及曲线下面积 (AUC) 评估影像组学、BI-RADS 分类及联合模型对于 BI-RADS 4A 类病变诊断效能，采用 DeLong 检验比较 AUC 的差异。

结果：训练集及测试集中，良性病变患者的 Rad-score 均高于恶性患者 (均 $P < 0.05$)。基于 CC 位、MLO 位和二者体位联合的影像组学模型在训练集和测试集中诊断乳腺 BI-RADS 4A 类病变良、恶性的 AUC 分别为 0.935、0.823、0.947 和 0.812、0.716、0.937。训练集中基于二者体位联合的影像组学模型 AUC 高于 MLO 位 ($P = 0.042$)，余差异均无统计学意义 (均 $P > 0.05$)。影像组学、BI-RADS 分类及二者联合模型在训练集和测试集中预测乳腺 BI-RADS 4A 类病变的 AUC 值分别为 0.947、0.843、0.995 和 0.937、0.821、0.994。二者联合模型在训练集 ($P = 0.002$) 及测试集中 ($P = 0.046$) 诊断的 AUC 均高于 BI-RADS 分类；而与影像组学模型比较无统计学差异 ($P = 0.053$, $P = 0.140$)。影像组学模型和 BI-RADS 分类的 AUC 值在训练集 ($P = 0.088$) 和测试集中 ($P = 0.249$) 差异均无统计学意义。

结论：影像组学模型对于 BI-RADS 4A 类病变良恶性鉴别中具有较高的诊断价值，基于 CC 和 MLO 位二者体位联合的影像组学模型在训练集中 AUC 值高于 MLO 位。与 BI-RADS 分类比较，BI-RADS 分类与影像组学二者联合模型预测的诊断效能较高。

PO-1435

常规磁共振特征联合定量参数在乳腺肿瘤中的研究价值

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目的：探讨常规磁共振特征联合定量参数在乳腺肿瘤良恶性鉴别以及乳腺癌分子亚型预测中的应用价值。

材料与方法：回顾性分析 2020 年 5 月至 2023 年 5 月经病理证实的 227 例乳腺肿瘤患者的临床和术前影像资料。分析常规磁共振特征及测量 DCE、IVIM 定量参数 (K_{trans} 、 K_{ep} 、 V_e 和 D 、 D^* 、 f)。组间差异性分析采用 Mann-Whitney U 检验、卡方检验及 Fisher 确切概率法。采用 Logistic 回归分析确定预测乳腺肿瘤良恶性和乳腺癌分子亚型独立影响因素，建立预测模型。采用受试者工作特征曲线 (ROC) 分析模型诊断效能，采用 DeLong 检验比较 ROC 曲线下面积 (AUC)。

结果：良恶性病变组间常规磁共振特征 (ADC 值、病变边缘、T2WI 信号、病灶数目、背景实质强化、腺体分型、病变强化方式及强化类型、TIC) 及定量参数 (K_{trans} 、 K_{ep} 、 V_e 、 D) 相比较，差异有统计学意义 (均 $P < 0.05$)。Luminal 型与其他亚型组间 ADC 值、病变强化方式及 K_{trans} 、 K_{ep} 、 D 值相比较，有统计学差异 (均 $P < 0.05$)。HER2 过表达型与其他亚型组间 ADC 值、病变边缘及 K_{trans} 、 K_{ep} 值相比较，有统计学差异 (均 $P < 0.05$)。三阴性型与其他亚型组间病变强化方式、强化类型及 V_e 、 D 值相比较，有统计学差异 (均 $P < 0.05$)。常规磁共振特征联合模型鉴别肿瘤良恶性的 AUC 为 0.937，均高于任一磁共振特征 (均 $P < 0.05$)。定量参数联合模型鉴别肿瘤良恶性的 AUC 为 0.854，均高于任一参数 (均 $P < 0.05$)。常规磁共振特征联合定量参数模型预测 Luminal、HER2 过表达及三阴性型的 AUC 分别为 0.831、0.876、0.883，均高于任一独立预测因素 (均 $P < 0.05$)。

结论：常规磁共振特征及定量参数对鉴别肿瘤良恶性及预测分子亚型具有一定价值，可作为评估乳腺肿瘤的一种无创性影像指标。

PO-1436

基于多参数磁共振生境分析早期预测 乳腺癌新辅助治疗疗效的研究

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目的：建立基于多参数磁共振的时空生境，并探讨其时间变化早期预测乳腺癌新辅助治疗（NAT）反应的价值。

材料与方法：前瞻性收集 2020 年 10 月至 2022 年 12 月在中国医科大学附属第一医院收治的 74 例经活检病理证实为浸润性导管型乳腺癌患者，肿块直径均大于 3cm。所有患者在治疗前均接受乳腺磁共振检查，并于入组后接受 NAT 一周后乳腺磁共振检查。结合弥散加权成像参数（ADC 值）和增强定量参数（Ktrans/Kep/ve 值），通过 K-均值聚类将病灶划分为三个亚区。采用独立样本 t 检验或 Mann-Whitney U 检验评估不同治疗反应组中各亚区的体积差异，以单因素及多因素 logistics 回归分析 NAT 治疗反应前后各亚区的体积变化，采用受试者操作特征曲线（ROC）及曲线下面积（AUC）分析各参数单独及联合预测乳腺癌新辅助治疗反应的效能。

结果：在 74 例（平均 49 岁；范围 28-67 岁）入组患者中，21 例（28.4%）于 NAT 后获得病理完全缓解（pCR），53 例（71.6%）为非 pCR。最终分割出三种亚区，即低灌注低细胞性（LV-LC）、中灌注高细胞性（MV-HC）及高灌注高细胞性（HV-HC）。非 pCR 患者一周的各亚区体积均高于 pCR 患者（Z 分别为 -3.993、-3.579、-3.969， $P < 0.001$ ）；pCR 患者治疗前后的 LV-LC 亚区、HV-HC 亚区体积变化均大于非 pCR 患者（Z 分别为 -2.704、-2.164， $P < 0.05$ ）。LV-LC 亚区的减少预示着更好的治疗效果，产生了良好的诊断性能，AUC 为 0.70（95%CI，0.57-0.83）。

结论：多参数磁共振时空生境的时间变化在区分早期预测乳腺癌 NAT 反应方面具有一定的价值，低灌注低细胞性（LV-LC）亚区的减少可能预示着更好的治疗效果。

PO-1437

合成 MRI 在乳腺癌分子亚型的临床价值研究

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目的：探讨合成 MRI 在不同分子亚型乳腺癌中的临床价值。

方法：收集 2020 年 9 月至 2021 年 3 月因乳腺病变接受合成磁共振增强前后 MAGIC 序列检查的 211 例乳腺病变患者的临床及影像学资料。根据手术后病理免疫组化结果，将病例分为四组：Luminal A 型、Luminal B、Her-2 过表达型、三阴性（TNBC）。测量不同分子亚型组每个乳腺癌病灶注射造影剂前后的 T1、T2 弛豫时间，分别表示为 pre-T1、pre-T2、pre-PD、post-T1、post-T2、post-PD。采用 Kruskal-Wallis 方法检验各定量 MRI MAGIC 参数值。结果：不同分子亚型组乳腺癌定量 MAGIC 增强前后的 T2 弛豫时间测量结果如下：Luminal A 型组 pre-T2 为 62.33 ± 9.53 、post-T2 为 52.89 ± 7.04 ，Luminal B 型组 pre-T2 为 71.79 ± 12.27 、post-T2 为 60.74 ± 7.92 ，Her-2 过表达组 pre-T2 为 81 ± 20.73 、post-T2 为 66.47 ± 12.99 ，TNBC 组 pre-T2 为 67.78 ± 15.91 、post-T2 为 59 ± 9.31 。pre-T2、post-T2 弛豫时间值在 Her-2 过表达型组高于其他三组，且差异有统计学意义（ $P < 0.05$ ）。

结论：使用合成 MRI 定量弛豫参数有助于鉴别不同分子亚型乳腺癌。T2 弛豫时间值可作为鉴别 Her-2 过表达型与非 Her-2 过表达型乳腺癌相关的影像学参数。

PO-1438

定量 MRI 预测 I-III 期乳腺癌分子亚型和预后的可行性研究

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目的: 探讨体素内不相干运动 (IVIM) 成像和动态对比增强 MRI (DCE-MRI) 评估 I-III 期乳腺癌分子亚型和预后的可行性及价值。**方法:** 回顾性分析 2020 年 1 月至 2022 年 3 月在济宁医学院附属医院行 IVIM 和 DCE-MRI 检查并经手术病理证实的乳腺癌患者 144 例, 测量 IVIM 参数真实扩散系数 (D)、假扩散系数 (D^*)、灌注分数 (f) 及 DCE-MRI 参数容量转移常数 (Ktrans)、速率常数 (Kep)、血管外细胞外容量比 (Ve)。采用 Logistic 回归分析确定预测分子亚型和预后的独立影响因素, 建立预测模型。采用受试者工作特征曲线 (ROC) 分析模型诊断效能, 采用 DeLong 检验比较 ROC 曲线下面积 (AUC)。建立分子亚型预测列线图, 采用校准曲线评估列线图效能, Hosmer-Lemeshow 检验评估拟合优度。**结果:** Logistic 回归分析结果显示, D、Ktrans 和 Ve 均分别为 Luminal 型和三阴性型的独立预测因素 ($P = 0.003$ 、 <0.001 、 0.002 ; 0.027 、 0.002 、 <0.001)。D + Ktrans + Ve 联合模型诊断 Luminal 型和三阴性型的 AUC 分别为 0.883、0.850。D 和 Ktrans 为预测 HER2 过表达型的独立影响因素, D + Ktrans 联合模型具有最佳的诊断效能, AUC 为 0.913。此外, Ktrans 为预测诺丁汉预后指数 (NPI) 的独立影响因素, AUC 为 0.790; D 为预测 Ki-67 表达情况的独立影响因素, AUC 为 0.747。校准曲线显示分子亚型预测列线图有较好的校准效果, Hosmer-Lemeshow 检验拟合优度 P 值分别为 0.66、0.62 和 0.93 ($P > 0.05$)。**结论:** IVIM 和 DCE-MRI 联合诊断模型对 I-III 期乳腺癌分子亚型和预后具有较好的预测效能, 可在一定程度上指导临床治疗决策。

PO-1439

联合治疗前和治疗后深度学习量化的 DCE-MRI 血流动力学特征评估乳腺癌新辅助治疗后腋窝淋巴结状态及预后的研究

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研究背景: 新辅助治疗后腋窝淋巴结状态的再评估与乳腺癌患者手术方式的选择及预后密切相关。术前准确评估乳腺癌新辅助治疗后腋窝淋巴结状态能指导临床腋窝管理策略的制定, 在保证患者能从治疗中获益的同时, 尽可能减少患者术后并发症的发生, 改善其生存质量。

研究目的: 联合治疗前和治疗后乳腺 MRI 定性特征和定量 DCE-MRI 三维容积血流动力学特征对乳腺癌新辅助治疗后腋窝淋巴结状态及预后进行分析。

研究方法: 纳入 270 例接受术前新辅助治疗的乳腺癌患者进行分析。研究终点指标为新辅助治疗后的腋窝淋巴结状态。基于乳腺 DCE-MRI 采用深度学习方法对病灶进行自动分割, 并量化病灶内三维容积血流动力学特征进行分析。采用 logistics 回归模型基于临床病理指标、治疗前和治疗后 MRI 定性特征以及 DCE-MRI 定量三维容积血流动力学特征构建预测模型, 并进一步采用 Kaplan-Meier 曲线、Log-rank 检验及多因素 Cox 回归模型分析其与患者无复发生存期的相关性。

研究结果: 三维容积血流动力学模型、临床病理特征模型和 MRI 定性特征模型的 AUC 值分别为 0.736 (95%CI, 0.677-0.796)、0.715 (95%CI, 0.651-0.780) 和 0.791 (95%CI, 0.733-0.850)。通过结合这三种类型特征构建的综合模型 AUC 值为 (0.881; 95%CI, 0.837-0.925), 明显高于任一单一模型 ($P < 0.05$)。此外, 血流动力学评分 (高 vs. 低: HR, 6.31; 95%CI,

2.11-18.84; $P = 0.001$) 和综合模型评分 (高 vs. 中&低: HR, 6.11; 95%CI, 2.24-16.67; $P < 0.001$) 均为乳腺癌新辅助治疗后无复发生存期的独立预测因素。

研究结论: 联合治疗前和治疗后 DCE-MRI 定量三维容积血流动力学特征有望为乳腺癌新辅助治疗后腋窝淋巴结精准管理及预后评估提供参考依据。

PO-1440

不同时相选择下 DISCO DCE - MRI 药代动力学参数对乳腺癌新辅助化疗后病理完全缓解的预测价值

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目的: 比较笛卡尔 K 空间共享三维容积快速动态成像 (DISCO) DCE - MRI 药代动力学参数在不同时相对乳腺癌新辅助化疗 (NAC) 后病理完全缓解 (pCR) 的预测价值。

方法: 回顾性收集原发性乳腺癌患者 272 例, 根据 HR、HER2 状态 1:2 匹配 108 例: pCR46 例, Non-pCR62 例。NAC 前行 DISCO DCE-MRI, 共 18 期, 时间分辨率为 19.4s / 期。运用 Omni Kinetics (OK) 软件的 Reference Region 模型, 分别从四个时相 (前 116.4s、174.6s、252.2s、349.2s, 记作 TP1、2、3、4) 的图像中提取容量转移常数 (Ktrans)、速率常数 (Kep) 和血浆体积分数 (Vp) 直方图特征: 第 10、25、50、75、90 百分位数、最大值、最小值、中位数、均值、能量、熵、峰度、偏度。采用 Mann-Whitney U 检验比较各时相参数差异, 多因素 logistic 回归、ROC 曲线、DeLong 检验评估并比较预测性能。

结果: 不同时相 Ktrans、Kep 和 Vp 的平均值差异显著 ($p < 0.05$)。TP1 中 Kep 熵、TP2 中 Ktrans 中位数和第 50 百分位数、TP3 中 Ktrans 偏度和体素值和、TP4 中 ktrans 第 75 百分位数是乳腺癌 NAC 后 pCR 的独立预测因子。联合参数效能 TP1 (0.608, 95%CI 0.510-0.701)、TP2 (0.708, 95%CI 0.612-0.791)、TP3 (0.697, 95%CI 0.601-0.781) 和 TP4 (0.631, 95%CI 0.533-0.722) 差异无统计学意义 (DeLong 检验: $p > 0.05$)。

结论: 不同时相的 Ktrans 是新辅助治疗后 pCR 的良好预测指标。TP2 中的联合参数具有良好的预测性能, 且延长扫描时间不能提高检验效能。

PO-1441

64 排 CT 平时加增强扫描联合穿刺活检及形态学特征在诊断乳腺癌并淋巴结转移的价值

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目的: 探讨 64 排 CT 平扫加增强扫描加穿刺活检结合肿块形态学特征对乳腺癌并腋窝淋巴结的诊断价值。**方法:** 回顾性分析我院近 5 年经手术后病理证实 207 例 (366 枚肿大淋巴结) 乳腺癌患者, 根据病理结果分为非转移性肿大淋巴结 204 枚和转移性淋巴结 162 枚。收集淋巴结形态学特征, 包括直径大小、形态、密度、边缘、强化程度及穿刺活检病理学检查, CT 值、动脉期及静脉期碘浓度测定, 回顾分析影响腋窝淋巴结转移的因素, 分别构建形态学模型、CT 增强扫描模型、活检穿刺模型等独立模型于联合模型, 采用 ROC 评估各模型诊断效能, 计算敏感性和特异性。结果构建的形态学特征、增强程度方式及穿刺活检核模型诊断价值模型优于其他独立因素, 敏感度及特异性分别为 85.5%、83.4%。**结论:** 64 排 CT 平时加增强扫描及穿刺活检在术前检查评估乳腺癌患者腋窝淋巴结转移患者中有很好应用价值, 联合形态学特征可明显提高诊断正确率。

PO-1442

乳腺导管原位癌伴或不伴微浸润的临床病理及影像学特征对比分析研究

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目的：探讨乳腺导管原位癌（DCIS）发生微浸润（DCISM）的临床病理及影像学预测因子并建立联合预测模型。**方法：**回顾性收集宁夏医科大学总医院于 2018 年 4 月至 2022 年 12 月间经术后病理证实的 DCIS 伴或不伴微浸润病例共 127 例患者，所有患者术前接受乳腺钼靶和 MRI 检查并依据乳腺影像报告和数据系统（BI-RADS）标准进行分类。使用 χ^2 检验、Fisher 确切概率法或 t 检验分析两组间临床病理及影像表现差异，采用二元 Logistic 回归分析法筛选具有统计学意义的参数（ $P<0.05$ ），绘制受试者工作特征（ROC）曲线，建立联合模型并用 SHAP 分析方法将各参数的贡献大小可视化。**结果：**以病理结果为金标准，127 例患者中 DCIS 患者 81 例（平均年龄 50.9 ± 10.8 岁）共 89 个病灶、DCISM 患者 46 例（平均年龄 50.6 ± 10.8 岁）共 52 个病灶。二元 Logistic 回归多因素分析显示，恶性钙化（OR: 0.318, 95%CI: 0.106~0.948, $P=0.040$ ）、MRI 内部强化方式（OR: 2.746, 95%CI: 1.284~5.871, $P=0.009$ ）、组织学分级（OR: 3.999, 95%CI: 1.087~14.713, $P=0.037$ ）、坏死（OR: 0.067, 95%CI: 0.022~0.206, $P<0.001$ ）、腋窝淋巴结状态（OR: 0.046, 95%CI: 0.003~0.670, $P=0.024$ ）是 DCISM 的独立预测因子（ $P<0.05$ ）。**结论：**联合术前乳腺 X 线摄影和乳腺磁共振成像特征及临床病理学特征可有效预测 DCIS 及 DCISM，从而提升治疗计划的准确性。

PO-1443

基于灰度共生矩阵的乳腺浸润性导管癌和非哺乳期乳腺炎 ADC 图纹理特征研究

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目的：非哺乳期乳腺炎（non-lactation mastitis, NLM）同非肿块样强化的乳腺癌 MR 影像鉴别存在一定困难。纹理分析是影像组学研究中的主要方法，灰度共生矩阵（GLCM）是使用最广泛的一种纹理分析方法。表观扩散系数（ADC）值对于乳腺良恶性病变鉴别有重要价值。本研究的目的是分析非哺乳期乳腺炎和非肿块样强化乳腺癌的 ADC 图纹理特征及其差异，探讨其在鉴别诊断中的意义。**材料与方法：**回顾性分析 2021 年 1 月至 2022 年 12 月在我院住院并经穿刺活检或手术病理证实的 27 例非哺乳期乳腺炎患者和 33 例浸润性导管癌（infiltrating ductal carcinoma, IDC）患者乳腺 ADC 图像。采用 GE Signa 1.5T 超导 MR 扫描仪，DWI 采用 EPI 序列，b 值 0、800s/mm²，TR/TE = 6000/65 ms，层厚 6 mm。生成 ADC 图，并使用 MaZda 软件对其进行 GLCM 分析。选取病灶最大层面作为感兴趣区，避开脂肪。生成 4 个方向（0°、45°、90°和 135°）GLCM 的纹理特征，包括：角二阶矩（ASM）、逆差距（IDM）、对比度（CON）、相关度（COR）和熵（ENT）。分别计算上述各个纹理特征 4 个方向上的平均值（mean）、范围（range，纹理特征在四个角度中的最大值减去最小值）。使用 R 语言（version 3.6.1）进行统计分析， $P<0.05$ 有统计学意义。根据数据分布情况采用均数±标准差、中位数（四分位间距）来表示。**结果：**1.IDC 的 IDM 均值高于 NLM [0.4749 (0.1204) Vs 0.4080 (0.0905)]；IDC 的 CON 均值和范围高于 NLM [3.8981 (2.8904) Vs 6.2948 (4.0694), 2.1862 (1.5886) Vs 4.4899 (4.7030)]。2.IDC 的 IDM、CON、COR 组内相关系数低于乳腺炎 (0.8528 Vs 0.5361、0.7994 Vs 0.5745、

0.5784Vs0.2468)。结论: IDC 和 NLM 在 ADC 图上病灶纹理特征存在差异, 对于临床鉴别诊断有参考价值。

PO-1444

术前锥光束乳腺 CT 与乳腺 MRI 预测乳腺癌保乳手术切缘状态的临床价值

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目的: 探讨锥光束乳腺 CT (CBBCT) 与乳腺 MRI 在预测保乳手术切缘状态中的效能。

方法: 回顾性分析 2013 年 4 月至 2022 年 8 月于天津医科大学肿瘤医院行保乳手术治疗乳腺癌患者的临床、影像学及病理学资料。由 2 名放射科医师参照乳腺影像报告和数据系统标准对乳腺 MRI 及 CBBCT 图像分别进行独立阅片。采用 t 检验、Mann-Whitney U 检验、卡方检验、Fisher 精确检验分析临床病理特征及 CBBCT 及乳腺 MRI 影像特征与切缘状态的相关性。采用多因素 Logistics 回归建立基于 CBBCT 及乳腺 MRI 的保乳手术患者切缘状态的预测模型, 利用 ROC 曲线分析基于 CBBCT 和基于乳腺 MRI 预测模型的诊断效能, 并使用 DeLong 检验比较模型间 AUC 的差异。

结果: 本研究共纳入 77 例行保乳手术治疗的乳腺癌患者 (共 77 个病变), 其中 47 个为切缘阴性组, 30 个为切缘阳性组。两组在病理范围、周围脂肪浸润以及在 CBBCT 和 MRI 中测得病变范围、病变类型、患侧血管增多征、肿瘤周围血管征、肿瘤周围异常强化中的差异具有统计学意义 (P 均 <0.05), 在 CBBCT 上是否含有钙化 ($P=0.001$) 以及在乳腺 MRI 中病灶的早期强化率 ($P=0.038$) 的差异具有统计学意义。多因素 Logistics 回归分析结果显示, 肿瘤周围血管征 ($OR=9.829$)、肿瘤周围异常强化 ($OR=9.872$) 以及伴钙化 ($OR=5.064$) 是 CBBCT 影像特征预测保乳手术切缘阳性的重要影响因素, 肿瘤周围异常强化 ($OR=4.534$) 是乳腺 MRI 影像特征预测保乳手术切缘阳性的重要影响因素。ROC 分析表明, CBBCT 模型鉴别保乳手术切缘状态的效能 ($AUC=0.891$) 高于 MRI 模型 ($AUC=0.796$), 但二者差异无统计学意义 ($P=0.055$)。

结论: CBBCT 及乳腺 MRI 影像特征对乳腺癌患者保乳手术切缘状态具有较高的预测能力, 且二者效能相当。

PO-1445

X 线特征与乳腺癌 ER、PR、HER2、Ki-67 表达的相关性

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X 线特征与乳腺癌 ER、PR、HER2、Ki-67 表达的相关性

目的:

探索乳腺癌 ER、PR、HER2、Ki-67 不同表达的乳腺 X 线图像特征。

材料和方法:

回顾性分析我院 2018 年 1 月至 2021 年 12 月术前行乳腺 X 线检查的乳腺癌患者 508 例。由两位医生独立评估 X 线图像特征。根据免疫组化结果, 分为 ER 阳性和 ER 阴性组、PR 阳性和 PR 阴性组、HER2 阳性和 HER2 阴性组、Ki-67 高表达和 Ki-67 低表达组。分析两个配对组中受体表达结果与乳腺癌临床特征及 X 线图像特征的相关性。

结果:

(1) 在临床特征上, PR 阳性组患者年龄小于 PR 阴性组, Ki-67 高表达组发生淋巴结转移的比例高于 Ki-67 低表达组, 差异均有统计学意义。

(2) 在 X 线特征上, ER 阳性组出现毛刺肿块、不定形钙化的比例高于 ER 阴性组, 出现细小多形性钙化的比例低于 ER 阴性组, 差异均有统计学意义。PR 阳性组出现毛刺肿块、不定形及散在分布钙化的比例高于 PR 阴性组, 病灶最大径 $\geq 2\text{cm}$ 、出现区域分布钙化的比例低于 PR 阴性组, 差异均有统计学意义。HER2 阳性组出现钙化、结构扭曲征象的比例高于 HER2 阴性组, 出现肿块征象的比例低于 HER2 阴性组, 差异均有统计学意义。HER2 阳性组病灶最大径 $\geq 2\text{cm}$ 、出现细小多形性、区域状分布钙化的比例高于 HER2 阴性组, 出现毛刺肿块、不定形、簇状及散在分布钙化的比例低于 HER2 阴性组, 差异均有统计学意义。Ki-67 高表达组出现肿块、累及乳头、病灶最大径 $\geq 2\text{cm}$ 、出现细小多形性钙化的比例高于 Ki-67 低表达组, 出现不定形钙化的比例低于 Ki-67 低表达组, 差异均有统计学意义。

结论:

乳腺癌 ER、PR、HER2、Ki-67 不同表达在临床及 X 线图像特征上具有一定相关性。

PO-1446

数字化乳腺断层融合 x 线摄影及影像组学一阶纹理特征对乳腺肿块样病变的诊断效能分析

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目的: 通过对比分析 FFDM 与 DBT 对乳腺肿块性病变的检出能力及准确率, 并探讨基于 DBT 影像组学在评估乳腺肿块样良恶性病的诊断价值。方法: 收集乳腺肿块样病变患者的临床资料, 通过卡方检验比较肿块的检出率、正确诊断率的差异。采用受试者工作特征曲线(ROC)对于临床效能进行评价; 同时使用 pyradiomics 软件包提取一维特征进行模型的性能评价。结果: DBT 可以提高肿块的检出率、正确诊断率, 对于良性病变的检出更为显著, 差异具有统计学意义。对于致密型及非致密型腺体乳腺病变检出率比较, DBT、FFDM 及 DBT 联合 FFDM 对致密性腺体内肿块的检出差异具有统计学意义。对良恶性病变诊断的敏感度、特异度比较, 采用 DM+DBT 的敏感性 & 特异性均最高分别为 93.75%、97.06%, DM+DBT、DBT、DM 在良恶性病变诊断的 ROC 曲线下面积分别为 0.954、0.847、0.697, 三者之间的差异均具有统计学差异。对于影像组学特征的筛选, 在 MLO 位及 CC 位上均有特征模型具有鉴别良恶性病变的能力(AUC>0.7)。结论: 乳腺肿块样病变的检出率和符合率 DBT 优于 FFDM, 且 DBT 对肿块边缘的显示及对 BI-RADS 分类诊断结果的准确性优于 FFDM, 此外基于 DBT 的影像组学特征对乳腺良恶性病变的鉴别具有一定意义

PO-1447

多参数 MRI 与超声成像的决策树模型与 Logistic 回归模型识别三阴性与非三阴性乳腺癌

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目的 运用多参数 MRI 联合超声成像决策树模型和 Logistic 回归分析模型识别三阴性乳腺癌与非三阴性乳腺癌, 并比较二者之间的识别效能。方法 收集本院 2014 年 1 月至 2020 年 6 月行乳腺动态 MRI 增强与超声检查, 病理证实为乳腺癌的 194 例病例纳入研究, 并根据病理结果分为三阴性组 68 例和非三阴性组 126 例。对比分析两组间超声与 MRI 征象的不同, 单因素分析采用秩和检验和卡方检验, 将具有统计学意义的变量作为主要风险识别因子, 用决策树模型与 Logistic 回归模型建立风险识别模型, 运用受试者工作特征曲线 (ROC) 分析评估其诊断效能。结果 单因素分析显示, 两

组在超声血流信号明显、肿瘤更大、边界不清晰、乳头受累、伴有同侧淋巴结单发转移以及 MRI-BI-RADS 分级更高时均有统计学意义 ($P<0.05$)，决策树与 Logistic 回归分析均表明伴同侧淋巴结单发转移、有乳头受累是三阴性乳腺癌的独立识别指标，决策树识别三阴性乳腺癌的准确率 76.3%、特异度 79.4%、敏感度 72.0%、阴性识别值 79.4%、阳性识别值 72.0%，ROC 曲线下面积为 0.833。Logistic 回归模型识别三阴性乳腺癌的准确率 88.7%、特异度 75.0%、敏感度 96.0%、阴性识别值 91.1%，阳性识别值 87.7%，ROC 曲线下面积为 0.907。结论 决策树模型和 Logistic 回归分析模型均能识别三阴性乳腺癌，Logistic 回归模型识别能力高于决策树模型，两者互相补充，可结合二者鉴别三阴性乳腺癌与非三阴性乳腺癌。

PO-1448

基于 DCE-MRI 肿瘤早期退缩模式与不同亚型乳腺癌新辅助化疗后病理反应的相关性研究

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目的：分析不同亚型乳腺癌患者新辅助化疗 (NAT) 早期动态对比增强磁共振成像 (DCE-MRI) 上的肿瘤退缩模式与 NAT 后病理反应的关系。

方法：前瞻性地招募了 344 名 2018 年 9 月至 2021 年 12 月在中国医科大学附属第一医院接受 NAT 的浸润性导管乳腺癌患者。早期 DCE-MRI 包括在 NAT 一或两个周期后 (T_1 -MRI or T_2 -MRI) 进行。退缩模式分为四种类型：向心 (CS)、碎片 (DD)、仅强化减低 (DIO) 和稳定 (SD)。根据治疗前穿刺结果将肿瘤分为 3 种亚型：HR+/HER2-、HER2+ 和三阴性乳腺癌 (TNBC)。根据 NAT 后手术病理结果，将患者分为完全缓解 (pCR) 组和非 pCR 组。使用单因素和多因素 Logistic 回归分析影响疗效的相关因素。

结果：344 名 (1 名双侧) 患者有可评估的 T_1 -MRI or T_2 -MRI 纳入早期主分析队列 (113/345 [33%] pCR)，其中 245 名有完整 T_1 -MRI (82/245 [34%] pCR) 和 207 名有完整 T_2 -MRI (69/207 [33%] pCR) 的患者纳入单周期亚分析队列。早期主分析队列多因素分析显示 HR+/HER2-亚型 DD 模式 (OR: 12.083, 95%CI (3.337-43.750), $p<0.001$) 独立于大小的变化预测 pCR；在 HER2+ (OR: 1.611, 95%CI (1.222-2.126), $p=0.001$) 和 TNBC (OR: 1.605, 95%CI (1.220-2.111), $p=0.001$) 中大小的变化是预测 pCR 的唯一因素而不是退缩模式。 T_1 -MRI 亚分析结果与主队列一致，说明一周期肿瘤退缩模式可以更早预测 pCR。 T_2 -MRI 亚队列多因素分析显示 HR+/HER2-亚型 DD 模式 (OR: 7.716, 95%CI (1.545 - 38.527), $p=0.013$) 不独立于大小的变化预测 pCR，说明二周期后大小的变化显著影响 pCR 而不是退缩模式。

结论：乳腺癌新辅助化疗早期 HR+/HER2-肿瘤的碎片型退缩模式可作为 NAT 后 pCR 简单、独立的预测指标，且可以在更早的一周期进行预测。

PO-1449

双能 CT 图像评估乳腺癌 ER 表达水平的价值

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目的：探讨双能 CT 图像治疗前评估乳腺癌患者 ER 表达情况的价值。方法：回顾性收集病理诊断为乳腺癌的患者 114 例，根据雌激素受体 (ER) 表达情况分为阳性组 (84 例) 和阴性组 (30 例)。记录病灶常规影像特征，计算动脉期 70keV 标准化 CT 值 (NCT)、标准化碘浓度 (NIC)、标准化有效原子序数 (NZeff)、能谱曲线斜率 (K)、70keVCT 值差值 (Δ CT)、碘浓度差值 (Δ IC)，经单因素及多因素回归分析各项 CT 指标，构建联合模型，ROC 曲线分析各因素和不同模型的诊断效能及最佳截断值，构建列线图预测模型，绘制临床决策曲线 (DCA)、临床影响曲线 (CIC) 评估其临床应用价值。结果：两组患者年龄、发病部位、CEA、CA125、CA153 表达差异无统计学意义 ($P>0.05$)。ER 阳性组肿瘤最大径小于阴性组 ($P<0.05$)。阳性组脂肪型、散在纤维腺体型乳腺较阴性组多见，不均匀致密型、致密型乳腺及乳腺血运增加较阴性组少见 (均 $P<0.05$)。阳性组动脉期 NCT、NIC、NZeff、K 低于阴性组， Δ CT、 Δ IC 高于阴性组 (均 $P<0.05$)；多因素回归分析显示，腺体密度、动脉期 K 及 Δ IC 是 ER 的独立预测因子，AUC 分别为 0.669、0.711、0.668，灵敏度分别为 34.52%、76.19%、82.14%，特异度 90.00%、70.00%、50.00%。基于动脉期 K 及 Δ IC 构建定量参数模型，基于三项指标构建联合模型，两种模型 AUC 分别为 0.731、0.783，灵敏度分别为 88.10%、90.48%，特异度分别为 50.00%、63.33%，Delong 检验显示定量参数模型与腺体密度、联合模型诊断效能比较差异无统计学意义 ($P>0.05$)；联合模型诊断效能高于腺体密度、 Δ IC 单项诊断效能 ($P<0.05$)，与动脉期 K 诊断效能比较差异无统计学意义 ($P>0.05$)。基于三项独立预测因子构建列线图预测模型，校准曲线及 DCA、CIC 显示该列线图模型具有较好的诊断性能和临床应用价值。结论：腺体密度、动脉期 K 及 Δ IC 是 ER 的独立预测因子，基于三者构建的列线图模型对治疗前无创评估 ER 表达具有临床应用价值。

PO-1450

精准无对比剂增强乳房 MRI 成像技术研究

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目的：本研究旨探究非增强序列与增强序列图像间映射关系，进而建立增强序列图像合成模型，用于合成逼真增强序列图像。方法：回顾性收集 2020 年至 2022 年在西安国际医学中心医院行乳腺 MRI 检查的 98 例女性患者的临床信息及影像学资料，随机分为训练集 (80 例)、测试集 (18 例)。基于训练集中不同 MRI 平扫序列 (T1WI, T2WI) 及 DWI 序列，分别使用对抗生成网络构建乳腺 MRI 增强序列图像合成模型。并通过定量指标：峰值信噪比 (peak signal to noise ratio, PSNR)、结构相似性 (structural similarity, SSIM)、均方误差 (mean-squareerror, MSE) 及病灶增强曲线下平均面积 (AUC) 来评估合成的增强序列与真实扫描增强序列图像中病灶增强信息的一致性。结果：与原始的增强序列图像相比，仅使用单一 T1WI 序列图像合成的增强序列图像病灶增强 PSNR 为 35.701 ± 2.485 ；SSIM 为 0.984 ± 0.005 ；MSE 为 0.366 ± 0.094 ，AUC 为 0.69；T1WI 序列与 DWI 序列结合组中，合成病灶的 PSNR 为 36.465 ± 2.112 ；SSIM 为 0.984 ± 0.005 ；MSE 为 0.316 ± 0.061 ，AUC 为 0.97；T1WI 序列与 T2WI 序列结合组中，合成病灶的 PSNR 为 35.864 ± 2.213 ；SSIM 为 0.984 ± 0.004 ；MSE 为 0.347 ± 0.072 ，AUC 为 0.83；DWI 序列与 T2WI 序列结合组中，合成病灶的 PSNR 为 32.824 ± 1.987 ；SSIM 为 0.970 ± 0.006 ；MSE 为 0.497 ± 0.106 ，AUC 为 0.91；T1WI 序列联合 T2WI 序列及 DWI 序列组中，合成图像病灶的 PSNR 为 36.301 ± 2.304 ；

SSIM 为 0.984 ± 0.005 ; MSE 为 0.338 ± 0.076 , AUC 为 0.88。结论: 基于 T1WI 联合 DWI 序列图像的乳腺增强序列图像合成模型具有最优性能, 能够合成与扫描图像更加一致的增强序列图像; 这为逼真增强序列图像的合成提供有效证据支撑。

PO-1451

DCE-MRI 影像特征对乳腺癌 HER2 表达水平的鉴别诊断价值

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目的: 探讨 DCE-MRI 影像特征对乳腺癌 HER2 表达水平的鉴别诊断价值。

方法: 回顾性收集 2018 年 1 月至 2019 年 12 月在复旦大学附属肿瘤医院就诊的 238 例乳腺癌患者的临床、病理及影像资料, 根据其免疫组化评分和荧光原位杂交结果将其分为 HER2-零表达、低表达和过表达三组, 并对病变的影像特征进行分析, 包括纤维腺体类型、背景实质强化、病灶位置、瘤内水肿、瘤周水肿、单灶或多发、病灶类型、病灶大小、形状、边缘、分布、内部强化等特征。分析上述特征在不同 HER2 表达水平的乳腺癌中是否存在差异, 并进一步探讨 HER2-低表达组的影像特征与激素受体状态的联系。

结果: 存在瘤内水肿在 HER2-零表达组有 31 例 (49.2%), 在低表达组有 65 例 (69.1%), 在过表达组有 39 例 (48.1%), 其中低表达与零表达、低表达与过表达组的差异具有统计学意义 ($p=0.008, 0.003$)。在肿块型强化病灶中, 形态规则者在零表达组有 21 例 (37.5%), 在低表达组有 13 例 (16.7%), 在过表达组有 26 例 (38.2%), 其中低表达与零表达、低表达与过表达组的差异具有统计学意义 ($p=0.006, 0.003$); 边缘光整者在零表达组有 23 例 (41.1%), 在低表达组有 19 例 (24.4%), 在过表达组有 10 例 (14.7%), 其中零表达与低表达、零表达与过表达组的差异具有统计学意义 ($p=0.04, <0.001$)。在 HER2 低表达组中, 激素受体状态分层后的结果显示, 边缘光整的肿块在 ER 阴性组有 7 例 (46.7%), 在 ER 阳性组有 12 例 (19.0%), 差异具有统计学意义 ($p=0.042$)。

结论: 不同 HER2 水平乳腺癌病灶的 DCE-MRI 影像表现各异, 其中瘤周水肿、肿块形态和边缘对于乳腺癌 HER2 表达水平具有一定鉴别诊断价值。

PO-1452

数字乳腺断层摄影评价乳腺癌新辅助化疗疗效多因素分析

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目的: 探讨数字乳腺断层摄影 (DBT) 对肿块并钙化乳腺癌新辅助化疗疗效多因素分析。方法: 回顾性分析 100 例肿块伴钙化乳腺癌新辅助化疗 (NAC, Neoadjuvant Chemotherapy) 患者, 按月经情况、分子分型、腺体类型、肿块密度变化、周围腺体密度变化、钙化形态、钙化数目变化分组, 以术后病理 MP [Miller & Payen] 分级为金标准, 分析不同变量对 NAC 疗效的影响。结果: 未绝经患者 45 例, 化疗显著反应 22 例, 绝经患者 55 例, 化疗显著反应 22 例, $P=0.373$; HER2 过表达型 14 例, 显著反应 13 例, LuminalA 型 7 例, 显著反应 2 例, LuminalB 型 (HER2 阳性) 24 例, 显著反应 11 例, LuminalB 型 (HER2 阴性) 44 例, 显著反应 12 例, 基底样型 11 例, 显著反应 6 例, $P<0.05$; 不均匀致密型腺体 63 例, 显著反应 30 例, 致密型腺体 4 例, 显著反应 0 例, 散在纤维型腺体 24 例, 显著反应 10 例, 脂肪型腺体 9 例, 显著反应 4 例, $P=0.317$; 化疗后肿块密度下降 81 例, 显著反应 40 例, 肿块密度不变 5 例, 显著反应 0 例, 肿块密度下降又增加 4 例, 显著反应 0 例, $P=0.021$; 化疗后周围腺体密度下降 83 例, 显著反应 40 例, 周围腺体密度增加 1

例, 显著反应 0 例, 周围腺体密度不变 15 例, 显著反应 4 例, 周围腺体密度降低又增加 1 例, 显著反应 0 例, $P=0.262$; 粗糙不均质钙化 5 例, 显著反应 1 例占比, 不定型钙化 14 例, 显著反应 3 例, 细小多形性钙化 59 例, 显著反应 32 例, 细线样钙化 14 例, 显著反应 6 例, 点状钙化 7 例, 显著反应 1 例, 壳状 1 例, 显著反应 1 例占比, $P=0.066$; 化疗后钙化数目减少 40 例, 显著反应 27 例, 钙化增加 6 例, 显著反应 3 例, 钙化数目不变 54 例, 显著反应 14 例占比, $P<0.01$ 。结论: 分子分型、肿块密度改变、钙化数目改变可以显著影响新辅助化疗疗效, HER2 过表达型、RECIST 分级 CR、肿块密度减低、钙化数目减少者易获得 pCR。

PO-1453

基于 DWI 联合 T2WI 瘤内及瘤周影像组学特征术前 预测乳腺癌组织学分级的临床研究

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目的 探讨基于 MRI 扩散加权成像(diffusion weighted imaging, DWI)联合 T2 加权成像(T2 weighted Imaging, T2WI)瘤内及瘤周影像组学特征术前预测乳腺癌组织学分级的价值。**方法** 收集我院自 2017 年 1 月至 2020 年 12 月 700 例经病理证实为乳腺癌且有术前完整 DWI 及 T2WI-MRI 检查的患者临床及影像数据; 并按 8:2 的比例随机分为训练集 ($n=560$) 及测试集 ($n=140$)。采用 ITK-SNAP 软件手动逐层勾画 DWI 及 T2WI 图像上病灶的感兴趣区(region of interest, ROI), 并分别适形外扩 3mm; 通过 Z 分数归一化、方差阈值、K 最佳及最小绝对值收缩和选择算子 (least absolute shrinkage and selection operator, LASSO) 算法筛选最优影像组学特征; 分别构建 DWI 瘤内、DWI 瘤周 3mm、DWI 瘤内+瘤周 3mm、T2WI 瘤内、T2WI 瘤周 3mm、T2WI 瘤内+瘤周 3mm、DWI 联合 T2WI 的瘤内、DWI 联合 T2WI 的瘤周 3mm 及 DWI 联合 T2WI 的瘤内+瘤周 3mm 共 9 个模型用于预测乳腺癌的组织学分级。采用受试者工作特征 (receiver operating characteristic, ROC) 曲线评估各模型的预测效能, 并计算曲线下面积 (area under the curve, AUC)、灵敏度、特异度及准确度。**结果** 基于 DWI、T2WI 及 DWI 联合 T2WI 的瘤内或瘤周及瘤内+瘤周的影像组学模型在预测乳腺癌方面均有较好的预测效能, 且 DWI 联合 T2WI 的瘤内+瘤周影像组学特征构建的模型预测效能最佳, 其在训练集和测试集中的 AUC 值、灵敏度、特异度及准确度分别为: 0.860、80.4%、72.4%、75.0%和 0.781、68.9%、70.5%、70.0%。**结论**: 基于 DWI 联合 T2WI 的瘤内及瘤周影像组学特征构建的模型均可用于术前乳腺癌组织学分级的预测, 且联合序列的瘤内+瘤周预测模型效能最佳。

PO-1454

基于乳腺 DBT 图像深度学习模型 分类典型非典型结构扭曲的研究

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目的: 基于深度学习分类 AD 的方法, 在 DBT 中利用卷积神经网络的方法对 AD 病灶的典型非典型进行分类, 评估深度学习分类模型的临床有效性。

方法: 基于南方医院 2014 年 3 月至 2018 年 4 月在乳腺 X 线检查中检出结构扭曲的患者的 DBT 图像, 共计 1520 例。根据序号随机法抽取 404 例 AD 病例, 136 例为典型, 268 例为非典型。每个 DBT 序列中, AD 的位置由一名放射科医师根据手术病理记录的位置进行标记, 作为模型分类的金

标准。按照 7:3 的比例随机划分为训练集和验证集,研究采用了 VGG、Resnet 卷积网络结构,构建了 DBT 图像上典型与非典型 AD 病灶的分类模型,并在一个独立的测试集上进行评估。选取 VGG 网络作为基线模型,采用反应受试者工作特征曲线 (Receiver Operating Characteristic Curve, ROC) 确定分类性能。

结果: VGG-16、Resnet-34、Resnet-101 在独立测试集中验证。通过比较三种网络的分类性能,典型非典型分类实验中, Resnet-34 网络表现最好, ACC 为 0.704, AUC 为 0.615, 选定 Resnet-34 作为最终分类网络。

结论: 利用自适应感受野的方法可有效提高非典型 AD 病灶检出能力,说明全局特征可以更好地描述非典型 AD 病灶的特征。基于 Resnet-34 及 Resnet-101 网络的分类模型可作为 AD 病灶分类网络。基于 DBT 深度学习模型能较为准确分类典型及非典型结构扭曲,为后续乳腺疾病诊断提供更多指导依据。

PO-1455

基于 FF 图的瘤内瘤周影像组学预测 年轻女性乳腺癌脉管侵犯的价值研究

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目的: 探讨基于 FF 图的瘤内瘤周影像组学特征对术前预测年轻女性乳腺癌脉管侵犯的价值。

材料与方法: 回顾性分析 41 例经组织病理学证实的年轻女性乳腺癌患者。所有患者按照术后病理中的脉管侵犯 (有/无) 进行分组。所有患者均在手术前两周内在 3.0 T MR 扫描仪上进行了 MRI 检查, MR 序列包括 mDixon-Quant、DCE 序列。基于 mDixon-Quant 序列中 FF 图进行影像组学分析。使用 3Dslicer 对图像肿瘤区域进行分割,采用自膨胀算法自动对肿瘤向外扩张 5mm 形成瘤周区域,分别对瘤内、瘤周提取 851 个影像组学特征。以上特征经 ICC、t 检验/U 检验, spearman 相关性分析,最小绝对收缩和选择算子 (least absolute shrinkage selection operator, LASSO) 降维筛选后,剩余特征采用多因素 logistic 回归分别建立瘤内、瘤周模型及瘤内瘤周融合模型。上述模型采用受试者工作特征 (receiver operating characteristic, ROC) 曲线分析各模型的预测效能,并采用 DeLong 非参数检验比较曲线下面积 (area under the curve, AUC) 的差异。P<0.05 被认为差异具有统计学意义。

结果: 瘤内、瘤周模型中分别保留了 11、7 个影像组学特征。在预测脉管侵犯中,瘤内模型,瘤周模型,瘤内瘤周联合模型 AUC 值分别为 0.942, 0.843, 和 0.952。其中联合模型高于单独模型,但仅和瘤周模型相比差异具有统计学意义 (p<0.05)。详见表 1 和图 1-2。

结论: 基于 FF 图的瘤内瘤周影像组学特征对术前预测年轻乳腺癌脉管侵犯前景良好。各个模型都展现出较高的预测性能,其中,瘤内瘤周联合模型较好与单独模型。

PO-1456

乳腺浸润性导管癌磁共振影像表现与 VEGF、Her-2 表达水平的关联性分析

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【摘要】 目的 分析乳腺浸润性导管癌 (IDC) 磁共振平扫与增强扫描的基本特征,探讨其与血管内皮生长因子 (VEGF)、人表皮生长因子受体-2 (Her-2) 表达水平的关系。 方法 回顾分析 48 例经手

术病理证实为乳腺浸润性导管癌患者的乳腺磁共振平扫及动态增强扫描图像,记录病灶大小、形态、边缘、时间-信号曲线(TIC)类型分类;并检测术后切除肿瘤组织 VEGF、Her-2 表达情况,分析其与病灶磁共振表现的相关性。结果 乳腺癌 MRI 特点为边缘多呈毛刺或不规则状、边界模糊,形态多不规则或分叶状,部分病灶出现坏死,呈不均匀或环形强化;大多癌灶 T1WI 呈略低信号,抑脂 T2WI 呈不均匀性高信号,注射对比剂增强扫描后信号明显均匀或斑驳样不均匀强化或环形强化,病灶的大小及形态征象与免疫组化指标无明显相关性;VEGF 阳性表达率 80%,Her-2 阳性表达率 76.77%,VEGF 与乳腺癌 MR 边缘毛刺和早期边缘强化呈显著正相关;Her-2 与乳腺癌 MRI 病灶内部信号环形强化呈显著正相关。结论 乳腺浸润性导管癌影像表现与 VEGF、Her-2 表达具有一定相关性,MRI 评估乳腺癌治疗和预后具有一定参考价值。

PO-1457

MRI 影像组学术前预测浸润性导管癌腋窝前哨淋巴结转移的价值

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摘要:目的 探讨 MRI 影像组学术前预测浸润性导管癌腋窝前哨淋巴结转移的价值。方法 回顾性分析经手术病理证实 160 例浸润性导管癌患者(前哨淋巴结(SLN)阳性 86 例,SLN 阴性 74 例)的完整资料。采用完全随机方法将患者分为训练集(n=106)和验证集(n=54)。所有患者均行乳腺常规和动态增强扫描。所有病灶行逐层半自动 ROI 勾画,采用 AK 软件提取纹理特征,采用 LASSO 回归对训练集纹理特征降维并建立影像组学标签。分类变量采用 χ^2 检验或 Fisher 检验,连续性变量采用独立样本 t 检验或 Mann-Whitney U 检验,采用多种拟合方法建立影像组学模型,绘制 ROC 曲线评价模型的诊断效能。结果 AK 软件共提取了 3948 个影像特征,经 LASSO 回归降维得到 10 个价值较大特征,联合肿瘤最大径、ER 状态,共计 12 个参数进行建模。采用 NuSVC 拟合的影像组学模型在训练集和测试集的 AUC 值分别为 0.8707(95%CI: 0.7635-0.9636)、0.8187(95%CI:0.6335-0.9643)。结论 基于 MRI 影像组学模型术前预测浸润性导管癌腋窝前哨淋巴结转移有较高临床价值。

PO-1458

酰胺质子转移成像在不同雌激素受体状态下乳腺癌中的应用价值

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目的:本研究旨在探讨酰胺质子转移成像(amide proton transfer, APT)对乳腺癌中不同雌激素受体(estrogen receptor, ER)表达状态(ER 高表达/ER 低表达/ER 阴性)的鉴别价值。方法:回顾性搜集 2019 年 1 月至 2023 年 2 月经病理证实的乳腺癌患者 119 例,依据免疫组化结果,将其分为 ER 高表达组、ER 低表达组和 ER 阴性组。所有患者术前均行动态对比增强 MRI(dynamic contrast-enhanced MRI, DCE-MRI)和 3D-APT。在 3D-APT 和 DCE-MRI 融合图像上病灶显示最大层面手动勾画圆形感兴趣区(region of interest, ROI)进行 APT 值测量。采用单因素方差分析比较不同 ER 表达的 APT 值的差异。P 值 ≤ 0.05 代表有统计学意义。结果:119 例乳腺癌中,ER 高表达 76 例,ER 低表达 8 例,ER 阴性 35 例。ER 阴性乳腺癌的 APT 值($3.36\% \pm 1.46\%$)显著高于 ER 低表达和 ER 高表达乳腺癌的 APT 值($1.95\% \pm 0.91\%$ 、 $2.49\% \pm 1.18\%$),差异具有统计学意义($P=0.005, P=0.001$)。结论:APT 值与乳腺癌的 ER 受体表达相关,APT 成像可作为一种潜在的、无创可靠的影像方法来预测乳腺癌的不同 ER 受体状态,有助于临床治疗方案的选择。

PO-1459

断层技术在乳头溢液造影诊断中的应用价值

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摘要: 目的: 探讨数字断层乳腺 (DBT) 乳管造影在溢液性乳腺疾病诊断中的价值。方法: 回顾性分析 100 例 120 侧进行过乳腺导管造影检查的乳头溢液患者影像学资料, 将 DBT 和 DM 和造影图像分成 A、B 两组, 由 2 名资深乳腺影像医师按质控要求对病灶进行评估分析, 采取敏感度 (sensitivity, Sen) $Sen=a/(a+c)$, 特异度 (specificity, Sep) $Sep=d/(b+d)$ 公式进行统计 (a 真阳性、b 假阳性、c 假阴性、d 真阴性), 比较两者的敏感性、特异性、准确性。结果: DBT 造影的敏感性为 94.3%, DM 造影的敏感性为 82.0%, 两者特异性均为 100%。准确性分别为 94.3% 和 83.2%。两组测量值差异有统计学意义 ($P<0.005$)。结论 乳腺导管造影有助于乳头溢液的病因诊断, DBT 乳腺导管造影提高了图像质量, 很大程度解决了由于结构重叠造成遮蔽所带来的不足, 在鉴别导管内良恶性病变的敏感性和准确性, 明显高于 DM 造影, 提高了病理性乳头溢液患者可靠诊断的可能性。结合乳腺超声、磁共振等检查, 在溢液性导管内良恶性病变的鉴别诊断中具有重要价值。

PO-1460

影响乳腺导管造影质量及成功率的因素

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摘要: 目的 探讨乳腺导管造影成像实践中的操作方法、注射剂量及摄片压力等因素对造影质量的影响。方法 将 100 例 120 侧乳腺导管造影, 根据实践中的几种不同因素分成实验 (A) 组 80 侧和对照 (B) 组 40 侧。A 组在在方法学上进行改进完善, 术前加强和患者沟通, 在术中控制进针深度、对比剂总量及注射压力、注射速度、对比剂类型、注射结束到摄片的时限, 以及乳腺摄影技师的 QC 职责等; B 组采用常规造影方法。结果 A 组 80 侧中, 一次性造影成功 75 侧, 2 侧第 2 次插管造影成功, 3 侧造影失败。一次性造影成功率 93.75% (75/80), 导管各级分支均显示良好, 图像清晰。A 组造影图片质量优良率: 优+良: 81.25% (65/80), 一般: 12.5% (10/80), 失败: 6.5% (65/80)。B 组 40 侧中一次性造影成功 30 侧, 7 侧第 2 次插管造影成功, 3 侧造影失败。一次性造影成功率 75% (30/40), 导管树的充盈程度、图像清晰度, 均较 A 组显影淡薄, 充盈不充分, 导管树显影不完全或对比剂进入腺泡等。B 组造影图片质量优良率: 优+良: 55% (22/40), 一般: 37.5% (15/40), 失败: 7.5% (3/40); 2 组乳腺导管造影质量及显示效果比较 (见表 1), 差异有统计学意义 ($P<0.05$)。120 侧造影评估结果: 21 侧导管正常, 8 侧导管炎症, 12 侧乳腺囊性增生, 23 侧单纯乳腺导管扩张症, 1 侧乳腺结核, 46 侧导管内乳头状瘤, 9 例乳腺导管内癌。本组检查对导管内占位性病变的敏感性为 A 组 94.6%, B 组 87.3%, 特异性均为 100%。结论 乳腺导管造影有助于乳头溢液的病因诊断, DBT 乳腺造影解决了图像结构重叠造成的遮蔽效应, 提高了诊断敏感性。结合乳腺超声、磁共振等检查, 在溢液性导管内良恶性病变的鉴别诊断中具有重要价值。

PO-1461

乳腺精简序列 MR 检查对致密型乳腺癌 筛查降本增效的临床价值研究

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背景：由于乳腺 X 线摄影投照速度快且对微小钙化较敏感，价格实惠，目前仍是女性乳腺癌的首选筛查方法。我国女性乳腺偏致密，由于乳腺 X 线摄影是对组织的重叠成像，致密性的乳腺容易漏掉隐藏的病灶，故 X 线摄影对致密型乳腺癌的诊断效能较低，易漏诊。本研究旨在乳腺 X 线摄影结合精简序列 MR 对乳腺癌的筛查，起到更高的诊断效能，降低回召率和术前活检率。传统乳腺 MR 检查技术多参数成像，分辨高，具有较高的特异性和敏感性，可以检测出许多 X 线及超声未检查到的病灶，但检查时间长，价格昂贵，耐受性差，结合以上传统 MR 的不足，我们提出了乳腺精简序列 MR 检查技术，弥补了 X 线对致密型乳腺癌筛查的不足，也解决了传统 MR 检查的不足。

材料方法：回顾性分析经乳腺 X 线报告 BI-RADS 分级 4 类筛查致密性乳腺 150 例，分别行传统乳腺 MR 检查和精简序列 MR 检查，由三名高年资医师阅片，记录两种筛查方式的结果，通过统计分析以确定乳腺精简序列 MR 检查方案与传统 MR 检查方案的诊断效能。

结果：150 例患者分别行传统 MR 检查和精简序列检查，共发现病灶 172 个，59%为恶性病灶，41%为良性病灶，传统 MR 检查和精简序列检查的特异性为 94.5%、93%，敏感性为 98%、99%。

结论：乳腺精简序列 MR 检查方案与传统 MR 检查技术有相仿的特异性与敏感性，不久的将来可作为有效的乳腺癌筛查手段。

PO-1462

基于压缩感知序列的超早期快速扫描序列 在乳腺良恶性疾病诊断中的价值探讨

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目的：探讨基于压缩感知序列的超早期快速扫描序列在乳腺良恶性病变诊断中的价值

材料与方法：

收集我院 2020 年 12 月 23 日-2023 年 5 月 18 日在 3.0TMR（西门子 skyra，GE Architect）行乳腺 MR 检查并采用压缩感知序列完成超早期快速扫描序列者共 210 例，排除不符合入组条件病例，最终共纳入乳腺恶性病变（导管原位癌、导管浸润癌）89 例（均为女性，年龄 46.3820 ± 10.3950 ），乳腺良性病变（纤维腺瘤、腺病等）22 例（均为女性，年龄 43.7727 ± 11.6166 ）。

所有患者均采用乳腺线圈俯卧位扫描，采集序列及顺序分别为平扫 T1-SE、T2 压脂像、DWI/ADC，T1 压脂像，高压注射器 2.0ml/s 推注钆类细胞外造影剂，打药同时启动压缩感知序列（6.8s/期，共 20 期）。

两名乳腺 MR 诊断医生在后处理工作站独立双盲阅片评估：1、MIP 像：评估病灶显示能力，1 分无法显示、2 分模糊显示、3 分显示清晰；2、选取病灶强化最明显的区域绘制压缩感知序列病灶的时间信号曲线并记录信号值，计算 a、病灶增强时间 (time-to-enhancement, TTE)，以较上一期信号值增强 1.5 倍作为强化标准；b、最大斜率 (Maximum slope, MS) 两个连续相位之间信号增强的最大百分比变化；c、冲入斜率 (wash-in slope, WIS)：为增强峰值 (S_{lmax}) 除以达到峰值强度的时间；4、评价时间信号曲线类型：a、低强化、缓升型，b、低强化，有肩型，c、高强化，无肩型；d、高强化、有肩型。

结果：

1.在 MIP 像病灶显示能力评估中,压缩感知序列对恶性病灶的显示能力在重度背景实质强化的患者中明显优于传统动态增强序列;在轻中度背景实质强化的患者中两者显示能力相当。2.TTE、MS、WIS 三种参数在乳腺良、恶性病变中均存在显著性差异 ($P<0.001$) 3.四种时间信号曲线中高强化且有肩型与恶性病变高度相关。

结论:

基于压缩感知序列的超早期快速扫描序列在乳腺良恶性疾病术前诊断中有着很好的诊断能效,并在重度背景实质强化时仍然可以清楚显示病灶,对减少召回率及 MR 筛查的推广有一定的帮助。

PO-1463

动态增强 MRI 纹理分析对乳腺癌分子分型及腋窝淋巴结状态的诊断价值

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目的:利用乳腺动态增强磁共振(MRI)图像进行纹理分析,研究纹理特征鉴别乳腺癌患者分子分型及腋窝淋巴结状态的可行性及价值,探讨基于 MRI 纹理特征结合机器学习算法建立的预测模型的诊断效能。

方法:回顾性收集宜昌市第一人民医院符合纳排标准的乳腺癌患者 75 例。所有患者均在术前接受 MRI 检查,病理免疫组化结果分为管腔 A 型、管腔 B 型、HER-2 过表达型及三阴性乳腺癌(TNBC)四种分子亚型,根据腋窝淋巴结状态分为淋巴结转移与无转移组。采用卡方检验、方差分析分析患者一般资料。采用独立样本 t 检验或 Mann-Whitney U 检验识别最优纹理参数,采用受试者工作曲线(ROC)曲线下面积(AUC)评价纹理分析的诊断效能。基于 MRI 纹理特征构建逻辑回归分类模型,绘制 ROC 曲线并评价模型对不同分子亚型及淋巴结状态的诊断效能。

结果:(1)在 75 例乳腺癌患者中,管腔 A 型 11 例、管腔 B 型 36 例、HER-2 过表达型 14 例及 TNBC 14 例,有淋巴结转移者 24 例,无淋巴结转移者 51 例。不同分子分型患者间 MRI 强化情况、病理学分型、淋巴结状态、年龄、绝经状态差异均无统计学意义($P>0.05$) (2)基于不同分子分型 2 组间的比较:管腔 A 型与非管腔 A 型组间 3 个纹理参数有统计学意义。(3)基于淋巴结状态两组间比较:淋巴结转移与无淋巴结转移组间有 3 个纹理特征有统计学意义。(4)通过特征筛选降维构建了基于逻辑回归的二分类模型,鉴别不同分子亚型及淋巴结是否转移最佳模型的 AUC 分别为 0.92、0.83、0.83、0.72 和 0.91,其中鉴别管腔 A 型与非管腔 A 型、淋巴结转移与无淋巴结转移组的预测模型的诊断效能较好,AUC 值均在 0.9 以上。

结论:(1)动态增强 MRI 纹理分析可术前有效预测乳腺癌分子分型及腋窝淋巴结状态,特别是对鉴别诊断 HER-2 过表达型乳腺癌很有帮助,3D_glszm_SALGLE 可成为最佳纹理指标。(2)基于动态增强 MRI 特征参数构建的逻辑回归分类模型在鉴别乳腺癌分子分型、淋巴结状态方面有较好的表现,可应用于临床对乳腺癌分子分型及腋窝淋巴结状态进行无创预测,为临床医生术前决策提供一定的理论参考依据。

PO-1464

乳腺导管造影 GICS 及 GGS 分级系统的临床应用价值

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目的 探讨全数字化乳腺 X 线摄影引导下的乳腺导管造影技术对乳头溢液性疾病的诊断效能。**材料与方法** 回顾性研究 203 例 2013 年 1 月至 2021 年 9 月期间本院就诊具有乳头溢液表现的患者, 分析其临床资料、乳腺导管造影图像表现及病理结果。本研究利用了 GICS 分级和 GGS 分级对 FFDM 乳腺导管造影图像进行分级评估。采用 ROC 曲线分析方法, 将 AUC 值、敏感性、特异性、假阳性率、假阴性率指标用来比较放射科医师与两种分级系统评估乳头溢液患者良恶性病变的诊断效能。**结果** 203 例患者平均年龄 48.54 ± 12.09 岁 (26 岁~80 岁), 病理结果显示良性病变 129 例, 恶性病变 74 例。放射科医师基于 FFDM 乳腺导管造影图像进行良恶性鉴别诊断的曲线下面积 AUC 为 0.829, 敏感度为 0.797, 特异性为 0.860, 假阴性率为 0.203, 假阳性率 0.140。GICS 分级和 GGS 分级系统进行良恶性诊断的曲线下面积 AUC 分别为 0.753 和 0.785。**结论** FFDM 乳腺导管造影在鉴别乳头溢液良恶性病变中有较好的鉴别诊断效能, 对乳头溢液疾病有一定的诊断价值。GICS 分级和 GGS 两种分级方法可应用于乳头溢液患者的临床诊疗过程中。

PO-1465

多参数 MRI 预测乳腺癌驱动蛋白 Kif2a 表达水平的研究

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探讨乳腺多参数 MRI 预测驱动蛋白 Kif2a 在乳腺癌中的表达及意义。**方法:** 回顾性分析 2017 年 1 月-2021 年 12 月经手术病理证实、且在术前行乳腺 MR 的 55 例患者, 采用免疫组化方法检测乳腺癌组织中 Kif2a 的表达, 记录多模态 MR 相关参数: 病灶 ADC 值、T2 相对信号强度、T2 病灶周围水肿、早期强化率 (ΔSI)、强化峰值 (PV)、达峰时间 (s)、病灶周围血管数量及管径、同侧腋窝淋巴结皮质最大厚度; 临床病理资料包括患者的年龄、绝经状态、腋窝淋巴结转移状况。采用单因素分析评估患者临床、多参数 MRI 特征与乳腺癌 Kif2a 表达的关系。对乳腺癌同侧腋窝淋巴结皮质最大厚度绘制 ROC 曲线、计算曲线下面积(AUC)及各参数的敏感性、特异性。多因素 logistics 回归方程分析的输入变量为临床特征和多参数 MR 特征, 以确定 kif2a 表达的预测因子。**结果:** 55 例乳腺癌中 kif2a 高表达 38 例, 低表达 17 例, kif2a 高表达组有 52.6% (20/38) 有腋窝淋巴结转移, 低表达组 11.7% (2/17) 有腋窝淋巴结转移。kif2a 表达与 DCE-MR 强化峰值、弥散序列 ADC 值、同侧腋窝淋巴结厚度差异有统计学意义 ($P=0.013$ 、 0.007 、 $0.047 < 0.05$)。通过 ROC 曲线分析腋窝淋巴结皮质最大厚度最佳临界值为 5.5mm, 乳腺癌 kif2a 高表达 ROC 曲线下面积 (AUC) 0.714, 其诊断敏感性为 60.5%, 特异性为 82.4%。logistic 二元回归显示多参数 MR 中 ADC 值、同侧腋窝淋巴结皮质最大厚度影响 kif2a 表达 ($OR=0.995$ (0.991-1.0), 4.139(1.061-16.14), $P<0.05$)。**结论:** 驱动蛋白 kif2a 与乳腺癌腋窝淋巴结转移密切相关, 多参数 MRI 中 ADC 值与同侧腋窝淋巴结最大厚度可作为独立预测因子, 无创检测驱动蛋白 kif2a 的表达, 为乳腺癌患者手术方案的选择以及未来新型靶向药物的疗效监测提供依据

PO-1466

基于 FFDM 的影像组学模型鉴别 BI-RADS 4 类病变良恶性的临床价值研究

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目的：通过基于瘤内、瘤周和对侧乳腺实质的全视野数字化乳腺 X 线摄影（FFDM）的影像组学对 BI-RADS 4 类乳腺病灶良恶性进行鉴别，以期为放射科医师提供一个有效的辅助意见，从而最大限度减少患者不必要的活检，帮助提升乳腺癌的早期检出率，改善患者的预后。**方法：**回顾性分析了从 2020 年 11 月至 2021 年 8 月在我院行全视野数字化乳腺 X 线摄影（FFDM）检查的 BI-RADS 4 类患者，按纳排标准纳入 117 例患者。将患者按病理标准分为良性病变和恶性病变两组，使用相关软件对图像进行 ROI 标注和影像组学特征的提取与降维，分析筛选出的特征，并构建出单区域影像组学模型及多区域影像组学模型，再联合患者的影像学特征及常见的临床资料构建临床模型和临床-影像组学联合模型，最后评估不同模型对 BI-RADS 4 类病灶的诊断效用、不同模型之间是否有差异。**结果：**一共 51 例良性病例，66 例恶性病例，在 3 个不同区域分别构建了单区域影像组学模型，除了对侧实质模型，其他均可以有效鉴别 BI-RADS 4 类病灶的性质，其中联合模型都优于单区域影像组学模型和临床模型，并且优于放射科医生。瘤内模型、瘤周模型、对侧实质模型、临床模型和临床-影像组学联合模型在测试集的 AUC 分别为 0.80、0.74、0.52、0.79、0.87。**结论：**基于 FFDM 的瘤内、瘤周影像组学模型可以鉴别乳腺 BI-RADS 4 类病变的性质，由其构成的联合模型可以进一步提高对 BI-RADS 4 类病变的诊断效能，但对侧实质纹理模型无法鉴别乳腺病变的良恶性。

PO-1467

基于 DBT 的影像组学对乳腺癌分子分型的鉴别价值

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目的：基于数字乳腺断层摄影技术，探讨乳腺癌影像特征与分子分型之间的关系。**方法：**回顾性分析 200 例乳腺癌术前 DBT 检查资料和术后病理、免疫组织化学资料。所有患者均经手术和病理证实为原发性乳腺癌，患者术后根据雌激素受体（ER）、孕酮受体（PR）、人类表皮生长因子受体 2（HER-2）表达水平将乳腺癌分为 luminal A 型（ER 阳性和（或）PR 阳性、HER-2 阴性），luminal B 型（ER 阳性和（或）PR 阳性、HER-2 阳性），HER-2 过表达型（ER 阴性、PR 阴性、HER-2 阳性），三阴性乳腺癌（ER 阴性、PR 阴性、HER-2 阴性）。用 Pearson χ^2 检验或 Fisher 确切概率法探讨乳腺癌影像特征（单纯肿块、单纯钙化、肿块伴钙化）与分子分型的关系。**结论：**乳腺癌不同分子分型在 DBT 上的图像各有特征，可以通过乳腺癌 DBT 图像特征去推测乳腺癌的分子类型，在未进行手术及活检之前指导临床工作，做好个性化诊疗方案。

PO-1468

多参数 MR 与转录因子 E2F2 在 乳腺癌生物侵袭性行为预测中的应用

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目的 探讨转录因子 E2F2 在乳腺癌组织中的表达情况, 研究其与乳腺癌患者的 MR 特征、临床及病理特征的相关性, 评估多参数 MR 与 E2F2 对乳腺癌生物侵袭性行为的预测作用, 为患者预后评估提供依据。

方法 回顾性分析南通大学第二附属医院 2014 年 10 月至 2020 年 12 月期间行乳腺磁共振检查且病理诊断为恶性乳腺肿瘤的患者 179 例。通过纳排标准最终纳入 92 例患者、对乳腺癌标本蜡片进行 E2F2 抗体染色进行分类。收集患者的临床基线资料、MR 特征及病理特征。采用独立样本 t 检验、Mann-Whitney U 检验或卡方检验比较两组间的特征差异, 并在此基础上选择 $P \leq 0.1$ 的特征进行多因素 Logistic 回归分析确定 E2F2 高表达的独立预测因素。使用划痕实验来验证 MCF-7 乳腺癌细胞的生物侵袭性行为。对照组: 含有 1 μL 二甲基亚砜溶液的完全培养基; 实验组: 含有 1 $\mu\text{M/L}$ 三苯甲烷三异氰酸酯抑制剂、2 $\mu\text{M/L}$ JQ-1 抑制剂、1 $\mu\text{M/L}$ BET 溴区抑制剂、2 $\mu\text{M/L}$ I-BET 抑制剂的完全培养基。Gradpad prism 9.3 进行统计分析、作图。实验数据用均数 \pm 标准差表示, 多组间比较采用单因素方差分析, $P < 0.05$ 表示差异具有统计学意义。

结果 92 例乳腺癌患者中 E2F2 高表达组比低表达组在有无瘤周水肿、TIC 类型、ER 表达、HER-2 表达、有无脉管内癌栓及分子分型差异有统计学意义。从比较结果中选取 $P \leq 0.1$ 的特征参数进行多因素 Logistic 回归分析, 结果显示瘤周水肿是 E2F2 高表达的独立预测因素 ($OR=7.061$, $P=0.004$)。BET 抑制剂干预的乳腺癌 MCF-7 细胞的划痕愈合百分比明显减低 ($P < 0.05$); 不同浓度的 JQ-1、I-BET 抑制剂干预的 MCF-7 细胞的划痕愈合百分比在组间有明显差异 ($P < 0.05$), 且随着浓度的增加细胞愈合能力减弱。

结论 转录因子 E2F2 高表达在乳腺癌中的占比率高, 瘤周水肿是转录因子 E2F2 高表达的独立预测因素, 并且与乳腺癌的侵袭性显著相关, 为乳腺癌的诊断、治疗及预后评估提供新的思路。

PO-1469

初探 mDIXON-QUANT 联合 DWI 在平台型乳腺导管原位癌与乳腺良性病变的价值

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目的 利用 mDixon-Quant 技术探讨脂肪分数(fat fraction, FF)联合 DWI 衍生的 ADC 图像在鉴别平台型乳腺导管原位癌与乳腺良性病变中的诊断价值。

方法 回顾性分析 2022 年 3 月至 2023 年 6 月经病理证实乳腺病变患者, 术前均行 mDixon-Quant 扫描及扩散加权成像 DWI、动态对比增强 MRI (DCE-MRI) 检查。对照 DWI 图像在表观扩散系数 (apparent diffusion coefficient, ADC) 图像上测量平均 ADC 值 (ADCmean), 观察病灶形态及血流动力学信息。采用独立样本 t 检验分析两组间 FF 值和 ADC 值, 通过 ROC 曲线评价 DWI 联合 mDIXON-QUANT 对平台型导管原位癌与乳腺良性病变的鉴别能力。

结果 最终纳入 28 例乳腺病变患者, 其中良性 16 例 (乳腺纤维腺瘤 7 例, 乳腺导管内乳头状瘤 3 例, 纤维腺瘤伴腺病 4 例, 肉芽肿性乳腺炎 2 例), 导管原位癌 12 例, 平均年龄 45.21 ± 10.80 , 范围 24~68 岁。FF 值在平台型乳腺良性病变、导管原位癌两组间差异具有显著统计学意义

($P=0.045$)；与良性组相比，DCIS 组的 FF 值较小($15.76\%\pm 7.51\%$ vs. $10.21\%\pm 5.99\%$)。DCIS 组平均 ADC 值为[$(1.02\pm 0.35)\times 10^{-3}\text{mm}^2/\text{s}$]低于良性组[$(1.28\pm 0.29)\times 10^{-3}\text{mm}^2/\text{s}$]，差异具有统计学意义($P<0.05$)。ROC 曲线显示 FF 值及 ADC 值独立鉴别诊断的 AUC 值分别为 0.711、0.719，两者联合诊断效能进一步提高(AUC 为 0.771，敏感度 0.583，特异度 0.875)。

结论 基于 mDixon-Quant 衍生的 FF 值可用于术前无创性鉴别平台型乳腺良性病变和导管原位癌，ADC 联合 FF 值有助于提高平台型导管原位癌和乳腺良性病变的鉴别诊断效能。

PO-1470

数字乳腺断层摄影引导下活检技术的临床应用初探

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目的：数字乳腺断层摄影（DBT）在乳腺癌筛查和诊断中应用越来越广泛，使得 DBT 引导活检的发展成为必要。本研究旨在探讨 DBT 引导下活检技术在临床中的应用价值。

方法：回顾性收集我院 DBT 检查（设备为 GE Pristina Serena）显示可疑恶性病变（诊断 BI-RADS 4A 类及以上）患者 42 例，均行 DBT 引导下导丝定位或穿刺活检术，获得组织病理学结果。操作流程：

①选择合适穿刺体位，对目标区域进行断层摄影；②在清楚显示病变层面精确标记目标靶点；

③自动导航定位；④再次断层摄影观察穿刺针或导丝头端位置，引导活检。

结果：42 例患者中，2 例 DBT 表现为肿块，2 例表现为结构扭曲，1 例表现为不对称致密影，37 例表现为微钙化。其中 9 例行 DBT 引导下穿刺活检（恶性 3 例，良性 6 例）；33 例行 DBT 引导下导丝定位，均定位准确（恶性 5 例，良性 28 例）。操作时间平均为 18 分钟。

结论：DBT 引导下活检精准、定位时间短，可用于微钙化等多种表现的病变，具有广阔的应用前景。

PO-1471

基于多参数 MR 列线图在 HR 阳性乳腺癌术后 复发风险评估中的预测价值

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目的

评估乳腺癌术后复发风险预测工具临床治疗评分 CTS5 在激素受体（HR）阳性乳腺癌患者中的预测效能，并探讨基于多参数 MR 列线图在 CTS5 复发风险分层的价值。

方法

纳入南通大学第二附属医院 2015 年 1 月~2023 年 5 月行乳腺 MR 且经病理证实的 HR 阳性乳腺癌患者，排除 MR 检查前行穿刺活检、定位或手术切除等侵入性操作、确诊时已发生转移、合并其他恶性肿瘤、既往乳腺癌病史患者。回顾性收集患者临床病理资料、乳腺 MR 特征，参照 CTS5 将患者分为高复发风险组与中低复发风险组。随访 2015 年 1 月~2019 年 12 月入组患者真实生存事件，比较 CTS5 风险分层与真实生存事件一致性。2020 年 1 月~2023 年 2 月入组患者为列线图构建训练集，2023 年 3~5 月患者为验证集，logistic 回归分析确定与 CTS5 高复发风险相关的独立预测因子，并构建列线图，受试者工作特征曲线下面积（AUC）、Hosmer-Lemeshow（H-L 检验）评估模型性能。

结果

2015 年 1 月~2019 年 12 月获得 106 例随访数据, CTS5 中低复发风险组 77 例, 其中 4 例出现真实复发事件; 高复发风险组 29 例, 22 例发生复发; CTS5 复发风险分层与真实生存事件具有较强一致性 ($Kappa: 0.730; p < 0.001$)。纳入 218 例训练集患者与 33 例验证集患者, 临床病理资料脉管内癌栓、HER2、血小板计数、淋巴细胞/单核细胞比值与 MR 特征病灶形态、纤维腺体类型、瘤周水肿、强化方式、子灶、引流血管增粗、皮肤受侵、ADC 差值在 CTS 高复发风险和中低复发风险组间差异具有统计学意义; 多因素 logistic 回归分析淋巴细胞/单核细胞比值、脉管内癌栓、引流血管增粗及皮肤受侵与 CTS5 高复发风险独立相关, 基于上述特征构建列线图在训练集与验证集中 AUC 分别为 0.812、0.750, H-L 拟合度检验 p 值分别为 0.747、0.399。

结论

CTS5 有效区分 HR 阳性乳腺癌患者的术后高复发风险与中低复发风险, 基于淋巴细胞/单核细胞比值、脉管内癌栓与 MR 特征的列线图在预测 CTS5 高复发风险具有良好的区分和校准能力, 可进一步有效评估 HR 阳性乳腺癌患者的术后复发风险。

PO-1472

乳腺癌异质性联合 MRI 图像视觉特征在预测 cN0 乳腺癌腋窝淋巴结转移中的应用研究

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目的 探讨基于乳腺癌异质性信息联合 MR 图像视觉特征在预测 cN0 期乳腺癌腋窝淋巴结转移中的应用价值。方法 根据纳入及排除标准, 回顾性分析 2016 年 1 月至 2020 年 6 月在吉林省肿瘤医院接受手术治疗的 284 例女性乳腺癌患者的临床、病理及影像资料。患者术前均接受乳腺增强 MRI 检查。采用异质性分析软件 MITK 以体素为单位分别提取得到病灶区域内对比剂注射前期、对比增强最显著期和延迟期三个不同期相的各体素信号强度, 根据各体素信号强度变化趋势的不同, 计算得到病灶中渐增型、平台型和流出型三种成分的百分比, 进而量化病灶的异质性信息。按 7:3 的比例将患者随机分为训练组($n=199$)和验证组($n=85$)。采用 6 种机器学习模型对 2 组数据进行处理, 采用受试者操作特征(ROC)曲线分析各机器学习模型对乳腺癌腋窝淋巴结转移的诊断效能, 根据验证组 AUC 大小, 选择最佳模型, 并用决策曲线分析(DCA)评价最佳模型的临床获益。结果 共有腋窝淋巴结阳性患者 66 例, 腋窝淋巴结阴性患者 218 例。每个病灶经过分析得到 4 个异质性参数, 分别为渐增型所占体积百分比、平台型所占体积百分比、流出型所占体积百分比和异质性量化值。将 4 个异质性信息与 2 个临床指标(年龄和绝经状态)和 4 个影像学指标(病灶位置、有无钙化、病灶数量、病灶长径)一起, 共 10 个参数, 构建预测模型。6 种机器学习模型中, Logistic 回归模型在验证组中诊断乳腺癌腋窝淋巴结转移的 AUC 最高(0.703), 准确率 66.3%、特异度 60.0%、敏感度 68.2%, 在训练组的 AUC 为 0.685、准确率 69.2%、特异度 56.5%、敏感度 73.0%, 为最佳机器学习模型。基于 Logistic 回归模型的决策曲线分析结果显示, 训练组中阈值为 0.6~1.0, 验证组中阈值为 0.7~1.0, 有临床获益。结论 基于乳腺癌异质性信息联合 MR 图像视觉特征建立的预测模型能够鉴别 cN0 期乳腺癌腋窝淋巴结转移, 其中以 Logistic 回归模型的诊断效能更优。

PO-1473

DCE-MRI 不同增强时相的组学特征在 乳腺癌新辅助治疗后残余癌识别中的应用价值

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目的：探讨乳腺癌新辅助治疗后 DCE-MRI 不同增强时相的组学特征在残余癌识别中的应用价值。

方法：回顾性分析 2018 年 1 月至 12 月我院就诊完成新辅助治疗及手术的乳腺癌患者的 306 个病灶，随机分为训练组（214 个）和验证组（92 个）。根据术后病理结果将所有病例分为残余癌与无残余癌组，其中残余癌选取了 2 种不同的定义。分别提取增强前（PH0）、增强早期（PH2）及增强晚期（PH5）MRI 的组学特征及计算特征变化（ Δ PH20、 Δ PH50、 Δ PH52）。采用单因素方差分析、最小绝对收缩和选择算子算法（LASSO）进行特征筛选，逻辑回归建立模型，ROC 曲线和德龙检验分别评价和比较模型的诊断效能。

结果：不同定义的残余癌占比（即仅浸润癌残余和浸润癌和/或导管原位癌残余）分别为 65%（199/306）和 75.5%（231/306）。在验证组中，各增强时相组学模型诊断残余癌的 AUC 范围分别为 0.644~0.798 和 0.658~0.803。当残余癌被定义为仅浸润癌残余时，不同增强时相的组学模型诊断表现无差异；当残余癌被定义为浸润癌和/或导管原位癌残余时，对比基于 Δ PH50 的组学模型，基于 Δ PH20 的组学模型诊断表现更好（AUC 分别为 0.644 和 0.798， $p=0.027$ ）。

结论：DCE-MRI 不同增强时相的组学特征均可用于乳腺癌新辅助治疗后残余癌的识别，增强晚期时相的组学特征诊断表现并没有优于增强早期，因此影像组学工具的应用或许可以优化疗效评估中 DCE-MRI 的成像方案。

PO-1474

Development and application of hepatocellular carcinoma risk prediction model based on clinical characteristics and liver related indexes

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Background and aims: Hepatocellular carcinoma (HCC) is difficult to diagnose and has a low survival rate. The survival of patients with HCC is closely related to the stage of diagnosis. Using logistic regression model, this study aimed to identify risk factors associated with HCC and establish a risk prediction model based on clinical characteristics and liver-related indicators to predict the presence of HCC.

Methods: The clinical data of patients in Affiliate Hospital of North Sichuan Medical College from 2016 to 2020 were collected. Based on the time of admission, the cases were divided into training cohort ($n = 1739$) and validation cohort ($n = 467$). Using HCC as a dependent variable, the research indicators were incorporated into logistic univariate and multivariate analysis. An HCC risk prediction model, which was called NSMC-HCC model, was then established in training cohort and verified in validation cohort.

Results: The area under receiver operating characteristic curve (AUC) of NSMC-HCC model in HCC diagnosis was 0.960, with sensitivity 94.40% and specificity 95.35% in training cohort, and AUC was 0.966, with sensitivity 90.00% and specificity 94.20% in validation cohort. In early-stage HCC diagnosis, the AUC of NSMC-HCC model was 0.946, with sensitivity 85.93% and specificity 93.62% in training cohort, and AUC was 0.947, with sensitivity 89.10% and specificity 98.49% in validation cohort.

Conclusions: NSMC-HCC model was an effective risk prediction model in HCC and early-stage HCC diagnosis.

PO-1475

Preoperative assessment of peripheral vascular invasion of pancreatic ductal adenocarcinoma based on high-resolution MRI

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Objectives: Preoperative imaging of vascular invasion is important for surgical resection of pancreatic ductal adenocarcinoma (PDAC). However, whether MRI and CT share the same evaluation criteria remains unclear. This study aimed to compare the diagnostic accuracy of high-resolution MRI (HR-MRI) and conventional MRI (non-HR-MRI) and CT for PDAC vascular invasion. **Methods:** Pathologically proven PDAC with preoperative HR-MRI (79 cases, 58 with CT) and non-HR-MRI (77 cases, 59 with CT) were retrospectively collected. Vascular invasion was confirmed surgically or pathologically. The degree of tumour-vascular contact, vessel narrowing and contour irregularity were reviewed respectively. Diagnostic criteria 1 (C1) was the presence of all three characteristics, and criteria 2 (C2) was the presence of any one of them. The diagnostic efficacies of different examination methods and criteria were evaluated and compared.

Results: HR-MRI showed satisfactory performance in assessing vascular invasion (AUC: 0.87–0.92), especially better sensitivity (0.79–0.86 vs 0.40–0.79) than that with non-HR-MRI and CT. HR-MRI was superior to non-HR-MRI. C2 was superior to C1 on CT evaluation (0.85 vs 0.79, $P=0.03$). C1 was superior to C2 in the venous assessment using HR-MRI (0.90 vs 0.87, $P=0.04$) and in the arterial assessment using non-HR-MRI (0.69 vs 0.68, $P=0.04$). The combination of C1-assessed HR-MRI and C2-assessed CT was significantly better than that of CT alone (0.96 vs 0.86, $P=0.04$).

Conclusions: HR-MRI more accurately assessed PDAC vascular invasion than conventional MRI and may contribute to operative decision-making. C1 was more applicable to MRI scans, and C2 to CT scans. The combination of C1-assessed HR-MRI and C2-assessed CT outperformed CT alone and showed the best efficacy in preoperative examination of PDAC.

PO-1476

Prediction of intra-tumoural tertiary lymphoid structures and survival of intrahepatic cholangiocarcinoma using MRI-based radiomics

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Objective To predict the tertiary lymphoid structures (TLSs) status and recurrence-free survival (RFS) of patients with intrahepatic cholangiocarcinoma (ICC) using preoperative magnetic resonance imaging (MRI) texture analysis.

Methods A total of 192 ICC patients were divided into training ($T = 105$), internal validation ($V1 = 46$), and external validation groups ($V2 = 41$). Three MRI sequences were performed with texture analysis. Radiomics score was calculated to predict the TLSs status and stratify ICC into high- and low-risk groups. Logistic regression was applied to select the significant clinico-radiological features

related to TLS status. The performance was compared with receiver operating characteristic curve (ROC).

Results The AUCs of arterial phase diffuse hyperenhancement were 0.59 (95% CIs, 0.50–0.67), 0.52 (95% CIs, 0.43–0.61), and 0.66 (95% CIs, 0.52–0.80) in the T, V1, and V2 cohorts. Eleven features were combined to establish the Rad-score with an AUC of 0.85 (95% CIs, 0.77–0.92), 0.81 (95% CIs, 0.67–0.94), and 0.84 (95% CIs, 0.71–0.96) in the T, V1, and V2 cohorts, respectively. The median RFS of the low-risk group with a Rad-score cut-off less than -0.21 was 38.7 months (95% CIs, 5.4–71.9 months), which was better than that of the high-risk group (median RFS: 14.1 months; 95% CIs, 7.0–21.2 months) ($p = 0.048$). This was also confirmed in cohort V1 and cohort V2.

Conclusion The MRI radiomics signature could serve as a better preoperatively predictive biomarker of the intra-tumoural TLSs status and survival of ICC patients than MRI imaging features.

PO-1477

The clinical and radiological features of pediatric adrenal cortical carcinoma: compared with benign/uncertain malignant potential counterparts.

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Purpose Pediatric adrenal cortical carcinoma (ACC) is rare. This research aims to analyze the clinical and radiological features of ten cases with ACC and compare these features with the benign/uncertain malignant potential ones.

Materials and Methods Twenty cases (twenty-one masses) of adrenal cortical tumors in our institution, from October 2011 to October 2016, were collected and analyzed. Ten cases (eleven masses) were pathologically proven ACC, four uncertain malignant potential cortical tumors, and six adenomas (two suspected) were included. Sixteen cases were performed CT scans, ten MR scans (seven with DWI), and seven cases underwent both CT and MR scans. These masses were divided into the malignant and benign/uncertain malignant potential groups. The clinical and radiological findings of carcinoma and its counterpart were compared. The independent samples T-test and Fisher exact test (SPSS Version 17.0) were used for statistical analysis.

Results Eleven complained of precocious puberty, ten with an elevated level of hormones (mainly androgen); the sex ratio is 3:2. In the malignant group, the age ranged from 18 months to 12 years old, with the median age being 3 years old; 90% of patients were less than five years old. Sixty percent suffered from precocious puberty, 30% manifested abdominal mass; 80% manifested the elevation of hormone level. While in the counterpart group, the median age was 5 years old (7 months to 13 years old), the rate of precocious puberty was 50%, and only two the elevated hormone levels. The maximal diameter of the malignant (7.35 ± 3.08 cm) was larger than the counterpart group (3.87 ± 2.11 cm). All the masses showed a gradually enhanced pattern. The unenhanced CT values, calcification rate, and hemorrhage/necrosis rate of the malignant group are significantly higher than the benign/uncertain malignant potential group ($p < 0.05$). Conversely, the CT value of the artery, and portal vein phase had no significant differences between these two groups. On T1WI, the parenchyma showed homogeneous mainly iso-signal intensity. On T2WI, the masses showed heterogeneous hyper-signal intensity, with necrosis. Six cases (four carcinomas) of them showed reticular enhancement. The ADC values of ACC (1.01 ± 0.09 mm²/s) were significantly lower than that of its counterparts (1.23 ± 0.04 mm²/s) ($p < 0.05$). Metastasis was detected in six cases (54.5%) of carcinoma, two with recurrence; the lung (6 cases) was the most metastatic site, followed by the liver (2 cases), lymph node (1 retroperitoneum, 1 hilum of right lung).

Conclusion The clinical and radiological features of pediatric adrenal cortical carcinoma are different, compared with its counterparts. ACC occurs younger; is more likely with elevated hormone level, larger and more commonly accompanied by calcification, hemorrhage/necrosis;

enhances more heterogeneous and with lower ADC values; recurs easily and has a high metastasis rate (54.5%), lung is the most common metastasis site.

PO-1478

Extracellular volume fraction determined by equilibrium contrast-enhanced CT to predict the survival outcomes in patients with resectable pancreatic ductal adenocarcinoma

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Objectives To evaluate whether extracellular volume (ECV) fraction with equilibrium contrast-enhanced computed tomography (CT) can predict survival outcomes in patients with resectable pancreatic ductal adenocarcinoma (PDAC).

Methods Eighty-three PDAC patients who underwent radical resection and preoperative pancreatic CT from January 2014 to January 2019 were retrospectively included. ECV fraction was calculated using ROI measurement within the primary tumor and aorta on unenhanced and equilibrium-phase CT images, followed by the correction of hematocrit value. The CT variables (tumor margins, parenchymal atrophy, main pancreatic duct dilation, peripancreatic tumor infiltration, venous contact, adjacent organ invasion) were assessed. Multivariable Cox proportional-hazards models were conducted to evaluate the effects of clinical factors, CT variables and ECV fraction on the recurrence-free survival (RFS) and overall survival (OS). Survival rates were derived by Kaplan-Meier method. We also evaluated the association between ECV fraction and recurrence pattern in PDAC.

Results Median OS and RFS were 17.1 and 10.7 months, respectively. On multivariate analysis, tumor ECV fraction and adjacent organ invasion were found to be associated with RFS ($P=0.017$; $P=0.006$), and only tumor ECV fraction showed an independent prognostic factor for OS ($P=0.022$). Increasing ECV fraction was associated with a positive effect on RFS (HR, 0.968; 95% CI: 0.942, 0.994), and OS (HR, 0.968; 95% CI: 0.942, 0.995). When stratified patients into low and high ECV groups, based on the median ECV fraction (35.4%, [IQR, 29.0-43.2%]). The median RFS and OS of patients with high ECV group were significantly longer than that of those with low ECV group (RFS, 14.7 months vs 8.3 months, $P=0.047$; OS, 27.9 months vs 12.2 months, $P=0.021$). In recurrence pattern analysis, the ECV fraction did not exhibit association between local recurrence and non-local recurrence groups ($P=0.455$), while patients in low-ECV group were more inclined to experience distant recurrence ($P=0.037$).

Conclusion ECV fraction determined by equilibrium contrast-enhanced CT was a useful imaging biomarker for predicting survival outcomes in resectable PDAC patients, which may facilitate further risk stratification and personalized care.

PO-1479

Multi—slice spiral computerized tomography findings of colorectal cancer with chronic schistosomiasis

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Objective To retrospectively analyze computerized tomography (CT) imaging features of colorectal cancer with chronic schistosomiasis in order to improve the diagnostic accuracy.

Methods Eighty patients whose diagnosis was pathologically confirmed as colorectal cancer with schistosomiasis were collected from Tongji Hospital and Kunshan Chinese Medicine Hospital from January 2007 to December 2012. All the patients underwent abdominal plain CT and contrast-enhanced CT scan. The lesion location, morphology, size, calcification features, enhancement patterns and cancer metastasis were evaluated and compared by two radiologists who were blind to the diagnosis. Twenty colorectal cancer cases without schistosomiasis from the same area were also collected as controls.

Results CT imaging showed that the tumors all occurred in the colon and rectum in 80 patients, mainly in colon descendens, colon sigmoideum and rectum. The lesion was characterized by irregular bowel wall thickening with soft tissue masses, and the average length of impaired intestine was (21.35 ± 4.50) cm. The lesions were solitary in 68 cases (85.0%) and were multifocal in 12 cases (15.0%). Linear, spotty and small patchy calcifications were seen in all the patients, with margins unclear in 59 patients (73.8%) and margins clear in 21 patients (26.2%). Early phase enhancement was seen in 68 cases (85.0%), of which 45 cases (56.2%) had homogenous enhancement and 23 cases (28.8%) had heterogeneous enhancement. Late phase enhancement was seen in 73 cases (91.2%) and necrosis was hardly seen. Only two cases (2.5%) had liver metastasis without lymphatic metastasis. All the 20 colorectal cancer cases without schistosomiasis presented with single lesion, which was characterized by irregular bowel wall thickening and local ulcer. The average length of impaired intestine was (6.90 ± 3.40) cm. No calcification was seen in these lesions. All cases had early phase lesion with remarkable heterogeneous enhancement with low density necrotic area. The late phase enhancement was decreased. Four cases (20.0%) had liver metastasis. Compared to cases without schistosomiasis, cases with schistosomiasis tended to have multifocal ($\chi^2=100$, $P=0.000$) and longer lesion ($t=45.506$, $P=0.000$), and more calcification ($\chi^2=100$, $P=0.000$). The early phase heterogeneous enhancement was less frequent ($\chi^2=88$, $P=0.000$) and late phase enhancement was more frequent ($\chi^2=100$, $P=0.000$). The liver metastasis rate was significantly lower ($\chi^2=8.688$, $P=0.014$).

Conclusions The CT imaging of colorectal cancer with schistosomiasis is characterized by calcifications inside the tumor with obscured margins and multiple intestinal segments involvement. Hematogenous metastasis and lymphatic metastasis are rarely seen.

PO-1480

Correlation study between CT-based perirenal fat variables and preoperative blood biochemical indicators with T Stage of clear cell renal cell carcinomaZehua Sun¹, Yumei Zhang¹, Chenchen Wang¹, Yuanhao Xia^{1,2}, Wei Zhang³, Yang Chen^{1,4}, Heng Ma^{1,2,4}, Hao Guo¹

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Purpose T stage is important for individualizing treatment regimens and prognosis for patients with clear cell renal cell carcinoma (ccRCC). However, few studies investigated the role of available preoperative variables of blood biochemistry and CT for T stage risk stratification of ccRCC currently. We aimed to explore the cut-off intervals of variables that are non-linearly related to ccRCC T stage for effective risk stratification to guide personalized treatment.

Materials and Methods We performed a retrospective analysis using a derived cohort of 218 ccRCC patients with a determined pathological T stage. The patients were divided into two cohorts: high T stage and low T stage. Preoperative blood biochemical indexes (BBI) and fat-related parameters based on CT images were included. Nonlinear tests were performed on the factors affecting the T stage of ccRCC, followed by identification of variables with a nonlinear relationship with the T stage. We used the generalized sum model to determine the cut-off interval for the corresponding variable.

Results The significantly higher indexes in patients with high T stage ccRCC included fibrinogen, platelet counts (PLT), white blood cells, monocyte counts (Mono), neutrophils counts, tumor-associated materials (TAM) and adipose parameters. Fibrinogen (2.63-4.06 g/L), PLT ($> 200.34 \times 10^9/L$) or Mono ($> 1.69 \times 10^9/L$) were significantly positively correlated with high T stage in specific intervals, while PLT ($< 200.34 \times 10^9/L$) was significantly negatively correlated with T stage in a certain interval. TAM was positively correlated with T stage to varying degrees at different cut-off intervals (TAM <90.56 U/mL; TAM >90.56 U/mL).

Conclusion This may be the first study to provide specific intervals for these indicators that are non-linearly related to T stage of ccRCC. This information could be used to stratify risk of preoperative ccRCC T stage, making routinely measured BBI attractive to improve the effectiveness of clinical transformation.

PO-1481

A risk prediction model for proliferative hepatocellular carcinoma and its prognostic value: using LI-RADS v2018 and other MR imaging featuresMengtian Lu, Xueqin Zhang, Tao Zhang, Qi Qu
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Objective: To develop a predictive model for proliferative hepatocellular carcinoma (HCC) using Liver Imaging Reporting and Data System (LI-RADS) and other magnetic resonance imaging (MRI) features and to investigate its prognostic value for HCC.

Methods: 241 HCC patients who underwent gadoteric-enhanced MRI were retrospectively included. In the training set, a diagnostic nomogram was developed using logistic regression analysis to identify proliferative HCC. The model performance was tested in the validation set and characterized by the area under the receiver operating characteristic curves (AUC). All patients were divided into high- and low-risk subgroups, and the recurrence-free survival (RFS) in different

subgroups was analyzed by Kaplan-Meier curves and the log-rank test. Cox regression analysis was performed to determine risk factors for RFS.

Results: Corona enhancement (OR, 3.373; $p = 0.006$), rim arterial phase hyperenhancement (APHE) (OR, 2.787; $p = 0.037$), infiltrative appearance (OR, 7.818; $p = 0.018$), intratumoral artery (OR, 4.706; $p = 0.001$), and substantial hypoenhancing component (OR, 2.684; $p = 0.033$) are identified as independent predictors of proliferative HCC. The model performed well, with AUCs of 0.823 and 0.803 for the training and validation sets, respectively. Differences in RFS were significant between the subgroups (high-risk vs. low-risk, $p = 0.001$; proliferative HCC vs. non-proliferative HCC, $p < 0.001$). Serum PIVKA level (HR, 1.013; $p < 0.001$) and risk score (HR, 8.026; $p < 0.001$) were risk factors for RFS.

Conclusion: LI-RADS v2018 and other MRI features may predict proliferative HCC before surgery, which is also predictive for RFS of HCC.

PO-1482

Preoperative CT-based radiomics model for predicting muscle invasion in patients with upper tract urothelial carcinoma

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Objectives: The study aimed to development of a preoperative CT-based radiomics model for predicting muscle invasion in patients with upper-tract urothelial carcinoma.

Materials and Methods: 117 consecutive patients who underwent radical nephroureterectomy for stage pT1–2 UTUC were retrospectively enrolled in a single center. Lesion segmentation, extraction and selection of radiomic features on pre-surgical CT urography, development and validation of predictive models were performed. Risk stratification of UTUC was evaluated and the diagnostic performances of the radiomics model and risk stratification were analyzed. Reference standard was histopathological analysis.

Results: Among 117 patients (mean age, 52 years \pm 9 [standard deviation], 70 men), 61.5% had pT2 grade tumors. 1165 features with intraclass coefficients >0.75 were retained for least absolute shrinkage and selection operator (LASSO) regression. Eight radiomic features with non-zero coefficients on LASSO regression were selected from the training dataset and used for constructing the predictive models. Ten-fold cross-validation was used to ensure optimal training and robustness of the predictive models. In training datasets, the averaged areas under the curve for linear discriminant analysis (LDA), logistic regression (LR), and support vector machine (SVM) models were 0.856, 0.858, and 0.856, respectively; the corresponding values in validation datasets were 0.852, 0.833, and 0.843, respectively. The LDA model was the best, with a sensitivity and specificity of 81.7% and 68.9%, respectively. 7 patients were stratified as low-risk. The sensitivity and specificity were 98.6% and 13.9%, respectively.

Conclusions: The preoperative radiomics model showed promising diagnostic performance in predicting UTUC muscle invasion.

PO-1483

Simultaneous multislice accelerated free-breathing diffusion-weighted imaging of the liver lesions at 3T

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Purpose: To investigate the diagnostic value of simultaneous multi-slice (SMS) accelerated diffusion-weighted imaging (DWI) for differentiating malignant and benign liver lesions, with the comparison to conventional DWI (CON-DWI).

Methods: This prospective study was approved by the institutional ethics committee. Fifty-nine patients with 59 focal liver lesions (32 pathological confirmed HCC and 27 benign lesions) were enrolled. Free-breathing SMS-DWI and CON-DWI examinations were acquired with b-values of 50, 400, and 800 s/mm². The acquisition time for SMS-DWI and CON-DWI was 52s and 83s, respectively. Qualitative image quality, visual lesion signal, and quantitative measurements of the average ADC for the lesions were compared between SMS-DWI and CON-DWI. The Wilcoxon rank-sum test, Friedman test, and paired Student t-test were used for statistical analysis. P-values < 0.05 are considered statistically significant.

Results: There were no significant differences in image artifact and visual lesion signal between SMS-DWI and CON-DWI in all b-value images. On b=50 s/mm² images, SMS-DWI demonstrated significantly superior overall image quality (3.92 ± 0.57 vs. 3.83 ± 0.56 , $P=0.025$) and better conspicuity of lesion than CON-DWI (4.17 ± 0.95 vs. 4.00 ± 1.00 , $P=0.004$). For malignant lesions, the ADC was 1.00×10^{-3} mm²/s in SMS-DWI and 1.09×10^{-3} mm²/s in CON-DWI ($P=0.20$). For benign lesions, the mean ADC was 1.81×10^{-3} mm²/s in SMS-DWI and 1.83×10^{-3} mm²/s in CON-DWI ($P=0.78$). The ADC cutoff for differentiating benign and malignant lesions was 1.14×10^{-3} mm²/s for SMS-DWI (sensitivity, 1; specificity, 0.84) with the area under the curve (AUC) of 0.96 (95% CI: 0.88-1.00), and 1.21×10^{-3} mm²/s for CON-DWI (sensitivity, 0.96; specificity, 0.84) with AUC of 0.93 (95% CI: 0.83-0.98). No significant difference was observed between the SMS-DWI and CON-DWI regarding ADC values ($P = 0.76$) and the AUCs ($P=0.32$).

Conclusions: SMS-DWI achieved comparable image quality to CON-DWI in considerable scan time reduction, and yielded similar diagnostic accuracy in differentiating malignant and benign liver lesions.

PO-1484

A Gd-EOB-DTPA-MRI-based multivariable model using LI-RADS v2018 and other imaging features for preoperatively predicting Ki-67 expression in hepatocellular carcinoma

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Objectives To construct a Gd-EOB-DTPA-MRI-based multivariable model to predict Ki-67 expression levels in hepatocellular carcinoma (HCC) using LI-RADS v2018 and other imaging features. **Methods** A total of 121 patients with HCC who underwent Gd-EOB-DTPA-MRI and were enrolled in this study. The patients were divided into three groups according to Ki-67 cut-offs: Ki-67 $\geq 20\%$ ($n = 86$) vs. Ki-67 $< 20\%$ ($n = 35$); Ki-67 $\geq 30\%$ ($n = 73$) vs. Ki-67 $< 30\%$ ($n = 48$); Ki-67 $\geq 50\%$ ($n = 45$) vs. Ki-67 $< 50\%$ ($n = 76$). A

multivariable model was established using LI-RADS v2018 and other imaging features. The performance characteristic of the multivariable model was assessed using receiver operating characteristic curves. **Results** The presence of mosaic architecture ($p=0.045$), the presence of infiltrative appearance ($p=0.039$), and the absence of targetoid hepatobiliary phase (HBP, $p=0.035$)

were independent differential factors for the prediction of HCC when Ki-67 \geq 50%, while no features predicted HCC when Ki-67 \geq 20% and Ki-67 \geq 30%. The multivariable model based on mosaic architecture, infiltrative appearance, and targetoid HBP performed better diagnostically than infiltrative appearance alone (0.776 vs. 0.619, $p=0.002$) and targetoid HBP alone (0.776 vs. 0.575, $p<0.001$), but had a comparable AUC with mosaic architecture (0.776 vs. 0.727, $p=0.082$). **Conclusions** A Gd-EOB-DTPA-MRI-based multivariable model was constructed to predict the expression of Ki-67 in HCC, which provides individualized guidance for prognostic evaluation and clinical decision-making in HCC patients.

PO-1485

Predicting overall survival in hepatocellular carcinoma patients using the functional liver imaging score model

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Purpose For patients with hepatocellular carcinoma (HCC), most of them have chronic liver disease and compromised liver function, leading to poor prognosis. The functional liver imaging score (FLIS), derived from hepatobiliary contrast agents-enhanced MRI, correlates with liver function. To develop a nomogram based on the functional liver imaging score to predict overall survival in HCC patients.

Methods This retrospective study included 460 HCC patients who underwent gadobenate dimeglumine-enhanced MRI from three hospitals. A nomogram was established integrating deep MRI information and clinicopathologic factors for better prediction. Harrell's concordance index (C-index) and time-dependent receiver operating characteristic (ROC) were used as performance metrics. Overall survival (OS) and recurrence-free survival (RFS) were estimated by the Kaplan-Meier method and compared with the log-rank test.

Results In multivariable analysis, functional liver imaging score (FLIS) (HR = 0.194, 95% CI = 0.119-0.317, $p < 0.001$), alpha-fetoprotein (AFP) > 400 ng/mL (HR = 2.149, 95% CI = 1.068-4.326, $p = 0.032$) tumor number (HR = 2.149, 95% CI = 1.044-4.421, $p = 0.038$) and tumor size > 5cm (HR = 3.036, 95% CI = 1.438-6.410, $p = 0.004$), were independent predictors of OS. A nomogram for predicting OS in HCC patients was developed using these factors. The C index (0.927; 95% CI = 0.864-0.990) for the FLIS model of the training cohort was significantly higher than other 8 prediction systems. Kaplan-Meier curves demonstrating differences in OS of patients with HCC between the FLIS model-low risk group and FLIS model-high risk group ($p < 0.001$).

Conclusion A nomogram incorporating functional liver imaging score and clinical parameters showed good discrimination and calibration abilities in predicting overall survival in HCC patients after liver resections.

PO-1486

Multiparametric MRI for Staging of Bowel Inflammatory Activity in Crohn's Disease with MUSE-IVIM and DCE-MRI: A Preliminary Study

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Objectives To investigate if the combination of multi-shot diffusion imaging based multiplexed sensitivity encoding intravoxel incoherent motion (MUSE-IVIM) and dynamic contrast-

enhanced magnetic resonance imaging (DCE-MRI) is feasible for staging Crohn's Disease (CD) activity.

Material and methods A total of 65 CD patients were enrolled and analyzed in this retrospective study. The simplified endoscopic score for Crohn's Disease (SES-CD) and magnetic resonance index of activity (MaRIA) were used as the reference. The MUSE-IVIM and DCE-MRI data were acquired at 3.0-T MRI scanner and processed by two radiologists. Three MUSE-IVIM parameters: fast apparent diffusion coefficient (ADC_{fast}), slow apparent diffusion coefficient (ADC_{slow}), and the fractional perfusion (Fraction of ADC_{fast}), as well as four DCE-MRI parameters: volume transfer constant (K_{trans}), rate constant (K_{ep}), extravascular extracellular volume fraction (V_e) and plasma volume fraction (V_p) were generated. Intra-class correlation coefficient (ICC), non-parametric test (Kruskal-Wallis H and Mann-Whitney U), logistic regression, receiver operating characteristic analysis, Delong test, and Spearman's correlation test were performed.

Results According to SES-CD, 116 ileocolonic segments with CD lesions were identified as: inactive (n = 38), mild (n = 46), and moderate to severe (n = 32). Inter-reader agreement has been validated with high ICC coefficients > 0.9 for all MUSE-IVIM and DCE-MRI parameters. Relative to the two active groups, MaRIA (p < 0.001), ADC_{fast} (p < 0.001), K_{trans} (p < 0.001), K_{ep} (p < 0.001) and V_e (p < 0.001) all showed lower values in inactive group. Fraction of ADC_{fast} (p < 0.001) was higher in inactive than the other two groups. With multivariable logistic regression analysis, ADC_{fast} (p < 0.001), Fraction of ADC_{fast} (p = 0.005), K_{trans} (p < 0.001) and K_{ep} (p = 0.003) were identified as significant factors for differentiating among the three groups. Significantly different parameters were revealed between inactive and active groups, including MaRIA score (p < 0.001), ADC_{fast} (p < 0.001), Fraction of ADC_{fast} (p < 0.001), K_{trans} (p < 0.001), K_{ep} (p < 0.001) and V_e (p = 0.011). Binary logistic analyses identified ADC_{fast} (Odds Ratio = 2.009, p = 0.001), K_{trans} (Odds Ratio = 54.771, p = 0.014) and K_{ep} (Odds Ratio = 6.105, p = 0.029) as independent predictors for the active status. The combination of ADC_{fast}, K_{trans} and K_{ep} performed better than MaRIA score (p = 0.028), for differentiating inactive and active status. MaRIA score was positively correlated with ADC_{fast} (r = 0.594, p < 0.001), K_{trans} (r = 0.581, p < 0.001), K_{ep} (r = 0.443, p < 0.001) and V_e (r = 0.294, p = 0.001), however, negatively correlated with Fraction of ADC_{fast} (r = -0.394, p < 0.001). **Conclusion** The combination of MUSE-IVIM and DCE-MRI has been demonstrated to accurately stage inflammatory activity in CD.

PO-1487

Establishment and Validation of the LI-RADS Morphologic Type II Hepatocellular Carcinoma Early Recurrence Risk Scoring System.

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Abstract:

Background: Tumor morphology is associated with early recurrence of hepatocellular carcinoma (HCC), and there is controversy regarding the recurrence risk of LI-RADS morphologic Type II HCC, which serves as a transition between Type I and Type III. This study aimed to explore the risk factors for early recurrence of Type II HCC, establish a risk scoring system, and provide reliable references for accurate diagnosis and treatment of HCC.

Methods: A retrospective analysis was conducted on patients who underwent curative resection for HCC and underwent preoperative contrast-enhanced MRI examinations at Harbin Medical University Cancer Hospital from June 2016 to June 2020. Patients classified as Type II based on morphology were included as the modeling group, and HCC patients from the TCIA database were included as the validation group. Univariate and multivariate Cox regression analyses were used to determine the independent risk factors for early recurrence of Type II HCC. Risk scores were assigned to the independent risk factors to establish the scoring system, with the mean score used

for risk stratification to define high-risk and low-risk groups. Additionally, an early recurrence prediction model was established using the scoring system. The predictive ability of the model was evaluated using the area under the receiver operating characteristic (ROC) curve (AUC), and the model and scoring system were validated using the validation group data.

Results: A total of 95 Type II HCC patients from our hospital were included as the modeling group, and 29 cases from the TCIA database were included as the validation group, with early recurrence rates of 33.7% (32/95) and 37.9% (11/29), respectively. In the modeling group, the results of multivariate analysis showed that age (HR 0.93, 95% CI 0.89-0.97, $P=0.001$), histological grade (HR 2.03, 95% CI 1.01-3.77, $P=0.024$), AFP (HR 3.39, 95% CI 1.37-8.41, $P=0.008$), and intratumoral hemorrhage (HR 4.19, 95% CI 1.84-9.52, $P=0.001$) were independent risk factors associated with early recurrence. The diagnostic performance of the model for early recurrence was AUC=0.817 (95% CI 0.72-0.89) in the modeling group. A scoring system was established based on the four variables mentioned above, with a cumulative score range of 0-6. Scores ≤ 3 were classified as the low-risk group for early recurrence, while scores >3 were classified as the high-risk group. Compared to the low-risk group, the high-risk group had significantly lower recurrence-free survival (40.0% vs 73.2%, $P=0.001$), and consistent results were obtained in the validation group (25.0% vs 73.3%, $P=0.028$).

Conclusions: Age <52 years, lower histopathological grade, elevated AFP levels, and preoperative imaging evidence of intratumoral hemorrhage are independent risk factors for early recurrence of Type II HCC. The risk scoring system established in this study demonstrated good discrimination and predictive ability after validation, enabling the assessment of early recurrence risk in Type II HCC and providing important references for clinicians to identify high-risk individuals.

PO-1488

Feasibility of abdominal aortic angiography utilizing ultra-low-dose contrast medium based on low-level virtual monoenergetic imaging: An prospective study

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Purpose: To investigate the feasibility of ultra-low-dose contrast medium (CM) utilization based on low-level virtual monoenergetic images (VMI) in abdominal aortic angiography.

Material and methods: Fifty-eight patients who underwent abdominal aortic CT angiography examination on a dual-layer detector CT (Spectral CT 7500, Philips Healthcare, Best, Netherlands) were randomly divided into ultra-low-dose CM group (LDCM) ($n=27$) and normal dose CM group (NCCM) ($n=31$). CM injection amount in NCCM was set as body weight (Kg) \times iodine concentration (mg/ml)/CM concentration (mg/ml). In LDCM group, 25% CM dosage of NCCM was used, and VMI 40keV were reconstructed instead of conventional images (VMI-LDCM). For objective analysis, circular regions of interest (ROIs) were placed on the abdominal aorta at the level of bifurcation of renal artery. The CT values, signal-to-noise ratios (SNRs), and contrast signal-to-noise ratios (CNRs) of abdominal aorta were calculated and compared in two groups (NDCM and VMI-LDCM). Subjective assessments were performed by two radiologists independently (0-3 point grading score: 0 = non-diagnostic, 3= excellent angiographic images). T test, Kruskal-Wallis Test (Mann Whitney) and Cohen's kappa test were used for statistical analysis.

Results: The CNR of VMI-LDCM were significantly higher than NDCM group ($p<0.01$). There were no significant differences in subjective scoring for primary and secondary arterial branches between NDCM and VMI-LDCM images ($p>0.05$), but there were significant differences in the third and fourth grade arterial branches ($p<0.01$). There was substantial agreement between the two independent readers.

Conclusion: The combination of VMI 40keV enabled 75% CM reduction in clinical abdominal aortic CTA scans and improve the imaging quality of small branch angiography.

PO-1489

Imaging and Pathological Feature Analysis of Idiopathic Portal Hypertension

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Background:

Idiopathic portal hypertension (IPH) is a relatively rare clinical condition characterized by portal hypertension without liver cirrhosis. With the ongoing challenge in diagnosing.

Objective: To assess the distinctive radiological and pathological features that differentiate between idiopathic portal hypertension (IPH) and cirrhosis.

Methods:

Pathological and radiological parameters (CT/MRI) were retrospectively evaluated in patients with histologically confirmed IPH versus those with cirrhosis. This study included 14 patients with IPH and 30 patients with cirrhosis.

Results:

There was a significant difference in spleen thickness between the IPH and liver cirrhosis groups ($P < 0.05$). Atrophy and hyperplasia of hepatic lobe in the two groups are also different. Both IPH and liver cirrhosis groups showed changes in liver morphology and parenchyma, with diffuse regenerative nodules and focal nodular hyperplasia being significant for distinguishing between IPH and liver cirrhosis. All 14 IPH patients had abnormalities in the portal vein system, including main portal vein dilation, stiffness, straightening, and distal branch vein stenosis or occlusion, while 9 liver cirrhosis patients had portal vein abnormalities, with thinning of the portal vein.

In terms of pathology, patients in the cirrhosis group showed varying degrees of cell necrosis and edema, and pseudolobule formation was observed in all patients. Patients with IPH showed varying degrees of fibrosis in the portal and confluent areas, but lobular inflammation was not evident. Some IPH patients showed portal vein occlusion and stenosis.

Conclusion:

In patients with early IPH, if a giant spleen is found on the image and the liver surface is smooth, it is necessary to consider IPH. While focusing on the changes in the portal system by image observation, atrophy and hyperplasia of hepatic lobe must be given some reference significance. In addition, FNH and diffuse hepatic regenerative nodules can also be used as key points to differentiate IPH and cirrhosis. The pathological absence of pseudobulbar changes and abnormal changes such as fibrosis, stenosis and occlusion of the portal venous system require cautious consideration of cirrhosis.

PO-1490

Risk Stratification and Overall Survival Prediction in Advanced Gastric Cancer Patients Based on Whole-volume MRI Deep Learning Radiomics

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Purpose: The prognosis of advanced gastric cancer (AGC) patients has always been the focus of attention which is a lack of real predictive method. We are eager to explore and predict risk stratification and overall survival (OS) in AGC patients using MRI deep learning radiomics.

Methods: A dataset of 337 patients with clinicopathologically confirmed AGC was retrospectively collected between February 2014 and October 2020. All patients underwent preoperative standard 3.0T MRI examination. The dataset was randomly allocated into a training cohort with 236 patients and an internal validation cohort with 101 cases. A total of 3705 radiomic features and 1876 deep learning features were extracted for each patient. Least absolute shrinkage and selection operator (LASSO) algorithm and multivariate Cox-regression analysis were conducted to obtain the optimized subset of texture feature and construct the final survival model. The risk score (RS) was calculated by each sample based on the characteristics and correlation coefficients. A survival prediction model was built by combining RS and independent clinical factors, and its performance was assessed with the receiver operating characteristic (ROC) analysis and calibration curves in both the training and validation cohorts, respectively.

Results: According to multivariate analysis, age ($P<0.001$) and LVI ($P=0.042$) were clinical independent predictors of OS. The RS consisting of 5 radiomic features and 6 deep learning features were found to be significantly associated with OS ($P<0.001$ for primary cohort and $P=0.006$ for validation cohort). Integrated with LN, LVI and RS, a survival prediction model was built, showing a favorable classification ability with an AUC in prediction on 3-year and 5-year OS was 0.765 and 0.788, 0.757 and 0.729 in the training set and validation set, respectively. The calibration curves also showed goodness-of-fit of the model and the nomogram was established.

Conclusions: This study puts forward a survival prediction model that combines the RS, LN, and LVI, which can be powerful predictors in preoperative prediction of OS in AGC patients. The survival prediction model may aid the identification of high-risk patients and optimization of decision-making.

PO-1491

Hepatic Epithelioid Hemangioendothelioma: CT Manifestations and Clinicopathologic Findings

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Purpose: Hepatic epithelioid hemangioendothelioma (EHE) is an extremely rare malignant vascular tumor with insufficient recognition leading to low diagnostic accuracy in the clinic.

Methods: All 12 cases with pathologically proven hepatic EHE were retrospectively evaluated between June 2006 and February 2020. The CT manifestations, clinical information, and pathological findings were recorded.

Results: Twelve patients pathologically confirmed hepatic EHE were enrolled in the study from June 2006 to February 2020. These patients presented with clinical symptoms of upper abdominal pain ($n=3$), bloating ($n=3$), loss of appetite ($n=2$), low fever ($n=1$), swollen left neck ($n=1$), and the remaining 6 patients were asymptomatic. Nine of 12 (75%) involved multiple intrahepatic

lesions, while another 3 (25%) were solitary lesion. For 9 multifocal patients, the lesions were all distributed under the hepatic subcapsular or suffused, while for the 3 solitary lesions, none of them were located under the hepatic subcapsular. Besides, nodule clustered distribution, lollipop sign, semicircle sign, vascular sign, and capsule retraction sign were present in a portion of the hepatic EHEs. Most patients showed positive expression of CD31 and CD34, 2 of 12 (17%) showed positive expression of CK7 antibody for the epithelial component, 5 of 12 (42%) showed positive expression of Vimentin, EMA, and CD117.

Conclusions: The aim of the study is to move forward mindfulness and understanding of hepatic EHE and diminish the misdiagnosis rate within the future via the CT manifestations and clinicopathologic findings.

PO-1492

Shape changes in the levator ani muscle obtained by dual-energy computed tomography compared with 3T MR imaging in women with stress urinary incontinence

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Purpose Using magnetic resonance imaging (MRI) and dual-energy computed tomography (DECT) of healthy people and patients with stress urinary incontinence (SUI) of levator ani muscle imaging, to explore the levator ani muscle imaging manifestations of patients with SUI in MR and DECT images.

Methods and Materials This study enrolled 30 healthy volunteers and 32 patients with SUI underwent pelvic examinations including 3.0-T MR and non-enhanced CT gemstone spectral imaging. The thickness of iliococcygeus muscle (tICM) and the angle of iliococcygeus (aICM) from coronal position were measured on CT of 110keV virtual monochromatic images and MR of coronal T2W images. The correlation between results of CT and MRI was evaluated, and the differences between the healthy group and the SUI group were compared.

Results The measured values of CT and magnetic resonance imaging MRI had strong and positive correlation (left tICM, $r=0.745$, $P<0.001$; right tICM, $r=0.708$, $P<0.001$; left aICM, $r=0.682$, $P<0.001$; right aICM, $r=0.838$, $P<0.001$). Our result showed that the tICM of SUI group (left, 3.19 ± 0.62 mm; right, 3.01 ± 0.79 mm) was significantly lower than that of healthy group (left, 3.51 ± 0.98 mm, $P=0.021$; right, 3.66 ± 0.76 mm, $P=0.002$), and the aICM (left, $33.43\pm6.51^\circ$; right, $35.14\pm7.49^\circ$) was higher than that of the healthy group (left, $26.59\pm5.19^\circ$, $P=0.005$; right, $27.99\pm6.95^\circ$, $P=0.001$) in MRI. And in CT, the tICM of SUI group (left, 3.11 ± 0.88 mm; right, 3.17 ± 0.67 mm) was also significantly lower than that of healthy group (left, 3.68 ± 0.78 mm, $P=0.009$; right 3.60 ± 0.91 mm, $P=0.012$), and the aICM (left, $33.10\pm5.59^\circ$; right, $34.25\pm6.98^\circ$) was higher than that of the healthy group (left, $25.18\pm6.99^\circ$, $P=0.003$; right, $26.28\pm5.62^\circ$, $P<0.001$).

Conclusion DECT and MRI of anus levator anatomical parameters measured value has significant correlation. The thickness of iliococcygeus muscle of SUI patients is lower than that of healthy people, and the angle of iliococcygeus is higher than that of healthy people.

Clinical Relevance Currently the imaging of levator ani muscle damage is still confined to MRI and ultrasound, this study proves that spectral imaging of DECT is feasible to detect levator ani muscle damage, showing strong correlation with MRI. DECT has the advantages of fast scanning speed. For patients such can't tolerate MRI examination, DECT scanning is clinically valuable.

PO-1493

Age-related variations in levator ani muscle fat and muscle content of once vaginal delivered females evaluated using spectral CT imaging

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Purpose To evaluate changes in muscle and fat contents of levator ani muscle with aging by using material decomposition (MD) technique in spectral CT imaging.

Methods and Materials An analysis of 33 female volunteer who underwent non-enhanced gemstone spectral imaging for Pelvic floor. The muscle and fat contents were measured for levator ani muscle on muscle-based MD images and fat-based MD images respectively. All the volunteers underwent only once vaginal delivery. And all the volunteers were divided into two groups, respectively for the young (20-44 years old, 31.8 ± 5.9) and the middle aged and elderly group (45-70 years old, 53.0 ± 6.5). The correlation of muscle contents-age, fat contents-age and the differences of muscle and fat contents in each age group were statistically analyzed.

Results Our result shows that the fat contents of levator ani muscle and age were positively and strongly correlated ($r=0.695$, $P<0.001$), and the muscle contents and age were negatively and strongly correlated ($r=-0.714$, $P<0.001$). In the middle aged and elderly group, fat content (94.3 ± 12.3 mg·cm⁻³) was significantly higher than that of the young group (78.2 ± 11.5 mg·cm⁻³, $P<0.001$), while muscle content in older (984.3 ± 27.7 mg·cm⁻³) lower than that the younger (1017.5 ± 25.9 mg·cm⁻³, $P<0.001$).

Conclusion The muscle degeneration in levator ani muscle occurs with aging .

Clinical Relevance This research through material decomposition (MD) technique in spectral CT imaging reveals female levator ani muscle degeneration of law: levator ani muscle appears aged degenerative change, which is the decrease of muscle content and the increase of fat content. Degeneration of the pelvic floor muscles will lead to the occurrence of pelvic floor functional disorder. The results provides not only evidences for understanding underlying mechanism but also valuable tools for early diagnosis of subsequent pelvic floor functional disorder.

PO-1494

Spatial Evaluation of the First-line Systemic Therapy Related Pathological Indicators in Hepatocellular Carcinoma with Multiparametric Magnetic Resonance Imaging

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Purpose:

We aimed to explore the feasibility of multiparametric magnetic resonance imaging (MRI) in evaluating the first-line systemic therapy related pathological indicators (VEGFA, PD-L1) in hepatocellular carcinoma (HCC).

Materials and Methods:

C57/BL6 mouse HCC model underwent MRI scan. MRI and pathological planes ($n_{\text{tumor}}=15$, $n_{\text{plane}}=115$) were spatially matched with 3D printing technology. We analyzed MRI parameters and immunohistochemically stained pathological indicators in different spatial regions (margin, center, plane, whole tumor). MRI evaluation model of the pathological indicators were established, respectively. The pathological indicators were further grouped into $V^{\text{high}}|^{\text{high}}$ (high VEGFA, high PD-L1), $V^{\text{high}}|^{\text{low}}$, $V^{\text{low}}|^{\text{high}}$, $V^{\text{low}}|^{\text{low}}$ groups. The combined indicators evaluation model was established.

Results:

The expressions of VEGFA and PD-L1 significantly differed between the marginal and central regions. MRI parameters significantly correlated to the pathological indicators in different spatial regions. Ktrans, Kep, Ve, and α significantly differed between VEGFA high- and low- groups in different spatial regions. The area under the curves (AUCs) of VEGFA evaluation model at the regions of margin combining center (ROC^{M+T}) and margin (ROC^M) were 0.732(95%CI 0.663-0.793), and 0.715(95%CI 0.621-0.797), respectively. Kep, Ve, iAUC60, T1pre, and T1pos significantly differed between PD-L1 high- and low- groups in different spatial regions. The AUCs of PD-L1 evaluation models of ROC^{M+T} , ROC^M , ROC^{plane} were 0.707(95%CI 0.637-0.770), 0.647(95%CI 0.552-0.735), 0.648(95%CI 0.552-0.736), respectively. Ktrans, Kep, Ve, and T1pre significantly differed among $V^{high|high}$, $V^{high|low}$, $V^{low|high}$, and $V^{low|low}$ groups. The combined indicators evaluation model was statistically significant ($P=0.001$).

Conclusion:

Multiparametric MRI was feasible to evaluate the first-line systemic therapy related pathological indicators (VEGFA, PD-L1) with the consideration of spatial heterogeneity.

PO-1495

The correlation of gut microbiome and metabolites with MR enterography and their combined efficacy in evaluation of bowel damage of patients with Crohn's disease

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Purpose: Bowel damage (BD) is a significant complication of Crohn's disease (CD) associated with microbial dysbiosis and metabolic disorder. MR enterography (MRE) can reflect BD at the macroscopic imaging anatomic level. However, the correlation of gut microbiome and metabolites with MRE is unknown, and whether combining macro-level data (i.e., MRE) with micro-level data (i.e., gut microbiome and metabolites) can better assess BD has not been investigated. This study aimed to address these two questions which had not been fully understood.

Materials and Methods: This prospective study included 230 CD patients whose stools and serums were collected within one week of MRE examination and stored in the -80°C freezer. CD patients were classified as BD ($n=103$) and non-BD ($n=127$) groups by Lémann index. MRE features (e.g., bowel wall thickness and T2WI hyperintensity, stricture, penetrating diseases, comb sign, etc.) between the two groups were compared by K-W test. The correlations among MRE features, gut microbiota, fecal and serum metabolites were analyzed by Spearman correlation; subsequently, gut microbiota and metabolites markers related to BD were selected. MRE model, gut microbiota model, fecal metabolites model, serum metabolites model, and comprehensive model that integrating all of the above data were developed to assess BD.

Results: Seven MRE features (i.e., penetrating diseases, bowel wall thickness and T2WI hyperintensity, comb sign, lesion length, etc.) were significantly different between BD and non-BD groups. 26 gut microbiota and metabolites that relating to BD were selected. According to the correlations of intestinal microbiota, fecal metabolites, serum metabolites, and MRE features, the biomarkers of BD were defined. The comprehensive model showed the highest efficacy for assessing BD ($AUC=0.708$, $P\leq 0.05$), followed by fecal metabolites model ($AUC=0.671$, $P\leq 0.05$), MRE model ($AUC=0.651$, $P\leq 0.05$), serum metabolites model ($AUC=0.640$, $P\leq 0.05$), and gut microbiota model ($AUC=0.588$, $P\leq 0.05$).

Conclusion: MRE findings are inextricably related to gut microbiome and metabolites; integrating MRE and gut microbiome and metabolites allows for a more comprehensive assessment of BD in patients with CD.

PO-1496

A Deep Learning Model Based on MRI for Prediction of Vessels Encapsulating Tumour Clusters and Prognosis in Hepatocellular Carcinoma: A Two-Centre Study

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Abstract

Objectives: This study aimed to build and evaluate a deep learning (DL) model to predict vessels encapsulating tumour clusters (VETC) and prognosis preoperatively in patients with hepatocellular carcinoma (HCC).

Methods: 320 pathologically confirmed HCC patients (58 women and 262 men) from two hospitals were included in this retrospective study. Institution 1 (n=219) and Institution 2 (n=101) served as the training and external test cohorts, respectively. Tumours were evaluated three-dimensionally and regions of interest were segmented manually in the arterial, portal venous, and delayed phases (AP, PP, and DP). Three ResNet-34 DL models were developed, consisting of three models based on a single sequence. The fusion model was developed by inputting the prediction probability of the output from the three single-sequence models into logistic regression. The area under the receiver operating characteristic curve (AUC) was used to compare performance, and the Delong test was used to compare AUCs. Early recurrence-free survival (ERFS) rate was evaluated by Kaplan-Meier survival analysis.

Results: Among the 320 HCC patients, 227 were VETC- and 93 were VETC+. The fusion model in the external test cohort showed an AUC of 0.772, a sensitivity of 0.80, and a specificity of 0.61. The fusion model-based prediction of VETC high-risk and low-risk categories exhibits a significant difference in ERFS rates, akin to the outcomes observed in VETC+ and VETC- confirmed through pathological analyses ($p < 0.05$).

Conclusions: A DL framework based on Resnet-34 has demonstrated potential in facilitating non-invasive prediction of VETC as well as patient prognosis.

PO-1497

Preoperative MR-based deep transfer learning and radiomics feature prediction of disease-free survival in patients with early-stage cervical cancer

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Objective To explore the deep learning radiomics nomogram (DLRN) to predict the disease free survival (DFS) in patients with early-stage cervical cancer (ECC).

Methods A total of ECC 225 patients from 2 centers (training cohort, n=113; internal validation cohort, n=57; external validation cohort, n=55) were retrospectively recruited. Handcrafted and deep learning based radiomics features were derived from the T2-weighted imaging (T2WI) and diffusion-weighted imaging (DWI). DFS-related radiomics signatures were selected in 3 target tumor volumes (VOI, VOI3, and VOI6) to build 3 rad-scores using the least absolute shrinkage and

selection operator (LASSO) Cox regression analysis. Logistic regression was applied to build combined model incorporating rad-scores of handcrafted and DL-based radiomics signatures with clinical risk factors and compared with clinical model alone. Kaplan–Meier analysis was used to further validate prognostic value of selected clinical and radiomics characteristics.

Results Rad-score (VOI6) performed best in both handcrafted and DL-based radiomics signatures with AUCs of 0.700 (95% CI 0.638-0.824) and 0.854 (95% CI 0.751-0.957) in the internal validation cohort, and 0.784 (95% CI 0.710-0.906) and 0.806 (95% CI 0.683-0.929) in the external validation cohort. Combined model was constructed by incorporating menopausal status, FIGO stage, serum SCC-Ag level and handcrafted and DL-base radiomics signatures. The DLRN performed better than clinical model in DFS prediction in the training set (0.815 vs 0.709; $p=0.024$), internal validation set and external validation set (C-index 0.866 vs 0.719; $p=0.001$).

Conclusion A deep learning radiomics nomogram combining handcrafted and DL-based radiomics signatures can aid in the prediction of DFS for ECC, thereby facilitating clinical decision-making.

PO-1498

Susceptibility-weighted Imaging for Renal Iron Overload Assessment: A Pilot Study

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Purpose: To explore the feasibility of susceptibility-weighted imaging (SWI) for evaluating renal iron overload.

Methods: Twenty-eight rabbits were randomly assigned into control ($n=14$) and iron ($n=14$) group. In the 0th week, the study group was injected with iron dextran. Both groups underwent SWI examination at the 0th, 8th, and 12th week. The signal intensity (SI) of cortex and medulla was assessed. Angle radian value (ARV) calculated with phase image was taken as the quantitative value for cortical and medullary iron deposition. After the 12th week, the left kidneys of rabbits were removed for pathology. The difference in the ARV among three groups was used Kruskal-Wallis test. The difference of the iron content between two groups was analyzed through independent sample t-test.

Results: In the iron group: at the 12th week, 8 rabbits were found to have decreased SI of only cortex, and the other 6 rabbits had decreased SI of cortex and medulla by the same degree; the ARV of cortex at the 8th and 12th week was significantly higher than that of the 0th week ($P<0.05$); the ARV of the 6 rabbits' medulla at the 12th week was significantly higher than that of the 0th week, 8th week, and the other 8 rabbits at the 12th week ($P<0.05$); at the 12th week, 8 rabbits (iron group) were found to have many irons only deposit in the cortex, and the others were found to have many irons deposit in both cortex and medulla; the iron content of cortex and 6 rabbits' medulla in the iron group was significantly higher than that of the control ($P<0.05$).

Conclusion: The ARV of SWI can be used to quantitatively assess excess iron deposition in the kidneys. Excessive iron deposition mainly occurs in the cortex or medulla and causes their SWI SI to decrease.

PO-1499

The Role of MRI Texture Analysis Based on Susceptibility-Weighted Imaging in Predicting Fuhrman Grade of Clear Cell Renal Cell Carcinoma

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Background The Fuhrman nuclear grade system is one of the most important independent indicators in the patients with clear cell renal cell carcinoma (ccRCC) for aggressiveness and prognosis. Preoperational assessment of tumor aggressiveness is meaningful for surgical decision making.

Purpose To explore the role of MRI texture analysis based on susceptibility-weighted imaging (SWI) in predicting Fuhrman grade of ccRCC.

Material and Methods A total of 45 patients with SWI and surgically proven ccRCC were divided into low-grade group (Fuhrman I and II, $n = 29$) and high-grade group (Fuhrman III and IV, $n = 16$). Texture features were extracted from SWI images. Feature selection were performed, and the multivariable logistic regression analysis was performed to develop the SWI-based texture model for grading ccRCC. The ROC curve analysis and leave group out cross validation (LGOCV) was performed to test the reliability of the model.

Results A total of 396 SWI-based texture features were extracted from each SWI image. The SWI-based texture model developed by the multivariable logistic regression analysis was: $\text{SWIscore} = -0.59 + 1.60 * \text{ZonePercentage}$. The AUC of the SWI-based texture model for differentiating high- from low-grade ccRCC was 0.81 (95% CI: 0.67–0.94), with 80% accuracy, 56.25% sensitivity, and 93.10% specificity. After 100 times LGOCV, the mean accuracy, sensitivity, and specificity was 90.91%, 91.83%, and 89.89% for the training sets, and 77.29%, 80.52%, and 71.44% for the test sets.

Conclusion SWI-based texture analysis might be a reliable quantitative approach for differentiating high- from low-grade ccRCC.

PO-1500

Using the “2 standard deviations” rule with Dixon MRI to differentiate renal cell carcinoma types

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Background: Clear cell and non-clear cell renal cell carcinoma (RCC) are distinguishable based on microscopic fat, detectable by chemical shift MRI. However, these assessments are often subjective. Conversely, Dixon MRIs and the “2 standard deviations” rule (2SDR) are quantitative methods that may decrease diagnostic subjectivity. Therefore, this study assessed the value of the 2SDR for detecting microscopic fat and thus differentiating clear cell and non-clear cell RCC using Dixon MRI.

Methods: This retrospective study included patients with RCC who underwent preoperative Dixon MRI. The patients were grouped based on tumor type: clear cell RCC and non-clear cell RCC. The 2SDR value was calculated based on in-phase and opposed-phase images and then compared between the two groups. 2SDR values >0 indicated clear cell RCCs, whereas values <0 indicated non-clear cell RCC.

Results: We included 151 patients; 114 patients had clear cell RCC, of which 106 had a 2SDR value >0 . Furthermore, 37 patients had non-clear cell RCC, of which 3 had a 2SDR value >0 . The 2SDR value was significantly higher in the clear cell RCC group than in the non-clear cell RCC

group ($p = 0.000$). Overall, 93.0% (106/114) and 8.1% (3/37) of patients with clear cell and non-clear cell RCC, respectively, had microscopic fat. The evaluation indices for this 2SDR method were: accuracy: 92.72%, sensitivity: 92.98%, specificity: 91.89%, positive predictive value: 97.25%, and negative predictive value: 80.95%.

Conclusions: 2SDR values calculated from Dixon magnetic resonance images can differentiate clear cell from non-clear cell RCCs by detecting microscopic fat.

PO-1501

Application of convolutional neural network in diagnosing gastric poorly cohesive carcinoma in CT late arterial phase

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Objective: To develop and test a convolutional neural network (CNN) model with CT late arterial phase for diagnosing gastric poorly cohesive carcinoma (PCC).

Methods: A total of 195 patients (46 cases of PCC and 149 cases of non-PCC) with gastric cancer were retrospectively collected. Their preoperative CT images from the late arterial phase were divided into training sets (156 images) and testing sets (39 images) at a ratio of 4:1. The training sets were augmented and then were taken into a CNN model for analysis. After training, we employed seven traditional classification models to assess the performance of our network in predicting PCC in testing sets.

Results: The trained CNN model, built with support vector machine, showed the highest Accuracy and F1 score with an AUC of 0.78. The logistic regression model showed the highest AUC of 0.81.

Conclusion: The CNN model with CT late arterial phase serves as a promising assistant tool in differentiating PCC from non-PCC.

PO-1502

A prognostic nomogram model for guiding treatment selection in unresectable hepatocellular carcinoma treated by transarterial chemoembolization plus lenvatinib with or without PD-1 inhibitor therapy

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Background: To establish and verify a prognostic nomogram model for guiding treatment selection in unresectable hepatocellular carcinoma treated by transarterial chemoembolization plus lenvatinib with or without PD-1 inhibitor therapy.

Methods: Data from 241 patients with unresectable HCC (uHCC) who underwent transarterial chemoembolization plus lenvatinib (TACE-L group, $n=128$) and TACE-L combined with PD-1 inhibitor (TACE-L-P group, $n=113$) were retrospectively reviewed, and the differences in tumor responses, progression-free survival (PFS), overall survival (OS) and adverse events (AEs) between the two groups were compared. Then, a prognostic nomogram model was established based on independent clinical-radiologic factors and confirmed by Cox regression analysis for predicting PFS and OS. The treatment selection for uHCC patients was stratified by the nomogram score using locally weighted methods.

Results: Compared to TACE-L, TACE-L-P presented prolonged PFS (14.0 vs. 9.0 months, $P<0.001$), longer OS (24.0 vs. 15.0 months, $P<0.001$), and a better overall objective response rate

(54.0% vs. 32.8%, $P=0.001$). There was no significant difference between the rate of AEs in the TACE-L-P group and the TACE-L group, with rates of 56.64% and 46.09% ($P=0.102$), respectively. Additionally, there was no difference in the rate of grade 3 or 4 AEs, with rates of 11.50% and 9.38% ($P=0.588$), respectively. Therapy method, nonobjective initial treatment response, Barcelona Clinic Liver Cancer (BCLC) C stage, extrahepatic metastasis, higher albumin-bilirubin (ALBI) grade, size, and higher AFP were independent risk factors for PFS. Additionally, therapy method, nonobjective initial treatment response, BCLC C, extrahepatic metastasis and higher ALBI grade were independent risk factors for OS. The nomogram model presented good discrimination, with a C-index of 0.790 for predicting PFS and 0.749 for predicting OS. HCC patients who scored more than 9 in the nomogram model had better 2-year PFS with TACE-L-P, and those with a nomogram score over 25 had better 2-year OS for TACE-L-P.

Conclusions: TACE-L-P showed significant improvements in efficiency and safety among patients with uHCC compared with TACE-L. The nomogram model was useful for stratifying treatment decisions and selecting a suitable population for TACE-L-P therapy in uHCC patients.

PO-1503

What imaging modality is more effective in predicting early recurrence of hepatocellular carcinoma after hepatectomy using radiomics analysis: CT or MRI or both?

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Background: It is of great importance to predict early recurrence (ER) of hepatocellular carcinoma (HCC) after hepatectomy using preoperative imaging modalities. Nevertheless, no comparative studies have been conducted to determine which modality, CT or MRI with radiomics analysis, is more effective.

Methods: We retrospectively enrolled 119 HCC patients who underwent preoperative CT and MRI. A total of 3776 CT features and 4720 MRI features were extracted from the whole tumor. The minimum redundancy and maximum-relevancy algorithm (MRMR) and least absolute shrinkage and selection operator (LASSO) regression were applied for feature selection, and support vector machines (SVMs) were applied for model construction. Multivariable logistic regression analysis was employed to construct combined models that integrate clinical-radiologic-pathological (CRP) traits and radscore. To compare the efficacy of CT, MRI, and CT&MRI models in the test cohort, receiver operating characteristic (ROC) curves, calibration curves and decision curve analysis (DCA) were used.

Results: There was no significant difference between the CT model and MRI model for the prediction of ER in HCC patients ($P=0.911$). RadiomicsCT&MRI demonstrated a superior predictive performance than either RadiomicsCT or RadiomicsMRI alone ($P=0.032$, 0.039). The combined CT&MR model demonstrated significantly better performance for stratifying patients at high risk of ER (area under the curve (AUC) of 0.951 in the training set and 0.955 in the test set) than the CT model (AUC of 0.894 and 0.784) and the MRI model (AUC of 0.856 and 0.787). DCA demonstrated that the CT&MR model provided a greater net benefit than the models without radiomics analysis. Conclusions: No significant difference was found in predicting ER of HCC between CT models and MRI models. However, the multimodal radiomics model derived from CT and MRI can significantly improve the prediction of ER in HCC patients after resection.

PO-1504

Feasibility of T1 Mapping with Histogram Analysis for the Diagnosis and Staging of Liver Fibrosis: Preclinical Results

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Purpose To compare the diagnostic accuracy of parameters derived from the histogram analysis of precontrast, 10-min hepatobiliary phase (HBP) and 20-min HBP T1 maps for staging liver fibrosis (LF).

Methods LF was induced in New Zealand white rabbits by subcutaneous injections of carbon tetrachloride for 4-16 weeks (n=120), and 20 rabbits injected with saline served as controls. Precontrast, 10-min and 20-min HBP modified Look-Locker inversion recovery (MOLLI) T1 mapping was performed. Histogram analysis of T1 maps was performed, and the mean, median, skewness, kurtosis, entropy, inhomogeneity and 10th/25th/75th/90th percentiles of T1native, T110min and T120min were derived. Quantitative histogram parameters were compared. For significant parameters, further receiver operating characteristic (ROC) analyses were performed to evaluate the potential diagnostic performance in differentiating LF stages.

Results Finally, 17, 20, 21, 21 and 20 rabbits were included for the F0, F1, F2, F3, and F4 pathological grades of fibrosis, respectively. The mean/75th of T1native, entropy of T110min and entropy/mean/median/10th of T120min demonstrated a significant good correlation with the LF stage ($|r|=0.543-0.866$, all $P<0.05$). The 75th of T1native, entropy10min, and entropy20min were the three most reliable imaging markers in reflecting the stage of LF. The area under the ROC curve of entropy20min was larger than that of entropy10min ($P<0.05$ for $LF \geq F2$, $\geq F3$, and $\geq F4$) and the 75th of T1native ($P<0.05$ for $LF \geq F2$ and $\geq F3$) for staging LF.

Conclusion Magnetic resonance histogram analysis of T1 maps, particularly the entropy derived from 20-min HBP T1 mapping, is promising for predicting the LF stage.

PO-1505

A nomogram model integrating LI-RADS features and radiomics based on contrast-enhanced magnetic resonance imaging for predicting microvascular invasion in hepatocellular carcinoma falling the Milan criteria

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Purpose: Preoperative prediction of MVI in HCC patients meeting the Milan criteria has particular clinical significance for guiding early-stage treatment decisions and improving patient outcomes. However, liver imaging reporting and data system (LI-RADS) features and radiomics based on contrast-enhanced MRI (CEMRI) for the prediction of MVI in patients with HCC falling into the Milan criteria has not been explored until now. Thus, the development of a combined model incorporating LI-RADS features and radiomics derived from CEMRI to predict MVI in HCC patients falling into the Milan criteria is desirable. This study aimed to establish and validate a nomogram model incorporating both LI-RADS features and CEMRI-based radiomics for predicting microvascular invasion (MVI) in hepatocellular carcinoma (HCC) falling the Milan criteria. **Material and Methods:** In total, 161 patients with 165 HCCs diagnosed with MVI (n = 99) or without MVI (n = 66) were assigned to a training and a test group. MRI LI-RADS characteristics including major features, ancillary features favoring HCC in particular, ancillary features favoring

malignancy but not HCC in particular, and baseline findings of HCCs were analyzed blindly by Two radiologists. Additionally, radiomics features consisted of 3D shape- features, first-order histogram features, texture features were selected by the ICC, mRMR and LASSO algorithm to establish the Rad-score models. Then, the independent features acquired by univariate and multivariate logistic were integrated to develop the nomogram model. The predictive ability of the nomogram was evaluated with receiver operating characteristic (ROC) curves.

Results: Larger tumor size (>3 cm), nonsmooth margins, nodule-in-nodule, mosaic architecture and corona enhancement were indicated to be independent factors associated with MVI ($P<0.05$). After combining these significant MRI features, the MRI feature model for predicting MVI in HCC falling within the Milan criteria presented a sensitivity of 89.13%, a specificity of 66.67% and an AUC value of 0.85 (95% CI: 0.78-0.92) in the training group, and they were 80.00%, 73.33% and 0.85 (95% CI: 0.74-0.95) for the test group, respectively.

The six most valuable features associated with MVI were combined to construct the Rad-score model based on the following formula: $\text{Rad-score} = 0.30464 \times \text{Shape-MajorAxisLengthAP} + 0.04237 \times \text{Glcm-CorrelationAP} - 0.02774 \times \text{Glrlm-RunVarianceAP} - 0.04997 \times \text{Glszm-ZoneVarianceAP} + 0.13854 \times \text{Glszm-SmallAreaLowGrayLevelEmphasisPVP} + 0.19174 \times \text{Firstorder-SkewnessDP}$. The sensitivity, specificity and AUC value of the Rad-score model in predicting MVI were 80.43%, 73.91% and 0.82 (95% CI: 0.73-0.90) for the training group and 60.00%, 96.67% and 0.80 (95% CI: 0.67-0.93) for the test group, respectively.

After multivariate analysis, the retained independent predictors for MVI in HCC falling Milan criteria were related to larger size (OR=4.1, 95% CI: 1.3-12.9, $P=0.02$), nonsmooth margin (OR=4.4, 95% CI: 1.1-18.0, $P=0.04$), mosaic architecture (OR=3.2, 95% CI: 1.0-9.6, $P=0.04$), corona enhancement (OR=3.7, 95% CI: 1.1-12.2, $P=0.03$) and higher Rad-score (OR=10.2, 95% CI: 1.0-102.2, $P=0.04$). The nomogram presented improved AUC values of 0.87 (95% CI: 0.81-0.94) in the training group and 0.89 (95% CI: 0.81-0.98) in the test group ($P<0.05$) for predicting MVI. The calibration curves suggested that the predictive nomogram and the actual probability of MVI were well fitted in both the training and test groups. Additionally, the DCA results showed that the predictive nomogram curve was higher than the default lines for either all or none of the patients having MVI over all reasonable threshold probabilities.

Furthermore, the combined nomogram model demonstrated better performance than the MRI features and the Rad-score model for predicting MVI in HCC falling into the Milan criteria, with AUC values of 0.87 vs. 0.85 ($P=0.13$) for the nomogram compared with the MRI features and 0.87 vs. 0.82 ($P=0.02$) for the nomogram compared with the Rad-score model. However, no significant difference in the AUC value (0.85 vs. 0.82, $P=0.30$) was found in the comparison between the MRI features and the Rad-score model.

Conclusions: Larger tumor size, nonsmooth margins, mosaic architecture, corona enhancement and higher Rad-score were identified as effective imaging markers for preoperatively predicting MVI in patients with HCC falling into the Milan criteria. Moreover, the nomogram combining LI-RADS and radiomics features based on CEMRI demonstrated improved performance in predicting MVI, with high goodness-of-fit and clinical benefits, and this model may provide a noninvasive tool for predicting MVI and for guiding individualized treatment decision-making for HCC patients falling into the Milan criteria.

PO-1506

Machine learning-based CEMRI radiomics integrating LI-RADS features achieves optimal evaluation of hepatocellular carcinoma differentiation

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Purpose: As far as we know, there is a scarcity of developed models that combine ML-based CEMRI radiomics with LI-RADS features for evaluating HCC differentiation. The purpose of this study was to establish and compare the performance of contrast-enhanced magnetic resonance imaging (CEMRI)-based radiomics model using different machine learning (ML) classifiers for predicting hepatocellular carcinoma (HCC) differentiation and to validate the most effective model. Furthermore, an investigation was conducted to explore a combined model that incorporated both radiomics and Liver Imaging Reporting and Data System (LI-RADS) features.

Methods: A total of 251 patients with HCCs ($n = 262$) were assigned to a training ($n = 200$) cohort and a validation ($n = 62$) cohort. A collection of 5502 radiomics signatures were extracted from the CEMRI images for each HCC nodule. To reduce redundancy and dimensionality, spearman rank correlation, minimum redundancy maximum relevance (mRMR), and the least absolute shrinkage and selection operator (LASSO) approach were employed. Eight ML classifiers including the logistic regression (LR), support vector machine (SVM), K-nearest neighbor (KNN), random forest (RF), ExtraTrees, eXtreme Gradient Boosting (XGBoost), light gradient boosting machine (LightGBM) and multilayer perceptron (MLP)

were trained to obtain the best radiomics model. The performance of each model was evaluated based on the area under the receiver operating characteristic curve (AUC). The radiomics model was integrated with liver imaging reporting and data system (LI-RADS) features to design a combined model.

Results: The inter- and intrareader variability for radiomics signatures was 0.88(95%CI: 0.81-0.93) and 0.91(95%CI: 0.84-0.95), respectively. After removing redundant radiomic parameters with Spearman correlation coefficients greater than 0.90, a total of 305, 313, and 318 signatures were retained from AP, PVP, and DP, respectively. Upon applying mRMR and the LASSO approach for further dimension reduction and redundancy removal, a total of eighteen highly robust signatures were selected and retained to train the ML classifier models.

The AUCs of different ML classifiers in diagnosing pHCC ranged from 0.85 to 1.00 in the training cohort and from 0.73 to 0.88 in the validation cohort. Among the eight ML classifiers, the XGBoost model achieved the highest AUC (1.00) and accuracy (1.00), followed by Extratrees (AUC = 1.00, accuracy = 1.00), RF (AUC = 1.00, accuracy = 0.995), LightGBM (AUC = 0.96, accuracy = 0.86), SVM (AUC = 0.88, accuracy = 0.88), KNN (AUC = 0.89, accuracy = 0.80), MLP (AUC = 0.88, accuracy = 0.76), and LR (AUC = 0.85, accuracy = 0.78). The detailed information of various ML classifiers for diagnosing pHCC

Larger tumor size, nonsmooth margin, mosaic architecture, intratumoral blood products, and corona enhancement were identified as significant risk factors associated with pHCC. The LI-RADS model, which combines these five significant MRI features, demonstrated an accuracy of 0.72, sensitivity of 0.69, specificity of 0.73, and an AUC value of 0.77 (95% CI: 0.70-0.83) in the training cohort. In the validation cohort, the corresponding values were 0.68, 0.92, 0.60, and 0.82 (95% CI: 0.70-0.94)

The nomogram model that incorporated XGBoost-based Rad-signatures and significant MRI LI-RADS features demonstrated an AUCs value of 1.00 (95% CI: 0.99-1.00) and 0.86 (95% CI: 0.76-0.96), for evaluating pHCC in the training and validation cohorts, respectively, shown in (Figure. 4A-B).

The calibration curves indicated that three models (Radiomics, LI-RADS, nomogram) presented good agreement in both training and validation cohorts. Furthermore, the DCA results suggested that the nomogram model curve was higher than either "treat all" (pHCC, solid black line) or "treat

none" (npHCC, virtual black line) across a full range of reasonable threshold probabilities, suggesting that the nomogram model has improved clinical benefits in individualized clinical decision-making for HCC differentiation.

Conclusions: CEMRI radiomics integrating LI-RADS features demonstrated excellent performance in evaluating HCC differentiation, suggesting an optimal clinical decision tool for individualized diagnosis of HCC differentiation.

Discussion: In our study, we observed that the CEMRI-based radiomics model showed higher AUCs and accuracies compared to previous studies, indicating it was able to optimally predict HCC differentiation. We speculate that our research findings may be attributed to the following two factors: 1) A large number ($n=5502$) of quantitative radiomics signatures were extracted from the CEMRI images for each HCC nodule. Then, spearman rank correlation, LASSO, mRMR approaches were employed to select the most robust signatures for developing the radiomics model. This comprehensive selection process possibly contributed to the higher AUC. 2) Comparison of eight ML classifiers, including regression, classification, and clustering algorithms. These classifiers were used to establish the most effective radiomics model, addressing both linear and nonlinear classification problems. In contrast, most previous studies solely employed linear models, leading to lower accuracy. The inclusion of diverse ML classifiers in our study enhanced the accuracy for diagnosing HCC differentiation. Therefore, our study suggests that a larger number of extracted radiomics signatures, combined with a variety of ML classifiers, can improve the accuracy of diagnosing HCC differentiation, which is useful for advancing the current understanding of radiomics model with ML classifiers.

PO-1507

Association between renal surface nodularity and increased adverse vascular event risk in patients with arterial hypertension

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Objective: To explore the association of renal surface nodularity (RSN) with the increased adverse vascular event (AVE) risk in patients with arterial hypertension. **Methods:** This cross-sectional study included patients with arterial hypertension aged 18–60 years who underwent contrasted computed tomography (CT) of kidney from January 2012 to December 2020. The subjects were classified into AVE or not (non-AVE) matched with age (≤ 5 years) and sex. Their CT images were analyzed using both qualitative (semiRSN) and quantitative RSN (qRSN) methods, respectively. Their clinical characteristics included age, sex, systolic blood pressure (SBP), diastolic blood pressure, hypertension course, diabetes history, hyperlipidemia, and estimated glomerular filtration rate (eGFR).

Results: Compared with non-AVE group ($n = 91$), AVE ($n = 91$) was at lower age, higher SBP, and fewer rate of diabetes and hyperlipidemia history (all $P < .01$). Rate of positive semiRSN was higher in AVE than non-AVE (49.45% vs 14.29%, $P < .001$). qRSN was larger in AVE than non-AVE [1.03 (0.85, 1.33) vs 0.86 (0.75, 1.03), $P < .001$]. The increased AVE was associated with semiRSN (odds ratio = 7.04, $P < .001$) and qRSN (odds ratio = 5.09, $P = .003$), respectively. For distinguishing AVE from non-AVE, the area under receiver operating characteristic was bigger in the models combining the clinical characteristics with either semiRSN or qRSN than that of semiRSN or qRSN alone ($P \leq .01$).

Conclusion: Among the patients with arterial hypertension aged 18–60 years, CT imaging-based RSN was associated with increased AVE risk.

PO-1508

Different treatment options for Primary vaginal malignant melanoma with abdominal multiple metastases: Two cases reports

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Objective: Primary vaginal malignant melanoma is clinically rare and highly aggressive, and easy to spread to the surrounding lymph nodes and the occurrence of distant metastasis. The authors reported the two cases of primary vaginal malignant melanoma with abdominal multiple metastases. The treatment strategy for this disease changes as it develops. The treatment of high-risk patients is presently recommended radical surgery and supplemented by chemistry, radiation and immunotherapy. To explore the imaging findings of primary vaginal malignant melanoma with different abdominal viscera metastasis and the different treatments outcomes monitoring.

Methods: Retrospective analysis the clinical presentation, Magnetic resonance imaging (MRI) and other imaging findings of two cases pathologically confirmed primary vaginal malignant melanoma with different abdominal viscera metastasis. Then the MRI follow-up performance after the different treatment methods was analyzed.

Results: Both patients were elderly women, main clinical manifestations consist of postmenopausal vaginal bleeding and vaginal wall black mass. Abdomen MRI showed the two cases of primary vaginal malignant melanoma both were medium T1 signal, high diffusion weighted imaging signal, and under clear border, inhomogeneous obvious enhancement, and multiple enlarged lymph nodes were seen in the pelvic cavity and groin, and the enhancement scan showed uneven enhancement. Difference included that the right wall case is high T2 signal of MRI, and the abdomen MRI and Computed Tomography (CT) both showed liver parenchyma has multiple mass and ring enhancement, were both considered as more likely metastatic lesions. However, the vaginal front wall malignant melanoma is T2 hypointense, and the cystoscope showed the posterior wall of the bladder has multiple black nodules, which were considered for the metastatic nodules. About the treatment method, the right wall case adopted immunotherapy with toripalimab, MRI review after half a year showed the vaginal malignant melanoma was increased, and multiple metastases in the liver also increased number and increased range compared with the previous. But the front wall case performed Laparoscopic total vaginectomy and pelvic lymph node dissection and Removal repair of bladder nodules, and there was no obvious recurrence by MRI after surgery half a year. The two cases were both pathologically confirmed primary vaginal malignant melanoma, and multimodal imagings showed abdominal different viscera metastasis. Main clinical manifestations both consist of postmenopausal vaginal bleeding and vaginal wall black mass. A case of MRI and CT showed liver multiple metastatic nodules, and MRI review showed the vaginal malignant melanoma and liver multiple metastases increased after half year immunotherapy with toripalimab. Another case the cystoscope showed the bladder posterior wall has multiple metastatic nodules, and half year MRI showed no obvious recurrence by after Laparoscopic total vaginectomy and Removal repair of bladder nodules surgery.

Conclusion: Primary vaginal malignant melanoma has highly aggressive, high recurrence rate, which is more easily spread to regional lymph nodes and distant metastases. A variety of imaging tests can be used to make a more comprehensive assessment for range and severity of primary vaginal malignant melanoma with abdominal metastases, can also be applied to the prognosis monitoring of different therapeutic approaches.

PO-1509

Preliminary study of multi-parameter Spectral Detector Computer Tomography imaging in predicting lymphovascular space invasion in cervical cancer

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Objectives: To investigate the clinical value of spectral CT multi-parameter imaging in predicting lymphovascular space invasion (LVSI) in cervical carcinoma. **Methods:** 108 patients with cervical carcinoma proved by operation and pathology were divided into LVSI positive group (n = 50) and LVSI negative group (n = 58) according to pathological results. Spectral CT arteriovenous phase conventional energy images (CI), 40 to 200 KeV monoenergetic images (VMIs), and iodine density maps were analyzed by an imaging physician to obtain dual-phase CT values and iodine values of cervical cancer lesions and different background tissues, and lymph node metastasis status and tumor maximum diameter were assessed on VMI40Kev. Monoenergetic curve slope (K), normalized iodine concentration (NIC) were calculated. Univariate and multivariate logistic regression analysis was performed to determine the independent risk factors that can be used to assess LVSI status in spectral CT multiparametric image characteristics and clinical characteristics, and receiver operating characteristic (ROC) curves were used to assess the predictive efficacy of combining spectral multiparametric variables and clinical variable models for LVSI status in cervical cancer. **Results:** Squamous cell carcinoma antigen (SCC) and differentiation were obtained by univariate analysis. Lymph node metastasis status, tumor maximum diameter (MD), GTV, CI, 40Kev, 80Kev and 100Kev arterial phase CT value, K, arterial phase iodine value (IC (AP)) and arteriovenous phase standardized iodine value (NIC muscle (AP)) were correlated with LVSI status in cervical carcinoma ($P < 0.05$). Multivariate logistic regression analysis showed that differentiation, lymph node metastasis status, tumor maximum diameter, lesion CT40Kev (AP) value, IC (AP), and NIC muscle (AP) were independent risk factors for LVSI in cervical cancer patients ($P < 0.05$). The area under the curve (AUC), sensitivity, and specificity of the clinical prediction model (M1) were 0.671, 64.7%, and 61.4%, respectively; the AUC, sensitivity, and specificity of the clinical combined conventional image parameter prediction model (M2) were 0.717, 64.7%, and 63.2%, respectively; and the AUC, sensitivity, and specificity of the spectral multiparametric prediction model (M3) were 0.831, 80.4%, and 71.9%, respectively. DeLong's test showed that there was a significant difference in AUC values between M1 and M3 ($P = 0.0051$); no statistical difference between M2 and M3 ($P = 0.0408$). **Conclusion:** The clinical combined spectral CT multi-parameter model has a high diagnostic efficacy for predicting LVSI status in cervical cancer.

PO-1510

Study of the optimal monoenergetic images of cervical cancer on Dual-layer spectral detector Computed Tomography

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Objective To investigate the optimal KeV level of virtual monoenergetic images (VMIs) of Dual-layer spectral detector Computed Tomography (dl-SDCT) for assessment cervical cancer (CC) lesions. **Materials and methods** 105 patients with CC underwent abdominal dl-SDCT and pelvic MR enhanced scan before treatment. One fellow analyzed conventional images (CIs) and 40~200KeV images of the arterial and venous phase, recorded the CT attenuation and standard

deviation (SD) for cervical lesions and background tissues, and calculated signal to noise ratio (SNR) and contrast to noise ratio (CNR). Subjective image analysis was performed by two radiologists independently who assessed lesion conspicuity and diagnostic confidence in staging on 5-point scales for conventional and VMI40KeV reconstructions images. The differences of parameters and subjective scores between VMIs and CIs were compared. Results The CT, SNR, CNRuterine body and CNRvaginal values of VMI40KeV were the highest in the arterial and venous phase, which were significantly higher than those low monoenergetic levels and CIs ($P < 0.05$). The SNR values in the venous phase were higher than those in the arterial phase regardless of CI or VMI40KeV~VMI80KeV images ($P < 0.05$). For the CNRuterine body, the arterial phase was higher than that in the venous phase regardless of CI or VMI40KeV~VMI100KeV images ($P < 0.05$). For the CNRvaginal, the arterial phase was higher than that in the venous phase regardless of CI or VMI40KeV~VMI70KeV ($P < 0.05$). In the arterial and venous phase, the Kappa scores of the two radiologists on CI-A、CI-V、VMI40KeV-A、VMI40KeV -V images were 0.77, 0.77, 0.84, 0.80, respectively, and the score on VMI40KeV images were higher than that on CIs ($P < 0.05$). Conclusion Compared with CIs and other VMIs, VMI40KeV showed the optimal SNR and CNR, improving the objective image quality and subjective performance of CC lesions.

PO-1511

Value of Gd-EOB-DTPA-Enhanced MRI and Diffusion-Weighted Imaging in Detecting Residual Hepatocellular Carcinoma After Drug-Eluting Bead Transarterial Chemoembolization

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Objectives: To investigate the value of gadolinium ethoxybenzyl diethylenetriamine pentaacetic acid (Gd-EOB-DTPA)-enhanced magnetic resonance imaging (MRI) and diffusion-weighted imaging (DWI) in diagnosing residual hepatocellular carcinoma (HCC) after drug-eluting bead transarterial chemoembolization (DEB-TACE). **Materials and Methods:** Sixty-two patients (50 men, 12 women; mean age, 56.8 ± 1.4 years) with 74 HCCs who underwent Gd-EOBDTPA-enhanced MRI and DWI in 1-2 month intervals after DEB-TACE were retrospectively studied. Imaging features derived from GdEOB-DTPA-enhanced MRI and DWI were analyzed and compared between residual HCCs and necrotic tumors. The sensitivity and specificity of Gd-EOB-DTPA-enhanced MRI and DWI with quantitative apparent diffusion coefficient (ADC) values in diagnosing residual HCCs were calculated and compared, based on the reference standard of pathology and/or angiography. **Results:** Thirty-three residual HCCs and 41 necrotic tumors were diagnosed. Residual HCCs presented characteristics of arterial hypervascularity (90.91%) and DWI hyperintensity (78.78%), which were of importance in differentiating necrotic tumors ($p < 0.05$). DWI showed lower sensitivity (78.79% vs. 96.97%, $p < 0.001$) and specificity (78.05% vs. 100%, $p < 0.001$) than Gd-EOB-DTPA-enhanced MRI in diagnosing residual HCCs after DEB-TACE. Residual HCCs had a significantly higher mean ADC value than necrotic tumors ($1.30 \pm 0.32 \times 10^{-3} \text{ mm}^2/\text{s}$ vs. $1.55 \pm 0.50 \times 10^{-3} \text{ mm}^2/\text{s}$, $p < 0.001$). Receiver operating characteristic curve analysis for identifying residual HCCs demonstrated that the threshold ADC value of $1.25 \times 10^{-3} \text{ mm}^2/\text{s}$ had 84.85% sensitivity and 87.80% specificity. **Conclusion:** Gd-EOB-DTPA-enhanced MRI is superior to DWI in diagnosing residual HCCs after DEB-TACE, and arterial hypervascularity and DWI hyperintensity are important imaging features in distinguishing residual HCCs from necrotic tumors.

PO-1512

Dynamic contrast-enhanced MRI with Gd-EOB-DTPA for the quantitative assessment of early-stage liver fibrosis induced by carbon tetrachloride in rabbits

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Purpose: To explore quantitative parameters obtained by dynamic contrast-enhanced magnetic resonance imaging (DCE MRI) with Gd-EOB-DTPA in discriminating early-stage liver fibrosis (LF) in a rabbit model. **Materials and methods:** LF was established in 60 rabbits by the injection of 50% CCl₄ oil solution, whereas 30 rabbits served as the control group. All rabbits underwent pathological examination to determine the LF stage using the METAVIR classification system. DCE MRI was performed, and quantitative parameters, including K_{trans}, K_{ep}, V_e, V_p and R_e were measured and evaluated among the different LF stages using spearman correlation coefficients and receiver operating characteristic curve. **Results:** In all, 24, 25, and 22 rabbits had stage F0, stage F1, and stage F2 LF, respectively. K_{trans} ($r = 0.803$) increased, and K_{ep} ($r = -0.495$) and R_e ($r = -0.701$) decreased with LF stage progression ($P < 0.001$), while no significant correlation was found for V_e or V_p. K_{trans} and R_e were significantly different between all LF stage pairs compared (F0 vs. F1, F0 vs. F2, F1 vs. F2, F0 vs. F1-F2, $P < 0.05$). With the exception of F0 vs. F1, K_{ep} differed significantly between stages ($P < 0.05$). The AUC of K_{trans} was higher than that of other quantitative parameters, with an AUC of 0.92, 0.99, 0.94 and 0.92 for staging F0 vs. F1, F0 vs. F2, F1 vs. F2, and F0 vs. F1-F2, respectively. **Conclusion:** Among quantitative parameters of Gd-EOB-DTPA DCE MRI, K_{trans} was the best predictor for quantitatively differentiating early-stage LF.

PO-1513

Preoperative multiphase liver MRI for predicting early recurrence of single hepatocellular carcinoma after curative resection

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Abstract:

PURPOSE

To investigate whether preoperative contrast-enhanced multiphase MRI can help identify early recurrence in patients with single hepatocellular carcinoma (HCC) after curative resection.

METHODS

This retrospective study included patients with single HCC treated with surgical resection between January 2015 and February 2019 who underwent preoperative multiphase liver MRI. Clinical, biologic, and imaging features associated with early recurrence (within 2 years) were identified and analyzed. Multivariable Cox regression analysis was performed to determine predictors of early recurrence. Early recurrence and overall recurrence were evaluated by using Kaplan-Meier analysis.

RESULTS

In multivariable cox analysis, peritumoral arterial phase hyperenhancement (odds ratio = 1.3; 95% confidence interval [CI] = 0.9, 2.1; $P=0.044$) and non-smooth tumor margin (odds ratio = 1.5; 95% CI = 0.8, 2.6; $P=0.027$) were independent significant variables associated with early recurrence in

MRI findings. Clinicopathologic characteristics presenting as microvascular invasion (odds ratio = 1.6; 95% CI= 1.1, 2.6; P=0.019) and satellite nodules (odds ratio = 1.8; 95% CI= 1.1, 3.1; P=0.006) also were independent predicting factors with early recurrence.

CONCLUSION

Presence of peritumoral arterial phase hyperenhancement, and non-smooth tumor margin in contrast-enhanced multiphase MRI and microvascular invasion and satellite nodules in pathological characteristics help to predict early recurrence of single HCC after curative resection.

PO-1514

Early tumor shrinkage as a predictor of survival in patients with advanced esophageal squamous cell carcinoma treated with first-line checkpoint inhibitors

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Purpose: Early tumor shrinkage (ETS) is a promising parameter for assessing treatment responses. Our study hypothesized that an ETS with an optimal cut-off value was an imaging biomarker for advanced esophageal squamous cell carcinoma (ESCC) treated with first-line immunotherapy.

Methods: We retrospectively enrolled 129 patients with unresectable locally advanced ESCC treated with first-line immunotherapy between 2019 and 2021. ETS was defined as the relative change in the sum of the target lesions' longest diameters at the first evaluation compared with that at baseline. Multivariate analyses were conducted to identify the significant prognostic variables in progression-free survival (PFS) and overall survival (OS).

Results: The median value of ETS was 29.5%. An ETS with a 10% cut-off value was statistically significantly associated with PFS in the univariate analysis (hazard ratio [HR]: 2.26; 95% confidence interval [95% CI]: 1.21-4.24; $p = 0.009$). Besides, in the univariate analysis, the longest diameter, maximum short diameter, central necrosis on enhanced computed tomography, enhanced pattern, and ETS values were statistically significant predictive factors for OS. In the multivariate analysis, ETS with a 10% cut-off value was an independent predictive factor for OS (HR: 3.14; 95% CI: 1.45-6.83; $p = 0.004$).

Conclusion: ETS is associated with survival outcomes in patients with advanced ESCC treated with immunotherapy. Early tumor size shrinkage of at least 10% can be regarded as a promising biomarker predictor for PFS and OS. ETS supports clinical decisions by identifying patients who can benefit from immunotherapy.

PO-1515

Multi-slice spiral CT study on the anatomical variation of the left renal vein

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Background: To investigate the diagnostic value of multi-slice spiral computed tomography (MSCT) in the anatomical variation of left renal vein (LRV).

Materials and Methods: The clinical and imaging data of 96 patients with LRV variation in our hospital from June 2019 to December 2022 were retrospectively analyzed, and the imaging manifestations, classification, and clinical significance were discussed in combination with the literature.

Results: Among the 96 patients with LRV variation, 30 patients (30/96, 31.25%) were type I (annular aortic type), including 20 cases of type IA, 7 cases of type IB, and 3 cases of type IC. A total of 17 cases (17/96, 17.71%) were type II (complete retroaortic type), with 15 cases were type IIA and 2 cases were type IIB. There were 52 cases (52/96, 54.17%) of type III (abnormal reflux type), with 32 cases of type IIIA and 20 cases of type IIIB. There were 15 cases (15/96, 15.63%) of type IV (delayed confluence type). Taken together, 18 of the 96 patients (18/96, 18.75%) had both types of variants, including 10 cases with other types of variants accompanied by delayed confluence of the LRV, and 5 cases with other types of variants combined with abnormal reflux.

Conclusion: Fully understanding the anatomical variation of renal vein before operation is of great guiding significance for the selection of renal transplant donors, and helps to formulate the best renal surgery plan, guide the correct treatment of renal vein before operation, avoid renal vein tear, bleeding, miscut and misligation, and reduce surgical complications.

PO-1516

The Value of Combined Clinical-Radiomics-Deep Learning Model for Diagnosis of Clinically Significant Prostate Cancer

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Objective: To investigate the diagnostic performance of deep learning model and radiomics model for clinically significant prostate cancer (csPCa), and to establish a mixed model that combines clinical features, radiomics, and deep learning.

Methods: A total of 885 patients with prostate diseases who underwent 3.0 T MRI examination and confirmed by pathology from January 2015 to March 2022 at the First Affiliated Hospital of Soochow University were collected retrospectively. Among them, 531 cases were diagnosed with csPCa, 99 cases were clinically insignificant prostate cancer (ciPCa), and 255 cases were benign lesions. The data were randomly divided into training cohort (n=708) and testing cohort (n=177) at a ratio of 7:3. The radiomics model was built using support vector machine, the deep learning model was constructed using DenseNet, and the mixed model (DR model) was established by combining deep learning and radiomics with logistic regression. Clinical features including prostate-specific antigen (PSA) and Prostate Imaging Reporting and Data System (PI-RADS) score by experienced radiologists were included to establish a clinical-radiomics-deep learning combined model (DRC model). The diagnostic performance of the models and clinical features was evaluated using receiver operating characteristic (ROC) curves, and the areas under the curves (AUCs) was compared using the Delong test. The clinical utility of the models and clinical features was also assessed using Decision curve analysis.

Results: In the test group, the AUCs of radiomics model and deep learning model were 0.88 and 0.86, respectively, with no statistically significant differences between them ($P = 0.6$). Moreover, there were no statistical differences between their AUCs and that of PI-RADS (AUC=0.87) ($P = 0.62, 0.97$). The AUC of DR model was 0.88, which was higher than that of deep learning model ($P = 0.002$), but showed no statistical difference compared to those of radiomics model and PI-RADS ($P = 0.89, 0.59$). The AUC, sensitivity and specificity of DRC model were 0.92, 83% and 87%, respectively. The AUC of DRC model was higher than those of the radiomics model, deep learning model, DR model and PI-RADS (all $P < 0.05$), and the specificity of DRC model was significantly improved compared to PI-RADS (54%) ($P < 0.001$). The decision curve analysis showed that the DRC model achieved a superior net benefit, outperforming PI-RADS.

Conclusion: The diagnostic performance of the radiomics model and the deep learning model is equivalent for csPCa, which is comparable to that of experienced radiologists. The combined clinical-radiomics-deep learning model has highest diagnostic performance for csPCa and is superior to experienced radiologists, which can help reduce unnecessary biopsies.

PO-1517

Prediction of Fuhrman nuclear grade for clear cell renal carcinoma by a multi-information fusion model that incorporates CT-based features of tumor and serum tumor associated material

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Purpose Prediction of Fuhrman nuclear grade is crucial for making informed herapeutic decision in clear cell renal cell carcinoma (ccRCC). The current study aimed to develop a multi-information fusion model utilizing computed tomography (CT)-based features of tumor and preoperative biochemical parameters to predict the Fuhrman nuclear grade of ccRCC in a non-invasive manner.

methods 218 ccRCC patients confirmed by histopathology were retrospectively analyzed. Univariate and multivariate logistic regression analyses were performed to identify independent predictors and establish a model for predicting the Fuhrman grade in ccRCC. The predictive performance of the model was evaluated using receiver operating characteristic (ROC) curves, calibration, the 10-folds cross-validation method, bootstrapping, the Hosmer-Lemeshow test, and decision curve analysis (DCA).

Results R.E.N.A.L. Nephrometry Score (RNS) and serum tumor associated material (TAM) were identified as independent predictors for Fuhrman grade of ccRCC through multivariate logistic regression. The areas under the ROC curve (AUC) for the multi-information fusion model composed of the above two factors was 0.810, higher than that of the RNS (AUC, 0.694) or TAM (AUC, 0.764) alone. The calibration curve and Hosmer-Lemeshow test showed the integrated model had a good fitting degree. The 10-folds cross-validation method (AUC, 0.806) and bootstrap test (AUC, 0.811) showed the good stability of the model. DCA demonstrated that the model had superior clinical utility.

Conclusion A multi-information fusion model based on CT features of tumor and routine biochemical indicators, can predict the Fuhrman grade of ccRCC using a non-invasive approach. This model holds promise for assisting clinicians in devising personalized management strategies.

PO-1518

Fast non-Gaussian diffusion-weighted imaging with deep learning-based reconstruction in locally advanced esophagogastric junction adenocarcinoma: image quality assessment and prediction of microsatellite instability status

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Purpose Deep learning-based reconstruction (DLR) can potentially improve image quality and reduce acquisition time. Microsatellite instability (MSI) esophagogastric junction adenocarcinoma (EGA) is a special molecular phenotype with substantial therapeutic and prognostic significance. We aim to assess the image quality and investigate the feasibility of fast non-Gaussian diffusion-weighted imaging (DWI) with DLR for predicting MSI status in EGA in comparison with conventional reconstruction (CR).

Method Between November 2022 to August 2023, a total of 53 patients with locally advanced EGA were enrolled in this study. Non-Gaussian DWI were acquired by using the standard CR and DLR with a reduced number of excitations, both of which consist of thirteen b-values (0–1500 s/mm²). Image quality of DLR was qualitatively and quantitatively evaluated compared with CR. Six diffusion metrics were extracted from conventional DWI, intravoxel incoherent motion (IVIM) model, and diffusion kurtosis (DK) model. These parameters were compared between two acquisition sequences. The predictive efficacy of various diffusion metrics for predicting MSI status in EGA were analyzed by receiver operating characteristic curves.

Results The mean acquisition time for the DLR (116.25 ± 29.23 sec) was significantly shorter ($p < 0.001$) than for CR (266.48 ± 45.82 sec). DLR showed significant higher image quality than CR in both subjective and objective evaluations in all b value images, but no significant differences were found regarding diffusion parameters. True diffusion coefficient (D), perfusion fraction (f), mean diffusivity (MD), and mean kurtosis (MK) showed significantly different between different MSI status. The combination model of D and MK demonstrated the best predictive efficacy for MSI status in EGA with the highest AUC of 0.933. The DLR-based model showed comparable predictive performance with CR-based model ($p > 0.05$).

Conclusion DLR-based non-Gaussian DWI provides feasible technique with improved image quality and reduced acquisition time for routine clinical use. The DLR-based non-Gaussian DWI of IVIM and DKI model may serve as potential tool for noninvasive prediction of MSI status in EGA patients.

PO-1519

A Radiomics Differentiation Model of “rich blood supply like” Pancreatic Ductal Adenocarcinoma Based on MRI

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Objectives: Construct radiomics-clinical model for a differential diagnosis of “rich blood supply like” pancreatic ductal adenocarcinoma (rPDAC) from focal-mass chronic pancreatitis (MFCP).

Methods: The magnetic resonance images of 38 MFCP patients and 35 PDAC patients containing three non-enhanced sequences and four enhanced sequences were acquired, and 883 radiomics features were extracted from each phasic imaging to build radiomics models using SVM. The single

sequence and multi-sequence image radiomics models were established and then combined with clinical features to obtain the radiomics-clinical model.

Results: The generated radiomics model resulted in an accuracy of 64% in test and 71% in the all the dataset. The model has demonstrated 79% sensitivity and 81% specificity in train dataset. The tumor classifier generated a F1-score of 0.73 for all dataset. AUC of the generated model 0.86 and 0.65 for training and test set, respectively. Radiomics-clinical model performed similar with the multi-sequence radiomics model showed improvement than simple clinical model measuring as 0.86 of AUC for training cohort and 0.65 of AUC for the test cohort.

Conclusions: Radiomics is helpful for a differential diagnosis between MFCP and rbPDAC in clinical practice as a noninvasive and quantitative method

PO-1520

Quantitative differentiation of non-invasive bladder urothelial carcinoma and inverted papilloma based on CT urography

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Purpose: To investigate the value of CT urography (CTU) indicators in the quantitative differential diagnosis of bladder urothelial carcinoma (BUC) and inverted papilloma of the bladder (IPB).

Material and methods: Retrospective analysis of clinical and imaging data of 103 patients who underwent CTU prior to transurethral resection of the bladder tumor or radical cystectomy from January 2019 to December 2022. The imaging data included 6 qualitative indicators and 7 quantitative measures. The recorded clinical information and imaging features were subjected to univariate and multivariate logistic regression analysis to find independent risk factors for BUC, and a combined multi-indicator prediction model was constructed, and the prediction model was visualized using nomogram. ROC curve analysis was used to calculate and compare the predictive efficacy of independent risk factors and nomogram.

Results: Junction smoothness, maximum longitudinal diameter, tumor-wall interface and arterial reinforcement rate were independent risk factors for distinguishing BUC from IPB. The AUC of the combined model was 0.934 (sensitivity = 0.808, specificity = 0.920, accuracy = 0.835), and its diagnostic efficiency was higher than that of junction smoothness (AUC=0.667, sensitivity = 0.654, specificity = 0.680, accuracy = 0.660), maximum longitudinal diameter (AUC=0.757, sensitivity = 0.833, specificity = 0.604, accuracy = 0.786), tumor-wall interface (AUC=0.888, sensitivity = 0.755, specificity = 0.808, accuracy = 0.816) and Arterial reinforcement rate (AUC=0.786, sensitivity = 0.936, specificity = 0.640, accuracy = 0.864).

Conclusion: Above qualitative and quantitative indicators based on CTU and the combination of them may be helpful to the differential diagnosis of BUC and IPB, thus better assisting in clinical decision-making.

PO-1521

Correlation between CT-Based Adipose Variables and Short-Term Postoperative Complications in Clear Cell Renal Cell Carcinoma

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Purpose: The intricate relationship between clear cell renal cell carcinoma (ccRCC), inflammation, and adipose tissue has yielded inconsistent findings. This study aimed to identify non-linearly correlated variables related to short-term complications in ccRCC, enhancing preoperative risk stratification.

Materials and Methods: A retrospective analysis of 218 ccRCC patients (January 2014 to November 2021) stratified by short-term postoperative complications was conducted. Abdominal and perirenal fat variables were assessed via preoperative CT images, alongside collecting inflammatory, adipose-related, and renal function indexes from the latest preoperative evaluation. The generalized sum model was used to identify cut-off intervals for nonlinear variables.

Results: Patients without complications demonstrated higher Mayo Adhesion Probability Score (MAPS), visceral fat area (VFA), and the visceral fat area to total fat area ratio (VFA/TFA). Patients with complications exhibited elevated subcutaneous fat area (SFA) and glomerular filtration rate (GFR). Indices exhibiting non-linear correlations with postoperative complications included total fat area (TFA), VFA, perirenal fat volume (PFV), and lymphocytes. Specific intervals revealed negative correlations with short-term postoperative complications: VFA ($>81.03 \text{ cm}^2$), PFV ($95.20\text{-}365.04 \text{ cm}^3$), and lymphocytes ($<2.08 \times 10^9/\text{L}$).

Conclusion: Preoperative VFA, PFV and lymphocytes are nonlinearly related to short-term postoperative complications in ccRCC patients. These intervals can aid in the risk stratification of ccRCC patients before surgery, allowing for more personalized treatment planning made.

PO-1522

Estimating Vessels Encapsulating Tumor Clusters in Hepatocellular Carcinoma at Pretreatment CT: Prognostic Impact for Outcomes after Transarterial Chemoembolization

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Background and purpose: Vessels encapsulating tumor clusters (VETC) pattern in hepatocellular carcinoma (HCC) may have implications for outcomes after transarterial chemoembolization (TACE). This study aimed to develop and validate a predictive model for estimating VETC pattern using CT imaging features and to compare outcomes between predicted VETC-positive and VETC-negative HCCs after TACE according to the proposed model.

Methods: Patients undergoing liver resection or TACE for HCC from January 2014 to June 2020 were identified from a prospectively maintained bicentric database. A CT-based predictive model for estimating VETC pattern in HCC was developed and validated using two independent sets ($n = 360$ and 255) that underwent resection. Diagnostic performance was calculated for the model. Subsequently, patients in the TACE cohort ($n=120$) were stratified into groups with predicted VETC-positive or VETC-negative HCCs according to the model. The primary outcome was overall survival

(OS), and the secondary outcomes were tumor response rate. These were compared between the two groups with use of the χ^2 test and the log-rank test.

Results: The proposed model for VETC pattern, named the VETC score, incorporated presence of heterogeneous enhancement with septations or with irregular ring-like structures, presence of necrosis and hypovascular enhancement proportion $\geq 20\%$. The area under the receiver operating characteristic curve for the VETC score was 0.844 for training and 0.834 for validation. According to the VETC score, patients with predicted VETC-positive HCCs ($n = 35$) had lower tumor response rate (34.8% vs 65.5%; $P = 0.027$) and worse OS (17.0 months vs 29.5 months; $P < .001$) than those with VETC-negative HCCs ($n = 85$).

Conclusion: The proposed model demonstrated good performance for estimating VETC pattern in HCC. According to the VETC score, patients with predicted VETC-positive HCCs have worse therapeutic outcomes than those with predicted VETC-negative HCCs after TACE.

PO-1523

Predicting Microvascular Invasion in Hepatocellular Carcinoma Using an CT and MRI-Based Multimodality Deep Learning Model

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Purpose: To investigate the value of multimodality deep learning (MDL) model based on CT and MRI for predicting microvascular invasion (MVI) in hepatocellular carcinoma (HCC).

Methods and Materials: Two hundred and eighty-seven patients with HCC from our institution and 58 patients from an external institution from January 2008 to May 2022 were collected. Of these, 119 with only CT images and 116 with only MRI images were selected for training the single-modality models. And then, a multi-modality CT and MRI-based deep learning (MDL) model was developed, incorporating the parameters obtained from the single-modality models by using transfer learning (TL). We input the robust convolutional features extracted from DenseNet121 into extreme learning machine (ELM) classifier to build a classification model. In addition, 110 patients with both CT and MRI images were divided into training cohort ($n=66$) and validation cohort ($n=44$) to train and validate the performance of MDL models. The area under the receiver operating characteristic curve (AUC) was used to evaluate the models' performance.

Results: The AUC of MDL model is of 0.844, which outperformed single-phase CT (AUC = 0.706 to 0.776), single-parameter MRI (AUC = 0.706 to 0.717), single-modality fusion DL model (AUCCT fusion = 0.722, AUCMRI fusion = 0.731), clinical model (AUC = 0.574 to 0.651) and radiological model (AUC = 0.701 to 0.772). When combined with clinical features in a nomogram model, the AUC of MDL model statistically increased from 0.844 to 0.871, resulting in an overall net gain greater than single- or multi-phase CT, single- or multi-parameter MRI, and clinical model.

Conclusions: The MDL model based on CT and MRI images is a valuable noninvasive technique for preoperatively predicting MVI of HCC, and TL technique based on a large number of single modality images may be a potential approach for further improving the performance of MDL model.

PO-1524

Predictive value of computed tomography imaging features in Vessels that encapsulate tumor clusters pattern of HCCYumeng Zhao^{1,2}, shuagnshuang Xie², jiaming Qin^{1,2}, xiaotian Li^{1,2}, cheng Zhang², caixin Qiu², wen Shen²

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Objectives: To investigate the non-invasive prediction of VETC-HCC based on imaging features of contrast-enhanced computed tomography (CE-CT).

Methods: Total 241 HCC patients who underwent CE-CT and immunohistochemical staining for CD34 were retrospectively evaluated between January 2014 and November 2022. In chronological order, 241 HCC patients were divided in chronological order: training (n=169) and validation (n=72) cohorts. Univariate and multivariate analyses identified independent factors for differentiating VETC-HCCs from non-VETC-HCCs. A nomogram and scoring model were developed to assess the probability of VETC-HCC. ROC analysis was employed to assess the efficacy of the two cohorts, while decision curve analysis was utilized to assess the clinical utility of the nomogram.

Results: Tumor size >5 cm (P= 0.030), intratumoral necrosis (P=0.038), and non-smooth margins (P=0.011) were independent predictors of VETC-HCC. Area under the ROC curve of the logistic regression coefficient-based nomogram in the training and validation cohorts were 0.768 and 0.742, respectively. These features were used to construct an SNM model (where S is size, N is necrosis, and M is margin), demonstrating similar predictive capabilities in the training and validation cohorts. Preoperative high SNM phenotype (P<0.001) and VETC-HCC (P=0.028) were linked to early recurrence following surgical resection.

Conclusion: Preoperative CE-CT features and predictive models are applicable for delineating VETC-HCC and have prognostic significance in predicting early recurrence.

PO-1525

Added value of CE-CT radiomics to predict high Ki-67 expression in hepatocellular carcinomaYumeng Zhao^{1,2}, shuangshuang Xie², jiaming Qin^{1,2}, xiaotian Li^{1,2}, caixin Qiu², wen Shen²

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Background: This study aimed to develop a computed tomography (CT) model to predict Ki-67 expression in hepatocellular carcinoma (HCC) and to examine the added value of radiomics to clinico-radiological features. **Methods:** A total of 208 patients (training set, n = 120; internal test set, n = 51; external validation set, n = 37) with pathologically confirmed HCC who underwent contrast-enhanced CT (CE-CT) within 1 month before surgery were retrospectively included from January 2014 to September 2021. Radiomics features were extracted and selected from three phases of CE-CT images, least absolute shrinkage and selection operator regression (LASSO) was used to select features, and the rad-score was calculated. CE-CT imaging and clinical features were selected using univariate and multivariate analyses, respectively. Three prediction models, including clinic-radiologic model (CR), rad-score model (R), and clinic-radiologic-radiomic (CRR) model, were developed and validated using logistic regression analysis. The performance of different models for predicting Ki-67 expression was evaluated using the area under the receiver operating characteristic curve (AUROC) and decision curve analysis (DCA). **Results:** HCCs with high Ki-67 expression were more likely to have high serum α -fetoprotein levels (P= 0.041, odds ratio [OR] 2.54, 95% confidence interval [CI]: 1.04–6.21), non-rim arterial phase hyperenhancement (P = 0.001, OR 15.13, 95% CI 2.87–79.76), portal vein tumor thrombus (P = 0.035, OR 3.19, 95% CI: 1.08–9.37), and two-trait predictor of venous invasion (P = 0.026, OR

14.04, 95% CI: 1.39–144.32). The CR model achieved relatively good and stable performance compared with the R model (AUC, 0.805 [95% CI: 0.683–0.926] vs. 0.678 [95% CI: 0.536–0.839], $P = 0.211$; and 0.805 [95% CI: 0.657–0.953] vs. 0.667 [95% CI: 0.495–0.839], $P = 0.135$) in the internal and external validation sets. After combining the CR model with the R model, the AUC of the CRR model increased to 0.903 (95% CI: 0.849–0.956) in the training set, which was significantly higher than that of the CR model ($P = 0.0148$). However, no significant differences were found between the CRR and CR models in the internal and external validation sets ($P = 0.264$ and $P = 0.084$, respectively). **Conclusions:** Preoperative models based on clinical and CE-CT imaging features can be used to predict HCC with high Ki-67 expression accurately. However, radiomics cannot provide added value.

PO-1526

Development of a radiomics-based model to predict occult liver metastases of pancreatic ductal adenocarcinoma: a multicenter study

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Background: Undetectable occult liver metastases are a blockade to the long-term survival of pancreatic ductal adenocarcinoma (PDAC). This study aimed to develop a radiomics-based model to predict occult liver metastases and assess its ability to predict survival.

Materials and Methods: Patients who underwent surgical resection and were pathologically proved to have PDAC were recruited retrospectively at five tertiary hospitals between January 2015 and December 2020. Radiomics features were extracted from tumors, and the radiomics-based model was developed in the training cohort using LASSO-logistic regression. The model's performance in the internal and external validation cohorts was assessed using the area under the receiver operating curve (AUC). The association of the model's risk stratification with progression-free survival (PFS) and overall survival (OS) was then statistically examined using Cox regression analysis and the log-rank test.

Results: A total of 438 patients (mean [SD] age, 62.0 [10.0] years; 255 [58.2%] male) were divided into the training cohort ($n = 235$), internal validation cohort ($n = 100$), and external validation cohort ($n = 103$). The radiomics-based model yielded an AUC of 0.73 (95% CI: 0.66–0.80), 0.72 (95% CI: 0.62–0.80), and 0.71 (95% CI: 0.61–0.80) in the training cohort, internal validation cohort, and external validation cohort, respectively, higher than the preoperative clinical model. The model's risk stratification was an independent predictor of PFS (all $P < 0.05$) and OS (all $P < 0.05$). Furthermore, the model also demonstrated the added value to the prognostic stratification of TNM staging systems.

Conclusion: The radiomics-based model provided a promising tool to predict occult liver metastases and retained its prognostic significance.

PO-1527

Correlation between quantitative multi-parameters of energy-spectrum CT and short-term prognosis of acute-on-chronic liver failure

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Objective: Analyzing the correlation between clinical features and quantitative multiparametric imaging (conventional and energy-spectral CT) and the prognosis of acute-on-chronic liver failure (ACLF). A comprehensive prediction model for the progression of ACLF was further constructed, and explore the value of applying the model and draw a nomogram to assist in clinical decision making.

Materials and Method: Retrospective collection of ACLF cases between June 2019 and June 2022, ACLF was diagnosed in accordance with the Asia-Pacific Association for the Study of the Liver guidelines, and all patients underwent liver energy-spectrum CT scans within one week before and after the diagnosis of ACLF. Patients were grouped (stable and progressive groups) according to whether disease progression (deterioration, death, or liver transplantation) within 90 days of the diagnosis of ACLF. Independent risk factors associated with disease progression in clinical characteristics and quantitative imaging parameters were identified by logistic regression analysis, and further construct the prediction model and compared with clinical scores. The effectiveness of the model was evaluated by applying the area under the receiver operating characteristic (ROC) curve (AUC), C-index, calibration curve, and decision curve (DCA).

Results: A total of 107 patients were included, with 44 cases in the stable group. Multifactorial logistic regression analysis showed that the clinical characteristics of BUN (OR=1.774, 95% CI: 1.617-1.971; P=0.027) and the quantitative imaging parameters of VCR (OR=0.003, 95% CI: 0.001-0.087; P=0.010), IC-VP (OR=0.820, 95% CI: 0.728-0.924; P=0.001) and NIC-VP (OR=0.002, 95% CI: 0.001-0.026; P=0.004) were independent risk factors for 90-day disease progression in patients with ACLF, and a comprehensive prediction model-nomogram was developed based on the results of regression analysis. The ROC curve showed the highest predictive accuracy of the nomogram with an AUC of 0.893, sensitivity of 84.13%, and specificity of 84.09%, both higher than the clinical model (MELD and MELD-Na scores). The C-index and corrected C-index of the Nomogram were 0.893 (95% CI: 0.833-0.953) and 0.876, respectively, showing good model discrimination. The calibration curves show good agreement between predicted and actual risks. The DCA indicates that the model has good clinical application.

The model combined BUN, VCR, IC-VP and NIC-VP can predict early disease progression within 90 days in patients with ACLF. The nomogram derived from this study allows the assessment and risk stratification of 90-day disease progression in ACLF, providing effective guidance for active and precise implementation of clinical decisions.

PO-1528

Comparison of Image Quality and Radiation Dose of CT Colonography Using Different Low-dose CT Scanning Parameters and Statistic-based Reconstruction Algorithm levels: A Study Using Pig Colonic Phantoms and An Anthropomorphic Phantom

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Objective: To compare image quality and radiation dose on CT colonography (CTC) images acquired using different scanning parameters and reconstruction methods, using both pig colonic phantoms and an anthropomorphic phantom.

Methods: Seven pig colonic phantoms with lengths of approximately 120cm were prepared, with 161 simulated polyps. The simulated polyps were made of small bowel, stomach, and lymph nodes tissue from pigs specimens. Among the 161 polyps, 105 were sessile, 35 were pedunculated, and 21 were flat. The colonic specimens were placed in a large plastic case filled with 45 L of water, and 40 ml of diatrizoatemeglumine was added to water to simulate abdominal absorption. Room air was injected through a 14-F Foley catheter. CT images were scanned under 7 different settings of tube voltages and currents (120, 100, 80kvp, and 50, 30, 10mAs) using a 256-channel multi-detector row CT. Images were reconstructed using a statistical based reconstruction algorithms (iDose4; Philips Healthcare) at a matching workstation, with a level between 3 and 5 selected from a total of 7 levels. Two experienced radiologists independently evaluated all sets of CTC images for image noise and contrast-to-noise ratios (CNRs). Subjective image quality was assessed on a 5-point scale. The anthropomorphic phantom is used for measuring radiation dose scanned under the same parameters as porcine phantoms. Data were analyzed using analysis of variance. Interobserver variability was estimated by using k statistics between the two radiologists. The significance level for all tests was 0.01 (two-sided) to allow for type 2 errors due to multiple testing.

Results: The sensitivities for the two readers to detect all simulated polyps using different scanning parameters ranged from 75 to 100%. The sensitivity of detection of flat polyps tended to be lower than that of sessile polyps and pedunculated polyps. Using the same scanning parameters with different statistical based reconstruction algorithm levels, there were no significant differences ($p < 0.01$) in polyps detection of all sizes and shapes. Using the same statistical based reconstruction algorithm level, there were no significant differences in sensitivities ($p < 0.01$) among all groups except group C3. The rise of reconstruction levels resulted in less image noise and higher CNRs with statistically significant difference ($p < 0.01$). The quality of images among different scanning parameters and statistic-based reconstruction levels remained diagnostic acceptable, and showed no significant differences among all sets ($p > 0.05$). A dose reduction of 84.8% was achieved at 80kVp/30mAs compared with 120kVp/50mAs.

Conclusion: The phantom study shows that image quality of CTC using 80kVp/30mAs with iDose4 level-3 could be comparable to the standard 120kVp/50mAs, which can be used in clinical widely for screening. The anthropomorphic phantom showed screening and diagnostic examinations could be acquired with a potential dose saving of about 84.8% without compromising image quality.

PO-1529

Role of tomoelastography in differentiating between pancreatic neuroendocrine neoplasms and solid pseudopapillary neoplasms

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Objectives: To explore the diagnostic performance of stiffness and fluidity quantified with tomoelastography for the differentiation between pancreatic neuroendocrine neoplasms (pNENs) and solid pseudopapillary neoplasms (SPNs).

Methods: Tomoelastography, a multifrequency magnetic resonance elastography technique, provides high-resolution maps of shear wave speed (c in m/s) and phase angle (ϕ in rad), allowing to evaluate the stiffness and fluidity of the pancreas. This prospective study enrolled 83 untreated patients with pathologically confirmed SPNs and pNENs who underwent pancreatic tomoelastography examination from September 2021 to May 2023. Two radiologists measured the stiffness and fluidity independently and intra/inter-observer agreements were assessed. Multivariate logistic regression analysis was performed to identify independent relevant clinical and radiological features to differentiate SPNs and pNENs. The diagnostic performance of stiffness and fluidity as well as clinical features for discrimination were evaluated by receiver operating characteristic (ROC) curves.

Results: There were 22 patients with SPNs and 61 patients with pNENs (Grade 1, 22 patients; Grade 2, 27 patients; Grade 3 or neuroendocrine carcinoma, 12 patients). Two radiologists showed substantial or near-perfect inter-observer agreements in clinical and radiological features evaluation. SPNs showed significantly lower stiffness (1.870 vs 2.290 m/s, $P < 0.001$) and fluidity (0.950 vs 1.090 rad, $P < 0.001$) than pNENs. The independent relevant factors for the differentiation were age ($P = 0.010$), stiffness ($P = 0.008$) and fluidity ($P = 0.021$) in the multivariate analysis. The area under the curves (AUCs) of stiffness and fluidity for differentiation were 0.879 (cutoff, 2.068 m/s) and 0.844 (cutoff, 1.048 rad), respectively. The differentiate performance of radiological model ($c + \phi$) was better than age (AUC = 0.931 vs 0.812; $P = 0.031$). The differentiate performance of clinical-radiological model ($c + \phi + \text{age}$) was comparable to the radiological model (AUC = 0.961 vs 0.931; $P = 0.071$).

Conclusions: Tomoelastography enables non-invasively and quantitatively to distinguish SPNs from pNENs with higher diagnostic efficacy comparing to clinical features.

PO-1530

Preoperative gadoxetic acid-enhanced MRI features for evaluation of vessels encapsulating tumor clusters and microvascular invasion in hepatocellular carcinoma: nomogram for risk assessment

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Abstract

Objectives: To develop nomograms based on preoperative gadoxetic acid (GA)-enhanced magnetic resonance imaging (MRI) features to predict microvascular invasion (MVI), vessels

encapsulating tumor clusters (VETC) pattern, and recurrence-free survival (RFS) in patients with hepatocellular carcinoma (HCC).

Methods: This retrospective study included 240 patients who underwent radical hepatectomy with a postoperative pathological diagnosis of hepatocellular carcinoma, all of whom received preoperative GA-enhanced MRI. Patients were assigned at random to training cohort ($n = 168$) and validation cohort ($n = 72$) according to 7:3 ratio. Multivariate logistic regression analyses were used to screen out the independent risk factors to predict MVI-HCC, VETC-HCC, and a combination of VETC and MVI (VETC+/MVI+ HCC) in HCC in the training set, and then the nomogram models were further established. The area under the curve (AUC), calibration curve, and decision curve analysis (DCA) were used to evaluate the predictive performance and discriminative ability of the nomogram, and the results were validated in the validation dataset. Risk scores were stratified according to three nomogram models, and the Kaplan-Meier method was used to plot recurrence-free survival (RFS) curves for high- and low-risk groups.

Results: Serum protein induced by vitamin K absence or antagonist-II (PIVKA-II) level >40 mAU/mL (odds ratio [OR], 4.283; $p = 0.025$), arterial peritumoral enhancement (OR, 5.289; $p = 0.003$), intratumoural vessels (OR, 4.033; $p = 0.015$), and nonsmooth tumor margin (OR, 3.621; $p = 0.019$) as independent predictors of MVI-HCC. Predictors of VETC-HCC included PIVKA-II level >40 mAU/mL (OR, 3.658; $p = 0.005$), $\geq 50\%$ arterial phase hypovascular component (OR, 3.529; $p = 0.040$), peritumoral hypointensity on hepatobiliary phase (HBP) (OR, 5.885; $p = 0.002$), and lower relative intensity ratio (RIR) on HBP images (OR, 0.009; $p = 0.001$). PIVKA-II level >40 mAU/mL (OR, 6.507; $p = 0.030$), arterial peritumoral enhancement (OR, 8.194; $p = 0.001$), and lower RIR on HBP images (OR, 0.001; $p = 0.007$) were significantly associated with VETC+/MVI+ HCC. The area under the curves (AUCs) of the predictive models for evaluating MVI, VETC and VETC+/MVI+ were 0.892 and 0.839, 0.848 and 0.810, 0.888 and 0.882 in the training and validation cohorts, respectively. Calibration plots and DCA also showed superior predictive performance. In the three prediction models based on nomograms, patients in the high-risk subgroups performed the poorer RFS than in the low-risk subgroups, similarly, patients in the pathologically-confirmed positive expression subgroups performed the poorer RFS than pathologically-confirmed negative expression subgroups (all $p < 0.001$).

Conclusions: Nomograms based on preoperative GA-enhanced MRI characteristics and clinical serological parameters showed good predictive performance in the preoperative noninvasive assessment and postoperative RFS of MVI, VETC, and VETC+/MVI+ in HCC.

PO-1531

A comparative study of constructing prediction models for muscle invasive of bladder cancer based on different machine learning algorithms combined with MRI radiomic

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OBJECTIVE: To explore the comparative study of constructing prediction models for muscle invasive of bladder cancer based on different machine learning algorithms combined with MRI radiomic.

METHODS: Data of bladder cancer patients who underwent MRI examination in our hospital from October 2016 to March 2020 and confirmed by pathology were retrospectively collected. The patients were divided into MIBC group and NMIBC group according to the surgical pathology results. Tumor volume of interest (VOI) was outlined on the three sequence images of T2WI, DWI, and ADC, and the radiomic features were extracted by A.K software, and dimensionality reduction was performed using the maximum correlation minimum redundancy (mRMR) algorithm combined with LASSO. Six machine learning algorithms, including K Nearest Neighbor (KNN), Decision Tree (DT), Support Vector Machine (SVM), Logistic Regression (LR), Random Forest (RF), and Explanatory

Booster Machine (EBM), were used to construct the radiomic model and calculate the corresponding area under the curve (AUC), accuracy, sensitivity, and specificity, respectively.

RESULTS: Six machine learning algorithms, including KNN, DT, SVM, LR, RF, and EBM, were used to construct the model, and the AUC values for predicting muscle invasive of bladder cancer in the training set were 0.863, 0.838, 0.853, 0.866, 0.977, 0.997, and in the test set were 0.748, 0.833, 0.860, 0.868, 0.870, 0.900. Among them, the MRI radiomic model constructed based on EBM had the highest predictive efficacy for muscle invasive of bladder cancer, with AUC values, accuracy, sensitivity and specificity of 0.997, 97.7%, 95.7% and 98.1% in the training set, and 0.900, 87.7%, 80.0%, and 89.4% in the testing set, respectively.

CONCLUSION: Machine learning algorithms combined with MRI radiomic to construct models have good predictive efficacy for muscle invasive of bladder cancer, and the model constructed based on EBM shows the highest predictive value.

PO-1532

CT-based radiomics signature of visceral adipose tissue and bowel lesions for identifying patients with Crohn's disease at high risk of primary nonresponse to infliximab

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Purpose

Approximately 13%–40% of patients with Crohn's disease (CD) show a primary nonresponse to infliximab (IFX). Recent evidences show that computed tomography (CT) based radiomics features could potentially identify CD patients at high risk of primary nonresponse to IFX. However, their predictive efficacy still needs to be improved. Visceral adipose tissue (VAT) has recently been considered to effect on IFX therapy. We developed a comprehensive radiomics model (RM) combining with VAT and bowel features to compare with bowel-RM alone, to explore whether VAT can further improve the predictive efficacy on the basis of bowel RM.

Methods

This retrospective study included 244 CD patients (training cohort, n=119; test cohort 1, n=51; test cohort 2, n=74) recruited from two tertiary referral centres. The outcome of IFX induction therapy at week 14 was classified as primary response or nonresponse. A machine-learning VAT-RM and bowel-RM were separately developed using the selected CT features and support vector machine classifier to identify CD patients with primary nonresponse to IFX. Finally, a comprehensive model that consisting of VAT and bowel radiomics features was further established to verified whether features extracted from VAT could potentially provide more information to improve the prediction efficacy of bowel-RM. Area under the operating characteristic (ROC) curve (AUC) and decision curve analysis were used to compared the prediction performance. The clinical utility of the comprehensive model was then compared using integrated differentiation improvement (IDI).

Results

VAT-RM and bowel-RM exhibited comparable performance for identifying patients with primary nonresponse in test cohort 1 [AUC of VAT-RM, 0.720(95% CI, 0.577-0.837); AUC of bowel-RM, 0.789 (95% CI, 0.652-0.891)] and test cohort 2 [AUC of VAT-RM, 0.725(95% CI, 0.609-0.823); AUC of bowel-RM, 0.789 (95% CI, 0.678-0.875)], with a relatively good net benefit in clinical utility. Adding VAT-RM into bowel-RM to develop a comprehensive RM, this model yielded a satisfactory predictive efficacy in test cohort 1 (AUC=0.848, 95% CI, 0.720-0.933) and test cohort 2 (AUC=0.839, 95% CI, 0.735-0.914). Moreover, the comprehensive RM significantly improved

predictive efficacy compared with bowel-RM alone in test cohort 1 (IDI=8.3%, $P<0.001$) and test cohort 2 (IDI=12.2%, $P<0.001$).

Conclusion

VAT has effect on IFX treatment response and improves the performance for identification of CD patients at high risk of primary nonresponse to IFX therapy.

PO-1533

Prediction of Postoperative Reintervention Risk for Uterine Fibroids using CE-T1WI Radiomics Nomogram before High-Intensity Focused Ultrasound Ablation

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Objective: To develop and validate a contrast enhancement T1-weighted imaging (CE-T1WI)-based radiomics nomogram for predicting postoperative reintervention risk for uterine fibroids before high-intensity focused ultrasound (HIFU) ablation.

Materials and Methods: Retrospective continuous collection of 189 patients with uterine fibroids treated by HIFU between 2018 and 2021 (43 reintervention; 146 non-reintervention). All patients were randomly divided into a training cohort ($n=132$) and a validation cohort ($n=57$). The smote algorithm was used to oversample the minority (reintervention) class and undersample the majority (non-reintervention) class in the training cohort to achieve class balance. Multivariate analysis was used to determine independent clinical-imaging features that predicted the risk of reintervention for uterine fibroids. The maximum correlation minimum redundancy and least absolute shrinkage and selection operator were used to select the optimal radiomics features. The rad-score for each patient was calculated by a linear combination of selected features and their coefficients. Logistic regression was used to construct a clinical-imaging model based on independent clinical-imaging features, a radiomics model based on the rad-score, and a radiomics nomogram incorporating the rad-score and independent clinical-imaging features. Receiver operating characteristic (ROC) curves and decision curve analysis (DCA) were used to evaluate the models'; predictive performance and clinical application. The integrated discrimination index (IDI) was used to compare the predictive performance of the models.

Results: Age ($p<0.001$), fibroid volume ($p=0.001$), and fibroid enhancement degree ($p=0.001$) were independent clinical-imaging features. The area under the ROC curves (AUC) of the radiomics model was 0.845 (95% CI: 0.799-0.890) and 0.822 (95% CI: 0.659-0.984) in the training and validation cohorts, respectively. The AUC of the radiomics nomogram was 0.869 (95% CI: 0.828-0.911) and 0.801 (95% CI: 0.682-0.920) in the training and validation cohorts, respectively. The specificity and sensitivity of the radiomics nomogram in the training cohort were 0.853 and 0.724, respectively. The specificity and sensitivity of the radiomics nomogram in the validation cohort were 0.646 and 0.889, respectively. The IDI results showed a significant improvement in the overall predictive performance of 12.5% (training cohort, $p<0.001$) and 14.0% (validation cohort, $p=0.019$) for the radiomics nomogram compared to the clinical-imaging model. The DCA indicated that the radiomics nomogram had more excellent clinical application value across most risk thresholds.

Conclusion: CE-T1WI-based radiomics nomogram can effectively predict the risk of reintervention after HIFU ablation for uterine fibroids. The nomogram has the potential to assist clinicians in formulating accurate and individualized treatment plans to reduce the incidence of reintervention. Furthermore, it may help develop early chronic disease management plans following HIFU ablation to improve patients'; long-term quality of life.

PO-1534

Highly Accurate Large-Scale Pancreatic Cancer Detection via Noncontrast CT and AI

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Introduction:

Early or incidental detection of pancreatic ductal adenocarcinoma (PDAC) is associated with prolonged survival. Noncontrast CT imaging routinely performed for established clinical indications offers an opportunity for large-scale screening of asymptomatic adults. The objective of this study was to develop a novel approach – PANcreatic cancer Detection with AI (PANDA) – that can detect and classify pancreatic lesions, via noncontrast CT imaging modality alone.

Methods:

The design of the algorithm leverages supervision from contrast-enhanced CT annotations and pathology-level ground truth labels, incorporating diagnostic cues from pancreas-lesion global morphology and local texture information. PANDA is trained on a large curated dataset with 3208 patients from a single center and has been extensively evaluated in a larger international multi-center validation study cohort of 6239 patients from 10 centers, two reader studies of 48 radiologists, and a real-world multi-scenario (i.e. involving patients from a combination of physical exam, emergency department, outpatient, and inpatient visits) validation cohort consisting of 20530 consecutive patients from a high-volume pancreatic cancer institution (ChiCTR2200064645).

Results:

PANDA generalizes well across multi-center datasets with reported AUCs (area under the curve) of 0.986–0.996, outperforms mean radiologist scores by 34.1% in sensitivity and 6.3% in specificity on PDAC identification, and achieves a sensitivity of 92.9% and a specificity of 99.9% for pancreatic lesion detection in real-world validation studies.

Conclusions:

PANDA may potentially serve as a new tool for large-scale (opportunistic or designed) pancreatic cancer screening that is highly accurate, readily distributable across medical institutions, cost-effective and highly beneficial to patients. Furthermore, our method for developing an AI system on noncontrast CT could also feasibly be generalized to other cancer screening tasks.

PO-1535

Development of a diagnostic model based on Contrast-Enhanced CT to distinguish Clear Cell Renal Cell Carcinoma from Small Renal Masses

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Objectives

This study aimed to develop and validate a diagnostic model based on contrast-enhanced CT for distinguishing clear cell renal cell carcinoma (ccRCC) from small renal masses (SRMs).

Methods

This retrospective multicenter study enrolled patients with pathologically confirmed SRMs. Two radiologists evaluated the imaging features of all tumours on CT and gave the diagnostic results. Univariate and multivariate logistic regression analyses were used to screen independent risk factors for ccRCC and build the classification and regression tree (CART) diagnostic model. Data from three centers were used as training set ($n=229$), with data from one center serving as an independent external validation test set ($n=81$). The average value of the areas under the curve (AUC) was used as the evaluating indicator of the model. The AUCs of different models were compared by DeLong test.

Results

There were 310 SRMs in 309 patients. A total of 71% (220/310) of patients were ccRCC. Enhancement pattern, early dark cortical band (EDCB), the ratio of lesion to normal cortex attenuation (L/C) in the corticomedullary phase, non-enhancing phase L/C and gender were used to develop the CART model. In the testing cohort, the AUC of the CART model was 0.903 (95%CI 0.807, 0.974). Compared with the assessment results of two radiologists, the CART model had a higher AUC value (0.903 vs. 0.694, $P = 0.0005$; 0.903 vs. 0.616, $P < 0.0001$).

Conclusion

The CART diagnostic model can distinguish ccRCC from SRMs with a diagnostic efficacy that is better than that of experienced radiologists, potentially reducing the number of unnecessary biopsies.

Clinical relevance statement

An easy-to-use, highly interpretable decision tree model was developed in this study for the diagnosis of SRMs, which could be used as a tool for risk stratification to reduce unnecessary surgery and biopsy of patients and assist clinical decision-making.

PO-1536

Prediction of postoperative disease-free survival in colorectal cancer using CT radiomics nomogram: a multicenter study

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Objectives To explore the value of CT radiomics nomogram in predicting disease-free survival (DFS) of patients with colorectal cancer (CRC) after operation.

Methods A total of 569 CRC patients from three centers were retrospectively included. Radiomics features were extracted from portal venous phase CT images, and the Least absolute shrinkage and selection operator Cox regression algorithm was employed to select radiomics features. Clinical risk factors associated with DFS were selected through univariate and multivariate Cox regression analysis to build the clinical model. A predictive nomogram was developed by amalgamating pertinent clinical risk factors and radiomics features. The predictive performance of the nomogram was evaluated by the C-index, calibration curve and decision curve analysis. DFS probabilities were estimated using the Kaplan-Meier method, with comparisons made using the log-rank test.

Results Integrating the retained 15 radiomics features and three clinical risk factors (pathological N stage, microsatellite instability, peripheral nerve invasion), a nomogram was constructed. The C-index for the nomogram were 0.811 (95% CI: 0.789-0.833), 0.810 (95% CI: 0.772-0.848), 0.797 (95% CI: 0.766-0.828), and 0.794 (95% CI: 0.760-0.828) in the training set, internal validation set,

external validation set 1, and external validation set 2, respectively. The calibration curves demonstrated a favorable congruence between the predicted and observed values as depicted by the nomogram. The decision curve analysis underscored that the nomogram yielded a heightened clinical net benefit.

Conclusions The constructed radiomics nomogram, amalgamating the radiomics features and clinical risk factors, exhibited commendable performance in the individualized prediction of postoperative DFS in CRC patients.

PO-1537

Comparison of preoperative CT- and MRI-based multiparametric radiomics in the prediction of lymph node metastasis in rectal cancer

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Abstract

Objective To compare computed tomography (CT)- and magnetic resonance imaging (MRI)-based multiparametric radiomics models and validate a multi-modality, multiparametric clinical-radiomics nomogram for individual preoperative prediction of lymph node metastasis (LNM) in rectal cancer (RC) patients.

Methods 234 rectal adenocarcinoma patients from our retrospective study cohort were randomly selected as the training ($n = 164$) and testing ($n = 70$) cohorts. The radiomics features of the primary tumor were extracted from the non-contrast enhanced computed tomography (NCE-CT), the enhanced computed tomography (CE-CT), the T2-weighted imaging (T2WI) and the gadolinium contrast-enhanced T1-weighted imaging (CE-T1WI) of each patient. Three kinds of models were constructed based on training cohort, including the Clinical model (based on the clinical features), the radiomics models (based on NCE-CT, CE-CT, T2WI, CE-T1WI, CT, MRI, CT combining with MRI) and the clinical-radiomics models (based on CT or MRI radiomics model combining with clinical data) and Clinical-IMG model (based on CT and MRI radiomics model combining with clinical data). The performances of the 11 models were evaluated via the area under the receiver operator characteristic curve (AUC), accuracy, sensitivity, and specificity in the training and validation cohort. Differences in the AUCs among the 11 models were compared using DeLong's test. Finally, the optimal model (Clinical-IMG model) was selected to create a radiomics nomogram. The performance of the nomogram to evaluate clinical efficacy was verified by ROC curves and decision curve analysis (DCA).

Results The MRI radiomics model in the validation cohort significantly outperformed than CT radiomics model (AUC, 0.785 vs. 0.721, $p < 0.05$). The Clinical-IMG nomogram had the highest prediction efficiency than all other predictive models ($p < 0.05$), of which the AUC was 0.947, the sensitivity was 0.870 and the specificity was 0.884.

Conclusion MRI radiomics model performed better than both CT radiomics model and Clinical model in predicting LNM of RC. The clinical-radiomics nomogram that combines the radiomics features obtained from both CT and MRI along with preoperative clinical characteristics exhibits the best diagnostic performance.

PO-1538

PI-RADS version 2.1 evaluation of prostate 'nodules in nodule': clinical, imaging and pathological features

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Abstract

Objectives: To analyze whether the imaging features of prostate 'nodules in nodule' are correlated with other clinical and pathological indicators of the prostate.

Methods: We retrospectively analyzed the prostate images of 47 male patients who underwent MRI scans and pathological biopsy examinations from January 2022 to July 2023. Two radiologists (R1/2) evaluated the morphology and signal intensity of the 'nodules in nodule' in a double-blind manner and calculated the PI-RADS v2.1 score. The results were compared with the clinical indicators and pathological results of the prostate.

Results: Third-four percent (16/47) of patients were pathologically diagnosed with prostate cancer. There were significant statistical differences in total PSA, free/total PSA, PSAD and volume between PCa and BPH patients. On MRI, R1/R2 detected 17/16 prostate 'nodules in nodule', of which 10.60% (16/151) (R1) and 10.46% (16/153) (R2) had a DWI PI-RADS v2.1 score of 4 and 0.66% (1/151) (R1) had a score of 3. The proportion of 'nodules in nodule' pathologically conformed as PCa with encapsulated, circumscribed or atypical nodules (partially or completely absent capsule) and obscured boundaries was 0.00% (0/151), 0.00% (0/151), 5.96% (9/151), 5.30% (8/151) for R1 and 0.00% (0/153), 0.00% (0/153), 5.88% (9/153), 4.58% (7/153) for R2, respectively. **Conclusion:** Prostate 'nodules in nodule' with a PI-RADS v2.1 category 1 showing incomplete capsulation or obscured boundaries on T2WI and DWI PI-RADS V2.1 ≥ 4 should be updated to PI-RADS V2.1 category 3. Total PSA ≥ 18.01 ng/ml or PSAD ≥ 0.57 is a high-risk factor for PCa.

PO-1539

Curled edge Sign of Epstein-Barr virus-associated gastric cancer on CT imaging

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Objective: To assess the appearance of Epstein-Barr virus-associated gastric (EBVaGC) on CT imaging and to investigate the potential of qualitative and quantitative CT images analysis to differentiate EBVaGC from gastric cancer not associated with EBV infection (EBVnGC).

Materials and methods: This study reviewed an institutional database of patients who underwent resection of GC and identified patients with EBVaGC and Random matching patients with the same amount of EBVnGC. The imaging characteristics and correlated histopathological basis of the cancers on CT were investigated.

Results: Sixty-four patients with EBVaGC were classified as EBVaGC group in this study. After matching EBVaGC (n = 64) and EBVnGC patients (n = 64), a total of 128 cases were analyzed. The binary logistic regression analysis showed that the location, thickness to length ratio and the curled edge sign of tumor were independent predictors of EBVaGC, with an area under the curve (AUC) of 0.78 on the receiver operating characteristic (ROC) curve analysis.

Conclusion: Three CT features, including the location, thickness to length ratio and curled edge sign of the tumor, are good predictors of patients with EBVaGC.

PO-1540

Predictive value of modified MRI-based split scar sign (mrSSS) score for pathological complete response after neoadjuvant chemoradiotherapy for patients with rectal cancer

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Purpose To measure the diagnostic performance of modified MRI-based split scar sign (mrSSS) score for the prediction of pathological complete response (pCR) after neoadjuvant chemoradiotherapy (nCRT) for patients with rectal cancer.

Methods The modified MRI-based split scar sign (mrSSS) score, which consists of T2-weighted images (T2WI)-based score and diffusion-weighted images (DWI)-based score. The sensitivity, specificity, and accuracy of modified mrSSS score, endoscopic gross type, and MRI-based tumor regression grading (mrTRG) score, in the prediction of pCR, were compared. The prognostic value of the modified mrSSS score was also studied.

Results A total of 189 patients were included in the study. The Kendall's coefficient of interobserver concordance of modified mrSSS score, T2WI -based score, and DWI-based score were 0.899, 0.890, and 0.789 respectively. And the maximum and minimum k value of the modified mrSSS score was 0.797 (0.742–0.853) and 0.562 (0.490–0.634). The sensitivity, specificity, and accuracy of prediction of pCR were 0.66, 0.97, and 0.90 for modified mrSSS score; 0.37, 0.89, and 0.78 for endoscopic gross type (scar); and 0.24, 0.92, and 0.77 for mrTRG score (mrTRG=1). The modified mrSSS score had significantly higher sensitivity than the endoscopic gross type and the mrTRG score in predicting pCR. Patients with lower modified mrSSS scores had significantly longer disease-free survival ($P<0.05$).

Conclusion The modified mrSSS score showed satisfactory interobserver agreement and higher sensitivity in predicting pCR after nCRT in patients with rectal cancer. The modified mrSSS score is also a predictor of disease-free survival.

PO-1541

Association between radiomics features of visceral fat derived from computed tomography enterography (CTE) and short-term prognosis in UC disease

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Purpose: Intestinal inflammation induces dynamic changes in the balance between water and lipid content in visceral fat especially the adipose tissue which around the intestinal as captured by CT attenuation index in standard computed tomography enterography (CTE). Emerging evidence points to a link between visceral fat and illness behaviour and prognosis of ulcerative colitis (UC). This study aimed to establish and validate radiomics signatures using radiomics features of visceral fat for early assessing short-term prognosis in UC.

Methods: 138 patients from two center in local institution were enrolled. Among them, 66 patient could benefit from the basic treatment plan (mesalazine, steroids and azathioprine) and achieve remission and the other 72 not. 851 radiomics features were extracted from the third lumbar level based on CTE images. The features were selected using Mann-Whitney U-test, Pearson correlation and followed by refining using least absolute shrinkage and selection operator (LASSO) regression combing 5-fold cross-validation. The optimal radiomics features were processed by Logistic Regression (LR), Support Vector Machine (SVM) and Random Forest (RF) to construct

prediction models for early identifying patients who could not achieve remission. The radiomics signatures were developed in the train (n=96) and validated in the validation dataset (n=42) from another center. The performance of the radiomics signatures were evaluated using discrimination and calibration.

Results: Three radiomics signatures constructed by three different machine learning algorithm comprising of six robust features were built. The Random Forest signature showed the highest AUC of 0.811/0.781 in the train and validation dataset. The accuracy, sensitivity and specificity were 85.00%, 86.21%, 68.00% and 76.76%, 72.00%, 81.82% in the training and validation dataset. The Hosmer-Lemeshow test concluded that the radiomics signatures showed goodness of fit (all $p > 0.05$).

Conclusion: The CTE-based radiomics features profiling of visceral fat detects the structural remodeling associated with UC, which might attribute to inflammation. A new artificial intelligence-powered imaging biomarker can be a promising approach for early identify the patient who could not benefit from the basic treatment plan, which contributes to making a tailored and upgrading treatment decision timely.

PO-1542

Arterioportal Shunt as a Prognostic Factor in HCC Patients Treated With DEB-TACE

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Purpose: To investigate the influence of Arterioportal Shunt (APS) on treatment response and postoperative complications after drug-eluting beads transcatheter arterial chemoembolization (DEB-TACE) for hepatocellular carcinoma (HCC).

Materials and Methods: We prospectively included 102 patients received DEB-TACE for HCC, follow-up with contrast-enhanced-MRI (CE-MRI) for 12 months, from December 2017 to December 2020. Two radiologists independently assessed APS and other related imaging features. Response was assessed by using changes in viable tumor volume by using modified RECIST (mRECIST). Factors influencing APS and complication rate were identified by logistic regression model.

Results: A total of 76 patients developed APS. Patients occurred APS at early term (within 1.5 month) after latest DEB-TACE show better treatment response and more obvious tumor reduction rate than patients without APS (All $P < 0.05$). Direct bilirubin (DB) was an risk factor for APS, patients with lower DB were more likely to develop APS ($P < 0.001$). Besides, APS is significantly correlated to biliary injury ($P < 0.001$).

Conclusion: The occurrence of APS indicates a positive response to DEB-TACE treatment in HCC patients, however, it is noteworthy that there may be increased risk of biliary injury and further validation is needed.

PO-1543

Progress in the application of dual-energy CT in pancreatic diseases

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Pancreatic diseases are difficult to diagnose due to their insidious onset and complex pathophysiological developmental characteristics. In recent years, dual-energy computed tomography (DECT) imaging technology has rapidly advanced. DECT can quantitatively extract and analyze medical imaging features and establish a correlation between these features and clinical results. This feature enables the adoption of more modern and accurate clinical diagnosis and treatment strategies for patients with pancreatic diseases so as to achieve the goal of non-invasive, low-cost, and personalized treatment. The purpose of this review is to elaborate on the application of DECT for the diagnosis, biological characterization, and prediction of the survival of patients with pancreatic diseases (including pancreatitis, pancreatic cancer, pancreatic cystic tumor, pancreatic neuroendocrine tumor, and pancreatic injury) and to summarize its current limitations and future research prospects.

PO-1544

Preoperative CT features for characterization of vessels that encapsulate tumor clusters in primary hepatocellular carcinoma

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Purpose This study aimed to estimate the potential of preoperative CT in the prediction of vessels that encapsulate tumor clusters (VETC) in primary hepatocellular carcinoma (HCC) and to evaluate whether the estimations are associated with recurrence after hepatic resection.

Materials and Methods From January 2015 to October 2021, patients who underwent curative resection and preoperative CT were retrospectively included in the hospital. Clinical and imaging features related to histopathologic VETC status (VETC + or VETC-) were determined by logistic regression analyses. Early recurrence was determined using the Kaplan–Meier survival curve. Prognostic factors associated with early recurrence after surgical resection were identified by using Cox regression analyses. P value < 0.05 was considered statistically significant.

Result In total, 212 patients (median age, 57 years; interquartile range, 21-88 years; 185 women) were evaluated. The multivariable logistic regression analyses revealed total bilirubin(TBL) > 17.1umol/l (odds ratio [OR], 4.981; 95% confidence interval [CI]: 2.132, 11.638; p = 0.000), arterial peritumoral enhancement (OR,4.894; 95% CI:1.923, 12.452; p = 0.001) and intratumor vascularity (OR, 2.499; 95% CI:1.116, 5.95; p = 0.026) as independent predictors of VETC of HCC. In Kaplan–Meier survival analysis, the VETC status was associated with early and overall recurrence (p = 0.001, P=0.000). In the Cox proportional hazard regression model, VETC+ (hazard ratio [HR], 2.211; 95% CI: 1.319, 3.707; p = 0.003), intratumor vascularity (HR,1.595; 95% CI:1.004, 2.535; p = 0.048) and the number of the tumor (HR, 1.84; 95% CI: 1.023, 3.312; p = 0.042) were independently associated with early recurrence.

Conclusion Preoperative CT features could be used for the characterization of vessels that encapsulate tumor clusters pattern and were of prognostic significance for early recurrence in patients with hepatocellular carcinoma.

PO-1545

A modified targetoid feature emphasizing thin-rim APHE to improve the diagnostic performance of LI-RADS for malignant hepatic tumors

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Objective: The Liver Imaging Reporting and Data System version 2018 (LI-RADS v2018) provided a LI-RADS M (LR-M) category for hepatic observations that reflect probable or definite malignancy but not specific to HCC. To identify imaging features that help distinguish between HCCs and non-HCC malignancies assigned to LR-M and evaluate the diagnostic performance of a LI-RADS with modified targetoid criteria using thin-rim Arterial phase hyperenhancement (APHE).

Methods: This retrospective study included 381 patients (387 observations) at high-risk for HCC who underwent enhanced-MRI before surgery. The tumor diagnosis was based on histopathological examination. Two radiologists reviewed imaging findings for LI-RADS categorization of hepatic observations. The thin-rim ($< 30\%$) APHE was defined based on the thickest thickness of rim APHE compared with the tumor radius, on the contrary, if the thickness of the thickest part of the rim-enhancement was between 30% and 70% of the tumor radius, it was defined as thick-rim APHE. And a modified LI-RADS emphasizing thin-rim APHE as a specific feature of LR-M was established. We compared the diagnostic performance of conventional LI-RADS and modified LI-RADS.

Results: Thin-rim APHE, targetoid diffusion-weighted imaging (DWI), and bile duct dilatation were found as independent predictive factors of non-HCC malignancies, while enhancing capsule and peripheral washout were noted as independent variables significantly associated with HCC of LR-M ($P < 0.05$). The noticeable performance of thin-rim APHE in distinguishing non-HCC malignancies from HCCs was evaluated by ROC curve. Emphasizing thin-rim APHE on targetoid features, the modified LR-M revealed significantly superior specificity and accuracy (89.4% vs. 81.1%, $P=0.004$; and 87.9% vs. 82.2%, $P=0.027$, respectively) while maintaining high sensitivity (82.2% vs. 86.0%; $P=0.529$) compared with the LR-M. Meanwhile, the modified LI-RADS 5 (LR-5) achieved greater sensitivity and accuracy (88.6% vs. 79.7%, $P=0.004$; and 85.8% vs. 80.1%, $P=0.036$, respectively) for diagnosing HCC, without compromising specificity (78.3% vs. 81.1%; $P=0.608$) compared with the LR-5.

Conclusion: Thin-rim APHE may be the specific imaging feature for differentiating non-HCC malignancies from HCCs within LR-M. The modified targetoid criteria emphasizing thin-rim APHE can improve the diagnostic performance of LI-RADS for hepatic malignancies.

PO-1546

Predicting mismatch-repair status in rectal cancer using multiparametric MRI-based radiomics models: A preliminary study

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Objective Detecting mismatch-repair (MMR) status is crucial for personalized treatment strategies and prognosis in rectal cancer (RC). A preoperative, non-invasive and cost-efficient predictive tool for MMR is critically needed. Therefore, this study developed and validated machine learning radiomics models for predicting MMR status in patients directly on preoperative MRI scans.

Methods Pathologically confirmed RC cases administered surgical resection in our hospital were examined in this retrospective trial. Totally 78 and 33 cases were included in the training and test sets, respectively. Then, 65 cases were enrolled as a validation set. Radiomics features were obtained from preoperative rectal MR images comprising T2-weighted imaging (T2WI), diffusion-weighted imaging (DWI), contrast-enhanced T1-weighted imaging (T1WI) and combined multi-sequences. Optimal features related to MMR status were selected by the least absolute shrinkage and selection operator (LASSO) method. Support vector machine (SVM) learning was adopted to establish four predictive models, i.e., ModelT2WI, ModelDWI, ModelCE-T1WI and Modelcombination, whose diagnostic performances were determined and compared by receiver operating characteristic (ROC) curves and decision curve analysis (DCA).

Results Four optimal radiomics features for predicting MMR status from combined sequences were selected to build Modelcombination, which provided a better performance compared with other models in all data sets (all $p < 0.05$). The usefulness of the proposed model was confirmed by DCA. Therefore, the present pilot study showed the radiomics model combining multiple sequences derived from preoperative MRI is effective in predicting MMR status in RC cases.

Conclusions The present pilot study showed the radiomics model derived from preoperative MRI is effective in predicting MMR status in patients with RC. In addition, the model combining multiple sequences might show improved performance.

PO-1547

Differential diagnosis of dual-phenotype hepatocellular carcinoma (DPHCC) from non-DPHCC and intrahepatic cholangiocarcinoma (ICC) based on MRI radiomics and deep learning models

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Objectives: To develop and validate radiomics and deep learning models based on contrast-enhanced MRI (CE-MRI) for differentiating dual-phenotype hepatocellular carcinoma (DPHCC) from non-DPHCC and intrahepatic cholangiocarcinoma (ICC).

Methods: Our study consisted of 306 patients from two centers with 102 DPHCCs, 108 non-DPHCCs, and 96 ICCs who were randomly divided into a training set ($n=244$) or a validation set ($n=62$). Radiomics and deep transfer learning (DTL) models based on CE-MRI were established for differential diagnosis, respectively, and their predictive performances were compared using the confusion matrix and area under the receiver operating characteristic (ROC) curve (AUC).

Results: The AUC and accuracy of the DTL models were mostly higher than the radiomics models, especially in the vgg19 model. The accuracy, macro-AUC, and F1-score of the combined radiomics model were 0.72, 0.91, and 0.71 in validation set. The accuracy, macro-AUC, and F1-score of the vgg19 model were all higher than 0.85. In the validation set, the accuracy, macro-AUC, and F1-score of the vgg19-combined model were 0.92, 0.98, and 0.92. Furthermore, the fusion models exhibited higher predictive efficacy, the accuracy, macro-AUC, and F1-score were all higher than 0.9 in the Fusion-vgg19-combined model. In the validation set, the accuracy, macro-AUC, and F1-score of the Fusion-vgg19-combined model were 0.94, 0.98, and 0.95.

Conclusions: Both the radiomics and the DTL models were able to differentiate DPHCC from non-DPHCC and ICC before surgery. DTL models tend to be superior to radiomics models, and the fusion models showed better diagnostic accuracy.

PO-1548

Evaluation of image quality and diagnostic performance of deep learning-based reconstruction of prostate T2WI for transition zone prostate cancer

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Objective Comparison with standard T2-weighted imaging, we evaluated the image quality and diagnostic performance of prostate T2-weighted imaging reconstructed based on deep learning known as T2 Deep Learning for transition zone prostate cancer. **Methods** 79 patients who underwent prostate MRI for elevated prostate specific antigen from December 2020 to September 2022 were prospectively consecutively collected from Beijing Hospital. Scan sequences included axial T2-weighted imaging (T2WI) and T2 Deep Learning, axial diffusion-weighted imaging (DWI), and T2WI scan time was recorded. For subjective evaluation of image quality, and subjective image quality evaluation metrics included image quality, diagnostic confidence, noise level, artifacts, clarity and lesion detectability. For objective evaluation of image quality, signal-to-noise ratio (SNR) and contrast signal-to-noise ratio (CNR) were calculated. Two-parameter prostate imaging-reporting and data system version 2.1 (PI-RADS v2.1) scoring was performed for transition zone lesions using T2 Deep Learning and T2WI standard, respectively. The subjective and objective image quality evaluation metrics for T2 Deep Learning and T2WI standard were compared using the Wilcoxon signed rank test. For transition zone lesions, the diagnostic performance of PI-RADS scores for T2 Deep Learning and T2WI standard for transition zone PCa was evaluated by plotting the receiver operating curve (ROC) based on the lesion (all lesions in the transition zone) and the patient (the most malignant lesions in the transition zone), respectively, using the pathologic results as the gold standard, and the area under the curve (AUC) was compared using the DeLong's test. **Results** We found that T2 Deep Learning significantly reduced the examination time by 64.6%, from 4:37 s to 1:38 s. The median of subjective image quality evaluation metrics of T2 Deep Learning and T2WI standard are same, ranging from 5.00 (4.00, 5.00), the differences in image quality and lesion detectability were statistically significant ($Z=-2.32$, -2.36 , $P=0.020$, 0.018), and the differences of all other image quality evaluation metrics were not statistically significant ($P>0.05$). The SNR of T2 Deep Learning and T2WI standard were 17.11 (14.09, 21.92) and 9.15 (7.16, 11.17), with a statistically significant difference ($Z=-7.72$, $P<0.001$). The CNR of T2 Deep Learning and T2WI standard were 20.78 (13.42, 31.42) and 11.05 (7.82, 16.25), and the difference was statistically significant ($Z=-7.54$, $P<0.001$). Based on the lesion, the AUC of the two-parameter PI-RADS score for diagnosing PCa in the transition zone with T2 Deep Learning and T2WI standard were 0.915 (95% CI 0.86~0.98) and 0.916 (95% CI 0.86~0.98), and the differences were not statistically significant ($Z=-0.03$, $P=0.973$). Based on the patient, the AUC of the two-parameter PI-RADS score for diagnosing PCa in the transition zone with T2 Deep Learning and T2WI standard were 0.921 (95% CI 0.86~0.98) and 0.939 (95% CI 0.89~0.99), and the differences were not

statistically significant ($Z=-0.59$, $P=0.558$). Conclusions Compared with T2WI standard, T2 Deep Learning of the prostate reduces scanning time while maintaining image quality and has comparable diagnostic performance for transition zone Pca.

PO-1549

Spectral-CT iodine concentration to evaluate human epidermal growth factor receptor 2 expression in node-negative gastric cancer

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Objectives: The purpose of this study was to investigate the spectral computed tomography (CT) parameters in the preoperative evaluation of human epidermal growth factor receptor 2 (HER2) in node-negative gastric cancer (GC).

Methods and materials: We retrospectively analysed 76 patients with GC. All cases were confirmed by pathology, underwent spectral-CT examination, and were divided into positive group ($n=15$) and negative group ($n=61$) depending on immunohistochemistry (IHC) results of HER2 status. Clinical characteristics, including demographic information, serum tumour markers, and gastroscopic pathological information, were collected. The iodine concentration (IC), water concentration, and CT values of 70 keV (CT70keV) were measured in the arterial (AP) and venous (VP) phases. The venous-to-arterial phase IC ratio (V/A ratio) was calculated. Parameter differences between the two groups were compared, and diagnostic performance was evaluated.

Results: The HER2 positive group's VP-IC, VP-CT70keV, and V/A ratio were substantially greater than those of the negative group (VP-IC, 24.10 ± 6.34 vs 18.92 ± 5.23 ; VP-CT70keV, 92.09 ± 25.67 vs 79.12 ± 17.43 ; V/A ratio, 1.25 ± 0.48 vs 1.01 ± 0.56 , all $p < 0.05$). Predictive efficacy analysis demonstrated that V/A ratio exhibited a favourable performance ($AUC=0.757$). The VP-IC and V/A ratio combined with histological grade exhibited good evaluation efficacy ($AUC=0.855$, sensitivity=80.2%, specificity=85.4%).

Conclusions: Spectral-CT IC-derived parameters exhibited considerable value in the preoperative evaluation of HER2 expression in GC. The combination of VP-IC, V/A ratio and histological grade exhibited a favourable performance in predicting HER2 status in GC.

PO-1550

Quantitative iodine concentrations measurements with dynamic spectral CT imaging to detect viability of hepatocellular carcinoma after transcatheter arterial chemoembolization

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Purpose:

To investigate the value of iodine concentrations measurements in detecting viability of HCC after TACE with dynamic spectral CT scan.

Material and Methods:

20 patients who had 36 iodized-oil areas in HCCs treated with TACE were included. All patients underwent CT examination with spectral imaging during arterial phase (AP), venous phase (VP),

and parenchymal phase (PP) of enhancement. Normalize iodine concentrations (NIC), the lesion-normal parenchyma iodine concentration ratio (LNR) were calculated in 28 iodized-oil defect areas in triple phases respectively. Two radiologists reviewed both conventional dynamic CT images and spectral CT images with iodine concentrations to evaluate viability, and then diagnosis confidence rate was explored (5-point scale).

Results:

There were 19 viable tumors and 9 non-viable tumors in our study. NICs and LNRs of viable tumors differed significantly from those in patients of the non-viable tumors. Mean NICs: $0.18 \pm 0.08 \text{ mg/ml}$ compared with $0.07 \pm 0.07 \text{ mg/ml}$ in AP, respectively, and $0.49 \pm 0.13 \text{ mg/ml}$ compared with $0.23 \pm 0.16 \text{ mg/ml}$ in VP, and $0.52 \pm 0.36 \text{ mg/ml}$ compared with $0.30 \pm 0.19 \text{ mg/ml}$ in PP. Mean LNRs: 4.98 ± 1.18 compared with 1.29 ± 1.05 in AP, respectively, and 0.49 ± 0.13 compared with 0.23 ± 0.16 in VP, and 0.88 ± 0.23 compared with 0.53 ± 0.37 in PP. The differences were significant ($p < 0.05$). The rate of diagnosis confidence rate was significantly improved in spectral CT group with iodine concentrations compared with conventional CT (4.86 ± 0.36 and 4.04 ± 0.69 , $p < 0.05$).

Conclusions:

Dynamic spectral CT imaging with quantitative analysis of iodine concentration was able to detect viable tumors of HCC after TACE, and may help to increase diagnosis confidence.

PO-1551

Adrenal hyperplasia and lipid-poor adenoma: Can they be differentiated with CT density and volume?

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Purpose: To explore the potential of CT density and volume in the differentiation of lipid-poor adenoma from nodular hyperplasia and evaluate the diagnostic performance.

Methods: A cohort of 128 patients with pathologically confirmed lipid-poor adrenal adenoma ($n=83$) and nodular hyperplasia ($n=45$) who underwent preoperative unenhanced and enhanced CT were enrolled. Regions of interest were placed to determine each lesion's unenhanced attenuation (CTpre) and portal-venous phase attenuation (CTp), along with the abdominal aorta's portal-venous phase attenuation. Absolute enhancement, relative enhancement, and relative enhancement ratio were calculated, lesion size was measured and volume was assessed by ITK-snap software. Intergroup differences were analyzed using student t-test and chi-square test. Logistic regression models were developed, and receiver operating characteristic curves were constructed to determine the area under the curve (AUC), sensitivity and specificity. The model's performance was compared against radiologists' subjective assessments. The inter-reader and intrareader agreement among radiologists were calculated.

Results: Significant differences between lipid-poor adenoma and nodular hyperplasia were observed in gender, CTpre, CTp, absolute enhancement, lesion size, and lesion number. The AUC of multivariate logistic regression model incorporating CTpre, volume ratio and lesion number was 0.835 (95%CI 0.764–0.907, sensitivity 73.5%, specificity 80%). Radiologists' specificity and accuracy were worse than the model. The inter-reader agreement among radiologists ranged from 0.082 to 0.535. The intrareader agreement of two radiologists was 0.734 and 0.583, respectively.

Conclusion: CT density and volume can be utilized to distinguish adenoma from hyperplasia. The model integrating density, volume, and lesion number exhibited superior diagnostic performance than radiologists with low variability and reproducibility.

PO-1552

Multiparametric spectral CT imaging for the evaluation of perineural invasion in rectal cancer

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Objectives

To determine whether the preoperative perineural invasion (PNI) status of patients with rectal cancer (RC) can be diagnosed using the parameters derived from spectral CT.

Methods

This retrospective study included 62 patients with RC who underwent surgical resection and preoperative spectral CT. Clinical features and quantitative parameters obtained from spectral CT were used to predict PNI. The virtual monochromatic images (VMIs), effective atomic number (Z_{eff}) and iodine concentration (IC) were measured in the venous phase (VP). Multivariable logistic regression was performed to identify potential predictors of PNI. Then, a nomogram was established, and the predictive efficacy was assessed using receiver operating characteristic (ROC) curve analysis.

Results

All spectral CT parameters (VMIs, K(HU), Z_{eff} and IC) were higher in the PNI-positive group compared to the PNI-negative group. The highest predictive efficiency of PNI was observed at 40 keV VMIs, with an Area under the curve (AUC) value of 0.778. Multivariable analysis revealed that the N stage and 70 keV of VMIs were independent predictors of PNI. The combined model (combined N stage and 70 keV) had an AUC value of 0.856 (0.761 - 0.951).

Conclusion

Spectral CT parameters demonstrate considerable capabilities in the preoperative evaluation of PNI in RC. The combination of clinical and spectral-CT parameters further improves the diagnosis efficiency in the prediction of PNI.

PO-1553

Exploring a Multiparameter MRI-Based Radiomics Approach to Predict Tumor Proliferation Status of Serous Ovarian Carcinoma

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Objectives: To explore the value of prediction for tumor proliferation status of serous ovarian carcinoma (SOC) using radiomics combined clinical and MRI features.

Materials and Methods: (1) A total of 134 patients eligible undergoing 3.0 T MRI examination from Institute A from January 2016 to December 2020 were screened in this retrospective study and allocated into the training (n = 93) and internal validation (n = 41) sets. From Institute B, 42 patients from January 2019 to March 2022 were screened as the external validation set. The clinical data included expression level of Ki-67, age, serum carbohydrate antigen 125, human epididymis protein 4, neutrophil-to-lymphocyte ratio, and the International Federation of Gynecology and Obstetrics stage. MRI data included mass distribution, size, shape (lobulated/non-lobulated), mass angiogenesis, solid part containing homogeneous slightly higher signal intensity area on T2-weighted imaging fat-suppressed fast spin-echo (T2FSE), peritoneum/mesentery nodules, metastases of distant parenchymal organs, retroperitoneal lymphadenopathy, and amount of ascites. (2) All patients underwent abdominal pelvic enhanced MRI scan within 1 month before surgery, including T2FSE, and T1 with contrast enhancement (T1CE) using liver acquisition with

volume acceleration 3D with fat saturation (LAVA). (3) The region of interest (ROI) of each case was determined by two radiologists by drawing the ovarian mass boundaries manually slice-by-slice on T2FSE and T1CE images using ITK-SNAP software. A total of 1688 handcrafted radiomic features were extracted from each sequence (T2FSE and T1CE), and the features were then selected using variance threshold algorithm, SelectKBest algorithm, and least absolute shrinkage and selection operator. Then, the logistic regression algorithm was used to establish the radiomics models based on single sequence T2FSE, T1CE and dule sequence (T2FSE+T1CE), respectively. (4) Univariate and multivariate analyses were used to screen the clinical and MRI independent predictors of tumor proliferation status of SOC. (5) The radiomic model (T2FSE, T1CE, and T2FSE+T1CE) with the highest area under the curve (AUC) was used to integrate the clinical and radiological independent predictors as a radiomic-clinical-radiological model by multivariate logistic regression. (6) The DeLong method was used to assess model differences, and the performance of the optimal model was validated in the internal and external validation sets. (7) The Hosmer-Lemeshow test and calibration curve were used to evaluate the accuracy of the model, that is, the consistency between the tumor proliferation status the model predicted and the actual proliferation status.

Results: (1) The average age of 134 patients with SOC eligible from institution A was 54 years (range 27~80 years), and that of 42 patients with SOC eligible from institution B was 54 years (range 30~74 years). (2) The optimal radiomic model was based on combined-sequence (T2FSE+T1CE) among the three radiomic models ($P<0.05$). (3) The homogeneous solid component of the ovarian mass was considered the only independent predictor of the expression level of Ki-67 by univariate and multivariate regression analyses among the five clinical and nine radiological variables. (4) In the internal validation set, the AUC value of the radiomic-radiological model was higher than that of the optimal radiomics model or the radiological model (AUC = 0.974 vs. 0.937/0.897), and the differences between the two groups were significant ($P < 0.05$). (5) The calibration curves in the training, internal validation, and external validation sets were close to the ideal diagonal.

Conclusions: In this study, the radiomics method combined with MRI features was used to construct a radiomic-radiological model for predicting the expression level of Ki-67 of SOC. The model has high repeatability and accuracy, and performed well after internal and external verification, which is of great significance for the guidance of individualized treatment programs and clinical monitoring of SOC.

PO-1554

Computed tomography-based body composition parameters can predict short-term prognosis in ulcerative colitis patients

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Objectives: Emerging evidence suggests a potential relationship between body composition and short-term prognosis of ulcerative colitis (UC). Early and accurate assessment of rapid remission based on conventional therapy via abdominal computed tomography (CT) images has rarely been investigated. This study aimed to build a prediction model using CT-based body composition parameters for UC risk stratification.

Methods: Totally, 118 patients with abdominal CT images were enrolled. Eleven quantitative parameters related to body composition involving skeletal muscle mass, visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) were measured and calculated using a semi-automated segmentation method. A prediction model was established with significant parameters using a multivariable logistic regression. Receiver operating characteristic(ROC) curve was plotted to evaluate prediction performance. Subgroup analysis were implemented to evaluate diagnostic

efficiency of prediction model between different disease locations, centers and CT scanners. The Delong test was used for statistical comparison of ROC curves.

Results: VAT density, SAT density, gender, and visceral obesity were significantly statistically different between the rapid remission and invalidation groups (all $p < 0.05$). The accuracy, sensitivity, specificity, and AUC of prediction model were 82.61%, 95.45%, 69.89% and 0.855 (0.792-0.917), respectively. The positive predictive value and negative predictive value were 70.79% and 93.88%. No significant differences in the AUC of prediction model were found in different subgroups (all $p > 0.05$).

Conclusion: The predicting model constructed with CT-based body composition parameters is a reliable non-invasive approach for short-term prognosis identification and risk stratification. Additionally, VAT density was an independent predictor for escalating therapeutic regimens in UC cohorts.

PO-1555

Construction and validation of a novel CT-measured body composition Radiomics model to estimate prognosis of Pancreatic Ductal Adenocarcinoma after resection

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Background: Prediction models for the disease-free survival (DFS) of localized pancreatic ductal adenocarcinoma (LPDAC) remain unsatisfactory.

Objective: The purpose of this study was to construct and validate a CT-measured body composition radiomics model to predict DFS in patients who underwent curative resection for LPDAC.

Methods: This single-institution study included retrospectively identified 191 patients with pathologically diagnosed LPDAC and were chronologically divided into training ($n=142$) and validation group ($n=49$). Preoperative CT images of the L3 vertebral level were used for body composition radiomics analysis. Univariate and multivariate Cox regression analyses were conducted in the training group to establish radiomic models based on fat, muscle, and combined variables to predict DFS. Then, median radiomic risk scores were employed to separate the patients into high- and low-risk groups. DFS was calculated through the Kaplan–Meier technique. The predictive power of the model was assessed by receiver operating characteristic (ROC) curve. Results: The radiomic models based on fat (HR 3.510; $p < 0.001$) and muscle (HR 3.377; $p < 0.001$), each constructed from 7 and 4 features, respectively, were effective prognostic factors for DFS. The combined radiomics model could better differentiate high-risk patients with poor prognosis and was validated in the validation group. ROC curves revealed that our model had favourable prediction accuracy for both the training and validation groups.

Conclusions: The radiomics model based on CT-measured body composition can be useful in predicting DFS in patients undergoing curative resection for LPDAC.

PO-1556

Risk stratification for Overall Survival and Recurrence-Free Survival after R0 Resection for Solitary Intrahepatic Mass-Forming Cholangiocarcinoma Based on Preoperative MRI and Clinical Features

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Purpose To establish two nomograms integrated with preoperative magnetic resonance imaging (MRI) features for predicting overall survival (OS) and recurrence-free survival (RFS) in patients with solitary intrahepatic mass-forming cholangiocarcinoma (IMCC).

Methods This retrospective study included 120 consecutive patients who were diagnosed with solitary IMCC. Preoperative MRI and clinical features were collected. Based on the univariate and multivariate Cox regression analyses, two nomograms were constructed to predict OS and RFS, respectively. The effective performance of the nomograms was evaluated using concordance index (C-index). The prognostic stratification systems for OS and RFS were developed and used to classify patients into high- and low-risk groups.

Results Suspicious lymph nodes, arterial phase (AP) enhancement patterns, and bile duct dilatation were independent predictors of OS, while suspicious lymph nodes, AP enhancement patterns, and necrosis were independent predictors of RFS. The nomograms achieved the C-index values of 0.705/0.710 for OS and 0.721/0.759 for RFS in the development/validation cohorts, which were significantly higher than those of the T and TNM stages ($P < 0.05$). Patients were stratified into high- and low-risk groups, the 1-year OS and RFS rates of high-risk patients were poorer than those of patients with low-risk in the development cohort (OS: 93.5% vs 76.3%, $P < 0.001$; RFS: 74.5% vs 22.4%, $P < 0.001$). Similar results were observed in the validation cohort.

Conclusions Two nomograms were constructed based on preoperative MRI features in patients with solitary IMCC for predicting the OS and RFS and facilitate further prognostic stratification.

PO-1557

MRI Radiomics Features of Mesorectum Can Predict Metachronous Metastasis in Patients with Rectal Cancer

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Objectives: Metachronous metastases remain the main challenge and affect the prognosis of patients with rectal cancer. Some studies have explored the predictive value for metachronous metastases based on rectal tumors, while limited research has been conducted on mesorectum features. Therefore, we aimed to build MRI-based radiomics models using tumor and mesorectum features to predict metachronous metastasis.

Materials and Methods: From January 2014 to December 2020, 143 out of 859 rectal cancer patients in the PACS system were included in this study. Among them, 73 developed metachronous metastases within five years. Radiomics features were extracted from mesorectum and tumor regions in T2WI images. ANOVA, Pearson correlation analysis, and the LASSO method were used to select the most potent features, and radiomics models were established using logistic regression. Model performance was assessed by the ROC curve. The cut-off value of model was used to divide the patients into high- and low-risk groups, and metachronous metastasis-free survival was evaluated using K-M survival analysis.

Results: The joint model, combining tumor and mesorectum features, outperformed with an AUC of 0.942, while the mesorectum and tumor models achieved AUCs of 0.887 and 0.776, respectively. And in the internal validation using 5-fold cross-validation, the AUC of the joint model were 0.902(0.888-0.916) and 0.771(95% CI, 0.681–0.861) in the training and validation cohort. The DeLong test showed that the joint model was statistically different from the other two models ($p < 0.001$), highlighting the improved predictive performance. Through the K-M survival analysis, the stratification effect of the joint model radiomics score was significant ($P < 0.001$).

Conclusion: The combined radiomics model of mesorectum and tumor exhibited strong predictive capabilities for metachronous metastasis in rectal cancer and the radiomic features of the mesorectum serve as more effective biological markers.

PO-1558

Preliminary Study on CT Radiomics Model for Evaluating Peritoneal Cancer Index

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Materials and Methods: Pathologically confirmed pancreatic, colon, rectal, and gastric cancer cases with PM administered exploratory laparotomy in 2 different cohorts were retrospectively analyzed. Surgical PCIs (sPCIs) were confirmed by the surgery team, and CT-PCI scores were assessed by radiologists. Totally 63 and 27 cases in cohort 1 were assigned to the training and test groups, respectively. Then, 73 cases in cohort 2 were enrolled as an external validation set. Radiomics features were derived from the portal venous phase of preoperative abdominopelvic CT scans. Nineteen optimal features related to sPCI were finally selected. Support vector machine (SVM) was adopted for radiomics model generation. The associations of CT-PCI, radiomics PCI and sPCI were analyzed. The performances indistinguishing between low-sPCI (≤ 20) and high-sPCI (> 20) cases were also assessed by receiver operating characteristic (ROC) curve analysis and decision curve analysis (DCA).

Results: Both CT-PCI and radiomics PCI scores had positive associations with sPCI. The radiomics approach had higher agreement for detecting sPCI than CT-PCI. In addition, the radiomics model had enhanced diagnostic performance than CT-PCI (AUCs were 0.894, 0.822 and 0.810 in training, test and validation sets, respectively, vs 0.749, 0.678 and 0.693, respectively). The net reclassification index was 0.266. The usefulness of the proposed model was confirmed by DCA in an external validation set.

Conclusion: The present pilot study showed that the radiomics model based on preoperative abdominopelvic CT has increased agreement and diagnostic performance in detecting sPCI than CT-PCI in patients with PM, which could be used to optimize individualized treatment strategies.

PO-1559

Diagnostic Accuracy of liver and spleen stiffness on Magnetic Resonance Elastography for the Detection of Gastroesophageal Varices: A Systematic Review and Meta-analysis

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Objective: The aim of this meta-analysis was to assess the performance of magnetic resonance elastography (MRE) for gastroesophageal varices in patients with chronic liver disease (CLD).

Method: Literature search in English and Chinese databases such as PubMed, EMBASE, Cochrane Library, Web of Science, and China National Knowledge Infrastructure was conducted. The pooled sensitivity (SEN), specificity (SPE), diagnostic odds ratio (DOR), and area under curve (AUC) of the summary receiver-operating characteristic (SROC) curve with 95%CI were calculated. The quality analysis of the included study was evaluated by the QUADAS-2 tool, and the meta-analysis was performed with Stata16.

Result: A total of nine relevant articles that compared LS or SS (using MRE) with EGD for detecting the existence of GEV were identified. The pooled summary sensitivity, specificity, PLR, NLR, and DOR of liver or spleen stiffness for the detection of GEV were 81% (95% CI: 74%, 87%), 72% (95% CI: 62%, 80%), 2.89 (95% CI: 2.12, 3.94), 0.26 (95% CI: 0.19, 0.36) and 10.91 (95% CI: 6.53, 18.24), respectively.

Conclusion: Given these results, magnetic resonance elastography expresses good diagnostic accuracy for gastroesophageal varices.

PO-1560

Development and Validation of CT-based Radiomics Deep Learning Signatures to Preoperatively Predict Lymph Node Metastasis in Non-functional Pancreatic Neuroendocrine Tumor: A Multi-cohort Study

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Purpose:

Lymph node status is an important factor for the patients with non-functional pancreatic neuroendocrine tumors (NF-PanNETs) with respect to surgical methods, prognosis, recurrence. Our aim is to develop and validate a combination model based on contrast-enhanced CT images to preoperatively predict the lymph node metastasis (LNM) in NF-PanNETs.

Materials and Methods:

Retrospective data were gathered for 320 patients with NF-PanNETs who underwent curative pancreatic resection and CT imaging at two institutions (Center 1, n= 236 and Center 2, n=84) between January 2010 and March 2022. RDPs (Radiomics deep learning signature) were developed based on ten machine-learning techniques. These signatures were integrated with the clinicopathological factors into a nomogram for clinical applications. The evaluation of the model's performance was conducted through the metrics of the area under the curve (AUC).

Results:

The RDP signature showed excellent performance in both centers with a high AUC for predicting LNM and DFS in Center 1 (AUC, 0.88; 95% CI: 0.84, 0.92; DFS, p <.05) and Center 2 (AUC, 0.91;

95% CI: 0.85, 0.97; DFS, $p < .05$). The clinical factors of vascular invasion, perineural invasion, and tumor grade were associated with LNM ($p < .05$). The combination nomogram showed better prediction capability for LNM (AUC, 0.93; 95% CI: 0.89, 0.96). Notably, our model maintained a satisfactory predictive ability for tumors at the 2-cm threshold, demonstrating its effectiveness across different tumor sizes in Center 1 (≤ 2 cm: AUC, 0.90 and > 2 cm: AUC, 0.86) and Center 2 (≤ 2 cm: AUC, 0.93 and > 2 cm: AUC, 0.91).

Conclusions:

Our RDPs may have the potential to preoperatively predict LNM in NF-PanNETs, address the insufficiency of clinical guidelines concerning the 2-cm threshold for tumor lymph node dissection, and provide precise therapeutic strategies.

PO-1561

MRI-based multiregional radiomics for pretreatment prediction of distant metastasis after neoadjuvant chemoradiotherapy in patients with locally advanced rectal cancer

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Purpose: To develop and validate a nomogram based on intratumoral and peritumoral radiomics signatures for pretreatment prediction of distant metastasis-free survival (DMFS) in patients after neoadjuvant chemoradiotherapy (NCRT) with locally advanced rectal cancer (LARC).

Methods and Materials: This retrospective study included 230 patients (161 training cohort; 69 validation cohort) with LARC who underwent NCRT and surgery. Radiomics features were extracted on T2-weighted images from gross tumor volume (GTV) and volumes of 4-mm, 6-mm, and 8-mm peritumoral regions (PTV₄, PTV₆, and PTV₈). The least absolute shrinkage and selection operator (LASSO)-Cox analysis were used for features selection and models construction. The performance of each model in predicting DMFS was evaluated by the Concordance index (C-index) and time-independent receiver operating characteristic curve (ROC).

Results: The PTV₄ radiomics model demonstrated superior performance compared to the PTV₆ and PTV₈ radiomics models, with C-indexes of 0.750 and 0.703 in the training and validation cohorts, respectively. The nomogram was constructed by integrating the GTV radiomics signature, PTV₄ radiomics signature, and relevant clinical characteristics, including CA19-9 level, clinical T stage, and clinical N stage. The nomogram achieved C-indexes of 0.831 and 0.748, with corresponding AUCs of 0.872 and 0.808 for 5-year DMFS in the training and validation cohorts, respectively. Kaplan-Meier analysis revealed that a cut-off value of 1.653 effectively stratified patients into high- and low-risk groups for DM ($p < 0.001$).

Conclusion: The intra-peritumoral radiomics nomogram is a favorable tool for clinicians to develop personalized systemic treatment and intensive follow-up strategies to improve patient prognosis.

PO-1562

Preoperative prediction of renal fibrous capsule invasion in clear cell renal cell carcinoma using CT-based radiomics model

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Abstract

Objectives: To develop radiomics-based classifiers for preoperative prediction of fibrous capsule invasion in RCC patients by CT images.

Methods: In this study, clear cell RCC (ccRCC) patients who underwent both preoperative abdominal contrast-enhanced CT and nephrectomy surgery at our hospital were analyzed. By transfer learning, we used base model obtained from Kidney Tumor Segmentation (KiTS) challenge dataset to semi-automatically segment kidney and tumors from corticomedullary phase (CMP) CT images. Dice similarity coefficient (DSC) was measured to evaluate the performance of segmentation models. The least absolute shrinkage and selection operator (LASSO) algorithm was used to select the most related features. Ten machine learning classifiers were compared in our study. Performance of the models was assessed by their accuracy, precision, recall and area under the receiver operating characteristic curve.

Results: This retrospective study enrolled 163 ccRCC patients. The semiautomatic segmentation model using CMP CT images obtained DSCs of 0.98 on training cohort and 0.96 on test cohort for kidney segmentation, and DSCs of 0.94 and 0.86 for tumor segmentation on training and test set, respectively. For preoperative prediction of renal capsule invasion, the AdaBoost had best performance in batch1, with accuracy, precision, recall and F1-score equal to 0.8571, 0.9091, 0.8333 and 0.8696, respectively; and the same classifier was also the most suitable for this classification in batch 2. Nine common significant features for classification were found from two independent batch datasets, including morphological and texture features.

Conclusions: The CT-based radiomics classifiers performed well for preoperative prediction of fibrous capsule invasion in ccRCC.

Advances in knowledge: Noninvasive prediction of renal fibrous capsule invasion in RCC is rather difficult by abdominal CT images before surgery.

A machine learning classifier integrated with radiomics features shows a promising potential to assist surgical treatment options for RCC patients.

PO-1563

Development of a CT-based scoring system to predict progression after intraoperative radiotherapy in locally advanced pancreatic cancer with initial stable disease

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Objectives: We aimed to develop a risk scoring system integrating CT imaging features and serum carbohydrate antigen 19-9 (CA19-9) for stratifying the short-term outcomes in locally advanced pancreatic cancer (LAPC) patients receiving intraoperative radiotherapy (IORT) with initial stable disease (SD).

Materials and Methods: We retrospectively recruited 103 consecutive patients with LAPC who received IORT as first-line treatment. All patients underwent CT examinations and serum CA19-9 test baseline and post-IORT. Clinical and CT imaging features were analyzed. The risk scoring

system was constructed using the coefficient of the independent risk factors for progression-free survival (PFS) from cox regression model. Time-dependent receiver operating characteristic (ROC) curve was used to evaluate the predictive performance of the scoring system.

Results: All patients developed disease progression after IORT and the median PFS time was 6.40 (4.95–7.86) months. Multivariable analysis revealed that CA19-9 non-response (hazard ratio [HR] = 1.672, $P = 0.018$), the percentage change of relative enhanced ratio (HR = 2.318, $P = 0.030$), rim-enhancement (HR = 1.784, $P = 0.007$), and peripancreatic fat infiltration (HR, 1.799, $P = 0.006$) were significant correlated with poor PFS. Time-dependent ROC showed a satisfactory predictive performance for disease progress with area under the curve (AUC) all above 0.70. Low-risk patients (risk score < 5) progress significantly slower than high-risk patients (risk score ≥ 5) ($P < 0.001$).

Conclusion: The scoring system integrating CT imaging features and CA19-9 can be used as a convenient and practical method for prognosis prediction in LAPC patients showing SD receiving IORT.

PO-1564

4. The Value of Deep Learning Image Reconstruction Algorithm on Double-Low Renal artery CTA

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Objective: To assess the influence of deep learning image reconstruction(DLIR) algorithm on image quality of renal arteries CT angiography with low radiation dose and contrast volume technique.

Materials and Methods: This prospective study included five patients suspicious of renal hypertension. All patients were scanned by Revolution CT with the below scanning parameters: 80 kV, noise index of 24, automatic current modulation(mA range of 200-600), rotation speed of 0.5 s, collimation of 128x0.625 mm, pitch of 0.992:1, 50% ASIR-V, standard kernel, bolus tracking technique. Data acquisition was initiated after breath holding when the CT value reached a threshold of 100 Hounsfield units (HU) in a region-of-interest (ROI) in the descending aorta. The volume and injection rate of contrast agent(320 mgI/ml) were 40 ml and 4 ml/s. Raw data were retrospective constructed by three algorithms: DLIR-H, DLIR-M and ASIR-V 50%. CT values and standard deviations(SD) of abdominal aorta, subcutaneous adipose tissue(SAT), proximal and distal segments of bilateral renal artery at the level of renal hilus, upper and lower segmental renal arteries of left and right kidneys were measured to calculate signal noise ratio(SNR, $SNR = CT \text{ value} / SD$). SD of SAT was defined as background noise. CTDI and Dose length product(DLP) was recorded. Two radiologists evaluated images using a 4-point scale(1.poor;2.moderate;3.good;4.excellent). Wilcoxonsigned-rank test were used to analyze the differences among any 2 groups. p value <0.05 was considered significant.

Results: The CTDI and DLP were 2.15 mGy and 81.24 mGy·cm. There were no differences in CT values of various tissues between any two groups($p > 0.05$). All SNRs were highest for DLIR-H, followed by DLIR-M, were lowest for ASIR-V ($p < 0.05$ each). SD of SAT for DLIR-H was significantly lower than DLIR-M and ASIR-V(10.83 vs. 17.21, $p = 0.002$; 10.83 vs. 21.58, $p < 0.001$). No significant differences in subjective evaluation were found among groups($p > 0.05$).

Conclusion:DLIR-H is the optimal algorithm for double-low renal artery CTA.

Clinical Relevance: The image quality is better for the deep learning algorithm of low dose renal artery CTA of Ge revolution 256 row wide body CT than that of traditional iterative algorithm, which can improve the successful rate of diagnosis and confidence of clinicians, reduce the rate of misdiagnosis, reduce the radiation dose and contrast agent dosage of patients, and reduce the burden of liver and kidney of patients.

PO-1565

Diagnostic benefit of dual-energy spectral CT imaging over conventional contrast-enhanced CT in patients with bladder cancer

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Purpose: To assess the clinical applicability of local tumor staging in bladder cancer (BC) with quantitative parameters derived from preoperative spectral computed tomography (CT).

Methods and Materials: Patients who were suspected of BC were prospectively recruited in March 2022 and April 2022. All patients underwent transurethral resection or radical cystectomy after spectral CT scanning. Patients with pathologically confirmed urothelial carcinoma were finally included. Iodine concentration, virtual non-contrast (VNC) images, electron density (ED) and effective atomic number (Zeff) were calculated. The diagnostic performance of the quantitative parameters for discriminating muscle-invasive BC (MIBC) from non-muscle invasive BC (NMIBC) was assessed by receiver operating characteristic curves (ROC).

Results: A total of 60 patients with BC were finally included, including 16 MIBC and 44 NMIBC. No significant difference was observed between MIBC and NMIBC regarding age, sex, pathological grade, and surgery method. The VNC attenuation and ED in VP from spectral CT in the MIBC group were significantly higher than those in NMIBC group (both P values <0.05). The VNC attenuation showed slightly higher diagnostic performance (AUC = 0.734), sensitivity (0.750 vs. 0.813), and specificity (0.659 vs. 0.591) than the ED between MIBC and NMIBC images (AUC = 0.733). The ROC analysis showed there was no improvement in discriminating MIBC from NMIBC after combining the ED in VP and VNC attenuation (AUC: 0.733, sensitivity: 81.30%, specificity: 59.1%).

Conclusions: Quantitative parameters derived from preoperative spectral CT, including VNC attenuation and electron density performed moderate in predicting MIBC pre-operatively.

PO-1566

Mono+ algorithm assessment of the diagnostic value of dual-energy CT for high-risk factors for colorectal cancer: a preliminary study

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Objective: To assess the diagnostic value of dual-phase, DECT based on the Mono+ algorithm for high-risk factors for colorectal cancer (CRC).

Methods: This prospective study was performed from 2021-2023. A dual-phase DECT protocol was performed for consecutive patients with primary CRC. The SNR, CNR, overall image quality, lesion delineation and image noise of the dual-phase DECT images were assessed. Then, the optimal energy level image was selected to analyze the IC, NIC, Z, Rho, DEI, and slope of the energy spectrum curve within the tumor between the high- and low-risk CRC groups. Multifactor binary logistic regression analysis was used to construct a differential diagnostic regression model for high- and low-risk CRC; receiver operating characteristic curves were plotted, and AUC was calculated to assess the diagnostic value of the model.

Results: A total of 74 patients were enrolled in this study, namely, 41 patients with high-risk factors and 33 patients with low-risk factors. The SNR and CNR were best at 40 keV virtual monoenergetic

imaging (VMI+) (SNR 8.79 ± 1.27 , CNR 14.89 ± 1.77 , $P < 0.03$). The overall image quality and lesion contours were best at 60 keV VMI+ and 40 keV VMI+, respectively ($P < 0.01$). Among all the DECT parameters, the AP-IC, NIC, DEI and IHU and the VP-NIC were statistically different between the two groups. AP-IC was the optimal DECT parameter for predicting high- and low-risk CRC, with AUC, sensitivity, specificity and cutoff values of 0.96, 97.06, 87.80 and 2.94, respectively. Integrating the clinical factors and DECT parameters, the AUC, sensitivity, specificity and predictive accuracy of the model were 0.99, 97.06, 90.24 and 89.33%, respectively.

Conclusions: The DECT parameters based on 40 keV noise-optimized VMI+ reconstruction images could depict CRC tumors best, and the clinical DECT model may have significant implications for the preoperative prediction of high-risk factors in CRC patients.

PO-1567

Bi-regional quantitative dynamic contrast-enhanced MRI-based nomogram for prediction of microvascular invasion in solitary hepatocellular carcinoma and its significance for prognosis and treatment

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Purpose The peritumoral region (PTR) of liver is the main-site of microvascular invasion (MVI) taken place in hepatocellular carcinoma (HCC), and contains perfusion information which can reflect the hemodynamic change during MVI. We aimed to construct a nomogram based on quantitative dynamic contrast-enhanced MRI (DCE-MRI) for predicting MVI of HCC in both intra-tumoral region (ITR) and PTR, and to assess the its ability for stratifying the risk of recurrence after hepatectomy and directing the choice of hepatectomy approaches.

Methods A total of 133 HCC patients who underwent quantitative DCE-MRI studies between October 2019 and September 2021 were enrolled in our hospital. Arterial fraction (ART), arterial blood flow (Ft), portal-venous total (Fp), blood flow (Ft), distribution volume (DV), and mean transit time (MTT) were obtained from dual-input single compartment model in both ITR and PTR. Variables were compared using Student's t-test, Mann-Whitney U, χ^2 , or Fisher's exact test as appropriate. A combined perfusion DCE parameter (C_{DCE}) was constructed to predict MVI. A nomogram incorporating and clinical-radiological (CR) features and C_{DCE} was constructed through multivariate logistic regression analyses for MVI prediction. The performance of the nomogram was assessed with respect to ROC curve analysis, discrimination calibration, and decision curve analysis. The Kaplan–Meier survival analysis was used to explore the prognostic significance of the prediction results of the nomogram and the survival benefits of hepatectomy approaches [anatomical resection (AR) or non-anatomical resection (NAR)].

Results Multivariate analysis showed that AFP, corona enhancement, two-trait predictor of venous invasion (TTPVI), and C_{DCE} were independent predictors of MVI (all $p < 0.05$). The nomogram based on these variables showed good discrimination and calibration with the areas under the receiver operating characteristic curve (AUC) of 0.966 (0.935–0.996). Decision curve analysis confirmed the clinical usefulness of these nomogram. Survival analysis demonstrated that the nomogram could stratify HCC patients in terms of recurrence-free survival (RFS) according to the predicted risk of MVI ($p < 0.001$). AR was associated with better RFS than NAR in high-risk group ($p = 0.014$), while no significant effect observed in the low-risk group ($p = 0.610$).

Conclusion The nomogram combining the perfusion DCE parameters and clinical-radiological features achieved preoperative non-invasive MVI risk prediction and patient benefit assessment after hepatectomy, which may help clinicians implement more appropriate interventions.

PO-1568

Texture Analysis Based on Iodine Based Material Decomposition Images of Spectral CT Imaging for Predicting the Expression of Ki-67 in Colorectal Cancer

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Purpose:

To investigate the value of texture analysis based on iodine based material decomposition images of spectral CT imaging in prediction the expression of Ki-67 in colorectal cancer.

Methods and Materials:

The 78 colorectal cancer patients confirmed by postoperative pathology were included in our study. All patients have underwent Revolution CT enhanced spectral imaging scan in our hospital within one month before surgery. The post-operative tissues have been tested by immunohistochemical examination to detect the protein expression levels of Ki-67 (group 1: $\leq 50\%$, low expression, $n=13$; group 2: $> 50\%$, high expression, $n=65$). Import all the images into GE AW 4.6 workstation and reconstruct the arterial phase iodine (water) maps using GSI Viewer software. Export them with Digital Imaging and Communications in Medicine (DICOM) format. Select the slice with the largest axial diameter of the colorectal cancer and its adjacent upper and lower Slices. The ITK-SNAP software was used to perform lesion segmentation (Figure 1). Use the Artificial Intelligent Kit software to extract 107 radiomics features, including histogram features, texture features, and shape features. Because of the imbalance of the samples, we used Synthetic Minority Over-sampling Technique (SMOTE) method with R software to overcome imbalances. Use the independent-samples t-test or the Mann Whitney U test to compare the differences between two groups according to the normality of data distribution. Logistic regression and receiver operating characteristic (ROC) curve analyses were performed to evaluate the diagnostic efficiency of parameters.

Results:

We extracted 107 radiomics features, including histogram features, texture features, and shape features. 20 parameters were different between the two groups (The details were shown in Table 1). Their diagnostic efficacy, and the area under the curve (AUC), 95% confidence interval of AUC, cutoff value, sensitivity and specificity were shown in Table 2. The ROC curve were shown in Figure 2-5.

Conclusions:

The texture analysis based on arterial phase iodine (water) maps of spectral CT imaging can effectively predict the expression of Ki-67 in colorectal cancer. The texture analysis based on arterial phase iodine (water) maps of spectral CT imaging can effectively predict the protein expression of Ki-67 in colorectal cancer. It has potential to become a new way for obtaining immunohistochemical results noninvasively, which is also meaningful for predicting therapeutic response, providing treatment decisions and prognosis prediction in colorectal cancer.

PO-1569

Dual-layer spectral-detector CT for predicting microsatellite instability status and prognosis in locally advanced gastric cancer

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Objective To construct and validate a prediction model based on dual-layer detector spectral CT (DLCT) and clinicoradiological features to predict the microsatellite instability (MSI) status of gastric cancer (GC) and to explore the relationship between the prediction results and patient prognosis.

Methods A total of 264 GC patients who underwent preoperative DLCT examination were randomly allocated into the training set ($n = 187$) and validation set ($n = 80$). Clinicoradiological features and DLCT parameters were used to build the clinical and DLCT model through multivariate logistic regression analysis. A combined DLCT parameter (C_{DLCT}) was constructed to predict MSI. A combined prediction model was constructed using multivariate logistic regression analysis by integrating the significant clinicoradiological features and C_{DLCT} . The Kaplan–Meier survival analysis was used to explore the prognostic significance of the prediction results of the combined model.

Results In this study, there were 70 (26.52%) of MSI-high (MSI-H) GC patients. Tumor location and CT_N staging were independent risk factors for MSI-H. In the validation set, the area under the curve (AUC) of the clinical model and DLCT model for predicting MSI status was 0.721 and 0.837, respectively. The combined model achieved a high prediction efficacy in the validation set, with AUC, sensitivity, and specificity of 0.879, 78.95%, and 75.4%, respectively. Survival analysis demonstrated that the combined model could stratify GC patients according to recurrence-free survival ($p = 0.010$).

Conclusion The combined model provides an efficient tool for predicting the MSI status of GC noninvasively and tumor recurrence risk stratification after surgery.

PO-1570

An MRI-based pelvimetry nomogram for predicting surgical difficulty of transabdominal resection in patients with middle and low rectal cancer

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Objective: The current work aimed to develop a nomogram comprised of MRI_x0002_based pelvimetry and clinical factors for predicting the difficulty of rectal surgery for middle and low rectal cancer (RC). **Methods:** Consecutive mid to low RC cases who underwent transabdominal resection between June 2020 and August 2021 were retrospectively enrolled. Univariable and multivariable logistic regression analyses were carried out for identifying factors (clinical factors and MRI-based pelvimetry parameters) independently associated with the difficulty level of rectal surgery. A nomogram model was established with the selected parameters for predicting the probability of high surgical difficulty. The predictive ability of the nomogram model was assessed by the receiver operating characteristic (ROC) curve and decision curve analysis (DCA). **Results:** A total of 122 cases were included. BMI (OR = 1.269, $p = 0.006$), pelvic inlet (OR = 1.057, $p = 0.024$) and intertuberos distance (OR = 0.938, $p = 0.001$) independently predicted surgical difficulty level in multivariate logistic regression analysis. The nomogram model combining these predictors had an area under the ROC curve (AUC) of 0.801 (95% CI: 0.719–0.868) for the prediction of a high level of surgical difficulty. The DCA suggested that using the nomogram to predict surgical difficulty

provided a clinical benefit. Conclusions: The nomogram model is feasible for predicting the difficulty level of rectal surgery, utilizing MRI-based pelvimetry parameters and clinical factors in mid to low RC cases.

PO-1571

Intussusception caused by an inverted colonic diverticulum: a case report

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Background: Intussusception is an unusual disorder among the complications of diverticula in adults. This study aimed to report intussusception due to an inverted colonic diverticulum. Such a large inverted colonic diverticulum has rarely been reported.

Case presentation: A 62-year-old Chinese woman presented to the First Hospital of Jilin University with abdominal pain, vomiting, and bloody stool. Preoperative computed tomography imaging indicated intussusception. The intraoperative diagnosis was consistent with postoperative pathology. Our patient was diagnosed as having an inverted colonic diverticulum near the ileocecal valve with intussusception and intestinal necrosis.

Conclusion: Although inverted colonic diverticulum is extremely rare, it should also be considered among the causative factors of intussusception

PO-1572

Which Definition of Upper Rectal Cancer Is Optimal in Selecting Stage II or III Rectal Cancer Patients to Avoid Postoperative Adjuvant Radiation?

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Background: In most guidelines, upper rectal cancers (URC) are not recommended to take neoadjuvant or adjuvant radiation. However, the definitions of URC vary greatly. Five definitions had been commonly used to define URC: 1) >10 cm from the anal verge by MRI; 2) >12 cm from the anal verge by MRI; 3) >10 cm from the anal verge by colonoscopy; 4) >12 cm from the anal verge by colonoscopy; 5) above the anterior peritoneal reflection (APR). We hypothesized that the fifth definition is optimal to identify patients with rectal cancer to avoid adjuvant radiation. Methods: The data of stage II/III rectal cancer patients who underwent radical surgery without preoperative chemoradiotherapy were retrospectively reviewed. The height of the APR was measured, and compared with the tumor height measured by digital rectal examination (DRE), MRI and colonoscopy. The five definitions were compared in terms of prediction of local recurrence, survival, and percentages of patients requiring radiation. Results: A total of 576 patients were included, with the intraoperative location of 222 and 354 tumors being above and straddle/below the APR, respectively. The median distance of the APR from anal verge (height of APR) as measured by MRI was 8.7 (range: 4.5–14.3) cm. The height of APR positively correlated with body height ($r=0.862$, $P<0.001$). The accuracy of the MRI in determining the tumor location with respect to the APR was 92.1%. Rectal cancer above the APR had a significantly lower incidence of local recurrence than those straddle/below the APR ($P=0.042$). For those above the APR, there was no significant difference in local recurrence between the radiation and no-radiation group. Multivariate analyses showed that tumor location regarding APR was an independent risk factor for LRFS. Tumor height as measured by DRE, MRI and colonoscopy were not related with survival outcomes.

Fewer rectal cancer patients required adjuvant radiation using the definition by the APR, compared with other four definitions based on a numerical tumor height measured by MRI and colonoscopy. Conclusions: The definition of URC as rectal tumor above the APR, might be the optimal definition to select patients with stage II/III rectal cancer to avoid postoperative adjuvant radiation.

PO-1573

Renal fat deposition measured on Dixon-based MRI is significantly associated with early kidney damage in obesity

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Background: Obesity is an independent risk factor for the occurrence and development of chronic kidney disease (CKD). Obesity could lead to renal fat deposition, which often occurs in the perirenal space, renal sinus, and renal parenchyma. This study was aimed to investigate the renal fat deposition on Dixon-based magnetic resonance imaging and explore whether the renal fat biomarkers of magnetic resonance (MR-RFBs) have predictive value for early kidney damage in obesity.

Methods: This prospective study included 56 obese volunteers and 47 non-obese healthy volunteers. All volunteers underwent renal magnetic resonance examinations. The differences in MR-RFBs [including renal proton density fat fraction (PDFF), renal sinus fat volume (RSFV), and perirenal fat thickness (PRFT)] measured on Dixon-based MRI between the obese and non-obese volunteers were analyzed using a general linear model, taking sex, age, diabetes, and hypertension as covariates. The relationship between estimated glomerular filtration rate (eGFR) and demographic, laboratory, and imaging parameters in obese volunteers was examined by correlation analysis.

Results: All of the MR-RFBs in obese volunteers were significantly higher than those in non-obese volunteers after controlling for age, sex, diabetes, and hypertension (renal PDFF, $p = 0.003$; RSFV, $p = 0.002$; PRFT, $p < 0.001$). Renal PDFF ($r = -0.285$; $p = 0.033$), RSFV ($r = -0.279$; $p = 0.038$), and PRFT ($r = -0.416$; $p = 0.001$) were significantly negatively correlated with eGFR in obesity. After adjusting for age, sex, body mass index, diabetes, hypertension, visceral adipose tissue, subcutaneous adipose tissue, renal PDFF, and RSFV, PRFT remained independently negatively associated with eGFR ($\beta = -0.587$; $p = 0.003$).

Conclusions: MR-RFBs are negatively correlated with eGFR in obesity. The MR-RFBs, especially PRFT, may have predictive value for early kidney damage in obesity.

PO-1574

Magnetic resonance diagnosis of polypoid endometriosis

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Purpose: Polypoid endometriosis (PEM) is a rare type of endometriosis. Its location and clinical manifestations are similar to EM, some patients' clinical manifestations are similar to malignant tumors, which are easily misdiagnosed as malignant tumors or confused with other diseases. The prognosis of PEM patients is good, and reproductive function can be preserved by local tumor resection. Accurate preoperative diagnosis is important for women with reproductive needs. Previous reports mostly describe the clinical and pathological features of PEM. In this report, we describe and summarize the imaging findings of 8 cases of PEM, and discuss the correlation

between magnetic resonance imaging and pathological findings. **Methods and Materials:** Eight patients, aged from 31 to 67 years (mean 42.4 ± 10.4 years), underwent 1.5 T superconducting MRI. Axial, sagittal and coronal images of T2WI, axial T1WI, DWI, ADC and dynamic enhanced scanning images were obtained. The lesion size, location, growth pattern, signal intensity, internal structure, hemorrhage and necrosis, and invasion of surrounding structures were analyzed. The intensity was compared with the signal intensity of myometrium and endometrium. To find out the correlation between these radiological findings and pathological findings. ***Results:** PEM was single, 2 cases located in muscular layer, adnexal region in 5 cases, broad ligament in 1 case, cystic-solid changes in 7 cases and solid changes in 1 case with clear boundary. The solid part of the mixed tumor showed low signal intensity on T1WI, nodular and high signal intensity on T2WI, the solid nodule inside with low signal ring at the edge, high signal intensity on DWI and ADC. The solid part showed uneven enhancement and was weaker than or similar to myometrium, with a rapid rise enhancement curve. The signal of cystic part was mixed. and enhanced scan showed no enhancement. **Conclusions:** PEM is mainly composed of endometrial-like glands and interstitial components. Some glands are cystic dilated, some are dense in cells or with mitotic phase. MRI shows clear solid part boundary of the mass, T2WI shows vesicle-like changes, corresponding to cystic dilated acini seen under microscope, and the distribution of fiber bundles in solid part is consistent with the low signal band on the solid part edge of the image. On DWI and ADC, the lesions were similar to endometrial polyps, which could be distinguished from other malignant pelvic masses. Mixed bleeding signals in different periods of cystic part suggest evidence of endometriosis. These may be the characteristics of PEM. **Clinical Relevance/Application:** Magnetic resonance imaging of polypoid endometriosis is related to pathology, and imaging features may provide accurate preoperative diagnosis.

PO-1575

Three-dimensional MR Elastography Identifies Portal Hypertension in Cirrhosis: A Prospective Multicenter Study

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Purpose: To develop a non-invasive multivariate models based on Three-dimensional MR elastography (3D-MRE) to determine portal hypertension (PH), particularly to diagnose clinically significant portal hypertension (CSPH, HVPg>10mmHg) and severe portal hypertension (SPH, HVPg>12mmHg), using Hepatic Venous Pressure Gradient(HVPg) as the gold standard.

Methods and Materials: This prospective, multicenter study enrolled patients with cirrhosis scheduled for HVPg, and who intended to undergo MR imaging (including 3D-MRE and diffusion-, T1-, and T2-weighted imaging) before the HVPg procedure. A total of 57 patients were recruited from five institutions. Multiple viscoelastic parameters of the liver and spleen, as well as shear stiffness (SS) ratios and subtraction values, were evaluated independently by two radiologists. Univariable and multivariable linear regression analyses were conducted to assess the associations between mechanical parameters and HVPg. Univariable and multivariable logistic regression analyses were used to predict CSPH and SPH, respectively.

Results: HVPg showed the strongest positive correlation with splenic SS at 60Hz ($r = 0.785$; $P < .001$), followed by hepatic SS at 30Hz ($r = 0.631$; $P < .001$), splenic SS at 30Hz ($r = 0.612$; P

< .001), hepatic SS at 60Hz ($r = 0.547$; $P < .001$). Multivariable linear regression analysis showed splenic SS at 60Hz ($\beta = 1.017$; 95% CI: 0.71, 1.325; $P < .001$), liver SS ratio ($\beta = -2.359$; 95% CI: -4.477, -0.241; $P = .03$), and liver stiffness difference ($\beta = 1.169$; 95% CI: 0.251, 2.087; $P = .001$) was the independent factors determining HVP. Approximately 56.5% of the total variability in HVP was explained by these 3 variables (adjusted $R^2 = 0.565$). Logistic regression analysis showed splenic SS at 60Hz (OR = 2.217 [95% CI: 1.292, 3.803]; $P = 0.004$) and liver SS at 30Hz (OR = 6.211 [95% CI: 1.218, 31.669]; $P = 0.028$) were independently associated with CSPH, establishing a model with excellent performance in diagnosing CSPH (area under the receiver operating characteristic curve [AUC], 0.975 [95% CI: 0.79, 0.99]). As for SPH, it showed splenic SS at 60Hz (OR = 1.65 [95% CI: 1.25, 2.16]; $P = .001$) were independently associated with HVP, also with better performance (AUC, 0.969 [95% CI: 0.81, 0.98]).

Conclusions: 3D-MRE with dual frequencies is a very promising method in both predicting HVP and diagnosing the presence CSPH and SPH. Splenic stiffness at 60Hz, combining liver stiffness ratio (60Hz/30Hz) and differences (60Hz-30Hz), was the independent parameters associating HVP.

PO-1576

Differentiation of Crohn's disease from intestinal tuberculosis by clinical, endoscopic and radiological features

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Objective: Similar clinical, radiological and endoscopic features are exhibited by Crohn's disease (CD) and intestinal tuberculosis (ITB). The purpose of the present study was to compare the clinical, radiological and endoscopic features of these two disorders.

Methods: 79 patients with CD and 72 patients with ITB were studied retrospectively. The clinical, radiological and endoscopic features were undertaken to investigate differences in these two disease characteristics.

Results: It was determined that the indicative clinical features of CD were hematochezia and perianal disease, whereas those of ITB included the occurrence of ascites, pulmonary tuberculosis and night sweats ($P < 0.05$). Endoscopic manifestations indicative of CD were longitudinal ulcers and a cobblestone appearance to the mucosa, while the manifestations indicative of ITB were ring- and rodent-like

ulcers ($P < 0.05$). The computed tomography (CT) manifestations indicative of CD included mural stratification, intramural gas, intramural fat, intestinal stricture and the comb sign, whereas the manifestations indicative of ITB were a mural single layer and necrotic lymph nodes ($P < 0.05$).

Conclusion: The present study indicates that the combined evaluation of clinical features, endoscopy and CT is key to differentiating between CD and ITB.

PO-1577

The Diagnostic Value of Extracellular Volume Fraction Based on CT Scan in Differentiating Clear Cell Renal Carcinoma from Minimal Fat Renal Angiomyolipoma

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Objective: To explore the value of extracellular volume fraction (ECV) calculated based on CT scan in the differential diagnosis of minimal fat renal angiomyolipoma (MFAML) and homogeneous renal clear cell carcinoma (CCRCC), and to provide useful information for clinical treatment.

Methods: A total of 33 cases of MFAML and 40 cases of homogeneous CCRCC confirmed by pathological examination after surgery were retrospectively included in Dalian Central Hospital from January 2018 to April 2023. All patients underwent abdominal enhanced CT scan before surgery, and hematocrit was collected before examination. The collected enhanced CT images were measured and calculated, the region of interest was placed in the solid area of the tumor, and the CT value of the lesion in plain scan and delayed phase was recorded respectively, the CT value of aorta in plain scan and delayed phase at the tumor level was measured, and the ECV of the two groups of lesions was calculated. Independent-sample t-test was used to compare the difference in ECV between MFAML and CCRCC. The value of ECV in the diagnosis between MFAML and CCRCC was analyzed by using the receiver operating characteristic (ROC) curve.

Results: The ECV value of homogeneous CCRCC was $59.04 \pm 16.56\%$, and that of MFAML was $35.10 \pm 18.74\%$. The ECV value of homogeneous CCRCC was higher than that of MFAML. The difference was statistically significant ($P < 0.01$). ECV had a good diagnostic efficacy in differentiating homogeneous CCRCC from MFAML. ROC curve analysis showed that the AUC (95% CI) evaluated by ECV was 0.843, sensitivity and specificity were 87.5% and 75.8%, respectively.

Conclusion: ECV has a high diagnostic efficiency in the differential diagnosis of MFAML and homogeneous CCRCC, and has certain clinical application value.

PO-1578

Pretreatment MRI-based radiomics for prediction of rectal cancer outcome: a discovery and validation study

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Background: Accurate prediction of local recurrence or distant metastasis is critical for developing individualized therapies for locally advanced rectal cancer (LARC) patients after standard therapy. This study aims to develop and validate a multiparameter MRI-based radiomics signature (RS) for prognostic prediction in LARC patients receiving neoadjuvant chemoradiotherapy (nCRT) and total mesorectal excision (TME) and to explore the ability of RS for personalized survival risk stratification.

Methods: In this multi-center study, 454 patients who received nCRT and TME and completed 3 years of follow-up participated. RS was constructed for prognostic prediction based on features extracted from pretreatment multiparameter MRI in a training cohort (TC; $n = 298$), which was tested in an internal validation cohort (IVC; $n = 75$) and further validated in an independent external

validation cohort (EVC; $n = 81$). Furthermore, the ability of RS for personalized survival risk stratification was explored using the Kaplan–Meier survival curves.

Results: The RS model showed satisfactory accuracy for prognostic prediction with AUCs of 0.83, 0.81 and 0.82 in the TC, IVC and EVC, respectively. In addition, RS helped to refine risk stratification for LARC patients on the basis of significantly different 3-year disease-free survival rates, independent of their pathological stage, pre-surgery CEA, and even treatment modality.

Conclusions: The proposed RS can be used not only to predict local recurrence or distant metastasis but also to serve as an effective postoperative survival risk stratification tool for clinicians to facilitate decision-making for LARC patients receiving standard treatment.

PO-1579

Multiphase and multiparameter MRI-based radiomics for prediction of tumor response to neoadjuvant therapy in locally advanced rectal cancer

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Background: To develop and validate radiomics models for prediction of tumor response to neoadjuvant therapy (NAT) in patients with locally advanced rectal cancer (LARC) using both pre-NAT and post-NAT multiparameter magnetic resonance imaging (mpMRI).

Methods: In this multicenter study, a total of 563 patients were included from two independent centers. 453 patients from center 1 were split into training and testing cohorts, the remaining 110 from center 2 served as an external validation cohort. Pre-NAT and post-NAT mpMRI was collected for feature extraction. The radiomics models were constructed using machine learning from a training cohort. The accuracy of the models was verified in a testing cohort and an independent external validation cohort. Model performance was evaluated using area under the curve (AUC), sensitivity, specificity, positive predictive value, and negative predictive value.

Results: The model constructed with pre-NAT mpMRI had favorable accuracy for prediction of non-response to NAT in the training cohort (AUC = 0.84), testing cohort (AUC = 0.81), and external validation cohort (AUC = 0.79). The model constructed with both pre-NAT and post-NAT mpMRI had powerful diagnostic value for pathologic complete response (pCR) in the training cohort (AUC = 0.86), testing cohort (AUC = 0.87), and external validation cohort (AUC = 0.87).

Conclusions: Models constructed with multiphase and multiparameter MRI were able to predict tumor response to NAT with high accuracy and robustness, which may assist in individualized management of LARC.

PO-1580

Nomogram Using CT Radiologic Features and Clinical Risk Factors for Preoperative Estimation of Microvascular Invasion in Hepatocellular Carcinoma: Multicenter Development and External Validation Study

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Objectives: Construction of a visible nomogram for microvascular invasion (MVI) prediction in hepatocellular carcinoma (HCC) patients using clinical and imaging features to guide treatment decisions.

Materials & Methods: This retrospective multicenter study enrolled 335 patients (252 in the training cohort and 83 in the external validation cohort) with pathologically confirmed HCC from three independent institutions. Imaging characteristics were evaluated from contrast CT images before treatment. Texture features were extracted in the regions shrunk and dilated 5 mm from the boundary of the tumor. In the training cohort, the clinical radiological (CR) model and clinical radiological texture feature (CRT) models were developed by logistic regression analysis, with ultimate models visualized as nomograms. Subgroup analyses were conducted by tumor size and the best cut-off value of tumor size for MVI prediction was determined by maximizing the Youden index.

Results: Elevated alpha-fetoprotein, tumor size, invasion of liver capsule, incomplete "capsule", peritumoral enhancement, intratumor necrosis, portal venous phase (PVP) peritumoral hypo-enhancement (PPHE) and satellite nodule were independent risk factors for MVI. With the newly discovered features, PVP peritumoral hypo-enhancement, the AUCs of CR nomogram reached 0.863 (95% CI: 0.773-0.941) in the external validation cohort and it is higher than the AUC of 0.834 (95% CI: 0.742-0.917) of the model without this feature. The predictive performance of the CRT model did not outperform that of the CR model, with AUCs of 0.845 and 0.863, respectively. The best cut-off value of tumor size was about 4.5 cm. Incomplete "capsule" and PVP peritumoral hypo-enhancement were risk factors of MVI in tumors larger than 4.5 cm, while the invasion of the liver capsule and peritumoral enhancement independently predicted MVI in smaller HCCs.

Conclusion: The nomogram, integrating clinical and radiologic features with a rarely reported feature, PVP peritumoral hypo-enhancement, demonstrates good performance for predicting MVI. The optimal cut-off value of tumor size in predicting MVI is about 4.5cm and there are more noteworthy imaging features in different sizes of HCCs. The findings proposed new features related to MVI, and the nomogram can accurately predict MVI status in patients with HCC. It is helpful to make individualized treatment decisions.

PO-1581

Predicting Early Response to Transarterial Chemoembolization in Hepatocellular Carcinoma Using a Multimodality Deep Learning Model With CT and MRI

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Purpose

To investigate the value of CT- and MRI-based multimodality deep learning (MDL) model in preoperatively predicting the early response to transarterial chemoembolization (TACE) in patients with hepatocellular carcinoma (HCC).

Method and Materials

A total of 553 patients with 693 HCC lesions (response = 445; non-response = 248), who received enhanced CT or enhanced MRI prior to initial TACE treatment between January 2017 and December 2022, were retrospectively collected. Of these, 362 had CT-only, 156 had MRI-only, and 175 had both CT and MRI. CT-only and MRI-only cases were used as training datasets for single-modality deep learning (SDL) model development, respectively. 104 cases with both CT and MRI were used as a training dataset for MDL model development, and 71 cases with both CT and MRI were used as a test cohort for MDL model test. The CT- and MRI-based MDL model were developed using transfer learning (TL), which immigrated the parameters from SDL model development. Feature extractors were established by using a pre-trained ResNet-18 convolutional neural network, and an extreme learning machine (ELM) was the classifier. Independent clinical risk factors were determined by univariate and multivariate logistic regression analyses, and clinical prediction models were developed. The prediction model was evaluated by area under the curve (AUC), calibration curve and decision curve analysis (DCA).

Results

Three-phase CT-based model (AUC = 0.759) is superior to each single-phase CT-based model (AUC = 0.705 to 0.718). Similarly, multiparameter MRI-based model (AUC = 0.757) is superior to each single-parameter MRI-based model (AUC = 0.700 to 0.725). In addition, the CT- and MRI-based MDL model (AUC = 0.836) with TL achieved the best performance compared with other SDL model (AUC = 0.759 and 0.757, respectively). The CT- and MRI-based MDL model (AUC = 0.836) with TL is also superior to clinical prediction model (AUC = 0.511). The DCA indicates that the CT- and MRI-based MDL model achieved greater clinical utility in predicting the early response to TACE compared with other models.

Conclusion

By using TL, the CT- and MRI-based MDL model is a reliable technique for predicting the early treatment response to TACE in patients with HCC.

PO-1582

Multi-parametric MRI-based intratumoral and peritumoral radiomics for predicting pathological differentiation of hepatocellular carcinoma

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Purpose: To investigate the predictive potential of intratumoral and multi-region peritumoral radiomics from multi-parametric magnetic resonance imaging (MRI) for determining pathological differentiation in hepatocellular carcinoma (HCC).

Methods: A total of 265 patients with 277 HCCs (training cohort n = 193, validation cohort n = 84) who underwent preoperative MRI scans were retrospectively analyzed. The risk features identified through stepwise regression analysis were utilized to construct a clinical model. Radiomics models based on MRI (arterial phase, portal venous phase, delayed phase) across various regions (entire intratumoral, Peri_5mm, Peri_10mm, Peri_20mm) were developed using the least absolute shrinkage and selection operator approach. The signatures obtained from the intratumoral region and the optimal peritumoral region were combined to design the fusion IntraPeri model. The performance was assessed using the area under the receiver operating characteristic curve (AUC).

Results: Larger tumor size, nonsmooth margin, and mosaic architecture were identified as risk features for poorly differentiated HCC (pHCC). The clinical model achieved an AUC of 0.77 in the training cohort and 0.73 in the validation cohort, the corresponding AUC values were 0.84 and 0.77 for the intratumoral model. The Peri_10mm model demonstrated superior performance compared to the Peri_5mm and Peri_20mm models, with AUC values of 0.95 vs. 0.84 vs. 0.77 (all $P < 0.05$) in the training cohort, 0.86 vs. 0.77 vs. 0.73 in the validation cohort, respectively. The IntraPeri model exhibited a remarkable AUC values of 0.95 and 0.86 for predicting pHCC in the training and validation cohorts, respectively.

Conclusions: Our study highlights the potential of MRI-based radiomics model that integrates intratumoral and peritumoral signatures as a promising tool for predicting HCC differentiation.

PO-1583

Evaluation of Hypoxia Status in a Rat Liver Fibrosis Model Using IVIM and T1 Mapping

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Objective: To assess the diagnostic performance of intravoxel incoherent motion (IVIM) and T1 mapping in detecting hypoxia status of liver fibrosis using a carbon tetrachloride (CCl_4) – induced rat model.

Method: The hypoxia group of liver fibrosis included 8 rats induced by injection of CCl_4 , 9 rats were injected of oil as control group. All 17 rats underwent MRI examination at the timepoint of 13th week after injection, using T1 mapping and IVIM. The hypoxia index of pimonidazole was performed by immunohistochemical examination. The pathological examination included hematoxylin eosin, masson trichrome, prussian blue staining. The quantitative analysis of hypoxia of liver fibrosis was used by pimonidazole immunohistochemical staining and H-score. The quantitative parameters were analyzed in two groups, with histopathological results serving as the reference standard. The differences of MRI multi-parameters and pimonidazole score between control and hypoxia group were compared with IVIM parameters and T1 relaxation time and pimonidazole score.

Results: There were significant differences between control group and hypoxia group in D^* and f values of IVIM parameters, T1 mapping and pimonidazole scores (all $p < 0.01$). D^* and T1 mapping values showed a positive correlation with pimonidazole scores ($r = 0.508$ & 0.489). The optimal cut-off value of D^* was 0.75, and the sensitivity, specificity and AUC were 75%, 88.9% and 0.875, respectively.

Conclusion: IVIM and T1 Mapping are promising methods for non-invasive detection of hypoxia status in liver fibrosis.

PO-1584

The Value of Pelvic Skeletal Muscles to Identify the Low-Risk Rectal Cancers with Poor Prognosis

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Objective

This study was aimed to establish a radiomics model based on pelvic skeletal muscles in coronal T2WI to identify the low-risk rectal cancer (RC) with poor prognosis.

Methods

Study Population: A total of 99 postoperative histopathological proved RC (allocated to a training and testing set with a 7:3 ratio) with low risk factors (cT1–cT3a/b, N0, MRF clear, no EMVI, no LVI and PNI) were recruited in our study. All patients underwent MR examination preoperatively, had no postoperative treatments followed by TME, and followed up 2-6 years. Our institutional review board approved this retrospective study and waived the requirement for informed consent.

MRI Acquisition: MRI examinations were performed with a 3.0-T system (uMR780; Shanghai United Imaging Healthcare Co., Ltd.) with phased-array surface coils. 2D fast spin-echo (FSE) T2WI was performed in coronal planes, repetition time 4900 ms, echo time 153.72 ms, slice thickness 4 mm, gap 0.4 mm, field of view 320x320 mm², refocus flip angle 90°.

Annotation: Two gastrointestinal radiologists (G.J. and F.Y., with 5 and 11 years of experience in rectal MRI, respectively) annotated the area of interests (ROIs) together. When opinions were consistent, the label would be output. ITK-SNAP software (version 3.6, www.itk-snap.org) was used for manual segmentation of 2D MR images, and the muscles were delineated layer by layer on the coronal T2WI sequence, including bilateral piriformis, obturator internus and perianal complex.

Statistical Analysis: Statistical Analysis: Total 33 radiomic signatures based on 1257 3D features was generated using the least absolute shrinkage and selection operator (LASSO) Cox regression model by 5 folds cross validation. Then 8 radiomic signatures with p value less than 0.1 were selected by Cox single factor. Finally, 3 radiomic signatures with p value less than 0.05 were selected by Cox multi factor analysis. The Cox-score is obtained by the coefficient of the Cox model and the value of radiomic signatures. The Cox-score with DFS was investigated by Kaplan-Meier survival curves. Survival curves were compared by the log-rank test. One model was built and assessed for their predictive values, using the Harrell concordance index.

Results

The Cox-score stratified patients into low- and high-risk groups for DFS in the training set ($P = 0.006$), and was successfully validated in the testing set ($P = 0.031$). The model with 3 radiomic signatures had good performance in training set (C index=0.776, 95% confidence interval [CI] 0.598-0.914) and testing set (C index=0.753, 95% confidence interval [CI] 0.591-0.939). The calibration curves depicted consistency between the predicted and observed outcomes.

Conclusion

The novel radiomic signatures could be used to predict DFS in patients with low-risk RC. The radiomic model has the ability to estimate DFS ($P=0.006$, 0.031 in training set and in validation set, respectively), and may help guide individualized treatment in such patients.

PO-1585

A CT-based radiomics nomogram involving the cystic fluid area for differentiating appendiceal mucinous neoplasms from appendicitis with intraluminal fluid

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Objective To develop and validate a radiomics nomogram based on computed tomography (CT) to distinguish appendiceal mucinous neoplasms (AMNs) from appendicitis with intraluminal fluid (AWIF).

Method A total of 211 patients from two medical institutions were retrospectively analysed, of which 109 were pathologically confirmed as having appendicitis with concomitant CT signs of intraluminal fluid and 102 as having AMN. All patients were randomly assigned to a training (147 patients) or validation cohort (64 patients) at a 7:3 ratio. Radiomic features of the cystic fluid area of the appendiceal lesions were extracted from nonenhanced CT images using 3D Slicer software. Minimum redundancy maximum relevance and least absolute shrinkage and selection operator regression methods were employed to screen the radiomic features and develop a radiomics model. Combined radiomics nomogram and clinical-CT models were further developed based on the corresponding features selected after multivariate analysis. Lastly, receiver operating characteristic curves, calibration curves, and decision curve analysis (DCA) were used to assess the models' performances in the training and validation cohorts.

Results A total of 851 radiomic features were acquired from the nonenhanced CT images. Subsequently, a radiomics model consisting of eight selected features was developed. The combined radiomics nomogram model comprised rad-score, age, and mural calcification, while the clinical-CT model contained age and mural calcification. The combined model achieved area under the curves (AUCs) of 0.945 (95% confidence interval [CI]: 0.895, 0.976) and 0.933 (95% CI: 0.841, 0.980) in the training and validation cohorts, respectively, which were larger than those obtained by the radiomics (training cohort: AUC, 0.915 [95% CI: 0.865, 0.964]; validation cohort: AUC, 0.912 [95% CI: 0.843, 0.981]) and clinical-CT models (training cohort: AUC, 0.884 [95% CI: 0.820, 0.931]; validation cohort: AUC, 0.767 [95% CI: 0.644, 0.863]). Finally, DCA showed that the clinical utility of the combined model was superior to that of the clinical-CT and radiomics models.

Conclusion Our combined radiomics nomogram model constituting radiomics, clinical, and CT features exhibited good performance for differentiating AMN from AWIF, indicating its potential application in clinical decision-making.

PO-1586

Construction of a Nomogram Predicting the Healing Time of Clinically Relevant Pancreatic Fistula after Pancreaticoduodenectomy Based on Abdominal Visceral Fat Area

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Background: Pancreaticoduodenectomy (PD) is often accompanied by a high incidence of clinically relevant pancreatic fistula (CR-PF) which may lead to limited postoperative recovery or even death. Many previous studies have focused on predicting the occurrence of CR-PF, but few have paid

attention to the healing time of CR-PF (CR-PF-HT). It has been shown that the nutritional status of patients is closely related to the clinical outcome of PF and other complications. In addition to clinical routine nutritional status indicators and treatment methods, information on nutritional status included in CT images is often ignored or underestimated. The aim of this study was to develop a prediction model based on postoperative clinical and imaging nutritional factors to predict CR-PF-HT after PD.

METHODS: A retrospective study was conducted including 244 patients with pancreatic cancer who underwent PD and developed CR-PF (training group: 171 cases from Lanzhou University Second Hospital; validation group: 73 cases from Affiliated Hospital of Qingdao University). According to the revised criteria of the International Study Group on Pancreatic Fistula (ISGPS) in 2016, B- and C-grade PF were classified as CR-PF. CR-PF-HT was defined as the time from diagnosis of pancreatic fistula to the removal of drainage tubes. Patients were divided into two groups based on median healing time: healing and delayed healing groups. Univariate and multivariate logistic regression analyses were performed using preoperative CT images, treatment interventions, and clinical factors to develop a prediction model (nomogram). The efficiency of the model was evaluated using the area under the ROC curve (AUC), calibration curve, and decision curve analysis (DCA).

RESULTS: The average CR-PF-HT was 42 ± 23 days (median time: 36 days; range 12-118 days). Univariate and multivariate logistic regression analyses identified enteral nutrition support, neutrophil-to-lymphocyte ratio (NLR) ≤ 2.1 , prognostic nutritional index (PNI) > 38 , and abdominal visceral fat area (VFA) $> 134.6 \text{ cm}^2$ for male or $> 91.1 \text{ cm}^2$ for female as factors associated with a shorter CR-PF-HT. A nomogram based on enteral nutrition support, NLR, PNI, and VFA was developed. In the validation group, the AUC value of the nomogram was 0.778 (95% CI: 0.734-0.795), with a sensitivity of 69.7% and specificity of 82.1%. DCA and calibration curves showed good consistency and clinical applicability of the nomogram.

CONCLUSION: Enteral nutrition support, NLR, PNI, and VFA are important factors affecting CR-PF-HT. The nomogram developed based on data from two centers can accurately predict pancreatic fistula healing time, providing valuable reference information for clinicians managing pancreatic fistula.

PO-1587

Predictive Nomogram for Healing Time of Esophagojejunal Anastomotic Leakage after Total Gastrectomy for Gastric Cancer Based on Skeletal Muscle Index

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Background: Esophagojejunal anastomotic leakage (EJAL) occurs in 4-15% of gastric cancer patients who undergo radical total gastrectomy, and its failure to heal can lead to poor prognosis and a mortality rate of up to 60%. Previous studies have mainly focused on predicting EJAL based on preoperative conditions and surgical procedures, research on the prognosis of EJAL, such as healing time, is relatively scarce. Nutritional status plays a crucial role in the healing of anastomotic leakage, and besides clinical conventional nutritional indicators, nutritional information contained in CT images is often overlooked. This study aims to predict the healing time of EJAL based on postoperative clinical and imaging nutritional status.

Methods: We retrospectively collected data from 218 patients with EJAL of grades II-III according to the Clavien-Dindo complication classification, who underwent radical total gastrectomy for gastric cancer at two centers from 2018 to 2023 (training group: 126 cases from Lanzhou University Second Hospital; validation group: 92 cases from Affiliated Hospital of Qingdao University). EJAL was diagnosed based on medical records, imaging or endoscopic examination. The healing time of EJAL was defined as the time from diagnosis to the time of abdominal drainage tube removal,

and patients were divided into a healing group and a delayed healing group based on the median healing time. We conducted univariate and multivariate logistic regression analysis to construct a prediction model (Nomogram) based on relevant characteristics including the first abdominal CT scan, clinical nutrition, and treatment interventions following diagnosis of EJAL. The area under the ROC curve (AUC), calibration curve, and decision curve (DCA) were used to evaluate the performance of the model.

Results: The average healing time of EJAL was 15 ± 6 days (median: 11 days, range 4-63 days). Patients who received combined enteral and parenteral nutrition support, had a systemic immune-inflammation index (SII) $< 2.93 \times 10^{12}$, a controlling nutritional status score (COUNT) > 4 , and a skeletal muscle index (SMI) for male and female > 40.31 or $30.88 \text{ cm}^2/\text{m}^2$ had a shorter healing time for EJAL. We constructed a Nomogram based on these four factors. In the validation group, the AUC value of the Nomogram was 0.751 (95% CI: 0.709-0.791), with a sensitivity of 64.3% and a specificity of 77.4%. The DCA and calibration curve showed that the Nomogram had good predictive performance and clinical application value.

Conclusion: Postoperative nutritional support methods, SII, COUNT, and SMI are important factors affecting the healing time of EJAL. The prediction model constructed based on the two centers can relatively accurately predict the healing time of EJAL, providing reference value for clinicians managing nutritional support and clinical interventions in EJAL patients.

PO-1588

Correlative study of clinical, serum biochemical, CT parameters and pathological findings between hepatoid adenocarcinoma of the stomach and common gastric adenocarcinoma

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Objective:

Gastric adenocarcinoma is the most important type of gastric cancer, which can be divided into common type and special type. Gastric hepatoid adenocarcinoma belongs to special gastric adenocarcinoma and has the worst prognosis among other types of gastric adenocarcinoma. Definite preoperative diagnosis is beneficial to guide clinical treatment and improve prognosis of patients with gastric hepatoid adenocarcinoma. Combined with pathological results, clinical parameters, serum biochemical biomarkers and CT for the predictive value of gastric hepatoid adenocarcinoma alone and in combination were discussed.

Materials and Methods:

We collected clinical parameters, serum biochemical biomarkers and CT features of pathologically proved 44 gastric hepatoid adenocarcinoma patients and 116 common gastric adenocarcinoma patients, retrospectively. Gender, age, serum biochemical biomarkers (AFP, CEA, CA19-9 and CA125 levels), location of lesion were analyzed in two groups. Following CT features were evaluated: maximum diameter, growth mode, enhancement mode, necrotic cystic circumstance on plain and contrast-enhanced phase and the CT attenuation values of plain and contrast-enhanced phase. TNM stage, T stage, N stage, differentiation degree, vascular tumor thrombi, nerve invasion and HER-2 expression were analyzed. The statistical differences of the above indicators were analyzed. Binary logistic regression analysis was used to screen the preoperative valuable indicators for predicting gastric hepatoid adenocarcinoma. The receiver operating characteristic curves were drawn. The area under the curves was calculated. In addition, the diagnostic efficiency of each indicator and its combination were evaluated.

Results:

There were no statistically significant differences in age, gender, maximum diameter of lesion, growth mode, enhancement mode, necrotic cystic circumstance, CT attenuation values of plain

and arterial phase, CA19-9 and CA125 groups ($P > 0.05$). The location of lesion in gastric antrum (65.9%; 34.5%), serum AFP (13.27ng/ml; 2.70ng/ml), serum CEA (4.07ng/ml; 2.42ng/ml) and CT attenuation values of venous phase (82.34 ± 8.46 Hu; 91.02 ± 10.62 Hu) and delayed phase (72.89 ± 8.83 Hu; 78.27 ± 9.51 Hu) were significantly different in two groups ($P < 0.05$). The cut-off value of serum AFP and CT attenuation values of venous phase in differentiating gastric hepatoid adenocarcinoma from common gastric adenocarcinoma was 4.7ng/ mL and 85Hu. The AUC of the location of lesion, serum AFP, CT attenuation values of venous phase and combined diagnosis were 0.657, 0.881, 0.749 and 0.903, respectively. Gastric hepatoid adenocarcinoma patients had higher N stage, lower differentiation, higher incidence of vascular cancer thrombin and lower expression of HER-2 than those in common gastric adenocarcinoma patients ($P < 0.05$).

Conclusion:

The location of lesion, serum AFP and CT attenuation values of venous phase are valuable indicators for preoperative prediction of gastric hepatoid adenocarcinoma. For gastric cancer occurring in the gastric antrum, if preoperative serum AFP concentration is greater than 4.7ng/ml and CT attenuation values of venous phase is less than 85Hu, it suggested the diagnosis is gastric hepatoid adenocarcinoma

PO-1589

The Value of Intravoxel Incoherent Motion Imaging in Diagnosing Placenta Accreta Spectrum Disorders and Predicting Their Intraoperative Bleeding

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Objective To investigate the changes and diagnostic value of placental microcirculation perfusion and diffusion parameters in patients with placenta accreta spectrum disorders (PASDs) using intravoxel incoherent motion (IVIM) imaging, and to analyze the correlation between IVIM parameters and intraoperative hemorrhage in patients with PASDs.

Methods 69 patients with PASDs and 37 normal pregnant women underwent 1.5-T magnetic resonance examinations with IVIM-DWI. The perfusion percentage (f), pseudo-diffusion coefficient (D^*), and diffusion coefficient (D) were calculated and analyzed in each group. ROI includes the entire placenta. Comparison of IVIM parameters between multiple groups was performed using a nonparametric rank-sum test. ROC curves were used to evaluate IVIM parameters that predicted placental implantation and massive intraoperative bleeding.

Results The f -value of patients with PASDs was significantly higher than that of normal pregnant women ($P < 0.001$). f -value in the deep placental implantation group was significantly higher than that in the superficial implantation group in the PASDs group ($P < 0.001$); the D -value in the deep placental implantation group was higher than that in the normal group ($P < 0.05$); and the difference in D^* values between the groups was not statistically significant ($P > 0.05$). The best cut-off f value for predicting PASDs was 0.326, with a sensitivity of 0.750 and a specificity of 0.919; the best cut-off f value for discriminating shallow and deep placental implantation was 0.339, with a sensitivity of 0.680 and a specificity of 0.931; the best cut-off D value for discriminating between normal and deep implantation was 1.83×10^{-3} mm/s, with a sensitivity of 0.632 and a specificity of 0.703; the best critical f value for predicting massive maternal blood loss was 0.310, with a sensitivity of 0.881 and a specificity of 0.667.

Conclusions Placental perfusion is significantly increased in patients with PASDs. f -value and D -value can be used to diagnose PASDs, and f -value helps to predict intraoperative blood loss in PASDs.

PO-1590

Histogram analysis of MR quantitative parameters: Are they correlated with prognostic factors in prostate cancer?

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Purpose: To investigate the correlation between quantitative MR parameters and prognostic factors in prostate cancer (PCa).

Method: A total of 186 patients with pathologically confirmed PCa who underwent preoperative multiparametric MRI (mpMRI), including synthetic MRI (SyMRI), were enrolled from two medical centres. The histogram metrics of SyMRI [T1, T2, proton density (PD)] and apparent diffusion coefficient (ADC) values were extracted. The Mann-Whitney U test or Student's t test was employed to determine the association between these histogram features and the prognostically relevant factors. Receiver operating characteristic (ROC) curve analysis was conducted to evaluate the differentiation performance. Spearman's rank correlation coefficients were calculated to determine the correlations between histogram parameters and the International Society of Urological Pathology (ISUP) grade group as well as pathological T stage.

Results: Significant correlations were found between the histogram parameters and the ISUP grade as well as pathological T stage of PCa. Among these histogram parameters, ADC_minimum had the strongest correlation with the ISUP grade ($r = -0.481$, $p < 0.001$), and ADC_Median showed the strongest association with pathological T stage ($r = -0.285$, $p = 0.008$). The ADC_10th percentile exhibited the highest performance in identifying clinically significant prostate cancer (csPCa) (AUC: 0.833; 95% CI: 0.771~0.883). When discriminating between the status of different prognostically relevant factors, a significant difference was observed between extraprostatic extension-positive and -negative cancers with regard to histogram parameters of the ADC map (10th percentile, 90th percentile, mean, median, minimum) and T1 map (minimum) ($p = 0.002 \sim 0.032$). Moreover, histogram parameters of the ADC map (90th percentile, maximum, mean, median), T2 map (10th percentile, median), and PD map (10th percentile, median) were significantly lower in PCa with perineural invasion ($p = 0.009 \sim 0.049$). The T2 values were significantly lower in patients with seminal vesicle invasion (minimum, $p = 0.036$) and positive surgical margin (10th percentile, 90th percentile, mean, median, and minimum, $p = 0.015 \sim 0.025$).

Conclusion: Quantitative histogram parameters derived from synthetic MRI and ADC maps may have great potential for predicting the prognostic features of PCa.

PO-1591

Feasibility of machine learning based CT radiomics to predict gastric poorly cohesive carcinoma

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Purpose: To explore the value of machine learning based CT radiomics in preoperative prediction of gastric poorly cohesive carcinoma.

Materials and Methods: The clinical data and preoperative CT images of 116 patients with postoperative pathology confirmed gastric cancer were retrospectively enrolled. According to WHO classification, 30 patients with gastric poorly cohesive carcinoma and 86 patients with non-poorly cohesive carcinoma were classified. The volume of interest was delineated on the CT venous phase axial image, and the radiomics features were extracted. They were divided into training set and test set according to 8:2, and the least absolute shrinkage and selection operators were used to screen the radiomics features. Four machine learning models (logistic regression, random forest,

decision tree and support vector machine was constructed. The receiver operating curve was performed.

Results: There were the significant difference in venous phase ($P=0.009$) and delayed phase CT values ($P<0.001$). The accuracy of the four types of machine learning models is higher than 70%. The model with the highest accuracy is random forest in the training set, with an accuracy of 93.54%; in the test set, it is a decision tree model with an accuracy of 82.61%.

Conclusion The CT radiomics model based on machine learning have the ability to noninvasively distinguish poorly cohesive carcinoma with good accuracy, which may provide add information for clinical.

PO-1592

Dynamic prediction of Overall survival After Transarterial Chemoembolization for Hepatocellular Carcinoma using artificial intelligence

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Objectives: Developing and validating a MRI-based deep learning model for predicting overall survival (OS) of patients with hepatocellular carcinoma (HCC) undergoing transcatheter chemoembolization.

Methods: In this retrospective study, 268 patients with hepatocellular carcinoma (HCC) who received TACE from 2012 to 2017 were collected and divided into training ($n = 187$) and validation ($n = 81$) cohorts. The residual network was used to extract prognostic information from MRI images, which was then combined with the AFP factors to predict survival using a bayesian joint models. Harrell C index, the time-dependent area under the receiver operating characteristic curves (TD AUCs), calibration curve, and decision curve were used to evaluate the performance of the models, the independent cohort is used to verify the validity and superiority of the model.

Results: With a median follow-up of 2 years for all patients, we identified independent risk factors affecting survival after transcatheter arterial chemoembolization, including tumor size, number of tumors, and AFP. The final model showed accurate calibration and very high discrimination in the development cohort (overall dynamic AUC: 0.846; 95% CI: 0.832-0.860) with a persistent improvement in AUC for each new repeated measurement (from AUC: 0.810; 95% CI: 0.769-0.780 to 0.931; 95% CI: 0.915-0.934; $p<0.0001$). The predictive performance was confirmed in the external validation cohorts (overall AUC: 0.849; 95% CI: 0.838-0.861).

Conclusions: The deep learning model based on MRI images and Dynamic change of AFP can predict the overall survival of patients with transarterial chemoembolization.

PO-1593

Automated Segmentation of Liver Segment on Portal Venous Phase MR Images Using a 3D Convolutional Neural Network

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Objective: We aim to develop and validate a three-dimensional convolutional neural network (3D-CNN) model for automatic liver segment segmentation on MRI images.

Methods: This retrospective study evaluated an automated method using a deep neural network that was trained, validated, and tested with 367, 157, and 158 portal venous phase MR images, respectively. The Dice similarity coefficient (DSC), mean surface distance (MSD), Hausdorff distance (HD), and volume ratio (RV) were used to quantitatively measure the accuracy of segmentation. The time consumed for model and manual segmentation was also compared. In addition, the model was applied to 100 consecutive cases from real clinical scenario for a qualitative evaluation and indirect evaluation.

Results: In quantitative evaluation, the model achieved high accuracy for DSC, MSD, HD and RV (0.920, 3.34, 3.61 and 1.01, respectively). Compared to manual segmentation, the automated method reduced the segmentation time from 26 min to 8 sec. In qualitative evaluation, the segmentation quality was rated as good in 79% of the cases, moderate in 15% and poor in 6%. In indirect evaluation, 93.4% (99/106) of lesions could be assigned to the correct segment by only referring to the results from automated segmentation.

Conclusion: The proposed model may serve as an effective tool for automated anatomical region annotation of the liver on MRI images.

PO-1594

Virtual monoenergetic imaging in dual-layer spectral CT can improve diagnostic performance of active Crohn's disease

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Purpose: To investigate the diagnosis value of virtual monoenergetic images (VMI) in CT enterography (CTE) using dual-layer spectral CT for active Crohn's disease lesions.

Methods: Forty-five pathologically confirmed patients of Crohn's disease were analyzed retrospectively. All patients underwent CTE on a dual-layer spectral CT (IQon, Philips Healthcare, Best, the Netherlands) and endoscopy within two days. Three radiologists blinded to enteroscopy findings assessed CTE images for the presence of active lesions in the colorectum, ileocecum and small bowel separately using conventional enhanced images and VMI 40 keV with one-month intervals to avoid recall bias. A 5-point scale was applied for recording lesions ranging from 1 (definitely absent) to 5 (definitely present), with scores ≥ 3 being considered positive finding. All image findings were compared with the enteroscopy result. Receiver operating characteristic (ROC) analysis was used to assess the improvement of radiologists' performance.

Forty-five pathologically confirmed patients of Crohn's disease were analyzed retrospectively. All patients underwent CTE on a dual-layer spectral CT (IQon, Philips Healthcare, Best, the Netherlands) and endoscopy within two days. Three radiologists blinded to enteroscopy findings assessed CTE images for the presence of active lesions in the colorectum, ileocecum and small bowel separately using conventional enhanced images. The radiologists were asked to perform a re-evaluation using VMI 40 keV one month later to avoid recall bias. A 5-point scale was applied for recording lesions ranging from 1 (definitely absent) to 5 (definitely present), with scores ≥ 3 being considered positive finding. All image findings were compared with the enteroscopy result. Receiver operating characteristic (ROC) analysis was used to assess the improvement of radiologists' performance.

Result: In total, 66 and 83 positive findings were recorded on conventional CT images and VMI 40 keV (inter-reader agreement $\alpha = 0.610$ and 0.684). Using enteroscopy result as golden standard, the overall area under the curve (AUC), sensitivity, and specificity of VMI 40 keV were significantly improved (all $p < 0.05$) from 0.817 to 0.944, 85.7% to 93.1% and 70.0% to 90.0%, respectively, compared with conventional enhanced images.

Conclusion: The VMI 40keV could improve the diagnostic performance for active lesions of Crohn's disease.

PO-1595

Multifrequency three-dimensional MR elastography assessment liver fibrosis heterogeneity in Rat Models

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Purpose: Liver fibrosis usually affect the entire liver, however, its spatial distribution may be heterogeneous. This study aims to investigate the potential value of Magnetic resonance imaging (MRI) and Three-dimensional (3D) MR elastography (3D-MRE) in assessing the spatial distribution heterogeneity of liver fibrosis progression and alleviation in rat liver fibrosis models.

Methods and Materials: 80 male Sprague-Dawley rats were induced with different grades of fibrosis using bile duct ligation (BDL) and carbon-tetrachloride (CCl₄) intoxication. Meanwhile, 20 age-matched rats were given sham operation or intraperitoneal injection of olive oil as the control group. In both the BDL and CCL4 models, 20 rats in each group were administered silymarin orally at a dose of 150 mg/kg per day. Multiparameter MRI sequences, included 3D-MRE, diffusion-, T1-, T2-weighted, T1 mapping, T2 mapping, and T2* mapping were performed on the model group, control group, and treatment group at predetermined time points. 3D-MRE was used to calculate liver shear stiffness (SS) and damping ratio (DR) for the left lateral lobe, left lobe, middle lobe, and right lobe of the liver at various frequencies (60, 80, 100, 150, and 200 Hz) for each animal. Liver and serum samples were collected for histologic and biochemical analyses.

Results: A total of 400 liver lobes from 100 rats were evaluated. Strong correlations was found between liver stiffness ($r=0.80$, $P < 0.01$), T2 value ($r=0.71$, $P < 0.01$) and the stage of liver fibrosis. The area under the curves (AUCs) range of liver shear stiffness for predicting $\geq F1$, $\geq F2$, $\geq F3$, and F4 were 0.82, 0.83, 0.91 and 0.86 in the BDL model. For the CCl₄ model, the AUCs range of liver shear stiffness for predicting $\geq F1$, $\geq F2$, $\geq F3$, and F4 were 0.89, 0.87, 0.90 and 0.97, respectively. Based on the results of MRE and pathological fibrosis staging, among the 40 BDL model rats and 40 CCL4 model rats, 35 rats exhibited a one-stage difference in fibrosis staging between different liver lobes, and 4 rats showed a two-stage difference in fibrosis staging between different liver lobes. Both models showed a heterogeneous distribution of liver stiffness compared to controls.

Conclusions: This preclinical study provides evidence that MR elastography can accurately depict the heterogeneity distribution of liver fibrosis in the global liver.

PO-1596

Diagnosis of primary biliary melanoma with distinct imaging features: a case report and literature review

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Primary biliary melanoma arises from proliferating melanocytes in the mucosal surface of the bile duct and is extremely rare. Since the vast majority of biliary melanomas represent metastases of cutaneous origin, accurate preoperative diagnosis of melanoma and exclusion of other primary

sources are vital in cases involving primary lesions. Although melanomas with pigmented cells have typical signal characteristics, obtaining a non-invasive pre-treatment diagnosis remains difficult, due to their low incidence. Here, the case of a 61-year-old male Asian patient who presented with upper quadrant abdominal pain, swelling and jaundice for 2 weeks, and who was diagnosed with primary biliary melanoma following extensive preoperative blood analyses, computed tomography (CT) and magnetic resonance imaging (MRI), is described. Post-resection immunohistochemistry confirmed the diagnosis and the patient received six chemotherapy cycles of temozolomide and cisplatin, however, progression of multiple liver metastases was observed at the 18-month follow-up CT. The patient continued with pembrolizumab and died 17 months later. The present case of primary biliary melanoma is the first reported diagnosis based on typical MRI features and the exhaustive exclusion of a separate primary origin.

PO-1597

T1 mapping predicts progression-free survival of clear cell renal cell carcinoma after nephrectomy

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Purpose: To demonstrate the prognostic significance of T1 mapping in prediction of Progression Free survival (PFS) in patients with ccRCC (clear cell renal cell carcinoma) after nephrectomy.

Materials and methods: A total of 195 ccRCC cases with eligible data were included in the study. Univariate and multivariable Cox proportional hazard regression models were performed to identify the independent predictive effectors and then integrated to build a comprehensive nomogram for predicting the 1, 3-year, and 5-year PFS. Based on the numbers of independent predictive factors, Kaplan-Meier survival analysis was used to evaluate the difference in PFS.

Results: The median follow-up was 27.6 months (range, 1-88 months), in which 22 (11.3%) patients had metastasis or recurrence. The enhanced T1 relaxation time ($P=0.001$) and the integrality of tumor capsule ($P=0.000$) were independently related to the PFS of ccRCC. The Kaplan-Meier plot showed that high-risk patients tended to have higher enhanced T1 relaxation time and incomplete tumor capsule (log-rank test all $p < 0.05$).

Conclusions: The enhanced T1 mapping may be a new reliable biomarker for PFS prediction in patients with ccRCC.

PO-1598

Intraindividual Comparison of CT and MRI for Predicting Vessels Encapsulating Tumor Clusters in Hepatocellular Carcinoma: Which Imaging Modality is Better?

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Purpose: This study aimed to investigate imaging features of vessels encapsulating tumor clusters (VETC) pattern in hepatocellular carcinoma (HCC) using CT and MRI, and to compare the predictive performance of these imaging modalities.

Materials and Methods: Between July 2019 and August 2020, consecutive patients with surgically confirmed HCC who underwent preoperative dynamic contrast-enhanced CT and MRI were retrospectively included. Two abdominal radiologists independently reviewed the CT and MRI scans. Univariate and multivariate logistic regression analyses were conducted to determine predictors associated with the VETC pattern in solitary HCC. Two separate scoring models were

developed based on the significant CT and MRI predictors, weighted by their regression coefficients. The optimal threshold for each scoring model was determined using receiver operating characteristic analysis with the Youden index. Sensitivity, specificity, and the area under the curve (AUC) of the two scoring models were calculated and compared using generalized estimating equations. Additionally, postoperative early recurrence was evaluated using the Kaplan-Meier method and compared using the log-rank test.

Results: A total of 324 patients (262 men; median age, 58.6 years; IQR, 18–85 years) were enrolled in the study, with 227 patients in the training cohort and 97 patients in the validation cohort. Logistic regression analyses revealed that five factors independently predicted the VETC pattern on CT, including tumor size > 5.0 cm (odds ratio [OR] 3.81; $P = 0.002$; 7 points), intra-tumoral artery (OR 6.07; $P < 0.001$; 9 points), 3 or 4 type of enhancement pattern (OR 3.74; $P = 0.002$; 7 points), tumor-to-liver ratio at arterial phase > 1.57 (OR 4.86; $P = 0.001$; 8 points), and serum alpha-fetoprotein > 400 ng/ml (OR 7.31; $P < 0.001$; 10 points). Conversely, incomplete “capsule” (OR 12.83; $P < 0.001$; 10 points), necrosis or serve ischemia (OR 8.31; $P < 0.001$; 7 points), marked diffusion restriction (OR 10.93; $P < 0.001$; 8 points), tumor-to-liver ratio at apparent diffusion coefficient ≤ 1.03 (OR 6.89, $P < 0.001$; 7 points), and serum alpha-fetoprotein > 400 ng/mL (OR 4.35; $P = 0.004$; 6 points) were identified as independent predictors for the VETC pattern on MRI. CT-based and MRI-based scoring models were constructed using these predictors, with cutoff values of >17 points and >21 points, respectively. Compared to the MRI-based model, the CT-based model exhibited lower sensitivity (training cohort: 87.0% vs. 72.5%, $P = 0.041$; validation cohort: 76.7% vs. 86.7%, $P = 0.453$) but higher specificity (training cohort: 93.0% vs. 83.5%, $P = 0.002$; validation cohort: 85.1% vs. 74.6%, $P = 0.119$). However, both CT-based and MRI-based models demonstrated similar AUC values in predicting the VETC pattern (training cohort: 0.83 vs. 0.85, $P = 0.468$; validation cohort: 0.81 vs. 0.80, $P = 0.966$). Moreover, patients predicted to have the VETC pattern by the models had significantly higher early recurrence rates than those without the predicted VETC pattern in both the training and validation cohorts (all $P < 0.05$).

Conclusion: Preoperative CT and MRI may show comparable predictive performances for identifying the VETC pattern in HCC. The application of CT or MRI should be determined by the preferred trade-off between sensitivity and specificity in clinical practice.

PO-1599

Acid-etched Layered Double Hydroxides Armed with Dual “Doorkeepers” for Immunomodulatory-NIR III Photodynamic Therapy of Hepatocellular Carcinoma

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Immune checkpoint blockade (ICB) therapy for hepatocellular carcinoma (HCC) is limited due to its immunosuppressive tumor microenvironment (TME). Proinflammatory pyroptosis as a new schedule can induce immunogenic cell death (ICD), thereby reversing immunosuppressive TME and improving ICB efficiency. Herein, we report an acid-etched layered double hydroxides nanosheets (E-LDH)-based smart nanoplateforms armed with H₂O₂/pH dual “doorkeepers” (denoted as CTEP) targeting HCC to realize membrane-anchored photodynamic therapy (PDT) and evoke potent pyroptosis to improve anti-tumor immunity. The hybrid Hepa1-6 cancer cell membrane (CM) and thylakoid (TK) membrane is cloaked on the surface of pH-(low)-insertion peptide (pHLIP) modified E-LDH to obtain CTEP. Once CTEP nanoplateforms arrive at tumor regions, the dual “doorkeepers” will orderly open to perform PDT precisely. Given the fact that TK membranes have the catalase mimetic function, CTEP responds to high concentrations of H₂O₂ in TME and rupture the hybrid CM-TK membrane to expose pH-sensitive peptide pHLIP. Membrane-localized PDT can induce gasdermin-D (GSDMD) mediated pyroptosis, effectively stimulating tumor immunogenicity. Pyroptotic cell death release damage-associated molecular

patterns (DAMPs) and consequently robust ICB ability. CTEP-evoked pyroptosis together with anti-PD-L1 blockade therapy activates adaptive immunity in HCC, successfully inhibiting the progression of primary and distant HCC tumors with mitigation of the side effects.

PO-1600

MRI quantitative hemodynamic parameter histogram assessment of hepatocellular carcinoma development in a rabbit VX2 liver cancer model

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Background Nowadays, liver cancer is the second leading cause of cancer death in the world. Therefore, it is very important to understand tumor progression and evaluate tumor microcirculation for treatment strategy.

Objective To explore the application of MRI quantitative hemodynamic parameter histogram analysis in the development of a rabbit VX2 liver cancer.

Method This study was approved by the animal protection and ethics committee of The First Affiliated Hospital of Shihezi University School of Medicine. Five New Zealand white rabbits were randomly selected each time for liver Dynamic contrast-enhanced MR perfusion (DCE-MRI) imaging at the 1st, 2nd, 3rd, 4th and 5th weeks after liver tumor implantation. The dynamic changes and the significant differences between the tumor volume and related derived parameters during tumor progression were compared and analyzed.

Result In the development of the VX2 liver cancer model, the tumor volume between the end of 1~5w group ($F=44.11$; $P=0.000$) was statistically significant ($P<0.01$), and the significant differences were found between the 5th week and the 1st, 2nd, 3rd, 4th week, the 4th week and the 1st, 2nd week, the 3rd week and the 5th week ($P<0.01$), respectively. The skewness and kurtosis of the K_{trans} value, the maximum, 90th percentile and skewness of the K_{ep} value, and the skewness, kurtosis, 75th and 90th percentiles of the V_p value were statistically significant ($P<0.05$) at the end of each week. The 10th, 25th, 50th percentiles of the K_{ep} value, the 10th, 25th percentiles of the V_e value, the 10th percentile of the V_p value was positively correlated with tumor volume ($r>0$, $P<0.05$). The expression of α -SMA was negatively correlated with the mean, 75th percentile of the K_{trans} value, the 50th, 75th percentiles of the K_{ep} value, the mean, minimum of the V_p value ($r<0$, $P<0.05$). It was positively correlated with the skewness, kurtosis of the K_{trans} value, the skewness of the V_p value ($r>0$, $P<0.05$).

Conclusion MRI quantitative hemodynamic parameter histogram analysis can reflect the progress of the rabbit VX2 liver cancer. In particular, the skewness, kurtosis and percentiles of K_{trans} , K_{ep} and V_p can reflect the microvascular information and can be used as biomarkers to assess the development of Hepatocellular Carcinoma (HCC).

PO-1601

The Comprasion of Modified ESUR Score and Mehralivand Grade for Predicting Extracapsulare Extension in Prostate Cancer

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Purpose To compare the value of the modified ESUR score and Mehralivand grade in predicting extracapsulare extension (ECE) of prostate cancer (PCa), and to explore the potential value of clinical variables in predicting ECE.

Methods A retrospective study of 235 PCa patients were enrolled in this study. Two radiologists (reader 1 and 2) assessed the ECE by the modified ESUR score and Mehralivand grade. The inter- and intra-observer correlation coefficient (ICC) were calculated and the receiver operating characteristic (ROC) curve were used to evaluate the performance of the modified ESUR score and Mehralivand grade for ECE. Univariate and Binary Logistics regression analysis were used to screen out the independent risk factors from clinical variables, and combined models were constructed to predict ECE. Finally, Delong test was used to compare the performance between the combined models and the two scoring methods.

Results Both scoring methods showed good inter- and intra-observer stability (both ICC > 0.75). The modified ESUR score achieved an AUC of 0.696 in reader 1 and 0.691 in reader 2 in predicting ECE, and Mehralivand grade achieved an AUCs were 0.746 in reader 1 and 0.753 in reader 2. The AUCs of Mehralivand grade were significantly higher than those of the modified ESUR score in both reader 1 and 2 ($P < 0.05$). PSA, PI-RADS v2.1 score, Gleason Group, modified ESUR score and Mehralivand grade were determined as the independent risk factors of ECE and the combined models were constructed. The AUCs of the combined model were 0.826 and 0.841, which were both significantly higher than that in separate scoring method ($P < 0.05$).

Conclusion The Mehralivand grade showed better diagnostic performance for predicting ECE than the modified ESUR score. The combination model of scoring methods and clinical variables can be a potential tool in the prediction of ECE.

PO-1602

Differentiate gastric stromal tumors from adenocarcinomas of the stomach: spectral CT quantitative parameters

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Objective: To investigate the value of different quantitative parameters of dual-energy CT in the differential diagnosis in differentiating gastric stromal tumors and gastric adenocarcinomas.

Methods: In this study, 48 patients were included to compare clinical features such as age, sex, tumor size, tumor location and virtual monochromatic images, energy level slope (K(HU)), effective atomic number maps and iodine maps of dual-energy CT during different phases by t-test, rank sum test and chi-square test. The efficacy of quantitative parameters for the identification of gastric stromal tumors was evaluated by receiver operating characteristic curves (ROC).

Results: Among the clinical features, the gender and tumor location were statistically significant ($p=0.021$, $p=0.042$), and all the quantitative parameters were statistically significant ($p < 0.05$). Both gastric stromal tumors and gastric adenocarcinoma are progressively strengthened, with HU in the

venous phase being higher than in the arterial phase. In the quantitative parameters of the arterial phase, the virtual single-energy image at 40keV (AUC=0.914) and K(HU) (AUC=0.917) had the better discriminative performance for GST and adenocarcinoma patients. Among the parameters of the venous phase, the AUC of K(HU) and Z-eff were 0.945 and 0.946, respectively.

Conclusions: The derivative parameters of dual-energy CT can improve the difference between gastric stromal tumors and gastric adenocarcinoma compared with conventional CT.

PO-1603

Machine learning methods based on CT features differentiate G1/G2 from G3 pancreatic neuroendocrine tumors

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Abstract

Objective: Pancreatic neuroendocrine tumors (PNETs) constitute a group of heterogeneous tumors with different radiological features and clinical outcomes based on their grades. Our study is to distinguish grade 1 (G1)/ grade 2 (G2) PNETs from grade 3 (G3) neuroendocrine tumors (NETs) based on CT quantitative and qualitative features by using different machine learning methods.

Materials and Methods: A total of 149 patients with 156 lesions of PNETs confirmed by biopsy or surgery were retrospectively collected, and 25 lesions were G3 PNETs, while 131 lesions were G1/G2 PNETs. General demographic data, such as sex, age, symptoms, and tumor markers were included. Radiological features, including location, maximum size (mm), shape, margin, texture, calcifications, pancreatic duct, and biliary dilation, pancreatic atrophy, pancreatitis, invasion of the nearby tissues, lymph node enlargement, liver metastasis, and performance of enhancement within the lesion. The arterial/portal relative enhancement ratio, and arterial/portal enhancement ratio were calculated. The whole data was separated into training and validation groups by a ratio of 7:3. Firstly, the least absolute shrinkage and selection operator (LASSO) algorithm was initially implemented to reduce the dimension of features. Secondly, principal component analysis (PCA) was used to further select features. Three machine learning classifiers, including support vector machine (SVM), K-nearest neighbor classifier (KNN), and linear logistic regression (LR), were performed to build diagnostic differentiated models when distinguishing G1/G2 PNETs from G3 PNETs, respectively. Receiver operating characteristic (ROC) curves and precision-recall curves (PRC) for each machine learning method were generated to determine their differentiation ability. The area under the curve (AUC), accuracy rate, sensitivity and specificity were calculated.

Results: G3 PNETs were more likely to present as a larger, irregular shape with an ill-defined margin, and invasive behaviors such as causing pancreatitis, invasion of nearby tissues, lymph node enlargement, and liver metastasis than G1/G2 PNETs ($p < 0.05$). Furthermore, G3 PNETs had a much lower arterial/portal relative enhancement ratio and arterial/portal enhancement ratio than G1/G2 PNETs ($p < 0.05$). Twelve features were initially selected by the LASSO algorithm using 10-fold cross-validation with the minimum λ value of 0.025. Four features were included in the PCA algorithm, and three models were built through SVM, KNN, and LR. The LR classifier yielded the highest AUC of 0.964 (95%CI:0.930, 0.972), with an accuracy rate of 95.4%, a sensitivity of 95.7%, and specificity of 92.9%, followed by SVM (AUC of 0.957 (95%CI:0.833, 0.983), accuracy rate of 94.4%, sensitivity of 95.7%, specificity of 86.7%), and KNN (AUC of 0.893 (95%CI:0.843, 0.906), accuracy rate of 84.3%, sensitivity of 86.3%, specificity of 50%) in the training group. In the validation group, the SVM classifier reached the highest AUC of 0.952 (95%CI:0.860, 0.981), with an accuracy rate of 91.5%, a sensitivity of 97.3%, and specificity of 70%, followed by LR (AUC of 0.949, (95%CI:0.902, 0.962), accuracy rate of 91.5%, sensitivity of 94.9%,

specificity of 75%), and KNN (AUC of 0.923 (95%CI:0.818, 0.948), accuracy rate of 87.2%, sensitivity of 90.2%, specificity of 66.7%) in the validation group.

Conclusions: Different machine learning methods had relatively good diagnostic performance when differentiating G1/G2 PNETs from G3 PNETs. The LR classifier and SVM classifier did the best performance in the training and validation groups respectively.

PO-1604

T1 mapping of the pancreas in patients with pancreatic cancer—does pancreatic extracellular volume fraction or signal intensity ratio increase the diagnostic value?

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Purpose: Fibrosis in pancreatic cancer (PC) closely related to therapeutic effect, occurrence, and prognosis, there is an urgent need for quantitative methods to evaluate noninvasively. To evaluate whether the T1 relaxation time of the pancreas can detect parenchymal changes in PC patients and whether signal intensity ratio (SIR) and extracellular volume (ECV) fraction improve the diagnostic value.

Methods: Our study was the prospective study. A total of 113 patients who underwent MRI were included. 76 patients with pancreatic cancers (PCs), 16 patients with other solid pancreatic lesions (Non-PCs), and 21 patients with normal pancreas (NP) were separated. 3.0 T MR including T1 mapping with Modified Look-Locker inversion recovery sequence (MOLLI). The T1 relaxation times of the lesion, pancreas, liver, spleen, paraspinal muscle, dorsal subcutaneous fat, and aorta were extracted. The SIR and pancreatic ECV were calculated. Mann-Whitney U test; χ^2 test; and receiver operating characteristic (ROC) curve.

Results: Native T1 relaxation time of the pancreas in patients with PCs was significantly higher than in patients with Non-PCs and NPs (1102.9 ± 233.9 ms vs. 960.4 ± 231.0 ms/ 867.6 ± 91.3 ms, $P < 0.05$), while no difference was evident in patients with Non-PCs and NPs. According to SIR, we succeeded in finding evidence of a significant difference in SIR p-liver, SIR p-muscle, SIR p-fat and SIR p-aorta between PC and Non-PCs. Pancreatic ECV fraction values of the PC, Non-PCs, NP groups were $82.9 \pm 38.6\%$, $77.2 \pm 32.2\%$ and $74.4 \pm 42.3\%$, respectively, but we failed to show a significant difference among these three groups.

Data Conclusion: Native T1 relaxation of the pancreas could be a potential imaging biomarker to evaluate pancreatic fibrosis in patients with PCs. The SIR of the pancreas could increase the diagnostic capability, while pancreatic ECV did not improve the diagnostic performance.

PO-1605

Preoperative Prediction of Microvascular Invasion in Pancreatic Neuroendocrine Tumors Through Analysis of Portal Venous Phase CT Images

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Objectives: Microvascular invasion (MVI) has been identified as a strong independent risk factor for both overall survival and recurrence-free survival. However, the nature of MVI remains poorly understood, with limited available knowledge. Hence, our study was to evaluate clinical and CT

imaging features on portal venous-phase for predicting MVI in patients with pancreatic neuroendocrine tumors (PNETs).

Methods In this retrospective study, 160 patients underwent surgical resection for PNETs were included, with 25 patients had MVI, 135 patients without MVI. Demographic data and CT features on portal venous-phase were collected. The independent predictive factors for predicting MVI were confirmed through univariate and multivariate logistic regression analyses. The predictive performance was assessed by employing receiver operating characteristic curve for predicting MVI, and a forest map was pictured. Sensitivity and specificity were further analysis according to selected quantitative parameters.

Results PNETs with MVI were more frequent presented with larger size, irregular shape, invasion of surrounding tissues, lymph nodes and liver metastases, a much lower enhancement ratio, absolute enhancement, and relative enhancement ratio ($p < 0.05$). After multivariate analyses, invasion of surrounding tissues (odds ratio [OR]: 4.12, 95% confidence interval [CI], 1.19-14.3), absolute enhancement (OR: 0.84, 95%CI, 0.72-0.97), and relative enhancement ratio (OR: 16.1, 95%CI, 1.54-167.81) were identified as independent predictors for predicting MVI in PNET patients, with area under curve of 0.819(95%CI, 0.720-0.917), demonstrating a sensitivity of 64% and a specificity of 90.4%. When the absolute enhancement was > 150 HU, the specificity was 94.1%, while the relative enhancement ratio $> 400\%$, the specificity was 93.3% for predicting MVI.

Conclusions Invasion of surrounding tissues, absolute enhancement, and relative enhancement ratio were identified as independent predictors for predicting MVI in PNET patients. Furthermore, clinical and imaging features from portal venous phase CT images can be used to accurately predict the presence of MVI in patients with PNETs prior to surgery.

PO-1606

A nomogram for predicting the prognosis of pancreatic neuroendocrine tumors patients with liver metastases

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Background: An increased incidence of pancreatic neuroendocrine tumors (PNETs) has been reported worldwide recently, and metastasis is the dominant cause of PNET-related death. Studies focus on the prognosis of PNETs with liver metastases are limited.

Methods: A population-based retrospective study was carried out in the Surveillance, Epidemiology, and End Results (SEER) database from 2010 to 2016. A univariate and multivariate Cox regression analysis were performed to select independent prognostic factor, and two nomograms were constructed to predict both overall survival (OS) and cancer-specific survival (CSS), respectively. The discrimination and calibration plots were obtained to evaluate the performance of the nomogram using the concordance index (C-index) and calibration plots respectively. The Kaplan-Meier survival analysis with log-rank was used to analyze survival outcomes. Statistical analysis was conducted by Stata 14.0, and the nomogram was developed using the R 3.6.0 software with the "RMS" R library.

Results: A cohort of 1354 liver metastatic PNETs patients were included. The median age of the whole cohort was 61 years, and 765 (56.50%) cases were male. The lesion was mostly located in pancreatic tail, followed by head. Grade I was more likely to develop a liver metastasis, followed by grade III and grade II. Primary site surgery was performed in 40.29% of grade I patients, but only performed in 20.22% of grade III patients. 36.34% of cases had found regional lymph nodes metastases. Near half of cases (51.11%) had chemotherapy and only 1.85% of cases had radiotherapy. After univariate and multivariate Cox regression analysis, we found that an age older than 60 years (Hazard ratio (HR) = 1.404, 95% confidence interval (CI): 1.194-1.651, $P < 0.001$), grade III (HR = 3.224, 95%CI: 2.397-4.335, $P < 0.001$), surgery of primary site (HR = 0.363, 95%CI: 0.1995-0.659, $P = 0.001$) and lung metastasis (HR = 0.526, 95%CI: 0.398-0.695, $P < 0.001$) were independent factors to predict CSS, which were applied to develop a nomogram. The C-index was

0.678, with 95% confidence interval (CI) of 0.658 to 0.700. The second nomogram to predict OS was built including age ≥ 60 years (HR = 1.425, 95%CI: 1.218-1.668, $P < 0.001$), grade III (HR = 3.104, 95%CI: 2.329-4.137, $P < 0.001$), insurance status (HR = 1.240, 95%CI: 1.014-1.518, $P = 0.036$), surgery of primary site (HR = 0.413, 95%CI: 0.237-0.720, $P = 0.002$), lung metastasis (HR = 0.508, 95%CI: 0.388-0.664, $P < 0.001$) and bone metastasis (HR = 0.735, 95%CI: 0.567-0.953, $P = 0.02$). The C-index was 0.692 (95%CI: 0.672-0.712). The internal calibration curves presented well veracity and consistency in predicting 1-, 3- and 5-year OS and CSS probabilities. The median survival month of entire cohort was 13 months. However, the median survival was 24 months in grade I patients, and was only 6 months in grade III patients. For patients performed with primary site surgery, they had 29 median survival months, longer than patients did not performed surgery (10 months). The KM analysis also shown that patients with surgery of primary site, better grade, had chemotherapy and without lung metastasis had better OS than those were not ($P < 0.001$). Conclusions: The nomogram was constructed and verified to predict 1-, 3- and 5-year OS and CSS in patients with liver metastatic PNETs. The nomogram showed a good performance, suggesting it could be an optimal too for serving clinicians. Surgery of primary site did benefit to OS and CSS, even in patients with live metastasis.

PO-1607

Dual-energy CT Quantitative Parameters to Evaluate Occult Peritoneal Metastasis in Advanced Gastric Cancer Preoperatively

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Background: Patients with advanced gastric cancer have the possibility of occult peritoneal metastasis (OPM) and the treatment is different from the one without metastasis. But accurate preoperative assessment remains a challenge. There is an urgent need for a noninvasive approach to reliably identify patients with occult peritoneal metastasis.

Purpose: To explore whether dual-energy CT (DECT) quantitative parameters could provide more analytic ability for the diagnosis of OPM preoperatively compared to conventional CT features.

Materials and Methods: This retrospective study included 219 patients with advanced gastric cancer and DECT scans between March 2022 and March 2023. The patient's clinical data and DECT related iodine concentration (IC) parameters and effective atomic number (Zeff) were collated and analyzed among non- peritoneal metastasis (NPM), OPM and radiologically peritoneal metastasis (RPM) groups. By means of Synthetic Minority Oversampling Technique, the relevant analysis of normalized IC, venous to arterial phase (V/A) IC ratio, and Zeff were conducted within NPM and OPM using logistic regression. The predictive performance of the DECT parameters was compared with that of the CT features through evaluating area under curve of the precision-recall (AUC-PR), F1 score, balanced accuracy, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV).

Results: Of 213 patients, Borranmam IV type diagnosed on CT and serum tumor indicator CA125 index were statistically different between the NPM and OPM groups ($P < 0.05$). DECT quantitative parameters of PM group includes IC and NIC in arterial and venous phases and the Zeff were lower than the NPM group and all of them declined earlier in OPM stage. The DECT predictive nomogram combined the three independent predictors, including V_NIC (OR, 0.44; 95% CI: 0.33, 0.58), V/A IC ratio (OR, 8.01; 95% CI: 2.92, 22.46), and Zeff (OR, 0.83; 95% CI: 0.70, 0.98; $P < 0.001$), produced a better diagnostic performance than the conventional CT feature scheme which was based on Borranmam IV type and serum CA125 index in AUC-PR with 0.770 vs 0.750, F1 score with 0.750 vs 0.667, balanced accuracy with 0.860 vs 0.844, specificity with 0.971 vs 0.939, PPV with 0.750 vs 0.600, and NPV with 0.971 vs 0.968.

Conclusions: The lower quantitative NIC, V/A IC ratio, and Zeff on DECT was associated with peritoneal metastasis in advanced gastric cancer and was promising to identify patients with occult peritoneal metastasis noninvasively.

PO-1608

Combination of MRI with clinical parameters helps in predicting recurrence in patients with stage IB2 and IIA2 cervical cancer receiving neoadjuvant surgery and concurrent chemoradiotherapy

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Purpose: To investigate the practicality of clinical indexes and different MRI parameters in predicting the recurrence of stage IB2 and IIA2 cervical cancer undergoing neoadjuvant therapy followed by radical hysterectomy (NAT+RH) and concurrent chemoradiotherapy (CCRT).

Methods: Data from 170 patients with stage IB2 and IIA2 cervical cancer from February 2015 to October 2018 were retrospectively included, among whom 100 cases were treated with NAT+RH and 70 cases were treated with CCRT. All patients underwent pretreatment MRI including DWI scan, and imaging indexes including tumor size and tumor apparent diffusion coefficient (ADC) values were measured. Clinical and pathological indices, and recurrence and metastasis of the patients were recorded. The correlation between recurrence and clinical indices and MRI parameters were analyzed by univariate analysis, and statistically significant parameters were further assessed by logistic regression analysis, and the predictive performance was estimated by receiver operating characteristic analysis.

Results: 26 of 170 cases had recurrence and metastasis, including 15 cases in neoadjuvant group and 11 cases in CCRT group. In the entire cohort, there were significant differences in SCC-Ag, lymph nodes metastases (LNM), ADCmax and ADCmin between recurrent and non-recurrent patients ($P < 0.05$). In NAT+RH group, there were significant differences in SCC-Ag, LNM, lymphovascular space invasion, deep stromal invasion and ADCmin between recurrent and non-recurrent patients ($P < 0.05$). In CCRT group, there were significant differences in tumor size, ADCmax and ADCmin between recurrent and non-recurrent patients ($P < 0.05$). In all patients, the area under curve (AUC) of ADCmin was the highest (0.722), and the sensitivity and specificity were 84.00% and 57.70%. The AUC of the combined prediction model was 0.977, the sensitivity was 92.30%, and the specificity was 95.80%. The AUC of the combined prediction model was significantly higher than that of ADCmin ($P < 0.05$).

Conclusion: Tumor ADCmin and ADCmax may be helpful in predicting the recurrence of patients with stage IB2 and IIA2 cervical cancer, and the conjunctive model has a better predictive value for recurrence.

PO-1609

The CT features and prognosis of acquired cystic disease-associated renal cell carcinoma: a review

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Background

Acquired cystic disease-associated renal cell carcinoma (ACD-RCC) is a relatively new subtype of RCC and was added to the list of RCC subtypes in the 2016 World Health Organization classification. It is the third most common type of RCC in acquired cystic kidney disease (ACKD). ACD-RCC is generally believed to be indolent, however, some tumors may show local recurrence and distant metastasis. Increased awareness of this new entity has given rise to a recent accumulation of case reports and investigative studies in the literature. However, the literature published at home and abroad mainly focused on this disease's clinicopathological features, there is scarce research describing the imaging features and prognosis of ACD-RCC. This study aimed to review the literature to reveal recent findings on computed tomography (CT) features and prognosis of ACD-RCC, as well as strategies to surveillance this disease.

Methods

PubMed was searched for studies of ACD-RCC published before 31 December 2022. Excluded were studies that either did not describe the image features or reported prognosis and surveillance of patients with ACD-RCC.

Results

1. CT Imaging:

On non-enhanced CT, the bilateral renal atrophy with multiple lesions of varying sizes cysts. The lesion can be solitary or multifocal and can be seen in one or both kidneys. Multifocal lesions were found in more than 50% of ACKD-RCC's cases, and bilateral in more than 20%. Tumors are generally solid masses with regular margin, more often exophytic than intrarenal, and often arises in a cyst. Size is variable but averages probably 3 cm. Pseudocapsules with calcification may be seen in larger lesions. Focal hemorrhage and necrosis can be present in some tumors. ACD-RCCs are hypovascular masses and showed mild enhancement patterns on dynamic enhanced CT.

2. Prognosis

Generally, ACD-RCC is believed to be indolent; but there are also a small number of cases of developed sarcomatoid or rhabdomyoid transformation, indicating that the tumor is aggressive and may experience local recurrence and distant metastasis, leading to poor prognosis. Lymph nodes and organs (lungs, liver, bones, etc.) are common metastase sites. Duration of hemodialysis more than 20 years ($P=0.0085$) and tumor necrosis ($P=0.049$) are clinically significant adverse prognostic features associated with metastasis.

3. Surveillance

Contrast-enhanced ultrasound (CEUS) can be used for the follow-up of non-surgical renal lesions, many research estimating the prevalence of RCC in patients with ACKD was based on Ultrasound (US) diagnosis, while the detection rate of RCC by the US is dissatisfied. Contrast-enhanced CT (CECT) is the best imaging technique for the diagnosis of ACD-RCC, the main disadvantage is cumulative radiation exposure from recurrent CT scanning for regular screening. Therefore, magnetic resonance imaging (MRI) was recommended for regular screening and CECT for further examination.

It is not clear that regular screening for ACD-RCC is beneficial to all end-stage renal disease (ESRD) patients. Younger ESRD patients with high life expectancy may benefit from screening. For most kidney transplant recipients, the evidence of screening for RCC was weak and insufficient.

Conclusion ACD-RCC is the third most common kidney in ACKD patients. ACD-RCCs are typically solid masses that exhibit mild enhancement on CT. Although the disease is a low-grade malignant tumor, it may also cause local recurrence or distant metastasis. Regular screening for ACD-RCC

may be beneficial to younger ESRD patients, MRI was recommended for regular screening and CECT for further examination.

PO-1610

Evaluation of Pancreatic Iodine Uptake and Related Influential Factors in Multiphase Dual-energy CT

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Objectives: To establish normative values and identify potential influential factors related to pancreatic iodine uptake using multiphase dual-energy CT (DECT).

Materials & Methods: This dual-institution retrospective study consecutively selected participants without pancreatic diseases from September 2021 to September 2022 who underwent multiphase abdominal contrast-enhanced DECT including entire pancreas at Shengjing Hospital of China Medical University (SJ-CMU) and The First Affiliated Hospital of University of South China (FH-USC). The arterial phase (AP), portal venous phase (PP), and equilibrium phase (EP) were defined as 35s-40s, 60s-70s, and 150s-180s after the injection of contrast agent, respectively. Normalized iodine concentration (NIC), the ratio of iodine concentration (IC) of pancreas to IC of aorta was calculated. Abdominal obesity was determined by the visceral fat area (VFA). An 1:1 ratio propensity score matching (PSM) was performed. Multiple linear regression analyses were performed to determine independent factors affecting iodine uptake.

Results: A total of 562 participants (mean age 56 years \pm 12 [standard deviation], with 282 men) were evaluated. After 1:1 PSM was performed, the mean IC differed significantly between institutions (all $p < 0.001$) across three contrast-enhanced phases, while mean NIC showed no significant differences (AP: 0.21 vs. 0.21; PP: 0.41 vs. 0.43; EP: 0.46 vs. 0.47, all $p > 0.05$). In multiple linear regressions, NIC_{AP} was independently affected by VFA ($\beta = -0.301$, $p = 0.017$), smoking ($\beta = -0.240$, $p = 0.001$) and type-II diabetes mellitus ($\beta = -0.449$, $p < 0.001$); NIC_{PP} by VFA ($\beta = -0.301$, $p = 0.017$) and smoking ($\beta = -0.291$, $p < 0.001$); and NIC_{EP} by smoking ($\beta = -0.154$, $p = 0.10$) and alcohol abuse ($\beta = -0.350$, $p < 0.001$).

Conclusion: NIC values were consistent across two institutions. Abdominal obesity, smoking, alcohol abuse, type-II diabetes mellitus, and gender are independent factors influencing pancreatic iodine uptake.

PO-1611

A machine learning-derived radiomics signature of visceral adipose tissue predicts the cardiovascular events risk in patients with T2DM

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Objective: Visceral adipose tissue (VAT) is a metabolically active fat depot that plays an important role in cardiovascular diseases. Computed tomography (CT) is a well-established and precise method to measure VAT distribution. In this study, our aim was to investigate the relationship between major adverse cardiovascular events (MACEs) and VAT detected by CT in patients with Type 2 diabetes mellitus (T2DM).

Materials and methods: Our study included 1541 patients with T2DM who underwent baseline non-contrast CT examinations from December 20, 2011 to September 26, 2022 at the third affiliated hospital of southern medical university. VAT area and mean attenuation were quantified using automatic software from CT and a total of 1561 radiomics features were extracted from VAT. Machine learning was developed to identify significant imaging biomarkers associated with MACEs-related traits using selected reproducible features. We also set a 5-year follow-up in 147 patients to demonstrate the long-term predictive effectiveness.

Results: In this study of 1541 participants with T2DM (649 men and 892 women), a substantial number of patients were suffered from MACEs (921, 59.8%), with hypertension (1082, 70.2%), hyperlipidemia (602, 39.1%). VAT attenuation was increased in T2DM patients with MACEs compared to those without MACEs (-90.5HU VS -93.1HU , $P=0.002$), VAT area was not significantly different in patients with or without MACEs (124.1 cm^2 VS 121.2 cm^2 , $P=0.372$). Combined with age and blood glucose level, sixteen VAT texture features achieved areas under the curve (AUCs) and accuracy of 0.802 and 74.4% respectively. The predicted incidence of high-risk population using those features was as high as 84.6% during the 5-year follow-up ($P=0.009$).

Conclusion: This study shows that the texture features of VAT have significant clinical implications in evaluating MACEs and predicting the risk of develop MACEs in T2DM patients.

PO-1612

Prediction value of iodine based images of dual-energy CT on venous phase in esophageal variceal bleeding: a prospective analysis of one-year follow up

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Objectives

This study seeks to assess the potential clinical benefits of utilizing iodine-based images generated from contrast-enhanced dual-energy CT in port-venous phase for evaluating esophageal varices (EV) and predicting EV associated bleeding (EVB) in patients suffering from liver cirrhosis.

Methodology

Cirrhotic patients were prospective enrolled and divided into groups of non-EV, mild-EV, and conspicuous (including moderate and severe) EV (CEV) based on the EV severity assessed by esophagogastrosocopy. They were also categorized into EVB and non-EVB groups after a one-year follow-up. All patients underwent upper abdominal multi-phase contrast-enhanced CT scans in a dual-energy model. Through iodine-based images, quantitative parameters of iodine concentration (IC), iodine concentration ratio ($\text{ICR}_{\text{E/H}}$), overlay value (OV), and overlay value ratio ($\text{OVR}_{\text{E/H}}$) were obtained from the lower end of the esophagus. Binary logistic regression was deployed to identify risk factors for EVB. The AUC, sensitivity, and specificity of models with /without clinical factors were calculated, and the difference of performance will be compared.

Results

A total of 138 liver cirrhosis patients initially enrolled for EV evaluation, they were divided into non-EV, mild EV, and CEV groups as 36, 44, and 58 cases, respectively. After follow-up, 116 patients were included for the prediction of EVB analysis, among which 32 (27.6%) patients experienced EVB. The agreement between iodine based images and endoscopy in EV evaluation was recorded at 0.842 (Kappa value). In addition to clinical factors of platelet count and EV grade, the logistic regression model identified $\text{ICR}_{\text{E/H}}$ as an independent risk factor for predicting EVB, with an odds ratio of 24.26 (CI: 3.630-162.25), $p=0.001$. The AUC of $\text{ICR}_{\text{E/H}}$ for predicting the presence of EVB was 0.820 (95% CI: 0.753-0.896), is higher than $\text{OVR}_{\text{E/H}}$ (0.786, 95% CI: 0.701~0.858), but did not show statistical differences, $p=0.133$. The multivariate logistic regression model, which included $\text{ICR}_{\text{E/H}}$, demonstrated an AUC of 0.905 (95% CI: 0.856-0.952),

with a sensitivity of 93.75%, specificity of 72.62%, demonstrating a better performance compared to the prediction model did not include $ICR_{E/H}$, with AUC of 0.843 (0.762-0.915), $p=0.033$.

Conclusions

The quantitative parameters provided by iodine based images in venous phase show incremental value in predicting EV associated bleeding in patients with liver cirrhosis.

Key Points

There is high consistency between CT and endoscopy in EV degree evaluation .

The quantitative parameters on the lower esophagus of cirrhosis patients who experienced EVB is significantly higher than that of patients did not experience EVB.

The combination of significant clinically influencing factors and $ICR_{E/H}$ improves the predictive power of whether EVB will occur in patients with liver cirrhosis.

PO-1613

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Background: Gallbladder cancer (GBC) is a rare but aggressive malignancy that is often diagnosed at an advanced stage and is associated with poor outcomes. Radiomics analysis has demonstrated promising abilities for potential use in diagnosing several types of cancers. In this study, we aimed to develop a radiomics model to discriminate between benign and malignant gallbladder lesions using enhanced CT imaging.

Methods: A retrospective analysis was performed on 144 lesions of 135 patients who underwent cholecystectomy for suspected GB diseases between January 2014 and March 2022. All patients had a preoperative contrast-enhanced CT scan, which was independently analyzed by two radiologists. The regions of interest (ROIs) were manually delineated on portal venous phase images, and radiomics features were extracted. Feature selection was performed using the minimum redundancy maximum relevance (mRMR) and LASSO methods. The patients were randomly divided into a training and test group at a ratio of 7:3. Clinical and radiomics parameters were identified in the training group, three models were constructed, and the models' prediction accuracy and ability were evaluated using AUC and calibration curves.

Results: In the training group, the AUC of the clinical model and radiomics model was 0.914 (95% CI 0.854~0.973) and 0.968 (95% CI 0.940-0.996), and that of the nomogram model was 0.980 (95% CI 0.960~1.00), respectively. There were statistically significant differences in diagnostic accuracy between the nomograms and radiomics features ($P<0.05$). There was no significant difference in diagnostic accuracy between the nomograms and clinical features ($P>0.05$) or between the clinical features and radiomics features ($P>0.05$). In the testing group, the AUC of the clinical model and radiomics model were 0.904 (95% CI 0.816-0.993) and 0.941 (95% CI 0.872-1.00), and that of the nomogram model was 0.948 (95% CI 0.883-1.00), respectively. There was no significant difference in diagnostic accuracy between the three groups ($P>0.05$). The calibration curves of the nomogram prediction models in the training group and test group showed a better fit than the ideal curve.

Conclusion: The performance of the nomogram was good, and the calibration curve showed a good fit of the nomogram. It was suggested that radiomics analysis using enhanced CT imaging can effectively discriminate between benign and malignant gallbladder lesions. This study provides a noninvasive approach to diagnose gallbladder diseases, which may have clinical implications for patient management.

PO-1614

Contrast enhanced CT imaging to predict early recurrence of Primary liver cancer post-ablation

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Objective:This study aimed to assess the prognostic significance of Radiomics features from pre-ablation contrast-enhanced CT images in Primary liver cancer patients, especially concerning early recurrence (within 1 year) post-ablation.

Methods:Between June 2014 and December 2019, 124 eligible patients were retrospectively included. 31 patients with less than one year of follow-up were excluded. 93 patients participated in constructing and validating the nomogram models to predict early recurrence (within 1 year) post-microwave ablation of liver cancer. These patients were randomly allocated to a training cohort (n=70) and a testing cohort (n=23).Radiomics labels in the training cohort were established post-dimension reduction via LASSO.All clinical variables underwent logistic regression analysis. Univariate analysis selected variables with a p-value less than 0.10 for inclusion in the multivariate regression model.Clinical variables with a p-value below 0.05 in the multivariate analysis were deemed significant.Prediction models for early recurrence of primary liver cancer were constructed, encompassing clinical, radiological, and combined clinical-radiological models.The predictive performance of each model was evaluated using the area under the curve (AUC), sensitivity, specificity, and by creating nomograms.The classification performance of the model on the test cohort was assessed using the confusion matrix method.

Results:We selected two significant clinical variables, presence of CA199 and diabetes, for predicting early recurrence of primary liver cancer. A clinical model was constructed based on these variables. For the training cohort, the clinical model exhibited an AUC of 0.635 (95% CI: 0.506-0.764) with a sensitivity of 0.65 and specificity of 0.60. For the testing cohort, it yielded an AUC of 0.794 (95% CI: 0.618-0.970) with a sensitivity of 0.80 and specificity of 0.72.In the training cohort, the Radscore model exhibited an AUC of 0.805 (95% CI: 0.686 – 0.924) with a sensitivity of 0.80 and specificity of 0.92. In the testing cohort, it showed an AUC of 0.811 (95% CI: 0.625 - 0.997), a sensitivity of 1, and a specificity of 0.61.The combined clinical and Radiomics model, constructed using the optimal clinical features and Radscore, demonstrated an AUC of 0.851 with a sensitivity of 0.85 and specificity of 0.74 for the training cohort. For the testing cohort, it yielded an AUC of 0.889 with a sensitivity of 0.80 and a specificity of 0.94.

Conclusions:In this study, we established and validated a nomogram model based on radiomics features and conventional clinical characteristics. This model predicts early recurrence of HCC post-ablation, offering added value in forecasting the prognosis for HCC patients undergoing ablation therapy.

PO-1615

CT Radiogenomics: a potential tool for prediction of molecular subtypes in gastric stromal tumor

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Objectives: This study aims to develop a combined model based on clinical and contrast-enhanced CT (CE-CT) features for predicting gastric GISTs with KIT exon 11 mutations or KIT exon 11 codons 557-558 deletions.

Methods: A total of 231 GIST patients with definitive genetic phenotype were categorized into a training data set and a validation data set with a ratio of 7:3. Clinical features, conventional CT features and radiomics features extracted from abdominal CE-CT images were selected and classified to construct the following models: model CT sign, model CT sign + rad and model CT

sign + rad + clinic. The diagnostic performance of the three models were evaluated by the receiver operating characteristics (ROC) curve analysis and Delong test.

Results: The results of ROC analyses showed that the AUCs of model CT sign, model CT sign + rad, and model CT sign + rad + clinic for KIT exon 11 mutation were 0.743, 0.818, and 0.915 in the training cohort, and 0.670, 0.781, and 0.811 in the validation cohort, respectively. The AUCs of model CT sign, model CT sign + rad, and model CT sign + rad + clinic for KIT exon 11 codons 557-558 deletions were 0.667, 0.842, and 0.72 in the training cohort, and 0.610, 0.782, and 0.795 in the validation cohort, respectively. Based on the decision curve analysis, Model CT sign + rad + clinic was found to be clinically significant and useful.

Conclusions: Our results demonstrated that model CT sign + rad + clinic can effectively distinguish GISTs with KIT exon 11 mutation and KIT exon 11 codons 557-558 deletions. The combined model may be useful in assessing the genotype of GISTs.

PO-1616

Development of a combined nomogram integrating radiomics, deep learning, and clinical risk factors to predict neoadjuvant chemoradiotherapy outcomes in patients with rectal cancer

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Abstract

Objective: To develop a nomogram integrating clinical variables and radiomics signatures, deep learning (DL) features from T2-weighted MR images for the non-invasive prediction of nCRT outcome in patients with rectal cancer.

Materials and Methods: A total of 292 rectal cancer patients were retrospectively collected and randomly divided into a training (n = 230) and a validation dataset (n = 62). Both intra-tumoral and peri-tumoral regions were manually labeled on the T2-weight MR images. Deep features and radiomics features were extracted from the intra-tumor regions only and the combined intra- and peri-tumoral regions, respectively, and used for the development of deep learning models and radiomics model. Clinical risk factors were selected through univariate and multivariate regression analysis. Furthermore, a nomogram was constructed by integrating DL features, radiomics features and clinical risk factors. The performance of these models was evaluated by receiver operating characteristics curve (ROC) analysis and decision curve analysis (DCA).

Results: The AUCs of the DL model and radiomics model based on intra-tumor regions were 0.666 (95% CI, 0.534–0.780) and 0.817 (95% CI, 0.698–0.903) in the validation dataset, respectively. The performance of DL model and radiomics model was improved after integrating peri-tumoral regions, with AUCs increasing to 0.739 (95% CI, 0.612–0.842) and 0.845 (95% CI, 0.731–0.924) in the validation dataset, respectively. The nomogram showed the best predictive capability with AUCs achieving 0.921 (95% CI, 0.824–0.874) in the validation dataset, which was significantly higher than other models (all p-values < 0.05). All models showed good calibration, and the DCA demonstrated that the net benefit of the nomogram was higher than other models across majority range of threshold probabilities.

Conclusion: The nomogram incorporating deep learning features, radiomics signatures and clinical variables showed good performance and can be served as a noninvasive tool for predicting postoperative outcomes in patients with rectal cancer.

PO-1617

Computed tomography-based tumoral and peritumoral radiomics: Clinical machine-learning models for the prediction of postoperative recurrence and metastatic risk in localized clear cell renal cell carcinoma

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Purpose: We aimed to develop an intra- and peritumoral radiomic signature using machine-learning models to improve postoperative recurrence and metastatic risk stratification for use with localized clear cell renal cell carcinoma (ccRCC) patients.

Methods: In this study, 407 patients with pathologically diagnosed ccRCC were included in the training (n = 325) and testing cohort (n = 82) with a cohort distribution ratio of 8:2. Tumors inside and at various distances outside the tumor were analyzed for the selection and extraction of intra- and peritumoral radiomic characteristics. After dimension reduction and selection, multiregional radiomic and clinical models were built using different machine-learning models. Ultimately, a radiomic-clinical model was created by combining radiomic and clinical features. The models were evaluated using a receiver operating characteristic curve. A radiomic nomogram was created by combining multiregional radiomic and clinical characteristics.

Results: Using computed tomography images, a total of 9170 radiomic features were identified inside and around tumors from five regions of interest. After dimension reduction, 23 radiomic features were thought to be important. Among the radiomics models, the logistic regression (LR) model showed the best prediction accuracy and robustness, with an area under the curve (AUC) of 0.936 in the training set, and 0.906 in the test set. Among the clinical models, the LR model also had the greatest prediction accuracy, with AUCs of 0.838 in the training set, and 0.896 in the test set. The combined model had the best prediction accuracy (AUCs: training set, 0.952; test queue, 0.914).

Conclusion: Our radiomic nomogram using a combination of radiomic and clinical features demonstrated excellent predictive accuracy for recurrence and metastasis in postoperative ccRCC.

PO-1618

Apparent diffusion coefficient histogram metrics of multiplexed sensitivity encoding diffusion weighted imaging in evaluating pelvic lymph node metastasis of cervical cancer

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Purpose: To investigate apparent diffusion coefficient (ADC) histogram metrics of multiplexed sensitivity encoding diffusion weighted imaging (MUSE DWI) in evaluating pelvic lymph node metastasis of cervical cancer (CC).

Methods: We retrospectively analyzed the clinical data of 54 cervical cancer patients who were pathologically confirmed after extensive hysterectomy and pelvic lymph node dissection. A total of 74 lymph nodes were extracted, including 28 metastatic lymph nodes and 46 non metastatic lymph nodes. All patients underwent routine magnetic resonance imaging (MRI) examination and MUSE-DWI scan before surgery. Referring to T2 Weighted Imaging, in MUSE-DWI, the region of interest (ROIs) covering the entire lymph nodes were drawn on the b=800 s/mm² images of

MUSE-DWI, enabling the extraction of ADC histogram parameters including minimum, maximum, mean, median, percentile (10%, 25%, 75%, 90%), kurtosis, and skewness. We compared the differences of ADC histogram parameters between the CC pelvic lymph node metastasis group and the non-metastatic group, and evaluated the diagnostic efficacy using receiver operating characteristic curves and area under the curve (AUC).

Results: The mean, median, 25%, and 75% in the metastatic lymph node group were significantly lower than those in the non-metastatic lymph node group ($p < 0.05$). However, there were no statistically significant differences in minimum, maximum, 10%, 90%, kurtosis, and skewness ($p > 0.05$). The median showed the highest diagnostic efficacy with AUC of 0.718, sensitivity of 64.3%, and specificity of 71.7%.

Conclusion: As a high-definition diffusion sequence, the ADC histogram parameters of MUSE DWI have high diagnostic value for pelvic lymph node metastasis in cervical cancer, especially the mean, median, 25%, and 75% metrics.

PO-1619

Implementation of CT colonography for colorectal cancer screening in a Chinese hospital: initial outcomes from the first pilot study

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Background: Although colorectal cancer (CRC) is ranked as the second in incidence and the fifth leading cause of death for men and women in China, there is significant medical resource shortage of optical colonoscopy (OC) for population-wide screening, resulting in less than 10% of early-stage diagnosis of CRC in China. Computed-tomography colonoscopy (CTC) is well established as an alternative to OC, unfortunately, no Chinese hospital has established and implemented a clinical procedure of CTC for clinical practice. This study aims to investigate the performance of CTC as a complementary approach of OC for population-wide early screening of CRC.

Methods: We conducted a 6-month feasibility study to evaluate a newly established clinical procedure for CTC.

Results: Among 131 referred patients, a total of 16 colonic polyps were detected in fourteen patients (10.6%), with the findings of follow-up OC in 3 CTC patients matched with the original CTC results. In addition, we identified 2 (1.3%) patients with important extracolonic findings in liver or adrenal gland. We also created a new indicator, named Rate of complete visualization of the entire colon (RCV), for quality assessment of entire CTC procedure. More than 95% CTC had acceptable RCV index.

Conclusion: The evaluated CTC clinical procedure could be used as a complementary approach of OC for population-wide early screening of CRC.

PO-1620

Value of routine CT parameters for PD-L1 expression status in gastric cancer

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Objective: We aimed to explore the correlation between routine computed tomography (CT) imaging features and programmed cell death ligand-1(PD-L1) expression status in gastric cancer and evaluate the predictive value of imaging parameters for this immunotherapy biomarker. **Materials and Methods:** Patients with gastric adenocarcinoma who underwent abdominal CT three-stage enhanced scan and PD-L1 immunohistochemical testing before treatment were retrospectively examined. All diagnoses were confirmed through pathology. According to the expression status of PD-L1, they were divided into the positive (CPS ≥ 5) or negative group (CPS < 5). Baseline CT imaging features were collected. Diagnostic performances of the different variables were evaluated using receiver operating characteristic (ROC) curve.

Results: In total, 67 patients (17 women and 50 men; mean age: 59.55 ± 10.22 years) with gastric adenocarcinoma were included in the study. The probability of maximum lymph node short diameter > 1 cm and peak of lesion enhancement occurring in the arterial phase were statistically significant between the two groups ($p < 0.05$). Moreover, the arterial enhancement fraction (AEF) was significantly higher in the positive group than that in the negative group ($p < 0.05$), and ROC curve analysis showed that the AEF exhibited a high evaluation efficacy (area under the curve [AUC]=0.724 [95% confidence interval (CI): 0.602–0.826]). The combined parameters had the best diagnostic efficacy (AUC=0.786 [95%CI: 0.669–0.877]), sensitivity (58.33%), and specificity (88.37%).

Conclusions: These findings confirm a correlation between CT imaging features and PD-L1 expression status in gastric cancer, and AEF may help evaluate high PD-L1 expression and select patients suitable for immunotherapy.

PO-1621

Optimal treatment strategy for Child-Pugh stage B of hepatocellular carcinoma based on recurrence time and tumor size: A propensity score matching study

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Purpose : Child-Pugh stage B of hepatocellular carcinoma (HCC) is usually treated with transhepatic arterial chemoembolization (TACE) or TACE combined with lenvatinib, but the optimal treatment strategy remains controversial. This study was designed to compare the efficacy of treating HCC patients with TACE-Lenvatinib or TACE at Child-Pugh stage B.

methods: A total of 116 HCC patients were included between June 2016 and January 2020, with 64 patients in the TACE-Lenvatinib group and 52 patients in the TACE group. The primary endpoints were median repeat recurrence-free survival (rRFS) and overall survival (OS). Propensity-score matching (PSM) was conducted to minimize bias. Subgroup analysis based on recurrence patterns (recurrence time and tumor size) and prognostic factors were studied.

Results: Before PSM, the TACE-Lenvatinib group had better median OS (32.0 vs 22.0 months, $P < 0.001$) and rRFS (11.0 vs 9.0 months, $P = 0.003$). After PSM, the TACE-Lenvatinib group also had a better median OS (33.5 vs 28.0 months, $P = 0.026$), but there was no significant difference in median rRFS between the two groups (11.0 vs 10.0 months, $P = 0.085$). Subgroup analysis

showed that when tumor diameter>5 cm, TACE-Lenvatinib had a better median OS (30.5 vs 23.0 months, $P = 0.022$) and rRFS (12.0 vs 10.1 months, $P = 0.030$).

Conclusion: In summary, HCC has better efficacy to TACE-Lenvatinib for HCC with tumor diameter >5 cm. We suggest using TACE-Lenvatinib to treat Child-Pugh stage B of HCC.

PO-1622

Nomogram based on energy spectral computed tomography for predicting mutation status of c-KIT exon 11 in gastrointestinal stromal tumors

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Purpose

This study aimed to develop a nomogram that combined clinical indexes and quantitative parameters of energy spectrum CT to predict the mutation status of c-KIT exon 11 in gastrointestinal stromal tumors (GISTs).

Method

61 patients with confirmed GISTs by pathology were retrospectively enrolled. All patients underwent energy spectrum CT preoperatively and c-KIT gene testing. Univariate analysis was used to compare the clinical indexes and energy spectrum CT quantitative parameters of two patient groups. The statistically significant parameters in the above univariate analysis were incorporated into Logistic regression, and screened independent predictors for predicting the mutation status of c-KIT exon 11. Draw a nomogram for predicting the mutation status of c-KIT exon 11, and evaluate the discrimination, calibration, and clinical net benefit of nomogram using C-index, calibration curve, and decision curve analysis.

Results

In our research, 26 were men and 35 were women. The average age of all participants was 59.25 ± 14.25 years. The logistic regression analysis showed that age, the CT values at a single energy level of 60 keV and 120 keV in the venous phase were independent predictors in the predictive model. Based on these predictors, we developed a nomogram to predict the mutation status of GISTs c-KIT exon 11. The C-index of a nomogram was 0.827 (95% CI: 0.723-0.932), the sensitivity and specificity were 72.5% and 81.0%, respectively. The calibration curve showed the predicted values of the nomogram was in good consistency with the actual values ($P=0.724$). Decision curve analysis showed that a nomogram achieved high clinical net benefits.

Conclusion

This study presents a nomogram that combined clinical indexes and quantitative parameters of energy spectrum CT, which has high efficiency in predicting the mutation status of GISTs c-KIT exon 11.

PO-1623

Influence of skeletal muscle and intermuscular fat on postoperative complications and long-term survival in rectal cancer patients

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Background: The body composition of rectal cancer patients, specifically muscle and adipose tissue, can potentially impact both short-term and long-term postoperative outcomes. The aim of this study is to explore the correlation of skeletal muscle and adipose tissue quantified by computed tomography (CT) with postoperative complications and long-term prognosis in rectal cancer patients after surgical resection.

Methods: This retrospective cohort study included 415 patients with rectal cancer who underwent surgical resection at Wuhan Union Hospital between December 2014 and May 2018. Skeletal muscle and adipose tissue indexes were quantified with CT images at the third lumbar vertebra (L3) and umbilicus levels obtained within three months prior to surgery. Adipose tissue indexes include visceral fat area (VFA), subcutaneous fat area (SFA), and intermuscular fat area (IMFA), while skeletal muscle indexes include skeletal muscle area (SMA) and skeletal muscle radiodensity (SMD). The sex-specific optimal cut-off value for each body composition was defined by using the X-tile software. Logistic and Cox proportional hazards models were used to assess the associations between body composition and postoperative complications, overall survival (OS) and disease-free survival (DFS). Furthermore, receiver operating characteristic (ROC) analysis was used to estimate the predictive ability of body composition combined with clinical indicators.

Results: A total of 415 patients (240 males and 175 females) were included, the mean (SD) age was 57.8 (10.5) years. Logistic regression analysis indicated no significant correlation between body composition and postoperative complications (all $P > 0.05$). Multivariate Cox regression analysis showed that SMD at the L3 level (HR 0.338, 95% CI 0.131-0.876, $P = 0.026$) and IMFA at the umbilical level (HR 1.993, 95% CI 1.053-3.769, $P = 0.034$) were independent prognostic factors for OS and DFS (HR 0.371, 95% CI 0.160-0.861, $P = 0.021$; HR 2.256, 95% CI 1.410-3.612, $P = 0.001$). Furthermore, ROC analyses revealed the predictive accuracy of a combination of body composition and clinical indicators for OS and DFS with the area under the ROC curve of 0.861 and 0.823, respectively (both $p < 0.05$).

Conclusions: There was no significant correlation between CT-quantified body composition and postoperative complications. Low SMD at the L3 level and high IMFA at the umbilical level were associated with shorter OS and DFS. The combination of CT-quantified body composition and clinical indicators could help physicians to recognize worse survival outcomes in rectal cancer patients after surgery.

PO-1624

Prognostic value of platelet-to-lymphocyte ratio in patients with unresectable hepatocellular carcinoma undergoing transarterial chemoembolization and tyrosine kinase inhibitors plus immune checkpoints inhibitors

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Purpose To investigate the prognostic value of platelet-to-lymphocyte ratio (PLR) in patients with unresectable hepatocellular carcinoma (uHCC) treated with transarterial chemoembolization (TACE) and tailored tyrosine kinase inhibitors (TKIs) plus immune checkpoints inhibitors (ICIs).

Materials and methods Ninety-eight patients from May 2018 to January 2022 in our hospital were enrolled in this study. The receiver operating characteristic (ROC) curve analysis was performed to determine the optimal PLR cut-off. Overall survival (OS), progression-free survival (PFS), and adverse events (AEs) of patients were evaluated based on the PLR cut-off. The factors affecting survival were assessed using univariate and multivariate analyses.

Results The PLR cut-off was 98.89. There were 49 patients in the low pretreatment PLR group ($PLR \leq 98.89$) and 49 patients in the high PLR group ($PLR > 98.89$). Patients with low pretreatment PLR had significantly longer median OS (25.7 months vs 16.1 months; $P < 0.001$) and PFS (14.9 months vs 10.2 months; $P < 0.001$) than those with high pretreatment PLR. The multivariate analysis revealed that ALT, tumor size, and PLR are risk factors affecting OS. The four independent factors affecting PFS are tumor size, HBV infection, AFP, and PLR. The AEs were tolerable and manageable.

Conclusion The low pretreatment PLR ($PLR \leq 98.89$) was an independent protective factor for the survival outcomes of patients in this study. PLR was helpful for clinicians to predict the prognosis and identify the patients with uHCC who were most likely to benefit from TACE + TKIs + ICIs.

PO-1625

Using Intra-voxel Incoherent Motion MRI to Dynamically Evaluate the Anti-hepatic Fibrotic Effects of Donafenib Combined with Carvedilol in a Thioacetamide-induced Rat Model

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Objective

To dynamically evaluate the anti-hepatic fibrotic effects of donafenib combined with carvedilol using intra-voxel incoherent motion (IVIM) MRI at different time points of disease course in a thioacetamide (TAA)-induced rat model.

Materials and Methods

In this study, forty male Sprague-Dawley rats received TAA for 6 weeks to induce liver fibrosis and were divided into four groups randomly ($N = 10$). From week 3 to week 6 of modeling, each group of rats received daily gavage of vehicle, carvedilol (CARV), donafenib (DON) and donafenib plus carvedilol (DON+CARV), respectively. IVIM MRI was used to assess the degree of liver fibrosis in the above groups at 0, 2, 4 and 6 weeks after modeling.

Results

The mean pathological collagen areas and the expression of α -SMA and Collagen I in CARV, DON and DON + CARV groups were significantly less than that in vehicle group ($P < 0.001$). IVIM-derived parameters (D, D* and f) and ADC values were negatively correlated with the fibrosis levels (D: $r^2 = 0.594$, $P < 0.001$; D*: $r^2 = 0.556$, $P < 0.001$; f: $r^2 = 0.737$, $P < 0.001$; ADC: $r^2 = 0.694$, $P < 0.001$). At 4 and 6 weeks after modeling, the mean IVIM parameters and ADC values of the DON+CARV group were significantly higher than those of the vehicle group.

Conclusion

IVIM MRI is a non-invasive and valuable dynamic monitoring tool for liver fibrosis, and it was useful to monitor the dynamic inhibition process of donafenib and carvedilol on liver fibrosis in a TAA-induced rat model.

PO-1626

Influence of regional adipose tissue distribution on prognosis in patients with locally advanced rectal cancer

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Background: Body composition is recognized to be associated with clinical outcomes in patients with locally advanced rectal cancer (LARC). This study aimed to determine the prognostic role of regional adipose tissue distribution in patients with LARC.

Methods: This study retrospectively included in patients who underwent radical surgery for LARC between 2013 and 2019. Patients underwent contrast-enhanced CT scans before surgery. Visceral adipose tissue (VAT), abdominal subcutaneous adipose tissue (aSAT), and gluteal subcutaneous adipose tissue (gSAT) were quantified on the CT images. The association of adipose tissue distribution with progression-free survival (PFS) was analyzed using Cox proportional hazards analysis.

Results: A total of 176 patients with LARC were included in this study. During a median follow-up period of 24 months, 54 (30.7%) patients experienced local recurrence or metastasis. In patients with LARC, univariate analyses showed that pT staging (hazard ratio [HR] 8.41, 95% confidence interval [CI] 1.13-62.52; $P = 0.038$), pN staging (HR 3.05, 95% CI 1.61- 5.78; $P = 0.001$) VAT (HR 1.93, 95% CI 1.53- 2.43; $P < 0.000$), aSAT (HR 1.54, 95% CI 1.22- 1.94, $P < 0.000$) and gSAT (HR 1.38, 95% CI 1.08- 1.77, $P = 0.011$) were significantly associated with PFS. In multivariate analysis, only VAT was a predictor of poor prognosis (HR 1.94, 95% CI 1.45- 2.58; $P < 0.001$). Kaplan-Meier survival curves showed that visceral obesity was associated with an increased risk of local recurrence or metastasis in patients with LARC ($P = 0.0028$).

Conclusion: Visceral obesity is an adverse prognostic factor in patients with surgically LARC. VAT can be used as a prediction indicator for patients' postoperative survival prognosis.

PO-1627

Locally Advanced Rectal Cancer: Add Value of Amide Proton Transfer Weighted MR imaging in the Evaluation of Complete Response to Neoadjuvant Chemo- and Radiation Therapy

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Background: Complete response (CR) to neoadjuvant chemotherapy and radiation therapy (NCRT) provides the opportunities to avoid surgical complications, and the benefits of decreased overall recurrence and disease-free survival in patients with locally advanced rectal cancer (LARC). Thus, accurate preoperative evaluation of CR through imaging techniques is essential.

Purpose: To investigate the added value of Amide Proton Transfer weighted (APTw) magnetic resonance imaging (MRI) in the evaluation of CR to NCRT in patients with LARC.

Materials and Methods: Institutional review board approved this single-center prospective study and the patient informed consent requirement was obtained from all study participants. Patients with LARC (T3-4N0M0 or T1-4N+M0) who underwent NCRT and subsequent surgery, with adequate MRI quality were enrolled from November 2021 to April 2023 in Wuhan Union Hospital. All patients underwent conventional MRI and APTw imaging before and after NCRT. Tumor segmentation and histogram analysis were performed based on post-NCRT APTw images. Conventional evaluation of CR to NCRT, based on post-NCRT T2WI and DWI, were evaluated by two experienced radiologists independently. Pathologic complete response (pCR) served as the reference standard. The independent risk factors markedly correlated with pCR were assessed using multivariate logistic regression analyses. Diagnosis performance was assessed by receiver operating characteristic curve (ROC) analysis. The AUCs were compared using the Delong method. **Results:** In total, 64 participants were evaluated: 21 with pCR and 43 with non-pCR. Diagnostic accuracy in the evaluation of CR was significantly improved when APTw imaging was added to conventional evaluation based on T2WI and DWI, with AUC improved from 0.706 to 0.969.

Conclusion: Adding APTw imaging to conventional T2WI and DWI yields better diagnostic accuracy than only use of combination of T2WI and DWI in the evaluation of CR to NCRT in patients with LARC. Superimposing the advantage of noninvasiveness, APTw imaging may provide additional valuable information for clinical decision making after NCRT.

PO-1628

Imaging follow-up and literature review of 2 intractable case of visceral angiosarcoma

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Background: Angiosarcoma is a highly aggressive and malignant neoplasm. Visceral angiosarcoma is extremely rare and there are few reports describe changes in follow-up images till now.

Case presentation:

Case1: A 58-year-old male was admitted to our hospital, with diagnosis of pericardial effusion and mild abnormal hepatic function.

Hepatic MRI revealed high signal intensity mass in the right lobe on T2-weighted imaging mimicking hepatic hemangioma, with mild 18FDG uptake (SUVmax 3.7). Furthermore, Positron emission tomography (PET) examination showed moderate 18FDG uptake (SUVmax 5.7) in the region of

ventricular septum, while CT-scan showed no definite abnormality. After treatment, the patient's condition improved significantly and was discharged from hospital. Discharge diagnosis included pericardial infection, pericardial effusion, and hepatic hemangioma.

Two months later, the patient's condition deteriorated rapidly, 18FDG-PET/CT image revealed multiple moderate and high 18FDG uptake lesions, including lung, liver and the region of ventricular septum. Finally, he was diagnosis as Angiosarcoma by CT-guided fine-needle aspiration (FNA) biopsy.

Case2: A 59-year-old male underwent PET/CT examination because of pulmonary ground-glass nodules. The ground-glass nodules represented mild 18FDG uptake (SUVmax 0.8), were considered as inflammatory granulomas. Moreover, PET/CT images showed a low-density lesion in the spleen with mild uptake of 18FDG (SUVmax 2.6).

Six months later, he was admitted to our hospital because of anemia. Moderate and high 18FDG uptake was found in the huge mass of liver and spleen as well as multiple lesions of spine on 18FDG-PET/CT images. Pathologic analysis of bone suggested a diagnosis of Angiosarcoma.

Conclusions: Early diagnosis of angiosarcoma requires an appreciation for their unique anatomic predilections and a high clinical index of suspicion. Visceral angiosarcoma has a rapid progression without early diagnosis.

PO-1629

Inter-operator variation and error sources in response assessment for advanced hepatocellular carcinoma to combined targeted immunotherapy

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To explore the inter-operator variation and the potential sources of discordance in response assessments achieved by different criteria in advanced hepatocellular carcinoma with combined targeted immunotherapy.

Methods: Thirty patients with advanced HCC who received immune checkpoint inhibitors combined with anti-angiogenic agents between October 2020 and October 2022 were scrutinized for this retrospective study. The baseline and follow-up images were evaluated separately by three radiologists with different expertise in liver imaging (operator 1, 20 years; operator 2, 5 years; operator 3, no specific training in liver imaging), according to: response evaluation criteria in solid tumors (RECIST1.1), immunotherapy modified RECIST (iRECIST) and modified RECIST (mRECIST).

Results: The objective response rate (ORR) evaluated by RECIST 1.1 was 33.3%, and the disease control rate (DCR) was 80%, both of which were same with the iRECIST. According to RECIST 1.1 and mRECIST, the result of the response assessments was statistically different between the complete response (CR), partial response (PR), the stable disease (SD) and progressive disease (PD) groups ($P=0.018$), however, no statistically significant differences were observed in ORR and DCR ($P=0.161$). The overall response concordance between the more expert operators was good, irrespective of the criteria. The most evident discordance was in target lesion response assessment, with expert operators disagreeing mostly on lesion selection and less expert operators on lesion measurement.

Conclusion: Decision on whether a patient is a responder or progressor under combined targeted immunotherapy may vary among different operators. The patients should be evaluated by experienced radiologists to minimise variability, regardless of the adopted criteria.

PO-1630

Development of combining CT features and CA 125 to diagnose occult peritoneal metastasis in patients with advanced gastric cancer preoperatively

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Abstract

Objectives: To explore the diagnostic value of clinical characteristics and conventional CT features in diagnosing occult peritoneal metastasis (OPM) of advanced gastric cancer (AGC).

Methods: In this retrospective study, 66 patients with OPM and 111 patients with non-peritoneal metastasis (NPM) who underwent preoperative contrast-enhanced computed tomography (CECT) between January 2020 and December 2021 were included. Patient information, clinical characteristics, CT features, and abdominal fat such as visceral fat, subcutaneous fat were observed. A combined indicator was established using multivariate logistic regression. ROC and AUC were performed to assess the diagnostic performance of our combined indicator.

Results: A total of 177 patients were included in this study, of whom 66 patients underwent OPM and 111 patients had no PM, in other words, non-peritoneal metastasis (NPM). The mean age of the patients was 66.1 ± 9.3 years and majority of them were men (143, 80.8%). Variables covering age, NLR, PLR, Carbohydrate antigen 125 (CA125) and Carbohydrate antigen 72-4 (CA 72-4) were significantly different between OPM and NPM. The evaluated characteristics of tumor length, Borrmann IV, NAPV, pelvic effusion, visceral fat, visceral fat/abdominal fat and mean of visceral fat were significantly different between OPM and NPM with $P < 0.05$. Patients with OPM illustrated more tumor length, more Borrmann IV, more pelvic effusion, less visceral fat, lower visceral fat to abdominal fat ratio and less mean of subcutaneous fat. Variables including gender, body mass index (BMI), Carcinoembryonic antigen (CEA), Carbohydrate antigen 153 (CA 153), Carbohydrate antigen 199 (CA 199), tumor thickness, NVPV, cT stage, cN stage, subcutaneous fat, mean of subcutaneous fat showed no significant difference between two groups. On stepwise logistic analysis, Borrmann IV ($P = 0.002$; odds ratio [OR], 3.70; 95% confidence interval [CI], 1.59-8.59), pelvic effusion ($P = 0.004$; OR, 3.22; 95% CI, 1.47-7.07), CA125 ($P = 0.001$; OR, 3.80; 95% CI, 1.72-8.40) and NAPV ($P < 0.001$; OR, 4.02; 95% CI, 1.85-8.71) proved to be independent risk factor of OPM in AGC. The AUC of the combined indicator for detecting OPM was higher (AUC=0.820; 95% CI, 0.753-0.887) than that of single independent risk factor of Borrmann IV (AUC=0.643; 95% CI, 0.553-0.734), pelvic effusion (AUC=0.681; 95% CI, 0.594-0.769), CA125 (AUC=0.696; 95% CI, 0.612-0.779) and NAPV (AUC=0.676; 95% CI, 0.589-0.763). In order to assess whether AUC values were significantly different between combined indicator and each independent risk factor, the DeLong test was performed. The results indicated AUC values were significantly different between combined indicator and each independent risk factor. The SEN, SPE, PPV and NPV of combined indicator were 0.752, 0.783, 0.656, 0.851 respectively.

Conclusion: A predictive indicator based on CT features and CA 125 provided valuable information and was of important potential in clinical practice in terms of individual treatment of AGC.

PO-1631

Nomogram Based on Body Composition and Prognostic Nutritional Index Predicts Survival After Curative Resection of Gastric Cancer

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Purpose: This study aimed to identify independent prognostic factors for gastric cancer patients after curative resection using quantitative computed tomography (QCT) combined with prognostic nutritional index (PNI), and to develop a nomogram prediction model for individualized prognosis.

Method: This study retrospectively analyzed 119 patients with gastric cancer who underwent curative resection from January 2016 to March 2018. The patients' preoperative clinical pathological data were recorded, and all patients underwent QCT scans before and after curative resection to obtain QCT parameters: bone mineral density (BMD), skeletal muscle area (SMA), visceral fat area (VFA), subcutaneous fat area (SFA) and CT fat fraction (CTFF), then relative rate of change in each parameter (Δ BMD, Δ SMA, Δ VFA, Δ SFA, Δ CTFF) was calculated after time normalization. Multivariate Cox proportional hazards was used to establish a nomogram model that based on independent prognostic factors. The concordance index (C-index), area under the time-dependent receiver operating characteristic (ROC) curve and clinical decision curve were used to evaluate the predictive performance and clinical benefit of the nomogram model.

Results: This study found that Δ CTFF, Δ VFA, Δ BMD and PNI are independent prognostic factors for overall survival (hazard ratio: 1.034, 0.895, 0.976, 2.951, respectively, all $p < 0.05$). The established nomogram model could predict the area under the ROC curve (AUC) of overall survival at 1, 3, and 5 years as 0.816, 0.815 and 0.881, respectively. The C-index was 0.743 (95% CI, 0.684-0.801), and the decision curve analysis showed that this model has good clinical net benefit.

Conclusion: The nomogram model based on body composition and PNI is reliable in predicting the individualized survival of underwent curative resection for gastric cancer patients.

PO-1632

A non-contrast CT radiomics nomogram for early differentiation of acute necrotizing pancreatitis from acute interstitial edematous pancreatitis

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Objective: The aim of this study was to investigate non-contrast CT-based nomogram predictions for early differentiation of acute necrotizing pancreatitis (ANP) from acute interstitial edematous pancreatitis (AEP).

Methods: This retrospective study included 161 patients with acute pancreatitis (AP) who underwent an early non-contrast CT between January 2016 and January 2022. The diagnosis for AEP and ANP was determined by follow-up enhanced MRI or CT. Clinical data (age, gender, white blood count, serum glucose and lactate dehydrogenase within 48 hours of admission) were collected. The minimum redundancy maximum relevance (mRMR) and the least absolute shrinkage and selection operator (LASSO) were used for dimension reduction and feature selection, and radiomics model was established. The nomogram was developed based on radiomics scores (Radscore) and clinically risk factors.

Results: The nomogram model outperformed both the clinical model and the radiomics model in predicting ANP in both the training cohort (AUC 0.93; 95% CI: 0.88 to 0.97) and the validation cohort (AUC 0.84; 95% CI: 0.73 to 0.95).

Conclusions: Non-contrast-CT-based radiomics nomogram offers a new non-invasive method to accurately identify AEP and ANP at an early stage, which may help in the individual management of AP patients.

PO-1633

Hepatic alveolar echinococcosis accompanied by lung and kidney metastases: a case description of imaging findings

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Alveolar echinococcosis is a zoonotic disease caused by larvae of *Echinococcus multilocularis*. Almost all alveolar echinococcosis originate in the liver, with the lungs and brain being the most common organs of transfer. In contrast, metastasis to the kidneys is very rare; here, we report a case of hepatic alveolar echinococcosis metastasis to the lung and kidney successively with imaging manifestations and features. On March 23, 2017, a 49-year-old woman came to our hospital due to discomfort and pain in her lower back. Imaging at our hospital suggested hepatic alveolar echinococcosis with intrapulmonary metastases. From 2018 to 2019, the patient underwent follow-up examinations at our hospital, which showed enlarged liver and lung lesions. In May 2020, the patient underwent liver transplantation and resection of an intrapulmonary lesion due to the gradual enlargement of the lesions in other hospitals and was diagnosed with HAE with lung metastasis. On August 15, 2022, the patient again visited our hospital with "intermittent pain in the left lumbar abdomen. The clinical diagnosis was hepatic alveolar echinococcosis with renal metastases, and renal tumors were not excluded. The renal lesion underwent radical resection and was confirmed as alveolar echinococcosis by pathological examination. During postoperative follow-up, the patient had no uncomfortable symptoms. In this case, the patient's hepatic alveolar echinococcosis metastasized successively to the lung and kidney. We have complete imaging data, from which we have analyzed the relevant features to provide some assistance in future clinical diagnosis and treatment.

PO-1634

The prediction of mortality outcomes at CT in patients with severe acute pancreatitis: Non-Local Means Denoising and Histogram Analysis

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Background: Severe acute pancreatitis (SAP) carries a significant risk of mortality and places a substantial financial burden on patients's families. Contrast-enhanced CT (CECT) is frequently utilized as a diagnostic and severity assessment tool for acute pancreatitis (AP).

Purpose: This study aimed to create a histogram model based on Contrast-enhanced CT to early predict the risk of death in severe acute pancreatitis patients and investigate the impact of Non-Local means denoising on prediction accuracy.

Methods: Patients diagnosed with severe acute pancreatitis from September 2014 to April 2023 were involved, and their clinical characteristics and Contrast-enhanced CT data were involved. Non-Local means denoising techniques were applied to Contrast-enhanced CT images. Histogram

analysis was conducted on volume of interest data obtained from arterial and portal phase Contrast-enhanced CT images. Statistical analyses encompassing both univariable and multivariable assessments were conducted. A histogram model based on Contrast-enhanced CT for predicting death risk was constructed. Comparing the prediction accuracy of the histogram model with clinical model and CT model.

Results: The study involved a collection of 74 patients, 27 of whom (36.5%) suffered mortality. A total of 8 histogram models were developed. However, there was no statistically significant difference in the prediction ability among the various levels of noise coefficient in both the artery phase and the portal venous phase ($P > 0.05$). These histogram models outperformed both the conventional CT and clinical models ($P = .009$ and $P = .048$, respectively). Statistical significance between the CT model and the clinical model was not found ($P = 0.699$).

Conclusion: Histogram analysis supplements the conventional Contrast-enhanced CT diagnosis of AP, and shows strong predictive capabilities for the mortality outcomes among patients with severe acute pancreatitis.

PO-1635

Pathological Grading of Clear Cell Renal Cell Carcinoma: Role of Perirenal Fat, Automated Segmentation and Ensemble Learning

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Objective: To develop and validate a comprehensive approach combining automated segmentation and machine learning to predict ccRCC grade, while exploring the role of perirenal fat.

Materials and Methods: In this retrospective study, patients with pathologically confirmed ccRCC from a local hospital and an open-source dataset were retrospectively analyzed. Use TransUNet combined with the train-while-annotation method to train an automatic segmentation model for tumors, kidneys, and perirenal fat. Randomly partition local data for training and internal validation, and utilize images from public datasets for external validation. Multi-filter radiomics features were extracted, lasso regression was used to screen features, and SVM was used to establish a pathological grading prediction model. Dice coefficient and performance metrics such as accuracy and AUC were calculated to evaluate the segmentation and classification model. Besides, the SHapley Additive exPlanations (SHAP) method was employed for interpreting and visualizing the WHO/ISUP grading model.

Results: A total of 614 patients (mean age 56.3, 430 males, and 184 females) were included in the analysis. In the segmentation task, the mean Dice coefficient was 0.836 for the cancer region. For WHO/ISUP grading, the ensemble model of perirenal fat showed predictive value, with an AUC of 0.711 (95% CI, 0.604-0.802) in the internal validation set. AUC of the ensemble model of combination (including tumor, kidney, and perirenal fat) was 0.814 (95% CI, 0.717-0.889) in the internal validation set, significantly higher than the ensemble model of tumor 0.760 (95% CI, 0.657-0.845).

Conclusion: Our study proposes a novel method to predict pathological grade of ccRCC using automated segmentation and radiomics analysis. And found that perirenal fat has incremental value for the prediction of ccRCC pathological grade.

PO-1636

CT-radiomics-based surrogates of distinct vascular patterns assisted surgical procedure decision-making and prognostic prediction

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Background and Purpose: The distinct vascular patterns, including microvascular invasion (MVI) and vessels encapsulating tumor clusters (VETC), represent the biological aggressiveness of hepatocellular carcinoma (HCC). Imaging surrogates of these vascular patterns potentially helped for assistance in surgical planning and prognostic prediction. Herein, a prognostic model integrating CT-radiomics-based surrogates of these distinct vascular patterns was developed and validated to assist decision making for the optimal surgical procedure.

Materials and Methods: Clinic-radiologic data of 1,285 HCC patients undergoing surgical resection were retrospectively enrolled. The CT-radiomics-based surrogate of MVI or VETC was individually built by conventional radiomics approach based on two independent sets ($n = 360$ and 255). The prognostic model using clinical data and CT-radiomics-based surrogates of MVI and VETC patterns was developed ($n = 297$) and externally validated ($n = 373$) for predicting recurrence-free survival (RFS). Whether the model's stratification was associated with postoperative recurrence following anatomic resection was evaluated.

Results: The radiomics signatures of MVI and VETC demonstrated effective performance in their respective training and independent validation sets (area under the curve: 0.841-0.892 for MVI and 0.830-0.851 for VETC). The prognostic model incorporating serum alpha-fetoprotein, tumor multiplicity, the radiomics signatures of MVI and VETC achieved a C-index of 0.734-0.766 for developing and external validation and generated three prognostically distinct strata. For patients at model-predicted medium risk, anatomic resection was associated with improved RFS ($P < 0.05$). By contrast, anatomic resection had no impact on RFS in patients at model-predicted low or high risk (both $P > 0.05$).

Conclusions: The proposed model integrating CT-radiomics-based surrogates of distinct vascular patterns demonstrated relatively accurate predictions and potentially be used to identify HCC surgical candidates who may benefit from anatomic resection.

PO-1637

Inferior vena cava thrombosis after gastrointestinal ulcer perforation

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Abstract

Gastrointestinal ulcer perforation is a serious disease of digestive tract, which can cause serious complications and even endanger the patient's life. Common complications include hemorrhage, abdominal infection, toxic shock, pulmonary infection, pyloric obstruction, etc.

The patient in this case was a 34-year-old male who was admitted to the hospital with "Upper gastrointestinal bleeding, duodenal ulcer, peritonitis, and moderate anemia" due to intermittent abdominal pain for 5 years, hematemesis with black stool for 11 days. Previous gastroscopy indicated duodenal ulcer and a history of *Helicobacter Pylori* infection. The patient developed haematemesis with black stool after staying up late due to fatigue 11 days ago. The gastroscopy indicated giant ulcer of duodenal bulb with bleeding, Forrest grade (Ib). Give hemostatic treatment. Fever occurred after eating porridge 2 days ago. An unenhanced CT examination showed multiple

exudative lesions at the posterior margin of the head of pancreas, around the abdominal aorta, around the anterior and posterior fascia of the right kidney, and secondary peritonitis. After admission, An enhanced CT examination of the abdomen and pelvis revealed penetrating duodenal ulcer with surrounding inflammatory encapsulation, which was closely related to inferior vena cava, thrombosis in the right renal vein, collateral circulation formation, and thrombosis in inferior vena cava to the iliac vein. After treatment with anti-infection, gastrointestinal mucosal protective agents and heparin anticoagulant drugs, the symptoms improved. An enhanced CT examination of abdomen and pelvis was reviewed 8 and 36 days later, respectively, and no significant changes were found in venous thrombosis, duodenal penetrating ulcer and peripheral inflammatory exudation improved.

Inferior vena cava thrombosis is a rare complication of duodenal ulcer perforation. It is necessary to be alert to this possibility when patients present with abdominal pain, fever and other peritonitis after duodenal perforation, especially when the perforation is located close to the inferior vena cava, resulting in peripheral inflammatory exudation and inferior vena cava thrombosis. Therefore, when duodenal perforation is suspected, the enhanced CT examination should be performed in time to confirm whether there is inferior vena cava thrombosis, and timely treatment to avoid serious consequences.

PO-1638

Value of magnetic resonance imaging for diagnosis of LR-3 and LR-4 lesions coexisting with hepatocellular carcinoma

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Introduction:

To explore which preoperative clinical data and conventional magnetic resonance imaging (MRI) features may indicate the presence of hepatocellular carcinoma (HCC) in HCC patients coexisting with LR-3 and LR-4 lesions.

Materials:

HCC Patients coexisting with LR-3 and LR-4 lesions who participated in a prospective clinical trial (ChiCTR2000036201) were included in this study. Two radiologists independently assessed the preoperative MRI features and each lesion was assigned according to the Liver Imaging Reporting and Data System (LI-RADS). The preoperative clinical data were also evaluated. The relative values of these parameters were assessed as potential predictors of HCC.

Results:

We enrolled 102 HCC patients (58.1 ± 11.5 years; 84.3% males) coexisting with 110 LR-3 and LR-4 lesions (HCCs group [n = 66]; non-HCCs group [n = 44]). The presence of restricted diffusion (OR: 18.590, p < 0.001), delayed enhancement (OR: 0.113, p < 0.001), and mild-moderate T2 hyperintensity (OR: 3.084, p=0.048) were found to be independent predictors of HCC diagnosis. The sensitivity and specificity of the above independent variables for the diagnosis of HCC ranged from 66.7-80.3% and 56.8-88.6%, respectively. ROC analysis showed that, in discriminating HCC, the AUCs of the above factors were 0.777, 0.686, and 0.670, respectively. Combining these three findings for the prediction of HCC resulted in a specificity greater than 97%, and the AUC further increased to 0.874.

Conclusion:

The presence of restricted diffusion, delayed enhancement, and mild-moderate T2 hyperintensity can be useful features for risk stratification of coexisting LR-3 and LR-4 lesions in HCC patients.

PO-1639

Computed tomography radiomics nomogram to predict the intraoperative hypertensive crisis of abdominal pheochromocytoma and paraganglioma: a two centers study

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Background: Patients with abdominal pheochromocytoma and paraganglioma (PPGL) are prone to a hypertensive crisis during surgery, which may endanger their lives. This study aimed to develop and validate a computed tomography (CT) radiomics nomogram for the prediction of intraoperative hypertensive crisis in patients with PPGL.

Methods: In this retrospective study, 212 patients with abdominal PPGL underwent abdominal-enhanced CT and surgical resection. Radiomic features were extracted from arterial and venous phases. Multivariable logistic regression models were developed using an internal validation and an external test set. The performance of the nomograms was determined by their discrimination, calibration, and clinical usefulness.

Results: A total of 212 patients with PPGL were included, including 44 with hypertension crises. The patients were divided into training ($n = 117$), validation ($n = 51$), and test ($n = 44$) sets. Eighteen radiomics-relevant radiomic features were selected. History of coronary heart disease and CT radiomics score were included in the prediction model, which achieved an area under the curve of 0.91 (95% confidence interval (CI) 0.85–0.97) in the training set, 0.93 (95% CI 0.84–0.99) in the internal validation set, and 0.85 (95% CI 0.72–0.97) in the external test set. The decision curve analysis demonstrated that the radiomics nomogram was clinically useful.

Conclusion: The CT radiomics nomogram may preoperatively predict intraoperative hypertensive crisis of abdominal PPGL and as an accurate method that can reduce intraoperative cardiovascular complications and contribute to improved surgical outcomes.

PO-1640

CT-based radiomics nomogram to predict the intraoperative massive blood loss of abdominal pheochromocytoma and paraganglioma: a two centers study

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Objectives: Patients with abdominal pheochromocytoma and paraganglioma (PHEO/PGL) are prone to massive blood loss during surgery, which may endanger their lives. This study aimed to develop and validate a CT-based radiomics nomogram for the prediction of intraoperative massive blood loss of PHEO/PGL.

Methods: In this two centers retrospective study, a total of 168 patients of PHEO/PGL underwent abdominal enhanced CT and surgical resection. Radiomics features were extracted from 3D CT features in multi-phase, including nonenhanced phase, arterial phase, and venous phase. A clinical model was constructed with clinical and imaging characteristics. A radiomics model included CT radiomics score, clinical and imaging characteristics. A multivariable logistic regression models

were developed basing on a training cohort consisting of 117 patients with <400ml blood loss and 51 patients with ≥ 400 ml blood loss between June 2011 and December 2018. The performance of the nomograms was determined by its' discrimination, calibration, and clinical usefulness. The models were validated in 43 consecutive patients between January 2019 and December 2021, of which 36 and 8 patients had <400ml and ≥ 400 ml blood loss, respectively.

Results: Location, tumor size, vascular invasion and nutrient artery were selected for the clinical model. The radiological model achieved an area under the curve (AUC) of 0.83 (95% CI 0.77–0.89) in the training cohort and 0.78 (95% CI 0.53–1.00) in the validation cohort. Location, tumor size, vascular invasion, nutrient artery and CT radiomics score were selected for the radiomics model. The radiomics model achieved an AUC of 0.88 (95% CI 0.82–0.93) in the training cohort and 0.85 (95% CI 0.70–1.00) in the validation cohort. The radiomics model outperformed the radiological model. The decision curve analysis demonstrated that the radiomics nomogram was clinically useful.

Conclusion: The CT-based radiomics nomogram could preoperatively predict intraoperative massive blood loss of PHEO/PGL, and may help clinical decision-making.

PO-1641

The Value of MRI Radiomics in Differential Diagnosis of Autoimmune Pancreatitis and Pancreatic Cancer

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Purpose: Explore the value of MRI radiomics in the differential diagnosis of autoimmune pancreatitis (AIP) and pancreatic ductal adenocarcinoma (PDAC).

Methods: This retrospective study included 262 patients diagnosed with AIP versus PDAC from seven independent institutions between June 2015 and July 2022. Among them, 202 patients from 5 institutions were used as the training set and test set, and 60 patients from 2 other institutions were used as the external validation set. The average age of 262 patients was 62.34 ± 10.53 [standard deviation], including 171 males and 91 females. All patients underwent MR abdominal plain scan and enhanced examination, including magnetic resonance plain scan (T1WI, T2WI, DWI, ADC), enhanced scan (arterial phase AP, venous phase VP, delayed phase DP), and manually segmented the region of interest (ROI) on each sequence of images. The radiomics features were extracted by Shukun scientific research platform, and the Pearson correlation and lasso regression algorithms were used to screen the features. Four models (logistic regression, LR), support vector machines (SVM) random forest (RF) and stochastic gradient descent (SGD) were developed using the data from the training set, and the diagnostic efficiency of the model was tested using the test set. Clinical variables affecting diagnosis (including age, sex, lesion location and laboratory tests (IgG4, CA199, CA125, CEA) were added to the machine learning model for adjustment. Finally, the diagnostic efficacy of radiomics model, clinical model and radiomics clinical combined model was verified with external validation set.

Results: The area under the ROC curve (AUC) of radiomics models T1WI, T2WI, DWI (B0), DWI (B800), ADC, AP, VP, DP were 0.882, 0.930, 0.947, 0.931, 0.926, 0.938, 0.920, 0.960 in the training set; The AUCs of multi parameter MRI omics model, clinical model and radiomics clinical combined model were 0.964, 0.768 and 0.773, respectively.

Conclusions: MRI radiomics model has good diagnostic efficacy in the differential diagnosis of AIP and PDAC.

PO-1642

Profiling intussusception in adults: focusing on treatment decision based on the clinical manifestations and MDCT features

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Purpose: To introduce clinical manifestations, multidetector computed tomographic (MDCT) features and treatment of three types of intussusceptions in adults, in order to identify indicators that an intussusception may require surgery.

Methods: We retrospectively reviewed 186 adult patients with 194 intussusceptions. Depending on the location, intussusceptions were classified as enteric, ileocolic and colonic types. Meanwhile, three types of intussusceptions were further divided into surgical and conservative groups based on treatment. Clinical manifestations, MDCT features and treatment were compared. Uni- and multivariate logistic analyses were used to identify risk factors for intussusception requiring surgery. **Results:** There were 73 enteric intussusceptions in 66 patients, and 32 intussusceptions in 28 patients were in the surgical group. Intussusception diameter ($OR=2.972$, $P=0.009$) and discernible lead point on MDCT ($OR=27.064$, $P<0.001$) were reliable indicators of enteric intussusception requiring surgery. Each of the 49 patients had one ileocolic intussusception and 46 intussusceptions belonged to the surgical group. Seventy-one patients had 72 colonic intussusceptions, and all but one patient with one intussusception were in the surgical group. Enteric and ileocolic intussusceptions mainly presented with abdominal pain (78.79% and 85.71%). Hematochezia/melena (63.38%) was the main symptom of colonic intussusception. Ileocolic intussusceptions were longer in length, larger in diameter, and had more hypodense layer and fluid collection than enteric and colonic intussusceptions.

Conclusion: The clinical manifestations and MDCT features of three types of intussusceptions have different emphases. Less than half of enteric intussusceptions require surgery, and MDCT features are effective in identifying them. Surgery remains the treatment of choice for most ileocolic and colonic intussusceptions.

PO-1643

Fat Free Muscle Area measurement based on liver MRI workflow to assess sarcopenia

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Objective

Fat free muscle area (FFMA) is usually measured on T2WI-TSE sequence, but T2WI-TSE sequence is not routine MRI workflow, and the scanning time of T2WI-TSE sequence is obviously longer than T1WI e-dixon sequence, so we develop a new algorithm to measure FFMA on T1WI edixon-fat phase.

Method

16 patients with fatty liver ($F:M=10:6$, age 50 ± 1.2) underwent liver MRI examinations on a 3T system (MAGNETOM Vida, Siemens Healthineers). The protocols include an axial T1WI edixon sequence and T2WI TSE sequence without fat saturation. Typical scanning parameters are shown in table1.

First, an experienced radiologist carefully delineated the contour of bilateral psoas on the maximum cross-sectional images of lumbar spine three on T2WI TSE and T1WI edixon-fat phase, respectively, and generated the corresponding regions of interest. The total muscle area (TMA) of

the psoas muscles was obtained by Itk-snap(www.itksnap.org). Subsequently, both images were converted to binary images based on signal intensity. On T2WI TSE and T1WI edixon-fat phase muscular tissue and adipose tissue are characterized by low and high signal intensity, respectively. Therefore, binarization allowed for separation of lean muscular tissue from intramuscular adipose tissue. Summation of pixels with high signal intensity and multiplication with the corresponding surface area resulted in intramuscular adipose tissue area (ATA), which was subtracted from TMA to obtain FFMA. The algorithm was implemented by scripts in MATLAB software, and the consistency was compared with the previous FFMA measurement results based on T2WI TSE image by Consistency check.

Result

The mean value of bilateral psoas FFMA at the maximum cross-sectional area of lumbar spine 3 vertebral body measured based on T1WI edixon-fat phase was 217.5mm² (164.8, 332.5) and that measured based on T2WI TSE sequence was 238.2 mm² (152.7, 311.3). The intraclass correlation coefficient of the two method was 0.933 (ICC=0.933).

Conclusion

FFMA of bilateral psoas muscles based on edixon sequence proposed in this paper are highly consistent with those of previous methods based on T2WI TSE sequence. This method is possible to provide quantitative indicators for evaluating sarcopenia for routine clinical MRI examination

PO-1644

Clinical value of intratumoral necrosis in the prognosis of pancreatic ductal adenocarcinoma based on pathological and MDCT characteristics

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Purpose: To evaluate the relationship between intratumoral necrosis and prognosis in patients with pancreatic ductal adenocarcinoma (PDAC), and to explore the accuracy of preoperative multidetector computed tomography (MDCT) characteristics in diagnosing intratumoral necrosis.

Methods: A total of 89 patients with PDAC who were completely resected by surgery with negative margins were included in the study and grouped according to the presence or absence of pathologically diagnosed necrosis. Clinical, pathological and MDCT characteristics of the two groups were analyzed, and the Kaplan-Meier method was applied to analyze survival curves. Univariate and multivariate Cox proportional hazard models were used to identify prognosis factors. **Results:** There were 27 PDACs with pathologically diagnosed necrosis. PDACs with pathologically diagnosed necrosis had a significantly shorter overall survival (OS) compared to those without necrosis (median, 12.0 vs 31.0 months, $P < 0.001$). Multivariate Cox regression revealed that age over 65 years ($HR=2.277$, $P=0.011$), pathologically diagnosed necrosis ($HR=2.094$, $P=0.029$), and poorly differentiated tumors ($HR=2.382$, $P=0.014$) were independent predictors of poor prognosis. Using pathologically diagnosed necrosis as the reference standard, the sensitivity, specificity, positive prediction value (PPV), and negative prediction value (NPV) for MDCT-detected necrosis estimated by observer 1 were 74.1%, 71.0%, 52.6%, and 86.3%, respectively. Similarly, the sensitivity, specificity, PPV and NPV of MDCT-detected necrosis estimated by observer 2 were 74.1%, 67.7%, 50.0% and 85.7%. The inter-observer agreement for MDCT-detected necrosis was good ($k=0.772$).

Conclusion: Pathologically detected necrosis could be a potential predictor of poor prognosis in PDAC patients. MDCT characteristics can be utilized to initially estimate the presence of intratumoral necrosis.

PO-1645

Whole-lesion iodine map histogram analysis in the risk classification of gastrointestinal stromal tumor: Comparison single-slice iodine concentration measurement

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Purpose: To evaluate and compare the diagnostic performances of whole-lesion iodine map (IM) histogram analysis and single-slice IM measurement in the risk classification of gastrointestinal stromal tumors (GISTs).

Methods: Thirty-seven patients with GISTs, including 19 with low malignant underlying GISTs (LG-GISTs) and 18 with high malignant underlying GISTs (HG-GISTs), were evaluated with dual-energy computed tomography (DECT). Whole-lesion IM histogram parameters (mean; median; minimum; maximum; standard deviation; variance; 1st, 10th, 25th, 50th, 75th, 90th, and 99th percentile; kurtosis, skewness, and entropy) were computed for each lesion. In other sessions, iodine concentrations (ICs) were derived from the IM by placing regions of interest (ROIs) on the tumor slices and normalizing them to the iodine concentration in the aorta. Both quantitative analyses were performed on the venous phase images. The diagnostic accuracies of the two methods were assessed and compared.

Results: The minimum, maximum, 1st, 10th, and 25th percentile of the whole-lesion IM histogram and the IC and normalized IC (NIC) of the single-slice IC measurement significantly differed between LG- and HG-GISTs ($p < 0.001 - p = 0.042$). The minimum value in the histogram analysis (AUC = 0.844) and the NIC in the single-slice measurement analysis (AUC = 0.886) showed the best diagnostic performances. The NIC of single-slice measurements had a diagnostic performance similar to that of the whole-lesion IM histogram analysis ($p = 0.618$).

Conclusions: Both whole-lesion IM histogram analysis and single-slice IC measurement can differentiate LG-GISTs and HG-GISTs with similar diagnostic performances.

PO-1646

Predicting Preoperative Pathologic Grades of Bladder Cancer Using Intravoxel Incoherent Motion and Amide Proton Transfer-Weighted Imaging

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Rationale and Objectives: To investigate the predictive value of intravoxel incoherent motion (IVIM) combined with amide proton transfer-weighted (APT_w) imaging for the preoperative grading of BCbladder cancer (BC).

Materials and Methods: A total of 69 patients with histopathologically confirmed bladder cancer underwent diffusion-weighted imaging (DWI), IVIM, and APT_w imaging at 3.0T MRI. Two radiologists independently measured the mean apparent diffusion coefficient (ADC) in DWI, true diffusion coefficient (D), perfusion-related pseudo-diffusion coefficient (D*), and perfusion fraction (f) in IVIM, and APT_w values, respectively. The areas under the receiver operating characteristic curves (AUCs) were utilized to compare the diagnostic efficacy of these single and combined quantitative parameters.

Results: ADC and D values of low-grade BC were significantly higher than those of high-grade BC ($[1.420 \pm 0.200 \times 10^{-3} \text{ mm}^2/\text{s}]$ vs. $[1.0986 \pm 0.2547 \times 10^{-3} \text{ mm}^2/\text{s}]$ and $[1.240 \pm 0.2439 \times 10^{-3} \text{ mm}^2/\text{s}]$ vs. $[0.8985 \pm 0.1875 \times 10^{-3} \text{ mm}^2/\text{s}]$, respectively; all $P < 0.001$). Opposite patterns were found for APTw ($[1.5327 \pm 0.421]\%$ vs. $[2.384 \pm 0.712]\%$, $P < 0.001$). The ROC curves indicated that the combination of D and APTw values could distinguish low- from high-grades of BC with the highest predictive efficacy ($\text{AUC} = 0.964$), as well as a significant difference compared to those by ADC, D, and APTw values separately ($\text{AUC} = 0.844, 0.8878, 0.853$, respectively; all $P < 0.05$).

Conclusion: IVIM combined with APTw imaging significantly improved the predictive efficacy of assessing low-and high-grade BC compared to the individual parameters on their own, providing an effective non-invasive method for clinical preoperative prediction of BC grading.

PO-1647

Diagnostic Value of Clear Cell Likelihood Score v1.0 and v2.0 for Pathological Subtypes of Small Renal Masses: A Multicenter Comparative Study

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Purpose: To compare the diagnostic performance and interobserver agreement of clear cell likelihood score version 1.0 (ccLS v1.0) and clear cell likelihood score version 2.0 (ccLS v2.0) for diagnosing each pathological subtypes of small renal masses (SRMs).

Methods: Clinical data and MR images of patients with pathologically confirmed SRMs were retrospectively collected from three academic medical centers between October, 2017 and December, 2021. Six abdominal radiologists were trained in the ccLS algorithm and scored independently using ccLS v1.0 and ccLS v2.0, respectively. Random-effects logistic regression was used to generated plot ROC to evaluate the diagnostic performance of ccLS v1.0 and ccLS v2.0, and AUCs of these two scoring systems were compared using the DeLong's test. The weighted Kappa test was used to evaluate the interobserver agreement of the ccLS score, and the difference in the weighted Kappa was compared using z test.

Results: 797 patients (563 males, 234 females; mean age, 53 ± 12 years) with 806 SRMs were identified. The results suggested that the pooled AUCs of ccLS v1.0 and ccLS v2.0 for diagnosing ccRCC, pRCC, RO, AMLwvf and malignancy were 0.851, 0.888, 0.679, 0.766, 0.757 and 0.907, 0.926, 0.745, 0.826, 0.818, respectively, and the difference was statistically significant ($P < 0.01$). The weighted Kappa coefficient of ccLS v1.0 was 0.571 (95% CI: 0.473-0.669), and the weighted Kappa coefficient of ccLS v2.0 was 0.628 (95% CI: 0.534-0.772), and the difference was not statistically significant ($P > 0.05$). The interobserver agreement of ccLS in the diagnosis of pRCC and malignancy was relatively greater.

Conclusion: ccLS v2.0 provided better diagnostic performance than ccLS v1.0 for diagnosing ccRCC, pRCC, RO, AMLwvf and malignancy of SRMs, and may be considered to support the daily diagnostic work of radiologists.

PO-1648

Combined intravoxel incoherent motion and diffusion kurtosis imaging in preoperative assessment of bladder cancer with different grades and stages

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Objectives: To compare the diagnostic efficacy of combined intra-voxel incoherent motion (IVIM) and diffusion kurtosis imaging (DKI) in differentiating between high- and low-grade bladder cancer (BC) and in identifying muscle-invasive bladder cancer (MIBC, stage T2 or higher) and non-muscle-infiltrating bladder cancer (NMIBC, stage T1 or lower).

Methods: 61 patients with pathologically confirmed BC underwent DKI and IVIM measurement at 3.0T. Two radiologists independently outlined the regions of interest (ROIs) and measured apparent diffusion coefficient (ADC), true diffusion coefficient (D), perfusion-related pseudo-diffusion coefficient (D*), perfusion fraction (f), mean diffusivity (MD), and mean kurtosis (MK) by dedicated software. An independent samples t-test and Mann-Whitney U-test were used to compare the differences in each parameter between different grades and stages of tumors. The diagnostic efficacies of DKI, IVIM, and combined model (IVIM+DKI) were evaluated with receiver operating characteristic (ROC) and compared with conventional DWI and single parameter (IVIM or DKI) by DeLong method.

Results: D and MD were lower in the high-grade than in the low-grade group, and in the MIBC than in the NMIBC group. Opposite patterns were found for MK (all $p < 0.01$). For BC grading, the AUCs of IVIM, DKI, and the combined model (0.819, 0.829, 0.836, respectively) were higher than ADC of DWI (0.727). The combined model achieved the highest AUC, indicating the most robust diagnostic efficacy. For BC staging, the AUCs of IVIM, DKI, and the combined model (0.855, 0.889, 0.919, respectively) were higher than ADC (0.803) of DWI. The best diagnostic performance was also revealed in the combined model of IVIM and DKI, validated by highest AUC.

Conclusion: IVIM and DKI derived parameters have been demonstrated different in BC with different staging and grading. The combined IVIM and DKI model has been further revealed with the most robust diagnostic efficacy in both BC staging and grading.

PO-1649

Decoding Tumor Stage by Peritumoral and Intratumoral Radiomics in Resectable Esophageal Squamous Cell Carcinoma

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Purpose To evaluate the potential application of radiomics in predicting Tumor-Node-Metastasis (TNM) stage in patients with resectable esophageal squamous cell carcinoma (ESCC).

Methods This retrospective study included 122 consecutive patients (mean age, 57 years; 27 women). Corresponding tumor of interest was identified on axial arterial-phase CT images with manual annotation. Radiomics features were extracted from intra- and peritumoral regions. Features were pruned to train LASSO regression model with 93 patients to construct a radiomics

signature, whose performance was validated in a test set of 29 patients. Prognostic value of radiomics-predicted TNM stage was estimated by survival analysis in the entire cohort.

Results The radiomics signature incorporating one intratumoral and 4 peritumoral features was significantly associated with TNM stage. This signature discriminated tumor stage with an area under curve (AUC) of 0.823 in the training set, with similar performance in the test set (AUC, 0.813). Recurrence-free survival (RFS) was significantly different between different radiomics-predicted TNM stage groups

(Low-risk vs high-risk, log-rank $P = 0.004$). Univariate and multivariate Cox regression analyses revealed that radiomics predicted TNM stage was an independent preoperative factor for RFS.

Conclusions The proposed radiomics signature combining intratumoral and peritumoral features was predictive of TNM stage and associated with prognostication in ESCC.

PO-1650

Feasibility of three-dimension chemical exchange saturation transfer MRI for predicting tumor and node staging in rectal adenocarcinoma: an exploration of optimal ROI measurement

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Objectives: To investigate the feasibility of predicting tumor (T) and node (N) staging with amide proton transfer weighted-signal intensity (APT_w-SI) and magnetization transfer (MT) derived from three-dimensional chemical exchange saturation transfer (3D-CEST) for rectal adenocarcinoma (RA) and to explore the optimal ROI measurement.

Methods: Fifty-eight RA patients with pathologically TN staging underwent 3D-CEST and DWI. APT_w-SI, MT and ADC values were measured using three ROI approaches (ss-ROI, ts-ROI, and wt-ROI) to analyze the TN staging (T staging: T1-2 vs T3-4; N staging: N- vs N+), and the reproducibility of APT_w-SI and MT were also evaluated. The AUC was used to assess the staging performance and determine the optimal ROI strategy.

Results: MT and APT_w-SI respectively gained an excellent and a good reproducibility with three ROIs. Significant differences of MT were observed (all $P < 0.05$) but not APT_w-SI and ADC (all $P > 0.05$) in TN staging among various ROIs. AUCs of MT with ss-ROI were 0.860 (95% CI: 0.743 - 0.937) and 0.852 (95% CI: 0.735 - 0.932) in predicting T and N staging, which is similar to ts-ROI (T staging: 0.856 [95% CI: 0.739 - 0.934], N staging: 0.831 [95% CI: 0.710 - 0.917]) and wt-ROI (T staging: 0.833 [95% CI: 0.712 - 0.918], N staging: 0.848 [95% CI: 0.729 - 0.929]) (all $p > 0.05$).

Conclusions: MT of 3D-CEST has an excellent reproducibility and predictive performance with ss-ROI method for RA patients' TN staging. Compared to ts-ROI and wt-ROI, the ss-ROI is easy to operate and could be used for clinical diagnosis.

PO-1651

Role of clinical and MDCT features in the prediction of patients with intestinal lipoma developing intussusception

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Purpose: To present the clinical and multidetector computed tomography (MDCT) features between intestinal lipomas with and without intussusception and to look for risk factors that predict intussusception caused by intestinal lipomas.

Materials and methods: We retrospectively reviewed 281 adult patients diagnosed with intestinal lipomas by MDCT. The patients were divided into adult intussusception (AI) and non-AI groups based on the MDCT images. Uni- and multivariate logistic regression analyses were performed to identify risk factors for intestinal lipoma-induced intussusception.

Results: A total of 281 patients with intestinal lipomas were included in the study, with an average age of 68.00 ± 11.30 years old, and the male to female ration was about 1:1.44. Among them, 24 patients developed intussusception. Lipomas occurred more in the small bowel (224/281, 79.7%) than in the large bowel (57/281, 20.3%). Patients in the AI group presented with more abdominal pain (70.8% vs 47.1%, $P = 0.026$), nausea/vomiting (37.5% vs 14.8%, $P = 0.009$), hematochezia/melena (29.2% vs 11.3%, $P = 0.021$) and abdominal tenderness (66.7% vs 24.9%, $P < 0.001$). Lipomas in the AI group showed more heterogeneous hypodensity (41.7% vs 15.6%, $P = 0.004$), longer length (median, 2.22 vs 1.18 cm, $P < 0.001$) and larger volume (median, 4.14 vs 0.57 cm³, $P < 0.001$). In multivariate logistic regression, hematochezia/melena (OR = 6.080, $P = 0.003$), abdominal tenderness (OR = 5.667, $P = 0.001$), lipoma length (OR = 3.289, $P < 0.001$) were independent risk factors for intestinal lipoma-induced intussusception.

Conclusion: The possibility of intussusception caused by intestinal lipoma should be warned when patients with intestinal lipoma develop new hematochezia/melena and abdominal tenderness with no apparent predisposing causes. The risk of developing intussusception increases with lipoma length. In addition, the predilection site of intestinal lipoma may have changed from the colon to the small intestine.

PO-1652

The role of MRI Compared to CT in Diagnosing metastasis of Ovarian Cancer

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Objective: To investigate the diagnostic value of metastasis of ovarian cancer by MRI compared to CT.

Methods: Thirty-six patients were retrospectively recruited. All patients underwent MRI and CT before surgery. Two radiologists who were blind to pathological results analyzed CT and MR images independently. Inter-observer agreement was assessed using kappa(κ) statistics. Sensitivity, specificity and accuracy between MRI and CT were compared using McNemar's test.

Results: The κ of MRI was higher than CT ($\kappa = 0.826, 0.641$). The sensitivity, specificity and accuracy of MRI were significantly higher than CT ($\chi^2 = 4.806, 4.093, 4.257, P = 0.024, 0.037, 0.033$).

Conclusions: MRI had better diagnostic performance compared to CT in metastasis of ovarian cancer.

PO-1653

Development of a nomogram based on body composition analysis of quantitative CT combined with clinical prognostic factors to predict disease-free survival after surgery and adjuvant chemotherapy in patients with gastric cancer

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Background: Gastric cancer patients have a high recurrence rate after surgery. To predict disease-free survival, we investigated the value of body composition changes measured by quantitative computed tomography in assessing the prognosis of patients with gastric cancer undergoing resection combined with adjuvant chemotherapy and to construct a nomogram model in combination with clinical prognostic factors.

Method: A retrospective study of 60 patients with gastric cancer between February 2015 and June 2019 was conducted. Pre-and post-treatment computed tomography images of patients was used for body composition analysis, including bone mineral density (BMD), subcutaneous fat area (SFA), visceral fat area (VFA), total fat area (TFA), and paravertebral muscle area (PMA) were measured in both groups of computed tomography images, and the rate of body composition change was calculated. Prognostic factors such as maximum tumor diameter, HER-2, Ki-67, and lymph node metastasis were derived from postoperative pathological findings. Independent prognostic factors affecting disease-free survival in gastric cancer were screened by univariate and multivariate Cox regression analysis ($P < 0.05$), a nomogram was constructed. The Kaplan-Meier method was used to plot survival curves and calculate median disease-free survival time. The comparison of survival curves between groups was performed using the log-rank test. Receiver operating characteristic curves, calibration curves and decision curves to evaluate the efficacy of nomogram predictive disease-free survival.

Results: The results of multivariate Cox regression analysis showed that Δ BMD ($P = 0.008$, HR: 4.577, 95%CI:1.483–14.132), Δ PMA ($P = 0.025$, HR:0.173, 95%CI:0.037–0.799), HER-2 ($P < 0.001$, HR:4.819, 95%CI:2.201–10.549), and maximal tumor diameter ($P < 0.001$, HR:3.973, 95%CI:1.893–8.337) were independent influences on disease-free survival. Δ BMD, Δ SFA, Δ VFA, Δ TFA, and Δ PMA were -3.86%, -23.44%, -19.57%, -22.45%, and -5.94%, respectively. The median disease-free survival was 55 months. The prognostic model of body composition changes combined with clinical prognostic factors had the highest predictive performance (The area under the curve was 0.844). Decision curve analysis showed good clinical benefit for the prognostic nomogram. The concordance index of the prognostic nomogram was 0.814, and the area under the curve of predicting 2-year and 3-year disease-free survival were 0.879 and 0.928, respectively. The fitted lines of the predicted 2-year and 3-year disease-free survival in the calibration plots roughly coincide with the reference line, indicating that the nomogram-predicted disease-free survival align well with the actual disease-free survival.

Conclusion: computed tomography-based body composition analysis and clinical prognostic factors (HER-2, maximal tumor diameter) correlated with prognosis in patients with gastric cancer undergoing surgical resection combined with adjuvant chemotherapy. The prognostic nomogram combining body composition changes and clinical prognostic factors was able to predict the disease-free survival of gastric cancer patients reliably.

PO-1654

A Bibliometric Analysis of Medical Imaging in Hepatocellular Carcinoma from 2000 to 2022

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Objectives: In order to identify the research hotspots and development trends in medical imaging for hepatocellular carcinoma, we conducted a systematic and comprehensive statistical analysis through the application of bibliometrics in this study.

Methods: A systematic search was conducted on the Web of Science Core Collection to retrieve studies on hepatocellular carcinoma and medical imaging published from 2000 to 2022. The results were independently examined by two experienced radiologists. Microsoft Excel 2019 software was used to analyze the general information. VOSviewer 1.6.19 was utilized for visual analysis, while CiteSpace 6.2.R3 was employed to generate the dual-map overlay of journals. Additionally, the R package software "Bibliometrix" was used for the three fields plot.

Results: A total of 11965 papers were included in this study, comprising 10526 articles and 1439 reviews. There was an overall upward trend in the annual number of publications, with the annual cumulative number of papers continuing to increase. The journal with the most publications was European Radiology (502 publications, 4.2%), and the most co-cited journal was Radiology, both of which are the authoritative journals in this field. The People's Republic of China had the highest number of publications (2718 publications, 22.72%), followed by the United States of America (USA) (2133 publications, 17.83%) and Japan (1935 publications, 16.17%). The author with the most publications was LEE JM, who also had the highest numbers of local citations in this field. The keyword analysis showed that in addition to the research on imaging, studies on histopathology and clinical treatment were also prevalent. Furthermore, the research hot topics and frontier areas of medical imaging in hepatocellular carcinoma for the last five years included: LI-RADS, microvascular invasion, sorafenib, microwave ablation, magnetic resonance imaging and deep learning.

Conclusions: This study highlighted the key contributions made to the research of medical imaging in hepatocellular carcinoma over the past nearly 20 years through bibliometric analysis. It systematically assessed the current status, providing a knowledge framework and identifying emerging trends in this field.

PO-1655

A radiomics nomogram based on MSCT and clinical factors can stratify fibrosis in inflammatory bowel disease

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Abstract

Intestinal fibrosis is one of the major complications of inflammatory bowel disease (IBD) and a pathological process that significantly impacts patient prognosis and treatment selection. Although current imaging assessment and clinical markers are widely used for the diagnosis and stratification of fibrosis, these methods suffer from subjectivity and limitations. In this study, we aim to develop a radiomics diagnostic model based on multi-slice computed tomography (MSCT) and clinical factors. MSCT images and relevant clinical data were collected from IBD patients, and a large number of quantitative image features were extracted. Using these features, we constructed a radiomics model and transformed it into a user-friendly diagnostic nomogram. Based on these methods, a nomogram was developed to predict fibrosis in IBD by integrating multiple factors. The

nomogram exhibited favorable discriminative ability, with an AUC of 0.865 in the validation sets, surpassing both the logistic regression (LR) model (AUC=0.821) and the clinical model (AUC=0.602) in the test set. In the train set, the LR model achieved an AUC of 0.975, while the clinical model had an AUC of 0.735. The nomogram demonstrated superior performance with an AUC of 0.971, suggesting its potential as a valuable tool for predicting fibrosis in IBD and improving clinical decision-making. In conclusion, the radiomics nomogram, incorporating MSCT and clinical factors, demonstrates promise in stratifying fibrosis in IBD. The nomogram outperforms traditional clinical models and offers personalized risk assessment. However, further validation and addressing identified limitations are necessary to enhance its applicability.

PO-1656

Preliminary study on deep learning image reconstruction algorithm for improving abdominal thin layer image quality

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Objective To compare the effects of conventional filtered back projection (FBP), multi-model-based iterative reconstruction (ASiR-V) algorithm and deep learning image reconstruction (DLIR) algorithm on the image quality of adult abdominal enhanced CT thin slices and whether there is room for reducing radiation dose. **Methods** A total of 75 patients with the same scanning conditions were retrospectively collected with enhanced CT scan of the upper abdomen. DLIR-H was used for image reconstruction, and the reconstructed slice thicknesses were 5 mm and 1.25 mm, respectively. Subjective (5-point scale) and objective (noise, signal-to-noise ratio and contrast-to-noise ratio) evaluation of images in each group were performed by two radiologists. The agreement of the observers for the scores was assessed by calculating the kappa value; the differences between groups of each parameter were compared by one-way ANOVA or rank sum test. **Results** Compared with FBP and 40% ASiR-V, the objective evaluation indexes of slice thickness DLIR-H reconstruction images were significantly different between the two groups ($P < 0.05$). There was a statistical difference in SNR ($P < 0.05$), and a statistical difference between CNR and FBP reconstructed image ($P < 0.05$). Compared with 80% ASiR-V, the two groups of slice thickness DLIR-M reconstructed images had statistical differences in SD and SNR (P value < 0.05). The subjective scores of DLIR-M reconstructed images with slice thickness between the two groups were only not significantly different between the 5 mm slice thickness DLIR-M reconstructed images and 40% ASiR-V (P value > 0.05), and the rest had statistical differences (P value < 0.05). The 1.25mm slice thickness DLIR-H reconstructed image was significantly different from the FBP and 80% ASiR-V reconstructed images (P value < 0.05); Statistical difference (P value < 0.05). Compared with 5mm40% ASiR-V, the DLIR-H reconstruction image with 1.25mm slice thickness had no statistical difference in various evaluation indicators (P value > 0.05). **Conclusion** Compared with the FBP and ASiR-V reconstruction algorithms, the DLIR reconstruction algorithm effectively improves and improves the image quality, especially in thin-layer images. Moreover, the 1.25mm DLIR-H reconstructed image has reached the image quality level of 5mm40% ASiR-V, which provides a technical basis for further reducing the radiation dose of abdominal enhanced CT.

PO-1657

A comparative study of two-dimensional single-shot fast spin echo (2D SSFSE) with deep learning based reconstruction and three-dimensional fast imaging employing steady state acquisition (3D FIESTA) in the assessment of active inflammation in Crohn's Disease

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Introduction and Purpose

Crohn's disease (CD) is a chronic inflammatory disease that can affect any portion of the gastrointestinal tract. Endoscopy is commonly used to diagnose CD as the reference standard while magnetic resonance imaging has the advantage of being non-invasive and able to investigate small bowel involvement that cannot be reached by endoscopy. Previous studies have shown that FIESTA sequence was superior to SSFSE sequence in showing linear ulcers and pseudopolyps[1]. However, the scanning time of 3D FIESTA sequence is longer than that of 2D SSFSE sequence but provides higher resolution and better image quality. Deep learning reconstruction (DLR) is excellent at noise reduction without additional acquisition and post-processing time and has recently been introduced for clinical use. Our study aimed to explore the feasibility of 2D SSFSE with DLR (SSFSEDL) for evaluating bowel inflammation in CD using 3D FIESTA sequence as reference.

Materials and Methods

Patients: Forty-seven patients with histological diagnosis of CD confirmed by endoscopy (36 male/11 female, age: 14–56 years) were prospectively recruited in this study. **Imaging:** All patients fasted for 6–8 hours prior to the scheduled exam time, and ingested 2000 mL of oral contrast agent (water with polyethylene glycol electrolytes powder dissolved) over 1 hour before magnetic resonance enterography (MRE) scan. All MRE scans were performed on a 3.0 T clinical MRI scanner (Signa Architect, GE Healthcare). Parameters of 3D FIESTA and 2D SSFSE sequences were shown in Table 1. 2D SSFSEDL and SSFSEO were automatically reconstructed with commercial DL-based reconstruction algorithm (AIRTM Recon DL). **Assessment:** Two radiologists made diagnosis in consensus and independently drew regions of interest on the bowel-segment of the suspected lesions to calculate signal-to-noise-ratio (SNR) and contrast to-noise-ratio (CNR). Representative MR images are shown in Figure 1. **Statistical Tests:** According to data normality and equality of variance, paired Wilcoxon signed-rank tests or paired t-test were performed to evaluate the statistical significance of differences in SNR and CNR between 2D SSFSE with and without DLR (SSFSEO), and between 2D SSFSE with DLR and 3D FIESTA. P value <0.05 was considered to be statistically significant.

Results SSFSEDL showed significantly higher SNR in jejunum (125.24 ± 106.84 vs. 69.41 ± 42.79 , $P=0.026$), ileum (167.87 ± 110.42 vs. 98.18 ± 49.51 , $P=0.001$) and terminal ileum (190.34 ± 80.70 vs. 123.24 ± 48.10 , $P<0.0001$) than SSFSEO as well as in ileum (94.85 ± 45.88 , $P=0.02$) and terminal ileum (88.81 ± 33.57 , $P<0.0001$) than 3D FIESTA. SSFSEDL showed significantly higher CNR in jejunum (123.64 ± 107.00 vs. 68.08 ± 42.87 , $P=0.027$), ileum (166.24 ± 110.61 vs. 96.73 ± 49.67 , $P=0.001$) and terminal ileum (188.60 ± 80.71 vs. 121.85 ± 48.15 , $P<0.0001$) than SSFSEO as well as . ileum (93.29 ± 45.87 , $P=0.02$) and in terminal ileum (87.16 ± 33.43 , $P<0.0001$) than 3D FIESTA. There was no significant difference of SNR and CNR in jejunum between 2D SSFSEDL and 3D FIESTA ($P=0.477$) (Figure 2).

Discussion and conclusion

2D DLR SSFSE showed overall better image quality, has shorter scanning time and consistent diagnosis performance on assessing bowel inflammation in CD with 3D FIESTA. The previous

research showed that SSFSE has superior lesion detection rate and imaging ability on motion target to DWI. The SSFSE sequence alone might be sufficient in lesion detection[2]. With DLR SSFSE images, inter-observer agreement on the lesion detection rate elevated. The inline DLR SSFSE shortened scan time and increase patient compliance.

PO-1658

Application of MR Radiomics in Predicting Extramural Vascular Invasion in Rectal Cancer

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Objective: To investigate the application value of MRI- based imaging model in preoperative prediction of extramural vascular invasion of rectal cancer.

Methods: A total of 202 patients who underwent pelvic MRI examination in our hospital from January 2019 to October 2022 and were pathologically confirmed as rectal cancer after surgery were selected, of which 63 were positive and 139 were negative. The patients were divided into the training set (141 cases) and the verification set (61 cases) in a ratio of 7:3. Clinical and imaging data of patients were collected and statistically significant ($p \leq 0.05$) data were included to establish clinical models. Receiver operating characteristic curve (ROC) was plotted and area under the curve (AUC) was calculated. In the radiomics analysis, IntelliSpace Discovery (ISD) software was used to conduct semi-automatic 3D delineation of the primary lesion and the area of interest (ROI) of peritumoral vessels and lymph nodes along the lesion contour, and the 3D volume of interest (VOI) of the lesion was generated automatically by the computer. The three-dimensional volume of interest delineated on the HR-T2WI sequence of the primary tumor lesion was referred to as T2 tumor lesion (VOI1) for short. In the last phase of DCE-T1WI sequence enhancement, the diameter range of the outer edge of the intestinal wall of the focus was delineated to be about 4mm, and the three-dimensional volume of interest formed by the thickened and tortuous vessels outside the wall was referred to as DCE-T1 extrawall vessels (VOI2) for short. The three-dimensional volume of interest delineated on the DWI sequence of lymph node formation around the rectum is referred to as DWI lymph node (VOI3) for short. Four radiomic models and one combined clinical-radiomic model were established: T2 tumor lesion (Model 1), DCE-T1 extramural vessel (model 2), and DWI lymph node (model 3), from the above three models, two models with better prediction efficiency were selected to form the joint image omics model (Model 4); Then the model with the best predictive efficacy was selected from the four models to calculate the Radscore, and a combined clinics-imaging model (Model 5) was formed by combining the clinical data with the Radscore of the optimal model, and a nomogram was made. In the process, the Pyradiomics tool of Philips was used to extract the all radiomicss features of the outlined VOI. After dimensionless processing of the original image data, independent sample t-test was applied to the data conforming to normal distribution, and independent sample Mann-Whitney U test was applied to the non-normal distribution for preliminary screening. Then, the minimum absolute compression and selection algorithm (LASSO) in the machine learning model is applied to further reduce the dimension screening and select more meaningful features. Support vector machine SVM classifier was used to divide the sample data into training set and validation set in a ratio of 7:3. The ten-fold cross-validation method was used to draw ROC curve and calculate the value of AUC, sensitivity, specificity and accuracy to quantify the prediction efficiency. Finally, the model with the most predictive value was compared among the five models and a column graph was established. Calibration Curve and Decision Curve were used to evaluate the predictive performance of calibration curve. Calibration curve and decision curve were used to verify the clinical application value of calibration curve.

Results: 1. In clinical imaging data: mrT stage, mrN stage and mrEMVI of patients had statistical significance ($p \leq 0.05$), and CEA in training set had statistical significance ($p \leq 0.05$).

2.DCE-T1 extramural vessel (Model 2) had the best predictive efficacy in the imaging omics model, with AUC value of 0.94 in the training set and 0.94 in the test set. DWI lymph nodes (Model 3) had the second best predictive efficacy, with AUC value of 0.93 in the training set and 0.91 in the test set. The combined clinical information-imaging feature model (Model 5) further improved the predictive efficacy, with the AUC value of 0.980 in the training set and 0.983 in the test set.

3.Extramural vascular invasion probability of rectal cancer patients can be calculated based on the column diagram of Model 5.

Conclusion: 1.Model 5 has the best predictive ability of EMVI, and it shows good identification and calibration ability in both experimental and verification queues.

2.DCA shows that the Model 5 to draw a nomogram has application value in clinical diagnosis and treatment.

PO-1659

Development of a model including MRI features for predicting advanced-stage recurrence of hepatocellular carcinoma after liver resection

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Purpose: To develop an MRI-based model to predict postoperative advanced-stage hepatocellular carcinoma (HCC) recurrence.

Methods: This single-center, retrospective study included consecutive adult patients who underwent preoperative contrast-enhanced MRI and curative-intent resection for very early- to intermediate-stage HCC (Dec 2011-Apr 2021). Three radiologists evaluated 52 qualitative features on MRI. In the training set, Fine-Gray proportional subdistribution hazard analysis was performed to identify clinical, laboratory, imaging, pathological, and surgical variables to include in the predictive model. In the test set, the C-index was computed to compare the developed model with current staging systems. The Kaplan-Meier survival curves were compared using the log-rank test. Results: 532 patients (median age, 54 years; 465 males) were included, 302 (median age, 54 years; 265 males) from the training set, and 128 (median age, 53 years; 108 males) from the test set. Advanced-stage recurrence was observed in 12.6% and 11.7% of these patients, respectively. Serum neutrophil count ($10^9/L$), tumor size (cm), and arterial-phase hyperenhancement proportion on MRI were associated with advanced-stage recurrence (subdistribution hazard ratio range, 1.16-3.83 [95% CI: 1.02, 7.52]; P range, <.001-.02) and constituted the predictive model. The model showed better test set prediction for advanced-stage recurrence than 4 staging systems (2-year C-indexes, 0.82 [95% CI: 0.74, 0.91] vs 0.63-0.68 [95% CI: 0.52, 0.82]; P range, .001-.03). High-risk patients (model score ≥ 15 points) showed increased advanced-stage recurrence and worse all-stage recurrence-free survival (RFS), advanced-stage RFS, and overall survival than low-risk patients (P range, <.001-.02).

Conclusions: A model combining serum neutrophil count, tumor size, and arterial-phase hyperenhancement proportion predicted advanced-stage HCC recurrence better than current staging systems and could identify high-risk patients.

PO-1660

The Relationship between CT Imaging Characteristics and the Preoperative Response to Anti-PD1 Therapy in Colorectal Cancer with High Microsatellite Instability (MSI-H)

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Background: Immunotherapy has shown significant promise in treating colorectal cancer (CRC) patients, particularly those with the microsatellite instability-high (MSI-H) subtype. However, the value of imaging in assessing the response to immunotherapy in CRC is unknown. Thus, the study aims to evaluate the predictive value of pre-treatment CT features for the preoperative immunotherapy response in MSI-H CRC.

Methods: This retrospective study enrolled patients with MSI-H CRC who underwent anti-PD1 therapy prior to surgery. All patients underwent a CT scan prior to receiving immunotherapy. We divided all the patients into two groups: Pathological Complete Response (pCR) and Non-pCR. We compared the CT image features between the two groups. The receiver operating characteristic (ROC) curve was used to evaluate the effectiveness of CT features in predicting pCR.

Results: A total of 48 patients (mean age 48 ± 12 , 29 men) were evaluated. Of these, 31 (61.9%) achieved pCR. The lesion wall thickness based on pre-treatment CT imaging, was significantly associated with pCR ($p = 0.018$). Other CT imaging features, including the CT values of the lesion on venous phase or plain scanning and lesion length, had no association with pCR (all $p > 0.05$). The area under the ROC was 0.715 (95% confidence interval [CI]: 0.557-0.842, $p = 0.006$, sensitivity: 94.1%, specificity: 42.3%) for the lesion wall thickness in predicting pCR.

Conclusions: The lesion wall thickness on CT imaging reflects the preoperative anti-PD1 response in MSI-H colorectal cancer. This could assist physicians in promptly identifying non-responsive MSI-H rectal cancer patients, enabling personalized treatment regimens.

PO-1661

Predicting MVI and Early Recurrence of Hepatocellular Carcinoma: A Real-world Study Based on HBP Imaging Radiomics Combined with Liver Function Indices

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Aim: To develop a predictive model integrating liver function indices and radiomics based on magnetic resonance imaging (MRI) for preoperative identification of MVI and assess ER in HCC after hepatectomy in the real world.

Methods: From December 2016 and June 2021, consecutive patients who underwent surgery for HCC and MRI were included in this retrospective study. The patients were divided into the training, test, and validation groups according to time. Gradient Boosting Decision Trees were used to extract radiomic features from the MR images, and the Forest model was used to determine the Rad-score. A combined model containing the Rad-score and clinical and radiological liver function indices was developed. The receiver operating characteristic (ROC) curve was used to assess the prediction performance. The ER based on model-predicted high- and low-risk MVI was evaluated for validation based on Kaplan-Meier survival curves.

Results: Of the 228 patients included, histological MVI was diagnosed in 79 patients. Alanine transaminase (ALT)/aspartate aminotransferase (AST) ≤ 1.21 (odds ratio [OR]=0.22), size (OR=0.35), morphology (OR=0.30) and hepatocellular uptake index (HUI) (OR=8.89) were

independent risk factors. The AUCs for the final model were 0.89 (training), 0.88 (test) and 0.78 (validation). The patients with model-predicted high-risk MVI had significantly shorter recurrence-free survival (RFS) ($p=0.014$), which was similar to the histological results ($p=0.005$).

Conclusion: A preoperative MVI predictive model incorporating liver function indices with radiomic features based on MRI could accurately predict MVI and RFS and have the potential to influence individual treatment planning.

PO-1662

Assessing Vessels That Encapsulate Tumor Clusters via Preoperative MRI in HCC Based on Integrating Deep Learning and Radiomics Features

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Purpose: To assess if integrated deep learning and radiomics features can predict the Vessels That Encapsulate Tumor Clusters (VETC) in preoperative MRI of hepatocellular carcinoma (HCC) patients.

Methods: All 350 eligible patients were included retrospectively between July 2019 and July 2020, and assigned into the training cohort ($n = 245$) and the testing cohort ($n = 105$). These patients were divided into VETC positive and VETC positive negative. Both deep learning and radiomics features were extracted from MRI sequence of T2WI, arterial phase (AP), portal venous phase (PVP). Three models for the prediction of VETC were constructed, radiomics model, deep learning (DL) model and hybrid model, respectively. A clinical-hybrid model for the prediction of VETC integrated significant clinical features and the features generated from the hybrid model with the optimal area under the receiver operating characteristics curve (AUC) in the testing cohort. Otherwise, prognostic model were constructed in prediction of recurrence and mortality via Cox proportional hazard analysis.

Results: The clinical-hybrid model for VETC represented an AUC of 0.856, accuracy of 88.32%, sensitivity of 85.56% in the testing cohort. The clinical-hybrid models for identification of RFS and OS outperformed prediction performance of the radiomics model or the DL model alone. The clinical-hybrid model for prognostication showed great predictive value with discrimination and classification abilities after validation.

Conclusion: The feature set integrating deep learning and radiomics features is more effective in predicting VETC than only one feature type, and might facilitate predicting tumor recurrence and mortality in order to optimize clinical decisions for patients with early stage HCC.

PO-1663

Preoperative CT histogram analysis to predict the expression of Ki-67 in solid pseudopapillary tumors of the pancreas

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Purpose: To explore the value of preoperative computed tomography (CT) histogram features in predicting the expression status of Ki-67 in patients with solid pseudopapillary pancreatic tumors (SPTP).

Materials and Methods : This retrospective study analyzed venous phase CT images of 39 patients with SPTP confirmed by surgery and pathology and measured using the Ki-67 proliferation index in our hospital from November 2015 to February 2022. According to the Ki-67 proliferation index, they were divided into high expression ($Ki-67 \geq 4\%$) and low expression ($Ki-67 < 4\%$) groups. The histogram features of quantitative parameters were extracted using MaZda software, and the quantitative parameters of CT histograms were compared between groups. The receiver operating characteristic (ROC) curves of the subjects were plotted according to the parameters, with statistically significant differences. The area under the curve (AUC), sensitivity, and specificity were calculated, and the effectiveness of the histogram parameters in predicting Ki-67 expression was analyzed and evaluated.

Results: In total, 27 SPTP patients were enrolled, including 11 with high expression of Ki-67 and 16 with low expression of Ki-67. Comparative analysis of the Ki-67 high-and low-expression groups revealed a statistically significant variance ($P < 0.05$). ROC curve analysis showed that the AUC of variance predicting Ki-67 expression status was 0.841, with sensitivity of 81.3% and specificity of 81.8%.

Conclusion : Preoperative CT histogram features help predict the Ki-67 expression status in patients with SPTP.

PO-1664

Prognostic MRI features to predict postresection survivals for very early to intermediate stage hepatocellular carcinoma

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Purpose: Contrast-enhanced MRI can provide individualized prognostic information for hepatocellular carcinoma (HCC). We aimed to investigate the value of MRI features to predict early (≤ 2 years)/late (> 2 years) recurrence-free survival (E-RFS and L-RFS, respectively) and overall survival (OS).

Methods: Consecutive adult patients at a tertiary academic center who received curative-intent liver resection for very early to intermediate stage HCC and underwent preoperative contrast-enhanced

MRI were retrospectively enrolled from March 2011 to April 2021. Three masked radiologists independently assessed 54 MRI features. Uni- and multivariable Cox regression analyses were conducted to investigate the associations of imaging features with E-RFS, L-RFS and OS.

Results: This study included 600 patients (median age, 53 years; 526 men). During a median follow-up of 55.3 months, 51% of patients experienced recurrence (early recurrence: 66%; late recurrence: 34%), and 17% died. Tumor size, multiple tumors, rim arterial phase hyperenhancement, iron sparing in solid mass, tumor growth pattern, and gastroesophageal varices were associated with E-RFS and OS (largest $P=.02$). Nonperipheral washout ($P=.006$), markedly low apparent diffusion coefficient value ($P=.02$), intratumoral arteries ($P=.01$), and width of the main portal vein ($P=.03$) were associated with E-RFS but not with L-RFS or OS, while the VICT2 trait was specifically associated with OS ($P=.02$). Multiple tumors ($P=.048$) and radiologically-evident cirrhosis ($P<.001$) were the only predictors for L-RFS.

Conclusion: Twelve visually-assessed MRI features predicted postoperative E-RFS (≤ 2 years), L-RFS (> 2 years), and OS for very early to intermediate-stage HCCs.

PO-1665

Deep learning-based compressed SENSE improved diffusion-weighted image quality and liver cancer detection: a prospective study

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Objective: To assess whether diffusion-weighted imaging (DWI) with Compressed SENSE (CS) and deep learning (DL-CS-DWI) can improve image quality and lesion detection in patients at risk for hepatocellular carcinoma (HCC).

Materials and Methods: This single-center prospective study enrolled consecutive at-risk participants who underwent 3.0 T gadoxetate disodium-enhanced MRI. Conventional DWI was acquired using parallel imaging (PI) with SENSE (PI-DWI). In CS-DWI and DL-CS-DWI, CS but not PI with SENSE was used to accelerate the scan with 2.5 as the acceleration factor. Qualitative and quantitative image quality were independently assessed by two masked reviewers, and were compared using the Wilcoxon signed-rank test. The detection rates of clinically-relevant (LR-4/5/M based on the Liver Imaging Reporting and Data System v2018) liver lesions for each DWI sequence were independently evaluated by another two masked reviewers against their consensus assessments based on all available non-DWI sequences, and were compared by the McNemar test.

Results: 67 participants (median age, 58.0 years; 56 males) were enrolled. Among the three DWI sequences, DL-CS-DWI showed the best qualitative and quantitative image qualities (p range, <0.001 - 0.039). For clinically-relevant liver lesions, the detection rates (91.4%-93.4%) of DL-CS-DWI showed no difference with CS-DWI (87.3%-89.8%, $p=0.230$ - 0.231) but were superior to PI-DWI (82.7%-85.8%, $p=0.015$ - 0.025). For lesions located in the hepatic dome, DL-CS-DWI demonstrated the highest detection rates (94.8%-97.4% vs 76.9%-79.5% vs 64.1%-69.2%, $p=0.002$ - 0.045) among the three DWI sequences.

Conclusion: In patients at high-risk for HCC, DL-CS-DWI improved image quality and detection for clinically-relevant liver lesions, especially for the hepatic dome.

PO-1666

Are Systematic Reviews of Diagnostic Tests for Rectal Cancer Trustworthy? A Cross-sectional Study

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Purpose: Many systematic reviews (SRs) have evaluated the value of different diagnostic tests for rectal cancer. But the quality of these SRs remains unclear. This study aimed to examine epidemiological characteristics, methodological and reporting quality of SRs of diagnostic tests for rectal cancer, and to explore factors that may affect the quality.

Methods: PubMed, EMBASE, Cochrane Library, and Chinese Biomedicine Literature were searched to identify SRs evaluating diagnostic tests for rectal cancer. We used AMSTAR to assess the methodological quality and PRISMA-DTA for reporting quality.

Results: 33 SRs were included in our analysis and the number of publications had gradually decreased each year. 33 SRs involved 8 topics and 6 diagnostic tests. The median number of index test was 1 (range: 1-5) and there were 6 index tests, of which MRI (22/33, 66.7%) was the most studied index test. PubMed/Medline (100.0%) was the most frequently searched database. Only 15 (45.5%) SRs reported search strategy. The overall methodological quality was poor. All the SRs were not fully assessed the scientific quality of the included studies, only 33.3% performed a comprehensive literature search, 21.2% used the scientific quality appropriately in formulating conclusions, and 33.3% assessed the publication bias. There were many flaws in reporting quality. None of the SRs presented a structured summary, protocol or registration, only 6.1% provided the results of individual studies, 6.1% conducted additional analyses, 36.4% fully reported limitations, and 21.2% completely reported funding.

Conclusion: The quality needs to be further improved, especially referring to the performance of comprehensive literature search, assessment of scientific quality of included studies, assessment of publication bias, structured summary, protocol and registration, additional analyses, limitations, and funding.

PO-1667

Development and validation a model in predicting the expression of Ki-67 in pancreatic ductal carcinoma with radiological features and dual-energy computed tomography quantitative parameters

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Objective: To construct and validate a model on the basis of the dual-energy computed tomography (DECT) quantitative parameters and radiological features to predict Ki-67 expression level in pancreatic ductal adenocarcinoma (PDAC).

Materials and methods: Data from 102 PDAC patients were analyzed. The variables of clinic, radiology and DECT were evaluated. In arterial phase and portal venous phase (PVP), normalized iodine concentration (NIC), normalized effective atomic number and slope of the spectral attenuation curves were measured. Extracellular volume fraction (ECVf) were measured in the equilibrium phase. Univariate analysis were used to screen independent risk factors to predict Ki-67 expression. The models of Radiology, DECT and DECT-Radiology were erected and the diagnostic effectiveness and clinical applicability of them were obtained through area under

the curve (AUC) and decision curve analysis, respectively. The nomogram was established based on the optimal model and its goodness-of-fit was assessed by calibration curve.

Results: Computed tomography reported regional lymph node status, NIC of PVP, and ECVf were ascertained as independent predictors for Ki-67 expression prediction. The AUC of the models of Radiology, DECT, and DECT–Radiology were 0.715, 0.917, and 0.938, respectively, in the training cohort; 0.727, 0.831, and 0.889, respectively, in the validation one. DECT–Radiology nomogram was established based on the DECT–Radiology model which showed the highest net benefit and satisfactory consistency.

Conclusions: The DECT–Radiology model shows favorable predictive efficacy for the Ki-67 expression, which may be of value for clinical decision-making in PDAC patients.

PO-1668

The Influence of Female Pelvic Configuration at All Ages on Pelvic Organ Prolapse

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Purpose:

In this study, we retrospectively analyzed pelvic dimension in women with pelvic organ prolapse (POP) compared with normal group of all ages to ensure the relationship between pelvic configuration and POP.

Methods:

We retrospectively recruited 130 patients with POP (age 21-82) as the POP group and 130 normal women without any pelvic floor dysfunction (age 23-89) as the control group. Their age, body mass index (BMI), parity, and menopause were recorded as demographic data. The diameter of the transverse inlet, the bispinous diameter, the bituberous diameter, the pelvic inclination, the anterior angle, the anatomic conjugate, the obstetric conjugate, the diagonal conjugate, the anteroposterior diameter of mid plane, the anteroposterior diameter of lower mid plane, the sagittal outlet, the coccygeal curved length, the ratio of sacrococcyx, the area of left and right obturator internus muscles and the area of anterior and posterior pelvic area were measured on MR image.

SPSS version 26.0 (IBM Corp., Armonk, NY, USA) and R statistical software, version 4.3 (R Foundation for Statistical Computing, Vienna, Austria) was used for the statistical analysis. T test was used to compare the normal distribution between the two groups, and Wilcoxon test was used to compare the abnormal distribution between the two groups, and χ^2 test was used to compare the classified data between the two groups. Univariate analyses were performed for imaging parameters after testing multicollinearity on the variables, and the remaining variables were included in the Multivariate logistic regression after excluding the parameters that were not statistically significant. In addition, the above parameters remained statistically different after including demographic characteristics as covariates. At the same time, in order to ensure the repeatability of the parameters, 30 cases were randomly selected from the data 2 months after the first measurement by the same physician through simple random sampling method for retest, and the intra-group correlation coefficient (ICC) was used for evaluation.

Results:

We detected good interobserver reliability. The demographic characteristics and imaging parameters of the two groups were analyzed, it showed that BMI (24.03 vs 23.15, $p=0.02$), diameter of the transverse inlet (143.18 vs 137.57 mm, $p < 0.001$), bispinous diameter (112.25 vs 109.16 mm, $p=0.001$), bituberous diameter (131.22 vs 125.61 mm, $p < 0.001$), anterior angle (94.17 vs 91.81°, $p=0.005$), anteroposterior diameter of mid plane (128.46 vs 125.55 mm, $p=0.042$), anteroposterior diameter of lower mid plane (114.87 vs 110.39 mm, $p < 0.001$), sagittal outlet (94.41 vs 91.62 mm, $p=0.004$), coccygeal curved

length(36.04vs31.75mm, $p < 0.001$), anterior pelvic area(6144.60vs5405.14mm², $p < 0.001$) and posterior pelvic area(2020.32vs1690.40mm², $p < 0.001$) in POP group were all higher than those in normal group, but pelvic inclination(57.46vs61.23°, $p < 0.001$) was lower than the normal group, and no statistical differences in the rest. After variance inflation factor was used to multiple collinearity test for the pelvimetry variables, we deleted anatomic conjugate and obstetric conjugate, and performed univariate regression on the remaining variables, and the results were consistent with the characteristic analysis. Multivariate logistic regression was performed after excluding collinearity by step-by-step regression method for statistically significant parameters again to avoid over-fitting, and the results showed that as an independent risk factor for POP in women, the larger the diameter of the transverse inlet(OR:1.103; $p=0.02$), the sagittal outlet(OR:1.051; $p=0.035$), the coccygeal curved length(OR:1.107; $p < 0.001$), the anterior pelvic area(OR:1.001; $p < 0.001$), the smaller the anteroposterior diameter of mid plane(OR:0.949; $p=0.019$), the pelvic inclination(OR:0.925; $p=0.01$), the higher the risk of POP. We found that coccygeal curved length had the greatest influence on POP, and the anteroposterior diameter of mid plane changed from the original exposure factor to the protective factor after collinearity was excluded. In addition, the above parameters remained statistically different after including demographic characteristics as covariates.

Conclusion:

Compared with normal women, patients with POP have larger diameter of the transverse inlet, sagittal outlet, coccygeal curvature length, and anterior pelvic area, and smaller pelvic inclination and anteroposterior diameter of mid plane, and the coccygeal curved length has a greater impact on POP than other parameters, regardless of age, BMI, parity, and menopausal status.

PO-1669

Extracellular volume fraction determined by equilibrium contrast-enhanced dual-energy CT for the prediction of histological grade

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Objectives: To evaluate the feasibility and diagnostic efficacy of extracellular volume (ECV) based on iodine density measurement with dual-energy CT (DECT) for evaluating histological grade of rectal adenocarcinoma, as compared with single-energy CT (SECT).

Methods: We prospectively collected the basic data of 97 patients with rectal adenocarcinoma confirmed by surgery and pathology in Affiliated Hospital of Jiangsu University from November 2017 to March 2022, including gender, age, T stage, N stage, CEA and CA19-9. All patients underwent dual-energy computed tomography enhanced examination. Hematocrit was collected within 7 days before the examination. Unenhanced and 120-kVp equivalent images equilibrium phase were used to calculate tumor SECT-derived ECV fractions (SECT-ECV), and iodine density images were obtained from equilibrium-phase DECT for DECT-derived ECV fractions (DECT-ECV). Attenuation values were measured on unenhanced and the equilibrium-phase 120-kVp equivalent CT images for tumor and the aorta at the same plane, and iodine densities of the tumor and aorta were measured in the equilibrium-phase. SECT-ECV and DECT-ECV of the tumor were calculated. With postoperative pathological results as the gold standard, adenocarcinoma patients were divided into low-grade (moderately differentiated and well-differentiated) or high-grade (poorly differentiated) groups according to the histological grading criteria of rectal adenocarcinoma. Mucinous adenocarcinoma was excluded. Assessing whether the differences in parameters between the low-grade and high-grade groups were statistically significant. Receiver operating characteristic (ROC) curve and the area under the receiver-operator curve (AUC) were performed to analyze the ability of SECT-ECV and DECT-ECV to predict the histological grade of rectal adenocarcinoma before operations. The Delong test was used to investigate whether there was a

statistical difference in predictive performance between the two AUCs. Correlations between SECT- and DECT-derived ECV fractions were identified using the Pearson correlation coefficient . Results: Among the 97 participants, 15 were in the high-grade group and 82 were in the low-grade group. There were significant differences in the SECT-ECV ($P<0.001$) and DECT-ECV ($P<0.001$) between high and low grade groups. In terms of clinical features, there were statistically significant differences in age ($P=0.049$), N phase ($P=0.003$) and CA19-9 ($P=0.014$) between two groups. The ROC curve demonstrated that the best efficacy in evaluating the histological grade of rectal adenocarcinoma was achieved by DECT-ECV, with an area under the curve of 0.840, which was higher than SECT-ECV (0.712) , age (0.660), N stage (0.701) and CA19-9 (0.690) of the two groups. The Delong test showed that the difference between the SECT-ECV and DECT-ECV was statistically significant ($P<0.05$). In addition, the correlation between SECT- and DECT-derived ECV fractions was low ($r = 0.42$; $P = 0.012$).

Conclusions: The ECV fractions obtained by iodine density from the equilibrium-phase of dual-energy computed tomography is more effective than single-energy computed tomography in predicting the histological grade of rectal adenocarcinoma patients.

PO-1670

Hepatoid carcinoma of the pancreas: A case report and literature review

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Background: Hepatoid adenocarcinoma (HAC) is a malignant tumor with a poor prognosis. HAC has a similar morphological feature to hepatocellular carcinoma and presents with elevated alpha-fetoprotein (AFP). Hepatoid adenocarcinoma of the pancreas is rare and underrecognized. Here we report a rare case of HAC arising from the pancreas in the early stage and treated with distal pancreatectomy and splenectomy as well as adjuvant chemotherapy.

Case summary: A 70-year-old male patient was admitted to our hospital with space-occupying lesions of the pancreas. Laboratory tests indicated an increase in alpha-fetoprotein. He had a history of hypertension, diabetes mellitus, and hepatitis B infection. Contrast-enhanced abdominal computed tomography and magnetic resonance imaging revealed a mild enhanced soft tissue nodule located in the body of the pancreas. Distal pancreatectomy and splenectomy were performed. The patient was diagnosed with HAC according to the clinical pathological characteristics and immunochemical staining. The patients received chemotherapy with oxaliplatin and capecitabine after surgery.

Conclusion: Early diagnosis of hepatoid adenocarcinoma of the pancreas is difficult but plays a vital role in the treatment and prognosis of patients. Hepatoid adenocarcinoma should be considered when patients present with pancreatic mass and elevated AFP.

PO-1671

Diffusion-weighted MRI to predict the efficacy of irreversible electroporation for the ablation of pancreatic cancer

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Background : The purpose of our study was to evaluate the response to IRE ablation in pancreatic cancer patients using DWI MRI.

Methods: This is a retrospective study and pancreatic cancer patients who received IRE ablation were enrolled. DWI MRI was performed before and after IRE ablation, and apparent diffusion coefficient (ADC) values were calculated based on DWI MRI. The response to IRE was assessed by using RECIST (version 1.1) standard, ADC values and CA19-9.

Results: Twenty three patients with pancreatic cancer were treated with IRE and underwent DWI before and after treatment. According to RECIST criteria, there were 0 cases of complete remission, 4 cases of partial remission, 11 cases of stability, and 8 cases of progression. The ADC values after and before IRE ablation were 1.5848×0.001 , and 1.2880×0.001 , respectively, which had a significant difference ($P = 0.01$). After IRE ablation, the median CA19-9 decreased (305 U/mL vs 280.20 U/mL), but there was no statistical difference ($P = 0.913$).

Conclusions: DWI MRI can accurately display the lesion, and evaluate the effect of IRE ablation of pancreatic cancer. It can be used as an effective method for monitoring the efficacy of IRE ablation, and provides an important reference for clinical efficacy monitoring.

PO-1672

Prediction of Vessels Encapsulating Tumor Clusters (VETC) Pattern and Prognosis of Hepatocellular Carcinoma Based on Preoperative Gd-EOB-DTPA MR

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Background VETC (Vessels encapsulating tumor clusters) is a novel vascular pattern distinct from microvascular invasion (MVI) that is significantly associated with poor prognosis in patients with hepatocellular carcinoma (HCC).

Purpose To predict VETC status and prognosis of patients with hepatocellular carcinoma based on preoperative Gd-EOB-DTPA MRI.

Methods Patients with HCC who underwent surgical resection and preoperative Gd-EOB-DTPA MRI between 1 January 2016 and 31 August 2022 were retrospectively included. The variables associated with VETC were evaluated by logistic regression, a nomogram model was constructed based on independent risk factors and the area under receiver operating characteristic curve (AUC) was calculated to evaluate the diagnostic performance of MR features for VETC. COX regression was used to determine the variables associated with recurrence-free survival (RFS) of HCC patients, and survival curves were plotted by Kaplan-Meier method. P value < 0.05 was considered as statistical significance.

Results A total of 98 HCC patients were included, the overall median age was 53 years, ranging from 48.75 to 64.25. Peritumoral hypointensity on hepatobiliary phase (HBP) (OR[Odd ratio]=2.58 [95%CI(1.05 , 6.33)], $P=0.038$), tumor/liver SI(Signal intensity) ratio on HBP ≤ 0.75

(OR=27.80[95%CI (1.53, 502.91)], P=0.024] and tumor/liver ADC ratio \leq 1.23 (OR=4.65[95%CI (1.01, 21.38)], P=0.048] were independent predictors of VETC pattern. A nomogram was constructed by combining the above three significant variables, the accuracy, sensitivity and specificity were 69.79%, 71.74% and 68.00%, respectively, with AUC of 0.75[95%CI (0.65, 0.83)], indicating good diagnostic performance. Variables significantly associated with RFS of HCC patients after surgery were BCLC stage (HR=2.15 [95% CI (1.09, 4.22)], p=0.026) and VETC pattern (2.28 [95% CI (1.29, 4.02)]), and studies have shown that VETC-positive HCC have worse RFS.

Conclusion The preoperative imaging features based on Gd-EOB-DTPA MRI can be used to predict VETC pattern, which has prognostic significance for postoperative recurrence-free survival of patients with hepatocellular carcinoma.

PO-1673

Evaluation of Amide Proton Transfer-Weighted Imaging and T2 mapping for preoperative risk stratification of endometrioid adenocarcinoma

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Objective: To evaluate the contribution of amide proton transfer-weighted (APTw) imaging and T2 mapping to characterizing the risk stratification of endometrioid adenocarcinoma (EA) before surgery.

Materials and Methods: Seventy-five patients (33 low-risk EA, 42 non-low-risk EA) were incorporated into the prospective study and underwent preoperative multiparametric MRI, including APTw imaging and T2 mapping. Two observers independently delineated the region of interests (ROIs) and the interobserver agreement was assessed by intraclass correlation coefficients (ICCs), independent samples t-tests and Mann-Whitney U test were applied to compare quantitative variables between the two groups, the receiver operator characteristic (ROC) curve was conducted to evaluate the predictive performances of different parameters and the Delong test was implemented to compare the area under the curve (AUC) for each of the meaningful parameters and their combinations.

Results: The APTw values of the low-risk EA group were significantly lower than those of the non low-risk EA group ($[17.416 \pm 4.531] \times 10^{-3} \text{ mm}^2/\text{s}$ vs $[26.084 \pm 6.787] \times 10^{-3} \text{ mm}^2/\text{s}$, $P < 0.001$). The T2 values of the low-risk EA group was significantly higher than that of the non low-risk EA group ($[102.231 \pm 9.485] \text{ ms}$ vs $[93.291 \pm 7.354] \text{ ms}$, $P < 0.001$). The combination of APTw and T2 mapping yielded the highest AUC of 0.882 which had no significant difference with APTw imaging but was significantly higher than T2 mapping alone (AUC= 0.843 and 0.757, respectively).

Conclusion: APTw imaging and T2 mapping parameters have been demonstrated differently in EA with different risks. The combination of APTw imaging and T2 mapping has the robust potential to improve the risk stratification of EA.

PO-1674

Inflammatory pseudotumor-like follicular dendritic cell sarcoma of liver

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Objective: Inflammatory pseudotumor-like follicular dendritic cell sarcoma(IPT-FDCS) is described as an independent subtype in the 5th edition of WHO Classification of Haematolymphoid Tumor which is a kind of rare and easily misdiagnosed tumor. This study analyzed the imaging and pathological manifestations of 5 patients diagnosed with hepatic IPT-FDCS and reviewed previous literature reports to improve the understanding of IPT-FDCS in MR and CT imaging.

Methods: 5 patients (3 males and 2 females) were pathologically diagnosed with hepatic IPT-FDCS, including 3 cases of upper abdominal MRI and 2 cases of CT examination were performed. And we retrospectively analyzed the imaging features of more than 30 cases reported in previous literature before 2023.

Results: All 5 patients (with 5 lesions) in this study were pathologically confirmed as IPT-FDCS. As the literature which has been reported, hepatic IPT-FDCS mainly occurs in adult female. Clinical manifestations include abdominal discomfort, weight loss, anemia, etc. Three of the five patients were confirmed in the left lobe of liver. Based on its imaging manifestations and the reported literature, the imaging manifestations of hepatic IPT-FDCS include: large, isolated, rounded, with clear border and slightly hypodensity on non-contrast CT. Hepatic IPT-FDCS shows hypointense on T1WI, hyperintense both on T2WI and DWI. Enhanced MRI or CT performed "fast in and fast out" (3 cases) or "fast in and slow out" (2 cases). Abundant and enlarged feeding arteries can be found around the lesion on enhanced MRI, which is the characterization of that manifestation. According to literature, mildly intensified "pseudocapsules" was detected in 2 patients. Abnormal perfusion of liver parenchyma may occur in 2 patients.

Conclusion: From what has been discussed above, hepatic IPT-FDCS should be considered in, among the differential diagnosis when the cases show abundant and enlarged feeding arteries around the tumor, pseudocapsule, and abnormal perfusion of parenchyma in liver while no viral hepatitis background was confirmed.

PO-1675

Value study in predicting CK19 positive hepatocellular carcinoma and recurrence based on MRI radiomics and clinical characteristic nomograms

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Objective To investigate the predictive value of Gadoxetate disodium (Gd-EOB-DTPA) enhanced MRI radiomics features combined with clinical and imaging characteristics for cytokeratin 19 (CK19) positive hepatocellular carcinoma (HCC) and postoperative recurrence.

Methods The Gd-EOB-DTPA enhanced MRI images and clinicopathological data of 142 HCC patients who underwent hepatectomy from January 2017 to December 2021 were retrospectively collected. Patients were randomly divided into a training group and a test group at a ratio of 7:3. Variance analysis (ANOVA) and recursive feature elimination (RFE) were used for feature dimension reduction and screening. The radiomics model was constructed using four classifiers: Logistic regression (LR), support vector machine (SVM), linear discriminant analysis(LDA) and

adaptive boosting (Adaboost). The receiver operating characteristic(ROC)curve analysis was used to evaluate the predictive efficacy of CK19 expression and postoperative recurrence. Kaplan-Meier analysis and log-rank test were used for survival analysis and recurrence-free survival (RFS).

Results Among radiomics features, The classifier model of LR algorithm based on the first 11 features of hepatobiliary phase had the best performance in predicting CK19, and its AUC in the training group and the verification group were 0.7877(0.691-0.861) and 0.750 (0.587-0.867), respectively. The predictive efficacy of combined model was better than that of other models, and its AUC, sensitivity and specificity in predicting CK19 positive HCC in the training group and the validation group were 0.843 (0.757-0.908), 0.792, 0.868 and 0.841 (0.695-0.935), 0.896, 0.723, respectively. CK19-positive HCC patients had lower RFS after hepatectomy (1-year RFS 65.5 % vs 81.4 %, 2-year RFS 51.0 % vs 65.9 %), but there was no significant statistical difference (LogRank $P = 0.103$). HBP peritumoral low signal and intratumoral necrosis were independent risk factors for HCC postoperative recurrence. A nomogram based on independent risk factors and CK19 was constructed to predict RFS and the C index was 0.714.

Conclusion The nomogram based on the clinical-imaging-omics model can be used as a non-invasive marker for predicting CK19-positive HCC, with a view to developing individualized treatment plans for HCC patients.

PO-1676

CT radiomics nomogram to predict the intraoperative hypertensive crisis of abdominal pheochromocytoma and paraganglioma

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Objectives Patients with abdominal pheochromocytoma and paraganglioma (PPGL) are prone to hypertensive crisis during surgery, which may endanger their lives. This study aimed to develop and validate a CT radiomics nomogram for the prediction of intraoperative hypertensive crisis of PPGL.

Methods In these two centers retrospective study, a total of 212 patients of PPGLs underwent abdominal enhanced CT and surgical resection. Radiomics features were extracted from arterial and venous phases. A multivariable logistic regression models were developed in an internal validation and an external test set. The performance of the nomograms was determined by its' discrimination, calibration, and clinical usefulness.

Results A total of 212 patients with PPGL were included including 44 patients with hypertension crisis. Patients were divided into training ($n = 117$), validation ($n = 51$), and test ($n = 44$) sets. A total of 18 radiomics relevant radiomics features were selected. History of coronary heart disease and CT radiomics score were included the prediction model, which achieved an AUC of 0.91 (95% CI 0.85–0.97) in the training set, 0.93 (95% CI 0.84–0.99) in the validation set, and 0.85 (95% CI 0.72–0.97) in the test set. The decision curve analysis demonstrated that the radiomics nomogram was clinically useful.

Conclusions The CT radiomics nomogram could preoperatively predict intraoperative hypertensive crisis of abdominal PPGLs, and accurate method that can reduce intraoperative cardiovascular complication and contributes to improved surgical outcomes.

PO-1677

Comparative study of the diagnostic efficacy of CT and MRI in the identification of supraclavicular lymph node metastasis in patients with esophageal squamous cell carcinoma

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Objectives: To compare the diagnostic efficacy of CT and MRI in the identification of supraclavicular lymph nodes metastasis (SCLNM) in patients with esophageal squamous cell carcinoma(ESCC).

Materials and Methods: This retrospective study enrolled 137 consecutive patients with esophageal cancer who had suspected SCLNM and confirmed with ultrasound-guided fine needle aspiration(US-FNA) pathologic results between April 2015 and March 2023. Concurrent CT and MRI were performed in one week before US-FNA. Morphological features of supraclavicular lymph nodes, such as short axis, shape, border, enhancement and quantitative parameter of ADC, were analyzed and significant indicators were screened to build three different models, including CT model, MRI model and MRI+DWI model. The area under the curves (AUCs) were used to assess the performance of logistic models. The AUCs of different models were compared by Delong test.

Results: Multivariate analyses showed that short axis, border and enhancement were independent risk factors for SCLNM and used to construct the CT model. Short axis and enhancement were independent risk factors for MRI model. Short axis, enhancement and ADC were independent risk factors for MRI+DWI model. The AUCs of CT, MRI and MRI+DWI models were 0.906, 0.914 and 0.942, respectively ($p < 0.05$).

Conclusion: The combined MRI + DWI model is superior to single CT and conventional MRI model in evaluating SCLNM and may function as a valuable tool.

PO-1678

The application of multi-layer perception network classifier based on CT in the diagnosis of extrapancreatic perineural invasion in pancreatic ductal adenocarcinoma

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Objective: Extrapaneatic perineural invasion (EPNI) is an important cause of positive surgical margin and early recurrence after resection of pancreatic ductal adenocarcinoma (PDAC). However, the existing imaging scores are greatly affected by subjectivity. In this study, a new scoring method, tumor-vascular contact (TVC) score, was established for the diagnosis of EPNI. Finally, based on clinical features, TVC score, deep learning and radiomics features (DLR), the DLR multi layer perception classifier was formed to diagnose EPNI before surgery.

Methods: The clinical, imaging and pathological data of 690 patients with PDAC who were admitted to the our hospital from March 2016 to December 2020 were collected. According to the results of pathological EPNI, the patients were divided into EPNI positive group and EPNI negative group. The nnU-Net model was used for automatic segmentation of pancreatic tumor and surrounding blood vascular, and then the radiomics features of intratumoral and perivascular space and deep learning features of intratumoral were extracted. The least absolute shrinkage and selection

operator (LASSO) logistic regression algorithm was used for feature selection. Finally, the multi-layer perceptual network classifier was used to build the clinical model and DLR model respectively. The area under the receiver operating characteristic curve (AUC), sensitivity, specificity, positive predictive value, negative predictive value and accuracy were used to evaluate the performance of the two models.

Results: A total of 690 patients were enrolled, including 506 patients in the EPNI positive group and 184 patients in the EPNI negative group. The DLR prediction model showed good diagnostic performance in the training set and validation set, with AUC of 0.89 and 0.88, respectively. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of the training set and the validation set were 81.10%, 81.53%, 92.79%, 59.54%, 0.81 and 76.74%, 86.65%, 92.59%, 67.35%, 0.86, respectively.

Conclusion: The CT-based DLR multi-layer sensing network classifier is an accurate non-invasive tool for the diagnosis of EPNI in PDAC patients.

PO-1679

Comparative study of stretched-exponential and kurtosis models of diffusion-weighted imaging in renal assessment to distinguish patients with primary aldosteronism and healthy controls

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Objectives To compare the ability of diffusion parameters obtained by stretched-exponential and kurtosis models of diffusion-weighted imaging (DWI) to differentiate between patients with primary aldosteronism (PA) and healthy controls (HCs) in renal assessment.

Methods Forty-four participants (22 patients and 22 HCs) underwent renal MRI with a 11 b-value DWI sequence and a 3 b-value diffusion kurtosis imaging (DKI) sequence. The independent-sample t test or the Mann-Whitney U test was used. Binary logistic regression was used to construct regression models combining different diffusion parameters. Receiver operating characteristic (ROC) curve analysis and comparison were used to evaluate the ability of single diffusion parameters and combined diffusion models to differentiate the two groups.

Results A total of 44 participants were included and 10 regression models were studied. The values of the cortical anomalous exponent term (α_{Cortex}) and medullary fractional anisotropy (FA_Medulla) were significantly higher in patients than in HCs, and the cortical FA (FA_Cortex), cortical axial diffusivity (Da_Cortex), medullary mean diffusivity (MD_Medulla) and medullary radial diffusivity (Dr_Medulla) were significantly lower in patients. The area under the curve (AUC) of Dr_Medulla was 0.855, comparable to that of FA_Cortex and FA_Medulla and significantly higher than that of α_{Cortex} , Da_Cortex and MD_Medulla. The AUC of Model_all parameters was 0.967, comparable to that of Model_FA (0.946) and Model_DKI (0.966) and significantly higher than that of other models. The sensitivity and specificity of Model_all parameters were 87.2% and 95%, respectively.

Conclusion Model_all parameters, Model_FA and Model_DKI were valid for differentiating between PA patients and HCs with similar differentiation efficacy and were superior to signal diffusion parameters and other models.

PO-1680

Quantification of MCTSI Scoring and Improvement in Predictive Ability for the Duration of Hospitalization in Patients with Acute Hypertriglyceridemic Pancreatitis: A Focus on CT Values

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Abstract

Object: MCTSI, a frequently used scoring system for evaluating patients with acute pancreatitis, possesses inherent subjectivity. This study aims to objectify the scoring system by utilizing CT values. Furthermore, we explore the potential of the improved MCTSI scoring system in predicting the length of hospital stay for patients with acute hypertriglyceridemic pancreatitis (HTGP).

Methods: We retrospectively collected data from 170 HTGP patients, meeting the RAC criteria. Severity classification was performed by two experienced physicians based on RAC criteria, dividing the patients into three groups: mild, moderate, and severe. We calculated APACHE II, BISAP, Ranson, SIRS, Marshall, Balthazar, and MCTSI scores for each patient. Additionally, CT values of the pancreatic head, body, and tail were measured on the most comprehensive image levels of the pancreas in the non-enhanced, arterial, and portal venous phases. Two models were established based on these measurements. Statistical analyses involved chi-squared tests and Fisher's exact tests for categorical variables, and analysis of variance for continuous variables. The ability of different scoring systems, including the new model, to predict the duration of hospitalization for HTGP patients was evaluated using ROC curves.

Results: Among all the existing scoring systems, MCTSI demonstrates the highest predictive efficacy for the duration of hospitalization in HTGP patients. However, the newly proposed Model1 and Model2 in this study have higher AUC values, namely 0.801 and 0.804, respectively, compared to both MCTSI and other scoring systems. Model1 achieves a higher sensitivity than MCTSI, whereas Model2 demonstrates a higher specificity compared to MCTSI.

Conclusion: CT values are an effective approach to objectify MCTSI and facilitate the detection of difficult-to-recognize necrosis. The modified MCTSI, therefore, improves the predictive efficacy for the duration of hospitalization in HTGP patients.

PO-1681

Noninvasive Evaluation of Renal Oxygenation by Blood Oxygenation Level-dependent Magnetic Resonance Imaging: Comparison between Patients with Primary Aldosteronism and Healthy Controls

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Objectives To explore the application of blood oxygenation level-dependent magnetic resonance imaging (BOLD-MRI) for the task of renal oxygenation in patients with primary aldosteronism (PA), by comparison with healthy controls.

Materials and methods All the patients and healthy controls (HCs) underwent renal BOLD-MRI. The region of interest (ROI) method was used to measure $R2^*$ values in the renal cortex and medulla separately. Independent samples t-test or Mann-Whitney U test were used. The correlation between renal BOLD parameters and clinical indicators were analyzed by Pearson correlation

analysis or Spearman correlation analysis. Receiver operating characteristic (ROC) curve was used to distinguish the PA patients and healthy volunteers.

Results A total of 20 PA patients (female:male, 14:6; age, 46 ± 12 years) and 20 HCs (female:male, 14:6; age, 47 ± 10 years) were enrolled. The cortical $R2^*$ was significantly lower than medullary $R2^*$ in the HCs and PA patients ($p<0.001$). The cortical $R2^*$ of the PA group was higher than the cortical $R2^*$ of the HCs ($p=0.003$). The correlation analysis showed that there was a statistical significant positive correlation between the medullary $R2^*$ value and urea nitrogen ($r = 0.566$, $p = 0.018$). The ROC curve showed that the optimal diagnostic threshold of cortical $R2^*$ was 17.13 Hz to distinguish PA patients and healthy volunteers, and the corresponding sensitivity and specificity were 84.30% and 55.30%, respectively. The area under the curve (AUC) was 0.692.

Conclusion BOLD-MRI provides a useful technique to detect oxygenation levels in the renal cortex and medulla of patients with PA.

PO-1682

Performance of Node-RADS Scoring System: Lymph node invasion in preoperative rectal cancer patients

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Purpose: To evaluate the diagnostic performance of the Node Reporting and Data System (NODE-RADS) in the diagnosis of lymph node invasion (LNI) of preoperative rectal cancer (RC) patients, based on three different modalities: T2WI, enhanced T1WI and contrast CT. Furthermore, we compared the diagnostic value of NODE-RADS classification and the short-axis of the suspicious lymph nodes.

Methods: This retrospective study included 105 patients who were diagnosed with RC between March 2018 and March 2022. They all underwent both MRI and contrast CT scans within two weeks prior to surgery. Regional lymph nodes with the highest score were assessed accordingly to the NODE-RADS stratification and their short-axis were measured by two radiologists blinded for pathologic results. The histopathological findings served as the reference standard. Receiver operating characteristic (ROC) curve analysis was used to evaluate the diagnostic performance of the NODE-RADS score system in the prediction of pN staging at the three modalities. Delong test was used for the calculation of the difference between two areas under the curve (AUCs).

Results: In total, 105 patients (mean age, 65 ± 10 years; 71 men) were included. In discriminating pN+ patients from pN- patients, the AUCs of the NODE-RADS and the short-axis were 0.868 vs. 0.743 for T2WI, 0.907 vs. 0.732 for enhanced T1WI, 0.866 vs. 0.693 for contrast CT, respectively. The NODE-RADS classification in enhanced T1WI showed the best diagnostic performance (AUC=0.907) compared to the others ($P<0.05$). Among all the three modalities, the NODE-RADS showed better performance in predicting LNI than the short-axis ($P<0.05$). Besides, there is no difference in the diagnostic performance between the three modalities ($P<0.05$).

Conclusion: The NODE-RADS risk stratification system exceeds the short-axis in LNI prediction. Our study lays a foundation for the application of NODE-RADS in RC patients in clinical routine and may guide clinical treatment.

PO-1683

Value of diffusion kurtosis MR imaging and conventional diffusion weighed imaging for evaluating response to first-line chemotherapy in unresectable pancreatic cancer

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Synopsis

This study firstly compared diffusion kurtosis imaging (DKI) and traditional diffusion weighted imaging (DWI) in evaluating first-line chemotherapy in unresectable pancreatic cancer. The result demonstrated that higher efficacy was shown in DKI derived parameters than DWI by the ROC curve analysis. DKI has potential to become a new non-invasive tool for clinical efficacy evaluation and help clinicians select individualized treatment.

Introduction

Pancreatic cancer is a malignant digestive tumor with poor prognosis. For those patients who are diagnosed at advanced stage losing their opportunity to undergo radical surgery, first-line chemotherapy regimens recommended by NCCN guidelines are used to prolong the survival period and improve the life of quality[1]. However, few studies have evaluated the efficacy of first-line chemotherapy among unresectable pancreatic cancer patients using diffusion kurtosis imaging (DKI). The purpose of our study was to compare the application of DKI and traditional diffusion weighted imaging (DWI) in evaluating chemotherapy efficacy in patients with unresectable pancreatic cancer.

Methods Patients fulfilling the following criteria were included in this study: 1) clinically diagnosed with unresectable pancreatic cancer; 2) without radiotherapy during the treatment phase; 3) underwent 3T MRI with both DKI and DWI sequence before and after chemotherapy; 4) the tumor size ≥ 2 cm; and 5) Eastern Cooperative Oncology Group performance status (ECOG PS) score of 0-1. Patients were excluded for incomplete standard treatment (severe adverse reaction, n=3; cytoreductive surgery n=1) or loss to follow-up (n=4). According to the recommendation of comprehensive guidelines for the diagnosis and treatment of pancreatic cancer, patients underwent the following first-line chemotherapy regimens: 1) gemcitabine combined with tegafur gimeracil oteracil potassium (GS): gemcitabine 1000 mg/m² on Day 1 and Day 8, qd, intravenously; tegafur gimeracil oteracil potassium 60 to 100 mg, Day 1-15, bid, orally; every 3 weeks; and 2) gemcitabine combined with nab-paclitaxel (AG): nab-paclitaxel 125 mg/m² and gemcitabine 1000 g/m² on Day 1, Day 8, and Day 15, qd, intravenously, every 4 weeks.

All MRI examinations were performed on a 3T scanner (MAGNETOM Skyra, Siemens Healthcare, Erlangen, Germany) using a 16-channel phased-array volume coil as the receiving coil within 15 days before and after two courses of chemotherapy. The conventional DWI were obtained using a free-breathing single-shot echo-planar sequence (TR, 8,500 ms; TE, 56 ms; FOV, 381×309 mm²; matrix, 256×208; number of slices, 28; thickness, 5 mm; b values, 0, 50, 800 s/mm², acquisition time, 2 min 40 s). The DKI sequence used the same scan parameters as the conventional DWI, except the b values (0, 100, 700, 1400, 2100 s/mm²). The acquisition time was 4 min 45 s.

Measurement of DWI and DKI parameters

Both conventional DWI parameters (ADC values) and DKI parameters (MD, MK) were obtained by using a post-processing research application (MR Body Diffusion Toolbox; Siemens Healthcare, Erlangen, Germany).

ADC maps were calculated voxel-wise by fitting the DW images to a mono-exponential signal decay model[2, 3]:

$$S(b) = S_0 \times \exp(-b \cdot \text{ADC})$$

in which S(b) represents the signal intensity with diffusion weighting b, S₀ represents the intensity without a diffusion gradient, and ADC represents the apparent diffusion intensity.

The DKI parameters were generated voxel-wise by fitting the multi-b DWI to the diffusion kurtosis signal decay equation according to a two-variable linear least squares algorithm[4]:

$$S(b)=S_0 \times \exp (-b \cdot D +1/6 \cdot b^2 D^2 K)$$

in which D value represents the corrected diffusion coefficient, K value represents the diffusion kurtosis coefficient, indicating the degree to which the molecular motion deviates from the ideal Gaussian distribution model.

Statistical analysis

The nonparametric Shapiro-Wilk test and the independent t test were adopted to compare the DWI and DKI parameters among different efficacy groups before and after the treatment. Continuous variables are expressed as the mean \pm standard deviation. All statistical analyses were performed using SPSS software (version 22.0, Chicago, IL, USA) and MedCalc software (version 17.5.5, MedCalc Software, Ostend, Belgium). Dependent variables (PR=1, non-PR=0) (partial response, PR) and independent variables (DWI and DKI parameters) were selected for the construction of ROC curves. $P < 0.05$ was considered statistically significant. ROC curve analysis was used to evaluate potential variables. Internal validity was assessed by use of bootstrapping procedure. ROC analyses were further performed to evaluate the diagnostic efficacy of each parameter in predicting the chemotherapeutic response of unresectable pancreatic cancer.

Results

Patient characteristics

The subjects enrolled 21 patients, including 6 women and 15 men, with an average age of 64 ± 8 years old. Patients were classified into the PR group ($n=7$, Figure 1) and the non-PR group according to the treatment response ($n=14$, Figure 2).

Statistics of functional parameters

The ADC_{change} and MD_{change} in the PR group (0.21 ± 0.05 , 0.37 ± 0.24) were significantly higher than those in the non-PR group (0.11 ± 0.09 , 0.10 ± 0.12) ($P=0.02$, 0.002 respectively) (Figure 3). However, no statistically significant differences were shown between the PR group and non-PR group concerning certain aspects of ADC_{pre} , ADC_{post} , MK_{pre} , MK_{post} , MK_{change} , MD_{pre} , and MD_{post} ($P=0.734$, 0.09 , 0.686 , 0.289 , 0.573 , 0.153 , 0.166). The ICCs ranged from 0.857 to 0.912 for intraobserver agreement. The AUC of DWI and DKI parameters were successfully validated by 1000 times bootstrapping. The results of ROC curve analysis showed that MD_{change} (AUC=0.898) had greater diagnostic efficacy than ADC_{change} (AUC=0.80) (Figure 4). The MD_{change} had sensitivity of 85.7% and specificity of 85.7%, while the cutoff value was 0.1373. The combined model SUM_{change} ($ADC_{change}+MD_{change}$) showed higher AUC (0.912, $P=0.002$) than that of MD_{change} or ADC_{change} (Figure 4).

Discussion and Conclusion

ADC_{change} and MD_{change} demonstrated strong potential for evaluating the response to chemotherapy in unresectable pancreatic cancer. MD_{change} showed higher specificity in the classification of PR and non-PR than ADC_{change} . Other parameters, including ADC_{pre} , ADC_{post} , MK_{pre} , MK_{post} , MK_{change} , MD_{pre} , and MD_{post} , are not suitable for response evaluation. Further experiments are needed to evaluate the potential of DWI and DKI parameters in predicting the prognosis of patients with unresectable pancreatic cancer. DKI parameters have potential to be the new indicators for clinical efficacy evaluation while these results require further validation with a larger cohort.

PO-1684

The development and external validation of automatic future liver remnant (FLR) assessment system for non-anatomic resection (NAR) based on deep learning

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Objective: First, to build automatic FLR assessment system by developing five 3D U-Net models for the automated segmentation of liver, Couinaud segments, hepatic vein, portal vein and hepatic lesion; second, to verify the feasibility of the automatic FLR assessment system by using external validation data set.

Materials and Methods: This retrospective study developed five 3D U-Net models for the automated segmentation of liver, Couinaud segments, hepatic vein, portal vein and hepatic lesion on contrast-enhanced CT scans. Images were obtained from 353 patients from January 2018 to March 2019. First, radiologists annotated the anatomic structures. Then, 3D U-Net models were trained in medical center A (n=353) and tested in medical center B in cases with various liver diseases (n1=146) and in candidates for major hepatectomy (n2=32). The segmentation accuracy was evaluated using dice similarity coefficient (DSC) and volumetric similarity (VS). The difference in FLR assessment and the prediction in resection between automated and manual method were compared.

Results: The hepatic lesion with narrow margin (1cm) and wide margin (2cm) were obtained by rule. The DSC and VS values of 5 models ranged from 0.73 ± 0.12 to 1.00 ± 0.01 . The automated, manual FLR% assessments ranged from 29.24% to 87.52%, 32.82% to 89.67%, respectively ($P > 0.99$). Based on automated FLR% assessment results, 32, 32 cases in data set 2 were categorized as candidates for NAR with narrow, wide margin reserved, respectively. Those were 32, 31 cases by using manual FLR% assessment results, respectively. No statistical difference was found in the prediction of NAR ($P > 0.99$). **Conclusion:** Automatic FLR assessment system on CT images prior to NAR by using deep learning is feasible.

Clinical relevance: This study developed and verified automatic FLR assessment system for different margin reserved non-anatomic resection. The resection margin can be freely defined. The FLR% assessment system provide a quantitative output and a 3D visualization for surgeons.

PO-1685

Automatic future liver remnant (FLR) assessment prior to major hepatectomy : comparison between hepatic VCAR and deep learning based assessment system

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Objective: FLR assessment is essential before major hepatectomy to minimize postresectional liver failure. Currently used method (hepatic VCAR, GE Health Care) is accurate but depend on doctor's virtual cut. This study aim to compare the difference between hepatic VCAR and deep learning based FLR assessment system.

Materials and Methods: Five 3D U-Net models for the automated segmentation of liver, Couinaud segments, hepatic veins, portal veins and hepatic lesions on contrast-enhanced CT were trained and used for the development of automated FLR assessment system. Patients who underwent contrast enhanced portovenous phase CT scan in 2022 were included. Total liver volume (TLV), FLR and FLR% were measured using these two methods for four types of major hepatectomy. The

difference in FLR% assessment and the prediction in resection between two methods were compared.

Results: TLV, FLR and FLR% ranged from 752.0 to 1904.0 cm³, 48.7 to 1339.0 cm³ and 3.5% to 82.9% by using hepatic VCAR, and 776.1 to 1911.8 cm³, 74.1 to 1348.0 and 6.1% to 81.9% by using assessment system, respectively. There is a positive linear correlation in the volumetry of FLR and FLR% between the hepatic VCAR and assessment system ($r=0.937$, 0.938 , $P < 0.0001$), and the consistency of the two methods is high. Based on FLR% assessment results, 57,23,58,54 cases were categorized as candidates for hepatectomy by using assessment system for four types of hepatectomy, those were 57,2,58,45 cases by using hepatic VCAR, respectively.

Conclusion: Both hepatic VCAR and assessment system are accurate and easily applicable.

Clinical relevance: This study provided the comparison of hepatic VCAR and automated FLR% assessment system in the FLR% assessment and the prediction of four types of major hepatectomy. Hepatic VCAR provided a feasible and flexible method.

PO-1686

Automatic future liver remnant (FLR) assessment prior to major hepatectomy: comparison between hepatic VCAR and human doctor

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Objective: FLR assessment is essential before major hepatectomy in clinical practice. Currently used method is accurate but depend on doctor's manual segmentation. This study aimed to compare the difference between hepatic VCAR (GE, Healthcare) and human doctor in the pre-operative FLR% assessment and the prediction of resection.

Materials and Methods: Patients who underwent contrast enhanced portovenous phase CT scan in 2022 were included. Total liver volume (TLV), FLR and FLR% were measured using these two methods for four types of virtual major hepatectomy. Time needed to determine TLV, FLR and FLR% was measured. The difference in FLR% assessment and the prediction in resection between two methods were compared.

Results: TLV, FLR and FLR% ranged from 752.0 to 1904.0 cm³, 48.7 to 1339.0 cm³ and 3.5% to 82.9% by using hepatic VCAR, and 776.1 to 1911.9 cm³, 77.77 to 1348.2 and 6.4% to 80.8% by using manual method, respectively. There is a positive linear correlation in the volumetry of FLR and FLR% between the hepatic VCAR and assessment system ($r=0.94$, 0.94 , $P < 0.0001$), and the consistency of the two methods is high. Based on FLR% assessment results, 56,19,57,51 cases were categorized as candidates for hepatectomy by using manual method for four types of hepatectomy, those were 57,2,58,45 cases by using hepatic VCAR, respectively. The median time needed for complete FLR% analysis was 91.1 ± 4.9 min with manual method and 4.8 ± 1.4 min using hepatic VCAR. Conclusion: Hepatic VCAR is accurate and easily applicable in the pre-operative FLR% assessment.

Clinical relevance: This study provided the comparison of hepatic VCAR and human doctor in the FLR% assessment and the prediction of four types of major hepatectomy. Hepatic VCAR provided a feasible, accurate and flexible method.

PO-1687

Fully Automated Segmentation and Volumetry of key anatomic structures of the liver at CT prior to hepatectomy using deep learning

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Objective: To verify the feasibility of the automatic segmentation model of liver, Couinaud segments, hepatic vein, portal vein, bile duct and hepatic lesion in a whole system by using external validation data set.

Materials and Methods: This retrospective study develop six 3D U-Net models for the automated segmentation of key anatomic structures of the liver on contrast-enhanced CT scans. Images were obtained from 353 patients from January 2018 to March 2019. First, radiologists annotated the hepatic veins and portal veins. Then, six 3D U-Net models were trained in medical center A (n=353) and tested in medical center B (n=178) in cases with various liver conditions (n=146) and in candidates for major hepatectomy (n=32). The segmentation accuracy was evaluated using dice similarity coefficient (DSC) and volumetric similarity (VS). Correlation analysis and Bland-Altman analysis were used to assess the correlation and consistency of the two methods.

Results: The DSC values ranged from 0.73 ± 0.12 to 0.99 ± 0.01 , and VS values ranged from 0.83 ± 0.09 to 1.00 ± 0.01 , respectively. There is a positive linear correlation between the automatic and the manual segmentation results (r ranged from 0.77 to 0.99, $P < 0.0001$), and the consistency of the two methods is high.

Conclusion: It's feasible for the automatic segmentation of key anatomic structures in a whole system by using 3D U-Net algorithm.

Clinical relevance: This study provided adequate validation in diverse liver conditions and thorough evaluation using clinical cases, and provide liver, Couinaud segments, hepatic veins, portal veins, bile duct and hepatic lesion assessment in a whole system both in a quantitative volumetric output and as a 3D visualization for surgeons.

PO-1688

Arteriovenous Shunt in Hepatocellular carcinoma: Characteristics based on DSA, CT and MR Imaging

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Background: Hepatic arteriovenous shunt (AVS) is a characteristic finding for hepatocellular carcinoma (HCC) on digital subtraction angiography (DSA), but the abnormalities on CT/MRI and their comparison with DSA findings remain unclear. The purpose of the study is to evaluate the imaging characteristics of the HCC-related AVS based on DSA, CT and MR Imaging.

Material and methods: Clinical and imaging data of consecutive HCC patients who received digital subtraction angiography (DSA) in the hospital between June 2015 to August 2021 were reviewed. and enhanced CT and/or MR were done in these patients before DSA imaging. Grading and classification of the AVS were performed based on DSA, and the positive findings of CT/MR were summarized for enrolled patients. In addition, statistical analysis of imaging characteristics between the severe and non-severe AVS was performed.

Results: Fifteen HCC patients with angiographically evident AVS were enrolled, S[L1] evere AVS was diagnosed in 40.0% patients (6/15), while non-severe AVS were diagnosed in 60.0% (9/15) patients. Positive findings of AVS were noted in 73.3% (11/15) patients in CT/MR. Among these, early enhancement of the hepatic vein (HV) or the retro-hepatic inferior vena cava (IVC) in the

arterial phase was observed in 40% (6/15) patients, abnormal hypoperfusion of non HCC foci hepatic parenchymal in the arterial were seem in 13.3% (2/15) patients, hepatic vein involvement were noted in 73.3% (11/15) patients, and tumor thrombosis was observed in 60.0% (8/15) patients. The comparison analysis showed that the presence of tumor thrombosis ($P=0.019$) and the early enhancement of hepatic veins/IVC in CT/MR ($P=0.002$) was more prone to be found in severe AVS than non-severe AVS, and there was significant difference.

Conclusion: A part of patients is absent for positive findings in CT/MR, and the diagnosis of HCC-associated AVS is highly rely on DSA. The comparison between the severe and non-severe AVS bore statistically significant relationship to the early enhancement of the HV/IVC and the presence of tumor thrombosis.

PO-1689

Value of renal Intravoxel incoherent motion diffusion-weighted imaging in different regions in distinguishing Immunoglobulin A nephropathy patients from healthy volunteers

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Objective To explore the value of quantitative parameters of Intravoxel incoherent motion diffusion-weighted imaging (IVIM-DWI) in different renal regions in distinguishing Immunoglobulin A nephropathy (IgAN) patients from healthy volunteers. **Methods** Twenty-six patients with pathologically-proven IgAN and twenty-five healthy volunteers who underwent T2WI and IVIM-DWI of kidney were retrospectively collected. The maps of apparent diffusion coefficient (ADC), pseudo-diffusion coefficient (D), pure diffusion coefficient (D^*) and perfusion fraction (f) parameters of the right renal cortex, medulla and parenchyma was obtained after post processing by two abdominal radiologists. The intraclass correlation coefficient (ICC) was used to evaluate the data consistency between two observers. T-test or nonparametric test were used to analyze the differences of the IVIM-DWI parameters in cortex, medulla and parenchyma between healthy volunteers and IgAN patients, and the differences of ROI measurements in renal cortex, medulla and parenchyma of all subjects. And the parameters with statistical significance were further evaluated using receiver operating characteristic curve (ROC). **Results** The consistency of renal IVIM-DWI measurement results in different renal regions of the IgAN patients was acceptable ($ICC \geq 0.5$); Except for cortex D value ($ICC=0.473$)、medulla D value ($ICC=0.227$), the consistency of other parameters of healthy volunteers is acceptable ($ICC \geq 0.5$). ADC、 D^* and f values in the cortex、medulla and parenchyma of the right kidney in the healthy volunteers were higher than those in the IgAN patients (except for medulla $D^* P=0.065$, medulla f $P=0.163$; the rest $P<0.05$), but there was no significant difference in the D values of different regions of the right kidney between the two groups (all $P>0.05$). In addition to D values (IgAN patients $P=0.109$ 、healthy volunteers $P=0.084$)、f values (IgAN patients $P=0.191$ 、healthy volunteers $P=0.058$) between the right renal cortical and parenchymal among two groups, and D values($P=0.148$)、 D^* values($P=0.443$) between the medulla and parenchyma of healthy volunteers had no significant difference; There were statistical differences in other parameters of different ROI between the two groups (all $P<0.05$). The AUC (95%CI) of cortical ADC, cortical D^* , and parenchymal ADC values in distinguishing the IgAN from healthy volunteers were 0.768 (0.628-0.874), 0.732 (0.590-0.847), and 0.752 (0.612-0.862), respectively; The AUC value of other parameters is between 0.65 to 0.7. **Conclusion** Renal IVIM-DWI parameters were affected by regional variation, and IVIM-DWI-derived parameters, especially the ADC value、 D^* value of renal cortex, and renal parenchymal ADC value, can effectively distinguish

IgAN patients from healthy volunteers. Especially the ADC value、D* value of renal cortex, and renal parenchymal ADC value have good efficacy.

PO-1690

Pre-/post- transplant CT-based deep learning radiomics prognostic nomograms for hepatocellular carcinoma: comparison with existing criteria

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Purpose The Milan and University of California San Francisco (UCSF) criteria, and the Risk Estimation of Tumor Recurrence After Transplant (RETREAT) score, which fail to reflect tumor heterogeneity, may be insufficient for predicting recurrence of hepatocellular carcinoma (HCC) after liver transplantation (LT). The aim of this study was to develop and validate pre- and post-transplant CT-based deep learning radiomics nomograms (DLRNs) for outcome prediction in HCC after LT. The performance of the DLRNs was compared with the existing criteria.

Methods From March 2010 to August 2021, patients with preoperative enhanced CT and pathologically confirmed HCC after LT were derived from 3 hospitals. The endpoint was recurrence-free survival (RFS). A pre-transplant DLRN incorporating clinical, CT, deep learning and radiomics features, and a post-transplant DLRN combining the above pre-transplant factors and the explant pathological variables were developed for predicting tumor recurrence in HCC patients after LT. The performance of the DLRNs was compared with that of the Milan, USCF and RETREAT criteria. Model performance was assessed with Kaplan-Meier curves, Harrell's concordance index (C-index) and decision curve analysis (DCA).

Results A total of 210 HCC patients who underwent LT (median age, 54 years; 179 males; training/test cohort, 146/64) were included. The pre- and post- transplant DLRNs were associated with RFS (log rank $P < 0.0001$) in the training and test cohorts. In predicting RFS for HCC patients after LT, the pre-transplant DLRN achieved higher C-index (0.898) than the Milan (0.856) and USCF (0.864) criteria; and the post-transplant DLRN provided higher C-index (0.910) than the RETREAT score (0.852) in the test cohort.

Conclusion The pre- and post- transplant DLRNs could accurately predict tumor recurrence and outperformed the existing criteria in HCC patients after LT, thus facilitating in better candidate selection for LT and guiding management of HCC patients after LT.

PO-1691

Comparison of T1 ρ , DKI, and IVIM Imaging Parameters for Liver Fibrosis Staging in a Rat Model

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Purpose: To compare the efficacy of imaging parameters derived from T1 relaxation times in the rotating frame (T1 ρ or T1 ρ), intravoxel incoherent motion (IVIM) and diffusion kurtosis imaging (DKI) for differentiating varying liver fibrosis stages.

Materials and Methods: Thirty rats were divided into one control group (n = 6) and four fibrosis experimental groups (n = 6 each group) induced by intraperitoneal injection of thioacetamide (TAA) for 2, 4, 6, 8 weeks. T1 ρ , DKI and IVIM imaging were performed; the parameters derived from T1 ρ , DKI and IVIM were measured and compared among different liver fibrosis stages with

one-way analysis of variance (ANOVA). Corresponding liver histopathological results were obtained. Spearman rank correlation was used to assess the relationship between the imaging parameters and histopathological scores. Receiver operating characteristic (ROC) curve analysis was used to evaluate the diagnostic efficiency of different imaging parameters for staging liver fibrosis. Interobserver reproducibility of imaging parameters was evaluated by the intraclass correlation coefficient (ICC).

Results: According to the histopathological results, there were 6, 6, 5, 7, 6 rats designated into stage F0, F1, F2, F3 and F4, respectively. All imaging parameters exhibited excellent interobserver reproducibility, with ICC values > 0.75 ($P < 0.001$ for all). ANOVA test showed that only D^* derived from IVIM had no significant difference among various liver fibrosis stages ($P = 0.584$). $T1\rho$, mean apparent diffusion (MD) derived DKI and D derived from IVIM all had strong correlations with histopathological scores (Sirius red and α SMA-positive ratios). ROC curve analysis suggested that the mean area under the ROC curve (AUC) value, sensitivity, and specificity of $T1\rho$ and MD were comparable but much higher than those of other imaging parameters. The model combining $T1\rho$ and MD exhibited better performance with larger AUC values than any individual method for staging liver fibrosis.

Conclusion: Among the evaluated imaging parameters, $T1\rho$ and MD were superior for differentiating varying liver fibrosis stages. And the model combining $T1\rho$ and MD was promising to be a credible diagnostic biomarker to detect and accurately stage liver fibrosis.

PO-1692

Quantification of arterial enhancement fraction and extracellular volume fraction extracellular: utility for differentiating pathological grade of renal clear cell carcinoma

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Purpose To evaluate whether the arterial enhancement fraction (AEF) and extracellular volume fraction (ECV) based on iodine maps could predict WHO/ISUP pathological grading of clear cell renal cell carcinoma (ccRCC).

Materials and Methods We retrospectively included patients ($n=50$) with pathologically confirmed ccRCC who underwent preoperative dual-layer spectral computed tomography urography (CTU) (2017.10-2021.02). They were divided into low-grade (WHO/ISUP 1/2, $n = 30$) and high-grade groups (WHO/ISUP 3/4, $n = 20$). AEF and ECV images were generated based on iodine map. The Hounsfield (HU)-based AEF (AEF-HU) and iodine concentration (IC)-based AEF (AEF-IC) of ccRCC were obtained based on the conventional images and iodine map of the arterial and venous stages, respectively. At the same time, the HU-based ECV (ECV-HU) and -based ECV (ECV-IC) of the tumor were obtained by conventional excretion stage images and excretion iodine. The difference of quantitative parameter between high-grade and low-grade groups was compared and receiver operating characteristic curves (ROC) were used to evaluate the ability of these parameters to predict WHO/ISUP grade.

Results The AEF-IC of low-grade tumors was higher than that of high-grade tumors ($52.29\% \pm 11.10\%$ vs. $43.33\% \pm 14.97\%$, $p = 0.017$), but the AEF-IC had no difference between the two groups ($46.80\% \pm 13.47\%$ vs. $46.51\% \pm 17.31\%$, $p = 0.947$). The ECV-HU and ECV-IC of low-grade tumors was both higher than that of high-grade tumors ($55.85\% \pm 12.26\%$ vs. $44.60\% \pm 12.29\%$, $p = 0.002$; $51.24\% \pm 10.41\%$ vs. $34.92\% \pm 4.96\%$, $p < 0.001$). ECV-IC has the highest area under the curve (AUC) of 0.9685 in predicting pathological grade of ccRCC. When the

threshold was 40.05%, ECV-IC could distinguish higher grade from lower grade tumors with sensitivity of 96.67% and specificity of 90.48%.

PO-1693

Histogram analysis of whole placental T2-weighted magnetic resonance image-derived in patients with Pre-eclampsia

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Objective: The whole placental T2-weighted magnetic resonance image histograms were used to investigate whether the parameters can distinguish between the patients with pre-eclampsia(PE) and normal pregnant women.

Materials and methods: The clinical and prenatal pelvic MRI data of 22 patients with PE and 24 normal pregnant women were retrospectively analyzed, forming the two study groups. Histogram parameters including included mean, variances, kewnness, kurtosis, entropy, 10th percentile, 50th percentile, 90th percentile and 99th percentile were calculated from the whole-volume placental of T2-weighted image. The volume and thickness were recorded as the morphological parameters. Histological examinations of placentas were conducted following delivery and where available. Student-t test or Mann-Whitney U test was used to compare the continuous data between the two groups. Chi-square test was used to compare the categorical data. The diagnostic efficacy for PE with parameters was analyzed by receiver operating characteristic(ROC).

Results: In the T2WI histogram, the differences between the two groups in two of the parameters (variance and 99th percentile) were statistically significant ($P < 0.05$). In the morphological measurement, the differences between the two groups in one parameter(volume) was statistically significant ($P < 0.05$). The distinguishing ability of variances, 99th percentile and volume for PE was good, with area under the ROC(AUC) were 0.713, 0.693 and 0.709 respectively. The combined AUC value of the three parameters was higher than that of a single parameter ($AUC = 0.899$, $P = 0.000$), with sensitivity of 86.36% and specificity of 77.27%.

Conclusion: The histogram parameters of the whole placenta T2WI have good diagnostic efficacy in distinguishing PE patients. It provides a novel method for distinguishing the PE group from the normal group, which may have a positive effect on disease monitoring and prediction.

PO-1694

Utility of reduced FOV diffusion-weighted MRI in distinguishing endometrial cancers from invasive histologic subtype

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Objective: To evaluate the utility of apparent diffusion coefficient (ADC) value derived from reduced FOV diffusion-weighted imaging (DWI) in differentiating invasive histologic subtype from noninvasive subtype.

Methods: 78 patients with endometrial cancers (49 noninvasive, 29 invasive) were included from May 2022 to September 2023. All patients were given conventional MRI examination and reduced FOV DWI were included. The ADC values derived from reduced FOV DWI in different groups were

compared. The ROC curves were used to analyze the diagnostic efficacy of ADC values to differentiating invasive histologic subtype from noninvasive subtype..

Results : The ADC values of noninvasive histologic subtype were $1.08 \pm 0.19 \times 10^{-3} \text{ mm}^2/\text{s}$, the The ADC values of invasive histologic subtype were $0.87 \pm 0.21 \times 10^{-3} \text{ mm}^2/\text{s}$, The ADC values of invasive histologic subtype were significantly lower than noninvasive subtype ($P < 0.05$). The ADC values yield AUC of 0.89 in ROC analysis, and a diagnostic thresholds of $0.94 \times 10^{-3} \text{ mm}^2/\text{s}$ created sensitivity and specificity of 0.876 , 0.789 to differentiating invasive histologic subtype from noninvasive subtype.

Conclusion: Apparent diffusion coefficient (ADC) value derived from reduced FOV diffusion-weighted MRI can differentiate invasive histologic subtype from noninvasive subtype in endometrial cancer.

PO-1695

Deep learning reconstruction to improve characterization of gastrointestinal system tumors in low-keV virtual monoenergetic dual-energy CT: a comparative study with routine imaging

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Objectives

To qualitatively and quantitatively compare dual-energy computed tomography (DECT)-derived 55keV virtual monochromatic images (VMIs) using deep learning image reconstruction (DLIR) with 70keV VMIs using adaptive statistical iterative reconstruction (ASiR-V) in the Gastrointestinal (GI) system tumors and to investigate whether DLIR can influence the measured iodine parameters.

Methods

This observational study included 47 patients with GI system tumors who underwent DECT. Qualitative and quantitative assessment was performed on 70keV VMIs using ASiR-V40%, and 55keV VMIs using DLIR at low (DLIR-L), medium (DLIR-M), and high strength (DLIR-H). Quantitative evaluation included calculation of the contrast-to-noise ratio (CNR) and the signal-to-noise ratio (SNR). Overall image quality, lesion conspicuity, and diagnostic confidence were evaluated qualitatively by 2 radiologists. Iodine parameters of tumor lesions were compared among four groups of algorithms.

Results

There were no significant differences in the image noise between DLIR-M and ASiR-V40, whereas image noise was significantly lower in DLIR-H than ASiR-V40 and DLIR-M (both phases, $P < 0.001$). DLIR-M and DLIR-H had significantly higher CNR and SNR compared with ASiR-V40 on both phases (all $P \leq 0.001$). When compared to ASiR-V40, DLIR-M and DLIR-H had similar or improved qualitative assessment metrics. DLIR-L yielded the highest image noise, and the lowest overall image quality score among these algorithms. Lastly, the measured iodine parameters were equivalent among different algorithms (all $P > 0.1$).

Conclusion

55keV VMIs with DLIR (-M, and -H) has the potential to replace 70keV VMIs with ASiR-V40% for GI system tumor. DLIR at any strength could maintain the measured iodine parameters similar to those of ASiR-V40%.

PO-1696

Imaging-based surrogate classification predicts response to adjuvant hepatic arterial infusion chemotherapy in hepatocellular carcinoma with microvascular invasion

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Background and Aims:

Adjuvant hepatic arterial infusion chemotherapy (HAIC) with FOLFOX has shown promising results in microvascular invasion (MVI) positive hepatocellular carcinoma (HCC). We aim to develop an imaging-derived biomarker to depict HCC patients with MVI more precisely and promote individualized treatment strategies of adjuvant HAIC.

Methods: The multicenter study enrolled HCC patients with MVI positive. Imaging features were reviewed and predictors associated with RFS were determined by multivariate Cox proportional hazards regression analysis. Model performance was evaluated using the area under the receiver operating characteristic curve (AUROC). The primary endpoint was recurrence-free survival (RFS), compared by the Kaplan-Meier method with a log-rank test.

Results: A total of 758 patients were enrolled, divided into training cohort (n=470) and validation cohort (HAIC cohort [n=143], control cohort [n=145]). Independent predictors for RFS included arterial phase peritumoral enhancement, boundary of the tumor enhancement, tumor necrosis stratification, and boundary of the necrotic area, incorporated into the multivariate model. The 2-year AUROC of the model constructed for the RFS prediction was 0.83(95% CI, 0.79-0.87), 0.73 (95% CI, 0.62-0.83), 0.84(95% CI, 0.74-0.93) respectively for the training, HAIC and control cohorts. The median RFS time of low-risk groups for the above cohorts was longer than high-risk groups (all $P < 0.01$). Besides, there was no significant statistical difference between HAIC high-risk group and control group ($P = 0.61$).

Conclusion: The radiological characteristics can reflect the heterogeneity of tumors. We successfully proposed and validated the model predicting postoperative recurrence risk and guiding postoperative HAIC for HCC patients with MVI-positive

PO-1697

Quantitative evaluation of acute pancreatitis based on dual-energy computed tomography

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Purpose: To evaluate the value of dual-energy computed tomography (DECT) parameters for the quantitative diagnosis of acute pancreatitis (AP) and classification of its severity.

Methods: Patients with AP underwent a plain CT scan and three contrast-enhanced DECT scans. We analyzed the group differences in iodine concentration (IC) and slope of the spectral Hounsfield unit curve (λ_{HU}) of the three-phase enhanced scans (arterial, venous, and delayed phases).

Results: The study included 60 patients with AP (38 men and 22 women; mean age: 47.43 ± 13.47 years). Based on the CT severity index (CTSI), the patients were divided into two groups: group A (mild AP, $n = 26$) and group B (moderate/severe AP, $n = 34$). IC and λ_{HU} in the arterial and venous phases were all significantly higher in group A than in group B ($P < 0.001$) and could effectively differentiate the two groups. The areas under the curve were 0.753, 0.799, 0.774, and 0.842 for IC at arterial and venous phases and λ_{HU} at arterial and venous phases, respectively. These parameters decreased with the increases in CTSI, showing significant negative correlations, with r values between -0.569 and -0.492 ($P < 0.001$).

Conclusion: DECT imaging can quantitatively analyze AP, and the IC and λ_{HU} can be used to distinguish mild and severe cases, adding functional information to the CT morphology to determine the severity and prognosis of the disease.

PO-1698

Dual-Energy Computed Tomography Imaging in Early-Stage Hepatocellular Carcinoma: A Preliminary Study

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Purpose

Small hepatocellular carcinoma (HCC), also known as early-stage liver cancer, has no obvious clinical symptoms. Radiofrequency ablation (RFA) is typically minimally invasive and minimally invasive, but HCC recurs easily after RFA. To address this, preoperative quantification of tumor effect after RFA is important for preoperative planning and improvement of patient prognosis. Aiming at this research direction, this paper applied texture analysis combined with clinical variables to determine the tumor response of patients with small HCC after RFA, in order to obtain preoperative non-invasive imaging indicators.

Methods

A total of 63 patients with small HCC who received RFA in from August 2017 to September 2020 were included in this study. Two to four weeks after RFA, DECT scan was performed to obtain dual-phase quantitative energy spectrum parameters and clinical baseline variables. Meanwhile, 6 CT texture features are extracted by manual segmentation of energy spectrum images, and the least absolute shrinkage and selection operator (LASSO) was used for feature selection and data dimensionality reduction, and logistic regression analysis was used to establish a clinical model containing clinical variables and quantitative energy spectrum parameters, and then texture features were included to establish a clinical texture model. The ROC was used to evaluate the diagnostic efficacy of different models, and then the DCA was used to evaluate their clinical application value.

Results

A total of 6 optimal texture analysis features (CTTA) were selected by LASSO algorithm, and there was statistical difference between patients with tumor progression and patients without tumor progression ($P < 0.05$). The linear product of the 6 optimal CTTA features was used to obtain CTTA-score for each patient. When only clinical variables and energy spectrum quantitative parameters were included, the clinical model based on multivariate logistic regression analysis showed albumin-bilirubin (ALBI) grade (OR=2.77; 95% CI, 1.35 to 6.65; $P=0.010$), λ (40-100KeV) (OR=3.21; 95% CI, 3.16 to 5.65; $P=0.045$) and IC (ICAP) on AP (OR=1.25; 95% CI, 1.01 to 1.62; $P=0.028$) was associated with tumor progression within 1 year, while after inclusion of CTTA-score, clinical-texture model based on multivariate Logistic regression analysis showed ALBI (OR=2.40; 95% CI, 1.19 to 5.68; $P=0.024$), λ (40-100keV) (OR=1.43; 95% CI, 1.10 to 2.07; $P=0.019$) and CTTA-score (OR=2.98; 95% CI, 1.68 to 6.66; $P=0.001$) was an independent risk factor for tumor progression. The clinical model, clinical texture model and CTTA-score all performed well in predicting tumor progression within 1 year after RFA (AUC = 0.92, 0.96 and 0.91, respectively), and the concordance index (C-index) of clinical model and clinical-texture model was 0.917 and 0.957, respectively, and the predicted probabilities matched well with the actual probabilities.

Conclusion

The clinical prediction model constructed by energy spectrum CT parameters, texture analysis and clinical variables can predict the response of HCC patients after RFA, and provide early warning for potential tumor progression risk of post-RFA HCC patients.

Key words: energy spectrum CT; Radiomics; Radiofrequency ablation; Texture analysis; Tumor response

PO-1699

Case report: Idiopathic mesenteric phleboscrosis: clinical experience and literature review

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Abstract Content:

Background

Idiopathic mesenteric phleboscrosis (IMP) is a rare ischemic enteritis, which is characterized by extensive calcification, fibrosis and intestinal wall thickening of the branches of mesenteric veins and the venous wall of the colon wall. This disease mainly occurs in Asian population, and its etiology is still unclear. It was first named as IMP by A et al. in 2003. CT showed characteristic linear calcification of the colonic mucosa as well as the mesenteric veins and their branches. Its incidence is low, and clinicians lack of understanding of the disease, which is easy to lead to misdiagnosis, missed diagnosis and delayed treatment.

Case report

A 53-year-old male patient was admitted to the hospital due to abdominal pain with no obvious trigger for 1 week. Abdominal CT scan showed slight thickening of the intestinal wall and diffuse calcification at the edge of the intestinal canal. Gastrointestinal endoscopy showed multiple colonic submucosal protrusions. Based on the clinical manifestations, characteristic imaging findings and colonoscopy findings, the clinician diagnosed mesenteric phleboscrosis. After treatment, the patient's symptoms improved and he was discharged. Telephone follow-up at 3 months after discharge showed that the patient did not have abdominal pain, abdominal distension and other symptoms.

Conclusion

In summary, IMP has a low incidence and lack of specificity in clinical manifestations, which often leads to missed diagnosis and misdiagnosis. However, the imaging and endoscopic findings have certain characteristics. As long as clinicians improve the understanding of the disease, comprehensive medical history and related auxiliary examination results, the early diagnosis and treatment of IMP can still be achieved.

PO-1700

The diagnostic value of dual-energy CT for the preoperative T staging of gastric cancer

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Objective: To explore the diagnostic value of dual-energy CT multi-parametric and optimal energy level for preoperative T staging of gastric cancer, and assist clinical professionals in formulating appropriate treatment plans.

Methods: Patients diagnosed with gastric cancer who underwent abdominal dual-energy CT enhancement examinations from October 2021 to December 2022 at the Second Affiliated Hospital of Nantong University were collected as the research subjects. Liver VNC software was used to measure the iodine content (IC) of gastric cancer, normal gastric wall, and peritumoral fat tissue of gastric cancer, while measuring the IC of the same level of aorta, and then calculate the normalized iodine content (NIC). Mono+ technology was utilized to measure the Δ CT value of lesions in both arterial and venous phases, as well as peritumoral fat tissue, on the optimal energy level image. Applied the Syngovia Workstation post-processing workstation to obtain energy spectrum curves

of gastric cancer lesions in arterial and venous phases, as well as peritumoral fat tissue, and calculate the spectral slope. The patients were divided into T1-3 group and T4 group, and compared the differences in clinical baseline data and dual-energy CT imaging features between the two groups. Applied logistic regression analysis to explore the relevant imaging features for preoperative T staging diagnosis of gastric cancer, and constructed a Nomogram diagnostic model based on these features, then evaluated the diagnostic value of the Nomogram model for preoperative T staging of gastric cancer through ROC curve, Hosmer-Lemeshow goodness-of-fit test, calibration curve, and decision curve analysis (DCA).

Results:

1. The differences in clinical baseline data between the groups: In the T4 group, the maximum tumor diameter, ratio of low differentiation, lymph node metastasis rate, and tumor marker abnormal rate were significantly higher than those in the T1-3 group ($P<0.05$). There was no statistically significant difference in other baseline data between the groups ($P>0.05$).
2. Differences in multi-parameter of dual-energy CT between groups: the T4 group's artery and venous-phase lesion IC, perilesional fat IC, lesion NIC, and perilesional fat NIC were significantly higher than those in the T1-3 groups ($P<0.05$). The T4 group's venous-phase lesion NIC difference, perilesional fat IC difference, and perilesional fat NIC difference were significantly higher than those in the T1-3 groups ($P<0.05$), while the lesion IC difference between groups was not significant ($P>0.05$). The T4 group's spectral slope was significantly higher than that of the T1-3 groups ($P<0.05$).
3. Differences in lesion CT and Δ CT values of 40 keV monochromatic images between groups: The venous phase lesion CT value in the T4 group was significantly higher than in the T1-3 group ($P<0.05$). There was no significant difference in the arterial phase lesion CT value and Δ CT value ($P>0.05$).
4. Analysis of imaging features related to T staging: The analysis results of a univariate unconditional regression equation showed that the difference in NIC between the arterial and venous phases, the difference in NIC of the surrounding fat between the arterial and venous phases, the Δ CT value at 40 keV, and the spectral slope were imaging features related to the diagnosis of T staging ($P<0.05$). The analysis results of a multivariate unconditional regression equation showed that the difference in NIC of the surrounding fat between the arterial and venous phases was an independent imaging feature for diagnosing T staging ($P<0.05$).
5. Construction of Nomogram diagnostic model for T staging: Based on the results of logistic regression analysis, the diagnostic model for T staging was constructed by considering the arterial and venous phase lesion NIC difference, arterial and venous phase peritumoral fat NIC difference, venous phase 40 keV Δ CT value, and spectral slope. The constructed diagnostic model was visualized using Nomogram.
6. Nomogram diagnostic model evaluation for T staging: ROC results showed that the AUC of the Nomogram diagnostic model was 0.986 (95% CI: 0.961-1.000) ($P<0.01$). The Nomogram prediction model demonstrated good diagnostic efficacy, and the AUC was higher than that of the difference in NIC values of lesions during arterial and venous phases, the Δ CT value of 40 keV during the venous phase, and the spectral slope when diagnosed separately ($Z=3.16$, $P<0.01$; $Z=2.76$, $P<0.01$; $Z=2.87$, $P<0.01$). There was no significant difference in AUC between the Nomogram prediction model and the difference in NIC values of the surrounding fat during the arterial and venous phases ($Z=1.36$, $P=0.17$). The diagnostic curve of the Nomogram diagnostic model matched well with the calibration curve, and the results of the Hosmer-Lemeshow goodness-of-fit test showed $\chi^2=3.82$, $P=0.87$, $P>0.05$, indicating good diagnostic performance of the predictive model. The DCA analysis results showed that when the probability threshold for the Nomogram model diagnosing gastric cancer T staging was 0.00~0.99, patients could benefit more and the area under the curve was larger, making it suitable for clinical application.

Conclusions:

Patients with stage T4 gastric cancer show significantly higher iodine uptake parameters and spectral slope in dual-energy CT compared to patients with stage T1-3. The lesion Δ CT value of the venous phase is significantly higher in stage T4 patients than in stage T1-3 patients. The Nomogram diagnostic model constructed based on imaging features such as the difference in NIC values between arterial and venous phases, the difference in NIC values between lesion and

surrounding fat, the Δ CT value at 40 keV in the venous phase, and the spectral slope has a good diagnostic value for T4 staging.

PO-1701

Volumetric visceral fat machine learning phenotype on CT for differential diagnosis of inflammatory bowel disease

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Objectives: To investigate whether volumetric visceral adipose tissue (VAT) features extracted using radiomics and three-dimensional convolutional neural network (3D-CNN) approach are effective in differentiating Crohn's disease (CD) and ulcerative colitis (UC).

Methods: This retrospective study enrolled 316 patients (mean age, 36.25 ± 13.58 [standard deviation]; 219 men) with confirmed diagnosis of CD and UC who underwent CT enterography between 2012 and 2021. Volumetric VAT was semi-automatically segmented on the arterial phase images. Radiomics analysis was performed using principal component analysis (PCA) and the least absolute shrinkage and selection operator (LASSO) logistic regression algorithm. We developed a 3D-CNN model using VAT imaging data from the training cohort. Clinical covariates including age, sex, modified body mass index, and disease duration that impact VAT were added to the machine learning model for adjustment. The model's performance was evaluated on the testing cohort separating from the model's development process by its discrimination and clinical utility.

Results: Volumetric VAT radiomics analysis with LASSO had the highest AUC value of 0.717 (95% CI, 0.614-0.820), though difference of diagnostic performance among the 3D-CNN model (AUC = 0.693; 95% CI, 0.587-0.798) and radiomics analysis with PCA (AUC = 0.662; 95% CI, 0.548-0.776) and LASSO have not reached statistical significance (all $p > 0.05$). The radiomics score was higher in UC than in CD on the testing cohort (mean \pm SD, UC 0.29 ± 1.05 versus CD -0.60 ± 1.25 ; $p < 0.001$). The LASSO model with adjustment of clinical covariates reached an AUC of 0.775 (95% CI, 0.683-0.868).

Conclusion: The developed volumetric VAT-based radiomics and 3D-CNN models provided comparable and effective performance for the characterization of CD from UC.

PO-1702

To investigate the correlation between DCE-MRI quantitative parameters and tumor microvascular characteristics and the value of combined prediction of lymph node metastasis in cervical cancer

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Objective The objective of this study is to investigate the correlation between dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) quantitative parameters (K_{trans} , K_{ep} and V_e) and tumor microvascular characteristics of primary cervical cancer and the value of combined prediction of lymph node metastasis (LNM). **材料与方法** 回顾性分析 2015 年 1 月至 2017 年 6 月在我院病理确诊的 IB1-IIA2 期宫颈癌患者 85 例。根据术后淋巴结状态病理结果, 将患者分为 LNM 组

(43 例) 和非 LNM 组 (42 例)。从病历中收集患者的临床病理特征, 包括年龄、国际妇产科联合会 (FIGO) 2009 年分期、触诊时肿瘤最大直径、组织学类型、分化程度、淋巴血管间隙浸润 (LVSI)、基质浸润深度等。85 例宫颈癌患者在临床治疗前接受了常规 MRI 和 DCE-MRI 检查。在首席放射科医生的监督下, 一位具有 3 年经验的放射科住院医师对患者的临床和病理信息视而不见, 使用了 Tissue 4D 软件 (西门子医疗, 西门子医疗, 中国)。中国) 对 DCE 图像进行后处理, 得到原发性宫颈癌的定量 DCE-MRI 参数, 包括体积转移常数 K_{trans} (min^{-1})、间质到血浆速率常数 K_{ep} (min^{-1})、血管外至细胞外体积分数 V_e 及其图像伪彩色图像。CD34 用于标记宫颈癌组织病理切片中的微血管内皮细胞, 并利用 α 平滑肌肌动蛋白 (α -SMA) 标记微血管中的周细胞。具有 10 年工作经验的高级病理学家根据说明书对宫颈癌组织的病理切片进行了免疫组织化学双重染色。微血管密度 (MVD) 和微血管周细胞覆盖指数 (MPI) 分别用于评估宫颈癌的微血管生成和微血管成熟度。采用卡方检验和秩和检验比较 LNM 组与非 LNM 组临床病理特征、DCE-MRI 定量参数、微血管特征参数 (MVD 和 MPI) 的差异。采用 Spearman 相关法分析原发肿瘤 DCE-MRI 定量参数 (K_{trans} 、 K_{ep} 、 V_e) 与 MVD、MPI 的关系。采用二元 logistic 回归分析筛选宫颈癌 LNM 的危险因素, 并根据分析结果建立联合预测模型。采用受试者工作特征 (ROC) 曲线分析比较各参数和组合模型诊断宫颈癌 LNM 的能力。结果 1、LNM 组与非 LNM 组在 2009FIGO 期 ($p=0.019$)、LVSI ($p=0.003$) 和基质侵袭深度 ($p=0.003$) 方面存在显著差异; 两组患者年龄 ($p=0.323$)、触诊时肿瘤最大直径 ($p=0.100$)、组织学类型 ($p=0.527$)、分化程度 ($p=0.840$) 比较差异无统计学意义 ($P > 0.05$)。与非 LNM 组相比, LNM 组原发性宫颈癌 K_{trans} 值和 K_{ep} 值较高, MPI 较低 ($P < 0.001$)。LNM 组与非 LNM 组的 V_e 值和 MVD 差异无统计学意义 ($p > 0.05$)。2、Spearman 相关分析表明, DCE-MRI 的所有定量参数均与 MVD 不相关 ($p > 0.05$)。DCE-MRI 定量参数 K_{trans} 和 K_{ep} 与 MPI 呈负相关 ($r=-0.410$, $p < 0.001$; $r=-0.314$, $p=0.003$), V_e 与 MPI 无显著相关性 ($p > 0.05$)。3、二元 logistic 回归分析显示, LVSI、基质浸润深度、 K_{trans} 、 V_e 和 MPI 是宫颈癌 LNM 的危险因素。ROC 曲线分析显示, 2009FIGO 期曲线下面积 (AUC)、LVSI、基质侵袭深度、 K_{trans} 、 V_e 和 MPI 预测 LNM 分别为 0.614 (0.494~0.734)、0.660 (0.543~0.777)、0.645 (0.526~0.763)、0.779 (0.680~0.877)、0.731 (0.625~0.837) 和 0.781 (0.681~0.881)。利用上述危险因素构建的组合模型预测 LNM 的 AUC 为 0.894 (0.828~0.960), 最佳诊断临界值为 0.497, 敏感性为 86.0%, 特异性为 81.0%, 高于任何单个参数。结论 1、宫颈癌微血管的成熟度可能与 LNM 有关, 宫颈癌组织术前病理微血管染色可能有助于评估 LNM 的状态。2、原发性宫颈癌 DCE-MRI 定量参数可在一定程度上反映肿瘤微血管的成熟度, 术前盆腔 DCE-MRI 检查有助于预测 LNM。3、与单独的 DCE-MRI 定量参数或微血管特征参数相比, 由临床病理特征、DCE-MRI 定量参数和微血管成熟度参数组成的组合模型在预测宫颈癌 LNM 方面具有更好的诊断效果。

PO-1703

Preliminary Study of Functional Magnetic Resonance Imaging in Evaluating Pathological Features and Hypoxic Microenvironment of Cervical Squamous Cell Carcinoma

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Abstract

Objective To evaluate the correlation of quantitative parameters of dynamic contrast-enhanced magnetic resonance (DCE-MR) and diffusion-weighted imaging (DWI) with the pathological features and the expression of hypoxia-inducible factor 1- α (HIF-1 α) in patients with cervical squamous cell carcinoma (CSCC).

Methods A total of 81 patients with CSCC in Liaoning Cancer Hospital & Institute from 2015 to 2017 were retrospectively included. According to FIGO 2009 clinical stage, 53 cases were stage IB,

27 cases were stage IIA, and 1 case was stage IIB. CSCC was confirmed as by biopsy. The patients examine enhanced computed tomography (CT) scan, pelvic magnetic resonance (MR) scan, diffusion-weighted imaging (DWI) and dynamic enhanced magnetic resonance imaging (DCE-MRI) before treatment. The patient's age, clinical stage, lymph node metastasis (LNM), lymphovascular space invasion (LVSI), deep stromal invasion (DSI) and differential degree (DD) were collected. Measure DCE-MR parameters (Ktrans, Kep and Ve) and ADC values. HIF-1 α expression and Ki-67 expression were obtained by immunohistochemistry. The differences of HIF-1 α expression and Ki-67 expression between patients with or without lymph node metastasis, vascular tumor thrombus, interstitial infiltration depth and pathological differentiation were compared by rank sum test. The diversity of DCE-MRI quantitative parameters Ktrans, Kep, Ve and DWI parameters ADC values between groups with or without lymph node metastasis, vascular tumor thrombus, interstitial infiltration depth and pathological differentiation were compared by rank sum test. DCE-MRI quantitative parameters Ktrans, Kep, Ve and DWI parameters ADC values and HIF-1 α expression, Ki-67 expression were analyzed by non-parametric Spearman correlation analysis, using SPSS 25.0 software, $P < 0.05$. The difference was statistically significant.

Result 1. HIF-1 α expression: 12 patients (14.8%) had score 0, 2 patients (2.5%) had score 1, 11 patients (13.6%) had score 2, 6 patients (7.4%) had score 3, 18 patients (22.2%) had score 4, 25 patients (30.9%) had score 6, and 7 patients (8.6%) had score 9. Low expression was observed in 49 patients (60.5%) and high expression in 32 patients (39.5%). Ki-67 expression: $< 50\%$: 52 (64.2%), $\geq 50\%$: 29 (35.8%)

2. In The expression of HIF-1 α in CSCC patients was significantly different between groups with or without LNM ($P=0.007$), LVSI ($P=0.002$), DSI ($P=0.003$) and DD ($P=0.021$). Patients with LNM, HIF-1 α expression was higher; in patients with lymphovascular space invasion, HIF-1 α expression was higher than that in patients without vascular tumor thrombus; the deeper the deep stromal invasion, the higher the HIF-1 α expression; and the lower the differential degree, the higher the HIF-1 α expression. Ki-67 expression was different between lymph node metastasis and non-metastasis groups ($P = 0.005$), and Ki-67 expression was higher in patients with lymph node metastasis than in those without lymph node metastasis; Ki-67 expression was different between groups with stromal invasion depth $\geq 1/2$ and stromal invasion depth $< 1/2$ ($P = 0.017$), and the deeper the depth of stromal invasion, the higher the Ki-67 expression. There was no significant difference in Ki-67 expression between the group with vascular tumor thrombus and the group without vascular tumor thrombus and between the poorly differentiated, moderately differentiated, and well differentiated groups ($P > 0.05$).

3. The Ktrans ($P=0.001$) was significantly different between non-LNM and LNM groups. The other DCE and DWI parameters had no significant difference between the groups with or without LNM, LVSI, DSI and DD ($P>0.05$).

4. HIF-1 α was positively correlated with Ki-67 ($r=0.249$, $P=0.025$). HIF-1 α was positively correlated with Ktrans and Kep ($r=0.478$, $r=0.388$, $P=0.001$). There was no correlation between HIF-1 α expression and Ve, ADC value. There was no correlation between Ki-67 expression and Ktrans, Kep and Ve. Ki-67 expression was negatively correlated with ADC ($r = -0.359$, $P = 0.001$).

Conclusion 1. HIF-1 α is associated with LNM, LVSI, DSI and DD of cervical squamous cell carcinoma. Patients with LNM and LVSI, deeper the deep stromal invasion, and cervical squamous cell carcinoma with lower differential degree has a greater degree of malignancy, more severe tumor hypoxia, and higher HIF-1 α expression.

2. Ki-67 is related to lymph node metastasis and depth of stromal invasion in cervical squamous cell carcinoma. Cervical squamous cell carcinoma with deep stromal invasion has a high degree of malignancy, the more significant the cell proliferation, and the higher the Ki-67 expression. Ki-67 expression was positively correlated with HIF-1 α expression, and hypoxia was more pronounced in tumors with significant cell proliferation.

3. Functional magnetic resonance imaging parameters can predict HIF-1 α and Ki-67 expression, and then assess the hypoxic microenvironment of the cervical squamous cell carcinoma.

PO-1704

Feasibility of 3D magnetic resonance elastography for assessing cervical stiffness in healthy and diseased participants

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Background: The feasibility and reproducibility of three-dimensional magnetic resonance elastography (3D-MRE) in evaluating cervical stiffness in healthy individuals and patients with cervical disease have not been extensively investigated.

Objective: This prospective study aimed to assess the feasibility of 3D-MRE in quantifying cervical stiffness and explore its potential application in characterizing cervical diseases, including cervical cancer and cervical insufficiency.

Methods: A total of twenty-five healthy volunteers and thirteen patients with cervical disease (five with cervical cancer and eight with non-pregnant cervical insufficiency) were enrolled in this prospective study between October 2021 and April 2023. 3.0-T MRE was conducted at frequencies of 40, 60, 80, and 100 Hz. Image quality was evaluated using the image quality score (IQS), and cervical stiffness of four subregions in healthy volunteers and different cervical conditions were measured. Statistical analysis included assessing inter- and intra-rater agreement levels using intraclass correlation coefficients (ICC) and Cohen's kappa coefficient (κ). The Kruskal-Wallis rank sum test followed by Dunn's multiple comparison were employed to compare image quality scores and cervical stiffness between groups.

Results: Among the 38 individuals across 142 subregions, image quality scores exhibited significant differences at different vibration frequencies, with scores significantly higher at 40 Hz (3 [2-3]) and 60 Hz (2 [2-3]) compared to 80 Hz (1 [1-1]) and 100 Hz (1 [1-1]). Excellent inter- and intra-observer agreement was observed at 40 Hz and 60 Hz (ICC: 0.83-0.95; IQS: 0.85-0.89). The inner subglandular zone exhibited significantly higher stiffness than the outer stroma at both 40 Hz and 60 Hz frequencies, while the supravaginal portion demonstrated higher stiffness compared to the vaginal portion at 40 Hz. Healthy subjects exhibited higher mean shear stiffness values at 40 Hz (1.48 [1.31-1.57] kPa) and 60 Hz (3.16 [2.92-3.44] kPa) than individuals with cervical incompetence (1.24 [1.10-1.34] kPa at 40 Hz, 2.86 [2.62-3.07] kPa at 60 Hz) ($P < 0.05$), but lower values than those with cervical cancer (2.4 [2.3-2.6] kPa at 40 Hz, 4.7 [3.9-5.5] kPa at 60 Hz) ($P < 0.05$).

Conclusions: Our prospective study demonstrates that 3D-MRE at 40 Hz and 60 Hz is a feasible and reproducible method for quantifying spatial stiffness differences in cervical subregions. Furthermore, it holds promise for characterizing cervical diseases such as cervical cancer and cervical insufficiency.

PO-1705

Prediction of Fuhrman grade of renal clear cell carcinoma by multimodal MRI radiomics: a retrospective study

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Purpose: To explore the value of multimodal MRI radiomics combined with traditional radiologist-defined semantic characteristics and conventional (CMR) and functional MRI (FMR) texture features in predicting Fuhrman grade of clear cell renal cell carcinoma (ccRCC).

Materials and Methods: The data of 89 patients with pathologically proven ccRCC (low-grade, 54; high-grade, 35) were collected. Texture features were extracted from CMR (T1 and T2 weighted imaging) and FMR (Dixon-MR, BOLD-MR, and SWI) images, and the traditional characteristics (TC) were evaluated. Logistic regression analysis was performed to develop models based on TC, CMR, and FMR texture features for grading. ROC curve analysis and leave-group-out cross-validation (LGOCV) were performed to test the reliability of combined models.

Results: Two T2 weighted imaging-based, two Dixon_W-based, one Dixon_F-based, one BOLD-based, and three SWI-based texture features, and three TC were extracted for feature selection. TC, CMR, FMR, CMR+FMR, CMR+TC, FMR+TC, and CMR+FMR+TC models were constructed. The AUC of the CMR+FMR+TC model for differentiating high- from low-grade ccRCC was 0.74, with 81.42% accuracy, 75.93% sensitivity, and 91.43% specificity. The FMR+TC model exhibited a performance similar to that of the CMR+FMR+TC model ($P > 0.05$). The AUCs of the FMR+TC and CMR+FMR+TC models were significantly higher than those of the other five models (all $P < 0.05$). For the CMR+FMR+TC model, the mean accuracy was 85.40% after 100 LGOCV for the test sets.

Conclusion: Multimodal MRI radiomics combined with TC, CMR, and FMR texture features may be a reliable quantitative approach for differentiating high-grade ccRCC from low-grade ccRCC.

PO-1706

Radiogenomics of clear cell renal cell carcinoma and non-clear cell renal cell carcinoma: Associations between multimodal MRI texture features and mutations

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Purpose: To investigate the associations between genetic mutations and MRI texture features and the biological processes on the mutation genes.

Methods: Third-one patients with pathologically proven renal cell carcinoma (ccRCC 19; n-ccRCC, 12) were included. Texture features were extracted from T1-weighted, T2-weighted, Dixon-MR, cortical-medulla phase (CMP), nephrographic phase (NGP), and delayed phase (DEP) images. The correlation between mutation genes with texture features were analyzed. Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway annotation analysis was performed.

Results: In the ccRCC group, PTEN mutation was correlated with DE_Phase_InverseDifferenceMoment_angle0_offset7. In the non-ccRCC group, SETD2 mutation was correlated with CMP_InverseDifferenceMoment_AllDirection_offset1 and Dixon_W_InverseDifferenceMoment_AllDirection_offset7, PBRM1 mutation was correlated with DEP_InverseDifferenceMoment_angle0_offset7 and DEP_HaraVariance, and FAT1 mutation was correlated with DEP_HaraVariance and NGP_Inertia_angle135_offset4. The KEGG pathway annotation analysis showed that the mechanisms of the mutation genes that correlated with MRI texture features in the ccRCC group were related to the p53 signaling pathway, inositol phosphate

metabolism, central carbon metabolism in cancer, EGFR tyrosine kinase inhibitor resistance, PD-L1 expression and PD-1 checkpoint pathway in cancer, and phosphatidylinositol signaling system. The mutation genes that correlated with MRI texture features in the non-ccRCC group were mainly associated with lysine degradation.

Conclusion: This study showed associations between MRI texture features and underlying genetic mutations of ccRCC as well as n-ccRCC, and revealed the potential biological processes.

PO-1707

Diffusion kurtosis versus diffusion-weighted MRI in differentiating clear cell renal cell carcinoma and renal angiomyolipoma with minimal fat: a comparative study

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Objective: To quantitatively compare the diagnostic values of conventional diffusion-weighted imaging (DWI) and diffusion kurtosis imaging (DKI) in differentiating clear cell renal cell carcinoma (ccRCC) and renal angiomyolipoma with minimal fat (RAMF).

Methods: Sixty-eight patients with ccRCC and 18 patients with RAMF were retrospectively studied. For DKI and ADC, respiratory triggered echo-planar imaging sequences were acquired in axial plane (three b-values: 0, 1000, 2000s/mm²) and (one b-value: 2000s/mm²). Mean Diffusivity (MD), fractional Anisotropy (FA), mean kurtosis (MK), kurtosis anisotropy (KA), radial kurtosis (RK) and apparent diffusion coefficient (ADC) were performed. The diagnostic efficacy of various diffusion parameters for predicting ccRCC and RAMF was compared.

Results: The ADC and MD values of ccRCCs were higher than those of RAMFs ($p < 0.05$), while comparable FA, MK and KA values were found between ccRCCs and RAMFs ($p > 0.05$). Moreover, the RK values of RAMFs were higher than those of ccRCCs ($p < 0.05$). ROC curve analyses showed that MD values had the highest diagnostic efficacy in differentiating ccRCCs from RAMFs. For pairwise comparisons of ROC curves and diagnostic efficacy, ADC was worse than DKI analysis ($p < 0.05$).

Conclusion: DKI analysis performs better than ADC analysis in differentiating ccRCC and RAMF.

PO-1708

A Comprehensive Prediction Model Based on MRI Radiomics to Predict Tumor Therapeutic Response After Neoadjuvant Chemoradiotherapy in Rectal Cancer

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Rationale and Objectives: To establish a prediction model for the efficacy of neoadjuvant chemoradiotherapy (nCRT) in patients with locally advanced rectal cancer (LARC), using pre-treatment magnetic resonance imaging (MRI) multi-sequence image features and clinical parameters.

Materials and Methods: Patients with clinicopathologically confirmed LARC were included (training and validation datasets, $n=100$ and 27 , respectively). Clinical data of patients were collected retrospectively. We analyzed MRI multi-sequence imaging features. The tumor regression grading (TRG) system proposed by Mandard et al was adopted. Grade 1-2 of TRG was a good response group, and grade 3-5 of TRG was a poor response group. In this study, a clinical model, a single

sequence imaging model, and a comprehensive model combined with clinical imaging were constructed respectively. The area under the subject operating characteristic curve (AUC) was used to evaluate the predictive efficacy of clinical, imaging, and comprehensive models. The decision curve analysis method evaluated the clinical benefit of several models, and the nomogram of efficacy prediction was constructed.

Results: The AUC value of the comprehensive prediction model is 0.99 in the training data set and 0.94 in the test data set, which is significantly higher than other models. Radiomic Nomo charts were developed using Rad scores obtained from the integrated image omics model, CRM, DoTD, and CEA. Nomo charts showed good resolution. The calibrating and discriminating ability of the synthetic prediction model is better than that of the single clinical model and the single sequence clinical image omics fusion model.

Conclusion: Nomograph, based on pre-treatment MRI image characteristics and clinical risk factors, has the potential to be used as a non-invasive tool to predict outcomes in patients with LARC after nCRT.

PO-1709

GSI-Deep learning image reconstruction to improve accuracy of iodine quantification and image quality in Spectral CT of the abdomen: preliminary clinical application study

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*Purpose: To investigate the effect of Gemstone Spectral Imaging with DLIR on the accuracy of iodine quantification and image quality of Spectral Computed Tomography compared to that of other reconstruction algorithms in an abdominal clinical study.

*Methods and Materials: Contrast-enhanced CT of the abdomen in clinical patients with x-ray source switches rapidly between 80 kVp and 140 kVp DECT (Revolution Apex Platform). All images were reconstructed using 50% iterative reconstruction (50% ASIR-V), and GSI-DLIR algorithms. Measured and nominal iodine concentrations were compared among the algorithms. In arterial and portal venous phase images, iodine concentration, image noise, and coefficients of variation for four locations were retrospectively compared among the algorithms. One-way repeated-measures analyses of variance were used to evaluate differences in the iodine concentrations, SD, coefficients of variation, and percentages of error among the algorithms.

*Results: 26 clinical patients enrolled in this study, iodine concentrations were equivalent among the algorithms for each location (all $p > 0.99$). Image noise and coefficients of variation were lower with GSI-DLIR than with 50% ASIR-V algorithms ($p < 0.05$).

*Conclusions: TrueFidelity for GSI reduced image noise and variability of iodine concentration values compared with 50% ASIR-V in the spectral CT

PO-1710

TrueFidelity for contrast-enhanced CT of the upper abdomen: similar image quality with lower radiation dose in direct comparison with ASIR-V

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***Purpose:** To evaluate the effect of a commercial deep learning algorithm on the image quality of chest CT, focusing on the upper abdomen.

***Methods and Materials:** 36 consecutive patients who simultaneously underwent contrast-enhanced chest and abdominal CT were collected. The radiation dose was optimized for each scan (mean CTDIvol: chest CT, 2.89 ± 1.21 mGy; abdominal CT, 5.88 ± 1.31 mGy). Three image sets were collected: chest CT reconstructed with 50% ASIR-V-chest, chest CT with DLIR-chest-H, and abdominal CT with 50% ASIR-V-abo. Afterwards, the images covering the upper abdomen were extracted, and image noise, the SNR and CNR were measured. For subjective evaluation, three senior radiologists independently assessed noise, spatial resolution, presence of artifacts, and overall image quality. Additionally, readers selected the most preferable reconstruction technique among three image sets for each case.

***Results:** The average measured noise for DLIR-chest-H, 50% ASIR-V-chest, and 50% ASIR-V-abo was 7.21 ± 2.12 , 14.6 ± 2.21 , 12.8 ± 2.26 , respectively ($p < 0.05$). DLIR also showed the best SNR and CNR ($p < 0.05$). However, in the subjective analysis, 50% ASIR-V-abo showed less subjective noise than DLIR-chest-H (2.52 ± 0.18 vs. 2.68 ± 0.21 ; $p < 0.05$), while DLIR-chest-H showed better spatial resolution (2.42 ± 0.21 vs. 2.38 ± 0.28 ; $p < 0.05$). 50% ASIR-V-abo showed a better overall image quality ($p < 0.05$), but two of the three readers preferred DLIR-chest-H more frequently.

***Conclusions:** With $< 50\%$ of the radiation dose, DLIR-chest-H showed comparable image quality in the upper abdomen to that of dedicated abdominal CT and was preferred by most readers.

PO-1711

Gadoxetate-enhanced Abbreviated MRI for Hepatocellular Carcinoma Surveillance in At-Risk Patients: A multi-center Study in China

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Objective To evaluate the diagnostic performance of three different abbreviated MRI (AMRI) sets extracted from a complete gadoxetic acid (Gd-EOB-DTPA)-enhanced MRI for hepatocellular carcinoma (HCC) surveillance in at-risk patients.

Methods This retrospective multi-center study in China enrolled 251 consecutive patients from 3 different hospitals (137 males and 114 females; mean age, 56 years) with chronic hepatitis B or C virus infection and/or cirrhosis who underwent Gd-EOB-DTPA-enhanced MRI for HCC surveillance from 2020 through 2023. Three AMRI sets were extracted from the complete Gd-EOB-DTPA-enhanced MRI: non-contrast abbreviated MRI (NC-AMRI) including T2-weighted imaging (T2WI)

and diffusion-weighted imaging (DWI); dynamic-AMRI (Dyn-AMRI) including early and late arterial phases (AP), portal venous phase (PVP), and DWI; and Hepatobiliary phase AMRI (HBP-AMRI) including T2WI, DWI, and HBP. MR images were independently reviewed by two abdominal radiologists. Each eligible patient was classified as HCC positive/HCC negative based on the reference standard. Per-lesion diagnostic sensitivity, specificity, and accuracy of each AMRI set were compared by using Cochran's Q test.

Results Totally 298 lesions were detected in the 251 included patients, 104/251 patients with HCC (prevalence, 41.4%; mean size, 17.30 ± 10.06 mm). The sensitivity (Cochran's Q=11.511, $P=0.003$), specificity (Cochran's Q=6.333, $P=0.042$), and accuracy (Cochran's Q=134.224, $P<0.001$) of three AMRI sets were statistically significant (P all <0.05). Compared with NC-AMRI, Dyn-AMRI and HBP-AMRI had significantly higher sensitivity and accuracy from post hoc tests (all $P<0.05$). However, post hoc test comparisons among three sets of AMRI indicated no significant differences in specificity between any two AMRI sets (all $P>0.05$). Moreover, post hoc test comparisons demonstrated that the accuracy of Dyn-AMRI or HBP-AMRI was significantly higher than that of NC-AMRI (all $P<0.001$). The value of area under curve (AUC) for each AMRI set were 0.748 (95% CI, 0.694-0.796), 0.856 (95% CI, 0.810-0.893), and 0.859 (95% CI, 0.814-0.896), respectively.

Conclusion AMRI may offer an alternative option for HCC surveillance/screening to support the growing at-risk population. HBP-AMRI set, the combination of T2WI, DWI, and HBP has a considerable sensitivity and diagnostic accuracy equivalent to Dyn-AMRI as an acceptable regimen for HCC surveillance/screening in at-risk patients.

PO-1712

Collateral vessels on preoperative enhanced computed tomography for predicting high WHO/ISUP grade in ccRCC

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Objectives: To retrospectively evaluate the association between the presence of collateral vessels and grade of clear cell renal cell carcinoma (ccRCC) and whether the presence of collateral vessels could serve as a predictor to differentiate high- and low-grade ccRCC.

Materials and Methods: Between May 2018 to September 2022, a total of 160 ccRCC patients with pathological diagnosis were enrolled in this study. Patients were divided into a high-grade group and a low-grade group according to WHO/ISUP grading system. Multivariate logistic regression analyses were performed to determine independent factors among clinical and CT features. The predictive performance of collateral vessels on WHO/ISUP grade was calculated. Furthermore, to investigate the additional predictive contribution of collateral vessels, a primary model and a control model were constructed to predict WHO/ISUP grade.

Results: The proportion of ccRCC patients with collateral vessels was significantly larger in high-grade ccRCC than those in low-grade ccRCC (87.5% vs. 26.8%, $P<0.001$). Multivariate logistic regression analyses shown that the presence of collateral vessels was an independent predictor for high WHO/ISUP grade ($P<0.001$). The sensitivity and specificity of the presence of collateral vessels for differentiating high- and low-grade ccRCC were 87.5% and 73.2% respectively. Including collateral vessels in predictive model improves predictive performance for WHO/ISUP grade, increasing the area under the curve (AUC) value from 0.889 to 0.914.

Conclusion: The presence of collateral vessels has high sensitivity and specificity for differentiating high- and low-grade ccRCC and can improve the predictive performance for high WHO/ISUP grade.

PO-1713

The Value of High-resolution MRI in The Diagnosis of Adjacent Organ Invasion in Middle and Lower Rectal Tumors Involving Anterior Wall

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Purpose:

Infiltration of adjacent organs determines neoadjuvant treatment options and extent of surgical resection. This study prospectively explored the diagnostic value of high-resolution magnetic resonance imaging for adjacent organ infiltration in middle and lower rectal tumors involving anterior wall, and its role in accurate preoperative staging.

Methods and Materials

This study was approved by Medical Ethics Center of West China Hospital. The inclusion criteria included middle and lower primary rectal adenocarcinoma involving anterior wall who performed MRI and radical surgery. The exclusion criteria included incomplete clinical, pathological and imaging data of the patients and poor image quality. From September 2021 to December 2022, 50 patients were finally enrolled. Conventional MRI combined with 3D T2 CUBE sequence and HR 3D T1 LAVA sequence constituted high-resolution MRI. Assessment contained infiltration of adjacent organs, subjective image quality scores, preoperative T staging. The weighted kappa test was applied to compare the consistency of adjacent organ infiltration. Rank sum test was used for grade variables, and chi-square test was used for dichotomous variables. When $p < 0.05$, the difference was statistically significant.

Results:

For adjacent organ infiltration, there was a strong degree of consistency between high-resolution MRI group and pathology, with a kappa value of 0.878 ($p < 0.05$). The high-resolution MRI group achieved a negative predictive value and sensitivity of 100%, accuracy of 98%, specificity of 97.8% and a positive predictive value of 80%. The conventional MRI group had poor consistency with pathology. In the conventional MRI group, the negative predictive value was the highest (94.7%), followed by the specificity (78.3%), accuracy (76%), sensitivity (50%), and positive predictive value (16.7%). For preoperative T staging, there was a strong degree of consistency between the high-resolution MRI group and the pathology, with a kappa value of 0.867 ($p < 0.05$). In the high-resolution MRI group, the overall T staging accuracy was 92%. For preoperative T staging, the degree of consistency between the conventional MRI group and the pathology was general, with a kappa value of 0.217 ($p < 0.05$). In the conventional group, the overall accuracy of T staging was 40%.

Conclusion:

High-resolution MRI was of high diagnostic value in the evaluation of adjacent organ infiltration and preoperative staging of the middle and lower rectal tumor involving anterior wall.

PO-1714

Dual-Energy Computed Tomography Iodine Imaging Combined with Laboratory Data for Preoperative Evaluation of Microvascular Invasion in Patients with Hepatocellular Carcinoma: A Two-Center Study

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Objectives Microvascular invasion (MVI) is a recognized biomarker associated with poorer prognosis in patients with hepatocellular carcinoma (HCC). Dual-energy computed tomography (DECT) is a highly sensitive technique that can determine the iodine concentration (IC) in tumor and provide an indirect evaluation of internal microcirculatory perfusion. This study aimed to assess whether the combination of DECT with laboratory data can improve preoperative MVI prediction.

Methods This retrospective study enrolled 119 patients who underwent DECT liver angiography at two medical centers preoperatively. To compare DECT parameters and laboratory findings between MVI-negative and -positive groups, Mann-Whitney U test was employed. Additionally, principal component analysis (PCA) was conducted to determine fundamental components. Mann-Whitney U test was applied to determine whether the PC scores varied across MVI groups. Finally, a general linear classifier was used to assess the classification ability of each PC score.

Results Significant differences were noted ($P < 0.05$) in AFP level, normalized arterial phase IC, and normalized portal phase IC between the MVI groups in the primary and validation datasets. The PC1–PC4 accounted for 67.9% of the variance in the primary dataset, with loadings of 24.1%, 16%, 15.4%, and 12.4%, respectively. In both primary and validation datasets, PC3 and PC4 were significantly different across MVI groups, with area under the curve values of 0.8410 and 0.8373, respectively.

Conclusion Both bilirubin parameters and the intratumoral IC in the arterial phase were considered important for MVI analysis.

PO-1715

The value of H2O based automated machine learning in predicting microvascular infiltration in hepatocellular carcinoma

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[Abstract] **Objective** This study is to explore the application value of H2O automated machine learning (AutoML) in predicting microvascular invasion (MVI) in hepatocellular carcinoma (HCC) patients preoperatively. Additionally, the study aims to provide visual explanations for the model. **Method** Retrospective analysis of clinical data and contrast-enhanced CT images of 121 patients confirmed as HCC postoperatively. The patients were divided into positive and negative groups based on the presence or absence of MVI, and the intergroup differences were analyzed. Multiple machine learning algorithms for predicting HCC MVI were established using the H2O AutoML framework. The receiver operating characteristic (ROC) curve was plotted for the best model, and the area under the curve (AUC) was calculated. Moreover, important variables were visualized, and the Shapley Additive Explanation (SHAP) algorithm was used for local explainability analysis of the optimal model. **Results** The AFP levels and tumor maximum diameter were significantly higher in the MVI-positive group than in the MVI-negative group ($P < 0.05$). The best model built using the H2O AutoML framework was the Gradient Boosting Machine (GBM) model, with an AUC of 0.856, Gini of 0.712, R^2 of 0.319, and LogLoss of 0.505 in the training set. In the validation set, the model achieved an AUC of 0.637. The most important variables in the model were tumor shape, followed by tumor number, AFP, age, and tumor maximum diameter. The SHAP force plot and waterfall plot visualized the feature impacts on the GBM model's predictions of MVI. **Conclusion**, the HCC MVI prediction model built using the H2O AutoML framework demonstrated good performance and allowed for individual-level visual interpretation of the features, promoting its application in clinical practice.

PO-1716

MR radiomics to predict microvascular invasion status and biological process in combined hepatocellular carcinoma-cholangiocarcinoma.

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Objectives To establish a robust MRI-based radiomics model for predicting MVI (microvascular invasion) status of combined hepatocellular carcinoma-cholangiocarcinoma (cHCC-CCA), and to investigate the biological process underlying the radiomics model.

Methods The study consisted of one retrospective dataset and one prospective dataset from two hospitals. Uni- and multivariate logistic regression analyses were employed to develop the clinical-imaging model, while radiomic features were extracted to construct a radiomics model. The prediction models were built based on the training set, and their diagnosis performance was validated in the validation set and test set. The prognostic aspects of the radiomics model were investigated using Kaplan-Meier method and log-rank test. Additionally, differential gene expression analysis and Gene Ontology (GO) analysis were conducted to explore the biological processes underlying the radiomics model based on RNA sequencing data.

Results Among 82 patients (mean age, 56.7 ± 10.4 ; 67 men) including in the radiomics modeling, 38 (46.3%) were confirmed as MVI-positive. The radiomics model included 26 radiomic features and exhibited good performance in predicting MVI status, with the area under the curve (AUC) of 0.953, 0.873 and 0.779 in training set, validation set and test set, respectively. Recurrence-free survival (RFS) and overall survival (OS) were, marginally or significantly, different between the predicted MVI-negative and MVI-positive groups (median RFS: 18 vs. 10.5 months, $p = 0.100$; median OS: 25 vs. 18 months, $p = 0.006$). Radiogenomic analysis revealed associations between the radiomics model and biological processes involved in regulating immune response.

Conclusions A robust MRI-based radiomics model was established for predicting MVI status in cHCC-CCA. The model demonstrated good diagnostic performance and potential prognostic value. Additionally, the study revealed potential biological processes that regulate immune response underlying the radiomics model through GO analysis.

PO-1717

MR imaging findings of stage I intravenous leiomyomatosis: A Retrospective Single-Center Study in 19 Cases

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Objectives: To explore the magnetic resonance imaging (MRI) presentation and diagnostic value of stage I intravenous leiomyomatosis (IVL).

Materials and methods: Clinical, immunohistochemical, and MRI features of 19 cases of stage I IVL confirmed by surgical pathology were collected, and MRI features emphasized on the tumor size, complication, parauterine infiltration, T1WI, T2WI, contrast-enhanced T1WI, DWI, and ADC values were retrospectively analyzed.

Results

1. MRI findings

The MRI finding data were summarized in Table 1. All 19 cases of IVL were located within the myometrium or parametrium (figure 2), with an average diameter of 11.2 ± 4.8 cm. Among the cases, 14 (74%) were found to have combined leiomyoma (Figure 3), while 6 cases (32%) involved the broad ligament (Figure 4). Tortuous vessels were observed within or next to the lesion in 17 cases

(89.3%), and multiple intravascular cord-like filling defects were observed in 11 cases (57.9%) on T2WI (Figure 5). The mean ADC value was $1.771 \times 10^{-3} \text{ mm}^2/\text{s}$, which did not differ significantly from the normal myometrial ADC value ($1.473 \times 10^{-3} \text{ mm}^2/\text{s}$) ($p > 0.05$). Isointensity was observed in 14 cases (73.7%) on T1WI, while 5 cases (26.3%) showed slightly hypointensity. On T2WI, iso- or hyperintensity was observed in 4 cases (21.1%), and slightly hyperintensity was observed in 15 cases (78.9%). Table 3 showed that there is a significant difference between the normalized T2WI signal of IVL and myometrium ($p < 0.001$).

2. Clinical, histopathology and follow-up

The patients of stage I IVL ranged in age from 33 to 66 years, with a mean age of 46 ± 7.6 years. Among the cases, four presented with prolonged menstruation, 3 with increased menstruation, 14 with concomitant leiomyoma, and 12 with uterine masses detected through physical examination (Table 1). Immunohistochemical data were available for 17 out of 19 patients diagnosed with IVL. Positive expression of estrogen and progesterone receptors was observed in all 17 patients. Additionally, smooth muscle marker (SMA) expression was positive in 12 patients (70.6%), while Desmin and Caldesmon expression was positive in 14 patients (82.4%). CD10 expression was negative in 10 patients (58.8%) and focally positive in 5 patients (29.4%). CD31 and CD34 expression were positive in 15 patients (88.2%). Ki67 was $\leq 5\%$ in 14 patients (82.4%) (Table 2).

3. Correlation between ADC values and tumor cell density

Pearson correlation analysis was used to analyze the correlation between ADC values and tumor cell density. The results showed that there was a negative correlation between them. $r = -0.946$, $p < 0.001$ (Figure 6).

Conclusion

The pathogenesis of IVL remains unclear, with two main theories attempting to explain its etiology. One theory suggests that the tumor originates directly in the venous wall, while the other theory proposes that it is the result of vascular invasion by the primary tumor caused by leiomyoma[15]. Our study presents immunohistochemical findings that show a 100% rate of positive estrogen and progesterone receptors, which partly confirms the idea that IVL originates from the uterus and is an estrogen-dependent tumor. Additionally, 70.6% of patients exhibited positive smooth muscle marker (SMA) expression, and 82.4% exhibited positive Desmin and Caldesmon expression, indicating that IVL shares molecular cytogenetic features with leiomyoma. Ki-67 was $\leq 5\%$ in 82.4% of patients, suggesting that IVL has a low degree of malignancy despite sharing some biological behavior with malignant tumors. CD34 expression was positive in 88.2% of patients, while CD10 expression was negative in 58.8% and focally positive in 29.4%, indicating that the tumor originated from smooth muscle cells rather than endometrial mesenchymal cells or vascular endothelial cells[11]. Furthermore, 14 cases (74%) in our study were combined with leiomyoma, supporting the idea that stage I IVL is a result of vascular invasion by leiomyoma.

Studies have indicated that the clinical presentation of IVL confined to the uterus and parametrium resembles that of leiomyoma, with altered menstrual periods being the most common symptom. This can include increased menstrual flow (32%), prolonged periods (38%), or abnormal uterine bleeding (33.3%). Larger masses can lead to compression symptoms such as pelvic masses (42%), pelvic pain (6.6%), abdominal pain and distention (6.6%), urinary frequency (5%), constipation, lumbar pain, and even hydronephrosis[9, 16-18]. In this study, all 19 patients had stage I IVL, with 11 cases (57.9%) presenting with prolonged periods and increased menstruation and 6 cases (31.6%) having no obvious clinical manifestations, which is consistent with the 30% reported in the literature[6, 11].

The treatment of IVL is based on surgical resection, and complete tumor resection is the key to successful treatment. For stage I IVL, hysterectomy and bilateral oophorectomy are commonly performed. Ma et al. reported an absence of postoperative complications in stage I patients, in contrast to 34.1% (14/41) of stage II-IV patients who experienced complications[6]. In our study, all 19 IVL patients achieved a favorable outcome following hysterectomy and bilateral oophorectomy, with no postoperative complications observed. Nonetheless, one case (5.2%) exhibited recurrence during follow-up. In a larger cohort of 166 patients with stage I IVL, Peng et al. reported a recurrence rate of only 5.4%[9]. In a systematic review by Lim et al., the recurrence rate for stage I IVL was 4.8%[16]. By contrast, Yu et al. observed that 31% (18/58) of patients relapsed, of which 31 had tumor extension to the inferior vena cava and heart[19]. Tumor recurrence was found to be

correlated with the extent of the preoperative tumor and the involvement of large veins. The postoperative recurrence rate noted in our study was in general agreement with those reported in the literature. Given the paucity of imaging studies and atypical early clinical presentation in IVL, the timely and accurate diagnosis of stage I IVL through MRI is paramount to achieving favorable patient outcomes. IVL often lacks typical ultrasonographic and CT imaging features, making it difficult to distinguish from leiomyoma, particularly in small intramural lesions, which may result in misdiagnosis using ultrasonography. MRI has significant diagnostic value for stage I IVL in the following ways[20-22].

First, previous reports indicated that about 25.9% of IVL cases have a history of leiomyoma, and 22.9% of patients are complicated by leiomyoma. Our study has unveiled that 14 (73.7%) cases of stage I IVL had concurrent leiomyoma, suggesting a high incidence of co-occurrence between IVL and leiomyoma. Second, the mass is likely to involve the broad ligament[9, 11, 23]. In our study, 6 cases (31.6%) involved the broad ligament. Third, most IVL masses showed iso- or slightly hypointensity on T1WI, iso- or slightly hyperintensity on T2WI, and hyperintensity or slightly hyperintensity in DWI, consistent with leiomyoma literature reports[12, 24]. In our study, 73.7% (14/19) showed isointensity, 26.3% (5/19) showed slightly hypointensity on T1WI; 21.1% (4/19) showed iso- or slightly hyperintensity, and 78.9% (5/19) showed slightly hyperintensity on T2WI. Among them, our research showed that there is a significant difference between the normalized T2WI signal of IVL and myometrium ($p < 0.001$). The presence of hyaline, cystic, or mucinous degeneration or edematous infiltration results in an inhomogeneous signal in the tumors, which is a crucial imaging feature for the diagnosis of stage I IVL. Fourth, due to the benign nature of the tumor, it tends to grow slowly and with the turbulent flow of veins, rendering the tumor surface irregular with some fissures parallel to the long axis of the cord-like structure. Blood flowing through these fissures appears as an intravascular striated filling defect on MRI[14]. Fifth, the disease presents multiple tortuous vessels inside or next to the tumor, which is a hallmark imaging feature. Our study revealed multiple tortuous vascular images within or next to the tumor in 17 cases (89.5%), and 11 cases (57.9%) of tortuous vessels demonstrated multiple intravascular striated filling defects. Enhancement scans of the tumor were significantly enhanced in the early stage and still significantly enhanced in the delayed stage, mostly with inhomogeneous enhancement[13].

DWI indirectly reflects information such as tissue structure and cell density at the microscopic level[25]. Therefore, we investigated the relationship between the ADC value of stage I IVL and cell density. Previous studies have shown that there is a significant negative correlation between tumor ADC value and tumor cell density, and ADC value can be used to predict tumor staging and therapeutic efficacy evaluation[26]. The result of this study showed a negative correlation between ADC value and cell density, which was consistent with the result of previous experiments[27]. Within a certain range, the ADC value can indirectly reflect the size of tumor cell density. It can be used to identify the degree of tumor malignancy and evaluate the development and prognosis of the disease.

The differential diagnosis of IVL includes leiomyoma with degeneration, deep venous thrombosis, uterine sarcoma, and ovarian tumors. Preoperatively, IVL can be easily misdiagnosed as leiomyoma with degeneration. In our study, 5 out of 19 cases were initially misdiagnosed as leiomyoma with degeneration, highlighting the importance of careful differentiation. IVL is a slow-growing tumor with no clear demarcation from the normal myometrium. Other uterine malignant tumors, such as uterine sarcoma, often demonstrate large masses with moderate to hyperintensity on T2WI and invasive growth[28]. However, some IVL patients with degeneration can display hyperintensity on T2WI, and the addition of DWI sequence and ADC mapping can help differentiate them. Contrast-enhanced scanning can also aid in distinguishing venous thrombosis from IVL, as thrombosis does not show enhancement while IVL is significantly enhanced[12]. In cases where the mass is located in the broad ligament, it can be mistaken for an ovarian tumor. Benign ovarian tumors are usually cystic and relatively easy to diagnose, while borderline or malignant ovarian tumors often show vegetation in cystic components or necrosis in solid components. The solid components of ovarian tumors often demonstrate moderate to slightly hyperintensity on T2WI, while the cystic fluid typically shows a watery hyperintensity[29]. Following enhancement, ovarian

tumors often show significant enhancement, but the uterine arteries are not typically distorted or tortuous.

Nevertheless, our study has some limitations that should be acknowledged. Firstly, due to the rarity of the disease, the sample size in our study was relatively small. In future studies, increasing the sample size may help to address this limitation. Secondly, dynamic contrast-enhanced MR imaging was performed in only a subset of patients for a specific purpose. Thirdly, our study only collected samples from a single hospital. Therefore, additional multicenter studies are required to confirm these findings further.

In conclusion, despite being histologically benign, IVL can display aggressive biology. Due to its rarity and specificity, clinical misdiagnosis of early-stage IVL (stage I) is a common occurrence. MRI is the cornerstone technology for diagnosis, staging, and operative decision-making. The typical MRI presentation of stage I IVL includes a huge and irregular mass in the uterus and adnexal region, often with concurrent leiomyoma and involving the broad ligament. It often shows isointensity on T1WI and slightly hyperintensity on T2WI. The myometrium or parametrium commonly exhibits irregular, tortuous, shuttle-like solid masses with multiple tortuous vessels within or adjacent to the tumor, alongside multiple intravascular cord-like filling defects typically observed on T2WI. Our findings aim to enhance understanding of the disease, facilitating early diagnosis and appropriate treatment to achieve a favorable prognosis.

PO-1718

Quantitative analysis of MRI parameters in the diagnosis of clinically significant prostate cancer in lesions with PI-RADS 4

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Objective: To investigate the diagnostic value of quantitative analysis of MRI parameters for clinically significant prostate cancer (csPCa) in PI-RADS 4 lesions.

Methods: We conducted a retrospective analysis of patients with suspected PCa who underwent a 3-T MRI study and had prostate biopsy results from January 2018 to June 2020. The signal intensity of the lesion (T2, DW), the background signal intensity of the same plane (T2B, DB), the obturator internal muscles (TM, DM), and the inner pelvic cavity of the same plane were measured on the Tra TSE T2WI sequence and b=1400 unit DWI sequence. Fat signal intensity (TF, DF); Measure the ADC value of the lesion; in the images of each phase of DCE, select the initial enhancement phase of the lesion and set it on the sequence Measure the signal strength (C), the background signal strength (CB) of the same layer and the signal strength of the obturator internal muscle (CM) of the same layer. The independent sample T test was used to compare the difference between the two groups in the difference between the lesion and the background signal/fat signal ratio, and the Mann-Whitney rank sum test was used to compare the lesion/muscle signal ratio, the lesion/fat signal ratio, the lesion and the background signal between the two groups Difference/muscle signal ratio difference, ROC curve evaluates the diagnostic efficacy of TB/F, PSAD, EB/M and the combination of the three in the two groups of lesions.

Results: A total of 49 patients (4 cases of clinically insignificant prostate cancer (ciPCa)、15 cases of benign prostate lesions in the low-risk group and 30 cases of csPCa in the high-risk group) were included. The PSAD of the low-risk group was lower than that of the high-risk group ($P=0.038$), the cutoff value was 0.2, and the AUC was 0.707 (95% CI 0.530-0.803, $P=0.032$). The TB/F in the low-risk group was higher than the TB/F between the high-risk groups ($P=0.000$); the cutoff value was -0.29, and the AUC was 0.884 (95% CI 0.753-0.954, $P<0.0001$). EB/M in the low-risk group was lower than that in the high-risk group ($P=0.043$); the best cutoff value was 0.6, and the AUC was 0.665 (95% CI 0.499-0.806, $P=0.068$). The diagnostic performance of TB/F was better than that of PSAD and EB/M ($P=0.048, 0.043$) between the low-risk group and the high-risk group.

Conclusions: MRI parameter analysis of PI-RADS 4 lesions may improve the diagnosis rate of CsPCa.

PO-1719

Accelerated 3D MR cholangiopancreatography using a deep learning-based reconstruction in patients with cholelithiasis

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Synopsis

In this work, we aimed to compare image quality and lesion detectability in patients suspected with gallstones among single breath-hold three-dimensional (3D) magnetic resonance cholangiopancreatography (MRCP) with gradient and spin-echo (GRASE) technique, with compressed sensing (CS) and with deep learning (DL) technique. DL MRCP showed the best image quality and better lesion conspicuity and lesion edge sharpness.

Introduction

Cholelithiasis is a very common condition (~10 - 20% of the global adult population) and is associated with high socioeconomic costs. 3D MRCP is a noninvasive imaging technique to evaluate the biliary tree. MRI accelerated imaging techniques have been applied to 3D MRCP to enable imaging in a single breath-hold, including the 3D GRASE technique and 3D CS technique. Recently, the DL-based image reconstruction has been introduced to 3D MRCP promising higher acceleration factors while simultaneously increasing SNR. Sometimes the reduction in noise could bring about a reduction in image detail and decrease in diagnostic performance. It is necessary to evaluate the diagnostic efficacy of accelerated techniques. The purpose of this study is to compare the imaging quality and diagnostic confidence among GRASE, CS and DL in patients suspected with cholelithiasis.

Methods

This study was approved by the local IRB. Fifty-three patients suspected with cholelithiasis were examined on a 3.0T system (Ingenia Elition, Philips Healthcare) with a 16-element phased-array coil. The MRCP sequences were scanned in a random order. The imaging parameters were shown as following: (1) 3D GRASE: TR/TE = 235/93 ms, field of view (FOV) = 300x300x100 mm², voxel size = 0.59x0.59x1 mm³, NSA = 1, acquisition time (TA) = 13 s; (2) 3D CS: TR/TE = 1800/390 ms, FOV = 300x300x100 mm², voxel size = 0.59x0.59x1 mm³, NSA = 1, CS acceleration factor = 24, TA = 13 s; (3) AI-CS: TR/TE = 1800/385 ms, FOV = 300x300x100 mm², voxel size = 0.59x0.59x1 mm³, NSA = 1, CS acceleration factor = 24, TA = 13 s. Two radiologists independently and blindly evaluated image quality and lesion detectability using the 5-grade scoring (5 = excellent, 4 = good, 3 = moderate, 2 = poor, 1 = nondiagnostic). The image quality included the following parts: overall image quality, artifacts, background suppression and duct visualization of common bile duct, right hepatic duct, anterior branch, posterior branch, left hepatic duct, medial branch, lateral branch, pancreatic duct. The lesion detectability included lesion conspicuity and lesion edge sharpness.

Results

DL sequence received significantly higher scores than GRASE for overall image quality (3.83 ± 0.64 vs 3.40 ± 0.69), duct visualization of common bile duct (3.83 ± 0.75 vs 3.30 ± 0.70), right hepatic duct (3.58 ± 1.08 vs 3.04 ± 1.02), anterior branch (3.38 ± 1.09 vs 2.68 ± 1.24), posterior branch (3.39 ± 1.10 vs 2.68 ± 1.19), left hepatic duct (3.74 ± 0.98 vs 3.26 ± 0.94), medial branch (3.15 ± 1.17 vs 2.25 ± 1.24), lateral branch (3.53 ± 0.97 vs 2.74 ± 1.15), pancreatic duct (2.68 ± 1.25 vs 2.23 ± 1.20) (all $p < 0.05$). Compared with CS, DL also demonstrated better duct visualization in anterior branch (3.38 ± 1.09 vs 3.11 ± 1.10) and posterior branch (3.39 ± 1.10 vs 3.13 ± 1.19) of the right hepatic duct and medial branch (3.15 ± 1.17 vs 3.05 ± 1.18) and lateral branch (3.53 ± 0.97 vs 3.26 ± 1.06) of the left hepatic duct (all $p < 0.05$).

Lesion conspicuity was rated good to excellent in all 3 sequences with higher scores for DL (4.60 ± 0.77) in comparison to CS (4.45 ± 0.87) and GRASE (4.02 ± 1.35 , $p < 0.05$). Lesion edge sharpness was higher scores for DL (4.63 ± 0.87) in comparison to CS (4.42 ± 0.66) and GRASE (3.99 ± 1.17 , $p < 0.05$).

Two radiologists showed good to perfect interobserver consistency (0.77 - 0.92).

Discussion and Conclusion

DL reconstruction provides better duct visualization, especially small hepatic duct visualization than GRASE and CS. And DL shows a significant higher lesion conspicuity and lesion edge sharpness compared GRASE in patients suspected with cholelithiasis. Therefore, DL reconstruction could denoise 3D MRCP without any loss of image details.

PO-1720

Radiomics analysis of magnetic resonance imaging improves diagnostic performance of lymph node metastasis and prognosis in patients with cervical cancer

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Objective: To improve the accuracy of the diagnosis and outlook of lymph node metastasis (LNM) in cervical cancer patients using an imaging histology model based on conventional magnetic resonance and clinical aspects. **Materials and methods:** In 485 patients with surgically and pathologically confirmed cervical cancer from two medical centers, preoperative magnetic resonance imaging (MRI) images and clinicopathological data (including patient age, squamous cell carcinoma antigen (SCC-Ag), pathology, type of tumor, maximum diameter, tumor volume, and clinical characteristics) were retrospectively analyzed. A training cohort ($n=261$), an internal validation cohort ($n=113$) in a 7:3 ratio, and an external validation cohort from Medical Centre 2 ($n=111$) were randomly selected from the Medical Centre 1 dataset. Each patient's transaxial fat saturation (FS) T2W image and sagittal contrast-enhanced (CE) T1W image histological characteristics were retrieved. Clinical features linked to LNM status were chosen using a single multi-factor logistic regression, and significant features among radiological features were chosen using analysis of variance-based feature screening (ANOVA F-value). The area under the curve (AUC), the sensitivity, and the sensitivity were used to calculate the area under the curve for the conventional clinical imaging diagnostic model (M1), the SVM model with linear kernel based on imaging histological features (M2), and the joint model M3 constructed by conventional MRI features and optimal imaging histological features, respectively. The area under the curve (AUC), sensitivity, specificity, and accuracy of the receiver operating characteristic (ROC) were used to assess the model's efficacy. The group and matching Disease-Free Survival(DFS) survival curve were divided by the follow-up findings, and a discrepancy in the model's prognosis between the two groups was seen. **Results:**① In the training cohort, internal validation cohort, and external validation cohort, M3 performed the best in detecting cervical cancer LNM, with AUCs of 0.892, 0.781, and 0.827, respectively. ② The Rad-score combination model ($p=0.003$) was a reliable predictor of the specific recurrence of cervical cancer. **Conclusion:** The preoperative prediction of LNM in patients with cervical cancer and the prediction of patient prognosis can both be accomplished using the support vector machine binary classification model proposed in this study, which combines the imaging histological models of transverse-axial FS-T2WI, sagittal CE-T1WI, and clinical features.

PO-1721

Influence of rectal susceptibility artefacts on diagnosis of prostate cancer based on biparametric magnetic resonance imaging

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Objective: To explore the impact of rectal susceptibility artefacts on the prostate cancer diagnosis of radiologists using biparametric Magnetic Resonance Imaging (bpMRI).

Materials and Methods: A retrospective analysis was conducted on 685 patients who underwent biparametric Magnetic Resonance Imaging including T2WI and DWI examinations. All patients have confirmed pathological results via either biopsy or surgical resection. Three groups of radiologists with varying years of experience independently reviewed suspicious lesions on prostate MRI according to the Prostate Imaging Reporting and Data System (PI-RADS) version 2.1, along with the presence and degree of rectal artifacts. The consistency of the scoring was assessed using the weighted Kappa coefficient. Differences in PI-RADS scores and rectal artifact scores among radiologists with different years of experience were compared using the chi-square test. The diagnostic differences among readers were compared using the multi-reader multi-case receiver operating characteristic curve (MRMC-ROC). A significance level of $P < 0.05$ was considered statistically significant.

Results: This study included a total of 685 patients, comprising 199 cases of prostate cancer and 486 cases of benign lesions. An analysis of the diagnostic efficacy AUC of the six radiologists based on the presence and absence of artifacts showed that the AUC for junior radiologists 1 was 0.890 without artifacts and 0.799 with artifacts in the AUC, a statistically significant difference ($P = 0.033$), while the AUC for junior radiologists 2 was 0.796 without artifacts and 0.654 with artifacts in the AUC, a statistically significant difference ($P = 0.022$). The difference was not statistically significant ($P > 0.05$) between the diagnostic efficacy of the middle and senior radiologists. Regarding the assessment of different degrees of rectal artifacts, there were no statistically significant differences in the diagnostic performance AUC among all radiologists ($0.35 \leq P < 0.89$). Based on subjective scoring criteria, the six radiologists rated the rectal artifact with a consistency of 0.85. Further subgroup analysis based on nodule location and the presence or absence of artifacts revealed that artifacts had an impact on the diagnostic accuracy of peripheral zone prostate cancer for junior radiologists. The AUC in the artifact-free area was higher than that in the area with artifacts (Reader 1: 0.92 vs. 0.88; Reader 2: 0.83 vs. 0.77), and these differences were statistically significant ($P < 0.001$). However, no statistically significant differences were observed in the remaining subgroups ($P > 0.05$).

Conclusions: Rectal susceptibility artifacts have a significant impact on the diagnostic performance of less experienced physicians, while they have a minimal impact on the diagnostic performance of physicians with moderate to high experience. Therefore, specialized training for less experienced physicians is beneficial in reducing misdiagnosis or missed diagnosis of prostate cancer, improving diagnostic accuracy, and providing more precise imaging evidence for clinical diagnosis and treatment.

PO-1722

High-resolution DWI for hepatic lesions detection: prospective comparison with gadoxetic acid-enhanced MRI using DWI

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Purpose

To evaluate the ability of high-resolution diffusion-weighted imaging (HR-DWI) with dynamic MRI in comparison with gadoxetic acid-enhanced MRI using HBP and conventional DWI for hepatic lesion detection.

Methods

A prospective study was performed on 29 patients with 140 suspected hepatic focal lesions. All patients underwent gadoxetic acid-enhanced MRI and HR-DWI on a 3-T system with a 32-channel phased-array coil (Ingenia Elition 3.0T; Philips Healthcare, Best, The Netherlands). Two experienced radiologists (H.Y.J. and D.Y.C. with 11 and 11 years of experience in interpreting liver MRI, respectively) reviewed two different MRI sets, separately and independently. Two imaging sets included: 1) HR-DWI (including b values sequences) + dynamic contrast-enhanced images; 2) and conventional DWI + HBP+ dynamic contrast-enhanced images. Inter-reader agreement between two reviewers was evaluated by Cohen's kappa efficiency and intraclass correlation coefficient (ICC).

Results

A total of 140 lesions were identified in 29 patients. The detection rate was comparable for HR-DWI sets (112/140, 80%) and HBP+DWI sets (121/140, 86.4%, $p=0.874$). There were excellent agreements for hepatic lesions detection between the two imaging sets with ICC of 0.990 (95% CI 0.977-0.996) and 0.977 (95% CI 0.945-0.990) for reader 1 and 2, respectively. Meanwhile, the inter-reader agreement was statistically higher for HR-DWI sets (ICC=0.939 [95% CI 0.86-0.97]) compared with that for HBP+DWI sets (ICC = 0.881 [95% CI 0.731-0.95]) ($P<0.001$).

Conclusion

Our results indicate that HR-DWI showed ability for hepatic lesions detection compared with HBP in gadoxetic acid-enhanced MRI, which was reflected by an increased image quality, along with a higher confidence for liver tumor detection.

PO-1723

CDP-choline modulates cholinergic signaling and gut microbiota to alleviate DSS-induced inflammatory bowel disease

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Objective: This study aimed to investigate the efficacy and underlying mechanism of cytidine diphosphate (CDP)-choline (citicoline), an intermediate product of choline metabolism, in a mouse model of IBD induced by dextran sulfate sodium salt (DSS).

Methods: The 30 mice were divided randomly into three groups: the control group ($n=10$); the DSS group ($n=10$); and the CDP + DSS group ($n=10$). The related proteins in the colon of mice were detected in the laboratory, the intestinal microbiota of mice was detected by 16S rDNA

miseq sequencing, and the SCFAs in mouse feces was analyzed by liquid chromatography combined with a tandem mass spectrometer (LC-MS/MS) with derivatization.

Results: The results demonstrated that CDP-choline effectively alleviated colonic inflammation and deficiencies in choline, ACh, and PC by increasing the raw material. Further detection showed that CDP-choline also increased the ACh content by altering the expression of high-affinity choline transporter (ChT1) and acetylcholinesterase (AChE) in DSS-induced mice colon. Moreover, CDP-choline increased the expression of $\alpha 7$ nicotinic acetylcholine receptor ($\alpha 7$ nAChR) and activated the cholinergic anti-inflammatory pathway (CAP), leading to reduced colon macrophage activation and proinflammatory M1 polarization in IBD mice, thus reducing the levels of TNF- α and IL-6. In addition, CDP-choline reduced intestinal ecological imbalance and increased the content of hexanoic acid in short-chain fatty acids (SCFAs) in mice.

Conclusion: This study elucidates the ability of CDP-choline to mitigate DSS-induced colon inflammation by addressing choline and its metabolites deficiencies, activating the CAP, and regulating the composition of the intestinal microbiome and SCFAs content, providing a potential prophylactic and therapeutic approach for IBD.

PO-1724

The application value of dual-layer detector CT in reducing metal artifacts of abdominal coils

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Objective:

To investigate the application value of subtraction technique which combined OMAR, metal artifact reduction (OMAR) technique and monoenergetic imaging of dual-layer detector CT in reducing metal artifacts of upper abdominal coils.

Method:

A total of 71 patients with metal coil artifacts in the abdomen after interventional portal hypertension were enrolled in this study. All patients underwent upper abdominal CT vascular three-dimensional reconstruction scan on the dual-layer detector CT. Arterial phase, portal phase and venous phase images were obtained in all cases after threshold trigger monitoring scanning. Six kinds of images were reconstructed in each phase, including conventional images(CI), virtual non-contrast images(VNI), OMAR+ conventional images(CIOMAR), virtual monochromatic images(VMI40keV), OMAR+virtual monochromatic image(VMI40keVOMAR), subtracted images of VMI40keVOMAR and VNI in the same phase (SUB-OMAR). The signal-to-noise ratio (SNR), contrast noise (CNR) and background noise of CI, CIOMAR, VMI40keVOMAR and Sub-OMAR images were quantitatively calculated. All images were qualitatively assessed for artifacts by two independent senior radiologists using a coil artifact score (CA score: 5-point Likert scale). All the results were statistically analyzed, and when $P < 0.05$, the difference was considered statistically significant.

Results:

Compared with CI, the SNR, CNR and CA scores of CIOMAR, VMI40keVOMAR and Sub-OMAR images were improved($P < 0.05$). In addition, according to the results of CA scoring, SUB-OMAR images were found to have better metal artifact reduction performance than CI, CIOMAR and VMI40keVOMAR($P < 0.05$), which is conducive to the visualization of upper abdominal vessels, especially portal vein vessels.

Conclusion:

The metal artifact reduction technique of dual-layer detector CT including OMAR and SUB-OMAR can significantly reduce the metal coil artifacts in abdominal CT images, improving the image quality of abdominal vascular CT images, which is beneficial to clinical diagnosis and efficacy evaluation.

PO-1725

Tumor markers combined with quantitative parameters of double-layer detector CT predict vascular nerve infiltration in patients with colorectal cancer

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Objective: To evaluate the value of tumor markers combined with quantitative parameters of bilayer detector CT in evaluating vascular invasion (LVI) and neuroinfiltration (PNI) status in patients with colorectal cancer.

Materials and METHODS: A total of 49 patients with colorectal adenocarcinoma who received double-layer detector CT scan in our hospital from June 2022 to July 2023 were prospectively enrolled and confirmed by postoperative pathology. The patients were divided into LVI (+) group (n=14) and LVI (-) group (n=35), PNI (+) group (n=20) and PNI (-) group (n=29) according to the pathological results. The spectral parameters of the arterial and venous phases of colorectal cancer patients were analyzed, including CT values on conventional CT images, 40KeV virtual single-level images (VMI) and virtual plain scan (VNC) images, iodine density value (IC), standard iodine density value (NIC), effective atomic order value (Eff-Z) and energy spectrum curve slope (λ HU). Clinical features were collected, including demographic characteristics, tumor markers, and postoperative pathological biopsy information. Independent sample t test, Mann-Whitney U test or Chi-square test were used to compare the differences between different groups, and binary logistic regression analysis was used to construct a joint parameter model. Receiver operating characteristic curve (ROC) was used to evaluate the efficacy of serum markers and spectral CT parameters in the diagnosis of colorectal vascular and nerve infiltration alone and in combination. **Results:** Tumor markers, IC, NIC, Eff-Z, CT-40KEV-VMI and λ HU in LVI positive and PNI positive groups were significantly higher than those in negative group. There were statistically significant differences in T stage and N stage between LVI positive group and negative group ($P < 0.05$), and there were statistically significant differences in tissue differentiation grade and tumor gross morphology between PNI positive group and negative group ($P < 0.05$). There were significant differences in IC, NIC, Eff-Z, CT 40kev-VMI and λ HU in arterial and venous phases between positive and negative LVI groups. There were significant differences in IC, Eff-Z and λ HU in arterial phase and IC, NIC, Eff-Z, CT 40 KeV-VMI and λ HU in venous phase between positive and negative PNI groups. ROC curve analysis showed that the diagnostic efficacy of AP parameters in the LVI group was better than that of VP parameters, the diagnostic efficacy of VP parameters in the PNI group was better than that of AP parameters, and the diagnostic efficacy of tumor markers combined with spectral parameters was better than that of single parameters. The Eff-Z combined with tumor markers in arterial phase had the best diagnostic efficacy for vascular invasion, and its AUC, sensitivity and specificity were 0.796 (95%CI: 0.666-0.926), 64.3% and 85.7%, respectively. The diagnostic efficacy of intravenous Eff-Z combined with tumor markers was the best, with AUC, sensitivity and specificity 0.769 (95%CI: 0.635-0.903), 85% and 62.1%, respectively.

Conclusion: Dual-energy CT imaging parameters have good diagnostic value for preoperative assessment of vascular nerve infiltration in patients, and Eff-Z combined with tumor markers is the best diagnostic model for reflecting vascular nerve invasion of colorectal cancer. Dual-energy CT provides a noninvasive and effective method for preoperative prediction of LVI and PNI through quantitative enhancement measurement.

PO-1726

DISCO 定量参数与半定量参数在前列腺癌的诊断应用价值评估张家伟¹、杨淑兰²、吴晓辉²、张剑锋¹、钟洪波¹

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目的：探讨基于笛卡尔采集 K 空间共享三维容积快速动态成像 (DISCO) 技术定量参数与半定量参数在前列腺癌的诊断价值。**方法** 回顾性分析经病理证实为前列腺疾病 (前列腺癌、良性前列腺增生和/或慢性前列腺炎) 患者 183 例行 DISCO 技术检查，并测量血流动力学参数：容积转运常数 (K_{trans})，速率常数 (K_{ep})，血管外细胞外容积分数 (V_e)，初始增强曲线下面积 (IAUGC)，最大增强斜率 (MaxSlope)，对比增强比率 (CER)，再根据 ROC 曲线评价各参数及联合参数的诊断价值。**结果** 与前列腺良性疾病相比，前列腺癌 K_{trans}, K_{ep}, V_e, IAUGC, MaxSlope, CER 均升高 (P < 0.05)；DISCO 定量参数联合鉴别良恶性病灶 ROC 曲线下面积为 0.89，高于 DISCO 半定量参数联合鉴别良恶性病灶 ROC 曲线下面积 (0.82)，高于单独 K_{ep}、单独 V_e 检测 ROC 曲线下面积 (0.84, 0.67)，但与单独 K_{trans} 鉴别 ROC 曲线下面积 (0.88) 无显著统计学差异 (Z = 0.84, P > 0.05)。**结论** DISCO 定量参数 K_{trans}、K_{ep} 和半定量参数 IAUGC, MaxSlope, CER 对前列腺癌均具有较高诊断效能；与半定量参数联合比较，定量参数联合诊断效能有所提高，可为前列腺癌诊断及鉴别诊断提供更加精确、更加可靠的量化参数。

PO-1727

基于钆塞酸二钠增强 MRI 利用 LI-RADS v2018 辅助特征提高小肝细胞癌(≤20mm)的诊断效能

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目的 探讨 2018 版肝脏影像报告与数据系统 (LI-RADS v2018) 辅助特征在钆塞酸二钠增强 MRI (EOB-MRI) 上对 ≤20mm 的小肝癌 (HCC) 的诊断效能。

方法 回顾性收集 154 例患者 183 个肝病灶。按以下方法分类：①仅使用 LI-RADS 主要征象；②先用主要征象，后按 LI-RADS 原则用辅助征象调整分类。用逻辑回归分析确定独立显著的辅助征象，将其作为新的主要征象改进 LI-RADS (mLI-RADS) 中 LR-5 分类的升级标准。计算 mLI-RADS 的诊断效能，并与 LI-RADS v2018 的进行比较。

结果 扩散受限、移行期低信号和肝胆期低信号是独立显著的辅助征象。mLI-RADS a、c、e、g、h 和 i (分别使用上述独立显著的辅助征象中的某一种、两种、三种作为新的主要征象重新将上述根据方法①仅使用主要征象分为 LR-4 类的病灶重新分类)，结果其 LR-5 诊断 HCC 的敏感度显著高于 LI-RADS v2018 (68.0%、69.1%、69.1%、69.1%、69.1%、68.0% vs. 61.9%，p 均 < 0.05)，而特异度无差异 (84.9%、86.0%、84.9%、83.7%、84.9%、87.2% vs. 88.4%，p 均 > 0.05)。当单独使用上述独立显著的辅助征象对方法②联合使用主要和辅助征象分为 LR-4 类的结节重新分类 (mLI-RADS b、d、f) 后，其 LR-5 诊断 HCC 的敏感度提高 (69.1%，69.1%，70.1% vs. 61.9%，p 均 < 0.05)，但特异度降低 (76.7%，81.4%，80.2% vs. 88.4%，p 均 < 0.05)。

结论 扩散受限、移行期低信号和肝胆期低信号作为诊断 HCC 独立显著的辅助征象可用于将仅依据主要征象分为 LR-4 类的小病灶升级到 LR-5 类，从而提高 LI-RADS 对小 HCC 的诊断效能。

PO-1728

辅助征象替代阈值增长后 LI-RADS 对 HCC 的诊断效能

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目的 作为 2018 版肝脏影像报告和数据系统 (LI-RADS v2018) 中诊断肝细胞癌 (HCC) 的主要征象之一的“阈值增长”, 其作用各种研究结论不完全一致。因此本研究探讨用特异性辅助征象替代阈值增长后, LI-RADS v2018 中 LR-5 (肯定 HCC 的类别) 对 HCC 的诊断效能, 从而验证阈值增长的作用。

方法 回顾性收集未经治疗并行钆塞酸二钠增强 MRI (EOB-MRI) 且经病理证实的 HCC 和其他肝内恶性肿瘤 (OM) 病人 262 例共 262 个病灶。由 2 名放射科医师依据 LI-RADS v2018 对病灶进行分析, 采用 t 检验比较 HCC 和 OM 病灶中伴和不伴阈值增长的病灶大小; 分析 HCC 和 OM 病灶间主要和辅助影像征象的差异, 并确定 HCC 特异性辅助征象。分别计算 LI-RADS v2018 以及 HCC 特异性辅助征象替代阈值增长后 (变更 LI-RADS) LR-5 对 HCC 的诊断效能, 并采用 McNemar χ^2 检验比较其差异。

结果 262 个病灶中, HCC 187 个 (71.4%), OM 75 个 (28.6%)。共 47 个 HCC 和 29 个 OM 病灶用于阈值增长评价, 其中 22 个 HCC 和 14 个 OM 病灶出现阈值增长。HCC 和 OM 病灶中, 伴有阈值增长的病灶直径均小于不伴阈值增长者 (均 $P < 0.05$)。主要征象中, OM 较 HCC 更常见阈值增长; 辅助征象中, HCC 较 OM 更常见结中结和病灶内含脂 (均 $P < 0.05$)。以结中结和病灶内含脂作为特异性辅助征象替代阈值增长, 诊断 HCC 的敏感度、特异度、准确度分别为 75.4%、88.6%、81.0%和 74.9%、89.3%、81.0%, 诊断效能与 LI-RADS v2018 (74.3%、88.6%、80.4%) 的差异无统计学意义 (P 均 > 0.05)。

结论 当阈值增长被 HCC 特异性辅助征象 (结中结和病灶内含脂) 替代后, 并未影响 LI-RADS 诊断 HCC 的效能, 提示阈值增长可能没有那么重要。

PO-1729

基于钆塞酸二钠增强 MRI 简化 LI-RADS 诊断肝细胞癌的价值

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目的 研究基于钆塞酸二钠增强 MRI (EOB-MRI) 图像简化 2018 版肝脏影像与报告系统 (LI-RADS v2018) 诊断表对肝细胞癌 (HCC) 的诊断效能。

方法 回顾性收集 331 例 (356 个肝脏病灶) 行 EOB-MRI 的 HCC 高危患者资料。仅使用一个尺寸标准 (10mm 或 20mm) 评估简化 LI-RADS (sLI-RADS A-D) 的诊断效能, 经与 LI-RADS v2018 比较选择最佳 sLI-RADS。增加肝胆期 (HBP) 低信号为 HCC 主要征象, 以最佳 sLI-RADS 形成最终的简化 LI-RADS (F-sLI-RADS) 诊断表, 并评价其诊断效能。同时比较根据 F-sLI-RADS 和 LI-RADS v2018 标准进行病灶分类所需的时间。

结果 最佳 sLI-RADS 即 sLI-RADS D 的原则为以单一 20mm 为分界, 对所有 < 20 mm 的伴有动脉期高增强的结节均采用 LI-RADS v2018 诊断表中 10-19 mm 结节的分类标准进行分类。sLI-RADS D 的敏感度高于 LI-RADS v2018 (89.8%/87.0%, $p = 0.031$), 特异度未降低 (89.4%/90.1%, $p > 0.999$)。以 HBP 低信号为主要征象, F-sLI-RADS 的敏感度高于 LI-RADS v2018 (93.0%/87.0%, $p < 0.001$) 和 sLI-RADS D (93.0%/89.8%, $p = 0.016$), 特异度未降低 (86.5%/90.1%, $p = 0.062$; 86.5%/89.4%, $p = 0.125$)。与 LI-RADS v2018 相比, F-sLI-RADS 减少了病灶分类所用的时间 (51 ± 21 秒/ 73 ± 24 秒, $p < 0.001$)。

结论 以 HBP 低信号为主要征象,简化的 LI-RADS 可提高 LR-5 类诊断 HCC 的敏感度,节省分类时间,更有利于临床应用。

PO-1730

肥胖人群减重术前的定量 CT 体质成分与代谢综合征组分的关系

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目的 探讨不同性别、肥胖程度人群减重术前定量 CT(QCT)体质成分的差异,及其与代谢综合征 (MS) 组分的关系。**方法** 纳入本院 2021 年 1 月至 2023 年 3 月拟行减重手术的肥胖患者 97 名,记录其身体质量指数 (BMI),生化指标以及基于 QCT 测量的体质成分。按照不同性别、肥胖程度、MS 组分数进行分组,比较各组之间体质成分的差异,同时分析各体质成分与代谢指标的相关性,采用受试者工作特征曲线分析各体质成分对不同 MS 组分肥胖人群的诊断效能。**结果** 患者中女性 75 例 (77.3%)。男性肥胖患者较女性有较高的腹部总脂肪面积 (TFA, $P<0.001$)、内脏脂肪面积 (VFA, $P<0.001$)、胰头脂肪含量 (pHF, $P=0.007$) 及骨骼肌指数 (SMI, $P<0.001$)。随肥胖程度的增加,腹部脂肪的增加以皮下脂肪 (SFA) 为主。随 MS 组分的增加,VFA、内脏脂肪/皮下脂肪 (V/S)、肝脏脂肪含量 (LF)、pHF 以及 SMI 随之升高。在诊断合并 2 项 MS 组分中,VFA 的评估效能 ($AUC=0.706$, $95\%CI=0.577\sim0.834$) 优于其他体质成分指标;在诊断合并 3 项、4 项及 5 项 MS 组分中,LF 的评估效能 ($AUCMS3=0.712$, $95\%CI=0.605\sim0.818$; $AUCMS4=0.652$, $95\%CI=0.537\sim0.766$; $AUCMS5=0.706$, $95\%CI=0.576\sim0.836$) 更好。**结论** 不同性别、肥胖程度及合并 MS 组分数的肥胖患者腹部体质成分存在差异。VFA 及 LF 对评估肥胖患者合并不同 MS 组分具有重要价值。

PO-1731

经阴道三维超声子宫肌瘤血管网评估高强度聚焦超声消融疗效的应用价值

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【摘要】目的 探讨经阴道三维超声子宫肌瘤血管网在评估高强度聚焦超声(HIFU)消融子宫肌瘤疗效中的应用价值。**方法** 选取接受 HIFU 消融单个子宫肌瘤患者 67 例,分别在术前,术后当天、3、6 和 12 月采用阴道三维超声高分辨力血流成像技术对靶肌瘤血供进行重建及分级,分析子宫肌瘤血管网评估治疗前、后子宫肌瘤内血供不同分级与 HIFU 疗效的相关性。**结果** HIFU 治疗前子宫肌瘤血管网显示了子宫肌瘤内部不同程度的血供,Adler 分级 1 级 5 例,2 级 2 例,3 级 60 例,增强 MRI 显示低增强 8 例,中等增强 2 例,明显增强 57 例,两种检查方法对子宫肌瘤内部血供评价的 ICC 为 0.766 ($P=0.001$),一致性较好。治疗后子宫肌瘤血管网与超声造影评估 HIFU 疗效结果比较,差异无统计学意义 ($P>0.05$),治疗后当天及治疗后 12 月子宫肌瘤内血供少的 0 和 1 级患者,肌瘤缩小率明显高于分级为 3 级患者,差异具有统计学意义 ($P<0.05$)。**结论** 三维超声子宫肌瘤血管网能立体直观显示子宫肌瘤内部血供,子宫肌瘤血管网的分级对 HIFU 疗效预估、术后随访有提示作用,具有一定的临床应用价值。

PO-1732

基于增强 CT 的影像组学模型在鉴别肾上腺醛固酮瘤与肾上腺无功能腺瘤的应用

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【摘要】目的：为确定肾上腺偶发瘤（adrenal incidentaloma, AI）有无内分泌功能，以实现个性化精准医疗。本研究探讨了基于增强 CT 的影像组学模型是否可以区分肾上腺醛固酮瘤（aldosterone producing adenomas, APAs）与无功能腺瘤（non-functioning adrenal adenomas, NAAs）。

方法：本研究回顾性地分析了 2017 年 1 月至 2023 年 5 月之间在本机构进行肾上腺静脉采血的 243 个原发性醛固酮增多症患者，最终纳入了 68 名 APAs 与 60 名 NAAs 病例，按照 8: 2 的比例随机地分为训练组和验证组。在训练组中，单变量分析和最小绝对收缩和选择算子回归分析用于挑选影像组学特征并计算影像组学得分(Radscore)。将 Radscore 与基线临床资料进行多变量逻辑回归分析，并构建临床-影像组学的列线图模型。列线图模型的诊断效能采用受试者工作特征曲线、校准曲线及决策曲线分析进行评价。

结果：影像组学模型的曲线下面积（area under the curve, AUC）在训练组及验证组中分别为 0.869[95%置信区间（confidence interval, CI）0.769~0.943]和 0.762[95%CI 0.572~0.952]；敏感性和特异性分别为 0.889、0.77 和 0.929、0.58。包含了血清钾浓度、年龄、Radscore 的列线图模型在训练组和验证组中的 AUC 分别是 0.988[95% CI 0.972~1.000]和 0.988[95% CI 0.957~1.000]；敏感性和特异性分别是 0.981、0.940 和 1.000、0.920。

结论：基于增强 CT 的影像组学模型具有较大的区分肾上腺 APAs 与 NAAs 的诊断效能，在结合基线临床资料后，临床-影像组学模型的诊断效能进一步增加。

PO-1733

MRI 征象及临床因素对胎盘植入性疾病的风险预测研究

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目的 通过分析临床因素及 MRI 征象，对胎盘植入性疾病的发生进行风险预测，为临床诊治本病提供参考依据。**方法** 收集胎盘植入性疾病患者 48 例，另收集 48 例非胎盘植入患者作对照进行对比研究。记录孕产妇年龄、孕周及既往剖宫产、流产次数。参考既往研究的观察指标分析相应的 MRI 征象。对各临床因素及 MRI 征象进行单因素分析。计算各因素（临床因素及 MRI 量化指标除外）的 PPV 和 OR 值。将单因素分析有统计学意义的因素纳入二元 logistic 回归分析。**结果** 胎盘植入性疾病的存在与否和剖宫产次数、前置胎盘、胎盘主要附着位置、胎盘邻近子宫肌层情况、T2WI 低信号、宫颈上方胎盘厚度、异常血管、胎盘突出征、子宫膀胱间隙消失有关（ $P<0.05$ ）。胎盘主要附着于子宫下壁、胎盘与邻近子宫肌层分界不清/肌层欠连续及其他 MRI 异常征象（MRI 量化指标除外）存在时， $OR>1$ （ $P<0.05$ ）。剖宫产次数、前置胎盘、异常血管为胎盘植入性疾病的独立危险因素（ $P<0.05$ ）。**结论** 通过分析临床因素及 MRI 征象进行风险预测，有助于对胎盘植入性疾病的诊断。根据本研究结果，需关注有剖宫产史、前置胎盘、胎盘附着于子宫下壁、胎盘与邻近子宫肌层分界不清/肌层欠连续、T2WI 低信号、宫颈上方胎盘较厚、异常血管、胎盘突出征、子宫膀胱间隙消失的病例，而后结合分析各因素，以便相对准确地诊断胎盘植入性疾病，从而为临床的诊疗提供参考依据。

PO-1734

全模型迭代重建 (IMR)算法在改善 CT 门静脉成像中的应用研究

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目的: 探究全模型迭代重建算法对 CT 门静脉成像图像质量的应用研究, 分析受检者所受辐射剂量的改变, 讨论全模型迭代重建算法的应用价值。方法: 纳入接受 CT 门静脉成像的患者, 根据筛选标准选出 60 例, 采用数字法随机分为常规组和实验组, 每组 30 例。常规组采用正常辐射剂量, 使用四级混合迭代重建算法重建图像; 实验组采用稍低辐射剂量, 使用全模型迭代算法重建图像, 保持实验组与常规组的其它摄影参数一致。记录所需数据, 选用独立样本 t 检验比较两组辐射指标和客观参数指标, 再让两位有多年诊断经验的影像医师对其进主观评价。采用 Kappa 检验评价两位医师评分结果的一致性。结果: 实验组的 CTDIvol 为 $[(11.74 \pm 1.23) \text{ mGy}]$ 低于常规组 $[(13.83 \pm 0.81) \text{ mGy}]$, $P < 0.05$; 实验组的 ED 为 $[(6.31 \pm 0.57) \text{ mSv}]$ 低于常规组 $[(7.38 \pm 0.72) \text{ mSv}]$, $P < 0.05$; 实验组图像质量评分 (3.93 ± 0.74) 高于常规组评分 (3.43 ± 0.73) , $P < 0.05$; 实验组的 SD 为 $[(7.17 \pm 1.58) \text{ Hu}]$ 明显低于常规组 $[(14.19 \pm 0.95) \text{ Hu}]$, $P < 0.05$; 实验组的 SNRH 为 (14.23 ± 1.23) 高于常规组 (4.71 ± 0.83) , $P < 0.05$ 。结论: 全模型迭代重建算法在保证图像质量略有提高的同时还能进一步降低患者所受的辐射剂量, 其对 CT 门静脉图像有明显的改善能力, 具有实践应用价值。

PO-1735

APT 定量参数评估直肠癌预后相关因素

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目的: 分析酰胺质子转移成像 (APT) 定量参数评估直肠癌预后相关因素的价值。方法: 以 104 例病理证实为直肠癌的患者为研究对象, 行高分辨 MRI、APT 及 DWI, 测量不同组织病理类型、分级、分期以及相关结构侵犯状态的 APT 信号强度 (APT SI) 及表观扩散系数 (ADC)。结果: 直肠黏液腺癌 APT SI、ADC 值高于普通腺癌, 差异具有统计学意义 ($P < 0.001$); 低级别普通腺癌 APT SI 低于高级别普通腺癌, 差异具有统计学意义 ($P < 0.05$); T 分期, N 分期, 壁外血管侵犯, 神经侵犯及脉管癌栓不同组间 APT SI、ADC 值的差异均无统计学意义 ($P > 0.05$)。APT SI、ADC 值鉴别直肠黏液腺癌与普通腺癌的 ROC 曲线下面积分别为 0.932、0.980; APT SI 鉴别低级别与高级别普通腺癌的 ROC 曲线下面积为 0.741。结论: APT 有助于评估直肠癌患者的组织病理类型及肿瘤分级。

PO-1736

磁共振成像对粘连性小肠梗阻手术与否的预判价值探讨

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【摘要】目的: 探讨磁共振成像对粘连性小肠梗阻手术与否的预判价值。方法: 回顾性分析我院 2019 年 6 月 1 日至 2023 年 6 月 6 日收治的粘连性小肠梗阻患者 55 例, 其中男 36 例, 女 19 例, 年龄 16~89 岁, 平均年龄 61.9 ± 14.8 岁, 分为手术组 25 例, 非手术组 30 例; 25 例手术组中有 17 例肠梗阻均经手术证实为绞窄性肠梗阻。30 例非手术组肠梗阻中, 均经保守治疗好转, 最终均临床诊断为粘连性小肠梗阻。采用荷兰 PHILIPS Achieva 1.5T 超导型磁共振扫描仪及专用腹部多通

道线圈进行腹部 MRI 成像扫描。由 2 名高年资影像医师于 PACS 系统上对 MRI 图像进行协商回顾性分析, 统计学分析采用 SPSS17.0 软件。定性资料采用卡方检验, 定量资料采用 t 检验, $P<0.05$ 为差异有统计学意义。结果: 25 例手术组肠梗阻肠管扩张程度为 $3.90\pm0.73\text{cm}$, 30 例非手术组肠管扩张程度为 $3.67\pm0.61\text{cm}$, 差异无统计学意义; 手术组患者 MR-T2WI 可见“C”形征 (17/25, 68%)、“黑靶环征” (16/25, 64%)、“黑积液征” (10/25, 40%) 具有较高的诊断特异度, 较非手术组差异有统计学意义; 其中“黑靶环征”对绞窄性肠梗阻的诊断特异度和灵敏度分别是 100% (38/38) 和 94.12% (16/17), “黑积液征”对绞窄的诊断特异度和灵敏度分别是 92.11% (35/38) 和 58.82% (10/17)。手术组患者均可见多腹腔间隙积液, 敏感度较高, 较非手术组有统计学差异, 但特异度较差。结论: 联合 MR-T2WI 的“C”形征、“黑靶环征”、“黑积液征”三种征象对粘连性小肠梗阻的手术指征具有较高的诊断特异度和灵敏度, MRI 可作为指导临床手术与否的重要检查手段, 多腹腔间隙积液对于手术指征具有一定的辅助提示价值。

PO-1737

联合 80KV 管电压及 Karl 迭代重建降低 320 排 CT 腹部增强扫描辐射剂量的可行性

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目的: 探讨联合 80KV 管电压及 Karl 迭代重建降低 320 排 CT 腹部增强扫描辐射剂量的可行性。方法: 100 例行全腹部增强 CT 检查的患者分成 120KV 组和 80KV 组, 120KV 组使用滤波反投影图像重建, 80KV 组使用 Karl 迭代图像重建。比较两组的辐射剂量和图像质量。结果: 120KV 组和 80KV 组有效辐射剂量分别为 $11.0\pm1.7\text{mSv}$ 和 $5.6\pm0.7\text{mSv}$, 与 120KV 组相比, 80KV 组辐射剂量下降 49.1% ($P<0.01$)。动脉期两组图像上肝脏 CT 值及噪声差异无统计学意义 ($P>0.05$); 80KV 组腹主动脉的 CT、噪声及信噪比相对于 120KV 组增加, 差异有统计学意义 ($P<0.01$)。在静脉期, 与 120KV 组相比较, 80KV 组的肝脏及门静脉 CT 值显著增加 ($P<0.01$), 肝左外叶噪声无明显增加 ($P>0.05$), 肝右后叶噪声、门静脉噪声及门静脉信噪比稍增加 ($P<0.05$)。肝脏、脾脏、胰腺、肾脏及胃肠道的图像质量主观评分在两组间比较差异均无统计学意义 ($P>0.05$)。结论: 联合 80KV 低管电压及 Karl 迭代重建能够显著降低 320 排 CT 腹部增强扫描的辐射剂量, 并保持诊断需要的图像质量。

PO-1738

假性肝硬化的临床及影像诊断现状

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目的: 假性肝硬化大都伴有尾状叶肥大、结节状肝轮廓与肝实质萎缩等影像征象, 同时也可并发门脉高压和肝细胞衰竭等临床表现, 通常与肝硬化难以区分。然而, 目前国内对假性肝硬化认识不足, 少有报道。现将国内外报道假性肝硬化系列病例的临床及影像特征作一综述, 为患者鉴别及诊疗提供多角度判断。

方法: 假性肝硬化概念最早由 Honma 提出, 命名为“hepar lobtum”, 包含一类影像学类似肝硬化但缺乏后者典型病理证据支持的疾病, 主要有肝转移瘤化疗后假性肝硬化、粟粒性肝转移、急性肝衰竭、结节病及寄生虫感染性疾病。具体列举并分析其临床及影像诊断现状。

结果: 在影像诊断过程中, 我们常根据肝脏形态改变诊断肝硬化, 但在临床工作中, 我们还需考虑一些特殊背景下发生的假性肝硬化。假性肝硬化的典型特征是在组织学检查中再生结节之间没有桥

接纤维化。在乳腺癌肝转移患者中,肝包膜回缩是常见的,可通过回顾患者的病史和先前的影像学检查鉴别;当已知原发性恶性肿瘤且无门脉高压征象的患者出现细小的肝表面结节,应考虑粟粒性转移;在急性肝衰竭患者中,肝脏形态大多是正常或可以看到增大的脂肪肝,少数影像学表现可以类似肝硬化,这通常被认为是由于融合再生结节和大面积坏死形成;CT 上表现弥漫性肝实质和表面结节、脾脏内多个低密度结节,部分还存在腹膜后淋巴结肿大,临床结合血清 ACE 水平升高或纵隔淋巴结肿大提示结节病;疫区患者肝脏影像表现为肝周包膜下和门脉周围多个楔形低强化区,应考虑到寄生虫感染性疾病。

结论:目前假性肝硬化的报道与研究仍不够深入,需要未来更系统的观察研究。早期识别,短期内复查并采取不同治疗方法处理这些疾病非常重要,可为患者的预后提供更好的指导作用。

PO-1739

多参数成像在肾脏恶性肿瘤诊断及鉴别诊断中的价值

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目的 探讨 3.0TMR 磁敏感成像结合弥散加权成像序列与肾癌病理分级分期的关系及 320 CT 动态增强扫描在不同类型肾癌鉴别诊断中的作用。

方法 回顾性分析 65 例不同类型肾脏恶性肿瘤,采用 3.0TMR 行 b 值=800s/mm² DWI 及 SWI 检查,所有肿瘤均经手术病理或穿刺活检证实,其中肾透明细胞癌 38 例,乳头状肾细胞癌 15 例,肾嫌色细胞癌 12 例。对病灶的 DWI 及 SWI 信号特点进行记录和分析,将其中的 T 分期与术后病理 T 分期进行对比,计算并比较临床各期 ADC 值间的关系。比较肿瘤动态增强各期增强特点和强化程度,并测量动态增强扫描各期肾癌的 CT 值,对各组数据进行统计学处理,计算均值与标准差,并计算强化幅度。

结果 肾癌中,各期两两比较发现,在未用 SWI 检测出血时,I 期与其余各期相比,差异有统计学意义,III 与 IV 期相比差异有统计学意义,而 II 期与 III、IV 期相比,差异无统计学意义,参照 SWI 除出血区域后测量 ADC 值发现,I 期与其余各期、II 期与 III、IV 期两两比较相比,差异均有统计学意义,而 I、II 期之间及 III 期与 IV 期之间相比,差异无统计学意义 ($P<0.01$)。不同亚型肾癌 CT 动态增强扫描发现,肾透明细胞癌与非透明细胞癌强化幅度差异有统计学意义 ($P<0.01$),而乳头状肾癌与嫌色细胞癌两者差异无统计学意义 ($P>0.05$),肾透明细胞癌强化幅度最高。

结论 利用磁共振多参数序列成像能准确、良好的判断肾癌的临床分期,而 CT 动态增强扫描在鉴别不同亚型肾癌有方面较高的临床应用价值。

PO-1740

基于双参数 MRI 联合 PSA 等衍生参数构建模型预测灰区前列腺癌的诊断价值研究

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目的 探讨基于双参数磁共振 (bp-MRI) 前列腺影像报告和数据系统版本 2.1(PI-RADS v2.1)联合前列腺特异性抗原(PSA)等衍生参数在诊断 PSA 灰区前列腺癌 (PCa) 中的价值,并建立预测模型和列线图以指导临床决策。方法 回顾性分析 118 例 PSA 灰区 (4~10ng/mL) 患者行双参数 MRI 检查,并有病理学结果的患者资料。入组患者被随机分配到训练集($n=82$, 70%)和验证集($n=36$, 30%)。进行单因素和多因素 Logistic 回归分析筛选出灰区 PCa 的独立风险因子,构建量化、可视化风险评估列线图模型,采用受试者工作特征曲线(ROC)及校准曲线评价模型效能,决策曲线分析(DCA)评

价临床有用性。结果 单因素分析发现年龄、体积、F/TPSA、PSAD、AVR、PI-RADS v2.1 评分在灰区 PCa 组和非 PCa 组之间差异具有统计学意义($P<0.05$)，再进行多因素 Logistic 回归分析显示体积、PSAD、AVR、PI-RADS v2.1 评分是预测灰区 PCa 的独立危险因素。基于上述 4 个预测因子构建灰区 PCa 列线图模型 AUC 值最高，其训练集和验证集的 AUC 分别 0.935 和 0.878，均高于其他单独指标，体积、PSAD、AVR、PI-RADS v2.1 分别为 0.743 和 0.678、0.699 和 0.644、0.775 和 0.756、0.850 和 0.844。校准曲线表明列线图模型预测预测灰区 PCa 的概率一致性较好，决策曲线分析表明该模型具有较好的临床应用价值。结论 基于 PI-RADS v2.1 双参数 MRI 联合 PSA 等衍生参数构建的列线图风险模型，具有较好的预测效能，可用于预测 PSA 灰区前列腺癌，能减少不必要的穿刺活检。

PO-1741

LI-RADS v2018 对 HCC 高危人群肝脏病变的诊断效能： 增强 CT 和 MRI 的对比研究

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目的 探讨 2018 版肝脏影像报告和数据系统 (LI-RADS v2018) 基于增强 CT (CECT) 和钆塞酸二钠增强 MR (EOB-MRI) 图像对肝细胞癌 (HCC) 及非 HCC 恶性肿瘤 (OM) 的诊断效能。

方法 收集行 CECT 和 EOB-MRI 检查 HCC 高危患者 248 例 285 枚肝脏局灶性病灶，以穿刺或手术病理为金标准。两名医师双盲下据上述图像进行 LI-RADS 分类，计算 LR-5 对 HCC、LR-M 对 OM 的诊断价值，并比较不同检查方法诊断效能的差异。

结果 285 枚病灶中包括 HCC 187 枚，OM 33 枚，良性病灶 65 枚。CECT 和 EOB-MRI 对病灶分类的一致性较好 ($Kappa=0.764$, $P<0.001$)。CECT 和 EOB-MRI 两种检查方法 LR-5 类对 HCC 的诊断效能分别为灵敏度 54.01% 和 76.47%、特异度 94.90% 和 89.80%、阳性预测值 95.28% 和 66.67%、阴性预测值 51.96% 和 66.67%、准确度 68.07% 和 81.05%、约登指数 0.489 和 0.663；除特异度比较无统计学差异 ($P=0.125$) 外，EOB-MRI 的灵敏度和准确度均高于 CECT (P 均 <0.05)。CECT 和 EOB-MRI 两种检查方法 LR-M 类对 OM 的诊断效能分别为灵敏度 93.94% 和 87.88%、特异度 98.81% 和 94.84%、阳性预测值 91.18% 和 69.05%、阴性预测值 99.20% 和 98.35%、准确度 98.25% 和 94.04%、约登指数 0.927 和 0.826；除灵敏度差异无统计学意义 ($P=0.625$) 外，CECT 的特异度和准确率均高于 EOB-MRI (P 均 <0.05)。

结论 LI-RADS v2018 在 CECT 和 EOB-MRI 上对病灶分类的一致性较好。LR-5 分类对 HCC 的诊断效能 EOB-MRI 检查好于 CECT，而 LR-M 分类对 OM 的诊断效能 CECT 优于 EOB-MRI。

PO-1742

血吸虫肠病合并结直肠癌的计算机 X 线断层扫描影像学表现

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目的 回顾性分析血吸虫肠病合并结直肠癌的 CT 表现，提高对该病诊断的准确性。

方法 2007 年 1 月至 2012 年 12 月同济大学附属同济医院和昆山市中医院收治的 80 例经病理学检查证实为血吸虫肠病合并结直肠癌患者，均行腹部 CT 平扫+增强扫描，由两名放射科医师采用盲法阅片，对病灶部位、形态、大小，钙化特点及强化方式，有无转移进行评估；同时收集同一地区非血吸虫结直肠癌患者 20 例作为对照。

结果 80 例血吸虫肠病合并结直肠癌患者的肿瘤以降结肠、乙状结肠和直肠为主, 表现为管壁不规则增厚, 伴软组织团块, 累及肠管长度为 $(21.35\pm 4.50)\text{cm}$; 其中单发病灶 68 例, 多发病灶 12 例, 表现为多节段肠管受累; 肿瘤组织均可见不同形态的钙化灶, 钙化发生比例为 100.0%, 主要表现为线状、斑点状及小斑片状钙化影, 其中 59 例钙化边缘模糊, 21 例钙化边缘较清晰; 增强早期 68 例病灶明显强化, 均匀强化 45 例, 不均匀强化 23 例, 增强晚期 73 例持续强化, 坏死少见; 仅 2 例伴发肝脏转移瘤, 均无淋巴结转移。20 例非血吸虫结直肠癌患者肿瘤均为单发病灶, 表现为肠壁不规则增厚, 伴局部溃疡形成, 累及肠管长度为 $(6.90\pm 3.40)\text{cm}$; 肿瘤组织内均未见钙化影; 均表现为增强早期病灶明显不均匀强化, 可见低密度坏死区存在, 增强晚期不同程度降低; 4 例伴发肝脏转移瘤。与非血吸虫结直肠癌患者比较。血吸虫肠病合并结直肠癌患者多发病灶的比例较高 ($P=0.000$), 病变管壁长度较长 ($P=0.000$), 钙化灶发生比例较高 ($P=0.000$), 增强早期病灶明显不均匀强化比例较低 ($P=0.000$), 晚期病灶持续强化比例较高 ($P=0.000$); 肝脏转移发生比例较低 ($P=0.014$)。

结论 血吸虫肠病合并结直肠癌在 CT 上特征性表现为瘤组织内不同形态钙化影, 钙化边缘模糊, 并累及多节段肠管; 血道转移及淋巴道转移均少见。

PO-1743

影像学诊断老年隐匿性急性肾衰竭

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目的 通过影像学诊断老年隐匿性急性肾衰竭 (急性肾损伤), 分析总结 OAKI 病理基础、临床表现、影像学特征, 及时诊断 OAKI, 避免由于老年急性肾损伤 (Acute kidney injury, AKI) 具有一定的临床隐匿性或亚临床特性而导致治疗延误, 造成患者肾脏慢性损伤或不可逆肾损伤、甚至患者死亡。

方法 前瞻性收集通过医学影像学诊断为 AKI 的老年患者 153 例, 患者均年龄大于 75 岁; 其中临床最终诊断符合 OAKI 的共计 57 例, 57 例中上呼吸道感染静脉输入阿昔洛韦过敏 9 例, 恶性肿瘤患者 11 例, 急性胆囊炎患者 5 例, 急性胰腺炎 7 例, 手术后腹膜后脓肿患者 3 例, 术后腹膜后血肿 4 例, 慢性阻塞性肺疾病伴肺炎 7 例, 左心衰肺水肿患者 8 例, 复合脏器外伤患者 3 例。观察、统计患者临床症状, AKI 实验室诊断指标血清肌酐和尿素。检查设备使用 GE 宝石能谱 750 HD 多层螺旋 CT 机、Philips Bariliance 64 排多层螺旋 CT 机、超导型 16 通道 GE Signa TwinSpeed 1.5T MR 机。为了加重肾脏损伤和防止对比剂肾病的发生, 所有患者均未做影像增强检查。影像诊断由两名高年资医师承担。结果: OAKI 临床表现复杂, 其慢性、隐匿性、亚临床特征明显; 且作为诊断标准的血清尿素氮和肌酐水平均在正常范围, 且至今为止尚未发现新的标志物来明确 AKI 的诊断。

MSCT 和 MR 检查提示 AKI 诊断已经成为共识, AKI 影像学表现: CT 和 MR 共同表现为两侧肾脏外形增大、形态饱满, 肾周脂肪囊均可见桥隔增粗和吉氏筋膜增厚; MSCT 显示双侧肾实质密度弥漫减低; MR 检查 T1WI 表现肾脏实质信号减低, T2WI 肾脏实质信号弥漫性不均一增高, T2WI 压脂肾实质信号不均一增高; 部分病例肾周少量积液。结论: 老年人 AKI 存在明显的临床隐匿性特性或慢性亚临床特征, 但同时又具有典型的肾脏以及肾周异常影像学表现, 影像和临床结合可早期诊断及时治疗。

PO-1744

3.0T MR DWI 序列在肾脏肿块型病变的诊断价值

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目的 评价 3.0T MR 弥散加权成像 (Diffusion weighted imaging,DWI)序列在肾脏肿块型病变的诊断及鉴别诊断价值。

方法 回顾性分析 139 例肾脏肿块型病变,采用 3.0TMR 行 b 值=800s/mm² DWI 检查,除良性囊肿性病例外,所有肿瘤均经手术病理或穿刺活检证实,对病灶的 DWI 信号特点进行记录和分析:1、计算 ADC 值鉴别肾脏良恶性肿瘤的敏感性、特异性,阳性预测值、阴性预测值。2、测量比较所有病灶、病灶周围及健侧肾组织的 ADC 值。

结果 肾癌与癌周组织及正常肾实质 ADC 值相比,差异有统计学意义($P<0.05$),癌周组织与正常肾组织 ADC 值相比,差异无统计学意义($P>0.05$)。肾癌、肾盂癌、肾脓肿、肾血管平滑肌脂肪瘤、肾良性囊肿性病及肾癌囊变区各组 ADC 值差异有统计学意义($F=129.71, P=0.000$),其中肾癌、肾血管平滑肌脂肪瘤及肾盂癌组的 ADC 值两两之间差异有统计学意义 ($P<0.01$),肾癌及肾盂癌的 ADC 值统计学上均低于良性病变(肾脓肿及肾血管平滑肌脂肪瘤),肾盂癌的 ADC 值最低,肾血管平滑肌脂肪瘤的 ADC 值最高。良性囊肿性病及肾癌囊变区的 ADC 值差异有统计学意义 ($t=3.756, P=0.000$)。其中透明细胞癌病理各分期两两比较发现,I 期与 III、IV 期及 II 期与 III、IV 期相比,差异有统计学意义 ($P<0.01$),III 期及 IV 期的 ADC 值较低。

结论 高 b 值 DWI 鉴别肾脏良恶性肿瘤有较高的准确率,结合量化分析 ADC 值能够更好的显示肾脏肿块的病变特征,有助于肾脏肿块的鉴别、恶性程度评估以及预后预测等方面有着重要的意义。

PO-1745

多频 MRE 术前预测肝细胞癌 MVI 的初步研究

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目的: 探索多频 MRE 机械参数是否能够在术前预测 MVI 状态及其价值。

材料与方法: 2021 年 1 月至 11 月在中南大学湘雅医院前瞻性招募临床拟诊肝细胞癌患者 328 名。所有患者均接受了常规多参数 MRI 及多频 MRE 检查,最终纳入经术后病理确诊的肝细胞癌患者共 124 例。收集患者临床资料、评估常规 MRI 影像学特征及测量肿瘤及背景肝实质多频 MRE 机械参数 $c(m/s)$ 和 $\phi(rad)$ 。通过单因素分析中 $P<0.05$ 的参数进入二元 logistic 回归进行多因素分析,以阐明 MVI 的危险因素。以进入多因素分析中的临床变量、常规 MRI 影像学特征分别建立预测模型;多频 MRE 机械参数及其联合多因素分析中临床变量、常规 MRI 影像学特征建立预测模型。使用 ROC 曲线下面积评估预测效能。使用校准曲线评价模型拟合度。使用临床决策曲线分析评价模型的临床获益度。 $P<0.05$ 为差异有统计学意义。

结果: (1) MVI+组的肿瘤硬度 c 及相对硬度比较 MVI-组高 ($2.85\pm0.62m/s$ Vs $2.54\pm0.63m/s$; 1.47 ± 0.39 Vs 1.24 ± 0.33 , P 均 <0.05)。(2) 多因素 Logistic 回归结果表明,瘤内动脉 ($OR11.68, 95\%CI (2.65-52.00)$, $P<0.001$)、肿瘤边缘是否光滑 ($OR0.08, 95\%CI (0.02-0.38)$, $P<0.001$)、肿瘤硬度 c ($OR14.28, 95\%CI (2.16-94.58)$, $P=0.006$) 是 MVI 的独立危险因素。(3) 在 MVI+的预测模型中,常规 MRI 影像特征模型的特异性最高 (0.89)、常规 MRI 影像特征联合多频 MRE 机械参数模型的 AUC 值 (0.911 (0.864-0.959))、敏感性及准确性最高 (分别为 0.86、0.82)。

结论: 多频 MRE 的机械参数 c 能够在术前预测 MVI 状态。临床资料、常规 MRI 影像学特征联合多频 MRE 机械参数可以提升预测 MVI 效能。

PO-1746

探讨多层螺旋 CT 评估胃间质瘤病理危险度分级的可行性

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目的 探讨胃间质瘤 (GST) 的多层螺旋 CT (MSCT) 影像学特征预测其病理危险度分级(美国国防病理学研究所标准, AFIP)的可行性, 为 GST 患者治疗前提供影像学依据。

方法 回顾性收集经手术病理证实为单发 GST 的 424 名患者 (424 枚病灶) 的临床影像资料, 其中男 223 例, 女 201 例, 年龄 61 (14-85) 岁。根据病理 AFIP 危险度分级标准, 将 424 枚 GST 分为低风险组 (含极低危险度与低危险度, 282 枚), 中风险组 (中危险度, 72 枚), 高风险组 (高危险度, 70 枚)。比较三组间的临床资料及影像学特征的差异性。定量资料采用 Kruskal-Wallis H 检验, 对统计学有差异的变量采用 LSD 法进行两两比较; 分类资料采用秩和检验, 对统计学有差异的变量采用 Bonferroni 检验进行两两比较。纳入单因素分析中 $p < 0.05$ 的指标进入多因素模型, 再根据赤池信息准则 (AIC) 进行多因素双向逐步 Logistic 回归分析, 并构建列线图模型。

结果 三组间肿瘤位置、生长方法、形态、坏死、溃疡、供血动脉、血管样强化、病灶周围脂肪阳性征、静脉期 CT 值、静脉期增强幅度、肿瘤长径存在统计学差异 (均 $p < 0.05$)。成功创建两个列线图模型。以低风险组为参照, 预测高风险 GST 的独立危险因子包含肿瘤位置、溃疡和肿瘤长径, 该预测模型的 ROC 曲线下面积 (AUC) 为 0.911 (95% CI: 0.872 - 0.951), 灵敏度和特异度分别为 80.0%、89.0%。以中风险组为参照, 预测高风险 GST 的独立危险因子含肿瘤形态、坏死和血管样强化, 该预测模型的 AUC 为 0.826 (95% CI: 0.759 - 0.893), 灵敏度和特异度分别为 85.7%、70.8%。

结论 MSCT 预测 GST 的病理 AFIP 危险度分级具有一定价值, 特别区分高风险和非高风险具有较高价值, 能为患者的治疗前提供一定影像学依据。

PO-1747

基于 LI-RADS v2018 对肝细胞癌 CK19 表达风险分层及术后复发预测价值

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目的: 探讨 2018 版肝脏影像报告和数据系统 (LI-RADS v2018) 对肝细胞癌 (HCC) 细胞角蛋白 19 (CK19) 表达的术前预测及预后评估的价值。

方法: 回顾性纳入 220 例术前接受 MRI 检查并经病理证实的 HCC 患者, 包括 CK19 阳性组 59 例, CK19 阴性组 161 例。总患者分为训练集和验证集, 比较组间临床、病理及影像资料。通过 Logistic 回归分析确定 HCC-CK19 表达的独立预测因素并构建列线图评分模型。采用受试者工作特征 (ROC) 曲线分析模型诊断效能。计算患者的列线图得分并进行高低风险分组, 采用 Kaplan-Meier 生存曲线比较不同亚组患者的总体、早期及晚期无复发生存率 (RFS)。采用时间依赖性 ROC 曲线下面积 (tdAUC) 分析 CK19 预测模型对 HCC 术后复发的预测效能。

结果: 甲胎蛋白 (AFP) 水平 ($P=0.012$; OR=1.002)、靶样弥散受限 ($P=0.003$; OR=17.667)、环形动脉期高强化 ($P=0.016$; OR=12.932)、晕状强化 ($P=0.011$; OR=5.041)、不光滑肿瘤边缘 ($P=0.019$; OR=4.412) 及肝胆期相对增强比 (RER) ($P=0.023$; OR=0.026) 是 HCC-CK19 表

达的独立预测因素,模型在训练集和验证集的 AUC 分别为 0.896、0.711。CK19 阳性与阴性组的总体 RFS、高与低风险组的总体(及早、晚期)RFS 之间均存在显著差异($P<0.05$)。CK19 风险评分预测 HCC 术后复发的 tdAUC 在第 1-6 年分别为 0.619、0.607、0.578、0.612、0.622、0.565。

结论:LI-RADS v2018 结合其他 MRI 征象可对 HCC 的 CK19 表达进行术前风险预测,并有助于预测 HCC 术后复发。

PO-1748

嗜酸性实性和囊性肾细胞癌:一例新型肾脏肿瘤的病例报告

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目的:第五版 WHO 肾脏肿瘤新分类将嗜酸性实性囊性肾细胞癌(Eosinophilic solid and cystic renal cell carcinoma, ESC-RCC)作为一种以形态学定义的新肾细胞癌亚型,因具有独特的形态特征、镜下特征及免疫表型而被熟知,通常表现为惰性的生物学行为,这使得在影像上很难与其他良性肾脏肿瘤区分开。然而,由于罕见的发病率,目前关于它的影像学报道甚少。因此,本文旨在通过个案病例报道,加深对其影像学特点理解,从而在临床工作中减少误诊。

方法:通过回顾性个案病例报道,结合其他相关文献,描述、总结 ESC-RCC 独特的病理、免疫组化及影像学特点,在此基础上,提出并强调其影像学特点及鉴别诊断要点。

结果:本例为男性,40 岁,平素无特殊及肾癌三联征,MRI 表现为左肾上极皮质的囊实性肿块,大小约 30mm×35mm,肿块突出于肾轮廓之外,见假包膜,信号不均匀,囊性成分主要位于肿瘤边缘,实性成分呈稍长 T2 信号。DWI 示肿瘤呈不均匀高信号,实性成分 ADC 值减低。增强扫描皮质期肿块呈明显不均匀强化,强化程度弱于肾皮质,囊性成分未见强化,延迟期强化程度减退。镜下呈实性区及囊性区混合生长结构,实性区肿瘤细胞呈巢状排列,胞质丰富,呈显著嗜酸性;细胞核呈圆形或卵圆形,可见明显核仁,约相当于 ISUP2/3 级,间质中可见局灶性泡沫细胞和淋巴细胞浸润。免疫组化标记显示 CK20、RCC 抗原均不同程度阳性表达,CD117、CK7、CA-IX、TFE3 表达均为阴性。

结论:ESC-RCC 作为一种新肾细胞癌类型,具有独特的形态学、病理及影像学特点。实性和囊性的混合生长结构具有特异性,胞质内见具有诊断意义的嗜酸性颗粒,CK20 阳性/CD117 阴性是最重要的诊断免疫组化标记物及鉴别要点。特征性影像学特点上为囊实性肿块影,大小不一的囊性成分主要位于肿瘤边缘区,但尚需大样本数据总结。

PO-1749

肝血管瘤 CT 增强诊断分型与肝固有动脉直径相关性研究

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目的 探讨不同血供分型血管瘤的 CT 增强扫描影像学表现特点,并分析血供分型与肝固有动脉直径的相关性。方法 回顾性分析 2019 年 1 月—2021 年 9 月经影像或临床明确诊断为肝血管瘤的患者资料与图像。根据其动脉期强化特征将其分为高速灌注、中速灌注与低速灌注三组。分类标准如下:高速灌注为动脉期出现中心填充趋势,表现为斑片状、片状强化;中等灌注动脉期填充部分血窦、勾勒部分病灶边缘,表现为结节状、线状强化;低速灌注为病灶边缘少许血窦填充,表现为边缘点状强化。测量患者肝固有动脉直径、病灶直径,分析其血流灌注快慢与肝固有动脉直径、病灶直径的相关性。结果 入组的 111 例病灶中,高速灌注 57 例,中速灌注 18 例,低速灌注 36 例。高速灌

注、中速灌注的肝固有动脉直径均大于低速灌注, 差异有统计学意义 ($P < 0.05$)。中速、高速灌注的肝固有动脉直径比较, 差异无统计学意义 ($P > 0.05$)。将高速灌注、中速归为富血供型血管瘤, 低速灌注归为乏血供型血管瘤。绘制两组间肝固有动脉 ROC 曲线, 曲线下面积 (AUC) 为 0.788, 截断值为 4.2cm, 敏感性 77.3%, 特异度为 75.0%。另外, 三组之间的病灶直径比较, 差异无统计学意义 ($P > 0.05$)。结论 CT 增强扫描可以显示肝血管瘤的灌注特点并对其进行分型。肝固有动脉直径大小是肝血管瘤的灌注的影响因素, 测量其大小有助于肝血管瘤血供分型。

PO-1750

扩散峰度成像在胃印戒细胞癌的诊断效能

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目的: 探究扩散峰度成像 (diffusion kurtosis imaging, DKI) 在诊断印戒细胞癌与非印戒细胞癌的诊断效能。

材料和方法: 前瞻性的收集在山东第一医科大学附属省立医院住院的胃癌患者 94 例的 MRI 图像。根据病理结果将其分为印戒细胞癌组 45 例, 非印戒细胞癌 49 例。参考 T1WI 及 T2WI 图像, 选择肿瘤的最大截面及其上、下邻近两个截面, 将感兴趣区(region of interest, ROI)选在病灶的实性部分。将所有 ROI 的测量值的平均值作为测量最终数值。将符合正态分布的数据用平均数 \pm 标准差 ($\bar{x} \pm s$) 表示, 组间比较采用独立样本 t 检验; 不符合正态分布的数据表示为中位数 (M) 或四分位数间距 (Q1, Q3), 组间比较采用多个独立样本非参数检验。采用受试者工作特性曲线 (receiver operating characteristic, ROC) 来分析具有统计学差异的成像参数鉴别印戒细胞癌与非印戒细胞癌的诊断效能, 并且通过计算曲线下面积 (area under curve, AUC) 来确定阈值、敏感度和特异度等诊断效能相关参数。 $P < 0.05$ 为差异具有统计学意义。

结果:

①印戒细胞癌与非印戒细胞癌之间的 ADC 值与 D 值均存在统计学差异 ($P < 0.05$), 印戒细胞癌与非印戒细胞癌之间 K 值不具有统计学差异 ($P > 0.05$);

②D 值和 ADC 值鉴别印戒细胞癌与非印戒细胞癌的 AUC 值分别为 0.837 (95%CI: 0.787~0.971)、0.744 (95%CI: 0.801~0.980)。ADC 值以 $1.142 \times 10^3 \text{mm}^2/\text{s}$ 为临界值时, 其敏感度和特异度分别为 77.93%, 85.36%; D 值以 $1.157 \times 10^3 \text{mm}^2/\text{s}$ 为临界值时, 其敏感度及特异度分别为 83.17%, 92.85%。

结论: 扩散峰度成像具有鉴别区分印戒细胞癌与非印戒细胞癌的潜能, 其中 ADC 值与 D 值具有较高的诊断效能。

PO-1751

不同治疗方案下输尿管结石能谱 CT 参数的改变

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目的: 初步探讨单源双能量 CT (SS-DECT) 能谱扫描模式 (GSI) 在手术及非手术两种治疗方案输尿管结石的成分评估中的应用价值。

方法: 收集输尿管结石患者 41 例, 患者行单源双能量 CT 扫描, 然后进行 DECT 数据采集。设置 80~140Kv 瞬时自动切换, 管电流采用自动 mA, 噪声指数 (NI) 10。在结石最大径层面勾画 ROI (面积约最大层面面积 $1/2 \sim 2/3$, 测量两次取平均值), 采集 (羟基灰石 (水), 碳酸氢钙 (水), 尿酸 (羟基灰石), 草酸钙 (水), 磷酸氨镁 (水) 及胱氨酸 (水)) 等数据, 用 flie 格式记录

ROI 的 CT 值、有效原子序数 (Eff-Z) 等能谱信息。采用独立样本 T 检验分析比较组间差异, $P < 0.05$ 为差异具有统计学意义。

结果: (1) 采集的病例中手术治疗 18 例 (平均年龄 47 ± 10.94), 非手术治疗 14 例 (平均年龄 49.08 ± 8.47), 9 例未能随访。(2) 手术组与非手术组结石的 CT 值分别为 (1461.61 ± 504.04)HU, (902.37 ± 436.94)HU, Eff-Z 值分别为 12.54 ± 1.0 、 11.11 ± 1.53 。两组间差异均有统计学意义 ($t = 2.558$, 2.535 , $P = 0.020, 0.021$)。 (2) 对照能谱能谱有效原子序数参考值表, 手术组包括 10 例钙结石 (包括草酸钙和磷酸氢钙), 4 例鸟粪石及 4 例半胱氨酸结石。非手术组结石包括 2 例钙结石, 2 例鸟粪石, 2 例尿酸结石及 8 例半胱氨酸结石。手术组各基物质对参数明显高于非手术组, 尿酸 (羟基灰石) 差异无统计学意义 ($P > 0.05$), 其余各组参数差异有统计学意义 ($P < 0.05$)。相同结石成分条件下, 各组基物质对参数间差异无统计学意义 ($P > 0.05$)。

结论: 大量研究证明, 输尿管结石的 CT 值及有效原子序数值 (Eff-Z) 对鉴别结石成分具有一定的临床意义。本研究病例收集病例数较少, 也可加大样本量进行进一步探讨。

PO-1752

透明细胞肾癌的诊断和病理相关分析: 一项基于 CT 直方图的初步研究

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目的: 评价 CT 直方图 (CT histogram, CTH) 定量参数及参数联合对透明细胞肾癌 (clear cell renal cell carcinoma, ccRCC) 诊断价值和效能; 与术后病理指标作对照, 评估 CTH 定量指标是否能够预测肿瘤分化程度。方法: 采用回顾性研究方法, 收集 2019 年 1~12 月手术病理证实的 ccRCC 病例 66 例 (67 个肿瘤)。所有病例术前接受 CT 增强三期扫描, 包括皮质期、髓质期和排泄期。两位放射科医师采用 Omini-Kinetics 软件分别于增强三期图像瘤区和对照区勾画感兴趣区, 合计得到参数 32 个 (30 个直方图参数和 2 个瘤区容积参数)。比较瘤区和对照区 CTH 参数的组间差异; 采用二元 logistic 回归和受试者工作特征曲线 (receiver operator characteristic, ROC), 比较各期 CTH 参数和联合参数对 ccRCC 的诊断价值和效能; 采用 spearman 相关分析, 比较 CTH 参数、瘤区容积参数与病理指标的相关性。结果: 皮质期参数 MedianIntensity、Kurtosis、Entropy, 髓质期参数 MinIntensity, 排泄期参数 MinIntensity、uniformity、skewness 共 7 个参数对 ccRCC 具有诊断价值。ROC 显示联合参数 (髓质期 MinIntensity+排泄期 MinIntensity+排泄期 uniformity) 诊断效能最高 (敏感性=95.5%, 特异性=98.5%, $AUC = 0.996$)。排泄期 MinIntensity、skewness 比值 (瘤区/对照区) 与 Fuhrman 分级呈统计学负相关; 瘤区容积相关参数与 Fuhrman 分级、Ki-67 计数呈统计学正相关。结论: CTH 定量参数和联合参数反应肿瘤的异质性, 对 ccRCC 具有诊断效能; 结合瘤区容积测量, 能够有效预测 ccRCC 的病理分级和分化程度。

PO-1753

多材料分离技术重建虚拟平扫 CT 图像： 评估儿童肝脏肿瘤的诊断价值

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目的：通过多材料分解后的虚拟平扫对儿童肝脏肿瘤的定量分析，评估虚拟平扫（VUE）替代真实平扫（TUE）并减少辐射剂量的可行性。

方法：回顾性分析 24 例肝肿瘤患儿的动脉、门脉期 VUE，与 TUE 进行定量和定性对比。采用方差分析比较肝实质、肝肿瘤肌肉的 CT 和 SNR、CNR 以及背景噪声 SD，通过 Pearson 分析三者相关性、绘制 Bland-Altman 图。计算病灶和钙化灶的检出率，同时分别评价病灶的显示能力。

结果：富血供与乏血供肝肿瘤分别各 12 例，三组肝实质 CT 值和 CNR 值差异无统计学意义，其余参数的差异均有意义。VUEa 和 VUEpv 所有参数均无差异，且两者的肝实质和肝肿瘤 CT 值的存在显著关联性（ $r=0.878/0.972$, $p<0.001$ ）。VUEa、VUEpv 与 TNC 的肝实质 CT 值具有较强的关联性（ $r=0.787/0.802$, $p<0.001$ ），VUEpv 与 TNC 的肝肿瘤 CT 值的关联性一般（ $r=0.497$, $p=0.014$ ），而 VUEa 与 TNC 的肝肿瘤 CT 值无关联性（ $r=0.394$, $p=0.057$ ），但肝肿瘤中的非富血管灶提示 VUEa 与 TNC 存在显著关联性（ $r=0.749$, $p=0.005$ ）。Bland-Altman 图显示与 TNC 的肝肿瘤 CT 值相差 10HU 以上的病灶 VUEa 有 6 例，VUEpv 有 7 例，其中富血管病灶居多。肝肿瘤检测能力分别为 TNC（76/111, 68.47%），VUEa（64/111, 83.78%），VUE(PV)（93/111, 83.78%），VUEpv 与 TNC 对肝肿瘤的显示能力、内部结构和图像整体质量的评分均无差异，除了 TNC 的肝肿瘤显示能力与 VUEa 无差异，其余评分均优于 VUE（A）。

结论：VUE 可以替代 TNC 图像，两者的肝实质与肝肿瘤的 CT 值具有一定关联性，其中，VUEpv 提高了肝肿瘤病变显示及内部结构改变，并进一步减少辐射剂量与扫描时间。

PO-1754

增强 CT 量化分级奥沙利铂相关肝窦损伤

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摘要 目的：探讨 3Dslicer 软件图像分割技术在奥沙利铂化疗后出现肝窦损伤病人的肝脏组织损伤划分方法的可行性，分析肝脏总容积和肝窦损伤低灌注容积的变化规律。方法：回顾接受奥沙利铂相关化疗患者 CT 影像资料，纳入 24 例奥沙利铂化疗后出现显著肝窦损伤患者，收集患者化疗前、化疗后各周期患者的上腹部增强 CT 门静脉期图像。设计自身对照，将患者分为三组：化疗前组（手术后未进行第一次化疗的时期）、化疗中期组（化疗后开始出现肝窦损伤的时期）、化疗后期组（化疗后肝窦损伤最显著的时期），由 2 名医生分别运用 3Dslicer 软件勾画并测量各组图像的肝脏总容积（ILV）及肝窦损伤低灌注容积（HSHV），计算肝脏总容积增大百分比（PIILV）和肝窦损伤低灌注容积增大百分比（PIHSHV），进行统计学分析。结果：2 名医生对肝脏总容积和肝窦损伤低灌注容积的测量结果具有较好的一致性（Kendall=0.945, $P<0.05$ ）。肝脏总容积（ILV） 化疗后期组大于化疗前组[（1208.963±208.275）cm³vs（1118.764±241.775）cm³, $P<0.05$]，化疗后期组肝脏总容积增大百分比（PIILV）约为 10.06 %（ $P<0.05$ ）。肝窦损伤低灌注容积（HSHV） 化疗后期组大于化疗前组、化疗后期组大于化疗中期组[（376.761±68.524）cm³, $P<0.05$ vs（235.949±59.633）cm³, $P<0.05$]，化疗中期组及化疗后期组的肝窦损伤低灌注容积增大百分比（PIHSHV）约为 19.78%、30.26%（ $P<0.05$ ）。结论：应用 3Dslicer 软件可对奥沙利铂相关肝窦损伤的肝实质进行三维重建，并预测肝脏总容积和肝窦损伤低灌注容积的变化规律。

随着化疗周期的增加肝脏总容积逐渐增大,肝窦损伤低灌注容积也逐渐增大,肝窦损伤最显著时期肝脏总容积约为化疗前的 110.06%,肝窦损伤低灌注容积约为化疗前的 130.26%。

PO-1755

酰胺质子转移加权和脂肪定量测量技术评估子宫内膜癌淋巴血管间隙浸润

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目的 探讨酰胺质子转移加权 (APT_w) 和脂肪定量测量 (mDIXON-Quant) 技术评估子宫内膜癌 (EC) 淋巴血管间隙浸润 (LVSI) 的价值。**材料和方法** 回顾性分析经手术病理证实的 50 例 EC 患者资料,其中有 LVSI 者(LVSI(+))18 例,无 LVSI 者(LVSI(-))32 例,术前 MR 扫描序列包括 APT_w 和 mDIXON-Quant,经后处理获得 APT、横向弛豫率 (R2*)、脂肪分数 (FF) 图。测量两组病例的 APT、R2*和 FF 值,采用独立样本 t 检验或 Mann-Whitney U 检验比较两组病例各参数值的差异,采用受试者工作特征曲线评价有统计学差异的参数及其联合后评估 LVSI 的效能,采用 Delong 检验比较各曲线下面积 (AUC) 之间的差异,采用 Pearson 相关分析评价 APT 值与 R2*、FF 值的相关性。**结果** LVSI(+EC) 的 APT、R2*和 FF 值分别为 2.947±0.399 %、20.605 (18.525, 27.953) /s 和 2.234±1.047 %, LVSI(-)EC 的上述参数值分别为 2.628±0.307 %、18.968 (16.225, 20.544) /s 和 2.103±1.070 %, LVSI(+EC) 的 APT、R2*值高于 LVSI(-)者 (P<0.05), 两组之间的 FF 值无差异 (P>0.05)。APT、R2*、APT+R2*值评估 LVSI 的 AUC 分别为 0.751、0.713、0.781, 各 AUC 之间无统计学差异 (P>0.05)。APT 值与 R2*值呈中等正相关 (r=0.528, P<0.001), APT 值与 FF 值呈弱的正相关 (r=0.312, P=0.027)。结论 APT_w 和 mDIXON-Quant 技术均可有效评估 EC LVSI, 联合应用可提升评估效能。

PO-1756

基于临床- CT 影像组学动态列线图预测 T1~2 期直肠癌淋巴结转移

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目的 探讨临床特征联合 CT 影像组学构建的动态列线图在预测 T1~2 期 RC 发生 LNM 的价值。**方法** 收集皖南医学院一附院 183 例 T1~2 期 RC 患者的完整资料。按 7:3 随机分为训练组 (n=128) 及内部验证组 (n=55), 另选取芜湖市第二人民医院 54 例患者为外部验证组, 根据 LN 状态分为 LNM 组与 NLNM 组。利用 MaZda 软件提取纹理特征, LASSO 回归降维筛选最优特征, 基于最优特征构建影像组学标签评分 (radscore)。采用单因素与多因素 logistic 回归分析筛选独立危险因素, 构建联合预测模型, 绘制模型的动态列线图及校准曲线。利用受试者工作特征 (ROC) 曲线及曲线下面积 (AUC) 评价模型的区分度, 利用赤池信息准则 (AIC)、贝叶斯信息准则 (BIC) 及 delong 检验比较各模型效能, 临床决策曲线 (DCA) 评价模型的临床适用性。**结果** LASSO 回归筛选出 3 个最优特征, 单因素与多因素 logistic 回归肿瘤 T 分期、碳水化合物抗原 (CA19-9)、中性粒细胞与淋巴细胞比 (NLR)、影像淋巴结短径及 radscore 为独立危险因素。联合模型 AUC 训练组、内部验证组及外部验证组分别为 0.877、0.831、0.797, 联合模型 AIC 与 BIC 值均最低, delong 检验联合模型诊断效能最高 (均 P<0.05), 校准曲线及 DCA 表明联合模型具有较高的校准度及很好的临床适用性。

结论 临床特征联合 CT 影像组学构建的动态列线图模型能够有效的预测 T1~2 期 RC 患者 LN 状态, 且动态列线图可直接输出个体预测结果, 有助于外科医师为患者制定最佳治疗方案。

PO-1757

MiT 家族易位性肾癌影像诊断与鉴别诊断

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[摘要] 目的: 探讨 MiT 家族易位性肾细胞癌 (MiT RCC) 的影像表现及与肾透明细胞癌 (CCRCC) 及乳头状肾细胞癌 (PRCC) 的鉴别诊断价值。方法: 选择经手术病理证实的 11 例 MiT RCC 患者 CT 及 MRI 影像资料, 分析患者的性别及年龄、病灶大小、形态、出血、假包膜、强化模式、生长方式以及对周围组织侵犯等影像学特征, 并与 11 例 CCRCC、11 例 PRCC 的影像特点对照分析。结果: 11 例 MiT RCC 患者中男 3 例, 女 8 例。患者年龄 10-73 岁, 平均年龄 33.18 ± 17.41 岁。11 例 MiT RCC 和 11 例 CCRCC、11 例 PRCC 三组间分析结果显示, 年龄、性别、肿块位置、有无假包膜、有无出血、发病年龄分布、强化程度的三组间差异具有统计学意义 ($p < 0.05$); 肿块大小及形态、钙化、坏死囊变、强化模式、生长方式、对组织侵犯以及转移征象无统计学差异 ($p > 0.05$)。MiT RCC 相比 CCRCC、PRCC 发病年龄更小, 女性更多见, 出血发生率更高, 更易表现为肾髓内生长, 假包膜 MiT RCC 及 CCRCC 发生率均较高, 明显高于 PRCC ($p < 0.05$); 强化程度 $CCRCC > MiT RCC > PRCC$ ($p < 0.01$)。结论: MiT RCC 的影像学表现有一定特征性, 结合好发于 30 岁以下的儿童及年轻人、出现肾轮廓内肿块伴出血、钙化、假包膜、多发淋巴结及远处转移, 有助于提高术前诊断率。

PO-1758

Gd-EOB-DTPA 增强 MRI 和 CT 对粗梁-团块型肝细胞癌患者的预测价值

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目的: 对比钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 和 CT 影像学特征对粗梁-团块型肝细胞癌 (MTM-HCC) 的预测能力, 并筛查影响 MTM-HCC 患者无病生存期 (DFS) 的预后因素。方法: 本回顾性研究共纳入 316 例经手术证实的 HCC 患者, 其中 MTM-HCC 患者 91 例, 非 MTM-HCC 患者 225 例。利用统计学方法比较两组患者的临床及影像学特征, 采用多变量逻辑回归分析筛查独立危险因素, 绘制受试者工作曲线评价模型的预测效能, 利用 R 软件构建可视化诺莫图, 并绘制 Calibration 校准曲线评估诺莫图性能。结果: Gd-EOB-DTPA 增强 MRI 影像征象对 MTM-HCC 的预测效能 (ROC 曲线下面积为 0.797, 95% CI: 0.741 ~ 0.854, $P < 0.001$) 略高于 CT (ROC 曲线下面积为 0.763, 95% CI: 0.701 ~ 0.824, $P < 0.001$), 但两者间差异无统计学意义 ($P = 0.089$)。基于 2 个临床因素 (AFP 和 PT-INR) 和 Gd-EOB-DTPA 增强 MRI 的四个影像学特征包括无瘤内脂肪、动脉期瘤周强化、包膜不完整和肝胆期瘤周低信号构建的可视化诺莫图对 MTM-HCC 的术前分类和术后 1 年 DFS 具有较高的预测价值, ROC 曲线下面积分别为 0.812 和 0.711。结论: Gd-EOB-DTPA 增强 MRI 对 MTM-HCC 的预测效能与 CT 相当。基于 Gd-EOB-DTPA MRI 影像特征和临床因素构建的诺莫图对 MTM-HCC 术前分类和术后超早期复发风险具有较好预测价值。

PO-1759

双能量螺旋 CT 肝脏门静脉海绵样变性成像扫描技术

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目的：通过造影剂团注追加盐水的对比研究，探讨双能量螺旋 CT 肝脏门静脉成像的最佳扫描技术和延迟时间。

方法：选取肝脏门静脉高压和肝脏门静脉海绵样变性患者各 30 例。分别以 90ml 和 100ml 对比剂，并在对比剂团注后分别追加 16ml 和 20ml 盐水。获得大小两次剂量到达峰值，并且肝脏内血管对比剂填充最充分的时间，分别计算两类患者肝脏门静脉到达峰值的平均时间和差值。

结果：双能量螺旋 CT 肝脏门静脉成像，对于肝脏门静脉高压患者，给予 90ml 造影剂，流速 3.2ml/s，追加 16ml 盐水冲管，流速 4.0ml/s。对于肝脏门静脉海绵样变性患者，剂量 100ml，流速 3.5ml/s 追加盐水 20ml，流速 5.0ml/s。在造影剂开始团注后 28 秒开始动脉期扫描，延时 18 秒后进行门脉期扫描，再延时 45 秒进行延迟期扫描。门脉期门静脉的 CT 值为 175~210HU，平均 190HU。门脉期腹主动脉 CT 值比门静脉低 40~50HU。

结论：通过造影剂的快速团注及追加大于造影剂盐水的冲管，可以使门静脉高压患者以及门静脉海绵样变性患者的门静脉在 55 秒~60 秒的门脉期充盈良好，并且与主动脉等大动脉形成良好的 CT 差值，方便图像的后期处理以及三维重建效果。

PO-1760

基于转录组学的直肠癌新辅助放化疗抵抗 差异基因筛选与图像识别

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目的：探索局部进展期直肠癌（LARC）患者新辅助治疗（NCRT）抵抗的基因转录差异，筛选差异基因并分析其与 MRI 征象相关性及潜在生物学机制。

方法：回顾性纳入 25 名 2021 年于我院行 NCRT 及根治性手术的 LARC 患者，其中包括 19 例 NCRT 敏感者（Dworak TRG 3-4）和 6 例 NCRT 抵抗者（Dworak TRG 0-2）。获取患者的直肠活检标本进行全转录组 RNA 测序，筛选影响 NCRT 敏感性的差异表达基因并进行功能富集分析。卡方检验对比两组患者临床资料及直肠 MRI 征象差异。

结果：全转录组 RNA 测序共识别出 NCRT 抵抗者存在 604 个上调表达和 1112 个下调的差异表达基因，功能富集分析显示上述基因差异表达可引起淋巴细胞的增殖活性降低和激活状态受阻。NCRT 抵抗组和敏感组患者的临床特征均不具有显著差异，MRI 显示 NCRT 抵抗者直肠癌原发灶更倾向于表现为 T2WI 信号增高（6/19 VS. 5/6, $P=0.026$ ），直肠系膜筋膜内索条影增多（7/19 VS. 5/6, $P=0.047$ ）和脂肪相对体积减少（4/19 VS. 4/6, $P=0.037$ ）。

结论：本研究揭示了 NCRT 抵抗的 LARC 原发灶微环境免疫抑制状态及相关差异表达基因，MRI 检查肿瘤 T2WI 信号增高、直肠系膜筋膜内索条影增多及脂肪相对体积减少可能对微环境改变和 NCRT 抵抗具有提示意义。

PO-1761

基于 MRI 影像组学的直肠癌新辅助放化疗 抵抗预测与肿瘤微环境研究

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目的: 基于基线 MRI 影像组学在治疗前预测局部晚期直肠癌 (LARC) 患者新辅助放化疗 (NCRT) 抵抗, 并分析其微环境特征。

方法: 回顾 180 例入组的 LARC 患者临床资料, 并按 7:3 比例随机分为训练集 (126 例) 和验证集 (54 例)。两名放射科医生在基线直肠 MRI-T2WI 连续层面勾画肿瘤感兴趣区 (ROI) 并提取组学特征。根据 Dowrak 肿瘤退缩分级 (TRG) 评价病理反应, 定义治疗抵抗为 TRG 0-2, 治疗敏感为 TRG 3-4。利用肠镜活检切片评估肿瘤间质比 (TSR), 免疫组化评估 CD3、CD8 和 HIF- α 表达水平。分别采用六种机器学习算法构建临床-组学模型预测 NCRT 抵抗, 并对比模型性能。

结果: NCRT 抵抗者 82 例, 敏感者 98 例。TSR 升高 (HR=3.458, $P<0.001$) 是治疗抵抗的唯一临床危险因素。共有 9 个放射组学特征与治疗反应显著相关。随机森林算法在训练集 (AUC: 0.9833, $P=0.002$) 和验证集 (AUC: 0.8224, $P=0.036$) 中表现最优。治疗抵抗患者 CD3、CD8 表达明显降低 ($P=0.035$), HIF- α 表达明显升高 ($P=0.02$)。

结论: 我们构建了治疗前预测 LARC 患者 NCRT 抵抗的模型, 并证实了直肠癌微环境显著影响肿瘤治疗敏感性。

PO-1762

基于 CTE 影像组学模型预测肠道克罗恩病炎症活动度的价值

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[摘要] 目的 探讨基于 CT 小肠造影 (CTE) 的影像组学模型 (RM) 对肠道克罗恩病 (CD) 活动性炎症的诊断价值。方法 回顾性分析 105 例病理确诊为肠道 CD 患者的 CTE 图像和临床资料, 以临床经典克罗恩病活动度评分 (CDAI) 为参照标准分为无-轻度活动组和中-重度活动组。按 8:2 比例随机选取 84 例作为训练组 (43 例阳性, 41 例阴性), 另外 21 例作为试验组 (11 例阳性, 10 例阴性)。使用 ITK-Snap 对 CTE 静脉期图像上的所有病变区域 (包括肠道外病灶) 进行手动勾画, 提取特征后用 DARWIN 软件进行特征降维。采用极致梯度提升 (XGBOOST) 建立二分类 RM, 并应用到测试集进行验证, 计算敏感度、特异度和曲线下面积 (AUC)。最后, 应用 AUC 评估 RM 对肠道 CD 活动性炎症的诊断效能及最佳诊断阈值。结果 在训练集中, RM 区分无-轻度活动性及中-重度活动性的 AUC 为 0.93, 敏感度为 90.2%, 特异度为 83.7%; 在验证集中, AUC 为 0.86, 敏感度 90%, 特异度为 81.8%。结论 基于 CTE 的影像组学模型可准确、客观、有效地评估肠道 CD 活动度。

PO-1763

定量磁化率成像技术在直肠癌不同病理特征中的初步应用探讨

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目的 探讨基于 QSM 技术的定量磁化率值在直肠癌不同病理学特征中的差异。方法 回顾性分析 2022 年 10 月-2023 年 2 月于我院进行直肠 MRI 检查的患者资料。使用运行在 MATLAB version 2018b 软件的 STI_Suite V3.0 对扫描获得的 QSM 原始图像进行后处理,得到 QSM 加权图像。将 QSM 加权图像导入 FireVoxel build 394D 软件进行图像分割。由两名具有 20 年以上直肠癌 MRI 诊断经验的高级职称医生,在距离肿瘤外缘内侧 1mm 处分割最大层面内的肿瘤组织,软件自动计算出肿瘤组织的磁化率直方图。采用 SPSS 26.0 统计软件进行数据分析。观察者间的一致性程度采用组内相关系数检验 (ICC)。不同临床病理学特征间组织磁化率直方图结果的比较,采用独立样本 t 检验。 $P < 0.05$ 认为差异具有统计学意义。结果 本研究纳入 28 名患者。T3-4 期直肠癌第 60、70、80、90 百分位的顺磁效应明显高于相应的 T1-T2 期直肠癌 [(60th: $-0.087 \pm 0.05 \text{ ppm}$ 比 $-0.036 \pm 0.067 \text{ ppm}$)、(70th: $-0.048 \pm 0.046 \text{ ppm}$ 比 $0.009 \pm 0.072 \text{ ppm}$)、(80th: $-0.009 \pm 0.042 \text{ ppm}$ 比 $0.055 \pm 0.081 \text{ ppm}$)、(90th: $0.030 \pm 0.043 \text{ ppm}$ 比 $0.101 \pm 0.091 \text{ ppm}$)], 均 $P < 0.05$, 差异具有统计学意义], 随着百分位的增加,病灶顺磁性效应降低,逆磁性效应增加。脉管癌栓阳性组第 50、60、70、80、90 百分位的顺磁效应高于脉管癌栓阴性组 (P 值均 > 0.05)。同时,随着百分位的增加,病灶顺磁性效应降低,逆磁性效应增加。神经侵犯阳性组、阴性组的组织磁化率直方图参数结果 P 值均 > 0.05 , 差异均不具有统计学意义。结论 基于 QSM 技术的定量磁化率值直方图分析可以反映直肠癌的不同病理学特征差异。

PO-1764

比较小视野多激发平面回波序列 DWI 与常规单激发平面回波序列 DWI 在直肠癌中的应用价值

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目的 比较直肠癌 rFOV IRIS-DWI 序列与 fFOV ssEPI-DWI 序列的图像质量。方法 回顾性分析 2022 年 10 月-2022 年 12 月于我院进行直肠 MRI 检查的患者资料。所有入组患者均完成小视野基于图像空间重建技术 DWI (rFOV IRIS-DWI) 序列、常规视野单激发平面回波 DWI (fFOV ssEPI-DWI) 序列。所有图像均传至 Philips IntelligenceSpace Portal 后处理工作站分析。由两名具有 20 年以上直肠癌 MRI 诊断经验的高级职称医生,采用双盲法分别评估两组 DWI 图像。图像质量评价包括主观评价和客观评价。主观评价采用 5 分制进行评分,包括总体图像质量、图像伪影、图像变形、病变对比度、图像解剖结构。客观评价包括肿瘤最大层面面积、肿瘤平均最大面积、ADC 值、肿瘤信号噪声比 (SNR) 和对比信号噪声比 (CNR)。采用 SPSS 26.0 统计软件进行分析。两组 DWI 的图像质量主观评分比较采用配对 Wilcoxon S 秩和检验,客观图像质量比较采用配对样本 t 检验。 $p < 0.05$ 表示差异有统计学意义。结果 本研究纳入 30 例患者,平均年龄为 63.2 ± 10.6 岁。rFOV IRIS-DWI 序列主观评价中的图像总体质量、变形、伪影、对比度、解剖结构均优于 fFOV ssEPI-DWI 序列 ($p < 0.05$)。rFOV IRIS-DWI 序列 ADC 值明显低于 fFOV ssEPI-DWI 序列,分别为 $0.86 \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $1.08 \times 10^{-3} \text{ mm}^2/\text{s}$ ($p = 0.000$)。rFOV IRIS-DWI 序列的最大层面面积、平均最大面积均大于 fFOV ssEPI-DWI 序列 ($p < 0.05$)。结论 相对于 fFOV ssEPI-DWI 序列,rFOV IRIS-DWI 序列能明显提高直肠癌图像分辨率,减轻磁敏感伪影、图像变形,提高图像质量。

PO-1765

基于 L3 水平骨骼肌 CT 图像的深度学习模型在胃癌患者生存结局中的预测价值

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目的：探讨基于 L3 水平骨骼肌 CT 图像的深度学习模型与胃癌生存结局的关系，比较其与人体成分参数对胃癌预后的预测价值。

方法：回顾性纳入 2010 年 11 月至 2020 年 12 月期间行胃癌根治性切除术的患者，按 4:1 分为训练队列和测试队列。临床终点事件为无复发生存（Recurrence-free survival, RFS）和疾病特异性生存（Disease-specific survival, DSS）。将每位患者 L3 水平的整个 CT 图像和相应的骨骼肌掩模输入 Transformer 提取特征构建深度学习模型。比较模型与人体成分参数（骨骼肌指数、骨骼肌平均灰度值、体重指数）对 RFS 和 DSS 的预测表现。采用多因素 Cox 回归评估模型评分对胃癌预后的影响。根据最佳截断值将患者分为高、低危险组进行组间生存率比较。分析模型在不同性别、年龄亚人群的漏诊率和误诊率以评估模型公平性。

结果：共收集 1553 例符合标准的胃癌患者。在测试队列中模型表现优越，预测 RFS 和 DSS 的 AUC 值分别为 0.783（95%CI: 0.733-0.827）和 0.716（95%CI: 0.662-0.765），显著高于人体成分参数（AUC 为 0.506-0.529；DeLong 检验，所有 $P<0.001$ ）。模型评分是 RFS（HR: 158.4；95%CI: 90.8-276.3； $P<0.001$ ）和 DSS（HR: 55.1；95%CI: 32.1-94.6； $P<0.001$ ）的一个强大独立影响因素，并对患者具有良好的预后分层作用，高、低危险组间 5 年生存率差异达到 50-77%。模型在服务不同性别、年龄亚人群时的误诊率和漏诊率相似，体现了模型良好的公平性。

结论：基于 L3 水平骨骼肌 CT 图像的深度学习模型作为胃癌生存预后的新型影像生物标志物，可以提供比传统人体成分参数更有价值的信息，能够准确地预测胃癌患者的生存结局，并有效识别复发或死亡高风险患者，辅助临床决策。

PO-1766

联合肿瘤及 L3 水平骨骼肌 CT 图像构建深度学习模型 辅助胃癌预后评估及化疗决策

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目的：探讨整合了胃癌患者术前肿瘤和 L3 水平骨骼肌 CT 图像的深度学习模型是否可以提高预后评估的准确性和辅助化疗决策。

方法：回顾性纳入 1553 例接受了根治性切除术的胃癌患者，并将其随机分配到训练集（ $n=1242$ ）和内部验证集（ $n=311$ ），从另一中心纳入 309 例患者组成外部验证集以评估模型的泛化性。使用 Transformer 开发和验证预测胃癌无复发生存（Recurrence-free survival, RFS）的骨骼肌模型、肿瘤模型和融合模型。通过 C 指数评估不同模型的预测性能，DeLong 检验差异的存在。计算净重分类改善度以量化模型预测准确性的相对提高。观察最优模型对 1、3 和 5 年 RFS 的预测表现，采用校准曲线和决策曲线评估模型校准效果和临床应用价值。将患者分为高、低危险组，利用 Kaplan-Meier 生存分析探讨不同危险组患者与生存结局和全程辅助化疗之间的关联。引入梯度加权类激活映射技术为模型生成可视化解释。

结果：融合了肿瘤和 L3 水平骨骼肌 CT 图像的深度学习模型比基于单一信息源的模型表现更佳，在内部和外部验证集中预测 RFS 的 C 指数为 0.761（95%CI: 0.746-0.783）和 0.755（95%CI: 0.739-0.776），预测分类准确度相对提高了 33.4%。它对 1、3 和 5 年 RFS 的预测在所有队列上

均达到稳定的性能, 且具有良好的校准度和临床获益。模型评分在三个数据集上都可以很好地区分预后不同的患者。对于高危组患者, 接受全程辅助化疗可以提高 RFS (内部验证集 HR: 0.6; 95%CI: 0.4-0.9; P=0.025); 然而, 对于低危组患者, 全程辅助化疗对 RFS 无显著影响 (内部验证集 HR: 1.0; 95%CI: 0.5-1.9; P=0.981)。

结论: 肿瘤和骨骼肌之间的协同作用为胃癌患者提供了一种新型联合影像生物标志物, 考虑这种协同作用将有助于更精准的预后评估和辅助化疗决策。

PO-1767

矢状位 RS-EPI DWI 与 SS-EPI DWI 对直肠病变 DWI 图像质量的影响

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目的: 探讨 3.0TMR 矢状位 RS-EPI DWI 与 SS-EPI DWI 对直肠病变 DWI 图像质量的影响。方法: 搜集经病理证实的 151 例直肠病变患者, 其中恶性肿瘤 126 例, 良性肿瘤 25 例, 均采用飞利浦 3.0TMR 进行矢状位 RS-EPI DWI 和矢状位 SS-EPI DWI 序列检查。由 2 名放射科医师分别对两种序列上的直肠与病灶解剖结构的显示、病灶的清晰度与几何变形进行评分; 同时对图像质量进行客观评价, 评价指标包括病灶性噪比 (SNR)、对比度 (CR)、对比噪声比 (CNR) 以及表观扩散系数 (ADC) 值。采用 Kappa 检验评价两位医师评分的一致性, 采用配对 Wilcoxon 秩和检验和配对样本 t 检验比较两种序列主观评分及定量评估指标的差异。结果 直肠矢状位 RS-EPI DWI 显示直肠与病灶解剖结构、病灶的清晰度与几何变形的分数均高于 SS-EPI DWI (p 均 <0.05)。直肠矢状位 RS-EPI DWI 中的 SNR 和 CNR 高于 SS-EPI DWI (p 均 <0.05); 在矢状位 RS-EPI DWI 与 SS-EPI DWI 之间, 肿瘤的平均 ADC 值无统计学意义 ($p>0.05$)。结论 直肠矢状位 RS-EPI DWI 图像质量优于 SS-EPI DWI, 可常规用于直肠病变 MRI 扫描。

PO-1768

T1MAPPING 定量分析移植肾肾功能的价值

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摘要: 目的: 需要一种评估移植后肾移植功能的非侵入性方法, 本研究旨在通过 T1-mapping 定量分析技术评估肾移植术后肾功能。方法: 收集我院异体肾移植术后第 12 周的患者 45 例, 均行常规序列和斜矢状面 T1mapping 序列 MRI 检查、SPECT 检查。根据 SPECT 肾动态显像结果, 将患者组分为 2 组: A 组为移植肾功能良好组 (23 例); B 组为移植肾功能受损组 ($n=22$)。分别测量出各组移植肾皮、髓质 T1 值。比较两组内及组间肾脏皮髓质 T1 值的差异, 同时分析移植肾皮质、髓质 T1 值与 eGFR 间的相关性, 采用 ROC 曲线分析 T1 值对不同功能移植肾的鉴别诊断价值。结果: 各组内肾皮质的 T1 值均明显小于肾髓质 ($P<0.01$)。A、B 组肾皮质 T1 值分别为 (1535.95 ± 67.1)、(1663.22 ± 78.8) ms, 各组间的差异均有统计学意义 ($P<0.05$)。A、B 组肾髓质的 T1 值分别为 (1987.95 ± 87.3)、(2056.1 ± 56.5) ms, 各组间的差异均有统计学意义 ($P=0.04$)。移植肾皮质的 T1 值与 eGFR 呈负相关 ($r=-0.47, P<0.01$)。移植肾 T1 值区分移植肾功能损伤与非损伤组时曲线下面积 (AUC) 为 0.74, 灵敏度及特异度分别为 80.5% 及 79.1%。结论: T1-mapping 定量分析技术对评估肾移植术后早期肾功能具有一定价值, 并且可能有助于识别移植后并发症和肾活检的指征。

PO-1769

基于定量 CT 身体组分分析及临床预后因子的列线图预测局部晚期宫颈癌同步放化疗后生存

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目的 探讨同步放化疗 (CCRT) 前后的定量 CT (QCT) 身体组分参数变化在评估局部晚期宫颈癌 (LACC) 患者总生存期 (OS) 和无进展生存期 (PFS) 中的价值, 并联合临床预后因子 (CPF) 构建列线图模型。**方法** 回顾性收集自 2014 年 1 月到 2017 年 10 月经我院病理证实为 LACC 的 88 例患者的临床病理资料。所有患者于 CCRT 前后行 QCT 扫描, 分别测量前后两次 QCT 参数, 包括 L1、L2 骨密度 (BMD) 和 L3 水平皮下脂肪面积 (SFA)、内脏脂肪面积 (VFA)、总脂肪面积 (TFA)、椎旁肌群面积 (PMA), 将 QCT 扫描时间间隔标准化为 180 天, 计算治疗前后的 QCT 参数的变化率。对 QCT 参数和 CPF 进行单因素和多因素生存分析, 筛选出独立预后因子, 并构建列线图模型。结果 多因素 COX 回归分析显示 Δ BMD, Δ SFA, 疗前鳞状抗原 (SCC-Ag) 和淋巴结转移 (LNM) 是 OS 的独立预后因子, Δ PMA, SCC-Ag 和 LNM 是 PFS 的独立预后因子。QCT 参数和 CPF 的联合模型预测效能最高, 曲线下面积 (AUC) 分别是 0.837, 0.846。校准曲线显示了 OS 和 PFS 的列线图模型预测 LACC 患者生存的效能和实际有良好的一致性。结论 QCT 身体组分参数和 CPF 与接受 CCRT 的 LACC 患者的生存密切相关, 基于 QCT 身体组分参数和 CPF 的列线图对预测 LACC 患者 CCRT 后 OS 和 PFS 具有较高的临床价值。

PO-1770

比较小视野 IRIS-DWI 序列和 TSE-DWI 序列在直肠癌中的应用价值

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目的 比较直肠癌 rFOV IRIS-DWI、rFOV TSE-DWI 序列的图像质量。**方法** 本研究回顾性分析了临床诊断为直肠癌患者的弥散加权成像数据 30 例。所有患者均采用 3.0T MR 扫描仪 (Elition, PHILIPS, 荷兰) 扫描。由一名具有 20 年以上直肠癌 MRI 影像诊断的放射科高级职称医生在 Philips IntelligenceSpace Portal (ISP) 工作站 (版本号 V10.1) 上进行图像分析。图像的评估包括主观图像质量评估和客观图像质量分析。主观图像质量评估采用 5 分的评估标准, 评估图像变形、图像伪影、病变可视度和图像解剖结构清晰的程度。客观图像质量分析包括图像信噪比 (SNR)、对比信噪比 (CNR)、肿瘤 ADC 值、肿瘤最大面积平均值、肿瘤最大层面面积、肿瘤体积。结果 主观图像质量评估中, rFOV TSE-DWI 序列图像相较于 rFOV IRIS-DWI 序列图像, 变形程度更弱、伪影程度更轻 ($P < 0.05$)。在对病变的显示及正常肠壁解剖结构的显示上, rFOV IRIS-DWI 序列明显优于 rFOV TSE-DWI 序列, P 值分别为 0.003、 < 0.001 。客观图像质量分析中, rFOV IRIS-DWI 序列的 ADC 值明显低于 rFOV TSE-DWI 序列, 分别为 $0.86 \times 10^{-3} \text{mm}^2/\text{s}$ 、 $1.07 \times 10^{-3} \text{mm}^2/\text{s}$, 差异具有统计学意义 ($P < 0.001$)。rFOV TSE-DWI 序列的 SNR 明显高于 rFOV IRIS-DWI 序列 ($P = 0.002$)。而 rFOV IRIS-DWI 序列 CNR 明显高于 rFOV TSE-DWI 序列, 分别为 0.85、0.52, 差异具有统计学意义 ($P < 0.05$)。结论 直肠癌 rFOV TSE-DWI 的图像变形和伪影更少, 而 rFOV IRIS-DWI 序列能更好的显示肿瘤、解剖结构。

PO-1771

基于多序列 MRI 的影像组学模型术前预测 早期子宫内膜癌 ki-67 表达水平

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目的：开发和验证基于多序列 MRI 的影像组学模型预测早期子宫内膜癌的 ki-67 表达水平。**方法：**回顾性分析 131 名早期子宫内膜癌患者的临床病理资料及术前 MRI 图像，根据 ki-67 表达水平分为两组。基于 T2 加权成像(T2WI)、增强 T1 加权成像(CE-T1WI)和表观扩散系数(ADC)图提取影像组学特征。使用皮尔逊相关系数对影像组学特征进行筛选。采用多层感知机和五折交叉验证法构建影像组学模型。使用受试者工作特征(ROC)曲线对模型进行评估。结果：T2WI、DCE-T1WI 和 ADC 图的多序列融合影像组学模型显示出比单独使用任何一个序列更好的区分能力。多序列融合的影像组学模型获得了最高的 ROC 曲线下面积，验证集 AUC 值为 0.852，准确率为 0.827，敏感性为 0.844，特异性为 0.773，精准性为 0.799。结论：基于多序列 MRI 的影像组学模型，可以术前无创性的预测早期子宫内膜癌的 ki-67 表达水平，为临床诊疗提供客观的影像学依据。

PO-1772

影像组学联合深度学习在 CT 平扫上自动识别隐匿性脾挫裂伤

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目的：建立并验证用于自行识别隐匿性脾挫裂伤的人工智能模型。

材料与方法：回顾性分析重庆大学附属中心医院腹部外伤患者 213 例，根据 CT 平扫、增强扫描将患者分为隐匿性脾挫裂伤组（93 例）和无脾挫裂伤组（120 例），以 8:2 的比例随机分为训练集和测试集。在联影智能科研平台上使用 VB-net 网络在 CT 平扫上行脾脏的自动识别、分割，通过 Research Portal VX. X 在 CT 平扫上建立脾脏自动分割框架结构，从每个患者的全脾感兴趣区域中自动提取影像组学特征。降维后，共使用了 13 种不同的机器学习（Machine learning, ML）方法来开发一种从 CT 平扫中自动分割和自动检测隐匿性脾挫裂伤的方法，并在测试集上验证。此外，从陆军军医大学第一附属医院收集了 142 名腹部外伤患者（包括 46 名隐匿性脾挫裂伤患者和 96 名无脾挫裂伤的患者）为外部验证集。运用受试者工作特征曲线下面积（AUC）、灵敏度、特异度及准确率和来评估模型性能。结果：共提取了 2264 个放射组学特征，降维后，共筛选出 19 个与隐匿性脾挫裂伤相关的特征。在 13 种不同的 ML 算法中，基于高斯过程（Gaussian Processes, GP）的诊断模型表现出良好性能，且在所有模型中精度最高，其训练集、测试集、外部验证集上 AUC 分别为：0.989、0.984、0.948；灵敏度分别为：0.981、0.944、0.894；特异度分别为：0.958、0.958、0.853；准确率分别为：0.941、0.952、0.866。校准曲线显示，预测腹部外伤患者合并隐匿性脾挫裂伤发生风险的模型结果具有良好的一致性和稳定性。临床决策曲线显示 GP 模型患者获益概率范围最广，具有临床价值。结论：深度学习联合影像组学模型能够自动识别和分割脾脏，并能够基于腹部 CT 平扫图像准确诊断隐匿性脾挫裂伤，可显著提高该病的临床诊断率。

PO-1773

影像组学综合列线图预测 BRAF 突变型结直肠癌患者的术后早期复发：多中心研究

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目的：探讨影像组学综合列线图对 BRAF 突变型结直肠癌患者术后早期复发的预测价值。

方法：回顾性研究共纳入来自 2 家机构的 220 例经手术及病理确诊的 BRAF 突变型结直肠癌患者。来自机构 1 的所有患者以 7:3 的比例被随机分为培训队列 (n=108) 和内部验证队列 (n=45)，而来自机构 2 的患者被作为外部验证队列 (n=67)。在训练队列中评估了影像组学特征与早期复发之间的关系，并在验证队列中进行了验证。此外，通过结合影像组学评分和临床危险因素来评估综合列线图的预测性能。采用受试者工作特征曲线分析、校准曲线分析和决策曲线分析来评价预测性能。

结果：由 4 个选定的影像组学特征产生的影像组学评分显示，在训练 (AUC 0.81)、内部验证 (AUC 0.73)、外部验证 (AUC 0.63) 队列中均具有良好的早期复发预测能力。随后，将两个独立的预测因子 (包括影像组学评分和临床危险因素) 整合到列线图中，显示出更有价值的鉴别性能，两个队列的 AUC 均提高到 0.88 和 0.81。

结论：基于 CT 影像组学特征与 BRAF 突变型结直肠癌患者的早期复发相关，此外影像组学综合列线图有望应用于 BRAF 突变型结直肠癌患者早期复发的个性化术前预测。

PO-1774

卵巢子宫内膜样癌的 MRI 影像及肿瘤指标分析

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目的 总结我院经手术及病理确诊的卵巢子宫内膜样癌 (OEC) 的 MRI 影像特征和临床肿瘤指标，提高对该疾病的 MR 影像认识及诊断水平。方法 回顾性分析 2016 年 1 月至 2021 年 12 月我院收治的 26 例经手术及病理证实的 OEC，而 MR 误诊为卵巢其它性质肿瘤的患者。结果 26 例患者中，5 例双侧，15 例右侧，6 例左侧；2 例实性，1 例为双侧囊性，23 例囊实性，实性肿块明显强化，囊性肿块囊壁明显强化，囊实性肿块实性部分以宽基底形式附着于囊壁，实性部分动态早期明显强化，呈持续强化，强化程度可高于或等于子宫肌层。临床肿瘤指标 6 例 CA125 明显升高 (>1000U/ml)，余 20 例轻度升高。CA199 2 例明显升高 (>1000U/ml)，余 26 例轻度升高。结论 OEC 的 MR 影像表现具有一定的特征性，以囊实性肿块多见。临床肿瘤指标多有 CA125 及 CA199 的轻度升高。结合临床表现及实验室指标，有助于提高 OEC 的术前诊断准确性。

PO-1775

双参数 MRI 影像组学对前列腺癌 ISUP 分级的预测价值

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【摘要】目的 探讨基于术前双参数 MRI 影像组学对前列腺癌 (PCa) 国际泌尿病理协会 (ISUP) 分级的预测价值。方法 回顾性分析浙江中医药大学附属第一医院从 2013 年 1 月至 2020 年 09 月间

的 165 例 PCa 患者。根据 ISUP 分级分组系统将 PCa 患者分为 5 组: G1 组(Gleason 评分=6 分)、G2 组(Gleason 评分=3+4 分)、G3 组(Gleason 评分=4+3 分)、G4 组(Gleason 评分=8 分)、G5 组(Gleason 评分=9 或 10 分)。从每例患者的 T2WI、弥散加权成像和表观弥散系数图中共提取 3948 个影像组学特征。对训练组采用最小冗余最大相关 (mRMR) 和最小绝对值收敛和选择算子 (LASSO) 两种方法进行特征降维后建立影像组学标签 (Rad-score)。采用 Spearman 秩相关分析评价 Rad-score 与 ISUP 分级的相关性。采用 Kruskal-Wallis 检验比较 Rad-score 在 5 组间两两比较的差异性。采用受试者工作特征 (ROC) 曲线评估 Rad-score 对上述 5 组的诊断效能。结果经过 mRMR 和 LASSO 降维后筛选出 11 个价值较大的影像组学特征及其相关系数组成 Rad-score。Rad-score 与 ISUP 分级之间具有良好的相关性 ($r = 0.53$, $P < 0.05$) , Rad-score 在 G1、2 组与 G3、4、5 组间差异均有统计学意义 ($P < 0.05$) , 除此之外两组间差异均无统计学意义 ($P > 0.05$) 。Rad-score 诊断 G1-5 组的 ROC 曲线下面积依次分别是 0.827、0.762、0.563、0.657、0.698。结论 双参数 MRI 影像组学对 PCa 患者 ISUP 分级具有一定的预测价值, 特别对于 ISUP 1~2 级患者。

PO-1776

基于钆塞酸二钠增强磁共振功能性肝脏影像评分联合 T2*mapping 序列在小肝癌术前肝功能评估中的应用价值

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目的 以 15 min 吲哚菁绿保留率作为参考标准, 对比钆塞酸二钠增强磁共振成像功能性肝脏影像评分 (FLIS) 联合 T2*mapping 序列对小肝癌术前肝脏储备功能评估的诊断价值, 并与 T1mapping 序列比较, 统计分析诊断效能。

资料与方法 回顾性分析术前影像学符合小肝癌表现患者 60 例, 所有受试者都接受钆塞酸二钠增强磁共振扫描, 包括注射前 (T1-pre) mapping、注射后 (T1-post) 20 min mapping、T2*mapping 等序列。选取相同位置 ROI 测量计算 R2*值、注射前 (T1-pre)、注射后 (T1-20min) T1 松弛时间, 最后得到的为平均值, 并计算 T1 弛豫时间降低率 ($T1\text{-pre} - T1\text{-20min} / T1\text{-pre}$)。评估肝胆期图像肝实质、胆道和门静脉信号强度, 计算 FLIS。根据术前均行吲哚菁绿滞留试验将患者分为 3 组 ($<10\%$ 、 $10\% \sim 20\%$ 、 $\geq 20\%$)。分析三组之间正常肝脏 R2*值、FLIS 及 T1 弛豫时间降低率之间的差异, ROC 曲线评估上述参数对肝储备功能的诊断效能, 采用 DeLong 检验比较诊断效能。

结果 3 组之间 R2*值、FLIS 及 T1 弛豫时间降低率差异均有统计学意义 ($P < 0.01$) , R2*值、FLIS 及 T1 弛豫时间降低率与肝功能分级 Spearman 相关系数分别为 -0.921、0.821、0.981。R2*值、FLIS 及 T1 弛豫时间降低率 ROC 曲线下面积 1 组与 2 组之间为 0.883、0.825、0.914, 2 组与 3 组之间为 0.867、0.8、0.869。T1 弛豫时间降低率诊断效率最高, R2*值、FLIS 两者联合诊断效能提高 (0.945, 0.935)。

结论 FLIS 及 T2*mapping 可以准确评估小肝癌患者肝脏储备功能, 两者联合诊断效能高于 T1 弛豫时间降低率, 且 T2*mapping 序列扫描时间明显缩短, 值得临床推广。

PO-1777

基于 CT 的影像组学结合腹部脂肪面积预测肝细胞癌的微血管侵犯

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目的：探索基于 CT 肿瘤及瘤周区域的支持向量机模型对肝细胞癌微血管侵犯（Microvascular invasion of Hepatocellular carcinoma, HCC-MVI）的预测性能以及联合腹部脂肪面积参数对 HCC-MVI 的附加预测价值。方法：回顾性收集 120 例经术后病理证实为 HCC 患者的 CT 图像，在平扫图像上测量所有患者腹部脂肪面积，采用 t 检验等方法对比阳性及阴性组脂肪面积差异的显著性。分别在 CT 动脉期及门脉期逐层勾画肿瘤区域以及瘤周切缘 10mm 感兴趣区域 ROI，各 ROI 分别提取 846 个影像组学特征。将所有数据集采用随机分层抽样法以 7: 3 划分为训练集（n=84）和测试集（n=36），使用 200%SMOTE 平滑算法扩充训练集的样本量，生成平滑后的训练集数据用于后续数据降维及建模，在测试集进行验证，最终得到四个支持向量机模型，腹部脂肪面积参数结合性能较优模型构建最终联合模型。采用受试者操作特征曲线下面积(AUC)、灵敏度、特异性和准确性评估不同模型预测性能，Delong 检验比较不同模型 AUC 值，校准曲线用于评估模型预测和实际值的一致性。结果：逐层特征筛选及降维后，各 ROI 分别剩余 7、9、9、8 个特征用于支持向量机模型的构建，其中基于门脉期肿瘤区域模型性能较优，在 SMOTE 训练集和测试集中的 AUC 值分别为 0.85、0.86，联合模型的 AUC 值分别为 0.94 和 0.89。Delong 检验显示，SMOTE 训练集中联合模型效能显著高于单纯机器学习模型，差异具有统计学意义（P=0.015），校准曲线显示模型预测和实际值的一致性较好。结论：与瘤周区域模型相比，基于 CT 肿瘤区域的支持向量机模型在 HCC-MVI 方面具有较优预测价值，联合腹部脂肪面积参数可以进一步提升 HCC-MVI 的预测性能。

PO-1778

基于 CT 的机器学习预测肝细胞癌微血管侵犯

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目的：探索基于 CT 门脉期的机器学习模型对肝细胞癌微血管侵犯的预测价值。方法：回顾性收集 120 例经病理证实是否存在微血管侵犯(Microvascular invasion, MVI)的肝细胞癌（Hepatocellular carcinoma, HCC）患者 CT 图像。根据随机分层抽样的原则将患者以 7: 3 的比例划分为训练集和测试集，提取门脉期肿瘤的影像组学特征，采用 Spearman 相关性分析和 Lasso 算法进行特征筛选，并分别构建六种机器学习模型，采用受试者工作特征曲线下面积（Area under curve, AUC）评估模型的预测效能，校准曲线来验证校准能力，决策曲线用于分析和比较模型的临床实用性，Delong 检验评估各模型之间预测效能的差异。结果：基于门脉期肿瘤提取的影像组学特征经过逐层特征筛选及降维后剩余 10 个影像组学特征用于六种机器学习模型的构建，其中支持向量机模型的预测性能较好，在训练集和测试集中的 AUC 值分别为 0.904 (0.844-0.965)和 0.838 (0.717-0.959)，校准曲线显示模型拟合良好，决策曲线提示该较好的临床实用性。结论：基于 CT 门脉期的机器学习模型对 HCC-MVI 具有较高的预测价值。

PO-1779

影像组学在胃癌术后早期复发与晚期复发者中的比较

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目的: 探讨影像组学标签在胃癌术后早期复发 (≤ 1 年) 与晚期复发者 (> 1 年) 之间的相关性。

方法: 回顾性纳入 84 例胃癌术后复发病例, 将其随机分为训练组 ($n=58$) 和验证组 ($n=26$)。分析与复发相关的临床危险因素、基本影像特征、肿瘤指标及术后病理危险因素, 建立预测早期复发与晚期复发的临床模型。利用 3D-slicer 软件在胃癌病灶勾画感兴趣区提取影像组学特征, 并利用 LASSO 分析选择有效的纹理特征建立影像组学标签, 分析训练组与验证组中早期与晚期复发的 Rad-score 值差异, 分析训练组与验证组预测早期复发的 AUC、最佳截断值、敏感性与特异性。对训练组各危险因素做单因素及多因素分析, 选择能区分胃癌术后早期复发与晚期复发的独立预测因子。

结果: 从 CT 静脉期图像中提取出共 1409 个纹理特征, 最终选出 9 个有效的纹理特征值建立影像组学标签。训练组影像组学标签在早期与晚期复发间有统计学意义 ($P<0.001$), 验证组影像组学标签在早期复发与晚期复发间有明显差异 ($P=0.009$)。训练组中影像组学标签区分早期复发与晚期复发的最佳截断值为 0.724, AUC 值为 0.907(95%CI: 0.833-0.982), 特异性为 0.905, 敏感性为 0.784; 验证组影像组学标签区分早期与晚期复发的最佳截断值为 -1.437, 特异性为 0.500, 敏感性为 0.812, AUC 值为 0.619(95%CI: 0.388-0.850)。单因素分析显示 Rad-score ($P<0.001$)、CA-199 ($P=0.038$)、术前 T 分期 ($P=0.021$) 及 EGFR ($P=0.038$) 对区分训练组早期复发与晚期复发有统计学意义, 多因素分析显示影像组学标签区分胃癌早期复发与晚期复发有统计学意义 ($P<0.001$)。

结论: 影像组学标签是区分胃癌早期与晚期复发的独立危险因素。早期与晚期复发 RS 值有明显差异。训练组区分早期复发与晚期复发的效能良好。

PO-1780

对比分析增强 CT 于 MRI 对于妇科恶性肿瘤的评估价值

白浩言

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目的: 分析增强 CT 与 MRI 对于妇科恶性肿瘤的诊断价值及效能。方法: 选取 2020 年 1 月—2021 年 2 月在辽宁省肿瘤医院妇科诊断为宫颈癌、子宫内膜癌、卵巢癌妇科恶性肿瘤的 1260 名女性患者作为研究对象, 患者术前均行增强 CT、MRI 检查, 以术后病理结果作为金标准, 对比分析增强 CT 与 MRI 的检查结果的准确性, 比较其灵敏度、特异度、阳性预测值、阴性预测值, 并绘制 ROC 曲线。

结果: 经病理确诊为宫颈癌 565 例、子宫内膜癌 385 例、卵巢癌 510 例; 增强 CT 诊断为宫颈癌 502 例、子宫内膜癌 273 例、卵巢癌 458 例, 准确率分别为 88.85%、70.91%、89.80%; 增强 MRI 诊断为宫颈癌 513 例、子宫内膜癌 315 例、卵巢癌 440 例, 准确性分别为 90.80%、81.82%、86.27%。增强 CT 与 MRI 检查宫颈癌、子宫内膜癌、卵巢癌的准确性差异均不显著 ($P>0.05$); 增强 CT 与 MRI 检查的灵敏度、特异度、阳性预测值、阴性预测值之间的差异无统计学意义 ($P>0.05$); 绘制 ROC 曲线, 增强 CT 的 AUC 值为 0.69 (0.538–0.823), 增强 MRI 的 AUC 值为 0.701 (0.562–0.843)。

结论: 增强 CT 与 MRI 对于妇科恶性肿瘤均表现出较好的诊断意义, 对于妇科恶性肿瘤术前评估提供了有价值的帮助, 指导临床决策, 在临床实际应用过程中, 可以依据患者的病情及影像学图像特征选择合适的影像学检查方式。

PO-1781

血清 GDF15、sB7-H1 联合 MSCT 对胃癌患者淋巴结转移的诊断价值

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【摘要】目的 探讨血清生长分化因子 15 (GDF15)、可溶性 B7-H1 (sB7-H1) 联合多层螺旋 CT (MSCT) 对胃癌患者淋巴结转移的诊断价值。方法 选取我院 2021 年 5 月~2023 年 5 月期间收治的 96 例胃癌患者作为研究组, 根据有无淋巴结转移将研究组患者分为转移组 (41 例) 和未转移组 (55 例), 另选取同期 96 例胃良性疾病患者作为对照组。Spearman 法分析患者血清 GDF15、sB7-H1 表达水平与 MSCT 参数的相关性; Logistic 回归分析影响胃癌患者发生淋巴结转移的相关因素; 受试者工作特征 (ROC) 曲线分析血清 GDF15、sB7-H1 及 MSCT 参数对胃癌患者淋巴结转移的诊断价值。结果 转移组血清 GDF15、sB7-H1 表达水平均高于对照组和未转移组 ($P < 0.05$); 血清 GDF15、sB7-H1 表达水平与病变区血容量 (BV) 和出血流量 (BF) 均呈负相关, 与对比剂平均通过时间 (MTT) 和表面通透性 (PS) 呈正相关 ($P < 0.05$); 转移组肿瘤 ≥ 2 cm、浸润深度为黏膜下层的患者所占比例显著高于未转移组 ($P < 0.05$); 肿瘤大小、浸润深度、GDF15 及 sB7-H1 为胃癌患者发生淋巴结转移的危险因素 ($P < 0.05$); 血清 GDF15、sB7-H1 及 MSCT 单独诊断胃癌患者淋巴结转移的曲线下面积 (AUC) 分别为 0.867、0.804、0.740、0.855、0.580 及 0.655, 血清 GDF15、sB7-H1 联合 MSCT 检测的 AUC 为 0.965。结论 血清 GDF15 和 sB7-H1 表达水平与胃癌患者淋巴结转移的发生密切相关, 二者联合 MSCT 对胃癌患者淋巴结转移具有较高的诊断价值。

PO-1782

MR 体素内不相干运动成像评价兔肾动脉狭窄肾纤维化的研究

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目的 探讨 MR-IVIM 评价兔肾动脉狭窄肾纤维化 (RF) 的价值。材料与方法 将 78 只健康新西兰大白兔随机分为对照组 ($n=8$) 和 RF 组 ($n=70$), RF 组再随机分为 6 个亚组, 分别为建模前 pre-RF 亚组、建模后 RF-1W、RF-2W、RF-3W、RF-4W 亚组 ($n=12$), 以及动态观察 RF-L 亚组 ($n=10$)。RF 组实验兔行左肾动脉狭窄建立 RF 模型, 分别于术前、术后 1、2、3 和 4W 行 IVIM 扫描。各亚组 MR 末次扫描后立即切除左肾并行病理组织学检查。在 IVIM 图像上分别测量双肾皮、髓质的 D、D*、f 值。采用重复测量方差分析比较各组左右肾皮质和髓质 D、D*、f 值随时间的差异。采用独立样本 t 检验比较各组每个时间点双肾皮、髓质 D、D*、f 值的差异。采用 Spearman 相关性分析比较左肾皮、髓质 D、D*、f 值与 RF 程度的相关性。采用 ROC 曲线判断左肾皮、髓质 D、D*、f 值对 RF 诊断和分期的效能。结果 RF 组左肾皮质和髓质的 D 值和 f 值随 RF 均逐渐减低。RF 组右肾皮质和髓质的 D* 值和 f 值随 RF 均逐渐升高。RF-4W 亚组左肾皮质与髓质的 D 值、D* 值均有统计学差异; pre-RF、RF-3W 和 4W 亚组的左肾皮质与髓质的 f 值均有统计学差异, P 均 < 0.05 。pre-RF、RF-4W 亚组右肾皮质与髓质的 f 值有统计学差异, $P < 0.05$ 。Spearman 相关性检验显示左肾皮质 D、f 值、髓质 f 值与 RF 程度呈中等或强负相关 (r 值分别为 -0.595、-0.717、-0.412, P 均 < 0.01)。f 值对鉴别 pre-RF 和 RF-1~4W、pre-RF~RF-1W 和 RF-2~4W 的效能最优; D 值对鉴别 pre-RF~RF-2W 和 RF-3~4W、pre-RF~RF-3W 和 RF-4W 的效能最优。结论 MR-IVIM 可以从灌注和扩散两方面反映 RF 发生发展的过程, 可以为 RF 的分期诊断提供信息, 对 RF 的评价具有较大的应用前景。

PO-1783

DKI 及 ASL 评价对比剂相关的急性肾损伤向持续性肾功能不全进展中的应用研究

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目的：探讨基于 DKI、ASL 成像评估 CA-AKI 向 PRD 进展的过程，进一步评价 DKI、ASL 在对比剂相关的急性肾损伤向持续性肾功能不全进展中的应用价值。方法：我们将 SD 大鼠随机分为四个 CA-AKI 组，每组 6 只，另取 6 只设立对照组。CA-AKI 组建立 CA-AKI 模型。对照组注射生理盐水；所有大鼠分别于注射对比剂前 24 小时及注射对比剂后 1 天、3 天、7 天、13 天进行 DKI、ASL 扫描及图像分析，在扫描结束后留取大鼠血液、尿液及双肾标本。并将影像学参数与肾脏组织学评分、AQP2、HIF-1 α 做相关性分析。结果：与对照组相比，CA-AKI 组 CysC 和 NGAL 值在第 1 至 13 天显著升高。CA-AKI 组病理评分在第 1 至 13 天明显升高。CA-AKI 组 AQP2 的表达水平在第 1 至 13 天升高；CA-AKI 组大鼠肾皮质 HIF-1 α 表达在第 3 天、第 7 天升高，外髓外带及外髓内带 HIF-1 α 表达在第 3 至 13 天升高。CA-AKI 组大鼠肾皮质 Δ MK 值仅在第 3 天升高，外髓外带及外髓内带 Δ MK 值在第 1 天开始升高，第 3 天达到最大值，随后逐渐下降，但在第 13 天时仍明显高于基线。CA-AKI 组大鼠肾皮质 Δ Ka 值在第 13 天升高。外髓内带 Δ Ka 值在第 7 天、第 13 天升高；CA-AKI 组大鼠肾皮质 Δ Kr 值在第 3 天、第 7 天升高，外髓外带及外髓内带 Δ Kr 值在第 3 至第 13 天升高。CA-AKI 组肾皮质 Δ RBF 值在第 1 天至第 7 天降低；外髓外带及外髓内带 Δ RBF 值第 1 天至第 13 天的各个时间点均降低。肾脏组织学病理评分与 Δ MK 值、 Δ Ka 值、 Δ Kr 值呈正相关，与 Δ RBF 值呈负相关；AQP2 与 Δ MK 值、 Δ Ka 值和 Δ Kr 值呈正相关；HIF-1 α 与 Δ RBF 值呈负相关。结论：多模态磁共振可以无创检测 CA-AKI 大鼠肾脏组织微观结构的复杂性，在一定程度上反映 CA-AKI 向 PRD 持续发生发展过程的病理生理改变，对 CA-AKI 向 PRD 进展进行无创、早期诊断。

PO-1784

多模态磁共振评价法舒地尔在对比剂相关急性肾损伤向持续性肾功能不全进展中的保护作用

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目的：利用 T1-mapping 成像技术探讨法舒地尔在 CA-AKI 向 PRD 进展过程中的保护作用。方法：随机将 72 只 Sprague-Dawley 雄性大鼠分为 3 组：对照组、CA-AKI 组、CA-AKI+Fasudil 组，每组 24 只。实验大鼠腹腔注射 3%戊巴比妥钠麻醉后，CA-AKI 组大鼠经尾静脉按 8 mg/kg 体重注射碘普罗胺，CA-AKI+Fasudil 组分别在注射碘普罗胺前 12 小时、注射对比剂后 2 小时及 4 小时注射法舒地尔，对照组大鼠尾静脉注射 0.9%生理盐水；所有大鼠分别于注射对比剂前 24 小时及注射对比剂后 1 天、3 天、7 天、13 天进行 T1-mapping 扫描及图像分析。MRI 扫描结束后，另取血液标本测量 CysC、IL-1 β 、NGAL 含量。取肾组织切片做 HE 染色、Masson 染色及免疫组化检测。结果：与 Control 组相比，CA-AKI 组在第 1 至 13 天血清 CysC、IL-1 β 和尿 NGAL 水平明显升高；与 CA-AKI 组相比，CA-AKI+Fasudil 组第 1 至 13 天血清 IL-1 β 水平明显降低。在对比剂使用后的第 1 至 13 天，CA-AKI+Fasudil 组大鼠组织学损伤评分明显低于 CA-AKI 组；在对比剂使用后第 3 至 13 天，CA-AKI+Fasudil 组大鼠组织 Masson 染色胶原纤维表达量低于 CA-AKI 组；在对比剂使用后第 1 至 13 天，CA-AKI+Fasudil 组 HIF-1 α 、p-MYPT1、ROCK-1、 α -SMA 表达量明显低于 CA-AKI 组。在对比剂注射后第 1 至 13 天，CA-AKI+Fasudil 组大鼠肾脏皮质、外髓外带及外髓内带的 Δ T1 值均明

显低于 CA-AKI 组。结论：法舒地尔可通过激活 Rho A/ROCK 信号通路以及抑制 TGF- β 1、HIF-1 α 信号通路及 α -SMA 蛋白表达来减轻 CA-AKI 向 PRD 进展中出现肾缺氧、肾纤维化和肾功能异常。

PO-1785

磁共振动态增强及弥散加权成像对胰腺癌诊断及其侵袭性预测价值的临床研究

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【目的】

探讨磁共振动态增强及弥散加权成像相关参数对胰腺癌诊断及其侵袭性预测的临床价值。

【方法】

前瞻性收集临床怀疑胰腺占位，临床怀疑胰腺炎病例以及健康志愿者进行磁共振动态增强及弥散加权成像检查；设定肿瘤实质组、肿瘤组、胰腺癌背景组、胰腺炎组、健康志愿者组不同 ROI 勾画标准，使用飞利浦图像后处理工作站及 Omni Kinetics DCE 分析软件对磁共振动态增强 8 个相关参数及弥散加权成像 2 个定量参数进行测量。使用 SPSS 及 Medcalc 统计软件对五组间参数进行统计分析，将肿瘤实质组根据侵袭性指标及临床病理情况分为 10 个亚分组，分别进行各亚分组参数对比分析。

【结果】

胰腺癌组的 ADC 值、 K^{trans} 值、 K_{ep} 值、 V_p 值低于炎症组，胰腺癌组 TTP 值高于炎症组；胰腺癌组 ADC 值、 K_{ep} 值、 V_p 值低于正常胰腺组织，胰腺癌 eADC 值、 V_e 值、TTP 值、AUC 值高于正常胰腺组织；上述差异具有统计学意义。其中独立预测因子 TTP 诊断效能最高（胰腺癌组 vs 正常组：AUC=0.922；胰腺癌组 vs 炎症组：AUC=0.908）。由 eADC、 K^{trans} 、 V_e 及 AUC 参数构成的胰腺炎综合诊断模型的诊断效能接近较高水平（AUC=0.894）。除 eADC 参数外，其余参数在胰腺癌背景组与胰腺炎组间的差异无统计学意义。胰腺癌发生器官侵犯组 K^{trans} 值、 V_e 值、AUC 值高于无器官侵犯组，发生种植转移组的 K^{trans} 值低于无种植转移组，Ki67 高表达组的 K^{trans} 值高于低表达组，上述差异均具有统计学意义。

【结论】

磁共振动态增强及弥散加权成像部分参数在胰腺癌诊断及与胰腺炎的鉴别诊断中显示出较高诊断效能，多参数预测模型能够提高胰腺炎与正常胰腺组织之间的鉴别能力。DCE-MRI 相关参数在胰腺癌转移、侵犯及病理情况预测中显示出相对较好的诊断效能。胰腺癌背景胰腺组织在 DCE-MRI 及 DWI 参数上与胰腺炎具有高度相似性。

PO-1786

磁敏感加权成像评价肾脏过量铁沉积的价值

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目的 探讨磁敏感加权成像（SWI）评价肾脏过量铁沉积的价值。

方法 将 30 只新西兰大白兔随机分为铁剂组 15 只（注射右旋糖酐铁）和对照组 15 只，于铁剂注射前 0 周及注射后 8 周行 SWI 检查。分析对照组 0 周、8 周和铁剂组 0 周、8 周的图像，在 Phase 图上测量肾皮质的相位值并计算角弧度值，应用普鲁士蓝染色观察肾铁沉积分布、原子吸收分光光度计测量肾铁含量。两组间的角弧度值比较、肾铁含量比较采用独立样本 t 检验。角弧度值与肾铁含量间的相关性研究采用 Pearson 相关分析。

结果 (1)仅铁剂组 8 周的肾皮质 SWI 信号强度显著低于髓质, 铁剂组 8 周的肾皮质 SWI 信号强度显著低于铁剂组 0 周和对照组 8 周的肾皮质。(2)铁剂组 8 周的角弧度值 (0.2101 ± 0.0771) 明显高于铁剂组 0 周 (-0.0226 ± 0.0276) 和对照组 8 周 (-0.0244 ± 0.0314) ($t=11.007, 10.913, P$ 均 $=0.000$)。(3)仅铁剂组 8 周的肾皮质内见明显蓝色铁离子沉积、髓质内见极少量蓝色铁离子沉积; 铁剂组 8 周的肾铁含量 (135.3 ± 14.1) mg/kg 明显高于对照组 8 周 (75.5 ± 9.8) mg/kg ($t=13.938, P=0.000$)。(4)铁剂组 8 周和对照组 8 周的角弧度值与其所测肾铁含量呈高度正相关 ($r=0.913, P=0.000$)。

结论 SWI 能够评价肾脏过量铁沉积, 过量铁主要沉积于肾皮质并使其 SWI 信号强度减低, 由相位值计算角弧度值可以量化铁沉积。

PO-1787

增强 CT 形态学特征及 CT 值评估结直肠癌分化程度

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目的 通过增强 CT 形态学特征及 CT 值评估结直肠癌分化程度。

方法 回顾性分析我院病理确诊的结直肠癌增强 CT 图像 162 例。评估包括部位、形态、肌层外壁、钙化、坏死/囊变、强化是否均匀、周围脂肪间隙、肿大淋巴结、多发淋巴结、周围异常血管、近段肠管有无扩张和近段肠管有无气液平 12 个 CT 特征。测量肠壁范围、CT 值系列参数。数据进行 Kolmogorov-Smirnov 正态性检验。连续变量使用 Mann-Whitney U 检验进行分析。分类变量采用 χ^2 检验或者 Fisher 精确性检验。

结果 部位 ($P=0.011$)、坏死/囊变 ($P=0.007$)、强化是否均匀 ($P=0.014$)、肿大淋巴结 ($P=0.010$)、多发淋巴结 ($P=0.011$) 5 个 CT 特征在不同分化程度组间有显著差异。中低-低中分化的结直肠癌病灶肠壁范围显著高于中-高分化病灶 ($P=0.025$), 而平扫 CT 值显著低于中-高分化病灶 ($P=0.028$)。

结论 部位、坏死/囊变、强化是否均匀、肿大淋巴结、多发淋巴结、病灶肠壁范围和平扫 CT 值参数在不同分化程度组间有显著差异, 这些影像学表现可以为临床评估结直肠癌侵袭性提供一定的帮助。

PO-1788

双源 CT 评估不同部位的克罗恩病与肝脏脂肪变性的相关性

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目的: 采用双源 CT 定量分析发生在不同部位的克罗恩病与肝脏脂肪变性的相关性。

方法: 回顾性分析 2021 年 5 月至 2023 年 1 月间于我院住院治疗并确诊为克罗恩病 (CD) 并在此期间行双源 CT 小肠三维重建检查的患者 40 例。根据 CD 发生部位分为回肠组 (病灶仅发生于回肠) 和回结肠组 (病灶同时发生于回肠及结肠), 图像均上传至后处理工作站, 采用手动勾画的方法勾画出肝门层面的肝脏的整体轮廓作为感兴趣区 (ROI), 分别测量两组图像的动脉期及静脉期全肝的脂肪含量及肝脏/腹主动脉的碘浓度比值, 比较两组的肝脏脂肪含量与碘浓度比值是否具有统计学差异。

结果: 根据 CD 发生部位分为回肠组 (25 例) 和回结肠组 (15 例), 回肠组动脉期肝脏脂肪含量 [$(2.38\pm4.29)\%$] 略高于与回结肠组的肝脏脂肪含量 [$(2.24\pm2.50)\%$], 但无明显统计学差异 ($P>0.05$)。回肠组静脉期肝脏脂肪含量 [$(2.23\pm3.80)\%$] 高于回结肠组 [$(1.18\pm2.36)\%$], 二者

无统计学差异 ($P>0.05$)。回肠组动脉期肝脏碘浓度比值 (5.30 ± 4.37) 略低于回结肠组 (6.73 ± 3.23)，二者无统计学差异 ($P>0.05$)。回肠组静脉期肝脏碘浓度比值 (52.01 ± 12.61) 高于回结肠组 (42.75 ± 22.01)，二者无统计学差异 ($P>0.05$)。

结论：本研究结果表明发生在回肠与发生于回结肠的克罗恩病患者的肝脏脂肪含量及碘浓度比值并无明显相关性。

PO-1789

双源 CT 评估克罗恩病不同部位病变肠壁脂肪变性的相关性

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目的：采用双源 CT 定量分析克罗恩病发生在不同部位病变肠壁脂肪变性的相关性。

方法：回顾性分析 2021 年 5 月至 2023 年 1 月间于我院住院治疗并确诊为克罗恩病 (CD) 并在此期间行双源 CT 小肠三维重建检查的患者 40 例。根据 CD 发生部位分为回肠组 (病灶仅发生于回肠) 和回结肠组 (病灶同时发生于回肠及结肠)，图像均上传至后处理工作站，采用手动勾画的方法勾画出病变最明显处肠壁轮廓作为感兴趣区 (ROI)，分别测量两组图像的动脉期及静脉期病变肠壁的脂肪含量及肠壁/腹主动脉的碘浓度比值，比较两组的肠壁脂肪含量与碘浓度比值是否具有统计学差异。

结果：根据 CD 发生部位分为回肠组 (25 例) 和回结肠组 (15 例)，回肠组动脉期病变肠壁脂肪含量 [16.06 ± 4.93] % 略高于与回结肠组的病变肠壁脂肪含量 [14.16 ± 2.77] %，但无统计学差异 ($P>0.05$)。回肠组静脉期病变肠壁脂肪含量 [14.66 ± 4.52] % 略低于回结肠组 [14.81 ± 4.59] %，二者无统计学差异 ($P>0.05$)。回肠组动脉期病变肠壁碘浓度比值 (15.28 ± 5.01) 略高于回结肠组 (14.14 ± 3.02)，二者无统计学差异 ($P>0.05$)。回肠组静脉期病变肠壁碘浓度比值 (41.00 ± 9.17) 高于回结肠组 (35.50 ± 7.31)，二者无统计学差异 ($P>0.05$)。

结论：双源 CT 定量分析克罗恩病发生在不同部位病变肠壁脂肪无相关性。

PO-1790

基于 CT 的腹部脂肪定量与 Borrmann IV 型胃癌术后病理的关系

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目的：探讨 CT 测定的腹部脂肪参数与 Borrmann IV 型胃癌术后病理的关系。

方法：回顾性收集在我院行手术切除的 78 例 Borrmann IV 型胃癌。在每个病例的术前 CT 平扫图像上，测量 L3 椎体水平腹部的脂肪参数，包括：内脏脂肪面积 (VFA)、皮下脂肪面积 (SFA)、总脂肪面积 (TFA)、内脏/总脂肪比 (VFA/TFA)、内脏/皮下脂肪比 (VFA/SFA)。收集并记录每个病例手术后的病理结果，包括：WHO 分型、Lauren 分型、手术切缘、脉管侵犯、神经侵犯、TN 分期、腹膜转移。采用 Mann-Whitney U 或 Kruskal-Wallis 检验来分析 Borrmann IV 型胃癌不同病理特征的腹部脂肪参数差异。

结果：Borrmann IV 型胃癌腹膜转移组的 VFA、SFA、TFA 显著高于非转移组 ($P < 0.05$)。低分化组及弥漫型的 SFA 显著高于中分化、混合型/肠型 ($P < 0.05$)。相较于切缘阴性组，切缘阳性组的 SFA、VFA 占比更低，均有显著差异 ($P < 0.05$)。CT 测定的腹部脂肪面积与 Borrmann IV 型胃癌的其他病理分组无显著差异。

结论：不同病理结果的 Borrmann IV 型胃癌其腹部脂肪定量存在差异。基于 CT 测量的脂肪定量参数具有预测 Borrmann IV 型胃癌病理结果的潜能。

PO-1791

在体孕期子宫 MRI 三维模型构建及其意义

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目的 探讨利用 MRI 原始数据集构建在体孕期子宫数字化三维模型的方法及意义。资料及方法 选择 12 例单胎足月孕妇行盆腔 MRI 检查，利用快速平衡稳态采集（FIESTA）序列获得 MRI 原始数据集，将原始 Dicom 数据集并录入 Mimics 软件中进行宫颈数字化三维重建。结果 成功重建出在体宫颈的数字化三维模型，该模型可以进行任意角度旋转便于多视角、多平面地观察子宫颈的整体形态和结构，同时可以测量宫颈长度，宫颈角角度等数据。结论 应用 MRI 原始数据集重建在体子宫颈数字化三维模型，具有立体感强，多角度观察、可进行三维测量等优点，为在体子宫颈的解剖教学、整体形态学研究及疾病诊疗提供新的思路。

PO-1792

磁共振弹性成像在宫颈癌诊断中的初步应用研究

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[摘要] 目的 本研究旨在探究磁共振弹性成像（Magnetic resonance imaging, MRE）在宫颈癌研究中的应用潜力，以及评估宫颈癌患者宫颈的弹性特征，并与健康对照组进行比较，以探讨 MRE 技术在宫颈癌早期诊断和治疗监测中的临床应用前景。材料与方法：前瞻性地招募 10 名经临床和病理诊断确诊为宫颈癌的患者（宫颈癌组）和 24 名健康女性志愿者（健康对照组），每名受试者进行宫颈常规磁共振检查和频率为 60hz 的 MRE 检查。由两名有着 5 年以上盆腔影像诊断经验的放射科医师绘制 ROI（感兴趣），测量两组受试者宫颈的弹性值以及宫颈癌组肿瘤的最大左右径、前后径及上下径。采用独立样本 t 检验对宫颈癌组和健康对照组的弹性值进行对比分析。同时，收集宫颈癌组患者临床资料，包括：年龄、体质指数（Body mass index, BMI）、肿瘤浸润程度。运用一元及多元线性回归分析影响宫颈癌组织弹性值的变量。结果：研宫颈癌患者组的平均弹性值为 5.47 ± 0.98 kPa，健康对照组宫颈平均弹性值为 2.94 ± 0.13 kPa，宫颈癌组的平均弹性值明显高于健康对照组（ $P < 0.001$ ）。同时，在我们的研究中发现，4kPa 的临界值可以准确地区分宫颈癌与正常宫颈组织。在单元线性回归分析中，肿瘤的最大前后径（ $P < 0.01$ ）及浸润程度（ $p < 0.001$ ）均与癌变组织弹性值相关。多元线性回归分析中，肿瘤的浸润程度（ $P < 0.001$ ）是影响癌变组织弹性值的重要独立因素。结论： 本研究表明，MRE 技术可以作为一种非侵入性的辅助检查手段，帮助早期发现和诊断宫颈癌，并且有助于评估病情严重程度，在宫颈癌研究中具有潜在的临床应用前景。

PO-1793

基于术前增强 MRI 影像组学分析的列线图模型预测肝细胞癌切除术后复发风险的价值

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目的 探讨术前增强磁共振 (magnetic resonance imaging, MRI) 影像组学分析的列线图模型预测肝细胞肝癌 (hepatocellular carcinoma, HCC) 切除术后复发风险的价值。

材料和方法 回顾性分析 2015 年 8 月至 2020 年 8 月在常州市第一人民医院进行 HCC 切除术的患者资料, 共纳入 164 例于术前 2 周内进行增强 MRI 检查的病例, 随机分为训练集 (115 例)、测试集 (49 例)。单因素及多因素 Cox 回归分析术前临床、病理及影像学特征与术后复发关系。运用最小绝对收缩和选择算子的 Cox 回归进行影像组学分析。联合影像组学标签及肿瘤复发的独立预测因素建立列线图预测模型, 并在测试集进行验证。校准曲线观察模型预测概率与实际观察值一致性。根据训练集影像组学标签界值对 HCC 术后肿瘤复发风险分层, Kaplan-Meier 法绘制生存曲线、Log-rank 检验比较风险亚组间的生存差异。

结果 肿瘤边缘、肿瘤坏死、影像组学标签为预测 HCC 术后肿瘤复发独立因素 (风险比=2.1, 2.5, 64.1, 95%可信区间分别为 1.3-3.3, 1.5-4.3 和 20.6-199.9, $P<0.05$)。列线图模型预测肿瘤复发风险的 C-index 分别为训练集 0.796 (0.738-0.854) 和测试集 0.784 (0.684-0.885)。模型预测概率与实际观察值有较好一致性。按影像组学标签界值进行复发风险分层, 低危组无复发生存率较高, 较高危组差异在训练集及测试集中均具有统计学意义 (训练集: $\chi^2=52.88$, $P<0.001$, 测试集: $\chi^2=4.14$, $P=0.042$)。

结论 基于术前增强 MRI 影像组学分析的预测模型可有效预测 HCC 切除术后复发风险, 有助于 HCC 术后患者个体化管理。

PO-1794

影像组学在卵巢癌早期诊断及铂耐药预测中的研究进展

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目的: 卵巢癌是发病率第 3 位的女性生殖系统恶性肿瘤, 但早期诊断率低, 恶性程度高, 预后差。影像组学通过建立影像学标记物指导临床疾病的诊断和治疗。本文探讨了影像组学在卵巢癌早期诊断中的研究进展及其在预测铂耐药中的作用, 以期今后临床工作中卵巢癌早诊和精准治疗提供个体化方案和参考。

方法: 计算机检索了 CNKI、Wanfang、PubMed 等数据库中近 5 年发表的影像组学与卵巢癌的相关文献。纳入关于影像组学与卵巢癌的相关研究并筛选, 对最终纳入的文献进行归纳综述。

结果: (1) 卵巢癌的早期诊断受限于早期筛查的低特异性和高假阳性率, 即使经过系统治疗, 70% 的患者在 3 年内复发, 且多数复发患者最终会发展为铂耐药。(2) 影像组学旨在从检查图像中提取定量信息并寻找其与临床数据之间的关联, 指导个性化临床决策。近年来, 影像组学与机器学习相结合, 可以单独地或与人口统计学、组织学、基因组学或蛋白质组学数据结合地用于解决临床问题。(3) 研究发现, 应用于阴道超声的影像组学模型, 在预测卵巢肿物的良恶性方面具有较高的准确率。近年来研究发现基于 CT、MRI 检测技术的影像组学构建的诺模图模型, 提高了早期卵巢癌的诊断效能, 更有研究进一步证实, 基于 MR 图像的影像组学建模可以区分 I 型和 II 型上皮性卵巢癌。另有研究发现综合了年龄、FIGO 分期、基因组数据、血清标志物、残余肿瘤等重要临床指标构建的影像组学列线图可提示卵巢癌患者耐药发生的可能性, 有助于预测卵巢癌复发风险。

结论：卵巢癌的早筛和耐药问题一直是困扰临床医生的难题，影像组学作为一种非侵入性的肿瘤良恶性鉴别和预测耐药及预后的方法，在卵巢癌中有较好的预测性能，应用前景广阔，期待更多大样本多中心研究及标准化流程，提高影像组学的应用性能。

PO-1795

体素内不相干运动扩散加权成像定量参数在术前评估胰腺导管腺癌可切除性的价值

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目的：探讨体素内不相干运动扩散加权成像 (IVIM-DWI) 定量参数在术前评估胰腺导管腺癌 (PDAC) 可切除性的价值。

方法：回顾性分析 2018 年 11 月至 2019 年 9 月本院 39 例病理诊断为 PDAC 的临床和影像学资料，利用 IMAgenGINE 软件测量病灶感兴趣区 (ROI) 的 IVIM 相关定量参数：真扩散系数 (D) 值，灌注相关扩散系数 (D*) 值，灌注分数 (f) 值。利用组内相关系数 (ICC) 分析各参数值的测量者内可重复性，t 检验比较可切除与不可切除组各参数的差异性，受试者工作特性 (ROC) 曲线评价各参数值的诊断效能， χ^2 检验比较单一 IVIM 参数值与影像征象评估 PDAC 是否可切除的差异，比较 IVIM 参数值联合影像征象是否评估效能高于单一 IVIM 参数值。

结果：可切除组 PDAC 的 D、D*、f 值分别为 $(1.66 \pm 0.39) \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $(1.91 \pm 2.29) \times 10^{-2} \text{ mm}^2/\text{s}$ 、 $37.8 \pm 14.2\%$ ，不可切除组 PDAC 的 D、D*、f 值分别为 $(1.30 \pm 0.33) \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $(1.14 \pm 1.82) \times 10^{-2} \text{ mm}^2/\text{s}$ 、 $23.9 \pm 13.8\%$ ，其中 D、f 值的差异具有统计学意义 (P 值均 < 0.05)。各参数值的测量可重复性较好 (ICC=0.799, P < 0.001)。D、f 值预测 PDAC 为可切除性的 ROC 曲线下面积 (AUC) 分别为 0.714、0.728，D 值 $> 1.42 \times 10^{-3} \text{ mm}^2/\text{s}$ 时预测 PDAC 可切除的敏感度为 79.3%，f 值 $> 17.2\%$ 时预测 PDAC 的可切除性的敏感度为 96.6%，IVIM 参数值联合常规影像征象较单一 IVIM 参数值评估 PDAC 是否可切并无统计学差异。

结论：IVIM 定量参数，尤其是 D，f 值能预测胰腺导管腺癌的术前可否切除性。

PO-1796

光谱 CT 及 MRI 评价宫颈癌分期与临床分期一致性的初步研究

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目的：本研究旨在通过与临床宫颈癌国际妇产科协会 (FIGO) 分期比较，探讨光谱 CT 常规图像 (CI)、虚拟单能量图像 (VMI) 和磁共振成像 (MRI) 对于评估宫颈癌 FIGO 分期的准确性。方法：回顾性收集我院 2022 年 2 月-2023 年 3 月经手术病理证实的 131 例初治宫颈癌患者，所有患者术前同时行全腹+盆腔光谱增强 CT 检查及盆腔增强 MRI 检查。患者采用光谱 CT 扫描后分别获得动脉期和静脉期 CI 及光谱图像，使用飞利浦星云工作站 ISP 对采集的图像进行数据重建。由 1 名影像科医师分别在光谱 CT 的 CI、VMI40KeV 上测量宫颈癌病灶的最大径，并评估肿瘤局部侵犯范围，两次评估间隔 2 周；另一名影像科医师在 MR 图像上测量宫颈癌病灶的最大径，并评估肿瘤局部侵犯范围。评估光谱 CT、MRI FIGO 分期与临床 FIGO 分期的一致性标准为 Kappa 检验；使用 McNemar Bowker 检验比较基于光谱 CT 的 CI、VMI40KeV 及 MRI 评估的宫颈癌分期与临床分期诊断准确一致性。结果：基于光谱 CI、VMI40KeV 及 MRI 分期患者与临床结果一致分别为 Kappa=0.385, 0.643, 0.738。MRI (83.2%) 及光谱 VMI40Kev (72.5%) 评估宫颈癌 FIGO 分期准确性高于光谱 CI (54.2%) (P < 0.05)；MRI、光谱 VMI40Kev 对于穹窿侵犯

(86.8%,83.8%,75%), 宫旁侵犯(81.1%,67.6%,54.1%), 阴道下 1/3 侵犯(87.5%,87.5%,25%), 盆壁侵犯(82.4%,76.5%,41.2%), 膀胱直肠侵犯(75%,75%,50%)的检出率高于光谱 CI。结论: 光谱 CT 的 VMI40KeV、MRI 诊断宫颈癌 FIGO 分期准确性较高, 有助于临床诊断和治疗。

PO-1797

多参数光谱 CT 技术预测宫颈癌 LVSI 的初步研究

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目的: 探讨光谱 CT 多参数成像技术预测宫颈癌淋巴血管间隙浸润 (LVSI) 的临床应用价值。方法: 回顾分析 108 名经手术病理证实的宫颈癌患者, 根据病理结果分为 LVSI 阳性组(n=50)及 LVSI 阴性组(n=58), 所有患者治疗前均行全腹+盆腔光谱 CT 增强检查。由 1 名影像科医师分析光谱 CT 动脉期 (AP)、静脉期 (VP) 常规能量图像 (CIs)、单能量图像 (VMIs) 及碘密度图, 获得宫颈癌病灶及不同背景组织(邻近血管及肌肉)的双期 CT 值和碘值 (IC), 在所有光谱图像上评估淋巴结转移状态及肿瘤最大径 (MD)。计算能谱曲线斜率 (K), 标准化碘浓度 (NIC) 和肿瘤体积 (GTV)。进行单变量、多变量 Logistic 回归分析以确定光谱 CT 多参数影像特征及临床特征中可用于评估宫颈癌 LVSI 状态的独立危险因素, 采用受试者工作特征 (ROC) 曲线评估各模型对 LVSI 状态的预测效能。结果: 单因素分析得到鳞状细胞癌抗原 (SCC)、肿瘤分化程度、光谱多参数图像中淋巴结转移状态、MD、GTV、动脉期病灶 CT 值 (CI、40Kev、80Kev、100Kev)、K、AP-IC、AP-NIC 肌肉与宫颈癌 LVSI 状态具有相关性 ($P < 0.05$)。多因素 Logistic 回归分析显示淋巴结转移状态、MD、AP-NIC 肌肉是宫颈癌患者发生 LVSI 的独立危险因素 ($P < 0.05$)。临床模型 (M1)、临床结合常规影像参数模型 (M2)、光谱多参数模型 (M3) 曲线下面积 (AUC) 分别为 0.671、0.717 和 0.831, DeLong 检验显示, M3 诊断效能优于 M1、M2 ($P=0.0051$, $P=0.0408$), 其敏感度及特异度分别为 80.4%和 71.9%。结论: 光谱 CT 多参数模型对于预测宫颈癌 LVSI 状态具有较高的诊断效能, 优于常规临床和影像模型。

PO-1798

超高 b 值弥散加权成像评估促红细胞生成素治疗肾缺血再灌注损伤效果

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目的 探讨超高 b 值弥散加权成像 (HBV-DWI) 评估促红细胞生成素 (EPO) 治疗肾缺血再灌注损伤 (IRI) 效果的价值。方法 将 18 只健康新西兰大白兔随机均分为 IRI + EPO 组、IRI 组及对照组, 每组各 6 只。对 IRI + EPO 组于左肾蒂夹闭再灌注后立即腹腔注射 EPO (3000U/kg), IRI 组在相同时间注射等量生理盐水; 对照组除未夹闭左肾蒂外均同 IRI 组。于再灌注 48h 后行 MR 扫描, 测量左肾皮质 (CO) 及髓质 (OM) 超高 b 值表现观弥散系数 (ADC_{uh}); 行免疫组织化学染色, 测量水通道蛋白 AQP-1、AQP-2 累积光密度 (IOD) 值; 以 Pearson 相关分析评价左肾 CO 及 OM 的 ADC_{uh} 与免疫组织化学指标的相关性。结果 IRI 组、IRI + EPO 组及对照组左肾 CO 层 ADC_{uh} 值分别为 0.4243 ± 0.0082 、 0.4379 ± 0.0092 、 0.4613 ± 0.0118 , 左肾 OM 层 ADC_{uh} 值分别为 0.3952 ± 0.0136 、 0.4158 ± 0.0136 、 0.4403 ± 0.0157 , 组间两两比较均有统计学意义 ($P < 0.05$)。免疫组化结果显示对照组左肾髓质 AQP-1、AQP-2 表达量均高于 IRI 组及 IRI + EPO 组 ($P < 0.01$)。IRI 组左肾髓质 AQP-1 表达量低于 IRI + EPO 组 ($P=0.010$ 、 $P=0.005$)。IRI 组左肾 CO 层 AQP-2 表达量和 IRI + EPO 组无明显差异 ($P=0.267$)。IRI 组左肾 OM 层 AQP-2 表达量

低于 IRI+EPO 组 ($P=0.032$)。左肾皮髓质 ADC_{uh} 值与 AQP-1 (CO 层: $r=0.756$ 、 $P<0.01$; OM 层: $r=0.720$ 、 $P=0.001$)、AQP-2 (CO 层: $r=0.819$ 、 $P<0.01$; OM 层: $r=0.850$ 、 $P<0.01$) 表达水平均具有相关性。结论 HBV-DWI 可无创性评估 EPO 治疗兔肾 IRI 效果。

PO-1799

T2mapping 成像动态定量评估肾脏缺血再灌注损伤的价值

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目的 探讨 T2mapping 成像动态定量评估肾缺血再灌注损伤的可行性。

方法 健康新西兰大白兔 48 只分为 IRI 组 (40 只) 和对照组 (8 只)。于建模前和建模后 1、12、24、48 小时行动态 MRI 扫描, 包括 T2WI 及 T2mapping 序列, 分别在髓内、髓外和皮质层面手动勾画感兴趣区。IRI 组于建模前后各时间点随机选取 8 只处死, 对照组于建模后 48h 扫描后处死。所有肾脏标本行 HE 染色, 然后行病理半定量损伤评分。采用单因素方差分析比较 IRI 组兔肾各部位 5 个时间点 T2 值的差异, 采用重复测量方差分析比较对照组兔肾各部位 5 个时间点 T2 值的差异。采用独立样本 t 检验比较 IRI 组与对照组 T2 值的差异。采用 Spearman 相关性分析比较 IRI 组建模后兔肾各部位 4 个时间点的 T2 值与损伤评分的相关性。

结果 对照组兔肾各部位不同时间点间的 T2 值差异无统计学意义。IRI 组建模前后各部位 5 个不同时间点 T2 值的差异有统计学意义 (均为 $P < 0.05$)。2 组间髓内、髓外和皮质在建模后 4 个时间点的 T2 值差异有统计学意义 (P 均 < 0.05)。IRI 组建模后 4 个时间点髓内 T2 值与细胞坏死、间质炎症、管型呈负相关性 ($r = -0.42$ 、 -0.39 、 -0.53 , $P < 0.05$); 髓外 T2 值与细胞水肿呈正相关 ($r = 0.53$), 与细胞坏死、间质炎症、管型呈负相关性 ($r = -0.48$ 、 -0.40 、 -0.54 , $P < 0.05$); 皮质 T2 值与损伤评分无相关性 ($P > 0.05$)。

讨论 T2mapping 成像可以反映肾 IRI 后组织不同时间点的动态变化, 对早期发现肾 IRI 损伤有一定帮助。

PO-1800

前列腺影像报告和数据系统的阳性预测值研究

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目的: 评估前列腺影像报告和数据系统在诊断前列腺癌中的阳性预测值。方法: 回顾性分析 2014 年 1 月至 2022 年 9 月进行磁共振检查且有完整临床数据的患者资料, 使用 PI-RADS 进行分级和诊断, 纳入 PI-RADS 2 分以上的病例共 610 例。其中, PI-RADS 2 分 49 例, 病理为 PCa15 例; PI-RADS 3 分 170 例, 病理为 PCa40 例; PI-RADS 4 分 265 例, 病理为 PCa164 例; PI-RADS 5 分 126 例, 病理为 PCa101 例。采用独立样本 t 检验和秩和检验来比较非 PCa 组与 PCa 组之间年龄和前列腺特异性抗原 (Prostate Specific Antigen, PSA) 的差异, 采用方差分析和非参数检验比较不同 PI-RADS 评分间年龄和 PSA 的差异, 并采用邦弗伦尼法进一步进行两两比较。结果: 总体 PI-RADS 的 PPV 为 52.46% (320/610), PI-RADS 2 的 PPV 为 30.61% (15/49), PI-RADS 3 的 PPV 为 23.53% (40/170), PI-RADS 4 的 PPV 为 61.89% (164/265), PI-RADS 5 的 PPV 为 80.16% (101/126)。非 PCa 组与 PCa 组之间年龄和 PSA 差异存在统计学意义 (P 均 < 0.001), 不同 PI-RADS 评分组比较, 年龄与 PSA 差异也不全相同 (P 均 < 0.001)。组间比较时, PI-RADS 5 与 PI-RADS 2 和 PI-RADS 3 的年龄差异有统计学意义 ($P=0.001$, $P=0.008$), 其余年龄差异无统计学意义。而 PI-RADS 2 和 PI-RADS 3 的 PSA 差异无统计学意义 ($P=0.392$), 其余 PSA 差异

均有统计学意义 (P 均 <0.05)。结论: PI-RADS 的 PPV 为 52.46%, PI-RADS 3 分以上的 PPV 为 54.37%, 对 PCa 的预测能力不强, 建议结合其他指标进行 PCa 的诊断。

PO-1801

基于对比增强 CT 的影像组学模型预测 急性胰腺炎后糖尿病的初步研究

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目的:探究基于对比增强 CT 的影像组学模型可否用于预测急性胰腺炎后糖尿病 (Post-acute pancreatitis diabetes mellitus PPDM-A)。

方法:回顾性地分析来自两个三级转诊中心的 374 例首次发作的急性胰腺炎患者, 其中训练组 224 人, 内部验证组 56 人, 外部验证组 94 人。每个队列中分别有 86 例、22 例和 27 例 PPDM-A 患者。从动脉期和静脉期的 CT 图像中提取 2398 个影像组学特征, 并从病历中收集临床特征。采用重采样和 Min-Max 归一化分别对图像和数据进行预处理。采用基于随机森林的递归特征消除法、共线性分析和最小绝对收缩和选择算法(LASSO)进行特征选择。运用极端梯度提升 (eXtreme Gradient Boosting, XGBoost)进行影像组学建模分析。受试者工作曲线用来评价基于影像组学模型、临床模型及两者联合建立的 XGBoost 模型的诊断效能。

结果:经重复性试验和降维后, 选出 11 个影像组学特征。影像组学模型在训练组、内部验证组和外部验证组预测 PPDM-A 的准确性均较好(分别为 0.964、0.875、0.968)。在外部验证组中, 影像组学模型的 AUC 显著优于临床模型(0.857 vs 0.619, $p=0.000$), 而联合模型与影像组学模型之间无显著差异(0.882 vs 0.857, $p=0.317$)。

结论:基于双期增强 CT 的影像组学 XGBoost 模型对于预测急性胰腺炎后糖尿病具有良好的效果。作为一种定量手段, 影像组学为预防急性胰腺炎后糖尿病的发生提供了可能。

PO-1802

化疗药物相关性急性胰腺炎的 CT 表现: 一项横断面观察性研究

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背景: 化疗药物相关性急性胰腺炎(Chemotherapy drug-related acute pancreatitis, CDRAP)是一种罕见的化疗相关不良事件, 主要为少数病例报告, 缺少其 CT 表现的观察总结。

目的: 描述恶性肿瘤化疗药物相关性急性胰腺炎的 CT 表现。

方法: 临床诊断为 CDRAP 的 22 名患者被纳入此项横断面观察性研究。根据修订版 Atlanta 急性胰腺炎标准进行 CT 特征记录, 具体特征如下: 胰腺正常、胰腺增大(弥漫性或局灶性)、胰腺不均匀强化(弥漫性或局灶性)、胰周渗出、急性胰周积液、假性囊肿、急性坏死性积液(胰腺坏死和胰周坏死)和主胰管扩张。并尽可能记录 CDRAP 患者的 CT 影像学转归表现。其他化疗相关不良事件, 包括药物性肝炎、多发性脑神经病变和死亡也进行记录。

结果: CT 结果示, 23%(5/22)患者表现为胰腺正常, 77%(17/22)患者出现急性胰腺炎改变。CDRAPs 的 CT 表现如下: 弥漫性 ($n=7$) 或局灶性 ($n=8$) 胰腺肿大, 弥漫性 ($n=6$) 或局灶性($n=1$)胰腺不均匀强化, 胰周渗出 ($n=5$), 急性胰周积液 ($n=7$) 和假性囊肿 ($n=1$)。没有患者出现急性坏死性积液或主胰管扩张。81%的 CDRAP 患者的严重程度分类为轻度急性胰腺炎。其他化疗相关不良事件包括药物性肝炎 ($n=3$)、多发性脑神经病变 ($n=1$) 和死亡 ($n=1$)。关于胰腺转归, 2 例患者在初始 CT 表现为正常胰腺形态上出现了急性胰腺炎改变。

结论：化疗药物相关性急性胰腺炎 CT 主要表现为轻度急性胰腺炎或正常胰腺，胰腺炎者主要为弥漫性或局灶性胰腺肿大，初次 CT 表现为正常胰腺者应注意影像学转归结果。

PO-1803

1.5T 磁共振自由呼吸高分辨序列 AX 3D T1（QuickStar）联合 JET T2WI FS 对肠道肿瘤的研究价值

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目的：1.5T 磁共振自由呼吸高分辨序列 AX 3D T1（QuickStar）联合 JET T2WI FS 对肠道肿瘤图像的研究价值。

方法：采用 Vantage Elan（日本 Canon）1.5TMRI，从 2022 年 1 月至 2023 年 6 月，共收集 62 例肠道肿瘤志愿患者，所有研究对象扫描采取同层同范围自由呼吸扫描序列 AX 3D T1（QuickStar），JET T2WI FS，常规 AX T1WI FS+C，AX T2WI FS，以常规 FSE 序列为对照，与 QuickStar 和 JET 序列作比较，分别测量其常规 FSE 序列图像和 QuickStar 及 JET 序列图像的信噪比（SNR）与对比信噪比（CNR）。用 5 点 Likert 评分对图像质量和诊断信任度进行定性评价。采用 Cohen's Kappa 统计法计算阅读器间的一致性。采用 Kappa 统计对图像进行定量评价。

结果：用同一 MRI 后处理软件测量常规 FSE 序列图像及 QuickStar 和 JET2WI FS 图像 SNR 和 CNR，QuickStar 和 JET2WI FS 序列图像均有不同程度的提升。Likert 评分 QuickStar 和 JET2WI FS 图像质量优于常规 FSE 序列图像，肠道运动伪影均低于常规 FSE 序列图像。

结论：QuickStar 和 JET2WI FS 序列图像肠道运动伪影明显减少，图像质量和诊断信任度均高于常规 FSE 序列图像，完全自由呼吸模式极大提高肠道 MRI 诊断率，明显提高肠道肿瘤患者 MRI 图像质量，具有广阔的临床应用前景。

PO-1804

探讨 DWI 不同 B 值序列在 MRI 胰腺肿瘤的研究

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目的：探讨 DWI 不同 B 值序列在胰腺肿瘤 MRI 图像的质量研究。

方法：采用 Vantage Elan（日本 Canon）1.5TMRI，从 2022 年 4 月至 2023 年 7 月，共收集 65 例胰腺肿瘤志愿患者，所有研究对象扫描采取同层同范围扫描多个 AX DWI 序列（B 值 600、800、1000、1200），分别测量其图像的信噪比（SNR）与对比信噪比（CNR）。用 5 点 Likert 评分对图像质量和诊断信任度进行定性评价。采用 Cohen's Kappa 统计法计算阅读器间的一致性。采用 Kappa 统计对图像进行定量评价。

结果：用同一软件 Vantage Elan1.5TMRI 后处理软件测量各个序列图像 SNR 和 CNR，B 值为 800 的 DWI 序列图像为最佳，Likert 评分 B 值为 800 的 DWI 序列图像优于其他对照组图像。

结论：胰腺 DWI B 值为 800 序列图像质量和诊断信任度均高于其他 B 值序列图像，明显提高胰腺肿瘤患者 MRI DWI 图像质量。

PO-1805

集成 MRI 弛豫时间定量技术在前列腺癌术前神经侵犯评估中的应用价值

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目的 探讨集成 MRI 弛豫时间定量技术在前列腺癌神经侵犯术前评估中的应用价值。

方法 回顾性搜集 2020 年 11 月至 2022 年 12 月扬州大学附属医院行前列腺 MRI 常规序列和磁共振图像编译 (MAGiC) 序列扫描并行根治性手术的前列腺癌患者 69 例, 依据手术病理结果分为前列腺癌神经侵犯阳性组 32 例, 前列腺癌神经侵犯阴性组 37 例。MAGiC 图像经过后处理后得到 T1、T2、质子密度 (PD) 值, 同时用相关软件进行后处理生成表观扩散系数 (ADC) 值, 并采用独立样本 t 检验或 MannWhitney U 检验分析两组间数据的比较, 采用受试者工作特征 (ROC) 曲线分析各定量参数诊断前列腺癌神经侵犯状况的诊断效能。

结果 前列腺癌神经侵犯阳性的 T1 值和 T2 值 [M (Q1, Q3)] 均高于神经侵犯阴性性 [2 174.0 (1 620.9, 2 776.5) ms 比 1 101.3 (1 103.5, 1 298.2) ms; (162.6±54.9) ms 比 79.0 (74.0, 83.8) ms] (均 P<0.05), 两组 PD 值差异无统计学意义 (P>0.05)。T2 值显示出与 ADC 值相似的曲线下面积 (AUC) (0.963 比 0.991, P=0.105)。

结论 集成 MRI 获得的定量 T1 和 T2 值能够用于前列腺癌神经侵犯术前评估, T2 值与 ADC 值诊断效能相当。集成 MRI 通过定量组织 T1、T2 值, 有助于术前诊断前列腺癌神经侵犯, 具有一定的临床应用价值。

PO-1806

直肠癌新辅助治疗后淋巴结的磁共振评价与病理对照

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目的: 直肠癌患者在新辅助治疗后, 多数区域淋巴结会缩小、消失。然而, 在磁共振上发现的残留淋巴结仍有肿瘤转移的可能。本研究旨在评价欧洲胃肠和腹部放射学学会 (ESGAR) 的诊断标准 (短径≥5mm) 对直肠癌新辅助治疗后转移淋巴结的诊断效能, 并且探讨淋巴结的形态学特征 (包括形状、边缘、信号均匀度、强化均匀度) 能否提高短径≥5mm 的淋巴结诊断效能。

方法: 这项回顾性研究共纳入 90 个局部进展期的直肠癌患者, 所有纳入患者均接受了手术及术前磁共振检查。两位放射科医生分别测量所有可见淋巴结的短径, 以及仅评价≥5mm 的淋巴结的形态学特征。将组织病理学结果作为金标准, 进行逐个淋巴结的影像-病理对照。构建受试者工作特征曲线 (ROC) 评估淋巴结短径的诊断效能。分类变量分析采用 χ^2 检验或 Fisher 确切概率法。

结果: 总共评估了 298 枚淋巴结。短径诊断淋巴结转移的 AUC 为 0.81。以 5mm 作为截断值, 敏感性、特异性、阳性预测值、阴性预测值和准确度分别为 65.9%、87.0%、46.8%、93.6% 和 83.9%。≥5mm 的淋巴结中, 良恶性淋巴结的形态学特征无显著性差异 (P > 0.05)。

结论: 在新辅助治疗后的直肠癌患者中, ESGAR 标准在鉴别良恶性淋巴结方面表现出中等诊断效能。短径能够有效诊断 <5mm 淋巴结的性质。然而短径无法鉴别 ≥5mm 的良恶性淋巴结, 形态学特征亦不能提高此部分淋巴结的诊断效能。

PO-1807

CT 联合腹部脂肪定量预测肾细胞癌侵袭性

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目的：探讨 CT 联合腹部脂肪定量指标预测肾细胞癌（RCC）侵袭性的价值。方法：搜集 122 例经手术病理证实的 RCC 患者资料，按病理分期和病理分级分为非侵袭组（73 例）、侵袭组（49 例）。单、多因素 Logistic 回归分析筛选 RCC 侵袭性的独立预测因子，采用列线图构建联合预测模型，并评估其校准度、稳定性和临床净效益。结果：边缘模糊（OR=3.815，P=0.012）、大小（OR=1.752，P=0.010）、腹部皮下脂肪面积/内脏脂肪面积（SVR）（OR=5.381，P=0.006）和 RENAL 总分（OR=2.110，P<0.001）是 RCC 侵袭性的独立预测因子。列线图 AUC 为 0.902（95%CI: 0.842~0.962，P<0.001），高于各独立预测因子（均 P<0.05）。校准曲线的校准度较高；5 折交叉验证平均 AUC 为 0.899，与列线图一致。决策曲线（DCA）显示阈值范围 0.07~1.0 时临床有获益。结论：CT 联合腹部脂肪定量指标构建的列线图预测 RCC 侵袭性准确性高，临床获益价值较大。

PO-1808

CT 小肠造影、小肠胶囊内镜在小肠疾病诊断中的应用价值

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目的 探究多层螺旋 CT 小肠造影（CTE）、小肠胶囊内镜（CE）在小肠病变诊断中的应用价值，寻找更为简便、检出率高的检查方式以满足临床需求。方法 选取本院收治的小肠疾病患者 97 例作为研究对象，依次行 CT 小肠造影、小肠胶囊内镜检查；以病理活检结果为金标准，将所有患者的 CT 小肠造影、小肠胶囊内镜检查结果与病理诊断的结果相比较，分析两种检查方法对小肠疾病的敏感性、特异性、准确性以及检出率。结果 97 例患者中，CT 小肠造影检查对小肠疾病的敏感性、特异性与小肠胶囊内镜检查对比，比较差异是否具有统计学意义（P<0.05）。经 CT 小肠造影检查的肠壁强化、肠壁增厚、合并腹腔病变的检出率高于小肠胶囊内镜检查，比较差异具有统计学意义（P<0.05）；但在小粘膜病变、肠壁溃疡、出血、息肉方面的检出率，小肠胶囊内镜则高于 CT 小肠造影检查，比较差异具有统计学意义（P<0.05）。两种检查方式对于多节段病变的检出效果均较好，且二者之间的比较差异不具有统计学意义（P>0.05）。结论 CT 小肠造影不仅可以显示黏膜病变、肠壁增厚和强化，还能够分析肠管外的结构及病变，提高了对小肠病变的检出率。小肠胶囊内镜在小粘膜病变、肠壁溃疡、出血、息肉等方面的检出率很高，已成为小肠疾病检查的一线检查方式。两种检查方法在小肠病变诊断中具有较高的临床应用价值。二者联合检查、互为补充，可明显提高小肠疾病的临床诊断准确率。

PO-1809

异基因造血干细胞移植后患者肠壁积气症的 CT 表现及其诊断价值

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目的 分析异基因造血干细胞移植后患者肠壁积气症 (PI) 的 CT 及临床表现特点, 以提高对本病的认识及诊断水平。**方法** 回顾性分析中国医学科学院血液病医院 2016 年 6 月至 2023 年 5 月收治的 22 例异基因造血干细胞移植合并 PI 患者的临床和 CT 检查资料。由两名高年资且从事影像诊断多年的放射科医生对 CT 进行阅片, 调整 CT 窗宽、窗位, 观察 PI 发生部位、形态、程度及范围, 是否合并纵膈积气及腹腔游离气体。根据 PI 形态将其分为囊状、线样及弥漫海绵状, (其中弥漫海绵状指 PI 将肠壁分为 3-4 层, 伴多发小分格样结构, 其内见气体填充)。根据 PI 范围分为: ①单节段型, 仅 1 段小肠或结肠出现 PI。②多节段型, 即 ≥ 2 段小肠或结肠及直肠同时出现 PI (结肠肝曲、脾曲归为单独肠管)。**结果** 1. 临床资料: 22 例患者中, 男 15 例, 女 7 例, 年龄 4-68 岁, 中位年龄 36 岁。其中急性淋巴细胞白血病 1 例, 急性髓系白血病 10 例, 骨髓异常增生综合征 5 例, 再生障碍性贫血 3 例, 淋巴瘤 1 例, 慢性粒细胞白血病 2 例。22 例患者中 13 例患者无明显腹部症状, 于胸部常规检查时偶然发现。CT 发现 PI 与异基因造血干细胞移植间隔 28-290 天、中位时间间隔 133 天。2. CT 表现: 22 例患者, 病变位于小肠 3 例, 位于结肠 14 例, 同时位于结肠和小肠的 5 例, 伴有腹腔游离气体者 14 例, 3 例伴有门静脉积气, 5 例患者同时合并纵膈积气。22 例患者, 根据 CT 表现分型, 其中线样 4 例, 囊状 4 例, 弥漫海绵状 14 例。根据病变发生部位分型, 22 例患者中, 单节段型 4 例, 多节段型 18 例。**结论** 异基因造血干细胞移植后并发 PI 的 CT 表现具有特征性, CT 肺窗为 PI 最佳诊断方式, 能够评价积气程度和肠道受累范围, 并及时发现伴发的腹腔及纵膈游离气体, 为疾病诊断和预后评估提供有力证据。

PO-1810

CT 影像组学结合机器学习诊断 T1-T2 期结直肠癌淋巴结转移价值研究

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摘要: **目的:** 探讨 CT 影像组学结合机器学习 (ML) 方法诊断 T1-T2 期结直肠癌 (CRC) 淋巴结转移 (LNM) 的价值。**方法:** 搜集 243 例经手术病理证实的 T1-T2 期 CRC 患者资料, LNM 者 45 例, 按 (7:3) 分为训练组 (170 例) 和内部验证组 (73 例)。比较组间临床、CT 指标, 构建临床 CT 模型; 在静脉期 CT 图像对肿瘤区域进行图像分割, 提取的影像组学特征经降维、筛选, 获得影像组学评分 (rad-score); 基于临床 CT 指标和 rad-score 构建联合模型。观察各模型诊断 LNM 的效能。**结果:** 组间术前 CEA、术前 CA199、CT 淋巴结短径有统计学差异 (均 $P < 0.05$)。临床 CT 模型训练组和验证组曲线下面积 (AUC) 分别为 0.694、0.691。最终纳入 12 个影像组学特征用于构建 rad-score 模型, 训练组和验证组 AUC 分别为 0.851、0.861。联合模型训练组和验证组 AUC 分别为 0.876、0.917, 均优于临床 CT 模型 (均 $P < 0.001$)。联合模型决策曲线 (DCA) 分析显示训练组和验证组阈值概率为 0.08~0.73、0.13~0.85 时临床有净获益。**结论:** CT 影像组学结合 ML 方法有助于 T1-T2 期 CRC 是否发生 LNM 的正确分类。

PO-1811

临床-CT 影像组学列线图预测结直肠癌无病生存价值研究

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【摘要】 目的 构建预测结直肠癌 (CRC) 患者无病生存 (DFS) 的临床模型、影像组学模型 (radscore) 和基于上述两者的联合模型, 比较各模型诊断效能。方法 搜集 2015 年 1 月~2019 年 12 月间接接受增强 CT 检查的 II 期和 III 期 CRC 患者资料, 样本随机分为训练组 (n=217 例) 和验证组 (n=86 例)。比较临床变量组间差异并建立预测 DFS 的临床模型; 在静脉期 CT 图像勾画肿瘤三维体积感兴趣区 (VOI), 提取的影像组学特征经降维、筛选后获得 11 个最优特征用于建立 radscore; 并构建联合模型。最优模型以列线图展示, 并评估其校准度和临床获益; 比较各模型效能。结果 两组间肠梗阻、术前 CEA、术前 CA199、差分化、T 分期、淋巴结转移、脉管侵犯 (LVI)、神经侵犯 (PNI)、淋巴结清扫数目差异有统计学意义 (均 $P < 0.05$)。临床模型、radscore、联合模型 AUC 分别为 0.745、0.771、0.842 (训练组); 0.753、0.738、0.834 (验证组)。联合模型显示出较高的校准度, DCA 阈值范围 0.12~0.90 时临床有获益。联合模型 AUC 均大于临床模型、radscore (均 $P < 0.05$)。结论 基于临床变量和 CT 影像组学构建的列线图可用于预测 CRC 的 DFS, 有望成为 CRC 预后评估的新工具。

PO-1812

CT 影像组学在 II 期结肠癌风险分层中的应用研究

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【摘要】 目的 探讨 CT 影像组学模型对 II 期结肠癌 (CC) 风险分层的预测价值。方法 连续搜集 2015 年 1 月~2023 年 7 月经手术证实的 167 例 II 期 CC 患者资料, 按欧洲肿瘤内科学会 (ESMO) 指南将患者分为低风险组 77 例, 中高风险组 90 例; 按 7:3 将样本随机分为训练组 (n=116) 与内部验证组 (n=51)。在术前静脉期 CT 图像上对肿瘤进行分割并提取影像组学特征, 特征经降维、筛选后, 采用 logistic 回归分析构建预测模型, 观察模型校准度和临床获益。结果 训练组中高风险 64/116 例; 内部验证组中高风险 26/51 例, 两组间观测指标差异无统计学意义 (均 $P > 0.05$)。共筛选出 6 个影像组学特征用于构建 II 期 CC 低风险和中高风险的预测模型, AUC 为 0.822, 灵敏度: 84.4%, 特异度: 71.2%; 内部验证组 AUC 为 0.802, 灵敏度: 96.2%, 特异度: 60.0%。模型显示出较高的校准度; 决策曲线分析 (DCA) 阈值概率范围 0.04~0.85 时临床有获益。结论 基于静脉期 CT 图像构建的影像组学模型实现了低风险和中高风险 II 期 CC 的准确分类, 有望改善临床对该类患者的分层管理。

PO-1813

基于 ZOOM-mDixon 的 T2*/R2* 成像术前预测胰腺导管腺癌淋巴结转移的价值

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目的: ZOOM-mDixon 序衍生出的 T2*/R2* 成像扫描时间短, 还可实现病灶定量, 探讨其在术前评价胰腺导管腺癌淋巴结转移的可行性。**材料与方法:** 回顾性分析经病理证实的 59 例胰腺导管腺癌患者, 其中淋巴结转移 (LNM) 31 例, 非淋巴结转移 (nLNM) 28 例。术前均行包括 ZOOM-mDixon 序列的 MRI 扫描, 分析两组的临床基本资料 (年龄、术前 CA19-9 水平等)、常规影像学特征 (部位、形态等) 和 T2*/R2* 值。使用 ICC 组内相关系数评价其可重复性, 采用 U 检验、t 检验或 χ^2 检验比较两组间各参数的差异, 利用 ROC 曲线评价相关指标的诊断性能。**结果:** T2*/R2* 值的组间和组内的 ICC 值均在 0.83~0.97 之间。LNM、nLNM 两组间的年龄、肿块形态、肿块短径、肿块部位、术前 CA19-9、CA125、CEA 水平等均无统计学差异, 而性别、病灶长径和病灶边界存在统计学差异 (P 值分别为 0.023, 0.048, 0.040)。两组间的 T2* 值和 R2* 值有显著统计学差异 (P 值均 < 0.05)。与 nLNM 组相比, LNM 组的 R2* 值较小 (24.00 (20.0, 28.3/s, 17.63 (15.1, 22.5)/s); T2* 值更高 (49.71±12.67ms, 63.77±13.95ms)。T2*/R2* 值预测胰腺癌淋巴结转移的 AUC 分别为 0.763 和 0.752。**结论:** ZOOM-mDixon 序列衍生出的 T2*/R2* 成像量化值可术前预测胰腺导管腺癌的淋巴结转移, 为临床治疗提供参考。

PO-1814

双参数 MRI 机器学习模型和不同年资医师 PI-RADS 对前列腺癌和临床显著性前列腺癌诊断价值的多中心研究

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目的 构建基于双参数 MRI (bpMRI) 的机器学习模型诊断前列腺癌 (PCa) 和临床显著性前列腺癌 (csPCa), 并探讨该模型对不同年资医师的前列腺影像报告和数据系统 (PI-RADS) 评分的辅助诊断价值。

方法 回顾性收集 2015 年 1 月至 2020 年 12 月 4 个中心共 1616 例行术前 MRI 且经病理证实的前列腺病患的影像资料, 其中 csPCa 共 532 例, 无显著临床意义的前列腺癌 (ciPCa) 共 266 例, 良性病变共 818 例。由中心一的低年资医师、高年资医师和前列腺 MRI 专家完成 PI-RADS 评分。中心一、二数据按照 7: 3 比例随机划分为训练组和内部测试组, 中心三、四数据分别设为独立外部测试组 1 和 2。提取 T2WI、DWI 和 ADC 图像的影像组学特征, 使用随机森林 (RF) 构建机器学习模型用于预测 PCa 和 csPCa。最后, 根据机器学习模型结果对 PI-RADS 评分进行调整。

结果 机器学习模型诊断 PCa 的 AUC 在内部测试组、外部测试组 1 和外部测试组 2 分别为 0.869、0.845 和 0.928; 诊断 csPCa 的 AUC 分别为 0.874、0.876 和 0.893。机器学习模型对 PCa 和 csPCa 的诊断效能与专家 PI-RADS 效能相当 (AUC 间差异除在诊断 PCa 时在外部测试组 1 中 P=0.01, 其余 P 均 > 0.05)。经过模型辅助诊断后, 不同年资医师调整后 PI-RADS 的特异度得到不同程度的提升; 低年资医师调整后 PI-RADS 的诊断效能可达到专家 PI-RADS 水平 (AUC 间差异除在诊断 csPCa 时在外部测试组 1 中 P=0.018, 其余 P 均 > 0.05)。

结论 基于 bpMRI 机器学习模型对 PCa 和 csPCa 的诊断效能可达到前列腺 MRI 专家的诊断水平并具有良好的泛化性; 机器学习模型可辅助不同年资医师诊断, 特别是对低年资医师, 可有效减少患者不必要的穿刺活检。因此, 基于 bpMRI 机器学习模型有望作为辅助诊断工具广泛应用于临床。

PO-1815

深度学习重建算法在提高肝脏及门脉 CT 图像质量中的应用研究

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目的: 探讨深度学习重建算法(AIIR)在提高肝脏及门脉 CT 图像质量中的应用研究

方法: 选取今年 6-7 月份在我院行肝脏增强 CT 扫描患者 78 例, 其中男 45 例, 女 33 例。排除标准:①肝脏及门脉术后患者;②无法配合呼吸的患者。仪器与方法: 采用联影 960 CT, 螺旋扫描, 扫描参数: 120 kV, mA 调制技术, 参考 mAs:200,造影剂(优威显 370) 80ml,注射速率 3-4ml/s, 并追加 20ml 生理盐水,注射后 60s 行门脉期扫描。图像重建: 使用联影探索者科研工作站, 利用患者门脉期扫描数据, 重建层厚 5mm,间距 5mm 的五组轴位图像用于评价, 1 组:FBP(滤波反投影)算法;2 组: 迭代重建 (KARL 3D) 5 级;3-5 组 AIIR 算法;其中 3 组 AIIR 等级 5 级, 4 组 AIIR 等级 3 级, 5 组 AIIR 等级 1 级。客观评价: 由一名主治医师测量门脉主干最大层面肝实质、门静脉主干及右侧椎旁肌肉的 CT 值及 SD 值, 并计算五组图像的信噪比 SNR、对比噪声比 CNR, $SNR=CT \text{ 肝脏} / SD \text{ 肝脏}$, $CNR=CT \text{ 门脉}-CT \text{ 肌肉} / SD \text{ 肌肉}$ 。主观评价: 由两名副主任医师在不知情的情况下, 独立对五组图像行 5 分制主观评价, 3 分以上满足诊断。统计学方法: 采用 SPSS 21.0 统计分析软件, 计量资料以均值 \pm 标准差 ($\bar{x} \pm s$) 表示, 2 名放射科医师对图像质量主观评分的一致性采用 Kappa 检验, $P < 0.05$ 为差异有统计学意义。

结果: 客观评价: 各组间相同部位 CT 值差异无统计学意义 ($P > 0.05$), SD 值由 1 至 5 组逐渐减小, 图像 SNR,CNR 由 1 至 5 组逐渐增大, 差异有统计学意义 ($P < 0.05$); 主观评价: 各组得分, 4 组 > 3 组 > 2 组 > 1 组 > 5 组, 差异有统计学意义 ($P < 0.05$); 两名医师之间的主观评分具有高度一致性 ($K = 0.832$)。

结论: 深度学习重建算法 (AIIR 等级 3) 可显著减小肝脏及门脉 CT 图像噪声, 提高图像质量。

PO-1816

对妊娠期高血压及先兆子痫孕妇的分层管理: 基于胎盘 IVIM 灌注及虚拟磁共振弹性成像优于超声及实验室检查

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目的: 一部分妊娠高血压 (GH) 患者会随妊娠进程会进一步发展为先兆子痫 (PE), 这对母胎健康均会造成显著风险。因此准确预测 GH 中发展来的 PE, 对于及早干预和管理至关重要。本研究旨在探讨一种新的预测方法, 即使用胎盘 MRI 形态学参数、体素内不相干运动 (IVIM) 和虚拟磁共振弹性 (vMRE), 以比较其与传统超声及实验室检查的优越性。

方法: 前瞻性纳入 38 例 MRI 检查时血压 $> 140/90$ mmHg 并无其他并发症的患者, 根据 MRI 检查后随访中是否存在蛋白尿等并发症分为 GH 组 ($n=14$) 和 PE 组 ($n=24$)。另纳入 30 例血压正常的对照组。由两位放射科医生勾画胎盘的感兴趣区。通过 T2WI 图像测量胎盘面积及体积。功能磁共振 (fMRI) 参数包括以下: 选取低和高 b 值 (200 和 800 s/mm²), 通过 MATLAB 计算基于 DWI 的 vMRE 参数 (μ_{diff})。使用 Firevoxel 软件计算 VIM 参数[真扩散系数(D)、伪扩散系数(D*)、灌注分数(f)]和表观扩散系数(ADC)。在 MRI 检查两周内进行超声检查, 测量脐动脉 (UA) 及大脑中动脉

的 PI、RI、S/D 及脑胎盘比(CPR)，再获得实验室指标 AST、ALT 及凝血酶原时间 (PT) 等。对以上参数进行 ANOVA 分析及 ROC 分析。

结果：超声(UA-PI、RI、S/D 及 CPR)和 fMRI(μ_{diff} 和 f)能有效预测 GH 中的 PE，fMRI 联合模型预测效能高于超声联合模型 (AUC 0.845 vs. 0.792)，联合 fMRI 及超声可进一步提高 AUC (0.920)。此外，fMRI 参数(μ_{diff} 和 f)也可鉴别 GH 和对照组，但所有超声参数均不可鉴别这两组。

结论：与传统超声及实验室检查方法相比，IVIM 灌注和 vMRE 可以全面评估胎盘血流动力学和组织力学性质，可以更好的用于更早期发现胎盘功能障碍，从而识别具有高风险的妊娠高血压患者。

PO-1817

能谱 CT 容积定量参数评估结直肠癌组织学分级的可行性

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目的：探讨能谱 CT 容积定量参数在结直肠癌组织学分级评估中的可行性，以期探索一种更好的评估 CRC 组织学分级的能谱参数获取方法。

方法：收集 2019 年 1 月至 2022 年 10 月经手术病理证实的 CRC 患者 130 例，经过纳排标准筛选最终纳入管状腺癌 77 例进行分析，根据病理结果及 WHO 标准将其分为低级别管状腺癌组 55 例，高级别管状腺癌组 22 例。分别采用 ROI 勾画方法包括容积 ROI、面积 ROI、圆形小 ROI 测量肿瘤动脉期及静脉期的碘浓度 IC、水浓度 WC、有效原子序数 Eff-Z，并计算出标准化碘浓度 NIC。采用 ICC 进行一致性检验，组间比较采用两独立样本 t 检验、Mann-Whitney U 检验、 X^2 检验等，以 $P < 0.05$ 为差异具有统计学意义。绘制 ROC 曲线评价三种 ROI 测量的能谱定量参数对结直肠管状腺癌组织学分级的诊断效能。

结果：两组间动脉期和静脉期三种 ROI 勾画方法测量的 IC 和 NIC、容积 ROI 法测量的 Eff-Z 组间差异具有统计学意义；面积 ROI 和圆形小 ROI 法测量的 Eff-Z 组间差异不具有统计学意义 ($P > 0.05$)；两组间的 WC 差异均无统计学意义 ($P > 0.05$)。高级别 CRC 管状腺癌的 IC、NIC 和 Eff-Z 均高于低级别肿瘤，且静脉期观测值高于动脉期观测值。ROC 曲线分析显示，通过截面 ROI 和圆形小 ROI 方法获取的 IC 和 NIC 对 CRC 管状腺癌组织学分级的诊断效能低于容积 IC 和容积 NIC。动脉期容积 IC 和容积 NIC 的诊断效能高于静脉期，动脉期容积 IC 的 AUC 为 0.879，最佳诊断阈值为 1.53mg/cm³，动脉期容积 NIC 的 AUC 为 0.802，最佳诊断阈值为 0.15。其中动脉期容积 IC 的诊断效能高于容积 NIC 和容积 Eff-Z。

结论：能谱 CT 容积定量参数评估结直肠管状腺癌组织学分级的价值高于常规方法获取的定量参数，尤其是动脉期容积 IC 具有更大的诊断价值。

PO-1818

能谱 CT 容积定量参数鉴别结直肠黏液腺癌和管状腺癌的价值

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目的：探讨能谱 CT 容积定量参数鉴别结直肠黏液腺癌和管状腺癌的价值，以期探索一种术前无创检测 CRC 病理类型的影像学标志物。

方法：收集 2019 年 1 月至 2022 年 10 月经手术病理证实的 CRC 患者 130 例，包括管状腺癌 99 例，乳头状腺癌 4 例，黏液腺癌 23 例，印戒细胞癌 2 例，鳞状细胞癌 1 例，黑色素瘤 1 例，经过纳排标准筛选最终纳入 96 例 CRC 患者进行研究，根据病理结果将其分为黏液腺癌组 19 例，管状

腺癌组 77 例。所有患者均采用 Revolution CT 进行常规平扫及 GSI 模式下增强扫描。运用容积 ROI 方法测量包含肿瘤整体的能谱定量参数, 包括碘浓度 (IC)、水浓度 (WC)、有效原子序数 (Eff-Z), 并计算出标准化碘浓度 (NIC)。采用独立样本 t 检验、U 检验、 χ^2 检验等进行组间比较, 对有统计学意义的参数运用 ROC 曲线评价其诊断效能, 采用 Youden 指数确定最佳诊断阈值, 并分别计算出相应的敏感度和特异度。

结果: 能谱 CT 容积定量参数中, 动脉期和静脉期的 IC、NIC、Eff-Z 在结直肠黏液腺癌和管状腺癌两组间差异具有统计学意义 ($P<0.01$), 且静脉期观测值高于动脉期; 而无论动脉期还是静脉期, WC 在两组间差异均无统计学意义。黏液腺癌的 IC、NIC、Eff-Z 均低于管状腺癌的 IC、NIC、Eff-Z。动脉期和静脉期的 IC、动脉期和静脉期的 Eff-Z、静脉期的 NIC 具有中等诊断效能, ROC 曲线下面积分别为 0.792, 0.735, 0.726, 0.779, 0.784。其中动脉期 NIC 的诊断价值最大, 其 AUC 为 0.871, 最佳诊断阈值为 0.11, 敏感度为 77.90%, 特异度为 78.9%, 约登指数为 0.568, 95% 置信区间为 0.790~0.952。

结论: 能谱 CT 容积定量参数对鉴别结直肠黏液腺癌和管状腺癌具有一定价值, 其中动脉期 NIC 的诊断价值最高。

PO-1819

基于图像空间重建技术的小视野 DWI (rFOV IRIS-DWI) 序列在 直肠癌 T 分期中的应用价值

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目的: 探讨 rFOV IRIS-DWI 序列联合常规高分辨率 T2WI 序列诊断直肠癌 T 分期的效能。方法: 回顾性分析 2022 年 6 月-11 月行直肠 MRI 检查的患者资料。每位患者均使用 3.0T MR 扫描仪进行检查, 均完成小视野 (Reduced field of view, rFOV) 基于图像空间重建 (Image reconstruction using image-space sampling function, IRIS) 技术 DWI (rFOV IRIS-DWI) 序列、常规高分辨率斜轴位 T2WI 序列。图像由一名直肠癌研究方向的影像科高级职称医生进行评估。第一轮评估所有入组患者的高分辨率 T2WI 序列图像, 一周后第二轮评估观察高分辨率 T2WI 序列和 rFOV IRIS-DWI 序列图像, 分别记录两次评估的磁共振 T 分期结果。采用 MedCalc 统计软件 (Version 18.2.1) 进行分析。两种诊断方法对 pT 分期的诊断准确性采用 Fisher 精确概率检验。采用受试者工作特征 (Receiver operating characteristic, ROC) 曲线评估两种诊断方法对 pT 分期的诊断效能。两种诊断方法诊断信心差值符合正态分布采用配对样本 t 检验, 差值不符合正态分布采用配对 Wilcoxon 秩和检验。 $P<0.05$ 认为差异具有统计学意义。结果: 本研究共纳入 27 例直肠癌患者, 中位年龄 69 岁。基于 rFOV IRIS-DWI 联合 T2WI 序列, 对 pT1-2、pT3 期的诊断准确性分别为 91.7%、93.3% ($P<0.0001$), 两种诊断方法诊断 pT3 期的曲线下面积分别为 0.928、0.658 ($P=0.002$)。两种诊断方法对入组病例的诊断信心分别为 2.37、2.9 分 ($P=0.0002$)。结论 rFOV IRIS-DWI 联合高分辨率 T2WI 序列能够显著提高直肠癌的 T 分期的诊断效能和诊断信心。

PO-1820

基于 DCE-MRI 影像组学联合临床特征术前鉴别肝内胆管细胞癌与混合型肝癌

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目的 探讨动态增强 MRI(DCE-MRI)影像组学模型联合临床特征对肝内胆管细胞癌(ICC)和混合型肝癌(cHCC-CC)的鉴别诊断价值。**方法** 回顾性分析我院经病理证实的 84 例 ICC 和 36 例 cHCC-CC 的患者的临床资料。将 84 例 ICC 患者随机分成训练组(56 例)和测试组(28 例), 36 例 cHCC-CC 患者随机分成训练组(24 例)和测试组(12 例)。分析临床表现及 MR 特征。从 DCE-MR 图像瘤内及瘤周 5mm 提取放射组学特征, 利用最小绝对收缩和选择算子算法进行特征降维, 并构建影像组学模型; 利用多因素 logistic 回归筛选临床及影像学危险因素并构建临床模型; 最终以瘤内、瘤周及临床特征构建联合模型。通过受试者工作特征和曲线下面积(AUC)来评估模型的性能。结果 甲胎蛋白及背景性肝病(肝硬化或慢性肝炎)用于构建临床模型。临床模型、瘤内模型、瘤周模型、瘤内+瘤周模型及联合模型在训练集的 AUC 分别为 0.783、0.824、0.845、0.852、0.870; 在验证集中的 AUC 分别为 0.760、0.802、0.810、0.831、0.852。经 DeLong 检验, 训练集中联合模型与临床模型、瘤内模型、瘤周模型之间差异有统计学意义 ($Z=2.730、2.241、2.032, P=0.021、0.034、0.038$)。结果表明在训练集和验证集中联合模型的预测能力优于临床模型、瘤内模型、瘤周模型及瘤内+瘤周模型。结论 基于 DCE-MRI 影像组学模型及临床特征构建的联合模型可更好地鉴别 cHCC-CC 和 ICC。

PO-1821

甲胎蛋白联合 EOB-MRI 影像特征诊断微小 (<1cm) 肝细胞癌的新标准建立

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目的: 研究甲胎蛋白 (AFP) 在钆塞酸二钠增强磁共振成像 (EOB-MRI) 诊断微小 (<1cm) 肝细胞癌 (HCC) 中的作用。

方法: 本研究回顾性纳入了 2017 年 1 月至 2023 年 3 月期间在 EOB-MRI 上观察到单发<1cm 病灶的慢性乙型肝炎患者。HCC 组的最终诊断由手术切除病理学检查确认, 良性对照组的最终诊断由病理学或长期随访 (>2 年) 确诊。使用 Youden 指数确定 AFP 诊断微小 HCC 的新临界值。通过对 AFP 和影像特征的单因素/多因素 logistic 回归分析, 确定独立预测因素并建立新诊断标准。使用 McNemar 检验比较了新诊断标准与动脉期强化+门脉期廓清 (“快进快出”) 进行了比较。同时对肝胆期低信号结节进行了亚组分析。

结果: 共计 305 名患者 (平均年龄 51.5 ± 10.7 岁, 153 名男性) 被分为训练队列和时间独立验证队列。以下四项指标是诊断微小 HCC 的独立预测因子: 甲胎蛋白>13.7ng/mL、动脉期非周边强化、门脉期非边缘廓清和移行期低信号。一项新标准 (四项显著性因子中至少满足三项) 显示出比 “快进快出” 更高的灵敏度 (训练队列, 71.6% vs. 52.3%, $P < 0.001$; 时间独立验证队列, 75.0% vs. 47.5%, $P = 0.003$), 而特异性没有降低 (训练队列, 92.5% vs. 92.5%, $P > 0.999$; 时间独立验证队列, 92.0% vs. 92.0%, $P > 0.999$)。另一项标准 (所有四项显著性因子均满足) 的特异性略高于诊断标志 (训练队列, 99.1% vs. 92.5%, $P = 0.023$; 时间独立验证队列, 100.0% vs. 92.0%, $P = 0.134$)。对 242 枚肝胆低信号结节的亚组分析也得出了类似的结果。

结论: 将甲胎蛋白纳入诊断标准可提 EOB-MRI 诊断微小 HCC 的诊断效能。

PO-1822

肾上腺静脉术前规划中的新技术： CT 容积双能量成像结合全息可视化三维重建

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目的：探讨 CT 容积扫描模式下，使用双能量成像技术结合全息可视化三维重建在肾上腺静脉术前规划中的应用，提高重建图像质量与手术成功率。

方法：前瞻性收集我院内分泌科 2021 年 10 月至 2023 年 3 月临床继发性高血压患者确诊为原发性醛固酮增多症共 40 人。按性别比例平均分配为 A、B 两组，每组各 20 人，两组患者年龄、BMI、血压、检查前血糖、心率等差异均无统计学差异 ($P>0.05$)。所有患者检查前均签署知情同意书。A 组采用容积双能量扫描，B 组采用常规螺旋扫描。由 1 名影像科主治医师使用模型构建软件对右肾上腺静脉进行三维重建模型可视化处理。再由另外 2 名高年资副主任医师影像诊断医师分别对 2 组可视化模型影像进行主观质量评分，采用 5 分制评分法。并在原始数据图上测量右肾上腺静脉 (RAV) 的 CT 值及噪声值 (SD)，同层面肌肉噪声值，通过计算得到信噪比 (Signal To Noise Ratio, SNR) 和对比噪声比 (Contrast To Noise Ratio, CNR)。记录对比两组患者剂量长度乘积 (Dose Length Product, DLP) 并计算有效辐射剂量 (Effective Radiation, ED)。

结果：A 组中可视化三维模型满足临床诊断需求 (评分 3、4 分者) 的有 20 例 (100%)，而 B 组为 14 例 (70%)，两组对比有统计学差异，($P<0.05$)；A 组 CT 值、SNR 值较 B 组显著增高，差异有统计学意义 ($P<0.05$)，A 组 SD 值、CNR 值较 B 组无显著差异 ($P>0.05$)；A 组 DLP 值及 ED 值均比 B 组降低，差异有显著统计学差异 ($P<0.0001$)。

结论：容积扫描模式 CT 双能量成像技术可以在不提高辐射剂量的前提下，大幅度提高右侧肾上腺静脉可视化三维重建的图像质量，对于静脉采血术前规划有着较高的临床意义，值得推广应用。

PO-1823

基于 MRI 影像组学列线图预测早期宫颈癌非肿大淋巴结转移

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目的 探讨基于 MRI 影像组学列线图术前预测早期宫颈癌短径 $\leq 9\text{mm}$ 淋巴结转移 (LN) 的临床价值。

方法 回顾性分析 186 例经手术病理确诊的 I A1~II A2 期宫颈癌患者，所有患者均接受盆腔常规 MRI 平扫+增强扫描后行根治性广泛全子宫及淋巴结清扫术，根据术后病理结果将患者分为 LN+ (66 例) 和 LN- (120 例)。收集患者临床及病理完整资料，包括年龄、月经状态、鳞状细胞癌相关抗原 (SCC)、淋巴血管间隙浸润 (LVSI)、宫颈浸润深度等。基于横断面 T2WI、T1CE 图像提取三维影像组学特征，以 7: 3 的比例将数据分为训练集 (130 例) 和验证集 (56 例)，使用最大相关最小冗余 (mRMR) 和最小绝对收缩和选择算子 (LASSO) 回归对训练集影像组学特征进行降维，根据各自的影像组学系数建立影像组学标签。单因素 ANOVA 和多因素 Logistic 回归分析以确定 LN 高危因素。联合高危因素和影像组学标签建立列线图。采用受试者工作特征曲线 (ROC) 和决策曲线分析 (DCA) 评估其预测效能及临床收益。验证集数据用于验证模型。

结果 基于 T2WI 及 T1CE 分别提取 1316 个影像组学特征，经降维后分别获得 10、13 个最佳特征，用于分别构建单序列影像组学标签。共筛选出 11 个特征用于构建联合序列影像组学标签，其训练集和验证集数据中的 AUC 值分别为 0.79、0.78。在临床病理因素中，LN+ 和 LN- 组间 LVSI、宫颈浸润深度、SCC 值差异具有统计学意义 (P 均 <0.05)，纳入以上 LN 高危因素及联合序列的影像组学标签共同建立列线图模型。ROC 曲线及校准曲线均显示出良好的预测效能，在训练集和验证

集中的 AUC 值分别为 0.89、0.85。DCA 显示, 阈值取 0.09~0.84 时, 列线图模型的净收益高于联合序列影像组学模型。

结论 基于 MR 影像组学列线图对术前早期宫颈癌患者非肿大淋巴结转移具有良好的预测效能, 具有潜在临床应用价值。

PO-1824

低剂量容积扫描 CTA 扫描技术在动脉型勃起功能障碍诊断与治疗中的应用

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目的: 探究在低剂量容积扫描 CTA 扫描技术对于动脉型勃起功能障碍的诊断效能。

方法: 选取 2021 年 10 月至 2023 年 6 月我院收治需进行阴茎动脉 CTA 以确诊动脉型勃起功能障碍 (Erectile Dysfunction, ED) 的患者 40 人, 所有患者采用低剂量容积扫描, CTA 扫描参数一致。收集统计临床资料与超声、CTA 影像学数据及辐射剂量。所有患者在注射前列地尔后, 先进行阴茎双功能多普勒超声检查, 之后进行 CTA 扫描, 在 CTA 检查完后 72 小时再进行 DSA 检查与治疗。以 DSA 检查结果为金标准, 比较 CTA 与多普勒超声在确诊阴茎勃起功能障碍为动脉型的诊断效能及对狭窄程度的准确性判断。

结果: CTA 诊断血管 (阴部内动脉、双侧阴茎背动脉、双侧海绵体动脉) 狭窄的准确性 (95.21%)、灵敏性 (93.05)、特异性 (95.52) 均高于多普勒超声 (分别为 92.56%、88.07%、90.16%); CTA 判断狭窄程度与 DSA 无显著差异 ($P>0.05$), 两者狭窄分级进行 Kappa 对比一致性良好 ($Kappa>0.85$); CTA 在诊断是否为动脉型 ED 的受试者特异性曲线下面积 (AUC) 为 0.92, 高于双功能多普勒超声 (0.86)。

结论: 低剂量阴茎动脉 CTA 在诊断动脉型 ED 中具有良好的鉴别能力, 与金标准 DSA 效能相当; 诊断血管狭窄情况较双功能多普勒超声具有更好的准确性、灵敏性与特异性; 低剂量容积扫描 CTA 技术可以在临床诊断动脉型勃起功能障碍中作为常规扫描, 推广应用。

PO-1825

光谱 CT 虚拟平扫代替普通平扫价值

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目的: 探讨光谱 CT 肝脏虚拟平扫代替普通平扫的价值。

方法: 回顾性分析本院经光谱 CT 扫描的 32 例肝脏增强患者的影像资料。通过后处理工作站获取动脉期、静脉期、延迟期虚拟平扫图像。客观评价普通平扫和动脉期、静脉期、延迟期虚拟平扫图像上的 CT 值、背景噪声、图像的信噪比及对比噪声比、辐射剂量。

结果: 肝脏普通平扫和动脉期、延迟期虚拟平扫图像 CT 值差异有统计学意义 ($P<0.05$), 与静脉期虚拟平扫图像 CT 值差异无统计学意义 ($P>0.05$)。肝脏普通平扫与肝脏三期虚拟平扫的 SNR 差异均有统计学意义 ($P<0.05$)。肝脏 4 种图像间的对比噪声比及背景噪声无统计学意义 ($P>0.05$)。

结论: 基于光谱 CT 获得的肝脏静脉期虚拟平扫能更好的还原肝脏 CT 值, 可以替代肝脏普通平扫, 同时有效减低辐射剂量。

PO-1826

巨大肠系膜多形性未分化肉瘤一例

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患者 女, 73 岁, 因腹部疼痛 20 余天入院。患者于 20 天前无明显诱因出现腹胀、腹痛, 伴腰酸、乏力, 不欲饮食, 就诊于县人民医院, 予相关检查及治疗, 症状未见明显改善, 今日就诊于我院急诊科, 行相关检查, 考虑“盆腔内实性为主包块”, 为求进一步诊治, 收入综合病房。患者入院以来, 神志清楚, 精神差, 腹胀、腹痛, 腰酸、乏力, 不欲饮食, 留置尿管, 大便量少。既往 20 年前曾行子宫切除术, 具体不详。体检: P94 次/分, BP154/92mmHg。腹部膨隆, 腹硬, 下腹可触及一肿物, 压痛阳性, 无反跳痛, 未触及肌紧张。肿标: 神经元特异性烯醇化酶 19.77ng/ml, CA72-4 124.34U/ml, CA125 293.20U/ml。

PO-1827

CT 影像组学模型在双表型肝癌和肝内胆管细胞癌鉴别诊断中的价值

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目的: 探讨 CT 影像组学模型在鉴别双表型肝癌 (dual-phenotype hepatocellular carcinoma, DPHCC) 与肝内胆管细胞癌 (intrahepatic cholangiocarcinoma, ICC) 中的价值。方法: 收集分析广西医科大学第一附属医院 2018 年 1 月至 2022 年 6 月此时间段内 59 例 DPHCC 及 53 例 ICC 患者的影像资料, 同时收集患者的年龄、性别及术后病理组织学的分化程度等一般临床资料。其中所有患者均完善术前三期增强扫描, 且病理证实并具有免疫组化检查。应用 Syngo.via 软件勾画 CT 增强三期图像上的肿瘤病灶, 从中提取并筛选特征参数, 从而精准建立影像组学模型并进行数据分析, 来评估其鉴别诊断效能。结果: 在 Boruta 降维后筛选出 1691 个有效特征, 建立三个影像组学模型, 分别为: 动脉期、静脉期、延迟期。其中动脉期和静脉期的模型在训练组表现出较高的 AUC、敏感度、特异度、准确度, 在测试组结果较差; 延迟期模型训练组 AUC 值为 0.8810, 灵敏度、特异度和准确度分别为 0.9024、0.7142、0.8260; 测试组 AUC 值为 0.8529, 灵敏度、特异度和准确度分别为 0.8823、0.7272、0.8214。结论: CT 延迟期影像组学模型对 DPHCC 和 ICC 的鉴别诊断有一定价值, 为临床医师术前精确诊断制定决策、患者术后生存预后效果的评估提供帮助。

PO-1828

肝脏淀粉样变性计量学分析

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背景: 肝脏淀粉样变性较为罕见。既往文章多以病例报告为主, 且缺乏特异性临床表现及影像学特征。既往无研究对已发表的肝脏淀粉样变性进行定量文献计量分析。在本研究中主要对近二十三年来发表的肝脏淀粉样变性的关键词共现进行分析。

方法: 从中国期刊全文数据库 (CNKI) 及 Web of Science (WOS) 核心数据库中检索 2000-1-1 至 2023-5-13 发表的肝脏淀粉样变性的文章。利用 VOS viewer 对共同引用的关键词进行分析。

结果：检索到的 2000-1-1 至 2023-5-13 发表的关于肝脏淀粉样变性的中文文章和英文文章分别为 104 篇和 77 篇。共同引用的关键词聚类标签分别显示了 4 个和 3 个主要聚类，中文：#0 肝脏淀粉样变性的临床表现、诊断及治疗；#1 淀粉样变性累及肝的主要表现及多发性骨髓瘤的鉴别；#2 肝脏淀粉样变性诊断金标准；#3 肝脏淀粉样变性与肝窦阻塞综合征的影像学鉴别。英文：#0 肝脏淀粉样变性的自然病程；#1 肝淀粉样变性的病理机制；#2 以硼替唑米和地塞米松为代表的化疗药物研究。

结论：由于肝脏淀粉样变性的罕见性，目前所发表文章多属于病例报告，且误诊率较高，需临床医生提高对肝脏淀粉样变性的认识程度。肝脏淀粉样变性预后较差，因此早诊断和治疗的研究为肝脏淀粉样变性重要研究方向，近五年来，治疗药物以及影像学表现两方面的研究为主要的发表趋势，多中心研究或可进一步明确肝脏淀粉样变性的诊断要点。该研究提供了目前肝脏淀粉样变性研究领域发表文章的趋势，有助于确定肝脏淀粉样变性的早诊断和治疗方法。

PO-1829

直肠腺癌伴骨化生一例

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直肠腺癌伴骨化生是一个罕见的现象，分析其临床及影像学表现，探讨这一现象对临床诊治的价值。方法：回顾性分析因大便秘结及性状改变伴便血 1 月余入院 54 岁男性病例一例，并对相关文献进行复习。结果：CT 显示直肠壁不规则增厚，局部呈肿块影，形态不规则，局部浆膜面欠光整，其内及边缘见点状、线状钙化，大小约 5.3cmx4.5cm，实性成分增强后呈轻度不均匀强化，肿块内可见斑片状无明显强化区。盆腔 MRI 增强显示直肠壁见菜花状肿块影，累及肠壁 1/2 圈（1 点钟方向-7 点钟方向），肿块最大截面约 3.9cmx2.0cm，肿块向腔内腔外生长，肿瘤下缘距肛缘约为 6.7cm，增强扫描不均匀较明显强化；肿块累及直肠系膜筋膜上份，肿块与壁外血管关系密切。骨化组织在短时间内较明显增多。肠镜：直肠距肛门 5-12cm 处见一肿物，占管腔约 5/6 周，中间隆起，边缘溃烂。行直肠癌根治术，病理诊断为直肠中分化腺癌并骨化生，癌组织侵透肠壁肌层达外膜下，大部分为钙化及骨化组织，部分为纤维组织，根据 AJCC 的 TRG 分级为 2 级。送检组织近端、远端吻合口及自取双侧断端、系膜切缘未见癌。系膜淋巴结<4/9>见有癌转移。免疫组化：MSH（+），MSH6（+），PMS2（+），MLH1（+），CK（+），LCK（+），P53（+约 35%），Ki-67（+约 25%）。

结论：骨化生是一种罕见的现象，在诊断时应想到直肠癌的骨化生的可能性，和其他胃肠道肿瘤做鉴别，并避免将其诊断为骨来源肿瘤。

PO-1830

自适应迭代技术联合能谱在腹部 CT 三期增强扫描对肝实质图像质量的应用与研究

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目的：探讨最佳自适应统计迭代重建（ASIR）结合最优单能量技术提高肝实质质量。

方法：选取 2022 年 1 月 0 日至 2022 年 11 月行腹检查的 55 例患者为研究对象。所有患者均从横膈膜水平至耻骨联合水平进行扫描，扫描层厚度为 5 mm，重建层厚度为 0.625mm。患者检查采用常规能谱扫描进行，预选代为 60%，预设噪声指数（NI）为 8.5 采用 40Kev、50 Kev、60 Kev 结合不同百分比的 ASIR-V 算法，在动脉期、门静脉期和静脉期测量右前叶、右后叶、皮下脂肪和竖

脊肌的 CT 值和 SD 值进行重建三组图像。主观评价：两位具有 7 年以上经验的放射科医生对十二组图像的整体图像质量进行 5 分法评分。

结果：客观评价：9 组不同重建方法的右前叶和右后叶 CT 值、SD 值和 CNR 值均有统计学差异 ($P<0.05$)，肝左叶和肝脏右叶 60Kev-40%ASIR SD 值明显较低 47.53 ± 5.12 ， 14.63 ± 2.94 ， 18.28 ± 2.62 ， 18.41 ± 3.9 ， 16.13 ± 3.71 ， 15.36 ± 2.59)，SNR 值均高于其他 8 组 (47.53 ± 7.67 ， 44.35 ± 8.66 ， 37.57 ± 3.53 ， 42.12 ± 8.77 ， 40.71 ± 7.8 ， 42.12 ± 8.77)。主观评价：2 名诊断组医生对图像重建质量主观评分的 Kappa 值为 0.73、一致性强。在图像噪声方面，图像对比度显示，60Kev-40%ASIR 图像明显优于其他 8 组重建图像 ($P<0.05$)。

结论：随着 ASIR 权重的逐渐增大，噪点减小，但过高的 ASIR 对比度会降低，导致图像过度平滑，噪点纹理看起来“斑驳”、“蜡状”或“不自然”，因此结论是 60Kev-40%ASIR 在图像上的诊断值最高。

PO-1831

肝多灶性吻合状血管瘤一例

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患者，女，56 岁，因胸闷、发热行胸部 CT 检查时发现肝内多发低密度占位，遂转诊至我院。

实验室检查：乙丙肝均为阴性；AFP 等肿瘤标志物均正常。

影像学检查：胸部及腹部增强 CT 示两肺多发感染性病变，部分为间质性病变，伴两侧胸腔积液。肝内多发大小不一类圆形低密度结节及肿块影，边界欠清，较大者横截面约 $2.8\times3.7\text{cm}$ ，增强扫描动脉期呈明显环形强化，门脉期强化范围稍增大，延迟期较小病灶似呈等密度，较大病灶边缘仍可见环形强化，中心更低密度区未见明显强化。全身糖代谢 PET/CT 显像示肝内多发大小不一类圆形低密度结节及肿块影，边界欠清，较大者直径约 3.2cm ，部分病灶代谢轻度异常增高，SUVmax $2.0-3.0$ （该患者正常肝实质 SUVmax 2.5）；余探测部位未见明显恶性肿瘤病变征象。

术前影像诊断：肝内多发占位，考虑肝上皮样血管内皮瘤可能。

手术及病理：术中见肝脏多发占位，左外叶表面显露明显，未见明显转移灶，遂行肝左外叶切除术。

眼观：紧邻肝手术切缘及被膜见多处灰红间褐小结节，大小约 $0.9\times0.7\text{cm}\sim3.0\times2.2\text{cm}$ ，质地中等，边界尚清。镜检：肿瘤于肝组织内弥漫浸润性生长，但相对有界限，未见明显侵袭征象。肿瘤主要由紧密堆集的毛细血管样管腔构成，呈吻合状或交通状，形成窦隙样结构，并可见灶状髓外造血。血管内衬单层立方上皮，形态温和，核分裂象罕见。免疫表型：血管内皮标志物 CD34、CD31、ERG 均阳性，SMA 阳性，D2-40、Des、TFE3、PCK 均阴性，Ki-67（散在+）。病理诊断：肝多灶性吻合状血管瘤。

PO-1832

胰腺癌化疗患者预后的危险因素分析及 影像相关列线图风险模型构建

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目的：化疗是治疗胰腺癌患者的重要手段，但由于患者临床病理组织特征不同、治疗方式不同等因素，患者预后存在个体差异。本研究通过纳入公共数据平台及我院来源胰腺癌化疗患者，结合包括影像特征在内的多层次信息，分析胰腺癌化疗患者预后的危险因素，并构建影像相关可视化列线图预测模型，为制定临床决策提供参考价值。

方法：第一部分：在公共数据库中筛选 2013 年至 2016 年期间接受胰腺癌化疗的患者，收集临床、病理特征及总生存期（OS），对变量进行 Cox 分析以获得胰腺癌化疗患者 OS 的独立影响因子。第二部分：回顾性分析本院 2015 年至 2020 年期间胰腺癌根治术后辅以吉西他滨（GEM）化疗的患者，收集临床、病理、影像特征及患者无病生存期（DFS），对变量进行 Cox 分析以获得胰腺癌术后辅以 GEM 化疗患者 DFS 的独立影响因子。利用 R 软件构建预测列线图模型，对列线图的预测能力和临床获益性进行评价。

结果：第一部分：公共数据库共计 706 例胰腺癌化疗患者入组，分析显示：肿瘤病理分级、TNM 分期、原发部位手术为胰腺癌化疗患者 OS 的独立影响因子（ $p < 0.05$ ）。第二部分：本院共计 86 例胰腺癌术后辅以 GEM 化疗患者入组研究，结果显示 BMI、术前 CA199 >1000 U/ml、N 分期、肠系膜上静脉受累为胰腺癌术后辅以 GEM 化疗患者 DFS 的独立影响因子（ $p < 0.05$ ）。成功构建胰腺癌术后辅以 GEM 化疗患者 6 个月、1 年 DFS 的列线图预测模型，内部验证得该模型 C-index 为 0.713（95% CI: 0.660~0.763），校准曲线显示预测 DFS 与实际 DFS 具有良好一致性，模型 6 个月、1 年、3 年 AUC 为 0.749、0.809、0.735，时间 AUC 曲线及 DCA 曲线结果良好。

结论：本研究成功筛选出胰腺癌化疗患者生存情况的独立影响因素，并构建了影像特征相关的可视化列线图预测模型，该模型为制定精准临床决策提供参考价值。

PO-1833

深度学习重建算法在提高上腹部平扫及增强 CT 图像中的价值

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目的 探索深度学习重建算法（deep learning image reconstruction, DLIR）在提高上腹部平扫及增强 CT 图像质量中的临床应用价值。

材料与方法 回顾性分析经 GE Revolution CT 扫描的 57 例患者的上腹部平扫及增强 CT 原始扫描数据，分别采用深度学习重建算法低、中、高强度（DL-L、DL-M、DL-H）和迭代重建算法（ASiR-V 50%）对获得的图像薄层（0.625mm）CT 重建处理。一名观察者对重建图像进行定量分析，包括肝脏、脾脏、背部肌肉、主动脉 CT 值和代表图像噪声的标准差（SD）。两名观察者采用双盲法对重建图像进行定性评分，分为血管显著性、图像噪声和纹理、病变显著性、病变诊断信心 4 部分。

结果 相较于临床常用的 ASiR-V 50%，DLIR 算法在不影响平扫及增强各期图像上肝脏、脾脏、背部肌肉、主动脉的 CT 值，但图像噪声不同程度降低，图像质量主观评分也有明显提升，其中 DL-H 表现最好。

结论 与 ASiR-V 算法相比，DLIR 算法能改进上腹部 CT 平扫及增强图像质量，由于 DL-H 算法重建的 CT 图像噪声更低，主观评分更高，临床应用中优先推荐使用。

PO-1834

基于钆塞酸二钠增强 MRI 预测 VETC 阳性肝细胞癌的相关研究

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目的：本研究主要是探讨基于钆塞酸二钠增强 MRI 定性、定量特征术前预测血管包绕肿瘤簇（vessels encapsulating tumor clusters, VETC）阳性肝细胞肝癌的价值。

方法：回顾性分析 2013 年 1 月~2020 年 1 月间南通大学附属南通第三医院经病理和免疫组织化学检测的 HCC 的患者 234 例。其中 VETC 阳性 HCC 共 101 例，VETC 阴性 HCC 共 133 例，记录所有入组患者的术前实验室相关检查指标、病理结果以及影像学特征，依据 7: 3 将所有患者分为训练组和验证组。应用训练组数据构建预测 VETC 阳性 HCC 预测模型，绘制受试者工作特征 (ROC) 曲线并计算曲线下面积 (AUC) 验证模型的诊断效能，绘制校准曲线图 (Calibration Plot) 验证模型的校准度。通过临床及影像检查术后定期随访复查明确肿瘤是否复发，记录患者的无复发生存期 (RFS)。

结果：多因素 Logistics 回归分析预测 VETC 阳性 HCC 的独立危险因素：门脉期周边廓清 (优势比 (Odds ratio, OR): 6.493)，坏死或缺血严重 (OR: 4.756)，移行期或肝胆期靶征 (OR: 0.307)，LLR 动脉期 (OR: 0.074)。训练组预测 VETC 阳性 HCC 的 AUC 为 0.790 (95%CI: 0.720-0.859)；验证组预测 VETC 阳性 HCC 的 AUC 为 0.779 (95%CI: 0.668-0.889)。所有入组患者平均 RFS 为 31.52 个月 (1-52 个月)，VETC 阳性患者平均 RFS 为 24.19 个月 (1-47 个月)，VETC 阴性患者平均 RFS 为 37.34 个月 (3-52 个月)；

结论：基于 Gd-EOB-DTPA 增强 MRI 定性、定量特征对于术前预测 VETC 阳性 HCC 具有重要价值，门脉期周边廓清、病灶坏死或缺血严重、移行期或肝胆期靶征、LLR 动脉期是 VETC 的独立危险因素。

PO-1835

评估磁共振成像特征预测肝细胞癌 PD-L1 表达的诊断价值

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摘要

目的 旨在采用磁共振成像技术来评估肝细胞癌免疫抑制剂检查点 PD-L1 在患者术前和免疫治疗前的表达情况。方法 本研究前瞻性收集 144 例肝细胞癌患者。所有患者均在术前两周内进行 Gd-EOB-DTPA 的增强磁共振扫描。两名放射科医生对肝细胞癌患者的磁共振成像特征进行评估。这些特征包括：包膜 (完整/不完整)、动脉期瘤周强化、瘤内动脉、肝胆特异期信号、肝胆特异期瘤周低信号、癌栓、肿瘤大小以及表观弥散系数 (ADC)。采用免疫组织化学检测 HCC 患者肝癌组织中 PD-L1 的表达水平。使用相关性分析和逻辑回归分析评价磁共振成像特征与 HCC 中 PD-L1 表达水平之间的关系。结果 PD-L1 与包膜、ADC 值组间存在显著差异 ($P < 0.05$)，二元逻辑回归结果显示，包膜及 ADC 值均是 PD-L1 的独立预测因素 (包膜: OR=2.314, 95%CI 1.096-4.887, $P=0.028$; ADC: OR=0.997, 95%CI 0.995-1.000, $P=0.020$)。结论 术前 Gd-EOB-DTPA 的增强磁共振成像特征在术前预测肝细胞癌的免疫检查点 PD-L1 的表达具有潜在的价值。

PO-1836

联合影像组学及深度学习在 CT 平扫上自动识别隐匿性肝挫裂伤

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目的：建立并验证用于自行识别隐匿性肝挫裂伤的人工智能模型。

方法：回顾性收集重庆大学附属中心医院外伤病人 526 例，根据 CT 平扫和增强扫描分为有隐匿性肝挫裂伤组 (231 例) 和无肝挫裂伤组 (295)，按照 7:3 的比例随机的分为训练集和测试集。在联影智能一站式科研平台上使用 U-Net 网络演化的 VB-net 网络在 CT 平扫上自动行全肝的识别、分

割, 通过 Research Portal VX. X 在 CT 平扫上建立肝脏自动分割框架结构从每个患者的全肝感兴趣区域 (Region of interest, ROI) 中, 自动提取 2264 个影像组学特征。降维后, 在训练集上采用 4 个独立的机器学习分类器 (逻辑回归 (Logistic regression, LR)、高斯过程 (Gaussian process, GP)、随机森林 (Random forest, RF) 和二次判别分析 (Quadratic discriminant analysis, QDA)) 进行训练, 并在测试集上进行验证。采用受试者工作特性曲线下面积 (Area under the curve, AUC) 指标评价模型性能。

结果: 每例患者共纳入 2264 个影像组学特征, 降维后, 发现 15 个特征与隐匿性肝挫裂伤相关。基于 GP 诊断模型表现出良好性能, 训练集、测试集上 AUC 分别为 0.974、0.970。DeLong 检验表明, GP 模型在所有模型中精度最高。校准曲线显示, 预测外伤病人合并有隐匿性肝挫裂伤发生风险的模型结果具有良好的一致性和稳定性。临床决策曲线显示 GP 模型呈显著正效应, 患者获益概率范围广, 具有临床实用价值。

结论: 基于 CT 平扫的肝脏的影像组学特征构建的 GP 模型表现最佳, 可作为评估外伤病人合并隐匿性肝挫裂伤的辅助诊断工具。该机器学习模型可以自动识别、分割和提取肝脏组学特征, 实现外伤患者合并隐匿性肝挫裂伤的自动识别。

PO-1837

基于钆塞酸二钠增强 MRI 列线图预测 MVI 阴性肝细胞癌术后复发

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目的: 探讨基于钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 列线图模型预测微血管浸润 (MVI) 阴性肝细胞癌 (HCC) 患者根治性切除术后无复发生存期的价值。

方法: 回顾性研究 2015 年 2 月至 2021 年 5 月在我院接受根治性肝切除术且病理证实为 MVI 阴性 HCC 的患者 125 例, 分析患者的术前临床资料、MR 图像及术后病理资料。通过单因素和多因素 Cox 比例风险模型分析获得患者术后无复发生存的独立危险因素, 并构建预测患者 1、3 和 5 年无复发生存率的列线图模型, 采用 C-index 和受试者工作特征 (ROC) 曲线来评价模型的区分度, 采用校准曲线评价模型的一致性。

结果: 随访过程中, 37 例 HCC 患者发生复发, 中位无复发生存时间 27.1 个月 (95% CI: 43.3~54.1 个月), 术后 1、3 和 5 年无复发生存率分别为 88.0%、71.9%、45.9%。多因素分析显示: 病理分级 (HR =4.807, 95% CI:1.126~20.526, P=0.034)、肝胆期瘤周低信号 (HR =3.755, 95% CI:1.736~8.122, P=0.001)、RIR_{肝胆期} (HR =0.019, 95% CI:0.001~0.396, P=0.010) 是 HCC 患者术后无复发生存期的独立危险因素。整合上述三个变量构建的列线图预测模型曲线下面积 (AUC) 为 0.819 (95% CI: 0.740~0.882), 同时经 Bootstrap 内部验证, 该模型 C-index 为 0.795 (95% CI: 0.723~0.867), 且校准曲线验证结果显示该模型预测概率和实际观察概率吻合度较好。

结论: 基于 Gd-EOB-DTPA 增强 MRI 构建的列线图可以有效预测 MVI 阴性 HCC 患者术后无复发生存期。

PO-1838

双层探测器光谱 CT 定量参数在结直肠腺癌 Ki-67 和 HER2 表达中的评估

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目的：评估双层探测器光谱 CT (SDCT) 定量参数对结直肠腺癌 (CRAC) Ki-67 和 HER2 表达状态的诊断能力，同时探讨 SDCT 定量参数与 CRAC 中 Ki-67 和 HER2 表达状态之间相关性。

方法：对 88 例符合条件的 CRAC 患者进行回顾性分析，两名观察者分别独立测量了动脉期 (AP) 和静脉期 (VP) 40keV 和 100keV 的 CT 值、有效原子序数 (Zeff)、碘浓度 (IC)、光谱曲线斜率 (λ HU) 和标准化碘浓度 (NIC) 等光谱参数。组内相关系数 (ICC) 用于评估两名观察者的内部一致性。符合正态分布的参数采用独立样本 T 检验评价鉴别 CRAC 中 Ki67 和 HER2 表达状态的诊断价值，并采用受试者工作曲线 (ROC) 评估诊断效能。Spearman 相关性分析用于分析 SDCT 参数与 Ki-67 表达程度以及 HER2 表达状态之间的相关性。

结果：CRAC 光谱定量参数测量值在观察者内部一致性较好 (ICC 范围 0.793-0.978)。CRAC 中 Ki-67 高表达组和低表达组的静脉期 SDCT 参数 CT40keV、Zeff、IC、 λ HU 有显著性统计学差异 ($P=0.035$, $P=0.041$, $P=0.036$, $P=0.044$)。静脉期 SDCT 参数 CT40keV、Zeff、IC、 λ HU 与 CRAC Ki-67 表达呈正相关 ($r=0.227$, $P=0.034$; $r=0.219$, $P=0.040$; $r=0.225$, $P=0.035$; $r=0.216$, $P=0.043$)。SDCT 参数在 CRAC HER2 参数表达状态和相关性不具有统计学意义 (P 值均 >0.05)。

结论：SDCT 定量参数可用于区分 CRAC 中 Ki-67 的低表达和高表达，其中静脉期 SDCT 参数 CT40keV、Zeff、IC、 λ HU 可能是用于评估 CRAC 中 Ki-67 表达的有效参数。

PO-1839

双层探测器光谱 CT 定量参数在结直肠腺癌分化程度、 T 分期及淋巴结转移 的应用价值初步研究

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目的：探讨双层探测器光谱 CT (SDCT) 定量参数在结直肠腺癌 (CRAC) 分化程度、T 分期及淋巴结转移的应用价值。

方法：将符合条件的 85 例 CRAC 患者纳入本研究，两名观察者独立测量了动脉期 (AP) 和静脉期 (VP) 常规 CT 值、40keV 值、100keV 值、有效原子序数值 (Zeff)、碘密度 (IC) 值、同层腹主动脉/髂动脉 IC。计算标准化碘浓度 (NIC) 及光谱曲线斜率 (λ HU)。组内相关系数 (ICC) 用于评估两名观察者的内部一致性。符合正态分布的 SDCT 参数采用方差分析比较不同分化程度诊断价值，对于组间差异有统计学意义的光谱参数，进一步采用 LSD 法进行两两比较，并计算其诊断效能。SDCT 定量参数与常规检查结果使用 ROC 分析进行比较。并比较 SDCT 定量参数在 T 分期和淋巴结转移的诊断价值和相关性。

结果: CRAC 光谱定量参数测量值在观察者内部一致性较好 (ICC 范围 0.790-0.979), 静脉期光谱参数 CT40keV, CT100keV, IC, λ HU 在 CRAC 不同分化程度 (低-高分化以及中-高分化) 之间存在显著差异性 ($P<0.05$), 且具有较高的诊断效能, 以 CT100keV 诊断效能最高。静脉期 100keV 与常规增强相比 (低-高分化: $AUC=0.812$ VS $AUC=0.768$; 中-高分化: $AUC=0.684$ VS $AUC=0.656$)。光谱多参数值在 CRAC 的 T 分期和淋巴结转移上不具有统计学差异 (P 均 >0.05), 光谱多参数与 T 分期和淋巴结转移之间不具有相关性 (P 均 >0.05)。

结论: SDCT 定量参数静脉期 CT40keV, CT100keV, IC, λ HU 对 CRAC 不同分化程度鉴别具有较好诊断效能, 可作为 CRAC 分化程度的个体术前预测的临床工具。而对于 T 分期和淋巴结转移的评估, 诊断价值及相关性需要进一步深入研究。

PO-1840

基于多模态 MRI 影像学表现的 Logistic 回归分析模型对鉴别小肝癌和肝局灶性结节增生的应用价值

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【摘要】目的: 综合分析小肝癌 (sHCC) 和肝局灶性结节增生 (FNH) 的临床和多模态 MRI 影像学表现, 提高对两者鉴别诊断的水平。方法: 搜集 2015 年 1 月-2022 年 12 月经手术病理证实的直径均 ≤ 3 cm 的 79 例 sHCC 和 41 例 FNH, 综合分析两者临床及多模态 MRI 影像学表现的差异。结果: 与 sHCC 组相比, FNH 组患者发病年龄小, 乙肝病史者及临床症状均较少, 大部分患者无 AFP 升高, 但病灶中心部分可见瘢痕且不侵犯周围结构, 病灶中心在 T2WI 像易出现高信号, 增强后病灶延迟强化常见, 但少见包膜/包膜样强化, 以上特征均具有统计学差异 (P 均 <0.05)。Logistic 回归模型分析显示, 鉴别 sHCC 和 FNH 的独立危险因素包括平扫 AFP 升高 ($OR=22.498$)、病灶延迟期相对强化率 ($OR=8.189$)、患者临床症状 ($OR=0.223$)、肿瘤 T2WI 序列病灶中心高信号 ($OR=0.017$), 进一步进行 ROC 曲线分析, AFP 升高、病灶延迟期相对强化率、患者临床症状、肿瘤 T2WI 序列病灶中心高信号的 AUC 值分别为 0.794、0.813、0.654、0.834。结论: 综合分析患者的临床及 MRI 影像学特征, 有利于提高对 sHCC 和 FNH 的鉴别诊断水平。

PO-1841

肠道神经鞘瘤的影像学表现

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【摘要】目的 研究肠道神经鞘瘤 (IS) 的影像学表现, 提高对该病的诊断能力。方法 回顾性分析 14 例经手术病理证实的 IS 患者的临床和影像学资料, 评估内容包括肿瘤的部位、大小、形态、性质、生长方式、CT 密度、MRI 信号、PET/CT 代谢等特征。结果 14 例 IS 中, 位于十二指肠 3 例, 盲肠 2 例, 结肠 8 例, 直肠 1 例。病灶均为类圆形或椭圆形, 最大径平均 (2.4 ± 1.1) cm。病灶为实性 13 例, 肠腔外生长型 10 例, 囊变 1 例, 黏液变性 1 例。9 例病变肠周可见慢性炎性淋巴结, 其中 6 例淋巴结短径大于 5mm。14 例 IS 的 CT 平扫均为低密度, 增强后均为渐进性强化, 其中轻度强化 1 例, 中度强化 2 例, 明显强化 11 例。2 例 IS 在 MRI 上均表现为 T1WI 低信号, T2WI 稍高信号, DWI 明显高信号, 增强后明显渐进性强化。2 例 IS 在 18F-FDG-PET/CT 上均表现为高代谢, 病灶 SUVmax 分别为 9.4 和 8.8。结论 IS 的影像学表现具有一定的特征性, 主要表现为肠道粘膜下

来源的实质性结节或肿块，密度或信号均匀，增强后明显渐进性强化，18F-FDG-PET/CT 上肿瘤明显高代谢，灶周常见均质稍大淋巴结。

PO-1842

基于磁共振构建胎盘植入性疾病产后大出血的影像组学-临床联合预测模型

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目的：提取与胎盘植入性疾病产后大出血相关的影像组学特征、磁共振影像学特征及实验室指标，构建影像组学-临床联合模型的诺模图，以预测胎盘植入性疾病是否产后会出现大出血。

方法：回顾性收集 134 名丽水地区超声产前怀疑存在胎盘植入性疾病孕妇的资料，按照国际对于产后大出血的定义（即剖宫产 24h 内出血量大于 1000ml），将这些孕妇分为存在产后大出血（n=53 人）和不存在产后大出血（n=81 人）。将这些数据按照 8:2 比例将队列分为训练组和验证组，训练组 106 人，验证组 28 人。胎盘组学特征在 T2WI 矢状位图像上提取，通过降维的方法获得相关性最强的组学特征，利用单因素及多因素回归获得最相关的胎盘磁共振影像特征及实验室指标。获得影像组学模型及影像组学-临床预测模型，并进行模型之间的比较，最终获得最佳模型，并转化为相应的列线图模型，最终对列线图模型的效能进行验证。

结果：通过降维获得与产后大出血最相关的 4 个影像组学特征，单纯的组学模型在训练组和验证组的 AUC 分别为 0.773(95%CI 0.682-0.863)和 0.781(95%CI 0.587-0.974)。通过筛选获得胎盘内 T2WI 上低信号灶、胎盘内血管增多征、D2 聚体三项临床特征，将三项特征与影像组学特征合并构建影像组学-临床联合模型，其在训练组和验证组的 AUC 分别为 0.866(95%CI 0.798-0.935)和 0.840(95%CI 0.686-0.993)。校正曲线和决策曲线均显示出影像组学-临床联合预测模型诺模图具有较好的效能。

总结：基于磁共振构建的胎盘植入性疾病产后大出血的影像组学-临床联合预测模型在预测胎盘植入性疾病产后大出血这一严重产后并发症中具有较好的效能和临床应用价值。

PO-1843

CT 对局部进展期胃癌转化治疗效果的预测

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目的：术前准确预测胃癌转化治疗效果是选择合适的胃癌治疗方案的关键。我们开发了一种整合了 CT 图像和临床病理参数的可视化诺模图，用于胃癌转化治疗效果的个体化术前预测。

材料和方法：本回顾性研究包括 60 例 LAGC 患者(男性 39 例，女性 21 例，年龄 60.5 ± 11.61 岁)，行增强 CT 扫描。根据 RECIST1.1 评分，分为有效组（n=38）和无效组（n=22）。通过使用 ROC 来检测模型的性能。DeLong 检验用于评估两个模型之间 AUC 的差异。

结果：分层强化、肿瘤厚度和 Boroman 4 型是胃癌转化治疗效果的显著预测因素（ $p < 0.05$ ）。这三个因素的诺模图（与原始模型相比）显示出更高的预测效果（ $p < 0.001$ ）。模型的曲线下面积 (AUC) 为 0.830（95%CI 0.788-0.873），

结论：基于 CT 表型的诺模图显示了良好的区分和校准，它可以方便地用于胃癌转化治疗效果的术前个体风险评级。

PO-1844

定量磁敏感图与慢性肾脏病病理对照的初步研究

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目的 探讨定量磁敏感图 (quantitative susceptibility mapping, QSM) 与慢性肾脏病 (chronic kidney disease, CKD) 病理对照的临床价值。

方法 纳入 2019 年 10 月至 2021 年 11 月获得肾活检病理结果的慢性肾功能损伤患者 26 例, 根据估算肾小球滤过率 (estimated glomerular filtration rate, eGFR) 分为两组: 轻度肾损伤组 (mild renal injury group, m-RI; eGFR $\geq 60 \text{ ml} \cdot \text{min}^{-1} \cdot 1.73 \text{ m}^{-2}$) 和中重度肾损伤组 (moderate-severe renal injury group, ms-RI; eGFR $< 60 \text{ ml} \cdot \text{min}^{-1} \cdot 1.73 \text{ m}^{-2}$)。所有受试者均完成常规 MRI 及 QSM 检查, 测量肾皮质、髓质的磁化率。采用 Mann-Whitney U 检验比较 m-RI 与 ms-RI 病理损伤的差异。采用 Spearman 相关分析 CKD 患者肾皮质、髓质磁化率值与病理组织学评分的相关性。

结果 ms-RI 组的肾小球硬化、间质炎性细胞浸润、间质纤维化及肾小管萎缩评分均高于 m-RI 组 ($P < 0.05$)。肾皮质、髓质磁化率值与病理损伤评分之间存在负相关 (P 均 < 0.05), 其中肾皮质磁化率值与节段损伤的相关性最高 ($r = -0.569, P = 0.002$), 肾髓质磁化率值与肾小管萎缩的相关性最高 ($r = -0.564, P = 0.003$)。

讨论 QSM 可评估轻度肾损伤组与中重度肾损伤组病理损伤的差异及与病理组织学评分的相关性, 有助于慢性肾脏病病理机制的研究。

PO-1845

基于增强 CT 的 LI-RADS M 类肝细胞癌与肿块型肝内胆管细胞癌鉴别诊断及预后研究

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目的: 建立基于增强 CT 鉴别肝脏影像学报告和数据库系统 (Liver Imaging Reporting and Data System, LI-RADS) M 类肝细胞癌 (hepatocellular carcinoma, HCC) 与肿块型肝内胆管细胞癌 (mass-forming intrahepatic cholangiocarcinoma, mICC) 的诊断模型, 并比较两种病理类型患者的预后。

方法: 回顾性纳入我院 2018 年 1 月至 2020 年 12 月期间经病理证实并根据术前增强 CT 图像评定为 LR-M 类的 HCC 和 mICC 患者。CT 图像由两名不知晓临床病理信息的放射科医生独立评估。采用单因素和多因素逻辑回归分析识别与 mICC 相关的临床及 CT 影像特征, 并构建诊断模型。通过受试者工作特征曲线评估模型诊断效能。采用 Kaplan-Meier 曲线比较两种病理类型患者的无复发生存期和总生存期。

结果: 研究共纳入 98 例 HCC 和 60 例 mICC 患者。多因素逻辑回归分析显示, 动脉期高强化占比 $< 50\%$ 、分叶状、淋巴结转移、非肝硬化、甲胎蛋白 $\leq 19.52 \text{ ng/mL}$ 、糖类抗原 $19-9 \geq 29.28 \text{ U/mL}$ 及癌胚抗原 $\geq 3.74 \text{ ng/mL}$ 为 mICC 的独立预测因子。受试者工作特征曲线分析显示, 基于多因素逻辑回归分析的诊断模型曲线下面积为 0.97, 敏感度为 0.97, 特异度为 0.90。生存分析显示, HCC 患者的中位无复发生存期明显优于 mICC 患者 (47 月 vs 16 月, $p=0.023$), 但两组患者的平均总生存期无统计学差异 (48 月 vs 47 月, $p=0.671$)。

结论: 基于上述增强 CT 影像特征和肿瘤标志物的模型能够准确鉴别肝脏 LR-M 类病灶中的 HCC 与 mICC。LR-M 类 HCC 患者的肿瘤无复发生存期优于 mICC 患者, 但患者总体生存时间在两组患者间未见差异。

PO-1846

一站式驰豫定量 (MAGiC) 技术预测前列腺移行带 PI-RADS3 分病灶良恶性能力的临床价值研究

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目的: 探讨 MAGiC 技术鉴别前列腺移行带 PI-RADS 3 分病灶良恶性的临床价值。方法: 回顾性分析 134 例病人共 134 个前列腺移行带 PI-RADS 3 分病灶的 MAGiC 定量图谱图像, 观察指标包括前列腺癌与前列腺良性增生的 T1、T2 及 PD 值, 比较移行带 PI-RADS 3 分病灶良恶性的 MAGiC 定量参数 (T1、T2 及 PD 值) 的差异, 观察这三个定量参数在 PCa 诊断中的最佳诊断界值、敏感性、特异性、PPV、NPV、95%CI 以及约登指数。结果: 前列腺移行带 PI-RADS 3 分病灶中 PCa 的 T1、T2、PD 值分别为 $1171.86 \pm 25.75\text{ms}$ 、 $74.41 \pm 1.13\text{ms}$ 、 $66.16 \pm 1.45\text{pu}$, T1、T2、PD 值均低于良性增生病灶; 在前列腺移行带 PI-RADS 3 分病灶中 T1、T2 和 PD 值诊断 PCa 的 AUC 值分别为 0.617、0.820 和 0.549; 三者的敏感性、特异性、PPV 和 NPV 分别为 47.06%、83.13%、63.20%、71.90%, 76.47%、80.72%、70.90%、84.80%和 47.06%、85.54%、66.70%、72.40%, 三者的 95% CI 分别为 0.529~0.700、0.745~0.881、0.460~0.635, 约登指数分别为 0.302、0.572、0.326, 因此 T2 值可以用来鉴别移行带 PI-RADS 3 分病灶良恶性, 其最佳诊断界值为 77ms。结论: MAGiC 定量参数的 T2 值具有预测前列腺移行带 PI-RADS 3 分病灶良恶性的能力, 从而减少不必要的穿刺活检。

PO-1847

基于光谱 CT 参数的结直肠癌术后极早期远处转移风险分层新型标志物研究

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目的: 结直肠癌(CRC)术后极早期远处转移(VEDM)提示局部治疗策略的失败, 目前鲜有有效的生物标志物用于 VEDM 的风险分层, 以指导治疗调整。本研究旨在探究双层探测器光谱 CT (DLSCT) 定量参数在预测 CRC 术后 VEDM 的潜力。

方法: 本文为前瞻性研究, 纳入 2021 年 4 月至 2022 年 7 月期间经活检证实的 CRC 患者接受术前三期增强 DLSCT。由两位影像科医生进行图像的勾画和光谱特征的提取, 得到包括平扫有效原子序数、三期病灶碘浓度、三期病灶归一化碘浓度(NIC-A/V/E)、三期光谱曲线斜率(λ -A/V/E)、两种动脉增强分数、静脉增强分数(VEF)和三期 1/NIC (1/NIC-A/V/E)共 16 个光谱参数。类内相关系数(ICC)用于评价观察者间一致性。采用倾向性评分匹配(PSM)将术后发生与未发生 VEDM 的患者进行匹配, 基于匹配后的队列使用单/多因素逻辑回归分析探究各参数的预测效能。匹配前的全队列用于参数验证和建模, 生成联合的临床、联合的光谱及临床-光谱预测模型。模型的效能使用受试者工作特征曲线下面积 (AUC) 表示, 模型间的比较使用 DeLong 检验。

结果: 共 222 例 CRC 患者纳入本研究, 13 例发生 VEDM。光谱特征提取的观察者间一致性较优(ICC, 0.773-0.964)。共有 3 个光谱 CT 参数 (VEF、 λ -v 和 1/NIC-v) 表现较好的预测效能($p < 0.05$), AUC 值分别为 0.822、0.738 和 0.713, 对应的最佳截断值分别为 67.16%、2.46 和 2.44。在全队列中, 三个光谱参数的预测能力得到验证, 联合光谱模型显示出与联合临床模型相当的预测效能(AUC,

0.771 vs. 0.779, $p>0.05$); 临床-光谱模型显著优于联合临床模型(AUC, 0.887 vs. 0.779, $p=0.015$), 但不优于联合光谱模型(AUC, 0.887 vs. 0.771, $p=0.078$)。

结论:本项初步性研究发现基于光谱 CT 的定量参数具有较好的预测 CRC 患者术后 VEDM 的潜力, 这些参数与病灶的静脉期光谱灌注密切相关。未来需要更大样本的研究进一步验证。

PO-1848

提高胎盘植入性病变诊断效能的 MRI 影像特征及整合方法研究

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目的:分析胎盘植入性病变的 MRI 特征表现, 整合不同级别胎盘植入的影像特点, 以提高该疾病诊断的准确性。方法: 回顾性分析 2015 年 1 月~2023 年 4 月本院经手术证实胎盘植入的 235 例患者为例, 所有患者均通过病理诊断确诊。年龄 22~41 岁, 平均 (29.71 ± 3.23) 岁, 孕周 28~38 周, 平均 (35.26 ± 0.64) 周, 剖宫产史者有 188 例, 主动流产刮宫史者 48 例, 初产妇有 16 例。胎盘植入部位深度分布: 胎盘粘连者 110 例, 胎盘植入者 97 例, 胎盘穿透者 17 例, 所有患者进行 MRI 检查, 结合病理结果, 分析胎盘粘连、胎盘植入及胎盘穿透各自特征 MRI 表现。结果: 胎盘植入患者中, 胎盘/子宫膨出、膀胱壁中断、胎盘床异生血管、局部外生团块, 这四个征象单独出现时, 诊断胎盘植入的准确性较高, 其敏感性和特异性均高于 95%, $P<0.05$; 当上述征象联合其它 MRI 征象出现时, 更支持胎盘植入的诊断。在胎盘粘连患者中, 当出现胎盘内 T2WI 低信号带垂直于胎盘母体面、胎盘后 T2WI 低信号带消失及子宫肌层变薄这些征象时, 更支持胎盘粘连的诊断, 其敏感性和特异性均较高, 大于 90%, $P<0.05$, 当联合其它征象出现时, 如胎盘信号不均、胎盘不对称增厚/形状改变、胎盘缺血性梗死、胎盘内异常血管等征象时, 需高度怀疑胎盘粘连。当胎盘组侵犯膀胱或长入腹腔, 可明确诊断胎盘穿透。结论: 胎盘/子宫膨出、膀胱壁中断、胎盘床异生血管、局部外生团块是胎盘植入的最敏感征象, 胎盘后 T2WI 低信号带消失, 胎盘内出现垂直于母体胎盘的短 T2WI 信号影及伴有子宫壁变薄有助于胎盘粘连的诊断, 异常 MRI 征象越多, 胎盘植入的可能性越大, 需密切结合临床高危因素。

PO-1849

基于基线腹部对比增强 CT 的临床-影像组学列线图评估胃癌同时性卵巢转移: 一项双中心研究

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背景: 构建并验证基于术前 CT 和临床数据的影像组学列线图以检出女性胃癌患者的同时性卵巢转移 (SOM)。

方法: 回顾性研究纳入两个队列的胃癌患者。所有患者接受术前腹部增强 CT 和盆腔增强 MRI 检查, 如盆腔 MRI 发现疑似卵巢病变则行病理组织学检测。队列 1 (101 例患者) 作为训练样本, 提取影像组学特征并设置影像评分。联合影像评分及临床参数构建列线图检出 SOM。在队列 1 采用自举法进行内部验证。在队列 2 (46 例患者) 进行外部验证。ROC 曲线分析、决策曲线和混淆矩阵联合评估影像评分、列线图和主观诊断模型的效能。

结果：在训练组，联合了年龄和影像评分的列线图具有最高的 AUC 值（0.910，vs.影像评分 0.827 和主观诊断 0.773）。在外部验证组，上述列线图同样具有最高的 AUC 值（0.850，vs.影像评分 0.790 和主观诊断 0.675）。在两个队列中，决策曲线和混淆矩阵均证实列线图优于影像评分。

结论：研究证实联合了影像评分和临床特征的列线图模型可有效检出女性胃癌患者的 SOM，其在临床诊疗应用优于主观诊断或单独的影像评分。

PO-1850

腹部增强 CT 动脉期后不同间隔时间与 门静脉强化幅度的相关性研究

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目的 研究腹部增强 CT 动脉期后不同间隔时间与门静脉强化幅度的相关性，探讨门静脉强化幅度高的动脉期后最佳间隔时间。方法 回顾性分析 2022 年 1 月至 2023 年 6 月重庆医科大学附属第一医院采用相关技术参数及对比剂注射方案完成的腹部增强 CT 检查患者 300 例(BMI23~26，排除心功能不良及肝硬化)。设备为 GE Discovery 64 排螺旋 CT，对比剂选择碘美普尔（400 mgI/ml），对比剂总量按 450mgI/kg 体重计算，对比剂维持注射时间设置为 20s，相同速率维持注射 10s 生理盐水；根据动脉期后间隔时间（含动脉期扫描时间）不同分为 A、B、C 三组：A 组间隔时间为 16s，B 组间隔时间为 18s，C 组间隔时间为 20s。采用阈值触发/实时增强监测方法完成动脉期扫描，监测平面选择肝门区腹主动脉，触发阈值设置为 120HU，动脉期后间隔相应时间（18~22s-动脉期扫描时间）扫描门脉期，并再次间隔 19~22s 扫描静脉期，选取门脉期图像分别测量门脉主干及左、右属支 CT 值。结果 三组病例的门脉左支 CT 值分别为：184.56±8.17HU，171.11±9.23HU，159.46±8.71HU；门脉右支 CT 值分别为：185.22±6.83HU，169.35±10.27HU，161.36±8.61HU；门脉主干 CT 值分别为：182.32±8.55HU，165.46±9.08HU，153.12±8.27HU。结论 腹部增强 CT 动脉期后间隔 16s 扫描门脉期，门静脉主干及左、右属支的强化幅度更高，与周围组织的对比更好，能呈现更好的门静脉血管显示。

PO-1851

影像组学联合深度学习在肝细胞癌 TACE 疗效评估中的应用价值

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目的：探讨影像组学和深度学习对预测肝细胞癌（hepatocellular carcinoma, HCC）首次经动脉化疗栓塞术（Transarterial chemoembolization, TACE）疗效的价值。方法：回顾性收集 2015 年 1 月至 2021 年 1 月行 TACE 治疗的 HCC 患者影像及临床信息，从术前 CT 图像中分别获得影像组学分数（Rad-score）和深度学习分数（DL-score），采用单因素和多因素 Logistic 回归筛选与疗效相关的变量，并构建临床模型（Clin-score）。然后应用多因素 Logistic 回归开发结合 Rad-score、DL-score 和 Clin-score 因素的跨尺度预测模型，通过区分度、校准度和临床决策能力来评估模型性能。进一步通过 log-rank 检验，比较模型对于患者生存能力的预测性能。结果：研究共纳入 265 名患者，按 8: 2 比例随机拆分为训练集和测试集。在测试集中，深度学习和影像组学的联合模型（DL_RAD）可以更好的预测 TACE 的疗效，其受试者工作曲线下的面积（Area under curve, AUC）为 0.843，优于深度学习-临床（AUC: 0.838）和影像组学-临床（AUC: 0.786）联合模型，以及 DL-score（AUC: 0.806）、Rad-score（AUC: 0.775）和 Clin-score（AUC: 0.730）单一

模型。一步通过生存分析显示,该联合模型可以将患者分成生存期具有显著差异的不同亚组(700 天 vs. 1349 天, $P=5.6e-9$)。结论:联合影像组学和深度学习的预测模型可以在术前预测 TACE 疗效,助力精准医疗。

PO-1852

CT 严重指数 (CTSI) 与急性生理和慢性健康评分 (APACHE II) 对急性胰腺炎严重程度评价

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目的:探究 CT 严重指数(CTSI)与急性生理和慢性健康评分 (APACHE-II 评分) 对急性胰腺炎(AP) 患者预后指标的评估效能。

材料与amp;方法:回顾性分析我院 2021 年 1 月至 2021 年 12 月收治的 273 例急性胰腺炎(AP)患者,观察其腹部增强 CT 图像。CT 表现分为水肿性 AP 和坏死性 AP,并根据其图像进行 CT 严重指数(CTSI) 评分。在入院后 24 小时内计算 APACHE II 评分、局部并发症、死亡、住院时间及入住 ICU 天数。

统计分析 CTSI、APACHE II 评分分别与局部并发症、死亡、住院时间及入住 ICU 天数的关系。

结果:在急性胰腺炎患者中,发生局部并发症患者 CTSI 评分高于无局部并发症患者($P=0.000$),而有、无局部并发症患者之间 APACHE-II 评分无统计学差异($P=0.322$)。死亡患者 APACHE II 评分高于存活患者 ($P=0.001$),而死亡与存活患者之间 CTSI 评分无统计学差异 ($P=0.167$)。在预测住院天数方面,CTSI 评分及 APACHE II 评分评分越高,住院时间越久($r=0.340$ 和 $r=0.264$)。需要转入 ICU 患者的 CTSI 评分及 APACHE II 评分均高于不需要转入 ICU 的患者($P=0.000$ 和 $P=0.000$)。

结论:在急性胰腺炎患者中,CTSI 在评估局部并发症方面优于 APACHE II 评分,但在评价死亡方面不如 APACHE II;CTSI 及 APACHE II 评分能预测住院天数和是否转入 ICU。

PO-1853

基于增强 CT 影像组学的诺莫图术前预测胰腺癌神经侵犯

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目的:基于增强 CT 提取的影像组学特征及临床特征建立诺莫图用于术前无创评估胰腺癌神经侵犯,并对模型的稳定性进行验证,评估模型的性能。

方法:回顾性收集四川大学华西医院经病理证实为胰腺腺癌并明确是否有神经侵犯的患者共 217 例,根据术后病理将胰腺腺癌患者分为神经侵犯阳性组(PNI+)和 阴性组(PNI-),按照 7:3 的比例随机分为训练组和验证组。基于术前增强 CT 的动脉期和门脉期手动逐层勾画胰腺癌整个病灶,并提取相应的影像组学特征。通过对训练组的数据进行单因素和最小绝对收缩和选择算子(LASSO)进行特征选择,选出的组学特征用逻辑回归分析计算影像组学得分(rad-score)。临床特征如肿瘤大小、CA19-9 等用单因素和多因素分析在 PNI+与 PNI-组之间是否有差异。由 2 名有经验的放射科医师基于术前增强 CT 影像学表现评估神经侵犯的状态。通过影像及临床指标构建诺莫图,用 ROC 曲线和校准曲线评估模型的表现性能,用临床决策曲线评估模型的临床效能。

结果: 根据单因素和多因素分析, 纳入的临床指标仅组织病理分化程度和淋巴结状态在 PNI+与 PNI-组之间有统计学差异。因此用 Rad-score 和放射科医师对神经侵犯的评估状态建模。该联合模型的受试者工作特征曲线下面积(AUC)在训练组和验证组中分别为 0.785 和 0.778, 该模型的表现性能在训练组和验证组中均优于单独的影像组学模型(训练组: 0.720 VS 验证组: 0.650)和放射科医师的评估(训练组: 0.610 VS 验证组: 0.665) ($P<0.05$)。校准曲线显示用诺莫图预测神经侵犯与实际发生神经侵犯的概率具有较好的一致性。临床决策曲线显示, 在任何阈值概率时, 基于诺莫图评估神经侵犯优于放射科医师的评估。

结论: 基于增强 CT 的影像组学和放射科医师评估神经侵犯的诺莫图有望术前无创评估胰腺腺癌的神经过侵犯, 从而有助于帮助患者制定个体化治疗决策。

PO-1854

对比剂个性化在肝脏增强 CT 扫描的初步应用研究

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目的 评价对比剂个性化在肝脏增强 CT 应用的图像质量及可比性。方法 募集我院对比剂个性化肝脏三期增强扫描肝脏受检者, 入组标准: 18 岁 \leq 年龄 \leq 80 岁, 言语理解并配合良好, 图像噪声良好、肾功能正常。排除标准: 年龄 $>$ 80 岁或 $<$ 18 岁、信息不全、碘对比剂禁忌等。采用双筒高压注射器, 对比剂浓度 300~370mgI/ml, 个性化方案: 以 450mgI/Kg 计算对比剂总量、体重对应碘流率计算注射速率; 记录实际单位体重碘剂量、对比剂总量、有效总碘剂量等。医师双盲法评价主动脉强化、扫描时机及肝实质期增强效应, 观察图像质量分布、变异系数, 医师一致性检验。结果: 纳入受检者共 192 例, 实际单位体重碘剂量(374.8 ± 72.1)mgI/Kg, 实际注射碘流率(1138.0 ± 180.9)mgI/s, 对比剂总量(62.3 ± 10.5)ml, 有效总碘剂量(21320.0 ± 3717.7)mgI, 主动脉 CT 值动脉期为(338.6 ± 107.3)Hu, 肝门静脉 CT 值动脉期为(176.2 ± 49.3)Hu, 肝实质期 EU 值为(52.6 ± 13.7)Hu、变异系数约 13.1%。主动脉强化优秀 108 例、可接受 56 例、强化过度 21 例、显影不足 7 例, 满足诊断约 89.1%; 动脉期时机评价满意 160 例、可接受 21 例、过早 10 例、太晚 1 例, 扫描时机满足诊断约 94.3%; 肝实质期强化效应评价满意 106 例、可接受 35 例、强化过度 47 例、强化不足 4 例, 满足诊断约 97.9%; 动脉期主动脉强化($c2=3.333$)、扫描时机($c2=1.833$)、肝实质期强化效应($c2=7.667$)评价医师间无显著差异(均 $P\geq 0.05$), 医师间图像评价高度一致(kappa 值分别为 0.861, 0.803, 0.914, 均 $P=0.000$)。结论 对比剂个性化应用可获得总体质量良好的肝脏图像, 该技术应用简便、可操作且重复性好, 具有较高的临床推广价值。

PO-1855

肝脏增强 CT 扫描对比剂个性化的应用价值

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目的 探讨肝脏增强 CT 对比剂个性化扫描的应用价值。方法 肝脏三期增强受检者以对比剂个性化和对照方案分组扫描, 入组标准: 18 岁 \leq 年龄 \leq 80 岁, 图像噪声良好、肾功能正常。排除标准: 信息不全、伪影严重、碘对比剂禁忌等。评价图像质量及肝脏强化效应可重复性等组间差异。结果 纳入研究和对照组被试分别为 192 例和 100 例, 实际单位体重碘剂量(374.8 ± 52.1)研究组/(451.8 ± 39.1)对照组 mgI/Kg; 实际注射碘流率(1138.0 ± 130.9)研究组/(1020.0 ± 56.3)对照组 mgI/s, 有效总碘剂量(21320.0 ± 3017.7)研究组/(25650.0 ± 4245.8)对照组 mgI, 肝脏 EU 肝实质期为(53.2 ± 7.0)研究组/(66.8 ± 19.3)对照组 Hu, 肝实质期强化变异性为 13.1%研究组/28.8%对照组; 肝实质期强化效应评

价满意 55.2%研究组/36.0%对照组、可接受 18.2%研究组/18.0%对照组, 满足诊断约 97.9%研究组/99.0%对照组。主动脉强化 AP 优秀 56.3%研究组/56.0%对照组, 满足诊断约 89.06%研究组/95.0%对照组; 动脉期时机满意 83.3%研究组/48.0%对照组, 满足诊断约 94.3% 研究组/81.0%对照组; 实际单位体重碘剂量、有效总碘剂量、肝脏增强值研究组显著小于对照组(均 $P=0.000$); 研究组肝实质期 EU 值均数(53.2Hu)显著低于对照组(66.8Hu)($t=-8.673$, $P=0.000$), 研究组变异系数(13.1%)显著低于对照组(28.8%)即可重复性研究方案显著优于对照扫描; 单位体重碘剂量、有效总碘剂量研究组显著低于对照组($P=0.000$)。结论 对比剂个性化的肝脏图像质量与强化效应可重复性均显著优于对照方案并降低碘总量约 16.9%, 研究方案具有相对较高的推广价值。

PO-1856

基于双能量 CT 定量参数对结直肠癌神经浸润的预测价值

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【摘要】目的 探讨双能量 CT 术前预测结直肠癌神经浸润(perineural invasion, PNI)的可行性。方法 回顾性分析 2021 年 12 月至 2023 年 3 月于我院术前行腹部双能 CT 扫描、术后病理诊断为结直肠腺癌的患者 65 例。将其分为 PNI 阳性组(17 例)和阴性组(48 例)。比较两组间临床资料、影像特征及双能 CT 定量参数差异。采用多因素逻辑回归分析筛选 PNI 预测因素, 分别构建影像特征模型、双能 CT 参数模型和联合预测模型, 评估各模型的诊断效能。结果 临床资料在 PNI 阳性组与阴性组之间均无明显差异; 原发肿瘤位置、肠壁最大厚度、肠系膜条索影、肠周淋巴结个数(短径 $>5\text{mm}$)以及肿瘤沉积组间差异具有统计学意义($P<0.05$)。动脉期 IHU、IC、NIC、DEI 及静脉期 NIC 组间差异有统计学意义($P<0.05$)。影像特征与双能 CT 参数的联合预测模型诊断效能最高(AUC=0.952, 敏感度、特异度为 100%、75%)。结论 双能 CT 定量参数联合影像特征对结直肠癌术前 PNI 状态具有良好的预测价值。

PO-1857

特发性与硬化性门静脉高压影像学对比分析及病理对照研究

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目的:

探讨特发性门脉高压(idiopathic portal hypertension, IPH)与肝硬化相关门脉高压的影像学特点及病理对照分析, 提高对 IPH 的诊断准确性。

方法:

收集经临床及病理学证实的 14 例 IPH 患者及 30 例肝硬化患者 CT 增强及 MR 增强影像资料, 分别从脾脏厚度、肝脏形态、肝叶萎缩、增生情况、门静脉血栓、动静脉期肝脏灌注、再生结节、肝局灶性结节样增生、门静脉形态、脾肾分流、肝肾分流等方面对其影像表现分析、比较, 探寻影像征像与病理特点之间的相关性。

结果:

影像方面, IPH 组和肝硬化组之间的脾脏厚度有显著差异($P<0.05$)。IPH 组和肝硬化组 b(肝左叶冠状径)、c(尾状叶冠状径)、a/c(尾右比)项有显著差异($P<0.05$); IPH 组和肝硬化组都会发生肝脏形态及肝实质改变, 其中弥漫性再生结节及 FNH 对于鉴别肝硬化与 IPH 十分有意义; IPH 组与肝硬化组都会发生脾-肾分流及胃-肾分流, 但并无统计学意义; 14 例 IPH 均有门脉系统的异常,

具体表现为门静脉主干增宽、门静脉僵硬变直、远端分支静脉狭窄、闭塞，而肝硬化组有 9 例肝硬化患者门脉系统异常、表现为门静脉变细；

在病理方面，肝硬化组患者均有不同程度的细胞坏死、水肿，所有病人均可见假小叶形成，而在 IPH 患者病理中未见假小叶形成；在 IPH 患者病理中有不同程度的门脉及汇管区纤维化、但小叶炎症不明显，部分病人可见门静脉闭塞、狭窄，而在肝硬化患者中未见明显门脉狭窄、闭塞改变。

结论：

对于肝脏形态改变且伴有门脉高压的患者，影像上若发现巨脾，而肝表面光滑时，需要考虑 IPH 的可能性，同时在影像观察中注重门脉系统的改变，肝脏尾右比及肝左外叶的增生、萎缩情况也有一定的参考意义；此外 FNH 及弥漫性肝再生结节也可作为鉴别两者的关键点；病理上无假小叶改变，而有门静脉系统纤维化、纤细、闭塞等异常改变，需考虑 IPH 的可能性。

PO-1858

多参数 MRI 定量分析在卵巢-附件磁共振成像报告和数据系统 (O-RADS MRI) 4 分病变中的诊断价值

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目的：探讨基于多参数 MRI 图像（ADC 图、T2WI 及多期增强 T1WI）的定量分析在 O-RADS MRI 评分 4 分病变良恶性鉴别中的诊断效能。

方法：回顾性分析复旦大学附属闵行医院 2015 年 3 月至 2022 年 12 月间经手术病理证实的卵巢-附件病变患者的临床、影像及手术病理资料。纳入标准为术前 4 周内进行了盆腔 MRI 增强检查及 O-RADS MRI 最终评分为 4 分病灶。临床基线资料及 MRI 多模态定量参数纳入单因素、多因素 logistic 回归分析，得出 O-RADS MRI 评分 4 分病变良恶性的独立预测因子，并构建良恶性预测模型，使用列线图可视化展示并验证。

结果：最终 57 个病灶纳入本研究，良性 26 个，恶性 31 个。多因素分析显示 T2WI 信号强度值 SD、最低信号区 ADCmean 为 O-RADS MRI 评分 4 分病变良恶性的独立预测因子（ $P = 0.01$ 及 0.016 ）。ROC 分析结果显示 T2WI 信号强度值 SD 和最低信号区 ADCmean 的最优阈值为 40.85 和 $1.73 \times 10^{-3} \text{mm}^2/\text{s}$ 。良恶性预测模型的 AUC、灵敏度、特异度、正确率、阳性预测值和阴性预测值为 0.851、87.1%、73.1%、80.7%、79.4%、82.6%。

列线图的 Hosmer-Lemeshow 拟合优度检验显示 $P = 0.910$ 。校准曲线显示列线图预测 O-RADS MRI 评分 4 分病变良恶性预测概率与实际概率之间拟合良好。DCA 结果显示，当阈概率范围约为 4~84% 时，模型预测 O-RADS MRI 评分 4 分病变良恶性的获益性较高。

结论：基于多参数 MRI 图像（ADC、T2WI 及多期增强 T1WI）的定量参数 T2WI 信号强度 SD 和最低信号区 ADCmean 是 O-RADS MRI 评分 4 分病变良恶性评价的独立预测因素，其构建的 O-RADS MRI 评分 4 分病灶良恶性预测模型，具有良好的诊断效能，有助于临床制定最佳治疗策略。

PO-1859

多参数 MRI 图像纹理分析在区分 O-RADS MRI 4 分病变良恶性中的价值

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目的: 探讨多参数磁共振纹理分析对区分卵巢-附件磁共振成像报告和数据系统 (O-RADS MRI) 4 分病变良恶性的诊断价值。

方法: 回顾性分析 57 个经手术病理证实的 O-RADS MRI 评分 4 分卵巢附件肿瘤, 其中良性 26 例, 恶性 31 例。基于 T2WI、ADC、T1WI 增强图像, 提取整个病灶纹理特征。采用最小冗余最大相关性(mRMR)方法选择特征, 随机森林(RF)算法构建 T2WI 模型、ADC 模型、T1WI 增强模型和三者联合模型 4 个预测模型。使用十折交叉验证来验证模型预测性能, 并采用受试者工作特征(ROC)分析评价模型性能, 记录曲线下面积(AUC)、准确性、敏感性、特异性、阳性预测值(PPV)和阴性预测值(NPV)。

结果: 分别从 ADC、T2WI、T1WI 增强图像中提取 3474 个纹理特征, 构建 ADC 模型、T2WI 模型、CE_T1WI 模型及联合模型, 每个模型各包含 10 个纹理特征。ADC 模型、T2WI 模型、CE_T1WI 模型及联合模型的 AUC 分别为 0.749(95% CI: 0.621 ~ 0.876)、0.671(95% CI: 0.524 ~ 0.818)、0.786(95% CI: 0.662 ~ 0.909)及 0.860(95% CI: 0.76 ~ 0.959)。联合模型的 AUC 明显高于其他三组模型, 联合模型区分 O-RADS MRI 4 分病变良恶性的准确性、敏感性、特异性、PPV、NPV 分别为 75.9%、77.8%、74.1%、72.4%、79.3%。

结论: 多模态 MRI 纹理分析可用于改善 O-RADS MRI 评分 4 分病变良恶性的诊断效能, 对临床决策提供一定的帮助。

PO-1860

LI-RADS v2018 影像学特征对甲胎 蛋白阴性肝细胞癌患者预后价值

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目的: 评价肝脏影像学报告与数据系统 (LI-RADS v2018) 影像学特征及临床参数对甲胎蛋白阴性 (AFP ≤ 20 ng/ml) 肝细胞癌 (HCC) 患者预后的诊断价值, 并与 AJCC-TNM 分期系统及 BCLC 分期系统进行比较。

材料和方法: 回顾性纳入了 2015 年 1 月至 2020 年 8 月期间我院接受术前磁共振扫描及根治性切除手术的 169 例甲胎蛋白阴性 HCC 患者 (训练集:验证集= 118:51)。利用 Cox 回归分析确定与预后相关的危险因素, 并构建预后预测模型。

结果: 6 个危险因素与甲胎蛋白阴性 HCC 术后无复发生存期相关, 即 LI-RADS 分级、微血管侵犯、肿瘤大小、肿瘤内出血、肝硬化和白蛋白-胆红素等级。联合以上危险因素构建的预后模型在训练集和验证集中的 C 指数分别为 0.705 和 0.674。此外, 该模型在预测患者预后方面优于 AJCC-TNM 分期系统和 BCLC 分期系统。该模型能有效地将甲胎蛋白阴性 HCC 患者分为高危复发组和低危复发组, 两组预后差异有统计学意义 ($p < 0.05$)。

结论：将 LI-RADS 分级、微血管侵犯、肿瘤大小、肿瘤内出血、肝硬化和白蛋白-胆红素等级整合的预后模型是预测甲胎蛋白阴性 HCC 患者预后的重要工具。

PO-1861

定性和定量磁共振参数对微血管侵犯阴性肝细胞癌患者的预后价值

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目的：本研究旨在通过钆塞酸二钠磁共振成像的定性和定量参数分析，建立微血管侵犯阴性肝细胞癌（HCC）患者预后的预测模型。

材料和方法：回顾性纳入 2015 年 1 月至 2019 年 12 月连续行术前钆塞酸二钠磁共振检查的微血管侵犯阴性 HCC 患者。共有 122 名患者以 7:3 的比例随机分配到训练组和验证组。通过单因素和多因素逻辑回归分析以确定重要的临床参数和磁共振成像特征，包括与预后相关的定量和定性参数，并将其纳入预后诺模图。采用 Kaplan-Meier 法和 log-rank 检验评价诊断效果。

结果：本研究的中位随访为 58.86 个月，38 例患者出现术后复发。多因素逻辑回归分析显示 LI-RADS 分类、肝胆期低信号无动脉期明显增强、较低肝胆期相对增强比、轻中度 T2 高强度、高 AST 水平与微血管侵犯阴性 HCC 预后显著相关，并将以上因素纳入预后模型。训练组和验证组的 C 指数分别是 0.732 和 0.692。肝胆期相对增强比的最佳界值为 1.197。RER 肝胆期相对增强比 < 1.197 的患者术后复发率明显高于肝胆期相对增强比 > 1.197 的患者（ $p = 0.004$ ）。

结论：将定性及定量影像学参数与临床参数相结合的模型能较好地预测微血管侵犯阴性 HCC 患者的预后。

PO-1862

基于多参数 MSCT 检查在胃神经鞘瘤与间质瘤鉴别诊断的价值。

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目的：探讨多参数 MSCT 检查在区分胃神经鞘瘤与间质瘤的价值。

方法：回顾性分析胃神经鞘瘤（ $n = 16$ ）和胃间质瘤（ $n = 56$ ）的 CT 图像。记录平扫/动脉期/静脉期期间肿瘤/主动脉的绝对 CT 值，分别为肿瘤平扫（Tp）/主动脉平扫（Ap）、肿瘤动脉期（Ta）/主动脉动脉期（Aa）和肿瘤静脉期（Tv）/主动脉静脉期（Av），并计算三相的归一化 CT 值分别为 $Sp = Tp / Ap$ 、 $Sa = Ta / Aa$ 和 $Sv = Tv / Av$ 。计算动脉期和静脉期之间的肿瘤 CT 值的差异并将其记录为 Tv-a。CT 数据包括肿瘤大小、轮廓、边缘、生长方式、钙化的存在、囊性变化、评估每位患者的出血、溃疡、病灶周围淋巴结、对周围结构的局部侵袭、转移、腹水、强化方式/强化程度、Tp、Ta、Tv、Sp、Sa、Sv。接受者操作特征（ROC）曲线分析用于评估 CT 数据区分神经鞘瘤与胃间质瘤的能力。

结果：与胃间质瘤相比，胃神经鞘瘤更容易表现出圆形轮廓、相对较小的肿瘤大小、均匀的增强模式和较少的周围淋巴结显示（ $P < 0.05$ ），而在间质瘤中囊性变化的情况更为常见（ $P < 0.05$ ）。胃神经鞘瘤的 Sa、Ta 和 Tv-a 比 GIST 少（ $P < 0.05$ ）。ROC 分析表明，与其他[曲线下面积（AUC）> 0.7]相比，肿瘤的大小、囊性改变、PLN 的存在、肿瘤增强模式和 Sa 表现出更高的诊断潜力，其中囊性改变表现出最佳的诊断能力（AUC = 0.86），肿瘤大小显示出最高的敏感性（90%）和

Sa 显示出最佳的特异性 (90%)。定量分析表明,某些特征有助于通过 CT 成像区分胃神经鞘瘤和道间质瘤,肿瘤增强模式和 Sa 的诊断潜力较其他[曲线下面积 (AUC) > 0.8]更高,其中囊性变化显示出最佳的诊断能力 (AUC = 0.86),肿瘤大小显示出最高的敏感性 (90%),Sa 显示出最佳的特异性 (90%)。

结论:多参数 MSCT 检查有助于区分胃神经鞘瘤和间质瘤。

PO-1863

凶险性前置胎盘 MRI 征象与产后出血的相关性分析

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目的 探讨凶险性前置胎盘(PPP)孕妇产后出血的危险因素,并分析 MRI 征象与产后出血的关系.方法 回顾性分析 68 例 PPP 孕妇的临床资料及 MRI 表现,根据产后出血情况分成产后出血组(41 例)与非产后出血组(27 例),分析 PPP 孕妇 MRI 征象与产后出血的相关性.结果 PPP 孕妇 MRI 征象中,子宫肌层信号局部中断消失、胎盘下段膨隆伴子宫轮廓变形、胎盘基底血流信号增多、T2WI 低信号带及胎盘凹陷均与产后出血显著相关($P < 0.01$),多变量 Logistic 回归显示子宫下段胎盘厚度是 PPP 产后出血的独立危险因素,受试者工作特征(ROC)曲线分析显示曲线下面积(AUC)为 0.753[95%置信区间(CI)0.637~0.869],截断点为 3.86cm 时,预测产后出血的敏感度为 68.3%,特异度为 85.2%.结论 前次前置胎盘史此次妊娠为完全性前置胎盘伴胎盘植入时易发生产后出血,MRI 征象及子宫下段胎盘厚度测量可用于预测产后出血。

PO-1864

基于多序列 MRI 影像组学列线图预测肝外胆管癌 PD-L1 表达

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目的 探讨多序列 MRI 影像组学联合临床特征的列线图术前无创预测肝外胆管癌 PD-L1 表达状态的价值。

资料与方法 回顾性搜集 2011 年 1 月—2021 年 12 月西南医科大学附属医院手术病理确定的肝外胆管癌患者 87 例,以 7:3 随机拆分为训练集和测试集。使用 3D-Slicer 软件在 MRI 图像上逐层勾画感兴趣区,并提取影像组学特征,然后进行数据标准化、特征降维及筛选。采用高斯朴素贝叶斯构建影像组学模型,同时获取影像组学评分。利用多因素 Logistics 回归筛选临床特征,并分别构建临床模型和联合模型。采用受试者工作特征曲线下面积 (AUC) 对三种模型预测效能进行评估,通过校准曲线和决策曲线评估联合模型列线图拟合优度和临床净收益。

结果 最终筛选出 9 个影像组学特征和 3 个临床特征,临床特征分别为 ALT ($P=0.020$)、AST ($P=0.025$)、TBIL ($P=0.026$)。联合模型的预测效能 (训练集 AUC=0.813,测试集 AUC=0.818) 优于单独的临床模型 (训练集 AUC=0.711,测试集 AUC=0.705) 和影像组学模型 (训练集 AUC=0.769,测试集 AUC=0.767)。校准曲线与决策曲线表明联合模型列线图拟合优度佳,并可取得较好的临床净获益。

结论 基于术前多序列 MRI 图像的影像组学评分,以及 ALT、AST、TBIL 三种临床特征,构建联合模型列线图,能有效预测肝外胆管癌 PD-L1 表达状态,为患者精准个性化的免疫治疗提供指导。

PO-1865

APT 联合 DWI 鉴别前列腺癌与前列腺增生价值评估

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目的：本研究旨在研究酰胺质子加权成像(Amide proton transfer-weighted, APTw, APT) 联合弥散加权成像 (Diffusion Weighted Imaging, DWI) 鉴别前列腺癌与前列腺增生的价值。材料与方法：回顾性收集行前列腺 3.0T MRI 扫描 (包括 APT 及 DWI 序列) 的前列腺癌患者 62 例, 前列腺增生患者 47 例。由两名观察者于病灶实体显示最大层面放置 ROI 测量两组病例的 APT 值及 ADC 值, ROI 应避开病灶出血、坏死及囊变区域。采用组内相关系数 (intraclass correlation coefficient, ICC) 评估两名观察者各测量参数的一致性。采用 Shapiro-Wilk 检验评估两组病例 APT 值及 ADC 值的正态性。采用独立样本 t 检验或 Mann-Whitney 检验评估两组病例各参数值的差异性分析。采用 Logistic 回归计算 APTw 及 DWI 序列联合参数模型的预测值。采用受试者工作特征 (ROC) 曲线评估有差异的参数单独或联合的诊断效能, 并利用 Delong 检验比较各 ROC 曲线间的差异。结果：两名观察者测量参数值一致性好 (ICC>0.75)。前列腺癌组的 APT 值大于前列腺增生组 [(2.44%±0.62%) vs (1.83%±0.63%)], 差异具有统计学意义 (t=4.913, P<0.01); 前列腺癌组的 ADC 值小于前列腺增生 [0.70 (0.58, 0.71) mm²/s vs 1.20 (1.03, 1.35) mm²/s], 差异具有统计学意义 (z=-8.371, p<0.01)。APT 值、ADC 值及二者联合鉴别两组病例的 AUC 值分别为 0.747, 0.969 及 0.975, 敏感度、特异度及阈值分别达到 67.7%、80.6%、87.1%, 74.5%、100%、97.9%, 2.2%、0.84mm²/s 及 0.77。结论：APT 值及 ADC 值对于鉴别前列腺癌与前列腺增生有很好的价值, 二者联合模型的诊断效能提升, 具有很好的临床应用前景。

PO-1866

血清总胆汁酸与 TACE 治疗无效的肝细胞癌患者增强磁共振影像组学特征的相关性研究

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目的：评估血清总胆汁酸 (TBA) 与经动脉化疗栓塞 (TACE) 治疗无效的肝细胞癌患者增强 MRI 动脉期影像组学特征及常规影像征象的相关性。

材料与方法：回顾性收集 124 例接受 TACE 治疗的 HCC 患者, 根据 mRECIST 标准分为治疗有效组 (n=61) 和治疗无效组 (n=63)。记录患者 TBA、肿瘤大小、边界、包膜、瘤周强化、卫星结节、瘤内动脉、放射学肝硬化。使用 ITK-SNAP 软件在增强 MRI 动脉期图像上逐层手动勾勒肿瘤边缘获得三维容积感兴趣区。通过 AK 软件提取病灶的一阶影像组学特征, 包括 MaxIntensity、MeanValue、MedianIntensity、MinIntensity、Range、Variance、VolumeCount、VoxelValueSum、Energy、Entropy、Kurtosis、Skewness、Uniformity。使用 Mann-Whitney U 检验比较治疗有效组 and 无效组间 TBA 的差异, 通过 Spearman 或 Pearson 相关性检验评估 TBA 与影像组学特征及常规影像征象的相关性。

结果：TACE 治疗无效组 [13.2 (5.2, 25.2) umol/L] 的 TBA 显著高于治疗有效组 [8.4 (5.75, 14.55) umol/L] (P=0.018), TBA 与 TACE 疗效具有显著相关性 (r=0.214, P=0.017)。TBA 与 MinIntensity、Range、VolumeCount、VoxelValueSum、Uniformity、肿瘤大小、瘤内动脉、放射学肝硬化具有相关性 (r=0.349、-0.325、-0.344、-0.298、0.301、-0.311、-0.285、0.490, P<0.05)。

结论：胆汁酸代谢水平影响肝癌患者 TACE 治疗效果，TBA 与增强 MRI 影像组学特征及常规影像征象相关。

PO-1867

腹膜后血管瘤 CT 及 MRI 影像学表现

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背景：腹膜后血管瘤属于腹膜后脉管瘤，其按病理细分包括吻合状血管瘤（也称交织状血管瘤）、海绵状血管瘤，部分病灶同时含血管瘤及淋巴管瘤构象。本研究旨在总结腹膜后血管瘤 CT、MRI 影像学特征，尤其是吻合状血管瘤。

方法：回顾性搜集 2013 年 1 月至 2023 年 7 月我院病理诊断为腹膜后血管瘤的病例，收集患者的年龄、性别、症状、病理等，并对术前的影像图像进行总结及测量，包括腹部 CT 增强、MRI 平扫、DWI 及增强，记录病灶的个数、部位、大小、形状、与周围组织关系、CT 值（HU）、CT/MRI 的强化程度、方式、MRI 平扫及 DWI 的信号强度等。

结果：本次研究共纳入 17 例病例、共 19 个病灶，年龄为（40.6±16.5）岁，包括 10 例男性、7 例女性，3 例患者有轻微腰腹痛症状、余 14 例患者无明显症状，其中有 3 例患者为多发病灶（3 个）、余 14 例为单发。影像学 CT 增强扫描可见 4 个病灶周围淋巴结异常增多、余 10 例无明显增多淋巴结，11 例病灶有钙化、6 例无钙化，5 例病灶有分隔、9 例无分隔；对比剂增强后有 4 个病灶无强化、5 个病灶弱强化、余 10 个病灶均呈明显不均匀强化、部分呈渐进性强化；15 个病灶位于肾周（8 例在肾门周围），4 个病灶未与肾脏毗邻；CT 值动脉期（46.2±36.5）HU、静脉期（68.3±60.7）HU、延迟期（51.2±39.0）HU，MRI 共 3 例，其中 2 例呈长 T1 长 T2 信号，DWI 未见明显扩散受限，另一例呈明显混杂 T1 及混杂 T2 信号，病理提示有出血、坏死。

其中吻合状血管瘤 3 例，均呈明显、渐进填充式强化，1 例成人有 3 个病灶，余 2 例为单发；1 例 5 月婴儿为形态不规则病灶，余 2 例、5 个病灶呈类圆形；4 个病灶位于腹膜后肾周、1 例（多发病灶之一）位于腹主动脉远端与左侧腰大肌间；增强后 CT 值动脉期（103.6±14.1）HU，静脉期（162.2±28.9）HU，延迟期（121.3±3.2）HU。

结论：腹膜后血管瘤表现形式多样，大多数单发，绝大多数见于成年人、无明显症状，大多数为单发、明显强化，少部分病灶也可呈弱强化甚至无强化，部分病灶有钙化、分隔，其中吻合状血管瘤均呈明显填充式强化，延迟期强化稍减低。

PO-1868

肌肉减少症影像学评估对免疫治疗的晚期肝癌患者疗效和预后的影响

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背景：肌肉减少症是恶性肿瘤患者常见的临床综合征之一，其发生发展对肿瘤患者疗效和预后的不良影响已在不同的肿瘤类型以及接受不同治疗的肿瘤患者中得以证实。免疫治疗在肝癌领域取得了较大进展。近年来多项免疫联合治疗方案研究已经成为肝癌多线治疗的标准治疗方案，但目前尚缺乏预测疗效和预后的生物标志物。本研究探索肌肉减少症影像学评估对接受免疫治疗的晚期 HCC 患者疗效和预后的影响。

方法: 回顾性分析于吉林大学第一医接受免疫治疗的 36 例晚期 HCC 患者。治疗前采用腹部 CT 测量第 3 腰椎(the third lumbar vertebral,L3)层面骨骼肌横截面积(cm^2),肌骨骼肌指数(skeletal muscle index, SMI)为 L3 水平骨骼肌横截面积/身高 2(cm^2/m^2)。根据日本肝病学会标准,肌肉减少症定义为男性 $\text{SMI} < 42 \text{ cm}^2/\text{m}^2$,女性 $\text{SMI} < 38 \text{ cm}^2/\text{m}^2$ 。治疗过程中,2-3 个月评估一次疗效(采用增强 CT/MRI 根据 RECIST 1.1 评估疗效)。

结果: 中位随访时间为 10.0 个月(1.6-24.9 个月)。共纳入 36 例原发性肝癌患者,其中肌肉减少症患者有 19 例(52.8%),非肌肉减少症患者有 17 例(47.2%);年龄 27-77 岁,中位年龄 55 岁;男性 33 例,女性 3 例。肌肉减少症组的疾病控制率(disease control rate,DCR)有小于无肌肉减少症组的趋势(DCR 分别为 52.6% vs 70.6%, $P=0.322$)。肌肉减少症组和无肌肉减少症组的客观缓解率(objective response rate,ORR)分别为(26.3%和 17.6%, $p=0.226$),差异无统计学差异。

两组的中位无进展生存时间(progression free survival, PFS)均未达到。肌肉减少症组的 3、6 和 12 个月的 PFS 率分别 84.2%、63.2%和 50.5%,均低于无肌肉减少症组的 88.2%、74.7%和 74.7%。

结论: 肌肉减少症与免疫治疗的 HCC 患者较差的疗效和预后有关,无肌肉减少症的肝癌患者可能预示着较长的无进展生存率。

PO-1869

不同呼吸模式下呼气后憋气扫描磁共振肝脏弹性成像的对比研究

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目的:

本研究旨在比较胸式呼吸与腹式呼吸憋气扫描磁共振肝脏弹性成像的差异,探讨其在肝脏疾病诊断中的应用价值。

方法:

本研究选择了 10 名健康志愿者参与研究,志愿者年龄在 20 至 40 岁之间,其中 5 名为男性,5 名为女性。所有志愿者的身体状况均经过详细检查。在开始实验之前,对所有志愿者进行了细致的胸式呼吸和腹式呼吸训练。在训练结束后,要求每一名志愿者分别用胸式呼吸和腹式呼吸的方式进行呼气后憋气的肝脏磁共振弹性成像序列扫描。全部扫描均由同一名 3 年以上磁共振弹性成像扫描经验的磁共振技师操作完成。扫描完成后,由一名具有 5 年以上放射诊断工作经验的放射科医师对每例检查的肝脏硬度 95%可置信区间面积以及肝脏硬度数值进行测量,并比较上述数值在不同呼吸模式下的差异。

结果:

通过对比分析,我们发现健康志愿者在胸式呼吸憋气情况下肝脏弹性成像的 95%可置信区间面积与腹式呼吸憋气情况相比呈现出较明显的差异。具体来说,胸式呼吸憋气情况下肝脏弹性成像的 95%可置信区间面积为 8.5 ± 2.1 平方厘米,而腹式呼吸憋气情况下肝脏弹性成像的 95%可置信区间面积为 6.3 ± 1.8 平方厘米。这些数据表明,在胸式呼吸情况下,肝脏的弹性显著高于腹式呼吸。差异具有统计学意义($P < 0.05$)。同时,我们注意到尽管不同呼吸方式测得的肝脏整体硬度数值差异没有达到统计学意义,但在部分志愿者中,胸式呼吸下的肝脏硬度数值略高于腹式呼吸。

结论:

胸式呼吸与腹式呼吸憋气扫描磁共振肝脏弹性成像具有一定的差异,这种差异可能与呼吸方式对肝脏周围结构的影响有关。虽然胸式呼吸情况下肝脏弹性成像的 95%可置信区间面积较高,但其最终结果没有统计学差异。由于弹性成像扫描过程中需要使用机械波对患者腹部进行反复冲击,对部分被检者来说可能会影响其憋气效果,进而较大程度的影响到检查的最终结果。故磁共振弹性成像还应综合评估患者具体情况选取适合的扫描方案,才能达到稳定的检查质量。

PO-1870

以患者为中心的上腹部普美显磁共振检查前准备方法对降低患者动脉期补扫率的作用与价值

谢欢

中国人民解放军陆军特色医学中心

目的：研究以患者为中心的上腹部普美显磁共振检查前准备方法对降低患者动脉期补扫率的作用与价值。

方法：回顾性分析 2023 年 1 月-2023 年 7 月在我院影像科行上腹部普美显磁共振检查的患者 200 例，把这些患者按其检查前的准备方式不同分为以患者为中心准备组（CP）和常规准备组（RP），每组 100 例。RP 组患者采用常规准备方式进行上腹部普美显磁共振检查前准备；CP 组患者采用我们全新设计的以患者为中心的方式进行上腹部普美显磁共振检查前准备（如检查流程学习、噪声熟悉、注射预刺激训练和检查适应性训练等）。两组患者动脉期图像是否需要再次扫描由我科工作 10 年以上诊断医师评定。采用配对卡方检验对两组患者动脉期补扫率、图像质量以及检查效率进行差异性分析。

结果：CP 组患者动脉期补扫率为 5/100（5.0%），RP 组患者动脉期补扫率为 16/100（16.0%）， $P=0.02$ ；CP 组图像质量评分平均分为 4.6 分，RP 图像质量评分平均分为 3.5 分， $P=0.03$ ；CP 检查效率中位检查时间为 17.5min，RP 检查效率平均时间为 25.3min， $P=0.018$ 。

结论：上腹部普美显磁共振检查采用以患者为中心的准备方式可以提高其检查成功率、图像质量及检查效率，降低动脉期补扫率。也减少了对比剂的使用，降低了患者因注射对比剂而发生过敏的风险，有助于患者的身心健康，也提高了患者对此项检查的满意度，值得进行推广。

PO-1871

分析上腹部普美显增强检查动脉期图像伪影发生与普美显注射刺激的关系研究

谢欢

中国人民解放军陆军特色医学中心

目的：分析上腹部普美显增强检查动脉期图像伪影发生与普美显注射刺激的关系。方法：收集我院 2020 年 11 月-2021 年 12 月行上腹部普美显磁共振增强检查患者共 327 例，其中 127 例患者为自身对照，另外 200 例患者为互相对照。本次研究分为两个部分，第一部分为 127 例自身对照的患者行上腹部普美显磁共振增强检查前，先以 3ml/s 的速度注射生理盐水 10ml 同时行 T1 三维容积梯度回波序列扫描，将这部分图像定义为对照组；等待 60s 患者状态恢复后，再以相同速度注射普美显 10ml 同时行相同序列扫描动脉期，将这部分图像定义为研究组。评价两组图像质量，并对图像质量进行评分。这 127 例患者中有 69 例患者在注射生理盐水和普美显时进行了心率的监测。第二部分为研究组、对照组患者各 100 例；研究组 100 例患者在行上腹部普美显增强扫描前，先以 3ml/s 的速度注射生理盐水 10ml，同时行 T1 三维容积梯度回波序列扫描，观察图像质量，若图像质量不理想，与患者进行沟通，再以相同速度注射普美显 10ml 行相同序列扫描动脉期。对照组 100 例患者按照常规方法以 3ml/s 的速度注射普美显 10ml 行相同序列扫描动脉期。评价两组动脉期图像质量。结果：第一部分 127 例自身对照患者注射生理盐水和注射普美显时伪影发生率分别为 13.39% 和 10.24%，图像质量平均分分别为 3.67 和 3.76；采用配对卡方检验进行统计学分析， P 值分别为 0.48 和 0.18。69 例监测心率自身对照的患者注射生理盐水和注射普美显的平均心率分别为 78 次/分和 77 次/分，采用配对 t 检验进行统计学分析 P 值为 0.09。第二部分研究组和对照组注射普美显动脉期图像伪影发生率为分别为 6.55% 和 15.52%，采用配对卡方检验进行统计学分析 P 值为

0.001。结论：普美显的药物刺激不是引起上腹部动脉期图像伪影的主要原因，主要原因跟注射刺激、患者心理因素以及对检查流程的不熟悉相关。

PO-1872

基于 MRI 影像组学模型预测直肠癌术前同时性远处转移

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目的：基于术前 MR 成像数据开发和验证一种新的非侵入性人工智能模型，以预测直肠癌同步远处转移（Synchronous Distant Metastasis, SDM）的存在。

方法：符合纳入标准的 RC 患者共 169 例，采集 T2WI 和 DWI 两个序列图像。通过 Python 语言的 PyRadiomics 包提取影像组学特征，共提取了 1688 个影像组学特征，包括一阶特征、形状特征、纹理特征、小波特征。选取受试者工作特征(ROC)、曲线下面积(AUC)、准确性、敏感性、特异性和 95%置信区间(CI) 5 个指标对模型进行评价。

结果：使用四个独立危险因素(CEA、年龄、CA199 和 T 分期)建立的临床模型在训练和测试数据集上的 AUC 值分别为 0.81 和 0.83。结合临床因素和不同序列图像的影像组学特征，我们建立了三种临床-影像组学模型，即 DWI+临床模型、T2W+临床模型和 nomogram (影像组学+临床)模型。结果显示 nomogram 模型在预测直肠癌 SDM 上的判别性能最好。训练集中，nomogram 模型的 AUC、准确率、灵敏度、特异性和 95% CI 分别为 0.93, 0.85, 0.85, 0.86, 0.89-0.96；测试集中，nomogram 模型五项指标分别为 0.94, 0.89, 0.88, 0.89, 0.79-0.97。校正图在临床影像组学模型预测和实际观察概率之间是一致的。决策曲线分析显示，与临床模型和影像组学模型相比，nomogram 模型在训练集和测试集上获得了最高的净效益。

结论：我们的预测模型对于指导和管理直肠癌 SDM 患者是有价值的，对于改善患者治疗决策和指导个性化治疗方案提供方案。

PO-1873

酰胺质子转移加权成像评估子宫内膜癌 PTEN 基因表达的价值

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【摘要】目的 探讨酰胺质子转移加权 (amide proton transfer weighted, APTw) 评估子宫内膜癌 (endometrial carcinoma, EC) 磷酸酶及张力蛋白同源物 (phosphatase and tensin homolog deleted on chromosome ten, PTEN) 基因表达的价值。**方法** 回顾性分析 25 例经手术病理证实为 EC 的患者资料，其中 PTEN 表达阳性组 11 例，PTEN 表达阴性组 14 例，术前行 3.0T MR 检查，扫描序列包括 APTw，扫描后经后处理获得 APT 图。由两位观察者分别测量两组病例的 APT 值，采用同类相关系数 (intra-class correlation coefficients, ICC) 检验两位观察者对两组病例各参数值测量结果的一致性，采用独立样本 t 检验比较两组病例 APT 值的差异，采用 ROC 曲线评估 APT 值评估 EC PTEN 表达的效能，并计算曲线下面积 (Area Under Curve, AUC) 及相对应的截断值、敏感度、特异度。结果 两位观察者测量各组数据的一致性很好 (ICC>0.75)。PTEN 表达阳性组的 APT 值 (2.727±0.342 %) 小于 PTEN 表达阴性组 (3.029±0.330 %)，差异具有统计学意义 (t=2.230, P=0.036)；APT 值评估 EC PTEN 基因表达的 AUC 值为 0.688，截断值为 2.675 %，敏感度为 92.9 %，特异度为 54.5 %。结论 APTw 有术前定量评估 EC PTEN 基因表达的潜力，具有一定临床应用价值。

PO-1874

多模型 MRI 扩散加权成像评估大鼠标准 肝部分切除术后残肝再生的价值

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目的：探讨多种模型 MRI 扩散加权成像（包括单指数、双指数和峰度模型）在评价大鼠标准肝部分切除术后残肝再生中的价值。

材料和方法：70 只大鼠随机分成 MR 扫描组（n=14）和病理组（n=56），MR 扫描组又分为 2/3 肝切除组（n=7）和假手术组（n=7）。MR 扫描组在术前和术后第 1、2、3、5、7、14、21 天行多 B 值 DWI 磁共振扫描，分别获得单指数模型参数（ADC 值）、双指数模型参数[真实扩散系数（D）、假性扩散系数（D*）以及灌注分数（f）]和扩散峰度模型参数[平均扩散系数（MD）及平均扩散峰度值（MK）]。测量肝脏体积，并计算肝再生率。病理组行约 2/3 肝切除后于上述每个时间点随机选取 7 只实验鼠取肝脏组织进行病理学检查，采用苏木精-伊红染色和 Ki-67 免疫组化染色进行组织学检查，测量肝细胞大小（直径）和肝细胞增殖活性（Ki-67 指数）。观察影像学指标和病理指标的变化规律，分析 MR 参数与肝脏体积及病理指标间的相关性。采用 ROC 曲线评估 MR 参数诊断肝脏再生生活性能。

结果：大鼠肝部分切除术后，肝实质所有 MR 参数值均表现为先升高后逐渐恢复至术前基线的趋势。D*和 f 值两者均与肝体积有较好的相关性（r 值分别为 0.718，0.476，P 值均<0.01），与 Ki-67 增殖指数（r 值分别为-0.693，-0.41，P 值均<0.01）和肝细胞大小（r 值分别为-0.469，-0.425，P 值均<0.01）有中度负相关。MK 值与 Ki-67 指数呈高度相关（r=-0.807）、肝脏体积和肝细胞大小呈中度相关（r 值分别为 0.595，-0.562，P 值均<0.01）。ADC、D、MD 与肝再生相关指标无相关性或弱相关。f 值诊断肝脏再生生活性的曲线下面积（AUC=0.952）显著高于其他参数（ADC、D、D*、MD、MK 的 AUC 值分别为 0.821、0.758、0.867、0.789、0.863）（P<0.05）。

结论：D*、f、MK 值能反映肝脏再生过程的微观变化，可纵向评价大鼠肝部分切除术后残肝再生情况，f 值在评价肝脏再生生活性方面更有价值。

PO-1875

双层探测器光谱 CT 虚拟平扫替代常规平扫 评估结直肠癌的可行性研究

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目的 探讨双层探测器光谱 CT（SDCT）虚拟平扫技术在结直肠癌诊断中的价值。方法 收集我院 52 例结直肠癌患者的影像资料，比较真实平扫、动脉期虚拟平扫、静脉期虚拟平扫、延迟期虚拟平扫（TNC、VNC-A、VNC-V、VNC-D）四组图像中结直肠癌病灶、腹主动脉、椎旁肌/臀大肌、皮下脂肪的 CT 值、噪声、信噪比（SNR）、对比噪声比（CNR），并对四组图像质量进行评分。结果 四组图像中结直肠癌病灶、椎旁肌/臀大肌 CT 值均无显著性差异（P 均>0.05），而腹主动脉、皮下脂肪 CT 值均存在显著性差异（P 均<0.05）。与 TNC 图像相比，各组织在三组 VNC 图像中的噪声均明显降低，且病灶及腹主动脉 SNR 高于 TNC 图像（P 均<0.05）。四组图像均能满足诊断要求，两名观察者的主观评价一致性较好。采用“VNC+直接增强扫描”方案可降低约 22.39%的辐射剂量。结论 在评估结直肠癌方面，由 SDCT 获得的 VNC 图像质量接近于 TNC，且辐射剂量更低。

PO-1876

瘤周脂肪特征联合全身炎症反应指数预测结肠直肠癌新辅助治疗的病理完全反应

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目的 探索结肠直肠癌 (CRC) 瘤周脂肪 (PA) 特征联合全身炎症反应指数 (SIRI) 能否预测 CRC 患者新辅助治疗后的病理完全反应 (pCR)。

方法 回顾性收集兰州大学第二医院 2019 年 1 月至 2022 年 12 月 136 例经新辅助治疗的 CRC 患者。对 CRC 患者行新辅助治疗前的 PAT 侵犯程度、横向及纵向瘤周脂肪累及范围进行评分, 计算累计分, 建立 PAT 分级。0~1 分为 PAT1 级, 1 分为 PAT2 级, 3 分为 PAT3 级。采集 CRC 患者新辅助治疗前的外周静脉血, 计算 SIRI, $SIRI = \text{中性粒细胞计数} \times \text{单核细胞计数} / \text{淋巴细胞计数}$ 。评价病理学肿瘤退缩分级 (TRG), 将 TRG 0 级定义为 pCR, TRG1~3 级定义为非 pCR。比较 pCR 与非 pCR 组间的 PAT 特征以及 SIRI, 并建立联合参数。比较 PAT 特征、SIRI 以及 PAT 特征联合 SIRI 的受试者工作特性曲线下面积 (AUC) 评估预测 pCR 的性能。采用 DeLong 检验比较单一参数和联合参数。

结果 本研究共纳入 136 例患者, 47 例出现 pCR, 89 例出现非 pCR, 其中 PAT1 级较 2-3 级更易出现 pCR, 差异具有统计学意义 ($\chi^2=8.183$, $P=0.004$)。pCR 组 SIRI 低于非 pCR 组, 差异具有统计学意义 (342.16 ± 35.72 比 417.03 ± 38.11 , $t=7.612$, $P=0.001$)。基于 PAT 分级与 SIRI 建立的联合模型 AUC 为 0.825 (95% CI=0.809, ~ 0.973, $P<0.001$), 高于 PAT 分级 AUC 为 0.790 (95%CI=0.669 ~ 0.911), SIRI AUC 为 0.819 (95%CI=0.713 ~ 0.925), AUC 差异具有统计学意义 (DeLong test: $p<0.001$)。

结论 CRC 新辅助治疗前的 PAT 特征联合 SIRI 可以预测 CRC 新辅助治疗后的病理完全反应, 且预测效能良好。

PO-1877

双螺旋 128 排 CT 对于肾损伤的影像诊断以及治疗措施的相关研究

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目的:更详细的了解肾损伤的相关病因, 临床表现自己肾损伤的影像学表现。

肾损伤的病因主要包括 1 暴力因素最常见:直接暴力包括 撞击、跌打、挤压等 间接暴力包括高处坠落移位, 对冲伤等 2.锐器因素比较少见 枪弹、刀刃等 3.医源性因素结石 冲击波碎石、对肾脏行穿刺活检、输尿管插管等。

影像学检查方法包括: 增强 CT 是肾脏损伤的金标准, 动脉期和静脉期可以排除所有的创伤, 延迟期可以评估集合系统是否有对比剂外漏。动脉期图像显示活动性出血、创伤性假性动脉瘤 静脉期有助于鉴别出血与假性动脉瘤。

I 级:包膜下血肿或挫伤, 不伴有撕裂

II 级:肾周血肿局限于 Gerota 筋膜;实质撕裂 $\leq 1\text{cm}$, 无尿外渗

III 级肾实质撕裂伤深度 $>1\text{cm}$, 没有集合系统破裂或尿液外渗; Gerota 筋膜内的肾血管损伤或活动性出血

IV 级实质撕裂伤延伸至集合系统, 伴有尿外渗; 肾盂撕裂和/或肾盂输尿管完全断裂; 节段性静脉或动脉损伤; 超过 Gerota 筋膜进入腹膜后或腹腔的活动性出血; 无活动性出血的血管血栓形成导致的节段性或完全性肾梗死

V 级: 肾动脉或静脉主干撕裂, 或肾门撕脱; 肾血供中断伴有活动性出血; 肾破碎。值得注意的是: 双侧肾损伤分级应提升一至三级; 如果一侧肾脏多处损伤应以最严重的分级归类。并且在 2018 年将血管损伤 (假性动脉瘤、动静脉畸形) 纳入内脏损伤影像学标准。其中血管损伤 CT 诊断的血管损伤包括假性动脉瘤 (PSA) 和动静脉瘘 (AVF), 源于节段性动脉水平远端的较小分支的肾脏内血管损伤 (PSA, AVF) 属于 III 级, 而源于节段性动脉水平近端的血管损伤属于 IV 级。PSA 被定义为一种局灶性边界清晰的血管外造影剂的集合, 并在延迟期保持相同的大小 AVF 的特点是在动脉期出现肾静脉的早期增强以及静脉扩张。

在治疗上, I 级和 II 级以及部分 III 级肾实质损伤都可以保守治疗, IV-V 级可能需要栓塞或外科手术。输尿管-肾盂连接处完全撕脱需要手术修复。节段性梗死通常会自然消退或导致微小的实质瘢痕, 因此对其进行保守治疗

结论: 大约 90% 的肾损伤由钝性伤引起

血尿是最常见的症状, 但严重肾损伤可无血尿。增强 CT 是肾损伤评估的金标准, 肾损伤的治疗取决于损伤程度。

PO-1878

基于能谱 CT 定量参数及临床特征预测肝硬化食管静脉曲张出血风险的列线图模型研究

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目的 构建基于能谱 CT 定量参数及临床特征预测肝硬化食管静脉曲张破裂出血风险的列线图模型。方法 选取 2017 年 1 月至 2023 年 7 月在本医院确诊为肝硬化并食管静脉曲张的患者为研究对象, 分别行电子胃镜及上腹部能谱 CT 增强扫描检查, 并收集其临床资料。根据患者内镜下表现及临床症状, 分为出血组和非出血组, 比较两组间的能谱 CT 定量参数及临床特征, 将有统计学差异的变量纳入 Logistic 回归分析, 筛选食管静脉曲张破裂出血的危险因素, 采用 R 软件构建预测破裂出血的列线图模型, 分别使用受试者工作特征曲线、校准曲线、决策曲线分析评估模型的区分度、校准度、临床实用性。结果 共纳入 115 例患者, 其中出血组 55 例, 非出血组 60 例。单因素分析显示, 肝左叶标准化碘基值、肝尾叶标准化碘基值、门静脉内径、胃左静脉内径、脾脏体积、脾脏碘浓度、性别、血小板计数及凝血酶原时间差异具有统计学意义 ($P < 0.05$)。多因素 Logistic 回归分析显示, 肝左叶标准化碘基值及血小板计数是食管静脉曲张破裂出血的危险因素 ($OR = 0.009$ 、 0.989 , $P < 0.05$)。列线图模型预测评估的区分度曲线下面积为 0.832, 对应的敏感度、特异度分别为 78.40%、75.00%; 校准曲线显示预测结果与实际结果一致性良好, Hosmer-Lemeshow 拟合优度检验 $\chi^2 = 6.55$, $P > 0.05$; 与 2 个独立危险因素比较, 模型的决策曲线离两种极端情况最远, 在阈值 0-80% 区间内体现出更高的净获益。结论 肝左叶标准化碘基值和血小板计数是食管静脉曲张破裂出血的独立危险因素, 由此构建的列线图预测模型具有较好的区分度、校准度及临床实用性, 可为临床无创性预警食管静脉曲张破裂出血提供重要参考依据。

PO-1879

子宫附腔畸形 1 例并文献学习

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目的：根据本院 1 例确诊为子宫附腔畸形（Accessory cavitated uterine malformation）患者的临床及影像学资料，通过文献学习，了解该病的发病机制、发展过程、临床表现及影像学表现特点，提高对该病的认识，为以后的诊断工作奠定基础。

方法：根据本院 1 例术后确诊为子宫附腔畸形患者的超声、影像学、实验室检查、临床表现及术后病理，结合相关文献学习，总结相关临床特征及影像学表现。

结果：MRI 示子宫左侧壁团块影，大小约 39×45mm，边界不清，病灶中心示类圆形短 T1 长 T2 信号影，可见液液平面，DWI 信号增高，中心边缘示条状 T2 低信号影，增强后病灶实性成分不均匀强化，病灶囊腔与子宫腔不相通，腹腔镜下切除子宫病变，病理示子宫附腔畸形伴腺肌症。

结论：子宫附腔畸形是一种比较罕见的苗勒管畸形，是一种孤立的囊肿性子宫病变，位于子宫肌层的外侧，位于子宫圆韧带的下方，含有功能性子宫内膜的子宫附腔与子宫不相通，其在青少年女性患者中常表现为从初潮开始进行性加重的痛经，常被误诊为青少年囊性子宫腺肌病。ACUM 的起源尚不明确，有假说认为，苗勒管组织的重复或持续存在可能与引带功能（发育为圆韧带有关），异常苗勒管与对侧的对称苗勒管进行了正常的融合吸收，但是子宫内膜没有吸收，形成了游离异常腔室，从而导致一种新的苗勒管畸形，即 ACUM 的形成，多数报道均为一个腔室，亦有发现同侧有两个腔室者。影像学表现：在超声上病变独立于正常子宫腔，表现为边界清晰的球形空化病变，包含有回声的液体，周围环绕着肌层，子宫肌层和充满液体的腔隙被认为是超声的决定性特征，子宫肌层内有血管，但病变空化部分没有血管。诊断标准①正常宫腔及内膜腔；②正常的卵巢及输卵管；③经手术切除并通过病理证实的空腔样包块；④子宫附腔内包含有腺体和间质的内膜组织；⑤附腔内含有巧克力样液体；⑥未证实子宫腺肌病（如行子宫切除）。ACUM 诊断相对困难，需要与囊性子宫腺肌病、子宫肌瘤囊性变，以及其他与痛经相关的阻塞性苗勒管畸形中的单角子宫伴近端残角子宫伴功能性子宫内膜相鉴别。

PO-1880

卵巢癌术后病理检查结果与 CT 及超声影像特征的比较分析

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目的比较分析卵巢癌 CT 及超声影像特征与术后病理检查结果的关系。方法将 2016 年 8 月至 2018 年 7 月我院收治 79 例疑似卵巢癌患者作为研究对象,所有患者均进行手术治疗且术前进行 CT 和超声检查,将其检查结果与术后病理检查结果进行对比分析,评估 CT 和超声对卵巢癌的诊断效能。结果术后病理检查显示,79 例患者中 64 例为卵巢癌。卵巢癌超声显示肿瘤瘤体较大,回声强,囊壁有突起,周边及内部血流主要表现为高速低阻;CT 图像病灶以囊实性为主,肿块体积较大,形态不规则,轮廓模糊,囊壁和间隔分布不均,密度均匀或不均匀,部分病灶内可见钙化。超声对卵巢癌诊断灵敏度、特异度、准确度依次为 84.38%、66.67%、81.01%;CT 对卵巢癌诊断灵敏度、特异度、准确度依次为 93.75%、86.67%、92.41%;CT 检查准确度高于超声($\chi^2=4.448, P<0.05$)。结论 CT 及超声对卵巢癌均有一定诊断价值,但 CT 对卵巢肿块组织学特征显示效果更好,诊断价值相对较高。

PO-1881

体素内不相干运动扩散加权成像评估肝细胞癌 TACE 治疗早期疗效的价值

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目的

探讨体素内不相干运动扩散加权成像 (IVIM-DWI) 定量参数评估肝细胞癌 (HCC) 经动脉化疗栓塞 (TACE) 治疗早期疗效的价值。

材料与方法

回顾性收集我院 2017 年 1 月至 2022 年 2 月期间进行上腹 MRI 检查且采取 TACE 治疗的患者 44 例, 根据 mRESICT 标准评估 TACE 术后 3 个月内肿瘤治疗反应, 其中客观应答 (objective response, OR) 24 例, 无应答 (non-response, NR) 20 例。上腹 MRI 检查包括 T1WI、T2WI、动态增强扫描、DWI 和 IVIM-DWI。在 GE AW4.6 工作站, 使用 Functool 软件重建图像, DWI 序列生成 ADC 图、IVIM-DWI 序列生成 Standard ADC 图、D-Bi、D*-Bi、f-Bi 图、DDC 和 α 图。参照 T2WI 及动脉期, 在肿瘤最大层面及瘤周区域 (肿瘤周围 $<1\text{cm}$) 分别放置 3 个大小相等的感兴趣区 (ROI) (图 1), 取 3 个 ROI 平均值用于统计分析。采用独立样本 t 检验或 Mann-Whitney U 检验比较两组间定量参数的差异; 采用 logistic 回归分析建立有统计学差异参数组合的预测模型; 使用受试者操作特征 (ROC) 分析评估预测效能。

结果

DWI 序列的 ADC 值在 OR 和 NR 组间无统计学差异 ($P > 0.05$)。OR 组的 D*-Bi-瘤周 (0.078 ± 0.0347) 显著高于 NR 组 (0.055 ± 0.029), OR 组的 α -肿瘤和 α -瘤周值 [0.594 ($0.561, 0.689$)、 0.448 ($0.394, 0.477$)] 明显低于 NR 组 [0.679 ($0.592, 0.736$)、 0.507 ($0.456, 0.581$)] ($P < 0.05$), 其余 IVIM-DWI 定量参数在两组间无统计学差异 ($P > 0.05$)。D*-Bi-瘤周、 α -肿瘤和 α -瘤周值预测客观应答的曲线下面积 (AUC) 分别为 0.690、0.698 和 0.732; 三个参数联合后, 预测效能有所提高 (AUC=0.821)。

结论

相比于 DWI 序列, IVIM-DWI 对评估 HCC 患者 TACE 治疗早期疗效更具价值, 有潜力揭示肿瘤周围区域的侵袭性。

PO-1882

基于低剂量双层光谱探测器 CT 平衡期的细胞外体积分数在胃部 病变诊断中的可行性分析

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目的: 探讨基于低剂量双层光谱探测器 CT (SDCT) 增强扫描平衡期的碘密度图像 (IDIs) 测定细胞外体积分数 (fECV) 作为评价胃部病变的影像学指标的可行性。

方法: 将经内镜活检证实的 38 例胃癌患者和 42 例胃炎患者随机平均分为 A 组和 B 组, 每组均包括 19 例胃癌患者和 21 例胃炎患者, 再分为胃癌组和胃炎组, 即 A1 组和 A2 组, B1 组和 B2 组。A 组和 B 组患者分别进行低剂量 (120kV, 90mAs) 和常规剂量 (120kV, 200mAs) 腹部 CT3 分钟延迟增强平衡期扫描, 并通过光谱数据 (SBI) 重建 IDIs。基于 IDIs 测定 fECV 值, 并生成 ECV 图。比较低剂

量组 (A1 组和 A2 组) 和常规剂量组 (B1 组和 B2 组) 的图像质量和辐射剂量。将两名医生测量的 fECV 值在 A 组和 B 组以及胃癌组 (A1 和 B1 组) 和胃炎组 (A2 和 B2 组) 之间进行比较, 同时评价两名医生测定 fECV 值的一致性。

结果: A1 组患者的图像噪声及噪声评分均高于 B1 组 ($P<0.05$), 但 A 组患者的辐射剂量较 B 组显著降低约 54% ($P<0.05$), A1 组与 B1 组、A2 组与 B2 组的信噪比 (SNR)、对比噪声 (CNR) 差异无统计学意义 ($P>0.05$); A1 组与 B1 组、A2 组与 B2 组的 fECV 值差异无统计学意义 ($P>0.05$), 而 A1 组和 A2 组的 fECV 值分别高于 B1 组和 B2 组 ($P<0.05$)。同时, 两名医生测定 fECV 值的一致性较高 ($ICC=0.828$, $P<0.05$)。

结论: SDCT 低剂量平衡期扫描可在不影响胃部病变图像质量的情况下大幅降低患者的辐射剂量, 基于低剂量 IDIs 测定的 fECV 在胃部病变的诊断和评估中有一定的可行性。

PO-1883

静脉内平滑肌瘤病一例报告

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静脉内平滑肌瘤病 (intravenous leiomyomatosis, IVL) 是指生长于静脉内的平滑肌瘤, 亦可发生于淋巴管内, 故又称脉管内平滑肌瘤, 是一种罕见的特殊类型的子宫平滑肌瘤病, 属于良性肿瘤, 具有沿腔静脉或卵巢静脉延伸至下腔静脉, 甚至到达右心和肺动脉, 严重者可引起猝死。

PO-1884

基于 QCT 探讨腹部脂肪与胡桃夹现象的关系

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目的 应用定量 CT (Quantitative Computed tomography, QCT) 测量腹部脂肪面积, 探讨胡桃夹现象与腹部脂肪的关系, 为临床选择治疗方案提供依据。方法 回顾 1345 例行全腹部 CT 平扫+增强的图像, 按胡桃夹现象在各年龄段的发生率, 随机抽取阳性及阴性病例各 141 例, 收集肠系膜上动脉与腹主动脉间夹角 (AMA) 类型、角度、左肾静脉在 AMA 夹角前和夹角中的横径比 (后简称左肾静脉横径比)、左肾静脉及 L2/3 水平层面腹部脂肪 (内脏脂肪、总脂肪、皮下脂肪) 指数、BMI。分析不同 AMA 夹角类型中胡桃夹现象与腹部脂肪的关系。结果 在 AMA 夹角 I 型组, 左肾静脉横径比与 AMA 角度呈中等负相关性 ($r=-0.375$, $P<0.05$), 与腹部脂肪指数、BMI 无相关性。II 型组, 左肾静脉横径比与 AMA 角度呈显著负相关性 ($r=-0.519$, $P<0.05$), 与腹部脂肪指数、BMI 存在中等负相关, 以左肾静脉水平内脏脂肪指数 (Visceral Adipose Tissue Index, VATI) 相关性最高 ($r=-0.328$, $P<0.05$); AMA 角度及左肾静脉水平 VATI 评估胡桃夹现象 AUC 分别 0.778、0.680, 取临界值 38.5° 、 $18.29\text{cm}^2/\text{m}^2$, 敏感性分别为 0.659、0.909, 特异性 0.792、0.415。结论 AMA 夹角 I 型组腹部脂肪与左肾静脉横径比不相关, 增加腹部脂肪不能改善左肾静脉受压的情况。II 型组 AMA 角度与左肾静脉横径比存在显著负相关性, AMA 角度 $\leq 38.5^\circ$ 对诊断胡桃夹现象具有一定的诊断效能; 腹部脂肪与左肾静脉横径比存在中等负相关, 增加腹部内脏脂肪可以改善左肾静脉受压的情况, 左肾静脉水平 VATI 高于 $18.29\text{cm}^2/\text{m}^2$ 时, 胡桃夹现象基本消失。

PO-1885

基于 IVIM 序列的超高 b 值 AQP-MRI 预测骨转移性前列腺癌价值评估

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目的: 本研究旨在比较不同超高 b 值预测前列腺癌骨转移的价值。**材料与方法:** 38 名患者接受了 3.0T MRI 扫描 (Ingenia CX, 飞利浦, 荷兰), 18 名有骨转移的患者和 20 名无骨转移的患者, 将扫描获得的原始 IVIM 图像被转移到 ISP V10。两位观察者在五组不同的超高 b 值 (第一组: $b=2000, 3000, 4000\text{s/mm}^2$; 第二组: $b=2000, 3000, 5000\text{s/mm}^2$; 第三组: $b=2000, 4000, 5000\text{s/mm}^2$; 第四组: $3000, 4000, 5000\text{s/mm}^2$; 第五组: $b=2000, 3000, 4000, 5000\text{s/mm}^2$) 肿瘤实体显示的最大层面测量 AQP-ADC 值。根据原始 IVIM 图像 ($b=2000$), 在肿瘤实体最大显示水平勾画 ROI, 勾画时避开囊变及坏死区域。同时, 在不同组的超高 b 值伪彩图上测量 AQP-ADC 值 (图 1)。采用观察者间一致性检验评估 2 位观察者测量的一致性。采用独立样本 t 检验或 Mann-Whitney U 检验来评估 AQP-ADC 在预测前列腺癌骨转移的价值。使用 ROC 曲线来评估不同 b 值的预测能力。**结果:** 两位观察者的测量结果一致性良好 ($\text{ICC}>0.75$), 见表 1。五组不同 b 值下的 AQP-ADC 值在预测前列腺癌骨转移方面有显著差异 ($P<0.05$), 见表 2, 其中 $b=2000, 3000, 4000\text{s/mm}^2$ 时, 诊断效能和敏感性最高, 见表 3。**结论:** AQP-ADC 测量在预测前列腺癌骨转移方面有很好的意义。当 $b=2000, 3000, 4000\text{s/mm}^2$ 时, 不仅预测性能明显提高, 而且扫描时间缩短, 图像的信噪比好, 值得进一步探索。

PO-1886

宫颈淋巴瘤 MR 影像分析及文献荟萃

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目的: 探讨女性生殖系统淋巴瘤磁共振成像 (magnetic resonance imaging, MRI) 特征, 以期提高治疗前的诊断准确性。

方法: 回顾分析本院及重医附二院于 2021 年至 2023 年期间经过手术病理确诊为原发性宫颈淋巴瘤的 MRI 资料。两例来自于本院, 1 例来自于重医附二院。本组病例年龄 45~79 岁, 平均年龄 65.3 岁。2 例患者表现为阴道不规则流血 (1 例为绝经后), 1 例表现为腹痛。术前临床怀疑为为宫颈癌, 行术前 MRI 评估。术后病理结果均为非霍奇金淋巴瘤, 弥漫性大 B 细胞瘤。

结果: 通过对本研究病例的临床及 MRI 表现进行回顾性总结, 并对国内外文献进行回顾, 研究发现宫颈淋巴瘤的患者的临床表现多无特殊, 通常表现为阴道不规则流血、流液及腹痛, 临床前期及 MRI 易误诊为宫颈癌。[LY1] 宫颈淋巴瘤的典型 MRI 影像表现为宫颈明显增大, 正常形态消失, 被软组织肿块影所取代, 呈长 T1 长 T2 信号。DWI 及 ADC 示弥散明显受限, ADC 平均值约 $0.47 \times 103 \text{ mm}^2/\text{s}$, 低于宫颈癌的 ADC 平均值约 $0.99 \times 103 \text{ mm}^2/\text{s}$ 。宫颈粘膜及宫颈基质环受累少见, 可见正常形态残留[LY2], 不同于宫颈癌的正常粘膜受侵、破坏。动态对比增强磁共振成像 (Dynamic contrast enhancement magnetic resonance imagination, DCE-MRI[LY3]) 呈轻度持续性均匀强化, 强化程度低于正常子宫肌层, 囊变、坏死少见, 而宫颈癌 DCE-MRI 表现为快进快出, 多呈不均匀强化, 较大者多见坏死、囊变。部分可见非引流区淋巴结转移, 转移淋巴结强化方式同原发灶一致。

结论: 宫颈淋巴瘤具有一定的 MR 特征性表现。通常表现为较大的均匀强化的软组织肿块, DCE-MRI 呈轻度均匀强化, 并表现为明显的弥散受限 (ADC 值显著降低), 并有正常宫颈粘膜的残留的典型表现, 可与宫颈癌鉴别, 这对术前诊断、分期及治疗方案制定具有重要意义。

PO-1887

MSCT 对盆腔淤血综合症的病因价值分析

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目的：回顾性分析盆腔淤血综合征（PCS）患者的 MSCT 影像学资料，并对病因学进行分析，为介入治疗提供解剖学依据。方法：回顾性分析 134 例行 MSCT 增强检查诊断为 PCS 患者的临床资料和影像资料，观察腹、盆腔静脉的走行、形态、管径变化、管腔内结构、血流动力学方面（阻塞或反流）和动静脉畸形等情况。结果：134 例患者中可识别的血管解剖变异计 69 例，包括左肾静脉远端近下腔静脉处狭窄 37 例，前胡桃夹征象 22 例，左肾静脉变异 2 例，卵巢静脉发育或汇入异常 6 例，盆腔动静脉瘘 2 例，左髂静脉压迫综合征 1 例、左肾动静脉瘘 1 例、门静脉高压导致的脾肾静脉引流 1 例和肾脏旋转不良 1 例；血管未变异计 65 例。结论：MSCT 增强扫描有助于早期诊断 PCS，并可全方位地识别的解剖学病因。

PO-1888

基于 CT 的肾囊性病变 2019 版 Bosniak II~III 类阅片者间一致性分析

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【摘要】目的 评估根据 2019 版 Bosniak 分类标准评估 II~III 级肾囊性病变 CT 图像不同阅片者在分类和判断上的一致性。方法 回顾性选择 2017 年 1 月至 2022 年 12 月哈尔滨医科大学附属第二医院 PACS 系统中符合条件的 82 例 II-III 级肾囊性病变病例。高年资医师 R1 根据 2019 版 Bosniak 标准筛选 II-III 级病例，作为一致性分析对象。医师 R2-R4 采用单盲法独立进行 Bosniak 分类和良恶性判断。使用加权 Cohen's Kappa 及 Fleiss's Kappa 来评估阅片者在所有病例、不同分类和不同病理类型病例中的一致性。结果 阅片者 R2~R4 的 bosniak 分类结果与 R1 的一致性系数：R2 为 0.770，R3 为 0.775，R4 为 0.762，均达到高度一致性。阅片者 R2~R4 的良恶性判断与病理结果的一致性系数为 0.82、0.772 和 0.759。结论 本研究基于 2019 版 Bosniak 分类标准评估 II~III 级肾囊性病变 CT 图像，在不同阅片者在分类和判断上的一致性均达到了较高水平，为临床诊断提供参考。

PO-1889

腹腔镜下直肠癌全系膜切除术困难程度的影响因素的术前评估： 腹膜反折的重要性

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目的: 术前评估影响腹腔镜下直肠癌全系膜切除手术困难程度的因素, 尤其是与腹膜反折相关的因素。

方法: 回顾性收集 2020 年 12 月至 2021 年 12 月期间在行腹腔镜下直肠癌全系膜切除术前进行直肠磁共振检查的直肠癌患者。记录手术时间、术中出血量、住院天数、术后并发症来评估手术的困难程度。每个指标通过中位数分为高水平组和低水平组。在 MRI 矢状位图像上测量肿瘤下缘距腹膜反折的距离、肿瘤下缘距肛门距离、肛门距腹膜反折的距离、肿瘤相对于腹膜反折的位置关系。记录上述数据及其他临床资料。对连续变量进行可重复性检测; 用 Kappa 检验分析观察者间对于肿瘤相对于腹膜反折的位置关系判定的一致性; 使用单因素及多因素 Logistic 回归分析与手术困难程度相关的因素。

结果: 共纳入 283 例直肠癌患者 (平均年龄 60.98 ± 11.17 岁, 204 例男性)。肿瘤下缘距肛门距离 (ICC, 0.959; CV, 6.928%)、肛门距腹膜反折的距离 (ICC, 0.901; CV, 5.648%)、肿瘤下缘距腹膜反折的距离 (ICC, 0.995; CV, 9.814%) 的测量一致性较高; 肿瘤相对于腹膜反折的位置关系的 Kappa 值为 0.843。多因素 Logistic 回归分析发现肿瘤相对于腹膜反折的位置关系是手术时间 ($P=0.039$) 和术后并发症 ($P=0.014$) 的独立影响因素。

结论: 肿瘤相对于腹膜反折的位置关系是影响直肠癌患者行腹腔镜下全系膜切除术的手术困难程度的独立因素, 可以术前无创的评估手术困难程度。

PO-1890

基于临床-CT 征象模型对胃肠道移植抗宿主病诊断的研究

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胃肠道移植抗宿主病 (GI-GVHD) 是造血干细胞移植 (HSCT) 后易发生的并发症之一, 早期的诊断和治疗对患者预后至关重要。目前临床诊断中缺乏非入侵的诊断方法。共收集 2018 年 1 月至 2022 年 12 月期间, 两个中心共 267 例接受 HSCT 后出现胃肠道症状患者, 其中 190 例经过病理证实为 GI-GVHD (发病率 71%)。GVHD 的临床分级、黏膜下小气囊、“环靶征”、多灶性肠道炎症、CRP 增高、总胆红素增高均为 GI-GVHD 诊断的独立危险因素 ($p < 0.05$)。然后, 我们将 190 个确诊 GI-GVHD 的患者进行多变量分析, 最终四个候选因子被纳入最终诊断模型: II-IVaGVHD、“环靶征”、多灶性肠道炎症、总胆红素增高。根据移植时间, 将队列分为训练集 ($n=114$) 和验证集 ($n=76$)。模型在训练集和验证集的 ROC 曲线下面积分别为 0.867 和 0.828。校准图显示预测结果和观察结果之间高度一致。决策曲线分析表明, GI-GVHD 患者可以受益于诊断模型的临床应用。无创性诊断 GI-GVHD 患者可能有助于及时治疗并提高患者预后。

PO-1891

一体化 PET/MR 对肝癌术后复发的诊断价值

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目的

比较 18F-FDG PET/MR 与 PET/CT 对肝癌术后复发的诊断价值。

方法

回顾性分析 92 例肝癌术后怀疑复发患者，全身 18F-FDG PET/CT 检查及上腹部 PET/MRI 扫描的影像与临床资料，以病理结果及临床诊断为金标准，对比观察 PET/CT 与 PET/MRI 对比两者图像质量、诊断效能。

结果

92 例患者共 43 例出现复发。PET/CT 的敏感度、特异度和准确率分别为 45.15%、90.45% 和 78.38%；PET/MRI 的敏感度、特异度和准确率分别为 100%、84.61% 和 94.59%，诊断准确率显著高于 PET/CT ($P < 0.05$)。有 15 例 PET/CT 中 CT 与 PET 图像错位，PET/MR 图像融合准确，两侧有显著统计学差异 ($P < 0.05$)。共 25 例肝癌复发侵犯胆道，16 例出现胆管梗阻合并梗阻性黄疸，10 例 PET/CT 能显示梗阻征象，PET/MR 均能清楚显示，两侧有显著统计学差异。25 例出现淋巴结转移，两者均能清晰显示。20 例出现血管侵犯，其中 14 例侵犯门静脉或下腔静脉，两台设备、均能清晰分别；另有 12 例侵犯腹腔干、肠系膜上动脉脾血管、肠系膜上静脉等，PET/MR 比 PET/CT 多明确诊断 8 例，有显著统计学差异 ($P < 0.05$)。15 例出现肺、骨、肾上腺、脑等器官侵犯，PET/MR 比 PET/CT 多明确诊断 7 例，有显著统计学差异 ($P < 0.05$)。

结论 PET/MRI 诊断肝癌术后复发的敏感度、特异度、和准确度均高于 PET/CT，图像配比更准确，能更好的判断淋巴结转移、周围结构及其它器官侵犯的情况。

PO-1892

腹膜后多发平滑肌瘤并玻璃样变性一例

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患者 女，45 岁。因“发现下腹包块 2 年”于 2020 年 10 月 24 日入院治疗，患者近 2 年无诱因自行扪及下腹部包块，且逐渐增大，伴肛门坠胀感、反复便秘。性激素全套：孕酮 10.4ng/ml↑，余 (-)；肿瘤标志物、生化全套、粪便常规、尿常规、血常规均为阴性。CT 平扫：腹膜后见一巨大团块状病灶（以下称之为“病灶一”）及一类圆形病灶（以下称之为“病灶二”），大小分别约 21.6cm×14.3cm×29.4cm（左右经×前后径×上下径）、4.5cm×4.7cm×4.1cm（左右经×前后径×上下径），病灶密度不均匀，呈等、稍低密度，未见高密度出血及钙化（图 1）。泌尿系造影：膀胱、左侧输尿管中下段受压、向右侧偏移，泌尿系未见梗阻及扩张；大部分肠管受推压、聚集、向上移位，腹部未见肠梗阻征象（图 2）。MRI：T1WI 示腹膜后两个病灶，呈等、稍低信号，信号不均匀（图 3）；T2WI 示病灶一信号不均匀，可见不均匀高信号与低信号混杂交错，病灶形态不规则，边界尚清楚；病灶二主要呈高信号，内部可见不均匀片状低信号，病灶形态规则，边界清楚，位于子宫左后方、直肠右前方，与子宫、直肠分界清晰；病灶一与病灶二边缘均可见低信号的包膜样结构（图 4）；T2WI 冠状面示子宫、阴道及膀胱因病灶一推压、向右侧移位（图 5）；T2WI 矢状面示病灶一下缘延伸至左侧坐骨肛门窝区及会阴区（图 6）；DWI 横断面示病灶一部分区域呈稍高信号，ADC 值约 1.509~2.684×10⁻³mm²/s；病灶二大部分区域呈稍高信号，ADC 值约 1.168~

1.443×10⁻³mm²/s (图 7、8)；增强扫描示病灶一内可见片状不均匀强化影像，呈渐进性强化，病灶二呈渐进性强化，强化不均匀 (图 9、10、11)；增强扫描示右侧卵巢显示，向右、向上移位 (图 12)；增强扫描示左侧卵巢显示，向后、向上移位 (图 13)。手术经过：开腹，包块位于腹膜后，切开后腹膜，见巨大团块状肿瘤与周围组织粘连，见左侧输尿管与肿瘤粘连；另见骶骨岬右下方有一个类圆形的肿瘤；完整切除肿瘤。病理诊断：两个病灶均为平滑肌瘤 (玻璃样变)。

PO-1893

基于 MSCT 评估术前结肠癌壁外血管侵犯 对临床预后的价值研究

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目的：探讨多层螺旋 CT (MSCT) 术前评估结肠癌壁外血管侵犯 (EMVI) 对患者临床预后的价值研究。方法：回顾性分析 2019 年 4 月-2020 年 4 月在南通市第一人民医院接受结肠癌根治性手术的 101 例患者的临床、影像和病理资料，术前 MSCT 判断肿瘤部位、大小、T 分期 (ctT)、淋巴结转移 (ctN)、ctEMVI 情况，根据 ctEMVI 情况将患者分为阴性组、阳性组，比较两组患者临床和病理特征的差异。术后随访患者发生进展性事件及对应时间。分析不同影像特征患者无病生存期 (DFS) 差异采用 Kaplan-Meier 生存曲线和 log-rank 检验，影响患者预后的危险因素采用 Cox 回归模型。结果：101 例结肠癌患者中 ctEMVI 阳性 40 例，阴性 61 例，ctEMVI 与 ctT、ctN、病理 T 分期 (pT)、病理淋巴结转移 (pN) 相关 ($P < 0.05$)。入组患者的随访时间为 36 (18, 36) 个月，共 29 例患者出现进展性事件，ctEMVI 阳性组 19 例，阴性组 10 例，阳性组累积 DFS 率低于阴性组，差异具有统计学意义 ($\chi^2=13.991$, $P < 0.001$)。单因素回归分析显示 ctEMVI (HR=3.872, 95%CI 1.795-8.352, $P=0.001$)、ctN (HR=2.741, 95%CI 1.171-6.417, $P=0.02$)、pN (HR=6.314, 95%CI 2.195-18.166, $P=0.001$)、病理分级 (HR=2.623, 95%CI 1.216-5.658, $P=0.014$) 是结肠癌术后 DFS 的影响因素。多因素回顾分析显示 ctEMVI 阳性 (HR=2.663, 95%CI 1.155-6.14, $P=0.022$) 和 pN 阳性 (HR=5.012, 95%CI 1.685-14.907, $P=0.004$) 是结肠癌术后 DFS 的独立影响因素。根据 pN 情况进行分组，pN0 组 45 例，pN 阳性组 56 例，ctEMVI 对结肠癌患者的累积 DFS 率均具有统计学意义 ($P < 0.05$)。结论：术前 MSCT 可有效判断结肠癌 EMVI 情况，ctEMVI 作为结肠癌术后 DFS 的独立影像学因素，可为结肠癌患者制定治疗方案及评估预后提供帮助。

PO-1894

联合应用 CT 淋巴管成像与 99Tcm-DX 淋巴显像在原发性乳糜尿诊断中的应用价值

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目的：探讨联合应用 CT 淋巴管成像 (CTL) 与 99Tcm-DX 淋巴显像在原发性乳糜尿诊断中的应用价值。

方法：回顾性分析经临床确诊的原发性乳糜尿的 50 例患者的临床及影像学资料，所有患者均行 CTL 及 99Tcm-DX 淋巴显像两种检查。根据 99Tcm-DX 淋巴显像中胸导管显影的差异将原发性乳

糜尿分为三型：I 型：胸导管未显影型，II 型：胸导管一过性显影型，III 型：胸导管异常浓聚型，并分别记录每组的 CTL 影像学表现，CTL 影像学指标包括：会阴、腹股沟、盆腔、直肠周、膀胱、髂窝、肾脏、肾窦、肾实质、肾周、肾上腺、腹膜后、腰干区域、肠系膜、肠周、肠壁、肠管内、肝周、胰周、脾周、胸膜外、肋间、纵隔、肺脏、胸导管末端对比剂的异常沉积。将各组 CTL 影像学指标进行统计学分析， $P < 0.05$ 为差异具有统计学意义。

结果：99Tcm-DX 淋巴显像示 20 例 (40.0%) 患者单肾或双肾早期显像，胸导管末端未显影 14 例 (28.0%)，一过性显影 14 例 (28.0%)，持续增宽显影 19 例 (38.0%)，胸导管双侧引流 3 例 (6.0%)；根据 99Tcm-DX 淋巴显像的胸导管显像特点对于 50 例原发性乳糜尿进行分型，其中 I 型 14 例，II 型 14 例，III 型 22 例，三组间在性别、年龄、发病年龄、病程及临床症状之间无统计学差异 ($P > 0.05$)；三组间直肠周对比剂异常分布的差异具有统计学意义 ($P = 0.005$)，且 I 型患者的发生率高于 II 型；肾脏、肠系膜对比剂异常分布的差异具有统计学意义 ($P < 0.05$)，且 III 型患者的发生率高于 II 型；三组间肺脏的对比剂异常分布的差异具有统计学差异 ($P = 0.048$)，且 III 型患者的发生率高于 I、II 型。

结论：99Tcm-DX 淋巴显像能够评价胸导管回流入血情况，而 CTL 能够显示肾脏及全身淋巴管异常的部位、程度，两者的表现具有一定的相关性，对于明确原发性乳糜尿的诊断、显示淋巴管异常的程度及范围、探讨胸导管回流与淋巴管异常的关系具有重要价值，为原发性乳糜尿的诊治提供影像依据。

PO-1895

基于临床及 CT 影像特征的诺模图预测克罗恩病活动性的价值研究

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目的和意义：探讨基于临床和 CT 特征的诺模图在预测克罗恩病 (Crohn's disease, CD) 活动性中的应用价值。**方法：**回顾性分析我院 171 例经临床、病理综合确诊为 CD 患者的临床和 CT 影像资料，包括年龄、性别、腹痛、腹泻、便血、C 反应蛋白 (CRP)、血沉 (ESR)、血小板计数 (PLT) 及 14 个肠壁、肠系膜、并发症的影像特征。所有患者按经 CD 活动指数 (Crohn's disease activity index, CDAI) 分为非活动组 (53 例) 和活动组 (118 例)，并分析其临床特征和 CT 特征。按 7: 3 的比例将总体队列随机分为训练集 (121 例) 和验证集 (50 例)。在训练集中，通过单因素及多因素 Logistic 回归分析，确定 CD 活动性相关的独立危险因素。引入 R 软件，构建预测 CD 活动性的诺模图，并进行 ROC 曲线分析。采用验证集对模型的效能进行验证。**结果：**血小板计数 (优势比 [OR]=1.01, 95% 置信区间 [CI] 1.01~1.02, $P < 0.001$)、肠壁最大厚度 (OR=42.45, 95%CI 1.61~117.94, $P=0.025$)、肠壁分层强化 (OR=5.47, 95%CI 1.55~19.24, $P=0.008$)、肠系膜脂肪组织增生 (OR=13.83, 95%CI 2.62~73.10, $P=0.002$) 是活动期 CD 的独立危险因素。诺模图的曲线下面积 (AUC) 为 0.93 (95% CI 0.89~0.97)，敏感性和特异性分别为 84.13% 和 94.73%，略优于单独临床模型 (AUC=0.90, 95% CI 0.84~0.96；敏感性=80.72%；特异性=86.84%) 及影像模型 (AUC=0.92, 95% CI 0.87~0.97；敏感性=83.33%；特异性=86.84%)。**结论：**基于临床和 CT 特征的诺模图在预测活动期克罗恩病有较大的应用价值，可为临床个体化评估 CD 患者病情提供一定的帮助。

PO-1896

CT 淋巴管成像 (CTL) 和非增强 MR 淋巴管成像 (MRL) 对于原发性乳糜尿的诊断价值初探郝琪^{1,2}、李兴鹏³、刘梦珂³、张怡梦³、张晓杰³、王玉坚¹、郝文瀚¹、郑飞¹、尹平¹、洪楠¹、王仁贵^{2,3}

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目的 探讨联合应用 CT 淋巴管成像 (CTL) 和非增强 MR 淋巴管成像 (MRL) 在诊断原发性乳糜尿中的应用价值。

方法 回顾性收集确诊为原发性乳糜尿的 55 例患者的临床及影像学资料, 所有患者均行 CT 淋巴管成像 (CTL) 和非增强 MR 淋巴管成像 (MRL) 检查。将 CTL 与 MRL 各指标结果进行统计学分析, 统计指标包括: ①双髂、双侧腰干、双侧肾窦、胸导管、双侧支气管纵隔干、双侧颈干、双侧锁骨下干等淋巴管形态及扩张情况; ②泌尿系统及胸腹盆部淋巴管异常情况。采用配对 χ^2 检验的 McNemar 检验对 CTL 与 MRL 各指标进行对比分析, $P < 0.05$ 差异有统计学意义; 同时采用一致性 Kappa 检验评价 CTL 与 MRL 两种方法诊断原发性乳糜尿的一致性。

结果 CTL 及 MRL 对于显示双侧支气管纵隔干、右侧颈干、双侧锁骨下干、胸导管末端、右侧淋巴导管的异常扩张的差异具有统计学差异 ($P < 0.05$), 且 MRL 显示率高于 CTL; 两者对于显示左颈干、左髂、右髂、腹膜后、左侧腰干及右侧腰干异常扩张的差异无统计学意义 ($P > 0.05$); 两者对于显示双侧肾窦、盆腔、肠系膜、会阴、膀胱、胰周、肝周、胸膜外的淋巴扩张的差异具有统计学差异 ($P < 0.05$), 且 CTL 显示率高于 MRL; CTL 及 MRL 对于显示脾脏、骨骼淋巴管瘤的差异无统计学差异 ($P > 0.05$)。

结论 CTL 和 MRL 均能清晰显示原发性乳糜尿的腹部中央淋巴管的异常情况, 而 CTL 能进一步显示肾内、肾周淋巴管及远端异常扩张淋巴管分布, 明确与周围组织结构关系, MRL 能够进一步显示胸部淋巴干、胸导管末端及右淋巴导管异常扩张的部位及程度, 二者联合应用能够对于原发性乳糜尿的诊治具有重要价值。

PO-1897

光谱 CT 虚拟单能量成像在神经内分泌肿瘤肝转移检出中的优势: 与常规 CT 和普美显 MR 的对比研究

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目的: 探讨基于双层光谱探测器 (Dual-detector spectral-CT, DLCT) 衍生的虚拟单能量成像 (Virtual monoenergetic images, VMIs) 在检出肝转移性神经内分泌肿瘤中的价值, 并对 DLCT、常规 CT 和普美显增强 MR 的诊断效能进行头对头的对比分析。

方法: 回顾性纳入 2021 年 9 月至 2022 年 9 月间在复旦大学附属肿瘤医院就诊的神经内分泌肿瘤肝转移患者, 上述患者均在 3 周内行 DLCT 扫描和普美显 MR 增强扫描。首先对常规混合能量 CT 和各能量 VMIs 成像上肝转移瘤的信噪比 (Signal-to-noise ratio, SNR) 和对比噪声比 (Contrast-to-noise ratio, CNR) 进行对比分析; 进一步由 2 位放射科医师在盲法、独立阅片前提下基于常规混合能量 CT、常规 CT+VMIs 成像和普美显 MR 对肝脏病灶进行诊断, 比较上述三种影像方法对 NETLM 上的诊断价值。

结果: 在增强四期扫描中, 肝转移瘤在 40keV 能量 VMIs 成像中均表现出最高的 SNR 和 CNR 值, 并显著优于混合能量 CT (all $P < 0.01$)。在诊断效能对比中, 普美显 MR、常规 CT+VMIs、常规

混合能量 CT 的敏感度分别为 0.95、0.90、0.76 (McNemar test, $P < 0.05$), AUC 值分别为 0.97、0.90、0.85 (DeLong's test, $P < 0.05$), 三种影像方法间的诊断效能差异显著。进一步亚组分析发现, 上述影像方法的诊断差异集中在小于 10mm 的病灶中, 在大于等于 10mm 的病灶中上述影像手段的诊断效能接近。

结论: 基于 DLCT 衍生的 40keV 低能量 VMIs 成像可显著提高肝转移性神经内分泌肿瘤的客观成像效果。普美显 MR 是最敏感的影像方法, 而在常规 CT 基础上联合低能量 VMIs 成像可显著提高对小于 10mm 转移灶的诊断敏感度。

PO-1898

基于 CE-CT 的机器学习模型术前预测患者半肝切除术后的残肝再生

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目的: 残肝再生能力不足可能直接导致肝功能衰竭甚至死亡。本研究的目的是开发一种基于 CE-CT 的放射组学模型, 用于术前预测患者半肝切除术后的残肝再生能力。

材料与方法:

回顾性收集 2012 年 1 月至 2022 年 12 月期间来自三个中心的 213 名接受半肝切除术患者的临床资料及影像组学资料, 通过术前 CE-CT 门静脉期图像对未来残肝 (基于手术记录及术后图像) 进行了半自动分割测量未来残肝体积 (LVpre), 并从门静脉期的未来残肝中提取放射组学特征。术后残肝体积 (LVpost) 在随访的 CE-CT 上测量得到。再生指数 (RI) 按以下公式计算: $RI(\%) = (LVpost - LVpre) / LVpre \times 100 (\%)$ 。基于训练队列使用 XG Boos 建立机器学习模型, 并在内部验证队列及外部验证队列进行验证。单因素、多因素 logistic 回归分析确定预测 RI 的独立预测因子。使用受试者工作特征曲线 (ROC) 及曲线下面积 (AUC)、敏感性、特异性、准确度和 F1 分数来评估模型对术前预测残肝再生能力的诊断效能。所有检验均为双尾检验, $P < 0.05$ 为有统计学意义。

结果: 研究发现, 经单因素、多因素 logistic 回归分析后, 仅有影像组学评分为预测 RI 的独立预测因子。机器学习模型在训练队列、内部验证队列及外部验证队列中的诊断效能良好, AUC 分别为 0.88 (95%CI: 0.81-0.96)、0.80 (95%CI: 0.65-0.95) 及 0.85 (95%CI: 0.67-1.00) (图 1)。该模型在训练队列中的敏感性、特异性、准确度和 F1 分数分别为 0.79、0.88、0.85 和 0.79; 在内部验证队列中的敏感性、特异性、准确度和 F1 分数分别为 0.63、0.86、0.79 和 0.65; 外部验证队列中分别为 0.82、0.83、0.83 和 0.72 (图 2)。对影像组学评分和残肝再生能力的进一步分析表明, 较高的影像组学评分与高再生相关 (图 3)。

结论: 基于 CE-CT 的机器学习模型在术前预测半肝切除术患者术后残肝再生能力方面具有良好的诊断效能, 并且较高的影像组学评分预示着残余肝脏较高的再生能力。

PO-1899

脾脏少见原发肿瘤的影像与病理对照分析

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摘要：目的 分析 6 例不同组织类型的脾脏原发肿瘤的影像表现与病理特征，以提高对这些少见肿瘤的识别能力。方法 搜集 6 例经临床和病理证实的脾脏少见肿瘤，术前均行影像检查，其中炎性假瘤样滤泡树突样肉瘤(IPT-like FDCS)1 例、原发性血管瘤 1 例、原发性血管性结节样转化 (SANT) 2 例、囊腺瘤 2 例。结果 上述脾脏肿瘤表现多样化，炎性假瘤样滤泡树突样肉瘤老年女性发病，肿瘤呈多结节样，富含血管合并坏死，递增向心性强化，有假包膜，其原位杂交 EBER 弥漫阳性；原发性血管瘤青年男性发病，表现为低信号为主混杂信号灶，合并瘤内出血及大范围囊变、坏死，增强瘤内见粗大不规则动脉血管，无乙肝病史，早期即有转移，肝转移最常见；原发性血管性结节样转化 (SANT) 中年男性发病，属血管良性瘤样病变，病理上多个增生血管结节和纤维组织带交替排列是影像“轮辐”征的基础，多无症状，结合免疫组化可与血管瘤鉴别；脾脏囊腺瘤及其罕见，本组两例均女性发病，与囊肿类似，但囊壁不均匀可有强化，也可表现为多房样，本组两例均以腹痛发病，其一实验室检查指标 CA-199、D-D 二聚体升高，结合实验室检查与影像资料均未准确诊断，依靠病理确诊。结论 本组 6 例脾脏肿瘤临床均较少见，炎性假瘤样滤泡树突样肉瘤、血管瘤应与富血供血管瘤鉴别，后者 T2WI 明显高信号，不伴远处转移。原发性血管性结节样转化 T2WI 呈放射状低信号较具特征。脾脏单发囊性病灶合并症状或实验室指标异常时要考虑到囊腺瘤。通过影像与病理之间的对照分析，初步总结 6 例脾脏少见肿瘤的影像特征，以供大家在临床工作中鉴别参考。

PO-1900

基于增强 CT 的衰减系数预测局部晚期结直肠癌新辅助化疗联合贝伐珠单抗与信迪利单抗的治疗反应

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兰州大学第二医院

目的 评估基于增强三期 CT 值的衰减系数 (AI) 能否预测使用新辅助化疗联合贝伐珠单抗与信迪利单抗的局部晚期结直肠癌(LARC)患者的治疗反应。

方法 本研究共纳入兰州大学第二医院 2019 年 1 月至 2023 年 7 月的 71 例使用新辅助化疗联合贝伐珠单抗与信迪利单抗的局部晚期结直肠癌患者，计算动脉期-静脉期 AI ($avAI$)、静脉期-延迟期 AI ($vdAI$)，计算方法： $avAI = (\text{病灶动脉期 CT 值} / \text{病灶周围正常肠壁动脉期 CT 值} - \text{病灶静脉期 CT 值} / \text{病灶周围正常肠壁静脉期 CT 值}) / \text{动静脉期的时间间隔} \times 100$ ； $vdAI = (\text{病灶静脉期 CT 值} / \text{病灶周围正常肠壁静脉期 CT 值} - \text{病灶延迟期 CT 值} / \text{病灶周围正常肠壁延迟期 CT 值}) / \text{静脉期到延迟期的时间间隔}$ ，使用最大约登指数计算 $avAI$ 和 $vdAI$ 的截断值，行单变量与多变量分析评价 $avAI$ 和 $vdAI$ 的截断值与治疗反应的关系。

结果 2 名研究者得出的 $avAI$ 截断值分别为 0.638 与 0.492， $vdAI$ 截断值分别为 0.034 与 0.019。多变量分析结果显示 $avAI$ (比值比 = 6.512 / 5.892, 95%CI = 3.199-13.743 / 4.142-25.145, P 均 < 0.05) 和 $vdAI$ (比值比 = 0.037 / 0.081, 95%CI = 0.019-0.746 / 0.002-1.281, $P = 0.003 / 0.009$) 与治疗反应之间存在相关性，其中 $vdAI$ 与治疗反应分级的相关性由弱到强 ($p=0.001$)。

结论 基于增强三期 CT 值的 AI 能够作为一种非侵入性的方法预测使用新辅助化疗联合贝伐珠单抗与信迪利单抗治疗 LARC 患者的治疗反应。

PO-1901

运用 T1 mapping 定量成像技术探究宫颈癌复发的危险因素

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目的：本研究旨在通过 T1 mapping 定量成像技术来确定宫颈癌（CC）患者复发的危险因素。

方法：收集本院 2018 年 5 月至 2021 年 4 月经组织病理学确诊为 CC 的患者共 107 例，并分为手术组和非手术组。根据患者在治疗后 3 年内是否复发，进一步将每组患者分为复发和非复发亚组。计算肿瘤的纵向弛豫时间（native T1）和表观扩散系数（ADC）值。分析复发和非复发亚组的 native T1 和 ADC 值之间的差异，并为具有统计学差异的参数绘制受试者工作特性（ROC）曲线。采用 Logistic 回归分析影响 CC 复发的重要因素。无复发生存率通过 Kaplan-Meier 分析进行评估，并使用对数秩检验进行比较。

结果：手术组和非手术组分别有 13 例和 10 例患者在治疗后 3 年内出现复发。手术组和非手术组复发组和非复发组的 native T1 值存在显著差异（ $P < 0.05$ ）；但 ADC 值无差异（ $P > 0.05$ ）。用于区分 CC 手术和非手术治疗后复发的 native T1 值 ROC 曲线下面积分别为 0.742 和 0.780。Logistic 回归分析表明，native T1 值是手术组和非手术组肿瘤复发的危险因素（分别为 $P = 0.004$ 和 0.040 ）。与临界值相比，两组 native T1 值较高的患者无复发生存曲线与 native T1 值较低的患者有显著差异（分别为 $P = 0.000$ 和 0.016 ）。

结论：T1 mapping 定量成像技术可以帮助识别复发风险高的 CC 患者，补充除临床病理特征外的肿瘤预后信息，并为个体化治疗和随访方案提供理论依据。

PO-1902

运用定量和定性磁共振成像参数预测宫颈癌治疗后 2 年随访期内复发的初步研究

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目的：通过 native T1 mapping、常规 MRI 成像参数和临床病理学指标研究宫颈癌（CC）复发的预测因素。

方法：本前瞻性研究共纳入 144 例经组织病理学证实的 CC 患者（90 例接受手术治疗，54 例未接受手术治疗）。获得了 native T1 值、常规 MRI 成像参数和临床病理特征。使用单变量和多变量 Cox 比例风险回归分析评估定量和定性参数与治疗后的肿瘤复发的相关性。将独立的风险因素组合成预测复发风险的模型和个体预后指数方程。由受试者工作特性（ROC）曲线确定最佳截断值。

结果：90 名接受手术治疗的患者中有 12 名（13.3%）出现肿瘤复发。Native T1 值（X1）（危险比[HR]，1.008；95%置信区间[CI]，1.001–1.016）、最大肿瘤直径（X2）（HR，1.065；95%CI，1.020–1.113）和子宫旁浸润（X3）（HR：3.930；95%CI：1.013–15.251）是独立的肿瘤复发风险因素。建立的复发风险模型的个体预后指数（PI）为 $PI = 0.008X1 + 0.063X2 + 1.369X3$ 。Cox 回归模型的 ROC 曲线下面积（AUC）为 0.923。54 例非手术患者中有 20 例（37.0%）发生肿瘤复发。Native T1 值（X1）（HR，1.012；95%CI，1.007–1.016）和淋巴结转移（X2）（HR：4.064；95%CI：1.378–11.990）是独立的肿瘤复发风险因素。相应的 PI 计算如下： $PI = 0.011X1 + 1.402X2$ ；Cox 回归模型 AUC 为 0.921。

结论：Native T1 值结合常规 MRI 成像参数和临床病理变量可有助于 CC 复发的治疗前预测。

PO-1903

双能 CT 定量参数在预测胰十二指肠切除术后急性胰腺炎中的应用价值

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目的: 探索术前双能 CT 定量参数预测胰十二指肠切除术后的急性胰腺炎的可行性和价值。

方法: 回顾性分析 2022 年 4 月至 2022 年 9 月行术前双能 CT 检查并接受胰十二指肠切除术的患者, 纳入患者 69 例。根据是否发生胰腺术后急性胰腺炎 (postpancreatectomy acute pancreatitis, PPAP), 分为 PPAP 组和无 PPAP 组。分别测量所有患者胰腺实质切缘的胰腺实质期、门脉期及延迟期碘浓度 (iodine concentration, ID), 延迟期的脂肪分数 (fat fraction, FF) 和同层面腹主动脉 ID, 根据公式计算细胞外容积分数 (extracellular volume fraction, ECV)。采用独立样本 t 检验, 比较两组间双能 CT 定量参数差异, 采用单因素及多因素 Logistic 回归, 确定 PPAP 发生的独立危险因素, 并进行 ROC 曲线分析评估其诊断效能。

结果: 纳入的 69 例患者中, 包括胰腺癌 39 例, 壶腹癌 10 例, 胰腺导管内乳头状黏液肿瘤 7 例, 胆管癌 4 例, 慢性胰腺炎 4 例, 胰腺神经内分泌肿瘤 3 例, 囊腺瘤 2 例, 共有 9 例患者发生 PPAP。PPAP 组胰腺实质的门脉期 ID、延迟期 ID、FF 及 ECV 均低于非 PPAP 组, 差异均具有统计学意义 ($p < 0.05$)。多因素 Logistic 回归结果显示, ECV 是 PPAP 发生的独立危险因素 ($p < 0.001$), 其 AUC 为 0.839, 敏感度为 100.0%, 特异度为 58.3%。

结论: 胰十二指肠切除术前双能 CT 定量参数对 PPAP 具有一定的预测价值, 胰腺实质 ECV 的降低可作为 PPAP 预测的有效影像学标志物。

PO-1904

早期 CT 定量参数变化预测胰腺神经内分泌瘤肝转移索凡替尼治疗效果及无进展生存期

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目的:

本研究旨在通过评估肝转移瘤的大小及密度相关参数在索凡替尼治疗前后的变化, 探索定量 CT 参数预测胰腺 NELMs (neuroendocrine liver metastases, NELMs) 患者预后的效能, 筛选出评价胰腺 NELMs 患者治疗效果和预测预后的最有效影像学指标。

方法:

回顾性连续收集多家医学中心 (Ⅲ期临床试验) 2012 年 1 月-2017 年 12 月胰腺 NELMs 患者共 95 例。分析 NELMs 大小及密度相关参数, 采用 Logistic 回归评估其与治疗效果的相关性; 采用 Cox 回归分析和 Kaplan-Meier 曲线评估其与无进展生存期 (progression-free survival, PFS) 的相关性, 计算风险比 (hazard ratio, HR) 及 95% 置信区间 (95% confidence interval, 95% CI)。

结果:

动脉期 CT 值变化率 (HR: 0.070; 95% CI: 0.009-0.536; $P=0.010$) 是 PFS 的独立风险因素, 以变化率中位数将患者分为两组, 变化率更高者比变化率低者 PFS 更长 (HR: 0.530, 95% CI:

0.270-1.030; $P=0.058$)。肿瘤生长速率 (OR: 0.005; 95% CI: <0.001-0.376; $P=0.017$) 是客观缓解率的独立预测因素。

结论:

动脉期CT值变化率是患者PFS的独立风险因素,变化率更高的患者比变化率低的患者PFS更长;肿瘤生长速率可用于患者的疗效评估。

PO-1905

基于增强 CT 图像的肾细胞癌病理 T3a 侵犯影像组学预测模型的建立与时间验证

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目的: 建立并时间验证基于增强 CT 图像的影像组学模型对肾细胞癌病理 T3a 侵犯的预测价值。

方法: 本研究回顾性收集了 2014.1-2023.5 因肾脏肿块在本中心行外科治疗的患者。拥有术前 3 个月内增强 CT 检查、术后病理证实为肾细胞癌且手术为一线治疗手段的初发患者的静脉期 CT 图像纳入后续研究, 其中 2014.1-2021.12 的患者图像用于建立和内部交叉验证模型, 2022.1-2023.5 的患者图像用于时间验证。所有静脉期图像预先重采样至统一像素大小。一位医师借助基于 U-net 的半自动分割算法独立勾画病灶 ROI, 由另外两位医师共同检查并修正其勾画结果。由算法自动将 ROI 向外扩张 5mm, 并分别提取肿瘤和瘤周影像组学特征。使用肿瘤特征、瘤周特征和两个混合特征, 筛选特征并分别建立预测模型。使用巢式交叉验证对模型进行内部验证, 包括 20 次 5 折交叉验证作为内循环以优化超参数和 200 次 5 折交叉验证作为外循环以验证模型性能。内部验证和时间验证时记录的参数包括 ROC 曲线下面积、平均查准率、敏感度、特异度、阳性预测值、阴性预测值、准确度、约登指数和 F1 指数。同时校准度曲线和决策曲线也分别用于评估模型的性能。校正后 alpha 取 0.0167。

结果: 共纳入 1003 例患者, 其中内部验证集 729 例, 时间验证集 274 例。内部验证中, 肿瘤模型和混合模型区分度无明显差异 (0.8362 ± 0.0017 vs. 0.8347 ± 0.0018), 而瘤周模型区分度显著低于前两者 (0.7994 ± 0.0020)。校准度曲线示肿瘤模型和混合模型保持好的校准度, 而瘤周模型校准度稍差于前两者。决策曲线示肿瘤模型和混合模型的净获益相近, 且高于瘤周模型。时间验证中, 肿瘤模型、瘤周模型和混合模型的区分度无明显差异 (0.8457 ± 0.0519 vs. 0.8486 ± 0.0510 vs. 0.8426 ± 0.0527)。校准度曲线和决策曲线也未显示出明显差异。特征分析显示, 球形度为肿瘤模型中最重要的特征, 与 T3a 侵犯负相关, 灰度不均匀性为瘤周模型中最重要的特征, 与 T3a 侵犯正相关。

结论: 基于增强 CT 图像的影像组学模型能准确的预测肾细胞癌病理 T3a 侵犯。

PO-1906

术前 R.E.N.A.L 评分联合光谱 CT 参数预测肾透明细胞癌的 WHO/ISUP 核分级

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目的: 本研究旨在探讨联合肾肿瘤评分系统和光谱 CT 参数评估肾透明细胞癌病理分级的可行性。

方法: 这项回顾性分析纳入了 99 名术前接受光谱 CT 扫描并最终病理证实为肾透明细胞癌的患者。受试者在病理学上被分为低级别组(WHO/ISUP I, n=30)和高级别组(WHO/ISUP II ~ IV, n=69)。我们收集了患者的常规 CT 特征、肾肿瘤计量学评分和光谱 CT 参数等信息, 绘制受试者工作特征(ROC)曲线并计算曲线下面积(AUC)、灵敏度、特异度, 以评价参数的诊断效能。

结果: 两组的肿瘤最大径、肿瘤坏死及 R.E.N.A.L 评分存在差异($P<0.05$), 而 PADUA 评分无统计学差异($P>0.05$)。在肾皮质期和实质期, 高级别肾透明细胞癌患者的 70keV 单能量 CT 值(CT_{70keV})、有效原子序数(Zeff)、碘浓度值(I)明显低于低级别肾透明细胞癌患者($P<0.05$)。两组患者的水浓度值(WC)在统计学上没有差异($P>0.05$)。ROC 曲线分析表明, 皮质期 I 的诊断效能优于其它参数($AUC=0.722$, $p<0.001$, 灵敏度=73.9%, 特异度=66.7%)。常规 CT 特征、R.E.N.A.L 评分和能谱参数的联合可提供最佳的诊断效能($AUC=0.809$, $p<0.001$, 灵敏度=78.3%, 特异度=73.3%)。

结论: 术前联合使用常规 CT 特征、R.E.N.A.L 评分和能谱 CT 参数, 可以更好地预测肾透明细胞癌的 WHO/ISUP 核分级, 有助于临床医生术前治疗决策的制定。

PO-1907

基于增强 CT 门静脉影像组学模型在门脉高压诊断中的应用

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目的: 本研究旨在探讨增强 CT 门静脉影像组学模型在门脉高压无创诊断中的价值。

方法: 回顾性收集 2013 年 6 月至 2022 年 12 月受肝静脉力梯度(HVPG)测量的门脉高压患者共 110 人, 排除临床资料不全的患者 69 人, 最终纳入 41 人为门脉高压组。同时纳入 47 名健康人以平衡组间比例。由两名医生对门静脉期门静脉进行逐层 ROI 勾画, 并从 Rise 软件提取门静脉影像组学特征, 采用 LASSO 回归对影像组学特征进行筛选并构建门脉高压影像组学分类模型。用受试者工作特征曲线下面积(AUC)评估诊断性能。

结果: 本研究共采用 SVM、LR 两种模型, 测试集中 AUC 值最高的模型为 SVM, 模型 SVM 的测试集的灵敏度为: 0.97, 特异度为: 0.92, 精确率为: 0.92, 召回率为: 0.86, F1 分数为: 0.92, 准确率为: 0.89。

结论: 本研究构建的门静脉影像组学模型在无创诊断门脉高压中具有一定的价值, 值得进一步探索和研究。

PO-1908

表观扩散系数直方图对 EPE 分级系统预测 前列腺癌包膜外侵犯的附加价值

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目的: 探讨磁共振表观扩散系数(ADC)直方图对美国国家癌症研究所前列腺癌包膜外侵犯分级系统(EPE 分级系统)预测前列腺癌包膜外侵犯(EPE)的诊断价值。

方法: 回顾性连续入组 2021 年至 2022 年期间于解放军总医院第一医学中心行根治性前列腺切除术, 并于术前行标准多参数磁共振扫描的 100 例前列腺癌患者, MRI 扫描于前列腺穿刺术后 3 个月以上或穿刺术前扫描。由 2 名放射科医师使用 EPE 分级系统对所有病例进行独立评估, 意见不一致时由高年资医师审核作为最终结果。1 名医师利用 FireVoxel 软件在 ADC 图上逐层手动勾画肿瘤感兴趣区(VOI), 进行直方图分析得到 ADC 平均值、第 1、5、10、25、50、75、90、95 和 99 百分位数 ADC 值(1%、5%、10%、25%、50%、75%、90%、95%和 99%ADC)。采用 Mann-

Whitney U 检验比较 EPE 阳性组和 EPE 阴性组间 ADC 直方图参数的差异,对差异有统计学意义的 ADC 直方图参数进一步纳入多因素 Logistic 回归分析,筛选预测 EPE 的独立危险因素并构建联合模型。以受试者工作特征曲线评估 ADC 直方图、EPE 分级系统和联合模型的预测效能,并计算曲线下面积 (AUC),采用 DeLong 检验比较 AUC 的差异。

结果:100 例患者年龄 50~82 (68.34±6.66) 岁,经术后病理证实 34 例患者 EPE 阳性 (34%)。ADC 直方图各参数两组间差异均具有统计学意义 ($P<0.05$)。多因素 Logistic 回归分析显示 99% ADC ($P<0.01$, 比值比为 0.99) 和 EPE 分级系统 ($P<0.01$, 比值比为 4.15) 是预测 EPE 的独立危险因素。99% ADC、EPE 分级系统及联合模型预测 EPE 的 AUC 分别为 0.76、0.81 和 0.86,99% ADC 和 EPE 分级系统的 AUC 值并无显著统计学差异 ($P=0.43$),联合模型 AUC 优于 99% ADC 和 EPE 分级的 AUC,且差异有统计学意义 ($P<0.05$)。

结论:ADC 直方图对 EPE 分级系统术前预测 EPE 展现出一定附加价值,99% ADC 联合 EPE 分级系统能显著提高 EPE 的诊断效能。

PO-1909

高分辨 T2WI 形态学参数预测直肠癌临床分期的价值

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目的:探讨高分辨 T2WI (HR-T2WI) 形态学参数预测直肠癌临床分期的价值。方法:回顾性分析 2019 年 3 月至 2022 年 10 月于我院行直肠 MRI 检查并行手术治疗,经组织病理学证实的 78 例直肠癌患者的临床资料,根据术后病理分为 I 期 (T1-2N0 M0)、II 期 (T3-4N0M0)+III 期 (任何 T、N1-2M0) 2 组。运用 HR-T2WI 测量肿瘤最大厚度 (MTT)、肿瘤长径 (MTL)、肿瘤下缘距肛门距离 (DTA)、肿瘤最大截面积 (MTA)、肿瘤体积 (GTV),并评判肿瘤是否累及肠管全周。采用 Spearman 检验分析各指标间的相关性;采用受试者工作特征 (ROC) 曲线分析各参数预测直肠癌临床分期的价值。结果:I 期、II+III 期患者 MTL、GTV、环周受累情况比较差异均有统计学意义 ($P<0.05$);AUC 值分别为 0.732、0.716、0.791 ($P<0.05$)。MTL 和 GTV 呈正相关 ($r=0.779$, $P<0.01$)。以 $MTL>3.65$ cm 联合环周受累诊断直肠癌临床分期的 AUC 值为 0.842;以 $GTV>17.96$ cm³ 联合环周受累诊断直肠癌临床分期的 AUC 值为 0.838。结论:HR-T2WI 参数 MTL、GTV、环周受累在鉴别 I 期、II+III 期直肠癌中价值较高,MTL 联合环周受累收益最高,可有效筛选出新辅助放化疗 (nCRT) 获益者。

PO-1910

双能 CT 定量参数及形态学特征对 IB-IIA 期宫颈癌淋巴结转移的预测价值

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目的:探讨双能 CT 定量参数及形态学特征对 IB-IIA 期宫颈癌淋巴结转移的预测价值。

方法:选择 2020 年 6 月—2023 年 6 月在南京医科大学第一附属医院术前行 DECT 检查、术后病理证实为 IB-IIA 期宫颈癌 (腺癌或鳞癌) 的患者 19 例,共纳入淋巴结 48 枚,根据病理诊断是否发生淋巴结转移分为转移组 5 例、淋巴结 10 枚,未转移组 14 例、淋巴结 38 枚。比较两组间 DECT 定量参数差异以及形态学特征差异,DECT 定量参数包括动脉期和静脉期各能量 (40keV、50keV、70keV、100keV、150keV)、能谱曲线斜率、虚拟平扫 (VNC)、净增强率 (CM)、碘浓度

(IC)、标准化碘浓度 (NIC)、脂肪分数、电子密度 (Rho)、有效原子序数 (Z) 和双能指数 (DEI)，形态学特征包括淋巴结的短径、长径、短长比、边缘是否光整、淋巴门结构是否存在，评估双能 CT 参数以及形态学特征对 IB-IIA 期宫颈癌淋巴结转移的预测效能。

结果：与未转移组相比，转移组具有更高的动脉期 NIC、静脉期 40keV、50keV、70keV (P 均 < 0.05) 和更低的静脉期能谱曲线斜率和脂肪分数 (P 均 < 0.05)。形态学特征中，相比于未转移组，转移组具有更短的短径、更长的长径，边缘不光整、淋巴门结构不存在的淋巴结占比也更多 (P 均 < 0.05)。DECT 中表现最好的单一指标是动脉期 NIC (AUC, 0.802; 灵敏度, 77.8%; 特异度, 76.0%)，而形态学参数的最佳指标为淋巴结短径 (AUC, 0.807; 灵敏度, 80%; 特异度, 89.5%)。联合模型的预测效能最高 (AUC, 0.849; 灵敏度, 77.8%; 特异度, 88.0%)。

结论：DECT 定量参数可以辅助预测 IB-IIA 期宫颈癌患者淋巴结转移，DECT 定量参数结合淋巴结形态学参数具有最高的预测效能。

PO-1911

基于深度学习的放射组学模型预测肝癌术后早期复发

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目的：提出一种基于深度学习的影像组学方法，用多期相的 CT 图像预测肝细胞性肝癌的术后早期复发。方法和材料：这项回顾性研究纳入 2018-2022 年间 334 例经手术切除和病理证实肝细胞性肝癌患者。其中 65 例患者术后 1 年内出现早期复发，204 例患者无早期复发。由一位 3 年工作经验的放射科医师在 ITK-SNAP 上勾画肝细胞性肝癌在 CT 平扫期、动脉期和门静脉期的边框。本研究还纳入性别，年龄，肿瘤数量，肿瘤大小，门静脉侵犯，HBV，ALT，AST，AKP，中性淋巴比 NLR，肝硬化，BCLC 分期，AFP 水平等常规临床指标。我们将 334 名患者随机分为 10 组，使用 10 折交叉验证法分别训练和测试模型。本研究基于深度学习构建了包含放射学特征和临床数据在内的 4 种组合模型。通过比较 ROC 曲线下面积 (AUC 值) 评估放射组学模型，临床模型，以及组合模型 A, B, C, D 的预测性能。结果：使用和不使用迁移学习的放射学模型 AUC 值分别为 0.736 和 0.689，略低于基于 SVM 的临床模型 0.7088，基于随机森林的临床模型 0.7532。此外，基于深度学习的放射组学模型比基于低阶特征的放射组学模型预测效能更高，AUC 值为 0.834 和 0.775。组合模型 A, B, C, D 的预测准确性分别为 0.789, 0.815, 0.785, 0.835。结论：基于深度学习的放射学模型有助于术前预测肝细胞性肝癌的早期复发，结合放射组学特征和临床指标的组合模型比单独使用放射组学或临床模型预测效能更好。

PO-1912

使用延迟双源 CT 细胞外体积分数 评估肝纤维化分期及程度的应用价值

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目的：研究双源 CT 不同延迟期测量肝细胞外体积分数 (extracellular volume fraction, ECV) 的差异，探索评估肝纤维化较为可靠的延迟扫描时间点。

方法：前瞻性纳入 2021 年 1 月至 2021 年 12 月进行多期腹部双源 CT 扫描和肝活检的慢性肝病患者，多期双源 CT 包括 3min、5min 延迟期。测量所有患者延迟期肝实质碘浓度 (IC) 及主动脉碘浓度 (ICA) 并计算 ECV。使用 Spearman 相关分析评估肝纤维化分期与 ECV 之间的相关性；使用单因素方差分析及最小显著性差异法比较不同分期肝纤维化间 ECV 值的差异；使用受试者

工作特征 (receiver operating characteristic, ROC) 曲线评估 ECV 值鉴别不同程度肝纤维化的诊断效能, 并计算其截断值、敏感度、特异度以及 ROC 曲线下面积 (area under the curve, AUC)。结果: 本研究共评估了 90 名参与者, 其中 S1 期 10 例, S2 期 29 例, S3 期 25 例, S4 期 26 例。肝纤维化分期与 ECV3min ($r=0.519$, $P<0.001$)、ECV5min ($r=0.447$, $P<0.001$) 呈中等程度正相关, 不同肝纤维化分期的 ECV3min、ECV5min 总体差异有统计学意义 ($P<0.05$)。肝纤维化不同分期组间的 ECV3min 与 ECV5min 值均无统计学差异。在诊断显著性肝纤维化 (S2-4) 时, ECV3min (AUC=0.874) 诊断效能优于 ECV5min (AUC=0.790), 且差异有统计学意义 ($P<0.05$); 在诊断进展期肝纤维化 (S3-4) 及肝硬化 (S4) 时, 两者诊断效能无显著差异, AUC 值分别为 0.776vs0.711 和 0.754vs0.737。

结论: 使用双源 CT 延迟测定的 ECV 值与肝纤维化组织学阶段具有较好的相关性, 并且延迟 3min 采集所得 ECV 值可以区分不同程度肝纤维化。

PO-1913

Native T1 mapping 在胰腺导管腺癌诊断中的可行性研究

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目的 通过扫描 Native T1 mapping 序列, 探讨 Native T1 mapping 在 PDAC 诊断中的价值。方法 收集 2021 年 7 月至 2023 年 1 月确诊 PDAC 患者 53 例, 将 PDAC 分为病变区和非病变区, 同时收集 31 例无胰腺相关疾病的患者作为对照组。所有患者扫描 DWI 和 T1 mapping 序列, 由 2 名医师在病变最大层面测量 Native T1 值和 ADC 值, 参考 T2WI、增强等轴位图像, 利用手绘法绘制 ROI, 避开主胰管、周围的血管、脂肪、病灶内坏死等成分, 取 2 位测量值之和平均值为最终值, 采用单因素方差分析或 Kruskal-Wallis H 检验比较各组参数值在 PDAC 病变区、非病变区和对照组间有无差异, 对有差异的参数, 则进一步进行 K 个独立样本非参数检验, 两两比较, 其中 $P<0.05$ 代表差异具有统计学意义; 采用 ROC 曲线评价单个参数以及多个参数联合鉴别 PDAC 和非胰腺癌 (非病变区和对照组) 之间的诊断效能, 计算各参数值 AUC、敏感度、特异度及临界值。

结果 Native T1 和 ADC 值在 PDAC 病变区、非病变区和对照组分布分别为 1594.27 (1537.25~1701.10) 和、 $1.23(1.11\sim1.37)\times10^{-3}\text{ mm}^2/\text{s}$ 、1076.68 (985.03~1202.03) 和 $1.14(1.06\sim1.24)\times10^{-3}\text{ mm}^2/\text{s}$ 、861.45 (825.55~912.68) 和 $1.08(0.96\sim1.19)\times10^{-3}\text{ mm}^2/\text{s}$, 两参数三组比较差异都有统计学意义 ($P<0.05$), 其中参数 Native T1 值两两比较差异有统计学意义 ($P<0.05$), ADC 值在病变区和对照组比较差异有统计学意义 ($P<0.05$), 病变区和非病变区以及非病变区和对照组比较差异无统计学差异 ($P>0.05$); ROC 曲线显示各参数值及联合 Native T1+ADC 鉴别 PDAC 和非胰腺癌的 AUC 分比为 0.954、0.651 和 0.954。结论 Native T1 mapping 有助于 PDAC 诊断, 可以有效鉴别 PDAC 病变区、非病变区和正常胰腺组织, 相比 ADC 值诊断效能更好, 两个参数联合诊断效能未见提高。

PO-1914

能谱 CT 在胰腺癌与肿块型慢性胰腺炎鉴别诊断中的应用价值

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目的: 探讨能谱 CT 在胰腺癌与肿块型慢性胰腺炎鉴别诊断中的应用价值

材料与方法: 收集经病理证实及经随访证实的胰腺导管腺癌和肿块型慢性胰腺炎的患者, 其中, 胰腺导管腺癌 75 例, 肿块型慢性胰腺炎 34 例, 获取患者 CT 的动静脉 CT 图像, 结合能谱 CT 后

处理技术, 获取淋巴结常规动静脉期 CT 值、40Kev 单能量 CT 值、有效原子序数值、标准化碘浓度值及能谱曲线斜率, 同时获取定性指标: 是否有胰腺导管截断、动静脉是否受累、远端胰腺是否萎缩、胰胆管是否扩张, 导管与实质的比值是否 ≥ 0.34 等。采用 SPSS 18.0 统计分析软件。首先对定量资料进行正态性分布检验, 符合正态分布采用配对 T 检验, 否则采用 Wilcoxon 秩和检验; 对定性资料采用卡方检验或 Fishers 精确检验。将有意义的单因素纳入多因素 Logistic 向前逐步回归分析, 得出结论。 $P < 0.05$ 认为具有统计学意义。

结果: 在多因素分析中, 动脉期 40KeVCT 值、胰腺导管截断比较存在统计学差异, 可作为鉴别胰腺导管腺癌与慢性肿块型胰腺炎的独立预测因素。

结论: 能谱 CT 是近年来 CT 领域一种新型的成像方式, 能够实现“同时、同源、同向、同步”, 能谱 CT 实现定量和定性参数相结合有助于胰腺导管腺癌与肿块型慢性胰腺炎的鉴别, 为二者的治疗和预后具有一定的指导意义。

PO-1915

基于光谱 CT 的放射组学模型术前预测胃癌 Lauren 分型

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目的: 探讨基于光谱 CT 动脉期 40KeV、静脉期 40Kev 的放射组学模型对胃癌 Lauren 分型的预测价值。

方法: 对 168 例术前行光谱 CT 及术后病理证实的胃癌患者进行回顾性分析。根据病理结果, 患者分为肠型组和非肠型组。训练集 ($n=105$) 和测试集 ($n=63$) 按 7:3 的比例随机分配。两名放射科医生分析传统特征, 使用逻辑回归确定独立预测因子建立临床模型。利用 FAE 软件对动静脉图像进行放射组学特征提取。采用 ICC 和 MRMR 算法进行降维, 使用 logistic 回归构建放射组学模型。采用 ROC 和 DCA 对模型性能进行评价。

结果: 临床因素中, 最大肿瘤厚度是 Lauren 分型的独立预测因子, 并用于建立临床模型。分别建立临床、放射组学、临床+放射组学模型。在训练集中, 各放射组学模型的预测效果均优于临床模型, 其中临床+放射组学模型的预测效果最好 (AUC: 0.934)。在测试集中, 临床+放射组学模型的预测性能也优于临床模型 (AUC: 0.908)。

结论: 基于基于光谱 CT 动脉期 40KeV、静脉期 40Kev 的临床+放射组学模型对胃癌 Lauren 分型的预测价值。

PO-1916

定量形态学特征鉴别小肾透明细胞癌与肾乏脂肪血管平滑肌脂肪瘤的价值

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目的: 探讨定量形态学特征在鉴别小肾透明细胞癌 (ccRCC) 与肾乏脂肪血管平滑肌脂肪瘤 (fpAML) 中的价值。

方法: 回顾性收集 2017 年 1 月至 2020 年 12 月经病理证实的直径 ≤ 4 cm 的 ccRCC (52 例) 与 fpAML (23 例) 的 CT 扫描图像, 测量肿瘤的定量形态学参数, 包括肿瘤长短径、肿瘤周长、瘤肾

界面长度、肾内肿瘤皮质夹角及肾外肿瘤皮质夹角,并获得肿瘤纵横比、瘤肾界面比、肾内外肿瘤皮质夹角比、肿瘤周长直径比。对两种肿瘤间各定量形态学参数的差异进行统计分析,进一步通过多因素分析筛选关键特征构建逻辑回归(LR)预测模型,绘制 ROC 曲线并计算曲线下面积(AUC)评价诊断效能。

结果: 单因素分析显示, ccRCC 的肿瘤短径、肿瘤周长、瘤肾界面长度、瘤肾界面比、肿瘤周长长径比均高于 fpAML, 而肿瘤纵横比及肿瘤周长短径比低于 fpAML, 两组间的差异存在统计学意义 ($P<0.05$); 两组肿瘤的长径、肾内肿瘤皮质夹角、肾外肿瘤皮质夹角及肾内外肿瘤皮质夹角比值间均无统计学差异 ($P>0.05$)。多因素分析显示瘤肾界面长度、纵横比及性别为鉴别两种肿瘤的独立因素。基于这三个独立因素构建的 LR 预测模型的准确率为 80.0%, 敏感度为 86.5%, 特异度为 65.2%。ROC 曲线显示单一定量形态学特征的 AUC 为 0.65~0.77, 而 LR 模型的 AUC 达 0.90。Delong 检验显示 LR 预测模型的性能优于单一的定量形态学特征 ($P<0.05$)。

结论: 定量形态学参数可以量化 ccRCC 与 fpAML 的形态学特征, 在两种肿瘤的鉴别中具有较好的诊断价值及应用潜能。

PO-1917

基于体素内不相干运动成像的直肠癌脉管浸润预测模型构建

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吉林大学第一医院

目的: 探索体素内不相干运动 (IVIM) 在直肠癌脉管浸润预测方面的应用

方法: 回顾性收集吉林大学第一医院 2019 年 1 月至 2020 年 1 月术前进行 IVIM 扫描 ($b=0, 25, 75, 125, 150, 175, 200, 400, 600, 800, 1000$ s/mm²) 的 83 名直肠癌患者, 脉管浸润阳性 (LVI+) : 脉管浸润阴性 (LVI-) = 51:32, 我们以 7: 3 的比例将患者分为训练集和验证集。感兴趣区 (ROI) 在 T2WI、DWI ($b=1000$ mm²/s) 图像上沿肿瘤边缘逐层勾画, 并测量 IVIM 定量参数 (ADC、D、D* 和 f 值)。利用多元逻辑回归构建基于 IVIM 定量参数模型; 另外, 基于 T2WI、IVIM 功能图 (包括 DWI、ADCmap、Dmap 和 fmap) 肿瘤区域, 构建影像组学模型, 最后在验证集中对模型效能进行验证。LVI+、LVI-组的变量差异使用 t 检验或 Mann-Whitney U 检验。统计学显著性设定为 $P<0.05$ 。在“rms”软件包上进行逻辑回归分析。通过 ROC 曲线下方的面积 (AUC 值) 评估模型的性能。

结果: LVI+、LVI-组间 ADC、D 和 D*值无显著差异 (P 分别为 0.086、0.108、0.750), LVI+病灶的 f 值显著高于 LVI-病灶 ($P=0.002$, $P<0.05$)。基于单变量逻辑回归, 建立了基于 f 值的预测模型, AUC (95%CI) 为 0.699 (0.580-0.818)。基于 T2WI、IVIM 功能图 (包括 DWI、ADCmap、Dmap 和 fmap) 肿瘤区域构建的影像组学模型, 验证集 AUC (95%CI) 为 0.894 (0.731, 1.000)。

结论: 研究结果表明, 基于 IVIM 功能图的影像组学模型在术前预测直肠癌脉管浸润方面具有较好的诊断效能, 并优于基于 IVIM 定量参数构建的模型效能, 有望为术前预测直肠癌脉管浸润提供有效工具, 辅助临床决策。

PO-1918

MSCT 多平面重组技术在腹股沟疝鉴别及嵌顿疝预测中的价值丁文博¹、陈颖²、李红³、施海华⁴

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目的 分析多排螺旋 CT (MSCT) 多平面重组(MPR)技术在腹股沟疝鉴别及嵌顿疝预测中的价值。

方法 回顾性分析 2017 年 1 月至 2022 年 12 月经手术证实的 110 例腹股沟疝术前 MSCT 图像, 其中斜疝 49 例, 直疝 36 例, 股疝 25 例。观察冠状位及斜冠状位 MPR 图像中腹股沟韧带、腹壁下动脉、直疝三角、股三角的显示情况, 以及疝内容物、疝囊颈比、特殊征象等。结果 腹股沟韧带在冠状位 MPR 和斜冠状位 MPR 图像中完全显示分别为 24 例 (20.7%) 和 63 例 (54.3%), 部分显示分别为 43 例 (37.1%) 和 33 例 (28.4%), 不显示分别为 49 例 (42.2) 和 20 例 (17.2%), 斜冠状位 MPR 对腹股沟韧带的完全显示率优于冠状位 MPR, 两者差异存在统计学意义 ($P=0.00$)。三种类型疝内容物包括小肠、积液、肠系膜、脂肪等。其中, 股疝疝囊内出现积液的几率高于斜疝和直疝 ($P=0.00$), 斜疝疝囊内出现脂肪的几率低于直疝和股疝 ($P<0.05$)。侧新月征和直疝三角填塞征在直疝中的发生率高于斜疝和股疝 ($P=0.00$), 股三角填塞征在股疝中的发生率高于斜疝和直疝 ($P=0.00$)。7 个 (7/51, 13.7%) 斜疝疝囊发生嵌顿, 6 个 (6/39, 15.4%) 直疝疝囊发生嵌顿, 19 个 (19/26, 73.1%) 股疝疝囊发生嵌顿, 股疝嵌顿发生率高于斜疝和直疝 ($P<0.05$)。嵌顿性斜疝和直疝中, 疝囊出现积液的几率高于非嵌顿疝 ($P=0.00$)。嵌顿性和非嵌顿性斜疝的疝囊颈比分别为 3.9 ± 2.4 和 1.6 ± 0.5 , 两组差异存在统计学意义 ($P=0.02$), 当临界值为 2.3 时, 约登指数最大 (0.91), ROC 曲线下面积 (AUC) 为 0.97; 嵌顿性和非嵌顿性直疝的疝囊颈比分别为 4.6 ± 0.5 和 2.4 ± 0.9 , 当临界值为 3.9 时, 约登指数最大 (0.97), AUC 为 0.98; 嵌顿性和非嵌顿性股疝的疝囊颈比分别为 3.9 ± 1.4 和 2.6 ± 0.7 , 当临界值为 3.2 时, 约登指数最大 (0.59), AUC 为 0.84。结论 MSCT MPR 技术能很好显示腹股沟区解剖结构及判断腹股沟疝类型, 疝囊内积液、疝囊颈比有助于嵌顿疝的术前诊断。

PO-1919

影像学方法对孤立性肝细胞癌微血管侵袭的术前预测能力：一项系统回顾和荟萃分析董雪¹、苟骏久²、李璟琪²、李盈锋²、杨正汉¹

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目的: 孤立性肝细胞癌为肝细胞癌的其中一种特殊亚型。微血管浸润 (MVI) 是肝细胞癌的一种侵袭性血管亚型, 与往往导致较差的预后。近年来, 许多医学成像领域的研究探究了对 MVI 术前无创预测, 包括放射组学与常规成像方法。本荟萃分析目的在于比较放射组学和非放射组学方法在孤立性肝细胞癌中 MVI 状态的术前预测中的价值。

方法: 检索了 PubMed、Embase、Web of Science 和 Cochrane 数据库, 时间截至 2023 年 4 月 7 日。使用随机效应模型计算合并的敏感性、特异性、阳性似然比和阴性似然比。生成总结受试者工作特性曲线和曲线下面积 (AUC), 以评估放射组学模型和非放射组学模型的诊断准确性。使用标准化的数据抽取表格收集每个出版物的信息。meta 回归分析和亚组分析用于解释异质性。

结果: 最终纳入 26 篇文献, 涉及 3539 名孤立性肝细胞癌患者, 其中 1430 例 MVI 阳性病例和 2109 例患者 MVI 阴性。对于放射组学模型, 合并敏感度、特异度、SROC 曲线下的 AUC 分别为

0.74[95%CI:0.59-0.84]、0.80[95%CI:0.74-0.85]、0.84 [95%CI:0.81 - 0.87]，非放射组学模型对应为 0.74[95%CI: 0.65, 0.81]、0.88[95%CI:0.82, 0.92]、0.88[95%CI:0.85, 0.91]，均具有中等诊断价值。通过 meta 回归和亚组分析显示，放射组学和非放射组学模型中肿瘤大小是敏感度异质性的显著影响因素，影像学检查方式和建模方法是特异度异质性的显著影响因素。

结论：基于放射组学或非放射组学的孤立性肝细胞癌 MVI 术前预测模型均具有中等诊断价值，放射组学模型表现出较高的敏感性，但特异度较差且具有异质性。未来的研究中设计前瞻性、大规模、多中心、更严格标准化的评估方案，从而更有力提示放射组学具有用于孤立性肝细胞癌 MVI 的预测潜力。

PO-1920

临床-CT 影像组学列线图术前预测结肠癌淋巴结转移应用研究

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摘要 目的 构建预测结肠癌（CC）淋巴结转移（LNM）的临床影像模型、影像组学模型和基于上述两者的联合模型，比较各模型诊断效能。方法 回顾性分析经手术病理证实的 328 例 CC 患者资料，其中 LNM 者 156 例，随机分为训练组（229 例）和验证组（99 例）。比较临床影像指标组间差异并构建诊断 LNM 的临床影像模型；肿瘤三维体积感兴趣区（VOI）用于影像组学特征提取，经降维、筛选后获得 8 个特征用于构建影像组学评分（rad-score）；构建临床影像指标和 rad-score 的联合模型。比较各模型诊断 LNM 的效能，并评估最优模型校准度和临床获益。结果 两组间临床影像指标：CEA、CA199、肿瘤长径、淋巴结短径有统计学差异（均 $P < 0.05$ ）。临床影像模型、影像组学模型、联合模型 AUC 分别为 0.721、0.814、0.854（训练组），0.744、0.732、0.808（验证组）。联合模型 AUC 最大，训练组和验证组均大于临床影像模型（均 $P < 0.05$ ）。联合模型显示出较高的校准度，DCA 阈值范围 0.09~0.91 有临床获益。结论 基于临床影像指标和 CT 影像组学构建的列线图诊断 CC 淋巴结转移价值较高。

PO-1921

基于对比增强 CT 的定量测量鉴别小透明细胞肾细胞癌和小良性肾脏肿瘤

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目的：评估在对比增强 CT 上的定量测量在鉴别小（ ≤ 4 cm）透明细胞肾细胞癌（clear cell renal cell carcinoma, ccRCC）和小良性肾脏肿瘤[包括乏脂性血管平滑肌脂肪瘤（fat-poor angiomyolipoma, fpAML）和肾脏嗜酸细胞瘤（renal oncocytoma, RO）]的潜力。

方法：我们纳入 244 名经病理证实为 ccRCC（ $n=184$ ）和良性肾脏肿瘤（fpAML, $n=50$ ；RO, $n=10$ ）的病例，并随机分为训练队列（ $n=193$ ）和测试队列 1（ $n=51$ ），并从另一个医院纳入一个外部测试队列 2（ $n=50$ ）。我们通过对多期对比增强 CT（包括平扫期，UP；皮髓质期，CMP；实质期，NP；排泄期，EP）中肾脏病灶和肾脏皮质的密度进行测量与计算以获取定量测量参数。单变量和多变量逻辑回归分析用于评估这些参数和 ccRCC 之间的相关性。最后，构建的多变量模型将与放射科医生的诊断进行比较。

结果：在单变量逻辑回归分析中，UP 相关参数，尤其是 UPC-T（UP 时肾皮质密度减去肿瘤密度）在训练队列中取得了 0.766 的 AUC，在测试队列 1 中 AUC 为 0.901，在测试队列 2 中 AUC 为 0.805。异质性相关参数 SD（标准差）在训练队列、测试队列 1、测试队列 2 的 AUC 分别为 0.781，

0.834 和 0.875。在多变量逻辑回归分析中, 纳入 UPC-T, NPC-T (NP 肾皮质密度减去肿瘤密度), CMPT-UPT (CMP 肿瘤密度减去 UP 肿瘤密度) 和 SD 的模型 1 在训练队列、测试队列 1、测试队列 2 中的 AUC 分别为 0.866, 0.923 和 0.949。当与放射科医生进行比较时, 4 个多变量模型均显示出比 3 个放射科医生评估更高的准确度 (模型的准确度为 0.800-0.860, 放射科医生的准确度为 0.700-0.720) 和敏感度 (模型的准确度为 0.794-0.971, 放射科医生的准确度为 0.599-0.706)。结论: 在对比增强 CT 上的定量测量, 尤其是 UP 相关参数和异质性相关参数, 具有鉴别小 ccRCC 和小良性肾脏肿瘤 (包括 fpAML 和 RO) 的潜能。

PO-1922

吞服异物引起的各种并发症的临床及影像特征分析

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目的: 本文分析了从口腔摄入的各种异物引起的罕见并发症的 17 例患者, 提高临床医师对此类疾病的认识, 减少漏诊和误诊。

方法: 回顾性收集 2013-2023 年因吞服异物所引起的严重并发症而就诊的患者, 总结这些患者出现的不同系统并发症的临床及影像表现。

结果: 共 17 例患者因异物相关并发症入院, 主要表现为消化系统的并发症, 其次还有循环系统以及呼吸系统的并发症。其中, 异物引起穿孔并临近组织急性感染或化脓者共 7 例, 异物引起慢性肉芽肿 3 例, 异物引起小肠坏死 2 例, 异物穿破颈内静脉并血栓形成者 1 例, 异物移行到肝脏引起慢性炎症团块者 1 例, 异物穿孔引起广泛皮下气肿 1 例, 异物穿孔引起肝脓肿者 1 例, 异物引起血肿形成者 1 例。在所有的异物类型中, 鱼骨占绝大多数, 有 13 例患者症状皆由鱼骨引起, 鸡骨 1 例, 枣核 1 例, 围棋 1 例, 木筷残端 1 例。所有患者都有患病部位的 CT 检查图像, 手术治疗患者 13 例, 内镜治疗患者 3 例, 保守治疗患者 1 例。

总结: 临床上不同异物引起的症状和表现千差万别, 针对一些不太常见的影像表现, 临床医生需要结合病史排除异物穿孔或梗阻引起并发症的可能, 这对于及时有效地治疗患者至关重要。

PO-1923

双层探测器光谱 CT 在鉴别原发肝癌与富血供肝转移瘤中的价值

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目的: 探讨双层探测器光谱 CT 在鉴别原发性肝癌与富血供肝转移瘤中的价值。

方法: 回顾性收集 2021 年 10 月至 2023 年 5 月经病理或临床确诊的 24 例富血供肝转移瘤患者及 32 例原发肝癌患者, 测量并分析动脉期和静脉期下 40keV-190keV (每间隔 10keV) 单能量 CT 值, 无水碘 (INW)、碘密度 (ID)、有效原子序数 (Zeff) 及电子密度 (ED), 并计算出以同层肝实质为对照的单能量相对 CT 值 (nCT1)、相对无水碘 (nINW1)、相对碘密度 (nID1)、相对有效原子序数 (nZeff1)、相对电子密度 (nED1) 和以同层腹主动脉为对照的单能量相对 CT 值 (nCT2)、相对碘密度 (nID2)、相对无水碘 (nINW2)、相对有效原子序数 (nZeff2)、相对电子密度 (nED2)。分析上述参数在富血供肝转移瘤和原发肝癌患者间的统计学差异。

结果: 动脉期中, 富血供肝转移瘤在 40keV、50keV、60keV 下的 nCT1 及 nINW1、nID1、nZeff1、nZeff2 均小于原发肝癌, 具有统计学差异; 静脉期中, 富血供肝转移瘤 nZeff2 小于原发肝癌, nED2 的富血供肝转移瘤大于原发肝癌, 具有统计学差异。其中, 动脉期中 40keV 下的 nCT1 及 nINW1、nID1 具有较大临床意义, 其他均具有中等程度临床意义。以富血供肝转移瘤为对照, 动

脉期下, nCT1 为 40keV、50keV、60keV 时在鉴别富血供肝转移和原发肝癌上呈较弱正相关关系, nNW1、nID1 呈中等正相关, nZeff1、nZeff2 呈较弱正相关; 静脉期下 nZeff2 呈较弱正相关, nED2 呈较弱负相关。对以上有意义值绘制受试者工作特征曲线 (ROC), 并计算曲线下面积 (AUC)。AUC 在动脉期下的 nID1 最大, 为 0.747, 以 3.115 为阈值鉴别原发与转移最佳, 敏感度和特异性分别为 62.5%、87.5%。

结论: 双层探测器光谱 CT 多项定量参数在鉴别富血供肝转移瘤和原发肝癌中具有显著作用。尤其是动脉期中, 40keV 下的 nCT1、nINW1 和 nID1 在鉴别两者上具有较大的临床意义, 可作为临床鉴别富血供肝转移瘤和原发肝癌的重要指标。

PO-1924

应用能谱 CT 细胞外体积分数评估卵巢癌 WT-1 状态的初步探索

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目的 探索双能量 CT 测量胰腺细胞外体积分数(extracellular volume fraction, ECV)评估卵巢癌肾母细胞瘤基因-1 (Wilms tumor gene-1, WT-1)状态。

材料和方法 回顾性收集在大连医科大学附属第一医院经行单源双能 CT 能谱扫描并经病理证实的卵巢癌患者 93 例。其中 WT-1 阳性患者 70 例; WT-1 阴性患者 23 例。收集 CT 扫描前的血细胞比积 (HCT), 测量肿瘤实性成分增强延迟期的标准化碘浓度值 (D-NIC), 计算 ECV 值 ($ECV = (1 - HCT/100) * (D-NIC)$)。通过两独立样本 t 检验比较 WT-1 阳性与阴性患者 ECV 分数, 采用受试者工作特征(ROC)分析, 评价 ECV 预测卵巢癌 WT-1 表达的效能。

结果 卵巢癌 WT-1 阳性患者的患者 ECV (0.38 ± 0.23) 高于 WT-1 阴性 ECV (0.23 ± 1.55), $P=0.03$ 。ECV 预测卵巢癌 WT-1 表达阳性的曲线下面积 (area under the curve, AUC) 为 0.718 ($0.615, 0.806$), 敏感度、特异度分别为 61.43%、78.26%。

结论 卵巢癌 WT-1 阳性组的 ECV 值高于 WT-1 阴性组。ECV 对于预测卵巢癌 WT-1 表达具有一定的临床应用价值。

PO-1925

基于磁共振多 b 值 DWI 数据的生境成像与肝细胞癌 VETC 占比的相关性研究

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目的: 利用生境成像从定量磁共振成像数据中识别出 HCC 病灶内不同的子区域, 并与通过组织病理切片评估的 VETC 区域的面积比例进行对照, 分析两者之间的相关性。

方法: 收集 2022 年 1 月 1 日至 2023 年 1 月 31 日期间 104 例 HCC 患者的 CD34 免疫组织化学染色的病理切片, 所有患者均在手术前行包含多 b 值 DWI 序列的常规 MR 腹部检查。DWI 数据通过软件后处理得到 ADC 图及 IVIM 的 D*图。利用生境成像分析在两个参数图上将整个肿瘤分割成四个子区域, 分别是低 ADC 值/低 D*值区 (Low_ADC/Low_D*, LL)、低 ADC 值/高 D*值区 (Low_ADC/Hight_D*, LH)、高 ADC 值/低 D*值区 (Hight_ADC/Low_D*, HL)、高 ADC 值/高 D*值区 (Hight_ADC/Hight_D*, HH), 然后计算各个子区域的体积百分比。在 CD34 免疫组织化学染色的病理切片上评估存在 VETC 结构的区域占整个肿瘤组织总面积的比例 (VETC 占比), 通过 VETC 占比将病例分为 VETC-、VETC+和 VETC++三个分组。使用单因素方差分析评估生境

成像衍生的各子区域的体积比在组织病理学定义的三个 VETC 分组之间的差异。使用 Spearman 相关性分析评估 VETC 占比与低 ADC 值/高 D*值 (LH) 子区域体积比之间的相关性。

结果: 104 例患者中, 48 例 (46.2%) 为 VETC-, 45 例 (43.3%) 为 VETC+, 11 例 (10.6%) 为 VETC++。只有低 ADC 值/高 D*值 (LH) 子区域体积比在 VETC-、VETC+和 VETC++三个组织病理学分组之间都有显著性差异 (所有 $p < 0.001$)。LH 子区域的体积比与 VETC 占比呈现出正向的强相关性 ($r=0.722$, $p < 0.001$)。

结论: 从 MRI 多 b 值 DWI 数据中分析得出的肿瘤生境与组织病理学染色呈现正相关, 它提供了一种无创评估 HCC 的 VETC 结构特征的影像学新方法。

PO-1926

DTI 定量参数预测宫颈鳞状细胞癌周围神经侵犯的可行性研究

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目的: 探讨磁共振扩散张量成像 (diffusion tensor imaging, DTI) 定量参数预测宫颈癌神经侵犯的可行性。 **方法:** 回顾性分析经手术病理证实的 44 例宫颈鳞状细胞癌患者资料, 其中神经侵犯 19 例, 无神经侵犯 25 例, 所有患者术前均行 1.5 T MR (Signa HDxt, GE Medical Systems, USA) 扫描, 包涵 DTI 序列扫描。由两位观察者分别测量两组病例实质区 DTI 的平均扩散系数 (DC avg)、各向异性分数 (FA)、各向同性 (Iso)、容积比各向异性分数 (VRA)、衰减指数 (Exat) 以及 T2 加权迹线 (T2-weighted trace, T2-WT) 值。使用组内相关系数 (intra-class correlation coefficients, ICC) 来检验两位观察者测量值的一致性。检验两组病例间各参数值的差异, 使用 ROC 评估有统计学差异参数的鉴别效能。 **结果:** 两位观察者测量各组数据的一致性很好 (ICC > 0.75)。神经侵犯 (peripheral nerve invasion, PNI) 阳性组的 DC avg 值、FA 值和 VRA 值小于 PNI 阴性组, 差异均有统计学意义 ($P < 0.05$)。两组间 Iso、Exat 和 T2-WT 值无统计学差异 ($P > 0.05$)。DC avg 值、FA 值和 VRA 值的曲线下面积 (area under curve, AUC) 分别为 0.688、0.687 和 0.699。 **结论:** DTI 可以更准确地反映水分子的扩散情况, 并有效预测宫颈鳞状细胞癌 PNI 的发生, 为患者后期治疗方案提供重要参考。

PO-1927

基于 APT 影像组学评估宫颈癌淋巴结转移

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目的: 本研究旨在探讨 3D 酰胺质子转移加权 (APT_w) 影像组学模型在预测宫颈癌淋巴血管间隙浸润的诊断价值。

方法: 回顾性分析 2019 年 7 月至 2023 年 4 月经手术病理证实的 74 例宫颈癌患者的临床资料及术前 MRI 图像, 其中淋巴转移组患者 18 例; 非淋巴结转移组患者 56 例。对对照常规 MRI 平扫和增强图像, 在 3D APT_w 定量图像上进行特征提取。使用 uAI Research Portal 软件进行影像组学分析。通过最小冗余-最大相关性 (mRMR) 和最小绝对收缩和选择算子 (LASSO) 算法对提取的特征进行降维处理。使用随机森林模型 (Random forest, RF) 构建影像组学模型。

结果: 最终本研究纳入 8 个影像组学特征并用于构建模型。RF 模型显示, 训练集和测试集的 AUC 分别为 0.933 和 0.886。在测试集中, 灵敏度、特异性、准确度分别为 0.75、0.91 和 0.87。

结论: 基于 APT 影像组学能有效预测宫颈癌的淋巴结转移。这种无创性预测技术能为患者的术前诊断、个性化治疗方案制定、预后评估提供重要信息, 在未来的临床诊疗工作中具有广阔的应用前景。

PO-1928

基于 MRI 的肾上腺体积对肌、脂、骨成分改变的影响

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目的: 肾上腺体积 (AGV) 被认为是下丘脑-垂体-肾上腺 (HPA) 轴激活的标志物, 在机体代谢和健康中起到重要的调节作用。本研究旨在探讨 AGV 对于肌肉、脂肪和骨成分的影响, 以更好地理解 HPA 轴在身体组成调节中的作用机制。**方法:** 回顾性分析 2017 年 1 月至 2021 年 3 月于我院行 1.5T 或者 3.0T MRI 检查的住院患者的临床及影像资料。基于 MRI 图像对每位受试者的皮下脂肪组织 (SAT)、内脏脂肪组织 (VAT)、肝脏脂肪分数 (HFF)、胰腺脂肪分数 (PFF)、骨髓脂肪组织 (BMAT)、腹部肌肉 (AM) 和双侧平均 AGV 进行测量。采用独立样本 t 检验或 Mann-Whitney U 检验比较两组之间各参数值的差异。采用 Pearson 和 Spearman 相关性分析以及偏相关分析 (对身高、体重、BMI 以及年龄进行调整) 评估双侧平均 AGV 与肌肉、脂肪和骨成分之间的相关性。**结果:** 共纳入患者 238 例 (男 117 例, 女 121 例)。男性的 VAT 面积、AM 面积和双侧平均 AGV 显著高于女性, 而 SAT 面积则低于女性 ($P < 0.05$)。相关性分析结果显示, 在整体患者群中, 双侧平均 AGV 与身高、体重、BMI、VAT 面积、PFF 和 AM 面积均呈正相关; 在男性中, 双侧平均 AGV 与体重、BMI、VAT 面积和 PFF 均呈正相关, 而在女性中, 双侧平均 AGV 与体重、BMI、年龄、SAT 面积、VAT 面积、PFF 和 AM 面积均呈正相关 ($P < 0.05$)。经过校正身高、体重、BMI 和年龄后的偏相关分析结果显示, 在整体患者群和女性中, 双侧平均 AGV 与 VAT 面积和 PFF 呈正相关, 而在男性中, 双侧平均 AGV 只与 VAT 面积呈正相关 ($P < 0.05$)。**结论:** 本研究探讨了 AGV 与肌肉、脂肪和骨成分之间的关系, 并强调了 HPA 轴可能主要通过影响腹部 VAT 面积和 PFF 来对机体代谢和健康产生重要的调控作用, 此外, 性别、年龄和体型差异可能会对这种调控作用产生影响。这一发现对于理解 HPA 轴活动与代谢调控之间的关系提供了新的见解, 对未来的健康研究具有重要意义。

PO-1929

CT 影像-代谢组学对急性胰腺炎严重程度的预测价值

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目的: 急性胰腺炎是一种临床上常见且严重的疾病, 其严重程度的早期准确评估对于有效治疗和改善患者预后至关重要。本研究旨在探讨 CT 影像-代谢组学的急性胰腺炎严重程度的预测价值。

方法: 回顾性分析自 2016 年 8 月至 2018 年 5 月在大连医科大学附属第一医院住院治疗的急性胰腺炎患者的临床、影像及实验室资料。根据改良的 Marshall 系统评分标准将急性胰腺炎分为轻症和中重症, 最终纳入轻症组 30 例, 中重症组 12 例。对所有患者血清进行非靶向代谢组学分析。使用联影 uAI Research Portal 科研平台对全胰腺进行手动分割, 得到感兴趣区体积 (VOI), 并进行标准化处理和影像组学特征的提取。按照 8:2 的比例将影像资料随机分为训练集与验证集。采用 t 检验 (t test) 和最小绝对值收敛和选择算子 (LASSO) 回归分析对提取的组学特征进行筛选, 采用随机森

林模型(random forest,RF)在训练组中进行建模对胰腺炎的严重程度进行鉴别。通过绘制受试者工作特征(ROC)曲线评价模型的诊断效能。

结果:本研究最终筛选出 7 个影像组特征和 15 个代谢组特征用于构建模型。模型在训练集的 AUC、灵敏度、特异度分别为 97.73%、81.82%和 100%;在验证集中的 AUC、灵敏度、特异度分别为 87.50%、100%和 87.50%。

结论:基于 CT 影像-代谢组学模型在急性胰腺炎严重程度方面具有良好的预测价值。本研究为临床医生提供了一种新的工具,有助于更准确地评估急性胰腺炎患者的病情严重程度,从而采取适当的治疗干预措施,提高患者的治疗效果和预后。

PO-1930

基于磁共振脂肪分数图的肝脏脂肪、胰腺脂肪和内脏脂肪与血清总胆汁酸的相关性研究

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目的:基于 MRI 脂肪分数图定量评估血清总胆汁酸(serum total bile acid, TBA)与胰腺脂肪分数(pancreatic fat fraction, PFF)、肝脏脂肪分数(hepatic fat fraction, HFF)和内脏脂肪组织(visceral adipose tissue, VAT)的相关性。

材料与方法:回顾性分析大连医科大学附属第一医院 2017 年 1 月至 2021 年 3 月行上腹部 1.5T 或 3.0T MRI 扫描的患者资料,扫描序列包括 IDEAL-IQ 或 mDixon Quant 序列。测量每个患者的 HFF、PFF 和 VAT 面积。对 TBA 与 HFF、PFF 以及 VAT 面积的相关性进行评估。参数呈正态分布采用皮尔逊相关系数;否则,采用 Spearman 相关系数。

结果:本研究共纳入 179 名受试者(男性 78 例,女性 101 例),平均年龄为 60 岁,平均 BMI 为 24.46 kg/m²。TBA 与 PFF、HFF 之间存在显著相关性(r 值分别为 0.220 和 0.181, P < 0.05)。TBA 与 VAT 面积无相关性(r = 0.130, P = 0.084)。结论:TBA 可能与 HFF 和 PFF 相关。早期干预胆汁酸代谢可能成为预防和治疗肝脏、胰腺脂肪浸润的新途径。本研究确定胆汁酸与 HFF 和 PFF 的关系,了解其潜在的作用机制,为肝脏脂肪浸润和胰腺脂肪浸润的诊断和治疗提供了新思路。

PO-1931

基于 MRI 评估肾上腺体积与 T2DM 的关系

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目的:本研究旨在使用 MRI 评估肾上腺体积(AGV),并探讨其作为下丘脑-垂体-肾上腺(HPA)轴激活的标志物在 T2DM 中的潜在作用。方法:回顾性收集 2017 年 1 月至 2021 年 3 月大连医科大学附属第一医院住院患者的临床及影像信息。共纳入 238 例患者,其中 T2DM 患者 53 例,非 T2DM 患者 185 例。所有受试者均接受了腹部 1.5T 或 3.0T 的 MRI 扫描,扫描序列包括肝脏快速容积成像(LAVA)、非对称回波最小二乘估算法迭代水脂分离序列(IDEAL-IQ)或魔镜成像(mDixon Quant)序列,图像质量均满足测量要求。基于 MRI 图像对每位受试者的皮下脂肪组织(SAT)、内脏脂肪组织(VAT)和双侧平均 AGV 进行测量。采用类内相关系数(ICC)对观察者间和观察者内测量结果的一致性进行分析,采用独立样本 t 检验或 Mann-Whitney U 检验比较各参数值之间的差异。采用单因素和多因素 Logistic 回归模型分析 SAT 面积、VAT 面积、VAT/SAT

(V/S) 和双侧平均 AGV 与 T2DM 的关系。**结果:** 观察者间和观察者内的测量结果一致性良好 (ICC > 0.75)。T2DM 组的 VAT 面积、V/S 和双侧平均 AGV 均高于非 T2DM 组, 差异均具有统计学意义 ($P < 0.05$)。然而, 两组之间的 SAT 面积无显著性差异 ($P > 0.05$)。**logistic** 回归分析结果显示,在校正身高、体重、性别、V/S、VAT 面积后, 年龄和双侧平均 AGV 仍然与 T2DM 显著相关 (年龄: OR = 1.060, 95% CI = 1.029-1.093; AGV: OR = 2.516, 95% CI = 1.837-3.446)。**结论:** VAT 面积和双侧平均 AGV 增加均与 T2DM 的患病风险增加相关, 然而, 双侧平均 AGV 是 T2DM 的独立危险因素。这一发现提示了 AGV 作为 HPA 轴激活的标志物, 在 T2DM 中可能通过介导内脏脂肪的积累发挥潜在作用。本研究为深入理解 T2DM 的发病机制提供了新的见解, 并为相关疾病的预防和治疗提供了潜在的靶向策略。

PO-1932

基于肾上腺体积的影像组学模型对 2 型糖尿病诊断价值的研究

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目的: 2 型糖尿病 (T2DM) 是一种常见且目前不能彻底治愈的疾病, 早期诊断并准确评估对其治疗与改善预后至关重要。本研究旨在探讨基于肾上腺体积 (AGV) 的影像组学模型对 T2DM 的诊断价值。**方法:** 回顾性分析自 2017 年 1 月至 2021 年 3 月在大连医科大学附属第一医院住院治疗的 T2DM 患者的临床及 MRI 资料。利用 ITK-SNAP 软件对患者双侧肾上腺进行感兴趣区 (ROI) 的勾画, 使 ROI 的范围尽量覆盖整个肾上腺。使用联影 uAI Research Portal 平台进行标准化处理和影像组学特征的提取。使用 K 最佳选择法 (select K Best) 和最小绝对值收敛和选择算子 (LASSO) 回归对提取的组学特征进行筛选, 采用 Bagging 决策树构建 T2DM 的影像组学诊断模型。通过绘制患者工作特征 (ROC) 曲线评价模型的诊断效能。**结果:** 本研究共提取 1184 个影像组学特征, 最终筛选出 4 个特征用于构建模型。Bagging 决策树在训练集的 AUC、灵敏度、特异度分别为 0.93 (0.904-0.957)、88.60% 和 80.60%; 在验证集中的 AUC、灵敏度、特异度分别为 0.865 (0.775-0.956)、83.30% 和 77.90%。**结论:** 基于 AGV 的影像组学模型对 T2DM 具有良好的诊断效能。本研究为临床医生提供了一种新的工具, 有助于早期诊断 T2DM, 从而采取适当的治疗干预措施, 极大改善患者的预后。

PO-1933

T1/T2 期直肠癌周围脂肪与皮下脂肪和内脏脂肪的影像组学差异性研究

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目的: 本研究旨在探讨 T1/T2 期直肠癌周围脂肪组织与皮下脂肪组织 (SAT) 和内脏脂肪组织 (VAT) 的影像组学特征的差异, 以揭示直肠癌早期发展过程中肿瘤周围脂肪组织的变化情况。**方法:** 回顾性分析大连医科大学附属第一医院 2017 年 1 月至 2022 年 9 月期间经手术病理证实的 86 例 T1/T2 期直肠癌患者的临床及影像资料。使用 ITK-SNAP 软件手动勾画直肠癌肿瘤周围脂肪组织、SAT 和 VAT。使用联影 uAI Research Portal 科研平台对图像进行标准化处理和影像组学特征的提取。采用 K 最佳选择法 (select K Best) 和最小绝对值收敛和选择算子 (LASSO) 回归分析对提取的组学特征进行筛选。采用单因素方差分析或 Kruskal-Wallis H 秩和检验对筛选后的组学特征进行差异性分析。**结果:** 本研究共获得 2264 个影像特征参数, 通过特征降维及筛选最终保留 5 个特征

参数, 分别为 `laplaciansharpening_firstorder_10Percentile`、`recursivegaussian_firstorder_Median`、`wavelet_firstorder_wavelet-LLH-RootMeanSquaredv`、`wavelet_firstorder_wavelet-HLL-MeanAbsoluteDeviation` 以及 `wavelet_firstorder_wavelet-HLLH-RobustMeanAbsoluteDeviation`。单因素方差分析结果显示, 肿瘤周围脂肪组织与 SAT 和 VAT 之间的影像组学特征差异有统计学意义 ($P < 0.05$)。结论: 本研究发现 T1/T2 期直肠癌患者的肿瘤周围脂肪组织在影像组学上显示出与 SAT 和 VAT 不同的特征。这可能意味着早期直肠癌肿瘤周围的脂肪组织发生了潜在的白色脂肪褐变。这一发现对于了解直肠癌早期发展过程中脂肪组织的变化以及影响肿瘤生长的机制具有重要意义。未来进一步研究阻断脂肪组织褐变的治疗方法可能为早期直肠癌患者提供有效的治疗方案。

PO-1934

CT 腹部脂肪定量测量与腹主动脉钙化相关性的研究

陈若余

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目的: 探讨腹主动脉钙化严重程度与腹部内脏脂肪的相关性。方法: 回顾性分析临床病史资料齐全并接受全腹及盆腔 CT 平扫的 166 例受试者。根据腹主动脉钙化 (AAC) 积分将受试者分为三组 (无钙化组、轻度钙化组、重度钙化组), 采用组内相关性检验 (ICC 检验) 和 Kappa 一致性检验分别评估 2 名影像医师对腹部脂肪测量和腹主动脉钙化分级的一致性, 采用独立样本 t 检验和多因素 Logistic 回归分析腹主动脉钙化积分与腹部脂肪的关系。结果: ①2 名影像医师对腹部脂肪测量 (ICC 均 > 0.833) 和腹主动脉钙化分级 ($\kappa = 0.86$) 具有较高一致性。②L3-4 椎体中间层面的内脏脂肪面积 (VFA) 对腹腔总体内脏脂肪体积 (VFV) 具有代表性 ($r = 0.838$, $P < 0.001$)。③重度钙化组 VFA 占比 (VFA%) 显著高于无钙化组 ($p < 0.01$)。④年龄 ($OR = 3.803$ $p < 0.01$)、VFA% ($OR = 1.728$ $p < 0.05$)、血脂异常 ($OR = 3.08$ $p < 0.05$) 是腹主动脉钙化的独立危险因素。结论: 腹主动脉钙化严重程度与腹部内脏脂肪显著相关。

PO-1935

动态定量增强磁共振成像对外周带前列腺癌的诊断价值

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目的 探讨磁共振动态增强扫描 (DCE-MRI) 定量分析在外周带前列腺癌的诊断价值, 并分析 DCE 定量参数在鉴别外周带前列腺癌与正常腺体的诊断效能。材料与方法 收集苏州大学附属第一医院临床高度怀疑前列腺癌且经穿刺或手术病理证实的外周带前列腺癌的 mp-MRI (T2WI, DWI, DCE) 资料和临床资料, 选取 23 例外周带癌 (共 42 个病灶), 并选取正常外周带腺体 39 例 (共 68 个区域), 分别获取前列腺癌组与正常腺体组 DCE-MRI 定量参数容积转运常数 (K_{trans})、速率常数 (K_{ep})、血管外细胞外间隙容积分数 (V_e) 数值, 进行组间比较, 并分析各参数对外周带前列腺癌的诊断效能。结果 外周带癌区与正常腺体组的 K_{trans} 、 K_{ep} 、 V_e 值分别为 (0.22 ± 0.18) VS (0.07 ± 0.05)、(1.15 ± 0.67) VS (0.57 ± 0.29)、(0.19 ± 0.06) VS (0.12 ± 0.06); 两组间行独立样本 t 检验, K_{trans} 、 K_{ep} 和 V_e 值之间差异均具有统计学意义 ($P < 0.01$)。 K_{trans} 、 K_{ep} 和 V_e 曲线下面积分别为 0.900、0.829、0.782; 若以 K_{trans} 值 0.100、 K_{ep} 值 0.697、 V_e 值 0.106 为界值诊断前列腺外周带癌, 敏感度和特异度分别为 85.71%、78.57%、95.24% 和 91.18%、85.29%、50.00%。结论 前列腺外周带癌区的 K_{trans} 、 K_{ep} 、 V_e 值均大于外周带正常腺体区, 对前列腺外

周带癌的诊断具有重要应用价值；且 Ktrans、Kep 和 Ve 参数对外周带癌的检出都具有较高诊断效能，在临床中具有重要的应用前景。

PO-1936

DWI 联合 mDixon-Quant 序列评估直肠癌 ki-67 表达的价值

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目的 探讨 DWI 联合 mDixon-Quant 在评估直肠癌细胞增殖抗原 Ki-67 表达的价值。方法 回顾性分析 20 例经临床病理证实的直肠癌患者的影像资料，对病理标本进行免疫组化 ki-67 染色，以各视野肿瘤阳性百分比的平均值作为表达指数分为高低表达两组，ki-67 高表达组 14 例，ki-67 低表达组 6 例。所有患者均于术前行 MRI 扫描，扫描序列包括常规 MRI、DWI 及 mDixon-Quant 序列。由两位观察者分别测量病灶 DWI 序列的 ADC 值及 mDixon-Quant 序列的脂肪分数 (FF) 值、表观弛豫率 ($R2^*$) 值及横向弛豫时间 ($T2^*$) 值。采用组内相关系数 (ICC) 评估两位观察者测量结果的一致性，采用独立样本 t 检验或 Mann-Whitney U 检验比较各参数值的差异，采用受试者工作特征 (ROC) 曲线评估有统计学意义的参数预测直肠癌 ki-67 表达的效能。通过二元 logistic 回归分析预测直肠癌 ki-67 高表达影像学定量参数的独立风险因素。采用 Delong 检验比较各曲线下面积 (AUC) 间的差异性。结果 两位观察者测量值的一致性良好 ($ICC > 0.75$)。ki-67 高表达组的 ADC 值 ($(0.76 \pm 0.10) \times 10^{-3} \text{mm}^2/\text{s}$) 低于 ki-67 低表达组的 ADC 值 ($(0.93 \pm 0.08) \times 10^{-3} \text{mm}^2/\text{s}$)，ki-67 高表达组的 $R2^*$ 值 ($22.92 \pm 1.38 \text{ Hz}$) 高于 ki-67 低表达组的 $R2^*$ 值 ($20.97 \pm 1.43 \text{ Hz}$)，且差异均具有统计学意义 ($P < 0.05$)；两组间 $T2^*$ 值、FF 值间的差异无统计学意义。多因素 logistic 回归分析，发现 ADC 值及 $R2^*$ 值为预测 ki-67 高表达的独立风险因素；ADC 值及 $R2^*$ 值及联合参数评估 ki-67 表达的 AUC 值分别为 0.863、0.869、0.881；联合参数的诊断效能均高于单一参数的诊断效能；各单一参数 AUC 间差异均具有统计学意义 ($P < 0.05$)。结论 DWI 和 mDixon-Quant 序列的多定量参数可以有效评估直肠癌 ki-67 的表达，并且二者联合可提高预测效能，具有很好的临床应用前景。

PO-1937

胆总管原发性神经内分泌癌一例

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【摘要】神经内分泌癌 (neuroendocrine carcinoma, NEC) 是一种罕见的恶性肿瘤，主要发生于胃肠道和肺，原发于肝外胆管的极其罕见。因其缺乏典型临床特点及影像学表现，术前极易误诊。本文报道 1 例女性患者，入院体检发现胆总管占位，以“运动障碍 1 年余，进行加重 1 月”收住入院。体检心肺及腹部检查未见明显阳性体征。入院辅助检查：肿瘤标志物：神经元特异性烯醇化酶 31.1 ng/ml，铁蛋白 216.1 ng/ml，余指标正常。血常规、肝肾功能正常。入院后腹部超声：胆总管内径 15mm，胰腺段管腔内见 22x14mm 等回声团。胰腺增强 CT 示：胆总管下段占位伴肝内外胆管、胰管扩张 (图 1)。上腹部 MR 增强示：胆总管下段占位伴肝内外胆管扩张，肿瘤可能大，建议 PET-CT 检查 (图 2-4)。ERCP 镜刷：“胆总管下段刷检”：见异型细胞，倾向腺癌。术后病理镜下所见：胆总管内见一菜花样肿物，大小 2.5cmx1.5cmx0.8cm，胆管腺上皮示导管内乳头状肿瘤伴高级别上皮内瘤变，局部粘膜固有层至肌层见高级别神经内分泌癌成分，其间夹杂少量中分化腺癌成分。最后病理诊断：“胆总管”高级别神经内分泌癌。

PO-1938

扩散峰度成像多定量参数预测肝细胞癌 TACE 术后早期疗效的价值

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目的

探讨弥散峰度成像 (DKI) 多定量参数预测肝细胞癌 (HCC) 经动脉化疗栓塞 (TACE) 术后早期疗效的价值。

材料与方法

回顾性收集进行上腹 MRI 检查 (包括 DKI 序列) 且采取 TACE 治疗的 53 例 HCC 患者 (治疗客观反应 (objective response, OR) 29 例, 治疗无反应 (non-response, NR) 24 例)。在 AW 4.6 工作站 (GE Healthcare) 使用 Functool 软件自动生成 DKI 定量参数图, 包括平均峰度 (MK)、轴向峰度 (Ka)、径向峰度 (Kr)、平均扩散系数 (MD)、轴向扩散系数 (Da)、径向扩散系数 (Dr)、峰度各向异性分数 (FAk) 及各向异性分数 (FA)。参照 T2W 和 DK 图像, 分别于肿瘤最大层面、瘤周区域 (1cm 内) 及远瘤周正常肝实质 (5cm 内) 各放置 3 个大小相等的类圆形感兴趣区域 (region of interest, ROI), 记录 MK、Ka、Kr、MD、Da、Dr、FAk 及 FA 值。使用 3 个 ROI 的平均值进行统计分析。使用 Kolmogorov-Smirnov 检验来评估各参数的正态性, 使用独立样本 t 检验或 Mann-Whitney U 检验比较两组间定量参数的差异。使用 logistic 回归建立不同参数组合的预测模型。使用受试者操作特征 (receiver operating characteristic, ROC) 分析评估诊断性能。

结果

OR 组的 MK-肿瘤、Ka-肿瘤显著低于 NR 组, OR 组的 MD-肿瘤、Da-肿瘤及 Dr-肿瘤显著高于 NR 组, 差异均具有统计学意义 ($P < 0.05$)。余定量参数在两组间无统计学差异 ($P > 0.05$)。MK-肿瘤、Ka-肿瘤、MD-肿瘤、Da-肿瘤和 Dr-肿瘤预测客观反应的曲线下面积 (AUC) 分别为 0.716、0.691、0.739、0.727 和 0.707。当 MK-肿瘤、Ka-肿瘤、MD-肿瘤、Da-肿瘤和 Dr-肿瘤参数联合时, 预测性能有所提高 ($AUC = 0.803$)。

结论

DKI 序列的多定量参数对术前预测 HCC 患者 TACE 治疗的早期疗效具有一定价值。

PO-1939

CT 及 MRI 诊断肝内胆管导管内乳头状瘤一例

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一名 45 岁女性患者一月前体检时发现肝占位性病变。无恶心呕吐、无呕血黑便, 否认乙肝病史。体格检查无明显异常, 肿瘤指标及余检验学检查未见明显异常。行 CT 检查发现肝脏内囊实性病变, 大小约 44*41mm, 边界清晰, 实性部分 CT 值平均值 57HU。MRI 增强检查示病灶囊性部分呈 T1 低 T2 高信号, 实性部分呈 T1 等 T2 稍高信号, DWI 可见弥散受限, 增强实性部分呈渐进性强化。

结果: 手术发现肝右叶表面见一微隆起肿块, 直径约 4.0cm, 紧贴胆囊, 胆囊表面未见异常, 腹腔内未见转移灶。腹腔内无腹水, 肝脏无明显肝硬化表现, 大小尚正常, 表面无弥漫性结节。病理检查示诊断为胆管导管内嗜酸性乳头状肿瘤。

讨论: 本例患者为中年女性, 体检偶然发现肝脏占位, 肿瘤标记物无异常。肝脏病灶为边界清晰的囊实性病变, 囊内无明显分隔, 见乳头状结节, 实性部分弥散受限。值得注意的是, 病灶边缘有多

发扩张的肝内胆管,呈小囊状突起,与大囊相通,需考虑肝内胆管来源肿瘤。胆管导管内乳头状肿瘤(*intraductal papillary neoplasm of bile duct*, IPNB) 是一种以胆管黏膜上皮细胞呈乳头状增生为特点的具有高度恶性潜能的罕见肿瘤,可同时累及肝内外胆管系统。根据内衬细胞形态及分泌黏液量的不同将 IPNB 分为嗜酸细胞型、胃型、肠型及胰胆管型 4 种病理类型。本病主要需要与肝内胆管囊腺瘤及囊腺癌鉴别。肝内胆管囊腺瘤表现为单发或多发内部有分隔的多房囊性病变,境界清晰,壁及分隔可见强化。肝内胆管囊腺癌病灶一般较大,表现为多房囊性病变,边界欠清,增强扫描显示间隔和附壁结节有强化。这两类病变鉴别的要点为病灶是否与胆管相通,肝内 IPNB 表现为肝内扩张的胆管内伴有或不伴有乳头状实性结节,而肝内胆管囊性瘤或囊腺癌的囊性部分通常并不与胆管相通。

PO-1940

提高成人 Currarino 综合征检出率及影像诊断的准确性

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目的:提高成人 Currarino 综合征(Currarino syndrome, CS)检出率,提高 CS 影像诊断的准确性,为临床手术方式的选择提供依据,以期减少术后并发症。

材料与方法:回顾性分析 9 例我院诊断为 CS 的成年患者影像资料,观察并分析各影像检查方法在诊断 CS 中的优劣,包括骺骨发育不良程度、骺前肿块、肿块与骺管之间关系的诊断效能。

结果:1.9 例成人患者均有骺前肿块及不同程度的骺骨发育不良,但均未被早期诊断。2.超声可以清晰显示骺前肿块,但是很难显示骺骨情况及骺前肿块与骺管的关系。3.计算机断层扫描(Computed Tomography, CT)联合三维重建显示骺骨发育不良最佳,磁共振成像(Magnetic resonance imaging, MRI)显示骺前肿块与骺管的关系最佳, MRI 平扫与 MRI 增强扫描诊断效能相同。

结论:1.由于临床症状隐匿,成人 CS 的发病率可能被低估。2.超声发现骺前肿块的患者,先行骨盆 X 线摄片,如若有骺骨发育不全,则进行 MR 检查。3.CT 发现骺前肿块,骨窗观察是否有骺骨发育不全,如若有,则进行 MR 检查。4.CS 诊断最优检查方法为 CT 三维重建联合 MR 平扫。

PO-1941

预测孤立性肝细胞癌患者肝切除术后超早期复发的诺模图

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目的:本研究旨在确定早期孤立性肝细胞癌患者超早期复发的独立危险因素,并构建预测超早期复发的个体预测诺模图。

材料与方法:本研究纳入 2015 年 01 月至 2021 年 05 月在我院经病理诊断为孤立性肝细胞癌并行根治性肝切除术的患者。根据患者 6 个月复发状态分为非超早期复发组和超早期复发组。采用单因素和多因素 Cox 回归分析用于构建诺模图,并通过 Bootstrap 重抽样法对诺模图的性能进行内部验证。

结果:332 例早期孤立性肝细胞癌患者中超早期复发组为 39 例(11.7%)。肿瘤形态、年龄 >46 岁、AFP $>332.4\text{ng/ml}$ 、GGT $>51.2\text{U/L}$ 、ALP $>126\text{U/L}$ 、PT $>12.8\text{s}$ 和卫星结节是影响早期孤立性肝细胞癌患者超早期复发的独立预后因素,并被纳入预测超早期复发诺模图的最终模型。诺模图和 Bootstrap 重抽样法得出的 C-index 分别为 0.842 和 0.815。校准图显示诺模图的预测概率与超早期复发的实际观察结果一致,决策曲线分析(DCA)结果显示诺模图的临床应用价值良好。此外,

AFP>332.4ng/ml、AST>35 U/L、GGT>51.2U/L、ALP>126U/L、肿瘤形态、肿瘤大小、卫星结节及瘤内出血是影响早期孤立性肝细胞癌患者的总生存期的危险因素。

结论：我们的研究结果构建了一种预测早期孤立性肝细胞癌患者术后超早期复发状态的诺模图，这在一定程度上有助于为临床决策者提供有价值的辅助决策信息，指导临床决策者选择最合适的治疗方案。

PO-1942

腰椎 X 线影像组学联合机器学习方法预测中晚期慢性肾病患者腹主动脉钙化及其预后

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目的：探讨基于腰椎 X 线的影像组学及临床特征构建机器学习模型评估中晚期慢性肾病（CKD）患者腹主动脉钙化（AAC）程度并预测其预后的可行性。方法：回顾性分析经临床确诊的 440 名 3-5 期 CKD 患者的临床及影像资料。所有患者首次就诊接受标准腰椎侧位 X 线检查，根据腹主动脉钙化评分（AACS）将 CKD 患者进一步分为无至轻度钙化组和中至重度钙化组。本研究使用基于 Python 语言的 PyRadiomics 库从 ROI（腹主动脉区域）中提取了总共 833 个影像组学特征。采用监督最小绝对收缩和选择算子回归进行特征筛选和降维，并使用五折交叉验证法划分数据集。根据选定的影像组学特征（RS）、临床特征及联合特征标签分别构建了基于逻辑回归的机器学习模型，使用受试者操作特征曲线和决策曲线分析评估各个模型的性能。各模型诊断 AAC 的曲线下面积（AUC）比较采用 DeLong 检验。多变量 Cox 风险回归分析和 Kaplan-Meier 生存曲线用于评估 RS 和临床特征对中晚期 CKD 患者全因死亡的预测能力。结果：研究结果显示无至轻度钙化组为 265 例，中至重度钙化组为 175 例。共筛选出 41 个影像组学特征用于构建模型。在训练集中，RS 模型和临床特征模型均显示出良好的校准和区分能力（AUC：0.86，0.83）；在验证集中，性能均略有降低（AUC：0.76，0.78），DeLong 检验显示两者均无统计学差异（ $p=0.233$ ， 0.486 ）。联合特征模型在训练集和验证集中分别显示出优越和良好的诊断性能（AUC：0.93，0.83），DeLong 检验显示其与 RS 模型和临床特征模型均具有显著统计学差异（训练集： p 值均 <0.001 ；验证集： $p<0.001$ ， 0.010 ）。在中位 52 个月随访中，RS 评分是中晚期 CKD 病人全因死亡的独立相关因素（风险比：1.543； $p<0.001$ ）。Kaplan-Meier 生存曲线显示，较低的 RS 与全因死亡风险增加显著相关（RR：0.425， $p=0.001$ ）。结论：基于腰椎 X 线侧位片的影像组学特征（RS）和临床特征构建的联合诊断模型可能有助于预测不同程度腹主动脉钙化和具有不良预后风险的中晚期 CKD 患者。

PO-1943

基于深度学习技术与压缩感知的三维各向同性高分辨率的膀胱 T2WI 磁共振成像的可行性探究

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目的：探讨深度学习算法（DLA）在膀胱癌三维 t2 加权成像（T2WI）中的临床应用价值。

方法与材料：67 例膀胱癌患者（肌层浸润性膀胱癌/非肌层浸润性膀胱癌= 12/42）行 3.0T MR T2WI 扫描的高分辨率 3D T2WI（扫描时间 10 分钟），在分别使用（扫描时间 4 分 25 秒）和不使用 DLA（扫描时间 6 分 32 秒）。以病理结果作为诊断评价的金标准。采用 Wilcoxon 符号秩和检验比较 T2WI 图

像的图像质量评分, 采用独立样本 t 检验定量评估信噪比(SNR)和对比噪声比(CNR) ($p < 0.05$ 为差异有统计学意义)。

结果:在 DLA、压缩感知(compressed SENSE, CS)的辅助下, 压缩 32.5%的扫描时间, 3D T2WI 组诊断效能的 AUC 分别为 0.895、0.888。两组图像 SNR、CNR 差异均无统计学意义。此外,3DT2WI CS=15 x 配合 DLA 的图像膀胱壁连续性有更高的评分(3.72 vs 4.18, $p < 0.01$)、伪影等级评分(3.5 对比 4.06, $p < 0.05$)和总体图像质量(3.11 对比 3.46, $p < 0.05$); 与 3D-T2WI (CS = 10)比较, 差异有统计学意义($p < 0.01$)。

结论:基于压缩感知的 DLA 重建技术在膀胱癌三维 T3WI 成像中, 可有效缩短扫描时间, 满足诊断要求, 提高图像质量, 减少伪影。

PO-1944

多参数 MR 为基础的预测模型术前评估胃肠间质瘤的危险度分级

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目的: 探讨基于多参数、多层面磁共振图像经随机森林算法筛选的影像组学特征评估胃肠间质瘤(gastrointestinal stromal tumor, GIST)的价值。方法: 本回顾性研究纳入了 121 例在秦皇岛市第一医院经病理证实的胃肠间质瘤患者, 将其随机分入训练集($n=83$)和测试集($n=38$)。每名患者提取 500 个组学参数, 应用随机森林算法进行参数筛选。应用 ROC 曲线分析和 PR 曲线分析评估模型的区分能力; 应用校准曲线分析评估模型的拟合优度。对病理最大径 $\leq 5\text{cm}$ 的 GIST 进行亚组分析。结果: 临床模型(ModelC)对 GIST 预测能力有限。由 5 个特征构成的组学模型(ModelR)在训练集和测试集中均具有较好的区分能力, 其在训练集和测试集的 ROC 曲线下面积分别为 0.893 和 0.855; 训练集和验证集的 P-R 曲线 F1max 分别达到 0.741 和 0.842。肿瘤的二维最大径和位置未筛选到模型 ModelCR 中, ModelCR 与 ModelR 相同。与 ModelC 比较, 训练集和验证集 ModelR 的区分能力明显改善(训练集: $\text{NRI}=0.298$, $P=0.040$; 验证集 $\text{NRI}=0.349$, $P=0.015$)。亚组分析表明 ModelR 对于 $\leq 5\text{cm}$ 的 GIST 具有良好的预测能力, AUC 为 0.946。结论: 以多参数、多层面 MR 为基础建立的影像组学模型能够用于术前预测 GIST 危险度分级。

PO-1945

基于 QCT 身体组分参数和临床因素构建直肠癌根治术患者预后的列线图预测模型

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目的 探讨定量 CT (QCT) 身体组分参数评估直肠癌 (rectal cancer, RC) 根治术患者预后中的价值。方法 回顾性收集 2016 年 1 月至 2021 年 11 月经病理证实为直肠腺癌的患者共 94 例, 记录患者的性别、年龄、CEA、CA199、最大瘤径、肿瘤 TNM 分期、肿瘤病理分化程度等资料; 所有患者均在术前 10 天内接受 QCT 扫描。测量 L3 椎体水平骨骼肌横截面积、总脂肪面积、皮下脂肪面积、内脏脂肪面积, 并计算骨骼肌指数 (SMI)、总脂肪组织指数 (TATI)、皮下脂肪指数 (SATI)、内脏脂肪指数 (VATI)。通过绘制 ROC 曲线获得 TATI、SATI、VATI 预测 RC 患者术后预后情况的截断值, 通过 SMI 评估肌肉减少症。采用多因素 logistics 回归分析筛选影响 RC 预后的独立危险因素, 并构建列线图模型。用 ROC 曲线、校准曲线分析评估模型的预测效能并计算 ROC 曲线下面积 AUC。结果 ROC 曲线分析显示 TATI、SATI、VATI 的截断值分别为 $106.39 \text{ cm}^2/\text{m}^2$ 、 $47.33 \text{ cm}^2/\text{m}^2$ 、 $42.61 \text{ cm}^2/\text{m}^2$ 。肌肉减少症的总体发生率为 30.0%(28/94)。多因素分析结果显示, 肿瘤

N 分期、肌肉减少症和 VATI 是 RC 患者术后预后的独立危险因素($P<0.05$)。列线图模型的 AUC 为 0.844 (95%CI: 0.755~0.911)。校准曲线结果显示模型的预测概率与实际概率吻合较好。结论 肿瘤 N 分期、肌肉减少症和 VATI 与接受手术的 RC 患者的预后相关。本研究建立的列线图模型对评估可切除 RC 患者的预后有一定的价值。

PO-1946

Feasibility of accelerated 3D isotropic high-resolution T2-weighted bladder magnetic resonance imaging using the deep learning-constrained compressed sensitivity encoding technique (SENSE)

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Objectives: This study aimed to evaluate the clinical value of DLA reconstruction in 3D T2WI for BCA.

Methods : 54 patients with BCA (MIBC/NMIBC=12/42) underwent T2WI at 3.0T MR high-resolution 3D T2WI with and without the DLA .Compare with the patnological results, the Wilcoxon signed-rank test was performed to compare image quality score acquisition between T2WI images.

Results: The diagnose efficiency of AUCs of the two 3D T2WI groups, with the assistance of the DLA-CS, and the compressed 32.5% scan time, were 0.895 and 0.888, respectively. DLA T2WI had higher scores for bladder wall continuity (3.72vs.4.18), minimization of artifacts (3.52vs.4.06), and overall image quality (3.11vs.3.46) than 3D-T2WI($p<0.05$)

Conclusions: DLA reconstruction with the CS helped high-resolution 3D T3WI decrease the scan time, meet the diagnostic requirements, improve image quality in bladder cancer.

PO-1947

双能量 CT 的不同定量参数在直肠癌术前评估中的应用价值

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摘要：目的：探讨双能量 CT 的不同定量参数在直肠癌患者术前评估中的诊断价值。

方法：回顾性纳入 118 例直肠癌患者，术前均行双能量 CT 扫描。根据病理，分为无淋巴结转移组和有淋巴结转移组、癌结节组和无癌结节组、脉管神经侵犯组和无脉管神经侵犯组。比较不同分组在动静脉期的造影剂含量、碘浓度(iodine concentration, IC)、标准化碘浓度(normalized iodine concentration, nIC)、电子云密度(the electron density , Rho)、原子序数(effective atomic number, Z)、双能量指数(dual energy index, DEI)、能谱曲线斜率(K)的差异。绘制受试者工作特征(receiver operator characteristic, ROC)曲线，比较 ROC 曲线下面积(area under the ROC curve, AUC)，明确诊断效能。

结果：两名医师测得的双能量 CT 定量参数的组间一致性为 0.803-0.928。直肠癌患者术前无淋巴结转移组的静脉期 nIC 明显低于有淋巴结转移组($P < 0.001$)，nIC 预测淋巴结转移的 AUC 值为 0.771。直肠癌患者术前无癌结节组的静脉期 Rho 高于癌结节组($P = 0.037$)，静脉期 Rho 预测癌结节的诊断效能最高，其 AUC 为 0.635。直肠癌患者术前无脉管神经侵犯组的动脉期 Rho 高于脉管神经侵犯组($P = 0.025$)，动脉期 Rho 预测脉管神经侵犯的诊断效能最高，其 AUC 为 0.648。

结论：双能量 CT 的不同定量参数可用于评估直肠癌患者术前的淋巴结状态、癌结节和脉管神经侵犯情况，为直肠癌患者精准化治疗提供有效依据。

PO-1948

双层探测器光谱 CT 碘密度图影像组学对直肠癌区域淋巴结转移的诊断价值

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目的 探讨基于双层探测器光谱 CT 碘密度图的影像组学对直肠癌区域淋巴结转移的诊断价值。**方法** 回顾性收集 2020 年 5 月至 2023 年 6 月山西医科大学第一医院术前行腹盆部光谱 CT 增强扫描、经手术病理证实的 157 例直肠癌患者（158 枚非转移淋巴结和 109 枚转移淋巴结）的临床、病理及影像资料。经病理证实的 267 枚淋巴结按照 7 : 3 的比例被分为训练集（108 枚非转移淋巴结和 78 枚转移淋巴结）和验证集（50 枚非转移淋巴结和 31 枚转移淋巴结）。采用 ITK-SNAP 软件在光谱 CT 动静脉期碘密度图上手动勾画淋巴结的三维感兴趣容积，使用开源软件 FeAture Explorer (FAE) 软件于每枚淋巴结提取动脉期和静脉期各 1781 个组学特征。用最小绝对收缩和选择算子 (LASSO) 回归的方法进行组学特征选择和影像组学标签建立。利用 logistic 回归建立基于淋巴结 CT 图像特征（模型 1）、组学特征（模型 2）和两者联合（模型 3）的诊断模型。将模型 3 用列线图直观表示，采用 ROC 曲线及曲线下面积 (AUC) 评估 3 个模型诊断效能，并使用 Delong 检验比较 3 个模型的诊断效能。**结果** 模型 1 由淋巴结短径、强化程度、强化方式和结外侵犯 4 个特征构成。LASSO 回归共筛选出 9 个组学特征并建立了影像组学标签（模型 2）。模型 3 由淋巴结短径、强化程度、结外侵犯和影像组学标签构成。在训练集和验证集中，病理转移阳性与阴性淋巴结间淋巴结短径、强化程度、结外侵犯、影像组学分数差异均有统计学意义 (P 均 < 0.05)。模型 1、模型 2、模型 3 于训练集的 ROC 曲线下面积 (AUC) 分别为 0.80、0.89、0.92，于验证集的 AUC 分别为 0.78、0.85、0.89。在训练集和验证集，模型 3 均具有最优的诊断效能。**结论** 光谱 CT 碘密度图影像组学能有效诊断直肠癌淋巴结转移，联合常规 CT 图像特征可进一步提高诊断准确性。

PO-1949

肝异常灌注与原发性肝癌复发、转移之间的关系

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目的：为了探究肝异常灌注与原发性肝癌复发、转移之间的关系。**方法**：回顾性分析 100 例经我院病理证实的原发性肝癌患者的资料，包括肿瘤类型及病理、特征性影像学征象及病情随访。其中有肝异常灌注患者 52 例，对照组患者 48 例。原发性肝细胞癌 82 例、原发性胆管细胞癌 18 例。**结果**：原发性肝恶性肿瘤合并肝异常灌注的患者较不合并肝异常灌注患者肿瘤更容易复发、转移。**结论**：合并肝异常灌注的原发性肝恶性肿瘤患者更容易发生复发和转移，应该引起我们的重视。

PO-1950

双层探测器光谱 CT 双期参数对术前预测胃癌分化与 E-cadherin 蛋白表达的价值

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目的

探讨基于双层探测器光谱 CT 动、静脉期虚拟单能量图像 (VMI)、有效原子序数 (Z_{eff}) 图和碘浓度 (IC) 图对胃癌分化程度和 E-cadherin 蛋白表达水平的预测价值。

方法

回顾性分析 2021 年 10 月至 2022 年 10 月福建医科大学附属第一医院 183 例经手术病理证实为胃癌的术前上腹部光谱 CT 资料, 根据胃癌分化程度和 E-cadherin 蛋白水平进行分组。所有患者 CT 光谱图像均重建动、静脉期常规 120kVp 混合能量图像 (PI)、40-100keV VMI、 Z_{eff} 、IC 图。测量每期图像的病灶 CT 值 (CT_{keV})、 Z_{eff} 、IC, 计算对比噪声比 (CNR)、信噪比 (SNR)、标准化参数 (NZ_{eff} 、NIC) 及曲线斜率 (λ_{HU})。采用 Mann-Whitney U 检验比较组间计量资料差异, Spearman 相关分析评价参数与蛋白表达水平相关性。Logistic 回归模型建立联合参数。ROC 曲线和 DeLong 检验评估能谱参数预测胃癌分化程度及蛋白表达水平效能。

结果

双期 40KeV VMI 的 CNR 和 SNR 明显高于同期其余图像 ($P < 0.05$)。低分化组 $CT_{\text{ap/vp-40-70keV}}$ 、 $NZ_{\text{effap/vp}}$ 、 $NIC_{\text{ap/vp}}$ 、 $\lambda_{\text{HUap/vp}}$ 、 Z_{effvp} 和 IC_{vp} 均明显高于中高分化组 (P 均 < 0.05)。CTap/vp-40keV、 Z_{effvp} 和 IC_{vp} 预测胃癌分化程度的 AUC 分别为 0.760、0.872、0.791、0.768。Logistic 回归模型显示联合参数的 AUC 为 0.934, 明显高于任一单参数, 差异具有统计学意义 ($Z = 3.307 \sim 5.390$, $P < 0.001$)。E-cadherin 蛋白阳性表达组 CTap/vp-40keV、 Z_{effvp} 和 IC_{vp} 均明显低于阴性表达组 (P 均 < 0.001), 且与表达水平呈负相关 ($r = -0.55$ 、 -0.51 、 -0.52 、 -0.53 , $P < 0.001$)。

结论

双层探测器光谱 CT 参数 CTap/vp-40keV、 Z_{effvp} 和 IC_{vp} 有助于术前预测胃癌分化和 E-cadherin 蛋白表达水平, 联合参数可进一步提高分化预测效能。

PO-1951

特发性腹膜后纤维化的多层螺旋 CT 影像及临床诊断价值

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【摘要】目的: 探讨多层螺旋 CT (multi-slice spiral CT, MSCT) 对特发性腹膜后纤维化 (idiopathic retroperitoneal fibrosis, IRPF) 疾病的影像特点总结, 提高对该病的综合诊断能力。**方法:** 回顾性分析 79 例经临床诊断为 IRPF 患者的 MSCT 影像资料及血生化数据, 评估病灶形态、密度、累及范围、病灶强化程度, 有无肾脏积水及血流灌注、排泄异常等。**结果:** 79 例诊断为 IRPF 患者, 多数软组织密度灶分布于肾动脉水平以下, 包绕远端腹主动脉 69 例 (87.3%, 69/79), 沿尾侧方向延伸至髂血管近端, 多呈双侧受累, 髂总动脉双侧受累 50 例 (92.6%, 50/54), 髂内动脉双侧受累 13 例 (76.5%, 13/17), 髂外动脉双侧受累 8 例 (88.9%, 8/9)。除累及腹膜后动脉, 病变最常包绕输尿管 45 例 (57.0%, 45/79), 表现为受累输尿管向内侧偏移, 早期累及单侧输尿管 24 例 (53.3%, 24/45), 晚期纤维化逐渐向对侧输尿管延续 21 例 (46.7%, 21/45), 并导致双侧肾孟

及输尿管不同程度扩张积水 40 例 (50.6%, 40/79), 肾脏排泄功能受到影响, CT 显示 42 例 (53.2%, 42/79) 肾脏造影剂填充密度减低。纵向范围最常累及腰椎层面, 以 L3-5 椎体层面为主, L5 水平受累最多 58 例 (73.4%, 58/79)。增强扫描病灶具有典型的持续渐进性强化, 峰值多位于静脉期, CT 值 $66 \pm 10 \text{HU}$ 。大部分高水平血清 IgG4 经临床诊治一段时间后, 浓度减低。**结论:** 特发性腹膜后纤维化有特定的发病部位、特异性影像学表现、强化特点, 结合病理影像学分析及血生化实验室检查, 可对该病作出明确诊断, 做到早发现。早治疗。

PO-1952

对比分析磁共振 Ishim-DWI 序列与双能量 CT 定量参数在预测胃癌 Lauren 分类的应用价值

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目的: 探讨胃癌术前磁共振 Ishim-DWI 序列与双能量定量参数在预测胃癌 Lauren 分类的应用价值
资料与方法: 收集我院 2020 年 2 月-2022 年 12 月已由内镜确诊为胃癌患者行磁共振和双能量 CT 扫描, 测量磁共振 ishima-DWI 的 ADC 值及双能量 CT 动脉期、静脉期、延迟期肿瘤感兴趣区的标准化碘浓度和能谱曲线斜率, 对比分析其与经手术病理证实的胃癌 Lauren 分类的相关性差异是否有统计学意义, 评估 ishima-ADC 值、标准化碘浓度和能谱曲线斜率的诊断性能。采用受试者工作特征 (receiver operating, ROC) 曲线分析它们的最佳诊断阈值, 评价其诊断效能。

结果: 本研究共纳入 140 例, 以术后病理学检查结果为金标准, 分为肠型 ($n=72$)、弥漫型 ($n=40$)、混合型 ($n=28$), 单因素分析结果提示 T 分期 ($\chi^2=18.43$, $P<0.001$)、神经侵犯 ($\chi^2=15.78$, $P<0.001$)、脉管癌栓 ($\chi^2=17.13$, $P<0.001$)、强化方式 ($\chi^2=10.29$, $P=0.006$)、门脉期标准化碘浓度 (NICv) ($Z=7.001$, $P=0.030$)、延迟期标准化碘浓度 (NICd) ($F=26.08$, $P<0.001$)、门脉期能谱曲线斜率 (λHUv) (40-110keV) ($Z=10.41$, $P=0.005$)、延迟期能谱曲线斜率 (λHUd) (40-110keV) ($Z=28.91$, $P<0.001$)、ishima-ADC 值在三组间差异有统计学意义。ROC 曲线分析示 ishima-ADC 在鉴别肠型与弥漫型胃癌、弥漫型与混合型胃癌的 AUC 值最大, 分别为 0.927、0.822, 敏感度分别为 82.50%、82.50, 特异性分别为 95.83%、78.57%; NICd 在鉴别肠型与弥漫型胃癌的 AUC 值高于 NICv 和 λHUv 差异有统计学意义 ($P<0.05$)

结论: 磁共振 ishima-ADC 在鉴别肠型与弥漫型胃癌的诊断效能最高, 仅 ishima-ADC 可用于鉴别弥漫型胃癌与混合型胃癌, NICd 与 λHUd 在鉴别肠型与混合型胃癌的诊断效能相当。ishima-ADC、NICv 与 λHUv 无法鉴别肠型胃癌与混合型胃癌。

PO-1953

T1-mapping 联合 DWI 预测前列腺癌神经侵犯的可行性研究

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目的: 探索 T1-mapping 联合 DWI 预测前列腺癌神经侵犯的可行性。

方法: 回顾性分析本院行 3.0T MR 扫描并经病理证实的前列腺癌 56 例, 其中无神经侵犯组 (A 组) 36 例, 有神经侵犯组 (B 组) 20 例。所有患者均行 T2WI、T1-mapping、DWI 扫描。扫描图像上传至 ISP (IntelliSpacePortall, Philips Healthcare) 工作站, 由两名观察者分别于病灶显示最大层面测量两组病变的 T1 值、ADC 值。采用组内相关系数 (ICC) 检验两名观察者测量结果的一致性; 采用独立样本 t 检验比较两组病变各参数值的差异; 采用受试者工作特征 (receiver operating

characteristic curve, ROC) 曲线评估有差异参数单独及联合对两组病变鉴别诊断的效能; 采用 Delong 检验比较各参数及联合参数诊断效能的差异。

结果: 两名观察者测量各组数据的一致性良好 ($ICC > 0.75$)。A 组的 T1 值 [(1216.79 ± 245.73) ms]、ADC 值 [$(0.76 \pm 0.15) \times 10^{-3} \text{mm}^2/\text{s}$] 高于 B 组的 T1 值 [(1063.15 ± 306.59) ms]、ADC 值 [$(0.67 \pm 0.11) \times 10^{-3} \text{mm}^2/\text{s}$]，差异均有统计学意义 ($P < 0.05$)。T1 值、ADC 值及二者联合鉴别两组病变的 ROC 曲线下面积分别为 0.642、0.667 及 0.728。单独及联合诊断效能间无统计学差异 ($P > 0.05$)，两参数联合的诊断效能优于单独诊断效能。

结论: T1 值、ADC 值可用于无创性预测前列腺癌神经侵犯，两者联合的诊断效能有所提升，可以为临床诊断提供更多参考。

PO-1954

T2-mapping 联合 DWI 预测前列腺癌神经侵犯的可行性研究

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目的: 探索 T2-mapping 联合 DWI 预测前列腺癌神经侵犯的可行性。

方法: 回顾性分析本院行 3.0T MR 扫描并经病理证实的前列腺癌 54 例，其中无神经侵犯组 (A 组) 36 例，有神经侵犯组 (B 组) 18 例。所有患者均行 T2-mapping、DWI 扫描。扫描图像上传至 ISP (IntelliSpacePortall, Philips Healthcare) 工作站，由两名观察者分别于病灶显示最大层面测量两组病变的 T2 值、ADC 值。采用组内相关系数 (ICC) 检验两名观察者测量结果的一致性; 采用独立样本 t 检验比较两组病变各参数值的差异; 采用受试者工作特征 (receiver operating characteristic curve, ROC) 曲线评估有差异参数单独及联合对两组病变鉴别诊断的效能; 采用 Delong 检验比较各参数及联合参数诊断效能的差异。

结果: 两名观察者测量各组数据的一致性良好 ($ICC > 0.75$)。A 组的 T2 值 [(78.27 ± 8.73) ms]、ADC 值 [$(0.75 \pm 0.14) \times 10^{-3} \text{mm}^2/\text{s}$] 高于 B 组的 T2 值 [(72.95 ± 6.98) ms]、ADC 值 [$(0.67 \pm 0.11) \times 10^{-3} \text{mm}^2/\text{s}$]，差异均有统计学意义 ($P < 0.05$)。T2 值、ADC 值及二者联合鉴别两组病变的 ROC 曲线下面积分别为 0.667、0.667 及 0.701。单独及联合诊断效能间无统计学差异 ($P > 0.05$)，两参数联合的诊断效能优于单独诊断效能。

结论: T2 值、ADC 值可用于无创性预测前列腺癌神经侵犯，两者联合的诊断效能有所提升，可以为临床诊断提供更多参考。

PO-1955

肾脏罕见原发恶性肿瘤 CT、MRI 影像学表现及其病理学特征

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目的: 探讨肾脏罕见原发恶性肿瘤的 CT、MRI 表现及其病理学特征。方法: 回顾性分析 22 例经病理证实的肾脏罕见原发恶性肿瘤的 CT 及 MRI 影像学资料，对其影像特征进行分析。结果: 黏液样小管状和梭形细胞癌、集合管癌肿瘤呈圆形或不规则分叶状软组织影，可见囊变、坏死及出血，增强扫描呈轻-中度渐进性强化，但集合管癌肿瘤边界模糊不清，易侵犯肾周、肾窦，出现肾门处及腹膜淋巴结转移; 多房囊性肾细胞癌肿瘤呈多房囊性，囊壁及分隔粗细不均、可伴有壁结节，增强扫描肿瘤皮质期明显强化，多呈“快进快出”强化方式; 原发肾淋巴瘤可呈单发或弥漫性肿块，T1WI、T2WI 以等信号为主，DWI 呈明显高信号，增强扫描呈轻度强化，并可见“血管漂浮征”; 原

发肾血管肉瘤肿瘤内可见囊变、坏死，边界欠清，增强扫描动皮质可见小片状明显强化（接近动脉密度），静脉期强化范围增大、且强化程度减低。结论：肾脏罕见原发恶性肿瘤具有一定的 CT、MRI 影像学特征，准确的术前诊断对指导临床治疗方式的选择有重要价值。

PO-1956

初探 mDIXON-Quant 联合弥散加权成像鉴别前列腺癌有无神经侵犯的可行性

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目的：探索 mDIXON-Quant 联合 DWI 鉴别前列腺癌有无神经侵犯的可行性。

方法：回顾性分析本院行 3.0T MR 扫描并经病理证实的前列腺癌 38 例，其中无神经侵犯组（A 组）20 例，有神经侵犯组（B 组）18 例。所有患者均行 T2WI、mDIXON-Quant 及 DWI 扫描。扫描图像上传至 ISP 工作站，由两名观察者分别于病灶显示最大层面测量两组病变的 mDIXON-Quant 定量值（FF、R2*、T2*）和 ADC 值。采用组内相关系数（ICC）检验两名观察者测量结果的一致性；采用独立样本 t 检验比较两组病变各参数值的差异；采用 ROC 曲线评估有差异参数单独及联合对两组病变鉴别诊断的效能；采用 Delong 检验比较各参数及联合参数诊断效能的差异。

结果：两名观察者测量各组数据的一致性良好（ICC>0.75）。A 组的 R2* 值[（16.00±2.97）ms]低于 B 组的 R2* 值[（23.52±14.74）ms]，A 组的 T2* 值[（65.52±11.47）ms]高于 B 组的 R2* 值[（53.06±15.11）ms]，A 组的 ADC 值[（0.79±0.16）10⁻³mm²/s]高于 B 组的 ADC 值[（0.67±0.12）10⁻³mm²/s]，差异均有统计学意义（P<0.05）；两组的 FF 值差异无统计学意义（P>0.05）。R2* 值、T2* 值、ADC 值单独及三者联合鉴别两组病变的 ROC 曲线下面积分别为 0.746、0.717、0.717 及 0.828。单独及联合诊断效能间无统计学差异（P>0.05），三参数联合的诊断效能优于单独诊断效能。

结论：mDIXON-Quant 和 DWI 可用于无创性预测前列腺癌神经侵犯，多参数联合后的诊断效能有所提升，可以为临床诊断提供更多参考。

PO-1957

4D-Flow MR 成像预测肝硬化门脉高压患者胃肾及脾肾分流的值

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目的：评估 4D-Flow MRI 作为无创成像标记物预测肝硬化门脉高压患者胃肾/脾肾分流及其分流程度的可行性。

材料和方法：本研究前瞻性收集了 60 名肝硬化门脉高压患者进行 4D-Flow MR 成像扫描，将患者分为胃肾/脾肾分流组和无分流组，其中胃肾/脾肾分流组中根据分流交通支管径大小分为轻中度分流（≤8mm）和重度分流（>8mm）两个亚组。所有 4D-Flow 图像导入 CVI 后处理工作站，测量门静脉主干(PV)的血流参数，包括血流量、峰值速度、平均速度和管壁剪切力，使用单变量分析和多变量逻辑回归分析来确定有/无分流以及轻中度/重度分流的独立预测因子，并进行受试者工作特征（ROC）曲线分析来评估每个预测因子的诊断能力。

结果：60 名肝硬化患者中，33 例患者无胃肾/脾肾分流，27 例患者有胃肾分流，其中 18 例为轻中度分流，9 例患者为重度分流。在无分流组中，参数血流量、峰值速度、平均速度显著高于有分流

组, 多因素逻辑回归分析显示, 血流量、峰值速度是预测肝硬化患者胃肾分流的独立预测因子 (敏感性=84%, 特异性=81%, 曲线下面积=0.812)。重度分流患者中, 参数血流量显著低于轻中度分流患者, 其中血流量是预测肝硬化患者重度胃肾分流的独立预测因子 (敏感性=80%, 特异性=78%, 曲线下面积=0.769)。

结论: 4D-Flow MRI 可作为预测肝硬化门脉高压患者胃肾/脾肾分流及其分流程度的无创成像标记物, 血流量、峰值速度能有效预测肝硬化患者是否会出现胃肾/脾肾分流, 血流量是预测肝硬化患者出现重度胃肾/脾肾分流的独立预测因子。

PO-1958

酰胺质子转移成像联合弥散加权成像预测 前列腺癌神经侵犯的可行性研究

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目的: 探索酰胺质子转移成像 (Amide proton transfer, APT) 联合弥散加权成像 (Diffusion weighted imaging, DWI) 预测前列腺癌神经侵犯的可行性。

方法: 回顾性分析本院行 3.0T MR 扫描并经病理证实的前列腺癌 64 例, 其中无神经侵犯组 (A 组) 44 例, 有神经侵犯组 (B 组) 20 例。所有患者均行 T2WI、APT 及 DWI 扫描, 扫描参数见表 1。扫描图像上传至 ISP (IntelliSpacePortall, Philips Healthcare), 由两名观察者分别于病灶显示最大层面测量两组病变的 APT 值、ADC 值。采用组内相关系数 (ICC) 检验两名观察者测量结果的一致性; 采用独立样本 t 检验比较两组病变各参数值的差异; 采用受试者工作特征 (receiver operating characteristic curve, ROC) 曲线评估有差异参数单独及联合对两组病变鉴别诊断的效能; 采用 Delong 检验比较各参数及联合参数诊断效能的差异。

结果: 两名观察者测量各组数据的一致性良好 (ICC>0.75)。A 组 APT 值[(2.40±0.57)%]低于 B 组 APT 值[(2.78±0.76)%], A 组 ADC 值[(0.75±0.15) 10⁻³mm²/s]

高于 B 组 ADC 值[(0.67±0.11) 10⁻³mm²/s], 差异均有统计学意义 (P<0.05)。APT 值、ADC 值及二者联合鉴别两组病变的 ROC 曲线下面积分别为 0.620、0.663 及 0.726。单独及联合诊断效能间无统计学差异 (P>0.05), 两参数联合的诊断效能优于单独诊断效能。

结论: APT 值、ADC 值可用于预测前列腺癌神经侵犯, 两者联合的诊断效能有所提升, 具有很好的临床应用前景。

PO-1959

基于增强 CT 影像组学对肾透明细胞癌恶性程度的鉴别

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目的: 探索基于 CT 增强图像影像组学鉴别肾透明细胞癌恶性程度的价值。

方法: 回顾性分析 192 例经病理证实为肾透明细胞癌 (ccRCC) 增强 CT 图像资料, 其中低级别组 (I-II 级, n=111)、高级别组 (III-IV 级, n=81)。对于增强 CT 皮质髓质期 (CMP)、肾实质期 (NP)、排泄期 (EP) 及三期联合的图像进行影像组学特征提取, 运用最小绝对收缩率和选择运

算符 (LASSO) 进行降维, 选取有价值的组学特征, 采用五折交叉验证将样本量分为训练组及测试组, 训练组采用支持向量 (support vector machine, SVM) 及逻辑回归 (logistic regression, LR) 两类分类器创建 CMP、NP、EP 及三期联合的影像组学模型, 运用受试者工作特征曲线下面积 (AUC)、准确度、灵敏度、特异度、精确度最终评估影像组学模型对于肾透明细胞癌恶性程度的诊断效能, 并用测试组进一步验证。结果: 基于 CMP、NP、EP 及三期联合图像所建立的影像组学模型与 ccRCC 恶性程度显著相关, 且 CMP 影像组学模型对于 CCRCC 恶性程度诊断效能最高 ($R=0.831, 0.801$)。SVM 分类器模型测试组 CMP、NP、EP 及三期联合诊断效能 ROC 曲线下面积 (AUC) 值分别为 0.819、0.808、0.785、0.812; LR 分类器模型测试组 CMP、NP、EP 及三期联合 AUC 值分别为 0.860、0.808、0.789、0.799; 在 SVM 与 LR 分类器中, CMP 与 EP、CMP 与 NP 影像组学模型 AUC 值之间具有显著差异 ($P<0.05$), NR 与 EP 模型之间无差异 ($P>0.05$)。两类分类器均有较好的诊断性能, 且 SVM 分类器建立的影像组学模型性能较 LR 分类器更稳定、全面。结论: 基于增强 CT 影像组学特征所建立的影像组学模型对于肾透明细胞癌恶性程度鉴别具有临床指导性作用, 且 SVM 分类器建立的影像组学模型性能更加稳定、全面。

PO-1960

双源 CT 胰腺脂肪定量对 2 型糖尿病患者冠脉狭窄的预测价值

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目的 探讨双源 CT 双能量技术胰腺脂肪定量参数对 2 型糖尿病 (type 2 diabetes mellitus, T2DM) 患者冠脉狭窄的预测价值。方法 回顾性分析 120 例经临床证实的 T2DM 患者的临床及双源 CT 影像资料, 其中冠脉正常组 18 人、轻-中度狭窄组 80 人、重度狭窄组 22 人, 比较各组间胰腺平均脂肪容积分数 (FVF%) 的差异, 比较冠脉重度狭窄组与非重度狭窄组之间相关实验室及影像指标的差异。分析冠脉重度狭窄的独立危险因素及各因素对冠脉重度狭窄的诊断效能。结果 T2DM 患者的胰腺平均 FVF% 随着冠脉狭窄程度的增高而升高, 且各组间差异有统计学差异 ($P<0.05$)。单因素及多因素 Logistic 回归分析显示胰腺平均 FVF%、冠周脂肪体积、冠脉钙化积分及脂蛋白 a 为冠脉重度狭窄的独立危险因素。受试者工作特征 (receiver operating characteristic, ROC) 曲线显示冠周钙化积分对冠脉重度狭窄的诊断效能最高。结论 胰腺平均 FVF% 可作为预测 2 型糖尿病患者冠脉狭窄的指标之一, 胰腺平均 FVF%、脂蛋白 a、冠周脂肪体积及冠脉钙化积分是冠脉重度狭窄的独立危险因素, 可为临床提供参考。

PO-1961

肝脏特异性对比剂钆贝葡胺增强 MRI 影像学特征对肝细胞癌微血管侵犯的术前预测研究

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目的: 基于术前肝脏动态增强 MRI 的影像学特征探讨肝脏特异性对比剂钆贝葡胺 (gadobenate dimeglumine, Gd-BOPTA) 在预测肝细胞癌 (hepatocellular carcinoma, HCC) 微血管侵犯 (microvascular invasion, MVI) 上的能力。

方法: 本研究搜集并整理在我院经手术病理诊断为肝细胞癌患者 42 例, 所有患者术前均行肝脏特异性对比剂钆贝葡胺 MR 增强扫描。回顾性分析患者术前影像学资料和一般临床资料, 其中影像学资料包括肿瘤数目、大小、肿瘤边缘、肿瘤信号、T1WI 低信号、肿瘤脂肪、肿瘤假包膜、强化类

型、动脉期环状强化、非周边廓清、动脉期瘤周实质强化、肝胆期肿瘤低信号、肝胆期瘤周低信号；患者的一般临床资料包括年龄、性别、病毒性肝炎感染病史、Child-Pugh 分级、术前甲胎蛋白 (Alpha fetoprotein, AFP) 水平。根据组织病理学结果将患者分为 MVI 阳性组和 MVI 阴性组。采用 χ^2 检验及多因素 logistic 回归分析对患者影像学资料和一般临床资料分别进行分析，根据得出的独立危险因素建立 MVI 预测模型。采用受试者工作特征 (receiver operating characteristic, ROC) 曲线评估预测模型的效能，并采用 Log-rank 检验对患者无进展生存期进行生存分析。结果：病灶边缘不光滑和 T1WI 不均匀低信号是预测 MVI 的独立危险因素。Gd-BOPTA 组模型的曲线下面积 (area under curve, AUC) 为 0.814。生存分析显示模型预测的 MVI 阳性组、MVI 阴性组的平均无进展生存期与组织病理证实的 MVI 阳性组、MVI 阴性组的平均无进展生存期均存在显著差异。结论：病灶边缘不光滑和 T1WI 不均匀低信号是预测 MVI 的独立危险因素。Gd-BOPTA 对比剂可用于预测 MVI 的发生。

PO-1962

基于深度学习重建的高分辨率 SSFSE MRI 在卵泡计数中的应用价值

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目的:探讨基于深度学习(DL)重建算法的高分辨率单次激发快速自旋回波(SSFSE)成像在卵泡计数方面的诊断性能，并与原始 SSFSE 图像和常规快速自旋回波(FSE)图像进行比较。方法:前瞻性招募已确诊 PCOS 的患者 20 名(平均年龄= 22.5±4.7 岁，年龄在 15 - 31 岁之间)，总共 40 个卵巢。所有的受试者均接受了高分辨率卵巢 MRI 检查，包括三平面 T2 加权 FSE 序列和与之层面匹配 T2 加权 SSFSE 序列。在 SSFSE 序列中应用 DL 重建算法获取 SSFSE-DL 图像，并保留原始 SSFSE 图像。两名影像诊断医生独立地对 SSFSE-DL、SSFSE 和常规 FSE 图像进行定性评估，评估指标包括模糊伪影、主观噪声和卵泡清晰度。利用类内相关系数和 Bland-Altman 图估计基于三种图像的每个卵巢卵泡数(FNPO)评估的重复性和再现性。结果:与 SSFSE 和 FSE 相比，SSFSE-DL 图像模糊伪影、主观噪声更小，卵泡清晰度更高($P<0.05$)。对于 FNPO 评估的重复性，SSFSE-DL 显示观察者内一致性($ICC=0.930$;95% CI: 0.878-0.962)和观察者间一致性($ICC=0.914$;95% CI: 0.843-0.953)最高。SSFSE-DL、SSFSE 和 FSE 的观察者间 95%一致性界限(LOA)分别为-3.7 ~ 4.5、-4.4 ~ 7.0 和-7.1 ~ 7.6。SSFSE-DL、SSFSE 和 FSE 的观察者内 95% LOA 分别为-3.5 ~ 4.0、-5.1 ~ 6.1、-5.7 ~ 4.2。SSFSE-DL 的观察者内和观察者间差异绝对值显著低于 SSFSE 和 FSE 的差异($P<0.05$)。SSFSE-DL 的观察者内和观察者间差异的绝对值无显著性差异($P=0.071$)。结论:与原始 SSFSE 图像和常规 FSE 图像相比，DL 重建的高分辨率 SSFSE 图像能更好地显示卵泡，从而提高 FNPO 评估的重复性和再现性。

PO-1963

基于能谱 CT 细胞外容积分数评估上皮性卵巢癌 P53 状态

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目的: 探究基于能谱 CT 评估上皮性卵巢癌 P53 状态。

方法: 回顾性分析 2019 年-2022 年于本院经手术病理证实的 92 例卵巢上皮性癌患者, 根据术后病理及免疫组化结果, 根据 P53 表达情况分为突变型组和野生型组。所有患者均于术前在 Discovery CT 750HD 扫描机上行能谱 CT 扫描, 重建动脉期、静脉期、延迟期碘浓度 CT 图像。于延迟期测量病灶最大层面实性部分延迟期碘浓度值和同层面髂外动脉的碘浓度值 (iodine concentration, IC), 计算延迟期标准化碘浓度值 (delay-phase normalized iodine concentration, DNIC), 公式为“ $DNIC = \text{病灶 DIC} / \text{髂外动脉 DIC}$ ”。收集患者血细胞比积 (HCT), 根据公式“(1-HCT) * DNIC * 100%”计算卵巢癌细胞外容积分数 (extracellular volume, ECV)。采用独立样本 t 检验及秩和检验比较 P53 突变型组和野生型组卵巢癌 ECV 差异。绘制受试者特征曲线(receiver operating characteristic curve, ROC)得到各指标的曲线下面积 (area of curve, AUC)、敏感度及特异度, 评价 ECV 的诊断效能。

结果: P53 突变型组患者 40 例, 野生型组患者 27 例。P53 突变型组卵巢癌 ECV 明显高于野生型组卵巢癌 (0.29 (0.23, 0.46) vs. 0.19 (0.10, 0.27), $P < 0.05$)。ECV 的曲线下面积 (area of curve, AUC) 为 0.762, 敏感度及特异度分别为 70.37% 和 77.78%。

结论: 基于能谱 CT 细胞外容积分数在评估上皮性卵巢癌 P53 状态方面具有潜在临床应用价值。

PO-1964

基于能谱 CT 碘图参数评估高级别浆液性卵巢癌腹膜转移的价值

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目的: 探讨基于能谱 CT 碘图参数评估高级别浆液性卵巢癌腹膜转移的价值。

方法: 回顾性分析 2017 年至 2022 年于本院经手术病理证实的 73 例卵巢上皮性癌患者, 根据病理报告中腹膜是否存在转移病灶将患者分为腹膜转移阳性和阴性组。所有患者均于术前在 Discovery CT 750HD 扫描机上行能谱 CT 扫描, 重建动脉期、静脉期、延迟期碘浓度 CT 图像。测量病灶最大层面实性部分的增强三期碘浓度值和同层面髂外动脉的碘浓度值 (iodine concentration, IC), 计算增强三期标准化碘浓度值 (normalized iodine concentration, ANIC、VNIC、DNIC), 公式为“ $NIC = \text{病灶 IC} / \text{髂外动脉 IC}$ ”。采用独立样本 t 检验及秩和检验比较腹膜转移阳性和阴性组 ANIC、VNIC 和 DNIC 的差异。绘制受试者特征曲线(receiver operating characteristic curve, ROC)得到各指标的曲线下面积 (area of curve, AUC)、敏感度及特异度, 评价各参数的诊断效能。

结果: 腹膜转移阳性患者 47 例, 腹膜转移阴性患者 26 例。腹膜转移阳性组 ANIC、VNIC 及 DNIC 明显高于腹膜转移阴性组 (所有 $P < 0.05$)。ANIC、VNIC 及 DNIC 的 AUC 分别为 0.851、0.863 及 0.840, 敏感度及特异度分别为 63.83% 和 92.31%、89.36% 和 69.23%、78.72% 和 76.92%。

结论: 基于能谱 CT 碘图参数有潜力成为无创性评估高级别浆液性卵巢癌腹膜转移影像标志物。

PO-1965

能谱 CT 碘水值及 ECV 纹理分析预测直肠癌神经侵犯

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目的:

探讨能谱 CT 碘水值及基于细胞外体积分数(extracellular volume, ECV)纹理分析在预测直肠癌(rectal cancer, RC)神经侵犯中的价值。

材料与方法:

我们回顾性地收集了 74 例经手术和病理证实并于术前行 Revolution 能谱 CT 增强扫描检查的 RC 患者图像与临床信息。根据 RC 的组织学分类标准, 将患者分为神经侵犯组(A 组, 17 例)和非神经侵犯组(B 组, 57 例)。将所有图像导入 GE AW 4.6 工作站, 使用 GSI Viewer 软件重建延迟期碘(水)图。两名放射科医生(2 年及 8 年腹部诊断经验)各自将三个椭圆形 ROI 放置在病灶的最大层面上, 测量并计算其均值作为最终碘水值(Iodine concentration, IC)。延迟期标准化 IC (DNIC)=病灶的 IC /同层面左髂外动脉的 IC; $ECV=(1- \text{红细胞压积}/100)*NIC*100$ 。将延迟期碘水图导入 Matlab 软件生成 ECV 图, 并导入 ITK-SNAP 软件; 由 2 名分别具有 2 年和 8 年腹部影像诊断经验的影像科医师采用盲法, 参照增强三期原始图像沿病灶边缘逐层手动勾勒感兴趣区(ROI), 并融合生成三维感兴趣区(volume of interest, VOI)。使用联影 AI 平台(V1.6)进行纹理特征提取; 采用差异性检验比较各参数是否具有统计学差异; 建立 logistic 回归模型, 绘制受试者工作特征(ROC)曲线评估预测效能, 计算 ROC 曲线下面积(AUC)、敏感度及特异度。

结果:

ECV 及 DNIC 在两组间没有差异($P>0.05$); 经筛选得到 12 个最优纹理特征, 包括 2 个一阶特征, 6 个灰度共生矩阵特征(GLCM)特征, 2 个灰度依赖矩阵(GLDM)特征, 1 个灰度游程矩阵(GLRLM)特征, 1 个灰度级大小区域矩阵特征(GLSZM)特征(表 1)。Logistic 回归模型预测 HCC 肝切除术后早期复发的 AUC、灵敏度及特异度分别为 0.885、88.2%、84.2%(图 1, 表 2)。结论: 基于能谱 CT 碘水图延迟期 ECV 的全肿瘤纹理分析对于直肠癌神经侵犯具有一定的预测价值。

PO-1966

LI-RADS v2018 CT 征象与 HCC 的关联性和诊断效能

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目的 研究 LI-RADS 适用人群和非 LI-RADS 定义的风险人群中, LI-RADS CT 征象与肝细胞癌(HCC)的关联性及诊断 HCC 效能。

方法 回顾分析 2014 年 1 月至 2022 年 12 月在遂宁市中心医院经病理证实的 435 例患者 482 个肝脏病灶(HCC 327 个, 非 HCC 恶性肿瘤 77 个, 良性病变 78 个)资料, 根据病理结果分为 HCC 组和非 HCC 组。LI-RADS v2018 CT 征象诊断 HCC 效能采用 ROC 分析。各征象与 HCC 的关联性采用 Logistic 回归分析。

结果 CT 征象与 HCC 关联性, 非周边廓清(OR, 15.1; 95 %CI: 5.6, 40.4; $P=0.00$)及非环形 APHE(OR, 12.4; 95 %CI: 7.5, 20.5; $P=0.00$)高于强化包膜(OR, 9.9; 95 %CI: 2.8, 34.8; $P=0.00$; OR, 2.4; 95 %CI: 1.4, 3.8; $P=0.01$)。诊断 HCC 的灵敏度、特异度、阳性预测值(PPV)、阴性预测值(NPV)、曲线下面积(AUC), 非周边廓清分别为 85%、83%、

91%、73%、0.84；非环形 APHE 分别为 82%、77%、88 %、66%、0.79；强化包膜分别为 31%、98%、97%、40%、0.65。所有征象联合诊断 HCC 灵敏度 (88% vs. 87%)、特异度 (83% vs. 82%)、PPV (92 % vs. 91%)、NPV (77% vs. 76%)、AUC (0.90 vs. 0.87) 略高于非周边廓清+非环形 APHE+强化包膜。强化包膜 (OR, 13.3; 95% CI: 3.6, 48.9; P=0.00)、肿块内出血 (OR, 20.3; 95% CI: 2.4, 171.4; P=0.00)、马赛克征 (OR, 37.7; 95% CI: 4.2, 340.0; P=0.00) 与非典型 HCC 有较强的关联性, 诊断非典型 HCC 特异度为 98-99%。

结论 LI-RADS 适用人群及非 LI-RADS 定义的风险人群, LI-RADS v2018 CT 征象诊断 HCC 准确度高, 灵敏度 88%, 特异度 83%。辅助征象肿块内出血、马赛克征对于非典型 HCC 具有高度特异性。

PO-1967

小视野结合压缩感知技术短时间屏气高分辨 3D-MRCP 的可行性研究

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目的: 通过缩小 FOV 结合压缩感知技术改良 3D 屏气 MRCP 序列, 达到小视野高分辨短时间屏气 MRCP 成像。

方法: 前瞻性招募 50 例疑似胰胆道疾病患者, 分别以随机顺序进行改良的小视野压缩感知 3D 屏气 MRCP, 原始 3D 屏气 MRCP 扫描, 记录屏气情况。两名放射科医师以 5 分独立盲法评估, 图像质量、背景抑制、运动伪影、胰胆管清晰度, 及诊断自信度。Wilcoxon 符号检验比较个体内差异, ICC 系数评价观察者间一致性, 受试者特性曲线 ROC 计算诊断效能。

结果: 改良后小视野 3D 屏气 MRCP 序列扫描时间为 13s, 原始 3D 屏气 MRCP 序列扫描时间为 18s。50 例患者中约 34 例患者屏气不佳, 无法完成 18s 原始 MRCP 序列稳定屏气, 而 13s 改良 MRCP 序列患者完成率占到了 92% (46 例), 差异有统计学意义 ($p<0.05$)。二者在图像质量总体评分无统计学差异 (原始 MRCP 为 3.87 ± 0.73 , 改良 MRCP 为 3.80 ± 0.89 , $z=0.5$, $p=0.617$)。而改良 MRCP 的背景抑制效果评分要劣于原始 MRCP, 差异有统计学意义 (原始 MRCP 为 4.57 ± 0.51 , 改良 MRCP 为 4.17 ± 0.44 , $z=2.70$, $p=0.007$)。改良 MRCP 的运动伪影评分要优于原始 MRCP, 差异具有统计学意义 (原始 MRCP 为 4.15 ± 0.63 , 改良 MRCP 为 4.60 ± 0.62 , $z=2.62$, $p=0.009$)。在其余胰胆管等结构的显示上, 两种扫描序列图像质量评分没有显著差异 ($p>0.05$)。两种序列对于胰胆道的解剖变异和疾病的诊断准确度相似 ($p=0.72-0.88$)。

结论: 通过缩小视野提高分辨率, 并结合压缩感知技术减少扫描时间的情况下, 改良 3D 屏气 MRCP 与原始 3D 屏气 MRCP, 两种序列图像质量总评分差异无统计学意义, 且改良后只有 13s 屏气时间对于患者的配合度更好, 同时又降低运动伪影提高扫描成功率, 对于不能配合呼吸的患者可能更有用。

PO-1968

“善变”的肝血管瘤——肝脏硬化性血管瘤李阳阳¹、谭艳²

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背景及目的：肝不典型血管瘤是一种罕见变异，其中包括巨大不规则血管瘤、离心样强化的血管瘤、硬化性/玻璃样变的血管瘤等，非典型血管瘤特征很难与原发性或转移性恶性肿瘤鉴别。本文将讨论硬化性/玻璃样变的血管瘤临床特征及影像学表现。

方法：本文回顾性分析 1 例肝脏 S7 段的硬化性/玻璃样变的血管瘤的临床、影像学特点，讨论其诊断、治疗及预后情况，并结合相关文献进行分析。

结果：患者，女性，64 岁，4 月前无明显诱因右上腹间断胀痛，未予重视，近期加重就诊。急诊行腹部 CT 检查显示：肝 S7 段可见一混杂密度肿块影，局部突出于肝脏轮廓之外，周围脂肪间隙内密度增高，增强扫描见环形强化并向内填充，考虑为炎性假瘤或胆管细胞癌可能。患者以“肝占位”就诊于肝胆外科，查体未见明显异常。患者自发病以来食欲差，体重减轻 7.5 kg。为明确诊断进一步行 MRI 检查，提示 S7 段可见团块状长 T1 短 T2 信号，其内可见更长 T2 信号，DWI 扫描病灶中央呈高信号，增强扫描动脉期未见明显强化，静脉期及延迟期可见病灶内分隔轻度强化，肝胆期病灶廓清，部分分隔持续性强化，考虑胆管细胞癌可能。行右半肝及尾状叶部分切除术中发现肿瘤位于尾状叶附近，直径约 5cm，质韧，切面黄白相间。病理显示病灶内可见较多厚壁血管增生，伴管壁玻璃样变性，并可见较多炎细胞浸润及含铁血黄素沉积，符合血管瘤改变。

结论：硬化性/玻璃样变血管瘤是罕见的非典型肝血管瘤，是海绵状血管瘤退行性改变引起的纤维化和玻璃样变，属于海绵状血管瘤变性的终末期，无特殊症状。回顾文献报道总结硬化性海绵状血管瘤的特征如下：①多无肝炎、肝硬化病史；②病灶呈地图样轮廓，包膜回缩，随时间推移病灶体积缩小；③T2WI 信号强度低于脑脊液，注入对比剂后早期强化不足，晚期外周轻度增强；④PET/CT 未见显像剂累积；⑤影像学上只有当先前的检查显示典型血管瘤，观察到时间演变时才可能进行推定诊断。深入了解其影像学表现并纳入肝脏病变的鉴别诊断可以改变患者的治疗及管理。

PO-1969

光谱 CT 多参数定量评估胃癌 HER-2 表达的相关性研究

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目的：探讨基于光谱 CT 的多参数定量分析对于胃腺癌 HER-2 表达评估的应用价值。 **方法：**回顾性分析 60 例经手术病理证实为胃癌患者的临床、病理及影像学资料。基于光谱 CT 测量并计算胃癌 CT 动脉期 (AP) 和静脉期 (PP) 的碘浓度值 (IC)、标准化碘值 (nIC)、40keV 单能级 CT 值 (CT40keV) 及有效原子序数 (Z-eff)。利用单变量分析确定各参数与胃癌 HER-2 表达的相关性，筛选可提示 HER-2 表达水平的光谱 CT 参数，利用受试者工作特征曲线 (ROC) 分析相关参数评估 HER-2 表达水平的效能。 **结果：**将 HER-2 表达为 2+ 或 3+ 定义为 HER-2 表达阳性组 (n=19)，将 HER-2 表达为 0 或 1+ 定义为 HER-2 表达阴性组 (n=41)。HER-2 表达阳性组的 nICAP、nICPP、CT40AP 均低于 HER-2 表达阴性组 (nICAP=0.16±0.05 vs. 0.21±0.09, P=0.035; nICPP=0.49±0.17 vs. 0.59±0.16, P=0.030; CT40AP=151.95±45.30HU vs. 189.48±74.40HU, P=0.047)，且差异具有统计学意义；HER-2 表达阳性组的 ICAP、ICPP、CT40PP、Z-effAP、Z-effPP 亦均低于 HER-2 表达阴性组，但差异均无统计学意义。基于 ROC 曲线分析，参数 nICAP、nICPP、CT40AP 的曲线下面积分别为 0.684 (95%CI: 0.538, 0.831)、0.656 (95%CI: 0.493,

0.819)、0.673 (95%CI: 0.526, 0.820), 其中当诊断阈值为 0.166 时动脉期标准化碘浓度值诊断效能最高, 敏感性为 75.6%, 特异性为 68.4%。结论: 光谱 CT 动、静脉期的标准化碘值 nIC 及动脉期 40keV 单能级 CT 值可在一定程度上提示胃癌病灶中的 HER-2 表达水平, 对其诊断及鉴别具有一定的指导意义。

PO-1970

基于盆底 MR 三维模型分析子宫无韧带状态下受腹压影响的应力改变

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目的:利用健康志愿者的盆底 MR 三维模型, 分析无韧带牵拉子宫受腹压影响的应力改变。

方法:收集 29 岁健康女性 (BMI=21.09 kg/m², 前位子宫) 盆底磁共振成像(MRI)的数据, 使用 Ingenia 3.0T CX MR 扫描仪 (Philips Healthcare, Best, the Netherlands) 获得基于压缩感知薄层高分辨三维 T2WI (5 倍 CS-SENSE 加速, TR/TE=1250 ms/148 ms, FOV=300x300 mm², FA: 90°, 层厚/间距:1.0mm/-0.5mm, 层数 240, 用时 4min55s) 建模重塑盆腔三维模型, 模型包括子宫 (无宫腔)、膀胱、直肠。通过有限元探讨子宫表面及内部在 Valsalva 状态下的应力分析、应变分析及最大位移分析。

结果:通过盆底 MR,成功建立了无韧带盆腔三维模型。子宫表明: 应力分析显示子宫的最大应力出现在子宫峡部前壁 (图 1a), 最大位移出现在子宫底及体部, 且峰值出现在子宫体后壁 (图 1b)。子宫内部: 应力分析显示子宫内部的应力主要出现在子宫体部 (图 2a), 且子宫体部应力大于子宫表面 (图 2a vs. 图 1a)。最大位移出现在子宫体部, 且峰值出现在子宫体后壁 (图 2b), 子宫内部位移较子宫表明位移小 (图 2b vs. 图 1b)。

结论:对于无韧带支撑的子宫, 加腹压状态下子宫峡部内侧承受力最大, 子宫表面的应力大于内部。加腹压状态下子宫体背侧位移最大, 且子宫表面的受力大于内部。通过对无韧带子宫有限元分析, 初步确定了腹压对子宫内、外部的直接影响, 可为临床工作提供一些参考。

PO-1971

双源 CT 肝动脉三期扫描及增强灌注扫描诊断肝硬化背景下小肝癌的价值

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目的 探讨双源 CT 肝动脉三期扫描及增强灌注扫描诊断肝硬化背景下小肝癌的价值。

方法 回顾性分析 2019 年 2 月至 2021 年 9 月医院收治的 85 例肝硬化背景下小肝癌患者的临床资料为研究组, 另回顾性分析医院同时间段收治的 45 例肝硬化背景下肝脏良性结节患者的临床资料为对照组。两组均行双源 CT 肝动脉三期扫描与增强灌注扫描, 分析动脉三期病灶强化特征及病灶检出率, 比较不同肝硬化程度患者与对照组灌注参数[血容量 (BV)、肝动脉分数 (HAF)、血流量 (BF)、肝动脉灌注量 (HAP)], 比较不同分化程度患者与对照组的灌注参数, 绘制受试者工作曲线 (ROC), 以曲线下面积 (AUC) 分析双源 CT 肝动脉三期扫描与增强灌注扫描对肝硬化背景下小肝癌的诊断价值。

结果 85 名肝硬化背景下的小肝癌患者中, 病理诊断病灶有 92 个, 病灶直径 0.8~3.0cm, 平均 (1.85±0.37) cm。动脉晚期、动脉中期 CT 绝对值、强化值、检出率均高于动脉早期 (P<0.05),

动脉中期、动脉晚期 CT 绝对值、强化值、检出率比较差异无统计学意义 ($P>0.05$)。不同肝硬化程度患者与对照组 BV、BF、HAF、HAP 比较有统计学意义 ($P<0.05$)；肝硬化患者 HAP、HAF 均高于对照组 ($P<0.05$)；随着肝硬化程度的加重，HAF、HAP 逐渐增加，而 BV、BF 逐渐下降；不同分化程度患者与对照组 BV、BF、HAF、HAP 比较有统计学意义 ($P<0.05$)，随着分化程度的增加，BV、BF、HAF、HAP 逐渐下降；双源 CT 肝动脉三期扫描与增强灌注扫描诊断肝背景下小肝癌的灵敏度分别为 83.53%、90.59%；特异度分别为：84.78%、86.96%；AUC 值 (95%CI) 分别为 0.842 (0.768~0.899)、0.888 (0.821~0.936)，双源 CT 肝动脉三期扫描与增强灌注扫描对肝背景下小肝癌的诊断效能比较差异无统计学意义 (Z 值=1.012, P 值=0.312)。结论 双源 CT 肝动脉三期扫描有助于发现肝硬化背景下小肝癌病灶，增强灌注扫描可有效评估患者肝硬化程度与分化程度，二者在诊断肝硬化背景下小肝癌中均具有良好的价值。

PO-1972

基于三期增强 CT 影像组学和临床特征在小肾透明细胞癌鉴别诊断中的应用分析

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目的 探讨基于三期增强 CT 的影像组学和临床特征在小肾透明细胞癌与小肾非透明细胞癌的鉴别诊断中的应用价值。

方法 回顾性研究共计 112 例(透明细胞癌 75 例，非透明细胞癌 27 例)经病理诊断为肾细胞癌的患者，包括性别、年龄、肿瘤最大径、肿瘤位置(左肾或右肾)、出血、钙化、囊变坏死、中心瘢痕、假包膜在内的临床信息及患者的增强三期 CT 图像，在每一期的图像上逐层勾画 ROI；提取病灶的纹理特征；利用方差阈值法、K 最佳法、Lasso 模型进行降维筛选，分别在皮质期、实质期、排泄期筛选出来 20、11、14 个最佳特征；利用这些影像组学特征和具有统计学意义的临床特征构建基于 SVM 模型的单期、两期联合、三期联合分类器模型；通过受试者工作特征 (ROC) 曲线和校准曲线来评价模型的性能。

结果 患者仅假包膜一项临床信息与小肾癌的病理类型的差异具有统计学意义($P=0.017$)，其余的临床信息包括：性别、肿瘤位置、出血、钙化、囊变坏死、中心瘢痕、年龄、肿瘤最大径与小肾癌病理类型的差异均无统计学意义($P>0.05$)；在测试集上，实质期模型达到了 $AUC = 0.59$ ，排泄期模型达到 $AUC=0.60$ ，皮质期加实质期模型达到 $AUC=0.75$ ，皮质期加排泄期模型达到 $AUC=0.77$ ，实质期加排泄期模型达到 $AUC=0.73$ ，三期联合模型达到 $AUC=0.73$ 。皮质期模型表现最佳： $AUC = 0.79$ 。

结论 基于皮质期增强 CT 的影像组学与临床特征可用于小肾透明细胞癌和小肾非透明细胞癌的鉴别诊断。

PO-1973

基于营养学深度学习模型的慢加急性肝衰竭患者 90 天不良预后预测

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目的：慢加急性肝衰竭 (ACLF) 是一种以急性失代偿 (AD) 为特征的综合征，伴有慢性肝病和器官衰竭 (肝内或肝外)，导致短期死亡率高。有效识别预后不良的患者并进行早期干预是挽救患者

生命的关键。因此,本研究旨在应用深度学习提取 ACLF 患者的营养影像学特征,构建营养学深度学习预后预测模型。通过独立验证集,验证该模型对 ACLF 患者 90 天不良预后的预测准确性。

方法: 从 2020 年 7 月至 2022 年 7 月,从我院招募 163 名符合 APSAL 诊断标准并有随访记录的 ACLF 患者。这些患者被随机分配到训练集 ($n = 99$) 和测试集 ($n = 64$)。在增强 CT 动脉期获得第三腰椎骨骼肌、皮下脂肪和内脏脂肪的感兴趣区 (ROI), 三个 ROI 区域与患者的营养学水平相关。本研究将三个 ROI 区域分别提取,叠加为一个三层的图像作为深度学习模型输入,通过基于 Transformer 模块的三组特征提取模块,最终使用全连接层将营养学相关图像特征与血常规、血液生化、凝血功能和甲胎蛋白信息进行融合,并预测患者结局。研究终点是 ACLF 患者的 90 天无肝移植生存率。

结果: 在训练集和测试集中,分别有 30.3% (30/99) 和 29.7% (19/64) 的患者出现疾病进展 (死亡或肝移植)。该模型在训练集中的曲线下面积 (AUC) 为 0.904 (95% CI 0.879-0.957), 灵敏度和特异度分别为 0.875 和 0.854; 在测试集中的曲线下面积 (AUC) 为 0.811 (95% CI 0.753-0.932), 灵敏度和特异度分别为 0.845 和 0.681。Dlong 检验用于比较营养学深度学习模型与子模型 (单一影像模型和单一临床模型) 和传统经典模型 (MELD 和 MELD-Na) 的 AUC。结果显示,营养学深度学习模型优于上述任何一种模型 ($P < 0.05$)。

结论: 基于营养学深度学习模型能有效预测 ACLF 患者 90 天的不良预后。这一综合模型可为临床实践提供一种新颖而有价值的方法,以尽早发现需要积极干预的患者,从而提高 ACLF 患者的生存率。

PO-1974

新型 ^{18}F 放射性标记分子探针用于高表达 GPC3 肝细胞癌的 PET 成像

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目的: Glypican-3 (GPC-3) 是一种细胞表面蛋白多糖,在肝癌 (HCC) 细胞膜上过度表达。本研究旨在开发一种靶向特异性放射性标记氟化肽,用于正电子发射断层扫描 (PET) 成像检测高 GPC3 表达的肝细胞癌。

方法: 采用 Click 化学方法合成了一种新的 GPC3 结合肽 (GP3239), 并利用氟化铝标记法对其进行了快速的 ^{18}F 放射性标记。随后对得到的 PET 探针进行了生物学评估。GP3239 中螯合一个高亲水性连接体,以减少探针在肝脏中的吸收,提高肿瘤与背景的总对比度。对 ^{18}F 标记肽的辛醇-PBS 分配系数、细胞摄取量和稳定性进行了测试。通过对肝癌荷瘤肿瘤小鼠进行 PET 成像,明确 $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 的肿瘤靶向性及其体内生物分布。

结果: $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 可快速进行合成,放射化学纯度极高 ($>98\%$)。经测定, $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 具有亲水性,测得的 LogP 值为 -3.58 ± 0.02 ($n = 5$)。 $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 表现出良好的体外稳定性,以及在 GPC3 表达阳性 HepG2 肝癌细胞系中良好的特异性。在 PET 成像中,注射后 1 小时, $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 在 HepG2 肿瘤中摄取良好 ($\%ID/g: 1.97 \pm 0.45$),而在肝脏中蓄积极少 ($\%ID/g: 0.52 \pm 0.29$),因此肿瘤与肝脏 (T/L) 对比良好。生物分布结果与 PET 研究结果一致。

结论: $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 是对 HCC 中 GPC3 表达进行 PET 成像的一种有前景的探针。 $\text{Al}[^{18}\text{F}]\text{F-GP3239}$ 的放射合成方便、对 HCC 中的 GPC3 具有极好的特异性以及良好的排泄特性,值得进一步研究以实现临床转化。使用 GPC3 特异性探针进行 PET 成像将为临床医生提供有价值的信息,从而对 HCC 患者的治疗产生重大影响。

PO-1975

构建预测结直肠癌 POLE 致病突变的影像组学模型

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目的: POLE 致病突变在结直肠癌较为罕见, 由于其对于免疫治疗较为敏感, 因此早期准确筛选、识别 POLE 致病突变患者具有重要的临床意义。本研究拟基于基线 CT 图像, 应用影像组学构建预测结直肠癌患者 POLE 致病突变的预测模型。

材料与方法: 回顾性连续收集 2008 年 1 月至 2022 年 6 月多家医学中心通过高通量测序明确 POLE 基因状态的结直肠癌患者。将 POLE 致病突变、非致病突变/野生型患者以 7:3 比例随机划分为训练集及验证集。采用 3D-Slicer 软件手动勾画感兴趣区 (ROI), 包括 ROI 1 静脉期图像中原发灶、ROI 2 原发灶周围脂肪组织密度异常的区域。应用 Pyradiomics 3.0.1 提取全部患者 ROI 影像特征。在训练组两组样本间进行 t 检验, 保留 P 值 < 0.05 的特征, 然后进行两两特征之间的相关检验, 淘汰相关系数绝对值 > 0.5 的一对特征中 t 值较小的特征, 使用逻辑回归联合 LASSO 回归, 在其中选取用于构建模型的特征用于模型构建。

结果: 训练集纳入 17 例 POLE 致病突变患者及 62 例非致病突变/POLE 野生型 CRC 患者, 验证集纳入 8 例 POLE 致病突变及 32 例非致病突变/POLE 野生型 CRC 患者。基于原发灶及原发灶周围脂肪组织 2 个 ROI 分别提取 851 个特征, 共得到 1702 个特征。利用逻辑回归和 LASSO 回归, 筛选出 4 个特征用于模型构建, 根据建模权重得到影像学评分, 结合临床病理特征, 使用 Logistic 回归构建临床-影像组学联合预测模型。训练集中, 临床模型、影像组学模型、联合模型诊断的 AUC 值分别为 0.845、0.901、0.961; 灵敏度均为 1.000; 特异度分别为 0.532、0.645、0.839。验证集中, 临床模型、影像组学模型、联合模型诊断的 AUC 值分别为 0.789、0.887、0.906; 灵敏度分别为 0.875、1.000、0.750; 特异度分别为 0.562、0.656、1.000。

结论: 本研究基于结直肠癌原发灶及其周围脂肪组织基线 CT 图像特征, 构建的影像组学模型对于 POLE 致病突变具有较好的预测效能, 有助于筛选出免疫治疗潜在受益的结直肠癌患者。

PO-1976

基于机器学习的影像特征在鉴别肾上腺增生
和乏脂肪腺瘤中的诊断价值

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目的: 肾上腺增生与腺瘤在临床表现上相似, 但治疗方法不同。肾上腺增生通常采用药物治疗, 而腺瘤则需要手术干预。乏脂肪的肾上腺病变在临床及影像学上均难以准确区分是增生还是腺瘤。本研究旨在探讨机器学习算法在区分肾上腺增生与乏脂肪腺瘤方面的适用性和潜在价值。

方法: 回顾性分析 2019 年 1 月至 2020 年 10 月期间在我院接受腹部平扫及增强 CT 检查并经病理证实为肾上腺腺瘤和增生的患者 (病灶平扫 CT 值 > 10HU), 以 8: 2 的比例随机划分为训练集和测试集。在门脉期图像上勾画感兴趣区, 以确定病灶的平扫 CT 值、门静脉期 CT 值及腹主动脉门静脉期 CT 值, 并计算病灶的绝对增强 (门脉期 CT 值 - 平扫 CT 值)、相对增强 [(绝对增强 / 平扫 CT 值) × 100%] 及相对增强比 [(绝对增强 / 腹主动脉门静脉期 CT 值) × 100%]。此外, 测量病灶的最大径, 记录病灶数量, 使用 ITK-snap 软件分别测量病灶及肾上腺的体积并计算二者体积比。结合具有显著相关性的临床特征, 使用随机森林、逻辑回归、神经网络、梯度提升以及朴素贝叶斯等机器学习算法分别建立相应的预测模型。使用受试者工作特征曲线 (ROC) 和曲线下面积 (AUC) 评估各类模型的分类性能。

结果: 研究共纳入 128 例患者 (83 例腺瘤, 45 例增生), 随机森林模型及神经网络模型均表现出最佳的分类性能 (训练集 AUC=1.000, 测试集 AUC=0.938), 优于梯度提升模型 (训练集 AUC=1.000, 测试集 AUC=0.931)、朴素贝叶斯模型 (训练集 AUC=0.834, 测试集 AUC=0.925) 及逻辑回归模型 (训练集 AUC=0.871, 测试集 AUC=0.906)。

结论: 结合影像特征和临床特征的机器学习算法在区分肾上腺增生和乏脂肪腺瘤方面表现出优越性, 有助于降低将肾上腺增生误诊为腺瘤的概率, 避免不必要的手术治疗对肾上腺增生患者的风险。

PO-1977

卵巢甲状腺肿的术前影像学诊断及鉴别

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目的 通过对照分析卵巢甲状腺肿 (struma ovarii, SO) 与 I 期卵巢上皮来源恶性肿瘤 (Epithelial Ovarian Cancer, EOC) 的术前临床资料及影像学资料, 总结 SO 的临床特点及影像学特征。方

法 回顾性分析经手术及病理确诊的 42 例 SO 与 40 例 I 期 EOC 患者的临床资料及影像学资料, 临床资料包括症状、年龄、肿瘤指标 (CA125、HE4 和 CA19-9)。影像学资料包括: 病变部位、数目、大小、形态、质地、囊壁及分隔厚度、CT 密度和 MRI 信号特征、强化方式及程度等。比较两组患者的临床指标及影像学特征是否有统计学差异。通过多参数回归分析明确独立预测因素, 并计算联合诊断效能。结果 两组患者的 CA125 ($P<0.001$) 及 HE4 ($P<0.001$) 是否升高、绝经后阴道流血症状 ($P=0.005$) 均具有统计学差异。两组肿瘤质地、蜂房、壁结节、囊液密度、实性信号、肿块强化方式及程度的差异均有统计学意义 ($P<0.05$); 其中 CA125 及肿块强化程度是独立预测因素 ($P=0.022$, $OR=0.128$; $P=0.002$, $OR=11.148$), 两者联合诊断的特异性达 90.0%。结论 SO 与 I 期 EOC 在临床症状、肿瘤标志物及影像学特征上均有差异。其中 CA125 是否升高及肿瘤实性成分的强化程度是两者鉴别诊断的独立预测因素。

PO-1978

结肠癌影像 T 分期诊断流程及其效能评价

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目的: 本研究拟前瞻性分析穿壁动脉异常影像学表现及肠壁外缘光滑或毛糙等原发灶分期相关 CT 影像特征在不同病理 T 分期 (pT) 中的分布差异, 在此基础上提出影像 T 分期 (rT) 诊断流程, 接下来在回顾性、多中心研究中进一步验证 rT 的诊断效能, 分析 rT 的预后价值以佐证其可靠性, 从而提高结肠癌术前分期的准确性及可重复性, 为临床决策的制定提供依据。

方法: 前瞻性连续收集我院 2021 年 5 月-2021 年 12 月的结肠癌患者共 101 例, 分析不同 pT 中原发灶分期相关影像特征的分布差异, 提出 rT 诊断流程; 回顾性连续收集两家医学中心 2016 年 1 月-2017 年 12 月的结肠癌患者共 179 例, 计算 rT 及常规 T 分期 (cT) 诊断 T 分期的准确性, 采用单因素 Cox 回归分析和 Kaplan-Meier 曲线评估其与预后的相关性, 计算风险比及 95% 置信区间。

结果: pT1-4b 期中原发灶分期相关影像特征的分布存在明显差异, 包括肿瘤外缘是否光滑、肿瘤是否侵透肠壁全层、肿瘤周围脂肪间隙是否清晰、小动脉征及肿瘤是否侵犯邻近器官 (P 均 <0.05)。回顾性队列中, rT 诊断 T 分期的准确率、过分期率、分期不足率分别为 89.9%、3.9%、6.1%。cT 诊断 T 分期的准确率、过分期率、分期不足率分别为 52.0%、32.4%、15.6%。其中, 影像过分期、病理诊断为 T3 的病例中, 49 例被判断为 cT4a, 仅有 4 例被判断为 rT4a; 影像过分期

期、病理诊断为 T1-2 的病例中, 7 例被判断为 cT3-4a, 仅有 2 例被判断 rT3。影像分期不足、病理诊断为 T4a 的病例中, 18 例被判断为 cT3, 10 例被判断为 rT3。Kaplan-Meier 生存分析曲线显示 rT、pT 分期与患者的 OS、MFS 显著相关 (rT: $P=0.003$ 、 $P=0.010$; pT: $P=0.001$ 、 $P<0.001$); 而不同 cT 分期中, 患者的 OS、MFS 并无显著差异 ($P=0.457$ 、 $P=0.052$)。

结论: 本研究基于原发灶分期相关的 CT 影像特征提出结肠癌 rT 诊断流程, 并且在多中心研究中证实 rT 判断 T 分期的准确性及其预后价值。rT 诊断流程能够为术前准确地判断结肠癌 T 分期提供有价值的指导, 为临床制定治疗决策提供有意义的参考。

PO-1979

CT 在食管尖锐异物诊断中的应用: 病例回顾分析与 CT 食管碘水造影模具实验研究

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目的: 回顾分析食管尖锐异物病例的影像与临床资料, 并联合体外模具实验筛选 CT 食管碘水造影中不同浓度规格对比剂的最佳稀释比例, 旨在探讨 CT 在食管尖锐异物诊断和随访中的应用, 并解决目前 CT 食管碘水造影检查中对比剂稀释比例混乱、标准不一的问题。

方法: 回顾本中心十年内(2012 年 10 月至 2022 年 10 月)因食管尖锐异物入治疗的病例, 分析患者的影像及临床资料。在模拟 CT 食管造影检查的体外实验研究中, 将 4 种浓度规格(320 mgI/mL、350 mgI/mL、370 mgI/mL、400 mgI/mL)的碘对比剂原液分别按 21 种比例稀释后进行常规 CT 扫描(采用 3 种常用管电压 80 kVp、100 kVp、120 kVp)与双能 CT 扫描, 对图像质量进行客观和主观评估。

结果: 本研究共纳入食管尖锐异物 241 例: 所有患者异物取出前的 CT 检查均检测到异物的存在; 最初入院时 CT 提示穿孔 155 例(155/241, 64.32%); 临床证实 12 例(12/241, 4.98%)患者在治疗后仍存在穿孔; CT 检查可以发现 25 例(25/226, 11.06%)内镜漏诊的异物和 2 例(2/12, 16.67%)X 线食管碘水造影阴性的异物穿孔。通过模具实验发现不同稀释比例 CT 图像之间的客观评估参数的差异有统计学意义($P<0.05$); 并进一步通过主观图像质量评分, 筛选出可获得高质量图像的稀释比例: 以 100 kVp 扫描为例, 浓度为 320 mgI/mL 的最佳稀释比例为 1: 6~1: 19, 其余 3 种浓度均为 1: 8~1: 19。此外, 双能 CT 扫描被证明可以在降低辐射剂量的同时显著降低模具实验图像的硬化伪影。

结论: 对于临床高度怀疑但内镜未能发现的异物和治疗后 X 线食管碘水造影阴性但患者病情无明显改善的穿孔病例, 应补充 CT 检查; 根据模具实验得到碘对比剂的最佳稀释比例, 为 CT 食管碘水造影技术的临床应用提供依据。

PO-1980

增强 T2*血管加权成像预测肝细胞癌肝切除术后早期复发的价值

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目的: 探讨增强 T2*血管加权成像(enhanced T2-star weighted angiography, ESWAN)预测肝细胞癌肝切除术后早期复发的价值。

方法：回顾性收集进行上腹 MRI 检查（包括 ESWAN 序列）且接受肝切除术的肝细胞癌患者 29 例（早期复发（ER）15 例，早期未复发（NER）14 例）。在 AW 4.6 工作站（GE Healthcare），使用 Functool 软件自动生成 ESWAN 定量参数图，包括幅度图、相位图、R2*图和 T2*图。参照 T2WI 图像，在病变的最大层面，分别于肿瘤、瘤周区域（1cm 内）及远瘤周正常肝实质（5cm 内）各放置 3 个大小相等的类圆形感兴趣区域（ROI），记录幅度值、相位值、R2*值和 T2*值。使用 3 个 ROI 的平均值进行统计分析。采用 Kolmogorov-Smirnov 检验评估各参数的正态性，使用独立样本 t 检验或 Mann-Whitney U 检验比较两组间定量参数的差异。使用受试者操作特征（ROC）分析评估诊断性能。

结果：ER 组的幅度值(肿瘤)、幅度值(瘤周)、幅度值(肝值)、R2*(肿瘤)、R2*(瘤周)和 R2*(肝)显著高于 NER 组，差异具有统计学意义（ $P<0.05$ ）。余定量参数在两组间的差异无统计学意义（ $P>0.05$ ）。幅度值(肿瘤)、幅度值(瘤周)、幅度值(肝)、R2*(肿瘤)、R2*(瘤周)、R2*(肝)预测早期复发的曲线下面积（AUC）分别为 0.590、0.600、0.681、0.890、0.924 和 0.929。当幅度值(肿瘤)、幅度值(瘤周)、幅度值(肝)、R2*(肿瘤)、R2*(瘤周)和 R2*(肝)参数联合时，预测效能升高（AUC=0.971）。

结论：ESWAN 序列的多个定量参数对预测肝细胞癌肝切除术后早期复发具有一定的价值。

PO-1981

APT 联合 T1-mapping 预测前列腺癌神经侵犯的可行性研究

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目的：探索酰胺质子转移成像（Amide proton transfer, APT）联合 T1-mapping 预测前列腺癌神经侵犯的可行性。

方法：回顾性分析本院行 3.0T MR 扫描并经病理证实的前列腺癌 60 例，其中无神经侵犯组（A 组）40 例，有神经侵犯组（B 组）20 例。所有患者均行 APT 和 T1-mapping 扫描。扫描图像上传至 ISP（IntelliSpacePortall, Philips Healthcare），由两名观察者分别于病灶显示最大层面测量两组病变的 APT 值、T1 值。采用组内相关系数（ICC）检验两名观察者测量结果的一致性；采用独立样本 t 检验比较两组病变各参数值的差异；采用受试者工作特征（receiver operating characteristic curve, ROC）曲线评估有差异参数单独及联合对两组病变鉴别诊断的效能；采用 Delong 检验比较各参数及联合参数诊断效能的差异。

结果：两名观察者测量各组数据的一致性良好（ $ICC>0.75$ ）。A 组 APT 值[（ 2.40 ± 0.49 ）%]低于 B 组 APT 值[（ 2.74 ± 0.75 ）%]，A 组 T1 值[（ 1191.26 ± 252.98 ）ms]高于 B 组 T1 值[（ 1043.62 ± 294.88 ）ms]，差异均有统计学意义（ $P<0.05$ ）。APT 值、T1 值及二者联合鉴别两组病变的 ROC 曲线下面积分别为 0.606、0.638 及 0.702。单独及联合诊断效能间无统计学差异（ $P>0.05$ ），两参数联合的诊断效能优于单独诊断效能。

结论：APT 值、T1 值可用于预测前列腺癌神经侵犯，两者联合的诊断效能有所提升，具有很好的临床应用前景。

PO-1982

APT 联合 T2-mapping 预测前列腺癌神经侵犯的可行性研究

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目的:探索酰胺质子转移成像(Amide proton transfer, APT)联合 T2-mapping 预测前列腺癌神经侵犯的可行性。

方法:回顾性分析本院行 3.0T MR 扫描并经病理证实的前列腺癌 56 例,其中无神经侵犯组(A 组) 38 例,有神经侵犯组(B 组) 18 例。所有患者均行 APT 和 T2-mapping 扫描。扫描图像上传至 ISP(IntelliSpacePortall, Philips Healthcare),由两名观察者分别于病灶显示最大层面测量两组病变的 APT 值、T2 值。采用组内相关系数(ICC)检验两名观察者测量结果的一致性;采用独立样本 t 检验比较两组病变各参数值的差异;采用受试者工作特征(receiver operating characteristic curve, ROC)曲线评估有差异参数单独及联合对两组病变鉴别诊断的效能;采用 Delong 检验比较各参数及联合参数诊断效能的差异。

结果:两名观察者测量各组数据的一致性良好(ICC>0.75)。A 组 APT 值[(2.41±0.52)%]低于 B 组 APT 值[(2.79±0.77)%], A 组 T2 值[(77.76±8.55) ms]

高于 B 组 T2 值[(72.95±6.98) ms],差异均有统计学意义(P<0.05)。APT 值、T2 值及二者联合鉴别两组病变的 ROC 曲线下面积分别为 0.610、0.650 及 0.709。单独及联合诊断效能间无统计学差异(P>0.05),两参数联合的诊断效能优于单独诊断效能。

结论:APT 值、T2 值可用于预测前列腺癌神经侵犯,两者联合的诊断效能有所提升,具有很好的临床应用前景。

PO-1983

基于肝脏普美显的人工智能研究

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目的:本文主要就普美显 MRI 在肝癌影像诊断过程中的数据信息进行了探究分析

方法:就本院收治的 20 例肝癌患者作为研究对象,并对所有患者的 MRI 诊断检查资料进行回顾性分析

结果:对肝癌患者进行普美显 MRI 检查,其具备良好的诊断准确率以及诊断特异性

结论:借助于人工智能的统计能够使得肝癌的检出率得到大幅度的提升,并能够对肝癌的信号变化特点、分化程度进行有效的提供,从而给予治疗方案以及预后方案的针对性制定提供足够多的诊断依据,值得临床应用跟推广。

PO-1984

MRI DWI 评估肝纤维化的最佳 b 值组合

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目的

扩散加权成像 (DWI) 被认为可以用于评估肝纤维化。但是其用于肝纤维化分期的最佳 b 值组合目前还没有达成共识。本研究拟以穿刺活检作为对照, 确定能够准确评估肝纤维化的 DWI 的最佳 b 值组合。

材料和方法

本研究招募 81 名慢性肝病患者 (平均 49 岁, 24-75 岁) 和 21 名健康志愿者 (平均 45 岁, 26-65 岁)。应用联影 uMR790 进行 DWI 扫描, 具体扫描参数为: TR/TE 为 4000/78 ms, 层厚 5 mm, FOV=300 mm x 380 mm, b 值分别为 0、50、100、150、200、800、1000、1200 和 1500 s/mm²。用于计算 ADC 值得 b 值组合为 20 组 (0-800、0-1000、0-1200、0-1500、50-800、50-1000、50-1200、50-1500、100-800、100-1000、100-1200、100-1500、150-800、150-1000、150-1200、150-1500、200-800、200-1000、200-1200、00-1500)。

结果

健康志愿者 ADC 值均显著高于肝纤维化组 ($P < 0.01$)。随着肝纤维化进展, ADC 值在 b 值组合 (100 和 1000 s/mm², 150 和 1200 s/mm², 200 和 800 s/mm², 200 和 1000 s/mm², $P < 0.01$) 中的 ADC 值显著降低。ADC₁₀₀₋₁₀₀₀、ADC₁₅₀₋₁₂₀₀、ADC₂₀₀₋₈₀₀ 和 ADC₂₀₀₋₁₀₀₀ 区分 METAVIR F1 和 F2-4 受试者曲线下面积 (ROC) 分别为 0.693、0.785、0.774 和 0.756。区分 F1-2 和 F3-4 期肝纤维化的 ROC 分别为 0.713、0.680、0.802 和 0.769。区分 F1-3 和 F4 期肝纤维化的 ROC 分别为 0.728、0.705、0.834 和 0.779。

结论

DWI 的技术可以表征肝纤维化, 并提供肝纤维化程度的信息。临床上推荐 b 值为 200-800 s/mm² 或 200-1000 s/mm² 两种组合来评估肝纤维化。b 值为 200 和 800 s/mm² 时效果可能更好。

PO-1985

计算机视觉处理生成的能谱 CT 斜率参数图图像质量及定性诊断
克罗恩病的效能评价

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目的: 探讨经计算机视觉处理生成的斜率参数图的图像质量及其定性诊断克罗恩病的价值。

方法: 收集经能谱 CTE 及结肠镜检查确诊克罗恩病患者 76 例及无病对照组 53 例。在主机自带的工作站上重建门脉期 120kVp-like、40-100keV 虚拟单能量图像 (VMI₄₀₋₁₀₀), 使用 Python 软件生成 40-100keV 斜率参数图 (K₄₀₋₁₀₀ 图), 测量计算正常肠壁、病变部位的信噪比 (SNR) 和对比噪声比 (CNR)。采用 5 分法对各组总体图像质量、噪声及对比度进行主观评分。两名放射科医师独立评估 120kVp-like、120kVp-like + 最佳 VMI 及 120kVp-like + K₄₀₋₁₀₀ 图, 使用 5 分置信量表诊断是否存在克罗恩病。比较各组客观参数和主观图像质量评分, 采用 ROC 曲线评价两名医师三种阅片方式诊断克罗恩病的效能。

结果:

1、各组图像 SNR 组间均无统计学差异, 对照组 (4.02, 7.26)、病例组 (5.82, 9.39) K₄₀₋₁₀₀ 图 CNR 高于对照组 (-2.22_{VMI100}, 5.34_{VMI40})、病例组 (0.19_{VMI100}, 13.42_{VMI40}) VMI₅₀₋₁₀₀ 和对照组 (-0.05, 1.91)、病例组 (2.18, 4.46) 120kVp-like 图 ($P < 0.05$)。

2、主观评价, K_{40-100} 图的对比度 (5-5) 高于 VMI_{50-100} (2-5) 和 120kVp-like 图 (3-4) ($P < 0.05$)。 VMI_{40} 与 VMI_{50} 的对比度高于 VMI_{60-100} 和 120kVp-like 图像 ($P < 0.05$)。 VMI_{50} 图像的总体图像质量优于其余各组图像 ($P < 0.05$)。

3、120kVp-like + K_{40-100} 图联合诊断克罗恩疾病诊断效能 (AUC: 0.973-0.977) 高于 120kVp-like 图像 (AUC: 0.913-0.931) 和 120kVp-like + VMI_{50} 联合诊断 (AUC: 0.949-0.962)。

结论: 由计算机视觉处理生成的 K_{40-100} 图图像质量好, 与 120kVp-like 联合诊断可提高放射科医师对克罗恩病的诊断效能及诊断信心。

PO-1986

术前超重/肥胖和脂肪组织分布对胃癌预后的价值: 一项回顾性队列研究

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目的: 肥胖与肿瘤预后之间的相关性一直存在争议, 在大多数研究中, 肥胖常被用作辅助参数而未被进一步分析, 其中脂肪组织分布对肿瘤长期预后的影响研究尚缺乏。计算机断层扫描 (CT) 是分析脂肪组织成分的金标准方法, 本研究拟采用 CT 评估胃癌患者术前的脂肪组织分布, 探讨超重/肥胖和脂肪组织分布与胃癌长期预后之间的关系。

方法: 本回顾性队列研究共纳入了 607 例胃癌患者, 其中身体质量指数 (BMI) 大于 25 kg/m² 的患者被定义为超重/肥胖。入组患者在胃癌手术前 15 天内进行腰椎 CT 检查, 并使用 SliceOmatic 软件的 ABACS 自动分割模块测定第三腰椎水平的脂肪组织分布参数, 包括内脏脂肪组织 (VAT)、皮下脂肪组织 (SAT) 和 VAT/SAT 比率。在调整包括年龄、性别、T 分期、N 分期和化疗等协变量后, 应用多元 Cox 回归模型评估超重/肥胖与胃癌特异性生存期 (DSS) 之间的相关性。此外, 除上述协变量外, 对超重/肥胖也进行了额外调整, 并采用多元 Cox 回归模型评估胃癌患者脂肪组织分布参数与 DSS 之间的相关性。

结果: 超重/肥胖是胃癌预后的预测因素 (HR=0.61, 95%CI:0.37–0.99), 与非超重/肥胖的患者相比, 超重/肥胖患者的预后明显更好 ($p=0.009$)。在对超重/肥胖进行调整后, 高 SAT 百分比是胃癌 DSS 的独立保护因素 (HR=0.59, 95%CI:0.36–0.96), 而高 VAT 百分比 (HR=1.68, 95%CI:1.06–2.68) 和高 VAT/SAT 比率 (HR=1.99, 95%CI:1.19–3.34) 是胃癌 DSS 的独立危险因素。与其他患者 (超重/肥胖伴低 VAT/SAT 比率、非超重/肥胖或高 VAT/SAT 比率) 相比, 非超重/肥胖症伴高 VAT/SA 比率的患者预后较差 (HR=1.89, 95%CI:1.28–2.77)。

结论: 超重/肥胖是胃癌预后的预测因素, VAT/SAT 比率可作为胃癌的一个有前景的预后因素, 因此, 在胃癌患者术前评估中, 不仅要注意 BMI, 还要注意脂肪组织的分布。

PO-1987

体素内不相干运动成像与宫颈癌病理学特征的相关性

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目的：本研究主要探讨了宫颈癌组织病灶边缘区和中央区的扩散加权成像（DWI）和体素内不相干运动成像（IVIM）各参数值的临床统计学意义，并进一步探讨病灶最佳区域的各参数与宫颈癌病理学特征的相关性。

方法：收集宫颈癌患者 46 例，对每个病灶的 DWI 和 IVIM 图像分别进行边缘区和中央区的感兴趣区（ROI）的绘制。根据手术或穿刺病理结果分为宫颈鳞癌组 39 例和腺癌组 7 例，鳞癌组进一步分为高、中、低分化。各自比较分析出病灶边缘区和中央区各参数的统计学意义。

结果：不同分组间的边缘区数据测量的 ADC 值和 D 值较中央区更具有统计学意义。宫颈鳞癌边缘区的 ADC 值和 D 值低于腺癌，差异具有统计学意义（ $P < 0.05$ 、 $P < 0.01$ ），D 值具有最优的鉴别能力，阈值分别为 $1.10 \times 10^{-3} \text{mm}^2/\text{s}$ 和 $0.83 \times 10^{-3} \text{mm}^2/\text{s}$ ，敏感度为 94.9%、94.9%，特异度为 71.4%、85.7%。在鉴别宫颈癌鳞癌中、低分化中，D 值具有最优的鉴别能力，ADC 值和 D 值的阈值为 $0.93 \times 10^{-3} \text{mm}^2/\text{s}$ 和 $0.76 \times 10^{-3} \text{mm}^2/\text{s}$ ，敏感度为 100%、87.5%，特异度为 81.8%、100%。在鉴别宫颈癌鳞癌高、低分化中，ADC 值和 D 值 ROC 曲线下面积 AUC 值相等（0.96），阈值为 $0.92 \times 10^{-3} \text{mm}^2/\text{s}$ 和 $0.77 \times 10^{-3} \text{mm}^2/\text{s}$ ，敏感度为 100%、91.7%，特异度为 81.8%、100%。

结论：颈癌病灶边缘区的 DWI、IVIM 各参数值较中央区各参数值更具有统计学意义；在宫颈鳞癌和腺癌的鉴别方面，边缘区的 D 值具有最佳诊断效能，其次是边缘区的 ADC 值；在鉴别宫颈癌鳞癌中分化和低分化中，边缘区的 D 值具有最优鉴别能力；在鉴别宫颈癌鳞癌高分化和低分化中，边缘区的 ADC 值和 D 值具有同等鉴别能力。

PO-1988

直肠癌/直肠系膜脂肪 CT 影像组学预测局部淋巴结转移

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目的：提取中低位直肠癌病灶以及直肠系膜脂肪影像学特征，联合临床相关因素构建模型来预测接受中低位直肠癌根治性手术的患者淋巴结转移的情况。

方法：回顾性分析中南大学湘雅三医院 2014 年 11 月至 2018 年 12 月的 232 例中低位直肠癌根治性手术患者的临床资料及影像数据，所有患者按照 7: 3 的比例随机分成训练组（ $N=162$ ）和验证组（ $N=70$ ）。

结果：232 例中低位直肠癌患者中有 92（39.7%）例患者有淋巴结转移，140（60.3%）例患者没有淋巴结转移。（1）经过单因素特征筛选及 LASSO 算法降维后，在病灶及直肠系膜脂肪中分别选择 19、17 个特征用来建立模型。在训练组中，病灶 ROI、直肠系膜脂肪 ROI 及两者结合的影像组学结合模型的 AUC 值分别为 0.796(95%CI: 0.721, 0.856), 0.747(95%CI: 0.667, 0.817), 0.840 (95%CI: 0.776, 0.903)；在验证组中，病灶 ROI、直肠系膜脂肪 ROI 及两者结合的影像组学结合模型的 AUC 值分别为 0.768(95%CI: 0.635, 0.861), 0.766(95%CI: 0.638, 0.865), 0.816 (95%CI: 0.697, 0.897)。影像组学结合模型的效能最佳。（2）将筛选出的 ctEMVI、ctTDs 及 ctNsII 三个危险因素纳入临床模型，临床模型在训练组和验证组中的 AUC 值分别为 0.750 (95%CI: 0.616, 0.863), 0.744 (95%CI: 0.538, 0.906)。

结论：基于肿瘤病灶及灶周直肠系膜脂肪影像组学联合临床因素构建的临床-影像组学联合模型显示了较好的预测性能，该模型可被用于预测接受中低位直肠癌根治性手术患者的淋巴结转移情况。

PO-1989

基于 CT 放射学列线图对肾透明细胞癌患者病理 T1-3 分期的个体化预测

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目的 评价基于 CT 扫描的多参数列线图对肾透明细胞癌 (ccRCC) 患者病理 T1-3 分期的个体化预测性能。

方法 回顾性分析哈尔滨医科大学 2020 年 6 月至 2023 年 4 月经病理学确诊为 ccRCC 的 188 例患者。基于 CT 扫描, 半自动化将腹部脂肪分割为皮下脂肪、内脏脂肪和肌间脂肪区域, 并计算腹部总脂肪量, 以获得相对内脏脂肪 (rVAF)。将所有参数依据身高归一化获得个体化内脏脂肪体积 (VAFI)、皮下脂肪体积 (SAFI)、肌间脂肪体积 (IMAF)。选择并组合与病理 T (pT) 分期相关的最佳影像学特征及临床特征, 通过多变量 logistic 回归分析建立放射学诺莫图, 并对其进行评估和验证 (区分度和有用性)。此外, 还评估了不同性别亚组中 rVAF 的预测能力。

结果 纳入 3 个 (肿瘤直径、IMAF、rVAF) 最佳的特征, 基于腹部脂肪分布与量与临床参数相结合的诺莫图能够预测高 pT 分期 (ROC 曲线下面积 (AUC) = 0.846), 并在不同性别亚组中具有较好的预测能力 (AUC 分别为 0.824、0.866)。决策曲线分析表明, 此诺莫图具有临床应用价值。

结论 基于多参数 CT 测量的腹部脂肪联合临床参数建立的列线图可以实现对 ccRCC 患者高 pT 分期的个体化预测, 有可能提高术前对肾透明细胞癌的诊断分期水平。

PO-1990

基于 CT 影像组学联合身体成分预测 pMMR/MSS 型结直肠癌预后

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中南大学湘雅三医院

目的: 开发并验证基于术前增强 CT 图像、临床特征和身体成分的模型, 以预测错配修复功能完整/微卫星稳定型 (pMMR/MSS) 结直肠癌 (CRC) 患者术后的总生存 (OS)。

方法: 回顾性纳入 2014 年 1 月至 2018 年 12 月期间中南大学湘雅三医院 135 名 pMMR/MSS CRC 患者, 收集其人口统计学、临床数据、术后病理及影像学资料, 并将患者分为训练队列 ($n = 90$) 和验证队列 ($n = 45$)。选取增强 CT 门脉期图像, 通过 3D-Slicer 勾画感兴趣区, 经 LASSO 降维、筛选特征; 通过 ImageJ 在 L3 椎体中份水平勾画身体成分, 计算相应面积及指数。

结果: 1) 从 851 个影像组学特征中筛选出 9 个最具统计学意义的特征, 其中小波特征数量超过三分之二, 且具有最佳预测效能的特征亦为小波特征。

2) 经单因素及多因素 Cox 分析, 结果显示与 pMMR/MSS CRC 患者术后 OS 显著相关的临床因素 (包含身体成分) 为病理 N 分期 (N1: OR = 4.13, 95%CI 1.42-11.97, $P = 0.009$; N2: OR = 7.73, 95%CI 2.71-22.03, $P < 0.001$) 和骨骼肌密度 (SMD) (OR = 0.94, 95%CI: 0.89-0.99; $P = 0.026$), 其余特征在本研究中无统计学意义。

3) 比较影像组学模型、临床模型、综合模型的预测性能, 发现综合模型在 3 年和 5 年 ROC 曲线中具有最高的 AUC 值 (3 年 AUC = 0.887、5 年 AUC = 0.891); 随后经 C 指数分析, 结果显示综合模型 C 指数值最高 (0.787, 95%CI: 0.869-0.705)。

结论： 综上，开发了基于增强 CT 影像组学、 临床数据及身体成分的预测模型，用于评估 pMMR/MSS CRC 患者的术后 OS。比较其性能， 发现综合模型在预测 pMMR/MSS CRC 患者术后长期 OS 方面性能最为优异，构建简洁实用的列线图，实现个体化治疗。

PO-1991

计算机视觉处理生成的能谱 CT 斜率参数图诊断克罗恩病的价值

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目的：探讨计算机视觉处理生成的能谱 CT 斜率参数图参数在克罗恩病诊断中的应用价值。

方法：收集经能谱 CTE 及结肠镜检查确诊克罗恩病患者 76 例及无病对照组 53 例，根据内镜活动评分 (SES-CD) 作为金标准确定正常及病变肠段，在主机自带的工作站上重建门脉期 120kVp-like、40-100 keV 虚拟单能量图像 (VMI₄₀₋₁₀₀)，使用 Python 软件生成 40-100keV 斜率参数图 (K₄₀₋₁₀₀ 图)，测量正常、病变肠壁及肠系膜脂肪部位动脉期及门脉期图像 K₄₀₋₁₀₀ 及 VMI₄₀₋₁₀₀ 的单能量 CT 值 (HU_{40-100keV})。采用 ROC 曲线评价以上两种定量参数对克罗恩病的诊断效能。

结果：

双期病变组肠壁及爬行脂肪的 K₄₀₋₁₀₀ 及 HU_{40-100keV} 均明显高于正常组 (P<0.001)。ROC 曲线显示动脉期病变肠壁 HU_{40keV} 诊断克罗恩疾病的曲线下面积最大 (AUC=0.948)，敏感度和特异度分别为 82.0%、100.0%，与 K₄₀₋₁₀₀ 无统计学差异 (AUC=0.946, 灵敏度: 89.8%, 特异度: 92.5%)；动脉期爬行脂肪 K₄₀₋₁₀₀ 在诊断克罗恩病的曲线下面积最大 (AUC=0.969)，敏感度和特异度分别为 88.0%、98.1%，高于 HU_{40keV} (AUC=0.935, 灵敏度: 83.8%, 特异度: 90.6%, P<0.05)。

结论：

计算机视觉处理生成的能谱 CT 斜率参数图 K₄₀₋₁₀₀ 值及单能量 CT 值在诊断 CD 具有临床应用价值；动脉期爬行脂肪的 K₄₀₋₁₀₀ 诊断效能优于 HU_{40-100keV}。

PO-1992

计算机视觉处理生成的能谱 CT 斜率参数图评估 克罗恩病活动度的价值

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目的：探讨计算机视觉处理生成的能谱 CT 斜率参数图参数在克罗恩病活动度评估中的应用价值。

方法：收集经能谱 CTE 及结肠镜检查确诊克罗恩病患者 76 例及无病对照组 53 例，根据内镜活动评分 (SES-CD) 标准确定缓解期、轻度活动期和中重度活动期肠段，在主机自带的工作站上重建门脉期 120kVp-like、40-100 keV 虚拟单能量图像 (VMI₄₀₋₁₀₀)，使用 Python 软件生成 40-100keV 斜率参数图 (K₄₀₋₁₀₀ 图)，测量正常、病变肠壁及肠系膜脂肪部位动脉期及门脉期图像 K₄₀₋₁₀₀ 及 VMI₄₀₋₁₀₀ 单能量 CT 值 (HU_{40-100keV})。采用 ROC 曲线评价两种定量参数对克罗恩病活动度评估的效能。

结果：双期中重度组病变肠壁及爬行脂肪的 K₄₀₋₁₀₀ 值及 HU_{40-100keV} 均高于非中重度组 (P<0.001)。ROC 曲线显示动脉期 HU_{40keV} 和 HU_{50keV} 诊断中重度克罗恩疾病的曲线下面积最大 (AUC=0.908)，敏感度和特异度分别为 88.1%、85.2%及 88.1%、84.3%，与 K₄₀₋₁₀₀ (AUC=0.902, 灵敏度: 89.8%, 特异度: 84.3%) 无统计学差异；爬行脂肪 K₄₀₋₁₀₀ 在动脉期诊断中重度克罗恩病疾病活动度的曲线下面积最大 (AUC=0.935)，敏感度和特异度分别为 79.7%、93.5%，高于单能量 CT 值

($AUC=0.715_{VMI100} \sim 0.886_{VMI40}$, 敏感度: $78.0\%_{VMI100} \sim 84.7\%_{VMI40}$, 特异度: $58.3\%_{VMI100} \sim 80.6\%_{VMI40}$, $P<0.05$)。

结论: 计算机视觉处理生成的能谱 CT 斜率参数图及单能量 CT 值在评估克罗恩病活动度方面具有临床应用价值; 动脉期爬行脂肪的 K_{40-100} 诊断效能优于 $HU_{40-100keV}$ 。

PO-1993

局部进展期胃癌新辅助化疗疗效的预测: 能谱 CT 与 DWI 的对比研究

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目的: 比较能谱 CT 和扩散加权成像在预测局部进展期胃癌新辅助化疗后病理学反应的效能。方法: 本研究从一项前瞻性试验中抓取数据进行回顾性分析。所有胃癌患者均接受标准的新辅助化疗联合手术切除并有明确的肿瘤消退分级 (tumor regression grading) 结果。以 TRG 为参考标准, 将患者分为缓解良好组 (TRG 0+1) 和缓解不良组 (TRG 2+3)。所有纳入的患者在基线期同时行腹部平扫+增强三期能谱 CT 扫描和上腹部 DWI-MRI 检查。比较两组间患者临床病理特征和基线期影像学特征, 包括肿瘤厚度、Bormann 分型、临床 T/N 分期。测量胃癌病灶增强动脉期、静脉期、延迟期的碘基值 (iodine concentration, IC), 并计算标准化碘基值 (normalized iodine concentration, nIC), 及表观扩散系数 (apparent diffusion coefficient, ADC), 比较不同病理缓解组间上述参数的差异。采用受试者工作特征曲线 (receiver operating characteristic, ROC) 分析各预测参数的效能, 采用 Delong 检验比较效能间的差异。采用 Spearman 检验探索碘基值和 ADC 值与 TRG 结果的相关性。结果: 共纳入 65 例患者, 缓解良好组 24 例, 缓解不良组 41 例。不同病理缓解组间的延迟期标准化碘基值 (nICDP) 和 ADC 值的差异有统计学意义 ($P<0.05$), 且与 TRG 相关 ($P<0.05$)。两组间患者的人口学信息和基线期影像学形态学特征的差异均无统计学意义。nICDP 和 ADC 值预测胃癌新辅助化疗疗效的效能相当, AUC 分别为 0.673、0.674。两者联合后的 AUC 为 0.770, 显著高于单一参数 (Delong test, $P=0.037$ for vs. ADC; $P=0.037$ for vs. nICDP)。结论: 能谱 CT 和 DWI 是预测胃癌新辅助化疗疗效的有效影像学方法, 联合 nICDP 和 ADC 值后效能进一步提高。

PO-1994

光谱 CT 显示左结肠动脉的最佳虚拟单能量

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目的: 探讨双层探测器光谱 CT 显示左结肠动脉 (LCA) 的最佳虚拟单能量, 以便为腹腔镜直肠癌根治术前评估 LCA 提供帮助。方法: 回顾性分析 2022 年 10 月至 2023 年 2 月在昆明医科大学第一附属医院行腹部 CTA 扫描的 100 例患者图像, 将动脉期原始图像重组为混合能量图像以及基于能谱的间隔 10keV 的 40~70 keV 的单能量图像。对 5 组图像 LCA 的 CT 值、信噪比 (SNR)、对比噪声比 (CNR)、图像噪声以及图像质量评分进行比较。结果: 40~70keV 组单能量图像 LCA 的 CT 值、噪声、CNR、SNR 随着能级的升高呈递减趋势。常规混合能量图像组及 40~70keV 单能量图像组两两比较, 各组间 CT 值、SNR、CNR、噪声差异有统计学意义 ($P<0.05$)。40 keV 组图像 LCA 的 CT 值、CNR、SNR 均高于其他组, 噪声低于常规混合能量图像组。两名影像科医师图像质量主观评价的一致性良好 ($0.40 \leq \text{Kappa 值} < 0.75$), 各组间图像主观评分差异均有统计学意义 (P 均 < 0.001)。40 keV 组图像主观评分最高, 40~70 keV 组单能量图像质量均高于常规混合能量

图像。结论: 40 keV 为显示 LCA 的最佳虚拟单能量, 显示血管清晰、边缘锐利, 能更清晰显示 LCA 及其解剖变异, 利于外科医生腹腔镜直肠癌根治术的顺利进行。

PO-1995

ct 主动脉造影作为判断腹主动脉瘤动脉壁不稳定性的诊断工具

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目的:本研究的目的是通过 CT 扫描来探索和揭示主动脉及周围组织的具体结构变化, 被认为是主动脉壁不稳定的迹象

方法和材料:采用 160 层 CT 扫描仪进行 CT 研究, 具有固有和动脉造影剂相。104 例确诊患者 CT 资料

对腹主动脉瘤(AAA)进行回顾性研究。对主动脉壁不稳定体征的评估基于以下发现:

月牙征过度衰减, 顶骨血栓团块裂裂, 垂下主动脉, 主动脉泡, 主动脉周围搁浅。此外, 还对患者的治疗策略进行了研究。

结果:根据上述结果, 将患者分为 3 组:1.aaa 破裂 28 例(26.9%)。2.AAA 未破裂, 伴有一个不稳定征象 50 例(48%), 其中 10 例(20%)患者接受手术治疗。AAA 未破裂, 并伴有多个不稳定的征象 26(25.1%)例。本组 6 例患者急诊手术治疗, 4 例未治疗患者在术后数天内发生 AAA 破裂, 占 38.4%。

结论:CT 能快速、全面地诊断 AAA, 破裂后 AAA 出现不稳定体征的频率较高

它们具有较高的预后意义。2 个或 2 个以上的征兆的结合表明一个高风险的威胁破裂, 结合其他因素可以被认为是紧急手术治疗的指征。主动脉瓣不稳定最常见的 CT 征象包括高衰减的新月形征象、主动脉垂布和主动脉周围搁浅。

PO-1996

CT 征象评估预测胃肠道穿孔部位: 100 例手术患者的回顾

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目的:本研究的目的是回顾性评估 ct 在术前确定手术证实的胃肠道穿孔部位的准确性, 并确定在此诊断中最具预测性的结果。方法和材料:我们回顾性分析了于 2017 年 3 月至 2019 年 3 月在我院 100 例手术证实 GI 穿孔的患者(64 例男性;年龄 32-92 岁)。83 例患者使用静脉造影剂。两位分别有 25 年和 4 年放射学经验的观察者, 对手术诊断不知情, 通过以下 ct 表现预测穿孔部位:腔外空气(等级和分布)、壁缺损、壁增厚、壁异常强化、腹膜液体、脂肪束和炎性包块。我们还评估了这些体征在预测消化性溃疡与憩室炎引起的穿孔方面的作用, 憩室炎是上、下 GI 穿孔的最常见原因。使用卡方检验分析结果。

结果:37 例为上 GI 穿孔, 63 例为下 GI 穿孔。严重的游离空气($p=0.04$)、上结肠室游离空气($p=0.00$)和腹膜液($p=0.00$)是上 GI 穿孔的有力预测因素, 而轻度和中度游离空气($p=0.04$)和脂肪束($p=0.00$)提示下 GI 穿孔。有消化性溃疡 35 例, 憩室炎 28 例。肠系膜上腔室($p=0.00$)、腹膜液($p=0.00$)提示消化性溃疡所致穿孔, 盆骨、腹膜后腔室($p=0.03$)、脂肪束($p=0.00$)、肠壁异常强化($p=0.05$)、炎性肿块($p=0.05$)提示憩室炎所致穿孔。

结论:cT 对上、下消化道穿孔的鉴别具有较高的准确性。

局限性:17 例患者行 CT 平扫。

PO-1997

CT 小肠造影预测克罗恩瘘管病发病率和短期手术中的价值

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目的:分析 CT 小肠造影(CT enterography, CTE)预测肛周瘘管病患者 1 年内发病率及手术治疗风险的价值,为指导临床评估及合理选择治疗方案提供依据。

方法和材料:对 279 例新诊断的克罗恩病进行回顾性分析。随访 1 年。记录 CTE 成像参数,评估盆腔 MR 图像是否存在肛瘘。

结果:204 例患者符合分析条件。肛瘘组(组 1)47/88 例(53.41%)有结肠受累,非肛瘘组(组 2)38/116 例(32.76%)有结肠受累($P=0.006$)。组 1 肠壁强化主要表现为 1 型和 2 型,为 69/88(78.41%),组 2 肠壁强化主要表现为 3 型和 4 型,为 78/116(67.25%)($P<0.001$)。手术组(3 组)12/18 例(66.67%),非手术组(4 组)22/53 例(41.51%),管腔狭窄 15/18 例(83.33%),3 组 4/18 例(22.22%),腹内瘘 33/53 例(62.27%),3 组 2/53 例(3.77%)。多因素分析显示,直肠累及($OR1.911$ (1.102 ~ 4.185), $P<0.001$)、管腔狭窄($OR 2.627$ (1.760 ~ 6.024), $P=0.028$)和腹腔内($OR 1.337$ (1.093 ~ 3.585), $P=0.006$)增加了手术风险。

结论:结肠受累和肠壁强化可预测肛周瘘管病的发生。直肠受累、管腔狭窄和腹腔内瘘增加了术周瘘管病的短期手术风险。

局限性:局限性有:1.只有选择偏见;2.很少患者不使用灌肠;少数患者的药物治疗不规范。

PO-1998

多模态磁共振成像纹理特征分析鉴别肝细胞癌与肝脏局灶性结节性增生的初步研究

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目的 基于多模态磁共振成像纹理特征分析鉴别肝细胞癌(HCC)与肝脏局灶性结节性增生(FNH)。**方法** 回顾性分析解放军总医院海南医院经病理确诊的 38 例 HCC 和 14 例 FNH 患者,分别对两组患者的横轴位 T₂WI 及 DWI 图像进行纹理特征分析,参数包括角二阶矩(ASM)、对比度(Contrast)、自相关(Correlation)、逆差距(IDM)、熵(Entropy)。采用 Kolmogorov-Smirnov 检验及 Mann-Whitney 检验比较组间纹理特征参数差异,应用多元回归分析获得整体模型拟合中入选变量及其值,得到回归方程,最终选择 ROC 曲线评估 HCC 与 FNH 的诊断效能。**结果** 基于 DWI 图像纹理特征参数证实 FNH 组的角二阶矩、自相关、逆差距显著大于 HCC 组,而 FNH 组的对比度、熵则显著小于 HCC 组($P_{ASM}=0.000$, $P_{Correlation}=0.000$, $P_{IDM}=0.026$, $P_{Contrast}=0.020$, $P_{Entropy}=0.000$)。基于 T₂WI 图像纹理特征参数证实 FNH 组的角二阶矩、自相关显著大于 HCC 组,而 FNH 组的对比度、逆差距、熵则显著小于 HCC 组($P_{ASM}=0.000$, $P_{Correlation}=0.000$, $P_{Contrast}=0.020$, $P_{IDM}=0.026$, $P_{Entropy}=0.000$)。DWI 组在整体模型拟合中入选变量是熵、对比度和常量,得到回归方程 $Y=-1.621 \times Entropy - 0.031 \times Contrast + 12.410$; T₂WI 组、T₂WI 联合 DWI 组入选变量及其值均相同,入选变量为熵和常量,得到回归方程 $Y=-2.595 \times Entropy + 16.419$ 。DWI 组受 ROC 曲线下面积(0.945)最大,肝细胞癌的 T₂WI 联合 DWI 组的正确率(93.42%)最高。**结论** 基于多模态磁共振成像的图像纹理特征分析可以有效鉴别肝细胞癌与肝脏局灶性结节性增生。

PO-1999

基于 CT 影像组学评估结直肠癌肝转移一线化疗的早期疗效

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[摘要] 目的: 观察临床、病理联合 CT 影像组学特征构建的联合模型预测结直肠癌肝转移 (CRLMs) 化疗反应的价值。方法: 回顾性分析了我院 169 例 CRLMs 患者的临床、病理、化疗前及化疗 2 个月时的增强 CT 图像等资料。每位患者随机抽取一个肝转移灶 (n=169), 包括有反应 75 例和无反应 94 例, 按 7: 3 比例将病灶随机分为训练集 (n=118) 和验证集 (n=51)。提取训练集门脉期 CT 中病灶 1688 个影像组学特征, 以 Select Percentile 单因素分析、Spearman 相关性分析及最小绝对收缩和选择算子 (LASSO) 筛选最优影像组学特征, 以分类器 logistic 回归 (LR) 构建模型并计算影像组学评分 Radscore; 以 t 检验、U 检验以及 2 检验筛选有统计学差异的临床、病理特征, 并与 Radscore 结合分别构建临床-病理模型、影像组学模型及联合模型; 使用受试者工作特征 (ROC) 曲线、校准曲线评价模型的预测效能及校准度, 并以联合模型预测指标构建列线图。结果: 共筛选出 9 个最优影像组学特征以及 3 个临床、病理特征, 包括肝转移类型、CEA 及 RAS 基因。在训练集和验证集中, 联合模型预测化疗反应的 AUC (0.896, 0.798) 均高于临床-病理模型 (0.681, 0.68)。联合模型在训练集中的 AUC 略高于影像组学模型 (0.895, 0.786), 在验证集的 AUC 与影像组学模型差异无统计学意义 (Z= 0.5478, P=0.5838)。校正曲线显示影像组学及联合模型列线图的校准度良好。结论: 化疗前 CT 影像组学特征可以有效预测 CRLMs 化疗疗效; 联合临床、病理特征可提高预测效能。

PO-2000

多参数光谱 CT 对于胰腺神经内分泌肿瘤与腺癌的鉴别价值

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目的: 神经内分泌肿瘤 (NEN) 最常见的原发部位是胰腺, 而胰腺腺癌表现出相对较差的临床预后, 以及对某些化疗方案的反应良好, 因此需要不同的临床诊疗策略。而 CT 是最广泛使用的成像方式, 因此本文的研究目的是, 探讨胰腺神经内分泌肿瘤与腺癌进行鉴别诊断的效能和意义。

方法: 该研究总共纳入 100 例经病理证实的 NEN 患者, 和 100 例胰腺腺癌, 均在活检或切除前 15 天内行多期增强 DLCT 扫描。记录肿瘤各期衰减、碘浓度 (IC)、有效原子序数 (Zeff), 并评估定性特征 (如成分、均质性、边缘、钙化、主胰管扩张、血管侵犯、淋巴病变等), 最后进行多元 Logistic 回归分析和 ROC 分析。

结果: 在定量参数方面, 与 NEN 相比, 腺癌在动脉期 (71.5 vs 110.5) 和门静脉期 (78.2 vs 113.5) 的中位数衰减 (HU) 都显著更低 (P<0.001), 但在平扫期无显著差异 (P=0.24)。NEC 在动脉期 (IC: 1.0 vs 2.5; Zeff: 7.9 vs 8.6) 和门脉期 (IC: 1.3 vs 2.7; Zeff: 8.1 vs 8.6) 的 IC (mg/mL) 和 Zeff 都显著低于 NEN。在定性特征方面, 腺癌的血管侵犯 (73.3% vs 34.8%) 和淋巴结转移 (53.3% vs 26.9%) 明显高于 NEN (P<0.05)。两者在成分、均匀性、边缘、钙化和主胰管扩张方面无显著差异 (均 P>0.05)。结论: 与传统 CT 衰减、碘浓度相比, 多参数光谱 CT (DLCT) 特征参数在治疗前准确鉴别 NEN 和腺癌具有重要意义, 可以有效辅助临床决策。

PO-2001

基于增强 CT 影像组学模型预测泌尿系梗阻患者分肾功能的价值

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目的: 探讨基于增强计算机断层扫描的影像组学模型, 预测泌尿系梗阻患者分肾功能的价值。

方法: 回顾性收集本院确诊泌尿系梗阻并完成腹部增强 CT 及肾动态显像检查的患者 118 例(单肾者 6 人), 最终 230 个肾脏被纳入研究。根据肾动态显像所得分肾 GFR 结果: 将入组肾脏分为正常组与异常组, 异常组又分为轻中度亚组与重度亚组。在病历系统中收集患者年龄及相关实验室检查结果等数据, 建立临床特征组合。在 CT 图像中测量肾皮质厚度、肾实质厚度等数据, 建立放射学特征组合。在 CT 图像中勾画肾脏感兴趣区, 获得多个期相的肾脏容积感兴趣区 (VOI), 并从 VOI 中提取影像组学特征, 并对多期特征进行串联组合。将不同组合的影像组学特征组合、临床特征组合、放射学特征组合, 输入到 140 个分类模型中, 以评估影像组学、放射学、临床三大类特征的单类别特征组合和多类别特征组合模型在预测泌尿系梗阻患者分肾功能中的效能, 并设置独立测试集予以验证。分肾功能预测模型分两个阶段共三个任务: 第一阶段即任务一 (区分正常组和异常组); 第二阶段对分肾功能行分级预测, 包括任务二 (区分正常组和轻中度亚组) 和任务三 (区分轻中度亚组和重度亚组)。对各个预测模型在验证集和训练集中通过十折交叉验证进行筛选, 最终通过净重新分类改善指数 (NRI) 对上述多任务分肾功能预测模型进行效能评估。预测效能评估指标有 ROC 曲线下面积 (AUC), 准确率 (ACC), 敏感度 (SEN) 和特异度 (SPE) 和净重新分类改善指数。

结果: 具有最大正值净改善的预测模型分别为: 任务一为“三期影像组学特征组合”模型, AUC 为 0.972; 任务二为“三期影像组学特征组合+放射学特征组合”模型, AUC 为 0.939; 任务三为“皮髓质期影像组学特征组合”模型, AUC 为 0.964。最终, 来自皮髓质期图像的纹理特征占排名前十位的关键特征的比例最高。

结论: 基于增强 CT 的综合特征模型, 以包含影像组学纹理特征的预测模型诊断性能更高, 排名前十的关键特征以来自皮髓质期图像的纹理特征占比最高, 是预测分肾功能的最可靠特征, 影像组学模型可以作为一种评估泌尿系梗阻患者分肾功能的有效诊断工具。

PO-2002

双层探测器光谱 CT 在恶性淋巴瘤活性状态评估中的应用探索

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目的:

FDG PET/CT 仍然是恶性淋巴瘤治疗前分期和治疗反应评估的核心工具, 但 PET-CT 在应用上仍有一定的局限性, 例如检查费用昂贵、病人接受的辐射剂量较大, 其次对于惰性淋巴瘤, 其最大标准化摄取值 (SUVmax) 通常低于侵袭性淋巴瘤, 临床上并不推荐其常规使用 FDG PET/CT 检查手段。目前, 双层探测器光谱 CT 扫描技术不仅可以获得血流灌注信息, 还可以获得组织成分信息。因此, 本研究旨在初步探索光谱 CT 定量参数中的碘浓度 (IC) 及有效原子序数 (Z_{eff}) 作为淋巴瘤活性监测指标的价值。

方法:

28 名初诊和 35 名经过化学治疗的患者被纳入本研究进行回顾性分析。由一名高级和初级医生共同对 PET-CT 图像进行审阅及标注, 对于初诊患者, 通过测量淋巴结的 SUVmax 判断淋巴结是否具有代谢活性, 对于治疗后的患者, 通过 Deauville 评分标准, 小于等于 3 分的淋巴结视为代谢活性

抑制, 大于 3 分的淋巴结视为仍有代谢活性, 最终将所评估的淋巴结分为受累组和非受累组, 分别有 117 个和 352 个淋巴结。随后, 由另外两名放射科医生对静脉期光谱 CT 图像上相应位置的淋巴结进行 IC 和 Zeff 的测量。为了消除个体循环的影响, 还测量了同层面锁骨下动脉、胸主动脉或者腹主动脉的 IC 和 Zeff 的测量, 最终得到标准化碘浓度 (nIC) 和标准化有效原子序数 (nZeff)。由于一个患者可能被纳入多个淋巴结, 需要考虑同一患者不同淋巴结之间的相关性, 因此我们采用广义线性混合模型对 nIC 和 nZeff 分析, 最后通过 ROC 曲线评估 nIC 和 nZeff 在判断淋巴瘤活性状态中的应用价值。

结果:

受累组淋巴结的 nIC 及 nZeff 要显著高于非受累组淋巴结 ($p < 0.001$)。广义线性混合模型分析结果显示 nIC 及 nZeff 的固定效应参数的估计值均有统计学意义。nIC 和 nZeff 的 AUC 分别为 0.911 (95%CI: 0.881-0.935) 和 0.898 (95%CI: 0.867-0.924)。

结论:

nIC 及 nZeff 在检测淋巴瘤活性方面具有良好的诊断性能, 并可能是一种潜在的成像生物标志物。

PO-2003

基于深度学习的 CT 水平脾挫裂伤分类网络框架的建立

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目的: 建立深度学习网络框架, 通过输入 CT 图像检测脾脏是否存在挫裂伤。

背景: 创伤发生率高, 情况复杂, 容易造成严重的经济财产损失。脾脏挫裂伤在腹部创伤中较为常见, 其血供丰富和质地脆弱等生理特点使脾挫裂伤的发生率和死亡率均在较高水平。在急诊场景下, 快速且准确的检测出受伤脾脏将有利于创伤患者的诊疗。通常, 脾挫裂伤的诊断需要结合多学科会诊, 必要时还需要进行手术、穿刺等有创检查。CT 在腹部创伤的诊断中具有良好的敏感度和特异度, 然后单纯平扫诊断难度大, 具有较高的假阳性。深度学习网络的加入可能会提高平扫诊断的准确率, 为临床筛查提供快速准确的结论。

方法: 回顾性连续性收集吉林大学第一医院 2018 年至 2023 年, 影像报告提示脾脏创伤的患者共 320 例作为阳性组, 按照 7: 1 分成训练组和测试组, 并按照 1: 1 收集未出现脾挫裂伤的患者作为阴性对照组, 基于开源分割网络 Totalseg 对所有患者进行预分割, 并将分割结果作为分类模型的输入, 基于 nnUNET 算法训练创伤分类模型, 所有分类结果均来自放射学报告并由两名放射科医生根据图像进行核对。最终测试集结果与报告金标准进行比较, 判断模型的诊断效能, 评价指标包括: 敏感度, 特异度, AUC。

结果: 模型在 280 例脾脏挫裂伤的患者及 280 例健康人 CT 图像上进行训练, 随后在 80 例的测试集上获得了 82.5 (95%CI: 73.2-95.8) 的敏感性, 86.2 (95%CI: 79.9-91.5) 的特异性, 并获得了 0.914 的曲线下面积, 模型可以在 CT 上有效的筛查出创伤的患者。

结论: 我们建立了基于深度学习框架的脾挫裂伤分类网络, 可以在 CT 上有效检测出存在脾挫裂伤的患者, 然而模型的敏感度尚无法达到筛查水平, 需要更大的数据集和更优化的网络框架以进一步完善脾创伤的筛查。

PO-2004

磁共振酰胺质子转移加权成像对卵巢肿瘤性质的鉴别价值

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目的：探讨磁共振酰胺质子转移加权成像 (Amide proton transfer-weighted, APT) 值对卵巢肿瘤性质的鉴别价值。

材料和方法：回顾性分析 2019 年 4 月至 2023 年 9 月间在大连医科大学附属第一医院经飞利浦 3.0T MR(Ingenia CX, Philips Healthcare, the Netherlands)行盆腔 MR 扫描并经手术病理证实为卵巢占位的 24 例患者，其中（其中卵巢囊腺瘤 10 例，卵巢癌 14 例（高级别浆液性癌 8 例，透明细胞癌 2 例，内膜样癌 4 例）。由两名观察者分别测量 APT 值，在肿瘤液性部分最大层面放置三个 ROI，大小约为病灶的 1/2，3 个 ROI 均值为测量值。采用组内相关系数 (The intra-class correlation coefficient, ICC) 检验两位观察者测量所得 APT 值的一致性，采用 Mann-Whitney U test 检验进行差异性分析。采用受试者操作特征 (ROC) 曲线计算 APT 值对卵巢癌的诊断效能。

结果：卵巢癌 APT (5.45, (4.15, 6.28)) % 高于囊腺瘤 APT (3.09, (1.83, 4.19)) %， $P=0.0002$ 。APT 诊断卵巢囊腺瘤的 AUC 值为 0.821，当阈值为 4.45 % 时，敏感度和特异度分别为 90.00% 和 71.43%。

结论：APT 能够对卵巢肿瘤的良恶性进行鉴别，对临床有一定的指导意义。

PO-2005

基于重建的深度学习技术在克罗恩病磁共振小肠成像中的应用

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目的：在克罗恩病 (Crohn's disease, CD) 磁共振小肠成像 (magnetic resonance enterography, MRE) 中，比较 SSFSE 与 2D-FIESTA 序列在经基于重建的深度学习处理后 (DL-SSFSE 和 DL-FIESTA) 与经常规重建处理后 (Conv-SSFSE 和 Conv-FIESTA) 的图像质量比较

材料与方法：回顾性分析 32 例确诊为 CD 的 MRE 图像，分别计算 DL-SSFSE、DL-FIESTA Conv-SSFSE、Conv-FIESTA 序列中各肠段病灶的信噪比 (SNR)，采用 5 点法评估序列中各肠段病灶的锐利度及显著度。采用配对 Wilcoxon 符号秩检验或配对样本 t 检验比较比较 DL-SSFSE、DL-FIESTA 与 Conv-SSFSE、Conv-FIESTA 上病灶的信号强度 (SI)、SNR、锐利度及清晰度是否存在差别。

结果：DL-SSFSE、DL-FIESTA 序列上病灶的 SNR、锐利度及显著度均显著高于 Conv-SSFSE、Conv-FIESTA 序列。DL-SSFSE、DL-FIESTA 序列上病灶的 SI 与 Conv-SSFSE、Conv-FIESTA 序列无显著差别，一致性为 0.998。

结论：基于重建的深度学习技术可显著提高 CD 患者 MRE 成像中 SSFSE 与 FIESTA 序列图像质量，且对病灶的 SI 无影响。

PO-2006

术前 CT 影像特征对于肾透明细胞癌 Fuhrman 分级的预测价值

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目的 探讨肾透明细胞癌 (Clear cell renal cell carcinoma, CCRCC) 的 CT 影像特征对于术前预测 Fuhrman 分级的价值。**方法** 回顾性分析经病理确诊的 185 例 CCRCC, 其中低级别组 99 例 (Fuhrman 分级 1、2 级), 高级别组 86 例 (Fuhrman 分级 3、4 级); 提取的临床特征包括年龄和性别, CT 特征包括肿瘤大小、平扫及增强皮质期 CT 值、 Δ CT 值 (肿瘤皮质期增强净值)、 Δ CT 比值 (肿瘤和正常肾皮质增强净值比值)、钙化、坏死、出血、脂质、生长方式、假包膜有无及完整性、区域淋巴结、肾静脉癌栓、集合系统侵犯等。应用 SPSS22.0 软件进行统计学分析。**结果** 高级别组中, 年龄 ≥ 60 岁的患者较低级别组多 ($P < 0.05$)。高、低级别组 CCRCC 在肿瘤大小、皮质期 CT 值、 Δ CT 值、 Δ CT 比值、钙化、出血、脂质、假包膜不完整、区域淋巴结肿大、肾静脉癌栓和集合系统侵犯时具有统计学差异 ($P < 0.05$)。**结论** CCRCC 的 CT 影像特征可以反映其恶性程度, 术前通过 CT 特征预测 CCRCC 的 Fuhrman 分级具有可行性, 有助于临床进行个体化治疗。

PO-2007

术前 CT 评估胃癌新辅助化疗后腹主动脉分支周围软组织反应在手术方面的临床意义

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目的: 在新辅助化疗后的手术过程中, 通常会观察到血管周围软组织水肿及纤维化。这一现象目前缺乏相关病理学解释, 但却在临床上较为常见。同时, 这一现象增加了淋巴结清扫及血管断离的手术操作难度。作者发现了对应的 CT 影像学征象, 进而在术前预测该种改变。

方法: 回顾性纳入北京大学肿瘤医院术前行 SOX/XELOX 治疗 1~6 周期后进行手术的 42 例及直接进行手术治疗的 10 例胃癌患者, 由 10 名临床经验的胃肠外科医生在不知道患者分组的情况下对手术视频对血管周围组织情况进行评估, 分为 easy-to-desperate and hard- to-desperate 两组。由 1 名具有 7 年影像工作经验的放射科医在单盲的情况下判读新辅助治疗前后的术前 CT 图像, 对腹主动脉、胃左动脉、肝总动脉、肠系膜上动脉及脾动脉周围软组织情况进行评价。以术中所见作为金标准, 评价新辅助化疗后 CT 预测手术操作相关血管周围反应的性能。

结果: 52 例患者中, 被外科医生评价为“难以切除”的患者共计 36 例。从这些患者的手术视频中, 观察到术区血管周围组织存在水肿和纤维化。这种水肿和纤维化一方面会影响手术器械的功率, 另一方面会影响组织层次的分辨, 给手术带来困难。另有 16 例患者表现为血管周围软组织反应轻, 手术易于切除。新辅助化疗组中, 反应重的占 83.3% (35/42); 直接手术组中, 反应轻的占 70% (7/10)。“难以切除”患者的新辅助化疗后 CT 图像上, 可以观察到血管周围脂肪密度模糊增高及索条影 (出现率 CA 76.19%, LGA 45.24%), 对应术中见到的渗出及纤维化改变 (图 1)。而“易于切除”的分组中, 血管周围组织没有异常, 或紧贴血管出现一圈边界光整的“包鞘样”稍高密度影 (图 2)。CT 预测血管周围反应的灵敏度 91.67%, 特异度 93.75%, 准确率 92.31%, 且与手术时长有相关性 ($p < 0.05$)。

结论: CT 上的血管周围脂肪密度模糊增高及索条影的征象能够提示水肿和纤维化, 用于评估胃癌周围脉管手术切除难度的表现良好, 往往提示更长的手术时长。借助新辅助化疗后的腹主动脉分支血管周围组织的 CT 征象, 预测胃癌手术脉管操作的难易程度。

PO-2008

非子宫附件部位子宫内膜异位症影像表现

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目的 探讨非子宫附件部位子宫内膜异位症的影像特点及影像诊断价值。**方法**：回顾性收集于2012.01-2021.10之间就诊于我院且经手术病理证实为非子宫、卵巢部位子宫内膜异位症的患者结果，排除术前未进行CT/MRI扫描或图像丢失的病例，通过HIS系统收集患者的临床病史资料，通过PACS系统采集图像并分析病变的部位、大小、成分、密度特征、各序列信号及强化特点、与周围组织结构关系、是否发现其他部位子宫内膜异位症等影像特征。**结果**：共收集到我院手术确诊为非子宫、卵巢部位子宫内膜异位症的患者104例，腹壁86例（82.7%），结直肠5例（4.8%），腹膜3例，腹股沟2例，肛旁2例，会阴、膀胱、输尿管、阴道直肠隔、回盲部、肺各1例，共36例行术前CT/MRI检查：31例行MRI检查，9例行CT检查。在所有行影像检查的患者中，28例为腹壁子宫内膜异位症患者，其临床症状以腹痛（46.4%）和腹部肿块（50%）最常见，仅有5例具有明显周期性下腹痛，而且另有2例因其他腹部疾病就诊，几乎所有的患者（96.6%）均有剖宫产史，仅有一例患者实在无手术史的情况下发生了腹壁子宫内膜异位症，剖宫产术后至出现症状的平均时间为 5.69 ± 5.0 （1-23）年，至初次入院检查的平均时间为 7.12 ± 5.0 （2-25）。病例共36例行术前CT/MRI检查。28例腹壁子宫内膜异位症中，多数对腹直肌有一定程度的浸润腹壁异位灶更多的为实性的结节或肿块，该组患者中仅有1例为囊实性，未见纯囊性灶。腹壁子宫内膜异位症的CT特征为与手术瘢痕区相关的非特异性软组织密度肿块，密度可较邻近肌肉稍高或稍低，边界显示不清晰，增强后呈中度以上较均匀强化。MRI表现部分具有特异性，在本组病例中多为T1WI等-稍低信号及T2WI均匀/不均匀高信号（20例），DWI可呈高信号；3例以T1WI及T2WI低信号为主；增强后多数病例可见较均匀明显强化。**结论** 非子宫附件部位子宫内膜异位症影像诊断较困难，易发生漏误诊。CT可以帮助排除或提示肿块的存在并判断其范围和性质。典型的MRI表现加临床病史、症状有助于诊断，对于帮助术前精确手术范围具有重要价值。

PO-2009

双层探测器光谱 CT 70keV 单能量扫描技术在胰腺癌术前诊断中的应用

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【摘要】目的 探讨双层探测器光谱CT(dual-layer detector spectral CT, DLCT) 70keV单能量扫描技术在胰腺癌术前诊断中的应用。**方法** 收集自2019年3月-2022年5月期间于我院经病理检查确诊为PDAC且行DLCT检查患者的病历资料。将患者分为淋巴结转移组64例和非转移组40例。对比两组患者的一般特征及DLCT参数。**结果** 两组患者的性别、年龄、病变部位等一般特征对比无统计学差异（ $P>0.05$ ）；两组患者的病灶最长径，Zeff，动脉期nIC，静脉期IC、nIC、CT40keV、CT50keV、 λ_{HU1} 、 λ_{HU2} 、 λ_{HU3} 对比具有统计学差异（ $P<0.05$ ）；Logistic回归分析结果提示，病灶最长径、动静脉期nIC、Zeff是预测PDAC淋巴结转移的独立危险因素（ $P<0.05$ ）；ROC曲线结果提示，病灶最长径、动静脉期nIC、Zeff的AUC分别为0.886、0.855、0.712、0.778，敏感度分别为69.9%、97.1%、79.2%、76.0%，特异度分别为100.0%、66.0%、71.0%、66.0%。**结论** 病灶最长径、动静脉期nIC、Zeff是预测PDAC淋巴结转移的独立危险因素。

PO-2010

CT 检查改良公式法判断食管胃结合部腺癌 Siewert 分型的临床价值

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目的: Siewert 分型的主要依据是肿瘤中心与食管胃结合部 (esophagogastric junction, EGJ) 的距离, 而此处消化道走行迂曲, 影响分型的准确率与术后病理结果比较。基于此, 本研究通过 CT 轴位和冠状位双平面联合, 推导出 Siewert 分型的计算公式, 通过图像层面序号和分型规则对应关系, 计算 EGJ 径线的相对位置关系, 从而进行 Siewert 分型。

方法: 利用 CT 这种无创且常规的检查手段, 通过轴位和冠状位双平面图像联合, 确定各径线的层面, 继而通过层面和层厚的简单计算得到各分型关键解剖点的相对位置关系, 进而推导出计算 Siewert 分型的层面序号公式。而仰卧位扫描时, 胃远端相对前倾, 更接近于水平方向, 而食管胃结合部的胃腔长轴更接近于垂直方向, 故胃部浸润范围的计算值较实际情况偏短(图 2), 导致 Siewert III 型误判为 II 型。故本研究针对此情况进行了改良。改良公式法校正的第一步, 大致判断了肿瘤中心点距校正后食管胃交界线胃侧 2cm 线的相对距离, 因该线的主体位置位于胃腔左偏区, 故采用 $\sin 35^\circ$ 的值进行校正。校正的第二步, 即公式 a、公式 b, 是将肿瘤中心点的计算分别按照肿瘤走行左偏及右偏进行校正, 再和食管胃交界线胃侧 2cm 线进行相对位置的判断 (见附件)。

结果: 回顾性纳入北京大学肿瘤医院 2019 年 3 月至 2020 年 12 月采用传统术前 CT 影像学误判分型的 II 型及 III 型 AEG 患者 20 例, 其中 II 型患者 3 例, III 型患者 17 例。分别利用三段公式法及改良公式法利用患者冠状位及轴位 CT 图像进行 Siewert 分型。其中, 无须三段公式法判断正确 4 例 (II 型 3 例, III 型 1 例), 需要改良公式法校正判断正确 16 例 (II 型 0 例, III 型 16 例)。改良公式法判断传统影像学误判 AEG 患者的 Siewert 分型准确率 80%, 其中, III 型准确率可达 94.12%。

结论: 本项目通过 CT 轴位和冠状位双平面联合, 设计了 Siewert 分型改良公式法, 进而设计了易于临床应用的软件, 通过输入 CT 层面序号, 即可得出 Siewert 分型, 内科、外科及影像科医生在临床工作中易于操作。

PO-2011

社区全人群与 2 型糖尿病人群的慢性肝脏疾病检出率及临床特征: 一项基于瞬时弹性成像技术的前瞻性研究

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目的: 探讨社区全人群与 2 型糖尿病 (T2DM) 人群的肝脏疾病检出率及临床特征。

方法: 本前瞻性研究于 2022 年 10 月至 2023 年 2 月期间, 对无锡市新吴区随机抽取的 6 个街道 10019 名社区居民进行筛查, 所有参与对象进行现场体格检查 (测量身高、体重、腰围、臀围、血压), 并采集个人信息 (年龄、性别、教育程度、职业等) 和既往传染病、肝脏病及糖尿病史。通过瞬时弹性成像技术 iLivTouch® 测量脂肪超声衰减参数 (UAP) 和肝脏硬度值 (LSM)。根据 UAP 将人群分为四组: 无非酒精性脂肪性肝病 (NAFLD) 组 ($UAP \leq 244 \text{ dB/m}$)、轻度 NAFLD 组 ($244 \text{ dB/m} < UAP \leq 269 \text{ dB/m}$)、中度 NAFLD 组 ($269 \text{ dB/m} < UAP \leq 296 \text{ dB/m}$) 和重度 NAFLD 组 ($UAP > 296 \text{ dB/m}$)。根据 LSM 是否 $\geq 7.3 \text{ kPa}$ 将人群分为有无肝纤维化组, 根据是否 $\geq 10 \text{ kPa}$ 分为有无代偿期进展性慢性肝病 (cACLD) 组。组间比较采用方差分析或卡方检验。

结果: 在本研究筛查的社区人群中, 检出 T2DM 患者 3.6% (366 例)。社区自然人群中 NAFLD 占比 57.6% (5765 例), 其中轻度、中度、重度 NAFLD 占比分别为 28.1% (2811 例)、21.4% (2146 例) 和 8.1% (808 例)。而社区 T2DM 人群中合并 NAFLD 占比 63.9% (234 例), 其中合并轻度、中度、重度 NAFLD 占比分别为 23.5% (86 例)、29.2% (107 例) 及 11.2% (41 例)。社区自然人群中的肝纤维化患者占比 22.5% (2253 例)、cACLD 患者占比 4.9% (487 例)。而社区 T2DM 人群中合并肝纤维化患者占比 38.8% (142 例)、合并 cACLD 患者占比 12.6% (46 例)。通过 Logistic 回归分析发现, 社区自然人群和 T2DM 人群的血压、臀围、腰围等指标无显著性差异, 但两组体重指数存在显著性差异。此外, 两组在 NAFLD、肝纤维化、cACLD 的检出率方面也具有统计学差异 (P 值均 <0.001)。

结论: 社区人群中较高的肝脏疾病检出率, 其中 T2DM 人群比自然人群具有更高的 NAFLD、肝纤维化和 cACLD 发生风险。

PO-2012

孤立性肝癌超标准复发术前预测评分系统

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目的: 肝细胞癌(HCC)的肝切除术后复发率可高达 50-70%。由于再复发患者可行挽救性肝移植, 但如出现不可移植的复发 (NTR) 则无法进行挽救性肝移植, 我们试图确定术前危险因素来预测切除术后的 NTR, 以辅助孤立性肝癌患者选择前期肝切除术(LR)或肝移植(LT)。

患者和方法: 对 253 例接受根治性切除术并且术前行 MRI 的 HCC 患者进行了回顾性分析, 定义 NTR 患者为发生复发时超过 UCSF 标准。根据临床及肿瘤影像学特征进行 COX 回归分析, 建立我们的 NTR 评分并进行验证。

结果: 253 例患者中, 86 例患者出现复发;在复发患者中, 34 例(39.5%)发生 NTR。在多变量分析中, 与 NTR 相关的因素包括甲胎蛋白(AFP) [10ng/mL][HR: 3.42, 95%可信区间(CI): 1.54, 7.63, P : 0.003]、APHE[HR: 2.23, 95%可信区间(CI): 1.03, 4.81, P : 0.041], 廓清[HR: 0.35 95%可信区间(CI): 0.15, 0.84, P : 0.019], 包膜[HR: 0.44, 95%可信区间(CI): 0.22, 0.88, P : 0.021]。使用每个因素的 b 系数建立简化的基于影像的评分 (c 指数 0.747, 95% CI: 0.6688-0.8252) 并使用评分构建分组。

结论: NTRscore 具有较强的区分能力, 可能是临床上对孤立性肝癌患者进行风险分层和指导治疗的有用工具。

PO-2013

全腹平扫 CT 在胃肠间质瘤靶向治疗疗效评估中的应用价值

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目的 探讨全腹平扫 CT 在胃肠间质瘤靶向治疗疗效评估中的应用价值, 参照 RECIST 及 Choi 两种评价标准, 对比平扫及增强 CT 疗效评估结果, 评价平扫 CT 在 GIST 靶向治疗疗效评估中的准确性及可行性。

方法 收集胃肠间质瘤患者在靶向治疗前后的全腹增强 CT 扫描图像, 从中筛选出经病理证实的患者 53 例, 分别在平扫和静脉期图像测量靶病灶的长径之和与平均 CT 值, 并计算出靶病灶长径之和变化率与靶病灶平均 CT 值变化率, 参照 RECIST 标准及 Choi 标准分别使用平扫及静脉期图像评估, 观察 53 例患者新发病灶、靶病灶新发出血、钙化的情况。使用统计学方法研究平扫与静脉期图像

中靶病灶的长径之和、靶病灶长径之和变化率、靶病灶平均 CT 值变化率的差异；参照 RECIST 标准及 Choi 标准分别统计平扫及静脉期图像评效的一致性；统计 53 例患者单次全腹平扫 CT 及全腹增强 CT 扫描的有效辐射剂量的差异。

结果 平扫与静脉期中靶病灶长径之和、靶病灶长径之和变化率的差异均无统计学意义 (P 均 >0.05)，且一致性很强 (ICC 值 = 1.000, 0.999)；平扫与静脉期靶病灶平均 CT 值变化率的差异有统计学意义 ($P < 0.05$)，一致性较强 (ICC 值 = 0.672)；平扫与静脉期参照 RECIST 标准的评估结果一致性很强，Kappa 值为 1.000 ($P < 0.05$)；平扫与静脉期参照 Choi 标准的评估结果一致性很强，Kappa 值为 0.882 ($P < 0.05$)；平扫与增强扫描平均辐射剂量差异具有统计学意义 ($P < 0.05$)，全腹平扫 CT、增强 CT 平均有效辐射剂量约 8.490(6.0,11.6)mSv，28.404(19.2,34.4)mSv，单次平扫 CT 较增强 CT 检查辐射剂量降低约 70.11%；53 例患者治疗后有 3 例患者见新发病灶，3 例患者治疗后新发瘤内出血，5 例患者治疗后新发钙化，平扫 CT 均可识别。结论 全腹平扫 CT 参照 RECIST 及 Choi 标准在胃肠道间质瘤靶向治疗疗效评估的准确性好，可以一定程度上减少患者的辐射暴露损伤及检查费用负担，具有一定的应用价值。

PO-2014

直肠癌 APTw 成像的基线值及其预测 新辅助治疗抵抗的可行性研究

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背景：新辅助放化疗联合全系膜直肠切除术是局部晚期直肠癌的标准治疗，而准确的治疗抵抗预测是实现个性化精准治疗的前提，目前尚无可靠有效的预测手段。酰胺质子转移加权 (APT_w) 成像是一种分子 MRI 技术，主要基于组织内源性游离蛋白和多肽中的酰胺质子产生图像对比度，已在中枢神经系统疾病中显示出潜在的应用前景，近年来有几篇关于直肠癌中 APT_w 相关的探索性研究报道，但尚没有关于 APT_w 成像预测新辅助放化疗治疗抵抗的研究。

目的：探究 APT_w 成像在直肠癌治疗抵抗中应用的可行性。

方法与材料：21 例病理和临床诊断的局部晚期直肠癌患者纳入，进行了基线常规 MR 扫描和 APT_w 成像，并进行了后续同一方案的新辅助治疗和标准的全系膜直肠切除术、以及标准化的病理评估。两名放射科医生在后处理工作站 (IntelliSpace Portal, Philips Healthcare, Best, 荷兰) 上独立绘制 roi 进行 APT 值的测量。病理特征包括肿瘤分级和肿瘤消退分期 (TRG)。使用组内相关系数 (ICC) 分析观察者间的 APT 值的一致性。采用独立样本 t 检验比较不同病理分级组间的 APT 值差异，采用 Pearson 相关分析评价 APT 值与 TRG 的相关性。

结果：所有肿瘤的 APT 值为 3.55 ± 1.78 (%)，范围 1.09 ~ 7.80)。2 名放射科医师 APT 值的 ICC 值为 0.963 ($p < 0.05$)。TRG0-1 组 (APT 值 1.95 ± 0.74) 与 TRG2-3 组 (APT 值 4.10 ± 1.71) 间 APT 值差异有统计学意义 ($p < 0.05$)。TRG 与 APT 值有显著相关性 ($R = 0.793, p < 0.05$)。

结论：直肠癌通常具有很强的增殖性，这可能导致大量的游离细胞蛋白和多肽的存在。我们测定了直肠癌基线 APT 值，并发现其与新辅助 CRT 后新辅助治疗后的 TRG 显著相关。我们推测 APT 值可能是评估直肠癌病理特征和预测新辅助治疗抵抗的有用生物标志物，可能对患者的临床治疗策略产生潜在影响，这需要在进一步的更大样本量的研究中进行验证。

PO-2015

探讨磁共振 mDIXON-Quant 序列 R2 值 对卵巢上皮肿瘤性质的鉴别价值

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目的: 探讨磁共振 mDIXON-Quant 序列中 R2*值对卵巢上皮肿瘤性质的鉴别价值。

材料和方法: 回顾性分析 2019 年 4 月-2023 年 9 月在大连医科大学附属第一医院经飞利浦 3.0T MR (Ingenia CX, Philips Healthcare, the Netherlands) 行盆腔 MR 扫描并经手术病理证实为卵巢占位的 25 例患者, 其中卵巢占位良性病变 (卵巢囊腺瘤) 患者 12 例, 卵巢占位恶性病变患者 13 例 (高级别浆液性癌 6 例, 透明细胞癌 3 例, 内膜样癌 4 例)。入组条件: ①患者病例资料完成, 影像资料和病理资料证实为卵巢囊实性肿瘤, 病理资料完整; ②卵巢肿瘤直径 $\geq 1.5\text{cm}$; ③患者的 MR 扫描序列包括 mDIXON-Quant 序列。出组条件: ①mDIXON-Quant 序列伪影重; ②mDIXON-Quant 序列未包全肿瘤。在工作站测量 mDIXON-Quant 序列的 R2*值, 选取病灶最大层面放置 3 个 ROI, ROI 大小约为病灶直径的 1/2, 3 个 ROI 的均值为测量值。采用 Mann-Whitney U test 检验进行差异性分析。采用受试者操作特征 (ROC) 曲线计算 R2*值对卵巢癌的诊断效能。

结果: 卵巢癌的 R2* (11.52, (10.05, 14.44)) % 低于卵巢囊腺瘤 R2* (12.47, (10.39, 20.34)) %, $P=0.026$ 。R2*值诊断卵巢囊腺瘤的 AUC 值为 0.763, 当阈值为 12.31Hz 时, 灵敏度和特异度分别为 53.8%和 83.3%。(见图 1)

结论: R2*能够对卵巢上皮肿瘤的良恶性进行鉴别, 对临床有一定的指导意义。

PO-2016

基于能谱 CT 多期增强碘水图的影像组学特征预测肾透明细胞癌侵犯肾包膜

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目的:

肾细胞癌是成人泌尿系统常见的恶性肿瘤, 其中肾透明细胞癌(cc RCC)最常见, 占 70% ~ 80%。肾包膜侵犯是肾细胞癌分期的重要因素。基于能谱 CT 增强扫描碘(水)图图像建立术前预测肾癌患者被膜侵犯的影像组学模型。

方法:

回顾性分析 27 例 ccRCC 患者的临床资料, 其中 17 例有包膜侵犯, 10 例无包膜侵犯。所有患者术前均行肾脏能谱 CT 动态增强扫描, 采用后处理生成皮髓质期、实质期和排泄期的碘(水)图像。利用术前 CT 扫描图像构建影像组学模型, 将患者分为包膜侵犯组和无包膜侵犯组。由两名具有 1 年和 3 年腹部影像诊断经验的放射科医师使用 ITK-SNAP 软件(版本 4.0.0)逐层手动绘制覆盖整个肿瘤的感兴趣体积(VOIs)(图 1.2)。对各期 ct 影像组学特征数据进行标准化, 并采用最小冗余 最大相关(mRMR)和最小绝对收缩和选择算子(LASSO)回归分析进行特征选择并建立影像组学模型, 并计算影像组学评分(Radscore)。采用 ROC 曲线评估模型的鉴别预测能力(图 3)。

结果:

采用联影 UAI 软件分别从皮髓质期、实质期和排泄期提取出 104 个纹理特征。LASSO 回归分析显示皮髓质期、实质期、排泄期最具预测价值的特征分别为 1,6 和 6(图 4)。皮髓质期、实质期、排泄期和三相组合模型的曲线下面积(AUC)分别为 0.700、0.529、0.571 和 0.794。

结论:

能谱 CT 增强扫描碘(水)图纹理分析构建的 4 种模型术前对肾被膜侵犯均具有较好的预测效能, 其中三相联合模型的预测效能最佳。

PO-2017

胃 T2WI 图像质量优化：HASTE-GRE-Separated、HASTE-TSE-Separated、TSE-BLADE 和 TSE 序列的对比研究

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目的：比较 HASTE-GRE-Separated、HASTE-TSE-Separated、TSE-BLADE 和 TSE 序列在胃部 T2WI 中的图像质量，探索胃部 T2WI 最佳的成像方案。

方法：纳入 25 例胃癌患者(男 17 例，女 8 例)，均在 3.0T 磁共振上进行扫描。计算病灶各序列的 SNR、病灶与水的信号强度比及 CNR。由两位腹部诊断医师（诊断经验分别为 15 年和 5 年）将图像按照 5 分法分别对图像质量进行评分，5=优(胃壁及胃周脂肪间隙显示清晰)，4=良好(胃壁及胃周脂肪间隙少许伪影)，3=中等(胃壁显示可)，2=欠佳(胃壁显示欠清)和 1=差(胃壁及病灶显示不清)。所有定量和定性参数采用 One-way ANOVA 和 Kruskal-Wallis 单因素方差分析，组间两两比较采用 Bonferroni 校正。应用 Kappa 分析对两位医师评分的一致性进行分析。

结果：客观定量参数分析表明，胃部四种 T2WI 的 SNR 及 CNR 均有统计学差异 ($F=4.709$, $P<0.05$; $F=4.164$, $P<0.05$)。HASTE-GRE-Separated 序列的 CNR 高于 TSE 序列 ($P<0.05$)。HASTE-GRE-Separated 和 HASTE-TSE-Separated 序列的信号强度比无显著差异 ($P>0.05$)，但 HASTE-TSE-Separated 序列显示组织 CNR 略高。HASTE-GRE-Separated 和 HASTE-TSE-Separated 序列的主观评价得分 $[(4.52\pm0.59)$ 和 (4.64 ± 0.49) 分] 明显高于 TSE-BLADE 及 TSE $[(3.16\pm0.80)$ 和 (3.04 ± 1.02) 分，($F=32.47$, $P<0.001$)]。其中 HASTE-TSE-Separated 序列图像得分最高。两位医师对四种序列主观评分一致性均为良好。

结论：尽管 HASTE 序列的信号强度不如 TSE-BLADE 和 TSE 序列，但 HASTE 序列由于具有较快的成像速度、运动伪影较少，尤其 HASTE-TSE-Separated 成像序列的出现，进一步提高了传统 HASTE 的成像质量，在胃部 MR T2WI 成像中具有较大的应用潜力。

PO-2018

基于 IVIM-DWI 的纹理分析预测肝细胞癌术后复发的价值

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目的

探讨基于体素内不相干运动扩散加权成像 (intravoxel incoherent motion diffusion weighted imaging, IVIM-DWI) 定量参数图的纹理分析预测肝细胞癌 (hepatocellular carcinoma, HCC) 术后复发的价值。

材料与方法

回顾性收集 2015 年 8 月至 2021 年 11 月期间我院病理证实的 75 例 HCC 患者，分为复发组 ($n=28$) 和非复发组 ($n=47$)。所有患者行上腹 MRI 检查，包括 T1WI、T2WI、动态增强扫描及 IVIM-DWI 序列。使用 Functool 软件对 IVIM-DWI 图像进行后处理，获得 Standard ADC、D mono、D* mono、及 f mono 图。参照动脉期图像，在定量参数图上沿肿瘤边缘逐层勾画肿瘤轮廓获得三维容积感兴趣区 (VOI) (图 1)。提取 104 个纹理特征，包括一阶特征、形状特征、灰度共生矩阵 (GLCM)、灰度游程矩阵 (GLRLM)、灰度大小矩阵 (GLSZM)、灰度依赖矩阵 (GLDM) 及邻域灰度差矩阵 (NGTDM)。采用 Lasso 方法进行特征选择，通过逻辑回归方法构建 HCC 术后复

发预测模型, 包括 Standard ADC、D mono、D* mono、f mono 及影像组学联合模型。使用受试者工作特征 (ROC) 曲线评估模型的效能。

结果

经筛选 Standard ADC、D* mono 及 f mono 分别获得 8、1、6、6 个最优纹理特征 (表 1)。Standard ADC、D mono、D* mono、f mono 模型预测 HCC 术后复发的效能, 敏感度及特异度分别为 0.616、89.4%、39.3%; 0.616、89.4%、39.3%; 0.574、78.7%, 42.9%; 0.672, 76.6%, 53.6%。

结论

IVIM-DWI 纹理分析对 HCC 术后复发预测具有一定价值。

PO-2019

多参数磁共振脂肪定量技术预测宫颈癌淋巴结转移

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目的: 评价磁共振脂肪定量成像在预测宫颈癌淋巴结转移中的作用。

背景: 宫颈癌是一种主要的妇科癌症, 居全球女性常见恶性肿瘤的第三位, 也是全球女性癌症死亡的第四大原因。

方法: 回顾性分析 2019 年 7 月至 2023 年 5 月经手术病理证实的 47 例宫颈癌患者, 其中 15 例为淋巴结转移组, 32 例为非淋巴结转移组。术前均行 mDIXON-Quant 检查; 由三年影像学诊断经验的医师测量其 R2*值, T2*值。使用 spss27.0 进行统计, 根据数据分布的正态性, 对连续变量进行独立样本 t 检验或 U 检验。采用 Logistic 回归和受试者工作特征(ROC)曲线分析评价单项和联合参数的诊断效能。

结果: 淋巴结转移组的 R2*值 (20.58 ± 5.08) 小于淋巴结非转移组的 R2*值 (27.46 ± 7.17), 淋巴结转移组的 T2*值 (55.58 ± 15.75) 大于淋巴结非转移组 (42.36 ± 10.72), 差异均具有统计学意义。R2*值, T2*值以及二者联合鉴别早期淋巴结转移组与淋巴结非转移组的 AUC、敏感度、特异度分别为 0.777, 0.244, 0.779; 93.3%, 13.3%, 93.3%; 56.3%, 96.9%, 56.3%。

结论: R2*值及 T2*预测宫颈癌转移有一定价值, 两者联合诊断的效能得到了提升, 具有一定价值。

PO-2020

MRI 体素内不相干运动对高原妊高征胎盘微循环及微结构的研究

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目的 通过 MRI IVIM 探索高原地区妊高征孕妇胎盘微循环和微结构的研究。方法 回顾性分析 2019 年 8 月至 2022 年 1 月于青海红十字医院就诊正常孕晚期单胎妊娠孕妇 22 例和妊高征孕妇 20 例。所有孕妇均行超声、常规 MRI 和 IVIM 检查, 测得整体胎盘和胎盘各部位真实扩散系数(D), 假性扩散系数(D*), 灌注分数(f)值, 记录估计胎儿体重和出生后体重。统计学采用独立样本 t 检验或单因素 ANOVA 分析, 随后两组胎盘各定量参数组间多重比较采用 Bonferroni 法分析。结果 正常晚孕组胎盘胎儿侧及整体胎盘 f 值均高于妊高征组 ($P < 0.05$), 正常孕晚期胎盘母体侧及整体胎盘 D 值均高于妊高征 ($P < 0.05$), 正常孕晚期 EFW 和胎儿出生体重均高于妊高征 ($P < 0.05$)。结

论 IVIM 可有效分析高原地区妊高征孕妇胎盘血流微循环和微结构, 为临床评估胎盘结构和功能变化提供新依据。

PO-2021

MR 弹性成像与钆塞酸二钠增强 T1 mapping 评估肝纤维化定量的对比研究

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目的 探讨 MR 弹性成像 (MRE)、钆塞酸二钠 (Gd-EOB-DTPA) 增强 T1 mapping 在肝纤维化定量 (liver fibrosis, LF) 的价值。**方法** 实验材料为纯种 6 月龄新西兰大白兔 (共 120 只), 分为正常对照组 (n=20) 与肝纤维化组 (LF 组, n=100), LF 组建模采用每周皮下注射 0.1~0.3ml/kg 的 50% 四氯化碳 (CCL₄) 油溶液模型, 分别在第 4、5、6、15 周末取 5 只对照组与 25 只 LF 组兔行 MRI 肝脏轴位 T1WI、MRE 及钆塞酸二钠 (Gd-EOB-DTPA) 增强 T1 mapping 扫描, 影像学获得肝脏弹性硬度值 (liver stiffness, LS)、平扫 T1 弛豫时间 T1_{native} 及 Gd-EOB-DTPA 增强 T1 mapping 扫描 20 分钟后 T1 弛豫时间 T1_{20min}、T1 弛豫时间减少率 ($\Delta T1_{20min}$) 及 1/T1 弛豫时间增加值 ($\Delta R1_{20min}$); LF 病理学分期依 Scheuer 评分系统, 所得定量参数在早期诊断中的价值, 采用单因素方差分析, 采用 Spearman 法比较各定量参数与 LF 病理分期相关性, 采用 ROC 曲线评估各定量参数对 LF 分期诊断效能。**结果** 病理学评分获得: F0 期 (n=15)、F1 期 (n=22)、F2 期 (n=22)、F3 期 (n=18)、F4 期 (n=19), 共纳入 96 只兔。LS、T1_{native}、T1_{20min}、 $\Delta T1_{20min}$ 、 $\Delta R1_{20min}$ 于 LF 各期间差异均有统计学意义 (P<0.05)。LS、T1_{native}、T1_{20min}、 $\Delta T1_{20min}$ 、 $\Delta R1_{20min}$ 均与 LF 分期相关 (r=0.935、0.559、0.770、-0.418、-0.686, P<0.0001)。ROC 曲线评估 (诊断 F0vsF1~F4、F0vsF1~F2、F0vsF3~F4、F1~F2vsF3~F4) LS 诊断效能最佳 (AUC 分别为 0.988、0.979、1.000、0.995), 其次为 T1_{20min} (AUC 分别为 0.914、0.852、0.987、0.896)。**结论** 在定量评估 LF 分期中, MRE 优于 Gd-EOB-DTPA 增强 T1 mapping。

PO-2022

基于 CT 的体成分分析与肠痿患者术后并发症的相关性研究

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目的: 评估基于 CT 的体成分分析对肠痿患者确定性手术术后并发症的预测价值。

方法: 回顾性分析 2016 年 01 月至 2021 年 12 月间在北京清华长庚医院接受确定性手术的 88 例肠痿患者的临床资料及术前腹部 CT 资料。将所有患者根据术后并发症发生情况分为主要结局 (术后并发症 Clavien-Dindo Grade \geq III 级) 组和次要结局组 (包括术后并发症 Clavien-Dindo Grade < III 级及无术后并发症者)。对 CT 图像中 L3 椎体横突层面的体成分 (内脏脂肪、皮下脂肪、腰大肌、腰方肌、竖脊肌和总腹部肌肉) 进行手工勾画得出面积, 进而将面积除以患者身高的平方, 计算出各个体成分指数。对两组间临床数据和 CT 体成分指标进行单因素的统计学差异分析; 然后, 采用 Logistic 回归分析确定确定性手术术后主要并发症的独立预测因子; 最后, 联合临床指标及 CT 体成分指标绘制预测主要结局发生的 ROC 曲线, 确定预测价值最高的模型。

结果: 在纳入研究的 88 例患者中, 有 16 例 (18.08%) 患者出现术后主要结局。单因素分析中, 低腰方肌指数 (QLI) (P = 0.047)、低 QLA/体重指数 (BMI) (P = 0.023)、高 C 反应蛋白 (CRP) (P = 0.036)、较长住院时间 (LOS) (P = 0.002)、较少术前住院史 (P = 0.049) 是术后主要结局发生的危险因素。在多变量回归分析中, QLI (OR= 0.383, 95%CI:0.138~0.803,

$P = 0.011$) 和 LOS (OR= 1.006, 95%CI:1.001~1.010, $P = 0.012$) 是术后主要结局的独立危险因素。CT 体成分指标 QLA/BMI、QLI 联合住院时间、CRP、性别及年龄的诊断价值最高, 曲线下面积为 0.815 (95% CI: 0.693~0.937), 诊断特异度及灵敏度分别为 64.8%和 93.8%。

结论: 联合临床及 CT 体成分指标可成为预测肠痿患者术后并发症的筛选手段; 且 QLI 是肠痿患者确定性手术后主要结局的独立预测因素, 可作为肠痿患者的风险分层工具。

PO-2023

基于 CTE 的影像特征及体成分分析可提高肠白塞 与克罗恩病的鉴别效能

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目的: 白塞病(BD)累及肠道时与克罗恩病(CD)表现相似。计算机断层扫描(CTE)可以准确显示肠道受累情况、提取提成分定量数据。本研究旨在评估 CTE 是否可以提高肠 BD 和 CD 的鉴别能力。

方法: 系统回顾我院 2015 年 1 月至 2022 年 10 月诊断为肠 BD 和 CD 的患者。评估首次入院时的临床、实验室、内镜和影像特征。选择 CTE 动脉期进行体成分分析, L1-5 各取中间一层, 分析: 内脏脂肪 (VAT) 与皮下脂肪 (SAT) 面积以及体积的比值、各层 VAT CT 值分布和 5 层之间 VAT 面积的变异系数 (CV)。将感兴趣的变量进行单因素分析并将 P 值 <0.1 的变量进行多因素分析以建立两种鉴别模型 (传统模型:临床数据结合内镜特征; 综合模型:传统模型加上 CTE 特征)。绘制 ROC 曲线比较两种模型的效能。

结果: 本研究纳入 20 例肠 BD 和 179 例 CD 患者。肠 BD 患者年龄更大, 复发性口腔和生殖器溃疡更常见。肠 BD 患者内镜下溃疡多为局灶分布。在影像特征方面, 肠 BD 患者多为息肉样肠壁增厚, 以下特征在 CD 患者中更常见:近端回肠受累、系膜侧强化、肠狭窄。CD 患者 L1-5VAT 与 SAT 面积比、体积比更大, 但仅 L4、L5 层面的面积比有统计学意义 ($P=0.046$; $P=0.013$), 且 CD 患者 VAT 密度的四分位数均比肠 BD 患者高 (P 值均 <0.05)。传统模型纳入的变量有: 年龄 ($P=0.002$)、性别 ($P=0.253$) 局灶性溃疡分布 ($P=0.001$)。综合模型纳入的变量有: 年龄 ($P=0.016$)、性别 ($P=0.887$)、局灶性溃疡分布 ($P=0.001$)、近端回肠受累 ($P=0.007$)、系膜侧强化 ($P=0.167$)、肠道狭窄 ($P=0.017$)、CV ($P=0.038$)、L4 层面 VAT 与 SAT 面积比 ($P=0.118$)。综合模型 ($AUC=0.941$) 的鉴别效能高于传统模型 ($AUC=0.862$) ($P=0.005$)。

结论: 肠 BD 和 CD 可以相互区分。与传统的临床加内镜模式相比, CTE 的加入可显著提高鉴别效能。

PO-2024

初探 mDixon-Quant 技术脂肪分数对 鉴别卵巢上皮肿瘤良恶性的价值

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目的：利用 mDixon-Quant 技术探讨脂肪分数(fat fraction, FF)值对卵巢上皮肿瘤良恶性鉴别的可行性。

材料与方法：回顾性分析 2019 年 4 月至 2023 年 9 月间在大连医科大学附属第一医院经飞利浦 3.0TMR (Ingenia CX, Philips Healthcare, the Netherlands) 行盆腔 MR 扫描并经手术病理证实为卵巢上皮肿瘤患者共 18 例。其中卵巢囊腺瘤 10 例, 高级别浆液性癌 4 例, 透明细胞癌 2 例, 子宫内膜样腺癌 2 例。在肿瘤液性部分最大层面放置 3 个 ROI, 大小约为病灶直径的 1/2, 3 个 ROI 均值为测量值。采用独立样本 Mann-Whitney U 检验进行卵巢癌和卵巢囊腺瘤间 FF 值比较。绘制受试者工作特征(receiving operator characteristic, ROC)曲线, 利用曲线下面积(area under the curve, AUC)比较诊断性能。

结果：卵巢囊腺瘤囊液的 FF 值 (2.11 (2.03, 3.23)) % 高于卵巢癌的 FF 值 (1.38 (0.92, 2.03)) %, $P=0.027$ 。(见图 1) FF 诊断卵巢癌的 AUC 值为 0.80, 当阈值为 1.64% 时, 敏感度和特异度分别为 70.00% 和 100.00%。(见图 2)

结论：FF 值对鉴别卵巢上皮肿瘤的良恶性具有一点作用, 对于临床诊断肿瘤性质具有一定帮助。

PO-2025

不同 MRI 对比剂在预测肝细胞癌微血管侵犯中的应用探究

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目的：基于 MRI 影像学特征探究肝脏特异性对比剂 (Gd-EOB-DTPA) 与常规对比剂 (Gd-DTPA) 在预测肝细胞癌 (hepatocellular carcinoma, HCC) 微血管侵犯 (microvascular invasion, MVI) 上的差异。

方法：回顾性分析 2010 年 1 月—2019 年 1 月行手术治疗的 HCC 患者 253 例 (Gd-DTPA 组 121 例、Gd-EOB-DTPA 组 132 例)。评估患者术前 MRI 影像学特征, 通过多因素 Logistic 回归分别建立 MVI 预测模型, 以受试者工作特征曲线及临床决策曲线评估模型效能及差异, 并对患者术后生存情况进行随访分析。

结果：Gd-DTPA 组中病灶大小、边界侵袭征及 Gd-EOB-DTPA 组中病灶大小、边界侵袭征、卫星灶是预测 MVI 的独立风险因素。Gd-DTPA 组和 Gd-EOB-DTPA 组模型的曲线下面积 (area under curve, AUC) 分别为 0.761、0.791。临床决策曲线显示 Gd-DTPA 与 Gd-EOB-DTPA 在预测 MVI 发生上具有相近的临床效益。生存分析显示组织病理证实的 MVI 阳性组与 MVI 阴性组的平均无疾病生存时间及模型预测的 MVI 阳性组与 MVI 阴性组的平均无疾病生存时间均存在显著差异。

结论：病灶大小、病灶边界侵袭征及卫星灶是预测 MVI 的独立危险因素。使用 Gd-EOB-DTPA 在预测 MVI 发生方面不能比 Gd-DTPA 获得更多临床效益, 但是 Gd-EOB-DTPA 具有较高的敏感度。

PO-2026

探讨单源双能 CT 标准化碘浓度值对卵巢癌 WT-1 表达的预测价值

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目的：利用单源双能 CT 增强扫描三期的标准化碘浓度值(normalized iodine concentration, NIC)预测卵巢癌的肾母细胞瘤基因-1 (Wilms's tumour-1 Gene, WT-1) 的表达情况。材料和方法：回顾性分析 2019 年 1 月-2022 年 7 月在大连医科大学附属第一医院经单源双能 CT 增强扫描行盆腔扫描并经手术病理证实的卵巢占位患者。入组条件为：①患者做过单源双能 CT 增强扫描；②患者病例资料完整，术后病理免疫组化包括 WT-1。出组条件：①图像有伪影；②病灶的实性成分小于 1cm 最终入组卵巢癌患者共 66 例（浆液性癌 44 例，粘液腺癌 2 例，子宫内膜样腺癌伴鳞状分化 6 例，透明细胞癌 13 例，癌肉瘤 1 例）。测量增强三期的碘水值，选取肿瘤病灶实性成分最大层面，沿着实性成分边沿勾画感兴趣区 (Region Of Interest, ROI)。采用独立样本 t 检验比较 WT-1 阳性和阴性的三期碘定量值；使用 ROC 曲线计算三期碘定量值对 WT-1 阳性组的诊断效能。结果：①动脉期 WT-1 阴性组 NIC ($0.11 \pm 0.09 \text{mg/ml}$) 与阳性组 NIC ($0.13 \pm 0.07 \text{mg/ml}$) 差异无统计学意义， $P=0.425$ 。②静脉期 WT-1 阴性组 NIC ($0.33 \pm 0.21 \text{mg/ml}$) 低于 WT-1 静脉期阳性组 NIC ($0.46 \pm 0.22 \text{mg/ml}$)， $P=0.035$ 。③延迟期：WT-1 阴性组 NIC ($0.33 \pm 0.24 \text{mg/ml}$) 低于 WT-1 延迟期阳性组 NIC ($0.61 \pm 0.35 \text{mg/ml}$)， $P<0.001$ 。静脉期及延迟期 NIC 诊断 WT-1 阳性的 AUC、灵敏度、特异度分别为 0.671 及 0.740、72.92% 及 62.50%、61.11% 及 83.33%。结论：单源双能 CT 标准化碘浓度值能够对卵巢癌的 WT1 的表达进行预测，具有一定的临床指导意义。

PO-2027

基于多参数 MRI 预测子宫肌瘤 HIFU 术后复发

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目的：探究构建基于多参数核磁共振成像 (MRI) 的子宫肌瘤高强度聚焦超声 (HIFU) 术后复发的评估模型。方法：选 2022 年 4 月至 2023 年 4 月于我院行 HIFU 的患者 150 例，对其进行术后半年随访，根据其随访情况分为复发组 (23 例)、未复发组 (127 例)。比较两组术前 MRI 影像资料及相关临床表现，采用二元 logistics 回归分析构建基于多参数 MRI 的子宫肌瘤 HIFU 术后复发的评估模型。结果：共 150 例子宫肌瘤患者，年龄 23~43 岁，中位年龄为 34 岁，其中术后 1 年有 23 例患者出现复发，127 例患者未复发，复发率为 15.33%。计量资料如年龄、腹壁厚度等，以中位数为临界点进行分类。与未复发组相比，复发组年龄 <34 岁、StandardADC 值 $<0.50 \times 10^{-3} \text{mm}^2/\text{s}$ 、SlowADC 值 $<0.81 \times 10^{-3} \text{mm}^2/\text{s}$ 占比更大 ($P<0.05$)。以年龄、StandardADC 值、SlowADC 值为自变量，复发为因变量。Logistic 回归分析显示 StandardADC 值、SlowADC 值影响复发的因素 ($P<0.05$)。将 StandardADC 值、SlowADC 值纳入研究进行重复建模，至纳入方程中的变量均保持 P 值 <0.05 。最终进入回归方程的变量有 2 个，复发评估模型 $Y=1.224\text{StandardADC 值}+1.891\text{SlowADC 值}-3.499$ 。ROC 曲线结果显示，评估曲线下面积为 0.791，特异度为 0.929、敏感度为 0.609，界值为 0.286，具有一定临床参考价值。结论：基于多参数 MRI 及临床构建子宫肌瘤 HIFU 术后复发的评估模型准确度尚可，可用于临床参考。

PO-2028

基于 CT 平扫的影像组学在预测急性胰腺炎预后的应用价值

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目的：AP 患者病情进展迅速，且预后不良，因此早期准确判断 AP 进展并做出及时干预对于患者预后至关重要。本实验目的是探讨基于胰腺实质 CT 平扫图像建立的影像组学模型对预测早期 AP 预后的应用价值。

方法：回顾性收集 137 例根据 2012 年修订的亚特兰大分类诊断为 AP 的患者，并分析基线临床资料及影像信息。根据是否出现新的局部、全身并发症或并发症的加重，将患者分为进展组（95 例）与非进展组（42 例），将这 137 例病例以 7: 3 的比例被随机分成训练集和验证集，其中训练集 95 例（非进展组 29 例，进展组 66 例），验证集 42 例（无并发症组 13 例，有并发症组 29 例）。所有患者均接受胰腺 CT 扫描，分析 CT 检查图像人工勾画 ROI，并进行 MCTSI 评分，采用联影科研平台提取 CT 纹理特征，使用 mRMR 和 LASSO 回归进行降维、筛选，基于十倍交叉运算优化组学特征子集，并计算每个患者的 Rad-score，融合 MCTSI 构建模型影像组学模型，将临床基线数据构建临床模型，将二者融合建立临床-影像组学联合模型。ROC 曲线分析评估各模型的效能，使用 DeLong 检验比较各模型的 AUC 间的差异。

结果：通过 mRMR 算法和 LASSO 回归筛选出 13 个价值较大的纹理特征，并计算各个纹理特征的 Rad-score 融合 MCTSI 评分建立影像组学模型，而后建立临床模型及临床-影像组学模型。经 ROC 曲线分析结果显示在训练集中，临床-影像组学模型的 AUC 及 95%CI、准确度、灵敏度、特异度分别为 0.984 (0.964-1.000)、0.947、0.955、0.931；在验证集中，临床-影像组学模型的 AUC 及 95%置信区间、准确度、灵敏度、特异度分别为 0.942 (0.870-1.000)、0.929、0.966、0.846。DeLong 检验显示临床-影像组学联合模型的预测效能高于临床特征模型 (P=0.005) 和影像组学模型 (P=0.042)。

结论：基于胰腺实质 CT 临床-影像组学模型预测早期 AP 患者病情进展具有较高的诊断效能，明显优于临床模型或影像组学模型，联合模型有助于尽早识别并判断急性胰腺炎患者的进展趋势，指导临床尽早改善患者的预后和生存。

PO-2029

术前磁共振扩散加权成像结合血清 CA125 对
子宫内膜癌及其淋巴结转移的评估价值

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目的：分析术前磁共振弥散加权成像 (DWI) 结合血清糖类抗原 125 (CA125) 对子宫内膜癌及其淋巴结转移的评估价值。方法：选取 2022 年 9 月—2023 年 3 月在我院经手术病理组织学检查确诊的 144 例子宫内膜癌患者为观察对象，术前均接受磁共振 DWI 检查与血清 CA125 检测。分析血清 CA125 水平与患者临床病理特征的关系及磁共振 DWI 检查图像特征。结果：血清 CA125 水平随着病灶直径、肌层浸润深度、手术病理分期、分级的增加而增加，淋巴结转移者血清 CA125 水平也明显高于无转移者 (P<0.05)。在 DWI 图像中本组所有子宫内膜癌病变呈明显高信号、边界清晰，表观扩散系数 (ADC) 图显示病变信号明显低于周围正常肌层。淋巴结转移者平均 ADC 值低于无淋巴结转移者 (P<0.05)。以手术病理为“金标准”，磁共振 DWI 结合血清 CA125 对子宫内膜癌患者淋巴结转移诊断的灵敏度、特异度、准确率、阳性预测值、阴性预测值 (95.24%、94.92%、95.00%、86.96%、98.25%) 明显高于血清 CA125 (76.19%、74.58%、75.00%、51.61%、

89.80%) 和磁共振 DWI (90.47%、83.05%、85.00%、65.52%、96.08%) 等单独诊断。结论 磁共振 DWI 检查、血清 CA125 均可反映子宫内膜癌患者的病情严重程度, 二者联合可有效提高其淋巴结转移的诊断效能。

PO-2030

不同严重程度初发性急性胰腺炎患者 复发性急性胰腺炎的 CT 特征

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背景: 急性胰腺炎、复发性急性胰腺炎和慢性胰腺炎是同一疾病的连续过程。以往研究表明, 初发为轻症的急性胰腺炎患者较少与慢性胰腺炎相关联, 而反复发作的重症坏死性胰腺炎可诱发最终导致慢性胰腺炎。然而, 不同严重程度初发性急性胰腺炎患者复发性急性胰腺炎的 CT 特征尚未见报道。我们进行这项研究, 目的是调查不同严重程度初发性急性胰腺炎患者复发性急性胰腺炎的 CT 特征。

方法: 回顾性收集 2013 年 1 月至 2019 年 12 月中国四川省三家三甲医院因复发性急性胰腺炎和急性胰腺炎发作入院而接受增强 CT 检查的同一患者。根据复发或初发, 将患者分为复发性急性胰腺炎组和急性胰腺炎组。根据 2012 年修订的亚特兰大分类中初发性急性胰腺炎的严重程度将复发性急性胰腺炎和急性胰腺炎患者分为两组。初发性急性胰腺炎为轻症的复发性急性胰腺炎和急性胰腺炎患者为第 1 组, 初发性急性胰腺炎为中重症和重症的复发性急性胰腺炎和急性胰腺炎患者为第 2 组。分别分析两组患者复发性急性胰腺炎和初发性急性胰腺炎的人口统计学数据、2012 年修订的亚特兰大分类、CT 特征、CT 严重程度指数评分以及 CT 胰外炎症评分。分别采用秩和检验、卡方检验和 Fisher 精确检验来比较两组之间的连续变量和分类变量。

结果: 在 99 名急性胰腺炎患者中, 共收集到 111 次复发。复发性急性胰腺炎和急性胰腺炎患者最常见的病因都是高脂血症。在第 1 组患者中, 与急性胰腺炎组相比, 复发性急性胰腺炎组的 CT 严重程度指数评分更高 ($P=0.02$); 根据 2012 年修订的亚特兰大分类, 复发性急性胰腺炎组的轻症占比更低, 而中重症占比更高 ($P<0.001$)。在第 2 组中, 与急性胰腺炎组相比, 复发性急性胰腺炎组的住院时间更短 ($P=0.01$), CT 胰外炎症评分更低 ($P=0.007$); 根据 2012 年修订的亚特兰大分类, 复发性急性胰腺炎组的轻症占比更高, 而中重症和重症的占比更低 ($P<0.001$)。

结论: 根据 2012 年修订的亚特兰大分类, 与急性胰腺炎相比, 初发为轻症的急性胰腺炎患者复发性急性胰腺炎的严重程度更高, 而初发为中重症和重症的急性胰腺炎患者复发性急性胰腺炎的严重程度更低。

PO-2031

应用多个非高斯弥散模型预测膀胱癌的组织学分级

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目的: 组织学分级对于膀胱癌来说是重要的预后因素之一, 本研究的主要目的在于探讨非高斯弥散模型在膀胱癌组织学分级中的鉴别价值。

方法: 2022 年 1 月至 6 月间疑诊膀胱癌的 93 名患者于术前行常规 MRI 和多 b 值弥散成像, 在 2 周内经病理确诊分为两组 (低级别和高级别), 所有的研究均在 3.0T MRI 扫描仪上进行。多 b 值弥

散成像经后处理后获得 5 个非高斯弥散模型：连续时间随机模型 (CTRW)、体素内不相干运动模型 (IVIM)、拉伸指数模型 (SEM)、扩散峰度成像 (DKI) 和分数阶微积分扩散模型 (FROC)。感兴趣区 (VOI) 分别由两名具有十年和八年泌尿系统阅片经验的放射科医师在 DWI ($b=0 \text{ sec/mm}^2$) 进行勾画，参照 T2 和增强扫描，VOI 尽可能包含整个肿瘤，不包括出血、坏死、囊变和肿瘤柄。所有的统计学分析应用 SPSS 软件 (25.0 版本)，P 值小于 0.05 被认为具有统计学差异，采用独立样本 t 检验或 Mann-Whitney U 检验比较膀胱癌低级别和高级别组间单个弥散参数是否存在统计学差异。基于 Logistic 回归结合最优子集筛选，利用存在统计学差异的参数进行建模，预测膀胱癌组织学分级。绘制受试者工作特征曲线 (ROC)，曲线下面积 (AUC) 用于评估模型分类效能。

结果：最终纳入 60 例符合要求的患者。35 例 (58.33%) 经病理学确诊为低级别尿路上皮癌，25 例 (41.67%) 为高级别，在定量参数值中，低级别组中的 CTRW-D, DKI-Dapp, DKI-Kapp, FROC-D, IVIM-D 和 SEM-DDC 值均明显高于高级别组 ($P<0.05$)，单个参数中，CTRW-D 的 AUC 最高，达到 0.769。基于所有参数的组合模型分类效能最高，AUC 达 0.848。

结论：研究表明相比于传统的 DWI 单指数模型，CTRW、IVIM、SEM、DKI 和 FROC 非高斯弥散模型更有利于鉴别膀胱癌组织学分级，指导临床诊疗。

PO-2032

能谱 CT 参数对胃癌新辅助化疗疗效的预测价值

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目的：探讨化疗前能谱 CT 参数对胃癌新辅助化疗反应的预测价值。

材料与方法：回顾性收集 60 例化疗前行新辅助化疗并进行能谱 CT 检查的胃癌患者，根据术后病理肿瘤消退程度分为反应组和无反应组。收集患者临床特征。测定化疗前门静脉相碘浓度 (IC)、水浓度 (WC)、有效原子序数 (Eff-z)，并且 IC 与主动脉的 IC 进行归一化，得到归一化 IC (NIC)。采用独立样本 t 检验、Mann-Whitney U 检验或卡方检验分析两组差异，采用受试者工作曲线 (ROC) 评价不同变量的预测效果。

结果：反应组中性粒细胞与淋巴细胞比值 (NLR) 低于无反应组 ($P<0.05$)。反应组 IC、NIC、Eff-z 值显著高于无反应组 ($P<0.01$)。NLR、IC、NIC、Eff-z 的 ROC 曲线下面积分别为 0.694、0.688、0.799、0.690。NIC、Eff-z、NLR 值联合预测 GC 对 NAC 的反应具有较好的诊断效果，ROC 曲线下面积为 0.857，敏感性 76.92%，准确度 80.00%，特异性 85.71%。

结论：能谱 CT 参数可作为预测胃癌患者对新辅助化疗反应的无创工具。

PO-2033

临床联合能谱 CT 参数在预测胃癌 Lauren 分型中的价值

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目的：探讨临床联合能谱 CT 参数在评估胃癌 Lauren 分型的价值。

材料与方法：回顾性收集术前行能谱 CT 检查并经病理证实的 59 例弥漫型胃癌和 41 例肠型胃癌患者。收集患者临床特征并测定两组肿瘤的动脉期碘浓度 (AIC)、有效原子序数 (AZeff)、水浓度 (AWC) 和静脉期碘浓度 (VIC)、有效原子序数 (VZeff)、水浓度 (VWC)。采用类内相关系数 (ICC) 来检验测量结果的一致性。采用独立样本 t 检验、Mann-Whitney U 检验或卡方检验分析两组差异，采用受试者工作曲线 (ROC) 评价不同变量的预测效果。

结果 两组患者的临床参数 CT-T 分期与 N 分期差异有统计学意义 ($P < 0.05$)，弥漫型胃癌 T3-4、N1-3 的患者比例较肠型胃癌高 (83.05% vs 58.54%, 72.88% vs 54.66%)。弥漫型胃癌 AIC、AZeff、VIC 及 VZeff 值显著高于肠型胃癌 ($P < 0.01$)。在单个参数中，VIC 产生的 ROC 曲线下面积最大 (AUC=0.774)。联合临床参数和能谱 CT 参数的联合模型组合产生了最好的整体性能，灵敏度为 88.14%，特异性为 60.98%，曲线下面积为 0.802。

结论 临床联合光谱 CT 参数在术前鉴别胃癌 Lauren 分型中表现出不错的潜力。

PO-2034

CT 影像组学在鉴别有无功能肾上腺腺瘤中的临床应用研究

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目的：肾上腺皮质腺瘤是起源于肾上腺皮质的良性肿瘤，绝大部分肾上腺腺瘤是无功能的，少部分因自主分泌激素成为功能性腺瘤，从而对机体产生影响。本研究的目的是分析基于 CT 的影像组学能否鉴别功能性肾上腺腺瘤与无功能性肾上腺腺瘤。

方法：回顾性分析哈尔滨医科大学附属第一医院接受肾上腺 CT 平扫及增强扫描、且经病理证实为肾上腺皮质腺瘤的 131 例患者的图像和临床资料。其中 111 例（功能性肾上腺腺瘤患者 56 例，无功能性 55 例）用作建立影像组学模型：在 Philips EBW4.5 工作站测量肿瘤横断面最大径；随后手动勾画平扫和动脉期、静脉期图像病灶，使用平台自动提取肿瘤平均 CT 值和影像组学特征；对提取后的特征进行 Z 分数归一化，随即依次使用 mRMR 和 LASSO 算法筛选出各个期相的最佳特征；而后把患者按照 8:2 的比例随机分为训练组和测试组，使用平扫及动脉期、静脉期筛选出的特征建立 Logistic 回归分类模型，计算并比较三个期相模型的 ROC 曲线下的 AUC 值、灵敏性、特异性和准确性。其余 20 例患者（功能性 10 例，无功能性 10 例）用来对模型进行外部验证。使用 DeLong 检验分析各个模型之间的差异。

结果：临床数据和 CT 图像中，功能组及无功能组肾上腺腺瘤的患者年龄与肿瘤最大径差异具有统计学意义。在影像组学方面，共筛选出 8 个平扫特征、7 个动脉期特征与 4 个静脉期特征分别建立三个期相的 Logistic 回归分类模型。其中静脉期模型在鉴别有无功能肾上腺腺瘤方面的准确性最高，训练组 AUC 值 0.992，测试组 AUC 值 0.856，其次为动脉期模型（AUC 训练组：0.988，测试组：0.848）和平扫模型（AUC 训练组：0.871，测试组：0.826）。外部验证组中各个模型表现均良好，平扫及动脉期、静脉期模型的 AUC 值分别为 0.860 与 0.850、0.820。DeLong 检验结果显示，训练组中平扫与动脉期模型、平扫与静脉期模型 ROC 曲线之间的差异具有统计学意义，测试组与外部验证组中各个模型之间的差异不显著。

结论：基于 CT 的影像组学特征在鉴别功能性肾上腺腺瘤与无功能性肾上腺腺瘤方面具有一定价值，可以帮助临床医生制定治疗方案。

PO-2035

开发和验证影像组学空间综合模型预测直肠癌新辅助治疗患者病理完全反应：基于机器学习的人工智能模型研究

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目的：本研究旨在探讨直肠癌新辅助治疗不同时间点的磁共振影像组学特征对直肠癌新辅助治疗患者病理完全缓解（pathologic complete response, pCR）的预测效能，并使用机器学习开发和验证

影像组学空间综合模型 (radiomics spatial synthesis model, RSSM) 在预测 pCR 患者中的人工智能干预效能。

方法: 回顾性分析 83 例直肠癌患者的临床及影像资料进行分析, 并依据术后病理结果分为 pCR 患者和非 pCR 患者。所有患者均接受了新辅助治疗前后两次 MRI 检查以便于提取影像组学特征, 包括治疗前、治疗后及 delta 特征, delta 特征为治疗前后特征之间计算获得, 基于以上三类特征进行特征降维后使用机器学习方法构建 RSSM, 使用 ROC 曲线评估模型性能。

结果: 治疗前特征、治疗后特征及 Delta 特征构建的单独基础模型的 AUC 值分别为 0.762、0.735 及 0.746, 敏感性为 0.909、0.682 及 0.864, 特异性为 0.74、0.721 及 0.607。结合治疗前、治疗后及 delta 特征构建的联合基础模型的 AUC、敏感性和特异性分别为 0.834、0.955 及 0.541。在此基础上使用 KNN 构建的 RSSM 模型的 AUC、敏感性及特异性分别为 0.887、0.864 及 0.803, Delong 检验显示 RSSM 模型与治疗前、治疗后及 delta 模型均有统计学差异 ($P < 0.05$), 与三者联合基础模型没有统计学差异 ($P > 0.05$)。

结论: 基于新辅助治疗前后及 delta 的联合特征使用 KNN 分类器构建的 RSSM 模型对新辅助治疗的病理完全反应的预测效能最佳, 这可能为临床提供了一种新的工具来协助直肠癌患者的个体化管理。

PO-2036

在诊断和治疗 Zinner 综合征中对精囊腺囊肿进行分类: 六例病例报告和文献复习

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目的: 探讨影像学检查 CT/MR 在诊断精囊囊肿合并同侧肾脏缺如 (Zinner 综合征) 中的作用, 并提高对本病的认识, 包括胚胎学、影像学、临床诊断及其治疗。方法: 收集我院 2014 年-2017 年 6 例精囊囊肿/缺如伴同侧肾脏缺如的 CT 或 MRI 检查资料, 6 例 CT 检查, 5 例 MR 检查, 其中 5 例同时有 CT、MRI 检查。5 例 CT 和/或 MR 诊断 Zinner 综合征 (1 例左侧精囊囊肿合并同侧肾缺如、输尿管囊性扩张, 1 例双侧精囊囊肿合并同侧肾缺如、输尿管囊性扩张, 1 例左侧精囊及同侧肾、输尿管缺如, 1 例右侧精囊囊肿合并同侧肾缺如、输尿管囊性扩张, 1 例右侧精囊囊肿合并同侧肾、输尿管缺如), 1 例诊断左侧输尿管下段间叶性肿瘤合并同侧肾脏缺如。结果: 3 例行机器人辅助下腹腔镜精囊囊肿切除, 并病理证实 2 例精囊囊肿合并同侧输尿管开口异位于精囊, 1 例双侧精囊囊肿合并左侧输尿管开口异位于精囊, 3 例术后住院时间平均 12 天, 术后随访恢复情况好, 其余 3 例均无任何手术史及外伤史。结论: Zinner 综合征是发生在男性泌尿生殖系统一种罕见的疾病, 而影像学检查 CT/MRI 在诊断该疾病起到至关重要的作用, 同时提高对病变认识并熟悉影像学特征对临床诊断及其治疗起到指导作用。

PO-2037

CT 平扫自发性孤立性肠系膜上动脉夹层 周围脂肪模糊的临床意义

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目的: 自发性孤立性肠系膜上动脉 (SMA) 夹层 (SISMAD) 患者通常因急性或慢性腹痛而入院, 并在急诊科或消化科接受辅助检查, 通常是腹部平扫 CT 或增强 CT。平扫 CT 是急诊放射科最重要

的检查。SMA 直径增大和血管周围脂肪层 (PFS) 尽管不是特异性的, 但可能是 SISMAD 的唯一适应症。这些结果很容易被忽视, 从而导致可能会漏诊 SISMAD。然而, CT 上 SMA 周围的 PFS 可能是可能存在 SISMAD 的唯一指标, 尤其是在血管壁未发生巨大变化的早期阶段。本研究旨在确定 PFS 是否有助于 SISMAD 的诊断。

方法与材料: 本研究 161 例接受腹部增强或 CTA 检查的 SMA 夹层患者的数据进行了回顾性回顾。SMA 直径、分类、PFS、并发症、合并症和治疗方法进行了分析。

结果: SISMAD 的 PFS 与入院类型 (急诊)、临床表现 (急诊)、并发症 (并发症) 和治疗方法显著相关。入院类型 (急诊)、临床表现 (腹痛)、诊断方式和夹层亚型明显相关。

结论: 在平扫 CT 上, SMA 周围的 PFS 可能是 SISMAD 的标志性征象、尤其是在急诊情况下, 这表明需要进行 CTA 检查。

PO-2038

卡维地洛预防基于新型无创模型分层的临床显著门静脉高压患者的肝硬化失代偿

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目的: 本研究旨在开发一种新的无创模型用于预测肝硬化患者的临床显著门脉高压 (clinically significant portal hypertension, CSPH), 并研究卡维地洛能否降低基于新型无创模型分层的高危 CSPH 患者的肝功能失代偿风险。

研究人群: 共纳入 1304 名肝硬化患者。在卡维地洛纵向治疗队列中, 51 名患者接受了卡维地洛治疗。

方法: 研究共纳入来自 6 个国家的 3 个队列: 国际多中心肝静脉压力梯度 (hepatic venous pressure gradient, HVPG) 横断面队列、国际多中心纵向随访队列和纵向卡维地洛治疗队列。主要研究结果为首次肝功能失代偿的发生 (显著腹水、内镜发现的静脉曲张出血以及 3-4 级肝性脑病)。

结果: 本研究共涉及 6 项荟萃分析, 肝硬度测量和血小板计数被最终确定为 CSPH 的独立风险因素, 其汇总风险比分别为 1.10 (95% 置信区间: 1.06-1.15) 和 0.99 (95% 置信区间: 0.98-0.99)。

新的 CSPH 风险模型如下: $0.095310 \times \text{LSM (kPa)} - 0.01005 \times \text{PLT (} \times 10^9/\text{L)} - 0.11$ 。在 HVPG 队列 (n=151) 中, 新型模型、ANTICIPATE 模型和 Baveno VII 标准用于 CSPH 分层的 ROC 曲线下面积分别为 0.91 (95% 置信区间 (CI): 0.86-0.95)、0.80 (95% CI: 0.73-0.87) 和 0.83 (95% CI: 0.77-0.89)。值得注意的是, 新的 CSPH 风险模型将灰色区域缩小至 22.5%, 明显低于采用 Baveno VII 标准时的 50.3% (P<0.001)。在随访队列 (n=1102) 中, 基于新模型建立的分界值具体为: >0、0 至 -0.68、<-0.68 分别为高、中、低风险, 其在评估失代偿事件的累积发生率时有显著差异 (p<0.001), 分别为 1.7%, 2.5%, 15.8%。

结论: 本研究建立的新型无创模型在对肝硬化患者的 CSPH 和随后的失代偿事件分层表现良好。对于根据新模型分层的高危 CSPH 患者, 应用卡维地洛治疗可显著降低肝功能失代偿的发生风险。

PO-2039

基于 IVIM 序列评估局部进展期直肠癌新辅助放化疗效果的研究

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目的 本研究旨在探讨多序列 MR 图像(常规 MR、IVIM 及增强成像)在评估局部进展期直肠癌新辅助放化疗效果的价值。**方法** 回顾性分析 81 例新辅助放化疗 (NCRT) 后行全直肠系膜切除术 (TME) 的局部进展期患者数据。所有患者在 NCRT 前和 TME 术前一周内分别行常规 MR、体素不相干运动序列 (IVIM) 及增强成像。将多序列图像结合起来对 MR 分期为局部进展期 (T3-4Nx 或 TxN+) 患者行新辅助放化疗, 结束后行 TME 手术。根据术后病理肿瘤退缩分级 (TRG), 分为疗效敏感组 (pCR, TRG 0-1 级) 和疗效非敏感组 (npCR, TRG 2-3 级)。比较放化疗前后及疗效敏感组和非敏感组之间的 IVIM 定量参数: 真性扩散系数(D)、假性扩散系数(D*)、灌注分数(f)、表观扩散系数(ADC)值差异。结果 81 例患者 NCRT 后有 72 例病灶明显缩小, 其中 PCR 组(n=46)、npCR 组(n=35), NCRT 前 IVIM 定量 ADC、D、f 值均低于 NCRT 后, NCRT 前后 ADC、D、f 变化差值 pCR 组大于 npCR, 有统计学意义 ($P<0.05$), 而 D*值数值未出现稳定变化, 在 NCRT 前后及组间比较无统计学差异。ADC、D、f 变化差值的 ROC 曲线下面积及约登指数分别为: 0.84、0.93、0.76; 0.70、0.856、0.41。结论 多序列 MR 成像对局部进展期直肠癌新辅助放化疗效果具有较高的评估价值, IVIM 定量参数 ADC、D、f 值的变化可以有效预测术后病理的缓解情况。

PO-2040

CT 影像组学对 Bosniak II~III 级肾脏囊性病
变良恶性的鉴别诊断

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【摘要】目的 评估根据 2019 版 Bosniak 分类标准评估 II~III 级肾囊性病通过 CT 影像组学进行分析以鉴别其良恶性。**方法** 回顾性选择 2017 年 1 月至 2022 年 12 月哈尔滨医科大学附属第二医院 PACS 系统中符合条件肾囊性病病例。以高年资医师根据 2019 版 Bosniak 标准筛选出 II-III 级病变, 共 82 例, 采用 3D slicer 软件对图像进行处理, 并进行图像分割以及特征提取, 获得影像组学特征。应用降维方法对影像组学特征进行降维以及模型构建, 计算敏感度、特异度、准确度以及 AUC, 用以评估每个模型的诊断效能。结果 对最具判别能力的 3 个纹理参数: 皮髓期差熵 (AUC=0.769)、皮髓期长游程增强 (AUC=0.773), 以及实质期逆差矩 (AUC=0.7459) 绘制 ROC 曲线, 评估多参数联合的诊断价值, 得到结果: AUC=0.867, SEN=0.786, SPE=0.838。结论 本研究 CT 影像组学对 Bosniak II~III 级肾脏囊性病变良恶性的鉴别诊断, 为临床诊断提供参考。

PO-2041

基于增强 CT 构建图卷积神经网络模型 识别肝细胞癌患者微血管侵犯

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目的

基于增强 CT 构建图卷积神经网络模型 (graph convolutional network, GCN) 识别肝细胞癌微血管侵犯, 并利用病理学特征行模型事后可解释性分析

方法

回顾性选取自 2015 年 1 月到 2021 年 12 月经手术治疗的肝细胞癌患者, 收集临床资料及增强 CT 图像信息, 且获取肿瘤病理学特征: Edmondson-Steiner 分级, Ki67 指数, 侵袭性高的肿瘤亚型: 粗梁-团块型、角蛋白-19 阳性及肿瘤包绕型血管的生长方式。按照 6:2:2 将患者随机分为训练集 (167 例)、验证集 (56 例)、测试集 (56 例), 据病理诊断 MVI 状态分组: MVI+组、MVI-组。利用图卷积神经网络, 融合自适应学习模块, 学习肿瘤及瘤周的异质性空间拓扑结构信息, 构建分类模型, 识别肝细胞癌患者微血管侵犯。并对比影像组学模型、卷积神经网络模型 (convolutional neural network, CNN) 识别肝细胞癌患者微血管侵犯的效能。另, 利用图卷积神经网络模型的特征行层次聚类分析, 比较各聚类间病理特征差异, 及分析聚类与病理特征的相关性, 对模型进行事后可解释性分析。

结果

纳入 279 例 HCC 患者, 116 例 MVI 阳性患者。GCN 模型较影像组学模型、CNN 模型识别肝细胞癌微血管侵犯的效能最优, 测试集 AUC: 0.784, 准确率: 0.750。基于 GCN 模型特征, 聚类为 3 类: Cluster1-Cluster3, 3 个聚类间病理特征: Edmondson-Steiner 分级、瘤内坏死、Ki67 指数、粗梁团块型肝细胞癌、瘤内坏死、肿瘤包绕型血管、均存在差异 ($p = 0.000-0.005$, <0.05)。以 Cluster 1 为参考, 上述所有差异病理特征均与 Cluster 3 相关 ($p = 0.000-0.003$, <0.05), 除 Ki67 指数的上述所有差异病理特征均与 Cluster2 相关 ($p = 0.001-0.031$, <0.05)。

结论

基于增强 CT 图像的 GCN 模型, 有利于获取肿瘤异质性拓扑图结构信息, 可能有助于 HCC 患者 MVI 的非侵入性识别。病理信息为 GCN 模型提供形态学水平可解释性的可能。

PO-2042

MDCT 和 EUS 对胃十二指肠异位胰腺 与小于 3cm 胃肠道间质瘤的鉴别

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目的: 本研究的目的是比较多排螺旋 CT(multidetector computed tomography, MDCT) 与超声内镜(endoscopic ultrasound, EUS)对胃十二指肠 HP 与小于 3cmGIST 的诊断性能, 并研究 MDCT 及 EUS 联合应用在 HP 与小于 3cmGIST 鉴别中的作用。

方法: 收集经病理证实的 HP 或 GIST 患者, 经筛选后收集 MDCT 90 例(HP 43 例, GIST 47 例), EUS 98 例(HP 62 例, GIST 36 例)。分析 MDCT 表现, 包括位置、长径(LD)、短径(SD)、LD-SD 比、轮廓(是否具有中央凹陷征或微分叶征)、边缘、生长模式、病变形态、导管状结构、大囊性结构、病变强化特征等影像学特征, 强化特征主要分析病变各期的强化值、强化比、对胰腺的增强比、Sp、Sa、Sv、Sb。内镜超声分析的内容为病变位置、长径[LD]、短径[SD]、LD/SD 比、边缘、回

声强度、均质性、起源层、存在< 3mm 的微囊性(无回声管状)结构、大囊性结构、是否存在中央凹陷。寻找 HP 与 GIST 患者的临床特征、MDCT 征象和 EUS 征象的差异, 随后采用 Logistic 回归分析构建 MDCT 和 EUS 诊断模型。绘制出 ROC 曲线下面积用于评价 MDCT 和 EUS 模型的诊断效能, 确定模型的最佳阈值, 并计算出敏感度、特异度、阳性预测值(positive predictive value, PPV)、阴性预测值(negative predictive value, NPV)及准确性。

结果: 多因素分析显示 LD/SD 比值、CT 平扫值为诊断两个病变的独立 MDCT 特征。EUS 诊断 HP 的特征为回声强度。当 LD/SD 比值、平扫值与回声强度 3 个指标联合应用时, 能够显著提高对 HP 与 GIST 的鉴别诊断效能。

结论: 对于胃十二指肠 HP 与小于 3cm GIST 的诊断, MDCT 与 EUS 相结合, 在鉴别 HP 与 GIST 方面具有明显优势, 相较于单独使用一种检查方法, 诊断效能显著提高。

PO-2043

ADC 直方图分析在卵巢占位性病变鉴别诊断中的应用

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目的: 探究 ADC 直方图分析对 O-RADS MRI 评分诊断卵巢占位性病变的附加价值。

方法: 本研究回顾性分析了 36 例成年女性患者(包括 13 例卵巢恶性占位, 23 例卵巢良性占位)的临床及影像学资料, 所有患者术前均行 3.0 T MRI 检查。由两位放射科医师使用 FireVoxel 软件在患者的 ADC 图像上勾画感兴趣区并进行直方图分析, 记录直方图参数[包括 ADC 最小值(ADCmin)、ADC 最大值(ADCmax)、ADC 平均值(ADCmean)、方差、标准差、第 5、10、25、50、75、90、95 百分位数、偏度、峰度、熵值]; 同时根据 ACR O-RADS MRI 评分标准对病灶进行评分, 其中评分存在分歧的病灶由一位高年资医师阅片后给出最终评分。采用单因素回归分析筛选独立危险因素, 将筛选出的独立危险因素与标准化的 O-RADS MRI 评分相结合, 采用多因素回归分析确定最佳诊断模型。应用 ROC 曲线评估最佳诊断模型的诊断效能, 并与单独使用 O-RADS MRI 评分比较。

结果: ADC 直方图中的峰值是预测卵巢占位良恶性的独立危险因素, ADC 峰度联合 O-RADS MRI 评分诊断卵巢占位性病变的效能优于单独使用 O-RADS MRI 评分或 ADC 峰度的诊断效能, ROC 曲线下面积(area under the curve, AUC)值分别为: 0.953, 0.905 及 0.799。联合诊断的灵敏度及特异度分别为 92.3%和 91.3%, 诊断准确度为 88.89%。

结论: 基于全病灶的 ADC 直方图分析有助于提高 O-RADS MRI 评分对卵巢占位性病变的诊断效能。

PO-2044

构建并验证基于 MRI 影像组学的列线图 用于肝内胆管癌的区域淋巴结转移和预后预测

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目的: 构建并验证一个基于临床、影像学特征和 MRI 影像组学特征的列线图, 用于肿块型肝内胆管癌(ICC)患者区域淋巴结转移(LNM)和预后的术前预测。

方法：将 296 名经术后病理诊断为肝内胆管癌（ICC）的患者随机分成训练和测试组（207:89），采用 5 折交叉验证法筛选独立的临床-影像学特征。使用最大相关最小冗余算法（mRMR）和 LASSO 回归从 MRI 图像中提取和选择可重复性高的影像组学特征。使用逻辑回归进行模型组合，评估各模型的预测区分度、校准度和临床实用性。采用生存分析比较淋巴结转移（LNM）阳性和阴性组的总生存率。

结果：CA199、肝内胆管扩张和强化方式是独立的临床-影像学特征。影像组学模型由 T2WI 和延迟期模型组合而成。融合临床、影像学 and 影像组学模型的综合 LNM 预测模型在训练、验证和测试队列中均表现出出色且稳定的预测效能（AUC 分别为 0.888、0.884 和 0.811），并具有正净收益（NRI 95% CI>0）。决策曲线证实了列线图的临床实用性。与术前 PET/CT 检查具有更高的敏感性相比，综合 LNM 预测模型具有更高的特异性和良好的敏感性。区域 LNM 高风险组的总生存期明显低于低风险组（ $p=0.0001$ ）。

结论：综合 LNM 预测模型可以有效预测肿块型 ICC 患者的区域 LNM，且基于模型预测所得的 LNM 可能是预后预测的潜在生物学标志物。

PO-2045

儿童肝母细胞瘤 MRI 特点探讨

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目的：探究儿童肝母细胞瘤 MRI 特点。

方法：回顾性分析自 2014 年 1 月-2021 年 1 月共 23 例儿童肝母细胞瘤患者的 MRI 资料，了解患者的临床表现；根据 MRI 表现对其进行分型，记录病灶的位置、数目、大小、病灶侵犯及转移的情况，观察病灶 DWI 图像特点，通过后处理工作站测量病灶实质部分及周围正常肝实质的 ADC 值，分析各区域 ADC 值差异。

结果：23 例病例肝内共 36 例病灶；累及肝右叶 7 例；累及肝左叶 1 例；同时累及肝左、右叶 15 例；肝外转移病 4 例；灶共 7 例，其中，肺转移 4 例，脑转移 1 例，肾转移 1 例，腰 5 椎体转移 1 例；分型：实质型 20 例；多发结节型（结节数大于 3 个）1 例；病灶大小：<5cm 8 例；5-10cm 11 例；>10cm 4 例；侵犯及转移情况：侵犯胆管共 3 例；侵犯门静脉共 5 例，侵犯肝静脉共 5 例；侵犯下腔静脉共 4 例；病灶实质部分、周围肝实质 ADC 值分别为：病灶实质 ADC 值 > 周围正常肝实质 ADC 值；

结论：儿童肝母细胞瘤向血管丰富区域侵袭性生长，具有生长快、转移率高等特点。儿童肝母细胞瘤高 b 值 DWI（ $b=800s/mm^2$ ）序列呈高信号，磁共振成像能从功能上反应出病灶的生长特性。

PO-2046

使用基于 MRI 的影像组学模型预测富粗梁亚型肝细胞癌

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目的：开发并验证动态对比增强 MRI（DCE-MRI）的影像组学模型，以术前预测 HCC 患者的 MTM 亚型和预后。

方法：回顾性纳入 2015 年 1 月至 2023 年 3 月期间来源于 3 个医疗中心的回顾性数据集。430 例行手术切除的成人患者术前 DCE-MRI 检查纳入研究。从术前配准 MRI 图像上的肿瘤和肿瘤周围区域提取影像组学特征。在训练集中提取影像组学特征，经过特征筛选通过逻辑回归构建五个影像组学

模型，并在内部和外部测试集中验证其性能。将最佳 AUC 影像组学模型和临床影像学特征结合起来构建混合模型。根据模型得出的高分和低分来分析早期无复发生存率和总生存率。

结果：在用于影像组学建模的 430 例患者（中位年龄 57 岁；IQR51-66 岁；男性 348 例）中，155 例（36%）被证实具有 MTM 亚型。分为训练集（n=192）、内部测试集（n=82）、外部测试集（n=156）。内部测试集的影像组学和混合模型的 AUC 分别为 0.84 和 0.87，外部测试集的 AUC 分别为 0.86 和 0.89。早期无复发生存期 ($P < 0.01$) 和总生存期 ($P < 0.005$) 可以使用混合模型进行分类。

结论：MRI 影像组学模型可以精准预测富粗梁亚型肝细胞癌。

PO-2047

基于 T2WI 影像组学模型预测胰腺浆液性囊性肿瘤 和黏液性囊性肿瘤

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目的：建立并验证一种基于 T2WI 影像组学的诊断模型来预测胰腺浆液性囊性肿瘤(SCN)和黏液性囊性肿瘤(MCN)。

方法：回顾性分析 2011 年至 2021 年收治的 304 例（216 例 SCN 和 88 例 MCN）术前行 MRI 检查且经手术病理确诊的患者。按照时间顺序将 2011 年至 2018 年共 223 例患者（159 例 SCN 和 64 例 MCN）组成训练集，2019 年至 2021 年共 81 例患者（57 例 SCN 和 24 例 MCN）组成验证集。比较 SCN 和 MCN 两组患者的临床特征和 MRI 影像特征，筛选出独立危险因素，建立临床预测模型。在 T2WI 图像提取影像组学特征，采用最小绝对收缩与选择算子算法回归模型进行特征筛选并构建影像组学模型，获得 T2WI 影像组学评分，联合临床预测模型和 T2WI 影像组学评分建立临床-组学预测模型。绘制列线图的受试者工作特征曲线（ROC），计算曲线下面积（AUC），评估模型的鉴别诊断效能，使用决策曲线分析评估模型的临床应用价值。

结果：临床预测模型在训练集的 AUC 值为 0.90（95%CI 0.86~0.94），灵敏度、特异度和准确率分别为 90.6%、86.7%和 80.7%，在验证集的 AUC 值为 0.83（95%CI 0.72~0.93），灵敏度、特异度和准确率分别为 91.7%、71.9%和 77.8%。临床-组学预测模型在训练集的 AUC 值为 0.93（95%CI 0.90~0.96），灵敏度、特异度和准确率分别为 81.2%、92.5%和 89.2%，在验证集的 AUC 值为 0.87（95%CI 0.75~0.96），灵敏度、特异度和准确率分别为 91.7%、78.9%和 82.7%。临床决策曲线分析表明临床-组学预测模型具有临床诊断价值。

结论：基于 T2WI 影像组学模型可作为有效预测 SCN 和 MCN 的临床工具，为临床决策提供参考依据。

PO-2048

临床-影像组学模型预测前列腺 PI-RADS 4-5 分病灶的良恶性以避免不必要的活检

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目的：本研究结合前列腺磁共振 T2 加权成像（T2WI）和扩散加权成像（DWI）衍生的影像组学与临床信息建立模型，用于预测术前前列腺 MRI PI-RADS4-5 分病灶的良恶性，以避免不必要的活检。

方法: 纳入术前 MRI 评估为 PI-RADS 4-5 分并进行了前列腺穿刺手术的患者, 以穿刺病理结果作为金标准。收集每位患者的临床特征和术前 T2WI 和 DWI 图像。在 T2WI 和表观扩散系数图 (由 DWI $b=0$ 和 $1500s/mm^2$ 生成) 上使用 3D slicer 手动分割病灶, 并使用 PyRadiomics 提取影像组学特征。利用 student's t 检验和最小绝对收缩和选择算子 (least absolute shrinkage and selection operator, LASSO) 进行特征筛选。构建了三个预测模型: 临床模型、影像组学模型以及临床-影像组学模型。接收器工作特性曲线(ROC)和决策曲线分析(DCA)用以评估模型的预测效果, Delong 检验来比较各模型的预测性能。

结果: 一共纳入了 295 例患者, 其中 204 例为前列腺癌, 91 例为良性。随机分为训练集 ($n=181$) 和验证集 ($n=114$)。经特征筛选得到 7 个与良恶性鉴别相关性最强的影像组学特征并计算获得 Radscore。临床参数中总前列腺特异性抗原 (TPSA) 和年龄为显著性变量。临床-影像组学模型的预测效果最佳, 在训练集和测试集的 ROC 曲线下面积 (AUC) 分别为 0.87、0.79。影像组学模型与其表现相当 (训练集 $AUC=0.85$, 验证集 $AUC=0.77$), 但显著高于临床模型 (训练集 $AUC = 0.68$, 验证集 $AUC = 0.63$)。决策曲线分析表明在阈值概率大于 0.2 的情况下, 临床-影像组学模型可获得更多用于临床决策的净收益。

结论: 基于 T2WI 和 DWI 的临床-影像组学模型可以预测前列腺 PI-RADS 4-5 分病灶的良恶性, 以避免患者接受不必要的活检。

PO-2049

多层螺旋 CT 结合脂肪酶、D-二聚体、 糖蛋白 2 对急性胰腺炎的临床诊断价值探讨

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目的: 研究多层螺旋 CT (MSCT) 结合血清脂肪酶 (LPS)、D-二聚体 (D-D)、糖蛋白 2 (GP2) 对急性胰腺炎 (AP) 的诊断价值。

方法: 选取 2017 年 1 月~2023 年 1 月我院收治的 89 例 AP 患者, 记作研究组。另取同期健康体检人员 80 例作为健康组。对所有 AP 患者均开展 MSCT 检查, 并分析相关影像学表现特征。比较两组血清 AMY、LPS、D-D 及 GP2 水平。以受试者工作特征 (ROC) 曲线分析明确 MSCT 联合血清 LPS、D-D 及 GP2 诊断 AP 的效能。

结果: AP 患者的 MSCT 影像学表现特征明显, 且急性水肿型胰腺炎体积明显肿大或呈轻度增大, 显示不均匀强化, 胰腺轮尚可, 周围渗出明显, 小肠扩张, 肠壁增厚, 见少量腹腔积液。而急性坏死性胰腺炎以胰腺体积显著增大为主, 坏死区呈片状低密度影, 其内有高密度出血灶, 增强无强化或不明显强化, 形态不规则, 胰腺轮廓模糊不清, 胰周、肾周积液。在血清 AMY、LPS、D-D 及 GP2 水平方面对比, 研究组均高于健康组 (均 $P<0.05$)。经 ROC 曲线分析发现, MSCT 联合血清 AMY、LPS、D-D 及 GP2 诊断 AP 的曲线下面积 (AUC)、灵敏度、特异度以及约登指数均高于上述五项单独诊断。

结论: MSCT 联合血清 LPS、D-D 及 GP2 诊断 AP 的效能较佳。

PO-2050

基于平扫 CT 的肌肉分层分析技术在 预测肝移植术后并发症中的研究

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目的 本文旨在 Myosteatosis 的基础上, 利用分层分析的方法将肌肉内部按照不同的密度范围划分成不同的亚分区, 进一步研究肌肉密度改变对原位肝移植 (orthotopic liver transplantation, OLT) 术后并发症 (Clavien-Dindo \geq III) 的影响, 从而建立全新的预测模型评估 OLT 患者术后并发症的发生情况。

方法 回顾性分析 2013 年 5 月至 2020 年 9 月 145 例就诊于吉林大学第一医院 OLT 患者的病历信息及术前一个月内的肝移植上腹部 CT 平扫检查, 选取每个患者腰 3 椎体水平最大层面的 CT 平扫图像作为原始图像数据, 利用 Neusoft Fat Analysis 软件对 CT 平扫图像进行相关肌肉参数的测量, 根据肌肉测量结果和相关实验室检查建立多种机器学习模型, 绘制不同模型的受试者工作曲线 (ROC), 计算曲线下面积 (AUC)、敏感度、特异度、精确率、召回率、F1 分数、准确率等。

结果 采用肌肉分层分析前的临床特征建立逻辑回归 (logistic regression, LR)、支持向量机 (support vector machine, SVM)、随机森林 (random forests, RF) 三种机器学习模型, 其中 RFC-C 模型测试集的 AUC 值较高为 0.803 (95%CI: 0.660-0.946)、灵敏度 0.588, 特异度 0.778。采用肌肉分层分析后的临床特征建立的 LR-CS、SVM-CS、RFC-CS 模型中, LR-CS 和 SVM-CS 模型测试集的 AUC 值较高, 分别为 0.852 (95%CI: 0.719-0.984) 和 0.852 (95%CI: 0.713-0.991)、灵敏度分别为 0.765 和 0.706、特异度分别 0.889 和 0.926, 相比肌肉分层分析前, LR-CS 和 SVM-CS 模型的灵敏度和特异度均有着明显的提升。

结论 在 Myosteatosis 的基础上, 利用分层分析的方法将肌肉按照不同的密度划分成不同子区, 对于预测 OLT 患者术后并发症情况存在一定价值, 值得我们进一步探讨和研究, 这可能为预测 OLT 患者术后并发症提供新的思路。

PO-2051

基于多期增强 CT 影像组学对原发性胃淋巴瘤与 Borrmann IV 型胃癌的诊断价值

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【目的】 探讨基于多期增强 CT 影像组学模型鉴别 Borrmann IV 型胃癌与原发性胃淋巴瘤的诊断价值。

【方法】 回顾性收集 2016 年 1 月至 2022 年 5 月病理确诊的 Borrmann IV 型胃癌或原发性胃淋巴瘤的病例共 136 例, 其中训练组 96 例, 验证组 40 例。采用计算机软件对 CT 平扫、动脉期、静脉期图像提取影像组学特征, 再选择 Lasso Logistic 回归方法进行特征筛选, 并建立平扫模型、动脉期模型、静脉期模型、影像组学联合模型 1 (动脉期+静脉期)、影像组学联合模型 2 (平扫+动脉期+静脉期) 等 5 个 CT 影像组学模型。同时筛选 CT 主观影像学征象构建 CT 主观征象模型, 并利用 CT 主观征象及组学特征构建联合模型。应用受试者工作特征 (receiver operating characteristic, ROC) 曲线评估模型的预测性能。校准曲线和霍斯默莱梅肖检验用于评估校准性能。决策曲线分析 (decision curve analysis, DCA) 用于评估临床净效益。

【结果】浆膜亮线征、标准化静脉期 CT 值、瘤周脂肪浸润三个特征构建 CT 主观征象模型，其在训练组、验证组中曲线下面积(area under the ROC curve, AUC) 分别为 0.902、0.878。与其他影像组学模型相比，影像组学联合模型 2（平扫+动脉期+静脉期）显示出良好的预测性能，训练组和验证组的 AUC 分别为 0.871 和 0.865。与 CT 主观征象模型和影像组学模型比较，CT 主观征象-影像组学联合模型进一步提高了判别性能，其在训练组、验证组中的 AUC 值分别为 0.960、0.932。DCA 表明 CT 主观征象-影像组学联合模型的临床效益最大。

【结论】CT 主观征象-影像组学联合模型能够较准确地鉴别 Borrmann IV 型胃癌与原发性胃淋巴瘤，为临床辅助诊断提供有利的手段。

PO-2052

全组 MRI 定量参数预测直肠癌脉管侵犯及其独立危险因素筛选

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目的：探讨 MRI 定量参数在直肠癌脉管侵犯的预测价值。**方法：**回顾性分析 120 例直肠癌患者的临床病理及 MRI 资料，根据病理结果将患者分为脉管侵犯阳性组和阴性组。分析两组间临床病理及 MRI 特征参数的差异，并用二元 Logistic 回归分析直肠癌脉管侵犯的独立影响因素，采用 ROC(receiver operating characteristic curve)曲线下面积(area under the curve, AUC)评价其预测效能。**结果：**(1)本研究共入组 120 例患者，其中脉管侵犯阳性组 38 例(31.67%，38/120)，脉管侵犯阴性组 80 例(68.33%，82/120)；合并神经侵犯及淋巴结转移的直肠癌患者更易出现脉管侵犯，且在两组间的差异均有统计学意义(P 值均<0.05)。(2)在 MRI 定量参数中，Ve 值越高的患者更易出现脉管侵犯，且在两组间的差异有统计学意义(P 值<0.05)。(3)Logistic 回归分析结果显示淋巴结阳性为脉管侵犯的独立危险因素(P 值<0.05)，其 AUC 为 0.911。**结论：**淋巴结阳性状态是直肠癌脉管侵犯的独立危险因素，且具有较高的诊断效能。

PO-2053

基于多层螺旋 CT 增强扫描的卵巢浆液性囊腺癌术前腹膜转移风险预测模型

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目的：探讨多层螺旋 CT 增强对卵巢浆液性囊腺癌腹膜转移诊断的临床意义。

方法：将 181 例卵巢浆液性囊腺癌患者随机分为两组:训练组和验证组分别使用训练组增强 CT 检查结果对图像特征进行最小绝对收缩和选择算子(LASSO)回归，筛选出特征因素，建立线图模型。将模型应用于验证组，检验模型的有效性，并对训练组和验证组进行 ROC 分析和决策曲线分析。

结果：使用 17 个图像特征进行 LASSO 回归，筛选出双侧卵巢、腹水、腹膜结节、实性成分强化程度 4 个特征因素。回归系数分别为:0.1031、0.1239、0.5952、0.0005。用 4 个特征因子构成折线图。训练集的 ROC 曲线下面积(AUC)为 0.86 (95%CI: 0.84 ~ 0.86)，验证集的 AUC 为 0.98 (95%CI: 0.92 ~ 0.98)。

结论：增强 CT 检查卵巢浆液性囊腺癌风险预测模型有助于腹膜转移的早期诊断和预防疾病的发生发展。

PO-2054

磁共振扩散峰度成像直方图分析对前列腺癌的诊断价值及侵袭性评估

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目的 探讨磁共振扩散峰度成像 (DKI) 直方图分析对前列腺癌的诊断价值及其鉴别低级别和高级别前列腺癌的应用价值。

方法 回顾性分析成都市第五人民医院自 2021 年 4 月至 2023 年 4 月临床怀疑前列腺疾病于我院行 MRI 检查的患者 110 例, 经超声穿刺或手术病理确诊, 良性前列腺增生组 57 例, 前列腺癌组 53 例, 其中低级别癌灶 (LG) 12 例 (Gleason 评分 ≤ 6), 高级别癌灶 (HG) 41 例 (Gleason 评分 ≥ 7)。所有患者于术前行 MRI 检查, 序列包括: T1WI、T2WI、DWI 和 DKI。使用 Firevoxel 软件对 DKI、DWI 序列图像进行感兴趣区 (ROI) 勾画, 测量得到 ROI 的 DKI 参数及 ADC 值的直方图参数。采用组内相关系数 (ICC) 分析数据测量的可重复性。采用独立样本 t 检验分别评估良性前列腺增生与前列腺癌、低级别与高级别前列腺癌之间各测量参数的差异。采用受试者工作特性曲线 (ROC) 分析各参数鉴别诊断前列腺癌及鉴别低级别与高级别前列腺癌的诊断效能。采用 Spearman 秩相关分析评估各参数与 Gleason 评分的相关性。

结果 前列腺增生组的 Dapp-25th、Dapp-50th、Dapp-75th、ADC25th、aADC50th、aADC75th 明显高于前列腺癌组 ($P<0.001$), Kapp-25th、Kapp-50th、Kapp-75th 明显低于前列腺癌组 ($P<0.001$)。高级别前列腺癌的 Dapp-25th、Dapp-50th、Dapp-75th、aADC25th、aADC50th、aADC75th 明显低于低级别前列腺癌 ($P<0.05$), Kapp-25th、Kapp-50th、Kapp-75th 明显高于低级别前列腺癌 ($P<0.05$)。Dapp、ADC 参数与 Gleason 评分呈负相关, Kapp 参数与 Gleason 评分呈正相关, Kapp-75th 与 Gleason 评分具有良好的相关性 ($r=0.619$, $P<0.05$)。

结论 DWI 和 DKI 参数直方图分析可以有助于鉴别诊断前列腺癌并评估前列腺癌的侵袭性, 为临床治疗提供帮助。

PO-2055

mDixon-Quant 序列预测前列腺癌神经侵犯价值评估

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目的: 本研究旨在研究 mDixon-Quant 序列预测前列腺神经侵犯价值研究。材料与方法: 回顾性收集行前列腺 3.0T MRI 扫描 (包括 APT 及 DWI 序列) 的前列腺癌神经侵犯患者 14 例, 前列腺癌非神经侵犯患者 35 例。由两名观察者于病灶实体显示最大层面放置 ROI 测量两组病例的 FF 值、T2* 及 R2* 值, ROI 应避开病灶出血、坏死及囊变区域。采用组内相关系数 (intraclass correlation coefficient, ICC) 评估两名观察者各测量参数的一致性。采用 Shapiro-Wilk 检验评估两组病例 FF 值、T2* 及 R2* 值的正态性。采用独立样本 t 检验或 Mann-Whitney 检验评估两组病例各参数值的差异性分析。采用受试者工作特征 (ROC) 曲线评估有差异的参数的预测效能, 并利用 Delong 检验比较各 ROC 曲线间的差异。结果: 两名观察者测量参数值一致性好 (ICC >0.75)。前列腺癌神经侵犯组与非神经侵犯组的 FF 差异无统计学意义 ($z=0.365$, $P<0.715$); 前列腺癌神经侵犯组的 R2* 值大于前列腺增生 [57.17 (52.18, 67.05) s⁻¹ vs 46.60 (38.35, 61.40) s⁻¹], 差异具有统计学意义 ($z=-1.970$, $p=0.049$)。前列腺癌神经侵犯组的 T2* 值小于前列腺增生 [17.80 (14.85, 19.90) ms vs 22.15 (16.55, 26.35) ms], 差异具有统计学意义 ($z=-2.003$, $p=0.045$)。R2* 值、T2* 值预测前列腺癌侵犯的 AUC 值分别为 0.680 及 0.683, 敏感度、特异度及阈值分别达到 62.86%、78.57%、

19.00s⁻¹, 68.57%、71.43%、55.00ms。结论: mDixon-Quant 序列对于预测前列腺癌神经侵犯具有一定的价值, 具有很好的临床应用前景。

PO-2056

比较不同呼吸方式对胰腺志愿者磁共振弥散加权成像测量可重复性及图像质量的临床价值

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目的: 评估 FOCUS-MUSE DWI、MUSE DWI、FOCUS DWI 和 SS DWI 四种不同 DWI 序列使用四种不同呼吸方案的可靠性, 并系统地比较 ADC 值测量的可重复性和图像质量。

方法: 招募 24 名健康志愿者在 3.0 T MRI 上接受胰腺 DWI 检查($b = 50,800 \text{ s/mm}^2$)。所有志愿者根据四种不同的呼吸方案(RT、NT、BH 和 FB)分为四组, 每组均使用 FOCUS-MUSE DWI、MUSE DWI、FOCUS DWI 和 SS DWI 四种序列进行扫描。所有 DWI 序列扫描 2 次, 间隔 10 分钟。通过系统比较 ADC 值测量的可重复性和图像质量评分, 确定具有最佳临床应用价值的序列。采用组内相关系数(intraclass correlation coefficient, ICC)分析 ADC 值在观察者内和观察者间的重复性。ICC 超过 0.75 代表很好的一致性。使用 Bland-Altman 方法比较 95%置信区间(一致限[LOAs])以及第一次和第二次 DWI 扫描之间 ADC 值的平均差异来展示其 ADC 值测量的可重复性。当 P 值小于 0.05 时, 认为差异显著。

结果: 在四种呼吸方案下扫描的 FOCUS-MUSE、MUSE、FOCUS 和 SS DW 四种序列图像中, 相较于 NT、BH、FB 呼吸方式, RT 均具有更可靠的观察者内一致性、观察者间一致性及 ADC 值测量可重复性。此外, 在图像质量评分方面, RT-DWI 的评分高于 BH 和 FB, 与 NT 相似。

结论: 在 3.0 T 磁共振上, 呼吸触发 (RT) 下扫描的 FOCUS-MUSE、MUSE、FOCUS 和 SS DWI 对 ADC 值测量的可重复性优于 NT、BH 和 FB。RT-DWI 能够提供更好的 ADC 值可重复性测量和良好的图像质量, 并推荐其应用于胰腺 DWI 扫描中。

PO-2057

伊犁地区少数民族女性卵巢恶性肿瘤的多模式联合诊断价值

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【摘要】目的 探讨伊犁地区少数民族女性卵巢恶性肿瘤的多模式联合诊断价值。方法 回顾分析 2013 年 5 月至 2021 年 6 月我院经穿刺或手术病理证实的少数民族女性患者卵巢恶性肿瘤 60 例共 84 个病灶的影像学表现, 其中维吾尔族 25 例, 哈萨克族 24 例, 回族、东乡族 9 例, 其他少数民族蒙古族、柯尔克孜族各 1 例。60 例均行术前超声、MR 常规扫描及增强扫描、CT 平扫增强扫描。根据病理结果观察单项检查及两两影像检查、三者联合影像检查的灵敏度、准确度。结果 超声检查的灵敏度、诊断符合率分别为 89.2%、72.3%, MR 常规扫描及增强扫描的结果分别为 96.1%、83.8%、, CT 常规及增强扫描的结果为 93.3%、80.5%, 超声与 MR 联合灵敏度为 96%、诊断准确率 85.6% ;超声与 CT 联合诊断灵敏度为 90.9%、准确率 80.5%, 三种影像检查联合的灵敏度和准确度为 95.7%、86.2%, 结论 MR 联合超声或者三种影像检查联合的术前诊断符合率高于单种检查方式。

PO-2058

能谱 CT 碘基值术前预测可切除性胃癌 Lauren 分型的价值

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【摘要】目的：探讨能谱 CT 碘基值 (IC) 术前预测可切除性胃癌 Lauren 分型的价值。**方法：**前瞻性搜集 336 例经手术病理证实为胃癌患者的资料，术前均行腹部增强三期能谱 CT 扫描并测量碘基值，术后病理分为 Lauren 肠型、混合型和弥漫型。单因素方差分析三组间年龄、性别、肿瘤部位、厚度、分化程度、病理 T 分期 (pT)、病理 N 分期 (pN)、脉管侵犯、神经侵犯、Borrmann 分型、临床 T 分期 (cT)、动脉期碘基值 (ICAP)、静脉期碘基值 (ICVP)、延迟期碘基值 (ICDP)、动脉期标化碘基值 (nICAP)、静脉期标化碘基值 (nICVP)、延迟期标化碘基值 (nICDP) 的差异；LSD-t 检验进行组间两两比较；Logistic 回归分析筛选出弥漫型胃癌的独立危险因素；受试者工作特征 (ROC) 曲线分析相关指标鉴别弥漫性胃癌的诊断效能，Delong 检验比较曲线下面积 (AUC) 间的差异。**结果：**肠型、弥漫型及混合型分别 92 例、131 例、113 例，三组间部位、pT、厚度、cT、ICAP、nICAP 的差异无统计学意义 ($P>0.05$)；年龄、性别、分化程度、pN、脉管侵犯、神经侵犯、Borrmann 分型、ICVP、ICDP、nICVP、nICDP 的差异有统计学意义 ($P<0.05$)。肠型与弥漫型年龄、ICVP、nICVP、ICDP、nICDP 的差异有统计学意义 ($P<0.05$)，与混合型 nICVP、nICDP 的差异有统计学意义 ($P<0.05$)；混合型与弥漫型年龄、ICDP、nICDP 的差异有统计学意义 ($P<0.05$)。年龄和 ICDP 是弥漫型胃癌的独立危险因素，并由此构建联合参数。年龄、ICVP、ICDP、nICVP、nICDP 及联合参数预测弥漫型胃癌的 AUC 分别为 0.579、0.597、0.622、0.567、0.610、0.660。联合参数与 ICDP、nICDP 间 AUC 的差异无统计学意义 ($P>0.05$)，与 ICVP、nICVP、年龄间 AUC 的差异有统计学意义 ($P<0.05$)。**结论：**能谱 CT 的碘基值能有效预测胃癌 Lauren 分型，年龄和 ICDP 是弥漫型胃癌的独立危险因素，ICDP 是最有价值的碘基值。

PO-2059

基于磁共振成像预测结直肠癌肝转移患者 RAS 基因突变状态和肝切除术后的预后的临床模型的开发和外部验证

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目的：本研究旨在分别构建并验证诊断和预后模型，用于预测 RAS 突变状态和接受肝切除术的结直肠癌肝转移患者的生存率。

方法：2014 年 1 月至 2020 年 5 月间，来自三家机构的患者被纳入研究。结果为 RAS 突变状态、无疾病/无复发生存期 (DFS/RFS) 和总生存期 (OS)。研究人员采用 LASSO 方法来选择合适的变量建立模型。根据模型构建了多个列线图，分别预测 RAS 突变状态、1 年 DFS/RFS 和 3 年 OS。预测模型的性能通过 AUC 或 C-指数以及校准图进行估算和报告，校准图包括模型开发和外部验证。**结果：**诊断模型研究共纳入 173 例患者，其中 117 例用于建立模型，33 例和 23 例用于外部验证。最终模型的预测变量包括肝转移的发生时间、原发病灶的位置、瘤内坏死的类型和瘤周肝实质的早期强化。开发队列、内部验证队列、外部验证队列 1 和外部验证队列 2 的 AUC 分别为 0.742、0.741、0.703 和 0.708。在同一时期，共有 167 名患者被纳入预后模型研究，其中 112 人用于开发模型，32 人和 23 人用于外部验证。DFS/RFS 模型中选择的预测因子包括 RAS 突变状态、肝转移的发生时间、CA199、原发肿瘤位置和主血管侵犯。OS 模型中的预测因子包括 RAS 突变状态、肝转移的发生时间、原发肿瘤位置、肿瘤负荷评分 (TBS)、肝转移位置和肿瘤周围胆管扩张。DFS/RFS 模型中开发队列、外部验证队列 1 和外部验证队列 2 的 C 指数分别为 0.710、0.702 和

0.719。OS 模型中开发队列、外部验证队列 1 和外部验证队列 2 的 C 指数分别为 0.740、0.786 和 0.753。

结论：整合临床、人口学和放射学特征，尤其是基于核磁共振成像的方法，或许能准确预测肠癌肝转移患者的 RAS 突变状态和预后，从而帮助分诊，并有可能缩短进行诊断和挽救生命所需的时间。这将为预后分层和治疗决策奠定基础。

PO-2060

术前 Gd-BOPTA MRI 在微血管浸润阴性肝细胞癌患者中的预后价值研究

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目的：评估术前基于 Gd-BOTPA MRI 在单发肝细胞癌(HCC)且微血管浸润(MVI)阴性患者中的无肿瘤复发(RFS)的预后价值分析。

方法：本研究以回顾性方式纳入本单位两所院区 2016 年 1 月至 2018 年 12 月术前 2 周内行 Gd-BOTPA MRI 检查且组织病理学证实为 MVI 阴性的 HCC 患者。两名放射科医生根据 2018 版 LIRADS 独立评估 MRI 特征。分别将两家院区病例分成训练集队列(院区 1)和验证集队列(院区 2)。运用单因素和多因素 Cox 回归分析院区 1 队列，确定 RFS 的独立风险因素。根据这些风险因素绘制列线图 and ROC 曲线，并在院区 2 队列中对其性能进行验证。RFS 采用 Kaplan-Meier 生存曲线和对数秩检验进行分析。

结果：在院区 1 队列中和院区 2 队列中分别纳入 107 例和 50 例单发且 MVI 阴性 HCC 患者，其中两个队列中分别有 42 例和 23 例出现术后复发。多因素 Cox 回归分析表明，MRI 影像特征马赛克征、肝胆期瘤周低信号和临床指标 HBeAg 阳性是与 RFS 相关的风险因素，并将其纳入了列线图。在训练集和验证集中，模型的 C 指数分别为 0.761 和 0.748，显示出较好的诊断效能。

结论：术前 Gd-BOTPA MRI 特征能有效的预测 MVI 阴性 HCC 患者的 RFS，能为临床个体化的治疗方案提供重要信息。

PO-2061

脾脏硬化性血管瘤样结节转化的 MR 特征及病理学基础

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目的：探讨脾脏硬化性血管瘤样结节转化 (SANT) 的磁共振成像 (MRI) 特征及病理基础，提高术前诊断水平。

材料与方法：回顾性分析 12 例经组织病理学证实为脾脏硬化性血管瘤样结节转化 (SANT) 的患者临床及 MR 影像资料，分析患者的临床症状、组织病理学特征与 MR 特征的表现，包括在 MR 图像上病灶数量、大小、形状、边界、信号强度和增强模式。

结果：12 例脾脏 SANT 患者均为单发病灶，12 例均呈圆形或椭圆形，T2WI 呈稍低和低信号的有 9 例 (9/12)，出现星状或纤维瘢痕的 10 例 (10/12)，DWI 呈均匀或不均匀低信号的有 11 例 (11/12)，MR 增强后 12 例均表现渐进持续向心性强化，其中 8 例出现轮辐样强化 (8/12)，结节样强化的 5 例 (5/12)，12 例均无坏死、囊变，2 例出现出血。

结论：脾脏 SANT 是一种罕见的良性非肿瘤性病灶，磁共振特征主要为 T2 及 DWI 为低信号，平扫及增强可见轮辐征，增强呈向心性延迟强化，以上特征对术前诊断脾脏 SANT 有一定价值。

PO-2062

探究动脉自旋标记灌注成像 (ASL) 评估慢性肾病的价值

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目的

探究动脉自旋标记灌注成像评估慢性肾病(chronic kidney disease, CKD)患者肾功能的价值。

材料与方法

回顾性收集 3.0 T MRI 检查的慢性肾病共 50 例, 扫描序列包括常规 T2WI 及 ASL 序列。根据 CKD 分期标准将其分为 A 组(轻度肾损害, n=27)和 B 组(中重度肾损害, n=10), 同时搜集 12 例健康志愿者作为对照组 (C 组)。将所有原始图像导入工作站生成伪彩图, 由两名观察者对照 T2WI 图像在双肾最大横断面及其相邻上下两个层面的皮质、髓质区分别放置一个椭圆形感兴趣 (ROI), 最终结果取三个层面皮质、髓质测量值的均值进行统计分析。使用 Shapiro-Wilk 检验数据正态性, 使用方差齐性检验、单因素 ANOVA 检验比较三组总体间差异性, 用邦弗伦尼检验进行事后两两比较; 应用二元 Logistic 回归和受试者工作特征 (receiver operating characteristic, ROC) 曲线分析各单一参数和联合参数的诊断效能。

结果

双肾皮质、髓质 BF 值在三组间均存在显著差异($P < 0.01$)。其中, C 组右肾皮质 BF 值显著高于 A 组 (差值为 76.94 mL/min/100g) 和 B 组 (差值为 106.89 mL/min/100g) ($P < 0.01$)。C 组右肾髓质 BF 值显著高于 B 组 (差值为 58.31 mL/min/100g) ($P < 0.01$)。C 组的左肾皮质 BF 值明显高于 B 组 (差值为 112.87 mL/min/100g) ($P < 0.01$)。C 组的左肾髓质 BF 值显著高于 A 组 [差值为 40.75 mL/min/100g ($P = 0.02$)] 和 B 组 [差值为 64.66 mL/min/100g ($P < 0.01$)]。右肾皮质、髓质、左肾皮质、髓质及四者联合鉴别 B 组和 C 组的 ROC 曲线下面积(AUC 值)分别为 0.925, 0.908, 0.858, 0.933, 0.967; 右肾皮质、左肾髓质及二者联合鉴别 A 组和 C 组的 AUC 值分别为 0.869, 0.804, 0.866。

结论

ASL 可无创性评估 CKD 肾功能损害程度, 有助于疾病的早期发现与诊断, 为疾病治疗方案的制定与预后评估提供一定的临床参考价值。

PO-2063

下腔静脉 MRI 4D Flow 成像参考值

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目的: 利用 MRI 的 4D Flow 技术测量下腔静脉的血容量、流速和壁剪切力, 建立健康成人的正常参考值, 并对比分析健康成人与肝硬化患者下腔静脉的血容量、流速和壁剪切力是否有差异。方法: 在这项回顾性研究中, 我们筛选了 2022 年至 2023 年期间我院的健康成年人及肝硬化患者, 在 3.0 T MRI 下获得的所有可用的上腹部 MRI 4DFlow 检查。对下腔静脉的 3 个平面(肝段、肾上段、肾下段)的血容量、流速和壁剪切力进行量化。并对比分析健康成人与肝硬化患者下腔静脉的血容量、流速和壁剪切力。结果: 健康体检者 13 例, 女性 6 例, 男性 7 例, 年龄 36-75 岁; 肝硬化患者 45 例, 女性 16 例, 男性 29 例, 年龄 25-78 岁。我们使用 4DFlow 报告了健康下腔静脉的血容量、流速和壁剪切力的参考值。健康成人与肝硬化患者下腔静脉的血容量、流速和壁剪切力间均有差异性。

结论：我们报道了正常下腔静脉的血流动力学值，这是 MRI 4D Flow 在下腔静脉新兴临床应用所必需的基线数据。

PO-2064

基于 MRI 的深度学习模型与 LI-RADS 标准在肝细胞癌诊断中的对比研究

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目的：本研究旨在探究基于多序列 MRI 的多任务深度学习模型与基于 LI-RADS 标准在肝细胞癌（HCC）中的诊断效能。

材料与方法：研究共纳入 406 例患者共 468 个病灶（285 个 HCC，47 个非 HCC 恶性肿瘤和 136 个良性病变）进行两个分类任务，分别为二分类（HCC，非 HCC）和三分类（HCC，非 HCC 恶性病变，良性病变）。CNN 模型的分类结果与不同年资阅片者（3 名高年资和 3 名低年资阅片者）基于 2018 MRI LI-RADS 的分级结果比较分类诊断的准确性、敏感性和特异性。对于二分类任务，采用 McNemar's 检验比较不同 LI-RADS 标准以及 CNN 模型与阅片者间诊断敏感性和特异性的差异。对于三分类任务，分别计算 CNN 模型与阅片者的诊断准确性。

结果：二分类 CNN 模型的诊断准确性高于六名阅片者（0.904 vs 0.809~0.904），敏感性显著高于三名低年资阅片者（0.982 vs 0.821~0.893, $P < 0.001$ ），特异性与六名阅片者无明显差异（0.789 vs 0.789~0.895, $P > 0.05$ ）。CNN 模型三分类的诊断准确率高于低年资阅片者（0.894 vs 0.798~0.840），接近或达到高年资阅片者诊断水平（0.894 vs 0.840~0.904）。当病变直径小于 20mm 时，六名阅片者诊断准确性和敏感性显著降低，而 CNN 模型的诊断性能几乎不受肿瘤大小的影响。

结论：基于多序列 MRI 构建的肝肿瘤二分类和三分类 CNN 模型高于低年阅片者，接近或达到高年资阅片者的诊断水平。CNN 模型有助于提高医生，尤其是低年资医生的诊断信心，促进 HCC 的早期诊疗。

PO-2065

穿刺活检后前列腺 MRI 出血回避征对前列腺癌的诊断价值

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目的 验证前列腺穿刺活检后 MRI 上的出血回避征对前列腺癌的诊断价值，并探讨其检出的相关影响因素。方法 回顾性连续入组 2021 年 1 月至 2022 年 2 月期间于解放军总医院第一医学中心行根治性前列腺切除术，并于术前行标准 mpMRI 扫描的 91 例外周带前列腺癌患者，年龄 48-80（ 66.0 ± 7.0 ）岁。全部患者均在 MRI 检查前行超声引导下 8-15 针系统穿刺活检。活检至 MRI 检查的中位间隔时间为 32（22, 42）天。将 T1 高信号的病变定义为出血灶，由两名放射科医师在 T1WI 上勾画前列腺内总出血体积，并除以前列腺体积得到前列腺出血分数。出血回避征定义为 T1WI 上存在由高信号区域包绕的低信号区，或连续扇形高信号区域突然截断。两名高年资放射科医师在 T1WI 上对出血回避征进行了独立盲法评估，并依据 6 分法记录病灶位置。以术后病理切片图像为金标准，在高年资泌尿生殖亚专业病理科医师的协助下核对出血回避征所示病灶位置的配准情况。应用受试者工作曲线评估出血回避征的诊断效能，并分析其灵敏度、特异度、阳性预测值（PPV）

及阴性预测值 (NPV)。运用 Mann-Whitney 检验及卡方检验比较有无出血回避征患者组间临床、影像及病理特征差异。运用单因素及多因素 Logistic 回归筛选影响出血回避征检出的独立风险因素。结果 观察者 1 报告了 30/91 (33.0%) 例出血回避征, 观察者 2 报告了 34/91 (37.4%) 例出血回避征; 两者曲线下面积 (AUC)、灵敏度、特异度、PPV 及 NPV 分别为 0.695 [95%CI: 0.589-0.787]、39.0%、100%、100%、23.0% 及 0.710 [95%CI: 0.605-0.800]、49.3%、95.8%、97.06%、40.35%。出血回避征阳性组的穿刺间隔时间 ($P=0.060$) 及出血分数 ($P<0.001$) 均高于出血回避征阴性组。多因素 Logistic 回归显示仅有出血分数是出血回避征出现的独立风险因素 ($P=0.001$)。结论 出血回避征的检出与前列腺穿刺后出血程度相关, 具备较为优异的诊断特异度, 可辅助放射科医师在穿刺活检后 MRI 上准确识别前列腺癌位置。

PO-2066

基于磁共振质子密度脂肪分数成像在 前列腺癌风险分层中的应用研究

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【摘要】

目的: 本研究的目的是通过磁共振质子密度成像获取前列腺癌内脂肪分数, 并收集患者临床及磁共振常规特征, 通过多因素 logistics 回归, 获得高风险前列腺癌的危险因素。

方法: 收集经病理证实的 143 例良性病变和 191 例前列腺癌患者的临床资料。所有前列腺癌患者根据格里森评分, 进行病理风险分层, 其中低风险组 (Gleason 评分 $\leq 3+4$) 63 例, 高风险组 (Gleason 评分 $\geq 4+3$) 128 例。所有患者均接受 3.0T MRI 检查, 并统计与前列腺癌相关的临床危险因素。通过多元逻辑回归分析确定前列腺癌风险分层独立的危险因素, 建立前列腺癌风险分层预测模型, 并进行受试者工作特征 (ROC) 曲线分析, 建立列线图用于可视化分析。

结果: 研究显示, 良性病变组和前列腺癌组在前列腺体积、前列腺特异抗原浓度、全腺体脂肪分数、前列腺周围脂肪厚度和皮下脂肪厚度之间差异有统计学意义 ($p<0.05$)。前列腺癌低风险组和高风险组在患者 BMI、前列腺体积、前列腺特异抗原浓度、肿瘤 ADC 值、标准 T2 信号强度、PI-RADS 评分、病灶脂肪分数和前列腺周围脂肪厚度之间差异有统计学意义 ($p<0.05$)。两组患者在年龄、吸烟史、饮酒史、糖尿病史和皮下脂肪厚度之间差异没有统计学意义 ($p>0.05$)。GS 和 FF ($p=0.6$, $p<0.001$)、PSA ($p=0.432$, $p<0.001$)、ADC 值 ($p=-0.379$, $p<0.001$) 以及 PIRADS 评分 ($p=0.366$, $p<0.001$) 呈现显著相关。通过多元 Logistic 回归分析显示, 脂肪分数的增加、PIRADS 评分 5 分以及 ADC 值和前列腺体积的减少是高风险前列腺癌的独立预测因子 ($p=0.000$ 、 0.04 、 0.03 和 0.032)。建立前列腺癌风险分层的预测模型, 构建 ROC 曲线显示以 0.67 为模型的最佳截断值, 区分高风险前列腺癌曲线下面积为 0.907, 灵敏度 78.1%、特异度为 88.9%。

结论: 基于磁共振质子密度成像获取前列腺癌内脂肪分数与前列腺癌 Gleason 评分存在显著相关性, 是高风险前列腺癌的独立预测因素。

PO-2067

直肠癌区域淋巴结良恶性与周围浸润程度 相关性的磁共振成像分析

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目的：通过对直肠癌患者 MRI 周围浸润情况及区域淋巴结良恶性分析，探讨壁外血管侵犯与区域淋巴结良恶性的相关性。方法：回顾性分析我院 2018 年 10 月-2023 年 5 月经手术病理证实的直肠癌患者 85 例，其中 EMVI 患者 46 例，根据其 MRI 检查及病理结果，获得 MRI-EMVI、DWI 区域淋巴结信号强度、病理学 EMVI、肿瘤浸润程度（T 分期）、区域淋巴结良恶性情况等临床病理资料，分析 MRI 评价 T 分期及 EMVI 准确性，MRI-EMVI、肿瘤 T 分期、DWI 淋巴结信号强度及病理 T 分期与区域淋巴结良恶性的相关性。结果：MRI 评价 EMVI 准确性 83%；MRI-EMVI、肿瘤 T 分期、DWI 及病理 EMVI 与区域淋巴结良恶性相关性有统计学意义（ $p<0.05$ ）。通过对以上诊断效能分析，ROC 曲线下面积分别为 0.83、0.81、0.71 和 0.91。MRI-EMVI、T 分期和 DWI 信号强度对评价区域淋巴结良恶性准确性分别为 83.4%、81.5%和 71.2%。结论：直肠癌 MRI 周围浸润情况对评价区域淋巴结良恶性有一定帮助。

PO-2068

双能 CT 碘（水）图细胞外体积分数直方图 分析预测直肠癌 T 分期

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目的：探讨双能 CT 碘（水）图细胞外体积分数（ECV）直方图分析预测直肠癌 T 分期的价值。

方法：回顾性分析直肠癌患者并有术后病理 T 分期资料病灶 74 例，其中 T1-2 期 25 例、T3-4 期 49 例，术前均行双能 CT 增强三期能谱扫描。将直肠癌延迟期碘（水）图图像导入 matlab 软件，输入患者血细胞比容（HCT），获得碘（水）图 ECV 图像，使用 itk-snap 软件手动勾画全肿瘤感兴趣区域（ROI）。使用联影 uAI Research Portal 软件提取直方图参数，采用秩和检验用于比较两组之间的参数的差异性。采用受试者工作特征（receiver operating characteristic, ROC）曲线下面积（area under the curve, AUC）、敏感度及特异度来评估直方图参数的诊断效能。

结果：ECV 直方图参数 Energy、Entropy、InterquartileRange、Range、Variance 在直肠癌 T 分期的差异有统计学意义（均 $P<0.05$ ），曲线下面积（AUC）分别为 0.742、0.661、0.691、0.717、0.691，敏感度分别为 55.1%、93.88%、85.71%、61.22%、89.8%，特异度分别为 84%、40%、52%、80%、48%。

结论：基于双能 CT 碘（水）图细胞外体积分数（ECV）直方图分析对于预测直肠癌 T 分期具有一定的价值，可无创术前为诊疗计划提供帮助，Entropy 参数具有高敏感度。

PO-2069

小体积管腔增强 CT 成像对非肿瘤性小肠出血的定位及病因分层

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背景：小肠出血是胃肠道出血病例中约占 10% 的一种情况，其诊断具有相当大的挑战性。目前的方法如内窥镜和数字减影血管造影（DSA）存在显著的局限性，因此需要对增强 CT 扫描的诊断潜力进行深入探索。

方法：本回顾性研究评估了从 2013 年 12 月至 2023 年 3 月期间在我们机构接受腹部 CT 检查的非肿瘤性小肠出血患者（包括十二指肠）。根据出血原因，将患者分为憩室和非憩室组。在 CT 图像上，活动性出血被定义为动脉期肠腔对比剂外渗和/或静脉期对比剂逐渐积聚。每位患者的图像由两名放射科医生分别评估，评估内容包括活动性出血、潜在出血病变的位置和形态，他们之间寻求达成共识以确定诊断。

结果：本研究共纳入了 167 名患者，以男性为主，中位年龄为 30 岁。49% 的患者被确定为活动性出血。回肠是潜在出血部位最常见的位置。值得注意的是，在憩室组中发现的所有出血性憩室均表现为盲囊状终止。在确定的出血原因中，克罗恩病最为常见。憩室组和非憩室组的诊断方法存在显著差异，憩室组主要采用手术治疗，而非憩室组主要采用内窥镜检查。憩室组的对比剂外渗明显更高，管状样的 Meckel 憩室出现比其他憩室更为显著。

结论：CT 扫描可以更高地检测到憩室性出血，即使是无症状的，可以指导将其分类为多个可能临床相关的类别。

PO-2070

双能 CT 碘（水）图细胞外体积分数纹理分析
预测直肠癌肿瘤出芽分级

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目的：探讨双能 CT 碘（水）图细胞外体积分数（ECV）纹理分析预测直肠癌肿瘤出芽分级的价值。

方法：回顾性分析直肠癌患者肿瘤出芽分级资料病灶 74 例，其中中低级别 48 例、高级别 26 例，术前均行双能 CT 增强三期能谱扫描。将直肠癌延迟期碘（水）图图像导入 matlab 软件，输入患者血细胞比容（HCT），获得碘（水）图 ECV 图像，使用 itk-snap 软件手动勾画全肿瘤感兴趣区域（ROI）。使用联影 uAI Research Portal 软件提取纹理参数，采用秩和检验用于比较两组之间的参数的差异性。采用受试者工作特征（receiver operating characteristic, ROC）曲线下面积（area under the curve, AUC）、敏感度及特异度来评估纹理参数的诊断效能。

结果：ECV 纹理参数 glcm_Autocorrelation、glcm_JointAverage、gldm_HighGrayLevelEmphasis、gldm_LargeDependenceLowGrayLevelEmphasis、gldm_LowGrayLevelEmphasis 在直肠癌肿瘤出芽分级的差异有统计学意义（均 $P < 0.05$ ），曲线下面积（AUC）分别为 0.682、0.679、0.675、0.691、0.673，敏感度分别为 84.62%、73.08%、73.08%、76.92%、69.23%，特异度分别为 54.17%、64.58%、64.58%、56.25%、66.67%。

结论：基于双能 CT 碘（水）图细胞外体积分数（ECV）纹理分析对于预测直肠癌肿瘤出芽分级具有一定的价值，可术前为患者诊疗计划提供帮助。

PO-2071

Gd-EOB-DTPA 增强 MRI 对不典型增生结节和肝细胞癌的鉴别诊断效能的 Meta 分析

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系统评价 Gd-EOB-DTPA 增强 MRI 的不同序列成像特征和组合序列在鉴别不典型增生结节 (dysplastic nodules, DN) 和肝细胞癌 (hepatocellular carcinoma, HCC) 中的总体诊断效能。方法 计算机检索各大中英文数据库, 搜索关于 Gd-EOB-DTPA 增强 MRI 鉴别 DN 和 HCC 的原始研究, 检索年限为 1998 年 1 月到 2023 年 3 月。由两位研究者独立完成文献筛选、提取数据特征和质量评价后, 采用 Stata 17.0、Meta-disc1.4 软件进行 Meta 分析。结果 共纳入 14 篇文献, 包括 DN 375 个, HCC 653 个。Meta 分析结果显示: 多参数联合诊断序列中, 合并的敏感度、特异度、阳性似然比、阴性似然比、曲线下面积分别为 0.95 (95%CI, 0.87-0.98)、0.95 (95%CI, 0.91-0.97)、18.57 (95%CI, 9.64-35.78)、0.06 (95%CI, 0.02-0.14) 和 0.98 (95%CI, 0.97-0.99)。结论 Gd-EOB-DTPA 增强磁共振对于 DN 和 HCC 具有明确的鉴别诊断效能, 肝胆期成像大大弥补了动态增强对早期 HCC 低敏感度的诊断缺陷。

PO-2072

原发性肝癌热消融治疗的 MR 评估及进展

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目的: 探讨磁共振成像 (MR) 在原发性肝癌 (HCC) 热消融围手术期的应用价值与前景。

方法: 总结本中心 MR 在 HCC 热消融治疗的术前、术中和术后各个阶段中的应用, 以及近五年来此领域的国内外研究进展。

结果: HCC 严重威胁我国人民的健康和生命, 热消融治疗, 主要是射频和微波消融, 已成为早期 HCC 及不适合手术或拒绝手术患者的一线根治性治疗手段。影像学检查, 尤其是 MR, 包括各种功能成像、肝胆特异性对比剂增强 MR、多模态融合成像及影像组学等, 在 HCC 的围手术期发挥了重要的作用。一、术前早期精准诊断与鉴别诊断, 判断 HCC 生物学行为, 确定病灶的大小、数目、位置, 选择合适穿刺路径、热消融范围和综合治疗方式, 根据肿瘤浸润范围、位置等制定消融策略, 保证足够的安全范围, 尽可能获得一次性、适形的完全消融治疗; 病变位于高危部位 (膈下、门静脉旁)、动脉期环形强化、肝胆期瘤周低信号等均被认为是与 HCC 热消融治疗后预后不良相关的 MR 特征; 非富血供肝胆期低信号结节 (NHHN) 的存在也被认为是局部和远处复发的预测因素。二、本中心采用超声-MR 融合成像, 术中引导穿刺、布针、监测及协助控制治疗过程、即时判断疗效, 指导即时补充消融获得充足的消融范围, 协助胆囊旁、肝门部胆管旁 HCC 热消融, 随访时间五年以上, 取得了良好的治疗效果。三、术后, MR 可早期发现严重并发症; 肝脏影像报告和数据系统治疗反应算法 (LI-RADS TRA) 为术后评估提供了一个全面的方案, 以标准化 LI-RADS 局部治疗后的治疗反应评估; 影像组学也在预测 HCC 射频消融后的治疗反应和患者预后方面取得了初步的良好结果, 是未来研究的趋势。

结论: MR 辅助下的精准热消融, 对于提高疗效, 改善预后具有重要意义, 融合成像、EOB-MR、影像组学等 MR 新技术在肝癌热消融治疗评估和预测中发挥了越来越多的作用, 但也需要更多的前瞻性多中心研究验证其临床效用。

PO-2073

三维酰胺质子转移磁共振成像与直肠腺癌预后因素相关性的研究

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目的：酰胺质子转移成像 (APT_w) 在直肠癌精准评估的价值有待进一步研究。本研究采用全新的数据测量方式，探究三维酰胺质子转移磁共振成像参数与直肠腺癌预后因素的相关性，以提高术前评价直肠腺癌预后因素的准确度，为直肠癌的精准治疗提供影像学依据。

方法：前瞻性连续性纳入 2022 年 1 月至 2023 年 4 月，被确诊为直肠腺癌且未行新辅助治疗而直接进行直肠癌根治术的患者。所有患者术前 MR 检查均包括 APT_w、T1WI 加权增强图像 (T1WI-C)。APT 加权成像 (WI) 信号强度 (SI) (%) 定义为 3.5 ppm 偏移处的磁化转移率不对称性百分比 (MTR_{asym})。使用 ITK-SNAP 4.0 软件，以 APTWI-T1WI-C 成像为参照勾画图像，计算直方图数据。根据直肠腺癌预后因素进行分组，采用单因素方差分析/Mann-Whitney U 检验/Kruskal-Wallis H 检验比较不同分组的 APTWI SI。使用受试者工作特性曲线 (ROC) 来确定 APTWI SI 评估直肠腺癌预后因素的诊断性能。

结果：共连续纳入 200 例患者，最终共 50 例患者符合研究纳入与排除标准，平均年龄 58 岁 (55 ~ 61 岁)。直肠腺癌 T1-T2 分期组 (n = 24, 1.93 ± 0.64%) 的平均 APTWI SI 低于 T3-T4 分期组 (n = 26, 2.32 ± 0.73%) (p = 0.05)。有脉管浸润组 (n = 5, 2.7 ± 0.97%) 的平均 APTWI SI 高于无脉管浸润组 (n = 45, 2.06 ± 0.65%) (p = 0.032)。使用平均 APTWI SI 评估直肠腺癌预后因素的曲线下面积分别为 0.66 (95% CI: 0.513 ~ 0.789)、0.70 (95% CI: 0.559 ~ 0.825)。当使用平均 APTWI SI ≥ 1.93% 作为 T3-T4 分期的指标时，敏感性和特异性分别为 76.9% 和 58.3%。当使用平均 APTWI SI ≥ 3.29% 作为有脉管浸润的指标时，敏感性和特异性分别为 40.0% 和 100.0%。结论：酰胺质子转移成像有评价直肠腺癌 T 分期及脉管浸润状态的价值。

PO-2074

自适应迭代技术与频谱 CT 相结合在肝实质检查动脉期中的应用

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目的：探讨最佳自适应统计迭代重建 (ASIR) 结合最优单能量技术提高肝实质质量

方法：选取 2021 年 1 月至 2022 年 11 月行全腹检查的 55 例患者为研究对象。所有患者均从横膈膜水平至耻骨联合水平进行扫描，扫描层厚度为 5 mm，重建层厚度为 0.625mm。患者检查采用常规能谱扫描进行，迭代率为 60%，预设噪声指数 (NI) 为 8.5 采用 40Kev、50 Kev、60 Kev 结合不同百分比的 ASIR-V 算法，测量动脉期的右前叶、右后叶、皮下脂肪和竖脊肌的 CT 值和 SD 值进行重建三组图像。其对比度噪声比 (CNR) 计算如下：CNR = (肝实质的 HC 值 - 等面竖立脊肌 CT 值) / 相同水平的竖立脊肌的 CT 值的标准差。信噪比 = 肝脏 CT / 肝脏 SD。主观评价：两位具有 7 年以上经验的放射科医生对十二组图像的整体图像质量 (肝脏图像噪声和伪影) 进行主观评分：1 分，组织结构显示不清晰，图像噪点和伪影很大；2 分，组织结构模糊，图像噪点和伪影较大；3 分，组织结构不清晰，图形噪点和伪影稍大；4 分，结构仍然清晰，图像噪点和伪影小；5 分，结构非常清晰，图像没有明显的噪点和伪影。

结果：客观评价：9 组不同重建方法在动脉期的右前叶和右后叶 CT 值、SD 值和 CNR 值均有统计学差异 (P < 0.05)，肝右叶 60Kev-40%ASIR SD 值明显较低 17.04 ± 5.12, 14.63 ± 2.94, SNR 值均高于其他 8 组 (47.53 ± 7.67, 44.35 ± 8.66)。主观评价：2 名诊断组医生对图像重建质量主观评分的 Kappa 值为 0.77、一致性强。在图像噪声方面，图像对比度显示，60Kev-40%ASIR 图像明显优于其他 8 组重建图像 (P < 0.05)。

结论: 随着 ASIR 权重的逐渐增大, 噪点减小, 但过高的 ASIR 对比度会降低, 导致图像过度平滑, 噪点纹理看起来“斑驳”、“蜡状”或“不自然”, 因此结论是 60Kev-40%ASIR 在图像上的诊断值最高。

PO-2075

基于双能 CT 的细胞外体积分数构建 诺模图预测胃癌微卫星不稳定性状态

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目的: 探索基于双能 CT 的细胞外体积分数 (ECV) 及碘浓度参数评估胃癌微卫星不稳定 (MSI) 状态的可行性, 并建立、验证基于双能 CT ECV 分数和 CT 特征的诺模图术前预测胃癌的 MSI 状态。
方法: 回顾性收集本院行双能 CT 能谱成像增强扫描检查且术后病理证实为胃癌的患者 123 例。根据术后免疫组化检测将患者分为 MSI 组 41 例, 微卫星稳定 (MSS) 组 82 例, 然后按照 7: 3 的比例随机分配到训练组 (86 例) 和验证组 (37 例)。两位观察者分别测量患者 CT 特征 (肿瘤最厚径、肿瘤位置、Borrmann 分型、浆膜侵犯、淋巴结转移)、增强三期碘浓度 (IC) 及标准化碘浓度 (nIC), 并根据延迟期病灶及腹主动脉的 IC 值结合患者红细胞压积计算 ECV 分数。采用组内相关系数 (ICC) 检验两名观察者测量结果的一致性。采用独立样本 t 检验或 Mann-Whitney U 检验比较两组病灶各参数值的差异。将单因素分析有统计学意义的变量, 进行多因素 logistic 回归分析筛选胃癌 MSI 的独立预测因素并构建诺模图。通过用受试者操作特征 (ROC) 曲线评估诺模图和各有差异变量的诊断效能, 并通过 Delong 检验进行比较。通过校准曲线 (Hosmer-Lemeshow 检验) 及决策曲线评估诺模图校准性能和临床实用性。

结果: 两名观察者测量各组数据的一致性良好 ($ICC > 0.75$)。MSI 组的 ECV 分数、增强三期 IC、静脉期及延迟期 nIC 值均低于 MSS 组 ($P < 0.05$)。MSI 组中 Borrmann I-II 型和胃窦癌的发病率高于 MSS 组 ($P < 0.05$)。肿瘤位置、Borrmann 类型和 ECV 分数是 MSI 状态的独立预测因素, 被用于建立诺模图。诺模图在训练组和验证组的 AUC 值分别为 0.826(0.729-0.899) 和 0.833(0.675-0.935), 高于其他单变量 AUC ($P < 0.05$)。且诺模图具有良好的校准性能和临床实用性。

结论: 基于双能 CT ECV 分数和 CT 特征的诺模图能有效术前预测胃癌 MSI 状态, 有潜力为胃癌患者的个性化治疗提供更多有价值信息。

PO-2076

基于双能 CT 衍生的影像组学术前预测 直肠腺癌组织学分级的价值

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目的: 探讨基于双能计算机断层扫描 (DECT) 静脉相碘图 (IM) 的影像组学模型对直肠腺癌组织学分级的预测价值, 并与静脉相 120 kVp 等效混合图像 (MIX) 进行比较。

方法: 我们前瞻性收集 2017 年 11 月—2022 年 3 月于江苏大学附属医院经手术和病理证实的直肠腺癌 144 例患者的基本资料, 所有患者行双能计算机断层扫描增强检查。以术后病理结果为金标准, 根据直肠腺癌的组织学分级标准, 将腺癌患者分为高级别组 (组织学分级为低分化) 42 例和低级别组 (组织学分级为高分化及中分化) 102 例。按 7: 3 的比例分为训练组 (100 例, 高级别组 29 例、低级别组 71 例) 和验证组 (44 例, 高级别组 13 例、低级别组 31 例)。用 3D-Slicer 分别在 IM 及 MIX 上手动分割原发肿瘤, 获得感兴趣容积, 分别用 3D-Slicer 软件中 radiomics 模块提取影

像组学特征。感兴趣容积由两名放射科医生分别进行勾画，计算组内相关系数 (ICC) 以评估影像组学特征提取的可重复性和稳定性。在训练组中，使用最小绝对收缩与选择算子 (LASSO) 回归对影像组学特征进行降维，并各自建立影像组学模型。使用受试者工作特征 (ROC) 曲线和校准曲线评估两组模型性能，使用 Delong 检验评价两个模型间 ROC 曲线下面积 (AUC) 的差异，使用决策曲线分析 (DCA) 评估预测模型的临床价值。

结果：从 IM 和 MIX 的每个感兴趣容积中总共各提取了 648 和 587 个特征，其中 483 和 425 个特征 ICC 均大于 0.80。训练组中由 LASSO 回归各筛选出 9 个非零系数最佳影像组学特征，分别建立 IM-影像组学 (R-IM)、MIX-影像组学 (R-MIX) 模型。在训练组及验证组中，R-IM 的 AUC 值分别为 0.93、0.86；R-MIX 的 AUC 值分别为 0.78、0.69。Delong 检验提示训练组和验证组的 R-IM 与 R-MIX 间差异具有统计学意义 ($P < 0.05$)。通过校准和决策曲线分析，分别观察到良好的校准和临床应用。

结论：基于 DECT-IM 的 R-IM 模型在预测直肠腺癌的组织学分级方面具有很大的潜能，优于 120 kVp 等效 MIX 图像的 R-MIX 模型。

PO-2077

矢状位 T2WI 新征象对于新辅助治疗后 直肠癌完全缓解的诊断价值

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目的：准确判断局部进展期直肠癌新辅助治疗后是否达到完全缓解，对于制定下一步治疗决策至关重要。本研究旨在探讨矢状位 T2WI 影像学新征象对于识别肿瘤完全缓解的诊断效能。

材料与方法：回顾性连续收集 2021 年 10 月至 2023 年 2 月于北京大学肿瘤医院接受新辅助放化疗联合全直肠系膜切除术的局部进展期直肠癌患者，选取术前 MRI 与手术之间间隔时间小于 30 天的病例。判断肿瘤完全缓解的新征象包括术前 MRI 矢状位 T2WI 呈厚均匀等低信号，以及矢状位 T2WI 呈分层征及 DWI 无明确高信号。以手术病理标本为参考标准，计算新征象对于肿瘤完全缓解判断的准确性、灵敏度、特异度、阳性预测值 (positive predictive value, PPV)、阴性预测值 (negative predictive value, NPV)、ROC 曲线下面积 (area under curve, AUC)。

结果：共纳入 111 例患者，其中 96 例被诊断为 MRI 肿瘤退缩分级 (MRI tumor regression grade, mrTRG) 1-3 级，15 例为 mrTRG4-5 级。新征象诊断肿瘤完全缓解的准确率为 86.5%，灵敏度为 56.7%，特异度为 97.5%，PPV 为 89.5%，NPV 为 85.9%，AUC 值为 0.768。针对 mrTRG1-3 级患者，即难以准确判断肿瘤是否残留的患者，新征象的准确率为 84.4%，灵敏度为 56.7%，特异度为 97.0%，PPV 为 89.5%，NPV 为 83.1%，AUC 值为 0.768。

结论：矢状位 T2WI 中的厚均匀等低信号和分层征对于识别直肠癌新辅助治疗后肿瘤完全缓解者具有极高的特异性，有助于筛选适合行“等待观察”策略的患者。

PO-2078

基于增强 CT 图像的瘤内和瘤周影像组学 预测胃肠道间质瘤危险度分级的研究

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目的：探讨基于 CT 增强图像的瘤内及瘤周影像组学预测胃肠道间质瘤（GIST）危险度分级的价值。**方法：**回顾性纳入经手术病理证实为原发性 GIST 患者 241 例，根据改良版 NIH 标准将其分为低危组及高危组，按 7:3 比例随机分为训练集及测试集。收集入组病例的临床、病理及 CT 特征，通过单因素分析筛选组间比较 $P<0.1$ 的特征纳入二元逻辑回归分析得到与危险度分级相关的独立危险因素，通过 Logistic 回归构建临床模型。利用 3D-slicer 软件在 CT 静脉期图像逐层分割出瘤内、3mm 瘤周及 5mm 瘤周 ROI，并通过 Python 软件提取影像组学特征。经过 ANOVA 及 LASSO 进行特征降维，通过 Logistic 回归建立 5 个影像组学模型，选择表现最佳的影像组学模型计算 Rad-score，将其与临床独立危险因素结合建立临床-影像组学联合模型、绘制诺模图、评估各模型预测 GIST 危险度分级的性能、比较各模型间 AUC 值的差异性、评价诺模图的校准度，采用 DCA 比较联合模型的临床价值。结果：1、训练集 169 例（低危组：78 例；高危组：91 例）、测试集 72 例（低危组：33 例；高危组：39 例），分析结果显示肿瘤最大径、Ki-67 指数及 CT 图像上肿瘤坏死是 GIST 危险度分级的独立危险因素。2、从瘤内、3mm 瘤周及 5mm 瘤周 ROI 提取影像组学特征，将 3mm 瘤周及 5mm 瘤周的影像组学特征分别与来自瘤内的影像组学特征结合，最终建立 5 个影像组学模型，包括 1 个瘤内模型（ITV）、2 个瘤周模型（PTV3、PTV5）及 2 个瘤内-瘤周联合模型（ITV+PTV3、ITV+PTV5），ITV+PTV3 在训练集、测试集均表现出最佳的危险度分级预测性能，Delong 检验显示其预测性能最优，决策曲线表明其临床净效益最高。3、最佳影像组学模型 ITV+PTV3 的 Rad-score 结合临床资料建立的临床-影像组学联合模型预测性能最佳。结论：基于 CT 静脉期图像的瘤内及瘤周区域建立的影像组学模型及临床-影像组学联合模型，在预测 GIST 危险度分级方面表现出较高的诊断效能，可指导 GIST 的精准诊疗。

PO-2079

双层探测器光谱 CT 虚拟单能量图像在 下腔静脉成像中的临床研究

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【摘要】目的 探讨双层探测器光谱 CT 单能量图像在下腔静脉 CTV 中的应用。**方法** 回顾性分析 2019 年 9 月至 2022 年 10 月在华中科技大学同济医学院附属协和医院采用双层探测器光谱 CT 行下腔静脉 CTV 的 202 例患者的影像资料。重建常规 120 kVp 混合能量图像（PI）和 40~100 keV 虚拟单能量图像（VMI）。对 120 kVp PI 和 VMI 的图像质量进行客观评分，客观指标包括下腔静脉 CT 值、信噪比（SNR）和对比噪声比（CNR）。采用配对样本 t 检验或 Wilcoxon 秩检验分析探索 CT 值、SNR、CNR 与能级水平的相关性。结果 VMI 的 CT 值、SNR 和 CNR 与能级水平呈负相关。40 keV VMI 的 CT 值、SNR 和 CNR 最高，显著高于 120 kVp PI 和 50~100 keV 各能级 VMI 的 CT 值、SNR 和 CNR，差异具有统计学意义（ P 均 < 0.001 ）。结论 在下腔静脉 CTV 检查中，使用双层探测器光谱 CT 单能量成像能够显著提高 SNR 和 CNR，优化图像质量。

PO-2080

基于多参数 MRI 联合影像组学在前列腺癌骨转移风险评估中的应用研究

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目的：基于多参数 MRI (multiparametric MRI, mpMRI) 联合影像组学构建分类模型，实现对前列腺癌 (prostate cancer, PCa) 患者骨转移的风险评估。

材料和方法：回顾性收集经穿刺或手术病理证实并在本院接受 mpMRI 及单光子发射计算机断层显像的 PCa 患者 109 例，年龄 45~87 岁，平均 (72.4±8.51) 岁，其中有骨转移 50 例，无骨转移 59 例，按照 7:3 随机分为训练集 (n=77 例) 和测试集 (n=32 例)，其中有骨转移训练集中 35 例，测试集中为 15 例。从 T2WI、DWI 及 ADC 轴位图上勾画前列腺肿瘤全体积 (volume of interest, VOI) 作为感兴趣区，并提取影像组学特征，使用 LASSO 回归选取用于建模的特征。使用受试者操作特征 (receiver operating characteristic, ROC) 曲线下面积 (area under the curve, AUC)、敏感度、特异度和准确度作为评价机器学习分类器性能的指标。比较传统参数，包括患者年龄、ADC、tPSA 等组间差异。构建不同组合模型，评价传统定量参数、影像组学模型和综合模型在前列腺癌骨转移风险评估中的诊断效能。

结果：应用组学分析软件优化筛选出 20 个与 PCa 骨转移密切相关的影像组学特征 ($P<0.01$)，包括 6 个 T2WI 组学特征，4 个 DWI 组学和 10 个 ADC 图组学特征。研究发现基于逻辑回归 (logistic regression, LR) 分类器可以在训练集、测试集上生成最准确的分类模型。基于 LR 分类器，ADC、DWI 和 T2WI 的多模态影像组学模型在训练集、测试集中前列腺癌骨转移风险评估中的 AUC 分别为 0.978 和 0.937；多模态影像组学联合传统定量参数的综合模型在训练集、测试集中的 AUC 分别为 0.977、0.945。

结论：基于前列腺 T2WI、DWI 和 ADC 的影像组学特征构建的机器学习模型能够对 PCa 骨转移风险做出评估，从而可能为 PCa 患者临床上治疗方法的选择、预后的评估及患者全流程管理起到较好的参考作用。

PO-2081

多发结节型脾脏窦岸细胞血管瘤的影像表现与病理对照分析

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目的 结合文献总结脾脏窦岸细胞血管瘤 (LCA) 的临床特点、影像表现及病理特征，从而提高对本疾病的认识。方法 回顾性对 6 例多发结节型脾脏窦岸细胞血管瘤的临床资料、CT、MRI 影像表现与病理进行对照分析、总结。结果 本组病例中 3 例因腹部不适就诊，4 例伴有不同程度贫血；较大病灶 (直径 $>2.0\text{cm}$) 病灶强化方式呈由内向外，出现“花瓣样”改变，可能是其特征性表现，较小病灶 (直径 $<2.0\text{cm}$) 病灶强化方式显示欠清。T2WI 上的“雀斑征”、DWI 高信号是 its 特点。结论 对于贫血伴有或不伴腹部不适患者，影像学检查提示脾脏多发占位，LCA 应被考虑在内。

PO-2082

双能 CT 结合 DCE-MRI 对直肠癌肿瘤出芽分级的价值研究

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目的 探讨双能 CT 结合 DCE-MRI 对直肠癌肿瘤出芽分级的价值研究。

方法 回顾性分析直肠癌患者肿瘤出芽分级资料病灶 70 例，其中中低级别 41 例、高级别 29 例。获取双能 CT 动、静脉碘浓度 (IC) 值及 DCE-MRI 参数 (Ktrans、Kep 和 Ve) 值。分别将三个 ROI 放置于病灶最大层面的实性成分上，并将三个 ROI 的平均值作为该病灶的参数定量值，双能 CT 和 DCE-MRI 所测量的病灶层面尽可能一致。标准化碘浓度值 (NIC) = 病灶 IC / 该层面左侧髂动脉或股动脉 IC。采用秩和检验分析双能 CT 参数值 ANIC、VNIC 和 DCE-MRI 参数值 Ktrans、Kep、Ve 的两组间差异性，并同时联合参数检验，利用有差异单一参数及联合参数生成 ROC 曲线，计算曲线下面积 (AUC) 并获得各参数的诊断效能。使用 Delong 检验比较各参数 AUC 效能。

结果 中低级别肿瘤出芽患者 VNIC 值为 0.555 (0.480,0.656)，低于高级别患者 0.703 (0.606,0.806)，两组之间有统计学意义的差异 ($p < 0.05$)，其 AUC、最大 Youden 指数和诊断阈值分别为 0.758、0.486 和 0.596，敏感度和特异度分别为 82.76% 和 65.85%。中低级别肿瘤出芽患者 Kep 值为 2.382 (1.763,3.182) min⁻¹，高于高级别患者 1.806 (1.348,2.778) min⁻¹，两组之间有统计学意义的差异 ($p < 0.05$)，其 AUC、最大 Youden 指数和诊断阈值分别为 0.643、0.292 和 1.526 min⁻¹，敏感度和特异度分别为 41.38% 和 87.8%。Ktrans 和 Ve 以及 ANIC 两组间无明显统计学差异。联合 VNIC 及 Kep 诊断直肠癌肿瘤出芽分级的 AUC、敏感度、特异度分别为 0.790、89.66%、60.98%。比较各参数的诊断效能单一参数 Kep 与 VNIC+Kep 两者间具有统计学差异，而 Kep 与 VNIC 间、VNIC 与 VNIC+Kep 间效能无统计学差异。

结论 VINC 和 Kep 值对预测直肠癌肿瘤出芽分级具有一定意义，两者联合可以提高一定的诊断效能及敏感度，对术前无创诊疗计划提供帮助。

PO-2083

基于常规 CT 征象评估胰腺导管腺癌胰周血管侵犯的研究

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目的：1.探讨术前增强 CT 征象在评估胰腺导管腺癌 (Pancreatic ductal adenocarcinoma, PDAC) 胰周血管侵犯的价值。

材料与方法：1.回顾性分析 2015 年-2022 年于我院行手术治疗并经病理组织活检证实的 128 例 PDAC 患者的术前临床、病理及 CT 影像资料。依据血管是否受累分为血管侵犯组与非血管侵犯组。分析患者年龄、性别、术前糖类抗原 CA199、CA125 及 AFP、CEA 等临床资料；观测术前增强 CT 肿瘤部位、肿瘤横径、肿瘤与周围血管的最大夹角 (T/动脉夹角、T/门静脉夹角、T/肠系膜上静脉夹角等)、瘤周脂肪间隙以及淋巴结转移等特征；随后对两组患者进行单因素、多因素 Logistic 回归筛选分析 PDAC 周围血管侵犯的独立预测因子。对于具有统计学显著差异的参数，绘制受试者工作特征 (Receiver operating characteristic, ROC) 曲线，计算曲线下面积 (Area under the curve, AUC) 值，以评估不同参数预测血管侵犯的能力。

结果：1.128 例 PDAC 中，血管侵犯组 35 例，非血管侵犯组 93 例。两组在 T/动脉夹角、T/门静脉夹角、T/肠系膜上静脉夹角、肿瘤横径及 CA199 的差异上具有统计学意义 ($P < 0.05$)；而在淋巴结转移、瘤周脂肪间隙、平扫及增强各期 CT 值两组间差异不具有统计学意义 ($P > 0.05$)；多因素 Logistic 回归结果显示，T/动脉夹角和 T/门静脉夹角是 PDAC 患者血管侵犯的独立预测因子。

ROC 曲线分析显示, T/动脉夹角、T/门静脉夹角预测 PDAC 血管侵犯的 AUC 值分别为 0.642 和 0.687。

结论: 1.CT 影像征象能够术前预测 PDAC 血管侵犯表达状态; T/动脉夹角及 T/门静脉夹角 $\geq 180^\circ$ 可以间接评估血管侵犯。

PO-2084

基于增强 CT 影像组学预测胰腺导管腺癌胰周血管侵犯的研究

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目的: 探讨 CT 影像组学特征结合临床特征构建的列线图模型在术前预测胰腺导管腺癌 (PDAC) 胰周血管侵犯的应用价值。

材料与方法: 回顾性收集经手术病理证实的 101 例 PDAC 患者 (血管侵犯组 43 例、非血管侵犯组 58 例) 的术前临床、病理及 CT 影像资料。将所纳入病例随机性地分配为训练组 (70 例) 和验证组 (31 例), 从动脉期、静脉期及延迟期 CT 图像中提取 5622 个影像组学特征, 随后采用 Man Whitney U 检验、SelectKBst 及最小绝对收缩和选择算子 (LASSO) 筛选出能够预测血管侵犯的影像组学特征。选择 5 种不同的分类器对预测模型进行训练和验证, 根据混淆矩阵计算得出模型的准确性、敏感性、特异性。使用 ROC 曲线评估血管侵犯的诊断效能, 将效能最优的组学模型和临床因素融合构建列线图, 并采用决策曲线 (DCA) 评估肿瘤血管侵犯预测模型的临床实用性。

结果: 基于三期增强 CT 图像建立的影像组学模型由 23 个影像组学特征组成。5 种不同分类器建立的影像组学预测模型中, XGBOOST 的诊断效能最优, 训练集预测血管侵犯的 AUC、ACC、SEN、SPE 分别为 0.92、0.957、0.966、0.88; 验证集的 AUC、ACC、SEN、SPE 分别为 0.88、0.847、0.798、0.861。此外, 由 XGBOOST 结合临床因素构建的临床-影像组学融合模型诊断效能较单一因素模型诊断效能进一步提高, 其训练集的 AUC、ACC、SEN、SPE 为 0.97、0.971、0.976、0.975; 验证集的 AUC、ACC、SEN、SPE 分别为 0.92、0.932、0.886、0.982。校准曲线结果显示实际区分 PDAC 血管侵犯的结果和临床-影像融合模型的预测概率相当, DCA 显示融合模型可获得最佳净收益值。

结论: 三期增强 CT 图像上提取的组学特征结合临床因素建立的临床-影像组学融合模型在术前预测 PDAC 血管侵犯的准确性和敏感性较高, 可以作为临床治疗方案选择和评估患者生存预后的手段。

PO-2085

卵巢 sertoli-leydig 细胞瘤 MRI 表现 2 例

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卵巢 Sertoli-Leydig 细胞瘤 (Sertoli-Leydig cell tumor, SLCT) 是一种罕见的分泌性激素的卵巢性索间质肿瘤, 在原发卵巢肿瘤中所占比例低于 0.5%, 98% 的患者位于单侧卵巢, 性索间质来源于原始体腔的间叶组织, 可向男女两性分化。

MR 表现呈边界清楚的实性或囊实性信号影, 囊性部分一般在 T1WI 呈低信号, T2WI 呈高信号, 但有时伴随出血或囊液蛋白沉积时 T1WI 可出现斑片状高信号, T2WI 出现低信号; 实性成分在 T1WI 表现为低或等信号, T2WI 信号不一, 可表现为低、等或高信号, 这与肿瘤内部纤维间质的数量有关。增强扫描囊性壁和分隔以及实性成分表现为中等或明显强化。DWI 实性成分多呈等或高信号, 提示肿瘤弥散受限。SCLT 是一种罕见的原发肿瘤, 当 MR 提示囊性为主肿块、实性成分表现为囊壁及分隔 增厚或沿其生长的宽基底实质区, 或 T2WI 信号不一但囊壁以及实性部分强化, DWI 高信

号, 同时结合临床表现以及睾酮水平增高时, 应考虑该疾病, 但最终确诊应考虑术后病理及免疫组化。

PO-2086

基于增强 CT 图像的影像组学在胃 NEC 与胃腺癌鉴别中的价值

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目的: 探讨基于 CT 增强图像的影像组学模型在鉴别胃腺癌 (adenocarcinoma, ADC) 和胃神经内分泌癌 (neuroendocrine carcinoma, NEC) 中的诊断价值。材料和方法: 回顾性收集本院经病理证实的胃 NEC45 例、胃 ADC99 例作为训练集, 收集外院经病理证实的胃 NEC23 例、胃 ADC40 例作为外部验证集。采集患者的临床资料, 并评估 CT 主观特征。临床及 CT 特征通过单因素/多因素分析筛选出独立危险因素, 使用二元 Logistic 回归建立临床模型。对 CT 增强扫描静脉期图像进行影像组学特征提取及降维, 筛选特征建立影像组学模型。通过绘制 ROC 检验模型的诊断效能。计算影像组学模型的 Rad-score, 结合临床特征中的独立危险因素构建临床-影像组学联合模型, 并比较三种模型的效能。各模型 AUC 的差异采用 Delong 检验进行比较。采用决策分析曲线 (decision curve analysis, DCA) 评估各模型的临床应用价值。结果: 单因素/多因素分析显示, 肿瘤部位、坏死、淋巴结转移是鉴别胃腺癌与胃 NEC 的独立危险因素。对以上 3 个因素运用二元 Logistic 回归建立临床预测模型, 得到训练组的 AUC 为 0.768 (95%CI: 0.689-0.846), 验证组的 AUC 为 0.811 (95%CI: 0.7-0.921)。筛选从增强 CT 静脉期图像中提取影像组学特征并使用 Logistic 回归建模, 发现使用 9 项特征建立的影像组学模型达到了最高的诊断效能, 训练集 AUC 为 0.796 (95%CI: 0.716-0.876), 验证集 AUC 为 0.813 (95%CI: 0.696-0.93)。使用临床特征及影像组学特征建立的联合模型, 训练集 AUC 为 0.874 (95%CI: 0.81-0.938), 验证集 AUC 为 0.86 (95%CI: 0.756-0.963)。结论: 通过 Logistic 回归分析建立的临床特征模型和基于增强 CT 的影像组学模型在胃腺癌与胃神经内分泌癌的鉴别方面均具有一定的诊断能力。但使用临床及影像组学特征建立的联合模型可以进一步提高诊断效能。

PO-2087

基于增强 CT 影像组学术前预测肝细胞癌微血管侵犯的研究

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目的: 基于增强 CT 影像组学联合临床信息, 建立用于术前预测肝细胞癌 (HCC) 微血管侵犯 (MVI) 的联合模型, 并对模型效能进行比较。方法: 回顾性分析 262 例行根治性肝切除术且病理证实为 HCC 患者资料, 并按照 7: 3 的比例随机分为训练集 (191 例) 和验证集 (71 例)。采用单-多因素逻辑回归分析构建临床特征模型。采用 3D-Slicer 软件对静脉期图像逐层勾画 VOI, 包括肿瘤区域 (GTV)、瘤内及瘤周外扩分别 5mm (GPTV5)、10mm (GPTV10) 区域。从不同的 VOI 提取影像组学特征并建模, 选择在验证集中 ROC 曲线下面积最大的影像组学模型预测概率值作为影像独立生物标志物 (R-Score)。R-score 结合临床特征构建联合模型, 并以列线图形式展示。采用 AUC、敏感度、特异度、Hosmer-Lemeshow 检验 (H-L 检验)、决策曲线分析 (decision curve analysis, DCA)、DeLong 检验、净重新分类指数 (net reclassification index, NRI) 和综合判别改善指数 (integrated discrimination improvement, IDI) 对模型进行评价。结果: 甲胎蛋白 (alpha fetoprotein, AFP) 等 5 项临床特征可作为 HCC 患者 MVI 的独立预测因子。GTV、GPTV5 和 GPTV10 模型 AUC 值在训练集中分别为 0.854、0.863、0.842; 验证集中分别为 0.812、

0.783、0.704。选择 GTV 模型的预测概率值作为 R-Score。临床-影像组学联合模型在训练集、验证集的 AUC 分别为 0.883、0.876。NRI、IDI 结果显示联合模型较临床模型和 R-score 模型均有所提高 (NRI 均 >0 ，IDI 均 >0 、P 均 <0.05)。DCA 结果显示，联合模型在阈值概率范围内提供了更高的临床净获益。结论：基于增强 CT 的临床-影像组学联合模型能较好地术前无创预测 HCC 患者 MVI，将成为临床有力的参考工具。并且从 GTV 整体获得的影像组学特征预测效能优于 GTPV5、GPTV10。

PO-2088

基于影像及临床特征的 LI-RADS 形态 II 型肝癌早期复发风险评分系统的建立及验证

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目的：肿瘤形态与肝细胞癌早期复发相关，LI-RADS 形态 II 型肝癌作为 I 型和 III 型的过度，其发生复发的发生存在争议。本研究旨在探讨 II 型肝癌早期复发的危险因素，建立风险评分系统，并对其验证，为肝癌精准诊疗提供可靠参考。

方法：回顾性分析 2016 年 6 月-2020 年 6 月行肝癌根治手术且术前进行 MR 检查定义为形态 II 型的患者临床及影像资料，作为建模组，搜集 TCIA 数据库肝细胞癌患者资料作为验证组。采用单因素和多因素 Cox 回归分析确定 II 肝癌早期复发的独立危险因素。AUC 评价预测模型预测能力。赋予风险分值建立评分系统，以均值作为危险分层，划分高风险组和低风险组。最后将验证组数据代入模型及评分系统进行验证。

结果：共纳入我院 II 型肝癌患者资料 95 例作为建模组，TCIA 29 例为验证组，早期复发率分别为 33.7% 和 62.0%。在建模组中，多因素分析结果显示：年龄 (HR, 0.93, 95%CI, 0.89-0.97, P=0.001)、组织学分级 (HR, 2.03, 95%CI, 1.01-3.77, P=0.024)、AFP (HR, 3.39, 95%CI, 1.37-8.41, P=0.008)、瘤内出血 (HR, 4.19, 95%CI, 1.84-9.52, P=0.001) 是早期复发相关的独立危险因素。模型预测早期复发的诊断效能，建模组 AUC 为 0.817 (95%CI, 0.72-0.89)，验证组 AUC 为 0.922 (95%CI, 0.76-0.99)。由以上 4 个变量赋值建立评分系统，累积总分 0-6 分。将 ≤ 3 分划分为早期复发的低风险组， >3 分为高风险组，相比低风险组，高风险组的患者无复发生存率低 (40.0% vs 73.2%, P=0.001)，验证组得到一致的结果 (25.0% vs 73.3%, P=0.028)。

结论：年龄 <52 岁、组织病理分级低、AFP 增高、术前影像见瘤内出血是 II 型肝癌早期复发的独立危险因素。本研究所建立的评分系统经验证具有较好的区分度和预测能力，能够预测 II 型肝癌早期复发的风险，为临床医生识别高危人群提供重要参考。

PO-2089

腹膜后副神经节瘤的多模态影像表现

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本文报道一例腹膜后副神经节瘤 (Primary retroperitoneal paraganglioma) 的多模态影像表现并分析其误诊原因。回顾性分析误诊为孤立性纤维瘤 1 例，经病理证实为腹膜后副神经节瘤。影像表现为左下腹膜后较大肿块 T1WI 呈低/稍高混杂信号，STIR 呈明显高信号，内部见血管流空信号影，DWI 呈扩散受限，增强病灶明显不均匀强化，内部见低强化囊变区，内部见明显强化血管影，

周围组织成推压改变。患者临床表现不明显。腹主动脉旁、肾门附近及下腔静脉旁囊实性圆形、类圆形肿块,伴有囊变、坏死、出血、钙化,增强扫描呈明显持续性强化,且病灶内见流空血管影,实验室检查儿茶酚胺类物质数值增加者,在鉴别诊断中要考虑到此病可能,最终确诊需要根据病理及免疫组化检查。

PO-2090

联合多模态磁共振成像在肝细胞癌病理分级诊断的应用

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目的: 评价弥散加权成像(DWI)、磁敏感加权成像(SWI)、体素内不相干运动成像(IVIM)在肝细胞癌(HCC)病理分级中的诊断价值。方法:前瞻性选取我院就诊,根据临床诊断或超声、CT 等影像学检查诊断为 HCC 的患者 65 例,所有患者均行 MRI 平扫、DWI、IVIM 及 SWI 检查,共有 40 例患者共 47 个病灶符合纳入标准,根据病理结果分为高级别 HCC 组和低级别 HCC 组两组。利用后处理工作站及软件观察图像及测量参数值,记录 SWI 图像上肿瘤内的磁敏感信号(ITSS)的数量,并进行评分,在 DWI、IVIM 图像上人工勾画 ROI,测量 ADC、D、D*以及 f 值。最后整合各值利用 SPSS 23.0 软件进行统计学分析。结果: 1.肝细胞癌最大直径在高低级别 HCC 组之间无统计学差异。2.高级别 HCC 组的 ITSS 评分高于低级别组,且差异有统计学意义 ($P<0.05$),ITSS 评分与 HCC 分级呈正相关。曲线下面积 AUC 为 0.73,当评分取 1.5 时,其灵敏度为 86.4%,特异度为 76%。3. ADC、D 值在高、低级别 HCC 组之间的差异有统计学意义, D*、f 值在高、低级别 HCC 组之间的差异不具有统计学意义($P>0.05$)。ADC 和 D 值与 HCC 病理分级的相关系数分别为-0.33($P<0.05$), -0.446。4.联合 IVIM 和 DWI 诊断高低级别肝细胞癌的 AUC 为 0.82,灵敏度和特异度分别是 68% 和 92%;联合 SWI 和 DWI 诊断高低级别肝细胞癌的 AUC 为 0.89,灵敏度和特异度分别是 96%和 88%;联合 SWI 和 IVIM 诊断高低级别肝细胞癌的 AUC 为 0.90,灵敏度和特异度分别是 77%和 88%;联合 IVIM、SWI 和 DWI 诊断高低级别肝细胞癌的 AUC 为 0.92,灵敏度和特异度分别是 91% 和 84%。对比分析各联合诊断的 ROC 曲线显示,任意两者比较无统计学差异

PO-2091

基于双能 CT 细胞外体积分数图的直方图分析 识别胃癌微卫星不稳定状态的价值

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目的: 探讨基于双能 CT 细胞外体积分数图的直方图参数预测微卫星不稳定(MSI)状态的可行性。方法: 回顾性分析 23 例 MSI 胃癌(MSI 组)及 37 例微卫星稳定(MSS)胃癌(MSS 组)患者的资料。所有患者均经术后病理检查证实,且术前均接受腹部能谱 CT 成像。使用 ADW 4.6 工作站的 GSI Viewer 软件重建平衡期碘(水)图,导入 MatLab 软件计算 ECVf 图,计算公式为: $ECVf(\%) = (1 - \text{红细胞压积}) \times (ID_{\text{tumor}} / ID_{\text{aorta}}) \times 100$,其中红细胞压积于检查前 3 天内采集 ID_{tumor} 和 ID_{aorta} 分别为肿瘤和主动脉平衡期的碘密度。然后将 ECVf 图导入 uAI Research Portal 平台,选取病灶最大层面及其相邻上下两个层面沿病灶边缘勾画 ROI 并进行直方图分析,获得 18 种纹理特征。比较两组间各纹理参数的差异并采用 Logistic 回归将纹理参数进行联合,通过 ROC 曲线分析不同纹理参数及参数联合预测的效能。

结果: MSI 组的峰度 (25.86 ± 5.21 vs. 21.00 ± 3.35) 和第 10 百分位数 (21.57 ± 3.65 vs. 16.89 ± 4.56) 明显低于 MSS 组 ($P < 0.05$), 峰度、第 10 百分位数及两参数联合预测胃癌 MSI 的效能分别为 0.777, 0.762 和 0.827。

结论: 基于双能 CT 细胞外体积分数的直方图分析可在术前无创预测胃癌 MSI 状态, 且将多纹理参数联合后预测效能更优。

PO-2092

多模态磁共振成像对宫颈癌的诊断及在宫颈癌分化程度的相关性研究

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目的: 探讨和比较 DWI、IVIM 和 DKI 在宫颈癌中的诊断及其与分化程度的相关性。

方法: 回顾性分析 39 例宫颈癌 (宫颈癌组) 和 30 例正常宫颈病人 (正常宫颈组) 的 DWI, IVIM 和 DKI 影像学资料。DWI 单指数模型 ADC 值, IVIM 相关双指数参数 [慢扩散系数 (ADC- slow, D), 快速扩散系数 (ADC- fast, D*) 和扩散分数 (f)] 和 DKI 相关参数 [表观扩散系数 (MK), 表观峰度系数 (MD)], 比较不同分化程度的宫颈癌组, 正常宫颈组和宫颈癌的参数差异。

结果:

1. 相较于正常宫颈组织, 宫颈癌的 ADC、D、MD 值降低, 而 D*、f、MK 值升高, 各参数值均有统计学意义 ($P < 0.05$); D 值具有最佳的诊断效能;

2. 宫颈癌的分化程度越高, ADC、D、MD 值越大, D*、f、MK 值越小。分化的程度不同的宫颈癌分别比较, ADC、D、MK 值差异都有统计学意义 ($P < 0.05$), 在鉴别低和中高分化、高和中低分化宫颈癌时, MK 值具有最佳诊断效能 ($P < 0.003$), f 值在鉴别高和中低分化宫颈癌中差异无统计学意义 ($P > 0.05$), MD 值在鉴别低和高中分化宫颈癌中差异无统计学意义 ($P > 0.05$)。

结论:

1、鉴别宫颈癌和正常宫颈组织方面, DWI、IVIM、DKI 均具有一定作用;

2、鉴别不同分化程度宫颈癌方面, IVIM 和 DKI 有着重要的意义。

PO-2093

治疗前中性粒细胞/淋巴细胞比值联合基于腹部 CT 的身体成分参数在乳腺癌患者新辅助化疗疗效中的预测价值

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目的: 探讨新辅助化疗前中性粒细胞/淋巴细胞比值 (neutrophil to lymphocyte ratio, NLR) 联合基于腹部 CT 的身体成分参数对乳腺癌患者新辅助化疗病理完全缓解 (pathologic complete response, pCR) 的预测价值。

方法: 对 85 例接受新辅助化疗的非转移性乳腺癌患者进行研究, 其中, 新辅助化疗后达到 pCR 者 (pCR 组) 26 例, 未达到 pCR 者 (Non-pCR 组) 59 例。收集患者治疗前临床病理参数和治疗前一周内的腹部 CT 图像。利用腹部 CT 图像在第 3 腰椎水平获得骨骼肌面积 (SMA)、内脏脂肪面积 (VFA) 和皮下脂肪面积 (SFA), 高 VFA 和高 SFA 定义为 $\geq 100 \text{ cm}^2$, 用身高 (m) 对 SMA 进行标准化, 计算骨骼肌指数 (SMI), 低肌肉量定义为 $\text{SMI} < 39 \text{ cm}^2/\text{m}^2$ 。采用单因素和多因素

Logistic 回归分析筛选出 pCR 的独立预测因素。使用 ROC 曲线来分析 Logistic 回归模型对 pCR 的预测效能。

结果: 比起 Non-pCR 组, pCR 组 SMI 更高, SFA 更小, ki67 指数更大, 雌激素受体阳性率更高, T 分期更低, NLR 更低 ($P < 0.05$), 两组间年龄、体重、BMI、VFA、孕激素受体表达状态、Her-2 表达、绝经状态、N 分期差异无统计学意义。多因素 Logistic 回归分析显示高 SMI、低 SFA、高 Ki67 指数和低 NLR 是非转移性乳腺癌患者新辅助化疗后 pCR 的独立预测因素, 联合这四个指标构建的综合模型的 AUC 为 0.882 (95CI: 0.793-0.942), 敏感性为 0.923, 特异性为 0.729。

结论: 乳腺癌患者新辅助化疗前 NLR 和基于腹部 CT 的身体成分参数对预测新辅助化疗后的病理完全缓解有一定价值, 可为乳腺癌的个体化治疗提供参考。

PO-2094

探究扩散峰度成像 (DKI) 定量参数预测宫颈癌病理分型

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目的

探讨扩散峰度成像 (diffusion kurtosis imaging, DKI) 定量参数对宫颈癌病理分型的预测价值。

材料与方法

回顾性收集经手术病理证实的宫颈癌患者 29 例, 其中鳞癌 (鳞癌组) 19 例, 腺癌 (腺癌组) 10 例。所有患者均行 1.5T MRI 检查, 扫描序列包括 T1WI、T2WI、DKI。在 GE AW4.6 工作站, 使用 Functool 软件对 DKI 图像进行后处理, 测量两组病灶实质区各 DKI 参数值, 包括平均扩散峰度 (MK) 和平均扩散系数 (MD)。采用独立样本 t 检验或 Mann-Whitney U 检验比较两组间定量参数的差异; 使用受试者操作特征 (ROC) 分析评估预测效能。

结果

腺癌组的 MD 值 [1.83 (1.21, 2.30)] 显著高于鳞癌组 [1.05 (0.74, 1.91)] ($P < 0.05$), MK 值在两组间无统计学差异 ($P > 0.05$)。MD 值预测腺癌的曲线下面积 (AUC) 为 0.737, 阈值、敏感度、特异度分别为 2.03 $\mu\text{m}^2/\text{ms}$ 、50%、94.7%。

结论

DKI 定量参数可无创性地预测宫颈癌分型, 具有一定的临床应用价值。

PO-2095

基于机器学习的 CT 影像组学方法预测肝细胞肝癌 M2 级微血管侵犯

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目的: 探索影像组学模型预测肝细胞肝癌 M2 级微血管侵犯的诊断效能。

方法: 该研究为单中心回顾性研究。纳入标准为年龄 18-99 岁、2016 年 9 月至 2021 年 8 月于我院行术前增强 CT 及免疫组化检查、行肝细胞肝癌手术切除的患者。金标准为免疫组化检查。研究对象以 7:3 的比例随机分为训练集和测试集。由三名影像科医生在动脉期和门静脉期 CT 图像上手动勾画肝细胞肝癌区域。分别使用从动脉期、门静脉期感兴趣区提取的影像组学特征构建动脉期、门静脉期影像组学模型。使用影像组学特征、人口学信息、实验室检查和影像特征构建联合影像组学

模型。使用回归特征消除进行特征选择, 使用支持向量机作为分类器。使用受试者特征 (receiver operating characteristic, ROC) 曲线、校准曲线和决策曲线分析评价模型的预测效能。

结果: 研究共纳入 255 例患者, 其中 M2 级微血管侵犯者 47 例。动脉期、门静脉期和联合影像组学模型分别纳入 17 个、5 个和 18 个特征, 测试集的 ROC 曲线下面积分别为 0.826 (95%置信区间 0.719,0.933), 0.806 (95%置信区间 0.699,0.914) and 0.870 (95%置信区间 0.779,0.961)。校准曲线和决策曲线分析显示联合影像组学模型具有良好的临床应用价值。

结论: 联合影像组学模型在预测肝细胞肝癌 M2 级微血管侵犯中具有较好的诊断效能。

PO-2096

基于机器学习的 CT 影像组学方法预测肝细胞肝癌高 Ki-67 表达

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目的: 探索联合影像组学模型对肝细胞肝癌高 Ki-67 表达 ($\geq 30\%$) 的诊断效能。

方法: 该研究为单中心回顾性研究。纳入标准为年龄 18-99 岁、2016 年 12 月至 2021 年 8 月于我院行术前增强 CT 及免疫组化检查、行肝细胞肝癌手术切除的患者。金标准为免疫组化检查。研究对象以 7:3 的比例随机分为训练集和测试集。由三名影像科医生在动脉期和门静脉期 CT 图像上手动勾画肝细胞肝癌区域。使用从感兴趣区提取的影像组学特征、人口学信息、实验室检查和影像特征构建联合影像组学模型。使用回归特征消除进行特征选择, 使用支持向量机作为分类器。使用受试者特征 (receiver operating characteristic, ROC) 曲线、校准曲线和决策曲线分析评价模型的预测效能。

结果: 研究共纳入 207 例患者, 其中高 Ki-67 表达者 111 例。联合影像组学模型最终纳入 18 个特征。训练集和测试集的 ROC 曲线下面积分别为 0.870 (95%置信区间 0.812,0.929) 和 0.722 (95%置信区间 0.594,0.850)。校准曲线和决策曲线分析显示联合影像组学模型具有良好的临床应用价值。

结论: 联合影像组学模型在预测肝细胞肝癌高 Ki-67 表达中具有较好的诊断效能。

PO-2097

基于 DKI 的全肿瘤及瘤周多参数在预测肝细胞癌微血管侵犯中的价值

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目的: 微血管侵犯 (MVI) 是导致肝切除和移植后预后较差的独立因素, 评估扩散峰度成像 (DKI) 在预测肝细胞癌微血管侵袭的鉴别能力。

方法: 对我院经病理证实的 63 例原发性肝癌患者进行回顾性分析。将患者分为 MVI 阳性组 ($n=22$) 和 MVI 阴性组 ($n=41$)。采集常规 MRI Ax T1 FSPGR、Ax T2 FSE、DWI 序列、双回声序列、DKI 序列。使用 GE AW 4.6 工作站上的 Functool 软件, 从 DKI 序列自动生成定量 DKI 衍生图谱, 包括 FA、MD、Da、Dr、FAK、MK、Ka 和 Kr。参考 DWI 图像上获得的病变信息, 将 FA、MD、Da、Dr、FAK、MK、Ka 和 Kr 图导入 3DSlicer-5.0.3 中逐层勾画肿瘤边缘、瘤周区域分别等距外扩 (8mm), 所有肿瘤及瘤周的每个参数的平均值用于进一步的统计分析。采用独立样本 t 检验或 Mann-Whitney U 检验比较各参数值的差异, 采用受试者工作特征 (ROC) 曲线评估有统计学意义的参数预测肝细胞癌微血管侵犯中的价值。

结果: MVI 阳性组和 MVI 阴性组之间的全肿瘤 DKI 参数比较, MVI 阴性组的 MK、Ka 和 FA 值显著低于 MVI 阳性组 ($P<0.05$); MK、Ka 和 FA 预测 MVI 的 AUC 分别为 0.744、0.622、0.721,

组合 (Ka+MK+FA) 为 0.812。当组合 (Ka+MK+FA) 时, AUC 得到改善, 灵敏度为 45.5%, 特异性为 100% (临界值: 0.740); MVI 阳性组和 MVI 阴性组之间的瘤周 DKI 参数比较, MVI 阴性组瘤周的 MK、Ka 值显著低于 MVI 阳性组瘤周 ($P<0.05$); MK、Ka 预测 MVI 的 AUC 分别为 0.811、0.712, 组合瘤周 (MK+Ka) 为 0.824, 当组合瘤周 (MK+Ka) 时, AUC 得到改善, 灵敏度为 54.2%, 特异性为 98% (临界值: 0.735)。

结论: 基于 DKI 的全肿瘤及瘤周定量参数对识别 HCC 中的微血管侵犯具有一定的价值, 具有很好的临床应用前景, 其中全肿瘤和瘤周 MK、Ka 值具有较高价值。

PO-2098

3D-ASL 序列评估慢性肾病患者肾纤维化程度的价值

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目的: 本研究旨在探索 3D-ASL 序列与纤维化肾脏组织病理学指标之间的关联关系, 通过病理指标和 ASL 序列的参数的映射关联, 验证 ASL 序列在评估 CKD 患者肾脏纤维化程度中的价值。方法: 通过回顾性队列研究数据, 收集大连医科大学附属第一医院 2020 年 5 月至 2023 年 9 月接受肾脏功能磁共振检查的 CKD 患者。扫描序列包括 3.0 T 磁共振常规序列及 3D-ASL 序列, 所有患者在 MRI 检查后 3 天内, 在超声引导下肾活检。肾活检方法采用国家肾脏疾病临床医学研究中心发明并推广的“B 超引导下斜角进针负压吸引一秒钟快速经皮肾活检法”。收集肾活检常规病理数据(球性硬化比例)以及肾脏病理诊断。球性硬化比例=硬化肾小球数量/切片上所有肾小球数量。根据肾小球球性硬化百分比进行分组, 以小于 10%, 10%-30%, 30%-50%和大于 50%分为四组, 分析对应的磁共振序列参数变化。采用 SPSS 27.0 统计学软件(IBM SPSS Statistics)进行统计分析。功能磁共振序列参数与肾纤维化病理指标的相关关系采用皮尔逊相关系数(Pearson's r)或斯皮尔曼相关系数(Spearman's Rho)。所有检验均为双侧检验, $P<0.05$ 为差异有统计学意义, $P<0.01$ 为差异有非常显著统计学意义。

结果: 双肾皮、髓质区的 RBF 值在不同球性硬化分组间均存在统计学差异 ($P<0.05$)。肾皮、髓质区的 RBF 值与球性硬化百分比之间的相关性分析发现, 右肾皮质 RBF 值、左肾髓质 PBF 值与球性硬化比例之间均存在显著负相关性, 分别为: $Rho = -0.597, P<0.01$; $Rho = -0.613, P<0.01$ 。

结论: 3D-ASL 序列对评估慢性肾纤维化程度具有优势。本研究将 3D-ASL 序列的参数与肾脏病理纤维化指标进行相关性分析, 以明确其对肾脏纤维化的评估作用和 CKD 进展的预后判断能力。未来可以尝试用于患者远期预后判断和随访过程中肾脏慢性化病变进展的监测。

PO-2099

基于 DKI 的全肿瘤及瘤周多参数在预测肝细胞癌早期复发中的价值

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目的: 肝细胞癌 (HCC) 手术切除后的 5 年总生存率仅为 30-40%, 70%的患者在 5 年内肿瘤复发, 评估扩散峰度成像 (DKI) 对肝细胞癌根治性切除后两年早期复发 (ER) 的预测能力。

方法: 对我院经病理证实的 35 例原发性肝癌患者进行回顾性分析。将患者分为早期复发 (ER) 组 ($n=20$) 和非早期复发 (NER) 组 ($n=15$)。使用 GE AW 4.6 工作站上的 Functool 软件, 从 DKI 序列自动生成定量 DKI 衍生图谱, 包括 FA、MD、Da、Dr、FAK、MK、Ka 和 Kr。参考 DWI 图像上获得的病变信息, 将参数图导入 3DSlicer-5.0.3 中逐层勾画肿瘤边缘、瘤周区域分别等距外扩

(8mm)，所有肿瘤及瘤周的每个参数的平均值用于进一步的统计分析。采用独立样本 t 检验或 Mann-Whitney U 检验比较各参数值的差异，采用受试者工作特征 (ROC) 曲线评估有统计学意义的参数预测肝细胞癌早期复发的价值。

结果：ER 组和 NER 组之间的全肿瘤 DKI 参数比较：NER 组 MK 值明显低于 ER 组 ($P<0.05$)，Da 值明显高于 ER 组 ($P<0.01$)；用于预测 ER 的 MK 和 Da 的 AUC 分别为 0.710、0.760，组合 (MK+Da) 为 0.807。当组合 (MK+Da) 时，AUC 得到改善，灵敏度为 80.0%，特异性为 75.0% (临界值：0.423)。ER 组和 NER 组之间的瘤周 DKI 参数比较：NER 组 MK 和 Fa 值明显低于 ER 组 ($P<0.05$)，Da 值明显高于 ER 组 ($P<0.01$)；用于预测 ER 的瘤周 MK、Fa、Da 的 AUC 分别为 0.812、0.802、0.734，组合瘤周 (MK+Fa+Da) 为 0.832。当组合瘤周 (MK+Fa+Da) 时，AUC 得到改善，灵敏度为 85.5%，特异性为 89.0% (临界值：0.623)；组合全肿瘤 (MK+Da) 和瘤周 (MK+Fa+Da) 为 0.912，灵敏度为 91.2%，特异性为 95%。

结论：基于 DKI 的全肿瘤及瘤周定量参数对预测肝细胞癌早期复发具有一定的价值，具有很好的临床应用前景，其中全肿瘤和瘤周 MK、Da 值具有较高价值。

PO-2100

4 例不同部位血管球瘤的 CT 影像特征及文献复习

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目的 探讨血管球瘤 (Glomus tumor, GT) 的 CT 平扫及增强扫描的影像特征。方法 回顾性分析本院经手术病理诊断证实的 4 例 GT 患者术前临床及 CT 影像学资料，分析不同部位 GT 的 CT 影像特征。结果 本组 4 例患者发病部位及主要临床表现：左肾 1 例，反复左腰部隐痛；胃窦 1 例，剑突下疼痛；食管 1 例，吞咽困难；左肺下叶背段 1 例，无明显不适。病灶平扫均密度均匀，边界清，3 例有点状钙化，1 例无钙化，4 例均无坏死囊变及空洞，4 例增强扫描动脉期呈边缘结节样明显强化，静脉期及延迟期呈逐渐均匀强化，增强扫描各期病灶密度与主动脉相似。结论 GT 的 CT 动态增强扫描表现具有一定特征性，能有效提高术前诊断准确率，为临床术前评估提供重要的指导价值。

PO-2101

非酒精性脂肪性肝病肝纤维化分期：非增强 T1 ρ 色散成像与基于 Gd-EOB-DTPA 增强 T1mapping 细胞外体积成像比较

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目的：比较评估 T1 ρ 值、T1 ρ 色散值、肝胆期 T1 值和细胞外体积分数 (extracellular volume fraction, ECV) 对于非酒精性脂肪性肝病兔肝纤维化的评估价值。

材料与方法：60 只新西兰大白兔随机分配到标准对照组 ($n=12$) 和不同高脂高胆固醇饮食喂养周数的 NAFLD 模型组 (共 6 组包括 2 周、4 周、6 周、8 周、10 周和 12 周组，每组 8 只兔子)。所有兔子在相应时间节点完成 T1 ρ mapping (FSL=0Hz 和 500Hz)，native T1mapping 和增强 Gd-EOB-DTPA 肝胆期 T1mapping 扫描，扫描完成获取肝脏标本。测量 T1 ρ 值、T1 ρ 色散值、肝胆期 T1 值和 ECV。根据 NASH CRN 评分系统，对组织病理学结果进行评估。使用组内相关系数、方差分析、多元线性回归和受试者工作特征曲线进行统计分析。

结果：在多元回归分析中，肝纤维化是唯一独立影响 T1 ρ 色散值的独立因素 ($R^2=0.746$, $P=0.000$)。相反，肝细胞脂肪变性、小叶炎症和纤维化与 T1 ρ 独立相关 ($R^2=0.799$, $P=0.000$)。肝小叶炎症、肝细胞气球样变性和肝纤维化是肝胆期 T1 值的独立因素 (R^2 分别为 0.631,

$P=0.000$)。肝细胞气球样变性和肝纤维化是影响 ECV 的独立因素 ($R^2=0.728$, $P=0.000$)。对于诊断早期肝纤维化 ($\geq F1$) 和显著肝纤维化 ($\geq F2$), T1 ρ 色散值具有最佳的诊断效能(AUC 分别为 0.849 和 0.916), 其次为 ECV (AUC 分别为 0.821 和 0.905), 然而 1 ρ 色散值和 ECV 诊断效能无统计学差异 ($P>0.05$)。

结论: 非增强 T1 ρ 色散成像在识别早期肝纤维化上与基于 Gd-EOB-DTPA 增强 T1mapping 的 ECV 成像诊断效能相当, 但具有无需注射对比剂和延长扫描时间优点, 有利于对非酒精性脂肪性肝病进行纵向监测和多次随访。

PO-2102

DTI 与 T1mapping 序列评估慢性肾病纤维化程度的价值

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目的: 本研究旨在探索功能磁共振序列与纤维化肾脏组织病理学指标之间的关联关系, 通过病理指标和磁共振序列参数的映射关联, 验证 DTI 序列和 T1mapping 序列在评估 CKD 患者肾脏纤维化程度中的价值。方法: 通过回顾性队列研究数据, 收集大连医科大学附属第一医院 2020 年 5 月至 2023 年 8 月接受肾脏功能磁共振检查的 CKD 患者。扫描序列包括 3.0 T 磁共振扩散张量成像 (diffusion tensor imaging, DTI) 和 T1mapping 序列。功能磁共振参数值分别为 FA 值和 T1 值。所有患者在 MRI 检查后 3 天内, 在超声引导下肾活检。收集肾活检常规病理数据(球性硬化比例)以及肾脏病理诊断。球性硬化比例=硬化肾小球数量/切片上所有肾小球数量。根据肾小球球性硬化百分比进行分组, 以小于 10%, 10%-30%, 30%-50%和大于 50%分为四组, 分析对应的磁共振序列参数变化。采用 SPSS 27.0 统计学软件(IBM SPSS Statistics)进行统计分析。功能磁共振序列参数与肾纤维化病理指标的相关关系采用皮尔逊相关系数(Pearson's r)或斯皮尔曼相关系数(Spearman's Rho)。所有检验均为双侧检验, $P<0.05$ 为差异有统计学意义, $P<0.01$ 为差异有显著的统计学意义。结果: DTI 序列和 T1mapping 序列在不同球性硬化分组间均存在统计学差异 ($P<0.05$)。就 DTI 序列和 T1mapping 序列与球性硬化百分比之间的相关性分析发现, DTI 序列参数值 (FA 值) 与球性硬化比例之间存在显著负相关性 ($Rho=-0.693, P<0.01$)。T1mapping 序列参数值 (T1 值) 与球性硬化比例之间存在显著正相关性 ($Rho=0.552, P<0.01$)。结论: DTI 序列和 T1mapping 序列对评估慢性肾病纤维化程度具有优势。本研究将 DTI 序列和 T1mapping 序列与肾脏病理纤维化指标进行相关性分析, 以明确其对肾脏纤维化的评估作用和 CKD 进展的预后判断能力。未来可以尝试用于患者远期预后判断和随访过程中肾脏慢性化病变进展的监测。

PO-2103

压缩感知 3D MRU 与常规 3D MRU 对采集时间、图像质量和诊断效能的对照研究

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目的 通过对压缩感知 (compressed sensing, CS) 3D 磁共振尿路成像 (magnetic resonance urography, MRU) 和常规 3D MRU 的采集时间、图像质量和诊断效能对比分析, 探讨压缩感知 3D MRU 的临床可行性。

材料与方法 56 名患者进行 MRU 检查, 采集序列包括屏气压缩感知 MRU(breath-holding CS MRU, BH-CS MRU), 导航触发压缩感知 MRU(navigator-triggered CS MRU, NT-CS MRU)和常规导航触发 MRU(conventional NT MRU, cNT MRU)。借助 5 分法 (1-5, 差-优) 评估图像质量包括尿路显

示锐度、背景抑制程度。依据尿路病变检出难易程度对不同序列进行 5 分法评估。计算不同序列的敏感度、特异度、受试者工作特征曲线下面积(area under the receiver operating characteristic curve, AUC), 以量化诊断效能。

结果 BH-CS MRU 序列的采集时间是 17s。NT-CS MRU 和 cNT MRU 的采集时间分别是 213.8 ± 62.5 s 和 512.8 ± 106.7 s ($p < 0.001$)。BH-CS MRU 序列显示尿路锐度好于 NT-CS MRU 和 cNT MRU ($p = 0.038$, $p = 0.030$)。NT-CS MRU 序列显示背景抑制效果好于 BH-CS MRU 和 cNT MRU ($p = 0.038$, $p = 0.042$)。3 种 MRU 序列诊断效能相当($p = 0.783$)。

结论 与 cNT MRU 相比, BH-CS MRU 和 NT-CS MRU 以较好的图像质量、较短的采集时间和相当的诊断效能临床中具有可行性。

PO-2104

基于 MRI 的超出米兰标准的多结节性 HCC 患者预后分层系统

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研究目的: 确定超出米兰标准的多结节型肝细胞癌 (MHCC) 患者肝切除术后的临床影像预后因素, 并进一步构建预后分层系统。

研究方法: 回顾性连续纳入自 2015 年 1 月至 2019 年 1 月期间, 肝切除术前接受增强 MRI 检查, 且经病理证实的超出米兰标准的 MHCC 患者。收集并分析术前临床资料及影像学特征。采用多因素 Cox 回归选择与无复发生存期 (RFS) 和总生存期 (OS) 相关的临床影像学因素, 并构建预测模型。采用 Harrell 一致性指数 (C 指数) 和校正曲线对模型进行评价。进一步构建基于预测模型的风险分层系统。

研究结果: 共计 176 名超出米兰标准的 MHCC 患者纳入本研究。谷草转氨酶 >40 U/L (HR: 1.533; 95%CI: 1.028-2.289; $P=0.036$)、肿瘤负荷评分增加 (HR: 1.088; 95%CI: 1.010-1.172; $P=0.026$)、影像学肝硬化 (HR: 1.465; 95%CI: 1.029-2.085; $P=0.034$) 和肿瘤边缘不光滑 (HR: 2.461; 95%CI: 1.454-4.165; $P=0.001$) 是超出米兰标准的 MHCC 接受肝切除术后不良 RFS 的独立危险因素, 谷草转氨酶 >40 U/L (HR: 1.796; 95%CI: 1.070-3.015; $P=0.027$)、甲胎蛋白 >400 ng/mL (HR: 2.111; 95%CI: 1.129-3.945, $P=0.019$) 和影像学肝硬化 (HR: 1.792; 95%CI: 1.058-3.035; $P=0.030$) 是术后不良 OS 的独立危险因素。根据以上临床影像学因素构建的预测 RFS 和 OS 的预测模型显示出较好的预测效能, C 指数分别为 0.653 (95%CI: 0.602-0.794) 和 0.685 (95%CI: 0.623-0.747)。基于预测模型, 超出米兰标准的 MHCC 被进一步分成三组, 具有显著不同的 RFS 和 OS ($P<0.001$)。

研究结论: 提出了基于 MRI 的预后分层系统, 有助于对超出米兰标准的 MHCC 进行优化和分层, 以选择最适合手术切除的对象。

PO-2105

DTI 与 T1mapping 序列评估慢性肾脏病患者肾功能的价值

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目的: 本研究旨在探索功能磁共振序列与肾功能指标之间的关联关系, 通过肾功能指标和磁共振序列参数的映射关联, 验证 DTI 序列和 T1mapping 序列在评估 CKD 患者肾功能中的价值。方法: 回顾性分析大连医科大学附属第一医院 2020 年 5 月至 2023 年 8 月接受肾脏功能磁共振检查的 CKD 患者, 收集患者的临床资料和影像资料。扫描序列包括 3.0 T 磁共振扩散张量成像 (diffusion tensor

imaging, DTI) 和 T1mapping 序列。功能磁共振参数值分别为 FA 值和 T1 值。通过基于肌酐的 CKD-EPI 公式计算肾小球滤过率 (GFR)。GFR = $a \times (\text{血肌酐浓度}/b)^c \times (0.993)^{\frac{\text{年龄}}{24}}$ [a 参数值: 女性 = 144, 男性 = 141。b 参数值: 女性 = 0.7, 男性 = 0.9。c 参数值根据血肌酐大小采用如下数值: 女性: 血肌酐 ≤ 0.7 mg/dL = -0.329, 血肌酐 > 0.7 mg/dL = -1.209; 男性: 血肌酐 ≤ 0.7 mg/dL = -0.411, 血肌酐 > 0.7 mg/dL = -1.209]。根据 GFR 对患者进行 CKD 分期, 分析功能磁共振序列与 CKD 患者 GFR 之间的相关关系。采用 SPSS 27.0 统计学软件 (IBM SPSS Statistics) 进行统计分析。功能磁共振序列参数与肾功能指标的相关关系采用皮尔逊相关系数 (Pearson's r) 或斯皮尔曼相关系数 (Spearman's Rho), $P < 0.05$ 为差异有统计学意义。结果: DTI 和 T1mapping 序列在不同 CKD 分期间均存在统计学差异 ($P < 0.05$)。就 DTI 和 T1mapping 序列与 GFR 之间的相关性分析发现, DTI 序列参数值 (FA 值) 与 GFR 之间存在负相关性 ($Rho = -0.434, P < 0.05$)。T1mapping 序列参数值 (T1 值) 与 GFR 之间存在正相关性 ($Rho = 0.544, P < 0.05$)。结论: DTI 序列和 T1mapping 序列与 GFR 之间存在较好的相关性, 对评估慢性肾脏病患者的肾功能具有优势, 有可能作为 CKD 患者肾功能损伤的评判候选指标, 在 CKD 的分层诊断和预测上具有重要意义和研究前景。

PO-2106

酰胺质子转移成像联合 Mapping 在肝脏局灶性病变诊断中的价值研究

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目的: 探讨酰胺质子转移加权 (amide proton transfer, APTw) 成像联合 Mapping 序列对肝脏局灶性病变 (Focal liver lesions, FLLs) 诊断的价值。方法: 回顾性分析 2021 年 1 月至 2023 年 5 月于大连医科大学附属第一医院行 3.0T MRI 扫描的肝脏局灶性病变患者的临床及影像资料, 扫描序列包括 APT 序列、T1 Mapping 序列和 T2 Mapping 序列。共纳入 67 例肝脏局灶性病变患者, 包括肝血管瘤 21 例、转移瘤 18 例、原发性肝癌 28 例 (肝细胞肝癌 14 例、胆管细胞癌 14 例)。根据病理诊断结果将患者分为良性肿瘤组 (21 例)、继发性恶性肿瘤组 (18 例)、原发性恶性肿瘤组 (28 例)。根据数据是否符合正态分布, 采用方差分析或 Kruskal Wallis 秩和检验比较各参数的差异。采用受试者工作特征 (receiver operating characteristic, ROC) 曲线评估 APT、T1/T2 Mapping 及其联合对肝脏局灶性病变良恶性的鉴别价值, 并计算其 ROC 曲线下面积 (AUC)、灵敏度和特异度。结果: 原发性恶性肿瘤组的 APT 值高于良性肿瘤组和继发性恶性肿瘤组; 良性肿瘤组的 T1 mapping 值高于原发性恶性肿瘤组和继发性恶性肿瘤组; 良性肿瘤组的 T2 mapping 值高于原发性恶性肿瘤组和继发性恶性肿瘤组, 差异均具有统计学意义 ($P < 0.05$)。此外, 良性肿瘤组和恶性肿瘤组之间的 APT 值和 T2 mapping 值的存在显著差异 ($P < 0.05$)。APT 值、T2 mapping 值以及两者联合诊断肝脏局灶性病变良恶性的 AUC 分别为 0.549、0.831、0.835, 敏感度分别为 0.609、0.848、0.848, 特异度分别为 0.571、0.857、0.143。结论: APT 值、T2 mapping 值以及它们的联合应用在诊断肝脏局灶性病变的良恶性方面都具有潜在的诊断价值, 特别是 T2 mapping 在敏感度和特异度方面表现出色。本研究为临床医生提供了一种有潜力的非侵入性诊断工具, 以更准确地评估患者的肝脏病变。

PO-2107

CT 联合肿瘤标志物对肝细胞癌的诊断及预后评价

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CT 联合肿瘤标志物对肝细胞癌的诊断及预后评价

目的:目前临床上唯一确认的 HCC 肿瘤标志物是 AFP, AFP 已被广泛用于 HCC 筛查, 但其敏感性非常有限(39-65%), 特异性不高(76-94%), 特别是对于小肝癌和早期 HCC。目前, 对 TM 的鉴定还处于起步阶段, 研究者正在尝试对 TM 单独或组合的性能进行评价。本研究旨在探讨 CT 联合肿瘤标志物(TM)在肝细胞癌(HCC)诊断及预后中的应用价值。

方法:选择 60 例肝癌患者为研究组, 均行肝切除术。另外, 40 名健康受试者作为对照组。研究组术前采血, 采集患者血液样本测定血清甲胎蛋白(AFP)、糖类抗原 19-9 (CA199)和癌胚抗原(CEA)水平。通过病理检查探讨血清 TM 水平与临床病理特征的相关性。通过螺旋 CT 平扫和增强扫描探讨 HCC 的影像学特征。采用受试者工作特征曲线(ROC)分析单独检测 TM、联合检测 TM、联合检测 TM 与 CT 的诊断效率。

结果:HCC 患者血清 AFP、CA19-9、CEA 水平均显著高于对照组($p<0.05$)。低分化无远处转移患者 AFP、CA19-9、CEA 水平高于高分化无远处转移患者($p<0.05$)。不同年龄、性别、临床分期 HCC 患者 TM 水平差异无统计学意义($p>0.05$)。ROC 分析显示, 单独检测血清 AFP、CEA 或 CA19-9 的特异性和敏感性较 3 种 TMs 联合检测低($p<0.05$)。CT 联合检查特异性为 93.47%, 敏感性为 88.23%, 优于 TMs 联合检查($p<0.05$)。5 例 HCC 患者术后 6 个月内复发。与术前比较, 复发患者血清 AFP、CA19-9、CEA 水平均显著升高, TM 水平高于未复发患者($p<0.05$)。

结论:血清 AFP、CA19-9、CEA 与 CT 联合检测可克服单一检测的不足, 避免误诊漏诊, 显著提高 HCC 的阳性检出率。

PO-2108

基于双能 CT 定量参数、影像征象及临床特征构建的机器学习模型预测胰腺癌 Ki-67 表达的临床价值

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背景与目的 胰腺癌是最具侵袭性的肿瘤之一, 其 Ki-67 的表达越高, 提示肿瘤分级越高, 侵袭性越强。本研究拟通过基于术前双能 CT 定量参数、影像征象及临床特征, 探究机器学习方法预测预测胰腺癌 Ki-67 表达的临床价值。

方法 回顾性分析重庆市人民医院在 2021 年 8 月—2023 年 2 月期间术前行双能 CT 检查的经病理证实的胰腺癌患者资料, 参考标准是经免疫组化检查明确的 Ki-67 增殖指数, 本研究根据既往研究以 50%作为临界值, 将患者分为 Ki-67 高表达组 ($Ki-67 > 50\%$) 和 Ki-67 低表达组 ($Ki-67 \leq 50\%$)。

双能 CT 定量参数包括动脉期和静脉期的标准化碘浓度 (NIC)、标准化有效原子序数 (NZeff)、能谱曲线斜率 (λHU) 以及细胞外容积分数 (ECV), 临床指标及影像征象包括年龄、性别、BMI、CEA、CA199、CA125、肿瘤位置、淋巴结转移情况、T 分期、胰管扩张情况、胰尾部萎缩情况、血管受侵情况。另将患者按照 7: 3 的比例随机分为训练集 ($n = 70$ 例) 和测试集 ($n = 30$ 例), 在训练集中应用 3 种机器学习方法支持向量机 (SVM)、极致梯度提升 (XGBoost) 及逻辑回归 (LR) 构建预测 Ki-67 表达的机器学习模型, 在验证集中独立验证模型的效能, 通过绘制受试者曲线 (ROC) 获得曲线下面积 (AUC) 值选择最优模型, 利用 SHAP 方法再选择最优特征。

结果 Ki-67 高表达组 ($Ki-67 > 50\%$) 有 56 人, Ki-67 低表达组 ($Ki-67 \leq 50\%$) 有 44 人。在验证集中, 基于双能 CT 定量参数、影像征象及临床指标构建的 SVM 模型的 AUC 值为 0.917, XGBoost 模型的 AUC 值为 0.960, LR 模型的 AUC 值为 0.767。基于效能最高的 XGBoost 模型利用 SHAP 方法可视化分析, 筛选出最强的 3 个特征为: ECV、动脉期斜率、门脉期斜率。
结论 本研究开发的基于双能 CT 定量参数和临床特征构建的机器学习模型能够有效地预测胰腺癌 Ki-67 表达情况, 其中 XGBoost 模型效能最高。

PO-2109

磁共振 Dixon 水脂分离技术在鉴别 2 型糖尿病患者中糖尿病肾病与非糖尿病肾病的价值

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目的: 探究磁共振 Dixon 水脂分离技术在鉴别 2 型糖尿病患者中糖尿病肾病与非糖尿病肾病的价值。
方法: 2019 年 2 月至 2023 年 6 月前瞻性、连续性纳入在解放军总医院第一医学中心行肾脏磁共振扫描并接受肾脏穿刺活检的 2 型糖尿病伴肾功能不全患者 92 例 (年龄 51.40 ± 9.92 , 男 68 例, 女 24 例), 同时招募健康对照组 28 名 (年龄 40.18 ± 12.09 , 男 21 例, 女 7 例), 测得双侧肾脏实质脂肪分数 (fat fraction, FF)。根据肾脏穿刺结果将患者分为 DN 组和 DNRD 组。应用 Kruskal-Wallis H 检验比较三组间的脂肪分数, 应用受试者工作特征 (ROC) 曲线分析肾脏 FF 对各亚组的诊断效能。

结果: 在 92 名 2 型糖尿病伴肾功能不全患者中, DN 患者为 41 例 (年龄 50.76 ± 9.56 , 男 32 例, 女 9 例), DNRD 患者为 51 例 (年龄 51.92 ± 10.26 , 男 36 例, 女 15 例)。DN 组及 DNRD 组肾脏 FF 值均显著高于健康对照组 ($1.73\% \text{ vs } 0.94\%$, $1.67\% \text{ vs } 0.94\%$; $P < 0.05$), 但 DN 组及 DNRD 组肾脏 FF 值不存在显著性差异 ($1.73\% \text{ vs } 1.67\%$, $P > 0.05$)。肾脏 FF 值鉴别 DN 组与志愿者及 DNRD 组与志愿者间的 AUC 值分别为 0.739 及 0.708。

结论: 2 型糖尿病伴肾损伤患者肾脏脂肪沉积程度显著高于健康志愿者, 但糖尿病肾病与非糖尿病肾病患者肾脏脂肪沉积程度类似。

PO-2110

光谱探测器 CT 虚拟单能量成像优化 Riolan 弓图像质量的研究

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[摘要] 目的: 本研究旨在探讨光谱探测器计算机断层摄影 (SDCT) 的虚拟单能图像 (Virtual Monoenergetic Images, VMI) 能否提高 Riolan 弓 (Arc of Riolan, AOR) 的可视化程度并确定最佳单能量水平 (keV), 以帮助外科医生更好地观察 AOR。方法: 纳入 2022 年 1-12 月在本院接受全腹部双能 CT 增强检查且 CTA 显示具有完整 Riolan 动脉弓的患者 33 例。使用动脉期基于光谱图像数据包 (spectral-based images, SBI) 重建常规图像 (conventional images, CI) 和 VMI (40~100 keV, 间隔 10 keV)。测量并比较不同单能量图像及常规图像上 Riolan 动脉弓的 CT 值及 SD 值、同层面左侧竖脊肌的 CT 值、背景 SD 值、信噪比 (SNR)、对比噪声比 (CNR) 及信号强度比 (SIR)。根据四点 Likert 分级评价 Riolan 弓在各组图像的图像质量。结果: Riolan 动脉弓 CT 值、SD 值、CNR 和 SIR 在 40、50keV VMI 均明显高于 CI ($P < 0.001$), 40 keV 时的 VMI 显著高于 50 keV ($P < 0.05$); 在 90、100keV VMI 均低于 CI ($P < 0.001$); 60-80keV VMI 与 CI 间的差异无统计学意义 ($P > 0.05$)。背景 SD 值、左侧竖脊肌 CT 值及 SNR 在各 VMI 与 CI 相比差异均无

统计学意义 ($P>0.05$)。40、50keV VMI Riolan 弓的主观评分明显高于 CI ($P<0.001$)，且 40 keV 的 VMI 主观评分高于 50keV VMI。结论：SDCT 的低 keV 单能量图像较常规图像具有更优的对比度，在 40 keV VMI 显示 Riolan 动脉弓效果最佳。

PO-2111

基于双能 CT 的静脉增强分数评估胃癌神经、 脉管浸润：初步探索

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目的：探讨基于双能 CT 的静脉增强分数 (VEF) 评估结直肠癌神经 (PNI)、脉管 (LVI) 浸润的可行性及诊断效能。

方法：回顾性分析本院经病理证实的 123 例胃癌患者资料，分为 PNI/LVI 阳性组 (88 例) 及 PNI/LVI 阴性组 (35 例)。所有患者行双能 CT 能谱增强检查，使用 ADW 4.6 工作站的 GSI Viewer 软件重建动脉期及静脉期碘 (水) 图，两位观察者分别测量两组病灶的 VEF 值， $VEF=ICv/ICa$ ，ICv 和 ICa 分别为病灶静脉期及动脉期碘浓度值。采用组内相关系数 (ICC) 检验两名观察者测量结果的一致性。采用独立样本 t 检验比较两组病灶 VEF 值的差异。采用受试者操作特征 (ROC) 曲线评估 VEF 值对两组鉴别诊断的效能。

结果：两名观察者测量参数的一致性良好 ($ICC=0.89$)。PNI/LVI 阳性组的 VEF 值 (1.79 ± 0.56 vs. 1.30 ± 0.40) 明显高于阴性组 ($P<0.001$)，ROC 曲线分析显示 VEF 值预测 PNI/LVI 的效能为 0.771。

结论：基于双能 CT 的 VEF 值可反映胃癌患者的神经、脉管浸润情况，为临床提供一种新的术前评估方法。

PO-2112

多参数 MRI 联合 SCC-Ag 预测早期宫颈癌盆腔 淋巴结转移的价值

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多参数 MRI 联合 SCC-Ag 预测早期宫颈癌盆腔淋巴结转移的价值

目的：探讨 DCE-MRI 及 IVIM-DWI 联合 SCC-Ag 预测早期宫颈癌盆腔淋巴结转移的价值。

方法：回顾性纳入 115 例病理证实的 FIGO IB-IIA 期宫颈癌患者，测量记录原发肿瘤的 Ktrans、Kep、Ve、ADCmean、ADCmin、ADCmax、D、D*、f、SCC-Ag。采用 Mann-Whitney 检验和独立样本 t 检验比较 PLNM 阳性组与阴性组间参数，二元 logistic 回归分析确定独立危险因素，建立预测模型并评估效能。

结果：115 例患者中 PLNM 阳性者 32 例，阴性者 83 例。PLNM 阳性组 SCC-Ag ($14.25(6.74, 36.75)$ ng/ml vs. $2.13(1.32, 6.00)$ ng/ml, $p<0.001$) 显著高于阴性组，Ktrans (0.51 ± 0.20 min⁻¹ vs. 0.80 ± 0.33 min⁻¹, $p<0.001$)、ADCmean (0.85 ± 0.09 mm/s² vs. 1.06 ± 0.35 mm/s², $p<0.001$)、ADCmin ($0.67(0.61, 0.75)$ mm/s² vs. $0.75(0.64, 0.90)$ mm/s², $p<0.05$)、ADCmax (1.22 ± 0.28 mm/s² vs. 1.42 ± 0.40 mm/s², $p<0.05$)、f (0.91 ± 0.09 vs. 0.26 ± 0.14 , $p=0.001$) 低于阴性组。二元 logistic 分析：SCC-Ag ($OR=1.154$, $p=0.007$)、Ktrans ($OR=0.003$, $p<0.001$)、f ($OR=0.001$, $p=0.036$) 是独立危险因素。预测模型建立为：Logit(P)= $4.116+0.054*SCC-Ag$ -

8.045*f-6.261*Ktrans, 敏感度和特异度为 79.1%和 94.0%。预测模型 AUC 值为 0.896, 高于各单一参数 SCC-Ag (0.824)、Ktrans (0.797) 及 f (0.703)

结论: 基于多参数 MRI 联合 SCC-Ag 建立的模型可以有效预测宫颈癌盆腔淋巴结转移, 有助于为临床个性化精准治疗提供影像依据。

PO-2113

基于 CT 影像自动分割的肿瘤-血管空间位置信息在预测胰腺导管腺癌患者血管受累中的应用

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研究目的: 探讨基于 CT 影像自动分割的肿瘤-血管空间位置信息是否能改善胰腺导管腺癌 (Pancreatic Ductal Adenocarcinoma, PDAC) 患者血管受累的术前评估。

方法: 回顾性连续纳入从 2020 年 7 月至 2022 年 6 月术前四周内接受双能量增强 CT 扫描且经组织病理学证实为 PDAC 的患者。由 2 名放射科医师独立评估增强 CT 图像中腹腔干、肝总动脉、肠系膜上动脉、门静脉和肠系膜上静脉 5 支主要血管受累情况。根据 NCCN 指南将肿瘤-血管关系分为无接触、邻贴 (肿瘤-血管接触 $\leq 180^\circ$)、包绕 (肿瘤-血管接触 $> 180^\circ$ 或血管畸形)。利用在公开数据集上训练的基于部分标注的多器官联合分割模型, 为三维 CT 影像中的肿瘤生成像素级分割掩码, 并提取肿瘤-血管包绕角度、血管狭窄程度等多个肿瘤-血管侵犯相关的局部影像学指标, 描述患者 CT 影像中肿瘤-血管的精确空间关系, 以作为血管受累预测的主要特征。以术中所见作为评估血管受累的参考标准。

结果: 本研究共纳入 87 例患者; 根据医师评价增强 CT 中胰腺周围 5 支主要血管与肿瘤的关系, 以肿瘤贴邻或包绕预测血管侵犯的灵敏度分别为 89%~94%, 特异度为 77%~96%; 以肿瘤包绕为阈值预测血管侵犯的灵敏度约 44%~78%, 特异度 89%~99%; 以自动分割预测血管侵犯的灵敏度约 38%~92%, 特异度分别 94%~100%。以自动分割预测腹腔干、肠系膜上动脉、门静脉、肠系膜上静脉受累的特异度高于贴邻或包绕, 预测腹腔干、肠系膜上静脉受累的灵敏度高于包绕 ($P < 0.05$)。

结论: 基于 CT 影像自动分割的肿瘤-血管空间位置信息预测有助于改善 PDAC 患者血管侵犯的预测, 与基于 NCCN 标准的医生评价结果具有互补作用。

PO-2114

ECV 对肝血管瘤与肝细胞癌的鉴别诊断价值

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目的: 本研究旨在探索肝血管瘤(HH)患者与肝细胞癌(HCC)患者细胞外体积分数 (ECV) 的差异, 探讨 ECV 对肝血管瘤与肝细胞癌的鉴别诊断价值。方法: 本研究回顾性分析 2022 年 1 月至 2023 年 2 月于大连医科大学附属第一医院行上腹部 3.0 T MRI 检查、扫描序列包括 T1mapping 序列、T1mapping 增强序列且图像质量满足测量要求的患者 12 例, 收集患者的临床资料和影像资料。根据临床诊断结果将患者分为肝血管瘤组(6例)和肝细胞癌组 (6例)。使用 MATLAB 软件根据 ECV 计算公式获得 ECVnii 图像[$ECV = (1/T1_{\text{肝脏增强后}} - 1/T1_{\text{肝脏增强前}}) / (1/T1_{\text{主动脉增强后}} - 1/T1_{\text{主动脉增强前}}) \times (1 - \text{hematocrit})$]。基于 ECVnii 图像使用 ImageJ 软件测量肝脏的 ECV 值。采用 SPSS 27.0 软件进行统计学分析, 符合正态分布的计量资料以均数 \pm 标准差表示, 不符合正态分布

的计量资料以四分位数间距表示。采用独立样本 t 检验观察肝血管瘤患者和肝细胞癌患者的 ECV 值是否有差异， $P < 0.05$ 为差异具有统计学意义。结果：本研究纳入了 6 名肝血管瘤患者和 6 名肝细胞癌患者。肝细胞癌患者的肝脏平均 ECV 值显著高于肝血管瘤患者（ $P < 0.05$ ）。结论：肝血管瘤患者和肝细胞癌患者的肝脏平均 ECV 值存在差异。这一发现可能有助于更深入地理解肝血管瘤和肝细胞癌对肝脏组织的影响，为肝血管瘤与肝细胞癌的鉴别诊断提供了新的影像学参考依据。

PO-2115

妊娠性绒毛膜癌 CT 及 MRI 影像表现分析

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目的 探讨妊娠性绒毛膜癌的 CT 及 MRI 影像特点及诊断价值。方法 回顾性分析 18 例妊娠性 GCC 患者 MRI、CT 影像资料，所有病例经病检或临床最终确诊。结果 18 例患者均行 CT 检查，16 例患者行 MRI 检查。16 例病灶发生于子宫体，1 例发生于宫颈，1 例发生于卵巢。13 例呈结节、肿块样，肿瘤最大径从 1.5cm~10cm 不等，5 例呈弥漫浸润生长，12 例患者子宫体积增大，11 例见大小不一囊变坏死区，所有病例均伴有出血。CT 平扫病灶呈等密度 5 例，混杂密度 13 例；T1WI 呈等、高混杂信号 14 例，等信号 2 例；T2WI 呈不均匀高信号 14 例，高、低混杂信号 2 例；DWI 呈不均匀稍高信号 12 例，信号不高 4 例。增强动脉期病灶实性部分及血管均明显强化，在增强静脉期弥漫浸润型病灶强化趋于均匀，结节、肿块型病灶与明显强化的子宫相比，病灶实性成分呈低强化，病灶内部及边缘的血管仍明显强化，坏死囊变部分无强化。17 例患者出现子宫、宫旁血管影增多迂曲的现象，肿块型病灶增粗迂曲血管影主要位于病灶周围、宫旁，而弥漫浸润型病灶增粗迂曲血管可弥漫分布于占整个子宫及宫旁。6 例伴有动静脉畸形，其中 1 例伴有假性动脉瘤形成。发生肺转移 14 例，脑转移 4 例，脑转移并发硬膜下血肿 1 例，肝转移 4 例，脾和肾转移 3 例，肾上腺转移 1 例，骨转移 3 例，椎管内转移 1 例，乳腺转移 1 例，纵隔转移 1 例。伴发卵巢黄素化囊肿 5 例。结论 妊娠绒毛膜癌的 CT、MRI 表现取决于其病理改变，病灶常伴有明显坏死、出血是其特征性表现，子宫及宫旁血管不仅受滋养细胞侵犯，还受高水平 HCG 刺激，致部分患者还伴有动静脉畸形。妊娠绒毛膜癌早期就可出现血管侵犯及远处转移，患者首发表现可能为转移部位的相关症状，并不一定都存在子宫原发灶相关症状。对于育龄期女性，在排除了妊娠或妊娠物残留后的 HCG 持续升高，并发现多个部位的转移灶时，需考虑绒毛膜癌的可能。CT、MRI 可反映妊娠绒毛膜癌的病理特征、病灶大小形态、侵犯范围、程度、转移部位及数目，可协助临床分期，为临床诊断及治疗方案的选择提供客观依据。

PO-2116

光谱 CT 细胞外容积在结肠癌分化程度中的应用研究

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摘要：目的：探讨双层探测器光谱 CT（Dual-layer spectral CT，DLCT）的细胞外容积（Extracellular volume，ECV）在术前预测结肠癌分化程度的价值。方法：回顾性收集 2021 年 9 月至 2023 年 7 月经 DLCT 检查的结肠癌患者 108 例，根据术后病理结果将患者分为高分级组 24 例（低分化）、低分级组 82 例（中分化、高分化），测量并计算基于光谱 CT 的定量参数值，包括三期增强扫描的碘浓度（Iodine concentration，IC）、标准化碘浓度（Normalized iodine concentration，NIC）、有效原子序数（Z-effective，Zeff）、ECV（%），采用卡方检验比较分类资料的差异，使用两独立样本 T 检验比较不同分化程度组间各参数的差异，绘制受试者操作特征曲

线(Receiver operating characteristic, ROC), 进而评价 ECV 预测结肠癌分化程度的效能。结果: 高分级组延迟期 ECV (%)、NIC、Zeff 值均高于低分级组, 差异有统计学意义 ($P<0.05$), 且与病理分级成正相关 ($P<0.05$), 两组间动脉期及静脉期 NIC 差异无统计学意义。延迟期 ECV 预测结肠癌病理分级的 AUC 为 0.708 (95%CI 0.588~0.828), 临界值为 30.37%时, 灵敏度为 70.83%, 特异度为 64.63%。结论: 基于 DLCT 的 ECV 在鉴别结肠癌分化程度中具有较高的诊断价值。

PO-2117

能谱 CT 诊断膀胱癌壁外脂肪间隙侵犯的价值

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目的: 探讨能谱 CT 在膀胱癌壁外脂肪间隙侵犯的诊断价值。

方法: 回顾性分析手术及病理证实的 35 例膀胱癌患者, 术前均行平扫及双期能谱 CT 增强扫描, 其中发生膀胱癌壁外脂肪间隙侵犯 (A 组) 13 例, 未出现壁外侵犯 (B 组) 22 例。

结果: 膀胱癌壁外脂肪间隙侵犯组动脉期和静脉期测量碘浓度分别为 -2.88 ± 4.38 、 -0.50 ± 4.33 , 高于未发生侵犯组的 -6.71 ± 4.80 ($P<0.05$)、 -4.17 ± 5.59 ($P=0.05$), 差异具有统计学意义。膀胱癌壁外脂肪间隙侵犯组动、静脉期标准化碘浓度值分别为 -0.02 ± 0.04 、 -0.02 ± 0.14 , 未发生侵犯组动、静脉期标准化碘浓度值分别为 -0.07 ± 0.05 、 -0.16 ± 0.22 , 差异具有统计学意义 ($P<0.05$)。膀胱癌壁外脂肪间隙侵犯组动脉期和静脉期测量水浓度分别为 985.50 ± 20.43 、 980.05 ± 15.98 , 未发生侵犯组的 973.52 ± 26.88 、 971.49 ± 22.54 , 差异不具有统计学意义 ($P>0.05$)。ROC 曲线显示, 动脉碘浓度及标准化碘浓度曲线下面积分别达到了 0.705、0.755。静脉期的碘浓度及标准化碘浓度曲线下面积分别为 0.678 和 0.685。

结论: 能谱 CT 测量动、静脉期碘浓度及标准化碘浓度对判断膀胱癌发生壁外脂肪间隙侵犯有一定的价值。

PO-2118

男性远段尿道结石在不同影像学检查中的表现

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【摘要】目的 了解男性远段尿道结石在钼靶、CT、DR 等不同影像学检查中的成像原理以及不同类型结石在不同检查设备显示结果。

材料与方法 一般材料: 男性患者, 尿急、尿痛、排尿困难, 尿道远段可触及结节状异物。

摄影方法: ①利用西门子 SIEMENS (型号 MAMMOMAT Inspiration) 软 X 线钼靶机进行摄影, 患者站立于钼靶摄影机前, 双手握住摄影机扶手, 身体前倾将尿道远段置于摄影机架托盘上, 不采用加压自动模式摄影, 采用手动模式 (Manual), 摄影条件为: 28 千伏 (KV)、56 毫安秒 (mAs)。

②CT 检查采用西门子 SIEMENS (型号 SOMATOM Force), 患者仰卧摄影架, 做泌尿系平扫, 利用图像后处理软件进行图像重建。③采用锐柯 Carestream (型号 DRX innolotion) 进行尿道正斜为摄影。

结果 大部分病例男性远段尿道结石在钼靶、CT、DR 等不同影像学检查中都能显示, 少部分病例只能在钼靶和 CT 检查中显示, DR 摄影中显示不清或不能显示。

结论 男性尿道生理特点：长、细、弯。男性尿道还具有三个狭窄和两处生理弯曲，三个狭窄处分别是尿道内口、尿道膜部、尿道外口。男性尿道最狭窄的部位是尿道外口，所以泌尿系结石排出体外时，最容易形成梗阻的是尿道远段尿道外口处。

泌尿系结石成分与密度：泌尿系结石主要成分类型有草酸钙结石、碳酸盐结石、胱氨酸结石、磷酸钙结石等质硬的阳性结石，普通 X 摄影可见，尿酸结石质软密度低，在普通 X 线不被显示，但在软 X 线下可清晰显示。

双源 CT 和 DR 摄影一般千伏值为 40 至 120KV，为硬 X 射线，高能量 X 射线都能穿透体积较小密度较低的尿道结石，只有极少部分低能量 X 线被结石吸收，因为 CT 密度分辨率高于 DR 摄影，所以阴结石可以显示。软 X 线的优点，钼靶摄影一般千伏值为 25 至 35KV，为软 X 射线，阴性结石在 DR 摄影中容易被硬 X 射线穿透而不显影，当采用钼靶软 X 射线摄影时，阴性尿道结石虽然体积小、密度低，但可以吸收大部分软 X 射线，所以在 X 线 DR 摄影中未显影而在钼靶摄影中则可以清晰显示。因此尿道远段结石可改用软 X 射线钼靶检查，以明确结石的大小、数量、形状及位置。

PO-2119

定量 MRI 用于评估离体供及长期随访结果

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目的：探讨体外磁共振成像(MRI)-质子密度脂肪分数(PDFF)是否有利于肝移植物的选择，并获得肝移植物质量的移植前指标信息。

材料和方法：使用 3.0T 磁共振扫描仪进行 MRI-PDFF。共有 35 个供肝获得病理证实，19 个供肝用于肝移植。肝供肝视觉评分分别为 3、2 和 1。MRI-PDFF 的准确性通过每个肝段进行测量，并通过病理组织学结果的受试者工作特征 (ROC) 曲线分析进行评估。对植入前获得的离体供肝 MRI-PDFF 和病理组织学结果以及早期和长期结果进行分析。

结果：队列中 9 个 ROI PDFF 的平均值为 $4.1 \pm 4.4\%$ 。大泡脂肪变性组 PDFF 高于正常组 ($P < 0.05$)。大泡脂肪变性组的视觉评分高于正常组 ($P < 0.05$)。大泡脂肪变性组的 1 年、2 年和 3 年移植物存活率分别为 100%、66.7%和 66.7%，低于正常组的 100%、78.6%和 78.6%。大泡脂肪变性组早期同种异体移植功能障碍 (EAD) 发生率为 50%，正常组为 33.3% ($P = 0.60$)。

结论：证实离体 MRI-PDFF 是一种安全、准确、无创的肝移植选择工具，并提供了移植前肝移植物质量指标的信息。

PO-2120

术前 CT 影像特征预测腹部嗜铬细胞瘤/ 副神经节瘤术中大量出血的危险因素

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目的 探讨术前预测腹部嗜铬细胞瘤/副神经节瘤 (PPGL) 术中大量出血的危险因素。方法 回顾性分析 2011 年 1 月至 2021 年 12 月在海军军医大学第一附属医院经手术病理确诊的 168 例腹部 PPGL 患者的临床和影像学资料。根据术中出血量将患者分为大量出血组和少量出血组。收集患者临床因素，包括性别、年龄、身体质量指数、典型“三联征”症状、既往病史、术前是否行降压药物准备；

收集患者影像学因素,包括病灶部位、最大径、数量、形态、病灶 CT 值、有无钙化、囊变范围、有无包膜侵犯、有无血管侵犯、是否显示供血动脉、是否显示引流静脉、有无瘤周侧支血管。采用独立样本 t 检验、秩和检验、卡方检验或 Fisher 确切概率法进行统计学分析。采用多因素 logistic 回归分析 PPGL 术中大量出血的独立危险因素。**结果** 少量出血组 117 例,其中男性 57 例、女性 60 例;大量出血组 51 例,其中男性 24 例、女性 27 例。两组病灶部位(肾上腺、肾上腺外)、最大径、形态(类圆形、分叶状)、动脉期及静脉期 CT 值、钙化、包膜侵犯、血管侵犯、显示供血动脉、瘤周侧支血管比较差异均有统计学意义(P 值均<0.05)。多因素 logistic 回归分析结果显示,病灶部位(肾上腺外)[OR (95%CI)=2.819 (1.250, 6.358)]、最大径[OR (95%CI)=1.031 (1.013, 1.049)]、血管侵犯[OR (95%CI)=3.148 (1.085, 9.133)]、显示供血动脉[OR (95%CI)=3.036 (1.009, 9.132)]是腹部 PPGL 术中大量出血的独立危险因素。**结论** 病灶部位(肾上腺外)、最大径、血管侵犯、显示供血动脉是术前预测腹部 PPGL 术中大量出血的独立危险因素。

PO-2121

基于 MRI 四种强化模式下肝细胞癌患者行手术切除和射频消融术后早期复发率比较及复发危险因素研究

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目的 探讨 MRI 四种强化模式下的肝细胞(HCC)癌患者行手术切除和射频消融(RFA)术后的复发率,并预测分析 HCC 患者 RFA 术后早期复发危险因素。**材料与方法** 收集榆林市第二医院及宁夏医科大学总医院 2016 年 1 月至 2022 年 12 月经手术切除或者 RFA 治疗的 HCC 患者 182 名。分析 MRI 4 种强化模式下的 HCC 患者行手术切除或 RFA 治疗后复发率的差异,采用 COX 多因素回归分析预测 HCC 患者 RFA 术后复发的独立危险因素。**结果** 137 名经手术切除的 HCC 患者,4 种强化模式的患者间早期复发率没有差异。相反 45 例经 RFA 治疗的 HCC 患者,4 种强化模式的患者间早期复发率有显著差异,1 型、2 型、3 型、4 型 HCC 患者早期复发率分别为 75.00%、66.67%、100%、93.75% (P<0.001)。进一步分层分析显示 1&2 型强化模式的 HCC 患者经手术切除和 RFA 术后早期复发率没有显著差异(P 值分别为: 0.231, 0.268);相反 3&4 型强化模式的 HCC 患者经手术切除和 RFA 术后早期复发率有显著差异(P 值分别为: 0.024, 0.001)。多因素 COX 分析显示 NLR (HR=1.206, 95%CI=1.010~1.434, P=0.035)、包膜是否完整 (HR=0.655, 95%CI=0.430~0.998, P=0.049)、4 型强化模式 (HR=1.270, 95%CI=1.090~1.479, P=0.002) 是 HCC 射频消融术后复发的独立危险因素。**结论** 肿瘤的影像特征可用于预测肿瘤的早期复发及手术方式的抉择。

PO-2122

双层探测器光谱 CT 预测结直肠癌微卫星不稳定状态的价值

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目的 探讨双层探测器光谱 CT 多参数成像鉴别结直肠癌(CRC)微卫星不稳定(MSI)和微卫星稳定(MSS)状态的价值。**方法** 回顾性分析行光谱 CT 三期增强扫描并经病理证实的 CRC 患者 92 例,根据免疫组化结果将患者分为 MSI 组 (n=20) 和 MSS 组 (n=72)。测量并分析两组病灶增强三期 40、70、100 keV 下单能量 CT 值、有效原子序数值 (Eff-Z),碘浓度 (IC) 值,并计算标准

化碘浓度 (NIC) 值, 能谱曲线斜率(λ HU)。对有统计学意义的参数绘制受试者工作特征曲线, 分析各参数评估 CRC 微卫星不稳定状态的效能。结果 MSI 组动脉期 40、70、100keV CT 值、静脉期 40、70keV CT 值、动静脉期 IC、NIC、Eff-Z、 λ HU 均小于 MSS 组 (p 均 <0.05)。动脉期各参数诊断效能高于静脉期, 其中动脉期 NIC 诊断效能最高(AUC 0.818, 敏感度 93.1%, 特异度 65.0%), 其次为动脉期 IC (AUC 0.815, 敏感度 77.8%, 特异度 75.0%)。两组病灶延迟期各参数差异均无统计学意义 ($p>0.05$)。结论 双层光谱 CT 动静脉期定量参数对于预测结直肠癌 MSI 状态有一定价值, 其中动脉期的 NIC 为最佳参数。

PO-2123

IVIM 联合 ESWAN 及 ITSS 预测肝细胞肝癌微血管侵犯

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【目的】探讨体素内不相干运动(IVIM)联合磁敏感加权成像(SWI)和自动定量瘤内磁敏感信号(ITSS)预测肝细胞癌(HCC)微血管侵犯(MVI)的价值。

【方法】回顾性分析 76 例经病理证实的 HCC 患者, 包括 26 例 MVI 阳性患者及 50 例 MVI 阴性患者, 所有患者均于术前行 3.0T MRI 扫描, 包括常规磁共振扫描序列及 IVIM, ESWAN 扫描序列。将扫描生成的图像传输至 GE AW 4.6 工作站上, 使用 Functool 软件自动生成 IVIM 序列的参数图 D、D* 和 f 和 ESWAN 序列的参数图幅度, 相位, R2* 和 T2*。放射科医师采用双盲法在各参数图像上于病变的最大层面放置三个感兴趣区 (ROI), 并使用 A.S. 软件自动计算肿瘤最大层面的 ITSS。采用 t 检验或 U 检验比较 MVI 阳性组和阴性组之间各参数之间的差异, 采用受试者工作特征 (ROC) 曲线评价 IVIM 和 ESWAN 各参数的阈值及诊断效能, 采用逻辑回归分析将两个序列参数进行联合并评估其诊断效能。采用 Delong 检验比较 ROC 曲线下面积 (AUC) 的差异。

【结果】MVI 阴性组的 D、D*、幅度值和 T2* 值显著高于 MVI 阳性组, 而 MVI 阴性组的 R2* 和 ITSS 值显著低于 MVI 阳性组 ($P < 0.05$)。D、D*、幅度值、R2*、T2* 和 ITSS 预测 MVI 的 AUC 分别为 0.739、0.707、0.673、0.798、0.764 和 0.657。IVIM (D+D*)、SWI(幅度值+R2*+T2*+ITSS) 和 IVIM 与 ESWAN 联合 (D+D*+幅度值+R2*+T2*+ITSS) 预测 MVI 的 AUC 分别为 0.772、0.841 和 0.905。当 IVIM 与 ESWAN 联合使用时, 其敏感度提升至 84.6%, 特异性提升至 82.0% (阈值: 0.346), IVIM 与 ESWAN 联合使用的 AUC 显著高于各参数与 IVIM 和 ESWAN 单独应用。

【结论】IVIM 和 ESWAN 的联合应用可能有助于临床术前无创性预测 MVI, 这可能有助于提高对 HCC 患者生存期的预测以及预防复发和转移。

PO-2124

基于弥散加权成像的磁共振影像组学预测克罗恩病对抗 TNF 药物的治疗反应

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目的: 探讨弥散加权成像 (Diffusion weighted imaging, DWI) 的磁共振影像组学在预测克罗恩病对抗 TNF 药物的治疗反应方面的价值。

方法：回顾性收集本院确诊为 CD、在抗 TNF 治疗前进行了 MR 肠道造影检查（包括 DWI 序列）、内镜检查以及 3 个月或 6 个月后进行内镜复查的患者。根据复查内镜下结果将患者分为“有反应”组与“无反应”组。将病例按 7 : 3 的比例随机分为训练组与验证组，采用 A.K 软件对治疗前 MR 图像特性进行特征提取，利用互信息（Mutual information, MI）方法对保留的组学特征进行降维，并采用逻辑回归分析构建影像组学模型，并通过受试者工作特征曲线、校准曲线和决策曲线分析影像组学模型效能。

结果：共纳入 89 例患者。通过降维共得到 8 个最佳影像特征集，构建的逻辑回归影像组学模型训练组 AUC 为 0.847，敏感性为 0.765，特异性为 0.900，验证组 AUC、敏感性、特异性分别为 0.835、0.706、0.800。

结论：基于弥散加权成像的磁共振影像组学可以较好的预测克罗恩病患者对抗 TNF 药物的治疗反应，为临床提供准确的影像学证据，从而实现个体化评估。

PO-2125

BOLD-MRI 无创评价肾氧合：原发性醛固酮增多症患者与健康对照组的比较

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目的：探讨血氧水平依赖磁共振成像（blood oxygenation level-dependent magnetic resonance imaging, BOLD-MRI）在原发性醛固酮增多症（primary aldosteronism, PA）患者肾脏氧合状态评估中的应用，并与健康对照组进行比较。

方法：所有患者和健康对照组（healthy controls, HCs）均行肾脏 BOLD-MRI 检查。采用感兴趣区（region of interest, ROI）方法分别测量肾皮质和髓质中的 $R2^*$ 值。采用独立样本 t 检验或 Mann-Whitney U 检验比较患者和健康组之间有无差异。采用 Pearson 相关分析或 Spearman 相关分析，分析肾脏 BOLD 参数与临床指标的相关性。采用受试者工作特征（receiver operating characteristic, ROC）曲线来区分 PA 患者和健康志愿者。

结果：共纳入 20 例 PA 患者（女性：男性，14：6；年龄 46 ± 12 岁）和 20 例 HCs（女性：男性，14：6；年龄 47 ± 10 岁）。HCs 和 PA 患者的皮质 $R2^*$ 明显低于髓质 $R2^*$ （ $p < 0.001$ ）。PA 组的皮质 $R2^*$ 高于 HCs 组的皮质 $R2^*$ （ $p = 0.003$ ）。相关分析显示，髓质 $R2^*$ 值与尿素氮呈正相关（ $r = 0.566$, $p = 0.018$ ）。ROC 曲线显示，皮质 $R2^*$ 对区分 PA 患者和健康志愿者的最佳诊断阈值为 17.13 Hz，相应的敏感性和特异性分别为 84.30% 和 55.30%。曲线下面积（area under the curve, AUC）为 0.692。

结论：BOLD-MRI 提供了一种有用的技术来检测 PA 患者肾皮质和髓质的氧合水平。

PO-2126

扩散加权成像参数与子宫内膜癌免疫组化预后因子及病理分型的相关性

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探讨 MRI 扩散加权成像 (DWI) 的表观扩散参数与子宫内膜癌免疫组化预后因子及病理分型的相关性。方法: 回顾性分析自 2013 年 1 月至 2017 年 5 月在我院经病理及临床确诊为子宫内膜癌并获得免疫组化结果的患者 49 例。所有患者均行盆腔增强 MRI 及 DWI 扫描, 并测量表观扩散系数 (ADC) 及相对表观扩散系数 (rADC)。记录免疫组织化学结果, 观察雌激素受体 (ER)、孕激素受体 (PR)、人表皮生长因子受体 II 型 (Cerb-2) 及预后因子 Ki-67 的表达情况, 同时患者进行病理分型。各受体在不同表达状态下及不同病理分型子宫内膜癌患者的 ADC 值和 rADC 值均采用 Mann-Whitney U 检验比较, ADC 值、rADC 值和 Ki-67 阳性表达率的相关性采用 Spearman 方法评价。结果: 低分化组子宫内膜癌患者的 ADC 值低于高分化组, 差异有统计学意义 ($P<0.05$)。ER、PR 阳性患者的 ADC 值及 PR 阳性患者的 rADC 值高于 ER、PR 阴性患者, 差异有统计学意义 ($P<0.05$)。Cerb-2 阳性和阴性患者的 ADC 值差异无统计学意义 ($P>0.05$)。子宫内膜癌患者的 ADC 值、rADC 值与 Ki-67 表达均呈负相关 ($r=-0.76$ 和 -0.66 , $P<0.05$)。结论: 磁共振 DWI 检查可在一定程度上提示子宫内膜癌的不同病理类型, 并且有潜力从分子水平评估恶性程度。

PO-2127

基于弥散张量成像评估狼疮性肾炎早期肾功能损害及无创性分级肾功能损害程度的价值

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目的 探讨弥散张量成像 (DTI) 识别狼疮性肾炎 (LN) 患者早期肾功能损害并分级肾功能损害程度的价值。

方法 前瞻性收集 2021 年 9 月至 2023 年 5 月间 54 名 LN 患者和 29 名健康志愿者 (对照组) 行肾脏常规 MRI, DTI 成像, 并且 LN 患者行肾动态显像。以估算肾小球滤过率 (eGFR) 大于 90 mL/min/1.73m^2 为指标挑选出 eGFR 正常的 LN 患者组 (eLN), 并以双肾肾动态显像求得的肾小球滤过率 (rGFR) 为 90 mL/min 作为阈值将这组患者分为 rGFR 正常的 LN 患者组 (eLNn, 7 例) 和 rGFR 异常的 LN 患者组 (eLNab, 23 例)。此外, 所有 LN 患者根据单肾 rGFR 被分为 LN 轻度组 (LNm, 40 例, $\text{rGFR} \geq 30\text{ mL/min}$) 和 LN 中重度组 (LNms, 14 例, $\text{rGFR} < 30\text{ mL/min}$) 两组, 以分级肾功能损害程度。由两名经验丰富的放射科医生分别独立测量肾皮质和髓质的 DTI 参数 (表观扩散系数 [ADC]、分数各向异性 [FA])。采用单因素方差分析对比较不同组间肾皮、髓质各参数值的差异, 采用 Pearson 相关分析比较肾皮、髓质各参数值与 rGFR 间的相关性, 采用二元 logistic 回归分析及 ROC 评价各参数单独及联合在预测肾损害方面的鉴别诊断效能, 采用 Delong 检验比较曲线下面积 (AUC) 的差异。

结果 除髓质 ADC 值外, 皮质 ADC 值及皮髓质 FA 值在 eLNn、eLNab 组与对照组间差异有统计学意义 (均 $p < 0.001$)。在鉴别 eLNn 组和对照组时, 髓质 FA 的诊断效能最优, 其 AUC 值达到 0.828, 敏感度和特异度分别为 77.8% 和 86.2%。所有 DTI 测量值在对照组与 LNm、LNms 组间

均呈逐渐下降趋势, 差异有统计学意义 (均 $p < 0.05$)。在鉴别 LNm 和 LNms 时, 髓质 FA 具有与皮质 ADC 和髓质 FA 联合相似的诊断效能 ($p > 0.05$)。

结论 髓质 FA 可早于 rGFR 识别肾功能损害并预测肾功能损害程度进展, 因此 DTI 可用于无创评估及监测早期狼疮性肾炎肾功能损害。

PO-2128

肾脏混合型上皮和间质肿瘤的 CT、MRI 表现及临床特征分析

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目的: 探讨肾脏混合型上皮和间质肿瘤的 CT、MRI 特点及临床特征, 提高本病的认识, 降低术前影像误诊率。方法: 回顾性分析宁波大学附属第一医院经病理证实的 12 例肾脏混合型上皮和间质肿瘤患者资料。结果: 临床表现, 12 例患者 1 例为肋骨骨折、1 例腹痛、1 例排便异常检查发现, 其余均为体检发现, 其中有 1 例患者定期随访复查 7 年, 患者均无明显不明症状和体征, 实验室检查和肿瘤标记物检查均为阴性。CT 或 MR 表现 12 例肿瘤均为单发, 左肾 5 例、右肾 7 例, 位于肾脏上部 9 例、下部 2 例、中部 1 例。肿瘤边界清楚, 最大径 17~107mm, 中位值 28.8mm。12 例位于肾实质内并局部向肾轮廓外突出, 边界清楚, 10 例伴瘤内多发囊变, 3 例伴瘤内出血, 1 例瘤内小钙化灶。12 例均无肿大淋巴结、双侧肾上腺异常、肾静脉和 (或) 下腔静脉瘤栓和其他脏器受累。混合性上皮和间质肿瘤是由上皮和间质成分相混合构成的肾脏肿瘤。肿瘤构成复杂, 由大囊、微囊和小管构成。大囊囊壁内衬柱状或立方上皮, 有时形成乳头状簇。部分囊壁内衬尿路上皮, 有时有增生, 微囊和小管内衬扁平、立方或柱状上皮。这些内衬上皮细胞浆或透明, 或淡染, 或嗜酸, 或呈囊泡状。微囊结构多样, 有的为微囊伴周围丰富的间质, 有的为密集簇状排列的微囊, 有的形成复杂分支迷路, 并引起囊腔扩张。这些成分常在肿瘤的同区域混合存在。间质有多少不等的梭形细胞, 这些细胞核大、胞浆丰富, 有时黏液样间质和束状平滑肌细胞显著, 常见致密胶原, 偶见脂肪, 该肿瘤细胞异型性及核分裂难以找到。免疫组化, 梭形细胞: Actin 和 Desmin 强阳性, ER、PR 阳性; 上皮成分常常表达 CK 和 Vimentin。结论: 肾脏混合性上皮和间质肿瘤诊断有一定困难, 但肿瘤实性成分的多少、间隔的形态以及增强方式可以为诊断及鉴别诊断提供依据。

PO-2129

基于术前 ADC 图纹理分析对胰腺癌组织学分级的预测价值

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目的 探究术前 ADC 图纹理分析对胰腺癌组织学分级的预测价值。方法 以 2018 年 2 月至 2022 年 2 月经我院病理证实的胰腺癌患者 122 例作为研究对象。依据美国肿瘤联合会分期, 将研究对象分为高分化组 (47 例), 中低分化组 (75 例)。术前患者行包含扩散加权成像的磁共振成像检查。由 2 名医师提取患者 ADC 图像参数。利用单变量 ADC 纹理特征参数预测, ROC 曲线分析纹理参数对胰腺癌组织学分级的预测价值。Pearson 分析检验参数间的相关性。利用支持向量机预测模型、逻辑回归预测模型、多任务学习预测模型三种多变量 ADC 纹理特征参数预测。建立 LOOCV 模型, 筛选出三个预测模型中频次较高参数。利用统计学 bootstrap 法比较单变量模型和多变量模型的预测性能。结果 ADC 纹理参数中, ADC10、短游程补偿、差熵等均为胰腺癌组织学分级有统计学意义的参数。多变量模型预测较单变量模型预测性能更优。ADC 纹理特征参数中, 63.64% 的参数具

有相关性。结论 ADC 图纹理参数在一定程度上反应胰腺癌组织学分级信息, 给术前胰腺癌组织学分级预测提供了重要方法。

PO-2130

双期增强 CT 成像特征能否预测胃癌新辅助治疗后的病理完全缓解? 初步回顾性研究

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目的: 旨在对比研究双期 CT 的成像特征在预测 GC 患者 pCR 状态方面的价值。

方法: 选择 2015 年 4 月至 2022 年 12 月期间接受新辅助化疗在我院进行胃根治性切除术的 115 例胃癌或食管-胃结合部癌患者进行连续分析。其中, pCR 患者 41 名, Non-pCR 患者 74 名。分析了所有患者治疗前、后双期 CT 成像特征, 双期 CT 成像特征分为定量特征和定性特征。比较了 pCR 组和 Non-pCR 组治疗前后参数的差异, 分类变量采用卡方检验, 非正态分布的连续变量采用 Mann-Whitney U 检验, 正态分布的连续变量采用独立样本 t 检验。pCR 状态与双期 CT 成像特征之间的关系通过单变量逻辑分析, 然后通过多变量逻辑回归和接受者操作特征 (ROC) 曲线分析。

结果: pCR 组 TMT first, TMT Post、LNSD Post 均小于 Non-pCR 组 ($P < 0.05$); Δ CTA、 Δ TMT、 Δ TMT-1 和 Δ LNSD 高于 Non-pCR 组 ($P < 0.05$)。与 Non-pCR 组相比, pCR 组肿瘤的 cT4 分期占比略低 (80.5%vs,90.5%, $P < 0.05$)。在 pCR 组中, 治疗后肿瘤溃疡的发生率为(19.5%, 8/41), 低于 Non-pCR 组的肿瘤溃疡发生率($P < 0.001$)。单变量逻辑分析显示, 治疗方案、TMT first, TMT Post、 Δ CTA、 Δ TMT、 Δ TMT-1、 Δ LNSD、治疗后肿瘤有无溃疡、治疗前 cT 分期、治疗后黏膜线强化、治疗后病变增强模式和治疗后病变厚度分层与 pCR 状态相关 (所有 $P < 0.05$)。然而, 在多变量分析中, TMT first、 Δ TMT 和治疗后黏膜线强化是 pCR 的独立预测因子。组合三个双期 CT 成像特征, 通过多变量逻辑回归模型获得的曲线下面积为 0.955 (95% CI 0.596-0.687)。结论: 双期 CT 成像特征, 包括 TMT first、 Δ TMT 和治疗后黏膜线强化及其组合, 可用作 GC 患者 pCR 状态的预测指标。

PO-2131

MRI 特征列线图模型鉴别胰腺实性假乳头状肿瘤与非功能性胰腺神经内分泌瘤

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目的: 探讨 MRI 特征列线图模型在胰腺实体假乳头状肿瘤与非功能性胰腺神经内分泌肿瘤鉴别中的价值; 方法: 回顾性分析 2010 年 01 月至 2021 年 01 月经手术病理证实的 pSPN 53 例和 NF-pNET 81 例患者临床信息、病理及 MRI 资料, 对两组病例的肿瘤部位、长径、形态、边界、是否位于胰腺轮廓外、磁共振平扫各序列信号、DWI、病灶与胰腺的 ADC 比值 (rADC)、T1WI 平扫信号强度是否均匀、强化程度、强化特点、强化趋势、囊变、囊实性比例、出血、主胰管扩张、胰周脂肪侵犯等, 采用卡方检验、独立样本 t 检验或 Mann-Whitney U 检验。将单因素分析具有统计学意义的变量均纳入二元 Logistic 回归模型, 采用逐步法筛选出 pSPN 和 NF-pNET 的独立预测因素, 建立 logistic 回归模型并绘制列线图。结果: pSPN 与 NF-pNET 的性别、年龄、部位、长径、T1WI 平扫信号强度、rADC、囊变、囊实性比例、出血、环形强化、浮云征、强化程度及强化趋势等差异有统计学意义 ($P < 0.05$), 肿瘤的部位、形态、边界、是否位于胰腺轮廓外、rADC 值、主胰管

扩张、胰周脂肪浸润、腊肠样强化等方面差异均无统计学意义 ($P>0.05$)。诊断 pSPN 和 NF-pNET 的独立预测因素包括年龄、T1WI 平扫信号强度、强化程度、强化趋势、浮云征, 成功建立术前预测 pSPN 的列线图模型, 其受试者操作特征曲线下面积为 0.985, 校准预测曲线与标准曲线贴合良好。结论: 根据 MRI 特征建立的列线图模型在术前预测 pSPN 有较高的应用价值, 为鉴别 pSPN 与 NF-pNET 提供了一种个体化预测方法。

PO-2132

双源 CT 碘定量参数预测胃癌浆膜侵犯和不同亚型分析

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目的 探究胃癌浆膜侵犯与双源 CT (DECT) 碘相关参数之间的关系, 并对不同亚型进行分析, 为临床术前预测胃癌浆膜侵犯提供参考。

方法 回顾性收集 2021 年 12 月至 2022 年 11 月我院手术病理证实为胃癌的患者临床及影像学资料。采用德国西门子第三代双源 CT (SOMATOM Force) 进行动静脉期双能量扫描。将 100KV 和 Sn150KV 动静脉期薄层图像导入后处理工作站。选择 Liver VNC 程序, 两名阅片人分别评估观察动脉期 (AP) 和静脉期 (VP) 融合图像。在病变最大的横断面上手工勾画不规则感兴趣区 (ROI), 勾画出病变的轮廓, 包括肿瘤异质性区域 (如囊变、坏死)。测量 AP 和 VP 的 ROI 面积、碘浓度 (IC)、归一化碘浓度 (nIC)、脂肪分数、CT 值平均值和标准差。另外, 根据手术病理结果, 对管状腺癌 (TAC) 和低粘附性癌 (PCC) 分别进行亚组分析。采用 SPSS 软件进行统计学分析, 采用双侧检验, 以 $P<0.05$ 为差异具有统计学意义。采用 Mann-Whitney U 检验评估定量变量的差异。

结果 本研究共纳入 93 例胃癌患者, 浆膜侵犯阳性患者 27 例, 阴性 66 例。单因素分析结果显示在动脉期 DECT 参数中, ROI 面积值在有无浆膜侵犯患者间有统计学差异 ($P<0.05$)。在静脉期 DECT 参数中, ROI 面积、IC、nIC、CT 值平均值

在有无浆膜侵犯患者间均有统计学差异 ($P<0.05$), ROI 面积以及静脉期 IC 在有浆膜侵犯患者中更高。另外, PCC 亚组分析显示静脉期 ROI 面积值、IC、nIC、CT 值平均值以及动脉期 ROI 面积值在有无浆膜侵犯患者中差异均有统计学意义 ($P<0.05$)。在 TAC 亚组分析中, 动脉期 CT 值标准差在有无浆膜侵犯患者间有统计学差异 ($P<0.05$), 其他参数差异无统计学意义 ($p>0.05$)。

结论 DECT 相关参数中, ROI 面积以及静脉期 IC 在胃癌浆膜侵犯不同状态组间有统计学差异, ROI 面积以及静脉期 IC 在有浆膜侵犯患者中更高。在亚型分析中, PCC 的结果与总体结果一致, DECT 也许能够为术前预测胃癌浆膜侵犯状态提供一定参考。

PO-2133

弥散加权成像的拉伸指数模型和峰度模型在肾脏评估中区分原发性醛固酮增多症患者与健康对照组的比较研究

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目的: 比较弥散加权成像 (diffusion-weighted imaging, DWI) 的拉伸指数模型和峰度模型获得的弥散参数对原发性醛固酮增多症 (primary aldosteronism, PA) 患者和健康对照组 (healthy controls, HCs) 的鉴别能力。

方法: 44 名参与者 (22 例患者和 22 例 HCs) 接受了肾脏 MRI 检查, 采用 11 个 b 值的 DWI 序列和 3 个 b 值的弥散峰度成像 (diffusion kurtosis imaging, DKI) 序列。采用独立样本 t 检验或

MannWhitneyU 检验比较各弥散参数在患者和健康对照组有无差异。采用二元逻辑回归方法建立结合不同扩散参数的回归模型。采用受试者工作特征 (receiver operating characteristic, ROC) 曲线分析和比较, 评价单个扩散参数模型和联合扩散模型对两组的区分能力。

结果: 共纳入 44 名参与者, 并研究了 10 个回归模型。患者皮质异常指数项 (α _Cortex) 和髓质各向异性 (FA_Medulla) 显著高于 HCs, 患者皮质 FA (FA_Cortex)、皮质轴向扩散 (Da_Cortex)、髓质平均扩散 (MD_Medulla) 和髓质径向扩散 (Dr_Medulla) 显著低于 HCs。Dr_Medulla 的曲线下面积 (AUC) 为 0.855, 与 FA_Cortex 和 FA_Medulla 相当, 显著高于 α _Cortex、Da_Cortex 和 MD_Medulla。Model_all parameters 的 AUC 为 0.967, 与 Model_FA (0.946) 和 Model_DKI (0.966) 相当, 显著高于其他模型。Model_all parameters 的敏感性和特异性分别为 87.2% 和 95%。

结论: Model_all parameters、Model_FA 和 Model_DKI 对 PA 患者和 HCs 的区分效果相似, 优于单个扩散参数等模型。

PO-2134

急性坏死性液体积聚和包裹性坏死合并感染的 CT/MRI 评价

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目的: 基于新亚特兰大标准, 对急性坏死性液体积聚 (ANC) 和胰腺包裹性坏死 (WON) 合并感染进行 CT/MRI 评价。方法: 回顾性分析因并发感染性胰腺坏死 (ANC 或 WON 合并感染) 行外科处理后将脓液标本培养证实有细菌或真菌生长者, 且患者发病后 3-10 天首次 CT 或 MRI 检查, 在感染性胰腺坏死外科治疗前后有 CT 或 MRI 复查者。综合观察感染性胰腺坏死灶的部位、数目、形态、大小、病灶密度及信号、增强特征, 并计算首次 CT 或 MR 严重指数 (CT/MR severity index, CTSI/MRSI); 随访患者术后演变及临床预后。结果: 纳入 ANC 或 WON 合并感染患者 40 例 (男 28 例、女 12 例, 年龄 50.9 ± 12.2 岁), 包括 ANC 合并感染 3 例和 WON 合并感染 37 例, 从患者发病至发现感染性胰腺坏死的时间为 38.4 ± 20.9 d。所有患者首次积分 CTSI/MRSI 为 7.8 ± 1.7 分 (6-10 分)。37 例 WON 合并感染者共 44 个胰腺 WON 病灶, 大小为 8.7 ± 3.6 cm; 所有 WON 病灶内含“非液性物质影”; 56.8% 的 WON 合并感染者见“气泡征”、“气液平征”; 13.5% 的 WON 合并感染者见胰尾部 WON 侵犯脾脏、脾内呈脓腔样病灶伴花环样强化及内部分隔样强化。所有患者外科引流引出褐色脓性液体后送细菌培养: 67.5% 的患者出现多重感染。结论: ANC 或 WON 合并感染在 CT/MRI 上有较为特异的一些征象可提示诊断, 能为外科治疗前后提供重要的参考价值。

PO-2135

基于修订版亚特兰大标准: 急性胰腺炎“假性囊肿”术语的影像学意见

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目的 探讨在修订版亚特兰大国际共识中急性胰腺炎 (Acute pancreatitis, AP) “假性囊肿”这一术语的使用问题。资料与方法 回顾性分析近十年住院的 AP 连续性病例的临床资料, 纳入 AP 发病后在我院有首次影像学资料, 且 AP 后期有 MRI 复查资料证实局部并发症“胰腺假性囊肿形成者”。MR 扫描包括 GRE T1 加权、SSFSE T2 加权、MRCP、3D-LAVA 序列等。综合各序列观测急性胰腺炎“假性囊肿”病灶的部位、数目、大小、体积、内容物、信号等。并依修订版亚特兰大新术语区分“假性囊肿”和“包裹性坏死 (WON)”。结果 共计 113 例连续性 AP 病例 (男 69 例、女 44 例, 年龄

50.5±14.1 岁) 由 MRI 共发现“假性囊肿”病灶 170 个, 大小为 8.5±4.8cm (1.5~24.5cm), 体积约 445±707ml。95 例 (84.1%) 属胰腺和胰周均坏死型, 8 例 (7.1%) 属仅胰腺坏死型, 7 例 (6.2%) 属仅胰周坏死型, 仅 3 例 (2.6%) 属间质水肿性型。位于胰内的包裹性液性积聚有 45 个 (26.5%)、胰周+胰内均受累有 52 个 (30.6%)。167 个 (98.2%) 病灶内见或多或少的“非液性物质影”, 它们在压脂 T2WI 上为低信号影, 增强扫描均未强化。76 例患者行外科操作后 64 例有病理学证实“胰腺囊肿内”含无结构坏死物, 符合胰腺包裹性坏死改变。结论 符合 AP 修订版亚特兰大标准定义的“假性囊肿”已相当罕见, 影像学 MRI 上拟诊的“急性胰腺炎假性囊肿”绝大多数应采用“胰腺包裹性坏死”这一新诊断术语。

PO-2136

坏死性胰腺炎伴胰管中断综合征的 MR 征象: “厚层性/透壁性胰腺坏死-胰管中断-胰腺包裹性坏死”三部曲

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目的 探讨急性坏死性胰腺炎所致胰管中断综合征的 MRI 特征。方法 回顾性分析急性胰腺炎住院病例因局部并发症行外科手术证实胰管中断的患者, 同时发病后 3-10 天有 MRI 检查且术前有 MRI 复查者。分析首次 MRI 检查上是否存在胰腺坏死, 统计胰腺坏死部位、范围、深度、类型及 MRSI 评分; 评价复查 MRI 上主胰管中断显示率、中断位置及与胰腺包裹性坏死的关系。结果 共纳入胰管中断综合征患者 26 例 (男 15 例, 女 11 例, 年龄 50.2±15.2 岁) 进入研究, 首次 MRI 检查均为急性坏死性胰腺炎, 透壁性胰腺坏死占 65.4% (17/26)、厚层性胰腺坏死占 34.6% (9/26); 胰腺内坏死厚度为 2.4±0.3cm (2~3.2cm), 坏死范围: >50% 者占 61.5% (16/26)、30%~50% 者占 38.5% (10/26), MRSI 评分为 8.9±0.9 分 (8~10 分)。MRI 复查示 73.1% (19/26) 的患者见“主胰管中断综合征”的直接征象即胰体部中断者占 57.9% (11/19)、胰体尾交界区中断者占 26.3% (5/19)、胰颈部中断者占 15.8% (3/19)。所有病例均见胰腺包裹性坏死形成, 19 例患者上游胰腺组织内的主胰管如“苹果柄”状近直角汇入病灶并相通。结论 急性胰腺炎厚层性/透壁性胰腺坏死致胰管中断综合征具有相应的 MRI 征象, 后期出现的胰腺包裹性坏死为胰管中断综合征的并发症, 可视为“厚层性/透壁性胰腺坏死-胰管中断-胰腺包裹性坏死”三部曲。

PO-2137

基于腹部 CT 的身体成分参数对乳腺癌新辅助化疗病理完全缓解的预测价值

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目的: 本研究旨在探究新辅助化疗前身体成分参数对乳腺癌患者新辅助化疗后病理完全缓解的预测价值。

方法: 回顾性收集接受新辅助化疗并行手术治疗的非转移性乳腺癌患者 85 例, 收集患者的临床病理资料及新辅助化疗前 1 周内的腹部 CT 图像, 根据新辅助化疗后手术标本的病理结果, 将患者分为病理完全缓解 (pCR) 组和非病理完全缓解 (non-pCR) 组。由一名放射科医生在对病理结果不知情的情况下使用 slice-o-matic 软件在患者腹部 CT 的腰 3 椎体水平手动测量骨骼肌面积 (SMA)、内脏脂肪面积 (VFA) 和皮下脂肪面积 (SFA), 高 VFA 和高 SFA 定义为 ≥100cm², 用身高 (m) 对 SMA 进行标准化, 计算骨骼肌指数 (SMI), 低 SMI 定义为 SMI<39cm²/m²。使用 t 检验、

Mann-Whitney U 检验、卡方检验评价 pCR 组与 non-pCR 组临床病理资料及身体成分参数的统计学差异。运用多因素 Logistic 回归分析及受试者工作特征 (ROC) 曲线分析评价身体成分参数对乳腺癌患者新辅助化疗后 pCR 的预测效能。

结果: 本研究患者中, 新辅助化疗后达到 pCR 者 26 例, 未达到 pCR 者 59 例。单因素分析结果显示 pCR 与 SMI、SFA、雌激素受体状态、ki67 增殖指数、临床 T 分期和分子亚型有关, 而与年龄、体重、BMI、VFA、孕激素受体状态、Her-2 表达状态、绝经状态、临床 N 分期无关。将单因素分析中有统计学意义的指标以及结合临床有意义的指标一并纳入多因素 Logistic 回归模型, 结果显示肌少症、皮下脂肪面积、ki67 增殖指数、分子亚型是 pCR 的独立预测因素 ($p<0.05$), 联合四个指标构建的综合模型的 AUC 为 0.851 (95CI: 0.757-0.919), 敏感性为 0.808, 特异性为 0.814。

结论: 高 SMI、低 SFA 的乳腺癌患者新辅助化疗后更容易达到 pCR, 联合 SMI、SFA 和临床病理参数构建的综合模型预测对 pCR 有较好的预测效能。

PO-2138

原发性肝癌肉瘤的临床特征和 MRI 表现

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目的 探讨原发性肝癌肉瘤的临床特点及 MRI 影像特征。方法 搜集 2013 年 12 月-2021 年 11 月复旦大学附属中山医院经手术病理证实的原发性肝癌肉瘤患者 11 例, 回顾性分析总结其临床特征及 MRI 表现。结果 11 例患者, 男性 9 例, 女性 2 例, 年龄 46-73 岁, 中位年龄 62 岁。8 例患者有慢性乙型肝炎病史, 1 例患者有肝炎肝硬化病史, 实验室检查中 7 例 AFP 升高, 1 例 CA199 轻度升高。11 例中, 8 例为单发, 3 例为多发, 共 21 个病灶, 其中肝右叶 14 个, 肝左叶 3 个, 同时累及肝左叶和右叶 4 个; 21 个病灶呈类圆形或浅分叶, 边界均清晰; 病灶最大径约 2.0-17.7cm, 其中 4 个病灶直径 >10 cm, 平均直径 (7.9 ± 1.4) cm。MRI 平扫呈囊实性或实性肿块, T1WI 以低信号为主, T2WI 以高或稍高混杂信号为主, 10 例病灶内可见大片状、多发小簇状或分隔状囊变区, 3 例病灶内可见出血信号, 2 例病灶内见少许脂肪成分, 动态增强扫描病灶边缘动脉期可呈轻度-明显不规则或环形强化, 门脉期及延迟期表现为快速廓清、逐渐填充及持续强化, 其中 6 例可见假包膜, 且延迟期显示更清晰。结论 肝脏边界清楚的孤立性肿块, 信号不均匀, 伴有明显的囊变坏死, 出血常见, 偶可见少许脂肪成分, 可有假包膜, 增强扫描实性成分可表现为快进快退型、渐进填充型及持续强化型。

PO-2139

增强 CT 图像联合实验室指标对急性胰腺炎严重度早期预测的影像学组学研究

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目的: 建立一个基于胰腺与胰周区域增强 CT 图像和实验室指标的早期预测急性胰腺炎 (acute pancreatitis, AP) 严重程度的联合模型和诺模图, 以实现重症急性胰腺炎 (severe acute pancreatitis, SAP) 的早期预测。

方法: 本研究对 209 例首发急性胰腺炎患者进行了回顾性分析, 其中训练集为 2016 年 1 月到 2021 年 7 月的 137 例样本, 男性 85 例, 女性 52 例, 平均年龄 51.3 ± 16.1 岁; 测试集为 2021 年 8 月到 2022 年 6 月的 72 例样本, 男性 39 例, 女性 33 例, 平均年龄 55.4 ± 17.8 岁。收集患者入院 48 小

时内的 CT 增强图像和实验室指标数据。从胰腺和胰周区域的门静脉期图像中提取影像组学特征，基于 LightGBM 构建特征筛选算法，获得最佳影像组学特征，建立逻辑回归影像组学模型，并根据受试者工作特征曲线下面积、灵敏度、特异度和准确度评价模型的预测性能。将提取的影像组学特征和实验室指标纳入 LightGBM 模型，筛选出可预测 AP 严重程度的风险因素并构建逻辑回归联合模型，并基于最佳联合特征建立诺模图，评价模型的预测性能。

结果：1.构建了影像组学模型，该模型由 9 个最佳影像组学特征构成，模型的 AUC 值：训练集为 0.960[95%可信区间：0.914~0.989]，验证集为 0.939，测试集为 0.833，灵敏度为 0.75，特异度为 0.789，准确度为 0.781；构建了增强 CT 图像与实验室指标的联合模型，该联合模型由 4 个影像组学特征和 3 个实验室指标所组成。训练集的 AUC 值为 0.940[95%可信区间：0.879~0.979]，验证集为 0.917，测试集为 0.858，灵敏度为 0.778，特异度为 0.844，准确度为 0.819。基于联合特征的诺模图显示，当总分大于 181 分时，模型预测为 SAP。基于 7 个特征的联合模型较基于 9 个特征的影像组学模型对 AP 严重程度的早期分类具有更好的预测性能。

结论：基于胰腺及胰周区域 CT 增强图像和实验室指标的联合模型在 AP 严重程度的早期预测中表现良好。基于最佳联合特征的诺模图为临床评估 AP 的严重程度提供了参考。

PO-2140

在局部晚期直肠癌患者中预测术后远处转移风险： 使用基于 MRI 的 Delta 影像组学方法

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背景 术后远处转移是局部晚期直肠癌患者预后不良的重要因素，准确预测 LARC 患者术后远处转移风险，有助于制定适当的个性化治疗方案。

目的 利用 nCRT 前后 2 次 MRI 提取的 delta-影像组学特征，用于预测局部晚期直肠癌患者术后远处转移风险。

资料与方法 回顾性纳入云南省肿瘤医院 2016 年 1 月-2019 年 6 月 213 例局部进展期直肠癌患者，所有患者均在 nCRT 后施行手术治疗，且均接受 nCRT 前后的 MRI 检查。除外术后发生终点事件的患者，其余患者术后至少随访 3 年。按 7:3 比例随机分为训练组和验证组（训练组 n=149，验证组 n=64），分别用于特征选择和验证。在 nCRT 前后的 T2 加权图像上对肿瘤病灶进行逐层勾画，利用 3D-slicer 软件进行特征提取。delta-影像组学特征被定义为 nCRT 前后影像组学特征的差异。使用最小绝对收缩和选择子算法(The least absolute shrinkage and selection operator algorithm,LASSO)用于特征降维和提取，构建 3 个 delta-影像组学模型，包括基于 nCRT 前后影像组学特征绝对和相对变化量的 delta-影像组学模型和 delta-影像组学联合模型。采用受试者操作特征曲线评价模型对 DM 的预测价值。

结果 本研究共纳入 213 例 LARC 患者，平均年龄为 58.50 ± 12.37 岁，中位随访时间为 39.8 个月，共有 36 例（16.9%）患者术后出现 DM。nCRT 前后每个病灶均提取 1382 个特征，进行特征降维和筛选后，训练集基于 nCRT 前后影像组学特征绝对和相对变化量的 delta-影像组学模型中各纳入 7 个关键特征。在训练集中，绝对与相对变化量 delta-影像组学模型，及 delta-影像组学联合模型的 ROC 曲线下面积分别为 0.77、0.74、0.82，相应测试集中 AUC 分别为 0.73、0.70、0.84。

结论 基于 MRI 的 delta-影像组学特征建立的联合预测模型，有助于对局部进展期直肠癌术后远处转移风险进行预测，且优于单纯的绝对和相对变化量的 delta-影像组学模型。

PO-2141

基于双能量 CT 多参数成像精准诊断 继发性胆总管结石的研究

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目的：探讨双能量 CT 诊断 CBDS 的价值；并基于双能量 CT 制定新的风险分层标准，探讨其对现有指南（即 ASGE 标准）的改进效能。

方法：回顾性收集我院 2019 年 1 月至 2022 年 11 月期间经 US 诊断为胆囊结石，拟行腹部双能量 CT 检测 CBDS 的患者。以外科手术或 ERCP 结果为参考标准，评估双能量 CT 不同组合图（虚拟平扫图像 [VNC]、虚拟单能图像 [40KeV+190KeV]、Rho+Z 图）在诊断 CBDS 的效能差异，择出最优参数图。将最优参数图指标代替现有 ASGE 指南中 US 指标制定基于双能量 CT 新的分层标准，并与现有指南对比。评价指标包括受试者操作特征曲线下面积（AUC）、敏感度、特异度。敏感度、特异度比较采用 McNemar 检验。AUC 比较采用 Delong 检验。采用 Kappa 检验评估观察者内和观察者间的一致性。P<0.05 被认为有统计学意义。

结果：共纳入 159 例患者。双能量 CT 参数图中，虚拟单能图像诊断 CBDS 的 AUC 高于 VNC 图像（0.907 vs 0.785；P<0.001）及 Rho+Z 图像（0.907 vs 0.850；P<0.05）；同时具有最高的观察者内及观察者间一致性（观察者内 Kappa 值：0.93 [95% CI: 0.78-1.00]；观察者间 Kappa 值：0.86 [95% CI: 0.66-1.00]）。与现有指南对比，基于双能量 CT 的 ASGE 标准提高了预测 CBDS 的特异度（90.0% vs 78.9%；P<0.001）的同时，二者敏感度（76.8% vs 75.4%；P=0.782）无显著统计学差异。

结论：双能量 CT 不同参数图中，虚拟单能图像诊断 CBDS 的诊断效能最高，且具有最高的观察者内及观察者间一致性。与现有 2019 年版 ASGE 指南对比，基于双能量 CT 新的风险分层标准提高了预测 CBDS 的特异度，减少了部分患者诊断性 ERCP 的使用。

PO-2142

光谱 CT 虚拟单能量图像对胰腺导管内乳头状粘液性肿瘤与胰管交通结构显示的研究

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目的：探讨光谱 CT 虚拟单能量图像（VMI）对胰腺导管内粘液性乳头状肿瘤（IPMN）与胰管交通结构的显示。

方法：回顾性收集重庆市人民医院 2021 年 10 月至 2023 年 7 月的 25 例 IPMN 患者。分析光谱 CT 动脉期及门脉期原始图像、40KeV 至 70KeV 虚拟单能量图像。客观定量指标：胰腺实质、主胰管及病灶的 CT 值、标准差（SD），信噪比（SNR）、对比噪声比（CNR）、衰减差异（AD）。主观评价指标：采用李克特 5 分量表（Five-point Likert scales）评估 IPMN 病灶显著性、边缘锐利度、主胰管边缘锐利度及 IPMN 与胰管交通结构边缘轮廓清晰度。统计分析采用 SPSS 软件进行。客观定量指标采用单样本 Kolmogorov-Smirnov（K-S）检验法进行正态分布检验，采用 Levene 检验法进行方差齐性检验。主观评价指标采用卡方检验分析。

结果：SNR 实质、SNR 病灶、SNR 主胰管各组间差异统计检验量分别为：22.425、5.375、2.432，P 值分别为：<0.001、<0.001、0.024，SNR 实质、SNR 主胰管在门脉期 VMI40 显示最佳，SNR 病灶在动脉期 VMI40 显示最佳。CNR 实质/病灶、CNR 实质/主胰管各组间差异统计检验量分别为：20.885、3.752，P 值分别为：<0.001、0.001。CNR 实质/病灶在门脉期 VMI40 显示最佳，CNR 实质/主胰管在动脉期 VMI40 显示最佳。AD 实质/病灶、AD 实质/主胰管各组间差异统计检验量分别为：34.289、2.042，P 值分别为：<0.001、0.073。AD 实质/病灶及 AD 实质/主胰管在门脉期 VMI40 显示最佳。病灶边缘锐利度、显著性、病灶与胰管交通结构边缘轮廓清晰性、主胰管边缘锐

利度各组间差异统计检验量分别为：154.616、158.710、135.568、139.623，P 值分别为：< 0.001、<0.001、<0.001、<0.001。各主观评分均在门脉期 VMI40 最佳。

结论：对于 IPMN 患者，门脉期或动脉期 VMI40 可以很好的显示病灶与主胰管交通情况，从而为 IPMN 的诊断提供主要依据。

PO-2143

原发性肝癌肝外转移患者预后生存影响因素分析

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【摘要】 目的 探讨影响原发性肝癌（PLC）肝外转移患者预后的相关因素，构建列线图预测 PLC 肝外转移患者的生存情况。方法 选取 2016 年 11 月至 2021 年 11 月宁夏医科大学总医院确诊的 201 例 PLC 肝外转移患者，将其 7:3 随机分为训练组和验证组。采用 LASSO 回归筛选协变量，基于多因素 Cox 回归确定独立预后因素，构建预测 PLC 肝外转移患者生存预后的列线图模型。采用 Bootstrap 法重复抽样 1000 次进行内部验证，计算一致性指数（CI），绘制校准曲线评价该列线图模型的校准度，决策曲线（DCA）以评价该列线图模型的临床有效性。结果 本组研究显示：NLR \geq 5（HR=2.053，95%CI:1.153~3.654）、肿瘤最大径 2-5cm（HR=2.566，95%CI:1.061~6.204）、肿瘤最大径 5-10cm（HR=2.624，95%CI:1.097~6.280）、肿瘤最大径 \geq 10cm（HR=3.574，95%CI:1.442~8.856）、肿瘤多发（HR=1.647，95%CI:1.049~2.587）、存在血管侵犯（HR=2.335，95%CI: 1.523~3.580）、联合靶向和（或）免疫治疗（HR=0.537，95%CI: 0.335~0.862）是 PLC 肝外转移患者的独立预后因素（ $P<0.05$ ），基于上述 5 个预测因子构建的列线图模型具有良好的预测性能。模型内部验证一致性指数(c 指数)训练组和验证组分别为 0.765（95%CI: 0.726~0.804）和 0.712（95%CI: 0.673~0.751）。校准曲线显示出良好的一致性。DCA 显示列线图具有正的净效益。结论 基于 NLR、肿瘤最大径、肿瘤数目、血管侵犯、联合靶向和（或）免疫治疗 5 个预测因子构建的列线图模型在 PLC 肝外转移患者生存预测方面表现良好，对临床有较高的指导意义，可很好的帮助个体化临床决策并促进精准治疗。

PO-2144

IVIM 和 DKI 技术评估直肠癌肿瘤间质比的研究

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目的

肿瘤间质百分比（TSP）作为肠癌肿瘤微环境评估的重要方法，与结直肠癌的生长和浸润密切相关，且是术后患者生存期的重要预测指标。体素内不相干运动（IVIM）和弥散峰度成像(DKI)是弥散加权成像技术的延伸。IVIM 和 DKI 不仅能够更好的反映癌症特征，还可以反映肿瘤微环境的组成和复杂性。本研究的目的是探讨 IVIM 和 DKI 定量参数在评价直肠癌肿瘤间质比中的作用。

材料和方法

对 27 名内镜下证实原发性直肠腺癌患者（年龄范围，37-88 岁，平均年龄 64.30 \pm 11.73 岁，16 名男性和 11 名女性）在进行全直肠系膜切除术之前进行 MRI。IVIM-DKI 详细的成像参数如下：轴向横断位；TR, 5700ms；TE 76ms；总采集时间，9 分 32 秒；FOV, 200 mm;体素尺寸为 1.0 \times 1.0 \times 3.0 mm³；层厚 3mm，带宽，1724；b 值，0,20,40,80,150,200,400,600,800,1000,1500,2000,2500。应用后处理软件勾画感兴趣区，IVIM 功能定量参数：灌注分数（f），纯扩散系数（D）和灌注相关扩散系数（D*）。DKI 功能定量参数：

平均扩散峰度 (Kapp) 和平均扩散系数 (Dapp)。术后, 对病理切片进行 HE 染色, 评估 TSP。应用 SPSS 进行统计分析。

结果

肿瘤间质比高组 D 值显著高于肿瘤间质比低组 ($t=-2.567$, $P=0.017$)。肿瘤间质比高组与低组 D* 值与 f 值未见显著统计学差异 ($t=1.267$, $P=0.214$; $t=-0.858$, $P=0.399$)。肿瘤间质比高组 Dapp 值明显高于肿瘤间质比低组 ($t=-2.548$, $P=0.020$)。肿瘤间质比高组与低组 Kapp 值未见显著统计学差异 ($t=-0.087$, $P=0.931$)。

结论

IVIM 定量参数 D 值和 DKI 定量参数 Dapp 值可以用于评估直肠癌肿瘤间质比。直肠癌 IVIM 和 DKI 可以作为识别直肠癌微环境的生物标志物。

PO-2145

基于 CT 影像组学及临床特征的 II 期结直肠癌患者预后预测

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目的: 结直肠癌是最常见的消化道恶性肿瘤之一。目前, 对于 II 期结直肠癌患者术后是否给予术后辅助化疗 (adjuvant chemotherapy, ACT) 治疗一直存在争议。而且大多数预后指标 (例如: T4 期、血管浸润、分化差等) 与病理有关, 无法在术前获得。因此, 迫切需要开发更准确的预后预测因子以协助临床诊疗。本研究旨在探讨 CT 影像组学 (Radiomics) 特征在 II 期结直肠癌预后评估中的应用价值, 建立并验证基于 CT 影像组学特征与临床特征的预后预测模型。

方法: 我们首先收集了 230 例 (训练集 170 例, 验证集 60 例) 经临床病理证实的 II 期结直肠癌患者。然后, 我们使用影像组学方法提取原发灶的影像组学特征, 并构建模型来预测 II 期结直肠癌患者的预后。最后, 为了提高模型的预后预测性能, 我们纳入了多项术前可获得的临床特征, 并采用信息融合方法, 结合 CT 影像组学特征和临床特征构建了融合预测模型, 最后分析比较单一影像组学模型与融合模型的预测性能。

结果: 研究显示融合模型生成的 DFS 和 OS 预测 AUC 值分别提高到 0.906 (95% CI: [0.835, 0.977]) 和 0.980 (95% CI: [0.956, 1.000]), 均高于单一影像组学模型产生的 DFS 和 OS 预测 AUC 值: (0.862 (95% CI: [0.773, 0.952]) 和 0.942 (95% CI: [0.906, 0.978])。

结论: 本研究通过 CT 扫描原发病变的影像组学特征分析, 并结合临床特征, 建立了预测 II 期结直肠癌预后的临床-影像组学融合模型, 可辅助临床筛查预后不良的高危患者, 以实现精准医疗。

PO-2146

基于人工智能临床影像与病理多模态融合对胰腺癌术后患者生存期预测的研究

诸露冰

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一直以来影像学很难找到一个较好的指标与胰腺癌患者的预后相关, 也很难基于目前肉眼可见的影像学特征建立一个较为准确的模型预测预后。但影像组学在免疫浸润环境及免疫检查点预测方面有进展, 由临床变量和 CT 放射学特征组成的预测模型可以进行晚期肺腺癌 PD-L1 表达的无创性评估。有学者提出了一个基于无创胸部 CT 图像的深度学习模型, 该模型在预测非小细胞肺癌患者 EGFR 突变/PD-L1 表达状态及其亚型方面表现出良好的性能, 此外, 有学者发现放射基因组学可以预测 p53 基因突变, 进而预测 PDAC 患者的预后。能否通过影像组学特征预测胰腺癌预后相关的病理特

征来预测胰腺癌的预后呢? VISTA 是新近发现的一个免疫抑制检查点, 在多种肿瘤细胞及肿瘤浸润免疫细胞表面不同程度地表达 VISTA, 作为 PD-L1 同源的 B7 家族一员, VISTA 的表达与肿瘤的预后息息相关, 有关研究发现在胰腺导管腺癌中, 癌组织中 VISTA 高表达的胰腺癌患者与 VISTA 低表达的胰腺癌患者相比预后更好, 那么通过影像组学建立预测 VISTA 表达的模型, 或许能对胰腺癌诊疗以及其预后的预测带来帮助。本课题组通过回溯性研究, 通过相关排纳准则收集 93 例 2014-2022 年间病理确诊为胰腺导管腺癌的患者, 分为训练组与验证组, 通过相关软件勾画肿瘤区域等, 提取相关影像组学特征, 经过 logistic 回归等统计学分析, 选择相关性较高的组学特征, 构建模型, 再通过验证组验证, 绘制 ROC 曲线, 确定准确性与精确性, 验证通过组学特征构建模型能预测 VISTA 的表达, 从而预测胰腺癌的预后。

PO-2147

应用钆塞酸二钠增强磁共振 T1 加权成像对 肝细胞癌肝切除术后肝脏再生的术前评估

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目的: 探讨钆塞酸二钠增强 T1 加权成像 (T1 WI) 参数在肝部分切除术 (partial hepatectomy, PH) 后 HCC 患者术前预测肝再生 (liver regeneration, LR) 中的潜在价值。

方法: 研究共招募 206 例 HCC 患者, 术内在 GE 750w 3.0T 扫描仪上进行钆塞酸二钠增强前后的扫描。肝胆延迟期 (hepatobiliary phase, HBP) 的时间为注射对比剂后 20 分钟。由两位放射科医生采用双盲法测量对钆塞酸二钠增强前后 T1 WI 参数进行测量。Spearman 相关性检验用于评估 T1 WI 参数与再生指数 (regeneration index, RI) 之间的相关性, 再生指数计算为 $100\% \times (\text{术后残余肝脏体积} - \text{术前残余肝脏体积}) / \text{术前残余肝体积}$ 。多元线性回归分析用于确定 RI 的因素。

结果: 通过排除标准, 最后共对 57 例 HCC 患者 (47 男 10 女, 平均年龄 51.26 ± 10.79 岁) 进行分析。组内相关系数 (ICC) 在 0.791-0.973 之间。Spearman 相关性检验显示, 小肝切除患者的 SIHBP (肝) ($r=0.450$, $P=0.011$)、SI[HBP pre (肝)] ($r=0.531$, $P=0.002$)、DR (肝) ($r=0.4570$, $P=0.008$)、SI/HBP pre ($r=-0.358$, $P=0.048$) 与 RI 相关。但多变量分析显示, 只有 SI[HBP pre (肝)] (模型 1: 标准化 $\beta = 0.425$, $P=0.007$) 和 SIHBP (肝脏) (模型 2: 标准化 $\beta = 0.337$, $P=0.035$) 与 RI 相关。在接受小肝切除术的患者中, SIHBP (肝) 和 SI[HBP pre (肝)] 也与纤维化分期呈负相关 (分别为 $r=-0.290$, $P=0.046$ 和 $r=-0.175$, $P=0.029$), 纤维化分期与 RI 也呈负相关。然而, 在多变量分析中, 对于总患者和大肝切除患者, 没有 Gd-EOB-DTPA 增强的 T1WI 参数与 RI 相关 ($P>0.05$)。

结论: SI[HBP pre (肝)] 和 SIHBP (肝) 可能是肝再生的可靠术前预测指标。

PO-2148

基于能谱 CT 影像组学在预测小肝癌微血管浸润中的研究

刘相如

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目的：微血管浸润（Microvascular invasion, MVI）被认为是一种早期的血管侵犯，当存在 MVI 时，小肝癌的短期复发率增加。MVI 的诊断依赖术后有创的组织病理学检查。因此，术前准确、可重复的非侵入性检测手段预测预后是十分必要的。双能计算机断层扫描（Dual-Energy Computed Tomography, DECT）成像是一种新型技术，可以在微观上对于小肝癌及其周围血供情况提供定量信息。评估 DECT 参数在早期肝癌浸润范围及治疗疗效中的应用价值，构建组学模型预测是否存在肝癌 MVI，以期获得术前无创的影像评估指标。

方法：回顾性收集本院 117 例小肝癌患者的影像及临床资料，经术后病理证实，50 例患者存在 MVI。将小肝癌动脉期 CT 增强图像上传至深睿科研平台。影像组学-临床模型（联合模型）预测模型的建立由三部分组成：A. 临床参数筛选：纳入 70Ke 能量水平 IC、NIC、WC、NWC、Zeff 和 λ （40-100KeV）6 个能谱参数和临床基线变量，进行单因素分析筛选具有统计学差异的变量（ $P < 0.05$ ），构建临床模型；B. 影像组学模型构建：原始图像获取和感兴趣区分割（由两位资深放射科医师进行勾画），进行特征提取及特征选择，随后训练逻辑回归、支持向量机、多层感知机、决策树、随机森林 5 种机器学习模型，评估性能，输出最优模型并计算影像组学评分；C. 将具有统计学差异的变量和影像组学评分结合建立的联合模型，采用受试者工作曲线对模型诊断性能进行分析，校准曲线进一步判断模型的优劣，决策曲线来评估临床效能。

结果：MVI 组 IC、NIC、 λ （40-100KeV）均显著高于 non-MVI 组（ $P < 0.05$ ）。WC、NWC、Zeff 与临床基线变量在两组之间没有明显统计学差异（ $P > 0.05$ ）。通过 LASSO 10 折交叉验证筛选出最优的 13 个影像组学特征，构建影像组学-临床模型（联合模型），二元逻辑回归联合模型表现最好，ROC 曲线下面积（area under the curve, AUC）为 0.87。

结论：临床参数与影像组学结合构建的联合模型对小肝癌术前预测 MVI 具有良好的诊断价值。

PO-2149

双能量 CT 图像在胃癌显示中的优化选择

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目的 探讨双能量 CT Monoenergetic+算法在胃癌显示优化中的价值。

方法 收集 2021 年 10 至 2022 月 12 月于南通大学第二附属医院行腹部双能量 CT 增强检查的胃癌确诊患者为研究对象。应用 Syngovia Workstation 后处理工作站，运用 Mono+算法获得动脉期及静脉期图像（40~90 keV）共 12 组。分别将动脉期及静脉期 100 kVp 和 140 kVp 图像以系数 0.5 融合，获得 120 kVp 融合图像共 2 组。重建出层厚 3 mm、层间距 3 mm 的横断面图像，用于主观及客观评估。比较各能量级的主客观评分差异性。

结果

1. 动、静脉期图像主观评分情况：40 keV 组 5 分占比最高，显著高于其他 6 组（ $P < 0.05$ ），120 kVp 组 5 分占比高于 60 keV~90 keV 单能级图像组，差异有统计学意义（ $P < 0.05$ ），而与 50 keV 单能级图像相比差异无统计学意义（ $P > 0.05$ ）。

2. 动、静脉期图像客观评分情况：120 kVp 组图像信噪比（SNR）最高，与其他组两两比较显示差异有统计学意义（ $P < 0.05$ ）；40 keV 单能级图像 SNR 虽然高于其它单能级图像，但与其它单能级图像组（50~90 keV）两两比较差异无统计学意义（ $P > 0.05$ ）；50~90 keV 单能级图像组的

SNR 值，两两相比差异无统计学意义（ $P>0.05$ ）。40 keV 单能级图像对比噪声比（CNR）高于其他各组图像，与 70、80、90 keV 两两比较显示差异有统计学意义（ $P<0.05$ ），与其它组比较差异不显著（ $P>0.05$ ）。50 keV 及常规 120 kVp 与 80、90 keV 两两比较显示差异有统计学意义（ $P<0.05$ ）。

结论

双能量 CT Mono+算法获得的 40 keV 单能级图像可以明显优化胃癌病灶的显示，有助于胃癌病灶的识别及观察。

PO-2150

基于常规磁共振联合临床特征影响组学模型预测 宫颈癌淋巴结转移和预后的研究

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目的：建立一种基于常规磁共振和临床特征的影像组学模型，用于提高宫颈癌患者淋巴结转移（lymph node metastasis, LNM）的诊断性能和预后。材料和方法：回顾性分析来自两个医学中心的 485 例经手术病理证实为宫颈癌患者的术前磁共振（Magnetic Resonance, MRI）影像及临床病理资料（包括患者年龄、鳞状细胞癌抗原（Squamous cell carcinoma antigen, SCC-Ag）、病理类型、肿瘤最大径、肿瘤体积、MR 诊断有无 LNM）。医学中心 1 数据集按照 7: 3 的比例随机分成训练队列（ $n=261$ ）和内部验证队列（ $n=113$ ），医学中心 2 数据集作为外部验证（ $n=111$ ）。从肿瘤的横轴位脂肪抑制（Fatsaturation, FS）T2WI 及矢状位对比增强（Contrast enhanced, CE）T1WI 上提取每位患者影像组学特征。基于二分类向量机（Support vector machine, SVM）方法分别获取常规临床影像诊断模型（M1），基于影像组学特征建立具有线性核的 SVM 模型（M2）及常规 MRI 特征及最优影像组学特征共同构建的联合模型 M3，利用曲线下面积（Area under the curve, AUC）、灵敏度、特异性和受试者工作特征曲线（Receiver operating characteristic, ROC）的准确性对模型效率进行评价。根据随访结果进行分组及相应无进展生存期（Disease-Free Survival, DFS）的生存曲线划分，观察模型在两组间预后的差异。结果：①M3 诊断宫颈癌 LNM 性能最佳，在训练队列、内部验证队列和外部验证队列中 AUC 分别为 0.892、0.781 和 0.827。②Rad-score 结合模型（ $p=0.003$ ）是宫颈癌特异性复发的独立预测因子。结论：本研究提出的结合横轴位 FS-T2WI、矢状位 CE-T1WI 和临床特征的影像组学模型的支持向量机二分类模型可应用于宫颈癌患者的 LNM 的术前预测及患者预后预测。

PO-2151

IVIM 模型对直肠腺癌壁外血管侵犯的诊断价值及 与 Ki-67 的相关性

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目的 探讨体素内不相干运动（IVIM）模型鉴别直肠腺癌壁外血管侵犯（EMVI）的诊断价值，并分析各参数值与 Ki-67 表达的相关性。方法 回顾性分析安庆市立医院 2020 年 1 月至 2022 年 1 月收治的 36 例经病理证实的直肠腺癌患者的资料；恶性组中 EMVI 阳性 16 例、阴性 20 例。测量病灶的参数值包括：ADCstandard（标准表观扩散系数）；ADCslow（慢速表观扩散系数）；ADCfast（快速表观扩散系数）；f（灌注分数）；DDC（分布扩散系数）；Alpha（扩散异质性指数）。对

36 例经病理证实的直肠腺癌患者的 IVIM 参数进行分析, 探讨其对直肠腺癌 EMVI 的术前评估价值。以病理结果作为检验标准, 采用 Spearman 相关分析比较各参数值与 Ki-67 表达水平的相关性。结果 EMVI 阳性组中的 ADCslow、ADCfast、f、DDC 参数值高于阴性组; ADCstandard、alpha 值在两组间差异无统计学意义 ($P>0.05$)。在评估 EMVI 时, ADCfast 的 ROC 曲线下面积最大 (0.818), 具有较高的准确性。以 $5.045 \times 10^{-3} \text{mm}^2/\text{s}$ 为诊断阈值时, 其敏感性及特异性分别为 87.5%、94.3%。结论 IVIM 模型在评价直肠腺癌 EMVI 有较高价值, 且 ADCfast 诊断准确性最高。

PO-2152

基于定量 CT 研究腹部脂肪分布、肝脏脂肪含量及胰腺脂肪含量预测急性胰腺炎复发的价值

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目的 基于定量 CT (QCT) 探讨腹部脂肪分布、肝脏脂肪含量及胰腺脂肪含量预测急性胰腺炎(AP)复发的价值, 建立复发性急性胰腺炎(RAP)的临床影像特征风险模型。

方法 回顾性收集 2017 年 1 月至 2022 年 12 月在皖南医学院弋矶山医院首次诊断为 AP 的 468 例患者, 均在发病 7 天内进行 CT 平扫和增强扫描, 经临床随访, 其中 261 例归为无复发 AP 组, 207 例归为复发性急性胰腺炎(RAP)组; 使用 QCT Pro 软件测量患者 L3 椎体中部层面的腹部内脏脂肪面积 (VFA)、腹部皮下脂肪面积 (SFA)、胰腺脂肪含量、肝脏脂肪含量, 并计算相应层面腹部总脂肪面积 (TFA); 同时收集两组患者临床特征及 CT 常规影像特征; 分析急性胰腺炎复发的风险因素。采用 Mann Whitney U 检验或 χ^2 检验比较两组间临床特征、CT 常规影像特征及 QCT 体脂参数, 将差异有统计学意义的特征纳入多因素 logistic 回归, 建立预测 AP 复发的综合模型, 使用受试者操作特征曲线评估模型预测 AP 复发的效能。

结果 无复发 AP 组与 RAP 组组间在年龄、饮酒、高脂血症、胆道结石、胰腺边缘 (清晰或模糊)、VFA、TFA、肝脏脂肪含量、胰腺脂肪含量差异均有统计学意义 (P 均 <0.05); 多因素 Logistic 回归分析显示高脂血症、胆道结石、饮酒、胰腺脂肪含量是 RAP 的独立危险因素, 胰腺边缘是 RAP 的保护因素; 基于高脂血症、胆道结石、饮酒及胰腺边缘情况构建临床-影像特征模型, 胰腺脂肪含量联合上述指标构建综合模型, 经 Delong 检验发现, 胰腺脂肪含量预测 AP 复发的 AUC 值 (0.770) 高于临床-影像模型 (0.701, $Z=2.00$, $P<0.05$), 综合模型预测 AP 复发的 AUC 值 (0.860) 高于临床-影像模型、胰腺脂肪含量 (0.701、0.770, $Z=6.98$ 、5.57, P 均 <0.001)。

结论 VFA、TFA、肝脏脂肪含量及胰腺脂肪含量是急性胰腺炎复发的影响因素, 其中胰腺脂肪含量是复发的独立危险因素, 并且胰腺脂肪含量联合临床及 CT 影像特征的综合模型可有效预测 AP 的复发, 能够为 RAP 的预防及临床诊治提供依据。

PO-2153

基于 MRI 影像特征和组学分析的联合模型预测子宫内膜样癌微卫星高度不稳定状态的初步研究

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目的: 构建 MRI 影像和组学特征联合模型, 对术前预测 EEC 的微卫星高度不稳定 (MSI-H) 状态的应用价值进行评估。方法: 本研究回顾性收集本院 144 名病理证实的 EEC 患者资料。根据免疫组化结果将患者分为 MSI-H 组 ($n=48$) 和 non-MSI-H 组 ($n=96$)。收集临床特征及各个常规 MRI 诊断特

征（肌层浸润深度、肿瘤最大径线、宫颈受累及淋巴结情况）。基于临床常规 MRI 诊断特征提取 MSI-H 的临床危险因素，利用 logistic 回归分析构建常规 MRI 特征模型（M1）。利用 ITK-SNAP 软件分割 MRI 图像的 ROI，继而将标注图像导入 AK 软件设置三大类纹理参数进行组学特征提取。使用 IPMs 计算 ICC 来评价分割病灶的一致性，而后将患者按 7:3 随机分为训练组（n=100）和验证组（n=44），采用自变量与自变量的相关系数、梯度提升决策树分析、逐步逻辑回归进行影像组学特征的降维和筛选，构建影像组学模型（M2）。利用 logistic 回归分析结合影像组学特征和常规 MRI 特征建立联合模型（M3），并绘制出诺模图。绘制各个模型的校准曲线及决策曲线分析评估模型的分类效能及校准性能。结果：在训练组和验证组中，非 MSI-H 组与 MSI-H 组患者肌层浸润深度、宫颈间质情况存在的差异有统计学意义（ $p<0.05$ ）。校准曲线和决策曲线表明，三种模型中 M3 模型表现最佳且临床应用价值最高。M3 与 M1 的诊断效能存在差异（ $p<0.001$, $p=0.017$ ）。M2 与 M1 两个模型的诊断效能存在差异有统计学意义（ $p=0.033$ ），但在验证组中差异无统计学意义（ $p=0.600$ ）。M3 与 M2 的诊断效能存在差异有统计学意义（ $p=0.013$ ），但是在验证组中差异无统计学意义（ $p=0.421$ ）。在训练组和验证组内，相较 M1 和 M2，M3 均获得正向分类改善（ $NRI>0$, $IDI>0$, $p<0.05$ ）。结论：基于 MRI 图像的影像组学特征构建的影像组学模型可以很好地预测 EEC MSI-H 状态。常规 MRI 与影像组学联合模型可以有效提高预测 EEC MSI-H 的能力，为临床了解 MSI-H 状态提供重要价值。

PO-2154

全容积 ADC 直方图分析联合 ADC 值术前预测直肠癌肿瘤沉积的价值

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【摘要】

目的：探讨基于肿瘤全容积的 ADC 直方图参数联合 ADC 值在术前预测直肠癌肿瘤沉积（TDs）中的应用价值。

方法：回顾性分析苏州大学附属第一医院 2016 年 6 月至 2023 年 6 月术前行直肠 MRI 检查且经病理确诊的 111 例直肠癌患者的临床及影像学资料，根据病理结果将其分为 TDs 阳性组（ $n=30$ ）和 TDs 阴性组（ $n=81$ ），将扩散敏感系数（ b 值）=1000 s/mm² 的 DWI 生成的 ADC 序列图像导入 ITK-SNAP 软件中，手动勾画肿瘤全容积并生成 3D 感兴趣区，利用 Feature Explorer (FAE) 软件提取 ADC 直方图参数，包括第 10 百分位数（ADC10%）、第 90 百分位数（ADC90%）、最大值（ADCmax）、最小值（ADCmin）、均数（ADCmean）、中位数（ADCmedian）、峰度及偏度；同时测量肿瘤最大层面的 ADC 值。分析比较两组患者之间 ADC 值及 ADC 直方图参数的差异，将有统计学差异的参数纳入多因素 logistic 回归分析并构建联合模型，利用 ROC 曲线分析 ADC 值、全容积 ADC 直方图参数及两者的联合模型的预测效能。采用 DeLong 检验比较各 AUC 间的差异。

结果：ADC 值、ADC10%、ADC90%、ADCmax、ADCmean、ADCmedian 及峰度在 TDs 阳性组和阴性组间差异具有统计学意义（ $P<0.05$ ），以 ADC90% 的预测效能最高（AUC、灵敏度、特异度分别为 0.778、80.0%、65.4%）。由 ADC 值、ADC10%、ADC90%、ADCmax、ADCmean 构建的联合模型的 AUC、灵敏度、特异度、准确度分别为 0.940、86.7%、83.8%，其诊断效能优于 ADC 值（AUC 为 0.645）及各全容积 ADC 直方图参数（AUC 为 0.649-0.778），差异均有统计学意义（ $P<0.05$ ）。

结论：全容积 ADC 直方图参数及肿瘤最大层面的 ADC 值可用于术前预测直肠癌 TDs，基于两者的联合模型具有最高的预测效能。

PO-2155

肝硬化背景下肝内胆管细胞癌和肝细胞癌的影像诊断对照研究

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目的:对照分析肝硬化背景下肿块型肝内胆管细胞癌和肝细胞癌的多期动态增强 CT、MRI 表现,并探讨有助于诊断肿块型肝内胆管细胞癌的特征性表现,指导临床及术前诊断、分期。

方法:回顾性分析 2015 年 1 月—2022 年 7 月在天津市第三中心医院就诊并经手术或穿刺病理证实的肝硬化背景下 16 例肿块型肝内胆管细胞癌(男性 12 例,女性 4 例,年龄 31-69 岁,平均年龄 58.32 岁)和 22 例肝细胞癌(男性 16 例,女性 6 例,年龄 34-67 岁,平均年龄 51.30 岁)的多期动态增强 CT、MRI 表现及 MRI 多参数表现。

观察指标包括两组患者病灶的大小、形态、动态增强各期信号、强化方式及伴随征象,尤其特异性造影剂 Gd-EOB-DTPA 影像表现特点,同时分析患者的血清学指标及临床表现。连续性变量采用 t 检验,分类变量采用卡方检验或 Fisher 精确概率检验。 $P<0.05$ 为有统计学差异。

结果:统计学分析显示肿瘤的强化方式、MRI 延迟期信号($p=0.000$)以及伴随征象如肿瘤最大径($P=0.010$)、包膜凹陷($P=0.001$)、门静脉侵犯($P=0.002$)、肝内胆管扩张($P=0.007$)及腹腔淋巴结肿大($P=0.000$)等表现在肝硬化背景下肿块型肝内胆管细胞癌和肝细胞癌中均存在统计学差异。其中肿块型肝内胆管细胞癌最常见的强化方式是渐进性强化及环状强化,肝细胞癌最常见的强化方式是快进快出。另外,16 例肿块型肝内胆管细胞癌中只有 3 例(20.0%)表现为 MRI 延迟期低信号,而 22 例肝细胞癌中有 19 例(90.4%)表现为此信号($P=0.000$)。表观弥散系数 ADC 图肝内胆管细胞癌大多表现肿瘤周边环形低信号,肝细胞癌表现为团块样弥散受限。同时,肝硬化背景下肿块型肝内胆管细胞癌和肝细胞癌的肿瘤标志物 CA199、AFP 及 CEA 也具有统计学差异。

结论:肝硬化背景下出现多期动态增强 CT/MRI 渐进性强化或外周环状强化、MRI 延迟期相对等高信号伴随包膜凹陷、门静脉侵犯、肝内胆管扩张、腹腔淋巴结肿大、CA199 和/或 CEA 升高则有助于肿块型肝内胆管细胞癌的诊断,尤其环状的 DWI 弥散受限及特异性造影剂肝胆期相的晕征具有一定特异性。

PO-2156

基于双能 CT 的影像指标在急性阻塞性肠系膜缺血发生不可逆透壁性肠坏死评估中的价值

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目的:探讨双能 CT (DECT) 第二代虚拟单能谱图像 (VMI+) 与碘密度图在预测急性阻塞性肠系膜缺血 (AOMI) 不可逆透壁性肠坏死 (ITIN) 中的价值。

方法:连续性收集 2012 年 01 月~2022 年 01 月在本医院就诊的 AOMI 患者。CT 包括常规 MDCT 和 DECT 扫描,DECT 扫描的双能量数据重建 120kVp 混和能量图像、50 keV VMI+和碘密度图。主观评估包括肠系膜血管、肠壁及肠外 CT 征象。客观评价包括在 50keV VMI+和碘图上测量病变肠壁 CT 值 ($CT_{50keV \text{ 病变}}$)、正常与病变肠壁 CT 值比值 ($CT_{50keV \text{ 正常/病变}}$),病变肠壁的碘浓度 (IC 病变) 和正常与病变肠壁 IC 比值 ($IC_{\text{正常/病变}}$)。

结果:(1) 纳入 AOMI 患者共 102 例,ITIN 共 48 例。(2) 在 47 例 DECT 组中,ITIN 组患者病变肠壁的 $CT_{50keV \text{ 病变}}$ 和 $IC_{\text{病变}}$ 值明显低于非 ITIN 组;ITIN 组 $CT_{50keV \text{ 正常/病变}}$ 与 $IC_{\text{正常/病变}}$ 高于非 ITIN 组。

(3) 102 例患者中,ITIN 组患者肠壁强化降低或缺失、肠腔扩张和实质脏器梗死的发生率明显高于非 ITIN 组。Logistic 回归发现肠壁强化降低或缺失 ($P=0.009$)、肠腔扩张 ($P<0.001$) 和实质性脏器梗死 ($P=0.007$) 是发生 ITIN 的独立危险因素;联合 CT 主观征象预测 ITIN 的 AUC 为

85.30%。(4) 在 DECT 扫描的 47 例患者中, 以 $CT_{50keV \text{ 正常/病变}}=2.81$ 为截值, 预测 ITIN 的 AUC 为 0.794; 以 $IC_{\text{正常/病变}}=2.39$ 为截值, 预测 ITIN 的 AUC 为 0.777; 主观征象联合预测 ITIN 的 AUC 为 0.801。Delong 检验 $CT_{50keV \text{ 正常/病变}}$ 、 $IC_{\text{正常/病变}}$ 和 CT 主观征象预测 ITIN 的 AUC 无差异 ($P=0.782\sim0.957$)。分别使用客观指标 $CT_{50keV \text{ 正常/病变}}$ 、 $IC_{\text{正常/病变}}$ 代替 CT 主观中的肠壁强化降低与缺失, 预测 ITIN 的 AUC 分别为 0.857 和 0.896。

结论: 门静脉期 $CT_{50keV \text{ 正常/病变}}$ 、 $IC_{\text{正常/病变}}$ 是预测 AOMI 发生 ITIN 有效的客观影像学指标, 其中 $IC_{\text{正常/病变}}$ 联合 CT 主观征象的预测效能最佳。

PO-2157

80kV 三低扫描技术在低 BMI 指数病人 CT 门静脉血管成像中的应用

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[摘要] 目的 探讨在低体重指数患者腹部 CT 门静脉血管成像中使用 80kV 低辐射剂量、低对比剂量以及低注射流速 (三低) 扫描技术的可行性。方法 选取来我院行门静脉 CT 血管成像 $BMI \leq 18.5 kg/m^2$ 患者 80 例随机分为两组, 每组 40 例, A 组采用 80kV, 300mAs 参考值, 造影剂量为 0.9ml/kg, 造影剂注射流率为 2.7ml/s; B 组采用 120kV, 300mAs 参考值, 造影剂量为 1.2ml/kg, 造影剂注射流率为 3.5ml/s。对比评价两组的图像质量、辐射剂量和最终诊断结果, 所得图像由两位放射科医师对两组图像质量进行 5 分评价对所得到的图像数据运用 SPSS17.0 软件进行统计学分析。结果 A 组的容积 CT 剂量指数 (CTDIvol)、剂量长度乘积、有效辐射剂量明显低于 B 组, 差异有统计学意义 ($P < 0.05$)。A、B 两组图像所测门静脉主干、门静脉分支、肝门层面腹主动脉强化值 $A < B$, 差异有统计学意义 ($P < 0.05$)。所用对比剂量 A 组小于 B 组, 差异有统计学意义 ($P < 0.05$)。A、B 两组各图像静脉主干、门静脉分支、肝门层面腹主动脉信噪比 SNR 及对比噪声比 CNR 无明显差异, 无统计学意义。A 组图像得分 (4.4 ± 0.5), B 组得分 (4.8 ± 0.38)。结论 门静脉 CT 血管成像扫描中使用低 kV 扫描可以在同时降低辐射剂量、对比剂剂量、降低注射对比剂的流速 (三低) 的情况下仍可获得符合临床诊断要求的优质图像, 减少对比剂量可降低患者对比剂肾病的发生几率, 降低注射流速可降低注射对比剂时皮下外渗的发生几率, 在老年患者、糖尿病患者及放化疗患者等体质差人群中可以推广应用。

PO-2158

能谱纯化技术与低浓度对比剂对门静脉血管成像质量的研究

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目的: 探讨能谱纯化技术联合低对比剂浓度对门静脉血管成像质量的影响。方法: 收集 2023 年 3 月至 2023 年 7 月来我院行门静脉血管 CTA 扫描的 100 例患者, 采用前瞻性随机对照研究, 随机分常规组 (A 组)、对照组 (B 组) 各 50 例, A 组采用 120Kv, 参考管电流 300mAs, 对比剂使用碘海醇 (350mg/ml), B 组采用能谱纯化技术 Sn100Kv, 参考管电流 300mAs, 对比剂使用碘克沙醇 (270mg/ml), 分别测量门静脉左右支 CT 值, 肝实质噪声 (SD 值), 门静脉对比噪声 (CNR 值) 以及 CT 剂量指数 (CTDIvol), 主观评价采用四分法。结果: A 组平均 CT 值 130.32 ± 23.73 , SD 值 16.92 ± 5.74 , CNR 值 17.63 ± 3.71 , 辐射剂量 $12.54 \pm 3.67 mGy$, 图像质量评分 2.72 ± 0.36 ; B 组平均 CT 值 189.36 ± 20.85 , SD 值 18.11 ± 3.54 , CNR 值 19.23 ± 4.54 , 辐射剂量 $7.82 \pm 3.85 mGy$, 图像质量评分 3.32 ± 0.61 。其中 AB 两组的 CT 值、辐射剂量及图像质量评分有显著差异 ($P < 0.05$), SD

值和 CNR 值未见明显差异 ($P>0.05$)。结论: 能谱纯化技术可提高患者检查的舒适性以及门静脉血管的成像质量并降低辐射剂量, 值得临床推广。

PO-2159

双能 CT 能谱技术对急性阻塞性肠系膜缺血 异常肠壁图像显示的优化

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目的: 比较双能 CT (DECT) 第二代虚拟单能谱图像 (VMI+) 和常规 120kVp 图像显示急性阻塞性肠系膜缺血 (AOMI) 异常肠壁的图像质量, 旨在确定显示异常肠壁的最佳能级 (keV), 为准确评估 AOMI 是否发生肠坏死及其预后提供技术支撑。

方法: 连续性收集 2017 年 01 月~2022 年 01 月在本院就诊高度怀疑为 AOMI 的患者。将门静脉期 90kVp 和 Sn 150kVp 双能量原始数据重建常规 120kVp 混和能量图像和范围从 40~90keV (间隔为 10keV) 共 6 组 VMI+ 图像。对上述 7 组图像进行图像质量客观和主观评价。

结果: (1) 最终纳入患者共 43 例, 21 名男性和 22 名女性, 中位年龄 72 (64, 78) 岁。(2) 7 组图像中, 病变肠壁的 CT 值、正常肠壁的 CT 值及两者之间的差值均存在统计学差异 (P 值均 <0.001)。两两比较, 40keV、50keV、60keV 组正常和病变肠壁 CT 值均高于 120kVp 组 (P 值均 <0.05); 40keV、50keV、60keV 组正常与病变肠壁 CT 值的差值均高于 120kVp 组, 但只有 40keV、50keV 组与 120kVp 组存在统计学差异 (P 值均 <0.05)。CNR: 病变肠壁相对于正常肠壁的 CNR 存在差异 ($F=8.63$, $P<0.001$)。其中 40keV、50keV、60keV 组的 CNR 均高于 120kVp 组 (P 值均 <0.05)。7 组图像的噪声存在差异 ($F=76.18$, $P<0.001$)。其中 40keV、50keV、60keV 组噪声高于 120kVp 组 (P 值均 <0.05)。(3) 病变肠壁显著性评分: 7 组图像的病变肠壁显著性评分存在统计学差异 ($H=257.09$, $P<0.001$)。40keV、50 keV 组的病变肠壁显著性评分高于其它组 (P 值均 <0.05)。图像总体质量评分: 7 组图像的图像总体质量评分存在统计学差异 ($F=203.27$, $P<0.001$)。其中 50keV、60keV 组图像总体质量评分高于其他组 (P 值均 <0.05)。

结论: DECT 50keV 的 VMI+ 可以在不影响图像总体质量的同时, 显著增加 AOMI 病变段肠壁的 CNR, 更有利于病变段肠壁的检出。

PO-2160

钆塞酸二钠增强 MRI 诊断肝嗜酸性粒细胞浸润 1 例

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男, 47 岁, 主诉: 右上腹钝痛不适, 间断发热 1 周, 无胸闷、胸痛等症状。外院胸部 CT 未见明显异常, 上腹部 CT 提示肝内异常密度影。入院前 1 周每日出现午后低热, 最高 37.1°C 。入院后实验室检查: 白细胞计数 $10.5\times 10^9/\text{L}$, 中性粒细胞计数 $4\times 10^9/\text{L}$, 嗜酸性粒细胞计数 $1.72\times 10^9/\text{L}$, 嗜酸性粒细胞比 21.11%。血清肿瘤标记物检查: AFP 7 ng/ml, CA19-9 25 U/ml, CEA 2.3 ng/ml。肝脏钆塞酸二钠 (gadolinium ethoxybenzyl diethylenetriamine pentaacetic acid, Gd-EOB-DTPA) 增强 MRI 提示: 肝右叶前下段异常信号, 考虑为感染性病变。遂行超声引导下穿刺活检术, 术后病理提示嗜酸性粒细胞增多症。

PO-2161

肝假性淋巴瘤的典型及不典型 MRI 特征

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【摘要】目的 总结肝假性淋巴瘤(hepatic pseudolymphoma, HPL)的典型及不典型 MRI 特征,以提高其术前诊断水平。方法 回顾性分析经病理证实且接受 MRI 平扫、DWI 及动态增强扫描的 35 例 HPL 患者 50 个肝病灶的 MRI 数据,分析病灶的 MRI 特征。定量资料组间比较采用 Mann-Whitney U 检验,一致性比较采用 Kappa 检验。结果 27 例单发病灶,8 例多发病灶中 2 例合并肝外病灶。50 个肝病变中 45 个最大径 $\leq 20\text{mm}$,仅 5 个 $>20\text{mm}$,46 个呈类圆形,4 个不规则形,49 个呈均匀 T1WI 低信号、T2WI 高信号,仅 1 个长径 50mm 病灶中央伴囊变坏死。ADC 值可准确测量的 44 个病灶 ADC 值均低于邻近肝脏 ADC 值 $0.93(1.12, 1.51) \times 10^{-3}\text{mm}^2/\text{s}$,38 个病灶 ADC 值为 $0.55(0.46, 0.73) \times 10^{-3}\text{mm}^2/\text{s}$ 低于脾脏 ADC 值 $0.93(0.79, 1.09) \times 10^{-3}\text{mm}^2/\text{s}$,6 个病灶 ADC 值为 $1.3(1.07, 1.8) \times 10^{-3}\text{mm}^2/\text{s}$ 高于脾脏 ADC 值,组间 ADC 值差异有统计学意义(病灶与邻近肝比较,病灶与同层脾脏比较, R 均 <0.001)。36 个病灶出现 DWI“连续线状高信号征”即在 DWI($b=500\text{mm}^2/\text{s}$)图中表现为高信号肿块与邻近门脉间连续性线状高信号相连,36 个病灶出现增强“尖角征”即强化峰值期病灶边缘欠光整可见“尖角状”高信号向外延伸,且两种影像征象一致性极好(Kappa 值 $=0.802$)。增强方式多样,以模糊“廓清型”为主。6 个病灶增强无“环形征”,44 个病灶增强出现“环形征”,其中 2 个及以上多期相同时出现“环形征”占 75%(33/44),单期相出现“环形征”占 25%(11/44)。结论 HPL 典型表现为单发、呈类圆形均匀 T1WI 低信号、T2WI 高信号,ADC 值低于脾脏、特征性 DWI“连续线状高信号征”、增强“尖角征”及多期相同时出现“环形征”。不典型表现包括多发合并肝外病灶、不规则形可伴中央囊变坏死、ADC 值高于脾脏、DWI 及增强无特异性表现。

PO-2162

DWI 和半定量 DCE-MRI 预测醋酸甲羟孕酮治疗子宫内膜非典型增生和子宫内膜样腺癌疗效的价值

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目的 保留女性患者生育能力是临床决策中不可或缺的组成部分。关于子宫内膜癌和子宫内膜非典型增生保留生育能力治疗的有效性和风险,包括是否完全缓解的最佳检查方案尚不确定。建立预测保守治疗子宫内膜非典型增生和子宫内膜癌疗效的生物标志物非常必要。因此,本研究将探讨扩散加权成像和半定量动态磁共振增强成像预测醋酸甲羟孕酮治疗子宫内膜非典型增生和子宫内膜样腺癌疗效的可行性。

方法 回顾性分析北京妇产医院 12 例子宫内膜癌和子宫内膜非典型增生患者临床病理资料,醋酸甲羟孕酮治疗后第 3 个月和第 6 个月每次随访的治疗效果均进行病理评价和 MRI 检查,且治疗后第 6 个月随访时的完全缓解。采用重复测量方差分析法比较治疗前、治疗后 3 个月、治疗后 6 个月病变及相应部位内膜 ADC 值和 ME 值的差异是否有统计学意义。TIC 曲线的差异是否有统计学意义采用 Fisher 确切概率法。

结果 子宫内膜癌治疗前、治疗后第 3 个月和第 6 个月 ADC 值差异有统计学意义,呈递增趋势($P<0.05$),而 ME 值差异无统计学意义($P>0.05$)。子宫内膜癌治疗前后 TIC 曲线类型差异有统计学意义($P<0.05$)。子宫内膜非典型增生治疗前、治疗后第 3 个月和第 6 个月 ADC 值、ME 值和 TIC 曲线类型差异均无统计学意义($P>0.05$)。

结论 ADC 值和 TIC 曲线类型可以作为预测醋酸甲羟孕酮治疗子宫内膜癌完全缓解的成像标记。ADC 值和 TIC 曲线类型可以作为预测醋酸甲羟孕酮治疗子宫内膜癌完全缓解的成像标记, 而 ME 值不可以。与子宫内膜癌患者相比, 虽然子宫内膜非典型增生患者在治疗后第 6 个月较治疗后第 3 个月 ADC 值升高, 有一些预测疗效价值, 但整体而言, ADC 值、TIC 曲线类型和 ME 值尚不能反应醋酸甲羟孕酮治疗的疗效。

PO-2163

基于靶向整合素 $\alpha v\beta 3$ 的新型 MR 超微纳米探针用于肝纤维化诊断的可行性研究

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目的: 靶向整合素 $\alpha v\beta 3$ 分子显像可无创评价其表达和功能状态, 为肝纤维化程度及预后提供重要信息。本研究旨在合成新型超微纳米探针超微超顺磁性氧化铁-聚乳酸-精氨酸-甘氨酸-天冬氨酸 (USPIO-PLA-RGD), 通过磁共振显像评估其在肝纤维化领域的可行性。

方法: 首先构建出新型超微纳米探针 USPIO-PLA-RGD, 进行探针表型验证、稳定型及细胞学靶向性验证; 应用 20%四氯化碳-橄榄油溶液腹腔注射方法构建肝纤维化 SD 大鼠模型, 分别于 2-4-6-8 周 (n=6/时点), 行 7.0T 小动物 MRI 显像对比大鼠 USPIO-PLA-RGD 尾静脉注射前, 注射后 6 小时肝脏 T2 Mapping 变化, 以 T2 Mapping 变化率 ΔT 作为定量参数; 大鼠显像后安乐死取肝组织, 评估肝内整合素 $\alpha v\beta 3$ 的表达及肝纤维化程度。对照组大鼠 (n=6) 亦同模型组大鼠进行注射探针前后显像。建模 4 周大鼠选取 3 只进行额外一次 RGD 标记前的非靶向探针显像, 在上述第一次显像后即刻完成, 6 小时后再注射靶向探针 USPIO-PLA-RGD 显像。

结果: 新型 USPIO-PLA-RGD 探针粒径 18-20nm, 分散度良好, 细胞学实验显示普鲁士蓝染色可见活化的肝脏星状细胞内摄取明显高于非标记 RGD 的 MRI 分子探针; 大鼠尾静脉注射后无明显急性毒性副反应; 模型大鼠肝纤维化 S1-S4 分期不等; 模型组 T2 Mapping 信号高于对照组; 模型组 T2 Mapping 变化率 ΔT 3.14%-24.72%不等; ΔT 与肝内整合素 $\alpha v\beta 3$ 的表达量及肝纤维化分级呈正相关 (相关系数 r 分别为 0.79、0.67)。对照组大鼠 USPIO-PLA-RGD 注射前后, 肝脏 T2 Mapping 无明显变化。建模 4 周大鼠 RGD 标记前的非靶向探针显像肝脏 T2 Mapping 信号与注射前相比无变化, USPIO-PLA-RGD 注射后肝脏 T2 Mapping 信号出现减低。

结论: 新型超微纳米探针 USPIO-PLA-RGD 对整合素 $\alpha v\beta 3$ 的靶向性良好, 在体评估整合素 $\alpha v\beta 3$ 表达水平及功能、辅助诊断肝纤维化方面安全、有效。

PO-2164

基于多参数 MRI 和 68Ga-PSMA 0PET/CT 的前列腺腺癌的对比较研究

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目的: 比较多参数磁共振成像 (multiparameter magnetic resonance imaging, mpMRI) 和 68Ga-前列腺特异性膜抗原正电子发射断层扫描/计算机断层扫描 (68Ga-prostate specific membrane antigen positron emission tomography/computed tomography, 68Ga-PSMA PET/CT) 对前列腺腺癌 (prostate adenocarcinoma, PA) 的诊断情况。方法: 临床疑似 PA 的患者术前行前列腺 mpMRI 扫描, 包括 T2 加权成像 (T2 weighted imaging, T2WI) 和弥散加权成像 (diffusion weighted

imaging, DWI), 间隔两周内行 ^{68}Ga -PSMA PET/CT 扫描, 影像学检查后两周内行手术或全前列腺穿刺活检术。将手术结果与两种成像结果相对照, 评估不同方法诊断 PA 的效能, 并将 PA 分为匹配组 (两种成像异常表现区相吻合且组织学为腺癌)、不匹配 1 组 (mpMRI 上呈癌灶特征, 而 ^{68}Ga -PSMA PET/CT 上无阳性且组织学为腺癌)、不匹配 2 组 (^{68}Ga -PSMA PET/CT 上呈癌灶特征, 而 mpMRI 上无阳性且组织学为腺癌)、不匹配 3 组 (两种成像显示癌灶范围不同且组织学为腺癌)。结果: 符合纳排标准的 32 例疑似 PA 患者被纳入, 其中 26 例病理确诊为 PA。mpMRI 和 ^{68}Ga -PSMA PET/CT 诊断 PA 的灵敏度、特异度、阳性预测值、准确度分别为 88.5%、66.7%、92.0%、84.4%和 82.8%、83.3%、96.0%、90.6。26 例 PA 患者中, 匹配组 17 例 (65.38%), 不匹配 1 组 2 例 (7.69%), 不匹配 2 组 3 例 (11.54%), 不匹配 3 组 4 例 (15.38%)。结论: mpMRI 和 ^{68}Ga -PSMA PET/CT 均可用于 PA 的诊断, ^{68}Ga -PSMA PET/CT 诊断效能更佳; PA 在 mpMRI 和 ^{68}Ga -PSMA PET/CT 上存在不匹配现象, 两者结合可提高诊断效能。

PO-2165

应用光谱多参数 CT 鉴别门静脉血栓与癌栓的诊断研究

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目的: 本研究旨在探讨应用光谱 CT 多参数 (Spectral based image) 增强 CT 成像在门静脉系统中血栓与癌栓的鉴别诊断价值, 以提高两者临床鉴别诊断效能。

方法: 本研究回顾性纳入 2023 年 2 月-2023 年 4 月行光谱 CT 腹部扫描患者, 结合临床资料, 确诊门静脉血栓癌栓患者各 50 例。在栓塞位置绘制兴趣区 (Region of interest, ROI), 分别得到常规 CT 混合能量图像 (Conventional image, CI)、碘密度图 (Iodine density, ID)、有效原子序数图 (Effective atomic number, Z-eff) 及光谱曲线 (Spectral curve), 并测量 ROI 区域常规混合能量图像 CT 值 (CIHU)、碘密度值 (ID)、有效原子序数 (Z-eff) 及光谱曲线斜率 (Slope of the spectral curve, λHU)。参数间差异采用独立样本 t 检验。采用单因素 Logistic 回归评估门静脉血栓与癌栓预测概率, 并建立光谱多参数联合模型 (Iodine Density & Effective Atomic Number, ID-Z-eff)。绘制受试者工作特征曲线 (Receiver operating characteristic, ROC), 并计算 AUC (Area under curve) 及截断值 (Cutoff value)。

结果: 与 CT 值 (AUC 为 0.72, 截断值 134, 灵敏度 60%, 特异度 72%)、ID 值 (AUC 为 0.78, 截断值 2.14, 灵敏度 67%, 特异度 73%)、Z-eff 值 (AUC 为 0.825, 截断值 8.96, 灵敏度 80%, 特异度 82%)、 λHU 值 (AUC 为 0.82, 截断值 1.22, 灵敏度 82%, 特异度 85%) 相比, 光谱联合模型 (AUC 为 0.92, 灵敏度 85%, 特异度 92%) 对门静脉血栓与癌栓的鉴别效能最高。

结论: 光谱多参数联合模型较常规 CT 值及各光谱参数在鉴别门静脉血栓或癌栓方面具有更高的鉴别诊断价值, 或可为门静脉系统血栓, 癌栓患者的临床早期诊断、治疗策略制定及预后预测提供更多影像学支持。

PO-2166

肿瘤标志物联合双层探测器 CT 定量参数预测结直肠癌患者脉管神经浸润

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目的：探讨肿瘤标志物和双层探测器 CT 定量参数相结合在评估结直肠癌患者脉管浸润（LVI）和神经浸润（PNI）状态中的价值。

方法：前瞻性纳入 2022 年 6 月至 2023 年 7 月于本院接受双层探测器 CT 扫描且经术后病理证实为结直肠癌的 49 例患者。并根据病理结果将患者分为 LVI（+）组（n=14）和 LVI（-）组（n=35），PNI（+）组（n=20）和 PNI（-）组（n=29）。分析结直肠癌患者动脉期和静脉期的光谱参数，包括常规 CT 图像、40KeV 虚拟单能级图像（VMI）和虚拟平扫（VNC）图像上的 CT 值，碘密度值（IC），标准碘密度值（NIC），有效原子序数值（Eff-Z）和能谱曲线斜率（λHU）。采用独立样本 t 检验、Mann - Whitney U 检验或卡方检验比较不同组之间的差异，采用二元 logistic 回归分析构建联合参数模型。采用受试者工作特征曲线（ROC）评价血清标志物和光谱 CT 参数对结直肠脉管、神经浸润的单独及联合诊断效能。

结果：LVI 阳性组与阴性组 T 分期、N 分期差异有统计学意义（ $P<0.05$ ），PNI 阳性组和阴性组组织分化等级、肿瘤大体形态差异有统计学意义（ $P<0.05$ ）。LVI 阳性组与阴性组动脉期和静脉期 IC、NIC、Eff-Z、CT 40kev-VMI 和 λHU 差异均有统计学意义，PNI 阳性组和阴性组动脉期 IC、Eff-Z、λHU 和静脉期 IC、NIC、Eff-Z、CT 40kev-VMI、λHU 差异均有统计学意义。ROC 曲线分析显示肿瘤标志物结合光谱参数诊断效能优于单个参数的诊断效能。动脉期 Eff-Z 结合肿瘤标志物评估脉管侵犯的诊断效能最佳，其 AUC、灵敏度、特异度分别为 0.796（95%CI: 0.666-0.926）、64.3%、85.7%。静脉期 Eff-Z 结合肿瘤标志物评估神经侵犯的诊断效能最佳，其 AUC、灵敏度、特异度分别为 0.769（95%CI: 0.635-0.903）、85%、62.1%。

结论：双能 CT 成像参数对于术前评估患者脉管神经浸润状态具有较好的诊断价值，为术前预测 LVI 和 PNI 提供了无创、有效的方法。

PO-2167

基于动态增强 CT 术前预测结直肠癌肿瘤间质比状态的研究

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目的：肿瘤间质比为肿瘤微环境重要形态学参数，是多种实体肿瘤的独立预后因素。本研究分析了结直肠癌（colorectal cancer, CRC）患者术前增强计算机断层成像（computed tomography, CT）影像学特征与肿瘤间质比（tumor stroma ratio, TSR）及预后的关系。

方法：回顾性收集 2010 年 1 月-2017 年 12 月病理组织检查确诊为结直肠癌患者的术前增强 CT 图像及临床病理学信息。评估的增强 CT 影像学特征包括肿瘤位置、肿瘤内低密度占比、强化程度、强化形式和肠壁增厚形式。通过 HE 染色评估肿瘤组织中间质成分所占比例。采用 Kaplan-Meier 方法进行生存分析。采用 kappa 一致性检验评价影像学特征评估结果的一致性。

结果：本研究共纳入 554 例 CRC 患者，29.5%（163 例）为 TSR-High，70.5%（391 例）为 TSR-Low。研究发现，肿瘤强化程度和强化形式与肿瘤间质比状态密切相关，差异具有统计学意义（ $P<0.05$ ）。肿瘤间质含量占比较高组肿瘤强化程度多低于肠壁，且为不均匀强化。另外，肠壁增厚

形式也与肿瘤间质密切相关, 偏心性增厚及环形增厚患者肿瘤间质含量占比高, 预后差 ($P < 0.05$)。

结论: 强化程度、强化形式和肠壁增厚与结直肠癌患者肿瘤间质比状态相关。基于 CT 常见影像学征象, 实现结直肠癌患者 TSR 状态的术前无创预测, 进一步改善结直肠癌患者的预后分层。

PO-2168

能谱 CT 多参数术前鉴别 HER2-0, HER2 低阳性及阳性胃癌的价值

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目的: 探讨能谱 CT 多参数成像在术前评估胃癌 HER2 状态的价值。

方法: 回顾性分析本院行能谱 CT 增强扫描、经病理证实的 96 例胃癌患者资料, 根据免疫组化(IHC) 结果, 分为 HER2-0 组 (IHC 0, 55 例)、HER2 低阳性组 (IHC 1+或 2+, 35 例)、HER2 阳性组 (IHC 3+, 6 例)。两位观察者分别测量能谱 CT 上动脉期、静脉期及延迟期 40、70 keV 单能量图像中病灶的 CT 值 (CT40 keV 值、CT70 keV 值)、碘浓度 (IC)、归一化碘浓度 (NIC), 并计算 40~70 keV 的能谱曲线斜率 K (40-70)。采用单因素 ANOVA 检验比较各组之间参数差异, 两两比较采用 LSD。采用受试者操作特征 (ROC) 曲线评估各参数区分不同 HER2 状态的效能。

结果 HER2 阳性组患者静脉期 NIC 较 HER2-0 和 HER2 低阳性组高, HER2 低阳性组上述参数较 HER2-0 组高, 差异有统计学意义 ($P < 0.05$)。受试者工作特征曲线 (ROC) 分析, 静脉期 NIC 鉴别 HER2 阳性组与 HER2-0、HER2 低阳性组的曲线下面积 (AUC) 分别为 0.783、0.732。

结论 能谱 CT 静脉期 NIC 有潜力成为术前预测胃癌 HER-2 状态的影像标志物。

PO-2169

瘤周侧支血管对肾透明细胞癌 WHO/ISUP 分级预测研究

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摘要: 目的: 探讨瘤周侧支血管对肾透明细胞癌 (CcRCC) 的 WHO/国际泌尿病理学会 (ISUP) 分级的评估价值。方法: 收集锦州医科大学附属第一医院经病理、检查证实的 ccRCC 患者共 207 例进行回顾性分析和筛查, 通过排除标准, 组中选取 207 例患者作为研究对象, 依据 WHO/ISUP 分级标准分为低级别组 ($n=167$) 和高级别组 ($n=40$), 肾透明细胞癌患者对计算机断层扫描 (CT) 图像进行成像分析, 以评估瘤周侧支血管的存在, 并了解与 WHO/ISUP 分级的潜在联系。通过 t 检验、Mann-Whitney U 检验、 χ^2 检验、多因素 logistic 回归分析筛选组间差异有统计学意义的因素, 绘制 ROC 曲线评价模型预测效能 结果: 多因素 Logistic 回归分析结果显示, 年龄、肿瘤最大直径及有无侧支循环对于鉴别 ccRCC 高、低级别组患者差异具有统计学意义 ($P < 0.05$), 有侧支循环能更好的预测高级别 ccRCC; 单因素 (有无侧支循环) 模型预测高级别的 AUC 值是 0.671 (95%CI 0.668-0.854 $p < 0.05$)。结论: 在肿瘤周围有侧支血管的患者中, 能更好的预测高级别 ccRCC; 在男性患者中, 肿瘤周围侧支血管与高 WHO/ISUP 分级的肾细胞癌之间存在一种新的相关性, 肾周脂肪组织中瘤周侧支血管的存在可预示更具侵袭性的肾细胞癌。

PO-2170

结合 CT 影像组学和基于深度学习的病理学特征预测 II 期结直肠癌患者预后

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目的: 本研究旨在探索 CT 影像组学特征和基于深度学习评估的病理学特征在 II 期结直肠癌患者预后评估中的价值及其关联。

方法: 共在两个中心回顾性纳入了 479 名经病理确诊为 II 期结直肠癌的患者, 其中, 山西省肿瘤医院的患者被划分为训练集 (n=182) 和测试集 (n=78), 来自复旦大学附属肿瘤医院的患者被作为外部验证集 (n=189)。使用 PyRadiomics 在患者的增强 CT 图像上提取了共 1218 个影像组学特征。对于患者的 HE 数字病理图像, 使用 U-Net 模型对各类组织区域进行分割, 使用 Hover-Net 模型对各类细胞核进行识别与分割, 并进一步定义如间质内淋巴细胞密度, 中性粒细胞/淋巴细胞比例等共 31 个病理学指标。使用 Cox 回归建立预测患者 OS 的模型。使用一致性指数 C-index 和曲线下面积 AUC 评估模型, 根据模型对患者的分组进行 Kaplan-Meier 生存分析, 并计算影像组学模型确定的高危与低危组间病理特征的差异。

结果: 由 8 个影像组学特征组成的预测 II 期结直肠癌患者 OS 的影像组学模型在两个中心中均取得效果 (测试集: C-index=0.655, AUC=0.663; 外部验证集: C-index=0.628, AUC=0.592)。在验证集中, 发现影像组学评分和肿瘤区域内淋巴细胞与中性粒细胞比例等多个病理学特征相关 (p=0.001)。并进一步构建了由 8 个影像组学特征、1 个病理学特征和 1 个临床特征组成的临床-影像-病理模型, 在两个中心中取得了良好效果 (测试集: C-index=0.748, AUC=0.762; 外部验证集: C-index=0.682, AUC=0.689)。根据确定的最佳截止值, 将患者分为高危组和低危组, Kaplan-Meier 生存分析显示两组间存在显著差异 (影像组学模型: 测试集: p=0.016; 外部验证集: p=0.005; 临床-影像-病理模型: 测试集: p=0.002; 外部验证集: p<0.001)。

结论: 基于 CT 的影像组学模型和临床-影像-病理模型可有效预测 II 期结直肠癌患者的预后, 影像组学评分与患者病理学特征相关。

PO-2171

基于 CT 图像的老年糖尿病伴肌少症患者的胰腺影像组学研究

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目的:

探究伴有肌少症与不伴肌少症的老年糖尿病患者的胰腺实质是否存在基于 CT 图像的影像组学特征差异, 并构建影像组学诊断模型。

材料和方法:

本研究回顾性地连续纳入从 2016 年 1 月至 2017 年 12 月于我院有腹部 CT 检查图像的年龄≥60 岁的糖尿病患者。根据腰 3 椎体 (L3) 层面骨骼肌指数 (skeletal muscle index, SMI) 性别分界点将患者分为肌少症组和非肌少症组。利用 ITK 软件在平扫 CT 影像上勾画胰腺三维感兴趣区 (three-dimensional region of interest, 3D ROI), 并使用 PyRadiomics 工具包提取影像组学特征。对提取的影像组学特征进行筛选, 基于筛选出的组学特征分别采用逻辑回归 (logistic regression, LR)、高斯朴素贝叶斯 (gauss naive bayes, NBG)、随机梯度下降 (random gradient descent,

SGD)、多层感知机 (multilayer perceptron, MLP) 以及线性判别分析 (linear discriminant analysis, LDA) 算法构建影像组学诊断模型, 采用五折交叉验证法进行模型的训练和验证, 采用受试者工作特征 (receiver operating characteristic, ROC) 曲线、决策分析曲线 (decision curve analysis, DCA) 分别评估模型效能和临床价值。

结果:

研究最终纳入患者 211 例, 其中肌少症组 160 例、非肌少症组 51 例。筛选得出两组患者胰腺平扫 CT 图像存在差异的影像组学特征有 8 个。分别采用 LDA、LR、MLP、NBG 和 SGD 算法建立的模型, 训练集 AUC 值分别为 0.836、0.837、0.828、0.820 和 0.834, 验证集 AUC 分别为 0.778、0.748、0.776、0.782 和 0.763, DCA 表明所有模型均有临床价值。

结论:

伴肌少症与不伴肌少症的老年糖尿病患者的胰腺的 CT 影像组学特征存在差异, 并且基于这些组学特征构建的诊断模型具有良好效能。

PO-2172

基于人工智能技术的胰腺平扫 CT 图像诊断糖尿病的研究

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目的:

本研究采用影像组学及深度学习的方法探索正常人与 2 型糖尿病患者的胰腺结构的微观差异, 以期进一步促进糖尿病的风险预测、早期诊断、疗效评估以及随访监测的研究。

材料和方法:

回顾性分析 2017 年 12 月至 2020 年 12 月在我院放射科行腹部 CT 的患者, 分别纳入了 2 型糖尿病 (Type 2 Diabetes mellitus, T2DM) 及对照组患者, 按照 8:2 的比例随机分配到训练集和验证集中。使用 ITK-Snap 手动分割胰腺, 采用 PyRadiomics (V3.0) 工具包对分割图像进行影像组学特征提取, 通过逻辑回归筛选特征并建立影像组学模型, 并通过提出了一种基于 MobileNetV2 架构的深度学习模型; 最后建立融合影像组学特征和深度学习的融合模型, 通过模型来判断区分糖尿病患者和正常对照组。通过受试者工作特性曲线(receiver operating characteristic, ROC)分析对模型性能进行评估。

结果:

最终纳入 T2DM 患者 396 例, 对照组 396 例。T2DM 组和对照组之间甘油三酯和胆固醇水平有显著差异。将 T2DM 组和对照组患者随机分为训练集和验证集, 训练集有 316 例 T2DM 和 316 例正常对照, 验证集有 80 例 T2DM 和 80 例正常对照。从胰腺分割图像中提取 602 个影像组学特征参数, 经回归降维处理筛选出的 27 个组学特征。在基于影像组学的 T2DM 诊断模型中, 表现出比较好的性能, 在训练集和测试集的曲线下面积 (areas under curve, AUC) 分别达到 0.769 (95% 置信区间, 0.734-0.802) 和 0.713 (95% 置信区间, 0.636-0.783)。但是深度学习模型在训练、验证集中, AUC 分别为 0.931(95% 置信区间, 0.908-0.950), 0.579(95% 置信区间, 0.497-0.657), 融合模型在训练集及验证集中 AUC 分别为 0.895(95% 置信区间, 0.868-0.918), 0.687(95% 置信区间, 0.636-0.783)。

结论:

基于腹部 CT 平扫图像影像组学的模型表现出良好的性能, 对于诊断糖尿病较好的能力。

PO-2173

基于双能 CT 单能量图的 Delta 纹理特征术前 预测胃癌淋巴结转移的价值

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目的：探讨基于双能 CT 单能量图的 Delta 纹理特征术前预测胃癌淋巴结转移的可行性。

方法：回顾性分析本院经病理证实的 48 例胃癌患者资料，分为淋巴结转移组（33 例）及非淋巴结转移组（17 例）。所有患者行双能 CT 能谱增强检查，使用 ADW 4.6 工作站的 GSI Viewer 软件重建静脉期 40、70keV 单能量图，选取病灶最大层面及其相邻上下两个层面沿病灶边缘勾画 ROI 并提取特征，提取的纹理参数包括最小值、最大值、平均值、中位值、标准差、偏度、峰度、均匀性、能量值、熵，计算每个纹理特征在高低能级的变化，即 Delta 特征值，公式为：Delta 特征值 = 40keV 纹理特征值 - 70keV 纹理特征值。比较两组间各 Delta 纹理特征的差异。并采用 Logistic 回归将有差异纹理特征进行联合，通过 ROC 曲线分析不同纹理特征及特征联合预测的效能。

结果：淋巴结转移组的峰度 [3.81(2.75, 3.29) vs. 2.56(2.74, 3.46)] 和熵 (7.14±0.41 vs. 7.54±0.44) 明显高于非淋巴结转移组 (P<0.05)，峰度、熵及两特征联合预测胃癌 MSI 的效能分别为 0.751，0.732 和 0.813。

结论：基于双能 CT 单能量图的 Delta 纹理特征能有效术前预测胃癌淋巴结转移，有助于为指导临床治疗方案的选择提供更多信息。

PO-2174

多层螺旋 CT 血管造影检查在胡桃夹综合征的应用

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【摘要】目的 通过螺旋 CT 三维重建处理技术，提高对“胡桃夹症”的诊断水平。

材料与方法 本组患者 19 例，男 18 例，女 7 例，年龄 13~40 岁，平均 22.5 岁。临床表现反复腰痛伴血尿、蛋白尿，其中男性患者精索静脉曲张 7 例，女性月经量较多 3 例。采用 GE Lightspeed Plus 4 排 CT 进行 HQ 扫描，层厚 2.5mm，重建间隔 1.25mm，并在 ADW4.0 工作站进行二维多平面重建（MPR）、曲面重建（CPR）和最大密度投影（MIP）。分别测量肠系膜上动脉与腹主动脉（AA）间的夹角（A）、左肾静脉（LRV）在 AA 前方的内径值（D1）、面积（S1）和 LRV 在 SMA 左侧的内径值（D2）、面积（S2）以及之比（D2/D1、S2/S1）。

结果 分别测量胡桃夹综合征患者测量 A、D1、D2、D2/D1、S1、S2 和 S2/S1 为 22.5±5.3°、3.1±0.2mm、13.8±0.6mm、4.5±0.6、34.6±3.2mm²、141.8±15.4mm² 和 4.1±0.7，而正常对照组为 66.3±15.2°、7.1±2.5 mm、10.5±2.2 mm、1.6±0.6、95.5±35.5 mm²、129.9±30.1 mm² 和 1.5±0.6，两者差异具有统计学意义（P<0.05）。

结论 1、多层螺旋 CT 三维重建可以直观的显示“胡桃夹症”的 LRV 的受压情况，并能准确地测量 AA 与 SMA 间的夹角、左肾静脉（LRV）在 SMA 左侧的内径值（A）和 LRV 在 AA 前方的内径值（B）之比（A/B），有利于临床治疗前后的评价。2、可以直观的显示增粗 LRV 及其侧枝循环血管（如睾丸静脉等）。3、可以测量两侧肾脏皮质的厚度及强化程度，为临床评价两侧肾脏功能提供依据。4、利用多层螺旋 CT 的容积扫描数据，可以对肾脏及其周围组织进行观察。5、直观的显示腹主动脉及双侧肾动脉情况。

PO-2175

医学影像在评估肾细胞癌肾外脂肪浸润中的价值

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肾癌是全球第十四大常见的癌症，其中肾细胞癌占 90%。随着医学成像技术的广泛应用，越来越多的局部肾癌被检测出。手术一直是治疗局部肾癌的最佳方案，其中部分肾切除术能更好地保留肾脏功能、降低代谢和心血管疾病发展的风险。但是，根据指南该术式不适用于伴有局部浸润的肾癌患者。在不同类型的局部浸润中，对肾外脂肪浸润的评估-肾周脂肪浸润和肾窦脂肪浸润，是放射科医生最具有挑战性的任务。既往的研究提出了许多影像征象来解决这个难题，然而它们各有优缺点。因此，本研究总结了影像学评估肾细胞癌肾外脂肪浸润的最新进展和未来方向，以帮助临床决策和患者风险分层。目前对肾周脂肪浸润的评估征象主要包括（1）肾周软组织线-相对较高的敏感性，但由于潜在的病理机制多样，特异性低（2）肾周强化结节-高度特异性（92%-100%），有研究推测其病理机制为肾周脂肪内的“卫星灶”，但由于低度敏感性（31%-50%），临床应用受限（3）不规则的肿瘤边缘-相对较高的特异性（83%-94%），但敏感性较低，同时对客观定义“不规则”具有挑战（4）假包膜-磁共振 T2 加权图像上出现的肿瘤边缘低信号带，目前的研究报道较少，现存研究提示改征象对排除肾周脂肪浸润准确性较高（95%）（5）肿瘤大小-具有高度一致性的特点，但临界值变化较大，诊断效能尚不明确。目前对肾窦脂肪浸润的评估征象主要包括（1）肾盂肾盏系统受侵-肿瘤同肾盂肾盏系统的空间关系对评估肾癌浸润肾窦脂肪具有重要的意义，其中“侵犯模式”显示出较高的预测效能（准确性达 94%）（2）指状凸起征-肿瘤突入肾窦脂肪部分局部形成手指状凸起，一个最近报道的新征象，来源于一个类似的病理学术语，显示出较高的特异性（85-89%）（3）不规则的肿瘤边缘和肿瘤大小-同样也是评估肾窦脂肪受侵的重要征象，其中不规则的肿瘤边缘敏感性达 71-88%，特异性达 62-79%。未来的研究可能会集中在三个方向上改善影像学在术前评估肾癌肾外脂肪浸润的表现：（1）研究稳健的特征、制定更客观的定义、运用多变量预测模型（2）改进成像协议、运用新技术（光谱 CT 等）（3）定量图像分析(影像组学、深度学习等)。

PO-2176

探究个体化低剂量 CT 成像参数对 QCT 肝脏脂肪含量测量的影响

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目的: 基于管电压预置技术 (Auto-prescription) 探究个体化低剂量 CT 成像参数对 QCT 肝脏脂肪含量测量及图像质量的影响。方法: 收集胸及上腹部 CT 联扫的患者 231 例，胸部采用个体化低剂量扫描 (A 组)，基于 Auto-prescription 技术选择的 80kVp、100kVp，记为 A1、A2 组。上腹部为常规扫描 (B 组)，管电压 120kVp，与 A 组患者对应分为 B1、B2 组。A 组图像分别结合 40%、60%、80% 后置 ASIR-V 重建，B 组采用常规 40% 后置 ASIR-V 重建。对胸腹部扫描重叠部分肝脏进行分析，测量肝脏 CT 值、SD 值，计算肝脏 SNR、CNR。图像传至 QCT 工作站，获得肝脏脂肪含量值 (Fat%_{QCT})。A 组组内不同权重 ASIR-V 测得的 Fat%_{QCT} 值采用单因素方差分析，A、B 组间图像客观值采用配对样本 t 检验，对肝脏 Fat%_{QCT} 进行 Spearman 相关分析，并基于常规 120kVp 构建线性回归方程。由两位观察者对低剂量胸部图像进行五分法评价，并行 Kappa 一致性检验。结果: 随着 ASIR-V 权重的增加，A 组 SD 值降低 (P<0.05)，SNR、CNR 逐渐升高 (P<0.05)；A 组结合不同权重 ASIR-V 测得的 Fat%_{QCT} 值差异无统计学意义，A、B 组 Fat%_{QCT} 值呈高度正相关 (r=0.9397, 0.9872, P<0.05)，80kVp、100kVp 扫描条件下的线性回归方程分别为: y=0.976x+3.119, y=1.007x+2.041。2 名观察者对 A、B 两组图像质量评分一致性较好 (Kappa=0.781~0.914, P<0.05)，A 组中结合后置 60% ASIR-V 与 B 组常规管电压结合后置

40% ASIR-V 的主观评分差异无统计学意义 ($P>0.05$)。结论: 基于 Auto-prescription 技术可实现个体化胸部低剂量成像, ASIR-V 的使用不会影响肝脏 Fat%QCT 定量, 初步构建了低管电压 (80kVp/100kVp) 下肝脏脂肪含量量化的回归方程。

PO-2177

探究 CT 成像参数对 QCT 肝脏脂肪含量测量的影响

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目的: 基于管电压预置技术 (Auto-prescription) 探究个体化低剂量 CT 成像参数对 QCT 肝脏脂肪含量测量及图像质量的影响。方法: 收集胸及上腹部 CT 联扫的患者 231 例, 胸部采用个体化低剂量扫描 (A 组), 基于 Auto-prescription 技术选择的 80kVp、100kVp, 记为 A1、A2 组。上腹部为常规扫描 (B 组), 管电压 120kVp, 与 A 组患者对应分为 B1、B2 组。A 组图像分别结合 40%、60%、80% 后置 ASIR-V 重建, B 组采用常规 40% 后置 ASIR-V 重建。对胸腹部扫描重叠部分肝脏进行分析, 测量肝脏 CT 值、SD 值, 计算肝脏 SNR、CNR。图像传至 QCT 工作站, 获得肝脏脂肪含量值 (Fat%_{QCT})。A 组组内不同权重 ASIR-V 测得的 Fat%_{QCT} 值采用单因素方差分析, A、B 组间图像客观值采用配对样本 t 检验, 对肝脏 Fat%_{QCT} 进行 Spearman 相关分析, 并基于常规 120kVp 构建线性回归方程。由两位观察者对低剂量胸部图像进行五分法评价, 并行 Kappa 一致性检验。结果: 随着 ASIR-V 权重的增加, A 组 SD 值降低 ($P<0.05$), SNR、CNR 逐渐升高 ($P<0.05$); A 组结合不同权重 ASIR-V 测得的 Fat%_{QCT} 值差异无统计学意义, A、B 组 Fat%_{QCT} 值呈高度正相关 ($r=0.9397, 0.9872, P<0.05$), 80kVp、100kVp 扫描条件下的线性回归方程分别为: $y=0.976x+3.119$, $y=1.007x+2.041$ 。2 名观察者对 A、B 两组图像质量评分一致性较好 (Kappa=0.781~0.914, $P<0.05$), A 组中结合后置 60% ASIR-V 与 B 组常规管电压结合后置 40% ASIR-V 的主观评分差异无统计学意义 ($P>0.05$)。结论: 基于 Auto-prescription 技术可实现个体化胸部低剂量成像, ASIR-V 的使用不会影响肝脏 Fat%_{QCT} 定量, 初步构建了低管电压 (80kVp/100kVp) 下肝脏脂肪含量量化的回归方程。

PO-2178

基于不同区域的 ¹⁸F-PSMA-1007 PET 影像组学特征预测前列腺癌患者根治术后 PSA 持续状态

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目的: PSA 是常规检测前列腺癌的敏感指标, 在患者进行根治性前列腺切除术后需常规随访。目前大多数前列腺癌影像组学研究聚焦于肿瘤病灶本身, 而未探讨其周围区域的预测效能。因此, 本研究旨在比较从前列腺内三个不同区域提取的 ¹⁸F-PSMA-1007 PET 影像组学特征对前列腺癌患者根治术后 PSA 持续状态的预测效能。

方法: 回顾性研究 2019.3 至 2022.12 本院 325 例病理证实的前列腺癌患者。所有患者均接受了标准化术前 ¹⁸F-PSMA-1007 PET/CT 检查和根治性前列腺切除术, 收集患者的一般信息、PSA 随访情况以及影像学资料。将 325 例患者分为训练组和测试组, 由 2 位经验丰富的核医学科医师在 ¹⁸F-PSMA-1007 PET 上用 LIFEX 软件半自动勾画整个前列腺作为初始感兴趣区域, 将前列腺分为 3 个放射组区, 并分别提取 3 个感兴趣区域的 PET 影像组学特征。进行一致性检验, 选取 ICC>0.75 的特征进行 lasso 和 logistic 回归分析建立 7 个影像组学特征模型 (模型 1 为第 1 区域, 模型 2 为第

2 区域, 模型 3 为第 3 区域, 模型 4 为第 1、2 区域, 模型 5 为第 1、3 区域, 模型 6 为第 2、3 区域, 模型 7 为第 1、2、3 区域), 计算不同模型的 **ROC** 和 **AUC**, 比较各个模型之间的预测性能。PSA 持续状态定义为前列腺癌患者进行根治性切除术后 4-8 周内 PSA \geq 0.1ng/ml。

结果: 基于 lasso 和 logistic 回归分析建立 7 个 PET 影像组学模型, 最好的三个分别为模型 5、模型 4、模型 1。3 个模型在训练组中的 AUC 分别为 0.78 (95% CI:0.70-0.85)、0.76 (95% CI:0.68-0.83) 和 0.76 (95% CI:0.68-0.83), 在测试组中的 AUC 分别为 0.76 (95% CI:0.61-0.90)、0.76 (95% CI:0.65-0.88) 和 0.70 (95% CI:0.55-0.86)。影像组学模型 5 实现了最佳性能。

结论: 前列腺模型 5、模型 4、模型 1 的影像组学特征可有效预测前列腺癌患者根治术后 PSA 持续状态, 模型 5 实现了最佳的预测效能, 可为患者预后提供更好的个体化随访工具。

PO-2179

基于 MRI 测量脾体积预测肝细胞癌伴肝硬化患者行根治性手术切除后晚期复发风险

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目的: 肝细胞癌 (hepatocellular carcinoma, HCC) 行手术切除后发生晚期复发主要与肝病严重程度相关。本研究旨在探索 HCC 伴肝硬化患者行手术切除后发生晚期复发的危险因素。

方法: 回顾性分析 301 例行手术切除并有术前 MRI 检查的 HCC 伴肝硬化患者, 所有患者完成两年以上随访并记录是否发生晚期复发。使用基于 MRI 的人工智能技术全自动测量脾体积, 并由三名放射科医师独立评估反映肿瘤侵袭性的 MRI 定性影像特征。使用单因素和多因素 Cox 回归分析探索晚期复发的独立预测因素并构建评分系统, 并基于区分度和校准度进行预测效能评估。

结果: 随访期间共 84 例患者发生晚期复发。术前脾体积是晚期复发的独立预测因素, 且脾体积 >370 cm³ 的患者发生晚期复发的风险显著升高 (风险比: 2.02, 95%置信区间: 1.31-3.12, $p=0.002$)。脾体积与反映肝纤维化严重程度的实验室及病理指标呈中度-弱关联 ($r<0.6$)。此外, 反映肿瘤侵袭性的 MRI 定性征象均与晚期复发无显著相关性。基于 APRI 评分、脾体积和肿瘤数目构建了一项风险评分, 其受试者曲线下面积为 0.700 至 0.751。使用 0.42 作为该评分的截断值, 可有效区分两组晚期复发风险显著不同的患者 (高风险组风险比: 2.38, 95%置信区间: 1.73-3.26, $p<0.001$)。

结论: 基于 MRI 及人工智能技术全自动测量的术前脾体积与 HCC 伴肝硬化患者术后晚期复发风险相关。本研究构建了一项评分系统用于预测晚期复发风险, 有助于辅助指导术后监测计划制定。

PO-2180

肝脏弥漫结节型血管肉瘤 1 例误诊分析并文献复习

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病例 男, 64 岁, 因间断性腹痛腹胀 1 月余入院。患者 1 月前无明显诱因出现下出现腹痛腹胀, 既往有肝硬化病史。入院查体: 上腹部轻压痛, 未触及肿块。实验室检查: 肿瘤指标 CA125 424.10U/mL, AFP(-); 肝功能指标总蛋白 52.7(g/L), 白球比 1.15, 总胆红素 298.21(umol/L), 直接胆红素 274.18(umol/L), 间接胆红素 24.03(umol/L), 总胆汁酸 99.1(umol/L), 碱性磷酸酶 293(U/L), 谷氨酰转肽酶 318(U/L), 谷丙转氨酶 140(U/L), 谷草转氨酶 161(U/L)。超声检查: 肝脏弥漫性病变, 肝硬化。CT 平扫+增强检查: 平扫示肝脏形态欠规则, 密度欠均匀。增强后肝内见多发斑片状、结节状异常强化灶, 增强早期病灶即可见明显强化, 门脉期及延迟期病灶强化程度仍旧明显高于周围肝实质。影像初步考虑原发性弥漫型肝癌 (图 1-4)。超声引导下穿刺: 用 17G 同轴活检针进入肝脏包块内, 沿同轴定位针送入 18G 活检针切取 1.3cm 长组织条 1 条, 2.3cm 长组织条 1 条。病理: 镜下肿瘤细胞明显异型性, 核分裂象多见。免疫组化: CD34 (+)、CD31 (+)、Fli-1 (+)、ERG (+)、CK (-)、S-100 (-)、SMA (部分+)、Ki67 (+, 约 50%)。病理诊断: 肝脏血管肉瘤。

PO-2181

术前肝细胞癌微血管侵犯预测: 细胞外对比剂增强磁共振与肝胆特异性对比剂增强磁共振效能相当

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目的: 本研究旨在评估和比较肝胆特异性对比剂增强 MRI (EOB-MRI) 和细胞外对比剂增强 MRI (ECA-MRI) 在肝细胞癌 (HCC) 中预测微血管侵犯 (MVI) 的效能。

方法: 自 2009 年 11 月至 2021 年 12 月, 回顾性纳入我院术前行增强 MRI 且经术后病理确诊为 HCC 的患者。按照检查方式, 将患者分别纳入 ECA-MRI 组 (N=415) 或 EOB-MRI 组 (N=121)。使用 1:1 倾向性分数匹配将 ECA-MRI 组与 EOB-MRI 组进行匹配, ECA-MRI 组匹配出的患者构成 ECA-MRI 测试集 (N=121), 余下患者构成 ECA-MRI 训练集 (N=294)。在 ECA-MRI 训练集中, 通过单因素和多因素逻辑回归构建 ECA-MRI MVI 诊断评分。而 EOB-MRI MVI 诊断评分参照本课题组前期研究成果[1], 其纳入的 HCC 患者与本研究具有相同的纳排标准。在 ECA-MRI 测试集和 EOB-MRI 组中分别评估和比较两种不同 MVI 诊断评分效能。采用 Kaplan-Meier 曲线评估两种 MVI 诊断评分预测早期复发的效能。

结果: 基于 ECA-MRI 训练集, 构建的 ECA-MRI MVI 诊断评分包括甲胎蛋白>400 ng/ml (比值比 [OR] = 2.3)、浸润样外观 (OR = 4.9)、瘤内动脉 (OR = 2.5) 以及结中结征 (OR = 2.4) 四个变量。ECA-MRI MVI 诊断评分的 AUC 为 0.720, EOB-MRI MVI 诊断评分的 AUC = 0.721, 两者之间不具有统计学差异性 (P = 0.99)。ECA-MRI MVI 灵敏度和特异度分别是 54.7% 和 89.1%; EOB-MRI MVI 灵敏度和特异度分别是 52.8% 和 75.0%; 两者灵敏度和特异度之间均没有统计学差异性 (P = 0.84; P = 0.06)。在 ECA-MRI 和 EOB-MRI 组中, 两种 MVI 诊断评分预测 MVI 阳性患者的早期复发时间均显著短于 MVI 预测阴性患者 (P < 0.001)。

结论: 基于术前甲胎蛋白和 MRI 影像特征 (浸润样外观、瘤内动脉、结中结征), ECA-MRI 在预测 HCC MVI 方面与 EOB-MRI 具有相似的预测效能。

PO-2182

胰腺脂肪含量与糖尿病的相关性研究

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基于中国西南区域自然人群队列四川简阳和郫都区受试者 2022 年的调查数据, 所有受试者均行上腹部定量 CT(quantitative computed tomography, QCT)扫描, 采用 QCT Pro 软件测量 QCT 参数: 胰腺头、体、尾部脂肪含量、腹部总脂肪面积 (Total fat area, TFA)、腹内脂肪面积 (Visceral fat area, VFA)、皮下脂肪面积 (Subcutaneous fat area, SFA)、总肌肉面积 (Total muscle area, TMA)。采集受试者的空腹静脉血: 糖化血红蛋白、空腹血糖。采用单因素方差分析比较三组一般资料、QCT 参数、血生化指标之间的差异, 采用 logistic 回归分析胰腺脂肪含量、腹部脂肪、肌肉脂肪与糖尿病前期和糖尿病的关系。

结果: 本研究共纳入 370 名受试者, 根据糖代谢状况分为糖代谢正常组、糖尿病前期组和糖尿病组。与正常组相比, 糖尿病组胰腺头、体、尾部脂肪含量、VFA、TFA、SMA、HbA1c、GLU 均显著增高 ($P<0.05$)。多因素分析发现, 胰尾脂肪每上升 1%, 糖尿病前期患病风险增加 $OR=1.10$ (95%CI: 1.01~1.21)。胰头、胰体和胰尾脂肪每上升 1%, 糖尿病患病风险分别增加 $OR=1.10$ (95%CI: 1.03~1.18)、1.11 (95%CI: 1.04~1.18)、和 1.08 (95%CI: 1.02~1.16), $P<0.05$ 。糖尿病组 SFA、VFA、TFA、TMA、分别增加 22.62(95%CI: 6.40~38.84)、35.06(95%CI: 15.87~54.25)、57.75(95%CI: 27.29~88.20)、13.76(95%CI: 0.74~26.78), $P<0.05$ 。

结论: 胰腺脂肪含量增加和腹部脂肪代谢异常与糖尿病的发生具有相关性。

PO-2183

生活方式与胰腺脂肪含量的相关性研究

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目的: 探讨人群生活方式与胰腺脂肪含量的相关性。

方法: 本研究基于中国西南区域自然人群队列四川简阳和郫都区受试者 2022 年的调查数据, 所有受试者均行上腹部定量 CT(quantitative computed tomography, QCT)扫描, 采用 QCT Pro 软件测量胰腺头、体、尾部脂肪含量, 采集受试者的空腹静脉血: 糖化血红蛋白、空腹血糖。填写调查问卷: 婚姻状况、受教育程度、收入水平、吸烟状况、饮酒状况。采用单因素方差分析比较三组一般资料、胰腺脂肪、血生化指标和既往生活习惯之间的差异。采用 logistic 回归分析既往/现在饮酒、吸烟与胰腺脂肪增多的相关性。 $P<0.05$ 有统计学意义。

结果: 本研究共纳入 370 名受试者, 多因素分析发现, 是否吸烟与胰腺脂肪无关; 相较于不饮酒者, 既往/现在饮酒者胰头脂肪含量减少 1.34% (95%CI: -2.34%~-0.33%), 胰尾脂肪含量减少 1.19% (95%CI: -2.24%~-0.13%)。

结论: 饮酒会导致胰头及胰尾脂肪含量减少。吸烟不是胰腺脂肪含量的影响因素。

PO-2184

VI-RADS：膀胱癌双参数 MRI 的准确性及 DCE 的必要性探讨

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目的：探讨 T2WI 和 DWI 评分与 VI-RADS 不一致病例的影像学特点及动态对比增强（DCE）的必要性，以及基于双参数 MRI（bpMRI, T2WI+DWI）的 VI-RADS 评分对膀胱癌肌层浸润评估的准确性。

材料与方法：回顾性收集本院 2018 年 5 月至 2021 年 5 月期间经手术病理证实为膀胱癌患者的磁共振影像及临床资料。纳入 106 例膀胱癌患者的 mpMRI 影像资料，每个序列分别进行独立的 VI-RADS 评分，当 T2WI 评分 4 且 DWI 评分 2 时，与评分系统相矛盾，定义为“不一致”组，其余符合 VI-RADS 评分系统的病例，定义为“一致”组。利用 ROC 曲线、德隆检验等方法比较不同 MRI 序列及不同序列组合（bpMRI 及 mpMRI）对膀胱癌肌层浸润评估的诊断效能。

结果：共 14 例（13.2%）患者纳入“不一致”组，影像特征为：T2WI 肌层低信号连续性中断（T2WI 评分 4 分），DWI 序列肿瘤呈高信号，内部见低信号“蒂”或基底部见低信号内层增厚（DWI 评分 2 分），DCE 序列预测膀胱癌肌层浸润的 AUC 为 0.875。在“一致”组和总体 106 例患者中，bpMRI VI-RADS 的诊断效能与 mpMRI 相近，差异无统计学意义（ $P=0.57$ 、 0.64 ）。

结论：VI-RADS 评分在预测膀胱癌肌层浸润方面具有较高的诊断准确性，bpMRI 与 mpMRI 对肌层浸润的诊断效能是相似的；但在评分“不一致”组病例中，DCE 对肌层浸润的评估至关重要。

PO-2185

双平面小视野 DWI (rFOV DWI) 在膀胱癌肌层侵袭性评估中的应用

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目的：比较小视野(rFOV)扩散加权成像(DWI)与全视野(fFOV)扩散加权成像(DWI)在膀胱癌诊断中的成像质量；探讨双平面(轴状和矢状)rFOV DWI 在预测膀胱癌肌层侵袭方面的价值。

材料和方法：本回顾性研究分析了 61 例接受 DWI 序列检查的膀胱癌患者，包括轴位 fFOV DWI、轴位 rFOV DWI 和矢状 rFOV DWI。对轴位 fFOV DWI 序列和 rFOV DWI 序列进行定性和定量的图像质量评价。将 DWI 上基底部能清晰显示的肿瘤定义为可评估病变，记录单轴位 fFOV DWI、轴位 rFOV DWI、矢状位 rFOV DWI 和双平面 rFOV DWI 序列中可评估病变的数量并进行比较。基于轴位 fFOV DWI 和 rFOV DWI 序列，比较非肌层浸润性膀胱癌(NMIBC)和肌层浸润性膀胱癌(MIBC)的表观弥散系数(ADC)，采用 VI-RADS 评估膀胱癌肌层浸润的总体风险，采用受试者工作特征(ROC)分析评估诊断性能。

结果：rFOV DWI 的对比信噪比(CNR)显著高于 fFOV DWI ($p<0.01$)，信噪比(SNR)显著低于 fFOV DWI ($p<0.01$)。rFOV DWI 主观评分显著高于 fFOV DWI ($p<0.01$)。在 rFOV DWI 和 fFOV DWI 上，MIBC 组的 ADC 值均显著低于 NMIBC 组($p<0.01$)。双平面 rFOV DWI 检测到的可评估病变数量显著高于单轴、轴向 rFOV DWI 和矢状面 rFOV DWI ($p < 0.01$)。基于双平面 rFOV DWI 的 VI-RADS 对膀胱癌是否存在肌层浸润有较高的预测能力(ROC 曲线下面积 0.946)。

结论：与单平面 DWI 相比，双平面 rFOV DWI 在预测膀胱癌存在肌层浸润方面可能提供更高的诊断可信度，并且图像质量优于 fFOV DWI。

PO-2186

DWI 及 MRI 影像征象预测肝细胞肝癌 CK19 的表达

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【目的】探讨弥散加权成像(DWI)及 MRI 影像征象对肝细胞肝癌(HCC)细胞角蛋白 19 (CK19) 表达的预测价值。

【方法】回顾性分析 54 例经病理证实的 HCC 患者, 根据免疫组化结果将患者分为 CK19 阳性组 17 例及 CK19 阴性组 33 例, 所有患者均于术前行 3.0T MRI 扫描。采用双盲法对常规 MRI 影像学征象进行分析, 包括肿瘤坏死、肿瘤出血、脉管癌栓、神经侵犯、被膜累及、淋巴结转移和卫星灶。将扫描生成的 DWI 图像传输至 GE AW 4.6 工作站上, 使用 Functool 软件自动生成 DWI 序列的参数图, 放射科医师采用双盲法在于病变的最大层面放置三个感兴趣区 (ROI), 记录 ADC 值取均值, 避开囊变、坏死、出血区。分类变量记录为病例数与百分比, 采用 χ^2 或 Fisher 精确检验比较 CK19 阳性组与阴性组之间的差异; 连续变量采用 t 检验或 U 检验比较 CK19 阳性组与阴性组之间的差异, 采用受试者工作特征 (ROC) 曲线评价 DWI 的阈值及诊断效能。

【结果】CK19 阳性组的 ADC 值为 $(1.887 \pm 0.523) \times 10^{-3} \text{mm}^2/\text{s}$, 显著高于 CK19 阴性组 $(1.287 \pm 0.247) \times 10^{-3} \text{mm}^2/\text{s}$ ($P < 0.001$), 其鉴别两组的 AUC 值达 0.857 (阈值: 0.002), 敏感度为 75.9%, 特异度为 88.7%。相较于 CK19 阴性组, 被膜累及在 CK19 阳性组更为常见 ($P = 0.001$), 其他影像学征象在两组间无显著统计学差异。

【结论】DWI 的 ADC 值结合常规 MRI 影像征象对预测肝细胞肝癌 CK19 的表达有一定价值。

PO-2187

Gd-BOPTA 增强 MR 对肝转移瘤的检出价值

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【目的】探讨 Gd-BOPTA 增强 MR 对肝转移瘤的检出价值

【方法】回顾性分析于我院行 3.0T MRI 扫描的肝转移瘤患者 21 例, 所有患者均于术前行 3.0T MRI 扫描, 包括常规磁共振扫描序列及 APT 扫描序列, 静脉团注对比剂钆贝葡胺 (Gd-BOPTA) 后 60 分钟后行肝胆期成像扫描。将 MR 扫描生成的原始数据传输到 ISP 工作站(Intellispace Portal v10, Philips Healthcare)进行后处理。分别对动脉期、门脉期、平衡期、肝胆期图像进行分析, 在病灶最大层面放置三个感兴趣区 (ROI), 记录信号强度 (SI), 记为 SI 病灶, 在同层面肝左叶、肝右前叶和肝右后叶的正常肝实质各放置一个 ROI, 记为 SI 肝实质, 避开血管和其他异常肝组织。在病灶同层面右侧竖脊肌放置一个 ROI, 记录 SI 和标准差 (SD), 记为 SI 肌肉与 SD 肌肉。通过下述公式计算信噪比 (SNR), 对比噪声比 (CNR), 病灶-肝脏信号强度比 (LLR): 计算公式如下: $\text{SNR 病灶} = \text{SI 病灶} / \text{SD 肌肉}$, $\text{CNR 病灶} = (\text{SI 病灶} - \text{SI 肌肉}) / \text{SD 肌肉}$, $\text{LLR} = (\text{SI 肝实质} - \text{SI 病灶}) / \text{SI 肝实质}$ 。采用 Mann-Whitney U 检验比较增强扫描不同期相的 SNR、CNR 和 LLR 的差异, 组内两两比较采用 Friedman 检验。

【结果】平衡期的 SNR 为 41.25(20.63, 54.94), 显著高于肝胆期 24.00(8.15, 38.46); 肝胆期的 LLR 为 0.63(0.47, 0.87), 显著高于增强动脉期 (0.40(0.28, 0.59))、静脉期 (0.34(0.22, 0.57)) 与平衡期 (0.35(0.14, 0.76))。

【结论】Gd-BOPTA 增强肝胆期 MR 显像可在一定程度上提高肝转移瘤的检出率。

PO-2188

200 例减重与代谢手术病人上消化道碘水造影应用体会

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目的 探讨减重与代谢手术病人术前、术后行上消化道碘水造影常规开展的必要性。**方法** 回顾性分析 2018 年 1 月到 2022 年 12 月曲靖市第二人民医院 200 例行减重与代谢手术病人的临床资料，了解术前胃腔形态，排空情况，食管下段及胃有无返流；术后胃腔外形，有无返流及吻合口情况。**结果** 术后行上消化道碘水造影，患者均出现胃腔明显缩小，对比剂快速通过残胃腔到达十二指肠，胃腔充盈良好，壁光滑；术后 3 天 5 例出现腹痛，行上消化道碘水造影显示吻合口瘘，对比剂游离于胃腔之外；术前上消化道碘水造影 4 例显示胃、食管返流；2 例显示胃排空缓慢；2 例诊断为食管裂孔疝；同时参考内镜检查结果，10 例显示胃、食管返流，慢性胃炎 6 例，2 例显示胃、食管返流；**结论** 对于减重与代谢手术病人，术前术后行常规上消化道碘水造影阳性率不高，但可以了解胃的外形及有无梗阻，检查方便易行，可重复使用，推荐应用。

PO-2189

基于术前增强 CT 的影像组学预测胰腺癌间质亚型

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背景：胰腺癌是恶性程度最高的肿瘤之一，五年生存率仅 11%。研究发现胰腺癌具有三种特征性的肿瘤间质亚型，即荒漠型、中间型和反应型，其与患者治疗反应及预后密切相关。因此亟需探究无创方法反映肿瘤间质亚型，指导临床决策。

目的：基于术前增强 CT 胰腺癌影像组学特征无创评估胰腺癌肿瘤间质亚型，并探究组学模型对新辅助化疗患者客观缓解率的预测价值。

方法：本研究回顾性收集 3 个中心行根治性切除，1 个中心行根治性切除且术前行新辅助化疗的胰腺癌患者。所有患者均收集临床资料、术前增强 CT 图像、术后数字化病理切片和随访数据。两名病理专家基于 HE 病理切片确定胰腺癌的三种间质亚型。两名放射科医生使用 ITK-SNAP 软件手动勾画肿瘤病灶，然后利用 Pyradiomics 对动脉期、静脉期病灶 ROI 进行影像组学特征提取，然后通过 FAE 软件进行建模预测间质分型并比较新辅助化疗患者不同间质亚型的客观缓解率。

结果：本研究共纳入 4 个中心 503 个病人（中位年龄，61 岁；四分位间距，52–68 岁；211 女），我们将研究对象按照中心分成三个数据集：中心 1+中心 2：298 个患者作为训练集，中心 3：121 个患者作为外部验证组，中心 4：84 个新辅助治疗患者。通过训练集数据集构建胰腺癌间质分型的预测模型。影像组学模型在评估肿瘤间质亚型时获得了较高的诊断准确性，在内部验证和外部验证队列中，AUC 分别为 0.782 和 0.775。在根治性切除队列中，反应型间质患者可能预示着较差的生存预后（ $P<0.01$ ），荒漠型、中间型和反应型中位生存期分别为 26.2M、18.0M 及 17.1M。在新辅助化疗队列中，荒漠型间质患者客观缓解率低于反应型间质患者（20.00% vs 42.86%， $P<0.05$ ）。

讨论：本研究探究了胰腺癌影像组学特征预测胰腺癌间质分型的价值，为胰腺癌患者的个体化治疗和预后评估提供了新的方法和依据。

PO-2190

胰腺切除术后临床相关胰瘘的术前预测模型及风险分层

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目的：术后临床相关胰瘘（clinically relevant postoperative pancreatic fistula, CR-POPF）是胰腺切除手术后常见的严重并发症，本研究旨在从术前计算机断层扫描（computed tomography, CT）特征和临床指标中确定与胰瘘风险增加相关的术前特征，并建立风险评分系统。

方法：回顾性纳入了 178 例 2015 年-2022 年期间在浙江省肿瘤医院接受胰腺切除术的患者，其中胰瘘组与对照组各 89 例，收集术前 CT 图像特征和临床信息，包括主胰管直径、胰腺厚度和病变最大直径等。建立了放射学模型、临床模型和联合模型。使用 ROC 曲线来评估模型的预测性能，并根据危险预测因子建立风险评分系统。

结果：联合模型多因素 logistic 回归分析显示，整体胰腺质地 < 2.5 、残留区胰腺最厚厚度 $\geq 22.85\text{mm}$ 、切缘主胰管直径 $< 2.85\text{mm}$ 、病灶最大径 $< 22.05\text{mm}$ 、 $\text{BMI} \geq 21.3$ 、 $\text{CA19-9} < 213.01\text{U/ml}$ 与 CR-POPF 独立相关。联合模型、放射学模型和临床模型的 ROC 曲线下面积分别为 $0.877(95\%CI: 0.824, 0.930)$ 、 $0.837(95\%CI: 0.776, 0.897)$ 和 $0.764(95\%CI: 0.693, 0.835)$ 。并基于联合模型确定了四个风险组：可忽略风险组、低风险组 ($< 10\%$)、中风险组 ($10\%-60\%$) 和高危组 ($\geq 60\%$)。

结论：术前放射学特征及临床指标有助于预测 CR-POPF 的发生，联合模型的预测效果优于放射学模型与临床模型。基于联合模型的四个术前风险分组将有助于临床医生进行个性化治疗。

PO-2191

基于 CT 全肿瘤直方图分析的肾细胞癌
淋巴结转移非侵入性预测研究

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目的：本研究旨在探索应用 CT 全肿瘤直方图分析预测肾细胞癌（RCC）淋巴结转移（LNM）的可能性。

方法：我们回顾性分析了 88 例接受根治性或部分肾切除的 RCC 患者，其中 20 例为 LNM 阳性，68 例为 LNM 阴性。收集了各种患者信息和肿瘤特征，包括：基本信息、血液参数、肾功能指标、尿液检测结果和肿瘤影像特征。我们对 CT 图像进行了直方图分析，并对结果进行了逻辑回归分析，以确定 LNM 的独立预测因子。

结果：在乳酸脱氢酶、红细胞计数、尿蛋白水平、肿瘤形状、假包膜的存在、侵及肾门和淋巴结图像异常等参数上，两组间存在显著差异。直方图分析显示，LNM 患者的均值、中位数、25%分位数、75%分位数和 95%分位数显著低于非 LNM 患者。尿潜血、淋巴结图像异常和 95%分位数被确定为 LNM 的独立预测因子。结合这些变量的模型显示出最高的预测准确性，曲线下面积（AUC）为 0.85。

结论：全肿瘤直方图分析作为一种非侵入性方法，提供了一种定量的方法，以提高诊断的精准性，有可能提高 RCC 患者 LNM 预测的准确性。通过确定关键预测因子，我们可以改善和指导治疗策略。然而，需要进行进一步的研究和验证，以确定这种方法的临床应用价值。

PO-2192

普美显增强 MRI 鉴别肝硬化背景下混合型肝细胞癌-胆管癌与肝细胞癌的诊断价值

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目的：探讨普美显-钆塞酸二钠(Gd-EOB-DTPA)增强 MRI 对混合型肝细胞癌-胆管癌(cHCC-CCA)与肝细胞癌(HCC)的鉴别诊断价值。

方法：回顾性纳入 2018 年 2 月至 2023 年 6 月天津市第三中心医院经病理证实的 32 例 cHCC-CCA 和 82 例 HCC 患者。所有患者均行 MRI 平扫、扩散加权成像(DWI)及 Gd-EOB-DTPA 增强检查,比较两组患者的临床资料和 MRI 征象。使用 logistic 回归分析筛选出鉴别 cHCC-CCA 与 HCC 的独立预测指标,采用受试者工作特征(ROC)曲线分析各独立因素及其联合模型预测 cHCC-CCA 的诊断效能。

结果 单因素 logistic 回归分析结果显示,糖类抗原 19-9(CA19-9)升高(19/32)、动脉期环形强化(22/32)、门脉期周边廓清(16/32)、延迟性中央强化(23/32)、马赛克征(20/32)及 DWI/肝胆期(HBP)靶征(17/32)提示为 cHCC-CCA;而肿瘤出血(32/82)、“快进快出”(63/82)提示为 HCC($P<0.05$)。多因素 logistic 回归分析显示,CA19-9 升高、动脉期环形强化及 DWI/HBP 靶征是鉴别 cHCC-CCA 与 HCC 的独立预测指标($P<0.05$)。CA19-9 升高、动脉期环形强化、DWI/HBP 靶征独立及三者联合模型诊断 cHCC-CCA 的曲线下面积(AUC)分别为 0.702、0.671、0.748 及 0.870,联合模型可提高诊断效能($P<0.05$)。结论 Gd-EOB-DTPA 增强 MRI 对 cHCC-CCA 与 HCC 的鉴别诊断具有重要价值,CA19-9 升高、动脉期环形强化及 DWI/HBP 靶征是 cHCC-CCA 的独立预测指标,结合 3 个独立指标的联合模型可提高诊断效能。

PO-2193

基于增强 CT 图像建立影像组学模型精准预测非功能性胰腺神经内分泌肿瘤的生长抑素受体 2 (SSTR2) 表达情况——一项初步研究

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目的：探讨基于增强 CT 图像的影像组学模型预测散发型无功能性胰腺神经内分泌肿瘤 (Nonfunctional pancreatic neuroendocrine tumors, NF-panNETs) 的生长抑素受体 2 (Somatostatin receptors 2, SSTR2) 表达强度的价值。

方法：回顾性分析 2012 年 1 月至 2022 年 12 月复旦大学附属肿瘤医院术后病理证实、具有术前增强 CT 图像的 NF-panNETs 患者 90 例。SSTR2 免疫组化分析采用 HER2 评分法,定义 - 及 + 为阴性,++ 及 +++ 为阳性 (阴性组 $n=51$, 阳性组 $n=34$)。采用简单随机法,按照 6: 4 的比例将患者分为训练组 ($n=54$) 和测试组 ($n=36$)。全手动勾画病灶体积,采用 Pyradiomics 方法 (Python, version 3.6.0) 提取影像组学特征,并基于组内相关系数 (intraclass correlation coefficient, ICC)、Spearman 回归分析、t 检验以及 LASSO 回归分析选取特征,然后采用 GBM 机器学习算法建立影像组学模型。最终,影像组学模型的预测效能用受试者工作特征 (Receiver Operating Characteristic, ROC) 曲线、校正曲线和决策曲线分析 (DCA) 来评估。

结果：本研究初步提取了 1830 个影像组学特征。经筛选后,通过保留 9 个影像组学特征建立 SSTR 2 特征模型。每个特征的相关系数 r 小于 0.6 ($p\text{-value}>0.05$),显示特征之间没有显著关联性。训练集和测试集的 AUC 值分别为 0.876 (95% CI, 0.845-0.813) 和 0.855 (95% CI, 0.821-

0.782)，在各自的数据集中显示出良好的 SSTR2 表达强度区分效能。另外，DCA 和校正曲线结果都表明影像组学模型区分效能的可靠性及准确性。

结论：在这项初步研究中，基于动脉期 CT 图像的影像组学模型能有效并可靠地区分 SSTR 2 阴性及阳性表达，旨在帮助暂时无法行核医学生长抑素受体成像的患者初步预测 SSTR 2 表达情况并将其分层，有助于临床决策。

PO-2194

影像组学预测肝细胞癌微血管侵犯：一项系统评价

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目的：全面评估预测肝细胞癌微血管侵犯的影像组学模型的报告质量、偏倚风险和影像组学方法学质量。

方法：截至 2022 年 1 月 21 日，在 PubMed、Embase、Web of Science、Scopus 和 Cochrane 图书馆对现有文献进行系统检索。包括基于影像组学数据开发和/或验证机器学习模型以预测肝细胞癌微血管侵犯的研究。两名研究者对这些研究进行了审查，并使用一致数据进行分析。报告质量、偏倚风险和影像组学方法学质量分别通过个体预后或诊断的多变量预测模型的透明报告 (TRIPOD)、预测模型偏倚风险评估工具 (PROBAST) 和影像组学质量评分 (RQS) 进行评估。结果：共有 30 项研究符合纳入标准，其中 24 项模型开发研究和 6 项模型开发及外部验证研究。总体 TRIPOD 依从性的中位数为 75.4% (范围为 56.7%-94.3%)。所有研究都存在高偏倚风险，20 个偏倚来源中至少有 2 个存在偏倚。此外，28 项研究显示，由于缺乏具体报告，多达 5 个信号问题存在不明确的偏倚风险。RQS 得分中位数为 37.5% (范围 25%-61.1%)。

结论：目前用于 MVI 状态预测的影像组学模型具有中等至良好的报告质量、中等的影像组学方法学质量，并且在模型开发和验证中存在较高的偏倚风险。

PO-2195

CT 影像组学在慢性肾脏病患者预后预测方面的应用研究

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目的：本研究旨在探讨基于计算机断层扫描 (CT) 图像的影像组学特征在慢性肾脏病 (CKD) 患者预后预测方面的应用价值。

方法：本研究回顾性纳入了 174 例 CKD 患者，随机分为训练组 (n=139) 和验证组 (n=35)。在 CT 平扫图像上勾画整个肾实质的感兴趣区，并提取影像组学特征。采用最小绝对收缩和选择算子 (LASSO) 惩罚的多元 Cox 比例风险回归分析筛选出对预后预测最具价值的影像组学特征，并计算影像组学得分 (Rad-Score)。我们还收集了患者的常规人口统计学信息、实验室指标和共病信息，并基于 Cox 比例风险回归分析构建了影像组学模型、临床模型和综合模型。使用 C 指数和时间依赖性受试者工作特征曲线下的面积 (AUC) 来评估这些模型的预测性能。

结果：Rad-Score 由 19 个影像组学特征组成。单变量和多变量 Cox 分析表明，Rad-Score、血尿素和血清白蛋白是独立的预后预测因子。整合影像组学特征和临床特征的综合模型，在训练组和验证组中预测 CKD 患者 3 年、5 年和 7 年预后可能性的 AUC 值分别为 0.824、0.805、0.772 和 0.812、0.876、0.941。与单独的影像组学或临床模型相比，综合模型在预测 CKD 预后方面更具准确性 (C 指数：训练组：0.767 vs. 0.762 vs. 0.689，验证组：0.757 vs. 0.713 vs. 0.739)。Kaplan-Meier 生

存曲线显示在训练组和验证组的高-低进展风险分层组之间存在显著的统计学差异（训练组： $p<0.0001$ ，验证组： $p=0.0034$ ）。

结论：Rad-Score 可作为一种新型生物标志物，用于早期识别高进展风险 CKD 患者。CT 影像组学可作为一种有效工具，用于早期无创预测患者的预后，为个体化治疗和更密切的随访提供指导，从而有效地预防慢性肾脏病的进展。

PO-2196

直肠癌术后吻合口漏与腹部脂肪及肌肉参数的相关性研究

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目的：探究腹部脂肪、骨骼肌肉分布情况与直肠癌术后吻合口漏是否存在相关性。

方法：回顾性搜集 2013 年至 2020 年于我院行腹部手术的病人，术后病理诊断为直肠癌，且患者术前于我院行全腹部增强 CT。

采用动脉期、L3 椎体水平 5mm 厚的图像，使用 sliceOmatic 半自动勾画脂肪及肌肉区域（ cm^2 ），包括骨骼肌（SM）、内脏脂肪（VAT）、皮下脂肪（SAT）、肌间脂肪（IMAT），并计算出相应指数（index），即各指标与身高的比值（ cm^2/m^2 ），分别称为骨骼肌指数（SMI）、内脏脂肪指数（VATI）、皮下脂肪指数（SAT）、肌间脂肪指数（IMATI），并计算出内脏/皮下脂肪比（VSR）、肌间脂肪/肌肉比（IMAMR）、内脏脂肪/肌肉比（VMR）。

搜集患者的相关危险因素，包括性别、年龄、BMI 及分类、术前放、化疗、麻醉评分 ASA、临床伴发疾病（DM、心血管疾病、肾病、肝病、肺疾病）、吸烟、酒精、营养状况（血白蛋白、血红蛋白）、血液炎性指标（CRP、PCT、WBC、中性粒细胞）及手术前后变化、血脂指标（甘油三酯、胆固醇）、肿瘤的部位、手术方式（是否腹腔镜、是否前切除/低位前切除/超低位前切除，是否预防性回肠造瘘）、病理类型、分期及 TNM 分期等。

有急性吻合口漏为术后 1 个月内发生的吻合口漏（AL），将病人分为 AL 组、非 AL 组，对比两组间的脂肪分布及各危险因素。

结果：收集了 451 例进行了直肠癌手术的患者，其中 431 例非 AL、20 例有 AL，两组间性别、年龄等基本特征无明显统计学差异，AL 组患者酒精摄入更高，手术前、后血中白蛋白更低、术前血胆固醇更低，术后 5 天内血 PCT、白细胞、中性粒细胞更高，且术后血 WBC 及 PCT 升高的程度更高，并且肠道病灶直径更大（上述危险因素 $P<0.04$ ）。但两组间腹部脂肪、肌肉状态、分布及比例的各项参数均无明显统计学差异。

结论：进行了直肠癌手术的患者，酒精摄入、血白蛋白较低、血 PCT、WBC、中性粒细胞较高、病灶更大均为急性吻合口漏的危险因素，但腹部脂肪、肌肉各项指标与 AL 的发生无明显统计学相关性，可能与样本量较小有关，需进一步扩大样本量或进行前瞻性研究以明确。

PO-2197

1.5T 和 3.0T MRI 评估垂体铁沉积与肝脏、心脏铁沉积的相关性研究

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目的：地中海贫血等需长期输血的患者，易出现肝脏、心脏、垂体、胰腺等器官铁沉积，垂体铁沉积会导致其发生不可逆的功能损害。本研究采用 1.5T 和 3.0T MRI 评估垂体、肝脏、心脏铁沉积，并探讨垂体铁沉积与肝脏、心脏铁沉积的相关关系。

方法：本研究共纳入 147 例地中海贫血患者，分析 3.0T 垂体 T2 (T2 MAP) 值、T2 (MAGIC) 值、T1 值、PD 值与心脏 T2* (3.0T) 值、心脏 T2* (1.5T) 值、肝脏 T2* (3.0T) 值、肝脏 T2* (1.5T) 值、血清铁蛋白的相关性，1.5T 垂体 T2 值、T2* 值与肝脏 T2* (3.0T) 值、心脏 T2* (3.0T) 值、肝脏 T2* (1.5T) 值、心脏 T2* (1.5T) 值、血清铁蛋白的相关性，1.5T 垂体 T2 值、T2* 值与 3.0T 垂体 T2 (T2 MAP) 值、T2 (MAGIC) 值、T1 值、PD 值的相关性。

结果：3.0T 垂体 T2 (T2 MAP) 值与心脏 T2* (3.0T) 值、心脏 T2* (1.5T) 值、肝脏 T2* (1.5T) 值、血清铁蛋白的相关系数分别为 0.503、0.401、0.460、-0.488，T2 (MAGIC) 值与肝脏 T2* (1.5T) 值、血清铁蛋白的相关系数分别为 0.416、-0.472。垂体 T2 (1.5T) 值与心脏 T2* (3.0T) 值、肝脏 T2* (1.5T) 值、血清铁蛋白的相关系数分别为 0.464、0.412、0.417 (P 均 < 0.001)，垂体 T2* (1.5T) 值与心脏 T2* (3.0T) 值、肝脏 T2* (1.5T) 值的相关系数分别为 0.428、0.401 (P 均小于 0.001)。1.5T 垂体 T2 值与 3.0T 垂体 T2 (T2 MAP) 值、T2 (MAGIC) 值的相关系数分别为 0.816、0.756 (P 均 < 0.001)，1.5T 垂体 T2* 值与 3.0T 垂体 T2 (T2 MAP) 值、T2 (MAGIC) 值的相系数分别为 0.756、0.732 (P 均 < 0.001)。

结论：垂体铁沉积与肝脏、心脏铁沉积、血清铁蛋白存在中度相关，1.5T 垂体 T2 值、垂体 T2* 值与 3.0T 垂体 T2 (T2 MAP) 值、T2 (MAGIC) 值的存在高度相关。

PO-2198

Spectral CT assists differentiation of osteoblastic bone metastasis from bone island in newly diagnosed cancer patients

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Objectives: To investigate measurements derived from plain and enhanced spectral CT in differentiating osteoblastic bone metastasis (OBM) from bone island (BI). Materials & Methods: From January to November 2020, 73 newly diagnosed cancer patients with 201 bone lesions (OBM = 92, BI = 109) having received spectral CT were retrospectively enrolled. Measurements including CT values of 40-140 keV, slope of the spectral curve, effective atomic number (Zeff), Water (Calcium) density, Calcium (Water) density, and Iodine (Calcium) density were derived from manually segmented lesion on plain and enhanced spectral CT, and then analyzed using Student t-test and Pearson's correlation. Multivariate analysis was performed to build models (plain spectral model, enhanced spectral CT model, and combined model) for the discrimination of OBM and BI with performance evaluated using receiver operator characteristics curve and DeLong test. Results: All features were significantly different between BI group and OBM group (all P < 0.05), highly correlated with the corresponding features between plain and enhanced spectral CT both in OBM (r: 0.392-0.763) and BI (r: 0.430-0.544). As for the model performance, combined model achieved the best performance (AUC = 0.925, 95% CI: 0.879 to 0.957), which significantly outperformed plain spectral CT model (AUC = 0.815, 95% CI: 0.754 to 0.866, P < 0.001) and

enhanced spectral CT model (AUC = 0.901, 95% CI: 0.852 to 0.939, P = 0.024) in differentiating OBM and BI. Conclusion: In addition to plain spectral CT measurements, enhanced spectral CT measurements would further significantly benefit the differential diagnosis.

PO-2199

Application of 3.0T 1H MRS in differential diagnosis of benign and malignant compression fracture of spine

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Objective: To investigate the characteristics of 3.0T 1H MRS in benign and malignant spinal compression fractures due to osteoporosis and malignant tumors of the spine and to provide scientific basis for differentiating benign or malignant compression fractures of the spine.

Methods: A total of 221 subjects were collected from June 2019 to September 2022 in Xi'an Honghui Hospital, including 50 patients in the normal bone mass group, 65 in the osteopenia group, 62 in the osteoporosis compression fracture group, and 44 in the malignant tumor compression fracture group. The age range was 35-75 years, including 99 males and 122 females. The patient's age, sex, and BMI were collected. Fat fraction (FF %) and Fat water ratio (LWR) measured by 1H MRS scanning for all subjects. In this study, 3.0 T GE superconducting MR machines and body coils were used to acquire the spectrum. SPSS20.0 was used for data analysis, mean \pm standard deviation was used for statistical description of quantitative data such as age, FF % and LWR, and frequency were used for statistical description of classified data such as gender. The ANOVA was used for the comparison among multiple groups of quantitative indicators, and the Bonferroni method was used for the horizontal comparison. Pearson correlation analysis was used for correlation analysis among quantitative indicators.

Results: By analyzing the age and BMI of different groups, variance analysis showed that there were differences in age among different groups. The age of the normal group was the smallest (53.05 ± 10.35 years old), followed by that of the osteopenia group (59.01 ± 6.34 years old). The age of the osteoporosis group was the largest (66.54 ± 5.32 years). After the analysis of different gender groups, it was found that there was a statistical difference between different groups, $P < 0.001$. The proportion of bone mass loss and osteoporosis in women was much higher than that in men. For the malignant tumor group, the proportion of males was higher than that of females, $P < 0.001$. There was a significant difference between the fat fraction and the lipid water ratio between the four groups. 1H MRS FF% was the lowest in malignant tumor group (15 ± 5.21) and the highest in osteoporosis group (65.8 ± 4.99). Bonferroni method was used to compare the difference between the two groups, which was statistically significant ($P < 0.001$). There was a high correlation between MRS FF% and LWR, $r = 0.865$, $P < 0.001$.

Conclusion: There were statistically significant differences in FF% and LWR of 3.0T 1H MRS in benign and malignant spinal compression fractures caused by osteoporosis and malignant tumors. It can be used in the differential diagnosis of benign and malignant compression fractures of the spine.

PO-2200

A series of radiologically misdiagnosed visceral lymphatic malformation (LM)

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Purpose This study aims to explore the clinicopathological and imaging findings of a series of radiologically misdiagnosed visceral lymphatic malformations (LM), to familiarize their typical clinicopathological and imaging features.

Methods The clinicopathological and imaging findings of 11 cases with histologically proven visceral LM misdiagnosed radiologically, were reviewed. All the patients underwent CT examinations (one with unenhanced CT only), and six underwent MR examinations.

Results The median age was 34 years old with a gender ratio (male: female) of 1.2:1. The tumor's greatest diameter ranged from 1.2 to 12 cm, with an average of 5.12 ± 3.62 cm. Most were asymptomatic and found incidentally, other symptoms included abdominal pain, epigastric discomfort with the elevation of CA19-9, and a pulmonary mass. There was no significant correlation between the tumors' greatest diameter and the presence of symptoms. Eight cases were lobulated multi-cysts with fine and uniform fibrous septa, and three were solitary round unilocular cysts. LM mainly showed fluid attenuation on unenhanced CT (one filled with gas), hypo-signal intensity (SI) on T1WI, and hyper-SI on T2WI with internal hypo-SI fibrous septa. And the septa showed mild to moderate enhancement. These masses were misdiagnosed as congenital pulmonary airway malformation (CPAM), hepatic mesenchymal hamartoma, splenic cyst, intraductal papillary mucinous tumors (IPMN), mucinous cystadenoma, serous cystadenoma, pancreatic ductal adenocarcinoma respectively. They were all surgical-excision completely. The positive rates of D2-40, CD34, CD31, and F8 staining were 100%, 100%, 100%, and 83.3% respectively.

Conclusion Visceral LM was rare and easily misdiagnosed. But it had typical imaging and pathological features and can be completely excised. The LM needed to be reminded of in the differentiation of visceral cystic mass, a definite diagnosis maybe made

PO-2201

MRI-based radiomics models of the patella predict the radiographic progression of osteoarthritis: Data from the FNIH OA Biomarkers Consortium

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Objective: To analyse the MRI-based radiomics features to establish a radiomics model for predicting the radiographic progression of osteoarthritis (OA).

Design: The patella was manually delineated, and radiomic features were extracted from the sagittal intermediate-weighted (IW) fat-saturated turbo spin-echo (TSE) sequences of 565 participants randomly divided into training and validation groups at a 7:3 ratio. The training cohort consisted of 395 participants and included 202 cases. The validation cohort consisted of 170 participants and included 87 cases. Least absolute shrinkage and selection operator (LASSO) was used for feature selection. Support vector machine (SVM) was used to establish radiomics models

and clinical and biomarker models for predicting the radiographic progression of OA. The predictive ability of the model was evaluated by the area under the curve (AUC).

Results: The baseline, 24 M, Delta, and combination (24 M+Delta) radiomics models all showed good predictive performance in the training and validation cohorts, with the combination model exhibiting the best performance. In the training cohort, the AUCs were 0.851, 0.825, 0.804 and 0.884, respectively. The AUCs in the validation cohort were 0.741, 0.786, 0.745 and 0.802, respectively. The DeLong test showed that the predictive performance of the radiomics models in the training and validation cohorts was significantly better than that of the clinical and biomarker models.

Conclusions: The MRI-based radiomics models of the patella performed better than the clinical and biomarker models in predicting the radiological progression of OA. This indicates a close relationship between the patella and the radiographic progression of OA.

PO-2202

Comparisons of volumetric Hounsfield units and bone density in discriminating vertebral fractures on lumbar CT scans

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Purpose: To compare the discrimination of volumetric Hounsfield units (HU) and volumetric bone mineral density (vBMD) by quantitative CT (QCT) in vertebral fractures (VFs).

Methods: We retrospectively included CT scans of the lumbar spine 101 VFs cases (60 women, mean age: 64 ± 4 years; 41 men, mean age: 73 ± 10 years) and sex- and age-matched 101 control subjects (60 women, mean age: 64 ± 4 years; 41 men, mean age: 72 ± 7 years) without any VF. In order to discriminate the probability of VFs in both men and women, binary logistic regressions were used to compare CT-measured volumetric bone attenuation in the HU of the L1 and L2 vertebrae with QCT-measured vBMD.

Results: The average HU value of the two vertebrae were significantly associated with QCT-measured vBMD of the lumbar vertebrae in both men and women with and without VFs (from 0.96 to 0.98, all $p < 0.001$). For the patients who were matched for age and sex, there was a statistically significant difference in HU value and vBMD between the patients with fractures and controls ($p < 0.001$). When age and BMI were taken into account as covariances and corrected simultaneously, odds ratios (ORs) for vBMD and HU values, which represent the risk of VFs, were significant ($p < 0.001$). Compared with HU, vBMD was more strongly associated with VFs occurrence in both men (vBMD: OR, 6.57; 95% CI, 2.99-14.46 vs HU: OR, 3.77; 95% CI, 1.97-7.22) and women (vBMD: OR, 6.39; 95% CI, 3.35-12.28 vs HU: OR, 3.82; 95% CI, 2.25-6.48). The area under the receiver operating characteristic curve (AUC) for predicting VFs using the average HU and vBMD of two vertebrae was 0.83 and 0.89 in men and 0.79 and 0.86 in women.

Conclusions: The QCT-measured volumetric bone mineral density is more associated with acute VFs than volumetric HU values of the lumbar spine. Although the use of HU values for the diagnosis of osteoporosis and predicting fracture risk is limited to scanner- and imaging protocol-specific, volumetric HU values have great potential for opportunistic osteoporosis screening.

PO-2203

Evaluation of the magnification of full-length weight-bearing lower extremity measurement using a single-shot exposure x-ray system

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Objective. To evaluate the magnification of full-length weight-bearing lower limb measurements using a single-shot digital x-ray system (New Oriental 1000LB, Wandong Medical, Beijing, China) compared with conventional radiography and fluoroscopy (R/F) slot system (Sonialvision Safire, Shimadzu Corp., Kyoto, Japan) and to verify its clinical applicability.

Materials and methods. A lead ruler and cadaver bones from the lower limb were imaged with both units in an upright weight-bearing position, and the lengths of the ruler, femur, tibia and total limb were measured on each image. The lengths of the femur, tibia and total limb were also measured on an EOS imaging system (EOS-imaging, Paris, France) and used as the ground truth. All image measurements on the three devices were performed using their respective post-processing software. Finally, the percentage errors in length due to image magnification were calculated. In a separate clinical study, examination time of the anterior-posterior (AP) was recorded and compared for 8 patients on each system.

Results. The magnification errors measured for the single-shot exposure x-ray system were slightly higher (< 3%) than those measured for the R/F system (< 1%). When compared to the R/F system, the single-shot exposure x-ray system had a significantly shorter mean examination time (10.57 s vs. 23.32 s).

Conclusion. The shorter examination time allows for higher patient throughput and cheaper examination costs compared with a conventional R/F system. Although there is a slight magnification error, this is reduced by the built-in calibration scale.

Clinical Relevance/ Application. In orthopedics, it is important to have optimal, reliable images without magnification or distortion, especially in preoperative planning. Image magnification has been shown to pose a risk of error in the measurement of joint replacement dimensions in surgical orthopedics. In addition, when determining the length of lower limbs, image magnification also makes the measurements unreliable. Thus, it's important to assess the image magnification of the single-shot exposure x-ray system.

PO-2204

Quantitative study of patellar ligament in patients with knee osteoarthritis based on MRI T2 mapping technology

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Purpose Using MRI T2 mapping technology to study the quantitative changes in T2 values of the patellar ligament in patients with knee osteoarthritis (KOA), as well as whether there are differences in T2 values between different parts of the patellar ligament, and to explore the characteristics of patellar ligament degeneration in KOA patients. **Materials and Methods** Group 1, healthy control group, 31 knee joints; Group 2, mild osteoarthritis group (VAS score < 80), 52 knee joints; Group 3, severe osteoarthritis group (VAS score > 120), 37 knee joints. Using quantitative T2 mapping sequence scanning, select the layer on the image that displays the largest area of the patellar ligament, and divide the patellar ligament into three sub regions (PPL, MPL, DPL) on average from the proximal to the distal end. Select circular regions of interest (ROIs) with an area of 50mm² at

the above positions, and select three ROIs with an area of 1mm² at the center of the circle where the signal is uniform, and measure their T2 values. Single factor analysis of variance was used to compare the differences in T2 values between three groups at different measurement points of the patellar ligament, as well as the differences in T2 values between different measurement points of the patellar ligament within the three groups. Results ① The T2 values at different measuring points of the patellar ligament were statistically different among the three groups ($P<0.05$), and there were significant differences between the two groups ($P<0.05$). Group 1>Group 2>Group 3. ② The T2 values of PPL, MPL and DPL in the three groups were compared in pairs. Only the difference within group 2 was statistically significant, and the average T2 value of MPL was greater than the average T2 value of PPL and DPL. Conclusion The degeneration of the patellar ligament occurs earlier at both ends and later in the middle, but it will eventually become consistent with the further deterioration.

PO-2205

A retrospective study of the association between disc shape alterations following percutaneous endoscopic lumbar discectomy and the 1-year postoperative outcomes.

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Background: Lumbar disc herniation (LDH) is a common orthopedic disease. Percutaneous endoscopic lumbar discectomy (PELD) has developed as an alternative to open surgery as a less invasive treatment. The majority of relevant studies have focused on cross-sectional comparisons of the differences in treatment outcomes between patients treated with conventional and minimally invasive surgery, as well as the complications and recurrence rates associated with the surgery, and fewer studies have examined the relationship between the changes in disc morphology before and after minimally invasive surgery and the prognosis. There is no specific study to elucidate the relationship between changes in disc morphology after PELD and the development of symptoms experienced by postoperative patients.

Objectives: This study investigates the possible association between the two postoperatively by observing the changes in the morphological parameters of the different reference surfaces of the intervertebral disc and the improvement in clinical symptoms after percutaneous endoscopic lumbar discectomy (PELD).

Study Design: A retrospective case study.

Setting: The First Medical Centre of the PLA General Hospital.

Methods: In this study, a total of 98 patients who were treated with percutaneous endoscopic lumbar discectomy (PELD) for lumbar disc herniation (LDH) at the First Medical Centre of the People's Liberation Army General Hospital from October 2019 to October 2021 were included. Preoperative and 3-month postoperative lumbar spine MRI DICOM data were obtained and measured using the RadiAnt DICOM viewer (version 2022.1.1). Morphological parameters of the diseased disc and the disc of the previous segment were measured by T2-weighted images in three reference planes: median sagittal, parasagittal, and transverse. In addition, we classified LDH according to the Michigan State University (MSU) classification criteria into three levels (denoted as 1, 2, and 3) according to the degree and four regions (designated as A, AB, B, and C) according to the location and evaluated the efficacy of LDH by using the Oswestry Disability Index (ODI), the visual analog pain scores for back and leg (VAS-back/VAS-leg), the Japanese Orthopaedic Association (JOA) score and recovery rate to assess efficacy. We compared postoperative differences in disc parameter changes and postoperative outcomes between patients with different

types of surgical segments and LDH based on the presence or absence of a subluxated disc and MSU staging. The patients were followed up in the outpatient clinic at 3, 6, and 12 months postoperatively, and questionnaires were completed at each visit. The follow-up time was 14.69 ± 4.21 months (12 to 24 months). (Chinese Clinical Trial Registry: ChiCTR2300071767)

Results: All the patients' health improved after the operation. Oswestry Disability Index (ODI), visual analog pain scores for the back and leg (VAS-back/VAS-leg) at postoperative follow-up were significantly lower, and JOA scores were significantly higher compared to preoperative, with statistically significant differences in postoperative follow-up results compared to preoperative ($p < 0.05$). Among these imaging parameters, those statistically significant postoperatively compared to preoperatively were disc height (DH), superior disc height (S-DH), disc height index (DHI), superior disc height index (S-DHI), protrusion distance (PD), disc height in the parasagittal plane (P-DH), disc height index in the parasagittal plane (P-DHI), protrusion distance in the parasagittal plane (P-PD), the vertical diameter of the disc (VD), aspect ratio of the disc (AR), superior aspect ratio of the disc (S-AR), disc circumference (DC), and disc area (DA). These parameters were reduced postoperatively compared to the preoperative parameters. The Pearson correlation coefficients showed that ΔDH was negatively correlated with the amount of change in VAS scores for low back pain at three months postoperatively and six months postoperatively ($r = -0.419$, $P < 0.01$), ($r = -0.402$, $P < 0.01$) among the parameters of median sagittal change. The ΔDHI was negatively correlated with the amount of change in VAS scores for low back pain at three months postoperatively and at six months postoperatively ($r = 0.411$, $P < 0.01$), ($r = 0.409$, $P < 0.01$). Among the parameters of parasagittal change, $\Delta P-PD$ was negatively correlated with the amount of change in VAS scores for low back pain at three months postoperatively and at six months postoperatively ($r = 0.367$, $P < 0.01$), ($r = 0.364$, $P < 0.01$). Among the parameters of cross-sectional variation, the parameter differences did not correlate with the values of changes in the efficacy indicators. Postoperatively, there was no significant difference in the changes in morphological parameters of the discs, nor the efficacy indicators at various time points between the two types of operated segments with subluxated discs (Inf group) and segments without subluxated discs (N-Inf group), nor between the MSU-A, MSU-B, MSU-AB, and MSU-C groups.

Limitations: A single-centre retrospective design was used for this study, which should be considered for its inherent selection bias and limited statistical power.

Conclusions: After percutaneous endoscopic lumbar discectomy (PELD), the values of change in the height of the discs in the operated segment in the median sagittal plane and the parasagittal plane, and the distance of herniation were associated with the speed of relief of low back pain at three months as well as at six months postoperatively; the values of change in the parameters of the discs' area and circumference in the transverse plane were not associated with the difference in the outcome of the treatment at one year after the operation. There were no significant differences in changes in disc parameters and changes in efficacy between different types of surgical segments and between different types of lumbar disc herniation (LDH) after surgery.

PO-2206

Optimization of keV for radiomics extracted from spectral virtual monochromatic images to predict osteoporosis

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Purpose: To investigate the effect of radiomics obtained from different virtual monochromatic images (VMIs) by dual-energy computed tomography (CT) on the prediction of osteoporosis. **Materials and Methods:** A retrospective study of 62 participants who underwent both single source dual-energy CT and quantitative computed tomography (QCT) lumbar-spine examination were enrolled. With QCT as the reference standard, the patients were divided into two groups according to the guidelines introduced by the International Society for Clinical Densitometry (ISCD) and American College of Radiology (ACR), osteoporosis ($n=16$) of the spine was defined

as a BMD value $<80 \text{ mg/cm}^3$, and non-osteoporosis ($n=46$ [osteopenia and normal]) was defined as a BMD value $\geq 80 \text{ mg/cm}^3$. Radiomics scores (RSs) for osteoporosis prediction were constructed from 11 sets of VMIs (40-140 keV, 10 keV interval). Receiver operating characteristic (ROC) curves were drawn and the area under the curves (AUCs) was calculated to evaluate the discriminatory power of RS for each VMI. Results: The AUC values for osteoporosis prediction with RS of 40-140 keV VMIs were 0.995, 0.996, 1.000, 1.000, 1.000, 1.000, 0.793, 0.787, 0.807, 0.821, 0.846. The accuracies of RS of VMIs were 0.952, 0.968, 0.984, 1.000, 1.000, 1.000, 0.705, 0.721, 0.746, 0.742, 0.770. The sensitivities of RS of VMIs were 0.882, 0.938, 0.941, 1.000, 1.000, 1.000, 0.400, 0.375, 0.444, 0.444, 0.545. The specificities of RS of VMIs were 0.978, 0.978, 1.000, 1.000, 1.000, 1.000, 0.765, 0.774, 0.796, 0.792, 0.820. The negative prediction values of RS of VMIs were 0.957, 0.978, 0.979, 1.000, 1.000, 1.000, 0.867, 0.891, 0.896, 0.894, 0.891. And the positive prediction values of RS of VMIs were 0.938, 0.938, 1.000, 1.000, 1.000, 1.000, 0.250, 0.200, 0.267, 0.267, 0.400. Conclusions: The RS obtained from multiple VMIs in dual-energy CT had a good ability to predict osteoporosis. And the RS of 40-90 keV VMIs showed higher performance than the RS of 100-140 keV VMIs.

PO-2207

Combination of 3.0T magnetic resonance imaging T2 mapping with texture analysis for evaluating the degeneration of lumbar facet joints

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Objective: Quantitative magnetic resonance imaging has been successfully applied to assess the status of cartilage biochemical components. This study aimed to investigate the performance of 3.0T magnetic resonance imaging T2 mapping combined with texture analysis for evaluating the early degeneration of lumbar facet joints. Methods: A total of 38 patients (20 in the asymptomatic group and 18 in the symptomatic group) were enrolled. All patients underwent 3.0T magnetic resonance imaging conventional sequences, water excitation three-dimensional spoiled gradient echo sequence (3D-WATSc), and T2 mapping scans. The bilateral L4/5 and L5/S1 lumbar facet joints were morphological graded using the Weishaupt criteria, T2 values, and texture parameters derived from T2 mapping of cartilage. The Kruskal-Wallis H test was used to compare the differences of parameters among different groups. Multivariate logistic regression analysis was used to obtain the independent predictive factors for evaluating the early degeneration of lumbar facet joints. Receiver operating characteristic (ROC) curve was performed and the area under curve (AUC) was calculated. Spearman correlation analysis was used to evaluate the correlation of the independent predictors of cartilage T2 value and texture parameters with the subjects' Japanese Orthopedic Association (JOA) score or Visual Analogue Scale (VAS) score. Results: A total of 148 facet joints were selected, including 70 in Weishaupt 0 (normal) group, 58 in Weishaupt 1 group, and 20 in Weishaupt 2-3 group. T2 value, entropy, and contrast increased significantly as the exacerbation of facet joint degeneration (all $P < 0.05$), while the inverse difference moment, energy, and correlation decreased (all $P < 0.05$). Entropy among different groups was significantly different (all $P < 0.05$), and the differences of T2 value, contrast, inverse difference moment, and energy between Weishaupt 0 and Weishaupt 1 groups, or Weishaupt 0 and Weishaupt 2-3 groups were statistically significant (all $P < 0.05$). Multivariate logistic regression analysis suggested that T2 value and inverse difference moment were the independent predictors for evaluating early degeneration of facet joints. The combination of T2 value with inverse difference moment achieved the best performance in distinguishing Weishaupt 0 from Weishaupt 1 (AUC=0.85), with sensitivity and specificity at 92.7% and 76.5%, respectively. In the symptom group, the cartilage T2 value combined inverse difference moment was correlated with JOA score ($r=-0.475$, $P < 0.05$) and VAS score ($r=0.452$, $P < 0.05$). Conclusion: 3.0T magnetic resonance imaging T2 mapping combined with

texture analysis is helpful to quantitatively evaluate the early degeneration of lumbar facet joints, in which the T2 value and inverse difference moment show an indicative significance.

PO-2208

Evaluation of early cartilage degeneration of knee based on 3.0T multi-parameter MRI and its correlation with β -catenin and MMP-13

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Abstract Objective: To investigate the performance of 3.0T MR T2 mapping combined with T1 ρ for evaluating the early degeneration of knee cartilage, and to preliminarily clarify the relationship between quantitative parameters and biochemical changes. **Methods:** According to the improved cast immobilization method and braking time, forty rabbits were randomly divided into 4 groups: control group, 2, 4 and 6 weeks groups. T2 mapping and T1 ρ imaging of the right posterior knee were performed. OARSI grading was used to evaluate the histological changes of cartilage, and the contents of type II collagen and proteoglycan as well as the expression levels of β -catenin and MMP-13 were analyzed by immunohistochemistry. The differences of T2 and T1 ρ value among different groups was compared by the Kruskal-Wallis H test. Spearman correlation analysis was used to evaluate the correlation of T2 value and T1 ρ values with OARSI grading and pathological indexes. Multivariate logistic regression analysis was used to obtain the independent predictive factors for evaluating the early degeneration of knee cartilage. **Results:** A total of 37 knee cartilage were selected, including 8 in 0 (normal) group, 20 in OARSI 1~2.5 group, and 9 in OARSI 3~6.5 group. T2 and T1 ρ value among different groups were significantly different, and increased significantly as the exacerbation of knee cartilage (all $P < 0.05$). T2 and T1 ρ value were negatively correlated with the contents of type II collagen ($r = 0.704$, $r = -0.611$) and proteoglycan ($r = 0.820$, $r = -0.573$) (all $P < 0.05$), MMP-13 ($r = 0.843$, $r = 0.592$) and β -catenin ($r = 0.759$, $r = 0.663$) were positively correlated (all $P < 0.05$). The combination of T2 value with T1 ρ value achieved the best performance in distinguishing OARSI 0 from OARSI 1~2.5 (AUC=0.84). **Conclusion:** The combination of T2 value and T1 ρ value can quantitatively predict the early degeneration of articular cartilage, which may have the potential in noninvasive evaluation of the cartilage pathological indicators.

PO-2209

Study on morphology and position of coracoid process in patients with subscapular tendon tear based on CT three-dimensional model

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Objective To investigate the correlation between the shape and position of the coracoid process and subscapularis tendon tear (STT).

Methods We retrospectively collected the imaging data of shoulder joint of patients with degenerative rotator cuff tear after arthroscopy and healthy people. They were divided into rotator cuff tears with STT group (group A, n = 28), rotator cuff tear without STT group (group B, n = 26), and healthy group (group C, n=22). The Mimics software was used to establish the three-dimensional modeling of the scapula and evaluate the positions of the coracoid process and scapular glenoid. The length of the coracoid (LC), the anteroposterior distance of the coracoid (ADC), the height of the coracoid (HC), the version angle of the glenoid (VAG), and the inclination angle of the glenoid (IAG) were measured, and the parameters of each group were analyzed and compared.

Result The LCs in groups A, B and C were (21.32 ± 3.83) mm, (18.95 ± 2.36) mm, and (17.75 ± 2.69) mm, respectively. The ADCs in groups A, B, and C were (23.52 ± 4.04) mm, (22.83 ± 2.37) mm, and (24.03 ± 3.65) mm, respectively. The HCs in groups A, B, and C were (20.76 ± 3.35) mm, (23.33 ± 2.7) mm, and (22.86 ± 3.64) mm, respectively. The VAGs in groups A, B, and C were $(-2.99 \pm 3.27)^\circ$, $(-2.28 \pm 4.9)^\circ$ and $(-2.83 \pm 4.4)^\circ$, respectively. The IAGs in group A, B, and C were 107.82° ($101.59-112.04$) $^\circ$, 110.19° ($105.86-118.72$) $^\circ$ and 110.37° ($104.9-118.02$) $^\circ$, respectively. There were significant differences in LC, HC, and IAG between group A and group B ($P < 0.05$), but there was no significant difference in ADC and VAG between the two groups ($P > 0.05$). There were significant differences in LC, HC, and IAG between group A and group C ($P < 0.05$), but there was no significant difference in ADC and VAG between the two groups ($P > 0.05$). There was no significant difference in all the measured indexes between group B and group C ($P > 0.05$).

Conclusion The longer the coracoid process, the lower the position and the smaller the inclination angle of the glenoid, the more likely it to cause subscapular tendon tears. However, the ADC and VAG are not significantly related to the subscapular tendon tears.

PO-2210

Application of dual-energy CT fat-muscle decomposition techniques in assessment of paraspinal muscles in young patients with chronic nonspecific low back pain

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Objective: To explore the imaging signs of paraspinal muscle in young patients with chronic nonspecific low back pain (CNLBP) by dual-energy CT material decomposition techniques. To guide the evaluation of clinical conditions and efficacy. **Methods:** 56 young CNLBP patients and 51 healthy volunteers were selected. The balanced male-to-female ratio within and between groups. Lumbar dual-energy CT were performed on two groups. The fat content of the bilateral multifidus and erector spinal muscles were measured at the middle level of the L1-L5 vertebral of the two groups of volunteers. CNLBP patients completed the Oswestry questionnaire to evaluate the degree of lumbar dysfunction. The differences in fat content of paraspinal muscles between CNLBP

patients and healthy volunteers were analyzed. The relationship between fat content and dysfunction in CNLBP patients were analyzed. Results: Compared with healthy volunteers, young patients with CNLBP had statistical differences in the fat content of the multifidus muscle at the middle level of the L4 and L5 vertebral ($p < 0.001$). There is a moderate positive correlation between the fat content of L4 and L5 vertebral in CNLBP patients and their dysfunction ($p < 0.05$). Conclusion: Dual-energy CT fat-muscle decomposition techniques can non-invasively quantify the fat content of paraspinal muscles in young CNLBP patients at the microscopic level and has a good consistency. There is a certain correlation between the degree of fatty infiltration of CNLBP paraspinal muscles and the degree of dysfunction. Dual-energy CT fat-muscle decomposition techniques is expected to become an effective means for clinical evaluation of the condition and efficacy of CNLBP.

PO-2211

Effect of Zhitong-Jiangu recipes on cartilage Wnt5a expression in knee osteoarthritis rabbits and correlation between Wnt5a expression and T2 value

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Objective: To study the effects of Zhitong-Jiangu recipe on the expression of Wnt5a in articular cartilage of rabbit knee osteoarthritis(KOA). To preliminarily clarify the correlation between the content of Wnt5a and T2 value in articular cartilage and to explore the feasibility of T2 mapping imaging in evaluation of the effect of Zhitong-Jiangu recipe in treatment of articular cartilage injury in rabbit KOA. Methods: The knee osteoarthritis model of New Zealand white rabbits was established by Improved cast immobilization method. According to different intervention methods, 32 rabbits were randomly divided into normal control group, model control group, glucosamine sulfate treatment group and Zhitong-Jiangu recipes treatment group. The treatment group was given the corresponding drug by gavage for intervention, and the control group was given the same volume of distilled water by gavage for intervention. T2 mapping was performed on the right knee and the content of Wnt5a in articular cartilage was analyzed with immunohistochemistry 6 weeks after experiment. Safranin-Fast green staining was used to detect cartilage damage. The differences of T2 value and Wnt5a content of articular cartilage among the four groups were compared by Kruskal-Wallis H and Mann-Whitney U test. Spearman correlation analysis was used to evaluate the correlation of T2 value and Wnt5a content of articular cartilage. Results: Compared with the normal control group, glucosamine sulfate treatment group, Zhitong-Jiangu recipes treatment group and model control group had different degrees of articular cartilage damage by Safranin-Fast green staining. Compared with the normal control group, the expression of Wnt5a and T2 value of articular cartilage in glucosamine sulfate treatment group, Zhitong-Jiangu recipes treatment group and model control group were increased, the difference was statistically significant ($P < 0.05$). Compared with the model control group, the glucosamine sulfate treatment group and Zhitong-Jiangu recipes treatment group decreased ($P < 0.05$). The expression of Wnt5a in articular cartilage was positively correlated with T2 value ($r = 0.884$, $P < 0.01$). Conclusion: Zhitong-Jiangu recipes can alleviate cartilage damage by down-regulating the expression of Wnt5a. Zhitong-Jiangu recipes could effectively lower Wnt5a expression. There is a good correlation between T2 mapping imaging and the expression of cartilage Wnt5a, which is helpful for non-invasive evaluation of the efficacy of Zhitong-Jiangu recipe in the treatment of KOA articular cartilage injury in rabbits.

PO-2212

Chronic non-specific low back pain, gender and BMI influenced fat infiltration in lumbar paraspinal muscles for young patients

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Objective: To analyze the correlation between the fat content of lumbar paraspinal muscle and chronic non-specific low back pain (CNLBP), gender and body mass index (BMI) for young patients.

Materials and Methods: The clinical data of 107 young patients (< 29 years old) in our hospital from November 2021 to March 2023 were retrospectively analyzed, according to whether there was CNLBP, the patients were divided into CNLBP group (56 cases) and control group (51 cases). All participants underwent 256-rows dual energy CT imaging. Fat content was measured on lumbar paraspinal muscle (the erector spinae muscles at L1/2-L4/5, and the multifidus muscles at L2/3-L5/S1) with fat-muscle decomposition techniques. The factors influencing fat content of lumbar paraspinal muscle were analyzed by multiple linear regression.

Results: A multiple linear regression analysis was performed to adjust for CNLBP, BMI and gender. The R², adjusted R² and standard deviation of the overall linear model were 0.706, 0.499 and 0.484,

respectively ($P < 0.05$). Multivariate linear regression analyses demonstrated that CNLBP ($\beta = 25.820$, $SE = 5.710$, $t = 4.522$, $P < 0.0001$), the BMI ($\beta = -6.713$, $SE = 0.830$, $t = -8.092$, $P < 0.0001$) and gender ($\beta = 23.749$, $SE = 6.652$, $t = 3.570$, $P = 0.001$) were the influence factors of mean fat content of total lumbar paraspinal muscle. For the mean fat content of multifidus: The R², adjusted R² and standard deviation of the overall linear model were 0.716, 0.513 and 0.499, respectively ($P < 0.05$), that CNLBP ($\beta = 45.551$, $SE = 6.853$, $t = 6.647$, $P < 0.0001$), BMI ($\beta = -7.698$, $SE = 0.996$, $t = -7.731$, $P < 0.0001$) and gender ($\beta = 20.940$, $SE = 7.983$, $t = 2.623$, $P = 0.01$) were the influence factors. For the mean fat content of erector spinae muscles: The R², adjusted R² and standard deviation of the overall linear model were 0.661, 0.437 and 0.426, respectively ($P < 0.05$). Gender ($\beta = 27.197$, $SE = 6.275$, $t = 4.334$, $P < 0.0001$) and BMI ($\beta = -5.600$, $SE = 0.777$, $t = -7.202$, $P < 0.0001$) were the influence factors.

Conclusions: This study demonstrated that CNLBP, BMI and gender may be associated with fatty infiltration of the lumbar paraspinal muscles for young patients, especially the multifidus muscles.

PO-2213

Application of IDEAL-IQ technique in quantitative assessment of adipose infiltration in dermatomyositis/polymyositis

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Purpose: To explore the FF value of IDEAL-IQ technology in assessing the extent of fat infiltration in dermatomyositis (DM)/polymyositis (PM).

Materials and Methods: A total of 68 patients with PM/DM (47.9 ± 15.0 years old) were retrospectively collected from December 2021 to June 2023, including 24 males and 44 females. According to disease duration exceeding six months, they were divided into an acute group (28 cases) and a chronic group (40 cases). Additionally, 24 normal volunteers were included, consisting of 10 males and 14 females. All subjects underwent bilateral thigh-axis IDEAL-IQ sequence

scanning, and the FF values of the three muscle groups in the thigh were measured by two radiologists on the IDEAL-IQ sequence. Intra- and interobserver consistency were evaluated using intraclass correlation coefficients (ICCs). One-way analysis of variance was used to compare the differences in FF values among different groups. Receiver operating characteristic (ROC) curves were plotted, and the area under the curve (AUC) was calculated to analyze the diagnostic efficiency of FF values for DM/PM fat infiltration.

Results: The intra- and interobserver ICC values of all muscle FF values were above 0.75. The FF values of the anterior, medial, and posterior muscle groups in the acute PM/DM group were higher than those in the corresponding muscle groups of the chronic group and the control group, and the differences were statistically significant ($P < 0.05$). The AUC of the FF values of the three muscle groups in the acute group vs. chronic group, acute group vs. control group, and chronic group vs. control group were 0.601 (95% CI 0.561-0.640), 0.817 (95% CI 0.784-0.850), and 0.759 (95% CI 0.725-0.794) ($P < 0.05$).

Conclusion: The FF value of IDEAL-IQ technology can quantitatively analyze the extent of muscle infiltration in PM/DM patients, which can reflect the disease progression of DM/PM and provide imaging evidence.

PO-2214

Application of MR Integrated sequences in active stage diagnosis of dermatomyositis/polymyositis

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Purpose: To investigate the MAGiC sequence in assessing dermatomyositis (DM)/polymyositis (PM) and its activity, and to analyze the correlation between quantitative parameters and clinical indicators.

Methods: A total of 68 PM/DM patients and 24 normal volunteers were retrospectively collected. According to myositis disease activity assessment tools, patients were divided into an active group (28 cases) and a non-active group (40 cases). All subjects underwent MAGiC sequence scanning, and the T1 values of the muscles in the thigh were measured twice by two radiologists on the MAGiC sequence. One-way analysis of variance was used to compare the differences in T1 values among different groups. Receiver operating characteristic (ROC) curves were plotted, and the area under the curve (AUC) was calculated to analyze the diagnostic efficiency of T1 values for PM/DM and its activity. Spearman correlation analysis was used to analyze the correlation between the quantitative parameters of DM/PM patients and lactate dehydrogenase (LDH) values.

Results: The T1 value of the anterior muscle group in the DM/PM active group was higher than that in the non-active group and control group ($P < 0.05$). The differences in the T1 values of the medial and posterior muscle groups were not statistically significant ($P > 0.05$). The AUC of the T1 values of the anterior muscle group in the active group vs. non-active group, active group vs. control group, and non-active group vs. control group were 0.704 (95%CI 0.641-0.768), 0.644 (95%CI 0.578-0.710), and 0.567 (95%CI 0.507-0.627) ($P < 0.05$). The T1 value of the anterior muscle group was significantly positively correlated with LDH ($r = 0.384$, $P < 0.05$).

Conclusion: The MAGiC quantitative spectrum technique can quantitatively analyze muscle edema in DM/PM patients and is correlated with the clinical indicator LDH, which can serve as an imaging biomarker for the diagnosis of active period.

PO-2215

Application of MR Integrated sequences in quantitative evaluation of edema muscle in dermatomyositis/polymyositis

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Purpose: To investigate the T2 value of the MAGiC sequence in assessing edematous muscles in dermatomyositis (DM)/polymyositis (PM), and to analyze the correlation between quantitative parameters and clinical indicators.

Methods: A total of 68 PM/DM patients and 24 normal volunteers were retrospectively collected from December 2021 to June 2023. According to electromyography and myositis disease activity assessment tools, patients were divided into an active group (28 cases) and a non-active group (40 cases). All subjects underwent bilateral thigh-axis MAGiC sequence scanning, and the T2 values of the three muscle groups in the thigh were measured twice by two radiologists on the MAGiC sequence. One-way analysis of variance was used to compare the differences in T2 values among different groups. Receiver operating characteristic (ROC) curves were plotted, and the area under the curve (AUC) was calculated to analyze the diagnostic efficiency of T2 values for edematous muscles in PM/DM. Spearman correlation analysis was used to analyze the correlation between the quantitative parameters of DM/PM patients and creatine kinase (CK) values.

Results: The T2 values of the anterior, medial, and posterior muscle groups in the DM/PM active group were higher than those in the non-active group and control group, and the differences were statistically significant ($P < 0.05$). The AUCs of the T2 values of the posterior muscle group in the acute vs. chronic group, acute vs. control group, and chronic vs. control group were 0.722 (95%CI 0.678-0.765), 0.937 (95%CI 0.918-0.957), and 0.849 (95%CI 0.820-0.877) ($P < 0.05$). The T2 value of the posterior muscle group was significantly positively correlated with CK ($r = 0.48$, $P < 0.01$).

Conclusion: The T2 value of the MAGiC sequence can quantitatively analyze edematous muscles in DM/PM patients and is highly correlated with the clinical indicator CK, which can be used to evaluate the improvement of inflammation after treatment.

PO-2216

Application of MR Integrated sequences in the diagnosis and quantitative evaluation of dermatomyositis/polymyositis

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Purpose: To investigate the diagnostic value of MAGiC sequence for the activity of dermatomyositis (DM)/polymyositis (PM) and analyze the correlation between quantitative parameters and clinical indicators.

Methods: Retrospective image and clinical data of 68 patients with confirmed PM/DM were collected. According to disease activity evaluation tools, patients were divided into an active group (28 cases) and a non-active group (40 cases). Additionally, 24 normal volunteers were included. Two radiologists measured the T2 and T1 values of the three muscle groups in the thigh twice on the MAGiC sequence. One-way analysis of variance test was used to compare the differences in T2 and T1 values among different groups. Receiver operating characteristic (ROC) curves were plotted, and analyze the diagnostic efficiency of T2 values for DM and its activity. Spearman

correlation analysis was used to assess the correlation between quantitative parameters and creatine kinase (CK) values in DM/PM patients.

Results: The T2 values of the anterior lateral, medial and posterior muscle group in the DM/PM activity group were higher than those in the non-active group and the corresponding muscle groups in the control group ($F = 48.17/94.60/79.11$, $P < 0.05$). The T1 value of the anterior lateral muscle group in the activity group was higher than that in the non-active group and the control group ($F = 16.13$, $P < 0.05$); the differences in the medial and posterior muscle group were not statistically significant ($P > 0.05$). The AUCs of the T2 values in the three muscle groups of the patient and the control group were 0.939. The AUC of the T2 values in the groups during the active and non-active periods was 0.722. The T2 value of the posterior group was positively correlated with CK ($r = 0.48$, $P < 0.01$).

Conclusion: The MAGiC quantitative mapping technique can quantitatively analyze the muscle involvement in DM/PM patients and are correlated with the clinical indicator CK.

PO-2217

Application value of MAGiC combined with IDEAL-IQ technology in the diagnosis of dermatomyositis/polymyositis

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Purpose: To investigate the diagnostic efficiency of the MAGiC sequence combined with IDEAL-IQ technology in the clinical diagnosis of dermatomyositis (DM)/polymyositis (PM).

Methods: A total of 68 patients (47.9 ± 15.0 years old) were retrospectively collected from December 2021 to June 2023, including 24 males and 44 females. Additionally, 24 normal volunteers (10 males and 14 females) were included. All subjects underwent bilateral thigh-axis MAGiC and IDEAL-IQ sequence scanning. Two radiologists measured the T2 and FF values of the three muscle groups in the thigh twice on both the MAGiC and IDEAL-IQ sequences. Intra- and interobserver consistency were evaluated using intraclass correlation coefficients (ICCs). One-way analysis of variance was used to compare the differences in T2 and FF values among different groups. Receiver operating characteristic (ROC) curves were plotted, and the area under the curve (AUC) was calculated to analyze the diagnostic efficiency of T2 and FF values for PM/DM.

Results: The intra- and interobserver ICC values of all muscle T2 and FF values were above 0.75. The T2 and FF values of the PM/DM group were higher than those of the control group, and the differences were statistically significant ($P < 0.05$). The AUCs of the T2 values and FF values of the PM/DM and control groups were 0.887 (95%CI 0.865-0.907) and 0.783 (95%CI 0.754-0.813), respectively, and the differences were statistically significant ($P < 0.05$). The AUC of the combined T2 and FF values of the PM/DM and control groups was 0.933 (95%CI 0.918-0.957), and the difference was statistically significant ($P < 0.05$).

Conclusion: The IDEAL-IQ sequence can quantitatively evaluate the degree of fat infiltration in PM/DM and determine the progression of the disease, while the MAGiC sequence can reflect the degree of muscle edema in DM/PM. The combination of the two sequences has high diagnostic value for PM/DM.

PO-2218

Quantitative diagnosis of dermatomyositis/polymyositis by IDEAL-IQ technique

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Purpose: To investigate the quantitative diagnostic value of IDEAL-IQ technology's $R2^*$ value in assessing thigh muscle lesions in dermatomyositis (DM)/polymyositis (PM).

Methods: A total of 68 PM/DM patients (47.9 ± 15.0 years old) and 24 normal volunteers were retrospectively collected from December 2021 to June 2023. According to disease duration exceeding six months, patients were divided into an acute group (28 cases) and a chronic group (40 cases). All subjects underwent bilateral thigh-axis IDEAL-IQ sequence scanning, and the $R2^*$ values of the three muscle groups in the thigh were measured by two radiologists on the IDEAL-IQ sequence. Intra- and interobserver consistency were evaluated using intraclass correlation coefficients (ICCs). One-way analysis of variance was used to compare the differences in $R2^*$ values among different groups. Receiver operating characteristic (ROC) curves were plotted, and the area under the curve (AUC) was calculated to analyze the diagnostic efficiency of $R2^*$ values for thigh muscle lesions in DM/PM.

Results: The intra- and interobserver ICC values of all muscle $R2^*$ values were above 0.75. The $R2^*$ value of the posterior muscle group in the acute PM/DM group was lower than that in the chronic group and control group, and the difference was statistically significant ($P < 0.05$). The differences in the $R2^*$ values of the anterior and medial muscle groups were not statistically significant ($P > 0.05$). The AUC of the $R2^*$ values of the posterior muscle group in the acute group vs. chronic group, acute group vs. control group, and chronic group vs. control group were 0.679 (95%CI 0.600-0.759), 0.797 (95%CI 0.729-0.866), and 0.672 (95%CI 0.591-0.753), and the differences were statistically significant ($P < 0.05$).

Conclusion: IDEAL-IQ technology's $R2^*$ value can quantitatively analyze muscle involvement in PM/DM patients, which can reflect the disease progression of DM/PM and evaluate the improvement of lesions after treatment.

PO-2219

Quantitative diagnosis of dermatomyositis/polymyositis by MAGiC combined with IDEAL IQ technology

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Objective: To investigate the efficacy of the MAGiC sequence combined with the IDEAL-IQ sequence for the quantitative diagnosis of thigh muscle in patients with dermatomyositis (DM) and polymyositis (PM).

Methods: 67 patients diagnosed with DM/PM were retrospectively enrolled as the case group. Matched volunteers ($n=23$) in terms were recruited as the control group. Were scanned with MAGiC sequence and IDEAL-IQ sequence Two radiologists measured the T2, T1, PD, FF and $R2^*$ values of 12 muscles on each sequence. The one-way analysis of variance test was used to compare the T2, T1, PD, FF and $R2^*$ values among different groups. The receiver operating characteristic (ROC) curves were drawn to calculate the area under the curve (AUC) to analyze the diagnostic efficacy of T2, PD, FF and $R2^*$ values, as well as the combination of T2 value and FF value.

Results: The T2 value of the DM/PM group was higher than that of the control group ($Z=-19.818$, $P < 0.05$), while the FF value was higher ($Z=-14.586$, $P < 0.05$), the PD value was lower ($Z=-6.803$, $P < 0.05$), and the $R2^*$ value was lower ($Z=-5.475$, $P < 0.05$) than those of the control group. There

was no significant difference in T1 value between the two groups ($Z=-0.936$, $P=0.349$). The AUC of the T2 value was 0.902 (0.880-0.925), $P<0.05$. The AUC of the FF value was 0.817 (0.786-0.848), $P<0.05$. The AUC of the PD value was 0.653 (0.613-0.694), $P<0.05$. The AUC of the $R2^*$ value was 0.712 (0.674-0.750), $P<0.05$. The AUC of the combination of T2 value and FF value was 0.934 (0.917-0.951), $P<0.05$. The sensitivity and specificity of EMG were 83.58% and 72%, respectively, $P<0.05$.

Conclusion: MAGiC quantitative spectrum technology can quantitatively evaluate the degree of thigh muscle edema in DM/PM patients, and IDEAL-IQ sequence can quantitatively evaluate the degree of thigh fat infiltration. The combination of the two sequences has a higher diagnostic value for DM/PM than EMG.

PO-2220

Prognostic value of FDG-PET/CT based radiomics analysis in newly-diagnosed multiple myeloma: comparison with clinical assessment

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Objective: The aim of this study was to explore the clinical utility of FDG-PET/CT-based radiomics fusion diagnostic model for Predicting multiple myeloma (MM) Survivability.

Methods: Our study included a total of 249 newly-diagnosed multiple myeloma from two centers. All patients were examined with whole body PET-CT within one month before treatment, and we built three prediction models in total, including the radiomic model, the clinical model and the fusion prediction model. The combined hematologic diagnoses, R-ISS and PET/CT was selected as an independent clinical model. The hematologic diagnoses included additionally quantification of serum protein, serum albumin, glomerular filtration rate, beta-2 microglobulin, hemoglobin, hematocrit, calcium levels, and serum lactate dehydrogenase. The dataset was randomly assigned to the training cohort or the test cohort in a ratio of 7:3. Synthetic minority oversampling technique (SMOTE) was used to make positive/negative samples balance. Pearson correlation coefficient (PCC)、Principle component analysis (PCA) and Kruskal Wallis methods were used to reduce features. 5-fold cross validation was applied on the training dataset to select hyper-parameters, support vector machine (SVM) and Lasso were selected as the classifier. The prediction performance of the nomogram was assessed using the area under the receiver operating characteristic curve (AUC), calibration curves, and decision curve analysis.

Results: 944 radiomics features were selected to build the radiomic model. The fusion diagnostic model achieved the best model. The fusion prediction model showed better calibration and higher discriminatory capacity (AUC of 0.81 in the internal test cohort, respectively, and 0.79 in the external test cohort, respectively) than the radiomic model and clinical model (AUC of 0.661 and 0.674 for radiomic model in the in the internal test cohort and external test cohort, respectively and AUC of 0.661 and 0.674 for clinical model in the in the internal test cohort and external test cohort).

Conclusions: This fusion prediction model had a remarkable prognostic power for estimating the survival outcomes of patients with NDMM. This fusion prediction model helps discriminate patients with a good prognosis from those with a poor prognosis more precisely.

PO-2221

Automatic grading of knee osteoarthritis using a radiomic model based on plain radiographs: the effect of combined use of anteroposterior & lateral images

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Purpose: This study intends to establish a radiomics-based automatic grading model for knee OA, and compare the effect of different body positions on the model effect.

Methods and Materials: A total of 473 pairs of knee joints plain radiographs from 473 patients (May 2020 to July 2021) were retrospectively analyzed. Each knee joint including anteroposterior (AP) and lateral (LAT) images which were randomly assigned to the training cohort and the validation cohort at a ratio of 7:3. First, Assessment of knee OA severity was done by two independent radiologists with Kallgren-Lawrence grading scale. Then, two radiologists independently delineated the region of interest (ROI) for radiomics features extracting and selecting. The radiomics classification features were dimensionally reduced and a classification was conducted using Logistic Regression classification. At last, receiver operating characteristic (ROC) curve, calibration and decision curves were used to evaluate the classification efficiency of the model.

Results: The AUC (macro/micro) of the combined use of the anteroposterior and lateral images were 0.772/0.778, 0.818/0.799, and 0.864/0.879, respectively. The radiomic features from the combined images achieved better classification performance than the individual position image ($P < 0.05$).

Conclusions: A radiomics model constructed by combining the anteroposterior and lateral images of the knee joint can better grade KOA and assist clinicians in accurate diagnosis and treatment.

PO-2222

The Advantage of 3-Dimensional Quantitative Assessment for Supraspinatus Intramuscular Fatty Infiltration in Patients with Different Degree of Rotator Cuff Tear.

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Purpose: To determine whether 2D-FF can accurately reflect 3D-FF and whether the relationship is associated with the different degree of tendon retraction and tear size.

Methods: A total of 46 participants with rotator cuff tears were studied. A T2*-corrected 3D multi-echo Dixon (q-Dixon) sequence was performed. Included subjects were categorized into 3 groups based on tendon retraction and 2 groups based on tear size. 2D-FF was calculated from the scapular Y-view. The whole supraspinatus muscle was manually segmented and 3D-FF was automatically obtained on the workstation. A paired t test was used to compare the individual differences between 2D-FF and 3D-FF results. Linear regression equations were performed to determine the agreement between 2D-FF and 3D-FF.

Results: 2D-FF were significantly higher than 3D-FF in the supraspinatus. Patients were prone to significantly be overestimated in the supraspinatus with small tear size ($5.64 \pm 2.38\%$ vs $3.91 \pm 2.33\%$ $P = 0.001$) and no tendon retraction ($5.19 \pm 2.63\%$ vs $3.83 \pm 2.40\%$ $p = 0.02$). 2D-FF overrated the FF compared with 3D-FF by $>50\%$ in 30.4% of the subjects ($n = 46$), and this predominantly ($n = 78.6\%$) was in patients with small tear size and no tendon retraction. The agreement between 2D-FF and 3D-FF was lower in patients with small tear size and no tendon retraction.

Conclusion: 2D-FF couldn't represent 3D-FF for estimating FI of supraspinatus muscle and 2D-FF was significantly higher than 3D-FF, especially in patients with small tear size and no tendon retraction.

PO-2223

The value of improving artifacts by using WARP sequences in assessing image quality after internal fixation implants

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Purpose: the aim of this article is to evaluate the value of improving artifacts by using WARP sequences in assessing image quality after internal fixation implants.

Methods: Analyze total 24 subjects image scores which scanned by using WARP sequences and normal TSE sequences after internal fixation implants operation. Compare the difference between two type sequences about SNR, image scores, scanning time. All data were processed by SPSS 23.0 software edition and checked for statistical significance.

Results: The image scores of WARP sequences were higher than normal TES sequences ($P < 0.01$) as well as the same SNR in these two groups ($P > 0.01$) even if it expended much time ($P < 0.01$).

Conclusion: WARP sequences could help to improved image quality with lower artifacts influence in patients suffered internal fixation implants.

PO-2224

Risk Factors of Intravertebral Cleft in Acute Spinal Fractures and Its Relationship with Cement Leakage After Percutaneous Vertebroplasty or Percutaneous Kyphoplasty

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Objective: To investigate the risk factors of intravertebral cleft (IVC) in acute spinal fractures (ASF) and its relationship with cement leakage after percutaneous vertebroplasty (PVP) or percutaneous kyphoplasty (PKP).

Methods: 1612 patients diagnosed with ASF in two medical centers were retrospectively included. 127 vertebrae (125 patients) were diagnosed with intraspinal fissure sign and included in the IVC group. 125 age and gender matched patients without IVC were included in the control group (134 vertebrae). Clinical and imaging characteristics including demography, presence of trauma, trauma position, severity of osteoporosis and compression, and the vertebral part of fracture line involvement were compared between the two groups. For the patients who received PKP or PVP within three months, the incidence and type of bone cement leakage were analyzed.

Results: There were significant differences in the compression severity and vertebral fracture line involvement of the inferior endplate, posterior wall and basivertebral foramen between the IVC and control groups ($p < 0.05$). While no significant difference was found in age, presence of trauma, osteoporosis severity, and vertebral fracture line involvement of superior endplate, anterior wall, left lateral wall or right lateral wall between the two groups ($p > 0.05$). The vertebral fracture line involvement of basivertebral foramen was an independent risk factor for IVC (95% CI: 2.415 (1.051~5.550), ($p < 0.05$)). Within 3 month, 64 vertebrae underwent PKP or PVP in the IVC group, and 15 cases experienced leakage. While 61 vertebrae in the control group underwent PKP or PVP,

with 6 cases experiencing leakage. There was a significant difference between the two groups ($p=0.042$). C-type leakage was the most common type for the IVC group, accounting for 86.67% (13/15).

Conclusion: The involvement of basivertebral foramen by vertebral fracture line was an independent factor of the IVC in acute spinal fractures. The vertebral fracture with IVC was more prone to have cement leakage after PVP or PKP.

PO-2225

Diagnostic value of cervical spine DWI-ZOOM in cervical spondylotic myelopathy ---A novel diffusion imaging in spinal

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Objective: To investigate the clinical application value of non-shared incentive diffusion imaging technique (ZOOM-DWI) in the diagnosis of cervical spondylotic myelopathy (CSM).

Methods: The patient group consisted of 49 CSM patients treated at the Third Hospital of Hebei Medical University from January 2022 to December 2022, while the control group included 50 healthy volunteers from the same period. All subjects underwent conventional MRI and ZOOM-DWI of the cervical spine, as well as neurological assessment using modified Japanese Orthopedic Association (mJOA) scores in the patient group. Apparent diffusion coefficient (ADC) values were measured at various levels in the patient group and controls. Statistical analyses were performed to compare ADC values and evaluate the correlation between patient ADC values and mJOA scores. The receiver operator characteristic (ROC) curve analysis was conducted to assess diagnostic accuracy.

Results: The mean ADC showed no significantly different levels in the control group. Among the ADC values at each measurement level in the patient group, except for C4-5 and C6-7 segments was not statistically significant, the remaining pairwise comparisons all showed statistically significant differences ($F=24.368$, $p\text{-value} < 0.001$). And C5-6 had the highest ADC value. The C5-6 ADC value in the patient group was significantly higher compared with the ADC value in the control group ($t=9.414$, $p < 0.001$), with statistical significance; The ADC value at the patient stenosis showed a significant negative correlation with the mJOA score ($r = -0.493$, $p < 0.001$), the value of area under ROC curve (AUC)=0.907.

Conclusion: Cervical ZOOM-DWI can be applied to diagnose CSM, and spinal ADC value can be used as reliable imaging data for the diagnosis of cervical myelopathy.

PO-2226

Advancements in the Application of Compressed Sensing Techniques in Spinal and Articular Imaging

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Abstract: Starting from the application origin of Compressed Sensing (CS) technology, this study primarily integrates domestic and foreign literature from the past decade to review the current status and development trends of CS in spinal and articular Magnetic Resonance Imaging (MRI). This article introduces the fundamental concepts of MRI and elaborates on CS theory. Finally, an analysis is conducted regarding the clinical application of CS-MRI in the context of spinal and articular imaging. The application of Compressed Sensing technology in MRI can reduce imaging

time, accelerate imaging speed, facilitate timely understanding of patient conditions by medical professionals, ensure image quality, effectively suppress artifacts, provide higher-resolution images, and contribute to more accurate clinical diagnoses.

PO-2227

Muscles fat infiltration evaluation for second hip fracture among female adults: a qualitative and quantitative study

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Purpose

To compare the qualitative and the quantitative muscle parameters as risk predictors of second hip fracture independently of areal bone mineral density (aBMD) in female adults.

Method and Materials

Two female adult groups were included, one with a first, and another with a second hip fracture. Subjects were recruited from the longitudinal Chinese Second Hip Fracture Evaluation (CSHFE), and computed tomography (CT) scans were obtained immediately following their first fracture. On qualitative evaluation, muscles fat infiltration was assessed according to the Goutallier classification system. Quantitative parameters including cross-sectional area and density of the gluteus maximus (G.MaxM) and gluteus medius and minimus (G.Med/MinM) muscles were measured on CT images. CT X-ray absorptiometry was used to measure aBMD of the contralateral femur. Median follow-up time to second fracture was 4.5 years. Cox proportional hazards models were used to compute hazard ratios (HR) of second hip fracture risk in subjects with a first hip fracture.

Results

Two hundred and six female participants (74.9 ± 9.5 years) with a first hip fracture were included in the analysis. Among them, after 4.5 years of follow-up, 35 females (79.3 ± 7.7 years) sustained a second hip fracture, 153 (73.4 ± 9.6 years) without a second hip fracture and 18 (79.5 ± 8.1 years) with death. Except for G.MinM Goutallier grade 3 (HR, 5.83; CI, 1.49–22.83) before adjustment for covariates, there were no statistically significant HRs for qualitative muscles fat infiltration classification in predicting second hip fracture. Among quantitative metrics on muscles fat infiltration evaluation, G.Med/MinM density (HR, 1.44; CI, 1.02–2.04) was significant after adjustment for covariates. G.Med/MinM density remained borderline statistically significant for predicting second hip fracture after adjustment for femoral neck (FN) aBMD in the competing risk analysis (HR, 1.43; CI, 0.99–2.06; $p=0.057$).

Conclusion

Goutallier classification as the most commonly used qualitative method in evaluating muscle fat infiltration is less effective than quantitative muscle metrics in the female fracture cohort, and G.Med/MinM density is a FN aBMD borderline independent predictor of second hip fracture risk for female adults. For practical considerations, quantitative muscle parameters especially G.Med/MinM density appear to be more instructive than qualitative classification as risk predictors of second hip fracture. Incorporating these quantitative muscle measures in clinical assessments may enhance the accuracy of predicting hip fracture risk and enable more effective prevention strategies. For female adults with the first hip fractures, more attention should be paid to muscle mass as well as bone density in order to prevent a second hip fracture.

PO-2228

A practical deep learning framework for the segmentation of Pelvic and sacral tumors on Multiple MRI sequences

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Purpose To efficiently segment Pelvic and sacral tumors (PSTs) from MRI images, we developed a deep-learning (DL) method using the available MRI sequences.

Method This study included a total of 616 patients pathologically diagnosed with PSTs between April 2011 to May 2022. We proposed a practical DL framework integrating 2.5D U-net and MobileNetV2 for automatic PSTs segmentation with a fast annotation strategy on multiple MRI sequences (T1-w, T2-w, DWI, and CET1-w). Two different models, the All-sequence segmentation model and the T2-fusion segmentation model were built. During the implementation of our DL models, all regions of interest (ROIs) in the training set were coarse labeled, and ROIs in the test set were fine labeled.

Results The 2.5D MobileNetV2 architecture demonstrated improved segmentation performance compared to 2D and 3D U-Net models, with a Dice score of 0.741 and an IoU of 0.615. The All-sequence model trained using a fusion of four MRI sequences (T1-w & CET1-w & T2-w & DWI), exhibited superior performance with Dice scores of 0.659 for T1-w, 0.763 for CET1-w, 0.819 for T2-w, and 0.723 for DWI as inputs. In contrast, the T2-fusion segmentation model, which used T2-w and CET1-w as inputs, achieved a Dice score of 0.833 and an IoU value of 0.719.

Conclusion All-sequence model demonstrated satisfactory performance with any one of T1-w, DWI, CET1-w, or T2-w as input. And the T2-fusion model produced superior segmentation masks for T2-w sequences with both T2-w and CET1-w as inputs. These models offer solutions for different clinical scenarios and have potential for wide-ranging applications.

PO-2229

Diagnostic value of color-coded virtual non-calcium dual-energy CT for the assessment of bone marrow edema of wrist rheumatoid arthritis

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Objective To evaluate the value of color-coded dual-energy CT (DECT) virtual non-calcium (VNCA) images in the diagnosis of wrist bone marrow edema (BME) in patients with rheumatoid arthritis (RA).

Methods Forty patients with wrist involvement in active RA were prospectively underwent DECT and MRI between January 2021 and September 2022. Functional reconstruction of DECT images was undertaken to obtain VNCA images. CT values of both bone marrow edema and normal bone marrow were measured. Paired chi-square test was applied to compare the differences between VNCA technique and MRI in the diagnosis of BME. Mann-Whitney U test was used to compare the difference of CT values between BME areas and normal bone marrow areas. The optimal CT value for detecting BME in VNCA images was selected based on the receiver operating characteristic curve analysis. The correlation between VNCA image score, MRI image score and RA activity was evaluated.

Results There was no statistically significant difference between VNCA technique and MRI in diagnosing BME ($P = 0.111$). On the VNCA images, there was a statistically significant difference in CT values between BME and normal bone marrow ($P < 0.001$). A cut-off value of -57.2 HU yielded an overall sensitivity, specificity, and accuracy of 90.63%, 94.00%, and 93.04%, respectively, for the detection of wrist BME in RA. The area under the receiver operating

characteristic curve was 0.99 in differentiation of the BME from normal bone marrow. On conventional CT images, there was no statistically significant difference ($P = 0.082$) in CT values between BME and normal bone marrow. The VNCA images score of BME was positively correlated with RA activity ($r = 0.372$, $P < 0.05$).

Conclusions The DECT VNCA technique demonstrates its potential in diagnosing wrist BME in patients with RA and offers a valuable tool for assessing the disease activity in RA.

PO-2230

Reversible Changes of the Knee Articular Cartilage After a Half-marathon: an MRI Study in Healthy Amateur Runners

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Purpose: To explore and assess the effect of long-distance running on knee articular cartilage.

Methods: 12 amateur marathon runners (age: between 28 and 51 years) were recruited. 3D-DESS and T2* mapping were performed on both knees of amateur runners before (t0), immediately after (t1), 3 days after (t2), and 1 week after (t3) the half-marathon running. The non-exercisers were scanned only at t0. An automatic cartilage segmentation method was used to quantitatively assessed the morphological and T2* of knee cartilage pre- and post-marathon. The cartilage thickness, volume, and T2* values of 21 sub-regions were quantitatively assessed, respectively. A one-way repeated measures ANOVA was used to analyze changes in T2* values of cartilage at the four-time points.

Results: The volume and thickness of cartilage in all 21 regions showed no statistical difference before and after the half-marathon exercise. Immediately after running a half-marathon (t1), the regional cartilage analysis of amateur runners showed that T2* values increased in Femur medial posterior, Femur trochlea lateral, and Tibia medial central cartilage, while decreased in Patella lateral central cartilage ($P < 0.05$). The T2* values of all cartilage regions were not significantly different from the baseline level 3 days and 1 week after running.

Conclusion: 1) The change of cartilage T2* value is more sensitive than volume and thickness. 2) After running, the T2* value of the femur and tibia cartilage increased, while the T2* value of the patellar cartilage decreased, which may be related to the load they bear during exercise. 3) The recovery time of T2* value after a half-marathon is about three days.

PO-2231

Effect of lumbosacral transitional vertebrae on developmental alterations of the hip investigated by quantitative measurements of lumbo-pelvic-hip complex on whole body CT

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Purpose: To investigate the effect of LSTV on the hip joint through assessing the alignment and balance of the LPHC by the quantitative imaging measurements.

Methods: This study matched 23 presacral vertebrae (PSV) ($n=102$), 25 PSV ($n=108$) and normal anatomy with 24 PSV ($n=100$) by age and sex. Hip measurement parameters included the measurements of acetabular anteversion angle (AAA), CE angle, Sharp angle, and femoral neck-

shaft angle. Spinopelvic parameters included the measurements of pelvic incidence (PI), pelvic tilt (PT), sacral slope (SS), lumbar lordosis (LL).

Results: The results showed that significant differences were found in the sagittal-AAA values between each pair of the controls and the LSTV subgroups (Right $p < 0.001$, Left $p < 0.05$). Sharp angle, CE angle, femoral neck-shaft angle, Sagittal-AAA and Axial-AAA were correlated with the pelvic incidence (PI) ($p < 0.05$), the pelvic tilt (PT) ($p < 0.05$). PI showed a weak positive correlation with hip parameters, and PT showed a moderate positive correlation with them. Compared to the normal group (24PSV), both the 23PSV and 25PSV groups exhibited an increase in the sagittal-AAA value, with a more significant increase observed in the right side. Furthermore, the increase was more pronounced in the 23PSV group compared to the 25PSV group. Additionally, our paired t-test revealed that apart from Sagittal-AAA, Axial-AAA and femoral neck-shaft angles in LSTV groups and the control group have significant differences, CE angle also showed a significant difference between the 24PSV and 25PSV groups.

Conclusion: Development of variation of LSTV results in excessive coverage of the lateral and anterior acetabulum, particularly an increase in coverage of the anterior acetabular rim, which has a corresponding impact on the development of secondary bone-related lesions. LSTV is unrelated to other hip measurements that reflect acetabular inclination and coverage of the lateral rim of both acetabulum and femur development.

PO-2232

Evaluation of anatomical variations with morphological measurements and their relationship to ligament injury

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Purpose: The objective of this study was to reveal the anatomical risk factors for anterior and posterior cruciate ligament (ACL and PCL) injuries. We aim to investigate whether there are significant relationship between tibial tubercle-trochlear groove distance (TT-TG), patella angle, trochlear sulcus angle (TSA), trochlear groove depth (TGD), medial tibial condyle angle (MTA) and lateral trochlea length (MT and LT), MT/LT ratio, lateral patellar tilt angle (LPTA), patella-patellar tendon angle (P-PTA), quadriceps-patellar tendon angle (QPA), Insall-Salvati index (ISI), medial and lateral trochlear inclination (MTI and LTI) measurements and important common pathologies such as ACL, PCL, medial and lateral meniscal injuries (MM and LM), peripatellar fat pad edema, chondromalacia and effusion. Thus, the mechanisms of injury will be better understood by revealing important anatomical variations for ligament damage

Methods: In this retrospective study, 246 patients with knee magnetic resonance imaging examination included in this study. Our patients who underwent knee MRI were divided into groups according to the presence of MM tear, LM tear, ACL tear, PCL tear, peripatellar fat pad edema, chondromalacia and effusion. TT-TG distance, patella angle, TSA, TGD, MT, LT, MT/LT ratio, LPTA, P-PTA, QPA, ISI, MTI and LTI were measured.

Results: In patients with ACL tear; age, LT, ML/LT ratio and QPA measurements were found to be significantly higher. There was no significant difference between the participants' LPTA value and the presence of ACL tear, MM and LM injury. MT and ML/LT ratio were found to be significantly lower in the group with MM tear ($p < 0.001$). The TT-TG distance was found to be significantly lower in the group with LM tear. **Conclusion:** Increased age, LT, ML/LT ratio and QPA are predispose risk for ACL tear. Decreased MT and ML/LT ratio are among the risk factors for MM tear. The anatomical variations are associated with ligament and meniscal injury.

PO-2233

Diffusion-relaxation correlation spectrum imaging for detecting early-stage knee osteoarthritis with four compartment

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Purpose: To present a technique that enables knee early-stage OA detection using diffusion-relaxation correlation spectrum imaging (DR-CSI).

Methods: Fifty-five early osteoarthritis (OA, Kellgren-Lawrence [KL] score 1 to 2; mean age, 56.4 years) and forty-nine healthy volunteers (mean age, 56.7 years) were tested on MR scans with T2-mapping and DR-CSI techniques. Maps of mean apparent diffusion coefficient (ADC), T2 relaxation time and volume fraction V_i for DR-CSI compartment i (A, B, C, D) sensitivity, specificity, and positive and negative likelihood ratio (PLR, NLR) were assessed to determine the diagnostic accuracy for detection of early-stage degeneration in knee articular cartilage. The structural abnormalities of articular cartilage were evaluated by the modified Whole-Organ MR Imaging Scores (WORMS).

Results: All intra- and inter-observer agreements for DR-CSI compartment volume fractions and modified Whole-Organ MR Imaging Scores (WORMS) of cartilage were excellent. Early OA versus the controls had higher V_C , lower V_A and V_B ($p < 0.001$), but comparable V_D ($p > 0.05$). V_A , V_B and V_C had a moderate association with WORMS. No significant correlation was identified between V_D and WORMS. V_C had better ability than V_A , V_B , V_D , T2 and ADC to discriminate early OA patients from healthy controls (area under the curve, 0.898). Sensitivity, specificity, PLR, and NLR of V_C with cutoff value 29.9% were 81.8% (95% CI, 69.1% - 90.9%), 95.9% (86.0% - 99.5%), 20.05% (5.13% - 78.34%), and 0.19% (0.11% - 0.33%).

Conclusions: DR-CSI compartment volume fractions may be sensitive indicators for detecting early-stage degeneration in knee articular cartilage.

PO-2234

Effect of lumbosacral transitional vertebrae on sagittal balance of lumbo-pelvic complexity assessed by quantitative whole-body CT imaging

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Objective This study aims to investigate the influences of lumbosacral transitional vertebrae (LSTV) on sagittal lumbo-pelvic balance assessment and provide some recommendations for preoperative imaging evaluation.

Methods Based on whole-body CT images, a total of 310 individuals with complete segmentation anomalies of LSTV were included and divided into 23 presacral vertebrae (PSV) (sacralization, $n = 102$), 25 PSV (lumbarization, $n = 108$). The control group with 24 PSV (normal, $n = 100$) was matched by age and gender. Sagittal lumbo-pelvic parameters including pelvic incidence (PI), pelvic tilt (PT), sacral slope (SS), lumbar lordosis (LL), sacral table angle (STA), sacral kyphosis (SK) and pelvic radius (PR) were measured at the ontogenetical S1 (Ontog S1) level and the morphological S1 (Morph S1), respectively. The association of lumbo-pelvic parameters with LSTV types and measurement levels was investigated.

Results All the parameters at the Ontog S1 differed significantly from those at the Morph S1 (all $p < 0.001$). At the Ontog S1 level, PI, PT, SS and LL were negatively correlated with vertebrae counts; SK and PR were positively correlated with vertebrae counts (all $p < 0.001$). Instead, reverse results

were obtained at the Morph S1 level. The measurement level and vertebrae counts were independent influence factors for the measurement of PI, PT, SS, SK and PR (all $p < 0.05$). Compared with the measured values of the matched controls, the variability of most lumbo-pelvic parameters (PI, SS, LL, STA, SK, PR values of 25 PSV subgroup, and PI, PT, SS, LL, STA values of 23 PSV subgroup) at the Morph S1 level were significantly smaller than that at the Ontog S1. The measurements of PT, SS, LL and PR were less influenced by the measurement level and vertebrae counts than those of PI and SK.

Conclusion Morph S1 is more recommended for the measurements of most lumbo-pelvic parameters in patients with LSTV. The parameters (PT, SS, LL, STA, PR) are shown more stable and recommended to help reduce the effects caused by LSTV.

PO-2235

MRI features in the ankles of amateur marathon runners and analysis of associated factors

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Objective To explore the MRI features of and factors associated to ankle injuries in amateur marathon runners.

Materials and methods 72 amateur marathon runners as the study group and 32 healthy volunteers as the control group were recruited. All subjects were asked to complete a questionnaire at the beginning of the study and underwent MRI of the ankle. To compare the differences of ankle injuries between the two groups, and to explore the MRI manifestations of ankle injuries in amateur marathon runners. The independent sample chi-square test was used to analyze the relationship between ankle injury and different sex, BMI, foot strike pattern, running years and monthly running distance in the study group.

Results The main MRI features in the study group were peritendinous effusion and ligament injuries. The peritendinous effusion was mainly found in flexor tendons and ligament injuries mainly manifested as old lateral collateral ligament injury. Others common ankle injuries included bone marrow edemalike signal intensity and Achilles tendinopathy. The main MRI features in the control group were peritendinous effusion, and flexor hallucis longus tendon and posterior tibialis tendon were common. There was no statistically significant difference in peritendinous effusion of flexor hallucis longus tendon (chi-square value was 0.320, $p=0.572$) and flexor digitorum longus tendon (chi-square value was 0.256, $p=0.613$) between the two groups. The difference between the other major injuries between the two groups was statistically significant ($p<0.05$). In the study group, the incidence of calcaneofibular ligament injury was higher in women than in men, the incidence of Achilles tendinopathy was higher in those who habitually used a non-rearfoot strike pattern than in those who habitually used a rearfoot strike pattern, the incidence of anterior talofibular ligament injury was higher in those who habitually used a rearfoot strike pattern than in those who habitually used a non-rearfoot strike pattern, and the incidence of Achilles tendinopathy was higher in a higher running years group than in a lower running years group, the all differences were statistically significant (All $p<0.05$). BMI and monthly running distance were not significantly different between the groups (All $p>0.05$).

Conclusion Recreational marathon may lead to several positive MRI findings without correlation with clinical findings. The main MRI features of amateur marathon runners are peritendinous effusion and old lateral collateral ligament injury. Other common ankle injuries include bone marrow edemalike signal intensity and Achilles tendinopathy. In addition, the MRI features of ankle injuries in amateur marathon runners are related to different sex, foot strike pattern and running years.

PO-2236

Blood Oxygenation Level Dependent MRI on Assessing the Muscle Perfusion of Patients with Peripheral Arterial Occlusive Disease under the P30 Model

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Objectives: To investigate the repeatability and feasibility of blood oxygenation level dependent MRI (BOLD-MRI) on assessing the perfusion of calf muscles under the ischemia-hyperemia model, which was provoked by the quick inflation and deflation of a cuff placed around the midthigh level with a pressure of brachial systolic blood pressure plus 30 mmHg (P30 model).

Methods: 15 young healthy volunteers, 15 age-matched old healthy volunteers and 20 patients with peripheral arterial occlusive disease (PAOD) were recruited in the study for BOLD-MRI imaging. And 15 subjects (5 subjects for each group) were randomly selected to be rescanned after 24 hours in the same condition. The BOLD parameters were calculated on standardized BOLD time-signal curves for each muscle, including gastrocnemius, soleus, peroneus, tibialis anterior and tibialis posterior.

Results: TTP and Shyp showed excellent interscan repeatability, especially TTP (ICC= 0.969, CV= 9.3%). There were significant difference among the three groups in TTP and Shyp (all $P < 0.05$), and the MIV of soleus was larger than the other four muscles ($P < 0.05$). Meanwhile, TTP and Shyp performed a good diagnostic capability on distinguishing the perfusion deficit between PAOD patients and healthy controls, with the area under the curve (AUC) were 0.979 and 0.917 respectively.

Conclusion: BOLD-MRI had a good repeatability and feasibility on assessing the perfusion of calf muscles under the P30 model.

PO-2237

QRAPMASTER for Quantitative evaluation of knee cartilage: ready for clinical daily practice?

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Synopsis

Quantitative MRI assigns absolute quantification of T1, T2 and PD based on tissue characteristics, such as the T2 metric values a surrogate marker for cartilage collagen integrity. The QRAPMASTER technology enables inline generation of quantitative T1 maps and T2 maps and scans of high image quality, representing a promising synthetic MRI option that appears clinically feasible and may eventually facilitate the time neutral acquisition of quantitative T1 maps, T2 maps in the knee MRI.

Introduction

Knee pain affects approximately 25 % of adults, limits function and mobility, and impairs life quality (1). Based on the structural and contrast abnormalities of MR images, many diseases can be diagnosed, such as ligament fibers rupture, meniscal tissue tear, and articular cartilage substance defects (2). However, specific states of disease, such as early articular cartilage degeneration and healing after cartilage restoration, may escape detection with morphologic MRI. T1 and T2 relaxation times are physiological tissue property which reflect cartilage collagen integrity (3,4). "Quantification of Relaxation Times and Proton Density by Multi echo acquisition of a saturation-recovery using Turbo spin-Echo Readout" (QRAPMASTER) is a novel method, which generates multiple contrast images and absolute quantification of relaxation time within a single scan. QRAPMASTER collects four reverse times and two echoes to obtain the T1 map, T2 map and PD

map(5). An important feature of QRAPMASTER method is that T1 and T2 maps are measured independently at the same location, so there is no error propagation between them, and registration is not required. In addition, based on these quantization parameters, it can generate many contrasts, such as T1WI, T2WI, PDWI, etc. The concomitant T1, PD and T2 maps are generated by inversion recovery methods with different inversion times and multi echo spin echo methods with different TE fitting, respectively. Studies have shown QRAPMASTER may be feasible in the diagnosis of knee disease, T2WI and PDWI showed substantial image quality for the assessment of knee diseases compared with conventional imaging. While few study investigate the value of quantitative image T1 and T2 maps of synthetic MRI in knee diseases. The purpose of this study was to characterize articular cartilage using T1 and T2 maps generated from QRAPMASTER based on multiple-dynamic multiple echo (MDME) sequence in a clinical setting.

Methods

The study was approved by the local IRB, and written informed consent was obtained from all subjects. A total of 10 volunteers were examined on a 3T MRI scanner (MAGNETOM Vida, Siemens Healthcare, Erlangen, Germany) with a dedicated knee coil. Reference scanning including sagittal 2D T1WI, B1 inhomogeneity-corrected variable flip angle (VFA) T1mapping and spin echo T2mapping were performed with the detail imaging parameters as shown in table1. The MDME sequence was performed using the following imaging parameters in a sagittal orientation for synthetic reconstruction (Table1). Quantitative image analysis (reference scan VBF T1mapping and SE T2mapping vs synthetic T1, T2mapping) was performed by three radiologists with more than 5 years of experience. ROIs were placed on muscle (gastrocnemius muscle), fat pad, and cartilage. Based on the ROIs, value of T1/T2mapping, signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) were analyzed for objective evaluation. All numerical values were reported as the mean \pm SD. We used a paired t-test to compare the value, SNR, and CNR with the common and synthetic sequences. Statistical significance was defined as a p-value less than 0.05.

Results

The total scan time for each knee T1WI, T1mapping, T2mapping was around 10mins. and the scan time of MDME was around 7mins.

The quantitative image analysis results for the different anatomical locations are shown in Table 1. The T1 and T2 relaxation times of fat pad and cartilage were significantly different between two methods (reference scan VFA\SE sequence and QRAPMASTER)(6), and these values were within the results reported in the previous literatures. No difference was found for the SNR of fat tissue in two T1\T2 mapping. The SNR for cartilage in T1mapping was 10.01 ± 5.67 , which is significantly different from synthetic T1mapping. The CNR (muscle-cartilage) of synthetic T1mapping and T2mapping, CNR (fat pad-cartilage) of synthetic T2mapping did not demonstrate significantly reduced compared to the reference sequence. Figure 2 showed metric values of T1/T2mapping comparable to that of the conventional method, and there was significant difference between the quantitative value in cartilage of knee.

Discussion

The QRAPMASTER based on MDME showed image quality comparable to that of the reference method, especially for cartilage in T2mapping, which took obviously shorter scan time(5). These quantitative imaging analyze the cartilage mainly by providing information regarding water content, collagen integrity, and proteoglycan content. The small structures such as cartilage in knee MRI were also demonstrated well in synthetic images, and produced visually sharper images compared to conventional method. However, the synthetic images became very noisy and the values of fat pat and cartilage in quantitative sequence were significantly different. The above results suggests that the MDME scan may be useful for getting a high-quality quantitative image to improve diagnostic confident and save 33% of scanning time, and it is essential to enable this new technology to be implemented in clinical routine, especially the evaluation of cartilage. The initial results, which need to be further validated in a larger patient cohort, demonstrated the ability of T1 and T2 metric values to characterize articular cartilage and other knee normal structures.

Conclusion

QRAPMASTER for quantitative evaluation of knee cartilage may decrease up to 33% scan time, demonstrated the ability of T1 and T2 metric values to characterize articular cartilage in knee MRI.

PO-2238

Effects of vitamin D on bone marrow fat fraction and microvascular permeability in diabetic rabbits:a quantities MRI study

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Abstract

Objectives: To evaluate the effect of vitamin D on the proton density fat fraction (PDFF) and permeability of bone marrow in the vertebrae of alloxan-induced diabetic rabbits using the iterative decomposition of water and fat with echo asymmetry and least-squares estimation quantitation (IDEAL-IQ) technique and quantitative dynamic contrast agent-enhanced magnetic resonance imaging (DCE-MRI) sequence.

Methods: Thirty male New Zealand rabbits aged 28-32 weeks were randomly divided into three groups: diabetic, intervention, and control groups. Scans were performed at weeks 0, 4, 8, 12, and 16. The parameters of IDEAL-IQ (PDFF) and DCE-MRI (transfer constant [K_{trans}], rate constant [K_{ep}], and volume of extracellular space [V_e]) were compared in pairs between the groups using repeated measures at fixed time points. The correlations of DCE-MRI and PDFF parameters with the microvessel density (MVD), endothelial progenitor cells (EPCs) and adipocytes were analyzed using Spearman's correlation coefficient.

Results: Vitamin D did not significantly improve the parameters of IDEAL-IQ and DCE-MRI in diabetic rabbits based on the PDFF, K_{trans}, K_{ep}, and V_e ($P < 0.05$ for all). In the 16th week, the PDFF in the intervention and diabetic groups showed no significant differences ($t = -0.481$, $P = 0.412$), while the MVD showed statistical significance ($t = 15.681$, $P < 0.05$). The PDFF showed a significant positive correlation with adipocytes ($r = 0.828$, 95%CI: 0.611~0.965), and the MVD was significantly positively correlated with K_{trans} and K_{ep} ($r = 0.672$, 95%CI: 0.394~0.816; $r = 0.827$, 95%CI: 0.704~0.911) in diabetic rabbits. However, the EPCs showed a significant negative correlation with K_{trans} ($r = -0.395$, 95%CI: -0.553~0.096) and were not correlated with K_{ep} ($P > 0.05$).

Conclusions: Vitamin D did not improve the progression of bone marrow fat tissue and microvascular permeability in diabetic rabbits in the 16th week using the quantitative DCE-MRI and IDEAL-IQ sequence.

PO-2239

Deep learning based on knee MRI for fully automated precision diagnosis of rheumatoid arthritis, gout, and pigmented villonodular synovitis

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Purpose: To develop a deep learning (DL) segmentation model of the suprapatellar capsule (SC) and infrapatellar fat pad (IPFP) based on knee MRI, and to establish classification models based on the two regions of interests (ROIs) to distinguish 3 common knee synovitis. Their discrimination performance was compared with the radiologists' assessment.

Materials and Methods: In this retrospective study, 376 patients (Internal training set: 233 cases, internal test set: 93 cases, external test set: 50 cases) with pathologically diagnosed knee synovitis, including rheumatoid arthritis (RA), gouty arthritis (GA) and pigmented villonodular synovitis (PVNS) from two institutions were included. Manual annotation was performed on SC and IPFP, and a semantic segmentation model was trained based on Resnet and UNet networks based on PD-weighted images to reduce the burden of manual annotation. Segmentation of SC and IPFP obtained and then processed through two pooling layers for feature extraction, with the patient's gender and age features added and processed through polynomial feature mapping. The professional doctors' classification results were compared with five machine learning methods: support vector machine (SVM), multilayer perceptron (MLP), decision tree, AdaBoost and XGBoost.

Results: Patients enrolled in institution A were assigned to a training cohort (69 with RA, 87 with GA, and 77 with PVNS) and a test cohort (25 with RA, 43 with GA, and 25 with PVNS). Patients included in Institution B formed the external test cohort (15 with RA, 21 with GA, and 14 with PVNS). The test results of the automatic segmentation model recall (internal test set=0.8164, external test set=0.7065), precision (I=0.7796, E=0.6598), mIoU (I=0.6633, E=0.5178) and mACC (I=0.9907, E=0.9893) all show a more accurate segmentation of ROI (IPFP and SC). The test results of the automatic segmentation model recall (internal test set (I)=0.8164, external test set (E)=0.7065), precision (I=0.7796, E=0.6598), mIoU (I=0.6633, E=0.5178) and mACC (I=0.9907, E=0.9893) all show a more accurate segmentation of segmentation of the ROI (IPFP and SC) was relatively accurate. The performance of classification models was assessed mainly by the results of the area under curve (AUC), and with the comparison results of SVM (I=0.8046, E=0.6903), MLP (I=0.8264, E=0.7558), Adaboost (I=0.7873, E=0.7429), XGboost (I=0.7648, E=0.7013), and Decision Tree (I=0.7663, E=0.7669) and professional doctors (I= , E=) show that our ROI segmentation and classification diagnosis model has higher classification accuracy and less manual burden.

Conclusion: The established DL methods for segmentation and classification of different knee synovitis lesions based on SC and IPFP can support an accurate radiologic diagnosis.

PO-2240

Dual-energy computed tomography for measuring bone mineral density at different energy levels: correlation with quantitative CT

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Purpose

The objective of this study was to evaluate the precision and agreement between BMD measurements performed in quantitative CT (QCT) and DECT-derived hydroxyapatite (HAP) concentration of the L1 vertebra to L3 vertebra with European Spine Phantom (ESP) under different radiation exposure, and to assess how the keV level influences BMD measurements and determine the usefulness of keV level of quantitative DECT closest to the results of QCT.

Materials and Methods

Data acquisitions were scanned using Revolution CT (GE Healthcare, Waukesha, WI) at 120kV with tube rotation times of 0.8 seconds and modulated tube currents of 100 and 500mA, and fast tube voltage switching between high and low energy (140/80kVp) with tube rotation times of 0.5 seconds and modulated tube currents of 240 and 365mA

on March 2023 on ESP (No. 145, Germany ORM company) for ten repeated times without repositioning. The HAP values of the three vertebrae were measured from the axial-view HAP (Water)-based material decomposition (MD) images, and the DECT-derived HAP values were reconstructed with 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76keV monochromatic images acquired by QCT, respectively. The BMD value of the three ESP vertebrae of the L1, L2, L3, and the average L1-3 were measured by QCT PRO workstation (Mindways QCT PRO workstation). The relative errors (RE) and relative standard deviations (RSD) were calculated and compared with the nominal values of the ESP (L1, 51.0; L2, 102.2; L3, 200.4mg/cm³). The association of the two measurements were analyzed by Pearson correlation. One-way analysis of variance (ANOVA) was used to compare BMD values of different keV levels and tube currents on ESP.

Results

The volume CT dose index (CTDI_{vol}) of QCT were 5.53mGy in 100mA and 27.66mGy in 500mA, whilst DECT were 5.80mGy in 240mA and 9.25mGy in 365mA. Under different scanning conditions, the QCT-derived BMD values of the L1, L2, and L3 were 53.60±0.27, 106.25±0.11, 202.76±0.23mg/cm³, respectively. The DECT-derived HAP values of the L1, L2, and L3 were 55.56±1.05, 117.23±1.02, 233.50±1.80mg/cm³ in 66keV, 54.40±1.13, 115.26±0.88, 228.25±1.44mg/cm³ in 67keV, 53.45±1.44, 112.91±1.27, 223.80±2.09mg/cm³ in 68keV, 52.33±1.17, 110.66±1.13, 219.39±2.01mg/cm³ in 69keV, 51.28±1.13, 108.71±0.74, 214.77±1.18mg/cm³ in 70keV, 50.9±1.22, 107.02±0.71, 210.65±0.86mg/cm³ in 71keV, 50.00±1.37, 105.32±1.26, 207.13±1.42mg/cm³ in 72keV, 49.64±1.35, 104.20±0.85, 204.68±0.88mg/cm³ in 73keV, 48.60±0.77, 100.89±0.51, 200.23±0.82mg/cm³ in 74keV, 46.61±1.00, 99.04±0.82, 195.47±0.90mg/cm³ in 75keV, 48.70±7.70, 97.93±0.79, 193.08±1.02mg/cm³ in 76keV, respectively. For QCT-derived BMD values of the L1, L2, and L3, the RE and RSD of the L1, L2, and L3 were 5.09, 4.94, 1.18mg/cm³ versus 4.85%, 4.71%, 1.16%, respectively. For DECT-derived HAP values, the RE and RSD of the L1, L2, and L3 were 8.94, 14.70, 16.52mg/cm³ versus 8.20%, 12.82%, 14.18% in 66keV, 6.66, 12.78, 13.90mg/cm³ versus 6.24%, 11.33%, 12.20% in 67keV, 4.80, 10.48, 11.68mg/cm³ versus 4.58%, 9.49%, 10.46% in 68keV, 2.60, 8.28, 9.47mg/cm³ versus 2.54%, 7.65%, 8.65% in 69keV, 0.55, 6.37, 7.17mg/cm³ versus 0.54%, 5.99%, 6.69% in 70keV, -0.20, 4.71, 5.11mg/cm³ versus -0.21%, 4.50%, 4.87% in 71keV, -1.97, 3.25, 3.36mg/cm³ versus -2.01%, 4.50%, 4.87% in 72keV, -2.67, 1.95, 2.14mg/cm³ versus -2.74%, 1.92%, 2.09% in 73keV, -4.71, -1.28, -0.09mg/cm³ versus -4.95%, -1.30%, -0.09% in 74keV, -8.60, -3.09, -2.46mg/cm³ versus -9.41%, -3.19%, -2.52% in 75keV, and -4.52, -4.18, -3.65mg/cm³ versus -4.73%, -4.36%, -3.79% in 76keV, respectively. Results indicated that the RE and RSD values of each vertebral body at the energy level of 74keV were lowest, whilst highest in

66keV, and closest to the QCT-derived BMD values. As the energy level changed, the RE and RSD of the L1 showed a largest variation than L2 and L3. There was a strong positive correlation between the two methods in 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76keV ($r=0.7091, 0.7983, 0.8411, 0.7617, 0.8620, 0.9855, 0.7040, 0.7003, 0.9104, 0.7240, 0.05032, P<0.05$), respectively. There were significant differences at different energy levels ($P<0.05$), whilst no statistically significant differences in different tube current groups ($P>0.05$).

Conclusion

The DECT-derived HAP values at energy level of 74keV was closest to the QCT-derived BMD values, indicating that patients who undergo DECT with the scan parameters of 240mA, 0.5r/s, and 74keV can be selected to measure BMD with relatively high accuracy and precision and reduce radiation exposure on patients.

PO-2241

Association of Lumbar Trabecular Bone Ultrashort Echo Time Magnetization Transfer Ratio (UTE-MTR) with Intervertebral Disc Degeneration

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Purpose: To investigate the relationship between ultrashort echo time magnetization transfer ratio (UTE-MTR) measurements of lumbar trabecular bone and intervertebral disc degeneration (IVDD). **Methods and Materials:** A total of 150 patients with IVDD (age 42 ± 8 years, age range 37-75) were recruited and scanned with UTE-MT sequence in lumbar on a 3T MRI scanner (Signa, Pioneer, GE Healthcare). The UTE-MT sequence was scanned twice with flip angle of 750° for MT-On and 0° for MT-Off. Other UTE-MT sequence parameters were as follows: TR = 100 ms, TE = 0.032 ms, excitation flip angle = 5° , number of spokes per-TR = 5, FOV = 28cm \times 28cm, matrix = 140 \times 140, slice thickness = 3.6mm, and slice number = 16, oversampling factor = 1.2, and scan time = 3min. The UTE-MTR is calculated by the signal ratio of the difference between UTE-MT-OFF and UTE-MT-ON to the UTE-MT-OFF. Mean lumbar trabecular bone UTE-MTR value corresponding to each disc was calculated by averaging adjacent upper and lower vertebral body UTE-MTR. The grade of IVDD was assessed using the Pfirrmann scoring system. Pearson correlation analysis was performed to calculate the correlations between lumbar trabecular bone UTE-MTR and age, gender, and ODI, respectively. A one-way ANOVA test was used to compare lumbar trabecular bone UTE-MTR between different grades of disc degeneration. A value of $P < 0.05$ was considered as a statistically significant.

Results: The lumbar trabecular bone UTE-MTR showed a strong negative correlation with grade of IVDD ($r = 0.352, P < 0.001$), lumbar trabecular bone UTE-MTR decreased with grade of IVDD. Moreover, our results showed that the lumbar trabecular bone UTE-MTR was negatively correlated with age ($r = -0.482, P < 0.001$) and ODI ($r = -0.396, P < 0.05$), while had no association with gender. **Conclusion:** UTE-MTR measurements of lumbar trabecular bone may be a useful biomarker to predict IVDD.

PO-2242

Utilization of T1-Mapping for the pelvic and thigh muscles in Duchenne Muscular Dystrophy: a quantitative biomarker for disease involvement and correlation with clinical assessments

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Objectives: Little is known about the disease distribution and severity detected by T1-mapping in Duchenne muscular dystrophy (DMD). Furthermore, the correlation between skeletal muscle T1-values and clinical assessments is less studied. Hence, the purposes of our study are to investigate quantitative T1-mapping in detecting the degree of disease involvement by detailed analyzing the hip and thigh muscle, future exploring the predicting value of T1-mapping for the clinical status of DMD.

Methods: Ninety-two DMD boys were included (mean age was 8.78 ± 2.06 years, range 5-15 years). Four representative cross-section levels (①level near the sciatic foramen; ②level near the greater trochanter-ischial tuberosity; ③level near the closer proximal part of the femoral diaphysis; ④approximately 5 cm below level ③) that contained larger area of visible muscle with the excellent distinction of different muscle compartments were chosen for MRI assessments. Grading fat infiltration and measuring the T1-values of Nineteen muscles (gluteus maximus, gluteus medius, gluteus minimus, iliopsoas, tensor fascia, obturator internus, pectineus, rectus femoris, vastus lateralis, vastus intermedius, vastus medialis, gracilis, sartorius, adductor longus, adductor brevis, adductor magnus, semitendinosus, semimembranosus, biceps femoris long head) in the right side of the pelvic girdle and right thigh in axial T1-weighted images (T1WI) and T1-maps, respectively, the disease distribution and severity were evaluated and compared. Visual grading of axial T1WI through the 5-point modified Mercuri scale of fat infiltration (0=normal, 1=mild fatty streaks, 2=mild fat infiltration < 30%, 3=moderate fat infiltration between 30%–60%, 4=severe fat infiltration >60%) . The region of interest (ROI) was obtained by manually tracing the outline of the individual muscle. The ROI size was determined by using the individual muscle size on the axial images. Placing the ROI of each muscle on the T1-maps automatically generated a mean T1-value for each muscle. Finally, the average value measured by the two radiologists was taken as the T1-value of each muscle. Clinical assessments included age, height, weight, body mass index (BMI), wheelchair use, timed functional tests (10-m run/walk, Gowers manoeuvre, 4-stair climb, 4-stair descend), NorthStar ambulatory assessment (NSAA) score, serum creatine kinase (CK) level. The NSAA used a 17-item rating scale, and each item was 0-2 points, with a total score being 34 points (the higher total score, the better motor function). The Shapiro-wilk test was used to evaluate the normality of the data distribution. The individual muscle T1-value among different grades of fat infiltration was compared by test for trend. The Spearman method with Benjamini-Hochberg correction was used to assess the correlation between T1-values, the Mercuri scale and clinical assessments. Multiple linear regression analysis was used to determine the independent association of T1-value and clinical motor function. The above results were considered statistically significant when the $P < 0.05$. Bland-Altman plots and interclass correlation coefficient (ICC) were used to determine the reproducibility of the T1-value ROI measurement. All statistical analyses were conducted with SPSS version 22.0 and MedCalc Version 20.011.

Results: Approximately 12.0 % of patients (11 of 92) used a wheelchair in the study group. Since the timed functional tests can only be carried out in cooperative patients with mild to moderate dysfunction, the 10-m run/walk, Gowers manoeuvre, 4-stair climb, 4-stair descend were obtained in 77, 68, 68, 68 patients, respectively. NSAA scores and serum CK levels were acquired in all 92 patients. The gluteus maximus achieved the highest mean score of fat infiltration and had the lowest T1-value, followed by the adductor magnus, the gracilis muscle showed the lowest mean

score of fat infiltration and had the highest T1-value. T1-value decreased as the grade of fat infiltration increased scored by T1WI (P-value <0.001). Negative correlations were found between T1-value and the participants' age ($r = -0.297$ to -0.629 , all P-value <0.05), height ($r = -0.244$ to -0.571 , all P-value <0.05), weight (P-value of 17 muscles were <0.05, $r = -0.283$ to -0.495), BMI (P-value of 6 muscles were <0.05, $r = -0.255$ to -0.286), wheelchair use (P-value of 18 muscles were <0.05, $r = -0.223$ to -0.527), 10-m run/walk (P-value of 12 muscles were <0.05, $r = -0.268$ to -0.605), Gowers manoeuvre (P-value of 9 muscles were <0.05, $r = -0.366$ to -0.705), 4-stair climb (P-value of 9 muscles were <0.05, $r = -0.308$ to -0.668), 4-stair descend (P-value of 8 muscles were <0.05, $r = -0.333$ to -0.527). Positive correlations were discovered between T1-value and NSAA ($r = 0.232$ to 0.721 , all P-value <0.05), serum CK level (P-value of 14 muscles were <0.05, $r = 0.292$ to 0.491). Notably, the T1-value of gluteus maximus, gluteus medius, tensor fascia, pectineus, rectus femoris, vastus lateralis, vastus intermedius, vastus medialis, adductor magnus, biceps femoris long head showed a correlation (P-value <0.05) with both NSAA and timed functional tests. Besides, most of the correlations between T1-values and clinical assessments were moderate or high [r (absolute value) = 0.404 to 0.721 , P-value <0.01]. Although some of the correlations appeared to be relatively weak ($r = -0.394$ to 0.396), they were still statistically significant (P-value <0.05). Especially in the correlations between T1-values and NSAA, except the gracilis and sartorius showed a relatively weak correlation ($r = 0.232$ to 0.330 , P-value <0.05), the T1-values of the remaining 17 muscles all showed good correlation with NSAA ($r = 0.419$ to 0.721 , P-value <0.01). Multiple linear regression analysis showed that the T1-value of tensor fascia and adductor magnus possessed an independent association with the NSAA score (P-value <0.05), the T1-value of vastus medialis showed an independent association with 10-m run/walk (P-value <0.05), the T1-value of gluteus maximus and vastus lateralis achieved an independent relevance with 4-stair climb (P-value <0.05), and the T1-value of vastus intermedius manifested an independent relevance with 4-stair descend (P-value <0.05). The Bland-Altman plots and ICC analysis showed excellent reproducibility of T1-value ROI measurement. Bland-Altman plots presented good agreements between the two independent observers. The range of ICC-intra and ICC-inter was 0.931-0.994 and 0.908-0.985, respectively.

Conclusion: T1-value generated by T1-mapping of pelvic and thigh muscles decreases as the grade of fat infiltration increased scored by T1WI. Skeletal muscle T1-value can be used as a quantitative biomarker for disease involvement, further to assess the disease severity and predict motor function by quantifying chronic fatty degenerations in DMD.

PO-2243

A splicing method to reduce misalignment artifacts and radiation dose in digital radiography(DR) full-length photography of both lower extremities

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Background: The splicing method is related to image quality and radiation dose.

Objective: To explore a splicing method to reduce misalignment artifacts and radiation dose in digital radiography(DR) full-length photography of both lower extremities.

Methods: Thirty-five patients who underwent DR full-length non-weight-bearing photography of both lower extremities in our hospital and had duplicate photography or misalignment artifacts in the spliced images were collected retrospectively. The original images of all patients were re-spliced, and the duplicate photographic images were not used in the re-splicing process. The resulting images were then divided into groups A and B based on their respective splicing methods. Group A: Only one conventional splicing process was performed, i.e., the original images were

spliced from top to bottom by automatic splicing and manual adjustment. The actual exposure times were included in group A. Group B: The conventional splicing process was performed first to ensure that the right lower extremity was spliced well, then the left lower limb was cut off by a rectangular cutting tool, and the pubic symphysis and the right lower limb were preserved; the original images were spliced once again to ensure that the left lower limb was spliced well, then the right lower limb was cut off by a rectangular cutting tool, and the pubic symphysis and the left lower limb were preserved; the two preserved images were spliced into a full-length image of both lower limbs through the common part of the pubic symphysis. The theoretical exposure times were included in group B. Finally, the quality of the spliced images (with and without splicing misalignment artifacts) and the exposure times were compared between the two groups.

Results: After the original images of all patients were re-spliced, 35 full-length images in group A still had splicing misalignment artifacts, while all images in group B had no splicing misalignment artifacts, and the image quality scores of group B were significantly higher than those of group A ($\chi^2=34.323$, $P<0.001$). There was a statistical difference in the exposure times between the two groups ($\chi^2=14.233$, $P<0.05$), the radiation doses in group B were lower than that in group A (total exposure times in group A were 131, and total exposure times in group B were 108), and the radiation doses were reduced by about 17.6%.

Conclusions: Splicing and cutting the original image many times can help improve image quality and reduce radiation doses in DR full-length photography of both lower extremities.

PO-2244

The Discriminatory Potential of Multiparametric Spectral CT in Distinguishing Bone Islands from Osteoblastic Metastases

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Objective To investigate the diagnostic and differential diagnostic value of multi-parameter imaging based on DLCT in osteoid osteoma and osteoblastic metastases is the aim of this study.

Methods This retrospective study collected 80 patients (42 males and 38 females) who underwent a DLCT chest or abdominal plain scan with contrast-enhanced scan, image evaluation was performed only on the plain phase. Record the total CT dose index (DLP), dose length product (CTDI) and effective radiation dose (ED) of both the plain scan and multi-phase contrast-enhanced scan phases. Spectral data were post-processed to obtain conventional images (CI), effective atomic number (Z-eff) and electron density (DE) maps, and the slope of the X-ray attenuation curve (λ HU), which were then measured. Differences in various spectral quantitative parameters between bone islands (BIs) and osteoblastic metastases (OBMs) were evaluated by t-test. Single-factor logistic regression was used to evaluate the predictive probability of spectral multi-parameters for bone islands and osteoblastic metastases, and a spectral multi-parameter joint model was established. The receiver operating characteristic curves (ROC) and area under the curve (AUC) were used to evaluate the diagnostic efficacy of the spectral multi-parameter joint model and each parameter in bone islands and osteoblastic metastases.

Results There were significant differences in conventional CT value, Z-eff, ED, and λ HU between the BIs and OBMs groups, and all of them could effectively distinguish BIs from OBMs ($P<0.001$). The spectral multi-parameter joint model had the highest discriminative power for differentiating BIs from OBMs (AUC=0.931), while conventional CT value (AUC=0.92) and each spectral parameter (Z-eff: AUC=0.888; ED: AUC=0.84; λ HU: AUC=0.888) also showed good independent predictive

performance. Compared to multiphase contrast-enhanced scans (DPL: CTDI: ED:), the radiation dose during the plain phase is significantly reduced (DPL: CTDI: ED:).

Conclusions The spectral multi-parameter joint model obtained solely during the plain phase has a higher discriminative diagnostic value for differentiating bone islands from osteoblastic metastases compared to conventional CT value and each spectral parameter, and can significantly reduce patient radiation exposure. This provides more imaging support for the clinical early diagnosis, treatment strategy formulation, and prognosis prediction of osteoblastic metastases.

PO-2245

Value-added Opportunistic Chest CT Screening for Osteoporosis using Bone Mineral Density Estimation Computed by Multi-View Semi-Supervised Learning

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Objectives To evaluate the value of bone mineral density estimation computed by multi-view semi-supervised learning on chest CT for opportunistic osteoporosis screening.

Methods Patients who underwent chest CT for lung cancer screening and received dual-energy X-ray absorptiometry (DXA) during the same period in our general medical department from October 2018 to October 2019 were collected. After excluding scans with low quality, metal implants and bone fractures, a total of 1295 patients were included. The patients were divided into three groups: normal group, osteopenia group and osteoporosis group based on bone mineral density measured by DXA. And a new proposed indicator—bone mineral density estimation of all thoracic vertebrae and the first lumbar vertebra were automatically computed by multi-view semi-supervised learning on chest CT images. The differences of bone mineral density estimation were compared between the three groups. The correlation between bone mineral density estimation and T values of the first lumbar vertebra was analyzed, and the diagnostic efficacy for distinguishing osteopenia and osteoporosis from normal group were also evaluated.

Results The bone mineral density estimation of thoracic and first lumbar vertebrae was significantly different among three groups and between any two groups ($P < 0.001$), and decreased successively in normal group, osteopenia group and osteoporosis group. The bone mineral density estimation of thoracic vertebrae and the first lumbar vertebrae were positively correlated with T values of the first lumbar vertebrae ($R = 0.58-0.77$, $P < 0.01$), and bone mineral density estimation of first lumbar vertebrae had the strongest correlation with the T values of first lumbar vertebrae ($R = 0.77$). The bone mineral density estimation of thoracic vertebrae and the first lumbar vertebrae had high diagnostic efficacy for distinguishing osteopenia and osteoporosis from normal group ($AUC = 0.777-0.824$).

Conclusions The bone mineral density estimation of thoracic and first lumbar vertebrae, which computed by multi-view semi-supervised learning on chest CT, is of great value in the opportunistic screening of osteopenia and osteoporosis.

PO-2246

Combined radiomics-radiologic model to predict acute and chronic Osteoporotic Vertebral Compression Fractures on CT

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【Purpose】The purpose of this study was to differentiate acute osteoporotic compression fractures of the spine by use of radiomics-radiologic model.

【Method】Preoperative Unenhanced CT and MR data of 54 patients with Osteoporotic Vertebral Compression Fractures. On CT image, seven features (presence of cortical or endplate fracture line, presence of trabecular fracture line, presence of condensation band, pneumatosis, cloudy high density, Paravertebral soft tissue swelling and Fracture level) were analyzed. MaZda 4.7 software was used to manually draw the maximum ROIs along inner edge of bone cortex at midsagittal image CT, avoiding the effects of bone cortex and pneumatosis. The radiologic model、the radiomics model、the combined radiomics-radiologic model was constructed respectively by integrating significant clinical parameters with radiomics score using multivariate logistic regression analysis.

【Result】: A total to 155 fractures (55 acute, 45 chronic and 55 normal) and 67 fractures (23 acute, 20 chronic and 24 normal) were included in the training and test cohorts, respectively. The AUC of the radiologic model was 0.907 in the training and 0.841 in the test cohorts. The AUC of the radiomics model was 0.886 in the training and 0.825 in the test cohorts. The AUC of the Combined model was 0.909 in the training and 0.870 in the test cohorts.

【Conclusion】: The radiologic models had better diagnostic value than radiomics models in differentiating acute and chronic osteoporotic compression fractures on CT, the combining radiomics –radiologic model improved performance.

PO-2247

Analysis of the use of MRI and CT in the diagnosis of SAPHO syndrome

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Purpose: To investigate the relationship between the duration of disease and sternal stalk hypertrophy in patients with synovitis-acne-pustulosis-hyperostosis-osteitis (SAPHO) syndrome. Analysis The imaging presentation and distribution of lesion involvement in SAPHO syndrome.

Methods: Retrospective analysis of our hospital Clinical data and imaging data of 24 patients with SAPHO syndrome diagnosed from January 2020 to September 2022, CT and MRI were performed in all 24 patients to analyze their imaging characteristics. The patients' disease duration was divided into ≤ 5 years and > 5 years into 14 and 10 cases, and the sternal stalk was measured on chest CT images to compare the relationship between the duration of the disease and sternal stalk hypertrophy.

Results: The sites of involvement in 24 patients included the anterior chest wall, spine, sacroiliac joints and peripheral osteoarthritis. The rate of osteosclerosis and bone erosion lesions in the anterior chest wall was higher than that in the spine, and the difference was statistically significant ($P < 0.05$, $P = 0.017$, $P = 0.030$), and the rate of fat deposition lesions in the spine was higher than that in the anterior chest wall and sacroiliac joints, and the difference was statistically significant ($P < 0.05$, $P = 0.001$, $P = 0.017$). Patients with a disease duration of > 5 years had higher rates of sternal stalk thickness and sternoclavicular joint involvement than those with a disease duration of ≤ 5 years, and the difference was statistically significant ($P < 0.05$, $P = 0.023$, $P = 0.041$). The correlation between changes in sternal stem width ($r^2=0.003$, $P=0.815$) and sternal stem thickness ($r^2=0.035$, $P=0.379$) and the course of the disease is poor.

Conclusion: The types of lesions in SAPHO syndrome are complex, with osteosclerotic and bony erosive lesions being more prevalent in the anterior chest wall and fat deposition lesions being more common in the spine. A long course of the disease is more likely to lead to a change of sternal

stalk thickness, and the involvement of the sternoclavicular joint may be a sign of a long course of disease.

PO-2248

The value of MRI in assessing structural changes in the spine in SAPHO syndrome

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Purpose: To assess the MRI manifestations of SAPHO syndrome involving the spine and to study the correlation between the duration of bone pain and the number of segments and lesions involved in the spine of SAPHO syndrome.

Methods: Clinical and MRI data of 43 patients with SAPHO syndrome were retrospectively analyzed. (1) Clinical features and spinal MRI characteristics of SAPHO syndrome were comprehensively summarized and statistically assessed. (2) The degree of spinal involvement in each patient was assessed by MRI to quantify the number of segments involved and the total number of lesions, and linear regression analysis was used to explore the correlation between the duration of bone pain and the number of spinal segments and the total number of lesions involved.

Results: The 43 patients included in the study were 32 females and 11 males, with a mean age of (38.1 ± 10.7) years. The average duration of bone pain was (36.3 ± 68.8) months. The spinal lesions of SAPHO syndrome mainly involved the thoracic and lumbar segments, which accounted for 40.1% and 40.8% of the spinal lesions, respectively, and the difference was statistically significant compared with that of the cervical segments ($P < 0.001$). The cervical, thoracic, and lumbar spine were predominantly involved in the vertebral angle ($P < 0.001$). MRI manifestations mainly included bone marrow edema, fat deposition, osteosclerosis, and bone erosion, among which fat deposition was more common, accounting for 51.7% (109/211) of the total number of lesions. The number of involved segments ($r^2 = 0.008$, $P = 0.343$) and the total number of involved lesions ($r^2 = 0.076$, $P = 0.073$) correlated poorly with the course of bone pain.

Conclusion: Spinal involvement in SAPHO syndrome is dominated by fat deposits in the vertebral horns, and the distribution of involvement is somewhat characteristic. There was no clear relationship between the number of spinal segments involved and the total number of lesions involved and the duration of bone pain.

PO-2249

Chronic Ankle Instability: A Cadaveric Anatomical and 3D High-Resolution MRI Study for Surgical Reconstruction Procedures

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Abstract

Objectives: To quantitatively investigate the anatomy of the anterior talofibular ligament (ATFL) and calcaneofibular ligament (CFL) for surgical reconstruction procedures in chronic ankle instability.

Materials and Methods: 3D MRI were performed on five fresh-frozen cadaveric ankles with six different spatial resolutions (0.3×0.3×0.3mm³, 0.45×0.45×0.45mm³, 0.6×0.6×0.6mm³, 0.75×0.75×0.75mm³, 0.9×0.9×0.9mm³, 1.05×1.05×1.05mm³). Resolution of 0.45×0.45×0.45mm³ was performed on 24 healthy volunteers on bilateral ankles. Classification of the ATFL and the four distances of surgically relevant bony landmarks were analyzed (distance 1 and 3, the fibular origin of the ATFL and CFL to the tip of fibula, respectively; distance 2, the talar insertion of the ATFL to the bare zone of talus; distance 4, the calcaneal insertion of the CFL to the peroneal tubercle).

Results: In subjective evaluation, the interobserver ICC was 0.95 [95% confidence interval(CI):0.94-0.97] between two readers. The spatial resolution of 0.3×0.3×0.3mm³ and 0.45×0.45×0.45mm³ received highest subjective score on average and demonstrated highest consistency with autopsy measurements in objective evaluation. Regarding the measurements on the 48 volunteer ankles, distance 1 in type I and II were 12.65±2.08 mm, 13.43±2.06 mm (superior-banded in Type II) and 7.69±2.56 mm (inferior-banded in Type II) (means ± SD), respectively. Distance 2 in type I and II were 10.90±2.24 mm, 11.07±2.66 mm (superior-banded in Type II), and 18.44±3.28 mm (inferior-banded in Type II), respectively. Distance 3 and 4 were 4.71±1.04 mm and 14.35±2.22 mm, respectively.

Conclusion: The feasibility of quantifying the distances for surgery of the lateral ankle ligaments using high-resolution 3D MRI. High-resolution 3D MRI provides a potential tool assisting surgeons in formulating operation plan before operation.

PO-2250

Sex-specific Body Composition Profile Determined by Pelvic Computed Tomography Associated with Mortality in Older Patients with Hip Fracture

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AbstractObjective: To investigate the sex-specific associations between body composition profile and mortality in older patients undergoing hip fracture surgery.

Materials and methods: This retrospective cohort study was conducted among consecutive older patients (aged ≥ 60 years) with hip fracture who were treated with surgery between June 1, 2017, and November 30, 2020. The cross-sectional area and attenuation of the skeletal muscle, subcutaneous adipose tissue, and intermuscular adipose tissue at the upper thigh level on preoperative pelvic computed tomography (CT) were measured. The association between body composition and mortality was determined using Cox proportional hazards analysis stratified by sex.

Results: Of 488 patients included in this study, the median age was 77.0 years, and 312 (63.9%) were female. A total of 89 (18.2%) patients died within 1 year after surgery. Female patients had greater subcutaneous adipose tissue area (SATA), whereas skeletal muscle area (SMA) was higher in males (both $P < 0.001$). In the sex-stratified multivariable analyses, SATA in females (per 10 cm² increase; hazard ratio [HR] 0.92; 95% CI, 0.86~0.97; $P = 0.003$) and SMA in males (per 10 cm² increase; HR 0.93; 95% CI, 0.86~1.00; $P = 0.05$) were significant predictors of 1-year mortality. Mediation analysis revealed that SATA mediated an estimated 40.8% (95% CI, 13.3%~96.0%; $P = 0.002$) of the sex gap in 1-year mortality. Incorporating SATA or SMA within the existing Nottingham Hip Fracture Score (NHFS) demonstrated improved performance predicts mortality in males. Low subcutaneous adiposity may represent the depletion of energy storage and result in unfavorable clinical outcomes or predicting 1-year mortality among females (area under the curve [AUC], 0.70 vs 0.64, $P = 0.11$) or males (AUC, 0.76 vs 0.71, $P = 0.06$), respectively.

Conclusion: Reduced subcutaneous adiposity is associated with mortality in older females undergoing hip fracture surgery while reduced muscle mass predicts mortality in males. Low subcutaneous adiposity may represent the depletion of energy storage and result in unfavorable clinical outcomes.

PO-2251

Differential Diagnosis of Osteogenic Metastatic and Bone Island with Multiparameter Spectral CT Enhanced Imaging

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Purpose: This study aims to explore the differential diagnostic value of Spectral Based Image enhanced imaging in osteogenic metastatic and bone islands

Method: this study retrospectively included a total of 104 tumor patients who underwent enhanced spectral CT examination from December 2022 to April 2023. Combined with clinical and imaging data, they were diagnosed with osteogenic metastatic or bone islands during followed-up, including 53 osteogenic metastatic lesions and 5 bone island patients. A Philips post-processing workstation was used to reconstruct the spectral data and measure the Regular CT value (rCT), Virtual monochromatic imaging (VMI) 40KeV / 100KeV CT value, Iodine Density maps (ID), Effective atomic number maps (Z-eff), Electron Density (ED) and Standard deviation (SD) of each lesion in the arteriovenous phase, Slope of the spectral curve (Δ HU) and the Standard Deviation (SD value) of various spectral parameters. The difference between osteogenic metastatic and bone islands in various spectral parameters was evaluated using an independent sample t-test. Using univariate logistic regression to evaluate the discrimination probability of the two and combining ID value, ED value, Z-eff value, VMI 40/100 KeV CT value to establish a spectral multi-parameter joint model. Draw Receiver operating characteristic (ROC) curve and calculate area under curve (AUC) and Cutoff value to evaluate the differential diagnostic efficacy of each parameter for osteogenic metastatic and bone islands.

Result: Except for the arterial phase SDZ off value, the differences in all parameters were statistically significant ($P < 0.05$). The ROC curves were plotted for each spectral parameter (ID, ED, Z-off, VMI 40keV, VMI 100keV) in the arterial and venous phases, with AUC less than 0.9; The AUC of the multi-parameter joint model for arterial and venous phases were 0.914 and 0.908, respectively. The joint model of multiple parameters in the arterial and venous phase spectra (ID, ED, Z-eff, VMI 40KeV, 100KeV) has the best diagnostic performance of AUC=0.953 (sensitivity=96%, specificity=94.2%), which is superior to the arterial/venous phase energy images (arterial phase AUC rCT=0.918, cutoff=872.2HU, static Pulse period AUC=0.904, cutoff=824.5HU).

Conclusion: Compared to conventional CT ,the application of spectral CT multi-parameter combined model has the best predictive performance in the differentiation of osteogenic metastatic and bone islands , providing more imaging information for early diagnosis and differential diagnosis of the two.

PO-2252

CT-based intratumoral and peritumoral radiomics for predicting prognosis in osteosarcoma: a multicenter study

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Purpose: To evaluate the performance of CT-based intratumoral, peritumoral and combined radiomics signatures in predicting prognosis in patients with osteosarcoma.

Methods: The data of 202 patients (training cohort:102, testing cohort:100) with osteosarcoma admitted to the two hospitals from August 2008 to February 2022 were retrospectively analyzed. Progression free survival (PFS) and overall survival (OS) were used as the end points. The radiomics features were extracted from CT images, three radiomics signatures (RS intratumoral, RS peritumoral, RS combined) were constructed based on intratumoral, peritumoral and combined radiomics features, respectively, and the radiomics score (Rad-score) were calculated. Kaplan-Meier survival analysis was used to evaluate the relationship between the Rad-score with PFS and OS, the Harrell's concordance index (C-index) was used to evaluate the predictive performance of the radiomics signatures.

Results: The median follow-up time of 202 patients with osteosarcoma was 45 months (range: 3-170 months). The disease progression rate was 38.61% (78/202), and the median PFS was 7 months (interquartile range, 4-12 months) for patients with progression, and 34 months (interquartile range, 17-66 months) for patients without progression. The median OS was 32 months (interquartile range, 17-52 months). The 1 - year, 3 - year and 5-year survival rate was 90.10%, 56.44% and 42.57%, respectively. For the construction of radiomics prediction signature, 8, 6 and 21 features were selected to construct RS intratumoral, RS peritumoral, and RS combined, respectively. Kaplan-Meier survival analysis confirmed that the Rad-scores of the three RSs were significantly correlated with the PFS and OS of patients with osteosarcoma. Among the three radiomics signatures, RS combined had better predictive performance, the C-index of PFS prediction was 0.833 in the training cohort and 0.814 in the testing cohort, the C-index of OS prediction was 0.796 in the training cohort and 0.764 in the testing cohort.

Conclusions: CT-based intratumoral, peritumoral and combined radiomics signatures have excellent performance in predicting the prognosis of patients with osteosarcoma, which can help to guide the individualized treatment and improve the prognosis of patients with osteosarcoma.

PO-2253

Hip muscle size and density are associated with trochanteric fractures of elderly women

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Purpose We aimed to investigate the differences in hip muscle area and density between older patients with femoral neck (FNF) and trochanteric fractures (TRF).

Methods A total of 554 older women patients were enrolled, including 314 FNF (77.02 ± 7.15 years) and 240 TRF (79.70 ± 6.91 years) for the comparisons. The area and density of the gluteus medius and minimus muscle (G.Med/MinM) and the gluteus maximus muscle (G.MaxM) were measured by CT. Total hip (TH) areal bone mineral density (aBMD) and femoral neck aBMD (FNaBMD) were measured by quantitative CT. A cutoff of 80 years was used to stratify the cohort and to further explore the age-specific relationship.

Results For the total subjects, all these muscle parameters were higher in the FNF group than in the TRF group ($p < 0.001$). The muscle parameters except for the G.Med/MinM density were significantly correlated with hip fracture typing after adjustment for age, BMI, and THaBMD. In the age ≥ 80 group, no statistically significant correlation was found between all hip muscle parameters and fracture types. In contrast, in the age < 80 group, interestingly, after adjustment of age, BMI, and THaBMD, the associations between G.MaxM density, G.MaxM area, G.Med/MinM density, and G.Med/MinM area and fracture type were all statistically significant.

Conclusions Our results indicate that in older women, especially under 80 years of age, gluteus muscle parameters are related to trochanteric fractures.

PO-2254

Prevalence and risk factors of osteoporosis in Chinese inpatients with major depressive disorder — a cross-sectional study based on quantitative CT

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Objective The relationship between major depression disorder (MDD) and osteoporosis remains controversial. We aimed to report the prevalence of osteoporosis in inpatients with MDD in China and explore the risk factors for osteoporosis in MDD patients.

Methods 306 inpatients with MDD and 604 healthy physical examination people were included in this study. The lumbar bone mineral density (BMD) of the study subjects was measured by quantitative CT. BMD < 80 and 80 to 120 mg/cm³ were used to define osteoporosis and osteopenia, respectively. 274 pairs were matched according to age and sex between the patient group and the control group for case-control analysis. Intergroup difference analysis and binary logistic regression were used.

Results The prevalence of osteoporosis in MDD patients was 23.9% (95% CI: 19.1%-28.7%). 2) the risk of osteoporosis in the MDD group was higher than that in the control group even after adjustment for age, sex, and BMI. 3) the patients in the low BMD group (BMD < 120 mg/cm³) were older and had a lower education level, a more significant proportion of the Han population, and a more significant proportion with a history of hypertension than the normal BMD group. However, there were no statistically significant differences in gender distribution, average disease duration, the proportion of smokers, diabetes, and hyperlipidemia between the two groups.

Conclusions The prevalence of osteoporosis in inpatients with MDD in China was higher than that of healthy people; MDD may be a risk factor for osteoporosis; The decrease of BMD in MDD patients is related to aging, low education level, and hypertension.

PO-2255

Fusion with or without fixation in combined posterior laminoplasty and anterior discectomy for multilevel cervical spondylotic myelopathy with a single prominent disc herniation

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Objective For multilevel cervical spondylotic myelopathy (MCSM) with severe ventral compression, a combined posterior-anterior surgical approach might be indicated. In MCSM cases with single-level severe ventral compression, anterior cervical interbody fusion with or without plate could be chosen. We aimed to compare the clinical and radiological results between these two surgical methods, namely fusion with standalone cage (SC), and cage with plate (CP) after laminoplasty.

Methods Between 2012 and 2013, a total of 81 consecutive patients with MCSM were treated with combined posterior-anterior surgery (SC group, $n = 23$; CP group, $n = 58$). Outcome measures included modified Japanese Orthopedic Assessment scale (mJOA), the neck disability index (NDI), visual analog scale (VAS), fusion rate, cage subsidence, Swallowing-Quality of Life Questionnaire (SWAL-QOL), blood loss, and operative time. All patients had follow-up at regular intervals of 3, 6, 12 and 24 months after surgery.

Results The final follow-up rate was 93.8% (76/81). There were no significant differences between the two groups with respect to age, sex, baseline characteristics, operative time, and blood loss ($p > 0.05$). There were no significant differences between the two groups in the recovery of mJOA, NDI, or VAS during the follow-up period. There was a significant difference in the SWAL-QOL score at 3-month follow-up ($p = 0.017$), though not at later follow-up. All cases achieved bony fusion without screw loosening, subsidence or displacement at the final follow-up.

Conclusions Patients with stand-alone cages showed similar clinical and radiological outcomes as those with cages and plates in the combined posterior-anterior surgery for MCSM with severe single level ventral compression. Anterior fusion with standalone cage might reduce the incidence of dysphagia in the early postoperative period with similar fusion rates.

PO-2256

Differentiation of abdominal extra-abdominal desmoid-type and nodular fasciitis based on conventional MRI signs and quantitative segmentation methods

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Objective: Explore the application value of MRI routine signs and quantitative segmentation and measurement of tumor tissue based on ImageJ software in the differential diagnosis of extra-abdominal desmoid-type fibromatoses and nodular fasciitis.

Methods: This study retrospectively analyzes the MRI images of 30 patients with extra-abdominal desmoid-type fibromatoses and 14 cases of nodular fasciitis confirmed by pathology. The imageJ software is used to segment the image, calculate the tumor volume, the range of edema and other values, and combine conventional imaging signs and clinical characteristics to make a differential diagnosis of the diseases.

Results: There was no statistically significant difference in age, gender, tumor growth site, morphology, boundary, presence or absence of capsule, T1WI circular target sign, fat fissure sign, fascial tail sign, and peritumoral edema between the two groups. There were statistically significant differences between the two groups in terms of whether it crossed the muscle cavity, the ratio of length to diameter, whether the edge was smooth, and whether the edema boundary was clear ($P < 0.05$). There was no statistical difference in the percentage of peritumoral edema in volume between the two groups based on ImageJ software for tissue segmentation measurement of tumor bodies; The proportion of low signal to volume on T2WI showed statistical differences between the two groups and had the highest diagnostic efficacy ($AUC = 0.840$), with sensitivity and specificity of 0.633 and 0.929, respectively.

Conclusion: The imaging manifestations in conventional sequences and the quantitative segmentation measurement method of tumor tissue based on ImageJ software are helpful for the differential diagnosis of the two. Among them, whether it crosses the muscle cavity, whether the edge is smooth, the ratio of length to diameter, whether the edema boundary is clear, and the percentage of low signal to volume on T2WI have important diagnostic value.

PO-2257

Solitary sacral osteochondroma growing into the spinal canal: Case report and review of the literature **Running title: Solitary sacral osteochondroma**

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Background

Osteochondroma is one of the most common benign bone tumors, mainly involving the bone ends of long bones, and involving the spine is rare. It often involves the competing, followed by the thoracic and lumbar spine, and rarely involves the sacrum, accounting for approximately 0.5%. About 90.9% of previously reported (2005 – 2022) sacral chondromas involved had neurological symptoms.

Case presentation

A 37-year-old woman presented with progressive low back pain associated with left buttock pain and discomfort for 1 month, marked soft tissue tenderness on the left side of the L5-S1 spinous process and spinous process, negative vertebral percussion pain, and radiating soreness on the left buttock. CT showed a bony mass growing into the spinal canal in the left lamina of S1, resulting in compressive bone resorption of the L5 vertebral body and stenosis of the left foramen. MRI showed that the mass was similar to the bone signal, no significant abnormal enhancement was observed on enhancement, the left intervertebral foramen was narrowed, and the left nerve root was compressed, edematous, and enhanced. Radiological diagnosis revealed osteochondroma of the left lamina of S1. Postoperative pathological diagnosis of osteochondroma.

Conclusion

This is the 11th solitary osteochondroma of the sacrum reported so far, and the first osteochondroma arising from the left lamina of S1, with radicular symptoms, and the lesion was removed en bloc and the symptoms were relieved after surgery.

PO-2258

Correlation between Skeletal Muscle Changes and Insulin Resistance and Islet β Cell Function in Type 2 Diabetes Mellitus Evaluated Using MRI

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Background: Skeletal muscle changes are associated with insulin resistance and islet β cell function and other markers of type 2 diabetes mellitus (T2DM) related glycolipid metabolism. MRI sequences including diffusion-tensor imaging (DTI) and mQixon-quant may enable to detect muscle abnormalities related to type 2 diabetes mellitus.

Purpose: To explore MRI characteristics and potential indicators of skeletal muscles in evaluation of patients with T2DM.

Materials and Methods: Seventeen male patients with newly diagnosed T2DM and 17 healthy volunteers were enrolled in this prospective study from November 2021 to November 2022. The general condition and blood indexes of these two groups were recorded and insulin resistance index (HOMA-IR) and insulin secretion (HOMA- β) were calculated. The skeletal muscles of lower extremity and lumbar were scanned using 3.0T MR Scanner. The contents of intermuscular adipose tissue (IMAT) and intramuscular fat (intraMF) in left thigh and lumbar muscles, as well as the FA and ADC values of skeletal muscle fibers, were obtained. ROC curve was used to analyze the cut-off value and diagnostic efficacy. Independent sample t test and population correlation analysis were used to perform statistical analysis.

Results: There were significant differences for the IMAT value of left thigh, the FF of psoas major muscle, the FF of quadratus lumborum muscle, the FF of autochthonous back muscles and the mean FF of lumbar muscles between experimental group and control group ($p < 0.05$). There were no significant differences for MRI parameters in other skeletal muscles between two groups ($p > 0.05$). Moreover, the sensitivity and specificity for the diagnosis of T2DM were 82.4% and 81.2% with the cut-off value as proportion of 8.995% for the IMAT. The sensitivity and specificity for the diagnosis of T2DM were 64.7% and 81.2% with the cut-off value 4.835% for FF of psoas major muscle, while 88.2% and 62.5% with 3.010%, respectively. The sensitivity and specificity for the diagnosis of T2DM were 64.7% and 87.5% with cut-off value of 12.490% for FF of autochthonous back muscles. And the sensitivity and specificity for the diagnosis of T2DM were 70.6% and 81.2% with cut-off value 7.025% for mean FF of lumbar muscles. Thirdly, the area under the curve (AUC) of IMAT of left thigh, FF of psoas major muscle, FF of quadratus lumborum muscle, FF of autochthonous back muscles and mean FF of lumbar muscles for the diagnosis of T2DM were 0.842, 0.765, 0.750, 0.765 and 0.776, respectively. Lastly, the IMAT of left thigh, FF of psoas major muscle, FF of quadratus lumborum muscle, FF of autochthonous back muscles and mean FF of lumbar skeletal muscle were correlated with fasting blood glucose. The FF of psoas major muscle is correlated with HbA1c. The IMAT of left thigh, FF of quadratus lumborum muscle, FF of autochthonous back muscles and mean FF of lumbar muscles were correlated with HOMA-IR. The FF of psoas major muscle, autochthonous back muscles and mean FF of lumbar muscles were correlated with HOMA- β . And the IMAT of left thigh, FF of psoas major muscle, FF of quadratus lumborum muscle and mean FF of lumbar muscles were correlated with high density lipoprotein.

Conclusions: The contents of intraMF of lumbar skeletal muscle and IMAT of left thigh are correlated with insulin resistance in male patients with newly diagnosed T2DM. There is a potential value for mDixon-Quant sequence in evaluating skeletal muscle changes and predicting β cell function conditions.

PO-2259

Quantification of Volumetric Thigh and Paravertebral Muscle Fat Content: Comparison of Q-Dixon MRI with High-Speed T2-Corrected Multiecho MR Spectroscopy

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Objective To validate the water-fat separation-based method Q-Dixon MRI against the HISTO MRS reference standard for quantifying the volumetric fat content in thigh and paravertebral muscles.

Materials and Methods This retrospective study involved 54 subjects (60.2 ± 14.2 years; 38 men) for thigh muscles and 56 subjects (mean age, 50.0 ± 15.3 years; 22 men) for paravertebral muscles, employing 6-point Q-Dixon MRI, HISTO MRS, and conventional T1-weighted sequence. Quantitative parameter proton density fat fraction (PDFF) was measured with Q-Dixon MRI and HISTO MRS respectively within upper-middle part of the left quadriceps femoris and at the level of L4/L5 vertebrae in the paravertebral muscles in a small voxel. On Q-Dixon, the volumetric PDFF from the freehand delineation of the quadriceps or paravertebral muscles was also measured. The weighted Cohen's kappa coefficient, Intraclass correlation coefficient (ICC), Bland-Altman plots, Spearman correlation coefficients and Wilcoxon signed rank test with Bonferroni correction were used to assess agreement between observers and methods.

Results Q-Dixon PDFF exhibited excellent inter- and intra-observer agreement (ICC = 0.927, 0.932). Q-Dixon PDFF correlated positively with HISTO PDFF ($r = 0.98$, $p < 0.001$) across 110 small voxels, with average differences of 0.12% insignificantly ($p = 0.35$). The average differences were 0.04% for thigh and 0.19% for paravertebral muscles, both statistically insignificant ($p = 0.82$, 0.29, respectively). PDFF values from small voxels in Q-Dixon and HISTO significantly differed from the volumetric PDFF obtained via freehand delineation on Q-Dixon (all $p < 0.001$).

Conclusion Volumetric PDFF using Q-Dixon MRI exhibited good correlation and consistency with HISTO MRS for quantitative fat assessment in thigh and paravertebral muscles, and the freehand segmentation of volumetric Q-Dixon PDFF offers a more comprehensive reflection of actual MFI compared to small voxel PDFF.

PO-2260

A Correlative Study of Monosodium Urate Crystal Volume Measured by Dual-energy CT and Gout-related Hematological Indicators.

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Abstracts

Purpose

Monosodium urate (MSU) crystals deposition is the central pathological feature of gout. However, the clinical significance of the MSU crystal volume quantification by dual energy computed tomography (DECT) is rarely discussed, especially its relationship with hematologic indicators. The purpose of this study was to evaluate the correlation between the hematological indicators and the volume of MSU crystals detected by DECT, and to further explore the influencing factors of MSU crystals deposition in the first metatarsophalangeal (MTP) joint.

Materials and Methods

This retrospective study included 680 patients who underwent hematologic examinations and DECT scans of hands, knees, and feet bilaterally between January 2017 and September 2022. MSU deposits were visualized and color-coded and volume measurement were performed automatically by a Siemens MultiModality Workspace workstation with Syngo Via VB40 (Figure 1A). Hematological indicators included serum uric acid (SUA), glomerular filtration rate (GFR), serum creatinine (Scr), and erythrocyte sedimentation rate (ESR). Pearson correlation test was used to assess the association between MSU crystal volume and laboratory indicators. All tests were two tailed and $p < 0.05$ was considered as statistically significant.

Results

There was a weak correlation between the laboratory indicators including GFR, Scr ESR and CRP and the volume of MSU crystals in patients without intervention (correlation coefficients were all around 0.15) (Figure 1B). Univariate logistic regression showed that age and duration were all significant predictive factors of the deposition of MSU in the first MTP. In multivariable analysis, duration [OR: 1.122 (confidence intervals, CIs: 1.049–1.200), $p = 0.001$] and ESR [OR: 0.987 (0.976–0.998), $p = 0.024$] were independent predictive factors of the deposition of MSU in the first MTP. No other variable was predictive of the deposition of MSU in the first MTP, including laboratory indicators.

Conclusion

The volume of MSU crystals could reflect GFR, Scr, ESR and CRP levels effectively. A longer duration of disease is a independent predictive factor for the occurrence of MSU crystals in the first MTP joint. In this study, it could not be considered that hematological indicators have a definite influence on the MSU deposition of the first MTP joint.

PO-2261

Implementation of a Novel Classification and Stratification System for Solitary Bone Tumor: Osseous Tumor Radiological and Interpretation and Management System (OT-RIMS)

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Purpose: A streamlined and practical imaging classification system of bone tumors oriented by tumor biological behavior and patient treatment urgently needs to be developed, emphasizing the correlation of key radiological features with histological grades and patient management. To propose a histological-grades-based Osseous Tumor Radiological Interpretation and Management System (OT-RIMS) for bone tumor patients that would streamline the radiological evaluation of bone tumors and consolidate key radiological features into ordinal severity categories that would inform corresponding patient management actions and that could be used as a clinical decision support tool.

Materials and Methods: This retrospective study between January 2015 and August 2022 evaluated consecutive patients with solitary bone tumors confirmed by pathology and imaging follow-up received two or three imaging modalities of radiographs, CT, or MRI. Three radiologists independently assessed the radiological features, categorized bone lesions based on the OT-RIMS criteria, and reached a consensus. Kappa statistics and observed agreement were calculated.

Results: A total of 341 patients (182 men and 159 women; mean age, 26.0 years [interquartile range, 16.0–44.5 years]) were included, with 102 malignant, 177 benign, and 62 intermediate or low-grade malignant bone lesions. The overall sensitivity and specificity of OT-RIMS for categorizing solitary malignant bone tumors accurately as OT-RIMS 4 for three readers were as follows: 93.1% (95 of 102) and 93.3% (223 of 239) for reader 1, 96.1% (98 of 102) and 91.6% (219

of 239) for reader 2, 92.2% (94 of 102) and 89.5% (214 of 239) for reader 3, respectively. Inter-reader agreement of the OT-RIMS category for three readers was considered excellent (Kendall's $W=0.924$, $p<0.001$) with a kappa value of reproducibility in category 1&2, 3, and 4 of 0.764, 0.528, and 0.930, respectively.

Conclusion: The OT-RIMS category demonstrated excellent reproducibility regardless of the reader's expertise level in categorizing the risk stratification of bone tumors and informing patient management, with histological grades used as the reference standard.

PO-2262

Prediction of Arthroscopic Meniscopectomy or Meniscectomy for a Torn Discoid Meniscus: Using Conventional Magnetic Resonance Imaging and Quantitative T2-Mapping

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Objective. To predict discoid meniscal meniscopectomy or meniscectomy using conventional magnetic resonance imaging (MRI) and quantitative T2-mapping.

Methods. We retrospectively studied 69 patients who underwent arthroscopic meniscopectomy or total meniscectomy between February 2021 and May 2023. The patients underwent 3.0 T MRI and quantitative T2-mapping examinations. Six independent orthopedic surgeons prospectively reviewed all MRI images and provided predictions for each discoid meniscal treatment. Finally, all patients underwent arthroscopy by a single surgeon with 20 years' arthroscopy experience.

Results. There is no obvious difference in the morphology of the discoid meniscus between the two operations ($P = 0.473$). Tear type ($P = 0.002$), zone of the tear ($P < 0.001$), length of tear ($P = 0.002$) and width of tear ($P = 0.001$) are significantly different in two treatments. For the anterior and posterior part of discoid meniscus, T2 values of the meniscopectomy group were significantly lower than those of the meniscectomy group ($P < 0.001$ and $P < 0.001$). For the middle part, T2 values did not significantly differ between the groups ($P = 0.103$). The group with above 5 years' experience was good for differentiating two surgical treatments (k -value = 0.737). Orthopedic surgeons with more than 5 years of experience have higher consistency than those with less than 5 years of experience. (agreement: 87.0%, 72.5%, respectively).

Conclusions. The combined use of conventional MRI and quantitative T2-mapping techniques will help orthopaedists develop a more accurate operation for patients with discoid meniscus. Surgeon's experience level will influence the prediction of surgical treatment.

PO-2263

Deep learning-based artificial intelligence model for classification of vertebral compression fractures: A multicenter diagnostic study

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Objective: To develop and validate an artificial intelligence diagnostic system based on X-ray imaging data for diagnosing vertebral compression fractures (VCFs) **Methods:** In total, 1904 patients who underwent X-ray at four independent hospitals were retrospectively (n=1847) and prospectively (n=57) enrolled. The participants were separated into a development cohort, a prospective test cohort and three external test cohorts. The proposed model used a transfer learning method based on the ResNet-18 architecture. The diagnostic performance of the model was evaluated using receiver operating characteristic curve (ROC) analysis and validated using a prospective validation set and three external sets. The performance of the model was compared with three degrees of musculoskeletal expertise: expert, competent, and trainee. **Results:** The diagnostic accuracy for identifying compression fractures was 0.850 in the testing set, 0.829 in the prospective set, and ranged from 0.757 to 0.832 in the three external validation sets. In the human and deep learning (DL) collaboration dataset, the area under the ROC curves(AUCs) in acute, chronic, and pathological compression fractures were as follows: 0.780, 0.809, 0.734 for the DL model; 0.573, 0.618, 0.541 for the trainee radiologist; 0.701, 0.782, 0.665 for the competent radiologist; 0.707, 0.732, 0.667 for the expert radiologist; 0.722, 0.744, 0.610 for the DL and trainee; 0.767, 0.779, 0.729 for the DL and competent; 0.801, 0.825, 0.751 for the DL and expert radiologist. **Conclusions:** Our study offers a high-accuracy multi-class deep learning model which could assist community-based hospitals in improving the diagnostic accuracy of VCFs

PO-2264

Morphological changes of meniscus after anterior cruciate ligament injury : posterior base angle of medial meniscus

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Purpose

To compare the meniscus parameters of patients with simple ACL injury and volunteers, analyze the correlation between meniscus parameters and ACL injury, and explore the morphological changes of meniscus after ACL injury.

Methods

A retrospective study of patients with ACL injury from January 2021 to December 2021 was conducted. Patients with simple ACL injury were selected according to the inclusion and exclusion criteria, and patients with complete ACL were matched for comparative study. The meniscus slopes, posterior meniscus angles and alpha angle (α angle) were measured in MR images. The meniscus slopes include the slope of the anterior horn of the medial meniscus (SAHMM), the slope of the posterior horn of the medial meniscus (SPHMM), the slope of the anterior horn of the lateral meniscus (SAHLM), and the slope of the posterior horn of the lateral meniscus (SPHLM). The posterior meniscus angles include the posterior base angle of the medial meniscus (PBAMM) and the posterior base angle of the lateral meniscus (PBALM). The parameters of patients with ACL injury and patients with ACL integrity were compared.

Results

This study included 70 patients with simple ACL injury and 70 patients with ACL integrity. Comparing the meniscus slope of the two groups, it was found that the SPHMM of patients with ACL injury was higher than that of patients with ACL integrity ($P=0.019$). The SPHMM of patients with ACL injury was $23.24^{\circ} \pm 3.42^{\circ}$, while that of patients with ACL integrity was $21.88^{\circ} \pm 3.35^{\circ}$. Comparing the posterior horn of the meniscus, it was found that the PBAMM in patients with ACL injury was significantly higher than that in patients with ACL integrity ($73.78^{\circ} \pm 6.32^{\circ} > 67.82^{\circ} \pm 5.88^{\circ}$, $P=0.00$). The α angle of patients with ACL injury was significantly larger than that of patients with ACL integrity ($40.62^{\circ} \pm 2.15^{\circ} > 35.62^{\circ} \pm 1.94^{\circ}$, $P=0.000$). In the receiver operating characteristics curve analysis, the cut-off value of SPHMM was 20.62, and values above this showed 81.4% sensitivity and 45.7% specificity for ACL injury. The cut-off value of PBAMM was 73.55, and values above this showed 54.3% sensitivity and 84.3% specificity for ACL injury. The cut-off value of α angle was 37.75, and values above this showed 91.4% sensitivity and 91.4% specificity for ACL injury.

Conclusions

The results of this study strongly indicate that there is a correlation between the morphological changes of the posterior horn of the medial meniscus and ACL injury, and this correlation is more obvious in the posterior horn of the medial meniscus. The morphological changes of meniscus can predict the damage of ACL.

PO-2265

HawkinsⅢ型距骨颈骨折与距骨完全脱位的对比分析

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目的分析 HawkinsⅢ型距骨颈骨折脱位、距骨完全脱位的影像学特点及鉴别要点；

方法 回顾性分析 9 例 HawkinsⅢ型距骨颈骨折脱位、7 例距骨完全脱位患者的临床及影像学资料，9 例 HawkinsⅢ型距骨颈骨折脱位 8 例男性、1 例女性，年龄 20~53 岁，中位年龄 29 岁；7 例距骨完全脱位的图像，均为男性，年龄 21~61 岁，中位年龄 43 岁，对比分析 HawkinsⅢ型距骨颈骨折脱位及距骨完全脱位影像学特点及征象；

结果 9 例 HawkinsⅢ型距骨颈骨折脱位冠状面距骨内移 6 例、外移 3 例，矢状面距骨后移 8 例、无前后移位 1 例，CT 横断面距骨外展 3 例；根据距骨移位分为后内侧移位 5 例，后外侧移位 3 例，单纯内移 1 例；根据距骨旋转分为跖屈型 3 例，背屈外展型 3 例，背屈外翻型 2 例，外翻型 1 例，伴发内踝骨折 5 例，外踝骨折 2 例。7 例距骨完全脱位冠状面距骨外移 7 例，矢状面距骨前移 7 例，横断面距骨外展 3 例，根据距骨移位均为前外侧移位；伴发距骨后突骨折 5 例，内踝骨折 1 例，外踝骨折 2 例；

结论 9 例 HawkinsⅢ型距骨颈骨折脱位距骨以后内移位和后外移位多见，距骨完全脱位距骨以前外侧移位多见，距骨的旋转相对复杂，应从三个维度分析距骨移位及旋转情况，常伴有周围骨质骨折。

PO-2266

尺侧腕骨轴向骨折脱位的影像诊断

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目的 分析尺侧腕骨轴向骨折脱位的影像学征象及特点;

材料和方法 回顾性分析 10 例尺侧腕骨轴向脱位、骨折脱位病例, 男性 6 例, 女性 4 例, 年龄 16~43 岁, 平均年龄 28.4 ± 6.2 岁; 9 例行 DR 摄影, 3 例行 CT 扫描;

结果 10 例尺侧腕骨轴向骨折脱位右腕 7 例, 左腕 3 例, 9 例 X 线平片显示: 第 4、5 掌骨与钩骨一起移位, 钩骨骨折脱位 6 例, 钩骨脱位 3 例, 豌豆骨脱位 5 例, 三角骨骨折 2 例, 头状骨撕脱骨折 1 例, 第 4 掌骨基底骨折 3 例; 3 例 CT 显示: 第 4、5 掌骨与钩骨一起移位, 钩骨骨折脱位 3 例, 豌豆骨脱位 2 例, 三角骨骨折 2 例, 第 4 掌骨基底骨折 1 例; 综合平片及 CT: 经钩骨型 4 例, 钩骨周围、豌豆骨周围型 2 例, 经钩骨、经三角骨、豌豆骨周围型 3 例, 经头状骨、钩骨周围、豌豆骨周围型尺侧腕骨轴向脱位 1 例;

结论 尺侧腕骨轴向骨折脱位虽然罕见且分型复杂, 但其共性为钩骨与第 4、5 掌骨作为一个整体的移位, 并且常伴有豌豆骨脱位。

PO-2267

大弧损伤性月骨脱位的分型及影像诊断

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目的 探讨腕间关节大弧损伤性月骨脱位的分型、影像诊断及其临床价值;

材料和方法 回顾性分析 23 例大弧损伤性月骨脱位病例, 男性 17 例, 女性 6 例, 年龄 20~60 岁, 平均年龄 37 ± 11.9 岁。16 例行 DR 摄影, 19 例行 CT 扫描; Siemens Multix Fusion 800ma 摄片 X 光机, Mindray DigiEye 640ma 摄片 X 光机, Siemens 128 层螺旋 CT 扫描仪扫描, 应用 SSD、MPR、CPR 及 VRT 重建技术; 结果 23 例腕关节大弧损伤性月骨脱位患者中, 23 例近排腕骨近侧及远侧关节面连线均不连续。综合 X 线平片及 CT 改变, 经三角骨月骨脱位伴茎突骨折 7 例, 经舟骨、三角骨月骨脱位伴茎突骨折 6 例, 经舟骨月骨脱位伴茎突骨折 5 例, 经三角骨月骨脱位 3 例, 经舟骨、三角骨月骨脱位 1 例, 经舟骨月骨脱位 1 例。X 线平片正位平片显示月骨与头状骨重叠, 头月关节间隙、桡月关节间隙变窄, 轮廓不清; 侧位平片显示月骨向掌侧旋转移位, 月骨窝状关节面空虚、朝向掌侧, 呈“倾倒茶杯”征, 舟骨和/或三角骨骨折块伴随月骨移位。CT 横断面、冠状面重建显示舟骨或/和三角骨骨折断端伴月骨向前旋转移位, 冠状面重建显示“月骨丢失”征; 矢状面重建显示月骨“倾倒茶杯”征; 三维重建多方位、多角度显示月骨移位、旋转的情况, CT 对小的撕脱骨折显示清晰。

结论 大弧损伤性月骨脱位种类较多, 以经舟骨和/或三角骨月骨脱位伴茎突骨折类型常见, 分析月骨旋转移位征象及月骨周围腕骨骨折是诊断的重点, 多层螺旋 CT 对腕间关节的对位关系及月骨周围小的撕脱骨折优于平片。

PO-2268

IDEAL IQ 和 BOLD-MRI 定量评估大鼠股四头肌脂肪浸润和血流灌注对肌肉减少症早期诊断的实验研究

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目的：严重的肌肉减少症可导致重度残疾。早期诊断是目前改善肌肉减少症治疗的关键。本研究旨在纵向评估基于 MRI 的脂肪浸润和血流灌注成像在肌肉减少症发展进程中的早期诊断价值。

材料与方法：依据地塞米松注射的不同天数（0,2,4,6,8,10 天）将 48 只 SD 大鼠随机分为 6 个组，并在注射结束后进行评估。多模态 MRI 扫描大鼠股四头肌评估肌肉质量；大鼠四肢握力和游泳力竭实验评估肌肉力量和功能。HE 染色和油红 O 染色评估肌纤维的萎缩和脂肪浸润情况。CD31 免疫荧光染色评估股四头肌的毛细血管形成。通过蛋白质印迹检测 VEGF-A 和 MuRF-1 蛋白的表达。皮尔逊相关分析评估 MRI 定量参数与组织病理学标志物之间的相关性强度。最后，通过 ROC 曲线分析 MRI 定量参数在肌肉减少症大鼠成模评估中的诊断效能及截断值。

结果：相比对照组，基于 MRI 的定量参数 PDFF、R2* 和 T2 值在第 2 天表现出显著统计学差异，早于第 6 天出现统计差异的 MRI-CSA 值和大鼠四肢握力以及第 8 天出现统计差异的游泳力竭时间（以上均为： $p<0.05$ ）。MRI-CSA 与 HE-CSA 值（ $r=0.67$ ； $p<0.001$ ）；ORO 面积与 PDFF（ $r=0.67$ ； $p<0.001$ ）；MVD（ $r=-0.79$ ； $p<0.001$ ）和 VEGF-A（ $r=-0.73$ ； $p<0.001$ ）与 R2* 之间存在较强相关性。肌肉减少症大鼠在第 8 天成模，用于成模评估的 PDFF、R2* 和 T2 值的 AUC 分别为 0.81（CI 95%：0.69-0.93），0.93（CI 95%：0.86-1.00）和 0.98（CI 95%：0.94-1.00）。

结论：MRI 定量参数 PDFF、R2* 和 T2 作为具有高灵敏度的影像生物标志物，可用于早期诊断和监测肌肉减少症的脂肪浸润与血流灌注病理改变。当 PDFF 大于 1.25，R2* 大于 53.85，T2 大于 33.88 时，可以判断肌肉减少症大鼠模型成功构建。

PO-2269

扩散张量磁共振成像非侵入性评估肌肉减少症大鼠腰椎旁肌细胞外基质重塑

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目的：骨骼肌细胞外基质重塑是肌肉减少症的主要组织病理学改变之一。本研究目的是探讨扩散张量磁共振成像技术在评估肌肉减少症大鼠腰椎旁肌细胞外基质重塑改变中的价值。

方法：将 20 只 6 月龄雌性 Sprague-Dawley 大鼠随机分为地塞米松组（DEX）和生理盐水对照组。两组大鼠均接受 3.0T 磁共振成像扫描，包括 Mensa，T2WI 和扩散张量成像序列。苏木精-伊红染色和天狼星红染色评估竖脊肌的肌纤维和细胞外基质改变。蛋白质印迹评估竖脊肌中 Collagen I，III 和纤连蛋白的表达。皮尔逊相关分析评估 MRI 定量参数与相应组织病理学标志物之间的相关性强度。

结果：影像学结果显示，相比对照组，DEX 组大鼠竖脊肌横截面积和分数各向异性值显著降低（ $P<0.05$ ）。苏木精-伊红染色显示 DEX 组肌纤维萎缩以及排列紊乱；天狼星红染色显示 DEX 组的胶原体积分数显著增加（ $P<0.05$ ）。蛋白质印迹结果显示 DEX 组 I 型胶原，III 型胶原和纤维连接蛋白表达显著增加（均为 $P<0.05$ ）。分数各向异性值与胶原体积分数，胶原蛋白 I，胶原蛋白 III，纤连蛋白之间的相关系数分别为 -0.77，-0.94，-0.85，-0.88（均为 $P<0.05$ ）。

结论: 分数各向异性值与病理胶原体积分数, I 型胶原, III 型胶原和纤维连接蛋白的表达密切相关, 表明扩散张量磁共振成像技术可以无创性地评估肌肉减少症竖脊肌细胞外基质重塑的变化, 为肌肉减少症的早期诊断提供潜在的影像生物标志物。

PO-2270

3.0T 1H MRS 在脊柱良恶性压缩性骨折鉴别诊断中的应用

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目的: 探讨骨质疏松及恶性肿瘤所致脊柱良恶性压缩性骨折的 3.0T 1H MRS 特征, 为鉴别脊柱良恶性压缩性骨折提供科学依据。

方法: 2019 年 6 月至 2022 年 9 月, 在西安市红会医院收集 221 例受试者, 其中骨量正常组 50 例, 骨量减少组 65 例, 骨质疏松压缩骨折组 62 例, 恶性肿瘤压缩性骨折组 44 例。年龄范围为 35-75 岁, 其中男性 99 例, 女性 122 例。收集患者的年龄、性别和 BMI。所有受试者进行 1H MRS 扫描并测量的脂肪分数 (FF %) 和脂水比 (LWR)。本研究采用 3.0 T GE 超导磁共振成像仪和体线圈获取波谱。数据分析采用 SPSS26.0, 年龄、FF %、LWR 等定量数据的统计描述采用均数±标准差, 性别等分类数据的统计描述采用频数。多组定量指标间比较采用方差分析, 横向比较采用 Bonferroni 法。定量指标间的相关分析采用 Pearson 相关分析。

结果: 通过对不同组的年龄和 BMI 进行方差分析, 发现不同组的年龄存在差异。正常组年龄最小 (53.05±10.35 岁), 其次为骨质减少组 (59.01±6.34 岁)。骨质疏松组年龄最大 (66.54±5.32 岁)。在对不同性别组间进行分析后, 发现不同组间存在统计学差异, $P<0.001$ 。女性骨量丢失和骨质疏松的比例明显高于男性。在恶性肿瘤组中, 男性比例高于女性, $P<0.001$ 。四组间 FF% 和 LWR 差异均有统计学意义。1H MRS FF% 恶性肿瘤组最低 (15±5.21), 骨质疏松组最高 (65.8±4.99)。采用 Bonferroni 法比较两组间的差异, 有统计学意义, $P<0.001$ 。MRS FF% 与 LWR 高度相关, $r=0.865$, $P<0.001$ 。

结论: 3.0T 1H MRS 在骨质疏松及恶性肿瘤导致脊柱良恶性压缩骨折中的 FF%、LWR 差异有统计学意义, 可用于脊柱良恶性压缩骨折的鉴别诊断。

PO-2271

磁共振 IDEAL-IQ 在糖尿病继发肌少-骨质疏松症定量诊断中的应用价值

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目的: 本研究旨在探讨磁共振 IDEAL-IQ 在糖尿病继发肌少-骨质疏松症中的应用价值, 并早期对肌肉减少及骨质疏松情况进行定量诊断。

方法: 收集 2022.3-2023.3 年糖尿病继发肌少-骨质疏松症 60 例研究对象。其中男性 25 例, 女性 35 例。年龄范围为 50-80 岁。糖尿病继发肌少-骨质疏松症 30 例进行 MRI IDEAL-IQ 序列扫描后在 FF 图上用专用后处理软件分别进行腰椎每个椎体及周围肌肉 (腰大肌、竖脊肌、多裂肌) 的兴趣区 (ROI) 脂肪定量 (FF) 测定, 计算的相应水平椎体及肌肉的 FF 的平均值。糖尿病继发肌少-骨质疏松症 30 例进行 DXA 扫描, 与 DXA 骨密度 BMD 进行对比研究, 分析观察肌肉减少、骨质疏松情况, 进行统计学分析。

结果: 采用 SPSS 22.0 进行统计学分析。计量资料用均数 \pm 标准差($\bar{x} \pm s$)表示, 组间比较用 t 检验。计数资料用例数(百分率)表示, 组间比较采用 χ^2 检验。Logistic 回归分析骨质疏松与年龄、BMI 及肌少症的相关性。以 $P < 0.05$ 为差异有统计学意义。平均年龄(66.73 ± 6.86)岁, 平均 BMI 为(25.76 ± 3.53) $\text{kg} \cdot \text{m}^{-2}$ 。腰椎每个椎体及周围肌肉(腰大肌、竖脊肌、多裂肌)的感兴趣区(ROI)脂肪定量(FF)测定平均值分别约为(66.2 ± 4.51 , 36.2 ± 3.41 , 32.3 ± 6.37 , 35.2 ± 5.18)。腰椎 DXA BMD 为(1.21 ± 0.21) $\text{g} \cdot \text{cm}^{-2}$ 。MRI FF%与年龄呈正相关($r=0.90$), 而 DXA 中 BMD 与年龄呈负线性关系($r=-0.89$)与男性相比, 女性的 FF%更高。

结论: MRI IDEAL-IQ 可作为一种无创的新影像技术应用于肌骨系统, 早于肌肉减少及骨量的变化之前检测肌肉及骨髓脂肪的变化, 为客观评估糖尿病继发肌少-骨质疏松症提供新的量化标准和技术支持。

PO-2272

MRI T2-mapping 及 MR-DTI 在膝关节软骨损伤中的价值研究

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【摘要】目的: 分析膝关节软骨损伤中应用 T2-mapping 及 DTI 的临床应用价值。方法: 选择 2022 年 6 月—2023 年 6 月绍兴市上虞人民医院收治的 77 例膝关节软骨损伤患者, 均通过 MRI 常规扫描、T2-mapping 及 DTI 序列检查, 以关节镜评估软骨损伤为标准, 分为三组, 正常组($n=17$)、损伤组($n=37$)、撕脱组($n=23$)三组, 对每组膝关节软骨 T2 值、FA 值进行测量, 最后对诊断结果进行评估。结果: 77 例患者的膝关节软骨共 385 个部分(股骨内外侧髁、胫骨内外侧平台、髌软骨), 三组正常组、损伤组、撕脱组的 T2 值分别平均为(26.37 ± 4.37) ms, (24.22 ± 6.13) ms, (21.78 ± 5.39) ms, 差异有统计学意义($P < 0.05$)。结论: 磁共振 T2-mapping 及 DTI 有利于评估膝关节软骨损伤, T2 值及 FA 值对评价膝关节软骨损伤的定性及定量分析具有重要价值, 是膝关节常规 MR 序列检查的重要补充, 为临床的早期诊断、治疗及预后评估提供依据及指导。

PO-2273

基于透明质酸的磁共振可视化水凝胶促进关节软骨修复再生

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背景: 将临床常用影像技术应用于生物材料的在体监测有利于研究其在体内的真实分布及降解过程, 然而临床用磁共振成像较低的分辨率及造影剂的非特异性全身使用限制了磁共振成像在生物材料辅助组织再生领域应用的效率。

目的: 比较大鼠局部软骨缺损处植入透明质酸水凝胶材料后, 患处的磁共振信号变化与实际组织病理切片的对应关系

方法: 在 SD 大鼠股骨滑车处制造一 3mm 直径的圆形缺损, 并随即填充修饰有 GD-DTPA 的透明质酸-降冰片烯水凝胶材料, 同时设置阴性(手术后缺损处没有填充材料)和阳性(假手术)对照组, 在手术后的第 2 周和第 8 周分别对大鼠膝关节进行 9.4T 高分辨率磁共振扫描, 包括 PDWI、T1WI 和 T2WI, 随后将对应老鼠的膝关节组织切片进行番红固绿染色。分析局部缺损处 PD、T1、T2 信号值随着时间的变化与组织切片中材料的分布、降解, 新生骨/软骨组织的对应关系。

结果: 修饰有 Gd-DTPA 的降冰片烯透明质酸, 在局部缺损处与明胶-巯基交联形成的水凝胶具有较好的体外弛豫率, r_1 值为 $34.45 \text{Mm}^{-1} \text{s}^{-1}$, 是临床用造影剂的 3 倍。植入 HA 水凝胶材料后第 2 周和第 8 周的组织切片对比, HA 水凝胶的横截面积有明显减少(p), 磁共振 PDWI、T1WI、T2WI

局部信号均有明显改变。同时两者的变化值在相关性分析中呈现明显的正相关 (p , R)。术后第 8 周, 植入 HA 水凝胶的大鼠组织切片 ICRS 评分与阴性对照组有明显差异 (p), 与正常对照组的差异不明显 (p); 对术后第 8 周的大鼠膝关节磁共振图像进行 CaLS (Cartilage Lesion Score) 评分时, 与正常对照组没有明显差异 (p)。

结论: 高分辨率 MRI 提供了在无创条件下定量监测植入材料在体内降解过程及局部组织修复程度的可能性, 可以作为研究生物材料在体分布、降解情况以及组织修复效率的先进工具。

PO-2274

骨密度及体质成分特征对新冠病毒感染后住院时长的影响

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目的: 胸部 CT 平扫是新型冠状病毒感染早期发现及协助疾病分期的有效手段, 胸部 CT 中病变累及范围、形态和密度与新冠感染的预后密切相关。胸部 CT 除提供呼吸系统相关信息外, 也涵盖了大量其他系统信息。基于影像多模式与多维度协同的多要素关联诊断理念, 胸部 CT 图像提取的肺外改变与 COVID-19 预后的关系值得进一步探索。本研究旨在探索基于定量 CT (QCT) 的骨密度 (BMD) 及体质成分与新冠感染住院时长的相关性。

方法: 本研究回顾性收集 2020 年 1 月-2021 年 2 月期间成年住院新冠感染患者, 采用 QCT 测量其胸部 CT 图像中 L1~L2 骨密度、L1~L2 椎间隙层面椎旁肌肉面积、椎旁肌肉脂肪面积、腹部皮下脂肪面积及腹腔内脂肪面积。

结果: 本研究共纳入 88 例新冠感染者, 平均年龄 43.0 ± 12.6 岁, 其中男性 59 例 (67.0%), 女性 29 例 (33.0%); 平均住院时长 27.4 ± 8.7 天。L1-L2 平均 BMD 为 $145.6 \pm 36.9 \text{ mg/cm}^3$; L1~L2 椎间隙层面椎旁肌肉面积、椎旁肌肉脂肪面积、腹部皮下脂肪面积、腹腔内脂肪面积分别为 41.9 cm^2 、 1.7 cm^2 、 78.0 cm^2 、 122.2 cm^2 。在单因素分析中住院时长与年龄 ($r=0.202$, $p=0.046$)、L1~L2 椎间隙层面椎旁肌肉脂肪面积与椎旁肌肉面积之比 ($r=0.246$, $p=0.021$) 呈正相关。在纳入年龄、BMI、骨密度、椎间隙层面椎旁肌肉面积/椎旁肌肉脂肪面积、腹部皮下脂肪面积、腹腔内脂肪面积的广义线性模型中, 新冠感染住院时长与 L1~L2 椎间隙层面腹腔内脂肪面积呈正相关 ($\beta: 9.304$, $p=0.025$)。

结论: 本研究首次基于真实世界新冠感染者胸部 CT 数据, 应用 QCT, 对我国新冠感染者住院时长相关骨肌特征进行了探索。新冠肺炎感染者体质成分特征与其住院时长相关。新冠肺炎感染者增龄、椎旁肌肉脂肪含量增加、腹腔内脂肪增多, 均与更久住院时长相关。

PO-2275

新型冠状病毒感染患者一年随访骨密度及体质成分特征分析

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目的: 新型冠状病毒 (COVID-19) 感染临床症状虽以肺部表现为主, 但该病除累及呼吸系统外, 还可累及多系统, 但目前有关 COVID-19 对骨肌系统影响的研究较为缺乏。本研究旨在探索 COVID-19 对骨肌系统的影响。

方法: 本研究纳入有入院、出院及 1 年后随访胸部 CT 资料的 COVID-19 感染者, 采用定量 CT (QCT) 分析其胸椎骨密度 (BMD) 及体质成分特征。

结果: 本研究共纳入 33 例 COVID-19 感染者, 平均年龄 47.1 ± 15.0 岁, 其中男性 22 人, 占 66.7%; 女性 11 人, 占 33.3%。其中无症状感染者、轻型、普通型、重型患者各 2 例、8 例、19 例及 4 例,

无危重型患者。平均住院时长为 29.5 ± 9.6 天, 平均随访时间为 423.0 ± 53.6 天。入院、出院、1 年后随访胸 1~胸 12 平均 BMD 分别为 $165.6 \pm 34.6 \text{mg/cm}^3$ 、 $165.3 \pm 35.2 \text{mg/cm}^3$ 、 $165.2 \pm 35.4 \text{mg/cm}^3$, 三者之间无明显统计学差异。胸 12~腰 1 椎间隙层面腹部皮下脂肪、腹腔内脂肪及腹部总脂肪面积亦未见明显变化。将入组患者分为无症状感染者及轻型组 (10 例, 占 30.3%)、普通型及重型组 (23 例, 占 69.7%) 两组, 无症状感染者及轻型组患者入院及 1 年随访胸 1~胸 12 平均 BMD 高于普通型及重型组 ($173.9 \pm 33.6 \text{mg/cm}^3$ vs. $162.0 \pm 35.2 \text{mg/cm}^3$); 普通型及重型组患者入院及 1 年后随访腹腔内脂肪面积及腹部总脂肪面积均大于无症状感染者及轻型组。

结论: 本研究提示感染 COVID-19 一年后, 并未导致患者胸椎骨密度和腹部脂肪面积发生明显变化。本研究首次基于真实世界 COVID-19 感染者胸部 CT 影像数据, 应用 QCT 软件, 对我国 COVID-19 感染者的骨密度及体质成分特征进行了阐述和对比, 并首次描述了该群体一年随访骨密度及腹部脂肪变化情况, 以期助力探索 COVID-19 对骨肌系统的长期影响。

PO-2276

基于可解释机器学习模型探讨 X 线征象在骨肿瘤分类中的价值

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目的: 基于数字化 X 线影像征象及临床信息构建多种骨肿瘤的机器学习分类模型, 确定对骨肿瘤分类最重要的影像特征, 更好地辅助骨肿瘤临床诊断工作。

方法: 回顾性收集南方医科大学南方医院 2014 年 1 月~2019 年 9 月经手术病理证实的骨肿瘤患者的影像学图像及病例资料。由 2 名具备 8 年以上工作经验的骨关节放射科医师对入组病例的 X 线图像进行独立阅片, 确定影像学征象结果, 包括病灶的位置、边缘、偏心性、膨胀性、硬化边、骨膜反应、病灶密度、病灶内高密度成分和骨质破坏类型等。随后, 基于影像学征象及临床信息构建 LR、DT、RF 及 SVM 模型, 对骨肿瘤进行良性、中间型和恶性三分类研究。同时选用 SHAP 值这一解释模型输出结果的重要方法, 评估对骨肿瘤诊断最重要的特征。

结果: 共纳入 796 例骨肿瘤病例, 良性骨肿瘤 412 例, 恶性骨肿瘤 215 例, 中间型骨肿瘤 169 例, 平均年龄 (26 ± 18) 岁。DT、RF、LR 及 SVM 模型的 micro AUC 值分别为 0.821、0.935、0.930 和 0.944, LR、RF 及 SVM 模型在三分类中的 AUC 值均高于 DT 模型, 且差异有统计学意义 ($P < 0.05$), RF 和 SVM、LR 和 SVM 模型在良恶性和中间型骨肿瘤中的 AUC 值差异均无统计学意义 ($P > 0.05$), 而 LR 和 RF 模型在良性、恶性骨肿瘤的 AUC 值差异均有统计学意义 ($P < 0.05$)。模型对中间型骨肿瘤、血管瘤、良性纤维组织细胞瘤、脊索瘤和软组织肉瘤诊断准确性偏低。各模型都将“病灶的边缘”评估为骨肿瘤分类最重要影像征象, 其次分别是“病灶内高密度成分”, “骨皮质受累情况”和“病灶的膨胀性”等。

结论: 结果表明 SVM 模型是本研究构建的 4 种机器学习模型中性能最优的模型。机器学习模型对重要特征评估的结果在一定程度上解释了模型的输出规则, 增强了临床医生对机器学习模型的理解程度, 提高了模型的可信度, 有望有效促进模型的临床应用推广。

PO-2277

基于 X 射线图像的深度学习模型改善医生对原发性骨肿瘤组织学分类的研究

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目的 基于 X 线图像开发深度学习(DL)模型判别原发性骨肿瘤(PBT)的组织学类型, 并评估其临床实用性。

方法 这项回顾性研究纳入两家医院经病理证实的 878 名 PBT 患者 (训练集、验证集、内部测试集和外部测试集分别为 638 例、77 例、80 例和 83 例), 本研究将 PBT 分为五种组织学类型: 成骨性肿瘤、软骨源性肿瘤、富含破骨细胞的巨细胞肿瘤、骨的其他间叶源性肿瘤和其他组织学类型的 PBT。基于 EfficientNet-B3 结合 X 线图像和临床特征构建 DL 模型, 采用受试者工作特征曲线下面积(AUC)、准确度、敏感度和特异度评估模型性能, 通过观察该模型是否可提升放射科医生判别 PBT 组织学类型的能力来评估其临床实用性。

结果 DL 模型在内部和外部测试集的 AUC 分别为 0.904 (95%CI, 0.852–0.942)和 0.873 (95%CI, 0.812–0.920)、准确度分别为 67.5% (95%CI, 58.8%–76.2%)和 68.7% (95%CI, 61.4%–78.3%)、敏感度分别为 79.7% (95%CI, 75.0%–84.1%)和 80.4% (95%CI, 75.9%–84.6%)、特异度分别为 92.1% (95%CI, 89.3%–94.3%) 和 91.6% (95%CI, 89.3%–93.8%)。初级放射科医生在模型辅助前后的准确度由 50.6%提升至 72.3%, 判读时间由 53.07 秒减少至 18.55 秒, 李克特 5 点量表法显示置信度由 3.10 增加至 3.70; 高级放射科医生在模型辅助前后的准确度由 68.7%提升至 75.3%, 判读时间由 32.50 秒减少至 21.42 秒, 置信度由 4.19 增加至 4.37, 所有的 P 均小于 0.05。

结论 我们的 DL 模型有效地判别 PBT 的组织学类型, 并可在临床上帮助放射科医生获得比独立视觉判别更好的临床效益, 因此该模型具有改善 PBT 患者临床决策的潜力。

PO-2278

定量 CT 评估锁骨不同区域骨密度的差异

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目的 通过 QCT 测量锁骨远端不同区域骨密度的差异, 为外科修复重建喙锁韧带提供参考。

方法 回顾性分析 2022 年 10 月至 2022 年 12 月在安徽医科大学附属阜阳人民医院(阜阳市人民医院)行胸部 CT 体检的 101 例患者 202 例锁骨影像学信息, 由内侧向外侧划分锁骨远端为以下 8 个区域, 分别为锥状结节区(A 区)、结节间区(B 区)方区(C 区)以及锁骨远端区(D 区), 再将每个区域分为前半部分和后半部分确定 8 个亚分区, 在亚分区中设置半自动感兴趣区(region of interest, ROI), (ROI A1、A2、B1、B2、C1、C2、D1、D2), 将每个原始数据传输至 QCT pro 分析工作站, 采用 QCT BMD 测量系统, 对锁骨远端以上 8 个 ROI 松质骨骨密度进行测量, 比较测量结果。

结果 (1) 锁骨 A1、A2、B1、B2、C1、C2、D1、D2 八个亚分区 BMD 值差异具有统计学意义 ($H=1131.899$, $P<0.05$); 两两比较显示除 A1 与 A2、D1 与 D2、A2 与 B1 之间 BMD 水平差异无统计学意义($P>0.05$), 其余亚分区 BMD 值两两比较差异均有统计学意义($P<0.05$); (2) 与锥状带解剖止点 A2 区 BMD 值比较, 结节间区(B 区)BMD 值低, 差异有显著性意义($P<0.05$); 与斜方韧带解剖止点 C1 区 BMD 值比较, C2 区、D1 区及 D2 区 BMD 值低, 结节间区(B 区)BMD 值高, 差异均有统计学意义($P<0.05$)。

结论 QCT 评估锁骨远端不同区域骨密度的差异对于喙锁韧带修复重建术具有重要指导意义。

PO-2279

腰椎管狭窄患者硬膜囊横截面积与马尾神经冗余关系的 MRI 研究

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目的 分析腰椎管狭窄患者的腰椎硬膜囊横截面积 (dural sac cross-sectional area, DSCA) 与马尾神经冗余 (redundant nerve roots, RNRs) 之间关系, 拟探索 RNRs 形成机制及其对椎管狭窄的诊断价值。**方法** 收集我院 2022 年 2 月-2022 年 8 月临床诊断为腰椎管狭窄患者的 MRI 资料共 155 例。根据矢状位 T2W 图像马尾神经形态将患者分为 RNRs (+) 和 RNRs (-), 测量并记录狭窄节段椎管硬膜囊面积及硬膜囊前后径, 统计分析 RNRs (+) 和 RNRs (-) 之间硬膜囊面积、硬膜囊前后径、椎管狭窄程度的差异, 进一步分析 RNRs (+) 组椎管不同狭窄程度间马尾神经冗余长度的差异。结果 腰椎管狭窄病人中马尾神经冗余的发生率为 34.2%。RNRs (+) 组平均年龄大于 RNRs (-) 组, 腰椎管最窄层面平均硬膜囊面积及硬膜囊前后径均小于 RNRs (-) 组, 椎管狭窄程度大于 RNRs (-) 组 (P 值均 <0.05)。RNRs (+) 组女性发生率较男性稍高 (56.6% vs 43.4%), 但差异无统计学意义; RNRs (+) 组椎管不同狭窄程度间马尾神经冗余长度差异具有统计学意义 ($P<0.05$)。结论 马尾神经冗余征是一种特殊的影像学表现, 常见于较严重的腰椎管狭窄患者, 能够被 MRI 清晰地展现, 为腰椎管狭窄症的明确诊断提供了重要的依据。

PO-2280

比较业余马拉松运动员与健康志愿者大腿肌肉的质与量: 一项基于多参数磁共振的定量研究

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目的: 本研究旨在通过定量多参数磁共振成像探讨中老年男性业余马拉松运动员与健康志愿者大腿肌肉体积、肌间脂肪体积、肌内脂肪分数、T1 和 T2 弛豫时间的差异, 为提升中老年男性大腿肌肉质与量, 预防老年性肌肉减少及相关疾病提供数据参考。

方法: 本研究为前瞻性研究, 于杭州马拉松运动医学研究所招募了基线情况匹配 (男性, 55-70 岁) 的 30 名业余马拉松爱好者和 30 名健康志愿者。对受试者优势侧的大腿中段进行 MRI 扫描, 使用高清 T1 序列、q-Dixon 序列分别获得标准化肌肉体积 (肌肉体积/BMI)、标准化肌间脂肪体积 (肌间脂肪体积/BMI) 与肌内脂肪分数; 使用 T1mapping、T2mapping 序列分别获得 T1、T2 弛豫时间。采用独立样本 t 检验比较业余马拉松运动员组与健康志愿者组优势侧的大腿肌肉体积、大腿肌间脂肪体积、肌内脂肪分数、T1 与 T2 弛豫时间。

结果: 运动组的大腿中段标准化肌肉体积显著大于对照组 ($P<0.05$); 对于体现肌肉质的脂肪浸润检测, 运动组大腿中段肌内脂肪分数显著低于对照组 ($P<0.05$), 并且运动组大腿中段肌间脂肪体积显著低于对照组 ($P<0.05$)。此外, 运动组的大腿 T1、T2 弛豫时间显著低于对照组 ($P<0.05$)。

结论: 多参数磁共振成像提示中老年男性业余马拉松运动员与健康志愿者大腿肌肉存在显著差异, 马拉松运动可能显著增加中老年男性的大腿肌肉体积, 并且显著减少大腿肌间脂肪体积与肌内脂肪分数。本研究结果可能为老年性肌肉减少及相关疾病的预防和治疗提供一定启示。

PO-2281

能谱 CT 成像评估壮医治疗对痛风石内钙、羟基磷灰石吸收的应用分析

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摘要：目的 通过能谱 CT 成像分析壮医治疗后痛风石内的钙、羟基磷灰石变化情况，评估壮医治疗痛风性关节炎的有效性，为壮医治疗痛风疗效的评估提供客观依据。方法 25 例痛风性关节炎患者均行 256 排 CT 能谱扫描，经后处理测量治疗前后痛风石 UA、HAP、Ca、Water 各基物质对的浓度变化，分析壮医治疗痛风石内尿酸盐以及钙、羟基磷灰石吸收效果。结果 痛风性关节炎患者经壮医治疗，治疗 1 个月后痛风石 UA(HAP)、Water (HAP) 相对浓度有显著性下降 ($p<0.05$)，Water(Ca)、Ca (Water)、HAP(Water)、Ca (UA)、HAP(UA) 相对浓度降低，但无统计学差异 ($p>0.05$)。治疗 3 个月后 UA(HAP)、UA(Ca)、Water (HAP)、Water(Ca)、Ca (Water)、HAP(Water)、Ca (UA) 相对浓度降低相对浓度有显著性下降 ($p<0.05$)，HAP(UA) 相对浓度降低，但无统计学差异 ($p>0.05$)，其中 1 例病例在治疗三个月后发现 HAP 结晶吸收、消失。结论 壮医综合治疗不仅在缓解痛风性关节炎疼痛上有着明显效果，还在痛风石吸收上有着良好的疗效：壮医治疗首先促进痛风石内尿酸盐成分、水分的吸收，后期对痛风石内钙成分——钙、羟基磷灰石的吸收仍有效果。

PO-2282

大转子疼痛综合征的诊断

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目的：引起髋部及大腿疼痛的常见原因很多，大转子疼痛综合征是其中的常见原因。准确的诊断本病有助于临床医生选择合适的治疗方式，进而有效缓解患者疼痛。通过本次的资料报告及相关的文献学习可以帮助影像科医生更好的了解疾病，提高诊断的准确性。

方法：回顾了大转子疼痛综合征患者的临床资料、影像资料，并进行了相关疾病的文献复习。

结果：大转子疼痛综合征常因大转子附近软组织受到长期反复的过度牵拉而发生慢性损伤及继发性无菌性炎症所致。诊断标准包含 6 种征象，臀肌腱病、肌腱撕裂、转子滑囊炎或滑囊积液、髂胫束增厚、骨髓水肿及骨侵蚀。

结论：磁共振扫描可以较为准确的诊断大转子疼痛综合征，熟悉疾病的发病部位、发病机制、特征性影像表现，有助于提高影像科医师诊断的准确性。

PO-2283

AI 辅助压缩感知 (ACS) 技术在膝关节 MRI 扫描中的应用研究：3D-MRI 视角

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目的：探讨人工智能辅助压缩感知 (ACS) 技术优化膝关节 MRI 扫描流程的潜在价值。

材料与方法：志愿者和患有运动损伤疾病的患者接受了一系列加速技术的前瞻性 MRI 扫描。志愿者接受了不同 ACS 加速级别的检查以确定最有效的加速级别。患者在确定的最佳 3D-ACS 加速级别后进行相应 MR 扫描，同时进行 3D 压缩感知 (CS) 和 2D 并行采集技术 (PAT) 扫描。通过多平面重建 (MPR) 对 3D-ACS 图像进行 3.5 mm/2.0 mm 图像重建。由经验丰富的放射科医生对 3D-ACS-MRI 和 3D-CS-MRI、3.5 mm/2.0 mm MPR 和 2D-PAT-MRI 获得的图像质量进行评估和比较、疾病诊断，并将结果与关节镜检查结果进行比较。采用 Cohen kappa 相关系数评价诊断一致性，并采用绝对评价法和相对评价法进行客观评价。

结果：该研究共纳入 15 名志愿者和 53 名运动损伤患者。10.69x 的加速因子被认为是最佳的加速级别。图像质量评估表明，与 2D-PAT 相比，3D-ACS 提供的骨结构可视化较差，软骨可视化有所改善，并且 3.5 mm/2.0 mm MPR 的横轴位图像不太令人满意。在客观评价方面，相对评价在不同群体中得到了令人满意的结果，而绝对评价则显示大多数特征存在显著差异。尽管如此，所有诊断均观察到高水平的诊断一致性 (κ : 0.81-0.94) 和准确性 (0.83-0.98)。

结论：ACS 技术作为 3D-MRI 膝盖扫描中传统 CS 的替代品具有巨大的潜力，可以在不牺牲诊断准确性的情况下实现更薄的 MPR 和显著更快的扫描。

PO-2284

胸部低剂量 CT 联合定量 CT 评估肺癌筛查人群的骨折风险

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目的 评估肺癌筛查人群中基于胸部低剂量 CT 联合定量 CT 预测骨折风险的效能，为建立一站式肺癌筛查及骨折风险评估的健康体检新模式提供理论依据。**方法** 回顾性纳入参加胸部低剂量 CT 基线检查的社区肺癌筛查人群。获取其腰椎 BMD 估计值 (BMD_L^*)。使用骨折风险评估工具根据基线信息计算主要部位骨质疏松性骨折概率 (PMOF) 和髌部骨折概率 (PHF)。于三年复查时收集过去三年内临床骨折发生情况，并于复查胸部 CT 图像上评估椎体骨折有无及程度。采用逻辑回归分析建立基于基线 BMD_L^* 、PMOF 及 PHF 的骨折预测模型并采用受试者工作特征 (ROC) 曲线，并通过比较各模型的曲线下面积 (AUC) 对评估各模型的骨折预测效能。结果 最终纳入 549 例受试者，其中男性 251 例，女性 298 例。受试者基线时的中位年龄为 62.0 岁，中位 BMD_L^* 为 102.3 mg/cm^3 ，骨质疏松患病率为 22.2%。三年复查时自我报告的临床新发骨折为 16 例 (2.9%)，其中 13 例为脆性骨折；341 例 (62.1%) 诊断为椎体骨折，其中 74 例为中重度椎体骨折，新发中重度椎体骨折 4 例；中位随访时间为 36.4 个月。逻辑回归分析结果显示，基线 BMD_L^* 、PMOF、PHF 均为椎体骨折的独立影响因素 (P 均 < 0.05)，但与临床新发骨折及脆性骨折均无显著相关性 (P 均 > 0.05)。与基于 PMOF 及 PHF 的椎体骨折预测模型 ($AUC = 0.612$ 、 0.626) 相比，基于 BMD_L^* 的模型 ($AUC = 0.832$) 效能显著较高 (P 均 < 0.001)；在 BMD_L^* 的基础上进一步联合临床危险因素后的模型预测椎体骨折的效能没有显著提高 ($AUC = 0.840$, $P = 0.071$)。结论 胸部低剂量 CT 联合定量 CT 测得的下段胸椎 BMD 替代腰椎 BMD 具有良好的骨折风险预测效能，可能有助于建立一站式肺癌筛查及骨折风险评估的健康体检新模式。

PO-2285

髌部骨折患者股骨头不同区域骨微结构与股骨近端几何结构分析

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目的：探讨髌部骨折患者股骨头不同区域松质骨微结构的差异，并分析骨微结构与股骨近端几何结构的相关性。

方法：收集髌部骨折并行髌关节置换术患者的股骨头 18 例。采用 Micro-CT 对样本进行扫描，采用 Avatar v1.6.5 (PINGSENG Healthcare Inc.) 进行分析。三个圆柱形感兴趣区分别位于主压缩区、主拉伸区和非应力区。分析不同区域内松质骨微结构参数，包括骨体积分数 (BV/TV)、骨表面积密度 (BS/BV)、骨小梁厚度 (Tb.Th)、骨小梁数目 (Tb.N)、骨小梁间距 (Tb.Sp)、结构模型指数 (SMI) 和骨小梁连通密度 (Conn.D)。在患者骨盆正位片上测量健侧髌轴长度 (HAL)、股骨头宽度 (FWW)、股骨颈宽度 (FNW) 和颈干角 (NSA)。分析骨微结构与股骨近端几何结构的相关性。

结果：三组间骨微结构均存在统计学差异 ($P < 0.05$)；其中，与主拉伸区和非应力区相比，主压缩区 BV/TV、Tb.Th 最高，BS/BV、Tb.Sp、SMI 最低。HAL 与主压缩区 Tb.Th、Tb.Sp 呈负相关 ($r = -0.719$ 和 -0.686)，与主压缩区 Tb.N 呈正相关 ($r = 0.814$)；FNW 与各区域 Tb.Th 均呈负相关 ($r = -0.812$, -0.735 和 -0.634)，与主压缩区 Tb.Sp 呈负相关 ($r = -0.573$)，与主压缩区 Tb.N 呈正相关 ($r = 0.653$)；FWW 仅与非应力区 Tb.Th 呈负相关 ($r = -0.514$)，而 NSA 与骨微结构之间均无相关性。

结论：(1) 髌部骨折患者股骨头不同区域松质骨微结构存在差异，主压缩区骨微结构明显优于主拉伸区和非应力区，临床治疗髌部骨折时需要充分考虑内固定物及固定位置。(2) HAL 和 FNW 与骨小梁厚度、骨小梁间距和骨小梁数目存在相关性，HAL 和 FNW 值越高，骨微结构越差，其可作为评估髌部骨折患者骨微结构的一项重要参考指标。

PO-2286

基于腹部 CT 的影像组学模型在预测髌部骨量异常中的应用价值

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目的：探讨基于腹部 CT 图像构建的影像组学模型在预测髌部骨量异常方面的价值。

方法：回顾性收集 2021 年 8 月至 2023 年 7 月来自山东第一医科大学第二附属医院的 163 例患者的影像资料，所有患者均于 14 天内接受双能 X 线吸收仪 (DXA) 和腹部 CT 检查。以 DXA 为参考标准，将患者分为骨量正常 ($T\text{-score} \geq -1.0$) 和骨量异常 ($T\text{-score} < -1.0$) 组，骨量异常包括骨质疏松和骨质减少。按照 7:3 的比例将患者随机分为训练集 ($n=114$) 和验证集 ($n=49$)。在腹部 CT 图像上自动勾画左侧股骨近端作为三维容积感兴趣区并提取影像组学特征，采用最小冗余最大相关 (mRMR) 和最小绝对收缩和选择算法 (LASSO) 筛选最有价值的特征，并构建影像组学模型。采用受试者工作特征曲线 (ROC) 评估模型在训练集和测试集中预测骨量异常的效能，采用 DeLong 检验比较训练集和测试集 AUC 的差异，采用校准曲线评估模型的预测准确性，采用 Hosmer-Lemeshow 检验评估模型的拟合效果。

结果：最终选择 14 个最有价值的特征用于构建影像组学模型。模型在训练集和测试集中的 AUC、灵敏度、特异度、准确率分别为 0.96 (95% CI, 0.92-0.99)，91.4%，89.9%，90.0% 和 0.92 (95% CI, 0.84-0.99)，91.7%，83.8%，83.7%。DeLong 检验显示训练集和测试集的 AUC 具有统计学差异 ($P=0.342$)，校准曲线显示理想结果和实际结果接近，H-L 检验显示在训练集和测试集中 P 值均大于 0.05。

结论: 基于腹部 CT 图像构建的影像组学模型对髌部骨量异常具有良好的预测价值, 可以在不增加额外扫描时间和辐射剂量的情况下, 为患者提供一种潜在的骨质疏松筛查方法, 有助于临床医生制定后续诊疗计划。

PO-2287

基于 Micro-CT 和微有限元分析研究辛伐他汀对去卵巢小鼠骨组织和生物力学的影响

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目的: 通过微型计算机断层扫描 (Micro-Computed Tomography, Micro-CT) 和微有限元分析 (micro-finite element analysis, μ FEA) 定量分析辛伐他汀 (Simvastatin, Sim) 对去卵巢 (ovariectomy, OVX) 小鼠的椎骨骨微结构及力学性能的影响, 探讨辛伐他汀对去势引起的骨改变的作用。

方法: 将 24 只 8 周大小的雌性小鼠 (C57BL/6J) 随机分为 3 组, 每组 8 只: OVX+Sim 组、OVX 组和对照组。OVX 组与 OVX+Sim 组小鼠行双侧卵巢切除术, 对照组小鼠仅行背部切口, 未切除卵巢。术后 4 周, OVX+Sim 组予以辛伐他汀口服喂养, 剂量为 10mg/(kg.d), 持续 4 周。OVX 组和对照组小鼠予以等量生理盐水口服喂养。8 周后处死取材, 采用 Micro-CT 和 μ FEA 评估 L4 椎体骨微结构和力学性能。

结果: 各组间骨体积分数 (BV/TV)、骨小梁厚度 (Tb.Th)、骨小梁数目 (Tb.N)、骨小梁间距 (Tb.Sp)、骨小梁连接度 (connectivity) 和骨小梁密度 (Tb.BMD) 均存在统计学差异。其中, OVX+Sim 组 BV/TV、Tb.N、connectivity 和 Tb.BMD 显著高于 OVX 组, 而 Tb.Th 和 Tb.Sp 变化不明显; OVX+Sim 组 BV/TV、Tb.Th、Tb.N、connectivity 和 Tb.BMD 显著高于对照组, 而 Tb.Sp 变化不明显。OVX+Sim 组总形变、等效应变和等效应力均显著低于 OVX 组; OVX+Sim 组总形变显著高于对照组, 而等效应变和等效应力的差异无统计学意义。总形变和等效应力与 BV/TV 均呈负相关性 ($R^2=0.767$ 和 0.701)。

结论: 辛伐他汀通过对骨重建的调节, 改善了骨小梁微结构, 提高了骨力学性能, 为临床医生对绝经后骨质疏松患者的治疗提供了新思路。

PO-2288

基于 MRI 特征的影像组学模型在预测脊柱转移瘤立体定向放射治疗疗效方面的应用研究

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目的: 本研究旨在使用机器学习 (ML) 算法从 MRI 中提取影像组学特征, 并将其与临床特征相结合, 构建脊柱转移瘤患者体立体定向放射治疗 (SBRT) 后治疗疗效的预测模型。

方法: 选取了 2018 年 7 月至 2023 年 4 月期间在我们医院接受 SBRT 治疗的脊柱转移瘤患者。使用实体瘤疗效评价标准 (RECIST; 版本 1.1) 对其治疗疗效进行评估。将病变分为进展组 (PD) 组和非 PD 组。从 T1 加权、T2 加权和脂肪抑制 T2 加权序列中提取影像组学特征。采用组内相关系数、最小冗余最大相关和最小绝对收缩和选择算子进行特征筛选。利用 13 种 ML 算法构建了影像组学预测模型。将临床特征、常规影像学特征和影像组学特征组合构建结合模型。使用受试者工作特征曲线 (ROC 曲线) 分析评估模型性能, 使用决策曲线分析 (DCA) 评估临床价值。

结果:共纳入 194 名患者,其中非 PD 组为 142 例(73.2%),PD 组为 52 例(26.8%)。每个感兴趣区域生成了 2264 个特征。临床模型显示出中等的预测效能(ROC 曲线下面积(AUC)=0.733),而影像组学模型表现更好(AUC=0.745–0.825)。影像组学结合临床特征的模型的表现最好(AUC=0.828)。

结论:基于 MRI 的影像组学模型对接受 SBRT 的脊柱转移瘤患者的疗效预测方面有较好的价值。影像组学预测模型有潜力为临床决策提供帮助,在改善接受 SBRT 治疗的脊柱转移病患者的预后方面存在一定的价值。

PO-2289

骨促结缔组织增生性纤维瘤的影像学表现特点

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目的:探讨骨促结缔组织增生性纤维瘤的 CT 及 MRI 表现特点,以加深对本病的认识和鉴别。材料与方法:收集 2018 年 1 月至 2023 年 6 月间在我院经病理证实为骨促结缔组织增生性纤维瘤 15 例,分析其 CT 及 MRI 图像并总结其影像学表现特点。结果:15 例中发生于长骨 12 例,发生于骨盆 3 例;病灶主要呈轻度局限性膨胀、边缘清晰、有不完整硬化缘、局部侵蚀或突破骨皮质的溶骨性病变,病灶内 CT 表现为较均匀的软组织密度、MRI 表现为高低混杂信号影。结论:骨促结缔组织增生性纤维瘤好发于长骨,影像学具有一定的特征性,需要注意与纤维结构不良、骨性纤维结构不良、非骨化性纤维瘤、骨巨细胞瘤等鉴别。

PO-2290

双能 CT 中的新型胶原蛋白成像在腰椎间盘突出症评估中的应用

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摘要:腰椎间盘突出症是一种常见的脊柱疾病,严重影响人们的生活质量。传统的成像技术如 X 线、CT 和 MRI 等可以显示椎体及椎间隙的状态,但对于软组织如胶原蛋白的成像较为困难。双能 CT 作为一种新型成像技术,其利用不同能量的 X 射线对不同组织进行成像,可实现软组织的高分辨率成像。因此,本研究旨在探讨双能 CT 中的新型胶原蛋白成像技术在腰椎间盘突出症评估中的应用。采集了 50 名腰椎间盘突出症患者及 50 名健康志愿者的双能 CT 图像,根据临床症状和放射学发现被诊断患有腰椎间盘突出症。并利用新型胶原蛋白成像技术定量分析了患者与健康人群间的差异。利用 SPSS 20.0 软件进行数据处理和统计分析,采用 t 检验和方差分析等方法比较两组数据的差异。结果表明,腰椎间盘突出症患者的胶原蛋白含量显著低于健康人群,而且随着病情的加重,胶原蛋白含量也不断下降。因此,双能 CT 中的新型胶原蛋白成像技术可定量评估腰椎间盘突出症患者的胶原蛋白含量,为临床诊断和治疗提供了一种新的方法。该技术应用前景广泛,但仍需进一步研究和改进。总之,DECT 中的胶原蛋白成像是一种非常具有前途的评估腰椎间盘突出症的技术,可以提供结构和功能信息。这种 DECT 中的新型胶原蛋白成像可能成为诊断和治疗腰椎间盘突出症的重要工具,为治疗规划和患者护理提供有价值的信息。如得到证实,DECT 中的胶原蛋白成像可能成为脊柱疾病领域中重要的影像学检查技术。

PO-2291

X 线几何测量参数预测慢性踝关节不稳的临床价值

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目的 探究 X 线几何测量参数对慢性踝关节不稳（CAI）预测的临床价值。**方法** 回顾性分析 2018 年 1 月至 2022 年 6 月我院行踝关节 X 线检查患者的图像，纳入 CAI 患者 104 例和正常对照 136 例。踝关节正位片上测量胫骨远端内侧角（MDTA）、腓骨相对大小、内踝倾斜角、踝角、 α 角和 β 角。侧位片上测量腓骨相对位置、距骨高度、距骨半径、胫距接触率、踝穴角、跟骨角、Kite 角，分析以上影像学测量参数与 CAI 的关系。**结果** 踝关节 CAI 组的 MDTA、 α 角、 β 角高于对照组，而胫距接触率、腓骨相对位置、腓骨相对大小低于对照组，且差异有统计学意义（ $P<0.05$ ）。MDTA、腓骨相对位置、腓骨相对大小、胫距接触率是 CAI 的独立预测因素，其中胫距接触率预测 CAI 的 AUC 最大（0.663），而联合腓骨的相对位置、相对大小与胫距接触率后，AUC 可达 0.736。**结论** MDTA、腓骨相对位置、腓骨相对大小、胫距接触率是 CAI 的独立影响因素，对 CAI 的发生有临床预测价值。

PO-2292

**基于 CT 脊柱骨质定量系统的腰椎相关参数在
评估骨量异常中的应用价值**

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目的：探讨基于 CT 脊柱骨质定量系统测得的第 1 腰椎（L1）椎体骨皮质、骨松质参数在评估骨量异常中的应用价值。

方法：回顾性收集 2021.07-2023.04 于我院行 256 排 Revolution 胸腹部 CT（同步 QCT）检查的患者 233 例，将 L1 椎体的 CT 图像导入 CT 脊柱骨质定量系统并自动测量 L1 椎体总体积、皮质体积、松质体积、皮质平均厚度、皮质总 HU、皮质平均 HU 和松质平均 HU。以 QCT 测得的 L1~2 椎体体积骨密度（vBMD）平均值为参考标准，将患者分为骨量异常（ $\leq 120 \text{ mg/cm}^3$ ）和骨量正常（ $> 120 \text{ mg/cm}^3$ ）组。采用独立样本 t 检验比较各参数的组间差异；对各参数和骨密度进行 Pearson 相关性分析；采用多因素 Logistic 回归构建模型，按照 7:3 的比例将患者分为训练集（ $n=163$ ）和测试集（ $n=70$ ），采用受试者工作特征曲线（ROC）分析模型诊断骨量异常的效能，采用 DeLong 检验进行曲线下面积（AUC）的比较。

结果：L1 椎体所有参数在两组间差异均有统计学意义，骨量异常组各参数均较低（ $P<0.05$ ）；L1 椎体皮质平均 HU 和松质平均 HU 与骨密度呈正相关（ $r=0.713$ 、 0.825 ， $P<0.05$ ）；在训练集与测试集中，多因素 Logistic 回归模型诊断骨量异常的 AUC 分别为 0.890、0.884，敏感性（75.0%、79.2%）和特异性（91.3%、87.0%）较高，训练集与测试集的 ROC 曲线无统计学差异（ $P = 0.922$ ）。**结论：**骨量异常患者基于 CT 脊柱骨质定量系统测得的 L1 各参数均较低；L1 皮质平均 HU 和松质平均 HU 与骨密度呈正相关。本研究表明骨量异常患者不仅骨量减少，骨皮质、松质的体积和密度也发生下降，并且 L1 椎体参数所构建的模型对骨量异常的评估具有较高的应用价值。

PO-2293

3D 机器人系统锥形束计算机断层成像在颈椎成像中的应用价值

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目的: 通过与常规X线摄影和CT进行比较, 探讨 Siemens 双悬吊 3D 机器人系统 (Multitom RAX) 锥形束计算机断层成像 (CBCT) 在颈椎检查中的临床应用价值。方法: 回顾性将在本院骨科就诊且因疑似颈椎疾病而分别行正侧位 X 线摄影 (A 组)、颈椎 CT (B 组) 或 3D RAX CBCT (C 组) 检查的 60 例患者纳入本研究。基于 3 组图像, 测量每例患者颈椎解剖学参数, 包括枕颈角 (OC2A)、第 1 胸椎倾斜角 (T1S)、C2 与 C7 矢状位轴向距离 (cSVA) 及颈椎前凸角 (CL), 并采用 5 级评分法评估图像质量。计算各组的辐射剂量, 包括容积剂量指数 (CTDI)、剂量长度乘积 (DLP) 和剂量面积乘积 (DAP)。对 3 组的各项解剖学参数的测量结果、图像质量及辐射剂量指标进行比较。结果: A、C 两组的 OC2A、CL 及 cSVA 分别为 $18.29^{\circ} \pm 6.73^{\circ}$ 、 $10.52^{\circ} \pm 12.53^{\circ}$ 、 $(26.77 \pm 10.33) \text{ mm}$ 及 $18.14^{\circ} \pm 7.23^{\circ}$ 、 $10.54^{\circ} \pm 11.08^{\circ}$ 、 $(27.07 \pm 9.26) \text{ mm}$, 两组间差异均无统计学意义 ($P > 0.05$); B 组的 OC2A、CL 及 cSVA 分别为 $14.78^{\circ} \pm 6.98^{\circ}$ 、 $3.32^{\circ} \pm 13.70^{\circ}$ 和 $(21.92 \pm 8.85) \text{ mm}$, 与 A、C 两组间的差异均有统计学意义 ($P < 0.05$)。三组之间图像质量主观评分 (A 组: 2.5 ± 0.65 、B 组: 3.72 ± 0.45 、C 组: 3.52 ± 0.62) 的差异有统计学意义 ($P < 0.05$)。C 组的剂量长度乘积 (DLP) 较 B 组降低了 54.6%, 较 A 组 DAP 增大了 86.9%, 差异均有统计学意义 ($P < 0.001$)。结论: 颈椎检查时, 采用 3D 机器人系统 CBCT 较常规 X 线能提供质量更高的图像且相比 CT 有更精准的站立位测量数据及更低的辐射剂量, 能为临床提供更精准、更有价值的测量参数。

PO-2294

针刺治疗膝骨性关节炎患者的脑结构 MRI 研究

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目的 基于体素的形态学测量 (voxel-based morphometry, VBM) 探讨膝骨性关节炎 (KOA) 患者在针刺治疗前后的脑灰质体积改变, 进而分析其针刺疗效机制。方法 前瞻性纳入 30 例 KOA 患者, 对 KOA 患者行针刺治疗, 并在针刺治疗前后进行 VAS、SAS、SDS、MOCA 相关评分量表评估及高分辨率 T1WI 像扫描。采用 VBM 方法分析针刺治疗前后 KOA 患者脑灰质结构差异, 分析其与评估量表结果间的相关性。结果 针刺治疗后 KOA 患者对疼痛、焦虑、抑郁均有缓解 ($P < 0.001$), 认知功能有所提高 ($P < 0.001$)。治疗后灰质体积增加的脑区包括左侧舌回、左侧脑岛; 灰质体积减少的脑区包括左侧枕中回、中央旁小叶 (体素水平 $P < 0.001$, 团块水平 $P < 0.05$)。结论 针刺治疗可以明显缓解 KOA 患者的临床症状, 同时发现 KOA 患者治疗后多个脑区结构改变, 因此推测针刺疗效可能是通过大脑多个脑区相互作用而实现。

PO-2295

灌注加权成像在股骨头缺血性病变早期诊断中的价值

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目的

股骨头缺血性坏死是由一系列股骨头疾病和损伤导致股骨头缺血改变所引起。传统的磁共振成像不能反映与股骨头缺血相关的早期变化情况，例如早期血流灌注的变化。我们使用磁共振灌注加权成像 (PWI) 来评估股骨头的早期血流灌注改变，用来评估 PWI 所示血流灌注结果与股骨头缺血改变程度的相关性。

方法

从 2020 年到 2021 年，纳入 20 名临床诊断为单侧股骨头缺血的患者 (实验组) 进行 MR-PWI 扫描。软件后处理后测量感兴趣区 (ROI) 的相对增强率 (RE)、最大增强率 (ME)、达峰时间 (TTP) 值。绘制股骨头血流灌注曲线，同时与对侧 (对照组) 股骨头同样区域进行对比，并对差异进行统计学分析。

结果

20 例股骨头病变患者 (实验组) 的 RE、ME 和 MRE 均低于对照组 ($P < 0.05$)，TTP 高于对照组 ($P < 0.05$)。患股骨头内侧和外侧柱的 RE、ME、MRE 和 TTP 与对照股骨头相比无显著差异。

结论

在本研究中，我们发现股骨头缺血部位的 RE、ME 和 MRE 在不同程度上降低，TTP 增加。因此，PWI 能够发现股骨头缺血的早期血流变化，对于早期发现或预警股骨头缺血坏死具有一定的作用。

PO-2296

基于临床因素预测冠状动脉粥样硬化患者的骨量健康状况

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目的：探讨基于临床因素在预测冠状动脉粥样硬化患者的骨量健康状况中的应用价值。

方法：收集 2021 年 6 月至 2023 年 7 月就诊于我院并根据冠状动脉 CT 血管成像检查评估为冠状动脉粥样硬化的患者 157 例。以 QCT 测得的体积骨密度 (vBMD) 为参考标准，将患者分为骨量正常 ($vBMD > 120 \text{ mg/cm}^3$) 和骨量异常 ($vBMD \leq 120 \text{ mg/cm}^3$) 组。收集所有患者的一般资料如年龄、性别、吸烟史、饮酒史、血压、血糖、血脂、血钙等。首先将各因素纳入单因素 Logistic 回归分析，然后将 $P < 0.05$ 的因素纳入多因素 Logistic 回归分析以筛选骨量异常的独立预测因素，并构建预测骨量异常的回归方程模型，根据预测概率绘制受试者工作曲线 (ROC)，并计算曲线下面积 (AUC)。所有统计分析均采用 R 语言分析。 $P < 0.05$ 认为具有统计学意义。

结果：多因素 Logistic 回归分析显示年龄和低密度脂蛋白是影响冠状动脉粥样硬化患者骨量的独立危险因素，OR 值分别为 1.13 (95% CI: 1.08-1.18)、2.62 (95% CI: 1.52-4.51)。当 Cutoff 值为 0.382，约登指数为 0.538 时，AUC (95% CI)、灵敏度、特异度、准确率分别为 0.820 (95% CI: 0.754-0.885)、67.1%、86.7%、76.4%。

结论：年龄和低密度脂蛋白是冠状动脉粥样硬化患者发生骨量异常的独立风险因素，随着年龄的增长和低密度脂蛋白的升高，冠状动脉粥样硬化患者的骨状况也越差。因此，本研究表明有必要对冠状动脉粥样硬化患者采取干预措施以降低未来发生骨质疏松的风险。

PO-2297

全身磁共振扩散加权成像评估多发性骨髓瘤不同骨髓浸润模式

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目的 采用全身磁共振扩散加权成像 (WB-DWI) 评估多发性骨髓瘤 (MM) 患者不同骨髓浸润模式的表观扩散系数 (ADC) 值, 并确定不同骨髓浸润类型的 ADC 阈值。**方法** 招募首次确诊的 MM 患者 19 例, WB-DWI 检查的图像经视觉评估后, 将各部位 (颈椎、肋骨、胸骨、肱骨、肩胛骨、骶椎、髂骨、股骨、胸椎、腰椎) 病灶类型分为局灶组 (包括混合型中局灶病变) (ROI=141)、弥漫组 (ROI=150)、混合型中弥漫病变组 (ROI=127)、“盐和胡椒”组 (ROI=54)、正常组 (ROI=68), 测量并比较各部位的 ADC 值, 绘制 ADC 值区分不同骨髓浸润类型的受试者工作特征 (ROC) 曲线。**结果** 混合型中弥漫病变组与“盐和胡椒”组 ($P>0.99$) ADC 值差异无统计学意义, 余组间 ADC 值差异均有统计学意义 ($P<0.005$)。ROC 曲线显示, 鉴别局灶组及“盐和胡椒”组骨髓浸润的曲线下面积 (AUC) 为 0.889 (95%CI: 0.844~0.934), 鉴别弥漫组及正常组骨髓浸润的曲线下面积 (AUC) 为 0.968 (95%CI: 0.949~0.987), ADC 值能够准确、直观地区分不同骨髓浸润模式。**结论** ADC 值能够作为量化工具, 客观地区分 MM 患者不同骨髓浸润模式。

PO-2298

MRI 中 PDWI 序列在膝关节损伤中的应用价值

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目的: 探讨 pdwi(质子密度加权像)序列在膝关节损伤的应用价值。**方法:** 收集 2022 年 3 月至 2022 年 6 月医院的膝关节损伤患者 60 个, 进行不同的扫描序列对膝关节的扫描分析, 采用相同的层厚 4mm, 层间距 1mm, 小 fov 参数, 进行扫描, 分别采用 pdwi 压脂序列、stir 序列, fs 序列进行扫描。**结果:** 通过 mri 的 3 种序列对比观察: pdwi 扫描的图像质量率为 70%, fs 为 20%, stir 为 10%, 分析原因: pdwi 扫描时间短, 获得图像的 snr 和空间分辨率较好, 噪声小, 显示半月板、肌腱、韧带断裂清楚。stri 主要用于骨髓性病变, fs 的噪声大, snr 低, 图像的颗粒感强, 显示关节处不清楚。**结论:** pdwi 序列在膝关节损伤的价值明显高于 stir、fs, 更好地发现病变, 满足临床需求, 提高准确率。

PO-2299

膝关节骨骺发育主观评价在 MRI 骨龄预测的应用

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目的: 采用 Vieth-classification 进行膝关节 MRI 骨骺发育主观评价, 探索该评价方法在青少年膝关节骨龄预测中的适用性。

方法: 回顾性纳入 2016 年 1 月至 2021 年 1 月 10~20 岁膝关节 MRI 数据, 经评估符合纳入标准和排除标准, 最终有效样本共 1517 例, 其中男性 1112 例, 女性 405 例, 年龄波动在 10.03~20.21 岁。MRI 检查采用 1.5T 或者 3.0T 场强, 膝关节线圈, T1 自旋回波序列(T1TSE)、脂肪抑制质子密度加权序列、T2 自旋回波序列(T1TSE)。获得冠状位、矢状位、和轴位图像。采用 Vieth-classification 进行评级, 其中所有分级评估 T1TSE 序列图像, PDWI 作为补充评估以区分 5 和 6

级, 其不同骨化时期的形态学特征见附件。将所测量数据录入至 EXCEL 表格, 录入后的结果导入至 R 软件 (版本号: V4.2.1) 进行分析。通过计算 Kappa 系数确定观察者组内和组间一致性; 描述性分析不同阶段对应的年龄值 (包括最大值、最小值、中位数、上下四分位数) 及分布情况, 使用 Mann-Whitney U 检验分析股骨远端与胫骨近端之间评级差异, 以确定其统计相关性 ($P<0.05$, 精确, 双侧)。

结果: 男性股骨远端评级为 6 的 100% 超过 16 岁且 93.66% 超过 18 岁, 评级为 4 的 100% 大于 14 岁, 评级为 3 的 100% 大于 12 岁, 评级为 2 的 93.10% 小于 14 岁。女性股骨远端评级为 6 的 100% 超过 16 岁且 82.26% 超过 18 岁, 评级为 5 的 100% 大于 14 岁, 评级为 4 的 100% 大于 12 岁, 评级为 2 的 100% 小于 14 岁。

结论: 因地域差异, Vieth-classification 方法在中国青少年骨龄评估中 18 岁年龄判定效果弱于欧洲国家, 但可以肯定的是 MRI 可获得更丰富的骨龄评价信息, 值得进一步探索基于 MRI 的能完全判定中国青少年 18 岁的骨骺发育特点。

PO-2300

两种不同的站立位双下肢全长拍摄、 拼接方式肢体力线测量差异与准确度研究

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【目的】 探讨两种不同拍摄及拼接方式对站立位双下肢全长肢体力线测量的准确度。

【方法】 利用机器 GE Definium6K 不打角度站立位双下肢全长成像和锐珂 DRX-COMPASS 打角度站立位双下肢全长称下两种方式分别对人体下肢骨骼标本进行标准体位双下肢全长拍摄, 经各自机器自带拼接软件拼接得到双下肢全长影像, 分析和总结两种机型所得双下肢全长影像的力线, 并与拍摄所用骨骼标本力线进行对比。

1. 站立位双下肢全长拍摄方法: 使用大头针和铜丝对人体下肢骨骼标本的股骨头中心和踝关节中心做标识, 标本分别呈解剖学体位站立于机器 GE Definium6K 和锐珂 DRX-COMPASS 自带的全长拍摄摄影架前, 上界包括骨盆上缘, 下界包括足底进行拍摄。机器 GE Definium6K 为 17IN*17IN 探测器, 自动条件, 定位时采用机头不打角度, 上下平行移动至上界和下界分别定位, 机头和平板探测器由上界至下界平行移动的同时进行摄影, 得到 6-8 幅图, 通过自带软件对图像进行拼接, 得到站立位双下肢全长图像。机器锐珂 DRX-COMPASS 为 17IN*17IN 探测器, 手动条件, 定位时, 将机头放置约上下界连线中点的位置, 向上打角度至定位线包含骨盆上缘, 向下打角度至定位线至足底, 探测器处于上下界中心位置不移动, 上下打角度, 同时探测器由上界至下界移动进行摄影, 得到 3-4 幅图, 通过自带软件对图像进行拼接, 得到站立位双下肢全长图像。

2. 力线测量: GE Definium6K 和锐珂 DRX-COMPASS 分别用机器自带的软件测量力线。标本采用万能角度尺测量。

【结果】 两种机型拍摄的双下肢全长影像力线测量差异与骨骼标本实际力线相比的差异均在临床允许范围内。

【结论】 使用 GE Definium6K 和锐珂 DRX-COMPASS 两种机型得到的站立位双下肢全长影像均可靠。

PO-2301

男性业余马拉松运动员胫股关节软骨厚度、体积及 T2* 值改变

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目的: 横断面比较业余马拉松运动员与匹配的久坐对照组的胫股关节软骨厚度、体积及软骨 T2* 值的变化, 以初步评价马拉松运动对膝关节胫股关节软骨的影响。方法: 收集 2018 年 1 月至 2021 年 12 月期间在我院进行右膝关节磁共振检查的男性业余马拉松运动员 28 人, 以及与之匹配的久坐对照组 13 人。将获取的 3D-DESS、T2* mapping 序列数据使用后处理原型软件进行自动化软骨分割, 得到膝关节软骨 21 个亚区的厚度、体积及 T2* 值, 通过独立样本 t 检验或秩和检验方法对两组数据进行统计分析。结果: 业余马拉松运动员膝关节股骨滑车外侧软骨全层、浅层及股骨外侧前部软骨浅层区域 T2* 值显著低于久坐对照组, 差异具有统计学意义 (t 分别为 -3.30, -3.51, -3.47, P 均 < 0.05)。两组之间各软骨分区的厚度和体积无统计学差异 (P 均 > 0.05)。结论: 长期的马拉松运动可能不会引起膝关节软骨的厚度和体积的改变。以股骨外侧非承重区为主的浅层关节软骨 T2* 值在业余马拉松运动员中较健康对照组有所减低, 表明马拉松运动在一定程度上可能降低胫股关节 OA 的风险, 其与 OA 的发生发展之间的关系及与马拉松运动的关系有待今后的进一步研究。

PO-2302

b 值及脂肪抑制方式对磁共振四肢软组织弥散成像的影响

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目的: 探讨不同 b 值及脂肪抑制方式的 DWI 在四肢软组织中的差异, 并筛选出优势组合。材料与方法: 纳入了陆军特色医学中心 2021 年 1 月至 2023 年 5 月接受大腿近端软组织 DWI 的病例。主要参数如下: a 序列 b 值 50/800s/mm², 脂肪抑制方式为反转恢复; b 序列 b 值 0/800s/mm², 脂肪抑制方式为反转恢复; c 序列 b 值 50/800s/mm², 脂肪抑制方式为频率选择+反转恢复; d 序列 b 值 50/600s/mm², 脂肪抑制方式为频率选择+反转恢复, e 序列 b 值 50/600s/mm², 脂肪抑制方式为频率选择。采用主、客观评价方法进行图像质量分析。主观评价由具有 5 年以上骨关节影像诊断经验的放射科医师独立完成, 根据清晰度、失真度 (变形)、脂肪抑制效果和伪影按 1-5 评价, 4/5 分为优质影像。工作经验 8 年以上的磁共振扫描技师独立完成兴趣区和噪声测量两次, 取平均值作为客观评价实际值。客观评价指标包括信噪比、对比噪声比、ADC 值、畸变程度、扫描时长。使用 SPSS23.0 软件进行统计学分析。主观评价一致性使用加权 Kappa 系数进行评估, 使用 RxC 列联表比较序列影像的优质率。信噪比、对比噪声比、ADC 值、畸变程度和扫描时长的差异采用方差分析进行比较。结果: 不同诊断医师的主观评价具有较好的一致性, Kappa 值为 0.925。a 序列、b 序列、c 序列、d 序列、e 序列的影像评分分别为 4.43、4.56、4.75、4.68、4.28, 优质率分别为 79%、76%、83%、81%、72%。影像优质率无显著性差异 (P > 0.05)。信噪比、对比噪声比、畸变程度和扫描时长存在显著性差异 (P < 0.05), 然而 ADC 值则没有 (P > 0.05)。结论: b 值为 50/800、采用频率选择+反转恢复脂肪抑制方式的成像模式是优势组合, 在四肢软组织弥散成像中具有更好的临床应用价值。

PO-2303

中老年人胫骨结节-股骨滑车沟距离与髌股关节软骨退变之间的关系研究

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目的：利用膝关节核磁共振成像（MRI）扫描探讨中老年人髌股关节软骨退变程度与胫骨结节-股骨滑车沟间距（TT-TG）之间的关系。方法：选取 2020 年 9 月—2022 年 12 月在我院行膝关节 MRI 扫描的中老年患者 515 例。由两名从事骨科相关的影像科医生对髌股关节软骨退变分级进行客观评价。并利用 GE 工作站使用膝关节轴位图像后处理，进行 TT-TG 距离测量。比较髌骨侧软骨退变及股骨滑车侧软骨退变各组间 TT-TG 间距，采用 Logistic 回归分析 TT-TG 间距是否是关节软骨退变的影响因素，并绘制受试者特征曲线（ROC）进行分析。结果：髌骨侧软骨退变及股骨滑车侧软骨退变各组间 TT-TG 间距存在统计学意义（ $P<0.05$ ）。髌骨侧关节软骨退变分级与 TT-TG 间距存在相关性（ $P=0.021$ ）；股骨滑车侧关节软骨退变分级与 TT-TG 间距不存在相关性（ $P=0.737$ ）。TT-TG 间距对评估髌骨侧关节软骨退变存在诊断意义（ $AUC=0.583$ ），但诊断能力较低；而对股骨滑车侧关节软骨退变则不存在诊断意义（ $AUC=0.487$ ）。结论：TT-TG 间距对于髌骨侧关节软骨退变分期有一定的预测作用，但是对于股骨滑车侧关节软骨退变无法准确预测。

PO-2304

定量 MRI 对业余马拉松运动员椎体脂肪含量相关性的研究

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目的：应用 MR 化学位移成像技术，对业余马拉松运动员腰椎骨髓脂肪（BMF）进行定量分析研究，探讨马拉松运动与其相关性。方法：招募男性业余马拉松运动员 47 名（年龄 30-50 岁之间）作为实验组，按跑龄分为低跑龄组：小于 3 年， $n=16$ ；中等跑龄组：3-5 年， $n=16$ ；高跑龄组：大于 5 年， $n=15$ ；健康男性久坐志愿者 18 名作为对照组。所有受试者接受 Dixon 序列扫描，获得基于 Dixon 扫描的氢质子密度脂肪分数值（MRI-PDFF），并测量椎体高度。采用 Pearson 相关性检验分析实验组椎体 PDFF 值与跑龄的相关性；采用单因素方差分析比较实验组与对照组椎体高度的差异。结果：不同跑龄志愿者间椎体的 MRI-PDFF 值差异均有统计学意义（ P 均 <0.01 ）。所有实验组 L3、L4、L5 椎体的腰椎骨髓脂肪（BMF）按照跑龄的增加而递减（ $p<0.05$ ），其中 L4 椎体的 BMF 与对照组的差异性最大（ $p<0.05$ ），L2 椎体的 BMF 与对照组相比无明显差异（ $p>0.05$ ），所有实验组 L2、L3、L4、L5 椎体的高度与对照组有边缘性差异（ $p=0.048$ ）。结论：马拉松运动会降低椎体的 BMF，且随着跑龄的增加，腰椎椎体的 BMF 会逐渐降低。

PO-2305

腰椎孤立性纤维瘤病例 1 例并文献复习

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目的：SPB 临床较为罕见，有较高风险进展为多发性骨髓瘤，因此早期发现并明确诊断至关重要。本研究目的是通过临床病例及文献复习，分析 SPB 影像学特点，提高对该病的认知和诊断的准确性。

方法：分析我院最近收治 1 例腰椎 SPB 患者影像学资料，并复习相关文献。

结果：

1、患者男，62 岁，腰痛 1 月，加重 2 周；脊柱 DR 示腰 2 椎体骨质密度不均匀，见纵形条状高密度影；腰椎 CT 示腰 2 椎体膨胀性骨质破坏，其内见残存骨嵴，部分骨皮质不连续，椎旁区未见肿块形成；腰椎 MRI 示腰 2 椎体呈稍长 T1 稍长 T2 信号影改变，内见右侧部分椎弓，病灶内见少许低信号分隔，邻近椎间隙未见明显变窄，病灶周围未见明显肿块影；穿刺活检及腰 2 椎体切除术后病理证实为 SPB。

2、文献复习表明 SPB 是一类以分泌免疫球蛋白的浆细胞单克隆增生导致的恶性肿瘤，目前病因与发病机制不明，起病比较隐匿，以病变部疼痛为主要临床表现，实验室检查一般无异常。影像特点：X 线表现为溶骨性骨质破坏，无骨膜反应。CT 表现为椎体及附件骨质内穿凿样、充蚀状溶骨性、膨胀性骨质破坏，骨皮质变薄、不完整，但整体轮廓仍较规则，骨破坏区内为软组织密度应充填，边缘可见环形壳状残存骨小梁结构，残存骨嵴上下径大于左右径，与椎体应力有关，横断位残存骨嵴呈高密度与等低密度的软组织肿块组成类似大脑半球的脑沟、脑回影，呈较具特征性的“微脑”征改变。MRI 表现为病灶信号不一，T1WI 呈稍低信号、等信号，常规 T2WI 呈等信号、稍高信号、稍低信，STIR 序列呈明显高信号，增强扫描病灶明显强化，境界清楚，骨质破坏后残留的骨嵴及硬化边呈低信号，镶嵌在等 T1、长 T2 或强化后呈高信号的软组织肿块中，类似于颅脑横断位影像，与 CT 表现相对应，亦称之为“微脑”征。

结论：SPB 影像学表现主要特点为单发的以椎体为中心的膨胀性、溶骨性骨质破坏，破坏区可有残留骨嵴及硬化边，典型表现为“微脑”征。

PO-2306

增强后多时序 T1mapping 量化退行性颈椎病血 脊髓屏障破坏的初步研究

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目的：利用 Gd-DTPA 增强前后颈髓 T1mapping 值的变化评估退行性颈椎病(Degenerative Cervical Myelopathy DCM)受压节段血脊髓屏障(Blood Spinal Cord Barrier BSCB)破坏，初步探讨 T1mapping 量化 BSCB 功能障碍的可行性。

方法：招募 DCM 患者 60 名及健康志愿者 30 例纳入本研究。DCM 患者组根据 Reiber 诊断标准分为 BCSB 完整组及 BSCB 破坏组。首先进行矢状位 T2WI 扫描，患者组根据 T2WI 图像确定最狭窄位置，对照组选取 C5-6 椎间盘水平，进行轴位增强前 T1mapping (Native T1)，增强后 1min、5min、15min T1mapping 扫描。测量增强前后脊髓 T1 值，计算不同延迟时间 T1 变化值 ($\Delta T1_{1m}$ 、 $\Delta T1_{5m}$ 、 $\Delta T1_{15m}$)。多因素方差分析比较组别间 Native T1 值及不同时期 $\Delta T1$ 值，不同时间 $\Delta T1$ 值与 AlbQ 进行 pearson 相关性分析，绘制不同时间 $\Delta T1$ 值与 AlbQ(脑脊液和血清中标准化的白蛋白商)的 ROC 曲线，确定发生 BCSB 破坏的 $\Delta T1$ 最佳截断值。

结果：DCM 出现 BSCB 破坏的为 21 例，未出现 BSCB 破坏的为 39 例。各组间 Native T1 存在差异 ($F=5.32$ $P=0.007$)，BSCB 破坏组 $\Delta T1_{1m}$ 、 $\Delta T1_{5m}$ 、 $\Delta T1_{15m}$ 均高于 BSCB 完整组 ($P=0.039$ 0.002 0.028)。DCM $\Delta T1_{5m}$ 与 AlbQ 呈强相关性， $R=0.734$ 。 $\Delta T1_{1m}$ 、 $\Delta T1_{5m}$ 、 $\Delta T1_{15m}$ 诊断 BSCB 破坏的 ROC 曲线下面积分别为 0.712、0.758 及 0.638，截断值分别为 39.2ms、47.75ms、44.4ms。结论：增强后不同时序 T1mapping 变化值可评估 DCM 患者 BSCB 的完整性，其中增强后 5 分钟 T1 变化值是量化 DCM 患者 BSCB 破坏程度最佳影像学参数。

PO-2307

神经根型颈椎病症状发作及缓解期臂丛扩散张量成像的对比研究

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目的：通过对比神经根型颈椎病(cervical spondylotic radiculopathy CSR)患者症状发作及缓解期臂丛神经扩散张量成像(Diffusion tensor imaging DTI)特征,探讨 DTI 评估神经根型颈椎病临床症状严重程度及持续时间的可行性。

方法：招募症状发作 72 小时之内 CSR 患者 54 例作为患者组,健康志愿者 36 例作为对照组。患者组进行症状 72 小时内及症状消失 72 小时后双侧臂丛神经 DTI 成像,对照组行臂丛神经 DTI 成像。使用纤维束示踪成像技术测量 C5-6、C6-7、C7-8、C8-T1 双侧神经根 FA 值及 MD 值。收集患者颈部功能障碍指数(neck disability index, NDI)和症状持续时间。独立样本 T 检验比较组间不同节段神经根 FA 值、MD 值,配对样本 T 检查比较患者组发作期及缓解期不同节段神经根 FA 值、MD 值,同时比较患者组健侧及患侧不同节段症状发作期 FA 值及 MD 值。进行患者症状发作期 DTI 参数与症状持续时间和 NDI 的 Pearson 相关性分析。

结果：与对照组相比,患者组患侧 C6-7 及 C7-8 神经根 FA 值明显降低,MD 值明显增高。患者组发作期患侧 C6-7 及 C7-8FA 值较健侧降低,MD 值增高。患者组患侧发作期 C6-7 及 C7-8FA 值较缓解期降低,MD 值增高。患者组发作期 C6-7FA 值与症状持续时间及 NDI 评分均呈明显负相关。结论：臂丛神经 DTI 可作为评估 CSR 患者症状严重程度及持续时间有效影像学手段,推测症状发作期患侧 C6-7 神经根 FA 值可预测症状持续时间和严重程度。

PO-2308

**双源下肢静脉 CTV 对下肢 DVT
(深静脉血栓)的显示与诊断的研究**

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目的：双源下肢静脉 CTV 对下肢 DVT(深静脉血栓)的显示与诊断的研究。

方法：将 90 例拟行双源下肢静脉 CTV 检查的病例随机分成 A, B, C3 组,每组 30 例。对比剂采用碘佛醇 320mg/ml, A 组用量 400mg/kg, B 组用量 450mg/kg, C 组用量 500mg/kg, 注射速率 4 m L/s, 注射完毕后同等速率注入生理盐水 30 m L。对这 90 例病例用双源后处理单能+分别做出 50kv, 70kv, 100kv, 140kv 的图像,测量下腔静脉,髂外静脉,股静脉,腘静脉,胫前静脉,足背静脉的 CT 值,记录并分析数值来评价双源单能+及对比剂用量对下肢 DVT 的显示与诊断。

结论：双源 CT 在减少对比剂的情况下可以用于诊断 DVT。

PO-2309

西门子双源螺旋 CT 扫描技术在成人股骨头坏死临床诊断中的应用和疗效观察

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目的：通过对比分析明确西门子双源螺旋 CT 应用于股骨头坏死诊断中的价值。方法：以 2022 年 1 月-12 月作为本次研究的时间阶段，随机选择共 35 例股骨头坏死成年患者作为对象开展研究，以 X 线检查结果为对照组，西门子双源螺旋 CT 检查结果为观察组。X 线检查：利用西门子 DR 成像系统，指导患者置于仰卧位，并且将足尖内旋，角度为 15-20°，以充分暴露双侧股骨头、股骨颈为标准。按照临床诊断要求，拍摄爱舍股骨头轴位片、标准正位片。螺旋 CT 检查：利用西门子双源螺旋 CT 设备进行检查，准直器宽度参数调节分别是 200mA、130kV、0.6mm，重建间隔调节为 1mm，螺距调节为 1mm，收到秒层距调节为 4mm，层厚调节为 5mm。参数调节完成后，要求患者置于仰卧位，设定扫描范围开始扫描，即从患者两侧髌臼上缘作为起点，至股骨颈、股骨头，获得横断面影像信息。检查结束后均由两名医生的影像科医生读片，并且获得诊断最终结果。分期采用 ARCO 分级，分为：I 期（检查无明显改变，骨头外形，密度正常）、II 期（股骨头斑片状、囊变形成、硬化、密度不均匀，影像学检查未塌陷，检查为阳性，髌臼未发生变化）、III 期（正侧位照片新月征，关节面塌陷）、IV 期（关节间隙变窄、关节破坏、骨关节炎、股骨头或者关节面塌陷，髌臼改变）。对比检查后不同期的患者数量，以及总检出率，对比结果 $P < 0.05$ 表示有统计学对比意义。结果：观察组的总检出率高于对照组，差异对比存在统计学意义 ($P < 0.05$)。结论：双源螺旋 CT 有较好的临床应用价值，能够应用于成人股骨头坏死的诊断中，可以保证检出率。通过进行全面的、准确地、及时地检测，以及及时地评估，能够更好地帮助患者恢复健康，并且能够更好地改善他们的生活质量。

PO-2310

探讨去金属伪影 (iMAR) 算法与电影式体积渲染技术 (cVRT) 在髌关节成形术后 CT 评价中的临床价值。

刘星

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目的：探讨去金属伪影 (iMAR) 算法与电影式体积渲染技术 (cVRT) 在髌关节成形术后 CT 评价中的临床价值。

方法与材料：对 120 例接受 CT 扫描的髌关节成形术后患者进行了回顾性研究。重建 CT 图像，包括常规、iMAR 和相应的体积渲染 (VR) 和 cVRT 图像。测量感兴趣区域 (ROI) 的 CT 值和标准差 (SD)，计算客观评价指标。使用 Likert 5 分制评价主观评分和诊断信心评分。使用配对 T 检验、Mann-Whitney U 检验和 Kappa 检验进行统计分析。

结果：iMAR 组在高密度区域显示 CT 值降低，在低密度区域显示 CT 值增加，伪影指数显著降低 ($P < 0.05$)。iMAR 组中所有 ROI 的 SD 均减小 ($P < 0.05$)，除了背景噪声，不同区域之间的伪影去除率没有差异 ($P > 0.05$)。iMAR 组在图像质量评分和诊断信心评分方面均有改善，分别增加了 2.70 和 2.88 分 ($P < 0.05$)。与 cVRT 重建相结合的 iMAR 图像获得了最高的主观评分 ($P < 0.05$)，其次是与 VR 重建相结合的 iMAR 图像 ($P < 0.05$)，常规组中的 cVRT 和 VR 图像获得了最低的评分 ($P > 0.05$)。

结论: iMAR 可以有效纠正低密度区域、高密度区域和同一层次对侧软组织的 CT 值, 大大减少图像噪声, 并提高诊断信心。与 cVRT 重建相结合时, 金属植入物的稳定性以及与相邻组织的关系可以更直观地显示和评价。

PO-2311

基于 CT 影像组学在肺转移预测中的研究

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目的:

尤文肉瘤患者的主要预后不良事件包括肺转移, 肺转移的预测可能为指导个体化治疗方案提供潜在的可靠依据。本研究旨在建立并验证基于计算机断层扫描 (Computed Tomography, CT) 图像的影像组学模型, 探究其在尤文肉瘤肺转移预测中的价值。

材料与方法:

回顾性纳入 143 例经组织病理学诊断为尤文肉瘤的患者, 按照 7:3 的比例随机分为训练组 100 例, 测试组 43 例。在 CT 平扫和 CTE 图像中沿着每个肿瘤的边缘手动勾画 ROI, 并提取影像组学特征。建立了 6 个不同的模型, 包括 3 个影像组学模型 (Pre-CT、CTE 和 ComB 模型) 和 3 个临床-影像组学模型 (Pre-CT_clinical、CTE_clinical 和 ComB_clinical 模型) 用于预测尤文肉瘤肺转移。通过计算 AUC、ACC、敏感性和特异性来评价不同模型, 并采用 DeLong 检验比较影像组学模型和临床-影像组学模型的 AUC 值是否有统计学差异。

结果:

在临床因素中, 治疗方式在转移组和非转移组有统计学差异。影像组学模型及临床-影像组学模型在预测尤文肉瘤患者肺转移方面均表现良好, 其中 ComB 模型应用 LR 分类器取得的 AUC 值最高 (训练组/测试组 AUC: 0.885/0.848), 但是影像组学与临床-影像组学模型的 AUC 值没有统计学差异。

结论:

在尤文肉瘤患者中, 联合影像组学特征和临床特征建立的临床-影像组学模型对肺转移具有较好的预测能力, 但是与影像组学模型相比, 临床-影像组学模型的预测效能没有提高。

PO-2312

应用深度学习分析颈椎 CT 形态学参数

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目的: 颈椎 CT 形态学参数的测量是可重复和耗时的。深度学习 (DL) 提高了效率和一致性。我们建立了一系列基于 DL 的分割算法来自动测量脊髓型颈椎病评估的五个关键参数, 并将我们的算法的性能与医生的性能进行了比较, 以评估其准确性和临床应用价值。

方法: 将 685 例患者的颈椎 CT 图像分为训练组 (n=548) 和测试组 (n=137)。训练集用于开发 VB-Net-DL 模型, 包括多个颈椎亚区的 3D 分割模型和颈椎 CT 中矢状面上的关键点定位模型。测量参数包括矢状椎管径 (SCD)、矢状椎体径 (VBD)、巴甫洛夫比、横向椎管径 (TCD), 和骨性椎管面积 (OSCA)。由放射科医生和脊椎外科医生进行手动测量。使用 Mann-Whitney U 检验、Pearson 相关性、平均绝对误差和 Bland-Altman 图评估模型性能。

结果: 测试集中巴甫洛夫比率、SCD、VBD、TCD 和 OSCA 的 DL 和手动测量在准确性和一致性方面具有可比性。对于大多数参数, VB-Net 模型的 Pearson 相关系数超过 0.8。

结论: 我们基于 VB-Net 的 DL 方法可以有效地近似人工测量人类颈部 CT 形态参数, 从而为医生提供准确高效的辅助诊断工具。

PO-2313

颈椎 MRI 中央椎管和椎间孔狭窄自动检测与分类的深度学习模型

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目的: 开发一种在颈椎 MRI 上自动检测和分类颈管和神经孔狭窄的深度学习 (DL) 模型, 可以提高其诊断的准确性和效率。

方法: 在 DL 模型的基础上, 提出了一种由感兴趣区域 (ROI) 检测和级联预测组成的颈椎管狭窄症诊断方法。首先, 使用三部分特定的卷积神经网络来检测颈部 MRI 图像不同部分的 ROI。然后, 对狭窄类别进行级联预测, 以获得患者各切片上狭窄程度和位置的结果。最后, 在测试中, 将结果进行融合, 以获得患者级别的诊断报告。使用 DL 模型的准确性 (ACC)、曲线下面积 (AUC)、敏感性、特异性、F1 评分和诊断时间以及 ROI 检测定位的召回率等指标来评估性能。

结果: 在我们的 DL 模型的五次交叉验证下, ROI 定位的平均召回率达到 89.3% (神经孔) 和 99.7% (中央椎管)。在二分类法分类 (正常或轻度 vs 中度或重度) 中, DL 模型的 ACC 和 AUC 非常接近放射科医生的水平。

结论: DL 模型在颈椎 MRI 上对中央椎管和神经孔狭窄的检测和分类方面表现出与专科放射科医生相当的性能。

PO-2314

Hoffa 脂肪垫能谱 CT 成像在膝骨关节炎诊断中的临床应用价值

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目的: 探讨能谱 CT 脂肪-肌肉分离图像及基物质含量在膝骨关节炎诊断中的临床应用价值。

资料与方法: 前瞻性收集临床初次诊治膝骨关节炎患者 90 例, 所有患者行患侧膝关节 MR 检查和双侧膝关节 CT 能谱成像。以 T2WI 抑脂序列上矢状面 Hoffa 脂肪垫最大层面为标准, 在相同层面常规 CT 图、脂肪基物质图、肌肉基物质图上测量脂肪内异常密度/灰度长径, 同时分别沿 Hoffa 脂肪垫边缘用自由笔圈出边界测量面积。此外, 比较症状严重膝关节与对侧膝关节常规 CT 图、脂肪基物质图、肌肉基物质图上矢状面 Hoffa 脂肪垫最大层面面积和相应 CT 值、脂肪基物质含量、肌肉基物质含量。

结果: 以 T2WI 抑脂序列为标准, 脂肪基物质图内异常灰度长径更为接近标准, 且两者差异无明显统计学意义 ($P < 0.05$), 均大于常规 CT 图、脂肪基物质图、肌肉基物质图上测量面积 ($P < 0.05$)。脂肪基物质图勾画矢状面 Hoffa 脂肪垫最大层面更为接近, 且两者差异无明显统计学意义 ($P < 0.05$), 均大于常规 CT 图、脂肪基物质图、肌肉基物质图上测量面积 ($P < 0.05$)。症状严重膝关节与对侧膝关节比较, 矢状面 Hoffa 脂肪垫最大层面面积和相应 CT 值、脂肪基物质含量、肌肉基物质含量存在差异, 脂肪基物质含量鉴别敏感性和特异性均最高。

结论 能谱 CT 脂肪-肌肉分离图像能较好地反映膝骨关节炎患者 Hoffa 脂肪垫大小、损伤情况, 有利于客观反映骨性关节炎临床症状严重程度。

PO-2315

能谱 CT 定量与发作期膝骨关节炎中医证型的相关性研究

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目的：探讨不同中医证型发作期膝骨关节炎（KOA）能谱 CT 髌下脂肪垫（IFP）、关节间隙和骨赘间的差异，为 KOA 辨证分型研究提供客观依据。

方法：选取发作期 KOA 住院患者 118 例并进行中医辨证分为 3 组：A 组(寒湿痹阻证)、B 组(气滞血瘀证)、C 组(肝肾亏虚证和气血虚弱证)。所有患者均采用能谱 CT 检查，使用 GSI Viewer 进行基物质分离图像后处理及分析，脂肪（肌肉）基物质图像、CT 图获得矢状位 IFP 最大面积及其脂基物质含量和常规 CT 值，骨（脂肪）基物质图像获得冠状位内外关节间隙最大面积并观察骨赘分级。分析各组不同急性发作期 KOA 中医证型在能谱 CT 成像 IFP 定量、关节间隙定量、骨赘评级之间的差异。

结果：根据主要证候分组，A 组寒湿痹阻证 51 例，B 组气滞血瘀证 40 例，C 组肝肾亏虚证和气血虚弱证 27 例。各中医证型间脂肪（肌肉）物质分离图像 IFP 最大面积和 CT 值无统计学差异，IFP 脂基物质含量方面，A 组<B 组<C 组，且差异有统计学意义。膝关节内侧间隙面积 A 组和 C 组之间无统计学差异，但均大于 B 组，差异有统计学意义。膝关节外侧间隙面积和骨赘评级在各中医证型间无统计学差异。

结论：IFP 脂基物质含量和关节间隙定量与发作期 KOA 中医证型间存在一定相关性，能谱 CT 基物质分离在中医辨证施治 KOA 中有一定临床应用价值。

PO-2316

健康人膝关节股骨内髁软骨 T2 值研究

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摘要：目的 应用定量磁共振 T2 mapping 技术，探讨健康人膝关节股骨内髁承重区与非承重区各层软骨 T2 值的差异，进一步了解形态完整的关节软骨各层含水量变化。方法 对健康人行膝关节 MRI 矢状位 T2 mapping 检查，共收集 22 例，38 个膝关节，平均年龄（27.05±1.05）岁。在 T2 mapping 图上对膝关节股骨内髁承重区、非承重区关节软骨进行 T2 值测量：于关节软骨完整且最厚处行深、中、浅三层测量。采用单因素方差分析(多组间统计数据的方差分析，如有统计学意义再做 LSD 两两组间比较)对同区域关节软骨深、中、浅层 T2 值进行比较；采用配对 t 检验比较股骨内髁承重区与非承重区间关节软骨相应深、中、浅层 T2 值的差异。结果 膝关节软骨在 T2 mapping 伪彩图上（阈值 0-80ms），根据颜色分为三层：深层呈黄色、中层呈绿色、浅层呈蓝色；股骨内髁承重区软骨深、中、浅三层两两间 T2 值差异均有统计学意义（ $P<0.001$ ），非承重区软骨深层与中层、深层与浅层间 T2 值差异有统计学意义（ $P<0.001$ ）；股骨内髁承重区与非承重区软骨深层间、中层间 T2 值差异均有统计学意义（ $P<0.001$ ）。结论：应用 T2 mapping 序列测量 T2 值能够定量评价膝关节软骨。基于膝关节软骨含水量和胶原纤维排列的组织学特点，评价关节软骨建议分为深层、中层、浅层进行研究，且推荐在软骨深层、中层中完成 T2 值定量测量。同时，根据承重部位不同进行分区研究亦是必要的。

PO-2317

中轴骨痛风的 CT 及 MRI 表现

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目的: 探讨中轴骨痛风的 CT、MR 特点, 以提高对该病的认识。方法: 回顾性分析本院经病理证实的 54 例中轴骨痛风的临床及影像学资料, 分析其 CT、MR 特点。结果: 54 例中轴骨痛风中, 男 43 例, 女 11 例; 3 例发生于胸肋关节, 51 例发生于脊柱, 其中 3 例累及骶髂关节。脊柱单一部位发病 45 例 (88.24%, 45/51), 其中腰骶椎最多 (58.82%, 30/51), 其次为颈椎 (15.69%, 8/51)、胸椎 (13.73%, 7/51); 两个及两个以上部位同时发病仅 6 例 (11.76%, 6/51)。44 例出现溶骨性骨质破坏 (81.48%, 44/54), 多为穿凿样骨质破坏, 其中 16 例可观察到骨质破坏边缘见硬化边。CT 密度多为不同程度的高密度; MR 信号多样, T1WI 多为等、低信号, T2WI 可为高、低不等的混杂信号。29 例行增强扫描检查, 除了 3 例无强化外, 其余 26 例均可见强化。结论: 中轴骨痛风的影像表现具有一定特点, 如近关节或关节内的穿孔样骨质侵蚀、边缘突出和硬化、痛风石等, 对于不明原因的中轴疼痛、尤其伴有高尿酸血症的高危人群, 诊断时应考虑是否存在中轴骨痛风的可能。

PO-2318

膝骨性关节炎疼痛因素分析

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目的 利用问卷调查联合受试者进行膝关节 CT 扫描的方式, 探讨 KOA 相关疼痛的发病机制。

方法 收集 2022 年 3 月至 2022 年 9 月解放军第 960 医院进行膝关节 CT 平扫患者 35 例, 共 70 例膝关节影像。应用 WOMAC 问卷针对其左右膝关节的感受分别从疼痛、僵硬和关节功能三大方面对患者的骨关节炎指数进行评分。WOMAC 评分相对较高的一侧被分为“感受较多疼痛”组, 记为组 1, 相对较低的被分为“感受较少疼痛”组, 记为组 2。对患者两侧膝关节同时进行扫描并应用 Bone Density 软件 (AVW 2.0 医学影像后处理工作站, 东软医疗) 完成胫骨软骨下骨密度测量。由两名高年资医师对患者是否有囊肿及膝关节对齐方式进行诊断, 通过双盲法对膝关节骨关节炎进行 Kellgren-Lawrence 分级。

结果 患者平均年龄 55.7 ± 9.0 岁, 平均 BMI 为 25.9 ± 3.0 。膝关节内外翻对于 WOMAC 评分呈现出显著差异性, $p < 0.01$ 。KL 分级和 WOMAC 之间没有明显关联 ($p > 0.05$), 膝关节软骨下囊肿对于 WOMAC 评分呈现出显著差异性 ($p < 0.01$), KL 分级和 WOMAC 之间没有明显的联系 ($p > 0.05$)。BMI 和 WOMAC 之间没有明显的相关性 ($p > 0.05$)。配对 t 检验显示, 在距软骨下表面 0-2.5 mm 的深度处, 组 1 与组 2 的内外侧 BMD 存在显著差异 ($p < 0.05$)。与组 2 相比, 组 1 的外侧 BMD 较高 (平均差异为 63.80 mg/cm^3 ; Cohen's d 值为 0.471)。

结论 膝骨关节炎患者的 WOMAC 评分与内外翻、是否有囊肿及胫骨软骨下骨内外侧骨密度变化有关, 与 KL 分级及 BMI 无关, 胫骨软骨下的 BMD 改变及膝关节排列方式和状态的改变是 KOA 相关疼痛的特征。

PO-2319

合成 MRI 在业余马拉松运动员距骨软骨急性改变中的初步研究

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目的 探讨合成 MRI 对业余马拉松运动员距骨软骨急性改变定量检测的价值。**方法** 2022 年 9 月至 2023 年 5 月间招募业余马拉松运动员 42 名。在跑前基线及以 10km/h 速度跑步 30 分钟后分别对其右踝关节进行扫描, 扫描序列包括合成 MRI 序列, 扫描后可获得 T1、T2、PD 3 种定量图谱。将距骨软骨分为六个隔室: 内侧前 (MA), 内侧中心 (MC), 内侧后 (MP), 外侧前 (LA), 外侧中心 (LC) 和外侧后 (LP) 6 个亚区, 基于合成 MRI, 测量各软骨亚区的 T1、T2、PD 值。跑步前后距骨软骨 T1、T2 及 PD 值的比较采用 Wilcoxon 符号秩和检验。**结果** 距骨软骨整体 T1、T2 及 PD 值在跑后均高于跑前, 差异有统计学意义 (P 均 <0.05)。MC、MP、LC 亚区 T1 值差异有统计学意义; 除 LA 亚区外, 其他亚区 T2 值差异均有统计学意义; 仅 MC 亚区 PD 值差异具有统计学意义 (P 均 <0.05)。**结论** 合成 MRI 技术的定量参数 T1、T2、PD 值可用于业余马拉松运动员踝关节距骨软骨急性改变的检测。

PO-2320

定量 MR 技术对业余马拉松运动员椎间盘生化成分的研究

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目的: 采用 MR 化学位移成像技术, 探讨不同跑龄业余马拉松运动员及健康志愿者对椎间盘生化成分的影响

方法: 共招募 40 名年龄 25-55 岁之间的男性志愿者, 其中 30 名为业余马拉松运动员作为实验组, 10 名为健康志愿者作为对照组, 将实验组按跑龄分为低跑龄组: 小于 3 年, $n=10$; 中等跑龄组: 3-5 年, $n=10$; 高跑龄组: 大于 5 年, $n=10$; 所有受试者进行 MRI 检查, 获得其腰椎间盘 (IVD) 的 Dixon-VIBE、矢状位 T2*mapping 及矢状位 T2WI 序列图像。将 IVD 绘制成大致等距的五个 ROI, 纤维环被分割为前纤维环 (AAF) 和后纤维环 (PAF), 髓核被分割成三个区域, 即前髓核 (ANP)、中央髓核 (CNP) 和后髓核 (PNP), 获得各个亚区 ROI 的 T2 值。并将其腰椎间盘的退变程度采用 Pfirrmann 分级评估定级。采用 Mann-Whitney U 检验比较运动组与对照组 IVD Pfirrmann 分级的差异; 采用独立样本 t 检验比较组间腰椎体 IVD 不同区域 ROI T2*值的差异。**结果:** 不同跑龄志愿者及健康志愿者间 L1/2~L5/S1 IVD Pfirrmann 分级差异均有统计学意义 (P 均 <0.01)。运动组 L1/2 中央髓核、L1/2 前髓核、L1/2 后髓核、L2/3 中央髓核、L1/2 后髓核、L3/4 后髓核 T2*值小于对照组, 差异具有统计学意义 ($P<0.05$), 其余组 T2*值差异无统计学意义 ($P>0.05$)。

结论: 随着跑龄的延长, 腰椎间盘退变程度逐渐加快, 且主要影响腰椎间盘髓核区域的退变。

PO-2321

胸部 CT 联合 QCT 机会性测定南京地区健康人群 T8-L2 骨密度分布规律及低骨量、骨质疏松患病率的研究

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目的 利用胸部 CT 联合定量 CT (QCT), 测定并探讨南京地区健康人群胸腰椎骨密度分布规律及骨量异常患病率。

方法 回顾性选取江苏省中医院 2021 年 08 月至 2022 年 08 月行胸部 CT 的健康人群共 1086 例, 其中男 568 例, 女 518 例, 根据年龄分为 14 个年龄段: 20~24、25~29、30~34、35~39、40~44、45~49、50~54、55~59、60~64、65~69、70~74、75~79、80~84、85~89; 同时获得 QCT 原始数据并将数据传至 PACS 及 BMD 后处理工作站“QCT Pro”, 通过 QCT 异步体膜法测量 T8、T9、T10、T11、T12、L1、L2 骨密度, 并以 L1+L2 骨密度平均值判断受检者骨量状态。采用 Pearson 相关、线性回归分析不同性别各年龄段间胸椎骨密度规律及其与性别、年龄的差异与相关性, 及骨质疏松的患病率。

结果 各年龄组胸椎 T8~T12 平均骨密度均高于腰椎 L1~L2 的平均骨密度, 二者差异有统计学意义 ($P<0.001$); T8-T10 骨密度呈现递增趋势, T10 至 L2 椎体骨密度逐渐递减; 各年龄组各胸椎骨密度与腰椎 L1、L2 骨密度间均高度相关(相关系数 r 均 >0.90), 且均有统计学意义 ($P<0.001$), 胸腰椎相邻椎体间骨密度差异均无统计学意义 ($P>0.05$)。男性和女性的椎体骨密度均随年龄增长逐渐减低, 在各年龄段间两两比较, 差异均有统计学意义 (P 均 <0.001), 在 45~49 组之前, 男性骨密度低于女性, 但随后女性 BMD 减低幅度明显增大并低于男性。随年龄增长, 男性和女性骨质疏松症患病率均呈上升趋势, 其中 55-89 岁各组女性患病率均明显高于同龄男性。

结论 南京地区健康人群下位胸椎 (T8-T12) 的平均骨密度高于腰椎 (L1-L2), 并呈显著正相关; 两性椎体骨密度均随年龄增长而降低, 中老年人群, 尤其是绝经后女性是骨质疏松症的高危人群。

PO-2322

基于 X 线及磁共振影像组学预测骨肉瘤术后复发的研究

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目的: 探索基于 X 线和多参数磁共振影像组学在预测骨肉瘤术后复发的价值。**材料和方法:** 回顾性收集经病理证实的 92 例骨肉瘤患者的 X 线及 MRI 资料, 根据术后 2 年后随访分为术后局部复发 (LRs) 36 例和术后局部无复发 (NLRs) 56 例, 按照 7:3 的比例随机分为训练组和验证组。所有患者均在治疗前行 X 线和多参数 MRI 成像, 经预处理后, 手动勾画三维肿瘤感兴趣区, 从 X 线、多参数 MRI (T1WI、T2WI 和 CE-T1WI) 中提取影像组学特征。采用最小冗余-最大相关性 (mRMR)、最小绝对收缩和选择算子 (LASSO) 回归和递归特征消除随机森林分类器 (RFE-RF) 三个步骤筛选特征, 并使用 XGB、LR、KNN、SVM 和 RF 5 种分类器构建基于 X 线、MRI 及 X 线联合 MRI 的预测模型。使用受试者工作特征曲线 (ROC) 和曲线下面积 (AUC) 来评估分类器的性能。**结果:** 基于 X 线、T1WI、T2WI、T1WI-CE 提取的特征, 经 mRMR、LASSO 和 RFE-RF 最终筛选的特征数为分别为 1、5、1、3 个。基于 X 线、MRI、X 线联合 MRI 影像组学特征的 XGB 模型在验证组中的 AUC 值分别为

0.611、0.609、0.682, LR 模型 0.540、0.759、0.759, KNN 模型 0.686、0.654、0.690, SVM 模型 0.459、0.759、0.768, RF 模型 0.627、0.704、0.868。联合 X 线和 MRI 组学特征的模型具有较好的预测性能。

结论: 联合 X 线和 MRI 影像组学特征构建的机器学习模型在预测骨肉瘤术后复发具有一定的价值, 可为临床早期干预提供了一个新的决策依据。

PO-2323

骨质疏松性椎体压缩骨折椎体强化术后残余背痛的临床-影像预测模型研究

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目的 探讨基于 CT 影像组学与临床相关危险因素的联合模型对骨质疏松性椎体压缩骨折 (OVCF) 行椎体强化术后发生残留背痛的预测价值。方法 回顾性分析 101 例 OVCF 行椎体强化术后患者的临床和 CT 影像资料, 将术后第一天视觉模拟评级法 (VAS) 评分 ≥ 4 定义为残留背痛 (RBP)。所有病例按 8:2 的比例随机分层抽样分为训练集 (80 例) 和测试集 (21 例)。从术前平扫 CT 图像中提取出影像组学特征并筛选出强相关特征; 采用单因素分析及多因素 Cox 回归分析筛选出临床独立危险因素。最后将临床独立危险因素, 强相关影像组学特征输入到 logistic 回归模型中分别构建临床模型、影像模型、临床-影像联合模型, 采用受试者操作曲线 (ROC) 对模型的预测性能进行评定, 以决策曲线分析 (DCA) 评估联合模型收益。结果 经过筛选, 10 个影像组学特征与术后 RBP 强相关, 椎体高度损失为临床独立危险因素 ($HR=3.39, p<0.01$); 基于以上特征用于分别构建风险预测模型, 影像模型及临床模型在训练组与测试组中的 AUC 分别为 0.86、0.78、0.86 和 0.87。临床-影像联合模型训练组与测试组的 AUC 为 0.91 和 0.90, 均高于影像模型及临床模型, DCA 显示联合模型具有一定的临床收益。结论 影像组学特征联合椎体高度损失特征构建的风险模型对 OVCF 患者行 VA 术后发生 RBP 有一定的预测能力。

PO-2324

膝关节应力位 CT 扫描技术

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目的: 探讨膝关节应力位 CT 检查技术, 研制膝关节应力位辅助用具, 为临床分析关节各解剖结构及其周围韧带损伤程度, 判定手术提供准确可靠的影像依据。

方法: 针对临床科下肢关节手术的要求, 研究应力功能体位设计并使用辅助器械, 对 30 例膝关节进行强制外翻和强制内翻应力位 CT 平扫, 病例选取患者年龄在 40-80 岁之间。扫描参数: KVP: 120, MAS: 200

结果: 30 例膝关节强制外翻和强制内翻应力位一侧关节间隙增宽者 21 例, 其中 10 例只进行了内翻应力位扫描显示外侧间隙。辐射剂量: 3.093mSv, 其中 DLP: 309.3mGy*cm, K 值 0.01。

结论: 膝关节外伤在没有骨折的情况下, 也很容易造成副韧带、半月板、交叉韧带的损伤等。外侧副韧带损伤易导致小腿的内翻和内旋, 内侧副韧带损伤易导致小腿的外翻和外旋。DR 图像直观快捷辐射剂量低, CT 扫描骨骼影像清晰, 由于密度分辨力高, 软组织副韧带、半月板及交叉韧带的显示优于 DR, 图像也可以三维重建。应力位 CT 扫描的研究是技术创新, 拓展了检查范围得到了功能位影像, 对判断膝关节副韧带损伤有一定的意义。

PO-2325

基于低剂量胸部 CT DCNN 辅助筛查骨质疏松的可行性研究

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目的：分析基于低剂量胸部 CT 影像图像及临床资料建立深度卷积神经网络（DCNN）模型评估骨量的可行性和效能，作为人工智能辅助机会性筛查骨质疏松以应用于临床的手段。

材料方法：回顾性分析 500 名脊柱外科住院患者 1000 张图像及相应临床资料。图像来源于脊柱外科患者住院期间同时行管电压 100kv 的低剂量胸部 CT 入院常规检查和术前腰椎定量 CT（QCT）的检查。以腰椎 QCT 测量骨密度结果为标准将测量结果分为骨量正常、低骨量和骨质疏松，利用骰子相似系数（DSC）评价 DCNN 分割效能。基于训练集（240 人）建立 DCNN 分类模型 1（腰 1+腰 2 融合特征构建）和模型 2（腰 1+腰 2 融合特征图像和临床指标），模型 3（腰 1+腰 2 融合特征图像和临床指标及组学特征）在测试集（260 人）中使用 ROC 曲线比较三种模型评估骨量的效能。

结果：模型 1、模型 2、模型 3 诊断骨质疏松的敏感性、特异性、AUC 依次为：0.911，0.941，0.966；0.895，0.971，0.975；0.927，0.963，0.977。三种模型对骨质疏松的诊断效能有统计学意义。考虑临床资料及组学特征对诊断效能有提高的作用。

结论：基于 DCNN 的模型对于低剂量胸部 CT 影像图像可辅助诊断骨质疏松，同时考虑临床因素及组学特征的模型效能更佳。

PO-2326

不同病原体脊柱感染的 MR 鉴别诊断

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目的：探讨结核性脊柱炎、化脓性脊柱炎、布氏杆菌性脊柱炎的不同 MR 特征，以提高鉴别诊断水平。

方法：分析 77 例经手术、穿刺病理、实验室检查确诊的脊柱感染患者 MR 影像资料，分为结核性脊柱炎组、化脓性脊柱炎组、布氏杆菌性脊柱炎组，所有患者均行 MR 扫描，扫描序列包括常规矢状位 T2WI、T1WI、STIR 和横断位 T2WI，分别由两位主任医师对 MR 资料进行独立分析，评估项目包括：发病部位、累及椎体数目、椎体破坏情况、椎体骨髓水肿范围（轻度，范围<椎体高度 1/2；重度，范围>椎体高度 1/2）、椎体塌陷程度（无明显塌陷；轻度，高度>相邻正常椎体高度 1/2；重度，高度<相邻正常椎体高度 1/2）、椎间盘受累情况（未受累；轻度，范围<正常椎间盘范围 1/2；重度，范围>正常椎间盘范围 1/2）、椎间隙狭窄情况（无明显狭窄；轻度狭窄，程度<正常椎间隙 1/2；重度狭窄，程度>正常椎间隙 1/2）、脓肿范围（无脓肿；少量脓肿，范围<1 个相邻正常椎体高度 1/2；大量脓肿，范围超过受累椎体总长度）。对计数资料用卡方检验，以 $P<0.05$ 为差异存在统计学意义。

结果：46 例结核感染 106 个椎体，20 例化脓性感染 41 例椎体，11 例布氏杆菌感染 25 个椎体。结核性脊柱炎侵犯腰椎占 44.34%，胸椎占 42.45%，颈椎占 13.21%；化脓性脊柱炎侵犯腰椎占 68.29%，胸椎占 29.27%，骶椎占 2.43%；布氏杆菌性脊柱炎侵犯腰椎占 60.00%，颈椎占 36.00%，骶椎占 4%。统计学分析显示：骨质破坏情况、椎体塌陷程度、椎间隙狭窄情况、脓肿范围，三组发生率有显著性统计学意义（ $P<0.01$ ）；累及椎体数目、椎体骨髓水肿范围、椎间盘受累情况三组发生率无显著性统计学意义（ $P>0.05$ ）。

结论：结核性脊柱炎、化脓性脊柱炎、布氏杆菌性脊柱炎的 MR 表现在骨质破坏情况、椎体塌陷程度、椎间隙狭窄情况、脓肿范围方面有显著性差异，有助于鉴别诊断。

PO-2327

基于 MRI 影像及数字病理的组学列线图预测软组织肉瘤术后复发风险的研究

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目的

探讨基于 MRI 影像及数字病理的组学列线图预测软组织肉瘤 (STS) 术后复发风险的价值。

方法

回顾性收集 2016 年 1 月至 2021 年 3 月青岛大学附属医院经手术病理证实的 STS 患者，其中于崂山院区就诊的患者作为训练集 (112 例)，市南院区就诊的患者作为验证集 (80 例)。分别提取病灶的 MRI 影像组学和病理组学特征，采用多因素 Cox 回归分析基于影像组学特征、病理组学特征和两者组合特征构建预测模型，采用一致性指数 (C index) 和时间依赖受试者操作特征曲线下面积 (t-AUC) 评价各模型预测 STS 术后复发风险的效能，确定最优组学模型。采用多因素 Cox 回归筛选临床和影像学特征，建立临床模型。基于 T 分期、N 分期及 M 分期建立 TNM 模型。结合最优组学模型和临床模型，构建组学列线图，采用 C index 和 t-AUC 评估各模型的预测性能，采用 DeLong 检验比较 AUC 间的差异。

结果

联合模型的性能优于单一影像组学或病理组学模型，在验证集中的 C index 值为 0.727 (95%CI: 0.632-0.823)，中位 AUC 值为 0.737。结合临床模型和联合模型构建的组学列线图，在验证集中的 C index 值为 0.763 (95%CI: 0.685-0.842)，中位 AUC 值为 0.783。组学列线图的验证集 AUC 值高于临床模型、TNM 模型、影像组学模型及病理组学模型，差异有统计学意义 (Z=3.33、2.18、2.08、2.72, P 均<0.05)；组学列线图与联合模型的验证集 AUC 值差异无统计学意义 (Z=0.70, P=0.487)。在训练集和验证集中，三个复发风险组 STS 患者的术后复发率差异有统计学意义 (训练集 $\chi^2=73.90$, P<0.001；验证集 $\chi^2=18.70$, P<0.001)。

结论

组学列线图对于 STS 术后复发风险评估具有较好的预测性能，并可为 STS 患者个体化治疗方案的制定提供依据。

PO-2328

中老年直肠癌患者骨盆骨髓扩散高信号的影响因素及潜在原因研究

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目的：中老年人骨盆骨髓扩散高信号容易被误认为是病理改变，尤其是肿瘤患者。在 DWI 上，部分中老年直肠癌患者骨盆骨髓扩散表现高信号，本研究旨在探讨了中老年直肠癌患者骨盆骨髓 DWI 高信号的影响因素及潜在原因。

方法：收集我院中老年直肠癌患者 IVIM 和 IDEAL-IQ 的检查，根据骨盆骨髓与邻近肌肉扩散信号强度的比较，将骨盆骨髓扩散信号分为低、等、稍高、高信号四级及等低信号和高信号两组。分析贫血、红细胞分布宽度 (RDW)、质子密度脂肪分数 (PDFF)、年龄和性别因素对骨盆骨髓扩散信

号的影响, 并分析骨盆骨髓扩散信号分级与之的相关性。最后比较骨盆骨髓扩散高信号组和等低信号组 IVIM 参数间的差异, 并分析 IVIM 各参数与信号分级间的相关性。

结果: 共纳入 74 人, 男 51 人, 女 23 人。范围为 50-88 岁, 平均年龄为 68 岁。骨盆骨髓扩散表现为低信号 12 例, 等信号 31 例, 稍高信号 22 例, 高信号 9 例; 其中等低信号组 43 例, 高信号组 31 例。多因素分析显示, 贫血($OR = 5.265$, $P = 0.007$)和 PDFF ($OR = 0.895$, $P = 0.001$)是骨盆骨髓扩散信号强度的重要影响因素, 而年龄、性别及 RDW 则不是。贫血分级与扩散信号分级呈正相关($r=0.441$, $P<0.001$), 而 PDFF 与扩散信号分级呈负相关($r=-0.566$, $P<0.001$)。高信号组的标准表现观扩散系数(ADC)、扩散系数(D)和假扩散系数(D*)值较等低信号组低。而灌注分数(f)值两者不存在明显差异。此外, 骨盆骨髓扩散信号分级与标准 ADC 值($r=-0.208$)、D 值($r=-0.502$)和 D* 值($r=-0.284$)之间存在相关性, 但与 f 值不相关。

结论: 中老年直肠癌患者骨盆骨髓扩散信号强度与贫血和 PDFF 相关。中老年患者直肠癌患者骨盆骨髓扩散高信号主要是骨髓细胞增生的表现, 而骨髓内灌注增加不明显。

PO-2329

远侧尺桡关节不稳定的 MRI 影像学分析

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目的: 远侧尺桡关节(distal radioulnar joint, DRUJ)是维持手腕部稳定和前臂/腕关节旋转功能的重要解剖结构, 骨性结构和软组织结构共同维持 DRUJ 稳定性。DRUJ 失稳是临床常见病, 关节失稳的机制尚不明确。既往很少有使用 MRI 评估 DRUJ 不稳定的研究报道。本研究旨在探讨基于 MRI 图像评估创伤后与 DRUJ 失稳的相关影响因素。

方法: 收集从 2021 年 4 月至 2022 年 4 月期间 121 例外伤后伴或不伴有 DRUJ 不稳定的患者进行了 MRI 检查。体检显示所有患者均有腕关节疼痛症状或腕关节功能障碍。将患者的年龄、性别、远端尺桡骨横断面形态、三角纤维软骨盘、背侧尺桡韧带、掌侧尺桡韧带、远端骨间膜、尺侧腕伸肌腱和旋前方肌作为感兴趣的变量纳入单因素和多因素 Logistic 回归模型进行分析。通过雷达图和条形图比较变量间的差异。

结果: 121 例患者的平均年龄为 42.16 ± 16.07 岁。50.4%的患者存在 DRUJ 不稳定, 20.7%的患者存在远端骨间膜斜束。多因素 Logistic 回归模型发现三角纤维软骨盘损伤($OR: 4.640$, $p=0.03$)和旋前方肌异常($OR: 54.759$, $p=0.006$)是发生远侧尺桡关节不稳定的危险因素, 存在远侧骨间膜($OR: 0.107$, $p=0.001$)是防止 DRUJ 不稳定的保护因素。DRUJ 不稳定组韧带损伤的发生率较高。缺少远侧骨间膜的患者更容易发生 DRUJ 失稳、三角纤维软骨盘和尺侧腕伸肌腱的损伤。桡骨远端横断面形态为 C 型、三角纤维软骨盘结构完整和存在远侧骨间膜的患者拥有更好的 DRUJ 关节稳定性。

结论: 本研究基于 MRI 影像学发现远侧尺桡关节不稳定与三角纤维软骨盘和旋前方肌的损伤情况、远侧骨间膜是否存在密切相关性。该结论可以早期发现 DRUJ 不稳定的潜在风险, 并为采取相应预防措施提供临床依据。

PO-2330

胸椎 QCT 诊断骨质疏松 BMD 阈值的临床研究

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目的 分析下部胸椎与腰椎骨密度的相关性并确定诊断骨质疏松及骨量减少的胸椎骨密度阈值。**方法** 回顾性分析因临床需要进行腹部 CT 扫描的患者 276 名。测量 T10-L3 各椎体的 BMD,使用 pearson 相关分析各椎体间的 BMD 及胸椎 (T10-12) 与腰椎 (L1-L3) BMD 的相关性,应用线性回归方程计算诊断骨质疏松及骨量减少的胸椎平均 BMD 阈值。结果 T10 至 L3 椎体 BMD 逐渐减低, BMD 范围 $120.49 \pm 35.96 \sim 95.62 \pm 35.95 \text{ mg/cm}^3$, T10-L3 各椎体之间 BMD 均呈明显正相关 ($r=0.894 \sim 0.967$, $p < 0.05$), T10-12 平均 BMD 与 L1-3 平均 BMD 相关系数为 0.957。胸椎诊断骨质疏松及骨量减少的平均 BMD 阈值分别是 96.59 mg/cm^3 及 134.75 mg/cm^3 。结论胸椎与腰椎 BMD 呈明显相关性, 胸椎 BMD 测量可以作为诊断骨质疏松及骨量减少的方法。

PO-2331

不同勾画方法及参数定量评估 DLS 患者椎旁肌群 MRI 特点

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目的 使用两种不同的椎旁肌勾画测量方法, 多参数定量评估退行性腰椎侧凸 (degenerative lumbar scoliosis, DLS) 患者多裂肌、竖脊肌、腰大肌退行性改变特点。**方法** 收集 2019 年 8 月至 2022 年 3 月于本院确诊为 DLS 的患者 33 例作为实验组, 同期招募健康志愿者 35 例作为对照组, 行腰椎 MRI 常规序列和多回波 Dixon-vibe 序列扫描。两位观察者在腰椎间盘 4/5 中心层面 (L4/5) 的水、脂相图中分别对椎旁肌执行总横截面积 (TCSA)、纯肌肉横截面积 (PCSA) 两种不同勾画方案。采用组内相关系数 (ICC) 评估两观察者测量结果的可重复性。分析两组患者三种椎旁肌多种定量参数差异性。使用受试者操作特性 (ROC) 曲线比较三种椎旁肌具有显著差异性参数的曲线下面积大小。结果 TCSA、PCSA 两种勾画方法在退变较严重的 DLS 患者多裂肌和竖脊肌中一致性较好 ($ICC > 0.75$, $P < 0.05$); DLS 组患者中多裂肌的总脂肪浸润 (TMFI)、纯肌肉脂肪浸润 (PMFI)、功能面积相对值 (RFCSA) 与对照组具有极其显著性差异 ($P < 0.001$); 竖脊肌 PCSA 不对称性 (ARPCSA)、腰大肌相对横截面积 (RTCSA) 与对照组具有显著性差异 ($P < 0.01$); 多裂肌 PCSA 相对值 (RPCSA)、TCSA 相对值 (RTCSA)、PMFI 不对称性 (ARPMFI)、TCSA 不对称性 (ARTCSA) 参数, 竖脊肌 TMFI、PMFI、RTCSA、ARTMFI, 腰大肌 ARTCSA 参数与对照组患者椎旁肌各参数具有统计学差异 ($P < 0.05$); 其中多裂肌 TMFI、竖脊肌 ARPCSA、腰大肌 RTCSA 在三种肌肉各参数中具有较大曲线下面积 ($AUC = 0.7619$ 、 0.7108 、 0.7126)。结论在 DLS 患者中, 利用 Dixon-vibe 序列对多裂肌和竖脊肌的两种勾画测量方法具有较好的可重复性, 在 L4/5 层面多裂肌的退变表现最突出, 肌肉内外受脂肪浸润严重, 功能面积减小; 竖脊肌表现为纯肌肉面积的不对称性程度显著增大, 而腰大肌相对横截面积表现出显著减小。

PO-2332

双能 CT 的虚拟去钙技术对非创伤性股骨头坏死骨髓水肿的检出价值

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摘要 目的 以 MR 为参考标准,评价双能 CT 的虚拟去钙 (VNCa) 技术对非创伤性股骨头坏死 (ONFH) 骨髓水肿 (BME) 的检出价值。方法 前瞻性纳入 2022 年 10 月~2023 年 5 月期间本院 30 例非创伤性股骨头坏死患者,共 48 个髋关节,分析其双能 CT 及 MRI 图像。以 MRI 结果作为参考标准,分别计算两名医师在 VNCa 彩色编码图像主观评估 BME 的敏感性、特异性、阳性预测值、阴性预测值和准确性。比较 VNCa 彩色编码图像和 MRI 显示 BME 范围。比较正常骨髓和 BME 的常规 CT(rCT)值及 VNCa CT 值。勾画基于 VNCa CT 值的受试者工作特征 (ROC) 曲线,计算曲线下面积 (AUC),找出区分正常骨髓和 BME 的最佳截断值,并计算该截断值下预测 BME 的敏感性、特异性、阳性预测值、阴性预测值和准确性。结果 48 个髋关节中,34 个髋关节在 MRI 上显示骨髓水肿,14 个无骨髓水肿。两名医师在 VNCa 彩色编码图上视觉主观评估 BME 的敏感性、特异性、PPV、NPV 和准确性分别为 97.06%和 97.06%、92.86%和 71.43%、97.10%和 94.4%、92.90%和 89.2%、94.96%和 84.25%。VNCa 彩色编码图像与 MRI 对 BME 范围的显示无统计学差异 ($Z=-1.404$, $p=1.160$)。正常骨髓的 rCT 值平均为 400.7 ± 82.8 HU, BME 的 rCT 值为 443.7 ± 65.7 HU,两者的 rCT 值无统计学差异 ($t=-1.9$, $p=0.062$); 正常骨髓的 VNCa CT 值平均为 -103.1 ± 27.8 HU, BME 的 VNCa CT 值为 -32.9 ± 25.7 HU,两者的 VNCa CT 值有统计学差异 ($t=-8.4$, $P<0.001$)。基于 VNCa CT 值区分正常骨髓和 BME 的 ROC 曲线的 AUC 为 0.958,最佳截断值为 -74.5 HU,该截断值下预测 BME 的敏感性、特异性、PPV、NPV 和准确性分别为 97.06%、92.86%、97.1%、92.9%和 94.96%。结论 DECT 的虚拟去钙技术对非创伤性 ONFH 骨髓水肿的检出效能较高,且能准确显示骨髓水肿的范围。

PO-2333

椎间盘突出 MRI 表现和 椎旁肌脂肪浸润与慢性腰痛的相关性

牟章林

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摘要背景:慢性腰痛 (CLBP) 患者存在着椎旁肌脂肪浸润及横截面积的改变。然而,关于椎间盘相关改变与椎旁肌的关系尚不清楚。因此,我们研究旨在探讨 CLBP 患者腰椎间盘突出程度及类型与椎旁肌脂肪浸润以及椎旁肌横截面积的关系。

方法:前瞻性收集慢性腰痛患者共 494 例 (201 例男性和 293 例女性),平均年龄 45.75 岁。采用常规磁共振扫描序列、同反相位及 IDEAL-IQ 序列,并对患者进行 VSA 疼痛评估,根据 L4-S1 水平的 T2 轴位图像评估腰椎间盘突出的程度和类型,分别在同反相位上和 IDEAL-IQ 序列上测量 L4-S1 段椎间盘中心层面双侧多裂肌、竖脊肌截面积 (CSA) 和质子密度脂肪分数 (PDFF),并以身高 2 进行标化。将数据进行统计分析以确定腰椎间盘突出程度及类型是否与椎旁肌脂肪浸润以及椎旁肌横截面积否存在统计学意义,同时评估 VAS 与腰椎间盘突出程度的相关性。

结果:合并椎间盘突出的 CLBP 患者 L4/5 水平多裂肌的 PDFF 小于有突出者, $P<0.05$,合并椎间盘突出的 CLBP 的 VAS 4 (2-6) 大于对照组的 VAS 6 (4-6), $p<0.05$;而腰疼患者的椎旁肌横截面积改变与是否合并椎间盘突出之间的差异并无统计学意义。

结论:合并椎间盘突出的慢性腰痛患者,椎间盘的突出相比于 PDF、CSA 的改变是引起患者疼痛更为重要的因素,腰疼患者合并椎间盘突出应积极手术治疗,但同时也不能忽略对椎旁肌肉功能进行康复训练。

PO-2334

基于横断位 T2 脂肪抑制 MRI 桡骨乙状切迹 影像组学模型诊断远端尺桡关节失稳

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目的:桡骨乙状切迹与远端尺桡关节(DRUJ)稳定性相关。本研究的目的是利用影像组学方法,提取桡骨乙状切迹的 MRI 纹理特征,建立远端尺桡关节失稳的诊断模型。

方法:回顾分析了 2022 年 1 月至 2 月 40 例腕关节外伤后进行了 MRI 检查的患者资料。通过体格检查,其中 19 例患者诊断为 DRUJ 失稳。根据排除标准筛选后,19 例 DRUJ 失稳、16 例无失稳的患者纳入研究。两名影像科医师分别使用 3Dslicer 软件在横断位 fsT2WI MRI 影像资料中对桡骨乙状切迹进行标注。将患者资料随机分为训练集和测试集。使用 Pyradiomics 提取影像特征,使用 LASSO 算法降维,并使用 logistic regression 建模,并进行五折交叉验证。评估模型是否能够诊断 DRUJ 失稳。

结果:经过图像预处理后,将患者资料按 7:3 分为训练集和测试集。提取了 1316 个纹理特征,经过计算 ICC,保留了 610 个特征用于建模。经过 LASSO 降维后保留了 2 个特征。经过五折交叉验证的 logistic regression 建模,诊断 DRUJ 失稳的模型训练集中准确率为 0.792, F1score 为 0.762,召回率为 0.615, AUC 为 0.909 (0.799~0.986),测试集中分别为 0.727、0.667、0.5、0.867 (0.625~1.0)。

结论:基于桡骨乙状切迹的纹理特征可以建立诊断 DRUJ 失稳的模型。

PO-2335

腰椎椎体及椎旁肌 MRI 改变预测 2 型糖尿病患者椎体骨折

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目的:T2DM 患者是否发生骨折受多种因素的影响,目前关于 T2DM 患者骨折风险的预测主要从骨骼方面进行,鲜少有人关注椎旁肌质量及脂肪浸润对骨折风险的影响。因此,本研究旨在探究基于 MRI 的腰椎椎体及椎旁肌的改变对 T2DM 患者发生椎体骨折及其程度之间的关系。

方法:回顾性收集 2021 年 1 月 1 日至 2022 年 1 月 31 日于昆明医科大学第一附属医院确诊 T2DM 患者的一般资料和腰椎 MRI 图像,并使用 Image J 软件对椎旁肌面积及脂肪浸润进行勾画。使用 Pearson's 相关分析评估 T2DM 患者 VBQ 评分与椎旁肌改变之间的相关性。使用单因素及多因素逻辑回归分析确定 T2DM 椎体骨折程度的危险因素,并使用 ROC 曲线分析模型的效能。

结果:本研究共纳入 T2DM 患者共 168 例,其中骨折组患者 81 例(男性 49 例,女性 32 例),未骨折组患者 87 例(男性 39 例,女性 48 例)。骨折组患者年龄及 BMI 较无骨折组患者更高 ($P=0.038$ 、 $P=0.000$),糖尿病病程更长 ($P=0.013$);骨折组 VBQ 评分及椎旁肌 FI 大于无骨折组 ($P<0.001$);骨折组椎旁肌相对 CSA 小于无骨折组 ($P<0.001$)。重度骨折组椎旁肌 CSA 较轻度骨折组小,且中度、重度骨折组 FI 较轻度骨折组高 ($P<0.05$);相关性分析仅发现椎旁肌 FI 与相对 CSA 呈轻度负相关关系 ($r=-0.300$, $P<0.05$);多因素逻辑回归表明 T2DM 患者 BMI 越高,DM 病程 >5 年,VBQ 评分越高,椎旁肌相对 CSA 越低,椎旁肌脂肪浸润越多,其发生骨折的

风险就越高,且 ROC 曲线结果显示,该模型训练集和验证集的 AUC 分别为 0.973、0.979 ($P=0.011$ 、 $P<0.001$)。

结论:磁共振评估的 VBQ 评分升高、椎旁肌相对横截面积减小及椎旁肌脂肪浸润增加是 T2DM 患者发生腰椎椎体骨折的危险因素,且椎旁肌脂肪浸润与骨折程度有关。

PO-2336

慢性腰痛患者椎旁肌肉脂肪浸润与椎体骨质量评分有关, 但与 Modic 分类无关:一项前瞻性横断面研究

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目的:慢性腰痛(Chronic low back pain, CLBP)已是全球公认的健康问题,许多研究已经发现 CLBP 患者椎旁肌肉存在脂肪浸润,但其与椎体相关改变的关系尚不清楚。因此,本研究目的是探讨 CLBP 患者椎体骨质量(Vertebral bone quality, VBQ)评分和莫迪克变化 (Modic changes, MCs)与椎旁肌肉脂肪浸润的关系。

方法:前瞻性地收集 CLBP 患者。扫描前收集患者基本信息。所有患者行 3.0T 磁共振扫描,扫描序列包括常规序列、同反相位序列和非对称回波的最小二乘估算法迭代水脂分离序列(IDEAL-IQ)。根据 T1 和 T2 加权成像的信号,将 MCs 分为 3 型;在正中矢状 T1 加权成像上设定感兴趣区,采用公式计算 VBQ 评分: SIL1-L4/SICSE; 分别在同反相位和 IDEAL-IQ 序列上以 L4-S1 椎间盘中心层面测量多裂肌、竖脊肌的横截面积(Cross-sectional area, CSA)和质子密度脂肪分数(Proton density fat fraction, PDFF),取两侧肌肉的平均值分析。

结果:本研究纳入 476 例 CLBP 患者。无 Modic 变化者占 69%,有 Modic 变化者占 31%,其中 Modic III 型数量较少,未纳入统计分析。在 L4-S1 层面椎旁肌肉的 CSA 和 PDFF 在 Modic I 型与 II 型间均无差异, P 值均 >0.05 。多元线性回归分析显示,年龄($\beta=0.141, p<0.001$)、性别($\beta=4.285, p<0.001$)和 VBQ($\beta=1.310, p=0.001$)与椎旁肌肉总 PDFF 相关。年龄与各水平椎旁肌肉的 PDFF 呈轻度正相关($r=0.194 \sim 0.351, p<0.05$)。

结论:在 CLBP 患者中,Modic I 型与 II 型间椎旁肌肉的 CSA 和 PDFF 无显著性差异,而 VBQ 与椎旁肌总 PDFF 呈线性正相关。

PO-2337

能谱 CT 单能量成像+MARs 技术在 肢体外固定支架术后评估中的应用

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目的:

肢体长骨骨折在骨科创伤中很常见,其处理方式与关节功能和预后关系密切。CT 广泛应用于骨折的术前诊断、指导制订手术方案和评价疗效,因局部金属伪影干扰大,不易准确判断。近年来开发应用的能谱 CT 金属伪影去除技术,为肢体外固定术后疗效评价和指导康复训练提供一种新的方法。

方法:收集本院 52 例肢体骨折外固定术后行能谱 CT 检查患者的临床资料。观察图像窗选择:窗宽为 1500Hu,窗位为 500Hu;层厚为 0.625 mm。分别在应用 MARs 技术前后的混合能量图像和单能量 MARs 图像上进行感兴趣区(ROI)测定。观察图像窗选择:窗宽为 1500Hu,窗位为 500Hu;层

厚为 0.625 mm。分别在应用 MARs 技术前后的混合能量图像和单能量 MARs 图像上进行感兴趣区 (ROI) 测定。①所有图像均由三位有经验的放射医师采用盲法进行独立评分, 按金属伪影对图像质量的影响程度予以记 3、2、1、0 分 (3 分为图像质量好, 基本无伪影; 2 分为图像质量较好, 有部分伪影; 1 分为伪影较重, 图像尚能观察; 0 分为伪影很重, 图像无法观察); ②量化分析: 在伪影最重的层面选择伪影最重的两个部位进行感兴趣区 (ROI) 测定, 同时选择无或伪影最少部位进行测定作为正常对照, 分别获得不同感兴趣区的 SD 值, 伪影部位的 SD 值采用两个伪影点的均值, 然后通过计算获得伪影的 SD 值

结果:

所获得的数据采用 SPSS 17.0 进行配对 t 检验分析, 分析混合能量图像质量与能谱图像的图像质量之间有无差异, 以 $P < 0.05$ 为差异有统计学意义。3 名评价者一致认为经 MARs 技术重建后图像金属伪影明显减少, 即处理后图像质量明显高于处理前图像 ($P < 0.01$), 经过 MARs 技术处理后, 金属伪影区域的 SD 值明显下降 ($P < 0.01$), 其 SD 均值 / SD 参照值明显低于 QC 图像 ($P < 0.01$)。即能谱图像的图像质量明显优于混合能量图像的图像质量。

结论:

宝石 CT 的能谱扫描能有效去除外固定支架引起的伪影, 使外固定支架部位的图像质量显著提高, 具有广泛的临床应用价值。随着后处理软件的不断完善, 在去除伪影方面宝石能谱 CT 会发挥更大的临床价值。

PO-2338

OLT 磁共振软骨 T2 值与 Jagged1 表达的相关性分析

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目的

探讨距骨骨软骨损伤 (osteochondral lesions of the talus, OLT) Notch 信号通路相关蛋白 Jagged1 的表达与磁共振 T2 值之间的关系及其在距骨骨软骨损伤的机制。

材料与方法

1. 收集 60 例踝关节距骨骨软骨损伤行微创治疗术患者, 招募 60 名健康志愿者, OLT 患者及志愿者均行 3.0T 常规踝关节磁共振成像及 T2 -mapping 功能成像, 测量距骨骨软骨 T2 值。

2. OLT 患者术后离体距骨骨软骨行苏木精 — 伊红染色 (HE) 和 Western Blot 法分析距骨骨软骨 Jagged1 的表达;

3. 统计学分析 OLT 距骨骨软骨 T2 值与 Jagged1 表达的相关性。

结果

距骨骨软骨损伤以内中侧最为多见 (磁共振 6 分区法), 距骨骨软骨 T2 值随软骨损伤 Mankin 分级明显增大 ($P < 0.05$)。软骨 Jagged1 表达高级别与低级别差异明显 ($P < 0.05$)。软骨 T2 值与软骨 Jagged1 表达呈线性相关趋势, Pearson 分析距骨骨软骨损伤 T2 值增加与 Jagged1 表达增加呈直线性正相关 ($r = 0.757$, $P < 0.0001$)。

结论

距骨骨软骨损伤以内中侧最为多见, 距骨骨软骨磁共振 T2 值随软骨损伤分级逐级递增; 距骨骨软骨损伤磁共振 T2 值与 Jagged1 表达呈正相关, 距骨骨软骨磁共振 T2 -mapping 功能成像 T2 值定量分析可在体、无创性预测不同级别软骨损伤 Jagged1 的表达含量, 为临床治疗 OLT 提供影像学定量依据。

PO-2339

膝关节置换术后假体周围骨溶解诊断效能对比

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X 射线、MRI 及 SPECT / CT 对膝关节置换术后假体周围骨溶解的诊断效能比较

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目的：分析 X 射线、磁共振成像 (MRI) 及单光子发射计算机体层摄影 (SPECT) / 计算机体层成像 (CT) 对膝关节置换术后假体周围骨溶解的诊断效能。

方法：选取 2016 年 8 月 - 2020 年 8 月收治的 90 例膝关节置换术后疑似假体周围骨溶解患者。所有患者均接受 X 射线、MRI 及 SPECT / CT 检查。以翻修术结果为金标准，分析 X 射线、MRI 及 SPECT / CT 对假体周围骨溶解的诊断效能。

结果：翻修术结果显示，70 例患者有假体周围骨溶解，其余 20 例患者中无菌性松动 13 例，感觉障碍 4 例，假体周围骨折 3 例。X 射线、MRI、SPECT / CT 及联合诊断假体周围骨溶解与金标准的一致性分别为 0.585、0.686、0.842、0.906。SPECT / CT 诊断的敏感性 (95.71%) 及准确性 (94.44%) 均高于 X 射线与 MRI ($P < 0.05$)；联合诊断的敏感性 (98.57%) 及准确性 (97.78%) 高于 X 射线与 MRI ($P < 0.05$)。4 种诊断效能从高至低依次为联合诊断、SPECT / CT、MRI、X 射线。

结论：X 射线、MRI 及 SPECT / CT 对膝关节置换术后假体周围骨溶解有一定的诊断效能，SPECT / CT 的敏感性、准确性最高，联合诊断可提高诊断效能，临床可根据实际情况合理选择诊断方式

关键词：假体周围骨溶解；膝关节置换术；X 射线；磁共振成像；单光子发射计算机体层摄影；计算机体层成像；诊断效能

PO-2340

DCE-MRI 联合脂肪酸代谢组学评价兔糖尿病重症肢体缺血骨髓内皮祖细胞功能

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目的 采用 DCE-MRI 和脂肪酸代谢组学评价糖尿病重症肢体缺血图骨髓微血管渗透性与内皮祖细胞功能。方法 将 28 只雄性新西兰大耳白兔随机分为糖尿病重症肢体缺血实验组 ($n=14$)、重症肢体缺血对照组 ($n=11$) 和空白对照组 ($n=3$)。造模成功后各时间点 (0、1、2、3、4 周) 进行 DCE-MRI 检查以及外周血 MMP-9 浓度测量，第 4 周进行外周血和骨髓 EPCs 数量、迁移和成血管功能测定、骨髓 MMP-9 浓度测量、骨髓代谢组学、CD31 免疫组学组织病理学。分析 K_{trans} 、 K_{ep} 、 V_e 与外周血及骨髓内皮祖细胞数量和功能、MMP-9 浓度变化、微血管密度以及脂肪酸代谢组学的相关性。结果 糖尿病重症肢体缺血兔 K_{trans} 、 K_{ep} 、 V_e 值均随周数变化呈升高趋势，并显著高于重症肢体缺血兔和正常空白对照组兔，糖尿病重症肢体缺血组和重症肢体缺血组两组各时间点间 K_{trans} 值和 V_e 值差异均具有统计学意义。CD31 免疫组化结果显示糖尿病重症肢体缺血兔股骨上段骨髓 MVD 较重症肢体缺血兔和正常兔明显减少。与重症肢体缺血兔和正常兔相比，糖尿病重症肢体缺血兔骨髓 EPCs 数量无明显变化，外周血 EPCs 数量减少，外周血 EPCs 和骨髓 EPCs 迁移能力和血管生成能力受损。代谢组学结果显示糖尿病重症肢体缺血兔棕榈油酸和二十二碳三烯酸含量、MUFA 比例以及从头脂肪生成指数和硬脂酰辅酶 A 去饱和酶 1 活性指数减少，PUFA 比例和延长酶

活性指数增加。在糖尿病重症肢体缺血兔和重症肢体缺血兔中, K_{trans} 、 K_{ep} 、 V_e 值、骨髓 MVD、外周血 EPCs 和骨髓 EPCs 数量和迁移以及血管生成功能、外周血 MMP-9 浓度以及骨髓脂肪酸差异代谢物相关指标互相存在相关性。**结论** DCE-MRI 联合脂肪酸代谢组学评价兔糖尿病重症肢体缺血骨髓早期微血管渗透性、内皮祖细胞功能与脂肪酸差异代谢物具有相关性, 可以为早期调脂改善骨髓内皮祖细胞功能和预防截肢的病理生理机制提供可视化影像学证据。

PO-2341

膝关节骨性关节炎肌肉改变的 IDEAL 定量研究

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目的: 采用 IDEAL 技术, 分析半膜肌和股内侧肌在正常和膝关节骨性关节炎 (KOA) 时信号强度值的变化, 以及肌肉面积在 KOA 时是否改变。方法: 收集我院 2022 年 1 月—8 月行膝关节磁共振检查的 81 个病例, 将所有受试者分为两组: N 组为对照组, 共纳入 33 例志愿者, 年龄范围 24-58 岁, 平均年龄 33.58 ± 12.78 岁, 男性 15 例, 女性 18 例。D 组为膝关节退变有严重症状组, 共纳入 48 例, 年龄范围 35-72 岁, 平均年龄 57.02 ± 7.4 岁, 男性 14 例, 女性 34 例。扫描序列包括常规序列及 IDEAL 序列。使用 GE AW4.6 工作站中的工具软件, 对股内侧肌、半膜肌、股骨进行轮廓勾画, 记录股内侧肌和半膜肌的水相信号值、脂相信号值和半膜肌/股骨横截面面积 (SM/F) 及股内侧肌/股骨横截面面积 (VM/F)。采用独立样本 t 检验分别比较 N、D 两组间的 IDEAL 水相信号值及脂相信号值, 并且讨论在不同组内男性与女性之间的 IDEAL 水相信号值和脂相信号值的差异。对不同组间肌肉面积与股骨面积的比较采用独立样本 t 检验。结果: 半膜肌和股内侧肌的水相信号值 N、D 两组间比较差异无统计学意义, 而脂相信号值 N、D 两组间的比较差异有统计学意义。男性半膜肌的水相信号值, N、D 两组间比较无显著性差异; 脂相信号值两组间比较有统计学差异。男性股内侧肌的水相信号值, N、D 两组间比较无显著性差异; 脂相信号值两组间比较有统计学差异。女性半膜肌的水相和脂相信号值, 在 N、D 两组间比较均有统计学差异。女性股内侧肌的水相信号值 N、D 两组间差异无统计学意义; 脂相信号值 N、D 两组间比较有统计学差异。SM/F 比值, N、D 组间差异无统计学意义; VM/F 比值, N、D 组间差异有统计学意义。男性 SM/F 在 N、D 两组间差异无统计学意义, 男性 VM/F 在 N、D 两组间差异有统计学意义。女性 SM/F 和 VM/F 在 N、D 两组间差异均有统计学意义。

结论: KOA 时, 半膜肌及股内侧肌脂肪含量的改变较水含量的改变更明显。女性肌肉内脂肪含量较男性多, 这可能是女性 KOA 多发的原因。KOA 时, 股内侧肌的面积减小, 而半膜肌面积的改变不明显。

PO-2342

钙化上皮瘤影像表现 1 例及文献回顾

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目的: 钙化上皮瘤常见于儿童, 但对其影像以及病理的表现并不充分。通过分析钙化上皮瘤的 CT 及 MRI 表现, 并探讨其病理基础, 提高对钙化上皮瘤的诊断水平。方法: 通过对 1 例钙化上皮瘤患者临床分析, 并结合文献探讨钙化上皮瘤的临床、病理及影像学特点。结果: 钙化上皮瘤典型表现为皮下单发、质硬的实性包块, 多见于头颈部。毛母质瘤的 CT 特征通常为边界清楚的皮下肿块, 伴有轻度至中度强化和不同程度的钙化。在 T1WI 上呈均匀的中等信号, 在 T2WI 上呈不均匀的中高信号, 呈弥漫不均匀性强化, 脂肪抑制 T2WI 和脂肪抑制增强 T1WI 上常出现网状或环状高

信号。结论：钙化上皮瘤的影像学表现具有一定的特征性表现，结合其临床以及病理表现，提高对该疾病的认识，减少误诊率。

PO-2343

单侧永存坐骨动脉伴下肢缺血一例

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目的：通过分享典型病例，以期永存坐骨动脉的诊治提供借鉴。方法：患者行双下肢 CTA 检查及相关文献学习分析总结。结果：本例患者经 CTA 检查发现,诊断为右侧永存坐骨动脉（persistent sciatic artery, PSA），为下肢供血伴右股动脉发育不全，右侧 PSA 继发血管硬化及血栓形成，引发右下肢出现缺血症状。结论：永存坐骨动脉是一种胚胎时期血管发育异常遗留的疾病。由于 PSA 特殊的解剖走行，易发生动脉硬化及动脉瘤等。

PO-2344

基于 MR 单髌小视野扫描的股骨头坏死 ARCO 分期诊断：一项可行性研究

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目的：本研究旨在评估单髌 MR 小视野扫描在股骨头坏死（ONFH）ARCO 分期诊断中的可行性，并探讨各期 MRI 影像特点。

方法：回顾收集了 2019 年 2 月至 2023 年 4 月宁波市第二医院治疗随访的 123 例 ONFH 患者，共 162 侧髌关节。所有患者均行单髌 MR 小视野检查及 CT 检查。以高年资放射诊断医师及关节外科医师通过结合 MRI 和 CT 影像作为 ARCO 分期标准组，2 位中级职称放射医师单独根据 MRI 检查资料对 ONFH 进行 ARCO 分期作为观察组。评估观察组和标准组诊断符合率，以及观察者 A 和 B 的诊断一致性。

结果：观察组的分期准确率 I 期 81.5%、II 期 86.5%、III A 期 93.6%、III B 期 94.9%、IV 期 96.5%，总体准确率 91.4%；观察者 A 和 B 之间诊断一致性的 Kappa 值为 0.825，两者一致性好。

结论：单髌 MR 小视野扫描可用于 ONFH 的 ARCO 分期，且具有较高的准确性和可重复性。

PO-2345

基于多模态磁共振评估全身振动训练对 PCOS 大鼠模型下肢骨骼肌胰岛素代谢功能的影响

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目的：多囊卵巢综合征（PCOS）是一种常见的内分泌和代谢紊乱性疾病，其中高达 95% 的 PCOS 患者存在明显的胰岛素抵抗。研究表明，PCOS 的内源性胰岛素抵抗可能是由于骨骼肌对胰岛素的反应失调造成的。全身振动训练（WBV）对多种代谢性疾病的康复有益，故此研究旨在基于多模态磁共振序列为平台，探索 WBV 是否能增强 PCOS 患者的骨骼肌代谢功能、改善 PCOS 病情发展。

材料与方法：使用 15 只 1 个月龄的雌性 SD 大鼠，体重 200~250g，通过灌胃来曲唑溶液建立 PCOS 模型。模型成功后，大鼠分为 PCOS 组和振动训练组。振动训练采用 0.45g、10Hz，每天 30 分钟，每周 5 天，持续 4 周。所有大鼠在治疗前后测量睾酮、空腹血糖和空腹胰岛素，治疗 4 周后进行 2 小时葡萄糖耐量试验。所有大鼠进行 T2WI、DTI、Dixon 及 T2-mapping 磁共振扫描。取下肢股四头肌进行葡萄糖转运蛋白 4（GLUT-4）及胰岛素受体底物-1（IRS-1）免疫组化染色，以及 H&E 和油红 O 染色。

结果：PCOS 大鼠卵巢成熟卵泡增大，且其空腹血糖、胰岛素、睾酮及体重均高于对照组。4 周全身振动训练治疗后，WBV 组体重、睾酮、空腹血糖、胰岛素及 2 小时血糖、胰岛素、HOMA-IR 较 PCOS 组明显下降（ $p < 0.05$ ）。H&E 及油红 O 染色表明，PCOS 大鼠骨骼肌结构紊乱、脂肪增多，WBV 骨骼肌结构恢复、脂肪减少；在 PCOS 骨骼肌中，GLUT-4 及 IRS-1 表达下降，而较 PCOS 组相比，WBV 表达明显增高，且较对照组无明显差异。磁共振显示，WBV 组骨骼肌 T2、ADC 及肌间脂肪（IMAT[%]）较 PCOS 组明显下降（ $p < 0.05$ ），骨骼肌 FA 值平行增高，且较对照组无明显差异。骨骼肌 T2、FA 及 IMAT（%）值与 GLUT-4 及 IRS-1 免疫组化阳性面积显著相关（ $p < 0.05$ ），骨骼肌 ADC 值与 IRS-1 免疫组化阳性面积相关。

结论：全身振动训练可以改善 PCOS 大鼠的骨骼肌胰岛素代谢，减少骨骼肌脂肪，并缓解 PCOS 大鼠骨骼肌胰岛素抵抗。此外，多模态磁共振可以评价 PCOS 大鼠的骨骼肌胰岛素代谢情况，为我们后续的研究奠定了基础。

PO-2346

基于 MRI 分析业余马拉松运动员大腿肌肉与 膝关节损伤和跑步因素的相关性

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目的:应用磁共振 T1WI 成像评估业余马拉松运动员大腿前、内、后群肌肉横截面积(Crosssectionalarea, CSA),并探究肌群 CSA 与膝关节半月板损伤分级、骨髓水肿分级以及跑步因素,包括年龄、体重指数(body massindex, BMI)、跑龄、配速、月跑量间的相关性。

方法:对所有符合纳入标准的 51 名业余马拉松运动员进行双侧大腿轴位磁共振 T1WI、T2WI 扫描及双侧膝关节冠、矢状位 PDWI、3Ddss 序列扫描。在大腿 T1WI 图像上勾画前群、内侧群、后群肌肉 CSA。根据美国全器官磁共振成像评分(WORMS 评分)标准对膝关节骨髓水肿分级。采用 Pearson 检验分析大腿各群肌肉 CSA 与各跑步因素的相关性。采用 Kendall 检验分析大腿各肌群 CSA 与对应膝关节各半月板损伤分级和骨髓水肿评分的相关性。

结果:右侧大腿后群、内侧群肌肉和左侧大腿前群 后群、内侧群肌肉 CSA 与 BMI 呈正相关(P 值分别为 0.005 0035 0.048、0.017 0.011, 相关系数分别为 0.275、0.204、0.191、0.231、0.246)。

左、右侧大腿前群肌肉 CSA 与年龄均呈负相关(P 值分别为 0.001、0.003, 相关系数分别为-0.452、-0.412)。左侧大腿后群肌肉 CSA 与配速呈负相关(P=0.046, 相关系数为-0.281);与月跑量呈正相关(P=0.026, 相关系数为 0.229)。其余双侧大腿各肌群 CSA 与年龄、跑龄、配速、月跑量、BMI 无明显相关性。右侧大腿内侧群肌肉 CSA 与右膝内侧半月板前角损伤等级呈正相关(P=0.025, 相关系数为 0.260)。左侧大腿前群肌肉 CSA 与左膝外侧半月板后角损伤等级呈负相关(P=0.010, 相关系数为-0.286)。双膝关节其余半月板的损伤等级和骨髓水肿评分与大腿各群肌肉 CSA 无明显相关性。

结论:跑龄、配速、月跑量对业余马拉松运动员大腿肌肉横截面积变化无影响。不同肌群横截面积与不同部位的半月板损伤等级相关程度不同。膝关节骨髓水肿评分与大腿各肌群横截面积变化无相关性。

PO-2347

妊娠期合并富巨细胞骨肉瘤 1 例

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妊娠期合并富巨细胞骨肉瘤个案报道 1 例,

患者女,20 岁,急性起病,孕 24 周+1 天,于 17 小时前无明显诱因突发右下腹痛,呈持续性锐痛,右下肢平展时加重,行走时坐卧不便。于县级医院急诊行剖腹探查术,术后发现腹膜后占位,未切除占位,急诊转入我院。以“腹痛待查,腹膜后占位”为诊断收入病房。化实验室检查,甲胎蛋白 68.8ng/ml,血清淀粉样蛋白 A>320mg/ml,碱性磷酸酶阴性。结合 CT(图 1-3)及 MRI(1-3),考虑右侧髂骨区骨巨细胞瘤(不排除二级以上)伴动脉瘤样骨囊肿。

PO-2348

腰椎定量 CT 骨密度测定与双能 X 线骨密度测量对老年患者骨质疏松症中的应用效果对比

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目的：对比分析腰椎定量 CT(QCT)骨密度(BMD)测定与双能 X 线(DXA)BMD 测量在老年骨质疏松症中的应用效果

方法：先后对 52 例老年男性患者（平均年龄 60 岁）行腰椎 QCT BMD 测定和腰椎正位 DXA BMD 测量,对比分析 QCT 测定 BMD 与 DXA 测量 BMD 对老年骨质疏松的检出率.

结果：腰椎正位 DXA 对骨质疏松的检出率为 14.6%,腰椎 QCT 为 39.8%,检出率差异有统计学意义 ($P<0.01$). 由此得出腰椎 QCT 测量骨密度在老年患者骨质疏松的诊断中可能具有较高的临床价值.

PO-2349

破碎脂肪垫征：鉴别膝关节类风湿性关节炎和骨关节炎的重要影像征象

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目的：影像学诊断在膝关节骨关节炎 (OA) 和类风湿关节炎 (RA) 患者的治疗前检查中具有重要作用。因此，我们基于术前磁共振检查 (MRI) 探索膝关节髁下脂肪垫 (IPFP) 形态对于二者的鉴别诊断意义。

方法：回顾性分析 162 例年龄和性别匹配的病理确诊的 RA 和 OA 患者的治疗前 MRI 图像。所有随机的 MR 图像均由两名放射科医生进行盲法和独立审查。整个评估过程包括初次诊断、征象评估和最终诊断，每次评估间隔 3 周。常规 MRI 矢状面 t_2 加权成像评估破碎脂肪垫 (Broken-fat pad sign, BFP) 征象。使用曲线下面积 (AUC) 和 kappa (κ) 来评估分类性能。同时，应用影像组学从 IPFP 中提取两个形状特征进行定量解释。

结果：研究人群的中位年龄为 57.6 岁(31.0-78.0 岁)。BFP 征象在 RA 患者中的检出率(72.8%)高于 OA 患者(21.0%)。两位放射科医生通过参考 BFP 征象取得了更好的表现，低年资医师的准确率分别从 58.0%提高到 75.9%。在明确 BFP 征象后，低年资医师与高年资医师的读者间相关系数从一般 ($\kappa=0.30$) 增加到优秀 ($\kappa=0.75$)。通过定量分析，RA 的 IPFP 球形度明显低于 OA (0.54 ± 0.04 vs. 0.59 ± 0.03 , $p<0.01$)，表面体积比高于 OA (0.38 ± 0.05 vs. 0.37 ± 0.04 , $p=0.25$)。

结论：破碎脂肪垫征象是常规膝关节 MRI 鉴别 RA 与 OA 的潜在重要诊断线索，尤其是对于低年资医师，可以有效减少漏误诊。

PO-2350

代谢综合征下肢肌肉 CT 直方图与脂肪分布分析

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目的：对下肢肌肉进行 CT 直方图分析，用以表征代谢综合征（Metabolic Syndrome, MS）肌肉脂肪浸润程度，测量不同部位肌肉及脂肪比例参数，分析 MS 风险因素及建立 MS 影像诊断模型。

方法：纳入病例组主要为诊断为 MS 的患者，对照组主要是以体格检查为主要目的，且实验室检查及影像学结果均为阴性的患者，分别测量大腿中部，小腿中部及 L3 椎体层面的肌肉，皮下脂肪组织（Subcutaneous Adipose Tissue, SAT），肌肉细胞间隙脂肪（Extramyocellular lipid, EMCL）及内脏脂肪组织（Visceral Adipose Tissue, VAT）的含量，分别对不同部位肌肉进行感兴趣区（Region Of Interest, ROI）的勾画，提取直方图参数。统计临床资料及影像学参数，记录慢性病史，采用独立 t 检验，卡方检验等比较不同组的临床及影像学参数，进行回归分析，得出其受试者工作特征曲线（Receiver Operating characteristic Curve, ROC），计算曲线下面积（Area Under the receiver operating characteristic Curve, AUC）。P < 0.05 被认为差异具有统计学意义。

结果：其中纳入的病例组 47 人，对照组 48 人。对下肢的肌肉及脂肪含量及直方图参数进行统计，病例组的肌肉及脂肪比例失调，主要表现为脂肪比例增多，肌肉比例下降，病例组中大腿 EMCL 含量增多。在直方图参数的统计上，病例组中肌肉 CT 值分布表现峰度值降低（P = 0.041），偏度减小（P = 0.049），肌肉中低 CT 值的分布频率更高。以直方图参数及肌肉脂肪含量参数为自变量进行回归分析，大腿及腹部 EMCL 含量及直方图参数表现较好，联合直方图参数及含量参数的诊断模型 AUC 值较高。

结论：直方图参数峰度，偏度等特征值可用来评估肌肉脂肪浸润，肌肉及脂肪比例失调与 MS 相关，联合脂肪肌肉含量和直方图参数组成的影像诊断模型较好。在对代谢异常时的人体成分评估中，大腿中部和腹部均可作为肌肉脂肪分析的参考位置。

PO-2351

基于能谱 CT 物质分离技术在创伤性骨髓水肿的定量研究

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目的：基于能谱 CT 物质分离技术，探讨其在创伤性骨髓水肿的临床应用价值

材料与方法：回顾性分析 2017 年 11 月至 2018 年 3 月行双能 CT 检查的 24 名急性骨折患者的图像，并重建出相应的水-钙分离伪彩图像。由两名影像诊断医师对图像进行评估，判断骨折及其骨髓水肿范围，并测量骨髓水肿区和正常骨髓区的 CT 值和水-钙值。使用配对 t 检验评估两组的差异，以 Kappa 值评估两位医师判断骨髓水肿区的一致性。

结果：24 例骨折患者均伴有骨髓水肿。两位医师在水-钙分离彩色编码图像识别骨髓水肿区的一致性良好（Kappa 值为 0.878）。骨髓水肿区域的水-钙值及 CT 值（ $1040.28 \pm 33.55 \text{mg/cm}^3$ ， $210.18 \pm 108.63 \text{HU}$ ）显著高于正常骨髓区（ $1011.11 \pm 45.83 \text{mg/cm}^3$ ， $133.44 \pm 134.06 \text{HU}$ ）（P < 0.001），差异有统计学意义。

结论：基于能谱 CT 测量的水-钙分离值和 CT 值在定量评估创伤性骨髓水肿方面有较高的敏感性。

PO-2352

脊椎骨内神经鞘瘤的影像学诊断与鉴别诊断

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目的: 探讨脊椎骨内神经鞘瘤(intraosseous schwannoma, IOS)的特征性影像学表现, 以期与其他脊椎溶骨性病变鉴别。

方法: 回顾性分析我院经手术病理证实的脊椎 IOS 的临床资料及 CT、MRI 等影像学资料。我们搜集了 11 例脊椎 IOS 病例。所有患者行 CT 和 MR 检查。由两名高年资骨关节系统放射科医师对所有影像学征象进行评估, 并复习了近几年来文献报告的脊椎 IOS 影像学征象。

结果: 病变累及部位包括颈椎 3 例, 胸椎 1 例, 腰椎 5 例, 骶椎 2 例, 平均直径 5.8cm, 形态均为不规则形。CT 示偏心性膨胀性溶骨性骨质破坏, 密度不均匀, 平扫平均 CT 值: 43.0HU, 增强后不均匀轻度强化, CT 值: 70.3HU, 病灶边界清晰, 有硬化边, 未见骨膜反应, 病灶易沿着椎间孔向椎管内外延伸。在 MRI 上, 跟肌肉组织对比, 病灶在 T1WI 上呈等稍低信号, 在 T2WI 上呈混杂稍高信号, 压脂后呈混杂高信号, DWI 未见弥散受限, 增强后不均匀明显强化。

结论: 脊椎 IOS 是一种罕见的良性肿瘤, 影像学表现具有一定的特征性, 在鉴别诊断边界清晰的具有异质性的脊椎溶骨性病变时应予以考虑。

PO-2353

泡沫滚轴及静态拉伸对半程马拉松后大腿肌肉微损伤恢复的多模态磁共振研究

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目的 采用多模态磁共振评估业余马拉松运动员在一次半程马拉松后通过被动恢复 (REST) 及泡沫滚轴 (Foam Rolling, FR)、静态拉伸 (Static Stretching, SS) 等主动恢复方式后肌肉微损伤及其恢复程度。方法 招募业余马拉松运动员 18 名, 随机分为 3 组, 静态拉伸组 (SS, n=6)、泡沫滚轴组 (FR, n=6) 以及 REST 组 (REST, n=6)。对于所有受试者进行半程马拉松前基线、跑后 3 小时内以及跑后 24、48、72 小时的双侧大腿 DTI 及 T2 mapping 磁共振序列扫描。FR 及 SS 组在跑后 3 小时内、24、48 小时磁共振扫描后进行干预, REST 组则不进行任何运动及放松方式。对大腿前侧肌群 (股直肌、股内侧肌、股外侧肌、股中间肌)、后侧肌群 (半膜肌、半腱肌、股二头肌长头) 进行 ROI 勾画后, 采集 FA、ADC、T2 值。结果 三组跑后大腿肌肉 FA 值较跑前降低, ADC 值及 T2 值较跑前增高, 跑前及跑后 3 小时均存在统计学差异 ($p < 0.05$)。REST 组大腿肌肉 FA 值在跑后 24 小时到达峰值, ADC 及 T2 值在跑后 48 小时到达峰值, 各组在跑后 72 小时均未回到基线水平; FR 及 SS 组 FA 值、ADC 值、T2 值在跑前及跑后 3 小时均存在统计学差异 ($p < 0.01$), 都在跑后 3 小时到达峰值, 除 SS 组的 T2 值未在跑后 72 小时回到基线水平, 余组均回到基线水平, FR 组的 ADC 及 T2 值在跑后各时间点存在统计学差异 ($p < 0.05$)。FR 组与 REST 组的 FA 值、ADC 值在跑后 24、48、72 小时存在统计学差异 ($p < 0.05$), T2 值在跑后 48 小时存在统计学差异 ($p = 0.001$)。SS 组与 REST 组的 ADC 值在跑后 24、48、72 小时存在统计学差异 ($p < 0.05$), T2 值在跑后 48 小时存在统计学差异 ($p = 0.001$)。结论 DTI 结合 T2 mapping 能够评估一次半程马拉松后产生的大腿肌肉微损伤, 泡沫滚轴与静态拉伸较休息能更好促进肌肉微损伤的恢复, 且泡沫滚轴较静态拉伸效果更好。

PO-2354

q-Dixon 和 T2 mapping 评价下腰痛患者腰椎间盘突出退行性变和腰痛情况的定量研究

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摘要:目的 探究下腰痛患者椎间盘 T2 及 T2*值、椎体 BMF 值与椎间盘退变 Pfirrmann 分级、患者腰痛 ODI 评分之间的相关性。方法 收集 2021 年 1 月-2023 年 3 月下腰痛患者 95 例,使用 1.5T 磁共振行 q-Dixon 和 T2 mapping 技术进行扫描。腰痛评价使用的是 Oswestry 功能障碍指数 (Oswestry disability index, ODI) 进行,根据 ODI 指数得分不同,将患者分为轻度疼痛组、中度疼痛组、重度疼痛组。Pfirrmann 分级由两位放射诊断医师根据 T2WI 图像商讨完成,在正中矢状位的 T2 map、T2* map 和 BMF 图上由两位放射诊断医生手动绘制感兴趣区,分别测量椎间盘前纤维环(AAF)、髓核(NP)、后纤维环(PAF)的 T2 值、T2*值、椎体脂肪分数(BMF)。采用 Pearson 相关比较椎间盘的 T2 和 T2*值、BMF 值与 Pfirrmann 分级、ODI 得分的相关性。采用 ANOVA 检验比较各 Pfirrmann 分级、ODI 分组椎间盘的 T2 和 T2*、BMF 值差异。结果 椎间盘 AAF、NP、PAF 的 T2、T2*值以及椎体的 BMF 值和 Pfirrmann 分级、ODI 指数均有相关性,并且 NP 的 T2、T2*值和和 Pfirrmann 分级呈强相关关系,BMF 和 Pfirrmann 分级呈中等程度相关关系。AAF、PAF 的 T2 值在大部分的 Pfirrmann 分级之间有差异。NP 的 T2、T2*值在各 Pfirrmann 分级(除了 IV 级与 V 级之间)均有统计学差异。BMF 在较低的 Pfirrmann 分级之间有统计学差异。在不同疼痛分组之间,轻度和中度疼痛组除了 AAF 的 T2*值,其余各参数值均有统计差异,轻度和重度疼痛组之间各参数均有统计学差异。结论 椎间盘 AAF、NP、PAF 的 T2、T2*值以及椎体的 BMF 值能反映腰椎间盘的退行性变,并且有从定量的角度体现腰痛情况的潜力。

PO-2355

基于能谱 CTA 的下肢动脉硬化闭塞性疾病支架显示质量评价研究

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下肢动脉 CTA 已经广泛应用于临床,成为下肢动脉疾病的术前评估、术后随访的主要检查手段。对于下肢动脉植入支架的患者,使用多层螺旋 CT 进行 CTA 检查后,图像会存在金属伪影,影响对支架通畅性的观察,可能造成过度诊断。

目的基于能谱 CTA 对下肢动脉支架植入的患者进行(40~100 keV)单能量、120 kVp 能量、虚拟平扫(Virtual unenhanced images, VUE)和去金属伪影(Metal artifact reduction, MAR)图像重建,通过对比各组图像,寻找显示下肢动脉支架植入最佳单能量图像。

材料与方法回顾性收集我院行能谱下肢动脉 CTA 检查的患者 20 例,共 21 例支架植入。所有患者进行能谱扫描,以及重建 VUE 和 MAR 图像。将所有 CTA 数据上传至工作站,使用能谱 CT 后处理软件进行处理获得单能量图像(120 kVp 常规组、40 keV-100keV)。选取支架近端、中间和远端水平的横截面计算平均支架观察视野,在支架相邻肌肉和脂肪组织评估图像的 CNR 和噪声,并测量支架厚度。图像质量根据支架内腔和结构分别采用四分法和五分法来评价。

结果根据支架平均视野的结果可以看出 VUE、MAR 和 80 keV 平均视野较大,且三者之间无统计学差异。支架平均观察视野的显示范围随着单能量的升高(40 keV~80 keV)不断在增大,但当单能量大于 90 keV 时,平均支架观察视野范围减小。经测量 80 keV 所显示的支架厚度最薄($1.48\pm 0.33\text{mm}$),伪影最小。对于 CNR 的测量显示,仅 VUE 重建组与其他组之间有统计学差异

($P=0.03$)。随着单能量 keV 的升高,动脉植入支架的显示能力越来越清晰。基于支架显示进行主观定性分析发现,除 100 keV,随着单能量 keV 强度水平的增加(40 keV-90 keV),支架管腔显示和支架结构显示的评分越来越高。MAR 和 80 keV 图像为支架评分最高、图像质量最佳。

结论

能谱 CT 下肢动脉成像是针对下肢动脉支架植入术后复查的主要方法。相较于其他能量的图像,MAR 技术和 80 keV 单能量成像提高了下肢动脉和支架内腔显示的图像质量。

PO-2356

多模态影像检查在肩袖钙化性肌腱炎诊断中的应用价值

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目的:探讨肩袖钙化性肌腱炎应用 X 线与 MRI 诊断的价值。

方法:选择医院现有的数字化 X 射线摄影系统进行 X 线检查,包括 X 线正侧位与冈上肌出口位片。

MRI:应用 3.0T 超导 MRI 扫描仪进行 MRI 检查,使用肩关节线圈。常规扫描肩关节轴位、斜矢状位、斜冠状位图像评价

X 线与 MRI 扫描图像均交由本院影像科经验丰富的医师 2 名完成,采取双盲法阅片,有不同意见则协商,或经上级医师综合评判,直到结果统一。主要分析与评估受累的肌腱及具体位置情况,肌腱浅层或深层,肌腱止点区等情况,同时分析钙盐沉积情况,包括其数目、大小及信号等。

统计学分析数据分析软件为 SPSS22.0,计数资料%表示、 χ^2 检验,计量资料表示、t 检验, $P<0.05$ 有统计学意义。

结果:X 线诊断大部分可见钙化灶,而 MRI 诊断 T2WI、PDWI 多为低信号,T1WI 为低信号;不同肌腱部位钙化灶在 MRI 诊断长短径上对比,差异不显著($P>0.05$)

X 线诊断符合率为 86.54% (45/52),

MRI 则为 94.23% (49/52),差异不显著($P>0.05$)。

结论:肩袖钙化性肌腱炎应用 X 线与 MRI 诊断均有较高的价值,但 X 线因体位、骨重叠等导致其有漏诊可能,而 MRI 可结合 T2WI、PDWI 等多序列扫描综合评估,可为临床提供更多的参考依据,值得应用。

PO-2357

儿童颅骨骨内脑膜瘤影像学表现

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探讨儿童颅骨骨内脑膜瘤的 CT 与 MR 表现。

回顾性分析 1 例经手术病理证实为颅骨骨内脑膜瘤 12 岁患者的临床病史、CT 及 MR 表现。

患者，女，12 岁，因“发现额部肿块 1 年余”就诊，1 年前发现额部肿块，初期大小约 1cm×1cm，定期复查，现肿块增大至 5cm×5cm。CT 提示额骨增厚，病变跨越冠状缝累及顶骨前份，MR 提示病灶临近硬脑膜增厚。术中所见颅骨病变范围 7cm×8cm，质硬，血供一般。病理结果示颅骨骨内脑膜瘤（板障型脑膜瘤），CNS-WHO 1 级。

颅骨骨内脑膜瘤临床表现不具有特异性，须与骨瘤、骨纤维异常增殖症鉴别。

PO-2358

探讨 MRI 对膝关节腱鞘巨细胞瘤与结节状增生的慢性滑膜炎的鉴别诊断价值

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目的：腱鞘巨细胞瘤（GCTTS）与结节状增生的慢性滑膜炎（NCS）临床和 MRI 影像学特征相似，本研究旨在探讨 MRI 对两者的鉴别诊断价值。

方法：回顾性分析 2014 年 6 月至 2023 年 6 月经手术、病理证实的膝关节 GCTTS（13 名男性，20 名女性，10-64 岁）和 NCS（12 名男性，40 名女性，19-75 岁）的资料，比较两者的一般临床资料（包括年龄、性别比例、发病部位）及 MRI 影像学特征（包括病灶形态、信号、厚度、关节腔分布情况、膝关节 MRI 骨关节炎评分（MOAKS 评分）、周围软组织改变），使用独立样本 T 检验、卡方检验、秩和检验来比较两组特定特征。

结果：GCTTS（33 名）更常表现为分叶状、肿块状、毛毯状生长，于 PDWI、T2WI 呈不均匀低信号，NCS 表现为小结节状、毛毯状生长，PDWI、T2WI 呈均匀低信号。GCTTS 的病灶增厚程度（ $14.26 \pm 5.37\text{mm}$ ）较 NCS（ $8.90 \pm 4.26\text{mm}$ ）更高（ P 值 < 0.000 ）。NCS 发病年龄（ 52 ± 13 岁）较 GCTTS（ 40 ± 14 岁）高（ P 值 < 0.05 ）。NCS 基于 MRI 的膝关节骨关节炎评分（包括软骨损伤程度、骨髓损伤程度、骨质增生程度、半月板损伤程度、韧带韧带损伤程度、关节腔积液程度）较 GCTTS 高（ P 值均 < 0.05 ）。NCS 周围软组织肿胀程度较 GCTTS 更高（ $P < 0.000$ ）。两者之间性别比例、发病部位、病灶关节腔分布差异无统计学意义（ P 值 > 0.05 ）。

结论：GCTTS 滑膜病灶增厚程度较 NCS 高，于 T2WI、PDW-SPAIR 上更常表现为病灶不均匀低信号，NCS 发病年龄、MRI 骨关节炎评分较 GCTTS 更高，周围软组织肿胀程度更明显，MRI 影像学特征对 GCTTS 和 NCS 有鉴别诊断价值。

PO-2359

多参数定量 MRI 评价外源性硫化氢干预兔糖尿病重症肢体缺血骨髓氧化应激水平与微血管渗透性

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目的：联合磁共振动态增强扫描技术（DCE-MRI）和非对称回波最小二乘估算法水脂迭代分离量化序列（IDEAL-IQ）定量 MRI 评价外源性硫化氢（H₂S）在糖尿病重症肢体缺血并发症中的保护作用。

材料与方法：将 14 只糖尿病合并重症肢体缺血模型兔随机分为 DM+CLI+Saline 组（n=7）、DM+CLI+NaHS 组（n=7），另设置 NS 组（n=6），DM+CLI+NaHS 组实验兔连续 3 周予耳缘静脉注射 NaHS 溶液（30 μmol/kg）。分别于造模后 0、1、2、3 周行 MRI 右侧股骨矢状位 DISCO 和 IDEAL-IQ 扫描，并通过后处理计算得到右股骨上段骨髓的血容量转移常数（K^{trans}）及脂肪含量比值（FF%）等定量参数。第 3 周扫描后对实验兔股骨上段行 CD31 免疫组化和 HE 染色，计算骨髓微血管密度（MVD）和骨髓脂肪细胞。流式细胞仪检测原代骨髓内皮祖细胞（EPCs）内活性氧（ROS）水平，组织生化法检测骨髓组织超氧化物歧化酶（SOD）水平，酶联免疫吸附试验测定血清可溶性细胞间粘附分子 1（sICAM-1）、血管生成素-1（Ang-1）水平。

结果：DM+CLI+NaHS 组第 2、3 周 K^{trans} 和 FF 值、第 3 周 V_e 值低于 DM+CLI+Saline 组（P<0.05），股骨上段 MVD 较 DM+CLI+Saline 组明显增高、骨髓脂肪细胞减少（P<0.05），相关性分析显示骨髓 K^{trans} 与 MVD 呈负相关，FF% 与骨髓脂肪细胞数量呈正相关。DM+CLI+NaHS 组骨髓内皮祖细胞 ROS 阳性率较 DM+CLI+Saline 组降低、骨髓组织 SOD 水平升高，股骨上段骨髓 V_e 值与骨髓内皮祖细胞 ROS 阳性率呈显著正相关、与骨髓组织 SOD 水平呈显著负相关。DM+CLI+NaHS 组第 3 周血清 sICAM-1 显著降低、血清 Ang-1 浓度显著增加，与股骨上段骨髓 K^{trans}、K_{ep}、V_e 值之间均无显著相关关系。

结论：多参数定量 MRI 可作为一种监测骨髓氧化应激水平、评价骨髓微血管渗透性的非侵袭性影像学技术，为探究外源性 H₂S 在糖尿病合并重症肢体缺血骨髓微环境的保护机制提供了无创、定量的影像学证据。

PO-2360

二维超声联合剪切波弹性成像对产后腹直肌肌力评估的临床研究

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研究目的：应用二维超声（Two dimensional ultrasound, 2DUS）联合 SWE 对受检者进行腹直肌成像，旨在探讨应用相关超声测量参数评估腹直肌肌力的可行性。

研究方法：本研究纳入了在 2021 年 4 月至 2021 年 12 月于一院进行腹直肌检测的 91 例单胎初产妇。通过手动肌肉测试（Manual muscle test, MMT）来初步评估腹直肌肌力等级。应用 2DUS 测量不同位点下的 IRD，按照最大 IRD 将其分为 DRA 组和非 DRA 组。获取最大 IRD 位点处双侧腹直肌 CSA，应用 SWE 获取同一位点处双侧腹直肌剪切波速度（Shear wave velocity, SWV）（平均值），重复三次，取双侧腹直肌 SWV 的平均值。通过 Pearson 系数和 Spearman 系数描述上述超声参数与腹直肌肌力等级的相关性。

研究结果：腹直肌肌力等级与卷腹位 IRD 负相关（p=0.011, r=-0.264），与静息位腹直肌 CSA

正相关 ($p=0.045$, $r=0.226$)，卷腹位 IRD 还与静息位腹直肌 SWV 负相关 ($p=0.002$, $r=-0.354$)。此外，产后 6-8 周女性 DRA 发生率高达 73.6%，DRA 组中最大 IRD 位点常位于脐水平 (82.1%)，其次是脐上 3cm (16.4%)。

研究结论：超声测量腹直肌 CSA 与腹直肌 SWV 分别与腹直肌肌力等级和 IRD 相关，此超声参数可用于评估腹直肌肌力。

PO-2361

动态 CT 血管扫描技术在骨肌血管影像检查中的应用研究

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目的：采用动态 CT 血管扫描技术对骨盆外伤病人进行“死亡冠”血管扫描，对比术中“死亡冠”血管显示率的一致性，探讨动态 CT 血管扫描技术在肌骨血管影像中的临床应用。

资料和方法：收集因骨盆创伤就诊于天津市天津医院行盆腔 CTA 检查的患者，共得到 339 位受检者的盆腔 CTA 图像。依据不同的检查方法将研究对象分为两组：A 组采用动态 CT 血管扫描技术进行盆腔 CTA 扫描，扫描时限为动脉早期至静脉晚期，动脉期扫描应用对比剂示踪法，当感兴趣区 CT 值达到 120 HU 时开始动态 CTA 扫描。静脉期从注射对比剂后 75-80 s 开始动态扫描。B 组采用双期扫描，动脉期扫描时相与 A 组相同，静脉期扫描时间为对比剂注射后 90s。本研究分为两个部分：第一部分为动态 CT 血管扫描技术在“死亡冠”显示中的应用；第二部分为“死亡冠”解剖的相关研究。采用卡方检验和单因素方差分析进行统计学分析。

结果：①动态 CT 血管扫描技术可以多期显示动、静脉 CMOR。A 组动脉 CMOR，显示率为 15.5% (54/348)，静脉 CMOR 显示率为 64.1% (223/348)，B 组动脉 CMOR 显示率为 17.2% (56/324)，静脉 CMOR 显示率为 47.8% (155/324)；A、B 两组间动脉 CMOR 血管的显示率差异无统计学意义 ($P>0.05$)，静脉 CMOR 血管显示率之间差异有统计学意义 ($P<0.05$)；A 组和 B 组内动脉 CMOR 和静脉 CMOR 显示率的差异有统计学意义 ($P<0.05$)。

②手术总共观察了 402 例半骨盆的 CMOR 血管，其中与 CTA 相符的有 398 例，真阳性 201 例，真阴性 137 例，假阴性 4 例，灵敏度为 85.71%，特异度 100%。一致性检验中 Kappa 值为 0.84，表明一致性较好。

结论：①动态 CT 血管扫描技术对 CMOR 的显示率与手术中发现的 CMOR 一致性较好。

②动态 CT 血管扫描技术对 2mm 左右血管有较好的显示率，在外伤及肌骨血管检查中有较高的临床应用价值。

PO-2362

混杂型肩袖撕裂与肩袖病变磁共振征象对比分析

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目的：比较肩袖病变与混杂型肩袖撕裂 (rotator cuff tears, RCT) 磁共振成像 (magnetic resonance imaging, MRI) 中图像特征的差异，为肩袖撕裂伤病关系判定提供依据。

方法：回顾性分析 87 例 RCT 患者的病历与 MRI 资料，包括 16 例肩袖病变与 71 例混杂型撕裂，其中混杂性撕裂又分为骨折脱位组 (22 例) 和轻度创伤组 (49 例)。根据 MRI 图像测量 RCT 内外侧长

度(media1-1atera1 tear size ,ML)、韧带损伤数量、撕裂类型、肌骨挫伤及撕裂端脂肪浸润信号。对三组患者的基线资料和 MRI 测量参数进行比较。

结果: ML、撕裂类型、韧带损伤数量和肌骨挫伤信号三组的比较差异具有统计学意义($P<0.05$), 其中骨折脱位组 ML 最小、韧带损伤数量最多, 轻度创伤组全层撕裂发生率最高。年龄、性别、撕裂端脂肪浸润信号这三组比较差异无统计学意义($P>0.05$)。

结论: 依据 MRI 韧带损伤数量和肌骨挫伤信号可推断创伤大小, 但肩袖撕裂内外侧长度、撕裂类型与创伤大小无关。撕裂端脂肪浸润信号发生率低, 判断伤病关系价值有限。

PO-2363

改良法双下肢直接法 CT 静脉造影在下肢静脉曲张性病变中的成像研究

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目的: 探索双下肢直接法 CT 静脉成像最佳成像方法, 以达到下肢静脉性疾病的诊断 CT 成像要求。

方法: 收集我院 2020 年 6 月至 2023.5 月我院因下肢静脉曲张行下肢直接法 CTV 检查的患者 60 例, 分为三组, 每组 20 例, 对比剂为含碘量 32gI/100ml 的碘克沙醇注射液, 予以生理盐水按比例稀释, A 组检查对比剂稀释浓度为 (1:4), B 组对比剂稀释浓度为 (1:6), C 组对比剂稀释浓度为 (1:8), 注射速率为 3ml/s, 扫描前于踝关节上方 5CM 结扎, 髌骨下方结扎, 扫描范围为深静脉以下腔静脉至足背静脉。测量股深静脉、腘静脉及胫前静脉管腔 CT 值, 并观察股静脉有无层流现象。结果: A 组深静脉管腔平均 CT 值明显高于 B 组 ($P<0.05$), 差异有统计学意义; B 组深静脉管腔 CT 值明显高于 C 组 ($P<0.05$), 差异有统计学意义; A 组发生层流现象 (100%), B 组发生层流现象 (15%), C 组发生层流现象 (12%), A 组与 B 组及 C 组间差异有统计学意义 ($P<0.05$), B 组与 C 组差异无统计学意义 ($P>0.05$)。结论: 改良法双下肢直接法 CT 静脉成像对比剂稀释浓度为 (1:6) 成像效果最佳。

PO-2364

基于 DCE-MRI 影像组学及临床特征深度学习预测骨肉瘤患者新辅助化疗反应的研究

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目的: 评估基于磁共振动态对比增强 (DCE-MRI) 影像组学及临床特征的深度学习方法来预测骨肉瘤患者新辅助化疗 (NAC) 治疗反应的价值。

方法: 纳入 102 例接受 NAC 的骨肉瘤患者。所有患者 NAC 前均行 DCE - MRI 扫描。将获取的数据随机分为 70 % 用于训练, 30 % 用于测试。基于人工智能机器学习的方法, 建立应用原始动态增强 MRI 图像的影像组学特征和临床变量的联合机器学习模型。对接受新辅助化疗的骨肉瘤患者的 MRI 图像归一化处理后, 使用 nn UNet 训练的深度学习分割模型, 对术前 MRI 的 ROI 进行分割。使用方差阈值、单变量特征选择和最小绝对收缩和选择算子 (LASSO) 选择最优特征。采用 (K 近邻算法 (KNN))、支持向量机 (SVM) 和逻辑回归 (LR) 3 种分类器进行建模。此外, 收集临床相关危险因素, 包括年龄、肿瘤大小和部位、病理性骨折和手术分期, 评估其对 NAC 疗效的预测价值。然后建立临床、影像组学和临床-影像组学模型的多种机器学习方法, 并使用相同测试数据集进行

验证。采用混淆矩阵和受试者工作特征(Receiver Operating Characteristic, ROC)曲线和决策曲线分析(DCA)评价不同分类器的性能。

结果: 临床相关性危险因素分析显示只有手术分期是骨肉瘤患者 NAC 疗效的独立预测因素。通过影像组学特征提取和筛选, 共选取 7 个影像组学特征, 基于这些特征建立 3 个机器学习模型(KNN、SVM 和 LR)。3 个模型的预测准确率(ACC)分别为 0.89、0.84 和 0.84。3 个模型的受试者工作曲线下面积(AUC)分别为 0.86、0.92、0.93。在训练集和测试集中, 联合模型的 ACC 和 AUC 均高于影像组学模型(ACC = 0.91 , AUC = 0.95), 表明综合了临床特征和影像组学特征的机器学习模型表现更突出。

结论: 临床-影像组学列线图可以很好地在术前对骨肉瘤患者 NAC 治疗反应进行预测。这一发现可能为改进骨肉瘤患者个性化治疗方案提供新的决策依据。

PO-2365

不典型部位骨巨细胞瘤影像学表现

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目的: 分析不典型部位骨巨细胞瘤影像学表现

方法: 回顾性分析遵义医科大学附属医院 2014 年 1 月至 2023 年 5 月经病理证实的不典型部位骨巨细胞瘤 15 例, 其中发生于股骨头颈部 3 例、坐耻骨 3 例、股骨大转子 2 例、跟骨、距骨、足舟骨、髌骨、髌臼、大多角骨及锁骨各 1 例, 15 例患者中男性 5 例, 女性 10 例, 年龄 16-75 岁, 平均 32.8 岁。

结果: 15 例不典型部位骨巨有以下特点: 1、发生在股骨头颈部及髌骨的骨巨细胞瘤未表现出膨胀性改变, 发生在其余部位的骨巨细胞瘤表现为不同程度的膨胀性改变; 2、少有硬化边; 3、增强扫描明显强化。

结论: 多数不典型部位骨巨细胞瘤表现为膨胀性骨质破坏, 发生于股骨头颈部的不表现为膨胀性骨质破坏与股骨头颈缺少骨外膜这一解剖因素相关; 典型或不典型部位的骨巨细胞瘤增强扫描均匀明显强化是其影像学特点。

PO-2366

T2mapping 定量测量前交叉韧带重建术后移植物的韧带化进程

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目的: 探讨前交叉韧带(ACL)重建术后移植物的韧带化过程。方法: 前瞻性研究 30 例 2020 年 1 月至 2021 年 12 月期间的膝关节镜下腘绳肌腱单束重建 ACL 并定期随访的患者, 并选取 30 例无膝关节症状的志愿者进行对照。记录患者的性别、年龄、体重、身高、体重指数(BMI)、ACL 断裂病程时长和半月板处理情况。术后 3 月、6 月、12 月、18 月通过 T2mapping 序列测量韧带移植物关节腔内段 (近端、远端) 以及骨道内移植物 (股骨段、胫骨段) 的 T2 弛豫时间, 以评估 ACL 重建术后的韧带化进程。采用重复测量的方差分析比较术后不同时间节点的关节腔内段、股骨骨道内段及胫骨骨道内段的移植物 T2 弛豫时间的差异; 采用单因素方差分析比较术后各个时间节点 ACL 移植物的亚区域的 T2 弛豫时间的差异 (关节腔远端 vs 近端; 骨道内股骨段 vs 胫骨段)。当 $P < 0.05$ 为差异具有统计学意义。结果: 30 例患者纳入本次前瞻性研究, 年龄 29.3 ± 3.2 岁, 26 名男性, 4 名女性, BMI 指数 24.0 ± 2.0 。在关节腔内段, ACL 移植物信号为 $22.3 \pm 3.5\text{ms}$ (术后 3 月), $36.2 \pm 5.4\text{ms}$ (术后 6 月), $29.4 \pm 3.6\text{ms}$ (术后 12 月), $25.6 \pm 4.7\text{ms}$ (术后 18 月)。30 例志愿者

测得正常的前交叉韧带信号为 $20.2 \pm 2.5\text{ms}$ 。ACL 移植物在韧带化进程中出现节段性不同：在关节腔内段，移植物近端的 T2 弛豫时间术后 3 月、6 月、12 月、18 月的 T2 弛豫时间均高于移植物远端 ($P < 0.05$)；股骨骨道内的移植物 T2 弛豫时间在术后 3 月、6 月、12 月、18 月的均值均高于胫骨骨道内的移植物 ($P < 0.05$)；胫骨骨道段内的移植物在术后 3 月、6 月、12 月、18 月的 T2 弛豫时间未见显著统计学差异 ($P > 0.05$)。结论：ACL 移植物 T2 弛豫时间在术后 6 月达峰并逐渐下降，在术后 18 月仍未达到正常韧带水平。ACL 移植物在韧带化进程中出现节段性不同。T2mapping 序列可能为 ACL 移植物的韧带化进程提供客观的量化结果，并可能提高临床医生在重返运动决策前无创评估移植物成熟度的能力。

PO-2367

定量弛豫时间测量值可以有效地辅助诊断膝关节半月板损伤程度

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目的

膝关节损伤半月板中的胶原纤维含量减少，定量评估比定性评估更有助于确定临床治疗方法。因此，我们旨在探讨 MAGiC 对区分半月板严重程度的诊断效果，甚至早期发现分子改变以预防半月板恶化。

方法

这项前瞻性研究共纳入了 2022 年 5 月至 2022 年 10 月期间 87 名疑似 OA 患者，所有参与者均接受了常规 MRI 序列和 MAGiC 序列。在合成质子密度加权图像 (PDWI) 上绘制受损半月板的感兴趣区 (ROI)，然后复制到 T1、T2 和 PD 图上以检索测量结果。两周后由放射科医生重复测量。使用组内相关系数 (ICC) 检验观察者之间的一致性。所有数据均以均值 \pm 标准差 ($\bar{x} \pm s$) 表示。对半月板 WOMRS 和定量参数 (T1、T2 和 PD) 的相关性进行斯皮尔曼相关性检验。独立样本 t 检验或 Mann-Whitney U 检验用于比较不同半月板 WOMRS 分级，分别通过 Kolmogorov-Smirnov 检验和 Levene's 检验进行检验。P < 0.05 为差异有统计学意义。

结果

松弛度测量值和面积测量值在评分者之间具有良好的一致性。内侧后半月板的严重程度与 T1 值 ($r = -0.272$, $P = 0.030$)、T2 值 ($r = -0.278$, $P = 0.026$) 和 PD 值 ($r = 0.692$, $P = 0.000$) 显著相关。由于 WOMRS 值为 0 和 1 的患者较少，本研究仅对 WOMRS 值为 2 和 3 的患者进行了相关性分析和比较。WOMRS II 和 III 之间的面积差异不大 ($P = 0.194$)。在 WOMRS II 和 III 患者之间，发现内侧后半月板的 T1、T2 和 PD 有明显差异 ($P = 0.009$ 、 0.040 和 0.000)。

结论

内侧后半月板撕裂的严重程度可通过 T1、T2 和 PD 的最大横截面 ROI 测量值进行明显区分。若能及早发现半月板的状况并采取适当的治疗措施，则有可能逆转半月板的退化。我们的研究表明，省时的 MAGiC 成像序列在半月板的预后判断、辅助治疗选择和长期随访方面具有巨大潜力，无需进行侵入性关节镜手术。

PO-2368

弥散加权成像 ADC 值和 SPARCC 评分 在强直性脊柱炎活动期评估中的价值探讨

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目的通过分析强直性脊柱炎 (AS) 活动期患者及骶髂关节表观扩散系数 (ADC 值) 及加拿大脊柱关节炎评分 (SPARCC), 探讨弥散加权成像技术 (DWI) ADC 值及 SPARCC 评分在评估 AS 活动期中的价值。方法选取临床确诊为 AS 活动期患者 62 例, 同时收集 28 例健康体检者作为正常组。对两组进行骶髂关节横断位及斜冠状位扫描。通过 DWI 序列及 ADC 图, 测量患者与正常组骶髂关节 ADC 值, 同时测量 L5 椎体中央区 ADC 值, 比较两组骶髂关节相对 ADC 值 ($rADC$) 变化。同时对活动期 AS 患者骶髂关节行 SPARCC 评分, 并对 $rADC$ 与 SPARCC 评分之间的相关性进行分析。结果 DWI 可显示骶髂关节炎活动期骨髓水肿情况; 活动期双侧骶髂关节 $rADC$ 值大于正常对照组。活动期 AS 患者髂侧 ADC 多大于骶侧 ADC, 两组差异均有统计学意义 (均 $P<0.05$), 活动期骶髂关节平均 $rADC$ 值与 SPARCC 评分呈正相关 ($r=0.725$, $P<0.05$)。结论 ADC 值在 AS 患者病情活动度评估中具有一定价值, ADC 值与 SPARCC 评分可以成为判断 AS 活动性的重要指标。

PO-2369

基于对比增强 T1 加权图像结合机器学习 预测软骨肉瘤术后复发风险的价值研究

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目的: 本研究旨在通过对比增强 T1 加权图像结合不同机器学习算法构建相应组学模型, 探讨影像组学模型预测软骨肉瘤术后 2 年内复发风险的价值研究。

资料与方法: 回顾性收集 2006 年 1 月-2018 年 12 月省内三级骨科中心经病理组织学证实的 102 例软骨肉瘤患者的临床及影像学资料, 根据临床随访分为 2 年内有复发和无复发, 并统计与预后相关的临床风险因素 (部位、年龄、性别、病灶大小、病理分级)。按照 7:3 随机分成测试组 ($n=72$) 和验证组 ($n=30$), 由两名经验丰富的骨肌诊断医生对患者对比增强 T1 加权图像进行 ROI 感兴趣区的勾画, 并提取影像组学特征, 采用最小绝对收缩及选择算子回归分析进行特征降维及筛选, 应用 Logistic 回归、随机森林、支持向量机构建不同的影像组学模型, 同时通过多元逻辑分析获得与肿瘤复发相关的独立预测风险因素, 并构建联合模型, 通过绘制受试者操作特征曲线及校准曲线、决策曲线, 来评估不同模型对软骨肉瘤术后 2 年内复发风险的预测价值。

结果: 发病部位及病理分级是软骨肉瘤患者术后 2 年内复发的独立预测风险因素 ($P<0.05$), 基于 CET1WI 序列筛选出 4 个影像组学特征, 构建的三种不同机器学习模型在训练集和验证集的 AUC 分别为 LR: 0.85、SVM: 0.9、RF: 1.0 和 LR: 0.82、SVM: 0.78、RF: 0.70, 训练集中准确度 75%, 灵敏度 80.5%, 特异度 67.7%; 验证集准确度 70%, 灵敏度 76.5%, 特异度 61.5%, 提示 LR 模型的诊断效能最高。联合发病部位、病理分级及 LR 影像组学标签构建的诺莫图, 其在训练集中 AUC 为 0.88 (95%CI:0.80-0.97), 校准曲线提示该诺莫图预测效能与实际复发风险相一致, 决策曲线显示当阈值概率为 10%至 70%时获得较大的净收益。

结论: 基于对比增强 T1 加权图像构建的影像组学模型可作为一种无创、可靠、实用的生物学标志物来预测软骨肉瘤术后 2 年内的早期复发风险。

PO-2370

SEMAC 结合压缩感知成像技术在骨肉瘤假体植入术后评估中的应用

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目的: 探讨层间编码去金属伪影结合压缩感知技术 (CS-SEMAC) 在骨肉瘤假体植入术后评估中的可行性及临床应用价值。

材料与方法: 收集我院骨肉瘤假体植入术后患者 36 例, 采用 1.5T 磁共振对所有受检者进行 T2WI STIR, T2WI WARP, T2WI SEMAC, T2WI CS-SEMAC (序列成像。由两名放射科医师对图像质量进行主观评价和客观评估。采用 Mann-Whitney U 检验分析三组图像清晰度、图像对比度、运动伪影、假体结构可见性、图像模糊度, 对比噪声比, 金属伪影的体积大小与层面内的大小。

结果: CS-SEMAC 和 SEMAC 的金属伪影体积最小, 而 T2WI STIR 的金属伪影体积最大 ($P<0.001$)。高带宽 T2WI WARP 金属伪影体积明显大于 CS-SEMAC 金属伪影体积 ($P<0.01$), 但层面内的金属伪影面积一致 ($P=0.64$)。SEMAC 和 CS-SEMAC 的图像质量与伪影的大小均无统计学差异。SNR 和 CNR 在 T2WI STIR、SEMAC 和 CS-SEMAC 上相似, 在 T2WI WARP 上最低。CS-SEMAC 的伪影较小, 噪声较少, 运动较少, 假体及周围组织显示较好, 且无错层伪影 ($P<0.001$), 高带宽 T2WI WARP 具有较好的清晰度 ($P<0.001$) 和靶区可见度。

结论: 与常规 SEMAC 相比, CS-SEMAC 在节约时间的情况下可骨肉瘤假体植入术后评估, 其成像精度高于高带宽 T2WI WARP 和 T2WI STIR。

PO-2371

基于弥散磁共振的早期脊髓型颈椎病配对病例对照研究

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背景: 早期脊髓型颈椎病 (CSM) 诊断困难, 依赖医生的经验且漏诊率较高, 通过研究 CSM 患者邻近未受压颈髓的弥散磁共振 (dMRI) 改变, 可以更深入地了解疾病的病理机制, 为实施个体化治疗提供助益。

目的: 通过 DTI (diffusion tensor imaging), DKI (diffusion kurtosis imaging) 和 NODDI (neurite orientation dispersion and density imaging) 三种 dMRI 模型, 以病例对照研究方法探讨 dMRI 在识别早期 CSM 的价值, 并研究 CSM 患者邻近未受压节段颈髓的 dMRI 变化。

方法: 按照年龄和扫描位置 1:1 配对纳入 CSM 患者和志愿者。通过配对 t 检验计算组间 dMRI 参数的差异, 通过方差膨胀系数 (variance inflation factor, VIF) 评估 dMRI 的多重共线性, logistic 回归判断 dMRI 参数在区分正常和 CSM 患者的价值。使用单样本 t 检验分析 CSM 患者与志愿者在邻近未受压迫区域间的差异。

结果: 共纳入 CSM 患者和志愿者各 56 例。配对 t 检验结果表明除 MK (mean kurtosis) 和 NDI (neural density index) 外其它参数均在组间存在显著差异, logistic 回归结果表明 ODI (orientation division index) 呈显著正相关 ($r=2.12$, $p=0.035$), AWF (anisotropic water fraction) 呈显著负相关 ($r=-0.98$, $p=0.015$)。FA (Fractional anisotropy), MD (mean diffusivity), RD (radial diffusivity), ISOVF (isotropic volume fraction), ODI 和 AWF 在所有年龄的邻近、下未受压迫区域均有显著差异。

结论: 结合 ODI 和 AWF 有助于区分正常人和早期 CSM 患者, 并帮助临床医生更好地理解疾病机制, 制定个体化的治疗方案。

PO-2372

基于机会性胸部 CT 对中老年男性骨量减低的诊断价值研究

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[摘要] 目的 基于胸部 CT 比较骨量正常、骨量减少、骨质疏松三组临床指标、定量测量指标的差异,分析骨密度测量值(T 值)与临床指标以及定量测量指标的相关性。评价敏感指标对骨量减少或骨质疏松的诊断效能,建立多个指标联合诊断骨密度减低的预测模型,比较、评价各个模型。
方法 收集延安大附院 2022 年 6 月到 2023 年 3 月进行健康体检,同时行胸部 CT 检查及 DXA 骨密度测量的中老年男性患者共 106 例,并收集一般资料及临床数据。分别分为正常骨密度组、骨密度减低组。利用 VR 软件对确诊患者 T4、T7、T10、T11、T12 五个椎体进行定量测量,分别测量椎体 CT 值,椎体中部高度(MH)、前部高度(AH),胸椎指数表示为 MH/AH。采用独立样本 t 检验或非参数检验比较 2 组 CT 定量参数及临床指标的差异,均以 $P < 0.05$ 为差异有统计学意义。有差异的指标纳入多因素二元 logistic 回归分析,分别建立临床指标模型,定量 CT 指标模型,临床与定量 CT 指标联合模型,绘制受试者工作特征(ROC)曲线比较各个模型对腰椎骨密度减低的诊断效能,最优模型使用 R 语言绘制诺莫图及校准曲线。
结果 2 组间 CT 定量参数:椎体 CT 值,椎体中部高度(MH)、前部高度(AH),胸椎指数(MH/AH)均有显著性差异($P < 0.05$)。二组临床指标:体重、长期吸烟者占比、长期饮酒者占比、碱性磷酸酶、谷草转氨酶、谷丙转氨酶均有显著性差异。二元 logistic 回归分析结果示,长期饮酒史、谷草转氨酶、T7-CT 值, T4 中部高度(MH)(临床+定量 CT 指标模型)是骨密度减低发生的独立预测因素。采用 ROC 计算曲线下面积 $AUC = 0.884(95\% CI: 0.818 \sim 0.949)$, 高于临床指标模型($AUC = 0.744$)及定量 CT 指标模型($AUC = 0.853$)。
结论: 临床+定量 CT 模型(长期饮酒史、谷草转氨酶、T7-CT 值, T4 中部高度(MH))联合诊断对骨密度减低具有较高的预测价值。

PO-2373

髋关节临床应用解剖 CT 数字化测量及相关性分析

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[摘要] 目的: 通过 CT 多平面重建技术(MPR)及实影渲染技术(CR)测量髋关节形态解剖参数指标,比较不同年龄段成人髋关节解剖参数差异,分析不同解剖指标之间与身高、体重、BMI 等基线资料的相关性,为髋关节相关性疾病的诊断评估及髋关节置换术提供精准解剖参数依据。方法: 纳入病例 156 例,共 312 侧,按 10 岁一个年龄段,分为 6 组。在 CR 基础上通过 CT 多平面重建技术测量双侧髋关节髋臼外展角、股骨头中心距离、髋臼覆盖率、髋臼深度、颈干角、股骨偏心距、中心边缘角、髋臼前后断面角、髋臼前倾角。运用 SPSS 统计软件比较不同年龄段双侧髋关节解剖参数差异,分析不同解剖指标之间与临床基线资料的相关性。结果: 髋关节解剖参数指标按左右侧比较, CV、FO 差异存在统计学意义, $P < 0.05$; 按性别比较, Sharp 角、FO、FHD、AAT 女性大于男性; 按不同年龄段分组比较, 青年组在 AD、AC、AASA、PASA、AAT、CEA 指标上数值小于老年组,但是 Sharp 角大于老年组。AC-T 与 AC-I、AD-C 与 AD-A 比较, 差异无统计学意义,但存在显著相关性($r = 0.76、0.95, P < 0.01$)。Sharp angle 与 BMI、AC、AD、CEA、AASA、PASA 呈负相关($P < 0.05$), AC、AD、CEA、AASA 及 PASA 彼此之间存在正相关($P < 0.01$)。
结论: 不同性别、不同年龄段髋关节解剖参数指标存在明显差异,不同解剖参数指标之间存在显著相关性。

PO-2374

布氏杆菌性脊柱炎的磁共振成像诊断

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目的：分析布氏杆菌性脊柱炎的临床资料及磁共振成像特点，提高对本病的认识，避免误诊。方法：回顾性分析我院收治的布氏杆菌性脊柱炎患者的临床及磁共振成像资料，并查阅相关文献进行总结。结果：布氏杆菌性脊柱炎病灶分布多以下腰段为主，L4 椎体发病率最高，椎体前缘可见多发不规则骨质破坏，病灶周围可有骨质明显增生、硬化形成，因骨质修复大于骨质破坏，椎体边缘常呈鸢嘴样骨质增生，一般无死骨形成及椎弓根破坏，椎体形态一般正常或仅有轻度楔形变，椎旁脓肿范围较小，与腰大肌分界较清，壁较厚，脓肿内无钙化等改变。结论：布氏杆菌病是由布氏杆菌引起的一种人畜共患的传染性疾病，此病常侵袭脊柱引起脊柱炎，多数患者以腰痛就诊，其临床症状及影像学表现与脊柱结核等其他脊柱疾病相似，易引起误诊、误治。MRI 是一种灵敏的影像学技术，是脊柱炎诊断的首选影像学检查，可提高诊疗效率，具有较高的临床价值。

PO-2375

基于临床及早期影像学特点的儿童急性过伸性脊髓损伤的发病机制探讨

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目的：儿童急性过伸性脊髓损伤由于发病原因不明确，目前尚无有效治疗手段。本研究回顾既往病例的临床以及急性期甚至超急性期核磁共振多模态影像学特点，探讨其发生机制。

方法：收集 2010 年 9 月至 2022 年 11 月间在我院就诊的因脊柱后伸导致的儿童急性脊髓损伤的病例资料和 MRI、MRA、DTI 等核磁共振多模态影像学资料，结合脊柱解剖学、生物力学等，分析其发病机制。

结果：总共纳入 47 例符合标准的病例，其中女童 44 例（93.6%），男童 3 例（6.4%），平均年龄 6.1 ± 1.3 岁（3.5-10 岁）。发病原因为下腰（41/47）、平躺行过伸运动（4/47）、站立时突然坐下（2/47）。入院时的脊髓损伤 ASIA 分级为 29 例 A 级、13 例 B 级、3 例 C 级和 2 例 D 级。末次随访时的 ASIA 分级为 29 例 A 级、4 例 B 级、1 例 C 级、9 例 D 级、4 例 E 级。大部分病例（46/47）脊髓损伤平面集中于 T9-L1，入院时 MRI 均见脊髓内水肿。29 例 ASIA A 级的患儿神经功能无改善，27 例见髓内出血；MRI 动态检查见髓内水肿进行性上升；22 例患儿在脊髓损伤后 2-6 月中下段胸髓发生萎缩甚至消失；19 例患儿 MRI 显示脊髓圆锥-马尾神经交界处表现为脊髓圆锥腹侧出现弧形凹陷，1 例患儿伤后 10 小时 DTI 检查显示胸段脊髓神经纤维束尚完整，伤后 50 小时复查 DTT 发现脊髓神经纤维束部分断裂。17 例完成 MRA 检查的病例均未见明确血管畸形、血管栓塞、动静脉瘘。

结论：基于本组急性期完成 MRI、MRA、DTI 检查的病例资料，推测本病可能的发病机制为：脊柱过伸后脊髓被牵拉，特别是圆锥-马尾交界部的纵向牵拉损伤（类似肌腱-肌腹交界处损伤断裂），过伸时椎体一过性脱位及前后韧带对脊髓的横向挤压损伤（特别是对顶椎 T9-10 的挤压）；导致脊髓局部小微静/动脉损伤、静脉回流障碍、脊髓动静脉压力梯度改变，引起脊髓供血不足、缺血水肿并恶性循环，出现脊髓脊膜腔综合征（spinal cord compartment syndrome, SCCS）或脊髓内高压征（spinal cord intramedullary hypertension），最后出现脊髓梗死。

PO-2376

双层探测器多参数光谱 CT 在鉴别骨岛与成骨细胞转移瘤中的应用价值

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目的：本研究旨在探讨基于双层探测器光谱 CT (dual-layer spectral CT, DLCT) 的多参数成像在骨岛 (bone islands, BIs) 与成骨型转移瘤 (osteoblastic metastases, OBMs) 中的诊断及鉴别诊断价值。

方法：本研究回顾性收集接受 DLCT 胸部或腹部平扫扫描患者 80 例 (42 名男性和 38 名女性)，对光谱数据进行后处理分别获得混合能量 CT 图像 (Conventional image, CI)、有效原子序数图 (effective atomic number, Z-eff) 及电子云密度图 (electron density, DE)、钙抑制图 VNCa80 (Virtual non-calcium, VNCa) 及 X 线衰减曲线斜率 (λ HU) 并测值。t 检验评估骨岛与成骨型转移瘤中各光谱定量参数差异，单因素 Logistic 回归评估光谱多参数对骨岛与成骨型转移瘤的预测概率，并建立光谱多参数联合模型 (Z-eff、DE、 λ HU)，采用受试者工作特征曲线及曲线下面积 (area under curve, AUC) 评估光谱多参数联合模型与各参数在骨岛与成骨型转移瘤的诊断效能。结果：常规 CT 值、Z-eff、ED、 λ HU，在 BIs 组与 OBMs 组间均存在显著差异且均可有效区分骨岛与成骨型转移瘤 ($P < 0.001$)。光谱多参数联合模型对骨岛与成骨型转移瘤的鉴别效能最高 (AUC=0.931)，常规 CT 值 (AUC=0.92) 及各光谱参数 (Z-eff: AUC=0.888; ED: AUC=0.84; λ HU: AUC=0.888) 亦具有较好的独立预测效能。

结论：光谱多参数联合模型较常规 CT 值及各光谱参数在鉴别骨岛与成骨型转移瘤方面具有更高的鉴别诊断价值，为成骨型转移瘤的临床早期诊断、治疗策略制定及预后预测提供更多影像学支持。

PO-2377

蜡油样骨病影像学表现

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目的 探讨蜡油样骨病的影像表现特点，以 X 线为主，CT、MRI 及全身骨显像核素检查为补充。方法 回顾性分析蜡油样骨病影像表现。结果 15 个病例均为单侧骨骼发病，无双侧骨骼发病病例。病变累及 1 块骨骼 3 例，累及 2 块者 1 例，累及 3 块者 1 例，4 块者 2 例，6 块 1 例，9 块 1 例，10 块 2 例，11 块 1 例，12 块 1 例，16 块 1 例，21 块 1 例。8 例为右侧，7 例为左侧。累及上肢骨 3 例，下肢骨 12 例。15 例患者共累及骨骼 112 块，其中趾骨 25 块，跖骨 15 块，股骨 9 块，胫骨 9 块，腓骨 9 块，楔骨 8 块，指骨 6 块，骰骨 5 块，距骨 5 块，髌骨 3 块，跟骨 3 块，足舟骨 3 块，骾骨 2 块，桡骨 2 块，掌骨 2 块，尺骨 1 块，月骨 1 块，小多角骨 1 块，头状骨 1 块，坐骨 1 块，耻骨 1 块。15 个病例均可见病变区域骨膜增生，骨皮质增厚，骨髓腔变窄甚至闭塞，骨小梁结构消失，其中骨干上新骨堆积呈波浪状 5 例，长管骨呈蜡泪样流淌状骨肥厚 5 例，软组织内斑片状或不规则钙化 8 例，软组织肿胀 8 例。其中 15 例中有 7 例行 CT 检查，4 例行 MRI 检查，3 例行全身骨显像核素检查。其中 CT 发现关节间隙变窄甚至消失 4 例，共累及 27 个关节。结论 蜡油样骨病 x 影像表现典型，常规 X 线检查即可以明确诊断，CT 和 MRI 可作为有效的补充。

PO-2378

髌骨肿瘤样病变的骨痛风一例

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26 岁青年男性患者，无痛风病史，根据患者临床及影像学表现，该患者最初被误诊为髌骨良性肿瘤性病变。行右髌骨痛风结节刮除植骨术，术后病理证实为髌骨痛风。该案例说明对于髌骨骨质破坏性病变的表现，在临床日常工作中我们要考虑骨痛风发生的可能性，并注意与骨肿瘤进行鉴别，同时，要注重结合双能 CT 的检查优势，避免误诊、漏诊。

PO-2379

老年退行性脊柱畸形患者活动受限与椎旁多裂肌脂肪浸润相关性的单体素波谱研究

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目的:应用磁共振单体素波谱(Single Voxel Magnetic Resonance Spectroscopy, SVMRS)技术计算老年脊柱畸形(Degenerative spinal deformity, DSD)患者 L4/5 椎间盘多裂肌(Multifidus Muscle, MM)脂肪含量与腰椎冠状面和矢状面运动范围的相关性。

方法:30 名 DSD 患者和 35 名老年健康志愿者入组，用手持式数字肌肉测试仪测量腰椎屈、伸、冠状面 bending 方向活动范围与矢状线角度各 3 次，重复测量方差分析计算腰椎活动范围的重复性。所有受试者均行 3.0T 腰椎 MR 成像，SVMRS 测量 L4/5 椎间盘水平双侧 MM 的脂质含量。采用 Spearman 相关法计算 L4/5 椎间盘 MM 凹侧和凸侧脂质含量与腰椎四个方向运动角度，以及冠状面和矢状面活动角度的相关性。

结果:DSD 组和对照组前屈后伸 bending 方向运动范围的重复性无统计学差异($P=0.705$ 、 0.208 、 0.147 、 0.105)，($P=0.284$ 、 0.079 、 0.620 、 0.638)。L4/5 凹侧和双侧 MM 脂质含量与后伸角度呈负相关($R=-0.385^*$ ， $P=0.036$ ， $R=-0.387^*$ ， $P=0.035$)。

结论: L4/5 椎间盘为 DSD 患者活动受限的主要解剖学层面，凹侧 MM 脂肪浸润为活动受限重要成分退变指标。

PO-2380

软组织血管纤维瘤的 MRI 表现

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目的: 探讨 MRI 对软组织血管纤维瘤的诊断价值。资料与方法: 搜集我院 2021 年 7 月~2023 年 6 月经手术病理及免疫组化、分子及基因检测证实，MRI 检查资料齐全的软组织血管纤维瘤 11 例，其中男 4 例，女 7 例，年龄 39~67 岁，平均 51.2 岁。临床病程 2 周~6 个月，平均 3.4 个月。症状主要表现为缓慢增大的局部无痛性包块、伴活动受限。采用 Siemens Verio 3.0T MR 仪进行常规平扫及多期增强扫描，采用快速自旋回波序列(TSE) T1WI、T2WI 及脂肪抑制 T2WI (FS-T2WI)，增强扫描采用脂肪抑制 T1WI (FS-T1WI)。对比剂采用钆喷酸葡胺 (Gd-DTPA)，剂量为 0.1mmol/kg ，通过高压注射器经肘前静脉团注，注射速率 2.0ml/s 。结果: 肿瘤发生于肢体大关节周围 (膝关节周围 4 例，肩关节周围 2 例，髋关节周围 2 例)、胸腹壁 (2 例) 及盆腔 (1 例)。表

现为肌间隙或皮下单发软组织肿块, 最大径 5.1-12.6cm, 平均为 8.4cm, 临近结构受压推移。肿块相对均质, 内无明显钙化或脂肪成分, 边缘光整, 未见明显“尾征”或“绳系征”。MRI 检查 T1WI 病变相对骨骼肌呈较均匀等信号 (4 例) 或稍高信号 (7 例); T2WI 呈不均匀高信号, FS-T2WI 呈显著高信号 (11 例), 其内见索条状 T2WI 低信号 (7 例) 及/或流空血管 (9 例); 病变周围可见引流静脉 (3 例)。动态增强扫描早期呈显著不均质强化, 且渐进性填充 (11 例)。结论: MRI 在一定程度上反映了软组织血管纤维瘤的病理特点, 有一定特征性。病变边界清晰, T2WI 明显高信号伴流空信号、增强扫描呈显著渐进性强化有提示意义。

PO-2381

双能量 CT 骨髓水肿在骨肌创伤中的临床应用

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目的 探讨双能量 CT 骨髓分析在骨肌创伤中的临床应用价值。材料与方法 使用双源双能 CT 系统 (SOMATOM Force CT: 软件版本 VA50A; 后处理工作站:syngo.via 软件版本为 VB20A), 收集我院 2021 年元月以来入组双能量 CT 扫描外伤患者 138 例, 后处理工作站骨髓水肿 (BMO) 检测, 分析骨骼肌损伤中的影像学表现。结果 通过 DECT 评估 BMO 衰减增加的定性检测, 分析 DECT-VNCa 图与常规 CT、MRI 入组患者创伤的敏感性 & 特异性, 放射科医生可以提高对细微和隐匿性骨折的检出率, 并估算不确定发生时间骨折的敏锐度与愈合情况。结论 DECT 在研究骨小梁优势区域 (如椎体、骨盆、髌部、长骨干骺端) 的应力 (即疲劳或功能不全) 和脆性骨折方面具有显著优势; MRI 禁忌症检查 (例如起搏器, 金属异物、不配合等), DECT 可替代 MRI 检查。随着 DECT 技术的不断进步, VNCa 图像质量将得到改善, 从而允许在肌肉骨骼创伤中得到更广泛的应用。

PO-2382

基于 QCT 研究中青年腰椎间盘突出与椎旁肌脂肪浸润及骨密度之间的关系

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目的 研究椎旁肌脂肪含量及骨密度与中青年腰椎间盘突出之间的关系。方法 回顾性收集本院行腰椎 CT 检查的 60 岁以下患者 104 例, 共纳入 416 个椎间盘节段作为研究对象, 依据腰椎间盘是否突出分为突出组 (n=205) 与无突出组 (n=211)。使用联影 UCT760 进行统一参数下扫描, 并用定量 CT 测量腰 1-2、腰 2-3、腰 3-4、腰 4-5 椎间盘水平椎旁肌 (双侧腰大肌、多裂肌、竖脊肌) 脂肪含量及腰 1-5 椎体骨密度。使用 Mann-Whitney U 检验、Kruskal-Wallis 检验比较两组间及组内三种肌群脂肪含量的差异, 使用卡方检验、Wilcoxon 符号秩和检验、T 检验分别比较两组间性别、年龄及椎体 BMD 值差异。建立二项 logistics 回归模型分析腰椎间盘突出与三种椎旁肌脂肪含量、腰椎 BMD 值、性别及年龄之间的关系。绘制受试者工作特征曲线评价三种椎旁肌脂肪含量及腰椎 BMD 值诊断腰椎间盘突出的效能。结果 两组间 BMD 值差异有统计学意义 ($t=5.806, p<0.001$)。两组间三种肌肉脂肪含量差异有统计学意义 ($P<0.001$)。两组间年龄差异有统计学意义 ($p<0.001$)。两组间性别差异有统计学意义 ($\chi^2=11.957, P<0.001$)。二项 logistics 回归模型提示性别与腰椎间盘突出呈正相关 ($OR=1.968, 95\% CI: 1.099-3.523, P=0.023$); 竖脊肌脂肪含量与腰椎间盘突出呈正相关 ($OR=1.384, 95\% CI: 1.227-1.561, P<0.001$)。腰大肌脂肪含量 AUC 为 0.681, 临界值为 3.025%, 灵敏度为 0.659, 特异度为 0.635; 多裂肌脂肪含量 AUC 为 0.708, 临界值为

3.675%，灵敏度为 0.727，特异度为 0.583；竖脊肌脂肪含量 AUC 为 0.762，临界值为 5.35%，灵敏度为 0.678，特异度为 0.73；椎体 BMD 值 AUC 为 0.34。结论 中青年腰椎间盘突出与椎体骨密度及椎旁肌肉脂肪浸润程度相关，其中以竖脊肌脂肪含量预测椎间盘突出的效能最好。

PO-2383

寒区长跑运动膝关节慢性损伤的区域性特征及相关性分析

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目的：探讨寒区长跑运动膝关节慢性损伤的区域性特征及相关性分析。

方法：收集寒区 188 例因长期运动造成慢性膝关节损伤患者的临床资料和 MRI 影像资料，分析膝关节慢性损伤的特点与温度、年龄与关节部位的相关性。

结果：188 例单侧膝关节损伤患者（平均年龄 30 岁，男 174 例），5 个月的间隔期内出现对侧膝关节损伤，单侧与对侧膝关节损伤 MRI 评分之间存在着显著正相关（ $r=0.628, P<0.05$ ）。前交叉韧带损伤发生率最高（73.7%，75.3%）。两侧膝关节前交叉韧带损伤程度之间、内侧半月板损伤程度之间存在着显著正相关（ $r=0.392, p<0.05$ ； $r=0.610, p<0.05$ ）。外侧半月板损伤与气温存在显著差异（ $\chi^2=4.316, P<0.05$ ），内侧半月板损伤与年龄存在显著差异（ $\chi^2=12.942, P<0.05$ ）。结论：寒区长跑运动膝关节慢性损伤与年龄、气温有关，前交叉韧带和内侧半月板最易损伤，单侧膝关节损伤后持续运动 5 个月易引起对侧膝关节损伤。

PO-2384

DXA 在青海地区绝经后类风湿关节炎患者发生骨质疏松症危险因素分析

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目的：探讨双能 X 线（DXA）在青海地区绝经后类风湿关节炎（RA）患者发生骨质疏松症（OP）危险因素。方法：选取 2022 年 5 月—2023 年 4 月在青海省中医院收治的 200 例绝经后女性 RA 患者，所有患者入院后进行骨密度检测，采用 DXA，测量腰椎 L1~L4、腰整体、大转子、Wards 三角区、整体、前臂整体等部位，将上述任何部位的 t 值 $\leq -2.5SD$ 诊断为 OP 组，而 $> -2.5SD$ 为非 OP 组。收集所有患者一般资料和相关指标及上述部位的 t 值等。结果：OP 组 L1、L2、L3、L4、腰整体、大转子、Wards、三角区、整体及前臂整体 t 值均明显低于非 OP 组；ROC 曲线分析结果显示，L1、L2、L3、L4、腰整体、大转子、Wards、三角区、整体及前臂整体 t 值诊断 OP 的敏感度分别为 96.20%、95.22%、90.16%、96.03%、92.01%、89.36%、99.26%、90.02%、96.03%，特异度分别为 81.00%、82.19%、85.22%、83.06%、83.06%、90.22%、80.06%、86.23%、83.09%，AUC 分别为 0.908、0.905、0.896、0.906、0.903、0.879、0.918、0.901、0.906；Logistic 回归分析结果显示，影响青海地区绝经后女性 RA 患者发生 OP 的危险因素包括高龄、病程长、DAS28 评分及血沉、补充钙剂等。结论：DXA 检测 RA 发生 OP 患者骨密度，可作为 OP 评估的金标准，且影响青海地区绝经后女性 RA 患者发生 OP 的危险因素较多，临床应结合相关因素制定合理的措施，以降低 OP 的发生率。

PO-2385

运用 CT 三维重建技术测量骨质疏松性椎体压缩骨折与中青年创伤性胸腰椎(T11-L5)骨折患者椎弓根宽度的临床价值

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【摘要】 目的：探讨运用 CT 三维重建技术测量骨质疏松性椎体压缩骨折(OVCF)与中青年创伤性胸腰椎(T₁₁-L₅)骨折患者椎弓根宽度(POW)的临床价值。方法：收集 2020 年 10 月-2022 年 10 月本院收治的 117 例脊柱胸腰段骨折患者资料进行回顾性分析，将 OVCF 患者(n=65)纳入 A 组，将中青年创伤性胸腰椎(T₁₁-L₅)骨折患者(n=52)纳入 B 组，均采用 CT 三维重建技术测量 T₁₁-L₅ 各对应脊椎 POW，比例两组各对应弓根两侧 POW 及不同性别间的差异，并计算 POW<5 mm 及<7 mm 的百分比。结果：A 组对应脊椎左右侧 POW 比较无显著性差异(P>0.05)。A 组 T₁₁-L₅ 各对应脊椎的 POW 值小于 B 组(P<0.05)。A 组和 B 组 T₁₁-L₅ 各对应脊椎的 POW 值男性大于女性(P<0.05)，A 组 T₁₁-L₃ 各对应脊椎的男性和女性 POW 值小于 B 组(P<0.05)，A 组和 B 组的 L₄、L₅ 脊椎 POW 值比较无显著差异(P>0.05)。A 组共测量 655 个椎弓根，POW<5mm 者占椎弓根总数的 7.48%，主要分布于 T₁₁-L₃ 脊椎，<7 mm 占比 37.25%，T₁₁-L₄ 均有分布；B 组共测量 359 个椎弓根，POW<5 mm 者占椎弓根总数的 1.67%，T₁₂-L₂ 分别均有分布，<7 mm 患者占比 13.09%，分布于 T₁₁-L₃。结论：老年 OVCF 患者 T₁₁-L₃ POW 小于中青年创伤性胸腰椎骨折患者，且女性小于男性，故临床应对胸腰椎骨折患者术前行 CT 三维重建检查，测量 POW，以评估手术治疗的可行性，并降低并发症发生。【关键词】 骨质疏松；椎体压缩骨折；创伤性胸腰椎骨折；CT；三维重建技术；椎弓根宽度

PO-2386

基于深度学习多特征融合机会性筛查骨质疏松可行性研究

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目的 基于胸部 CT 图像，联合临床信息、影像组学特征构建多特征深度学习模型，探讨其筛查骨质疏松症的可行性及性能，并选出最佳模型指导临床诊疗决策。

方法 回顾性收集 2021 年 1 至 10 月间 1048 例受试者胸部 CT 图像为主数据集，2022 年 2 月至 4 月间使用不同 CT 扫描获得的 386 例受试者胸部 CT 图像用于外部验证。以 QCT 将其分为骨量正常、低骨量和骨质疏松三类。首先基于胸部 CT 图像构建分割模型[训练集 (n=548 例)，验证集 (n=100 例) 和测试集 (n=400 例)]以提取腰 1 和腰 2 椎体图像，并利用 DSC 比较其与手工标注的一致性；然后基于训练数据集 (n=530 例) 和验证集 (n=100 例)，建立 8 种模型：(1) 基于随机森林建立的组学模型；(2) 基于朴素贝叶斯建立的组学模型；(3) 基于 CNN-Net 的 DCNN 模型；(4) 基于组学特征及深度学习组成的融合模型；(5) 基于临床信息及深度学习组成的融合模型；(6) 基于临床信息、组学特征及深度学习组成的融合模型；(7) 在第 3 个模型的基础上，单独使用腰 1 图像构建模型 7；(8) 在模型 6 的基础上，单独使用腰 1 图像构建模型 8。使用 ROC、DCA 曲线评估模型的诊断效能及临床价值。不同模型之间的比较采用 Delong 法检测其 AUC 的差异。

结果 共 1434 名体检者。采用训练集图像数目时在测试集中 DSC 为 0.951±0.030，外部验证集中 DSC 为 0.941±0.050。基于单独腰 1 椎体 CT 图像、组学特征及临床信息组成的深度学习多特征融合模型（模型 8）诊断骨量正常、低骨量、骨质疏松的敏感性、特异性、AUC 依次为：0.920、0.970、0.992，0.922、0.923、0.973，0.941、0.989、0.989，性能最佳，且临床决策曲线也证明此多特征融合诊断模型的净收益最佳。

结论 单独使用腰 1 椎体 CT 图像及临床信息构建的深度学习多特征融合模型可以在不增加辐射剂量的情况下快速筛查骨质疏松高危人群。

PO-2387

骨内副神经节瘤的影像特征分析及文献复习

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目的 探讨骨内副神经节瘤的影像学特征。方法 以“Paraganglioma”、“Chemodectoma”、“Intraosseous”为关键词检索 PubMed 数据库,检索时间为 1990 年 1 月 1 日至 2023 年 7 月 1 日,获取文献,共收录 10 例患者;以“副神经节瘤”、“化学感受器瘤”、“骨”为关键词检索中国知网数据库,获取同期中文文献,共收录 34 例患者,删除重复病例及临床病史资料不全病例,纳入本例个案共收录 41 例患者分析其影像学特征。结果 骨内副神经节瘤在 X 线/CT 上多表现溶骨性、膨胀性骨质破坏伴边界清楚或不清楚的软组织肿块,呈圆形、类圆形或不规则形,2 例伴点片状残留骨及钙化,6 例病灶边缘有硬化边。CT 平扫呈等或低密度肿块,肿块较大时密度不均匀,可见坏死、囊变及出血,钙化少见;增强扫描病灶明显强化,其内可见多发迂曲增粗血管影。MRI 表现为 T1WI 呈等或稍低信号, T2WI 呈稍高或高信号,压脂序列呈高信号;肿瘤较大伴坏死和出血呈不均匀混杂信号,增强扫描明显不均匀强化,病灶内可见点状、匍匐状流空血管,形成所谓的“椒盐征”。ECT 及 PET/CT 表现为放射性异常浓聚及高摄取。结论 骨内的副神经节瘤罕见,CT 和 MRI 是骨内副神经节瘤定位、定性诊断的重要影像学检查方法,影像学上多表现为溶骨性、膨胀性骨质破坏伴边界清楚或不清楚的软组织肿块, MRI 病灶内点状、匍匐状流空血管具有一定特征;两者均能很好地显示肿瘤本身及其与周围结构的关系,CT 和 MRI 在发现病灶、副神经节瘤的诊断及鉴别诊断方面具有重要意义。

PO-2388

探讨临床及影像多种因素对首诊新鲜肋骨骨折漏诊的影响

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【摘要】目的:探讨临床及影像多因素对首诊新鲜肋骨骨折漏诊的影响。方法:回顾性分析 2021 年 06 月至 2023 年 06 月本院的 93 例肋骨三维检查的患者,分析病史是否明确、骨折单发/多发、断端有无移位、诊断医师的阅片习惯、图像质量等因素对首诊新鲜肋骨骨折漏诊的影响。93 例首诊新鲜肋骨骨折中,漏诊 38 例、未漏诊 55 例。将肋骨骨折分为漏诊组、未漏诊组,利用卡方检验分析以上多种因素对两组间的差异。结果:申请单病史是否明确、图像质量、骨折单发/多发对是否漏诊首诊新鲜肋骨骨折的影响不显著 ($P>0.05$);申请单病史是否明确对是否漏诊单发首诊新鲜肋骨骨折具有显著的影响 ($P<0.001$);肋骨骨折端有无移位、诊断医师阅片习惯对是否漏诊首诊新鲜肋骨骨折具有显著的统计学差异 ($P<0.01$)。在申请单明确外伤病史的患者中,骨折单发/多发、骨折端有无移位对是否漏诊肋骨骨折具有显著的统计学差异 ($P<0.01$)。结论:骨折端无移位的首诊新鲜肋骨骨折更容易漏诊;良好的阅片习惯可降低首诊新鲜肋骨骨折的漏诊率;申请单明确外伤病史可显著降低单发首诊新鲜肋骨骨折的漏诊率。

PO-2389

腺泡状软组织肉瘤的 CT 及 MRI 影像学特征

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目的：探讨腺泡状软组织肉瘤（ASPS）这一罕见肿瘤的 CT 及 MRI 影像学特征，以提高该肿瘤影像诊断的准确率。

方法：系列病例报告。回顾性分析我院 2012 年 1 月—2022 年 1 月经手术病理证实的 11 例 ASPS 患者的影像学资料。其中男 4 例，女 7 例，首次就诊年龄 20~52 岁，平均 30.5 岁。术前 5 例患者行 CT 平扫检查，1 例行 CT 及 MRI 平扫，5 例行 MRI 平扫（其中 1 例同时行 MRI 增强扫描）。总结 ASPS 的 CT 及 MRI 影像学特征并复习相关文献。

结果：本研究 11 例 ASPS 患者中，肿瘤位于左侧股直肌 4 例，左侧股中间肌 1 例，右侧股中间肌 1 例，右侧股骨四头肌 1 例，左上肢三角肌 1 例，左侧腹膜后 3 例；9 例呈卵圆形，1 例呈圆形，1 例呈不规则形；肿瘤最大直径 4.7~11.1 cm（平均 8.1 cm）；9 例病灶边界清晰，2 例病灶上下缘边界不清。CT 影像特征：6 例病灶呈不均匀稍低密度，平均 CT 值约为 26~38 HU，1 例病灶内见点状钙化。MRI 特征：MR 平扫 T1 加权像（T₁WI）2 例呈等信号，4 例呈稍高信号；6 例 T₂WI 呈不均匀高信号，6 例病灶内及周围均见低信号条状或迂曲血管影；MRI 增强扫描 1 例呈明显不均匀强化。

结论：腺泡状软组织肉瘤好发于年轻患者，四肢是其好发部位，肿块一般较大。CT 表现为不均匀的低密度，MRI 征象相对特异，T₁WI 呈等或稍高信号，T₂WI 呈不均匀高信号，病灶内及周围有低信号条状或迂曲的血管影，增强扫描呈明显强化。熟悉其 CT 及 MRI 影像特征有助于对患者的诊断和治疗。

PO-2390

脊柱泡型包虫病影像学表现特征

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目的：分析脊柱泡型包虫病的 CT、MRI 影像学特征，提高对该病的认识和诊断。方法：分析经病理证实的 15 例脊柱泡型包虫，均行 CT 扫描及三维重建、MR 检查，观察病灶骨质破坏形式、椎体附件及邻近肋骨、椎间盘累及情况，是否有囊样低密度或“小囊泡”样信号、钙化、死骨等各种征象。结果：15 例脊柱泡型包虫，3 例为原发，无其它脏器转移；12 例原发灶来源于肝脏，CT 检查呈斑片、地图样溶骨性骨质破坏伴骨质硬化，相应附件受侵且周围形成不规则软组织包块 12 例，软组织包块内见不规则钙化，并增强扫描见多发环形强化灶，椎间盘受累 8 例。MR 主要表现为病变椎体及周围软组织包块呈高低混杂信号，12 例病灶内见散在“小囊泡”样 T₂WI 高信号影，并可见长 T₁WI、短 T₂WI 骨质硬化影或不规则钙化灶，其中 3 例邻近肋骨受累；结论：脊柱泡型包虫病影像学表现有一定特征，CT 和 MR 检查相结合，对早期诊断及鉴别诊断具有重要意义。

目的：分析脊柱泡型包虫病的 CT、MRI 影像学特征，提高对该病的认识和诊断。方法：分析经病理证实的 15 例脊柱泡型包虫，均行 CT 扫描及三维重建、MR 检查，观察病灶骨质破坏形式、椎体附件及邻近肋骨、椎间盘累及情况，是否有囊样低密度或“小囊泡”样信号、钙化、死骨等各种征象。结果：15 例脊柱泡型包虫，3 例为原发，无其它脏器转移；12 例原发灶来源于肝脏，CT 检查呈斑片、地图样溶骨性骨质破坏伴骨质硬化，相应附件受侵且周围形成不规则软组织包块 12 例，软组织包块内见不规则钙化，并增强扫描见多发环形强化灶，椎间盘受累 8 例。MR 主要表现为病变椎体及周围软组织包块呈高低混杂信号，12 例病灶内见散在“小囊泡”样 T₂WI 高信号影，并可见长 T₁WI、短 T₂WI 骨质硬化影或不规则钙化灶，其中 3 例邻近肋骨受累；结论：脊柱泡型包虫病影像学表现有一定特征，CT 和 MR 检查相结合，对早期诊断及鉴别诊断具有重要意义。

PO-2391

磁共振 T2* mapping 分析不同跑量下业余马拉松运动员单侧膝关节周围肌肉改变及趋势变化

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目的: 基于磁共振 T2* mapping 分析不同跑量下业余马拉松运动员单侧膝关节周围肌肉改变及趋势变化。

材料与方法: 本研究前瞻性招募 35 例业余马拉松运动员及 18 例一般对照组志愿者进行单侧膝关节周围肌肉 T2* mapping 扫描, 所有受试者按照跑量区分为高跑量组 ($\geq 300\text{km}/\text{月}$) 16 例、中低跑量组 ($< 300\text{km}/\text{月}$) 19 例及一般对照组 18 例, 主要在矢状面上选取膝关节周围肌肉中的缝匠肌、股内侧肌、半膜肌、腓肠肌内侧头、腓肠肌外侧头、股二头肌进行感兴趣区测量, 采集数据时选取各肌肉显示最大层面及肌肉最大层面的前后各一层面进行相同方法测量, 同一块肌肉共测量三次。根据 3 次测量取平均值作为相应肌肉区域的 T2* 值进行分析。数据采用成组多样本方差分析对有统计学意义的肌肉进行 T2* 值比较, 多组样本均数两两比较采用 LSD 法。组内相关系数用于评价观察者间一致性和重测重复性。

结果: 所有受试者常规 MRI 检查显示膝关节周围肌肉信号均未见异常征象。高跑量组及中低跑量组膝关节各肌肉 T2* 平均值均低于健康对照组, 其中腓肠肌内侧头、腓肠肌外侧头及缝匠肌组间 P 值 < 0.05 , 差异有统计学意义, 其余肌肉组间差异无统计学意义。高跑量组半膜肌、腓肠肌内侧头、腓肠肌外侧头、股二头肌 T2* 值整体平均值较一般对照组下降 [25.29 比 27.07、25.59 比 27.15、25.29 比 27.05、25.74 比 27.71, P 值均 < 0.05 , 差异有统计学意义]; 高跑量组及中低跑量组缝匠肌 T2* 值整体平均值较一般对照组下降 [24.03/24.36 比 26.40] 且 p 值 < 0.05 (0.012, 0.004), 差异有统计学意义。

结论: 随着运动强度增加, 部分肌肉 T2* 值下降, T2* 值主要受水含量及胶原网格结构的影响, 在一定程度上可以间接暗示了肌肉损伤的严重程度, 在本研究观察肌肉中, 没有发现明显肌肉损伤, T2* 值较一般人群下降, 我们认为适量强度的肌肉运动导致肌内水分子含量减少, 生化成分发生改变, 适量运动有助于促进肌纤维形成。

PO-2392

ZTE-MRI 在膝关节间隙和角度诊断中的临床应用

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目的传统的 X 光片可用于观察关节间隙狭窄, 并确定 KL 分级, 我们尝试研究 ZTE-MRI 在利用关节间隙和角度诊断膝关节方面的临床应用, 并以 KL 分级作为分类器比较组间差异。

方法这项前瞻性研究从 2022 年 5 月至 2023 年 5 月招募了 87 名疑似 OA 患者。所有参与者均接受了常规磁共振扫描和 ZTE 序列。在 ZTE-MRI 上测量了关节间隙、髌腱长度与髌骨长度之比 (IS)、髌骨表面最低点到胫骨平台前上角的距离 (CD)、股骨长轴与股骨髁长轴之间的夹角 (FF) 以及股骨长轴与胫骨长轴之间的夹角 (FT)。采用类内相关系数 (ICC) 分析了 X 光片和 ZTE-MRI 上 KL 分级的模态间一致性。根据数据的正态性和方差齐性, 采用独立样本 T 检验和 Mann-Whitney U T 检验分析上述数值的组间比较。 $P < 0.05$ 为差异有统计学意义。

结果基于 X 光片和 ZTE 的 KL 分级的模态间一致性良好 ($k = 0.872$, $P < 0.05$)。JS 和 FF 之间有明显的相关性 ($r = 0.299$, $P = 0.048$)。此外, KL 分级对 ZTE 的影响 (KLZTE) 与 JS 和 CD 相关

(分别为 $r=0.459$, $P=0.002$; $r=-0.386$, $P=0.010$)。根据 KLZTE, JS 和 CD 在轻度/中度组和晚期组之间以及 FF 在轻度组和晚期组之间的差异均有统计学意义。

结论我们的研究表明, ZTE-MRI 可测量关节间隙和关节角度以评估膝关节机械功能, 并进一步支持使用 Kellgren-Lawrence 分级系统进行解剖评估。定量信息有利于长期跟踪和患者对 KOA 进展的理解。我们发现 JS 和 CD 均与 KLZTE 评分相关, 且两者在轻度/中度组和晚期组之间存在显著差异。当 JS 或 CD 不在正常范围内时, KOA 患者会有膝关节疼痛的表现, 并可能反映出骨质退化。无辐射的 ZTE-MRI 不仅能提供类似 CT 的图像, 清晰显示关节间隙和骨结构, 还能与常规 MRI 同时获取, 用于常规膝关节 MRI 检查。使用 ZTE-MRI 和常规 MR 成像进行一站式膝关节检查将为患者带来便利。

PO-2393

IDEAL-IQ 定量参数 FF 值评估女性贫血的价值

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Objective To investigate the diagnostic value of bone marrow fat content in female with anemia
Method 175 patients with a pelvic MRI appearance were retrospectively evaluated. proton density fat fraction maps were calculated, and measurements were performed in the lumbar vertebra, anterior superior spine, acetabulum, caput femoris, collum femoris and metaphysis of upper femur
Result Fat fraction was significantly different in the different locations evaluated ($P=0.001$), except the value of caput femoris and acetabulum($P>0.05$). Fat fraction in the normal group were higher than those in the anemia group($P<0.05$). Fat fraction in light anemia group were higher than those in moderate and severe anemia group($P<0.05$)
Conclusion Fat fraction can indirectly reflect the anemia of women from the perspective of bone marrow component changes, and can preliminarily determine the degree of anemia

PO-2394

发生于左胫骨远端的急性痛风 1 例

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痛风是嘌呤代谢紊乱性疾病, 以体液、血液中尿酸增加以及尿酸单钠 (MSU) 晶体在各种间叶组织中沉积引起炎症反应为特征。急性痛风性关节炎主要表现为夜间突发的关节剧痛, 伴关节压痛, 周围皮温升高、红肿, 服用非甾体抗炎药、秋水仙碱或类固醇后可迅速缓解。痛风主要好发于中年男性, 最常累及第一跖趾关节。案例介绍: 一名 16 岁的男孩近 2 月来反复出现左踝关节疼痛, 活动后加剧, 伴关节周围红肿, 主要发生在晚上, 口服非甾体抗炎药物后疼痛可迅速缓解。实验室检查提示: 血清尿酸升高: $726.5\mu\text{mol/L}$ (正常参考: $208-428\mu\text{mol/L}$), 左踝关节 CT 平扫提示: 左侧胫骨远端关节面下囊状骨质破坏区, 边界清, 边缘见硬化边, 累及关节面; 左踝关节 MRI 平扫进一步提示: 左侧跟腱局部欠连续, 见斑片状 FS-T2WI 高信号影, 左踝关节周围软组织肿胀; 左踝关节腔及邻近部分肌腱腱鞘少量积液。结果: 最终病理检查确诊为左胫骨远端痛风。结论: 本病例报告提示: 近年来痛风具有年轻化的趋势, 对于影像学上表现为伴硬化边的骨质破坏病变, 我们应仔细观察关节周围软组织改变、结合临床及实验室检查结果综合分析, 如果患者尿酸水平高或影像学检查提示关节周围软组织异常改变, 则应考虑痛风的可能。

PO-2395

突出腰椎间盘突出重吸收的 MR 回顾性分析

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摘要: 目的 探讨腰椎间盘突出症重吸收患者的临床及影像学特征, 为其治疗方案的选择提供依据。方法 以 42 例腰椎间盘突出症重吸收患者作为研究对象, 分析患者的年龄、性别、重吸收时间和 MRI 影像学特征, 椎间盘突出程度采用 Komori 分型和 MSU 分级, 组织成分采用分 lwabuchi 分型。结果 42 例患者平均年龄 41 ± 5.6 岁; 男女之比为 1.1:1; 重吸收时间为 3~15 个月, 平均 6.58 ± 5.54 个月。42 例患者首次 MRI 检查时突出椎间盘均突破后纵韧带; 各分型中, Komori 3 型最容易发生重吸收, 占比 66.67%; MSU 3 级最容易发生重吸收, 占比 73.81%; lwabuchi 1 型最容易发生重吸收, 占比 92.86%; 合并 Modic 变性 6 例。结论: 腰椎间盘突出症重吸收患者的 MRI 表现有一定特征, 可为其手术或非手术治疗的选择提供影像学指导。

PO-2396

钙化在骨肉瘤患者肺良恶性结节鉴别诊断中的价值

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目的: 通过分析比较骨肉瘤患者肺良恶性结节钙化发生率来协助肺结节的定性诊断。

方法: 回顾性分析 2011 年 1 月至 2023 年 8 月 114 例骨肉瘤患者经手术病理证实的 193 个肺结节的胸部 CT 图像, 包括良性结节 23 个、转移结节 170 个。两名放射科医生结合肺结节 AI 软件, 在胸部薄层 CT 平扫纵隔窗图像上独立观察测量肺结节内有无钙化, 并达成一致意见。

结果: 骨肉瘤患者 193 个肺结节中, 肺良性结节 23 个和转移结节 170 个。23 个良性结节中出现钙化 4 个 (17.4%), 170 个恶性结节中出现钙化 106 个 (62.4%), 良恶性结节内钙化发生率上的差异具有统计学意义 ($\chi^2 = 16.7, P < 0.01$)。肺良性结节随访时间 11-575 天, 中位数为 178 天 (四分位数间距 84-296 天); 肺转移结节随访时间 1-1424 天, 中位数为 179 天 (四分位数间距 42.25-242 天)。通过 Mann-Whitney 检验, 骨肉瘤患者肺良恶性结节观察随访时间上的差异无统计学意义 ($Z = 0.626, P = 0.53 > 0.05$)。

结论: 骨肉瘤患者中良恶性肺结节在近似的随访时间内发生钙化的机率不同, 提示骨肉瘤患者肺结节内有钙化时倾向肺转移瘤的诊断。

PO-2397

酰胺质子转移成像 APT 在鉴别良恶性骨与软组织肿瘤中的应用价值

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研究背景:

酰胺质子转移成像 (APT) 可以检测活体内游离蛋白质和多肽中的酰胺质子, 由于肿瘤细胞的异常增生, 细胞内蛋白质合成的浓度、速度增加, 酰胺质子含量增加。APT 成像是目前一种较理想的肿瘤分子成像技术。

研究目的:

探讨 APT 成像在鉴别骨与软组织良恶性肿瘤中的应用价值。

研究方法:

纳入 20 名健康志愿者, 40 名良恶性骨或软组织肿瘤患者, 分别于术前两周内在 Philips 3.0T (Ingenia CX) 扫描仪和体部线圈上扫描。肿瘤患者均行手术治疗取得病理结果。扫描序列冠状位 FS-T2WI、矢状位 FS-T2WI、横轴位 T1WI、横轴位 T2WI、横轴位 APT 成像。比较良恶性肿瘤组、正常组与良性肿瘤组 APT 值是否有统计学差异。对服从正态分布资料运用独立样本 T 检验; 对不服从正态分布资料运用非参数分析独立样本 U 检验。

研究结果:

健康志愿者组 APT 值 $1.94 \pm 0.23\%$; 良性肿瘤组 APT 值 $2.94 \pm 0.70\%$; 恶性肿瘤组 APT 值 $5.39 \pm 0.89\%$ 。正常志愿者组与良性肿瘤组 APT 值有统计学差异 $P < 0.001$; 良、恶性肿瘤组 APT 值有统计学差异 $P < 0.001$ 。

结论: APT 成像具有鉴别骨与软组织肿瘤良、恶性的作用, 可指导临床医生制定合理的手术方案。

PO-2398

前交叉韧带重建术后移植物及大腿肌肉评估的多参数 MRI 研究

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目的: 使用 T2* mapping、T2 mapping 序列评估 ACLR 后移植物重塑状态, 探讨其定量值与膝关节稳定性及临床功能评分的关联性, 观察 ACLR 后大腿肌肉面积及脂肪浸润情况, 从而进一步指导临床康复治疗。方法: 收集 ACLR 患者及对照组各 26 例, 所有受试者均行膝关节 T2* mapping、T2 mapping 扫描。ACLR 组于术后 1、3、6、12 月扫描, 对照组行单次扫描。ACLR 组术后 6、12 月另行临床评分, ACLR 组术后 12 个月另行大腿肌肉扫描及 Ligs 测量。于 GE AW4.6 工作站行图像后处理, 获得 ACL 及移植物 T2*值、T2 值及术后 12 月双侧大腿肌肉的 CSA、FF。根据 Ligs 测量结果, 将患者分为稳定组及不稳组。结果: ACLR 术后 1、3 月移植物 T2*值低于对照组 ACL, 术后 6、12 月移植物 T2*值高于术后 1、3 月, 术后 1、3 月移植物 T2 值低于对照组, 术后 6 月 T2 值高于对照组, 术后 6、12 月 T2 值高于术后 1、3 个月, 术后 12 月移植物 T2 值低于术后 6 月, 差异均有统计学意义。ACLR 组术后 12 月 IKDC 评分、Lysholm 评分均较术后 6 月明显升高, 且差异有统计学意义。术后 6 月 T2*值与 IKDC 评分、Lysholm 评分, 术后 12 个月移植物 T2*值与 Lysholm 评分, ACLR 组术后 12 个月移植物 T2 值与 IKDC 评分均呈中度负相关关系。不稳组术后 6、12 月移植物 T2*值、术后 12 月移植物 T2 值高于稳定组, 术后 12 月 IKDC 评分、Lysholm 评分低于稳定组, 差异均有统计学意义。术后 12 月患侧总肌肉、前外侧群肌肉、股四头肌面积明显小于健侧, 差异有统计学意义。结论: 1.定量 MRI T2* mapping、T2 mapping 序列可用于无创定量

评估 ACLR 术后移植物修复愈合状态, ACLR 术后早期移植物 T2*值增加可能预测术后膝关节不稳。2.ACLR 术后移植物的 T2*值、T2 值一定程度上与患者膝关节功能状态相关, 为 ACLR 后膝关节综合评估手段及参数提供新的参考。3. ACLR 术后一年, 患肢股四头肌发生了明显萎缩, 因此康复治疗中应关注股四头形态学指标的恢复。

PO-2399

中国多发骨髓瘤患者中肌少症与虚弱评分的关联性研究

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目的: 在确诊为多发性骨髓瘤的患者中, 普遍存在虚弱和肌少症, 这最终会增加对健康的负面影响的风险。目前没有太多研究评估多发性骨髓瘤患者的虚弱指数与肌少症之间的关联。因此, 本研究旨在确定多发性骨髓瘤患者虚弱相关的临床指标, 有助于早期发现和治疗多发性骨髓瘤患者的虚弱问题。

方法: 肌少症是一种临床症状, 表现为骨骼肌含量和质量下降。为了估算躯干肌肉的含量和质量并确定肌少症, 我们使用 OsiriX 软件对 L3 椎体水平的 CT 图像进行精确分割和测量。我们测量了躯干肌肉的大小[横截面积 (CSA)]和肌肉密度 (平均 HU), 分别代表肌肉含量和肌肉质量。虚弱指数采用英国骨髓瘤研究联盟提出的骨髓瘤风险概况 (MRP) 进行评估。根据 MRP 评分对北京积水潭医院 2014 年 1 月至 2022 年 11 月期间的 223 名多发性骨髓瘤患者进行了评估。采用多元有序 logistic 逻辑回归分析评估了虚弱的相关参数。使用了 Cox 回归分析法来评估不同变量与死亡率之间的关系。

结果: 本次分析共纳入 223 名患者 (中位年龄 62 岁, 59.8%)。共有 119 名患者被归类为高风险 (HR) 荧光原位杂交 (FISH) 细胞遗传学患者。肌少症的发病率为 91.1%。多元逻辑回归分析显示, 在男性 (OR=1.069, P=0.009) 和女性 (OR=1.067, P=0.018) 中, 肌肉密度的降低与虚弱指数的升高具有一定的相关性。随访结束时, 有 47 名患者失访, 66 名患者 (女性和男性分别占 46% 和 31%) 均已死亡。MRP 评分与死亡率有关 (HR=2.945, P=0.037 女性和 HR=4.670, P=0.002 男性)。肌肉密度也与女性死亡率相关 (HR=0.923, P=0.037)。

结论: 肌肉密度与多发性骨髓瘤患者的虚弱风险增加相关。我们的研究表明, 在校正了虚弱指数和临床其他风险因素的基础上, 肌肉密度与多发性骨髓瘤女性患者的死亡率有关。我们建议在评估多发性骨髓瘤患者的虚弱指数中应将肌肉质量纳入。

PO-2400

开发和验证用于预测 axSpA 骶髂关节结构性进展的影像组学-临床列线图模型

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目的: 构建一个包含影像组学特征和临床因素的列线图模型, 以预测 axSpA 患者骶髂关节 (SIJ) 的结构性进展。

方法: 本研究纳入 257 名经临床确诊为 axSpA 并有基线及一年随访的骶髂关节核磁的患者, 将患者按 7: 3 的比例随机分为训练组 (n = 179) 和验证组 (n = 78)。从每名患者的图像中提取 1691 个影像组学特征, 并在训练组中依次使用相关性检验、F 检验及 Lasso 进行特征选择, 构建最佳影像组

学模型。纳入六个临床风险预测因子构建临床模型。结合影像组学及临床模型,通过多变量逻辑回归构建列线图模型。利用 ROC 分析、校准曲线和决策曲线来评估所建模型的性能。

结果:最终提取 7 个影像组学特征来构建 Rad-score 函数。训练组的影像组学模型、临床模型和列线图模型的 AUC 分别达到 0.90、0.78 和 0.93,验证组的影像组学模型、临床模型和列线图模型的 AUC 分别达到 0.80、0.79 和 0.86。校准曲线 ($P>0.05$) 和 DCA 证明诺模图模型可用于预测 axSpA 结构性进展。

结论:本研究提出了一种可以预测 axSpA 患者骶髂关节结构性进展的影像组学模型,构建的临床-影像组学列线图模型可以进一步提高预测效果,这可能有助于临床决策过程。

PO-2401

慢性腰痛患者椎间盘高度的 MRI 分析

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目的:探讨慢性腰痛患者椎间盘高度与年龄、性别及身体质量指数的相关变化及差异。

方法:回顾性分析 2022 年 4 月-2023 年 6 月本院就诊的慢性腰痛患者,共纳入 1388 例患者 (男性 665 例,女性 723 例,平均年龄 46.84 ± 12.479),根据年龄分为 3 组:青年组 (20-39 岁)、中年组 (40-59 岁) 及老年组 (60 岁以上),根据身体质量指数 BMI 分为四组:低体重组 ($BMI<18.5$)、体重正常组 ($18.5\leq BMI\leq 23.9$)、超重组 ($24.0\leq BMI\leq 27.9$) 及肥胖组 ($BMI\geq 28.0$)。所有患者均完成腰椎 MRI 检查,并在 T2WI 正中矢状位层面测量 L1/2 到 L5/S1 椎间盘前缘、中间、后缘高度,并得到相应椎间盘高度平均数;观察椎间盘高度平均数与年龄、性别及身体质量指数的关系。

结果:在青年组患者当中, L1/2、L2/3、L5/S1 椎间盘高度平均数显著低于中年组 ($P<0.001$),且显著低于老年组患者 ($P<0.001$);男性患者的 L1/2、L2/3、L3/4、L4/5 椎间盘高度平均数显著高于女性患者 ($P<0.001$);在体重正常组患者 ($18.5\leq BMI\leq 23.9$) 当中, L1/2、L2/3、L3/4 椎间盘高度平均数显著低于超重组 ($24.0\leq BMI\leq 27.9$) 患者 ($P<0.001$); L1/2、L2/3、L5/S1 椎间盘高度平均数与年龄成正相关 ($r=0.306, 0.198, 0.182, P<0.001$), L1/2、L2/3 椎间盘高度平均数与 BMI 指数成正相关 ($r=0.112, 0.096, P<0.001$)。

结论:这项对慢性腰痛患者腰椎 MRI 数据的大规模横断面分析表明, L1/2、L2/3、L5/S1 腰椎间盘高度会随着年龄的增长而增大,其中 L5/S1 椎间盘高度变化更多取决于年龄,而 L4/5 椎间盘高度变化更多取决于性别。

PO-2402

光谱多参数 CT 增强成像在成骨型转移瘤与骨岛的鉴别诊断研究

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目的:本研究旨在探讨应用光谱 CT 多参数增强成像在成骨型转移瘤与骨岛中的鉴别诊断价值。

方法:本研究回顾性纳入 2022 年 12 月-2023 年 4 月行光谱 CT 增强检查的肿瘤患者共 104 例,结合临床及影像数据随访确诊为成骨型转移瘤或骨岛,其中成骨型转移瘤病灶 53 个,骨岛患者 5 个。应用飞利浦后处理工作站重建光谱数据并测量各病灶动静脉期的常规 CT 值 (rCT)、40keV 和 100keV 虚拟单能级图像 (VMI) CT 值、碘密度值 (ID)、有效原子序数 (Z-eff)、电子云密度 (ED)、及其标准差 (SD),光谱曲线斜率 (λHU) 及各光谱参数噪声值 (Standard deviation, SD 值)。成骨型转移瘤与骨岛的各光谱参数间差异性评估采用独立样本 t 检验;采用单因素 logistic 回

归评估二者鉴别概率并联合 ID 值, ED 值, Z-eff 值, VMI40/100keV CT 值建立光谱多参数联合模型, 绘制受试者工作特征(Receiver operating characteristic ROC)曲线及并计算曲线下面积 (Area under curve, AUC), 并计算截断值 (Cutoff value) 评估各参数对成骨型转移瘤与骨岛的鉴别诊断效能。

结果: 除动脉期 SDZ-eff 值外, 各参数差异均有统计学意义 ($P<0.05$)。动脉期和静脉期各光谱参数 (ID, ED, Z-eff, VMI40keV, VMI100keV) 分别绘制 ROC 曲线, 其 AUC 均小于 0.9; 动脉期和静脉期多参数联合模型的 AUC 分别为 0.914 和 0.908; 动静脉期多参数联合模型 (ID, ED, Z-eff, VMI40keV, VMI100keV) 具有最佳的 AUC, 为 0.953 (敏感度=96%, 特异度=94.2%), 诊断效能均优于动/静脉期能量图像(动脉期 AUC rCT=91.8 cutoff=872.2, 静脉期 AUC=90.4, cutoff=824.5)

结论: 相较于常规 CT, 应用光谱 CT 多参数联合模型在成骨型转移瘤与骨岛鉴别中具有最佳预测效能, 可为二者的早期诊断及鉴别诊断提供更多影像学信息。

PO-2403

First-Time Resolution of Unsaturated Fatty Acid Peaks in Trabecular Bone Using Clinical 1D Magnetic Resonance Spectroscopy

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The study addresses the difficulty in isolating unsaturated fatty acid peaks in bone marrow using traditional Magnetic Resonance Spectroscopy (MRS). Such peaks are critical for understanding bone metabolism but are challenging to identify due to the complex environment in bone marrow. Researchers employed a 1D acquisition method with intermolecular double-quantum coherence (iDQC) to improve spectral resolution on a clinical 3.0 Tesla scanner. Tested on a 62-year-old female's lumbar vertebra, this method succeeded in resolving additional fatty acid peaks. These results have important implications for studying bone-related diseases and potentially offer a more effective and time-efficient approach for clinical scans.

PO-2404

应用 MRI 去金属伪影技术评估骨肉瘤保肢术后影像表现

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目的: 应用 1.5T-MRI 压缩感知的层面编码金属伪影矫正 (Compressed Sensing Slice-Encoding for Metal Artifact Correction, CS SEMAC) 技术评估骨肉瘤保肢术后影像表现, 包括肿瘤复发、感染、无菌性松动, 及其诊断效能。

方法: 回顾性收集 2020 年 8 月至 2023 年 8 月四肢骨肉瘤保肢假体植入术后患者 102 例, 并接受 1.5T MRI CS SEMAC 序列检查。放射科两名肌肉骨骼专业医生对骨肉瘤保肢假体植入术后肿瘤复发组、感染组、无菌性松动组及对照组进行了回顾性评估。采用 Fisher 精确检验对各组进行比较。对每个发现的敏感性、特异性和准确性进行评估。观察者间的可靠性用 Kappa 统计量进行评估。

结果: 对肿瘤复发组的 12 名患者 (平均年龄 38 ± 10 岁; 8 名男性)、感染组 5 名患者 (平均年龄 32 ± 11 岁; 3 名男性)、无菌性松动组 8 名患者 (平均年龄 33 ± 11 岁; 4 名男性) 和对照组的 77 名患者 (平均年龄 30 ± 13 岁; 40 名男性) 进行了评估。四组之间的软组织结节或肿块、骨膜反应、

滑囊水肿和骨溶解有统计学差异 ($P < 0.001$)。12 例肿瘤复发患者中有 12 人出现软组织结节或肿块, 最小病灶直径约 1cm, 对照组 77 名患者中未见软组织结节或肿块。5 例感染患者中有 4 例出现骨膜反应, 77 例对照患者中有 5 例出现骨膜反应。5 例感染患者中有 5 例出现滑囊水肿, 77 例对照患者中有 8 例出现滑囊水肿。8 例无菌性松动患者中有 6 例出现骨溶解, 对照组 77 名患者中出现 9 例骨溶解。观察者之间的一致性较好, k 值在 0.90 和 0.93 之间。四组在骨髓水肿、积液、肌肉水肿方面没有差异性。

结论: 应用 1.5T-MRI 去金属伪影技术能准确评估骨肉瘤保肢术后影像表现, 软组织结节或肿块对肿瘤复发、骨膜反应和滑囊水肿对假体周围感染、骨溶解对假体无菌性松动的评估均具有很高的准确性。

PO-2405

人工智能辅助压缩传感技术在踝关节 MR 成像中的应用

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目的: MR 是诊断踝关节软组织损伤理想的影像学方法, 特别是使用 PD-SPAIR (3D-PD-SPAIR-ISO)、T1WI 和 T2WI 序列。然而, 传统的 PD-SPAIR、T1WI 和 T2WI 序列获取时间限制了其在临床上的广泛应用。本研究旨在将人工智能辅助与深度学习重建技术相结合, 为踝关节 3D PD-SPAIR-ISO 序列、T1WI 和 T2WI 序列成像确定合适的加速度因子, 优化成像速度, 同时保持图像质量。

方法和材料: 10 名志愿者接受踝关节 MRI 检查 (3D PD-SPAIR-ISO、T1WI 和 T2WI 序列), 使用最近开发的人工智能辅助技术, 具有不同的加速因子 (ACS3.0 至 ACS9.0)。使用 3.0T 扫描仪 (欧米茄, 上海联合影像医疗股份有限公司)。传统的加速方法为部分傅里叶和并行成像, 以 3.0 倍加速度 ($F3$) 作为参考。两位经验丰富的放射科医生对图像质量进行评估。测量胫骨远端、附近肌肉等不同解剖部位的信噪比 (SNR) 和对比噪声比 (CNR), 并进行统计学比较。利用 4 分法对主观评分进行评估, 评估图像信号的均匀性, 边缘清晰度。

结果: 不同加速因子下的 3D PD-SPAIR-ISO、T1WI 和 T2WI 序列下的胫骨远端和邻近的肌肉间 SNR 和 CNR 值组间没有显著差异 ($P > 0.05$), 图像主观评分组间无统计学差异 ($P > 0.05$)。

结论: 人工智能辅助可以在不影响图像质量的情况下加速踝关节 3D PD-SPAIR-ISO、T1WI 和 T2WI 序列。在更短的时间内提供与临床标准相当的诊断质量, 提高了 MR 扫描仪的生产率。

大临床相关性应用: 人工智能辅助集成了压缩传感和深度学习技术, 为扫描踝关节 3D-PD-SPAIR-ISO 序列 T1WI 和 T2WI 序列扫描节省了时间。人工智能辅助的应用具有很大的临床应用潜力, 提高了患者的舒适度和 MRI 效率。

PO-2406

基于卷积神经网络的颈椎 CT 椎间盘突出自动检测和分类的应用研究

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目的: 我们提出了一个基于深度学习在 CT 上自动评估和分类椎间盘突出的网络模型。

材料和方法: 从 2021 年 1 月到 2021 年 4 月收集了 768 名脊髓型颈椎患者的数据。70% 的数据用于训练集 ($n=558$), 10% 用于验证集 ($n=70$) 和 20% ($n=140$) 进行测试集。在外部测试集中评估了 100 名患者。椎间盘由三位经验丰富的放射科医师使用 Kang 分级系统独立评估, 并分为 0 至

3 级（为参考标准）。对于 C2-T1 节段的颈椎间盘，我们利用训练集和验证集来构建 3D-DenseNet 模型用于椎间盘突出分类，测试集的 CT 图像分别由 DenseNet 和两名放射科住院医师（5 年和 2 年工作经验）进行独立评估。我们最终使用 Cohen 的 κ 检验、ROC 曲线下面积、准确度、灵敏度、特异性和 F1 分数来评估和比较分类性能。

结果：评估了包含 25491 张轴位 CT 图像的内部数据集中的所有患者（平均年龄， 58.6 ± 17.5 岁；范围，32-78 岁）。对于内部测试，二分类（根据脊髓是否受压）显示 DenseNet 模型和两名放射科住院医师与参考标准相比基本一致，各自的 κ 值分别为 0.726、0.666 和 0.638 ($P < 0.001$)。DenseNet 模型对椎间盘进行分类的准确性略高于放射科住院医师（分别为 88.2%，85.8% 和 84.7%； $P = 0.011$ ）。为了进一步探索所提出的 DenseNet 模型的三分类（根据硬膜囊和脊髓是否受压）性能，对 DenseNet 模型、一名住院医师和参考标准进行了比较。DenseNet 模型对椎间盘进行分类的准确性略低于住院医师（78.2% 对 85.8%； $P = 0.003$ ）。外部测试集结果显示，DenseNet 模型和住院医师的二分类基本一致（ κ 值，0.681 和 0.712； $P < 0.001$ ）。

结论：对于颈椎 CT 椎间盘突出的评估和分类，所提出的深度学习网络模型可以达到与人工评估相当的性能。

PO-2407

业余滑板运动员不同运动类型对踝关节健康影响的影像研究

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目的：本研究旨在通过磁共振多模态技术，了解不同运动类型的业余滑板运动员踝关节健康情况，为滑板运动员基于踝关节磁共振影像数据选择合适的运动方式提供参考。

方法：本研究通过杭州市数家滑板培训机构招募了 35 名业余滑板运动员（平均年龄 23.6 ± 4.4 (SD)），此外，招募了 35 名健康被试作为对照组（平均年龄 23.4 ± 2.4 (SD)）。使用 1.5T MRI 对受试者双侧踝关节进行扫描，扫描序列包括 3D T1WI 及定量 mapping 等，通过图像分析软件分别获得踝关节影像数据，判断踝关节撞击存在与否及严重程度，使用 Mann-Whitney U 和卡方检验进行数据统计分析， $p < 0.05$ 被认为具有统计学意义。

结果：多模态影像学结果提示，实验组存在踝关节撞击情况显著高于对照组 ($P < 0.05$)，其中以刷板侧(前脚)为主；对于刷板侧(前脚)，存在前踝和(或)前内踝撞击情况的尖翻型运动组人数显著大于跟翻组 ($P < 0.05$)。

结论：滑板运动中尖翻动作可能增加刷板脚位的前踝和(或)前内踝撞击概率，导致该侧踝关节背屈、内翻动作受限并出现弹响、疼痛等症状。结合影像表现，对于出现相应症状的滑板运动员应避免长期进行尖翻动作。

PO-2408

医学影像在脊柱侧弯畸形中的应用价值及技术要点

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目的 总结分析全脊柱拼接 DR 摄影与 CT 容积扫描和 MR 扫描在全脊柱侧弯畸形中的临床应用诊断价值及技术要点。

方法 总结放射科自 2020 年至 2022 年在我院脊柱外科接受治疗的 60 例患者对其在我科做的 X 线，CT 扫描，MR 检查，对 CT 数据进行重建处理，请诊断及临床医生对其进行图像质量分析总结。

结果 1 X 线脊柱拼接能直观地显示脊柱整体解剖形态及侧凸部位, 判断脊柱的整体结构和活动度, 通过测量 Cobb 角对脊柱侧弯的严重程度诊断、在术前评估及预后判断具有一定的价值。2 CT 通过一次扫描全脊柱进行三维重建 MPR/CMR 能更加全面地观察畸形部位细节并且可以测量脊椎旋转角度, 还能发现椎管内外及小关节存在的骨性病变, VRT 通过调节不同阈值并辅以不同的伪彩依次可显示骨质及椎管的形态, 尤其适用观察侧弯的分类和椎管情况, 通过重建椎弓根指导手术钉道位置, 复查术后钉道所处位置情况在评价脊柱侧弯的程度, 进展, 为临床制定手术方案具及术后效果有重要的临床指导意义。3 磁共振 3DMRI SPACE 序列采用三维扫描, 实现无缝拼接, 可多方位重建, 不仅可显示脊髓病变如脊髓空洞, 脊髓肿瘤, 脊髓栓系和 Chiari 畸形等, 还能显示椎体及周围软组织情况。总之 MRI 可指导制定矫形手术方案, 显示和选择手术路径, 对脊柱侧弯矫形的术前评估具有重要意义。

结论 因为脊柱侧弯的解剖结构复杂, X 线检查是脊柱侧弯的首选检查方法, 也是不可缺少的检查方式。对于准备手术和术后复查患者螺旋 CT 扫描进行三维重建能够更好的指导手术对制订手术方案和复查术后效果是不能缺少的检查方法; 对于发现脊髓病变进行 MRI 扫描, 从而更好地、全面地了解脊柱侧弯原因相关脊髓病变情况。

PO-2409

7.0T 磁共振 SWI 序列与 UHRCT 对膝关节骨结构对比研究

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目的: 与 UHRCT 对比, 探讨 7.0T 磁共振 SWI 序列在膝关节骨结构成像中的价值。

方法: 分析陆军军医大学第一附属医院 2022 年 12 月-2023 年 3 月, 16 例行膝关节超高分辨率 CT (ultra-high-resolution Computed Tomography, UHR-CT) 扫描的患者, 一周内行 7.0T 磁共振膝关节扫描。所有数据经西门子 Syngovia 处理, 使用 Bone J 软件在膝关节 UHR-CT 与 7.0T 磁共振图像解剖相同层面测量股骨后份骨皮质厚度, 对 UHR-CT 和磁敏感加权成像 (susceptibility weighted imaging, SWI) 膝关节髌骨上下缘及胫骨平台层面行骨小梁拟合度分析, 以 UHR-CT 为标准评估 SWI 对骨质微结构显示能力。

结果: 在髌骨上缘层面测量股骨后份骨皮质厚度, CT 测值为: 0.23 ± 0.025 , 磁共振测值为: 0.32 ± 0.020 ($P < 0.001$)。髌骨下缘层面股骨后份骨皮质厚度, CT 测值为: 0.158 ± 0.028 mm, 磁共振测值为: 0.26 ± 0.021 ($P = < 0.001$)。髌骨上缘层面, 股骨骨小梁 CT 和磁共振拟合度为 $47 (\pm 11) \%$, 髌骨下缘层面, 股骨骨小梁 CT 和磁共振拟合度为 $53 (\pm 10) \%$, 胫骨平台髁线上水平缘层面胫骨骨小梁 CT 和磁共振拟合度为 $55 (\pm 06) \%$ 。

结论: 在 7.0T 磁共振下, SWI 能够较准确显示骨皮质图像, 但对骨小梁的显示有一定限度。

PO-2410

血友病性骨关节病 X 线表现及鉴别诊断 (附 60 例报告)

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目的 旨在探讨血友病性关节病 X 线征象, 提高其诊断与鉴别诊断。方法 回顾性总结 60 例经过临床及实验室检查证实的血友病患者 X 线表现。结果 60 例患者, 涉及 91 个关节 (膝关节 49 个、踝关节 17 个、髌关节 18 个、肘关节 7 个) 和 1 节指骨。X 线表现膝关节 29 例 (其中双膝 16 例且 3 例累及双髌及踝关节, 1 例伴双肘关节)、踝关节 11 例 (其中双踝 6 例)、髌关节 14 例 (其中双髌 4 例)、肘关节 5 例及指骨 1 例, 同时出现血友病性假肿瘤表现。X 线表现均有周围软组织肿胀,

关节间隙不同程度变窄, 关节面模糊、破坏而不规整 (19 例); 股骨髁间凹增宽、加深 (24 例) 伴髌骨脱位 2 例, 髌骨呈方形 6 例; 膝、踝关节骨端或骨骺增大伴骨质疏松 (17 例); 髌关节骨端糜烂模糊及关节间隙一致性变窄 11 例; 1 例指骨呈明显多房状膨胀性溶骨破坏区, 周围软组织肿胀, 曾考虑内生软骨瘤可能。结论 血友病性骨关节病 X 线征象具有一定特征, 结合临床实验室检查可以做出正确诊断。但需与以下关节疾病鉴别: (1) 渗出性关节炎: 主要与类风湿、结核、化脓性关节炎鉴别: 1) 类风湿性关节炎: 好发成年女性, 以手足小关节起病, 多呈对称性。早期常为骨质疏松, 继而关节面和边缘虫蚀及蜂窝状骨质破坏, 累及膝、髌关节, 以关节间隙变窄伴骨质疏松为主, 常致关节变形。2) 关节结核: 常发生于膝、髌等承重关节, 上下关节面对应部位骨质破坏(对吻性死骨)为其典型表现。3) 化脓性关节炎: 关节软组织肿胀, 骨质破坏及广泛骨质增生硬化, 关节间隙变窄, 晚期骨性强直。(2) 退行性骨关节病: 好发老年人, 常为骨端增生硬化伴囊变, 关节间隙狭窄。(3) 血友病性假肿瘤与骨肿瘤的鉴别: 1) 骨巨细胞瘤: 长骨端关节面下偏心性囊状或囊状膨胀性骨质破坏, 边缘无硬化。2) 内生软骨瘤: 囊状膨胀性骨质破坏, 其间点节状钙化, 软组织无肿胀。(4) 夏科氏关节: 病变关节无痛性肿胀, 关节破坏严重, 多有脊髓空洞症、糖尿病等病史。

PO-2411

18 岁及以下患者骨巨细胞肿瘤的临床及影像学特征分析

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目的: 大多数骨巨细胞瘤 (giant cell tumors of bone, GCTB) 发生在成人患者, 特别是年龄在 20-40 岁之间。本研究旨在探讨儿童患者 GCTB 的影像学特征, 并与成人病例进行比较。

方法: 回顾性分析 57 例 18 岁及以下的 GCTB 患者, 占 2001-2019 年郑州大学第一附属医院所有年龄 GCTB 患者的 12.8%。本研究还对 126 例成年患者 (19 岁及以上) 长管骨 GCTB 患者纳入研究。从病历中确定了以下临床信息: 年龄、性别和随访资料。影像学特征由两名肌肉骨骼放射科医生进行了分析。

结果: 本研究共纳入 57 例患者 (女性 32 例, 男性 25 例)。患者年龄为 9~18 岁 (中位=值为 17 y)。大多数肿瘤发生在管状骨 (=38,66.7%) 和骨盆 (n = 8,14.0%)。与成人 GCTB 患者相比, 儿童 GCTB 患者的上-下 (SI) 直径更大 (P = 0.005), 左-右直径/SI 直径比更小 (P = 0.001)。与成人患者相比, 儿童 gctb 患者的骨骺受累相对较少 (P = 0.009)。无骨骺受累的中位年龄低于有骨骺受累的中位年龄 (11 岁 vs 17 岁)。结论: 小儿年龄组的 GCTB 比较罕见。本研究发现, 在儿童 GCTB 患者中, 骨骺的受累性相对较少, 肿瘤更有可能发生纵向生长。这些发现有助于儿童人群中 GCTB 的诊断。

PO-2412

双层探测器光谱 CT 虚拟单能量 40 keV 在老年病人下肢动静脉血管造影中的应用价值

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目的 探讨通过双层探测器光谱 CT 虚拟单能量 (VMI) 40keV 技术在老年患者下肢动脉血管造影 (CTA) 和下肢静脉血管造影 (CTV) 一站式扫描的可行性与应用价值。方法 回顾性分析 2021 年 10 月至 2022 年 11 月在南京医科大学第四附属医院使用双层探测器光谱 CT (IQon Spectral CT, Philips, Netherlands) 行下肢 CTV 扫描患者的影像资料。纳入标准: (1) 年龄≥60 岁; (2) 接受

双层探测器光谱 CT 下肢进行 CTV 检查。排除标准：（1）下腔静脉 CT 值 <100 HU；（2）下肢金属内固定植入术后。共纳入患者 30 例，男 13 例，女 17 例，年龄 61-89（ 72 ± 9 ）岁。对重建获得的 VMI 40keV 组和传统混合能量图 CI 组进行主客观评价，两名医师双盲采用 Likert5 分法评价两组的图像质量，采用 Wilcoxon 秩和检验比较两组评分，采用 Kappa 一致性检验评价两位医师主观评分，采用配对样本 t 检验分别比较两组的髂动静脉、股动静脉、腘动静脉、胫后动静脉的 CT 值（CTHU）、信噪比（SNR）和对比噪声比（CNR）。结果 40keV 组各段血管主观评分均高于 CI 组，差异具有统计学意义（ $p<0.001$ ），两位医师的主观评分一致性较好，Kappa 值分别为 0.797，0.757，0.628 和 0.562，40 keV 组的各段血管主观评分均优于 CI 组，差异具有统计学意义（ $p<0.001$ ），40keV 组各段血管的 CTHU、SNR 和 CNR 均高于 CI 组，差异具有统计学意义（ $p<0.001$ ）。结论 双层探测器光谱 CT VMI 40keV 技术可以一次扫描同时获得下肢动脉和静脉的高质量成像，该技术适用于老年病人，值得临床推广应用。

PO-2413

增强现实导航在经皮影像引导脊椎活检中的应用

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目的：本研究的目的是评估增强现实导航系统（augmented reality navigation, ARN）系统用于经皮脊椎活检（percutaneous spinal biopsy, PSB）的准确性（偏离目标或预期路径）和有效性（插入时间）。

方法：提出一种基于多模态成像信息的 AR 手术导航系统，该系统包括透视、光学跟踪和深度相机。我们还提出了一种六自由度光学跟踪装置和深度相机在不同坐标系下的自适应校准和转换方法。由于荧光透视成像的频率大大降低，该系统可以实时准确地跟踪虚拟穿刺针并将其叠加在荧光透视图像上。在最初采集 CT 进行靶点标记和规划后，使用 ARN 由同一手术操作者进行 30 次脊椎活检。通过 CT 验证穿刺针的位置。

结果：活检针插入的平均准确度（ $n=30$ ）为 $0.71\text{ mm}\pm 0.33\text{ mm}$ ，与计划路径相比角度偏差为 $0.9^\circ\pm 0.4^\circ$ 。中位穿刺路径长度为 36 mm（范围 16–71 mm， $p=0.175$ ）。中位穿刺针到位时间为 274 秒（范围 117–492 秒）。

结论本研究表明，ARN 可用于经皮脊椎活检的导航，具有较高的准确性和有效性。

PO-2414

冬季北方寒区长跑人群运动性踝关节损伤特点的初步研究

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目的：通过 MR 影像学检查和踝关节损伤的流行病学特征分析冬季北方寒区长跑人群的踝关节损伤特征，探讨踝关节损伤特征与季节的相关性。

方法：采集 2022 年 1 月及 2023 年 1 月的长跑人群来我院行踝关节 MR 体检筛查，共 424 人，分为非冬季组和冬季组。

结果：在 19-60 岁的人群中，踝关节损伤高发年龄段为 19-25 岁（47.18%）；其中韧带损伤 131 例（33.58%），肌腱损伤 73 例（18.72%），骨软骨质损伤 186 例（47.69%），差异有统计学意义（ $\chi^2=70.993$ ， $p<0.001$ ）；左踝损伤 135 例，右踝损伤 141 例，差异无统计学意义（ $\chi^2=2.025$ ， $p>0.05$ ）。

$p=0.155$)。冬季损伤 (167 例) 高发于非冬季损伤 (135 例), 差异有统计学意义 ($\chi^2=9.887$, $p<0.05$)。损伤高发年龄段均为 19-25 岁, 构成比分别为 50.37% 和 44.91%; 损伤高发部位亦均为骨及软骨损伤, 构成比分别为 52.07% 和 44.34%。

结论: 踝关节损伤冬季损伤率高; 总体而言, 四季骨及软骨损伤率明显高于韧带及肌腱损伤; 冬季肌腱损伤率发生率较高。

PO-2415

深度学习重建算法对腰椎 QCT 图像质量的影响

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的: 通过与滤波反投影 (FBP) 及混合迭代 (ASIR-V) 重建算法的对比, 探讨深度学习 (DLIR) 重建算法的对腰椎 QCT 图像质量的影响及对诊断的准确性的影响。资料与方法: 纳入临床考虑骨质疏松行腰椎 QCT 检查的患者 28 例, 所有患者利用 Revolution APEX CT 进行腰椎 QCT 成像, 管电压选择 120Kv, 分别利用滤波反投影重建 (A 组)、40%ASIR-V 重建 (B 组)、深度学习低 (DLIR-L) (C 组)、深度学习中 (DLIR-M) (D 组)、深度学习高 (DLIR-H) (E 组) 重建算法重建重建出五组图像, 所有图像传输至 QCT 工作站, 在 QCT 工作站测量 T12-L2 椎体的骨密度 (BMD) 值, 同时在 ADW 工作站测量腰椎椎体、椎间盘、背部肌肉 CT 值及 SD, 计算 SNR 及 CNR。所有患者同期进行腰椎双能 X 线吸收检测仪 (DXA) 检查, 比较五组图像腰椎的 BMD 值, CT 值、SD、SNR 及 CNR 图像质量的差异。比较五组重建算法下对腰椎骨质疏松诊断真确性与 DXA 进行对比。结果: 五组图像腰椎的 BMD 值差异无明显统计学意义 (P 值 >0.05), 五组 QCT 图像对腰椎骨质情况的诊断差异无明显统计学意义 (P 值 >0.05)。五组图像腰椎 CT 值差异亦无明显统计学意义 (P 值 >0.05)。FBP、40%ASIR-V、DLIR-L、DLIR-M、DLIR-H 五组图像的噪声分别为 27.63 ± 12.34 、 20.07 ± 4.56 、 19.43 ± 5.07 、 17.13 ± 4.83 、 14.77 ± 4.64 , 差异有统计学意义 ($P<0.05$), DLIR-H 重建算法下噪声较 FBP 降低 46.54%, 较 40%ASIR-V 降低 27.36%, 五组图像信噪比及对比噪声比差异均有统计学意义 (P 值均 <0.05), DLIR-H 重建算法下信噪比及对比噪声比均较 FBP 及 40%ASIR-V 提高。五组图像对腰椎骨质疏松诊断结果与 DXA 无明显统计学差异。结论: DLIR 重建算法可以在不影响骨密度值准确性测量的情况下, 降低腰椎 QCT 的图像噪声, 提高信噪比及对比噪声比。

PO-2416

基于 L3 层面躯干肌质量与腰椎小关节炎严重程度相关性的研究

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摘要: 目的 研究中老年人群 L3 层面躯干肌质量与腰椎小关节炎严重程度相关关系。方法 使用 OsiriX 图像处理软件测定 346 名 44~82 岁人群 L3 椎体下终板层面躯干肌总面积及 CT 均值, 计算骨骼肌指数 (Skeletal muscle mass index, SMI); 同时利用 Weishaupt 椎小关节炎分级标准测定 L4-5 双侧椎小关节炎程度。应用 SPSS 23.0 统计软件进行数据处理, 使用独立样本 t 检验比较男女两组间 L3 下终板层面躯干肌 CT 均值、L3 下终板层面躯干肌面积、SMI、BMI、年龄及 L4-5 右、左两侧 FJOA 分级的差异性。关节炎分级相关性采用 Spearman 相关分析及偏相关分析。结果 不同性别组别之间, 男性组, 躯干肌均值和年龄有统计学意义 ($P<0.05$), 躯干肌均值与 L4-5 双侧 FJOA 均呈负相关 (r 值分别为 -0.25、-0.28), 年龄与 L4-5 双侧 FJOA 均呈正相关 (r 值分别为 0.23、0.21)。女性组, 躯干肌均值、年龄及 BMI 有统计学意义 ($P<0.05$), 躯干肌均值与 L4-5

双侧 FJOA 均呈负相关 (r 值分别为 -0.29、-0.33)，年龄与 L4-5 双侧 FJOA 均呈正相关 (r 值分别为 0.27、0.34)，BMI 与 L4-5 双侧 FJOA 均呈正相关 (r 值分别为 0.20、0.23)。控制年龄因素，采用偏相关分析，分析受检者躯干肌均值与 FJOA 间相关性，男性组与女性组 L4-5 双侧 FJOA 严重程度均与 L3 躯干肌均值呈一定负相关。结论 L3 层面躯干肌质量与腰椎小关节炎严重程度存在一定相关性。

PO-2417

跑步相关慢性踝关节不稳 MRI 损伤特征及足底压力、小腿肌力变化

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目的：探讨跑步相关慢性踝关节不稳 MRI 损伤的特征，以及患侧足底压力、小腿肌力变化特点。方法：对 50 例跑步过程中反复发生踝关节扭伤的患者进行踝关节不稳评估，对符合入组条件的受试者进行双侧踝关节 MRI 检查、足底压力、小腿肌力检测。将受试者左、右踝分成两组，比较距腓前韧带厚度、长度的差异；对两组距骨、胫骨、内外踝、跟骨骨髓水肿进行定性诊断并比较差异；比较两组之间足底压力、小腿肌力变化。结果：符合慢性踝关节不稳诊断标准的受试者 18 例，其中男性 14 例，女性 4 例。受试者左、右踝距腓前韧带长度、厚度之间存在差异性 ($P < 0.05$)；两组距骨、外踝骨髓水肿的存在差异性 ($P < 0.05$)，胫骨、内踝、跟骨骨髓水肿的差异无统计学意义 ($P > 0.05$)；两组足底压力、小腿肌力变化具有的差异有统计学差异 ($P < 0.05$)。结论：跑步相关踝关节不稳患侧踝关节距腓前韧带发生慢性损伤（增粗或变细），容易导致外踝和距骨内侧部长期存在骨髓水肿；而患侧足底压力分布会发生变化且小腿后侧肌群肌力减低。

PO-2418

股骨近端骨原发性假肌源性血管内皮瘤 1 例 影像及病理分析

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骨原发性假肌源性血管内皮瘤 (pseudomyogenic hemangioendothelioma, PHE) 是一种罕见的骨的中间型血管源性肿瘤，文献对其报道较少，且多以病理报道为主。本文通过分析 1 例经手术病理证实的骨原发性 PHE 的影像学表现，并复习相关文献，以扩大该病的影像学资料库，助力对该病的影像诊断及鉴别诊断认识。

PO-2419

合成磁共振成像对半月板损伤分级的定量评估

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本研究利用合成磁共振成像技术 (SyMRI) 联合常规 MRI 对半月板损伤产生的异常信号进行 Stoller 分级, 分析 SyMRI 各测量值与 Stoller 分级之间的相关性。以手术中关节镜下所见为金标准, 探讨 SyMRI 是否能对半月板损伤程度进行准确诊断, 以期减少不必要的关节镜检查。

方法收集 2022 年 7 月至 11 月在暨南大学附属第一医院骨科 60 例患者以及 20 例健康受试者。手术前对所有患者及健康受试者进行常规 MRI 及 SyMRI 检查。将 SyMRI 图像在主机上进行后处理, 并测量半月板的 T1 值、T2 值及 PD 值, 与常规 MRI 所见的半月板损伤的 Stoller 分级情况进行对应。采用单因素方差分析比较正常组、变性组及撕裂组半月板的 T1 值、T2 值及 PD 值。利用 Pearson 相关分析研究有意义的测量值与 Stoller 分级的相关性。以关节镜下所见半月板形态为金标准, 判断 SyMRI 诊断半月板损伤的准确性。采用 McNemar 检验分析常规 MRI 和 SyMRI 对于半月板变性和撕裂诊断效能的差异。

结果 1. SyMRI 与半月板 Stoller 分级相关性研究: SyMRI 测量的 T1 值及 PD 值组间没有统计学差异, T2 值的差异具有统计学意义, 三组组间的 T2 值均有差异。T2 值与 Stoller 分级之间的相关系数 $r=0.938$, 两者之间有显著相关性。

2. SyMRI 定量分析半月板损伤准确性研究: 以关节镜所见情况为金标准, 三组的 T1 值及 PD 值的差异无统计学意义, T2 值的差异具有统计学意义, 三组组间的 T2 值的差异均具有统计学意义。SyMRI 诊断半月板撕裂的灵敏度及特异度均高于常规 MRI。当 T2 值的阈值取 51.67 (ms) 时, AUC 为 0.934。

结论首先, SyMRI 测量值与 Stoller 分级具有较高相关性, 能有效地定量反映半月板损伤情况。其次, SyMRI 与半月板诊断金标准有较高的一致性, 说明 SyMRI 能够对临床治疗进行一定的指导作用。

PO-2420

定量 DWI 评估前交叉韧带重建术后 6、12 个月移植植物成熟度变化及其与临床评分的相关性

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目的: 基于 DWI 定量评估前交叉韧带重建术 (ACLR) 后 6、12 个月移植植物重塑状态及其与相应临床功能评分的相关性。

方法: 前瞻性纳入 2020 年 8 月—2021 年 10 月行 ACLR 的 44 例患者。患者于术后 6、12 个月行 3.0T 常规 MRI 及 DWI 扫描, 测量关节内移植植物及其近、中、远 3 个节段的 ADC 值。术后各时间点行 IKDC、Lysholm 评分。采用 Wilcoxon 检验比较术后 6 个月与 12 个月 ADC 值的差异。采用 Pearson 相关系数分析移植植物关节内段 ADC 值与术后 6、12 个月 IKDC 评分、Lysholm 评分的相关性。

结果: ACL 移植植物整体关节内段及其近、中、远端三个部分的 ADC 值在 6 ~ 12 个月显著下降 ($P < 0.05$)。术后 6、12 个月移植植物 ADC 值与 IKDC 评分、Lysholm 评分均无明显相关性。术后 6 个月移植植物关节内段远端 ADC 值高于近、中段 ($P < 0.05$), 术后 12 个月时三者 ADC 值相近。

结论: ACLR 术后 6 至 12 个月, 移植植物持续成熟, 但与评价膝关节整体临床功能评分不一致。在评估移植植物成熟度方面, 提示 DWI 和 ADC 值比膝关节整体临床评分更有临床价值。

PO-2421

甲基乙二醛——干预糖尿病骨代谢紊乱的新靶点

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目的：甲基乙二醛是糖酵解过程中的有毒产物，可与蛋白反应生成晚期糖基化终末产物，诱导细胞及组织损伤。探索 MG 异常积累对骨密度及骨微结构的影响，发现改善骨骼质量的新靶点。

方法：选择 C57BL / 6 小鼠，通过连续腹腔注射 MG，建造 MG 高水平积累的动物模型。本实验购入 72 只雄性 C57BL / 6 小鼠，随机分为实验组及对照组，每组 36 只。实验组和对照组再随机分为三组，分别为一期组：腹腔注射 MG，连续注射 4 天休息一天，累计注射 28 天后完成一期造模，对照组同时腹腔注射等剂量生理盐水。一期造模完成后，进行 QCT 扫描，扫描完成处死取股骨进行 micro-CT 扫描。二期组：小鼠腹腔注射 MG，累计注射 42 天后完成二期造模，实验组及对照组进行 QCT 扫描，扫描完成处死取股骨行 micro-CT 扫描。三期组：小鼠腹腔注射 MG，累计注射 56 天后完成三期造模，行 QCT 扫描，扫描完成处死取股骨行 micro-CT 扫描。利用 QCT 分析软件对小鼠腰椎进行骨密度测量，利用 micro-CT 分析软件测量小鼠股骨骨微结构，并对数据进行统计学分析。纵向比较各组三个时期骨密度及骨微结构的情况，横向比较每一时期实验组和对照组之间骨密度及骨微结构的情况。

结果：纵向比较显示，随时间延长，骨体积分数、骨小梁厚度、骨密度实验组及对照组均表现下降趋势，结构模式指数、骨小梁间距、骨皮质厚度实验组表现为先升后降而对照组表现为先降后升趋势，骨小梁数目实验组表现为先降后升而对照组表现为先升后降。横向比较显示，一期组和二期组，实验组骨密度、BV/TV 骨体积分数、骨小梁厚度、骨小梁数目、皮质厚度及面积数值减小，结构模型指数、骨小梁间距数值增大。第三期数据显示实验组和对照组仅骨小梁间距有显著差异，实验组大于对照组。

结论：MG 在体内高水平积聚会导致骨密度减低、骨体积相对减少、骨小梁厚度减低而间隙增大，对骨骼系统造成毒性作用，导致骨骼过早疏松进入衰老状态。早期干预 MG 异常积聚有望成为治疗相关疾病骨骼系统损伤的新靶点。

PO-2422

腺泡装软组织肉瘤 MRI 特征、全体积表观扩散系数（ADC）直方图评估 Ki-67 表达水平及组织学分级

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目的：评估腺泡装软组织肉瘤 MRI 特征、全体积表观扩散系数（ADC）直方图在确定 Ki-67 表达水平及组织学分级中的价值

材料和方法：回顾性分析 2010.1 至 2023.9 经手术及病理证实的 30 例腺泡装软组织肉瘤患者，年龄 5-68 岁(中位年龄 28 岁)。术前均接受磁共振成像检查，包括弥散加权成像和 ADC 图($b=0$ 和 1000 s/mm^2)。记录肿瘤的位置、深度、大小、形态、边界、T2 信号异质性、强化程度、瘤周水肿、瘤旁浸润、肿块及周围是否有流空血管。采用全实体肿瘤体积感兴趣区(ROI)测量病灶全域 ADC 直方图参数。Ki-67 低表达定义为 30%阳性染色，Ki-67 高表达定义为 $\geq 30\%$ 阳性染色。组织学分级高级别包含 II 级和 III 级，低级别为 I 级。采用 χ^2 检验或 Fisher 精确概率法比较 Ki-67 表达及组织学分级和常规影像学表现的差异。采用 Kruskal-Wallis 检验分析直方图参数与肿瘤组织学分级、Ki-67 表达水平的相关性。采用 Mann-Whitney U 检验比较肿瘤组织学分级、Ki-67 表达水平之间的差异。

结果: 大小、瘤周水肿、瘤旁浸润在 Ki-67 表达水平存在差异, 大小、形态、边界、T2 信号异质性、瘤旁浸润在组织学分级存在差异。ADC 直方图分析的第 5 百分位数、第 10 百分位数、第 25 百分位数、第 50 百分位数、平均值与组织学分级相关, 均有统计学意义 ($p=0.003$ 、 $p=0.002$ 、 $p=0.002$ 、 $p=0.005$ 、 $p=0.019$)。ADC 直方图分析的第 50 百分位数、第 75 百分位数、平均值与 Ki-67 表达相关, 均有统计学意义 ($p=0.036$ 、 $p=0.015$ 、 $p=0.036$)。肿瘤组织学分级、Ki-67 表达水平在 ADC 直方图各参数间无差异。

结论: 腺泡状软组织肉瘤 MRI 特征、全体积表观扩散系数 (ADC) 直方图在鉴别 Ki-67 表达、组织学分级方面具有一定的作用。

PO-2423

压缩感知对腰骶丛神经 3D-T2*-FFE 磁共振成像的影响

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目的 探索压缩感知技术 (Compressed SENSE, CS) 加速因子 (Acceleration Factor, AF) 对腰骶丛神经 3D-T2*-FFE 磁共振成像图像质量的影响。资料与方法 招募志愿者 21 人 (男 10 人, 平均年龄 45.00 ± 13.85 岁)。3.0T MR 结合平行采样技术 (Sensitivity Encoding, SENSE) 以及 CS 的腰骶丛神经 3D-T2*-FFE 序列扫描, 采用的 AF 分别为 SENSE AF=2、CS AF=2、3、4、5、6。两名观察者在原始图上划定感兴趣区 (Region Of Interest, ROI) 测量信号强度 (Signal Intensity, SI) 和噪声强度 (Standard Deviation, SD), 并计算信噪比 (SNR) 和对比噪声比 (CNR)。对图像质量进行四分法主观评分。组内相关系数 (ICC)、Kappa 检验两观察者测量数据和主观评分的一致性, 若一致性良好, 选择高年资医师主观评分进行后续分析。使用 Friedman 检验不同 AF 之间 SNR、CNR 及主观评分的差异性。若差异性有统计学意义, 则使用最小差异性检验 (LSD 法) 进行两两比较。结果 两名观察者测量数据和主观评分一致性良好 (ICC: 0.841-0.998, Kappa: 0.774-0.915)。不同 AF 之间 SNR、CNR 和主观评分差异有统计学意义 ($p < 0.05$)。与 SENSE 2 相比, 当 CS=2 时, 多个节段神经节、神经干主观评分及客观评分增高 ($p < 0.05$); CS=3 时, 其主观与客观评估增高 ($p < 0.05$) 或相仿; CS ≥ 4 时, 多节段神经节、神经干主观评分明显降低 ($p < 0.05$), SNR、CNR 也下降 ($p < 0.05$)。结论 腰骶丛神经 3D-T2*-FFE 序列随着 AF 的增加, 扫描时间逐渐降低。CS AF=3 对比 SENSE AF=2, 在确保图像质量前提下, 扫描时间缩短 43.11%。临床推荐使用 CS=3 行腰骶丛神经 3D-T2*-FFE 序列扫描。

PO-2424

36 例韧带样型纤维瘤病的 CT、MR 征象及病理分析

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目的 分析韧带样纤维瘤病的 CT 和 MRI 影像学表现及其形成的病理基础, 以提高对本病的影像学诊断。

方法 收集 2019 年 5 月至 2023 年 1 月南昌大学第二附属医院经手术病理证实的 36 例韧带样纤维瘤病患者临床资料。回顾性分析 CT、MRI 影像学表现及病理结果。

结果 本组 36 例患者中 1 例为多发病灶, 35 例均为单发病灶, 其中 12 例腹外型, 14 例腹壁型, 10 例腹内型。在 14 例腹壁型患者中, 6 例患者近 2 年内有腹壁损伤或手术史。病灶呈梭形或椭圆形 31 个, 不规则形 5 个。其中 18 个边界清楚, 18 个边界不清。CT 平扫示病灶均为等/略低软组织密

度, 增强扫描以中等以上渐进性强化为主, 强化均匀或不均匀, 均无坏死及出血。MRI 示 T1WI 等/稍低信号, T2WI 稍高信号, 6 例内见线状/条片状低信号, 为致密胶原纤维形成的低信号区; DWI 呈高信号, ADC 呈稍低信号; 增强 8 例呈明显不均匀强化。病理组织学上肿瘤主要由增生的梭形纤维母细胞/肌纤维母细胞及数量不等的胶原纤维组成, 细胞无明显异型性, 核分裂像罕见; 免疫组化标记物 β -Catenin、Vimentin、SMA 均为阳性。

结论 韧带样纤维瘤病在 CT、MRI 表现上具有一定的特征性征象。在肿瘤的组成成分和对周围组织浸润评估上 MRI 更有优越性, 对手术切除范围的判断更具有优势。

PO-2425

3D 打印个性化截骨导板在骨盆肿瘤切除重建术中的精准评价研究

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目的: 骨盆肿瘤的外科治疗被广泛认为是具有挑战性的, 基于影像图像数字化处理和 3D 打印技术的个性化的截骨导板用于辅助术中实现肿瘤精确切割。本研究的目的是通过术前术后影像建模图像之间以及假体模型配准方法评估基于影像图像数字化处理和 3D 打印技术的个性化截骨导板精准切除骨盆肿瘤的精确性。

方法: 2014 年 4 月至 2023 年 5 月, 我院 26 例骨盆肿瘤患者被纳入本研究, 对所有的患者术前行常规 CT 和 MRI 增强检查。将 DICOM 数据并导入 Medraw Print 软件, 手动勾画肿瘤边界, 选择影像图像配准融合模块, 重建骨盆肿瘤三维模型。对于导板组患者, 术前基于骨盆肿瘤三维模型设计个性化的截骨导板并 3D 打印, 用于术中辅助截骨。对于常规组患者, 术前基于骨盆肿瘤三维模型确定截骨方案, 术中行常规方法截骨。记录了所有患者的基本资料和术中情况, 对所有患者术后影像学进行随访, 获得术后 CT 图像, 通过术前术后影像建模图像之间以及假体模型配准方法评估实际截骨面与规划截骨面之间的距离偏差及角度偏差。

结果: 26 例患者手术顺利完成, 所有获得手术标本病理切缘均是安全的。

导板组纳入患者 17 例, 男 9 例, 女 8 例; 年龄 21-70 岁, 平均 45.2 岁; 肿瘤类型: 软骨肉瘤 6 例、骨巨细胞瘤 5 例、转移性肿瘤 2 例、纤维瘤 2 例、骨肉瘤 1 例、多形性肉瘤 1 例。

常规组纳入患者 9 例, 男 4 例, 女 5 例; 年龄 26-74 岁, 平均 43.5 岁, 肿瘤类型: 软骨肉瘤 4 例、骨肉瘤 1 例、骨软骨瘤 1 例、恶性纤维组织细胞瘤 1 例、弥漫性腱鞘巨细胞瘤 1 例、神经纤维瘤累及骨质 1 例。

导板组实际截骨面与规划截骨面距离平均 $4.91 \pm 2.83\text{mm}$, 与对照组 $7.21 \pm 3.89\text{mm}$ 比较差异有统计学意义 ($P=0.037$)。

导板组实际截骨面与规划截骨面角度平均 $5.93 \pm 4.01^\circ$, 与对照组 $8.18 \pm 4.41^\circ$ 相比差异无统计学意义 ($P=0.072$)。

导板组术中出血量平均 $2484 \pm 1515\text{ml}$, 与常规组 $8533 \pm 13788\text{ml}$ 相比差异有统计学意义 ($P=0.017$)。

结论: 基于影像图像数字化处理和 3D 打印技术的个性化的截骨导板能够使骨盆肿瘤截骨重建术获得更好的准确性。

PO-2426

脊柱原发原始神经外胚层瘤的 MRI 诊断

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【摘要】目的 回顾性分析脊柱原发原始神经外胚层瘤(primitive neuroectodermal tumor, PNET)的 MRI 表现特征,以提高对该病的认识及影像诊断。材料与方法 收集我院 2012.01-2023.04 月之间经病理证实的原始神经外胚层瘤患者 30 例,男性 21 例,女性 9 例,年龄 3-74 岁,中位年龄 22.9 岁。30 例患者术前均行 MRI 平扫及/或增强扫描。结果 30 例 PNET 患者中,病变位于胸段 8 例,胸腰交界区 3 例,腰段 7 例,腰骶段交界区 4 例,骶尾椎 8 例(其中 1 例伴胸腰段椎管内多发转移)。MRI 平扫示病变主要发生在椎管内脊髓外硬膜下、椎管硬膜外、椎体,累及 2-5 个椎体节段不等,以累及 2-3 个椎体节段多见。胸腰段病例几乎均沿一侧或双侧椎间孔向椎管外生长,并于附件区或椎旁形成大小不等的软组织肿块,呈等/稍长 T1 等/稍长 T2 信号,信号不均匀。30 例中,21 例病变累及椎体,其中,9 例受累椎体形态失常,多表现为上下径不同程度变短或前后径增长;3 例椎体呈双凹状;1 例呈铜板样改变。增强病变呈中度或明显不均匀强化,而发生于胸段病变常伴有病变邻近上下段硬脊膜增厚并强化,位于腰骶段病变未见此征象。结论 MRI 对 PNET 的诊断具有一定的影像学价值,可为该病的临床诊断、治疗提供一定的影像学指导价值。

PO-2427

腕部磁共振 T2 mapping 成像对不同类型 TFCC 损伤的诊断性能

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目的: 本研究旨在评估 T2 mapping 成像在腕部磁共振成像中检测不同类型 TFCC 损伤的益处。方法: 76 例患者行腕部 MRI 检查,并收集其横轴位 PD FS 序列、冠状位 PD FS 序列、横轴位 T2 mapping 序列、冠状位 T2 mapping 序列的图像。对于每个患者, MRI 数据集由两名经委员会认证的放射科医生独立分析。关节镜检查或手术证实作为参考标准。主观评估诊断性能和 TFCC 不同类型、不同区域损伤程度。根据 Palmer 分型,将 TFCC 损伤分为 2 个主要类型: I 型,创伤性损伤; II 型,退行性损伤。I 型根据损伤部位又分为四个亚型。II 型根据软骨盘的损伤程度又分为五个亚型。通过 MRI 工作站调出 T2 mapping 解剖图和伪彩图,手动勾画 TFCC 各个区域的感兴趣区(ROI),避开边缘,测量 3 次计算其平均值作为 T2 值,根据伪彩图色阶变化及 T2 值对 TFCC 损伤进行分型。将常规 PD FS 序列与 T2 mapping 序列的评价结果分别与术后或经关节镜证实的结果进行比较,所有数据进行统计学分析。结果: 34 (44.7%) 例为创伤型患者,42 (55.3%) 例为退变型患者。与常规 PD FS 序列相比, T2mapping 图像提高了对创伤性 IA 型 (R1/R2:0.71/0.68 vs0. 85/0.87)、IB 型 (R1/R2:0.69/0.71 vs0. 84/ 0.86) 和退变性 IIA 型 (R1/R2:0.72/0.75 vs0. 90/0.88)、IIB 型 (R1/R2:0.68/0.68 vs0. 87/0.90)、IIIC 型 (R1/R2:0.73/0.72 vs0. 91/0.92) 的诊断准确性,而对其他类型的损伤,两种序列诊断性能相当(所有 $p < 0.001$)。结论: 与常规 PD FS 序列相比, T2 mapping 成像对于 TFCC 部分损伤类型诊断的准确性较高,有更好的应用前景。

PO-2428

膝关节屈曲位磁共振成像对前交叉韧带撕裂合并 Ramp 区损伤患者的诊断价值

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目的:探讨膝关节屈曲位磁共振成像(MRI)对前交叉韧带撕裂患者半月板斜坡病变的诊断价值。

材料与方法:回顾性收集本院 60 例(平均年龄 24.5 ± 9.5 岁;45 例男性, 15 例女性)经关节镜证实前交叉韧带撕裂的患者纳入本次研究,以是否伴有 Ramp 区损伤为分组依据分为研究组和对照组。在 MRI 上记录了以下两个重要特征:内侧半月板后缘不规则,内侧半月板后角与囊缘之间有完全的液体充盈,它们是 Ramp 区损伤在影像学上的良好预测指标。关节镜检查结果作为参考标准。计算诊断敏感性、特异性和观察者间的一致性。

结果:两组患者的平均年龄和性别无显著差异。同样,在前交叉韧带撕裂的一侧或从受伤到手术的平均时间方面,两组之间没有观察到显著差异。关节镜检查发现 22 例斜坡病变(36.6%)。MRI 显示后缘内侧半月板不规则,屈膝 10° 时敏感性和特异性分别为 87.5 和 59.3%,屈膝 90° 时敏感性和特异性分别为 93.8 和 85.2%。MRI 上完全液体充盈征象在膝关节屈曲 10° 时的敏感性和特异性分别为 31.3 和 100%,在膝关节屈曲 90° 时为 87.5 和 100%。两个观察者对两个 MRI 特征的一致性非常好($k = 0.70-0.88$)。

结论:这项研究显示,在膝关节屈曲位的 MRI 上观察到的内侧半月板后缘不规则和完全的液体充盈比膝关节伸展位的 MRI 对内侧半月板 Ramp 区的检测更敏感。因此,膝关节屈曲位 MRI 与膝关节伸直位 MRI 相比,在半月板 Ramp 区病变的检测中提高了诊断性能。

PO-2429

磁共振 T1 ρ 成像在非专业马拉松军事学员膝关节软骨改变中的价值

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目的:应用 3.0T MR T1 ρ 成像评价 10 公里马拉松军事学员膝关节软骨 T1 ρ 值的变化。方法:对 30 名参加马拉松赛的学员的 30 个支撑腿膝关节在赛前、赛后及赛后一周行膝关节 3.0T 磁共振成像,平均年龄(21 ± 6.3)岁,应用 T1 ρ 成像观察和测量股骨内外髁与胫骨平台负重区及非负重区软骨浅、深层的平均 T1 ρ 值,比较赛前和赛后、赛后一周变化,并进行统计学分析。结果:磁共振 T1 ρ 成像示关节软骨浅层 T1 ρ 值在赛前及赛后均高于深层,差异有统计学意义($P < 0.05$);赛后浅层软骨 T1 ρ 值高于赛前,差异有统计学意义($P < 0.05$);赛后一周浅层软骨 T1 ρ 值低于赛后,差异有统计学意义($P < 0.05$)。结论:磁共振 T1 ρ 成像通过对色阶图像的观察及平均 T1 ρ 值的测量可定量分析军事学员膝关节软骨组织成分在马拉松前后的变化。

PO-2430

实性动脉瘤样骨囊肿的影像学表现

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目的 探讨实性动脉瘤样骨囊肿的影像学表现, 以提高本病诊断及鉴别诊断能力。**资料与方法** 回顾性分析 2007 年 1 月—2019 年 1 月空军军医大学西京医院经术后病理证实的 5 例实性动脉瘤样骨囊肿的 X 线、CT、MRI 资料, 分析病灶所在母骨位置、病灶大小形态、边缘、肿瘤基质和周围软组织改变等影像学征象。结果 5 例均为女性, 病灶发生于胫骨 2 例、股骨 1 例、寰椎椎弓 1 例、髌臼周围 1 例, 均偏心性位于母骨。病灶大小 4.0~17.0 cm, 均为大片状地图样、溶骨性破坏, 膨胀性较轻。病灶边界清晰 3 例、模糊 2 例, 有窄且长短不等硬化缘。所有病灶骨皮质变薄、壳样改变, 局部断裂、筛孔状改变或大段缺失。1 例周围有软组织肿块。所有病变均无骨膜反应。2 例病灶周围广泛水肿。**CT 表现:** 2 例病灶内部呈等或略低于肌肉密度, 无基质矿化。**MRI 表现:** 2 例病灶内部 T1WI 信号略高于肌肉, T2WI 呈均匀高信号, 且有点状更高信号。所有病例均无病理性骨折。**结论** 实性动脉瘤样骨囊肿青年女性好发。病灶呈轻度膨胀性、溶骨性改变, 有窄硬化缘, CT 呈均匀等低密度, MRI 呈混杂信号, 可突破骨皮质形成软组织肿块, 邻近骨髓与软组织明显水肿。

PO-2431

骶尾椎骨巨细胞瘤的影像学表现及临床诊断价值分析

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目的 分析研究骶尾椎骨巨细胞瘤的 X 线、CT 和 MRI 的影像学特征及诊断价值, 提高本病的诊断准确率及鉴别诊断能力, 充分指导临床手术治疗及预后。

方法 搜集南通大学附属医院经手术病理证实的 21 例骶尾椎骨巨细胞瘤患者的 X 线、CT 和 MRI 的影像学资料, 两名高年资医师对其进行回顾性分析。20 例患者均行 X 线检查, 17 例行 CT 检查, 13 例行 MRI 检查, 其中 2 例行 MRI 增强扫描。

结果 X 线平片简便易行, 能显示病变部位的整体情况。而 CT 和 MRI 检查可以提供更多信息资料。X 线、CT 及 MRI 的诊断准确率分别为 68.52%、89.66%、90.13%, CT 检查及 MRI 检查诊断准确率明显高于 X 线 ($P < 0.05$)。X 线检查表现: 10 例可见膨胀性骨质破坏, 10 例可见溶骨性骨质破坏, 9 例累及骶髂关节, 5 例可见周围软组织肿块形成。**CT 检查:** 10 例可见溶骨性骨质破坏, 7 例可见膨胀溶骨性骨质破坏, 9 例其内可见骨嵴影, 4 例其内可见液化、坏死区, 8 例周围见硬化边, 13 例不同程度累及椎体附件及骶髂关节, 并在周围形成软组织肿块, 病灶边界不清。**MRI 检查:** T1WI 2 例呈低信号, 3 例呈等低信号, 8 例呈等信号; T2WI 1 例呈等信号, 3 例呈高信号, 6 例呈等高信号, 3 例呈高低混杂信号。**MRI 增强扫描,** 1 例呈明显均匀强化, 1 例呈不均匀强化。

结论 X 线、CT 及 MRI 均可有效显示骶尾椎骨巨细胞瘤的影像学特点, 其中 CT 检查和 MRI 检查的诊断准确率较高, 能显示肿瘤的内部细微结构、肿瘤侵犯程度及与周围组织的关系。充分分析骶尾椎骨巨细胞瘤的影像学特点, 结合临床, 综合运用各种影像学检查方法, 对提高骶尾椎骨巨细胞瘤的诊断、对临床分期、手术方案制定、术后评估及预后具有重要的意义。

PO-2432

下尺桡关节形态与腕关节慢性疼痛的相关性分析

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目的: 通过观察腕关节 X 线平片及 CT/MRI 断层影像表现, 分析下尺桡关节 (DRUJ) 骨性结构的形态学差异与发生腕关节慢性疼痛风险的相关性, 探讨 X 线正位片评估下尺桡关节稳定性的敏感指标。

方法: 回顾性分析 2021 年 1 月到 2022 年 10 月于我院因腕关节慢性疼痛 > 3 个月就诊的患者作为观察组; 收集同时期因其他原因就诊, 无慢性疼痛史的患者作为对照组。所有纳入对象均排除腕关节骨折、脱位及肿瘤等病史, 且均进行腕关节 X 线正位片和 CT/MRI 检查。测量多项影像学参数, 分析下尺桡关节不同分型与腕关节慢性疼痛的相关性, 找到与腕关节慢性疼痛相关的最佳影像学指标, 制作腕关节慢性疼痛风险的 X 线综合评分表。

结果: 纳入 144 例患者中, 观察组 70 例, 男性 36 例, 女性 34 例, 平均年龄 34.9 ± 12.5 岁; 对照组 74 例, 男性 35 例, 女性 39 例, 平均年龄 36.3 ± 11.8 岁。与对照组相比, 观察组桡骨茎突和正向尺骨变异更长, 桡骨茎突长度指数、尺弓角、尺骨座桡倾角、下尺桡关节间距和背侧偏移比更大, 尺骨远端直径、乙状切迹曲率角更小, 且差异均具有统计学意义。其中尺弓角、正向尺骨变异、尺骨座桡倾角、下尺桡关节间距有较高的诊断效能 ($AUC=0.835$ 、 0.764 、 0.596 、 0.865)。乙状切迹掌背侧均突起型、改良 Tolat 尺侧倾斜型是发生腕关节慢性疼痛的危险因素 ($OR=5.379$ 、 5.667)。乙状切迹“C”型和“S”型是腕关节慢性疼痛的保护因素 ($OR=0.135$ 、 0.034)。制定腕关节 X 线正位片综合评分表将发生腕关节慢性疼痛的风险划分为低、中、高、极高四个等级, 该表的 AUC 值为 0.860 , 预测效能良好。

结论: 尺弓角、正向尺骨变异、尺骨座倾角等参数可作为判断发生腕关节慢性疼痛风险的独立预测指标。乙状切迹掌背侧均突起型、改良 Tolat 尺侧倾斜型和乙状切迹平坦/滑坡型是发生腕关节慢性疼痛的危险因素。制定腕关节 X 线正位片综合评分表, 对评估发生腕关节慢性疼痛的潜在风险具有良好的预测效能。

PO-2433

骨上皮样血管内皮细胞瘤临床特征与 MR 表现分析

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【摘要】目的 探讨骨上皮样血管内皮瘤 (B-EHE) 的 MRI 特征性表现及其临床特点。方法 对 8 例 (男性 3 例, 女性 5 例) 患者的临床资料及 MRI 表现进行回顾性分析, 所有患者均经手术病理证实为骨上皮样血管内皮细胞瘤。8 例 B-EHE 均行 MRI 检查, 其中 6 例行 MRI 平扫、动态增强及延迟增强扫描。结果 8 例 B-EHE 中, 3 例位于腰骶椎, 2 例位于胫骨, 1 例位于肱骨, 1 例位于胸骨, 1 例位于股骨。其中 1 例合并颅脑上皮样血管内皮瘤, 1 例合并椎体多发转移灶, 其余均为单发。T1WI 中, 3 例病灶呈低信号, 5 例病灶呈混杂等/低信号。T2WI 压脂序列中, 3 例呈较均匀高信号, 5 例呈混杂高信号。8 例均可见骨质破坏, 4 例可见骨膜反应, 3 例伴软组织肿块, 6 例伴周围软组织肿胀, 2 例伴病理性骨折。肿胀软组织和肿块在 T1WI 上呈低信号, 在 T2WI 和 T2WI 压脂序列呈高信号。6 例动态增强扫描中, 可见病灶不同程度强化, 其中 1 例为轻度强化, 1 例为中度强化, 4 例为明显强化。结论 B-EHE 的 MR 表现能有效评估病变的范围及性质, 需结合临床及病理明确诊断。

PO-2434

腰椎间盘与椎小关节退变的 T2、T2*值直方图分析研究

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目的：探索 T2、T2*值直方图分析评估腰椎间盘和腰椎小关节退变的可行性，并探索两者间的相关性。

材料与方法：收集 66 例下腰痛患者（男 31，女 35）和正常对照者 21 例（男 9，女 12），共 420 组“三关节复合体”。分别依据 Pfirrmann 和 Weishaupt 分级将椎间盘评为 I-V 级、将椎小关节分为 0-3 级。使用软件获得 T2、T2*值直方图参数。探索 T2、T2*值直方图分析评估腰椎间盘和椎小关节退变的可行性及相关性。

结果：椎间盘的 T2、T2*值直方图参数均具有鉴别正常（Pfirrmann 1-2 级）和退变（3-5 级）椎间盘的能力（AUC=0.562-0.864）；椎小关节中仅 T2 值的平均值、中位数、第 5、10、25、75 百分位数、偏度和峰度具有鉴别正常（Weishaupt 0-1 级）和退变（2-3 级）椎小关节的能力（AUC=0.546-0.620）。椎间盘及椎小关节的退变比率随年龄增长而增加，5 个年龄组椎间盘的退变比率依次为 15.04%、24.72%、55.29%、90.00%、95.24%，椎小关节的退变比率依次为 36.28%、38.76%、44.12%、65.00%、73.02%。在 20-29 和 30-39 岁组中，椎小关节的退变比率显著高于椎间盘（ $X^2=16.436$ ， $p<0.001$ ； $X^2=5.210$ ， $p=0.022$ ）。“三关节复合体”中除 T2 值的偏度、峰度和熵、T2*值的峰度外，椎间盘的其它 T2、T2*值直方图参数与其后方的椎小关节呈低到中度正相关（ $r=0.104-0.563$ ， $p<0.05$ ），左、右两个椎小关节的 T2、T2*值参数间低到高度相关（ $r=0.168-0.680$ ， $p<0.05$ ）。两个椎小关节间的相关系数 r 的绝对值均高于椎间盘与椎小关节间的 r。

结论：本研究证实了 T2、T2* mapping 直方图分析用于评估椎间盘和椎小关节退变的可行性。在 39 岁以下的年龄组中，椎小关节的退变比率显著高于椎间盘，不同于脊柱退变始于椎间盘的传统认知，提醒临床医生对椎小关节病变的重视。“三关节复合体”中椎间盘和椎小关节具有相互的关系，但不如成对的椎小关节间的相互关联性强。

PO-2435

北京地区青少年肘关节 X 线骨龄研究

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目的 以 Sauvegain 法等研究为基础，评估北京地区青少年肘关节 X 线发育特征，建立推断年龄的回归方程，为临床应用提供依据。**方法** 回顾分析北京积水潭医院 2019-2021 年间因急诊外伤摄左肘正侧位片者，共 510 例（男性 299 例，女性 211 例），年龄范围 8-18 岁；均为汉族，长期居住于北京，均有精确出生日期及详细病史；排除脏器及内分泌疾病患者、发育异常及残缺畸形者、服用影响骨发育药物及曾参加文艺、体育训练者。采用 Kodak DR7500 摄左肘正侧位片。参考文献分级标准，由两名有 5 年以上骨放射诊断经验的医师共同盲法阅片，不一致时以讨论意见为准。随机选取 40 例（男、女各 20 例）、采用 Kappa 检验评估观察者间的一致性。描述统计男性、女性青少年肘关节各骨骨化中心出现及闭合的年龄，用单因素方差分析比较两者差异；以年龄为因变量（Y），分级指标（X1 肱骨内上髁、X2 肱骨滑车、X3 肱骨外上髁、X4 肱骨小头、X5 桡骨小头及 X6 尺骨鹰嘴）为自变量，选取全部样本的 70%、用多元线性回归模型分析骨龄的影响因素，以逐步回归进行变量筛选，建立肘关节年龄推断的回归方程；以剩余 30%样本进行回代检验，验证回归方程的准确率。结果 （1）分级标准 Kappa 一致性检验结果，两名观察者 X1~X6 的 Kappa 值分别

为 0.773、0.657、0.805、0.705、0.787、0.882。(2)按分级标准,青少年肘关节各继发骨化中心出现、闭合的平均年龄男女比较,均有统计学差异($P<0.05$)。(3)回归方程:男性: $Y=7.952+0.472X_1+0.444X_3+0.247X_5+0.192X_6$;女性: $Y=4.452+0.778X_1+0.404X_3+0.599X_4$ 。

(4)回代检验:分别以 0.5 岁、1.0 岁、1.5 岁、2 岁及以上年龄为标准,验证回归方程年龄预测的准确率,男性、女性的累计准确率分别为 38.9%、34.9%、94.3%、100%和 67.7%、63.5%、92.1%、100%。结论 以 Sauvegain 法等研究为基础的肘关节骨龄研究,得出的北京地区青少年肘关节推断年龄的回归方程,可为临床应用提供依据。

PO-2436

椎旁肌肉参数与椎体骨折分级的相关性研究

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目的:本研究旨在评估椎旁肌肉参数与椎体半定量(SQ)分级和骨质疏松性椎体骨折(OVF)风险的相关性。

材料与方法:本研究纳入 3475 名受试者进行腰椎 CT 扫描,使用 SQ 法对椎体情况进行分级与分组(SQ0、SQ1 和 SQ2-3 组),使用定量 CT(QCT)测量体积骨密度(vBMD),并根据 vBMD 进行骨量分级(骨量正常、骨量减少和 OP)。测量 L3 椎体中心层面的肌肉参数:椎旁伸肌的大小(PEMS)、密度(PEMD)、脂肪面积(FS)和浸润指数(FI)以及双侧腰大肌的大小(PMMS)和密度(PMMD),首先比较了 SQ0、SQ1 和 SQ2-3 组的椎旁肌肉参数差异;再通过建立单因素和多因素 logistic 回归模型分析各肌肉参数与 OVF 发生风险的相关性;计算受试者工作特征曲线曲线下面积(AUC)评价肌肉参数对 OVF 的诊断效能。

结果:最终纳入 2992 人,男性 1109 名(64.70 ± 7.64 岁),女性 1883 名(63.42 ± 7.49 岁)。男性 SQ0 组与 SQ1 组的肌肉参数无统计学差异,与 SQ2-3 组的 PEMS、PEMD、PMMD、FS 和 FI 有统计学差异。女性 SQ0 组与 SQ1 组除 PMMS 无统计学差异之外,其他肌肉参数均有差异, SQ0 组与 SQ2-3 组的所有肌肉参数均有统计学差异。PEMD (OR: 0.68, 95% CI: 0.47~0.99, $p=0.045$)、FS (OR: 1.41, 95% CI: 1.1~1.81, $p=0.007$)和 FI (OR: 1.37, 95% CI: 1.07~1.76, $p=0.013$)与男性 GSQ2-3 级椎体骨折风险独立相关;PMMS (OR: 1.20, 95% CI: 1.01~1.43, $p=0.039$)和 FS (OR: 1.17, 95% CI: 1.01~1.36, $p=0.038$)与男性 SQ1-3 椎体变形/骨折的风险独立相关。PEMD (OR: 0.78, 95% CI: 0.61~0.98, $p=0.034$)与女性 SQ2-3 级椎体骨折的风险独立相关。男性椎旁肌肉参数诊断 SQ2-3 级骨折的 AUC 与 vBMD 的 AUROC 没有统计学差异。

结论:SQ 级别越高,椎旁肌肉更小、密度更低,脂肪浸润越严重。

PO-2437

骨矿物质密度 CT 定量分析简易校准体模的制作

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目的:制作一种价格低廉简单易行的骨矿物质密度定量 CT 用体模,用于机会性骨质疏松的 CT 筛查。

材料和方法:采用 20ml 注射器和不同浓度的磷酸氢二钾溶液制作体模,磷酸氢二钾溶液浓度分别为 50、100、150、200、300、400、600 和 800mg/ml;制作完成的体模置于水箱中与欧洲脊柱体模(ESP 393)同时进行 CT 扫描,CT 扫描采用 GE 64 层、256 层和东软 64 排,扫描条件为

120KV、150-200mAs, 准直 0.625mm, 重建层厚 1-1.25mm, 标准软组织算法。分别测量其 CT 值, 同时采用能谱 HAP/水物质解析 QCT 定量软件计算其相应的 BMD。

结果: QRM-ESP 体模 L1-3 的标准骨矿物质密度为 50、103 和 198mg/ml。三台 CT 测量的体模 L1-3 椎体的 CT 值分别为 61 (56.51-66.9) HU、127.84 (122.9-134.5) HU 和 243.47 (235-250) HU, QCT 定量分析 L1-3 椎体的 BMD 为 47.1 (45.43-48.1)、102.93 (102.3-103.86) 和 196.3 (192.23-198.4) mg/ml; 双能物质解析获得对应 L1-3 椎体 BMD 为 52.81、103.28 和 189.89 mg/ml。50-800mg/ml 磷酸氢二钾溶液对应的 CT 值为 44、99、143、183、281、368、550 和 701HU, 采用 QRM-ESP 体模曲线校正后的对应 BMD 为 36.4 (33-41)、81.3 (77-87)、117.5 (113-120)、150 (145-158)、231、302、454 和 580 mg/ml。采用能谱物质解析获得 BMD 为 37.8、75.43、108、7、146、216、275、406 和 525 mg/ml。三台 CT 中两台 64 排 CT 的结果比较一致, $P = 0.41$, 256CT 与东软 64 排 H 和 VCT 差异具有统计学差异, P 值为 0.03 和 0.006。结论: 采用已知浓度的磷酸二氢钾溶液作为定量 CT 的校准体模用于机会性骨质疏松的 CT 筛查是可行的, 该模型具有制作简单、费用低且稳定的优点。可以用于不同 CT 机型之间的差异校准。

PO-2438

Kummell 病的影像学诊断

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Kummell 病又称为迟发性创伤后椎体塌陷、缺血性椎体骨坏死、椎体骨折不愈合及椎体内裂隙, 多见于老年骨质疏松患者。目前发病机制尚不明确, 可能是椎体缺血性坏死和椎体内假关节形成等多种因素相互作用所致。主要的临床表现为迟发性的慢性腰背痛, 影像学特征为椎体塌陷和真空裂隙征。经影像学检查及临床诊断的学习旨在提高对 Kummell 病的诊断及认识。

PO-2439

利用 IDEAL-IQ 实现对髌髌关节骨质侵蚀与脂肪沉积的定性与定量评估

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目的: 为了验证 IDEAL-IQ 对髌髌关节骨质侵蚀与脂肪沉积定性与定量评估的可行性与优势, 将其与传统 T1 FSE 序列诊断表现进行比较, 并对其定量评估表现进行检验。

方法: 纳入 34 例疑似髌髌关节炎的患者, 所有患者同时接受了 MRI 和 CT 检查。每个髌髌关节被划分成 4 个象限, 最终纳入 272 个象限进行分析。由两位阅片者分别独立评价骨质侵蚀与脂肪沉积。在定性评估中, 以 CT 作为侵蚀诊断金标准, 计算 IDEAL-IQ 和常规 T1 FSE 的诊断性能, 并采用 McNemar 检验比较二者诊断性能; 同时, 利用 Cochran's Q 检验确定不同方法检测侵蚀的差异; 并且, 采用 McNemar 检验比较 IDEAL-IQ 和 T1 FSE 对脂肪沉积的检测。在定量评估中, 在 IDEAL-IQ 的脂肪分数图上手动绘制各象限感兴趣区域, 图像处理软件 FireVoxel 自动生成相应直方图参数: PDFF (质子密度脂肪分数) mean、PDFF_{10th}、PDFF_{25th}、PDFF_{50th}、PDFF_{75th}、PDFF_{90th}、偏度、峰度、异质性和熵, 采用独立样本 t 检验和 ROC 分析对各参数评估脂肪沉积的能力进行检验。

结果: 在定性评估方面, IDEAL-IQ 对骨质侵蚀的诊断敏感度 (93.04% vs 79.11%) 和准确性 (90.07% vs 82.35%) 均大于 T1 FSE ($P < 0.05$); IDEAL-IQ 和 CT 相比 T1 FSE 可检测到更多骨质侵蚀 ($P < 0.05$); IDEAL-IQ 在脂肪沉积的诊断方面与 T1 FSE 无统计学差异 ($P = 0.678$)。在定量评估方面, PDFF 所有直方图参数在脂肪沉积象限与正常象限之间均具有统计学差异 ($P < 0.05$), 并且均可对

二者进行区分 ($P < 0.05$)，其中 PDF_{F75th} 在鉴别脂肪沉积象限与正常象限上表现最优 ($AUC = 0.966$)。

结论：IDEAL-IQ 表现出优于常规 T1 FSE 的骨质侵蚀诊断性能以及不输于 T1 FSE 的脂肪沉积诊断性能，并且可通过直方图分析提供更客观、准确的脂肪沉积定量评估，具有良好应用价值，是当前髋膝关节 MR 扫描方案的潜在有力补充。

PO-2440

跗骨窦综合征的影像诊断价值

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目的 本研究旨在探讨对跗骨窦综合征的诊断有指导价值的影像学检查方法，并评估不同影像学检查方法在跗骨窦及其周围解剖结构的表现上的差异。

材料与方法 回顾性分析 52 例临床诊断为跗骨窦综合征患者的 MSCT 及磁共振影像资料，分析跗骨窦区的 CT、MRI 图像各自的特征，在不同检查方法上观察跗骨窦内各种组织的变化，并进行统计学分析。

结果 (1)52 例跗骨窦综合征患者的 CT 表现为陈旧性骨折 7 例，骨关节退行性表现 45 例；(2) 52 例跗骨窦综合征患者的 MRI 表现为跗骨窦区水肿 43 例、积液 16 例、囊肿 5 例、出血 2 例、纤维化者 3 例；颈韧带损伤 26 例，距跟骨间韧带损伤 22 例；跗骨窦骨髓水肿 32 例、骨质囊变 16 例、陈旧性骨折 3 例；(3)跗骨窦综合征的患者有 46 例患者的跗骨窦容积变小，主要出现在早期跗骨窦区骨折治疗不当和老年患者关节发生退行性变。

结论 MSCT 能明显观察到骨质的情况并能直观地显示足踝部的解剖位置关系，MRI 能够更好地显示跗骨窦及其周围解剖结构的改变包括韧带、正常脂肪组织等改变，对于跗骨窦综合征的诊断，多种影像学检查方法结合起来能够提供更为准确的诊断依据。

PO-2441

基于 T2*mapping 成像技术定量分析膝骨性关节炎患者的软骨损伤

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目的：我们旨在使用 3.0T 磁共振 T2*mapping 成像分析膝骨性关节炎患者软骨损伤的情况。

方法：回顾性分析延安大学附属医院 29 例膝骨性关节炎患者的 X 线、常规 MRI 和 T2*mapping 等影像资料。首先将每位患者的软骨划分为 14 个亚区，再将每个亚区按照软骨厚度分为深、浅两层，共获得 28 个软骨亚区。将扫描后的图像上传至后处理平台手动勾画 ROI，并记录各软骨亚区 T2* 值。然后将获得的软骨亚区按照 ICRS 标准分为 0 级、I 级、II 级、III 级、IV 级，最终将所有软骨亚区分为正常组 (0 级)、轻度损伤组 (I-II 级)、重度损伤组 (III-IV 级)。根据数据是否满足正态分布，分别用均数±标准差或中位数 (四分位数) 表示。软骨深层与浅层的两组间差异比较使用独立样本 t 检验或 Mann-Whitney U 检验，多组间比较使用单因素方差分析或 Kruskal-Wallis H 检验。软骨亚区 T2* 值与损伤程度的相关性用 Spearman 分析。

结果：各软骨亚区浅层的 T2* 值均高于深层 ($P < 0.05$)，但股骨内侧前区深层与浅层软骨之间差异无统计学意义 ($P = 0.101$)；另外，正常组、轻度损伤组与重度损伤组三组间 T2* 值均存在差异，

并且重度损伤组的 $T2^*$ 值高于其余两组 ($P < 0.05$)； $T2^*$ 值与软骨损伤程度呈正相关 ($r=0.34$, $P < 0.05$)，软骨损伤程度越重，对应 $T2^*$ 值越高。

结论： $T2^*$ mapping 技术可以定量评估软骨损伤情况，有助于早期识别并分析膝关节软骨的损伤程度，对骨关节炎患者的软骨损伤提供必要的诊断依据。

PO-2442

光谱检测器计算机断层扫描 VMI 对评估椎体溶骨转移显示的价值

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目的:探讨双探测器层谱计算机断层扫描(SDCT)虚拟单能图像(VMI)在不同背景下的最佳能级水平,以评估椎体溶骨性转移的显示。

材料和方法:本研究包括两名放射科医生鉴定的 56 个病变。采用 Philips 智能 Portal 工作站获取动脉期(包括 40keV-A, 50keV-A and 60keV-A)和静脉期(包括 40keV-V, 50keV-V and 60keV-V)常规图像(CI)和 VMIs,并在 CI 和 VMIs 上记录病变及背景(肌肉、脂肪)的 CT、SD 值。计算各图像序列上病灶的信噪比(SNR)和对比度噪比(CNR)。采用配对样本 t 检验比较 VMIs 和 CI 在不同背景下(脂肪和肌肉)的动脉和静脉期病变的 SNR 和 CNR。

结果:在动脉期,在脂肪和肌肉背景下,40keV VMI 的信噪比分别为 17.62 ± 9.79 、 16.18 ± 8.04 , CNR 分别为 35.27 ± 16.17 、 34.70 ± 14.76 ,均高于 50keV、60keV VMI 和 CI ($p < 0.001$)。静脉期,在脂肪和肌肉背景下,40keV VMI 的信噪比分别为 19.17 ± 9.77 、 17.48 ± 8.46 , CNR 分别为 34.70 ± 10.46 、 12.07 ± 6.70 ,均高于 50keV、60keV VMI 和 CI ($p < 0.001$)。VMIs 和 CI 的脂肪和肌肉背景在动脉期和静脉期的 SNR 和 CNR 差异无统计学意义。

结论:40 keV 为最佳单能水平,可显著提高 CT 对椎体溶骨转移灶的识别能力。

PO-2443

小腿腺泡状软组织肉瘤一例并文献复习

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患者女,22 岁,因右小腿内侧肿物 3 年,持续性胀痛 1 周于本院就诊。查体:该肿物为椭圆形,质硬,活动度差,左膝活动未见异常,左踝背伸受限,足趾感觉运动血运未见异常。超声:右小腿比目鱼肌内混杂低回声团块。MRI:比目鱼肌内边界清晰的异常信号, T_2WI 及 DWI 呈高信号, T_1WI 呈低信号,ADC 值低。病理:灰黄灰红色质软有包膜。免疫组化结果显示 TFE3(+),MyoD1(胞质+),结果支持腺泡状软组织肉瘤。

PO-2444

双能 CT 虚拟去钙技术在膝关节外伤性骨髓水肿中的应用价值

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目的: 探讨 Siemens 第三代 Force 双源 CT 虚拟去钙(VNCa)技术在急性创伤患者膝关节处骨髓水肿(BME)中的诊断价值。方法: 连续纳入我院 2021 年 7 月至 2022 年 7 月膝关节急性外伤后怀疑隐匿性骨折并在 24 小时内接受双能 CT (DECT)和 MRI 检查的患者 56 例。双能量 CT 图像传送至 Syngo.via 后处理工作站生成 VNCa 图像, 由两名放射科医师使用二元系统对图像进行分级(0=没有异常骨髓密度, 1=BME)。以 MRI 作为参考标准, 计算 VNCa 图像主观分析结果诊断 BME 的敏感性、特异性、准确性、阳性预测值和阴性预测值; 比较水肿骨髓和正常骨髓 CT 值的是否有差异, 并使用受试者操作特征曲线分析检验 BME 的最佳截断 CT 值。对 VNCa 图像的 CT 值进行受试者操作特性曲线(ROC)分析,以 MRI 结果为标准。结果: MRI 显示 49 例患者存在 BME,DECT 显示 47 例患者存在 BME(95.92%),两名医师通过 DECT 的 VNCa 图像显示 BME 的敏感性、特异性、准确性、阳性预测值和阴性预测值分别为 95.92%、91.67%、95.24%、98.00%、84.62%和 96.00%、92.31%、95.24%、97.96%、85.71%,阅片医师间对 DECT 图像定性分级的一致性较高(Kappa=0.85)。定量分析 DECT 的阳性区域平均 CT 值为(-11.85±35.08)HU,阴性区域平均 CT 值为(-61.83±39.51)HU,两区域 CT 值对比有显著差异(P<0.001)。VNCa 图像 CT 值曲线下面积(AUC)为 0.83(95%置信区间 0.73~0.93),诊断阈值为-24.15HU,定量分析 DECT 的敏感性、特异性、准确性阳性预测值和阴性预测值分别为 98.00%、92.31%、96.83%、98.00%、92.31%。结论: DECT 可以诊断膝关节处急性创伤背景下的 BME,与 MRI 相比无明显差别。

PO-2445

基于定量 CT 分析腰椎间盘突出症患者
椎旁肌肉退变与骨密度的相关性

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目的: 探讨定量 CT(QCT)对腰椎间盘突出症患者椎旁肌肉退变和腰椎骨密度的相关性价值研究。方法: 纳入 2019 年 12 月-2022 年 10 月在弋矶山医院的脊柱骨科确诊为腰椎间盘突出症的 312 例患者(LDH 组)及年龄、性别相匹配的 151 例健康体检者(NLDH 组),所有被试者行腰椎间盘 CT 平扫。采用 QCT Pro 软件测量在每例受试者 L3 椎体中部水平椎旁各组肌肉面积(CSA)并计算肌指数(skeletal muscle mass index, SMI)、椎后脂肪面积及椎后肌群肌肉脂肪浸润程度(MFI)及腰椎 vBMD。使用独立样本 t 检验及 Mann-Whitney U 检验比较两组间各组肌群 SMI、椎后脂肪面积、椎后脂肪肌肉浸润及骨密度的差异,使用线性相关分析研究各组肌群与腰椎 BMD 之间的关系,绘制受试者工作特征曲线(receiver operating characteristic curve, ROC)评价各组肌群 SMI 诊断 LDH 的效能。结果: 男性组中 LDH 组年龄、椎后肌群脂肪面积、MFI 高于对照组(P<0.001);椎旁肌群 SMI、双侧腰大肌 SMI 及腰椎 BMD 均低于对照组(P<0.001),但椎后肌群 SMI、BMI 低于对照组,两者之间统计学无差异(p>0.05)。椎后肌群脂肪面积、双侧腰大肌 SMI、MFI 是独立危险因素,诊断 LDH 效能分别是 0.713、0.735、0.668,联合模型为 0.827。女性组中年龄、椎后肌群脂肪面积、MFI 高于对照组(P<0.001),双侧腰大肌 SMI 及腰椎 BMD 均低于对照组(P<0.001),但椎旁肌群 SMI、椎后肌群 SMI 低于对照组及 BMI 高于对照组,均无统计学差异(p>0.05)。vBMD、椎后肌群脂肪面积、双侧腰大肌 SMI、MFI 是独立危险因素,诊断 LDH 效能分别是 0.857、0.750、0.788、0.663,联合模型为 0.921。结论: 腰椎间盘突出症患者椎旁肌肉会发生萎缩退变,椎后肌

群脂肪会增加, 该疾病患者更易引起骨量的减少, 椎旁各组肌群 SMI 对 LDH 的诊断具有一定的指导意义, 尤其双侧腰大肌 SMI。

PO-2446

基于 QCT 分析维持性血液透析患者骨密度、 体质成分变化及其相关性

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【摘要】目的 应用定量 CT (QCT) 探讨维持性血液透析患者骨密度、体质成分变化及其相关性。方法 选取我院 2022 年 3-11 月维持性血液透析患者 156 例, 收集其一般资料以及骨代谢指标, 包括血钙、血磷、完整甲状旁腺激素 (iPTH)、碱性磷酸酶 (ALP)。另选取 150 例与血透患者年龄性别相匹配的体检人员作为对照组。使用 QCT 软件测量所有患者及体检人员腰椎 (L1-3) 体积骨密度 (vBMD) 以及体质成分, 包括皮下脂肪含量 (SAT)、内脏脂肪含量 (VAT)、椎旁肌面积及椎旁肌脂肪面积。比较两组间 vBMD、体质成分的差异。将血透组患者分为继发性甲状旁腺功能亢进 (SHPT) 和非继发性甲状旁腺功能亢进 (N-SHPT) 两组, 并比较两组 vBMD、体质成分、骨代谢指标之间的差异; 使用相关性分析研究两组患者 vBMD 与年龄、透析龄、体质成分及骨代谢指标的相关性。结果 维持性血液透析患者 156 例, 其中 SHPT 78 例, N-SHPT 78 例。血透组患者 VAT 和椎旁肌脂肪面积均高于对照组; 其他指标无显著差异性。血透组中 SHPT 组患者 vBMD 高于 N-SHPT 组 ($P<0.05$); 体质成分无显著差异性。SHPT 组患者的透析龄、血钙、iPTH、ALP 高于 N-SHPT 组 ($P<0.05$)。SHPT 组、N-SHPT 组患者 vBMD 均与年龄、椎旁肌脂肪面积呈负相关; SHPT 组 vBMD 与 iPTH、ALP 呈正相关, N-SHPT 组 vBMD 与 ALP 呈负相关, 与 iPTH 无显著相关性。结论 维持性血液透析患者内脏脂肪与椎旁肌脂肪面积较健康人群增加, 椎旁肌脂肪含量越高 vBMD 越低; SHPT 患者 vBMD 较非 SHPT 患者高, 可能与 SHPT 患者 iPTH 的升高有关。

PO-2447

腰椎躯干肌的 CT 测量参数与躯体功能及 上肢肌肉力量的相关性研究

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目的: 通过腰椎 L1~L5 层面躯干肌的 CT 参数 (密度及面积) 与躯体功能及上肢肌肉力量的相关性评估, 探讨腰椎躯干肌对躯体功能、肌少症的预测价值及最佳的腰椎评估层面。

方法: 共纳入 50 岁以上受试者 615 名 (男性组 191 例 年龄 61.68 ± 9.02 岁; 女性组 424 例 年龄 59.18 ± 8.19 岁), 受试者均来自云南省骨松-肌少队列 (ChiCTR2100052153)。所有受试者均进行腰椎 CT 平扫、简易躯体功能评估 (SPPB) 及上肢肌肉力量测定。CT 图像通过 Osirix 软件进行脂肪阈值分割后分别测量 L1-L5 层面的躯干肌面积及密度。简易躯体功能评估包括平衡测试、4m 步速及椅子站立实验, 上肢肌肉力量测定通过液压握力器完成。数据采集完成后通过 Pearson/Spearman's 相关性分析及多元线性回归逐一获取 L1-L5 层面躯干肌 CT 参数与 SPPB 总分、SPPB 各分项及上肢肌肉力量间的相关性, 同时对年龄和 BMI 进行校正。

结果: 男性组较女性组具有更大的躯干肌面积、更高的躯干肌密度、更强的上肢肌肉力量 ($P<0.001$) 但两组躯体功能 SPPB 评分及 BMI 未见明显差异。男性组较女性组而言, 其躯干肌 CT 参数

与躯体功能及上肢躯体力量间的相关性更强、敏感性更高, 男性组躯干肌 CT 参数与上肢握力、SPPB 总分及平衡测试单项评分间均表现不同程度相关, 而女性组仅与上肢握力及平衡测试单项评分相关。但两组均为 L1 椎体层面的躯干肌密度与上肢肌肉力量和躯体功能评分间的关联性最强 (男性组: β 上肢肌肉力量=0.24 (0.16,0.72); β SPPB=0.31(0.05,0.14); β 平衡测试=0.16(0.00,0.033); 女性组: β 上肢肌肉力量=0.19 (0.08,0.28); β 平衡测试=0.15 (0.003, 0.022))。除此之外, 两组结果均证明腰椎躯干肌肌肉密度相较于肌肉面积而言, 与躯体功能和肌肉力量具有更强的相关性。

结论: 基于 CT 的腰椎躯干肌密度是中老年人群躯体功能和肌肉力量的良好预测指标, 其中 L1 椎体层面的躯干肌密度表现出了最强的相关性。L1 椎体层面的躯干肌密度评估可能是未来肌少症筛查的有益新型指标。

PO-2448

基于 MR Q-Dixon 序列和 QCT 测量 小鼠肝脏脂肪含量的可行性研究

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目的 探讨定量 CT(QCT, quantitative CT)与 MR Q-Dixon 序列测量小鼠肝脏脂肪含量的可行性研究。方法 本研究采用高脂饮食诱导的肥胖 (Diet-induced obesity,DIO) 的小鼠动物模型, 6 周龄 C57BL/6 小鼠 30 只, 随机分成三组, 每组 10 只, 第一组给予普通饲料饲养 40 周, 第二组给予高脂饮食 20 周, 第三组给予高脂饮食 40 周, 2 名医师利用 QCT 和 MR Q-Dixon 序列对小鼠肝脏脂肪含量进行测量, 对 QCT 测得的肝脏脂肪含量 (Fat%Q) 和 MR Q-Dixon 序列测得的肝脏脂肪含量 (Fat%M) 进行一致性检验和相关性分析。结果 本实验 QCT 肝脏脂肪含量测量值为 17.6 (6.00,28.95) %, MR Q-Dixon 序列肝脏脂肪含量测量值为 19.6 (5.70,29.55) %。两种方法评估脂肪肝严重程度比较, 无显著差异 ($\chi^2=4.000$, $P=0.216$), 且一致性较高 (Kappa=0.816, $P<0.001$); 两种方法的测量结果呈正相关 ($r=0.978$, $P<0.01$)。结论 在定量测量小鼠肝脏脂肪含量方面, 定量 CT 与 MR Q-Dixon 序列具有较好的一致性和相关性, 即可在体定量研究小鼠脂肪肝动物实验。

PO-2449

腺泡状软组织肉瘤 MRI 表现与病理学指标的相关性研究

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目的 探讨 MRI 表现与病理学指标的相关性, 术前预测腺泡状软组织肉瘤 (ASPS) 的组织学分级和 Ki-67 表达效能。方法 回顾性收集 2014 年 1 月至 2022 年 5 月河南省肿瘤医院 26 例 ASPS 患者。采用 3.0 T MRI (包括常规序列) 进行检查, 并获得了 DCE 扫描参数 TIC 曲线和 DWI 参数 ADC 值。通过术后病理学证实将所有患者分为低级别 (组织学 I 级) 组和高级别 (组织学 II 级和 III 级) 组。采用免疫组化法检测 ASPS 瘤组织中 Ki-67 的表达水平, Ki-67 表达指数 $\geq 30\%$ 为高表达组, $<30\%$ 为低表达组。运用卡方检验、独立样本 t 检验、二元 logistic 回归分析、Pearson 相关分析、接收者操作特征曲线 (ROC) 分析各观察指标数据。结果 低级别组有 10 例患者, 高级别组有 16 例患者。Ki-67 表达范围是 10%-70%。在所有 MRI 表现中, 瘤内坏死、肿瘤强化特征、TIC 类型及 ADCmean 在高级别组和低级别组之间的差异具有统计学意义 ($P<0.05$), 且远处转移是组

织学分级的独立预测因素。高级别组的 ADC 值显著低于低级别组 ($P = 0.047$)，ADC 预测 ASPS 高级别组和低级别组的 AUC、灵敏度和特异度分别为 0.725、62.5%和 80.0%。ADC 值与 Ki-67 表达呈中度负相关 ($r = -0.494$; $P = 0.010$)。当 ADC 临界值为 $0.851 \times 10^{-3} \text{ mm}^2/\text{s}$ 时，预测 Ki-67 高表达的 AUC、灵敏度和特异度分别为 0.818、63.6%和 93.3%。结论 MRI 定性和定量参数有助于预测 ASPS 组织学分级及 Ki-67 表达水平。

PO-2450

双源双能量 CT 脂肪图定量测量肥胖患者 肝脏脂肪含量可行性研究

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目的 探讨双源双能量 CT (DECT) 平扫脂肪图定量测量肥胖患者肝脏脂肪含量 (HFC) 的可行性及临床价值。方法 以 2021 年 6~11 月安徽医科大学第二附属医院普外科收治的 46 例拟行减重手术的肥胖患者 ($\text{BMI} \geq 30 \text{ kg/m}^2$) 为研究对象，术前均接受第三代双源 DECT 腹部或腹盆腔平扫检查，DECT 数据经后处理工作站采用多材料分解 (MMD) 算法自动计算生成肝脏脂肪图，由两名医师 (A 和 B) 采用盲法选择多点感兴趣区独立测量 HFC 值，医师 A 和 B 在 1 周后分别对同一数据重复测量 1 次，采用组内相关系数 (ICC) 评价测量者内 (A、B 前后两次测量) 及测量者间 (A 与 B 首次测量间) 测量结果的可重复性。在 100kV 平扫 CT 图像上测量肝脏 CT 值、肝脾 CT 值比值 (CTL/S)。计算 DECT 脂肪图与 CTL/S 法评价脂肪肝严重程度差异，HFC 值与肝脏 CT 值、CTL/S 间的相关性，并计算 HFC 值与临床指标 [身高、体质量、身体质量指数 (BMI)、腰围、三酰甘油、血清尿酸] 的相关性。结果 DECT 脂肪图 HFC 值测量结果，两名医师前后两次测量的可重复性 ICC 分别为 0.985 和 0.983 ($P < 0.001$)，医师 A 与 B 第一次测量间的可重复性 ICC 为 0.979 ($P < 0.001$)。DECT 脂肪图测量本组对象的 HFC 值范围为 0%~42.29%，中位数为 12.09%。DECT 脂肪图与 CTL/S 法评价脂肪肝严重程度结果比较，差异无统计学意义 ($\chi^2 = 6.000$, $P = 0.112$)。HFC 值与肝脏 CT 值 ($r = -0.978$, $P < 0.001$)、CTL/S ($r = -0.981$, $P < 0.001$) 均呈负相关。HFC 值与身高、体质量、BMI、腰围无明显相关性 (P 均 > 0.05)，与三酰甘油水平存在弱相关性 ($r = 0.293$, $P = 0.048$)，与血清尿酸水平呈中等相关 ($r = 0.339$, $P = 0.021$)。结论 采用 MMD 算法，双源平扫 DECT 脂肪图定量评估肝脏脂肪含量可重复性较好，是一种新的具有潜在临床应用价值的脂肪肝无创定量方法。

PO-2451

SAPHO 综合征 5 例影像表现分析及文献复习

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SAPHO (synovitis-acne-pustulosis-hyperostosis-osteitis syndrome) 综合征是主要累及皮肤、骨和关节的一种慢性疾病，诊断主要根据临床特点及影像表现。本文主要从全身骨闪烁显像、计算机断层扫描成像 (computed tomography, CT) 及磁共振成像 (nuclear magnetic resonance, MRI) 来介绍本院收录的 5 名 SAPHO 综合症患者影像学表现并进行文献复习。

PO-2452

SEMAC-VAT 在全髋关节置换术后慢性髋关节疼痛的评估

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目的 探讨层面编码去金属伪影矫正-视角倾斜技术(SEMAC-VAT)在全髋关节置换术 (THA) 后慢性髋关节疼痛中的应用价值。**方法** 收集 2021 年 1 月至 2023 年 1 月在本院行 THA 术后慢性髋关节疼痛需要磁共振 (MRI) 复查的 32 例患者, 所有患者均行冠状面、横断面的常规短时反转恢复序列 (STIR) 及 SEMAC-VAT 序列扫描。分别测量 2 组序列图像的金属假体及周围伪影面积, 记录异常病变的发现数目, 并对假体清晰度、周围重要解剖结构的可见度进行 Likert 评分。**结果** 32 例患者中, 冠状面及横断面 STIR 图像的金属假体及周围伪影面积分别为 (71.31±10.65)、(32.28±4.31); SEMAC-VAT 序列图像分别为 (39.78±5.99)、(21.84±4.44), 差异均具有统计学意义 (P 均<0.05)。SEMAC-VAT 序列对假体清晰度、周围重要解剖结构可见度的评分均明显高于 STIR 序列 (P 均<0.05)。SEMAC-VAT 序列较 STIR 序列更有助于异常病变的检出 (P<0.05)。**结论** 相较常规 STIR 序列, SEMAC-VAT 序列可显著减轻金属伪影, 提高图像质量, 能发现更多的阳性征象, 对 THA 术后慢性髋关节疼痛的评估具有重要的临床意义。

PO-2453

基于多参数光谱 CT 的痛风算法在痛风诊疗中的应用研究

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目的: 提出一种改进的基于多参数双层探测器光谱 CT 的痛风算法 (improved urate algorithm, IUA), 与现有的痛风算法 (current urate algorithm, CUA) 相比, 在保持病灶显示效果相似的同时, 显著减少了图像伪影 (假阳性)。

方法: 2022 年 5 月-2023 年 5 月持续性纳入痛风性足部关节炎疑诊患者, 并进行光谱双层探测器 CT 足部扫描。然后根据 ACR/EULAR 2015 指南将所有患者分为痛风组和非痛风组, 并对所有受试者的 CT 图像进行 CUA 和 IUA 重建。在非痛风组中, 统计各类图像伪影的数量并计算 IUA 相比 CUA 的伪影去除率。在痛风组中, 记录痛风阳性率、痛风最大体积的最大截面积 (S_{IT-max})。

结果: 49 名患者 (82 只患足) 被纳入痛风组, 35 名患者 (67 只患足) 被纳入非痛风组。与 CUA 图像相比, IUA 图像的甲床伪影、皮肤伪影、束硬化伪影、血管伪影、肌腱伪影及总伪影的去除率分别为 40.54%、48.89%、74.31%、99.19%、99.57% 和 80.03%。定性诊断方面, IUA 和 CUA 图像的痛风阳性率均为 100%。定量诊断方面, CUA 组的 S_{IT-max} 均略高于 IUA 组 (P<0.05)。

结论: 基于多参数双层探测器光谱 CT 的改进痛风算法, 能够在保证痛风定性诊断效能相似的同时, 有效地减少了 80% 的图像伪影, 对肌肉伪影和血管伪影的去除效果尤为显著, 可达 99% 以上。而对于新算法在临床真实环境中是否实现了更加准确的尿酸盐定量, 未来需要体膜研究和动物研究进一步论证。

PO-2454

探讨韧带样型纤维瘤病 (DF) 的影像学特征及其病理学基础

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目的探讨韧带样型纤维瘤病 (DF) 的影像学特征及其病理学基础。

方法回顾性分析经手术病理证实的韧带样型纤维瘤 11 例, 其中 5 例行 CT 检查, 其中 4 例行增强检查, 8 例行 MRI 检查, 其中 4 例增强。分析 CT 及 MRI 表现, 并对肿瘤的病理特点进行分析。

结果本组病例病变分布特点, 腹腔内 5 例, 主要位于腹膜后, 腹壁 3 例, 臀部 2 例, 足底 1 例, 肿瘤平均直径 5.9cm, 肿瘤形态为不规则形或分叶状 8 例, 类圆形或梭形的 3 例。肿瘤与周围结构分界不清, 或部分分界不清的 8 例。5 例在 CT 上表现为稍低密度或者等密度, 4 例增强后中度或明显强化, 以等密度区强化为主。8 例病灶在 MRI 上表现为 T1WI 6 例呈不均匀稍等信号, 2 例呈不均匀等信号。T2WI 7 例呈不均匀等信号, 压脂 T2WI 上所有病灶均呈不均匀高信号, 增强后 4 例病变明显不均匀强化, 原病变内所有序列显示为地形区域均未见强化。韧带样型纤维瘤病在病理上主要有纤维母细胞、胶原蛋白及成熟的纤维组织组成。病变很少发生钙化、出血或坏死等。

结论韧带样型纤维瘤病 (Desmoid-Type Fibromatoses) 属于良性纤维增生性病变, 具有明显的侵袭性生长的生物学行为, 恶变和转移少见, 但是术后复发率高。

韧带样型纤维瘤病在病理上主要有纤维母细胞、胶原蛋白及成熟的纤维组织组成。病变很少发生钙化、出血或坏死等。因此在 MRI 图像中, T1WI 呈等低信号 (与肌肉比较), T2WI 呈高信号的区域以纤维母细胞、粘液成分和增生的血管为主, 粘液及增生血管在 FS T2WI 上呈更高信号, 增强扫描, 显示不同程度的强化, 渐进性或进行性明显强化。低信号区域是瘢痕性胶原纤维组织, 增强扫描未见强化, 具有一定的特异性。

PO-2455

低位腰椎椎间盘突出与脊柱-骨盆矢状位参数的相关性研究

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目的 探讨低位腰椎间盘突出与脊柱骨盆矢状位参数的关系

方法 回顾性分析四川省骨科医院 2022 年 12 月—2023 年 7 月收治的 202 例腰椎间盘突出症患者, 其中男性 119 例, 女性 83 例; 年龄范围在 12-71 岁; 所有病例均排除脊柱畸形、肿瘤、感染、椎管狭窄、腰椎滑脱等疾病; 所有患者入院拍摄站立位脊柱全长正侧位 DR 片及腰椎 MRI 数据; 在全长 DR 片上测量患者的骨盆入射角 (pelvic incidence, PI)、骨盆倾斜角 (pelvic tilt, PT)、骶骨倾斜角 (sacral slope, SS)、胸椎后凸角 (thoracic kyphosis, TK)、腰椎前凸角 (lumbar lordosis, LL)、矢状面垂直轴 (sagittal vertical axis, SVA); 在 MR 图像上, 根据突出位置分为 L4/5 及 L5/S1 组; 参考 MSU (Michigan State University) 分型分别对突出椎间盘的程度、突出范围及髓核游离程度进行分组: 突出程度分为 1/2/3 级, 突出范围分中央型及旁中央型, 髓核游离程度分为 0/1/2/3 级; 应用 SPSS 17 版软件进行统计学分析, 计量资料样本符合正态分布采用独立样本 t 检验及方差分析; 不符合正态分布采用非参数检验方法; 相关性分析采用 Spearman 相关分析; 本研究获得四川省骨科医院伦理委员会同意。

结果: 年龄、BMI、椎间盘突出程度与髓核游离程度与脊柱-骨盆矢状位各参数均无明显统计学差异; 女性的 PI、SS 及 LL 均大于男性, 差异均有统计学意义 ($P < 0.05$); 女性的 SVA 小于男性, 差异有统计学差异 ($P < 0.05$); L4/5 突出组与 L5/S1 突出组间在 PI 上有统计学差异 ($P < 0.05$); 中央型和旁中央型突出组与 SVA 有统计学差异 ($P < 0.05$); PI 与腰椎间盘突出位置呈负相关 ($r_s = -0.194$, $p = 0.006$)

结论: PI 是影响腰椎间盘突出位置的原因之一; 女性脊柱-骨盆矢状面参数对椎间盘突出的代偿能力较男性更强; SVA 值的变化, 可能与神经根受压关系密切; 椎间盘突出程度及髓核游离程度变化与脊柱-骨盆矢状位各参数无明显相关。

PO-2456

MDCT 结合 MPR 诊断 Bastrup 病的价值

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目的 结合 CT 骨算法 MPR 探讨 Bastrup 病的 MDCT 影像学表现及其临床特点。**方法** 回顾性收集我院 96 例 Bastrup 病患者的 MDCT 表现, 结合 CT 骨算法 MPR, 对其临床及影像学表现进行分析。**结果** Bastrup 病的 MDCT 表现为腰椎相邻两个棘突间距缩小或相互接触, 部分甚至形成棘突间假关节, 两个棘突相对缘骨质增生硬化, 部分可见棘突肥大, CT 骨算法 MPR 重组腰椎正中矢状位显示最显著。**结论** CT 骨算法 MPR 重组腰椎正中矢状位可显示 Bastrup 病的特征性表现, 腰椎相邻两个棘突间距缩小或相互接触, 部分甚至形成棘突间假关节, 两个棘突相对缘骨质增生硬化, 部分可见棘突肥大; 并可显示关节面下的囊性变及棘突间积气影。

PO-2457

磁共振脂肪定量技术评估放化疗过程中骨髓脂肪含量的变化

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目的: 盆腔恶性肿瘤是放化疗是最常用的治疗方法。但副作用是减少红骨髓而增加含有脂肪的黄骨髓, 从而造成更高的质子密度脂肪分数(PDFF)。这种变化可以降低病人的造血能力。本研究的目的是在患者放疗和化疗期间使用基于 MRI 的脂肪定量技术评估实时骨髓毒性评价的可行性。

材料与方法: 6 位入组女性 (年龄 39 岁~60 岁, 平均 49 岁) 都被诊断为宫颈鳞状细胞癌 (FIGO IIB-IIIIB) 并接受放化疗。增强 CT 定位, 盆腔照射剂量为 50Gy/25 次, 每周 5 次。化疗方案为顺铂单药 40mg/m²/周。治疗前及放化疗过程中每周接受 GE 3.0 T (美国通用电气医疗集团 MR750) Ideal IQ 序列扫描, 以皮下脂肪组织作为参考, 分别测量放疗前 L4, S1 椎体脂肪分数 (图 1)。IDEAL-IQ 是用于生成定量脂肪分数的序列。详细的扫描参数: FOV38x38cm, 层厚 5mm, 翻转角度 3°, 矩阵 160x160。分别进行轴位, 矢位和冠位扫描。ROI 由经验丰富的放射科医师在脂肪分数图像手动放置在 S1 椎体和皮下脂肪组织, 最后脂肪分数计算的平均值从三个平面中获取。

结果: 治疗期间, S1 椎体分别为: 38.40±17.79, 47.42±13.92, 55.53±11.89, 66.21±10.39, 73.88±4.68, 75.40±3.51, 皮下脂肪组织分别为 85.56±3.29, 85.80±3.21, 85.44±2.51, 85.77±3.49, 86.92±2.67, 86.78±3.66。由此可看出在 S1 椎体上有明显的增长趋势 (图 2)。表明在放化疗过程中, 红骨髓更多的转化为黄骨髓。

结论: MRI 脂肪定量技术对骨髓脂肪含量的变化较敏感, 可以反应骨髓的实时脂肪含量变化。脂肪定量图像可以给放疗医师提供丰富信息, 对放疗计划的制定或提供指导性的建议, 根据病人的骨髓脂肪分数选择合适的放化疗。

PO-2458

地诺单抗治疗后骨巨细胞瘤的 CT 影像表现研究

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目的探讨经地诺单抗治疗后骨巨细胞瘤的 CT 影像学特征性表现。

方法回顾性分析 2017 年 9 月至 2022 年 4 月本院收治的 24 例骨巨细胞瘤患者临床和影像学资料。患者平均年龄为 31.6(16~67)岁,男 10 例,女 14 例。病变位于扁骨及不规则骨 7 例(骶骨 2 例,髌骨 4 例,腰椎 1 例),位于四肢骨 17 例(胫骨 7 例,腓骨 2 例、股骨 6 例和肱骨 1 例)。所有接受地诺单抗治疗的患者每 4 周接受 120mg 地诺单抗皮下注射,第 8 天和第 15 天增加 2 次负荷剂量。患者治疗前后均接受平扫及增强 CT 检查,计算病灶治疗前后的平扫、增强及平扫与增强 CT 差值的变化,以及通过 CT 评价病灶治疗后骨包壳的情况,探讨应用 CT 检查评价地诺单抗治疗骨巨细胞瘤的效果。

结果用药前和用药后病灶平均平扫 CT 值分别为 $47.14\pm 12.32\text{HU}$ 和 $57.03\pm 16.33\text{HU}$,用药后的平扫 CT 值明显升高 ($P=0.023$, $t=2.357$)。用药前和用药后病灶平均增强 CT 值分别为 $110.0\pm 21.34\text{HU}$ 和 $91.52\pm 19.13\text{HU}$,增强 CT 值较前降低,具有统计学意义($P=0.004$, $t=3.041$)。用药前和用药后病灶平扫与增强 CT 差值分别为 $63.40\pm 24.38\text{HU}$ 和 $34.60\pm 22.94\text{HU}$,有统计学意义($p<0.001$, $t=4.076$)。治疗后增强 CT 值对于评价肿瘤治疗后骨包壳形成具有较好的诊断效能($\text{AUC}=0.827$, 95% CI 60.9-100%, 灵敏度 77.8%, 特异性为 88.9%, Cutoff 值=94.7HU, $p=0.019$)

结论骨巨细胞瘤经地诺单抗治疗后有骨质修复、肿瘤血运减少的表现,CT 影像检查可作为评估临床治疗疗效的潜在方法。

PO-2459

不同剂量下重建矩阵对定量 CT 椎体骨密度测量值的影响

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目的:探讨不同剂量下重建矩阵对定量 CT (QCT) 椎体骨密度 (BMD) 测量值的影响。方法:应用联影 uCT760 对欧洲标准脊柱体模 (ESP) 和 QCT 校准体模,采用两种剂量水平 (管电压 120 kVp, 管电流 150 mAs 和 30 mAs) 进行扫描。扫描完成后,基于原始数据重建 512×512 、 768×768 、 1024×1024 矩阵的图像。重建图像传至 QCT pro 工作站进行各椎体 BMD 测量,基于椎体标定值,计算相对误差(RE),分析不同重建矩阵下椎体骨密度相对误差差异。回顾性分析于我院行胸部高分辨 CT (HRCT) 和胸部低剂量 CT (LDCT) 的患者各 45 例,对原始图像分别以 512×512 和 1024×1024 重建矩阵完成 QCT 椎体骨密度测量,分析不同重建矩阵间椎体 T12、L1 及 T12-L1 均值骨密度的差异。结果:150 mAs 和 30 mAs 两种剂量水平下不同重建矩阵 ESP 体模 V1、V2、V3 及 V 平均骨密度测量相对误差差异均无统计学意义 ($P>0.05$)。相同重建矩阵 150 mAs 和 30 mAs 间 V1、V2、V3 及 V 平均骨密度测量相对误差差异均无统计学意义 ($P>0.05$)。两位医师测量的患者椎体骨密度一致性较好 (ICC 值=0.978~0.990,均 >0.75)。HRCT 和 LDCT 的 45 例患者 512×512 和 1024×1024 间 T12、L1 骨密度值及 T12-L1 骨密度均值差异均无统计学意义 ($P>0.05$)。结论:不同重建矩阵对 QCT 椎体骨密度测量值无影响,胸部 HRCT 和 LDCT 数据均可用于机会性筛查骨质疏松症。

PO-2460

骶髂关节周围韧带钙化规律的 CT 征象分析

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目的 探讨骶髂关节周围韧带钙化的分布规律，以期为脊柱韧带骨化机制的研究提供更多依据。**方法** 回顾性分析 2022 年 1 月青岛市西海岸新区人民医院影像 PACS 工作站上包含骶髂关节的腹盆腔检查及腰骶部检查的患者的 CT 影像资料，通过纳入及排除标准入组连续病例 1266 例，男性 702 例，女性 564 例，年龄范围 18 ~ 95 岁。按照骶髂关节韧带骨化位置分为前方、中间、后方及上下部 4 组；按照 10 岁间隔分为 7 个年龄段组，其中 20 岁以下患者纳入 18-29 岁组，90 岁以上患者的纳入 >80 岁组。应用 SPSS25.0 统计软件中 χ^2 检验及 Spearman 相关分析统计分析骶髂关节周围韧带钙化的发生率以及患者年龄、性别的相关性，各组间比较使用 t 检验。结果 骶髂关节周围韧带钙化发生的发生率在不同性别间具有统计学意义 ($P < 0.05$)，女性 (82.45%) 高于男性 (73.79%)，且钙化数量在不同性别间亦具有统计学差异 ($P < 0.05$)；骶髂关节后方韧带钙化的发生率在不同性别间具有统计学差异 ($P < 0.05$)，钙化数量也具有统计学的差异 ($P < 0.05$)；在不同性别间，40-59 岁年龄段人群骶髂关节后方韧带钙化的发生率具有统计学差异 ($P < 0.05$)；骶髂关节其余位置韧带钙化的发生率在各年龄段中无性别差异。结论 骶髂关节周围韧带骨化在发生几率及数量上女性高于男性，高发年龄段为 40-49 岁，钙化更易于发生于骶髂关节后方韧带，因此，骶髂关节周围韧带骨化的年龄、性别及位置的分布规律为脊柱韧带骨化机制的研究提供了更多的数据，提示影像科医师在日常诊断工作中应重视骶髂关节韧带骨化的提示意义。

PO-2461

弹簧韧带损伤的 MRI 诊断价值

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目的：探讨弹簧韧带损伤的 MR 诊断价值

方法：1.1 一般资料 回顾分析 2018-2021 年 20 例弹簧韧带损伤所致获得性平足患者足踝部 MR 资料。患者年龄 20-62 岁，平均年龄 39 岁，男 9 例，女 11 例，左足 8 例，右足 12 例。判断弹簧韧带是否损伤，以及损伤程度，分析弹簧韧带损伤 MR 诊断价值。

1.2 检查方法：采用 Philips3.0T 超导磁共振，使用 16 通道踝关节专用线圈，采用踝关节常规扫描方案，矢状位 FSE T1WI 序列，轴位、矢状位及冠状位压脂图像均采用 Philips 专有 mDIXION 压脂，层厚 3mm，间距 0.1mm，FOV20cm。

1.3 观察与判断 弹簧韧带主要分为三束（内侧束、中间束、外侧束），内侧束主要在冠状位和轴位上观察，中间束和外侧束主要在矢状位及轴位观察。判断标准，急性韧带损伤主要表现为韧带水肿、T2WI 信号增高，部分中断、完全中断，陈旧性损伤主要表现为韧带中断或韧带松弛。

结果：弹簧韧带损伤的严重后果是扁平足，创伤性平足是临床常见病，大部分原因是扭伤后破坏正常足弓的骨及韧带结构，从而导致的创伤性平足，而非骨折性创伤性平足也不少见，早期不易引起重视。非创伤性平足其常见原因为外伤或过度运动后导致骨挫伤、胫骨后肌功能不全、弹簧韧带损伤、足底韧带损伤等，各种损伤常同时发生，也可单独存在。20 例获得性平足患者中，既往均有明确扭伤或暴力性损伤病史，均未经过及时有效治疗；首诊 MR 显示弹簧韧带损伤 17 例，同时合并距骨、跟骨、舟骨骨挫伤 14 例，同时合并胫骨后肌损伤的 12 例，足底韧带损伤 4 例。足弓塌陷后复查 MR，均显示显示弹簧韧带松弛或中断。

结论：弹簧韧带损伤与创伤性平足具有明显相关性。高场强 MR 能清晰显示弹簧韧带正常结构及病变，对弹簧韧带损伤提供可靠的诊断依据，对诊断弹簧韧带损伤早期诊断、临床治疗方案的选择提供了有力依据，能有效预防平足症的发生。

PO-2462

The feasibility of ASL and IVIM in the identification of pediatric IgAN and HSPN

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Purpose Pediatric nephropathies are ordinary and frequently-occurring disease diseases when children have chronic abdominal diseases. These conditions tend to be recurrent and the prognoses are poor¹⁻². IgA nephropathy (IgAN) and Henoch Schonlein purpura nephritis (HSPN) are pediatric nephropathy. The clinical characteristics and laboratory results in the development of these two diseases are similar, and the diagnosis can only be confirmed by renal biopsy in clinic. However, because the puncture biopsy is an invasive examination, there is a risk of problems such as poor repeatability and poor patient compliance, and it is impossible to evaluate the patient's condition in the multi-disease phase³. Functional magnetic resonance imaging (fMRI) has high application value in clinic diagnosis⁴⁻⁸. Arterial spin labeling (ASL) can evaluate renal blood flow and intravoxel incoherent motion (IVIM) can evaluate renal perfusion and diffusion. These two techniques can noninvasively evaluate renal function and have high repeatability, which can be used for disease follow-up and prognosis observation. However, few studies have focused on researching the application of ASL and IVIM on pediatric IgAN and HSPN. The goal of this study is to investigate the evaluation of ASL and IVIM in differentiating IgAN from HSPN.

Methods There were twenty-five pediatric patients with nephropathy (IgAN, 12 cases; HSPN, 13 cases) for kidney examinations were performed on a 3.0T MR scanner (Ingenia CX, Philips Healthcare, the Netherlands) using 32-channel abdominal coil. The protocol consisted of T1WI, T2WI, ASL and IVIM. The detailed scan parameters were shown in Table 1. ASL images were processed in Philips's workstation (ISP, Philips Healthcare, the Netherlands) and region of interest (ROI) of renal cortex and medulla were delineated respectively. The measurement parameter of ASL is renal blood flow (RBF). MITK-Diffusion software (4.13.2, <https://www.mitk.org/>) was used to process IVIM images and outline ROIs of renal cortex and medulla, respectively. The IVIM measurement parameters include pure diffusion coefficient (D), the perfusion fraction (f) and the pseudodiffusion coefficient (D*). Independent Student's T test or Mann-Whitney U test were used to analyze the differences of ASL and IVIM parameters between IgAN and HSPN. The ROC curve of the above parameters was used to analyze the diagnostic efficiency between IgAN and HSPN. P values < 0.05 were considered significant.

Results Corresponding parameter mapping of ASL and IVIM were showed in Figure 1. The results showed that RBF of renal cortex of HSPN was higher than that of renal cortex of IgAN (305.04 ± 37.75 vs 273.18 ± 50.28 ; $P=0.017$) in Table 2. The D of renal medulla of IgAN was higher than that of renal medulla of HSPN (1.67 ± 0.24 vs 1.43 ± 0.18 ; $P=0.003$) in Table 3. The area under the ROC curves (AUCs) of RBF of cortex and D of medulla were 76.3% and 83.7% for identify IgAN and HSPN, respectively (Table 4 and Figure 2). The sensitivity of the above parameters with feasible thresholds were 61.5% and 76.9%, the corresponding specificity were 83.3% and 75.0%.

Conclusions fMRI can evaluate the renal function of pediatric patients with nephropathy. ASL and IVIM can achieve differentiate diagnosis of IgAN and HSPN. Further researches are essential for evaluating the progression and prognosis of pediatric nephropathy.

PO-2463

Development and validation of a risk prediction nomogram for multiple magnets ingestion in children, a large sample retrospective study

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BACKGROUND & AIMS: In recent years, multiple magnets ingestion in children has rapidly increased worldwide. Timely gastroscopic or surgical intervention is extremely important for high-risk cases to reduce complications, while for low-risk patients, spontaneous discharge can be expected. Clinically, how to make a risk assessment and a scientific decision is the key step. This study is to develop an appropriate nomogram for risk management and judge decisions based on multiple clinical factors and radiology features.

METHODS: Patients with multiple magnets ingestion in Shenzhen Children's Hospital from 2017 to 2021 were enrolled in this study. Their clinical and radiology data were retrospectively analyzed. Single-factor and multi-factor logistic regression analyses were used to screen for risk factors, and clinical models (model C) and clinical imaging models (model C & R) were constructed. The two models were evaluated and validated by area under the curve (AUC), Hosmer-Lemeshow test, calibration curve, 1000 bootstrap decision curve analysis (DCA), NRI and IDI. Finally, the nomograms were plotted for the demonstration of two models.

RESULTS: Totally 113 cases with multiple magnets ingestion, 53 (45.1%) were treated with gastroscopy or surgery imperatively. After the screening, Model C included four independent risk factors: number of foreign bodies >4, vomiting, abdominal pain, and abdominal pressure pain, with an AUC of 0.924 (95% CI 0.875-974) and an internally validated AUC of 0.917. Model C&R included five independent risk factors: number of foreign bodies >4, vomiting, abdominal pain, abdominal pressure pain, and intestinal obstruction diagnosed on abdominal radiographs, with an AUC of 0.945 (95% CI 0.900,0.989). The calibration plots showed excellent agreement for both models. DCA had excellent net benefits. Comparing two models by NRI and IDI, Model C&R had superior performance.

CONCLUSION: In this study, Model C and Model C & R were built for the evaluation of multiple magnets ingestion in children, showing the good value of discrimination, calibration, and clinical utility. They can facilitate the clinical assessment and treatment strategy, whether it needs gastroscopic or surgical intervention for multiple magnets ingestion in children.

PO-2464

Comparison of maternal comfort level and fetal MR imaging quality in supine and left-lying position in a 75-cm bore magnet

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Purpose Although supine and left-lying position had been recommended for fetal MR imaging, the supine position was still the mainly position in clinics, and little attention has been focused on maternal experiences during MR scans. This study aimed to compare the comfort level of pregnant women when imaging fetal brain in supine and left-lying position, and to compare the image quality when combined with a conventional or a super-flexible coil.

Methods Single pregnancy women were enrolled and performing fetal MR in a 75-cm bore scanner in supine and left-lying position. Participants scored the comfort level separately. The images were classified into Group1 (supine with conventional coil, n=50), Group2 (supine with super-flexible coil, n=50), and Group3 (left-lying with super-flexible coil, n=50) at a ratio of 1:1:1. The images were

scored subjectively by two radiologists and then measuring the signal-to-noise ratio and contrast-to-noise ratio objectively. Comfort level scores were compared between supine position and left-lying position; Subjective and objective scores of image quality were compared between Group1, Group2 and Group3.

Results A total of 50 pregnant women (13 in mid pregnancy and 37 in late pregnancy) were enrolled with gestational ages between 25 and 36 weeks (mean GA=30.5). Comfort level score of left-lying position was higher than supine position (4.2 ± 0.8 vs 3.8 ± 0.9 , $p < 0.05$). Subjective score showed no significant differences. Objective score showed SNR of Group3 was significantly higher than that of Group1&2 in bilateral frontal and right cerebellum. CNR of Group3 in right frontal lobe and right occipital lobe were significantly higher than that of Group1&2. Further analysis revealed women in late pregnancy contributed to the significance.

Conclusions In condition of a 75-cm bore system, left-lying position acquired higher comfort level scores and higher image quality than supine position, mostly for late pregnancy.

PO-2465

Early imaging differentiation of children with acute hematologic malignancies that present in pancytopenia

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Objective: To find the potential differentiation indicators on thoracic and abdominal computed tomography (CT) among three hematologic malignancies characterized by acute pancytopenia in children.

Materials and Methods: Included in this study was a consecutive series of 133 children with pancytopenia, hospitalized in our institution from August 2016 to November 2021, who were divided into three groups, 23 children in Group 1 (malignancy associated hemophagocytic lymphohistiocytosis, M-HLH), 58 in Group 2 (acute leukemia, AL) and 52 in Group 3 (Epstein-Barr virus associated HLH, EBV-HLH). Differences of thoracic and abdominal CT features were statistically analyzed.

Results: 1. Chest CT: Incidences of pulmonary lesion, thickening of bronchovascular bundle, pleural effusion were significantly different among the groups. Short diameters of mediastinal largest lymph nodes (LLN) in Group 1 were significantly bigger than those in other groups. ROC analysis revealed a cut-off value of 11.45 mm (sensitivity 65.2% and specificity 98.2%) in distinguishing M-HLH from AL and a value of 11.60 mm (sensitivity 65.2% and specificity 100%) from EBV-HLH. Mediastinal LLNs in Group 1 were usually situated at retroinnominate space. Short diameters of axillary LLN in Group 1 was significantly bigger from those in Group 3. ROC analysis revealed a cut-off value of 5.95 mm (sensitivity 65.2% and specificity 76.9%). 2. Abdominal CT: Incidences of widened periportal space, ascites, splenomegaly and intrarenal lesion were significantly different among the groups. Short diameters of abdominal LLN in Group 1 was bigger than those in other groups. ROC analysis revealed a cut-off value of 9.30 mm (sensitivity 72.7% and specificity 77.2%) in distinguishing M-HLH from AL and a value of 9.60 mm (sensitivity 72.7% and specificity 75.0%) from EBV-HLH.

Conclusions: Thoracic and abdominal CT manifestations are usually different among pediatric hematologic malignancies that present in acute pancytopenia.

PO-2466

Altered functional connectivity density in distinct brain networks of early onset schizophrenia

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Aim: Schizophrenia is deemed to be a brain network or connectome disorder and is associated with brain development. Early-onset schizophrenia (EOS) provides an exceptional opportunity to evaluate neuropathology and the development of schizophrenia at a very early stage without potential confounding factors. The study intended to identify the abnormal function connectivity brain region in EOS patients.

Method: Function connectivity density (FCD) in resting-state functional Magnetic Resonance Imaging (rsfMRI) was used to investigate functional integrity of global brain regions in 76 first-episode, treatment-free EOS patients and 72 age and gender-matched healthy controls (HCs). As well as the correlation between the regional altered FCS and clinical variables in EOS patients was examined.

Result: Compared with HCs, EOS patients have lower total IQ scores and increased FCD in bilateral precuneus, left dorsolateral prefrontal cortex, left thalamus and left parahippocampus (paraHIP), and decreased FCD in right cerebellum posterior lobe and right superior temporal gyrus. The PANSS total score was positively related to the FCD in the left paraHIP in EOS patients.

Conclusion: Our study revealed the disrupted brain hubs for EOS concerning over-activation of DMN, ECN and limbic system, and suppression of MNS. Patients with EOS have a higher FCD in paraHIP which is positively related with total PANSS scores, implicating clinical symptoms are related to the altered connectome property of EOS. The disrupted functional brain connectivity maybe a neuroimaging biomarker in EOS and may have prognostic and therapeutic implications.

PO-2467

Quantification of myelination in Children with Attention-deficit/hyperactivity Disorder: A Comparative Assessment with Synthetic MRI and DTI

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Background: Evaluation of myelin content is crucial for attention-deficit/hyperactivity disorder (ADHD). To estimate myelin content in ADHD based on synthetic MRI-based method and compare it with established diffusion tensor imaging (DTI) method.

Methods: Fifth-nine ADHD and fifty typically developing (TD) children were recruited. Global and regional myelin content (myelin volume fraction [MVF] and myelin volume [MYV]) were assessed using SyMRI and compared with DTI metrics (fractional anisotropy and mean/radial/axial diffusivity). The relationship between significant MRI parameters and clinical variables were assessed in ADHD. **Results:** No between-group differences of whole-brain myelin content were found. Compared to TDs, ADHD showed higher mean MVF in bilateral internal capsule, external capsule, corona radiata, and corpus callosum, as well as in left tapetum, left superior fronto-occipital fascicular, and right cingulum (all PFDR-corrected < 0.05). Increased MYV were found in similar regions. Abnormalities of DTI metrics were mainly in bilateral corticospinal tract. Besides, MVF in the right retro lenticular part of internal capsule was negatively correlated with cancellation test scores ($r = -0.41$, $P = 0.002$), and MYV in right posterior limb of internal capsule ($r = 0.377$, $P = 0.040$) and left superior corona radiata ($r = 0.375$, $P = 0.041$) were positively correlated with cancellation test scores in ADHD.

Conclusions: Increased myelin content underscored the important pathway of frontostriatal tract, posterior thalamic radiation, and corpus callosum underlying ADHD, which reinforced the insights into myelin quantification and its potential role in pathophysiological mechanism and disease diagnosis.

PO-2468

Evaluation of Deep Gray Matter Iron and Myelin Changes in children with Attention-deficit/hyperactivity disorder: A Combined Assessment with QSM and Synthetic MRI

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Background: Application of magnetic susceptibility have been consistently demonstrated abnormal iron content in subcortical of ADHD children, but some uncertainties remain concerning the underlying neurobiological processes. We applied quantitative susceptibility mapping and synthetic magnetic resonance imaging (SyMRI) to clarify the relative contribution of iron and myelin changes to deep gray matter changes in ADHD.

Methods: Forty-eight drug-naïve pediatric ADHD and 41 age-, gender-, and handedness-matched typically developing controls (TDs) were enrolled. Compared with TDs, iron and myelin (concentration and content) of DGM, including subcortical and thalamic nuclei, were assessed with analysis of covariance. Partial correlation analysis was used to assess the relationship between significant MRI parameters and clinical symptom severity in ADHD.

Results: ADHD children showed significant increased iron content in the bilateral putamen and thalamic nuclei and reduced mean iron in bilateral substantia nigra (SN), left parabrachial pigmented nucleus (PBN) and right ventral tegmental area (VTA) (all $P < 0.001$, Bonferroni-corrected). Regarding myelin, increased myelin concentration was in the right caudate, left internal globus pallidus and bilateral SN, hypothalamus and mamillary nucleus (all $P < 0.001$, Bonferroni-corrected). Detailed results of the between-group analyses are reported in Table. For correlation analysis, iron concentration of left substantia nigra pars reticulata (SNpr, $r = -0.474$, $P = 0.0015$) and right SNpr ($r = -0.349$, $P = 0.0235$) were negatively correlated with clinical symptom severity of ADHD patients.

Conclusions: The subcortical maturation delay and dysfunction in dopaminergic transmission may play an important role in the pathophysiology of ADHD. Our findings provide new potential targets to investigate the pathophysiology of ADHD.

PO-2469

Cortical microstructural abnormality of Self-limited epilepsy with centrotemporal spikes: a surface-based and voxel-based morphometry

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Rationale and Objectives Through surface-based morphometry (SBM) and voxel-based morphometry (VBM) to explore the cortical microstructure abnormality of Self-limited epilepsy with centrotemporal spikes (SeLECT).

Materials and Methods 3DT1 images of 38 children with SeLECTS and 46 age- and gender-matched healthy control children were acquired. Then cortical reconstruction and grey-white matter tissue contrast (GWC) calculation were performed using Freesurfer, and FSL to perform the voxel-based morphometry.

Results The results show that clusters of significantly reduced GWC compared with the healthy control group were found in the left paracentral gyrus, left lateral occipital gyrus, and right superior frontal in children with SeLECTS ($p < 0.05$). Furthermore, cortex volume in the left lateral occipital cortex and right middle temporal gyrus was reduced significantly ($p < 0.05$). Moreover, the left occipital lobe's gray matter (GM) volume decreased in VBM analysis. In correlation analysis, GWC was negatively correlated with age and duration of epilepsy onset, cortex volume was positively correlated with onset age, and decreased GM volume of the left occipital lobe in VBM analysis was negatively correlated with epilepsy duration.

Conclusion Several representative cortical microstructure measurements of SeLECTS were significantly reduced compared with healthy control children, which may indicate the presence of cortical microstructure abnormalities in SeLECTS and help to understand the pathogenesis and pathophysiology of SeLECTS.

PO-2470

Forensic age estimation of living hands and wrists: A comparison of MRI and X-ray to evaluate the feasibility of MRI estimation of bone age

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Objective: To compare the effects of X-ray and MRI on bone age assessment and evaluate whether MRI can meet the requirements of bone age assessment in children and adolescents. **Methods:** X-ray data of 500 patients and MRI data of 497 patients were collected during routine medical investigation. Both groups were aged between 6 and 20. The four-stage system (Kramer's modified classification system) was used to assess the development of ossification and to analyze differences in growth-plate fusion in MRI and X-ray images. Define minimum, maximum, mean, standard deviation, standard error, median, and 95% confidence intervals for X-rays and MRI in men and women of all age groups. Kruskal-Wallis H method was used to analyze the differences among the groups. **Results:** The age of epiphyseal fusion in male was 1~2 years later than that in female. The correlation coefficients between the ossification stage of distal radius, distal ulna, first metacarpal bone, first proximal phalangeal bone, and second to fifth metacarpal bone (x1, x2, x3, x4, x5) and real age were 0.90, 0.90, 0.88, 0.90, 0.89, respectively. The X-ray correlation coefficients of male wrist and hand were 0.86, 0.87, 0.84, 0.85 and 0.86, respectively. For MRI of female wrist and hand, the correlation coefficients of x1, x2 and x3 ossification stage with real age

were 0.91, 0.92 and 0.85, respectively. The X-ray correlation coefficients of female wrist and hand were 0.89, 0.86 and 0.83, respectively. The correlation coefficient of wrist ossification stage in MRI images of male and female wrist was slightly higher than that of X-ray, with no statistical significance ($p>0.05$). Conclusion: MRI is an effective and reliable method for bone age assessment. In addition, there is no radiation during the MRI scan, making it safer to estimate the living age.

PO-2471

Non-ECG-triggered dual-source dependent CTA in children with congenital heart disease

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Abstract

Objective: To explore the value of non-electrocardiogram-triggered (non-ECG-triggered) on third-generation dual-source CT application in children with congenital heart disease (CHD) in a high heart rate.

Methods: Data on children with CHD received cardiac CT angiography (CTA) were collected between November 2019 and March 2021. CT images were obtained using two different protocols: non-ECG-triggered and retrospectively-ECG-triggered (retro-ECG-triggered). All children received transthoracic echocardiography (TTE) before surgery. Sex, age, weight, heart rate, volume CT dose index (CTDI vol), and dose length product (DLP) were recorded, and the effective dose (ED) was calculated. Image quality was rated using five-point Likert scales and the diagnostic values of CTA and TTE were compared.

Results: Children's age ranged from 1 day to 34 months, with minimum and maximum heart rates of 90 bpm and 160 bpm. There were significant differences between the retro- and non-ECG-triggered groups in the average tube current (54.95 ± 23.52 vs. 45.47 ± 24.65 mAs, $p=0.003$), CTDI vol (2.41 ± 1.6 vs. 0.58 ± 0.27 mGy, $p<0.001$), DLP (44.43 ± 34.65 vs. 9.92 ± 5.48 mGy.cm, $p<0.001$), and ED (1.48 ± 0.90 vs. 0.35 ± 0.17 mSv, $p<0.001$). There was no difference between the two protocols in the demonstration of extracardiac and intracardiac malformations (all $p\geq0.05$). The diagnostic accuracy of both retro- and non-ECG triggering in intracardiac and extracardiac malformations were high with no significant differences ($p=1.00, 0.80$). The diagnostic advantage of TTE is mainly in intracardiac malformations ($p=0.03, 0.01$).

Conclusions: High-pitch non-ECG-triggered CTA can significantly reduce radiation dose, whereas there was no significant difference in image quality and diagnostic accuracy between non- and retro-ECG-triggered CTA.

PO-2472

ASSEMENT OF ULTRA-LOW-DOSE CHEST CT IMAGING USING A NOVEL ARTIFICIAL INTELLIGENCE ITERATIVE RECONSTRUCTION TECHNIQUE IN INFANTS WITH CONGENITAL HEART DISEASE

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Background Radiation dose is still the most important issue for infants to undergo CT scanning now. But sometimes it is inevitable for infants with congenital heart disease to undergo chest

computed tomography (CT) examination to rule out lung diseases, such as tracheobronchial stenosis, pneumonia, etc. Based on this situation, it is very meaningful to reduce the dose of chest CT scan as much as possible without affecting the diagnosis.

Objective To investigate the image quality and feasibility of a novel artificial intelligence iterative reconstruction (AIIR) algorithm for chest CT with a low radiation dose protocol in comparison with hybrid iterative reconstruction (HIR) algorithm for standard chest CT.

Method Participants were divided into two groups: SDCT (80kV, 100mAs) and LDCT (80kV, 10mAs). SDCT was reconstructed using the HIR method, and LDCT was reconstructed using the HIR method (LDCT-HIR) and AIIR (LDCT-AIIR) respectively. Objective parameters (Noise, SNR, CNR) and subjective parameters (overall image quality, depiction of normal and abnormal lung structures) were compared between three image series.

Result 104 patients (mean age, 7.56M; mean weight, 7.08Kg) were enrolled in SDCT, and 119 patients (mean age, 6.32M; mean weight, 6.73Kg) in LDCT. The mean effective doses were 0.83 ± 0.01 mSv for SDCT and 0.08 ± 0.00 mSv for LDCT. The noise of LDCT-AIIR was lowest, the SNR and CNR of it were highest. All the subjective parameters of LDCT-HIR were significantly lower than SDCT and LDCT-AIIR. The Overall image quality of LDCT-AIIR was 4.07 ± 0.55 , which was adequate for diagnosis. While the Overall image quality of LDCT-HIR was 1.97 ± 0.51 , which was can't be used for clinical diagnosis.

Conclusion LDCT-AIIR had approximately 90 % dose reduction compared with SDCT while maintaining image quality on chest CT of infants.

PO-2473

Altered White Matter Integrity and Gray Matter Morphology in pediatric acute lymphoblastic leukemia without clinically diagnosed central nervous system infiltration

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Purpose: Dysfunction of the glymphatic system is present in pediatric acute lymphoblastic leukemia (ALL) without clinically diagnosed central nervous system (CNS) infiltration; however, brain structure alterations in such cases are still unclear. We aim to explore white matter (WM) and grey matter (GM) alterations using surface-based morphometry (SBM) and tract-based spatial statistics (TBSS) methods in pediatric ALL without CNS infiltration.

Methods: Thirty-five ALL and 33 typically developing (TD) children were prospectively recruited. They underwent three-dimensional T1-weighted and diffusion tensor (DTI) imaging. DTI metrics were compared between groups differences. Additionally, analyses of cortical GM features were conducted to determine group differences in cortical surface area (CSA), thickness (CT), and volume (CV), as well as deep GM nuclei volume using T1-weighted imaging.

Results: In pediatric ALL, the only identified WM change was an increased FA in the body of corpus callosum (P_{FWE-corrected} = 0.023) and left superior coronal radiata (P_{FWE-corrected} = 0.045). Relative to TDs, pediatric ALL presented a significant decrease in CSA, CT, and CV in orbital gyri, supramarginal gyrus, middle temporal gyrus, and superior temporal gyrus (all CWP = 0.01). Additionally, increased CT and CSA were found in lingual gyrus and left sulcus intermedius primus, respectively (all CWP = 0.01). Smaller volumes in pediatric ALL were observed in bilateral thalamus, caudate, hippocampus, and right putamen (P_{FDR-corrected} < 0.05).

Conclusions: Widespread brain structural abnormalities were found in pediatric ALL without clinically diagnosed CNS infiltration, which might provide novel insight into the pathophysiology of pediatric ALL, treatment, brain development, and long-term outcomes.

PO-2474

Relative mediastinal displacement index: A stable indicator to predict adverse events for fetuses with isolated left congenital diaphragmatic hernia by prenatal MRI

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Objective To quantify the extent of mediastinal displacement in fetus with isolated left congenital diaphragmatic hernia (iLCDH) with the new MRI parameter which is defined as relative mediastinal displacement index (RMDI) and to verify its efficacy in predicting adverse events including in-hospital deaths or the use of extracorporeal membrane oxygenation (ECMO). And to investigate the gestational age (GA) related stability of RMDI.

Methods A retrospective analysis was performed on 139 fetuses with prenatally diagnosed iLCDH (24 with adverse events and 115 without) and 36 controls without chest lesions and chromosomal anomalies. RMDI was measured on T2WI-TRUFI or T2WI-SSFSE axial images. The calculation formula of RMDI is $(DL + DR) / DH$. For all fetuses, the RMDI was determined by two operators and inter-operator variability. And the GA-related changes were investigated in both groups. The efficacy of RMDI predicting postnatal survival was compared with observed/expected total fetal lung volume (o/e TFLV) and mediastinal shift angle (MSA).

Results In the iLCDH and control groups, RMDI did not change with GA ($P > 0.05$). There were significant differences in RMDI values not only between the iLCDH group [0.890 (0.650, 1.000)] and the control group [-0.245 (-0.357, -0.170)] ($Z = -9.209$, $P < 0.001$), but also between with [1.23 (1.15, 1.47)] and without [0.82 (0.59, 1.00)] adverse events in the iLCDH group ($P < 0.001$). The best cut-off value of RMDI was 1.105 (sensitivity = 83.3%; specificity = 93.04%). Meanwhile, there was a significant difference in diagnostic accuracy between RMDI [AUC = 0.900 (95% CI 0.837-0.944)] and MSA [AUC = 0.820 (95% CI 0.746-0.880)] ($P = 0.041$), and between RMDI and o/e TFLV [AUC = 0.728 (95% CI 0.647-0.800)] ($P = 0.003$).

Conclusion RMDI is expected to be a stable, simple and accurate tool for predicting adverse events including in-hospital deaths or the use of ECMO in fetuses with iLCDH. The test performance of RMDI is better than o/e TFLV and MSA.

PO-2475

Dose optimization for pediatric on Emergency head CT : from age-specific to size-specific study

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Purpose

To investigate the possibility of replacing the conventional age-specific with a size-specific one for pediatric patients on Emergency head CT.

Methods and Materials

Firstly, a retrospective analysis was performed to confirm the appropriateness of the age-specific scanning protocol in head CT for pediatric patients. Fifty-five 5-year-old pediatric patients who underwent head CT with the same acquiring parameters (100kVp, 250mAs) were included, and the results showed that there were significant differences in image quality among pediatric patients

with different head diameters, which were defined as the distance between temples. Secondly, the prospective research was conducted to explore the feasibility of replacing the age-specific head CT protocol with a size-specific scanning protocol for pediatric patients based on head diameters. One hundred and ninety-one pediatric patients were enrolled and assigned to groups A (150-160 mm) and B (160-170 mm) according to their head diameters. In group A, six subgroups were divided, where the tube current was adjusted from 250mAs (reference) to 190mAs, one set every 10mAs. The noise, contrast-to-noise ratio (CNR), signal-to-noise ratio (SNR), and subjective score were compared. The image quality was evaluated subjectively by using the five-point Likert scale (5: excellent, 1: poor), which was compared using the independent T-test.

ResultsIn the prospective study, the noise on images with 190mAs in group A was significantly higher than that on images with 250mAs ($p<0.001$). The SNR, CNR, and subjective scores on images with 190mAs in group A were significantly lower than those on images with 250mAs ($p<0.001$). In addition, the objective and subjective scores with 200mAs were comparable to those with 250mAs ($p>0.05$). The results proved that 200 mAs was the lowest available tube current for pediatric patients with a head diameter of 150-160mm, and the corresponding lowest CT dose index-volume (CTDIvol) was 21.05 mGy. Similarly, the lowest tube current and CTDIvol required for pediatric patients in Group B were 210mAs and 22.07mGy, respectively.

ConclusionReplacing the age-specific head CT with the size-specific head CT for pediatric patients is possible.

It is more scientific to select the appropriate scanning parameters and radiation dose based on the differences of head diameters.

Clinical Application

The size-specific head CT could reduce the radiation dose for emergency pediatric patients reasonably when maintaining the image quality, which might improve the patient care.

PO-2476

Structural or/and functional MRI-based machine learning for the diagnosis of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis

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Background: Attention-deficit/hyperactivity disorder (ADHD) is one of the common neuro-developmental diseases among children, and its diagnosis is mainly depend on behavior analysis, which is subjective and inconsistent. Therefore, the diagnosis of ADHD requires objective and quantizable evidence. With the development of artificial intelligence (AI) in the field of medicine, Machine learning (ML) techniques based on structural magnetic resonance imaging (sMRI) or/and functional MRI (fMRI) have shown powerful capabilities in neuroimaging processing, and provided a new opportunity for the objective diagnosis of ADHD. However, the results of these studies varied widely and were difficult to directly compare, mainly due to diverse ML methods, especially in terms of feature selection and classifier selection. Therefore, the diagnostic value of ML techniques based on sMRI or/and fMRI for ADHD remains elusive. The aim of this study was to investigate the diagnostic value of ML techniques based on sMRI or/and fMRI for ADHD through a meta-analysis of the existing studies.

Method: We conducted a comprehensive search (from database creation date to March 2023) for relevant English articles on sMRI or/and fMRI-based ML techniques for diagnosing ADHD. The pooled sensitivity, specificity, positive likelihood ratio (LR+), negative likelihood ratio (LR-), summary receiver operating characteristic (SROC) curve and area under the curve (AUC) were calculated to assess the diagnostic value of sMRI or/and fMRI-based ML techniques. The I² test was used to assess heterogeneity and the source of heterogeneity was investigated by performing

a meta-regression analysis. Publication bias was assessed using the Deeks funnel plot asymmetry test.

Results: Forty-one studies were included in the systematic review, 26 of which were included in our meta-analysis. The pooled sensitivity and specificity of sMRI or/and fMRI-based ML techniques for the diagnosis of ADHD were 0.74 (95% CI 0.66-0.81) and 0.75 (95% CI 0.67–0.82), respectively. SROC curve showed that AUC was 0.81. Based on these findings, the sMRI or/and fMRI-based ML techniques have relatively good diagnostic value for ADHD. The sMRI or/and fMRI-based ML techniques have a moderate positive likelihood ratio (3.0) and a relatively low negative likelihood ratio (0.34), indicating that sMRI or/and fMRI-based ML techniques had good ability to confirm or exclude ADHD. Deeks' funnel plots for included studies showed unpublished bias ($P > 0.05$). However, substantial heterogeneity was detected among the studies ($I^2=98.11\%$, 95% CI 97.78-98.44). We performed subgroup analyses and meta-regression analysis to identify the source of heterogeneity. The meta-regression analysis showed that the feature (functional connectivity (FC) vs. non-FC), imaging modality (sMRI and fMRI vs. sMRI or fMRI) and classifier (support vector machines (SVM) vs. non-SVM) were the source of heterogeneity for these studies. And the subgroup analysis results showed that: 1) there was no statistical difference in the diagnosis of ADHD between the study group that selected only morphological features and the study group that selected only functional features; 2) The sensitivity and specificity of the study group selecting combination of morphological and functional features were slightly higher than those of the study group that only selective morphological or functional features; 3) The sensitivity and specificity of the study group selecting FC feature were slightly higher than those of the study group that did not selective FC feature, suggesting that FC feature should be an important discriminative feature for the diagnosis of ADHD; 4) the sensitivity and specificity of the study group selecting SVM classifier were higher than those of the study group that did not selective SVM classifier, suggesting that the advantage of SVM as a machine learning technology classifier for ADHD diagnosis.

Conclusions: This paper reviewed the research progress of sMRI or/and fMRI-based ML techniques in the diagnosis of ADHD, and explore the diagnostic accuracy of sMRI or/and fMRI-based ML techniques for ADHD through a meta-analysis of the existing studies. Despite automatic ADHD diagnostic ML techniques based on MRI/fMRI data is a challenging task, Our meta-analysis showed revealed the potential of sMRI and fMRI-based machine learning techniques for the diagnosis of ADHD through systematic review and meta-analysis. we hope that the results of the above meta-analysis could promote further development in this field.

PO-2477

White Matter Integrity Abnormalities in children with Global Developmental Delays: A DKI Study Utilizing Tract-Based Spatial Statistics and ROI-Based Analysis

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Abstract: Objective This study aimed to assess white matter integrity in children with global developmental delay (GDD) using diffusion kurtosis imaging (DKI) and its derived white matter tract integrity (WMTI) metrics, and to investigate the relationship between diffusion parameters and development quotient (DQ). Methods We enrolled 34 children with GDD and 44 healthy controls in this study and acquired MRI images. Diffusion parameters, including fractional anisotropy (FA), mean diffusivity (MD), axonal diffusivity (AD), radial diffusivity (RD), anisotropy (MO), mean kurtosis (MK), axial kurtosis (AK), kurtosis fractional anisotropy (FAK), radial kurtosis (RK), and WMTI parameters, such as the axial diffusivity of the extra-axonal space (EAS_AD), the radial diffusivity of the extra-axonal space (EAS_RD), the diffusivity of the intra-axonal space (IAS_DA), the axonal water fraction (AWF), and the tortuosity of the extra-axonal space (EAS_TORT), were obtained by Pydesigner and FSL procedure. We used tract-based spatial statistics analysis to compare the

diffusion parameters of the whole brain and covariance analysis to compare the diffusion parameters in the corpus callosum's genu, body, and splenium. Lastly, we used partial correlation analysis to assess the correlation between diffusion parameters and DQ. Results The results of TBSS showed that FA, AD, MO, MK, RK, and EAS_TORT were significantly reduced ($P<0.05$), while RD, AK, KFA, AWF, EAS_AD, and EAS_RD significantly increased in children with GDD compared to healthy controls ($P<0.05$). In the corpus callosum, FA, MO, IAS_DA, and EAS_TORT were significantly reduced ($P<0.05$), while AK, KFA, and AWF were significantly increased ($P<0.05$). In the correlation analysis, fine motor skills DQ was negatively correlated with AK and AWF ($P<0.05$) and positively correlated with MO ($P<0.05$). Additionally, Adaptability DQ was negatively correlated with AWF ($P<0.05$). Conclusion DKI and its derived WMTI parameters can be used to characterize the white matter integrity of children with GDD and have a certain correlation with the DQ, which can aid in understanding the specific pathological changes inside and outside axons and assist in clinical diagnosis.

PO-2478

Microstructural alterations of the corpus callosum in young-age autism spectrum disorder: a diffusion kurtosis imaging study

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Abstract

Objective The objective of this study was to analyze the changes in the microstructure of the corpus callosum in preschool children with autism spectrum disorder (ASD) and to determine the diagnostic value of diffusion kurtosis imaging and its derived White Matter Tract Integrity (WMTI) index. **Methods** Fifty-eight children with ASD and 43 healthy control (HC) children were acquired DKI images, and DKI parameters and WMTI parameters were calculated. The differences between the groups of these diffusion parameters were compared, and Logistic Regression (LR) and Linear Discriminant Analysis (LDA) models were constructed to evaluate the ability of each diffusion parameter to distinguish between ASD and HC. **Results** The results showed that children with ASD had a significant increase in the AD of the corpus callosum's three subregions, as well as a significant increase in the MD of the body and splenium. There was no substantial difference in FA and RD compared to the HC group. In the DKI index, the three subregions of the corpus callosum in children with ASD showed a significant increase in MK, AK, and KFA. The WMTI parameters indicated that AWF was considerably increased in all three subregions of the corpus callosum, and EAS_AD had a significant increase in the genu of the corpus callosum compared to the HC group. Children with ASD also exhibited a significant increase in EAS_TORT and a significant decrease in EAS_RD in the body of the corpus callosum. Furthermore, the DKI and its derived WMTI parameters proved highly effective in diagnosing ASD, with the LR-Bootstrap model constructed from AWF parameters demonstrating the highest AUC value and accuracy. **Conclusion** In conclusion, this study suggests that DKI and its derived WMTI parameters can effectively evaluate the abnormalities of callosum microstructure in children with ASD. MK and AWF parameters have high diagnostic value and could prove useful in the diagnosis and treatment of ASD.

PO-2479

Cortical gray-white matter contrast abnormalities in male children with attention deficit hyperactivity disorder

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Purpose: Presently, research concerning alterations in brain structure among individuals with attention deficit hyperactivity disorder (ADHD) predominantly focuses on entire brain volume and cortical thickness, either globally or within specific brain regions. In this study, we extend our examination to the cortical microstructure of male children with ADHD. To achieve this, we employ the gray-white matter tissue contrast (GWC) metric, allowing for an assessment of modifications in gray matter density and white matter microstructure. Furthermore, we explore the potential connection between GWC value and the severity of disorder in male children affected by ADHD.

Methods: We acquired 3D-T1 sequences from the public ADHD-200 database. In this study, we conducted a comparative analysis between 43 male children diagnosed with ADHD and 50 age-matched male controls exhibiting typical development trajectories. Our investigation entailed assessing differences in GWC values and cortical thickness. Additionally, we explored the potential correlation between GWC values and the severity of ADHD. To delineate the cerebral landscape, each hemisphere was subdivided into 34 cortical regions using freesurfer 7.2.0. For quantification, GWC values and cortical thickness were computed by evaluating the intensity contrast of non-normalized T1 images above and below the gray-white matter interface.

Results: Our findings unveiled elevated GWC values within the bilateral parahippocampal, bilateral insular, and left transversetemporal regions in male children with ADHD when contrasted with their healthy counterparts. Moreover, compared to the healthy control group, ADHD-afflicted children exhibited increased cortical thickness in the bilateral superiorparietal, left superiortemporal, left transversetemporal, and right cuneus areas. Intriguingly, the GWC value of left transversetemporal demonstrated a negative correlation with the extent of inattention experienced by male children with ADHD.

Conclusion: Utilizing GWC as a metric facilitates a more comprehensive assessment of microstructural brain changes in children with ADHD. The fluctuations in GWC values observed in specific brain regions might serve as a neural biomarker, illuminating structural modifications in male children grappling with ADHD. This perspective enriches our comprehension of white matter microstructure and cortical density in these children. Notably, the inverse correlation between the GWC value of the left transversetemporal and inattention severity underscores the potential role of structural and functional anomalies within this region in ADHD progression. Enhancing our insight into ADHD-related brain changes holds significant promise in deciphering potential neuropathological mechanisms. Such understanding is pivotal for robust disease evaluation, facilitating early diagnoses, timely intervention, and prognosis estimation in affected children.

PO-2480

Performance Evaluation of Deep Learning-based Bolus-tracking Technology For pediatric abdominal enhanced CT

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Purpose: The process of bolus-tracking scans before CT angiography usually include monitoring location selection and region-of-interest (ROI) placement to generate a time-density curve (TDC) triggering the CT scan. In this study, we aimed to evaluate the performance of an artificial

intelligence-based algorithm, SmartPlan, for the bolus-tracking process in pediatric abdominal enhanced CT examination.

Methods: 226 pediatric abdominal enhanced CT data were prospectively collected. The monitoring locations for placing ROI by experienced technicians for dynamic contrast-enhancement monitoring in bolus-tracking scans and TDC generated in the ROIs were recorded as the control group; The scout scans and time-resolved images were then imported into the SmartPlan software to automatically determine the monitoring location for placing ROI and to generate TDC, and the results were recorded as the experimental group. There are two steps during the SmartPlan process, monitoring section selection and ROI selection. For the monitoring section selection step, we calculated the accuracy of section selection and defined SmartPlan as accurate if the distance between the section selected by SmartPlan and the section selected by technicians was less than 1cm. For the ROI selection, we calculated the passing ratio of SmartPlan and defined the passing criteria as ROIs were located inner the aortas.

Results: For the monitoring section selection and ROI selection process in SmartPlan, the accuracy of monitoring section selection was 97.35% with a 95% Confidence Interval [95.24%, 99.44%], and the passing ratio of monitoring ROI selection was 0.962 with 95% Confidence Interval [0.919, 1]. There was no difference in the peak value of TDC curves between the experimental and control groups (all $P > 0.05$). Time-consuming was found significantly decreased by 18.18 ± 1.17 seconds in the experimental group compared with that in the control group ($P < 0.05$).

Conclusions: The AI-based automatic bolus-tracking technique can efficiently provide good performance on bolus-tracking accuracy of pediatric abdominal enhanced CT with experienced technicians.

Clinical Relevance: The AI-based automatic bolus-tracking technique could simplify the CT scan process of pediatric abdominal enhanced CT by fast and acutely automatically triggering CT scans.

PO-2481

The Optimal Level of Adaptive Statistical Iterative Reconstruction Veo Algorithm for Improvement of the Pediatric Superior Mesenteric Artery Image Quality in the Era of Dual-Energy Spectral CT

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Objective: To investigate the effect of the optimal level of adaptive statistical iterative reconstruction Veo (ASiR-V) on improving the superior mesenteric artery (SMA) image quality in pediatric abdominal enhanced spectral CT scanning.

Materials and Methods: Thirty pediatric patients who underwent upper abdominal enhanced gemstone spectral CT angiographic scans were retrospectively involved in this study. 120kVp-like images with 11 ASiR-V levels (from 0% to 100% at 10% increments) of the arterial phase were evaluated. Quantitative analysis included measurement of the CT value, image noises (IN), background CT value and noises, contrast-to-noise ratio (CNR), signal-to-noise ratio (SNR), and image scores of the vessels and surrounding tissues. Two senior radiologists assessed qualitative analysis using a 5-point Likert scale independently. The quantitative and qualitative data were compared with the linearly blended data set using McNemar's and Mann-Whitney U tests, respectively. The interobserver agreement for quantitative data was plotted using Bland Altman plots, and qualitative data were evaluated using weighted kappa statistics.

Results: CT value of the SMA and surrounding tissues showed no statistical difference among 120kVp-like images with 11 ASiR-V levels (all $P > 0.05$), while there were significant differences in image noise, SNR and CNR among images with 11 ASiR-V levels (all $P < 0.05$). Specifically, image noise gradually decreased, and SNR and CNR increased with the increase of ASiR-V level.

However, the qualitative assessment showed that 120 kVp-like images with 50% ASiR-V achieved the highest scores.

Conclusion: 120kVp-like imaging combined with 50% iterative reconstruction can significantly improve the image quality of the superior mesenteric artery of children.

Clinical Relevance: Lately, spectral CT is finding increasing applications in evaluating abdominal pathologies. We revealed that 120kVp-like imaging combined with 50% ASiR-V could improve the image quality of the superior mesenteric artery (SMA) in pediatric abdominal enhanced spectral CT scanning.

PO-2482

A comprehensive segmentation of chest X-ray improves deep learning-based WHO radiologically confirmed pneumonia diagnosis in children

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Objectives: To investigate a comprehensive segmentation of chest X-ray (CXR) in promoting deep learning-based World Health Organization (WHO)'s radiologically confirmed pneumonia diagnosis in children.

Methods: A total of 4400 participants were identified and divided into primary endpoint pneumonia (PEP), other infiltrates and normal groups according to WHO's diagnostic criteria. In the comprehensive segmentation stage, the CXR was divided into six segments of left lung, right lung, mediastinum, diaphragm, ext-left lung and ext-right lung by adopting the RA-UNet. In the pneumonia diagnosis stage, seven feature combinations between the six segments were devised, and fed into the CBAM-ResNet for the three-category classification. Besides, the interpretability of the CBAM-ResNet for pneumonia diagnosis was also performed by adopting a Grad-CAM module.

Results: The RA-UNet achieved a high spatial overlap between manual and automatic segmentation (averaged DSC=0.9639). The CBAM-ResNet when fed with the six segments achieved superior three-category diagnosis performance (Accuracy=0.8243) over other feature combinations such as solely left and right lungs and other deep learning models under comparison, which was increased by around 6% in accuracy, precision, specificity, recall, F1-score, and around 3% in AUC. The Grad-CAM could also capture the pneumonia lesions more accurately, generating a more interpretable visualization results and enhancing the superiority and reliability of our study in assisting pediatric pneumonia diagnosis.

Conclusions: This study demonstrated that the comprehensive segmentation of CXR could improve deep learning-based pneumonia diagnosis in childhood with a more reasonable WHO's radiological standardized classification of pneumonia instead of conventional dichotomous bacterial pneumonia and viral pneumonia.

PO-2483

Exploring the clinical value in dual energy spectral imaging multi-material artifact reduction (MMAR) technique for metal foreign bodies in the stomach of children

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ObjectiveTo assess the clinical value of spectral CT Multi-Material Artifact Reduction (MMAR) by comparing the artifact index in the scanning of metal foreign bodies in the intestinal canal of children.

Methods24 children (aged 1-10 years) who ingested metallic foreign bodies in the digestive tract and underwent spectral CT examination were retrospectively selected. The noise (standard deviations, SD) and contrast-to-noise ratio (CNR) were calculated on MAR images and non-images. artifact index (AI) was used to evaluate the image quality of the two groups of images subjectively by two doctors with many years of experience.

ResultsThe CNR of MAR group images was significantly higher than that of non-MAR group, and the SD value and AI value of MAR group images were significantly lower than those of non-MAR group (all $P < 0.05$) in the affected organs such as intestinal canal, liver, kidney as well as vertebral bodies. The subjective score of image quality in MAR group was higher than that in non-MAR group, and the difference was statistically significant.

ConclusionMMAR can significantly reduce the artifacts of metallic foreign bodies in the digestive tract and improve the image quality.

PO-2484

Prediction of drug treatment response in children under 3 years old with asthma by using the morphological structure of large airways

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Background: Pediatric asthma usually begins before the age of three. Without objective and quantitative indices, its early diagnosis and severity assessment always remains a challenge. Studies have shown that changes of large airway structures in asthmatic adults may represent the early stage of asthma.

Purpose: To investigate the morphological characteristics of large airways in children with asthma and explore the potential image markers for predicting asthma severity.

Material and Methods: In this study, we retrospectively analyzed low-dose computed tomography (CT) data, exploring whether the morphological characteristics of large airways could predict the drug treatment response in children with asthma under 3 years of age by using a machine learning method.

Results: Two hundred and forty-four children with asthma were diagnosed as having moderate ($n = 164$) and severe ($n = 80$) asthma by observing their drug treatment responses. For the between-group comparison, the airway in patients with severe asthma exhibited more uneven wall thickness and higher degree of ellipticity, suggesting subtle changes of the morphological structure of large airways in children with severe asthma. Furthermore, using these airway morphological measurements, moderate and severe cases were correctly classified with an area under the receiver operating characteristic curve (AUC) of 0.83 and an accuracy of 0.79.

Conclusion: Our findings can provide information as to the understanding of asthma pathogenesis, the predicted progression of the disease, and an effective therapeutic window for the early clinical stages of asthma

PO-2485

Altered neurovascular coupling in children with refractory temporal lobe epilepsy

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Introduction: Pediatric epilepsy patients account for approximately 10.5 million cases, and the frequent seizures often affect the growth and development of these children^{1,2}. Early diagnosis are critical to improve the prognosis of children with epilepsy. Temporal lobe epilepsy (TLE) is one of the most common types of medically refractory epilepsy, which lack of objective biomarkers to make diagnosis. Basic research has confirmed that recurrent epileptic seizures can lead to neurovascular coupling (NVC) alteration, which may be a potential objective biomarker for TLE³⁻⁶. However, specific neuroimaging evidence of NVC alterations in children with refractory left TLE are still lacking. Thus, this study aimed to evaluate the NVC alteration and its clinical significance in childhood refractory left TLE combining resting-state functional magnetic resonance imaging (rs-fMRI) and arterial spin labeling (ASL) and provide a new perspective to understand the neuropathological mechanisms of this disease.

Methods: The study finally included 59 right-handed subjects (24 children with refractory left TLE and 35 healthy controls [HCs]). The inclusion criteria for the case group were as follows: (1) clinically diagnosed refractory TLE; (2) Conventional head MRI examination results were normal; and (3) age 6-16 years at the time of MRI scanning. The exclusion criteria were: (1) any other neurological disorders and/or history of malignant tumors or head trauma; (2) image artifacts affecting the image analysis; (3) history of substance abuse; and (4) head motion with maximum displacement >3 mm or >3° rotation noted during rs-fMRI data preprocessing. All participants underwent MRI scans using a 3.0-T magnetic resonance scanner (GE Discovery MR750w, Chicago, IL, USA). The functional images were acquired using a gradient-echo echo-planar imaging sequence (TR: 2000 ms; TE: 30 ms; voxel size: 3.75 mm × 3.75 mm × 4 mm; FOV: 240 mm × 240 mm; slice number: 35; slice thickness: 4 mm; flip angle: 90°). The perfusion images were obtained with a pseudo-continuous ASL sequence (TR: 4854 ms; TE: 10.7 ms; slice number: 36; FOV: 240 mm × 240 mm; slice thickness: 4 mm; flip angle: 90°). Degree centrality (DC) and cerebral blood flow (CBF) were calculated based on the rs-fMRI and ASL. For each participant, across-voxel correlation analyses were performed between DC and CBF in the whole gray matter (GM) to quantitatively evaluate the global NVC. For all voxels, we calculated the CBF/DC ratio using the original values of CBF and DC, without z-transformations, to represent the regional NVC. The intergroup differences in CBF, DC, and CBF/DC ratio maps were analyzed using a voxel-wise two-sample t-test, adjusting for the covariates of age, sex, and years of education. For the resulting CBF, DC, and CBF/DC ratio maps, the Gaussian random field (GRF) method ($P < 0.05$) was selected to correct for multiple comparisons. The mean value of each cluster with significant between-group differences in CBF, DC, and CBF/DC ratio was extracted and correlated with the clinical variables using Pearson correlation.

Results: All subjects exhibited significant across-voxel spatial correlations between CBF and DC. the CBF-DC coupling within the GM mask was significantly higher in the refractory left TLE group than in the HC group ($P < 0.05$, Mann-Whitney U-test). The refractory left TLE group showed significantly higher CBF/DC ratio in the left superior frontal gyrus and superior parietal gyrus, with significantly lower CBF/DC ratio in the left posterior cingulate cortex/precuneus and inferior temporal gyrus compared to the HC group (GRF corrected: $P < 0.05$). The refractory left TLE group also showed a significantly lower CBF than the HC group in the right superior temporal gyrus, right

medial frontal gyrus, right supramarginal gyrus, right caudate lobe, and left posterior cingulate cortex/precuneus, and a higher CBF in the right middle temporal gyrus, right angular gyrus, left superior frontal gyrus and left precentral gyrus (GRF corrected: $P < 0.05$). The refractory left TLE group exhibited a lower DC in the right and left postcentral gyrus compared to the HC group, though the brain region of higher DC was not reported (GRF corrected: $P < 0.05$). The results showed a significant positive correlation between the decreased CBF in the left posterior cingulate cortex/precuneus and the lower verbal comprehension scores ($r = 0.523$, $p = 0.009$), perceptual reasoning scores ($r = 0.525$, $p = 0.008$), working memory scores ($r = 0.555$, $p = 0.005$), full-scale intelligence quotient scores ($r = 0.612$, $p = 0.001$); and the decreased DC in right postcentral gyrus were positively correlated with lower verbal comprehension scores ($r = 0.439$, $p = 0.032$), perceptual reasoning scores ($r = 0.427$, $p = 0.037$), and full-scale intelligence quotient scores ($r = 0.482$, $p = 0.017$).

Conclusion: Children with refractory left TLE present increased global CBF-DC coupling, and regional disrupted CBF-DC coupling in several brain regions, indicating neurovascular decoupling. Furthermore, the abnormal decreased CBF and DC are associated with executive and cognitive dysfunction. These findings provide new neuroimaging evidence of neurovascular decoupling in children with refractory left TLE and may be helpful for a deeper understanding of the potential neuropathological mechanisms in seizure generation, providing new biomarkers of cognitive performance in childhood refractory left TLE.

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PO-2486

The integrity of cerebral white matter fiber tracts in children with global developmental delay assessed by diffusion kurtosis imaging: a tract-based spatial statistics study

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Objective

The aim of this study was to assess abnormalities in the white matter microstructure of the whole brain in children with global developmental delay (GDD) using diffusion kurtosis imaging (DKI).

Materials and Methods

The present study included 27 children with GDD and 32 healthy controls (HCs). All of the above children were scanned for DKI sequences. The Chinese version of the Gesell Developmental Schedules (GDS) was used to assess the development of all children with GDD comprehensively. An automated processing pipeline was applied to the DKI data to obtain derived metrics of diffusion

tensor (DT), kurtosis tensor (KT), and white matter tract integrity (WMTI). Tract-based spatial statistics (TBSS) analysis was performed to investigate the differences in all derived metrics of whole-brain white matter fiber tracts between the GDD group and HCs. And correlations were analyzed between the parametric values of the fiber tracts with significant differences and correlated them with the GDS.

Results

TBSS analysis showed abnormalities of DT, KT, and WMTI parametric maps in extensive cerebral white matter tracts in the GDD group compared to HCs. These white matter regions mainly included corpus callosum(CC), retrolenticular part of internal capsule(RPIC), corona radiata(CR), fornix, superior longitudinal fasciculus(SLF), inferior fronto-occipital fasciculus(IFO) and uncinate fasciculus(UF). Significant correlations between mean kurtosis(right superior corona radiata) and radial diffusivity of extra-axonal space (right RPIC) and the adaptive development subscale were found in children with GDD.

Conclusions

White matter fiber integrity is generally reduced in children with GDD, and the ability of DKI to capture these changes is important in exploring the underlying pathological mechanisms of GDD.

PO-2487

Does premotor connectivity reflect stereotyped behavior in ASD children Evidence from resting fMRI study

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Objective Stereotyped behavior relates to one of the most typical characteristics in children with autism spectrum disorders (ASD), however, the neurobiological mechanism is still unclear. In this study, we examined the resting state functional connectivity of premotor area in order to determine whether alterations can be found to distinguish ASD from healthy controls, and correlated the behavior variables with connectivity.

Methods 39 children with ASD and 42 age, sex, and IQ-matched healthy children were recruited. All the 81 subjects performed scaling with behavior scale index and underwent resting-state fMRI scans. After the fMRI data preprocessing, the left and right side premotor were selected as ROI seeds to perform functional connectivity. Results Compared with healthy controls, children with ASD showed significant increased connectivity between the left premotor area and the posterior cingulate cortex, as well as decreased functional connectivity between the left premotor area and the left insula. In addition, a negative linear correlation exists between the connectivity of the left premotor and the insula and the behavioral scores. Conclusion Imbalanced premotor functional connectivity may be one possible mechanism of stereotyped behavior in ASD, representing an attention deficit and/or impaired sensory preception to the external salient stimuli.

PO-2488

Neurovascular coupling analysis in children with periventricular leukomalacia with cerebral palsy

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Purpose To combine resting-state functional magnetic resonance imaging (rs-fMRI) and arterial spin labeling (ASL) for detection neuralvascular coupling changes in Children with periventricular leukomalacia (PVL) with cerebral palsy (CP).

Materials and Methods This study included 10 children with PVL with CP (mean age 4.76 ± 5.19 years) and 16 gender and age-matched healthy control group (mean age 4.69 ± 2.43 years). The children with CP were diagnosed by two pediatric neurologists. In this study, 3D T1WI, 3D T2WI, rs-fMRI, and 3D-ASL were performed in a 1.5T scanner (Siemens magnetom aera) with 20-channel head coil. Scanning sequence: 3D T1 (TR2200ms / TE 3.06ms, thickness 1.0mm, interlayer spacing 0mm), 3D T2 (TR 1200ms / TE 96ms; thickness 1.0mm, interlayer spacing 0mm). The rs-fMRI parameters: TR 2000ms/TE 25ms, FLIP 90°, FOV 192mm, Voxel Size: 3x3x3mm, 36 Slices, thickness 3mm, Bandwidth 2298Hz, 200 Volume. 3D-pASL parameters: TR 4600ms/TE 16ms, Flip 180°, Label-time 700ms, PLD = 1200 ms, FOV 230mm, Voxel size: 1.8x1.8x3mm, thickness 3mm, bandwidth 2894Hz. Cerebral blood flow (CBF) and functional connectivity (FC) were calculated after data processing at Matlab. For pearson correlation analysis of FC-CBF based on whole brain voxel level, we calculated the group difference of FC-CBF correlation coefficient between CP and normal group. Neurovascular coupling level was assessed in children with CP based on group differences in CBF/FC ratio between the two groups. P values <0.05 were considered to be statistically significant differences.

Results Neurovascular injury analysis based on fMRI and ASL showed that PVL children with CP had lower FC in occip-parietal and frontal-striatal network compared with normal control group (Figure 1a) and increased CBF values in bilateral frontal-parietal and striatal regions (Figure 1b). Neurovascular coupling analysis of FC-CBF found increased frontal-striatal network and cerebellar CBF/FC ratio in PVL children with CP, reflecting neurovascular injury and decoupling (Figure 2 a-b). Neurovascular coupling analysis based on whole brain voxel level showed that the FC-CBF coupling degree in CP was $r=0.15$ ($p < 0.001$) (Figure 3a), while the FC-CBF coupling degree in normal children was $r=0.35$ ($p < 0.001$) (Figure 3b).

Conclusions Neurovascular coupling degree in PVL children with CP was reduced, especially the frontal-striatal network and cerebellar CBF/FC ratio increases, suggesting neurovascular damage and decoupling. This study provides a new understanding of the pathophysiological mechanism in children with CP, and provides specific imaging markers for the early diagnosis of PVL with CP.

Clinical Relevance Children with PVL with CP have neurovascular damage and decoupling. Multimodal MRI is helpful to explore the pathophysiological mechanism, identify specific imaging markers, and provide a new pathway for early diagnosis of PVL with CP.

PO-2489

Sex Differences in Normal Fetal Regional Brain Apparent Diffusion Coefficient Changes Assessed by Utero-DWI

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BACKGROUND: There are differences between male and female fetal brains in their vulnerability to adverse intrauterine exposure, preterm birth, and associated perinatal brain injury.

PURPOSE: The main objective of this study was to detect any statistical difference in the change of apparent diffusion coefficient (ADC) in intracranial regions of male and female fetuses in the 2nd to 3rd trimester.

METHODS: DWI (diffusion-weighted imaging) was performed in 200 fetuses between 20 and 37 gestational ages (GA) with normal or questionably abnormal results on sonography followed by normal structural MRI. Pairwise ADC values of the regions of interest (ROIs) were manually delineated in each side of the cerebral white matter (frontal, parietal, occipital, temporal WM), basal ganglia (BG), thalamus (THA), and cerebellar hemisphere (CBM), as well as a single measurement in the pons. The changes in those values were studied over the gestational range, along with potential gender differences and asymmetries of the cerebral hemispheres.

RESULTS: From the 2nd to 3rd trimester, the areas with the strongest negative and linear change of decrease were CBM, pons, and THA in both male and female fetuses. During the 3rd trimester, ADC values in temporal WM and CBM were significantly higher in male fetuses than that in females

($p < 0.05$). After correction for FDR (False Discovery Rate), the difference in CBM was statistically significant. However, the ADC value of male fetuses in cerebral WM (except for frontal), BG, THA, CBM, and pons decreased at higher rates than that of female fetuses.

CONCLUSIONS: We have shown several differences in intracranial regional ADC changes between male and female fetuses using utero-DWI during the 2nd to 3rd trimester.

PO-2490

A simple and reliable quantitative diagnosis model of idiopathic central precocious puberty in girls based on fisher stepwise discriminant analysis

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Background: Idiopathic central precocious puberty (ICPP) is defined as the premature activation of the hypothalamic-pituitary-gonadal (HPG) axis with clinical pubertal symptoms among girls under 8 years old and boys under 9 years of age in the absence of obvious etiology and organic disease. In recent years, due to the improvement of living conditions and changes in the social environment, the incidence of precocious puberty in children has been increasing year by year. The prevalence of precocious puberty in girls is 5-10 times that of boys, of which more than 90% are idiopathic. The ICPP can affect future height and even cause social psychological disturbances. More importantly, girls with ICPP have an increased risk of breast or cervical cancer. Therefore, early diagnosis and treatment are very important for girls with ICPP. In routine clinical diagnosis, it is difficult to distinguish ICPP from non-ICPP unless the gonadotropin-releasing hormone (GnRH) stimulation test is performed. However, the GnRH stimulation test is invasive, time-consuming, and expensive, with a large number of blood samples collected at different times. In addition, in nontertiary or community hospitals with limited resources, this cumbersome test is not always available. Therefore, the aim of this study was to develop a simple and reliable quantitative diagnostic model for ICPP in girls by using fisher stepwise discriminant analysis (FSDA) based on easily available data in the clinic.

Methods: A total of 254 female paediatric patients who had secondary sexual characteristics before 8 years old and had taken a GnRH stimulation test were randomly divided into a training group (203 patients, 80%) and a validation group (51 patients, 20%). The 203 patients in the training group were divided into two groups (ICPP ($n=115$) and non-ICPP ($n=88$)) according to the GnRH stimulation test results. Characteristic parameters were extracted from clinical data and imaging data and were statistically analysed. The stepwise discriminant method was used to select characteristic parameters. Based on these characteristic parameters, Fisher discriminant analysis was performed to establish a quantitative diagnostic model. The diagnostic ability of the model was verified by leave-one-out cross validation, test group and receiver operating characteristic (ROC) curve analysis. Decision curve analysis (DCA) was applied to assess the clinical utility of the model. **Results:** A total of four characteristic parameters, including basal follicle-stimulating hormone (FSH), uterine volume, bone age, and basal luteinizing hormone (LH) had significant discriminant values between the two groups. Using these characteristic parameters, the following diagnostic model was established: where X_1 , X_2 , X_3 and X_4 represent basal FSH ($1=<0.1$ IU/L; $2=\geq 0.1$ IU/L), basal LH ($1=<0.1$ IU/ml; $2=\geq 0.1$ IU/ml), uterine volume, bone age, respectively. The variable (X) is the characteristic parameter value that measured in the clinic is substituted into the model and calculating G values. The critical value of the discriminant function was $G_0 = -0.272$. By comparing the G and G_0 values, subjects were classified according to the following principles: if $G > G_0$, the subjects were assigned to the ICPP group; if $G < G_0$, the subjects were assigned to the non-ICPP group; if $G = G_0$, the subjects were assigned to either the ICPP group or the non-ICPP group. According to the leave-one-out cross validation, the accuracy of the model was 93.6%. When the test group data were substituted into the model formula, the results showed that the overall

accuracy of the model was 96.1% and the area under curve (AUC) of ROC was 0.95 (95%CI, 0.89-1.00). In addition, the clinical decision curve suggests that the model has a good clinical net benefit. Conclusion: We developed a quantitative diagnostic model for differentiating ICPP and non-ICPP by using FSDA based on easily accessed clinical and imaging data. This model has a high accuracy and is easy to be applied in clinic, especially in some non-tertiary or community hospitals where GnRH stimulation test is not available.

PO-2491

Deep learning based pediatric brain region segmentation and volumetric analysis in healthy children

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In order to provide quantitative reference basis for brain structural changes in children with neurological disorders, we applied deep learning technique to the brain region segmentation and volumetric analysis in healthy children. In this study, 312 healthy children aged 1.5 to 14.5 years (210 boys and 102 girls) were recruited and averagely divided into 5 age groups. High-resolution structural T1-weighted images were acquired for brain region segmentation using the platform Ull_mrbrain based deep learning technique. In each age group, volume of gray matter and white matter, thickness and surface area of cortex were calculated and compared between male and female children. The results showed that the gray matter and white matter of bilateral cerebral hemispheres volume and total brain volume of healthy children increased with age growth. Volumes of left and right hippocampus, amygdala and thalamus increased with age growth. Cortical thickness and surface area decreased with age growth. We provide quantitative reference basis for brain structural changes in children with neurological disorders.

PO-2492

Maturation and reorganization of structural connectivity in infants within half a year

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Purpose

Although brain networks have been extensively investigated, networks based on diffusion imaging are remain under-explored, particularly for infants in the early postnatal period, during which time axons undergo overproduction and elimination, complicated by increased axon diameter and myelination, which may cause alterations in topology of intercortical connections. However, the structural network refinement in early life is still under-researched.

Methods

Totally, 104 preterm infants with few complications aged 0 and 6 months were enrolled. The whole-brain tractography was performed for each participant using the second-order integration over the fiber orientation distribution method, which were then sifted to 1 million streamlines. The network density was set from 0.2 to 0.3 with an interval of 0.01, and then averaged the measures at all densities.

Results

The present study discovered that although the clustering coefficients of the entire brain tended to increase with age, while the degree of the temporo-parieto-occipital lobe gradually decreased, whereas the frontal lobes demonstrated the opposite. The hub edges between the hemispheres mainly connected the bilateral cingulate gyrus, cuneus and calcarine cortex, and the betweenness of the cuneus and calcarine cortex increases with age. Besides, the hub edges within the hemispheres were U-fibers, and their topology was gradually regular and symmetrical. Modularity in infants within half a year was found an age-related decline.

Conclusion

The present study discovered that the temporo-occipital lobe matures earlier in infancy in structural brain networks compared with the frontal lobe, manifesting as a decline in energy consumption along with a progressive increase in whole-brain information transfer efficiency. Besides, the visual cortex showed a rapid maturation within the first few months of life, which is sensitive to injury. Finally, the subcortical fibers are matured earlier than long fibers in infancy.

PO-2493

Contrast-Enhanced CT-Based Radiomics Facilitates Prediction of Synchronous Pulmonary Metastasis from Pediatric Hepatoblastoma

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Background: This study aimed to develop a combined model comprising contrast-enhanced CT-based radiomics signature and clinical factors for predicting synchronous pulmonary metastases in pediatric hepatoblastoma and to investigate its value in clinical context.

Methods: This was a retrospective study, approved by the Institutional Ethics Committee of Xinhua Hospital affiliated to Shanghai Jiao Tong University School, and informed consent was waived. Ninety pediatric patients with hepatoblastoma (median age, 17 months; age range, 2–122 months; 55 male) were included and randomly classified into training (n=64) and test cohort (n=26). Age, sex, initial AFP concentration, and histopathological results were collected. According to the 2017 PRETEXT system, two radiologists, blinded to the results for lung metastasis, assessed the PRETEXT stage (I–IV) and annotation factors in consensus. Another two radiologist, blinded to the PRETEXT results and annotations, reviewed lung metastasis on chest CT by consensus. The annotation factors included hepatic vein or inferior vena cava involvement (V), portal vein involvement (P), extrahepatic tumor extension (E), multifocality (F), tumor rupture (R), caudate lobe involvement (C), and lymph-node metastasis (N). Clinical factors (age, gender, alpha-fetoprotein concentration, PRETEXT stage and annotation factors) were recorded to build a clinical model. Portal venous phase images were used for tumor segmentation and radiomic features extraction. Feature selection was performed with max-relevance and min-redundancy and recursive feature elimination. Radiomics signature (Rad-score) was constructed using support vector machine. Multivariable logistic regression model was adopted to develop a combined radiomics-clinical model, the performance of which was evaluated with receiver operating characteristic (ROC) analysis and decision curve analysis (DCA).

Results: Pulmonary metastasis was confirmed with chest CT in 21 (23.3%) patients. There was no significant difference between the two cohorts in terms of age ($P = 0.862$), sex ($P = 0.958$), AFP concentration ($P = 0.264$), PRETEXT stage ($P = 0.946$), annotation factors (PVEFRCN, $P \geq 0.064$), or histological subtype ($P = 0.235$). In total, 1,192 radiomic features were extracted from segmented images. Rad-score was constructed with fifteen most relevant radiomics features. Area under the ROC curve (AUC) of Rad-score for predicting pulmonary metastases was 0.88 [95% confidence interval (CI), 0.78–0.98] in the training cohort and 0.86 (95% CI, 0.67–1.00) in the test cohort. The multivariable regression revealed that only multifocality (OR, 25.11; 95% CI, 3.19–313.03; $P =$

0.005) and Rad-score (OR, 0.002; 95% CI, 0.00–0.05; $P < 0.001$) were independent predicative factors. The combined model built with these two factors yielded an AUC of 0.93 (95%CI, 0.85–1.00) in the training cohort and 0.88 (95%CI, 0.73–1.00) in the test cohort, which were higher than 0.75 ($P=0.002$) and 0.67 ($P=0.060$) of clinical model respectively. The calibration curves of the combined model (Fig. 6A) in predicting pulmonary metastasis showed good agreement between the predicted and observed values in both the training ($P = 0.667$) and test cohorts ($P = 0.404$). DCA revealed that if the high-risk threshold was more than 0.22, using the combined radiomics-clinical model was more beneficial than using the radiomic signature or the clinical model.

Conclusions: The combined model incorporating radiomics signature and multifocality could be used as a valuable tool for predicating synchronous pulmonary metastases in pediatric hepatoblastoma.

PO-2494

Global Trends in Neonatal MRI Brain Neuroimaging Research over the Last Decade: Bibliometric Analysis

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Objectives: Conduct Bibliometrics and visualization analysis of the related researches in the field of neonatal magnetic resonance imaging (MRI) brain neuroimaging in the past ten years; summarize its research status, hotspots and frontier development trends.

Method: With Web of Science (WoS) core collection database as the literature source, retrieve the relevant papers and reviews in the field of neonatal MRI brain neuroimaging published in the Web of Science Core Collection (WoSCC) and SCI-Expanded Science Citation Index (SCI-Expanded) from 2013 to 2022. VOSviewer and CiteSpace are used to conduct bibliometric and visualization analysis of the annual publication volume, countries, institutions, journals, authors, co-cited literature and the overall distribution of keywords.

Result: We retrieved 3,568 papers and reviews published from 2013 to 2022. The number of publications increased during this period. The United States and the United Kingdom were the largest contributors, with the United States receiving the highest Hindex and number of citations (Nc). The institutions that published the most were the University of London and Harvard University. The most prolific authors were Benders, Manon, and the prolific journal was NEUROIMAGE. The research mainly focuses on cerebral cortex, brain tissue, brain structure network, artificial intelligence algorithm, automatic image segmentation, and premature infants.

Conclusion: This study reveals the research status and hotspots of MRI in the field of neonatal brain neuroimaging in the past decade, which helps researchers to better understand the research status, hotspots and frontier development trends in this field from a macro perspective, and provides certain references for future topic selection and research development direction.

PO-2495

Altered brain networks in pediatric autistic patients: A connectivity gradient-based research

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Purpose: Autism spectrum disorder (ASD) is an ongoing neurodevelopmental disorder with a highly complex behavioral phenotype. The gradient can be used to find the main axis of variance in the data by a method similar to PCA to find the orthogonal eigenvectors in high-dimensional data. Since ASD is associated with deficits in sensory processing and higher neural functions, we have attempted to provide a concise explanation of the various symptoms associated with this condition.

Materials and Methods: Our dataset included 34 ASD patients and 43 age-matched healthy controls. In this study, T1-MPRAGE and BOLD were performed in a 1.5T scanner (Siemens Magnetom Aera). Scanning sequence: T1-MPRAGE (TR 2200ms/TE 3.06ms/TI 900ms, Flip Angle=8°, Voxel Size=0.9x0.9x1mm); BOLD (TR=2000ms, TE=25ms, Voxel Size:3x3x3mm, 200 Volume). First, a functional connection matrix is constructed using resting state fMRI time series correlation. Next, an affinity matrix is constructed by applying a specific cosine function to represent similarities in the functional connection profile between all regions. Then, the matrix is dimensionally reduced to identify a series of major components and gradients of the target brain structure. Finally, the two sets of data were statistically analyzed and FDR corrected.

Results: Our study found a general decrease in gradient connectivity in children with autism throughout the brain. Through the scheafer400-7network template, we found that at the gradient 1 level, the main differences are concentrated in Visual Network, Sensorimotor Network, and Default Mode Network; At the gradient 2 level, the main differences are concentrated in Visual Network, Sensorimotor Network, and Dorsal Attention Network ($p < 0.05$, FDR corrected).

Conclusions: The aim of this study is to discover a low-dimensional functional connectivity parameter as a neurobiological indicator. We evaluated various algorithms and emphasized the importance of threshold setting since each parameter can impact the predictive accuracy of gradients. We hope that these findings will provide researchers with a solid foundation for the effective use of gradient frameworks in future studies.

PO-2496

Machine Learning and Statistic Analysis to Predict Drug Treatment Outcome in Pediatric Epilepsy Patients with Tuberous Sclerosis Complex

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Objectives Prediction of Epilepsy drug treatment outcome is valuable for the children with tuberous sclerosis complex (TSC). We aimed to investigate the association between multi-modality features and epilepsy drug treatment outcomes and propose a multi-modality features-based model to predict epilepsy drug treatment outcomes.

Methods This retrospective study consecutively enrolled 103 epilepsy children with rare TSC (41 in the controlled group and 62 in the uncontrolled group). Multi-modality data were used to characterize risk factors for epilepsy drug treatment outcome of TSC, including clinical data, TSC1, and TSC2 genes test results, magnetic resonance imaging (MRI), computerized tomography (CT), and electroencephalogram (EEG). Three common feature selection methods and six common machine learning models were used to find the best combination of feature selection and machine

learning model for epilepsy drug treatment outcomes prediction with multi-modality features for TSC clinical application.

Results Infantile spasms, age of onset, EEG discharge type, age of first doctor visit, angiofibroma, gene mutation type, type II lesions, epileptiform discharge in the right frontal area of EEG, drug-resistant epilepsy, shagreen patch and angiomyolipomas (AML) were significantly related to epilepsy drug treatment outcomes in these patients ($p < 0.05$). The analysis of variance based on selected 35 features combined with multilayer perceptron (MLP) achieved the best area-under-curve score of $0.812 (\pm 0.005)$, which shows the feasibility of using machine learning to predict the outcomes of drug treatments. Our machine learning results found that among MRI features, lesion type is the most important in the outcome prediction, followed by location and quantity.

Conclusion We developed and validated an effective prediction model for epilepsy drug treatment outcomes of TSC. Our results suggested that multi-modality features analysis and MLP-based machine learning may enable more precise and individualized prediction of epilepsy drug treatment outcomes of TSC.

PO-2497

Feature Selection and Combination of Information in the Brain Connectome for Discrimination of Autism Spectrum Disorder and Analyses of Altered Brain Patterns

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Abstract

Objective: Explore the topology of the white matter connectivity network in preschool autism spectrum disorder (ASD) and Healthy control (HC) based on diffusion basis spectrum imaging (DBSI).

Methods: Brain DBSI data from 31 patients with ASD and 30 HC were collected in Hunan Children's Hospital from September 2022 to July 2023, aged 2-6 years. All data were imported into the post-processing server, and whole-brain fiber tracking and brain network were constructed using the MATLAB 2013a toolkit. The most discriminative features were extracted from the consensus connectivity, global and node indices separately using the two-sample T-test. To effectively combine the multimodal information, we employed the multi-kernel learning support vector machine (MKL-SVM).

Result: In ASD group, the value of assortativity (A_r), modularity score (Q), Hierarchy (H_r), global efficiency (E_{global}), local efficiency (E_{local}), clustering coefficient (C_p) were lower than HC group, while normalized clustering coefficient (γ), normalized characteristic path length (λ), small-world (σ), characteristic path length (L_p), synchronization (S_r) higher. The difference was statistically significant. Consensus connectivity results showed that most of the consensus connectivity between frontal, parietal, and temporal lobe and thalamic regions was reduced in ASD patients. The model combining consensus connected connectivity, global and nodal graph metrics features can achieve the best performance in identifying ASD patients, with an accuracy of 96.72%.

Conclusion: The combination of global and nodal graph metrics and consensus connectivity of brain networks can identify preschool ASD patients and contribute to early clinical diagnosis.

PO-2498

A prediction nomogram for refractory mycoplasma pneumonia in children with community acquired pneumonia: using low-dose computed tomography

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Objective: The early predictive value of the chest imaging has not been adequately studied in the assessment of refractory mycoplasma pneumonia pneumonia (MPP). We aimed to build a nomogram for early predicting refractory MPP based on low-dose computed tomography in children. **Methods:** We retrospectively evaluated hospitalized children with MPP with probability of RMPP from June 2014 to December 2018. Low-dose chest computer tomogram (CT) were applied in each patient and interpreted in a blinded fashion by two radiologists. Total of 368 children diagnosed MPP were randomly assigned in a 7:3 ratio to either the training set or testing set. Multivariate logistic regression analysis was performed to identify independent predictors and establish a nomogram to predict the occurrence of RMPP. The predictive performance of the model and nomogram was evaluated by the receiver operator characteristic curves and decision curve analysis (DCA).

Results:

Multivariate logistic regression demonstrated that number lobes of lung consolidation (odds ratio [OR] 34.76, 95% confidence interval [CI] 14.53–98.44, $p < 0.01$), the left lower lobe of lung consolidation (OR 2.07, 95%CI 0.94–4.5, $p = 0.06$), pleural effusion (OR 2.82, 95%CI 1.25–6.34, $p = 0.01$) were independent predictors for RMPP. The area under curves of the prediction model in the training and testing sets were 0.90 and 0.87 respectively. The Hosmer–Lemeshow test showed that the model was a good fit ($P = 0.133$). The calibration curve of the nomogram was close to the ideal diagonal line. Furthermore, the decision curve analysis demonstrated significantly better net benefit in the model. The validation proved the reliability of the prediction nomogram.

Conclusion: A nomogram based on low-dose computed tomography was developed to predict the occurrence of RMPP in children. It provided clinicians with simple and practical tool for the early prediction and timely management of RMPP.

PO-2499

Dual-energy CT (DECT)—an important role in the diagnosis of acute osteomyelitis in children

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Background and purpose: This case report highlights the importance of dual-energy CT (DECT) imaging in demonstrating the bone marrow of children with acute osteomyelitis. It could provide early evidence for diagnosing bone marrow diseases and guide treatment decisions intuitively, conveniently, and quickly. **Case Description:** A six-year-old boy was admitted to the hospital mainly due to swelling, pain and limited movement of the right lower leg for one week. Physical examination showed that the proximal right tibia was swollen with high local skin temperature and deep tenderness, the right lower limb could not move and could only present a slightly hip-flexed knee position. No other significant abnormalities were found. **Diagnosis:** A diagnosis of acute osteomyelitis was proposed and confirmed by pathological results for the swollen right lower extremity with tenderness. During the operation, cartilage and inflammatory necrosis were seen under the microscope, and acute and chronic inflammatory cell infiltration was seen between the

striated muscles, which was consistent with the changes in purulent osteomyelitis. **Discussion and conclusions:** Dual-energy CT Virtual Non-Calcium (VNCa) bone marrow imaging technology could present abnormalities in bone marrow manifestations or subtle bone marrow edema that cannot be shown by conventional X-ray or conventional CT images, which is comparable to the clinical utility of MRI.

PO-2500

Feasibility of CT-like MR for the diagnosis of fractures in children based on point-to-point encoding time reduction of radial acquisition (PETRA) sequences: comparison of conventional and "CT-like" ultrashort echo time (UTE) images

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Objective CT-like PETRA images offer a radiation-free alternative to CT for depicting fractures, but data on children are lacking. The purpose of this study was to determine whether CT-like PETRA images improve the detection and characterization of fractures in children.

Materials and Methods Thirty-two pediatric patients with fractures underwent both CT and MR scans, which were included for analysis. MR and CT images were evaluated independently by two readers. Image quality was evaluated using visual scoring and quantitative measurements of the apparent contrast-to-noise ratio (CNR), signal-to-noise ratio (SNR), and contrast ratio (CR). Comparisons were made using the Wilcoxon test for means and the ANOVA test for ratios. Diagnostic performance parameters of the three imaging methods were determined using CT as the reference standard. Using Cohen's kappa tests and intraclass correlation coefficients, we evaluated the agreement between MR sequences and CT scans, as well as between readers.

Results CT-like PETRA image quality was good. Mean CNR and SNR with CT-like PETRA images were 90.48 ± 2.76 and 9.47 ± 3.25 , respectively, higher than those with T1 TSE ($P < 0.001$). The diagnostic accuracy of CT-like PETRA images was higher than that of T1 TSE for detecting callus formation/periosteal reaction and free bone fragment, as well as the area under curve (AUC), sensitivity, accuracy and negative predictive values (NPV). CT-like PETRA images showed more consistency with CT than T1 TSE for diagnosis. CT and CT-like PETRA had higher inter-reader agreement than T1 TSE.

Conclusion Our results confirm that CT-like PETRA images provide accurate imaging of bone morphology for fractures in children, with CT-like contrast that is not available with standard MR T1 TSE.

PO-2501

Automated Fiber Quantification Analysis Identifies Tract-specific Microstructural Alterations in Intermittent exotropia

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Abstract

Background: Growing evidence of neuroimaging has indicated brain microstructural abnormalities in comitant strabismus. Nonetheless, few studies have investigated neuropathological alterations in patients with intermittent exotropia (IXT). This study aimed at examining the characteristics of brain microstructure along major fiber tracts in IXT patients using an automated fiber quantification analysis.

Methods: A total of 25 patients with IXT as well as 25 healthy participants matched for age and gender finished the diffusion tensor imaging scanning and the ophthalmic examination. Automated fiber quantification analysis of 20 major fiber tracts was carried out for IXT patients and healthy subjects, respectively. Diffusion metrics of 100 equidistant nodes resampled along each tract were measured for every subject and compared between two groups. Effect size analysis was performed to identify the most affected fiber tracts in IXT.

Results: Widely declined MD was noted in IXT along major tracts containing bilateral thalamic radiations, bilateral corticospinal fasciculi, bilateral cingulum cingulate, left inferior fronto-occipital fasciculus, right arcuate fasciculus and superior longitudinal fasciculus. Local reduction in FA was observed in IXT along left cingulum hippocampus, right inferior longitudinal fasciculus and right uncinate fasciculus, in contrast to the regionally increased FA along bilateral thalamic radiation, left corticospinal tract and left arcuate fasciculus. Among the tracts with significantly changed diffusion metrics in IXT, right inferior longitudinal fasciculus was the most affected one in FA while left thalamic radiation was the most influenced one in MD.

Conclusions: Abnormalities in microstructural properties along visual-related fiber tracts are likely to contribute to difficulties in visual information processing in IXT patients, which could serve as the neural basis of underlying pathological mechanism of IXT.

PO-2502

A fully automated deep learning approach for accurate differentiation of subtypes in primary intracranial germ cell tumors using preoperative MR images

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Background: Accurate differentiation between intracranial germ cell tumors (iGCTs) subtypes, germinomas (GEs) and non-germinomatous germ cell tumors (NGGCTs), is crucial for treatment decisions and prognosis assessment.

Purpose: To develop a deep learning model that can automatically differentiate GEs from NGGCTs using preoperative MR images and determine whether the DL model could help clinical decision making.

Materials and Methods: This multicenter retrospective-prospective study collected a total of 344 patients between January 2010 and August 2021 (mean age [SD], 13.32 [6.4] years; 228 males) with pathology-confirmed iGCTs including the development set (n=280) that was split into training (n=200) and testing datasets (n=80), and three independent validation datasets (n=22,22,20,

respectively). We developed and validated a DL model based on a modified 3D nnU-Net and preoperative T2-weighted images to differentiate GEs from NGGCTs and compared to the diagnostic performance using conventional features including conventional MR presentation and clinical information. Further, we evaluated the role of our model in clinical decision making, the diagnostic performance of six neuroradiologists were analyzed in the testing and three validation datasets, with and without referring to the DL model's output. The area under the curve (AUC) was used to assess the diagnostic performance of DL model and neuroradiologists.

Results: The DL model achieved AUCs of 0.950, 0.921, 0.869, and 0.905 in the testing and three validation datasets, respectively. The performance is superior to that using conventional features (AUC=0.768, $P=0.009$) in testing dataset. The diagnostic performance of neuroradiologists was improved from an average AUC of 0.751 without reference to the DL output to 0.870 with reference to the DL output in the testing and validation datasets (13.61% improvement, $P=0.008$).

Conclusions: We developed and validated a DL model using a large dataset to accurately differentiate GEs from NGGCTs using preoperative T2-weighted images, which could help neuroradiologists to improve their differential diagnosis.

PO-2503

Extracellular volume for predicting pre-heart failure in children with Duchenne Muscular Dystrophy.

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Background

Cardiac failure is the leading cause of death in Duchenne muscular dystrophy (DMD). Early detection of heart failure (HF) in DMD can be challenging due to progressive muscle necrosis, physical inactivity and loss of function, often leaving children unaware of their deteriorating cardiac health. Pre-heart failure (pre-HF) is being recognized as an essential stage known to progress to symptomatic HF. The identification of measures that are associated with pre-HF in DMD could aid clinicians in detecting early cardiac involvement and following disease progression for patients. Therefore, our study aimed to investigate the predictive value of cardiac magnetic resonance (CMR) for pre-HF in children with DMD.

Materials and Methods

A total of 87 DMD patients (8.1 ± 1.7 years) were included from January 2019 to July 2022. All subjects underwent CMR with cine, T1 mapping and late gadolinium enhancement (LGE) sequences. The study outcome was pre-HF, which was defined as patients without current or prior symptoms of HF, but those with evidence of abnormal cardiac biomarkers (BNP ≥ 35 pg/mL, NT-proBNP ≥ 125 pg/mL or persistently elevated cardiac troponin), functional or structural heart disease. The X-tile software version 3.6.1 was used to determine the optimal cut-off value. Kaplan-Meier analysis was used to calculate the cumulative incidence rates of pre-HF. The variables were assessed by univariate and multivariate Cox regression analysis.

Results

During a median period of 16.8 months, pre-HF was present in 30 (34%) DMD patients. Univariable analysis indicated that extracellular volume (ECV), T1 mapping, end-diastolic volume index (EDVI) and left ventricle mass index (LVMI) were associated with pre-HF ($p < 0.1$). Multivariate analysis showed that ECV (hazard ratio [HR]: 5.503, 95% CI: 2.111–14.343; $p < 0.001$) was an independent risk factor for pre-HF. The cut-off value of ECV was 0.31, and it appropriately discriminated between low- and high-risk groups for pre-HF in DMD patients. The cumulative pre-HF-free survival rates of the low-risk group were significantly higher than those of the high-risk group ($P < 0.001$) according to the Kaplan-Meier curves.

Conclusions

The ECV was a feasible independent prognostic factor for pre-HF of DMD patients and provided incremental prognostic information and significant improvement for risk stratification, which could aid clinicians in detecting early cardiac involvement and providing early intervention for patients.

PO-2504

Discussion of children's axial-axis radiography techniques

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Objective: To analyze and study the methods of calcaneal axon radiography and to explore the calcaneal axonography standards, so as to reduce the radiation dose of children, improve the quality of photography and improve the diagnostic efficiency.

Methods: A total of 50 cases of calcaneal axon X-ray photos from February to May 2022 were analyzed. Among them, 28 were male and 22 were female. Be aged 6 to 16 years. In all cases, Ruike DR VX3733-SYS photography was used, and two methods were taken, methods (1) The child was lying on the supine photographic table, the lower limb was straightened, the long axis of the calf was parallel to the long axis of the photographic table, the ankle was extremely dorsiflexed, the ankle joint was placed in the center of the detector, and the center line was tilted 35° to 45° to the side of the head, 70KV, 6MAS. Aiming at the calcaneal joint through the base of the third metatarsal into the center of the detector. METHOD (2) THE CHILD STOOD ON THE PHOTOGRAPHIC TABLE, ROTATED BOTH FEET INWARD, MADE THE FEET PARALLEL, THE FEET WERE 80 MM APART, THE MEDIAL EDGE OF THE FOOT WAS PARALLEL, THE ANKLE DORSIFLEXION WAS 10°, 50KV, 4MAS, THE PHOTOGRAPHIC DISTANCE WAS 100CM, AND THE CENTER LINE WAS AIMED AT 45° THE midpoint of the Inner and Outer Ankle Line. Calcaneal axial image display standards: 1. The calcaneal body and calcaneus protrusion are clearly displayed 2. The full calcaneus is displayed in the center of the image, showing the bone, articular surface and surrounding soft tissue of the calcaneus on the side of the examinee³, and the bone trabeculae and surrounding soft tissues are clearly displayed.

Results: The calcaneal space showed poor performance, and there were factors such as improper body position, poor fit, and poor exposure dose. Method (1) The probability of calcaneal gap display was 80.2%, and method (2) The display rate of calcaneal gap was about 90%, and both sides could be compared simultaneously to reduce the retake rate, thereby reducing the irradiation of the children.

Results: Method 1 requires the child to use both hands or others to help pull the forefoot to make the ankle joint excessive dorsiflexion, due to the child's poor fit, insufficient internal rotation or abduction, resulting in improper position, metatarsal morphology development, increased exposure times, cumulative irradiation exposure. Method 2 requires the child to stand still, which greatly improves the film shooting rate. Familiar with the anatomical characteristics of calcaneal axon X-ray is the basis of calcaneal axon X-ray photography, master the calcaneal axon photography technology, improve the film rate, thereby reducing the incidence of cancer, reducing radiation dose, and conducive to children's growth and development. It is a fact that radiation can cause side effects on children, but the use of optimized radiation technology can achieve good imaging results, while minimizing side effects and reducing the harm to the child's body.

Conclusion: Familiar with calcaneal axon X-ray anatomy is the gold standard for photographing the calcaneus, and mastering the calcaneal shooting skills can improve the level of calcaneal axon X-ray photography.

PO-2505

Cerebral blood flow changes in COVID-19 children with neurological symptoms

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Purpose: To evaluate the changes of cerebral blood flow (CBF) in COVID-19 children with neurological symptoms based on arterial spin labeling (ASL), and explore the impact of novel coronavirus infection on cerebral hemodynamics and potential neurological sequelae in children.

Materials and Methods: 25 COVID-19 children with neurological symptoms (mean age 5.08 ± 3.91 years) and age-matched healthy control group were included. In this study, 3D T1WI, T2WI, DWI and 3D-ASL were performed in a 1.5T scanner (Siemens magnetom aera). CBF values were calculated after data processing at Matlab. Through spatial standardization, the CBF map obtained was registered to the MNI space. After data normalization and smoothing, the general linear model was used to statistically model and estimate the CBF of children with COVID-19 and healthy controls with SPM software, and multiple comparison corrections were performed. $P < 0.05$ was considered as statistically significant difference.

Results: Among 25 COVID-19 children with neurological symptoms, there were 15 cases of febrile seizures, 8 cases of epileptic seizures, 1 case of dizziness, and 1 case of paroxysmal abnormal movements. There were 13 cases with normal MRI findings and 7 cases with focal demyelination/abnormal myelination. On DWI, there were 3 cases with limited diffusion of the corpus callosum parietal, 1 case with right hippocampus hyperintensity, and 1 case with bilateral ventrolateral thalamic nucleus hyperintensity. Compared with the controls, CBF values of patients were significantly lower across the gray matter and the peak values were observed in the right middle temporal gyrus, right cuneus/precuneus, left middle frontal gyrus, left calcarine fissure ($P < 0.05$, GRF corrected) (Table1 and Figure1a-c).

Conclusions: CBF decreased in COVID-19 children with neurological symptoms, reflecting local blood-brain barrier disruption, ischemia, hypoxia, and brain damage. The involved brain regions were related to the visual motor coordination, executive cognition, language auditory processing, memory, and stress functions. Therefore, it is necessary for timely intervention and prevention of potential neurological sequelae.

Clinical Relevance: The assessment of CBF in children with COVID-19 based on 3D-ASL will help to study the hemodynamics and physiological mechanism related to clinical neurological symptoms.

PO-2506

An Investigation into Disparities in Accuracy and Clinical Utility of Artificial Intelligence for Assessing Bone Age in Pediatric Imaging

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Objective: The aim of this study is to assess the precision of artificial intelligence (AI) systems for measuring children's bone age, specifically focusing on the TW3-RUS, Carpal, and G-P mapping methods. We will investigate disparities between AI-based assessments and real-world evaluations, analyze the underlying factors contributing to these discrepancies, and propose potential enhancements to enhance accuracy.

Methods: We conducted a retrospective analysis of imaging data from 894 pediatric cases who underwent left wrist orthotopic X-rays at Kunming first people's hospital between August 2021 and

August 2023. AI-assisted bone age assessments were performed using TW3-RUS, TW3-Carpal, and G-P mapping standards. These assessments provided AI-derived bone age estimates. Simultaneously, three senior pediatric imaging physicians evaluated the same cases based on TW3-RUS, TW3-Carpal, and G-P mapping criteria. The average of the bone age values obtained by the three physicians was considered the gold standard. The bone age results were categorized into 3-year intervals. The distribution of cases by age included 84 in the 1 to 3-year group, 116 in the 4 to 6-year group, 178 in the 7 to 9-year group, 226 in the 10 to 12-year group, 183 in the 13 to 15-year group, and 107 in the 16 to 18-year group.

For each age group, we calculated the accuracy within 0.5 year, accuracy within 1 year, and accuracy within 2 years, mean absolute error (MAE), and root mean square error (RMSE) to quantify the discrepancies between the bone age results and the reference standard bone age. The intra-group correlation coefficient (ICC) was used to assess the consistency between AI-derived bone age and the reference standard. Additionally, Bland-Altman charts were generated to visually depict the agreement between AI-based bone age assessments and the reference standard.

Results The accuracy of the AI system error within 0.5 year in the overall sample was 81.2% (726/894), the accuracy of the error within 1 year was 89.6% (801/894), and the accuracy of the error within 2 years was 93.9% (839/894), respectively. MAE was 0.410, 0.494, and 0.530, respectively, and RMSE was 0.487, 0.563, and 0.636, respectively. Across different age groups, the accuracy in terms of errors less than 0.5 years, less than 1 year, and less than 2 years was as follows:

- 1 to 3-year-old group: 98.1% (82/84), 100% (84/84), 100% (84/84).
- 4 to 6-year-old group: 80.4% (93/116), 87.5% (103/116), 92.2% (107/116).
- 7 to 9-year-old group: 78.8% (140/178), 85.4% (152/178), 91.7% (163/178).
- 10 to 12-year-old group: 83.2% (188/226), 91.4% (207/226), 93.6% (212/226).
- 13 to 15-year-old group: 76.3% (140/183), 81.7% (150/183), 85.8% (157/183).
- 16 to 18-year-old group: 90.7% (97/107), 97.6% (104/107), 98.2% (105/107).

Additionally, the Mean Absolute Error (MAE) and Root Mean Square Error (RMSE) were calculated. The Bland-Altman chart revealed that the AI system's 95% consistency limits for TW3-RUS and TW3-Carpal bone age assessments were -0.82 to 1.12 years and -0.79 to 1.21 years, respectively.

Conclusion The AI-based bone age measurement results exhibit commendable reliability and accuracy. However, it is worth noting that in practical clinical applications, manual adjustments and further deep learning may still be necessary to ensure optimal performance. Furthermore, our analysis revealed that there is no statistically significant difference between the 1 to 3-year-old age group and the 16 to 18-year-old age group ($P > 0.05$). In contrast, statistically significant differences were observed among the 4 to 6-year-old, 7 to 9-year-old, 10 to 12-year-old, and 13 to 15-year-old age groups ($P < 0.05$).

PO-2507

A Study Assessing the Precision of an Artificial Intelligence-Based Bone Age Measurement System for Evaluating Bone Age in Pediatric Patients with Delayed Growth and Development

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Objective: This study aims to investigate the precision of employing an artificial intelligence (AI) system for bone age assessment in clinical settings for children experiencing delayed growth and developmental issues.

Methods: Between June 2020 and August 2023, a retrospective analysis was conducted on a total of 814 patients, comprising 478 male cases and 336 female cases, aged between 5 and 15 years old, with an average age of 11.6 ± 0.8 years old. All of these children underwent orthotopic radiography of the left wrist through X-ray imaging. From this pool, 244 children were meticulously selected to participate in the study. Inclusion criteria mandated that all cases must have been evaluated by the same three senior pediatric imaging physicians, resulting in a consistent diagnosis. Utilizing the patient's actual physiological age as the reference standard, a greedy algorithm was employed to meticulously match 122 cases in the AI application group with 122 cases in the manual evaluation group. Continuous variables were analyzed using paired t-tests and Wilcoxon rank-sum tests, while intra-group correlation coefficients were employed to assess the consistency and accuracy of bone age evaluations across the AI application group, manual evaluation group, and reference standard.

Results: Both the manual evaluation team and the AI application group yielded bone age estimates for all 244 patients that were lower than the actual physiological age of the children, which had a mean of (10.8 ± 1.5) years. Specifically, the AI application group's G-P mapping and TW3-c-Carpal bone age measurements were (9.5 ± 2.1) years and (8.8 ± 3.7) years, respectively, while the manual evaluation group's G-P mapping and TW3-c-Carpal bone age measurements were (10.6 ± 1.7) years and (10.4 ± 2.3) years, respectively. In the AI application group, the measurement error fell within 1 to 2 years for 62.3% (76/122) of cases, with an accuracy rate of 66.4% (81/122) within 2 to 3 years, and an accuracy rate of 67.2% (82/122) for errors exceeding 3 years. Conversely, the manual evaluation team achieved higher accuracy, with a measurement error within 1 to 2 years for 88.1% (107/122) of cases, an accuracy rate of 89.2% (108/122) within 2 to 3 years, and an accuracy rate of 92.3% (113/122) for errors exceeding 3 years. Notably, the accuracy of the G-P mapping method and TW3-c-Carpal bone age assessment within the AI application group was significantly lower than that of the manual evaluation group, with statistically significant differences ($P < 0.05$).

[RUS-CHN] Comparison of Bone Age Assessment Results with Reference Standards: The AI application team and the manual evaluation team achieved an accuracy of 75.3% (91/122) and 77.4% (94/122) within a margin of 1 to 2 years, respectively. For errors falling within 2 to 3 years, the accuracy rates were 88.1% (107/122) for the AI application team and 86.3% (105/122) for the manual evaluation team. Furthermore, for errors exceeding 3 years, the AI application team achieved an accuracy of 81.4% (99/122), while the manual evaluation team achieved 83.7% (102/122). In terms of the RUS-CHN bone age assessment method, both the AI application team and the manual evaluation team demonstrated good consistency and achieved high levels of accuracy when compared to the reference standard.

Conclusion: The accuracy of AI-based bone age assessment for children aged 5-15 years with growth retardation is lower than that of manual evaluation, with an average error of 1.8 ± 1.3 years. However, there was good consistency in the RUS-CHN method between the two groups. The G-P

and TW3-C-Carpal bone age evaluation results obtained through AI application cannot accurately reflect the actual physiological age of children and require manual intervention for recalibration.

PO-2508

Diagnosis of Fungal Infections and Management of Antifungal Agents in Pediatric Acute Lymphoblastic Leukemia: What is the Role of Chest CT

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Objective: To evaluate the impact of a preemptive diagnosis-driven approach to computed tomography (CT) on the diagnosis of fungal infections and management of antifungal agents in pediatric acute lymphocytic leukemia (ALL).

Methods: A retrospective analysis was conducted on a pediatric cohort diagnosed with ALL who exhibited signs of pneumonia while undergoing chemotherapy during the time span between March 2016 and August 2021. The study collected information on the demographics, medical history, and laboratory findings of each pediatric patient. Additionally, the CT images were evaluated with radiologic severity index (RSI), based on the affected volume and regional opacity. A t-test, U-test, Pearson's chi-square test, or Fisher exact test was used to determine the clinical and radiologic characteristics of both fungal and non-fungal pneumonia cases. Furthermore, linear regression models were implemented to analyze the correlation between the RSI and other clinical features.

Results: During initial chemotherapy, 51 children diagnosed with ALL developed pneumonia (31 boys and 20 girls, with a mean age of six years \pm 4 [standard deviation]). Fungal infection was suspected in 15 children (29%). Four children (8%) received a diagnosis of alveolar lavage. The CT images in 65% of cases showed a ground glass opacity (GGO). The use of antifungal drugs was associated with lower levels of serum albumin content ($p = 0.006$), leukocyte count ($p = 0.031$), and lymphocyte count ($p = 0.029$). The peak radiologic severity index (RSI) value could predict the requirement of antifungal drugs at a cutoff of 3.5 (AUC 0.76 [0.61, 0.91]) with a sensitivity of 75% and specificity of 60%.

Conclusions: Chest CT examination is a valuable tool for evaluating chemotherapy-related fungal pneumonia, as it provides characteristic imaging findings. Additionally, it can aid in deciding whether to use antifungal drugs, based on the peak RSI value over 4.5 out of a total of 36 points.

PO-2509

Exploring predictive factors for hypoplastic aortic arch development in pediatric patients with complex coarctation of the aorta

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Background

Complex aortic coarctation (CoA) is a pediatric cardiovascular disease influenced by multiple factors, impacting its treatment and prognosis. Among these factors, hypoplastic aortic arch (HAA) may play a pivotal role in determining the complexity of the condition and the selection of treatment

approaches. However, it is presently unclear which factors can predict whether children with complex CoA will exhibit underdeveloped aortic arch development. The aim of our study was to explore the potential predictive factors for HAA in pediatric patients with CoA and to assist healthcare professionals in gaining a deeper understanding of the pathophysiological processes of this condition, predicting patients' disease progression in advance, and providing a basis for the development of personalized treatment and management strategies.

Methods

A retrospective analysis of 103 patients diagnosed with complex CoA by CTA and echocardiography was performed. Aortic diameter was measured at six different levels. Correlation factors were compared between the non-HAA and HAA groups. Univariate and multivariate logistic regression analyses were used to identify risk factors for HAA in each arch segment.

Results

Of the 103 children with complex CoA, 55 were in the non-HAA group and 45 in the HAA group. The incidence of PDA (56.3% vs. 32.7%, $p < 0.05$), severe coarctation (CDR $< 50\%$, 81.3% vs. 34.5%, $p < 0.01$), and collateral vessels (39.6% vs. 0, $p < 0.01$) were higher in the HAA group than in the non-HAA group. Aortic arch size was positively correlated with age and negatively correlated with severe narrowing, VSD, collateral vessels, and left heart dysfunction. Logistic regression results showed that collateral vessels were risk factors for dysplasia in three segments of the aortic arch (proximal arch OR = 11.458; $p < 0.01$, distal arch OR = 4.211; $p < 0.05$, and isthmus OR = 11.744; $p < 0.01$), severe constriction (OR = 6.653; $p < 0.01$), and left heart dysfunction (OR = 5.149; $p < 0.01$) were risk factors for isthmus dysplasia.

Conclusion

The development of the segments of the aortic arch may be asynchronous in complex CoA. Collateral arteries, severe coarctation, and left heart dysfunction are risk factors for HAA, and children with collateral arteries may require more extensive arch reconstruction surgery.

PO-2510

Effect of different solutions on CT manifestation of crystal ball in vitro

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Objective: To observe the effects of different solutions on the CT performance of crystal ball in vitro.

Methods: The subjects were divided into 4 groups. 9 crystal balls of the same size were put into paper cups in groups A, B, C and D. Group A was 100 mL 0.9% saline and group B was 100mL low concentration of iodine solution (87.5mg I /mL). Group C was 100 mL highly concentrated of iodine solution (262.5mg I /mL), group D was 100 mL milk. The paper cup was placed in Siemens dual-source CT scanning to collect images. Test 1 was collected once per hour for a total of 24 hours. CT values of the lowest density area, of the highest density area and average CT value of each group at the same time were compared to evaluate the impact of different solutions on the crystal ball. Compare the retention time and the interaction of the same solution with different concentrations (Group B and Group C) on the CT value of the crystal ball. Test 2 was collected every 24 hours for a total of 120 hours. The average CT value of each group at the same time were compared to evaluate the impact of different solutions on the crystal ball. And observed whether the crystal balls are broken.

Result: The effects of different solutions on the CT value of lowest density area, CT value of highest density area and average CT value of the crystal ball showed great significance ($P < 0.05$). An interaction effect was observed on the CT value of lowest density area and average CT value of crystal ball in retention time and different concentration of same solution (Group A and Group B) ($P < 0.05$). As time increased, the average CT value of group B and C differed from group A and D

significantly. There were no differences between group A and D, and great significant differences between group B and C. The CT values stabilized in the nearly 120h (5 days), and the morphology of crystal balls was intact in all groups, and no broken occurred.

Conclusion: Different solutions affected the CT manifestations of the crystal ball in same time, but low concentration iodine solution (87.5mg I /mL) showed a striking contrast in the crystal ball. The crystal ball will not break in low concentration iodine within 120 hours.

PO-2511

Evaluation of cerebral development in preterm infants by using multiparametric MRI

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ObjectiveThe purpose of this study was firstly to identify multiparametric MRI makers that according to the degree of prematurity, and secondly to evaluate the impact of clinical complications on these markers.

Materials and methods

We prospectively enrolled preterm infants who were divided into two groups according to their degree of prematurity: extremely preterm(< 28 weeks' gestational age) and very preterm (28-32 weeks' gestational age). They underwent a multiparametric brain MRI scan at term-equivalent age including conventional MRI, diffusion kurtosis imaging (DKI) and arterial spin labeling (ASL). Then, we compared the parameters for the two groups. We also evaluated the effects of clinical data on those parameters.

ResultsIn the extremely preterm infant group, the MK and RK values of posterior limbs of the internal capsule (PLIC), anterior limb of internal capsule (ALIC) and parietal white matter (PWM) were lower than those in very preterm group. There were no significant differences in cerebral blood flow (CBF) values between the left and right cerebral hemispheres in the frontal lobe, temporal lobe, parietal lobe, occipital lobe, basal ganglia and thalamus ($p > 0.05$) both in two groups. The CBF values of frontal and occipital lobes in the extremely preterm infant group were significantly lower than those in very preterm group ($p < 0.05$). Regarding clinical complications, the presence of bronchopulmonary dysplasia was not associated to a significant CBF variation in the different ROIs.

ConclusionMultiparametric MRI scans performed at term-equivalent age in preterm infants by providing quantitative imaging parameters that differ with the degree of prematurity.

PO-2512

Study and progression of artificial intelligence assisted system in bone age imaging assessment of children

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Bone age assessment is a crucial tool for gauging an individual's developmental stage and biological age based on skeletal growth and development. It finds broad applications in clinical medicine, forensic analysis, and sports-related fields. Bone age assessment is a significant research area in pediatric radiology. Currently, many clinical approaches (such as TW3-RUS, TW3-Carpal, and G-P atlas) involve comprehensive evaluations of a child's bone age. However, they are time-consuming, demand a high level of expertise from assessing physicians, and may exhibit inherent biases.

In recent years, with advancements in computer technology and the application of artificial intelligence algorithms, particularly deep learning and neural network models in the field of medical imaging, various artificial intelligence-assisted bone age assessment systems have made rapid strides. These systems enable swift, precise, and effective bone age assessments. As research progresses and becomes more specialized, there is a growing emphasis on anatomical information and skeletal morphological details in bone age assessments. Some studies attempt to integrate clinical data into these tasks. The use of entire hand images and specific regions of interest for training and prediction has significantly enhanced the accuracy of artificial intelligence (AI) bone age measurement systems. AI-based automatic bone age assessment algorithms, thanks to their amalgamation of deep learning capabilities and clinical interpretability, have garnered increasing attention from researchers and clinical practitioners. They have also achieved promising results and hold the potential for practical clinical applications.

This article provides an in-depth review of the developmental trajectory of artificial intelligence-based bone age assessment systems, offering fresh insights and prospects for the advancement of automated bone age assessment technology.

PO-2513

Preliminary research on the construction of artificial intelligence bone age assessment system based on deep learning of characteristic regions in digital hand-wrist radiograph

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Objective To detect the feasibility and efficiency of bone age artificial intelligence estimation based on deep learning features from traditional regions of interest in hand digital radiographs.

Methods We conducted a retrospective analysis of imaging data from 2182 pediatric cases who underwent left wrist orthotopic X-rays at Kunming first people's hospital and Kunming children's hospital between March 2021 and May 2022 was split to training 1746 (80.0%) and validation 436 (20.0%) set in this study. The deep learning method was applied to construct the localization model of 17 feature regions and the regression model of bone age based on traditional ROIs in the images. Another set of bone age data with 635 subjects also in the hospital was adopted for test. Mean average precision (mAP)、mean absolute error (MAE) and root mean square error (RMSE) were used to assess model accuracy of detection and BA prediction, respectively.

Results The mAP of ROIs detection of the model was 0.93, and MAE of all subjects was 0.467 and 0.443 years respectively in validation and test sets. RMSE of all subjects was 0.487 and 0.563 years respectively in validation and test sets. The difference less than 1 year in test accounted for 89.6% (391/436) between BA assessment of the model and of the paediatric radiologists. The difference less than 2 years in test accounted for 93.9% (409/436) between BA assessment of the model and of the paediatric radiologists. The significant difference mainly appeared in conical epiphysis or epiphysis fusion covering interphalangeal articular surface in training set data of corresponding age.

Conclusion An AI model based on deep learning of traditional ROIs' features in hand DR images is initially achieved to automatically predict BA rapidly and effectively, yet manual adjustment and further deep learning are still needed in practical clinical applications.

PO-2514

超声对唇腭裂的产前诊断价值：Meta 分析

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【摘要】目的：用 Meta 分析评价超声（US）对唇腭裂的产前诊断的临床应用价值。方法：检索 EMBASE、PubMed、Web of science、Cochrane Library、万方、维普、中国知网及中国生物医学文献等数据库，查找所有评价 US 对胎儿唇腭裂产前诊断的相关研究，检索时限为 2000 年 1 月至 2022 年 12 月，同时手检纳入文献的参考文献。制定纳入排除标准，采用 STATA 17.0 进行 Meta 分析：检验异质性；计算汇总诊断比值比（DOR）、灵敏度（SEN）、特异度（SPE）、阳性似然比（+LR）、阴性似然比（-LR）、受试者工作特性曲线下面积（AUC）、验前验后概率及 95%可信区间。结果：纳入文献 12 篇，共含病例 617 例。US 合并敏感性及其特异性分别为：0.86（0.77-0.92）、0.90（0.63-0.98）。US 合并 AUC：0.92（0.90-0.94）。结论：（1）对唇腭裂的产前诊断，US 具有较高的诊断效能，可作为胎儿唇腭裂的首选筛查方式；（2）US 在诊断唇裂方面优势独特，而在诊断腭裂畸形方面表现欠佳。

PO-2515

深度学习在儿童先天性室间隔缺损和房间隔缺损辅助检测中的应用研究

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目的：评估以深度学习为代表的人工智能方法对先天性室间隔缺损（ventricular septal defect, VSD）和房间隔缺损（atrial septal defect, ASD）心脏 CT 病例的检测效能。方法：回顾性分析 165 例心脏 CT 数据。利用卷积神经网络训练 CT 缺损检测模型，采用十折交叉验证法对模型进行效能评估，并统计深度学习模型与影像医师检测情况的差异性及一致性。结果：深度学习模型检测 VSD 和 ASD 总测试集的平均准确性、平均敏感性及其平均特异性等均高于 80%。总测试集模型、VSD 模型及 ASD 模型的平均 AUC 分别为 0.85、0.81 和 0.89。此外，深度学习模型对测试集数据平均每例缺损的检测时间也远小于影像医师。统计分析显示深度学习模型与影像医师对于缺损的诊断情况没有差异且一致性较高。结论：利用深度学习方法能够有效检出先天性室间隔缺损和房间隔缺损，可辅助影像科医生进行诊断和教育培训。

PO-2516

儿童噬血细胞综合征中枢神经系统受累 (CNS-HLH) 预后危险因素分析

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目的: 探讨儿童噬血细胞综合征中枢神经系统受累 (CNS-HLH) 的临床变量、脑部 MRI 影像标志物和基础疾病与死亡的关系。

方法: 回顾性分析 2012 年 1 月~ 2022 年 3 月于重庆医科大学附属儿童医院临床确诊的 CNS-HLH 患儿的临床及脑部 MRI 资料。患者分为死亡组和存活组。分析了 12 项主要临床指标、7 项脑部 MRI 影像特征及基础疾病, 借以探索可预测 CNS-HLH 患儿死亡风险的标志物。

结果: 共纳入 114 例 CNS-HLH 患儿, 其中死亡 59 例, 存活 55 例。纳入的临床变量包括性别/年龄、神经精神表现/症状、脑脊液结果、血常规检查、肝功能、凝血功能等 12 项结果与患儿死亡没有统计学上的独立相关性。对于 MRI 变量, 多变量分析显示病变扩散受限 (OR = 9.64, 95% CI: 3.39-27.43, $p < 0.001$) 和受累脑区数量 (OR = 1.24, 95% CI: 1.03-1.49, $p = 0.02$) 是患儿死亡的独立危险因素。ROC 曲线显示受累脑区数量 (AUC = 0.79, 95% CI: 0.70-0.87, $p < 0.001$) 具有较高的预测价值, 最佳临界值为 4.5 (敏感性 76%, 特异性 73%)。对于 HLH 基础病因, 相比感染性 HLH 而言, 家族性 HLH (F-HLH, OR = 9.90, 95% CI: 2.01 ~ 48.87, $p = 0.005$) 和免疫损害相关 HLH (IC-HLH, OR = 4.95, 95% CI: 1.40 ~ 17.46, $p = 0.01$) 与死亡的关系更密切。与其他 HLH 亚型相比, 家族性 HLH 和免疫损害相关 HLH 脑部更容易发生大病灶、弥散受限和更多的脑区受累; 家族性 HLH 最容易发生颅内出血。

结论: 脑部 MRI 影像标志物, 如病变弥散受限和较多的受累脑区, 可独立预测 CNS-HLH 患儿死亡。其次, 不同 HLH 亚型具有不同的脑部 MRI 表现和不同预后。

PO-2517

儿童塑形性支气管炎的临床及 MSCT 影像特征分析

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目的 分析儿童塑形性支气管炎的临床及 MSCT 影像特征。 **方法** 收集 2018 年 1 月至 2022 年 12 月赴我院就诊且经电子支气管镜确诊及治疗的塑形性支气管炎患者 22 例, 回顾分析其胸部 MSCT 影像及临床资料。 **结果** 22 例患者均有发热、咳嗽, 绝大多数患者 CRP、D-二聚体水平增高。胸部 CT 影像表现为气道内软组织密度影及肺炎、肺不张或肺实变; 有 30 个肺叶不张或实变, 左肺上叶 5 例 (22.7%)、下叶 8 例 (36.4%), 右肺上叶 5 例 (22.7%)、中叶 4 例 (18.2%)、下叶 8 例 (36.4%)。术中见塑形内生性物质分布的支气管所在肺叶如下: 左肺上叶 5 例 (22.7%)、下叶 9 例 (40.9%), 右肺上叶 5 例 (22.7%)、中叶 2 例 (9.1%)、下叶 5 例 (22.7%)。22 例塑形性支气管炎病理分型均为 I 型 (炎症细胞型)。对患者灌洗液进行病原学检查, 检出肺炎支原体 19 例 (86.4%)、病毒 11 例 (50%)、细菌 3 例 (13.6%)、真菌 3 例 (13.6%)。通过支气管镜去除黏液栓后, 22 例患者病情均好转并出院, 2 例真菌感染患者因病情反复再次入院。 **结论** 儿童塑形性支气管炎影像表现为气道内软组织密度影及肺炎、肺不张或肺实变, 其病情危重、进展快、病死率高, 病原体以肺炎支原体最多见; 电子支气管镜是诊治塑形性支气管炎的最优方法, MSCT 检查能提示气道阻塞, 为支气管镜诊治提供精准的影像学信息, 有助于及时确诊和有效治疗。

PO-2518

三维动脉自旋标记在足月新生儿缺氧缺血性脑病的早期诊断和预后分组中的价值

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[摘要] 目的 探讨三维动脉自旋标记(3D ASL)灌注成像与 DWI 序列对足月新生儿缺氧缺血性脑病(hypoxic ischemic encephalopathy, HIE)的早期诊断价值以及对患者预后分组的价值。材料与方法 选择 2017 年 12 月至 2022 年 5 月在我院临床诊断为 HIE 的足月新生儿共 40 例, 对照组 40 例。所有 HIE 患儿根据其预后分为预后良好组和预后不良组, 所有受试者同时进行 3D-ASL 和 DWI 检查, 比较各感兴趣区的脑血流(CBF)和表观弥散系数(ADC), 并分析其一致性。感兴趣区包括双侧基底节、丘脑和额叶白质, 最终取双侧平均值。并研究 HIE 患儿不同脑区的 CBF 值与新生儿行为神经学评估(NBNA)的相关性, CBF 值的早期变化与 HIE 患儿预后分组的关系。结果 1.预后不良组基底节和丘脑的 CBF 值高于预后良好组, 差异有统计学意义($P<0.01$); 2.HIE 组新生儿基底节和丘脑的 CBF 值大于正常对照组, 差异有统计学意义($P<0.01$); 3.HIE 组额叶白质区的 CBF 值小于正常对照组, 差异有统计学意义($P<0.01$); 4.CBF 值的 ROC 曲线下面积为 0.973, CBF 值的特异性和敏感性为 97.5%和 90.2%; ADC 值的 ROC 曲线下面积为 0.881, 敏感性和特异性为 82.5%和 92.7%; 5.基底神经节区及丘脑的 CBF 值与 NBNA 评分高度相关($r=-0.8196, p<0.01$)、($r=-0.8504, p<0.01$); 额叶 CBF 值与 NBNA 评分无相关性($r=-0.0802, p=0.6229$)。结论 足月新生儿出生后 3 天内的 3D-ASL 结果与 NBNA 评分高度相关, 可以早期诊断 HIE 并预测脑功能损伤的结果, 比 DWI 有更好的诊断效果。

PO-2519

儿童先天性肺气道畸形的 CT 表现与病理对照

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目的: 探讨儿童先天性肺气道畸形(CPAM)的 CT 特征性表现, 并与组织病理学结果对照, 以提高本病影像诊断的准确性及术前病理分型的认识。方法: 纳入经外科手术病理证实的 CPAM 患儿 73 例, 男 34 例, 女 39 例, 所有病例均行术前胸部高分辨率 CT 平扫加增强扫描。回顾性的分析 73 例 CPAM 患儿的临床资料及 CT 特征性表现, 按照 Stocker 分型法对其进行病理分型, 观察 CT 特征表现, 并与病理学分型结果进行对照。结果: 术后病理 Stocker 分型中 0 型未见。Stocker1 型 13 例(13/73, 17.8%), CT 主要表现为大囊周围环以多发小囊, 其中大囊直径大于 2.0cm, CT 分型与病理分型符合率 100% (13/13)。Stocker2 型 54 例 (54/73, 74%), 其合并叶内型肺隔离症者 18 例 (18/54, 33%), CT 主要表现为多发含气或含液小囊腔, 囊腔直径多在 0.5cm-2.0cm 之间, 合并肺隔离症者可见异常体循环动脉供血。其中 2 例合并感染, 误诊为肺脓肿; CT 分型与病理分型符合率约 96% (52/54)。Stocker3 型 2 例 (2/73, 3%), CT 主要表现为肺内大片透光增强区, 其内含蜂窝状微囊, 1 例误诊为大叶性肺气肿; CT 分型与病理分型符合率约 50% (1/2)。Stocker4 型 4 例 (4/73, 5%), CT 主要表现为肺外带单个或分隔样大囊, 囊腔直径多大于 10cm。其中 1 例误诊为肺囊肿; CT 分型与病理分型符合率约 75% (3/4)。结论: 儿童 CPAM 的 CT 表现具有明显特征性, 主要囊性病变为主、特别是多囊病变最为常见, 胸部 CT 表现可以有效提示病理分型, 术前胸部 CT 分型与术后病理分型有很高符合率, 特别是 Stocker 分型中的 1 型和 2 型。

PO-2520

双能量 CT 小肠造影定量评估儿童克罗恩病活动性的初步研究

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目的 探讨双能量 CT 小肠造影 (DECTE) 扫描技术定量评估儿童克罗恩病 (CD) 活动度的价值。
方法 回顾性分析经临床及病理证实的 50 例 CD 患儿的双能量 CT 影像学资料, 以儿童克罗恩病活动指数 (Pediatric Crohn's Disease Activity Index, PCDAI) 将患者分为活动期和缓解期, 其中活动期 (PCDAI > 10 分) 28 例; 缓解期 (PCDAI ≤ 10 分) 22 例。分析两组能谱曲线斜率 K 及标准化碘浓度 (NIC), 绘制受试者工作特征曲线 (ROC), 计算曲线下面积 (AUC), 并得到最佳诊断阈值相对应的灵敏度、特异度。分析 DECTE 对 CD 患儿活动度的诊断价值。结果 活动期病变肠段能谱曲线斜率 K 及标准化碘浓度均高于缓解期, 差异均具有统计学意义 (P 均 < 0.01)。标准化碘浓度 (NIC) 在动脉期时 AUC 最大 (0.899), 当标准化碘浓度诊断阈值为 24.35% 时, 其诊断 CD 病变肠段处于活动期的灵敏度、特异度分别为 60.7% 和 81.8%。能谱曲线斜率 K 在门脉期时 AUC 最大 (0.979), 当 K 的诊断界值为 3.45 时, 诊断病变肠段处于活动期的敏感度、特异度分别为 71.4% 和 100%。结论 DECTE 能谱曲线斜率 K 及标准化碘浓度 (NIC) 在评估 CD 活动性方面具有很高的诊断价值和较好的敏感度和特异度, 可为临床精确诊断 CD 活动度提供客观依据。

PO-2521

儿童失神发作癫痫患者异常个体脑结构网络的探索

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研究目的: 失神发作是一种常见的儿童癫痫, 已被广泛认为存在异常的大脑结构和功能。然而, 是否存在特异性的个体协方差结构网络特征尚不清楚。

研究方法: 本研究中对 73 名儿童的个体结构协方差网络进行了映射和分析。38 名首次发作未经治疗的失神发作癫痫儿童和 35 名性别年龄匹配的正常儿童对照。全脑个体结构协方差网络是基于自动解剖标记 (AAL) 模板构建的并计算全局和节点网络度量进行统计分析。

结果: 我们发现失神发作儿童和正常对照儿童的脑结构网络均表现出小世界特性。失神发作儿童相对正常对照儿童在楔前叶存在较高的最短路径长度, 较低的全局效率, 以及更高的节点效率。

结论: 上述这些结果表明, 失神发作儿童存在特征性的脑结构网络异常, 该结构的异常可能导致认知功能受损。我们的发现可能有助于理解儿童失神发作, 并提示楔前叶可能在失神发作中的结构网络中起到重要作用提供了初步证据。

PO-2522

双能 CT 虚拟平扫技术在儿童腹部增强 CT 扫描中的应用: 降低辐射剂量

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目的 探讨儿童腹部双能 CT 虚拟平扫图像 (VNC) 代替真实平扫图像 (TNC), 降低儿童腹部多期检查辐射剂量的可行性。材料与方法 回顾性收集我院行腹部能谱增强 CT 检查的 0~16 岁患儿 136 例, 重建其动、静脉期 VNC (VNC-AP、VNC-VP)。测量 TNC、VNC-AP、VNC-VP 三组图像肝脏、肾脏、竖脊肌以及占位性病变 ($n=63$) 的 CT 值, 采用 Bland-Altman 法分析 VNC 和 TNC 间的

CT 值一致性。以竖脊肌 SD 作为图像噪声, 计算信噪比 (SNR) 和对比信噪比 (CNR), 并由两名影像医师对图像进行主观评分。对三组图像的病灶检出率以及辐射剂量进行评估比较。结果 VNC 与 TNC 各部位 CT 值一致性较好 (差异均值 $<7\text{HU}$), 病灶 CT 值差异 $\leq 4\text{HU}$ 。VNC-AP、VNC-VP 两组图像噪声均低于 TNC (15.53 ± 2.93 vs. 14.48 ± 2.39 , $P < 0.001$, $t=4.930$; 15.53 ± 2.93 vs. 14.49 ± 2.37 , $P < 0.001$, $Z=-4.871$), CNR 高于 TNC (1.77 ± 0.51 vs. 2.05 ± 0.57 , $P < 0.001$, $Z=-6.232$; 1.77 ± 0.51 vs. 2.03 ± 0.57 , $P < 0.001$, $Z=-5.992$)。在主观评价中, 三组图像所有图像均具有诊断价值, TNC 图像质量主观评价略高于两组 VNC (P 均 < 0.001)。三组平扫图像的病灶检出率无统计学差异 (94.12% vs. 92.94% vs. 92.94% , $P=0.939$, $\chi^2=0.126$)。两组 VNC 图像在各个指标上的差异均无统计学意义 ($P > 0.05$)。使用 VNC 的有效辐射剂量较使用 TNC 显著降低 (2.71 ± 1.80 vs. 4.23 ± 3.06 , $P < 0.001$)。结论 儿童腹部 VNC 图像质量能够满足影像诊断需求, 对病变描述较准确, 具有代替 TNC 的潜力。VNC 代替 TNC 后总辐射剂量可降低约 35.93%。

PO-2523

双能 CT 联合前瞻性心电门控技术在先心病患儿心脏 CT 血管成像的应用: 辐射剂量与对比剂剂量

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目的 通过比较减碘剂量双能 CT 虚拟单能图像 (VMI) 与常规单能 CT 图像, 探讨双能 CT 联合多期前瞻性心电门控, 降低先心病患儿心脏 CTA 辐射剂量以及对比剂剂量的可行性 方法 100 例先天性心脏病患儿被纳入研究。其中双能扫描组 ($n=50$) 采用双能扫描模式, 使用前瞻性心电门控; 常规扫描组 ($n=50$) 采用常规扫描模式, 使用回顾性心电门控。双能扫描数据重建 40~60KeV (间隔 5KeV) 5 组 VMI 图像。比较主动脉弓、升主动脉、肺动脉主干、降主动脉以及四个心腔的 CT 值、背景噪声、信噪比以及对比信噪比, 并由 2 名医师对图像质量做出主观评级。结果 各部位 CT 值、噪声、SNR、CNR 受 VMI 能级的显著影响。CT 值、噪声、SNR、CNR 均随着能级的降低而增加, 在 40KeV 组达到最大值 (P 均 > 0.05)。在主观评价中, 5 组 VMI 图像总体质量评分有差异 ($P < 0.001$)。40KeV~50KeV 评分均值显著高于 55KeV~60KeV 均值 (3.59 ± 0.60 vs. 2.88 ± 0.67 , $P < 0.001$)。45KeV 组 VMI 主要大血管及心腔 CT 值均高于常规 CT 组 ($P < 0.003 \sim 0.836$)。在图像噪声的比较中, 45KeV 组图像噪声高于常规 CT 组 ($P=0.004$)。SNR 与 CNR 在两组间无统计学差异。相较于常规扫描组, 45KeV 图像对比剂硬化伪影更少 ($P < 0.001$), 整体图像质量更高 ($P=0.037$)。两组间 CHD 诊断正确率无统计学差异 (80.90% vs. 74.36% , $P=0.310$, $\chi^2=1.031$)。双能扫描组辐射剂量较于常规扫描组降低 64.52%、碘剂量下降 40.45%。结论 双能 CT 联合前瞻性心电门控技术能降低 CHD 患儿心脏 CTA 检查辐射剂量与碘剂量。减碘剂量后 45 KeV VMI 血管内 CT 值、SNR、CNR 与常规扫描图像相同或更高, 且具有更少的对比剂伪影, 图像质量满足诊断要求。

PO-2524

能谱 CT 在儿童胸部大血管疾病的应用

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能谱 CT 利用不同能量 X 射线在物质中的衰减系数不同, 通过高、低两种能量对同一组织进行成像, 获得两种能量的衰减信息, 从而实现物质的鉴别、定量和定性分析, 相较于常规 CT 提供更丰富的信息。在成人中, 能谱 CT 已在肿瘤诊断与鉴别、心血管疾病诊断以及骨骼疾病评估等领域广泛应

用,并取得了显著的临床成果。然而,在儿童中,由于其生理特点与生长发育的不同,能谱 CT 的应用尚未充分被挖掘。

胸部心脏大血管疾病包括先天性心脏病、主动脉狭窄、动脉导管未闭、室间隔缺损、肺动脉狭窄、法洛四联症等,是儿科最常见疾病之一。然而,儿童胸部大血管疾病的正确诊断在儿科医学中仍然面临挑战。儿童生长发育阶段心脏和大血管结构复杂性的影响,传统 CT 成像在分辨率和软组织对比方面的局限,以及对儿童辐射安全的关注,使得儿童胸部大血管疾病的准确诊断相对困难。

能谱 CT 儿童胸部大血管疾病的准确诊断上具有独特优势。能谱 CT 可以提供更准确的软组织对比效果、物质定量分析以及物质鉴别,使医生能够获得更多有关儿童胸部大血管疾病的信息,从而更好地实现疾病的鉴别和评估治疗效果。此外,能谱 CT 在低辐射剂量与低对比剂剂量方面的优势,也有望进一步保障儿童患者的安全。

因此,能谱 CT 能为儿童胸部大血管疾病的准确诊断与治疗提供更可靠的支持,帮助医生更好地应对儿童胸部大血管疾病的挑战。

PO-2525

髋关节平片对 DDH 患者 limbus 的预测

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目的 探讨通过回顾 DDH 患儿的治疗前平片及 MRI,确定是否可以通过髋关节平片来初步推断孟唇形态。

方法 收集 2019 年 1 月至 2021 年 12 月在重庆医科大学附属儿童医院诊断为 DDH 且同时有治疗前平片及 MRI 影像学资料的患儿共 237 例 336 髋,男 78 例女 159 例,平均年龄 21.8 月,138 例单侧发病,99 例双侧发病。在治疗前 MRI 图像上判断孟唇形态并将患髋分为内翻、骑跨、外翻三组。在治疗前平片上测量相关数据,其中单侧发病的患儿测量各组患侧髋臼长度与正常侧髋臼长度的比值(记作 A/N)及患侧髋臼长度与髋一锥体椎弓根长度的比值(记作 A/S),双侧发病的患儿仅测量 A/S。采用独立样本 T 检验分析各组间的 A/N 值与 A/S 值是否存在差异,并作 ROC 图,计算曲线下面积,选取最佳截断值。

结果 单髋发病的 138 例患儿中,23 髋孟唇外翻,47 髋孟唇骑跨,68 髋关节孟唇内翻,双髋发病 99 例患儿中,77 髋孟唇外翻,40 髋孟唇骑跨,81 髋孟唇内翻。A/N 值在外翻型与骑跨型之间以及内翻型与外翻型之间有统计学差异($P<0.001$, $P<0.001$),A/S 值在内翻与外翻、内翻与骑跨以及外翻与骑跨三组之间均存在统计学差异($P<0.001$, $P<0.001$, $P=0.006$)。受试者工作曲线(ROC 曲线)提示当 A/N 值大于 0.945 时或 A/S 值大于 0.575 时,DDH 患侧髋臼孟唇形态为外翻的可能性大。

结论 在治疗前 X 线平片图像上测量 A/N 值及 A/S 值等指标可以较好的预测 DDH 患儿患侧髋关节孟唇的形态。

PO-2526

基于 MRI 的影像组学特征与儿童低级别胶质瘤免疫组化指标联系的研究

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目的: 探讨基于术前 MRI 的影像组学特征与儿童低级别胶质瘤 Ki-67, CD34, p53 表达状态的联系。

材料及方法: 收集资料完整的儿童低级别胶质瘤患者的临床、影像及免疫组织化学结果, 进行回顾性分析; 基于磁共振 T2 FLAIR 序列提取三维影像组学特征, 进行组学流程分析, 对 Ki-67, CD34, p53 表达状态进行二分类, Ki-67 分类方法是 Ki-67 $\leq 1\%$ 划分为阴性, $>1\%$ 划分为阳性, p53 定义零表达为阴性, 非零为阳性。利用受试者操作特性曲线、校准曲线及决策曲线分析评估模型诊断价值。结果: 该研究基于 T2 FLAIR 序列影像组学特征建立了三个预测模型。Ki-67 预测模型在训练集和测试集操作者工作特性曲线下面积分别为 0.775(95%CI:0.654-0.878), 0.871(95%CI:0.762-0.977); 敏感性分别为 0.629,0.533; 特异性分别为 0.829,0.882; 准确性分别为 0.737 和 0.719。CD34 预测模型在训练集和测试集操作者工作特性曲线下面积分别为 0.937(95%CI:0.880-0.979), 0.714(95%CI:0.516-0.886); 敏感性分别为 0.976, 0.833; 特异性分别为 0.765,0.571; 准确性分别为 0.880 和 0.719。p53 预测模型在训练集和测试集操作者工作特性曲线下面积分别为 0.891(95%CI:0.795-0.964), 0.643(95%CI:0.403-0.850); 敏感性分别为 0.813,0.5; 特异性分别为 0.862,0.667; 准确性分别为 0.836 和 0.577。据决策曲线分析 Ki-67, CD34 和 p53 模型均有临床净收益。结论: 利用基于 T2 FLAIR 序列的影像组学模型可以预测儿童低级别胶质瘤 Ki-67,CD34 和 p53 表达状态。

PO-2527

影像组学、临床因素和 CT 形态学特征的联合列线图模型在鉴别支原体肺炎和细菌性肺炎中的价值

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目的评估一种基于计算机断层扫描 (CT) 的放射组学特征、临床指标和 CT 形态学特征的联合列线图模型在区分儿童支原体肺炎与细菌性肺炎方面的临床价值。

方法回顾性分析 2019 年 11 月到 2022 年 2 月在山西省儿童医院接受胸部 CT 检查的 176 例支原体肺炎和 250 例细菌性肺炎患儿的资料。将所有病例数按 7: 3 随机划分为训练集 (n=410) 和测试集 (n=176), 根据病原学结果分为支原体肺炎亚组和细菌性肺炎亚组。对每位患儿的 CT 图像使用 phigo-LK 分割软件 (GE Healthcare) 进行自动分割。获得全肺区域的感兴趣区 (VOI) 并提取影像组学一阶特征、纹理特征及滤波特征。对训练组采用最大相关最小冗余 (MRMR) 算法和最小绝对收缩和选择算子 (LASSO) 为主的方法筛选关键特征, 并完成影像组学标签构建。采用受试者工作特征 (ROC) 曲线评价基于临床指标及 CT 图像特征、影像组学及其联合模型区分两种肺炎的能力。绘制校准曲线和决策曲线评估三种模型的校准效能和临床应用价值。

结果在临床-CT 模型中, 白细胞计数、C 反应蛋白、乳酸脱氢酶、树霉征及单肺病变为鉴别支原体肺炎和细菌性肺炎的独立特征, 训练组和验证组 ROC 曲线下面积分别为 0.913 和 0.909; 在放射组学模型中, 5 个放射组学特征与两种肺炎的识别相关, 在训练组和验证组中的 AUC 分别为 0.918 和

0.895; 包括临床指标、CT 图像特征和影像组学标签评分的联合列线图模型诊断效能最高, 在训练组和验证组中的 AUC 分别为 0.971 和 0.958, 校准曲线表明此列线图与实际具有良好的一致性。决策曲线分析表明其具有较高的临床净获益。

结论此联合列线图模型结合了基于 CT 的放射组学特征、临床因素和 CT 图像的形态学特征, 可为临床早期区分支原体肺炎和细菌性肺炎提供决策依据。

PO-2528

基于 DTI 图论分析法对痉挛型脑瘫儿童认知功能的研究

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DTI 被用于研究 CP 大脑的微观结构, 但既往研究多关注其运动功能。SCP 认知功能损伤的机制尚不清楚。因此, 本研究基于 DTI 采用图论分析法探讨痉挛型脑瘫 (spastic cerebral palsy, SCP) 儿童的脑网络属性与认知功能的关系。

招募 21 例 SCP 儿童 (男性 11 例, 年龄 8.6 ± 2.5 岁) 及 32 例对照组儿童 (男性 17 例, 年龄 8.9 ± 2.5 岁), 采集 3D-T₁WI、DTI 图像、行韦氏智力量表评估。SCP 组纳入标准: ① 4 岁-16 岁儿童; ② 3D-T₁WI、DTI 图像完整。排除标准: ① MRI 图像运动伪影; ② 韦氏智力评估失败。分析两组儿童脑网络小世界属性 (小世界标量 σ 、标准化最短路径长度 λ 、标准化聚类系数 γ)、全局属性 (全局效率 E_{glob} 、局部效率 E_{loc} 、特征路径长度 L_p 、聚类系数 C_p) 及节点属性 (节点中心度 DC 、节点效率 Ne 、介数中心性 Bc 、节点最短路径长度 NL_p 、节点聚类系数 Nc_p 、节点局部效率 Nle), 进行相关性分析。

(1) 组间比较: SCP 组儿童: ① 韦氏智力量表合成分数 (全量表智商 $FSIQ$ 、言语理解指数 VCI 、知觉推理指数 PRI 、工作记忆指数 WMI 、加工速度指数 PSI) 降低, $P < 0.05$ (表 1)。② 全局属性: E_{glob} 减低, L_p 、 λ 增加, $P < 0.05$ (图 1)。③ 节点属性: 多个脑区 DC 、 Ne 减低, NL_p 增高, $P < 0.05$, FDR 校正 (图 2)。(2) 相关性分析: SCP 组儿童右侧额下回后部 DC 与 $FSIQ$ 、 VCI 、 WMI 、 PRI 呈正相关 (表 2), 右侧额下回后部、右侧中央前回、右侧中央后回、左侧中央旁小叶 Ne 与 PRI 呈正相关 (表 3), 右侧中央前回 Ne 与 WMI 呈正相关 (表 3), 右侧额下回后部 Nl_p 与 PRI 呈负相关 (表 4), $P < 0.05$ 。

SCP 儿童全局及多个区域脑网络拓扑属性存在改变, 右侧额下回后部、右侧中央前回、右侧中央后回和左侧中央旁小叶节点属性改变与患儿认知功能损伤相关。

PO-2529

基于胎盘的虚拟磁共振弹性成像及基于 IVIM 的双指数和拉伸指数模型参数在预测小于胎龄儿预后中的价值

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目的: 对传统的影像学及实验室检查方法不能发现的真正存在不良结局的小于胎龄儿进行早期监测和处理至关重要。本研究旨在探讨基于弥散加权成像(DWI)的虚拟磁共振弹性成像(vMRE)和基于体素内不相干运动(IVIM)的双指数和拉伸指数模型参数在预测小于胎龄儿(SGA)的新生儿围产期不良结局中的价值。

方法: 本前瞻性研究纳入 20 例有不良结局的 SGA 新生儿和 40 例无不良结局的 SGA 新生儿。由两位经验丰富的放射科医生勾画胎盘的感兴趣区。选取低 b 值和高 b 值 (200 和 800 s/mm²), 通过 MATLAB 计算 1 个基于 DWI 的 vMRE 参数 (μ_{diff})。使用 Firevoxel 软件计算 5 个基于 IVIM 的参数 [真扩散系数(D)、伪扩散系数(D*)、灌注分数(f)、扩散分布系数(DDC)、扩散异质性指数(Alpha)]和表观扩散系数(ADC), 并进行组间比较。多因素分析得出 SGA 新生儿不良结局的独立危险因素。采用 Pearson 相关分析来阐明胎盘 μ_{diff} 值与胎龄之间的关系。

结果: 有不良结局的 SGA 新生儿胎盘 μ_{diff} 值显著高于无不良结局的 SGA 新生儿, f、DDC 和 ADC 值显著低于无不良结局的 SGA 新生儿。余参数在两组间无统计学差异。 μ_{diff} 和 f 值是 SGA 新生儿不良结局的独立预测危险因素。 μ_{diff} 和 f 值联合预测模型提高了预测效果。此外, 胎盘 μ_{diff} 与胎龄之间无统计学意义的相关性。

结论: 基于 DWI 的 vMRE 参数和基于 IVIM 的功能参数可以量化 SGA 新生儿胎盘弹性和微循环灌注。这是一种创新的辅助现有的产科早期监测和预测新生儿围产期不良结局的非侵入性方法。

PO-2530

三维动脉自旋标记灌注成像显示多动症儿童脑部血流灌注量降低

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目的: 探讨三维动脉自旋标记(3D-ASL)灌注成像在多动症儿童脑部的应用可行性。

方法: 前瞻性选取 5-13 岁多动症儿童 78 名为研究组, 选取年龄、性别相匹配健康儿童 89 名为对照组, 所有儿童均行磁共振常规序列、3D-ASL、3D-T1 序列扫描。通过软件后处理获得脑部各区脑灰白质体积和脑血流量 CBF 灌注值(采用 GE ADW 4.6 工作站, 将 3D-ASL 序列原始数据导入 Functool 软件, 获得脑血流 CBF 定量图, 为了计算不同脑区体积、CBF 等定量参数值, 我们采用了基于体素的形态学分析 VBM 法, 我们在 MATLAB 2018a 平台上, 使用 SPM12 软件, 将 3D-T1 序列结构图与 CBF 定量图进行配准, 在 SPM12 软件中利用 CAT12 工具包将配准后的 CBF 结构定量图进行分割, 最后提取各个脑区体积参数值和 CBF 参数值。), 比较分析两组儿童脑部各区脑灰白质体积和脑血流灌注量 CBF 值, 找出多动症儿童脑部各区脑灰白质体积和脑血流灌注量特点。

结果: 多动症儿童脑部总体积和脑部总血流量值低于健康儿童 ($P < 0.05$); 多动症儿童额叶、颞叶、海马、尾状核、壳核、苍白球等脑区灰白质体积低于健康儿童 ($P < 0.05$); 多动症儿童额叶、颞叶、海马、尾状核、壳核、苍白球等脑区灰质 CBF 值低于健康儿童 ($P < 0.05$); 多动症儿童额

叶、颞叶、海马、尾状核、壳核、苍白球等脑区白质与健康儿童相对应脑区白质 CBF 值差异无统计学意义 ($P>0.05$)；额叶、尾状核等脑区 CBF 值能区分多动症儿童 ($AUC>0.05$, $P<0.05$)。结论：3D-ASL 技术显示多动症儿童部分脑区脑血流灌注量降低,额叶、尾状核等脑区 CBF 值能区分多动症儿童。

PO-2531

定量磁共振成像技术在注意缺陷多动障碍伴孤独症特征儿童诊断中的应用

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目的：探讨定量磁共振成像技术在注意缺陷多动障碍伴孤独症特征儿童诊断中的应用可行性。

方法：前瞻性选取 4-5 岁注意缺陷多动障碍伴孤独症特征儿童 (ADHD-ATs) 56 名为研究组, 选取性别年龄相匹配注意缺陷多动障碍儿童 (without ATs) 53 名为对照组, 所有儿童均行磁共振 ESWAN、3D-PCASL、3D-T1 序列扫描; 通过软件后处理获得脑区铁含量 QSM 值、脑血流量参数 CBF 值 (为了计算不同脑区体积、QSM、CBF 等定量参数值, 我们采用了基于体素的形态学分析 VBM 法, 在 MATLAB 2018a 平台上使用 SPM12 软件, 将 3D-T1 序列结构图与 QSM、CBF 等定量图进行配准, 在 SPM12 软件中利用 CAT12 工具包将配准后的结构定量图进行分割, 最后提取各个脑区参数值), 比较分析两组儿童脑区参数值, 找出 ADHD-ATs 儿童脑区参数值特点。

结果：ADHD-ATs 儿童额叶、颞叶、海马、尾状核等脑区铁含量低于 ADHD 儿童, ADHD 儿童脑部总铁含量高于 ADHD-ATs 儿童 ($P<0.05$)；ADHD-ATs 儿童额叶、颞叶、苍白球、尾状核、壳核、海马等脑区 CBF 值低于 ADHD 儿童, ADHD-ATs 儿童脑部总 CBF 值低于 ADHD 儿童 ($P<0.05$)；ADHD-ATs 儿童额叶、颞叶、海马、尾状核等脑区 QSM 值与 CBF 值呈正相关；额叶、颞叶、尾状核等脑区 CBF、QSM 值能区分 ADHD-ATs 儿童和普通 ADHD 儿童 ($AUC>0.05$, $P<0.05$)，QSM 技术 AUC 值最高 (0.913)。

结论：ADHD-ATs 儿童脑部额叶、颞叶、尾状核等处铁含量、脑血流量低于普通 ADHD 儿童, 磁共振定量成像 (QSM、3D-PCASL) 技术可区分 ADHD-ATs 儿童, QSM 技术可作为 ADHD-ATs 儿童首选诊断技术选择。

PO-2532

扩散峰度成像显示注意力缺陷/多动障碍儿童部分脑区灰质和白质发育异常

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目的：探讨扩散峰度成像 (DKI) 在多动症儿童脑部的应用可行性。

方法：67 名多动症儿童和 72 名年龄、性别相匹配健康儿童纳入研究, 所有儿童均行磁共振 3D-T1、DKI 和常规序列扫描。通过软件后处理获得各脑区体积和 DKI 参数值 (采用 GE ADW 4.6 工作站, 将 DKI 序列原始数据导入 Functool 软件, 获得 DKI 参数图, 为了计算不同脑区体积、DKI 参数值, 我们采用了基于体素的形态学分析 VBM 法, 我们在 MATLAB 2018a 平台上, 使用 SPM12 软件, 将 3D-T1 结构图与 DKI 参数图进行配准, 在 SPM12 软件中利用 CAT12 工具包将配准后的 DKI 结构参数图进行分割, 最后提取各个脑区体积和 DKI 参数值), 比较分析两组儿童各脑区体积和 DKI 参数值, 找出多动症儿童各脑区体积和 DKI 参数值特点。

结果: 多动症儿童脑部总体积低于健康儿童 ($P<0.05$); 多动症儿童额叶、颞叶、海马、尾状核、壳核、苍白球等脑区体积低于健康儿童 ($P<0.05$); 多动症儿童额叶、颞叶、尾状核等脑区 Ka、MK、FA、Kr 值低于健康儿童, MD、FAK 值高于健康儿童 ($P<0.05$); ROC 结果分析显示额叶、尾状核、颞叶等脑区 Ka、MK、FA、Kr 值能区分多动症儿童 ($AUC>0.05$, $P<0.05$)。结论: DKI 成像显示多动症儿童部分额叶、尾状核、颞叶等脑区脑灰质和白质异常。

PO-2533

研究探讨 3.0T 磁共振准连续式动脉自旋标记灌注中不同标记距离及延迟时间在新生儿缺血缺氧性脑病的应用分析

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目的: 缺血缺氧性脑病是指围生期窒息引起的部分或完全缺氧、脑血流减少或暂停而导致的胎儿或新生儿脑损伤。缺血是新生儿 HIE 脑损伤早期的主要改变, 准连续式动脉自旋标记技术能够显示缺血性脑血管疾病所引起的血流低灌注, 且可以长期监测缺血区 CBF 变化情况, 了解缺血的发展进程。本研究通过分析不同标记距离及延迟时间对准连续式动脉自旋标记技术在新生儿缺血缺氧性脑病的应用, 以求取得最优参数。

方法: 选取本院自 2021 年 1 月至 2023 年 6 月 360 例结合病史、临床表现诊断为新生儿缺血缺氧性脑病的患儿行常规 MRI 及准连续式动脉自旋标记灌注检查, 在同一受试者的准连续式动脉自旋标记灌注采集 8 组数据, 延迟时间分别为 1500 ms、1750 ms、2000ms、2250ms, 在每个延迟时间下均采集了标记距离为 75 mm、90mm 两组数据。对比以上 8 组灌注结果的信噪比。由高年资医师对病灶对比度及分辨率进行对比评分, 结合 ROC 曲线对 8 组图像进行评价。

结果: 比较 8 组准连续式动脉自旋标记灌注检查结果。结合常规 MRI, 结果: 不同标记距离及延迟时间检查出的新生儿缺血缺氧性脑病的信噪比, 敏感性, 特异性, 准确性以及阳性预测值比较, 差异具有统计学意义 ($P<0.05$)。

结论: 经过我们对 360 例患儿扫描图像的对比研究, 综合分析信噪比, 敏感性, 特异性, 准确性以及阳性预测值, 在 3.0T 磁共振准连续式动脉自旋标记灌注检查新生儿缺血缺氧性脑病取延迟时间为 2000 ms, 标记距离为 90mm 时取得的效果最佳, 为最优组合。

PO-2534

产前 1.5T MRI 联合超声对胎儿 ACC 的诊断价值研究

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[摘要] 目的: 探讨产前 1.5T 磁共振成像 (MRI) 联合超声对胎儿胼胝体发育不全 (ACC) 的诊断价值。方法: 选取 2018 年 1 月至 2020 年 10 月我院经产前超声和 MRI 检查发现疑似胎儿 ACC 的孕妇 30 例。引产后的胎儿进行尸检诊断, 正常分娩的胎儿出生后行 MRI 进一步明确诊断。以产后确诊为金标准, 采用 Kappa 检验分析产前 MRI、超声与金标准的一致性。比较产前 MRI 与产前超声对完全型、部分型 ACC 的诊断效能。分析产前 MRI 与超声联合诊断的效能。结果: 30 例疑似病例中, 经出生后影像学检查或尸检结果确诊为 ACC 的胎儿有 22 例, 其中完全型 ACC 胎儿 15 例, 部分型 ACC 胎儿 7 例。产前 MRI 的灵敏度为 95.45%, 特异度为 100%, 准确率为 96.67%, 与金标准具有高度一致性 ($Kappa=0.918$)。产前超声的灵敏度为 81.82%, 特异度为 87.50%, 准确率为 83.33%, 与金标准的一致性中等 ($Kappa=0.619$)。产前 MRI 对完全型 ACC 的检出率为 100%, 漏诊率为 0; 产前超声对完全型 ACC 的检出率为 86.67%, 漏诊率为 13.33%。产前 MRI 对部分型

ACC 的检出率为 85.71%，漏诊率为 14.29%；产前超声对部分型 ACC 的检出率为 71.43%，漏诊率为 28.57%。两种方法对完全型、部分型 ACC 的检出率、漏诊率比较无显著差异 ($\chi^2=2.143$, $P=0.143$; $\chi^2=0.424$, $P=0.515$)。产前 MRI 与超声联合诊断的准确率为 100%。结论：产前 1.5T MRI 联合超声能提高胎儿 ACC 的诊断准确率，对于疑似病例可在产前超声的基础上进一步行 MRI 鉴别诊断。

PO-2535

儿童肝脏间叶性错构瘤与未分化胚胎性肉瘤的 CT 影像特征分析

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目的 探讨儿童肝脏间叶性错构瘤 (HMH) 与未分化胚胎性肉瘤 (UES) 的 CT 影像鉴别特征，以提高术前影像诊断正确率。

方法 回顾性分析经手术及病理证实的 25 例 HMH 和 15 例 UES 患儿的临床资料及 CT 影像，比较两组病例患儿 CT 影像表现及临床资料的差异。对患儿性别、血清甲胎蛋白 (AFP)、病灶位置、数量、生长方式、形态、边缘、有无钙化及出血、病灶内囊腔数量、囊内分隔、囊腔形态、囊腔内壁是否光滑、平扫实质密度、增强扫描动脉期病灶内有无增粗迂曲的血管、动脉期及门脉期强化程度的比较采用 χ^2 检验，对患儿年龄、病灶大小的比较采用 Mann-Whitney U 检验或 t 检验。

结果 两组在性别、病灶位置及数量、生长方式、形态、边缘、钙化、囊腔内分隔、平扫实质密度及增强扫描强化程度的比较差异均无统计学意义 ($P>0.05$)，在患儿年龄、血清 AFP、病灶大小、出血、病灶内囊腔数量、囊腔形态、囊腔内壁是否光滑、增强扫描动脉期病灶内血管的显现比较差异均有统计学意义 ($P<0.05$)。HMH CT 表现为：多显示为实性为主的囊实性病灶，病灶内囊腔多发、囊变区之间肿瘤实质较多，囊腔形态较规则，囊壁有一定张力，囊腔内壁较光滑。UES CT 表现为：多显示为囊性为主的囊实性病灶，病灶较大，易出血，囊性区为多房分隔样，囊腔形态不规则且囊壁无张力，囊腔内壁欠光滑，动脉期病灶内见增粗迂曲的血管。

结论 儿童 HMH 与 UES 在 CT 影像上有一定特征性，了解其影像特点，结合患儿年龄及血清 AFP 化验室检查，有助于对二者做出鉴别诊断。

PO-2536

ADHD 儿童动态功能稳定性的相关性研究： 基于静息态功能磁共振

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背景和目的：注意力缺陷/多动障碍 (ADHD) 是儿童期最常见的神经发育障碍，其特征是发育不当的注意力不集中和/或多动/冲动症状。静态和动态功能连接 (FC) 研究揭示了多动症患者的大脑功能障碍。然而，很少有研究测量 ADHD 儿童动态功能结构的稳定性。本研究旨在根据静息态功能磁共振成像数据，探究未经药物治疗过的 ADHD 儿童的功能稳定性 (FS) 变化。方法：收集 42 名 ADHD 儿童和 30 名健康对照 (HC) 的静息态功能磁共振数据。使用滑动窗口方法，通过测量动态 FC 随时间的一致性来获得每个体素的 FS。然后，我们选择 FS 改变的大脑区域作为种子来检查大脑区域的远程动态功能连接 (dFC)。最后，进行组间比较和相关性分析。结果：结果显示 ADHD 儿童表现出 (1) 双侧额上回 (SFG) FS 降低，右侧颞中回 (MTG) FS 增加，均属于默认模式网络 (DMN)；(2) 双侧 SFG (属于默认网络) 和左侧脑岛 (属于凸显网络) 之间的 dFC 增加 (GRF 矫正，体素 $p<0.001$ ，体簇 $p<0.05$)；和 (3) Stroop 试验中较差的表现与双侧 SFG

中 FS 的降低显著相关 ($r=-0.322$, $p=0.042$)。结论: 我们的研究结果表明, ADHD 儿童的异常功能结构涉及 DMN (双侧 SFG 和右侧 MTG) 和 SN (左侧脑岛) 区域。这项初步研究为多动症的动态大脑功能网络提供了新的见解。

PO-2537

CT 影像组学在高危神经母细胞瘤患者队列中识别超高危亚组

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目的: 利用 CT 影像组学分析在高危神经母细胞瘤患者队列中识别超高危 (ultra-high-risk, UHR) 亚组。

材料与方法: 回顾性纳入 105 例高危神经母细胞瘤患者, 按 7: 3 的比例分为训练集 ($n=74$) 和测试集 ($n=31$)。UHR 定义为在诊断后 18 个月内死于疾病的患者。从动脉期 CT 图像中提取并选择影像组学特征, 利用支持向量机算法建立最佳影像组学模型。计算曲线下面积 (area under the curve, AUC) 和 95% 置信区间 (confidence interval, CI) 等评价指标。此外, 我们还分析了该模型的拟合度和临床效益, 以及其与总生存期 (overall survival, OS) 的相关性。

结果: 识别 UHR 的最佳影像组学模型由 11 个特征组成, 在训练集中的 AUC、准确度、灵敏度和特异度分别为 0.911 (95%CI: 0.840-0.982)、0.892、0.857 和 0.906, 在测试集中的 AUC、准确度、灵敏度和特异度分别为 0.828 (95%CI: 0.669-0.987)、0.839、0.778 和 0.864。影像组学模型的预测概率和实际概率之间无统计学差异 ($P>0.05$), 且该模型在不同的风险阈值下具有净收益。影像组学模型在训练集中预测 OS 的一致性指数为 0.743 (95%CI: 0.672-0.814), 在测试集中预测 OS 的一致性指数为 0.688 (95%CI: 0.566-0.810)。该模型在训练集中预测 1 年、2 年和 3 年 OS 的 AUC 分别为 0.832、0.863 和 0.721, 在测试集中预测 1 年、2 年和 3 年 OS 的 AUC 分别为 0.870、0.836 和 0.638。

结论: 基于 CT 图像的影像组学模型有助于在高危神经母细胞瘤患者队列中识别 UHR 亚组, 并且该模型有助于预测疾病早期进展。

PO-2538

学龄前孤独症谱系障碍患儿静息态脑镜像同伦功能连接研究

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目的: 孤独症谱系障碍 (autism spectrum disorder, ASD) 是儿童常见的神经疾病, 是儿童常见的神经发育性疾病, 但其神经机制目前仍不清楚。本研究使用静息态功能磁共振技术, 基于体素镜像同伦功能连接 (voxel mirror homunculus connection, VMHC) 方法, 对学龄前 ASD 患儿进行大脑半球间同伦功能连接研究, 以探索半球间功能连接的变化。

方法: 本研究包括 24 例 (48.3 ± 11.9 , 19 名男性) 学龄前 ASD 患者和 17 例匹配健康对照者 (43 (33,65), 14 名男性), 所有参与者都接受了静息态功能磁共振和基于 T1WI 的三维磁化准备快速梯度回波扫描, 通过 DPABI (<http://www.rfmri.org>) 软件对数据进行预处理。采用 VMHC 方法进行大脑半球间功能连接改变。

结果: 与健康对照组相比, 学龄前 ASD 患儿的缘上回、海马、颞上回、颞极-颞中回、中扣带回、颞下回及直回的 VMHC 值减低 (FDR 矫正, 体素 >24)。

结论：我们的研究表明，学龄前 ASD 患儿额颞顶叶及边缘系统的 VMHC 减低，提示双侧大脑半球这些区域的同步性活动损害，半球间的信息交换机整合过程障碍。这可能与 ASD 患儿的认知功能损害、社会情感功能缺陷及感觉功能障碍有关，潜在反映了学龄前 ASD 患儿的神经病理机制。

PO-2539

实影渲染技术在儿童肋软骨病变的临床应用价值

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目的：探究实影渲染技术在重建儿童肋软骨的独特优势及临床应用价值。方法：选取 2021 年 1 月至 2022 年 12 月于我院受检的肋软骨畸形患儿 40 例作为研究对象，所有患儿均由 SIEMENS Force CT 扫描且上传至工作站行图像三维重建，A 组应用实影渲染技术重建（40 例），B 组应用容积再现技术重建（40 例），两组图像按照 4 个等级评估图像质量。结果：A 组图像明显好于 B 组图像，A 组图像上均可清晰显示肋软骨结构，而 B 组图像对肋软骨的显示清晰度明显低于实影渲染技术的三维成像。结论：实影渲染技术三维成像可以直观且立体呈现整体胸廓的解剖结构，在儿童肋软骨的三维成像方面有其独特的优势，可以大幅降低肋软骨病变的误诊率，对于临床诊断肋软骨病变有极其重要的指导意义。

PO-2540

CT 影像组学融合模型鉴别儿童支原体肺炎和病毒性肺炎

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目的：基于 CT 影像组学和临床特征相结合的融合模型，用于区分儿童支原体肺炎和病毒性肺炎。材料与方法：回顾性分析从 2021 年 8 月-12 月山西省儿童医院（山西省妇幼保健）453 例经病原学检测确诊为社区获得性肺炎患儿的临床及影像所有相关资料，其中支原体肺炎患儿 251 例，病毒性肺炎患儿 202 例。分为训练集（n=317）和测试集（n=136）。通过影像组学分析软件提取所有患儿的胸部 CT 平扫图像，经特征筛选构建影像组学标签，通过 Logistic 回归分析构建影像组学模型、临床特征模型及融合模型。使用 ROC 曲线、校准曲线及决策曲线评估模型性能。结果：从每个患儿胸部 CT 平扫图像中共提取 386 个纹理特征，并筛选出 10 个有价值的特征。影像组学模型中训练集的 AUC 是 0.936，测试集的 AUC 是 0.932。临床特征模型中训练集的 AUC 是 0.926，测试集的 AUC 是 0.915。在融合模型中训练集 AUC 为 0.967，测试集 AUC 为 0.963，且校准曲线一致性良好，决策曲线呈现较高的临床实用性。结论：影像组学融合模型鉴别支原体肺炎和病毒性肺炎，为临床早期诊治提供有效依据。

PO-2541

基于全脑体素分析研究扩散峰度成像 在新生儿缺氧缺血性脑病中的应用价值

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目的通过基于体素分析 (VBA) 方法, 探究扩散峰度成像 (DKI) 在新生儿缺氧缺血性脑病 (HIE) 中的诊断价值, 并比较不同程度新生儿 HIE 间 DKI 参数的差异。

材料与方法

以在我院医学影像科进行 MRI 检查且被临床诊断为 HIE 的新生儿 66 例为 HIE 组研究对象, 并分为轻度组、中度组和重度组。25 例围产期病史正常、无器质性神经系统疾病的新生儿作为对照组。HIE 组和对照组研究对象均在生后 28 内进行颅脑常规 MRI 和 DKI 的扫描。VBA 方法比较各组间全脑 DKI 衍生参数的差异, 统计方法采用 ANOVA/ANCOVA 及 scheffe 事后分析, 并采用高斯随机场 (GRF) 对结果进行校正。

结果 1. VBA 方法比较对照组、轻度组及中重度间差异, 发现大脑损伤的区域主要在上放射冠、上纵束、胼胝体、尾状核、丘脑和顶枕叶皮层区域, 且在峰度参数图及 FA 图中更为显著。此外, 还发现小脑上部、小脑中脚及小脑蚓部也出现了显著的损伤, 在 MD 图、Da 图及 Dr 图中更为显著。

2. VBA 方法事后比较中, 发现对照组与中重度间差异十分显著, MK 图、FA 图的差异主要在放射冠、上纵束、胼胝体及尾状核, Ka 图、Kr 图、MD 图及 Dr 图的差异主要在小脑上部和小脑中脚。对照组与轻度组间仅有 FA 图呈现出显著的差异, 主要在左侧上放射冠、小脑中脚和右侧小脑上部。而轻度组和中重度组间未表现出明显的差异。

结论 VBA 方法可进行自动全脑分析, 可显示 HIE 患儿常见的大脑白质和深部灰质损伤, 并且还呈现了 HIE 患儿皮层和小脑的损伤。同时, VBA 方法表现出不同损伤部位在不同参数图中的差异。大脑损伤在峰度参数图和 FA 图中有显著差异, 而小脑损伤则在 MD 图、Da 图和 Dr 图中有显著差异。

PO-2542

纵向揭示重组人生长激素对身材矮小儿童自发性脑活动的影响： 一项静息态功能磁共振成像研究

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背景: 重组人生长激素 (Recombinant human growth hormone, rhGH) 能改善身材矮小儿童身高和行为异常。然而, 目前关于 rhGH 对身材矮小儿童的自发性脑活动的影响尚不清楚。

目的: 探讨 rhGH 对身材矮小儿童生长发育、认知行为及自发性脑活动的影响。

材料与方法: 本研究共纳入 35 例身材矮小儿童, 并分为治疗组 (n = 14) 和未治疗组 (n = 21)。所有患儿分别在基线和一年随访结束时接受静息态功能磁共振成像和神经心理学评估。采用基于 rs-fMRI 的低频振幅 (low-frequency fluctuation amplitude, ALFF) 分析方法评估自发性脑活动。使用混合效应分析检测 rhGH 和时间对脑去 ALFF 值的相互作用效应。最后, 进行 Pearson 相关分析, 探讨显著改变的脑区 ALFF 值与临床指标之间的相关性。

结果: 治疗组的身高、体重、胰岛素样生长因子-1 水平、胰岛素样生长因子结合蛋白 3 水平和加工速度指数均显著升高。rhGH 与时间的交互作用在右侧壳核中表现明显, 其 ALFF 值在 rhGH 治疗后显著升高。此外, 在随访一年后, 未治疗组在左侧背外侧额上回观察到时间的主要效应, 其 ALFF

值明显下降。相关性分析显示, 未治疗组的左侧背外侧额上回的 ALFF 值与随访时的身高及加工速度指数呈正相关。

结论: rhGH 治疗不仅对身材矮小儿童的生长发育及认知行为有积极影响, 而且可以改善患儿的自发性脑活动。

PO-2543

膝关节滑膜炎炎症弥散加权成像表现与幼年特发性关节炎临床活动性的相关性研究

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目的: 总结幼年特发性关节炎 (JIA) 患儿膝关节滑膜炎的 DWI 表现, 探讨其与临床活动性的相关性。

方法: 回顾性分析 2018-2022 年临床确诊为 JIA 并 MRI 增强扫描提示膝关节滑膜增厚的 95 例患儿的临床和影像资料, 所有患儿均进行了膝关节 DWI 扫描, 对 DWI 图像中滑膜 ADC 值进行测量, 同时收集与 MRI 检查同期的红细胞沉降率 (ESR)、C 反应蛋白 (CRP) 等数据。采用 Mann-Whitney-U 检验比较临床活动性组与非活动性组的各项参数数值。利用 Spearman 相关分析法进行滑膜 ADC 值与实验室指标的相关性分析。

结果: 95 例 JIA (临床活动性组 54 例, 非活动性组 41 例), 中位年龄为 8.3 岁。ESR、CRP 和 ADC 值在临床活动性组与非活动性组间有显著差异; 临床活动性组与非活动性组中位 ADC 值分别为 $1.49 \times 10^{-3} \text{mm}^2/\text{s}$ 及 $1.25 \times 10^{-3} \text{mm}^2/\text{s}$, $p = 0.001$, 95% 可信区间为 $0.11 \sim 0.53 \times 10^{-3} \text{mm}^2/\text{s}$ 。ADC 值与 ESR 及 CRP 呈正相关 ($r = 0.62$, $r = 0.45$, $p < 0.05$)。

结论: DWI 做为无创性检查方式, 其 ADC 值可用于判断幼年特发性关节炎患儿膝关节炎症活动性。

PO-2544

腰部 MRI 评估腹侧马尾神经根横截面积在 II 型和 III 型脊髓性肌萎缩的应用价值

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目的 探讨腰部 MRI 评估腹侧马尾神经根横截面积在 II 型和 III 型脊髓性肌萎缩 (SMA) 的应用价值。方法 回顾性分析 2019 年 11 月至 2023 年 5 月于广州市妇女儿童医疗中心确诊的 SMA 患者 26 例, 其中 SMA II 型组 16 例、SMA III 型组 10 例。收集 2019 年 1 月至 2023 年 5 月期间与 SMA 患者性别、年龄匹配的正常志愿者 26 例为对照组。基于腰部 MRI 轴位 T2WI 快速自旋回波序列, 选取脊髓圆锥下方 10 mm 作为测量平面, 将图像放大 300 倍以清晰显示马尾神经根, 测量左、右腹侧马尾神经根最大横截面积。绘制 SMA II 型组、SMA III 型组与对照组的年龄与左、右腹侧马尾神经根横截面积散点图。采用 Pearson 相关性分析各组年龄与左、右腹侧马尾神经根横截面积相关性, 采用 Mann-Whitney 检验比较组间左、右腹侧马尾神经根横截面积差异。结果 Pearson 相关性分析结果显示 SMA II 型组 (左侧: $P = 0.105$, 右侧: $P = 0.068$)、SMA III 型组 (左侧: $P = 0.227$, 右侧: $P = 0.091$) 腹侧马尾神经根横截面积与年龄间不存在线性关系, 对照组腹侧马尾神经根横截面积与年龄间存在明显线性关系 (左侧与右侧 P 均 < 0.01)。SMA II 型组、SMA III 型组

与对照组间腹侧马尾神经根横截面积具明显统计学差异 (左侧与右侧 P 均 <0.01) , SMA II 型组与 SMA III 组组间左、右腹侧马尾神经根横截面积不具统计学差异 (左侧: $P = 0.121$, 右侧: $P = 0.053$) 。 结论 腰部 MRI 可用于评估 SMA II 型和 III 型儿童腹侧马尾神经根横截面积。腹侧马尾神经根萎缩是 SMA 患者的特征性生物学标志。

PO-2545

基于核磁共振放射组学模型预测儿童腹部神经母细胞瘤基因异常

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【摘要】 目的 探索基于核磁共振的放射组学特征预测儿童腹部神经母细胞瘤 (Neuroblastoma, NB) 存在基因异常的方法。资料与方法 回顾性分析 2019.4~2021.3 我院收治的 74 例经病理证实的腹部神经母细胞瘤患儿, 对他们术前腹部核磁共振图像进行感兴趣区勾画, N4 偏置场矫正、各向同性体素重采样及信号强度归一化后提取放射组学特征, 每例提取 1874 个放射组学特征; 采用 t 检验结合 lasso 进行特征筛选获取的放射组学特征, 应用 SMOTE (Synthetic minority over-sampling technique, SMOTE) 矫正数据不平衡性, 采用随机森林 (Random forest) 进行模型构建, 利用 80% 数据作为训练集对模型调优, 并用 20% 数据验证模型的准确度、敏感度、特异度及 ROC 曲线下面积 (AUC) 检验模型效能; 同时对比组学特征与肿瘤指标神经元特异性烯醇化酶 (NSE) 预测 NB 基因异常的效能。结果 74 例儿童腹部神经母细胞瘤中, 有基因异常的 27 例 (36%), 无基因异常的 47 例 (64%), 通过 t 检验和 Lasso 算法共获得 6 个放射组学特征与之相关, 利用这些特征基于随机森林构建模型, 经训练集数据进行机器学习后, 对腹部神经母细胞瘤有基因异常和无基因异常患儿进行预测, 训练集 10 次交叉验证后的平均特异度 0.67, 敏感度 0.69, 受试者工作特征曲线的曲线下面积 0.71, 模型准确度为 0.68; 测试集特异度 75%, 敏感度 73%, AUC 值 0.74, 模型准确度为 0.74; NSE 预测 NB 基因异常的 AUC 值 0.687。结论 应用放射组学以及机器学习技术对儿童腹部神经母细胞瘤基因异常进行预测是可行的, 通过 random forest 分类器建立的基于 6 个放射组学特征模型的诊断效能尚可; 同时放射组学特征预测存在基因异常 NB 的诊断效能优于肿瘤标记物 NSE。

PO-2546

产前超声联合 MRI 诊断胎儿先天性肺气道畸形的价值

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目的: 对先天性肺气道畸形 (CPAM) 胎儿进行产前诊断, 对评价不良出生结局或做好产时干预准备有一定价值。目前, 产前诊断主要包括超声检查和 MRI 检查。本研究旨在进一步探讨超声结合 MRI 在胎儿先天性肺气道畸形产前诊断中的价值。

方法: 收集 2018 年 1 月 1 日至 2022 年 12 月 31 日 29 例疑似 CPAM 并完成 MRI 检查的病例。收集超声和 MRI 测量的病灶-肺-头比 (CVR)。同时分别通过 MRI 测量患侧和健康侧肺肝信号强度进行比较。结合后期多次超声检查结果, 以及产后影像学检查和手术病理结果, 评价超声联合 MRI 的诊断价值, 为先天性肺气道畸形提供更合适的产前诊断和妊娠复查方案。

结果: 本研究共纳入 62 例患者, 其中引产 7 例, 出生后病变消退 5 例, 经产后影像学或手术结果证实的 CPAM 48 例, 支气管囊肿 1 例, 肺隔离症 1 例。其中产前超声确诊 55 例, 产前 MRI 确诊 56 例, 敏感性分别为 96.49% 和 98.25%。在病变的多次影像学回顾中, CVR 值表现出一定的波动规律。例如, CVR 的峰值出现在 26-28 周, 而在妊娠后期检查中, CVR 值呈现一定的消退趋势,

并在 30-33 周保持稳定。然而,在妊娠晚期的检查结果中,有 14 例在妊娠 30-37 周超声检查中难以发现病变,而 MRI 可以清晰显示妊娠晚期病变。患病侧与健康侧肺-肝信号比值的配对秩和检验,差异有统计学意义($P<0.05$),患侧的肺-肝信号强度比值低于健侧。

结论:超声联合 MRI 能准确诊断 CPAM,但超声在反映妊娠后期病灶范围及内部信号特征方面优势更明显。在检查过程中,CPAM 随孕周的增加呈现出先上升后下降的变化趋势。对于孕晚期超声检查的成像局限性,孕早期超声筛查的开展结合孕晚期 MRI 复查,可以对病变进行动态观察,患侧肺-肝信号强度比值与健侧存在差异。MRI 对先天性肺气道畸形肺发育程度的评价具有一定的价值。

PO-2547

弥散张量成像对孤独症谱系疾病儿童的研究

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摘要:目的:基于磁共振弥散张量成像(Diffusion tensor imaging, DTI)分析 2~6 岁孤独症谱系障碍(Autism spectrum disorder, ASD)儿童与同龄对照儿童脑白质不同区域差异性。方法:2022 年 12 月—2023 年 8 月,选取 10 例 ASD 儿童和 10 例正常对照儿童的 DTI 特点及 Gesell 发展量表(GDS)发育商,比较两组平均弥散系数(Mean diffusivity, MD)、各向异性比值(fractional anisotropy, FA)、表面弥散系数(apparent diffusion coefficient, ADC)的差异,并探索 ASD 组感兴趣区 FA 值与量表评分之间的关系。结果:与对照组相比,ASD 组的左侧小脑后脚、左侧胼胝体体部、左侧内囊后肢 FA 值降低($P<0.05$),ASD 组左侧小脑后脚、左侧胼胝体体部 ADC 值较正常对照组增高,其余感兴趣区的参数值未见明显差异($P>0.05$)。ASD 组左侧胼胝体体部的 FA 值与 Gesell 发展量表(GDS)发育商呈正相关($r=0.432, P<0.05$)。ASD 组 Gesell 量表发育商与左侧胼胝体体部 ADC 值呈负相关($r=-0.535, P<0.05$)。结论:ASD 儿童大脑可能存在广泛微结构改变,其中胼胝体损伤可能参与了 ASD 的病理生理过程并可进一步探究疾病严重程度。

PO-2548

能谱 CT 虚拟平扫在儿童腹部成像中的应用研究

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目的:通过定量分析儿童腹部虚拟平扫(VNE)与常规平扫(TNE)图像,探讨 VNE 在儿童腹部 CT 成像中应用的可行性。方法:自 2017 年 1 月至 2018 年 6 月,前瞻性连续纳入于上海儿童医学中心行腹部能谱 CT 扫描的患儿 35 例。应用 64 排 CT (GE Discovery CT 750 HD)行腹部平扫和增强扫描,采用低管电流(260mA)宝石能谱 CT 技术行动脉期扫描, TNE 和门静脉期采用常规多层螺旋 CT 扫描模式,利用虚拟平扫技术重建动脉期 VNE。测量比较 VNE 和 TNE 中肝脏、肾脏、胰腺、脾脏和肌肉的 CT 值、图像噪声值(SD 值)、对比噪声比(CNR)、图像质量主观评分、有效辐射剂量(ED)。结果:VNE 与 TNE 的各脏器 SD 值、CNR 比较,差异无统计学意义($P>0.05$)。VNE 各脏器与竖脊肌的平均 CT 值略低于 TNE,但具有良好的相关性($r: 0.509-0.952$)。VNE 主观图像质量评分与 TNE 比较,差异无统计学意义($P>0.05$)。省略 TNE 的两期方案的有效辐射剂量(动脉期采用能谱 CT 扫描模式、门静脉期采用常规多层螺旋 CT 扫描模式)略低于常规三期方案,差异无统计学意义($P>0.05$)。结论:VNE 图像 CT 值与 TNE 具有很好的相关性,图像质量较好,可满足临床诊断需求。VNE 技术在儿童腹部 CT 成像中具有一定的可行性,并可能为儿童腹部 CT 成像提供了一种更简单的方案。

PO-2549

儿童甲型 H3N2 与 H1N1 流感相关性脑病的影像表现比较分析

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目的：探讨儿童甲型 H3N2 及 H1N1 流感相关性脑病 (Influenza associated encephalopathy, IAE) 并发症的 CT 和 MR 影像表现，比较两者影像学表现的差异。

方法：回顾分析经临床实验室检查确诊的 17 例儿童甲型 H3N2 流感以及 19 例 H1N1 流感的临床及影像资料，并复习相关文献。

结果：36 例患儿中男孩 23 例，女孩 13 例，年龄范围 8 月~13 岁，H3N2 及 H1N1 平均年龄分别是 5.23 ± 3.73 岁、 6.01 ± 3.01 岁。患儿均有发热，H3N2 及 H1N1 抽搐比例分别是 58.8%、47.4%，出现意识障碍症状分别是 23.5%、36.8%。H3N2 患者中有 4 例并发急性坏死性脑病 (acute necrotizing encephalopathy, ANE)，H1N1 流感并发 ANE 有 7 例，ANE 预后明显较差，总病例中 12 例死亡，H3N2 及 H1N1 占比分别是 17.6%、47.4%。两种病毒的颅脑 CT 及 MRI 影像表现均表现为多灶性、部分对称性的异常表现，均以累及双侧丘脑、基底节区、双侧大脑半球额顶颞枕叶、小脑半球及脑干，出现不同程度脑肿胀，病变区 CT 表现为低密度影，MRI 的 T1WI 呈低信号，T2WI 及 FLAIR 呈高信号影，DWI 呈高信号，ADC 图呈不均匀低信号，ANE 典型表现 ADC 图可见“三色模式”。H1N1 型流感累及脑干、小脑明显多于 H3N2 型，前者发热最高体温明显高于后者，差异均具有统计学意义。

结论：儿童甲型 H3N2 及 H1N1 流感相关性脑病的 CT 和 MR 影像表现相似，H1N1 型流感累及脑干、小脑更多于 H3N2 型，且发热最高体温更高于后者，尽早应用 MRI 检查可避免漏诊。

PO-2550

超低剂量胸部平扫结合深度学习算法 (DLR)
重建在儿童肺部感染筛查中的应用

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目的：探索深度学习重建算法 (DLR) 结合超低剂量胸部平扫在儿童肺部感染筛查中的应用价值。

方法：收集临床怀疑肺部感染而行胸部平扫的患儿共 30 名，随机分为两组，实验组 A ($n=14$) 和对照组 B ($n=16$)，A 组采用 80KVp、转速 0.28rot/s 超低剂量扫描协议，并将扫描数据进行 DLR 图像重建；B 组采用 100kvp、转速 0.35rot/s 常规扫描协议，并采用 Asir-V 迭代算法进行图像重建。分别记录两组扫描数据的 CTDI、DLP、主动脉 CT 值、主动脉 SD 值、背部肌肉 CT 值和 CT 值。分别计算两组图像的 SNR 和 CNR 值，进行图像客观评估，并采用 3 分法对图像的呼吸运动伪影进行主观评估。结果：CTDI 和 DLP 实验组和对照组分别为 1.42mGy，35.65 mGy*cm 和 3.46 mGy,89.48mGy*cm，实验组较对照组分别降低了 59%和 64%，组间差异具有显著性意义；SNR、CNR 值对照组高于实验组，组间差异没有显著意义；主观评分实验组明显高于对照组，组间差异具有显著性意义。结论：深度学习重建算法 (DLR) 结合超低剂量扫描可以在保证图像质量的同时明显降低辐射剂量，减少呼吸运动伪影，在儿童肺部感染筛查中具有一定的意义。

PO-2551

基于深度学习的 Bolus 跟踪技术在儿童腹部 CTA 中的性能评估

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目的: CTA Bolus 注跟踪扫描过程通常包括监测位置选择和感兴趣区域 (ROI) 的放置, 以生成触发 CT 扫描的时间密度曲线 (TDC)。在此研究中, 我们旨在评估基于人工智能的算法 SmartPlan 在儿科腹部增强 CT 检查中的推注跟踪过程的性能。

方法: 前瞻性收集 226 例小儿腹部 CTA 检查。记录多年资儿童 CT 影像技师在推注跟踪扫描中放置 ROI 的监测位置和 ROI 中生成的 TDC 作为对照组(Fig.1-2); 然后将定位扫描和时间分辨图像导入 SmartPlan 软件, 以自动确定放置 ROI 的监测位置并生成 TDC, 并将结果记录为实验组。SmartPlan 过程中有两个步骤, 即监测部分选择和 ROI 选择。对于监测断面选择步骤, 我们计算了断面选择的准确性, 并将 SmartPlan 定义为如果 SmartPlan 选择的断面与技术人员选择的断面之间的距离小于 1cm, 则 SmartPlan 是准确的。对于 ROI 选择, 我们计算了 SmartPlan 的通过率, 并定义了通过标准, 因为 ROI 位于主动脉内。

结果(Fig.3): 对于 Smart Plan 中的监测断面选择和 ROI 选择过程, 监测断面选择的准确性为 97.35%, 置信区间为 95%[95.24%, 99.44%], 监测 ROI 选择通过率为 0.962, 置信区间为 95%, 实验组与对照组 TDC 曲线峰值无差异 (均 $P>0.05$), 实验组耗时比对照组显著减少 18.18 ± 1.17 秒 ($P<0.05$) (Table.1)。

结论: 结合经验丰富的儿童 CT 影像技师, 基于人工智能的自动推注追踪技术可以有效地提高儿科腹部增强 CT 推注追踪的准确性。

临床相关性: 基于 AI 的自动推注追踪技术可以通过快速、急性自动触发 CT 扫描来简化儿童腹部 CTA 的 CT 扫描过程。

PO-2552

中国华北地区儿童心脏形态、功能磁共振参考值

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目的: CMR 双心室体积、功能和质量正常参考值对于儿童心室舒张功能障碍评估是至关重要的, 是多种儿科心脏病发病率和死亡率的重要预测指标, 尚没有关于亚洲地区的报道。我们试图通过结合先前发表的研究数据并以标准化的重建和量化方式创建中国华北地区儿童双心室体积、功能和质量基于 SSFP 的 CMR 参考值。

方法:

1. 研究人群

此项研究回顾性收纳了 CMR 检查且检查结果为阴性的 28 天至 18 岁儿童患者 217 例, 评估其双心室大小和收缩功能参数。

2. CMR 采集协议: 所有 CMR 检查由 1.5T 完成的。心脏成像协议中包括标准电影稳态自由进动序列。此 CMR 方案中不包括静脉注射钆造影剂。

3. CMR 分析

CMR 图像由三名多年资医学影像技师使用专用软件程序进行分析。CMR 数值指数使用以 Du Bois 公式确定的患儿体表面积。

3.1 心室容积和功能

左心室: 手动追踪舒张末期 LV 心内膜和心外膜边界、收缩末期仅追踪 LV 心内膜边界 (图 1), 包含乳头肌、LV 流出道和室间隔

左心室容积=舒张末期心外膜和心内膜体积之差

左心室质量=心肌体积×心肌密度

LV 舒张末期和收缩末期根据短轴和长轴图像（分别为最大和最小容积）进行定义，相应相位用于 LV 分析

4.统计学分析：利用箱形图、正态概率图和密度函数直方图对样本变量作正态分布验证。Student t 检验用于连续变量的性别间比较，卡方检验用于分类变量的比较。

结果：全部患儿 CMR 图像显示均不存在结构性心脏病。全部样本的个体信息汇总统计数据归纳在表 1 中。男孩的指数双心室容积和左心室质量较大 48.5 ± 9.62 .vs 36.6 ± 6.0 g/m, 62.2 ± 4.1 vs $62.8\pm 4.2\%$ (表 2)。对于所分析的大多数参数，观察者观察者之间的一致性良好。

结论：本研究提供了除新生儿期以外的儿童总体和性别分类下的心脏大小、功能以及心肌组织特性的 CMR 参考值。这些信息对临床实践很有用，可能有助于该人群心脏疾病的鉴别诊断。

PO-2553

MRI 3D-UTE 序列不同翻转角成像以及与 3D-DESS 序列 在未成年猪离体膝关节中的对比研究

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目的：探讨 3D-UTE 不同翻转角 (FA) 以及与 3D-DESS 在未成年猪离体膝关节 (标本) 中的应用价值，为儿童膝关节成像做初步研究。

方法：运用膝关节线圈对 4 个标本进行两种 3D 扫描，主要成像参数如下。3D-UTE: TR=171ms, TE1=0.04ms, TE2=2.8ms; 每个标本采用不同 FA (3、5、8、11、15) 扫描。3D-DESS 序列: TR=14ms, TE=5ms, FA=28°。对所有图像进行矢状位重建，分别在后交叉韧带、胫骨骨皮质、邻近完整肌肉、股骨远端、胫骨近端、髌骨三个部位的软骨放置大小约 20mm² 的感兴趣区 (ROI)，测量信号值 (SI) 和标准差 (SD)，计算得到信噪比 (SNR=SI/SD)。对 3D-UTE 同一部位不同 FA 条件下 TE1 的 SNR 进行单因素方差分析；对同一部位 3D-UTE 的 TE2 和 3D-DESS 上的 SNR 进行配对 t 检验。

结果：(1) FA=3、5、8、11、15 时，SNR 在后交叉韧带依次为 18.43 ± 9.04 、 16.23 ± 3.09 、 16.47 ± 1.78 、 21.24 ± 6.36 、 19.37 ± 3.94 ，在胫骨骨皮质依次为 9.1 ± 2.16 、 8.77 ± 2.66 、 11.52 ± 5.16 、 9.53 ± 2.94 、 11.90 ± 3.05 ，在邻近完整肌肉依次为 13.06 ± 4.81 、 14.85 ± 5.72 、 15.72 ± 5.47 、 15.61 ± 6.06 、 13.64 ± 4.81 。(2) 两种 3D 序列在股骨远端软骨的 SNR 分别为 15.64 ± 3.35 、 16.14 ± 2.04 ，在胫骨近端软骨的 SNR 分别为 17.21 ± 4.98 、 15.67 ± 4.14 ，在髌骨软骨的 SNR 依次为 16.49 ± 3.26 、 15.27 ± 3.7 。(3) 上述差异无统计学意义 ($P>0.05$)。

结论：(1) 3D-UTE 能够显示韧带、骨皮质、肌肉，不同 FA 条件下 SNR 相差不大。(2) 两种 3D 序列参数不同，但对标本软骨的显示能力相当。

PO-2554

多模态 MRI 在脊髓性肌萎缩症肌肉定量研究中的应用进展

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目的：脊髓性肌萎缩症(spinal muscular atrophy, SMA)是由于染色体 5q13.2 上的运动神经元存活 (survival motor neuron, SMN)1 基因发生双等位基因缺失或突变而导致的常染色体隐性遗传病，主

要表现为进行性、对称性肌无力和肌萎缩。目前以诺西那生钠为代表的反义寡核苷酸药物已广泛用于改善 SMA 患者的运动功能,因此,一种无创、客观、敏感的生物标志物对于疾病监测及疗效评估具有重要临床价值。定量 MRI (quantitative MRI, qMRI) 能可靠地反映神经肌肉疾病的肌肉组织特征,早期、客观地反映显示个体肌肉受损情况。本文拟从肌肉微结构角度,阐述肌肉 qMRI 技术在 SMA 研究中的应用进展。

方法: 在 PubMed、Web of Science、Geenmedical 数据库中搜索关键词“脊髓性肌萎缩症、定量磁共振”,查阅 2010 年 3 月-2023 年 1 月 qMRI 在 SMA 肌肉微结构定量应用的相关文献,整理并排除无关文献,主要参考近 5 年文献进行分析。

结果: 最终纳入 17 篇文献研究,其中英文 17 篇,中文 0 篇,文献内 5 年引用率为 76%,外文引用率为 100%。本文得出,多种 qMRI 技术如 T1WI、化学位移同反相位成像技术、DTI 技术,可用于反映 SMA 疾病严重程度、监测疾病进展及评估药物疗效,而 T₂ mapping 的临床价值尚存争议。31P-MRS 可量化细胞能量代谢过程中的含磷生物分子,通过分析磷酸肌酸的恢复动力学来评估线粒体功能。MT 肌肉成像尚未在 SMA 中开展,其应用价值仍需在未来研究中探索。

结论: qMRI 可客观定量评估 SMA 疾病严重程度,并对疾病的进展及疗效评价具有重要意义。因此,随着影像技术的革新与发展,我们应着重应用客观、无创的影像技术从肌肉微结构角度评估 SMA 严重程度、疾病进展情况及药物疗效,挖掘可靠、多重性的影像学生物标记物,为临床提供个性化指导。

PO-2555

磁共振 3D UTE 序列与常规 2D 序列在儿童膝关节疾病中的对比研究

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目的 探讨 3D UTE 与常规 2D 序列在儿童关节疾病中的应用研究。

材料与方法 选取 5 例来我院行磁共振膝关节患儿,男性 4 例,女性 1 例,6 岁-14 岁,应用联影 uMR570 扫描。用膝关节专用线圈,扫描序列为: T1WI-FSE、PDWI-FSE-FS、3D UTE, 3D UTE 主要扫描参数: TR=7ms, TE1=0.09-0.16ms, TE2=4.48ms, Flip Angle°=8, scan time=5: 07min, 并生成短 TE 回波、长 TE 回波、SUB 三组图像。图像进行多平面重建,在矢状面测量计算各序列股骨远端、胫骨近端、髌骨软骨及前、后交叉韧带 SNR。统计分析用两样本 t 检验或两样本秩和检验。比较计算上述软骨及韧带 SNR 在 3D UTE 短 TE 回波与 T1WI-FSE 图像上的差异, 3D UTE 长 TE 回波与 PDWI-FSE-FS 图像上的差异。记录 3D UTE SUB 图像上述软骨及韧带 SNR, 用均数±标准误差表示。

结果 测得膝关节上述软骨及韧带 SNR 在 3D UTE 短 TE 回波图像上为 15.5, 16.2, 18.32±6.12, 17.4, 21.7, 长 TE 回波图像上为 10.3, 11.2, 19.1, 12.6, 5.94±2.42, T1WI-FSE 图像上为 9.0, 10.8, 13.27±3.62, 6.6, 3.9, PDWI-FSE-FS 图像上为 4.2, 5.2, 4.9, 3.5, 3.22±0.64, 以上每组差异均有统计学意义 (P<0.05)。3D UTE SUB 图像上 SNR 为 4.92±1.63, 4.24±1.30, 3.09±1.53, 6.73±3.26, 5.68±2.13。

结论 1、膝关节上述软骨及韧带 SNR 3D UTE 短 TE 回波高于 T1WI-FSE, 3D UTE 长 TE 回波高于 PDWI-FSE-FS。2、3D UTE SUB 图像, 能给临床提供更多信息, 对诊断儿童早期关节疾病具有较大指导应用价值。

PO-2556

利用 MARs 及深度学习图像重建减少儿童脊柱术后 CT 图像金属伪影的可行性

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目的：评估降低金属伪影算法 (MARs) 结合深度学习图像重建 (DLIR) 在儿童脊柱术后患儿 CT 扫描中，降低椎弓根螺钉引起的金属伪影的应用可行性。

方法：对 25 例 (7~14 岁) 儿童 (共 196 颗椎弓根螺钉) 在脊柱手术后进行 140kV 低剂量 CT 扫描，固定管电流 70mA，以确认脊柱或螺钉的状况。对照组仅使用 DLIR 算法进行图像重建，研究组同时使用 DLIR 与 MARs (DL-MARs) 进行图像重建。测量硬化伪影 (LHA) 的长度，定义为沿螺钉长轴从螺钉头到正常图像区域的阴影的长度。椎弓根的图像质量使用 4 分制进行评估 (4 分：清晰，3 分：受伪影影响但可观察，2 分：因严重伪影而难以观察，1 分：无法观察)。

结果：CT 扫描辐射剂量为 $2.61 \pm 0.00 \text{mGy}$ 。DL-MARs 图像中的 LHA 为 $17.00 \pm 12.56 \text{mm}$ ，显著低于仅 DLIR 图像中的 $29.78 \pm 15.15 \text{mm}$ 。主观评分结果 DL-MARs 明显优于对照组 (3.9 ± 1.1 vs. 2.8 ± 1.0) ($P < 0.05$)。

结论：DLIR 结合 MARs 可显著减少金属螺钉引起的低密度伪影，提高椎弓根结构和金属螺钉的可视性。

PO-2557

婴儿泛发性动脉钙化的一例报告并文献复习

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目的：探讨婴儿泛发性动脉钙化的影像学表现特点。方法：回顾性分析一例婴儿泛发性动脉钙化的 CT 及 MRI 表现，以分析本病的影像学特点。结果：婴儿泛发性动脉钙化 (generalized arterial calcification, GACI) 是一种罕见的常染色体隐性遗传病。本病特征性表现为大中动脉内弹力层弥漫性钙化，由于内膜增生导致管腔中断或狭窄。本病预后较差，确诊需要病理组织活检，影像学检查具有非常重要的诊断意义。产前超声可发现胎儿水肿、羊水过多、血管壁回声增高等。生后超声心动可发现左心室不同程度的肥厚、血管广泛管壁回声增高、心脏增大等。X 线平片可发现心影增大、肺水肿等。明确诊断主要依靠的是 CT 检查，CT 平扫可明确显示受累动脉及其分支血管管壁钙化这一直接征象，部分病例可见胸锁关节、髋关节内钙化或关节周围钙化。通过 CT 或 MR 血管造影可进一步显示受累血管的管腔情况，明确狭窄或闭塞的范围和严重程度，同时观察受累血管所支配的组织器官有无缺血性改变，有无出现灌注减低的征象。对于存在多部位血管异常的患儿，需根据不同征象帮助临床作出病因的鉴别诊断，包括大动脉炎、肌纤维发育不良。心脏 MRI 虽不能直接显示钙化，但可通过 CE-MRA 显示血管管腔变细或判断是否存在梗阻，心脏电影序列可进行心功能处理，提示左心室或双心室功能减弱。GACI 的发病年龄、症状及严重程度甚至包括影像学表现均与不同的致病遗传基因有关，ENPP1 基因致病较 ABCC6 基因致病的婴儿泛发性动脉钙化更容易发生血管广泛性钙化。ABCC6 基因突变可导致弹性假黄瘤变 PXE，后者被认为与 GACI 为异位钙化疾病谱的不同表现。结论：产后即出现心衰、高血压且影像学发现大中动脉广泛钙化，可高度提示婴儿泛发性动脉钙化；若起病年龄晚且表现不典型，但影像学提示多发血管异常亦不能除外本病的可能性，及时提示临床以助于早期诊断。

PO-2558

1 例婴幼儿心内膜弹力纤维增生症的 MRI 表现及文献复习

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目的：探讨 MRI 在婴幼儿心内膜弹力纤维增生症(endocardial fibroelastosis, EFE)诊断中的价值 **方法：**回顾性分析、总结我院 1 例诊断为心内膜弹力纤维增生症患儿的影像学表现并相关文献复习 **结果：**本例为 7 个月的男性患儿，因间断咳嗽伴喘息就诊，超声提示左室显著增大、收缩功能减低，左室局部心肌结构疏松，心脏 MRI 表现为左心室扩大，左室壁运动减低，T2WI 上局部心肌信号增高，首过灌注示基底及中间部前间隔段、前段及前外侧段心内膜下低信号影，10 分钟延时增强扫描可见强化，左室 EF 值约 23%，同时该患儿冠脉 CTA 示左右冠状动脉起源及走行未见异常，结合临床及影像表现诊断为 EFE。**结论：**心内膜弹力纤维增生症的 MRI 影像表现具有一定的特征性，能够对心脏形态、功能及组织特性进行一站式检查，为临床早期诊断及预后提供依据。

PO-2559

基于 CT 三维可视化技术在儿童胰胆管合流异常肝血管解剖变异中的分析

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目的：通过 CT 重建及三维可视化技术来观察和分析儿童胰胆管合流异常 (pancreaticobiliary maljunction, PBM) 的肝血管解剖和变异。

方法：回顾性分析 2015 年 1 月至 2023 年 4 月在我院诊断为 PBM 并保留有腹部薄层增强 CT 扫描图像的患儿资料。共纳入 160 名 PBM 患儿，其中女性 126 名 (78.7%)，年龄 (3.57±3.09) 岁。此外，纳入年龄、性别与 PBM 组相匹配的非 PBM 儿童作为对照组，回顾性分析其影像资料。对照组共纳入 234 名儿童，其中女性 176 名 (75.2%)，年龄 (3.81±3.12) 岁。

所有检查者均采用美国 GE optima CT 660 扫描机，扫描完成后图像传至 GE 后处理工作站，重组层厚 0.625 mm、层间距 1mm 的薄层图像，使用工作站自带的 Viewer 软件包进行三维立体重建，获得多平面重组、曲面重组、最大密度投影以及容积再现等多种方法进行观察。由两名经验丰富的放射科医生对影像图像进行独立双盲分析，记录肝动脉及门静脉的解剖分型。如果观察结果不一致，则通过讨论协商达成统一。肝动脉系统采用 Hiatt 分型方法，分为 I~VI 型；门静脉系统采用 Couinaud 分型方法，分为 I~V 型。

结果：根据 Hiatt 分型，PBM 组中肝动脉变异发生率为 18.1%，其中最常见是 II 型 (9.4%)，其次是 V 型 (3.8%)；对照组中肝动脉变异发生率为 12.8%，最常见的类型分别是 II 型 (4.7%) 和 III 型 (4.3%)。根据 Couinaud 分型，PBM 组中门静脉变异发生率为 20.0%，最常见的类型是 IV 型 (5.0%)；对照组中门静脉变异发生率为 15.8%，最常见的类型是 III 型 (5.1%)。与对照组相比，PBM 组肝动脉和门静脉变异的发生率均没有显著差异 ($P > 0.05$)。但 PBM 组中同时存在肝动脉和门静脉变异的发生率显著高于对照组 (7.5% vs. 2.1%; $P < 0.05$)。

结论：PBM 患儿同时存在肝动脉和门静脉变异的发生率高于一般人群，CT 三维可视化技术有助于确定肝血管的解剖变异，对 PBM 患者术前精准评估及指导手术具有一定意义。

PO-2560

儿童慢性肾脏病心脏重构的 CMR 研究

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目的: 利用心脏磁共振 (cardiac magnetic resonance, CMR) 探讨慢性肾脏病 (chronic kidney disease, CKD) 儿童心脏重构的特征及其影响因素。

方法: 本研究前瞻性招募 CKD 儿童 138 例以及正常对照组 50 例, 所有研究对象均进行 CMR 心脏电影序列评估。心脏重构参数包括: 左心室心肌质量指数 (left ventricular mass index, LVMI)、左心室重构指数 (left ventricular remodeling index, LVRI) 及左室壁厚度。

结果: 与正常对照组相比, CKD 1–2 期、CKD 3–5 期患儿的左室壁厚度 (4.66 ± 0.63 vs. 5.06 ± 0.73 vs. 5.69 ± 1.11 mm) 及 LVRI (0.53 ± 0.05 vs. 0.59 ± 0.10 vs. 0.67 ± 0.15 g/ml) 均有增加 (all $P < 0.05$)。且 CKD 3–5 期患儿的左室壁厚度及 LVRI 均较 CKD 1–2 期增加。CKD 1–2 期患儿与对照组相比 LVMI 的差异无统计学意义 ($P = 0.189$), 而 CKD 3–5 期患儿 LVMI 较对照组明显增加 (53.0 ± 14.8 vs. 38.6 ± 6.2 g/m², $P < 0.001$)。

多元线性回归分析显示 eGFR、蛋白尿分级、收缩压与心脏重构参数 LVMI (eGFR: $\beta = -0.047$; 蛋白尿分级 $\beta = 1.741$; 收缩压 $\beta = 0.391$)、LVRI (eGFR: $\beta = 0.000$; 蛋白尿分级 $\beta = 0.033$; 收缩压 $\beta = 0.003$) 独立相关 (all $P < 0.05$)。血红蛋白是重构参数 LVMI ($\beta = -0.176$) 的独立影响因子。

结论: CKD 儿童普遍存在心脏重构, 在早期即可发生。心脏重构的影响因素有肾小球滤过率减低、蛋白尿、高血压及贫血。

PO-2561

基于沿血管周围弥散张量成像分析和脑网络参数诊断难治性癫痫

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目的: 结合沿血管周围弥散张量成像 (DTI-ALPS)、分数各向异性 (FA)、平均弥散性 (MD) 和脑网络参数构建模型, 对儿童难治性癫痫 (IE) 进行早期诊断。

方法: 回顾性收集我院性别、年龄匹配的癫痫患儿 72 例, 健康儿童 26 例。在癫痫组中, IE 15 例, 药物敏感性癫痫 (DSE) 57 例。所有参与者均在 Siemens 1.5T MRI 上进行 3D-T1WI、3D-T2WI 和 DTI 检查。利用 FSL 和 MATLAB 软件测量 DTI-ALPS、FA 和 MD 值, 使用 Panda 和 Gretna 软件提取脑网络特征。三组间定量资料比较采用方差分析, 定性资料比较采用卡方检验。采用受试者工作特征曲线 (ROC) 评价模型对儿童癫痫的诊断效果。 $P < 0.05$ 为差异有统计学意义。

结果: 与对照组比较, 癫痫组 DTI-ALPS、FA 值较低, MD 值较高。与 DSE 组比较, IE 组 DTI-ALPS 和 FA 值较低, MD 较高, 累及穹隆、左内囊后肢、左额枕上束、左胼胝体毯部、豆状核后部和右海马扣带 (图 1a)。癫痫组的节点效率低于对照组 (图 1b), IE 组的节点效率低于 DSE 组 (图 1c), 累及右中央前回、左额中回、右楔叶、右尾状核、与右眶部额中回和左内侧额上回。单参数识别癫痫和对照组的 AUC 值为 0.65~0.73 (图 1d-e), 识别 DSE 和 IE 的 AUC 值为 0.76~0.86 (图 1d-h)。多参数模型诊断癫痫的敏感性为 72.22%, 特异性为 84.62%, AUC 为 0.86 (图 1f); 诊断 DSE 和 IE 的敏感性为 80.00%, 特异性为 92.98%, AUC 为 0.94 (图 1i)。

结论: DTI-ALPS、FA 及节点效率值随病情加重而降低, 反映癫痫患儿存在脑类淋巴系统循环紊乱、神经纤维束损伤及脑连接异常。基于 DTI-ALPS, FA, MD 和节点效率的预测模型可进一步提高癫痫的诊断效率。

PO-2562

“双低”扫描结合迭代重建技术应用于干细胞移植后 儿童腹部大血管 CTA 成像

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目的 本研究旨在通过结合多模型自适应迭代统计重建技术与低管电压扫描结合, 评估干细胞移植后儿童腹部大血管 CTA 成像质量。**方法** 将 26 例干细胞移植后儿童患者作为病例组, 扫描条件为: 管电压 80kVp, 对比剂 1.0ml/kg; 选取同时期 25 例非移植儿童患者为对照组, 管电压 100kV, 对比剂 1.5ml/kg, 每位病例分别选取迭代重建算法比例为 0%,30%,50%重建 3 组图像。客观比较两组目标动脉的 CT 值、信噪比 (SNR)、对比噪声比 (CNR)、噪声、有效辐射剂量(ED)、碘摄入量。主观评价由两名高年资的放射科医生采用双盲法对图像质量进行评分。**结果** 病例组血管平均 CT 值高于 A 组 ($p<0.01$), 在低迭代比例组, 对照组图像噪声优于比例组 ($p<0.01$), 高迭代比例组两组之间无统计差异。与对照组相比, 病例组的平均 CNR/SNR 更高 ($P<0.01$)。与对照组相比, 病例组的平均有效辐射剂量(ED)和碘摄入量分别降低了 32.8%和 40.0%。**结论** 儿童腹部大血管 CTA 使用低管电压扫描和低对比剂总量结合 ASiR-V 重建算法显著降低了患儿的扫描辐射剂量和碘对比剂负荷量, 同时有良好的血管对比图像质量。该方法为干细胞移植后儿童腹部 CTA 检查, 在不降低图像质量的同时降低辐射剂量和碘对比剂摄入量提供了良好的解决方案。

PO-2563

基于头颅 MRI 影像学表现分析早产儿脑损伤与预后的相关性

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目的: 本研究为回顾性队列研究, 基于头颅 MRI 影像诊断回顾性分析早产儿脑损伤 (Brain injury in premature infants, BIPI) 与早产儿神经系统功能发育的相关性, 以期实现早期诊断并提高脑损伤早产儿的生存质量。**方法:** 选取 2018 年 1 月 1 日至 2020 年 12 月 31 日在西北妇女儿童医院新生儿科住院期间行头颅 MRI 检查并在儿保科定期随访的早产儿作为研究对象, 回顾性收集纳入研究的早产儿影像学资料、临床资料以及儿童保健科随访的 Gesell 量表评估分数。**研究分组及内容:** 依据头颅 MRI 诊断结果将研究对象分为 BIPI 组与非 BIPI 组, 分析 BIPI 与早产儿神经系统功能发育的相关性。**结果:** 1. 239 例纳入研究的早产儿中, BIPI 组 69 例, 非 BIPI 组 170 例, BIPI 的发生率为 28.9%。BIPI 组中适应性发育落后占比为 91.3% (63/69), 大运动发育落后占比为 91.3% (63/69), 精细动作发育落后占比为 89.9% (62/69), 语言发育落后占比为 84.1% (58/69), 个人-社交发育落后占比为 78.3% (54/69); 2. BIPI 与早产儿适应性 ($r=-0.208$, $P=0.001$)、大运动 ($r=-0.264$, $P<0.001$)、精细动作 ($r=-0.272$, $P<0.001$)、语言 ($r=-0.242$, $P<0.001$) 以及个人-社交发育 ($r=-0.210$, $P=0.001$) 均呈显著相关且为负相关关系; 3. BIPI 组与非 BIPI 组对早产儿适应性 ($\chi^2=11.740$, $P<0.001$)、大运动 ($\chi^2=13.341$, $P<0.001$)、精细动作 ($\chi^2=20.974$, $P<0.001$)、语言 ($\chi^2=7.030$, $P=0.008$) 以及个人-社交 ($\chi^2=4.877$, $P=0.027$) 发育影响差异均具有统计学意义。**结论:** 早产儿脑损伤影响其神经系统功能发育, 胎龄和出生体重与脑损伤早产儿神经系统功能发育情况呈负相关, 出生胎龄越小、出生体重越低, 早产儿脑损伤的神经系统功能发育落后发生率越高, 应尽量预防极早早产儿 (GA<32 周) 和极低出生体重儿 (BW<1500g) 的出生。

PO-2564

儿童 H3 K27M 突变型弥漫性中线胶质瘤的 MRI 表现及随访

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目的 探讨儿童伴 H3 K27M 突变型弥漫性中线胶质瘤 (DMG) 的 MRI 表现, 随访术后患儿, 提高对该病的认识及诊断水平。**资料与方法** 回顾性分析 2018 年 9 月—2023 年 8 月经湖南省儿童医院及外院经病理证实的 21 例 H3 K27M 突变型 DMG 患儿的临床及影像学资料, 21 例行 MRI 平扫, 其中 19 例增强, 15 例行扩散加权成像 (DWI) 检查, 14 例行磁敏感加权成像 (SWI) 检查。观察分析肿瘤部位、形态、边界、瘤周水肿、大小、信号特点 (有无囊变、出血)、扩散情况及强化特点等。结果 21 例肿瘤主体均位于中线部位; 12 例形态不规则, 9 例呈类圆形; 15 例边界清晰, 瘤周无水肿, 6 例边界模糊, 瘤周轻中度水肿; 肿瘤最大直径 3.3~6.1 cm; 21 例病灶信号均欠均匀, 14 例肿块内存在形态及大小不一的囊变, 均呈偏心性改变, 7 例无囊变, 1 例出血。15 例 DWI 示病变均呈不同程度扩散受限, minADC 值为 $(0.992 \pm 0.262) \times 10^{-3} \text{mm}^2/\text{s}$ 。19 例增强后 9 例呈环状强化, 5 例小斑片状轻度强化, 2 例结节状强化, 2 例轻度不均匀强化, 1 例无强化; 15 例有基底动脉包绕。结论 儿童伴 H3 K27M 突变型 DMG 好发于脑桥等中线部位, 瘤内易发生偏心性囊变, 瘤周清晰多无水肿, 多呈环状、结节状及小斑片状强化等, MRI 特征具有一定的特异性。

PO-2565

18F-FDG PET/MR 全身显像在儿童横纹肌肉瘤分期中的应用价值

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目的:

分析和探讨 18F-FDG PET/MR 全身显像在儿童横纹肌肉瘤分期中的应用价值。

方法:

回顾性分析本中心 77 例已确诊为横纹肌肉瘤的患儿临床资料, 分为治疗前组 (n=40) 和治疗后组 (n=37), 分析其 PET/MR 表现, 观察肿瘤的大小、形态、信号特征、与周围组织的关系、病灶 SUVmax 值、转移情况及其分期特征。以病理及临床诊断结果为金标准。

结果:

40 例治疗前例患儿包括 I 期 3 例(7.5%), II 期 5 例(12.5%), III 期 16 例(40.0%), IV 期 16 例(40.0%)。10(25.0%)例肿瘤发生在眼眶, 4 例(10.0%)肿瘤发生在头颈, 4 例(10.0%)肿瘤发生在胆道, 17 例(42.5%)肿瘤在膀胱及前列腺, 2 例(5.0%)肿瘤发生在肢体, 2 例肿瘤(5.0%)发生在背部, 1 例肿瘤(2.5%)发生于腹膜后。病灶平均最大径为 $10.25 \pm 3.12 \text{cm}$, 最大径多为上下径。肿块边界光滑清楚, 局限于原发解剖位置的 28 例 (70%); 8 例(20%)侵犯邻近器官及组织。淋巴结转移 21 例 (52.5%); 远程转移 17 例 (42.5%), 其中肺转移 9 例, 骨转移 8 例, 肝转移 2 例, 皮下转移 2 例。治疗后组中有 12 例 (32.4%) 出现淋巴结转移, 10 例 (27.0%) 出现远程转移。PET/MR 显像后分期: 治疗前组有 15 例 (37.5%) 分期发生改变, 其中 11 例由 III 期提高到 IV 期, 4 例由 II 期提高到 IV 期。治疗后组共有 12 例 (32.4%) 分期发生改变, 其中 7 例由 0 期提高到 IV 期, 2 例由 III 期提高到 IV 期, 3 例因 PET/MR 摄取阴性而降低分期。

结论:

18F-FDG PET/MRI 对儿童横纹肌肉瘤分期的诊断价值优于临床分期, 在探查肿瘤周围侵犯和远处转移更具优势, 明显提高了肿瘤的原始分期及再分期的准确性。

PO-2566

全面性发育迟缓婴幼儿脑白质微观变化 MRI 研究

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目的: 应用磁共振扩散张量成像 (Diffusion tensor imaging, DTI) 评估全面性发育迟缓 (Global developmental delay, GDD) 婴幼儿脑白质纤维束发育的异常变化。

方法: 选取接受 DTI 检查的全面性发育迟缓婴幼儿 22 例作为 GDD 组, 年龄范围在 6-24 月; 另选年龄范围同在 6-24 月的正常发育婴幼儿 22 例作为对照组。利用 FMRIB software library 软件进行图像后处理获取双侧大脑各 30 个脑白质纤维束的分数各向异性 (Fraction anisotropy, FA)、轴向扩散系数 (Axial diffusivity, AD) 及径向扩散系数 (Radial diffusivity, RD) 参数值。比较两组参数值差异性, 之后将 GDD 组异常纤维束的 DTI 参数值与儿童神经心理发育量表评分进行相关性分析。

结果: 与对照组相比, GDD 组多个脑白质纤维束的 DTI 参数值存在异常改变, 主要表现为双侧内囊前后肢、双侧上纵束及胼胝体等 21 个纤维束的 FA 值减低, 穹窿、右侧内囊前肢及左侧放射冠后部三个纤维束的 AD 值增高, 双侧内囊后肢、双侧上纵束及双侧丘脑后辐射等 20 个纤维束的 RD 值增高, 差异均有统计学意义 ($p < 0.05$)。对胎龄、年龄、出生体重及性别因素进行控制后, GDD 组儿童神经心理发育量表的言语评分与双侧内囊前肢的 FA 值呈正相关 ($r = 0.505$ 、 0.470 , $P < 0.05$); 精细动作评分与左侧放射冠后部 AD 值呈负相关 ($r = -0.536$, $p < 0.05$), 也与右侧丘脑后辐射、左侧矢状层、右侧扣带及右侧胼胝体毯的 RD 值呈负相关 ($r = -0.611$ 、 -0.556 、 -0.593 、 -0.532 , $P < 0.05$)。

结论: 与正常发育婴幼儿相比, DTI 成像可显示 GDD 婴幼儿双侧大脑多个白质纤维束 FA 值减低、AD 值及 RD 值增高, 且异常纤维束的参数值与儿童神经心理发育量表动作、言语评分具有相关性, 为早期疾病诊断提供影像学依据。

PO-2567

ADC 值对儿童后颅窝良恶性肿瘤的鉴别价值

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目的: 探讨磁共振弥散加权成像 (diffusion weighted imaging, DWI) 表观弥散系数 (apparent diffusion coefficient, ADC) 值在儿童后颅窝良恶性肿瘤鉴别诊断中的应用价值。方法: 回顾性分析本院 34 例术后病理诊断为后颅窝肿瘤的资料, 分为良性组 (8 例) 和恶性组 (26 例), 全部患者手术治疗前均行磁共振平扫、增强扫描和 DWI 检查, 分析肿瘤的影像表现, 分别测量肿瘤三个不同区域及正常小脑组织的 ADC 值, 利用受试者工作特征 (receiver operation characteristic, ROC) 曲线评价平均 ADC 值法、最小 ADC 值法、平均 ADC 值/正常小脑组织 ADC 值法、最小 ADC 值/正常小脑组织 ADC 值法这四种方法在后颅窝良恶性肿瘤鉴别诊断中的表现。结果: 在儿童后颅窝良恶性肿瘤鉴别诊断中, 四种方法两两比较差异无统计学意义, 鉴于操作简便、诊断正确率高, 本研究推荐使用平均 ADC 值法, 取平均 ADC 值小于或等于 $0.823 \times 10^{-3} \text{mm}^2/\text{s}$ 作为诊断后颅窝恶性肿瘤

的标准, 灵敏度为 84.62%、特异度为 100%。结论: ADC 值在儿童后颅窝良恶性肿瘤鉴别诊断中有较高的应用价值, 可作为常规 MR 检查的有效补充。

PO-2568

神经与行为异常早期筛查模型的建立与应用: 基于胎儿脑结构和母体血液指标的分析

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胚胎期是大脑发育的关键时期, 若此阶段母体感染或营养不良都会导致胎儿出现自闭症、精神分裂症等精神疾病。随着医学影像学的发展, 精神疾病患者大脑结构变异已被众多研究所证实, 而磁共振成像也成为精神疾病诊断筛查的关键指标, 且该种检测技术被证明比已有的问卷和行为分析方法更准确客观。但影像检查效率较低且价格昂贵, 因此需要更加简单快捷的生理指标对精神疾病进行评估和预测。近年来, 血常规指标凭借其简便、高效的优点越来越多的应用于精神疾病的早期预测标志, 且孕期全血细胞计数可以清楚反映母体环境, 因此常通过母体血液对胚胎期胎儿发育情况进行评估。心理疾病起源于胚胎期的事实已被众多研究所证实, 若能在早期筛查出有患病风险的个体, 可以及时对其进行干预和治疗, 最大程度上减轻心理疾病带来的损害。因此本研究选取以上两个精神疾病早期标志物进行研究, 并建立胎儿脑部磁共振成像和母体环境之间的联系, 为精神疾病的脑发育机制提供理论基础, 在临床上尽早识别患精神疾病风险的个体, 在精神疾病的早期筛查中有一定的应用价值。本研究选取了吉林大学第一医院 109 名胎儿测量了评估胎儿脑结构发育的常见径线, 并收集其母体的血常规指标, 建立了孕期母体环境与胎儿脑结构发展的模型, 筛选出评估异常胎儿脑发育的血液标志物, 并确定了异常胎儿脑发育的血液标志物临界值, 最终得到以下结论: 1. 孕期母体血小板水平显著预测胎儿小脑蚓部高度, 因此红细胞和血小板影响胎儿小脑和胼胝体的发育, 进而会出现认知、行为、运动等方面的异常, 是智力障碍、运动障碍、多动症等神经发育障碍的重要指标。2. 侧脑室增宽胎儿的母体免疫血液细胞水平与未增宽组有显著差异, 且白细胞计数、中性粒细胞绝对值预测能力较好, 可以成为侧脑室增宽的有效预测因子。这可以作为精神分裂症、情感障碍等心理疾病的参考指标。3. 建立了新的母体孕期血常规范围, 有效筛选脑发育异常胎儿

PO-2569

儿童脑结节性硬化症的影像学研究

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目的:研究结节性硬化症的影像表现及临床特点。方法:回顾性研究 31 例结节性硬化的 CT 及 MRI 表现。结果:临床表现为面部皮脂腺瘤、癫痫和智力障碍三联征 15 例,占 48.4%。CT 及 MRI 表现:室管膜下结节 21 例, 双侧室管膜下多发结节状钙化 18 例, 未钙化的高密度结节 3 例, 并向脑室内突入, 主要分布在侧脑室前角 13 例及体部 6 例, 其次是侧脑室颞角 2 例及 IV 脑室 1 例; 皮质结节 6 例和白质异常 3 例, CT 及 MRI 表现为增厚增宽的脑皮质及白质内分别呈结节状低密度灶及 T2 高信号病灶, 无钙化, 局部脑皮层不同程度受压变薄。增强扫描可使病变显示更清晰, 常与室管膜下结节并存。左侧室间孔区巨细胞星形细胞瘤 1 例, 肿瘤大小约 2.9cmx2.5cmx2.3cm, 边界清晰伴有梗阻性脑积水、双侧脑室扩大及室管膜下钙化结节。结论: CT-MRI 表现室管膜结节伴有或不伴有脑实质内病灶, 均为诊断结节性硬化症的重要的征象, 结合临床三联征能即可明确诊断。

PO-2570

多模态 MRI 对侧脑室旁白质软化症的诊断及预后评估

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目的 探讨小儿侧脑室旁白质软化症(PVL)的病因与临床及 MRI 诊断价值。**方法** 选择临床 MRI 证实的 60 例 PVL 典型病例进行回顾性分析。**结果** 早产儿 39 例, 占 65%。患有缺氧缺血性脑病的足月儿 21 例, 占 35%。主要征象为侧脑室体及三角区旁脑量白质减少, 相应部位脑室不同程度扩大, 侧脑室旁斑片状长 T1 信号长 2 信号。依据 MRI 的表现将其分为 3 度。①轻度: MRI 表现为双侧侧脑室周围白质减少, 灰质达侧室缘, 脑室无扩大; ②中度: 侧脑室周围白质明显减少或部分消失, 灰质达侧室缘, 侧室外侧壁不规则, 脑室轻度扩大。③重度: 侧脑室周围白质消失, 被灰质替代, 侧脑室明显扩大且侧壁不规则, 呈锯齿状或波浪状。**结论** MRI 检查在 PVL 的诊断及预后评估有着重要的价值。

PO-2571

儿童颈部肿块的影像学分析

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目的:探讨小儿颈部包块的临床及影像学特点。**方法:**回顾分析了经手术病理证实的儿童颈部肿块 97 例, 总结了其 CT 及 MRI 表现。**结果:**先天性甲状舌骨囊肿 29 例, 鳃裂囊肿 15 例, 淋巴瘤 17 例, 淋巴管瘤 12 例, 血管瘤 9 例, 神经源性肿瘤 5 例, 畸胎瘤 2 例, 脂肪瘤 2 例, 化脓性淋巴结炎 4 例, 横纹肌肉瘤 2 例。婴幼儿期以淋巴管瘤及血管瘤多见, 尤其婴儿期 (<1 岁) 最多, 其它肿块较少。甲状舌骨囊肿好发年龄为学龄前和学龄期, 3-10 岁高发。10 岁以后鳃裂囊肿逐渐增多。恶性肿瘤极为少见, 但 7 岁后逐渐增多。各种不同肿块有比较固定的好发部位, 多在上颈部, 由上至下逐渐减少。淋巴管瘤、淋巴结炎主要分布在颌下及颌后区。甲状舌骨囊肿以颈前区多见。淋巴结核、鳃裂囊肿及各种肿瘤均沿胸锁乳头肌分布。**结论:**小儿颈部肿块以先天性为主, 其病因复杂, 组织来源多, 生物学特性各异, 位置较隐蔽, 触诊困难, 病史叙述不准确, 临床与病理常常不符。CT-MRI 扫描对颈部疾病的定位准确, 对定性、鉴别诊断及术前指导均有着重要的价值。

PO-2572

婴幼儿 LCH 多器官损害的临床与影像学表现

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目的 探讨朗格汉斯细胞组织细胞增生症(Langerhans cell histiocytosis, LCH)累及多器官的影像学表现及鉴别诊断, 提高对本病认识。**方法** 我们复习 39 例经组织病理学免疫组化证实朗格汉斯细胞组织细胞增生症的影像学及临床资料。**结果** 39 例中, 15 例为孤立性骨病变, 9 例为多灶性骨病变, 19 例表现为溶骨性破坏, 病变一般境界清楚, 6 例出现骨膜反应。其中 23 例可见软组织肿块; 另有 5 例病变周围出现骨硬化改变。术前诊断为骨肿瘤 5 例, 炎症或其他良性病变 4 例。39 例中有 30 例进行了手术治疗, 9 例穿刺活检。侵犯实质脏器的主要影像多发密度软组织肿块或结节, 因部位不同形态各异。本病的病因尚未明确, 可累及全身多个器官, 包括骨、肺、肝、脾、垂体、皮肤、黏

膜以及淋巴组织。临床表现取决于单器官或多器官以及受累的程度,当单器官受累时常常需要与肿瘤、炎症及结核等病变鉴别。结论 朗格汉斯细胞组织细胞增生症,结合临床特点及影像表现能准确显示病变范围及邻近的组织病变,且结合临床基本作出初步诊断,为早期治疗赢得时间。

PO-2573

双能量 CT 小肠造影在儿童活动期炎症性肠病的临床应用

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目的:探讨双能量 CT 小肠造影 (CTE) 在儿童活动期炎症性肠病患者的影像特征及疗效评估临床应用。

方法:回顾分析 50 例炎症性肠病患者,筛选 32 例经内镜和病理证实的克罗恩病 (CD) 影像资料,对其 CTE 分析;纳入 29 名活动期 CD 患儿,根据儿童克罗恩病活动指数 (PCDAI) 将患者分为轻度 (17 例) 和中重度 (12 例),对 CTE 评分,项目包括:肠壁厚度、肠壁强化 Δ CT 值、强化方式、梳征、肠系膜脂肪爬行征、肠系膜淋巴结数量、以 PCDAI 作为疾病活动度分组标准,测量重度及轻中度活动期:碘基图测量病变区标准化碘浓度 (NIC)。

结果:32 例患儿在 CTE 上均可见肠壁增厚及肠段壁强化,其中 15 例为分层强化 (46.9%), 18 例患儿出现 24 处肠腔狭窄,21 例溃疡,17 例 (53.1%) “木梳征”,该征象特征表现:11 例 (34.4%) “脂肪爬行”征。对轻度和中重度 CD 的 CTE 评分比较:单因素分析表明,两组间肠壁厚度、梳征、肠系膜脂肪爬行征评分及 CT 总分差异具有统计学意义,肠壁强化 Δ CT 值、强化方式、肠系膜淋巴结数量评分差异无统计学意义;肠壁厚度、梳征评分、肠系膜脂肪爬行征评分及 CT 总分与 PCDAI 评分呈中度/高度相关, r 值分别为:0.702、0.658、0.801、0.801 ($P<0.05$); ROC 曲线表明,CT 总分 9.5,区分轻度与中重度灵敏度 91.5%,特异度 86.9%,AUC 0.924。重度活动期 NIC 值:动脉期 $2.8\pm 0.3\text{mg/ml}$,门脉期 $3.8\pm 0.2\text{mg/ml}$;曲线斜率 K:动脉期 2.4 ± 0.35 ,门脉期: 3.2 ± 0.4 ,PCDAI: 58 \pm 6 分;轻中度活动期 NIC 值:动脉期 $1.3\pm 0.2\text{mg/ml}$,门脉期 $2.4\pm 0.2\text{mg/ml}$,曲线斜率 K:动脉期 2.2 ± 0.2 ,门脉期: 2.9 ± 0.3 ,PCDAI: 25 \pm 4 分, $P<0.05$ 。

结论:儿童炎症性肠病 (尤其是 CD) 在双能量 CTE 可显示发病部位,肠壁及肠外情况,可弥补内镜检查不足,用于 CD 诊断;动脉期 NIC $>2.8\text{mg/ml}$ 时,提示中重度;动脉期 NIC $<1.3\text{mg/ml}$ 时,提示轻度,用于定量评估儿童活动期 CD 患者严重程度及疗效预测及评估。

PO-2574

儿童淋巴瘤的 MRI 表现与病理基础

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目的:探讨儿童淋巴瘤的 MRI 特征及其病理基础。

方法:回顾性分析我院 2020 年 1 月-2023 年 4 月 35 例经手术和病理证实的淋巴瘤的 MRI 影像资料,对其 MRI 表现及病理改变进行研究分析。

结果:35 例患者均表现为大小不一的软组织肿块 (大小范围约 1.2cm-15cm),形状多为椭圆形和不规则形;所有肿块 T1WI 呈等信号,T2WI 呈等偏稍高信号,DWI 为高信号,ADC 为低信号 (有弥散加权序列者),仅 1 例发生囊变、坏死,1 例发生出血,增强肿瘤组织多呈显著强化;24 例为男性 (23/34);11 例发生于颈部淋巴结 (11/34),10 例发生于鼻咽部 (10/34),6 例发生在骨骼 (6/34),其余病例多发生于腹腔、腹股沟淋巴结、上纵隔、颅底、腰大肌等;21 例发生转移 (21/34),16 例转移至邻近的淋巴结 (15/21),7 例转移至中轴骨 (颈胸腰椎体及骨盆) (7/21);

12 例为 Burkitt 淋巴瘤 (11/34), 11 例为 T 淋巴母细胞性淋巴瘤 (11/34), 5 例为 B 淋巴母细胞性淋巴瘤 (5/34), 5 例为霍奇金淋巴瘤 (5/34), 1 例为大 B 细胞淋巴瘤。

结论: 淋巴瘤起源于发生突变的淋巴细胞, 是一种多发于儿童淋巴造血系统的恶性肿瘤, 居儿童恶性肿瘤第 3 位, 包括非霍奇金淋巴瘤 (NHL) 和霍奇金淋巴瘤 (HL)。本文总结了儿童淋巴瘤的影像学及病理特征: ①T1WI 多呈等信号, T2WI 多呈等偏稍高信号, DWI 为高信号, ADC 为低信号, 肿瘤较少发生囊变、坏死、出血, 肿瘤边界相对清楚, 对周围组织多为受压推移, 增强多呈均匀和环形显著强化; ②该病男性多于女性, 约为 2:1; ③儿童淋巴瘤的好发部位是颈部淋巴结和鼻咽部, 并且淋巴瘤的发病部位非常广泛。④淋巴瘤易发生转移, 转移部位最常见于邻近淋巴结, 亦可转移至椎体、胸腺、邻近肌群等。⑤儿童好发的淋巴瘤类型为 T 淋巴母细胞性淋巴瘤和 Burkitt 淋巴瘤, 且多呈高度恶性, 侵袭性强。综上, MRI 平扫、增强以及 DWI 对儿童淋巴瘤的诊断、转移、临床分期、疗效评估均有重要价值。

PO-2575

Duchenne 型肌营养不良症臀周肌群 MRI 生物标志物与临床运动功能的纵向研究

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目的: 通过表征 Duchenne 型肌营养不良症 (Duchenne muscular dystrophy, DMD) 臀周肌群 MRI 生物标志物 12 个月内的纵向进展, 探讨 MRI 生物标志物预测 DMD 患者未来运动功能下降的潜力。

材料与方法: 前瞻性纵向纳入 DMD 患者 112 例, 所有患者均行臀肌 MRI 检查, 成像序列包括 T1 mapping 和 Dixon 序列, 分别定量测量屈曲肌群、伸展肌群、内收肌群和外展肌群的纵向弛豫时间 (T1) 和脂肪分数 (fat fraction, FF) 值。采用北极星量表 (North Star Ambulatory Assessment, NSAA) 和定时功能测试 (Timed functional tests, TFTs) 来对 DMD 患儿的临床运动功能进行检测。所有受试者平均 12 个月后返回进行临床随访, 并根据患儿 12 个月内 TFTs 的纵向变化将所有受试者分为两个亚组: 功能稳定组和功能下降组。采用相关性热图 (heatmap) 来阐明 MRI 生物标志物与临床运动功能指标之间的关系。采用单因素和多因素 Logistic 回归探讨与 DMD 患者未来临床运动功能下降相关的危险因素, 并进一步采用受试者特征曲线 (Receiver Operating Characteristic Curve, ROC) 来分析其危险因素对运动功能下降的诊断效能。

结果: Heatmap 结果显示基线 T1 值与随访 NSAA 评分呈正相关关系 ($P < 0.001$), 而与随访 TFTs 呈负相关关系 ($P < 0.001$)。基线 FF 值与随访 NSAA 评分呈负相关关系, 而与随访 TFTs 呈正相关关系 ($P < 0.001$)。多因素 Logistic 回归分析结果显示, 外展肌群 FF 值升高与未来临床运动功能下降相关 ($OR = 1.085$, $95\%CI: 1.013 \sim 1.161$, $P = 0.019$), 曲线下面积为 0.874 ($P < 0.001$)。

结论: 外展肌群 FF 值是 DMD 患者未来 12 个月内临床运动功能下降强有力的预测因子, 强调了在 DMD 患者中早期关注外展肌群 FF 值的重要性。

PO-2576

动脉自旋标记成像技术评估早产儿脑发育

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目的早产儿脑组织及脑血流灌注循环系统尚未成熟,多种围产因素均可导致早产儿神经认知障碍。脑血流 (cerebral blood flow, CBF) 值是评估脑灌注的重要参数。

本研究的首要目的是探讨早产儿的脑血流分布特征,包括左右大脑半球脑血流分布等。其次是评估临床并发症对脑血流值的影响。

材料与方法回顾性纳入 2022 年 5 月至 2023 年 5 月,在郑州大学第三附属医院新生儿科出生的 219 例早产儿。在校正胎龄时进行常规 MRI 成像、三维伪连续动脉自旋标记成像 (three-dimensional pseudo-continuous arterial spin labeling, 3D-pCASL) 测量。测量感兴趣区包括大脑额叶、颞叶、顶叶、枕叶、基底节和丘脑。分析两组间基本资料特征,采用配对样本 t 检验比较左右大脑半球不同脑区 CBF 值的差异。不同脑区的 CBF 值采用单向方差分析。采用 Pearson 相关分析磁共振测量时校正胎龄、出生体重与不同脑区 CBF 值之间的相关性。此外,评估不同临床并发症对脑血流值的影响。

结果依据磁共振成像测量校正胎龄时间分为早产儿组 (138 例) 和等效足月组 (81 例)。早产儿组与等效足月组在患儿性别、出生孕周、Apgar 5 分钟评分之间无显著差异;早产儿组出生体重显著高于等效足月组 ($t = 4.698, p < 0.001$)。组内分析,各组间左、右两侧大脑半球在额叶、颞叶、顶叶、枕叶、基底节和丘脑的 CBF 值均无显著差异 ($p > 0.05$),不同脑区平均脑 CBF 值存在显著差异 ($p < 0.05$)。出生体重与不同脑区的脑 CBF 值呈负相关;早产儿组磁共振测量校正胎龄时间与脑 CBF 值无显著相关,等效足月组磁共振测量校正胎龄时间与脑 CBF 值呈正相关。临床并发症方面,支气管肺发育不良患儿左右两侧额叶、颞叶、顶叶、枕叶、基底神经节和丘脑的 CBF 值高于非支气管发育不良组。

结论动脉自旋标记成像技术能够评估早产儿脑血流值,与磁共振测量校正胎龄时间、出生体重有关,支气管肺发育不良可使早产儿皮质脑血流灌注增高。

PO-2577

MRI 3D CISS 序列与 3D SPACE 序列在儿童眼部疾病中的应用

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目的:通常儿童颅神经 III、IV、IV 异常,会引起眼部疾病。通过常规成像很难识别各对颅神经,我们通过使用 3D CISS 序列与 3D SPACE 序列联合成像,来研究三对颅神经的可见性和解剖特征,为临床治疗提供依据。

方法:本研究使用西门子 Prisma 3.0T 磁共振对 10 名眼部疾病和 10 名健康受试者进行检查,分别进行 3D CISS 序列与 3D SPACE 序列高分辨率图像采集。有两位 10 年工作经验儿童神经放射医生,使用最大密度投影 (MIP) 像进行多方位重组,并将重组图像保存关键图。分别使用四分法对三对颅神经可见性和清晰度进行分级评分,如下:清晰可见、可见但稍模糊、隐约可见、无法识别。通过 Mann-Whitney U 检验统计学方法,比较两组序列对三对颅神经的可见度与清晰度显示情况,判断有无颅神经异常。

结果:在 20 名被检者,其中 3D CISS 序列与 3D SPACE 序列对颅神经 III、IV、IV 的可见度显示均分别为 100%;使用 Mann-Whitney U 检验进行统计学分析,其中颅神经 III、颅神经 IV,3D CISS 序列与 3D SPACE 序列组间差异无统计学意义;颅神经 IV,3D CISS 序列优于 3D SPACE 序列组间差异有统计学意义 $P < 0.05$

结论：通过 3D 高分辨率成像，儿童颅神经 III、IV、IV 的可视化程度高，在儿童眼科疾病诊断中发挥着重要作用。

PO-2578

构建和验证儿童重症肺炎的 nomogram 预测模型

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目的：本研究旨在建立儿童重症肺炎的 nomogram 预测模型并进行验证。

方法：回顾性收集 850 例山西省儿童医院病原学证实为肺炎患儿的影像及临床资料。按 7: 3 的比例随机分为训练集（601 例）和内部验证集（249 例）。采用单因素分析和最小绝对收缩和选择算子（LASSO）回归进行预测因子筛选，并基于最小赤池信息准则（AIC）建立 nomogram 的最佳模型。通过 ROC 曲线下面积（AUC）的区分度、校准曲线的校准度和决策曲线分析（DCA）的临床净效益来评估 nomogram 的性能。

结果：使用单因素、LASSO 回归和基于 AIC 的多因素 Logistic 逐步回归筛选最优预测因素，建立儿童重症肺炎的预测模型：D-二聚体、CT 影像表现（斑片、大片、都有）、肝损害、坏死性肺炎、热程、应用激素时长。训练组和内部验证验证组的 AUC 分别为 0.807 和 0.799，校准曲线显示 nomogram 预测值与实际观测值之间有良好的 consistency。DCA 显示 nomogram 具有临床应用价值。

结论：本研究建立的儿童重症肺炎 nomogram 模型预测效能良好，有助于指导临床医师筛查重症肺炎高危患儿，从而对早期预防和治疗策略提供有用的参考。

PO-2579

儿童坏死性肺炎的 CT 影像学表现

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目的：分析总结儿童坏死性肺炎的临床表现及胸部影像学特征，提高该病的诊断水平。方法：回顾分析 57 例诊断符合坏死性肺炎患儿的临床及影像资料，总结其临床及影像学特点。其中男 27 例，女 30 例，年龄 3 天~12 岁，平均年龄 (4.2 ± 3.4) 岁。2 例新生儿，1 例合并癫痫，余 54 例既往体健。结果：57 例患儿一般状况差，主要有发热、咳嗽，发热，热峰 $(39.3\pm0.8)^{\circ}\text{C}$ ，热程 (9.2 ± 8.3) 天，伴有食欲差、精神差等感染中毒症状，呼吸困难 30 例，表现为胸部吸气性三凹征及鼻翼扇动，口唇发绀 5 例。病变侧闻及湿啰音 37 例，其中伴有喘鸣音 9 例，胸腔积液 26 例，1 例咯血。实验室检查中血常规：57 例患儿白细胞 $(13.0\pm4.5)\times10^9/\text{L}$ ，中性粒细胞比例 $(67.9\pm14.9)\%$ ，C 反应蛋白均明显升高 $0.5\sim249.7\text{ mg/L}$ ，平均 $(74.3\pm60.8)\text{ mg/L}$ 。病原学检查：57 例均行咽拭子肺炎支原体 DNA 测定和(或)肺炎支原体抗体检查，22 例 (38.6%) 存在肺炎支原体感染，5 例金黄色葡萄球菌感染，3 例耐甲氧西林金黄色葡萄球菌感染。胸部 CT 检查：57 例患儿于病程第 9~25 天检查，在原大片实变区有大小不一的低密度液化坏死区，右肺受累多见，即坏死性空洞形成，含气/含液空洞，为薄壁或无壁空洞，26 例伴不等量胸腔积液，29 例合并不同程度胸膜增厚。复查及随访 57 例患儿在出院后随访 7 天~2 个月，治疗后肺内实变及液化坏死区范围缩小，空洞明显减少，胸腔积液吸收；36 例患儿随访至 29 天~6 个月，肺内实变及坏死区明显吸收，空洞病灶消失；其中 15 例局部肺内组织残存少许条索影，11 例肺内残存囊性变，6 例肺不张。结论：儿童坏死性肺炎病程和热程长，胸部 CT 特点为大片实变内多发大小不一空洞、伴胸腔积液，转归过程中 CT 征象变化即肺部影像表现大致正常或条索影、肺不张及肺叶囊性变，胸腔积液吸收。虽然此病预后大

多良好,但当患儿出现长程高热、炎性指标明显升高,胸部影像学大片实变影,警惕发展为坏死性肺炎可能。

PO-2580

儿童胸膜肺母细胞瘤 CT 影像学表现

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目的 总结分析儿童(胸膜肺母细胞瘤 pleuropulmonary blastoma, PPB)的 CT 表现特点,以期提高对本病的认识。方法 回顾性分析 10 例经穿刺活检、手术病理证实为 PPB 病例的 CT 影像学表现。所有病例均行 CT 平扫及增强扫描。结果 本组病例中 I 型 1 例,II 型 2 例,III 型 7 例。8 例肿块位于肺外围向健侧推压肺组织及纵隔,肿瘤直径均大于 6.5cm,其中 6 例肿块几乎占满半侧胸腔。1 例合并左肾囊性肾瘤。CT 表现:I 型表现为多房囊性肿块,囊内充满液体并含少部分气体,囊内分隔可见强化。II 型为囊实性肿块,平扫实性部分为软组织密度,有不均匀轻度强化,囊性部分无强化。III 型为纯实性肿块,表现为边界较清楚、强化不均匀的肿块,其内可见多发肿瘤滋养血管。所有病例中均未见肋骨破坏及纵隔淋巴结肿大,伴或不伴少量胸腔积液,平扫仅 2 例见少许钙化灶。结论 了解 PPB 的 CT 影像学表现对本病的早期诊断有重要价值。

PO-2581

腺垂体磁共振成像特征对女童性早熟鉴别诊断价值的研究

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背景:本研究旨在评价腺垂体 MRI 特征(腺垂体体积[aPV]、腺垂体高度[aPH]、信号强度比[SIR])对女童性早熟(PP)的诊断价值,并建立一种易于临床实施的无创诊断方法。

材料与方法:自 2021 年 2 月至 2022 年 2 月,共有 126 名女孩(37 名,57 名和 32 名临床诊断为中枢性 PP [CPP]和不完全性 PP [IPP]患者,以及健康对照)被纳入该研究。所有参与者都进行了垂体 MRI 检查和 GnRH 激动剂刺激试验。收集三组患者腺垂体 MRI 特征及实验室检测特征数据,采用方差分析进行分析。采用 Pearson 相关分析检验相关性。采用逐步多元线性回归分析建立预测模型。采用受试者工作曲线(Receiver operating curve, ROC)分析评价 MRI 特征和预测值的诊断效果。

结果:各组的 aPH、aPV、SIR、身高(height)、体重(weight)、E2、IGF-1、IGFBP-3、INS、GLU、TT4、FT4 值与下丘脑-垂体-性腺(HPG)轴激活状态密切相关(均 $P < 0.05$)。应用与 LH 高度相关的 aPV、Weight、aPH 构建模型 1: $pLH = 0.045 \times aPV + 0.485 \times Weight + 1.567 \times aPH - 21.001$ ($R^2 = 0.271$);应用与 LH/FSH 高度相关的 SIR、aPV、Height 构建模型 2: $pLH/FSH = -0.042 \times SIR + 0.002 \times aPV + 0.034 \times Height - 3.686$ ($R^2 = 0.311$)。ROC 分析显示, LH、LH/FSH 和 aPV 是区分 CPP 组与对照组的最佳预测因子(曲线下面积[AUC]=0.969、0.949 和 0.938),而 LH/FSH 预测因子是区分 IPP 组与 CPP 组和对照组的最佳预测因子(AUC=0.829 和 0.828)。

讨论:腺垂体 MRI 的主要特征和使用 aPV、aPH、SIR、Height、Weight 构建的预测模型提高了 PP 的诊断效率。MRI 有可能成为一种无创、有效的 PP 诊断方式。

PO-2582

儿童新型冠状病毒感染相关脑并发症磁共振表现分析

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目的: 分析儿童新型冠状病毒感染相关脑磁共振表现, 提高影像医师对该病的认识, 为临床早期诊疗提供依据。方法: 搜集 2022 年 12 月-2023 年 1 月在郑州大学第三附属医院就诊、经专科医师依据临床病史、实验室及影像学检查诊断为新型冠状病毒感染相关的患儿 11 例, 探讨其头颅 MRI 表现。结果: 11 例患儿中, 男 9 例, 女 2 例, 年龄 9 个月-14 岁, 脑 MRI 平扫均有异常, 表现为脑白质斑片样脱髓鞘 4 例, 脑白质内弥漫对称性异常信号 2 例, 脑炎 2 例, ADEM 1 例, 伴胼胝体压部可逆性脑病 1 例, 急性坏死性脑病 1 例, 其中 9 例患儿脑部病变为对称性; 6 例患儿脑磁共振表现出不同程度脑萎缩改变。结论: 儿童新型冠状病毒感染相关脑磁共振表现多样, 多表现对称性病变, 累及脑白质病变为主, 且多伴有脑萎缩, 影像诊断及临床医师需加强认识, 避免误诊或漏诊。

PO-2583

MAP-MRI 扩散模型在新生儿高胆红素血症中的的应用价值

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目的 探讨平均表观传播扩散 MRI (Mean apparent propagator-MRI, MAP-MRI) 扩散模型在新生儿高胆红素血症 (Hyperbilirubinemia, HB) 中的应用价值。

材料与方法 前瞻性收集 6 例新生儿高胆红素血症患儿 (病例组) 和 6 例健康新生儿 (对照组), 所有被试均在西门子 3.0 MRI Lumina 行常规 MRI 和扩散频谱成像 (diffusion spectrum imaging, DSI) 检查, DSI 经西门子后处理工作站处理得到多个 MAP-MRI 的参数图。在各参数图上分别测量病例组与对照组双侧苍白球区的参数值。本研究采用 SPSS 26.0 软件进行分析, 计量资料采用均值±标准差($\bar{x} \pm S$) 表示, 采用两独立样本 t 检验对两组患者的 MAP-MRI 各参数值进行组间比较。采用配对 t 检验比较病例组双侧苍白球参数值。采用 Spearman 相关性分析病例组各参数值与血清总胆红素 (Total bilirubin, TBIL) 和间接胆红素(indirect bilirubin level, IBIL) 的相关性。P<0.05 表示差异有统计学意义。

结果 病例组苍白球区的非高斯 (non-Gaussianity, NG) 和非高斯轴向 (non-Gaussianity axial, NGAx) 均低于对照组, 差异有统计学意义 (P<0.05)。病例组左侧苍白球的 Q 空间逆方差 (Q-space inverse variance, QIV) 高于右侧, 差异有统计学意义 (P<0.05)。Spearman 相关性分析病例组各参数值与 TBIL 和 IBIL 的相关性不显著。

结论 MAP-MRI 扩散模型在新生儿高胆红素血症中有一定的应用价值, 且苍白球的 NG 和 NGAx 可作为早期诊断的影像学参考指标, 为临床诊断提供客观量化依据, 协助临床尽早干预。

PO-2584

机器学习结合弥散基谱成像的脑网络分析在学龄前 ASD 早期诊断中的应用

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目的：利用弥散基谱成像（DBSI）结合深度学习方法，探索学龄前自闭症谱系障碍（ASD）儿童脑网络的拓扑结构变化及其诊断价值。

方法：收集 2022 年 9 月至 2023 年 7 月在湖南儿童医院的 31 例 ASD 患者和 30 例正常对照（HC）的 Brain DBSI（DBSI_20、DBSI_21）资料，两组患者年龄均为 2~6 岁。将每个受试者的 DBSI_20 和 DBSI_21 的原始数据导入 DSI Studio 软件，生成 DBSI_combine 的扩散图像、bval 和 bvec。所有数据均采用 DSI Studio 对其进行连通性矩阵和图理论分析。应用 Kruskal-Wallis 用于提取全局和节点指标中最显著的特征。然后利用训练集中相关系数大于 0.99 的特征，使用支持向量机对上述进行分类。计算模型的准确度、召回率、精确度、F1 分数和 ROC 曲线下面积，以评价这三种模型的性能。

结果：DBSI_20 模型的 AUC（0.963）高于 DBSI_21 模型（0.481），DBSI_combine 模型的 AUC（0.975）最高。DBSI_combine 模型的准确度/召回率/精确度/F1 评分为 0.936/0.889/1.000/0.979，DBSI_20 模型为 0.890/1.000/0.784/0.879，DBSI_21 模型为 0.579/0.556/0.861/0.675。各模型最具辨别意义的脑区分布于左侧角回、右侧颞中回、右侧颞下回和左侧小脑、左中央后回。此外，节点脑网络特征（左侧角回偏心率）与临床量表（CABS）之间存在相关性（ $r=-0.605$, $p<0.05$ ）。
结论：基于 DBSI 脑网络特征指标的机器学习模型能够对 ASD 进行准确的鉴别，其中分类效果最好的模型是 DBSI_combine。节点脑网络特征（左侧角回）可能是学龄前 ASD 患者脑发育异常的基础。

PO-2585

基于 CT 定量测量与临床特征联合儿童重症 CAP Nomogram 预测模型的构建研究

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目的 儿童重症 CAP 的早期诊断是临床工作中的难点，本研究基于 CT 定量测量与临床特征联合构建儿童重症 CAP Nomogram 预测模型，探究影像学定量指标在重症 CAP 中的诊断价值，并结合临床特征寻找预测重症 CAP 的相关预测因素，进而为临床早期诊断及治疗提供依据。

材料与方法 回顾性纳入延安大学附属医院 2019 年 1 月-2022 年 12 月 CAP 患儿 197 例，其中普通组患儿 124 例，重症组患儿 73 例。将两组间差异指标行多因素 logistic 回归分析，筛选出重症 CAP 独立预测因素，建立预测回归模型。本研究建立了①只纳入临床特征的临床模型；②仅纳入 CT 定量指标的影像模型；③联合临床及 CT 定量的临床-影像模型。多变量模型的性能通过 ROC 曲线下面积（AUC）进行评估，采用 Delong 检验将三种模型的 ROC 差异数值化，评估 ROC 差异是否具有统计学意义。最优模型绘制列线图，使用自举法（B=1000 Bootstrap）进行内部验证其可重复性。通过 Hosmer-Lemeshow 检验对模型的拟合度进行评价。

同时使用 NRI、IDI 及决策曲线分析(DCA) 评价预测模型的临床效益及实用性。

结果 本研究多因素 logistic 回归分析显示 CRP、LDH、LeV%、GGO%为儿童重症 CAP 的独立预测因素。基于回归分析的独立预测因素建立 logistic 回归模型（临床、影像及临床联合影像模型），

通过 ROC 曲线分析，发现临床联合影像模型明显优于单纯临床模型及影像模型，并且绘制列线图表示。校准曲线显示联合模型中预测值和观察值具有较好的一致性。DCA 曲线显示，当患儿的预测概率阈值在 0-1 时，重症 CAP 的临床联合影像模型的收益优于单纯临床模型及单纯影像模型。

结论 建立了定量指标联合实验室检查指标的诺模图模型，模型表明 CRP、LDH、LeV%、GGO% 是儿童重症 CAP 的独立预测因素。模型的校准曲线及 DCA 曲线反映了模型良好的吻合度及临床实用性。模型的建立更加有利于临床早期识别和诊断儿童重症 CAP，从而提示临床尽早进行有效干预及治疗。

PO-2586

基于人工智能的儿童骨折的自动检测和定位

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目的：儿童骨折不同于成人骨折，不是成人的缩小版，不恰当的治疗给儿童的生长发育造成很大影响。本研究针对不同年龄儿童骨骼生长发育特点，构建集成深度神经网络模型，实现不同发育阶段的儿童骨折的自动诊断和定位，并对比不同资质的医师在有和没有 AI 辅助情况下的诊断效率，实现用于儿童骨折自动诊断与定位的临床决策支持系统，并推广为临床医生常用工具。

方法：收集 2016-2024 年行 DR 骨折检查的 0-16 岁患儿 6000 例，根据儿童生长发育特点，基于 Python 自动分为不同年龄组（0-3,3-12,12-16），使用 Faster R-CNN 结合 YOLOv7 网络模型进行儿童骨折的自动检测和定位，并和不同年资医生的诊断结果比较，最后分析在有和没有 AI 辅助诊断时医生的诊断效率。

结果：不同年龄组的自动诊断平均精度 AP50 均高于未分组时的平均精度，人工智能（AI）自动诊断能够达到医师的诊断水平，在有 AI 辅助诊断的情况下，医师每张片子平均阅片时间缩短 6 秒。

结论：结合儿童不同年龄的生长发育特点能够提高人工智能自动诊断效果，基于人工智能的辅助诊断能够大大提高医师阅片效率。

PO-2587

儿童原发椎管内原始神经外胚层肿瘤/尤文肉瘤的 MRI 影像表现

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目的 分析儿童原发椎管内原始神经外胚层肿瘤/尤文肉瘤（Primitive neuroectodermal tumor/Ewing sarcoma, PNET/EWS）的 MRI 影像征象，提高对本病的诊断准确率。**方法** 回顾性分析总结我院 2016 年 8 月-2023 年 5 月手术并术后病理确诊的原发于椎管内的 PNET/EWS 6 例患儿的临床资料及 MRI 影像表现。**结果** 6 例患儿发病部位均以胸椎水平为主，其中 1 例同时累及颈椎水平，1 例同时累及腰椎水平；5 例病变发生于椎管内硬膜外，1 例发生于椎管内硬膜下，其中 5 例病变向邻近椎间孔延伸。5 例患儿 MRI 表现为椎管内硬膜外团块状 T1WI 等信号，T2WI 等信号，其中 4 例病变 T2WI 压脂呈等、稍高信号，1 例病变 T2WI 压脂呈等低信号；1 例患儿 MRI 表现为椎管内硬膜下囊片状 T1WI 等稍低信号，T2WI 等高信号，T2WI 压脂呈等高信号。增强扫描显示 4 例患儿病变呈明显强化，1 例患儿病变呈环形强化，1 例患儿病变内未见明显强化，周围见少许强。4 例患儿病变累及相邻椎体或肋骨，1 例患儿病变内部发生凝固性坏死，表现为 T1WI 等信号、T2 压脂像低信号改变，合并周围软组织感染，1 例患儿并发 Trousseau 综合征及脑实质、脑膜、脊膜广泛转移，表现为右侧大脑半球脑梗塞及脑实质、脑膜、脑池、脊膜多发广泛结节状、线状转移灶。**结论** 儿童原发椎管内的 PNET/EWS 发病部位多位于胸椎椎管内硬膜外，易向邻近椎间孔延伸，易累及邻

近骨质,病变在 T1WI 及 T2WI 以等信号为主,内可发生囊变、坏死,增强病变多呈明显强化,病变可合并 Trousseau 综合征及并发转移。MRI 检查不仅可以明确显示肿瘤病变的范围及信号特征,还可发现转移性病变,为临床治疗方案的确定及治疗效果的评估提供重要参考。

PO-2588

儿童发育性口吃多模态结构磁共振成像与机器学习建立特征分类模型的研究

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目的:本研究采用结构磁共振成像,探究儿童发育性口吃脑灰质与白质结构改变,分析其与口吃程度的相关性,进一步通过机器学习方法建立儿童发育性口吃影像学特征分类模型,探寻发育性口吃潜在的影像学生物标志物。

材料和方法:本研究纳入于四川大学华西第二医院诊断为发育性口吃的儿童 54 例,言语流利儿童 54 例。采集脑部磁共振 3D-T1 加权像和弥散成像数据。对全脑灰质体积、皮层形态学、白质纤维束结构改变进行分析。提取有差异的灰质体积、皮层褶皱、弥散参数作为原始影像学特征,通过 10 种分类器建立疾病识别模型,使用 ROC 曲线下面积 (area under the curve, AUC) 评估模型效能,利用信息增益来评估特征变量对分类结果的贡献。

结果:口吃组右侧海马、右侧颞上回和左侧枕中回灰质体积较对照组增加具有统计学意义 ($P \leq 0.001$)。口吃组右岛盖部及右颞上回的皮层褶皱较对照组减小具有统计学意义 ($P=0.025$, $P=0.021$, $P=0.037$)。口吃组子网络以小脑为中心,小脑与右岛盖部、双侧岛叶、左角回、双侧尾状核及右海马回的结构连接减低 ($P < 0.05$)。口吃组右小脑节点介数减少,右枕下回节点效率减少 ($P < 0.05$)。NODDI 的脑脊液体积分数 (fcsf) 和 DKI 的轴向峰度 (AK) 在额斜束和弓状束等各个束上表现出显著差异 ($P < 0.05$)。NODDI 的方向弥散指数 (ODI) 和 DTI 的轴向弥散系数 (AD) 与口吃严重程度相关 ($P < 0.05$)。分别通过 10 种分类器构建二分类模型,全脑灰质体积特征分类的 AUC 为 0.85,对分类贡献最大的脑区是右尾状核和小脑。NODDI 参数特征分类的 AUC 为 0.88。

结论:本研究发现,颞上回灰质体积、皮层褶皱异常、以小脑为中心的子网络存在结构连接与儿童发育性口吃相关。本研究涉及言语运动控制相关的脑结构(皮质-基底神经节-丘脑-皮质环路以及背侧语言通路)异常,可能导致破坏了言语产生时间顺序的精准控制。通过机器学习建立了高精度的发育性口吃影像学特征分类模型,可用于疾病的识别和分类。

PO-2589

儿童及青少年难治性颞叶癫痫脑网络改变与认知功能相关性研究

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目的: 难治性颞叶癫痫是最常见的难治性癫痫类型之一, 反复的癫痫发作可能会造成皮层及皮层下脑网络连接异常, 但目前儿童及青少年难治性颞叶癫痫脑网络改变机制仍不完全清楚, 因此本研究旨在探究难治性颞叶癫痫患儿脑网络动态改变与认知功能的相关性。

方法: 本研究共纳入 41 名难治性颞叶癫痫和 35 名正常对照, 所有被试常规 MRI 检查均未见异常, 并于扫描当天对难治性颞叶癫痫患者进行儿童韦氏智力量表评估, 所有被试均进行高分辨三维 T1 结构像和静息态功能 MRI 扫描。通过独立成分分析方法, 在 GIFT 软件构建动态网络连接, 提取每个被试的三种动态网络时间参数指标。比较两组网络连接差异, 以及时间参数指标差异, 正态分布且方差齐的变量使用双样本 T 检验, 不符合使用 U 检验。分析时间参数指标与临床变量和认知评分的相关性。

结果: 与正常对照组相比, 难治性颞叶癫痫组脑动态网络连接在 4 个不同状态均有显著差异 ($P<0.05$, FDR 校正)。难治性颞叶癫痫患儿在主要状态 2 中呈现连接减弱, 部分脑网络状态(状态 1、3、4)网络连接增强。脑网络总体连接呈减弱状态, 高级认知网络中默认模式网络、执行控制网络、语言网络和楔前叶网络呈网络内连接减弱, 语言网络和其它脑网络之间均呈连接增强。低级知觉网络听觉网络、运动网络和视觉网络在网络内和网络间呈连接减弱。皮层下网络基底神经节网络和语言网络连接增强, 与默认模式网络连接减弱; 时间分数和平均滞留时间均在状态 1-3 的组间比较有差异, 转化次数在组间比较未见差异; 难治性颞叶癫痫组与正常对照组在智力评估各项中均有差异; 状态 1 的时间分数与病程呈正相关($r=0.337$, $P=0.031$), 状态 1 的平均滞留时间与病程呈正相关($r=0.401$, $P=0.009$), 状态 1 的平均滞留时间和言语智商($r=-0.323$, $P=0.039$)及知觉推理($r=-0.323$, $P=0.040$)呈负相关。

结论: 本研究结果表明难治性颞叶癫痫患儿动态脑网络连接存在异常改变并与病程和认知功能障碍相关, 推测难治性癫痫患儿脑功能网络的重塑超出代偿范围会伴随相应的认知功能障碍。动态脑网络指标可能是反映难治性癫痫病程进展和认知功能障碍的一种潜在生物标志物。

PO-2590

新生儿高胆红素血症患者的脑深部灰质核团和脑白质在定量磁化率图(QSM)上的变化

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目的: 新生儿高胆红素血症 (NHB) 在常规磁共振成像上无明显变化, 只有进展到高胆红素脑病时才出现典型的影像学征象。本研究旨在评估定量磁化率图 (QSM) 对 NHB 的诊断价值。

方法: 本试验共纳入 33 例足月 NHB 新生儿 (实验组) 和 12 例健康足月新生儿 (对照组), 每位受试者均行常规 MRI 和 QSM 扫描, 并提取壳核、苍白球、尾状核和额叶白质的 QSM 值。采用 t 检验和秩和检验探讨两组间 QSM 值的差异以及每组各脑区的左右两侧 QSM 值的差异。采用 Pearson 或 Spearman 双变量相关分析、多元线性回归分析和多项式回归分析探讨 QSM 值与血清总胆红素 (TBil) 以及血清间接胆红素 (IBil) 之间的关系。通过受试者操作特征 (ROC) 曲线计算曲线下面积 (AUC) 评估 QSM 的诊断能力。

结果:两组壳核的 QSM 值具有显著的统计学差异,且实验组壳核的 QSM 值明显高于对照组。两组壳核、苍白球、尾状核以及额叶白质的左右两侧的 QSM 值无显著的统计学差异。对照组苍白球的 QSM 值与 TBil 呈正相关;实验组右尾状核和左额叶白质的 QSM 值与 TBil 呈负相关;实验组右尾状核和左额叶白质的 QSM 值与 IBil 呈负相关。多元线性回归分析结果表明,对照组苍白球和额叶白质的 QSM 值与 TBil 有相关性;实验组右尾状核和左额叶白质的 QSM 值与 IBil 有相关性。由此,推断 TBil 和 IBil 与各脑区的 QSM 值密切相关。多项式回归曲线分析结果显示,健康足月新生儿的苍白球、右侧尾状核、尾状核和左侧额叶白质的 QSM 值分别随着 TBil 和 IBil 的升高而升高,当发生高胆红素血症时, QSM 值又分别随着 TBil 和 IBil 的升高而降低,但仍高于健康足月新生儿的水平,并且 TBil 和 IBil 对 QSM 值的影响非常相似。通过比较 AUC,我们发现壳核的诊断能力最强。ROC 曲线也印证了左右两侧脑区的 QSM 值相近。因此,单侧脑区的 QSM 值可以代表双侧脑区的诊断结果。

结论:QSM 是一种高度敏感、无创性的影像学检查方法。新生儿左右两侧的脑深部灰质核团和脑白质的 QSM 值均可以随着 TBil 和 IBil 动态变化,壳核的 QSM 值可以准确诊断 NHB。

PO-2591

儿童流感相关性脑病的影像表现

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目的 探讨儿童流感相关性脑病(influenza—associated encephalopathy, IAE)的影像学特征。

方法 回顾性分析 2022 年 1 月至 2023 年 4 月我院确诊 IAE 且资料完整患者的影像资料。

结果 共纳入患者 30 例,平均年龄 4 岁。其中急性坏死性脑病 19 例,急性脑病伴双向发作及后期弥散降低 2 例、临床轻症脑病伴可逆性胼胝体压部病变 8 例、出血性休克与脑病综合征 1 例。所有患者均进行了 CT 及磁共振检查。急性坏死性脑病患者 CT 均表现为双侧丘脑、基底节对称性低密度;磁共振均表现为双侧大小脑半球、丘脑、基底节、脑干大片状对称分布的长 T2 信号, DWI 病变中心为低信号,边缘为高信号,双侧丘脑病变为短 T1 信号。急性脑病伴双向发作及后期弥散降低患儿的 CT 无阳性表现,磁共振表现为皮质下脑白质的长 T1 长 T2 信号,伴有 DWI 明显高信号,即“亮树征”。临床轻症脑病伴可逆性胼胝体压部病变患儿的 CT 无阳性表现,磁共振表现胼胝体压部椭圆形或圆形的病灶,边界清楚, T1WI 呈等或低信号, T2WI 为高信号, DWI 为明显高信号, ADC 图呈低信号。其中 1 例患儿同时出现胼胝体膝部及侧脑室周围脑白质受累。出血性休克与脑病综合征的患儿的 CT 及 MRI 均表现为双侧大脑半球弥漫性脑水肿伴蛛网膜下腔出血。

结论 儿童流感相关性脑病具有一定的影像学特征,起病急,预后较差,在流感季节或流感大流行时,患儿出现上述影像表现时应考虑 IAE 的可能。

PO-2592

发育性口吃儿童脑血流异常的磁共振研究

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目的:探讨发育性口吃患儿静息态脑血流(CBF)的变化。

方法:采用伪连续动脉自旋标记(pcASL)磁共振成像技术对 35 例发育性口吃患儿和 27 例 3~14 岁健康儿童的静息态脑血流进行定量分析。比较两组患者的 CBF,评价 CBF 异常与口吃严重程度的相关性。

结果：与健康对照组相比，口吃组双侧小脑半球、右侧楔叶、左侧枕上回 CBF 降低，右侧内侧额上回、左侧直肌、左侧背外侧额上回 CBF 升高。此外，口吃组左侧 cerebellum_6 和左侧枕上回 CBF 与口吃严重程度呈正相关。

结论：发育性口吃患儿脑血流量减少主要发生在小脑和枕回，而额叶脑血流量增加。此外，左侧 cerebellum_6 和左枕上回 CBF 异常与更严重的症状相关，提示左侧 cerebellum_6 和左枕上回 CBF 降低可能是儿童口吃的潜在影像学生物标志物。

PO-2593

Oliver 病并卵巢颗粒细胞瘤一例

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患儿女，10 岁，因间断性阴道不规则流血 1 个月，发现盆腔肿物 1 周入院。该患儿于 3 个月前月经初潮，后月经不规律，周期为 28-30 天，经期 7-16 天。1 个月前无明显诱因间断性阴道不规则流血，量少，色淡红。既往 9 年前于北京骨肿瘤医院诊断“内生性软骨瘤”。入院查体多发骨骼畸形，腹部 CT 示子宫左前上方巨大肿块，大小约 13.0cmX6.4cmX15.0cm，其内密度不均，增强扫描不均匀强化，其内可见血管穿行，与右侧附件关系密切，病灶后方可见结节状软组织密度影，大小约 0.6cm，轻度强化。骨盆组成骨密度不均匀，形态不规整，可见骨质破坏，骨盆左侧软组织影增厚，密度不均。行右附件及大网膜切除术，术后病理汇报右侧卵巢幼年型颗粒细胞瘤 1C1 期。多发内生软骨瘤是一种罕见的非遗传性良性肿瘤，该病由 Oliver 于 1899 年首先报道，又称 Oliver 病。患病率约 1/100000。目前国外文献报道卵巢颗粒细胞瘤合并内生软骨瘤仅 11 例，国外 10 例，国内北京积水潭医院报道 1 例。卵巢幼年型颗粒细胞瘤合并多发内生软骨瘤临床罕见，发病可能与 1DH1 基因突变有关，治疗以手术切除为主，术后需定期随访。

PO-2594

早产风险对新生儿短程纤维微结构及发育模式影响的 dMRI 研究

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目的：早产风险是指早产时间及相关脑损伤等干扰早产儿脑结构发育的危险因素。短程纤维作为大脑功能发育的重要结构基础，也是发育最晚的大脑结构，其结构脆弱性导致易于受早产风险影响而损伤。然而目前对早产儿短程纤维的结构改变了解甚少。本课题旨在观察并描述早产风险对短程纤维微结构及发育模式的影响。

方法：基于人脑连接发育计划数据库筛选 35 例足月儿新生儿（37.8-41.8 孕周）、37 例适度早产儿（32.1-36.8 孕周）及 39 例极早产儿（23.7-31.7 孕周）的 T2 加权及多球壳弥散数据，分别追踪额、顶、颞、枕叶短程纤维并测量平均弥散参数值，包括部分各向异性指数（FA）、平均弥散率（MD）、轴向扩散率（AD）、径向扩散率（RD）神经突密度指数（NDI）、方向离散度（ODI），①采用 ANCOVA 分析分别比较 3 组额、顶、颞、枕叶短程纤维弥散参数值，观察早产程度对短程纤维微结构的影响；②采用线性回归分析早产时间对短程纤维发育模式的影响；③依据放射学评分将早产儿分为正常脑结构组和脑损伤组，采用 ANCOVA 分析早产相关脑损伤对短程纤维微结构的影响。

结果：①适度早产儿短程纤维 MD 值较足月儿升高（ $p<0.05$ ）；极早产儿短程纤维 FA 值、NDI 值较足月儿减低，MD 值、RD 值较足月儿升高；适度早产儿与极早产儿短程纤维弥散参数值无统计

学差异；②足月新生儿额叶短程纤维 FA 值，额颞枕叶短程纤维 NDI 值随孕龄增加升高；适度早产儿额叶短程纤维弥散参数值无统计学意义的孕龄相关变化；极早产儿顶叶 FA 值，顶枕颞叶 NDI 值升高速率较足月儿增快；③脑损伤组早产儿额顶叶 AD 值较正常脑结构组显著降低。

结论：研究结果表明①新生儿短程纤维具有异质性发育的特点；②短程纤维微结构及发育模式改变具有早产时间依赖性；③顶枕叶短程纤维具有代偿性发育特征；④MD 值对探测早产相关短程纤维微结构损伤敏感；⑤早产相关脑损伤造成额顶叶短程纤维轴突损伤。以上结果为全面了解人脑结构早期发育补充了新的证据，为深入了解发育性脑病的纤维机制提供新的思路，同时对精细化早产儿护理提供理论支持。

PO-2595

LAMA2-相关肌营养不良患儿大腿骨骼肌 MRI 改变特点

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目的：分析 LAMA2-相关肌营养不良(LAMA2-related muscular dystrophy, LAMA2-MD)大腿骨骼肌磁共振成像改变，总结其肌肉受累特点。

方法：选取 14 例 LAMA2-MD 患儿，其临床上均表现为生后肌无力、肌张力低，运动发育落后，伴广泛脑白质病变，基因检测出 LAMA2 复合杂合突变。选取上述患儿大腿各肌肉 MR 图像，对肌肉的脂肪浸润、水肿及萎缩进行评分，并以平均值及受累频度（%）评估脂肪浸润、以受累频度（%）评估萎缩，分析大腿骨骼肌受累模式。

结果：14 例患儿，男 10 例，女 4 例，先天性肌营养不良 1A 型(MDC1A) 11 例，常染色体隐性遗传肢带型肌营养不良 23 型(LGMDR23) 3 例，其中 1 例 LGMDR23 于首次检查 2 年后复查 MRI。MRI 检查时平均年龄 3.3 (1.0-11.1)岁。大腿肌肉 MRI 示所有患儿大腿肌肉均存在不同程度脂肪浸润，4 例出现水肿，14 例出现肌肉萎缩，LAMA2-MD 的两种表型肌肉脂肪化分布形式及程度存在差异。所有患儿大腿肌肉均有广泛脂肪浸润，以大收肌(3.9, 100%)、臀大肌(3.7, 100%)和股二头肌长头(3.5, 100%)最严重；长收肌(0.6, 40.0%)相对不受累；并且单块肌肉的脂肪化程度以周边为著。水肿较轻，主要累及臀大肌和股四头肌（除股直肌外）。肌肉萎缩主要累及大收肌(93.3%)，臀大肌(66.7%)。1 例 MDC1A 患儿随访过程中死亡，其肌肉脂肪浸润程度最重，上述各肌群均受累且脂肪浸润评分平均值为 3.8。LGMDR23 患儿的肌肉受累程度较 MDC1A 轻，大腿中段脂肪化以大收肌和股二头肌长头间隔受累为主，伴股四头肌受累，1 例 LGMDR23 患者在时隔 2 年后复查肌肉 MRI 无明显加重。

结论：LAMA2-MD 患者大腿肌肉 MRI 表现为广泛脂肪浸润，以大收肌、臀大肌、股二头肌和股四头肌病变明显，而长收肌相对不受累。萎缩主要累及大收肌、臀大肌和股四头肌。LGMDR23 患儿肌肉脂肪化及萎缩程度较 MDC1A 轻 LAMA2-MD 患儿大腿骨骼肌 MRI 表现具有一定特异性，可以帮助疾病定性诊断和进行病情进展和预后的评估。

PO-2596

儿童急性脑病的临床和磁共振表现分析

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目的：通过分析儿童急性脑病的临床表现和磁共振征象，总结儿童急性脑病的临床及影像学特点。

方法：回顾性分析 2015 年 12 月至 2023 年 3 月在郑州大学附属儿童医院诊治的 50 例急性脑病患儿临床资料、实验室检查、影像资料、治疗及转归，并根据其临床影像学特征对其进行进一步分类。

结果：50 例患儿中，男 32 例，女 28 例，就诊时年龄（ 3.0 ± 2.8 ）岁，中位数 4.1 岁，患儿神经系统首发症状为抽搐，19 例表现为惊厥持续状态，25 例昏迷。45 例均以发热起病。本研究根据脑病临床病理特征分为四组：细胞因子风暴组、兴奋毒性组、先天代谢紊乱组及无法分类组。细胞因子风暴组有 19 例急性坏死性脑病（ANE），MRI 表现以双侧病变对称分布，丘脑病变在 DWI 图像上呈“三色模式”或“双色模式”。兴奋毒性组：急性脑病伴双相癫痫和迟发性弥散减低(AESD)3 例，头颅 MRI 在病程的第 1~2 天无异常信号，第 3~9 天 DWI 皮层下白质出现“亮树征”；6 例发热性感染相关癫痫综合征(FIRES),头颅 MRI 首次检查 3 例无异常信号，1 例皮层及皮层下广泛 DWI 高信号，2 例海马边缘有线状 DWI 高信号，病程后期 3 例海马体积减小，FLAIR 信号增高，6 例均有脑组织不同程度萎缩，皮层 FLAIR 信号增高；急性婴儿额叶优势脑病 1 例（AIEF），头颅 MRI 的 DWI 显示双侧额叶为主皮质高信号。无法分类组有 19 例伴胼胝体压部可逆性病变的轻度脑炎/脑病(MERS), MERS I 型 17 例,DWI 胼胝体压部局限片状 DWI 高信号，MERS II 型 2 例，胼胝体压部及双侧顶叶白质内片状 DWI 高信号。先天性代谢紊乱引起的急性脑病 2 例，头颅 MRI 表现为急性期以白质为主的广泛细胞毒性水肿。

结论：儿童急性脑病以婴幼儿多见，以发热、抽搐及迅速出现的意识障碍最为常见，头颅 MRI 在病程初期、病程中的动态表现能够帮助诊断急性脑病及进行临床病理特征分类，为临床早诊断、早治疗及评估预后提供重要客观依据。

PO-2597

MRI 对胎儿先天性高位气道梗阻综合征的诊断价值。

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目的：探讨 MRI 评估胎儿先天性高位气道梗阻综合征(CHAOS)的诊断价值。

方法：回顾性收集 2014 年 12 月至 2023 年 8 月经引产后病理证实为 CHAOS 的 17 例胎儿。超声发现 CHAOS 当天接受 MRI 检查，MR 扫描序列包括半傅立叶单次激发快速自旋回波(HASTE)序列、真稳态进动快速成像(True-FISP)序列、T1WI，发现可疑气道梗阻后行病变区冠状位以及胎儿矢状位扫描。将胎儿产前、引产后标本 MR 图像与尸检病理结果对照分析。

结果：17 例胎儿均出现梗阻水平以下气道扩张、肺体积增大、双肺 T2WI 信号增高、膈肌平直或反向、心脏受压位于中线区、大量腹水。胎儿皮肤水肿 15 例，出现胸腺结构上移至胸廓入口以上 5 例，羊水过多 10 例。产前 MRI 判断 15 例喉部梗阻和 2 例气管梗阻。产后 MR 及尸检病理证实喉闭锁 13 例，喉闭锁合并气管食道瘘 1 例，气管缺如 1 例，气管发育不良 1 例，气管发育不良伴双主动脉弓 1 例。

结论：MRI 能辅助诊断 CHAOS 的梗阻水平以及梗阻类型，对评估预后、计划手术方案以及优生优育起到重要补充作用。

PO-2598

儿童 X 线跟骨轴位摄影技术的探讨

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目的：分析研究跟骨轴位 X 线摄影技术的方法，探讨跟骨轴位摄影标准，以降低儿童辐射剂量，提高摄影质量，提高诊断效率。

方法：分析我院 2022 年 2 月至 5 月跟骨轴位 X 线照片 50 例。其中男性 28 例，女性 22 例。年龄在 6 岁至 16 岁。所有病例均采用锐科 DR VX3733-SYS 摄影，分别取两种方法，方法①患儿仰卧摄影台上，被检测下肢伸直，小腿长轴与摄影台面长轴平行，踝部极度背屈，踝关节置于探测器中心，中心线向头侧倾斜 35°至 45°，70KV,6MAS。通过第三跖骨基底部对准跟距关节射入探测器中心。方法②患儿站立摄影台上，双脚内旋，使两足平行，双脚相距 80 毫米，足内侧缘平行，踝背屈 10°，50KV，4MAS,摄影距离 100CM，中心线对准内外踝连线中点 45°射入。跟骨轴位影像显示标准：1、跟骨体和跟骨各突出均显示清晰 2、全跟骨显示于图像正中，显示被检测跟骨的骨质、关节面及周围软组织 3、骨小梁、周围软组织显示清晰。

结果：跟骨间隙显示欠佳，存在体位不正、配合不佳、曝光剂量欠佳等因素。方法①跟距关节间隙显示概率为 80.2%，方法②跟距关节间隙显示率约为百分之 90%，并可双侧同时对比，减少重拍率，从而减少患儿受照辐射。

结果：方法一要求患儿需要用双手或者他人帮助拉住前脚掌使踝关节过度背伸，由于儿童配合度欠佳，内旋或外展不足，导致体位不正，跖骨形态显影，曝光次数增加，累计受照辐射。方法二要求患儿站立静止即可，大大提高摄片率。熟悉跟骨轴位 X 线解剖特点是跟骨轴位 X 线摄影的基础，掌握跟骨轴位拍摄技术，提高摄片率，从而降低癌症发生率，减少辐射剂量，利于儿童生长发育。放射对儿童产生的副作用已是事实，但采取最优化的放射技术可以获得良好的成像效果，同时能将副作用降到最低限度，减少对患儿身体的危害。

结论：熟悉跟骨轴位 X 线解剖是拍摄跟骨的金标准，掌握跟骨拍摄技巧，可以提高跟骨轴位 X 线摄影水平。

PO-2599

DCE 和 IVIM 联合预测髋关节发育不良儿童 复位后股骨头缺血性坏死

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目的：评估动态对比增强（DCE）-MRI 和体素内非相干运动（IVIM）在预测髋关节发育不良儿童复位后股骨头缺血性坏死的诊断价值。

方法：选取 2017 年 4 月至 2019 年 12 月在我院行复位术的 16 例髋关节发育不良（DDH）患儿为研究对象。复位后 6 个月随访结果显示，11 例髋关节发生缺血性坏死（AVN），21 例髋关节正常。在股骨头干骺端上勾画感兴趣的区域获得 DCE-MRI 和 IVIM 参数。参数分别是 ADC_{slow} ， ADC_{fast} ， f ， $f*ADC_{fast}$ ， K^{trans} ， Ve ， Vp 和 k_{ep} 。使用 SPSS，GraphPad Prism 和 MedCalc 软件对参数进行统计分析。

结果：与正常组比较，AVN 组 ADC_{fast} 、 $f*ADC_{fast}$ 和 K^{trans} 较低（ $P=0.08$ 、 $p=0.022$ 和 $p=0.004$ ）。 K^{trans} ， ADC_{fast} 和 $f*ADC_{fast}$ 的 AUC 分别为 0.805,0.784,0.749。联合 ADC_{fast} 和 K^{trans} 两个指标具有最高的诊断效率，AUC 为 0.926，灵敏度为 90.91%，特异性为 90.48%。

结论：DCE-MRI 和 IVIM 参数能准确鉴别复位后的 DDH 患儿 AVN 组与正常组， ADC_{fast} 和 K^{trans} 联合诊断显著提高了诊断效率。DCE-MRI 和 IVIM 可以预测 DDH 患儿复位后 AVN 的发生。

PO-2600

儿童弥漫内生型脑桥胶质瘤的临床和影像学特征、治疗反应和总生存率之间的关系

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目的 我们旨在评估儿童弥漫内生型脑桥胶质瘤 (DIPG) 的影像学特征和治疗反应 (通过比较二维交叉乘积和体积测量) 与总生存率 (OS) 之间的关系。

方法: 纳入 116 例 (≤ 18 岁) 诊断为儿童弥漫内生型脑桥胶质瘤的患者。进行单变量和多变量分析, 以评估临床和影像学特征以及治疗反应与 OS 的相关性。通过线性回归评估根据儿童神经肿瘤反应评估 (RAPNO) 工作组的建议定义部分反应 (PR) 为最大截面垂直直径乘积 (与基线相比) 减少 $\geq 25\%$ 和体积测量阈值之间的相关性。使用对数秩检验比较治疗反应分类不一致和分类一致患者之间 OS 的差异性。

结果: 在单因素分析中, 与较差 OS 相关的特征包括未接受替莫唑胺辅助治疗、未进行再程放疗、初始 Karnofsky 评分较低、较大脑桥外延伸率、坏死、非-PR 和放疗后增加的环形强化。在多变量分析中, 坏死、脑桥外延伸率、治疗反应、放疗后增加的环形强化和再程放疗可以预测 OS。25% 的 CP 减少定义 (PR) 与 32% 的体积减少相关 ($R^2=0.90$)。根据 CP 减少 (25%) 和体积减少 (32%), 7 名患者的治疗反应分类不一致。这 7 名患者的中位生存时间为 13.0 个月, 显著高于根据 CP 减少 (25%) 和体积减少 (32%) 同时分类为非-PR 组 (8.4 个月), $P<0.05$ 。

结论: 我们研究确定了影像学特征、治疗反应和 OS 之间的相关性; 这些信息对未来的临床试验至关重要。肿瘤体积可能比二维测量更准确地反应 DIPG 生长模式, 并且可以用于评估治疗反应。

PO-2601

多参数心脏磁共振在儿童心肌炎中的临床应用和研究进展

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目的: 对多参数心脏磁共振 (CMR) 在儿童心肌炎中的临床应用和研究进展进行综述。

方法: 通过查阅国内外相关文献, 首先对多参数心脏磁共振的扫描序列进行概述, 然后对多参数心脏磁共振在儿童心肌炎诊断、危险分层、治疗决策、预后评估和随访中的应用以及研究新进展方面进行全面归纳、总结和分析。

结果: 在急性心肌炎诊断方面, 多项研究显示 2018 版路易斯湖标准 (LLC) 对儿童急性心肌炎诊断的敏感度和特异度较高, AUC 值均在 0.9 以上; 在慢性心肌炎诊断方面, 横向弛豫时间定量成像 (T2-mapping) 和心肌细胞外容积百分数 (ECV) 可能有助于诊断儿童慢性心肌炎, 但敏感度有些偏低, 而晚期延迟强化 (LGE) 诊断儿童慢性心肌炎并不可靠; 在治疗决策方面, 有研究表明病情较重的患儿在进行心脏磁共振检查后住院费用和住院时间缩短, 死亡率较未进行心脏磁共振检查的患儿更低; 另外心脏磁共振在心肌炎危险分层、预后评估和随访中也有一定价值, 其中 LGE、ECV 和左室射血分数 (LVEF) 与患儿预后相关; 在研究进展方面, 特征追踪技术、压缩感知技术、人工智能、快速磁共振扫描序列和方案等方向的研究层出不穷, 但在低龄儿童人群中的研究还相对较少。

结论: 多参数心脏磁共振不仅是在体诊断儿童急性心肌炎的“金标准”, 而且对心肌炎的危险分层、预后评估和随访有一定价值, 但现阶段还存在诸多问题; 新的心脏磁共振技术需要更多关于儿童群体研究的证据, 未来心脏磁共振快速扫描和智能化后处理一直会是研究的热点方向, 而非增强序列结合机器学习、影像组学等技术可能给对比剂禁忌的患儿带来希望。

PO-2602

脑室周围白质损伤患儿发生混合型脑瘫的预测模型的建立

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目的：建立脑室周围白质损伤（periventricular white matter injury, PWMI）患儿发生混合型脑瘫的预测模型。

方法：回顾性纳入 2015 年 9 月—2022 年 10 月在河南中医药大学第一附属医院经 MRI 诊断为 PWMI（6 个月-2 岁）并随访至 2 岁以后确诊为脑瘫的患儿，分为混合型脑瘫（痉挛型+不随意运动型）和痉挛型脑瘫组。采用上采样方法（Borderline-SMOTE 算法）对数据分布不平衡进行预处理（1:1 匹配）。基于 PWMI-MRI 征象建立评分系统，采用单因素及多因素 Logistic 回归分析筛选与 PWMI 混合型脑瘫相关的 MRI 征象并建立列线图模型。评估模型的区分度、校准度及绘制决策曲线评估模型的临床应用性。采用五折交叉及重复交叉验证进行内部验证。计算准确度、敏感度、特异度、阳性预测值和阴性预测值评估模型的诊断效能。采用 Spearman 相关性分析评估独立 MRI 变量与 GMFCS 的相关性。

结果：本研究共纳入 135 例 PWMI 脑瘫患儿，男 82 例，女 53 例，中位年龄 14（9-18）月，痉挛型脑瘫 100 例，混合型脑瘫 35 例。采用上采样方法对数据预处理后，痉挛型和混合型脑瘫组各 100 例。多因素 Logistic 回归分析发现丘脑腹外侧核（OR, 27.5; 95%CI: 8.293-90.942）、后壳核（OR, 13.7; 95%CI: 4.489-41.549）、海马（OR, 7.2; 95%CI: 1.702-30.813）及尾状核的损伤（OR, 5.8; 95%CI: 1.973-16.950）与混合型脑瘫相关。模型的 AUC 为 0.96（95% CI: 0.934-0.988），五折交叉及重复交叉验证的 AUC 分别为 0.95, 0.96；该模型具有良好的校准度（ $c2=3.712$, $P=0.529$ ）及临床应用性。合理性分析显示该模型与单一 MRI 征象相比，具有最高的诊断效能。模型的 4 个独立 MRI 征象均与 GMFCS 正相关（ $r=0.559$ 、 0.581 、 0.171 、 0.409 , P 均 <0.05 ）。

结论：本研究建立的模型可以早期准确的鉴别 PWMI 混合型和 PWMI 痉挛型脑瘫，有助于指导脑瘫的个体化干预。

PO-2603

人工智能在儿童骨龄影像评估的准确性与临床应用差异性的研究

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目的 探讨人工智能（AI）骨龄测量系统（TW3-RUS、Carpal、G-P 图谱法）评估儿童骨龄的准确性，与真实世界评估的差异性，分析差异形成的原因及探讨改良措施。

方法 回顾性收集 2021 年 8 月至 2023 年 8 月于昆明市第一人民医院行左侧手腕部 X 线正位片检查的 894 例儿童的影像资料。采用 AI 骨龄测评 TW3-RUS、TW3-Carpal 和 G-P 法对入组病例进行骨龄评估，得到 AI 骨龄。由 3 名高年资儿科影像医师依据 TW3-RUS、TW3-Carpal 和 G-P 法进行评估，所得骨龄结果的平均值作为金标准。根据金标准获得的骨龄以 3 岁为间隔进行分层，骨龄 1~3、4~6、7~9、10~12、13~15 和 16~18 岁的例数分别为 84、116、178、226、183、107 例。分别计算各年龄组骨龄结果与参考标准骨龄之间误差在 0.5 年内、1 年内及 2 年内的准确度，计数平均绝对误差 MAE 和均方根误差 RMSE。使用组内相关系数评估 AI 骨龄与金标准骨龄结果的一致性，计算 AI 评测骨龄与参考标准骨龄之间的一致性。

结果 整体样本中 AI 系统误差在 0.5 年内、1 年内及 2 年内的准确度分别为 81.2% (726/894)、89.6% (801/894)、93.9% (839/894)。MAE 分别为 0.410、0.494、0.530 年, RMSE 分别为 0.487、0.563、0.636 年。

各年龄段中, 误差<0.5 年、<1 年、<2 年的准确度分别为: 1~3 岁组 98.1%、100%、100%; 4~6 岁组 80.4%、87.5%、92.2%; 7~9 岁组 78.8%、85.4%、91.7%; 10~12 岁组 83.2%、91.4%、93.6%; 13~15 岁组 76.3%、81.7%、85.8%和 16~18 岁组 90.7%、97.6%、98.2%。

结论 AI 骨龄测量结果具有良好的可靠性与准确性, 但实际临床应用中仍需要人工调校及进一步深度学习; 在各年龄分段 1~3 岁及 16~18 岁年龄组无明显差异 ($P>0.05$), 4~6 岁、7~9 岁、10~12、13~15 岁年龄组有统计学差异 ($P<0.05$)。

PO-2604

基于模糊聚类算法的早产儿 PWMD 的 MRI 影像组学及相关危险因素分析

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目的: 探究早产儿应用模糊聚类算法 (FCM) 分析其发生局灶性脑白质损伤 (PWMD) 的磁共振 (MRI) 特征并进一步明确影响因素。

方法: 从本医院 2020 年 2 月-2022 年 2 月期间新生儿科入住的早产儿中筛选 100 例深入调查, 根据 PWMD 的发生情况分为 PWMD 组、单纯早产组, 每组均为 50 例。所有早产儿进行 MRI 检查并分析其影像特征变化、ADC 值差异, 收集研究对象的临床信息并多因素回归分析早产儿发生 PWMD 的影响因素。

结果: 首次 MRI 检查点状、簇状、线状损伤例数分别为 28 例、12 例、10 例, MRI 复查点状损伤病灶完全消失, 簇状、线状损伤患儿中发展为 PVL 的比例分别为 33.33%、40.00%。PWMD 组患儿的病灶区域 ADC 值对比单纯早产组明显降低 ($P<0.05$)。PWMD 组具有更高比例的呼吸窘迫、低出生体重、胎膜早破、呼吸道感染且均是发生 PWMD 的危险因素 ($P<0.05$)。

结论: 早产儿发生 PWMD 后为点状、簇状、线状 T1 高信号 MRI 表现, 患儿的 ADC 值呈降低趋势变化, 呼吸窘迫、低出生体重、胎膜早破、呼吸道感染是引发早产儿发生 PWMD 的危险因素, 应将存在危险因素的早产儿作为临床 MRI 诊断的重点对象。

PO-2605

脑损伤新生儿前额叶脑 γ -氨基丁酸与谷氨酸代谢改变研究

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目的: 神经递质对维持正常的大脑功能至关重要, 脑损伤新生儿脑内生化代谢会出现一些列改变, 本研究旨在探索脑损伤新生儿前额叶皮层脑内 γ -氨基丁酸与谷氨酸的变化, 进一步探讨脑损伤发病机制。资料与方法: 招募郑州大学第一附属医院 11 例有脑损伤病史新生儿 (组 1, 孕周为 28-38) 及 7 例无脑损伤病史新生儿 (组 2, 孕周为 28-40 weeks), 进行 3.0T MR (Ingenia Meta, Philips Healthcare)扫描, 早产儿在纠正胎龄 38-40 周进行扫描。扫描序列包括脑常规扫描, 3D T1WI 及使用 J-差异编辑技术(J-difference edited point-resolved spectroscopy,MEGA-PRESS)的 MRS 扫描 (TR = 8.2 ms; TE = 3.7 ms; 层厚 = 1 mm; FOV = 24x24 cm²; and flip angle = 8°.), MRS 体素置于胼胝体膝部前上方前额叶中线旁。使用 Gannet 软件对 MEGA-PRESS 波谱进行数据分析, 测量

结果以肌酸(Creatine,Cr)作为参照物,用独立样本 t 检验分析两组间 GABA+/Cr、Glx/Cr 值的差异并进行分析。**Result:** 2 例脑损伤新生儿及 1 例正常新生儿扫描时头动,图像有伪影被排除。5 例脑损伤新生儿脑常规 MR 显示脑内异常信号,包括脑室内出血和/或白质损伤。所有组 2 新生儿常规脑 MR 均显示无异常。组 1 患儿测量脑内 Glx [Cr]平均水平 高于组 1 新生儿,且有统计学意义(0.101 ± 0.128 vs. 0.084 ± 0.007 , $p = 0.00$)。两组间 GABA[Cr]水平无明显差异。结论: MEGA-PRESS 波谱技术可以用来进行观察脑损伤新生儿脑内代谢改变情况,为脑损伤的诊断及预后评估提供一种新的技术方法。

PO-2606

基于 CT 多模态技术在降低儿童先天性心脏病 CTA 辐射剂量上的应用价值

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目的:多模态技术为等中心、低管电压、低管电流联合迭代重建以及大螺距技术,探讨多模态技术在降低儿童先天性心脏病 CTA 辐射剂量中的价值。方法:收集 2022 年 1 月至 2022 年 12 月来我院行双源 CT 血管造影并经手术证实的先天性心脏病患儿 54 例,采用前瞻性随机对照研究,随机分多模态组(A 组)、常规组(B 组),各 27 例,比较两组的图像质量、有效辐射剂量及诊断效能。结果:A 组和 B 组平均有效辐射剂量分别为 (0.31 ± 0.06) mSv、(0.52 ± 0.06) mSv,差异有统计学意义 ($P < 0.05$),A、B 两组噪声、SNR、CNR,后者优于前者($P < 0.01$)。A、B 两组主观质量评分 4.27 ± 0.59 分、 4.36 ± 0.57 分,差异无统计学意义($P = 0.46$),主观评分一致性 ICC 较好($ICC = 0.77, 0.96$)。A、B 两组诊断患儿先心病的效果上无差别 ($P < 0.01$)。结论:在保证图像质量以及满足临床诊断需求情况下,多模态扫描技术可降低患儿的辐射剂量。

PO-2607

儿童新型冠状病毒感染相关急性坏死性脑病的影像学表现及预后分析

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目的:总结分析儿童新型冠状病毒感染相关急性坏死性脑病 (ANE) 的影像学特征,探讨其对临床的指导价值。

方法:回顾性分析 2022 年 12 月至 2023 年 5 月西安市儿童医院收治的 7 例新型冠状病毒感染相关急性坏死性脑病患儿的影像学及临床资料。首次影像检查中,所有患儿均行颅脑 MRI 检查,其中 6 例行 DWI 检查,1 例行 MRS 检查。MRI 检查随访中,1 例死亡,6 例接受 1 次短期随访 ($< 14d$),4 例接受 1~3 次长期随访 ($> 14d$)。影像学检查重点观察丘脑、脑干、脑白质和基底节区等部位,以及整个随访过程中是否有出血及软化灶形成。

结果:7 例患儿中,男 6 例,女 1 例,发病年龄 4 岁 (10 个月~14 岁),均为急性起病,病史 1~3d,均有高热 ($\geq 39.6^{\circ}\text{C}$)、抽搐及意识障碍等临床表现,新型冠状病毒核酸及抗原检测均为阳性,其中 1 例既往有病毒性脑干脑炎病史,1 例有小脑发育不良病史,1 例出生时曾因“低体重、新生儿肺炎”住院治疗。6 例 ANE 患儿显示对称性、多灶性颅内病变,均累及双侧丘脑,其他对称病变部位包括大脑白质 (6 例)、基底节区 (5 例)、脑干 (4 例)、小脑 (3 例)、胼胝体 (1 例)。不对称病灶 1 例,病灶位于右侧丘脑、右侧基底节区及双侧侧脑室周围白质。1 例行磁共振波谱成像显

示病灶区 NAA 峰明显减低。典型的颅脑 MRI 征象为双侧对称性丘脑坏死、出血，在表观扩散系数 (ADC) 图上表现为“同心/层状结构”、“三色模式”或“靶样图形”。起病至末次随访时间为 21~39d，至末次随访，1 例死亡，2 例预后不良 (Glasgow 昏迷评分 < 8 分)；4 例预后良好 (Glasgow 昏迷评分 ≥ 9 分)。MRI 检查随访发现，脑干受累、出血及脑软化可能提示不良预后。

结论：儿童急性坏死性脑病可发生于新型冠状病毒感染的急性期，既往有神经系统基础疾病的患儿更容易出现新型冠状病毒感染的神经系统受累，早期颅脑影像学改变是诊断的重要依据，在 ADC 图上双侧丘脑表现为“三色模式”或“双色模式”等典型的影像学特征，脑干受累、出血、脑软化可能提示不良预后。

PO-2608

MRI-DTI 在脑发育迟缓中的诊断价值

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[摘要]目的：通过对三组发育异常患儿进行 MRI 常规序列和弥散张量成像 (DTI) 的扫描，应用 DTI 技术对患儿感兴趣区各向异性分数进行差异性分析，并对比 MRI 常规序列及 DTI 序列对脑髓鞘化异常的阳性检出率，探讨磁共振-弥散张量成像 (MRI-DTI) 对脑发育迟缓的诊断价值。方法：抽取 2022 年 1 月至 2023 年 6 月期间在我院临床诊断为发育迟缓患儿共 30 例，分为语言发育迟缓 15 例、运动发育迟缓 13 例及脑性瘫痪 2 例共三组，全部进行 MRI 常规序列及弥散张量成像 (DTI) 检查。应用 DTI 技术对患儿感兴趣区各向异性分数进行差异性分析，并对比 MRI 常规序列及 DTI 序列对脑髓鞘化异常的阳性检出率。结果：观察语言发育迟缓组 11 例、运动发育迟缓组 13 例、脑性瘫痪组 2 例，其中 DTI 序列在各组的阳性率分别为 90%、76.9%、100%，较 MRI 常规序列在相同分组中的阳性率高，有统计学意义 ($P < 0.05$)。非发育迟缓患儿 MRI 检查可见脑白质 T1 信号略高于灰质，T2 高信号白质略低于灰质，脑脊液呈 T1 低信号、T2 高信号，脑白质纤维束正常；发育迟缓患儿 MRI 检查可见明显髓鞘化延迟，左侧颞部神经纤维束较右侧稀疏，右侧皮质脊髓束较左侧略稀疏；双侧额、枕部神经纤维束略稀疏，右额叶局部纤维束较左侧稍稀疏；脑白质稍减少，桥脑、两侧大脑半球纤维束略稀疏；双侧大脑半球神经纤维束稍稀疏；右侧额叶及左枕叶神经纤维束较对侧略稀疏，右侧额叶局部神经纤维束不连续。DTI 图可见病灶附近纤维束受压甚至断裂。结论：弥散张量成像 (diffusion tensor imaging, DTI) 在诊断儿童脑发育迟缓中的价值较 MRI 常规序列更高。

PO-2609

传统尸检与基于 7.0 T MRI 影像学虚拟尸检在死胎和胎儿畸形的表型特征描述中的比较

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目的：基于死产儿和畸形胎儿的表型特征及父母接受程度，将运用超高场 (7.0T) MRI 成像技术的虚拟尸检与传统尸检进行比较。

方法：试验采用前瞻性观察性研究，收集 2022 年 6 月到 2023 年 6 月我院死产和怀孕 ≥ 20 周时因胎儿畸形而终止妊娠的数据，并获得父母对常规尸检和超高场 (7.0T) 磁共振影像学尸检的同意。常规尸检前先进行全身超高场 (7.0 T) 核磁共振成像检查。以常规尸检作为诊断的金标准，单独或结合其他微创产前和死亡后检查，评估和比较死后超高场 (7.0 T) MRI 表现的诊断准确性。

结果：22 例常规尸检和磁共振影像学尸检均征得父母同意，其中 1 例因严重变形被排除，21 例纳入分析。18 例 (85.7%) 影像学尸检结果与传统常规尸检结果一致。以传统常规尸检为标准，超高场

(7.0 T)MRI 影像学尸检的敏感性、特异性、阳性预测值和阴性预测值分别为: 全身 81.7%、97.2%、96.7%和 98.1%; 神经系统 94.2%、99.1%、93.2%和 99.6%; 心血管系统 76.7%、100.0%、100.0%和 98.7%; 肺部 93.1%、100.0%、100.0%和 98.3%; 腹部 91.6%、99.8%、95.8%和 97.9%; 肾脏 96.8%、100.0%、100.0%和 99.7%; 肌肉骨骼系统 80.7%、100.0%、100.0%和 97.4%。97.9%的家庭接受超高场(7.0 T)磁共振影像学虚拟尸检, 而 81.5%的家庭接受传统尸检。结论: 当父母拒绝传统尸检时, 使用死后磁共振(MRI)影像学尸检和其他微创检查的虚拟尸检可以成为传统尸检的一种可接受的替代方案。死后磁共振(MRI)影像学尸检更容易被父母接受, 且可以为大脑和脊髓畸形提供额外的诊断信息。

PO-2610

基于 3D-FIESTA 信号强度对自发性脑脊液耳漏与分泌性中耳炎鉴别诊断研究

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背景: 儿童内耳畸形合并脑脊液耳漏, 多表现为反复发作的化脓性脑膜炎, 有较高的致残率及致死率, 此类患儿均伴有中耳积液, 需与儿童常见的分泌性中耳炎所致的中耳积液相鉴别。

目的: 探讨三维稳态进动快速成像 (3D-FIESTA) 序列对儿童内耳畸形并自发性脑脊液耳漏与儿童分泌性中耳炎的鉴别诊断价值。方法: 回顾性分析 2019 年 1 月至 2023 年 8 月西安交通大学附属儿童医院经手术证实的 15 例内耳畸形并自发性脑脊液耳漏患儿(耳瘘组)与 25 例经临床诊断的分泌性中耳炎患儿(中耳炎组) 3D-FIESTA 图像, 测量两组中耳乳突蜂房、鼓室、前庭、脑桥的 FIESTA 信号强度, 并以脑桥的信号强度计算信号强度比值 (SIR), 两组间计量资料的比较采用 Mann-Whitney U 检验。结果: 耳瘘组 乳突蜂房/脑桥 SIR: 6.10(5.62 7.27), 中耳炎组 乳突蜂房/脑桥 SIR: 3.30(2.60 3.60), 耳瘘组 鼓室/脑桥 SIR: 6.30(5.72 7.01), 中耳炎组 鼓室/脑桥 SIR: 3.40(2.30 3.70), 两组有显著统计学差异 ($p<0.001$); 耳瘘组 前庭/脑桥 SIR: 6.25(5.00 7.00), 中耳炎组 前庭/脑桥 SIR: 6.40(5.90 6.95), 两组无显著统计学差异 ($p=0.466$); 耳瘘组 前庭/脑桥 SIR: 6.25(5.00 7.00), 耳瘘组 乳突蜂房/脑桥 SIR: 6.10(5.62 7.27), 两组无显著统计学差异 ($p=0.325$); 耳瘘组 鼓室/脑桥 SIR: 6.30(5.72 7.01), 耳瘘组前庭/脑桥 SIR: 6.25(5.00 7.00), 两组无显著统计学差异 ($p=0.478$)。结论: 内耳畸形并自发性脑脊液耳漏患儿(耳瘘组)中耳乳突蜂房、鼓室 FIESTA 信号强度明显高于分泌性中耳炎患儿(中耳炎组), 耳瘘组患儿前庭 FIESTA 信号强度与中耳乳突蜂房、鼓室信号强度无明显差异, 三维稳态进动快速成像 (3D-FIESTA) 序列对于鉴别上述两种疾病有重要价值。

PO-2611

儿童腹部结外淋巴瘤的影像学表现

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【目的】提高对儿童首发于腹部实质性脏器、胃肠道、腹膜淋巴瘤的影像学表现的认识。

【方法】回顾性分析在本院手术或穿刺活检病理证实的 20 例腹腔淋巴瘤的 CT 及 MRI 表现。

【结果】患儿年龄 2-13 岁, 全身症状重, 进展较快, 发热、盗汗、贫血、乏力多见, 腹腔淋巴瘤多数为 NHL。肝脏淋巴瘤 CT 可单发或多发, 平扫呈等或稍低密度, 多为门静脉周围密度均匀软组织肿块影。MRI T1WI 上呈稍低信号, T2WI 上呈稍高信号, DWI 弥散受限呈高信号, 可见到胆管

在内穿行。增强 CT: 淋巴瘤为典型乏血供肿瘤, 呈进行性轻至中度延迟强化, 强化相对均匀; 部分肿瘤内可见血管形态相对正常的肝脏固有血管, 形成所谓“血管漂浮征”。

肾脏淋巴瘤常多发 (50%~60%), 通常为双侧, 也可单侧, 表现为多发异常结节灶, CT 为等-低密度, MRI 为稍长 T1, 稍长 T2 信号灶, DWI 呈高信号; 增强扫描轻度不均匀强化; 约 20% 肾淋巴瘤表现为双肾弥漫性增大外形正常, 增强扫描可见多发边界模糊之浸润灶。

胰腺淋巴瘤可分为局限肿块型, 极少发生胰管扩张; 弥漫浸润型为腺体增大, 胰周脂肪不规则浸润, 类似于急性胰, 腺炎的表现。CT: 均匀低密度肿块, 呈轻度均匀强化。MRI: T1WI 呈低信号, T2WI 呈等或高信号, DWI 呈明显高信号。增强轻度强化。

脾脏淋巴瘤可分为均匀弥漫型、粟粒结节型、多发肿块型、孤立肿块型。增强呈均匀轻度强化。

胃肠道淋巴瘤: 管壁弥漫性或局限性增厚, 可多节段受累, 呈均匀较低密度, 表面光滑; 肠腔可不变窄, 甚至呈“动脉瘤样”扩张, 此为肠道淋巴瘤的特异性征象, 一般无肠梗阻。增强后肿瘤轻中度均匀强化, 表面粘膜可呈明显线样强化。

腹膜淋巴瘤影像表现为腹膜、大网膜及肠系膜病变; 90% 左右见腹膜增厚, 常有腹水; 其原发灶常为胃肠道, 实质性脏器受累常见; 腹腔和腹膜后淋巴结肿大常见。

【结论】儿童淋巴瘤较成人更易侵犯淋巴结外组织, 儿童首发于腹部的淋巴瘤临床并不少见, 影像学表现有其特征性, 掌握腹腔结外淋巴瘤的影像学表现对协助临床早期诊疗有重要意义。

PO-2612

儿童 SAPHO 综合征临床及影像学表现

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【目的】提高对 SAPHO 综合征临床及影像学表现的认识。【方法】对我院一例 13 岁男性 SAPHO 综合征患者个案报道并文献复习。【结果】患者右上臂及右膝关节疼痛 1 周, 发热 2 天。8 月前面部、后颈部反复出现少量痤疮。2 月前痤疮大量增多, 分布于颈部、前胸及后背, 皮疹顶端有脓点、脓疱。血常规示血象略高, C 反应蛋白增高, 血沉增快。MRI 显示右肩关节、右膝关节滑膜炎并积液, 右肱骨、右胫骨、右腓骨骨髓炎。CT 显示右侧锁骨近端骨质增生肥大, 骨膜增生, 胸锁关节破坏。滑膜炎(synovitis)、痤疮(acne)、脓疱病(pustulosis)、骨肥厚(hyperostosis)和骨髓炎(osteomyelitis)综合症简称 SAPHO 综合征, 是主要累及皮肤骨和关节的一种慢性疾病。发病年龄以青年和中年多发, 发病年龄最小 10 岁, 最大 59 岁。女性报道稍多于男性。实验室检查: C-反应蛋白增高, 类风湿因子阴性。白细胞计数和血沉可正常或稍高, RF 和 ANA 阳性, HLA-B27 约 30% 阳性。

影像学表现: CT 及 MRI 对本病滑膜炎和骨炎的早期诊断有很大意义。90% 的患者出现骨关节病, 可累及中轴骨及外周骨, 主要表现为滑膜炎、骨肥厚和骨炎。骨炎常累及骨皮质、骨髓腔或者同时累及两者, 但是典型病变是累及胸骨上端, 锁骨内端及第一对肋软骨的骨质硬化和骨肥厚。胸骨为 62%, 其次为髌髌关节(33%), 脊柱(24%), 周围骨(19%), 周围关节(10%); 81% 的病人有两处以上病变, 同时可伴有关节周围炎症。52%~66% 的病人有掌跖脓皮病, 14%~15% 的病人有痤疮, 9%~24% 的病人有银屑病。皮肤病变可发生在骨关节病之前或之后。儿童患者相对于成人患者来说, 多数都有较明显的皮肤改变; 骨髓炎多累及四肢骨, 骨髓炎及骨膜反应更明显。

本病预后良好。本病进展缓慢, 无明显的致残性, 无严重的并发症发生。大部分病例为自限性, 疾病平均持续时间约 4-5 年。【结论】SAPHO 综合征临床及影像表现典型, 学习了解此病后对此病多数可做出正确的诊断。

PO-2613

儿童智力障碍患者的多需求网络静息态功能连接改变的初步探索

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目的: 儿童智力障碍 (ID) 的显著特征是智力受损和适应功能障碍, 而正常智力活动涉及到一组广泛分布式大脑区域, 即多需求 (MD) 网络。目前还没有任何研究探讨 ID 儿童关于 MD 网络的功能连接 (FC) 情况。本研究对 ID 儿童 MD 网络的静息态 FC 变化进行分析, 探索 ID 儿童的异常大脑连接模式。

方法: 招募在我院就诊的 ID 儿童 41 例为研究对象, 同时匹配 33 名健康儿童为对照组, 依次进行 3D-T1WI、rs-fMRI 数据采集, 并采用中国韦氏儿童智力量表进行智力评估。通过基于 MATLAB 的 DPABI 软件包对 MRI 数据进行预处理, 提取标准图谱左侧大脑半球中的 MD 脑区作为感兴趣区, 分别构建每个受试者 MD 网络的 FC 矩阵, 并将 MD 内节点划分为不同功能脑网络, 比较 ID 组和对照组的组间差异 ($P < 0.05$, FDR 校正), 年龄、性别和头动作为协变量。分析差异性脑区的平均 FC 与 IQ 之间的偏相关性。

结果: 与正常对照组相比, ID 儿童整体 MD 网络的 FC 广泛减低 ($t = 7.38$, $p < 0.001$)。在 MD 网络内连接分析中, ID 组在背侧注意网络中的差异最大 ($t = 8.36$, $p < 0.001$), 其次是额顶网络 ($t = 6.15$, $p < 0.001$) 和扣带岛盖网络 ($t = 6.02$, $p < 0.001$)。在 MD 网络间连接分析中, ID 组的扣带岛盖网络与背侧注意网络之间的 FC 差异最大 ($t = 8.00$, $p < 0.001$), 其次是背侧注意网络与额顶网络 ($t = 7.84$, $p < 0.001$)、默认模式网络与背侧注意网络 ($t = 7.42$, $p < 0.001$), 而默认模式网络与额顶网络之间的差异相对较小 ($t = 5.50$, $p < 0.001$)。相关性分析显示, ID 儿童的平均 FC 与 IQ 呈负相关 ($r = -0.22$, $p = 0.19$), 正常对照组的平均 FC 与 IQ 呈正相关 ($r = 0.27$, $p = 0.15$)。

结论: 本研究发现, ID 儿童 MD 网络的 FC 模式与正常发育儿童明显不同。MD 网络整体 FC 广泛减低、MD 网络内 (特别是背侧注意网络) 和网络间 (主要涉及扣带岛盖网络和背侧注意网络) 连接改变, 可能是 ID 儿童的神经影像学特征。此外, MD 网络的平均 FC 的变化在预测智力受损程度方面具有一定的应用价值。

PO-2614

10 周胎儿脑发育结构的 9.4T MRI 与组织学切片对照研究

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目的 探讨 10 孕周胎儿脑发育结构的 9.4T 超高场强 MRI 及其与组织病理学图像的对应关系。 **方法** 6 具 10 孕周发育正常的自发性流产胎儿标本为研究对象。使用 9.4T MR 扫描后得出 MRI, 然后进行切片染色得出组织病理学图像, 对比两者显示的层状结构、侧脑室、小脑等, 并进行三维重建观察脑组织结构及形态。 **结果** 10 孕周胎儿脑层状结构在 9.4T MRI 上显示为 4 层, 组织病理学图像则显示为 6 层, 其中侧脑室层、皮质层、边缘层在 MRI 与组织病理学图像可清晰显示; MRI 所显示的混合的室周层、室下层、中间层、皮质下层于组织病理学图像上进一步显示为室周层, 混合的室下层、中间层, 皮质下层。MRI 显示侧脑室内脉络丛表现为三层, 边缘呈低信号, 中间呈稍低信号, 中心呈更低信号; 组织病理学图像亦表现为三层, 边缘为上皮细胞, 中间为结缔纤维基质, 中心为血管组织; MRI 形态学特点与病理图像对应。小脑表面光滑, MRI 呈低信号, 无法具体显示各层, 组织病理学图像各层结构显示清晰, 由内至外为中间层、分子层、颗粒前体细胞层。脑组织结构经三维重建可直观显示其形态、位置及毗邻关系。10 孕周胎儿脑体积较小, 脉络丛位于侧脑室内, 侧脑室外为层状结构及大脑半球, 小脑位于中脑后方, 局部与中脑相连。侧脑室及脉络丛占比

例大, 脉络丛占侧脑室体积的 40.4%, 侧脑室占大脑半球体积的 46.1%。 结论 10 孕周胎脑尚处于发育的早期阶段; 9.4T MRI 与组织病理学图像对照显示有很好的-致性; 两者结合并三维重建可以更好的揭示 10 孕周胎脑结构的特点。

PO-2615

基于扩散张量成像技术的学龄前儿童孤独症谱系障碍患者脑白质纤维束异常分析

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目的 探讨学龄前儿童孤独症谱系障碍 (ASD) 患者脑白质纤维束变化, 并分析其与儿童孤独症评定量表 (CARS) 评分的相关性。

方法 前瞻性招募 56 例学龄前儿童 (2~6 岁) ASD 患者作为 ASD 组, 以及 56 例年龄、性别相匹配的发育正常儿童作为健康对照组 (HC 组) 进行 DTI 检查, 根据约翰霍普金斯大学人类白质纤维束图谱, 将大脑白质组织分割为 48 条公认存在的粗大纤维束, 应用 FSL 软件计算每一个被试者每一条白质纤维束的 4 项平均弥散属性: 即各向异性分数 (FA)、平均扩散系数 (MD)、轴向扩散系数 (AD)、径向扩散系数 (RD), 采用双样本 t 检验比较组间 DTI 参数的差异, 将差异有统计学意义的扩散指标与 CARS 评分进行 Pearson 相关分析。

结果 ASD 患儿的双侧皮质脊髓束、双侧下纵束、双侧上纵束、左侧扣带束、双侧丘脑后辐射束的 FA 值较正常对照组降低; 左侧皮质脊髓束、左侧扣带束、双侧内侧丘系纤维束的 AD 值较正常对照组降低。ASD 患儿的双侧皮质脊髓束、右侧下纵束、左侧扣带束的 MD 值较对照组升高; 双侧皮质脊髓束、右侧丘脑后辐射束、双侧下纵束、右侧上额枕束的 RD 值较对照组升高。双侧上纵束、下纵束的 FA 值与 CARS 评分呈负相关。右侧下纵束、左侧皮质脊髓束的 RD 值与 CARS 评分呈正相关。

结论 学龄前 ASD 患者的白质纤维束结构不完整, 存在微观结构的损伤, 这些白质纤维束的异常发育可能与 ASD 患儿的异常行为 (社交障碍、语言障碍和重复刻板行为) 有关, 双侧上纵束、下纵束的 FA 值在一定程度上能反映疾病的严重程度

PO-2616

3D MERGE 在胎儿脊柱评估中的临床应用价值

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目的: 探讨三维多回波恢复梯度回波 (three-dimensional multiple-echo recalled gradient echo, 3D MERGE) 序列在胎儿脊柱成像中的临床应用价值。方法: 回顾性分析 2018 年 12 月—2020 年 1 月武汉儿童医院 47 例胎儿脊柱 MRI 的影像资料, 孕周 18W-37W。所有病例均通过二维稳态采集快速成像 (two-dimensional fast imaging employing steady-state acquisition, 2D FIESTA) 和 3D MERGE 序列对胎儿脊柱进行成像并分别对两种序列胎儿脊柱的颈、胸、腰骶段图像质量进行 4 分法评分, 采用 Kappa 检验对不同医生评分的一致性进行评估。使用 SPSS 24.0 软件进行统计学分析脊柱颈、胸、腰骶段的成像质量差异性。根据两个序列评分的差值绘制散点图, 根据散点图结果以 28 孕周为界, 分别统计颈、胸、腰骶段图形质量的差异性。结果: 1、两名医师的对两个序列颈、胸、腰骶段的评分一致性良好; 2、3D MERGE 序列在颈段、胸段、腰骶段评分均高于 2D FIESTA, 差异均具有统计学意义 (p 均 < 0.01), 且在颈段优势更明显; 3、差值散点图显示 3D MERGE 序

列评分整体高于 2D FIESTA 序列,且在 28 周及以前评分差值更大;4、两序列评分在大于 28 周时,颈段评分有显著差异($p<0.01$),胸、腰骶段评分无显著差异,在小于等于 28 周时,颈、胸、腰骶段评分均有显著差异($p<0.01$)。结论:与 2D FIESTA 序列相比,3D MERGE 序列对于胎儿脊柱解剖及发育情况判断具有明显优势,尤其颈椎和 28 周及以前的胎儿全脊柱,3D MERGE 序列可以常规应用于胎儿脊柱成像。

PO-2617

特发性中枢性性早熟及单纯乳房发育患儿腺垂体形态学参数与促性腺激素水平的相关性研究

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目的 回顾性分析特发性中枢性性早熟 (central precocious puberty,ICPP) 及单纯性乳房发育 (premature thelarche, PT) 女童腺垂体正中矢状径高度、腺垂体正中矢状径前后长度、腺垂体正中冠状位高度、腺垂体正中冠状位宽及腺垂体体积大小与体内促性腺激素水平的相关性。方法 收集 2019 年 1 月至 2021 年 1 月安徽医科大学第二附属医院收治的经临床确诊的 150 例性早熟 (ICPP 组 82 例,PT 组 68 例) 的影像学检查资料(腺垂体正中矢状径高度、腺垂体正中矢状径前后长度、腺垂体正中冠状位高度、腺垂体正中冠状位宽度、腺垂体体积大小) 及体内促性腺激素水平包括空腹血清促卵泡刺激素(FSH)、促黄体生成素(LH) 及性激素激发试验刺激后 LH 峰值、FSH 峰值及 LH 峰值/FSH 峰值。分析两组性早熟女童腺垂体形态学指标、促性腺激素水平的组间差异及垂体形态学指标与激素水平的相关性。结果 ICPP 组女童的腺垂体体积、垂体各径线长度明显大于 PT 组,ICPP 组患儿的促性腺激素水平明显高于 PT 组;ICPP 组患儿腺垂体体积与 LH 基础值、FSH 基础值、LH 峰值、LH 峰值/FSH 峰值均呈正相关关系 ($P<0.05$),与 FSH 峰值无明显相关性;PT 组女童腺垂体体积与 LH 峰值呈正相关 (P 小于 0.05),与其他激素指标无明显相关性。结论 ICPP 女童与 PT 女童的垂体形态学具有明显差异性,中枢性性早熟腺垂体体积与促性腺激素水平密切相关,腺垂体形态学有助于性早熟的诊断及鉴别诊断,垂体 MR 平扫在性早熟研究中具有重要价值。

PO-2618

儿童不同部位淋巴瘤影像表现分析

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目的结合文献分析和总结儿童不同部位淋巴瘤影像特点,并归纳与其他相应部位肿瘤相鉴别的影像学特征,从而减少临床误诊和漏诊。

材料与方法收集 2020 年至 2023 我院收治确诊淋巴瘤 24 例,对其影像特征和临床资料进行回顾性分析。

结果 24 例患者中,男性 14 例,女性 10 例,年龄在 2~13 岁,中位年龄 7 岁。3 例诊断为霍奇金淋巴瘤,21 例诊断为非霍奇金淋巴瘤。病理特点:儿童恶性淋巴瘤主要分为两种类型:霍奇金淋巴瘤(HL)、非霍奇金淋巴瘤(NHL),儿童 NHL 较 HL 发病率高,恶性度更高。不同发病部位淋巴瘤的影像特点:1.儿童颌面及颈部淋巴瘤:CT 平扫表现为均匀软组织密度肿块,边界清晰,呈分叶状,向外生长,较少侵及邻近肌肉、咽旁、颅底骨,可起源于咽淋巴环,或由腭扁桃体、咽后淋巴结及颈动脉鞘内淋巴结融合而成,增强扫描肿块呈均匀轻度强化,部分包块内可见少许低强化区。当颌面部淋巴瘤伴随骨质破坏时,淋巴瘤细胞主要侵犯骨髓及骨皮质,以软组织包块为主,

而无大范围骨皮质破坏；2.胸部淋巴瘤：CT 平扫前纵隔均匀同肌肉密度大肿块，可伴有多区域淋巴结肿大，胸膜增厚，胸壁软组织肿块及骨质破坏，部分可见胸腔及心包少量积液，增强扫描肿块轻中度强化，可见“血管漂浮征”、“头盔征”等，淋巴瘤的肺实质受累表现多样；3.腹部淋巴瘤：主要起源于肠壁，也常累及肠系膜和网膜，好发于远端回肠。CT 平扫为肠壁增厚型、动脉瘤样扩张型、肠腔内肿块型；肿块增强后轻度至中度强化，多数为均匀强化，或伴有不均匀强化区，可有系膜淋巴结、腹膜后淋巴结及远处淋巴结增大。

结论儿童淋巴瘤于全身各部位均可发生，不同部位淋巴瘤的影像学表现有差异。掌握其好发年龄、发病部位及影像表现对其定性及鉴别诊断具有重要意义。

PO-2619

儿童不同病原体感染相关坏死性脑病的影像学分析

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【目的】探讨儿童 2019 新型冠状病毒(2019 novel coronavirus, 2019-nCoV)感染及甲型流感病毒感染(influenza a virus)所致的坏死性脑病的流行病特征、临床特点及影像学表现，以提高影像医生对该疾病特征的认识水平。

【材料与方法】收集 2020 年至 2023 我院收治的新型冠状病毒感染(9 例)及甲型流感病毒感染(7 例)发生坏死性脑病的病例，回顾性分析其流行病特征、临床特点以及颅脑 CT 及 MRI 的影像学表现。【结果】1、新型冠状病毒感染流行病特征：年龄在 11 月~14 岁，中位年龄 3 岁，所有患者均有新型冠状病毒阳性感染者接触史，且鼻咽拭子核酸检测阳性；临床特点：以发热、惊厥、意识障碍及对称性多灶性脑损害为主要特征；影像学表现：灰质与白质均可受累，其主要分布在丘脑、脑干、侧脑室周围白质以及小脑的髓质；前驱期(早期)：病变部位主要表现为脑水肿；急性期(中期)：双侧丘脑病变在 MRI 各相中均为同心圆样改变；恢复期：大部分病灶萎缩、含铁血黄素沉着、囊腔形成等退行性改变。甲型流感病毒感染流行病特征：年龄在 8 月~10 岁，中位年龄 5 岁，所有患者均有甲型流感病毒阳性感染者接触史，且鼻咽拭子核酸检测阳性；临床特点：以发热、抽搐、呼吸困难、意识障碍为主要临床特征；影像学表现：灰质与白质均可受累，其主要分布在双侧丘脑、脑干、基底核、脑室周围白质及小脑；其 CT 表现主要是弥漫性脑水肿及脑沟内出血；MRI 表现为弥漫性皮质下白质细胞毒性脑水肿、全脑肿胀。【结论】新型冠状病毒感染及甲型流感病毒感染以发热、抽搐及意识障碍最常见，急性坏死性脑病是其重要的临床影像学表现，早期识别其特征性影像学表现并对其进行干预，能够有效减轻病程的进展、改善预后。

PO-2620

基于薄层 CT 影像组学联合临床参数预测儿童腺病毒肺炎后闭塞性细支气管炎

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目的：腺病毒肺炎是儿童感染后闭塞性细支气管炎(PIBO)最常见的原因。本研究旨在建立一个有效的预测儿童腺病毒肺炎后 PIBO 的模型。

方法：以 165 例腺病毒肺炎患儿为研究对象，根据临床随访结果将病例分为 PIBO (n=70) 及 non-PIBO (n=95) 两组。收集两组患儿的人口学特征、发热时长、住院时长、体温峰值、呼吸机使用时间、CT 检查、实验室检查结果等资料。所有患者按 7:3 的比例随机分为训练组和测试组。手动分割腺病毒肺炎薄层 CT 图像中的病变部位，提取影像组学特征。采用互信息(MI)、最小冗

余最大相关 (mRMR) 和最小绝对收缩与选择算子 (LASSO) 算法从训练组中确定最佳预测特征, 计算影像组学评分 (Radscore), 并构建影像组学模型。基于影像组学和临床模型构建联合预测模型, 包括逻辑回归 (LR)、随机森林 (RF) 和支持向量机 (SVM) 模型。通过受试者工作特征 (ROC) 曲线下面积 (AUC)、校准曲线和决策曲线 (DCA) 分析评价 3 种模型的性能, 并通过 Delong 检验、重分类改善指标 (NRI) 和综合判别改善指标 (IDI) 对 SVM 模型进行比较。结果: 从薄层 CT 图像上的感兴趣区共提取 2264 个影像组学特征, 筛选出 10 个最优特征构建影像组学模型。住院时长和肺炎病变叶数作为临床参数参与复合模型的构建。LR、RF、SVM 复合模型在训练组和测试组中的 AUC 分别为 0.946、0.890, 0.977、0.859, 0.971、0.885, 均显著高于影像组学模型和临床模型。SVM 模型校准曲线拟合度高, 决策曲线优于其他模型, 有利于临床应用。结论: 基于薄层 CT 的影像组学特征联合临床参数可能为预测儿童腺病毒肺炎后闭塞性细支气管炎提供一种有效的无创方法。

PO-2621

扩散峰度成像结合机器学习识别全面发育迟缓儿童

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目的 使用基于白质骨架的空间统计分析 (Tract-Based Spatial Statistics, TBSS) 方法结合扩散峰度成像 (diffusion kurtosis imaging, DKI) 探究全面发育迟缓儿童 (global developmental delay, GDD) 与健康对照儿童之间脑白质微结构的差异, 之后使用机器学习方法探究 DKI 在 GDD 诊断中的价值。

方法 采集 34 名 GDD 儿童和 44 名健康对照儿童的 DKI 数据。首先使用基于 Python 的 DIPY (<https://github.com/dipy>) 程序计算得到扩散峰度参数及其衍生的白质完整性 (white matter tract integrity, WMTI) 参数。之后使用 TBSS 方法探究扩散张量 (diffusion tensor, DT) 参数、DK 参数以及 WMTI 参数之间的差异, p 值经 FWE (family-wise error) 校正。有显著差异的参数使用 FSL 软件中的 fslmeant 函数提取, 之后经过主成分分析 (Principal Component Analysis, PCA) 筛选, 筛选后的数据输入 Logistic (LR) 回归和线性判别器 (Linear Discriminant Analysis, LDA) 两种机器学习模型, 两种机器学习模型均通过 R 构建, 通过自举重采样 (bootstrap-resampling) 方法进行验证。

结果 TBSS 的两组比较中, DK 参数和 WMTI 参数在两组之间具有广泛差异, 具体见图 1 和图 2。LR 和 LDA 两种机器学习模型均具有较高的诊断性能 (AUC 值分别为 0.806 和 0.809, 见图 3 和图 4)。

结论 DKI 可以检测 GDD 儿童的脑白质发育异常, 经过 TBSS 和 PCA 筛选后的扩散参数结合 LR 和 LDA 两种机器学习模型可以很好地诊断 GDD。

PO-2622

基于 MRI 建立并验证 6-24 月脑室周围白质损伤患儿发生脑瘫的预测模型: 一项多阅片者多病例研究

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目的: 建立并验证 6~24 月脑室白质周围损伤 (periventricular white matter injury, PWMI) 患儿发生脑瘫的预测模型, 并评估该模型的诊断效能。

方法: 回顾性纳入 2013 年 9 月~2021 年 9 月临床怀疑脑瘫并经 MRI 诊断为 PWMI 的多中心数据 (年龄为 6-24 月), 均随访至 2-5 岁待临床诊断确定。采用一家医院的数据构建模型, 另外三家医院的数据验证模型。基于 PWMI-MRI 征象建立评分系统, 构建 PWMI 患儿发生脑瘫的多因素 Logistic 回归模型。在训练集和验证集中评估模型的区分度、校准度及决策曲线分析。采用多阅片者多病例分析 (multireader multicase, MRMC) 评估模型的诊断效能, 计算 10 个中心的 18 位阅片者的平均准确度、敏感度及特异度。

结果: 本研究训练集 191 例, 男, 112 例, 中位年龄 14 月 (IQR: 10-18); 验证集 90 例, 男, 60 例, 中位年龄 14 月 (IQR: 10-18)。多因素 Logistic 回归分析发现: 内囊后肢 (OR: 6.53, 95% CI: 5.54-49.36)、半卵圆中心中央白质 (OR: 13.70; 95%CI: 3.17-53.49)、大脑脚 (OR: 4.76; 95%CI: 1.32-17.17)、丘脑 (OR: 4.76; 95%CI: 1.13-18.47) 及豆状核的损伤 (OR, 4.58; 95%CI: 1.13-18.47) 与脑瘫相关。该模型在训练集和验证集的 AUC 分别为 0.94 和 0.97, 并具有良好的校准度。在 MRMC 分析中, 18 位阅片者前后两次的平均 AUC 为 0.93vs 0.94 ($p=0.057$); 前后两次的平均敏感度均为 92.3% ($p=0.998$); 第 2 次的平均特异度高于第 1 次 (87.2% vs 90.8%, $p=0.009$)。第 2 次阅片者间的一致性高于第 1 次 ($kappa: 0.71$ vs 0.62), 第 2 次的阅片时间较第 1 次减少 (时间: 2.5 vs 3.1 分钟; $p=0.003$)。

结论: 本研究基于 MRI 征象建立的模型可以早期准确的预测 PWMI 脑瘫高风险患儿, 具有良好的预测及诊断效能, 有助于指导脑瘫的个体化干预。

PO-2623

基于 CT 影像组学的儿童肺炎支原体肺炎早期鉴别诊断的研究

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[摘要] 目的: 探讨基于 CT 影像及临床特征的儿童肺炎支原体肺炎 (MPP) 辅助诊断模型在早期鉴别儿童肺炎支原体与其他病原体引起的社区获得性肺炎 (CAP) 的应用价值。方法: 搜集 2020 年 10 月至 2023 年 4 月符合纳排标准的 303 例 CAP 患儿, 根据病原学诊断分为肺炎支原体组 ($n=128$) 和其他病原体组 ($n=175$), 对比组间临床特征及胸部薄层 CT 征象的差异; 将患儿以 7:3 比例随机分为训练集和验证集, 使用多因素回归分析来建立三种模型 (影像组学特征模型、临床特征模型、影像组学列线图)。最后, 绘制受试者工作特征曲线 (ROC), 计算曲线下面积 (AUC), 评价 3 种模型诊断不同病原体 CAP 的效能, 绘制出诺模图、校准曲线以及决策曲线。结果: 2 组病例的喘息、脉搏、淋巴细胞百分比 (LY)、血沉 (ESR)、B 型钠尿肽定量 (BNP)、实变均有统计学意义 ($P < 0.05$), 结合影像组学特征、临床特征结果建立的列线图在肺炎支原体肺炎和其他病原体肺炎之间具有较好的鉴别能力, 训练集中临床特征模型、影像组学特征模型及影像组学列线图的 AUC 分别为 0.90、0.89 及 0.93; 验证集中临床特征模型、影像组学特征模型及影像组学列线图的 AUC 分别为 0.82、0.88 及 0.91。结论: 基于 CT 影像组学列线图在早期鉴别儿童肺炎支原体肺炎与其他病原体肺炎方面具有较好的诊断效能, 单纯的影像组学特征模型对鉴别诊断具有较好的价值, 结合了临床资料的列线图的鉴别诊断效能得到了进一步提升, 可以辅助临床早期用药。

PO-2624

A multicentre study predicting drug resistance after mycoplasma pneumoniae in children based on computed tomography (CT) radiomic features

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Objective: The purpose of this study was to investigate the ability of radiomics features with machine learning based on CT images to predict drug resistance of mycoplasma pneumoniae in children. **Methods:** In this study, 157 patients with mycoplasma pneumoniae were included. According to the drug resistance, the cohort was divided into two groups: drug resistance group (n=69) and non-drug resistance (n=88). KNN and LR were used to build predictive models. **Results:** The AUC and F1-scores of KNN in the training set were 0.92 and 0.84, respectively, while those of KNN in the validation set were 0.82 and 0.63, respectively. The AUC and F1-scores of LR in the training set were 0.93 and 0.78, respectively, while those of LR in the test set were 0.69 and 0.7. **Conclusion:** Radiomics features extracted from CT images of mycoplasma pneumoniae are helpful to predict the drug resistance.

PO-2625

用药或未用药注意力缺陷多动障碍男性儿童丘脑体积改变

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目的: 目前,有关注意缺陷多动障碍(ADHD)儿童大脑结构改变的研究主要集中在未用药时的全脑体积等。在本研究中,我们将研究扩展到用药 ADHD 男性儿童、未用药 ADHD 男性儿童以及健康对照组三组丘脑体积的改变。此外,我们还探讨了部分丘脑体积与 ADHD 男性儿童障碍严重程度之间的潜在联系。

材料与方法: 收集其中 28 例未用药 ADHD 男性儿童、15 例用药 ADHD 男性儿童以及年龄、性别相匹配的 30 例健康儿童资料,并要求所有男性 ADHD 儿童无其他并发症、年龄范围为 8-15 岁且均为右利手。收集所有 ADHD 患儿的注意力不集中指数、多动-冲动指数、ADHD 指数等量表情况。为了更加系统获得丘脑体积,使用 freesurfer 7.2.0 将两侧丘脑各细分为 25 个区域体积和丘脑的总体积。采用 R 语言进行统计分析。使用 R 中 shapiro.test 函数进行正态性检验;使用 leveneTest 函数进行方差齐性检验;使用 chisq.test 函数进行卡方检验。使用单因素方差分析或 Kruskal-Wallis H 秩和检验比较三组之间丘脑体积的差异。采用 Spearman 或 Pearson 相关分析将三组有差异的丘脑区域与 ADHD 量表进行相关分析。

结果: 与对照组相比,未用药 ADHD 男性儿童组左侧颞旁核、右侧腹后外侧体积增大,但用药 ADHD 男性儿童组与对照组、用药组无明显差异。与对照组相比,用药 ADHD 男性儿童组左侧外侧膝状核、左侧丘脑枕核的体积增大,但未用药 ADHD 男性儿童与对照组、未用药组无明显差异。上述有差异的丘脑区域与 ADHD 量表进行相关性分析均未发现显著的相关性。

结论: 这些发现表明,用药后 ADHD 男性儿童的部分丘脑体积与健康对照组相比相对增大,可能与服药后的丘脑体积代偿有关;未用药 ADHD 男性儿童的部分丘脑体积与健康对照组相比相对增大,可能提示丘脑对于 ADHD 疾病的发生机制存在一定的影响。

PO-2626

The relationships among neural activity and connectivities, peripheral GABA and dopamine levels, and appetite and weight disturbance in major depression

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Objective

MDD is characterized by dysfunction in neurotransmission that involves 5-HT, DA, and GABA, which have major influence on brain circuits. This study sought to compare hyperphagic MDD and hypophagic MDD based on correlation between brain activity or connectivity and neurotransmitter levels.

Methods

In Study 1, a longitudinal study was conducted among 19 first-episode, treatment-naïve patients with MDD at baseline and after a 6-week follow-up to investigate regional fluctuation and interhemispheric interactions. Correlational analyses were performed among regional homogeneity (ReHo), voxel-mirrored homotopic connectivity (VMHC), and peripheral neurotransmitters. In Study 2, support vector machine (SVM) was applied to examine the validity of the findings in discriminating the 43 patients with hyperphagic MDD and 41 patients with hypophagic MDD.

Results

In Study 1, significant correlations emerged between DA levels and ReHo in the hippocampus of patients with MDD at baseline. The ReHo reduction was marginally associated with increase in DA level. The VMHC in bilateral supplementary motor area reductions was positively correlated with increase in GABA level. In Study 2, SVM results showed that ReHo in the right hippocampus could distinguish hyperphagic MDD from hypophagic MDD at an accuracy of >0.6. The VMHC of the bilateral supplementary motor area and mid-insula confirmed the validity of the findings as distinctive imaging markers to differentiate hyperphagic MDD from hypophagic MDD.

Conclusions

These findings imply that hyperphagic MDD is associated with deficits in DA and GABA-related reward circuits and multiple functional areas. Future investigations may identify specific neurotransmitter markers predicting hyperphagic MDD onset.

PO-2627

Nomograms based on clinical and imaging parameters help predict progress and outcome after concurrent chemoradiotherapy in patients with locally advanced cervical cancer

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Purposes: To investigate the value of nomograms based on clinicopathological prognostic factors, apparent diffusion coefficient (ADC) and MRI-derived radiomics in predicting early efficacy, progression-free survival (PFS) and overall survival (OS) after concurrent chemoradiotherapy (CCRT) for patients with locally advanced cervical cancer (LACC).

Methods: Data from 572 patients with IB2-IVA cervical cancer treated with CCRT at our hospital from March 2013 to March 2020 were retrospectively analyzed and randomized 2:1 into training and test groups. Values of ADC_{min}, ADC_{mean}, ADC_{max} (from ADC map) and texture parameters (from DWI, T2WI and T2WI-FS) for the whole lesion were measured in all patients. The LASSO

algorithm and Logistic regression analyses were used to select texture features and calculate radiomics score (Rad-score). The multivariate Logistic and Cox regression analyses were used to construct nomogram models for predicting early efficacy, PFS and OS after CCRT in patients with LACC, with internal and external validation.

Results: Tumor diameter, external irradiation dose, ADCmean, and Rad-score1 were independent prognostic factors for early efficacy of CCRT and formed model1 with AUC of 0.848. Clinical stage, total irradiation dose, ADCmin, and Rad-score2 were independent prognostic factors for PFS and formed model2 with AUC of 0.877, 0.907, 0.864 for predicting 1-year, 3-year, 5-year PFS respectively. Squamous cell carcinoma antigen, external irradiation dose, ADCmin and Rad-score3 were independent prognostic factors for OS and formed model3 with AUC of 0.902, 0.885, 0.868 for predicting 1-year, 3-year, 5-year OS.

Conclusion: The nomograms based on clinical parameters, ADC values and radiomics are of high clinical value in predicting short-term outcome and long-term prognosis after CCRT in patients with LACC, and can be used to some extent as prognostic markers for early efficacy, PFS and OS.

PO-2628

Models for assessing postoperative risk factors in patients with cervical cancer

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Objective To construct nomogram models based on clinical parameters, inflammatory indicators, intravoxel incoherent motion diffusion weighted imaging (IVIM-DWI) and MRI-derived radiomics to help accurately assess preoperative parametrial infiltration (PI), lymph node metastasis (LNM), deep muscle invasion (DMI), lymph-vascular space invasion (LVSI), pathological type (PT), differentiation degree (DD) and Ki-67 expression level in patients with cervical cancer.

Methods The data of 180 patients with cervical cancer were retrospectively analysed and randomised 2:1 into a training and validation group. The IVIM-DWI and radiomics parameters of primary lesion were measured in all patients. The LASSO algorithm was used to screen radiomics parameters and calculate radiomics score (Rad-score). Multivariate logistic regression analysis was used to construct nomogram models for predicting preoperative risk factors of cervical cancer, with internal and external validation.

Results The diagnostic efficacy of the nomograms based on clinical and imaging parameters was significantly better than MRI assessment alone. The AUC of nomograms and MRI for the assessment of PI, LNM, and DMI were 0.981 vs 0.868, 0.848 vs 0.639, and 0.896 vs 0.780, respectively. Nomograms also performed well in the assessment of LVSI, PT, DD, and Ki-67 expression levels, with AUC of 0.796, 0.854, 0.806, 0.839 and 0.840, 0.856, 0.810, 0.832 in the training and validation groups.

Conclusion Nomograms based on clinical and imaging parameters can serve as a useful tool for assessing postoperative risk factors in patients with cervical cancer.

PO-2629

Early Diagnosis of Patellofemoral Arthritis could be achieved using fat fraction of quadriceps femoris as imaging marker

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Objective to explore the relationship between fat infiltration in quadriceps femoris with patellofemoral arthritis

Methods Based on clinical and magnetic resonance imaging(MRI) diagnosis, we included 32 patients with chondromalacia patellae(CMP), 31 patients with patellofemoral arthritis (PA) and 35 healthy volunteers from July 2018 to November 2022 in our medical institutions. Proton density fat fraction (PDFF) maps by Iterative decomposition of water and fat with echo asymmetry and least squares estimation quantitation (IDEAL-IQ) sequence were obtained, based on this, we obtained the FF % of medial femoral muscle(FFm%)、lateral femoral muscle (FFl%) and total quadriceps(FFt%).and then compared FFm%, FFl% and FFt% between case group(patellar malacia group+ patellofemoral arthritis group) and control group, The FF% optimal cut-off point for the diagnosis of PA was calculated.

Results FF% (include FFl%、FFm%、FFt%)of the quadriceps in the control group were lower than the CMP group($p < 0.01$) and PA group ($p < 0.01$). In the case group, FFm%、FFl% of the PA group were significantly higher than those of the CMP group ($p = 0.015, p = 0.011$). Adipose infiltration of vastus lateralis was higher in CMP and PA groups than in vastus medialis ($P < 0.01, P < 0.01$), The FFm% has the highest diagnostic efficacy, Selecting an optimal T2 subject cut-of value of 8.4% to differentiate patients from controls revealed a sensitivity and a specificity of 73.3% and 93.3% respectively (AUC = 0.911, 95%CI 0.855-0.968). Youden Index=0.7

Conclusions Fat quantification using the IDEAL-IQ sequence showed that FF% in patellofemoral arthritis patients higher than healthy people and increased with disease progression. Therefore, FF% quantification of the quadriceps muscle may used to diagnose early patellofemoral arthritis.

PO-2630

Microstructural Degeneration in the Hypothalamic Subunits in Parkinson's Disease and Probable REM Sleep Behavior Disorder

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Background: The hypothalamus plays a critical role in multiple vital functions including energy metabolism, sleep-wake cycle regulation, as well as emotional and behavioral regulation. While there are similarities in the functions regulated by the hypothalamus and the symptoms presented in Parkinson's Disease (PD), the absence of in vivo approaches to detect hypothalamic degeneration impedes the verification of the association between hypothalamic dysfunction and clinical burden. Due to the difficulty in hypothalamic segmentation (stems from the small size of hypothalamus and the lack of image contrast in its vicinity) and the insensitivity of traditional volume analysis in detecting brain degeneration, previous studies that focused on hypothalamus have yielded conflicting results. In this study, we aimed to quantify the microstructural alterations in

hypothalamic subunits, segmented by a novel deep learning-based toolbox, in PD and probable rapid-eye-movement sleep behavior disorder (pRBD, the prodromal stage of PD), and explored the clinical implications of hypothalamic degeneration.

Methods: This study included 186 PD, 67 pRBD, and 179 healthy controls. Multi-shell diffusion MRI (b-values = 0, 1000, and 2000 s/mm²) scans were collected and the mean kurtosis (MK) in hypothalamic subunits were calculated. All participants were assessed using the Unified Parkinson's Disease Rating Scale (UPDRS), RBD Questionnaire-Hong Kong (RBDQ-HK), Hamilton Depression Rating Scale (HAMD), and Activity of Daily Living (ADL) Scale. Additionally, a subgroup of PD (n = 31) underwent assessment of free thyroxine (FT4) level.

Results: PD showed significant decreases of MK in anterior-superior (a-sHyp), anterior-inferior (a-iHyp), superior tubular (supTub), and inferior tubular hypothalamus when compared with healthy controls. Similarly, pRBD exhibited decreases of MK in a-iHyp and supTub. In PD group, MK in above four subunits were significantly correlated with UPDRS-I, HAMD, and ADL scores. Moreover, MK in a-iHyp and a-sHyp were significantly correlated with FT4 level. In pRBD group, correlations were observed between MK in a-iHyp and UPDRS-I score.

Conclusions: The microstructural degeneration of the hypothalamus in PD and pRBD, as well as the associations between hypothalamic degeneration and emotional disorders, limited daily living ability, and hormonal dysregulation, suggest the potential of targeting the hypothalamus as an adjuvant therapeutic approach.

PO-2631

Fat Fraction Quantified via Magnetic Resonance Spectroscopy in the Diagnosis of Osteoporosis: A Meta-analysis

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Purpose Given the global prevalence of osteoporosis and its associations with morbidity, mortality and deterioration in overall quality of life, significant research has been devoted to the diagnosis of this bone disease. This paper presents a meta-analysis of published research regarding one emerging diagnostic technique: magnetic resonance spectroscopy (MRS), a non-invasive method of determining the concentrations of various chemical components in tissues.

Methods Previous studies investigating the pathology of osteoporosis have established a statistically significant link between increases in the bone marrow fat fraction (FF%), measured via MRS, and decreases in bone mineral density, the primary predictor of bone strength. Relevant literature was reviewed, and over 1,000 data points were collected from past studies on osteoporotic, osteopenic, and/or healthy control subjects. Data points were then grouped based on MRS location (lumbar spine, femoral neck, calcaneus, and femur). Analysis of variance tests, followed by Tukey's post-hoc tests, were performed to evaluate the ability of MRS FF% scores to differentiate between osteoporotic, osteopenic, and healthy subjects. Welch's t-tests were performed to further validate these findings, accounting for the inconsistencies in variation between subject groups.

Results Results demonstrated the existence of statistically significant differences between osteoporotic, osteopenic, and healthy groups for measurements of the lumbar spine ($P < 0.001$), as well as between osteoporotic and healthy groups at the femoral neck. No such differences were found in measurements at the femur and calcaneus, potentially due to the low number of studies and subjects reported for the latter two categories.

Conclusion MRS FF% scores appear to hold great potential clinically as a non-invasive, early diagnostic tool for osteoporosis; however, further research is required before these findings can be generalized beyond well-studied bone areas.

PO-2632

Identification of transcriptional marker as predictors of short-term brain structural changes and associated cognitive impairments in first-episode schizophrenia

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Background: Inflammation has been implicated in the pathology of schizophrenia, and may cause neuronal cell death and dendrite loss. Neuroimaging studies have highlighted longitudinal brain structural changes in patients with schizophrenia, yet it is unclear whether this is related to inflammation. We aim to address this question, by relating brain structural changes with the transcriptional profile of inflammation markers in the early stage of schizophrenia.

Methods: Thirty-eight patients with first-episode schizophrenia and 51 healthy controls were included. High-resolution T1-weighted magnetic resonance imaging (MRI) and clinical assessments were performed at baseline and 2 ~ 6 months follow-up for all subjects. Changes of brain structure were analyzed using surface-based morphological analysis, and correlated with the expression of immune cells-related gene sets of interest reported by previous reviews. Transcriptional data were retrieved from the Allen Human Brain Atlas. Further, we examined brain structural changes and peripheral inflammation markers in association with behavioral symptoms and cognitive functioning in patients.

Results: Patients exhibited accelerated cortical thickness decrease in the left frontal cortices, less decrease or an increase in the superior parietal lobule and right lateral occipital lobe, and increased volume in the bilateral pallidum, compared with controls. Changes of cortical thickness correlated with the transcriptional level of monocyte across cortical regions in patients ($r = 0.54$, $p < 0.01$), but not in controls ($r = -0.05$, $p = 0.76$). In addition, cortical thickness change in the left superior parietal lobule positively correlated with changes of digital span-backward test scores in patients.

Conclusions: Patients with schizophrenia exhibit regional specific cortical thickness changes in prefrontal and parietooccipital cortices, which is related to their cognitive impairment. Inflammation may be an important factor contributing to cortical thinning in first-episode schizophrenia. Our findings suggest that the immunity-brain-behavior association may play a crucial role in the pathogenesis of schizophrenia.

PO-2633

Quantitative Analysis of Chest MRI Images for Benign-Malignant Diagnosis of Pulmonary Nodules

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Background: In this study, we developed and validated machine learning (ML) models by combining radiomic features extracted from magnetic resonance imaging (MRI) images with clinicopathological factors to assess pulmonary nodule classification.

Methods: A total of 333 consecutive patients with pulmonary nodules (233 in the training cohort and 100 in the validation cohort) were enrolled in this study. A total of 2824 radiomic features were extracted from the MRI images (CE T1w and T2w). Logistic regression (LR), Naïve Bayes (NB), support vector machine (SVM), random forest (RF), and extreme gradient boosting (XGBoost) classifiers were applied to build the predictive models, and a radiomics score (Rad-score) was obtained for each patient after applying the best prediction model. Clinical factors and Rad-score

were used jointly to build a nomogram model based on multivariate logistic regression analysis, and the diagnostic performance of the five prediction models was evaluated using the area under the receiver operating characteristic curve (AUC).

Results: A total of 161 women (48.35%) and 172 men (51.65%) with pulmonary nodules were enrolled in this study. Six important features were selected from the 2145 radiomic features extracted from CE T1w and T2w. The XGBoost classifier model achieved the highest discrimination performance, with AUCs of 0.901, 0.906, and 0.851 in the training, validation, and test cohorts, respectively. The nomogram model improved the performance to AUC values of 0.918, 0.912, and 0.877 in the training, validation, and test cohorts, respectively.

Conclusion: MRI radiomic ML models demonstrated good nodule classification performance with XGBoost, which was superior to the other four models. The nomogram model achieved higher performance with the addition of clinical information.

PO-2634

High-Resolution Vessel Wall Imaging for Quantitatively and Qualitatively Evaluating In-Stent Stenosis of Intracranial Aneurysms Compared with CE-MRA and TOF-MRA

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Background

It is critical to accurately and noninvasively evaluate the stented parent artery of intracranial aneurysms (IA) with endovascular treatment.

Objective

To investigate high-resolution vessel wall imaging (HR-VWI) for quantitative and qualitative evaluation of in-stent stenosis (ISS) in IA treated with stent implantation (SI).

Methods

Fifty-five patients (58 aneurysms) underwent HR-VWI, contrast-enhanced (CE)-HR-VWI, CE-MR angiography (MRA), time-of-flight (TOF)-MRA, and digital subtraction angiography (DSA) six months after SI, and the reliability of quantitative stent lumen measurements was evaluated by intraclass correlation coefficient (ICC) analysis. Agreement and correlation were estimated by comparing the four MR imaging modalities with DSA. The diagnostic performance for $>0\%$, $\geq 25\%$, and $\geq 50\%$ of ISS degrees and overall diagnostic accuracy for the ISS degrees of the four MR imaging modalities were calculated.

Results The reliability of CE-HR-VWI and HR-VWI for ISS quantitative measurements was excellent (ICC 0.955–0.989). The agreement and correlation of CE-HR-VWI, HR-VWI versus DSA for ISS quantitative measurements were better than those of CE-MRA and TOF-MRA ($p < 0.05$). The diagnostic performance for distinguishing the degree of ISS $>0\%$, $\geq 25\%$, and $\geq 50\%$ by CE-HR-VWI and HR-VWI was superior to CE-MRA and TOF-MRA (AUC 99.7%–100% versus 74.4%–89.9%), and their overall diagnostic accuracy was 96.55% and 94.83%, respectively. CE-HR-VWI and HR-VWI performed similarly in the quantitative measurement and qualitative evaluation for ISS.

Conclusion

HR-VWI demonstrated excellent diagnostic accuracy and consistency with DSA in the quantitative and qualitative evaluation of ISS after SI treatment for IA and was superior to CE-MRA and TOF-MRA, therefore as a noninvasive and effective imaging modality, it may be an alternative to DSA for detecting ISS.

PO-2635

Association of Systemic inflammatory response index with intracranial plaque vulnerability and the severity of subsequent ischemic events

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Abstract

Aim: We aimed to investigate the relationship between systemic inflammatory response index (SIRI) and intracranial plaque features, as well as the risk factors related to the severity of cerebral ischemic events.

Methods: We enrolled 120 patients with symptomatic intracranial atherosclerosis (sICAD). The correlation between SIRI levels and intracranial plaque features were analyzed by multiple sample ANOVA or Spearman's test. Multivariable ordered logistic regression was evaluated the risk factors associated with the severity of cerebral ischemic events. The efficacy of combined evaluation to classify clinical subtypes of sICAD was performed through the receiver operating characteristic (ROC) curve.

Results: SIRI levels were significantly associated with the enhanced plaque number ($r = 0.235$, $p = 0.010$), total plaque stenosis score ($r = 0.186$, $p = 0.042$), total plaque enhancement score ($r = 0.252$, $p = 0.006$), intraplaque hemorrhage ($F = 3.162$, $p = 0.046$), and plaque surface irregularity ($F = 3.116$, $p = 0.048$). Higher SIRI levels (OR = 2.560), total plaque enhancement score (OR = 1.680), intraplaque hemorrhage (OR = 2.609) and plaque surface irregularity (OR = 2.784) were independently related to moderate-severe stroke. The SIRI combined with plaque characteristics showed the best performance in the ROC curve, with an area under the curve of 0.902 (95%CI 0.842-0.961), significantly higher than intraplaque hemorrhage 0.651 (95%CI 0.549-0.753) and plaque enhancement scores 0.850 (95%CI 0.775-0.925) alone.

Conclusions: Higher SIRI levels may have adverse effects on the vulnerability and burden of intracranial plaques, and links to the severity of cerebral ischemic events. Therefore, the regulation of immune inflammation may be a potential therapeutic target for sICAD.

PO-2636

Identification of invasive adenocarcinoma in pulmonary ground-glass nodules using zero echo time magnetic resonance imaging (ZTE-MRI)

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Objective: The present study aimed to evaluate the performance of ZTE-MRI on detection rate of GGNs in comparison with T2WI and T1WI 3-dimensional gradient recalled echo with fat/water separation (LAVA-Flex) using CT as reference.

Methods: 28 patients with a total of 35 GGNs underwent chest MRI examination. MR scans were obtained using a 3.0T scanner including ZTE, T2WI-FS (fat-saturated T2-weighted imaging) and LAVA-Flex sequences. The nodule size (the longest diameter) and morphology (pure, part-solid) on CT as standard reference. The diagnostic performance was evaluated using binary logistic regression analysis and area under the receiver operating characteristic (ROC) curves (AUC). The sensitivity of nodule detection between the two sequences was compared using McNemar's test.

Results: Of the 35 GGNs, 11 (31%) were pure and 24 (69%) were part-solid. The sensitivity of nodule detection and diagnostic accuracy for recognizing GGNs were significantly higher on ZTE and T2WI-FS than any other 4 images of LAVA-Flex, including water, fat, in-phase, out-phase. T2WI-FS showed significantly greater sensitivity and diagnostic accuracy of GGNs detection than ZTE according to assessment of both readers ($p < 0.05$). The CT value contributed to significantly elevate GGNs detection rate on ZTE ($p < 0.05$) but not on T2WI-FS ($p > 0.05$), while the gender, age, longest diameter, morphology (pure or part-solid) and pathological type were not. The inter-reader agreement was fair to excellent in the assessment of GGNs detection for both ZTE ($\kappa = 0.94$) and T2WI-FS ($\kappa = 0.68$). The nodule size measurements on ZTE were underestimated by a bias up to 0.9 ± 1.2 mm compared to CT and 1.1 ± 1.4 mm for T2WI-FS.

Conclusions: MRI has a satisfactory performance in detecting GGN, especially T2WI-FS. The ZTE outperformed LAVA-Flex but not T2WI-FS in detecting GGNs and could differentiate lung invasive adenocarcinoma from precursor glandular lesions and MIA in some eligible GGNs.

PO-2637

Predicting invasiveness of pure ground-glass nodules of Lung-Rads 2 using 3.0 T MRI

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Objective: To investigate the value of MR zero echo time (ZTE) and thin-slice fat-saturated T2-weighted imaging (T2WI-FS) in detecting and predicting invasiveness of pure ground-glass nodules (pGGNs) of Lung-Rads 2 on 3T magnetic resonance imaging (MRI).

Methods: This prospective study enrolled a total of 76 consecutive patients with 110 pGGNs who underwent preoperative CT and MRI (including ZTE, T2WI-FS) scans. All pGGNs on CT imaging were automatic detection, segmentation, and Lung-RADS scoring by AI software and confirmed by a thoracic radiologist. Another two radiologists blind to pathology results assessed MRI imaging for detection of pGGNs. The Kruskal-Wallis test was utilized for between-group comparison in nodule diameter and CT density. The Chi-square test was employed to evaluate the differences in the detection rate in different groups. Receiver operating characteristic (ROC) curve analysis was used to compare the accuracy of different sequences for between-group differentiation.

Results: All pGGNs were divided into 5 kinds: focal inflammatory lesions, atypical adenomatous hyperplasia (AAH), adenocarcinoma in situ (AIS), minimally invasive adenocarcinoma (MIA), and invasive adenocarcinoma (IA). The detection rate of lung-rads 2 pGGNs was significantly higher in thin-slice T2WI-FS (79.0%) compared to ZTE (50.9%). A statistically significant association between the pathological entities and their visibility on ZTE MRI, from 0% (0/4) for AAH, 20% (2/10) for inflammatory lesions, 21.1% (4/19) for AIS, 58.6% (35/60) for MIA to 88.6% (15/17) for ICA ($p < 0.001$). The diameter has the highest diagnostic performance ($AUC = 0.871$) in differentiating between non-invasive and invasive (MIA+ICA) pGGOs, followed by ZTE visibility with an AUC of 0.734. The other variables, CT value and T2WI-FS have relatively lower AUC s of 0.678 and 0.675, respectively.

Conclusion: Thin-slice T2WI-FS has a better detection rate for pGGO compared to ZTE. While ZTE has more potential for predicting the histological invasiveness of pGGO.

PO-2638

Stress T1 Mapping Detecting Hibernating Myocardium in a Swine Model: A Validation Study with Pathology

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Background: Both dobutamine stress cardiovascular magnetic resonance imaging (CMR) cines and late gadolinium enhancement (LGE) have inherent limitations in the assessment of viable myocardium. The purpose of the study is to explore whether using non-contrast adenosine triphosphate (ATP) stress CMR T1 mapping can detect hibernating myocardium using pathology as a reference standard.

Methods: A chronic ischemia model was induced in swine using Ameroid constrictor to create hibernating myocardium. Non-contrast ATP stress T1 mapping, myocardial contrast perfusion and LGE were performed and analyzed at baseline and every week post-surgery until the animal were sacrificed. Pathology staining, including triphenyltetrazolium chloride, HE, Masson, picosirus red staining, CD31, and electron microscopy, was used as gold standard. The accuracy of T1 mapping was analyzed using ROC analysis.

Results: Twenty-seven swine (21 in experimental group and 6 in the control group) were enrolled. From baseline to 4 weeks after surgery, left ventricular function decreased from $62.7 \pm 8.3\%$ to $51.2 \pm 6.7\%$. The wall thickening score decreased from $53.5 \pm 15.6\%$ to $37.5 \pm 9.3\%$. The $\Delta T1$ ($10.0 \pm 2.0\text{ms}$), $\delta T1$ ($0.84 \pm 0.53\%$), ΔECV ($1.57 \pm 1.13\%$), and δECV ($5.97 \pm 4.92\%$) of hibernating myocardium were higher than infarcted myocardium and lower than normal control myocardium and remote myocardium. The rest T1 ($1210.2 \pm 65.6\text{ms}$), and stress T1 ($1220.3 \pm 63.5\text{ms}$) of the hibernating myocardium were lower than that of the infarcted myocardium, but higher than that of the remote and normal myocardium. Using pathology as the gold standard, ROC analysis found that the AUCs of $\Delta T1$ (0.828) and $\delta T1$ (0.827) to differentiate hibernating myocardium were slightly higher than LGE (0.797) and much higher than rest T1 and stress T1 (AUC=0.631, 0.685, respectively), all $p < 0.05$.

Conclusion: Non-contrast ATP stress T1 mapping accurately detects hibernating myocardium and may be beneficial for patients with contraindications to contrast media, as well as simplifying MR protocol and reducing examination costs.

PO-2639

The value of enhanced T2 FLAIR in the differential diagnosis of central nervous system lymphoma and high-grade adult diffuse glioma

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Objective : To investigate the value of enhanced T2 FLAIR in the differential diagnosis of central nervous system lymphoma (CNSL) and high-grade adult diffuse glioma (HG-ADG).

Date and methods: A retrospective analysis was performed on 63 patients (67 lesions) with CNSL and 14 patients (14 lesions) with HG-ADG confirmed by pathology/follow-up in our hospital from 2014 to 2022. All patients underwent head MRI scans including enhanced T2 FLAIR and enhanced T1WI before surgery. According to the shape of the lesion and whether the diffusion is limited, the tumor is divided into solid mass type and non-solid mass type. The characteristics of tumor enhancement were evaluated by visual score. The evaluation indexes included: the uniformity and degree of enhancement of tumor parenchyma, the degree and range of enhancement of thin layer

enhancement of tumor parenchyma edge. Finally, the enhancement characteristics of solid mass-like CNSL (58 cases) and solid HG-ADG (14 cases) on enhanced T2 FLAIR images were compared. Results: On CE-T2 FLAIR images, there was no significant difference in the uniformity of tumor parenchymal enhancement between the two groups, but there were significant differences in the degree of enhancement of tumor parenchyma, the degree and range of enhancement of tumor edge thin layer between the two groups ($P=0.0001$). Solid mass type CNSL showed moderate and large-scale (68%-99%) enhancement, while solid HG-ADG showed no enhancement.

Conclusion: On CE-T2 FLAIR images, CNSL has a higher probability of obvious thin-layer enhancement (thin-ring sign) of tumor parenchymal edge. This sign has great value in the differential diagnosis of CNSL and HG-ADG with solid mass growth, and is of great significance for guiding clinical treatment decisions.

PO-2640

Disrupted resting-state functional connectivity and network topology in mild traumatic brain injury: An arterial spin labelling study

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Abstract:

Background: Mild traumatic brain injury (mTBI) can cause different degrees of cognitive impairment. Previous literature has confirmed that mTBI patients have abnormal brain structure and functional connectivity (FC), but there is still a lack of research on the resting-state connectivity and topological organization of cerebral blood flow (CBF) fluctuations. This study explored the CBF, connectivity and topological organization of the CBF network in acute mTBI patients.

Methods: In total, 48 mTBI patients and 46 well-matched healthy controls (HCs) underwent resting-state arterial spin-labelled (ASL) perfusion MRI and neuropsychological assessments. The FC and topological organization of the CBF network were analysed. Then, the correlation between the changes in CBF network characteristics and cognitive function was explored.

Results: Acute mTBI patients showed decreased CBF in the right insula and increased CBF in the right inferior temporal gyrus (ITG) and left superior temporal gyrus (STG). Abnormal CBF network connection patterns mainly occur in sensorimotor network (SMN), default mode network (DMN), cingulo-opercular network (CON) and occipital network (ON)-related regions. Furthermore, graph analyses revealed that mTBI disrupted the topological organization of the whole brain, which manifested as (i) reduced global efficiency, (ii) abnormal degree centrality, betweenness centrality, nodal clustering coefficient, and nodal efficiency, and (iii) decreased intermodular connectivity between the ON and SMN. Finally, the change in network topology was correlated with the cognitive function score of the mTBI group.

Conclusions: This study provided evidence of abnormal FC and network topology based on CBF in acute mTBI patients, revealing their potential use as early markers for mTBI, which may contribute to both disease diagnosis and assessment.

PO-2641

Correlation between cerebral perfusion by arterial spin labeling and blood lipids in patients with cerebral small vessel disease

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Objective: To explore the cerebral perfusion level of the mesocortical atrophy areas of cerebral small vessel disease (CSVD) measured by arterial spin labeling (ASL) and the correlations with the blood lipid parameters.

Methods: This retrospective study included patients diagnosed with CSVD between November 2022 and January 2023 in Fuyang People's Hospital and healthy controls who underwent brain MRI during the same period. The regional cerebral blood flow (rCBF) was measured by ASL.

Results: This study included 80 patients with CSVD and 62 healthy controls. The CSVD group showed a thinner cortical thickness at all studied parts of the brain (all $P < 0.05$). Compared with the healthy controls, the CSVD group showed lower rCBF values in the left medial orbitofrontal area (33.438 ± 8.621 vs. 36.842 ± 8.627 , $P = 0.021$) and right superior temporal area (31.866 ± 7.030 vs. 34.610 ± 7.628 , $P = 0.028$). In the CSVD group, the right superior temporal rCBF values were correlated to the total cholesterol ($r = 0.338$, $P = 0.002$) and low-density lipoprotein-cholesterol (LDL-C) ($r = 0.360$, $P = 0.001$) levels but not to the high-density lipoprotein-cholesterol (HDL-C) levels ($r = 0.114$, $P = 0.315$). The left medial orbitofrontal rCBF values were correlated to the total cholesterol ($r = 0.292$, $P = 0.009$) and LDL-C ($r = 0.278$, $P = 0.012$) levels but not to the HDL-C levels ($r = 0.132$, $P = 0.244$).

Conclusion: Compared with healthy controls, patients with CSVD show lower right superior temporal and left medial orbitofrontal perfusion. In patients with CSVD, total cholesterol, and LDL-C levels are positively correlated with perfusion in these two areas.

PO-2642

Application of clinicopathological features and multiparametric magnetic resonance-based radiomics for predicting TP53-mutated prostate cancer

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Purpose: TP53 mutations are closely related to prostate cancer prognosis and therapy, but current detection methods are invasive and expensive, so we decided to develop a classifier for detecting TP53 mutations in prostate cancer using MRI radiomics features.

Method: The study enrolled 275 prostate cancer patients with TP53 expression profiling (85 with TP53 mutations and 190 without). Each patient's index tumor lesion was manually delineated on MRI images. Five clinicopathological and 428 radiomics features were obtained from each lesion. Radiomics features were selected by least absolute shrinkage and selection operator (LASSO) and binary logistic regression analysis. Clinicopathological features were selected by Mann-Whitney U test. Radiomics models were constructed using selected radiomics feature by Logistic regression (LR), support vector machine (SVM) and random forest (RF) classifier to predict the TP53 mutation status of patients. Clinicopathological-radiomics combined models were constructed using selected radiomics and clinicopathological features by the classifiers above. LASSO, binary logistic regression analysis and Mann-Whitney U test were employed for

feature preprocessing. Diagnostic accuracies of models were compared using the receiver operating characteristic curve (ROC).

Result: For radiomics model, the area under the ROC (AUC) of the testing cohorts of RF classifier (0.75) was significantly higher than LR (0.60)($p = 0.019$), but similar to SVM (0.70)($p = 0.422$). For combined model, AUC of the testing cohorts of RF model (0.83) was significantly higher than LR (0.63)($p = 0.001$), but similar to SVM (0.80)($p = 0.548$). There were significant differences between the combined RF and radiomics RF ($p = 0.037$), combined SVM and radiomics SVM ($p = 0.043$) models. But no significant difference between combined LR and radiomics LR model ($p = 0.106$).

Conclusion: Clinicopathological-radiomics combined model with RF, SVM could be used to predict TP53 mutations of prostate cancer.

PO-2643

Comparative study on three kinds of 3.0 T MRI sequences for lumbar facet joint cartilage

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Abstract Objective: To compare the image quality and imaging characteristics of three 3.0 T MRI sequences of lumbar facet joint cartilage. **Materials and Methods:** Thirty healthy subjects were studied with four chosen sequences using a 3.0 T MRI scanner. The sequences were T1WI/T2WI, water excitation three-dimensional spoiled gradient echo sequence (3D-WATSc), three-dimensional T1 fast field echo (3D-T1-FFE) and three-dimensional proton density weighted imaging volumetric isotropic turbo spin echo acquisition (3D-PDWI-VISTA). Two radiologists subjectively evaluated these MRI images qualitatively and quantitatively. Qualitative evaluation index including cartilage signal uniformity, cartilage-joint space edge sharpness, cartilage-bone edge sharpness, cartilage-joint space contrast, cartilage-bone contrast. Quantitative indicators include signal to noise ratio (SNR) and contrast to noise ratio (CNR). **Results:** The 3D-WATSc had the highest scores among the 5 qualitative indexes, and the 3D-T1-FFE had the second-highest scores. Only the difference of signal uniformity between the two was statistically significant ($P < 0.05$). The 3D-PDWI-VISTA is almost indistinguishable from the anatomical structure of the lumbar facet joint. The 3D-WATSc showed that cartilage SNR [L4/L5 (70.73 ± 14.86), L5/S1 (73.50 ± 13.63)] and the CNR of cartilage-space [L4/L5 (25.30 ± 8.44), L5/S1 (21.64 ± 13.01)], cartilage-bone [L4/L5 (60.75 ± 14.68), L5/S1 (64.31 ± 12.98)], and cartilage-bone marrow [L4/L5 (50.22 ± 14.33), L5/S1 (54.46 ± 10.99)] were higher than that of 3D-T1-FFE, and the difference were statistically significant ($P < 0.05$). **Conclusions:** The 3D-WATSc can present the anatomical structure of lumbar facet joints in detail, which is superior to 3D-T1-FFE and 3D-PDWI-VISTA. 3D-WATSc has advantage in imaging of lumbar facet joint cartilage and clinical diagnosis of lumbar facet joint degeneration.

PO-2644

Analysis of high resolution MRI plaque burden and its correlation with ABCD2 scores in transient ischemic attack and acute ischemic stroke patients

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Objective To investigate the differences in carotid artery plaque burden between transient ischemic attack (TIA) and acute ischemic stroke (AIS), and analyze the correlation with ABCD2 scores in TIA patients based on high-resolution MRI (HR-MRI). **Methods** Seventy-eight patients were retrospectively collected, divided into AIS group (22 patients), a low-intermediate risk group (ABCD2 score < 6) (37 patients) and a high-risk group (ABCD2 score ≥ 6) (19 patients). Wall thickness, vessel area, lumen area, remodeling index (RI), eccentricity index (EI), and normalized wall index (NWI) were calculated and analyzed. Differences of clinical characteristics and plaque burden between groups were compared using one-way analysis of variance or Kruskal Wallis-test. The relationship of plaque burden in the TIA and AIS groups were used ordinal logistics regression, multiple linear correlation and regression. The correlations of TIA plaque burden and ABCD2 score were analyzed by Spearman rank correlation or Pearson correlation. **Results** The WTmax, WTmin, LAMLN, RI, NWI of internal carotid artery were compared, which had statistically significant ($P < 0.05$). WTmax and WTmin were statistically significant between low-medium-risk TIA group and AIS group ($P < 0.05$), while LAMLN and NWI were statistically significant in low-medium-risk TIA group, high-risk TIA group compared with AIS group ($P < 0.05$), respectively. The NWI of internal carotid artery have good risk prediction to the incidence of ischemic stroke (95% CI = [2.87, 14.75], $P = 0.004$). There was a weak correlation between ABCD2 score and RI ($r = 0.295$, $P = 0.027$). **Conclusions** This study reveals the plaque features of internal carotid artery in TIA and AIS patients. The parameter NWI is correlated with AIS and TIA stratified patients, and RI has a weak positive correlation with ABCD2 score, which is a potential indicator for TIA stratified patients and has important significant for early prevention of stroke.

PO-2645

Distinguishing benign from malignant breast lesions with tumor subregion complexity using fractal analysis

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Purpose: To assess the feasibility of using fractal analysis in habitat analysis for the differential diagnosis of benign and malignant breast lesions, and to evaluate its diagnostic performance compared to conventional heterogeneity features extracted from the whole tumor.

Materials and Methods: A retrospective study was conducted on 97 patients with histologically confirmed breast lesions (75 malignant, 22 benign). Diffusion-weighted imaging (DWI) and dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) were acquired, and three tumor habitats were defined based on perfusion and cellularity characteristics. Fractal dimensions (FDs) were calculated for each habitat, and diagnostic performance was compared using the area under the receiver operating characteristic curve (AUC).

Results: The FD of hypervascular habitat (FD 1) showed a statistically significant difference ($p < 0.001$) between malignant and benign lesions. The AUC of FD 1 (0.925, 95% CI 0.854 – 0.969)

was higher than that of the conventional heterogeneity of the whole lesion (0.671, 95% CI 0.568 – 0.763), indicating improved diagnostic performance. Hypervascular cellular habitat, characterized by relatively low ADC and high wash-in, demonstrated a remarkable ability to discriminate breast cancer from benign lesions.

Conclusion: This pilot study reveals that FD features generated by habitat analysis could better differentiate benign from malignant breast lesions compared to conventional heterogeneity features extracted from the whole tumor. The predictive model combining tumor habitats MRI and fractal analysis could prove useful as a screening tool, suggesting that fractal analysis may play an essential role in identifying patients whose breast lesions are more likely to behave aggressively.

PO-2646

Social Support Mediates the Influence of Cerebellum Posterior Lobe Functional Connectivity Strength on Postpartum Depression symptoms

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Objective: Depression is a common mental disorder. Postpartum depression (PPD) is a major depressive disorder in which a mood disorder occurs during pregnancy or within one year after delivery. Maternal depression affects both the child's growth and the mother's ability to care for her infant. Previous studies have shown that adequate social support can protect against PPD. However, how the brain connectome is disrupted in PPD and the neural basis underlying the role of social support in PPD remain unclear. The present study aims to explore these issues in patients with PPD.

Method: Well-established questionnaires and resting-state functional Magnetic Resonance Imaging (rsfMRI) were performed in 120 PPD patients and 105 Healthy Postnatal Women (HPW). Brain functional integration was measured by analysis of Functional Connectivity Strength (FCS). Association and mediation analyses were performed to investigate relationships between FCS, PPD symptoms and social support.

Result: PPD patients showed specifically higher FCS in right parahippocampus. In all postpartum women, depression symptoms positively correlated with FCS in left paracentral lobule; depression and anxiety symptoms were negatively correlated with FCS in right cerebellum posterior lobe (CPL), a brain region implicated in supporting social cognition and regulation of emotion. Subsequent mediation analysis revealed that perceived social support mediated the association between CPL FCS and PPD symptoms.

Conclusion: Measurement of FCS in disorder-specific neural circuits offers a potential biomarker to study and measure the efficacy of social support for PPD.

PO-2647

Altered functional and morphological brain networks in major depressive disorder: Findings from the resting-state and structure analysis

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Objective Depression is a mental disorder characterized by low mood and anhedonia that involves abnormalities in multiple brain regions and networks. Epidemiological studies demonstrated that depression has become one of the most important diseases affecting human health and longevity. The pathogenesis of the disease has not been fully elucidated. Recent developments in neuroimaging have heightened the need for investigating the disruptions in the structure and function of brain in major depressive disorder (MDD). In this study, we employed resting-state functional magnetic resonance imaging (fMRI) and structure MRI (sMRI) to examine the global and local-brain functional and morphological networks among MDD patients and healthy controls. **Methods** 55 patients with MDD and 46 normal controls (NC) subjects were collected, data of brain 3D high resolution T1-weighted and resting-state image were acquired at 3.0T MR system. Construction of functional brain network was preprocessed through the DPARSF tool, and the morphological brain network was constructed through FreeSurfer tool. **Results** Compared with normal controls, the global features of functional brain network exhibited no significant differences in MDD patients, but the local features of functional and morphological networks were changed. 1) Morphological brain networks: The transverse temporal gyrus in left hemisphere showed increased gray volume and surface area in patients with MDD compared to NCs ($P < 0.05$). 2) Functional brain networks: The functional connectivity (FC) of multiple nodes in the default mode network (DMN) of depression patients was abnormally increased, especially the left temporal lobe. Besides, the betweenness centrality of topology in the left transverse temporal gyrus with MDD altered compared to NCs ($P < 0.05$). **Conclusion** Functional and morphological brain networks changes of transverse temporal gyrus in left hemisphere are found in MDD patients. These significant findings could expand our understanding of neurophysiologic mechanisms related to MDD from a network perspective.

PO-2648

Comparison of single-short, FOCUS single-short, MUSE, and FOCUS MUSE diffusion weighted imaging for pulmonary lesions: A pilot study

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Purpose: To compare the performance of single-short (SS), FOCUS SS, MUSE, and FOCUS MUSE diffusion weighted imaging (DWI) for pulmonary lesions.

Materials and Methods: In this prospective study, forty-eight patients who were suspected of pulmonary lesions according to computed tomography were recruited between November 2022 and May 2023. Pulmonary DWI with b-values of 0, 50, and 800 (s/mm^2) was performed at 3T MRI using SS, FOCUS SS, MUSE, and FOCUS MUSE sequences before biopsy. The image quality was assessed using 5-point Likert scale score, signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), and deformation rate (DR) for each sequence. The 5-point Likert scale score, SNR, CNR, and DR of the four sequences was compared respectively using Friedman test with the Bonferroni

post hoc test. The 5-point Likert scale score consistency using kappa coefficients. The agreement of SNR, CNR, and DR observable measurements was demonstrated using Bland-Altman plots. Apparent diffusion coefficients (ADCs) derived from DWI were also compared with Friedman test with the Bonferroni post hoc test. Inter- and intra-group agreement of ADC values was expressed using ICC correlation coefficients. The ADC value between benign and malignant lesions was compared using Mann-Whitney test.

Results: Forty-eight patients were finally selected including 20 adenocarcinomas, 12 squamous carcinomas, 2 small cell carcinomas, 1 adenoid squamous carcinoma, 1 lymphoma, 2 other epithelial tumors and 10 benign cases. Compared with SS, FOCUS SS and MUSE, FOCUS MUSE demonstrated better image quality, including significantly higher 5-point Likert scale score and significantly smaller DR. There were no significant differences in SNR and CNR between the four sequences. In terms of ADC value assessment, there was no significant difference in ADC values between the four groups of sequences, which were comparable in their ability to be used in clinical applications. In terms of the ability of the four sequences to differentiate between benign and malignant lesions, the ADC values for benign and malignant tumors were significantly different across the four sets of sequences, with FOCUS MUSE possessing the largest area under the curve (AUC=0.820), which gives it an advantage in discriminating between benign and malignant lesions. Conclusion: FOCUS MUSE has improved image quality compared to other three DWI sequences, providing more optimal images for clinical diagnosis of lung lesions.

PO-2649

Co-localization of dysfunction in auditory verbal hallucinations in schizophrenia: a study on state- and trait-based brain networks

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Many studies have explored the neuropathological mechanisms of auditory verbal hallucinations (AVH) in schizophrenia through regional brain changes, yet the existence of specific functional network impairments remains unclear. Utilizing resting-state functional magnetic resonance imaging (fMRI) data from a discovery dataset and an independent validation dataset, combined with prior literature findings, we applied the functional connectivity network mapping (FCNM) method to investigate whether distinct functional impairments associated with AVH in individuals with schizophrenia are co-localized within specific brain networks. We identified a widely distributed AVH-state dysfunctional network, primarily involving auditory, salience, basal ganglia, language, and sensorimotor networks, and an AVH-trait dysfunctional network is scattered across the bilateral orbitofrontal gyrus, bilateral insular, bilateral middle temporal gyrus (MTG), striatum and the anterior cingulate cortex (ACC). Our findings suggest that AVH-related dysfunction may reside in two distinct brain networks, which may contribute to a deeper understanding of the causal neuroanatomical basis of AVH. This knowledge could provide more reliable potential neuroanatomical targets, paving the way for improved treatment and prevention of AVH symptoms in schizophrenia.

PO-2650

Diffusion-weighted imaging using multiplexed sensitivity encoding (MUSE) without and with field-of-view optimized and constrained undistorted single-shot (FOCUS) In Different pathological types of pulmonary nodules and masses

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Purpose: To investigate in different pathological types of pulmonary nodules and masses (PNMs) population the benefits of using multiplexed sensitivity-encoding (MUSE) without and with field-of-view optimized and constrained undistorted single-shot (FOCUS) instead.

Methods: In this prospective study of fifty-one consecutive patients (median age, 65 years; age range, 28–81 years, 33 men, 18 women) who underwent 3.0 T pulmonary MRI from November 2022- June 2023, We compared image quality, geometric distortions, and diffusion values between three different approaches for DWI [Single-shot DWI, MUSE, and MUSE+FOCUS] in different pathological types of PNMs. Visual qualitative analysis of diffusion-weighted images was accomplished by two independent readers; images were assessed for lesion conspicuity and overall quality of image. Inter-reader agreement was assessed using the Kappa coefficient. Quantitative analysis was performed by calculating geometric distortion [Dice Coefficient (DICE) and Hausdorff Distance (HD)] and apparent diffusion coefficient (ADC) values by manually drawing regions of interest in PNMs. To assess the interobserver agreement of ADC values, paired samples t-tests and intra-class correlation coefficients (ICC) were used. Quantitative differences between two different DWI were assessed using the Mann-Whitney U test. Receiver operating characteristic (ROC) curve was used in distinguishing between malignant and benign PNMs.

Results: Of the 51 PNMs (from 51 patients), 42 (82.35%) were malignant and 9 (17.65%) were benign. MUSE+FOCUS and MUSE DWI perform better than Single shot DWI for pulmonary lesion conspicuity and overall image quality for qualitative parameters. Distortion levels assessed with DICE and HD were significantly lower for MUSE+FOCUS ($P < 0.05$) compared to Single-shot DWI and MUSE. For malignant and benign PNMs, no significant difference in mean ADC between the three DWI methods was found ($p > 0.05$) and the min ADC values measured using MUSE+FOCUS were significantly lower than those measured using Single-shot WI ($p < 0.011$ and $p = 0.024$, respectively). FOCUS+MUSE DWI had the largest area under the curve in discriminating malignant and benign PNMs (0.862 and 0.700).

Conclusion: FOCUS MUSE DWI has improved image quality compared to MUSE and Single-shot DWI sequences, providing more optimal images for clinical diagnosis of PNMs.

PO-2651

Dysregulated brain dynamics in visual-motor network of type 2 diabetes and its relation to cognitive impairment

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Background

Type 2 diabetes mellitus (T2DM) is a significant risk factor for mild cognitive impairment (MCI). The mainly impaired executive function and memory lead to the poorer performance of the rather demanding glucose monitoring tasks. Yet, the susceptible directed network and its dynamic features remain poorly understood. Here, we screen T2DM-specific effective connective (EC)

network, the dynamic features of which make contribution to distinguishing T2DM patients with cognitive impairment from controls and were correlated with cognitive performance in T2DM patients.

Methods

Twenty-eight local T2DM patients with normal cognition (IT2DM-CN) and 30 age, sex and education matched healthy controls (IHC-CN) were recruited. Resting-state functional MRI (rs-fMRI) data were subsequently acquired to screen the directed susceptible network for early cognitive impairment in T2DM using network-based statistic. Then, 31 multi-centered T2DM patients with MCI (mT2DM-MCI), 28 T2DM patients with normal cognition (mT2DM-CN) and 28 age, sex and education matched healthy controls (mHC-CN) were obtained from ADNI3 database to explore the directed dynamic temporal heterogeneity of the susceptible network in the three groups. The relationship between connectome characteristics and cognitive performance were also evaluated using Pearson correlation analysis and the binary logistic regression analysis.

Results

Poorer performance was found in IT2DM-CN in subitems of scales assessing executive and memory function. Extracted from cognitive declined IT2DM-CN, the T2DM-related static causality network mainly consisted of nodes in visual and sensorimotor network, including left area V5/MT of occipital gyrus (LOcC_L_4_2), right area 1/2/3 upper limb of postcentral gyrus (PoG_R_4_1), right area 2 of postcentral gyrus (PoG_R_4_3), right area 4 upper limb of precentral gyrus (PrG_R_6_3), left caudal area 35/36 of parahippocampal gyrus (PhG_L_6_2), left postcentral area 7 of superior parietal lobule (SPL_L_5_4), and left rostromedial superior temporal sulcus (pSTS_L_2_1). V5/MT region of visual cortex was the core. The main positive ECs were from visual network to sensorimotor network. Verified in different window widths, the dynamic network mode among multi-centered groups can be divided into stronger interconnected State I and relatively sparsely connected State II. While, the fractional windows (F) and mean dwell time (MDT) of State I in mT2DM-MCI were significantly higher than those in mT2DM-CN and mHC-CN groups, the F and MDT of State II in mT2DM-MCI were significantly lower than those in the two control groups. No significant different F and MDT was found between mT2DM-CN and mHC-CN groups. Comparing the strength of connections between each pair of the multi-centered groups, the predominantly altered dynamic ECs (dECs) were found in State I with more altered dECs in the mT2DM-MCI group. The sum of dECs (sumdECs) was negatively correlated with number of cues in Logical Memory test. The sumdECs could effectively distinguish the mT2DM-MCI from mHC-CN and mT2DM-CN with the accuracy to be 0.949 and 0.898, respectively.

Conclusions

Cognitive impairment, EC and dEC alterations were detectable in IT2DM-CN and mT2DM-MCI patients. Early and subtle cognitive alterations in T2DM, underpinned by increased EC, may represent an early harmful effect of T2DM to working memory system. The high differential diagnostic efficiency of sumdECs in visual-motor network was further evidence that sumdECs were more sensitive to the cognitive impairment in early T2DM. Our results contribute to a better understanding of the mechanism for the cognitive impairment in T2DM and its promising neuroimaging biomarkers.

PO-2652

Study on the pattern of nucleus accumbens-associated dynamic functional network abnormalities in type 2 diabetes mellitus

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AIM

To investigate the characteristics and role of the dynamic nucleus accumbens (NAC)-whole brain interactive network and classical reward circuit in the cognitive impairment process of type 2 diabetes mellitus (T2DM).

METHODS

Thirty-one T2DM with mild cognitive impairment (T2DM-MCI), 28 age, sex and education matched T2DM without MCI patients (T2DM-CN) and healthy control (HC) were obtained from ADNI3 database. The z-transferred low-frequency amplitudes (zALFF), regional homogeneity (zReHo) and voxel-mirrored homotopic connectivity (zVMHC) of NAC from AAL3, BNA and HOA templates were extracted and compared. Ventral tegmental area, NAC, amygdala, prefrontal regions and hippocampus were used as regions of interests (ROI) to construct reward networks. Besides, NAC was used as the ROI to construct the mutual network between NAC and other brain regions. The dynamic effective connective (dEC) clustering features of the two networks and their correlation with the cognitive performance were then explored.

RESULTS

In multi-centered subjects, zALFF of NAC decreased significantly, while zReHo and zVMHC increased significantly in T2DM-MCI group compared with T2DM-CN and HC groups ($P < 0.05$). The dEC of the two networks also fluctuated between stronger EC state I and weaker EC state II ($P < 0.001$). The fractional windows (F) and mean dwell time (MDT) of state I in mT2DM-MCI were significantly higher than those in mT2DM-CN and mHC-CN groups ($P < 0.001$). The F and MDT of State II are the opposite ($P < 0.001$). No significant difference in F value and MDT value was found between mHC-CN and mT2DM-CN groups ($P > 0.05$). In T2DM-MCI group, the F value of the state I in backward reward network was negatively correlated with completion time of TMT A.

CONCLUSIONS

The neural activity of NAC was useful for differentiating T2DM patients with cognitive impairment from HC. NAC may play an important role in the mechanism of cognitive impairment in T2DM. The reward circuit may be the susceptible pathway.

PO-2653

Functional connection network mapping to explore structural and functional damage networks of the risk for schizophrenia and bipolar disorder

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Background: Although schizophrenia (SZ) and bipolar disorder (BD) have a number of clinical features and certain susceptibility genes in common, they are considered separate disorders. Identifying brain alterations associated with genetic vulnerability for SZ and BD could help to quantify biological traits with greater prevalence in unaffected relatives (RELs) and early recognition biomarkers in ultrahigh-risk populations. Here, we introduce a new technique termed

functional connectivity network mapping to examine whether heterogeneous functional magnetic resonance imaging findings localize to connected brain networks.

Methods: We systematically searched PubMed and Web of Science for structural and functional MRI studies investigating relatives and healthy control subjects. A total of 104 eligible neuroimaging studies with 107 experiments (2364 SZ-RELS, 864 BD-RELS, and 4114 healthy control subjects) were identified. Then, we leveraged the normative human brain connectome (656) to test whether the coordinates derived from the studies might delineate specific functional or structural damage networks in SZ-RELS and BD-RELS rather than isolated neuroanatomical foci.

Results: First, we showed that the neuroimaging findings of SZ- and BD-RELS in function and structure localize to different specific brain damage networks, respectively. Second, when we further merged the functional and structural damage networks, we found that the overlap rate of brain damage networks in the two diseases increased significantly.

Conclusions: Our results suggested that neuroimaging studies that appear poorly reproducible may identify different regions within the same connected brain network. From the perspective of the network, we can further understand and explain that SZ and BD, two different mental disorders, have overlapping symptoms and genes.

PO-2654

Neural mechanism underlying the beneficial effect of Theory of Mind psychotherapy on early-onset schizophrenia: A randomized controlled trial

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Background: Psychosocial interventions have emerged as an important component of a comprehensive therapeutic approach in early-onset schizophrenia (EOS), typically representing a more severe form of the disorder. Despite the feasibility and efficacy of Theory of Mind (ToM) psychotherapy for schizophrenia, relatively little is known regarding the neural mechanism underlying its effect on EOS.

Methods: We performed a randomized, active controlled trial in 28 patients with EOS, who were randomly allocated into either an intervention (ToM psychotherapy) or an active control (health education) group. Diffusion tensor imaging data were collected to construct brain structural networks, with both global and regional topological properties measured using graph theory.

Results: After 5 weeks of treatment, both the intervention and active control groups showed significant improvement in psychotic symptoms, yet the improvement was greater in the intervention group. Importantly, contrasting with no brain structural network change after treatment in the active control group, the intervention group exhibited increased nodal centrality of the left insula that was associated with psychotic symptom improvement.

Conclusion: These findings suggest a potential neural mechanism by which ToM psychotherapy exerts its beneficial effect on EOS via strengthening the coordination capacity of the insula in brain structural networks, which may provide a clinically translatable biomarker for monitoring or predicting responses to ToM psychotherapy.

PO-2655

Functional gradient of the fusiform gyrus and its underlying molecular basis

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Background: Many lines of evidence have evinced the functional complexity, anatomical heterogeneity, connectivity diversity, and clinical relevance of the fusiform gyrus (FG). We aimed to provide a unified account for these FG characteristics by systematically investigating the hierarchical organization of the FG and its underlying molecular basis.

Methods: Resting-state functional MRI data of 793 healthy subjects were collected from a discovery dataset and two independent cross-scanner, cross-race validation datasets. Functional gradients of the FG were calculated based on the voxel-wise FG-to-cerebrum functional connectivity to reflect its functional organization. Coupled with the Allen Human Brain Atlas, transcription-neuroimaging spatial correlation analysis was performed to determine genes with expression levels tracking the FG functional gradient. **Results:** The dominant functional gradient that explained the greatest connectivity variance showed an anterior-posterior axis across the FG. More important, there was a strong association between the FG dominant gradient and gene expression profiles, with two gene sets contributing significantly to this association yet differing in their specific expression and functional annotation. In addition, the FG dominant gradient was linked closely to intrinsic geometry, slightly to cortical morphology, and gradually to behavioral domains from high-level cognitive processes to low-level sensory functions. **Conclusion:** Our findings add to the extant knowledge regarding the topographic organization of the FG by informing a novel conceptualization of how functional heterogeneity and multiplicity co-occur within the FG.

PO-2656

Correlations between DKI and DWI with Ki-67 Index in Gastric Adenocarcinoma

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Background: Although diffusion kurtosis imaging (DKI) has been applied for gastric adenocarcinoma but correlations between their parameters with Ki-67 index is still not clear.

Purpose: To investigate the correlation between the parameters of DKI and DWI with Ki-67 index in gastric adenocarcinoma.

Materials and methods: A total of 54 gastric adenocarcinoma patients were enrolled into the research and received DWI and DKI at 3.0T MRI before the surgery. Based on the setting of ROIs, the DWI and DKI parameters (including ADC, diffusion kurtosis (K) and diffusion coefficient (DK)) of each patient's gastric adenocarcinoma were measured and calculated. According to expression of Ki-67, participated subjects were divided into two groups (low Ki-67 group and high Ki-67 group). The intraclass correlation coefficient (ICC) was used to assess the consistency of each parameter measured by two radiologists. The independent-sample t-test was used to compare differences of each parameter between groups. Spearman correlation coefficient was calculated to reveal the correlation between Ki-67 with parameters. By using the area under the curve (AUC) of the receiver operating characteristic (ROC) curve, each parameter was compared. All parameters were included in multivariate logistic regression analysis to explore the relationship between each parameter with high Ki-67. **Results:** ADC and DK were negatively relevant to the expression of Ki-67 ($r = -0.725$,

-0.776, all $P < 0.05$) and K was positive relevant to the expression of Ki-67 ($r = 0.762$, $P < 0.05$). The ADC, DK and K had a diagnostic efficiency in differentiation of low Ki-67 group from high Ki-67 group. A higher K value ($K > 6.91 \times 10^{-2} \text{ mm}^2/\text{s}$) independently predicted a high Ki-67 status. Conclusions: DWI and DKI can effectively reflect the proliferative characteristics of gastric adenocarcinoma. And K is the strongest independent factor for predicting high Ki-67 status.

PO-2657

Automatic Diagnosis and Measurement of Intracranial Aneurysms Using Deep Learning in MRA Raw Images

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Objectives: In traditional clinical practice, the 3D reconstruction, visual recognition, and size measurement of intracranial aneurysms (IA) using MRA was very time-consuming and labor-intensive. In this study, a deep learning model was established to automatically diagnose and measure IA based on 2d original images.

Materials and methods: 852 IAs (806 patients) from the hospital 1 were included and randomly divided into training set, test set and internal validation set in a ratio of 7:3:3. Additionally, 319 patients (181 cases with IA, 136 cases without IA) from the hospital 2 were used for independent validation. A deep learning model based on 3D U-net was established for aneurysm diagnosis and measurement. The TP, FP, FN, Recall, Precision, Sensitivity and Specificity indexes were used to evaluate the detection performance of the model. Intraclass correlation coefficient was used to test the consistency between the measurement results of MR 3D U-net and DSA.

Results: For the IA detection, in the internal validation set, the recall, precision and sensitivity were 0.79, 0.62 and 0.75, respectively. In the independent validation set, the recall, precision, sensitivity and specificity were 0.71, 0.68, 0.74 and 0.77, respectively. For the IA measurement, the MR 3D U-net and DSA showed good consistencies, with ICC of 0.77 and 0.82, respectively.

Conclusions: In this study, a one-click fully automatic deep learning model was developed for automatic IA diagnosis and measurement. It could greatly shorten diagnostic time and reduce the workload of radiologists.

PO-2658

A correlative study of pituitary MRI manifestations in patients with hyperprolactinemia

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Objective To explore the pituitary MRI manifestations in patients with hyperprolactinemia, and to provide an objective basis for differentiating microprolactinomas from hyperprolactinemia.

Methods The MRI manifestations of 121 patients with hyperprolactinemia and 71 normal individuals were retrospectively analyzed, along with the clinical symptoms of the patients. Clinical symptoms, MRI pituitary morphology, signal intensity, and dynamic enhancement semiquantitative parameters (time to peak, maximum enhancement rate, and enhancement slope) were assessed in patients with hyperprolactinemia. Differences in age, anteroposterior diameter, transverse diameter, and volume of the pituitary gland between the hyperprolactinemia group and the normal control group were tested using two independent samples t-test. Pituitary median sagittal height and maximum height were assessed using a nonparametric test. Additionally, differences in sex,

pituitary stalk position, and pituitary morphology between the hyperprolactinemia and normal control groups were evaluated through a chi-square test. Correlations between the prolactin ratio and each measurement were analyzed using spearman correlation analysis.

Results The pituitary stalk was deviated in 19.8% of patients with hyperprolactinemia, and the pituitary morphology showed depression, flatness, and elevation in 28.1%, 50.4%, and 21.5%, respectively. The dynamic enhancement curve was steeply ascending in 77.5% and slowly ascending in 22.5%. The ratio of serum prolactin levels correlated only with the maximum enhancement rate ($P=0.025$, $r=-0.213$). Pituitary stalk excursion and pituitary morphology in the hyperprolactinemia group were not statistically different from normal controls ($P=0.273$ and 0.114). However, pituitary volume was greater in the hyperprolactinemia group than in the normal control group ($P=0.036$), while anteroposterior diameter, transverse diameter, median sagittal height and maximum height of the pituitary gland did not differ significantly between the two groups.

Conclusion Exploring and analyzing the morphology and signal characteristics of pituitary MRI in patients with hyperprolactinemia reveals differences compared to normal controls. This investigation lays the foundation for early and accurate diagnosis of microprolactinomas, providing an objective basis for clinical treatment decisions.

PO-2659

The value of myocardial contraction fraction and long-axis strain to predict late gadolinium enhancement in multiple myeloma patients with secondary cardiac amyloidosis

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Purpose: The objective of this study is to evaluate the efficacy of conventional and two supplementary functional markers obtained from standard cardiac magnetic resonance (CMR) images in predicting the presence of late gadolinium enhancement (LGE) in patients diagnosed with secondary cardiac amyloidosis (CA) associated with multiple myeloma (MM).

Methods: This study retrospectively enrolled 32 patients with preserved ejection fraction who were diagnosed with MM-CA in a consecutive manner. Using commercial cardiac post-processing software to obtain conventional left ventricular (LV) function markers and two supplementary functional markers, namely myocardial contraction fraction (MCF) and LV long-axis strain (LAS). Logistic regression analyses and receiver operating characteristic (ROC) analysis were performed for predict performances.

Results: 1) There were no notable distinctions in clinical features between the LGE+ and LGE- groups, with the exception of a reduced systolic blood pressure in the former (105.60 ± 18.85 mmHg vs. 124.50 ± 20.95 mmHg, $P=0.022$). 2) Patients with MM-CA presented with intractable heart failure with preserved ejection fraction (HFpEF). The left ventricular ejection fraction (LVEF) in the LGE+ group exhibited a greater reduction (54.27%, IQR 51.59% to 58.39%) in comparison to the LGE- group ($P<0.05$). And MM-CA patients with LGE+ had significantly higher LVMI (90.15 ± 23.69 g/m²), lower MCF (47.39%, IQR 34.28% to 54.90%), and the LV LAS were more severely damaged (-9.94 ± 3.42 %) than patients with LGE- (all P values <0.05). 3) The study found that MCF exhibited a significant independent association with LGE, as indicated by an odds ratio of 0.89 ($P<0.05$). The cut-off value for MCF was determined to be 64.25% with a 95% confidence interval ranging from 0.758 to 0.983. The sensitivity and specificity of this association were calculated to be 95% and 83%, respectively.

Conclusion: MCF is a simple reproducible predict marker of LGE in MM-CA patients. It is a potentially CMR-based method that promise to reduce scan times and costs, and boost the accessibility of CMR.

PO-2660

The utilization of cardiac magnetic resonance in hypertrophic cardiomyopathy in the past 10 years (2013-2023): A bibliometric analysis based on Citespace

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Background and objectives: Hypertrophic cardiomyopathy (HCM) is a prevalent genetic cardiac disorder characterized by the hypertrophy of a segment of the myocardium. Cardiac magnetic resonance (CMR) has been widely used in the assessment of HCM. However, bibliometrics on CMR for HCM still need to be added. This study aims to analyze the global research trend of CMR for HCM in the past 10 years.

Methods: A systematic search was conducted on the Web of Science about CMR in the assessment of HCM. The databases were searched from 2013 to August 2023. Citespace is a service that researches the underlying knowledge in the scientific literature. We used it to analyze the relationship between publication year and country, institution, journal, author, bibliography, and keywords about CMR in the assessment of HCM.

Results: A total of 1427 articles were included for analysis. In the assessment of HCM, the findings from the past decade have consistently demonstrated a progressive rise in the quantity of articles pertaining to CMR. The country with the largest number of publications is the United States of America (USA) (310), and the institution with the largest number of publications is University College London (45). The analysis of keywords revealed that the diagnosis and management of HCM using CMR is the current research focus and emerging trend within this academic field.

Conclusion: This study presents a novel approach for visually analyzing the utilization of CMR in evaluating HCM. The current research trajectory in CMR focuses on diagnosing and managing patients with HCM. While the majority of studies affirm the indispensability of CMR in assessing HCM, there remains a need for large-scale, randomized controlled trials to comprehensively evaluate the efficacy of CMR in this context.

PO-2661

Value of blood oxygenation level-dependent magnetic resonance imaging in early evaluation of the response and prognosis of esophageal squamous cell carcinoma treated with definitive chemoradiotherapy: A preliminary study

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Objective: To establish a quantitative imaging predictor for evaluation of early treatment response and prognosis to definitive chemoradiotherapy (dCRT) in patients with esophageal squamous cell carcinoma (ESCC), using blood oxygenation level-dependent (BOLD) magnetic resonance imaging (MRI).

Methods: The R2* values were obtained pre and 2-3 weeks post-dCRT in 28 patients with EC using BOLD MRI. Independent samples t-test (normality) or Mann-Whitney U test (non-normality) was used to compare the differences of R2*-related parameters between the complete response (CR)

and the non-CR groups. Diagnostic performance of parameters in predicting response was tested with receiver operating characteristic (ROC) curve analysis. The 3-year overall survival (OS) was evaluated using Kaplan Meier curve, log rank test, and Cox proportional hazards regression analysis.

Results: The post- $R2^*$, $\Delta R2^*$, and $\Delta\%R2^*$ in the CR group were significantly higher than those in the non-CR group ($P = 0.002, 0.003, \text{ and } 0.006$, respectively). The $R2^*$ -related parameters showed good prediction of tumor response, with AUC ranging from 0.813 to 0.872. The 3-year OS rate in patients with $\Delta R2^* > -7.54 \text{ s}^{-1}$ or CR were significantly longer than those with $\Delta R2^* \leq -7.54 \text{ s}^{-1}$ (72.37% vs. 0.00%; Hazard ratio, HR = 0.196; 95% confidence interval, 95% CI = 0.047-0.807; $P = 0.024$) or non-CR (76.47% vs. 29.27%; HR = 0.238, 95% CI = 0.059-0.963; $P = 0.044$).

Conclusions: The preliminary results demonstrated that the $R2^*$ value might be a useful hypoxia imaging predictor for response and prognosis of ESCC treated with dCRT. BOLD MRI may be used as a potential tool for evaluating tumor oxygenation metabolism, which is routinely applied in clinical practice and beneficial to clinical decision-making.

PO-2662

Measurement of tumor heterogeneity with habitats in breast cancer and its application in molecular subtype discrimination

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PurposeTo develop multiparametric physiologic MRI-based spatial habitat analysis and to validate the association between the habitats and the molecular subtypes of breast cancer.

MethodsIn an IRB approved retrospective study, 142 biopsy- and surgery-proven breast cancer (56 ± 27 years) with 148 lesions underwent DWI and abbreviated DCE-MRI examination on a 3-T scanner (uMR 780, United Imaging Healthcare, Shanghai, China). As illustrated in Figure 1, a three-dimensional parametric space for clustering of ROIs was constructed with processed ADC, wash-in, and wash-out features. An iterative unsupervised machine learning clustering algorithm, k-means, is applied in the 3D parametric space of all patients to stabilize the assignment of clusters among patients. The heterogeneity was quantified using the neighbors' information of each voxel. **Results**Three habitats sharing similar characteristics were constructed and assigned as hypervascular habitat (high wash-in and wash-out), hypovascular cellular habitat (low ADC and low wash-in/wash-out), and nonviable habitat (high ADC and wash-in/wash-out), respectively. Figure 2 shows the TNBC had a larger Habitat 3 and smaller Habitat 1. The volume fraction of hypervascular habitat showed good predictive performance of TNBC (AUC 0.853; 95% CI, 0.786–0.906) at an optimized threshold lower than 20.4% with 84.6% sensitivity and 91.0% specificity. Similarly, the fraction of nonviable habitat showed a prediction performance (AUC 0.752; 95% CI, 0.674–0.891) at an optimized threshold greater than 32.9%, with 73.1% sensitivity and 76.2% specificity, as shown in Figure 3.

ConclusionThe habitat method using conventional ADC and DCE-MRI may be a useful and practical imaging biomarker for predicting the TNBC status.

Limitation

A retrospective, single-institution study with unbalanced molecular subtypes, further study on other subtypes is possible.

PO-2663

Hippocampal dynamic functional connectivity, HPA axis activity, and personality trait in bipolar disorder with suicidal attempt

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Background The aim of this study was to explore the mechanisms underlying suicidal behavior by detecting dynamic functional connectivity (dFC) variability of hippocampus and hypothalamic-pituitary-adrenal (HPA) axis activity, and their associations with personality traits in bipolar disorder (BD) with suicidal attempt (SA).

Methods Resting-state functional magnetic resonance imaging data were obtained from 79 patients with BD (39 with SA and 40 without SA) and 35 healthy controls. The activity of the HPA axis was assessed by measuring morning plasma adrenocorticotrophic hormone (ACTH) and cortisol (CORT) levels. All participants underwent personality assessment using Minnesota Multiphasic Personality Inventory-2 (MMPI-2).

Results SA exhibited lower ACTH and increased dFC variability between right caudal hippocampus and left superior temporal gyrus (STG) compared to the non-SA. For SA, ACTH was positively correlated with dFC variability between right caudal hippocampus and left STG. SA scored significantly higher on the Hypochondriasis, Depression and Schizophrenia versus non-SA. Additionally, the interaction of ACTH \times dFC variability between right caudal hippocampus and left STG represented an independent contributing factor of Depression score in the SA.

Conclusions These results suggested that suicidal BD exhibited increased dFC variability of hippocampal-temporal cortex and less HPA axis hyperactivity, which may both together lead to the possibility of changes in personality.

PO-2664

The Value of DCE-MRI and MRS in the Differentiation of Pseudoprogression and Recurrence of Intracranial Gliomas

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Objective:

The objective of this study was to determine the value of dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) and magnetic resonance spectroscopy(MRS) in differentiating postoperative changes in intracranial gliomas.

Methods:

A retrospective analysis of fifty-five patients with high-grade glioma who underwent surgery and combined postoperative radiotherapy and chemotherapy treatments with new enhancement lesions or enlarged areas of enhancement was performed from February 2015 to June 2021, according to the pathological results of the second operation or a follow-up of more than 6 months, they were divided into recurrence group and pseudoprogression group. DCE-MRI and MRS scans were performed at the time of reexamination, and the relevant parameters of DCE-MRI and MRS were analyzed, the sensitivity, specificity, accuracy, positive predictive value and negative predictive value of DCE-MRI or MRS diagnosis alone and combined diagnosis were compared, and the application value of the two methods in differentiating recurrence from pseudoprogression of high-grade glioma was evaluated.

Results:

(1)Among the 55 patients, 30 were confirmed to be pseudoprogression and 25 were confirmed to be tumor recurrence;

(2)The Ktrans and iAUC values of the enhanced central area of the recurrence group were higher than those of the pseudoprogression group, and the differences between the groups were statistically significant ($P<0.05$); the ratios of Cho/NAA and Cho/Cr in the recurrent group were higher than those of the pseudoprogression group, and the difference between the groups was statistically significant ($P<0.05$).

(3)The results of the three tests were comparable to the those of pathological examination or follow-up, and the difference was not statistically significant ($P>0.05$). The sensitivity of DCE-MRI, MRS and combined diagnosis was 88.23%, 84.12%, and 90.25%, respectively, the specificity was 88.20%, 84.26%, and 96.18%, respectively, the accuracy was 89.12%, 81.99%, and 92.01%, respectively, the positive predictive value was 85.23%, 86.23%, and 96.28%, respectively, and the negative predictive value was 88.20%, 81.25%, and 89.52%, respectively.

In this study, DCE-MRI and MRS can accurately identify and predict the recurrence and pseudoprogression of glioma. It is helpful to comprehensively guide the early diagnosis, mid-term treatment and prognosis evaluation of glioma, and it is helpful to make a correct and detailed treatment plan and accurately evaluate the therapeutic effect, which has important clinical application value.

Conclusion:

In this study, DCE-MRI and MRS can accurately identify and predict the recurrence and pseudoprogression of glioma. It is helpful to comprehensively guide the early diagnosis, mid-term treatment and prognosis evaluation of glioma, and it is helpful to make a correct and detailed treatment plan and accurately evaluate the therapeutic effect, which has important clinical application value.

PO-2665

Structural and spontaneous functional brain changes in visual and oculomotor areas identified by functional localization task in intermittent exotropia children

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Intermittent exotropia (IXT) is characterized by an intermittent outward deviation of the eyes. Yet, the neural substrates associated with IXT are not fully understood. This study investigated brain structure and spontaneous functional activity changes in children with IXT. All participants underwent detailed ophthalmological examinations and multimodal magnetic resonance imaging (MRI) scanning. During functional scanning, binocular visual stimuli were presented to subjects to determine brain areas involved in visual and oculomotor processing. Regions of interest (ROI) were subsequently selected based on functional activation to investigate brain structural and spontaneous functional differences between IXT children and healthy controls (HCs) using small volume correction (SVC). Reduced gray matter density (GMD) was found in the right frontal eye field (FEF) and bilateral inferior parietal lobe (IPL) in IXT children compared with HCs. Besides, reduced fractional amplitude of low-frequency fluctuations (fALFF) values were observed in the left lingual gyrus, right inferior occipital gyrus (IOG), bilateral IPL, and bilateral cerebellum in the IXT children compared to the HCs. IXT children with worse eye position control ability exhibited lower GMD and fALFF values in these areas. Finally, resting state functional connectivity (RSFC) was reduced in frontoparietal oculomotor processing areas in IXT children compared to HCs. In addition, increased cortical thickness was found in the right visual areas and bilateral IPL. These results showed that IXT-related structural and functional brain abnormalities occurred in childhood and may be related to underlying neuropathological mechanisms.

PO-2666

Unraveling the Intricacies of Left Ventricular Hemodynamic Forces: Age and Gender-Specific Normative Values Assessed by Cardiac MRI in Healthy Adults

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Aims: Hemodynamic forces(HDFs) provided a feasible method to early detect cardiac mechanical abnormalities by estimating the intraventricular pressure gradients. The novel advances in assessment of HDFs using routine cardiac magnetic resonance(CMR) cines shed new light on detection of preclinical dysfunction. However, definition of normal values for this new technique is the prerequisite for application in the clinic.

Methods: A total of 218 healthy volunteers($38.1\text{years}\pm 11.1$; 111 male [50.9%]) were recruited and underwent CMR examinations with a 3.0 T scanner. Balanced steady state free precession breath hold cine images were acquired and HDF assessments were performed based on strain analysis.

Results: The normal values of longitudinal, transversal HDF strength(RMS) and ratio of transversal to longitudinal HDF were all evaluated in overall population as well as in both genders and in age-specific groups. The longitudinal RMS values(%) of HDFs were significantly higher in women ($P<0.05$). Moreover, the HDF amplitudes significantly decreased with ageing in entire heartbeat, systole, diastole, and diastolic deceleration, while increased in atrial thrust. In multivariable linear regression analysis, age, heart rate and global longitudinal strain emerged as independent predictors of the amplitudes of longitudinal HDFs in entire heartbeat and systole, while left ventricular end-diastole volume index was also independently associated with longitudinal HDFs in diastole and diastolic deceleration($P<0.05$ for all).

Conclusion: Our study provided comprehensive normal values of HDF assessments using CMR as well as presented with specific age and sex stratification. HDFs analyses can be performed with excellent intra and inter-observer reproducibility.

PO-2667

Gut microbiota-brain- inflammation relationships in unmedicated bipolar disorder II: A prospective study

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[Objective] The dysregulation of gut microbiota and immune are increasingly reported in bipolar disorder (BD), but the relationships of the gut microbiota-brain-immune remains unknown. **[Methods]** 65 Patients with unmedicated BD II depression and 58 healthy controls (HCs) were prospectively enrolled. Fecal samples, blood samples and resting-state functional magnetic resonance imaging (rs-fMRI) were acquired from all subjects. 16S amplicon sequencing was used to assess gut diversity and enterotypes. Serum was assayed for levels of inflammatory cytokines (interleukin [IL]-6, IL-8, IL-10). The amplitude of low-frequency fluctuation (ALFF) was measured, and abnormal ALFF masks were subsequently set as regions of interest (ROIs) to calculate the whole-brain functional connectivity (FC) and dynamic functional connectivity (dFC). Then, the partial correlation coefficients among the abnormal neuroimaging measures, gut microbiota and inflammatory cytokines levels were performed. Additionally, the support vector machine (SVM) classifiers were carried out to distinguish patients with BD II from HCs. **[Results]** Patients with BD II exhibited decreased ALFF values in the left cerebellum Crus II, as well as decreased FC between the left cerebellum Crus II and the right inferior parietal lobule (IPL), and decreased dFC between the left cerebellum Crus II and right cerebellum and right superior frontal gyrus compared to HCs.

Moreover, higher IL-6, IL-8, IL-10 levels, and 14 species increased and 5 species decreased were identified in patients compared to HCs. Correlation analysis showed that genus Parabacteroides was positively correlated with IL-10 level, as well as negatively correlated with ALFF values in the left cerebellum Crus II in patients with BD II. IL-8 level was negatively correlated with FC of the left cerebellum Crus II to the right IPL in patients with BD II. In terms of the classification of BD from HCs, it reached optimized area under curve (AUC) at 0.852 when combining abnormal gut microbiota, inflammatory cytokines and neuroimaging measures. [Conclusion] Our findings may enable a better understanding of the gut microbiota-brain- inflammation relationships in BD II.

PO-2668

The predictive value of myocardial microcirculation for left ventricular reverse remodeling in dilated cardiomyopathy patients

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Aims: We aim to assess the degree of coronary microvascular dysfunction (CMD) in dilated cardiomyopathy (DCM) patients based on cardiac magnetic resonance (CMR) first-pass perfusion parameters and to investigate the relationship between myocardial perfusion and left ventricle reverse remodeling (LVRR).

Methods: This retrospective study included eligible 94 DCM patients and 35 age- and sex-matched healthy controls. Myocardial perfusion parameters, including upslope, time to maximum signal intensity ($Time_{max}$), maximum and baseline signal intensity (SI_{max} , $SI_{baseline}$, $SI_{max-baseline}$) were recorded. The left ventricular (LV) structure and function parameters were also assessed. These parameters were compared among healthy controls, DCM with LVRR and without LVRR. The correlation between myocardial perfusion parameters and LV structure, function was explored. Univariable and multivariable logistic regression analyses were performed to identify the predictors of LVRR.

Results: At a median follow-up time of 12 [interquartile range (IQR), 8-13] months, 41 DCM patients (44%) achieved LVRR. Compared with healthy controls, DCM patients represented CMD with reduced upslope, $SI_{baseline}$ and increased $Time_{max}$ (all $P < 0.01$). $Time_{max}$ was further increased in LVRR than non-LVRR group (60.35 [IQR, 51.46-74.71] vs. 72.41 [IQR, 59.68-97.70], $p=0.017$). Myocardial perfusion parameters were correlated with left ventricular ejection fraction ($Time_{max}$: $r=-0.19$, $p=0.047$) and LV cardiac mass index (upslope: $r=-0.15$, $p=0.021$; SI_{max} : $r=-0.07$, $p=0.047$; $SI_{max-baseline}$: $r=-0.09$, $p=0.047$) in DCM patients. In the multivariate logistic regression analyses, $Time_{max}$ [odds ratio (OR) 0.98; 95% confidence interval (CI) 0.95-1.00; $p=0.032$], heart rate (OR 1.04; 95% CI 1.01-1.08; $p=0.029$), LV remodeling index (OR 1.73; 95% CI 1.06-3.00; $p=0.038$) and LGE extent (OR 0.85; 95% CI 0.73-0.96; $p=0.021$) were independent predictors of LVRR.

Conclusions: CMD could be found in DCM patients and was more impaired in patients without LVRR than with LVRR. $Time_{max}$ at baseline was an independent determinant of LVRR in DCM.

PO-2669

Common and distinctions between the type 2 diabetes mellitus and Alzheimer's disease: A systematic review and multimodal neuroimaging meta-analysis

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Background: Alzheimer's disease (AD) and type 2 diabetes mellitus (T2DM) are aging related diseases with high incidence. Because of the correlation of incidence rate and some possible mechanisms of comorbidity, the two diseases have been studied in combination by many researchers, and even some scholars call AD type 3 diabetes. But the relationship between the two is still controversial.

Methods: This study used AES-SDM software to conduct a meta-analysis of the whole brain resting state functional magnetic resonance imaging (rs-fMRI) study, exploring the differences in amplitude low-frequency fluctuation (ALFF) and cerebral blood flow (CBF) between patients (including AD or T2DM) and healthy controls, and looking for neuroimaging evidence of the relationship between the two diseases.

Results: The results of the T2DM group showed an increase in ALFF in the cerebellum and left inferior temporal gyrus, while a decrease in the left middle occipital gyrus, right inferior occipital gyrus, and left precentral gyrus. CBF increased in the right supplementary motor area and decreased in the middle occipital gyrus and inferior parietal gyri. The results of the AD group showed that ALFF increased in the right cerebellum, right hippocampus, and right striatum, while decreased in the precuneus gyrus and right superior temporal gyrus. CBF decreased in the precuneus gyrus and inferior parietal gyri. A multimodal analysis of a disease showed a decrease in ALFF and CBF in the occipital of T2DM and in the parietal lobes of AD. The joint analysis between diseases showed that both T2DM and AD had a common decrease in CBF in the right occipital gyrus.

Conclusion: Based on the neuroimaging evidence, we believed that the two diseases were completely different and had their own characteristics of brain damage. There was a small overlap in the changes of CBF between the two groups, which may be related to the similarity in clinical characteristics of the two groups.

PO-2670

Differentiation Value of Left Atrial Dysfunction in Reperfused Chronic Myocardial Infarction

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Abstract: Evaluation of left atrial dysfunction is of great value to assess reperfused chronic myocardial infarction. LA volumetric and strain parameters can be of great help to estimate left atrial function. However, limited data are accessed on its prognostic value in reperfused chronic myocardial infarction.

Purpose: In order to evaluate the relationship between LA volumetric and strain parameters in patients with chronic myocardial infarction.

Materials and methods: In this retrospective study, recruited people (included from April in 2017 to the June in 2021) experience cardiovascular MRI. The relationship between LA volumetric and strain parameters and chronic myocardial infarction was evaluated by linear regression.

Results: 83 patients with chronic myocardial infarction(mean age \pm standard deviation, 58.16 years \pm 9.58; 69men) were included. LATEF was weakly correlated with LAVmin(Pearson correlation coefficient $r=-0.674$, $P < 0.001$), Booster longitudinal strain($r=0.577$, $P < 0.001$), GLSRa($r=-0.567$, $P<0.001$), Total longitudinal strain($r=0.574$, $P<0.001$). Better passive radial strain is correlated to a lower rate of chronic myocardial infarction(hazard ratio, 0.789[0.699,0.892]; $P<0.001$) after adjusting for multiple clinical and CMR-based variables.

Conclusion: Left atrial volumetric parameters, strain and strain rate can be of great value in reperfused chronic myocardial infarction.

PO-2671

Effect of infarct location and size on Left Atrial Function: a cardiovascular magnetic resonance feature tracking study

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Background: LA function has been recognized as a significant prognostic marker in many cardiovascular diseases. Cardiovascular magnetic resonance feature tracking (CMR-FT) represents a promising technique for left atrial function evaluation.

Purpose: To investigate the effect of location and size of previous myocardial infarction (MI) on LA function using CMR-FT.

Study type: Retrospective.

Population: Patients formerly diagnosed with anterior MI (n=42) or non-anterior MI (n=40) and healthy controls (n=47).

Field Strength/Sequence: A 3.0T MR, Steady state free precession (SSFP), Phase-sensitive inversion recovery (PSIR).

Assessment: Infarct location and size were assigned and quantified by late-gadolinium enhancement (LGE) imaging. LA performance was analyzed using CMR-FT in 2- and 4-chamber cine images, including LA reservoir, conduit and booster pump function.

Statistics: Descriptive statistics, ANOVA with post Bonferroni correction, Kruskal-Wallis H, Spearman's correlation, intraclass correlation coefficient.

Results: Anterior MI patients had impaired LA reservoir function (LATEF, ϵ_s , SRs), conduit function (LAPEF, ϵ_e , SRs) and booster pump function (LAAEF, ϵ_a) compared with controls ($p < 0.05$). Non-anterior MI patients had impaired LA strain (ϵ_s , ϵ_e , ϵ_a ; $p < 0.05$) but preserved LAEFs ($p > 0.05$). After adjusting the area of MI, there was no significant difference in the LA morphology and function between the anterior and non-anterior wall groups. Stratification analysis by MI size revealed that LA volumes and LAEFs were unchanged in patients with MI size $\leq 15\%$ compared with controls ($p > 0.05$), only ϵ_s and ϵ_e were decreased ($p < 0.05$). Increased LAVIpre-a, LAVImin and decreased LATEF, LAAEF were found in patients with MI size $> 15\%$ compared with MI size $\leq 15\%$ group ($p < 0.05$). LVSVI, ϵ_s , and MI size were significant correlated with LAVI pre-a in multiple stepwise regression analysis.

Data conclusions: The location of myocardial infarction is not a major factor affecting the morphology and function of the left atrium. Patients with MI size $> 15\%$ experience more pronounced post-infarction LA remodeling and dysfunction than MI size $\leq 15\%$ patients.

Keywords Myocardial infarction, Cardiac magnetic resonance, Feature tracking, Left atrial dysfunction

PO-2672

Effect of infarct location and size on Left Atrial Function: a cardiovascular magnetic resonance feature tracking study

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Background: LA function has been recognized as a significant prognostic marker in many cardiovascular diseases. Cardiovascular magnetic resonance feature tracking (CMR-FT) represents a promising technique for left atrial function evaluation.

Purpose: To investigate the effect of location and size of previous myocardial infarction (MI) on LA function using CMR-FT.

Study type: Retrospective.

Population: Patients formerly diagnosed with anterior MI (n=42) or non-anterior MI (n=40) and healthy controls (n=47).

Field Strength/Sequence: A 3.0T MR, Steady state free precession (SSFP), Phase-sensitive inversion recovery (PSIR).

Assessment: Infarct location and size were assigned and quantified by late-gadolinium enhancement (LGE) imaging. LA performance was analyzed using CMR-FT in 2- and 4-chamber cine images, including LA reservoir, conduit and booster pump function.

Statistics: Descriptive statistics, ANOVA with post Bonferroni correction, Kruskal-Wallis H, Spearman's correlation, intraclass correlation coefficient.

Results: Anterior MI patients had impaired LA reservoir function (LATEF, ϵ_s , SRs), conduit function (LAPEF, ϵ_e , SRs) and booster pump function (LAAEF, ϵ_a) compared with controls ($p < 0.05$). Non-anterior MI patients had impaired LA strain (ϵ_s , ϵ_e , ϵ_a ; $p < 0.05$) but preserved LAEFs ($p > 0.05$). After adjusting the area of MI, there was no significant difference in the LA morphology and function between the anterior and non-anterior wall groups. Stratification analysis by MI size revealed that LA volumes and LAEFs were unchanged in patients with MI size $\leq 15\%$ compared with controls ($p > 0.05$), only ϵ_s and ϵ_e were decreased ($p < 0.05$). Increased LAVI_{pre-a}, LAVI_{min} and decreased LATEF, LAAEF were found in patients with MI size $> 15\%$ compared with MI size $\leq 15\%$ group ($p < 0.05$). LVS_{VI}, ϵ_s , and MI size were significant correlated with LAVI_{pre-a} in multiple stepwise regression analysis.

Data conclusions: The location of myocardial infarction is not a major factor affecting the morphology and function of the left atrium. Patients with MI size $> 15\%$ experience more pronounced post-infarction LA remodeling and dysfunction than MI size $\leq 15\%$ patients.

PO-2673

Study on the effect of acupuncture on brain function connection in patients with primary dysmenorrhea based on edge connection analysis

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Objective: To explore the changes of the brain at rest functional connectivity in patients with primary dysmenorrhea (PDM) after acupuncture treatment. **Methods:** 34 patients with PDM were enrolled in the study and treated with acupuncture for a menstrual cycle. The points of Sanyinjiao, Ganyuan group were selected for compatibility. PDM patients received the first functional magnetic

resonance imaging (rs-fMRI) scan within 1-2 days of the first menstrual period after enrollment, and then received acupuncture treatment 7 days before the next menstruation, once a day, 30 minutes each time. When menstruation came, acupuncture stopped and the second rs-fMRI scan was performed within 1-2 days of this menstrual period. Evaluate the efficacy of acupuncture using visual analog scale (VAS), dysmenorrhea symptom scale (CMSS), self rating anxiety scale (SAS), and self rating depression scale (SDS). The edge analysis method was used to describe the changes in functional connectivity (FC) of various brain regions in PDM patients after acupuncture, and correlation analysis was conducted with clinical scores. Results: The scores of VAS, CMSS, SAS and SDS after acupuncture in PDM group and CMSS, SAS and SDS after acupuncture in HC group were lower than those before acupuncture ($P<0.05$). Compared with that before acupuncture, FC between the right middle cerebral island and the right middle frontal gyrus, and between the left central sulcus cover and the right superior temporal gyrus in the PDM group during the menstrual period was enhanced; FC between right precentral gyrus and bilateral thalamus, right lenticular nucleus, right posterior central gyrus and left middle frontal gyrus, right supplementary motor area, right anterior cingulate gyrus and left anterior cingulate gyrus, right posterior cingulate gyrus, left precentral gyrus and left thalamus, right posterior cingulate gyrus and left middle temporal gyrus, left posterior central gyrus and left thalamus decreased. The FC in the left precentral gyrus and left thalamus was positively correlated with SDS ($r=0.516$, $P=0.002$). Conclusion: The neural pathways that acupuncture takes effect mainly include the thalamus - sensorimotor cortex circuit, and the cingulate cortex circuit of DMN and SN. The two main lines jointly shoulder the tasks of analgesia, emotional relief, and painful attention transfer. The use of edge analysis algorithm revealed predictive neural biomarkers for the efficacy of acupuncture in alleviating PDM pain syndrome, contributing to updating and supplementing the large-scale synthetic functional neuroimaging database, and providing data supplementation for identifying brain pain activity related images.

PO-2674

A study of functional brain networks in patients with primary dysmenorrhea based on graph theory

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Objective: To investigate the changes and application values of functional brain network topological properties in patients with primary dysmenorrhea (PDM). Methods: A sample of 57 PDM patients and 50 health controls (HC) was included. After the resting-state functional magnetic resonance imaging (rs-fMRI) data of all subjects were collected, using the Graph Theoretical Network Analysis (GRETNA) to do data preprocessing and construct the functional network, and then graph theory was utilized to calculate the network topological properties. Then, differences between the two groups were compared based on independent-samples t-test. Results: There were no significant differences in age, height, weight, menstrual cycle, menstrual duration and menstrual volume between the two groups ($P>0.05$). The course of disease, menstrual VAS, CMSS, SAS and SDS of PDM group were higher than those of HC group ($P<0.05$). Both groups conform to small-world attributes within the sparsity range, The global efficiency (E_g), mean clustering coefficient (C_p) and mean path length (L_p) of brain network had no significant differences ($P>0.05$). In the PDM group, node efficiency (N_e), node degree (D_c), node betweenness (B_c) in the left medial frontal gyrus, bilateral posterior cingulate gyrus, left insula, B_c in the left precentral gyrus, left anterior cingulate gyrus, D_c in the right precentral gyrus was significantly higher than HC group. The N_e , B_c , D_c of the left inferior temporal gyrus, the N_e , D_c of the right inferior frontal gyrus of the insular cortex, the D_c of the right orbital inferior frontal gyrus and the N_e of the right cuneus were significantly lower than HC group ($P<0.05$). The functional connectivity (FC) between the left posterior cingulate gyrus and the right cortex around calcarine fissure, the right lingual gyrus, the left middle frontal gyrus, the right posterior cingulate gyrus and the right dorsolateral superior frontal gyrus, the left middle frontal gyrus, the right insula and the left middle occipital gyrus in the PDM

group was higher than that in the HC group ($P<0.001$). Conclusion: There were no significant abnormalities in the global attributes of the brain functional network in PDM patients, and there was a significant positive activation of functional connections in some brain regions during the menstrual period, involving salience networks, default state networks, sensory motor networks, and central executive networks. During the menstrual period, some brain node attributes in PDM patients are abnormal, and the functional connections represented by the cingulate gyrus are positively activated, which may become potential biomarkers of PDM.

PO-2675

MRI-enhanced subtraction pattern in patient prognosis assessment in recurrent glioblastoma

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Objective: Defining tumor boundaries is difficult due to the infiltrative and uneven enhancement of gliomas, which is particularly common in post-recurrence antiangiogenic therapy. The post-treatment image T1 is significantly shortened, and the enhancement mode is associated with the high heterogeneity of the vascular structure of GBM. To investigate the effects of enhancing tumor volume (V), total volume (Vn) and relative non-enhancing tumor ratio (rNTR) before second-line treatment on overall survival (OS) and post-recurrence survival (PRS) in rGBM. Methods: A retrospective analysis was performed for 93 patients with recurrent GBM in the Daping hospital from July 2012 to December 2022. Quantitative measurements of V, Vn (including tumor enhancement, necrotic and cystic volume) and rNTR (FLAIR high signal volume/enhancing tumor volume) were performed in subtraction mode at T1WI. The Kaplan-Meier method and log-rank test was performed. The Cox model was used for univariate and multivariate prognostic analysis. Three multivariate Cox regression analysis models were constructed for the three main exposure factors V, Vn and rNTR, respectively. The difference in $P<0.05$ was statistically significant. Results: The median PRS was 239 days (95%CI=217.6~260.4) and the median OS was 443 days (95%CI=379.6~506.4). Kaplan-Meier curve and log-rank test showed PRS and OS differences between high and low levels groups of V and NTR ($P<0.05$). In univariate analysis, V, Vn and NTR are all significant factors of PRS and OS ($P<0.05$). V and Vn are independent PRS risk factors (HR=1.015, 1.014, $P=0.001$, $P<0.001$), and Vn was independent OS risk factor for (HR=1.007, $P=0.038$). Conclusion: Voxel subtraction technique can accurately assess the size of recurrent tumors in GBM patients, and provide a reliable reference for clinical evaluation of the extent of lesions and survival time of patients.

PO-2676

A comprehensive study of intracranial atherosclerotic plaque by 3.0T magnetic resonance high-resolution vascular wall technology

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Objective To analyze the distribution characteristics of intracranial plaque number and risk factors for plaque predisposing to occur in patients with ischemic cerebrovascular disease based on magnetic resonance high-resolution vascular wall technology.

Methods A total of 62 patients with ischemic cerebrovascular disease who underwent magnetic resonance high-resolution intracranial vascular wall examination were collected, and the distribution characteristics of intracranial artery plaque number were analyzed by single factor and nonparametric rank and multiple post-event examinations. The patients were divided into plaque group and no plaque group, and univariate and multivariate logistic regression were used to analyze the risk factors for plaque predisposition.

Results There were significant differences between the number of plaques in the intracranial segment of bilateral ICA and the rest of the arteries ($P < 0.05$), and hyperlipidemia, smoking and ABCD scores were risk factors for plaque ($OR = 7.322$, 95% CI 1.036-51.990, $P = 0.046$; $OR = 9.151$, 95% CI 1.152 -72.769, $P < 0.036$, $OR = 3.354$, 95% CI 1.256-8.897, $P = 0.016$).

Conclusion Patients with anterior circulation plaque are more common and bilateral ICA intracranial segment is most prone to plaque, and high blood lipidemia, smoking and high ABCD score are risk factors for plaque. Therefore, early control of risk factors and timely detection of plaques in clinical work can prevent the occurrence of ischemic cerebrovascular disease.

PO-2677

Exploring Gray Matter Changes in Tinnitus with and without Hearing Loss: Source-based morphometry (SBM) and Voxel-based morphometry (VBM) study

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Objective: Advanced MRI studies have improved our understanding of brain alterations in tinnitus patients. Yet, limited research has distinguished these changes based on hearing loss, resulting in inconsistent findings. In this study, we used both univariate and multivariate approaches to examine gray matter morphological changes in tinnitus patients with and without hearing loss.

Methods: We conducted structural MRI scans paired with standard audiometry assessments on three distinct groups: 15 tinnitus patients with hearing loss (T+HL), 19 tinnitus patients without hearing loss (T-HL), and 20 healthy controls (HC). Using voxel-based morphometry (VBM), we performed voxel-wise comparisons of whole-brain gray matter volume (GMV) among these three groups through a one-way analysis of variance (ANOVA). We also employed source-based morphometry (SBM) to discern patterns of structural covariation in GMV, and compare the Z-transformed loading coefficients (Z-scores) across the three groups. Additionally, we correlated these with clinical characteristics in tinnitus patients.

Results: The VBM analysis showed reduced GMV in the left precuneus and right cerebellum in T-HL vs. HC. Conversely, the T+HL group exhibited significant GMV decreases in the left precuneus,

right cerebellum, left anterior cingulate cortex, and left supplementary motor area vs. HC. Remarkably, the T-HL group exhibited an increase in GMV in the aforementioned regions, with the exception of the right cerebellum vs. T+HL. SBM analysis revealed significant Z-score differences in component 6 when T+HL vs. HC, primarily involving the precuneus, lingual gyrus, and thalamus. These differences correlated with both tinnitus severity and duration.

Conclusions: These findings not only shed new insights into the unique structural networks that underlie the neural mechanisms in tinnitus patients, both with and without hearing loss, but they also offer potential guidance for future therapeutic strategies.

PO-2678

Shared and Unique Alterations of Large-Scale Network Connectivity in drug-naïve Adolescent-onset and Adult-onset Major Depressive Disorder

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[Objective] Compared with adult-onset MDD, adolescent-onset MDD is associated with an increased likelihood of recurrent depressive episodes, increased symptom severity, more insidious symptoms and higher risk of mania. Current MDD brain network studies only focus on one age level. We aim to explore the Shared and Unique Alterations of Large-Scale network connectivity between the two different age level of MDD, and explain why MDD symptoms differ between two different age levels from the perspective of neural mechanisms.

[Methods] In this study, 46 adolescents with MDD, 35 adults with MDD, 19 healthy adolescents and 56 healthy adults completed resting-state functional magnetic resonance imaging (R-fMRI) scans. We used surface-based methods to preprocess R-fMRI data. Large-scale network analyses were applied based on the Schaefer's template. We calculated the intra-network and between-network functional connectivity (FC) of visual network (VN), sensorimotor network (SMN), dorsal attention network (DAN), ventral attention network (VAN), limbic network (LN), frontoparietal network (FPN) and default mode network (DMN). Then we used 2x2 ANOVA to analyze the main effects of diagnosis, age and their interaction effect on brain FC. In addition, we examined correlations between network abnormalities and HAM-D sub-scores.

[Results] Results found that both the adult and adolescent groups have diagnosis main effect on FC of VN, LN, VN-DAN and VN-LN, uncorrelated with age stratification. Post hoc analysis showed that the shared increased network connectivity was found in MDD group. There was an interaction effect of diagnosis and age on intra-network connectivity of DAN and LN. Post hoc analysis showed that intra-network connectivity of DAN and LN in adolescent patients with MDD was significantly lower than that in the adolescent HCs ($p=0.032$), whereas DAN connectivity in adult patients with MDD was significantly higher than that in the adult HCs ($p=0.008$). Regression analysis showed that these abnormal FCs were associated with HAM-D factor 1 anxiety somatization, and the association was more significant in the adults with MDD.

[Conclusion] Our findings indicated that both adolescents and adults with MDD have shared and unique Large-Scale network alterations. And we found the correlation between factor 1 anxiety somatization and abnormal FC was more significant in the adults with MDD. The results may explain why symptoms are more insidious in adolescents with MDD. The results also suggest that when we explore biomarker of MDD, we should include age as a consideration.

PO-2679

Intravoxel Incoherent Motion Diffusion-weighted imaging for evaluating the pancreatic perfusion in cirrhotic patients

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Purpose: To assess the characteristics of pancreatic perfusion in normal pancreas vs. cirrhotic patients using intravoxel incoherent motion (IVIM) diffusion-weighted imaging (DWI).

Methods: A total of 67 cirrhotic patients and 33 healthy subjects underwent IVIM on a 3.0 T MRI scanner. Diffusion coefficient (ADC_{slow}), pseudo-diffusion coefficient (ADC_{fast}), and perfusion fraction (f) were calculated based on the bi-exponential model. The pancreatic IVIM-derived parameters were then compared. In the cirrhotic group, the relationship was analyzed between IVIM-derived pancreatic parameters and different classes of hepatic function as determined by the Child-Pugh classification. Also, the pancreatic IVIM-derived parameters were compared among different classes of cirrhosis as determined by the Child-Pugh classification.

Results: The f value of the pancreas in cirrhotic patients was significantly lower than that in normal subjects ($p = 0.01$). In the cirrhotic group, the f value of the pancreas decreased with the increase of the Child-Pugh classification ($R = -0.49$, $p = 0.00$). The f value of the pancreas was significantly higher in Child-Pugh class A patients than in class B and C patients ($p = 0.02$, 0.00 , respectively), whereas there was no significant difference between class B and C patients ($p = 0.16$).

Conclusion: The IVIM-derived perfusion-related parameter (f value) could be helpful for the evaluation of pancreatic perfusion in liver cirrhosis. Our data also suggest that the blood perfusion decrease in the pancreas is present in liver cirrhosis, and the pancreatic perfusion tends to decrease with the increasing severity of hepatic function.

PO-2680

Ultrasensitive Magnetic Resonance Angiography based on Interlocking Stratagem for Diagnosis of Vascular Diseases

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Medical imaging including computed tomography (CT), positron emission tomography (PET), single photon emission computed tomography (SPECT), and magnetic resonance imaging (MRI) has great superiority of non-invasiveness, timeliness, and visibility than the biological detection for diagnosis of major diseases. Among the aforementioned imaging methods, MRI has been regarded as an excellently safe, non-limited by tissue depth, and high-spatial-resolution imaging technique for the clinical evaluation of vascular diseases popularly. However, MRI has a tough challenge of insufficient sensitivity, which makes it difficult to display the fine physiological structure of tissues and distinguish the definite boundary between diseased areas.

It is an urgent need to address the sensitivity issue of MRI instantly. The preparation and development of clinical contrast agent has improved the comparison of different tissues with enhanced sensitivity. Gadolinium-based contrast agents are widely used in clinical practice, because gadolinium ion (Gd^{3+}) has excellent paramagnetic properties due to its largest number of unpaired 4f electrons. For example, small molecule complex gadolinium-based contrast agents, such as gadolinium diethylenetriamine pentaacetic acid (Gd-DTPA) are used for angiography in common. However, due to small hydrodynamic sizes (e.g., ~ 0.18 nm for Gd-DTPA), Gd-DTPA exhibits short tumbling time (τ_R), which influences the spin-lattice relaxation of water protons with Gd^{3+} , leading to relatively low longitudinal molar relaxivity (r_1). Meanwhile, the small molecular Gd-chelates can extravasate from blood vessels very soon, resulting in the very short blood circulation

time and fast metabolism with low efficiency in imaging vascular diseases. Additionally, the small molecular Gd-chelate contrast agents can rapidly cross the capillary wall and then distribute themselves in the extracellular space of the tissues, which increases the overall signal of the organs but reduces the signal-to-background ratio of angiography. Thus, the MR angiography (MRA) with high resolution, especially for the tiny blood vessels, is still confronted with great challenge.

In this study, based on the interlocking stratagem, a zwitterionic polymeric contrast agent of hypersensitive MRA with high resolution has been developed. To restrict the tumbling of magnetic ions in bloodstream, polymer carriers of magnetic ions were synthesized by coupling the diethylenetriaminepentaacetic acid (DTPA) molecules to poly (acrylic acid) (PAA) through a linker of diethylenetriamine. The zwitterionic paramagnetic metal-chelating polymer was subsequently obtained by chelating Gd^{3+} through DTPA groups, which is noted as PAA-Gd. The movement of single Gd-DTPA section is restricted, which dramatically slows down the tumbling rate of Gd^{3+} . As a result, the r_1 of PAA-Gd is $13.9 \text{ mM}^{-1} \cdot \text{s}^{-1}$ evaluated by a clinic 1.5 T MRI scanner, while is 4.6-fold higher than that of individual Gd-DTPA ($3.0 \text{ mM}^{-1} \cdot \text{s}^{-1}$), with a more enhanced effect on T_1 -weighted MRI. In addition, the elimination half-life is calculated to be 73.8 min for the PAA-Gd, which is more than 6 times longer than that of Gd-DTPA contrast agents (11.4 min). To better evaluate the angiographic performance of PAA-Gd, a series of animal models have been built for imaging studies on a 7.0 T MRI scanner with different sequences. The results indicate that the PAA-Gd exhibit excellent imaging potential for precise diagnosis of vascular diseases

PO-2681

Functional-structural decoupling in visual network is associated with cognitive decline in patients with type 2 diabetes mellitus: Evidence from a multimodal MRI analysis.

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Introduction: Functional-structural coupling (F-S C) and visual network (VN) associated alterations are suggested to be potential mechanisms in cognitive impairment. However, the relationship of F-S C evidence derived from functional magnetic resonance imaging with type 2 diabetes mellitus (T2DM). This study was conducted in order to investigate the functional-structural coupling alterations in VN in T2DM and its potential clinical relevance.

Methods: Our Institutional Review Board approved the protocol and written informed consent was obtained from each subject. This study included 30 confirmed T2DM patients and 29 matched healthy controls. All participants underwent brain magnetic resonance examination on a 3.0T scanner (Discovery MR750, GE Healthcare) with 8-channel head coil, and cognitive function assessments. Volumetric T_1 -weighted (three-dimensional brain volume imaging, 3D-BRAVO) (echo time (TE)/ repetition time (TR) = 3.2/8.2 ms, inversion time (TI) = 450 ms, flip angle (FA) = 12° , acquisition matrix = 256×256 , slice thickness = 1 mm, slice number = 188) images were collected for anatomic structure. Blood oxygen level-dependent (BOLD) contrast with the following settings: (TE)/repetition time (TR) = 30/2000 ms, flip angle (FA) = 90° , acquisition matrix = 64×64 , field of view = 220 mm \times 220 mm, thickness = 3 mm, scanning gap = 1 mm, slices number = 36 and scan time = 6 min. Resting-state fMRI(rs-fMRI) included gradient-echo planar sequence sensitive to BOLD contrast (TR = 2,000 ms, TE = 30 ms, FA = 90°) and rs-fMRI was preprocessed in Data Processing Assistant for Resting-State fMRI (DPABI, <http://www.restfmri.net/forum/DPARSF>)[2] and the SPM12 software package in MATLAB R2013b platform. Visual component (VC) were estimated by independent component analysis (ICA). Degree centrality (DC), amplitude of low frequency fluctuation (ALFF) and fractional anisotropy (FA) were constructed to reflect functional and structural characteristics in these VCs respectively.

Functional-structural coupling coefficients were further evaluated using combined FA and DC or ALFF. Partial correlations were performed between neuroimaging indicators and neuropsychological scores and clinical variables. Results were corrected for multiple comparisons using voxel-based FDR ($P < 0.001$) which was implemented in SPM on the MATLAB R2013b platform.

Results: The study included 30 T2DM patients (22 males and 8 females; mean age of 52.60 ± 8.51 years) and 29 HCs (18 males and 11 females; mean age of 49.69 ± 5.19 years). These participants had no significant difference in age or gender ($P > 0.05$). All individuals received an assessment of cognitive function. Two groups had no significant difference in Montreal Cognitive Assessment (MoCA) score (T2DM, 27.04 ± 2.21 ; HCs, 26.29 ± 2.66). Three Visual components (VCs) were selected using group ICA. T2DM group showed significantly lower DC and ALFF values in the VC1 (PDC = 0.003, PALFF = 0.038) compare with HC group. No significant changes were found in VC2 and VC3. For functional-structural coupling coefficients, T2DM group exhibited lower DC-FA coefficients ($r_{DM} = 0.34 \pm 0.27$, $r_{HC} = 0.49 \pm 0.17$, PFDR = 0.014) in VC1, while DC-ALFF coefficient had no significant difference between two groups. The DC in VC1 was positively correlated with Trial 4 and Total trial 1-5 in CVLT. The positive correlation between DC-FA coefficients in VC1 and Total perseverative responses % of WCST was also observed.

Discussion: In this study, compared with HC group, DC, ALFF and DC-FA coefficients in VC1 were significantly lower in T2DM group, while FA had no significant change. The DC in VC1 was positively correlated with Trial 4 and Total trial 1-5 in CVLT. The positive correlation between DC-FA coefficients in VC1 and Total perseverative responses % of WCST was also observed. The results showed that the abnormal neuronal function mainly concentrated in VC1, while there was no significant change in VC2 and VC3. Anatomically, VC1 is located in BA 17, known as the primary visual cortex, and mainly includes the inferior talus gyrus in the occipital cortex. The dysfunction of the primary visual cortex (VC1), the first and simplest visual cortex area, may be a potential image biomarker of cognitive function change and provide a new insight into the mechanism of T2DM in the early stage of cognitive change (pre MCI stage). No significant structural changes were found in T2DM patients in the pre-MCI stage, but neuronal abnormalities and functional-structural decoupling had occurred in this stage, which may suggest that cerebral structure and function are closely related. This study explored this relationship and found that the higher the DC-FA coefficients were, the higher the executive function related scores were. Taken together, these findings indicate that DC and DC-FA coefficients in VN may be potential imaging biomarkers for revealing early cognitive deficits of different dimensions in T2DM.

Conclusion: In conclusion, cognitive, neural activity and structural-functional coupling alterations were detectable in T2DM patients. Compared with HC group, DC, ALFF and DC-FA coefficients in VC1 were significantly lower in T2DM group, while FA had no significant change. There were positive correlations between DC, DC-FA coefficients in VC1 and T2DM patients' memory and executive function. These results contribute to a better understanding of the mechanism for the cognitive impairment in T2DM and its neuroimaging biomarkers.

PO-2682

The influence of parallel acquisition technology and different compression perception acceleration factors on head and neck high-definition vascular wall imaging

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Objective: To compare the effects of different acceleration factors (AF) on the quality of high-definition vascular wall images of the head and neck using parallel acquisition (GRAPPA) technology and compressed sensing (CS) technology. Method: 30 healthy volunteers (20 males and 10 females) were recruited. Apply Vida 3.0T MR imager and GRAPPA [AF=2], CS [AF=2-10]

technology to perform 3D imaging of the head and neck high-definition blood vessel wall_ T1_ Space scanning is performed by two radiologists with over 5 years of diagnostic experience in MRI, who select 8 identical locations [left and right middle cerebral arteries, intracranial segments of left and right internal carotid arteries, below the bifurcation of left and right common carotid arteries, and left and right vertebral arteries], delineate ROI on the original image, measure signal intensity (SI) and standard deviation (SD) of the vessel wall, and calculate signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR); Simultaneously subjectively score the imaging quality of different segments of intracranial and cervical vascular walls in the image independently of each other. Consistency analysis was conducted on the measured data and subjective scores using intra group correlation coefficient (ICC) and Kappa test. If the consistency is good, use the Friedman test to compare the SNR, CNR, and subjective scores between different AFs; If the difference is statistically significant, use the LSD method for pairwise comparison. Result: The data measured by the two physicians showed good consistency with the subjective scores [ICC: 0.778~0.959, Kappa: 0.768~0.881]; When AF=2, the SNR of 8 ROIs under CS technology was higher than GRAPPA ($P<0.05$); When the AF of CS is 2, 3, 4, 5, and 6, the subjective score of 8 ROI can reach level 4. When the AF of CS is 7 and 8, the subjective score decreases to level 3 ($P<0.05$). When the AF of CS is 9 and 10, the subjective score decreases to level 2 ($P<0.05$). Conclusion: 3D with CS technology_ T1_ As AF increases, the scanning time of the Space sequence gradually decreases. Compared with GRAPPA's AF=2, CS's AF=6 reduces scanning time by 69.14% while ensuring image quality. Therefore, it is recommended to use CS [AF=6] for high-definition vascular wall scanning of the head and neck. In addition, 13 out of 30 healthy volunteers experienced different nerve stimulation symptoms in CS with AF=8,9,10, including nausea, palpitations, shortness of breath, etc. Therefore, it is not recommended to adjust the AF of CS to above 8.

PO-2683

Assessing varicose veins of the lower extremities :a comparative study of non- contrast enhanced MRV with DSA

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Objective: To prospectively evaluate the performance of a non-contrast enhanced MR venography using spatial labeling with multiple inversion pulses, to depict in varicose veins of the lower extremities comparison to digital subtraction angiography(DSA).

Methods: The examinations of all enrolled patients were in compliance with the requirement of the hospital ethics committee, and all patients signed the informed consent form and agreed to be enrolled and observed. 22 varicose veins of the lower extremities patients who underwent non-contrast MRV scan and DSA for further diagnosis were included. All patients in this group underwent non-contrast enhanced MRV(Space-Flow) and DSA examination of the varicose veins of the lower extremities using a 3.0T MR scanner.

Results: A total of 22 varicose veins of the lower extremities underwent DSA and non-contrast enhanced MRV(Space-Flow) examinations. The two radiologists had a high consistency in the evaluation results of imaging date, Kappa=0.93. For clinically significant varicose (>50% stenosis) was: the accuracy is 95.7%,the negative predictive value is 100%,the positive value is 93.3%, the specificity is 88.9%,and the sensitivity is 100%. Space-Flow had a good correlation with DSA in assessing the degree of varicose veins of the lower extremities(Kappa=0.86).

Conclusions: This preliminary research demonstrated that non-contrast enhanced magnetic resonance angiography sequence(Space-Flow) is a reliable, non-radiation,and non-invasive imaging method in the diagnosis of varicose veins of the lower extremities.Especially for patients with renal insufficiency, Space-Flow can be used an first choice imaging method.

PO-2684

Dysfunction of the triple-network model is associated with cognitive impairment in patients with cerebral small vessel disease

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Purpose: This study aimed to demonstrate the correlations between the altered functional connectivity patterns in the triple-network model and cognitive impairment in patients with cerebral small vessel disease (CSVD).

Methods: Resting-state functional magnetic resonance imaging data were obtained from 22 patients with CSVD and 20 healthy controls. The resting-state data were analyzed using independent component analysis and functional network connectivity (FNC) analysis to explore the functional alterations in the intrinsic triple-network model including the salience network (SN), default mode network (DMN), and central executive network (CEN), and their correlations with the cognitive deficits and clinical observations in the patients with CSVD.

Results: Compared to the healthy controls, the patients with CSVD exhibited increased connectivity patterns in the CEN-DMN and decreased connectivity patterns in the DMN-SN, CEN-SN, intra-SN, and intra-DMN. Significant negative correlations were detected between the intra-DMN connectivity pattern and the Montreal Cognitive Assessment (MoCA) total scores ($r = -0.460$, $p = 0.048$) and MoCA abstraction scores ($r = -0.565$, $p = 0.012$), and a positive correlation was determined between the intra-SN connectivity pattern and the MoCA abstraction scores ($r = 0.491$, $p = 0.033$).

Conclusions: Our study findings suggest that the functional alterations in the triple-network model are associated with the cognitive deficits in patients with CSVD and shed light on the importance of the triple-network model in the pathogenesis of CSVD.

PO-2685

Characterization of parotid gland tumors: whole-tumor histogram analysis of diffusion weighted imaging, diffusion kurtosis imaging, and intravoxel incoherent motion

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Purpose: To investigate the diagnostic performance of histogram features of diffusion parameters in the characterization of parotid gland tumors.

Method: From December 2018 to January 2023, patients who underwent diffusion weighted imaging (DWI), diffusion kurtosis imaging (DKI), and intravoxel incoherent motion (IVIM) were consecutively enrolled in this retrospective study. The histogram features of diffusion parameters including apparent diffusion coefficient (ADC), diffusion coefficient (Dk), diffusion kurtosis (K), pure diffusion coefficient (D), pseudo-diffusion coefficient (DP), and perfusion fraction (FP) were analyzed. The Mann-Whitney U test was used for comparison between benign parotid gland tumors (BPGTs) and malignant parotid gland tumors (MPGTs). Receiver operating characteristic curve and logistic regression analysis were used to identify the differential diagnostic performance. The Spearman Correlation Coefficient was used to analyze the correlation between diffusion parameters and Ki-67 labeling index.

Results: For diffusion MRI, twenty-one histogram features of diffusion parameters showed significant differences between BPGTs and MPGTs (all $P < 0.05$). Compared with DWI model, the IVIM model and combined model had better diagnostic specificity (58%, 94%, and 88%, respectively; both $P < 0.001$) and accuracy (64%, 89%, and 86%, respectively; both $P = 0.006$). The combined model was superior to the single DWI model with improved IDI (IDI improvement 0.25). Significant correlations were found between Ki-67 and ADC_{mean} , DK_{mean} , K_{mean} , and D_{mean} ($r = -0.57$ to 0.53 ; all $P < 0.05$).

Conclusions: Whole-tumor histogram analysis of IVIM and combined diffusion model could further improve the diagnostic performance for differentiating BPGTs from MPGTs.

PO-2686

The additive impact of metabolic syndrome on left ventricular deformation and function in patients with coronary artery disease assessed by 3.0T cardiac magnetic resonance feature tracking

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Background: Metabolic syndrome (MetS) can increase the risk of morbidity and mortality of cardiovascular disease (CVD), especially in patients with coronary artery disease (CAD). The study aimed to explore the impact on left ventricular (LV) deformation and function in CAD patients and investigate the independent factors of impaired LV function and deformation.

Materials and methods: 120 patients with CAD and 52 sex- and age-matched controls who underwent cardiac magnetic resonance scanning were enrolled in this study. All CAD patients were divided into two groups: CAD with MetS [CAD(MetS+), $n = 82$] and CAD without MetS [CAD(MetS-), $n = 38$]. LV structure and function parameters were measured and compared among the three groups. Multivariable linear regression analyses were constructed to investigate the independent factors of impaired LV function and deformation in CAD patients. The logistic regression analysis and receiver operating characteristic curve (ROC) were performed to quantify the prediction efficiency of MetS for impaired LV strain and deformation.

Results: From controls to the CAD(MetS-) group to the CAD(MetS+) group, the LV mass (LVM) increased, and LV global function index (LVGFI) and LV global longitudinal peak strain (PS) decreased (all $p < 0.05$). Compared with the CAD(MetS-) group, the LV global longitudinal PS was declined significantly in the CAD(MetS+) group ($P = 0.027$). After adjustment for covariates in CAD patients, MetS was an independent factor of decreased LV global longitudinal PS ($\beta = -0.211$, $p = 0.002$) and increased LVM ($\beta = 0.221$, $p = 0.003$). The logistic multivariate regression analysis and ROC analysis showed that combined MetS improved the efficiency of predicting LV global longitudinal PS reduction (AUC = 0.88) and LVM (AUC = 0.89) increase.

Conclusions: MetS aggravated the damage of LV function and deformation in CAD patients and was independently associated with impaired LV strain and deformation.

PO-2687

Biventricular Dysfunction and Ventricular Interdependence in Patients with Pulmonary Hypertension: A 3.0 T Cardiac MRI Feature Tracking Study

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Background: To explore the difference in right ventricular (RV) and left ventricular (LV) structural and functional alteration in patients with pulmonary hypertension (PH) and further investigate the ventricular interdependence in patients with PH, using cardiac MRI feature tracking (MRI-FT).

Methods: One hundred three patients diagnosed with PH through right heart catheterization (RHC) and 72 age- and sex- matched controls were recruited. Patients with PH were further divided into two subgroups based on CMR-derived RV ejection fraction (RVEF): PH with preserved RVEF (RVEF $\geq 40\%$; $n = 44$) and PH with reduced RVEF (RVEF $< 40\%$; $n = 59$). LV and RV strain parameters were compared among the three groups and multivariable linear regression analysis were performed to explore the RV–LV interdependence in patients with PH.

Results: RV strain decreased sequentially from controls, through PH with preserved RVEF, to PH with reduced RVEF. PH patients with reduced RVEF had significantly lower LV strain, especially septal strain and LV peak diastolic strain rate compared with both controls and PH patients with preserved RVEF (all $p < 0.05$). In PH patients, LV strain was significantly correlated with mPAP, RV volume and RV strain parameters. Multivariable analyses showed that RVEF was independently correlated with LV strain; furthermore, independent of RVEF, RV strain was significantly correlated with LV strain (LVGRS: $B = 0.463$, $p < 0.001$; LVGCS: $B = -0.194$, $p < 0.001$; LVGLS: $B = 0.227$, $p = 0.001$).

Conclusion: Subclinical impairment of RV function was found in PH with preserved RVEF. LV strain was impaired when RV was dysfunctional, which was associated with worsening RV strain. Therefore, while focusing on improving RV function, LV dysfunction in PH patients should also be monitored and treated early in order to slow the progression of the disease.

PO-2688

Scientific research and clinical application of the recently developed "Firefly imaging": preoperative assessment of brain tumor blood vessels and intratumoral microbleeds

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Purpose: Three-dimensional contrast-enhanced T1-weighted flow-sensitive black-blood (3D CE-T1WI FSBB), commonly referred to as "firefly imaging", is a black blood imaging sequence suppresses the flowing blood signal of both arteries and veins, thereby providing a clear contrast compared with an enhanced brain tumor. Our aim is to compare 3D CE-T1WI FSBB and CE-T1WI for preoperative assessment of blood vessels and microbleeds in brain tumors, and to investigate the correlation between visible intratumoral vessels and microbleeds.

Methods: Patients with brain tumors underwent scans with a 3.0-T MRI system using a 32-element phased-array head coil. Intravenous injection of 10.0 ml gadolinium glutamate was used for post-contrast imaging. Three neuroradiologists counted the internal blood vessels of the brain tumors separately based on CE-T1WI FSBB and CE-T1WI, and they counted microbleeds in the tumor on CE-T1WI FSBB. Two-way random intraclass correlation coefficient (ICC) was used for inter-reader

agreement. Further sub-analysis of consistency was carried out depending on histology and WHO grading. The linear regression analysis (with F-test) was used to study the correlation between intratumoral vessels and microbleeds based on CE-T1WI FSBB ($\alpha=0.05$).

Results: Inter-reader agreements for intratumoral vessel count on CE-T1WI FSBB (ICC=0.92) and CE-T1WI (ICC=0.93) were excellent. Agreement for intratumoral microbleed count on CE-T1WI FSBB (ICC=0.99) was also excellent. There were statistically significant differences in vessel counts using Mann-Whitney U -test: image readers could identify more vessels on CE-T1WI FSBB than on CE-T1WI, particularly for meningiomas, schwannomas, gliomas, and WHO grade I tumors. The intratumoral vessels had a significant positive effect on microbleeds (microbleeds = $5.024 + 1.665 \times$ vessels; $F=11.51$).

Conclusions: More intratumoral vessels could potentially be identified using 3D CE-T1WI FSBB compared to CE-T1WI, and the number of vessels showed a positive linear relationship with the number of microbleeds, which might suggest that brain tumors with abundant blood supply are more prone to microbleeds.

PO-2689

Amide proton transfer imaging of musculoskeletal tumors to characterize tumors and associate with Ki-67

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ObjectiveTo prospectively evaluate capability of amide proton transfer (APT) imaging to characterize musculoskeletal (MSK) tumors, to explore the correlation between Ki-67 labeling index (LI) and APT signal intensity (SI).

MethodsTotally, 85 patients with MSK tumors were enrolled in the prospective study. All the patients underwent APT imaging scan. Kruskal-Wallis test was used to test differences of APT SI among giant cell tumors of bone (GCTs), other benign, and malignant solid MSK tumors in central, peripheral regions, and entire tumors. The receiver operating characteristic (ROC) analysis was used to evaluate the diagnostic performance. The Spearman rank correlation test was used to analyze the correlation between APT SI and Ki-67 LI.

ResultsFor GCTs, the difference of APT SI was found only between GCTs and benign tumors ($P<0.001$). For other tumors excepting GCTs, APT SI of malignant tumor was higher than that of benign in central, peripheral regions and entire tumors. And the diagnostic performance in distinguishing malignant from benign one was highest in peripheral region. The cut-off value, sensitivity, and specificity were 2.78%, 0.93, and 0.84. Moderate correlations between Ki-67 LI and APT SI were found in above regions, with highest correlation in peripheral region ($r=0.570$ (95% CI, 0.355-0.728), $P<0.001$). In this study, high APT SI was found in 3 cystic tumors ($4.60\% \pm 0.78\%$) and 4 hemangiomas ($4.65\% \pm 0.73\%$).

ConclusionsAPT SI had potential clinical utility in characterizing MSK tumors, and could be a viable indicator of the proliferative activity of tumor cells in a noninvasive clinical setting.

PO-2690

Evaluation of cerebral microbleeds and the correlation between cognitive impairment by SWI

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AbstractBACKGROUND:Cerebral microbleeds(CMB) is a subclinical prodromal manifestation of cerebral small vessel disease(CSVD) and may have a correlation with cognitive dysfunction.

PURPOSE:CMB, as one of the main imaging manifestations of CSVD, is difficult to show in conventional MRI examination, while CMB can be shown more clearly by SWI technique. Therefore, this study appliedapplies SWI technique to evaluate cerebral microhemorrhage and investigate the correlation between cerebral microhemorrhage and cognitive dysfunction.

STUDY TYPE:retrospective

POPULATION:We included 44 patients with SVD , 24 patients with LVD, and 16 healthy controls who were well-matched in age, gender, and education level. These subjects were examined with brain MRI and neuropsychological assessments, including Montreal Cognitive Assessment (MoCA) , Mini-Mental State Examination (MMSE) and Activities of Daily Living (ADL).

SEQUENCE:A 3T MR imaging system was used to scan the DWI and SWI sequence.

ASSESSMENT:MRI scans of the brain were processed automatically to determine the diagnosis, location and number of cerebral microhemorrhagic lesions (on SWI) and white matter dystrophy grading (on T2-weighted image).

STATISTICAL TESTS:Two independent sample t test, χ^2 test, t test, Spearman's correlation test were used for statistical analysis. $P < 0.05$ was considered to be statistically significant.

RESULTS:On SWI, the detection rates of CMBs for CSVD, CLVD and normal controls were 61.36%, 54.17% and 0.00% respectively. The number of microhemorrhages was significantly correlated with blood pressure grading ($P = 0.355$, $P = 0.001$) and positively correlated with cerebral white matter grading ($P = 0.461$, $P = 0.001$).The number of CMBs was significantly and negatively correlated with the MMSE score ($P = -0.260$, $P = 0.017$). There was no significant correlation with MCA scores, ($P = -0.140$, $P = 0.206$).

DATA CONCLUSION: These findings suggest that the more CMBs, the more severe the white matter hyper signal and the more severe the cognitive dysfunction. Thus CMBs number is a neuroimaging indicator of vascular cognitive dysfunction.

PO-2691

Modulatory effects of aerobic training on the degree centrality of brain functional activity in subthreshold depression

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Aims: Aerobic training has been shown to effectively prevent the progression of depressive symptoms from subthreshold depression (StD) to major depressive disorder (MDD), and understanding how aerobic training promotes changes in neuroplasticity is essential to comprehending its antidepressant effects. Few studies, however, have quantified the alterations in spontaneous brain activity before and after aerobic training for StD.

Methods: Participants included 44 individuals with StD and 34 healthy controls (HCs). Both groups underwent moderate aerobic training for eight weeks, and resting state functional magnetic resonance imaging (rs-fMRI) data were collected before and after training. The degree centrality

(DC) changes between the two groups and the DC changes in each group before and after training were quantified.

Results: 1) A total of seventy-eight participants who satisfied the specified criteria were ultimately selected for involvement in this study, with 44 individuals assigned to the StD group and 34 persons assigned to the HCs group. Participants in both groups showed good adherence to the aerobic training intervention, with attendance and effective training exceeding 80% (StD group: 89%, HCs group: 91%). 2) There were no notable disparities observed in terms of age, gender, BMI, marital status, and baseline level of physical activity between the two groups. However, it is worth noting that the StD group exhibited a substantially higher educational level compared to the HCs group ($t = 2.930$, $P < 0.01$). 3) Following an eight-week period of aerobic exercise at a moderate intensity, the StD group exhibited significant improvements in their PHQ-9 and SAS scale scores when compared to their initial baseline scores ($P < 0.001$). Additionally, it was discovered that the SAS scale score in the healthy control group exhibited a statistically significant decrease compared to the initial measurement. 4) The results revealed greater DC of the orbital region of the left inferior frontal gyrus in the StD group compared to the HCs group at baseline (Table 3, Figure.2). After aerobic training, the results of the follow-up examination revealed no significant difference in DC between the two groups. In comparison to the baseline, the StD group exhibited an important decrease in the DC value in the left dorsolateral superior frontal gyrus; while the HCs demonstrated a large decrease in the DC value of the left thalamus. No statistically significant connection was seen between changes in DC and psychological scale scores in the StD group. 5) The results obtained by the StD group revealed that the correlation analysis failed to establish a statistically significant relationship between the DC values of various brain areas both before and after engaging in aerobic training, and the scores obtained from the PHQ-9 and SAS assessments ($P > 0.05$).

Conclusions: Our findings suggest that regular aerobic training can enhance brain plasticity in StD patients. In addition, we demonstrated that DC is a relevant and accessible method for evaluating the functional plasticity of the brain induced by aerobic training in StD.

PO-2692

MRI-based radiomics model to preoperatively predict mesenchymal transition subtype in high-grade serous ovarian cancer

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Objective: To develop an MRI-based radiomics model for the preoperative identification of mesenchymal transition (MT) subtype in high-grade serous ovarian cancer (HGSOC).

Materials and Methods: One hundred and eighty-nine patients with histopathologically confirmed HGSOC were retrospectively enrolled. Among the included patients, 55 patients were determined as the MT subtype and the remaining 134 ones were non-MT subtype. After extracting a total of 204 features from T2WI and CE-T1WI images, Mann-Whitney U test, Spearman correlation test, and Boruta algorithm were adopted to select the optimal feature set. Three classifiers, including logistic regression (LR), support vector machine (SVM), and random forest (RF), were trained to develop radiomics models. The performance of established models was evaluated from three aspects: discrimination, calibration, and clinical utility.

Results: Seven radiomics features relevant to MT subtypes were selected to build the radiomics models. The model based on RF algorithm showed the best performance in predicting MT subtype, with AUCs (95%CI) of 0.866 (0.797-0.936) and 0.852 (0.736-0.967) in the training and testing

cohorts, respectively. The calibration curves, supported with Brier scores, indicated the great consistency between the observation and prediction. The decision curve analysis (DCA) showed that the RF-based model could provide more net benefit, which suggested the favorable utility in clinical application.

Conclusion: The RF-based radiomics model provided an accurate identification of MT subtype from non-MT one and help facilitate personalized management of HGSOc.

PO-2693

DKI Evaluation of Crossed Cerebellar Diaschisis after Cerebral Infarction in MCAO Rats

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Objective To observe the expression of NMDA, apoptosis and the effect on nerve function recovery in rat model of middle cerebral artery occlusion (MCAO). Diffusion kurtosis imaging (DKI) was used to evaluate crossed cerebellar diaschisis (CCD) to provide experimental and theoretical basis for clinical treatment.

Materials and Methods MCAO models were established in rats. Every 12 rats were randomly divided into control group, 6-hour group, 12-hour group, 24-hour group, 48-hour group, 7-day group and 14-day group. The rats were scanned by MRI at the above time points. Then, rats were sacrificed for H&E staining, immunohistochemical staining and TUNEL staining to detect the expression of NMDA in the core infarct area and cerebellum, and analyze the relationship between the parameters of MRI and molecular biology.

Results The values of MD, ADC and FA in MCAO rats were all lower than those of control group, and the parameters of contralateral cerebellum were lower than those of ipsilateral cerebellum ($P < 0.05$), reaching the lowest value at 12 hours, while the values of MK were opposite. The expression of NMDA showed an upward trend, higher than that of the control group, which reached the maximum in 24 hours ($P < 0.05$), and that in the contralateral cerebellum was higher than that in the ipsilateral cerebellum.

Conclusion NMDA can be a novel treatment target for CCD, and the parameters of MRI can predict the occurrence and development of CCD.

PO-2694

Morphometry alterations of brain in patients with vestibular schwannoma after surgery: a pilot study

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OBJECTIVE Patients with vestibular schwannomas (VS) may experience changes in cortical thickness, sulcus depth and fractal dimension of brain after surgery, which may affect postoperative tinnitus symptoms and related brain function. This study aimed to explore the clinical value of these related indexes to assess tinnitus and the alteration of brain function in patients with VS after surgery. **METHODS** Twenty-eight VS patients were recruited for structural magnetic resonance image (MRI) scanning and clinical score evaluation preoperatively and postoperatively. Images of all patients with VS on the right side were flipped to the left side. To investigate changes after treatment, surface-based morphometry (SBM) analyses were performed.

RESULTS Voxel-wise analysis at the cluster level showed a significant decrease in cortical thickness mainly in the left frontal lobe, left temporal lobe, left fusiform gyrus, left occipital lobe, left

postcentral, left supramarginal gyrus and right frontal lobe, right fusiform gyrus, right lingual, right parahippocampal, right precuneus, a significant decrease in sulcus depth mainly in the left occipital lobe, left parietal lobe, left temporal lobe and left cuneus, a significant decrease in fractal dimension mainly in the left frontal lobe, left parietal lobe, left occipital lobe and a significant increase in fractal dimension mainly in the left fusiform gyrus, left occipital lobe, left frontal lobe, left pars orbitalis (cluster-level p value family-wise error [p_{FWE}] < 0.05) in VS patients postoperatively.

CONCLUSIONS Morphometry alterations of brain may be helpful to better understand the distant effect of surgery in patients with VS, and tinnitus and the alteration of brain function in VS patients after surgery.

PO-2695

Quantitative chemical exchange saturation transfer MR imaging of the substantia nigra and red nucleus in Parkinson's disease

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Objective This study aimed to investigate the change of chemical exchange saturation transfer (CEST) imaging in the bilateral substantia nigra (SN) and red nucleus (RN) of Parkinson's disease (PD), and to explore the value of CEST-MR for the clinical application of PD.

Methods In this retrospective study, 45 PD patients and 21 sex-, age-, and education-level matched normal control (NC) subjects were enrolled from December 2012 to July 2015. All subjects underwent brain CEST-MRI and routine MRI in 3T magnetic resonance imaging scanner. Based on the MATLAB software package, the signal change of CEST imaging was separated based on the 4-pool Lorentz fitting model. The regions of interest of the SN and RN were delineated by experienced radiologists. Then the mean amplitudes of the 4 pools including amide, nuclear overhauser enhancement (NOE), direct water saturation (DS) and magnetization transfer (MT) were acquired. Independent samples t-test and Mann-Whitney U-test were used to compare amplitude of individual pool between PD group and NC group and controlled by Bonferroni correction. The combined model was constructed by binary logistic regression analysis, and the receiver operating characteristic curve was used to evaluate the diagnostic efficiency of the 4pool-CEST parameters and the combined model.

Results Compared with the NC group, statistically significant reductions were observed in the amide value of the left SN and RN and the NOE value of the right SN of PD group ($T=-3.587$, $P=0.026$; $T=-3.767$, $P=0.016$; $Z=3.270$, $P=0.017$; respectively). The associated area under the curve (AUC) of the combined model and the above three CEST parameters had good diagnostic efficacy ($AUC>0.7$). The combined model had the highest AUC value and specificity ($AUC=0.81$; specificity =97.78%), the amide value of left SN had the highest sensitivity (sensitivity =93.33%).

Conclusions CEST-MRI based on the 4-pool Lorentz fitting model was used to show the signal changes of the amide of the SN and RN in PD patients, and had great potential in PD diagnosis.

PO-2696

Value of Non-Contrast Enhanced Vessel Wall MR imaging in Assessing Vascular Invasion of Retroperitoneal Tumors

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PURPOSE

To investigate the potential of non-contrast enhanced vessel wall MR imaging in evaluating the degree of vessel wall invasion of the retroperitoneal tumor.

METHODS

This is a prospective study evaluating patients with suspected malignant retroperitoneal masses found in computer tomography. All patients underwent 3.0 T magnetic resonance scan, including conventional sequence and black blood sequence. Two experienced radiologists jointly evaluated the degree of vascular invasion in all images of abdominal aorta, abdominal trunk, superior mesenteric artery / vein, inferior vena cava, portal vein and renal artery and vein, respectively. According to the positional relationship and the degree of contact between the tumor and the surrounding arteries or veins, it is divided into six conditions from mild to severe. Using the postoperative histopathology data as the ground truth, the sensitivity and specificity in evaluating vessel invasion of two MRI protocols were estimated based on both per-patient and per-score. Intra-class correlation coefficient was used to assess the intra-reader repeatability.

RESULTS

A total of 330 blood vessels were evaluated both on conventional and vessel wall images at the same time. Finally 112 of them were recorded because of the closely association with masses and probably impact on the clinical treatment. Compared with histopathology data, the result of vessel wall MR imaging (91.96%, 95% CI: 85.43, 95.71; 103 of 112) has higher accuracy than that of conventional MR imaging (75%, 95% CI: 66.24, 82.10; 84 of 112). The diagnostic efficiency of vessel wall MR imaging in predicting vessel wall invasion (AUC = 0.891, 95% CI: 0.806, 0.975) was also better than that of conventional MR imaging (AUC = 0.762, 95% CI: 0.633, 0.890, Z value = 6.786, P < 0.001).

CONCLUSION

Non-contrast enhanced vessel wall MR imaging yielded accurate in assessment the degree of vessel wall invasion of retroperitoneal tumor.

PO-2697

Prediction of microvascular invasion in HCC based on multi-modality MR radiomics and Delta radiomics model

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Objective: As a non-invasive and reproducible technical tool, radiomics has shown great application prospects in the study of tumor pathology. Delta radiomics provides information on the temporal evolution of eigenvalues. We aimed to investigate the value of multi-modality and multi-regional radiomics as well as Delta radiomics in predicting MVI of HCC patients.

Materials and methods: One hundred and sixty-one HCC patients confirmed by pathology at our hospital were retrospectively included and randomly divided into training and validation sets in the ratio of 7:3 (training set: validation set = 112:49). The tumor regions of interest were outlined

independently on T2WI and nonenhanced T1WI, arterial phase (AP), portal venous phase (PVP), delayed phase (DP) and hepatobiliary phase (HBP) images, using 3D Slicer software to outline the whole tumor area, the 10mm peri-tumor area and the whole tumor + 10mm peri-tumor area of the lesion, respectively, and the corresponding radiomics features were extracted using the pyradiomics package, while using whole-tumor features from different phases, including direct phase subtraction, normalized phase subtraction and relative phase subtraction modalities to calculate Delta radiomics features. In the training set, the maximum correlation and minimum redundancy algorithm and the recursive feature elimination algorithm were used to filter the radiomics features, the support vector machine algorithm was used to construct the radiomics models. The AUC values were used to evaluate the prediction performance of different models, while the models were also validated in the validation set.

Results: The AUC (95% CI) values of the portal venous phase and hepatobiliary phase radiomics models based on the whole tumor + peritumor region were 0.828 (0.721-0.887) in the training set and 0.804 (0.675-0.934) in validation set. The AUC (95% CI) for the direct phase subtraction-based multi-phase Delta radiomics model (portal phase - nonenhanced T1WI, delayed phase - nonenhanced T1WI and portal phase - arterial phase) was 0.825 (0.747-0.904) and 0.771 (0.639-0.903) on the training and validation sets, respectively.

Conclusion: The models based on whole tumor + peritumor region in portal venous phase and hepatobiliary phase images had the best predictive efficacy among all radiomics models.

Clinical Relevance/Application: We hope to provide non-invasive imaging biomarkers for the prediction of MVI through the combination of medicine and AI technique, further elucidate the potential biological significance behind the imaging Radiomics features, and provide imaging basis for individualized clinical treatment of HCC.

PO-2698

Brain iron deposition and analysis of risk factors in cerebral small vessel disease patients with different total CSVD scores: A quantitative susceptibility mapping study

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Purpose: This study aimed to compare the differences in brain iron deposition in gray matter (GM) nuclei between cerebral small vessel disease (CSVD) patients and healthy subjects and explored which factors could affect iron deposition and cognitive function of the brain.

Materials and Methods: A total of 321 subjects were enrolled in this study. All subjects performed MRI and cognitive examinations. The CSVD patients were divided into mild to moderate group (CSVD-M, total CSVD score ≤ 1) and severe group (CSVD-S, total CSVD score > 1). Morphology-enabled dipole inversion with an automated uniform cerebrospinal fluid zero reference algorithm (MEDI+0) was used to generate brain quantitative susceptibility mapping (QSM) maps using mGRE data. Neuroradiologists manually circled the region of interest (ROI) directly on the QSM images using ITK-SNAP v3.8 software. The mean susceptibility values and clinical parameters of the three groups were statistically analyzed by one-way ANOVA, Pearson correlation analysis, multiple linear regression analysis and mediation effect analysis.

Results: Our results showed significant differences in the SCWT scores and mean susceptibility values of the globus pallidus (GP), putamen (Put), and caudate nucleus (CN) among the three groups ($P < 0.05$, FDR correction). Pearson correlation analysis showed that iron deposition in the brain of CSVD patients was closely associated with decreased executive function. Age has a significant positive impact on the susceptibility values of GP ($p = 0.018$), Put ($p < 0.001$), and CN

($p < 0.001$). Additionally, a history of diabetes has a significant positive influence on the susceptibility values of Put ($p = 0.011$) and CN ($p < 0.001$), while a smoking history shows a significant positive association with the susceptibility values of CN ($p = 0.019$). Mediation effect analysis demonstrated that iron deposition in the neostriatum partially mediated the relationship between hypertension and executive function.

Conclusions: Our study revealed that age, diabetes and smoking could increase iron deposition in the basal ganglia. Additionally, the impact of hypertension on executive function is mediated through the deposition of iron in the neostriatum of the brain. These findings may help to understand the pathophysiological mechanisms underlying CSVD, and may have implications in the prevention and treatment of this disease condition.

PO-2699

Delta radiomics analysis based on multi-sequence contrast enhanced MRI to predict Ki-67 maker index in hepatocellular carcinoma

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Introduction: Primary liver cancer is the sixth most common cancer and the third leading cause of cancer death worldwide, and hepatocellular carcinoma (HCC) accounts for about 75%-85% of primary liver cancer. Several studies have indicated that Ki-67 can predict the prognosis of many solid tumors. Radiomics has been used to preoperatively predict Ki-67 expression in HCC. However, no studies are exploring the use of delta radiomics features for predicting Ki-67 expression in HCC. This study aims to develop a delta radiomics model for predicting Ki-67 expression in HCC.

Materials and methods: We analyzed preoperative magnetic resonance images of 103 patients with liver cancer confirmed by postoperative pathology. The sample included 30 patients with low Ki-67 expression ($Ki-67 \leq 10\%$) and 73 with high Ki-67 expression ($Ki-67 \geq 10\%$). We extracted the radiomics features, and built models using machine learning algorithms. The validation cohort was done using 10-k fold validation. Then, we compared the performance of the radiomics model with that of delta radiomics models.

Results: In the traditional radiomics models, the largest AUC value was for the radiomics model based on delayed phase images, with 0.851(95%CI 0.762,0.923) in the training cohort and 0.785(95%CI 0.698,0.872) in the validation cohort. The accuracy, sensitivity, and specificity were 80.6%, 82.2%, and 80.0% in the training set. And the delta radiomics models can improve model performance. The best delta radiomics model had an AUC value of 0.876(95%CI 0.803-0.941) in the training set and 0.832(95%CI 0.745-0.910) in the validation set. The accuracy, sensitivity, and specificity were 79.6%, 78.1%, and 86.7% in the training set.

Conclusion: This study develops a new delta radiomics model for preoperative prediction of HCC proliferation status, potentially improving liver cancer prognosis.

PO-2700

Evaluation of Myocardial Strain in Patients With Subclinical Hypertrophic Cardiomyopathy and Subclinical Hypertension Heart Disease Using Cardiac Magnetic Resonance Feature Tracking

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The evaluation of cardiac magnetic resonance feature tracking may have great diagnostic value in hypertrophic cardiomyopathy and hypertension heart disease.To explore the diagnostic and clinical research value of cardiac magnetic resonance feature tracking in evaluation of myocardium deformation in patients with subclinical hypertrophic cardiomyopathy(SHCM)and subclinical hypertension heart disease(SHHD).CMR scans was performed on 1.5 T MR scanner in 33 patients with SHCM,31 patients with SHHD, and 27 controls(NS).The CMR image post-processing software was used to analyze the characteristics of routine cardiac function, different global and regional myocardial strain in each group.Analysis of variance (ANOVA) was used to compare age, blood pressure,heart rate,routine cardiac function,body mass index (BMI), as well as the strain between different segments within each of the three groups. If a significant difference was detected, a least significant difference (LSD) comparison was performed if there was a significant difference.The diagnostic efficacy of different parameters in differentiating SHHD from SHCM was evaluated through receiver operating characteristic (ROC) curve analysis, and determination of the best cutoff value.The routine cardiac function parameters were no statistically different among three groups ($P > 0.05$).There are statistical differences between the global myocardial strain parameters and the peak strain parameters of some segments,especially the basal segment, in each group ($P < 0.05$), and the Global radial peak strain(GRPS) can be used to distinguish SHCM from SHHD group (The area under the ROC curve was 0.885), which is the best diagnostic performance.Cardiac magnetic resonance feature tracking can detect left ventricular deformation in patients with SHCM and SHHD group.The abnormality of strain has important research value for its subclinical diagnosis and clinical evaluation.

PO-2701

Compare the diagnostic performance of susceptibility-weighted imaging (SWI) and T2* mapping in evaluating articular cartilage at 3-Tesla MR scanner

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Objective: T2*-mapping MRI has been widely accepted as a noninvasive, effective imaging technique for quantitative evaluation of articular cartilage. Some previous studies have revealed that T2* values display a decreasing trend along with the increase in cartilage degeneration. Susceptibility weighted imaging (SWI) is based on a 3D gradient-echo (GRE) technique using a similar approach as T2*. Therefore, the purpose of this study is to determine if 3D SWI could be applied in evaluating degenerated knee articular cartilage, and to explore the correlations between T2* value and SWI results. To the best of our knowledge, there has been no previously reported study.

Methods: MRI was undertaken with a 3-T MR imager (uMR 780) and a commercially available knee coil (12 channels). 2D T2* map sequences were obtained using an axial FFE (fast-field echo) multi-echo acquisition with a TR of 500 ms, 5 echo times of 6.71, 13.42, 20.12, 26.83 and 33.54ms, flip

angle (FA) was 60° , the FOV was 16×16 cm, with a pixel matrix of 384×384 , and a slice thickness/gap of $3/0.3$ mm. SWI sequences were obtained using an axial 3D GRE acquisition with a TR of 30 ms, TE 9.2ms, and flip angle $=15^\circ$. the FOV was 14×20 cm, with a pixel matrix of 235×336 , and a slice thickness/gap of $2/0$ mm. Eight patients with knee osteoarthritis and totally 48 ROIs drawn at the patellar articular cartilage were obtained. The same measurements were carried out on the $T2^*$ maps and the SWI image. The measurements reproducibility and correlation analysis were performed.

Results: The relaxation values in $T2^*$ map were 17.9 ± 5.3 to 46.0 ± 18.5 ms. The SWI signal intensities were 216 ± 11 to 303 ± 32 . There was a great inter-reader agreement for SWI and $T2^*$. There was no significant difference between SWI and $T2^*$ sequences to detect degeneration of articular cartilage, strength of the correlation was good ($R=0.782$).

Conclusions: SWI was correlated with $T2^*$ maps in detecting the degeneration of cartilage. It holds great potential for serving as a noninvasive biomarker for osteoarthritis in human articular cartilage. Further studies on SWI are required to confirm its reliability and mechanism in cartilage degeneration.

PO-2702

Brain regions involved in pain relief after operative treatment of trigeminal neuralgia

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Purpose: Trigeminal neuralgia (TN) characterized by recurring paroxysmal pain, and can be cured by operation. However, regions involved in pain relief and reparative processes remain unclearly understood. To compare brain network frame remodeling in TN patients before and after percutaneous micro-balloon compression (PMC) operation with healthy controls (HCs) using functional MRI.

Methods: Methods: Twenty-two primary trigeminal neuralgia patients and 20 HCs were recruited. All patients underwent MRI scan before (<72 h) and after (>24 h and <36 h) the operation. Imaging data were analyzed using graph theory analysis.

Results: Twenty patients (10 females; average age 59.3 ± 7.73 years) and matched HCs (10 females; average age 51.9 ± 9.5 years) were included in our study. Both TN pre-treatment patients (Pre) and HCs exhibited small-world network organization. Compared with pre-treatment patients, post-treatment TN patients had higher node and connectivity attributes in the bilateral thalamus, but in particular on the right side. The primary motor cortex and secondary somatosensory motor cortex had lower node features in both Pre- and Post-treatment (Pos) TN patients. The thalamus exhibited a positive correlation with pain score in node attributes and degree centrality ($P < 0.05$).

Conclusions: Abnormal temporal patterns were found in TN patients by GTA. Motor cortex reduced in both Pre and Pos TN patients, which may have no relation with pain. Thalamus had a higher nodal efficiency in temporal variability and enhanced functional connectivity in pain relief.

PO-2703

Associations of quantitative susceptibility mapping with cortical atrophy and brain connectome in Alzheimer's disease: a multi-modal study

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Overload iron accumulation and brain network disconnections are observed in Alzheimer's disease (AD), with disrupted iron homeostasis hypothesized to be linked to AD pathology and neuron loss. However, associations between abnormal iron deposition, brain atrophy, and altered brain connectome in AD remain unclear. This study utilized multi-modal MRI techniques to explore overlapped regions between cortical atrophy and increased susceptibility and investigate relationships between structural and functional brain connectome, gray matter volumes, and iron deposition on 30 AD patients and 26 healthy controls enrolled at China-Japan Friendship Hospital. We calculated the QSM signal and cortical thickness in 246 brain regions and identified the overlapped regions. The structural and functional connectomes were constructed based on diffusion MRI tractography and functional connectivity, respectively. The network topology was quantified using graph theory analyses. We revealed seven brain regions with both reduced cortical thickness and abnormal iron deposition, including right superior frontal gyrus, left superior temporal gyrus, right fusiform gyrus, left superior parietal lobule, right superior parietal lobule, left inferior parietal lobule, and left precuneus. Unique correlations between cortical thickness and network topology specific to the AD group were observed in five of these regions, with stronger associations in functional compared to structural topology. Spatial decoupling of QSM and global efficiency of the structural network was also found in AD patients. These findings provide new insights into the complex relationships among iron accumulation, brain atrophy, and brain connectome in AD.

PO-2704

Multiplexed Sensitivity Encoding versus Single-Shot Echo-Planar Imaging: A Comparative Study for Diffusion-Weighted Imaging of the Thyroid Lesions

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Purpose To compare multiplexed sensitivity encoding diffusion-weighted magnetic resonance imaging (MUSE-DWI) and conventional DWI (cDWI) techniques in thyroid MRI.

Materials and methods Nineteen patients who underwent thyroid MRI using both MUSE-DWI and cDWI at a 3.0T MRI system were enrolled. Qualitative parameters (image quality, thyroid contour, lesion conspicuity) and quantitative parameters (signal-to-noise ratio (SNR), lesion-to-thyroid contrast-to-noise ratio (CNR), apparent diffusion coefficient (ADC)) were compared between the two sequences. In addition, ADC values derived from MUSE-DWI and cDWI were compared between benign and malignant lesions.

Results MUSE-DWI outperformed cDWI in terms of image quality, thyroid contour, and lesion conspicuity. Significant higher signal-to-noise ratio (SNR) in both the thyroid and its lesion were found in MUSE-DWI than those in cDWI (both $P < 0.05$). The lesion-to-thyroid contrast-to-noise ratio (CNR) were also significantly higher in MUSE-DWI than those in cDWI ($P < 0.05$). The apparent diffusion coefficient (ADC) of the thyroid in MUSE-DWI was significantly lower than that in cDWI ($P < 0.05$). The ADC of the lesion in MUSE-DWI was also significantly lower than that in

cDWI ($P < 0.05$). In addition, ADC values from MUSE-DWI and cDWI of benign lesions were significantly higher than those of malignant lesions ($P < 0.05$). The AUC for cDWI was 0.944, with cutoff value, sensitivity, and specificity of $1.39 \times 10^{-3} \text{ mm}^2/\text{s}$, 0.933, and 0.833, respectively. The AUC for MUSE-DWI was 0.922, with cutoff value, sensitivity, and specificity of $1.20 \times 10^{-3} \text{ mm}^2/\text{s}$, 0.867, and 0.833, respectively.

Conclusion Compared with cDWI, MUSE-DWI can improve the image quality, thyroid contour sharpness, lesion conspicuity, SNR in both the thyroid and its lesions, and enhancing the CNR between lesions and thyroid.

PO-2705

Magnetic susceptibility and R2*-based texture analysis for evaluating liver fibrosis in chronic liver disease

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Purpose: To explore potential feasibility of texture features in magnetic susceptibility and R2* maps for evaluating liver fibrosis.

Methods: Thirty-one patients (median age 46 years; 22 male) with chronic liver disease were prospectively recruited and underwent magnetic resonance imaging (MRI), blood tests, and liver biopsy. Susceptibility and R2* maps were obtained using a 3-dimensional volumetric interpolated breath-hold examination sequence with a 3T MRI scanner. Texture features, including histogram, gray-level co-occurrence matrix (GLCM), gray-level dependence matrix (GLDM), gray-level run length matrix (GLRLM), gray-level size zone matrix (GLSZM), and neighboring gray tone difference matrix (NGTDM) features, were extracted. Texture features and blood test results of non-significant (Ishak-F<3) and significant fibrosis patients (Ishak-F≥3) were compared, and correlations with Ishak-F stages were analyzed. Areas under the curve (AUCs) were calculated to determine the efficacy for evaluating liver fibrosis.

Results: Nine texture features of susceptibility maps and 19 features of R2* maps were significantly different between non-significant and significant fibrosis groups (all $P < 0.05$). Large dependence high gray-level emphasis (GLDM) and long run high gray-level emphasis (GLRLM) in R2* maps showed significantly negative and good correlations with Ishak-F stages ($r = -0.616$, $P < 0.001$; $r = -0.637$, $P < 0.001$). Busyness (NGTDM) in susceptibility maps, large dependence high gray-level emphasis (GLDM) and long run high gray-level emphasis (GLRLM) in R2* maps yield the highest AUCs (AUC=0.786, $P = 0.007$; AUC=0.807, $P = 0.004$; AUC=0.819, $P = 0.003$).

Conclusion: Texture characteristics of susceptibility and R2* maps revealed possible staging values for liver fibrosis. Susceptibility and R2*-based texture analysis may be a useful and noninvasive method for staging liver fibrosis.

PO-2706

Association of multimodal magnetic resonance imaging - derived brain age gap with the development of chronic kidney disease: a UK Biobank observational study

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Purpose: Brain age gap (BAG), defined as the difference between brain epigenetic age and chronological age, has been shown to serve as a biomarker of aging. A positive BAG reflects an accelerated brain aging process. We aim to investigate the longitudinal association between BAG and the risk of developing CKD.

Method: This is a prospective study. A total of 6,817 healthy adults from the UK Biobank, they were without ICD-10 diagnosis, or self-reported long-term illness, or disability, or frailty, and of good or excellent self-reported health. We used T1-weighted and diffusion tensor MRI data to train five machine learning (ML) models. The accuracy of the ML models was evaluated based on the mean absolute error (MAE) and the correlation between brain age and chronological age. A total of 25,185 participants without a history of CKD at baseline were included in the competing risk model to explore the association between BAG and the occurrence of CKD. A test for trend, subgroup analyses stratified by sex and restricted cubic spline (RCS) analyses were performed. A two-sided $P < 0.05$ was considered statistically significant.

Result: Among the established ML models, the CatBoost model had the best predictive performance, with an MAE of 3.52 years, a correlation coefficient of 0.63, and a calculated BAG of -0.02 (SD, 5.32). After a median follow-up time of 3.44 (IQR, 2.66-4.81) years, a total of 275 (1.55%) participants developed CKD, and 242 (0.96%) participants died for various reasons. The risk of CKD in the third group was 40% higher than that in the first group (HR, 1.40 [95% CI, 1.05-1.88], $P = 0.024$), and there was a graded association with incident CKD (P for trend = 0.024). The risk of CKD in males was consistently higher than that in females for any BAG group. RCS analysis showed non-linear association between them.

Conclusion: BAG is significantly associated with the development of CKD and may serve as an independent and promising biomarker for new-onset CKD.

PO-2707

Preoperative radiomics model based on multiparametric MRI for prediction of lymph node metastasis in gastric cancer

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Objective: To develop a preoperative radiomics model using multiparametric magnetic resonance imaging (MRI) for predicting lymph node metastasis (LNM) in patients with gastric cancer (GC), and then investigate its associations with prognosis.

Methods: This study consisted of 303 GC patients (training cohort, $n=213$; internal validation cohort, $n=90$) in center I and 176 patients in center II as external validation cohort who underwent multiparametric MRI before radical gastrectomy. A total of 1,049 imaging features were extracted from T2-weighted imaging (T2WI), apparent diffusion coefficient (ADC) maps, and contrast enhanced T1-weighted imaging (cT1WI), respectively. Six steps, including the Boruta and Simulated annealing (SA) algorithm, were conducted to select key features. Radiomic signatures

based on the single- and multiple-sequence were constructed. The performance of signatures to predict LNM was assessed with the area under the curve (AUC), accuracy, sensitivity, and specificity. Moreover, Kaplan-Meier survival curves were used to estimate the overall survival (OS). Results: The multiple-sequence signature achieved AUCs of 0.774 [95% confidence interval (CI), 0.703-0.845], 0.721 (95% CI 0.593-0.850), and 0.720 (95% CI 0.639-0.801) in the training and two validation cohorts, respectively, which performed better than those of the single-sequence signatures (all $P < 0.05$). The signature from cT1WI had the best performance among the single-sequence signatures. Besides, the proposed multiple-sequence signature was significantly associated with the OS of patients with GC ($p < 0.05$).

Conclusion: A multiparametric MRI-based radiomics signature on primary lesions exhibited a satisfactory performance for predicting LNM and survival outcomes in patients with GC, which could provide valuable information for assisting personalized treatment non-invasively.

PO-2708

Altered amide in substantia nigra is concordant with motor asymmetry in Parkinson's disease: a multipool CEST study

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Background: Parkinson's disease (PD) is a strikingly asymmetric condition with typical motor asymmetry related to the dopaminergic deficit and aggregation of α -synuclein. Chemical exchange saturation transfer (CEST) imaging can estimate the change of endogenous proteins and peptides content caused by these pathophysiological abnormalities.

Objectives: This study aimed to explore the concordance between motor asymmetry and changes of four CEST imaging within midbrain nucleus in Parkinson's disease (PD).

Methods: Forty-six subjects with PD and twenty-three normal controls were enrolled in this study. CEST imaging with 31 different frequency offsets (-6 to 6 ppm) were performed. Four related parameters containing amide, nuclear overhauser effects (NOE), magnetization transfer (MT) and direct water saturation (DS) were acquired in bilateral regions, including occipital white matter (OWM), substantia nigra (SN) and red nucleus (RN) divided into more and less affected side in PD patients based on the motor symptom. Three motor asymmetry subgroups, including PD with mild motor asymmetry, PD with significant motor asymmetry and hemiparkinsonism were classified. The differences of four parameters among PD more affected side, PD less affected side of different motor asymmetry subgroups and NC group were compared. Motor laterality and imaging laterality were determined to evaluate the concordance. Motor asymmetry index and imaging asymmetry index were calculated to evaluate the correlation.

Results: Our results showed the comparison of DS and MT in any region among any groups were no significant difference. Compared with NC group, the amide and NOE signal in PD more affected side were significantly decreased only in SN in all three motor asymmetry subgroups ($p < 0.05$, corrected by Bonferroni methods), but the differences of amide and NOE signal between NC group and PD less affected side in any region and any subgroup were not significant. Imaging asymmetry was only observed in amide of SN in PD with significant motor asymmetry subgroup (PD more affected side vs PD less affected side, $p < 0.05$, corrected by Bonferroni methods). The imaging laterality of amide in SN has a substantial consistency with the motor laterality in PD with significant motor asymmetry subgroup ($\kappa = 0.625$, $p < 0.001$), but the imaging asymmetry index was no significant correlation with motor asymmetry index scores.

Conclusions: Our results indicate that amide and NOE signal in SN significant lost in motor more affected side and imaging laterality of amide in SN may identify the motor laterality in PD patients. These might be able to provide new measure to evaluate and understand the motor asymmetry in PD.

PO-2709

Investigating Anorectal Function Using Postoperative MRI-based Fibrosis Score in Patients with Locally Advanced Rectal Cancer Receiving Neoadjuvant Chemoradiotherapy: A two-center study

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Purpose: This study aimed to develop a postoperative MRI-based fibrosis scoring system and to assess its correlation with anorectal function in locally advanced rectal cancer (LARC) cases administered neoadjuvant chemoradiotherapy (nCRT).

Methods: Pathologically confirmed LARC cases administered nCRT and radical resection were assessed retrospectively. Based on postoperative magnetic resonance imaging (MRI) findings, anastomotic fibrosis score (AFS) and perirectal fibrosis score (PFS) were determined to evaluate the extent of fibrosis. The Wexner score for anorectal function was obtained 2 years postoperatively and assessed for correlation with MRI fibrosis scores. The cases were divided into 2 groups by the median Wexner score. Univariable and multivariable analyses were adopted for building a nomogram model, whose diagnostic performance was estimated by receiver operating characteristic (ROC) and decision curve analyses (DCA).

Results: Finally, 144 patients with LARC were included in cohort 1 (training set). Thirty-one patients were enrolled in cohort 2 (external validation set). Spearman correlation analysis indicated that AFS and PFS were positively correlated with Wexner score. Univariable and multivariable analyses revealed age, tumor height, AFS and PFS were independent predictors of anorectal function. The nomogram model achieved a good diagnostic performance, with AUCs of 0.800 and 0.846 in the training and validation sets, respectively; its predicting value was also confirmed by DCA.

Conclusion: The present study showed AFS and PFS derived from postoperative MRI are positively correlated with Wexner score. In addition, the new scoring system was effective in predicting anorectal function in LARC cases administered nCRT.

PO-2710

Correlations between cognitive reserve, brain and cerebrospinal fluid volume in mild cognitive impairment patients

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Objective: To explore the effect of cognitive reserve (CR) on brain and cerebrospinal fluid (CSF) volume in patients with mild cognitive impairment (MCI) and healthy elders (HC).

Methods: 31 HC and 50 MCI patients were collected in this study to obtain high-resolution 3-dimensional T1 structure images, cognitive function and composite CR scores. Educational attainment, leisure time and working activity ratings from two groups were used to generate cognitive reserve index questionnaire (CRIq) scores. The different volumes of brain regions and CSF were obtained using uAI research portal in both groups, which were then taken as the regions of interest (ROI), the correlation analyses between ROIs and CRIq scores were conducted.

Results: The scores of CRIq, CRIq-leisure time, and CRIq-education in NC group were significantly higher than patients in MCI group, and the MoCA and MMSE scores were positively correlated with the CRIq, CRIq-education in both groups, and were positively correlated with CRIq-leisure time in MCI group and CRIq-working activity in NC group respectively. In MCI group, the volume of the right middle cingulate cortex and the right parahippocampal gyrus were negatively correlated with the CRIq and CRIq-working activity scores, and the volume of the CSF, peripheral CSF and ventriculus tertius were positively correlated with the CRIq-leisure time score.

Conclusion: People with higher CR show better levels of cognitive function, and MCI patients with higher CR showed more severe volume atrophy of the right middle cingulate cortex and the right parahippocampal gyrus, but more CSF at a given level of global cognition.

PO-2711

High clear visualization and precise quantification of habenula based on STAGE

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Purpose: The visualization and identification of the habenula is particularly challenging. We aimed to visualize and quantitative analysis the habenula using three-dimensional multi-echo strategically acquired gradient echo (STAGE).

Methods and Materials: 20 healthy participants who performed on a 3.0T MR scanner (MAGNETOM Vida, Siemens Healthcare, Germany) with a 64-channel head-and-neck RF receiver array was used and acquire whole brain STAGE data (TR = 29ms, TE = 8.18 ms, 15 ms, and 22.5 ms, flip angles (FA) = 6 and 27, resolution 0.67 mm × 0.67 mm × 1.0 mm, FOV = 256 mm × 192 mm, pixel bandwidth = 182 Hz/pixel, matrix = 416 × 312, and total scan time = 18 min). The qualitative image and quantitative mapping were obtained using STAGE 3.2.4 software (SpinTech MRI, Bing[1]ham Farms, MI, USA). Qualitative image quality and visibility of habenula anatomical features were analyzed by 3 radiologist using a 5-point scale. Quantitative values and was also measured in whole habenula. An intraclass correlation coefficient (ICC) was calculated to assess the interrater reliability of the delineation of the habenula.

Results: The habenula had consistent boundaries and clearly visualization (T1WE, SWI, DIR for white, DIR for gray and T1WI) as well as accurate quantification (T1 mapping, PD mapping, QSM, R2* mapping and T2* mapping) across the various qualitative and quantitative images from STAGE sequence. The intraclass correlation coefficient (ICC) for agreement in subjective scores and quantitative values measurements between raters were more than 0.8.

Conclusion: STAGE imaging protocol to provide a clear display and accurate quantification of the Hb and provide groundwork for the future development of an imaging surrogate for the habenula to study various psychiatric diseases.

PO-2712

Fat Free Muscle Area measurement based on clinical liver MRI workflow to assess sarcopenia

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Objective

Fat free muscle area (FFMA) is usually measured on T2WI-TSE sequence, but T2WI-TSE sequence is not routine MRI workflow, and the scanning time of T2WI-TSE sequence is obviously longer than T1WI e-dixon sequence, so we develop a new algorithm to measure FFMA on T1WI edixon-fat phase.

Method

16 patients with fatty liver (F:M=10:6, age 50 ± 1.2) underwent liver MRI examinations on a 3T system (MAGNETOM Vida, Siemens Healthineers). The protocols include an axial T1WI edixon sequence and T2WI TSE sequence without fat saturation. Typical scanning parameters are shown in table 1. First, an experienced radiologist carefully delineated the contour of bilateral psoas on the maximum cross-sectional images of lumbar spine three on T2WI TSE and T1WI edixon-fat phase, respectively, and generated the corresponding regions of interest. The total muscle area (TMA) of the psoas muscles was obtained by Itk-snap (www.itksnap.org). Subsequently, both images were converted to binary images based on signal intensity. On T2WI TSE and T1WI edixon-fat phase muscular tissue and adipose tissue are characterized by low and high signal intensity, respectively. Therefore, binarization allowed for separation of lean muscular tissue from intramuscular adipose tissue. Summation of pixels with high signal intensity and multiplication with the corresponding surface area resulted in intramuscular adipose tissue area (ATA), which was subtracted from TMA to obtain FFMA. The algorithm was implemented by scripts in MATLAB software, and the consistency was compared with the previous FFMA measurement results based on T2WI TSE image by Consistency check.

Result

The mean value of bilateral psoas FFMA at the maximum cross-sectional area of lumbar spine 3 vertebral body measured based on T1WI edixon-fat phase was 217.5 mm^2 (164.8, 332.5) and that measured based on T2WI TSE sequence was 238.2 mm^2 (152.7, 311.3). The intraclass correlation coefficient of the two method was 0.933 (ICC=0.933).

Conclusion

FFMA of bilateral psoas muscles based on edixon sequence proposed in this paper are highly consistent with those of previous methods based on T2WI TSE sequence. This method is possible to provide quantitative indicators for evaluating sarcopenia for routine clinical MRI examination

PO-2713

The Imaging Features of LI-RADS Nonviable or Equivocal Lesions in The First Follow-up Evaluation After TACE for HCC to Predict Recurrence

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Purpose: To investigate whether the imaging features of lesions evaluated as LI-RADS nonviable or equivocal during the first post-TACE imaging follow-up can predict recurrence in HCC patients. **Materials & Methods:** A total of 171 lesions from 149 patients were included in this study, retrospectively collected between February 2015 and October 2022. All patients underwent at least three enhanced magnetic resonance imaging examinations, with the first one conducted

before TACE and the second one during the first follow-up visit 1 to 2 months after TACE. The third follow-up was 6 to 12 months after TACE. The lesions were divided into two groups: no recurrence during long-term follow-up ($n = 128$) and recurrence during long-term follow-up ($n = 43$). Imaging features evaluated included irregular shape, size, internal homogeneity, non-smooth margin, arterial peritumoral enhancement, rim enhancement in portal venous phase or delay phase, peritumoral hyperintensity in T2WI or DWI. Using univariate and multivariate Logistic regression analysis to investigate imaging features which evaluated as LI-RADS nonviable or equivocal during the first post-TACE imaging follow-up associated with recurrence during long-term follow-up. The receiver operating characteristic curve was used to show the efficacy of imaging features in predicting LI-RADS Nonviable lesions; recurrence after TACE.

Results: After univariate analysis, the P values of non-smooth margin, arterial peritumoral enhancement and peritumoral hyperintensity in T2WI or DWI were less than 0.1, and the inclusion of these factors in multivariate analysis showed that non-smooth margin (OR, 3.96, 95% CI, 1.66, 9.44, $P = 0.002$) and peritumoral hyperintensity in T2WI or DWI (OR, 7.74, 95% CI, 3.32, 18.06, $P < 0.001$) were independent risk factors for recurrence of LI-RADS Nonviable lesions at 6 to 12 months. The area under the ROC curve using these two factors to predict the recurrence of LI-RADS Nonviable lesions at 6 to 12 months was 0.754.

Conclusion: Non-smooth border and peritumoral hyperintensity in T2WI or DWI are imaging features to predict recurrence in HCC patients with LI-RADS Nonviable lesions evaluated on the first post-TACE imaging follow-up.

PO-2714

Altered neural intrinsic oscillations in patients with multiple sclerosis: effects of cortical thickness

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Abstract

Objective: To investigate the effects of cortical thickness on the identification accuracy of fractional amplitude of low-frequency fluctuation (fALFF) in patients with Multiple sclerosis (MS).

Methods: Resting-state functional magnetic resonance imaging data was collected from 31 remitting MS, 20 acute MS, and 42 healthy controls (HCs). After preprocessing, we first calculated two-dimensional fALFF (2d-fALFF) maps using the DPABISurf toolkit. 2d-fALFF per unit thickness was obtained by dividing 2d-fALFF by cortical thickness. Then, between-group comparison, clinical correlation, and classification analyses were performed in 2d-fALFF and 2d-fALFF per unit thickness maps. Finally, we also examined whether the effect of cortical thickness on 2d-fALFF maps was affected by the subfrequency band.

Results: In contrast with 2d-fALFF, more changed regions in 2d-fALFF per unit thickness maps were detected in MS patients, such as increased region of the right-inferior frontal cortex and faded regions of the right-paracentral lobule and middle cingulate cortex and right-medial temporal cortex. There was a significant positive correlation between the disease duration and the 2d-fALFF values in the left-early visual cortex in remitting MS patients ($r = 0.517$, Bonferroni-corrected, $P=0.008 \times 4 < 0.05$). In contrast with 2d-fALFF, we detected a positive correlation between the 2d-fALFF per unit thickness of the right-ventral stream visual cortex and the modified Fatigue Impact Scale (MFIS) scores ($r=0.555$, Bonferroni-corrected, $P=0.017 \times 4 > 0.05$). 2d-fALFF and 2d-fALFF per unit thickness both performed remarkably well in support vector machine (SVM) analysis for detecting MS patients, especially in the remitting phase (AUC=86%, 83%). Compared with 2d-fALFF, the SVM model of 2d-fALFF per unit thickness had significantly higher classification performance in distinguishing between remitting and acute MS. More changed regions and more clinically relevant 2d-fALFF per unit thickness maps in the subfrequency band were also detected in MS patients.

Conclusion: The identification accuracy of fALFF in MS patients was detected to be potentially influenced by cortical thickness. Additionally, 2d-fALFF per unit thickness is a potential diagnostic marker that can be utilized to distinguish between the acute and remitting MS patients. Excitingly, we observed similar variations in the subfrequency band.

PO-2715

Bidirectional analysis of myocardial strain in healthy Chinese people by cardiac magnetic resonance-feature tracking

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Purpose: To investigate the difference of myocardial strain and the difference of CVI42 and Medis suppliers among healthy people of different ages in China.

Methods: 70 healthy Chinese people (30 males and 40 females) who fulfilled the inclusion criteria and showed normal CMR were enrolled and divided into three groups according to age: 24 in group 1 (18-45 years), 24 in group 2 (46-60 years) and 22 in group 3 (≥ 61 years). Film sequences of standard 2ch, 4ch and short-axis views of the heart were obtained by balanced SSFP sequences. Two physicians applied CVI42 and Medis to independently measure strain and strain rate in the left atrium, left ventricle and right ventricle, and with cross-repeated measurements. Statistics were performed using one-way ANOVA, Friedman's analysis, paired t-test and Wilcoxon test. Intra- and inter-observer group consistency tests were performed.

Results: 1. Myocardial strain in the 3 groups: 1) based on CVI42 measurements found that the differences in ϵ_e , ϵ_a , sGPLSr, eGPCSr and RsGPLSr were statistically significant; 2) based on the Medis measurements found that the differences in GPLS, eGPCSr, ϵ_e , ϵ_a , SRe, RGPLS, and RsGPLSr were statistically significant. 2. CVI42 vs Medis: GPLS ($-15.6 \pm 4.5\%$ vs. $-22.6 \pm 3.6\%$), GPCS ($-17.1 \pm 1.9\%$ vs. $-15.7 \pm 2.5\%$), sGPLSr (-0.9 ± 0.2 s⁻¹ vs. -1.2 ± 0.3 s⁻¹), eGPLSr (0.9 ± 0.2 s⁻¹ vs. 1.2 ± 0.4 s⁻¹), ϵ_s ($27.9 \pm 8.6\%$ vs. $40.1 \pm 8.6\%$), ϵ_e ($14.0 \pm 5.6\%$ vs. $23.6 \pm 7.7\%$), ϵ_a ($13.7 \pm 4.6\%$ vs. $16.8 \pm 6.8\%$), RGPLS ($-18.7 \pm 3.1\%$ vs. $-29.3 \pm 3.9\%$), RsGPLSr (-1.0 ± 0.2 s⁻¹ vs. -1.6 ± 0.3 s⁻¹), and ReGPLSr (1.0 ± 0.3 s⁻¹ vs. 1.3 ± 0.4 s⁻¹) were statistically significant differences ($p < 0.01$). Myocardial strain and strain rate measured by CVI42 and Medis had good intra- and inter-observer reproducibility.

Conclusion: Physiological changes in atrial strain occur most sensitivity at different ages, and the normal reference values for myocardial strain cannot be standardized across different providers, which may need to be addressed in the future from technical and AI.

PO-2716

Altered effective connectivity and patterns in fronto-striatal circuit is associated with the cognitive decline in patients with type 2 diabetes

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Background: As a common complication of type 2 diabetes mellitus (T2DM), mild cognitive impairment (MCI) has always been the focus of research, but its neural mechanism has not been clarified. Brain insulin resistance in patients with type 2 diabetes results in decreased dopamine secretion, leading to abnormal brain activity in the prefrontal striatal circuit, which may be a potential mechanism of cognitive dysfunction.

Methods: This study prospectively included 46 T2DM without MCI, 48 T2DM with MCI, and 41 healthy controls (HCs). In the constructed prefrontal-striatal network, graph theory and dynamic functional connectivity (dFC) analysis were used to explore the global performance of the network. Graph theory and functional connectivity (FC) were used to select important node brain regions, and then the Granger causality analysis was used for effective connectivity to find important brain regions and their conduction information flow.

Results: At the global efficiency level of the network, both graph theory and dFC features indicated differences among the three groups, with HC performing the best, T2DM without MCI performing the worst, and T2DM-MCI between these two groups. In the analysis of nodes, the left caudate, left putamen, and bilateral nucleus accumbens were important nodes. The information flow transmitted from the left caudate to the left middle frontal gyrus during effective connectivity was significantly reduced in the T2DM-MCI group compared to the HCs group.

Conclusion: The above results indicated that the changes of brain activity in the prefrontal-striatal circuit and the information flow from the left caudate to the left middle frontal gyrus were involved in the occurrence of cognitive impairment in diabetes, which may be the underlying neural mechanism of MCI in T2DM. Subsequently, it is necessary to verify this result in larger sample sizes and animal experiments, in an attempt to reveal this potential neural mechanism.

PO-2717

Altered effective connectivity of the pain matrix in herpes zoster and postherpetic neuralgia patients: a resting-state fMRI study with granger causality analysis

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Objectives: This study aimed to compare the differences of effective connections in the "pain matrix" between Herpes Zoster (HZ) and Postherpetic Neuralgia (PHN) patients and healthy controls using Granger causality analysis (GCA), in order to further understand the interaction patterns between brain regions, and to investigate the relationship between changes in effective connections and clinical features.

Methods: Resting-state fMRI scans were performed on 55 HZ; 55 PHN; and 50 age-, sex- and education-year-matched healthy controls (HCs). The brain regions associated with the pain matrix, namely the bilateral thalamus, insula, parahippocampal gyrus, amygdala, primary somatosensory cortex, primary somatomotor cortex, anterior cingulate gyrus, subparietal lobule, and dorsolateral prefrontal cortex (DLPFC) are used as the seeds of functional connectivity (FC). GCA was used to

analyze effective connections in brain regions that differed significantly between groups. Then the correlation between GCA values and clinical indicators was studied.

Results: Compared with HC, GCA values between thalamus and amygdala, between thalamus and anterior central gyrus, thalamus to posterior central gyrus, parahippocampal back to amygdala and cingulate gyrus were significantly decreased in HZ patients. Compared with HC, the GCA values between DLPFC and cingulate gyrus were significantly reduced in PHN patients between insula and posterior central gyrus, between insula and inferior parietal lobule, after central back to amygdala, and parahippocampal back to inferior parietal lobule. Compared with HZ, GCA values between the parahippocampal gyrus and the inferior parietal lobule, between the inferior parietal lobule and the cingulate gyrus, from the inferior parietal lobule to the DLPFC, and from the cingulate back to the amygdala were significantly increased in PHN patients. In HZ patients, the course of disease was negatively correlated with the GCA value between the parahippocampal gyrus and the subparietal lobule; in HZ patients, the VAS was negatively correlated with the GCA value between the thalamus and the right amygdala, and the GCA value from the anterior cingulate gyrus to the subparietal lobule; in HZ patients, the HAMD score was positively correlated with the GCA value of the anterior cingulate gyrus. The VAS of PHN patients was positively correlated with the GCA value of the central posterior insular lobe.

Conclusion: There are significant differences in the effective connections between HZ and PHN patients and the brain regions associated with HC pain matrix, and there is a significant correlation with clinical characteristics, which not only indicates that these brain regions play a key role in the complex pathophysiology of HZ and PHN patients, but also complements the non-directional functional connections in previous studies, which provides us with new insights into the neuroimaging mechanisms of shingles.

PO-2718

Quantitative analysis of four-dimensional blood flow in cardiac magnetic resonance: A preliminary study on the loss of left ventricular viscous energy by vortex ring in healthy people

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Objective To evaluate the characteristics of left ventricular viscous energy loss in healthy people by using four dimensional flow technique of cardiac magnetic resonance. **Methods** This study was a retrospective observational study, and the basic clinical data and CMR images of healthy people who met the criteria of the exclusion were screened in the radiology department of Ningxia Medical University General Hospital from May 1, 2019 to November 31, 2021. In this study, the healthy people were divided into two groups according to whether the blood flow produced a vortex ring in the left ventricular chamber. The basic left ventricular function and viscous energy loss parameters of the healthy people were measured by CVI42 post-processing software. According to the data distribution characteristics, independent sample t test or Mann-Whitney U test were selected to compare and analyze the imaging parameters of the two groups. The influencing factors of eddy current ring were analyzed by univariate and multifactorial logistic regression. **Results** A total of 38 healthy people were included in this study, of which 25 were in the eddy current group, aged 18-51 years old, with an average age of 28.89 years old, including 12 males. There were 13 patients in the group without eddy current, ranging in age from 24 to 46, with an average age of 31, including 10 males. For the basic data and basic left ventricular function parameters of healthy people, the body weight, BMI and the overall peak wall thickness (diastolic period) of the group without eddy current were significantly higher than those of the group with eddy current, and the difference was

statistically significant (body weight: 60.54 ± 10.56 vs 71.65 ± 10.25 ; BMI: 21.20 ± 5.95 vs 24.22 ± 7.55 ; The overall peak wall thickness (diastolic) was 8.19 ± 1.42 vs 9.73 ± 1.64 , the group with eddy current vs. the group without eddy current, $P \leq 0.01$). For the viscous energy loss in the left ventricle, the peak viscous energy loss in the left ventricle in the group without vortex generation was significantly greater than that in the group with vortex generation at all periods of the cardiac cycle, and the difference was statistically significant (systolic period: 0.49 ± 0.24 vs 0.94 ± 0.38 ; Early diastolic phase: 0.90 ($0.80, 1.10$) vs 1.30 ($0.95, 1.80$); Late diastolic period: 0.32 ± 0.15 vs 0.61 ± 0.18 , unit: mW, $P < 0.01$). Conclusion The generation of vortex ring can reduce the loss of peak viscous kinetic energy of blood in ventricular movement, and is more beneficial to the heart pumping. With the increase of body mass index, there will be an adaptive restructuring of the heart, affecting the production of vortex rings.

PO-2719

Establishment and validation of a Nomogram Clinical prediction model for osteoporosis based on magnetic resonance DXION and MT techniques

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Purpose: Based on the high incidence rate and occult of osteoporosis, as well as the deficiency of bone mineral density in the diagnosis of osteoporosis, magnetic resonance imaging is used more and more widely. Therefore, this study attempts to construct a clinical prediction model for osteoporosis using magnetic resonance technology using a nomogram.

Methods: 287 patients were collected and enrolled in the study. In a 7:3 ratio, 207 patients were randomly assigned to the training group: No Osteoporosis ($n=106$), Osteoporosis ($n=101$), and 80 patients to the validation group: No Osteoporosis ($n=39$), Osteoporosis ($n=41$). QCT bone mineral density examination was carried out for participants to measure BMD, and clinical data (gender, age, height, weight, BMI, marital status, education experience, drinking history, smoking history, diabetes history, fatty liver history) were collected. Then, magnetic resonance multi echo Dxion and magnetic transfer imaging were carried out, and the average FF and MT values of lumbar vertebrae 1, 2, and 3 were measured on the lumbar fat map and magnetic transfer map. A logistic regression analysis was conducted on these data. Established a clinical prediction model using column charts. The nomogram model was validated through ROC curves, calibration curves, and DCA curves.

Results: 1. There was no significant difference in the osteoporosis rate between training and testing set (48.8% vs. 51.3%, $P = 0.157$). Patients in the non-osteoporotic group had more male ratio than those in the osteoporotic group and the difference was statistically significant in the training cohort (50.9% versus 16.8%, $p < 0.001$), but gender did not have a statistical significance between two groups in the validation cohort (41.0% versus 26.8%, $p = 0.185$). In both the training cohort and the validation cohort, there were significant differences in the distributions of age, weight, BMI, diabetes, FF and MTR between the non-osteoporotic and osteoporotic group (all, $p < 0.05$). There were no significant differences in height, marital status, education level, manual laborer or not, fatty liver, history of drinking and smoking (all, $p > 0.05$).

2. Multivariate logistic regression analysis confirmed that four risk factors (gender: OR= 4.658, 95% CI: 1.411–15.374, $P=0.012$; age: OR= 3.274, 95% CI: 1.241–8.637, $P<0.017$; FF: OR=1.242, 95% CI: 1.120–1.378, $P<0.001$; MTR: OR= 0.706, 95% CI: 0.606–0.822, $P<0.001$) were significant independent predictors of osteoporosis.

3. The AUCs for the nomogram, FF and MTR models were 0.933, 0.890 and 0.899, respectively, in the training cohort and 0.923, 0.877 and 0.886, respectively, in the validation cohort. The calibration curve of the nomogram demonstrated very good reliability in evaluating osteoporosis in the training and validation cohorts ($P > 0.050$). If the risk threshold probability is set over 5%, nomogram models have more advantages to predict osteoporosis than FF model and MTR model.

Conclusions: The nomogram models clinical prediction model based on gender, age, FF value, and MT value has good universality and clinical benefits. The clinical prediction model of nomogram models is easy to generalize, which helps to better screen for osteoporosis in the general elderly population and achieve early detection and diagnosis.

PO-2720

Preoperative Vascular Heterogeneity Based on Dynamic Susceptibility-weighted Contrast MRI in Predicting Spatial Pattern of Locally Recurrent High-grade Gliomas

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Objectives: To investigate if spatial recurrence pattern is associated with patient prognosis, and whether MRI vascular habitats can predict spatial pattern.

Methods: In this retrospective study, 69 patients with locally recurrent high-grade gliomas (HGGs) were included. The cohort was divided into intra-resection cavity recurrence (ICR) and extra-resection cavity recurrence (ECR) patterns, according to the distance between the location of the recurrent tumor and the resection cavity or surgical region. Four vascular habitats, high angiogenic tumor, low angiogenic tumor, infiltrated peripheral edema, and vasogenic peripheral edema were segmented and vascular heterogeneity parameters were analyzed. The survival and diagnostic performance under different spatial recurrence patterns were analyzed by Kaplan-Meier and ROC. A nomogram model was constructed by regression analysis and validated by bootstrapping technique.

Results: Progression-free survival (PFS) and overall survival (OS) were longer for ICR (n=32) than those for ECR (n=37) (median PFS: 8 vs. 5 months, median OS: 17 vs. 13 months, $p < 0.05$). MRI vascular habitats analyses showed ECR had higher median relative cerebral blood volume (rCBV_{median}) at each habitat than ICR (all $p < 0.01$). The rCBV_{median} at IPE had good diagnostic performance (AUC: 0.727, 95%CI: 0.607, 0.828). The AUC of the nomogram based on MRI vascular habitats and clinical factors was 0.834 (95%CI: 0.726, 0.913) and was confirmed as 0.833 (95%CI: 0.830, 0.836) by bootstrapping validation.

Conclusions: The spatial pattern of locally recurrent HGGs is associated with prognosis. MRI vascular heterogeneity parameter could be used as non-invasive imaging marker to predict spatial recurrence pattern.

PO-2721

Radiomic analysis based on intratumoral heterogeneity to predict spatial recurrence patterns of high-grade gliomas

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Purpose: To investigate whether radiomic features extracted from intratumoral region can predict spatial patterns in locally recurrent high-grade gliomas (HGGs).

Methods: We included 118 patients with locally recurrent HGGs after maximum safe surgical resections and radiotherapy combined with temozolomide (training set, $n = 82$; validation set, $n = 36$). Local recurrence was divided into intra-resection cavity recurrence (ICR) and extra-resection cavity recurrence (ECR), according to the distance between the recurrent tumor and the surgical area or resection cavity. Radiomic features were extracted from the intratumoral region on contrast-enhanced T1-weighted imaging (CE-T1WI). The least absolute shrinkage and selection operator

was used to select the radiomic features and create the radiomics score. In addition, a radiomic nomogram combining the radiomics score and clinical factors was constructed and evaluated using calibration curves and the area under the receiver operating characteristic curve (AUC).

Results: Eleven features with nonzero coefficients related to spatial recurrence patterns were selected. The radiomics score of patients with ECR was higher than that of patients with ICR in the training set [0.536 (0.172-0.935) vs. -0.166 (-0.422-0.169), $p < 0.001$] and in the validation set [0.568 (0.380-1.225) vs. -0.068 (-0.430-0.464), $p < 0.001$]. The radiomics score performed well in training and validation sets with AUCs of 0.870 and 0.830, respectively. Likewise, the radiomics nomogram combining the radiomics score and the ventricular entry showed good calibration and performance in the training (AUC:0.887) and validation (AUC:0.882) sets.

Conclusion: Radiomic features extracted from the intratumoral region using preoperative CE-T1WI can noninvasively predict the spatial recurrence patterns of HGGs.

PO-2722

Diagnostic performance of modified O-RADS score combined with clinical features in the assessment of adnexal lesions with solid tissue based on non-DCE MRI

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Objective: to compare the diagnostic efficacy of Ovarian-Adnexal Reporting and Data System (O-RADS) MRI with the modified O-RADS scoring system based on non-dynamic contrast-enhanced (non-DCE) MRI for the classification of benign and malignant lesions with solid tissue. And evaluate the add value of clinical or imaging features to improve the ability of the scoring system to classify adnexal masses.

Methods and materials: This study was a two-center study, patients with adnexal masses containing solid tissue underwent pelvic MRI between January 2018 and March 2022 were retrospectively reviewed. Patients undergoing surgery and confirmed by histopathology were included in this study. Two experienced radiologists independently read the images and assigned the O-RADS MRI score and modified O-RADS score, respectively. Histopathology was used as the reference standard. The diagnostic efficacy of the two scoring methods was compared. Univariate and multivariate logistic regression was performed to evaluate the add value of significant features to predict malignant tumors.

Results: A total of 124 patients with 124 adnexal masses (40 benign, 84 malignant) were enrolled in this study. The diagnostic efficacy of modified O-RADS score in differentiating benign and malignant adnexal masses was higher than that of O-RADS MRI score, with sensitivity of 71.5% and 100.0%, specificity of 75.0% and 12.5%, the area under the curve was 0.732 and 0.563 ($p < 0.001$), respectively. Multivariate analysis showed that the modified O-RADS score 4b or 5 combined with patient age > 38.5 years, nullipara, maximum diameter > 40.5 mm and HE4 > 78.9 pmol/L significantly improved the diagnostic efficiency up to 0.954 ($p < 0.001$).

Conclusion: Modified O-RADS score can improve the differential diagnostic efficiency of benign and malignant adnexal masses with solid tissue based non-DCE MRI, and combined with certain clinical features can significantly improve the diagnostic performance.

PO-2723

T1 mapping and hepatocyte uptake indices in gadoxetic acid-enhanced MRI for Quantitative Evaluation of Liver Function

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Objective: This study aimed to explore the utility of T1 mapping and hepatocyte uptake indices in gadoxetic acid-enhanced MRI (EOB-MRI) for quantitatively assessing liver function.

Methods: We examined 183 patients with chronic hepatitis B or suspected liver focal disease using EOB-MRI with B1 inhomogeneity-corrected T1 mapping. Based on their albumin-bilirubin (ALBI) grade, they were categorized into four groups: Normal Liver Function (NLF), ALBI1, ALBI2, and ALBI3. We measured and calculated T1 relaxation times before and after contrast (T1pre and T1post), the rate of decrease in T1 relaxation time ($\Delta T1$), and the contrast uptake rate (Khep). Relationships between these T1 mapping parameters and the hepatocyte index and ALBI grade were determined using Spearman's correlation. The differences across ALBI groups were assessed with the Kruskal-Wallis test, followed by pairwise comparisons using the Mann-Whitney test. Receiver Operating Characteristic (ROC) curves assessed the discriminative power of T1 mapping and hepatocyte indices for liver function groups, with the DeLong test comparing ROC areas. A p-value below 0.05 indicated statistical significance.

Results: Significant differences were observed in T1 mapping and hepatocyte indices (T1pre, T1post, $\Delta T1$, and Khep) across the NLF and ALBI groups. T1post and Khep showed a strong correlation (ρ : 0.75-1.00) with ALBI grades, whereas $\Delta T1$ exhibited a moderate correlation (ρ : 0.5-0.75), and T1pre showed a weak correlation (ρ < 0.5). The T1pre values decreased in the advanced liver function impairment (ALBI3) group. Through pairwise comparison, both T1post and Khep showed statistically significant differences in discriminating all different liver function groups. Moreover, T1post, $\Delta T1$, and Khep also showed statistically significant differences in discriminating different liver function groups in stratified classification. For discriminating the NLF group from the ALBI1+2+3 group, the AUCs of T1pre, T1post, $\Delta T1$, and Khep were 0.75, 0.93, 0.85, and 0.90. For discriminating the NLF+ ALBI1 group from the ALBI2+3 group, the AUCs of T1pre, T1post, $\Delta T1$, and Khep were 0.69, 0.89, 0.83, and 0.88. For discriminating the NLF+ ALBI1+2 group from the ALBI3 group, the AUCs of T1pre, T1post, $\Delta T1$, and Khep were 0.51, 0.89, 0.76, and 0.94.

Conclusion: T1 mapping and hepatocyte uptake indices (T1post, $\Delta T1$, and Khep) showed good performance in differentiating different ALBI liver function groups, except for $\Delta T1$. T1post was the best in differentiating early liver function impairment groups, while Khep was the best in differentiating poor liver function groups.

PO-2724

The association between glymphatic system dysfunction and alterations in cerebral function and structure in patients with white matter hyperintensities

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Objective: To explore the relationship between the glymphatic system and alterations in the structure and function of the brain in white matter hyperintensity (WMH) patients.

Methods: MRI data were collected from 27 WMH patients and 23 healthy controls (HCs). The along perivascular space (ALPS) indices were calculated for each subject, and the anterior corner distance of the lateral ventricle and the width of the third ventricle were measured. The DPABISurf tool was used to calculate the cortical thickness and cortical area. In addition, DPARSF was used to calculate regional homogeneity (ReHo), degree centrality (DC), amplitude low-frequency fluctuation (ALFF), fractional amplitude of low-frequency fluctuation (fALFF) and voxel-mirrored homotopic connectivity (VMHC). In addition, each WMH patient was evaluated on the Fazekas scale. Finally, the correlation analysis of structural indicators and functional indicators with bilateral ALPS indices was investigated using Spearman correlation analysis.

Results: The ALPS indices of WMH patients were lower than those of HCs (left: $t=-4.949$, $P < 0.001$; right: $t=-3.840$, $P < 0.001$), and the width of the third ventricle and the distance of the anterior corner of the lateral ventricle were higher than those of HCs ($P < 0.05$). This study found that ALFF, fALFF, ReHo, DC, and VMHC values in some brain regions of WMH patients were alternated (AlphaSim corrected, $P < 0.005$, cluster size > 26 voxel, rmm value=5), and the cortical thickness and cortical area of WMH patients showed trend changes ($P < 0.01$, cluster size $> 20\text{mm}^2$, uncorrected). Interestingly, we found significantly positive correlations between the left ALPS indices and DC values in the superior temporal gyrus ($r=0.494$, $P=0.009$, $P \times 5 < 0.05$, Bonferroni correction).

Conclusions: We found that glymphatic dysfunction positively correlated with DC values in the left superior temporal gyrus in WMH patients. Our results suggest that glymphatic system impairment is related to the functional centrality of local connections in patients with WMH.

PO-2725

White Matter Hyperintensity Predicts Future Financial Capacity Impairment: A Study Based on Cognitively Normal Older Adults

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Background

This study explores the link between small vessel disease (SVD) and financial capacity in cognitively unimpaired (CU) older adults.

Methods

A total of 414 CU participants (mean age 73.2 ± 7.6 , 59.7% women) were recruited at baseline. Among the initial 414 participants, 104 (25.1%), 240 (57.9%), and 141 (34.0%) underwent follow-up visits after had one, two, and four years, respectively. Participants were assessed using the Financial Capacity Instrument-Short Form (FCI-SF) to evaluate cross-sectional and longitudinal financial capacity. Baseline MRI, amyloid, and tau PET scans were performed to calculate SVD total score and individual SVD severity, including white matter hyperintensities (WMH), dilated perivascular space (dPVS), cerebral microbleed (CMB), and lacune based on MRI results. Linear mixed estimates were used to examine the effects of SVD on baseline and long-term financial capacity, accounting for factors like age, sex, education, Alzheimer's disease (AD) related pathologies, and vascular risk.

Results

SVD total score associated with baseline bank statement management (BANK, $\beta=-0.12$, $p < 0.05$) and long-term FCI-SF ($\beta=-0.33$, $p < 0.01$) and single chequebook register (SNG, $\beta=-2.03$, $p < 0.05$) decline. Individual SVD components also showed associations; lacune and CMB were linked to baseline financial conceptual knowledge ($\beta=-0.17$, $p < 0.005$) and BANK ($\beta=-0.14$, $p < 0.01$), respectively. WMH and CSO-dPVS were related to FCI-SF decline ($\beta=-0.29$ and -0.52 , respectively, $p < 0.05$), and WMH indicated future decline in financial conceptual knowledge ($\beta=-0.05$, $p < 0.05$).

and single chequebook register ($\beta=-0.14$, $p<0.01$). The impact of SVD on financial capacity was more pronounced in APOE $\epsilon 4$ carriers.

Conclusions

SVD is linked to cross-sectional and longitudinal financial capacity impairment in cognitively unimpaired older adults, emphasizing SVD prevention for maintaining financial capacity.

Impact Statement

We certify that this work is novel clinical research. This study investigates how small vessel disease (SVD) affects financial capacity in cognitively unimpaired older adults. It reveals that higher baseline SVD is linked to impairment in complex financial tasks, and those with more initial SVD experience accelerated financial decline. This impact is more significant in APOE $\epsilon 4$ carriers. Our findings emphasize the importance of monitoring SVD-related changes in financial capacity to prevent losses, particularly among genetically vulnerable individuals.

PO-2726

Radiomic Models for Distinguishing Unstable Carotid Plaques from Stable Carotid Plaques on High-resolution Vessel Wall MRI

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Objective: To build radiomic models in differentiating unstable carotid plaques from stable carotid plaques based on T1-weighted imaging (T1WI) and contrast-enhanced T1WI (CE-T1WI) of high-resolution vessel wall magnetic resonance imaging (HR VW-MRI) through machine learning (ML) algorithm, to assess plaque vulnerability and reveal the relationship between plaque enhancement and plaque development mechanisms.

Materials and methods: The existing cases of CUBE T1WI and CE-T1WI HR VW-MRI examination of carotid plaques in the Department of Radiology, Huashan Hospital, Fudan University from January 2017 to December 2020 were retrospectively collected for internal training and testing. In addition, image data from another medical facility undergoing the same examination were collected for external verification. A brain MRI examination should have been performed within 3 months after the subjects completed the VW-MRI examination of carotid plaques, to determine the plaque vulnerability. ITK-SNAP software was used to delineate the region of interest of plaques, and the Standardized Environment for Radiomics Analysis toolkit of MATLAB software was used to extract 487 imaging radiomic features. The ElasticNet algorithm was used to build the radiomic model. The leave-one-out cross-validation was used to carry out internal tests. The diagnostic abilities of these models were evaluated using the area under receiver operating characteristic curve (AUC) analysis. In addition, the models were validated by external data sets and compared to radiologists' diagnoses.

Results: The VW-MRI image data of 120 patients in our hospital were used for model construction. Eleven features were used to build the T1WI radiomic model and 16 features were used to form the CE-T1WI radiomic model. The results of internal testing showed that the CE-T1WI radiomic model had better AUC ($0.885>0.838$), accuracy (ACC) ($0.825>0.779$) and sensitivity (SEN) ($0.883>0.783$) than the T1WI radiomic model. The AUC ($0.885>0.840$), ACC ($0.825>0.800$) and SEN ($0.883>0.880$) of the CE-T1WI radiomic model were superior to those of radiologists. The AUC ($0.838<0.840$), ACC ($0.779<0.800$), SEN ($0.783<0.880$) and SPE ($0.771<0.800$) of the T1WI radiomic model were all worse than those of the radiologists. VW-MRI images of 92 patients were retrospectively collected from the radiology department of another hospital for external

validation of the models, and the results showed that the diagnostic performance of the T1WI and the CE-T1WI radiomic models was similar. The ACC ($0.727 > 0.719$) and SPE ($0.615 > 0.583$) of the CE-T1WI radiomic model were slightly better than those of the T1WI model, while the AUC ($0.800 < 0.804$) was slightly worse than that of the T1WI model, and their SEN (0.800) was the same. However, the AUC (0.804 , $0.800 < 0.815$), ACC (0.719 , $0.727 < 0.787$), SEN (0.800 , $0.800 < 0.850$) and SPE (0.583 , $0.615 < 0.780$) of both models were slightly worse than those of radiologists.

Conclusion: The radiomic model based on CE-T1WI of HR VW-MRI had some value for evaluating the vulnerability of carotid artery plaques, and it could establish the relationship between plaque enhancement and pathologic mechanisms related to plaque development. However, large sample size data sets are still needed for ML training to optimize and improve the generalization ability and repeatability of the model.

PO-2727

Effects of bright light therapy on cingulate cortex dynamic functional connectivity and neurotransmitter activity in young adults with subthreshold depression: A double-blind randomized controlled trial

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BACKGROUND: Subthreshold depression is a strong risk factor for the onset of major depressive disorder and is associated with an increased burden of disease and suicide risk. Bright light therapy (BLT) is one of the effective interventions for subthreshold depression, but its neural mechanism is still unclear. Neurotransmitter systems have been proposed to involve in the mechanisms of light therapy. The goal of this double-blind, randomized, placebo-controlled clinical trial was to assess the correlation between BLT and the dynamic functional connectivity (dFC) changes in the cingulate cortex along with distribution of specific neurotransmitters in subthreshold depression.

METHODS: Participants with subthreshold depression were randomly assigned to either the BLT group ($N = 38$) or the placebo group ($N = 39$). The primary outcome was Hamilton Depression Rating Scale (HDRS), and secondary outcomes were Centre for Epidemiologic Studies Depression Scale (CESD) and Hamilton Anxiety Scale (HAMA), which were assessed before and after 8 weeks. The participants also underwent resting-state functional magnetic resonance imaging before and after 8 weeks. The subgenual, pregenual and the supracallosal anterior cingulate cortex (subACC, preACC, supACC), middle cingulate cortex (MCC) and posterior cingulate cortex (PCC) seed-based whole-brain dFC analysis was conducted. Besides, a multivariate regression model was adopted to predict HDRS and CESD scores changes after BLT. Furthermore, JuSpace toolbox was used to calculate the associations between dFC (pre- and after interventions) and neurotransmitter activity in the BLT group.

RESULTS: BLT group showed decreased CESD score ($t = 3.195$, $p = 0.002$) and HDRS score ($t = 3.232$, $p = 0.002$) from pre-treatment to post-treatment compared to the placebo group. Also, compared to baseline, BLT group showed increased dFC of the right supACC-right temporal pole (TP), left MCC-right insula, and left supACC-pons, and decreased dFC of the right supACC-right middle frontal gyrus (MFG) after intervention. Changes in dFC of the right supACC-right TP showed positive correlation with changes in CESD score (significant: $r = 0.522$, $p = 0.003$) and HDRS score (marginally significant: $r = 0.346$, $p = 0.061$) before and after BLT. Moreover, combining the baseline dFC variability of the cingulate cortex could predict HDRS changes in BLT. Finally, compared to baseline, the supACC and MCC dFC changes after BLT showed significant

correlations with the serotonergic, dopaminergic, noradrenergic systems as well as the GABAergic and glutamatergic maps.

CONCLUSIONS: These results suggested that BLT alleviates depressive symptoms and changes the cingulate cortex dFC variability in subthreshold depression, which raises the possibility that pre-treatment dFC variability of the cingulate cortex could be used as a biomarker for improved BLT treatment in subthreshold depression. Furthermore, dFC changes with specific neurotransmitter systems after BLT may underline the antidepressant mechanisms of BLT.

PO-2728

Alterations of apparent diffusion coefficient from ultra-high b-values in the bilateral thalamus and striatum in MRI-negative refractory epilepsy

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Background: Subcortical nuclei such as the thalamus and striatum have been shown to be related to seizure modulation and termination, especially in refractory epilepsy. And the potential roles of the aquaporin-4 (AQP4) in epilepsy have been mentioned in previous studies. However, no studies have reported the AQP4 abnormalities in vivo in the subcortical nuclei in refractory epilepsy. Therefore, this study aimed to assess AQP4 function reflected by the apparent diffusion coefficient (ADC) from ultra-high b-values (ADC_{uh}) in MRI-negative refractory epilepsy.

Methods: Twenty-nine patients with MRI-negative refractory epilepsy and 18 healthy controls underwent enhance diffusion weighted imaging (eDWI) with 15 b-values (0-5,000 s/mm²). The eDWI parameters such as standard ADC (ADC_{st}), pure water diffusion (D) and ADC_{uh} were calculated from the 15 b-values. Regions-of-interest analyses were conducted in the bilateral thalamus, caudate nucleus, putamen and globus pallidus and ADC_{st}, D and ADC_{uh} values were compared between the epilepsy patients and controls.

Results: ADC_{uh} values in the bilateral thalamus, caudate nucleus, putamen and globus pallidus in MRI-negative refractory epilepsy were significantly higher than those in the healthy control subjects (all $P < 0.05$), ADC_{st} value in the right thalamus was significantly lower than those in the healthy control subjects ($P < 0.05$).

Conclusion: The alterations of the ADC_{uh} values in the bilateral thalamus and striatum may reflect abnormal AQP4 function in MRI-negative refractory epilepsy. ADC_{uh} might be a useful measurement for evaluating subcortical nuclei related brain damage in epilepsy patients.

PO-2729

Performance of 0.55T magnetic resonance imaging (MRI) for parotid gland: Comparison with 1.5T and 3T MRI

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Purpose: To evaluate the clinical performance of 0.55T versus 1.5T and 3T magnetic resonance imaging (MRI) systems for parotid glands.

Materials and Methods: Nineteen healthy volunteers were prospectively recruited and underwent maxillofacial imaging using MRI systems with field strengths of 0.55T, 1.5T and 3T. The scanning protocols included T2 fat-saturation (T2-FS) sequence and diffusion imaging sequences with

multiple b values across the three different field strengths. Two radiologists, with 5 and 15 years' diagnostic experience in head and neck imaging, made subjective scores according to the 5-point method in five aspects on the T2-saturation images with a double-blind manner. Objective image quality was evaluated by measuring signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) on T2-FS images. The quantitative degree of the parotid gland distortion in diffusion-weighted imaging (DWI), the stability and interval range differences of ADC, as well as parameters derived from intravoxel incoherent motion-diffusion kurtosis imaging (IVIM-DKI) were compared under different field strengths. Statistical analysis was performed using Graphpad Prism 8.0 software while image fusion was conducted using 3D slicer software. Differences in quality measurement and quantitative parameters were analyzed using one-way ANOVA. The Spearman's coefficient correlation was used for the inter-observer consistency analysis. Bland-Altman method was used to evaluate the stability of corresponding parameters along with calculation of coefficients of variation (CV). Differences were considered statistically significant at $P < 0.05$.

Results: The SNR and CNR of T2-FS in 0.55T were the lowest; however, no significant differences were found between 0.55T and 1.5T ($P > 0.05$). The degree of distortion with DWI in 0.55T was significantly lower than 1.5T using SS-EPI ($P < 0.0001$), while no differences were found in axial slices compared with RESOLVE-DWI in 3T. The stability of ADC was the highest in 0.55T versus 1.5T and 3T. Additionally, the corresponding parameters of different diffusion sequences in 0.55T were significantly different in contrast with higher field strengths ($P < 0.0001$), in addition to the D values ($P > 0.05$). The stability of D values across different field strengths were the highest, while D^* values were the lowest.

Conclusion: The results demonstrated that 0.55T could significantly reduce image distortion and retain stable ADC values in DWI and present comparable image quality in morphologic imaging with 1.5T, which will be helpful for patients with limited condition to achieve the normal diagnostic effect. The diffusion parameters of IVIM-DKI in 0.55T showed significant difference with 1.5T and 3T, with the exception of D values. Therefore, the use of diffusion parameters as biomarkers for the clinical practice of parotid gland tumors across different field strengths should be carefully considered.

PO-2730

Abnormal Functional Connectivity in the Fronto-Striatal Network in adolescent depression with Psychotic Symptoms

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Background:

Depression is a mental disorder with a high incidence and mortality rate, particularly common in adolescents. Adolescent depression with psychotic symptoms is characterized by more severe impairment and a poorer treatment response, along with a higher risk of suicide. Previous studies have demonstrated the involvement of the frontal striatal network (FSN) circuit in various psychiatric disorders such as depression, bipolar disorder and schizophrenia, indicating its crucial role in emotional regulation and cognitive control. However, it remains unclear whether adolescent depression with psychotic symptoms exhibits similar or different coupling with the orbitofrontal-striatal network. Therefore, the aim of this study is to compare adolescent depression, both with and without psychotic symptoms, in order to explore the potential disruptions in connectivity within the FSN and the neural mechanisms associated with psychotic symptoms

Methods:

The study included 77 adolescents diagnosed with depression. Based on the presence or absence of psychotic events such as hallucinations or delusions in their medical history, the participants were divided into two groups: the group with psychotic symptoms ($n=33$) and the group without psychotic symptoms ($n=44$). The Brief Psychiatric Rating Scale (BPRS) was used to assess the severity of psychotic symptoms, and the Patient Health Questionnaire-9 (PHQ-9) was used to assess the severity of depressive symptoms. Functional magnetic resonance imaging (fMRI) data were collected from each participant. Independent component analysis was then performed using the GIFT software to obtain the functional connectivity networks. The voxel-wise distribution of the FSN predominantly encompasses the frontal lobe and bilateral striatum regions, including the superior frontal gyrus, middle frontal gyrus, inferior frontal gyrus, anterior cingulate, frontal orbital cortex, caudate nucleus, putamen, and globus pallidus. Finally, two-sample t-tests were conducted to compare the two groups of participants.

Results:

There was no significant difference in sex, age, education years, disease duration, and PHQ-9 scores between the two subgroups. A significant difference in the BPRS total score was found ($P < 0.001$). The one-sample t-test revealed a typical spatial pattern in the FSN in each group, including superior frontal gyrus, middle frontal gyrus, inferior frontal gyrus, anterior cingulate, frontal orbital cortex, caudate nucleus, putamen, and globus pallidus. The adolescent depression with psychotic symptoms demonstrated decreased FSN connectivity in the bilateral caudate and bilateral putamen compared with the adolescent depression without psychotic symptoms (corrected at the cluster level using family-wise error, $P < 0.05$). Additionally, a negative correlation was observed between the left caudate, left putamen and BPRS scores ($r = -0.385$, $P = 0.030$) in adolescent depression with psychotic symptoms group.

Conclusion:

We found specific alterations in the striatum and temporal lobe in adolescent depression with psychotic symptom, providing new evidence for the pathogenesis of psychotic symptoms.

PO-2731

Application of Multi-echo in steady-state acquisition sequence in MR imaging of Inferior alveolar nerve

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Abstract

Purpose This study evaluated the performance of a 4-min multi-echo in steady-state acquisition (MENSA) sequence in MRI for the assessment of Inferior alveolar nerve.

Methods 15 subjects underwent MENSA sequence on a 3.0-T MRI scanner. Two Oral and Maxillofacial Surgery doctor and radiologist independently assessed the images for quality and diagnostic capability. A qualitative assessment scoring system for image quality and quantitative nerve signal-to-noise ratio (SNR) and inferior alveolar nerve and masseter muscle contrast-to-noise ratios (CNR) was applied. Using surgical reports as the reference, sensitivity, specificity, accuracy, and area under the receiver operating characteristic curves (AUC) were evaluated. Intraclass correlation coefficients (ICC) and weighted kappa were used to calculate reliability.

Results Weighted kappa and ICC values indicated good reliability. Sensitivity, specificity, and accuracy of diagnosis based on MENSA images were 96.23%, 89.47%, and 94.44%, respectively, and AUC was 0.929. Weighted kappa values for intraobserver (0.758) and interobserver (0.768–0.818) reliability were substantial to perfect.

Conclusion A time-efficient 4-min MENSA protocol exhibits superior image quality and high vascular contrast with the potential to produce high-resolution inferior alveolar nerve images.

PO-2732

The Value of Enhanced 3D-STIR Sequence in Detecting the Inferior Alveolar Nerve

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Abstract

Objective To explore the application value of Magnetic Resonance (MR) three-dimensional (3D) sampling perfection with application-optimized contrasts using different flip-angle evolution (SPACE) and the short time inversion recovery (STIR) sequences in displaying the inferior alveolar nerve.

Methods 10 volunteers were prospectively enrolled, non-enhanced and enhanced 3D-STIR MR sequence were performed using combined head and neck coil. Imaging scores of non-enhanced and enhanced 3D-STIR MR were evaluated. Moreover, signal intensity of the masseter muscle and medial pterygoid muscle were measured to calculate the signal intensity ratio (SIR) and contrast noise ratio (CNR).

Results The subjective score of image quality of enhanced 3D-STIR MR sequence was higher than that of non-enhanced sequence, which had excellent consistency among observers, and the Kappa coefficients were 0.912, 0.875, respectively. The SIR and CNR values of enhanced 3D-SPACE-STIR MR sequence of inferior alveolar nerve were higher than those of non-enhanced MR imaging.

Conclusion The image background suppression of enhanced 3D-STIR MR sequence was superior to that of non-enhanced 3D-STIR MR sequence; Enhanced 3D-STIR MR sequence can clearly show the inferior alveolar nerve.

PO-2733

DCE-MRI in cervical cancer: correlation between quantitative parameters and molecular markers HIF-1 α , VEGF, and Ki-67

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Background: To investigate whether dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) has the potential to non-invasively detect microenvironmental condition by quantitatively measuring blood perfusion, vessel wall permeability, and vascularity, and to elucidate the possible correlations between DCE-MRI quantitative parameters and the expression level of hypoxia, vascularity, and proliferation related molecular biomarkers.

Materials and methods: In this prospective single center clinical study, 58 patients diagnosed with cervical cancer underwent DCE-MRI before anticancer treatment were enrolled. Ktrans, Kep, Ve, and Vp were generated from Extended Toft's model. Then patients underwent colposcopy biopsy within 1 week after DCE-MRI. Pretreatment expression levels of HIF-1 α , VEGF and Ki-67 were assessed and scored by immunohistochemistry on colposcopy obtained tumor specimens.

Results: In HIF-1 α low-expression group, Ktrans ($p=0.031$) and Kep ($p=0.012$) values were significantly higher than the HIF-1 α high-expression group. In VEGF high-expression group, Ktrans ($p=0.044$) and Ve values ($p=0.021$) were significantly higher than the VEGF low-expression group. In Ki-67 high-expression group, Ktrans ($p=0.026$) and Kep ($p=0.033$) were significantly higher than the Ki-67 low-expression group. Multiple linear regression analyses and Pearson correlation revealed that Ktrans independently negatively correlated with HIF-1 α expression, Ve independently

positively correlated with VEGF, and Kep independently positively correlated with Ki-67. The area under the ROC curves of Ktrans for HIF-1 α , Ve for VEGF, and Kep for Ki-67 were 0.728, 0.743, 0.730, respectively.

Conclusion: Our results suggest that DCE-MRI quantitative parameters could be potentially used as imaging markers for non-invasively detecting microenvironmental hypoxia, vascularity and proliferation in cervical cancer patients.

PO-2734

Comparison of Monoexponential and Biexponential Model of Diffusion-Weighted Imaging in Grading Clear Cell Renal Cell Carcinoma

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PURPOSE

To compare the value of diffusion-weighted imaging (DWI) and intravoxel incoherent motion (IVIM) in grading clear cell renal cell carcinoma (ccRCC).

MATERIALS AND METHODS

96 patients with pathologically proven ccRCC were evaluated by DWI and IVIM on a 3-T scanner. These patients were divided into low-grade (grade I and grade II) and high-grade (grade III and grade IV) groups according to the WHO/ISUP classification system. The apparent diffusion coefficient (ADC), true diffusion coefficient (D), pseudodiffusion coefficient (D*), and perfusion fraction of pseudodiffusion (f) values were calculated. The Mann Whitney U test was used to compare the differences of parameters between the two groups; the receiver operating characteristic (ROC) analysis and Delong test was performed for all parameters.

RESULTS

Compared with low-grade ccRCC, the ADC and D values of high-grade ccRCC patients decreased, while the D* and f values increased, and the differences were statistically significant ($p < 0.05$). The cut-off values of ADC, D, D* and f value to distinguish low-grade and high-grade ccRCC were $1.50 \times 10^{-3} \text{mm}^2/\text{s}$, $1.12 \times 10^{-3} \text{mm}^2/\text{s}$, $33.19 \times 10^{-3} \text{mm}^2/\text{s}$, 0.31, respectively; the AUCs of ADC, D, D* and f value were 0.871, 0.942, 0.621, 0.894, and the AUC of D value was the highest. Based on the Delong test, the AUCD was significantly higher than AUCADC ($p = 0.018$) and AUCD* ($p < 0.001$), and there was no significant difference between AUCD* and AUCf ($p = 0.176$).

CONCLUSION

Compared with the monoexponential model DWI, the biexponential model IVIM was more valuable in grading ccRCC.

PO-2735

MRI radiomic features-based machine learning approach to identify H3 G34 mutation in patients with diffuse hemispheric glioma

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Purpose: Diffuse hemispheric gliomas, H3 G34-mutant (DHGs-G34m), are newly recognized aggressive brain tumors characterized by histone H3F3A point mutations at G34, and occur most often in cerebral hemispheres of teenagers and young adults. This study aimed to investigate the value of predicting H3 G34 mutation status by applying MR radiomics features of patients with diffuse hemispheric gliomas.

Methods: This retrospective study enrolled 47 patients with diffuse gliomas. We divided the patients into three groups for separate analysis (16 DHGs-G34m vs 16 GBMs-IDH-WT and 16 DHGs-G34m vs 15 GBMs-IDHm). The Feature Explorer (FAE) was performed to generate the ML pipeline and select important radiomics features. Metrics such as sensitivity, specificity, accuracy, and area under the curve (AUC) provided estimates of the performance of the FAE-generated models to identify the final best-performing model.

Results: There were 16 patients with DHG-G34m, 16 GBM-IDH-WT, and 15 GBM-IDHm patients included in our study. Patients with DHG-G34m were younger than that in IDH-wildtype or IDH-mutant GBM groups (mean age 22.38 years vs. 55.25 years, $p<0.01$, and 22.38 years vs. 42.87 years, $p<0.01$). It turned out that MR radiomics features could better distinguish DHGs-G34m from the other two groups. At first, in the stage of identifying DHGs-G34m patients from the GBMs-IDH-WT group, Logistic regression with LASSO (LR-LASSO) model based on 3 important features including original shape Least Axis Length, original shape Minor Axis Length, and original glrlm Gray Level Non-Uniformity achieved the best performance. On the validation data set, the AUC and the accuracy of the model were 0.982 and 0.949 (0.956 and 0.900 on the testing set), respectively. Then, for the comparative analysis of DHGs-G34m and GBMs-IDHm, original shape Sphericity, original first-order Kurtosis, and original glrlm Run Entropy 3 important features were selected by LR-LASSO model with the best performance, the AUC and the accuracy were 0.800 and 0.714 (0.959 and 0.929 on testing set) on validation data set. Moreover, the inclusion of more patients should be performed to further verify the diagnostic value of radiomics features in rare DHGs-G34m.

Conclusions: The ML algorithms with FAE based on radiomics features of conventional MR images provide high discriminatory accuracy in predicting the H3 G34 mutation status of diffuse hemispheric glioma.

PO-2736

Effects of acupuncture treatment on changes in the brain structural covariance network in patients with primary dysmenorrhea

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Objective To observe the characteristics of brain structural covariance network changes and their correlation with clinical scales in patients with primary dysmenorrhea (PDM) treated with acupuncture. **Methods** High-definition resolution T1 structural image data were prospectively

collected from 50 patients with PDM (PDM group) and 47 healthy controls (HC group), and clinical scale scores related to dysmenorrhea were recorded; after that, acupuncture treatment was performed on the PDM group, and high-definition resolution T1 structural images and clinical scale scores were collected for a second time after the treatment, to compare the differences in gray matter volume (GMV) between the PDM group and the HC group, and to construct a structural covariate network (SCN) based on the whole-brain level with the brain area of difference as the area of interest, and to analyze the correlations between the structural covariance and the clinical scales. Results Compared with the HC group, the PDM group showed increased GMV in the right precentral gyrus, left precuneus, right middle temporal cortex, and left basolateral amygdala ($P<0.05$). After needling the PDM group to construct the SCN with the region of interest, GMV decreased in the right precentral gyrus SCN in the bilateral postcentral gyrus, the left precentral gyrus, the right angular gyrus, the right middle occipital gyrus, the right precuneus, and bilateral lingual gyrus ($P<0.05$); and increased in the left postcentral gyrus, the left middle occipital gyrus, and the left medial prefrontal cortex GMV ($P<0.05$). GMV decreased in the left posterior cingulate gyrus, left angular gyrus, right middle cingulate gyrus, and left prefrontal cortex in the left precuneus SCN ($P<0.05$); and increased in the bilateral thalamus and right medial frontal cortex ($P<0.05$). Left middle temporal gyrus and left precentral gyrus decreased in the right middle temporal gyrus SCN ($P<0.05$). GMV in the left basolateral amygdala SCN decreased in the left lingual gyrus and right basolateral amygdala ($P<0.05$); GMV in the right insula increased ($P<0.05$). Right precuneus GMV was positively correlated with the Self-Depression Scale (SDS) in the PDM group ($r=0.296$, $P=0.027$). Conclusion Acupuncture treatment for PDM involves neural network modulation in different regions of the brain, and SCN analysis can be used as a complementary method to reveal the overall effect of acupuncture treatment on the gray matter structure of the brain in PDM, which provides a new perspective for understanding the analgesic mechanism of acupuncture treatment for PDM.

PO-2737

Divergent effects of sex on hippocampal subfield alterations in drug-naïve patients with major depressive disorder

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Background: The hippocampus is a crucial brain structure in etiological models of major depressive disorder (MDD). It remains unclear whether sex differences in incidence and symptoms in MDD are related to differential illness-associated brain alterations including those of the hippocampus. This study investigated divergent effects of sex on hippocampal subfield alterations in drug-naïve patients with MDD.

Methods: High-resolution structural MR images were obtained from 144 drug-naïve individuals with MDD early in their illness course and 135 age- and sex-matched healthy controls (HCs). Hippocampal subfields were segmented using FreeSurfer software and analyzed in terms of both 18 histological subfields along its transverse axis (CA1-4, dentate gyrus, etc.) and the more integrative larger functional subregions (head, body and tail) along its longitudinal axis.

Results: We observed significant overall hippocampal volume reduction in MDD patients, with deficits more prominent in posterior hippocampus. Differences in anatomic alterations between male and female patients were observed in CA1-head, presubiculum-body and fimbria in the left hemisphere. Exploratory analyses revealed a different pattern of clinical and memory function correlations with histological subfields and functional subregions between male and female patients primarily in the hippocampal head and body.

Conclusions: These findings represent the first reported sex-specific alterations in hippocampal histological subfields in patients with MDD early in the illness course prior to treatment. Sex-specific hippocampal alterations may contribute to diverse sex differences in the clinical presentation of MDD.

PO-2738

Study on the changes of brain structural covariance network in patients with postherpetic neuralgia

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Objective: In order to find the potential imaging evidence of the central pathogenesis of postherpetic neuralgia (PHN) and the neuroimaging markers of the transformation of herpes zoster (HZ) to PHN, the purpose of this study was to construct structural covariance network (SCN) at the level of PHN group and HZ group, and statistically analyze it with healthy control(HC) to calculate whether there were differences in SCN metrics among the three groups.

Methods: 54 PHN, 53 HZ and 50 HC subjects were scanned by structural magnetic resonance imaging (3DT1). Before the scan, the pain intensity was evaluated by visual analog score (VAS), the degree of depression was assessed by Hamilton depression scale (HAMD), the degree of anxiety was assessed by Hamilton anxiety scale (HAMA), and the 90-item symptom list was used to evaluate psychological or emotional disorders. The group-level SCN was established by Pearson correlation based on the cortical thickness of the Desikan-Killiany map. The global attributes and node attributes were calculated by graph theory, and calculated whether there were significant differences in SCN among the three groups.

Results: 1. There was no significant difference in global network properties among the three groups. 2. Nodal metrics: (1) The nodal efficiency of left superior and middle temporal gyrus in HZ was lower than that in HC, and the nodal betweenness in left superior temporal gyrus, right paracentral lobule, right taloid gyrus and right frontal pole in HZ was less than that in HC, and the nodal degree of left superior temporal gyrus and right temporal pole in HZ were lower than those in HC. The nodal efficiency of left cingulate gyrus, left middle frontal gyrus and right prefrontal lobe in HZ was higher than that in HC, the nodal betweenness in left olfactory cortex and left middle frontal gyrus in HZ was higher than that in HC, and the nodal degree of left cingulate gyrus and left middle frontal gyrus in HZ were higher than those in HC. (2) The nodal degree of right superior marginal gyrus in PHN was lower than that in HC, the nodal efficiency of left inferior temporal gyrus in PHN was higher than that in HC, and the nodal betweenness in posterior left cingulate gyrus and left superior marginal gyrus in PHN group was higher than that in HC. (3) The nodal efficiency and degree of caudal left anterior cingulate gyrus, lateral left occipital lobe and left lingual gyrus in PHN group were lower than those in HZ, and nodal betweenness in caudal left anterior cingulate gyrus in PHN was lower than that in HZ. The nodal efficiency of left superior temporal gyrus, left middle temporal gyrus and posterior left inferior frontal gyrus in PHN was higher than that in HZ, the nodal betweenness in right superior temporal gyrus in PHN was larger than that in HZ, and the nodal degree of left superior temporal gyrus, left middle temporal gyrus, posterior left inferior frontal gyrus and right temporal pole in PHN were higher than those in HZ. The above node metrics with differences are not corrected by FDR.

Conclusion: There is no significant difference in global network properties among the three groups, which may be related to the shorter course of disease in HZ and PHN. There are some differences of the nodes which relate with pain matrix among the three groups, which provides supplement to functional network topology of PHN and new insights into the neural basis for the development of HZ to PHN.

PO-2739

Association of MRI Findings with Paraspinal Muscles Fat Infiltration in Patients with Chronic Low Back Pain: A Multicenter Study

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Objective: Aim to evaluate the relationship between common MRI findings and paraspinal muscle morphology and fat infiltration in CLBP patients by quantitative MR imaging.

Methods: All the CLBP patients were consecutively enrolled from July 2021 to December 2022 in four medical institutions. Imaging the lumbar spine using a 3.0 T MRI. The cross-sectional area (CSA) and proton density fat fraction (PDFF) of the multifidus (MF) and erector spinae (ES) muscles at the central level of the L5-S1 intervertebral discs were measured. Different MRI findings of the same participant were evaluated in regular sequences, including Degenerative lumbar spondylolisthesis (DLS), Intervertebral disc degeneration (IVDD), Facet arthrosis, Disc bulge, and Disc herniation. The relationship between MRI findings and the PDFF of the paraspinal muscles in CLBP patients was analyzed.

Results: A total of 493 participants were included in the study (198 females, 295 males). Multivariate linear regression analysis showed that the grading of IVDD was the main factor affecting the PDFF of MF at the L4-S1 level and the PDFF of ES at the L4/5 level (BMF at L4/5=1.544, BES at L4/5=1.845, BPSM at L4/5=1.789, BMF at L5/S1=1.218, $P<0.05$). DLS was a significant factor affecting the PDFF of MF at the L4/5 level ($B=4.774$, $P<0.05$). After including age, gender, and BMI as control variables in the regression analysis, the effects of the grading of IVDD and DLS on the PDFF of the paraspinal muscles were no longer statistically significant. **Conclusion:** This study demonstrates that among those MRI findings, DLS and the grading of IVDD have a larger effect on the increase in the PDFF of paraspinal muscles in the posterior column, but there are overlapping influences with age, gender, and BMI. This reveals that the paraspinal muscle fat infiltration in CLBP patients is related to the combined or synergistic effect of multiple factors, especially at the L4/5 disc level.

PO-2740

Altered intersubject variability in functional connectivity within brain white-matter of major depressive disorder and its association with gene expression profiles

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Background: Major depressive disorder (MDD) is a heterogeneous disorder with remarkable intersubject variability in clinical presentations and neurobiological substrates. Although the altered intersubject variability in functional connectivity (IVFC) within gray-matter has been reported in MDD, the alterations to IVFC within white-matter (WM-IVFC) and the molecular mechanisms associated with these changes remain unknown.

Methods: Based on the resting-state functional MRI data of discovery [(145 MDD patients and 119 healthy controls (HCs)] and validation cohorts (54 MDD patients, and 78 HCs), we compared the WM-IVFC between the two groups. We further assessed the meta-analytic cognitive functions related to the alterations. The altered regional WM-IVFC was used to classify MDD patients and predict clinical symptoms in patients. In combination with the Allen Human Brain Atlas, transcriptome-neuroimaging association analyses were further conducted to investigate gene

expression profiles associated with WM-IVFC alterations in MDD, followed by a set of gene functional characteristic analyses.

Results: We found extensive WM-IVFC alterations in MDD compared to HCs, which were associated with multiple behavioral domains, including visual and sensorimotor processes, as well as higher-order functions. For clinical applications, the altered regional WM-IVFC could not only effectively distinguish MDD patients from HCs with an area under curve ranging from 0.889 to 0.901 across three classifiers, but also significantly predict depression severity ($r = 0.575$, $p = 0.002$) and suicide risk ($r = 0.384$, $p = 0.040$) in patients. Furthermore, MDD-related WM-IVFC changes spatially correlated with the expression of 1004 genes, which were enriched for synapse, neuronal system, and ion channel, and predominantly expressed in excitatory and inhibitory neurons. Our results obtained good reproducibility in the validation cohort.

Conclusion: These findings revealed intersubject functional variability changes of brain WM in MDD and its linkage with gene expression profiles, providing potential implications for understanding the high clinical heterogeneity of MDD.

PO-2741

Diagnosis of spinal dural arteriovenous fistula: a multimodal magnetic resonance imaging assessment strategy

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Objective To seek more specific screening indicators in magnetic resonance imaging (MRI) for the diagnosis of spinal dural arteriovenous fistulas (SDAVF) and to identify an efficient diagnostic strategy.

Methods This retrospective study analyzed clinical and imaging data of patients diagnosed with SDAVF and alternative myelopathy who underwent conventional MRI examinations. Additionally, 3D-T2-weighted-sampling perfection with application-optimized contrasts using different flip-angle the diagnostic efficacy of evolutions (3D-T2-SPACE) and contrast-enhanced magnetic resonance angiography (CE-MRA) data from patients with SDAVF were compared with digital subtraction angiography (DSA).

Results The age of onset, perimedullary flow voids, distribution of lesions, degree of spinal edema, and cauda equina disorder were statistically significant in the identification of SDAVF with alternative myelopathy. Perimedullary flow voids and cauda equina disorder were independent predictors of SDAVF; the diagnostic model constructed using the two had better diagnostic performance, with an area under the curve of 0.957 ($P < 0.001$), maximum Youden index of 0.844, sensitivity 92.9%, and specificity 91.5%. Both 3D-T2-SPACE (77.8%) and CE-MRA (83.3%) sequences had good localization values for SDAVF. When the two imaging examinations were combined, their diagnostic accuracy was better than that of DSA.

Conclusion Cauda equina disorder and degree of spinal cord edema on conventional MRI were specific for diagnosis of SDAVF. Make up for the lack of fistula location of conventional MRI, 3D-T2-SPACE and CE-MRA can better locate SDAVF. If they are combined, they complement each other and have good diagnostic potential.

PO-2742

Inferior frontal sulcal hyperintensities changes along the Alzheimer's disease continuum, and their association with amyloid and tau level

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Background: Fluid-attenuated inversion recovery (FLAIR) MRI is a common method used to visualize cerebrospinal fluid (CSF) in the brain. However, factors like proteins, blood, or debris can influence the CSF signal's intensity. Researchers are interested in understanding the glymphatic system's role in clearing waste from the brain, especially how it changes with age and how it relates to alterations in CSF signals. In particular, they are investigating whether hyperintensities in the inferior frontal sulci (IFSH) on FLAIR images might indicate localized changes in CSF composition, especially in older individuals. This study aims to explore the connection between IFSH, CSF drainage, and the Alzheimer's disease (AD) continuum.

Method: The study involved participants at different stages of the Alzheimer's disease continuum: healthy subjects (203 individuals, NC A-T-), cognitively healthy individuals (120 individuals, A+T-), cognitively healthy individuals with tau protein deposition (29 individuals, A+T+), mild cognitive impairment with tau deposition (80 individuals, A+T+), and Alzheimer's disease patients with tau deposition (38 individuals). Researchers assessed IFSH by identifying abnormal CSF hyperintense signals in three inferior frontal sulci using a specific scale. In addition to IFSH, they analyzed other glymphatic-related markers like choroid plexus volume and perivascular space (PVS) volume, adjusting for whole-brain volume and quantified from T1 segmentation data for comparison.

Results: ANOVA results revealed significant differences in IFSH among the groups ($p < 0.001$). Post-hoc analysis showed that CN A+T+ individuals had the highest IFSH scores, significantly different from CN A-T-, CN A-T+, and AD A+T+ ($p < 0.05$, corrected). Choroid plexus volume also exhibited group differences, with MCI A+T+ and AD A+T+ differing from CN A-T- ($p < 0.05$, corrected). There were no significant group differences in PVS volume. Correlation analysis, adjusted for age and education, revealed significant associations between IFSH scores and amyloid ($r = 0.126$, $p < 0.005$) and tau PET ($r = 0.128$, $p < 0.005$) SUVR. Choroid plexus volume also exhibited correlations with amyloid and tau PET markers. IFSH remained mildly correlated with amyloid and tau PET SUVR even after correcting for white matter hyperintensities burden, suggesting that IFSH might be an early compensatory phenomenon in the AD continuum.

Conclusion: This study proposes that hyperintensities in the IFSH observed on FLAIR MRI can potentially serve as a non-invasive marker for altered CSF clearance in AD and related conditions. Moreover, IFSH may demonstrate greater sensitivity in distinguishing AD patients, particularly in the early stages of the AD continuum, compared to measures like choroid plexus volume and PVS volume. These findings suggest that IFSH could reflect early compensatory changes in CSF dynamics before eventual decompensation, making it a promising marker for monitoring AD progression and glymphatic system function. Further research is required to validate these findings and explore the role of IFSH in other diseases linked to glymphatic dysfunction, such as AD.

PO-2743

MRI is a potential prognostic imaging biomarker for 5-year survival in cervical cancer patients treated with neoadjuvant therapy followed by radical hysterectomy

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Objectives: To evaluate the prognosis of cervical cancer patient underwent neoadjuvant therapy (NAT) followed by radical hysterectomy (RH), and investigate the value of MRI impacting in survival.

Methods: Data from 80 cervical cancer patients treated with NAT+RH in February 2015 to October 2018 were retrospectively included. All the patients underwent pretreatment MRI including DWI and DCE scan, and imaging indexes including tumor size, tumor apparent diffusion coefficient (ADC), Ktrans, Kep and Ve values were measured. Clinical and pathological parameters, and recurrence and death of the patients were recorded. Kaplan-Meier survival analysis and multivariate Cox regression analyses were used to analyze the independent factors of overall survival (OS) disease-free survival (DFS), and the cutoff values were estimated by receiver operating characteristic analysis..

Results: The median follow-up time for surviving patients was 66 months (range, 6–100 months), and 18 cases recurred. 11 patients died of persistent or recurrent disease. The overall 5-year OS rate was 86.3%, and the 5-year DFS rate was 77.5%. In univariate analyses, deep stromal invasion, LVSI, ADCmin, Ktrans max, Ktrans mean, Ktrans min, Kep mean, Kep min and Ve min were prognostic factors for OS. FIGO Stage, deep stromal invasion, LVSI, LNM (pathology), Ktrans value, Kep mean, Kep min and Ve value were prognostic factors for DFS. Multivariate analyses showed that Ktrans mean was independent prognostic factors for OS of patients, and Ktrans mean, Ve max, Ve min were independent prognostic factors for DFS of patients.

Conclusion: Tumor ADCmin and DCE variables may be helpful in predicting the recurrence and survival of patients with cervical cancer.

PO-2744

High Resolution 3D T2-Weighted SPACE Sequence with Compressed Sensing Improved Diagnostic Performance in Muscle Invasion for Bladder Cancer Based on Radiomics

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ABSTRACT

Purpose: Employing radiomics to evaluate the diagnostic value in determining muscle invasiveness of compressed sensing (CS) accelerated 3D T2-weighted SPACE sequence with high resolution and short acquisition time.

Method: This prospective study involved 108 participants (including 89 males and 19 females, aged 20–86 years [65 ± 11]) who underwent preoperative 3D-CS-T2-weighted-SPACE, 3D-T2-weighted-SPACE and T2-weighted sequences. The cohort was divided into training and validation cohorts in a 7:3 ratio. In the training cohort, a Rad-score was constructed based on radiomic features selected by intraclass correlation coefficients (ICC), pearson correlation coefficient (PCC) and least absolute shrinkage and selection operator (LASSO). Multivariate logistic regression was used to develop a nomogram combined radiomics and clinical indices. In the validation cohort, the

diagnostic performance of nomogram was validated by using receiver operative characteristic (ROC) curve, calibration curve and decision curve analysis (DCA).

Results: In the validation cohort, the area under ROC curve (AUCs) of 3D-CS-T2-weighted-SPACE, 3D-T2-weighted-SPACE and T2-weighted models were 0.87(95% confidence interval (CI):0.73-1.00), 0.79(95%CI:0.63-0.96) and 0.77(95%CI:0.60-0.93), respectively. While the clinical model was 0.74(95%CI:0.55-0.94). A radiomics-clinical nomogram won the best diagnostic performance, the AUC reached 0.88(95%CI:0.75-1.00). The DCA also showed that the radiomics model and combined nomogram model yielded higher net benefits than the clinical model.

Conclusions: The radiomic features extracted from 3D-CS-T2-weighted-SPACE had the acceptable performance for diagnosing muscle invasiveness in BCa. Compared to radiomic features of 3D-T2-weighted-SPACE and T2-weighted, radiomic features of 3D-CS-T2-weighted-SPACE had more textured details. The nomogram combined Rad-score and clinical indices could enhance the diagnostic performance.

PO-2745

Nomogram based on apparent diffusion coefficient and MR features to differentiate intracranial solitary fibrous tumor (WHO grade II) from angiomatous meningioma

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Background: To assess clinical and magnetic resonance imaging (MRI) features in differentiating intracranial solitary fibrous tumor (WHO grade II) from angiomatous meningioma(AM).

Method: Pathologically confirmed intracranial SFT (WHO grade II) (n= 23) and AM (n = 28) were retrospectively collected and their clinical and conventional MRI features including diffusion-weighted imaging (DWI) were analyzed. The apparent diffusion coefficient (ADC) values, Age, tumor volume and EI were using two-sample t tests, and the gender, features on conventional MRI were using the chi-square test. Logistic regression analysis and receiver operating characteristic (ROC) curve were used to analyze the diagnostic efficacy in predicting the SFT (WHO grade II) and AM. The nomogram of the combined ADC and conventional MRI was established based on the multivariate logistic regression model results.

Results: Tumor shape, cystic necrotic, T1WI signal intensity, T2WI signal intensity, and ADC value were found significantly different between SFT (WHO grade II) and AM ($P < 0.05$). Logistic regression analysis demonstrated that Tumor shape, T1WI signal, T2WI signal, cystic necrosis, and ADC value were independent factors, and ADC value showed the best diagnostic performance (area under curve [AUC], 0.823; sensitivity, 86.9%; specificity, 75.0%) in differentiating SFT (WHO grade II) from AM with optimal cutoff value being $1.08 \times 10^{-3} \text{mm}^2/\text{s}$. ROC curve demonstrated ADC value combined with conventional MRI showed the best diagnostic performance (AUC, 0.950; sensitivity, 95.7%; specificity, 85.7%; accuracy, 90.2%) in differentiating SFT (WHO grade II) from AM. Moreover, as shown in the calibration curve, strong agreements were observed between nomogram prediction probability and actual findings in the prediction of two tumors.

Conclusions: The study reveals significant differences between SFT (WHO grade II) and AM. The combination of ADC value with clinical and MRI features shows promising diagnostic potential for accurately distinguishing between two tumor types, enhancing diagnostic accuracy and facilitating effective tumor identification.

PO-2746

An MRI study on the correlations between the atrophy of gray matter related to memory function, white matter damage, and memory impairment in patients with subcortical ischemic vascular disease

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Objective: To explore the correlations between the atrophy of the gray matter related to memory function, white matter damage, and memory impairment in patients with subcortical ischemic vascular disease (SIVD).

Methods: We recruited 32 normal controls (NC) and 58 SIVD patients, including 29 SIVD patients with cognitive impairment (SIVD-CI) and 29 SIVD patients with normal cognition (SIVD-NC). MRI data and memory scores were acquired from all participants. The thickness or volume of gray matter related to memory function, as well as the volume, fractional anisotropy (FA) and mean diffusivity (MD) values of white matter hyperintensity (WMH) and normal-appearing white matter (NAWM), were obtained using FreeSurfer, FSL and SPM software. The analysis of covariance, Kruskal-Wallis H test, spearman correlation and mediation analysis were used for inter-group comparison and correlation analysis.

Results: Compared with NC, SIVD patients showed significant decreased auditory, visual and working memory scores, decreased volume, FA value of WMH and NAWM, increased MD value of WMH and NAWM, and decreased gray matter volume, mainly including thalamus, middle temporal gyrus and hippocampal subfields such as ammonia angle (CA), presubiculum, motor layer and dentate gyrus ($p < 0.05$). The SIVD-CI group showed more severe gray matter atrophy and white matter damage than the SIVD-NC group. Besides, the atrophy of thalamus, middle temporal gyrus, CA1, presubiculum, molecular layer and dentate gyrus were significantly correlated with memory scores and the FA and MD values in WMH and NAWM in patient group ($p < 0.05$). Mediation analysis results showed that the reduced volume of CA1 and thalamus mediated the correlation between the abnormal FA and MD values in WMH and the decreased memory scores.

Conclusions: Patients with SIVD had atrophy in gray matter related to memory function and structural damage in WMH and NAWM, which worsened with cognitive impairment. The atrophy of some gray matter areas was closely related to WMH damage and memory impairment. Additionally, WMH damage may affect memory function through the atrophy of CA1 and thalamus. Our findings may help provide specific neuroimaging biomarkers for the early diagnosis of memory impairment in patients with SIVD.

PO-2747

Functional disruption of brain subnetworks in patients with first and recurrent adolescent depression

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OBJECTIVE: Functional changes in brain subnetworks in patients with first-episode and recurrent adolescent depression are unclear. The aim of this study was to investigate the changes in brain subnetworks in patients with first-episode, recurrent adolescent depression and in healthy individuals.

METHODS: 105 adolescent MDD patients (66 first-episode and 39 recurrent) and 87 normal controls (HCs) were included in the study. All fMRI images were acquired in the resting state, and the resting state images were preprocessed using MATLAB (The Mathworks, Natick, MA, USA) and DPABI (<http://rfmri.org/dparbi>) software. Dossenbach160 atlas was used to define the nodes of the brain network, the whole brain was divided into 160 anatomical ROIs, 80 ROIs in each hemisphere, and each ROI represented a network node, we obtained a 160 × 160 functional connectivity (FC) matrix for each subject, and the data were made more consistent with normal distribution using the Fisher r-z transformation. Matlab-based NBS toolbox (<https://www.nitrc.org/projects/nbs>) was used to analyze the subbrain network connectivity, the number of permutations was set to 5000 ($T \geq 3.6$, NBS corrected, $p < 0.05$).

RESULTS: There was a significant difference in whole-brain FC between patients with first-episode adolescent depression (FAD), patients with recurrent adolescent depression (RAD) and HCs. The results of the study involved the DMN (Default Mode Network), ECN (Executive Control Network), SN (Salience Network), SMN (Sensorimotor Network), VN (Visual Network), and CN (cerebellar network). Specifically, FAD increased functional connectivity in multiple regions compared to RAD, including 15 nodes and 16 connections, involving ECN-SN, ECN-SMN, SN-SN, SN-SMN. FAD decreased functional connectivity in multiple regions compared to RAD, including 9 nodes and 10 connections, including DMN-SMN, DMN-VN, SMN-SMN, SMN-VN. RAD showed reduced functional connectivity in multiple regions compared to HC, consisting of 36 nodes and 46 connections, involving ECN-ECN, ECN-SN, ECN-SMN, ECN-VN, ECN-CN, SN-SN, SN-SMN, SN-VN, SN-CN. There was no difference between FAD and HCs.

CONCLUSION: To the best of our knowledge, this may be the first study of brain subnetworks in FAD versus RAD. Brain subnetworks were altered in FAD and RAD, and brain subnetwork disruption in RAD mainly involved the ECN and SN. Our findings provide brain subnetwork-related imaging references for patients with FAD and RAD.

PO-2748

Assessment of the DTI-ALPS Parameter Along the Perivascular Space in Early- and Late-Onset Alzheimer's Disease

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Background: This study aimed to investigate the Diffusion Tensor Imaging along the Perivascular Space (DTI-ALPS) parameter in individuals with early-onset and late-onset Alzheimer's disease (EOAD and LOAD) and its impact on cognitive function, as well as Alzheimer's disease (AD) and vascular-related pathologies.

Methods: We identified 49 Young Normal Controls (YNC), 24 EOAD, 35 Old Normal Controls (ONC), and 31 LOAD participants, each of whom underwent MRI, neuropsychological assessments, and amyloid PET. We computed a proxy marker for glymphatic system function, the DTI-ALPS index, to assess glymphatic function in vivo. We calculated average ALPS indices for the left, right, and bilateral hemispheres. These parameters were compared among different groups ($p < 0.05$, Bonferroni corrected). Subsequently, we evaluated the relationship between ALPS and cognitive function and amyloid levels through correlation analysis.

Results: The ALPS index was significantly reduced in both EOAD and LOAD patients compared to their respective controls ($p < 0.05$). However, there were no significant differences in the ALPS index between EOAD and LOAD patients. Correlation analysis revealed a significant association between ALPS and amyloid SUVR in the young group (EOAD+YNC) ($r = -0.30$, $p < 0.05$) and in the older group (LOAD+ONC), ALPS was associated with hippocampal volume ($r = 0.25$, $p < 0.005$) and white matter hyperintensity (WMH) burden ($r = -0.20$, $p < 0.05$). Backward linear regression suggested that in the young group, sex, education years, and amyloid SUVR contributed to ALPS, while in the older group, age, sex, and WMH were contributing factors. Regarding cognition, ALPS was closely related to CDR, MMSE, and other cognitive functions in both the young and older groups.

Conclusion: Our study reveals that ALPS is decreased in both EOAD and LOAD and is closely associated with cognitive function. This suggests that glymphatic function is impaired in both EOAD and LOAD, making ALPS a valuable in-vivo indicator. Furthermore, the mechanisms underlying glymphatic dysfunction in EOAD and LOAD may differ, with amyloid deposition possibly contributing to glymphatic impairment in EOAD, while aging, neurodegeneration (hippocampal atrophy), and cerebrovascular disease play significant roles in glymphatic dysfunction in LOAD. These findings imply that interventions targeting the glymphatic system improvement should adopt distinct strategies for EOAD and LOAD.

PO-2749

Assessing the Relationship Between Brain Iron Levels and Glymphatic Function in the Alzheimer's Disease Continuum

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Background Iron is a critical element for various essential biochemical processes in the human body and plays a significant role in neural tissue, particularly in the brain. Abnormal iron accumulation has been associated with neurodegenerative disorders, including Alzheimer's disease (AD), which is characterized by the presence of β -amyloid plaques and neurofibrillary tangles. This study employed non-invasive techniques, including quantitative susceptibility mapping (QSM), to assess subcortical brain iron levels and glymphatic system function in individuals across the AD spectrum. The study included 62 cognitively unimpaired (CU) amyloid-negative (A-) participants, 30 CU amyloid-positive (A+), and 42 mild cognitive impairment (MCI) A+ patients.

Methods: Brain iron content was quantified in regions of interest, including the caudate nucleus (Cd), putamen (Pt), globus pallidus (Gp), thalamus (Th), red nucleus (Rn), and substantia nigra (Sn) using QSM. Glymphatic system function was assessed through the visual semi-quantitative evaluation of enlarged perivascular spaces (ePVS) and choroid plexus volume (CPV). Comparisons were made between AD pathology, iron deposition, and glymphatic function in the different participant groups.

Results: The results revealed significant differences in iron content and glymphatic function among the participant groups. Specifically, the Pt susceptibility values were significantly higher in MCI A+ and CU A+ patients compared to CU A- participants ($p < 0.001$). MCI A+ patients exhibited a

significant increase in CPV compared to CU A- participants ($p < 0.005$). Additionally, ePVS in the basal ganglia (ePVS-BG) were significantly enlarged in CU A+ individuals compared to both CU A- and AD A+ patients. Correlation analyses showed associations between Pt susceptibility, CPV, amyloid SUVR, and cognitive function. Importantly, Pt susceptibility was found to fully mediate the relationship between increased CP and elevated amyloid SUVR.

Conclusion: This study provides insights into the relationship between brain iron deposition, glymphatic system function, and AD pathology across the AD spectrum. The findings highlight the potential role of iron in AD pathogenesis and suggest that interventions targeting brain iron levels and glymphatic function could hold promise for AD management. Understanding these relationships may contribute to the development of novel diagnostic and therapeutic strategies for Alzheimer's disease.

PO-2750

Visualization of Collateral Vessels in 4D TRANCE MR Angiography Compared with 3D TOF in Moyamoya Disease

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Purpose To evaluate and compare the visualization of collateral vessels in patients with MMD between 4D TRANCE and 3D TOF MR angiography with DSA as the reference standard.

Method Thirty-five patients with symptoms of MMD were included. 3D TOF and 4D TRANCE angiography were performed on a 3.0T MR system. Two radiologists evaluated the visualization of the terminal ICAs, distal MCAs, Moyamoya vessels and LMA collaterals from posterior circulation, by using DSA findings.

Result The Suzuki stage of Moyamoya disease was based on the Suzuki stage standard of the improved method. It indicates an intrinsic compensatory reorganization process of moyamoya disease, Table 2. Bilateral vascular changes were scored separately. The modified Suzuki grading results of 4D TRANCE, 3D TOF and DSA are shown in Table 3-1. Compared with the golden standard, the correlation coefficient between 4D TRANCE and DSA was 0.92, Table 3-2. Vessel visualization scores are summarized in Table 4. Taking DSA as the gold standard, 4D TRANCE scored higher and closer to the gold standard in evaluating bilateral terminal ICAs than 3D TOF. The difference between 3D TOF and DSA was statistically significant. The 4D TRANCE score of the two observers was significantly higher than the 3D TOF score.

Conclusion Visualization of distal cerebral arteries and collateral vessels in patients with MMD with 4D TRANCE was good to excellent when compared with that attained with DSA. 4D TRANCE is helpful for classification, collateral compensatory blood flow information and evaluation of postoperative blood flow reconstruction and also can evaluate the shape and blood flow change information of stenosis or occlusion vessels when caused by arterial stenosis or occlusion.

PO-2751

Three-dimensional MR Elastography evaluates changing of melanoma stiffness after Dabrafenib treatment

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Purpose: Normally, the melanoma will have more infiltration of cancer-associated fibroblasts (CAFs) and thus the melanoma is more stiffed than the adjacent tissue. Three-dimensional MR Elastography is a non-invasive method to detect disease progression based on tissue stiffness. However, there is a paucity of literature on three-dimensional MR Elastography to assess the efficacy of melanoma after clinical treatment.

Methods and Materials: Based on bioinformatics we calculated the relationship between the infiltration of CAFs in melanoma and patients' survival, furthermore, Dabrafenib, may has significant efficacy. In vitro experiments, we constructed a xenograft model of melanoma. Baseline was set when tumor volume reached 500mm³ and MRE was utilized to assess tumor stiffness at this time. Afterwards, 10 nude rats were randomly assigned to treatment (Dabrafenib, 10mg/kg/d, Selleck Chemical) and control groups. When the tumor volume in control group approached 4000 mm³, treatment was terminated and use MRE to assess stiffness in both control groups and treated groups.

Results: CAFs infiltration has positive correlation with melanoma prognosis in both TCGA and GEO cohort ($p < 0.001$, HR = 1.631, 95%CI: 1.226 - 2.168, $p = 0.013$, HR = 1.482, 95%CI: 1.084 - 2.026, $p < 0.001$, HR = 1.871, 95%CI: 1.327 - 2.639, $p = 0.002$, HR = 1.842, 95%CI: 1.243 - 2.73, $p = 0.003$, HR = 1.804, 95%CI: 1.211 - 2.687, $p = 0.005$, HR = 2.018, 95%CI: 1.222 - 3.331, $p < 0.001$, HR = 2.926, 95%CI: 1.917 - 4.468). Pathology results showed significantly fibrosis in melanoma compared to adjacent tissues. Dabrafenib shows high sensitivity to high-risk pancreatic cancer patients ($p = 7.6e-06$). After treatment with Dabrafenib, the mean stiffness in the treatment group was 1.113kpa, a slight decrease compared to the baseline which mean stiffness is at 1.3kpa ($p = 0.037$). The mean stiffness in the control group (when tumor volume reached 4000mm³) was 1.87kpa, which was increased compared to the treatment group ($p = 0.0223$). Tumor volume was significantly decreased after Dabrafenib treatment ($p < 0.0001$).

Conclusions: Malignant progression of pancreatic cancer is associated with infiltration of CAFs causing a more stiffed tumor. Dabrafenib is effective by reducing tumor volume, fibrosis and stiffness. 3D MR Elastography is highly efficiency in observing the changes of tumor stiffness and it is possible to use MRE to evaluate drugs' efficacy.

Clinical Relevance/Application: 3DMRE is a non-invasive, rapid, and highly accurate tool for predicting melanoma and now it is demonstrably showed its potential in evaluating the efficacy of TKIs.

PO-2752

The Diagnostic Value of Diffusion Weighted Imaging and Conventional Magnetic Resonance Imaging on Parotid Gland Tumors

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Objective: To investigate the value of diffusion weighted imaging(DWI), conventional MRI(cMRI) finding and demographic data to diagnose parotid gland tumors.

Methods: A retrospective evaluation was made of the clinical data, histopathologic data, preoperative cMRI and DWI of 85 patients who underwent parotidectomy from November 2015 to September 2021 in Tongren people's hospital. They were classified into three categories according to pathology:(PA, WT and MT. Values of apparent diffusion coefficient (ADC) for PA, WT and MT were compared. The signal of lesion was observed on cMRI sequence. Classification variables are tested using Pearson's chi-squared test. For metric parameters, normality tests are performed first. If they follow a normal distribution, T-tests are used, else non-parametric tests will be used.

Results: 35 cases were PA, 31 cases were WT and the remaining 19 cases were MT. the PA group was younger and more frequent in females than the WT and MT groups, while WT and MT were more frequent in males. The PA group was younger and more frequent in females than the WT and MT groups, whereas it was more frequent in WT and MT in males. The cMRI is able to clearly visualize anatomical structures. The median of ADC values for them were $1.53 \pm 0.29 \times 10^{-3} \text{mm}^2/\text{s}$, $0.77 \pm 0.20 \times 10^{-3} \text{mm}^2/\text{s}$ and $1.06 \pm 0.19 \times 10^{-3} \text{mm}^2/\text{s}$, respectively. PA was differentiated from the other two groups ($P=0.000$). When the ADC threshold was $1.23 \times 10^{-3} \text{mm}^2/\text{s}$, the sensitivity and specificity for differentiating PA from WT was 94.3% and 93.5%, respectively; and when the ADC threshold was $1.29 \times 10^{-3} \text{mm}^2/\text{s}$ for identifying PA from MT was 85.7% and 84.2%, respectively.

Conclusion: cMRI combined with ADC values are helpful to identify PA from WT and MT, it can be used as an aid in determining the preoperative pathological classification of parotid tumors.

PO-2753

Left Ventricular Dyssynchrony Measured by Cardiovascular Magnetic Resonance-Feature Tracking in Anterior ST-Elevation Myocardial Infarction: Relationship with Microvascular Occlusion Myocardial Damage

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Objectives: Cardiovascular magnetic resonance-feature tracking (CMR-FT) enables quantification of myocardial deformation and may be used as an objective measure of myocardial involvement in ST-elevation myocardial infarction (STEMI). We sought to investigate the associations between myocardial dyssynchrony parameters and myocardium damage for STEMI.

Methods: We analyzed 65 patients (45-80 years old) with anterior STEMI after primary percutaneous coronary intervention during 3-7 days (observational [STEMI] group) and 60 healthy volunteers (normal control [NC] group). Myocardial dyssynchrony parameters were derived, including global and regional strain, radial rebound stretch and displacement, systolic septal time delay, and circumferential stretch.

Results: CMR characteristics, including morphologic parameters such as left ventricular ejection fraction (LVEF) ($45.3\% \pm 8.2\%$) and myocardium damage in late gadolinium enhancement (LGE)

(19.4% \pm 4.7% LV), were assessed in the observation group. The global radial strain (GRS) and global longitudinal strain (GLS) substantially decreased in anterior STEMI compared with the NC group (GRS: 19.4% \pm 5.1% vs. 24.8% \pm 4.0%, $P < 0.05$; GLS: -10.1% \pm 1.7% vs. -13.7% \pm 1.0%, $P < 0.05$). Among 362 infarcted segments, radial and circumferential peak strains of the infarcted zone were the lowest (14.4% \pm 3.2% and -10.7% \pm 1.6%, respectively). The radial peak displacement of the infarct zone significantly decreased (2.6 \pm 0.4 mm) ($P < 0.001$) and manifested in the circumferential displacement (3.5° \pm 0.7°) in the STEMI group ($P < 0.01$). As microvascular occlusion (MVO) was additionally present, some strain parameters were significantly impaired in LGE+/MVO+ segments (radial strain [RS]: 12.2% \pm 2.1%, circumferential strain [CS]: -9.6% \pm 0.7%, longitudinal strain [LS]: -6.8% \pm 1.0%) compared to LGE+/MVO- (RS: 14.6% \pm 3.2%, CS: -10.8% \pm 1.8%, LS: -9.2% \pm 1.3%) ($P < 0.05$). When the extent of transmural myocardial infarction is greater than 75%, the parameter of the systolic septal delay (mean, 148ms) was significantly reduced compared to fewer degrees of infarction ($P < 0.01$).

Conclusion: In anterior STEMI, the infarcted septum swings in a bimodal mode, and myocardial injury reduces the radial strain contractility. A more than 75% transmural degree was the septal strain-contraction reserve cut-off point.

PO-2754

Radiomics models based on multiparametric magnetic resonance imaging for early predicting the prognosis of peripancreatic collections in acute pancreatitis

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Objective: To develop multiparametric MRI based radiomics models for early predicting the prognosis of peripancreatic collections (PPCs) in acute pancreatitis (AP).

Methods: A total of 127 patients of AP combined with PPCs in our unit were included in this study. All of them have performed MRI. They were identified as good or poor prognosis according to clinical and imaging follow-up. Patients were categorized into two groups: a training cohort (69 good prognosis, 19 poor prognosis), and a validation cohort (30 good prognosis, 9 poor prognosis). Radiomics features were derived from PPCs on fat-saturated T2-weighted (T), pancreatic parenchyma on enhanced delayed phase (D), venous phase (V) and arterial phase (A) images. Construction of radiomics models using the optimal radiomics features left after dimensionality reduction by means of support vector machine (SVM) with Gaussian kernel. The clinical characteristics and conventional MRI manifestations were collected to construct clinical (C) and MR models respectively. The integrated model was constructed from the radiomics and clinical features. The AUCs of different models were in comparison using Delong tests.

Results: The radiomics model of A, V, D, T and D+T, integrated model of T+C, and MR model turned to be excellent with better predictive capability, and the T model performed best with the AUC of 0.943 and 0.859 respectively; the radiomics results superior to the clinical model ($P < 0.05$). No significant differences were found between the different radiomics models, between the radiomics and integrated models, and among the radiomics, integrated and MR models ($P > 0.05$).

Conclusions: The radiomics model, the integrated model, and MR model all can predict the prognosis of PPCs at an early stage of AP. The T model performed best, because of the strongest predictive capacity and advantages of easily accessible, it has a potential for wider range of clinical applications.

PO-2755

Performance of Node Reporting and Data System (Node-RADS): a Preliminary Study in Cervical Cancer

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Background Node Reporting and Data System (Node-RADS) was proposed and can be applied to lymph nodes across all anatomical sites. The aim of this study was to investigate the diagnostic performance of Node-RADS in cervical cancer patients.

Methods A total of 81 cervical cancer patients treated with hysterectomy and LN dissection was retrospectively enrolled. Node-RADS evaluation was performed in all patients both at LN level and patient level by two radiologists independently based on preoperative MRI. Chi-square test and Fisher's exact test were used to evaluate the distribution difference of size and configuration between patients with and without LN metastasis (LNM) in different regions. The receiver operating characteristic (ROC) and the area under the curve (AUC) were used to explore the diagnostic performance of the Node-RADS score for LNM.

Results The rates of LNM in the para-aortic, common iliac, internal iliac, external iliac, and inguinal regions were 7.4%, 9.3%, 19.8%, 21.0%, and 2.5% (4/162), respectively. At patient level, as the Node-RADS score increased, the rate of LNM also increased, with rates of 26.1%, 29.2%, 42.9%, 80.0%, and 90.9% for Node-RADS score 1, 2, 3, 4, and 5, respectively. At patient level, the AUCs for Node-RADS scores >1, >2, >3, and >4 were 0.632, 0.752, 0.763, and 0.726, respectively. Both at the patient level and LN level, a Node-RADS score >3 could be considered as the optimal cut-off value with the best AUC and accuracy.

Conclusions Node-RADS is effective in predicting LNM for scores 4 to 5. However, the proportions of LNM were more than 25% at the patient level for scores 1 and 2, which does not align with the expected very low and low probability of LNM for these scores.

PO-2756

Anti-motion ultrafast T2 mapping via multiple overlapping-echo detachment imaging technology based on deep learning

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Background: Some patients frequently experience loss of consciousness and uncontrollable involuntary movements, such as Huntington's chorea and delirium, which pose significant challenges for successful clinical MRI examinations, particularly when utilizing magnetic resonance technology that provides quantitative information. Here, we aim to use a newly self-developed ultra-fast, anti-motion, single-shot multiple overlapping-echo detachment (MOLED) quantitative magnetic resonance technology to address this issue.

Methods: To validate the accuracy, reproducibility and movement resistance of MOLED technology, a set of self-made phantoms and five volunteers underwent 3T magnetic resonance imaging, including conventional T₂-weighted imaging (T₂WI), multi-section multi-echo spin-echo (MESE), and MOLED, which can obtain T₂ mapping for a slice of the brain in approximately 150ms. A deep learning network was employed for image reconstruction. In the volunteers, we performed six scans on the same volunteer, five scans with minimal head motion (REP 1-5), and the final scan was

performed under moderate head movements (REP move). The T_2 values of seven ROIs were used for the analysis.

Results: The results of phantoms revealed a strong positive correlation between the T_2 values obtained by MOLED and MESE, with a Pearson correlation coefficient (PCC) of 0.9995 ($P < 0.0001$). In addition, there was good consistency between the two sequences: mean difference ($\text{Mean}_{\text{diff}}$) = 4.20%, standard deviation of difference (SD_{diff}) = 1.71%. In the volunteers, T_2 values derived from MOLED have excellent repeatability for all REPs, with all ROIs showing good consistency across the five scans, with CoVs ranging from 0.47 to 2.74. In the ICC analysis, the putamen and pallidum were showed excellent reproducibility ($\text{ICC} = 0.95 [0.84, 0.99]$, $\text{ICC} = 0.95 [0.83, 0.99]$), while the hippocampus was the lowest but still moderate reproducibility ($\text{ICC} = 0.55 [0.18, 0.92]$). Moreover, the head movements caused characteristic artifacts in the $T_2\text{WI}$, but did not induce any systematic bias to the T_2 measurement.

Conclusions: The ultra-fast and anti-motion properties of MOLED show high accuracy and excellent repeatability, and access to reliable quantitative results even under head movements, thus showing significant advantages in imaging patients with involuntary movements.

PO-2757

Predicting carotid plaque vulnerability by high-resolution vessel wall imaging with macrophage-targeted nanoagent

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Introduction Non-intrusive, quantitative, and precise imaging of vulnerable atherosclerotic plaque is critical for timely stroke prevention 1-3. Mounting evidence has established that macrophages play a key role in the pathogenesis of atherosclerosis 4,5. Determining the underlying role of macrophages in plaque progression holds promise for patient stratification and could significantly facilitate therapeutic monitoring. Thus, the utility of the macrophage-targeting contrast-enhanced high-resolution vessel wall imaging (HR-VWI) technique 6 was systematically examined in this in vivo animal study, and a histogram analysis was conducted to predict atherosclerotic vulnerability accurately.

METHODS: A simplified flowchart describing the methods in this study is shown in Figure 1. Contrast-enhanced HR-VWI was performed on a 3T system (MAGNETOM Prisma, Siemens Healthcare, Erlangen, Germany) with a commercial 64-channel head/neck coil. The macrophage-targeted PP1-Au@GSH@Gd (GdMG) nanoclusters (NCs) and conventional Gadovist approach were used for longitudinal plaque evaluation by the morphology assessment. In contrast, a systematic histogram analysis in atherosclerosis (AS) rabbit model was conducted. The performance of in vitro HR-VWI contrast capacity, the in vivo foamy macrophage targeting, and the selectivity efficacy of GdMG NCs on HR-VWI in atherosclerotic rabbit models were quantified compared with Gadovist.

After revealing the superior competence of GdMG NCs in measuring the morphological assessment for plaque, prediction studies of plaque vulnerability were further conducted based on the contrast-enhanced HR-VWI.

The continuous variables were reported as appropriate. The Mann-Whitney U test was used to assess differences between the two groups, and Bland-Altman plots were used to compare the inter-observation agreement for image evaluation. 7 The intra-observer reproducibility for the plaque characteristics assessment was evaluated using the intraclass correlation coefficient (ICC). Repeated measures analysis of variance (RM ANOVA) was applied to inspect the morphological evaluation (PA and WA) at the different plaque stages, followed by a post-hoc Bonferroni correction

of multiple comparisons to examine the between-contrast-agent differences at the individual time points.

Multiple linear regressions, including histogram-derived parameters (i.e., kurtosis, skewness, and CV), and potential time confounders (i.e., weeks of HFD induction) were performed. Then, the diagnostic utility of the employed fitting formula from those multiple linear regression analysis for the histogram vulnerability index (VIH) mentioned above was further quantified by calculating the area under the receiver operating characteristic (ROC) curve (AUC).

Results Due to the compelling targeting capacity of GdMG NCs to foamy macrophages in atherosclerotic plaques with GdMG NCs, the contrast-to-noise ratio (CNR) from the pre-injection baseline dramatically increased from 6.50 to 36.91 ($p < 0.001$), with an increment of 1.39-fold higher than that of the Gadovist approach (Figure 2). Furthermore, Spearman's correlation test confirmed that the coefficient of variation (CV) derived from the histogram analysis based on GdMG NCs HR-VWI was indeed positively linearly correlated with VIP significantly ($p < 0.05$) with adjusted $R^2 = 0.775$ (Figure 3). Finally, mathematical formulas with histogram-derived parameters as variables were fitted to quantitatively calculate the histogram vulnerability index (VIH) with the strength of the adjusted $R^2 = 0.952$ ($p < 0.001$) and the area under the curve (AUC) of 0.875 ($p < 0.001$) to realize the in vivo and quantitative calculation of the plaque vulnerability (Figure 4).

Discussion The current image-evaluation method can only sometimes provide objective and biologic-accordance information that helps in clinical diagnosis and management. To better assess the plaque vulnerability, it is vital to emphasize the tissue-specific image properties of the plaque heterogeneity by image interpretation. Inspired by a previous histogram study based on the conventional T1WI image investigating the intracranial plaque type, we expanded their conclusions. Finally, we reached an exciting advance in quantified plaque vulnerability with a statistical method.⁸ To the best of our knowledge, our experiment is the pioneering workflow to quantify plaque vulnerability via histogram based on the macrophage-targeted plaque HR-VWI in vivo, which had a satisfactory diagnostic performance with optimized specificity and sensitivity. Moreover, the proposed analysis processing is generated in Radiant and ImageJ software packages, both of which are in general use and readily available, hence making the introduced method applicable and adjustable for other studies in plaque vulnerability and clinical applications for risk management.

Conclusion The proposed integrative analysis provided an overall illustration of the non-invasive nano-image method for quantifying plaque vulnerability and substantially increasing the relevance of the results for clinical reference. The use of GdMG NCs as macrophage-targeted HR-VWI is considered a promising diagnosis avenue for many inflammation-related diseases. Additionally, a deep understanding between the quantified histogram parameters and plaque vulnerability will improve our ability to harness the mechanism for developing novel image strategies for cardiovascular disease and promote the prediction before adverse clinical events occur.

Although this is proof-of-concept only tested in rabbits, it lays a strong foundation for the bench-to-bedside translation of nano-agent-enhanced HR-VWI for stroke risk prediction and prevention.

PO-2758

Detection of renal hemodynamic change in patients with chronic diseases by free-breathing 3D Turbo Gradient Spin Echo pCASL Sequence with different ROIs: a comparative study

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Purpose: To investigate whether free-breathing 3D Turbo Gradient Spin Echo pCASL Sequence could detect renal hemodynamic change in patients with chronic diseases and compare the efficacy among three different types of ROIs selection.

Materials and Methods: Three Tesla (3T) pCASL-MRI (Skyra, Siemens Healthcare, Erlangen, Germany) using a 12-channel flexible body array combined with the spine array coil as receiver was performed to evaluate renal blood flow (RBF) in 30 subjects (20 males and 10 females, mean age, 54.5 years), including 8 patients suffered from diabetes mellitus and 22 suffered from malignancy. Regions of interest were placed manually on the central coronal RBF image with 3 different types: ①circular ROI(20mm²) at the middle of each kidney; ②circular ROIs(20mm²) at the upper, middle, and lower poles of each kidney; ③covering the entire renal cortex of each kidney, by two senior radiologist who were blinded to the clinical data (F.Y. with an experience of over 20 years and P.L. of over 10 years). The interobserver agreement for MRI-measurement variables was determined using the intraclass correlation efficient (ICC) (poor, ICC<0.20; fair, 0.20<ICC≤0.40; moderate, 0.40<ICC≤0.60; good, 0.60<ICC≤0.80; and excellent, 0.80<ICC≤1.0), and mean values of two senior radiologist were recorded. According to the renal function test acquired within 4 days interval, patients were divided into normal (n=12, GFR ≥90 ml/min/1.73m²) and abnormal (n=18, GFR <90 ml/min/1.73m²) groups. The correlation between GFR and RBF were evaluated using the Pearson correlation and the diagnostic value of RBF acquired with pCASL Sequence was evaluated by receiver operating characteristic (ROC) curve.

Results: The interobserver agreement for radiological assessment was excellent (ICC=0.841). The RBF values obtained with pCASL sequence and GFR values acquired with renal function test were well correlated (type1: r=0.532, p <0.01; type2:r=0.674, p <0.01; type3: r=0.829, p <0.01). The area under the curve (AUC) of the ROC curve was 0.528, 0.602, 0.731 for type1,2,3 ROIs in being able to distinguish the normal group from the abnormal group.

Conclusion: The free-breathing TGSE pCASL sequence with ROI covering the entire renal cortex of each kidney is a feasible method for the assessment of the renal hemodynamic change in patients with chronic diseases.

PO-2759

Application of MRI-based radiomics model in preoperative grading of grade II and III gliomas

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Objective: Gliomas is the most common primary tumors in the central nervous system, and grade II and III gliomas are more difficult to identify because of their similarity of presentation on magnetic resonance images. The purpose of this study was to investigate the diagnostic value of radiomics

models constructed based on magnetic resonance imaging (MRI) sequences for preoperative grading of gliomas.

Methods: This study retrospectively collected 120 patients with grade II and III gliomas who attended the Third Hospital Affiliated to Qiqihar Medical University from January 2019 to June 2023 after surgical treatment and confirmed by pathology. Among them, 58 cases of grade II gliomas and 62 cases of grade III gliomas were randomly divided into the training group (n=84) and the validation group (n=36) according to the ratio of 7:3. The enrolled patients were scanned with T2WI, T1WI-CE, and DWI sequences before surgery. The lesions were manually segmented using ITK-SNAP software to form a 3D region of interest (ROI). Python software was used to extract the radiomics features, and the minimum redundancy maximum correlation (mRMR) was used to perform the feature dimensionality reduction process on the patients in the training group, and the least absolute value shrinkage and selection operator algorithm (LASSO) was applied to screen out the features most relevant to glioma grades II and III from the reduced features and derive the radiomics signature (Rad-score), and the logistic regression (LR) to establish the radiomics prediction model. Finally, the predictive performance of the model was evaluated using the receiver operating characteristic (ROC) curve, and the area under the curve (AUC), specificity and sensitivity were calculated. The diagnostic efficacy of the model was measured using the Hosmer-Lemeshow test.

Results: 1032 radiomics features were extracted from the T2WI, T1WI-CE, and DWI of the patients in the training group. After removal of redundancy, each sequence was screened for 5, 7 and 15 features, respectively. Among the models constructed by the LR classifiers the AUC value of the T2WI model in the training group was 0.836, the specificity was 81.60%, and the sensitivity was 80.23%; and the AUC value in the test group was 0.802, the specificity was 70.14%, and the sensitivity was 82.24%. The AUC value of the T1WI-CE model in the training group was 0.859, specificity was 86.50%, and sensitivity was 81.98%; the AUC value in the test group was 0.879, specificity was 80.27%, and sensitivity was 84.12%. The AUC value of the DWI model in the training group was 0.925, specificity was 92.50%, and sensitivity was 81.28%; the AUC value in the test group was 0.901, specificity was 83.44%, and sensitivity was 94.02%.

Conclusion: This study shows that the four radiomics diagnostic models constructed based on MRI radiomics, T2WI, T1WI-CE and DWI, can predict grade II and grade III gliomas with certain diagnostic efficacy, among which the prediction model based on DWI sequences has the highest diagnostic value.

PO-2760

The added value of ADC-based nomogram in assessing the depth of myometrial invasion of endometrial endometrioid adenocarcinoma

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Objective: To explore the potential value of the ADC-based nomogram models in preoperatively assessing the depth of myometrial invasion of endometrial endometrioid adenocarcinoma (EEA).

Methods: Preoperative MRI of 210 EEA patients were retrospectively analyzed. ADC histogram metrics derive from the whole-tumor regions of interest. Univariate and multivariate analyses were used to screen the ADC histogram metrics and clinical characteristics for nomogram model building. The diagnostic sensitivity, specificity, accuracy, positive predictive value (PPV), and negative predictive value (NPV) of two radiologists without and with the assistance of models were calculated and compared.

Results: Two nomogram models were developed for predicting no myometrial invasion (NMI) and deep myometrial invasion (DMI) with area under the curves of 0.85 and 0.82, respectively. With the assistance of models, the overall accuracies were significantly improved [radiologist_1, 73.3% vs 86.2% ($p = 0.001$); radiologist_2, 80.0% vs 91.0% ($p = 0.002$)]. In determining NMI, the sensitivity and PPV were greatly improved but not significant for radiologist_1 (51.9% vs 77.8% and 46.7% vs 75.0%, $p = 0.229$ and 0.511), and under/near the significance level for radiologist_2 (59.3% vs 88.9% and 57.1% vs 82.8%, $p = 0.041$ and 0.065), while the specificity, accuracy, and NPV were significantly improved (all $p < 0.001$). In determining DMI, all sensitivity, specificity, accuracy, PPV, and NPV were significantly improved (all $p < 0.001$).

Conclusions: The ADC-based nomogram models can improve the diagnostic performance of radiologist in preoperatively assessing the depth of myometrial invasion and facilitate optimizing clinical individualized treatment decisions.

PO-2761

Resting-state functional MRI reveals altered brain neural activities and is correlated with brain amyloid- β deposition in type-2 diabetes with and without mild cognitive impairment.

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Background and Objective: The altered brain neural activity measured by the amplitude of low-frequency fluctuation (ALFF) in type 2 diabetes mellitus (T2DM) with or without mild cognitive impairment (MCI) is much less discussed, and if the neural activity associated with A β accumulation in such populations with high-risk developing into Alzheimer's Disease (AD) is unclear. To investigate the differences in ALFF signals in T2DM with MCI (T2DM-MCI) compared to T2DM without MCI (T2DM-NC) and identify the possible association between neural activity and A β accumulation in T2DM-MCI.

Methods: 18 healthy controls (HC), 18 T2DM-NC participants, and 13 T2DM-MCI participants were included in this study. Standardized ALFF maps were used to investigate the differences in neural activity in T2DM with and without MCI. A β accumulation values in clusters showing altered neural activity and in default mode network (DMN) were extracted and correlated with the same regional ALFF values and standardized ALFF maps respectively in T2DM-MCI.

Results: The altered ALFF signals were shown in the superior frontal gyrus, inferior temporal gyrus, fusiform gyrus, and core regions involved in DMN (posterior cingulate gyrus and precuneus) in the comparison between T2DM-NC and T2DM-MCI. Further correlation analysis indicated that A β deposition in DMN was correlated with ALFF signals in the superior frontal gyrus, fusiform gyrus, and cerebellum in T2DM-MCI.

Conclusion: Our study implies the importance of neural activity changes mainly in visual and default mode networks in T2DM-MCI and reveals the possible association between neural activity and A β accumulation in individuals at high risk of AD.

PO-2762

Non-invasive isocitrate dehydrogenase 1 status prediction in grade II/III glioma based on magnetic resonance images: a transfer learning strategy

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Objective: To evaluate transfer learning combined with various convolutional neural networks (TL-CNNs) in predicting isocitrate dehydrogenase 1 (IDH1) status of grade II/III gliomas.

Materials and methods: Grade II/III glioma patients diagnosed at the Tangdu Hospital (August 2009 to May 2017) were retrospectively included. CNNs, AlexNet, GoogLeNet, ResNet and VGGNet were fine-tuned with T2WI, FLAIR and T1CE images. Fifty-four patients with IDH1 mutant and 56 patients with wild-type IDH1 were included.

Results: IDH1 mutant prediction accuracies using AlexNet, GoogLeNet, ResNet, and VGGNet achieved 70.0% (AUC=0.660), 65.0% (AUC=0.600), 70.0% (AUC=0.700), and 80.0% (AUC=0.730) for T2WI images, 70.0% (AUC=0.660), 70.0% (AUC=0.620), 70.0% (AUC=0.710), and 80.0% (AUC=0.720) for FLAIR images, and 73.7% (AUC=0.744), 73.7% (AUC=0.656), 73.7% (AUC=0.633), and 73.7% (AUC=0.700) for T1CE images, respectively. The highest AUC (0.800) was achieved using VGGNet and FC-fusion images.

Discussion: TL-CNNs (especially VGGNet) had a potential predictive value for IDH1 mutant status of grade II/III gliomas.

PO-2763

Brain magnetic resonance imaging predicts treatment outcomes in major depressive disorder

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Purpose

To evaluate the performance of brain magnetic resonance imaging (MRI) features in predicting treatment outcomes for major depressive disorder (MDD) and to assess performance variations among interventions.

Materials and Methods

We searched studies in PubMed, Embase, Web of Science, and Science Direct databases before March 22, 2023, using keywords "depress*", "major depress*", "MDD", "treatment outcome", and "MRI". We extracted a confusion matrix for prediction in each study for further analysis.

The logarithm of diagnostic odds ratio [$\log(\text{DOR})$], sensitivity, and specificity were conducted using Reitsma's random effect model. The area under curve (AUC) of summary receiver operating characteristic (SROC) curve was calculated. We used Deek's funnel plot asymmetry test to assess publication bias.

Subgroup analyses were conducted based on MRI modalities: resting-state functional MRI (rsfMRI), task-based fMRI (tbMRI), and structural MRI (sMRI), as well as interventions: antidepressant (including selective serotonin reuptake inhibitors [SSRI]) and electroconvulsive therapy (ECT). Meta-regression was conducted among subgroups.

Results

We included 44 studies with 2623 patients, revealing an overall log(DOR) of 2.53. The AUC, sensitivity, and specificity were 0.89, 0.78, and 0.75. No publication bias was found in included studies.

RsfMRI had higher specificity (0.79 vs. 0.69) in predicting treatment outcomes than previous tbfMRI subgroup ($P = 0.01$). No significant differences were found between sMRI and other modalities, nor between antidepressants (SSRIs and others) and ECT. Antidepressant studies primarily identified predictive features in limbic and default mode networks, while ECT mainly focused on limbic network.

Conclusion

Our findings suggest a robust promise for pretreatment brain MRI features in predicting treatment outcomes in MDD. Overlapping but distinct network level measures predicted outcomes for antidepressants and ECT.

PO-2764

Altered hippocampal subfield volumes in chronic occupational manganese-exposed welders

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Objectives: Chronic occupational manganese (Mn) exposure is characterized by motor and cognitive dysfunction. Previous neuroimaging findings have demonstrated the association between neurodegeneration and the hippocampus. However, few studies have focused on the structural changes in the hippocampal subfield volumes. This study aimed to investigate the volumetric alterations of the hippocampus as well as its subfields in Mn-exposed welders.

Methods: Thirty HCs and Forty-three Mn-exposed welders were recruited and underwent MRI scans in this study. Based on high-resolution T1-weighted MRI scans, the automated hippocampal substructure module in FreeSurfer 7.3 was applied to segment hippocampus into twelve subregions, including cornu ammonis (CA) 1, C2/3, CA4, fimbria, granule cell and molecular layer of the dentate gyrus, hippocampal-amygdaloid transition area (HATA), fissure, tail, molecular layer, parasubiculum, presubiculum, and subiculum, and calculate the volumes of hippocampal subfields. Cross-sectional analysis was used to statistically compare the volumetric differences in hippocampal subfields between the two groups.

Results: There were no significant difference in age among the HCs and Mn-exposed welders. Compared to HCs, Mn-exposed welders showed significantly smaller volumes in the bilateral hippocampus (left, $p=0.003$; right, $p=0.002$). Further exploration revealed that welders had significantly reduced volumes in hippocampal subfields, including bilateral CA3, fimbria, presubiculum, subiculum, left CA4, and right HATA. No association was found between the hippocampal subfields volumes and clinical characteristics in the welders group.

Conclusions: These preliminary findings suggested that Mn-exposed welders exhibited unique atrophy of the hippocampus and that subfield abnormalities might be implicated in cognitive impairment. The hippocampus represents a phenotype that is distinct from traditional diagnostic strategies, which might help clinical diagnosis.

PO-2765

Abnormal temporal variability of thalamo-cortical circuits in moderate to severe OSA patients

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Purpose: This study aimed to investigate the abnormal dynamic functional connectivity (dFC) variability of the thalamo-cortical circuit in obstructive sleep apnea (OSA) patients and explore whether these changes are related to clinical characteristics of OSA patients.

Methods: A total of ninety-two newly diagnosed moderate to severe OSA patients and eighty-four education-matched healthy controls (HCs) were included in the study. All the participants underwent neuropsychological tests, and fMRI scan. We explored the thalamo-cortical dFC changes by dividing thalamus into 16 subregions and combining with a sliding-window approach. Correlation analysis was employed to assess the relationship between dFC variability and clinical features, and support vector machine method was used for classification.

Results: Compared to the HCs group, the OSA group exhibited increased dFC variability between most of the thalamic subregions and critical brain regions of the sensorimotor network, default mode network, auditory network, and visual network, while decreased dFC variability was observed in some frontal-occipito-temporal cortical regions. Furthermore, these changes in the dFC were positively correlated with the daytime sleepiness, disease severity, and cognitive scores. Altered dFC variability contributes to the discrimination between OSA patients and HCs, with a classification accuracy of 77.8%.

Conclusion: Our findings reflect thalamo-cortical overactivation and disconnection in OSA patients, leading to disrupted information flow within the brain networks. These results may contribute to a better understanding of the temporal variability of the thalamo-cortical circuit in OSA patients.

PO-2766

Meta-analytical evidence of functional and structural brain abnormalities across Alzheimer's disease spectrum

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Background: Numerous neuroimaging studies have reported that Alzheimer's disease (AD) and preclinical AD have been linked to alterations in the amplitude of low-frequency fluctuation (ALFF)/fractional ALFF (fALFF) and cortical thickness (CT) of some brain areas. However, the findings have been inconsistent.

Methods: We conducted a meta-analysis to identify multimodal differences in ALFF/fALFF and CT in patients with AD and preclinical AD compared to healthy controls (HCs), using the Seed-based d Mapping with Permutation of Subject Images software.

Results: We included 26 ALFF/fALFF studies comprising 884 patients with AD and 1,020 controls, along with 52 studies comprising 2,049 patients with preclinical AD and 2,331 controls. For CT, we included 10 studies comprising 338 patients with AD and 315 controls. Overall, compared to HCs, patients with AD showed decreased ALFF/fALFF in the bilateral posterior cingulate gyrus (PCC)/precuneus (extending to the bilateral median cingulate gyrus [MCC]) and right angular gyrus, as well as increased ALFF/fALFF in the bilateral parahippocampal gyrus (extending to the bilateral hippocampus and amygdala gyrus). Patients with preclinical AD showed decreased ALFF/fALFF in the left precuneus. Additionally, patients with AD displayed decreased CT in the bilateral parahippocampal gyrus, left PCC (extending to the bilateral MCC) and sensorimotor area. Overlapping analysis showed that patients with AD displayed decreased ALFF/fALFF and CT in

the left PCC (extending to the bilateral MCC), as well as increased ALFF/fALFF and decreased CT in the bilateral parahippocampal gyrus.

Conclusions: The study findings demonstrated that AD and preclinical AD both exhibited functional alterations in the precuneus. Furthermore, patients with AD also exhibited convergent functional and structural alterations in the PCC/precuneus and parahippocampal gyrus, as well as aberrant function or structure in the sensorimotor area, orbitofrontal cortex and temporal lobe. These findings may provide different insights into the pathophysiology of AD spectrum.

PO-2767

Changes and correlation analysis of abdominal tissue in obese subjects after bariatric surgery: A prospective magnetic resonance imaging study

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Objectives: To clarify which factors are related to the changes of important abdominal metabolic and endocrine organs such as liver and pancreas during the rapid weight loss after bariatric surgery. Methods: Forty-four subjects underwent sleeve gastrectomy from September 2019 to May 2023. The changes and correlations of clinical, laboratory, and MRI indicators of the abdominal tissue were analyzed before operation and one, three and six months after operation.

Results: Hepatic proton density fat fraction (H-PDFF) and visceral fat area (VFA) significantly in one month after bariatric surgery, decreased slowly 3-6 months after operation, while the pancreas proton density fat fraction (P-PDFF) and subcutaneous fat area (SFA) decreased gradually. 94% of nonalcoholic fatty liver disease (NAFLD) subjects recovered 6 months after operation. Apparent diffusion coefficient (ADC) of liver and pancreas increased gradually. T1 values of liver was significant positive correlated with the H-PDFF ($r = 0.86$, $p < 0.001$), and the ADC of liver was moderately negative correlated with the H-PDFF in three months after operation ($r = -0.67$, $p < 0.05$). The change of H-PDFF and fasting blood glucose (FBG) have always been correlated within six months ($r = 0.5 \sim 0.57$, $p < 0.05$). One month after operation, the changes of VFA were correlated with the changes of triglyceride (TG) and triglyceride glucose (TYG) index ($r = 0.73 \sim 0.76$, $p < 0.001$).

Conclusion: There is a significant positive correlation between H-PDFF and hepatic T1 values, and the ADC values of liver and pancreas increased with the decrease of fat content after bariatric surgery, suggesting the changes of diffusion function of liver and pancreas. The change of VFA is significantly related to the change of TG and TYG index one month after operation, but not SFA, suggesting that the metabolic activity of visceral adipose tissue (VAT) is higher. The gradual recovery of NAFLD after operation is continuously related to the changes of FBG.

PO-2768

Gray matter thickness and subcortical nuclear volume injury in male SARS-CoV-2 Omicron survivors in the acute phase: a prospective longitudinal study

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Background Omicron's clinical manifestations and effects of on the brain in the acute phase remain unclear. By longitudinally comparing pre-Omicron and post-Omicron data, to investigate the pathophysiological mechanisms underlying clinical symptoms and changes to gray matter and subcortical nuclei in males in the acute phase and provide an imaging basis for early detection and intervention.

Methods A total of 207 male police officers underwent health screening MRI scans between August 28 and September 18, 2022; among them, 98 provided complete imaging and scales. Sixty-one participants infected with Omicron were reevaluated in the acute phase (January 6–January 14, 2023). Neuropsychiatric scales, clinical symptoms, and MR data were collected in the acute phase of infection, and their clinical symptoms were followed-up after three months. Gray matter indexes and subcortical nuclear volumes were analyzed. Associations between changes in gray matter and neuropsychiatric scales were evaluated with correlation analyses.

Findings Ninety-eight individuals underwent complete baseline data collection, and 61 and 17 individuals voluntarily enrolled in follow-ups during the acute phase of Omicron infection and three months later, respectively. Compared with pre-Omicron measures, Beck Anxiety Inventory scores were significantly increased and depressive distress scores were significantly decreased post-Omicron. Fever, headache, fatigue, myalgia, cough, and dyspnea were the main symptoms during the acute phase; fever, myalgia, and cough were significantly improved at the three-month follow-up. The gray matter thickness in the left precuneus and right lateral occipital region and the ratio of the right hippocampus volume to the total intracranial volume (right hippocampus/TIV) were significantly reduced post-Omicron. The fever group had reduced sulcus depth of the right inferior parietal region compared with the nonfever group. Post-Omicron, the thickness of the left precuneus was negatively correlated with the Beck Anxiety Inventory ($r=-0.39$, $P=0.002$, $PFDR=0.018$), and the ratio of the right hippocampus/TIV was positively correlated with the word fluency test scores ($r=0.34$, $P=0.007$).

Interpretation The duration of symptoms in multiple systems after infection was short; fever, myalgia, and cough obviously improved at the three-month follow-up. Gray matter thickness and subcortical nuclear volume injury were observed in male SARS-CoV-2 Omicron survivors in the acute phase. These findings may provide new insights into the emotional and cognitive mechanisms of Omicron invasion into the nervous system and provide an imaging basis for early detection and intervention of neurological sequelae.

PO-2769

Causal evidence for cerebello-striato-limbic circuit dynamics supporting depression

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Background: Striatum-based circuits have been implicated in major depressive disorder (MDD), a disease that reflects reward deficits and associated striatal circuitry disturbances. However, the underlying mechanism linking striatum-based circuits and MDD remains not fully understood, and a whole-structure approach has commonly been adopted when investigating striatal

dysconnectivity in MDD patients, and it remains unclear which striatal nucleus is the core structure underlying adolescent MDD.

Methods: A total of 79 first-episode, drug-naïve adolescents with MDD and 63 matched healthy controls (HCs), underwent resting-state functional MRI scans. Resting-state functional connectivity (rsFC) of the striatal nucleus were investigated, and then dynamic causal modeling (DCM) was conducted to assess the hypothesis that depression is associated with aberrant effective connectivity (EC) within and between key regions in the striatum-based circuits.

Results: Adolescents with MDD manifested decreased rsFC of the left ventral caudate (vCAU)-bilateral hippocampus (HIP), the right ventral rostral putamen (vrPUT)-left thalamus (THA), the left vCAU-right THA, as well as decreased rsFC of the left vrPUT-right cerebellum crus II (CeCr2). Compared with HCs, DCM showed significantly weaker EC from the right CeCr2 to the right vrPUT nucleus and the weaker EC from the right vrPUT nucleus to the left HIP and then from the left HIP to the left THA, as well as the enhanced self-inhibition of the left HIP in MDD group compared with the HCs.

Conclusions: This study provides direct evidence that abnormal function of the striatal nucleus in adolescent MDD patients may lead to the dysfunction of cerebello-striato-limbic circuit, in which the vrPUT nucleus plays a central role in abnormal connectivity in adolescent MDD patients.

PO-2770

Decreased intrinsic neural timescale in first-episode, treatment-naïve adolescent depression

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Background: Major depressive disorder (MDD) is mainly characterized by its core dysfunction in higher-order brain cortices involved in emotional and cognitive processes, whose neurobiological basis remains unclear. In this study, we applied a relatively new developed resting-state functional magnetic resonance imaging (rs-fMRI) method of intrinsic neural timescale (INT), which reflects how long neural information is stored in a local brain area and reflects an ability of information integration, to investigate the local intrinsic neural dynamics using univariate and multivariate analyses in adolescent depression.

Method: Based on the rs-fMRI data of sixty-six first-episode, treatment-naïve adolescents with MDD and fifty-two well-matched healthy controls (HCs), we calculated an INT by assessing the magnitude of autocorrelation of the resting-state brain activity, and then compared the difference of INT between the two groups. Correlation between abnormal INT and clinical features was performed. We also utilized multivariate pattern analysis to determine whether INT could differentiate MDD patients from HCs at the individual level.

Result: Compared with HCs, patients with MDD showed shorter INT widely distributed in cortical and partial subcortical regions. Interestingly, the decreased INT in the left hippocampus was related to disease severity of MDD. Furthermore, INT can distinguish MDD patients from HCs with the most discriminative regions located in the dorsolateral prefrontal cortex, angular, middle occipital gyrus, cerebellar posterior lobe.

Conclusion: Our research aids in advancing understanding the brain abnormalities of first-episode treatment-naïve adolescents with MDD from the perspective of the local neural dynamics, highlighting the significant role of INT in understanding neurophysiological mechanisms. This study shows that the altered intrinsic timescales of local neural signals widely distributed in higher-order brain cortices regions may be the neurodynamic basis of cognitive and emotional disturbances in MDD patients, and provides preliminary support for the suggestion that these could be used to aid the identification of MDD patients in clinical practice.

PO-2771

Subtractionless compressed-sensing-accelerated whole-body MR angiography using two-point Dixon fat suppression with single-pass half-reduced contrast dose: feasibility study and initial experience

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Purpose To investigate the feasibility and clinical utility of a compressed-sensing-accelerated subtractionless whole-body MRA (CS-WBMRA) protocol with only contrast injection for suspected arterial diseases, by comparison to conventional dual-pass subtraction-based whole-body MRA (conventional-WBMRA) and available computed tomography angiography (CTA).

Materials and methods This prospective study assessed 86 patients (mean age, 56 years \pm 16.4 [standard deviation]; 25 women) with suspected arterial diseases from May 2021 to December 2022, who underwent CS-WBMRA ($n = 48$, mean age, 55.9 years \pm 16.4 [standard deviation]; 25 women) and conventional-WBMRA ($n = 38$, mean age, 48 years \pm 17.4 [standard deviation]; 20 women) on a 3.0 T MRI after random group assignment based on the chronological order of enrolment. Of all enrolled patients administered the CS-WBMRA protocol, 35% (17/48) underwent CTA as required by clinical demands. Two experienced radiologists independently scored the qualitative image quality and venous enhancement contamination. Quantitative image assessment was carried out by determining and comparing the apparent signal-to-noise ratios (SNRs) and contrast-to-noise ratios (CNRs) of four representative arterial segments. The total examination time and contrast-dose were also recorded. The independent samples t-test or the Wilcoxon rank sum test was used for statistical analysis.

Results The overall scores of CS-WBMRA outperformed those of conventional-WBMRA (3.40 ± 0.60 vs 3.22 ± 0.55 , $P < 0.001$). In total, 1776 and 1406 arterial segments in the CS-WBMRA and conventional-WBMRA group were evaluated. Qualitative image scores for 7 (of 15) vessel segments in the CS-WBMRA group had statistically significantly increased values compared to those of the conventional-WBMRA groups ($P < 0.05$). Scores from the other 8 segments showed similar image quality ($P > 0.05$) between the two protocols. In the quantitative analysis, overall apparent SNRs were significantly higher in the conventional-WBMRA group than in the CS-WBMRA group (214.98 ± 136.05 vs

164.90 ± 118.05 ; $P < 0.001$), while overall apparent CNRs were not significantly different in these two groups (CS vs conventional: 107.13 ± 72.323 vs 161.24 ± 118.64 ; $P > 0.05$). In the CS-WBMRA group, 7 of 1776 (0.4%) vessel segments were contaminated severely by venous enhancement, while in the conventional-WBMRA group, 317 of 1406 (23%) were rated as severe contamination. In the CS-WBMRA group, total examination and reconstruction times were only 7 min and 10 min, respectively, vs 20 min and < 30 s for the conventional WBMRA group, respectively. The contrast agent dose used in the CS-WBMRA protocol was reduced by half compared to conventional-WBMRA protocol (18.7 ± 3.5 ml vs 37.2 ± 5.4 ml, $P = 0.008$).

Conclusion: The CS-WBMRA protocol provides excellent image quality and sufficient diagnostic accuracy for whole-body arterial disease, with relatively faster workflow and half-dose reduction of contrast agent, which has greater potential in clinical practice compared with conventional-WBMRA.

PO-2772

Multiparametric pulmonary MR-based radiomics nomogram for predicting brain metastases in patients with stage II-IV lung cancer

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Purpose: To develop a radiomics nomogram based on pulmonary MR to predict brain metastases (BM) in patients with lung cancer.

Methods: 105 patients with stage II-IV pathologically confirmed lung cancer who had undergone chest MR (including T2HASTE, T2 fast-BADE, T1-VIBE, Star-VIBE, DWI, and T1 mapping) and brain MR examinations were enrolled retrospectively. Two groups of patients were created: BM+ (those with BM diagnosed at baseline examination or within a year of follow-up; n=40) and BM- (those without BM throughout at least one year of follow-up; n=65). Two radiologists independently measured the mean ADC and T1 values of lung cancer lesions, assessed the presence of lobulation, spicular sign, pleural indentation, and pleural effusion, and estimated the size of the lung lesion. Two independent radiologists semi-automatically extracted radiomics features from the pretreatment thoracic MR images. Patients were randomly assigned to the training cohort (n=73), and the testing cohort (n=32) with a ratio of 7:3. Intraclass correlation coefficient (ICC), linear dependent coefficient ρ , and F test were used to select the optimum radiomics features and develop a BM+ predictive logistic regression (LR) radiomics model. The independent sample t-test, Mann Whitney U-test, chi-square test, or Fisher's exact test were used to assess the differences in clinical and imaging characteristics between the BM+ and BM- groups. The performances of clinical, radiomics models, and a clinical-radiomics nomogram were compared by the areas under receiver operating characteristic (ROC) curves (AUCs).

Results: In the training group, the pretreatment CEA, N stage, ADC, and T1 mean values were statistically different between the BM+ and BM- cohorts ($P=0.003-0.040$). Among the constructed radiomics models of individual MR sequences, the T1-VIBE radiomics model demonstrated the best predictive performance with an AUC of 0.910 in the training group and 0.875 in the validation group. The capacity to predict brain metastasis was significantly improved (AUC was 0.934 and 0.933 in the training and test groups, respectively) by combining the clinical, radiological characteristics (CEA, N stage, ADC, and T1 values) and T1-VIBE radiomics model.

Conclusions: A multiparameter chest MR radiomics model may be used to predict brain metastases in lung cancer patients. The clinical-radiomics nomogram improved the risk classification of brain metastases in patients with stage II-IV lung cancer.

PO-2773

The change of modular properties of functional brain network in patients with cervical spondylotic myelopathy

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Objectives: Previous studies have indicated that brain functional plasticity and reorganization in patients with cervical spondylotic myelopathy (CSM). However, it remains unclear whether and how compression of the cervical cord influences the functional integration and separation between and/or within modules. This study aimed to address these questions using graph theory.

Methods: Functional MRI was conducted on 46 CSM patients and 35 healthy controls (HCs). The intra- and inter-modular connectivity properties of the whole-brain functional network and nodal

topological properties were then calculated using theoretical graph analysis. The difference in categorical variables between groups was compared using a chi-squared test, while that between continuous variables was evaluated using a two-sample t-test. Correlation analysis was conducted between modular connectivity properties and clinical parameters.

Results: Modules interaction analyses showed that the CSM group had significantly greater inter-module connections than the HCs group (DMN-FPN: $t=2.38$, $p=0.02$); On the contrary, the CSM group had significantly lower intra-module connections than the HCs group (SMN: $t=-2.13$, $p=0.036$). Then we calculated the nodal topological properties of all nodes that were part of exceptionally connected modules. Compared to HCs, CSM patients exhibited higher nodal centralities in the right superior frontal gyrus, left post cingulate gyrus, right precuneus, right ventrolateral prefrontal cortex, left anterior cingulate cortex and left dorsolateral prefrontal cortex. In contrast, compared to the HCs group, CSM patients exhibited lower nodal centralities in the sensorimotor network. The Japanese Orthopedic Association (JOA) score was positively correlated with inter-module connections ($r=0.330$, FDR $q=0.029$) and negatively correlated with intra-module connections ($r=-0.467$, FDR $q=0.001$).

Conclusions: This study reported altered modular connections and nodal centralities in CSM patients. Decreased nodal centralities and intra-modular connection in the sensory-motor regions may indicate sensory-motor dysfunction. Furthermore, increased nodal centralities and inter-modular connection in the DMN and the frontal-parietal network may be compensatory for sensory-motor dysfunction in CSM.

PO-2774

Heart Failure with Normal Natriuretic Peptide Levels and Preserved Ejection Fraction: A Prospective Clinical and CMR study

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Objectives: Heart failure with preserved ejection fraction (HFpEF) and normal natriuretic peptide levels can be defined as predisposed HFpEF, based on the HFA-PEFF score reaching four points from the ESC guidelines, and can be better evaluated by cardiovascular magnetic resonance (CMR). We aimed to describe the clinical presentation, comprehensive CMR characteristics, and prognosis of patients with predisposed HFpEF.

Materials and Methods: This prospective cohort study was conducted from January 1, 2019 to September 30, 2021. Patients who had primary cardiomyopathy, and primary valvular heart disease were excluded. Clinical and CMR-based characteristics and outcomes were compared. The primary endpoints were death, or heart failure hospitalization, or stroke.

Results: A total of 213 patients with HFpEF, 151 patients with predisposed HFpEF and 100 control subjects were analyzed. Compared with controls, patients with predisposed HFpEF had worse left ventricular (LV) remodeling and function, and higher systemic inflammation. Compared with patients with HFpEF, patients with predisposed HFpEF, whether obese or not, were younger, had higher plasma volume, yet lower prevalence of atrial fibrillation (AF), had lower left atrial volume index, less impaired LV global longitudinal strain ($-12.2\pm2.8\%$ vs $-13.9\pm3.1\%$, $p<0.05$) and early-diastolic global longitudinal strain rate (eGLSR, $0.52\pm0.20/s$ vs $0.57\pm0.15/s$, $p<0.05$), while similar prognosis. Besides, AF occurrence (HR=3.98, $p=0.008$), hemoglobin levels (HR=0.95, $p=0.002$), and eGLSR (per 0.2/s increase, HR=0.35, $p=0.006$) independently associated with endpoints in patients with predisposed HFpEF.

Conclusions: Predisposed HFpEF has relatively unique clinical and CMR features compared with HFpEF. eGLSR should be considered to improve prognosis in patients with predisposed HFpEF.

PO-2775

Prognostic value of left atrial strain derived from CMR fast semi-automated long-axis strain analysis in cardiac light-chain amyloidosis

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Objective

Cardiac light-chain amyloidosis (AL-CA) is a rare and life-threatening disease characterized by deposition of amyloid fibrils in the heart. The evaluation of left atrial (LA) function is important for predicting the prognosis of AL-CA patients. This study aimed to investigate whether fast semi-automated long-axis strain (FLAS) technique can evaluate the LA function changes in AL-CA patients and whether it has additional prognostic value.

Methods

Forty-one AL-CA patients and 19 healthy volunteers were retrospectively enrolled, and LA strain parameters were analyzed using FLAS based on cardiac magnetic resonance imaging (CMR). The endpoint was defined as all-cause mortality, and survival time was from the CMR examination date to the last follow-up or death. The prognostic value of LA strain was evaluated using Kaplan-Meier method and COX regression model. The intraclass correlation coefficient (ICC) was used to assess the repeatability of LA strain.

Results

LA strain parameters showed good reproducibility both within and between observers (ICC range, 0.945-0.991). Compared to the control group, AL-CA patients had significant left heart remodeling and dysfunction, including increased LVMI, decreased LVEF and LVLAS (all $P < 0.001$), enlarged LA, decreased ejection fraction (both $P < 0.05$), and significantly lower LA total strain (ϵ_s), active strain (ϵ_a), and passive strain (ϵ_e) (all $P < 0.001$). During a median follow-up of 16 months, 16 patients died. In Kaplan-Meier analysis, $\epsilon_s \leq 8.29\%$, $\epsilon_a \leq 2.05\%$, and $\epsilon_e \leq 2.78\%$ all increased the risk of death. In the multivariate model, ϵ_s and ϵ_a were independent predictors of patient prognosis and significantly improved the predictive ability of the model after adding them to models constructed with NYHA class, Mayo 2004 stage, and LVEF ($P = 0.002$ and $P = 0.005$, respectively).

Conclusion

FLAS has good repeatability in evaluating LA strain. LA enlargement and dysfunction are common in AL-CA patients. LA strain is correlated with the prognosis of AL-CA patients, and ϵ_s and ϵ_a are independent predictors of all-cause mortality and provide additional prognostic value on the basis of common clinical staging and CMR parameters.

PO-2776

The value of diffusion-weighted imaging for predicting pathologic response to neoadjuvant immunotherapy combined with chemotherapy in locally advanced resectable esophageal squamous cell carcinoma

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Objective: This study was conducted in order to explore the value of DWI-derived parameters for the prediction of pathologic response to neoadjuvant immunotherapy (nIT) combined with chemotherapy in locally advanced resectable esophageal squamous cell carcinoma (ESCC).

Material and methods: Thirty-two patients with locally advanced ESCC who were treated with nT combined with chemotherapy followed by surgery were prospectively enrolled from May 2022 to May 2023. DWI (including IVIM) was performed within 1 week (median 2 days) before NT, and 2 to 5 weeks (median 25 days) after completion of nT, prior to surgery. Parameters including apparent diffusion coefficient (ADC), true diffusion coefficient (D), pseudo diffusion coefficient (D^*), and pseudo diffusion fraction (f) before and after NT were measured. Pathologic response was evaluated according to tumor regression grade (TRG) system. We grouped patients with TRG 0 into complete response (CR), while TRG 1-2 into minimal residual cancer cell (MRC). The changes in IVIM values before and after NT in different TRG groups were assessed. Receiver operating characteristic (ROC) curves analysis was used to determine the best cutoff value for predicting the pathologic response or MRC to NT.

Results: Twenty-one patients were identified as TRG 0-2 (responders), and eleven as TRG 3 (non-responders) in pathologic evaluation. While seven patients were identified as TRG 0 (CR), and fourteen as TRG 1-2 (MRC) in minimal residual cancer cell detection. The ADC, D, and f values increased significantly after nT. The post-ADC, post-D and Δ ADC values of responders were significantly higher than those of non-responders. The post-ADC, post-D and Δ ADC values of responders were significantly higher than those of non-responders. The Δ ADC and Δ D values of patients achieved CR were significantly higher than those with MRC. The area under curve (AUC) value of the post-ADC, post-D, Δ ADC and Δ D for prediction of pathologic response to nT was 0.801-0.857, 0.688-0.758, 0.879-0.913 and 0.805-0.861. The AUC value of Δ ADC and Δ D for identification MRC after nT was 0.776-0.796 and 0.786-0.867.

Conclusion: DWI may be used as an effective functional imaging technique to predict pathologic response and detect minimal residual cancer cell to nT combined with chemotherapy in locally advanced resectable ESCC.

PO-2777

Feasibility of bone marrow infiltration pattern and ADC values for assessment of tumor burden using multi-parameter MR in multiple myeloma

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Objective: The purpose of our study was to explore and compare the tumor burden of different bone marrow (BM) infiltration patterns and evaluate the feasibility of ADC value to identify patterns in multiple myeloma (MM).

Materials and Methods: 93 patients with newly diagnosed MM and 23 controls had undergone routine MRI and DWI from January 2019 to November 2020. All patients had exhaustive laboratory data. Five BM infiltration patterns were allocated according to routine MRI. The laboratory data and ADC values of patterns were analyzed and compared. ROC analysis was used to establish the best diagnostic ADC threshold value for identifying these patterns and distinguishing normal pattern from controls. Besides, the correlation between the ADC values of diffuse pattern and the plasma cells ratio was assessed.

Results: The values of hemoglobin, β 2-MG, plasma cell, M protein, the percentages of ISS, R-ISS stage, high-risk FISH, and ADC values showed significant difference among patterns. ADC mean at a specific value ($368.5 \times 10^{-6} \text{ mm}^2/\text{s}$) yielded a maximum specificity (95.5%) and sensitivity (92.0%) in diagnosing MM. A specific value ($335.5 \times 10^{-6} \text{ mm}^2/\text{s}$) yielded a maximum specificity (84.7%) and sensitivity (88.0%) in discriminating visually normal pattern in MM from controls. There was a moderate[1] positive correlation between the plasma cells ratio and ADCs of diffuse infiltration patterns ($r=0.648$, $P<0.05$).

Conclusions: The BM infiltration patterns in MM patients can indicate the tumor burden and ADC value has the ability to discriminate these patterns objectively.

PO-2778

Aberrant dynamic properties of whole-brain functional connectivity in patients with non-small cell lung cancer after chemotherapy revealed by Hidden Markov Models

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Background: The dynamic patterns behind the brain functional reorganization for patients with non-small cell lung cancer after chemotherapy and cognitive impairment remain largely unclear. This study aimed to investigate the temporal dynamics of brain activity and characterize the spatiotemporal specificity of transitions for lung cancer after chemotherapy patients and cognitive impairment in detail.

Methods: A total of 20 non-small cell lung cancer patients and 30 age-, sex- and education-matched healthy controls (HC) were included and underwent resting-state functional magnetic resonance imaging (rs-fMRI) scan. A hidden Markov model (HMM) analysis for rs-fMRI was conducted to identify brain states that recurred over time and assess the dynamical patterns of activation of states that characterized the non-small cell lung cancer patients before receiving chemotherapy and undergo chemotherapy and cognitive impairment. Furthermore, the transitions across states were analyzed to investigate the abnormality of transitions for patients with lung cancer before/after chemotherapy and cognitive impairment.

Results: 6 HMM states were identified in this study. Compared with HC, fractional occupancies of HMM state 2 of post chemotherapy non-small cell lung cancer patients was significantly increased ($p = 0.028$); fractional occupancies of HMM state 2 of both C- and C+ groups were significantly increased ($p = 0.045$, $p=0.042$). The HMM state 3 of both C- and C+ groups expressed shorter lifetimes ($p = 0.008$, $p=0.006$); the HMM state 6 of both C- and C+ groups expressed shorter lifetimes ($p = 0.027$, $p=0.017$). Compared with HC, the interval time of HMM states 5 was significantly increased for C+ patients ($p = 0.019$), and interval time of HMM state 6 was significantly decreased for C+ patients ($p = 0.046$, $p=0.042$). Switching rate of showed non-small cell lung cancer patients significant increased ($p = 0.045$, $p=0.042$). Compared to HC, the transition probabilities from HMM state 1,2 to 3 decreased significantly for C+ ($p < 0.05$); from state 3,5 to 4 and from state 1,2 to 4 increased significantly for C+ group (all $p < 0.05$). The transition probability from HMM state 2 to 5 significantly decreased for C- group ($p < 0.05$), from state 2,4 to 6 increased significantly for C- group ($p < 0.05$). Compared to C- group, switching probabilities from state 3 to 5, from 4 to 3 increased significantly (all $p < 0.05$); from state 4 to 1 decreased significantly.

Conclusion: Notably, The HMM provides more information of how brain active dynamically in patients with non-small cell lung cancer after chemotherapy and cognitive impairment. Our results indicate special aberrant dynamics for patients with non-small cell lung cancer, which may contribute to cognitive impairment, suggesting that brain dynamics based on the HMM could help reinforce the understanding on neuropathological mechanisms of non-small cell lung cancer after chemotherapy and cognitive impairment ($p < 0.05$).

PO-2779

A radiomics-based nomogram for preoperative T staging prediction of rectal cancer

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Purpose: To investigate the value of a radiomics-based nomogram in predicting preoperative T staging of rectal cancer.

Methods: A total of 268 eligible rectal cancer patients from August 2012 to December 2018 were enrolled and allocated into two datasets: training (n=188) and validation datasets (n=80). Another set of 32 patients from January 2019 to July 2019 was included in a prospective analysis. Pretreatment T2-weighted images were used to radiomics features extraction. Feature selection and radiomics score (Rad-score) construction were performed through a least absolute shrinkage and selection operator regression analysis. The nomogram, which included Rad-scores and clinical factors, was built using multivariate logistic regression. Discrimination, calibration, and clinical utility were used to evaluate the performance of the nomogram.

Results: The Rad-score containing nine selected features was significantly related to T staging. Patients who had locally advanced rectal cancer (LARC) generally had higher Rad-scores than patients with early-stage rectal cancer. The nomogram incorporated Rad-scores and carcinoembryonic antigen levels and showed good discrimination, with an area under the curve (AUC) of 0.882 (95% confidence interval [CI] 0.835–0.930) in the training dataset and 0.846 (95% CI 0.757–0.936) in the validation dataset. The calibration curves confirmed high goodness of fit, and the decision curve analysis revealed the clinical value. A prospective analysis demonstrated that the AUC of the nomogram to predict LARC was 0.859 (95% CI 0.730–0.987).

Conclusion: A radiomics-based nomogram is a novel method for predicting LARC and can provide support in clinical decision-making.

PO-2780

MRI-based radiomics model for preoperative prediction of extramural venous invasion of rectal adenocarcinoma

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Purpose: To assess EMVI preoperatively through radiomics technology, and use different algorithms combined with clinical factors to establish a variety of models in order to make the most accurate judgments before surgery.

Methods: A total of 212 patients with rectal adenocarcinoma between September 2012 and July 2019 were included and distributed to training and validation datasets. Radiomics features were extracted from pretreatment T2-weighted images. Different prediction models (clinical model, logistic regression [LR], random forest [RF], support vector machine [SVM], clinical-LR model, clinical-RF model, and clinical-SVM model) were constructed on the basis of radiomics features and clinical factors, respectively. The area under the curve (AUC) and accuracy were used to assess the predictive efficacy of different models. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were also calculated.

Results: The clinical-LR model exhibited the best diagnostic efficiency with an AUC of 0.962 (95% confidence interval [CI] =0.936–0.988) and 0.865 (95% CI = 0.770–0.959), accuracy of 0.899 and 0.828, sensitivity of 0.867 and 0.818, specificity of 0.913 and 0.833, PPV of 0.813 and 0.720, and NPV of 0.940 and 0.897 for the training and validation datasets, respectively.

Conclusion: The radiomics-based prediction model is a valuable tool in EMVI detection and can assist decision-making in clinical practice.

PO-2781

Features of MR signals of retroplacental basal decidual space and its diagnostic significance

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BACKGROUND: With more pregnant women undergoing cesarean section, the number of women with scarring in the uterus undergoing uterine magnetic resonance (MR) examination in the second and third trimesters following a subsequent pregnancy, has increased.

OBJECTIVE: To investigate features of MR signals in retroplacental basal decidual space.

METHODS: The MR imaging data of patients with clinically and pathologically confirmed placenta implantation and complete placental abruption were retrospectively analyzed.

RESULTS: Patients with high-intensity signals in T2-weighted images (T2WI) of the retroplacental basal decidual space did not suffer placenta implantation after delivery, while high-intensity signals in T2WI of the retroplacental basal decidual space was not observed in patients with different degrees of placenta implantation.

CONCLUSION: As the retroplacental basal decidual space is the barrier between the placenta and myometrium, high-intensity signals in T2WI can improve the confidence of MR exclusion diagnostics of placenta implantation, and can be used as exclusion 1criteria for MR diagnosis of placenta implantation.

PO-2782

Multimodal imaging findings and predictive efficacy of primary diffuse large B-cell lymphoma of the central nervous system

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[Abstract]

Objective To investigate the multimodal imaging findings of primary diffuse large B-cell lymphoma of the central nervous system (PCNS-DLBCL) and analyze the predictive efficacy.

Methods 78 patients with PCNS-DLBCL admitted to our hospital from August 2020 to December 2022 were selected and the results of multimodal imaging were statistically analyzed. Standard CHOP regimen or Rituximab combined with standard CHOP regimen (R-CHOP) were used as first-line treatment. All patients underwent fluorodeoxyglucose positron emission computed tomography (18F-FDG PET/CT) before chemotherapy to obtain the total glycolysis value (TLG), metabolic tumor volume (MTV), SUV peak, SUV max and other parameters. According to the prognosis results, the patients were divided into non-progression group and progressive group, survival group and death group. The imaging parameters between non-progression group and progressive group, survival group and death group were compared, and the predictive value of each parameter on disease progression and death prognosis of PCNS-DLBCL patients was analyzed.

Results A total of 192 lesions were detected in 78 patients with PCNS-DLBCL by multimodal imaging, 33 cases were single lesions (33 lesions) and 45 cases were multiple lesions (159 lesions). There was no significant difference in age, sex, lesion distribution, CT plain scan, MRI T1WI, MRI T2WI, MRI enhanced scan, FLAIR sequence, MRS, DWI, FDG PET/CT imaging findings between

the single lesion group and the multiple lesion group ($P > 0.05$). During 1-year follow-up, the following subgroups were included according to whether they progressed or survived: no progression group (42 cases), progress group (34 cases), survival group (68 cases), and death group (8 cases). TLG, MTV, SUV peak and SUV max in the non-advanced group were lower than those in the advanced group ($P < 0.05$). TLG, MTV, SUV peak and SUV max in survival group were lower than those in death group ($P < 0.05$). The AUC of 18F-FDG PET/CT combined prediction of disease progression and death in PCNS-DLBCL patients was 0.901 and 0.930, respectively, which was greater than the AUC predicted by each parameter alone.

Conclusion There was no significant difference in the imaging findings of PCNS-DLBCL in single and multiple lesions. The 18F-FDG PET/CT parameters of patients with different disease progression and survival conditions were significantly different. TLG, MTV, SUV peak and SUV max have high predictive value for disease progression and death in PCNS-DLBCL patients.

PO-2783

A Preliminary Study of Diffusion Weighted Imaging and Resting-state Functional MRI in the Link between Brain Structural and Functional Network Disruptions in Cirrhosis with Minimal Hepatic Encephalopathy

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PURPOSES

While minimal hepatic encephalopathy (MHE) is increasingly recognized as a system-level disorder affecting brain structure and function, little is known about alterations of topological organization of brain functional and structural connectivity networks.

METHOD

We constructed functional connectivity networks from functional MRI signal correlations and structural connectivity networks from diffusion tensor imaging tractography in 30 MHE patients, 31 cirrhotic patients without MHE (NMHE) and 59 well-matched healthy controls. Graph theoretical analysis was employed to compute network properties. We investigated the relationships between functional and structural connectivity networks.

RESULTS

We found that MHE/NMHE patients exhibited altered small-worldness property in both functional and structural networks. Many regional characteristics were altered in both networks, involving attention, subcortical and visual networks, and some topological parameters in those regions were correlated with neurocognitive performances and/or disease duration, which reflect disease-specific pathophysiology in MHE. Compared with NMHE patients, MHE patients had decreased nodal local efficiency in functional network. The coupling strength of functional-structural connectivity was decreased and exhibited high sensitivity and specificity to differentiate MHE patients from controls.

CONCLUSION

This study indicates that MHE patients exhibit dysregulation of the 'small-world' topological organization in both brain structural and functional networks, and there is decoupling between the two networks. Our results suggest this so far neglected relationship (i.e, decoupling) serves a key point, which is related to neurocognitive dysfunction.

PO-2784

MRI-based Tumor Habitat Analysis for Treatment Valuation of Radiotherapy on Esophageal Cancer

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Purpose: We aim to evaluate the performance of pre-treatment MRI-based habitat imaging to segment tumor micro-environment and its potential to identify patients with esophageal cancer who can achieve pathological complete response (pCR) after neoadjuvant chemoradiotherapy (nCRT).

Methods: A total of 18 patients with locally advanced esophageal cancer (LAEC) were recruited into this retrospective study. All patients underwent MRI before nCRT and surgery using a 3.0 T scanner (Ingenia 3.0 CX, Philips Healthcare). A series of MR sequences including T2-weighted (T2), diffusion weighted imaging (DWI) and Contrast Enhance-T1 weighted (CE-T1) were performed. A clustering algorithm using a two-stage hierarchical approach groups MRI voxels into separate clusters based on their similarity. The t-test and receiver operating characteristic (ROC) analysis were used to evaluate the predictive effect of pCR on habitat imaging results. Cross-validation is used to test the accuracy of predictions.

Results: A total of 9 habitats were identified based on structural and physiologic features. The predictive performance of habitat imaging based on these habitat volume fractions (VFs) was evaluated. Students' t-test identified 2 habitats as good classifiers for pCR and non-pCR patients. ROC analysis shows that the best classifier had the highest AUC (0.82) with an averaged prediction accuracy of 77.78%. **Conclusions:** We demonstrate that MRI-based tumor habitat imaging has great potential for predicting treatment response in LAEC. Spatial habitat imaging results can also be used to identify tumor non-responsive sub-regions for the design of focused boost treatment to potentially improve nCRT efficacy.

PO-2785

Diagnostic value of diffusion weighted imaging to predict cervical lymph node status of papillary thyroid carcinoma

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Objective To investigate the feasibility of diffusion weighted imaging (DWI) examination in cervical lymph node; To discuss the value of apparent diffusion coefficient (ADC) for predict cervical lymph node status in patients with papillary thyroid carcinoma (PTC).

Method The imaging and clinical data of 182 patients with PTC diagnosed by operation and pathology were retrospectively analyzed, according to the result of surgical pathology, the patients were divided into lymph node metastasis group (25 cases) and no lymph node metastasis group (21 cases). They were examined with conventional MRI and DWI with b-value of 100 s/mm², 300 s/mm², and 500 s/mm². All mean ADC values of cervical metastatic and non-metastatic lymph nodes were compared. The receiver operating curve (ROC) method selected the best b-value for

the differentiation of cervical metastatic and non-metastatic lymph nodes. The diagnostic tests were then evaluated (sensitivity, specificity).

Results The mean ADC values of non-metastatic lymph nodes at b-factor 100 s/mm², 300 s/mm², and 500 s/mm² was significantly different ($F=62.993$, $p<0.01$; $t = 7.107, 8.999, 5.710$, $p<0.01$). The mean ADC value decreased as the b-value increased. The mean ADC values of cervical metastatic lymph nodes at b-factor 100 s/mm², 300 s/mm², and 500 s/mm² was significantly different ($F = 49.956$, $p<0.01$; $t = 6.208, 9.170, 3.808$, $p<0.01$). The mean ADC value decreased along with the b value increasing. The mean ADC values for cervical metastatic and non-metastatic lymph nodes were $(3.4326\pm0.4200) \times 10^{-3}\text{mm}^2/\text{s}$ and $(2.4693\pm0.7206) \times 10^{-3}\text{mm}^2/\text{s}$ for b-100 factor, $(2.9873\pm0.3050) \times 10^{-3}\text{mm}^2/\text{s}$ and $(1.7879\pm0.4719) \times 10^{-3}\text{mm}^2/\text{s}$ for b-300, $(2.7363\pm0.3698) \times 10^{-3}\text{mm}^2/\text{s}$ and $(1.444\pm0.3194) \times 10^{-3}\text{mm}^2/\text{s}$ for b-500, respectively. The mean ADC values of metastatic lymph nodes were lower. There were significant differences in ADC values between cervical metastatic and non-metastatic lymph nodes at all b-factors. ($t=5.960, 11.074, \text{ and } 13.959$, respectively. $p < 0.01$). Acutoff value for metastatic lymph nodes of $2.6052 \times 10^{-3}\text{mm}^2/\text{s}$ at b-300 factor yielded sensitivity and specificity of 91.2% and 72.7%, respectively.

Conclusion The present study revealed that ADC measurements could potentially quantitatively predict cervical lymph node status of PTC.

PO-2786

MRI differential diagnosis value between ovarian thecoma-fibroma with cystic degeneration and ovary adenofibroma

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Objective: To explore the value of conventional magnetic resonance imaging (cMRI) and diffusion-weighted imaging (DWI) in identifying ovarian thecoma-fibroma (OTF) with cystic degeneration and ovary adenofibroma (OAF). **Methods:** A total of 31 patients with OTF and 25 patients with OAF were included in this retrospective study. Dividing them into OTF group and OAF group. Clinical data, cMRI and DWI features, and apparent diffusion coefficient (ADC) [including mean ADC (ADCmean), minimum ADC (ADCmin), and maximum ADC (ADCmax)] were analyzed, measured, and compared. Logistic regression analysis was used to screen independent identification features. Receiver operating characteristic (ROC) curves were plotted to assess the discriminatory efficacy. DeLong's test was used to compare the area under the curve (AUC). **Results:** The OTF group had a smaller cyst degeneration degree ($p<0.05$), a fewer black sponge signs (16.1% vs. 56.0%, $p<0.05$), and a lower ADCmin (the cut-off value was $1.152 \times 10^{-3} \text{mm}^2/\text{s}$) than OAF group. The cMRI and DWI discriminated the two groups with AUC values of 0.827 and 0.770, respectively. The cMRI combined with DWI had a higher identification efficiency with AUC, accuracy, specificity, and sensitivity of 0.943, 0.893, 0.840, and 0.936, respectively. **Conclusion:** The cyst degeneration degree, black sponge sign, and ADCmin were independent characteristics to distinguish OTF group from OAF group. Combining cMRI with DWI can improve identification performance.

PO-2787

Brain recovery of the NAc fibers in smokers by high-frequency repetitive transcranial magnetic stimulation(rTMS)

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Objective: To reveal the brain fibers changes of nicotine addicts before and after a short-term treatment through rTMS and explore the structural biomarker for clinical treatment for nicotine dependence.

Methods: Eighteen smokers and Twenty-nine age- and gender- matched non-smoking controls (NSCs) were recruited. Smokers were received ten treatments per two weeks of high-frequency rTMS over the dorsolateral prefrontal cortex (DLPFC) and two MRI scans-diffusion spectrum imaging (DSI) were obtained at baseline (S1) and ten-treatments follow-up (S2). Dependence and craving were assessed using standardized questionnaires. We employed tractography atlasbased analysis (TABS) method to investigate fractional anisotropy (FA) , axial diffusivity (AD), radial diffusivity (RD) and other related diffusion indicators changes in fiber tracts based on region of interest. Two-sample t-test was performed to examine the tracts difference between S1 and NSCs. Paired t-test was performed to examine the tracts difference between S1 and S2. Correlation analysis between diffusion indicators' values and the Fagerstrom Test for Nicotine Dependence (FTND) scores were performed.

Results: Relative to NSCs, lower FA and higher RD were found in the right Subthalamic Nucleus (STN)-whole brain fiber tracts in S1. S2 showed decreased AD values in the right nucleus accumbens (NAc)-whole brain fiber tracts compared with S1. The AD values in the right NAc-whole brain fiber tracts was significantly and positively correlated with the FTND score of smokers.

Conclusion: The FA and RD values in the right STN-whole brain fiber tracts can be used to separate the smokers from the non-smokers. In particular, that the right NAc-whole brain fiber tracts are potential structural markers for brain recovery and to inform clinical decision-making of treatment for smokers.

PO-2788

Cervical transforaminal ligaments on MRI and its clinical significance

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Background. This study examined cervical transforaminal ligament(TFL) displays in cadavers and living bodies using magnetic resonance imaging (MRI) and evaluated the correlation between nerve entrapment in the brachial plexus by the TFL and cervical radiculopathy(CR).

Methods. First, 6 normal intact adult cervical specimens were used to calculate the relevant capacity in displaying the cervical TFLs by the three-dimensional fast imaging employing steady-state acquisition (3D-FIESTA). Second, 10 patients with CR and 10 healthy subjects were selected to perform the 3D-FIESTA sequence scan at the C4-T1 intervertebral foramina. The TFL display rate was calculated, and its correlation with CR was analysed.

Results. The microscopic anatomical results showed that the cervical TFL incidence was 39.6%. The relative capacity of the 3D-FIESTA sequence in displaying cervical TFLs showed a 96.6% specificity and a 73.7% sensitivity. In the 10 patients with CR, cervical TFLs were present in 17 intervertebral foramina, of which, 10 cases showed hypertrophy of the TFLs causing nerve entrapment, and corresponding symptoms of CR were found in 8 cases of cervical TFLs. The

correlation between nerve root entrapment by the cervical TFL and CR showed a 96.8% specificity and an 80% sensitivity. In the 10 healthy subjects, cervical TFLs were present in 13 intervertebral foramina.

Conclusions. The MR 3D-FIESTA sequence has high clinical value in displaying cervical TFLs in both cadavers and living bodies. If 3D-FIESTA sequencing shows nerve entrapment by the TFL, the possibility of CR caused by this TFL is approximately 80.0%. Conversely, the possibility of CR remains at 3.2%.

PO-2789

Altered functional connectivity in the resting state of amygdala in patients with primary angle-closure glaucoma

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Purpose: Depressive symptoms are common in patients with glaucoma. The amygdala plays an important role in the development of depressive symptoms; However, no studies have explored how the functional connectivity (FC) of the amygdala is altered in glaucoma. In this study, resting-state functional MRI (rs-fMRI) was used to investigate the changes of the amygdala FC in patients with primary angle-closure glaucoma (PACG).

Methods: In this study, we included 34 patients with PACG and 33 patients with healthy controls (HCs). All PACG patients underwent a complete eye examination. After MRI data preprocessing, the bilateral amygdala was selected as the seed point. The difference of resting-state FC among the groups was compared. Identify brain regions with significant differences between PACG patients and HCs patients, and then assess the association between the FC coefficients of these regions and clinical variables.

Results: Compared with HCs, the functional connections between the right amygdala and the left cerebellum 8 brain area, the vermis 4-5 brain area, the bilateral anterior central gyrus, the right supplementary motor area, and the left paracentral lobule were reduced in PACG patients, while the functional connections with the left amygdala were enhanced. Functional connections between the left amygdala and the bilateral cerebellar 8 brain area, the vermis 4-5 brain area, the bilateral putamen, the left middle frontal gyrus, the left posterior cingulate gyrus, and the left anterior central gyrus were reduced. There was no significant correlation between amygdala rsFC changes and disease duration, RNFLT, A-C/D, V-C/D, IOP, and other clinical indicators.

Conclusions: In PACG patients, there are extensive abnormal resting state functional connections between the amygdala and multiple brain regions, suggesting that abnormal FC in the amygdala plays an important role in the progression of PACG.

KEYWORDS: primary angle-closure glaucoma, amygdala, resting-state, functional magnetic resonance imaging, functional connectivity.

PO-2790

3D pCASL with dual PLDs could reflect cerebral blood flow regulation in patients with hydrocephalus

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Purpose: To investigate whether the difference in CBF between long and short PLD (Δ CBF) derived three-dimensional pseudocontinuous arterial spin-labeling (3D pCASL) in patients with

hydrocephalus could reflect cerebral regulation and to demonstrate the associations between regional Δ CBF and the degree of ventricular dilatation.

Materials and Methods: In this retrospective study from December 2017 to December 2022, consecutive patients with hydrocephalus and control subjects were included. Regional CBF and Δ CBF were compared by using covariance analyses. The associations between Δ CBF and the degree of ventricular dilatation were investigated by using linear regression analyses and interaction analysis.

Results: 58 patients with communicating hydrocephalus (median age, 61.5 years, IQR, 48-68 years, 24 women), 57 patients with obstructive hydrocephalus (median age, 46 years, IQR, 29-57 years, 28 women), and 52 control subjects (median age, 49 years, IQR, 34-57 years, 26 women) were analyzed. Compared to the control group, both hydrocephalus groups showed larger Δ CBF in all brain regions except for the bilateral parietal cortex and cerebellum. Furthermore, in the left medial watershed and left temporal cortex, communicating hydrocephalus exhibited greater Δ CBF than obstructive hydrocephalus. Δ CBF of the right posterior external watershed (adjusted β :0.276, 95%CI: 0.047-0.505, $P=0.019$), right parietal cortex (adjusted β :0.277, 95%CI: 0.056-0.498, $P=0.015$) in the obstructive hydrocephalus group; Δ CBF in the left internal watershed (adjusted β :0.274, 95%CI: 0.013-0.536, $P=0.04$) in the communicating hydrocephalus group was associated with the degree of ventricular dilatation, respectively.

Conclusion: Patients with hydrocephalus initiate cerebral regulation to maintain CBF, but require longer arterial transit times (ATT). The ability to regulate CBF in brain regions represented by the watershed is associated with the degree of ventricular dilation.

PO-2791

A fixel-based analysis of micro- and macro-structural changes in end-stage renal disease with cognitive impairment

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Background: Renal replacement therapy, hemodialysis (HD), peritoneal dialysis (PD), and renal transplant are essential to maintaining life in patients with ESRD, of which HD accounts for the most significant proportion. Cognitive decline occurs early in CKD but is especially serious, such as dementia, in ESRD. Patients with ESRD have brain structural damage and cognitive impairment after HD, and the prevalence of MCI and dementia in patients with HD is similar to that in patients without HD. The fixed-based analysis (FBA) can provide information on within-voxel fiber density (FD) and macroscopic fiber-bundle cross-section (FC) to reflect the number of axons and intra-axonal volume.

Method: Eighty-one ESRD patients including 41 with ND and 40 with maintenance HD were finally enrolled in this study. The preprocessing pipeline was performed using QSIPrep 0.14.2. Firstly, Marchenko-Pastur principal component analysis (MP-PCA) denoising as implemented in MRtrix3s dwidenoise was applied. Secondly, B1 field inhomogeneity was corrected using dwibiascorrect from MRtrix3 with the N4 algorithm after denoising. Thirdly, head motion correction and eddy current correction were done using FSL 6.0.4. Eddy's outlier replacement was performed. The DWI time-series were finally resampled to anterior commissure-posterior commissure (ACPC), generating a preprocessed DWI run in ACPC space with 2.5 mm isotropic voxels.

Result: Compared with HC, macrostructural fiber cross-section (FC) was lower in ESRD ND, mainly concentrated in fiber bundles in bilateral anterior hemispheres, such as frontal projections in striatum and thalamus, commissure anterior (CA), rostrum, and genu of corpus callosum (CC), anterior part of cingulum (CG), furthermore, associational bundles such as bilateral inferior occipitofrontal fascicle (IOFF) and inferior longitudinal fascicle (ILF) were also lower.

Microstructural fiber density (FD) was lower only in a small portion of bilateral frontal projections and bilateral associational bundles such as arcuate fascicle (AC) and superior longitudinal fascicle (SLF). When macro- and microstructural fiber were taken together, the regions of lower FDC were similar to the regions of lower FC, with a smaller range than FC in ESRD ND.

Compared with HC, ESRD HD showed an extensive lower FC in fiber bundles in bilateral anterior hemispheres and temporal lobe, furthermore, fiber bundles in the brainstem were also widely affected such as corticospinal tract (CST) and fronto-pontine tract (FPT). For FD, bilateral frontal projections and associational bundles in bilateral anterior hemispheres were more widely lower in ESRD HD, in addition, associational and commissural bundles were also affected. A wider range of lower FDC was found in ESRD HD, with a reduction of regions similar and smaller to FC in ESRD HD. There were no significant differences in FC, FD, and FDC between ESRD ND and ESRD HD.

Conclusion: The micro- and macro-structural changes were associated with cognitive impairment in end-stage renal disease.

PO-2792

Central diabetes insipidus with thickening of pituitary stalk: Differential diagnosis Langerhans cell histiocytosis from germ cell tumors by clinical-radiologic features

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Background

Due to different therapeutic strategies, distinguishing Langerhans Cell Histiocytosis (LCH) from germ cell tumors (GCT) for central diabetes insipidus (CDI) in children and adolescents by MRI is very important. The present study was retrospectively performed to review a series of clinical and neuroimaging findings in differential diagnosis GCT and LCH.

Methods

Thirty-six patients (16LCH and 20 GCTs) were included in this study. Five MR findings factors (include shape, enhancement pattern, thickened stalk, posterior pituitary T1 high intensity and pituitary involvement) and two clinical information (include age and gender) were assessed by 3 experienced neuroradiologists. The chi-squared test and the Rank sum test for continuous variables were performed to explore the differences between the two groups. A two-sided p-value <0.05 was considered significantly different. We also calculated sensitivity and specificity for the diagnosis of LCH and GCTs of some important imaging finding as described above.

Results

Between 36 patients with 16 LCH and 20 GCTs, a significant difference was identified by statistical analysis for the number of patients with age ($P<0.005$), shape ($P<0.005$), Maximum diameter($P<0.005$), enhancement pattern ($P<0.005$), gland involvement ($P<0.005$), thickened stalk($P<0.005$).

Sensitivity and specificity for the diagnosis for LCH were as follows: 0.875 and 0.75 for enhancement pattern; 0.85 and 0.82 for the thickened stalk; 0.86 and 0.84 for shape(V-Shaped).

Conclusion

MRI has a valuable role in differentiating GCTs and LCH in patients with CDI.

PO-2793

Quantitative Synthetic MRI evaluation of hippocampus in patients with multiple sclerosis

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Abstract

Background: The hippocampus atrophy is commonly revealed in patients with multiple sclerosis (MS), but the advanced quantitative evaluation needs to be tackled before atrophy for subtle early assessment in clinical practice.

Objective: To identify the early-stage changes in quantitative and volumetric parameters of hippocampus from patients with MS by using the synthetic MRI and correlate these quantitative changes with clinical variables.

Methods: In this prospective study, 30 clinically definite MS patients and 26 age-matched healthy controls (HCs) were included, who underwent both Synthetic MRI and T1-weighted three-dimensional MRI as baseline. 19 MS patients completed 1-year follow-up. The hippocampus and subregion volumes were assessed by using voxel-based morphometry (VBM). Synthetic MRI-derived parameters (T1, T2, and proton density) from bilateral hippocampus and subregion were measured and compared, and their associations with the Expanded Disability Status Scale (EDSS), Symbol Digit Modalities Test (SDMT) scores were further investigated. The longitudinal alterations of hippocampus synthetic parameters and volumes in 1-year follow-up MS patients were compared.

Results: There were no significant differences in the volumes of the hippocampus and its subregions between MS patients and HCs at baseline and 1-year follow-up. At baseline, compared with HCs, the T1, T2 and PD values of whole hippocampus and its subregion increased in patients with MS. EDSS scores were positively correlated with T2 value ($P = 0.01$, $R = 0.45$) and SDMT score were significantly negatively correlated with T2 value ($P = 0.02$, $R = -0.43$). In MS, compared with the baseline, both T1 and T2 values of CA2 subregion were increased, and the T1, T2 values of whole hippocampus and entorhinal cortex, subiculum subregions were decreased in 1-year follow-up. The T2 values of hippocampus were still significantly positively correlated with the EDSS scores ($P = 0.02$, $R = 0.53$) and negatively correlated with the SDMT scores ($P = 0.004$, $R = -0.63$).

Conclusions: Synthetic MRI can detect subtle quantitative changes of the hippocampus and its subregions in MS patients who had no obvious changes in hippocampal volume and can be used for its longitudinal evaluation. Specifically, the quantitative values of synthetic MRI have significant correlations with EDSS and SDMT both at the baseline and follow-up, suggesting that it can applied as potentially effective imaging biomarker in clinical practice for quantitative hippocampus evaluation.

PO-2794

Quantification imaging of renal steatosis in T2DM patients and reproducibility of IDEAL-IQ

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Purpose To evaluate the reproducibility of renal iterative decomposition of water and fat with echo asymmetry and least squares estimation-iron quantification sequence (IDEAL-IQ) in renal lipid deposition and to explore the application in type 2 diabetes mellitus (T2DM) patients.

Methods All participants (healthy volunteers and T2DM patients) received IDEAL-IQ imaging to measure renal proton-density fat fraction (PDFF). In healthy volunteers, two IDEAL-IQ scans without repositioning of the subject or changing the position of the surface coil to assess reproducibility by using Bland Altman analysis. The T2DM patients were classified according to their estimated glomerular filtration rate (eGFR) (mL/min/1.73m²) as T2DM (eGFR>90), DKD stages I-II (60<eGFR≤90), DKD stage III-IV (15<eGFR≤60), to determine differences depending on renal lipid depositions using one-way ANOVA. The correlation between renal PDFF and laboratory index was evaluated. Receiver-operating-characteristic (ROC) curve was constructed to assess the diagnostic performance of renal IDEAL-IQ.

Results Twenty-six healthy participants and ninety-six T2DM underwent IDEAL-IQ for examination. Bland-Altman analyses showed narrower limits of agreement and a significant difference in the correlated variances ($r=0.81$, $p<0.05$). No significant differences were found between the right and left kidneys in the renal PDFF. Statistically significant differences between the HC, T2DM, DKD I-II and DKD III-IV were found in renal PDFF values ($p<0.001$), all being highest in the DKD III-IV cohorts. The correlation between renal PDFF and eGFR showed a negative trend toward significance with an r value of 0.437 ($p<0.001$) and a positive correlation with Scr ($r=0.421$, $p<0.001$). The AUC of IDEAL-IQ for the HC and T2DM was 0.857. For the T2DM and DKD, DKDI-II and DKDIII-IV the IDEAL-IQ had AUC of 0.689 and 0.823.

Conclusions Renal lipid deposition is a potential driver of DKD. IDEAL-IQ is a promising and reproducible technique for the assessment of renal lipid deposition. It may be a reliable and valuable renal steatosis measurement for the identification the of risk of DKD in patients with T2DM.

PO-2795

Multimodal MRI data to identify multiple sclerosis and neuromyelitis spectrum diseases: Machine learning analysis

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Objective: The purpose of this study is to explore the role of machine learning combined with multimodal magnetic resonance imaging features in the recognition of multiple sclerosis (MS) and neuromyelitis optica spectrum disorders (NMOSD) patients.

Methods: The study collected 58 MS patients and 36 NMOSD patient. Every subject received the Paced Auditory Serial Addition Test, Expanded Disability Status Scale, Modified Fatigue Impact Scale, and magnetic resonance imaging scanning. After data preprocessing, based the 116 regions of interest in anatomical automatic labeling (AAL) brain atlas, the structure and functional metrics included functional connectivity (FC), amplitude of low frequency fluctuation (ALFF), regional homogeneity (ReHo), and gray matter volume (GMV) were calculated and extracted as features set. Then classifiers using different combinations among the four types of selected features were respectively built. Then, the features were selected by removing variables with a high pairwise correlation (the threshold was set at 0.65) and least absolute shrinkage and selection operator regression to obtain the most discriminative features. Finally, support vector machine (SVM) and logistic regression (LR) classification models were constructed to distinguish MS patients from NMOSD patients to compare the results of different combinations in both classifiers.

Results: Between the MS and NMOSD group, 59 features (mainly distributed by the brain regions of default mode network, cerebellum and subcortical network) included 31 FC, 7 ALFF, 14 ReHo and 5 GMV were selected. The SVM and LR classifier built with the combination of FC, ALFF, and GMV under the AAL template discriminated patients with the best performance (SVM:AUC=0.976; LR: AUC=0.940).

Conclusion: In this study, machine learning was used to construct SVM and LR classifiers for multimodal and multi-level MRI image features, which can effectively distinguish between MS and NMOSD patients, providing potential neuroimaging evidence for early diagnosis and clinical intervention.

PO-2796

Quantitative brain anatomy analysis in aiding clinical evaluation of patients with severe mental illness:

a preliminary study

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Object: The diagnosis of severe mental illnesses (SMI) is primarily made on behavioral symptoms and clinical observations, and there is a recognized need for additional objective tools to assisting diagnosis or predicting outcome. This study aimed to explore the clinical significance of quantitative structural magnetic resonance imaging (MRI) in screening for patients with SMI.

Methods: This study recruited 205 patients with suspected SMI and were scanned with high-resolution brain MRI. Structural volumetric measurements of major brain regions were obtained for each patient and patients' gray matter volume (GMV) values were computed and mapped against the normative GMV model established from the healthy participant database reported in the previous study, and graphics are obtained to indicate brain regions that fell out of the normative range and the extent of such alterations. GMV pattern for each patient was mapped against the reported gray matter volume alterations of four SMIs: depression, anxiety disorder, bipolar disorder, and schizophrenia. The diagnostic efficacy of quantitative structural MRI was evaluated and the number of correct imaging diagnoses in patients whose discharge diagnosis differed from the admission diagnosis was calculated during the process.

Results: Among the recruited participants, 149 of them met the diagnostic criteria of a SMI. The most-affected brain regions in SMIs were the bilateral superior frontal gyrus, right lateral orbitofrontal gyrus, left postcentral gyrus, and globus pallidus. Organic brain lesions were detected in 23 patients who didn't meet the diagnosis of SMI. The accuracy of identifying the four mental illnesses using quantitative structural MRI was 73.6%.

Conclusion: Quantitative structural MRI could be beneficial in screening and developing imaging diagnostic models for SMI. It also emphasizes the potential clinical use of structural MRI in diagnosing mental illness and detecting organic lesions.

PO-2797

Assessment of AAA morphology using relaxation-enhanced angiography without contrast and triggering (REACT)

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Background:

Abdominal aortic aneurysm (AAA) is a common vascular degenerative disorder. Contrast-enhanced computed tomography (CT) is usually the gold standard for AAA diagnosis. As magnetic resonance angiography (MRA) continues to evolve, a novel flow-independent relaxation-enhanced angiography without contrast and triggering (REACT) sequence is proposed, which can be used to diagnose aorta diseases. Therefore, the aim of the current study was to assess the accuracy of REACT for measuring abdominal aortic aneurysm.

Methods:

In this prospective, single-center study, patients were recruited consecutively and received a protocol REACT and contrast-enhanced CT. All examinations were performed using a 3T MRI system employing a standard 16-channel body coil and a multi-detector row CT systems. Two radiologists independently assessed scans for the morphology of AAA, including the diameter of neck of AAA, the maximum diameter of AAA, and the thickness of lateral thrombus.

Results:

A total of 15 consecutive AAA patients (53.27 ± 13.68 years, 11 males) were included. There was no significant difference between REACT and CT in measuring the diameter of neck of AAA (25.30 ± 4.71 mm vs. 26.93 ± 5.06 mm, $P=0.028$) and the maximum diameter of AAA (46.75 ± 19.43 mm vs. 48.52 ± 20.46 mm, $P=0.009$). When measuring the thickness of lateral thrombus, REACT slightly underestimated it than CT (6.48 ± 2.17 mm vs. 7.86 ± 3.18 mm, $P=0.073$). The interobserver agreement for contrast-enhance CT and REACT is relatively good (0.846 for neck of AAA, 0.751 for maximum diameter of AAA, and 0.56 for thickness of lateral thrombus). Further, REACT achieved a substantial accordance with contrast-enhanced CT regarding the morphology of AAA [Cohen's Kappa 0.776 (95% CI: 0.88–0.93)].

Conclusion:

REACT has high accuracy in AAA morphological measurements without any contrast agent. This novel sequence is also sensitive to the thickness of thrombosis, which provides a new diagnostic method for AAA patients.

PO-2798

T1 mapping-based Radiomics model in EOB-MRI for assessment of liver reserve function

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Purpose: To explore the value of the T1 mapping-based radiomics model in assessing the liver reserve function in patients with chronic liver diseases.

Methods: A retrospective study was conducted on the clinical and radiological data of 163 patients in our hospital from September 2020 to October 2022. The patients were classified into four groups: the normal liver function (NLF) group, the chronic liver disease (CLD) group, the Child-Pugh A grade cirrhosis (CPA) group, and the Child-Pugh B or C grade cirrhosis (CPBC). Three distinct data sets were created: NLF vs. liver disease (task 1), NLF+CLD vs. cirrhosis (task 2), and NLF+CLD+CPA vs. CPBC (task 3). These datasets were randomly split into training and test sets at a ratio of 7:3. Radiomics features were extracted and filtered from the T1 mapping images were acquired before and after 20 min of enhancement in hepatobiliary Phase (HBP) (T1native, T1post) and the T1WI images of HBP (T1WIHBP). Trained using four different machine learning algorithms, including random Forest (RF), Gradient Boost Tree (GBT), and AdaBoost (AB). Performance of the models were evaluated using the AUC (Area Under the Curve). Delong test was used to assess the performances among these models and Decision Curve Analysis (DCA) was utilized to evaluate the utility and clinical benefits.

Results: RF model showed high performance in the classification of liver reserve function, with AUC above 0.95 in each training set and above 0.8 in each test set, generally superior to the other three models. Compared with Native, post and delay sequences, RF model has the best diagnostic performance in delay sequences. When being classified as NLF and liver disease, NLF+CLD and cirrhosis, and NLF+CLD+CPA and CPBC, the AUC of the training set is all 1.0000, while the AUC of the test set is 0.9661, 0.9612, 0.9443, respectively. Accuracy was 0.77, 0.91, 0.76, Sensitivity was 0.92, 1.00, 0.86, Specificity was 0.84, 0.87, 0.95, respectively. The GBT model also demonstrated excellent diagnostic performance in grading liver reserve function, particularly in evaluating the NLF+CLD and cirrhosis classifications. In the test set, the AUC values for the T1native, T1post, and T1WIHBP sequences were 0.9302, 0.9691, and 0.9155, respectively. The AB model demonstrated superior diagnostic performance compared to other models when classifying NLF+CLD and cirrhosis. The AUC values for the T1native, T1post, and T1WIHBP sequences in the test set were 0.9354, 0.9743, and 0.9675, respectively, reflecting their strong discriminatory ability.

Conclusion: The radiomics models based on both T1 mapping image (T1pre, T1post) and HBP images (T1HBP) could be used as a reliable tool in the assessment of different liver reserve function in chronic liver disease patients.

PO-2799

Assessment of Tissue Characteristics in Brain Tumors and Tumor Microenvironment Using Multi-Parameter MRI Based on Histogram Analysis

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Purpose: Multi-Parametric(MTP) MR Imaging, an innovative and expeditious GRE-based quantitative mapping technique. By facilitating the simultaneous acquisition of diverse tissue properties within a single scan, MTP offers a quantitative evaluation of the T1map, T2*map, proton density(PD) map and quantitative susceptibility mapping(QSM) map among patients diagnosed with brain tumors. Those parameters provide sensitive and supplementary information about tissue composition.

Methods: This prospective study enrolled consecutive participants diagnosed with brain tumors. The three groups comprised consecutively admitted patients diagnosed with gliomas, meningiomas, and brain metastases. 3D whole-brain MTP MR imaging was acquired for all patients. Tumor and peritumoral edema(PTBE) were manually delineated as labels and matched onto the quantitative parameter maps of MTP for histogram analysis of the regions of interest(ROI). Group comparisons were performed using Kruskal-Wallis and Mann-Whitney U tests.

Results: Eighty-four participants diagnosed with brain tumors (mean age: 55 years; IQR: 23-80 years) were included in this study. We extracted 18 first-order statistical features from tumor and peritumoral edema regions respectively. In both the tumor core region and the peritumoral edema region, the T2* maps exhibit the highest number of statistically significant first-order features(tumor ROI: 16/18; PTBE ROI: 8/18), indicating the most pronounced intergroup differences($p < 0.001$). Conversely, within the peritumoral edema region depicted in the PD maps, none of the first-order features(0/18) show statistically significant differences among different tumor types.

Conclusion: We observed significant differences in the first-order statistical features of T2* among different types of brain tumors. T2* values, which are inversely correlated with tissue iron content, provide insights into the microenvironmental characteristics of tumors.

PO-2800

Altered cortical structural topology in first-episode antipsychotic naïve patients with schizophrenia

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Object: The present study aimed to employ the chaos analysis approach for the identification of specific brain topology changes related to the onset of psychosis beyond classical approaches based on structural MRI.

Methods: T1-weighted magnetic resonance imaging (MRI) of 150 first-episode antipsychotic-naïve schizophrenia (FEP) patients and 164 healthy participants (HC) were included. The identified regions were tested for changes in brain structural complexity by applying the chaos analysis approach in two steps: First, the center of mass in gray matter images was identified and the distances between voxels were calculated. Next, these distances multiplied by the voxel intensity were defined as spatial-series, which were then analyzed by extracting the Largest-Lyapunov-Exponent (lambda). Then, the lambda was mapped in the frequency domain using the correlation of the Morlet wavelet with the lambda spatial series resulting in a measure that reflects cortex folding complexity. Note, high lambda values represent high folding complexity.

Results: Cortical folding complexity in FEP patients was altered in widespread regions. Most of these voxels showed decreased complexity and were located in the left frontal, left limbic, left basal ganglia regions and bilateral occipital, parietal, temporal, thalamic, cerebellar regions. Meanwhile, some voxels among these above regions also presented increased complexity in FEP patients than in healthy participants. **Conclusion:** Our findings support the notion that defining cortex folding complexity by lambda offers a novel approach for identifying structural differences in brain regions related to psychosis. The proposed method provides interesting insights into specific brain alterations in FEP which beyond those provided by standard volumetric comparisons. Further analysis of the brain topology of regions without volume changes will shed light to the identification of structural biomarkers in psychosis.

PO-2801

White matter microstructural disruption in minimal hepatic encephalopathy: a neurite orientation dispersion and density imaging (NODDI) study

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Purpose To evaluate the ability of neurite orientation dispersion and density imaging (NODDI) for detecting white matter (WM) microstructural abnormalities in minimal hepatic encephalopathy (MHE).

Methods Diffusion-weighted images, enabling the estimation of NODDI and diffusion tensor imaging (DTI) parameters, were acquired from 20 healthy controls (HC), 22 cirrhotic patients without MHE (NHE), and 15 cirrhotic patients with MHE. Tract-based spatial statistics were used to determine differences in DTI (including fractional anisotropy [FA] and mean/axial/radial diffusivity [MD/AD/RD]) and NODDI parameters (including neurite density index [NDI], orientation dispersion index [ODI], and isotropic volume fraction [ISO]). Voxel-wise analyses of correlations between diffusion parameters and neurocognitive performance determined by Psychometric Hepatic Encephalopathy Score (PHES) were completed.

Results MHE patients had extensive NDI reduction and rare ODI reduction, primarily involving the genu and body of corpus callosum and the bilateral frontal lobe, corona radiata, external capsule, anterior limb of internal capsule, temporal lobe, posterior thalamic radiation, and brainstem. The extent of NDI and ODI reduction expanded from NHE to MHE. In both MHE and NHE groups, the extent of NDI change was quite larger than that of FA change. No significant intergroup difference in ISO/MD/AD/RD was observed. Tissue specificity afforded by NODDI revealed the underpinning of FA reduction in MHE. The NDI in left frontal lobe was significantly correlated with PHES.

Conclusion MHE is characterized by diffuse WM microstructural impairment (especially neurite density reduction). NODDI can improve the detection of WM microstructural impairments in MHE and provides more precise information about MHE-related pathology than DTI.

PO-2802

A long-term study of patients with newly-diagnosed primary CNS lymphoma: Arterial spin labeling MRI can predict prognosis

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Objective: Primary central nervous system lymphoma (PCNSL) is a highly aggressive non-Hodgkin's lymphoma with poor prognosis. This study aimed to evaluate the prognostic value of Three-dimensional arterial spin labeling (3D-ASL) in patients with PCNSL.

Methods: This retrospective study enrolled newly-diagnosed PCNSL patients in our institution between May 2015 and May 2019, who were treated with high-dose methotrexate (HD-MTX)-based chemotherapy. Patients underwent 3D-ASL and conventional MRI on a 3T system prior to each chemotherapy until the enhanced lesions disappeared. By the image fusion of T1WI+C and ASL, regions of interest (ROIs) were outlined manually. All patients were followed-up from August, 2015 to December, 2022. 3D-ASL and clinical characteristics about progression-free survival (PFS) and overall survival (OS) were calculated by log-rank test of Kaplan-Meier and Cox regression of Stata software.

Results: Eighty-six patients (53 years \pm 11; 20–76 years; 57 men) were included. During a median follow-up period of 69 months, 78 patients suffered disease progression (PD), and 49 patients died. The median PFS and OS were 16 months and 54 months. The 2-, 3- and 5-year OS rates were 62.16%, 56.76%, and 29.41%. In univariate analysis, inferior PFS and OS were associated with CSF involvement, failure to achieve PR and CR in two and four cycles, rCBFmean \geq 2.389, rCBFmax \geq 3.744, rCBFmin \geq 1.370. Predictors of shorter OS were age \geq 55 years, Karnofsky Performance Score (KPS) $<$ 50. Multivariate analysis suggested that KPS $<$ 50 (P=0.004), CSF involvement (P=0.022), failure to achieve CR in four cycles (P=0.020), and rCBFmean \geq 2.389 (P=0.033) were independent factors for adverse OS.

Conclusion: This is the first study to demonstrated that 3D-ASL-derived rCBF can be predictors. 3D-ASL has the advantage of requiring no contrast agent or radiation exposure. Inclusion of 3D-ASL in routine MRI protocols is recommended to help to optimize individualized treatment and improve prognosis.

PO-2803

Evaluation of the efficacy of PC cine MRI in patients with obstructive hydrocephalus and the ETV of traffic hydrocephalus

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OBJECTIVE: As neuroimaging, neural endoscopic manufacturing technology, microscopic surgical instruments, and the rapid development of stereotactic neural navigation system, preventing the endoscope assisted endoscopic third ventriculostomy (ETV) surgery methods matures, ETV are gradually used as alternative treatment for obstructive hydrocephalus. The aim of this study was to determine the utility of quantitative and qualitative examinations with cine phase-contrast MR imaging to determine the efficacy of ventriculostomy across time and whether CSF pulsation is restored after ETV.

METHODS: Thirty-eight patients treated with ETV were evaluated with cine PC cine MRI within 1 month before surgery. Follow-up studies were performed within 1 month after surgery. To determine the restoration of CSF pulsation, we compared the CSF waveform at the ventriculostomy with the CSF waveform at the aqueduct in a healthy control group.

RESULTS: After ventriculostomy, the recovery of the flow characteristics of cerebrospinal fluid circulation was observed and the changes of cerebrospinal fluid flow were recorded with time change after the operation of the ventricle. There was a statistically significant relationship between clinical outcome and stroke volume. Overall flow magnitude was the most effective variable to determine which patients would improve after surgery. The results showed that patients with obstructive hydrocephalus had the best response to the operation, and those with deformity or traffic hydrocephalus were the worst.

CONCLUSION: PC cine MR technique is very effective in evaluating the curative effect after ETV. The measurement of cerebrospinal fluid flow is an important indicator for PC cine MR technique to evaluate ETV.

PO-2804

Enhancing MRI Image Quality and Meniscus Injury grading in Knee Joints with Deep Learning

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Objective Evaluate the difference in image quality between knee joint fast spin echo (FSE) sequences using and without deep learning reconstruction (DLR) algorithms, and evaluate whether DLR improves meniscus injury.

Materials and Methods Prospective inclusion of 46 patients with meniscus injury underwent traditional and shortened 3.0T knee joint sagittal PD, T1 weighted. MRI scans, total 51 sets of MRI images. After the scan is completed, the system automatically saves the image as a traditional original image without DLR (Conventional), an accelerated MRI image without DLR (non-DL), and an accelerated MRI image with DLR (DL). Two reviewers randomly conducted a blind reading study, evaluating artifacts, noise, overall image quality, and meniscus damage. Based on three sets of image scores and the diagnosis of meniscus injury, Wilcoxon signed rank test was used to compare the values between Conventional, non-DL and DL images, while evaluating the consistency of inter observer and intra observer scores.

Result The overall quality, noise, and artifact scores of images using DLR were higher than those of original images without DLR. There was a statistically significant difference in overall quality, noise, and artifact scores between DL and Conventional ($P < 0.05$), and there was also a statistically significant difference in overall quality, noise, and artifact scores between DL and non-DL ($P < 0.05$). The consistency correlation coefficient between the subjective evaluation of image quality by two physicians ranges from 0.721 to 0.902. The two physicians evaluated knee joint structural abnormalities based on Conventional, non-DL and DL, with excellent consistency, κ The value is between 0.821 and 0.937.

Conclusion DLR can improve the quality of knee joint images while shortening scanning time, and improve the evaluation of meniscus injury using 3.0T knee joint MR images.

PO-2805

Decoupling of Regional Cerebral Blood Flow and Brain Function along the Alzheimer's Continuum

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Background: Alzheimer's Disease (AD) is accompanied with impaired neurovascular coupling. However, its early alteration remains elusive along the Alzheimer's continuum.

Objective: This study aimed to investigate the early disruption of neurovascular coupling in cognitively normal (CN) and mild cognitive impairment (MCI) elderly and its association with cognition and AD pathologies.

Methods: We included 43 amyloid- β -negative CN participants and 38 amyloid- β -positive individuals (18 CN and 20 MCI) from the Alzheimer's Disease Neuroimaging Initiative dataset. Regional homogeneity (ReHo) map was used to represent neuronal activity and cerebral blood flow (CBF) map was used to represent cerebral blood perfusion. Neurovascular coupling was assessed by CBF/ReHo ratio at the voxel level. Analyses of covariance to detect the between-group differences and to further investigate the relations between CBF/ReHo ratio and AD biomarkers or cognition. In addition, the correlation of cerebral small vessel disease (SVD) burden and neurovascular coupling was assessed as well.

Results: Related to amyloid- β -negative CN group, amyloid- β -positive groups showed decreased CBF/ReHo ratio mainly in the left medial and inferior temporal gyrus. Furthermore, lower CBF/ReHo ratio was associated with a lower Mini-Mental State Examination score as well as higher AD pathological burden. No association between CBF/ReHo ratio and SVD burden was observed.

Conclusion: AD pathology is a major correlate of the disturbed neurovascular coupling along the Alzheimer's continuum, independent of SVD pathology. The CBF/ReHo ratio may be an index for detecting neurovascular coupling abnormalities, which could be used for early diagnosis in the future.

PO-2806

Radiomics analysis of diffusion kurtosis imaging for predicting locally advanced rectal cancer response to neoadjuvant chemoradiotherapy: a comparative study with diffusion weighted imaging

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Background Accurate prediction of tumour response to neoadjuvant chemoradiotherapy (nCRT) enables personalised perioperative therapy for locally advanced rectal cancer. As unique functional imaging techniques, diffusion weighted imaging (DWI) and diffusion kurtosis imaging (DKI) have important value in predicting the treatment response in nCRT for locally advanced rectal cancer. Recently, the methodology of radiomics combined with machine learning algorithms has been widely used in tumor diagnosis and treatment and has produced exciting results. Therefore, We aimed to investigate radiomics analysis of DKI and readout-segmented echo-planar imaging (RS-EPI) DWI for predicting good response to nCRT in patients with locally advanced rectal cancer.

Methods A total of 120 patients with locally advanced rectal cancer who underwent nCRT were retrospectively enrolled from June 2014 to March 2019 in our study. Baseline MRI scans were performed using a 3.0T scanner and included RS-EPI DWI with 2 b values (0, and 800 s/mm²) and DKI sequence with 4 b values (0, 700, 1400, and 2100 s/mm²). The regions of interest (ROIs) were manually delineated for all the lesion images from both the sequences (Fig.1), and then the radiomics features were extracted from apparent diffusion coefficient (ADC), apparent diffusion for non-Gaussian distribution (Dapp) and apparent diffusional kurtosis (Kapp) maps. A single conventional quantitative parameter, the mean value, was selected to predict good response after nCRT, including pathologic complete response (pCR), tumor regression grade (TRG0 and TRG1 vs TRG2 and TRG3) and T-downstaging. After feature reduction and selection through Pearson Correlation Coefficient (PCC) analysis and Analysis of Variance (ANOVA), the machine learning method, support vector machine (SVM) classifier was used to construct radiomics models for the same post-treatment response prediction. Finally, the diagnostic performance was evaluated by the receiver operating characteristic (ROC) curve analysis.

Results Among the 120 enrolled patients, 38 (32%) achieved pCR while 82 (68%) did not, 55 (46%) achieved good response (TRG0 and TRG1) whereas 65 (54%) did not, and 47 (39%) achieved T-downstaging, while 73 (61%) did not. The radiomics model based on DKI, which combined Dapp and Kapp, exhibited superior predictive capability for pCR compared to the RS-EPI DWI-based radiomics model. In the testing set, the DKI-based model achieved an area under the receiver operating characteristic curve (AUC) of 0.818 (95% CI, 0.612-0.971), whereas the RS-EPI DWI-based model achieved an AUC of 0.771 (95% CI, 0.576-0.946) for pCR prediction. Similarly, the DKI-based radiomics model demonstrated an AUC of 0.722 (95% CI, 0.544-0.883) for predicting good response and 0.714 (95% CI, 0.519-0.882) for T-downstaging, the result of which showed a better performance compared with that of the RS-EPI DWI-based radiomics model (Fig.2). In addition, the AUC for predicting nCRT response with radiomics model was better than the AUC with the conventional quantitative parameter alone.

Conclusion Our study demonstrated the potential of radiomics analysis using DKI and RS-EPI DWI in predicting treatment response to nCRT in patients with locally advanced rectal cancer. And the DKI-based radiomics model with the combination of Dapp and Kapp can produce a more robust value than the RS-EPI DWI-based radiomics model in evaluation of rectal cancer treatment response.

PO-2807

Exploring the neuropathological characteristics of abnormal white matter functional signaling in adolescents with major depression

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Background: Major Depression Disorder (MDD) is a serious mental illness and an important factor in the global burden of diseases. On the epidemiological surveys, the lifetime prevalence of depression in adolescents is significantly higher shown than that in adults, and the risk of suicide is also higher. Regarding brain dysfunction in adolescents with MDD, brain gray matter is usually studied through resting-state functional magnetic resonance imaging (rs-fMRI). However, there is a paucity of research on brain white matter (WM) currently. Some researchers even mistakenly regard the signals generated by the WM as noise points. Indeed, WM exhibits similar blood oxygen level-dependent signal fluctuations to gray matter, which has been demonstrated by some studies. The functional organization of WM in adolescents with MDD is still unclear, including functional changes in WM signals, and the relationship between WM signals and patient severity. Therefore, this paper aims to explore whether there are such these abnormal changes in WM functional signals in adolescents with major depression.

Method: 48 adolescents patients with MDD and 31 healthy controls (HC) to participate this study. All participants were assessed using the Patient Health Questionnaire-9 Scale (PHQ-9), the 32-item Hypomania Checklist Scale (HCL-32), and the MINI Suicide Inventory. In addition, a Siemens skyra 3.0T magnetic resonance scanner was used to collect the subjects' image data. Using the DPABI software to calculate the WM signal of the fractional amplitude of low-frequency fluctuations (fALFF) and regional homogeneity (ReHo), and conducted a two-sample t test between the MDD and HC. Independent component analysis (ICA) was added to calculate the WM functional signal. Perform Pearson correlation between statistical test results and clinical scales.

Results: Compared to HC, MDD demonstrated decreased in the fALFF of WM in the body of corpus callosum, left posterior limb of internal capsule, right superior corona radiata, and bilateral Posterior corona radiata ($P < 0.001$, FWE voxel correction). The ReHo of WM increased in right external capsule and left superior corona radiata, while decreased in left superior longitudinal fasciculus ($P < 0.001$, FWE voxel correction). The results of ICA of WM overlap with those of ReHo. A positive correlation was observed between the ReHo value of the right external capsule and HCL-32 scales ($P = 0.041$, $r = 0.296$), while the fALFF of WM signal in the left posterior limb of internal capsule was negatively correlated with the MINI suicide scales ($P = 0.026$, $r = -0.32$), and the right posterior corona radiata was also negatively correlated with the MINI Suicide Scale ($P = 0.047$, $r = -0.288$).

Conclusion: The results of our study suggest that altered WM functional signaling in adolescents with MDD may provide new insights into the neuropathogenesis of depression. At the same time, the correlation between WM differential clumps and suicidality and mania scales can also bring positive predictions and researching trends for the future development of the disease.

PO-2808

Characteristics of white matter networks in adolescents with first-episode non-suicidal self-injury

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Objective: To explore the structural connectivity and network metrics of white matter in adolescents with first-episode non-suicidal self-injury(NSSI).

Methods: The diffusion tensor imaging data and clinical scales were prospectively collected from 30 NSSI patients and 29 healthy controls(HC) matched age and gender. The structural connectivity based on the number of fibers was analyzed by the network-based statistic(NBS) correction method. The network metrics based on the white matter were analyzed by Gretna software. After controlling for age, gender, and education years, the general linear model was performed to compare the network metrics between the two groups. Pearson correlation was adopted to analyze the correlation between structural connectivity/network metrics and clinical symptoms.

Results: At the structural connectivity level, the NBS analysis demonstrated the NSSI group showed increased structural connectivity mainly involved in the prefrontal lobe-prefrontal lobe, prefrontal lobe-limbic system, and limbic system-limbic system and decreased structural connectivity mainly involved in the occipital lobe-occipital lobe and parietal lobe-limbic system relative to HC group. At the nodal level, the graph-theory analysis demonstrated the NSSI group revealed decreased nodal degree centrality(DC) and nodal efficiency(NE), involving the right orbital middle frontal gyrus, left hippocampus, left thalamus, right angular gyrus, and bilateral cuneus. Besides, the NSSI group showed additional decreasing DC of the left median cingulate and paracingulate gyrus and increasing DC of the right orbital superior frontal gyrus. The correlational analysis revealed the DC of the right angular gyrus and the left cuneus had a negative relationship with the clinical symptoms.

Conclusions: These findings highlight the abnormal structural connectivity and nodal network metrics in adolescents with NSSI, which may help clarify the neural circuit mechanism related to emotional regulation in NSSI.

PO-2809

Artificial Intelligence (AI)-assisted compressed sensing technology application in Thoracic spine 3D STIR MR imaging

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PURPOSE

Short Tau Inversion Recovery (STIR) sequences are widely used for spinal imaging due to their advantages include large field-of-view (FOV) scanning and high quality fat suppression. However, the long acquisition time limits its clinical use. This study aimed to combine artificial intelligence (AI)-assisted compressed sensing(ASC) technique and Deeprecon image reconstruction technique to identify a suitable acceleration factor for 3D-STIR sequence imaging of the thoracic spine, optimizing the imaging speed while maintaining image quality.

METHOD AND MATERIALS

Ten healthy volunteers underwent thoracic spine MRI examinations (3D STIR) with a recently-developed ACS technology with various acceleration factors (3 – 9 times, ACS3.0 to ACS9.0). The conventional acceleration method: Partial Fourier (PF) and parallel imaging (PI) with 3.0 times acceleration (F3.0) was used as the reference. All MR examinations were conducted with a 3.0 T

scanner (uMR Omega, Shanghai United Imaging Healthcare Co.,Ltd, Shanghai, China). Two experienced radiologists evaluated the image quality. The signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) at different anatomic locations containing the T1、T6、T12 vertebra, T6/7vertebral disc, inter spinal ligaments, cerebrospinal fluid, and nearby muscle were measured and statistically compared. The uniformity of image signal, edge sharpness, uniformity of fat suppression effect, clarity of the small intramedullary vessels and dorsal intermuscular vessels were also evaluated. Nonparametre Kruskal-Wallis tests were conducted($p<0.05$).

RESULTS

No significant differences were observed among the groups with varying acceleration factors for SNR and CNR values ($p>0.05$). Subjective scores showed no differences between F3.0&ACS3.0 ($p=0.481$), ACS5.0&ACS7.0 ($p=0.165$). There were statistically significant differences in subjective scores among images with different acceleration factors for 3D STIR($P < 0.05$). Multiple comparisons suggested that the subjective image quality scores for F3.0 and ACS3.0 were significantly higher than those for ACS5.0 and ACS7.0 ($P < 0.05$). The subjective image quality scores of ACS5.0 and ACS7.0 were higher than ACS9.0 ($P < 0.05$).

CONCLUSION

ACS could accelerate thoracic spine 3D STIR without compromising image quality, offering comparable diagnostic quality to the clinical 2D standard in less time, potentially increasing the productivity of MRI scanners. During clinical practice, in consideration of the scanning time and image quality, the 3D STIR sequence of thoracic spine was recommended to be with 5.0 times acceleration factor for ACS.

PO-2810

Artificial Intelligence (AI)-assisted compressed sensing technology application in hip 3D PD-SPAIR-ISO imaging

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PURPOSE Magnetic resonance is an the most ideal diagnostic imaging modality for acetabular labral tears and femoroacetabular impingement syndrome, particularly using especially the 3D isotropic PD-SPAIR (3D PD-SPAIR-ISO) sequence has good imaging effect on articular cartilage and fibrocartilage of the acetabular labral. The 3D sequence can reduce the pPartial vVolume aArtifact, and the MPR image post-processing overcomes can break the constraints limitation of the traditional fixed scanning position, which provides the possibility enables to the potential diagnose the of complex acetabular labral tears of the ace

tabular labral. However, the acquisition time of the current conventional 3D PD-SPAIR-ISO sequence affects hinders the its widespread application of this sequence in clinical practice adoption. In this study, we used This study aimed to combine ASC technique in combination with andh DeepRecon image reconstruction technique to find identify a suitable acceleration factor for hip 3D PD-SPAIR-ISO sequence imaging of the hip, which can improve the optimizing imaging speed as much as possible while maintaining image quality.

METHOD AND MATERIALS

Ten volunteers were enrolled in this study. All patients underwent the hip MRI examinations (3D PD-SPAIR-ISO) with a recently-developed ACS technology while with various acceleration factors were configured (3 – 9 times, ACS3.0 to ACS9.0), using a 3.0 T scanner (uMR Omega, Shanghai United Imaging Healthcare Co.,Ltd, Shanghai, China). Besides, the conventional acceleration method: Half Partial Fourier (PF) and parallel imaging (PI) with 3.0 times acceleration (F33) was used as the reference. All MR examinations were conducted with a 3.0 T scanner (uMR Omega, Shanghai United Imaging Healthcare Co.,Ltd, Shanghai, China). Two experienced radiologists were invited to evaluate the image quality. The signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of at different anatomic locations containing the acetabular rim, head of femur, neck of

femur, greater trochanter, ligament, acetabular labral, acetabular cartilage, and nearby muscle were measured and statistically compared. Subjective image quality was evaluated using a 3-point scale for subjective scoring. The uniformity of the image signal, the edges sharpness of the edges, and the clarity of acetabular labral were also evaluated.

RESULTS

There were no significant differences among the groups in acceleration factors on for SNR and CNR values. ($p > 0.05$). The subjective score of 3D PD-SPAIR-ISO images were ranged from 10-13 ($P > 0.05$) with high consistency between two radiologists ($\kappa = 0.637$). Subjective scores showed no differences among F3&ACS3 ($P = 1.00$), ACS3&ACS5 ($p = 0.28$), F3&ACS5 ($P = 0.28$). There were no significant difference between ACS7&ACS9 ($p = 0.739$). There were statistically significant differences in subjective scores among images with varying acceleration factors for 3D PD-SPAIR-ISO ($P < 0.05$). Multiple comparisons suggested that the subjective image quality scores of for F3.0, ACS3.0 and ACS5.0 are all significantly higher than those of ACS7.0 and ACS9.0 ($P < 0.05$).

CONCLUSION ACS could accelerate the 3D PD-SPAIR-ISO of hip without compromising image quality. The 3D sequences offer comparable diagnostic quality to the clinical 2D standard with less scan time, potentially increasing the productivity of MRI scanners. ACS5 is a suitable accelerate factor, offering comparable diagnostic quality to the clinical 2D standard in less time, potentially increasing MRI scanner productivity that can be used.

PO-2811

Effects of altered network controllability on attention and anxiety symptom in first-episode medication-naïve major depressive disorder patients

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Introduction. Numerous psychiatric interventions can be regarded as attempts to affect the large-scale, dynamical system transitions of the brain. Controllability analysis is developing as an effective method for assessing the influence of one brain region over others regarding dynamic function. The neural underpinnings of intercorrelated clinical symptoms and cognitive deficits in major depressive disorder (MDD) remain elusive. This study attempts to explore the impact of controllability alterations for both the symptom severity and cognitive impairments, which will provide new insights for individualized treatment of MDD.

Methods. This study used diffusion tensor imaging (DTI) data from 170 first-episode medication-naïve MDD patients and 137 healthy controls (HCs). We inferred structural brain network and calculated network controllability metrics for each participant. Average controllability (AC) refers to the quantification of a node's capacity to steer the brain to all possible easily reachable and adjacent states. Brain regions with higher AC, like the DMN, are capable of switching functional states at low energy inputs, suggesting they can more easily be shifted into optimal network states. Modal controllability (MC) measures a node's ability to drive the brain into hard-to-reach states. Brain regions characterized by higher MC, such as those associated with cognitive control, tend to guide the brain network towards difficult-to-reach states that require substantial input energy in order to accomplish complex goal-specific tasks. Attention- and executive functioning-related cognitive scales were also assessed which are 2 of the core cognitive deficits in MDD. Group comparisons of controllability metrics between HCs and MDD patients were carried out in a structural basis. Correlation and moderation analyses were performed to reveal complicated relationship among controllability alterations, cognitive performance and clinical ratings.

Results. First, we demonstrate that measures of controllability differ between healthy controls and MDD patients, mainly involving the right superior frontal gyrus (SFG), right precentral (PreCG), left superior parietal gyrus (SPL) and left precuneus (PCUN) (Figure 1). We also found the AC changes

with the opposite direction to the MC, which is consistent with previous studies. Then, we found MC of SFG.R was positively associated with attention-related cognitive performance (Figure 2a), and its alteration was positively moderated the development of attention with anxiety symptom (Figure 2b). Interestingly, we discovered a positive link between attention and anxiety symptoms (yellow line, high MC values), while their negative correlation was not statistically significant (blue line, low MC values).

Discussion. MDD patients showed decreased AC of PCUN.L (the core of the DMN), indicating a reduced ability to shift between DMN and other task networks, which may explain the loss of capability of depressive patients to initiate, maintain, and control their thoughts, behaviors, or emotions. Then, we found the increased AC of dorsolateral SFG.R (the component of the FPN) in MDD individuals suggest potential compensatory mechanism for the impairments of cognitive manipulation. In addition, MDD patients exhibited an increased AC of preCG.R (the component of the SMN), which was correlated with the increased AC of dorsolateral SFG.R. This may be caused by top-down control over lower-level processes. The posterior SFG.R is a part of the dorsal attention network (DN), which is implicated in goal-directed processes. Conversely, SPL.L is a constituent of the ventral attention network (VAN), which is associated with stimulus-driven reorientation of attention. Thus, the disturbance of controllability in the above regions could contribute significantly attention-related cognitive deficits. In fact, we did find that MC of posterior SFG.R was positively associated with attention function, and we further found moderation effect of MC in this region on correlation between attention and anxiety symptom. It is possible that increasing MC can also exhibit unfavorable transitions and these adverse effects in turn lead to more severe clinical symptoms with the acceleration of attention. Interestingly, we discovered a positive correlation between attention and anxiety symptoms. Previous studies suggested that it was reasonable to hypothesize the negative emotions will promote the deployment of the ‘as many as can’ stop rule, and this task perseveration is likely to be closely associated with pathological anxiety, obsessive checking, and depressive rumination. In summary, our results provide initial insights into the clinical implications of altered network controllability in MDD and highlight the interplay between attention, anxiety symptom severity, and the MC of posterior SFG.R, which suggest that the MC of posterior SFG.R may be prognostic biomarkers of MDD.

PO-2812

Magnetic Resonance Imaging for Acute Pancreatitis in patients with Type 2 Diabetes Mellitus

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Objective To determine characteristics of type 2 diabetes mellitus (T2DM)-related acute pancreatitis (AP) on magnetic resonance imaging (MRI). **Methods** Retrospectively studied 262 patients with AP admitted to our institution and underwent MRI. Diagnosis of T2DM-related AP was based upon clinical manifestations, laboratory tests, and MRI. Pancreatic/peripancreatic changes were assessed on MRI. **Results** Fifty-three (20.2%) patients with T2DM-related AP and 209 (79.8%) with nondiabetic AP were enrolled. On MRI, a higher prevalence of necrotizing pancreatitis ($P < 0.001$), pancreatic necrosis $> 30\%$ (57.5% vs 29.2%; $P = 0.006$), hemorrhage (35.8% vs 19.1%; $P = 0.009$), abdominal wall edema (67.9% vs 46.8%; $P = 0.006$), walled-off necrosis (43.2% vs 14.6%; $P < 0.001$), and infected collections ($P < 0.001$) were registered in T2DM with AP. T2DM-related AP sustained greater MR severity index (mean, 5.1 [range, 2-10] vs 3.4 [range, 1-10]; $P < 0.001$), higher incidence of moderate and severe pancreatitis (69.8% vs 40.2%; $P < 0.001$), higher organ failure (45.3% vs 22%; $P = 0.001$) and prolonged hospitalization (mean, 25.2 [range, 10-63] vs 16 [range, 5-48] days; $P < 0.001$). **Conclusions** T2DM-related AP is more moderate-to-severe pancreatitis and it correlates with MRI characteristics of pancreas itself, hemorrhage, abdominal wall, and infected collections.

PO-2813

Static and dynamic alterations of default mode network subsystem in patients with acute and chronic low back-related leg pain

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Objective: Low back-related leg pain (LBLP) is characterized by predisposition to chronicity and high disability rate. While previous neuroimaging studies have argued that plasticity changes exist across network connections to the default mode network, static and dynamic functional connectivity (FC) and related topological alterations in the three functionally heterogeneous subsystems (the core subsystem, the dorsal medial prefrontal cortex (DMPFC) subsystem and the medial temporal lobe (MTL) subsystem) within default mode network (DMN) remain unclear.

Methods: We collected resting state functional magnetic resonance imaging (rs-fMRI) data from 19 patients with acute LBLP (aLBLP), 31 patients with chronic LBLP (cLBLP) and 51 healthy controls (HCs) to construct static and dynamic functional networks (FNs). For static FC (sFC) matrices of DMN, we further calculated topological properties and explored changes from static FNs. For dynamic FC (dFC) matrices of DMN, we analysed the variability of dynamic connectivity strength and topological properties.

Results: At the subsystem level of static connection analysis, we found increased FC between the core and MTL subsystem as well as between DMPFC subsystem and MTL subsystem as cLBLPs compared to the HCs. For static topological properties in patients with cLBLPs compared to the HCs, global network efficiency (Eg) was decreased and the bilateral inferior frontal gyrus (IFG) with decreased NCp, NE and NLe. However, the Dc of bilateral posterior cingulate cortex (PCC) and NCp of right ventral posterior inferior parietal lobule (vpIPL) were increased. For the subsystem level of dynamic connection analysis, the variability of dFC between the core and MTL subsystems had decreased in the cLBLPs as compared to HCs and aLBLPs compared to HCs. Pain severity was negatively correlated with the sFC between right vpIPL and right pIPL ($r = -0.489$, $P = 0.008$) as well as static NCp of right vpIPL ($r = -0.555$, $P = 0.002$), while the duration of acute LBLP was negatively correlated with DFCs variability between left PCC and left LTC_TP ($r = -0.52$, $P = -0.52$).

Conclusion: While changes of static functional and topological alterations within the DMN contribute to reveal the neural mechanisms related to symptoms in chronic LBLP, dynamic connection characteristics of DMN may serve as potential biomarkers for predicting conversion from acute to chronic in LBLP patients.

PO-2814

Multiparametric magnetic resonance imaging shows promising results to detect early kidney injury in chronic kidney disease

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Purpose:Glomerular filtration rate (eGFR) is a widely used clinical assessment for chronic kidney disease (CKD). However, in early stage CKD patients, eGFR can be normal due to renal compensation. Renal biopsy is the gold standard for assessing CKD, but it is invasive, prone to sampling bias, and has unfavorable long-term follow-up. Therefore, there is an urgent need for a non-invasive and comprehensive method to evaluate renal function.Functional MRI has shown promise in assessing renal pathophysiology, but few studies have combined Multiparametric magnetic resonance imaging (mpMRI) to assess the kidney. This study aims to combine multi-frequency 3D magnetic resonance elastography(MRE), arterial spin labeling (ASL), intravoxel incoherent motion (IVIM), and blood oxygen level-dependent (BOLD) imaging to assess the degree of chronic renal changes in CKD patients in terms of fibrosis, perfusion, and oxygenation. **Methods and Materials:** This is a prospective single-centre study that aims to enroll Forty CKD patients confirmed by renal biopsy (normal eGFR group [eGFR \geq 90 mL/min/1.73 m²]: n = 20; abnormal eGFR group [eGFR < 90 mL/min/1.73 m²]: n = 20) and 20 healthy volunteers (HV). The study will involve the use of MRE,ASL,BOLD,IVIM to perform mpMRI at 3.0T.The study will involve the calculation of shear stiffness (SS), RBF,R2*,true diffusion (D), pseudo-diffusion (D*), apparent diffusion coefficient (ADC),and perfusion fraction (f) for the cortex and medulla by two radiologists . The correlation between pathological grading and MRI parameters was assessed by Spearman correlation analysis. The diagnostic performance of MRI parameters for detecting kidney injury was assessed by receiver operating characteristic (ROC) curves.

Results:The SS,RBF,R2*,D, D*, f, and ADC values showed statistically significant differences among the three groups.Except for D*, all other MRI parameters were significantly correlated with pathological grading . The areas under the curve (AUCs) for discriminating CKD patients from HV were 0.725-0.947 by MRI parameters .SS, R2*, D, D*, f, RBF, and eGFR identified CKD patients with normal eGFR with AUCs of 0.917 , 0.863 , 0.765, 0.632, 0.721, 0.812, and 0.733, respectively, and AUC of SS value was significantly larger than that of eGFR.

Conclusions:Multiparametric magnetic resonance(mpMRI) is a very promising method in assessing the degree of chronic renal changes in patients with CKD. MRE、ASL、BOLD and IVIM were useful for detecting underlying pathologic injury in early CKD patients with normal eGFR,especially MRE.

PO-2815

Application value of cardiac magnetic resonance in patients with cardiac symptoms recovered from Omicron virus infection

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***Purpose:** To explore the application value of cardiac magnetic resonance (CMR) in patients with cardiac symptoms recovered from Omicron virus infection

***Methods and Materials:** 58 patients with cardiac symptoms recovered from Omicron virus infection were prospectively enrolled as the study group, and 30 healthy volunteers whose sex, age, body

surface area and cardiovascular risk factors matched with the study group were recruited as the controls. The clinical baseline data and CMR results (including left ventricular ejection fraction, left ventricular end-diastolic volume index, left ventricular stroke volume index, cardiac index, T1, T2 and 2D myocardial strain values) were acquired, and the differences between the two groups were compared.

*Results: The interval between CMR and PCR positive diagnosis was (18±6) days in patients with cardiac symptoms recovered from Omicron virus infection. Troponin values were elevated in 3(5%) patients, and electrocardiogram results were abnormal in 37(64%) patients. Compared with the control group, the native T1 values (1082.6±32.7 vs. 1048.9±27.0 ms) and T2 values (54.6±2.8 vs. 51.6±2.1 ms) in the study group were significantly higher (both $P < 0.001$). There was no significant difference in CMR parameters between two groups (all $P > 0.05$).

*Conclusions: CMR showed elevated T1 and T2 values in patients with cardiac symptoms recovered from Omicron virus infection, suggesting myocardial inflammation or edema. CMR can be used as an important method to detect suspected cardiac involvement in patients recovered from Omicron virus infection.

PO-2816

Application value of magnetic resonance endogenous contrast T1p technology in the detection of myocardial fibrosis in type 2 diabetes

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*Purpose: To investigate the application value of cardiac magnetic resonance (CMR) endogenous contrast T1p technique in the detection of myocardial fibrosis in patients with type 2 diabetes mellitus (T2DM).

*Methods and Materials: Twenty patients with T2DM (T2DM group) and 20 healthy controls matched in age, sex, body surface area and body mass index were prospectively enrolled. All subjects underwent CMR cine, T1 mapping, T1p (5Hz and 400Hz), and late gadolinium enhancement (LGE) sequence. The subjects' left ventricular cardiac function, native T1 values, T1p values, extracellular volume (ECV) and myocardial fibrosis index (mFI) were acquired. The differences between the two groups were compared by Student's t-test, and the correlation between ECV, mFI, T1p, native T1 and hemoglobin A1C (HbA1c) in the T2DM group was analyzed.

*Results: The ECV [(31.9±2.28)%], T1p values [(50.35±1.91) ms], native T1 values [(1075.25±9.22) ms] and mFI values [(7.22±2.33) ms] were higher in the T2DM group than controls [ECV (26.05±1.70)%, T1p (46.86±2.01) ms, native T1 values (1052.15±25.25) ms, mFI values (5.45±2.78) ms] were significantly elevated ($P < 0.05$). There was a positive correlation between ECV and mFI ($r=0.62$, $P=0.003$), T1p ($r=0.59$, $P=0.005$), native T1 ($r=0.50$, $P=0.023$), and HbA1c ($r=0.57$, $P=0.008$).

*Conclusions: Magnetic resonance endogenous contrast T1p technology can identify myocardial fibrosis in patients with T2DM, which has potential clinical application value in evaluating myocardial fibrosis, and can provide clinicians with a new examination method.

PO-2817

Early Detection of Myocardial Involvement by Noncontrast T1ρ Mapping of Cardiac Magnetic Resonance in Type 2 Diabetes Mellitus

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***Purpose:** To evaluate the feasibility of T1ρ in detecting myocardial fibrosis in type 2 diabetes mellitus (T2DM) patients by comparing with native T1 and Extracellular volume (ECV) fraction.

***Methods and Materials:** 35 T2DM patients free of cardiovascular symptoms and preserved ventricular systolic function and 30 healthy controls were prospectively enrolled for T1 mapping, T2 mapping T1ρ mapping, and late gadolinium enhancement (LGE) examination. ECV mps were calculated using pre- and post-contrast T1 maps. Global native T1, T1ρ, ECV and 2D global longitudinal strain (GLS) values were generated in respective maps. Receiver operating curves were used to show the diagnostic performance of ECV, T1ρ, GLS and native T1 in distinguishing T2DM patients and controls. The Student's t-test, Pearson's chi-squared test, Pearson correlation coefficient (r) and Delong test were used in this study. $P < 0.05$ indicates statistical significance.

***Results:** The global ECV and T1ρ of T2DM group ($ECV = 32.1 \pm 3.2\%$, $T1\rho = 53.1 \pm 2.0$ msec) were significantly higher than those of controls ($ECV = 26.2 \pm 1.6\%$, $T1\rho = 51.6 \pm 3.8$ msec) (all $P < 0.001$), whether there was no significant difference in native T1 between T2DM and controls ($P = 0.264$). The GLS decreased significantly in T2DM patients ($-16.5 \pm 2.4\%$ vs. $-18.3 \pm 2.6\%$, $P = 0.015$). The T1ρ and native T1 were associated with ECV (Pearson's $r = 0.50$ and 0.25 , respectively, both $P < 0.001$), the native T1, T1ρ, and ECV were associated with hemoglobin A1c (Pearson's $r = 0.41$, 0.52 , and 0.61 , respectively, all $P < 0.05$), the ECV were associated with diabetes duration (Pearson's $r = 0.41$, $P = 0.016$). The AUC of ECV, T1ρ, GLS, and native T1 were 0.869 , 0.810 , 0.659 , and 0.524 , respectively.

***Conclusions:** In T2DM patients, T1ρ may be a new noncontrast cardiac magnetic resonance technique for identifying myocardial diffuse fibrosis, and T1ρ may be more sensitive than native T1 in the detection of myocardial diffuse fibrosis.

PO-2818

Changes in subclinical cardiac abnormalities 1 Year after recovering from COVID-19 in patients without clinical cardiac findings

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AIM: To evaluate the subclinical cardiac involvement in COVID-19 patients without clinical cardiac evidence using cardiac MR imaging.

MATERIAL AND METHODS: Participants recovered from COVID-19 without cardiac symptoms and no cardiovascular medical history were enrolled in a prospective cohort study. They underwent baseline cardiac MR and follow-up cardiac MR >300 days after discharge ($n=20$). The study also included healthy controls ($n=20$). Extracellular volume fraction (ECV), native T1, and 2D strain data were assessed and compared.

RESULTS: Compared with healthy controls, the ECV values of participants at baseline [30.0% ($28.3\%-32.5\%$)] and at follow-up [31.0% ($28.0\%-32.8\%$)] were increased compared to the healthy control group [27.0% ($25.3\%-28.0\%$)] (both $p < 0.001$). However, the ECV increase from baseline

cardiac MR to follow-up cardiac MR was not significant ($p = 0.378$). There was a statistically significant difference in global native T1 between baseline [1140 (1108.3-1192.0) ms] and follow-up [1176.0 (1113.0-1206.3) ms] ($p = 0.016$). However, no native T1 difference was found between the healthy controls [1160.7 (1119.6-1195.4) ms] and the baseline ($p = 0.394$) or follow-up group ($p = 0.168$). The global T2 was 41(40-42) ms at follow-up which was within the normal range. In addition, We found a recovery in 2D GLS among COVID-19 participants between baseline and follow-up [-12.4(-11.7- -14.3)% vs. -17.2(-16.2- -18.3)%; $p < 0.001$].

CONCLUSION: Using cardiac MR myocardial tissue and strain imaging parameters, 35% of people without cardiac symptoms or clinical evidence of myocardial injury still had subclinical myocardial tissue characteristic abnormalities at 300 days, but 2D GLS had recovered.

PO-2819

Comparison of rFOV and fFOV magnetic resonance imaging image quality: A meta-analysis

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Purpose: This study aims to assess the influence of reduced field of view (rFOV) diffusion-weighted imaging (DWI) technology on the quality of MRI images.

Methods: We conducted a systematic literature search in databases such as Web of Science to identify studies comparing the image quality of rFOV and fFOV MRI. The search covered database inception to 2023.5. We screened and extracted data based on predefined criteria. Quality assessment used QUADAS-2. Study results were visualized with forest plots. Heterogeneity was assessed with I^2 , and subgroup analyses explored sources. Furthermore, Egger's test was employed to detect publication bias among the included studies.

Results: Our analysis included 13 studies. In 8 studies, rFOV outperformed fFOV in subjective image quality scores (WMD=0.535, 95%CI 0.339~0.731), with low heterogeneity ($I^2=45.7\%$) and no publication bias. Among 6 studies, rFOV effectively reduced image artifacts compared to fFOV (WMD=0.44, 95%CI 0.209~0.672), with low heterogeneity ($I^2=42.3\%$) and some publication bias ($P=0.028$). Additionally, in 5 studies, rFOV decreased image signal-to-noise ratio (WMD=-0.670, 95%CI -1.187~-0.152), with significant heterogeneity ($I^2=87.9\%$) and publication bias ($P<0.05$). In 5 other studies, rFOV enhanced lesion visibility (WMD=0.432, 95%CI -1.187~-0.152). Heterogeneity was mild ($I^2=53.1\%$), and no publication bias was found. Lastly, pooling results from 5 studies, rFOV displayed superior anatomical detail depiction (WMD=0.598, 95%CI 0.121~1.075), despite significant heterogeneity ($I^2=90.8\%$) and no publication bias. Heterogeneity might stem from variables like b value and race.

Conclusion: rFOV demonstrates significant advantages in image quality compared to fFOV, holding substantial clinical diagnostic relevance. With ongoing validation through high-quality, large-sample studies, this conclusion is poised to provide robust guidance for future advancements in magnetic resonance technology.

PO-2820

Quantitative MRI analysis of brachial plexus and limb-girdle muscles as a diagnostic biomarker for upper extremity onset Amyotrophic Lateral Sclerosis

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Background: The identification of reliable biomarkers for the early diagnosis of amyotrophic lateral sclerosis (ALS) is necessary. Recent evidence highlights the potential of axonal degeneration as a biomarker for early ALS detection. However, the diagnostic potential of peripheral nerve axon changes in ALS remains poorly understood.

Purpose: To evaluate the diagnostic performance of quantitative MRI of the brachial plexus and limb-girdle muscles (LGMs) in patients with upper extremity onset of ALS.

Study Type: Retrospective.

Population: 47 patients (age = 53.5 ± 8.6 , 19F) with upper extremity onset of ALS and 20 healthy volunteers (age = 50.7 ± 15.0 , 11F).

Field Strength/Sequence: 3-T, three-dimensional sampling perfection with application-optimized contrasts using different flip angle evolutions with short-tau inversion recovery sequences, T2-weighted turbo spin-echo Dixon sequence.

Assessment: The cross-sectional area (CSA) and nerve-muscle T2 signal intensity ratio (nT2) of the bilateral brachial plexus roots, trunks and cords as well as the CSA and fat fraction (FF) of the bilateral subscapularis, supraspinatus and infraspinatus were assessed by two radiologists. Disease severity and clinical stage of ALS patients were assessed by two neurologists.

Statistical Tests: Student's t-test, Wilcoxon rank-sum test, binary logistic regression, interclass correlation coefficient, receiver operating characteristic analysis and correlation analysis. A P-value < 0.05 was considered statistically significant.

Results: In the affected limbs of patients with ALS, The CSA of the brachial plexus roots, trunks and cords and the nT2 values of the brachial plexus trunks were significantly smaller than in the healthy controls. In the LGMs, the affected limbs of ALS showed significantly smaller CSA and higher FF than controls. The model containing parameters such as brachial plexus trunk CSA, subscapularis CSA, infraspinatus CSA, and subscapularis FF had excellent diagnostic efficacy for ALS. Additionally, increased subscapularis FF and supraspinatus FF were correlated with disease severity, and subscapularis CSA was negatively correlated with the clinical stage.

Data Conclusion: BP thinning, LGMs atrophy, and fatty infiltration might serve as MRI-derived biomarkers for ALS with upper extremity onset.

PO-2821

Integrating diffusion-weighted MRI radiomics features to predict brain invasion of meningiomas

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Background: Brain invasion is an independent diagnostic criterion for the diagnosis of WHO grade II meningiomas, and preoperative prediction of brain invasion in meningiomas is crucial for making treatment decisions. Therefore, we constructed a radiomics model using multimodal MRI for preoperatively predicting brain invasion in meningioma.

Methods: Seven hundred and twenty-three consecutive patients with pathologically confirmed meningiomas between 2013 and 2022 were retrospectively studied. Radiomic features of the brain-tumor interface region were extracted from structural MRI, diffusion-weighted imaging (DWI) and

apparent diffusion coefficient (ADC). Random forest and principal component analysis with varimax rotation were used to obtain optimal radiomics features. Support vector machine, linear discriminant analysis and logistic regression were performed to develop radiomics models. The performance of the model was evaluated using receiver operating characteristic (ROC) curve analysis. The 95% confidence interval was estimated by bootstrap with 1000 samples. The integrated discrimination improvement (IDI) index was used to compare the benefits of different models.

Results: Fifteen radiomics features from structural MRI, nine radiomics features from DWI, and the volume of peritumoral edema were selected for the combined model construction. The multiparametric MRI radiomics model had the highest performance in predicting brain invasion in the training (AUC = 0.945, 95%CI: 0.922 to 0.968) and testing sets (AUC = 0.935, 95%CI: 0.892 to 0.979). It showed higher performance than the structural MRI model (AUC = 0.840) and the DWI model (AUC = 0.810). IDI showed significant improvement in predictive value when the DWI radiomics signature was added to the combined model (IDI = 9.14%; $p < 0.001$).

Conclusion: The incorporation of DWI into the MRI radiomics model improved diagnostic performance for identifying brain invasion in meningioma.

PO-2822

Capecitabine Induced Ileitis Worsened after Dose De-escalation

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Introduction: Capecitabine is an oral fluoropyrimidine drug, widely used in patients with colorectal cancer. Ileitis is a rare but potentially life-threatening side effect of capecitabine, with only ten cases reported.

Methods: A 68-year-old man who received ten cycles of adjuvant chemotherapy with capecitabine after Dixon surgery for rectal cancer. During the fourth chemotherapy cycle.

Results: Patient started to complain of diarrhea (grade 3) without fever or abdominal pain. During follow-up treatment, imaging examinations, laboratory examinations and colonoscopy confirmed that the patient developed colitis and ileitis. Surprisingly, the ileitis worsened after drug reduction while diarrhea improved.

Discussion: To our knowledge, this is the first report of worsening ileitis after a reduction of capecitabine dosage. As dosage de-escalation is a common strategy to mitigate side effects, this potential consequence is worth noting. Therefore, we highlight the necessity of imaging examinations during the treatment of capecitabine. Clinicians should be vigilant for changes in imaging findings indicating ileitis even after dose reduction.

PO-2823

Relationship between brain damage and anxiety, depression, and cognitive impairment in patients with moderate to severe obstructive sleep apnea using diffusional kurtosis imaging

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Objective To explore the brain white matter damage in patients with moderate to severe obstructive sleep apnea-hypopnea syndrome(OSAHS) using diffusional kurtosis imaging(DKI), and analyze its relationship with anxiety, depression and cognitive impairment in patients. **Methods** 50 confirmed cases of moderate to severe OSAHS diagnosed by Polysomnography(PSG) from November 2017 to December 2022 were selected, with 32 healthy controls matched for gender, age and education background. DKI scanning and Beck Anxiety Inventory(BAI), Beck Depression Inventory-II(BDI-II), and Montreal cognitive assessment(MoCA) scores were performed for all subjects. Differences in kurtosis fractional anisotropy(KFA) of various brain regions were compared between the two groups to identify differential brain regions, and correlations were analyzed between KFA reduction and anxiety, depression, and cognitive impairment in OSAHS patients. **Results** The KFA values in right external capsule, bilateral corona radiata, bilateral superior longitudinal fasciculus, corpus callosum, posterior cingulate gyrus of moderate to severe OSAHS group were lower than control group($P<0.05$). For the moderate to severe OSAHS group: The correlation between AHI and KFA values of right posterior corona radiata, right superior corona radiata, left anterior corona radiata, left posterior corona radiata, left superior corona radiata, left superior longitudinal fasciculus, genu of corpus callosum, body of corpus callosum, splenium of corpus callosum are all negative($r=-0.378, -0.307, -0.337, -0.343, -0.341, -0.613, -0.390, -0.384, -0.396$, $P<0.05$). The correlation between LSO2 and KFA values of right anterior corona radiata, right posterior corona radiata, right superior corona radiata, right superior longitudinal fasciculus, left anterior corona radiata, left posterior corona radiata, left superior corona radiata, left superior longitudinal fasciculus, genu of corpus callosum, body of corpus callosum, splenium of corpus callosum, posterior cingulate gyrus are all positive($r=0.330, 0.338, 0.425, 0.312, 0.433, 0.358, 0.410, 0.459, 0.473, 0.659, 0.489, 0.356$, $P<0.05$). The correlation between BAI scores and KFA values of right external capsule, right anterior corona radiata, left posterior corona radiata, left superior corona radiata, body of corpus callosum, splenium of corpus callosum are all negative($r=-0.306, -0.372, -0.296, -0.346, -0.318, -0.386$, $P<0.05$). The correlation between BDI-II scores and KFA values of right superior corona radiata, right superior longitudinal fasciculus, left anterior corona radiata, genu of corpus callosum, body of corpus callosum, splenium of corpus callosum are all negative($r=-0.334, -0.289, -0.309, -0.310, -0.503, -0.469$, $P<0.05$). The correlation between MoCA scores and KFA values of right posterior corona radiata, right superior longitudinal fasciculus, left anterior corona radiata, left superior corona radiata, left superior longitudinal fasciculus, genu of corpus callosum, body of corpus callosum, splenium of corpus callosum are all positive($r=0.368, 0.431, 0.324, 0.410, 0.469, 0.384, 0.369, 0.309$, $P<0.05$). **Conclusion** With the aggravation of OSAHS, the damage to some brain regions becomes more pronounced in moderate to severe OSAHS patients. These damaged brain functional areas are closely related to the anxiety, depression, and cognitive impairment of patients.

PO-2824

Structural signatures of arithmetic abilities in children are associated with gene expressions

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Objectives Arithmetic ability is critical not only for everyday life but also for academic achievement, career development, and future economic success. Individual differences in arithmetic skills among typically developing children and adolescents are related to inter-individual differences in brain structures. However, most existing studies have used region of interest analysis methods, focusing primarily on the intraparietal sulcus region.

Methods To identify distributed brain regions related to arithmetic ability, we employed a cross-validated predictive model to analyze structural MRI data from children and adolescents (n=128). The arithmetic abilities were measured by the Comprehensive Mathematical Abilities Test. Furthermore, we applied neuroimaging-transcriptome association analysis to explore transcriptional signatures associated with spatial organization patterns and developmental changes in GMV in arithmetic-related brain regions.

Results The gray matter volume (GMV) of widespread brain regions reliably predicted individual differences in arithmetic abilities (subtraction: $r = 0.3841$, $P = 6.43 \times 10^{-6}$; multiplication: $r = 0.2941$, $P = 0.0007$). The development of brain regions associated with arithmetic ability primarily correlated with transcriptional profiles enriched for genes involved in amine transport and synaptic signaling transmission

Conclusion Our findings enhance our understanding of the neural and genetic mechanisms underlying children's arithmetic ability and offer a practical predictor for the typical development of arithmetic ability during developmental stages.

PO-2825

Fast Clinical Non-enhanced Sequences with Deep Learning Reconstruction in Abdominal MRI

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Purpose: To assess the image quality and scanning time of fast clinical non-enhanced sequences with deep learning reconstruction (DLR) in abdominal MRI, in comparison with fast sequences (with DLR turned off) and conventional sequences (without DLR).

Materials and Methods: 43 healthy volunteers were enrolled in this prospective study. A 3.0 T MRI scanner (SIGNA Architect, GE Healthcare) with a 30-channel abdominal coil was used to acquire the following sequences: coronal single shot fast spin echo (SSFSE) and fast imaging employing steady-state acquisition (FIESTA), axial dual echo (DE), T2 weighted fat saturation fast recovery fast spin echo (T2-frFSE-fs) and diffusion weighted imaging (DWI). Each sequence was scanned with DLR-fast protocol (parallel acquisition factor [PAF]=3), fast protocol (PAF=3) and conventional protocol (PAF=2). Signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of abdominal organs (liver, pancreas, spleen and kidney) were calculated by the junior radiologist and then verified by the senior radiologist. Subjective image quality was assessed by two other radiologists independently using a 5-point Likert scale, with inter-rater agreement being calculated. Parenchyma sharpness, contrast, truncation artifact (TA), image noise (IN) and overall quality (OQ) were evaluated for SSFSE, DE, T2-frFSE-fs and DWI. Portal sharpness, intrahepatic vessel conspicuity, TA, IN and OQ were evaluated for FIESTA. Scanning time of respiratory trigger (RT) sequences was recorded.

Results: For breath hold sequences, single breath-holding time of SSFSE, DE, FIESTA decreased from 14s to 10s, 16s to 13s and 13s to 9s, respectively. For RT sequences, the scanning time of T2-frFSE-fs and DWI with DLR-fast protocol was shorter than conventional protocol (94.00 ± 18.86 s vs. 133.16 ± 26.90 s, $P < 0.001$; 112.53 ± 18.36 s vs. 122.40 ± 23.40 s, $P = 0.003$). SNR and CNR of DLR-fast sequences were all higher than conventional sequences and fast sequences ($P < 0.01$). All DLR-fast sequences showed better subjective image quality than conventional sequences and fast sequences ($P < 0.05$), except for contrast in T2-frFSE-fs ($P > 0.05$). Inter-rater agreement of two radiologists was moderate.

Conclusion: Compared to conventional sequences, DLR-fast sequences can not only shorten scan time but also improve image quality, which is beneficial to patients' cooperation and clinical diagnosis. DLR-fast sequences may be the great alternative to conventional sequences in abdominal non-enhanced MRI.

PO-2826

Parkinson's disease Diagnosis and Biomarker Analysis using rs-fMRI Functional Brain Network and Deep Learning

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Objective: Accurate diagnosis of the early stage of Parkinson's Disease (PD) is essential but very challenging, in order to take intervention and early symptomatic treatments before the brain damage is shaped. As one of the promising techniques, resting state functional MRI (rs-fMRI) has been widely employed to support early-stage PD diagnosis. The objective of this study was to properly utilize the biomarkers for diagnosis of PD based on merging rs-fMRI brain networks and Deep Learning (DL) models for PD multi-class classification.

Methods: Twenty-nine PD patients and 38 healthy controls (HCs) were included. For each participant, resting state data and high-resolution 3D structural images with a MPRAGE pulse sequence were acquired on a 3T MRI. On the one hand, we apply the BrainNetCNN with contrastive learning (CL) framework of DL to predict cognitive and gait developmental outcome scores from functional brain networks of PD. The highest accuracy (ACC) was achieved by BrainnetCNN-CL using all indicators (0.80); The highest balanced accuracy (BA) was 0.78, particularly. On the other hand, graph theory analysis and connectomics were used to assess global and local topological network properties and regional functional connectivity.

Results: Apply BrainnetCNN-CL, it was found that compared with the HCs, PD patients had fewer connections, mainly involving the default mode network (DMN) and executive control network (ECN). The main brain regions where the results of BrainnetCNN-CL and NBS coincide are Right Calcarine, Left Lingual, Inferior frontal gyrus, left posterior cingulate gyrus, right calcarine, left cuneus and inferior occipital gyrus, which are stable biomarkers of PD. The highest accuracy (ACC) was 0.80, The highest balanced accuracy (BA) was 0.78. Compared to conventional fMRI algorithms, DL models produced better classification performance.

Conclusion: These findings demonstrated the capability of DL frameworks on the imbalanced class distribution analysis and validated the great potential of rs-fMRI based brain network approaches to be further contributed to the development of PD diagnosis systems.

PO-2827

Application of the magnetic resonance 3D multi-echo Dixon sequence for quantifying hepatic iron overload and steatosis in patients with thalassemia

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Rationale and Objectives: To investigate the feasibility and diagnostic efficacy of a 3D multiecho Dixon (qDixon) research application for simultaneously quantifying the liver iron concentration (LIC) and steatosis in thalassemia patients.

Materials and Methods: This prospective study enrolled participants with thalassemia who underwent 3T MRI of the liver for the evaluation of hepatic iron overload. The imaging protocol including qDixon and conventional T2* mapping based on 2D multiecho gradient echo (ME GRE) sequences respectively. Regions of interest (ROIs) were drawn in the liver on the qDixon maps to obtain R2* and proton density fat fraction (PDFF). The reference R2* value was measured and calculated on conventional T2* mapping using the CMRtools software. Correlation analysis, Linear regression analysis, and Bland–Altman analysis were performed.

Results: 84 patients were finally included in this study. The median R2*-ME-GRE was 366.97 (1/s), range [206.68 (1/s), 522.20 (1/s)]. 8 patients had normal hepatic iron deposition, 16 had Insignificant, 42 had mild, 18 had moderate. The median of R2*-qDixon was 376.88 (1/s) [219.33 (1/s), 491.75 (1/s)]. A strong correlation was found between the liver R2*-qDixon and the R2*-ME-GRE ($r=0.959$, $P<0.001$). The median value of PDFF was 1.76% (1.10%, 2.95%). 8 patients had mild fatty liver, and 1 had severe fatty liver.

Conclusion: MR qDixon research sequence can rapidly and accurately quantify liver iron overload, that highly consistent with the measured via conventional GRE sequence, and it can also simultaneously detect hepatic steatosis, this has great potential for clinical evaluation of thalassemia patients.

PO-2828

Gait Impairment-related axonal degeneration in Parkinson's disease: A Neurite Orientation Dispersion and Density Imaging Study

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Purpose: Microstructural alterations in brain networks of people with Parkinson's disease (PD) is presumed to be correlated with gait impairment. Evaluate the microstructural alterations of white matter fiber tracts by using neurite orientation dispersion and density imaging (NODDI) in PD patients.

Methods and Materials: Twenty-four PD patients and 29 healthy controls (HC) were included. For each participant, NODDI and high-resolution 3D structural images were acquired with a MPRAGE pulse sequence on a 3.0T MRI. The NODDI indicators intracellular neurite density index (NDI), orientation dispersion index (ODI), and isotropic fraction (ISO) were compared between the two groups. Diffusion-weighted data preprocessing was performed using Mrtrix3 software, using orientation distribution function to trace the main nerve fiber tracts in PD patients. Quantitative gait and clinical scales were used to record the medication ON and OFF status of PD patients.

Results: The NDI, ODI, and ISO of the specific fibers was significantly higher in PD patients than HC. Six significant fibers are anterior thalamic radiation, corticospinal tract, superior longitudinal fasciculus, forceps major, cingulum, and inferior longitudinal fasciculus. The ODI changes correlated with gait velocity, stride length and cadence in the ON state of patients with PD and correlated with gait velocity and stride length in the OFF state; ISO changes correlated with stride time in the ON state and correlated with gait velocity, stride length and time in the OFF state.

Conclusions: We use NODDI data estimate the density and angular variation of neurites (dendrites and axons) in patients with PD, and provide important neuroimaging information in association with clinical behavioral and gait measures of PD.

PO-2829

Evaluation of biventricular function in obese subjects after bariatric surgery by cardiac magnetic resonance feature tracking

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Purpose: Obesity is one of the major cardiovascular risk factors and increases the risk of cardiovascular disease. Studies have shown that obesity can lead to enlargement of the left and right ventricular (LV and RV) chambers and subclinical dysfunction even if the ejection fraction (EF) is normal. Bariatric surgery is not only an effective treatment for obesity, but also may improve obesity-caused cardiac structural and functional abnormalities. However, the effect of bariatric surgery on biventricular structure and function in obese subjects is still unclear. Therefore, the purpose of this study was to evaluate the effect of biventricular function in obese subjects after bariatric surgery by cardiac magnetic resonance (CMR) feature tracking.

Materials and Methods: Twenty-three obese subjects ($BMI=37.4\pm4.9\text{ kg/m}^2$) who underwent laparoscopic sleeve gastrectomy for weight loss in our hospital from December 2020 to February 2022 were prospectively enrolled. Preoperative CMR examination was performed on obese subjects and clinical data were collected. CMR and clinical follow-up were performed at 1 year after bariatric surgery for weight loss. Conventional cardiac function parameters included LV and RV end-diastolic volume (EDV), end-systolic volume (ESV), EF, and left ventricular mass (LVMASS). Myocardial strain parameters included LV and RV peak circumferential strain (PCS), peak radial strain (PRS) and peak longitudinal strain (PLS). According to the results of normality test, paired t-test or Wilcoxon signed rank sum test was selected for comparison. $P<0.05$ was considered to be statistically significant.

Results: After bariatric surgery, obese subjects had a significant decrease in BMI ($26.0\pm3.0\text{ kg/m}^2$ vs. $37.4\pm4.9\text{ kg/m}^2$, $P<0.001$). At the same time, biventricular EDV [LV, $141.15(29.53)\text{ml}$ vs. $162.82(33.03)\text{ml}$, $P=0.023$; RV, $140.16\pm22.54\text{ml}$ vs. $161.95\pm31.88\text{ml}$, $P<0.001$], ESV (LV, $54.77\pm9.17\text{ml}$ vs. $63.11\pm12.76\text{ml}$, $P=0.001$; RV, $56.31\pm11.92\text{ml}$ vs. $67.27\pm16.13\text{ml}$, $P<0.001$) and LVMASS [$76.15(25.91)\text{g}$ vs. $95.25(31.25)\text{g}$, $P<0.001$] were significantly lower than those at baseline. Although there was no significant change in left and right ventricular EF (both $P>0.05$), biventricular GCS [LV, $-18.95(2.22)\%$ vs. $-17.62(1.12)\%$, $P=0.001$; RV, $-15.64\pm2.82\%$ vs. $-14.00\pm3.16\%$, $P=0.027$], GRS [LV, $31.67(6.64)\%$ vs. $28.06(2.47)\%$, $P=0.002$; RV, $25.98\pm6.28\%$ vs. $22.78\pm6.29\%$, $P=0.046$] and LV GLS ($-18.87\pm1.51\%$ vs. $-17.46\pm1.69\%$, $P=0.001$) were significantly improved from baseline.

Conclusion: After bariatric surgery for weight loss, the obese subjects existed decreased left ventricular mass and biventricular volumes, as well as improved biventricular subclinical function. Cardiac magnetic resonance feature tracking technique can be used to evaluate biventricular subclinical function changes after bariatric surgery in obese subjects

PO-2830

Plastic alterations in cortical morphology due to age-related hearing loss: multiparametric mapping, multiscale neurobiological underpinnings and roles in cognitive impairment

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Background: Although plastic alterations in cortical morphology due to age-related hearing loss have been increasingly studied, their comprehensive mapping, neurobiological determinants, and roles in cognitive impairment are not well established.

Methods: We recruited 284 elderly adults who underwent structural magnetic resonance imaging, magnetic resonance spectroscopy, audiometry, and cognitive assessments. Hearing loss-induced alterations were mapped by correlating individual pure-tone audiometry scores with multiple cortical surface-based morphological indices. The alterations were then linked with brain-wide transcriptomic profiles, microstructural and functional connectomic gradients, and neurotransmitter receptor distributions. Finally, the mediating effects of the alterations were examined on the relationship between hearing loss and cognitive impairment.

Results: Poorer hearing led to widespread cortical thickness (CT) reductions in both auditory and non-auditory regions. The CT reductions were related to transcriptomic profiles of genes involved in certain biological processes and cell types and preferentially expressed during relatively late developmental stages, followed the microstructural connectomic hierarchy, and covaried with multiple dopaminergic neurochemicals. Additionally, the deterioration of hearing status induced gyrification index (GI) reductions in the right Area 52 and Insular Granular Complex, and the reductions were related to lower serotonin 5-hydroxytryptamine receptor subtype 2a. Moreover, the GI in the right Area 52 mediated the relationship between hearing loss and executive impairment. Interestingly, the mediation effect was further modulated by the glutamate and N-acetylaspartate levels in the right auditory region, which continuously declined as the hearing status deteriorated.

Conclusion: These findings provide novel insights into the neurobiological substrates underlying cortical morphological reorganization due to hearing loss, and have important implications for informing avenues for early intervention of hearing loss-related cognitive impairment.

PO-2831

Evaluation of cardiac function and myocardial strain based on a novel 3D cine sequence

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Purpose: To explore the consistency of a novel 3D cine sequence and the traditional 2D cine sequence in evaluating ventricular function and myocardial strain.

Methods: Cardiac cine images were obtained using the 2D cine balanced steady-state free precession sequence and 3D cine Enhanced sensitivity encoding by Static Outer-volume Subtraction (ESSOS) sequence. The 3D cine images were reconstructed according to the slice thickness and orientation of the 2D cine images. Cardiac function and strain were calculated by post-processing software.

Results: A total of 26 patients were enrolled, of which 2 patients were unable to hold their breath. The remaining 24 patients had good 3D image quality. There was excellent agreement (ICC: 0.99,

95%CI: [0.98, 0.99]) and insignificant bias between 3D and 2D cine measurements of left ventricular ejection fraction [58.3 (50.9, 61.9) vs. 59.0 (51.2, 61.7)]. The right ventricular ejection fraction measured by 3D and 2D cine was 52.2 (44.2, 53.8) and 51.7 (44.9, 53.7), respectively, with good agreement (ICC: 0.83, 95%CI: [0.65, 0.92]) and insignificant bias. The global circumferential strain measured by 3D and 2D cine was -16.0 (-17.6, -13.2) and -18.2 (-19.6, -15.3), respectively, with good agreement (ICC: 0.77, 95%CI: [0.54, 0.89]) and insignificant bias. The global radial strain measured by 3D and 2D cine was 28.2 (21.0, 31.1) and 31.2 (23.1, 34.0), respectively, with good agreement (ICC: 0.83, 95%CI: [0.64, 0.92]) and insignificant bias. The global longitudinal strain measured by 3D and 2D cine was -10.4 (-13.5, -6.8) and -16.1 (-18.9, -11.8), respectively, with good agreement (ICC: 0.76, 95%CI: [0.53, 0.89]) and insignificant bias. Although the quality of 3D cine images was not as good as that of 2D cine images, the ventricular function and myocardial strain parameters obtained by the two sequences are still in good agreement.

Conclusion: The 3D cine sequence can be used for rapid assessment of cardiac function and strain.

PO-2832

Preliminary study on the application value of ZTE sequence in calcified plaques of intracranial arterial wall

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Objective: Atherosclerosis (AS) is a common chronic vascular disease caused by multiple factors, in which calcification has a high incidence and may affect the stability of AS. At present, High resolution Magnetic Resonance Vessel Wall Imaging (HR-VWI) is the best magnetic resonance sequence for displaying vascular walls and evaluating plaque components. However, it does not display calcification well and needs to be analyzed in conjunction with Computed Tomography (CT). Therefore, we aim to explore the effectiveness of ZTE technology in displaying calcified plaques on the wall of intracranial arteries.

Methods: Thirty three patients with intracranial atherosclerosis and multiple calcium plaques diagnosed by computed tomography angiography (CTA) in our hospital were collected in the study, and accepted the ZTE and HR-VMI scans of intracranial vessels. Firstly, two experienced imaging physicians used a double-blind method to score CT and ZTE images based on the imaging conspicuousness, contrast and identification of calcified plaques, image quality, diagnostic confidence. And weight Kappa test was used to analyze the consistency of evaluations among evaluators; Then, a comparative analysis was conducted on the distribution and quantity of calcified plaques, and maximum plaque diameter among CT, ZTE original and post-processing images, and HR-VWI; McNemar paired sample test and ICC analysis were respectively used to compare the sensitivity, specificity, and consistency of these different images in detecting calcified plaques. Secondly, the calcification plaque's maximum diameter was measured in the all-above images, respectively. Finally, the Weight Kappa test was used to analyze the consistency between ZTE and CTA in evaluating the degree of vascular stenosis.

Results: 1. In the imaging conspicuousness and contrast of calcified plaques between CT and ZTE image, there was no statistically significant difference ($p>0.05$), with good consistency between two physicians ($\text{Kappa}=0.784$); In the diagnostic confidence, two physicians scored lower on ZTE images compared to CT ($p<0.05$), with good consistency ($\text{Kappa}=0.678$). In the image quality, two physicians also scored lower on ZTE images compared to CT ($p<0.05$), with moderate consistency ($\text{Kappa}=0.522$). 2. Using CT as the reference standard, the sensitivity of ZTE original and post-processing images, and HR-VWI in detecting intracranial arterial wall calcification was 95.42%, 96.15%, 67.65%, respectively, and the specificity was 89.58%, 78.44%, and 52.82%, respectively. In the sensitivity and specificity of detecting calcified plaques, there were significant differences ($p<0.001$) for ZTE images, compared to HR-VWI. Specially, in the specificity of detecting calcified plaques, there were also significant differences ($p<0.05$) between ZTE original and post-processed

images. 3. There is high consistency in the diameter measurement of calcified plaques on CT and ZTE images. However, the consistency of diameter measurement results between HR-VMI and CT images is poor. Linear regression analysis showed that ZTE images had stronger correlation with CT ($R^2=0.8764, 0.8555$), while the correlation between HR-VMI and CT was weaker ($R^2=0.5955$). 4. The consistency between CTA and ZTE in evaluating the degree of vascular stenosis is good ($Kappa=0.779$).

Conclusion: ZTE imaging technology can not only obtain the similar display efficiency of vascular wall calcification with CT, but also display the vascular lumen well. It make up for the deficiency of conventional magnetic resonance imaging technology in displaying calcified plaque of intracranial artery wall, and may became an effective examination method for clinical risk stratification of vascular diseases.

PO-2833

Clinical feasibility of multiparametric MRI in determining bladder-sparing strategy after initial systemic therapy for muscle-invasive bladder cancer Runninghead: MRI assessment of response to systemic therapy for MIBC

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Purpose

To examine the feasibility of Neoadjuvant Vesical Imaging-Reporting and Data System (nacVI-RADS) criteria in deciding whether to continue systemic therapy or perform salvage radical cystectomy (RC).

Experiment Design

Patients received bladder sparing treatment were retrospectively retrieved, including those had RC or continuing systemic treatment after initial treatment (3-5 cycles of systemic therapy). Pre-treatment and follow-up MRI after initial treatment, were independently reviewed by two readers using the nacVI-RADS algorithm. We observed the pathological results from salvage RC and oncological outcomes for patients continuing systemic treatment with different nacVI-RADS category. Receiver operating characteristic curve (ROC) analysis was used for assessing predictive performance to predict good response.

Results

Among the 33 patients, 12 underwent RC, and 21 received sequential systemic treatment. The nacVI-RADS matched the final pathological results from RC. For patients receiving sequential systemic therapy, ROC analysis showed that the optimal criterion was nacVI-RADS ≥ 3 with area under the curve (AUC) value of 0.801, while patients with nacVI-RADS 4 had indeterminate responses to the bladder sparing treatment. Therefore, we proposed modified nacVI-RADS by further subdividing nacVI-RADS 4 into nacVI-RADS 4a and 4b, according to the status of muscle-invasiveness in follow-up MRI. The AUC value of the modified nacVI-RADS was 0.842, significantly higher than that of nacVI-RADS ($p=0.02$).

Conclusions

This small-size study confirmed the consistency between the nacVI-RADS score and pathological response to initial treatment, and indicated that early assessment using modified nacVI-RADS might be a predictive factor for the prognostic outcome after continuing systemic outcome.

PO-2834

自由呼吸 Star-VIBE 序列动态增强联合 T1 mapping 成像在

孤立性肺结节诊断中的应用价值

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目的：采用自由呼吸 Star-VIBE 动态增强 MRI 的血流动力学参数联合 T1 mapping 成像评价孤立性肺结节(SPN),探讨其在良恶性鉴别诊断及肺癌分型中的应用价值。

材料与方法：本研究纳入 131 例经病理证实的 SPN 患者（其中恶性结节 117 例,良性结节 14 例），使用西门子 3.0T Prisma MR 扫描仪行常规序列、动态增强及 T1 mapping 序列检查。测量 DCE-MRI 定量参数(Ktrans、Kep、Ve)，增强前 T1 值（T1pre），增强后 T1 值（T1post），并计算 $\Delta T1$ （ $\Delta T1 = T1post - T1pre$ ）， $\Delta T1\%$ （ $\Delta T1\% = \Delta T1 / T1pre \times 100\%$ ）。对比 DCE-MRI 定量参数、T1 mapping 定量参数在良恶性两组间及不同病理类型肺癌间的差异。运用多元 Logistic 回归联合 ROC 曲线评价其鉴别不同病理类型肺癌的诊断价值，并分析联合诊断、单一诊断的准确效能。

结果 恶性组 Ktrans、Kep、T1post 值高于良性组,差异有统计学意义($P < 0.05$)。小细胞癌、腺癌、鳞癌三者之间的 T1-post、 $\Delta T1$ 、 $\Delta T1\%$ 、K-trans、kep 值的差异有统计学意义（ $P < 0.05$ ）。T1 mapping 联合 DCE-MRI 定量参数鉴别诊断小细胞癌与非小细胞肺癌的准确率为 91.6%，明显高于单一诊断且有显著性差异（ $P < 0.05$ ）；T1 mapping 联合 DCE-MRI 鉴别诊断鳞癌与腺癌的准确率为 90.9%，明显高于单一诊断且有显著性差异（ $P < 0.05$ ）；T1 mapping 鉴别鳞癌与小细胞癌准确率为 83.1%，DCE-MRI 无法鉴别鳞癌与小细胞癌。

结论 自由呼吸 Star-VIBE 序列成像稳定，二者均可鉴别良恶性，T1 mapping 联合 DCE-MRI 的诊断效能高于单一诊断，可无创定量评估肺占位性病变的病理类型，有助于临床治疗方案的选择，值得推广应用于临床。

PO-2835

磁共振扩散张量成像对女性青少年特发性胸腰弯腰椎间盘的定量研究

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目的 评价扩散张量成像（DTI）技术在评估女性青少年特发性胸腰弯侧凸（AIS）腰椎间盘（腰 1/2-腰 5/骶 1）早期退变中的价值。方法 选取 38 例临床诊断为女性 AIS 患者及 20 例性别、年龄相匹配的健康志愿者行腰椎间盘常规磁共振和 DTI 成像，根据 T2WI 图像上的椎间盘进行 Pfirrmann 分级。AIS 患者中腰 1-骶 1 椎间盘未发生任何退变为未退变组（Pfirrmann I 级），任何节段存在退变（分级高于 Pfirrmann I 级）为退变组。测量 AIS 2 组患者及健康志愿者（对照组）腰椎间盘的各项异性分数（FA）值和平均弥散率（MD）值，应用 ANOVA 方差分析及 LSD-t 检验比较 3 组腰椎间盘间以及每组各节段椎间盘间 FA 值和 MD 值的差异。结果 AIS 退变组腰椎间盘 MD 值显著低于未退变组（ $P < 0.001$ ）。AIS 两组腰椎间盘 MD 值显著低于对照组（ P 均 < 0.001 ）。AIS 退变组腰椎间盘 FA 值显著高于未退变组（ $P < 0.05$ ）。AIS 两组腰椎间盘 FA 值显著高于对照组（ P 均 < 0.01 ）。AIS 退变组腰 1/2、腰 2/3、腰 3/4 椎间盘的 MD 值和 FA 值分别与腰 4/5、腰 5/骶 1 椎间盘 MD 值及 FA 值存在显著差异（ $P < 0.05$ ）。结论 磁共振 DTI 研究显示在 Pfirrmann 分级未见异常的情况下，通过对 FA 值和 MD 值的测定能够早期发现和评价女性 AIS 患者腰椎间盘的退变。

PO-2836

磁共振动脉自旋标记及体素内不相干扩散技术评估 2 型糖尿病患者早期肾功能的变化

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目的：研究磁共振动脉自旋标记 (ASL) 及体素内不相干扩散技术 (IVIM-DWI) 识别 2 型糖尿病 (T2DM) 患者早期肾功能损伤的能力。

方法：选取 2021 年 11 月-2022 年 11 月间山西省人民医院内分泌科 T2DM 患者 43 例，按照尿白蛋白/肌酐比率 (ACR) 分为 ACR<30mg/g 的单纯糖尿病组 (共 27 例)、30≤ACR≤300mg/g 的早期糖尿病肾病组 (共 16 例)，同时纳入年龄、性别与 T2DM 患者匹配的 16 例健康者作为对照。对三组受试者行 ASL、IVIM-DWI 扫描，测量其双肾皮、髓质 ASL、IVIM-DWI 参数：肾血流量 (RBF 值)、灌注分数 (f 值)、假性扩散系数 (D*值)、表观扩散系数 (ADC 值)、真性扩散系数 (D 值)，行组间比较分析，并对上述指标与 ACR 的相关性、肾皮质 RBF 值与 f 值的相关性进行分析。应用受试者工作特征 (ROC) 曲线分析相关参数对 T2DM 患者早期肾功能损伤的诊断效能。

结果：健康对照组、单纯糖尿病组、早期糖尿病肾病组间肾脏皮质 RBF 值及皮、髓质 ADC、D、f 值的差异具有统计学意义 (均 $P<0.05$)。肾皮质 ADC 值及皮、髓质 f 值与 ACR 间存在中等程度以上的负相关性 ($r>-0.4$, $P<0.01$)，肾皮质 RBF 值与 f 值呈显著正相关 ($r=0.575$, $P<0.001$)。肾皮质 RBF 值、f 值、肾髓质 D 值、f 值对健康对照组与单纯糖尿病组有较高的鉴别诊断能力 (AUC 分别为 0.791、0.855、0.900、0.944)，肾皮质 RBF 值、ADC 值、D 值、f 值、肾髓质 ADC 值、D 值、f 值对单纯糖尿病组与早期糖尿病肾病组有较高的鉴别诊断能力 (AUC 分别为 0.750、0.791、0.765、0.852、0.757、0.832、0.910)。

结论：ASL 及 IVIM-DWI 能反映 T2DM 患者早期肾脏微循环灌注和微观结构的变化，可以用于 T2DM 患者早期肾功能损伤的评估。

PO-2837

基于高分辨率 MRI 放射组学诺莫图的宫颈癌患者预后模型的构建

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目的本研究的主要目标是建立一种预测接受放化疗宫颈癌患者的生存时间的方法，并基于影像组学评分 (Rad-Score, RS) 生成预后模型。

材料和方法从每个患者的治疗前的 T2 加权 (T2w)、T1 加权 (T1w) 和弥散加权 (DW) 磁共振图像中提取影像组学特征。使用最小绝对收缩和选择算子 (LASSO) 回归和 Cox 比例风险模型获得 RS。根据 RS 的临界值，将患者分为低风险组和高风险组，并生成包含影像组学特征的诺莫图。通过曲线下面积 (AUC) 评估模型的预测性能。

结果总共纳入 62 名患者，其中高风险组 43 人，低风险组 19 人。通过 LASSO 降维选择了四个重要特征，并计算了相应评分。该模型预测 3 年和 5 年总生存率 (OS) 的曲线下面积 (AUC) 值分别为 0.84 和 0.93。

结论结合影像组学特征的诺莫图在预测宫颈癌患者的总体生存率 (Overall Survival, OS) 方面表现良好，但仍需要进一步的大规模研究和外部验证队列来验证其潜在的临床实用性。

PO-2838

高和超高 b 值弥散加权腹部成像病灶检测和图像质量的定性和定量比较

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背景：腹部磁共振成像 (MRI) 越来越多地采用弥散加权成像 (DWI) 序列。尽管 DWI 可以极大地帮助检测和发现可疑病灶，但尚不清楚使用超高 b 值 DWI 可以在多大程度上进一步帮助放射科医生，尤其是在使用经过高级处理的 DWI 序列时。因此，本研究的目标是比较腹部 MRI 检查中的高和超高 b 值 DWI 下病变检出率、图像质量。

方法：研究包括对 70 名肿瘤患者（平均年龄 58 岁；范围 21-90 岁），使用 1.5 T MRI 扫描仪（MAGNETOM Aera，德国西门子）进行腹部检查，具有 DWI 序列（b = 0、50、900 和 1500 s/mm）。高 b900 和超高 b1500 DWI 通过图像质量和病变显著性的定性读数进行比较，使用 5 李克特量表，由 2 名放射科医生共同阅读。计算同一器官可疑病灶/正常组织的表观信号强度比值（LNTRs）。使用适当的方法进行统计分析，包括 Wilcoxon 符号秩检验和读者间一致性分析的 κ 统计量（校正后 $P < 0.05/0.0125/0.005$ ）。

结果：与 b1500 DWI 相比，b900 的图像质量显著提高（ $P < 0.001$ ）。共分析了 153 个可疑病变。总体读者对恶性病变特征/检测的信心以及相应的 LNTR（ 2.7 ± 1.8 VS 2.4 ± 1.6 ）在 b900 下显著高于 b1500 DWI（ $P < 0.001$ VS $P < 0.001$ ）。

结论：与腹部检查中的超高 b 值 DWI (1500 s/mm) 相比，使用高 b 值 DWI (900 s/mm) 可提供更好的图像质量和病灶显著性。因此，在未来的研究中应严格评估肿瘤检查中额外超高 b 值 DWI 的价值。

PO-2839

基于 PI-RADS v2.1 评分探讨不同经验影像医生采用双参数及多参数 MRI 对前列腺癌诊断效能的影响

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基于 PI-RADS v2.1 评分标准，比较双参数磁共振成像 (biparametric magnetic resonance imaging, bp-MRI) 与多参数磁共振成像 (multiparametric magnetic resonance imaging, mp-MRI) 的诊断效能，探讨不同经验医师对两种方案诊断效能的影响并提供方案选择依据。材料与方法：回顾分析 81 例可疑前列腺癌患者 MRI 资料，6 名不同工作年限医师（初、中、高级组各 2 名）采用 bp-MRI 和 mp-MRI 方案评分，通过绘制受试者工作特征曲线 (receiver operating characteristics, ROC) 曲线的灵敏度、特异性和曲线下面积 (area under the curve, AUC) 对诊断效能进行量化分析。分析两种方案的 AUC 与医师工作年限的关系，找到 mp-MRI 向更简便的 bp-MRI 方案过度的最佳阈值工作年限。结果：bp-MRI 高级组曲线下面积 (AUC) 大于中级组 ($p = 0.024$)，中级组大于初级组 ($p = 0.046$)。mp-MRI 中级组大于初级组 ($p = 0.043$)，中、高级组间无差异 ($p = 0.22$)。灵敏度随医师工作年限增加，但特异度变化不明显。高级组方案间无差异 ($AUC = 0.826 \sim 0.866$; $p \geq 0.05$)；初、中级组 mp-MRI 表现更好 ($AUC = 0.705 \sim 0.815$; $p < 0.05$)。两个方案的 AUC 与医师工作年限均接近线性关系，bp-MRI 及 mp-MRI 方案的斜率分别为 0.030 及 0.0246。AUC 值 ≥ 0.80 所需工作年限为 7-8 年，即为方案调整的最佳年限。结论：对于工作经验较丰富的医师可选择 bp-MRI 方案，而经验不足的医师则需要 DCE-MRI 序列进行补充，更适合采用 mp-MRI 方案。根据医生经验的积累可以在合适时机进行方案优化调整。

PO-2840

中重度阻塞性睡眠呼吸暂停患者中的多层网络分析

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目的：既往研究使用磁共振成像 (MRI) 技术来探索阻塞性睡眠呼吸暂停 (OSA) 的神经基础，但都是基于静态功能网络的变化。本研究旨在通过多层网络分析，探究中度至重度 OSA 患者脑网络的动态重构情况，并探讨其对疾病的影响。

方法：本研究纳入了经多导睡眠监测 (PSG) 新确诊的 27 例中重度 OSA 患者和 27 例年龄、性别匹配的健康对照者。所有参与者均接受了静息态功能性磁共振成像 (fMRI) 扫描。采用了时间分辨的 fMRI 数据构建了多层脑网络，总体模块化 (Q) 是反应大脑之间协同效应，切换率被用来反应个体静息态功能网络的动态变化。计算了 OSA 组和健康对照组总体模块化程度，全脑、子网络以及节点之间切换率，采用了独立样本 t 检验进行组间比较，并将有差异指标与睡眠监测、爱泼沃斯嗜睡量表 (ESS) 以及蒙特利尔认知量表 (MoCA) 进行偏相关分析。

结果：与对照组相比，总网络、子网络水平的默认模式网络、腹侧注意网络和听觉网络以及节点水平的额叶和颞叶区域中的节点切换率减低，差异均具有统计学意义 ($p < 0.05$, 经 FDR 校正后)。偏相关分析发现，总网络切换率与 ESS 呈负相关 ($r = -0.405, p = 0.003$)，与 MoCA 呈正相关 ($r = 0.356, p = 0.01$)；腹侧注意网络切换率与 ESS 呈负相关 ($r = -0.438, p = 0.001$)，与平均血氧饱和度呈正相关 ($r = 0.364, p = 0.009$)；右侧中央沟盖节点切换率与 ESS 呈负相关 ($r = -0.339, p = 0.015$)；左侧颞中回切换率与 AHI 呈负相关 ($r = -0.347, p = 0.013$)；右侧中央前回切换率与 ESS 呈负相关 ($r = -0.389, p = 0.005$)。

结论：OSA 患者在总网络、子网络和节点水平中展现出较低的切换率，和动态功能网络稳定性的破坏有关，并表明额叶和颞叶、默认模式网络、腹侧注意网络和听觉网络可能在潜在的神经机制中发挥关键作用。

PO-2841

多 b 值拟合 RESOLVE 弥散加权成像评估中轴型
脊柱关节炎炎症活动性及疗效

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目的：本研究的目的是通过多 b 值拟合 RESOLVE 弥散加权成像 (DWI) 寻找评估中轴型脊柱关节炎 (ax-SpA) 炎症活动性和疗效的最佳定量指标。

方法：本研究前瞻性纳入 106 例参与者，根据国际脊柱关节炎学会 (ASAS) 的标准，分为 axSpA 组 (n=89) 和 no-SpA 组 (n=17)。axSpA 组根据 ASDAS-CRP 分为活动组和非活动组。在活动组中选择经过系统的肿瘤坏死因子- α 抑制剂 (TNFi) 治疗为治疗组 (n=20)。所有参与者均行包括 RESOLVE DWI 序列在内的骶髂关节 MRI 检查。测量骶髂关节软骨下骨髓的 ADC 值 (ADC50,500 为 b=50,500 s/mm² 拟合, ADC50,700 为 b=50,700 s/mm² 拟合, ADC50,500,700 为 b=50,500,700 s/mm² 拟合)。通过比较不同组间的 ADC 值，获得一个相对最优的多 b 值拟合序列，用于进一步监测治疗组的疗效。

结果：axSpA 组、非活动组和活动组骶髂关节的 ADC 值均高于 no-SpA 组。活动组骶髂关节的 ADC 值高于非活动组。与 ADC50,700 值和 ADC50,500 值相比，ADC50,500,700 值的 AUC 最大，其兼顾到图像质量的同时，灵敏度和特异性相对较高。在治疗组中，治疗前和治疗 3 周，治疗 3 周

和 6 周, 治疗 6 周和 12 周, 组间 ADC 值均无统计学差异 ($P>0.0083$, bonferroni 校正), 但在间隔 6 周及以上, ADC 值下降且具有统计学差异 ($P<0.0083$, bonferroni 校正)。

结论: 多 b 值拟合 ($b=50,500,700\text{s/mm}^2$) RESOLVE DWI 在评估 axSpA 炎症活动性方面具有一定的优势。值得注意的是, 不推荐治疗后短期复查 (≤ 3 周), 间隔 6 周及以上复查能有效监测 axSpA 的疗效。

PO-2842

外周带前列腺癌 PI-RADS V2 评分与 Gleason 评分的比较研究

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目的: 比较外周带前列腺癌 PI-RADS V2 与 Gleason 评分的关系; 探讨外周带前列腺癌第二版前列腺影像和数据报告系统 (PI-RADS V2) 中总分 3+1 分与总分 4 分是否有差异并评估其对 PI-RADS V2 的影响。

方法: 连续收集 2012 年 1 月至 2016 年 1 月 354 例临床疑诊前列腺疾病病例, 前列腺移行带病变 150 例, 前列腺外周带病变 204 例 (142 例前列腺癌), 均经过病理证实。采用 Siemens Verio 3.0T 多参数 MRI 序列扫描。图像根据 PI-RADS V2 标准进行评分。204 例前列腺外周带病变用于统计分析。评分者之间一致性通过 Kappa 系数统计。PI-RADS 总分 3 分、3+1 分、4 分病例通过非参数检验分析。

结果: 204 例前列腺外周带病变中前列腺癌 169 例, 非前列腺癌 35 例。PI-RADS 总分 4 分的 kappa 系数高于 PI-RADS 总分 3 分或 3+1 分的 kappa 系数 ($k = 0.802$ vs 0.737 vs 0.591 ; $p < 0.01$), PI-RADS 总分 2、5 分的 kappa 系数高于 PI-RADS 总分 3 分、3+1 和 4 分的 kappa 系数。PI-RADS 总分 3 分、3+1 分、4 分之间的构成比有统计学差异 ($\chi^2 = 29.839$, $p < 0.05$)。PI-RADS 总分 4 分中前列腺临床显著癌高于 PI-RADS 总分 3+1 和 3 分 (78.2% vs 43.2% vs 16.7%)。PI-RADS 总分 3+1 分和 4 分之间的构成比有统计学差异 ($\chi^2 = 15.286$, $p < 0.01$)。71% 病例 (44/62) 由于 DCE 阳性从 PI-RADS 总分 3 分升高到 3+1 分。

结论: PI-RADS V2 外周带评分系统中有必要将 PI-RADS 总分 3+1 分与 PI-RADS 总分 4 分加以区分, 我们认为可将 PI-RADS 总分 3+1 分定义为 PI-RADS 3b 而非直接升级到 PI-RADS 总分 4 分。

PO-2843

不同计算化高 b 值对外周带前列腺癌第二版前列腺影像和数据报告中弥散加权成像评分的影响

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目的 探讨不同计算化高 b 值对外周带前列腺癌第二版前列腺影像和数据报告系统 (PI-RADS v2) 中弥散加权成像评分的影响。

方法 分析 2012 年 1 月至 2013 年 12 月在本医院经直肠超声引导下前列腺饱和穿刺活检或前列腺根治术后病理证实外周带前列腺癌 104 例患者的临床资料。均采用 Siemens Verio 3.0T MRI 扫描, 成像序列包括横断位、矢状位高分辨 T2WI, b 值=0、50、1000 s/mm^2 横断位 DWI 及 DCE 扫描, 通过 Matlab 后处理合成 $b=1000$ 、1400、2000 s/mm^2 的 DWI 图 (cDWI)。依据 PI-RADS v2 评分标准对 $b=1000$ 、1400、2000 s/mm^2 的三组 cDWI 资料进行评分, 并对各组病例的病灶信号强度比进行独立样本 t 检验及单因素方差分析。

结果 三组 cDWI 中 DWI 评分 2、5 分的病例数无差别, 27 例 $b=1000 \text{ s/mm}^2$ DWI 评分 3 分的病例中有 9 例在 $b=1400 \text{ s/mm}^2$ 及 2000 s/mm^2 时 DWI 评分均升高到 4 分。升高至 DWI 评分 4 分的病例与仍为 DWI 评分 3 分的病例间的病灶 SIR 在 $b=1400 \text{ s/mm}^2$ 及 2000 s/mm^2 时的比值分别为 1.86 ± 0.21 比 1.61 ± 0.27 、 2.18 ± 0.26 比 1.75 ± 0.30 , 两组间 SIR 差异均有统计学意义 ($t=2.486$ 、 3.671 , $P<0.05$)。升高至 DWI 评分 4 分的 9 例病例的病灶 SIR 在 $b=1000$ 、 1400 、 2000 s/mm^2 时两两之间差异均有统计学意义 ($F=10.907$ 、 33.768 、 8.043 , $P<0.05$), 且病灶 SIR 随 b 值的升高而增大。

结论 $b \geq 1400 \text{ s/mm}^2$ 的高 b 值主要影响 DWI 评分 3 分的病例, 但 $b=2000 \text{ s/mm}^2$ 不改变 $b=1400 \text{ s/mm}^2$ 时的 DWI 评分, $b=1400 \text{ s/mm}^2$ 可能更适用于外周带前列腺癌的 PI-RADS v2 中 DWI 评分。

PO-2844

3.0T MRI 扩散加权成像及灌注加权成像在肾脏良恶性肿瘤鉴别诊断中的价值

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目的 评价 3.0T MRI 扩散加权成像(DWI)和灌注加权成像(PWI)在肾脏肿瘤良恶性及不同病理组织学类型间鉴别诊断的价值。

方法 15 例正常志愿者及 46 例经病理证实的肾脏肿瘤患者 (肾透明细胞癌 18 例, 乳头状肾细胞癌 8 例, 肾嫌色细胞癌 7 例, 肾血管平滑肌脂肪瘤 13 例) 行 3.0T MRI DWI 及 PWI 扫描。采用单因素方差分析方法比较 PWI 所得 K_{trans} 、 K_{ep} 、 V_e , 以及 DWI 所得 ADC 值在不同病理类型肾脏肿瘤之间的差异。应用 ROC 曲线比较 DWI 及 PWI 对于鉴别肾脏肿瘤良恶性的诊断价值。

结果 正常肾实质与各病理类型肾脏肿瘤之间 ADC 值、 K_{trans} 、 K_{ep} 及 V_e 值差异均有统计学意义 ($P<0.05$)。肾脏良性肿瘤的 ADC 值高于各组恶性肿瘤; 恶性肿瘤中, 肾透明细胞癌的 ADC 值高于乳头状细胞癌及嫌色细胞癌 ($P<0.05$)。肾脏各组恶性肿瘤的 K_{trans} 值及 V_e 值均高于良性肿瘤 ($P<0.05$), 恶性肿瘤中, 仅肾透明细胞癌的 K_{ep} 值高于良性肿瘤 ($P<0.05$)。肾透明细胞癌、肾乳头状细胞癌及肾嫌色细胞癌的 K_{trans} 值逐渐减低, 差异均具有统计学意义 ($P<0.05$)。肾透明细胞癌的 V_e 值高于肾乳头状细胞癌 V_e 值 ($P<0.05$)。ROC 曲线鉴别肾脏肿瘤良恶性的诊断价值, K_{trans} AUC=0.937, 灵敏度和特异度分别为 87.9% 和 85.7%, 临界值为 $0.38/\text{min}$; ADC AUC=0.823, 灵敏度和特异度分别为 72.7% 和 92.9%, 临界值为 $1.40 \times 10^{-3} \text{ mm}^2/\text{s}$; V_e AUC=0.803, 灵敏度和特异度分别为 78.8% 和 71.4%, 临界值为 $0.29/\text{min}$; K_{ep} 则表现出较低的鉴别诊断价值。

结论 3.0T MRI DWI 及 PWI 能有效鉴别肾脏肿瘤良恶性及不同病理组织学类型。其中 K_{trans} 值的诊断价值最高, 但 ADC 值所提供的信息也是不可替代的。

PO-2845

MRI 多模态成像技术在肾透明细胞癌分级诊断中的应用价值

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目的 评价 3.0T MRI 扩散加权成像(DWI)、灌注加权成像(PWI)及磁敏感加权成像(SWI)在肾透明细胞癌(ccRCC) Fuhrman 核分级诊断中的应用价值。

方法 选取 35 例经手术病理证实为 ccRCC 并进行 Fuhrman 核分级患者, 均行 3.0T MRI DWI、PWI 及 SWI 扫描。采用 ANOVA 比较 DWI 所得 ADC 值、PWI 所得 Ktrans 值及 SWI 所得 ITSS 评分在 ccRCC 不同核分级之间的差异, 采用 Pearson 相关性比较 DWI、PWI 及 SWI 三种检查方法之间相关性, 同时应用 ROC 曲线评价三者对于 ccRCC 高、低级别鉴别诊断的价值。

结果 35 例经病理证实 ccRCC 患者 Fuhrman 核分级(其中 I 级 6 例、II 级 17 例、III 级 8 例、IV 级 4 例), III 级与 IV 级间 ADC 值差异不具有统计学意义, 其他各组间差异均具有统计学意义($P < 0.05$); Ktrans 值和 ITSS 评分随着肿瘤分级的升高而逐渐增高($P < 0.05$), 其中 III 级与 IV 级间 ITSS 评分差异不具有统计学意义, 其他各组间差异均具有统计学意义($P < 0.05$)。Pearson 相关性比较发现 Ktrans 与 ADC 之间呈强负相关($r = -0.64$), Ktrans 与 ITSS 之间呈中等正相关($r = 0.55$), ADC 与 ITSS 之间呈中等负相关($r = -0.57$) ($P < 0.05$)。运用 ROC 曲线比较 ccRCC 高(I 和 II 级)、低(III 和 IV 级)级别的诊断价值, Ktrans AUC=0.857, 灵敏度和特异度分别为 89.9%和 85.7%; ADC AUC=0.723, 灵敏度和特异度分别为 72.7%和 92.9%; ITSS 评分 AUC=0.763, 灵敏度和特异度分别为 78.8%和 71.4%。

结论 3.0T MRI DWI、PWI 及 SWI 分别从不同角度反映 ccRCC 的血供及细胞结构特征, 三者联合为 ccRCC 的 Fuhrman 核分级诊断提供有利价值。

PO-2846

多模态磁共振成像对宫颈癌化疗后早期效果评估的价值

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目的 探索多模态磁共振成像对宫颈癌化疗后早期效果评估的价值

方法 收集同济大学附属同济医院 2015 年 4 月至 2016 年 4 月期间, 经细胞学涂片或活检证实为宫颈癌且接受化疗的患者 15 例。所有患者在化疗前及化疗后 1 个月分别行多模态磁共振成像检查, 成像序列包括常规 T1WI、T2WI、DWI、BOLD-MRI 及 DCE-MRI, 并测得相关检查指标, 包括肿瘤最大径 dmax、DWI 检查指标 ADCmean; BOLD-MRI 检查指标 R2*值; DCE-MRI 检查指标 Ktrans 及 Ve 值。比较化疗前后肿瘤最大径 dmax 与多模态磁共振检查指标的变化; 并比较分析化疗后肿瘤大小变化(肿瘤最大径变化率 $\Delta dmax\%$)与化疗前多模态磁共振成像检查指标的相关性。

结果 (1) 化疗后肿瘤最大径 dmax 较化疗前明显减小 ($P < 0.05$); 化疗后肿瘤 ADCmean 较化疗前明显升高 ($P < 0.05$); 化疗后肿瘤 R2*值较化疗前明显升高 ($P < 0.05$); 化疗后肿瘤 Ktrans 较化疗前明显升高 ($P < 0.05$), 而化疗后肿瘤 Ve 值较化疗前虽有所升高, 但不具有明显统计学意义 ($P > 0.05$); (2) 化疗前后肿瘤最大径变化 $\Delta dmax\%$ 与化疗前肿瘤基线 R2*值呈明显负相关 ($r = -0.742$, $P < 0.05$); 而与化疗前肿瘤 ADCmean、Ktrans、Ve 值无明显相关性 ($P > 0.05$)。

结论 多模态磁共振成像对宫颈癌化疗后早期效果评估具有一定价值。

PO-2847

磁共振高分辨率血管壁成像技术对 大脑深静脉系统显示的应用价值

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摘要：目的：评估磁共振高分辨率血管壁成像技术（HR-VWI）在显示大脑深静脉系统的应用价值。方法：回顾性分析 2020 年 1 月至 2022 年 12 月在深圳市宝安区人民医院均接受颅脑磁共振平扫，高分辨率磁共振血管壁成像，DSA 颅内血管造影检查的患者 47 例。行冠状位 3D-T1WI-SPACE 序列并应用后处理软件进行重建，由 2 位高年资的影像科医师采用双盲法对 47 例受试者的双侧基底静脉（BVR）、大脑内静脉（ICV）、丘脑纹状体静脉（TSV）、透明隔静脉、尾状核头静脉和尾状核静脉数目分别进行计数。采用双盲法对 47 例双侧丘脑纹状体静脉主干及其属支的显示完整性进行评分。以 DSA 结果为金标准，使用 Kappa 一致性检验分析 HR-VWI 与 DSA 两种血管成像技术对于大脑深静脉系统显示的一致性。选取大脑内静脉和丘脑纹状体静脉距离静脉角顶点 5 mm 处为测量点，由 2 位高年资的影像科医师对 HR-VWI 及 DSA 静脉影像上的此两处直径进行测量，取两位测量者测量数据的平均值进行统计学分析。结果 大脑内静脉、基底静脉、丘脑纹状体静脉、透明隔静脉、尾状核静脉和尾状核头静脉的显示率分别为 100%、100%、94.0%、97.9%、92.0%、90.0%。Kappa 一致性检验，高分辨率血管壁成像技术对大脑深静脉系统的显示率与 DSA 结果具有强一致性（Kappa=0.858， $P<0.05$ ）；高分辨率血管壁成像技术测量双侧大脑内静脉和丘脑纹状体静脉的直径值要小于 DSA 测量（ $P<0.05$ ）。结论：高分辨率磁共振血管壁成像技术能够清晰显示大脑内静脉及属支的解剖走行，在脑深部静脉直径定量测量中有一定价值，可作为大脑深静脉系统检查的常规检查。

PO-2848

动态增强磁共振灌注参数对结直肠癌患者 微卫星不稳定的预测价值

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目的：结直肠癌发病率、死亡率很高，各国指南均推荐对所有结直肠癌患者检测微卫星不稳定性（Microsatellite instability, MSI），用于免疫治疗方法选择及疗效评估。本研究探索动态增强磁共振（DCE-MRI）对微卫星不稳定的预测价值。方法：回顾性分析经病理证实的 11 例 MSI 和 55 例 MSS 结直肠癌患者，这些患者均术前接受 DCE-MRI 及 DWI 检查。使用 Tissue 4D 后处理软件及 Tofts 模型计算以下 4 个灌注参数：容积转移常数（Ktrans）、回流速率（Kep）、血管外细胞外容积分数（Ve）和 初始曲线下面积（iAUC）。两名观察者独立测量灌注参数及 ADC 信号，采用 Mann-Whitney U 检验、独立样本 t 检验比较两组间指标有无统计学差异。采用多因素 logistic 回归分析多个指标，绘制受试者工作特征曲线（ROC）以评估这些参数的诊断效能。结果：MSI 结直肠癌患者 ktrans、kep、iAUC 显著低于 MSS 患者（ $P\leq 0.001$ ）。MSI 患者 ADC 显著高于 MSS 患者（ $P=0.000$ ）。MSI 患者 Ve 值与 MSS 患者无统计学差异（ $P=0.536$ ）。ROC 结果显示，Kep 独立诊断效能最大，曲线下面积（AUC）0.890，敏感度 76.4%，特异度 90.9%，高于 ADC、iAUC、Ktrans（ $P<0.001$ ）。使用多参数联合诊断模型显示，kep 联合 ADC 诊断微卫星不稳定性准确度最高（ $P=0.000$ ），AUC 0.970，敏感度 90.9%，特异度 100%。其次为 kep 联合 iAUC 诊断效能，AUC 0.926，敏感度 85.5%，特异度 100%。结论：MRI 成像中，灌注参数 kep 联合 ADC 为预测结直肠癌患者微卫

星状态提供了很高的诊断价值,可以初步实现微卫星状态的早期影像学评价,从而更好地指导结直肠癌患者的免疫治疗。

PO-2849

mDIXON-quant 序列评估脂肪肝严重程度与 尿液农药水平的关系

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摘要 探索 mDIXON-quant 序列评估脂肪肝 (FLD) 严重程度与尿液农药水平的关系。

方法 53 例志愿者行腹部磁共振扫描,采用 mDIXON-quant 序列测量肝脏脂肪分数 (FF 值),根据肝脏 FF 值分为健康对照组、轻度 FLD 组、中重度 FLD 组。同时搜集志愿者晨尿样本,采用 β -葡萄糖醛酸酶水解法和高效液相色谱-串联质谱法测定尿液农药水平,包括毒死蜱、百草枯和环唑醇。比较不同组间尿液毒死蜱、百草枯和环唑醇含量的差异,相关性分析志愿者肝脏 FF 值与尿液毒死蜱、百草枯和环唑醇含量的相关性,ROC 曲线分析尿液中毒死蜱、百草枯和环丙康唑水平对 FLD 诊断的敏感性和特异性。

结果 根据肝脏 FF 值,对照组 20 例,轻度 FLD 组 16 例,中重度 FLD 组 17 例。轻度 FLD 组、中重度 FLD 组尿毒死蜱、百草枯含量均高于正常组,差异均具有统计学意义 ($P < 0.05$),但轻度 FLD 组与中重度 FLD 组组尿中毒死蜱、百草枯水平均无统计学差异 ($P > 0.05$),此外,三组间尿中环唑醇水平均无统计学差异 ($P > 0.05$)。相关性分析显示尿中毒死蜱和百草枯水平与肝脏 FF 值均呈正相关 (r_s 分别为 0.659、0.481, $P < 0.05$),但尿中环丙康唑水平与 FF 值无相关性 ($P > 0.05$)。ROC 曲线显示,尿毒死蜱含量大于 4.21ng/ml 有助于 FLD 诊断, AUC 为 0.924,灵敏度为 78.8%、特异度为 99.5%;尿百草枯含量大于 0.315ng/ml 有助于 FLD 的诊断, AUC 为 0.832,灵敏度为 69.7%、特异度为 80.0%。

结论 尿液毒死蜱、百草枯与肝脏 FF 值呈正相关,可能是 FLD 的潜在预测因子,为预防和治疗 FLD 提供新思路。

PO-2850

心脏磁共振特征追踪成像在鉴别心脏淀粉样 变性亚型中的诊断性能

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目的: 本研究的主要目的是利用磁共振特征追踪成像 (CMR-FT) 获得淀粉样变患不同亚型者的左心室整体及各区域层面的心肌应变值,探讨其对淀粉样变分型的评估价值。

材料与方法: 本研究通过心内膜活检确诊淀粉样变,并根据免疫组化,血清免疫固定电泳和核医学闪烁成像,回顾性地连续性纳入了 20 例免疫球蛋白轻链型心肌淀粉样变性 (cardiac light-chain amyloidosis, AL-CA) 患者和 22 例转甲状腺素蛋白型心肌淀粉样变性 (cardiac transthyretin-related amyloidosis, ATTR-CA) 患者。通过评估两组延迟强化的类型和范围,反映组织特征学差异。通过 CMR-FT 技术得到左心室整体 (2D 和 3D) 以及各心肌层面 (心外膜下和心内膜下) 径向、周向和纵向应变,分析各参数的组间差异。用 ROC 曲线分析应变参数在鉴别两种 CA 类型中的准确性。

结果: 校正 BSA 后,ATTR 组的左室心肌质量略高于 AL 组 ($106.38 \pm 29.79 \text{ mL/m}^2$ VS. $100.04 \pm 36.73 \text{ mL/m}^2$)。ATTR-CA 型患者的 LGE 较多弥漫分布 (60%), AL-CA 型患者的 LGE 多

分布于心内膜下 (73%)。ATTR-CA 组的左室心肌整体 GRS (3D) ($12.96 \pm 5.21\%$ VS. $16.58 \pm 4.39\%$), GLS (2D) ($-6.7\% \pm 1.94$ VS. $-7.87 \pm 1.7\%$), GCS-epi ($-8.41 \pm 2.78\%$ VS. $-10.51 \pm 3.1\%$) 及 GLS-epi ($-6.49 \pm 2.03\%$ VS. $-8.15 \pm 1.86\%$) 的绝对值均低于 AL-CA 组 (p 值均 < 0.05)。GCS-epi 和 GLS-epi 鉴别两种心肌的准确性最高, AUC 值均为 0.705。
结论: CMR-FT 成像能够区分 ATTR-CA 和 AL-CA 这两种常见亚型。

PO-2851

钆贝葡胺增强磁共振成像的定量信息可预测单发肝细胞癌的增殖亚型

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目的 研究钆贝葡胺增强磁共振成像 (MRI) 得出的定量参数对预测肝细胞癌 (HCC) 分子亚型和总生存期的价值。

方法 这项回顾性研究纳入了 223 例接受钆贝葡胺增强磁共振成像的单发肝细胞癌患者。所有肝细胞癌病灶均已切除并经病理证实。在肝胆期测量了病灶与肝脏对比增强比 (LLCER) 和病灶与肝脏对比度 (LLC)。通过 logistic 回归评估了增殖型肝细胞癌的潜在风险因素。LLCER 和 LLC 预测增殖型肝细胞癌的能力通过接收者操作特征曲线 (ROC) 进行评估。采用 cox 比例回归模型对预后因素的生存结果进行评估。

结果 LLCER 是增殖性肝细胞癌的独立预测因子 (OR 为 0.015; 95% 置信区间 [CI] 为 0.008-0.022; $P < 0.001$)。ROC 曲线下面积为 0.812 (95% CI, 0.748-0.877), 高于 LLC、甲胎蛋白 > 100 ng/ml、卫星结节和边缘动脉期增高 (所有 P 均 ≤ 0.001)。LLCER $< -4.59\%$ 的 HCC 患者的增殖性 HCC 发生率明显高于 LLCER $\geq -4.59\%$ 的患者。在随访期间, LLCER 是预测 HCC 患者总生存期的独立指标 (危险比为 0.070; 95% CI 为 0.015-0.324; $p = 0.001$)。

结论 钆贝葡胺增强 MRI 在肝胆期的定量参数可以预测单发 HCC 的增殖亚型, 准确率为 81.2%。钆贝葡胺增强磁共振成像的定量信息可提供有关 HCC 亚型的重要信息。它可能对设计新型治疗策略 (如靶向治疗或免疫治疗) 具有重要价值。

PO-2852

利用 MRI 评价不同运动强度的正常体重青年男性的脂肪组织和肌肉的含量和功能

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目的: 本研究旨在通过 Dixon MRI 来表征正常体重男性在三种运动水平下的棕色脂肪组织 (BAT)、白色脂肪组织 (WAT) 和肌肉组织的体积和活性, 从而探索运动在减肥中的作用, 并为制定运动计划提供依据。

方法与材料: 对 10 名高强度运动 (HIE) 运动员、20 名中等强度运动 (MIE) 运动员和 19 名不运动的健康男性对照组 (NCM) 进行颈部和锁骨上区域的通过 3D Dixon MRI 扫描。利用 Dixon 数据获得如下 12 个参数: 肌肉组织的总体积 (totalMUS)、BAT 的总体积 (totalBAT) 和 WAT 的总体积 (total WAT), BAT 组织内的平均 FWF 值 (fwfBAT), 总脂肪组织内的平均 FWF 值

(fwfFAT), WAT 内的平均 FWF 值 (fwfWAT), 肌肉组织内的平均 FWF 值 (fwfMUS)。此外, BATr 或 WATr 定义为 BAT 或 WAT 在总脂肪 (BAT 和 WAT 的总和) 的占比, 而 Musp、BATp 和 WATp 分别定义为肌肉、BAT 和 WAT 在总组织 (BAT、WAT 和肌肉的总和) 的占比。对三组之间进行比较这 12 个参数。

结果:HIE 的肌肉和 BAT 体积显著高于其他两组 ($P<0.05$), 肌肉是比 NCM ($P<0.01$) 高。同时, 也显著高于另外两个组。相反, 发现 NCM 的 fwfFAT 和 fwfBAT 显著高于其他两组 ($P<0.05$), 但 HIE 和 MIE 之间的比较没有差异。对于 fwfWAT, NCM 高于 MIE, 但不高于 HIE ($P<0.05$)。HIE 和 MIE 的 MUSp 高于 NCM, 而 BATp 和 WATp 较低 ($P<0.05$)。此外, HIE 和 MIE 的 BATr 高于 NCM 组, 而 WATr 较低 ($P<0.05$) (图 1)。

结论:高强度运动可增加肌肉体积。中等强度运动者也和高强度运动者一样, 可以增加肌肉和褐色脂肪组织比例, 减少白色脂肪组织比例。因此, 中等强度的运动就可满足增加肌肉, 促进脂肪褐变, 减少白色脂肪, 从而维持代谢稳态。

PO-2853

BASS-TRANCE 非增强血管成像技术在下肢动脉疾病的应用价值

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目的: 评估非对比增强血管成像技术 BASS-TRANCE 序列技术 (背景抑制单激发心电激发非对比增强血管成像) 在下肢动脉疾病的可行性和临床价值。

方法: 30 例下肢动脉疾病的患者分别接受了 BASS-TRANCE、下肢 CT 血管造影 (CTA) 及下肢动脉数字减影血管造影 (DSA) 检查。成像范围包括腹主动脉远端及整个下肢血管, 分析了 19 个动脉节段, 由两名经验丰富的医师采用 3 分法分别对 CTA 和 BASS-TRANCE 的图像质量进行评分, 并对下肢动脉狭窄程度分为 5 级评价, 分别采用 Mann-WhitneyU 检验和卡方检验进行比较。以 DSA 结果为金标准, 采用 McNemar 检验比较 CTA 和 BASS-TRANCE 对下肢动脉 >50% 狭窄检测的敏感度和特异度。运用 Kappa 检验的方法评价两名观察者之间的一致性。

结果: BASS-TRANCE 能够可靠地观察下肢动脉的解剖结构和流通情况。在可靠的 540 个节段的血管中 (BASS-TRANCE 和 CTA 分别排除了 10 个和 20 个不确定的血管节段), BASS-TRANCE (2.53 [95% 置信区间: 2.46 至 2.57]) 和 CTA (2.49 [95% 置信区间: 2.43 至 2.55]; $p=0.5041$) 的主观图像质量评分相似。此外, BASS-TRANCE 在对血管狭窄 >50% 的评估上敏感度和特异度分别为 84.6% 和 97.9%, 与 CTA (敏感度和特异度分别为 86.3% 和 95.4%) 相似。BASS-TRANCE ($k>0.81$) 和 CTA ($k>0.82$) 狭窄检测的观察者之间一致性较高。

结论: BASS-TRANCE 作为一种无创的非对比增强血管成像技术, 与 DSA 相比, 具有较高诊断准确性, 同时与 CTA 相比不易出现图像伪影, 实现了下肢 6 分钟超快速高分辨率下肢血管成像, 用以观察下肢动脉血管的解剖结构及流通情况, 有望在术前通过极短的检查时间给予临床医生靶向指导作用。

PO-2854

基于线圈匀场技术改善颈部压脂成像质量的临床应用研究

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目的 颈部常规扫描图像噪声高、成像质量不佳、影响临床诊断效力。本研究采用 siemens 3.0T“生命感知”核磁的线圈匀场技术（即：Coil Shim 技术）对颈部扫描图像进行研究，旨在提高图像整体质量，优化扫描参数。

方法 回顾性分析 2020 年 6 月至 2020 年 12 月在东南大学附属中大医院放射科行颈部 MR 扫描的患者 60 例，使用 Siemens Vida 3.0T 磁共振扫描仪，采用磁体 20 通道头颈联合线圈和 Body 体线圈，对患者行大 FOV 冠状位 T2 快速自旋回波频率脂肪抑制技术和 T2 快速自旋回波频率抑制技术（施加 Coil Shim 技术），扫描结束后在 Syngo.via 工作站进行图像测量。随后邀请 3 名影像科高年资诊断医师采用主观跟客观的评价方法对 60 例患者进行图像质量进行评价。通过医生的 Cronbach's Alpha 重复性测定后对评分数据进行 SPSS18.0 统计软件分析。

结果 对比分析 T2 COR FS 与 T2 COR FS(施加 Coil shim)的图像质量：信噪比（SNR FS=37±8、FS Coil Shim=58±9），差异有统计学意义（ $t=4.653$ ， $p<0.04$ ）。2 种脂肪抑制的脂肪信号均匀度的评分分别为：（FS=2.1±0.4、FS Coil Shim=3.3±0.7）。（ $t=2.435$ ， $p<0.05$ ）。整个图像解剖细节显示：（FS=2.8±0.6、FS Coil Shim=3.2±0.6。）（ $t=2.375$ ， $p<0.05$ ）。

结论 采用 Coil Shim 技术对颈部进行成像，相较于传统 T2 FS 序列信噪比显著提高，颈部解剖细节显示更好，扫描时间无变化。因此后期可以帮助我们进一步优化参数，减少扫描时间，帮助医师提高诊断信心。

PO-2855

儿童膝关节软骨 DTI 成像中 b 值和弥散梯度方向数对成像结果的影响研究

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目的：探讨正常学龄儿童膝关节软骨弥散张量成像（DTI）b 值及弥散梯度方向数（NDG）对成像结果的影响。**方法：**招募 6-8 岁、8-10 岁、10-12 岁年龄段正常儿童志愿者各 10 名，每个年龄组男、女各 5 名，所有儿童均行左膝关节 MRI 常规及 DTI 序列扫描，DTI 序列 b 值分别为 300、600、900、1200s/mm²，NDG 分别为 6、15、25、35、45。扫描结束后重建膝关节 FA 图、ADC 图，分别测量膝关节髌软骨、髌股关节面软骨、股骨内侧髁及外侧髁软骨的 FA 值、ADC 值，重建各部分软骨的纤维束走行图，统计分析各年龄段不同 b 值和不同 NDG 对软骨 FA 值、ADC 值及纤维束显示的影响。**结果：**（1）固定 NDG 并变化 b 值，各年龄段膝关节软骨的 FA 值和 ADC 值均随 b 值的增加而减小，ADC 值减小的趋势较大，FA 值减小的趋势在 b 值≥600 s/mm² 逐渐平缓；FA 值随年龄的增大而增大，与年龄相关性呈正相关（ $r=0.361$ ， $P<0.05$ ）；ADC 值随年龄的变化差异无统计学意义（ $P>0.05$ ）；相同年龄段女性组的 FA 值大于男性组（ $P<0.05$ ），男性组的 ADC 值大于女性组（ $P<0.05$ ）；b 值越大，软骨显示的纤维束越少。（2）固定 b 值并变化 NDG，各年龄段膝关节软骨的 FA 值随 NDG 的增加而减小，NDG≥25 时 FA 值减小的趋势逐渐平缓；FA 值随年龄的增大而增大，与年龄相关性呈正相关（ $r=0.225$ ， $P<0.05$ ）；相同年龄段女性组的 FA 值大于男性组（ $P<0.05$ ），男性组的 ADC 值大于女性组（ $P<0.05$ ）；ADC 值随 NDG、年龄的增加均无明显规律；软骨纤维束的显示随 NDG 的增加而显示得清晰、准确，当 NDG≥25 时，纤维束的方向和数量趋于稳定。**结论：**DTI 可用于定量评估儿童膝关节软骨，b 值=600 s/mm²、NDG=25 时，对 DTI 的测量指标 FA 值和 ADC 值影响较小，纤维束显示较稳定。

PO-2856

“显微镜”高分辨率 MRI 鉴别良、恶性皮肤局灶隆起性结节

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目的：探讨“显微镜”高分辨磁共振成像（MHR-MRI）在皮肤局灶隆起性结节良、恶性鉴别中的价值。

方法：对 2020 年 4 月至 2023 年 4 月于山东大学齐鲁医院就诊并行术前 MHR-MRI 检查的 45 例皮肤局灶隆起性结节进行前瞻性分析。根据术后病理结果将其分为良性组（n=19）和恶性组（n=26）。分别对两组病灶的 MHR-MRI 特征进行测量及评估，包括形态、大小、边界是否清晰、基底的宽窄、侵犯皮肤的层面、周围有无血管、水肿及淋巴结，以及在 T1WI、T2WI 图像上病变的信号强度，同时对上述特征在良、恶性组，以及在基底细胞癌、隆突性皮肤纤维肉瘤和鳞癌三个类型之间的差异进行比较。

结果：在良性组，MHR-MRI 显示病灶形态多为类圆形，与恶性组存在显著差异（ $P<0.001$ ）；恶性组病灶更易出现尖角楔入征（ $P<0.001$ ）、累及表皮真皮（ $P<0.001$ ）、边界不清（ $P=0.003$ ），以及存在周围血管（ $P=0.008$ ）。在基底细胞癌、隆突性皮肤纤维肉瘤、鳞癌之间，MHR-MRI 显示基底细胞癌及隆突性皮肤纤维肉瘤的宽基底特征较鳞癌更多见（ $P=0.011$ ），隆突性皮肤纤维肉瘤和鳞癌比基底细胞癌更常出现尖角楔入征（ $P=0.001$ ）。

结论：MHR-MRI 作为一种新型的皮肤高清成像方法，有助于皮肤良、恶性局灶隆起性结节及常见恶性肿瘤的鉴别。

PO-2857

多模态 MRI 影像组学在脑膜瘤分级预测中的研究

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目的：评估基于 CMRI、ADC 图或 SWI 的影像组学模型在脑膜瘤分级预测中的应用价值；同时探讨联合 CMRI、ADC 图 SWI 的多模态影像组学模型对脑膜瘤的分级预测效能，以期获得最佳的预测模型，提高对该肿瘤的术前分级预测准确性。

材料和方法：回顾性分析 229 例低级别和 87 例高级别脑膜瘤患者的临床及影像学资料。分析传统影像学特征，基于整个肿瘤体积提取 CMRI、ADC 图及 SWI 的影像组学特征，采用 LASSO 进行特征选择。在不进行过采样或采用 SMOTE 的情况下，采用 RF 分类器构建 7 个影像组学模型。采用 LOOCV 训练和验证各影像组学模型性能。采用 ROC 曲线评估不同影像组学模型对脑膜瘤的分级预测效能，并采用 DeLong 检验比较各模型 AUC 的差异。

结果：在不进行过采样的情况下，CMRIADC 和 SWI 模型的 AUC 分别为 0.79、0.75 和 0.71。cMRI+ADC 模型与 CMRI 模型的 AUC 之间差异无统计学意义；ADC+SWI 模型的 AUC 低于 cMRI 模型；CMRI+SWI 模型的 AUC 高于 cMRI 模型；而 cMRI+SWI 模型与 cMRI+ADC+SWI 模型的 AUC 之间差异无统计学意义。在采用 SMOTE 情况下，cMRI、ADC 和 SWI 模型的 AUC 分别为 0.77、0.76 和 0.68。cMRI+ADC 模型与 CMRI 模型的 AUC 之间差异无统计学意义；ADC+SWI 模型的 AUC 低于 cMRI 模型；cMRI+SWI 模型的 AUC 高于 cMRI 模型，而 cMRI+SWI 模型与 CMRI+ADC+SWI 模型的 AUC 之间差异无统计学意义。

结论：(1)cMRI、ADC 图及 SWI 的影像组学模型在脑膜瘤的分级预测中均有一定的价值；(2)联合 CMRI 和 SWI 的影像组学模型对脑膜瘤的分级预测效能最佳，联合 CMRI、ADC 图和 SWI 的影像组学模型并不能进一步提高对脑膜瘤的分级预测效能。

PO-2858

DWI 联合 SWI 及 DSC-PWI 在 IDH 突变型星形细胞瘤分级中的价值

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目的 IDH 突变型星形细胞瘤的准确分级对于制定治疗策略和评估患者预后至关重要。本研究的目的是探讨 DWI、SWI 和 DSC-PWI 在 IDH 突变型星形细胞瘤分级中的作用。材料与方法 回顾性收集 107 例接受 DWI、SWI 和 DSC-PWI 检查的 IDH 突变型星形细胞瘤患者。评估最小表观扩散系数 (ADCmin) 值、肿瘤内磁敏感信号 (ITSS) 和最大相对脑血容量 (rCBVmax) 值。比较 II 级肿瘤与 III 级肿瘤、III 级肿瘤与 IV 级肿瘤以及 II+III 级肿瘤和 IV 级肿瘤之间的 ADCmin、ITSS 和 rCBVmax 值。使用 Logistic 回归、十折交叉验证和受试者操作特征 (ROC) 曲线来评估其诊断性能。结果 与 III 级星形细胞瘤相比, IDH 突变型 IV 级星形细胞瘤显示出更低的 ADCmin 值和更高的 rCBVmax 值 (校正后 $P<0.001$)。IDH 突变型 III 级星形细胞瘤的 ITSS 水平显著低于 IV 级星形细胞瘤 (校正后 $P<0.001$)。IDH 突变型 II 级和 III 级星形细胞瘤的 ITSS 水平差异有统计学意义 (校正后 $P=0.002$)。在区别 II+III 级和 IV 级肿瘤中, 联合 ADCmin、ITSS 和 rCBVmax 的 AUC 值最大。结论 ADCmin、rCBVmax 和 ITSS 可用于 IDH 突变型星形细胞瘤的分级。联合 ADCmin、ITSS 和 rCBVmax 可提高 IDH 突变型星形细胞瘤分级的诊断性能。

PO-2859

Gd-BOPTA 增强 MRI 鉴别 LI-RADS M 类别中肝细胞癌与肝内肿块型胆管细胞癌的辅助征象及其附加价值

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目的 探讨 Gd-BOPTA 增强 MRI 上鉴别肝细胞癌 (HCC) 和肝内肿块型胆管细胞癌 (IMCC) 的可靠影像征象及其附加价值。材料与方法 回顾性收集 116 例类别为 LI-RADS M (LR-M) 的患者, 其中 82 例经组织学证实为 HCC、34 例为 IMCC。将单因素分析中 P 值 <0.05 的所有变量纳入多变量 Logistic 回归分析, 在添加辅助影像征象前后分别建立诊断模型 1 和模型 2, 以寻找可靠的肝癌诊断预测因子。采用受试者工作特征 (ROC) 曲线和 De-long 检验对两种模型进行比较。结果 82 例 HCC 中有 49 例 (59.8%) 包膜强化, 频率显著高于 IMCC ($P<0.001$)。根据 LI-RADS 的主要表现、LR-M 表现和临床病理因素, 在模型 1 中, 甲胎蛋白升高 ($OR=10.676$, $95\%CI=2.125-4.470$, $P=0.004$) 和包膜强化 ($OR=20.558$, $95\%CI=4.470-94.550$, $P<0.001$) 是独立的危险因素。在模型 2 中, 包膜强化 ($OR=13.161$, $95\%CI=1.725-100.400$, $P=0.013$)、间隔强化 ($OR=17.983$, $95\%CI=1.049-308.181$, $P=0.046$)、肝胆期肿瘤中央小片状高信号 ($OR=44.386$, $95\%CI=1.610-1223.484$, $P=0.025$) 是肝细胞癌的独立危险因素。模型 2 的 AUC 值 (0.918, $P=0.021$) 显著高于模型 1 (0.845)。当满足模型 2 中任意两个或两个以上的预测因子时, 灵敏度为 91.46%, 准确率达 87.93%。结论 包膜强化是帮助识别肝细胞癌的可靠影像征象。增加辅助影像征象提高了 LR-M 中诊断 HCC 的敏感性和准确性, 同时对 IMCC 进行了区分。

PO-2860

基于 ASL 成像机器学习智能预测糖尿病患者早期肾损伤及进展的新应用

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目的

本研究采用动脉自旋标记灌注成像 (ASL) 探讨临床生物学指标与影像组学特征能否预测及早期识别 T2DM 患者肾脏损伤, 分析影像组学纹理特征参数与生物学指标相关性的价值, 识别糖尿病患者早期肾脏损伤的影像学危险因子, 为预测及诊断糖尿病早期肾脏损伤及进展提供新思路、新方法。

方法

选取行 fMRI 的 163 例受试者作为共同研究对象。采集其临床生物学资料, 对所有受试者行腹部核磁序列扫描, 提取双肾影像学资料, 建立联合影像组学标签识别糖尿病早期肾损伤模型, 提取糖尿病早期肾损伤影像学危险因子, 分析有意义纹理特征参数与临床生物学指标相关性分析。同时, 前瞻性随访分析糖尿病患者肾脏损伤, 使用机器学习 7 种算法建立预测糖尿病肾脏损伤进展影像学指标模型及影像联合生物学指标综合模型, 分析预测糖尿病肾脏损伤影像组学危险因素。

结果

RBF 值可早期识别临床指标未异常的 T2DM 患者不同时期肾脏损伤。健康对照组、糖尿病组及糖尿病肾病组 RBF 值均呈下降趋势, 肾脏 RBF 值与 eGFR 呈正相关, 与 UACR、年龄、BMI、DBP、BUN、SCr 呈负相关。通过机器学习筛选出 8 个最有价值的纹理特征为。AUC0.778, 敏感性 71, 特异性 74.4; 机器学习最佳模型 naive bayes AUC 为 0.734。

结论

影像学指标在临床指标肾功能正常的糖尿病患者中已有变化, 提示糖尿病患者可能已出现肾脏早期损伤, ASL 序列可敏感识别肾脏肾功能及血流的变化。与 eGFR 相比, RBF 值可更早识别 DM 患者肾脏早期血流量的变化。基于机器学习算法影像学指标是早期敏感识别糖尿病患者肾功能损伤及进展的有效标志物。影像数据联合临床生物学指标可早期、智能预测 T2DM 患者早期肾功能损伤及进展, 成为有高度敏感性和特异性的预测模型。

PO-2861

基于多参数 MRI 的放射组学模型预测弥漫中线胶质瘤的 H3 K27M 突变状态: 不同序列和机器学习技术的比较研究

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目的: 基于多参数磁共振成像的放射组学模型预测弥漫中线胶质瘤 (DMG) H3 K27M 突变状态的性能尚未得到全面评估。多参数磁共振成像和机器学习技术的最佳组合仍未确定。我们比较了各种放射组学模型在不同 MRI 序列和不同机器学习技术中的表现。

方法: 我们回顾性地纳入了 102 例经病理证实的 DMG 患者 (其中 27 例为 H3 K27M 突变型患者, 75 例为 H3 K27M 野生型患者)。从 8 个序列中提取放射组学特征, 并通过独立组合进行了 18 个特征集的分析。共有三种特征矩阵归一化算法、两种降维方法、四种特征选择器和七种分类器, 组成了 168 条机器学习流水线。通过不同的特征集和机器学习管道建立了放射组学模型。使用接收者操作特征曲线和曲线下面积 (AUC) 评估模型的性能, 并与 DeLong 检验进行比较。

结果：基于多参数磁共振成像的放射组学模型可以准确预测 DMG 中 H3 K27M 突变状态（不同序列或序列组合的最高 AUC：0.807-0.969）。然而，不同机器学习技术的结果差异很大。当使用合适的机器学习技术时，基于传统 MRI 的放射组学模型与基于高级 MRI 的模型具有相似的性能（最高 AUC：0.875-0.915 vs. 0.807-0.926；DeLong 检验， $p > 0.05$ ）。大多数模型在结合核磁共振成像序列生成时性能更佳。本研究中的最佳模型使用了所有序列的组合（AUC = 0.969）。

结论：基于多参数 MRI 的放射组学模型可用于预测 DMG 中 H3 K27M 突变状态，但不同序列和机器学习技术的性能各不相同。

PO-2862

应用动态对比增强 MRI 技术探讨直肠癌肝转移病灶环形强化特征在预后评价的价值研究

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目的：结直肠癌肝转移瘤不同的组织病理学生长模式与预后密切相关，拟利用动态对比增强磁共振成像建立一个预测模型，用于预测组织病理学生长模式并评估联合贝伐单抗治疗的效果。

方法：收集 2015 年 1 月至 2021 年 4 月期间，行结直肠癌肝转移瘤切除术的患者。其中 184 名患者接受了新辅助治疗（91 名患者接受了联合贝伐单抗的化疗）。对组织病理学生长模式进行了全面评估，通过多变量逻辑回归分析确定与组织病理学生长模式相关的 MRI 特征，并预测临床病理和放射学特征之间无病生存期（DFS）和总生存期（OS）的关系。

结果：共评估了 286 名患者（平均年龄为 59 岁；172 名男性）。DCE-MRI 的瘤周边缘持续强化（[OR], 4.22; 95% CI: 1.7, 10.2; $P=0.001$ ）是 dHGP 的独立预测因素。发现集和验证集的 AUC 分别为 0.81（95% CI: 0.80, 0.87）和 0.82（95% CI: 0.71, 0.93）。该模型是结直肠癌肝转移瘤患者预后的独立预测因子（DFS: HR, 0.3; 95% CI: 0.2, 0.4; $P < .001$; OS: HR, 0.4; 95% CI: 0.2, 0.4; $P < .001$ ）；HR: 0.4; 95% CI: 0.3, 0.6; $P < .001$ ）。通过预测模型对 CRLMs 进行分类，成功鉴别了联合贝伐单抗的化疗中获益群体（DFS（HR = 0.5, 95% CI: 0.3, 0.8; $P < .01$ ））。

结论：基于 DCE-MRI 上持续的瘤周边缘强化构建的模型可以准确识别结直肠癌肝转移瘤的组织病理学生长模式，并且该模型还可作为抗血管联合化疗的疗效的评判指标。

PO-2863

MUSE 与 FOCUS-MUSE DWI 用于肺癌的初步研究： 与 ki67 表达的相关性

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目的：与单次激发弥散加权成像（ss-DWI）对比，探讨复合灵敏度编码（MUSE）及视场优化约束无失真（FOCUS）-MUSE DWI 在不同病理亚型肺癌中的价值，并评估各参数与 ki67 表达水平的相关性。

材料与方法：对 38 例肺癌患者（23 例腺癌、8 例鳞癌、2 例腺鳞癌、1 例粘液腺癌、1 例未分化肿瘤及 3 例未分组）前瞻性的进行 ss-DWI、MUSE 及 FOCUS-MUSE DWI 扫描。视觉定性分析由两个放射科医生进行病变显著性、图像整体质量的双盲评估。通过手动绘制 ROI 获得几何失真（Dice

系数和 Hausdorff 距离) 及表观扩散系数 (ADC) 值。使用配对样本 t 检验、ICC 及 Mann-Whitney U 检验评估一致性及两种不同 DWI 之间的差异, 相关性采用 Pearson 相关分析。

结果: 两位测量者定性 (ICC>0.61) 及定量评估 (ICC>0.81) 均具有较高的一致性。FOCUS+MUSE DWI 的定性评分最高, 特别是对小病变 (长径<2cm) 及表现为混杂磨玻璃密度 (n=9) 的腺癌显示。与 ss-DWI 和 MUSE 相比, MUSE-FOCUS 的几何失真水平显著降低 ($P<0.05$)。在不同病理亚型的肺癌中, 三种 DWI 序列间平均 ADC 值没有显著差异 ($p>0.05$); MUSE+FOCUS 的最小 ADC 值低于 ss-DWI ($p<0.05$)。腺癌与鳞癌的 ADC 值无差异 ($p>0.05$), 粘液腺癌的 ADC 值最高, 低分化肺癌的 ADC 值低于中高分化肺癌 ($p<0.05$)。MUSE 的平均及最小 ADC 值与 ki67 具有较高的相关性 ($r=-0.506$, $p=0.008$; $r=-0.716$, $p<0.001$)。

结论: 与 ss-DWI 相比, FOCUS-MUSE DWI 对于小于 2cm 及表现为 mGGO 的肺癌显示, 具有较小的形变及较高的图像质量; 而 MUSE DWI 序列更能反映肺癌肿瘤细胞增殖活性, 可用于大于 2cm 实性肺癌的 DW 成像。

PO-2864

使用 DWI 和 DSC-PWI 结合常规 MR 成像对世界卫生组织 II 级和 III 级星形细胞瘤 IDH 突变状态进行无创评估

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目的: 已证明异柠檬酸脱氢酶 (IDH) 对神经胶质瘤具有诊断和预后意义。这项研究的目的是检查 DWI 和 DSC-PWI 与常规 MR 成像相结合是否可以无创地预测世界卫生组织 II 级和 III 级星形细胞瘤的 IDH 突变状态。

方法: 我们回顾性地回顾了 42 例世界卫生组织 II 级和 III 级星形细胞瘤患者的 DWI, DSC-PWI 和常规 MR 成像。使用 Mann-Whitney U 检验比较 IDH 突变型和野生型肿瘤的最小 ADC, 相对 ADC 和相对最大 CBV 值。受试者工作特征曲线和逻辑回归用于评估其诊断性能。

结果: IDH 突变的 II 和 III 级星形细胞瘤的最低 ADC 和相对 ADC 明显高于 IDH 野生型肿瘤 ($P<0.05$)。截止值 $\geq 1.01 \times 10^{-3} \text{ mm}^2/\text{s}$ 的最小 ADC 可以区分突变状态, 其敏感性, 特异性, 阳性预测值和阴性预测值分别为 76.9%, 82.6%, 91.2% 和 60.5%。在 IDH 突变预测中相对最大 CBV 的阈值 < 2.35 提供了分别为 100.0%, 60.9%, 85.6% 和 100.0% 的敏感性, 特异性, 阳性预测值和阴性预测值。DWI, DSC-PWI 和常规 MR 成像相结合来鉴定 IDH 突变, 其敏感性, 特异性, 阳性预测值和阴性预测值分别为 92.3%, 91.3%, 96.1% 和 83.6%。

结论: 常规 MR 成像, DWI 和 DSC-PWI 技术的组合对于预测 II 级和 III 级星形细胞瘤的 IDH 突变具有很高的敏感性, 特异性, 阳性预测值和阴性预测值。使用先进的半定量 MR 成像技术的策略可能会提供重要的, 非侵入性的替代标记, 应在较大的前瞻性试验中进行进一步研究。

PO-2865

瘤体及瘤周区的 DWI 和 DSC-PWI 在鉴别胶质母细胞瘤 IDH 基因分型中的应用

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瘤体及瘤周区的 DWI 和 DSC-PWI 在鉴别胶质母细胞瘤 IDH 基因分型中的应用
摘要:

目的: 评估瘤体及瘤周区的扩散加权成像(DWI)或动态磁敏感对比增强灌注加权成像(DSC-PWI)在鉴别胶质母细胞瘤异柠檬酸脱氢酶 (IDH) 基因分型中的应用价值; 同时探讨联合两项技术分别在瘤体和瘤周区的诊断效能。

材料与方法: 回顾性分析 10 例 IDH 突变型 (IDH-m) 及 65 例 IDH 野生型(IDH-w)

胶质母细胞瘤的常规 MRI 平扫+增强、DWI 和 DSC-PWI 图像。比较两组间的瘤体相对最小 ADC 值 (rADCmin-t)、瘤周相对最小 ADC 值 (rADCmin-p)、瘤体相对最大 CBV 值 (rCBVmax-t)、瘤周相对最大 CBV 值 (rCBVmax-p)。采用受试者工作特征 (receiver operating characteristic, ROC) 曲线与 Logistic 回归模型评估诊断效能。

结果: IDH 突变型 (IDH-m) 胶质母细胞瘤更容易发生于在额叶和年轻患者中。IDH 野生型的 rADCmin-t 值显著低于 IDH 突变型($P=0.042$)。rCBVmax-t

和 rCBVmax-p 在两个亚组间均具有显著性差异 ($P<0.001$)。rADCmin-t、rCB Vmax-t 及 rCBVmax-p 值预测 IDH 突变型胶质母细胞瘤的最佳阈值分别约 >0.98 、 <7.27 和 <0.97 , 多因素 logistic 回归分析显示, 联合 rADCmin-t 和 rCBVmax-t 参数的敏感性和特异性最高。

结论: 瘤体 rCBVmax-t 及瘤周 rCBVmax-p 值可以作为评价胶质母细胞瘤 IDH 状态的首选影像学指标, 联合瘤体 rADCmin-t 及 rCBVmax-t 值能获得最高的预测能力。

PO-2866

基于 Gd-EOB-DTPA MRI 增强 T1mapping、R2*定量参数及其联合指标评估乙肝肝硬化肝功能的价值

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目的 探索 Gd-EOB-DTPA 增强 MRI T1mapping、R2*定量参数及其联合指标对于评估乙肝肝硬化肝功能的价值。方法 回顾性分析 52 例乙肝肝硬化患者资料。所有患者行 Child-Pugh 分级评估, A 级 10 例, B 级 28 例, C 级 14 例。所有患者均行 Gd-EOB-DTPA 增强 MRI 及 mDixon-quant 扫描, 于增强前 (pre)、增强后 5min (mid)、增强后 20min (HBP) 获得 T1mapping 图像。测量计算相关 T1 弛豫时间定量值 (T1pre、T1mid、T1HBP), T1 弛豫时间减低率 ($\Delta T1mid$ 、 $\Delta T1HBP$)、及 R2*。ROC 曲线评价区分 Child-Pugh A 级与 Child-Pugh B 级及 Child-Pugh B 级与 Child-Pugh C 级的效能。结果 不同 Child-Pugh 分级组间 T1 值、 $\Delta T1$ 值、R2*比较差异具有统计学意义 ($P<0.05$)。T1mid、T1HBP、R2*与 Child-Pugh 分级均呈正相关, rs 分别为 0.365、0.566、0.597 (P 均 <0.05); $\Delta T1mid$ 、 $\Delta T1HBP$ 与 Child-Pugh 分级均呈负相关, rs 分别为-0.680、-0.771 (P 均 <0.05); T1HBP、 $\Delta T1mid$ 、 $\Delta T1HBP$ 、R2*及其联合指标区分 Child-PughA 级与 Child-Pugh B 级的 AUC 分别约 0.888、0.784、0.955、0.764、0.961 (P 均 <0.05); $\Delta T1mid$ 、 $\Delta T1HBP$ 、R2*及其联合指标区分 Child-PughB 级与 Child-PughC 级的 AUC 分别约 0.853、0.860、0.797、0.941 (P 均 <0.05)。结论 基于 Gd-EOB-DTPA 增强 MRI T1mapping 及 R2*定量参数可独立评估乙肝肝硬化的肝功能状况, 二者联合评估对于乙肝肝硬化的肝功能状况的诊断效能更高。

PO-2867

基于多序列 MRI 影像组学的胶质母细胞瘤风险分层预测研究

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目的: 以多序列 MRI 影像组学方法开发一种胶质母细胞瘤总生存期预测模型。方法: 本研究回顾性收集 TCIA/TCGA 公共数据库中 309 例经手术病理证实的胶质母细胞瘤患者的影像数据, 并针对术

前 T1 增强和 T2FLAIR 序列, 提取坏死区域、增强肿瘤实质区域、水肿区域三种感兴趣区域的 10128 个影像组学特征。通过相关性分析、PCA 降维和 Lasso-Cox 回归, 筛选出与总生存期 (OS) 显著相关的影像组学特征并计算风险评分 (Risk-score)。在训练集和测试集中, 利用 Risk-score 将患者划分为高、低风险组, 并进行 Log-rank 检验。对纳入样本的 Risk-score, 临床病理信息采用单因素 Cox 回归, 得出与胶质母细胞瘤 OS 显著相关的风险因素, 应用多因素 Cox 回归构建临床-影像组学联合预测模型以及影像组学列线图 (nomogram)。利用校准曲线评估训练集和测试集上 nomogram 预测性能和生存概率之间的一致性。采用 C-index 评估临床-影像组学联合预测模型的性能, 并与临床预测模型以及影像组学预测模型性能进行比较。结果: 根据训练集筛选出的 16 个影像组学特征计算风险评分, 依据风险评分将训练集与测试集划分为高、低风险组, Log-rank 检验表明利用 Risk-score 划分的高、低风险组具有显著统计学差异。通过单因素 Cox 回归, 确定风险评分、年龄、O⁶-甲基鸟嘌呤-DNA 甲基转移酶状态是影响胶质母细胞瘤 OS 的显著风险因素。利用多因素 Cox 回归构建预测模型, 发现临床-影像组学联合模型性能 (训练集: 0.768, 测试集: 0.724) 高于临床模型性能 (训练集: 0.659, 测试集: 0.653) 和影像组学模型性能 (训练集: 0.744, 测试集: 0.710)。结论: 由 16 个影像组学特征构建的影像组学标签可以作为胶质母细胞瘤 OS 的独立预后因素, 结合临床病理信息构建的总生存期预测模型, 具有重要的临床价值。

PO-2868

基于机器学习的放射组学模型区分脑胶质瘤和孤立性肺癌脑转移瘤及亚型

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目的: 构建应用机器学习的放射组学模型区分脑胶质瘤和孤立性肺癌脑转移瘤及亚型, 实现二者术前准确分类的可行性。材料与方法: 回顾性分析经病理证实的 105 例胶质瘤和 172 例孤立性肺癌脑转移瘤患者的 MRI T1WI 增强图像, 按照 8: 2 比例分为训练组和验证组, 在图像上对肿瘤实性部分进行三维手工分隔, 从图像中提取了总共 1521 个定量特征。使用皮尔逊相关系数对特征进行筛选, 使用多层感知器 (multiple layer perceptron, MLP)、支持向量机 (support vector machine, SVM)、随机森林 (Random Forest, RF) 及逻辑回归 (Logistic regression, LR) 构建模型, 5 折交叉验证方法用于训练模型, 验证组用于评估模型的预测性能, ROC 曲线用于计算模型的准确性、敏感性和特异性, 曲线下面积 (AUC) 用于评估模型的预测性能。结果: 高/低级别胶质瘤和孤立性脑转移瘤的 MLP 鉴别模型的 AUC、准确性分别为 0.969/0.986、0.992/0.986, 敏感性和特异性分别为 1.000/1.000、0.968/0.970, 高级别胶质瘤和非小细胞肺癌/小细胞肺癌脑转移瘤 MLP 鉴别模型的 AUC、准确性分别为 0.964/0.979、0.966/0.982, 敏感性和特异性分别为 1.000/0.958、0.929/1.000。结论: 应用机器学习的放射组学模型对区分脑胶质瘤和孤立性肺癌脑转移瘤及亚型有一定的临床价值, MLP 模型的诊断效能最好。

PO-2869

非对称回波最小二乘估算法迭代水脂分离技术在肩关节 MRI 扫描的应用价值

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摘要: 目的 探讨非对称回波最小二乘估算法迭代水脂分离技术 (IDEAL) 在肩关节 MRI 中的可行性, 并传统频率选择脂肪抑制技术 (Fat) 技术进行对照。方法 选取 20 例健康志愿者, 其中男性 10 例, 女性 10 例; 年龄 15 ~ 55 岁, 平均年龄 35 岁。均行肩关节冠状位 T2WI 扫描, 每次扫描分别结合 Fat、IDEAL 两种不同脂肪抑制技术。由两位放射科医师各自独立对两组图像的磁敏感伪影、运动伪影、脂肪抑制效果和整体图像质量进行定性评分, 并测量比较两组图像的冈上肌、肱骨头和三角肌的信噪比 (SNR)、冈上肌与肱骨头的对比噪声比 (CNR1) 和三角肌与肱骨头的对比噪声比 (CNR2)。结果 定性分析: IDEAL 组在磁敏感伪影、脂肪抑制效果和整体图像质量评分均优于 Fat 组, 而在运动伪影评分低于 Fat 组[磁敏感伪影评分: (3.70 ± 0.73) 分 vs (2.90 ± 0.72) 分, $P < 0.001$; 脂肪抑制效果评分: (3.80 ± 0.89) 分 vs (3.10 ± 0.91) 分, $P = 0.017$; 整体图像质量评分: (3.35 ± 0.99) 分 vs (2.55 ± 0.83) 分, $P = 0.007$; 运动伪影评分: (2.95 ± 0.69) 分 vs (3.85 ± 0.67) 分, $P < 0.001$]; 定量分析: IDEAL 组冈上肌、肱骨头和三角肌的 SNR、冈上肌与肱骨头的 CNR1 和三角肌与肱骨头的 CNR2 均优于 Fat 组 (冈上肌 SNR: $t = -5.917$, $P < 0.001$; 肱骨头 SNR: $t = -2.338$, $P = 0.030$; 三角肌 SNR: $t = -5.887$, $P < 0.001$; CNR1: $Z = -3.472$, $P < 0.001$; CNR2: $Z = -2.053$, $P = 0.040$)。结论 在肩关节 MRI 扫描中, IDEAL 技术较 Fat 技术能更好的控制图像的磁敏感伪影、获得更好的图像质量和脂肪抑制效果, 但对运动伪影更加敏感。

PO-2870

抑郁症患者的功能及形态学脑网络同步构建与联合分析

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目的 对抑郁症 (major depressive disorder, MDD) 患者的功能及形态学脑网络进行构建并分析。方法 选取 55 例抑郁症 (MDD) 患者和 46 例正常对照 (normal controls, NC) 被试作为研究对象。所有受试在 3.0T 超高场 MR 仪进行扫描, 获取全脑三维高分辨结构磁共振 (structural MRI, sMRI) 及静息态功能磁共振 (resting-state dynamic functional MRI, rs-fMRI) 图像数据, 通过 DPARSF 工具箱构建脑功能网络, 通过 Freesurfer 工具构建脑形态学网络。结果 MDD 组全局功能脑网络特征与正常对照无显著差异, 但局部形态学及功能脑网络特征区别于 NC 组, 组间差异主要包括 1) 形态学脑网络特征: 左脑区颞横皮质区域灰质体积 (gray volume, GrayVol) 和表面积 (surface area, SurfArea) 显著大于健康对照 ($P < 0.05$); 2) 功能脑网络特征: 默认模式网络 (default mode network, DMN) 中多个节点的功能连接 (functional connectivity, FC) 异常增加; 其中, 左脑区颞叶皮质与默认网络内其他节点及背侧注意网络 (dorsal attention network, DAN) 之间的功能连接 (functional connectivity, FC) 显著增强, 局部拓扑指标中左脑区颞横皮质介数中心性增强 ($P < 0.05$)。结论 MDD 患者功能及形态学脑网络较正常对照存在差异, 左脑区颞横皮质区域差异显著, 可能其发病机制相关联。

PO-2871

肿瘤全域表观扩散系数诺模图预测高级别子宫内膜癌

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目的：探讨并验证肿瘤全域表观扩散系数 (apparent diffusion coefficient, ADC) 诺模图术前预测高级别子宫内膜癌 (endometrial carcinoma, EC) 的应用价值。**方法：**收集病理证实为 EC 患者 142 例，按 7:3 的比例分为训练组 (n=99) 与验证组 (n=43)。采用 3D Slicer 软件，勾画感兴趣区，生成 3D 感兴趣容积，获得 ADC 直方图参数，包括最大值 (ADCmax)，最小值 (ADCmin)，平均值 (ADCmean)，偏度 (skewness)，峰度 (kurtosis)，熵 (entropy)，第 5 (5th)、第 10 (10th)、第 25 (25th)、第 50 (50th)、第 75 (75th)、第 90 (90th) 和第 95 (95th) 百分位数 ADC 值。测量肿瘤形态学参数，包括肿瘤体积、肿瘤最大径、矢状位 T2WI 肿瘤的最大前后径和肿瘤面积比。组内相关系数用于评价不同观测者间测量的变异性。利用逻辑回归构建 ADC 分数；联合 ADC 分数、肿瘤的形态学及临床参数构建诺模图，绘制校正曲线及决策曲线。**结果：**ADCmin, ADC5th, ADC10th, ADC25th, 所有的形态学参数和临床参数在高级别与低级别 EC 组间具有统计学差异 ($P < 0.05$)。经 LR 筛选，最纳入 ADCmin, ADC5th, ADC10th, ADC25th 构建 ADC 分数。联合 ADC 分数、年龄、肿瘤前后径及 ADC 分数构建 ADC 诺模图，预测高级别 EC 的受试者工作特性曲线下面积、敏感度、特异度在训练组分别为 0.845、81.2%、72.5%；验证组为 0.842、76.7%、80.0%。校正曲线显示，ADC 诺模图预测高级别 EC 具有较高的准确性；决策曲线显示其预测高级别 EC 在训练组和验证组效能相似。**结论：**肿瘤全域 ADC 诺模图有助于术前预测高级别 EC，并具有较好的稳定性及良好的诊断效能。

PO-2872

构建抑郁症患者大脑公共谐波及其形态学特征 谐波能量差异性的分析

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目的 脑部疾病的空间变化模式受到形态学脑网络拓扑结构变化的影响，而谐波能够反映出脑网络拓扑结构。通过研究抑郁症患者大脑形态学特征谐波的变化，能够帮助我们更好的理解抑郁症形态学脑网络的异常改变。**方法** 选取 55 例抑郁症 (major depressive disorder, MDD) 患者和 46 例正常对照 (normal controls, NC) 被试作为研究对象。所有受试在 3.0T 超高场 MR 仪进行扫描，获取全脑三维高分辨 T1 加权图像数据，通过 Freesurfer 5.3.0 工具构建九种形态特征 (脑区顶点、灰质体积、平均皮层厚度、高斯曲率和折叠指数等) 脑网络，通过拉普拉斯矩阵特征分解获得公共谐波，最后计算 MDD 被试和健康对照之间的谐波能量的 Fisher 评分 J (类间均值与类内方差的比率)，比较每个谐波中被试 MDD 和对照 NC 的形态学特征谐波能量之间是否有显著差异。**结果** MDD 组九种形态特征与正常对照总谐波能量没有显著差异，但特定谐波能量区别于 NC 组，差异主要包括 1) 脑区顶点数特征：第 2、6、15、44、57 谐波；2) 表面积特征：第 2、6、16、57 谐波；3) 灰质体积特征：第 2、12、13、15、57 谐波；4) 平均皮层厚度特征：第 2、19、35、36、44 谐波；5) 皮层厚度标准差特征：第 8、21、42 谐波；6) 平均曲率特征：第 26、57 谐波；7) 高斯曲率特征：第 34、40、54、57 谐波；8) 折叠指数特征：第 5、16、21 谐波；9) 曲率指数特征：第 25、32、33、37 谐波，MDD 和健康对照的谐波能量之间有显著差异 ($P < 0.05$)。**结论** MDD 患者在谐波较低段和比较高的部分中，与健康对照能量差异波动比较剧烈，揭示了 MDD 患者异常脑内谐波，为更深刻理解 MDD 患者形态学脑网络提供新视角。

PO-2873

体素内不相干运动成像评估高等强度间歇运动与中等强度持续运动干预对骨骼肌灌注的影响

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目的: 使用体素内不相干运动 (IVIM) 成像探索单次高等强度间歇运动 (HIIT) 与中等强度持续运动 (MICT) 干预后即刻以及干预后恢复期大腿骨骼肌微循环灌注改变。

材料与方法: 本实验招募了 20 个超重 ($BMI \geq 24 \text{ kg/m}^2$) 志愿者。每个志愿者在功率自行车车上分别接受了一次 HIIT 干预和一次 MICT 干预。干预过程有专业人员进行指导监督。两次干预间隔一个星期。每个志愿者在每次干预前、干预后即刻、干预后 1 小时以及干预后 2 小时接受了大腿磁共振 IVIM 扫描。通过对 IVIM 图像进行后处理得到了股直肌、股外侧肌和股二头肌长头的弥散系数 D ，灌注分数 f ，假弥散系数 D^* 以及微循环灌注 fD^* 四个参数。两种干预后的骨骼肌 IVIM 参数改变采用两因素重复测量方差分析进行比较。 $P < 0.05$ 表示差异有统计学意义。

结果: 股直肌 fD^* 在运动干预后即刻显著增加 ($d = 0.69 \times 10^{-3} \text{ mm}^2/\text{s}$, $P = 0.008$), 在运动干预后两小时仍然增加 ($d = 0.64 \times 10^{-3} \text{ mm}^2/\text{s}$, $P = 0.01$)。HIIT 干预组的股直肌 fD^* 增加大于 MICT 干预组 ($d = 0.32$, $P = 0.023$)。股外侧肌 fD^* 在运动干预后显著增加 ($d = 0.53 \times 10^{-3} \text{ mm}^2/\text{s}$, $P < 0.001$), 运动后 1 小时已恢复到运动前水平 ($P > 0.05$)。HIIT 干预组的股外侧肌 fD^* 增加小于 MICT 干预组 ($d = -0.21$, $P = 0.015$)。运动干预后即刻 HIIT 干预组股外侧肌 D 值大于 MICT 干预组 ($d = 0.12 \times 10^{-3} \text{ mm}^2/\text{s}$, $P < 0.001$)。股二头肌长头 fD^* , 股直肌的 D 值和股二头肌长头的 D 值在运动前后没有显著变化 ($P > 0.05$), 在两种运动干预方式之间也没有明显差别 ($P > 0.05$)。

结论: IVIM 成像可以很好的描述运动干预后骨骼肌微循环灌注变化趋势, 以及评估不同运动干预方式后骨骼肌微循环灌注改变的差别。

PO-2874

运用深度学习方法对 MRA 原始图像进行颅内动脉瘤全自动诊断和测量

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目的: 在临床实践中, MRA 颅内动脉瘤 (intracranial aneurysms, IA) 诊断的传统步骤包括人工三维重建、肉眼识别、手动测量, 整个过程非常耗时耗力。由于 MRA 的优势, 近年来头颅 MRA 检查数量急剧增加, 人工分析和测量大大增加了放射科医生的工作量, 动脉瘤的误诊和漏诊时常发生, 导致严重的后果。因此本研究基于 MRA 2D 原始图像建立一个自动诊断并测量 IA 的深度学习模型。

方法: 回顾性收集重庆医科大学附属第二医院 852 个 IAs (806 名患者) MRA 图像, 按 7: 3: 3 的比例随机分为训练集, 测试集和内部验证集。此外, 将来自于陆军军医大学附属第一医院的 319 例患者 (181 例有 IA, 136 例无 IA) 纳入独立验证组。基于 MR 3DUnet 建立自动诊断和测量 IA 的深度学习模型。采用 TP、FP、FN、召回率、精度、灵敏度和特异性指标评价模型的性能, 采用组内相关系数检验 MR 3DUnet 与 DSA 测量结果的一致性。

结果: 在 IA 检测方面, 在内部验证集中, 深度学习模型的召回率、精度和灵敏度分别为 0.79, 0.62 和 0.75。在独立验证集中, 其召回率, 精度, 灵敏度和特异性分别为 0.71, 0.68, 0.74 和 0.77。在 IA 测量方面, MR 3DUnet 和 DSA 显示出良好的一致性, ICC 分别为 0.77 和 0.82。

结论: 本研究开发了一个用于 IA 诊断和测量的一键式全自动深度学习模型, 大大地缩短了诊断时间, 减少了放射科医生的工作量。

PO-2875

基于多序列磁共振影像组学在膀胱癌复发风险分层中的预后价值

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目的: 膀胱癌的复发风险分层管理是患者个体化临床治疗的关键。然而, 术前复发风险评估的准确性并不令人满意。利用多序列磁共振图像开发一种影像组学模型来预测膀胱癌患者的无复发生存期, 并评估其比临床诊断模型的增量价值。

方法: 回顾性地纳入本院 229 例具有术前多序列磁共振图像的膀胱癌患者, 按 7: 3 比例随机分为训练集和验证集。基于 pyradiomics 包从 T2WI、DWI、ADC 和 DCE 图像中提取影像组学特征。采用单变量分析和套索回归方法进行特征筛选。利用 COX 单变量和多变量比例风险模型对临床危险因素进行筛选, 获得独立的危险因素用以构建影像组学-临床列线图。通过 C-index、校准曲线进行模型性能和拟合优度检验。Kaplan-Meier 分析和 log-rank 检验用于评估影像组学特征与 RFS 的相关性。计算净重分类指数(NRI)以评估列线图与影像组学模型或临床模型相比的增量诊断能力, 决策曲线分析来确定列线图的临床有效性。

结果: 通过单变量分析和套索方法后保留 22 个非零系数的 MRI 影像组学特征在膀胱癌复发风险分层模型中表现较好, Kaplan-Meier 生存分析结合 log-rank 检验显示了影像组学模型在高危组和低危组分层方面具有显著的预后价值 ($P<0.001$)。影像组学特征与临床独立危险因素 (尿痛和伴有恶性疾病史) 相结合的联合模型预后价值最好, 训练集和验证集的 C-index 值分别为 0.853 和 0.832, 与临床模型相比, 影像组学-临床列线图取得了更好的校准和分类 (NRI: 0.6768, 95 % CI: 0.5549–0.7987, $P<0.001$)。决策曲线分析表明, 列线图具有更好的临床有用性。

结论: 结合临床危险因素和影像组学特征构建的列线图在评估膀胱癌复发风险方面优于单独的影像组学模型或临床模型, 可能作为一个潜在的工具进行膀胱癌个体化复发风险预测, 并值得进一步验证。

PO-2876

基于多参数 MRI 的影像组学模型预测脑胶质瘤总生存期: 一项多中心队列研究

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目的: 探讨基于多参数 MRI 的影像组学模型预测胶质瘤总生存期(OS)的应用价值。

方法: 这项多中心研究共纳入 579 名病理确诊为胶质瘤的患者, 癌症图像档案 (TCIA) 和癌症基因组图谱 (TCGA) 的 414 例胶质瘤患者按照 8:2 随机分为训练集 ($n=331$) 和内部验证集 ($n=83$)。山西医科大学第一医院 (FHSXMU) 和山西省人民医院 (SPPH) 的胶质瘤患者作为外部验证集 ($n=165$)。使用 ITK-SNAP 勾画感兴趣区并用 FAE 提取增强 T1WI 图像和 T2 液体衰减反转恢复 (FLAIR) 的 3562 个影像组学特征。采用 z-score、单因素 Cox 回归分析与最小绝对收缩和选择算法 (LASSO) 筛选出特征子集构建影像组学模型, 根据影像组学模型的最佳截断值将训练集、内部与外部验证集分为高、低危两组进行 Kaplan-Meier 生存分析。采用 Cox 回归分析探

讨论临床特征和分子标志物的预后价值,联合放射组学特征构建综合模型并绘制列线图。以一致性指数 (C-index) 评估模型的预测效能。

结果:通过 LASSO-Cox 回归筛选出 32 个放射组学特征。构建的影像组学模型预测 OS 的 C-index 分别为 0.711、0.778、0.771。Kaplan-Meier 生存分析结果表明,无论是训练集还是内、外部验证集,高风险患者的 OS 都明显短于低风险患者 ($P<0.0001$)。单、多因素 Cox 回归分析显示 O6-甲基鸟嘌呤-DNA-甲基转移酶 (MGMT)、异柠檬酸脱氢酶 (IDH)、病理分级与年龄是 OS 的独立预后因素 ($P<0.05$)。结合临床基因危险因素及影像组学模型的综合模型预测性能较好 (C-index: 0.750、0.776、0.774)。

结论:基于多参数 MRI 图像特征构建的影像组学模型能将患者进行风险分层,联合 MGMT、IDH、病理分级、年龄和放射组学特征构建的列线图进一步提升了胶质瘤 OS 的预测效能。

PO-2877

CMR 组织追踪技术定量评估糖代谢异常患者左心室心肌应变的临床研究

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目的:探讨心脏磁共振组织追踪技术 (CMR-TT) 定量评估糖代谢异常患者左心室心肌应变的临床应用价值。

资料和方法:回顾性分析 2018-2021 年临床诊断的糖尿病前期患者 30 例及 2 型糖尿病患者 27 例,同期收集健康志愿者 31 例作为对照组。所有受检者均使用 3.0T 心脏磁共振扫描仪采集图像。

结果:(1)左心室常规心功能参数分析:各组间左心室基本心功能参数除 LVMI 外均无统计学差异。糖尿病组的 LVMI 较对照组及糖前期组升高,差异有统计学意义 ($66.37\pm 11.11\text{g/m}^2$ 对 $52.21\pm 8.97\text{g/m}^2$ 对 $48.17\pm 6.75\text{g/m}^2$, $P<0.001$)。(2)左心室心肌应变参数分析:对照组、糖前期组及糖尿病组的 GPLS 数值呈递减趋势,差异有统计学意义 (P 均 <0.001),糖尿病组的 GPRS 及 GPCS 绝对值较对照组及糖前期组减低,差异有统计学意义 (P 均 <0.001)。(3)LVMI 与心肌应变相关性分析:相关性分析发现 GPRS 与 LVMI 之间呈较强负相关 ($r=-0.779$, $P<0.001$),GPCS、GPLS 与 LVMI 呈较强正相关 ($r=0.724$, $r=0.699$, $P<0.001$)。ROC 分析诊断糖代谢异常患者左心室心功能受损,GPRS 最佳截断值:20.01%,灵敏度 52.9%,特异度 100.0%,AUC 为 0.747;GPCS 最佳截断值:-16.45%,灵敏度 76.5%,特异度 87.0%,AUC 为 0.863;GPLS 最佳截断值:-10.10%,灵敏度 85.3%,特异度 91.3%,AUC 为 0.915。

结论:随糖代谢异常程度加重,左心室心肌收缩功能逐渐减低。CMR-TT 可定量评估糖代谢异常患者左心室心肌应变,反应左心室射血分数改变前的早期心肌力学改变,能早期识别糖前期患者亚临床左心室功能受损。

PO-2878

磁共振检查技术在小鼠颅脑损伤疗效评估中的应用

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目的:本文旨在研究磁共振相关检查技术在小鼠颅脑损伤疗效评估中的应用价值,为临床在伤情诊断及治疗方面提供可靠的依据。方法:选取 60 只 C57 小鼠分为 A、B、C 三组,每组 20 只,其中 A 组为 sham 组,B 组为 TBI 组,C 组为治疗组,使用 BRUKER 70/20USR 小动物磁共振进行相关扫描,其中各组均采集建模前数据 (PRE),并于建模后分别采集 24h、14day、28day 的磁共振

数据, 每只小鼠进行常规 T1 WI、T2 WI、DTI、1H MRS 及 DCE 扫描, 其中波谱成像采用单体素 PRESS 序列, 基本参数为 TR=3000ms, TE=20ms, Averages=512, Flip Angle=90°, 180°, 180°, 体素大小为 1.5×1.5×1.5mm³。通过测量各组中 Cr、CHO、NAA、Lip、Lac、Glu/Gln、Ins 等代谢物平均浓度, 比较组内各时间点及各组之间差异性。DCE 扫描中主要分析 Ktrans、Vp 及 TTP 值。结果: A、B、C 三组互相比, FA 值, CHO、Lac 代谢物浓度, Ktrans 值均有明显统计学差异 (P<0.05); 组内比较时, A 组各时间点之间无统计学差异, B 组各时间点之间均有差异, C 组 24h 与 14day, 28day 比较有显著差异, 14day 与 28day 比较无差异。结论: 弥散成像中 ADC 值越低, 提示病灶周围区水分子弥散受限越重, 而 FA 值的升高则是由于细胞内外水分子分布异常所致。磁共振波谱能直接检测各类代谢物的浓度情况, 并间接反应组织环境, 其中 NAA 含量降低, 反映神经元丢失或能量代谢障碍, Cho 升高反映细胞膜的损伤、降解或胶质细胞增殖, Lac 升高表明有氧代谢障碍或糖酵解增加时其含量明显增加。本研究通过联合 DTI、MRS 及 DCE 检测结果, 可为小鼠颅脑损伤情况及疗效判别提供有效的保障。

PO-2879

MRI 神经-骨融合成像在下颌第三磨牙拔除术中的作用

颜雅兰

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目的: 探讨 MRI 神经-骨融合成像评估下牙槽神经(IAN)/下颌管(MC)与下颌第三磨牙(MTM)关系的可靠性。

材料和方法: 所有受试者均进行了 MRI(序列包括 T2 FFE 和 FRACTURE)和 CBCT 检查。由两名观察者在两种图像上(FRACTURE, CBCT)独立分割 37 个 MC, 随后计算 Hausdorff 距离(HD 值)和 DSC 相似系数比较一致性。在两种融合图像上(MRI-CBCT 融合和 MRI 融合)对 IAN/MC 与 MTM 根之间的关系、炎症和融合模式进行评分。

结果: FRACTURE 序列, 平均 HD 为 0.62 ~ 1.35, 平均 DSC 为 0.83 ~ 0.88; CBCT 平均 HD 为 0.98 ~ 1.50, 平均 DSC 为 0.76 ~ 0.83。与 MRI-CBCT 融合相比, MRI 融合的融合模式的分类 (MRI 融合 $\kappa = 0.694$, MRI-CBCT 融合 $\kappa = 0.644$)、IAN/MC 与 MTM 是否接触的分析都表现良好的再现性 (MRI 融合 $\kappa = 0.729$, MRI-CBCT 融合 $\kappa = 0.720$), 由 MRI 得到的融合图像中 Larger 模式 (代表图像失真或不匹配) 的比例更低 (磨牙区 16.2%VS27.3%, 磨牙后区 2.7%VS5.4%); 炎症检测方面则表现出中等至良好的一致性 (MRI 融合 $\kappa = 0.603$, MRI-CBCT 融合 $\kappa = 0.532$)。结论: MRI 融合成像提供了可靠的术前评估, 并且在 MTM 手术中更实用, 可以替代 MRI-CBCT 融合成像成为高危患者的术前一站式无辐射检查。

PO-2880

动脉期不规则环形强化肝细胞癌的病理学特征及早期复发预后研究

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目的: 探讨钆塞酸二钠增强 MRI 动脉期不规则环形强化肝细胞癌 (IRE-HCC) 的病理学特征及根治切除术后早期复发分析。**方法:** 回顾性收集 2015 年 02 月至 2021 年 09 月在我院就诊且经手术病理证实的 HCC 患者 131 例。依据钆塞酸二钠增强 MRI 动脉期强化方式分为 IRE-HCC 和非 IRE-HCC。比较两组患者的临床、病理及影像资料。采用 Logistic 回归分析与 IRE-HCC 相关的病理学特征。采用 Kaplan-Meier 法评估 HCC 术后 2 年内早期无复发生存率。采用 Cox 回归分析 HCC 术

后早期复发的危险因素。**结果**: 多因素 Logistic 回归分析显示 CK19 (OR 9.027, 95%CI 2.533-32.170, $P=0.001$)、MVI (OR 3.606, 95%CI 1.024-12.701, $P=0.046$) 和 DWI 靶征 (OR 10.370, 95%CI 3.046-35.303, $P=0.001$) 与 IRE-HCC 相关。IRE-HCC 术后 2 年累积无复发生存率 (24.1%) 显著低于非 IRE-HCC (55.9%) ($P<0.05$)。多因素 Cox 回归分析显示 MVI (HR 2.206, 95%CI 1.152-4.226, $P=0.017$) 和动脉期不规则环形强化 (HR 2.454, 95%CI 1.408-4.275, $P=0.002$) 是 HCC 术后早期复发的独立预测指标。**结论**: IRE-HCC 与 CK19、MVI 和 DWI 靶征相关, 且术后早期复发率高、预后差。

PO-2881

基于钆塞酸二钠增强 MRI 构建双表型肝细胞癌的 列线图预测模型

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目的 探讨基于钆塞酸二钠增强 MRI 构建的列线图对术前无创预测双表型肝细胞癌 (DPHCC) 的价值。

方法 回顾性分析 2015 年 1 月至 2020 年 6 月在我院行肝切除的 160 例 HCC 患者临床及影像资料, 根据 DPHCC 免疫组化诊断标准, 分为 DPHCC 组 (80 例) 和非 DPHCC 组 (80 例)。两组间计量参数的比较采用 t 检验或 Mann-Whitney U 检验, 分类参数的比较采用 χ^2 检验。采用单因素和多因素 Logistic 回归分析 DPHCC 发生的独立危险因素, 并构建预测 DPHCC 发生的列线图, 采用 Bootstrap 法对模型效能进行内部验证。

结果 DPHCC 组肿瘤边缘不规则、动脉期环形强化及 DWI 靶环征的比例明显高于非 DPHCC 组, 且 DPHCC 组肝胆期 RIR 值低于非 DPHCC 组, 差异均有统计学意义 ($P<0.05$)。多因素 Logistic 回归分析显示肿瘤边缘不规则、动脉期环形强化和肝胆期 RIR 值较低是预测 DPHCC 发生的独立危险因素。基于多因素 Logistic 回归分析结果和 Youden 指数将患者分为高风险组 (评分 >5.9) 和低风险组 (评分 ≤ 5.9)。列线图模型及内部验证 C-index 均在 0.7~0.9 之间, 列线图 ROC 曲线下面积为 0.723(95% CI: 0.646~0.790)。Hosmer-Lemeshow 检验显示校正曲线拟合度良好 ($P>0.05$), 预测曲线与理想预测曲线具有高度一致性。

结论 基于钆塞酸二钠增强 MRI 构建的列线图, 有助于术前无创性预测 DPHCC。

PO-2882

利用磁共振弥散张量成像评估盘源性腰痛 大鼠椎旁肌肌纤维类型转化

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目的 探究磁共振弥散张量成像 (Diffusion tensor image, DTI) 评估盘源性腰痛 (Discogenic low back pain, DLBP) 大鼠椎旁肌肌纤维类型转化的价值。

方法 将 90 只健康 SD 大鼠在不同时间点 (即第 1, 3, 6 个月) 随机分成正常组、假手术组和 DLBP 组, 共 9 组 ($n=10$ /组)。对大鼠的 L4/5 和 L5/6 椎间盘进行后入路穿刺破坏和假手术, 以建立 DLBP 和假手术模型。首先在造模术后第 1 个月、第 3 个月和第 6 个月对各组大鼠进行行为学测试, 在完成行为学测试后间隔 3 天行 DTI 扫描, 获得大鼠目标椎间盘层面 (L4/5、L5/6) 椎旁肌 (多裂肌、竖

脊肌)的 FA 值、MD 值、本征值(λ_1 、 λ_2 、 λ_3)的改变,最后取椎旁肌行肌纤维的免疫荧光实验,计算椎旁肌的 I/II 型肌纤维占比,使用 Spearman 分析评估 DTI 参数与 I/II 型肌纤维占比的相关性。

结果 造模术后第 3 个月和第 6 个月,与其余两组相比,DLBP 大鼠出现钢丝悬挂试验和抓握试验的掉落时间减少;四肢握力试验的握力下降;力竭游泳试验的力竭时间减少(P 均 <0.05);造模术后 1 月至 6 月,与其余两组相比,DLBP 大鼠目标椎间盘层面椎旁肌的 FA 值逐渐降低,而 MD 值、 λ_3 值逐渐增加(P 均 <0.05),各时间点正常组和假手术组大鼠的 DTI 参数无明显差异($P>0.05$);组织学结果显示造模术后第 3 个月和第 6 个月,DLBP 大鼠目标椎间盘层面的椎旁肌出现 I 型肌纤维占比(I%)减少,而 II 型肌纤维占比(II%)增加;同时 Pearson 相关分析发现 I%与 FA 值呈中度正相关($r=0.409$, $P<0.05$),而与 MD 值($r=-0.280$, $P<0.05$)和 λ_3 值($r=-0.397$, $P<0.05$)呈低度负相关。

结论 MRI-DTI 参数有助于表征 DLBP 大鼠椎旁肌肌纤维类型转化,FA 值可作为检测肌纤维类型改变的无创影像学标记物。

PO-2883

基于表面的形态学测量原发性痛经磁共振脑结构研究

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目的:原发性痛经(Primary dysmenorrhea, PDM)是育龄期最常见的妇科疾病之一。既往研究表明, PDM 患者存在脑结构和功能的异常,本研究旨在探讨 PDM 患者与健康对照(Healthy controls,HCs)患者脑结构网络(Structural brain networks,SBNs)的异常及其协方差模式。**方法:**本研究基于 41 例 PDM 患者和 35 名健康对照(HCs)的 T1 结构像数据,采用基于表面的形态学测量(surface-based morphology,SBM)技术研究 PDM 患者和 HCs 的异常 SBNs。采用多元经典交互线性模型分析 PDM 组与 HCs 组之间协方差模式的差异。**结果:**与 HCs 相比, PDM 患者的 SBNs 包括颞叶网络(主要位于杏仁核、颞极、中颞叶和下颞叶)、默认网络(主要位于后扣带回、楔前叶、海马和海马旁)和丘脑网络存在异常($P<0.001$)。在全脑 SBNs 中,我们还发现 PDM 患者的颞叶网络和丘脑网络之间存在异常的灰质体积(Gray matter volume, GMV)耦合。**结论:**脑结构异常可能与 PDM 相关的疼痛感知和调节障碍有关。此外,本研究发现 PDM 患者颞叶网络和丘脑网络之间的相互作用,希望这项研究结果有助于更好地理解 PDM 患者的病理生理。

PO-2884

MR-T2WI 及增强序列影像组学特征列线图鉴别卵巢囊肿和单房囊腺瘤的应用价值

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目的:利用影像组学的方法将女性盆腔 MR-T2WI 及增强序列的图像信息建立模型并绘制列线图,评价模型及列线图鉴别女性卵巢囊肿与单房囊腺瘤的诊断效能。**方法:**回顾性分析 113 例行盆腔 MRI 平扫及增强扫描并手术证实为卵巢囊肿或囊腺瘤者,共 121 例病灶,基于 T2WI 及增强图像各提取 1316 个、共 2632 个影像组学特征,筛选最佳特征,计算影像组学评分并建立影像组学模型。应用 logistic 回归分析筛选临床相关独立危险因素,建立临床模型,并构建形态学的独立因素联合影像组学评分联合模型,绘制列线图将之可视化。以受试者工作特征(ROC)曲线评估各模型预测囊肿与单房囊腺瘤的效能,以决策曲线分析(DCA)评价联合模型的价值。**结果:**共有 113 例患

者共纳入本研究, 其中卵巢囊肿 49 例, 单房囊腺瘤 72 例。训练集与测试集患者年龄差异无统计学意义 ($P<0.05$)。基于 T2WI、增强扫描 2 个序列的 MRI 上提取影像组学特征, 经特征筛选后得到 6 个关键特征, 并构建影像组学模型, 最终 T2WI 及增强序列各选出 10 个 (共 20 个) 最佳影像组学特征, 联合建立的影像组学模型在训练集患者中预测的曲线下面积 (AUC) 为 0.946, 测试集的 AUC 为 0.927。病变前后径与上下径是鉴别囊肿与单房囊腺瘤的 MRI 影像学独立因素 ($P<0.05$), 与影像组学构建的联合 nomogram 模型训练集 AUC 为 0.955, 测试集 AUC 为 0.942, 高于影像组学模型 ($Z=-3.451$, $P<0.001$)。联合模型在阈值概率 0~1.0 时的临床净获益大于影像组学模型。结论: MR-T2WI 及增强序列联合的影像组学模型对卵巢囊肿与单房囊腺瘤有很高的鉴别诊断能力。

PO-2885

首发未用药青少年抑郁症患者负性生活事件与 大脑海马结构相关性研究

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目的: 抑郁症是影响青少年最严重的心理健康问题。有研究显示青少年抑郁症的最大风险因素是压力暴露, 而海马是脑内应激调控的关键结构, 在压力与抑郁之间起着重要作用。因此, 本研究的目的基于磁共振成像技术探索青少年抑郁症患者海马结构与压力生活事件的相关性, 以期为进一步探索青少年抑郁症的发病机制与制定干预措施提供依据。

方法: 本研究共纳入了 68 例首发未用药青少年抑郁症患者和 43 例健康青少年。采用 24 项汉密尔顿抑郁量表 (HAMD) 和 14 项汉密尔顿焦虑量表 (HAMA) 评估受试者的抑郁和焦虑症状。采用青少年生活事件量表评估受试者应激性生活事件的频率和应激反应强度。基于 FreeSurfer 6.0 计算了海马整体及海马亚区的体积。通过一般线性模型分析抑郁组和对照组在海马整体和亚区体积的组间差异, 并分析海马体积与压力生活事件的相关性。

结果: 与对照组相比, 抑郁组 HAMD、HAMA 得分、青少年生活事件量表各压力因子得分 (包括: 人际关系因子、学习压力因子、受惩罚因子、丧失因子、健康适应因子) 均显著高于对照组, 且 HAMD 的日夜变化因子与青少年生活事件中丧失因子呈明显正相关。未发现抑郁症患者组与健康对照组海马的整体体积及亚区体积有明显组间差异性, 但是本研究发现抑郁症患者组双侧海马-杏仁核过度区 (HATA) 体积与青少年压力事件中人际关系因子、受惩罚因子、健康适应因子得分呈明显负相关; 左侧海马 CA3 体积与学习压力因子得分呈明显负相关, 左侧海马 CA3 和 CA4 体积与丧失因子得分呈明显负相关; 右侧海马裂体积与焦虑症状 HAMA 评分呈明显正相关。

结论: 1. 青少年抑郁症患者存在较高的压力生活事件, 并且这些压力事件与海马的结构存在显著相关性, 这可能在抑郁症的发病机制中起着重要作用。

2. 海马体积的改变是一个慢性过程, 青少年首发未用药患者可能处于疾病的早期, 所以还没有表现出海马体积的改变, 这可能是一个疾病防治的窗口期。

PO-2886

增强 T1 加权流动敏感黑血成像在肺癌脑转移放疗疗效评估的应用研究

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目的：通过在 CE-T1WI FSBB 图像上测量放疗前及放疗后脑转移瘤内肿瘤供血血管数目的变化情况，探讨 CE-T1WI FSBB 序列在肺癌脑转移瘤放疗疗效评估的应用价值。

方法：回顾性分析我院 41 例经临床或病理已证实为脑转移瘤并接受颅脑立体定向放疗联合全脑照射的患者放疗前、后完整的 MR 随访资料。包括 MR 常规扫描，T1WI 增强扫描及 CE-T1WI FSBB 成像。采用双盲法，由两位副高职称及以上的诊断医师分别对常规 MR 图像及 CE-T1WI FSBB 图像进行分析。对治疗前后测量数据进行对比分析及双变量相关性分析。

结果：

1、41 例肺癌脑转移瘤患者中，原发肺癌病理类型包括：腺癌 24 例（58.5%），鳞癌 5 例（12.2%），小细胞癌 12 例（29.3%）；均为脑实质转移，其中 13 例（31.7%）单发，另外 28 例（68.3%）多发。41 例肺癌脑转移瘤患者，所有序列共计检出 290 个病灶，常规 MR 平扫共检出 123 个病灶，常规 T1WI 增强扫描共检出 223 个病灶，CE-T1WI FSBB 检出 286 个病灶。常规 MR 检查检测出 12 个出血病灶，CE-T1WI FSBB 检测出 43 个出血病灶。

2、41 例患者被纳入疗效研究的 286 个病灶在放疗前 CE-T1WI FSBB 序列图像可以发现肿瘤新生血管及少量出血，放疗后复查时在 CE-T1WI FSBB 序列图像可发现血管数目减少且肿瘤体积缩小。

结论

1、CE-T1WI FSBB 对于脑转移瘤的显示具有较高的检出敏感性，并在肺癌脑转移瘤内肿瘤新生血管及出血显示方面具有一定优势。与常规的 MR 成像序列相比，CE-T1WI FSBB 能够在肺癌脑转移瘤的影像诊断中提供更多传统 MR 无法显示的信息。

2、CE-T1WI FSBB 能够测定脑转移瘤放疗前、后瘤内新生血管数目变化情况，为评估肺癌脑转移瘤放疗疗效及临床治疗方案的优化提供更可靠依据。

PO-2887

伴有抑郁症状的肠易激综合征患者前扣带回皮层亚区的静息态功能连接异常模式研究

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目的：肠易激综合征（IBS）是常见的脑-肠互动异常疾病，与抑郁症有较高的共病率。然而，两者共病的神经机制尚不清楚。前扣带回（ACC）萎缩和高活跃性是 IBS 及其伴发情绪障碍的关键驱动因素，且其不同亚区在认知加工、情绪和疼痛调节过程中发挥的功能各异。本研究采用静息态 fMRI 观察 IBS 伴抑郁症状（DEP-IBS）患者 ACC 亚区的功能连接（FC）模式，探讨 IBS 共病抑郁的潜在神经机制。

方法：对 28 例 DEP-IBS 患者、21 例 IBS 不伴抑郁症状（nDEP-IBS）患者和 36 例相匹配的健康被试（HC）分别以膝前扣带回（pgACC）和前中扣带回（aMCC，即背侧 ACC）为种子点进行全脑 FC 分析。采用单因素协方差分析和事后 t 检验比较三组 FC 的差异，并将患者异常的 FC 值与临床症状进行偏相关和中介分析，进一步绘制受试者工作特征曲线分析异常 FC 值对 IBS 及其共病抑郁的评估价值。

结果：与 nDEP-IBS 组相比，DEP-IBS 组存在 pgACC 与左内侧前额叶间的 FC 增强，aMCC 与右侧小脑、额中回和角回间的 FC 增强、与右侧楔前叶、顶上回和中央前回间的 FC 减弱。与 HC 相比，两患者组均存在 aMCC 与左背外侧前额叶间 FC 增加和 pgACC 与左顶上回间 FC 减少，其中前者可有效区分 IBS 患者和 HC (AUC=0.755)。此外，DEP-IBS 组还存在 aMCC 与右顶上回的 FC 减少。偏相关分析显示 IBS 患者部分异常的 FC 值与胃肠道和/或抑郁症状显著相关。特别地，pgACC 与内侧前额叶的 FC 值在胃肠道症状与抑郁评分的相关性中起部分中介效应，并可有效区分 DEP-IBS 和 nDEP-IBS 患者 (AUC=0.808)。

结论：ACC 不同亚区在是否伴抑郁症状的 IBS 患者中表现出不同的全脑连接模式。突显网络与执行网络间 FC 的异常可能是 IBS 潜在的神经机制。特别地，情绪唤醒网络内部 FC 的紊乱可能是 IBS 共病抑郁的特征性神经生物学标记。

PO-2888

心脏磁共振组织追踪技术定量分析肥厚型 心肌病左心室心肌应变的应用研究

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目的：探讨心脏磁共振组织追踪技术 (CMR-TT) 定量分析肥厚型心肌病 (HCM) 患者左心室心肌应变及诊断价值。

方法：本研究纳入 25 例患者 (病例组) 及 11 名健康志愿者 (对照组) 行心脏磁共振电影检查。比较两组间左心室舒张末期容积 (LVEDV)、收缩末期容积 (LVESV)、每搏输出量 (SV)、左心室射血分数 (LVEF)、左心室质量 (LVMASS) 及左心室心肌整体径向应变 (GRS)、周向应变 (GCS)、纵向应变 (GLS) 及收缩期应变率及峰值位移的差异。采用独立样本 t 检验、Pearson 相关性分析、ROC 曲线评价心肌应变指标诊断 HCM 的检验效能，做统计学分析。

结果：HCM 与对照组 LVEF、LVEDV、LVESV、SV 差异均无统计学意义 (P 均>0.05)；HCM LVMASS 高于对照组 (123.1±35.6 VS 92.18±9.84g)，差异有统计学意义 (P 均<0.05)；HCM 组左心室 GRS、GCS、GLS 与对照组分别为 (30.09±6.36 VS 35.96±4.01)% 和 (-18.37±2.43 VS -20.21±1.38)% 和 (-13.58±3.53 VS -17.33±1.7)% 均低于对照组，差异有统计学意义 (P 均<0.05)；HCM 组 GRS、GCS、GLS 收缩期应变率及峰值位移也较对照组降低。HCM 患者整体 GRS、GCS、GLS 与 LVEDV、LVESV、SV、LVEF 间无相关性，P 均>0.05；HCM 与对照组整体 GLS、GCS、GRS 的 ROC 曲线下面积分别为：(AUC=0.83、0.78、0.75，P 均<0.05)。

结论：CMR-TT 技术能够早期敏感地发现 HCM 患者的心肌应变功能异常，在射血分数 (LVEF) 正常而左心室心肌整体应变降低，提示心肌应力比 LVEF 能更早地反映心功能受损，对 HCM 具有较大诊断价值。

PO-2889

基于 HR-VWI 的影像组学和机器学习识别基底 动脉粥样硬化高危斑块

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目的：基于高分辨率血管壁成像 (HR-VWI)，利用影像组学特征识别基底动脉粥样硬化高危斑块。

方法: 本研究回顾性收集 54 例完成 HR-VWI 扫描的基底动脉狭窄患者, 按 8:2 的比例分为训练组和验证组。选择每例患者的 HR-VWI 中显示基底动脉斑块的轴位图像进行斑块手动分割 (采用开源软件 ITK-SNAP, 版本 3.8.0, www.itk-snap.org) 和影像组学特征提取 (Onekey AI), 采用最小绝对收缩和选择 (LASSO) -Logistic 回归算法及 10 倍交叉验证筛选相关影像组学特征。结合筛选特征, 应用所选特征建立预测模型, 包括支持向量机 (SVM)、k 近邻 (KNN)、逻辑回归 (LR)、决策树 (DT)、随机森林 (RF) 和 XGBoost, 以预测不稳定斑块。最后, 对六个模型的准确度进行比较。

结果: 训练组 43 例, 验证组 11 例。在 54 例患者中, 有 28 个稳定斑块和 26 个不稳定斑块。LASSO 回归后, 从斑块中定量提取了 108 个影像组学特征, 包括 GLSZM 和 GLDM 2 个特征。在六个机器学习模型中, SVM 和 KNN 的准确率超过 65%, 是所有模型中最好的。KNN 模型中训练组和验证组的 ROC 曲线下面积分别为 0.763 和 0.667。SVM 模型中训练组和验证组的 ROC 曲线下面积分别为 0.713 和 0.867。SVM 具有最佳性能。

结论: 基于 HR-VWI, 我们使用影像组学和机器学习算法建立了六个预测模型, 用于基底动脉粥样硬化斑块的稳定性预测。其中, SVM 模型表现最好, 有助于预测基底动脉粥样硬化斑块的稳定性, 为临床干预提供参考。

PO-2890

高分辨弥散加权成像 (RESOLVE) 对直肠肿瘤成像的探究

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目的探讨轴位 T2 加权图像结合高分辨弥散加权成像 (RESOLVE) 对直肠肿瘤的显示。

方法运用西门子 3.0T 磁共振 (MAGNETOM Trio, 32 通道心脏线圈) 对 20 例直肠癌患者 (12 名男性, 8 名女性, 39 岁~78 岁, 平均年龄 45 岁) 检查前使用开塞露排空肠道并注射 654-2 减缓肠道蠕动。对每个病人行 T2 矢状位 (层厚 2mm 且与肠道长轴平行)、冠状位 (层厚 2mm 且与病变肠道长轴平行)、轴位 (层厚 3mm 且与病变肠道垂直且包全盆腔) 高分辨及 RESOLVE (与轴位同层且包全盆腔) 磁共振普通扫描。

由两名高年资医生对轴位 T2 加权图像和 RESOLVE 图像进行评价, 对相同层面的轴位 T2 加权图像和 RESOLVE 图像显示的直肠肿瘤进行比较, 比较轴位 T2 加权图像和 RESOLVE 图像对直肠肿瘤的显示效果。

结果 T2 加权成像对肿瘤与纤维的区分良好, 对肿瘤周围结构显示清楚, 显示的结构多成分复杂, 肿瘤边界与周围组织的关系不易区分。高分辨弥散加权成像 (RESOLVE) 获得了良好的组织对比度, 能很好的限定肿瘤内部的结构, 对直肠肿瘤的形态、大小、边界及组织密度显示清楚, 几乎没有呼吸运动伪影影响, 结合 ADC 值可以进一步对肿瘤的良恶性进行预判。

结论高分辨弥散加权成像 (RESOLVE) 对直肠肿瘤的成像可以弥补轴位 T2 加权图像的不足, 获取更多的影像信息, 提供更佳准确的诊断信息。

PO-2891

对 200 例重庆地区多发性硬化临床和常规磁共振影像表现

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目的: 总结重庆地区多发性硬化 (MS) 的临床和常规磁共振成像 (MRI) 特征

研究对象: 收集资料完整的 200 例 MS 确诊患者, 回顾性分析其临床和 MRI 表现及与临床残疾状态功能评分

检测方法: 患者接受脑部的 MRI 扫描, 采用 GE 3.0TMR/i 磁共振成像系统, 按照国际 MS 学会制定的序列进行扫描:

(1) 脑部 MRI: 双回波质子密度 (Proton density, PD)PD/T2WI 成像, TR/TE1/TE2=2900ms/25ms/93ms, 矩阵= 256×192; 横断面和矢状面液体衰减反转恢复 (Fluid-attenuated inversion recovery, FLAIR)序列, TR/TE= 8000ms/120ms, 矩阵 256×160; 横断面 T1FLAIR 成像, 所有层厚 4mm 无间隔扫描, FOV= 24cm×24cm。

(2) 增强检查: 110 例急性期的患者均作钆喷酸葡胺增强检查, 对比剂 15~20ml 经肘静脉 3ml/s 的速度注射, 增强检查的层厚和间距与平扫 T1FLAIR 参数相同。

数据处理: 由一位经验丰富的神经科医师在 MRI 扫描前对所有患者进行 EDSS 评分, MRI 检查在随后 1d 内进行, 分析 MS 患者脑部和脊髓影像学特点以及与 EDSS 评分的相关性。

方法: 收集资料完整的 200 例 MS 确诊患者, 回顾性分析其临床和 MRI 表现及与临床残疾状态功能评分 (EDSS) 的相关性, 以提高对本病的诊断水平。

结果 (1) 常见症状及诱因: 肢体无力为最常见的症状(54.5%), 上呼吸道感染为主要诱因 (34.0%)。

(2) 病灶分布: 仅脑部受累 68 例(34.0%), 仅脊髓受累 34 例(17.0%), 脑和脊髓均受累 21 例 (10.5%), 两者 EDSS 评分有统计学差异($P < 0.05$)。

结论: 重庆地区 MS 患者以女性为多, 发病以 20-40 岁为主, 复发-缓解型最多, MRI 影像随访有利于 MS 的诊断和监测病灶的发展。

PO-2892

睡眠剥夺实验对小鼠类淋巴系统 DTI-ALPS 指数的影响

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目的: 睡眠是调节淋巴系统活动的重要因素, 而失眠是最常见的睡眠障碍之一。然而, 我们目前对于失眠在小鼠类淋巴系统影响了解有限。因此我们利用磁共振成像 (MRI) 中沿血管周围空间 (ALPS) 指数上的扩散张量成像 (DTI) 评估了睡眠剥夺小鼠的淋巴系统活动是否有异常。通过评估失眠对 DTI-ALPS 指数的影响, 来探究中枢神经淋巴调节的机制在睡眠中的作用与影响。

方法: 本研究选择雄性 C57BL/6 小鼠共 20 只作为实验对象, 随机将其分为失眠组和对照组。失眠组小鼠采用了改良多平台睡眠剥夺法 (MMPM), 将 10 只小鼠同时放置在 14 或 15 个小平台的水槽中进行实验。失眠组小鼠经历连续 72 小时的睡眠剥夺, 并在此后进行 24 小时的恢复睡眠。对照组小鼠则保持正常的睡眠模式。随后, 采用磁共振成像 (MRI) 技术进行扩散张量成像 (DTI) 扫描, DTI 采集参数如下: 重复时间 (TR)=7300ms, 回波时间 (TE) =72ms, FOV=64mX64mm, 矩阵=128*128, 层厚 1mm, 无层间距, 共扫描 12 层, 梯度方向 60, b 值设置为 b=0, 1000, 图像扫描时间为 23 分 20 秒。将扫描数据利用 FSL 软件计算得出 FA, Dx, Dz, Dy 等参数值, 之后使用 ImageJ 开源图像处理工具 (<https://imagej.nih.gov>), 计算 ALPS 指数来评估类淋巴系统的功能, 并利用独立样本 T 检验的方法比较失眠组和对照组小鼠的 DTI-ALPS 指数。

结果: 与对照组相比, 失眠组小鼠的 DTI-ALPS 指数显著降低 ($p < 0.05$), 存在统计学差异。这表明失眠对小鼠淋巴系统活动产生了负面影响, 导致 DTI-ALPS 指数的降低。

结论: 本研究结果表明, 失眠可能通过干扰小鼠的淋巴系统功能来影响 DTI-ALPS 指数。淋巴系统在清除废物和代谢产物方面起着重要作用, 而失眠可能干扰这一清除过程, 导致 DTI-ALPS 指数的降低。

PO-2893

MR 弹性成像与超声实时剪切波弹性成像 评估兔肝纤维化的对比研究

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目的 比较 MR 弹性成像 (MRE) 与超声实时剪切波弹性成像 (SWE) 评估兔肝纤维化的价值。

方法 2020 年 3 月至 11 月间选取 200 只健康新西兰大白兔采用随机数表法随机分为对照组 (40 只) 和肝纤维化组 (160 只)。肝纤维化组实验兔皮下注射 50%CCl₄ 油溶液。第 1~3 周剂量为 0.1ml/kg/周; 第 4~6 周剂量为 0.2ml/kg/周; 第 7~16 周每周注射 2 次, 剂量为 0.1ml/kg。对照组皮下注射等剂量生理盐水。肝纤维化组及对照组在第 4、8、12、16 周末分别随机选取 40、10 只进行 MRE 和 SWE 检查, 分别获得肝脏弹性硬度值 (LS), 记为 LSMRE、LSSWE。实验兔检查结束后处死取肝组织进行病理学 Scheuer 纤维化分期, 分为 F0~F4 组。采用单因素方差分析评价不同肝纤维化分期间 LSMRE、LSSWE 的差异; LS 值与病理分期的相关性分析采用 Spearman 法; ROC 曲线评价 LSMRE、LSSWE 诊断肝纤维化分期的效能, AUC 的比较采用 Z 检验。

结果 共 162 只实验兔纳入研究, 不同肝纤维化分期间 LSMRE、LSSWE 总体差异均有统计学意义 ($F=295.29$ 、 102.40 , P 均 <0.001)。LSMRE、LSSWE 与肝纤维化分期均呈正相关 ($r=0.93$ 、 0.81 , P 均 <0.001)。LSMRE 诊断肝纤维化分期 $\geq F1$ 、 $\geq F2$ 的 AUC 高于 LSSWE ($Z=2.93$ 、 3.29 , $P=0.003$ 、 0.001), 诊断 $\geq F3$ 、 $\geq F4$ 的 AUC 差异无统计学意义 ($Z=1.58$ 、 1.68 , $P=0.115$ 、 0.093)。

结论 MRE 及 SWE 技术均能较为准确地预测实验兔肝纤维化分期, MRE 诊断早期肝纤维化的效能优于 SWE。

PO-2894

基于瘤内与瘤周影像组学的子宫内膜癌微卫星不稳定性预测

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目的: 微卫星不稳定性 (MSI) 与子宫内膜癌 (EC) 的发生、发展及预后相关, 术前确认 MSI 状态可能有助于治疗决策。因此本研究提取 EC 病灶的多参数 MRI 瘤内及瘤周图像特征, 建立瘤内与瘤周特征的最佳联合模型, 预测 EC 患者的 MSI 状态。

材料与方法: 本研究回顾性收集 131 例经病理确诊的 EC 患者 MRI 横轴位 T2WI-FS 及 DWI 图像, 根据患者微卫星稳定情况将患者分为 MSI 组 ($n=30$) 和 MSS ($n=101$), 收集患者影像学及临床病理资料, 人工标注病灶瘤内及瘤周 (3mm) VOI, 使用逻辑回归分类模型对预测模型进行训练。在训练组及验证组中采用受试者特征曲线下面积 (AUC) 来评估不同模型性能。

结果: 在训练集中, MSI 组和 MSS 组之间在年龄、FIGO 分期、病理类型等方面具有统计学差异 ($P<0.05$)。联合模型包括 T2-FS 瘤内、瘤周及 DWI 瘤内、瘤周提取出的 8 个特征, 该联合模型在预测 MSI 状态方面显著优于单一参数模型 ($P<0.00$, 训练集和测试集的 AUC 分别为 0.89 和 0.85)。

结论: 本研究建立了瘤内与瘤周影像特征的联合模型, 可准确无创预测子宫内膜癌 MSI 状态, 为临床提供个体化的精准治疗策略选择。

PO-2895

基于磁共振的孕晚期前置胎盘数字三维模型临床应用的研究

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【摘要】目的：评估一种用于确定前置胎盘患者剖宫产期间子宫切口位置、胎盘位置的新型三维（3D）磁共振成像（MRI）模型的临床应用价值。方法：纳入 2019 年 01 月 01 日至 2023 年 06 月 01 日期间在喀什地区第一人民医院剖宫产分娩的单胎妊娠并发前置胎盘的妇女进行前瞻性研究。所有患者均接受常规盆腔 MRI 检查，根据患者知情同意分研究组和对照组，研究组患者的 MRI 图像导入开源软件 3D Slicer 并构建子宫、胎盘 3D 模型。收集产妇一般资料、手术记录及新生儿 1 分钟、5 分钟 Apgar 分数。结果：在入组的 71 例女性中，研究组 40 例，对照组 31 例。与对照组相比，试验组手术时间（ 58.63 ± 4.33 分钟）较对照组（ 61.42 ± 6.67 ）明显缩短（ $P=0.036$ ）；试验组术中失血量（ 885.00 （ $800.00, 965.00$ ））较对照组少 960.00 （ $800.00, 1300.00$ ）（ $P=0.045$ ）；试验组住院天数 6.00 （ $6.00, 7.00$ ）较对照组 7.00 （ $6.00, 7.00$ ）短（ $P=0.023$ ）；试验组婴儿 1 分钟 Apgar 评分小于 7 的新生儿较对照组明显低（ $P=0.022$ ）。结论：3D MRI 模型引导的子宫切口可以明显缩短手术时间，减少术中失血量，缩短住院天数，提高婴儿 1 分钟 Apgar 评分。

PO-2896

基于脂肪抑制 T2 mapping-T2 弛豫时间的不同测量方法评价轻度甲状腺相关眼病活动性的研究

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目的：在有和无脂肪抑制(fat suppression, FS)T2 mapping 上比较眼外肌(extraocular muscles, EOMs)的 T2 弛豫时间(T2 relaxation time, T2RT)，以评估轻度甲状腺相关眼病(thyroid-associated ophthalmopathy, TAO)的活动性。

方法：回顾性分析 2020 年 5 月至 2022 年 10 月间连续就诊的 44 例轻度 TAO 患者，以及 26 例无眼部或甲状腺相关或其他自身免疫性疾病史的健康者。轻度 TAO 患者根据其临床活动评分分为活动组和非活动组。分析有和无 FS 的 T2 mapping 图像上 EOMs 的影像学特征，并在大（在冠状切面上沿 EOMs 边缘）和小（以 EOMs 上 T2 信号最高处为中心，范围约 2mm^2 ）的感兴趣区域上测量每个 EOM 的 T2RT。采用受试者工作特征曲线评估(receiver operating characteristic, ROC)检测 T2RT 对轻度 TAO 活性的诊断效能。

结果：T2RT 在活动组显著高于非活动组和对照组($P<0.05$)。FS-T2 mapping 图像较无 FS 的更好显示 EOMs 内部和边缘信号特征，并观察到部分 EOMs 周围高信号聚集及中央呈相对低信号。在有和无 FS 的小区域或大区域中测量的最大 T2RT 对 TAO 活动具有良好的诊断功效，其中无 FS 的诊断效能更好(在无 FS 的小区域和大区域中测量的最大 T2RT 的 ROC 曲线下面积分别为 1.0 和 1.0， P 值为 <0.001 和 <0.001)。

结论：使用频率预饱和和反转恢复的 T2mapping 很好地反映 EOMs 炎性水肿的病理生理学特征。有或无 FS 的 T2 mapping 均可辅助临床对轻度 TAO 进行活动性分期，为临床诊断和治疗提供依据。

PO-2897

脊髓小脑共济失调三型患者神经影像功能网络的研究

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目的：本研究的主要目标是利用图论理论，结合静息态功能磁共振成像（Rs-fMRI）和脑网络分析（BNA）方法，深入研究脊髓小脑共济失调三型（SCA3）患者的脑功能网络变化。通过揭示其神经系统病理学机制，为 SCA3 的临床诊断和治疗提供理论依据。

材料和方法：研究纳入了 52 名 SCA3 患者和 55 名健康志愿者作为对照组。所有参与者都完成了结构磁共振成像（3D-MPRAGE）和静息态功能磁共振成像（Rs-fMRI）的数据采集。所获数据经过 Gretna 软件（基于 Matlab 编程）处理，采用偏相关系数 T 检验比较了两组受试者在所有脑区的节点效率，以明确 SCA3 患者组节点效率和脑网络中枢（Hub）的异常情况。选取显著差异脑区作为目标，进一步研究了异常功能连接值与临床数据及行为学量表评分之间的关系。

结果：相对于健康志愿者，SCA3 患者的脑功能网络呈现出 Hub 节点重新分布的现象。这些 Hub 节点主要分布在额叶、边缘系统、枕叶和颞叶等区域，然而，顶叶和小脑等脑区的 Hub 节点数量明显减少。另外，在 SCA3 患者中，左侧楔前叶和左侧颞下回的节点效率降低，而右侧豆状核和左侧颞中回的节点效率升高。进一步的静息态功能连接分析揭示，SCA3 患者的脑区间存在多个功能连接发生显著改变，这些变化与患者的共济失调、认知功能、情绪状况和基因重复次数等方面表现出显著负相关或正相关。

结论：通过采用静息态功能磁共振和脑网络分析，本研究深入阐明了罕见疾病 SCA3 患者脑功能网络的异常变化。SCA3 患者主要表现出口语、认知功能、情绪、姿势和步态功能方面的障碍，然而短时记忆方面未见明显异常。临床行为学变化与多个脑区间功能连接异常之间呈紧密相关，为进一步的临床诊疗提供了全新视角和可能性。这项研究为 SCA3 的神经基础研究和临床干预提供了重要的参考，有助于更好地理解 and 应对这一罕见疾病。

PO-2898

心血管磁共振成像技术在急性 ST 段抬高型心肌梗死患者经皮冠状动脉介入治疗后心肌内出血中的研究进展

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摘要：心肌内出血是急性 ST 段抬高型心肌梗死（STEMI）患者行经皮冠状动脉介入治疗（PCI）后的常见也是较为严重的并发症，与不良预后和不良心室重构息息相关。而且心肌内出血（IMH）的评估已经成为急性 STEMI 患者 PCI 后疗效评价的重要辅助手段。本文的目的是对心血管磁共振成像在急性 STEMI 患者 PCI 后心肌内出血中的诊断技术以及发展方向进行综述。

Abstract:

Intramyocardial hemorrhage is the common complication of percutaneous coronary intervention (PCI). And it is closely related to poor prognosis and adverse ventricular remodeling. In addition to that, the estimation of intramyocardial hemorrhage is the important auxiliary method for evaluating the effect of the PCI and instructing the drugs therapy. The purpose of this article is to review the diagnostic technology and development direction of cardiac magnetic resonance in intramyocardial hemorrhage after PCI.

关键词：心脏磁共振；心肌内出血；T1 mapping；T2 mapping；T2* mapping

PO-2899

基于心血管磁共振技术评估心肌梗死研究进展

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摘要：心肌梗死是一种由于冠状动脉内斑块形成导致心肌细胞内缺氧而造成损伤的疾病，心血管磁共振成像技术的应用越来越广泛，本文的目的是综述心血管磁共振技术在心肌梗死诊断和评估中的应用进展。

Abstract: Myocardial infarction is a disease caused by hypoxia in myocardial cells caused by the formation of plaque in the coronary arteries. The application of cardiovascular magnetic resonance imaging is becoming more and more extensive, The purpose of this paper is to review the application progress of cardiovascular magnetic resonance in the diagnosis and evaluation of myocardial infarction.

PO-2900

基于连边分析研究针刺对膝骨性关节炎患者脑功能连接的影响

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目的：探讨针刺治疗膝骨性关节炎（KOA）后患者静息态脑功能连接的变化，为临床针刺治疗 KOA 提供神经影像依据。方法：纳入 KOA 患者 25 例进行为期 3 周的针刺治疗，取犊鼻穴、血海、阳陵泉、足三里、三阴交、内膝眼、梁丘组穴配伍，每周 5 次，每次 30 分钟。采集 KOA 患者针刺前后的视觉模拟量表（VAS）、膝关节功能评分表（KSS）和头颅静息态功能 MRI（rs-fMRI）数据，应用连边分析方法描述 KOA 患者针刺后各脑区间功能连接（FC）的改变，并与临床评分作相关性分析。结果：针刺治疗后，KOA 患者 VAS 评分显著降低、KSS 评分显著升高（ P 均 <0.001 ）。连边分析显示，KOA 患者针刺后右侧眶部额下回与左侧梭状回，右侧角回与左侧楔前叶、右侧中央前回，左侧岛盖部额下回与左侧丘脑，左侧中央后回与右侧角回、右侧颞上回的 FC 增强（ P 均 <0.001 ）；相关性分析发现，右侧角回与右侧中央前回（ $r=0.540$ ， $P=0.008$ ）、左侧中央后回与右侧颞上回（ $r=0.654$ ， $P=0.001$ ）的 FC 变化与 VAS 变化呈正相关。结论：针刺可能通过正激活部分脑区间的功能连接，加强中枢镇痛区域间的联系来缓解 KOA 患者疼痛、改善膝关节运动障碍，这些脑区主要分布于默认模式网络、感觉运动网络、扣带岛盖网络。

PO-2901

评估辐射诱导的轴突运输功能障碍：MRI 嗅觉通路成像

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目的：探究经鼻 Mn⁺ MRI 成像在评估放射性脑损伤（RIBI）后轴突运输（AT）功能障碍中的价值。方法：本研究选取了 30 只 6-8 周龄的雄性 SD 大鼠，随机分为对照组（control 组， $n=15$ ）和照射组（IR 组， $n=15$ ）。IR 组接受全脑照射，其余部位使用铅板遮挡，总剂量 30Gy，分 2 次间隔 5 天完成，以模拟 RIBI，对照组则接受假照射。照射后 8 周，评估大鼠的觅食行为，第 10 周时使用 MnCl₂ 经鼻孔注入大鼠体内，进行 MRI 检查，观察嗅觉通路的成像情况。通过 Western blotting 检

测运动蛋白和与能量代谢相关的蛋白以及 AT 的表达水平, 并利用透射子显微镜对大脑超微结构进行分析。

结果: 研究结果显示, 与对照组相比, IR 组大鼠的觅食能力下降, 且觅食时间明显延长 ($P<0.05$)。嗅球中 Mn^{2+} 的摄取量在 IR 组中明显降低 ($P<0.05$)。IR 组大鼠嗅束外侧核的 AT 率和跨突触的 AT 率均明显低于对照组 ($P<0.05$)。Western blotting 结果显示, IR 组大鼠的运动蛋白 Kinesin-1 和胞浆动力蛋白水平明显降低 ($P<0.05$), 脑内能量代谢相关蛋白 ATPB 和 COX-IV 的表达也显著低于对照组 ($P<0.05$)。此外, 在 IR 组观察到了细胞凋亡和与突触相关的损伤。

结论: 嗅觉通路的 MRI 成像在评估 RIBI 模型中的轴突运输功能障碍方面具有一定的可行性。辐射引起的 AT 缺陷可能是由于运动蛋白水平的下降、神经元凋亡、突触损伤和能量代谢障碍所致, 需进一步深入研究了解这些机制, 并为放射性脑损伤的治疗和预防提供有力的依据。

PO-2902

基于 3.0T HRMR-VWI 技术对颅内动脉粥样硬化斑块与缺血性脑卒中的研究

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目的: 本研究基于 3.0T HRMR-VWI 技术, 探究缺血性脑卒中患者责任区与非责任区斑块特点、脑梗死面积与斑块特征相关性。

方法: 收集本院 62 例符合要求的缺血性脑卒中患者均行多模态磁共振头颅扫描 (HRMR-VWI、DWI 及常规 MR 序列)。在 3D T1 CUBE 重建图像上运用 AW 4.6 工作站测量软件获取斑块信号强度, 并对每位患者正常丘脑画感兴趣区测量其信号强度; 然后勾画患者涉及责任区血管狭窄最严重处斑块, 测量其面积、厚度、长度及信号强度。在 DWI 图像上通过 PACS 工作站测量软件画感兴趣区逐层累加计算梗死区面积。统计学采用 IBM SPSS 23.0 进行数据分析。

结果: 1. 62 例患者共 343 处斑块, 其中责任区斑块 131 处, 非责任区斑块 212 处, 两组斑块标准化 T1 信号强度比值及斑块易损性均存在统计学差异 ($P<0.01$), 两组斑块易损性和标准化 T1 信号强度比值曲线下面积为 0.866、0.953, 95% CI 为 (0.834-0.918, 0.925-0.981)。2. 28 例急性脑梗死患者梗死面积单因素相关分析显示: 梗死面积与斑块面积、厚度、长度、负荷及数目存在正相关 ($r=0.572$ 、 $p=0.002$, $r=0.571$ 、 $p=0.002$, $r=0.739$ 、 $p<0.001$, $r=0.412$ 、 $p=0.030$, $r=0.521$ 、 $p=0.005$), 与重构指数、血管狭窄率不存在相关性 ($r=0.226$ 、 $p=0.246$, $r=0.219$ 、 $p=0.264$)。多元逐步线性回归分析结果显示只有斑块长度与梗死面积存在正相关性 ($r=0.879$, $t=3.082$, $p=0.006$, 95% CI 37.817 -196.266), 其余变量无相关性, $R^2=0.288$ 。

结论: 基于 3.0T HRMR-VWI 技术, 对斑块与缺血性脑卒中事件的相关性研究发现, 责任区斑块标准化 T1 信号强度比值高且易损斑块多, 脑梗死面积与斑块长度存在正相关性。

PO-2903

DCE-MRI 及高 b 值 DWI 在前列腺癌及前列腺增生鉴别诊断中的应用价值

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目的: 探讨磁共振动态增强扫描 (DCE-MRI) 及高 b 值弥散功能成像 (DWI) 在前列腺癌及前列腺良性增生病例中的影像表现及鉴别诊断中的应用价值。方法: 经病理证实的前列腺癌 30 例及前列

腺良性增生 38 例, 年龄 57-86, 采用同一磁共振扫描仪行轴位 T1WI 及 T2WI、T2WI 脂肪抑制, 冠状位 T2WI 脂肪抑制及矢状位 T2WI 扫描, 横轴位高 b 值 (1400s/mm^2) 弥散加权成像, 行轴位动态增强扫描及轴位、冠状位、矢状位延迟扫描, 造影剂使用钆喷酸葡胺, 确定感兴趣区后绘制病灶信号强度-时间曲线 (SI-T 曲线), 观察曲线形态、分类, 并对前列腺癌及前列腺良性增生动态曲线的峰值时间、强化程度, 并测量各感兴趣区开始时间、最大信号强度及早期强化率等半定量参数及 Ktrans、Ve、Kep 等定量参数, DWI 信号强度 (SI)、表观扩散系数值 (ADC), 进行统计学分析。结果: 动态增强前列腺癌及前列腺增生强化程度高于正常前列腺组织, 延迟扫描可见正常前列腺组织强化明显, 病灶强化程度下降。SI-T 曲线: 30 例前列腺癌 4 例表现为 I 型, 8 例表现为 II 型, 18 例表现为 III 型; 38 例前列腺良性增生 20 例表现为 I 型, 15 例表现为 II 型, 3 例表现为 III 型, 两组病例 SI-T 曲线的峰值时间及强化程度均有明显差异 ($P<0.05$), 前列腺癌的 SI-T 曲线峰值时间明显早于前列腺良性增生, 强化程度也明显高于前列腺良性增生。前列腺癌 MRI 动态增强的早期强化参数开始时间、最大信号强度及早期强化率与前列腺良性增生不同 (P 分别为 <0.01 、 0.01 、 0.05), 但两者之间有部分重叠, 定量分析参数 Ktrans、Ve、Kep 在两组间差别均有统计学意义。前列腺癌 SI 高于前列腺良性增生, ADC 低于前列腺良性增生 ($P<0.05$)。结论: 磁共振动态增强及高 b 值 DWI 在前列腺癌及前列腺良性增生的鉴别诊断中诊断效能较好, 有助于提高临床诊断准确率。

PO-2904

基于 MRI 影像组学对原发性下肢淋巴水肿临床分期评估的研究

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目的 探索基于 MRI 影像组学模型对评估原发性下肢淋巴水肿(primary lower extremity lymphedema, PLEL)分期的价值。方法 回顾性收集 132 例就诊于首都医科大学附属北京世纪坛医院的单侧 PLEL 患者, 依据 2020 年国际淋巴协会(International Society of Lymphology, ISL)淋巴水肿临床分期标准将患者分为 I、II、III 期, 其中 45 名患者 I 期, 51 名患者 II 期, 36 名患者 III 期。将 STIR 序列原始图像导入深睿多模态科研平台, 手动勾画感兴趣区(region of interest, ROI), 并提取影像组学特征 1743 个。采用相关性分析及 F Test 算法筛选特征, 采用 Logistic 回归分类器分别建立 I 期与 II 期、II 期与 III 期的分类模型, 使用受试者工作特性(receiver operator characteristic, ROC)曲线评价模型的性能。使用决策曲线(decision curve analysis, DCA)来评估模型的临床实用性。结果 I 期 vs II 期, 共筛选出 10 个特征用于建模: 训练集 AUC 值为 0.935 (0.886-0.983), 验证集 AUC 值为 0.917(0.858-0.975); II 期 vs III 期, 共筛选出 10 个特征用于建模: 训练集 AUC 值为 0.838 (0.749-0.927), 验证集 AUC 值为 0.760(0.654-0.866)。DCA 曲线验证了影像组学模型鉴别 PLEL 临床分期的临床实用性。结论 基于下肢 MRI 建立的影像组学模型可准确进行 PLEL 分期, 评估其严重程度。

PO-2905

MRI 在原发性下肢淋巴水肿分期中的价值

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目的 探讨原发性下肢淋巴水肿(lower extremity lymphedema, LEL)不同临床分期的 MR 表现。资料与方法 回顾性分析 228 例原发性淋巴水肿病例, 均行 MR 检查, 扫描序列为短时反转恢复序列 (Short Time Inversion Recovery, STIR)。观察患肢的 MR 表现, 参考 2020 年国际淋巴协会(International Society of Lymphology, ISL)临床分期标准, 将患者分为 I、II、III 期, 记录各期淋巴

水肿累及范围（纵向及横向）以及 MR 表现的出现频次，包括有无皮肤增厚、皮下脂肪层的水肿形态（网格征、蜂窝征、平行线征、条带征、新月征、淋巴湖），采用卡方检验比较不同临床分期下 MR 表现的频次差异。采用 Spearman 检验评估水肿范围与临床分期的相关性。

结果 三期之间水肿范围（纵向及横向）、皮肤增厚、皮下脂肪层内不同水肿形态的发生率均存在统计学差异($P<0.05$)。纵向及横向累及范围与临床分期均呈正相关，各分期间两两比较，II 期及 III 期皮肤增厚的发生率明显大于 I 期，平行线征 I 期发生率显著大于 II 期及 III 期，网格征 I 期及 II 期的发生率明显大于 III 期，蜂窝征 II 期及 III 期的发生率显著大于 I 期，条带征 I 期及 II 期的发生率显著大于 III 期，淋巴湖及新月征 III 期的发生率显著大于 I 期及 II 期 ($P<0.05$)。

结论 原发性 LEL 不同分期下 MR 表现具有一定的特征性，MRI 能够成为评估原发性 LEL 严重程度的有效辅助工具。

PO-2906

MR 降噪类深度学习重建技术在前列腺癌的临床应用研究

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目的 评估 MR 降噪类深度学习重建技术在前列腺癌的图像质量及诊断效能。方法 回顾性分析组织病理学确诊的 62 例前列腺癌患者影像资料，所有患者在 1.5T MR 设备上均接受 SG T2W FS、AX T2W FS、AX T1W、CO T2W FS 扫描，对每个序列图像采用常规小波降噪方法（wavelet method, WE）和 dDLR 方法进行重建。两名放射科医生采用五分法对四种不同序列类型图像的整体图像质量、主观噪声、主观对比度和诊断可信度进行评分。定量分析肿瘤与周围组织信噪比（SNR）和对比噪声比（CNR）。统计分析采用单因素方差分析和 Friedman 检验。结果 dDLR 序列图像主观评分均优于常规 WE 图像。前列腺癌组织结构与周围组织关系的显示，dDLR 序列图像显示较常规 WE 图像更清晰。定量分析显示，dDLR 与常规 WE 图像 SNR 分别为 SG T2W FS: 63.59 ± 3.11 , 30.14 ± 4.28 ($P<0.05$) ; AX T2W FS: 52.41 ± 4.13 , 23.19 ± 3.36 ($P<0.05$) ; AX T1W: 85.28 ± 2.12 , 45.39 ± 2.31 ($P<0.05$) ; CO T2W FS: 61.16 ± 3.15 , 31.65 ± 3.98 ($P<0.05$)。dDLR 与常规 WE 图像 CNR 分别为 SG T2W FS: 42.59 ± 4.11 , 15.64 ± 3.28 ($P<0.05$) ; AX T2W FS: 36.41 ± 3.89 , 12.69 ± 4.39 ($P<0.05$) ; AX T1W: 50.78 ± 3.11 , 29.79 ± 2.82 ($P<0.05$) ; CO T2W FS: 41.55 ± 3.75 , 14.35 ± 3.48 ($P<0.05$)。结论 降噪类深度学习重建技术提高了前列腺癌图像质量，有助于前列腺癌疾病的临床诊断，值得临床推广。

PO-2907

基于时间依赖性弥散 MRI 的微观结构映射用于鉴别高级别浆液性卵巢癌和浆液性交界性卵巢肿瘤

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目的 术中冰冻切片检查在诊断高级别浆液性卵巢癌 (HGSOC) 和浆液性交界性卵巢肿瘤 (SBOT) 方面仍存在不足。运用时间依赖性弥散 MRI 可以描绘肿瘤的微观结构参数，可能在 HGSOC 和 SBOT 的术前鉴别中发挥作用。

方法 共 34 例 HGSOC 患者，12 例 BEOT 患者连续纳入本研究，接受术前盆腔 MRI 检查。两名放射科医师勾画肿瘤，获得感兴趣区 (ROI)。通过 IMPULSED 模型拟合时间依赖性扩散 MRI 信号，并提取包括细胞体积分数、细胞直径、细胞密度和细胞扩散系数在内的微观结构参数。同时从标

准弥散加权成像 (DWI) 获得表观扩散系数 (ADC) 值进行比较。比较 BEOT 和 MEOT 的各种参数, 并使用受试者工作特征曲线评估诊断性能, 并计算曲线下面积 (AUC)。同时计算微观结构参数与病理参数包括 Ki-67、P53、Pax-8、ER 和 PR 的相关性。使用组内相关系数 (ICC) 评估观察者间及观察者内的一致性。

结果细胞体积分数、细胞密度、细胞扩散系数和 ADC 值在两组间有显著的统计学差异, 在鉴别 HGSOC 和 SBOT 时均表现出良好的诊断性能, 具有较高的 AUC, 分别为 0.936、0.909、0.902 和 0.914。这些参数的诊断性能无显著差异。Spearman 相关分析显示, 在 HGSOC 组中, 细胞密度与 P53 表达呈显著正相关 ($P = 0.028$, $r = 0.389$), 细胞扩散系数与 Pax-8 表达呈显著正相关 ($P = 0.018$, $r = 0.415$)。ICC 显示所有参数具有极好的一致性。

结论时间依赖性弥散 MRI 在描绘 HGSOC 和 SBOT 的显微结构存在一定价值, 可以帮助术前鉴别 HGSOC 和 SBOT。

PO-2908

肥胖/超重多囊卵巢综合征患者的自发脑活动改变: 一项静息态功能磁共振成像研究

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目的 研究肥胖/超重多囊卵巢综合征 (PCOS) 患者的自发脑活动改变。通过使用静息态功能磁共振成像 (rs-fMRI) 探索潜在的神经病理基础。

方法 共招募 74 例 PCOS 患者 (26 例肥胖/超重 PCOS 患者、16 例正常体重 PCOS 患者和 32 例对照受试者 (HCs)), 行 rs-fMRI 检查。计算低频波动幅度 (ALFF) 法和区域同质性 (ReHo), 并比较 PCOS 组和 HCs 组。然后提取差异显著的脑区作为掩模。对肥胖/超重 PCOS 组与正常体重 PCOS 组在掩模中进行比较。Spearman 相关性分析用于评估了 ALFF/ReHo 值与临床参数之间的相关性。

结果 与 HCs 相比, PCOS 组表现为双侧楔前叶 ALFF 值的明显升高, 右侧楔前叶 ReHo 值升高。PCOS 患者右侧楔前叶的 ALFF 值与 PCOS 的 LH 水平呈正相关。在掩模中进一步分析, 与正常体重 PCOS 患者相比, 肥胖/超重 PCOS 患者的右侧楔前叶中 ALFF 和 ReHo 值显著降低。肥胖/超重 PCOS 患者的右侧楔前叶 ALFF 值与 HOMA2-IR 评分呈负相关。

结论 PCOS 患者表现出自发脑活动的改变。而且, 与正常体重患者相比, 肥胖/超重表型改变了 PCUN.R 的自发脑活动。胰岛素抵抗 (IR) 可能在肥胖/超重 PCOS 局部脑活动、情绪和认知改变的潜在神经病理基础中起关键作用。

PO-2909

非打药非触发的弛豫增强血管成像 (REACT) 技术初步探究

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目的: 初步探究在 3T 场强下, 非打药非触发弛豫增强血管成像(Relaxation-Enhanced Angiography without Contrast and Triggering, REACT)序列在非对比增强磁共振血管(NCE-MRA)成像中的应用。

方法: REACT 序列是由两个磁化脉冲 (T2 预备脉冲和 IR 反转脉冲) 与三维梯度回波 m-Dixon 序列相结合, 改良的三维两点化学位移 -水脂分离超快速场回波脉冲序列(mDIXON TFE)使用了七脂肪峰模型重建, B0 场校正和水脂化学位移校正, 脂肪抑制更彻底、更均匀。T2 预备脉冲是由 4 个重聚焦脉冲组成, 利用动脉和静脉 T2 弛豫时间的差异, 以及减少短 T2 弛豫时间 (如骨骼肌) 的信

号, 促进动脉和静脉信号分离。IR 反转脉冲抑制短至中等 T1 和 T2 弛豫时间 (如内脏和神经) 的信号, 增加了血液和背景组织对比, 凸显血液信号。无需进行图像减影, 并可以在自由呼吸状态下, 无需心电和呼吸门控触发进行扫描。本研究所有健康志愿者和临床患者均使用 Philips Ingenia CX3.0T 磁共振扫描仪进行扫描, 使用 16 通道腹部相控阵线圈采集图像。所有受试者行躯干及四肢血管 REACT 序列扫描, 并对图像行 MPR、MIP 重建, 观察图像质量、血管成像的可视度和信噪比 (SNR)。

结果: REACT 序列在自由呼吸、无心电门控触发的情况下获得的图像初步显示, 在视野范围内, 脂肪及其它背景组织均被均匀抑制, 在多个解剖结构上, 血液与组织对比显著, 血管显示良好, 并能同时显示动脉及静脉, 动脉与静脉之间存在信号差异。

结论: REACT 技术无需对比剂, 自由呼吸, 无需心电门控触发, 用于非对比增强磁共振血管 (NCE-MRA) 成像中, 具有无创、无电离辐射、三维成像等诸多优势, 可为临床诊断及治疗提供大量直观、可靠的信息, 孕妇小孩以及肾功能衰竭的患者均可行此检查, 临床中可作为血管性病变的常规筛选手段。

PO-2910

静息态全脑体素水平功能连接分析对脑小血管病相关轻度认知障碍患者认知水平的预测作用

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目的 通过体素水平静息态功能磁共振成像 (resting-state functional magnetic resonance imaging, rs-fMRI) 序列, 探索脑小血管病 (cerebral small vessel disease, CSVD) 相关轻度认知障碍患者早期认知障碍的机制, 并分析其与临床神经心理学指标的相关性。**方法** 筛选常规 MRI 检查符合 CSVD 相关轻度认知障碍诊断标准的受试者 21 例, 并挑选与其年龄、性别及受教育年限相匹配的健康对照组 20 例, 所有被试都接受 rs-fMRI 检查, 计算全脑度中心度 (degree centrality, DC) 值, 将两组 DC 值差异显著团块的峰值 MNI 坐标作为种子点, 与全脑其他体素进行功能连接 (functional connection, FC) 分析, 两组存在差异脑区的 DC 及 FC 值与 MoCA 评分进行相关性分析, 并进一步分析 CSVD 总负荷评分与 MoCA 评分的相关性。**结果** 与健康对照组相比, CSVD 相关轻度认知障碍组左侧内侧额上回/左侧前扣带回、左侧角回/左侧缘上回、右侧内侧额上回/右侧额中回、左侧小脑及右侧小脑 DC 值减低, 左侧前扣带回与左侧颞中下回、双侧楔前叶、双侧中扣带回 FC 值减低。脑白质高信号评分、CSVD 总负荷评分与 MoCA 评分呈负相关 ($r_s = -0.461$, $P = 0.036$; $r_s = -0.458$, $P = 0.037$); CSVD 总负荷评分与视空间和执行功能评分呈负相关 ($r_s = -0.443$, $P = 0.044$)。CSVD 相关轻度认知障碍组左侧前扣带回-右侧楔前叶 FC 值与 MoCA 评分呈显著正相关 ($r = 0.565$, $P = 0.018$)。**结论** rs-fMRI 序列可以早期发现 DC 及 FC 值减低脑区, CSVD 评分及 DC、FC 值与 MoCA 评分呈明显相关, 可作为 CSVD 相关轻度认知障碍患者的潜在影像学标志物, 揭示其认知功能减退的潜在机制。

PO-2911

带状疱疹后神经痛患者脑结构协变网络变化的研究

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目的：为了寻找带状疱疹后神经痛（postherpetic neuralgia, PHN）患者中枢发病机制潜在的影像学证据以及带状疱疹（herpes zoster, HZ）患者向 PHN 转化的神经影像标志物，本研究构建 PHN 组及 HZ 组患者组水平脑结构协变网络（structural covariance network, SCN），与健康对照组（healthy controls, HC）进行比较分析，计算三组间 SCN 指标是否存在差异。

方法：对 54 名 PHN、53 名 HZ 及 50 名 HC 被试进行结构磁共振成像（3DT1）扫描，利用基于 Desikan-Killiany 图谱皮质厚度的皮尔逊相关建立组水平 SCN，计算各组 SCN 全局属性和节点属性，并计算三组间 SCN 指标是否存在显著差异。

结果：1、三组间的全局属性不存在显著差异。2、节点属性：（1）HZ 组左颞上、中回节点效率小于 HC 组，HZ 组左颞上回后部、右中央旁小叶、右距状旁回及右额极节点介数小于 HC 组，HZ 组左颞上回后部及右额极节点度小于 HC 组；HZ 组左扣带回后部、左额中回头部及右楔前叶节点效率大于 HC 组，HZ 组左嗅皮质及左额中回头部节点介数大于 HC 组，HZ 组左扣带回后部及左额中回头部节点度值大于 HC 组。（2）PHN 组右缘上回节点度小于 HC 组；PHN 组左颞下回节点效率大于 HC 组，PHN 组左扣带回后部及左缘上回节点介数大于 HC 组。（3）PHN 组左前扣带回尾部、左枕叶外侧及左舌回节点效率及节点度均小于 HZ 组，PHN 组左前扣带回尾部节点介数小于 HZ 组；PHN 组左颞上回后部、左颞中回及左额下回后部节点效率大于 HZ 组，PHN 组右颞上回后部节点介数大于 HZ 组，PHN 组左颞上、中、下回及右额极节点度大于 HZ 组。以上有差异的节点属性，均未通过 FDR 校正。

结论：三组间全局属性未发现显著差异，可能与 HZ 及纳入的 PHN 病程较短有关。三组间多个疼痛矩阵有关的脑区的节点属性存在差异，为既往 PHN 患者功能网络拓扑属性进行了补充，也为 HZ 患者向 PHN 患者发展的神经基础提供新的见解。

PO-2912

基于冠状位平行肛管扫描的直肠癌 MR 影像分析： 病灶与肛门解剖关系的研究

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目的 本研究旨在通过基于直肠癌 MR 高分辨率冠状位平行肛管扫描的影像分析，深入探究直肠癌病灶与肛门之间的微观解剖关系。我们的目标是为保肛手术决策提供更为精确的临床信息，强调影像学在直肠癌手术前的决策制定中的重要性。方法 我们纳入了 55 例经临床和影像学诊断确认的直肠癌患者，以确保研究样本的多样性涵盖了不同病期和肿瘤位置。所有患者分别接受了常规盆腔 MR 扫描和高分辨率冠状位平行肛管扫描。我们在两种扫描图像上分别测量肿瘤下缘与齿状线的距离，并对肿瘤的位置、大小以及与肛门的相对位置进行了详细的解剖学分析。通过对比两种扫描方法下的锯齿状线距离测量结果，我们使用统计学方法评估了这些方法之间的差异。此外，我们将影像学测量结果与临床直肠指检和肠镜结果进行对比，以分析影像学信息与临床观察之间的一致性和差异。结果 通过冠状位平行肛管扫描，我们获得了清晰的直肠癌 MR 影像，准确地显示了病灶与肛门的相对位置。肿瘤下缘距齿状线的测量结果揭示了不同病灶位置的直肠癌与肛门的距离显著差异。此外，我们观察到肿瘤的大小、浸润程度以及与周围组织的关系在解剖学上对于手术决策产生了重要影响。结论 基于冠状位平行肛管扫描的直肠癌 MR 影像分析为直肠癌患者的保肛手术决策提供了有力的解剖学支持。通过准确测量病灶与肛门的相对位置和距离，医生能够更精确地判断是否适合进行保肛手术，从而最大限度地保留患者的生活质量。本研究的发现有望为直肠癌患者的个体化治疗方案制定提供有力的临床指导。

PO-2913

3D-ASL 联合 APT 鉴别诊断高级别胶质瘤和单发脑转移瘤的价值

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目的：探讨 3D-ASL 联合 APT 鉴别诊断高级别胶质瘤（HGG）和单发脑转移瘤（SMT）的价值。方法：回顾性分析经手术病理证实的 30 例 HGG 和 30 例 SMT 的 MRI 资料。分别测量计算 HGG 和 SMT 瘤体实质区及瘤周水肿区（ $<3\text{cm}$ ）的相对脑血流量（rCBF）值和非对称磁化转移率（MTRasym）值，采用独立样本 t 检验比较两者之间的差异；绘制 ROC 曲线，评估瘤体实质成分及瘤周水肿区的 rCBF 值和 MTRasym 值鉴别诊断两者的效能。结果：HGG 组与 SMT 组瘤体实质区的 rCBF、MTRasym 差异无统计学意义（ $P>0.05$ ）；HGG 组与 SMT 组瘤周水肿区的 rCBF、MTRasym 差异有统计学意义（ $P<0.05$ ），HGG 组均明显高于 SMT 组。当瘤周水肿区 rCBF >3.97 时，其诊断 HGG 敏感度为 88.59%，特异度为 86.47%，AUC 为 0.812；当瘤周水肿区 MTRasym >21.63 时，其诊断 HGG 敏感度为 90.77%，特异度为 88.71%，AUC 为 0.817；瘤周水肿区 rCBF 联合 MTRasym 诊断 HGG 的敏感度为 94.87%，特异度为 92.36%，AUC 为 0.957。rCBF 联合 MTRasym 的 AUC 最大，其次为 MTRasym、rCBF，三者间差异有统计学意义（ P 均 <0.05 ）。

结论：3D-ASL 联合 APT 可无创性定量鉴别诊断 HGG 与 SMT，瘤周水肿区比瘤体实质区更有诊断价值，且 rCBF 联合 MTRasym 鉴别诊断 HGG 和 SMT 的效能优于单独使用 rCBF 或 MTRasym。

PO-2914

并行采集技术与不同压缩感知加速因子对头颈高清血管壁成像的影响

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目的：比较并行采集（GRAPPA）技术与压缩感知（CS）技术不同加速因子（AF）对头颈高清血管壁图像质量的影响。方法：招募健康志愿者 30 例[男 20 例、女 10 例]。应用 Vida 3.0T MR 成像仪及 GRAPPA[AF=2]、CS[AF=2~10]技术对其行头颈高清血管壁 3D_T1_Space 扫描，由两名 MRI 方面具有 5 年以上诊断经验的放射科医师选取 8 处相同的位置[左右大脑中动脉、左右颈内动脉颅内段、左右颈总动脉分叉处下方、左右椎动脉]，在原始图像上划定 ROI，测量血管壁的信号强度（SI）和标准差（SD），并计算信噪比（SNR）和对比噪声比（CNR）；同时相互独立地对图像中颅内和颈部不同段血管壁的成像质量进行主观评分。采用组内相关系数（ICC）和 Kappa 检验对测量的数据和主观评分进行一致性分析。若一致性良好，则使用 Fried-man 检验对不同 AF 之间的 SNR、CNR 及主观评分进行比较；若差异性有统计学意义，则使用 LSD 法进行两两比较。结果：两位医师测量的数据与主观评分一致性良好[ICC: 0.778~ 0.959, Kappa: 0.768~ 0.881]；AF=2 时，CS 技术下 8 处 ROI 的 SNR 高于 GRAPPA($P<0.05$)；CS 的 AF=2、3、4、5、6 时，8 处 ROI 的主观评分可达 4 级，当 CS 的 AF=7、8 时，主观评分降低至 3 级($P<0.05$)，当 CS 的 AF=9、10 时，主观评分降低至 2 级($P<0.05$)。结论：结合 CS 技术的 3D_T1_Space 序列随着 AF 的增加，扫描时间逐渐降低。CS 的 AF=6 对比 GRAPPA 的 AF=2，在确保图像质量前提下，扫描时间缩短 69.14%，故推荐使用 CS[AF=6]行头颈高清血管壁扫描。另外，30 例健康志愿者中有 13 例在 CS 的 AF=8,9,10 中出现了不同神经刺激症状，症状为恶心、心慌、气短等不适，故不建议将 CS 的 AF 调整至 8 以上。

PO-2915

西门子 3.0T 磁共振 Skyra 心肌延迟强化与平扫 T1 mapping 相关性分析

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多种心肌疾病导致的心肌损害均会造成心肌组织学水平的类似病理改变,即心肌细胞的变性、萎缩、坏死瘢痕化和心肌间质纤维化[1]。心肌细胞变性坏死为不可逆性损伤,心肌细胞坏死后继发心肌间质的纤维化,导致心肌细胞外间隙增宽。在以上病理改变的基础上,病变心肌的 MRI 灌注扫描后会发生延迟强化(late gadolinium enhancement LGE),即可通过心肌磁共振灌注成像来显示心肌损害的范围和程度,但是有严重肾功能不全的患者钆对比剂是慎用或禁用[2]。心脏 MRI 灌注成像对此类患者心肌病变的评估存在局限性。心脏平扫 T1mapping 技术是评价心肌病变的一种定量方法,T1mapping 技术能够提供心肌组织 T1 值的数字模拟图像、即伪彩图,同时还能精确测量任一兴趣区心肌组织的 T1 值,从而通过 T1mapping 的技术来显示心肌损害的范围和程度[3]。本文旨在通过对比心脏延迟强化与 T1mapping 的相关性,探究能否使用平扫 T1mapping 技术替代心脏灌注成像来评价心肌损害的范围和程度,从而使得具有对比剂应用限制的患者也能够得到心肌病变的精准评估。收集我院的 2019.7 至 2021.12 月的 106 例心脏磁共振检查患者中发现的 24 处左心室明显的延迟强化病灶并测量该区域的 T1 值;并在同一患者的未发生延迟强化且 T1mapping 伪彩图无明显增高的区域测量左心正常心肌的 T1 值做为对照。两组数据使用 SPSS23.0 版统计软件进行统计学处理与检验,组间采用独立样本 t 检验,结果显示延迟强化组 T1 值为 $1524.50 \pm 102.779\text{ms}$,无延迟强化组 T1 值为 $225.88 \pm 50.708\text{ms}$,两组间数据具有统计学差异($t=12.765$, P 值小于 0.001)。上述结果说明增强扫描延迟强化病灶与 T1mapping 高信号病灶存在良好的相关性,心肌 T1mapping 成像能够作为评估心肌损害的影像方法。

PO-2916

基于定量磁敏感图评估不宁腿综合征患者治疗前脑铁含量变化

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目的:探讨定量磁敏感图(QSM)评价原发性不宁腿综合征(RLS)患者治疗前脑内灰质核团铁含量的运用价值,并探讨利用 QSM 诊断 RLS 的可行性。

方法:使用 GE SIGNA Architect 3.0T 超导磁共振扫描仪对符合 RLS 临床诊断标准的 18 例 RLS 治疗前患者(RLS 组)和 16 名健康志愿者(对照组)行 QSM 技术扫描及外周血清铁蛋白、血清铁浓度检测。对 QSM 原始图像进行后处理获得 QSM 定量图,运用 3D-slice 软件在 QSM 定量图勾画 ROI 并得到对应核团磁化率数据,ROI 置于脑灰质核团的双侧黑质、红核、丘脑、壳核、苍白球、尾状核、齿状核。应用 SPSS 25.0 对所获得的两组 ROI 所对应的磁化率数据和外周血清铁蛋白、血清铁浓度进行统计学分析。

结果:RLS 组治疗前黑质、红核、壳核、苍白球、尾状核、齿状核的磁化率均值分别为(74 ± 19.98)、(68.13 ± 16.44)、(39.25 ± 13.2)、(88.12 ± 14.13)、(40.53 ± 17.45)、(57.43 ± 13.25),对照组为(94.25 ± 26.48)、(78.42 ± 25.43)、(47.18 ± 15.45)、(90.13 ± 21.05)、(45.53 ± 21.89)、(63.44 ± 11.59),黑质、苍白球、壳核、齿状核两组间差异具有统计学意义,P 值均 <0.05 ,表明 RLS 患者这部分灰质核团铁含量减少。RLS 组血清铁蛋白、

血清铁分别为 (122.13±83.14) g/L、(15.73±7.59) μmol/L 与对照组血清铁蛋白、血清铁 (179.57±42.43) g/L、(17.26±6.31) μmol/L 比较差异无统计学意义, P 值均大于>0.05。

结论: RLS 患者治疗前脑内铁含量降低, 但脑铁含量变化与血清铁蛋白、血清铁浓度变化并不完全一致, QSM 评估 RLS 患者脑内铁含量降低有助于 RLS 的早期诊断。

PO-2917

基于孟德尔随机化研究分析糖脂代谢指标与 脑小血管病 MRI 特征之间的关系

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目的: 脑小血管病 (CSVD) 是一种脑内小血管疾病, 约占所有卒中的五分之一, 占有痴呆症的 45%。观察性研究表明 CSVD 磁共振影像 (MRI) 特征与糖脂代谢指标之间存在联系。因此, 我们进行了孟德尔随机化 (Mendelian randomization MR) 研究, 以探讨空腹血糖、糖化血红蛋白 (HbA1c)、空腹胰岛素、甘油三酯(TG)及低密度脂蛋白胆固醇(LDL-c)对 CSVD 的 MRI 特征的因果关系。

方法: 本研究从 IEU OpenGWAS project 网站获得暴露因素: 空腹血糖、HbA1c、空腹胰岛素、TG、LDL-c 的全基因组关联研究 (genome-wide association study, GWAS) 数据, 来源于欧洲人群, 男女不限。构建暴露因素的工具变量, 筛选与暴露因素高度相关的单核苷酸多态性 (Single Nucleotide Polymorphism, SNP)。以 CSVD 的 MRI 特征白质高信号 (white matter hyperintensities, WMH) 为作为结局变量。从 ubm-a-165 中提取与上述暴露因素有关的 SNP。然后进行 MR 分析, 并采用 随机效应逆方差加权法 Inverse-Variance Weighted, IVW) 等方法分析暴露因素与 WMH 的因果关系。

结果: IVW 分析显示糖脂代谢指标: 空腹血糖 (OR = 1.04; p = 0.65)、HbA1c (OR = 0.99; p = 0.93)、空腹胰岛素 (OR = 0.93; p = 0.64)、TG (OR = 1.02; p = 0.63)、LDL-c (OR = 1.03; p = 0.40) 与 WMH 之间无明显因果关系。敏感性分析表明, 本研究结果稳定可靠。

结论: 这项孟德尔随机化研究发现糖脂代谢指标与脑小血管病之间无明显因果关联, 需要更多的临床研究进一步探讨脑小血管病的发病机制。

PO-2918

ADC 直方图分析对多发性骨髓瘤患者细胞遗传学 高危的预测价值评估

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目的: 探索利用 ADC 直方图参数预测多发性骨髓瘤(MM)患者高危细胞遗传学异常(HRCA)的可行性, 并比较直方图参数预测模型与结合直方图参数与临床指标的联合预测模型的诊断效能。

方法: 本研究回顾性分析了 92 例临床新诊断为 MM 且接受全身磁共振检查患者的 DWI 图像、血清学指标及基本临床资料。在 DWI 图像上基于计算机辅助半自动勾画全身骨髓瘤病灶。应用软件自动化提取骨髓瘤病灶的 ADC 直方图参数。根据间期荧光原位杂交 (FISH) 检测是否检出 del (17p), t (4;14), t (14;16), 将患者分为 HRCA 组和非 HRCA 组。单因素分析初步筛选有统计学意义的指标, logistic 回归分析筛选独立危险因素。利用 logistic 回归分析分别构建基于 ADC 直方图参数的影像预测模型、基于直方图参数和临床指标的联合预测模型。采用受试者工作特征曲线下面积 (area

under curve, AUC) 来评估不同模型预测 HRCA 的诊断效能。运用 DeLong 检验比较各预测模型 AUC 差异。P<0.05 为差异有统计学意义。

结果: 单因素分析结果显示, 性别、ADC_SD、ADC95%、峰度和熵组间比较差异达统计学显著水准(P<0.05)。逻辑回归分析显示熵、性别、M 蛋白%是 HRCA 的独立危险因素。基于直方图参数熵、ADC_SD 构建的影像预测模型 AUC 值为 0.739, 敏感度为 73.9%, 特异度为 68.1%。基于直方图参数熵、患者性别、M 蛋白%构建的联合预测模型诊断效能优于影像模型, 且差异存在统计学意义 (AUC 值为 0.811, 敏感度为 82.6%, 特异度为 72.5%, P<0.05)。

结论: 基于 ADC 直方图参数构建的影像预测模型以及联合 ADC 直方图参数与临床指标构建的联合预测模型均可以有效地预测 MM 患者 HRCA。

PO-2919

基于 MR 双序列影像组学预测高强度聚焦超声 消融子宫肌瘤后再干预风险

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目的: 探讨 MR 双序列影像组学在预测高强度聚焦超声 (high intensity focused ultrasound, HIFU) 消融子宫肌瘤后再干预风险中的价值。材料与方法: 回顾性连续性分析接受 HIFU 消融的子宫肌瘤患者 180 名 (再干预组 42 名; 无再干预组 138 名), 以 7:3 的比例随机分为训练集 (n=125) 和验证集 (n=55)。从对比增强 T1 加权成像 (contrast-enhanced T1-weighted imaging, T1C) 和 T2 加权成像 (T2-weighted imaging, T2) 序列中提取影像组学特征, 并记录患者的临床-影像学特征。采用相关性分析、Relief、LASSO 算法筛选最佳影像组学特征。采用随机森林构建 T1C 模型、T2 模型、T1C+T2 模型及结合 T1C、T2 的最佳影像组学特征和独立临床-影像特征的联合模型。采用受试者操作特征 (receiver operating characteristic, ROC) 曲线和决策曲线分析 (decision curve analysis, DCA) 评估模型的预测性能与临床应用价值。采用 Delong 检验比较模型的预测性能。结果: 年龄 (p<0.001)、肌瘤体积 (p=0.001) 和肌瘤增强程度 (p=0.001) 是独立的临床-影像特征。T1C 模型、T2 模型、T1C+T2 模型及联合模型的验证集 ROC 曲线下面积分别为 0.670 (95%CI:0.503-0.838)、0.637 (95%CI:0.474-0.800)、0.764 (95%CI:0.621-0.906) 及 0.870 (95%CI:0.759-0.981)。DeLong 检验结果表明联合模型的预测效能训练集和验证集中均显著优于其余模型 (P<0.05)。结论: 基于双序列 MR 影像组学的联合模型可在术前有效预测 HIFU 后再干预风险, 有望为临床医生制定个性化治疗策略提供参考。

PO-2920

自动分割技术在颞叶内侧癫痫伴海马硬化亚区体积中的应用

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目的: 探讨自动分割技术在颞叶内侧癫痫 (MTLE) 伴海马硬化 (HS) 患者亚区体积定量研究中的价值。方法: 将 2021 年 1 月至 2023 年 5 月在本医院经 MRI 诊断或病理证实为单侧 HS 的 37 例患者纳入本研究, 其中左侧 HS (L-HS) 24 例, 右侧 HS (R-HS) 13 例, 同期收集年龄与性别相匹配的 42 例健康受试者作为对照组。所有被试均行 T1 加权等体素三维磁化强度预备梯度回波序列 (3D T1 MP-RAGE) 扫描, 将扫描后的序列图像经 freesurfer V7 后处理可得到海马及其亚区的体积数据, 进一步进行标准化处理并计算体积不对称指数 (AI)。对海马及其亚区标准化体积进行组内比

较和组间比较,对 AI 值进行组间比较。采用受试者工作特征曲线 (ROC) 及曲线下面积 (AUC) 评价两种指标的诊断效能并进行比较。结果: L-HS 组和 R-HS 组患侧海马及其亚区的体积均小于对侧,对照组左侧海马及其亚区的体积均小于右侧,差异均有统计学意义 ($P<0.05$)。L-HS 组左侧海马及其亚区的体积均小于 R-HS 组和对照组的左侧海马及其亚区的体积, R-HS 组右侧海马及其亚区的体积均小于 L-HS 组和对照组的右侧海马及其亚区的体积,差异均有统计学意义 ($P<0.05$)。L-HS 组右侧、R-HS 组左侧与对照组相应侧的体积差异均无统计学意义 ($P>0.05$)。L-HS 组与 R-HS 组、对照组, R-HS 组与对照组 AI 值比较差异均有统计学意义 ($P<0.05$)。除 L-HS 组海马体和 SUB 的 AI 值诊断效能优于体积,差异有统计学意义 ($P=0.042$ 、 $P=0.047$),余海马及亚区各体积和 AI 值比较,差异均无统计学意义 ($P>0.05$)。结论:自动分割技术对 MTLE-HS 患者海马及其亚区体积的定量研究具有重要价值,可为临床提供更加可靠的影像学依据与参考。

PO-2921

5.0 T 超高场磁共振磁敏感加权成像 (SWI) 在肝细胞肝癌合并静脉系统癌栓的应用价值

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目的 以 5.0 T 超高场磁共振动态增强扫描为诊断标准,探讨 SWI 序列对 HCC 合并静脉系统癌栓的诊断价值。

方法 研究收集中科大附一院 (安徽省立医院) 2023 年 5 月至 7 月影像学表现符合 HCC 的患者共 95 例,所有患者行 5.0 T 超高场肝脏特异性对比剂增强磁共振扫描包括 SWI 序列 (自动生成幅度图与相位图),癌栓诊断标准:增强扫描强化、管腔扩张及邻近肝内病灶。两名放射科医师分别分析 SWI 图像并诊断是否合并静脉系统癌栓,诊断结果一致性采用组内相关系数 (ICC) 检验;统计分析 SWI 序列对静脉系统癌栓诊断敏感性、特异性、正确率,并与增强扫描图像进行诊断一致性检验。

结果 增强 MRI 表现符合 HCC 表现共 95 例,男 79 名、女 16 名,年龄 29~82 (58.42 ± 9.43) 岁。除 1 例因呼吸伪影导致图像无法判断,其余 94 例图像质量良好。2 名放射科医师在 SWI 序列诊断癌栓一致性良好,ICC 值等于 0.878。所有病例经 2 名放射科医师一致判断 83 例未出现静脉系统癌栓,11 例合并静脉系统癌栓 (其中门静脉癌栓 8 例,下腔静脉癌栓-肝静脉 3 例)。SWI 序列显示门静脉癌栓 8 例 (漏诊 1 例,癌栓位于门静脉 3 级分支,SWI 序列图像层厚大于增强扫描门静脉图像;误诊 1 例,肝内病灶压迫门静脉 3 级分支且图像存在轻度伪影),下腔静脉-肝静脉癌栓 3 例。SWI 序列对门静脉/下腔静脉-肝静脉癌栓诊断敏感性 90.9%、特异性 98.8%、正确率 97.8%,一致性检验显示其与门静脉期图像诊断静脉系统癌栓吻合度良好 ($k=0.897$)。

结论 5.0 T 超高场强磁共振 SWI 序列对 HCC 合并门静脉/下腔静脉-肝静脉癌栓显示效果良好,敏感性、特异性较高,与增强扫描图像相比诊断一致性良好。且 SWI 序列无需注入造影剂,不受患者肝肾功能、心功能影响,是对增强扫描门脉期显示静脉癌栓很好的补充,特别适用于各种原因不能进行增强 CT/MRI 扫描的患者。

PO-2922

经筋疗法改善失眠障碍患者类淋巴系统功能的磁共振研究

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目的：脑类淋巴系统功能障碍可能是失眠患者的主要病因之一。经筋疗法在治疗失眠上有疗效良好且副作用小等优势。本研究拟使用沿血管周间隙扩散张量图像分析(DTI-ALPS)技术分析治疗前后失眠患者大脑类淋巴系统的功能变化。

方法：招募慢性失眠障碍患者（失眠组）以及健康志愿者（对照组）各 20 名。治疗前采集颅脑的 DTI 数据作为基线数据。然后失眠组隔期接受中医推拿及针灸治疗（经筋疗法），并于一月后进行磁共振复查扫描。治疗前后由睡眠专医生评估患者的睡眠质量，使用 DTI Studio 软件测量左侧侧脑室旁投射纤维和联合纤维区域不同方向的扩散系数并计算 ALPS 值，比较各组 ALPS 值差异。

结果：治疗后大部分失眠患者报告睡眠质量显著提高，少数患者表示症状有改善但不明显。治疗前失眠组的 ALPS 值较正常对照组明显降低（ $P = 0.029$ ）。治疗后失眠组的 ALPS 值较治疗前明显升高（ $P = 0.011$ ），与对照组无统计学差异（ $P = 0.364$ ）。提示失眠患者存在脑类淋巴系统功能障碍，而中医物理疗法能够显著改善其功能。

结论：经筋疗法能够改善失眠患者脑类淋巴系统的功能，ALPS 值作为评估类淋巴系统功能的定量指标具有临床价值，可用于失眠的机制探索和临床诊疗。

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PO-2923

基于高分辨率血管壁 MRI 的颈部及颅内动脉夹层临床危险因素和影像特征

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目的 基于高分辨率血管壁 MRI (VW-MRI) 分析颈部动脉夹层 (CAD) 及颅内动脉夹层 (IAD) 的潜在临床危险因素及影像特征的差异。

资料与方法 回顾性分析 2015 年 8 月至 2021 年 12 月间在福建医科大学附属第一医院就诊的 91 例颅颈部动脉夹层患者，其中 CAD 患者 58 例、IAD 患者 33 例，对比分析两组的潜在临床危险因素（包括性别、年龄、颈部按摩理疗史、吸烟史、饮酒史、高血压、糖尿病及高脂血症等）及 VW-MRI 特征（包括缺血性脑卒中发生率、前/后循环分布、单发/多发病灶、范围局限型/广泛型、内膜瓣、双腔征、壁间血肿、血管外管径扩张、MRA 管腔形态分型）的差异。

结果 CAD 和 IAD 组的年龄[(42.2 ± 11.4) 岁比 (47.2 ± 8.8) 岁, $t=2.188$]、高血压[11(19.0%)比 15(45.5%) $\chi^2=7.232$]、甘油三酯水平[$1.12 (0.81, 1.51)$ mmol/L 比 $1.41 (1.06, 1.83)$ mmol/L, $Z=-2.729$]比较, 差异均有统计学意义 (P 均 <0.05)。VW-MRI 特征对比分析显示, CAD 和 IAD 在缺血性脑卒中发生率[50(86.2%)比 21(63.6%), $\chi^2=6.249$]、前后循环分布[后循环 16(28.1%)比 32(97.0%), $\chi^2=39.863$]、单发/多发病灶、范围局限型/广泛型 ($\chi^2=21.638$) 及 MRA 管腔形态分型上差异有统计学意义 (P 均 <0.05)。

结论 基于高分辨率 VW-MRI 分析显示 CAD 和 IAD 在潜在临床危险因素及 MR 特征上存在一定差异性, 提示两者在潜在发病机制及病变特征上可能存在不同。

PO-2924

动态对比增强 MRI 预测直肠癌患者重度急性放射性直肠损伤的价值

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目的 探讨动态对比增强 MRI (dynamic contrast-enhanced MRI, DCE-MRI) 定量参数预测直肠癌患者重度急性放射性直肠损伤 (radiation-induced rectal injury, RRI) 的价值。

方法 本回顾性研究纳入 2014 年 11 月至 2021 年 3 月符合纳入标准的 49 例直肠癌患者, 这些患者接受了新辅助放化疗, 并且行包括 DCE-MRI 序列的直肠 MRI 检查。2 名放射科医师独立测量扫描野内距离肿瘤最远处肠壁的 DCE-MRI 定量参数和肠壁厚度, DCE-MRI 定量参数包括对比剂容积转换常数 (K^{trans})、速率常数 (k_{ep})、单位体积组织细胞外血管外间隙容量 (v_e)。根据组织病理学评价, 将纳入患者分为轻度和重度急性 RRI 两组。比较两组间 DCE-MRI 定量参数及肠壁厚度是否存在统计学差异, 并绘制具有统计学差异参数的受试者工作特征 (receiver operating characteristic, ROC) 曲线。

结果 本研究纳入的 49 例 (54 ± 12 岁, 37 名男性) 患者中, 25 例为重度急性 RRI。 K^{trans} 在重度急性 RRI 组中显著低于轻度急性 RRI 组 (0.032 min^{-1} vs 0.054 min^{-1} ; $P = 0.008$), 但两组间的 k_{ep} , v_e 和肠壁厚度无统计学差异 (P 均 > 0.05)。 K^{trans} 的 ROC 曲线下面积为 0.72 (95%置信区间为 0.57, 0.84), 取阈值为 0.047 min^{-1} 时, 其预测重度急性 RRI 的敏感性和特异性分别为 80% 和 54%。

结论 K^{trans} 预测急性重度 RRI 具有中等价值。DCE-MRI 可为直肠癌急性 RRI 患者的围手术期管理和治疗策略提供无创、客观的依据。

PO-2925

ADC 直方图在中枢神经系统淋巴瘤鉴别诊断中的价值

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目的: 研究 ADC 全域灰度直方图在鉴别原发性中枢神经系统淋巴瘤 (Primary central nervous system lymphoma, PCNSL) 与多形性胶质母细胞瘤 (Glioblastoma multiform, GBM) 和单发脑转移瘤 (Solitary brain metastasis, SMT) 的诊断价值。**方法:** 回顾性分析在我院做过脑部 MRI 检查并经病理证实的 95 例患者, 其中中枢神经系统淋巴瘤 38 例 (男 19 例、女 21 例, 平均年龄 57.1 ± 12.5 , 范围 33~81 岁), 胶质母细胞瘤 29 例 (男 13 例、女 17 例, 平均年龄 51.2 ± 14.5 , 范围 10~69 岁), 单发转移瘤 28 例 (男 15 例、女 13 例, 平均年龄 59.8, 范围 36~76 岁)。分别在三组 MR ADC 轴位图像上用 Mazda 软件将肿瘤的每一个层面勾画感兴趣区并进行灰度全域直方图分析, 并分别对这三组直方图参数特征进行统计学分析, 比较各参数的统计学意义。**结果:** 经灰度直方图中分析得到的 9 个参数, 即均值 (Mean)、变异度 (Variance)、峰度 (Kurtosis)、偏度 (Skewness)、第一百百分位数 (Perc.01%)、第 10 百分位数 (Perc.10%)、第 50 百分位数 (Perc.50%)、第 90 百分位数 (Perc.90%) 及第 99 百分位数 (Perc.99%) 这 9 个参数差异有统

计学意义 (P 均 <0.05)。结论: 直方图分析有助于中枢神经系统淋巴瘤与胶质母细胞瘤和单发转移瘤的鉴别, 均数、偏度及 Perc.50% 具有较高诊断效能。

PO-2926

大鼠 MCAO 脑梗死后交叉性小脑神经机能联系不能的 DKI 评价

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目的 观察大鼠大脑中动脉闭塞 (MCAO) 模型中 NMDA 的表达、细胞凋亡及对神经功能恢复的影响。应用扩散峰度成像 (DKI) 评价交叉性小脑神经机能联系不能 (CCD), 为临床治疗提供实验依据和理论依据。

材料与方法 建立大鼠 MCAO 模型, 每 12 只大鼠随机分为对照组、6h 组、12h 组、24h 组、48h 组、7d 组、14d 组。在以上时间点对大鼠进行脑扫描, MRI 扫描后处死大鼠进行 HE 染色、免疫组化染色和 TUNEL 法, 分别检测核心梗死区和小脑的 NMDA 表达, 并分析 MRI 参数与 NMDA 关系。结果 MCAO 大鼠的 MD、ADC 和 FA 值皆低于对照组, 且对侧小脑的参数低于同侧小脑 ($P<0.05$), 于 12h 达最低值, MK 值则相反。NMDA 的表达呈上升趋势, 高于对照组, 24h 达到最大值 ($P<0.05$), 且对侧小脑高于同侧小脑。

结论 NMDA 可成为治疗 CCD 的新靶点, 且 MRI 参数能预测 CCD 的发生发展。

PO-2927

基于多参数 MRI 的影像组学结合 PI-RADS 评分和临床变量的综合模型评估前列腺癌侵袭性的研究

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目的 探讨多参数磁共振成像上不同感兴趣区的影像组学模型和结合影像组学、PI-RADS 2.1 评分、临床变量的综合模型在评估前列腺癌侵袭性方面的价值。方法 收集本院 2018 年 5 月至 2022 年 9 月 2 个医疗中心经病理确诊为前列腺癌患者 245 例: 渝中院区 176 例, 其中低侵袭性组 (Gleason 评分 $\leq 3+4$) 77 例, 高侵袭性组 (Gleason 评分 $\geq 4+3$) 99 例; 江南院区 69 例 (低侵袭性组 33 例, 高侵袭性组 36 例)。所有患者行多参数 MRI 检查后, 在多参数 MRI 图像上分割 2 种 ROI: 肿瘤病变区域 (tumor region, TR) 和前列腺区域 (prostate gland, PG)。评估与前列腺癌侵袭性相关的临床变量, 并记录每位患者的 PI-RADS 2.1 评分。使用逻辑回归算法作为机器学习算法, 建立多个前列腺癌侵袭性分层模型: 影像组学模型 (Model_{TR}、Model_{PG} 和 Model_{PG+TR})、影像组学-临床联合模型、影像组学-PIRADS 联合模型、临床-PIRADS 联合模型和影像组学-临床-PIRADS 综合模型。分别采用受试者工作特性 (ROC) 曲线、曲线下面积 (AUC) 和决策曲线分析 (DCA) 比较各模型的诊断价值和临床收益。结合影像组学评分、独立临床变量和 PI-RADS 2.1 评分构建影像组学列线图。通过校准度、区分度和临床应用评价列线图性能。结果 在 3 种影像组学模型中, Model_{PG+TR} 的 AUC 值为 0.919, 高于 Model_{TR} (AUC=0.874) 和 Model_{PG} (AUC=0.887)。在联合模型中, 影像组学-PIRADS-临床综合模型的 AUC 为 0.954, 优于影像组学模型 (AUC=0.919)、影像组学-临床联合模型 (AUC=0.919)、影像组学-PIRADS 联合模型 (AUC=0.921) 和临床-PIRADS 联合模型 (AUC=0.769)。

PO-2928

基于使用供氧系统状态下提高胎儿磁共振检查成功率的研究

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【摘要】目的:探讨通过在检查过程中为孕妇提供不间断氧气的方法,提高胎儿磁共振检查成功率。方法:前瞻性分析 2020 年 1 月-2021 年 6 月在东南大学附属中大医院放射科行盆腔 3.0T MR (胎儿)扫描的孕妇 46 例的资料,其中吸氧孕妇为 26 例(吸氧组),不吸氧的孕妇为 20 例(未吸氧组)。吸氧时间为检查全程,统计分析患者的氧气供给时间、身体舒适度状况、检查总耗时、胎动时间等。结果:吸氧组的孕妇一次检查成功率高于未吸氧组,且图像质量高于未吸氧组,差异有统计学意义 ($P < 0.05$)。两组孕妇身体状态较好、一般、较差情况比较差异具有统计学意义 ($P < 0.05$)。结论:检查过程中吸氧 8min 以上,在提高胎儿磁共振检查一次成功率的同时,可改善图像质量,减少胎儿运动带来的伪影。

PO-2929

动态低频振幅在阿尔茨海默病高危人群中的变化

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目的:探讨动态低频振幅在阿尔茨海默病高危人群中的变化及其与临床认知评估量表的相关性,有望为阿尔茨海默病 (Alzheimer's disease, AD) 高危人群早期干预提供更可靠的依据。

材料和方法:本研究从南京医科大学第一附属医院痴呆门诊和当地社区招募了 152 名受试者,包括 72 例主观认知下降患者 (subjective cognitive decline, SCD), 44 例轻度认知障碍患者 (mild cognitive impairment, MCI) 和 36 例健康对照 (healthy control, HC), 各组间性别、年龄以及受教育年限相匹配。所有受试者均接受了静息态功能磁共振成像扫描和多维临床认知量表的评估。本研究采用基于滑动窗的动态低频振幅 (dALFF) 分析方法,比较静息状态下三组间 dALFF 值存在差异的脑区并与临床认知评估量表进行相关性分析。为了验证 dALFF 滑动窗的可靠性,本研究采用了额外 4 种窗长 (30TRs、40TRs、60TRs 和 70TRs) 来验证主结果。

结果:认知量表评估结果证实 MCI 组的认知表现最差,SCD 组为中等认知表现,HC 组为认知表现相对最佳。与 HC 组相比,MCI 组及 SCD 组在左侧楔前叶区域的 dALFF 值均更低,SCD 组在左侧枕中回也展现出更低的 dALFF 值。而与 SCD 组相比,MCI 组在右侧额中回 dALFF 值更低 (GRF correction, voxel $P < 0.001$, cluster $P < 0.05$)。相关性分析结果表明 dALFF 值的改变与受试者的临床认知评分存在显著的正相关 ($R = 0.43$, $P = 0.024$)。

结论:研究结果表明 AD 高危人群的 dALFF 值有明显改变,并与临床认知评估量表存在显著的相关性。基于静息态功能磁共振的研究有利于为 AD 高危人群的早期发现及干预提供更可靠的影像学依据,从而延缓 AD 的发生发展进程。

PO-2930

钆塞酸二钠增强磁共振成像在肝脏局灶性病变诊断及评估肝细胞癌病理分化程度的价值研究

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目的: 探讨钆塞酸二钠增强磁共振成像(MRI)在肝脏局灶性病变诊断及评估肝细胞癌(HCC)病理分化程度中的价值。**方法:** 选取医院就诊的 108 例肝脏局灶性病变患者, 所有患者均给予钆塞酸二钠增强 MRI 检查, 分析钆塞酸二钠增强 MRI 诊断良恶性病变的价值, 分析 HCC 不同病理分化程度病灶钆塞酸二钠增强 MRI 信号强度参数差异。**结果:** 108 例患者经病理学检测确诊恶性病灶 65 例, 良性病灶 43 例。钆塞酸二钠增强 MRI 诊断肝脏局灶性良恶性病变的诊断灵敏度、特异度、准确率、阳性预测值和阴性预测值分别为 92.31%、90.70%、91.67%、93.75%和 88.64%。HCC 病理分化程度Ⅲ~Ⅳ级病灶平均信号绝对增强强度、肿瘤相对增强比率平均值以及肿瘤对肝脏相对增强比率平均值分别为(117.79±60.20)、(0.42±0.10)和(0.29±0.10), 明显低于 I ~ II 级病灶, 差异有统计学意义($t=8.575$, $t=3.450$, $t=9.395$; $P<0.05$)。患者的不同性别、年龄、体质量指数及病灶长径, 以及患者病灶平均信号绝对增强强度、肿瘤相对增强比率平均值及肿瘤对肝脏相对增强比率平均值比较差异无统计学意义。病灶平均信号绝对增强强度、肿瘤相对增强比率平均值以及肿瘤对肝脏相对增强比率平均值预测 HCC 病理分化程度Ⅲ~Ⅳ级的受试者工作特征(ROC)曲线下面积分别为 0.860、0.778 和 0.943。**结论:** 钆塞酸二钠增强 MRI 诊断肝脏局灶性病变的灵敏度和特异度高, 同时 MRI 信号强度参数与 HCC 病理分化程度有关, 在预测病理分化程度方面有一定应用价值。

PO-2931

基于全病灶和全腺体双参数 MR 直方图与纹理分析检测前列腺临床显著性癌

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目的: 通过提取前列腺全病灶与全前列腺体的双参数 MR 直方图与纹理特征检测前列腺临床显著性癌 (Gleason 评分 ≥ 7), 并评估 PI-RADS、临床指标、纹理特征以及三者结合检测前列腺临床显著性癌的效能。

材料与方法: 收集 260 例经病理证实的前列腺结节患者的临床资料, 所有前列腺非癌性结节患者均行经超声引导下靶向穿刺活检, 癌性病灶均行机器人前列腺根治全切术。病理标本均经 HE 染色及免疫组织化学分析。临床显著性癌 106 例, 非临床显著性癌 154 例。所有患者均接受 3T MRI 检查, 统计与前列腺癌相关的临床危险因素及 PI-RADS 评分。基于双参数前列腺 MRI 图像 (T2WI 和 ADC 图像), 进行病灶分割并提取直方图纹理特征进行分析。采用卡方检验和方差分析比较临床特征的差异。对纹理参数进行单变量分析。使用多元逻辑回归建立鉴别模型, 用 Delong 检验来比较不同模型 ROC 曲线的差异。

结果: 对全病灶进行纹理分析, 检测移行带和外周带临床显著性癌时, 纹理模型的 AUC 分别为: 0.903 和 0.859, 纹理-临床模型 AUC 分别为 0.938 和 0.894, 联合 PI-RADS 模型的 AUC 分别为 0.971 和 0.888; 对全腺体进行纹理分析, 检测移行带和外周带临床显著性癌时, 纹理模型的 AUC 分别为 0.850 和 0.672 (95%IC:0.555-0.789), 纹理-临床模型 AUC 分别为 0.919 和 0.751, 联合 PI-

RADS 模型的 AUC 分别为 0.981 和 0.804。无论是对全病灶还是全腺体的纹理分析, 纹理模型、纹理-临床及联合 PI-RADS 模型对移行带临床显著性癌都有较高的检测效能, 全病灶纹理分析时纹理模型、纹理-临床及联合 PIRAS 模型对外周带临床显著性癌也有较高的预测能力。

结论: 基于双参数磁共振的全病灶和全腺体直方图与纹理分析能够检测前列腺临床显著性癌, 联合 PI-RADS 评分、纹理分析及临床因素时检测效能更高。

PO-2932

肾动脉自旋标记成像参数定量分析: 肾动脉狭窄介入治疗后灌注改善的无创指标

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目的: 探讨动脉自旋标记(arterial spin labeling, ASL)成像作为无创指标评价肾动脉狭窄(renal artery stenosis, RAS)患者介入治疗后灌注改善的可行性。

方法: 前瞻性纳入本中心 2020/12/05 至 2022/10/30 共 11 例经数字减影血管造影(Digital Subtraction Angiography, DSA)诊断为 RAS 并行介入治疗的患者。所有患者均行介入治疗前 ASL 检查, 7 例患者行介入治疗后 ASL 复查。两名放射科医师通过勾画感兴趣区的方式测量 RAS 患者术前及术后肾皮质肾脏血流灌注(renal blood flood, RBF)及肾皮质局灶性异常灌注区 RBF。肾皮质局灶性异常灌注区通过 2 名放射科医师主观评估得到。利用血清肌酐估计肾小球滤过率(eGFR), 利用钆-99m DTPA 测定单肾 GFR (SKGFR)。评价 RBF 与 eGFR 及 SKGFR 的相关性并比较术前及术后 RBF 的差异。

结果: RAS 患者介入治疗后收缩压和舒张压均显著降低(139.1 ± 12.4 vs. 127.6 ± 8.9 , 81.2 ± 11 vs. 70.4 ± 10.4 $p=0.017$)。术前肾皮质 RBF 与术前 SKGFR 有显著相关性($r=0.504$, $p=0.024$), 但与术前 eGFR 无明显相关性($r=0.159$, $p=0.530$)。在行术后 ASL 显像的 7 例患者中, 肾皮质术后 RBF 显著高于术前 RBF(203.19 ± 51.42 vs. 164.00 ± 68.10 , $p=0.005$), 肾皮质局灶性异常灌注区术后 RBF 显著高于术前 RBF(159.92 ± 46.10 vs. 108.55 ± 39.57 , $p=0.001$)。

结论: 基于 ASL 图像获得的肾脏 RBF 与单肾功能有显著相关性, 并且可用于评价 RAS 患者介入治疗后的灌注改善情况。

PO-2933

退行性腰椎侧凸患者多节段椎旁肌群退变特点

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目的: 基于磁共振多回波化学位移水脂分离成像序列(Dixon-vibe)准确的脂肪定量技术, 定量分析退行性腰椎侧凸(degenerative lumbar scoliosis, DLS)患者多节段层面多裂肌、竖脊肌、腰大肌退变特点。**方法:** 2019 年 10 月至 2022 年 11 月在陆军军医大学第一附属医院纳入符合 DLS 诊断的患者 46 名作为实验组, 健康体检者 47 名作为对照组, 两组患者人口统计学资料的差异不显著($P>0.05$)。在 Dixon-vibe 序列水脂分离图中分别测量计算所有受检者从 L1-L2 到 L5-S1 5 个节段椎间盘中央层面椎旁多裂肌、竖脊肌、腰大肌的脂肪浸润程度(fat infiltration, FI)、功能横截面积(functional cross-sectional area, FCSA)、相对横截面积(relative cross-sectional area, RCSA), 分析 DLS 患者各节段三种椎旁肌群退变特点及其关联性。**结果:** DLS 组腰椎 L1-L2 到 L5-S1 5 个节段的椎间盘层面多裂肌 FI 显著大于对照组(均 $P<0.001$), 组内各节段之间差异不显著($P>0.05$); 两组竖脊肌 FI 值从 L1-L2 节段到 L5-S1 节段呈逐渐增大趋势, L1-L2 节段 DLS 组竖

脊肌 FI 显著大于对照组 ($P < 0.001$)，L5-S1 节段两组差异不显著 ($P = 0.295$)；两组患者腰大肌在 5 个节段的 FI 值差异不显著 ($P > 0.05$)，L1-L2 节段腰大肌 FI 值显著大于其他各节段 (均 $P < 0.001$)；在 DLS 组、对照组患者中多节段多裂肌 FI 均值与竖脊肌 FCSA 均值呈负相关 ($r = -0.644$ 、 -0.323 ， $P < 0.001$ 、 $P = 0.025$)，与腰大肌 RCSA 均值呈负相关 ($r = -0.039$ 、 -0.482 ， $P = 0.796$ 、 0.001)。结论 退行性腰椎侧凸多裂肌在各个节段均发生相近程度的脂肪浸润改变，竖脊肌在下腰段脂肪浸润程度更大，腰大肌在 L1-L2 节段脂肪浸润程度稍高于其他节段；多裂肌退变以脂肪浸润为主，而竖脊肌的代偿作用明显，腰大肌其次。

PO-2934

高分辨率磁共振血管壁成像在 SLE 患者早期 脑血管炎性改变中的应用

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目的：应用高分辨率磁共振血管壁成像 (HR-VWI) 观察系统性红斑狼疮 (SLE) 患者的颅脑血管受累情况，并分析其与疾病活动度、认知功能的关系。

方法：收集 38 名 SLE 患者以及 15 名健康对照 (HC) 的脑部 HR-VWI 图像。采集 SLE 患者认知功能评分 (使用 MMSE 及 MoCA 量表) 及疾病活动度评分 (使用 SLEDAI-2000 评分表)。根据 HR-VWI 扫描结果，通过血管病变积分评估患者脑血管炎的严重程度，并分析血管炎评分与患者疾病活动、认知功能的相关性。

结果：根据 HR-VWI 图像表现，我们观察到 SLE 患者存在脑血管炎性病变，易累及大中血管为主 (37/38)，部分仅累及小血管 (1/38)。SLE 患者脑血管炎评分与 SLEDAI-2000 评分呈显著正相关关系 ($p < 0.05$)，与 MMSE、MoCA 评分呈显著负相关关系 ($p < 0.05$)。

结论：HR-VWI 可以观察到 SLE 患者脑血管的炎性改变，随着血管炎的严重程度增加，SLE 患者的疾病活动度和神经精神症状也相应加重。

PO-2935

颅颈一体化高分辨血管壁 MRI 成像联合 PWI 评估卒中复发危险因素

贾毓茜

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目的：联合颅颈一体化高分辨 MRI 血管壁成像与 PWI 评估缺血性卒中患者复发的相关危险因素。

方法：87 例缺血性脑卒中患者行包括 T1WI、T2WI 及 T1WI 增强序列在内的颅颈一体化高分辨 MRI 血管壁成像和灌注加权成像 (PWI)，经过图像处理获得急性与否、闭塞与否、狭窄率、斑块数量、斑块负荷、强化程度、IPH 有无及灌注指标等影像数据。同时收集患者相关的临床数据，包括年龄、性别、身高、体重、血压、生化指标及并发症。对所有病人进行随访，依据复发与否分为复发组 ($n = 11$ 例) 和非复发组 ($n = 76$ 例)，分析其影像学数据、临床相关指标与复发的相关性，并进行 ROC 曲线分析、回归分析和 Kaplan-Meier 生存曲线分析。

结果：两组的急性梗死占比 ($P = 0.007$) 与责任斑块负荷 ($P = 0.035$) 存在显著差异，复发与否与灌注指标间未发现显著相关性。患者急性与否与 rCBF、rMTT 及 rTTP 显著相关，闭塞与否及狭窄率也与 rTTP 显著相关。生存曲线分析发现急性与否、斑块负荷及同型半胱氨酸的水平会影响复发事件的发生。

结论:缺血性脑卒中的复发与患者急性与否、斑块负荷相关,同时临床指标同型半胱氨酸水平可能影响复发事件的发生。

PO-2936

基于扩散生成模型构建的高 b 值 DWI 在前列腺 MRI 阴性癌结节检测中的应用

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目的:本研究旨在构建并验证基于扩散生成模型构建的高 b 值 DWI 在前列腺 MRI 阴性癌结节检测中的应用价值。

方法:本研究构建了基于扩散生成模型的高 b 值 DWI 生成模型。回顾性收集 1000 名因临床怀疑前列腺癌而行前列腺 MRI 检查的患者的影像资料用于模型训练和内部验证。在多中心收集 100 名常规 MRI 扫描显示前列腺癌阴性 (PI-RADS 小于 3) 但随后经过手术证实为前列腺癌的患者影像资料作为外部验证集。将验证集患者 DWI 图像输入扩散生成模型,生成高 b 值 DWI。两名具有十年以上诊断经验的放射科医生采取双盲法在两个时间段分别阅读了验证集原始图像和生成图像,并对其 PI-RADS 评分。最终结果由二人协商决定。

结果:合成高 b 值 DWI 可以提升癌结节在 MRI 显示度,53%癌结节在合成高 b 值 DWI 得到了显示。相对于验证集原始图像,前列腺 MRI 阴性癌检测灵敏度得到显著提升 (10% vs. 56%; $P<0.05$)。

结论:基于扩散生成模型构建的高 b 值 DWI 能够提升前列腺 MRI 阴性癌结节检测性能。

PO-2937

三维动脉自旋标记 MRI 监测原发性中枢神经系统淋巴瘤患者疗效和预测预后的长期研究

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目的:原发性中枢神经系统淋巴瘤 (PCNSL) 是一种高度侵袭性的非霍奇金淋巴瘤。本研究探索 MRI 三维动脉自旋标记 (3D-ASL) 灌注参数相对脑血流量 (rCBF) 监测初发 PCNSL 患者疗效及预测预后的可行性。

方法:本回顾性研究收集自 2015 年 05 月至 2019 年 05 月在复旦大学附属华山医院就诊初发 PCNSL 患者的临床资料,所有患者接受大剂量甲氨蝶呤 (HD-MTX) 为基础的化疗,化疗前接受头颅 MRI 3D-ASL 和常规序列扫描,直至强化灶消失。此后,患者每 3-6 个月行头颅常规 MRI 检查随访,当出现复发与进展时,加扫 3D-ASL 序列。将 T1WI 增强和 3D-ASL 序列图像融合后手动勾画感兴趣区 (ROI)。每间隔 3-6 个月电话随访,从 2015 年 08 月至 2022 年 12 月,使用 Stata 软件 Kaplan-Meier 法、Cox 比例风险回归模型对 3D-ASL-rCBF 参数和临床特征进行生存分析。

结果:86 例患者纳入研究,男 57 例,平均年龄 53 ± 11 岁。中位随访时间 69 个月后,78 例疾病进展 (PD),49 例死亡。中位无进展生存时间 (PFS) 和总生存时间 (OS) 为 16 和 54 个月。2、3、5 年 OS 率为 62.16%、56.76%、29.41%。ASL-rCBF 单因素分析中,更短 PFS 和 OS 与以下因素相关:脑脊液 (CSF) 累及、2 个周期未达部分缓解 (PR),4 个周期未达完全缓解 (CR)、

rCBFmean \geq 2.389、rCBFmax \geq 3.744、rCBFmin \geq 1.370。此外, 年龄 \geq 55 岁, KPS $<$ 50 预示更短的 OS。多因素分析中, 更短 OS 的独立预后因素是: 初始 KPS $<$ 50 ($P = 0.004$), CSF 累及 ($P = 0.022$)、4 个周期未达 CR ($P = 0.020$)、化疗前 rCBFmean \geq 2.389 ($P = 0.033$)。

结论: 本研究证实 3D-ASL-rCBFmean \geq 2.389 是初发 PCNSL 较短 OS 的独立高危因素, ASL 具有无辐射、无需外源性造影剂的优点, 推荐作为 MRI 常规序列应用于初发 PCNSL 疗效监测及预后评估, 以利于临床基于危险度分层、选择个体化治疗方案和改善预后。

PO-2938

基于自动脑分割技术对颞叶癫痫伴海马硬化患者 颞叶亚区白质体积的分析及其临床应用价值

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目的 利用自动脑分割技术 (FreeSurfer) 分析颞叶癫痫伴海马硬化 (Temporal lobe epilepsy with hippocampal sclerosis, TLE-HS) 患者颞叶亚区白质体积的变化, 探讨该技术在 TLE-HS 中的应用价值。材料与方法 前瞻性分析 2021 年 1 月至 2023 年 6 月就诊的 TLE-HS 患者 50 例, 其中左侧 TLE-HS (LTLE-HS) 患者 30 例, 右侧 TLE-HS (RTLE-HS) 患者 20 例; 同期招募性别、年龄相匹配的健康对照者 48 例, 所有受试者均在 3.0T 磁共振上进行 T1 加权三维磁化强度预备梯度回波 (3D-T1WI-MPRAGE) 序列扫描。使用 FreeSurfer 软件对 T1- MPRAGE 图像进行全脑分割, 收集颞叶亚区 (颞极、颞横回、颞上回、颞中回、颞下回、海马旁回) 的白质体积数据, 采用配对 t 检验比较对照组左右两侧颞区白质体积差异; 采用独立样本 t 检验分别比较对照组与 TLE-HS 组患侧、对侧之间颞叶亚区白质体积差异。结果 对照组左右两侧颞极、颞横回、颞上回、颞中回、颞下回白质体积差异有统计学意义 ($P < 0.05$); 对照组左右两侧分别与 LTLE-HS 组及 RTLE-HS 组患侧、对侧比较, LTLE-HS 组患侧颞极、颞横回、颞上回、颞中回、颞下回、海马旁回, 对侧颞上回、颞中回、颞下回、海马旁回及 RTLE-HS 组患侧颞中回、颞下回、海马旁回白质体积差异有统计学意义 ($P < 0.05$), 其余亚区体积差异无统计学意义 ($P > 0.05$)。结论 1) LTLE-HS 双侧颞叶亚区白质均广泛损伤, 主要发生在患侧颞极、颞横回、颞上回、颞中回、颞下回、海马旁回, 对侧颞上回、颞中回、颞下回、海马旁回; RTLE-HS 患者颞叶亚区白质损伤局限于患侧, 主要在颞中回、颞下回、海马旁回; 2) 自动脑分割技术对 TLE-HS 颞区白质体积的测量、颞叶癫痫术前评估及手术方式的选择具有一定意义。

PO-2939

3D FSE 序列在库欣病垂体微腺瘤患者术前 MRI 中的应用价值

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目的: 约 90% 的库欣病患者病灶为直径小于 10mm 的垂体微腺瘤, 如何提高术前 MRI 病灶检出率是库欣病诊疗中的重点和难点。本研究拟探索基于 3D FSE 序列的垂体高分辨增强 MRI (high-resolution contrast-enhanced MRI, hrMRI) 在库欣病垂体微腺瘤患者术前 MRI 中的应用价值, 并与基于 2D FSE 序列的垂体增强 MRI (conventional contrast-enhanced MRI, cMRI)、垂体动态增强 MRI (dynamic contrast-enhanced MRI, dMRI) 进行比较。

材料和方法: 回顾性分析 2016 年 1 月至 2021 年 12 月在北京协和医院 232 例库欣病患者资料, 其中经术后病理确诊且术前完成全部 cMRI、dMRI 和 hrMRI 扫描的库欣病垂体微腺瘤患者 80 例 [男 30 例, 女 50 例, 年龄 37 (29, 50) 岁]。由两位神经放射专家分别独立评估 cMRI、dMRI 和 hrMRI

对库欣病患者垂体微腺瘤的检出率, 并采用 κ 检验评估观察者间一致性, 采用 McNemar 检验评估不同扫描方案间差异。

结果: 本研究中, 库欣病患者垂体微腺瘤直径为 5 (4, 5) mm。专家 1 在 cMRI、dMRI 和 hrMRI 扫描方案中的检出率分别为 66.3%、73.8%、95.0%, 假阳性率分别为 11.3%、8.8%、1.3%, 假阴性率分别为 22.5%、17.5%、3.8%; 专家 2 在 cMRI、dMRI 和 hrMRI 扫描方案中的检出率分别为 66.3%、58.8%、90.0%, 假阳性率分别为 10.0%、18.8%、3.8%, 假阴性率分别为 23.8%、22.5%、6.3%。两位专家的 hrMRI 术前检出率均显著高于 cMRI 和 dMRI (均 $P \leq 0.001$)。在 cMRI、dMRI 和 hrMRI 扫描方案中, 两位专家的观察者间一致性 κ 分别为 0.497、0.509、0.643。

结论: 基于 3D FSE 序列的垂体高分辨增强 MRI 具有较高的病灶检出率, 观察者间一致性较高, 在库欣病垂体微腺瘤患者术前 MRI 中应用价值高。

PO-2940

胎儿先天性膈疝膈肌缺损的 MRI 三维重建及其与预后的相关性

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目的: 探讨利用 ITK-SNAP 软件对胎儿先天性膈疝 (Congenital diaphragmatic hernia, CDH) 膈肌缺损三维重建的可行性和可重复性, 并分析膈肌缺损率 (Defect-diaphragmatic ratio, DDR) 对 CDH 预后的预测价值。

方法: 回顾性研究产前诊断为左侧 CDH 的胎儿, 使用 ITK-SNAP 软件对胎儿 MRI 的膈肌进行手动分割获得胎儿残存膈肌及缺损膈肌的三维模型, 并测量残存膈肌、缺损膈肌的大小, 计算 DDR ($\text{DDR} = \text{缺损膈肌面积} / \text{膈肌总面积} \times 100\%$)。根据胎儿 MRI 图像测量胎儿总肺容量 (total fetal lung volume, TFLV)、观察/预期胎儿总肺容量 (observed/expected total fetal lung volume, O/E TFLV) 和预测肺容量百分比 (percentage predicted lung volume, PPLV)。分析 DDR、TFLV、O/E TFLV、PPLV 与新生儿产后结局的相关性, 并比较 DDR 与 TFLV、O/E TFLV、PPLV 预测产后结局的效果。

结果: 纳入 2020 年 1 月至 2023 年 6 月重庆医科大学附属妇女儿童医院诊断为左侧 CDH 病例共 49 例, 术后存活 33 例, 死亡 16 例, 总生存率为 67.34%。完成所有 CDH 病例的膈肌三维重建并测量 DDR, 研究者之间的数值测量结果具有较好的一致性 ($\text{ICC} = 0.918$), DDR 在幸存组与非幸存组间具有显著性差异 ($P < 0.001$)。DDR、TFLV、O/E TFLV、PPLV 均可预测左侧 CDH 胎儿的产后结局。ROC 曲线显示 DDR 对左侧 CDH 新生儿死亡具有良好的预测能力, AUC 为 0.945, 预测能力高于通过 TFLV (AUC: 0.928)、O/E TFLV (AUC: 0.943) 及 PPLV (AUC: 0.890) 预测新生儿存活情况。

结论: ITK-SNAP 对胎儿左侧 CDH 膈肌进行手动分割具有较好的可行性和可重复性, 可以实现病灶区域三维可视化。DDR 可以预测新生儿产后结局, 预测能力与 TFLV、O/E TFLV、PPLV 相似, 是一种可靠的风险评估模型。

PO-2941

基于 MRI 放射组学直肠充盈在直肠癌术前 T 分期应用价值研究

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目的: 利用基于磁共振成像 (MRI) 的放射组学模型, 探讨在直肠癌 (RC) 患者术前 T 分期中, 使用超声耦合剂充盈直肠是否更有益于临床。**方法:** 将 94 例 RC 患者分为 1 组 (留一交叉验证

[LOO-CV]组), 230 例 RC 患者分为 2 组(验证组)。患者按不同的病理 T 分期进行分组。通过高分辨率 T2 加权成像提取两个队列中所有感兴趣体积的放射组学特征。采用最小绝对收缩和选择算子(LASSO)算法选择最优特征。构建模型 1(无直肠充盈)和模型 2(有直肠充盈)。1 组采用 LOO-CV 建立放射组学模型。然后, 利用 2 组对两种模型的有效性进行检验和验证。结果: 共纳入 204 例患者, 其中 1 组 60 例, 2 组 144 例。最后, 利用 LASSO 筛选出 7 个最优特征构建模型 1, 9 个最优特征构建模型 2。ROC 曲线显示, 在 1 组中, 模型 1 和模型 2 的 AUC 分别为 0.806 和 0.946, 在 2 组中, 模型 1 和模型 2 的 AUC 分别为 0.783 和 0.920 ($p=0.021$)。结论: 直肠充盈的放射组学模型具有将 T1+2 与 T3 鉴别开的优势, 在验证队列中分类不准确率较低, 这表明该模型可用于 T 分期评估。

PO-2942

磁共振技术定量定性肾周脂肪组织的意义、可行性及优势

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肾周脂肪组织是一种特殊的脂肪组织, 其内含有棕色脂肪, 且位置与肾脏相邻。研究显示其体积改变、病理改变及其内棕色脂肪含量改变与肾功能、糖尿病、心血管疾病及肾癌有关。磁共振既能帮助识别棕色脂肪及脂肪组织的病理改变, 还能较为精确的定量脂肪体积, 用磁共振监测肾周脂肪的改变可以帮助诊断和评估疗效, 是一个非常值得研究的领域。

PO-2943

单侧突发性感音神经性听力损失患者低频波动幅度的动态变化

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Objects

SSNHL (sudden sensorineural hearing loss) refers to hearing loss at least 30 dB in three sequential frequencies in the standard pure-tone audiogram in less than 3 days (1), affecting unilaterally in over 95% cases (2). The amplitude of low-frequency fluctuations (ALFF) reflects the spontaneous neuronal activity and can help identify abnormal neural activity in various diseases. However, the dynamic features of ALFF in SSNHL patients are not elucidated. Our study aims to explore the dynamic ALFF (dALFF) alterations in SSNHL patients, which may help better understand SSNHL as well as identify new functional neuroimaging biomarkers to guide its treatment.

PO-2944

磁共振成像影像组学特征对乳腺癌淋巴血管浸润的预测价值

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目的 探讨基于 MRI 影像组学特征对乳腺癌淋巴血管浸润(LVI)的预测价值。方法回顾性分析 2021 年 1 至 7 月在辽宁省肿瘤医院术前接受 MR 检查且经术后病理证实的乳腺浸润性导管癌患者 216 例, 均为女性, 年龄 27~80 (53 ± 11) 岁, 其中有 LVI 患者 68 例, 无 LVI 患者 148 例。将所有患者按 7:3 比例分成训练集和验证集。基于临床及 MRI 表现提取 LVI 的独立危险因素, 构建临床

特征模型。在动态增强 (DCE) MRI 第二期相及 DWI 中分别勾画肿瘤及瘤周 1 mm 环形带、瘤周 2 mm 环形带、瘤周 3 mm 环形带感兴趣区, 进行影像组学特征提取和筛选, 构建影像组学特征模型。绘制受试者操作特征 (ROC) 曲线评价各模型的诊断效能。结果 表观扩散系数 (ADC) 值 (OR=0.09, 95%CI 0.01~0.97, P=0.047)、腋窝淋巴结肿大 (OR=2.51, 95%CI 1.18~5.37, P=0.017)、瘤周水肿 (OR=2.34, 95%CI 1.15~4.75, P=0.019) 是 LVI 的独立危险因素。依据以上危险因素建立临床特征模型。最终筛选出 10 个影像组学特征构建 DCE-MRI 肿瘤模型, 8 个影像组学特征构建 DCE-MRI 瘤周 1 mm 模型、9 个影像组学特征构建 DCE-MRI 瘤周 2 mm 模型、5 个影像组学特征构建 DCE-MRI 瘤周 3 mm 模型, 8 个影像组学特征构建 DWI 肿瘤模型, 5 个影像组学特征构建 DWI 瘤周 1 mm 模型、10 个影像组学特征构建 DWI 瘤周 2 mm 模型、9 个影像组学特征构建 DWI 瘤周 3 mm 模型。ROC 曲线分析显示, DWI 瘤周 1 mm 模型在训练集和验证集中预测乳腺癌 LVI 状态的 AUC 值最大, 分别为 0.928、0.907, 且与其他模型比较差异均有统计学意义 (P<0.05)。结论 MRI 影像组学特征可以对乳腺浸润性导管癌 LVI 进行有效预测, 且 DWI 瘤周 1 mm 模型对 LVI 状态的预测效能最好。

PO-2945

3D-FIESTA-C 序列显示肘管综合征中弓状韧带价值的研究

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目的: 探讨 3D-FIESTA-C 序列清晰显示肘管综合征患者弓状韧带的全貌走行及与尺神经毗邻关系, 定量测量弓状韧带的厚度, 为临床诊疗肘管综合征提供影像学依据。

方法: 采用 GE Discovery MR 750 3.0T 高场磁共振成像仪, 联合八通道膝关节线圈, 选取 2020 年 10 月—2021 年 5 月天津医院手显微外科收治的 22 例行肘管尺神经松解术的肘管综合征患者, 其中男性 15 例, 女性 7 例, 年龄 49~75 岁, 平均年龄 60.91 ± 7.38 岁。按照解剖部位将弓状韧带分为五个部分, 肱骨内上髁附着部、肱骨内上髁部、尺神经部、鹰嘴部和鹰嘴附着部。以术中所见结果为金标准, 对比 MRI 的显示与术中所见, 计算 3D-FIESTA-C 序列观察弓状韧带在五部分的显示率; 分别计算 3D-FIESTA-C 序列显示弓状韧带全貌的准确度、敏感度、特异度、阳性预测值、阴性预测值及 Kappa 值; 比较 3D-FIESTA-C 序列显示和术中测量弓状韧带尺神经部厚度的一致性。

结果: 22 例临床诊断肘管综合征的患者中, 3D-FIESTA-C 序列观察弓状韧带在肱骨内上髁附着部、肱骨内上髁部、尺神经部、鹰嘴部和鹰嘴附着部的显示率分别为 90.9%、90.9%、90.9%、81.8% 和 68.1%。3D-FIESTA-C 序列显示 2 例弓状韧带缺如; 而术中探查 3 例弓状韧带缺如。3D-FIESTA-C 序列显示弓状韧带全貌的准确度、敏感度、特异度、阳性预测值及阴性预测值分别为 81.8%、79.0%、100%、100% 和 42.9%, Kappa 值=0.51, 该序列显示弓状韧带全貌与术中具有中度的一致性; 尺神经部分别为 95.5%、100%、66.7%、95.0% 和 100%, Kappa 值=0.78, 该序列具有高度的一致性。3D-FIESTA-C 序列和术中测量弓状韧带在尺神经部的厚度分别是 0.58 ± 0.15 mm 和 0.68 ± 0.34 mm, 差异无意义 ($t=0.985$, $P=0.366$) ($P < 0.05$)。

结论: 3D-FIESTA-C 序列可以三维显示肘管弓状韧带的走行变化及与尺神经毗邻的关系, 并可以对肘管内弓状韧带的厚度做定量测量, 对诊断肘管综合征有重要临床意义。

PO-2946

基于 DISCO 的定量 DCE 技术在乳腺良恶性疾病中的诊断价值

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目的：探讨基于笛卡尔采集的 K 空间共享三维容积快速动态成像(DISCO)技术在乳腺良恶性病变诊断中的价值。方法：收集重庆市中医院 2022 年 1 月~2023 年 5 月在放射科行乳腺磁共振增强的 46 例病人的影像资料，所有患者常规行乳腺横断面 T1WI、T2WI 平扫、DWI 扫描及 DISCO 扫描。将收集、扫描数据传输到 GE 后处理工作站(AW 4. 7)，在病变的最大层面勾画感兴趣区(region of interest, ROI)。测量血流动力学参数前向容积转移常数(Ktrans)、每单位体积组织的血管外细胞外间隙容积(Ve)、初始增强曲线下面积(IAUGC)、最大增强斜率(MaxSlope)、对比增强比率(CER)，并运用 ROC 曲线评价参数的诊断价值。结果：与乳腺良性病变比较，乳腺恶性病变的 Ktrans、CER、IAUGC、MaxSlope、Ve 升高($P < 0.05$)。Ktrans、CER、IAUGC、Ve、MaxSlope 诊断乳腺良恶性病变的 ROC 曲线下面积分别为 0.858、0.778、0.795、0.869、0.627，将病理结果作为对照，其诊断乳腺良恶性病变的敏感度分别为 83.8%、94.6%、89.2%、73.0%、86.5%，特异度分别为 74.3%、60.0%、60.0%、40.0%、82.9%。结论：乳腺良恶性病变的血流动力学特征不同，Ktrans、CER、IAUGC、Ve、MaxSlope 对乳腺良恶性病变的诊断具有重要的参考价值。随着技术的进步，DISCO 技术在不影响空间分辨率的条件下时间分辨率亦能得到提高，使得序列处理后能够同时得到病变的更多的参数(包括血流动力学的定量及半定量参数)。其中，DISCO 技术是建立于三维扰相梯度回波的序列基础上，并采用了水脂分离的技术、伪随机变量 K 空间分割的技术及 K 空间共享重建的技术进行数据采集。既往研究中针对乳腺良恶性病变的血流动力学定量及半定量参数研究中同时运用第三方软件及 GE 后处理工作站软件包得到相关参数。

PO-2947

3D TOF-MRA 和 ZTE-MRA 在磁共振脑血管成像中的对比

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目的：比较 3D TOF-MRA 和 ZTE-MRA 技术在脑血管的成像质量。方法：收集重庆市中医院 2022 年 1 月~2023 年 6 月在放射科行脑血管 3D TOF-MRA 及 ZTE-MRA 的 36 例病人的影像资料。将所有数据传送至 GE ADW 4.7 工作站，对原始图像进行后处理。并进行血管可视化及饱和伪影的质量评分，采用 Kappa 检验评估两名阅片者评分的一致性，并使用 Wilcoxon 符号秩检验对两种 MRA 成像的质量评分进行比较。测量并计算图像的信噪比、对比噪声比和对比度，采用配对样本 t 检验评估各项客观评价指标。结果：两名阅片者的质量评分结果具有较强的一致性 ($Kappa > 0.6$)；ZTE-MRA 成像血管可视化的评分与 3D TOF-MRA 无显著差异 ($P > 0.05$)，在饱和伪影方面 ZTE-MRA 成像有显著优势 ($P < 0.05$)；除在动脉瘤介入术后栓塞段成像的信噪比，ZTE-MRA 成像客观评估的各项指标均高于 3D TOF-MRA 成像 ($P < 0.05$)。ZTE-MRA 技术在颈内动脉虹吸部成像、动脉瘤瘤体处成像的 SNR、CNR 及 C 均高于 3D TOF-MRA 技术，在动脉瘤介入术后栓塞段成像的 CNR 及 C 均高于 3D TOF-MRA 技术，且两者差异均具有统计学意义 (P 均 < 0.05)。结论：ZTE-MRA 与传统 3D TOF-MRA 成像技术相比，脑血管的成像质量明显提高。本次研究中，我们发现 ZTE-MRA 技术在颈内动脉虹吸部成像效果较 3D TOF-MRA 有着明显的优势；而在 ZTE-MRA 序列所有病例的颈内动脉虹吸段均呈现均匀的高信号，且边缘清晰光整；但 3D TOF-MRA 在其余血管平直部位的血管边缘显示更为清晰锐利，且对血管远端末梢小分支的显示比 ZTE-MRA 更清晰；同时 ZTE-MRA 成像的背景存在一定的颗粒感。此外，我们收集的 3 例颈内动脉虹吸部动脉瘤的成像中，

较 3D TOF-MRA, ZTE-MRA 成像显示的瘤体更清晰, 内部信号也更均匀。同时, 在 2 例动脉瘤介入术后栓塞段后病人的影像中, ZTE-MRA 较 3D TOF-MRA 显示的磁化率伪影更少, 从而更清晰地准确地显示载瘤血管结构和评估栓塞治疗效果。

PO-2948

DCE-MRI 成像联合临床及血管病理参数预测 早期宫颈癌淋巴结转移

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目的: 研究 DCE-MRI 定量参数联合临床因素及微血管密度(microvessel density, MVD)和周细胞覆盖率 (microvessel pericyte coverage index, MPI) 预测早期宫颈癌淋巴结转移 (lymph node metastasis, LNM) 的价值。方法: 回顾性分析 85 例接受 DCE-MRI 和病理免疫组化检查的早期宫颈癌病例, LNM 阳性组 43 例, LNM 阴性组 42 例。应用 Extended Tofts Linear 双室模型获取宫颈癌原发灶 DCE-MRI 定量参数 (Ktrans、Kep、Ve); 使用 CD34 和 α -平滑肌肌动蛋白 (α -SMA) 进行免疫组织化学双染色分别量化宫颈癌 MVD 和 MPI。比较 LNM 阳性组与阴性组间临床因素、DCE-MRI 各定量参数及 MVD 和 MPI, 并分析这些因素与 LNM 的关系。结果: LNM 阳性组与阴性组间脉管癌栓 ($p=0.003$)、2009FIGO 分期 ($p=0.019$) 差异具有统计学意义; 两组间年龄 ($p=0.323$)、肿瘤最大径 ($p=0.168$)、病理类型 ($p=0.527$) 及分化程度 ($p=0.840$) 无显著差异。LNM 阳性组 Ktrans、Kep 显著高于阴性组 (P 均 <0.01), Ve 在两组间差异无统计学意义。LNM 阳性组 MPI 明显低于阴性组 ($P<0.01$); MVD 在两组间差异无统计学意义。由 Ktrans、MPI、脉管癌栓及 2009FIGO 分期构成的联合预测模型诊断效能高于单独的 DCE-MRI 定量参数, AUC 为 0.876。结论: DCE-MRI 定量参数联合临床因素及 MPI 在评估早期宫颈癌淋巴结转移方面具有一定的预测价值。

PO-2949

DCE-MRI 成像及微血管密度、周细胞覆盖率与 宫颈癌淋巴结转移的相关性研究

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【摘要】目的: 研究 DCE-MRI 定量参数和微血管密度(microvessel density, MVD)、周细胞覆盖率 (microvessel pericyte coverage, MPI) 在宫颈癌淋巴结转移中的诊断价值; 探讨 DCE-MRI 定量参数与 MVD、MPI 的相关性。方法: 85 例经病理证实的宫颈癌患者接受 DCE-MRI 和病理免疫组化检查, 应用 Extended Tofts Linear 双室模型获取 DCE-MRI 定量参数 (Ktrans、Kep、Ve), 使用 CD34 和 α -平滑肌肌动蛋白 (α -SMA) 免疫组织化学双染法进行染色分别量化 MVD 和 MPI; 采用 Mann-Whitney U 检验比较淋巴结转移组与无转移组间 DCE-MRI 各定量参数、MVD 及 MPI 值, 应用受试者工作特征曲线(receiver operating characteristic, ROC)分析 DCE-MRI 各定量参数诊断淋巴结转移的能力; 应用 Spearman 秩相关分析 DCE-MRI 各定量参数与 MVD、MPI 的相关性。结果: 宫颈癌淋巴结转移组 Ktrans、Kep 高于无转移组 (P 均 <0.01); Ve 在两组间无统计学意义差异 ($P>0.05$)。淋巴结转移组 MPI 低于无转移组 ($P<0.01$); MVD 在两组间无明显差异 ($P>0.05$)。ROC 曲线分析结果显示 Ktrans、Kep 在诊断淋巴结转移中其曲线下面积(area under the curve, AUC)分别为 0.773 (95%CI: 0.674~0.872)、0.719 (95%CI: 0.611~0.827)。DCE-MRI 各定量参数与

MVD 均无明显相关关系 (P 均 > 0.05)。DCE-MRI 定量参数 K_{trans} 、 K_{ep} 分别与 MPI 呈负相关 ($r = -0.410$, $P = 0.000$; $r = -0.308$, $P = 0.004$); V_e 与 MPI 无明显相关关系 ($P > 0.05$)。结论: DCE-MRI 定量参数及 MPI 在宫颈癌淋巴结转移的评估中有一定的诊断价值。DCE-MRI 定量参数可以为宫颈癌 MPI 提供有价值的信息。

PO-2950

基于 SWI 评估脑小血管病患者的认知功能障碍

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目的: 脑小血管病(cerebral small vessel disease, CSVD)是指脑内小血管受到各种病因作用而引发的病理、影像、临床综合征。磁敏感加权成像(susceptibility-weighted imaging, SWI)可用于评估 DMV。本研究旨在应用 SWI 来探究 DMV 与 CSVD 总负荷之间的关系, 并探讨 DMV 评分与 CSVD 患者的认知功能障碍的相关性。

方法: 回顾性分析我院接受脑 MRI 检查的 28 例 CSVD 患者的临床和影像学资料。应用 SWI 相位图得出 DMV 评分。应用国际通用的 CSVD 评分量表对 CSVD 总负荷进行评分。在磁共振液体衰减反转恢复 (FLAIR) 序列图像上进行脑白质高信号 (WMH) Fazekas 评分。依据简易精神状态检查量表 (MMSE) 将患者分为存在认知障碍(cognitive impairment, CI)(MMSE 评分 < 27)及认知功能正常组(MMSE 评分 ≥ 27)。应用多元有序 Logistic 回归分析 DMV 评分及其他相关因素与 CSVD 负荷的关系。应用 Spearman 相关分析对 DMV 评分与 WMH 进行相关性分析。明确 MMSE 与 WMH、CSVD 评分之间的相关性, 探讨 CSVD 患者存在 CI 的危险因素。

结果: CSVD 总负荷组间单因素分析得出 DMV 评分 ($P < 0.001$) 在三组间的差异性显著, 具备统计学意义。在校正其他相关因素后, 有序 Logistic 回归分析表明 DMV 评分增高是 CSVD 总负荷严重程度的独立相关因素 ($P = 0.04$)。Spearman 相关分析结果表明 DMV 评分与 WMH 呈正相关 ($r = 0.914$, $P < 0.001$), WMH ($r = -0.820$, $P < 0.001$)、CSVD 评分 ($r = -0.720$, $P < 0.001$) 均与 MMSE 评分呈负相关。

结论: 基于 SWI 的 DMV 评分是 CSVD 的潜在影像指标, 并与 CSVD 患者认知功能障碍相关。

PO-2951

非增强 MR 淋巴管成像在原发性乳糜尿中的诊断价值初探

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目的 探讨非增强 MR 淋巴管成像在原发性乳糜尿诊断中的应用价值。

方法 回顾性收集确诊为原发性乳糜尿患者 55 例, 所有患者均行 MRL 检查, 所有 MRL 影像图像均由 2 位放射科医师分别进行阅片, 意见不同时经讨论达成一致, 并记录最终诊断结果。统计指标包括: ①双髂、双侧腰干、双侧肾窦、胸导管、双侧支气管纵隔干、双侧颈干、双侧锁骨下干等淋巴管形态及扩张情况; ②泌尿系统及胸腹盆部淋巴管异常情况。对于原发性乳糜尿患者 MRL 征象采用分类变量资料中的构成比进行统计描述。

结果 55 例原发性乳糜尿中, 45 例 (81.8%) 左侧髂淋巴管扩张, 34 例 (61.8%) 右侧髂淋巴管扩张, 54 例 (98.2%) 腹膜后淋巴管扩张, 53 例 (96.4%) 左侧腰干扩张, 34 例 (61.8%) 右侧腰干扩张, 15 例 (27.3%) 左侧支气管纵隔干扩张, 7 例 (12.7%) 右侧支气管纵隔干扩张, 9 例

(16.4%) 左侧颈干扩张, 10 例 (18.2%) 右侧颈干扩张, 23 例 (41.8%) 左侧锁骨下干扩张, 15 例 (21.3%) 右侧锁骨下干扩张, 50 例 (90.9%) 胸导管末端扩张, 52 例 (94.5%) 右侧胸导管扩张, 21 例 (38.2%) 左侧肾窦淋巴管扩张, 18 例 (32.7%) 右侧肾窦淋巴管扩张, 9 例 (16.4%) 盆腔淋巴管扩张, 6 例 (10.9%) 肠系膜淋巴管扩张, 3 例 (5.5%) 会阴淋巴管扩张, 2 例 (3.6%) 膀胱淋巴管扩张, 1 例 (1.8%) 胰周淋巴管扩张, 8 例 (14.5%) 脾脏囊性病灶, 3 例 (5.5%) 骨骼囊性病灶。

结论 MRL 能清晰显示原发性乳糜尿的腹部中央淋巴管的异常情况, 并且能够进一步显示胸部淋巴干、胸导管末端及右淋巴导管异常扩张的部位及程度。

PO-2952

合成磁共振成像技术对肿块型浆细胞性乳腺炎及乳腺癌的鉴别诊断价值

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【摘要】目的 探讨合成磁共振成像(synthetic magnetic resonance imaging, SyMRI)定量参数对肿块型浆细胞性乳腺炎(plasma cell mastitis, PCM)及乳腺癌(Breast cancer, BC)的鉴别诊断价值。**材料与方法** 回顾性分析 2021 年 6 月至 2022 年 12 月因乳腺肿物在重庆市中医院就诊并经病理证实的 56 例肿块型 PCM 及 63 例乳腺癌患者的磁共振成像资料。除常规磁共振扫描序列外, 所有患者均行 SyMRI 序列扫描。使用 GE AW4.7 工作站生成 SyMRI 的 T1 图、T2 图以及质子密度(proton density, PD)图, 通过勾画感兴趣区, 获得病灶平扫 T1、T2 和 PD 值。采用独立样本 t 检验比较肿块型 PCM 及 BC 病灶各参数值的差异, 并采用受试者工作特征(receiver operator characteristic curve, ROC)曲线评估各参数的诊断效能。结果 肿块型 PCM 的 T1、T2 中位数(1608.08ms、109.45ms)均高于乳腺癌组(1389.17ms、86.35ms), 差异均具有统计学意义($P < 0.05$)。肿块型 PCM 及乳腺癌肿块 PD 值差异无统计学意义。以 T1 值=1491.82ms、T2 值=91.09ms 为界值, 鉴别肿块型 PCM 和乳腺癌的 ROC 曲线下面积分别为 0.89、0.78, 准确度分别为 82.5%、79.3%, 灵敏度分别为 78.6%、91.9%, 特异度分别为 89.6%、57.9%。结论 SyMRI 定量参数 T1、T2 有助于鉴别肿块型 PCM 及乳腺癌。

PO-2953

胸椎横断位 T1 压脂增强磁共振成像图像质量的对比研究: radial k 空间采样脉冲序列 vs. 传统笛卡尔 k 空间采样脉冲序列

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目的: 对比 radial k 空间采样脉冲序列与传统笛卡尔 k 空间采样脉冲序列在胸椎 T1 压脂增强磁共振成像图像质量方面的差异。

方法: 前瞻性收集分析 2023 年 4 月至 2023 年 7 月在我院行胸椎 3.0T 增强磁共振检查的椎体肿瘤患者 28 例。每位患者均行增强后 2D T1 TSE 抑脂序列、屏气 3D GRE 抑脂序列及自由呼吸 3D VANE xd (层面内 Radial 填充) 序列的扫描。对三组图像的图像质量进行客观和主观评价。测量病灶最大层面图像的对比噪声比(contrast to noise ratio, CNR), 并进行客观对比评价。由 2 名有经验的放射科医师依据 4 分李克特量表(Likert scale)对图像伪影、椎体及病灶显示清晰度、图像整体质量等三个方面进行双盲评价。对比不同序列下图像的 CNR 及图像主观指标评分结果的差异。

结果: 自由呼吸 3D VANE xd 序列图像的 CNR 显著优于其他两组序列图像 (p 均 <0.01)。在对抗伪影方面, 自由呼吸 3D VANE xd 序列 (4[3.75-4]) 及屏气 3D GRE 抑脂序列 (3.75[3.5-4]) 的评分均显著优于 2D T1 TSE 抑脂序列 (3 [2.75-3.25]; 在椎体及病灶显示清晰度方面, 自由呼吸 3D VANE xd 图像的评分显著高于其他两者 (p 均 <0.01); 且自由呼吸 3D VANE xd 序列的图像整体质量评分显著高于其他两组 (p 均 <0.01)。

结论: 运用自由呼吸 radial k 空间采样脉冲序列 (3D VANE xd) 可提高胸椎横断位 T1 压脂增强磁共振成像的图像质量。

PO-2954

MRI 对乳腺癌患者新辅助化疗治疗效果的评价价值

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目的 研究 MRI 对乳腺癌新辅助化疗治疗效果的评价作用。方法 回顾性分析 2019 年 1 月至 2021 年 12 月我院收治的 96 例乳腺癌患者临床资料。根据病理结果将全部患者分为新辅助化疗有效组 ($n=68$) 和无效组 ($n=28$)。比较两组新辅助化疗前后 MRI 测量的病灶最大直径、表观弥散系数 (apparent diffusion coefficient, ADC) 和时间-信号强度曲线 (time-intensity curve, TIC) 类型。使用 kappa 一致性比较 MRI 和病理诊断的诊断一致性。结果 MRI 对 98 例乳腺癌新辅助化疗效果判断的灵敏度为 0.957, 特异度为 0.926, 准确度为 0.948。MRI 检查与病理诊断结果一致性分析, 可见 Kappa 值 = 0.873 ($P=0.000$)。新辅助化疗后无效组和有效组的病灶最大直径较化疗前均减小 ($P<0.05$), 但无效组肿瘤的 ADC 值变化无统计学差异 ($P>0.05$), 有效组病灶的 ADC 值显著升高 ($P<0.05$)。新辅助化疗后 TIC III 型患者比例显著降低, 而 I 型患者比例明显升高 ($P<0.05$)。结论 MRI 可以显示乳腺癌病灶的最大直径、ADC 和 TIC 类型, 是评价乳腺癌新辅助化疗疗效的可靠方法。

PO-2955

脑小血管病总体负担与视网膜微血管异常的相关性研究

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【目的】探讨脑小血管病 (CSVD) 视网膜微血管异常相关指标与 CSVD 总体负担的相关性。

【方法】纳入符合《中国脑小血管病诊治专家共识 2021》的行头颅 MRI 及 OCTA 检查的患者, 对 CSVD 总体负担进行评分, 将研究对象分为低分组 (1-2 分)、高分组 (3-4 分), 同时纳入 0 分患者做对照组。将 OCTA 图像导入后处理工作站, 通过计算获得 OCTA 指标。采用 SPSS 25.0 统计学软件进行统计分析。

【结果】最终纳入 CSVD 患者 110 例和对照组 40 例。

1. CSVD 三组患者基线资料比较:

三个亚组间比较, 性别、年龄、高血压、饮酒、HCY 差异均有统计学意义 ($P<0.05$)。

2. CSVD 三组患者 OCTA 指标比较:

在黄斑区血管密度中, 除中层中央、其余差异均有统计学意义; 在黄斑区灌注密度差异均有统计学意义; 在 FAZ 全层中均有统计学意义; 在视盘血管密度中, 除 RPC 全部及内视盘, 其余差异有统计学意义; 在视盘灌注密度中, 视乳头层全部、内视盘、下侧及 RPC 全部、内视盘、下侧、上侧差异有统计学意义。

3. CSVD 总体负担评分与 OCTA 指标的相关性分析:

Pearson 相关性分析显示, 对于临床基线资料, 年龄、HYC 与 CSVD 呈弱相关; 对于黄斑区血管密度, 表层及深层中央与 CSVD 负担评分呈正相关; 对于黄斑区灌注密度, 表层中央、内环及深层中央与 CSVD 负担评分呈正相关; 对于视盘血管密度, 除视乳头层内视盘, 其余差异有统计学意义的与 CSVD 负担评分呈正相关; 对于视盘灌注密度, 视乳头层下侧、RPC 下侧与 CSVD 负担评分呈正相关。

4. OCTA 指标对 CSVD 高负担评分的诊断预测价值:

ROC 分析显示, 在黄斑区血管密度中, 对 CSVD 高负担评分发生风险预测从大到小依次是中层内环、深层全部、表层中央; 在黄斑区灌注密度中从大到小依次是中层外环、表层中央; 在视盘血管密度中从大到小依次是 RPC 下侧、鼻侧、颞侧及上侧、视乳头层颞侧、下侧及上侧。

【结 论】本研究显示中层内环和深层全部的黄斑区血管密度、中层外环的黄斑区灌注密度对 CSVD 高负担评分具有较好的预测效能。

PO-2956

优化髋关节磁共振成像: 利用基于深度学习的重建技术提高图像质量并增强观察者之间的一致性

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背景: 传统的髋关节磁共振成像扫描需要较长的扫描时间, 给患者的舒适度和临床效率带来了挑战。以前, 加速成像技术受限于噪声和分辨率之间的权衡。利用基于深度学习的重建 (DLR) 有可能在不影响图像质量的情况下缩短扫描时间。

目的: 我们的研究旨在探索深度学习 (DL) 重建的磁共振成像在加速髋关节成像中的可行性, 并将其性能与标准核磁共振成像中的传统重建和无深度学习的加速成像 (No-DL MRI) 进行比较。

方法: 我们选取了接受 DL-MRI、传统 MRI 和无 DL MRI 检查的 60 名患者进行图像质量评估。评估中考虑的关键指标包括扫描时间、整体图像质量、相对信噪比 (rSNR)、相对对比噪比 (rCNR) 和诊断效果的定量评估。两名经验丰富的放射科医生采用 5 分制 (5 分表示最高质量) 独立评估图像质量。为了衡量各组图像中病理评估的观察者间一致性, 我们采用了加权 Kappa 统计法。此外, 我们还采用了 Wilcoxon 符号秩检验来比较图像质量以及 rSNR 和 rCNR 的定量测量结果。

结果: DL-MR 显著缩短了 T2 fs Cor 和 T2 fs Axi 的扫描时间, 与传统磁共振成像所需的 3 分 32 秒相比, 仅需 1 分 11 秒, 缩短了约 66.5%。与传统磁共振成像和无 DL 磁共振成像相比, DL-磁共振成像在冠状 T2WI 和轴向 T2WI 方面始终表现出更高的图像质量。在比较 rSNR 时, 除测量髋臼之外, DL-MRI 的 T2 fs Cor 和 T2 fs Axi 始终优于 No-DL MRI。rCNR 数据显示, 与无 DL MRI 相比, DL-MRI 的 T2 fs Cor 有明显改善, 但 DL-MRI 与无 DL MRI 的 T2 fs Axi 没有明显差异。其中软骨下骨的 rCNR 结果在 T2 fs Axi 中无差异, 髋臼 rCNR 在 T2 fs Axi 中也无明显差异。

结论: 与传统磁共振成像相比, 髋关节的 DL-MRI 可大大缩短扫描时间, 同时提高 T2WI 的成像质量。虽然不同读者对传统磁共振成像和 DL-MRI 的病变检测能力存在差异, 但是观察者之间的一致性表明 DL MRI 整体上有所改善。

PO-2957

新的肝脏铁定量方法——吡啶菁绿结合磁共振扫描

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目的：铁元素是人体必需的微量元素，当机体发生铁元素代谢失衡，就会导致铁缺乏、铁过载，其中铁过载会导致多器官功能障碍，其中肝脏最常见。吡啶菁绿（ICG）是一个安全的常用药物，主要在肝脏代谢，近年来有研究表明其可与肝脏内铁元素结合，其结合物的 MRI-T₁ 值会明显升高，而与铁过载密切相关的疾病有地中海贫血、遗传性血色病、再生障碍性贫血、慢性肝炎等疾病及一些需要反复输血治疗的疾病，其可与铁过载形成恶性循环，一个准确的铁定量方法不仅可以有效指导临床进行祛铁治疗，更是保证铁过载患者的生命健康重要因素。本研究旨在探究吡啶菁绿结合磁共振 T₁ 扫描技术精确定量肝脏铁元素的可行性。材料与方法：对 3-6 月龄新西兰雄性家兔皮下注射铁剂造模，造模成功后，注射 ICG 并进行 MRI 动态扫描，分析 MRI-T₁ 值的变化，寻找与基线差值最大的时间点作为最佳扫描时间，并将最佳时间点的 T₁ 值与 MRI-T₂* 进行比对，推导肝脏铁含量与 ICG+MRI-T₁ 值之间的关系。结果：T₁ 信号比（T₁SIR，表示肝脏 T₁ 值/竖脊肌 T₁ 值）变化率的各个时间点分别与 0min 的配对 t 检验，结果显示 120min 与 0min 的差异具有统计学意义（ $p < 0.05$ ），15min、30min、60min 与 0min 差异均无统计学意义（ $p > 0.05$ ）；T₁SIR 变化率与 T₂* 值具有相关性（ $r=0.950$ ， $p=0.05$ ）；线性回归所推导的公式为： $y=5.532+54.333x$ （ y 表示 T₂*， x 表示 T₁SIR 变化率， $F=18.566$ ， $p=0.05$ ）。结论：注射 ICG 后进行 MRI 扫描，会延长铁过载肝脏 T₁ 值，且在 2h 达到最大差值；T₁SIR 变化率与 T₂* 具有相关性，且推导出的公式可间接推算肝脏铁含量。

PO-2958

DKI 比值法对肌层浸润性膀胱癌的诊断价值

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目的 探讨扩散峰度成像（DKI）比值法对肌层浸润性膀胱癌的诊断价值。方法 回顾性分析经病理证实的 73 例膀胱尿路上皮癌患者的 MRI 资料。患者术前均行常规 DWI、DKI 检查。2 名放射科医师独立测量膀胱癌（BCa）及闭孔内肌的扩散参数，包括平均表观扩散系数（ADCmean）、平均扩散峰度（MK）、平均扩散系数（MD）。BCa 和闭孔内肌的扩散参数分别以 ADCtumor、MDtumor、MKtumor、ADCmuscle、MDmuscle、MKmuscle 表示。以闭孔内肌作参照，分别计算 BCa 与闭孔内肌对应 3 个扩散参数的比值（包括 ADCratio、MDratio、MKratio）。采用 Mann-Whitney U 检验分别比较 MIBC 与非肌层浸润性膀胱癌（non-muscle invasive bladder cancer, NMIBC）之间扩散参数及扩散参数比值的差异。以手术后病理结果为标准，利用受试者工作特征（receiver operating characteristic, ROC）曲线评估 ADCtumor、MDtumor、MKtumor、ADCratio、MDratio、MKratio 诊断 MIBC 的效能；采用 DeLong 检验比较各模型曲线下面积（area under the curve, AUC）之间的差异。结果 MIBC 组的 ADCtumor、MDtumor、ADCratio、MDratio 值均低于 NMIBC 组（ $P < 0.05$ ），而 MKtumor、MKratio 值高于 NMIBC 组（ $P < 0.05$ ）。ROC 曲线分析表明，ADCratio、MDratio、MKratio 诊断 MIBC 的 AUC 分别为 0.748、0.828、0.938（ $p < 0.05$ ）。与 MKtumor 相比，MKratio 诊断 MIBC 的效能显著提升（从 0.765 提高到 0.938， $P < 0.05$ ）。MKratio 为 0.65 时诊断 MIBC 的 AUC 较高（0.938），敏感度，特异度分别为 88.00%、91.67%。结论 DKI 比值法可用于诊断 MIBC。MKratio 有望在术前诊断 MIBC 方面发挥重要作用。

PO-2959

血管源性脑白质高信号患者的合成 MRI 成像研究

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目的:血管源性脑白质高信号 (WMH) 是脑小血管病的重要影像学特征之一, 会导致认知功能损伤。其主要病理改变为脱髓鞘, 然而 WMH 旁的白质区可能同样存在髓鞘丢失。本研究应用合成 MRI 成像的纵向弛豫时间 (T1) 值、横向弛豫时间 (T2) 值和质子密度 (PD) 研究 WMH 患者病灶区和灶周白质区髓鞘丢失情况, 并探索弛豫时间和质子密度改变与认知功能的关系。

方法: 本研究共纳入 WMH 患者组 39 例, 健康对照组 20 例。所有被试者进行一般资料采集, 神经心理学评估如蒙特利尔认知评估、听觉词语学习测验、连线测验 A 和 B、数字广度测验, 接着被试者均通过相同的 MR 扫描方案采集合成 MRI 数据。根据患者的合成 T2-Flair 序列对每个患者选取病灶、灶周白质进行 ROI 勾画, 并选取健康对照组正常脑白质区进行 ROI 勾画。分别从 T1、T2、PD 定量图上获取相应值。使用方差分析 (ANOVA) 对患者组的病灶、灶周白质和健康对照组的 T1、T2、PD 值进行组间比较。通过相关分析评估 WMH 患者的各定量参数值与认知评分之间的相关性。

结果: 1、39 个患者的 ROI 总数为 660 个: 包括病灶 165 个, 灶周白质 495 个, 20 个健康对照的 ROI 总数为 160 个。与灶周白质组和健康对照组相比, 病灶的 T1、T2 和 PD 均有所增加 ($P < 0.001$); 灶周白质与健康对照组相比, T2 值明显增加 ($P = 0.002$); 2、T1 值、T2 值、PD 值分别与认知评分做相关性分析, 发现病灶的 T2 值与认知评分呈负相关 ($r = -0.361$, $P = 0.024$), 灶周白质组的 T2 值与认知评分呈负相关 ($r = -0.522$, $P < 0.001$)。

结论: SyMRI 可以提供多个参数定量评估 WMH 患者的病灶及病灶旁白质损伤情况, 其中 T2 值较其他参数敏感, 同时病灶区的 T2 值以及灶周白质区的 T2 值可为 WMH 患者评估认知障碍提供有价值的信息。

PO-2960

QSM 对轻微型肝性脑病脑铁沉积的 定量研究

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目的 采用 QSM 测量轻微型肝性脑病 (minimal hepatic encephalopathy, MHE) 患者额叶白质及深部灰质核团的磁敏感值, 分析 MHE 患者脑铁分布情况及脑铁沉积与认知障碍之间的关联, 探究 QSM 在评估轻微型肝性脑病方面的应用。

材料与方法 研究对象为我院感染科住院部确诊为乙肝后肝硬化的病人, 采用数字符号试验 (digit symbol test, DST) 和数字连接试验 A (number connection test- A, NCT- A) 将其分为 MHE 组及单纯肝硬化组, 另纳入 30 名年龄、性别相匹配的正常自愿者为健康对照组, 使用 SMART 软件进行后处理获得 QSM 图, 利用 SPIN 软件在 QSM 图上人工绘制双侧尾状核、壳核、苍白球、丘脑、黑质、红核及双侧额叶白质等 7 对 ROI, 并测量 ROI 的磁敏感值。

结果

1. 与健康对照组相比, MHE 组双侧壳核、双侧苍白球、左侧尾状核、右背侧丘脑、右侧红核、左侧黑质、左侧齿状核、右侧额叶白质的磁敏感值显著增加 (均 $P < 0.05$); 与肝硬化组对比, MHE 组右背侧丘脑、左侧尾状核、右侧红核、左侧黑质、左侧齿状核、右侧额叶白质的磁敏感值增加 (均 $P < 0.05$); 单纯肝硬化组与健康对照组对比, 双侧苍白球的磁敏感值增加 ($P < 0.05$)。

结论

1. 利用 QSM 技术测得的磁敏感值与文献报道的湿重脑组织的铁浓度呈正相关, 提示磁敏感值能够间接反应实际铁含量, QSM 对脑内结构中的铁质进行定量测量具有可行性。

3. MHE 病人左尾状核、右背侧丘脑、右侧红核、左侧黑质、左侧齿状核、右侧额叶白质的铁含量均高于正常对照组及单纯肝硬化组，单纯肝硬化组双侧苍白球的铁含量较正常对照组增高。

PO-2961

脑小血管病 MRI 总负荷与认知功能减退的相关性

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目的探究脑小血管病 (CSVD) MRI 总负荷与认知功能减退的相关性。方法选取 2023-07—2022-09 我院收治的 CSVD 患者 23 例，收集患者临床资料及头颅磁共振影像学图片，根据 Fazekas 量表对患者图像脑白质信号进行分级，统计 CSVD MRI 总负荷，根据负荷得分划分分组：0~2 分为低负荷，3~4 分为高负荷。对比低负荷组、高负荷组患者简易智力状态检查量表 (MMSE)、蒙特利尔认知评估量表 (MoCA)、建议精神状态检查量表 (MMSE)，使用 Spearman 相关性绘图尝试分析 CSVD MRI 总负荷评分与 MMSE 的关系。结果经整理负荷分值，23 例 CSVD 患者中 0~2 分 10 例 (低负荷组)，3~4 分 13 例 (高负荷组)。低负荷组与高负荷组在性别、糖尿病史一般资料上比较无统计学差异 ($P>0.05$)，高负荷组合并高血压、高血脂比例高于低负荷组，年龄大于低负荷组 ($P<0.05$)。高负荷组 MMSE、MoCA 各项目评分及总分均低于低负荷组 ($P<0.05$)；高负荷组 NIHSS、CSS 评分均高于低负荷组 ($P<0.05$)。Spearman 结果提示 CSVD MRI 总负荷评分与 MMSE ($r=-0.633$, $P<0.001$)、MoCA 均呈负相关 ($r_{MMSE}=-0.633$, $r_{MoCA}=-0.614$, P 均 <0.001)。结论 CSVD MRI 总负荷与认知功能、神经功能恶化之间密切相关，随着 MRI 总负荷评分增加，CSVD 患者认知能力、神经功能越差。通过分级量化 CSVD MRI 总负荷，可为临床评估患者脑小血管病变严重程度、制定诊疗计划有重要参考作用。

PO-2962

基于沿血管周围间隙扩散张量成像技术的早期帕金森病患者脑内类淋巴系统循环功能改变的研究

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目的：本研究旨在探讨早期帕金森病患者类淋巴系统循环功能改变及其与临床特征的关系。方法：选择山东第一医科大学附属省立医院 (山东省立医院) 神经内科自 2019 年 6 月至 2023 年 6 月收治的早期帕金森病 ($H-Y\leq 2.5$) 患者 27 例，对于所有帕金森病患者均由神经内科医生完成 H-Y 分期和国际统一帕金森病评分量表第三部分 (UPDRSⅢ) 评分。另外招募健康志愿者 27 例作为正常对照组。所有患者及健康志愿者均采集扩散张量成像 (DTI) 数据并计算沿血管周围间隙扩散张量成像 (DTI-ALPS) 指数，比较患者与健康志愿者 ALPS 值的差异，采用 Pearson 相关与 Spearman 相关分析检验早期帕金森病患者 ALPS 指数与临床特征的相关性。结果：健康志愿者组 (HC) 与早期帕金森病组 (PD) 之间在年龄、性别 (HC：男 13 人，PD：男 14 人) 方面无统计学差异。与健康志愿者 (左侧 ALPS: 1.62 ± 0.17 右侧 ALPS: 1.67 ± 0.21 双侧 ALPS: 1.64 ± 0.19) 相比，早期帕金森病患者双侧 ALPS (左侧 ALPS: 1.40 ± 0.18 右侧 ALPS: 1.40 ± 0.16 双侧 ALPS: 1.40 ± 0.16) 均显著减低，差异具有统计学意义 ($p<0.001$)。早期帕金森病患者双侧 ALPS 值与年龄呈负相关 ($r=0.27$, $p=0.0056$)，健康志愿者组 ALPS 值与年龄无明显相关关系。采用 Pearson 相关与 Spearman 相关分析早期帕金森病患者 ALPS 指数与 UPDRSⅢ评分、H-Y 分期的相关性，双侧 ALPS 与 UPDRSⅢ、H-Y 分期均呈负相关 ($r=0.27$, $p=0.0056$ ；

$r=0.43$, $p<0.05$)。ROC 曲线分析显示, 双侧 ALPS 指数较单侧 ALPS 指数(左侧 AUC:0.829, 右侧 AUC:0.851)诊断效能更好, AUC 为 0.855。

结论: 相较于健康志愿者, 早期帕金森患者双侧 ALPS 指数均降低, 且 ALPS 指数与早期帕金森病患者年龄、UPDRSⅢ评分、H-Y 分期等临床特征呈负相关, 因此 ALPS 可以作为帕金森病早期诊断与评估进展的潜在影像标志物。

PO-2963

多回波 Dixon 技术定量输血依赖性疾病肝脏铁沉积的应用价值

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目的: 铁沉积是一种常见的全身多系统疾病, 包括遗传引起的原发性铁过载(如遗传性血色素沉着症)和外源性引起的继发性铁过载(如重型地中海贫血或再生障碍性贫血等血液病)。基于磁共振成像(MRI)的多回波梯度回波序列(ME-GRE)已常规用于监测铁沉积的严重程度并且是指导铁螯合治疗的标准, 但其存在需要第三方软件离线后处理、手动曲线拟合、报告延迟及额外收费等缺陷。目前, MRI 供应商所开发的多回波 Dixon 技术(qDixon)可直接生成 $R2^*$ 弛豫图, 直接勾画 ROI 即可获取 $R2^*$ 值。因此, 本研究的目的是以 FerriScan 的肝脏铁浓度(LIC)作为参考标准, 比较 qDixon 技术和基于 ME-GRE 的 $R2^*$ 弛豫测定法在评估肝脏铁含量的差异。

方法: 本研究前瞻性收集 2022 年 6 月至 2023 年 6 月就诊于广西医科大学第一附属医院输血依赖型地中海贫血 40 名, 轻度肝脏铁沉积 1 例, 中度肝脏铁沉积 8 例, 重度肝脏铁沉积 32 例。所有患者均同时接受 FerriScan 技术、ME-GRE 序列及 qDixon 序列扫描, 分别获得肝脏实际铁浓度和两种序列对应的 $R2^*$ 值, 分别记为 $R2^*$ 值、 $dR2^*$ 值。以 FerriScan 的肝脏铁浓度(LIC)作为参考标准, 采用 spearman 法分析 $R2^*$ 值、 $dR2^*$ 值与 LIC 的相关性, 并分析 $R2^*$ 值、 $dR2^*$ 值的相关性, 同时采用 Bland-Altman 图比较 ME-GRE 序列及 qDixon 序列所测 $R2^*$ 值的差异。

结果: qDixon 序列所测的 $dR2^*$ 值与 LIC、ME-GRE 所测 $R2^*$ 均具有高度相关性(r 值分别为 0.8512、0.9693, $P<0.0001$), Bland-Altman 图显示 qDixon 序列与 GRE 序列所测 $R2^*$ 的平均差异为 25.53 1/S ($SD=90.23$), 当 $LIC<20\text{mg/g}$, 测值结果均聚集在零偏倚线周围, 随着 LIC 的增高, 在 Bland-Altman 图上显示一致性变差, 部分结果越过了一致性的上限。

结论: 与 ME-GRE 序列及 FerriScan 技术相比, qDixon 技术能够实现轻中度铁沉积的定量, 无需离线后处理, 可进一步优化临床工作流程, 但对肝脏重度铁沉积的程度会存在低估。

PO-2964

术前 PI-RADS v2.1 与前列腺癌根治术后 Gleason 评分变化的关系

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目的: 穿刺 Gleason 评分(biopsy Gleason score, bGS)有时与相应的根治性前列腺切除术后 Gleason 评分(Gleason score after radical prostatectomy, pGS)不一致。因此, 本研究目的是探究前列腺影像报告和数据系统 2.1 版本(prostate imaging reporting and data system version 2.1, PI-RADS v2.1)与术前、术后 Gleason 评分变化之间的关系。材料与方法: 连续收集我院 2015 年 1 月至 2021 年 12 月收治的 225 例前列腺病例的临床及 MRI 资料。所有患者均行术前超声引导下的经会阴穿刺活检和根治性前列腺切除术。分析影响 bGS 与 pGS 不一致的因素。通过受试者工作特征曲线分析, 计算曲线下面积(areas under the curve, AUC), 确定术前临床变量和 PI-RADS

v2.1 预测术后 Gleason 评分升级的诊断效能。结果：术后 Gleason 评分升级的有 91 例（40.4%），Gleason 评分降级的有 45 例（20%），bGS 与 pGS 相同的有 89 例（39.6%）。单因素分析显示年龄、阳性穿刺针数、bGS 和 PI-RADS v2.1 评分能够影响术后 Gleason 评分改变（P 值均 <0.05 ）。进一步多元回归分析显示，阳性穿刺针数 ≥ 4 针、bGS <7 、PI-RADS v2.1 评分 ≥ 4 分是术后 Gleason 评分升级的独立预测因子（P 值均 <0.05 ）。阳性穿刺针数、bGS、PI-RADS v2.1 评分预测 Gleason 评分升级的 AUCs 值分别为 0.713、0.637、0.611。联合诊断模型的 AUC 值为 0.817，均大于上述三个预测因子的 AUCs 值（P 值均 <0.001 ）。结论：阳性穿刺针数、bGS 和 PI-RADS v2.1 评分有助于预测术后 Gleason 评分升级，通过联合以上三个独立预测因子，可以减少前列腺癌患者治疗不足的可能性。

PO-2965

新路易斯湖标准诊断急性心肌炎： 心内膜心肌活检假阴性患者的心血管磁共振特征

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目的：相比原始路易斯湖标准，新路易斯湖标准对急性心肌炎的诊断效能已被证明有明显改善。然而，既往研究大多发生在预先选择的病人群体中，而心内膜心肌活检的假阴性结果在作为金标准时必然会带来偏差。本研究旨在真实世界中评估心血管磁共振（Cardiovascular magnetic resonance, CMR）与心肌活检对疑似心肌炎患者的诊断性能，并确定病理假阴性结果的患者特征。

方法：这项单中心的回顾性横断面研究纳入了 311 名临床疑诊心肌炎的患者，所有受试者均接受 3.0T 的 CMR 检查，其中 93 人接受心内膜心肌活检。CMR 扫描方案包括 cine-SSFP、T2 STIR、钆延迟强化（Late gadolinium enhancement, LGE）、T1 及 T2 mapping。当临床标准和磁共振成像同时支持诊断时，患者被确诊为心肌炎。受试者的病理结果依此分为真阳性、真阴性和假阴性组。结果：新路易斯湖标准的敏感性为 96.3%，特异性为 84.6%，而心肌活检的敏感性为 62.8%，特异性为 85.7%。在接受心肌活检的患者中，55 人（59.1%）被诊断为心肌炎，3 人（3.2%）被诊断为扩张型心肌病，其余 35 人（37.6%）没有发现具体的心肌损伤。根据预定的分类标准，27 名患者（29.0%）被归入假阴性组，53 名（57.0%）归入真阳性组，11 名（11.8%）归入真阴性组。容易出现病理假阴性结果的患者通常出现梗死样临床症状，心功能正常；CMR 表现包括左室射血分数保留，不典型的 LGE 模式和轻微升高的 T1 或 T2 弛豫时间。

结论：这项研究进一步证明磁共振检查在诊断急性心肌炎方面优于心内膜心肌活检。鉴于心内膜心肌活检的侵入性和高假阴性率，我们建议具有某些临床特征的患者将 CMR 作为首选检查，并更谨慎地进行有创性病理学检查。

PO-2966

慢性肾脏病患者脑血流量改变：基于 3D-pCASL 成像技术

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目的：慢性肾脏病（Chronic Kidney Disease, CKD）患者脑部血液动力学不稳定，尤其是血液透析患者。本研究应用磁共振 3D-pCASL 脑灌注成像技术定量评估 CKD 未透析及血液透析患者与健康人群的脑血流量变化并分析脑血流量变化与认知功能的相关性。

方法：前瞻性招募 19 名 CKD 未透析患者 (Non- Hemodialysis, ND) 和 37 名血液透析患者 (Hemodialysis, HD)，以及 46 名健康受试者 (Healthy controls, HC)。所有受试者均行头颅 MRI

平扫及 3D-pCASL 成像扫描,并在扫描前进行神经心理学测试。用 SPM8 进行基于体素的全脑分析,并提取三组间差异有统计学意义团块的相对脑血流量值(relative values of cerebral blood flow, rCBF)。所有 CBF 数据及神经心理学检查数据在组间比较使用单因素方差分析。采用偏相关分析方法,以性别、年龄、文化程度为协变量,对 HD 的 CBF 数据和认知测试得分进行相关性分析。统计学上有显著意义的 P 值设为 0.05。

结果:基于体素的全脑分析显示,三组间右侧海马、左侧颞上回、右侧中央沟盖、右侧缘上回 rCBF 有显著性差异(图 1,表 1)。三组间单因素方差分析结果显示,HC 右侧海马 rCBF 高于 ND,ND 左侧颞上回 rCBF 高于 HC 和 HD,HC 和 ND 右侧中央沟盖和右侧缘上回 rCBF 高于 HD,差异有统计学意义(图 2)。此外,神经认知结果显示,HC 组 MOCA 得分以及即时自由回忆得分高于 ND 和 HD,焦虑、抑郁量表得分低于 HD。偏相关分析显示,HD 左侧颞上回 rCBF 与定向能力呈负相关($P = 0.022, r = -0.392$);HD 右侧中央沟盖 rCBF 与抽象能力呈正相关($P = 0.021, r = 0.394$),与长时延迟自由回忆正确数呈负相关($P = 0.012, r = -0.426$)(图 3)。

结论:慢性肾脏病患者脑血流动力学不稳定,且认知及记忆能力下降,易出现情绪障碍。除右侧海马外,血液透析患者的脑血流量小于健康者及非透析患者,且与认知及记忆功能存在相关性。

PO-2967

基于 MR-BOLD 的 $R2^*$ 值对盘源性腰痛大鼠 (DLBP) 椎旁肌微循环和肌肉功能改变的研究

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目的:为研究椎旁肌毛细血管密度改变对 DLBP 的影响,利用 $R2^*$ 值对骨骼肌组织外周微循环进行定量评估,以早期非侵入性提示 DLBP 患者椎旁肌的病理改变,为腰痛的临床治疗提供影像参考。

方法:本研究通过 X 线透视引导下后入路穿刺 L4/5 及 L5/6 椎间盘,并注射无菌 PBS 建立 DLPB 模型,造模术后的第 7 天,利用 MRI 扫描大鼠腰椎的 L4/5 和 L5/6 椎间盘,当目标椎间盘的髓核在 T2WI 上出现信号减低时,证明模型建立成功;实验动物为 4 周龄 220-250g 雌性 SD 大鼠;分组包括 30 天组、90 天组、180 天组,再分为正常组、Sham 组、DLBP 组三个亚组 ($N=10$);在造模后,按分组时间分别进行行为学测试(包括悬尾试验、抓握试验、钢丝悬挂试验、四肢握力测试和力竭游泳试验),MRI 扫描 (MR-BOLD 包括 $R2^*$ 值)和组织学实验 (包括造模层面椎旁肌的 HE 染色、免疫荧光和免疫组化染色,观察毛细血管密度 (CD)、毛细血管纤维比例 (C/F) 等)。

结果:DLBP 组大鼠在造模 30-180 天内,悬尾试验的静止时间和弯腰时间增加,而挣扎时间减少,同时钢丝悬挂试验和抓握试验中掉落时间减少;四肢握力实验中握力减少、力竭游泳试验中力竭时间减少;DLBP 组大鼠 L4/5 和 L5/6 层面竖脊肌和多裂肌的 $R2^*$ 值逐渐增加;毛细血管密度 CD 值和毛细血管纤维比例 C/F 值较正常组和 Sham 组明显减少 (P 均 <0.05)。

结论: $R2^*$ 值与 CD 值呈中度负相关,即 $R2^*$ 值随 CD 值增加而减少, $R2^*$ 值可在一定程度上反映 DLBP 大鼠椎旁肌的微循环功能降低。同时通过免疫组化发现,在 DLBP 组中,I 型纤维向 II 型纤维发生转化,I 型纤维占比减少,而 $R2^*$ 值随 I 型纤维的减少而增加。可能与毛细血管密度和 I 型纤维占比减少导致 $R2^*$ 值增加有关,从而使腰椎肌肉结构受损,最终导致腰椎性能降低并加重腰痛。DLBP 是慢性腰痛最常见的类型,通过 MR-BOLD 的 $R2^*$ 值可早期定量评估肌肉的微循环灌注,提示 DLBP 患者椎旁肌的病理改变,为 DLBP 的临床治疗提供参考。

PO-2968

质子交换速率成像在脑胶质瘤诊断中的初步应用

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目的：去除直接水饱和效应（direct saturation, DS）的 Omega-plot 方法可用于量化质子交换速率（proton exchange rate, kex），其在脑胶质瘤中反映出独特的对比度，被认为可以一定程度上反映氧化应激水平。本研究旨在探究质子交换速率成像在脑胶质瘤诊断中的价值。

材料与方法：52 名经病理证实的脑胶质瘤患者被纳入研究。患者均在 3.0T 磁共振扫描仪上进行，包括常规平扫、增强和弥散加权成像（diffusion weighted imaging, DWI），并在注射对比剂前进行质子交换速率成像采集，B1 饱和脉冲功率分别为 1.5 μ T、2.5 μ T、3.5 μ T。通过去除 DS 效应的 Omega-plot 方法进行逐体素拟合得到 kex 参数图，通过 GE 工作站重建得到表观弥散系数（apparent diffusion coefficient, ADC）参数图。分别测量肿瘤实质区 kex 和 ADC，并测量对侧正常表现脑白质区进行标准化，计算相对 kex（rkex）和相对 ADC（rADC）。比较高级别胶质瘤与低级别胶质瘤间的参数差异，采用 ROC 曲线和 DeLong 检验评估参数的诊断效能。

结果：高级别胶质瘤的 kex 值和 rkex 值（ $985.20 \pm 100.60 \text{ s}^{-1}$, 1.32 ± 0.10 ）显著高于低级别胶质瘤（ $897.48 \pm 79.12 \text{ s}^{-1}$, 1.19 ± 0.10 ），差异具有统计学意义（ $P=0.003$, $P<0.001$ ）。而高级别胶质瘤的 ADC 值和 rADC 值[（ 1.16 ± 0.22 ） $\times 10^{-3} \text{ mm}^2$, 1.52 ± 0.33]均显著低于低级别胶质瘤[（ 1.31 ± 0.20 ） $\times 10^{-3} \text{ mm}^2$, 1.77 ± 0.28]，差异具有统计学意义（ $P=0.018$, $P=0.004$ ）。kex、rkex、ADC 和 rADC 鉴别高低级别胶质瘤的 AUC 分别为 0.743、0.820、0.691 和 0.735。rkex 与 rADC 联合诊断的 AUC 为 0.917，显著高于单个参数的鉴别效能（ $P<0.05$ ）。

结论：质子交换速率成像作为一种新型的成像技术可提供独特对比，有助于对脑胶质瘤的恶性程度进行无创术前评估。

PO-2969

比较 3DFast Spin Echo MRCP 两种不同采集方式的图像质量

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目的：本研究的目的是比较在 3D Fast Spin Echo 序列上使用屏气技术和呼吸触发技术完成 MRCP (磁共振胰胆管成像)扫描的图像质量和解剖信息，以确定哪种 MRCP 技术可以产生更好的图像质量和解剖信息，从而更好的为临床提供胰胆管系统的优质图像，用于疾病的诊断。

材料与方法：前瞻性收集 10 名健康并且呼吸配合良好的志愿者，使用屏气和触发技术进行 MRCP 检查，测量胆总管、胆囊、肝总管、左肝管和右肝管的 SI 与信噪比（SNR），胆总管的对比噪声比（CNR），主观评价胆总管、胆囊、胆囊管、肝总管、左肝管、右肝管、胰管近段、胰管中段和胰管远段的显示质量和 MRCP 的整体图像质量。采用统计学数据处理方法对收集的数据进行分析。

结果：采用 Wilcoxon 检验的结果显示，屏气和触发技术在 MRCP 检查中的图像质量（SNR 和 CNR）和解剖信息方面存在显著差异（ $P<0.05$ ）。各节段的 SI 均提高（均 $P<0.05$ ），胆囊的 SNR 提高（前：83.51；后：101.70, $P=0.018$ ），胆总管 CNR 的差异没有统计学意义（ $P=0.338$ ），各节段的显示质量提高（均 $P<0.05$ ），整体图像质量提高（前：3.68；后：4.08; $Z=-3.441$, $P<0.05$ ）。这表明，与呼吸触发技术相比，屏气技术获得了更好的图像质量和解剖信息。结论：在 MRCP 检查中使用 3D Fast Spin Echo 序列中的屏气技术确实有助于获得更好的图像质量和解剖信息。

PO-2970

利用胎盘虚拟磁共振弹性成像及 IVIM 参数联合 T2WI 纹理特征的列线图预测妊娠高血压患者的新生儿围产期不良预后

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目的: 本研究旨在联合胎盘体素内不相干运动 (IVIM) 的弥散与灌注参数、虚拟磁共振弹性成像 (vMRE) 的胎盘硬度和 T2WI 纹理特征建立列线图, 并预测 PIH 新生儿不良结局。

方法: 回顾性纳入 MRI 检查时满足妊娠高血压 (PIH) 临床诊断的患者 63 例 (不良结局 37 例, 正常结局 26 例)。由两位放射科医生勾画胎盘的感兴趣区。通过 PyRadiomics 得到基于 T2WI 图像的 107 个纹理特征。通过 LASSO 实现特征筛选, 并计算 T-score 评分。功能磁共振 (fMRI) 参数包括以下: 选取低 b 值和高 b 值 (200 和 800 s/mm²), 通过 vMRE toolbox (MATLAB) 计算基于 DWI 的 vMRE 参数 (μ diff)。使用 Firevoxel 软件计算 IVIM 参数[真扩散系数(D)、伪扩散系数(D*)、灌注分数(f)、扩散分布系数(DDC)、扩散异质性指数(Alpha)]和表观扩散系数(ADC), 对以上 7 个 fMRI 参数进行先后进行单因素及多因素分析得出最佳 fMRI 参数。分别建立 fMRI 模型及 T-score 模型, 并联合建立列线图模型, 并且评估各个模型的预测效能。

结果: 特征筛选后共得到 4 个 T2WI 纹理特征并建立了 T-score 评分, T-score 计算公式详见摘要附件。对 fMRI 参数进行单因素及多因素分析可得 μ diff (5.68±0.69 vs. 5.21±0.74, P=0.015) 及 f(22.29±4.39 vs. 26.16±5.86, P=0.007) 是预测新生儿不良结局的最佳 fMRI 参数。ROC 分析可得 T-score 评分模型 AUC 为 0.774, fMRI 模型 (μ diff+f) AUC 为 0.785, 两者联合的列线图模型效能进一步提高 (AUC 0.811)。

结论: 包括基于 vMRE 的胎盘弹性及基于 IVIM 胎盘微循环灌注的 fMRI 参数可以预测 PIH 患者的产后新生儿不良结局, 且预测效能高于基于 T2WI 的纹理特征及 T-score 评分。联合 fMRI 及 T2WI 纹理特征建立的列线图可进一步提高预测效能, 这有助于早期识别和管理高危病例, 最终改善新生儿不良预后。

PO-2971

健康重庆成年人下腰段后伸力的年龄和性别影响的退变规律: 六回波 T2*校正 Dixon 序列多参数评估研究

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目的: 运用 T2*校正的六回波 Dixon 序列评估重庆健康成人下腰段后伸力退变的年龄和性别影响规律。

方法: 105 名健康受试者(52 名女性), 男女以 10 岁为一个年龄段组, 行 3T Dixon 椎间盘磁共振轴位成像。定量获取双侧多裂肌(MF)和竖脊肌(ES)在 L1/2 至 L5/S1 各腰椎间盘椎旁肌形态和脂肪含量数据: 脂肪分数(FF)、横截面积(CSA)、相对横截面积(RCSA)和功能 CSA(无脂面积, FCSA)。通过外固定测力仪测量所有受试者下腰段后伸力量, spearman 相关分析评价肌肉 FF、CSA、FCSA 与下腰段最大后伸力之间的关系。

结果: 各年龄段组的所有腰椎间盘水平, 女性有较高的肌肉 FF, 男性有较大的肌肉 CSA 和 FCSA。肌肉 FF 随年龄增长而增加。50 ~ 59 岁女性 MF 平均 FF 明显增高, 40 ~ 49 岁女性组 ES 均值 FF 显著升高。在 60 ~ 73 岁男性组中, MF 和 ES 的平均 FF 均显著升高。与其他腰椎间盘水平相比, L5/S1 的 MF 和 ES FF 最高。此外, 女性和男性的 ES - FF 高于 MF (p < 0.001)。以体重指数(BMI)作为对照变量后, 年龄与 ES FCSA 和 ES RFCSA 呈负相关(r = -0.42, -0.37; P = 0.008, 0.000)。此

外, 年龄与所有 MF 和 ES 形态学参数(除男性 MF CSA 外)呈负相关($r = -0.28 \sim -0.45$, $p < 0.05$)。MF 和 ES 中, FF 与下腰段最大后伸展力(MVIC)呈显著负相关($r = -0.52$, -0.42 ; $p = 0.000, 0.000$)。在 MF 和 ES 中, CSA、FCSA 和 MVIC 之间存在显著正相关($r = 0.39 \sim 0.61$, $p < 0.05$)。MVIC 与 MF+ES FCSA 的相关系数 r 值高于 MF+ES FF 和 CSA。

结论: 重庆健康成人腰椎 MF 和 ES-FF 在女性椎水平较高, 退变早于男性 10 年左右, 男性椎旁肌面积更大, 比女性更容易受到年龄相关萎缩的影响。此外, 年龄对 ES 尺寸参数的影响大于 MF。在 MF 和 ES 中, MVIC 与椎旁肌参数(FF、CSA 和 FCSA)相关, 且与 FCSA 的相关系数高于 FF 和 CSA。

PO-2972

3D 酰胺质子转移成像和小视野弥散加权成像预测直肠腺癌病理分级的价值

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目的 探讨 3D 酰胺质子转移成像 (3D APT) 和小视野弥散加权成像 (rFOV DWI) 在预测直肠腺癌病理分级中的临床应用价值。方法 回顾性分析我院 2020 年 2 月至 2023 年 4 月经手术病理证实的 64 例直肠腺癌患者资料, 其中高分化组 28 例, 中低分化组 36 例。所有患者术前两周内采集常规 MRI、小视野高分辨 T2WI (rFOV T2WI)、rFOV DWI 及 3D APT。两名放射科医师参照常规 MRI 及 rFOV T2WI, 在 rDWI 图像上逐层勾画肿瘤实性部分作为感兴趣区, 提取其表观扩散系数 (rADC) 及非对称磁化转移率 (MTR_{asym}) 的平均值。卡方检验或两独立样本 t 检验用于比较两组间患者性别、年龄、平均 rADC 和 MTR_{asym} 值差异。采用组内相关系数 (ICC) 评价两位医师定量参数测量的一致性。利用二元 Logistic 回归构建联合参数 ($MTR_{asym}+rADC$) 诊断模型。利用受试者工作特征 (ROC) 曲线下面积 (AUC) 评估单一参数及联合参数模型诊断效能。不同 AUC 比较采用 DeLong 检验。结果 中低分化组 MTR_{asym} 平均值 $[(2.93 \pm 0.61)\%]$ 高于高分化组 $[(1.74 \pm 0.63)\%]$ ($P < 0.001$), 中低分化组 rADC 平均值 $[(0.98 \pm 0.17) \times 10^{-3} \text{mm}^2/\text{s}]$ 低于高分化组 $[(1.19 \pm 0.18) \times 10^{-3} \text{mm}^2/\text{s}]$ ($P < 0.001$)。ROC 曲线分析结果显示, MTR_{asym} 、rADC 及联合参数模型 ($MTR_{asym}+rADC$) 在鉴别直肠腺癌组织病理分级的 AUC 为 0.910、0.833、0.940, 敏感度为 0.750、0.916、0.861, 特异度为 0.928、0.678、0.964。结论 3D APT 和 rFOV DWI 有助于鉴别直肠腺癌的病理分级, $MTR_{asym}+rADC$ 联合参数的诊断效能优于单一参数。

PO-2973

肌、脂、骨成分与心功能的关系

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目的: 本研究旨在探讨肌肉、脂肪和骨成分与心功能之间的关系, 并阐述它们在维持左心室舒张和收缩功能方面的重要性。方法: 回顾性分析 2017 年 1 月至 2021 年 3 月我院住院患者的资料。基于 MRI 脂肪分数图对皮下脂肪组织 (SAT) 面积、内脏脂肪组织 (VAT) 面积、胰腺脂肪分数 (HFF)、肝脏脂肪分数 (PFF)、骨髓脂肪组织 (BMAT) 以及腹部肌肉 (AM) 面积和脂肪分数 (FF) 进行测量。使用超声心动图检测受试者的心脏结构和左心室功能参数, 包括收缩末期左心房内径(LAD)、舒张末期左室内径(LVDD)、舒张末期室间隔厚度(IVST)、舒张末期左心室后壁厚度(LVPWT)、左心室射血分数 (LVEF)、二尖瓣舒张早期血流速度 (E) 和二尖瓣舒张晚期血流

速度（A）、E/A、二尖瓣环侧壁处及间隔处舒张早期纵向最大运动速度均值（ $e\&\#39;$ ）和E/ $e\&\#39;$ 。采用多元线性回归评估肌肉、脂肪和骨成分与心脏结构和功能参数之间的关系。**结果：**本研究共纳入154例患者，平均年龄为62岁，平均BMI为25.10kg/m²。多元线性回归分析显示，VAT面积与LAD、IVST、LVPW呈正相关（ $\beta=0.006-0.022$ ； $P<0.05$ ），与LVEF呈负相关（ $\beta=-0.007$ ； $P<0.05$ ）；AM面积与LVDD呈正相关（ $\beta=0.44$ ； $P<0.05$ ），与E/ $e\&\#39;$ 呈负相关（ $\beta=-0.024$ ； $P<0.05$ ）；AM FF与A呈正相关（ $\beta=0.783$ ； $P<0.05$ ）；PFF与E/A呈正相关（ $\beta=0.039$ ； $P<0.05$ ）；HFF与 $e\&\#39;$ 呈正相关（ $\beta=-0.193$ ； $P<0.05$ ）。**结论：**本研究结果强调了VAT积聚可能是心脏结构和收缩功能异常的潜在因素，胰腺和肝脏等部位脂肪组织的积累可能与心脏舒张功能障碍相关。相反，AM面积的增加可能有助于维持心脏的正常舒张功能。这些研究结果为心血管疾病的预防和管理提供了重要的线索，强调了身体成分对心脏健康的影响，需要更深入的研究来解释这些关系以及制定相关的临床干预措施。

PO-2974

合成磁共振成像 T1、T2 弛豫时间在儿童孤独症谱系障碍中的应用价值

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研究目的本研究旨在探究合成磁共振成像 T1、T2 弛豫时间在儿童孤独症谱系障碍中的应用价值。材料与方法本研究纳入研究对象为自2021年9月至2023年4月在郑州大学第三附属医院（河南省妇幼保健院）首次确诊为ASD（自闭症谱系障碍）的20名儿童（ASD组，其中男17名女3名）与14名年龄性别相匹配的健康对照儿童（对照组，其中男11名女3名）。这些儿童均在美国GE SIGNA Pioneer 3.0 T MRI扫描仪上接受了常规MRI和合成MRI序列MAGiC的扫描。通过后处理，我们成功获得了所有受试者的T1和T2定量弛豫图。采用了ITK-SNAP软件，对特定脑区的弛豫值进行测量，感兴趣区（ROI）包括内囊后肢、内囊前肢、胼胝体膝部、胼胝体压部、顶叶白质、额叶白质、丘脑、苍白球、尾状核头和壳核。通过Mann-Whitney U检验比较ASD组与对照组在各个脑区的T1和T2弛豫值之间的潜在差异。多元logistic回归分析对ASD组显著变化的弛豫值进行筛选，探讨独立预测因素，并使用受试者工作特征曲线（ROC）下面积（AUC）来评估T1和T2弛豫值作为独立预测因素对儿童ASD的诊断效能。

结果与对照组相比，ASD组的右侧丘脑T1弛豫值和左侧顶叶白质T2弛豫值显示显著降低（P值均小于0.05）。多元logistic回归分析表明，左侧顶叶白质T2弛豫值和右侧丘脑T1弛豫值是预测ASD发生的独立预测因素。ROC曲线分析结果显示，左侧顶叶白质T2弛豫值的AUC为0.714，敏感度为50.21%，特异度为85.20%，阈值为88.624；右侧丘脑T1弛豫值的AUC为0.675，敏感度为75.10%，特异度为60.22%，阈值为943.333。

结论 1. 合成磁共振获取的T1、T2弛豫时间可以用于评估ASD儿童大脑组织异常；

2. 左侧顶叶白质T2弛豫值和右侧丘脑T1弛豫值有助于预测ASD的发生,对于ASD的诊断具有一定价值。

PO-2975

探讨 HR-mDixonQuant 序列在定量棕色脂肪方面可行性的研究

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目的：棕色脂肪组织（brown adipose tissue, BAT）作为一种独特的产热组织，在调节新陈代谢和能量消耗方面起着重要作用。近年来，它已成为对抗肥胖、糖尿病和非酒精性脂肪肝等代谢性疾病的新研究目标。本研究旨在探讨 HR-mDixonQuant 序列在定量 BAT 方面是否具有可行性和可重复性。方法：前瞻性收集 8 名健康志愿者进行两次颈部 3.0 T MRI 扫描（两次扫描时间间隔 1h），扫描序列为 HR-mDixonQuant 序列，并重建脂肪分数图。使用飞利浦后处理平台在两次扫描的 HR-mDixonQuant 脂肪分数图上对颈部 BAT 的感兴趣区（region of interest, ROI）进行勾画，并记录脂肪分数（fat fraction, FF）值。为评估观察者间一致性，一个月后由第二位观察者重复上述测量并记录结果。采用 SPSS 27.0 软件进行统计学分析，符合正态分布的计量资料以均数±标准差表示，不符合正态分布的计量资料以四分位数间距表示。采用组内相关系数（intra-class correlation coefficient, ICC）和 Bland-Altman 图评估观察者间一致性、观察者内一致性和复测信度。结果：本研究共纳入 8 名健康志愿者，平均年龄 23 岁，平均 BMI 为 22.97 kg/m²。不同观察者之间的测量结果表现出高度一致性，同一观察者在两次扫描之间的测量也表现出良好的一致性（ICC 均> 0.90）。Bland-Altman 图显示 95% 的点均在临床可接受的一致性界值内，两次扫描测量的 FF 值结果一致性较好，差值均数和 95% 一致性界限（LoA）分别为 0.17 和 -1.81~2.15。结论：HR-mDixonQuant 序列作为一种新的成像技术，在定量 BAT 方面表现出良好的可行性和可重复性，为深入研究 BAT 的功能和潜在作用提供了重要的基础。未来，积极推广该技术在临床和科研领域的应用将有助于更全面地了解 BAT 的生理和代谢特性，开发新的治疗策略以对抗肥胖、糖尿病和非酒精性脂肪肝等代谢性疾病，提供更准确的患者评估和监测方法，为医疗领域更好地应对相关疾病提供有力支持。

PO-2976

HR mDIXON-Quant 与 mDIXON-Quant 对棕色脂肪定量的准确性研究：以 iDQC 为金标准

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目的：棕色脂肪组织（BAT）作为一种独特的产热组织，在调节新陈代谢和能量消耗方面起着重要作用。对于 BAT 的研究有望对肥胖及其他相关疾病（如糖尿病、高血压和某些癌症类型）的研究和治疗具有重要指导价值。基于分子间双量子相干（iDQC）的新型磁共振方法可以实现对 BAT 成分的非侵入性和特异性检测。本研究旨在以 iDQC 作为参考标准，探讨高分辨率（HR）mDIXON-Quant 序列的脂肪分数图与传统 mDIXON-Quant 脂肪分数图在 BAT 定量方面的准确性。方法：前瞻性收集志愿者 22 例，所有人均接受颈部 3.0T MRI 扫描，包括 HR mDIXON-Quant 序列和 mDIXON-Quant 序列。在 HR mDixonQuant 脂肪分数图上，使用飞利浦后处理平台选取连续的三个层面对颈部 BAT 的感兴趣区（ROI）进行勾画。绘制 ROI 时，注意避开颈部血管并取三次测量的脂肪分数（fat fraction, FF）值的平均值作为结果。将 ROI 复制到 mDIXON-Quant 序列的 FF 图上并记录测量的 FF 值的平均值，以确保两个序列的 ROI 范围和位置保持一致。采用 Pearson 和 Spearman 相关性分析方法评估 HR mDIXON-Quant 序列和 mDIXON-Quant 序列所测的 BAT 的 FF 平均值与 iDQC 值之间的相关性。结果：相关性分析结果显示，HR mDIXON-Quant 序列所测得的 BAT 的 FF 平均值与 iDQC 值之间存在显著的负相关性（ $r = -0.557$, $P < 0.07$ ），而 mDIXON-

Quant 序列所测得的 BAT 的 FF 平均值与 iDQC 值之间相关性不具有统计学意义 ($P > 0.05$)。结论: HR mDIXON-Quant 序列在 BAT 定量方面表现出更高的可靠性和准确性, 相对于传统的 mDIXON-Quant 序列具有更大的优势。本研究为未来 BAT 的研究和相关疾病的治疗提供了重要的支持和指导。

PO-2977

IVIM-MRI 与 DWI 评估晚期宫颈癌盆腔转移 淋巴结放化疗疗效的临床价值

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目的 探讨磁共振体素内不相干运动(intravoxel incoherent motion, IVIM)与扩散加权成像(diffusion weighted imaging, DWI)对晚期宫颈癌盆腔转移淋巴结放化疗疗效的评估及预测价值。材料与方法 对 35 例晚期宫颈癌患者伴盆腔淋巴结转移患者在放化疗治疗前 1 周、治疗后 1 周、2 周、4 周行盆腔 3.0TMR 扫描, 扫描序列包括 T2WI、DWI 及 IVIM, 测量治疗前后表观扩散系数 (ADC)、纯扩散系数(D)、灌注分数(f)、伪扩散系数(D*)及转移淋巴结最大径, 并计算治疗后各参数变化率与转移淋巴结消退率。根据 RECIST 1.1 标准将患者分为完全缓解(CR) 组 22 例和部分缓解(PR) 组 13 例。入组患者均达到有效控制, 无稳定组 (SD) 及进展组(PD), 应用独立样本检验比较两组间治疗前后不同时间点参数值及其变化率的差异, 应用 ROC 曲线分析两组间有统计学差异参数及其变化率的疗效评价效能, 应用 Pearson 相关性分析检验参数及其变化率与转移淋巴结消退率的关系。结果 治疗前及治疗 4 周转移淋巴结最大径为 $(3.3 \pm 1.2)\text{cm}$ 及 $(0.35 \pm 0.25)\text{cm}$, 转移淋巴结消退率为 $0.89\% \pm 0.13\%$, 治疗前 CR 组 ADC 低于 PR 组, f 值高于 PR 组 ($P \leq 0.05$), CR 组 $\Delta\%ADC$ 及 $\Delta\%D$ 高于 PR 组 ($P < 0.05$), 治疗结束 $\Delta\%f$ 小于 PR 组 ($P < 0.05$), 治疗前 ADC 与转移淋巴结消退率呈负相关, 治疗前 f 值、治疗后 2 周及 4 周 $\Delta\%ADC$ 及 $\Delta\%D$ 与转移淋巴结消退率呈正相关, 治疗前 f 值、ADC 值, 治疗后 2 周及 4 周的 $\Delta\%D$ 、 $\Delta\%ADC$ 预测转移淋巴结疗效的曲线下面积(area under curve, AUC) 分别为(0.900、0.708、0.812、0.800、0.803、0.713)。结论 IVIM 和 DWI 可在治疗中动态评估宫颈癌盆腔转移淋巴结放化疗疗效, IVIM 具有更好的价值。

PO-2978

早期帕金森病伴认知障碍患者小脑的静息态功能连接的改变

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目的: 探讨帕金森病患者的认知缺陷是否会导致小脑功能连接的改变。方法: 共纳入 122 名非痴呆参与者, 包括 64 名早期 PD 患者和 58 名年龄和性别匹配的老年对照者, 根据他们的认知状态(正常认知与认知障碍)分为四组。采用质量控制和定量测量, 通过分析各组的结构和静息状态功能 MRI 数据, 分别对小脑容积和 FC 进行研究, 进行 MRI 指标与临床特征(运动和认知评分)的相关性分析。结果: 与没有认知缺陷的健康对照组相比, 早期运动和认知缺陷的 PD 参与者的的小脑 FC 发生改变, 但认知正常的 PD 患者和有认知障碍迹象的老年人的小脑 FC 均未发生改变。此外: “运动小脑”和 SMA(辅助运动区)之间的连接与运动评分呈正相关, 而伴有认知障碍的 PD 患者的小脑内连接与认知评分呈正相关。各组之间未观察到小脑体积差异。结论: 早期 PD 患者静息状态下小脑 FC 的改变可能不仅仅是由运动缺陷引起的, 也可能是由认知缺陷引起的, 因此强调了运动和认知功能之间的相互作用, 并可能反映了早期 PD 患者的代偿机制。

PO-2979

分数微积分模型对子宫内膜癌分级中的价值

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目的 传统单指数模型以人体单一均质为条件，而在人体实际组织结构中，其内部成分复杂多变，因而无法全面准确地反映组织内部真实信息。分数微积分模型（FROC）覆盖了从高 b 值到低 b 值等多个 b 值，通过多个定量参数无创地评估病变的情况及特点，从而能更准确、全面地反映肿瘤组织的内部情况，目前已广泛用于脑部肿瘤、乳腺癌、宫颈癌等病变。本文旨在探讨分数微积分模型在高级别子宫内膜癌与中低级别子宫内膜癌参数值的差异及应用价值，为临床医师制定准确诊疗方案提供参考信息。**方法** 回顾性分析经手术病理证实的子宫内膜癌患者 81 例，其中 31 例为高级别子宫内膜癌患者，50 例为中低级别子宫内膜癌患者；分析 81 例子宫内膜癌患者的 MRI 资料，所有患者均行 MRI 常规序列及分数微积分模型（FROC）序列扫描，由 2 名医师在分数微积分模型各参数伪彩图上分别计算出两组参数的标准 ADC 值（ADCstandard）、弥散系数值（D）、组织内部一致性参数值（ β ）及空间参数值（ μ ），组间比较采用秩和检验，参数间的诊断效能用受试者工作特征曲线（ROC）分析，统计数据 $P < 0.05$ 具有统计学意义。通过分析高级别与中低级别子宫内膜癌间参数差异，以此来反映组织内部成分特征。**结果** 本研究中由于高级别子宫内膜癌其内部成分复杂，且恶性程度高于中低级别子宫内膜癌，细胞较中低级别子宫内膜癌密集，故高级别子宫内膜癌组 ADCstandard 值、D 值、 β 值及 μ 值均低于中低级别子宫内膜癌组，两者具有统计学意义。、两组间 ADCstandard 值、D 值、 β 值及 μ 值差异具有统计学意义（Z 值分别为 -2.28、-3.1、-3.5、-2.62，P 值 < 0.05 ），曲线下面积依次为别为 0.679、0.743、0.775 和 0.706。**结论** 分数微积分模型各参数均可以用于子宫内膜癌的临床诊断，并能较准确地反映子宫内膜癌的分级。

PO-2980

基于体素的影像组学模型预测胶质母细胞瘤复发高风险亚区

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在手术前准确识别胶质母细胞瘤的复发高风险子区域能在早期对治疗抵抗区域进行切除干预以及放疗计划中局部增量，能改善胶质母细胞瘤患者的生存预后。本研究通过对 2015-2022 年 55 例在南方医科大学南方医院经病理确诊为胶质母细胞瘤的患者的手术前 48 小时的 T1-CE 和 Flair 图像进行基于体素的影像组学特征提取构建多种机器学习模型，包括有 Kernel ridge Regression（KRR）、Adaboost、Gradient boost 等多种机器学习模型。在测试集上，KRR、Adaboost 以及 GBDT 分别为 0.788，0.7623 和 0.762。更进一步，我们基于 KRR 模型对预测结果进行可视化，对胶质母细胞瘤的复发高风险子区进行定位，从而精准进行临床干预。

PO-2981

三种不同 T1 成像方法在胎儿肠道磁共振的应用

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目的：随着影像技术的发展，磁共振在胎儿肠道畸形的产前诊断中起到越来越重要的作用。由于胎粪的存在，肠道在 T1 加权图像中呈现高信号，这是 T1 加权序列被用来评估胎儿肠道形态的基础。本研究旨在比较三种不同 T1 成像方法在胎儿肠道畸形方面的应用。

材料与方法：收集妊娠 21-36 周磁共振及超声检查提示肠道发育正常胎儿 65 例，肠梗阻、肠道闭锁等患儿 10 例。三种 T1 成像方式包括以下三种，自由呼吸多次平均三维容积内插梯度回波序列，自由呼吸螺旋 K 空间采样 STARVIBE 序列，以及屏气序三维容积内插梯度回波序列。通过肠管不同节段信噪比 (SNR)、肠管-膀胱对比噪声比 (CNR) 以及伪影情况 (1-伪影重，2-明显伪影，3-伪影较少，4-无伪影) 进行分析，比较三种方法的成功率及图像质量的优劣。

结果及结论：自由呼吸多次平均梯度回波序列成功率更高图像质量更优，但也存在模糊伪影情况。STARVIBE 存在麦芒伪影和颗粒度高信噪比较低的缺点，扫描时间较长并不能纠正胎儿不规则的运动。屏气序列对于能耐受的孕妇且胎儿不动的情况比较合适，但是存在信噪比偏低的情况。

PO-2982

大脑中动脉粥样硬化斑块与脑白质高信号的磁共振研究

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目的：多种证据表明脑小血管病常与颅内大动脉病变共存，严重程度具有一定相关性。其中，在磁共振 T2 FLAIR 图像上表现为脑白质高信号 (white matter hyperintensity, WMH) 是脑小血管病的一种常见影像学表现，有学者提出动脉粥样硬化斑块可能与 WMH 的改变相关。本研究的目的是研究不同 WMH 分组患者的大脑中动脉管壁改变和斑块特征，探究斑块易损性参数与不同程度 WMH 的相关性。

方法：选取 2021 年 5 月-2023 年 5 月经哈尔滨医科大学附属第一医院收治的 128 例因“脑血管病”住院的患者。所有患者均行常规头平扫和高分辨管壁成像检查。图像采集完成后传输到后处理工作站进行处理，两名诊断医师对患者图像进行双盲法分析，选择动脉血管的横断面图像独立分析斑块特征，并计算斑块参数。按磁共振头平扫和改良 Fazekas 分级 (0-6) 将患者分为无和轻度 WMH 组 (Fazekas0-2)、中和重度 WMH 组 (Fazekas3-6)。对比两组狭窄程度、重构模式、斑块内出血和斑块负荷，并探究不同分组斑块易损性参数的差异。

结果：共 99 例受试者符合入组条件，其中无和轻度 WMH 组共 57 例，中和重度 WMH 组共 42 例。对比了两组在临床基线资料、血管高危因素和磁共振影像特征的差异，分析显示年龄、血脂异常比例和斑块内出血在两组间有统计学差异 ($P < 0.05$)，中和重度 WMH 组年龄更大，血脂异常更常见，斑块内出血比例高。Spearman 相关性分析显示年龄，血脂异常和斑块内出血均与 WMH 等级呈正相关 ($r=0.276, 0.215, 0.384$, P 均 < 0.05)。二元 Logistics 回归显示年龄和斑块内出血是影响 WMH 严重程度的独立因素 [$1.089 (1.032, 1.149)$, $P=0.002$; $6.129 (2.296, 16.842)$, $P < 0.001$]。

结论：本次实验表明 WMH 的严重程度与年龄、血脂异常和斑块内出血有关，年龄和斑块内出血是影响 WMH 严重程度的重要因素。斑块内出血、斑块负荷、管壁重构模式是判断斑块易损性的常见影像指标，研究颅内大动脉粥样硬化易损性斑块与脑小血管病的关系，可能对临床检查和干预治疗有帮助。

PO-2983

单次屏气 3D-GRASE 序列在 MR 胰胆管成像的应用

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目的 探讨单次屏气 3D-GRASE 成像技术在 MR 胰胆管的应用价值。**方法** 前瞻性收集本院 57 例胰胆管疾病患者, 所有患者均进行自由呼吸自旋回波技术 (3D-RT-TSE) 和屏气梯度-自旋回波技术 (3D-BH-GRASE) 胰胆管水成像, 分别记录两种成像方法的扫描时间; 测量计算图像胆总管信噪比 (SNR)、胆总管与其周围组织对比度 (CR) 及胆总管和肝脏之间对比噪声比 (CNR), 并由 2 名高年资技师分别对图像质量、伪影、背景抑制及胰胆管的显示进行评分。**结果** 与 3D-RT-TSE 技术比较, 3D-BH-GRASE 技术扫描时间明显缩短, 差异有统计学意义 ($t=70.995$, $P<0.001$); 3D-BH-GRASE 的整体图像质量、伪影、胰胆管的效果评分均高于 3D-RT-TSE, 2 种方法差异均有统计学意义 (P 均 <0.05)。3D-BH-GRASE 图像 SNR、CR、CNR 及图像背景抑制方面 (11.01 ± 3.09 、 0.83 ± 0.33 、 15.75 ± 3.85 、 3.77 ± 0.57) 均小于 3D-RT-TSE (14.15 ± 5.10 、 0.86 ± 0.42 、 18.67 ± 4.99 、 4.14 ± 0.69), 差异均有统计学意义 ($t=3.993$ 、 3.785 、 3.646 、 2.966 , P 均 <0.001); **结论** 相比呼吸触发 (3D-RT-TSE) 序列, 3D-BH-GRASE 序列扫描时间更短, 整体图像质量和胰胆管显示更好, 值得进一步推广应用。

PO-2984

基于深度学习重建的加速合成 MRI 在膝关节骨关节炎中的应用

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目的 本研究旨在评价加速合成 MRI 与深度学习重建的临床可行性, 并探讨基于深度学习重建 (deep learning reconstruction, DLR) 对合成 MRI 图像质量和定量值的影响。**方法**: 本研究前瞻性纳入 36 名志愿者和 62 名怀疑有膝关节病变的患者。比较不同加速因子下使用 DLR 或非 DLR 技术对膝关节合成 MRI 图像质量和定量值的影响。**结果**: 在加速合成 MRI 使用 DLR 显著改善了所有对比度加权的图像质量 ($P<.001$), 导致图像质量与常规扫描相当或优于常规扫描。使用 DLR 合成 MRI 与常规扫描组病灶检出率差异无统计学意义 ($P>0.05$)。使用 DLR 或非 DLR 技术合成 MRI 定量值的差异非常小 ($<0.5\%$)。**结论**: 在合成 MRI 中使用基于深度学习重建可以减少 42% 的扫描时间, 同时保持图像质量和病变的可检测性, 并提供一致的定量值。

PO-2985

血管周围间隙扩散张量成像指数在帕金森病的应用价值研究

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目的 基于血管周围间隙扩散张量成像 (DTI-ALPS) 技术评估帕金森病 (PD) 患者的类淋巴循环系统功能。**方法** 收集 2022 年 7 月至 2023 年 3 月在南昌大学二附院神经内科被诊断为帕金森病的患者 60 例作为帕金森患者组 (PD 组, $n=60$), 另选取 30 例年龄、性别与之相匹配的无神经系统变性疾病的

患者作为正常对照组 (HC 组, $n=30$)。PD 患者根据 Hoehn-Yahr (H-Y) 评分分为两 PD 亚组, PD 早期组 (ePD 组, $n=30$) 和 PD 晚期组 (IPD 组, $n=30$)。本研究采集相关临床资料, 并分析以下认知和运动测试量表, 帕金森病评估量表 (UPDRS) 评分和改良的 Hoehn-Yahr 分级量表 (H-Y) 分级、简易精神状态检查 (MMSE) 评分。PD 组及 HC 组的所有 MR 图像在本院 3.0T 磁共振上完成采集。观察半卵圆中心区、基底节区海马以及中脑区这三个层面的 EPVS 数量和分布特点。基于 DSI studio 软件对 DTI 的图像进行后处理, 并计算入组成员的 DTI-ALPS 指数。比较 PD 组与 HC 组之间、PD 亚组与 HC 组之间的 ALPS 指数差异; 运用多元线性回归分析探究 ALPS 指数与临床变量之间的相关性。

结果

PD 患者的 ALPS 指数低于 HC 组 ($p<0.001$), 尤其 IPD 组的 ALPS 指数显著低于 NC ($p<0.001$)。然而, 两个 PD 亚组之间以及 NC 组与 ePD 组之间的 ALPS 指数没有显著差异。多元线性回归分析显示, 在 ePD 组中, ALPS 指数与 MMSE 评分呈显著正相关 ($\beta=0.043$, $p=0.035$), ALPS 指数与 EPVS 评分呈负相关 ($\beta=-0.084$, $p=0.009$); 在 IPD 组中, ALPS 指数与年龄呈负相关 ($\beta=-0.087$, $p=0.005$), 而 ALPS 指数与其他临床状态无显著相关性 ($p>0.05$)。PD 组和 HC 组受试者基底节区、中脑区的 EPVS 数目均存在解剖学分布差异 ($p<0.01$)。但是两 PD 亚组间各解剖区 EPVS 数目不存在显著统计学差异。

结论

脑类淋巴循环系统功能障碍可能是 PD 的发病机制。DTI-ALPS 指数可能是衡量 PD 患者类淋巴循环系统功能的潜在影像学标志物。

PO-2986

静息态功能磁共振成像技术评估失眠障碍患者情绪及认知功能障碍

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目的 探讨静息态功能磁共振 (resting state functional MRI, rs-fMRI) 技术在评估失眠障碍 (Insomnia Disorder, ID) 患者情绪、认知、记忆功能障碍中的作用。 **方法** 纳入符合美国 DSM-V 分类与 和中国精神障碍分类与诊断标准 (CCMD-3) 诊断标准且脑部结构正常的 ID 患者 22 例, 年龄、性别、受教育程度与之相匹配的健康对照组 (HC) 22 例, 所有受试者均进行临床匹兹堡睡眠质量指数 (PSQI)、汉密尔顿抑郁量表 (HAMD)、汉密尔顿焦虑量表 (HAMA)、世界卫生组织-加利福尼亚听觉词语学习测验 (WHO-UCLA AVLT)、磁共振常规扫描、磁共振静息态脑功能成像扫描, 针对中西方人大脑结构存在的差异, 本文选择以中国人脑建立的中国人脑图谱模板 (Chinese2020) 进行空间标准化, 以双侧杏仁核为种子点, 比较 ID 组与 HC 组脑功能连接的差异。 **结果** ID 组与 HC 组的 PSQI、HAMD、HAMA、学习能力及认知障碍评分具有显著统计学差异 ($P<0.05$); 与 HC 组相比, ID 组左侧杏仁核与边缘叶、后扣带回、双侧海马旁回、双侧海马、颞叶、舌回和枕叶的功能连接增强; 右侧杏仁核与边缘叶、右侧海马旁回、舌回、枕叶、右侧距状皮层、后扣带回、前额叶功能连接增强。 **结论** 失眠障碍患者的双侧杏仁核与多个脑区的功能连接出现异常, 可能是失眠障碍患者出现情绪调节障碍、认知障碍等的机制之一; fMRI 可为评估失眠障碍患者情绪、认知和记忆功能障碍提供客观影像学依据。

PO-2987

药物难治性颞叶癫痫患者脑结构-功能耦合的研究及构建术后复发风险预测模型

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目的:本研究的主要目的是:(i)阐明药物难治性颞叶癫痫(DTLE)患者结构-功能(SC-FC)耦合的整体变化,(ii)基于 SC-FC 耦合特征预测 DTLE 患者的手术预后。

方法:收集 71 例 DTLE 患者的术前 DTI 和 fMRI 数据。术后无癫痫发作组(SF)43 例,术后有癫痫发作组(NSF)28 例。首先,我们构建了个体功能(FC)和结构连接(SC)矩阵。这些矩阵随后基于 Yeo 图谱划分为 16 个功能模块。计算全脑节点和模块 SC-FC 耦合特征,并与 48 名健康对照者进行比较。然后对 HC、SF 和 NSF 的网络特征进行组间比较,选择所有 SC-FC 特征构建预测模型。此外,根据我们之前的研究结果,所有特征被分为 5 个数据集。最后,将每个数据集集成到交叉验证的机器学习模型中,进行手术预后分类。

结果:与对照组相比,颞叶癫痫患者的视觉模块和皮层下模块出现解耦。三组间的比较分析显示,nSF 组多个与默认网络相关的 sfc 显著高于 SF 组和 HC 组。两个与默认模式网络(DMN)相关数据集的预测性能最高,最终的预测模型的受试者工作特征曲线下面积为 0.855,总体准确率为 0.816。

意义:这项研究揭示了 DTLE 术前 DMN 的 SC-FC 耦特征与术后癫痫复发密切相关,基于 SC-FC 耦合特性建立的机器学习模型可以预测 DTLE 手术预后。

PO-2988

糖尿病相关动脉粥样硬化斑块的鉴别诊断:基于颅内高分辨率磁共振的放射组学研究

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背景与目的:糖尿病显著影响颅内动脉粥样硬化的形成和发展。本研究旨在评估放射组学特征是否有助于区分与糖尿病相关的斑块。

材料与方法:我们回顾性分析了 2016 年至 2022 年间因颅内动脉粥样硬化导致急性缺血性卒中入院的患者。收集了所有患者的临床数据、血液生物标志物、常规斑块特征和斑块放射组学特征。通过逻辑回归模型确定了带有 95% 置信区间(CI)的比值比(OR)。接收者操作特征(ROC)曲线和 ROC 曲线下面积(AUC)用于描述诊断性能。DeLong 检验用于比较不同模型之间的差异。

结果:共有 157 名患者(115 名男性;平均年龄为 58.7 ± 10.7 岁)被纳入研究。多变量逻辑回归分析显示,斑块长度(OR: 1.17; 95% CI: 1.07-1.28)和斑块面积(OR: 1.13; 95% CI: 1.02-1.24)与糖尿病独立相关。将斑块长度和面积合并建立的常规斑块特征模型时,训练组和验证组识别糖尿病患者的 AUC 分别为 0.789 和 0.720。在结合 T1WI 和对比增强 T1WI 序列的放射组学特征时,训练组和验证组获得了更好的诊断价值(AUC: 0.889 和 0.861)。DeLong 检验显示,在两个队列中,结合放射组学和传统斑块特征的模型比传统模型表现更好($P < 0.05$)。

结论: 颅内高分辨磁共振基础上,提取的斑块放射组学特征能有效区分以糖尿病为主要病因的责任斑块,这将为研究斑块的形成和精确治疗提供新的思路。

PO-2989

动脉自旋标记成像联合酰胺质子转移成像在阿尔茨海默病中的初步研究

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目的：动脉自旋标记（arterial spin labeling, ASL）联合酰胺质子转移（amide proton transfer, APT）分析阿尔茨海默病（Alzheimer's disease, AD）患者和正常对照者（normal control, NC）的脑血流灌注（cerebral blood flow, CBF）、非对称性磁化转移率（magnetization transfer ratio asymmetry, MTRasym）和表观交换依赖弛豫（apparent exchange dependent relaxation, AREX）表达差异，并评价其诊断效能。

方法：采用独立样本 t 检验比较两组间不同脑区 CBF 值、MTRasym 值和 AREX 值差异（Bonferroni 校正），通过 ROC 曲线评价 CBF 单参数模型、CBF 组合模型、AREX 单参数模型、AREX 组合模型及 CBF+AREX 模型诊断效能。DeLong 检验评估不同模型间的诊断差异。Pearson 相关分析观察 CBF 及 AREX 与简易精神状态量表（mini-mental state examination, MMSE）的相关性。

结果：CBF 值在 AD 组 6 个脑区较 NC 组降低；MTRasym 值在 AD 组和 NC 组没有统计学差异；AREX 值 AD 组 3 个脑区较 NC 组降低；6 个脑区 CBF 值鉴定 AD 及 NC 的 CBF 单参数模型 ROC 曲线下面积分别是 0.797、0.757、0.753、0.742、0.733、0.759，CBF 组合模型 AUC=0.786。3 个脑区 AREX 单参数模型 ROC 曲线下面积分别是 0.764、0.710、0.723，AREX 组合模型 AUC=0.744。CBF+AREX 模型 ROC 曲线下面积最大，AUC=0.900。6 个脑区的 CBF 与 MMSE 评分呈正相关（r 值分别为 0.808、0.583、0.687、0.625、0.702、0.687）。3 个脑区的 AREX 值与 MMSE 评分均不相关。

结论：结合 CBF 值与 AREX 比单纯 CBF 可以更好地鉴别 AD 和 NC，由此可见，ASL 技术联合 APT 技术可能作为 AD 诊断的有力工具。

PO-2990

基于双参数 MRI 的深度学习-临床混合模型对临床显著性前列腺癌诊断价值的研究

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目的 探讨基于双参数 MRI 的深度学习联合临床指标构建的混合模型诊断临床显著性前列腺癌（csPCa）的有效性。材料和方法 回顾性分析本院 2017 年 2 月至 2022 年 5 月共 531 例行术前 MRI 且经病理证实的前列腺疾病患者的临床及影像资料，其中 csPCa 319 例，无显著临床意义的前列腺癌（ciPCa）57 例，良性病变 155 例。按照 8: 2 比例将所有患者随机划分为训练集（425 例）和测试集（106 例）。采用 DenseNet 网络建立深度学习模型，采用单因素和多因素逻辑回归筛选有意义的临床特征并建立临床模型，并使用逻辑回归联合深度学习模型和临床特征建立深度学习-临床混合模型。使用受试者工作特征（ROC）曲线评估模型性能，使用 Delong 检验比较曲线下面积（AUC）。通过决策曲线评估模型和临床因素的临床价值。结果 回归分析显示年龄、PSA 及 PI-RADS 评分为 csPCa 的独立危险因素。在测试集中，深度学习模型的 AUC 值为 0.90（95%置信区间：0.85-0.96），临床模型的 AUC 值为 0.85（95%置信区间：0.78-0.92），两者间差异无统计学意义（P = 0.24）。深度学习-临床混合模型的 AUC 值为 0.93（95%置信区间：0.88-0.98），优于临床模型（P = 0.034）和深度学习模型（P = 0.048）。决策曲线显示深度学习-临床混合模型的临

床净效益高于临床模型和深度学习模型。结论 深度学习模型对 csPCa 的诊断效能与临床模型相当。深度学习-临床混合模型对 csPCa 的诊断效能最高,有助于减少不必要的活检。

PO-2991

基于 3.0T MR 的大鼠颅内出血模型构建评估的应用研究

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目的: 颅内出血患者的高致残原因主要是血肿周围脑实质的水肿、坏死导致的不可逆性脑损伤,目前临床对出血后进行脑组织修复治疗的时机及方法尚无统一定论,仍需进行大量的动物实验及基础实验进行探索。本研究旨在应用常规国产 3.0T MR 搭配动物线圈对 SD 大鼠进行 MR 多参数颅脑扫描,实现大鼠颅内出血模型的构建评估及分期诊断;为后期应用磁共振影像对不同出血时期脑组织损伤程度及修复评估提供更直接、客观的研究方法及基础。

方法: 1. 颅内出血模型构建: 选取 8 周左右雄性 SD 大鼠,麻醉后使用脑立体定位图谱设计注血、开颅部位并进行定位开颅,利用微量进位器垂直穿刺注射 2ul 胶原酶于设定脑区,注射完消毒并缝合切口。2. 多参数 MR 扫描: 应用联影 3.0T uMR780 磁共振搭配联影 Rat coil-12 线圈,分别于术后 12h 及 1、2、3、5、7、14d 进行 MR 扫描,采集序列为改良后 T1WI (TR=1600ms, TE=13.4ms)、T2WI (TE=4800ms, TE=69.1ms) 及 SWI (TR=33.9ms, TE=20ms) 序列, FOV: 50x40mm, 体素大小 0.27x0.27x1.00mm, 层厚 1.0mm, 层间距 0mm, 扫描后应用 3D slicer 软件对颅内出血量进行精确测量。

结果: 应用立体定位仪胶原酶注射法进行 SD 大鼠颅内出血模型构建,术后 7 天内死亡率约 10%, 7 天以上死亡率为 0; 应用 3.0T 磁共振进行大鼠颅脑扫描可在术后 12h 发现颅内血肿,定位出血部位并精准计算出血量 ($24.085\pm2.99\text{ul}$), 在术后 2d 达到最大出血量并周围组织水肿 ($53.00\pm4.46\text{ul}$), 术后 5d 出血量停止增大 ($45.18\pm5.31\text{ul}$); T1WI、T2WI 及 SWI 扫描图像质量良好,出血部位与立体定位仪设置一致,各序列信号的变化可区分颅内血肿超急性期/急性期/亚急性期/慢性期改变。

结论: 应用联影 3.0T MR 及大鼠线圈进行磁共振多参数成像,可以对 SD 大鼠颅内脑出血模型进行精准出血量化及准确临床分期,评估结果表明立体定位仪胶原酶注射法进行 SD 大鼠颅内脑出血模型构建方法安全、准确、稳定。

PO-2992

CMR T1mapping 技术 MOLLI、ShMOLLI 和 SASHA 序列定量扩张型心肌病心肌纤维化的对照研究

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目的: 探讨 CMR T1mapping 技术 MOLLI、ShMOLLI 和 SASHA 序列分别对扩张型心肌病心肌纤维化的诊断价值,并分析序列定量的扩张型心肌病心肌纤维化参数与临床指标的相关性。

方法: 对我院 28 例扩张型心肌病患者和 14 位同期健康体检者进行回顾性分析。所有受检者均在 1.5T 磁共振机上,将不同序列测量出的扩张型心肌病患者组和正常对照组的平扫 T1 值、增强后 T1 值和 ECV 值进行比较分析。绘制不同序列 T1mapping 定量参数的 DCM 患者和正常对照组的 ROC 曲线,并计算曲线下面积和特异性及敏感性。比较不同序列心肌 16 节段的平扫 T1 值和 ECV 值,及不同序列心肌中间部层面 LGE+ 节段和 LGE- 节段的 T1mapping 参数。对不同序列之间的

T1mapping 参数进行相关性分析, 同时对不同序列的 **T1mapping** 参数与血清学结果进行相关性分析。

结果:不同序列的 DCM 患者组的平扫 T1 值和 ECV 值均较正常对照组平扫 T1 值和 ECV 值显著升高, 差异有统计学意义。DCM 患者和正常对照组的 ECV 值的 ROC 曲线结果: MOLLI 0.92(0.70-0.98), ShMOLLI 0.76(0.56-0.96), SASHA 0.78(0.67-0.97), p 值均小于 0.05。比较不同 ROC 曲线的 AUC 值发现: AUC (MOLLI) 大于 AUC (ShMOOLI) ($p=0.03$) 和 AUC (SASHA) ($p=0.04$)。不同序列的 LGE+节段的平扫 T1 值和 ECV 值均高于 LGE-组, 差异具有统计学意义 (p 值均小于 0.05)。相关性分析结果显示: 各序列间的平扫 T1 值、增强后 T1 值和 ECV 值都具有良好的正相关性。不同序列的平扫 T1 值与血中 BNP 和 TnI 浓度具有良好的正相关性。同时, 仅发现 MOLLI 序列的 ECV 值与射血分数呈负相关性 ($r=0.683$, $p=0.002$)。

结论: 扩张型心肌病患者中 MOLLI、ShMOLLI 和 SASHA 序列的平扫 T1 值、ECV 值均高于正常对照组, MOLLI 序列对扩张型心肌病心肌纤维化具有更好的诊断效能。BNP、TnI 与 MOLLI、ShMOLLI 和 SASHA 序列测得的平扫 T1 值均具有相关性。

PO-2993

基于超材料的无线腕关节线圈优化 1.5T 磁共振成像

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目的: 设计用于 1.5T 腕关节磁共振成像的无线超材料线圈 (wireless metamaterial coil, WMC), 并评估其对于腕关节磁共振成像质量的优化效果。

方法: 在实验室设计并制备 WMC 原型线圈。首先, 采用 CST 2021 电磁仿真软件研究 WMC 空载状态下的电磁谐振特性。然后, 采用 1.5T 磁共振成像系统 (uMR570) 进行水模和 14 个无症状腕关节 (来自 7 名健康志愿者) 磁共振成像。扫描序列包括: T1 加权的自旋回波序列 (T1 SE)、脂肪饱和质子密度加权的快速自旋回波序列 (FS PDW FSE) 以及 T1 加权的三维梯度回波序列 (3D T1W GRE)。分别采用 WMC 和 12 通道腕关节线圈 (12-channel wrist coil, 12CH WRC) 接收信号。由一名具有 5 年以上的放射学医生进行阅片, 测量并计算水模和腕关节不同组织的信噪比 (signal-to-noise ratio, SNR) 和对比噪声比 (contrast-to-noise ratio, CNR)。采用配对 t 检验比较 WMC 和 12CH WRC 图像 SNR、CNR 的差异 ($P<0.05$ 表示差异有统计学意义)。

结果: 电磁仿真结果显示 WMC 在磁共振信号接收频段谐振频率位于 64MHz (图 1a), 与体线圈比较, 能够提高射频接收场(B_1^-)达 170.1 倍, 同时不影响射频发场 (B_1^+) (图 1b)。在水模研究中, 与 12CH WRC 相比, 在三种成像序列上 WMC 均能够显著提高 SNR 和 CNR (1.2-3.5 倍) (图 2)。在健康志愿者腕关节成像中, 在三种成像序列上, WMC 图像中关节液、肌肉、软骨及脂肪等组织的 SNR 和 CNR 均显著高于传统 12CH WRC ($P<0.05$) (图 3)。

结论: 与传统的 12 通道腕关节线圈相比, 本研究设计的无线超材料线圈能够显著提高腕关节磁共振成像的图像质量。并且, 与传统线圈相比具有无线无源的特点, 能够在一定程度上简化磁共振检查流程。因此, WMC 具有客观的临床实际应用前景。

PO-2994

基于 MRI 脂肪分数图的 RSF 影像组学模型在 T2DM 中的应用价值研究

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目的：2 型糖尿病（type 2 diabetes mellitus, T2DM）是一种慢性代谢性疾病，其全球发病率持续上升，对患者健康和社会负担造成了严重的影响。因此，对 T2DM 进行早期诊断和有效管理是降低并发症风险的关键。本研究旨在探讨基于 MRI 脂肪分数图的肾窦脂肪（renal sinus fat, RSF）影像组学模型在 T2DM 中的应用价值。方法：回顾性分析 2017 年 1 月至 2021 年 3 月间大连医科大学附属第一医院住院患者的临床及影像资料。共纳入 T2DM 患者 33 例，非 T2DM 患者 101 例，按 7:3 比例随机分为训练集与测试集。使用 ITK-SNAP 软件在 MRI 脂肪分数图上手动逐层勾画双侧 RSF。使用联影 uAI Research Portal 科研平台对图像进行标准化处理和 RSF 影像组学特征的提取。采用最小冗余最大相关（mRMR）和最小绝对值收敛和选择算子（LASSO）回归分析对影像组学特征进行降维和筛选，利用随机森林(random forest, RF)方法建立预测 T2DM 的影像组学模型，采用受试者工作特征（receiver operating characteristic, ROC）曲线下面积（area under the curve, AUC）、校准曲线及决策曲线对模型效能进行评估。结果：本研究共提取 1184 个特征，最终筛选出 5 个特征参与模型构建。该模型在训练集中的 AUC 值为 0.824（95%CI 0.761-0.889），其诊断 T2DM 的灵敏度为 63.2%，特异度为 81.8%，准确度为 77.2%；在测试集中的 AUC 值为 0.746（95%CI 0.596-0.896），灵敏度为 56.3%，特异度为 75.7%，准确度为 70.9%，校准曲线显示模型一致性较好，决策曲线分析显示模型净收益率较高。结论：基于 MRI 脂肪分数图的 RSF 影像组学模型在 T2DM 中具有重要的应用潜力。本研究为 T2DM 的早期诊断和治疗策略的制定提供了重要的参考依据。

PO-2995

胶质母细胞瘤分子标志物 OLIG2 的预后作用 MR 影像组学预测模型的研究

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目的胶质母细胞瘤（GB）是成人最常见的颅内原发恶性肿瘤，具有高度异质性。OLIG2 作为胶质瘤干细胞潜在的特异性分子标志物与 GB 预后不良和化学抵抗有一定相关性。本研究旨在探究 OLIG2 分子在 GB 中表达的临床意义，同时，基于临床、形态学及术前 MRI 影像组学特征构建机器学习二分类模型，实现术前无创预测 OLIG2 表达水平，为个体化评估预后、指导治疗决策提供办法。方法收集 2012 年 9 月至 2020 年 1 月复旦大学附属华山医院经病理确诊的 GB 病例。采用免疫组织化学染色技术半定量分析 OLIG2 表达水平。Cox 比例风险回归模型分析 GB 总体生存期的影响因素。Kaplan-Meier 生存分析评估总体生存期并确定 OLIG2 表达的最佳 cutoff 值。采集患者术前头颅 MRI，包括 CE-T1WI 和 T2-FLAIR 序列。评估 VASARI 特征，勾画感兴趣区域。PyRadiomics 提取影像组学特征。按 7:3 将病例随机分为训练集和测试集。训练集中采用递归特征消除（RFE）筛选特征，随机森林（RF）建立 OLIG2 二分类预测模型。测试集用于验证最优模型的性能。绘制 ROC 曲线，计算 AUC 以量化模型预测能力。

结果单因素 Cox 分析显示性别、术前 KPS 及 OLIG2 为 GB 的保护性预后因素，多因素分析显示术前 KPS 和 OLIG2 是影响患者生存的独立预后因素。Kaplan-Meier 生存分析表明 OLIG2 表达水平与

GB 总体生存期显著相关 ($P<0.001$)，且最佳 cutoff 值为 10%。最终纳入 134 例 GB 患者，统计共 1945 个特征，包括年龄、性别、VASARI、影像组学特征。训练集中筛选出 23 个最佳特征，包括 8 个 CE-T1C 和 13 个 T2-FLAIR 影像组学特征。调参后的最佳 RF 二分类预测模型 AUC 在训练集中达到 0.854，在测试集中达到 0.819。

结论 OLIG2 在 GB 患者中具有独立的保护性预后作用，且 OLIG2 表达水平 $\leq 10\%$ 的 GB 患者预后较差。基于 VASARI 和 MR 组学特征构建的 RFE-RF 二分类机器学习模型可以实现术前无创预测 OLIG2 表达水平，辅助指导临床预后评估及制定个体化靶向治疗策略，而无需有创手术或病理活检检查。

PO-2996

基于 MRI 影像特征评估接受 TACE 或放疗肝癌患者预后的初步研究

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目的：探究 MRI 影像特征在评估接受 TACE 或放疗的肝癌患者预后的价值。

方法：回顾性收集 2010 年 1 月 1 日至 2020 年 3 月 31 日接受局部治疗的肝癌患者（共 58 例）的临床资料、生存期及影像资料，其中男性 46 例，女性 12 例。患者的 MRI 影像特征通过放射科医生评阅患者治疗前的 MRI 的图像来获取。使用 Kaplan-Meier 生存曲线进行单因素生存分析和多因素 COX 回归分析来检验 MRI 影像特征对肝癌患者无进展生存率预测的独立作用，获得与患者预后相关的影像特征。使用相关影像特征构建预后预测模型。

结果：“最大截面积”与“ADC 值”是肝癌患者无进展生存期的独立预测因素。对于接受介入治疗的患者，“瘤内动脉”与“瘤内动脉数量”也是其独立预测因素。使用“最大截面积”与“ADC 值”构建的预后模型可以对肝癌患者的预后做出有效的预测。预测模型的受试者曲线下面积 $AUC=0.787$ ($P<0.001$)，其敏感性和特异性分别为 96.79%、56%。

结论：MRI 影像学特征是接受局部治疗患者无进展生存期的有效评估因素，使用“最大截面积”与“ADC 值”构建的预后模型可以对肝癌患者的预后做出有效的预测。

PO-2997

神经突方向离散度与密度成像 (NODDI) 在帕金森病脑深部核团 微观结构变化的临床应用

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目的：基于神经突方向离散度与密度成像 (NODDI) 探索帕金森病脑深部核团微观结构变化。

方法：前瞻性纳入 24 例右利手 PD 患者，同期纳入 10 名年龄及性别相匹配的右利手健康志愿者作为对照，于 3.0T 核磁行 DSI 扫描，基于 Matlab 平台将弥散加权数据拟合到 NODDI 模型，量化分析双侧尾状核、壳核、苍白球的变化。两独立样本 t 检验或非参数检验比较 PD 患者与健康志愿者细胞内体积分数 (VIC)，方向分散指数 (ODI) 和各向同性体积分数 (VISO) 差异；配对 t 检验或符号秩和检验比较 PD 患者双侧尾状核、壳核、苍白球细胞内体积分数 (VIC)，方向分散指数 (ODI) 和各向同性体积分数 (VISO) 差异。

结果：PD 患者双侧尾状核、壳核、苍白球的各向同性体积分数 (VISO) 均显著低于健康对照组 ($P<0.05$)；PD 患者右侧尾状核的细胞内体积分数 (VIC)、方向分散指数 (ODI) 和各向同性体积分

数(VISO)均显著低于健康对照组 ($P<0.05$)；PD 患者双侧苍白球的各向同性体积分数(VISO)及双侧壳核的方向分散指数(ODI 存在显著差异 ($P<0.05$)。

结论：神经突方向离散度与密度成像可以反映PD患者深部核团微观结构变化，其参数值 VIC、ODI 及 VISO 可以作为 PD 患者的评估指标。

PO-2998

多频 MRE 术前预测肝细胞癌 VETC+/MVI+的初步研究

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目的：探索多频 MRE 机械参数是否能够在术前预测 VETC+/MVI+状态及其价值。

材料与方法：2021 年 1 月至 2022 年 11 月在中南大学湘雅医院前瞻性招募临床拟诊肝细胞癌患者 328 名。所有患者均接受了常规多参数 MRI 及多频 MRE 检查，最终纳入经术后病理确诊的肝细胞癌患者共 124 例。收集患者临床资料、评估常规 MRI 影像学特征及测量肿瘤及背景肝实质多频 MRE 机械参数 $c(m/s)$ 和 $\phi(rad)$ 。通过单因素分析中 $P<0.05$ 的参数进入二元 logistic 回归进行多因素分析，以阐明 VETC+/MVI+的危险因素。以进入多因素分析中的临床变量、常规 MRI 影像学特征分别建立预测模型；多频 MRE 机械参数及其联合多因素分析中临床变量、常规 MRI 影像学特征建立预测模型。使用 ROC 曲线下面积评估预测效能。使用校准曲线评价模型拟合度。使用临床决策曲线分析评价模型的临床获益度。

结果：（1）VETC+/MVI+组肿瘤硬度 c 及相对硬度比较非 VETC+/MVI+组高，（ $2.81\pm0.51m/s$ Vs $2.62\pm0.68m/s$ ； 1.47 ± 0.39 Vs 1.30 ± 0.36 ， P 均 <0.05 ）。（2）多因素 Logistic 回归结果表明，AFP（OR 0.19，95%CI（0.04-0.86）， $P=0.031$ ）、异常凝血酶原（OR 0.02，95%CI（0.02-0.73）， $P=0.021$ ）、瘤内动脉（OR 6.76，95% CI（1.72-26.67）， $P=0.006$ ）和肝实质流动性（OR0.00，95% CI（0.00-0.37）， $P=0.021$ ）是 VETC+/MVI+的独立危险因素。（3）在 VETC+/MVI+的预测模型中，多频 MRE 机械参数模型的特异性和准确性最高（分别为 0.79、0.75），临床资料、常规 MRI 影像特征联合多频 MRE 机械参数模型的 AUC 值（0.854（0.788-0.921））和敏感性（0.97）最高。

结论：多频 MRE 的机械参数 c 能够在术前预测 VETC+/MVI+状态。临床资料、常规 MRI 影像学特征联合多频 MRE 机械参数可以提升预测 VETC+/MVI+效能。

PO-2999

人工智能压缩感知不同加速因子在臂丛神经 MRI 成像中的应用

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目的：探讨人工智能辅助压缩感知（artificial intelligence-compressed sensing, ACS）技术在臂丛神经 MRI 成像中的加速效率及对图像质量的影响。

方法：招募 30 例健康志愿者，在 3.0T MRI 行平扫 3D-matrix-STIR 臂丛神经成像。扫描序列包括加速因子分别为 3.0、5.0、8.0 的 ACS 序列，以及常规并行采集（parallel imaging, PI）3.0 序列。两位高年资放射科医师双盲阅片，分别对 4 组图像的神经显示情况、图像伪影、脂肪抑制情况和整体图像质量评分 4 方面进行主观评价；两位放射科医师在原始图像上测量 C6 臂丛神经根、神经干、臂丛内侧束和背景的信号强度（signal intensity, SI）和噪声值（standard deviation, SD），计算信

噪比 (signal-to-noise ratio, SNR) 和对比噪声比 (contrast-to-noise ratio, CNR), 作为客观评价指标。对扫描时间、主观评分和客观指标进行统计学分析。

结果: ACS 序列扫描时间较常规 PI 序列有大幅降低, 且扫描时间随加速因子的增大而缩短 (PI 3.0: 352s; ACS 3.0: 227s; ACS 5.0: 158s; ACS 8.0: 108s)。主观评价一致性较好。4 组序列间主观评分和客观指标差异具有统计学意义 ($P<0.05$)。ACS 3.0 和 ACS 5.0 的主观评分和 SNR、CNR 与 PI 3.0 差异无统计学意义 ($P>0.05$), ACS 8.0 的 SNR、CNR 高于 PI 3.0, 主观评分低于 PI 3.0 ($P<0.05$)。

结论: ACS 技术能够缩短 MRI 扫描时间; 在平扫 3D 臂丛神经成像中, 推荐使用加速因子为 5.0 的 ACS 序列, 可在保证图像质量的前提下将扫描时间缩短 55%, 提高工作效率, 有望应用于临床。

PO-3000

基于 MRI 的改良脑小血管病负担评分联合颅内动脉责任斑块特征对卒中复发的预测价值

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目的 探讨基于 MRI 的改良脑小血管病 (CSVD) 负担评分和颅内动脉高分辨率血管壁成像 (HR-VWI) 责任斑块特征与症状性颅内动脉粥样硬化性狭窄 (sICAS) 患者卒中复发的关系。

方法 回顾性分析我院神经内科 2019 年 12 月-2021 年 12 月期间行常规头颅 MRI 及颅内动脉 HR-VWI 的 sICAS 患者 145 例。根据常规 MRI 图像计算获得改良 CSVD 负担评分, 其中脑白质高信号根据 Fazekas 量表评分记作 0-3 分, 腔隙性梗死根据数量记作 0-3 分, 存在脑微出血即记作 1 分, 总分为 7 分。分别于患者出院后 3 个月、6 个月、9 个月及 12 个月进行门诊随访, 根据随访结果将患者分为未复发组与复发组。使用秩和检验比较两组患者改良 CSVD 负担评分的差异, 使用 T 检验或单因素方差分析比较两组患者动脉粥样硬化高危因素及责任斑块特征的差异。多因素 Cox 比例风险模型用于分析卒中复发的独立危险因素。ROC 曲线用于分析改良 CSVD 负担评分及责任斑块特征对卒中复发的预测效能。

结果 本研究共有 32 例患者 12 个月内出现了卒中复发。复发组患者改良 CSVD 负担评分、斑块厚度、斑块负荷、管腔狭窄程度高于未复发组 (P 均 <0.05), 复发组患者糖尿病患病率、责任斑块内出血、斑块显著强化的发生率高于未复发组 (P 均 <0.05)。多因素分析显示改良 CSVD 负担评分 ($HR=2.264$, $P<0.001$)、责任斑块内出血 ($HR=2.632$, $P=0.033$) 是卒中复发的独立危险因素。ROC 曲线分析显示改良 CSVD 负担评分预测卒中复发的阈值为 4 分, AUC 值为 0.775, 敏感性 62.50%, 特异性 87.61%; 责任斑块内出血预测卒中复发的 AUC 值为 0.659, 敏感性 53.13%, 特异性 78.76%; 改良 CSVD 负担评分联合责任斑块内出血预测卒中复发的 AUC 值为 0.819, 敏感性 71.87%, 特异性 80.53%; Delong 检验分析显示改良 CSVD 负担评分联合责任斑块内出血预测卒中复发的效能最佳 ($Z=2.678$, $P<0.05$)。

结论 改良 CSVD 负担评分联合责任斑块内出血对卒中复发有较好的预测能力, 且数据相对易获取, 临床应用价值较高。

PO-3001

基于 3.0T MRI 的影像组学特征预测局部进展期直肠癌新辅助治疗疗效及多种分类器效能比较

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摘要: 目的 3.0 MRI 影像数据具有评估直肠癌新辅助治疗疗效临床价值,但是构建模型多种机器学习间的比较一直没有被探究过。我们将比较 4 种常用的机器学习的方法在评估直肠癌新辅助治疗疗效临床价值的效能。方法 选取 2021 年 9 月 1 日—2023 年 1 月 30 日于哈尔滨医科大学附属第二医院就诊经病理检查证实的局部进展期直肠癌,行新辅助化疗共 160 例,按 8:2 比例分为测试集及验证集。分别建立支持向量机、朴素贝叶斯、K 邻近算法以及神经网络四种分类器模型,采用 Delong 检验比较 ROC 曲线差异。对 4 种分类器诊断效能进行评估比较。结果 2 组患者年龄、性别差异无统计学意义。通过 LASSO 得到 9 个与治疗效果分组相关的特征,9 个特征在 GR/PR 组及 pCR/non-pCR 中有差异,但是差异不具有统计学意义。SVM 的 ROC 曲线下面积为 0.915,评估新辅助放化疗效果最为显著。结论 基于磁共振高分辨 T2WI 的纹理特征,通过 SVM、NB、NN、CNN 分类器模型可以对直肠癌 nCRT 疗效的进行评估,其中 SVM 分类器模诊断效能最佳,基于高分辨 T2WI 的影像组学可以评估 LARC 患者 nCRT 治疗效果。

PO-3002

氢质子磁共振波谱成像在胶质瘤分子特征中的应用

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目的: 用氢质子磁共振波谱成像 (1H-MRS) 半定量测量胶质瘤由于基因突变导致的脑代谢物改变。比较 MRS 测得的 IDH1 突变型和野生型间的代谢物比值是否存在差异。

方法: 纳入本院 2021 年 10 月至 2023 年 6 月经手术治疗且病理证实为胶质瘤患者 117 例,男性 57 例,女性 43 例,患者治疗前均使用 Philips Achieva 3.0T 磁共振扫描仪行头颅 MRI 平扫、增强及 1H-MRS 检查。使用轴向 T2 FLAIR 或 T1WI 增强检查作为指导,多体素 1H-MRS 的检测在肿瘤实性成分最大层面进行,避开出血、坏死及囊变等区域,记录各体素 Cho/NAA、Cho/Cr、NAA/Cr 值,选出最大值,计算平均值。收集 IDH1 状态、Ki-67 指数免疫组化检测结果。比较所有以及 WHO 分级各级中 IDH1 突变型与 IDH1 野生型组间的年龄、三组 1H-MRS 比值、Ki-67 指数的差异。应用 SPSS25.0 统计软件进行数据分析。

结果: 117 例胶质瘤中 IDH1 野生型 80 例, IDH1 突变型 37 例; WHO1 级 3 例, WHO2 级 38 例, WHO3 级 41 例, WHO4 级 35 例。IDH1 突变型和野生型 Cho/NAA 最大值、年龄、Ki-67 指数间存在差异 ($P < 0.05$)。其中在 WHO3 级中 IDH1 突变型和野生型 Cho/NAA 最大值分别为 12.45 ± 33.56 , 8.38 ± 10.32 , 两组间参数存在差异 ($P < 0.05$)。IDH1 突变型 Cho/NAA 最大值高于 IDH 野生型胶质瘤。

结论: IDH1 突变型和野生型间的代谢物比值存在差异, IDH1 突变导致胶质瘤内代谢物变化。

PO-3003

定量磁化率成像技术对地中海贫血患者脑铁沉积的定量研究

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目的：探讨定量磁化率成像技术 (QSM) 测量地贫患者脑铁含量的可行性，利用 QSM 测量地贫患者脑内铁含量的磁化率，观察地贫患者脑内铁含量的分布特征，并分析大脑灰质核团磁化率与肝脏、心脏、垂体横向弛豫率 ($R2^*$) 的相关性。

方法：招募 2022 年 10 至 2023 年 4 月就诊于广西医科大学第一附属医院的 β -重型地中海贫血患者 38 名，均同时完成头颅 QSM 及肝脏、心脏、垂体的 $R2^*$ 扫描，采用配对样本 t 检验比较两侧大脑半球灰质核团的磁化率，采用 pearson 相关分析评估地贫患者脑灰质核团磁化率与肝脏、心脏、垂体横向弛豫率的相关性。

结果：地贫患者黑质的磁化率最大，其次是苍白球，额叶白质的磁化率最低；地贫患者两侧背侧丘脑具有统计学差异 ($P < 0.05$)，左右两侧尾状核、苍白球、壳核、黑质、红核、齿状核不存在统计学差异 ($P > 0.05$)；地贫患者肝脏、心脏、垂体铁沉积与大脑灰质核团铁含量不具有相关性 ($P > 0.05$)。

结论：地中海贫血患者两侧背侧丘脑铁含量具有差异，利用 QSM 可以显示脑内灰质核团的铁含量，磁化率可以作为一种反应脑内铁含量变化的临床指标。

PO-3004

基于时间依赖性磁共振弥散成像区分前列腺病变组织微结构研究

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目的：本研究旨在利用时间依赖性磁共振弥散成像探究正常前列腺组织与前列腺癌的细胞微结构信息。**材料与方法：**本研究获得大连医科大学附属第一医院伦理委员会批准 (PJ-KS-KY-2022-277)。本研究纳入因临床怀疑前列腺疾病于我院行 3.0T MRI 扫描并诊断为前列腺癌的患者 16 例，年龄范围 70-82 岁；正常前列腺志愿者 10 例，年龄范围 23-77 岁。所有入组者均使用带有 32 通道体部线圈的飞利浦 3.0T MR 扫描仪 (Ingenia CX, Philips Healthcare, Best, the Netherlands) 进行扫描。在成像之前，患者被要求排空膀胱。扫描序列包括 T1WI、T2WI、DWI 及 OGSE 序列。由两名诊断经验丰富的影像科诊断医师 (分别从事影像诊断工作 3 年及 6 年) 在 3D slicer (www.slicer.org) 软件中参考 T2WI、DWI ($b=1400s/mm^2$) 及 ADC 图像，于 OGSE 图像上勾画 ROI，勾画时避开囊变、坏死及出血区域。采用 Matlab (2022b, Math Works) 软件对图像进行拟合，拟合次数为 20 次，得到的拟合参数包括细胞直径 (d)、细胞内体积分数 (fin)、细胞外扩散系数 (Dex)、细胞密度 ($cellularity$)。采用 Shapiro-wilk 检验各参数的正态性分布。采用独立样本 t 检验获 Mann-Whitney 检验评估各参数区分两组病例的差异。采用 ROC 曲线评估各参数的诊断效能，并记录各参数区分两组病例的敏感性、特异性。结果：两组病例间 d 、 Fin 、 $cellularity$ 、 Dex 、 ADC_{0HZ} 、 ADC_{25HZ} 及 ADC_{50HZ} 差异具有统计学意义 ($t=2.370$ 、 4.904 、 5.424 、 -3.465 、 P 均 < 0.05)。各参数区分两组病例的 AUC 值分别为 0.823、0.990、0.990、0.844，敏感度分别为 68.7%、93.7%、93.7% 及 100%，特异度分别为 100%、100%、100% 及 83.3%。结论：时间依赖性磁共振成像可从细胞微结构水平区分正常前列腺组织与前列腺癌，对于无创诊断前列腺癌具有一定的临床应用前景。

PO-3005

基于深度学习的减影技术提高 LR-TR 诊断效能

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目的

探讨基于深度学习的动脉期减影图像在 LR-TR 识别有活性病灶中的价值。

方法

回顾性收集接受 TACE 及 RFA 治疗的肝癌患者的多期动态增强 MR 图像。建立基于深度学习的减影模型，自动生成动脉期减影图像。两名放射科医生分别在原始图像、原始图像+动脉期减影图像上进行 LR-TR 分类，同时进行信心评分。活性的最终参考标准是 MR 检查 1 月后 DSA 中的肿瘤染色。

结果

共入组来自 105 例病人的 286 个病灶，根据 DSA，157 个病灶有活性，129 个病灶无活性。动脉期减影图像辅助提高 LR-TR 识别有活性病灶的敏感性和准确性（87.9% vs 67.5%， $p<0.0001$ ；86.4% vs 75.9%， $p<0.0001$ ），而特异性无统计学差异（84.5% vs 86.0%， $p=0.687$ ）。LR-TR 识别有活性病灶的 AUC 显著提高（0.862 vs 0.768， $p<0.0001$ ）。动脉期减影图像也提高了诊断者信心评分（ $p<0.0001$ ）和观察者间一致性（0.857 vs 0.727）。

结论

应用基于深度学习的减影技术明显提高 LR-TR 识别有活性肝癌的敏感性，而特异性无统计学差异。

PO-3006

伴海马硬化与 MRI 阴性颞叶癫痫静态和动态脑自发活动的异同

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目的：全面分析伴海马硬化颞叶癫痫（temporal lobe epilepsy with hippocampus sclerosis, TLE-HS）和 MRI 阴性颞叶癫痫（MRI-negative temporal lobe epilepsy, TLE-N）患者脑自发活动的静态和动态异常变化模式的异同，并探索这些改变是否与认知功能相关。

资料与方法：计算 38 例 TLE-HS 患者、51 例 TLE-N 患者和 53 名健康志愿者的 6 个脑自发活动静态指标（ALFF、fALFF、ReHo、DC、GSCorr、VMHC）及 6 个相应的动态指标（dALFF、dfALFF、dReHo、dDC、dGSCorr、dVMHC），进行 ANOVA 分析和进一步的两组间比较。并对上述组间差异区域的各指标值与发病年限和认知功能评分进行相关性分析。

结果：与 HC 组相比，TLE-HS 和 TLE-N 组均出现了脑自发活动的异常变化，且变化模式相似，主要包括：①颞叶内侧结构、丘脑、基底节、桥脑和小脑 fALFF、dALFF 和 dfALFF 值的升高；②致痫灶同侧外侧颞叶区域 fALFF、ReHo、dReHo、DC、GSCorr 和 VMHC 值的降低；③双侧距状裂周围皮质 dVMHC 值的降低。然而，TLE-N 组的异常激活脑区团块范围较 TLE-HS 组小，并且 TLE-HS 组在双侧海马、中央前回和中央后回出现了额外的 VMHC 值降低。另外，与 TLE-N 组相比，TLE-HS 组在尾状核的 fALFF、dfALFF 和 ReHo 值升高，在双侧中央后回、内侧和外侧颞叶的 VMHC 值和左侧外侧颞叶的 dReHo 值下降。相关性分析结果显示多种脑自发活动指标的改变与认知评分及发病年限相关。

结论: TLE-HS 和 TLE-N 患者脑自发活动异常的改变模式基本相似, 但 TLE-HS 患者的异常改变更为显著。多种静态和动态脑自发活动指标的联合应用, 有助于探索 TLE 中癫痫活动的传播途径以及认知功能的损伤机制。

PO-3007

合成磁共振成像评估子宫内膜癌肌层浸润深度和预测病理类型的可行性: 与高分辨 T2WI 和 DWI 的比较

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目的: 探讨合成磁共振成像序列评估子宫内膜浸润深度和预测子宫内膜癌病理类型的能力。

方法: 纳入 236 例疑似 EC 的患者, 治疗前进行 MAGIC、hr-T2WI 和 DWI 检查。MAGiC 可以生成合成形态学图像(sy-T2WI)和定量合成图像(sy-T1、T2 和 PD 图)。由两名放射科医生分别在 sy-T2WI 与 hr-T2WI 图像上评估 DMI ($DMI < 50\%$ vs $\geq 50\%$), 比较两者的诊断性能及其一致性。在定量合成图像上, 通过手工勾画 EC 肿块的感兴趣区测量 T1、T2 和 PD 值, 预测区分 I 型(g1 ~ g2 型 EACs) 和 II 型(g3 型 EACs + non-EACs)的诊断效能。以病理结果为金标准, 计算曲线下面积(AUC), 并与表观扩散系数(ADC)进行比较。

结果: 在 236 名患者中, 39 名经病理证实的 EC 患者中, 共有 33 名出现 DMI ($< 50\%$: n=23; $\geq 50\%$: n=10)。DMI $\geq 50\%$ 时, sy-T2WI 的准确度、灵敏度和特异性分别为 0.80、0.80 和 0.88, 与 hr-T2WI 相似 (0.90、0.90、0.70, $r=0.80$, $p>0.05$)。DMI $< 50\%$ 时, sy-T2WI 的准确性、灵敏度和特异性分别为 0.65、0.88 和 0.50, hr-T2WI 的准确性、敏感性和特异性为 0.70、0.89 和 0.60 ($r=0.51$, $p>0.05$)。对于定量合成图像, 子宫内膜癌 II 型的 T2、PD 和 ADC 值低于 I 型 (均 $P<0.05$), 但 T1 值无差异 ($P>0.05$)。此外, 与 ADC 相比, T2 (AUC: 0.767) 和 PD 值 (AUC: 0.737) 在区分 II 型和 I 型方面具有相似的预测性能 (AUC=0.767, 均 $P>0.05$)。

结论: MAGiC 可一次获得合成形态学图像和定量合成图像, 在评估 DMI 和预测 EC 病理类型方面具有良好的应用前景和可行性。

PO-3008

基于治疗前 MRI 的影像组学特征分析预测局部晚期宫颈癌患者新辅助化疗后淋巴结转移情况: 一项双中心研究

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目的 基于治疗前磁共振图像 (MRI) 的影像组学特征建立模型, 以早期预测局部晚期宫颈癌 (LACC) 新辅助化疗 (NACT) 后患者淋巴结转移状况。

方法 回顾性分析两中心 2013 年至 2022 年的 265 例接受新辅助化疗并行根治性子宫切除术的 LACC 患者的基线 MRI 资料。根据术后病理报告中淋巴结转移状态分为阳性组和阴性组, 中心 1 的数据用于训练模型, 中心 2 的数据用于验证模型。从 T2WI、DWI 和静脉延迟期 cT1WI 中提取影像组学特征。对临床信息进行多变量回归分析, 基于单序列组学特征或多序列组学特征建立预测模型并比较模型间性能差异。采用决策曲线分析评价其临床应用价值。

结果 基于单序列组学特征建立的模型和多序列组学特征及临床信息建立的模型均与淋巴结转移状态相关($p < 0.05$)。与基于单序列模型相比,多序列组学特征及临床信息建立的模型具有更好的预测能力,在训练集和验证集的诊断能力最高,ROC 曲线下面积分别为 0.840 (95% CI, 0.775 ~ 0.905) 和 0.825(95% CI, 0.736 ~ 0.915)。

结论 基于治疗前 MRI,组合多序列组学特征及临床信息对 LACC 患者 NACT 后淋巴结转移具有较好的预测效能。

PO-3009

基于磁共振的鞘内化疗后 ALL 儿童的脑白质微结构研究

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目的: 针对急性淋巴细胞白血病(Acute Lymphoblastic Leukemia, ALL)儿童的中枢神经系统性白血病进行的预防性鞘内化疗是白血病治疗中的必要步骤,但是鞘内化疗药物对颅脑正常组织也会产生一定的影响。现有的研究对象主要集中在 ALL 儿童长期存活者,我们将研究目标锁定在 ALL 治疗期的患儿,了解即时的脑部变化,分析其脑白质纤维的改变,以期获取 ALL 鞘内化疗后儿童的脑白质宏观及微观结构的变化特点,为预防鞘内注射引起的脑损伤提供新的思路。

方法 (1) 我们对 57 名鞘内化疗后 ALL 儿童和 57 名年龄性别匹配的对照组的扩散峰度成像数据进行基于白质纤维骨架的空间统计,比较两组人的 KFA、MK、AK 和 RK 值,使用 FSL 软件库进行配对 t 检验、置换检验以及多重比较校正。(2) 对 43 名鞘内化疗后 ALL 儿童和 43 名年龄性别匹配的对照组进行纤维自动量化追踪,追踪出了 8 条主要纤维束: 双侧丘脑辐射、双侧皮质脊髓束、胼胝体小钳、右侧上纵束和双侧钩束,比较整条纤维束以及每条纤维束 100 段的 FA、MD、AD 和 RD 值的改变。使用 SPSS 软件进行统计,根据数据是否符合正态分布分别采用配对 t 检验和 Wilcoxon 符号秩和检验,行多重比较校正。

结果: (1) 相对于正常组,鞘内化疗后 ALL 患者胼胝体膝部和体部、右侧大脑脚、双侧内囊前肢、双侧内囊后肢、双侧放射冠前部以及左侧放射冠上部的 KFA 值减低,两组间的 MK、AK 和 RK 值没有差异。(2) 相对于正常组,鞘内化疗后 ALL 患者双侧皮质脊髓束、双侧丘脑辐射以及胼胝体小钳的 FA、MD、AD 和/或 RD 值有差异。

结论: 白血病和鞘内预防性化疗均可以引起 ALL 儿童的白质纤维结构改变。本研究结果显示皮质脊髓束、胼胝体小钳和丘脑辐射是鞘内化疗后 ALL 儿童脑白质纤维束改变的主要部位,这可能是长期存活患者运动功能、认知障碍和情绪变化的原因。

PO-3010

长期吸烟人群静息态脑网络异常的功能磁共振评价

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目的 应用独立成分分析方法评价长期吸烟人群静息态脑网络功能连接异常。方法 2014 年 8 月至 2015 年 8 月期间通过网络宣传招募 5 例长期吸烟者和 34 名年和教育程度相匹配的不吸烟志愿者,采用 3.0T 共振进行静息态下共振扫描,使用基于 Matlab 平台的 SPM8 软件分析静息态脑网络的功能连接差异。结果 内侧视觉网络:右侧叶($t=4.17, P<0.05$)与左侧距状区($t=3.08, P<0.05$)功能连接减。外侧视觉网络:左侧枕上回功能连接增强减($t=3.42, P<0.05$)。枕极视觉网络右侧枕中回与左侧枕中回功能连接减($t=3.58, P<0.05$)。背侧注意网络右侧枕上回功能连接增强($t=3.42, P<0.05$)。左额顶网络:左

侧顶下小叶功能连接减($t=3.77, P<0.05$)。右额顶网络:右侧额上回功能连接增强($t=3.42, P<0.05$)。结论 长期吸烟人群存在多个静息态脑网络异常,并可导致多个脑区的连接异常。

PO-3011

脊髓型颈椎病大脑功能网络模块化特性的变化

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目的:以往的研究表明,脊髓型颈椎病(CSM)患者的大脑功能具有可塑性和重组性,然而,颈脊髓受压是否以及如何影响大脑模块之间和/或模块内部的功能整合和分离仍不清楚。本研究旨在利用图论分析的方法解决这些问题。

方法:对 46 名 CSM 患者和 35 名健康对照者(HCs)进行了功能磁共振成像。然后使用图论分析方法计算全脑功能网络的模块内和模块间连接特性以及节点拓扑特性。组间分类变量的差异采用卡方检验进行比较,连续变量的差异则采用双样本 t 检验,模块连接特性与临床量表之间进行了相关性分析。

结果:模块交互分析表明,CSM 组的模块间连接明显多于 HCs 组(默认网络-额顶网络: $t=2.38, p=0.02$);相反,CSM 组的模块内连接明显少于 HCs 组(感觉运动网络: $t=-2.13, p=0.036$)。然后,我们计算了属于异常连接模块的所有节点的节点拓扑特性。与 HCs 相比,CSM 患者在右侧额上回、左侧扣带回后部、右侧楔前叶、右侧腹外侧前额叶皮层、左侧扣带回前部皮层和左侧背外侧前额叶皮层表现出更高的节点属性。相比之下,与 HCs 组相比,CSM 患者在感觉运动网络中表现出较低的节点属性。JOA 评分与模块间连接成正相关($r=0.330, FDR q=0.029$),与模块内连接成负相关($r=-0.467, FDR q=0.001$)。

结论:本研究报告了 CSM 患者模块连接和节点属性的改变。感觉运动区域的节点属性和模块内连接降低可能表明感觉运动功能障碍。此外,默认网络和额顶叶网络中节点属性和模块间连接的增加可能是对 CSM 患者感觉运动功能障碍的代偿。

PO-3012

3D 液体衰减反转恢复序列和黑血序列增强在肺癌柔脑膜转移诊断中的临床应用

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目的:3D 黑血序列增强由于抑制血管显影,在颅内小转移瘤和柔脑膜转移显示中更有优势。有文献报道 3D 液体衰减反转恢复序列(FLAIR)增强对颅内转移瘤和柔脑膜转移显示有一定价值。探讨 3D FLAIR 序列和黑血序列增强分别在肺癌柔脑膜转移中的 MR 表现,对柔脑膜转移显示的临床应用价值。

方法:临床怀疑柔脑膜转移的肺癌患者 42 例,同时行 3.0T 头颅磁共振 3D 液体反转恢复序列和黑血序列增强检查。2 名具有 8 年以上影像科医生分别对 MR 图像进行分析,以脑脊液脱落细胞检查阳性或共同诊断柔脑膜转移典型脑沟线样强化影像表现为诊断金标准。以临床有颅神经受累症状或 2 个增强序列都显示颅神经强化为诊断柔脑膜颅神经受累的标准。

结果:42 例肺癌患者中,以脑脊液脱落细胞检查阳性或共同诊断柔脑膜转移典型影像表现的共 30 例,其中 12 例患者无柔脑膜转移。在 30 例有柔脑膜转移的患者中,3D 黑血序列显示脑沟裂柔脑膜强化的有 30 例,而 3D FLAIR 序列增强脑沟裂柔脑膜强化的有 25 例。颅神经受累的患者共 22 例,其中,3D FLAIR 序列显示颅神经强化 22 例,而 3D 黑血序列显示颅神经强化 18 例。

结论: 在当前样本条件下, 3D 黑血序列增强对肺癌柔脑膜脑沟裂线样强化显示能力优于 3D FLAIR 序列, 但在柔脑膜神经受累的表现上, 3D FLAIR 序列显示能力表现更好。联合 3D FLAIR 序列和黑血序列增强, 将提高对肺癌柔脑膜转移诊断的信心和认识。

PO-3013

肝胆特异期信号强度比值和表观弥散系数在 肝脏局灶性病变良恶性鉴别诊断中的应用

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目的: 探讨钆塞酸二钠磁共振增强肝胆特异期 (Hepatobiliary phase, HBP) 信号强度比值及表观弥散系数 (Apparent diffusion coefficient, ADC) 值在肝脏局灶性病变良恶性诊断中的应用价值。

方法: 回顾性分析 2020 年 12 月-2021 年 12 月长江大学附属第一医院收治的肝脏局灶性病变患者 85 例, 均于术前行钆塞酸二钠磁共振增强检查及弥散加权成像检查, 测量所有病灶的 ADC 平均值 (ADCmean)、ADC 最大值 (ADCmax)、ADC 最小值 (ADCmin), 同时测量肝胆特异期病灶信号强度 (Lesion signal intensity, SI_{HBPlesion})、肝脏信号强度 (Liver signal intensity, SI_{HBP}_{liver}) 并计算二者的信号强度比值 (Lesion-to-liver signal intensity ratio, LSIR), 以病理结果为金标准, 采用受试者工作特征 (ROC) 曲线比较各参数鉴别肝脏局灶性病变良恶性的诊断效能。

结果: 良性组的 ADCmean、ADCmax、ADCmin、LSIR 均大于恶性组, 差异均具有统计学意义 ($P < 0.05$); ADCmean、ADCmax、ADCmin、LSIR 的 ROC 曲线下面积均大于 0.9; LSIR 的 ROC 曲线下面积大于 ADCmax、ADCmin, 差异具有统计学意义 ($P < 0.05$); LSIR 诊断肝脏局灶性病变良恶性的敏感度 93.2%, 特异度 100.0%, ROC 曲线下面积为 0.995。

结论: LSIR、ADCmean、ADCmax、ADCmin 对于肝脏局灶性病变良恶性均具有良好的诊断效能, LSIR 的诊断效能高于 ADCmax、ADCmin。

PO-3014

对比增强全身 MRA 新技术的临床应用研究

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目的 利用压缩感知 (compressed sensing, CS) 技术, 研究单次注射、半剂量对比剂一站式超快速 3D 高分辨对比增强全身 MRA 成像 (3D-CS-CE-MRA) 的可行性和临床应用价值。方法 前瞻性收集 83 例临床怀疑全身动脉疾病前来行 MR 全身血管检查的患者, 分为 A、B 两组, A 组 44 例, B 组 39 例。A 组行 3D-CS-CE-MRA 扫描, 对比剂总量为 0.15mmol/kg, 单次注射, 流速为 2ml/s; B 组行常规 3D-CE-MRA 扫描, 对比剂总量为 0.4mmol/kg, 分两次注射, 每次用量均为 0.2mmol/kg, 流速为 2ml/s。两组患者在性别、年龄、身高、体重上均无统计学差异。分析两组 25 个节段动脉的图像质量, 并对各段动脉进行评分; 选取颈总动脉、腹主动脉、股动脉、腘动脉测量信噪比 (SNR) 和对比噪声比 (CNR), 采用 Kolmogorov-Smirnov 检验比较两种方法在颈总动脉、腹主动脉、股动脉、腘动脉四段动脉 SNR 和 CNR 的差异; 以及两种扫描方案对全身 25 段动脉的主观评分差异。 $P < 0.05$ 为差异有统计学意义。头臂干、胸主动脉、腹主动脉、肾动脉、肠系膜上动脉、腹腔干、髂总动脉、髂外动脉血管显示评分差异无统计学意义 (P 均 > 0.05), A、B 两组评分无显著差异; 颈总动脉、椎动脉、股动脉、腘动脉、胫前动脉、胫后动脉、腓动脉血管显示评分差异有统计学意义。

义 (Z 值 1.38~3.96, P 均 ≤ 0.05), A 组评分均高于 B 组。结论 3D-CS-CE-MRA 只需一次对比剂注射且无需减影即可快速完成磁共振全身血管检查, 相对于常规 3D-CE-MRA 对比剂用量减少了一半, 对于全身各级血管的显示优于 3D-CE-MRA, 对临床诊断多系统动脉血管疾病具有重要临床价值。

PO-3015

3.0 T 磁共振三维成像序列对腰骶神经根成像的一致性对比研究

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目的 探讨 3.0 T 磁共振三维成像序列, 即三维多回波数据联合成像 (three dimensional multi-echo data image combination with selective water excitation, 3D MEDIC WE)、三维快速自旋回波成像 (three dimensional sampling perfection with application optimized contrasts by using different flip angle evolution, 3D SPACE STIR) 和三维双回波稳态 (three-dimensional double-echo steady state, 3D DESS) 序列在腰骶神经根成像中的可行性和重复性。

方法 将有 52 例腰椎间盘突出伴单侧下肢疼痛的患者分别应用三种腰骶丛神经根成像, 评价图像质量参数估计信噪比 (estimated signal to noise ratio, SNR)、估计对比噪声比 (estimated contrast to noise ratio, eCNR) 和估计对比度 (estimated contrast ratio, eCR), 并验证健侧和患侧测量神经根直径的一致性。

结果 三序列测得神经根直径的一致性较高, 图像质量评价指标显示, 3D SPACE STIR 序列与 3D DESS、3D MEDIC 序列间差异均有统计学意义, 在三项指标中占优, 3D MEDIC WE 和 3D DESS 图像质量评分差异无统计学意义。三序列均能清晰显示正常腰骶丛神经根、病变所致的形态增粗神经根以及间盘突出受挤压变形的神经根。

结论 3D SPACE STIR、3D MEDIC WE 和 3D DESS 序列可应用于腰骶丛神经根成像, 三序列对正常和异常形态、走行的神经根评估具备很高的可行性和重复性。

PO-3016

FACT 序列脂肪定量技术的临床运用研究

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目的: 评价联影 uMR790 磁共振定量技术对脂肪肝患者的临床运用价值。

方法: 对 60 例受试者用联影 uMR790 脂肪定量技术进行扫描, 其中脂肪肝组 38 例, 正常组 22 例。由两名经过训练的放射科住院医师对 38 名脂肪肝组分别勾画感兴趣区测量 CSE-MRI 衍生的 PDFF、同反相位 IOP 法得到的脂肪分数 (Fat fraction, FF) 值, 正常组仅测量 PDFF 值。使用组内相关系数 (ICC)、正态性检验、Spearman 相关系数、非参数秩和检验、Kappa 检验统计分析。

结果: 两名放射科医师对联影磁共振脂肪定量 FACT 序列扫描脂肪肝组所得的图像行后处理所测得的 PDFF 值分别为 190.2‰ (145.0‰, 218.4‰)、198.9‰ (146.7‰, 216.0‰), ICC 值为 0.979, 用同反相法所测得的 FF 值分别为 228.0‰ (177.4‰, 277.5‰)、233.8‰ (176.7‰, 269.6‰), ICC 值为 0.983, PDFF 值及 FF 值的测定可重复性均较好。脂肪肝组 FACT 序列所得的 PDFF 值及同反相法所测得 FF 之间相关系数 r 等于 0.85, 呈高度相关。脂肪肝组和正常组间 PDFF 值 (脂肪肝组 PDFF 值 196.7‰ (145.7‰, 212.8‰), 正常组 PDFF 值 (32.6 \pm 12.6)‰) 比较存在显著性差异 ($P < 0.001$) (偏态分布数据用四分位间距法表述, 正态分布数据用均数 \pm 标准差表述)。

结论: 联影 uMR790 磁共振脂肪定量技术 PDFF 值及 IOP 法 FF 值可重复性高, 相关性强, 对定量肝脂肪变性具有较好的临床意义, 值得被广泛推广运用。

PO-3017

基于增强心脏磁共振电影图像的组学分析对 心肌淀粉样变患者的预后预测价值

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目的: 建立并验证基于增强心脏磁共振电影图像的组学模型对于心肌淀粉样变患者的全因死亡的预测价值。

方法: 前瞻性收集 172 例心肌淀粉样病患者的增强心脏磁共振图像及临床信息, 随访患者的终点事件为全因死亡。分别在电影图像上标记心肌区域 ROI (ROI1) 和心肌加血池区域 ROI (ROI2), 并提取组学特征。采用 LASSO 回归筛选组学特征, 分别构建基于 ROI1 和 ROI2 的组学模型并计算每个患者的组学分数 (Radscore), 分别通过 ROC 分析比较组学模型与 LGE 半定量参数 (QALE) 及梅奥 2004 分期系统对于心脏受累的 AL 淀粉样变患者 1 年随访的预后预测效能。另外, 采用单因素/多因素回归筛选临床特征, 并结合 Radscore 构建 Nomogram 用于预测患者预后。采用 ROC 分析评估模型的 1 年生存率预测效能, 采用决策分析曲线评估模型临床价值, 采用 Kaplan-Meier 法进行生存分析。

结果: 分别最终筛选了 3 个基于 ROI1 以及 4 个基于 ROI2 的影像组学特征, 以及 3 个临床特征用于模型构建。基于 ROI1 的组学模型 (Rad-ROI1), 在训练集和验证集的 AUC 分别为 0.718 和 0.694, 基于 ROI2 的组学模型 (Rad-ROI2) 在训练集和验证集的 AUC 分别为 0.760 和 0.750, 优于 QALE (训练集 AUC=0.705, 验证集 AUC=0.697) 及梅奥 2004 分期系统 (训练集 AUC=0.653, 验证集 AUC=0.593)。联合 Radscore-ROI2 和临床特征的 Nomogram 模型在训练集和验证集的 AUC 分别为 0.847 和 0.843。决策曲线分析结果也证实 Nomogram 的临床净收益高于其他模型。Kaplan-Meier 生存分析表明基于 Nomogram 的风险分层可以有效预测患者生存情况, 在训练集的 HR 为 3.288 ($p<0.001$), 验证集的 HR 为 4.431 ($p<0.001$)。

结论: 与梅奥 2004 分期系统相比, 基于增强心脏磁共振电影图像的组学模型对于心肌淀粉样变患者的 1 年生存率预测效能更好, 联合 Radscore 及临床特征的 Nomogram 模型则具有比单独组学模型更好的预测效能。

PO-3018

肺癌 B1 场校正 T1 mapping 影像组学特征的可重复性研究

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目的: 探讨肺癌 B1 场校正 T1 mapping 影像组学特征的测量可重复性。

方法: 回顾性收集 70 例肺癌患者的胸部 T1 mapping 和 T1 容积内插屏气 (volumetric interpolated breath-hold examination, VIBE) 图像, 其中, 有 41 例进行了 T1 mapping 重复扫描。2 名独立测量者采用半自动勾画方法在 T1 mapping 和 T1-VIBE 图像上画取整个病灶体积的兴趣区并提取影像组学特征。采用组内相关系数 (Interclass correlation coefficients, ICCs) 评价组学特征在观察者内、观察者间及重复扫描的可重复性。

结果: T1 mapping 和 T1-VIBE 各提取了 1906 个特征, 其观察者内及观察者间的平均 ICC 分别为 0.947、0.947、0.893 和 0.866, 分别各有 1450 (72.72%) 和 1768 (91.76%) 个影像组学特征同时满足观察者内和观察者间的一致性; T1 mapping 重复扫描的平均 ICC 为 0.788, 有 1002 (52.57%) 个 T1 mapping 组学特征同时满足重复扫描的可重复性 ($ICC \geq 0.80$)。其中, 形状特征表现出最佳的重复扫描可重复性 ($ICC \geq 0.80$: 100%), 而一阶特征、GLCM 及 GLSZM 纹理特征表现出相对较差的可重复性 ($ICC \geq 0.80$: 49.75%~53.98%)。基于不同变换的特征中, Gradient 变换明显提高了原始特征的可重复性 ($ICC \geq 0.80$: 86.05%), 而 Exponential、LBP2D、LBP3D、Logarithm 和 Square 变换的特征降低了原始特征的可重复性 ($ICC \geq 0.80$: 36.05%~50%)。结论: T1 mapping 的影像组学特征表现出中等可重复性, 在临床应用之前需要首先对其进行可重复性评估。

PO-3019

磁共振 DTI 技术定量参数在脑淋巴瘤与高级别胶质瘤鉴别中的应用

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目的: 探讨磁共振弥散张量成像 (DTI) 技术在脑淋巴瘤与高级别胶质瘤鉴别中的应用效果, 结合 DTI 技术定量参数进行分析。方法: 收集 2018 年 4 月~2019 年 5 月期间于我院接受诊疗的 20 例脑淋巴瘤与 20 例高级别胶质瘤患者作为研究对象, 分别作为观察组和对照组, 应用磁共振 DTI 技术进行临床诊断, 比较两组的磁共振 DTI 技术定量参数。结果: 根据 DTI 三维重建图像显示, 观察组脑淋巴瘤患者与对照组高级别胶质瘤主要表现为病灶区白质纤维束破坏, 分别占比 65%和 70%, 其他表现为病灶区白质纤维束浸润征象, 对比差异无统计学意义 ($\chi^2=0.403$, $P=0.835$)。观察组病灶的各项异性指数 (FA) 与对照组无显著差异 ($P>0.05$), 而表观弥散系数 (ADC)、轴向弥散系数 (DA) 和径向弥散系数 (DR) 均显著低于对照组 ($P<0.05$)。观察组脑淋巴瘤患者病灶区的 FA、ADC、DA 以及 DR 均显著低于对侧正常脑组织区 ($P<0.05$)。对照组高级别胶质瘤患者病灶区的 FA、ADC、DA 以及 DR 均显著低于对侧正常脑组织区 ($P<0.05$)。结论: 在脑淋巴瘤与高级别胶质瘤的临床诊疗中, 应用磁共振 DTI 技术进行诊断, 结合两者在 DTI 技术定量参数上的差异性, 对于两种疾病进行准确鉴别, 从中了解脑淋巴瘤与高级别胶质瘤的差异性, 便于实施针对性的治疗措施。

PO-3020

9 例阴道斜隔综合征影像表现及相关文献学习

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摘要:目的 探讨 MRI 在阴道斜隔综合征中的应用价值, 并进行文献复习, 旨在提高对该疾病的认识。方法 回顾性分析 2020 年 5 月-2023 年 8 月于我院进行 MRI 检查并经宫腔镜证实为阴道斜隔综合征患者的临床影像资料。结果 9 例患者均证实为阴道斜隔综合征, 其中 5 例双子宫, 4 例完全性纵膈子宫; 6 例患者合并患侧肾缺如及相应斜隔后腔积液, 积血; 2 例患者诊断为阴道斜隔综合征合并膀胱-阴道间瘘管形成。MRI 可清晰显示子宫、宫颈部、阴道形态异常, 还可确定斜隔走行, 是否有交通支形成, 还可明确泌尿系统是否异常, 进一步指导临床分型。

结论 MRI 可以明确诊断阴道斜隔综合征, 为临床进一步手术或宫腔镜提供指导性意见, 对于手术方式的选择至关重要。

PO-3021

常规 MRI 分形分析预测成人较低级别胶质瘤 IDH1 突变状态

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目的 探讨常规 MRI 分形分析参数预测成人较低级别胶质瘤 IDH1 突变状态的临床应用价值。**方法** 回顾性分析我院 2017 年 2 月至 2021 年 4 月经手术病理证实为较低级别胶质瘤且 IDH1 突变状态明确的 151 例患者的临床及影像资料, 其中 IDH1 突变组 118 例, IDH1 野生组 33 例。所有患者术前两周内采集常规平扫及增强 MRI。两名放射科医师基于 FLAIR 图像完成肿瘤全域的分割。利用 Image J 及 Fraclac 插件提取肿瘤全域的分形维数 (FD) 及孔隙度 (LAC) 参数, 并采用独立样本 t 检验比较两组间参数差异。采用组内相关系数 (ICC) 评价两名医师参数提取的观察者内及观察者间一致性。二元 logistic 回归构建联合参数 (FD+LAC) 诊断模型。利用受试者工作特征 (ROC) 曲线评价参数/模型诊断效能; 不同参数/模型效能比较采用 Delong 检验。**结果** FD、LAC 观察者内及观察者间一致性均较好 (ICC 均 >0.8 , P 均 <0.001)。与 IDH1 突变组相比, 野生组具有更高的 FD 平均值 (IDH1 野生组, 1.286 ± 0.054 ; IDH1 突变组, 1.188 ± 0.038 ; P 均 <0.001) 和更高的 LAC 平均值 (IDH1 野生组, 0.457 ± 0.069 ; IDH1 突变组, 0.365 ± 0.031 ; P 均 <0.001)。ROC 曲线分析结果显示, FD、LAC 及联合参数模型 (FD+LAC) 在预测成人较低级别胶质瘤 IDH1 突变状态的 AUC 值为 0.929、0.888、0.937, 敏感度为 91.53%、93.22%、90.68%, 特异度为 84.8%、75.76%、84.85%。**结论** 常规 MRI 分形分析有助于预测成人较低级别胶质瘤 IDH1 突变状态, FD+LAC 联合参数的诊断效能进一步提升, 有望为临床决策提供理论依据。

PO-3022

自动脑分割在帕金森病、多系统萎缩及进行性核上性麻痹鉴别诊断中的应用

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目的: 由于帕金森综合征 (帕金森病 (PD)、进行性核上性麻痹 (PSP)、多系统萎缩 (MSA)) 患者不同疾病各脑区的萎缩程度不同, 本研究拟采用自动脑分割技术, 对帕金森综合征患者的各脑区体积进行比较, 并提出新的计算指数用于鉴别诊断。

方法: 回顾性收集北京协和医院 2020 年 11 月至 2023 年 2 月、由运动障碍专业的神经内科教授诊断为帕金森综合征的患者共 171 例, 进一步筛选出明确诊断为帕金森病 (117 例)、进行性核上性麻痹 (27 例)、小脑共济失调型多系统萎缩 (MSA-C) (17 例) 及震颤麻痹型多系统萎缩 (MSA-P) (10 例) 的患者。所有患者采集 3D T1 加权翻转快速扰相梯度回波序列, 利用上海联影公司自动脑分割软件进行脑分割。

结果: MSA-C 与 MSA-P 患者所有感兴趣区的体积无明显差异 (均 $P > 0.05$)。MSA-C 患者的全小脑体积小于 PD 和 PSP 患者 (均 $P < 0.05$)。PSP 患者的双侧丘脑体积小于 MSA-C 和 PD 患者 (均 $P < 0.01$)。MSA-C、MSA-P 和 PSP 患者的中脑、脑桥及延髓体积均小于 PD 患者 (均 $P < 0.05$)。与 MSA-C 和 PD 患者相比, PSP 患者的第三脑室体积明显增大 (均 $P < 0.05$)。MSA-C 和 PSP 患者的第四脑室体积明显大于 PD 患者 (均 $P < 0.05$)。另外, 通过计算 (桥脑×第三脑

室)/(中脑×丘脑) 体积比, PSP 患者的数值明显大于 MSA-C、MSA-P 和 PD 患者 (均 $P<0.05$), 其他各组间无明显差异 (均 $P>0.05$)。(桥脑×第三脑室)/(中脑×丘脑) 体积比可将 PSP 患者与 MSA-C、MSA-P 和 PD 患者鉴别, 诊断效能优于手动测量的磁共振帕金森综合征指数 (均 $P<0.05$)。

结论: 通过自动脑分割软件, 帕金森病、进行性核上性麻痹、多系统萎缩患者不同脑区的体积值有明显差异。基于自动脑分割所获得的体积值, (桥脑×第三脑室)/(中脑×丘脑) 体积比可作为良好的鉴别诊断指标。

PO-3023

基于多种磁共振弥散加权成像模型对膀胱癌肌层浸润性的评估

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目的: 本研究旨在探究多种磁共振弥散加权成像模型预测膀胱癌肌层浸润性的可行性。

方法: 前瞻性地纳入从 2022 年 1 月到 2022 年 6 月疑诊膀胱癌的患者, 术前行常规 MRI 及多 b 值弥散加权成像检查, 并在 2 周之内经病理确诊, 将所有病人分为非肌层浸润性 (NMIBC) 和肌层浸润性膀胱癌组 (MIBC), 将多 b 值弥散图像进行后处理, 得到 6 个弥散模型参数图, 包括单指数模型 (MEM)、连续时间随机游走模型 (CTRW)、体素内不相干运动模型 (IVIM)、拉伸指数扩散模型 (SEM)、扩散峰度成像 (DKI) 和分数阶微积分扩散模型 (FROC)。两名放射科医生 (分别具有 10 年和 8 年的泌尿系统阅片经验) 在 DWI ($b=0 \text{ sec/mm}^2$) 上分别勾画完整的肿瘤作为感兴趣区 (VOI), 肿瘤直径大于 5mm, 排除掉肿瘤柄和出血坏死组织, 然后将 VOI 复制到所有的模型参数图像。应用独立样本 t 检验或 Mann Whitney U 检验评估各弥散参数在两组中是否存在统计学差异, 将有统计学差异的参数进行 Logistic 回归分析, 结合最优子集筛选, 找到最佳参数组合, 绘制受试者工作特征曲线, 计算曲线下面积 (AUC), 灵敏度及特异度, 所有的统计学分析都采用 SPSS 软件, P 值小于 0.05 被认为有统计学差异。

结果: 60 名患者中, MIBC 患者 13 名, NMIBC 患者 47 名。就单个参数而言, CTRW- α , CTRW-D, CTRW- β , Mono-ADC, DKI-Dapp, IVIM-D, IVIM-f 和 SEM-DDC 在 NMIBC 组中显著高于 MIBC ($P<0.05$), ROC 曲线分析显示, CTRW-D 和 SEM-DDC 的 AUC 最高, 均达到 0.838; 对联合参数而言, CTRW-D, FROC- β 和 FROC- μ 联合起来产生最好的诊断效能 (AUC: 0.887, 95% CI: 0.779-0.954, 灵敏度: 92.3%, 特异度: 80.9%), 优于单个参数。

结论: 研究表明多种弥散模型可以作为一种非侵入性和定量的方式评估膀胱癌肌层浸润性, CTRW 和 FROC 模型的联合可以有效鉴别 NMIBC 和 MIBC, 在未来的临床应用中可以作为一种有效的工具指导诊疗。

PO-3024

基于 MRI 扩散张量成像评价宫内孤立性侧脑室扩张胎儿脑白质改变

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目的: 应用 MRI 扩散张量成像 (DTI) 评价宫内轻中度孤立性侧脑室扩张胎儿脑白质纤维束的改变。

方法: 收集 2022 年 8 月至 2023 年 8 月在山东省立医院超声或 MRI 检查确诊为宫内轻中度孤立性侧脑室扩张胎儿 20 例【孕周为 24~36 (29.9±3.6) 周】和 22 例孕龄匹配的正常对照胎儿【孕周为 24~36 (30.2±3.7) 周】。对所有胎儿均行颅脑常规磁共振和 DTI 检查。对 DTI 数据进行处理, 分析比较两组间胼胝体的膝部和压部、小脑中脚, 双侧的丘脑前幅射、皮质脊髓束、下纵束、额枕下束等七种主要纤维束的 DTI 指标差异, 包括分数各向异性(FA)、平均扩散率(MD)、轴向扩散率(AD)和径向扩散率(RD)。两组间各纤维束 DTI 指标的比较采用独立样本 t 检验, 对于丘脑前幅射、皮质脊髓束、下纵束、额枕下束等纤维, 通过对双侧区域的测量值进行平均比较差异。

结果: 与正常对照胎儿组相比, 轻中度孤立性侧脑室扩张胎儿下纵束的 FA 值升高 (0.142±0.012 比 0.133±0.015, $p=0.033$) 具有统计学差异, 未发现其余纤维束 DTI 指标之间的差异。

结论: 宫内 DTI 成像可以在一定程度上反映轻中度孤立性侧脑室扩胎儿脑白质的改变, 其中只存在下纵束 FA 值的升高具有显著差异, 为轻中度孤立性侧脑室扩胎儿的预后评估提供了一定的客观依据。

PO-3025

基于 3D-IDEAL-IQ 序列评估椎旁肌肌肉脂肪浸润的可行性验证: 一项多中心研究

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椎旁肌是影响腰椎稳定、运动和功能的重要肌肉。腰痛患者比健康参与者表现出明显更多的直立脊柱肌肉脂肪浸润。脂肪浸润是腰部肌肉健康的重要生物标志物, 对于临床决策和预后评估至关重要。评估腰椎旁肌肉的脂肪浸润程度十分重要。影像学评估以非侵入性、准确、可重复为突出优点。

本研究旨在验证通过 3D-IDEAL-IQ MRI 序列量化椎旁肌肌肉脂肪浸润的可行性、可重复性及一致性, 与其他常用的 2D-IDEAL 序列的 IP/OP 评估、ImageJ 半自动软件测量、Goutallier 肉眼评分三种量化方法得出的结果进行对比, 为选择量化脂肪浸润的方法提供思路。

选取 L4-S1 层面多裂肌、竖脊肌作为目标肌肉。通过 3D-IDEAL-IQ 序列获得质子密度脂肪分数 (PDFF); 通过半自动软件 ImageJ 勾画多裂肌和竖脊肌边界, 阈值法识别脂肪组织, 脂肪浸润百分比 (FIA) 计算为 CSA 脂肪/CSA 肌肉; 通过 IP、OP 序列获得纯水、纯脂肪序列图像, 将勾画的 ROI 复制到另一图像, 通过 IP+OP/2 计算脂肪分数 (FF)。符合正态分布的参数使用平均值±标准差来表示, 不符合则使用四分位法, 使用 U 检验评估四种方法间组件差异, 使用 Pearson 相关系数或 Spearman 评估 PDFF 值与 FIA、FF、GC 值的相关性, 使用 Bland-Altman 评估 PDFF 值与 FIA、FF、GC 值的偏倚。

四种评估方法在量化 L4-S1 层面椎旁肌脂肪浸润时都存在差异, 在 L5-S1 竖脊肌处组件差异最大。PDFF 作为金标准, 可量化某处肌肉整体脂肪含量, 在四种评估方法中观察者间、观察者内部一致性最高, 但花费高、扫描时间长, 不同设备间还需进行统一。FF 与 PDFF 结果相关性较低, 普遍存在伪影大等问题, 偏移值最多。FIA 与 PDFF 相关性最大, 偏移值最少, 但半自动软件勾画耗费人力、时间。GC 作为一种简单的视觉评分数字量表, 可以简单快速评估脂肪浸润程度, 常用于评估某种骨关节疾病外科术后的临床结局, 但观察者一致性中等。应当根据具体应用来选取量化脂肪浸润的“最佳”方法。

PO-3026

腹部异位脂肪对糖代谢异常的潜在指示作用

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目的：本研究目的是分析不同代谢状态人群腹部脂肪分布的差异，并探究最有风险提示价值的异位脂肪沉积部位。

材料与方法：本研究共纳入 98 例受试者，包括糖代谢正常组 53 例，糖代谢异常组 45 例（均为初诊未治疗），行磁共振及实验室生化检查并收集基本体征（年龄、性别、BMI 等）。采用质子密度脂肪分数(proton density fat fraction, PDFF)测量值来表示胰腺脂肪分数(pancreatic fat fraction, PFF)和肝脏脂肪分数(hepatic fat fraction, HFF)，同时测量皮下脂肪组织(subcutaneous adipose tissue, SAT)及内脏脂肪组织(visceral adipose tissue, VAT)。分析不同代谢组间脂肪分布的相关性及差异。采用受试者工作特征(ROC)曲线分析不同部位脂肪沉积的提示意义。

结果：相关性分析显示 BMI 与空腹胰岛素($r=0.473$, $P<0.001$)、胰岛素抵抗指数 HOMA-IR ($r=0.363$, $P<0.001$) 及 C 反应蛋白($r=0.245$, $P<0.05$)相关性最强，BMI 仍是评估胰岛素抵抗状态的重要参考。胰腺脂肪与空腹血糖($r=0.247$, $P<0.05$)及糖化血红蛋白 HbA1c ($r=0.363$, $P<0.001$)具有良好的相关性，胰腺脂肪沉积愈严重，则提示血糖控制状况愈差。随着 BMI 的增加，胰腺脂肪($r=0.272$, $P<0.01$)、皮下脂肪($r=0.613$, $P<0.001$)及内脏脂肪($r=0.519$, $P<0.001$)呈明确上升趋势，但肝脏脂肪变化相对比较随机。相同 BMI 不同代谢状态人群间脂肪分布存在差异，糖代谢异常组的胰腺脂肪含量明显高于代谢正常组，胰腺脂肪也是提示糖代谢异常的可靠指标，尤其是在体重正常组和超重组中(曲线下面积分别为 0.859 和 0.864)。

结论：基于 MR 的脂肪定量技术提供了 BMI 之外的脂肪分布信息，不同代谢状态的人群，其脂肪分布模式存在差异。观察发现，相较于其他器官或部位，胰腺脂肪沉积较严重的人群发生糖代谢紊乱的风险更高。

PO-3027

不同积液量 TMD 伴疼痛患者的静息状态功能磁共振成像研究

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目的 通过静息状态功能磁共振成像（rs-fMRI）观察不同积液量引起的颞下颌关节紊乱病（temporo-mandibular disorders, TMD）伴疼痛患者的脑活动，探索这些患者异常脑活动是否存在差异。

材料与方法 前瞻性纳入 2023 年 6 月至 2024 年 2 月云南大学附属医院 47 例颞颌关节紊乱伴疼痛的患者，根据患者的 MRI 影像表现分为微量积液组 24 例、少量积液组 13 例及大量积液组 10 例。受试者完成自评量表，TMD 伴疼痛患者接受视觉模拟评分，所有受试者均接受 rs-fMRI 检查；基于全脑灰质体素分析静态和动态 ALFF 的组间差异并进行 AlphaSim 校正，将存在组间差异的静态和动态 ALFF 值与临床指标做相关性分析。

结果 受试者后扣带回的静态和动态 ALFF 均增加(全脑水平未校正 $P=0.005$;感兴趣区水平 AlphaSim 校正, 体素水平 $P<0.005$, 簇水平 $P<0.05$)，且大量积液组静态和动态 ALFF 值增加的较少量及微量积液组多。

结论 TMD 伴疼痛患者关节腔积液量与静态和动态 ALFF 变化有关，此外造成相关脑区出现异常的主要原因可能为心理因素。

PO-3028

运用磁共振 Dixon 技术研究 2 型糖尿病与肝脏及胰腺脂肪含量的相关性

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目的：肥胖会导致肝脏和胰腺异位脂肪沉积，从而影响胰岛素抵抗、血糖水平和代谢控制，并引发 2 型糖尿病（type 2 diabetes mellitus, T2DM）。为了评估肥胖、异位脂肪沉积与糖尿病之间的关系，本研究采用 MR Dixon 技术对 T2DM 组和健康对照组的肝脏和胰腺脂肪含量（fat fraction, FF）进行量化的测量。

方法：使用 MR Dixon 数据测量了 167 名受试者的全肝脂肪含量（FF of whole liver, FFWL）和全胰腺脂肪含量（FF of whole pancreas, FFWP）、胰腺最大直径、腹部皮下脂肪面积（the abdominal subcutaneous adipose area, SAT）、内脏脂肪组织面积（the visceral adipose tissue area, VAT）和腹部脂肪组织总面积（the total abdominal adipose tissue area, TAT）。根据体重指数数值分为四组。组内和组间比较采用独立样本 t 检验进行统计。

结果：T2DM 组（BMI<25）与对照组（BMI<25）、T2DM 组（BMI≥25）与对照组（BMI≥25）、T2DM 组（BMI<25）与 T2DM 组（BMI≥25）的 FFWL、FFWP 和 VAT 有显著差异（均 $P<0.05$ ）。对照组（BMI<25）与对照组（BMI≥25）的胰尾 FF、SAT 和 TAT 有显著差异（ $P<0.05$ ）。FFWP 和胰尾 FF 在正常或轻度肝脏脂肪含量的 T2DM 受试者和对照组之间差异显著（ $P<0.05$ ）。

结论：MR Dixon 技术可以评估与 T2DM 密切相关的器官脂肪沉积。无论 BMI 值如何，T2DM 患者都应关注组织脂肪含量。

PO-3029

基于 MRI-DTI 及 MAGIC 技术对面肌痉挛患者的脑结构和功能的研究

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目的：本研究对面肌痉挛患者及健康人群应用 MAGiC-MRI、DTI-MRI 技术，明确面肌痉挛患者组存在异常变化的脑区及其定量值，再将差异具有统计学意义的定量值与 HFS 患者的病程和痉挛程度分级做相关性分析。

方法：收集 2023 年 8 月至 2024 年 3 月于青海省人民医院神经内科门诊确诊的面肌痉挛患者 30 例，以及同期于该院体检的一般资料（年龄、性别、受教育程度）与面肌痉挛组相匹配的体检健康人员 30 例，通过 MAGiC、DTI 技术对所有研究对象各个脑区均测量 T1 值、T2 值、PD 值及 FA 值、RD 值、ADC 值变化并进行统计学分析，选取具有组间差异的 DTI 及 MAGIC 参数与面肌痉挛患者的病史、痉挛程度进行 Pearson 相关性分析。

结果：独立样本 t 检验结果表明，与健康对照组相比，HFS 患者胼胝体干、胼胝体膝部及整体、双侧下纵束、下额枕束、左上纵束、内囊左后肢、以及丘脑后辐射 FA 值减低，RD 值差增加。面肌患者病程、痉挛程度与胼胝体体部及整体的 FA 值呈负相关。

结论：面肌痉挛患者的双侧下纵束、下额枕束、左上纵束、内囊左后肢、丘脑后辐射及胼胝体存在广泛损伤，主要表现为胼胝体的髓鞘受损，可能与病程长短及痉挛严重程度都有关系。

PO-3030

基于 3.0T MR 的裸鼠颅内异种原位癌模型构建评估的应用研究

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目的:胶质瘤的裸鼠异种原位癌模型构建难度大, 成功率低, 肿瘤生长状况难以观测。本研究拟通过应用常规国产 3.0T MR 搭配小鼠线圈对裸鼠进行 MR 多参数颅脑扫描, 获取颅内原位肿瘤的大小、坏死面积、周围组织受累等情况的直观影像数据, 为胶质瘤异种裸鼠原位癌模型构建提供评估依据。**方法:**

1. 胶质瘤原位癌模型构建: 选取 4 周左右雌性裸鼠, 麻醉后使用脑立体定位仪设计额叶皮层注射坐标(AP: +1.5 mm, ML: -1.0 mm, DV: +2.4mm)并进行开颅, 利用微量进位器向设定脑区注射 5×10^5 个人源性胶质瘤细胞 (分别为 U87 及 U251 细胞), 注射完消毒并缝合切口。2. 多参数 MR 扫描: 应用联影 3.0T uMR780 磁共振搭配联影 Mouse coil-8 线圈, 分别于术后第 10、14、17、21、24、28、31、35、42d 进行 MR 连续扫描, 采集序列为改良后 T1WI、T2WI、T2WI-FLAIR 横断位序列, FOV: 30x20mm, 层厚 1.0mm, 层间距 0mm, 扫描后应用 3D slicer 软件对颅内病灶进行精准体积测量, 绘制生长曲线, 同时根据多参数信号表现评估肿瘤内坏死面积及周围组织受累。**结果:** 应用立体定位仪进行裸鼠胶质瘤原位癌模型构建并进行磁共振扫描评估, 结果表明: U251 细胞移植的异种胶质瘤原位癌最早可在移植后第 14 天成瘤, 肿瘤体积约为 $3.79 \pm 0.62 \text{mm}^3$, 于 28 天左右肿瘤达到最大并见粗大流空血管影, 体积约 $104.42 \pm 12.72 \text{mm}^3$, 此后肿瘤内可见坏死发生, 裸鼠出现一侧肢体活动不良、下肢瘫痪并体重迅速减轻。U87 细胞移植原位癌最早在移植后 21 天可见肿瘤发生, 体积约 $3.80 \pm 2.11 \text{mm}^3$, 于 42 天左右肿瘤仍在以较缓速度增长, 体积约 $53.78 \pm 9.60 \text{mm}^3$, 少见流空血管影, 肿瘤坏死、裸鼠肢体活动障碍及体重减轻均发生较晚。

结论:

本研究应用 3.0 T 磁共振及小鼠线圈进行裸鼠颅脑扫描, 可对裸鼠颅内异种胶质瘤原位癌模型构建进行肿瘤体积、瘤内坏死及周围组织受累情况评估, 该评估方法具有连续性、准确性及直观性。

PO-3031

Omicron 感染后急性期到慢性期恢复趋势以及持续性白质异常

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Objective To investigate the microstructural integrity following Omicron infection, considering the prior understanding of less severe impact compared to other strains.

Methods We enrolled 162 post-Omicron infection patients and 17 healthy controls (HCs_2023) in our study. Additionally, we included 17 HCs recruited in 2022 (HCs_2022) as another control group. Separate comparisons were conducted between patients and the two control groups. Furthermore, subgroup comparisons were performed based on neurological symptoms and the intervals between infection and scans. DTI, neurite orientation dispersion and density imaging were utilized to assess white matter integrity. Cognitive function was evaluated using Wechsler Intelligence scale. Correlations between diffusion metrics and cognitive function were also analyzed.

PO-3032

2 型糖尿病患者脑结构链接独立成分分析及
个体结构网络拓扑属性差异

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目的：采用链接独立成分分析对 T2DM 脑结构不同模态进行独立成分分析且确定每个模态的最佳权重，分析个体结构网络拓扑属性，探究这些变化与 T2DM 患者认知功能的相关性。

材料与方法：招募了 80 名 T2DM 和 55 名性别、年龄和受教育年限匹配的健康受试者；采用 FSL 及 DPABISurf 软件提取被试大脑灰质密度、皮层厚度、皮层表面积进行 LICA 分析；构建个体脑结构网络，利用 Kullback-Leibler 离散 (KLS) 的相似性对网络脑区间的边进行定量；然后使用 GRETNA 软件评估脑结构网络的拓扑属性的全局和节点属性。我们对两组的被试权重系数及脑结构网络属性进行双样本 t 检验比较两组的结构形态学差异与形态学脑网络的差异，使用 Bonferroni 进行多重比较校正。提取组间差异成分的被试权重系数、网络拓扑属性与临床指标、认知量表进行相关性分析 ($p < 0.05$)。

结果：IC12、IC13 成分在两组间有统计学差异 ($p < 0.05$)；IC12 成分由灰质密度权重 85%，皮层表面积权重 6%，皮层厚度权重 8% 组成。与正常对照组相比，T2DM 的双侧角回、颞中回、额上回、丘脑、楔前叶、距状裂周围皮层、眶部额下回灰质密度减低，双侧顶上小叶及右侧额中回灰质密度增加。IC13 成分由灰质密度权重 14%，皮层表面积权重 14%，皮层厚度权重 70% 组成。T2DM 左侧楔叶灰质密度增加；左侧角回、颞中回灰质密度减低；T2DM 双侧颞极皮层厚度减低，左侧嗅觉皮层及右侧直回皮层厚度增加。

在 0.05-0.55 的稀疏度范围内，两组都表现出相似小世界拓扑属性 ($p > 0.05$)；T2DM 左侧额中回、辅助运动区及舌回的节点效率及度中心性减低 ($p < 0.05$)。经 Bonferroni 校正后，左侧额上回的节点效率 ($r = 0.788$, $p = 0.035$) 和度中心性 ($r = 0.794$, $p = 0.001$) 与 AVLT 呈正相关。

结论：两组的组间差异成分以灰质密度和皮层厚度为主，这与老龄化和 AD 有相似特征；T2DM 患者脑结构网络具有与正常人相同的小世界属性，但 T2DM 患者节点属性损伤，且与认知相关评分呈正相关；这些为探究 T2DM 相关认知功能损伤提供新的角度。

PO-3033

伴自杀意念青少年重性抑郁障碍动态脑功能改变与皮质醇的相关性研究

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目的：本研究试图探讨伴自杀意念青少年重性抑郁障碍 (MDD) 患者静息态动态局部和全脑的功能连接特征改变及其与下丘脑-垂体-肾上腺 (HPA) 轴失调的相关性。

方法：采用静息态功能磁共振成像 (rs-fMRI) 对青少年 48 例伴自杀意念患者、38 例不伴自杀意念 MDD 患者和 41 例健康对照 (HC) 扫描。对数据进行预处理，利用滑动时间窗的分析方法，计算三组被试动态局部一致性 (dReHo) 和 dFC 值；对完成 MRI 扫描的受试者，在 MRI 扫描 24 小时内静脉采血，采用直接化学发光法测定促肾上腺皮质激素 (ACTH) 和皮质醇。采用单因素方差分析比较三组的 dReHo、dFC 值；采用单因素方差分析比较三组的激素浓度。将差异有统计学意义的脑区的 dReHo 值和 dFC 值与激素浓度进行 pearson 相关分析。

结果：

1、dReHo 值比较：三组右侧小脑后叶 (主要是 Crus II 和 Crus I) 及左侧楔前叶的 dReHo 值存在统计学差异。与 HC 组和不伴自杀意念组比较，伴自杀意念青少年 MDD 患者组右侧小脑后叶 (主要是 Crus II 和 Crus I) 的 dReHo 值增高，左侧楔前叶 dReHo 值减低；与 HC 组比较，不伴自杀意念组左侧楔前叶 dReHo 值增高。

2、dFC 值比较：三组 dReHo 值差异脑区左侧楔前叶与左侧颞中回、双侧楔前叶的 dFC 值存在统计学差异。与 HC 组比较，伴自杀意念青少年 MDD 组左侧楔前叶与左侧颞中回的 dFC 值减低，不

伴自杀意念组左侧楔前叶与左侧颞中回的 dFC 值减低、双侧楔前叶的 dFC 值增高；与不伴自杀意念组比较，伴自杀意念青少年 MDD 组左侧楔前叶与双侧楔前叶的 dFC 值减低。

3、HPA 轴激素比较：与 HC 和不伴自杀意念 MDD 患者相比，伴自杀意念 MDD 患者皮质醇浓度较低。三组间 ACTH 浓度无统计学差异。

4、相关性分析：伴自杀意念青少年 MDD 组左侧楔前叶的 dReHo 值、左侧楔前叶-左侧颞中回的 dFC 值均与皮质醇浓度正相关。

PO-3034

MRI-DWI 联合 HE4、CA125 对卵巢良恶性肿瘤诊断鉴别的价值

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目的：评估磁共振成像弥散加权成像 (DWI) 联合人附睾蛋白 4 (HE4)、糖类抗原 (CA125) 在卵巢良恶性肿瘤鉴别中的价值。

方法：选择 2021 年 3 月—2023 年 3 月就诊于青海省人民医院的 163 例卵巢肿瘤患者作为研究对象。所有患者均接受 DWI 检查及血清 HE4、CA125 水平检测，以病理学检查结果为金标准，对比卵巢良恶性肿瘤患者的血清 HE4、CA125 水平及 DWI 相关指标，并评估 MRI-DWI、HE4、CA125 及三者联合鉴别卵巢良恶性肿瘤的诊断效能。

结果：病理学检查结果显示，例卵巢肿瘤患者中恶性肿瘤 67 例，良性肿瘤 96 例；恶性肿瘤患者血清 HE4、CA125 水平比良性肿瘤患者高 ($P < 0.05$)；恶性肿瘤病变最大径比良性肿瘤大，ADC 值比良性肿瘤患者低，且以囊壁/分隔不均匀、T2 压脂信号不均匀为主 ($P < 0.05$)；将病理学诊断结果作为金标准，MRI 鉴别卵巢良恶性肿瘤的敏感性为 79.10% (95% CI: 0.736, 0.849)，特异性为 84.38% (95% CI: 0.762, 0.883)，准确性为 82.21% (95% CI: 0.764, 0.860)；HE4 的敏感性为 74.63% (95% CI: 0.610, 0.813)，特异性为 78.13% (95% CI: 0.745, 0.810)，准确性为 76.69% (95% CI: 0.652, 0.808)；CA125 的敏感性为 64.18% (95% CI: 0.592, 0.685)，特异性为 80.21% (95% CI: 0.729, 0.847)，准确性为 73.62% (95% CI: 0.639, 0.770)；联合检测的敏感性为 85.07% (95% CI: 0.785, 0.910)，特异性为 90.63% (95% CI: 0.852, 0.933)，准确性为 88.34% (95% CI: 0.850, 0.933)。

结论：

卵巢恶性肿瘤患者的 DWI 影像学特点以 T2 压脂信号不均匀、ADC 值低，且存在囊壁或分隔不均匀、囊实性等为主，且联合检测血清 HE4、CA125 可提升卵巢肿瘤良恶性鉴别的诊断效能，为临床诊治提供参考。

PO-3035

ConSept 法下扩张型心肌病心肌 T2 值准确性评估

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[摘要] 目的：横向弛豫时间定量成像(T2 mapping)可以无创性定量心肌初始横向弛豫时间(T2 值)，T2 值增加主要与心肌水肿或炎症有关，除应激性心肌病外，其他各类型的心肌病都伴有不同程度的弥漫性 T2 值增加，因此 T2 值的直接测量对于反应疾病相关的水肿炎症情况意义重大，传统的测量 T2 值的方法在 AHA 协会的建议下，将感兴趣区勾画在短轴全部心肌，操作稳定性差，而且心肌 T2 值受场强、序列类型、心率以及心肌节段等因素的影响较大，因而其在临床上的应用受到限制。近年来很多学者均已采用 ConSept 法进行心肌 T1 值的测量，并取得了较好的结果，ConSept 法测量时，中间层间隔壁较游离壁更厚，更容易将 ROI 放置在致密心肌内，也可以减少了心外膜下脂肪的影响。本研究拟对比中间层间隔壁(conservatively within the midventricular septum, ConSept)法和 SAX 法测量的扩张型心肌病 T2 值，来比较两种方法下 T2 值的一致性，以此解决 T2 值测量的稳定性问题，并为临床各类心肌病提供有价值的心肌水肿，炎症信息。方法：回顾性收集华中科技大学协和医院采用 1.5T 心脏磁共振扫描的 44 例扩张型心肌病(dilated cardiomyopathy, DCM)患者 and 17 例健康对照者。根据 DCM 患者是否存在 LGE 分为 LGE 阳性组和 LGE 阴性组。将 ROI 分别放置在 ConSept 法或 SAX 法的心肌层面进行初始 T2 值测量，比较两种方法测得的心肌初始 T2 值的差别。结果：DCM 组采用 ConSept 或 SAX 法测得的 T2 值均高于对照组(均 $P < 0.001$)，LGE 阳性组的 T2 值均大于 LGE 阴性组(均 $P < 0.05$)。ConSept 法和 SAX 法测得的中间层 T2 值与基底层、心尖层 T2 值无明显差别(均 $P > 0.05$)，具有非常好的一致性[(concordance correlation coefficient, CCC)=0.974]。结论：在扩张型心肌病的 T2 值测量中，与 SAX 法相比，ConSept 法测量心肌初始 T2 值的效率更高，更利于实现，适合在临床工作中使用。

PO-3036

生长激素缺乏对儿童结构脑网络影响研究

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目的：生长激素缺乏 (GHD) 不仅会影响儿童身体成长，还会影响大脑成熟，从而引起儿童在认知功能及神经心理上出现不同程度的障碍。但目前对 GHD 儿童的结构脑网络发育机制研究较少，尤其是不同组间患儿的结构脑网络差异。本研究通过比较不同组别的矮小儿童脑网络复杂结构的影像学特征，横向研究生长激素缺乏程度对儿童的结构脑网络影响。

方法：招募 64 名矮小儿童，根据临床生长激素激发试验结果分为完全性 GHD (N=22)，部分性 GHD (N=22) 和特发性矮小 (ISS, N=20)。分别采集患儿的颅脑薄层 T1, DTI 序列数据，用 PANDA 及 GRETNA 软件构建其结构脑网络，比较不同组间儿童在结构脑网络的差异。

结果：完全性 GHD 组患儿聚类系数低于 ISS 组 ($P=0.013$)，而完全性 GHD 组的特征路径长度 ($P=0.022$) 及小世界属性 ($P=0.037$) 均高于部分性 GHD 组。部分性 GHD 组特征路径长度低于完全性 GHD 组 ($P=0.022$) 及 ISS 组 ($P=0.032$)，而网络效率高于完全性 GHD 组 ($P=0.020$) 及 ISS 组 ($P=0.030$)。

结论：不同程度生长激素缺乏能够对相应患儿结构脑网络发育产生特异性影响。功能磁共振结合图论分析方法可以为 GHD 患儿神经脑网络研究提供更多影像学依据。

PO-3037

基于多模态 MRI 影像组学预测脑胶质瘤 IDH1 基因突变及 MGMT 基因甲基化状态

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目的：本研究旨在通过多模态 MRI 影像组学方法预测脑胶质瘤 IDH1 基因突变及 MGMT 基因甲基化状态，以提供一种非侵入性的分子生物学标志物检测方法，为个体化治疗提供依据。

方法：回顾性分析 2021 年 1 月-2023 年 8 月在新疆医科大学第一附属医院就诊的，经组织病理学证实为脑胶质瘤且具有 IDH1 基因突变及 MGMT 基因甲基化状态信息的患者 150 例。应用 T1WI、T2WI、T2-FLAIR 及 T1-CE 序列进行影像组学特征提取，随后，采用机器学习算法对特征进行训练和优化，建立 IDH1 基因突变及 MGMT 基因甲基化状态预测模型。

结果：在预测脑胶质瘤 IDH1 基因突变方面，多模态 MRI 影像组学方法取得了显著的效果。多序列联合预测模型的 AUC 为 0.925，高于单一的 T1WI、T2WI、T2-FLAIR、T1-CE 模型，且在训练集和测试集上都展现了良好的泛化性能。对于预测 MGMT 基因甲基化状态，多序列联合预测模型的 AUC 为 0.874，均高于单一的 T1WI、T2WI、T2-FLAIR、T1-CE 模型，证明了其在该领域的应用潜力。结果表明，多模态 MRI 影像组学方法在预测脑胶质瘤 IDH1 基因突变和 MGMT 基因甲基化状态方面都取得了显著的效果。

结论：本研究表明，基于多模态 MRI 影像组学的预测模型可用于非侵入性地预测脑胶质瘤 IDH1 基因突变及 MGMT 基因甲基化状态。与传统的基因检测方法相比，多模态 MRI 影像组学具有操作简便、高效性和可行性等优势。该方法的应用将为脑胶质瘤患者提供个体化治疗策略的制定提供依据，具有重要的临床应用前景。

PO-3038

2 型糖尿病海马血管周围间隙扩大与海马容积及认知功能的相关性研究

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目的 本研究拟通过分析 2 型糖尿病 (T2DM) 患者海马血管周围间隙扩大 (H-EPVS)、海马容积和认知功能之间的关系，探讨 H-EPVS 是否独立于海马萎缩加重 T2DM 患者认知功能障碍。

方法 连续性收集陕西省人民医院内分泌科就诊的 T2DM 患者 53 例，其中 T2DM 患者认知受损组 30 例，T2DM 患者认知正常组 23 例，所有患者接受头颅 MRI 扫描、蒙特利尔认知评估量表 (MoCA) 和 Rey 听觉词语学习测试 (RAVLT)。取 T2WI 图像上 H-EPVS 计数最多的一个层面，分别计算左右两侧 H-EPVS 的计数数目，并由左右两侧 H-EPVS 计数相加获得总 H-EPVS 计数。采用 VBM 分析计算获得每个被试的总海马容积和全脑容积，对总海马容积进行标准化以避免头颅大小引起的个体差异。比较 T2DM 认知正常组和认知受损组 H-EPVS 计数、总海马容积、MoCA 评分及 RAVLT 评分的差异。采用多元线性回归分析评价 H-EPVS 计数、总海马容积与 RAVLT 评分的相关性。

结果 相比于 T2DM 认知正常组，T2DM 认知受损组的总 H-EPVS 计数显著增加，MoCA 评分显著降低 ($P < 0.05$)，而 RAVLT 评分在两组间未见明显差异。相关性分析显示总 H-EPVS 计数与 RAVLT 评分呈负相关 ($r = -0.279$, $P = 0.043$)，而总海马容积与 RAVLT 评分无显著相关关系。校正总海马容积、年龄、性别、受教育年限后，多因素回归分析结果提示 RAVLT 评分与总 H-EPVS 计数显著相关 (回归系数 $\beta = -0.324$, 95% CI: $-1.524 \sim -0.149$, $P < 0.05$)。

结论 H-EPVS 计数可能独立于海马萎缩加重 T2DM 记忆功能降低, 有望作为预测 T2DM 记忆功能受损更敏感的影像学标志物, 有效防治脑小血管病对 T2DM 认知功能可能具有保护作用。

PO-3039

轻微肝性脑病脑功能网络动态度中心性的改变及其与代谢紊乱的关系

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目的: 研究轻微性肝脑病(minimal hepatic encephalopathy, MHE)中动态度中心性(dynamic degree centrality, dDC)的变化及其与代谢紊乱和认知障碍的关联。

方法: 58 例肝硬化患者(22 例为 MHE 患者, 36 例为非轻微肝性脑病(without MHE, NHE)患者)和 22 名健康对照者, 所有受试接受了静息态功能磁共振成像、1H-磁共振波谱成像和基于精神量表肝性脑病评分的神经认知测验(PHES, Psychometric Hepatic Encephalopathy Score)。获得了后扣带回和楔前叶的代谢物比值, 包括谷氨酸和谷氨酰胺 (glutamate and glutamine, Glx) /总肌酸 (total creatine, tCr)、肌醇 (myo-inositol, ml) /tCr、总胆碱/tCr 和乙酰天冬氨酸/tCr。对于每个体素, 度中心性被定义为其与大脑中其他体素的功能连接之和; 使用滑动窗口相关性方法计算每个体素的 dDC。

结果: NHE 和 MHE 的 Glx/tCr 呈逐步增加趋势, 而 ml/tCr 呈逐步减少趋势。在双侧后扣带回和楔前叶(region of interest [ROI1])、双侧额叶内侧上部和前扣带回 (ROI2) 以及左侧尾状核中观察到显著的 dDC 差异。ROI2 的 dDC($r = 0.450, P < 0.001$)和 ml/tCr($r = 0.297, P = 0.024$)与 PHES 相关。ROI1 的 dDC 与 Glx/tCr($r = -0.413, P = 0.001$)和 ml/tCr($r = 0.554, P < 0.001$)之间存在显著相关。ROI2 的 dDC、Glx/tCr 和 ml/tCr 显示出区分 NHE 和 MHE 的潜力(曲线下面积分别为 0.655、0.672 和 0.859)。

结论: 我们的研究结果表明轻微肝性脑病中存在动态脑网络紊乱, 与代谢紊乱和神经认知障碍有关。

PO-3040

扩散峰度成像评估 IgG4 肾脏疾病的可行性研究

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目的: 探索免疫球蛋白 G4 (IgG4)相关肾脏疾病(IgG4-KD)在弥散峰度成像(DKI)中的影像学表现, 并探讨基于 DKI 的定量参数在 IgG4-KD 评估中的价值。

方法: 共 23 例 IgG4-KD 患者纳入该前瞻性研究。所有患者均接受包括 T1WI、T2WI 及 DKI 序列在内的双肾 MRI 检查。两名放射科医生一直评估 MR 图像, 确定肾脏病变的分布模式(位置、偏侧性和多发性)及肾脏病变的信号强度(低、等或高)。同时, 两名医师通过在肾门层面的 DKI 图像中勾画 ROI 的方式定量测量双肾实质、双肾皮质及双肾髓质的以下各项定量参数: 平均弥散峰度 (MK), 平均扩散系数 (MD) 和表观扩散系数 (ADC), 利用组内相关系数 (ICC) 评价观察者间一致性。收集患者肌酐、肾小球滤过率 (eGFR)、IgG4、IgG、补体及血沉等临床指标, 评价其与肾脏定量 DKI 参数的相关性。

结果: IgG4-KD 典型表现为双侧(90.91%)、多发(95.24%)和肾实质斑片状病变(90.48%), T1WI 呈等信号(80.96%), T2WI 呈低信号(85.71%), DKI($b = 2000$)呈高信号(95.24%)。肾皮质 MK、肾实质 MK、肾实质 ADC 及肾皮质 ADC 一致性良好 (ICC: 0.822-0.846), 双肾髓质 MD 一致性差 (ICC: 0.121), 余参数一致性适中 (ICC: 0.729-0.752)。MK、MD 及 ADC 与右肾无差异。肾实

质、肾皮质和肾髓质的 MK 及 ADC 无明显差异, 然而肾皮质的 MD 高于肾实质及肾髓质。基于 DKI 得到的 MK 参数与包含肾功能在内的多项临床指标存在相关性。eGFR 与肾皮质 MK 呈负相关 ($r = 0.66, p=0.002$), IgG 与肾实质 MK 呈正相关 ($r = 0.58, p = 0.02$), 血沉与肾实质 MK 呈正相关 ($r = 0.58, p = 0.004$)。

结论: DKI 图像可用于评估 IgG4-KD 肾脏影像改变, 基于 DKI 得到的定量参数 MK 与 IgG4-KD 临床指标相关, 具有评估 IgG4-KD 的潜力。

PO-3041

个体特异性功能连接对阻塞性睡眠呼吸暂停患者 认知障碍分类及预测研究

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目的: 阻塞性睡眠暂停 (OSA) 患者认知障碍表现不一致性, 给临床诊断和治疗评估带来挑战, 然其机制尚不清楚。以往的神经影像学研究主要集中在患者和健康对照 (HC) 之间的平均差异, 忽略了患者之间跨大脑区域的连贯振荡活动的个体特异性差异。本研究基于静息态功能磁共振成像探索了个体特异性功能连接对 OSA 无认知障碍 (OSA-NC)、OSA 伴轻度认知障碍 (OSA-MCI) 患者、HC 分类的影响及个体间变异性预测认知障碍的潜在价值, 有助于 OSA 的潜在神经影像学标志物。

材料与方法: 收集了 82 例 OSA (OSA-NC 41 例, OSA-MCI 41 例) 患者和 HC 82 例磁共振及临床数量, 采用 Dosenbach 160ROIs 脑区模版, 基于多任务学习的稀疏凸松弛交互结构优化 (MTL-sCASO) 方法提取个体特异性功能连接, 并且计算脑功能连接的个体变异性模式 (IVFC), 并通过最小绝对收缩和选择算子 (LASSO) 进行特征选择, 最后利用支持向量机 (SVM) 分类器完成 OSA-NC/OSA-MCI/HC 的分类任务。此外, 采用双样本 t 检验来计算分类过程中最具辨识力的功能连接的组间差异 ($p < 0.05$)。

结果: 与传统皮尔森相关构建的功能连接的分类准确度结果 (79.5%) 比较, 基于个体特异性功能连接对 OSA/HC 的二分类的准确度高达 91.8%, 同时个体特异性功能连接对区分 OSA-MCI/HC (95.9%)、OSA-NC/HC (93.7%) 的分类性能要明显优于使用皮尔森相关得到的功能连接 (87.8%, 88.1%), 尽管个体特异性功能连接在区分 OSA-NC/OSA-MCI 的准确度稍差 (81.3%), 但明显高于皮尔森相关得到的功能连接 (63.8%)。在分类过程中最具辨识力的功能连接网络, 主要在默认网络、执行控制网络, 其连接强度及个体连接变异性在组间的存在显著差异。

结论: 使用个体特异性连接提高了对 OSA-NC 及 OSA-MCI 识别准确度, 个体间功能连接变异性可预测 OSA 患者认知障碍, 个体特异性功能连接有望作为 OSA-MCI 诊断的潜在神经影像学标志物。

PO-3042

基于多序列 MRI 影像组学预测子宫内膜癌危险分层的研究

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目的: 本研究旨在建立一个基于多序列 MRI 及临床特征的影像组学诺模图预测子宫内膜癌 (EC) 风险分层, 并评估该诺模图对高危 EC 的诊断效能。

方法: 回顾性分析 2017.01–2023.03 于本院术前行盆腔 MRI 检查的 210 例 EC 患者, 以最终手术病理结果为金标准, 将所有 EC 患者分为低危 EC 和高危 EC。收集每名患者的临床病理资料和常规 MRI 特征 [包括子宫肌层侵犯深度 (MI)、宫颈间质浸润状态 (CSI) 和肿瘤的最大直径]。采用单

因素和多因素回归分析明确临床独立危险因素。将所有患者按 7:3 的比例随机分成训练组（147 例）和测试组（63 例）。采用 3D-Slicer 软件在轴位 T2WI、DWI 及 DCE 序列上沿肿瘤边缘勾画三维感兴趣区（3D-ROI）。采用最小冗余最大相关算法（mRMR）和 LASSO 回归筛选各单一序列和组合序列中的最佳影像组学特征计算影像组学评分（Rad-score），联合临床独立危险因素和 rad-score 构建影像组学诺模图。采用 ROC 曲线评估训练组和测试组中各预测模型的诊断效能。通过临床决策曲线分析（DCA）、经重新分类指数（NRI）和总综合判别指数（IDI）评估影像组学诺模图的临床获益。

结果：Logistic 回归分析发现年龄、磁共振报告的 MI、CSI 及 D&C 是区分高危和低危 EC 的独立危险因素（ $P<0.05$ ）。联合临床危险因素和 Rad-score 构建影像组学诺模图。结果显示：Rad-score 及影像组学诺模图在训练集中的 AUC 分别为 0.823 和 0.926，在测试集中分别为 0.815 和 0.862。DCA 表明当概率阈值在 10%-94% 的范围内，使用诺模图预测高危 EC 获得的临床净收益大于 Rad-score。影像组学诺模图的 NRI 值为 0.512，IDI 值为 0.292，表明影像组学诺模图具有良好的临床实用性。

结论：患者年龄、D&C、MRI 报告的 MI 及 CSI 可作为鉴别高危和低危 EC 的独立危险因素。基于临床危险因素和多序列影像组学特征构建的影像组学诺模图可以在术前无创性地预测高危 EC。

PO-3043

酰胺质子转移 MRI 和扩散加权成像定量参数直方图在中央腺体区前列腺癌和前列腺增生结节鉴别的诊断价值

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目的：评估最新 3D APT MRI 和 ADC 定量参数直方图在中央腺体区对前列腺癌和前列腺增生结节鉴别的诊断价值。方法：收集本院经病理证实且既往未接受过治疗的患者，16 例中央腺体区前列腺癌患者；6 例良性前列腺增生患者。所有患者行前列腺常规 MRI 和 3D APT 检查。采用 MATLAB 2016a 软件进行图像后处理及直方图参数计算。将穿刺区域内对应的最高 PI-RADS 评分病灶定义为靶病灶，并逐层勾画。通过后处理分别获得 3D APT 和 ADC 图的 5%位数、25%位数、50%位数、75%位数、95%位数、峰度、偏度、均值、最大值、最小值。采用独立样本 t 检验或秩和检验，判断中央腺体区前列腺癌和良性前列腺增生结节各个参数是否有差异。采用 ROC 评估 3D APT 和 ADC 像各个参数的诊断效能，并用 Z 检验比较曲线下面积。结果：3D APT 直方图参数中，中央腺体区前列腺癌 5%位数（ $p=0.017$ ）、25%位数（ $p<0.001$ ）、50%位数（ $p=0.020$ ）、75%位数（ $p=0.017$ ）、峰度（ $p=0.023$ ）、偏度（ $p=0.008$ ）、均值（ $p<0.001$ ）明显大于良性前列腺增生结节。ADC 直方图参数中，中央腺体区前列腺癌 5%位数（ $p=0.018$ ）、25%位数（ $p=0.021$ ）、均值（ $p=0.038$ ）、最小值（ $p=0.008$ ）小于良性前列腺增生结节。在 3D APT 直方图各参数中，5%位数、25%位数、50%位数、偏度、均值诊断效能较好。AUC 分别为 0.958、0.958、0.917、0.875、0.922，75%位数和峰度 AUC 分别为 0.792、0.667，其中 5%位数、25%位数诊断效能比峰度高（ $p=0.022$ ）。在 ADC 直方图各参数中，5%位数、25%位数、均值、最小值 AUC 分别为 0.833、0.875、0.792、0.875，各个参数诊断效能没有差异。对比 3D APT 直方图 5%位数、25%位数、均值比 ADC 直方图诊断效能略高，但没有明显差异。结论：最新的 3D APT MRI 和 ADC 定量参数直方图在中央腺体区前列腺癌和前列腺增生结节鉴别中有较好的应用价值，3D APT MRI 的诊断效能略高。

PO-3044

心脏磁共振定量评估心脏移植术后患者心肌纤维化程度

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目的：通过心脏磁共振定量参数无创性评估心脏移植（HT）术后患者心肌纤维化的情况。

方法：前瞻性收集心脏移植（HT）术后的患者 78 例，平均移植时间约 1.6 年，按照心脏磁共振（CMR）标准化协议扫描，采用 CMR 特征跟踪(FT)技术在移植心脏中测量左室心肌应变参数，依据有无 LGE 将患者分为 LGE（+）和 LGE（-）两组，比较两组心肌整体纵向应变(GLS)、整体周向应变(GCS)和整体径向应变(GRS)。依据美国心脏协会 16 段模型测量左室基底段和中间段 T1 mapping、细胞外容积（ECV）等定量参数值，由于心尖段易受部分容积效应的影响，故不纳入测量。通过 ROC 曲线和 logistic 回归分析，探讨上述参数值与 HT 后心肌纤维化的关系。

结果：38 例(48.1%)患者检测到 LGE，LGE 中位范围 5%，以非典型梗死 LGE 模式更为常见。与 LGE(-)组相比，LGE(+)组供者年龄较大，心脏同种异体移植血管病变（CAV）发生率较高，利尿剂用量较高，左室质量（LVM）较高，左室射血分数（LVEF）较低，左室 GLS、GCS、GRS 降低，T1 mapping 与 ECV 有所升高，但未见明显差异。其中，GLS 与 LGE 独立相关，准确性约 76%，GLS 是判断 LGE 范围>5%的独立预测因子。

结论：GLS 能够准确的识别 HT 患者心肌纤维化情况，具有较高的诊断效能，可作为患者临床随访的一种无创检查方法。

PO-3045

肝性脑病患者局部自发脑活动异常改变的元分析

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【摘要】目的 探讨静息态功能磁共振成像（resting-state functional magnetic resonance imaging, rs-fMRI）研究肝性脑病（Hepatic encephalopathy, HE）患者最一致的易损大脑区域，揭示 HE 患者脑损伤潜在神经机制。方法 检索 2023 年 8 月以前采用局部一致性（regional homogeneity, ReHo）、低频振幅（amplitude of low-frequency fluctuation, ALFF）及分数低频波动振幅（fraction amplitude of low-frequency fluctuation, fALFF）方法探讨 HE 患者静息态局部自发脑活动异常改变的研究，依据纳入及排除标准，采用标记差异映像（signed differential mapping, SDM）软件对既往研究中 HE 患者相对于健康被试自发脑活动异常改变的脑区进行数据分析。结果 共纳入 19 篇文献（患者 433 例，健康被试 453 例）。基于元分析证实，静息态下 HE 患者局部自发脑活动异常增加脑区主要集中于右侧梭状回、右侧豆状壳核、左侧中央后回、左侧脑岛、右侧中央后回；异常减低脑区主要集中于右侧距状裂周围皮层、左侧距状裂周围皮层、左内侧和旁扣带脑回及左侧中央前回；（ $P < 0.001$ ，峰高 $Z > 1$ ，簇范围 ≥ 20 个体素）结论 应用脑功能元分析证实了 HE 患者相关核心脑功能异常的脑区，这些发现可能揭示 HE 患者脑损伤的神经病理基础及划定特定感兴趣区域进一步研究 HE 患者的脑功能改变。

PO-3046

自由呼吸全心黑血成像与普通黑血成像对比研究

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目的：近年来心脏磁共振应用越来越广泛，其中黑血成像通过抑制血池信号，心肌呈相对高信号可突出显示心肌结构、形态及信号，但心脏黑血短轴位需要多次屏气才能得到多层图像，通过使用单激发快速自旋回波序列进行自由呼吸全心黑血成像，提高心脏磁共振检查成功率。

方法：前瞻性收集 2023 年 7 月至 2023 年 8 月之间在贵黔国际总医院行心脏磁共振患者图像资料 14 例，均在联影 uMR880 3.0T MR 扫描仪上使用 24 通道超柔体线圈进行扫描成像，所有患者均连续扫描了两组黑血短轴位序列，采用随机数字表法将两组序列分为 A 组、B 组，A 组为屏气序列扫描层数为 9 层，9 次屏气扫描，扫描时间为 120s，B 组为自由呼吸序列扫描层数为 9 层，无需屏气 1 次扫描，扫描时间为 15s。由放射科多名影像医师对两组心脏黑血短轴位序列整体图像质量进行评估，分别从信噪比、运动伪影、扫描时间进行客观评价，结果使用 SPSS 软件配对 t 检验进行分析。

结果：放射科医师主观评价得出 B 组图像质量稍优于 A 组。A、B 两组图像信噪比无较大差异，无统计学意义。由于 A 组序列需要进行 9 次屏气扫描，检查成功患者很难做到每次屏气均配合良好，故部分层面存在运动伪影，B 组为自由呼吸 1 次扫描无需屏气，图像均未出现运动伪影 ($P<0.01$)。自由呼吸序列无需屏气 15s 就可以得到全心黑血图像，普通黑血成像序列 1 次屏气 10s，9 次屏气配合较好且每次屏气期间让患者休息 5s，一共需要 120s 左右的时间，两者差异具有统计学意义 ($P<0.01$)。

结论：自由呼吸全心黑血成像相较于普通屏气黑血成像，患者舒适度更好、图像质量更佳、检查成功率更高，使屏气困难患者受益，在临床磁共振工作中有较高的应用价值。

PO-3047

MRI 影像组学模型预测肝细胞癌微血管侵犯的研究

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目的：探讨基于术前增强 MRI 影像组学方法对肝细胞肝癌微血管侵犯 (MVI) 不同分级的术前预测价值。

方法：回顾性分析 340 例经手术病理证实为肝细胞肝癌病例的术前增强 MRI 图像资料以及临床资料，其中无 MVI (M0) 177 例，轻度 MVI (M1) 121 例，重度 MVI (M2) 42 例。将纳入患者分为三个组 (M0 与 M1 组，M1 与 M2 组，M0 与 M2 组)。每组患者按 7: 3 的比例随机分为训练集和验证集。分别从 T2WI、动脉期 (AP)、门脉期 (PVP) 序列高通量提取 1037 个特征参数，使用梯度提升决策树算法 (GBDT) 对特征参数进行降维。分别构建 3 期融合影像组学逻辑回归模型，临床影像模型以及临床影像组学模型。采用 ROC 曲线评价模型在训练集和测试集中预测肝细胞肝癌不同 MVI 分级的 ROC 曲线下面积 (AUC)、准确性、敏感性 & 特异性，并通过决策曲线分析 (DCA) 和校准曲线进行评估。

结果：M0 与 M1 组独立预测因素为肿瘤最大径；临床影像组学模型训练集的诊断效能 ROC 曲线下面积 (AUC) 值 0.755，测试集 AUC 值 0.754，3 期联合模型以及临床影像模型训练集 AUC 为 0.746 和 0.704，测试集 AUC 为 0.752 和 0.708。M1 与 M2 组独立预测因素包括 AST、AFP、肿瘤包膜，临床影像组学模型训练集的 AUC 为 0.868，测试集 AUC 值 0.819。3 期联合模型以及临床影像模型训练集 AUC 为 0.757 和 0.798，测试集 AUC 为 0.685 和 0.744。M0 与 M2 组独立预测因素为 AST、

AFP、肿瘤最大径、肿瘤包膜，临床影像组学模型训练集的 AUC 为 0.939，测试集 AUC 值 0.915。3 期联合模型以及临床影像模型训练集 AUC 为 0.901 和 0.872，测试集 AUC 为 0.893 和 0.907。结论：结合临床影像独立预测因子及 MRI 相关影像组学特征的联合模型是预测肝细胞肝癌微血管侵犯不同分级的最好模型。

PO-3048

大号超柔线圈 (Flexcoil Large) 应用于肩关节 MR 成像的可行性

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目的：探讨大号超柔线圈在肩关节 MR 成像中的可行性。

材料和方法：招募健康志愿者 10 例（男 6 例，平均年龄 26.40 ± 2.49 岁）。3.0T MR(Omega, UIH) 行肩关节轴位 T1WI，矢状位 T2WI，冠状位 PDWI 常规扫描及大号超柔线圈扫描，参数详见表 1。部分志愿者行多序列扫描，最终每组序列均为 10 例。采用 ROI 法测量肱骨，肱二头肌长头腱，三角肌信号值 (SI) 和标准差 (SD)，计算信噪比 (SNR) 和对比噪声比 (CNR)，两名观察者根据肌腱，冈上肌结构细节可见度、图像噪声以及诊断准确性对图像进行四分制主观评分 (表 2)。使用 Kappa 检验两观察者测量数据的一致性。对各序列不同组间图像的 SNR，CNR 和主观评分采用配对样本 t 检验， $P < 0.05$ 为差异具有统计学意义。

结果：两观察者主观评分一致性良好 (kappa: 0.773-0.828)，选择观察一主观评分进行后续分析。常规肩关节 MR 扫描及大号超柔线圈肩关节 MR 扫描多序列之间的肱骨、肱二头肌长头腱的 SNR、CNR 和主观评分均无统计学差异 ($p > 0.05$ ，表 3)。

结论：大号超柔线圈在肩关节 MR 成像中具有一定的应用价值。

临床意义：肩关节肿瘤患者和被迫体位的患者行常规肩关节扫描时，往往得不到最佳的扫描体位，影响图像的扫描和患者的就医感受，大号超柔线圈可以解决这一问题，并且很好地提高提高了患者检查舒适度。

PO-3049

人工智能辅助压缩感知技术应用于肩关节快速磁共振成像的可行性

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目的：探讨人工智能辅助压缩感知技术 (ACS) 应用于肩关节快速磁共振成像的可行性。

材料和方法：招募健康志愿者 10 例（男 6 例，女 4 例，平均年龄 26.40 ± 2.49 岁），3.0T MR(Omega, UIH) 行基于平行采集技术的 (PI) 和 ACS 的肩关节轴位 T1WI，冠状位 PDWI，矢状位 T2WI 扫描，采用的加速因子 (AF) 分别为 PI AF=2，ACS AF=2、2.5、3、3.5、4，T1WI 不同 AF 扫描时间分别为 134s、107s、84s、70s、60s、56s；T2WI 扫描时间分别为 113s、69s、58s、47s、41s、33s；PDWI 扫描时间分别为 99s、98s、75s、62s、54s、48s，其余参数详见表 1。部分志愿者行多序列扫描，最终每组序列均为 10 例。采用 ROI 法测量肱骨，肱二头肌长头腱，三角肌信号值 (SI) 和标准差 (SD)，计算信噪比 (SNR) 和对比噪声比 (CNR)，两名观察者根据关节盂唇清晰度、图像噪声以及诊断准确性对图像进行四分制主观评分 (表 2)。使用 Kappa 检验

两观察者测量数据的一致性。采用单因素方差分析检验三个序列不同 AF 之间 SNR、CNR 及主观评分的差异性。

结果：两观察者主观评分一致性良好 (κ : 0.799-0.882)，选择观察一主观评分进行后续分析。单因素方差分析不同 AF 间冠状位 PDWI 主观评分差异具有统计学意义 ($p < 0.05$, 表 3)。两两比较结果当 AF=3.5 时, PDWI 主观评分较常规序列显著降低 ($p < 0.05$, 表 4)。

结论：ACS 应用于肩关节 MR 具有良好的可行性, 当 ACS AF=4、4、3 时, 轴位 T1WI、矢状位 T2W、冠状位 PDWI 扫描时间缩短 58.2%、70.8%、37.4%, 图像质量满足诊断要求。

临床意义：ACS 应用于肩关节 MR 可以显著缩短扫描时间, 临床推荐应用 AF=4、4、3 行肩关节轴位 T1WI、矢状位 T2W、冠状位 PDWI 扫描。

PO-3050

基于多参数磁共振成像特征的深度学习预测直肠癌患者的 BRAF 基因突变状态

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目的：鼠类肉瘤病毒癌基因同源物 B 基因 (BRAF) 基因突变状态和直肠肿瘤患者的生存率相关。本研究旨在探索应用由卷积神经网络组成的多参数核磁共振成像 (MRI) 影像组学模型预测结直肠癌患者 BRAF 基因突变情况的可行性。方法：我们检查了 260 名诊断为直肠癌患者, 利用外显子测序鉴定 BRAF 基因突变情况。对于年龄差异进行 T 检验, 性别进行卡方检验, 肿瘤分期进行配对 T 检验比较 BRAF 基因突变与野生组间差异。采用生存分析对 BRAF 突变与直肠癌预后进行分析。然后, 从 260 名具有多参数核磁共振成像的直肠癌患者中提取 7388 个特征, 其中包括术前 T1 加权图像 (W)、T2 加权图像 (2W) 和对比增强 T1 I 图像。最后, 利用卷积神经网络 (ConvNet) 建立了基于特征的放射组学模型。该模型可以使用 ROC 曲线、准确率、召回率、灵敏度和特异性作为评价指标, 进行自主学习分类、并进行 ROC 曲线评估模型效能。结果：研究对象中, 共包括 89 例 BRAF 突变患者, 171 例 BRAF 野生型患者。两组患者的肿瘤恶性分期, 年龄, 性别等临床特征无显著差别, 但是 5 年的生存期有显著差别。BRAF 突变组生存期显著低于 BRAF 野生组 ($P < 0.0001$)。该网络 ROC 曲线下面积达到 0.932, 表明具有较好的预测价值。结论：卷积神经网络构建的基于放射组学特征的模型具有区分直肠癌患者 BRAF 突变状态, 对未来无创筛查 BRAF 状态提供了新的思路。

PO-3051

基于直肠磁共振的直肠侧系膜结构观察及其临床价值的探究

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目的：通过回顾性分析接受直肠癌根治术患者的直肠 MRI 影像资料, 观察患者直肠侧系膜结构, 并测量相关参数：直肠系膜筋膜中断宽度、直肠中动脉类型和直肠中动脉最大管径。结合临床资料, 分析其对患者预后的影响。

方法：对 2017 年 1 月至 2018 年 12 月期间在我院接受直肠癌根治性切除术患者的数据进行回顾性分析。收集在术前曾行直肠磁共振检查的患者的影像学资料, 根据磁共振图像观察直肠侧系膜, 并测量相关参数与患者 3 年预后资料进行分析。

结果：最终有 260 例患者被纳入本研究。根据既往研究总结和本课题组相关研究, 将直肠中动脉分成 4 种类型：1 型为前外侧(AL)型, 分支于前列腺动脉、膀胱下动脉或子宫动脉；2 型为外侧(L)型,

从侧方直接进入直肠系膜；3 型为后外侧型(PL)，经由直肠骶骨筋膜进入直肠后壁；4 型为细小分支型，多个细小分支血管从直肠侧方进入直肠，无明显主干。在术前直肠磁共振中，所有患者的双侧均观察到直肠固有筋膜的中断。

根据患者 3 年生存情况将患者分为 3 年生存组和 3 年死亡组。3 年生存组患者直肠中动脉类型以 3、4 型为主。多因素 COX 回归分析结果显示直肠中动脉最大管径 ($P=0.026$, HR: 3.843, 95%CI: 1.173-12.589) 和直肠系膜筋膜中断宽度 ($P=0.043$, HR: 1.115, 95%CI: 1.003-1.239) 为患者预后的预测因素。

结论：直肠侧系膜和直肠中动脉固有存在，直肠系膜筋膜中断宽度和直肠中动脉最大管径是患者术后生存期短的危险因素。术中更好地处理直肠侧系膜，可能会改善患者预后，但仍需要进一步研究。

PO-3052

基于 3D T2WI 的直肠癌转移性淋巴结诊断：影像-病理对照研究

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研究目的：在 3D T2WI 序列对淋巴结评估时发现部分淋巴结具有“包膜征”和/或“中央点征”。本研究的主要目的是评估 3D T2WI 在淋巴结中的特殊征象是否对转移性淋巴结具有诊断价值，并构建 3D T2WI 序列淋巴结诊断模型。

研究方法：本研究前瞻性收集 39 名直肠癌患者，并通过术前 MR、术后标本 MR 及病理结果精准匹配获得 145 枚淋巴结（52 枚阳性淋巴结，93 枚阴性淋巴结）。分别评估精准匹配淋巴结在 2D T2WI 和 3D T2WI 序列上的影像学特征，并通过单因素与多因素 logistic 回归分析筛选转移性淋巴结独立风险/保护因素。分别构建基于 2D T2WI 和 3D T2WI 独立因素及现有指南因素的淋巴结诊断标准，比较不同诊断标准下淋巴结诊断效能，最后构建基于 3D T2WI 序列的淋巴结诊断模型。

研究结果：基于 3D T2WI 序列筛选的危险征象、保护征象及以现有指南征象的淋巴结诊断标准的诊断准确率分别达到 82.1%，92.4%和 87.6%，均显著高于 2D T2WI 序列的淋巴结诊断准确率 57.7% 和 63.5%。综合 3D T2WI 序列淋巴结边缘、内部信号、包膜征和中央点征，通过构建淋巴结转移诊断模型，在训练数据集中受试者工作特征曲线（the receiver operating characteristic, ROC）下面积（the areas under the curve, AUC）值及 95%置信区间（confidence interval, CI）为 0.981（0.963-1.000），在验证数据集中 AUC 值及 95%CI 为 0.986（0.968-1.000）。

研究结论：3D T2WI 序列观察的包膜征和中央点征有利于提高转移性淋巴结诊断敏感度及准确性，通过 3D T2WI 序列评估的影像学特征构建的淋巴结诊断模型可以实现较高的诊断准确度。

PO-3053

绝对定量磁共振灌注成像在缺血性脑卒中患者中的初步研究

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目的：初步探究绝对定量动态磁敏感对比增强自校准平面回波灌注加权成像（selfcalibrated echo planar imaging perfusion weighted imaging, SCALE-PWI）在定量缺血性脑卒中患者脑血流动力学变化方面的应用价值。

方法：前瞻性收集了 14 位缺血性脑卒中受试者的常规 MRI、SCALE-PWI 和临床数据。SCALE-PWI 检查采用高压注射器以 4 mL/s 的流速依次注射单剂量（0.1mmol/kg）钆对比剂（Magnevist, Berlex, Montville, NJ, USA）和 20 mL 生理盐水。随后，在线自动后处理生成定量脑血流（quantitative cerebral blood flow, qCBF）图和定量脑容量（quantitative cerebral blood volume,

qCBV) 图。2 位神经影像医生各自独立测量低灌注区、缺血核心区与镜像区的 qCBF 和 qCBV, 并计算缺血半暗带区与镜像区的 qCBF 和 qCBV。采用配对 t 检验、威尔科克森符号秩检验、受试者工作特征曲线等方法进行统计学分析, 均以 $P < 0.05$ 为差异有统计学意义。

结果: 图 1 展示了急性缺血性脑卒中受试者的 MR 影像。14 位缺血性脑卒中受试者低灌注区、缺血核心区、缺血半暗带区的 qCBF 和 qCBV 均低于镜像区正常脑白质的相应值 (所有 $P < 0.05$), 缺血核心的 qCBF 和 qCBV 均低于缺血半暗带的相应值 (qCBF 平均值分别为: 16.42 mL/100g/min 和 21.54 mL/100g/min, $P = 0.013$; qCBV 平均值分别为: 1.23 mL/100g 和 1.47 mL/100g, $P = 0.049$)。缺血核心 qCBF 的最佳临界值为 18.18 mL/100g/min, 缺血半暗带 qCBF 的最佳临界值为 28.09 mL/100g/min。

结论: 不同于以往的半定量灌注成像, SCALE-PWI 能够在短时间内检测缺血性脑卒中患者的绝对定量血流动力学信息, 有助于识别缺血核心和缺血半暗带, 具有指导制定个体化治疗方案的潜力。

PO-3054

APT 联合 IVIM 鉴别宫颈鳞状细胞癌病理分化程度

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目的 探讨酰胺质子转移加权成像 (APTWI) 联合体素内不相干运动 (IVIM) 鉴别宫颈鳞状细胞癌 (CSCC) 病理分化程度和国际妇产科学联合会 (FIGO) 分期的价值。

方法 纳入经 FIGO 标准确诊的 56 例 CSCC 患者和 30 名健康志愿者。CSCC 患者分为中高分化组 ($n=34$) 和低分化组 ($n=22$); FIGO 分期早期 ($<IIB$, $n=27$) 和晚期 ($\geq IIB$, $n=29$)。APTWI 采用 3D Multi-shot TSE 获得 APT 信号强度 (APT SI)。IVIM 使用 12 个 b 值 (0、20、100、150、200、300、400、500、600、800、1000 和 1200s/mm²) 计算参数 D、D* 和 f。ADC 值基于 2 个 b 值 (0、800s/mm²) 计算。

结果 CSCC 患者 APT SI 高于正常宫颈 ($P < 0.001$), ADC、D、f 低于正常宫颈 ($P < 0.001$)。中高分化组和低分化组的 APT SI 和 D 有显著性差异 ($P < 0.001$)。中高分化组与低分化组比较, APT SI、D、f 的曲线下面积 (AUC) 分别为 0.691、0.685、0.612, 敏感性分别为 60.94%、67.19%、50.00%, 特异性分别为 72.73%、68.18%、77.27% (所有 $P < 0.05$)。APT SI+IVIM 对 CSCC 的诊断效果最好, AUC 为 0.995, 敏感性为 94.64%, 特异性为 100.00%。鉴别 CSCC 病理分化程度, APT SI+IVIM 的诊断效果最好, AUC 为 0.754, 敏感性为 68.75%, 特异性为 77.27%。

结论 APTWI 联合 IVIM 可用于 CSCC 的诊断, 提供准确的定量信息。与 IVIM 相比, APTWI 在鉴别 CSCC 病理分化程度方面具有更高的诊断效能。APTWI 联合 IVIM 比单独使用 APTWI、IVIM 鉴别 CSCC 病理分化程度具有更高的诊断效能。

PO-3055

颅内动脉粥样硬化性闭塞持续时间分析及对非急性再通价值

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目的: 对非急性颅内大血管闭塞的再通治疗可以改善患者预后, 且随着闭塞时间延长导致再通率下降, 但传统影像学术前对闭塞时间的判断较困难。因此, 利用高分辨血管壁成像 (HR-VWI) 分析颅内大血管闭塞不同时期的影像学特征, 探究闭塞血管随时间进展而产生的病理生理变化规律, 并根据其具体特性选择适合再通的非急性大血管闭塞类型。

方法：我们连续性回顾收集了病史明确的颅内大血管闭塞患者 218 例。按闭塞时间将上述数据分为急性期 77 例 (<3 天)、亚急性期 69 例 (3 天~3 周) 和慢性期 72 例 (>3 周) 大血管闭塞。分析其传统特征和直方图特征。比较急性期闭塞、亚急性期闭塞和慢性期闭塞患者的影像学差异，寻找闭塞血管随时间进展的生物学特性变化规律，进一步针对非急性大血管闭塞，采用多变量 Logistic 回归分析寻找适合再通治疗的闭塞类型特征。对部分接受血管内治疗的闭塞患者的再通成功率和手术细节进行了评估。

结果：本研究发现闭塞血管的平扫强度、出血信号、平均管径、强化指数及变异系数表现出随时间进展的一系列变化。针对非急性期大血管闭塞，利用血管壁特征的多因素 logistic 回归分析显示，平扫强度 (OR, 4.02 [95% CI, 2.10–7.69]; $p<0.001$)、强化指数 (OR, 2.02 [95% CI, 1.44–2.83]; $p<0.001$)、平均管径 (OR, 1.70 [95% CI, 1.21–2.38]; $p=0.002$) 和平扫偏度 (OR, 4.91 [95% CI, 1.02–23.58]; $p=0.047$) 是区分闭塞持续时间的 4 个显著特征，结合这 4 个特征的曲线下面积达 0.97，敏感性和特异性分别为 86.96% 和 100%。82.2% (45/54) 的患者 (亚急性 21/24, 87.5%; 慢性 16/21, 76.2%) 成功再通，并且慢性闭塞患者更多的使用了支架置入再通 ($p < 0.05$)。

结论：利用 HR-VWI 分析颅内大血管闭塞，发现不同闭塞持续时间的传统和直方图特征存在差异，阐明闭塞血管生物学特性随时间变化规律，通过有效鉴别大血管闭塞时间，为筛选适合血管内治疗再通的非急性大血管闭塞提供有效工具。

PO-3056

震颤型帕金森病的脑灰质体积及密度变化： 一项基于 VBM 的研究

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目的：采用基于体素的形态学测量 (VBM) 方法观察震颤型帕金森病患者脑灰质体积及密度的改变。

方法：纳入 34 例震颤型帕金森病患者 (患者组) 及与之相匹配的 34 名健康被试者 (正常对照组)，采用三维加权 T1 成像方式获取磁共振图像，并使用 VBM 的分析方法观察组间灰质体积与密度的差异及其临床意义。**结果：**与正常对照组相比，患者组右侧额上回灰质体积缩小，左侧中央前回、左侧中央后回、右侧中央前回、右侧中央后回灰质体积增加 (簇水平 P 均 <0.05 , FDR 校正)；与正常对照组相比，TD 组右侧岛叶、额上回、额下回及额上回灰质密度减低，左侧中央前回灰质密度增加 (簇水平 P 均 <0.05 , FDR 校正)；偏相关分析 (控制年龄、性别及教育程度) 显示，UPDRS 第三部分评分 ($r=-0.511, p=0.003$)、UPDRS 总分 ($r=-0.377, p=0.036$)、UPDRS 震颤得分 ($r=-0.363, p=0.045$) 及 H-Y 分期 ($r=-0.491, p=0.005$) 与右侧岛叶、右侧额上回、右侧额上回的灰质密度差异具有统计学意义。**结论：**震颤型帕金森病患者 TD 患者的额叶、额叶、顶叶及岛叶灰质体积及密度均有改变，值得注意的是右侧额上回、左侧中央前回可能与 TD 的病理生理机制密切相关，大脑皮层路易体最早出现于额叶皮层，有研究显示未经治疗的 PD 患者右侧额叶灰质体积减少，与我们右侧额上回灰质体积减少的结果一致，支持了 TD 亚型可能是 PD 患者早期表现的观点，灰质与震颤的严重程度呈负相关提示可能与震颤的发生密切相关，中央前回位于额叶区，既参与躯体运动，又与认知和学习活动相关，我们推测左侧中央前回灰质体积及密度的增加与疾病早期代偿相关。

PO-3057

锰掺杂超细氧化铁磁共振成像信号特点的对比研究

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目的: 通过掺杂不同锰含量的超小超顺磁性氧化铁 (ultra-small Superparamagnetic Iron Oxide, USPIO) 进行特定序列的磁共振成像 (MRI) 扫描, 对比分析不同材料的 MRI 信号特点及其区别, 探寻简单高效的 MRI 造影剂。

方法: 合成不同锰含量的超细氧化铁材料, 在磷酸盐缓冲液 (PBS) 稀释剂中配成浓度均一的溶液, 在 7T 磁共振仪器中进行 T1 和 T2 扫描分析, 观察不同锰含量的超细氧化铁材料显示出的信号变化强弱规律, 绘制含量-信号强度曲线, 分析锰含量的变化对超细氧化铁磁共振成像的影响。

结果: 在同种浓度条件下, 随着锰含量的变化, T1 和 T2 信号变化显示出一定的规律性, 且弛豫时间 R1 和 R2 呈现出相反的变化规律。同时, 在相同的锰含量时, 随着材料浓度的变化, T1 和 T2 信号强度先增强随后逐渐降低, 而弛豫时间 R1 和 R2 并没有明显的变化, 显示出材料浓度对 MRI 有一定的相关性。

结论: 在超细氧化铁中掺杂一定含量的锰金属, 能够调节弛豫时间 R1 和 R2 的相对值, 进而调控 T1 和 T2 的信号强度, 实现高效的磁共振成像诊断。

PO-3058

ALL 儿童鞘内预防性化疗后脑改变的 VBM 研究

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摘要:

目的: 探索急性淋巴细胞白血病 (acute lymphoblastic leukemia, ALL) 儿童中枢神经系统鞘内预防性化疗后脑灰质体积及白质体积的变化, 为预防性化疗引发的脑损伤提供理论依据。

方法: 收集 34 例 ALL 病例组患儿以及 34 例性别、年龄与 ALL 组相匹配的对照 (normal control, NC) 儿童的临床资料及磁共振图像, ALL 组磁共振检查均在鞘内预防性化疗后 6 个月以内完成。使用基于体素的形态学测量分析 (voxel-morphometry, VBM), 计算出全脑体积、83 个脑区相对灰质体积及相对白质体积。对 ALL 组及 NC 组儿童全脑体积、相对灰质体积及相对白质体积进行组间比较, 符合正态分布行配对样本 T 检验, 否则行 Wilcoxon 符号秩和检验。

结果: ALL 组与 NC 组儿童相比, 全脑体积无明显差异, 但存在相对灰质体积、相对白质体积改变的差异脑区, 且表现为 ALL 组患儿相应区域体积缩小。

结论: 急性淋巴细胞白血病儿童中枢神经系统鞘内预防性化疗会对部分脑区的灰质、白质体积产生影响, 这可能是脑损伤的结构基础。

PO-3059

腹侧额叶和枕叶之间的功能连接可能是带状疱疹患者的有效神经影像标记物

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目的：本研究旨在比较带状疱疹（HZ）患者和带状疱疹后神经痛（PHN）患者的全脑网络，并探讨全脑网络变化与疼痛强度之间的关联以及对不同类型带状疱疹疼痛进行分类的准确性。

方法：纳入的 PHN 患者（50 人）、HZ 患者（50 人）和健康对照组（50 人）接受了静息状态功能磁共振成像（rs-fMRI）检查。采用 Dosenbach-160 图谱计算功能连接性和全局及局部图论指标。神经影像指标与临床量表之间的联系通过相关性分析评估。使用 ROC 曲线评估使用特定神经影像指标对 PHN 和 HZ 患者分类的可行性。

结果：(1) HZ 组的默认模式、额顶叶、丘脑、感觉运动、枕叶网络（ON）和小脑的功能连接更高（ $p < 0.001$ ）。(2) HZ 患者的全局效率高于 PHN 和 HC 患者（ $t = 2.178$, $p = 0.038$ ）。(3) 多元线性回归分析表明，腹侧额叶皮层和枕回之间的功能连接可能是带状疱疹患者疼痛强度的一个影响因素（ $\beta = 4.273$; $p = 0.004$ ）。

结论：腹侧额叶和枕回之间的功能连接性变化可能是一个强有力的从 HZ 向 PHN 过渡的神经影像标记物。

PO-3060

不同解剖分区前列腺癌的 fMRI 定量比较研究

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目的：在功能水平上，通过 fMRI 定量参数对不同解剖分区前列腺癌(PCa)的深层生物学信息进行定量分析。

方法：前瞻性分析经病理确诊为 PCa 的 44 例患者，共计 50 个病灶，按照不同解剖分区分为移行区组（22 个）和外周区组（28 个）。患者均接受扩散加权成像 DWI、体素内不相干运动弥散加权成像 IVIM、扩散峰度成像 DKI、酰胺质子转移加权成像 APT 和动态对比增强 DCE-MRI 检查，并计算相应的表观扩散系数 ADC、真性扩散系数 D、假性扩散系数 D*、灌注系数 f、扩散峰度系数 Kapp、扩散系数 Dapp、APTmean、对比剂容积转换常数 Ktrans、血浆体积分数 Vp、达峰时间 TTP、流入速率 WI 和流出速率 WO 等 22 个定量功能参数。采用非参数检验分析 2 组之间 fMRI 定量功能参数的差异性，以探索不同解剖分区前列腺癌的深层生物学信息。

结果：组间比较结果显示移行区组 PCa 的 WI(131.77±17.08)、WO(15.75±2.1)、Vp(167.4±46.35)高于外周区组 PCa 的 WI(84.82±8.82)、WO(7.78±2.14)、Vp(52.74±35.7)，差异均具有统计学意义($P < 0.05$)；移行区组 PCa 的 ADC 值亦高于外周区组 PCa，但差异无统计学意义。

结论：不同解剖分区 PCa 的生物学信息不同，移行区 PCa 的毛细血管密度、通透性及血容量更高，对不同解剖分区前列腺癌的定量 fMRI 分析有助于揭示深层生物学信息，从而进一步分层分诊，采取针对性治疗措施。

PO-3061

原发性失眠患者大脑静息态低频振荡振幅百分比和功能连接变化

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目的低频振荡振幅百分比 (percent amplitude of fluctuation, perAF) 联合功能连接探讨原发性失眠患者脑功能及脑网络改变。

方法对 51 名原发性失眠患者和 46 名健康对照者进行静息态功能磁共振扫描, 对两组间的 perAF 值以及 perAF 值差异脑区的功能连接进行比较。采用 Pearson 相关分析探讨原发性失眠患者 perAF 值的变化与失眠时长、匹兹堡睡眠质量指数得分 (Pittsburgh sleep quality index, PSQI)、蒙特利尔认知评估量表得分 (Montreal cognitive assessment, MoCA) 的相关性。

结果与健康对照组相比, 原发性失眠组在前额叶 (-42 9 45) 的 perAF 值增加, 而在海马旁回 (27 -12 -27) 的 perAF 值减低。在功能连接方面, 与健康对照组相比, 原发性失眠组右海马旁回与左枕叶功能连接增强, 而与左侧颞中回和颞下回功能连接减弱。海马旁回的 perAF 值升高与 MoCA 量表得分正相关 ($r = 0.428, P = 0.002$)。

结论原发性失眠患者的静息态脑功能局部活动强度改变, 表现为海马旁回和前额叶 perAF 值的改变, 且海马旁回与颞下回功能连接减弱, 可能是原发性失眠患者认知功能、学习记忆能力降低的机制。

PO-3062

多模态 MRI 数据鉴别多发性硬化及视神经脊髓炎谱系疾病的机器学习分析

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目的: 本研究目的是探讨机器学习联合多模态磁共振成像特征在识别多发性硬化 (multiple sclerosis, MS) 与视神经脊髓炎谱系疾病 (neuromyelitis optica spectrum disorders, NMOSD) 患者中的价值。

方法: 本研究共纳入 MS 患者 58 例和 NMOSD 患者 36 例。被试者接受中文版听觉数字连续加法测试量表、扩展残疾状态量表、修订疲劳影响尺度量表评估以及磁共振数据扫描, 并记录患者病程。经数据预处理后, 基于自动解剖标记脑图谱再分别计算两组被试的 116 个脑区的结构及功能指标包括功能连接 (functional connectivity, FC)、低频振幅 (amplitude of low frequency fluctuation, ALFF)、局部一致性 (regional homogeneity, ReHo) 及灰质体积 (gray matter volume, GMV), 并提取每个脑区相应的值作为特征。然后分别利用所选择的四种特征的不同组合构建分类器。随后执行去除高成对相关性 (阈值为 0.65) 及最小绝对收缩选择算子 (Least Absolute Shrinkage and Selection Operator, LASSO) 回归筛选最具判别性的特征。最后构建支持向量机 (support vector machine, SVM) 以及逻辑回归 (Logistic Regression, LR) 分类模型来区分 MS 和 NMOSD 患者。比较不同组合在两种分类器的结果。

结果: MS 组与 NMOSD 组之间经特征筛选后最终得到了 31 个 FC、9 个 ALFF、14 个 ReHo 及 5 个 GMV 共 59 个特征 (主要分布在大脑默认网络区域、小脑区域及皮质下相关脑区), FC、ALFF、GMV 联合构建的 SVM 以及 LR 分类器对 MS 和 NMOSD 患者的鉴别效果最佳 (SVM: AUC=0.976; LR: AUC=0.940)。

结论: 本研究利用机器学习构建了多模态多层次 MRI 影像特征的 SVM 以及 LR 分类器, 能有效区分 MS 和 NMOSD 患者, 为临床早期鉴别、制订早期干预提供了影像学依据。

PO-3063

基于脑肠轴探究功能性消化不良患者脑网络的拓扑改变

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研究目的:

功能性消化不良(FD)是一种肠脑相互作用障碍疾病。先前的研究表明,功能性脑活动和连接模式在FD中存在广泛的异常。尽管FD的确切病理生理学变化仍有待阐明,但胃肠道运动异常和内脏高敏感被认为是症状发生的重要因素,目前普遍认为该疾病是一种由社会心理因素驱动的脑-肠轴紊乱,其中应激起着重要作用。本研究旨在使用图论法探究FD患者的大脑网络拓扑改变以及其与细胞因子水平、消化道症状、焦虑及抑郁间的相关性。

研究方法:

基于功能磁共振成像,通过图论分析,比较了30例FD患者和30例HC的小世界属性、网络效率、节点中心性及全脑功能连接组在整体和节点水平上的拓扑特性;此外,对同一批FD患者及健康对照抽取血液进行细胞因子TNF- α 、IL-1 β 、IL-10及IL-6的测量。Pearson相关评估各拓扑特性与临床症状、细胞因子水平、焦虑及抑郁的关系。

研究结果:

FD患者全脑功能网络的小世界属性、聚类系数、全局效率及局部效率均显著高于对照组,左侧额下回眶部、右侧杏仁核、右侧丘脑、左侧额下回、双侧颞上回及左侧角回的节点中心性升高,其中杏仁核的节点中心性与FD患者的症状严重程度显著相关($r=0.629$, $p<0.001$)。双侧楔前叶、右侧额上回、左侧海马、右侧颞中回及右侧中央前回的节点中心性降低。FD患者脑网络功能连接较HC显著减低(包含39个节点及69条连边),这些节点主要包含于默认模式网络、突显网络及感觉运动网络。较HC,FD组的TNF- α 水平明显增高(213.96 ± 24.65 vs 165.35 ± 36.48 , $p<0.05$),且TNF- α 水平与杏仁核的节点中心性及FD患者的症状严重程度相关。

研究结论:

本研究揭示了FD患者的异常节点中心性和功能连接降低主要位于默认模式网络、突显网络及感觉运动网络。此外,FD患者的细胞因子TNF- α 水平明显增高,破坏的拓扑属性、细胞因子水平及临床变量间显示出一定的相关性。这些发现将有助于增强我们对FD中枢病理生理的认识。

PO-3064

DCE-MRI 联合 Micro-CT 评价四氧嘧啶诱导兔糖尿病合并肢体缺血骨髓内皮祖细胞功能和骨微结构改变

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目的 采用动态对比增强磁共振成像(DCE-MRI)、微计算机断层扫描(Micro-CT)研究兔糖尿病合并肢体缺血后骨微结构改变及骨髓内皮祖细胞功能改变 **材料与方法** 30只健康雄性新西兰大白兔随机分为实验组($n=20$)和对照组(Control, $n=10$),实验组采用四氧嘧啶注射进行造模,造模成功后4周再将实验组兔随机分为单纯糖尿病组(DM, $n=10$)、糖尿病合并肢体缺血组(DM+CLI, $n=10$),糖尿病肢体缺血组进行右侧股动脉结扎(DSA造影证实)建立肢体缺血模型,在0周、4周、8周、12周及16周分别对三组兔行股骨近端冠状面FSE-T1WI、FSE-T2WI和DCE-MRI检查,采用Extended Tofts Linear双室模型获得股骨近端的DCE-MRI定量参数值,包括容量转移常数(K^{trans})、速率常数(k_{ep})和容积分数(V_e),在第16周完成检查后,抗凝抽取外周静脉血

10ml, 然后将兔处死, 提取骨髓样本, 进行骨髓和外周血内皮祖细胞计数及外周血内皮祖细胞功能检查, 同时取股骨上段标本行 Micro-CT 扫描, 计算骨髓骨小梁形态计量参数 **结果:** 糖尿病合并肢体缺血组在造模成功后 K^{trans} 值明显降低, 8 周时显著升高, 糖尿病组 K^{trans} 值在 12 周时显著升高, 两组 K_{ep} 值在 16 周时开始显著升高, V_e 值在各时间点差异无统计学意义, 对照组渗透性参数值在各时间点差异不具有统计学意义。16 周时, 糖尿病肢体缺血组和单纯糖尿病组骨髓和循环 CD34+EPCs 计数及循环 EPCs 功能相比于对照组, 都有不同程度减低, 差异有统计学意义, Micro-CT 显示糖尿病肢体缺血组和单纯糖尿病组的骨小梁参数骨小梁数 (Tb.N)、骨体积 (BV)、体积比 (BV/TV)、骨矿物质密度 (BMD) 均较对照组减低 骨髓 CD34+EPC 计数与 K^{trans} 、 K_{ep} 呈负相关, 与 Tb.N、MVD 呈正相关 **结论:** DCE-MRI 联合 Micro-CT 定量参数可用于评价糖尿病合并严重肢体缺血的骨髓微结构改变及骨髓内皮祖细胞功能改变

PO-3065

基于深度学习技术的脊柱磁共振图像生成算法的临床验证研究

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目的 观察基于深度学习技术生成的脊柱 STIR 磁共振图像 (MRI) 在临床诊断上的价值。

方法 该研究回顾性地收集 100 例脊柱检查患者的 MRI 序列, 其中颈椎 22 例、胸椎 33 例、腰椎 45 例; 磁场强度包含 1.5T42 例、3.0T58 例; 每一例患者均包含矢状位 T1、矢状位 T2 和矢状位 STIR。通常矢状位的 STIR 序列扫描时间长, 且图像质量不高, 信噪比偏低。本研究致力于用基于深度学习技术的图像生成算法从矢状位 T1 和矢状位 T2 序列生成矢状位 STIR 序列, 从而减少 STIR 序列实际扫描的时间, 达到快速获得所需完整诊断序列的目标。实验中对生成 STIR 图像和真实采集的 STIR 图像, 从定量和定性两方面指标评价生成图像的质量, 定量方面: 采用信噪比 (SNR) 和对比度噪声比 (CNR) 进行客观图像质量评价; 定性方面: 由一名具有 5 年 MRI 工作经验的主管技师和一名具有 8 年 MRI 诊断经验的主治医师分别从伪影程度、噪声程度、边缘锐利度、结构对比度和诊断置信度五个方面, 采用李克特量表 (Likert scale) 以双盲法进行主观图像质量评价。同时也采用平均绝对误差 (MAE)、峰值信噪比 (PSNR)、结构相似度 (SSIM) 和相关系数 (COR) 分析深度学习生成图像和真实采集图像的相关性; 选取椎体、椎间盘、脑脊液、脊髓和脂肪五个组织的感兴趣区域 (ROI), 使用 Bland-Altman 图分析生成图像和真实图像的一致性。

结果 对于颈椎、胸椎和腰椎三个部位, 生成图像的主观和客观图像质量评分均高于真实采集的 STIR 图像 ($P < 0.05$)。在 1.5T 的图像上, 生成图像的优势更为明显, 评分结果明显优于对应真实采集的 STIR 图像, 图像质量达到类 3.0T 的效果。生成图像和真实图像的相关性较高 ($MAE = 0.027 \pm 0.009$, $PSNR = 26.326 \pm 3.490 \text{ db}$, $SSIM = 0.755 \pm 0.070$, $COR = 0.893 \pm 0.076$)。

Bland-Altman 图分析结果表明生成图像和真实图像具有较好的一致性。

结论 基于深度学习技术生成的脊柱 MR 图像能够用于诊断, 在提供更高图像质量的同时节省扫描时间, 具有用于临床实践的价值。

PO-3066

睡眠碎片化与左心室结构功能的线性关系：The Multi-Ethnic Study of Atherosclerosis(MESA)

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目的：利用动脉粥样硬化多种族研究(MESA)队列收集的数据，以一个种族多样化社区人群为研究对象，研究睡眠碎片化参数(包括 Arl 、 SE 和 $WASO$)与左心室结构功能之间的关系。

方法：我们纳入了 MESA 中拥有完整多导睡眠图数据和心脏磁共振检查的 1404 名参与者，利用多导睡眠图评估碎片化睡眠参数，包括总睡眠中的唤醒指数(Arl -total)、睡眠效率(SE)和入睡后醒来(wake after sleep onset, $WASO$)等。左心室结构功能采用心脏磁共振测量。我们采用线性回归分析睡眠碎片化参数与左心室质量身高比值(left ventricular mass indexed for height, $LVHi$)的关系。

结果：单变量线性回归分析， $WASO$ (β 0.134;95%CI 0.023,0.052; $P < 0.0001$)、 Arl -total(β 0.184;95%CI 0.203,0.362; $P < 0.0001$)、 Arl -REM(β 0.116;95%CI 0.100,0.260; $P < 0.0001$)、 Arl -NREM(β 0.175;95%CI 0.176,0.323; $P < 0.0001$)与 $LVHi$ 正相关。校正年龄、性别、种族、饮酒、腰围、使用抗高血压药和糖尿病后采用多变量线性回归分析，确定 $WASO$ 与 $LVHi$ 之间仍有相关性。 $WASO$ (β 0.045;95%CI 0.001,0.024; $P=0.033$)与 $LVHi$ 正相关。在女性分组中， $WASO$ (β 0.089;95%CI 0.006,0.034; $P=0.006$)与 $LVHi$ 增加显著相关，而在男性分组中则无此相关性。

结论：一个种族多样化的队列研究中，校正可能的混杂因素后， $WASO$ 水平与左心室质量增加显著相关，这种相关性表现在女性人群中。

PO-3067

脑室旁白质高信号独立于脑萎缩加重 T2DM 认知功能下降

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目的 本研究拟通过分析 2 型糖尿病(T2DM)患者脑白质高信号(WMH)、脑容积和认知功能之间的关系，探讨 WMH 是否独立于脑萎缩加重 T2DM 患者认知功能障碍。

方法 连续性收集陕西省人民医院内分泌科就诊的 T2DM 患者 42 例，其中 T2DM 患者认知受损组 22 例，T2DM 患者认知正常组 20 例，所有患者接受头颅 MRI 扫描和系列认知功能评价量表检查，包括蒙特利尔认知评估量表(MoCA)、符号数字转换测试(SDMT)、连线测试 A(TMT-A)、连线测试 B(TMT-B)。采用 VBM 分析计算获得每个被试的全脑容积、灰质容积(GM)、白质容积(WM)，采用计算机自动分割算法获得全脑 WMH 容积、脑室旁 WMH 容积和深部 WMH 容积，对上述容积参量进行标准化以避免头颅大小引起的个体差异。比较 T2DM 认知正常组和认知受损组脑容积、WMH 容积和认知功能评分的差异。采用多元线性回归分析评价认知功能评分与脑容积和 WMH 容积的相关性。

结果 相比于 T2DM 认知正常组，T2DM 认知受损组的 MoCA 评分和 SDMT 评分显著降低($P < 0.05$)，其余参数在两组间未见明显差异。相关性分析显示 MoCA 评分与脑室旁 WMH 容积($r = -0.328$, $P = 0.034$)呈负相关，SDMT 评分与总 WMH 容积($r = -0.470$, $P = 0.002$)、脑室旁 WMH 容积($r = -0.532$, $P = 0.000$)呈负相关。多元线性回归调整混杂因素后，MoCA 评分与脑室旁 WMH 容积($\beta = -0.567$, $P = 0.007$)独立相关，SDMT 与脑室旁 WMH 容积($\beta = -0.474$, $P = 0.014$)独立相关，而 MoCA 评分和 SDMT 评分与灰质及白质容积均未见相关性。

结论 脑室旁 WMH 可能独立于脑萎缩加重 T2DM 整体认知功能和信息处理速度能力下降,有望作为预测 T2DM 认知功能受损更敏感的影像学标志物。

PO-3068

DWI 梯度非线性误差校准在胰腺疾病中的应用价值研究

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目的: 扩散加权成像 (DWI) 定量分析中梯度非线性误差高达 20%, 本研究目的是探究梯度非线性误差校准的表观扩散系数 (ADC) 用于胰腺疾病诊断的价值。

材料和方法: 本研究共纳入正常胰腺 25 例及胰腺疾病患者 126 例, 胰腺疾病包括术后病理证实的胰腺导管腺癌 60 例、慢性胰腺炎 27 例、自身免疫性胰腺炎 8 例和神经内分泌肿瘤 31 例。DWI 扫描参数包括 2 个 b 值 (50 和 800 s/mm²), 用于采集 DWI 图像分析中梯度非线性校准 ADC 的工具为实验室自主开发的校准软件。用感兴趣法测量校准前后相同位置处正常胰腺组织和病灶组织的 ADC 最小值、最大值和均值。配对样本 t 检验及 Wilcoxon 检验用于测量值的统计学分析。

结果: 正常胰腺组织或胰腺病变组织的校准后的 ADC 值和校准前 ADC 值 (包含均值、最小值和最大值) 相比, 差异均具有统计学意义 (P<0.01)。正常胰腺组织校准前后 ADC 均值分别为 $1.126 \times 10^{-3} \text{ mm}^2/\text{s}$ 及 $1.117 \times 10^{-3} \text{ mm}^2/\text{s}$; 胰腺导管腺癌校准前后 ADC 均值分别为 $1.127 \times 10^{-3} \text{ mm}^2/\text{s}$ 及 $1.118 \times 10^{-3} \text{ mm}^2/\text{s}$; 慢性胰腺炎组织校准前后 ADC 均值分别为 $1.025 \times 10^{-3} \text{ mm}^2/\text{s}$ 及 $0.984 \times 10^{-3} \text{ mm}^2/\text{s}$; 自身免疫性胰腺炎组织慢性胰腺炎组织校准前后 ADC 均值分别为 $0.990 \times 10^{-3} \text{ mm}^2/\text{s}$ 及 $0.980 \times 10^{-3} \text{ mm}^2/\text{s}$; 神经内分泌肿瘤组织校准前后 ADC 均值分别为 $1.009 \times 10^{-3} \text{ mm}^2/\text{s}$ 及 $1.0 \times 10^{-3} \text{ mm}^2/\text{s}$ 。

结论: ADC 梯度非线性误差校准后, 正常胰腺及肿瘤 ADC 最小值、最大值和均值皆显著减小;校准后的 ADC 用于鉴别不同类型胰腺疾病的显著性水平提升。

PO-3069

基于 rs-fMRI 探索机器学习算法对间歇性外斜视儿童患者脑改变分类识别效果的研究

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目的 调研常见机器学习方法结合静息态脑功能参数在识别间歇性外斜视儿童静息态脑功能改变的效果。方法 本研究收集了 41 名间歇性外斜视儿童患者和 36 名健康对照儿童的 rs-fMRI 数据, 计算了基于 rs-fMRI 的 Reho、ALFF、慢 4 和慢 5 波段 fALFF 等参数。将 HCP 脑图谱的 360 个脑区作为 ROI, 提取了每个 ROI 内参数图中的平均值作为脑功能特征。数据集被随机分为训练集(70%)和测试集(30%)两组。采用 Pearson 相关系数(PCC)方法进行降维, 采用 ANOVA、KW、RFE 和 Relief 方法进行特征选择, 使用 SVM、LDA、随机森林、逻辑回归等机器学习算法进行分类, 采用 10 折交叉验证评估结果。结果 比较了所有模型的 AUC, 将训练/测试/验证数据集 AUC≥0.75, 准确度 Acc≥0.75, 特征<10 个作为筛选模型的标准。对于慢 5 波段 fALFF 值, 使用 PCC 降维、ANOVA 特征选择、LR 分类器使用 5 个脑区的数值作为特征获得了曲线下最大面积 (AUC), 这些脑区为 Area_PGs_R、Area_6m_anterior_R、Area_posterior_9-46v_L、Area_2_R 等, 其训练/

验证/测试数据集的 AUCs 为 0.957/0.804/0.818, 准确度为 0.759。对于 Reho 值, 使用 PCC 降维、RFE 特征选择、GP 分类器使用 3 个脑区的数值作为特征获得了曲线下最大面积 (AUC), 这些脑区为 Medial_Superior_Temporal_Area_L、Anterior_Ventral_Insular_Area_R、Parieto-Occipital_Sulcus_Area_2_L, 其训练/验证/测试数据集的 AUCs 为 0.879/0.754/0.750, 准确度为 0.759。**结论** 间歇性外斜视儿童患者在视觉及眼动相关脑区出现异常的内在脑活动。基于慢 5 波段 fALFF 值作为特征, 采用 PCC 降维、ANOVA 特征选择、结合 LR 分类器算法是最佳机器学习模型, 这意味着慢 5 波段 fALFF 值结合机器学习算法在识别间外儿童脑功能改变方面具有较好的潜力。

PO-3070

压缩感知技术在颈静脉成像中的应用

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目的: 探索压缩感知技术 (Compressed Sensing, CS) 的不同加速因子在颈静脉成像中的应用价值。

方法: 招募 10 名健康志愿者 (男 6 名, 女 4 名, 平均年龄 35 岁)。采用 3.0T MR 行颈静脉成像, 所有患者均扫描非对比增强磁共振血管成像 REACT 序列 (Relaxation Enhanced Angiography without Contrast and Triggering), 设置并行成像 (Parallel Imaging, PI) 和 CS 不同加速因子对比, 包括 PI 2, CS 2, CS 4, CS 6 和 CS 8, 扫描时间分别为 291s, 352s, 175s, 120s 和 89s。由两名观察者采用双盲法分别对图像进行客观评价, ROI 放置位置包括双侧颈内静脉和胸锁乳突肌, 每个部位分别放置 3 个 ROI, 测量各 ROI 的信号强度及其标准差, 并计算相应的信噪比 (SNR) 和对比噪声比 (CNR)。由两名观察者通过 5 组 MIP 图像进行主观评分, 依据头臂静脉、颈内静脉和锁骨下静脉的显示、图像伪影以及噪声, 3 分好, 1 分差。采用 Wilcoxon 检验分析不同加速因子下两侧颈内静脉图像 SNR 和 CNR 的差异。若没有统计学差异, 选择右侧数据进行后续分析。采用 Kruskal-Wallis 检验比较五组图像间 SNR、CNR 和主观评分的差异。若差异具有统计学意义, 进行后续两两比较。

结果: 各组间 SNR 和 CNR 的差异无统计学意义 ($P > 0.05$)。各组间主观评分差异具有统计学意义 ($P < 0.05$)。两两比较结果显示, PI 2 组与 CS 2/4/6 组主观评分无显著差异 ($P > 0.05$), PI 2 组与 PI 8 组主观评分具有统计学差异 ($P < 0.05$)。

结论: 临床扫描中, 综合考虑扫描时间和图像质量, 颈静脉 REACT 序列推荐选择 CS 6 的加速因子, 较常规并行采集节省 59% 的扫描时间。

PO-3071

MOGAD 和 AQP4+ NMOSD 颅内病变分布概率与神经递质分布的关联研究

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目的: 通过 MRI 数据分析, 定量描述和比较 MOGAD 和 AQP4+ NMOSD 患者的颅内病变分布, 探讨其与神经递质系统的关联。

方法: 选取中国医科大学附属第一医院 72 例 AQP4-ab 阳性患者 100 次扫描及 31 例 MOG-ab 阳性患者 40 次扫描, 在轴位 T2 FLAIR 序列上自动分割两组疾病颅内病灶, 通过空间标准化, 建立各组病变概率分布图。对两种病变分布进行脑叶水平及体素水平定量比较, $p < 0.005$ 有统计学意义,

进而使用 MATLAB 中 JuSpace 工具箱对 MOGAD 和 AQP4+NMOSD 的颅内病灶神经递质受体的频率和核成像分布数据进行空间相关性分析。

结果：MOGAD 和 AQP4+ NMOSD 患者的脑内病变分布频率图显示，有统计学意义的差异区域在中央前回、楔前叶皮质、侧脑室前后角旁白质、扣带中回、额叶中部、颞中回、上枕叶、壳核、舌回、海马、颞极、脑桥及小脑脚。与 AQP4+ NMOSD 相比，MOGAD 中颅内病灶的分布模式与 5HT1a 受体分布显示出显著空间正相关性（ $R=0.2473$ ， $p<0.001$ ），与所研究其他神经递质没有显著空间正相关性。

讨论：MOGAD 与 AQP4+ NMOSD 颅内病灶空间分布模式不同。MOGAD 患者颅内病变范围较大、分布集中，在本研究中，与 AQP4+NMOSD 相比，EDSS 评分显著较低的 MOGAD 患者中，颅内病变的分布模式显示出与 5HT1a 受体分布存在显著空间对应关系。这些结果可以更好的帮助临床医生在诊断时区分 MOGAD 与 AQP4+ NMOSD。

PO-3072

基于心脏磁共振和机器学习建立肥厚型心肌病不良预后风险评估模型

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目的：肥厚型心肌病（HCM）是一种常见的遗传性心脏病，以心室壁增厚和舒张功能不全为特征，可导致心律失常、心力衰竭和猝死等不良预后。目前，评估 HCM 患者不良预后的风险的主要方法是基于临床和超声心动图参数的 HCM Risk-SCD 模型，但该模型存在一定的局限性，如不适用于 16 岁以下人群，不能反映心肌纤维化的程度和分布等。因此，本研究旨在基于机器学习和心脏磁共振（CMR）建立一种新的预测模型，以提高 HCM 患者不良预后的评估精度。

方法：研究队列是于 2012 年 1 月至 2021 年 12 月在南昌大学第二附属医院进行心脏磁共振检查的 225 例 HCM 患者。本研究采用逻辑回归（LR）、支持向量机（SVM）、随机森林（RF）以及神经网络（NN）四种机器学习方法，利用 CMR 中钆对比剂延迟强化（LGE）的分布和数量、左室射血分数、左房直径、左室质量指数等参数，在研究队列中进行了训练和验证，构建了多个预测模型。主要终点为接受植入式心律转复除颤器治疗、持续性室性心动过速、复苏性心脏骤停和猝死。

结果：在本研究纳入的 225 例 HCM 患者中，其中发生终点事件 82 例（36%），预后良好组 143 例（64%）。两组患者在基线特征上存在显著差异，如年龄、性别、LVEF、LGE 等（ $P<0.05$ ）。结果显示，所有机器学习方法均优于 HCM Risk-SCD 模型，其中神经网络模型表现最佳，其 C-指数为 0.85，明显高于 HCM Risk-SCD 模型的 C-指数 0.72（ $P<0.001$ ）。神经网络模型还能够将 HCM 患者分为低、中、高风险三组，其 2 年猝死风险分别为 1.5%、6.2% 和 22.7%。此外，敏感性分析表明，神经网络模型对于不同亚组的患者均具有良好的预测能力。

结论：本研究首次基于机器学习和 CMR 建立了一种新的预测模型，能够有效评估 HCM 患者发生不良预后的风险，并提供个体化的风险分层。该模型有望为临床决策提供有价值的参考，改善 HCM 患者的预后。

PO-3073

前列腺癌分区异质性生境成像研究

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目的：通过 Mp-MRI 生境成像量化和可视化 PCa 分区异质性，为进一步分层分诊并采取针对性治疗提供依据。

方法：前瞻性纳入 27 例经病理确诊的前列腺癌(PCa)患者，依据高清解剖相 T2WI 分为移行区前列腺癌(TZ PCa)12 例和外周区前列腺癌(PZ PCa)15 例。每位患者均接受 Mp-MRI 检查包括平扫、DWI、DKI 和 DCE-MRI，计算病灶每一体素 ADC、Ktrans 和 Kapp 值作为定量影像学标志物，进行 K-means 聚类并结合欧氏距离度量，最终划分为 4 个生境亚区：富血供细胞异质性生境、乏血供多细胞异质性生境、富血供少细胞低异质性生境和坏死生境，并分析各生境亚区肿瘤占比差异。通过计算 Pearson 相关系数分析各生境亚区与临床 T 分期及相应区域 ISUP 分级的相关性。

结果：通过生境成像成分比例分析得出 TZ PCa 的富血供细胞异质性生境和富血供少细胞低异质性生境肿瘤占比分别为 0.24、0.39，高于 PZ PCa 分别为 0.12、0.16；而乏血供多细胞异质性生境在 PZ PCa 中占比极高 0.52，该生境与 ISUP \geq 2 的临床显著性前列腺癌(csPCa)具有较高的相关性 $r=0.86$ 。

结论：TZ PCa 的毛细血管密度、通透性及血容量更高，而 PZ PCa 具有更高的异质性表明其恶性程度更高，通过生境成像量化和可视化 PCa 分区异质性有望运用于靶向诊断、治疗，避免过度治疗和不必要的活检，同时为分层分诊并采取针对性治疗措施提供了潜在的价值。

PO-3074

超高 b 值 DWIb1000、DWIb2000 和 DWIb3000 在直肠癌 3TMRI：一项图像质量评估和影像组学特征的初步研究

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目的：评估 DWIb 值 1000、2000 和 3000 图像质量并优化其 b 值；进一步开发和验证基于 ADC 图、DWIb 值 1000、2000、3000 和多 b 值 DWI (DWIb 值 1000、2000、3000) 的影像组学模型，探索不同超高 b 值 DWI 直肠癌肿瘤区微观结构表征的影像组学特征差异，并预测直肠癌患者的术前淋巴结转移。

方法：回顾性研究西京医院经超高 b 值 DWI 的检查并术后病理证实为直肠癌的 199 例患者的影像资料。分别基于 5 分量表主观评价标准（肿瘤显著性，伪影水平，解剖一致性和整体图像质量）和客观评价（SNR、CNR、SIR 和 SI_{lesion} ）来评估三组图像质量，并使用组内相关系数(ICC)来评估观察者间的一致性。其次，将患者按 7:3 的比例分为训练队列（ $n=140$ ）和验证队列（ $n=59$ ），基于 ADC 图、DWIb 值 1000、2000、3000 和多 b 值 DWI 的完整肿瘤区中提取影像组学特征，并通过单变量秩和检验、Pearson 相关系数、LASSO 回归选择最优特征子集，并基于 logistic 回归建立五个影像组学模型。通过受试者工作特征（ROC）曲线、校准曲线和决策曲线分析评估五种影像组学模型的鉴别效能和临床实用性。

结果：随着 b 值的增加， SI_{lesion} 、SNR 值、伪影水平和解剖一致性逐渐降低。DWIb2000 的 CNR 值优于 DWIb1000 和 DWIb3000 ($P<0.001$)。DWIb2000 和 b1000 的整体图像质量评分无统计学差异 ($P=0.059$)。此外，基于 ADC 图、DWIb 值 1000、2000、3000 和多 b 值 DWI 的影像组学模型的验证组的 ROC 曲线下面积 (AUC) 分别为 0.650、0.706、0.744、0.709、0.751。基于

DWib2000 和多 b 值 DWI 的影像组学模型的 AUC 值高于常规 ADC 图。决策曲线分析表明, 基于超高 b 值 DWI 的影像组学模型比常规 ADC 图显示出更多的临床效益。

结论: 可推荐使用 DWib2000 来提高图像 CNR 值和肿瘤显著性。源于超高 b 值 DWI 的微观结构表征的影像组学特征是提高预测直肠癌淋巴结转移的重要补充策略。

PO-3075

基于集成机器学习方法结合术前颅脑磁共振影像学特征鉴别单发性脑转移瘤和多形性胶质母细胞瘤的研究

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目的: 本研究旨在利用集成机器学习方法, 结合术前临床及颅脑磁共振影像学 (magnetic resonance imaging, MRI) 特征, 鉴别单发性脑转移瘤 (brain metastasis, BM) 和多形性胶质母细胞瘤 (glioblastoma multiforme, GBM)。

方法: 本回顾性研究共纳入 491 例患者, 其中包括 233 例 BM 患者和 258 例 GBM 患者, 并以 5:2 的比例将其随机分配到训练集 (BM, n=166; GBM, n=184) 和验证集 (BM, n=67; GBM, n=74)。伦勃朗视觉感受图像 (VASARI) 特征集用于评估颅脑 MRI 特征。最终采用集成机器学习算法构建了一个包含 VASARI 特征和临床变量的鉴别模型, 并使用区分度 (Discrimination)、校准 (Calibration) 和临床实用性 (clinical usefulness) 评估其性能。

结果: BM 组年龄较 GBM 组大 ($P<0.001$)。BM 组的卡氏评分 (Karnofsky Performance Status, KPS) 和白细胞计数 [均值 \pm 标准差, 7.42 ± 2.87 VS 9.03 ± 4.43 , $P<0.001$] 与中性粒细胞计数 [5.24 ± 2.79 VS 6.68 ± 4.43 , $P<0.001$] 比值相对低于 GBM 组。BM 组较少出现囊肿或出血, 语言功能区受累较少。BM 组软脑膜受累、室管膜受累或皮质受累较少, 深部白质受累或颅骨重建比例较低。本研究建立的集成机器学习模型可以较好的鉴别 BM 患者和 GBM 患者, 在训练集中模型曲线下面积 (AUC) 为 98.74% (95%CI: 97.95- 99.38%) (灵敏度为 95.88%, 特异性为 94.83%), 在验证集中模型 AUC 为 98.13% [95%CI: 96.23- 99.51%] (灵敏度为 92.06%, 特异性为 97.62%)。决策曲线分析表明该模型具有良好的临床应用性。

结论: 本研究表明, 结合术前颅脑 MRI-VASARI 特征和临床指标构建的集成机器学习模型有望用于鉴别单发性脑转移瘤和多形性胶质母细胞瘤, 这将有助于脑肿瘤病人的个性化管理。

PO-3076

MINOCA 的影像学表现

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冠状动脉非阻塞性心肌梗死 (MINOCA) 是一种特殊类型的急性心肌梗死, 其发病机制和预后因素尚不明确, 临床上缺乏有效的诊断和风险评估工具。本文旨在综述 MINOCA 的影像学表现, 包括心脏磁共振 (CMR)、光学相干断层扫描 (OCT)、微血管功能评估和冠脉痉挛激发试验等。

CMR 是一种非侵入性的影像学技术, 可以提供心脏的解剖、功能、灌注和组织特征等信息, 帮助区分 MINOCA 的不同病因, 如心肌炎、Takotsubo 综合征、自发性冠脉夹层 (SCAD)、隐匿性斑块破裂或糜烂等。CMR 中钆对比剂延迟强化 (LGE) 可以反映心肌纤维化的程度和分布。LGE 在

MINOCA 患者中的检出率约为 30%-40%，与传统 AMI 患者相似。LGE 的形态和位置可以提示 MINOCA 的可能病因，如斑块破裂或糜烂通常表现为亚内膜或跨壁性 LGE。

OCT 可以提供冠脉内壁的高分辨率图像，帮助发现冠脉造影难以检测的细微病变，如斑块破裂或糜烂、SCAD、冠脉栓塞等。OCT 在 MINOCA 患者中的检出率约为 50%-60%，高于传统 AMI 患者。OCT 可以与 CMR 相互补充，提高 MINOCA 患者的诊断率。

微血管功能评估可以测量冠脉微循环的阻力和灌注，帮助诊断冠脉微血管疾病 (CMD)，CMD 是 MINOCA 的常见病因。微血管功能评估可以通过测量指数 (IMR)、分数流储备 (FFR) 或冠脉流储备 (CFR) 等参数来进行。微血管功能评估在 MINOCA 患者中的检出率约为 30%-40%，与传统 AMI 患者相似。微血管功能评估可以与 CMR 和 OCT 相互印证，提高 MINOCA 患者的风险分层。冠脉痉挛是 MINOCA 的常见病因。冠脉痉挛激发试验在 MINOCA 患者中的检出率约 30%-40%，高于传统 AMI 患者。冠脉痉挛激发试验可以与 CMR、OCT 和微血管功能评估相结合，提高 MINOCA 患者的诊治效果。

本文综述了 MINOCA 的影像学表现，包括 CMR、OCT、微血管功能评估和冠脉痉挛激发试验等。这些技术可以帮助明确 MINOCA 的不同病因，提供个体化的风险分层和治疗指导。因此，建议对 MINOCA 患者尽早进行多模态影像学检查，以指导临床决策和治疗。

PO-3077

关于青少年边缘型人格障碍的非自杀性自残行为和视觉工作记忆与脑白质微结构改变的关系的研究

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背景：非自杀性自伤行为 (non-suicide self-injurious behavior, NSSI) 是青少年边缘型人格障碍 (borderline personality disorder, BPD) 的核心特征之一，伴随的视觉工作记忆损害参与了该疾病的病理过程。然而，其潜在的机制在很大程度上是未知的。本研究旨在探讨 BPD 青少年患者脑白质微结构的改变及其与 NSSI 和视觉工作记忆 (visual working memory) 的关系。

方法：本横断面前瞻性研究共纳入了 53 名 12 岁至 17 岁诊断为 BPD 的青少年患者和 39 名年龄性别匹配的健康对照 (HCs)。基于 DTI 数据并使用基于纤维束示踪的空间统计分析 (tract-based spatial statistics, TBSS) 得到的分数各向异性 (FA) 和平均扩散率 (MD) 参数对脑白质微观结构进行评估。使用 Visual Reproduction Immediate Recall Subtest 评估视觉工作记忆。采用相关分析的方法，探讨了 BPD 青少年患者的 FA/MD 比值与 NSSI (渥太华自伤量表)、视觉再现以及情绪调节困难量表 (DERS)、儿童边缘人格特征量表 (BPFS) 等核心特征之间的关系。本研究采用中介分析的方法，探讨了 BPD 青少年患者脑白质微结构改变对 NSSI 的影响是否是通过视觉工作记忆介导。

结果：BPD 青少年在胼胝体、放射冠、上纵束、丘脑后束、额枕下束等皮层-边缘、皮层-丘脑回路与健康对照相比 FA 值降低，MD 值升高 ($P < 0.05$)。BPD 患者 FA 值降低与视觉工作记忆评分呈正相关。MD 值增高与视觉工作记忆评分呈负相关，与 NSSI (渥太华自伤量表-4B)、冲动控制障碍 (DERS-D)、认同障碍 (BPFS-B) 呈正相关 ($P < 0.05$)。根据青少年 BPD 患者 MD 结果可以得出，保留的视觉工作记忆能力对脑白质微结构的改变具有代偿作用。

结论：本研究表明皮质-边缘系统和皮质-丘脑回路中的白质微结构缺陷可能与 NSSI、视觉工作记忆和其他核心症状特征相关，这些可能是青少年 BPD 的神经相关因素。另外，保留视觉工作记忆可预防 NSSI 的发生。

PO-3078

DKI 及 DTI 技术评估颈动脉斑块患者颅脑微观结构改变

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目的：通过扩散峰度成像 (DKI) 和扩散张量成像 (DTI) 评估两种颈动脉斑块亚型病人脑白质微观结构的改变。应用峰度指标定量探索了易损斑块患者临床指标、精神神经指标与脑白质微观结构改变之间的关系。

方法：本研究包括颈动脉易损斑块患者组 (VP 组) 58 人，颈动脉硬斑块患者组 (HP 组) 23 人，健康对照组 (HC 组) 38 人。入组患者均进行了颅脑 MRI 检查，包括 3D T1 成像、DKI 和 DTI。为了探索组间差异，TBSS 用于进行体素统计。为了检验 VP 组内扩散指标与临床变量之间的相关性，在组级 FA 骨架掩模内进行了皮尔逊相关系数检验，当 $P < 0.05$ 时，被认为具有统计学意义。应用 JHU 脑模板将白质分割为 48 个脑区，并分析了各脑区扩散指标和峰度指标的组间差异。对于 VP 组的患者，分析各脑区扩散指标和峰度指标与炎症因子、情绪认知指标的相关性，进行皮尔逊相关系数检验。

结果：TBSS 研究显示在广泛的脑白质区域，VP 组与 HC 组的峰度指标与扩散指标存在显著的组间差异，特别是 AD, MD, RD。HC 组和 PP 组之间没有发现明显的差异。应用 JHU 脑模板进行 ROI 分割后，我们发现 PV 组患者扩散及峰度系数存在显著差异 (超过 5 个) 的脑区包括脑桥横束、右侧内侧丘系、双侧小脑脚、右侧丘脑后辐射、矢状束、扣带束及弓状束。对于拥有临床炎症指标和情感认知量表的 29 名 PV 组患者，分析了峰度与扩散指标和炎症因子水平及临床认知量表评分间的相关性，在多个脑区，kFA 值与 MOCA 评分呈负相关，FA 与 MOCA、MMSE 评分正相关 ($p < 0.05$)。在右侧内囊后腹侧部，kFA 值与 MMSE 评分负相关。VP 组大多数脑区的峰度与扩散指标与炎症因子呈弱相关。在右侧内囊前臂束，RK 和 MD 值与 hsCRP2017 水平显著相关 ($p < 0.05$)。在左侧上额枕束，FA 值与 IL6 水平显著相关 ($p < 0.05$)。

结论：在广泛的脑白质区域，峰度与扩散指标在 HC 组和 VP 组之间存在显著差异。VP 组患者很多脑区的 kFA、FA 值与 MMSE、MoCA 评分有显著相关性。VP 组患者少量脑区的峰度与扩散指标与 CRP、IL6 水平显著相关。

PO-3079

伴忧郁特征抑郁症患者壳核功能连接与其认知功能障碍的相关性研究

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【摘要】目的 忧郁特征型抑郁症是普遍公认的重度抑郁症的亚型之一，其特征是精神运动困难、快感缺乏、体重减轻、不适当的内疚感和早醒。越来越多的研究表明，壳核结构的改变可能与忧郁特征型抑郁症的神经生理病理有关。然而，目前尚无研究探讨伴忧郁特征抑郁症患者的壳核 6 亚区的全脑功能连接的变化。本次研究目的是揭示壳核 6 亚区的功能连接异常的模式，以及其与伴忧郁特征抑郁症患者的认知功能障碍的关联。**方法** 纳入 81 例伴忧郁特征抑郁症患者和 88 名健康对照进行静息态磁共振数据采集，图像预处理后，选取壳核 6 个种子区，随即计算壳核 6 亚区与全脑的功能连接，比较病例组和对照组的静息态下脑区之间功能连接差异。通过 MATRICS 共识认知成套测验(MCCB)，比较病例组和对照组的认知功能。最后进行相关性分析，探讨差异脑区的功能连接与 MCCB 认知表现之间的相关性。**结果** 与健康对照组相比，伴忧郁特征抑郁症患者的右侧壳核背

侧尾状核 - 腹侧壳核亚区和左侧顶上小叶功能连接降低 [$t = -4.52$, 体素 $P < 0.001$, 团块 $P < 0.004$ (0.05/12), GRF 校正]。此外, 信息处理速度、工作记忆、词语学习、视觉学习、社会认知、综合分数表现得分均低于对照组(均 $P < 0.05$)。相关性分析显示, 右侧壳核背侧尾状核 - 腹侧壳核亚区和左侧顶上小叶差异脑区值与社会认知($r = 0.315$, $P = 0.017$)、视觉学习($r = 0.385$, $P = 0.003$)和综合分数($r = 0.411$, $P = 0.001$)均存在正相关。结论 本研究发现伴忧郁特征抑郁症患者右侧壳核背侧尾状核 - 腹侧壳核亚区存在功能连接异常, 并提示右侧壳核背侧尾状核 - 腹侧壳核亚区和左侧顶上小叶功能连接异常可能是伴忧郁特征抑郁症患者认知功能障碍的神经生物学基础。

PO-3080

动态对比增强磁共振评价伴轻度认知障碍的 2 型糖尿病患者血脑屏障通透性

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目的: 通过动态对比增强磁共振 (DCE-MRI) 评价 2 型糖尿病(T2DM)患者血脑屏障 (BBB) 通透性改变及其与轻度认知功能障碍(MCI)的关系。方法: 收集性别及教育相匹配 T2DM 伴 MCI 患者 (n=21)、T2DM 不伴 MCI 患者(n=18)及健康志愿者(n=20), 进行认知评分、血生化检查、外周血周细胞标记物 PDGFR β 检查和 DCE-MRI 扫描。运用 MoCA 量表和 MMSE 量表对各组进行认知评分, ELISA 法检测 PDGFR β 浓度, 应用 Tissue4D 软件处理 DCE 数据获得 Ktrans 参数。从临床、细胞因子及影像等方面来研究 T2DM 患者脑部异常改变。所有数据采用 IBM SPSS 26.0 软件分析, $P < 0.05$ 差异有统计学意义。结果: T2DM 伴 MCI 组、T2DM 不伴 MCI 组年龄、空腹血糖、餐后两小时血糖、糖化血红蛋白高于对照组, 每两组间差异具有统计学意义($P < 0.05$)。T2DM 伴 MCI 组 PDGFR β 浓度 (57.18 ± 36.60 pg/mL) 高于对照组 (24.16 ± 16.58), 差异具有统计学意义($P < 0.05$)。T2DM 不伴 MCI 组额叶及基底节区 Ktrans 值高于对照组, T2DM 伴 MCI 组额叶、颞叶、基底节区、丘脑及海马 Ktrans 值高于对照组($P < 0.05$)。T2DM 伴 MCI 组基底节区及海马 Ktrans 值高于 T2DM 不伴 MCI 组($P < 0.05$)。结论: T2DM 伴 MCI 患者血脑屏障破坏, 血脑屏障损伤可能在 T2DM 伴 MCI 患者认知功能损害的病理生理过程中起着关键作用。

PO-3081

磁共振 IDEAL-IQ 与 mDIXON Quant 技术对腹部、 椎体脂肪定量的对比分析

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目的: 探讨不同平台 3.0T MR 设备上非对称回波最小二乘估算法迭代水脂分离序列 (Iterative decomposition of water and fat with echo asymmetry and least-squares estimation quantitation sequence, IDEAL-IQ) 和魔镜成像 (mDixon Quant) 序列对肝脏、胰腺与腰椎椎体脂肪含量 (Fat Fraction, FF) 定量评估的差异。材料与方法: 前瞻性纳入 36 名健康志愿者 (男 15 人, 女 21 人; 年龄 24.39 ± 2.28 岁), 分别在两个不同平台 3.0T MR 上腹部与腰椎行 IDEAL-IQ 和 mDixon Quant 序列扫描。两名观察者测量所有志愿者肝脏、胰腺和腰椎 (L1-L5) 椎体的 FF 值并进行两序列间对比分析。结果: 两名观察者所测数据一致性良好 ($ICC > 0.75$)。IDEAL-IQ 与 mDixon Quant 序列定量测量肝脏 FF 值 (3.74 ± 0.89 & 3.69 ± 0.80)、胰腺 FF 值 (4.66 ± 1.37 & 4.63 ± 1.35) 和腰椎各节椎体 FF 值 (L1: 32.29 ± 7.98 & 32.32 ± 7.85 ; L2: 35.08 ± 9.15 & 35.08 ± 9.20 ; L3: 37.75 ± 9.93 & 37.61 ± 9.82 ; L4:

37.15±9.82&37.26±9.84; L5:37.79±9.58&37.72±9.54) 差异无统计学意义 (p 值均>0.05)。结论: IDEAL-IQ 与 mDixon Quant 序列均可定量测量肝脏、胰腺和腰椎椎体 FF 值, 其测量值具有高度的一致性。

PO-3082

初探静音技术在颅脑磁共振成像中的应用

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目的 探讨静音技术不同静音因子对颅脑磁共振图像质量的影响。材料和方法 招募 50 例志愿者 (男 23 例, 女 27 例, 平均 58.06±16.77 岁)。3.0T MR 扫描仪行结合静音技术的颅脑矢状位 T1 Flair、T2WI、T2 Flair 序列扫描, 采用的静音因子分别为 1、0.8、0.6、0.4、0.2, 部分受检者行单序列扫描, 部分受检者行多序列扫描, 最终各序列均为 21 例。在扫描过程中记录各序列噪声分贝最大值。在胼胝体、脑白质、小脑、脑桥划定感兴趣区测量信号值 (Signal Intensity, SI) 和噪声强度 (Standard Deviation, SD), 并计算信噪比 (Signal to Noise Ratio, SNR) 和对比噪声比 (Contrast to Noise Ratio, CNR)。采用四分法对图像进行评分。3 分及 3 分以上满足诊断要求。Kappa 检验两观察者主观评分的一致性。对各序列不同组间图像的 SNR, CNR 和主观评分采用单因素 ANOVA 分析, P<0.05 为差异具有统计学意义, 若差异具有统计学意义, 进行后续两两比较。结果 两观察者主观评分一致性良好 (Kappa: 0.806-0.871)。ANOVA 检验 T1 Flair 胼胝体 SNR、CNR、主观评分, T2 Flair 胼胝体和小脑 CNR, T2WI 胼胝体 CNR 和主观评分差异有统计学意义 (p<0.001)。两两比较结果当 Q 为 0.4、0.2、0.2 时, T1 Flair 主观评分、T2 Flair 胼胝体 SNR、T2WI 主观评分较 Q 为 1.0 差异具有统计学意义 (p<0.05)。结论 基于静音技术的颅脑 MR 扫描时间随着 Q 的减小, 噪声分贝逐渐降低, 综合考虑噪声分贝值与图像质量, 临床推荐 Q 分别为 0.6、0.4、0.2 行颅脑轴位 T1 Flair、T2WI、T2 Flair 序列扫描。

PO-3083

颅内动脉瘤的 DCE-MRI 和 4D-flow-MRI 研究

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目的: DCE-MRI 在颅内未破动脉瘤 (UIAs) 壁中的容量转移常数 (K^{trans}) 有助于 UIAs 不稳定状态的风险分层。本研究探讨 UIAs 中 4D-flow-MRI 的血流动力学参数和 K^{trans} 的关系。

方法: 前瞻性收集我院 2018 年 1 月至 2019 年 10 月同时行 3.0T 磁共振 4D-flow-MRI 和钆剂增强 DCE-MRI 的 UIAs 患者进行分析。共入组 78 例患者。所有患者均基于 3.0T Siemens Prisma 磁共振扫描仪 (64 通道头颈联合线圈) 完成 4D-flow-MRI、钆剂增强 DCE-MRI 检查。由 2 名有经验的神经影像医师通过 CVI42 5.11.2 软件对 UIAs 的 4D-flow-MRI 图像独立进行盲法分析, 并计算相应动脉瘤的血流动力学指标-壁面切应力 (WSS)。由 2 名有经验的神经影像医师通过西门子 Syngo.via 工作站 TISSUE 4D 软件对 UIAs 的 DCE-MRI 图像独立进行盲法分析, 并计算相应动脉瘤的全定量药代动力学指标- K^{trans} 。用 ICC 评价 2 名医评估 WSS 及 K^{trans} 的一致性。采用 Spearman 相关分析, 对连续变量间的相关性进行分析。采用带回归线的散点图, 呈现连续变量间的数量变化趋势。

结果: 78 例患者中共发现 96 个 UIAs。医师对 WSS 测量 (ICC=0.94; 95%CI 为: 0.91 to 0.96)、对 K^{trans} 测量 (ICC=0.97; 95%CI 为: 0.95 to 0.98) 的一致性均较好。 K^{trans} 与 WSS 之间呈负相关关系 (rs= -0.24, P=0.02, 95%CI 为: -0.42 to -0.04)。

结论: 颅内未破动脉瘤中的 WSS 与 K^{trans} 呈负相关, 有望用于 UIAs 不稳定状态的风险分层。

PO-3084

基于高分辨率 MRI 的影像组学评估颈动脉斑块患者 CEA 术后围手术期 NIILs 的研究

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目的: 本研究旨在评估颈动脉内膜切除术后颈动脉斑块患者同侧围手术期出现新缺血性病变的发生情况。材料与方法: 回顾性收集 115 例患者, 所有患者均经超声造影或 CT 检查证实颈动脉管腔狭窄 $\geq 70\%$, 在行颈动脉内膜剥脱术前, 所有患者均接受了高分辨率磁共振成像检查, 采用 3.0T MR750 系统(GE Healthcare, USA)配备 8 通道颈动脉线圈, hrMRI 检查方案包括 2D T1 加权双反转恢复 FSE、质子密度加权 FSE 和 2D T2 加权双反转恢复 FSE, 使用 ITK-SNAP 对 hrMRI 图像进行人工分割, 并使用 pyradiomics 提取影像组学特征。CEA 术后 DWI 证实新发同侧缺血性病变(NIILs)的发生。将患者随机分为训练组和测试组, 使用 Lasso 和多变量 logistic 回归分析构建无创模型预测 NIILs。结果: 在所有患者中, 75 例在 CEA 后发现了新的同侧缺血性病变(NIILs), 而 40 例未表现出任何此类病变。最初, 从 T1 加权图像中提取了总共 1175 个影像组学特征, 随后进行了降维以构建一个影像组学模型来预测 NIILs。在训练组和测试组中, 影像组学模型的曲线下面积(AUC)分别为 0.864(95%可信区间[CI], 0.781-0.947)和 0.795(95% CI,0.646-0.945)(图 a 和 b)。还使用性别、年龄、LDL、HDL、LHR、高血压、糖尿病、IPH(由 MRI 预测)和 LRNC(由 MRI 预测)等变量构建了临床模型。IPH(OR=42.01)和 LRNC(OR=5.11)被纳入临床模型, 并通过结合 radscore、LRNC 和 IPH 构建了多变量 logistic 回归模型。该模型使用列线图可视化(图 c)。联合模型的 AUC 在训练组为 0.949(95% CI,0.906-0.991), 在测试组为 0.837(95% CI,0.692-0.982)。校正显示, 列线图在训练组和测试组中拟合良好(图 d 和 e)。列线图显示, 在训练组和测试组中, 临床获益最佳(图 f 和 g)。总结: 与传统 hrMRI 相比, 融合影像组学和临床变量的联合模型不仅可以预测 NIILs 的发生, 而且可以为患者提供个性化治疗。

PO-3085

平面回波成像校正 (EPIC) 联合低方差表观弥散系数 (LOVA ADC) 在颈髓 DWI 和 DTI 序列中的应用

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目的 探索平面回波成像校正(Echo-Planar Imaging Correction,EPIC)联合低方差表观弥散系数 (Low variance Apparent Diffusion Coefficient,LOVA ADC) 技术对颈髓弥散加权成像 (Diffusion Weighted Imaging, DWI) 及弥散张量成像 (Diffusion Tensor Imaging, DTI) 图像质量的改善价值。资料与方法 招募志愿者 33 人(男 20 人, 平均年龄 23.33 ± 2.86 岁)。3.0T MR 行矢状位 T1WI、校正前后 DWI、DTI 序列。两名观察者在 T1WI 与校正前后 DWI、DTI 序列融合图像上划定感兴趣区 (Region Of Interest, ROI) 测量 ADC 值、各向异性分数 (Fractional Anisotropy, FA) 值, 测量偏移距离, 并对图像质量进行五分法主观评分。采用组内相关系数 (Intraclass Correlation Coefficient, ICC)、Kappa 检验两名观察者测量数据和主观评分的一致性, 若一致性良好, 取两名观察者平均值进行后续分析。采用独立样本 t 检验和 Mann-Whitney U 检验进一步比较图像主客观评估的组间差异。结果 两名观察者测量数据和主观评分一致性良好 (ICC: 0.912-0.999, Kappa:

0.778-0.816)。独立样本 t 检验显示:校正前后 DWI 序列所测 C6 ADC 值、C4、C5、C6 偏移距离和主观评分差异均有统计学意义 ($p<0.05$);校正前后 DTI 序列 C1、C3 FA 值、C1、C3 ADC 值、C4、C5、C6 偏移距离和主观评分差异均有统计学意义 ($p<0.001$)。结论 EPIC 联合 LOVA ADC 技术可以显著降低图像畸变,提高 ADC 值的精度,改善图像质量,从而提高颈髓疾病诊断的精确性。

PO-3086

基于压缩感知技术联合风车采集优化颅脑 T2 加权成像

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目的 探索不同压缩感知 (CS) 加速因子 (Acceleration Factor, AF) 结合不同风车采集 (MultiVane, MV) 填充百分比 (acquisition percentages, AQP) 对颅脑 T2 加权磁共振成像 (T2WI) 图像质量的影响。**资料与方法** 前瞻性招募志愿者 21 例(男 9 人,平均年龄 38.95 ± 19.56 岁),于 3.0T MR 行常规快速自旋回波(Turbo Spin Echo, TSE)T2WI 序列和 T2WI-MVXD 序列。T2WI-MVXD 序列由 4 种 AF (敏感度编码 SENSE2 以及 CS2、3、4) 与 3 种 MV AQP (160%、210%、260%) 两两联合组成。两名观察者在颅脑 T2WI 轴位原始图上划定感兴趣区 (ROI) 测量信号强度 (SI) 和标准差 (SD),并计算信噪比 (SNR) 和对比噪声比 (CNR)。并对图像质量进行四分法主观评分。使用组内相关系数 (ICC) 及 Kappa 检验评估两名观察者测量数据和主观评分的一致性;若一致性良好,选择高年资医师的测量和评分结果进行后续分析。使用 Friedman 检验不同 AF 之间 SNR、CNR 及主观评分的差异性。若差异性有统计学意义,使用最小差异性检验 (LSD 法) 进行两两比较。结果 两名观察者测量数据和主观评分一致性良好 (ICC: 0.971-0.996, Kappa: 0.769-1.000)。与常规 TSE 序列相比,所有 T2WI-MVXD 序列均获得高 SNR 和 CNR 图像 ($p<0.001$)。采用相同 AF 的扫描方案,各部位 SNR 和 CNR 随着 MV AQP 的增加而增加;采用相同 MV AQP 的扫描方案,SNR 和 CNR 随着 CS 加速因子的增加而减少,胼胝体 SNR、CNR 及小脑 CNR 差异有统计学意义 ($p<0.05$)。在扫描时间相当的几个扫描方案前提下,AF=CS3 (210%) 组合序列的胼胝体、小脑 SNR 和脑桥 CNR 均高于 CS2 (160%) 和 CS4 (260%) ($p<0.05$)。结论 AF=CS3 结合 MV AQP 210% 的扫描方案能够在保证图像质量满足诊断要求的情况下,扫描时间缩短了 25% (72s vs. 96s),推荐用于临床常规扫描。

PO-3087

基于定量 T2-mapping 和常规膀胱磁共振的影像组学模型预测膀胱癌高低级别的价值

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目的

基于质子自旋-自旋弛豫时间的 T2-mapping 定量技术可实现对体素内组织成分的定量评估,特别是自由水含量的评估。鉴于高低级别膀胱癌中细胞外液体的明显差异,本研究认为不同级别的膀胱癌的 T2 值存在差异。影像组学可深度挖掘肿瘤间的细微差异,基于 T2-mapping 及常规膀胱 MRI 的影像组学模型可进一步提高术前预测膀胱癌高低级别的准确性。因此,本研究将探索影像组学是否可提高常规 MRI 及 T2-mapping 对膀胱癌术前分级的预测价值。

方法

前瞻性纳入临床怀疑膀胱癌的患者，并在手术前进行常规膀胱 MRI 扫描及 T2-mapping 扫描，常规 MRI 扫描序列包括 T2 加权序列 (T2WI)，弥散加权序列 (DWI) 及动态增强序列 (DCE)。纳入标准：(1) 既往未接受过新辅助治疗；(2) 磁共振扫描后接受手术，包括经尿道膀胱肿瘤切除术或膀胱全切术；(3) 手术病理证实为尿路上皮癌；(4) 肿瘤直径大于 1cm。两名放射科医师分别在表面弥散系数 (ADC) 和 T2-mapping 图像上沿病灶边缘勾画三维感兴趣区，对所有图像分别提取影像组学特征及 T2、ADC 测值。将纳入患者按照 2: 1 随机分为训练组和测试组，使用训练组的影像组学特征建立预测膀胱癌术前病理分级模型，在测试组中验证模型。

结果

共纳入 92 名患者 (训练组 n=64, 验证组 n=28)，其中 63 例为高级别 (训练组 n=45, 验证组 n=18)。低级别膀胱癌的 T2 值及 ADC 值明显高于高级别肿瘤 ($p=0.002$ 及 <0.001)。但使用 ADC 值和 T2 值预测高低级别的效能较差，曲线下面积 (AUC) 分别为 0.69 及 0.71。在测试组中，T2-mapping 影像组学模型的预测效能 (AUC, 0.87; 95%可信区间(CI), 0.73-1.0) 高于 ADC 影像组学模型 (AUC, 0.77; 95%CI, 0.56-0.97) 及联合影像组学模型 (AUC, 0.78; 95%CI, 0.61-0.96)。

结论

我们的研究表明：使用 T2 值和 ADC 值预测膀胱癌高低级别的效果较差，影像组学特征在术前鉴别膀胱癌的病理分级方面可以提供更多的信息。而影像组学模型中，T2 影像组学模型优于 ADC 和联合影像组学模型。

PO-3088

DCE-MRI 纹理分析精准评估乳腺良恶性病变的应用价值

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目的：探讨高分辨率动态增强 MRI 纹理特征分析在诊断乳腺良恶性病变及背景强化中的应用价值。

方法：本文前瞻性入组我院 2015 年 4 月~2017 年 6 月期间 128 例临床怀疑有乳腺肿瘤患者，其中 62 例符合入组标准且术前行高时间分辨率 (1+26) DCE-MRI 扫描，对照组随机回顾性纳入 78 例术前行低时间分辨率 DCE-MRI 扫描 (1+5)。通过血流动力学双室模型 Extended Tofts Linear 进行全定量分析乳腺 DCE-MRI 图像，容积测量恶性组及良性组病灶中心区域 (lesion)、周围区域 (peri)、背景强化区域 (bpe) 的 Ktrans 纹理特征和血管渗透性参数 Ktrans、Kep、Ve 和 Vp。通过两样本 t 检验比较不同时间分辨率 DCE-MRI 扫描所得到的血流动力学特征 (Ktrans、Kep、Ve 和 Vp)，通过降维后获得的 Ktrans 纹理特征进行建模，通过 ROC 曲线评价其诊断性能。

结果：62 例高时间分辨率组及 78 例低时间分辨率组高时间分辨率和低时间分辨率 DCE-MRI 所得到的血流动力学参数存在统计学差异 ($p<0.05$)，且高时间分辨率组肿瘤中心区域的 Ktrans 均值 (Ktrans-mean) 与病理分级呈显著正相关 ($r = 0.400$, $P = 0.012$)。通过不同时间分辨率的 Ktrans 图获得的纹理特征构建分类模型，高时间分辨和低时间分辨率 DCE-MRI 的 Ktrans 图纹理特征模型鉴别疾病良恶性病灶中，肿瘤中心区域模型的 AUC 值、准确率分别为 0.889、0.867 和 0.850、0.750；肿瘤外周区域模型分别为 0.884、0.733 和 0.835、0.725；背景强化区域模型分别为 0.760、0.700 和 0.716、0.733；肿瘤中心区域+外周区域+背景强化区域模型分别为 0.933、0.800 和 0.868、0.833。

结论：高时间分辨率 DCE-MRI 定量纹理特征分析在乳腺良恶性病变的诊断中较传统低时间分辨率可能具有更高的应用价值，结合乳腺病变和背景强化可能更有助于乳腺癌的早期诊断，且 Ktrans-Mean 参数有助于恶性肿瘤的病理分级。

PO-3089

DCE-MRI 动脉早期宫颈黏膜强化对诊断 子宫内膜癌宫颈间质浸润的价值

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目的：术前评估子宫内膜癌发生宫颈间质浸润是制定治疗计划的重要依据，对盆腔淋巴结转移有重要的预后意义。核磁共振成像（MRI）被认为是术前评估宫颈浸润的最佳非侵入性技术。延迟 DCE-MRI（注射对比剂后 4-5min）是检测宫颈浸润的最佳选择，表现为中等强化的宫颈间质内出现低强化的肿瘤组织，但扫描时间相对较长。因此，本研究拟探索 DCE-MRI 动脉早期（注射对比剂后 30-40s）宫颈黏膜显像连续性评估子宫内膜癌宫颈间质浸润的可行性。

方法：分析北京妇产医院经手术治疗的子宫内膜癌 186 例患者盆腔 MRI 资料，其中矢状位 DCE-MRI 共采集 6 期增强影像，每期 16-20s，持续 1.5-2min，在 4-5min 扫描延迟期图像。由两位医师分别在 DCE-MRI 注射对比剂后 30-40s 和 4-5min 评估是否存在宫颈间质浸润，计算并对比不同时间评估宫颈间质浸润的符合度、敏感度、特异度、阳性预测值和阴性预测值，以卡方检验评估两者差异是否有统计学意义。两位医师对宫颈间质浸润判断的结果的一致性分析采用 kappa 检验进行分析。

结果：医师 1 在 DCE-MRI 30-40s 判断宫颈间质浸润的敏感度、特异度、符合度、阳性预测值和阴性预测值分别为 0.64、0.93、0.88、0.63、0.93；延迟 4-5min 分别为 0.59、0.93、0.87、0.67、0.93，两者差异无统计学意义（ $P>0.05$ ）。医师 2 在 DCE-MRI 30-40s 判断宫颈间质浸润的敏感度、特异度、符合度、阳性预测值和阴性预测值分别为 0.63、0.93、0.88、0.65、0.92；延迟 4-5min 分别为 0.60、0.93、0.87、0.63、0.92，两者差异无统计学意义（ $P>0.05$ ）。两位医师在 DCE-MRI 30-40s 和延迟 4-5min 判断子宫内膜癌宫颈间质浸润的结果均具有较好的一致性（ $k=0.63$ ， $k=0.72$ ）。

结论：DCE-MRI 在注射对比剂 30-40s 利用宫颈黏膜连续性诊断是否发生宫颈间质浸润可达到与延迟 4-5min 扫描一致的诊断效果，面对逐渐增多的 MRI 检查患者，可节约时间成本，避免延迟扫描，提高检查效率。

PO-3090

基于术前 T2 磁共振影像组学预测结直肠癌肝转移瘤 TACE 术后早期疗效的研究

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目的：探讨基于 TACE 术前 T2 磁共振的影像组学对结直肠癌肝转移瘤经 TACE 术后早期疗效预测中的价值。

方法：回顾性分析 70 例接受 TACE 治疗的结直肠癌肝转移瘤患者，术前 1 周内行 MRI 检查，术后 1~3 个月、半年随访多功能 MRI，按照 mRECIST 标准对 TACE 术后 3 个月肿瘤局部控制率进行评估，利用 3DSlicer 软件在 T2 图像上进行勾画肿瘤区域，提取影像组学特征，利用 Pearson 相关系数剔除冗余特征，利用 mRMR 特征排序方法筛选得到组学标签。采用留一法划分样本，与 LASSO 分类器共同构建结直肠癌 TACE 治疗后 3 个月进展预测模型。计算模型的受试者工作特性曲线（ROC）的曲线下面积（AUC），评估模型的预测能力。

结果: 70 例患者 3 个月后随访 52 例病灶未进展 (N-PD), 18 例进展 (PD), 两组术前 T2-MRI 的 Wavelet-HHH firstorder Mean 等 3 个的影像组学参数有统计学差异 ($P<0.05$), 以这些差异性影像组学特征所建的模型具有一定的预测能力 ($AUC=0.657, ACC=0.714, SEN=0.588, SPE=0.755$)。结论: 基于 MRI 组学特征能对接受 TACE 治疗的结直肠癌肝转移瘤进行近期进展风险预测, 可在 TACE 术前筛选进展危险性高的患者, 为其提早采取联合治疗提供个体化建议。

PO-3091

探讨磁共振特征追踪技术在帕金森病患者左心评估中的价值

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目的: 本研究利用心脏磁共振特征追踪技术评估帕金森病患者的左心结构和功能改变, 并探究影响左心结构及功能改变的相关因素。

方法: 本研究纳入了 PD 患者 39 例和健康对照者 34 例, 均完成了常规心脏磁共振检查。使用专业后处理软件 CVI42 分析左心功能及心肌应变。左心室 (LV) 功能参数包括: 左室舒张末期容积指数 (LVEDVi)、左室收缩末期容积指数 (LVESVi)、左室射血分数 (LVEF)、左室心肌质量指数 (LVMI); 心肌应变参数包括: 左室整体径向应变 (GRS)、周向应变 (GCS) 及纵向应变 (GLS)。左心房功能参数包括: LA 储蓄功能 (EF total、Es、SRs)、导管功能 (EF passive、Ee、SRe) 和泵功能 (EF booster、Ea、SRa)。两组间的比较采用独立样本 t 检验或 Mann-WhitneyU 检验。采用 Pearson 或 Spearman 相关系数分析心功能及应变参数与运动功能障碍及自主神经功能障碍的相关性。

结果: PD 组的 LVEF、GLS 均低于对照组, LVESV、LVESVi、LVMI 均高于对照组, 差异具有统计学意义 (P 均 <0.05)。与对照组相比, PD 组左心房容积 LA Vpac、LA Vmin 和 LA Vmax 差异无统计学意义 ($P>0.05$)。PD 患者的左房储蓄功能 (储蓄功能这种提法是否通用?) (EF total、Es、SRs) 和左室导管功能 (EF passive、Ee、SRe) 及泵功能 (EF booster、Ea、SRa) 与对照组相比均明显受损 (P 均 <0.05)。相关性分析显示, Es、SRs、LAEF passive、Ee 及 SRe 与 UPDRSIII 均存在显著相关性 ($r=-0.409$ 、 -0.355 、 -0.326 、 -0.445 、 0.417 , P 均 <0.05)。Es、SRs、Ee、SRe 与 SCOPA-AUT 均存在显著相关性 ($r=-0.535$ 、 -0.319 、 0.316 、 0.359 , P 均 <0.05)。

结论: PD 患者存在左心结构功能改变, 其中, 左心房储蓄功能及传导功能与运动障碍及自主神经功能障碍的严重程度相关。CMR-FT 有助于评估帕金森病对患者心脏结构及功能的影响。

PO-3092

磁共振 3D-THRIVE 增强序列联合 MIP 重建在复杂性肛瘻患者中的诊断效能及治疗指导价值研究

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目的分析磁共振 3D-THRIVE 增强序列联合 MIP 重建在复杂性肛瘻患者中的诊断效能, 探讨该诊断方法在患者手术治疗中的指导价值, 以期临床诊疗提供影像学依据。

方法 选择深圳市人民医院 2020 年 5 月-2022 年 12 月疑似复杂性肛瘻的患者 150 例为研究对象, 所有患者均采用 1.5T 磁共振增强检查, 分别完成常规扫描序列 T1 加权成像 (T1WI)、T2 加权成像 (T2WI)、T2WI 压脂、DWI、T1WI 压脂增强及 3D - THRIVE 增强序列, 以手术检查结果作为

“金标准”，借助 SPSS 26.0 软件完成统计学分析，分析磁共振增强检查在复杂性肛瘘患者与手术结果之间的符合率；计算不同扫描序列下复杂性肛瘘患者的诊断效能（灵敏度、特异度、阳性预测值及阴性预测值）；所有患者均行手术治疗，分析患者治疗前磁共振的影像学特征在患者治疗中的指导价值。

结果 150 例疑似复杂性肛瘘患者与“金标准”比较，磁共振诊断阳性患者 125 例，阴性患者 20 例，诊断符合率为 96.67 %；诊断灵敏度为 97.66 %、特异度为 90.91 %、阳性预测值 98.43 %、阴性预测值为 86.96 %；与各检查序列比较，3D - THRIVE 增强联合 MIP 重建技诊断效能最高，诊断符合率为 95.33 %，与其他序列比较均有统计学意义 ($P < 0.05$)。

结论 3D - THRIVE 增强序列联合 MIP 重建技术对于复杂性肛瘘的诊断效能明显高于其他序列，并且，该技术可以实现瘘管的三维形态显示，在提高复杂性肛瘘患者的诊断效能的同时，也为外科医生制定更为合理和安全的手术方案提供更加全面的信息。

PO-3093

AI 辅助压缩感知技术在上腹部 T2WI 序列中的应用

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目的：探索 AI 辅助压缩感知技术 (AI-assisted compressed sensing, ACS) 在上腹部 T2WI 序列扫描中的应用价值。

方法：回顾性收集 2023 年 6 月至 2023 年 8 月于我院行 3.0T MR 上腹部检查的患者 (uMR Omega, 上海联影)。所有患者均扫描常规 T2WI-arms-PI2 序列和 T2WI-ACS2 序列，两种序列均采用呼吸门控触发。出组标准：①脂肪肝，肝炎或肝硬化等弥漫性肝病影响数据测量者；②除肝囊肿外，肝脏/肾脏/脾脏占位患者；③术后患者。最终入组 121 例上腹部患者。由两名观察者采用双盲法分别对 T2WI-arms-PI2 和 T2WI-ACS2 图像进行客观评价，肝脏 ROI 分别放置于肝左内叶、肝左外叶、肝右前叶和肝右后叶最大层面以及同层面右侧竖脊肌 (3 个)，肾脏 ROI 分别放置于肾脏最大层面 (3 个) 及同层面同侧竖脊肌 (3 个)，脾脏 ROI 分别放置于脾脏最大层面 (3 个) 及同层面同侧竖脊肌 (3 个)，记录每个 ROI 的 mean 值和 SD 值。肝脏/肾脏/脾脏数据测量后分别取均值，并计算两组图像的信噪比 (SNR) 和对比噪声比 (CNR)。一致性检验采用组内相关系数 ICC 检验。若一致性良好，采用高年资医师测量数据进行后续分析。两组间 SNR 和 CNR 比较采用 Maan-Whitney U 检验。

结果：T2WI-ACS2 序列扫描时间较 T2WI-arms-PI2 序列明显缩短 (43s VS 2min30s)。T2WI-ACS2 序列右肾 SNR 大于 T2WI-arms-PI2 序列 (65.7 ± 27.9 VS 51.6 ± 23.5)，T2WI-ACS2 序列右肾 SNR 大于 T2WI-arms-PI2 序列 (43.6 ± 23.1 VS 34.2 ± 17.1)，差异均具有统计学意义 ($P < 0.05$)。T2WI-ACS2 序列和 T2WI-arms-PI2 序列的肝脏、左肾、脾脏 SNR 和 CNR 均无统计学差异 ($P > 0.05$)。

结论：临床扫描中，T2WI-ACS2 能够在保证图像质量前提下明显缩短扫描时间，通过快速扫描冻结上腹部运动伪影，可以作为上腹部常规 T2WI-arms-PI2 序列的替代方案。

PO-3094

1H 磁共振波谱结合模式识别对食管鳞癌诊断标志物的探寻研究

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目的 利用氢质子代谢指纹谱结合不同模式识别方法探寻食管鳞癌 (Esophageal Squamous Cell Carcinoma, ESCC) 患者血清代谢标志物, 寻找潜在的 ESCC 诊断标志物组, 从代谢水平上为 ESCC 预防筛查、早期诊断及精准治疗提供一定的理论基础。方法 收集本院心胸外科新入院并经病理组织确诊的早期食管鳞癌患者 (I/II 级) 的术前血清样本 70 份, 以及筛选同期本院体检中心年龄及性别相匹配的健康对照组的血清样 50 本份, 利用 Bruker Avance III 谱仪对三组样本进行数据采集, 采用主成分分析(PCA)、正交偏最小二乘法-判别分析(OPLS-DA)对获得的氢质子图谱进行模式识别, 检测正常对照组与术前 ESCC 组差异性代谢物, 筛选出潜在特征性代谢标志物组, 对发生代谢紊乱途径进行分析。结果 两组间共筛选出 31 个差异代谢物; 对模型的有效性利用交叉验证后得到的 R²X 和 Q² 值进行评判, 在 ESCC 组与对照组间筛选出包含有 6 个诊断特异性及灵敏性较高的具有潜在诊断价值标志物组 (AUC=0.969); 结论 基于氢质子代谢指纹谱结合模式识别方法能有效区分正常对照组、ESCC 术前组间的差异代谢物, 为 ESCC 预防、早期诊断及精准治疗提供有效的分子水平的代谢信息。

PO-3095

多参数集成序列联合人工智能压缩感知技术在颅脑中的应用

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目的: 利用多参数集成序列联合人工智能辅助下的压缩感知(united compressed sensing, ACS)技术颅脑进行成像, 并优化成像序列, 选择最合适的加速因子。

材料和方法: 前瞻性收集健康志愿者 10 例, 使用联影 uMR0mega 3.0T 扫描, 均行敏感度编码 (Sensitivity Encoding, SENSE) 并行采样技术 (SENSE=3) 和不同加速因子 (Acceleration Factor, AF, AF=ACS3、ACS 4、ACS 5、ACS 6) 的多参数集成序列检查。由具有 5 年以上工作经验的放射科医师分别在 T1map、PDmap、R2*map、T2*map、T1WI、PDWI 图上, 测量双侧额叶皮层、双侧枕叶皮层及双侧尾状核头, 取其信号强度及定量参数平均值为脑灰质信号强度及定量参数; 双侧半卵圆中心、胼胝体膝部、胼胝体压部, 取其信号强度、噪声强度 (Standard Deviation, SD) 及定量参数平均值为脑白质信号强度及定量参数; 双侧脑室前角信号强度平均值为脑脊液信号强度。计算信噪比 (Signal to Noise Ratio, SNR) 和对比噪声比 (Contrast to Noise Ratio, CNR)。观察者依据解剖结构细节可见度、伪影以及诊断价值进行主观评分。使用 Friedman 检验不同 AF 之间各定量参数、SNR、CNR 及主观评分的差异, 并对 P 值使用 Bonferroni 进行多重校正。

结果: 各序列不同 AF 比较, 与 SENSE 3 序列相比, 当 ACS4 时, 各序列定量值及 SNR、CNR 差距无统计学意义; 当 ACS5、6 时, PDWI 图像的 SNR、灰质及白质 PD 值升高, 差距具有统计学意义 (P<0.05), 其余数据差距无统计学意义。

结论: 多参数集成序列联合 ACS 技术能够对颅脑部进行成像。综合时间和图像质量的平衡考虑, ACS AF=4 序列值得推荐, 扫描时间缩短 60.85%, 一次扫描可重建出多组参数定量图像, 可以对扫描部位进行多方面评估, 获得质量可靠的颅脑部定量参数及定性图像, 具有广阔的临床前景。

PO-3096

黑血技术增强序列在颅内微小转移瘤诊断中的应用价值

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目的: 探讨 3D 黑血 (BB, Black Blood) -MSDE 技术增强序列对颅内微小脑转移瘤的诊断价值, 为临床放疗提供精准定位。

方法: 颅脑是各种恶性肿瘤常见的转移部位, 有文献报道多发性脑转移瘤可以占到颅内肿瘤 60 ~ 70%, 甚至更高。随着肿瘤治疗方法的改进, 使得患者生存时间延长, 早期检出病灶尤为重要, 目前磁共振检查是公认的脑转移瘤的最佳检查方法, 常规增强 T1WI 扫描敏感性高, 但其对颅内微小转移灶, 脑膜转移灶显示欠佳。本院飞利浦磁共振 3D 黑血 (BB, Black Blood) -MSDE 技术增强序列, 可有效提高组织的对比度, 获取更高分辨率的图像, 对于颅内病灶的检出和显示方面具有明显优势。

选取 2020 年 5 月至 2021 年 1 月本院收治的原发肿瘤经病理确诊且临床怀疑有脑转移瘤的患者 55 例作为研究对象, 入组标准: 1) 患者存在经病理证实的原发恶性肿瘤; 2) 行传统 3D-T1WI 颅脑增强检查并影像学诊断为脑转移瘤; 患者同时行传统 3D-T1WI 增强及 3D-BB-MSDE 序列增强扫描; 分别记录常规轴位增强 T1WI 与增强 FSBB 序列上所检出病灶的数目、大小及位置。按直径大小将病灶分为两组, $< 5\text{ mm}$ 及 $> 5\text{ mm}$ 。所有图像均由 2 名经验丰富的放射科高年资医师进行评估, 如意见不一致则讨论得出最终结果。

观察比较两种序列图像上显示颅内转移瘤的数目、大小、部位和转移瘤的信号强度, 并作统计学分析。

结果: 58 例脑转移瘤患者中, 综合临床及影像学分析, 共计 211 个病灶。3D-T1WI 增强扫描显示 178 个病灶, 3D-BB-MSDE 序列增强扫描显示 211 个病灶, 3D-BB-MSDE 序列增强扫描多发现 33 个病灶, 两者显示率差异比较, 3D-BB-MSDE 序列增强扫描序列对病灶的显示率为 100%, 显著高于常规增强 3D-T1WI FSE 序列, 差异有统计学意义 ($P < 0.05$)。

结论: 3D-BB-MSDE 序列扫描可显著提高颅内微小转移瘤的检出率。

PO-3097

基于 fMRI 技术探索化疗对 NSCLC 患者认知、情绪障碍影响的神经生物学机制

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目的: 采用无创脑磁共振成像 (fMRI) 方法, 探讨癌症和化疗对非中枢神经系统癌症对患者脑激活和微结构的影响, 探讨 NSCLC 患者化疗前脑白质网络的拓扑特性。

方法: 非小细胞肺癌 (NSCLC) 是肺癌最常见的亚型, 发病率高, 死亡率高, 生活质量较低。许多化疗药物 (“化学脑”) 对中枢神经系统以外的癌症患者的神经毒性引起的化疗相关的认知功能障碍, 该系统已在以前的神经心理学研究中被观察到。对 24 例非神经系统转移性 NSCLC 患者和 25 例匹配的健康对照组进行脑磁共振成像 (MRI) 数据, 非神经系统转移性 NSCLC 患者从江苏肿瘤医院的住院患者中招募, 如果他们最近的组织学诊断为 NSCLC, 在一个月内 (IIIB 或 IV 期) 未接受化疗、放疗和手术。使用 3.0T 飞利浦扫描仪获取所有参与者的 t1 加权和 DTI 图像。

数据采用脑部软件库-FMRIB 扩散工具箱 (FSL) 的功能 MRI 进行处理。首先, 对 MRI 数据进行了预处理。然后根据斯特杰斯卡尔和坦纳方程计算所有参与者的扩散张量矩阵。通过对扩散张量矩阵的对角化处理, 得到了特征值 (k_1 、 k_2 、 k_3)。计算每个受试者的分数各向异性 (FA) 图。最后, 将 DTI 图像与 t1 加权图像进行共配准, 然后将其空间归一化到蒙特利尔神经学研究所 152 (MNI-

152) 空间。通过扩散工具包, 进行白质束造影。脑网络的拓扑特性包括网络和节点效率, 包括局部效率和全局效率。NSCLC 患者和 HC 之间的网络和节点效率进行统计学比较。

结果:

NSCLC 患者在左侧额下回 (三角部)、左侧额下回 (眶部)、右侧脊盖、右直回、右侧晶状核 (壳核)、左侧颞上回和右侧颞下回的整体疗效也下, NSCLC 患者的额叶、颞叶和皮层下脑区的整体和局部疗效下降, 这可能与认知和情绪失调有关。

结论:

我们的研究表明, NSCLC 患者在化疗前表现出认知和情绪的变化, 这可能与脑白质网络中额-皮层下区域相互作用受损有关。我们的研究结果增强了临床对 NSCLC 认知和情绪障碍的认识, 并为未来 NSCLC 认知和情绪障碍的治疗提供了一个新的潜在干预靶点。然而, 需要进一步的前瞻性研究来探索脑网络的异常拓扑特征与癌症和化疗相关的认知和情绪缺陷之间的关系。

PO-3098

基于人工智能辅助下的压缩感知技术优化颅神经一站式 3D-MATRIX 成像

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目的: 利用人工智能辅助下的压缩感知(united compressed sensing, uCS)技术对 12 对颅神经的三维可调制翻转角超长回波链回聚脉冲 (three-dimensional modulated flip angles technique in refocusing imaging with extended echo train, 3D-MATRIX) 的 T2 加权成像序列进行优化, 选择最合适的加速因子。方法: 前瞻性收集 10 例健康志愿者, 均行敏感度编码并行采样技术 (SENSE=3) 和不同加速因子 (Acceleration Factor, AF, AF= 3、5、7、9) 的 3D-MATRIX 序列检查。由具有 5 年以上工作经验的放射科医师分别测量嗅神经 (I)、视神经 (II)、三叉神经 (V) 及邻近脑池脑脊液 (CerebroSpinal Fluid, CSF) 信号强度 (Signal Intensity, SI) 和噪声强度 (Standard Deviation, SD), 并计算信噪比 (Signal to Noise Ratio, SNR) 和对比噪声比 (Contrast to Noise Ratio, CNR); 测量脑池中与听神经相近的小血管的 SI, 并计算与脑脊液的对比度 (Contrast Ratio, CR)。观察者依据颅神经细节可见度、伪影以及诊断价值进行主观评分。使用 Friedman 检验不同 AF 之间 SNR、CNR、CR 及主观评分的差异, 并对 P 值使用 Bonferroni 进行多重校正。

结果: 各序列不同 AF 比较, 与 SENSE 3 序列相比, 当 ACS 5 时, SNR 与主观评分的差异无统计学意义 ($P>0.05$), CNR 及血管 CR 升高且差距具有统计学意义 ($P<0.05$); 当 ACS 7、9 时, SNR、CNR 及 CR 的差异无统计学意义。嗅神经 (I)、视神经 (II) 的主观评分降低, 且差异具有统计学意义 ($P<0.05$)。

结论 3D-MATRIX 序列联合 ACS 技术能够对十二对颅神经进行一站式成像。综合时间和图像质量的平衡考虑, ACS AF=5 序列值得推荐, 扫描时间缩短 60.85%, 能获得质量可靠颅神经图像。

PO-3099

多参数集成序列定量参数联合 rADC 值鉴别诊断高级别胶质瘤与脑转移瘤的应用价值

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目的：探究多参数集成序列定量参数及相对表观扩散系数(relative apparent diffusion coefficient, rADC)在高级别胶质瘤及脑转移瘤鉴别诊断中的价值。

材料方法：前瞻性收集在我院病理确诊 11 例高级别胶质瘤和 12 例转移瘤，使用联影 uMR OMEGA 3.0T 扫描，32 通道头线圈进行集成序列和 DWI 序列成像，TR 时间为 32.7ms, 6 个不同的 TE 时间为 2.61ms、6.59ms、9.25ms、13.23ms、15.89ms、19.87ms，4 个翻转角，矩阵 256×200，分辨率 1×1×1mm³，层数 64，扫描时间 363s，可得到 T1map、PDmap、R2*map、T2*map、QSM 定量图，由具有 5 年以上工作经验的放射科医师在所得的定量图上划定感兴趣 (Regions of interest, RIO) 测量定量值，对应肿瘤增强期相显示最大层面在对应定量图相对应区域放置三个 ROI 取平均值，在肿瘤周水肿区勾画三个 ROI 取最小 ADC 值，并计算相应的 rADC 值。rADC=最小 ADC/ADC 对侧正常脑组织。使用独立样本 t 检验或 Mann-Whitney U 检验比较两组各参数差异。应用 Logistic 回归分析模型得到联合变量，使用 ROC 曲线来确定对二者的诊断能力。

结果：两组 PD、R2*、T2*、QSM 比较差异无统计学意义 (p>0.05)。胶质瘤 T1 值高于转移瘤，rADC 值低于胶质瘤，差异具有统计学意义。rADC 值均低于转移瘤 (p<0.05)。鉴别胶质瘤和转移瘤的 T1 值、rADC 值及其组合 (T1&rADC) 的 AUC 值分别为 0.545，0.809 和 0.845。(表 1-2 和图 1)

结论：胶质瘤和转移瘤常规 MRI 扫描表现相似，强化方式也相类似。当脑转移瘤原发病灶隐匿时极易误诊。由于两者的临床病程，治疗手段及预后均不同，术前明确诊断十分重要。多参数集成序列 T1map 联合 rADC 可提高对高级别胶质瘤与脑转移瘤诊断，测量高级别胶质瘤与脑转移瘤 T1 值和 rADC 值对二者鉴别诊断具有一定的价值。

PO-3100

特发性正常压力脑积水特征性结构协变脑网络拓扑属性的研究

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目的：基于图论探究特发性正常压力脑积水 (Idiopathic normal pressure hydrocephalus, INPH) 特有的结构协变脑网络的改变。

方法：收集 85 例 INPH 患者及 76 例健康对照者的头颅磁共振结构成像数据，利用两组受试者的大脑皮层厚度分别构建结构协变脑网络，采取图论分析方法评估二者全局及节点网络水平的拓扑属性，并比较组间差异。

结果：与对照组相比，在网络密度为 0.20-0.50 的区间，INPH 组显示出更大的标准化聚类系数、小世界属性标量和较小的标准化特征路径长度，但差异无统计学意义 (P=0.58、0.56、0.89)；在全局网络水平，INPH 组的特征路径长度较对照组显著减低 (P<0.05)；在节点网络水平，INPH 组的平均边介数及平均节点介数较对照组亦减低，且存在统计学差异 (P<0.05)；在趋势上，INPH 组的聚类系数、全局属性增高。

结论：INPH 患者脑结构形态的改变揭示了该疾病潜在的脑组织重构方式，对于理解 INPH 的病理生理机制及疾病演变有重要意义。

PO-3101

吸烟成瘾与体重状态交互作用的脑结构磁共振研究

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【摘要】目的 探讨吸烟成瘾与体重状态之间的神经生物学相互作用机制。方法 回顾性分析 2019 年 1 月至 2021 年 12 月通过微信等网络平台招募的 99 名受试者的相关临床资料及静息态功能磁共振数据, 包括以下 4 组: (1) 超重吸烟成瘾组($n = 24$); (2) 正常体重吸烟成瘾组($n = 28$); (3) 超重非吸烟组($n = 19$), (4) 正常体重非吸烟组($n = 28$)。所有受试者均行 3D-T1 高分辨 MRI 检查。采用基于体素的形态学测量 (voxel-based morphometry, VBM) 的方法比较 4 组间的灰质体积 (gray matter volume, GMV) 的差异。采用双因素方差分析, 将年龄、受教育年限和头部运动作为协变量, 分析吸烟成瘾与体重状态对于大脑结构的交互作用、吸烟成瘾的主效应及体重状态的主效应, 并将其与临床资料做相关性分析。结果 吸烟成瘾和体重状态在左侧背外侧前额叶皮质 (dorsolateral prefrontal cortex, DLPFC) 存在显著的交互作用 (GRF 校正, 体素水平 $P < 0.001$, 团块水平 $P < 0.05$)。相关分析显示, BMI 与左侧 DLPFC GMV 存在二次效应 ($\beta = -3.846$, $t = -2.134$, $p = 0.036$)。此外, 吸烟成瘾主效应主要表现在双侧眶额叶皮层 (orbitofrontal cortex, OFC) (GRF 校正, 体素水平 $P < 0.001$, 团块水平 $P < 0.05$)。相关分析发现左侧 OFC GMV 与 FTND 评分呈负相关 ($r = -0.391$, $P = 0.006$), 右侧 OFC GMV 与吸烟指数呈负相关 ($r = -0.335$, $P = 0.019$)。在上述阈值水平未发现统计学意义的超重主效应。结论 本研究揭示了吸烟成瘾与体重状态在左侧 DLPFC GMV 存在拮抗作用, 这可能是吸烟成瘾和超重共同的神经生物学标志物。

PO-3102

酰胺质子转移成像与扩散峰度成像在无创定量评估慢性肾病患者肾功能及病理中的比较研究

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目的: 探究酰胺质子转移 (APT) 成像是否可用于评估慢性肾病 (CKD) 患者的肾功能和病理改变, 并与扩散峰度成像 (DKI) 进行比较。

方法: 本研究共纳入 41 例 CKD 患者和 16 例健康志愿者, 均行肾脏 DKI 和 APT 序列扫描。使用 Body Diffusion Toolbox 软件测量皮、髓质的平均扩散率 (MD) 及平均峰度 (MK), 使用 MATLAB 软件测量皮、髓质的 APT 值。根据肾小球滤过率估计值 (eGFR), 将患者分为肾功能稳定组和肾功能受损组。此外, 所有患者均行肾活检, 根据病理总分将患者分为轻度和中重度肾损伤组。比较健康志愿者、肾功能稳定组及肾功能受损组间, 以及健康志愿者、轻度肾损伤组及中重度肾损伤组间皮、髓质 MD、MK 和 APT 的差异, 分析各参数与 eGFR、病理总分的相关性, 评估各参数区分不同程度肾功能损害和肾病理损伤的诊断效能。

结果: 健康志愿者、肾功能稳定组和肾功能受损组三组间, 以及健康志愿者、轻度肾损伤组和中重度肾损伤组三组间的皮、髓质 MD、MK 和 APT 存在显著差异 (所有 $p < 0.01$)。皮、髓质 MD 与 eGFR 呈显著正相关 (所有 $p < 0.001$), 与病理总分呈显著负相关 ($p < 0.001$; $p = 0.002$)。皮、髓质 MK、APT 与 eGFR 呈显著负相关 (所有 $p < 0.001$), 与病理总分呈显著正相关 (MK: $p < 0.001$; $p = 0.001$; APT: $p < 0.001$; $p = 0.002$)。皮质 APT 与间质纤维化积分相关性最强 ($p < 0.001$)。髓质 APT 区分健康志愿者与肾功能稳定组, 以及区分健康志愿者与轻度肾损伤组的曲线下面积 (AUC) 最大, 分别为 0.985 和 0.974。皮质 MD 在鉴别肾功能稳定组与肾功能受损组中表现最佳, AUC 为 0.939。皮质 MK 在鉴别轻度肾损伤组与中重度肾损伤组中表现最佳, AUC 为 0.836。

结论: APT 成像和 DKI 均可无创、定量评估 CKD 相关的肾功能和病理改变, 有助于治疗干预和纵向监测。APT 成像在识别早期肾功能不全及病理损伤中优于 DKI, 而且在评估肾间质纤维化中表现出良好潜力。

PO-3103

基于多参数 MRI 影像组学评估卵巢癌淋巴结转移的研究

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目的 探讨多参数 MRI 影像组学在评估卵巢癌淋巴结转移的价值。

方法 回顾性分析 2020 年 1 月-2023 年 6 月于我院 87 例诊断为卵巢癌伴淋巴结转移患者的 MRI 影像学资料, 以手术病理结果作为金标准, 分为转移性淋巴结 (metastatic lymph node, MLN) 和非转移性淋巴结 (no-metastatic lymph node, NLN), 共选取 143 个淋巴结, 其中转移性淋巴结 79 个, 非转移性淋巴结 64 个。按 7:3 随机分成训练组 (100 个)、测试组 (43 个)。采用 ITK-SNAP 对淋巴结进行勾画, 提取其 T2WI 及增强 T1WI 的 MRI 影像组学特征并实现模型构建。通过独立样本 T 检验、卡方检验等分析转移性淋巴结与非转移性淋巴结的影像学特征。绘制受试者操作特征曲线计算模型曲线下面积 (area under the ROC curve, AUC)、灵敏度、特异性、阳性预测值及阴性预测值等指标进行性能比较分析。

结果 1、MLN 的短径及平均直径大于 NLN, MLN、NLN 组间的强化均匀性存在统计学差异, 其余特征组间均无统计学差异。2、经特征筛选后 T2WI 及增强 T1WI 最终分别保留 11、19 个影像组学特征。基于多参数 MRI 影像组学模型训练组及测试组的预测效能较单一参数的影像组学模型更优, 其 AUC、灵敏度、特异度、阳性预测值及阴性预测值分别为 0.93、85%、78%、83%和 89%。

结论 基于多参数的 MRI 影像组学模型可以无创性评估卵巢癌淋巴结转移的准确性, 为临床决策提供有价值的指导。

PO-3104

系统性红斑狼疮患者大脑半球间镜像同伦功能连接研究

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目的 探讨静息状态下系统性红斑狼疮患者脑镜像同伦功能连接特点。方法 纳入 65 例 SLE 患者 (non-NPSLE 30 例和 NPSLE 患者组 35 例) 和 31 名健康对照者 (HC), 行静息状态功能磁共振成像 (rs-fMRI) 检查, 并完成简易精神状态量表 (MMSE)、蒙特利尔认知功能评估量表 (MOCA)、医院焦虑抑郁量表 (HADS-A、HADS-D)、运动和认知功能疲劳量表 (FSMC-M、FSMC-C)。基于 Matlab 平台上 Restplus-V1.2 工具包进行 rs-fMRI 数据预处理, 计算 VMHC 值, 在 SPM12.0 软件中采用方差分析评估三组之间 VMHC 值的差异, 以三组间差异脑区为种子点, 提取差异脑区的 VMHC 值进行两两比较。最后提取差异脑区的 VMHC 值与临床资料行 Pearson 相关性分析, $P < 0.05$ 。结果 VMHC 值差异有统计学意义的脑区主要位于双侧海马旁回、颞上回、枕中回、中央前回、内侧和旁扣带回、背外侧额上回、中央后回; 两两比较 (事后分析) 显示, NPSLE 组与 non-NPSLE 组上述脑区 VMHC 值均低于对照组, NPSLE 组上述脑区 VMHC 值均低于 non-NPSLE 组; 与健康对照组相比, non-NPSLE 患者组双侧枕中回 VMHC 值增高。结论 系统性红斑狼疮患者双侧大脑半球镜像同伦功能连接存在异常, 可为其脑损伤的神经病理学机制提供新颖而有价值的观点。

PO-3105

急慢性下腰腿痛患者默认网络子系统的动静态神经机制变化

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目的：极易慢性化和高致残率已成为下腰腿痛的标签。以往的神经影像学研究表明，默认网络存在跨网络连接的可塑性改变，但是默认网络内部三个功能不同的子系统(核心子系统、背内侧前额叶子系统、内侧颞叶子系统)静态和动态的功能连接以及拓扑属性的变化尚不清楚。

方法：本研究收集 19 例急性期下腰腿痛患者(aLBLP)、31 例慢性期下腰腿痛患者(cLBLP)和 51 名健康对照者(HCs)的静息态功能磁共振成像数据，构建静态和动态默认网络功能连接矩阵。对于默认网络的静态功能连接矩阵，我们进一步计算拓扑属性和研究静态网络的功能变化。对于动态功能连接矩阵，我们分析了动态功能连接强度和拓扑属性的变异性。

结果：对于静态默认网络子系统的连边分析，cLBLP 患者与 HCs 相比核心子系统与内侧颞叶子系统以及背内侧前额叶子系统与内侧颞叶子系统之间的功能连接增加。对于静态拓扑属性，cLBLP 患者与 HCs 相比默认网络全局效率和双侧额下回节点聚类系数、节点效率、节点局部效率降低，而双侧后扣带皮层节点度中心度和右腹后侧顶下小叶节点聚类系数升高。在子系统水平的动态连边分析发现 aLBLP 患者与 HCs 相比核心子系统和内侧颞叶子系统之间的动态功能连接变异性显著降低。此外，cLBLP 患者的疼痛程度与右腹后侧顶下小叶(vpIPL)和右侧后顶下小叶(pIPL)之间的静态功能连接($r=-0.489$, $P=0.008$)以及右侧 vpIPL 的静态节点聚类系数($r=-0.555$, $P=0.002$)呈负相关。aLBLP 患者的病程与左侧后扣带皮层和左外侧颞皮质颞极动态功能连接的变异性呈负相关($r=-0.52$, $P=-0.52$)。

结论：默认网络静态功能连接和拓扑属性的变化揭示了慢性期下腰腿痛患者与疼痛强度的神经机制，动态功能连接的改变可成为预测急性下腰腿痛转变为慢性的潜在生物标志物。

PO-3106

磁共振细胞特征成像 IMPULSED 序列的研究进展

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细胞大小是组织的基本特征，从分子到器官水平都发挥着重要作用，包括细胞代谢、增殖和组织生长。在疾病进展期间或治疗后，细胞大小可能会显著变化。因此对细胞大小及其随时间变化的测量可在细胞水平上为临床提供关键信息。对于癌症的诊断和预后，细胞大小同样是有意义的，因为它在有丝分裂期间和死亡前会发生变化，因此可以作为评估肿瘤进展和对治疗反应的独特手段。但是，目前大多数情况下只能通过对侵入性获得的组织样本进行病理评估来获得细胞大小。因此开发一种能够非侵入性绘制细胞大小的成像方法，对微结构进行定量测量成为一项亟待解决的问题。IMPULSED（基于有限谱编辑扩散模型的显微结构成像）是基于时间扩散光谱(TDS)的 dMRI 采集方法。它已被证明可提供快速、稳定及可靠的反应平均细胞大小，并适用于临床成像。目前，IMPULSED 已经进行了全面的临床前及临床验证，分别包括计算机模拟、体外细胞及动物研究、肝脏乳腺及前列腺肿瘤研究、以及免疫治疗疗效研究，这些验证显示，IMPULSED 可以在较短时间的人体成像中可靠的反应细胞大小，且与细胞密度无关。

PO-3107

酰胺质子转移成像在前列腺癌诊断及危险分层评估中的应用价值

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目的 探讨磁共振酰胺质子转移 (amide proton transfer, APT) 成像在前列腺癌诊断中的应用价值及其对前列腺癌危险分层评估的可行性。**方法** 收集因 PSA 升高或排尿困难怀疑前列腺癌来我院就诊患者, MRI 检查前未接受过前列腺相关手术、放疗以及内分泌治疗者, MRI 检查后经穿刺活检或手术明确病理结果, 其中前列腺增生患者 50 例, 前列腺癌患者 132 例, 在前列腺癌患者中, GS \leq 6 分 16 例, GS=7 分 49 例, GS \geq 8 分 67 例, 术前行常规序列 T1WI、T2WI、DWI 和 APT 成像序列扫描, 分别测量前列腺癌区、前列腺增生的不对称磁化转移率 (MTRasym) 值, 使用 Mann-Whitney 检验对测得的参数进行统计学分析。根据 Gleason 评分将其分组, GS \leq 6 分为低危组, GS=7 分为中危组, GS \geq 8 分为高危组, 并比较各组间病变区 MTRasym 值的差异; 使用 Spearman 等级相关对 MTRasym 值与 Gleason 评分进行相关性分析。采用受试者工作特征 (ROC) 曲线评价 MTRasym 值的阈值及诊断效能。**结果** 前列腺癌区 MTRasym 值显著高于前列腺增生组织 ($P<0.001$); 低危组与中危组、低危组与高危组、中危组与高危组之间 MTRasym 值差异有统计学意义 ($P<0.05$); Gleason 评分与 MTRasym 值呈正相关 ($r=0.694$, $P<0.001$)。低危组与中危组、低危组与高危组、中危组与高危组的 ROC 曲线下面积 (AUC) 分别为 0.707、0.941、0.917, 诊断阈值分别为 2.95%、3.55%、3.75%。**结论** APT 成像对前列腺癌的诊断具有一定价值, 能够对前列腺癌与前列腺增生的鉴别诊断提供帮助并且对其危险度的评估也有重要意义。

PO-3108

基于 DCE-MRI 分析评价兔肢体高压电烧伤早期骨骼肌变化

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目的: 探讨 DCE-MRI 分析评价兔肢体高压电烧伤早期骨骼肌微循环灌注变化的可行性
方法: 32 只中国大耳白兔随机分为高压电烧伤组 ($n=20$) 和对照组 ($n=12$)。造模后各时间点 (0.5h、24h、48h、72h) 对兔右下肢行轴位 FSE-T1WI、FSE-T2WI 及 DCE-MRI 检查。DCE-MRI 原始数据利用 Omni-Kinetics 软件在兔对侧正常肢体肌肉选取参考区域, 建立 R-R 模型, 手动勾画损伤肌肉 ROI (避开气体、坏死、出血区), 采用 merge 功能软件自动计算获取容积转运常数 Ktrans、速率常数 Kep。扫描完成后立即处死实验兔, 取损伤肢体肌肉病理组织, 采用免疫组化 CD31 计算微血管密度 (MVD) 值。采用独立样本 t 检验对同一时间点电烧伤组与对照组 Ktrans 值、Kep 值的差异进行比较。采用单因素方差分析对不同时间点 Ktrans 值、Kep 值、电烧伤组各时间点 MVD 值的差异进行比较。采用 Pearson 相关分析评价 MVD 值和 Ktrans 值、Kep 值的关系。
结果: 各时间点电烧伤组与对照组 Ktrans 值差异均有统计学意义 ($P<0.05$), 除 72h 组 ($P=0.903$) 外各时间点电烧伤组与对照组 Kep 值差异均有统计学意义 ($P<0.05$)。对照组 Ktrans 值、Kep 值随时间变化差异无统计学意义 ($P>0.05$)。电烧伤组各时间点 Ktrans 值和 Kep 值差异均有统计学意义 ($P<0.05$), 而且 Ktrans 值和 Kep 值均在 24h 达到峰值, 其中电烧伤组 Ktrans 值、Kep 值 0.5h 组与 48h 组差异无统计学意义 (P 值分别为 0.066、0.773), 余电烧伤各时间点 Ktrans 值和 Kep 值差异有统计学意义 ($P<0.05$)。MVD 值与 DCE-MRI 灌注参数 Ktrans 值、Kep 值均呈正相关 (r 值分别为 0.954、0.950, $P<0.01$)
结论: DCE-MRI 定量参数 Ktrans 值和 Kep 值可用于评估肢体高压电烧伤早期骨骼肌微循环灌注变化。

PO-3109

应用 QSM 评估帕金森病合并 2 型糖尿病患者的脑静脉血氧饱和度变化

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目的: 应用 QSM 定量分析脑静脉血氧饱和度评价无 T2DM 的 PD 患者 (PD-DM) 与合并 T2DM 的 PD 患者 (PD+DM) 脑静脉血氧饱和度的差异, 并探讨其与认知功能障碍的相关性。

材料与方法: 经临床拟诊 16 例 PD-DM 患者 (男 8 例女 8 例平均年龄 70.51 ± 3.20 岁) 16 例健康对照患者 (男 8 例女 8 例平均年龄 72.83 ± 3.39 岁) 纳入本研究。收集患者的临床资料包括 MMSE、MOCA、日常生活活动能力 (ADL) 和实验室指标: 空腹血糖、甘油三酯、高密度脂蛋白 (HDL)、低密度脂蛋白 (LDL)。所有受试者均进行常规联影 3.0T MRI 序列及 QSM 序列扫描, 手动勾选双侧大脑静脉 (大脑皮层静脉 CVV、丘纹上静脉 STV、透明隔静脉 SPV、大脑内静脉、基底静脉) 的兴趣区域 (ROI), 并测量磁敏感值 (MSV) 对于符合正态分布的值采用 T 检验, 否则采用秩和检验。采用 Spearman 相关检验认知评分, 实验室指标与 MSV 之间的相关性。

结果: 与 PD-DM 组相比, PD+DM 组中双侧丘纹上静脉的 (STV) 和大脑皮层静脉 (CVV) 的 MSV 具有显著差异性与 HC 相比, PD-DM 组中所有静脉的 MSV 均上升, 其中双侧基底动脉 (BV) 双侧大脑皮层静脉 (CVV) 的 MSV 具有显著差异性 ($P < 0.05$) PD+DM 组所有静脉 MSV 均大于 HC, 双侧丘纹上静脉 (STV)。大脑皮层静脉 (CV) 透明隔静脉 (SPV) 具有显著差异性 ($P < 0.05$) 双侧 STV 的 MSV 与 MMSE 具有显著相关性, 双侧 ICV、CVV 的 MSV 与 ADL 具有显著相关性, 空腹血糖与双侧 STV 及 CVV 显著相关, 双侧 CVV 与 HDL 具有显著相关性。

结论: PD 合并 T2DM 患者的脑静脉血管饱和度较无 T2DM 的 PD 患者明显下降且与认知功能障碍和高血糖状态相关。

PO-3110

用于 3T 小动物成像的智能无线超材料

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目的: 设计并制造用于 3T 小动物成像的智能无线超材料, 实现图像信噪比大幅度增强和小鼠/大鼠头部的超高分辨清晰成像 (小鼠头部分辨率 $0.078 \times 0.078 \times 0.8 \text{ mm}^3$, 大鼠头部分辨率 $0.1 \times 0.1 \times 1 \text{ mm}^3$), 提升 3T 临床系统的小动物成像能力, 为科研人员提供更先进的成像手段。

方法: 使用超材料获得小鼠头部和大鼠头部的 T2 FSE 序列图像。并在相同序列参数条件下, 使用小鼠/大鼠商用线圈获得小鼠头部和大鼠头部的 T2 FSE 序列图像, 最后比较超材料与商用线圈的图像信噪比。

结果: 超材料在不调整任何扫描参数条件下即可大幅度增强图像信噪比, 并且支持小鼠头部分辨率 $0.078 \times 0.078 \times 0.8 \text{ mm}^3$ 、大鼠头部分辨率 $0.1 \times 0.1 \times 1 \text{ mm}^3$ 的超高分辨率清晰成像, 图像中各个组织细节显示清晰, 图像对比度好。此外, 超材料的图像信噪比显著优于小鼠/大鼠商用线圈: 小鼠头部专用超材料获得的图像信噪比是商用 8 通道小鼠专用线圈 4 倍, 大鼠头部专用超材料获得的图像信噪比是商用 12 通道大鼠专用线圈 3 倍。

结论: 超材料可大幅度提升临床 3T 系统的小动物成像能力, 实现常见于 9.4T 的超高分辨成像, 有望为 MRI 领域带来技术革新。

PO-3111

CT 联合 MR 多序列成像对胆总管小微结石的诊断价值

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[摘要]目的：探讨 CT 联合磁共振多序列成像对胆总管小微结石的诊断价值。材料和方法：回顾性收集上海市静安区市北医院放射科 2019 年 3 月至 2021 年 7 月所有行上腹部 CT 平扫和磁共振胰胆管水成像 (magnetic resonance cholangiopancreatography, MRCP) 检查并经内镜逆行胰胆管造影 (endoscopic retrograde cholangiopancreatography, ERCP) 证实的胆总管小微结石病例的影像及临床资料，共计 55 例。对比分析 CT、磁共振各序列及两者联合诊断胆总管小微结石的阳性率。结果：对于 55 例胆总管小微结石，CT 薄层扫描检出阳性率为 56.4%，MR 多序列扫描阳性率为 80.6%，MR 多序列扫描对胆总管小微结石诊断优于 CT 扫描 ($\chi^2 = 7.08$, $P < 0.05$)。CT 联合 MR 多序列阳性率为 98.2%，CT 联合 MR 多序列扫描诊断胆总管小微结石优于两种单独检查方法 (χ^2 的值分别为 27.38, $P < 0.01$; 9.35, $P < 0.05$)。对于 22 例胆总管微结石，CT 薄层扫描阳性率为 40.9%，MR 多序列扫描阳性率为 68.2%，两者比较差异无统计学意义 ($\chi^2 = 3.30$, $P > 0.05$)，CT 联合 MR 多序列扫描阳性率为 95.5%，CT 联合 MR 多序列扫描诊断胆总管微结石也优于两种单独检查方法 (χ^2 的值分别为 15.09, $P < 0.01$; 5.50, $P < 0.05$)。结论：CT 联合 MR 多序列成像有利于提高胆总管小微结石诊断的检出率，对胆总管小微结石的诊疗具有重要价值。

PO-3112

基于化学交换饱和转移成像鉴定氧化还原代谢物的体内及体外实验

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目的：本研究旨在通过试管模型和体内实验，优化和验证化学交换饱和转移 (Chemical Exchange Resonance Imaging, MRI) 成像鉴定在体肾脏氧化还原状态方法的可靠性，并通过两种量化方法：磁化转移率不对称分析法和七池洛伦兹拟合，定量分析各氧化还原代谢物以及正常兔肾皮髓质 CEST 效应。

方法：首先通过试管模型优化 CEST 扫描参数，试管模型实验配置生理浓度及条件下氧化还原代谢物溶液。在 3T 磁共振成像仪上，使用不同饱和能量 (B_1) 和不同饱和脉冲持续时间进行扫描，获取 CEST 图像与谱线，通过定量分析各代谢物 CEST 效应，从而获取最佳扫描参数。通过体内实验，运用两种量化方式，对比肾脏皮髓质 CEST 信号。

结果：在试管模型结果中，当射频持续时间为 2000ms 时，随着 B_1 的增加，所有代谢物的 CEST 效应逐渐增加。而部分氧化型代谢物 (例如丙酮酸) 的 CEST 效应在 $B_1=3\text{ut}$ 时反而低于 2ut，因此最佳饱和能量确定为 2ut。当饱和能量固定为 2ut 时，分别以饱和脉冲持续时间为 1500ms 及 2000ms 进行扫描，各代谢物 CEST 效应在 2000ms 时较高，因此饱和能量为 2ut，射频持续时间 2000ms 为最优扫描参数。

在正常兔肾在体实验中，运用于试管模型中得出的最优扫描参数进行活体扫描，在饱和频率为 0.5ppm 时，肾皮质和外髓质 CEST 信号差异存在统计学意义 ($P < 0.05$)。以七池洛伦兹拟合算法后处理后分析，正常兔肾皮髓质的幅值在水池和羟基池中存在差异，并具有统计学意义 ($P < 0.05$)。

结论：CEST 成像技术可以明确各氧化还原代谢物独立 CEST 效应，为活体 CEST 成像提供理论依据，且运用两种量化方式均可捕捉到正常兔肾皮髓质 CEST 信号差异。多池洛伦兹拟合算法后处理

CEST 数据后,可提取出与肾脏氧化还原状态相关的 CEST 效应,较传统 CEST 后处理方法而言消除了直接饱和效应和磁化转移效应的干扰,提高了 CEST 活体代谢物定量分析的准确性,为后续研究肾缺血再灌注损伤及治疗奠定理论基础。

PO-3113

3.0T 磁共振风车 dS ZOOM 技术与高分辨率技术在直肠肿瘤成像中的应用价值

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目的:探讨风车 (MultiVane XD) 小视野 (ZOOM) 技术在直肠肿瘤中的应用价值。

方法:前瞻性收集我院 2021 年 2 月至 2021 年 8 月接受磁共振检查的 50 例直肠肿瘤患者进行研究,行 MVXD ZOOM 和 HR 的快速自旋回波轴位 T2W 扫描,都应用并行采集技术,采集范围自直肠上缘至耻骨联合,采用 5 分法比较图像质量和扫描时间,Cohen Kappa 法评价 2 名医师评分的一致性,Wilcoxon 配对符号秩和检验比较图像质量的差异。

结果:两名医师对图像质量评价的 Kappa 值 0.811,($P<0.01$),一致性非常好。MVXD ZOOM T2WI 图像质量评分更高,差异有统计学意义 ($P<0.01$); 50 例患者中有 37 例 (占总数的 74%) 图像等级为最佳的 5 分,得到无伪影干扰 4 分和 5 分的图像达到 50 例 (100%)。在 22 例肠气较多的患者中,MVXD ZOOM 技术优势更加显著,其评分更优,这些患者在 HR TSE 序列中均见肠管显著扩张和更明显的肠管运动伪影。采集时间上 ZOOM 技术比 HR T2W 序列快 5 秒。

结论: MVXD ZOOM 技术在 T2WI 轴位图像上可以更好地显示直肠解剖细节,减轻成像伪影,提高图像质量。

PO-3114

凝血功能参数联合 MRI 预测胎盘植入患者剖宫产术中出血风险

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目的:探讨术前凝血功能参数联合 MRI 对胎盘植入性疾病患者 (placenta accreta spectrum, PAS) 剖宫产术中出血的预测价值。

方法:回顾性分析 2019 年 10 月-2023 年 5 月于东莞市人民医院就诊、剖宫产术前进行 MRI 检查、凝血指标检测,后经临床手术或病理检查确诊的 174 例胎盘植入患者。根据术中出血量是否 $\geq 1000\text{ml}$,将患者分为大出血组和对照组,对两组之间术前凝血功能参数、MRI 征象、临床因素进行单因素和多因素分析,构建预测 PAS 患者剖宫产术中出血风险模型。

结果:两组间单因素分析显示,前置胎盘、剖宫产史、超声怀疑或诊断胎盘植入、胎盘局部膨突、T2WI 胎盘内低信号、胎盘内异常血管、子宫浆膜层血管增多、凝血酶原时间 PT、纤维蛋白原 FIB 差异均有统计学意义 ($P<0.05$)。二元 Logistic 回归分析结果显示,前置胎盘、超声怀疑或诊断胎盘植入、胎盘局部膨突、T2WI 胎盘内低信号、子宫浆膜层血管增多、FIB 为 PAS 患者剖宫产术中大量出血的独立危险因素。ROC 曲线示联合预测模型的 AUC 为 0.880,敏感度为 82.1%,特异度为 80.0%,校准曲线显示模型校准能力好。

结论:术前凝血功能参数联合 MRI 征象对 PAS 患者剖宫产术中出血有良好的预测价值。

PO-3115

基于单次屏气三维电影序列评估心脏功能和心肌应变的研究

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目的: 探究一种新型三维电影序列和传统二维电影序列评估心室功能和心肌应变的一致性。

方法: 采用二维电影平衡稳态自由进动序列和通过静态外容积减法增强感知编码的三维电影序列获得患者的心脏电影图像。将三维电影图像按照二维电影图像的层厚和层间距进行重建。应用后处理软件计算得到心脏功能和心肌应变。采用 Bland-Altman 图和一致性相关系数比较两种序列心脏功能和应变参数的一致性。

结果: 共纳入 26 例患者, 其中 2 例患者屏气不佳, 无法进行功能和应变的定量分析。其余 24 例患者的三维图像质量良好。三维电影和二维电影测得的左心室射血分数分别为 58.3 (50.9, 61.9) 和 59.0 (51.2, 61.7), 具有极好的一致性 (ICC: 0.99, 95% CI: [0.98, 0.99]) 且没有偏倚。三维电影和二维电影测得的右心室射血分数分别为 52.2 (44.2, 53.8) 和 51.7 (44.9, 53.7), 具有良好的一致性 (ICC: 0.83, 95% CI: [0.65, 0.92]) 且没有偏倚。三维电影和二维电影测得的整体周向应变分别为 -16.0 (-17.6, -13.2) 和 -18.2 (-19.6, -15.3), 具有良好的一致性 (ICC: 0.77, 95% CI: [0.54, 0.89]) 且没有偏倚。三维电影和二维电影测得的整体径向应变分别为 28.2 (21.0, 31.1) 和 31.2 (23.1, 34.0), 具有良好的一致性 (ICC: 0.83, 95% CI: [0.64, 0.92]) 且没有偏倚。三维电影和二维电影测得的整体纵向应变分别为 -10.4 (-13.5, -6.8) 和 -16.1 (-18.9, -11.8), 具有良好的一致性 (ICC: 0.76, 95% CI: [0.53, 0.89]) 且没有偏倚。虽然三维电影图像质量没有二维电影图像质量好, 但是两种序列得到的心室功能和心肌应变参数仍具有良好的一致性。

结论: 通过静态外容积减法增强感知编码三维电影序列能在单次屏气的时间就获得全心三维电影图像, 可用于快速评估心脏功能和应变。

PO-3116

不同流速编码在脑积水患儿的脑脊液电影成像的可行性研究

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目的: 探讨基于磁共振成像技术中的 PhaseContrast 相位对比法, 设置不同的流速编码, 进行脑脊液电影成像, 探究最佳流速编码在脑积水患儿的成像中的图像质量。方法: 回顾性收集自 2023 年 5 月至 2022 年 8 月期间 13 例脑积水患儿 (男 9 例, 女 4 例), 应用新一代科研型磁共振 Prisma, 运用 PhaseContrast 相位对比法, 设置了 2, 4, 6, 8, 10 共五组的流速 (单位是 cm/s) 进行脑脊液电影成像, 主要序列为矢状位的 CSF-PCA 进行脑脊液电影的观察, 横断位的 CSF-QF 进行流速测定。由 2 名放射科医师按 5 分制标准法对五组不同流速的矢状位 CSF-PCA 进行主观评价并评分; 2 名放射科技师对五组不同流速的横断位 CSF-QF 进行流速测定。结果: 流速编码为 2, 4, 6, 8, 10 (单位是 cm/s) 的性别、年龄、体重、心率差异无统计学意义 ($P > 0.05$); 流速编码为 2, 4, 6 组的图像主观评分均高于 3 分, 且主观评分一致性好 (Kappa 值分别为 0.611、0.680、0.599); 其中流速编码为 2 (单位是 cm/s) 的图像质量评分较其他流速编码为 4, 6, 8, 10 各组高, 差异具有统计学意义 ($P < 0.05$)。结论: 运用 PhaseContrast 相位对比法, 设置流速编码为 2 (单位是 cm/s) 对脑积水患儿进行脑脊液电影成像图像质量最佳。

PO-3117

可视化呼吸训练在肝脏 MR 增强扫描序列中的应用

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目的 探讨可视化呼吸训练在肝脏 MR 增强扫描前的呼吸训练效果。

方法 选取 2023 年 4 月至 2023 年 6 月于武汉同济医院中法新城院区首次行肝脏 MR 憋气增强扫描（肝脏平扫+三期动态增强扫描）患者 174 例作为研究对象，采用随机数字表法将其分为常规组（n=87，男 50 例，女 37 例）和实验组（n=87，男 51 例，女 36 例）；常规组采用护士进行口头呼吸训练，对照组采用自研的可视化呼吸训练设备进行呼吸训练并实时监测患者憋气情况。测量并比较两组患者的肝脏 MR 憋气 T1 扫描各期相（平扫期、动脉期、门脉期、静脉期、延迟期）的图像信噪比（SNR）、对比肌肉信噪比（CNR）有无统计学差异。

结果 t 检验显示对照组平均年龄 53.21 ± 1.32 岁，实验组平均年龄 55.93 ± 1.27 岁，二者无统计学差异；对照组患者身高体重指数（BMI， 22.90 ± 3.66 ）与对照组（ 23.64 ± 3.51 ）无统计学差异。Mann-Whitney U 检验显示肝脏憋气扫描序列中，平扫期（ $p=0.018$ ）、门脉期（ $p=0.016$ ）、静脉期（ $p=0.003$ ）、延迟期（ $p=0.044$ ）图像信噪比（SNR）明显高于对照组并具有统计学差异；实验组动脉期图像 SNR 也高于对照组，但没有统计学差异（ $p=0.069$ ）。图像对比肌肉信噪比（CNR）分析显示平扫期（ $p=0.006$ ）、门脉期（ $p=0.029$ ）、静脉期（ $p=0.002$ ）、延迟期（ $p=0.010$ ）图像 CNR 明显高于对照组并具有统计学差异；动脉期两组图像 CNR 没有统计学差异（ $p=0.057$ ）

结论 可视化呼吸训练在肝脏 MR 憋气增强扫描序列中能够明显提高图像质量。

PO-3118

非缺血性扩张型心肌病患者中期心脏磁共振随访的预后价值：
一项前瞻性队列研究

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目的: 扩张型心肌病(DCM)患者的随访方案目前尚无定论。我们旨在探讨基于心脏磁共振(CMR)中期随访时心功能、结构和组织特征的预后价值。我们假设在一段时间的指导性药物治疗(GDMT)后复查 CMR 可以为 DCM 患者提供更好的预后价值。

方法: 我们前瞻性地招募了接受 GDMT 并伴有基线和随访 CMR 的 DCM 患者。测量包括双心室容积和射血分数、晚期钆增强、初始 T1、初始 T2 以及基线和随访时的细胞外体积。主要心脏不良事件(MACE)被定义为心血管死亡、心脏移植和心力衰竭再入院的复合终点。

结果: 235 例 DCM 患者(中位 CMR 间隔:15.3 个月;四分位数范围:12.5-19.2 个月), 54 例(23.0%)在随访期间经历了 MACE(中位数:31.2 个月;四分位数间距:20.8-50.0 个月)。在多变量 Cox 回归中, 随访 CMR 模型的预测价值明显优于基线模型。逐步多变量 Cox 回归分析显示:随访左室射血分数(LVEF;风险比[HR], 0.93;95%置信区间[CI], 0.91-0.96; $P<0.001$)和原生 T1 (HR, 1.01;95% ci, 1.00-1.01; $P=0.030$)是 MACE 的独立预测因子。随访 LVEF $\geq 40\%$ 或稳定 LVEF $< 40\%$ 且 T1 ≤ 1273 ms 为低风险(年事件率 $< 4\%$), 而稳定 LVEF $< 40\%$ 且 T1 > 1273 ms 或 LVEF $< 40\%$ 且恶化为高风险(年事件率 $> 15\%$)。

结论: 随访 CMR 比基线 CMR 提供更好的风险分层。LVEF 和 T1 映射的联合改善与 MACE 风险降低相关。

PO-3119

刀锋伪影校正技术在精神疾病患者海马 MRI 检查中的应用研究

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目的 探讨磁共振刀锋伪影校正 (BLADE) 技术在改善精神疾病患者海马 MRI 检查中图像质量的应用。**方法** 对 68 例精神疾病患者行 3.0T-MRI 海马斜冠状位扫描, 采集包括: 应用 BLADE 技术的 BLADE T2WI TSE、BLADE T2WI FIAIR 序列及常规 T2WI TSE、T2WI FLAIR 序列; 并且, 应用以上四个序列进行 ACR 标准模体扫描。患者的图像由 2 名放射科医师采用 5 分法对运动伪影、搏动伪影、颗粒度、海马图像质量 4 个质量指标进行评价, 并应用 Wilcoxon's 符号秩检验分析。ACR 模体的图像通过识别图像的钻孔阵列和轮辐的数目, 半定量评价各序列的高对比空间分辨率(The high contrast spatial resolution, HCSR)和低对比物体探测能力(The low contrast object detectability, LCD)。结果 在图像的运动伪影、搏动伪影、海马图像质量方面, 结合 BLADE 技术序列与常规序列相比表现更优($P < 0.05$); 在图像颗粒度方面, 常规序列表现更优($P < 0.05$)。ACR 模体半定量分析显示, 结合 BLADE 技术序列与常规序列相比, 在 LCD 检测方面结果更优、在 HCSR 检测方面结果相同或略逊。结论 在配合欠佳的精神疾病患者海马检查中, BLADE 技术的应用能够改善图像运动伪影、搏动伪影, 提高图像质量。

PO-3120

血液透析患者心脏结构和功能改变的磁共振研究

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目的: 应用心脏磁共振全面评价血液透析患者心脏结构和功能。

方法: 共纳入未进行血液透析的慢性肾病患者 15 例及血液透析大于 6 个月的患者 21 例。所有患者均采用 GE 3.0T 扫描仪进行扫描, 扫描的序列包括心脏电影序列、T1 mapping 及 T2 mapping 序列。应用后处理软件在电影图像上勾画心内外膜轮廓, 得到患者的心室功能和心肌应变参数。将机器自动生成的 map 图导入后处理软件, 得到 T1 值和 T2 值。

结果: 与非透析患者相比, 透析患者的左室射血分数 (63.7 ± 5.3 vs. 57.0 ± 7.2 , $P = 0.004$), PCS (-18.1 ± 2.0 vs. -14.7 ± 7.1 , $P = 0.012$), PRS (31.9 ± 5.7 vs. 26.1 ± 5.6 , $P = 0.007$), PLS (-14.9 ± 2.2 vs. -13.1 ± 1.6 , $P = 0.011$)均显著降低。与非透析患者相比, 透析患者的左心室基底 T1 值 (1334 ± 82 vs. 1277 ± 51 , $P = 0.015$), 中间层 T1 值 (1330 ± 68 vs. 1283 ± 42 , $P = 0.014$)和总 T1 值 (1327 ± 65 vs. 1285 ± 46 , $P = 0.032$) 均显著降低。与非透析患者比较, 透析患者的右室射血分数 (57.0 ± 7.0 vs. 56.3 ± 7.4 , $P = 0.882$)、心尖 T1 值 (1327 ± 66 vs. 1298 ± 62 , $P = 0.186$)、基底 T2 值 (56 ± 7 vs. 53 ± 4 , $P = 0.051$), 中间层 T2 值 (58 ± 9 vs. 55 ± 4 , $P = 0.199$), 心尖部 T2 值 (65 ± 15 vs. 59 ± 6 , $P = 0.461$), 总 T2 值 (59 ± 8 vs. 55 ± 4 , $P = 0.060$) 差异无统计学意义, 但透析患者的 T1、T2 值仍有降低的趋势。

结论: 透析患者心脏功能和应变发生恶化, T1 值和 T2 值降低可能与血液透析后有效的液体管理减少了心肌水肿有关。

PO-3121

MENSA 和 CUBE STIR 技术对坐骨神经图像质量的比较价值

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目的:比较多回波稳态采集成像 (MENSA) 与 3D 容积脂肪抑制 (CUBE STIR) 在坐骨神经成像的图像质量。

方法:于我院行坐骨神经 MR 检查的患者 10 例, 均行坐骨神经 MR 检查, 其中均采用冠状面 MENSA 和 CUBE STIR 扫描, 4 例患者存在坐骨神经病变。由两位资深影像诊断医生对图像质量进行主观评价分级, 同时运用感兴趣区 (ROI) 技术计算坐骨神经、梨状肌信号强度比。主观评价内容包括坐骨神经、梨状肌正常组织结构 (包括臀上动静脉)、病变清晰度、图像失真变形程度、磁敏感伪影以及整体图像质量等。客观评价指标包括基于 2 组坐骨神经图像测量的病变大小、信号强度比 (CNR) 及信噪比 (SNR)。由两名经验丰富的放射科诊断医师主观评分的一致性采用配对样本 t 检验进行组间分析。

结果:2 组坐骨神经图像间正常组织结构的显示 (包括臀上动静脉)、信号强度比 (CNR)、病变的清晰度以及整体图像质量的差异均具有统计学意义 (P 均 <0.05), CUBE STIR 组图像的主观评分显著高于 MENSA 组。2 组图像间坐骨神经最大横径、SNR、磁敏感伪影、图像的失真变形程度均无统计学意义 (P 均 >0.05)。

结论: 与 MENSA 技术相比, CUBE STIR 技术可以有效降低梨状肌脂肪伪影、磁敏感伪影, 更准确地显示坐骨神经正常解剖结构和病变组织, 明显改善坐骨神经图像的质量, 可以成为坐骨神经 (梨状肌综合征) 成像的首选序列。

PO-3122

功能 MRI 联合生化指标对肾氧合水平与早期肾功能损伤

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目的 探讨 MRI BOLD 成像评估患者肾氧合水平与早期肾功能损伤的相关性。资料与方法 选取肾内科确诊因糖尿病、高血压、肾病引起下肢水肿的 35 例肾功能损伤需穿刺活检 (肾穿) 的患者及 24 例健康志愿者, 行腹部常规 MRI 及 MRI BOLD 成像检查, 根据尿白蛋白排泄率将患者分为尿白蛋白正常组 21 例和尿白蛋白微量组 19 例。由 2 名影像科主治医师分别于肾门水平每侧肾脏上、中、下极的皮质及髓质内绘制 6 个圆形感兴趣区 (3 个位于皮质, 3 个位于髓质), 取 2 名医师测得双肾皮质 (CR2*)、髓质 (MR2*) 的平均值, 并计算 MR2* 与 CR2* 比值 (MCR)。比较 2 名医师测得 CR2*、MR2* 的一致性。比较同一组受试者肾脏 CR2*、MR2* 的差异; 比较 3 组受试者 CR2*、MR2*、MCR 的差异; 分析 CR2*、MR2*、MCR 与生化指标血清肌酐、尿白蛋白排泄率、尿 $\beta 2$ 微球蛋白、转铁蛋白、N-乙酰-D 氨基葡萄糖苷酶、视黄醇结合蛋白、 β -半乳糖苷酶、肾小球滤过率 (eGFR) 的相关性。结果 2 名医师测得 CR2*、MR2* 的一致性良好 (ICC >0.78)。同一组受试者 MR2* 高于 CR2* ($P <0.001$)。3 组间 MR2*、MCR 差异有统计学意义 ($P <0.001$), 组间两两比较显示尿白蛋白正常组 MR2*、MCR 高于对照组 ($P <0.001$); 尿白蛋白微量组 MR2*、MCR 低于尿白蛋白正常组 ($P <0.05$)。MR2* 与 eGFR 呈正相关 ($P <0.001$), 与血清肌酐、尿白蛋白排泄率、尿 $\beta 2$ 微球蛋白、转铁蛋白、视黄醇结合蛋白、 β -半乳糖苷酶呈负相关 ($P <0.05$); MCR 与 eGFR 呈正相关 ($P <0.001$), 与血清肌酐、尿白蛋白排泄率呈负相关 ($P <0.05$)。结论 MRI 能无创评价患者肾氧合水平, MR2*、MCR 与 eGFR 等肾功能指标具有相关性。

PO-3123

磁共振 Radial vibe T1 序列在胎儿中枢神经系统疾病的应用

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目的 对比分析 Radial VIBE T1 序列和常规 VIBE T1 序列在诊断胎儿中枢神经系统疾病中的价值。
方法 对 74 例行胎儿中枢神经系统磁共振检查的孕妇, 分别进行 Radial VIBE T1 序列扫描和常规 VIBE T1 序列扫描, 统计分析 Radial VIBE T1 组与常规 VIBE T1 组对胎儿中枢神经系统疾病的检出率和两组图像质量差异的统计学意义。
结果 在 74 胎儿图像中, Radial VIBE T1 加权图 62 例能够分辨颅脑灰白质, 52 例显示核, 8 例显示胎儿颅内出血; 常规 VIBE T1 加权图 25 例能够分辨颅脑灰白质、12 例显示核团、5 例显示胎儿颅内出血。2 位诊断医生对 74 例胎儿头颅的 Radial VIBE T1 和常规 VIBE T1 诊断信心度评分平均值为图像质量(3.6 ± 0.6 vs. 1.8 ± 0.8), $P < 0.05$ 。Radial VIBE T1 和常规 VIBE T1 诊断信心度评分之间差异均具有统计学意义 (P 值 < 0.05)。
结论 在胎儿头颅磁共振成像诊断中 Radial VIBE T1 序列较常规 T1 序列具有明显的诊断价值。Radial VIBE T1WI 序列采用了特殊的 K 空间填充方案, 具有明显的抗运动伪影能力, 可清晰的显示胎儿脑部正常解剖结构及其病变, 在显示胎脑的脑沟、脑回等结构明显优于超声。与常规 VIBE T1WI 序列对比, Radial VIBE T1WI 能够清晰的显示基底节区核团结构, 区分灰白质, 突出脑皮质层, 确诊颅内小出血点和小的结节性硬化。高清的 Radial VIBE T1WI 序列图能够清晰的显示胎脑髓鞘化的程度, 为进一步研究胎儿脑发育提供了新的方案。

PO-3124

静息态血氧水平依赖功能磁共振成像对急性脑梗死患者上肢运动功能康复的诊断价值

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目的: 探讨静息态血氧水平依赖功能磁共振成像 (BOLD-fMRI) 对急性脑梗死 (ACI) 患者上肢运动功能康复的诊断价值。

方法: 纳入在我院就诊的 30 例确诊为急性脑梗死的患者作为试验组, 26 例健康志愿者作为对照组。试验组和对照组均行 BOLD-fMRI 检查, 测量相关脑区低频振幅(ALFF), 对试验组和对照组相关脑区低频振幅(ALFF)进行对比。对试验组患者进行 Fugl-Meyer 肢体运动功能量表 (FMA) 评分、日常生活能力 Barthel 指数评分, 对比相关脑区 ALFF 与评分的关系。试验组患者进行两周的针灸推拿康复治疗后再行 BOLD-fMRI 检查和 FMA 评分、Barthel 指数评分, 并与治疗前的数据进行对比。

结果: 试验组辅助功能区、感觉运动区、后顶叶皮层、运动前区的 ALFF 值较对照组均下降 ($P < 0.05$)。试验组各脑区 ALFF 值与 FMA 评分、Barthel 指数评分呈负相关 ($P < 0.05$)。试验组 FMA 评分、Barthel 评分在治疗后均高于治疗前 ($P < 0.05$); 辅助功能区、感觉运动区、后顶叶皮层、运动前区的 ALFF 值均高于治疗前, 差距具有统计学意义 ($P < 0.05$)。

结论: 静息态血氧水平依赖功能磁共振成像 (BOLD-fMRI) 对急性脑梗死 (ACI) 患者的上肢运动功能康复具有较高的诊断与评估价值。

PO-3125

钆塞酸二钠增强 MRI 在结直肠癌肝转移术前评估中的临床价值

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目的 探讨钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 对结直肠癌肝转移 (CRCLM) 术前评估的临床价值。**方法** 收集 56 例 CRCLM 患者, 经手术病理确诊共计 156 个 CRCLM 病灶, 均行肝脏 Gd-EOB-DTPA 动态增强 MRI 检查。观察 T2WI、DWI、动脉期和肝胆期 (HBP) 的特征表现并计算各序列的检出率, 计算 HBP 病灶与肝实质信号强度比 (SIR) 以及表观扩散系数 (ADC) 值。采用 Mann-Whitney U 检验和 Mc-Nemar 检验, 比较 HBP 呈反靶征、靶征的病灶与 HBP 呈均匀、不均匀低信号病灶的 ADC 值以及各序列检出率的差异。结果 T2WI 多呈靶样外观 20.51% (32/156) 及均匀高信号 38.46% (60/156), DWI 多呈靶征 51.28% (80/156), 动脉期多呈环形强化 73.72% (115/156), HBP 多呈靶征 34.62% (54/156)。HBP 呈反靶征、靶征病灶的平均 ADC 值 $[(1.24 \pm 0.45) \times 10^{-3} \text{mm}^2/\text{s}]$ 与 HBP 呈均匀、不均匀低信号病灶的平均 ADC 值为 $[(1.20 \pm 0.43) \times 10^{-3} \text{mm}^2/\text{s}]$ 无统计学差异 ($P > 0.05$)。依据 CRCLM 的病灶大小分为 $<1.0\text{cm}$ 、 $1.0 \sim 2.0\text{cm}$ 和 $>2.0\text{cm}$ 三组, 分别包含 41、55 和 60 个病灶。与 T2WI、DWI、Gd-EOB-DTPA 四期动态增强 (Dyn-MRI) 比较, HBP 的总检出率 (96.79%) 最高 (P 均 < 0.05)。当 CRCLM 病灶 $<1.0\text{cm}$ 时, HBP 检出率 (87.80%) 高于 T2WI、DWI 和 Dyn-MRI 的检出率 (P 均 < 0.05)。结论 Gd-EOB-DTPA 增强 MRI 对 CRCLM 的术前评估具有重要的临床价值, 尤其特异性的 HBP 靶征或反靶征, 的影像特征以及 HBP 和肝胆期对 CRCLM 微小病灶优异的检出效能。

PO-3126

轻度认知功能障碍中脉络丛的临床价值

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背景: 轻度认知功能障碍是一种介于正常衰老与痴呆之间的过渡状态, 主要表现为记忆和其他认知功能的轻度损害, 但尚未达到痴呆的诊断标准。近年来, 脉络丛 (ChP) 与脑内代谢物清除、神经营养、神经再生等相关, 同时越来越多的证据表明脉络丛的结构和功能异常与神经退行性变、精神疾病等中枢神经系统的疾病的发生发展密切相关。ChP 在阿尔茨海默病 (AD) 的病理生理学中起着重要作用, 但其在轻度认知功能障碍中影像特征仍不清楚。

目的: 探讨 ChP 体积在遗忘型轻度认知损害 (aMCI) 和血管性轻度认知损害 (vMCI) 中的变化及其临床意义。

方法: 本研究为回顾性对照研究, 收集陆军军医大学第一附属医院 2018 年 1 月至 2019 年 12 月期间 152 例受试者 aMCI 受试者 49 例, vMCI 受试者 57 例, 和性别、年龄、受教育程度相匹配的 46 例健康对照 (HC) 受试者。所有受试者接受 3.0T 磁共振扫描, 应用 freesurfer 自动分割侧脑室 ChP、海马等, 比较三组之间体积差异。进一步研究 ChP 体积和海马体积以及临床指标的相关性。两两比较采用 Bonferroni 事后比较进行校正, 组间比较采用 ANOVA 检验。

结果: 纳入 152 例受试者, HC 组 (62.7 ± 8.7) 46 例, aMCI 组 (64.1 ± 7.3) 49 例, vMCI 组 (68 ± 8.7) 57 例。aMCI 组和 vMCI 组受试者的标准化 ChP 体积较 HC 组显著增大, 且具有统计学差异 (aMCI 组 vs. HC 组 $P = 0.0247$; vMCI 组 vs. HC 组 $P = 0.006$)。aMCI 组标准化 ChP 体积和标准化海马体积呈负相关 ($r = -0.423, P = 0.03$; vMCI 组标准化 ChP 体积和标准化海马体积呈负相关 ($r = -0.591, P < 0.001$)。aMCI 组和 vMCI 组受试者的 ChP 体积均与蒙特利尔认知评估量表 (MoCA) 评分负相关 ($r = -0.297, P = 0.043$; $r = -0.304, P = 0.023$)。

结论: aMCI 组和 vMCI 组较 HC 组均显示为 ChP 体积增大, 较海马缩小的程度更加明显。ChP 体积和海马体积具有相关性, 与 MoCA 评分相关, 有望作为评估轻度认知功能障碍的潜在 MRI 标记物。

PO-3127

基于任务态功能磁共振的睡眠剥夺和日间小睡对工作记忆的影响

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目的: 随着社会节奏的加快, 24/7 全天候服务、轮班工作以及睡前大量的娱乐活动, 有相当多的人患有睡眠不足和各种睡眠障碍。探讨睡眠缺乏如何影响认知功能及开发相应的对抗措施具有重要的理论和实际意义。本研究中, 我们采用 n-back 实验范式来探讨工作记忆受睡眠剥夺的影响以及工作记忆在日间小睡后的恢复情况。我们招募了 50 名军校学员, 在正常清醒、30 小时睡眠剥夺后和随后的 30 分钟午睡后在磁共振扫描仪中进行了 n-back 任务, 并分析三种状态下大脑反应的动态变化。

材料与方法: 采用单因素重复测量方差对 n-back 的行为学结果进行分析, 其中显著性阈值设置为 $P < 0.01$, FDR(false discovery rate)标准校正。在事后分析的两两比较中, 通过 Bonferroni 进行多重比较修正, 显著性阈值校正设为 0.05。对于 n-back 的影像学, 在经过预处理之后, n-back 的任务态数据采用 Block 的实验设计, 采用两阶段混合效应模型进行了分析。多重比较校正采用了 FDR 标准。对于不同条件下的 n-back 激活, 对于不同条件下的 F 比较, 以及事后分析的两两比较, 统计阈值均设置为 $pFDR < 0.05$ 。

结果: 单因素重复测量方差分析显示, 平均反应时 ($F_{2,98} = 70.33, p < 0.001$) 和准确率 ($F_{2,98} = 7.36, p < 0.001$) 均表现出了显著的时间差异。事后分析显示 RW、SD 和 nap 条件的两两比较存在显著差异。日间小睡后 RT 和准确率明显低于睡眠剥夺条件, 但仍然高于正常清醒状态, 表明午睡对于工作记忆水平具有一定的恢复作用。日间小睡后工作记忆反应时的改善与右脑岛增加的激活强度呈显著正相关 (相关系数 $r = 0.38, p < 0.005$)。

结论: 睡眠剥夺显著影响工作记忆水平的认知表现; 导致了处理速度和准确率。日间小睡通过两种方式部分恢复了工作记忆的水平: 日间小睡将睡眠剥夺后小脑、脑岛和丘脑降低的活动调整到正常水平; 日间小睡增加了额中回、楔前叶和颞上回的负激活, 将 DMN 网络从任务中脱离, 增加了大脑认知资源。

PO-3128

磁共振黑血成像技术评价脑静脉窦血栓再通的应用价值

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目的: 探讨应用磁共振黑血成像(MRBTI)技术定量监测血栓体积、长度变化对评价脑静脉窦血栓 (CVST)再通的可行性, 探讨其评价脑静脉窦血栓再通的应用价值。方法: 回顾性分析 30 例首次发病且仅接受内科治疗的 CVST 再通患者再通前后的 MRBTI 图像。诊断再通标准为以 2013 年 CVST 诊治的中国专家共识为参考, 由两名神经内科医师结合临床症状, 依据头颅 MRI 联合 MRV、DSA 图像进行独立解读及定性诊断为血栓再通或部分再通。采用 3.0T 磁共振扫描仪 (Signa Pioneer, GE, 美国), 21 通道头颈联合线圈, 3D 可变反转角快速自旋回波序列, 扫描范围包括全脑, 体位为仰卧位。MRBTI 扫描参数如下: TR 702ms, TE 13.5ms, 矩阵 256x256, FOV 200mmx200mm, 层厚 0.8mm, 扫描层数 327 层, 扫描时间 5min34s。应用图像后处理软件 (3D Slicer, 美国), 测

量 MRBTI 图像中静脉窦内的血栓体积、长度。统计学分析采用 SPSS 25.0, 采用配对 t 检验分析 CVST 再通患者治疗前后血栓体积、长度差异, 标准以 $P < 0.01$ 为差异有统计学意义。结果: 30 例 CVST 患者中, 共包含节段性血栓 94 处, 其中上矢状窦 15 处、左侧横窦 12 处、左侧乙状窦 10 处、右侧横窦 17 处、右侧乙状窦 16 处, 直窦 4 处、窦汇 4 处、颈内静脉上段 6 处、左侧皮质静脉 5 处、右侧皮质静脉 5 处。MRBTI 图像上, 血栓显示为高信号, 利用图像后处理软件, 可对其进行逐层勾画, 得到血栓体积、长度值。CVST 患者治疗前与治疗后 MRBTI 图像上可见静脉窦内血栓高信号减少, 测量得到治疗前后血栓体积、长度均有显著性差异(t 分别为 8.79、8.24, P 均 < 0.01)。结论: MRBTI 是一种直接血栓成像技术, 静脉血管内血流量信号基本上被抑制掉, 呈中等信号的血管壁能够清晰显示, 血管内高信号的血栓即能从周围组织中分离出来、可视化血栓, 有助于临床进行 CVST 的早期诊断。此外, 利用 MRBTI 结合图像后处理技术, 可定量测量血栓体积、血栓长度, 定量监测血栓变化, 辅助临床评估 CVST 再通情况。

PO-3129

基于磁共振弥散模型不同功能参数图的影像组学分析在临床显著性前列腺癌中的诊断价值

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目的旨在探讨基于磁共振单指数和扩散峰度模型功能参数图的影像组学分析技术对于临床显著性前列腺癌(clinically significant Prostate Cancer, csPCa)的诊断效能。方法回顾性的分析 2022 年 4 月-2023 年 7 月就诊于我院经直肠超声下引导穿刺或手术病理证实的前列腺患者 238 例, 其中 csPCa 组患者 96 例, 非 csPCa 组患者 142 例。所有患者均行磁共振多参数扫描, 包括轴位 T2WI 和多 b 值 DWI 序列, 用 DWI 序列通过弥散灌注后处理软件计算表观扩散系数 (apparent diffusion coefficient, ADC) 图、平均峰度 (mean kurtosis, MK) 和平均扩散系数 (mean diffusivity, MD) 图, 基于 T2WI 勾画三维感兴趣区 (ROI), 使用 ITKSNAP 将 ROI 配准到各个功能参数图上, 使用 R 语言软件提取 ROI 的纹理特征, 计算得出 3474 个纹理特征, 利用皮尔森相关系数进行特征降维, 利用递归特征消除来进行特征选择, 分别建立基于 ADC 数据集、MK 数据集、MD 数据集的随机森林 (Random Forest) 和支持向量机 (Support Vector Machine) 的机器学习模型。将 96 例 csPCa 和 142 例非 csPCa 患者按照 7:3 的比例分为训练集与测试集两部分, 采用十折交叉验证的方法对训练集进行训练, 用测试集验证得到特异性、敏感性、ROC 曲线和 ROC 曲线下面积。结果 ADC、MK、MD 数据集在 RF 机器学习模型中训练集的诊断效能 AUC 分别为 0.803、0.752、0.763, 在测试集中诊断效能 AUC 分别为 0.799、0.731、0.759。ADC、MK、MD 数据集在 SVM 机器学习模型中训练集的诊断效能 AUC 分别为 0.892、0.821、0.745, 在测试集中诊断效能 AUC 分别为 0.879、0.817、0.729。基于 ADC 和 MK 训练集的 SVM 机器学习模型中诊断效能最高, 具有较好的分类效能。结论通过对单指数、扩散峰度模型功能图的影像组学分析技术, 对临床显著性前列腺癌的检测具有显著的价值, 为临床早期诊断和治疗提供相关技术支持。

PO-3130

MRI 评估局部进展期直肠癌新辅助放化疗联合免疫治疗疗效 ——复旦肿瘤医院经验

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目的 新辅助放化疗联合免疫治疗使得局部晚期直肠癌的完全缓解率较传统放化疗有了大幅度提升,使得更多低位直肠癌患者有机会选择保留肛门的 W&W。MRI 是临床判断临床完全缓解及执行 W&W 的重要依据。在此背景下,如何利用 MRI 甄选出病理完全缓解病人,是目前临床及放射科医生亟需解决的难点。研究通过结合直肠癌新辅助放化疗联合免疫治疗后 MRI 与病理对照研究,对 pCR 的 MRI 影像特征进行总结,有利于临床新辅助治疗后选择正确的治疗策略。

方法 回顾性纳入我院短程放疗联合 CAPOX+特瑞普利单抗用于局部晚期直肠癌的全程新辅助治疗研究(下称 TORCH 研究),并于我院手术的患者。基线及治疗后(手术前)均须行高分辨率 MRI 检查。共收集到 25 例患者。根据术后病理,将患者分为 pCR 组及 non-pCR 组,评估病灶退缩模式:退缩即病灶沿粘膜方向退缩、肿块碎片化及黏液湖形成并记录。

结果 25 例患者中 44% (11 例) 达 pCR, 56% 患者 (14 例) non-pCR, non-pCR 组中 1 名患者 ypT0N1。48% 患者 (12 例) 术后 ypT0, 52% 患者 (13 例) 术后 ypT1-3。16% 患者 (4 例) 术后 ypN1。ypT0 组中 8 例患者治疗后在 T2WI 上表现为低信号瘢痕并局限于肠壁内, DWI 上未见明显高信号, 增强后表现为粘膜面线样强化。2 例 ypT0 患者治疗后低信号瘢痕超出肠壁外, DWI 上未见明显高信号, 增强后表现为粘膜面线样强化。3 例患者 T2WI 完全表现为高信号黏液样肿块, 但仅 2 例患者术后证实为 ypT0, 此 2 例患者增强后黏液湖周围线样强化, DWI 未见明显异常高信号。本研究中经过治疗后仅 16% (4 例) 患者术后病理证实有且仅有 1 枚淋巴结转移。84% (21 例) 患者术后 ypN0, MRI 图像上表现为淋巴结消失或短径小于 3mm, DWI 上未见明显高信号且增强未见明显强化。

结论 评估直肠癌新辅助放化疗联合免疫治疗疗效需 T2WI、DWI 及增强图像三种模态。当 T2WI 出现局限于肠壁的低信号瘢痕, DWI 未见明显高信号且粘膜面线样强化时, 诊断 ypT0 较为可靠。淋巴结消失或短径小于 3mm, DWI 上未见明显高信号且未见明显强化是诊断 ypN0 可靠征象。

PO-3131

时间飞跃法磁共振静脉血管成像在髂静脉压迫综合征腔内粘连结构特征分型中应用价值研究

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目的 探讨盆腔时间飞跃法磁共振静脉血管成像 (TOF-MRV) 在评价髂静脉压迫综合征 (IVCS) 腔内粘连结构特征分型的应用价值。**方法** 回顾性分析 2021 年 6 月至 2022 年 8 月在重医附一院行 TOF-MRV 检查的 204 例可疑 IVCS 病人临床资料, 通过三维重组技术分析髂静脉受压的特征。**结果** 两名医师图像质量评分一致性好, K 值 0.895; 左髂总静脉 (LCIV) 受到右髂总动脉 (RCIA) 及向前突出的腰骶椎共同压迫; LCIV 汇入下腔静脉的角度大于右侧; LCIV 受压处前后径缩窄, 横径较同水平右髂总静脉增宽; 静脉内粘连结构的发生率为 20.10%, 根据腔内粘连结构的特征确定了 3 种类型。I 型: 外侧壁粘连型 (21.95%); II 型: 中央隔带型 (70.73%); III 型: 隔膜型 (7.32%)。TOF-MRV 与 DSA 诊断 LCIV 腔内粘连结构情况完全一致。**结论** TOF-MRV 根据 LCIV 腔内粘连结构的形态特征进行分型, 可帮助临床医生制定合理的治疗方案。

PO-3132

无对比剂自由呼吸 mDixon 序列冠脉 MRA 与冠脉 CTA 的图像质量对比

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目的: 评估 3.0T MR 非对比增强 3D-mDixon-WH 序列对冠状动脉主干及近中段图像质量的显示能力。

方法: 筛选 68 例拟行冠状动脉检查的志愿者, 在 24H 内分别完成磁共振冠状动脉血管成像 (MRCA) 和冠脉 CTA 成像检查。MRCA 首先使用膈肌导航、自由呼吸下进行高分辨电影成像, 选取右冠相对静止期作为采集依据, 再利用 3D-mDixon-WH 水脂分离技术, 轴位采集冠状动脉原始数据。MRCA 和 CTA 的图像分析由两位高年资医师独立观察完成。两位观察者采用 4 分制对冠状动脉的每段图像质量进行评分, 并以冠脉 CTA 作为参考标准, 评价 MRCA 对管腔狭窄的显示能力。3D-mDixon-WH 序列扫描参数: TR/TE 4.3/1.4ms/2.6ms, shot duration 90-130ms, 采集空间分辨率 1.5x1.5x1.5mm, 重建分辨率 0.75x0.75x0.75mm。

结果: 获得 63 例志愿者的 MRCA 和冠脉 CTA 完整图像 (5 例志愿者未获得完整图像排除在外, 成功率 92.6%), 其中冠状动脉狭窄者 16 例 (25%)。MRCA 与 CTA 对比在冠状动脉 LM、RCA、LAD、LCX 段图像质量评分无显著差异 ($P>0.01$); 但在冠状动脉 D1 和 PDA 段, CTA 的图像质量评分有显著性差异 ($P<0.01$), 两名医师的图像质量评分具有高度一致性 ($ICC=0.81-0.90$)。其敏感性、特异性、阳性预测值、阴性预测值和诊断准确率分别为 86%、85%、70%、93% 和 85%。

结论: 3.0T MR 非对比增强 3D-mDixon-WH 序列对冠脉主干及近中段图像的显示具有良好的可行性, 为疑似冠脉主干狭窄患者提供了一种新的影像学检查方法。

PO-3133

体表标记投影结合 3D-nerve view 在臀肌挛缩术前应用价值

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目的: 探讨体表标记投影结合 3D-nerve view 在臀肌挛缩中术前影像定位的应用价值。方法: 选取我院 2022 年 10 月至 2023 年 7 月因臀肌挛缩来我院就诊患者 28 例。为避免术中伤及坐骨神经, 分别使用常规解剖学体表标志定位和术前核磁标记引导定位, 收集术中耗时及针刀切口深度。运用后处理软件测量其标记点与坐骨神经间最短安全距离, 测量坐骨神经 3D-nerve view 增强前后图像信噪比。并统计两位高年资医生对 Ober 实验臀肌挛缩程度分级与双侧臀肌挛缩程度核磁影像诊断的一致性。结果: 术前行影像定位组明显缩短手术时间 ($P<0.05$), 3D-nerve view 增强前后坐骨神经与体表标记距离测量无统计学差异 ($P>0.05$), 增强后在双侧坐骨神经信噪比测量及背景抑制明显优于增强前 ($P<0.05$); 两位临床医生的 Ober 实验分级和臀肌挛缩核磁诊断评估 ICC 值为 0.8 (95%CI: 0.5-0.9)。结论: 体表标记投影结合 3D-nerve view 坐骨神经平扫既可无创便捷实现臀肌挛缩的术前影像定位, 降低手术耗时, 避免术中伤及坐骨神经, 为术者提供更全面的患者信息。

PO-3134

高强度聚焦超声 (HIFU) 治疗子宫肌瘤早期疗效的 磁共振影像组学研究

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目的: 探讨基于增强磁共振影像组学模型术前预测高强度聚焦超声 (HIFU) 消融治疗子宫肌瘤的早期疗效的价值。

方法: 回顾性分析行 HIFU 消融治疗的 143 名妇女的 173 枚子宫肌瘤, 根据肌瘤的非灌注区体积率 (NPVR), 分为充分消融组 (NPVR \geq 70%, n=95) 与非充分消融组 (NPVR<70%, n=78)。按 7:3 的比例随机分为训练集 (n=121) 和测试集 (n=52), 训练集中充分消融 66 枚、非充分消融 55 枚, 测试集中充分消融 29 枚、非充分消融 23 枚。采用 3D Slicer 软件进行图像分割和特征提取, 提取术前子宫肌瘤增强磁共振图像的影像组学特征, 并记录肌瘤的临床-影像学特征, 通过最小绝对收缩和选择算子筛选出最优特征。采用独立的临床-影像学危险因素构建临床-影像学模型, 基于增强序列的最佳影像组学特征构建影像组学模型, 将两组特征合并构建联合模型。采用支持向量机构建模型, 并绘制受试者工作特征 (ROC) 曲线对模型进行评价, 采用 Delong 检验比较不同预测模型间 ROC 曲线下面积 (AUC) 的差异。在训练集中应用组合模型构建列线图。

结果: 最终筛选出 6 个影像组学特征和 2 个临床-影像学特征用于建模, 影像组学模型, 临床-影像学模型, 和联合模型在训练集中的 AUC 值分别为 0.815、0.646 和 0.785, 测试集中分别为 0.825、0.624、0.843。影像组学模型的预测性能优于临床-影像学模型 (训练集 $P=0.005$; 测试集 $P=0.047$), 联合模型的预测性能也优于临床-影像学模型 (训练集 $P=0.032$; 测试集 $P=0.033$), 而影像组学模型与联合模型的 AUC 值之间差异无统计学意义 ($P>0.05$)。

结论: 基于增强磁共振影像组学特征构建的模型可较好地术前预测 HIFU 消融治疗子宫肌瘤的早期疗效。

PO-3135

扩张型心肌病 LGE 模式与左心室逆转重构的关系

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目的: 先前的研究发现, 较低的基线左室射血分数 (LVEF) 是扩张型心肌病 (DCM) 逆转重构的重要预测因子, 这与我们现有的临床经验有些相反。晚期钆增强 (LGE) 模式可能提供独立于心功能的遗传背景和病因学的重要信息。我们假设 LGE 模式可以为 DCM 患者提供一个简洁有效的反向重塑预测模型, 而不依赖于基线 LVEF。

方法: 我们前瞻性地招募了 232 例 DCM 患者, 他们接受了完整的基线和随访心脏磁共振 (CMR) 检查。评估 LGE 的存在、位置、模式和程度。阴性 LGE、室间隔中壁 LGE 和局灶性 LGE 的患者为低危组, 室间隔+外侧心外膜、室间隔+外侧中壁 LGE、仅心外膜外侧 LGE 和斑块状 LGE 的患者为高危组。我们比较了两组 DCM 患者在 1-2 年的指导药物治疗 (GDMT) 后的基线和动态变化。

结果: 研究纳入 232 例患者, 平均年龄 46.1 ± 14.1 岁, 男性 157 例 (67.7%)。基线时, 与低危组患者相比, 高危组患者明显年龄较大, 女性比例较高, 体重指数较低, 心率较慢, LVEF 较高, RVEF 较高, RV 体积较小, 原生 T1、T2 和 ECV 值较高。GDMT 一段时间后, 低危组患者 LVEF [差值: $11.8(1.825-0)$ vs. $1.3(-3.5-5.0)$, $p<0.001$]、RVEF [差值: $13.1(2.6-23.9)$ vs. $3.9(-6.3-14.6)$, $p<0.001$] 和 LVEDVi [差值: $-30.0(-60.1-1.9)$ vs. $-1.5(-25.9-12.2)$, $p<0.001$] 显著改善。

总结: 高风险 LGE 模式与 GDMT 后较低的逆转重构可能性显著相关, 与基线 LVEF 无关。

PO-3136

变形配准分析测量的分层周向应变:基于 DENSE 序列验证

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背景:

斑点示踪超声心动图(speckle tracing echocardiography, STE)分层特异性心肌应变分析显示出独特的诊断和预后价值, 而基于心脏磁共振(magnetic resonance imaging, MRI)成像的分层特异性心肌应变分析方法尚未得到参考标准技术的验证。

目的: 为了验证基于平衡稳态自由进动(bSSFP)序列的变形配准算法(DRA)测量的层特异性周向应变(Ecc)与受激回波(DENSE)序列的位移编码。

方法: 前瞻性招募 20 名健康志愿者和 30 名非缺血性心肌病患者。场强/序列:3.0T 心脏 MR, bSSFP cine 序列, DENSE 序列。采用 DRA 和 DENSEanalysis 方法对短轴视图上的全局和层特异性周向应变进行后处理。统计检验:采用独立样本 T、Mann-Whitney U、卡方检验、Spearman 等级相关、类内相关系数、Bland-Altman 检验进行统计分析。

结果:

对于全局 Ecc 评价, DRA 和 DENSEanalysis 在基础和中心室水平上具有极好的一致性, 而在根尖水平上一致性较低(基础:r = 0.921, 中心室:r = 0.940, 根尖:r = 0.866, 均 p < 0.001)。对于分层特异性 Ecc, 心肌中层的一致性高于心外膜和心内膜层(心肌中层:r = 0.908, 心外膜:r = 0.880, 心内膜:r = 0.890, 均 p < 0.001)。两种方法在心内膜心肌层至心外膜心肌层的三个水平上均发现 Ecc 振幅递减的梯度。DRA 和 dense 分析方法均显示出良好的观察者内部和观察者之间的重复性。(CoV 分别为 3.2%至 6.9%和 3.2%至 5.7%)。

结论: 与基于 DENSE 序列的 DENSE 分析方法相比, 变形配准算法(DRA)是一种可行的、重复性好的全局和层间 Ecc 分析方法。

PO-3137

基于冠状动脉 MRA 脂肪分数对冠状动脉粥样硬化患者的预测效能评价

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目的: 探讨冠状动脉 MRA 脂肪分数与冠脉狭窄之间的关系, 以评估其对冠状动脉粥样硬化患者的预测效能。方法: 收集我院 2021 年 2 月-2022 年 8 月临床怀疑有冠心病的患者或经介入冠状动脉造影确诊有狭窄(狭窄程度 $\geq 50\%$)的患者 10 例作为实验组, 另收集 10 例正常人作为对照组, 男女不限, 年龄 ≥ 18 岁。两组均行非对比冠状动脉磁共振血管成像(coronary magnetic resonance angiography, CMRA)检查。由两名从事冠状动脉后处理多年的医师进行视觉性分析(包括视觉评分和狭窄分析)和脂肪分数的勾画工作, 后处理均在飞利浦 ISP 工作站进行。脂肪分数分别在 RCA、LM、LAD、LCX 等狭窄的节段地方勾画。结果: 在已经测量分析的 14 名患者中 CMRA 预测狭窄的敏感性为 87.5%、特异性为 66.67%、阳性预测值为 77.78%、阴性预测值 80.0%、准确性为 78.57%, 且狭窄情况与 MR 冠状动脉脂肪分数在 70%-90%之间具有较强的相关性。狭窄的 10 位患者, 其中 6 人的脂肪分数在 87%-88%之间, 有 4 人脂肪分数分布在 70%-90%之间。结论: 冠状

动脉 MRA 可以有效评价冠状动脉粥样硬化患者的狭窄情况, 且冠状动脉脂肪分数可以作为一个潜在的独立因子对冠状动脉狭窄进行预测

PO-3138

发作性睡病患者内侧前额叶 GABA+/Glx 比值与 认知功能异常相关性的 MRS 研究

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目的: 采用同步脑电-磁共振波谱成像 (EEG-MRS) 技术, 探讨 1 型发作性睡病 (NT1) 患者与正常对照组在非快速眼动 (NREM) 睡眠期前额叶 γ -氨基丁酸/谷氨酸+谷氨酰胺 (GABA/Glutamate+Glutamine) 即 GABA/Glx 比值的差异, 并探讨其与认知功能异常的相关性。

研究方法: 使用同步 EEG-MRS 技术, 采集 20 名 NT1 患者和 20 名性别、年龄、受教育程度匹配的健康志愿者睡眠期 MRS 数据, 计算所有受试者浅睡眠 N2 期前额叶 GABA+和 Glx 水平。应用北京版本蒙特利尔认知评估 (MoCA) 量表评估所有受试者认知能力, 并采用 Epworth 嗜睡量表 (ESS) 评估所有受试者白天嗜睡程度。所有受试者还在 MRS 扫描前 1 周内进行夜间多导睡眠图 (PSG) 记录, 以分析其睡眠分期成分的差距。采用 t 检验比较患者及对照组前额叶 GABA+、Glx 水平以及 GABA+/Glx 比值的差异。此外, 使用 Spearman 相关分析法来探索前额叶 MRS 数据改变与 NT1 患者量表数据、PSG 数据的相关性。

结果: NT1 患者 GABA+/Glx 前额叶比值高于正常对照组 ($P=0.0002$), 其中 GABA+水平高于对照组 ($P=0.0062$), 而 Glx 水平 ($P=0.6699$) 差异无统计学意义。相关分析显示, 内侧前额叶 GABA+/Glx 的比值与 NT1 患者认知功能异常呈负相关 ($rs=-0.7453$, $P=0.0002$)。此外, NT1 患者 GABA+水平与快速眼动睡眠潜伏期 (REML) 成反比 ($rs=-0.6917$, $P<0.01$)。

结论: 本研究发现, NT1 患者 N2 睡眠期内侧前额叶中 GABA+/Glx 的比值高于正常对照组, 差异主要由 GABA+水平升高引起, 而 Glx 水平无明显差异。GABA+/Glx 比值的改变与 NT1 患者异常的认知功能呈负相关。

PO-3139

基于机器学习的多参数影像组学模型预测结直肠癌的共识分子 亚型 4 (CMS4): 一项多中心回顾性研究

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目的: 共识分子亚型 (CMS) 是一种新型的反映肿瘤遗传特征的分类系统。在四个亚型中, CMS4 与最差的预后相关。然而, 目前的 CMS 检测方法存在几个限制, 阻碍了其在诊疗过程中的早期实施。目前, 使用非侵入性影像学方法识别 CMS 分型的研究从未报道过。因此, 本研究旨在探索基于机器学习方法的影像组学模型是否可以预测结直肠癌患者的 CMS4 分型, 并预测其复发转移风险。

材料和方法: 本回顾性研究共纳入包括三个中心的共 225 例结直肠癌病例。中心 1 的病例按 8:2 的比例分为训练队列 (136 例) 和测试队列 (32 例); 中心 2 和 3 的病例合并作为外部验证队列 (57 例)。每个病例都包含测序数据、基线 MRI 图像, 包括 T2 加权 (T2WI) 和增强 (CE) 序列。测序数据被输入 CMS 分类系统以生成 CMS 亚型结果。使用相同的参数设置从两个队列中提取相同的影像组学特征。应用多种机器学习算法以实现样本平衡、特征归一化、特征筛选和分类器构建, 建立表现最佳和最稳健的 CMS4 预测模型。分别使用 T2WI 和 CE 模型计算每个患者的影像组学评分

(Rad-score)。通过对上述两个模型的结果使用逻辑回归算法建立合并模型。使用接收器操作特征 (ROC) 曲线分析评估模型性能。计算 ROC 曲线下的面积 (AUC) 进行量化。每个病例都具有可靠的随访数据, 依据随访数据计算每个病例的无病生存期 (DFS), 使用 KM 曲线评估模型对患者复发转移的风险分层性能。

结果: 在所有病例中, 有 59 (26%) 例被分类为 CMS4。T2 和 CE 模型选择的最佳特征数分别为 23 和 20。我们发现, CE 模型在测试集 (0.812 vs 0.786) 和外部验证集 (0.741 vs 0.702) 中的表现优于 T2 模型。将两个模型合并后, 合并模型的预测性能进一步提高, 在测试集和外部验证集中的 AUC 分别为 0.854 和 0.759。基于 CMS 的合并模型可对患者的复发转移风险进行有效分层 ($P = 0.018$)。

结论: CMS4 结直肠癌的遗传表型可能与形态特征有潜在关联。基于机器学习的多参数影像组学模型在区分 CRC 的 CMS4 亚型与其他亚型方面显示出一定的潜力, 并可对复发转移风险做出有效预测。

PO-3140

正常人浅睡眠期额叶 GABA+水平与 脑电连接网络拓扑效率的相关性研究

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目的: 应用同步脑电图-磁共振波谱 (EEG-MRS) 扫描技术, 探索正常青年人轻度睡眠状态下内侧前额叶皮层 (mPFC) 的 γ -氨基丁酸水平与脑电功能连接网络的拓扑效率之间的关系。

研究方法: 本研究参与者包括 37 名正常青年人 (右利手, 男: 女比例, 16: 21; 中位年龄 25 (23, 26) 岁, 教育水平, 平均值=16.35 \pm 1.99 年)。应用 32 通道脑电系统记录脑电信号, 应用 Hadamard 编码和重建巨型编辑波谱 (Hadamard Encoding and Reconstruction of Mega-Edited Spectroscopy, HERMES) 技术并以 mPFC 作为波谱扫描感兴趣区, 进行同步 EEG-MRS 扫描, 同步记录浅睡眠状态下全脑电活动信号及测量内侧前额叶皮层 GABA+水平。应用 Gannet3.1 软件包对 MRS 数据进行处理, 再根据 3D-T1WI 进行脑实质体积校正, 得到 mPFC 脑组织校正后的 GABA+水平。使用 EEGLAB 对脑电数据进行预处理, 应用 REAT 软件建立 5 个频段 delta (0.5-4 Hz), theta (4-8 Hz), alpha (8-13 Hz), beta (13-30 Hz), gamma (30 Hz 以上) 下的相关连接矩阵, 然后通过 GRETNA 软件包计算浅睡眠期 (N2 期) 五个频带下全脑范围内脑电功能连接网络的拓扑效率, 包括小世界属性、全局效率、局部效率等, 应用相关分析探索脑电功能连接网络的拓扑效率与内侧前额叶皮层 GABA+水平的相关性。

结果: 本研究样本中浅睡眠期内侧前额叶皮层 GABA+/Cr: 0.10 (0.07, 0.12), 相关分析表明 N2 期睡眠状态下 theta 频带下的脑电功能连接网络的全局效率 (平均值=0.22 \pm 0.01) 与内侧前额叶皮层的 GABA+水平呈负相关 ($r = -0.4520$, $p = 0.005$), 其余频带下脑电功能连接网络的全局效率及所有频带下的局部效率、小世界属性均与 mPFC 的 GABA+水平不相关。结论: N2 期浅睡眠阶段 theta 频带脑电功能连接网络的全局效率与内侧前额叶皮层中 GABA+水平存在相关性。

PO-3141

基于 MR T2WI 影像组学模型对 胎盘植入性疾病进行产前诊断及分型

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目的 探讨基于 MR T2WI 的影像组学模型在产前预测胎盘植入性疾病 (PAS) 及其亚型的应用价值。**方法** 将 193 例患者按 2:1 的比例随机划分为训练集 (n=129) 和测试集 (n=64)。在 T2WI 序列提取影像组学特征, Pearson 相关系数和 LASSO 回归用于特征筛选, 构建 PAS 预测模型。然后, 计算便于临床应用的影像组学评分进一步评估 PAS 分型, 并选择临床主要风险因素建立基于影像组学评分和临床特征的临床-影像组学模型并绘制 Nomogram。结果 在 T2WI 序列上提取 806 个影像组学特征, 经过 Pearson 相关分析及 LASSO 回归处理后筛选出 10 个影像组学特征, 基于影像组学特征构建影像组学模型。影像组学模型的训练集 AUC 值为 0.933 (95% CI, 0.888-0.978), 准确率为 88.37%, 灵敏度为 88.78%, 特异度为 87.10%, PPV 为 95.60%, NPV 为 71.05%; 测试集 AUC 值为 0.914 (95% CI, 0.835-0.993), 准确率为 89.06%, 灵敏度为 90.91%, 特异度为 85.00%, PPV 为 90%, NPV 为 80.95%, 校准曲线和决策曲线表明模型具有较高性能和潜在临床应用价值。影像组学评分对穿透型 PAS 具有较强的识别能力, 训练集和测试集准确率分别达到了 82.95%、89.06%, 敏感度和 NPV 在训练集和测试集都达到了 100%, 特异度分别达到 81.35%、88.33%。同时, 本研究构建了临床-影像组学模型并绘制 Nomogram 用于可视化预测患者的 PAS。在训练集中, 临床-影像组学模型的 AUC 值为 0.969 (95% CI, 0.946-0.993); 测试集中, AUC 值为 0.976 (95% CI, 0.947-1.000)。DeLong 测试结果表明两模型性能存在显著性差异 (P<0.05), 临床-影像组学模型具有更好的性能表现。结论 基于临床特征及影像组学评分构建的临床-影像组学模型预测效能较好, 可作为产前预测是否存在 PAS 的方法。且影像组学评分对 PAS 亚型具有较好的鉴别能力, 尤其是对于穿透型 PAS。

PO-3142

基于深度学习重建的磁共振成像在胰腺占位性病变中的应用价值

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目的: 磁共振成像在胰腺占位性病变的诊断中具有重要作用。然而, 小病变的检测和表征往往受到图像空间分辨率的限制, 而空间分辨率又与扫描时间和信噪比 (signal to noise ratio, SNR) 存在冲突。因此, 深度学习重建技术, 其利用卷积神经网络在保留图像细节的同时降低噪声, 为空间分辨率与上述两者的权衡提供了可能性。本研究旨在探讨深度学习重建在胰腺占位性病变中的应用价值。**方法:** 从 2022 年 7 月到 2022 年 10 月, 共有 21 名胰腺占位性病变患者参与了这项研究。对轴位 2D FSE T1WI 强化序列和 FOCUS DWI 序列采集的数据分别进行深度学习重建与常规重建。对得到的两组图像进行主观和客观评价。主观评价, 由 2 名具有 5 年以上影像诊断经验的放射科医生采用“五分法”对图像均匀性、胰腺边缘清晰度、病灶及整体图像质量进行评分。当评分出现分歧时, 两位放射科医生经讨论后达成共识。客观评价, 由 1 名具有 10 年以上影像诊断经验的放射科医生, 在 2D FSE T1WI 强化序列和 FOCUS DWI 序列的深度学习重建以及常规重建图像中, 通过勾画感兴趣区 (region of interest, ROI), 测量计算胰腺及病变的 SNR 和对比噪声比 (contrast noise ratio, CNR)。测量值包括每个 ROI 的信号强度和标准差。统计分析采用 Wilcoxon 符号秩检验和配

对 t 检验评估深度学习重建组和常规重建组之间的主观和客观差异。 $P<0.05$ 表示差异具有统计学意义。

结果: 2D FSE T1WI 增强序列和 FOCUS DWI 序列的深度学习重建图像, 其主观评价结果明显优于常规重建图像。客观评价上, 在 2D FSE T1WI 增强序列以及 FOCUS DWI 序列的深度学习重建图像中, 计算得到的 SNR 和 CNR 均优于常规重建图像, 组间差异有统计学意义 ($P<0.001$)。

结论: 深度学习重建可以减少磁共振图像中的噪声, 这可能会转化为空间分辨率。在这项工作中, 我们通过定性评分和定量测量, 证明了将深度学习重建应用于胰腺磁共振成像中的可行性和优势, 揭示了深度学习重建在临床胰腺占位性病变磁共振成像中的潜力。

PO-3143

利用孟德尔随机化探讨多模态磁共振脑影像与 耳聋之间的因果关系

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目的: 观察性研究报告了多模态磁共振脑影像与耳聋之间的关联, 但目前尚不清楚这种关联是否是由于混杂因素或者反向因果效应导致的虚假关联, 且两者之间是否存在因果关联还有待证明。因此, 本研究采用两样本孟德尔随机化分析, 以确定多模态磁共振脑影像与耳聋风险之间的因果关系。

方法: 基于多模态磁共振脑影像数据, 从公共数据库得到皮质总面积和平均厚度 (样本量 33992)、灰质体积 (样本量 10119)、白质纤维 (样本量 11017) 以及耳聋 (病例数 6730, 样本量 87840) 的 GWAS 数据。筛选出合适的 SNP 作为工具变量。协调暴露及结局 GWAS 数据后, 采用随机效应逆方差加权法 (IVW) 评估因果关系, 并通过 MR-Egger 回归和加权中位数法进行验证。使用 MR-Egger 法检测水平多效性以保证结果的可靠性。

结果: IVW 模型显示后放射冠部分各向异性 (FA) ($OR=1.292$)、内囊豆状核后部平均弥散系数 (MD) ($OR=1.166$)、颞下回表面积 ($OR=1.003$)、枕叶皮层厚度 ($OR=22.923$)、颞下回皮层厚度 ($OR=12.386$)、左侧丘脑体积 ($OR=1.509$)、右侧丘脑体积 ($OR=1.449$)、右侧距状旁回体积 ($OR=1.255$)、左侧侧脑室体积 ($OR=1.201$) 为耳聋的危险因素; 胼胝体膝部径向弥散系数 (RD) ($OR=0.845$)、矢状束 RD ($OR=0.823$)、扣带束 MD ($OR=0.784$)、枕叶表面积 ($OR=0.999$)、颞上沟表面积 ($OR=0.999$)、岛叶表面积 ($OR=0.998$)、颞极皮层厚度 ($OR=0.285$)、脑干体积 ($OR=0.854$)、右侧小脑体积 ($OR=0.845$)、左侧海马旁回体积 ($OR=0.813$) 为耳聋的保护因素。MR-Egger 回归截距项 P 值均大于 0.05, 即筛选出的 SNP 不存在基因多效性, 因此孟德尔随机化在本研究中为因果推断的有效方法。

结论: 利用两样本孟德尔随机化方法排除混杂因素和反向因果关联后, 得到无偏估计的结果, 据此可以确定皮质总面积和平均厚度、灰质体积、白质纤维与耳聋之间存在因果关系, 这些发现有助于深入理解耳聋的发病机制。

PO-3144

深度学习结合压缩感知技术在屏气 3D MRCP 中的临床应用

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目的 探讨基于深度学习 (DL) 结合压缩感知 (CS) 技术在屏气三维磁共振胰胆管成像 (3D MRCP) 的最佳加速因子及其临床应用。

方法 前瞻性纳入 2023 年 3 月至 2023 年 8 月在四川大学华西医院行上腹部 3D MRCP 检查的患者 68 例, 3D MRCP 序列包括 CS 组, 加速因子为 24 (CS-24); DL-CS 组, 加速因子分别为 24 (DL-CS-24)、33 (DL-CS-33)。测量 3 组图像的信噪比 (SNR)、对比度 (CR) 和对比度噪声比 (CNR), 并对图像的整体图像质量、背景抑制、伪影、各级胆管及胰管可见性进行主观评价。采用卡方检验和 Friedman 检验分别对 3 组序列的不满足诊断图像数量与主客观指标进行统计学分析。

结果 DL-CS-33 组的扫描时间较 CS-24 组和 DL-CS-24 组缩短 30% (9s vs 13s)。68 例患者 DL-CS-33 组图像均满足临床诊断要求, 7 例患者的 CS-24 组图像不满足诊断要求, 4 例患者的 DL-CS-24 组图像不满足诊断要求, 且组间差异均有统计学意义 ($P < 0.05$)。DL-CS-33 组和 CS-24 组的 SNR、CR、CNR, 整体图像质量、伪影、各级胆管和胰管的可见性评分差异无统计学意义 (P 均 > 0.05), 背景抑制的评分差异有统计学意义 ($P < 0.05$), DL-CS-24 组的 SNR、CR、CNR, 肝内胆管、主胰管以及整体图像质量均好于 CS-24 组, 差异均有统计学意义 (P 均 < 0.05), 同时背景抑制、伪影和胆总管、肝总管可见性的评分差异无统计学意义 ($P > 0.05$)。

结论 与 CS 技术相比, 应用 DL-CS 技术在不改变图像扫描时间的情况下, 改善了屏气 3D MRCP 图像质量。DL-CS 技术结合高加速因子 33, 在确保整体图像质量的同时降低了单次扫描时间, 可提供高效的屏气扫描方案。

PO-3145

MRI 影像组学结合临床预测 ≤ 5 cm 肝细胞癌患者的粗梁亚型

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目的: 粗梁型肝细胞癌患者的预后较差, 评估基于 MRI 影像组学结合临床对于 ≤ 5 cm 肝细胞癌粗梁型的预测价值

方法: 回顾性收集 2016 年 1 月至 2022 年 1 月期间接受手术切除以及术前增强 MRI 检查患者, 并且将病理证实病灶 ≤ 5 cm 肝细胞癌患者纳入研究。所有影像学特征均由两位放射科医生评估, 分析患者的基线资料及临床指标、影像特征、病理结果, 将病例分为两组粗梁型和非粗梁型。分类变量使用卡方检验, 连续变量使用 T 检验。采用 logistic 回归分析确定粗梁型肝细胞癌的独立预测因素。在进行影像组学分析时将入组研究患者按照比例 7:3 被随机分配到训练组和验证组, 采用机器学习选取与肝细胞癌粗梁分型相关的特征并结合临床构建模型, 评估模型预测性能用 AUC (95% CI)。

结果: 91 例患者中包括粗梁型 27 例 (30%) 和非粗梁型 64 例 (70%), 两组患者年龄、性别、长径、AST、GGT、淋巴细胞、血小板、MVI、CD34、Ki67、病灶位置、生长方式、包膜、卫星灶、瘤内出血、瘤内坏死、瘤内血管、瘤周强化、肝炎、肝硬化比较, 差异无统计学意义 ($P > 0.05$)。其中 ALT、ALP、中性粒细胞、ADC 最低值、AFP、组织学分级两组间比较, 差异具有统计学意义 ($P < 0.05$)。Logistic 回归分析显示 ALP、ADC 最低值、Edmondson 分级为的粗梁型肝细胞癌独立预测因子。基于 f_classif 方法进行特征筛选并结合临床特征构建模型, 训练集曲线下

面积 (AUC) 为 0.82 (95% CI: 0.7189-0.9176), 测试集曲线下面积 (AUC) 为 0.79 (95% CI: 0.6188-0.9562)。

结论: ADC 最低值、Edmondson 分级有望成为肝细胞癌粗梁型有效预测指标。MRI 影像组学特征结合临床指标对粗梁型肝细胞癌预测具有较高价值。

PO-3146

常规磁共振特征在诊断星形细胞瘤 (IDH 突变型) 及预测分子状态中的临床价值

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目的: 分析常规 MRI 特征在星形细胞瘤 (IDH 突变型不伴 1p/19q 共缺失) 诊断中的临床应用价值, 以提高对该类型胶质瘤的术前诊断水平及预测分子状态。

方法: 回顾性分析 158 例经病理证实且有完整术前常规 MRI 影像 (T1、T2、FLAIR 序列) 的星形细胞瘤 (IDH 突变不伴 1p/19q 共缺失) 的 MRI 影像资料, 由 2 名中枢神经影像医师独立依据伦勃朗视觉感受图像 (visually accessible Rembrandt images, VASARI) 特征集的标准进行影像学特征的定量分析。运用 Kappa 检验评价 2 名医生对影像学特征评分结果的一致性。运用 Logistic 回归分析及受试者工作特征 (receiver operating characteristic, ROC) 曲线分析评价常规影像学特性对于星形细胞瘤 (IDH 突变不伴 1p/19q 共缺失) 的诊断效能。

结果: 2 名中枢神经影像医师 VASARI 特征评分的一致性较好 (Kappa 值: 0.737~0.960)。广义 T2/FLAIR 错配征、T2 微囊聚集区改变、囊壁/囊间隔 T2-FLAIR 不匹配、局部 T2-FLAIR 反错配征象对于弥漫性星形细胞瘤 IDH 基因突变的预测具有统计学意义 ($P < 0.05$), 可作为独立预测危险因素, ROC 曲线下面积 (area under curve, AUC) 分别为 0.840、0.779 和 0.702; 联合三者对星形细胞瘤 (IDH 突变不伴 1p/19q 共缺失) 的诊断效能最高, AUC 为 0.903。

结论: 广义 T2/FLAIR 错配征、T2 微囊聚集区改变、囊壁/囊间隔 T2-FLAIR 不匹配、局部 T2-FLAIR 反错配征象等常规 MRI 特征可以作为星形细胞瘤的成像标志物, 并可以术前非侵入性的预测星形细胞瘤的 IDH 突变不伴 1p/19q 共缺失的分子状态。

PO-3147

基于深度学习重建的缺血性脑卒中“百秒”快速磁共振成像的可行性

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目的: 探讨深度学习重建 (Deep Learning Recon, DLR) 算法缩短缺血性脑卒中急诊患者磁共振扫描时间的可行性。

方法: 21 例疑似急性缺血性脑梗塞患者 (10 例男性, 11 例女性, 平均年龄 69.86 ± 10.25 岁) 行头部 MR 检查。每位患者均完成常规成像和“百秒”快速成像, 扫描协议均包括轴位 T2WI-FSE、T1WI-FLAIR、T2WI-FLAIR 和 DWI 序列。常规图像采用传统滤波重构算法, “百秒”图像采用深度学习重建算法 (AIFI 指数 2 级; 预处理 2 级; 纹波抑制 0 级; 亮度系数 2 级)。ROI 置于脑桥、小脑、胼胝体、脑白质和梗塞灶记录 SI 和 SD 值, 以脑白质为背景计算 SNR 和 CNR 值, 并根据伪影、噪声水平、解剖细节和病灶显示, 对图像进行 4 分制评分。主观评分一致性采用 Kappa 检验。采用 Wilcoxon 检验分析各序列图像的 SNR、CNR、主观评分的差异。

结果: T2WI-FSE 序列梗塞灶 SNR、T1WI-FLAIR 序列梗塞灶 CNR 有统计学差异 ($P<0.05$); T2WI-FSE 序列梗塞灶 CNR、T1WI-FLAIR 序列梗塞灶 SNR、T2WI-FLAIR 及 DWI 序列 SNR、CNR 无统计学差异 ($P>0.05$)。两观察者主观评分一致性良好 (Kappa: 0.709~0.818), 评分无统计学差异。21 例患者中, 8 例在常规成像中存在运动伪影, 而在快速成像运动伪影显著减轻或消失。

结论:深度学习重建技术在“百秒”快速头部成像中可以显著减少图像运动伪影, 从而保证图像噪声低、病变对比度高。在快速获取急诊患者头部常用序列图像方面具有一定的临床应用价值。

PO-3148

改良磁共振 REACT 成像技术在全身血管成像的临床应用

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目的: 探究改良磁共振 REACT 成像技术在全身血管成像的临床应用, 并比较其与 DSA 及 CTA 成像技术的一致性。

材料与方法: 回顾性纳入兰州大学第二医院行改良磁共振 REACT 成像的胸腹部大血管, 冠状动脉及下肢静脉曲张患者 25 例, 其中男性 12 例, 女性 13 例, 平均年龄 49 ± 2.5 岁, 均行磁共振 REACT 成像及 CTA 和 DSA 成像, 分别有两名具有十年诊断经验的医师对 REACT 成像及 CTA 和 DSA 成像显示的大血管及小血管的数量及显示长度进行打分, 最后利用组内相关系数 ICC 评估 REACT 成像及 CTA 和 DSA 成像显示血管的一致性, $p<0.05$ 为差异具有统计学意义, 并利用 qq-plot 图展示两种技术的一致性分布。

结果: 磁共振 REACT 血管成像技术与 CTA 和 DSA 成像显示的血管, 在大、小血管数量及血管长度评分具有较高一致性, $ICC=0.89$, 且 $P=0.0051$, 差异具有统计学意义。

结论: 改良磁共振 REACT 成像技术在胸腹部大血管, 冠状动脉及静脉曲张血管成像技术可以无创性评估胸腹部大血管, 冠状动脉异常以及下肢静脉曲张程度, 且具有无需打药、无需心电触发等优点, 并且有较大的临床推广价值。

PO-3149

多序列 3D-MRI 影像组学对乳腺小肿块的鉴别价值

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目的 基于动态增强磁共振 (dynamic contrast enhancement-magnetic resonance imaging, DCE-MRI) 序列及弥散加权成像 (diffusion weighted imaging, DWI) 序列构建影像组学模型探讨其对直径 $<2\text{cm}$ 的乳腺肿块良恶性的鉴别价值。方法 选取 2019 年 1 月-2022 年 8 月就诊于我院 122 例患者, 均接受 MRI 检查, 且经测量, 肿块直径小于 2cm ; 将所有患者图像以(digital imaging and communications in medicine, DICOM)上传至慧影大数据平台, 使用双盲法在 DWI 及 DCE 第三期图像上逐层勾画感兴趣区 (region of interest, ROI), 后将该病灶勾画的所有 ROI 融合成三维容积感兴趣区 (Three dimensional volume region of interest, 3D-VOI), 进行组学分析, 按照 4: 1 将数据集随机分为训练集与测试集, 采用逻辑回归 (Logistic regression LR) 分类器, 构建 DCE、DWI 及 DCE 与 DWI 联合鉴别模型, 以病理检查为金标准, 评价三种影像组学模型的鉴别效能, 并比较三种模型的曲线下面积 (area under the curve, AUC)、准确性、特异性及敏感性。结果 根据病理结果将 122 例患者分为良性 42 例, 恶性 80 例, 以 DCE 构建组学模型鉴别乳腺小肿块的 AUC 值为 0.83 (0.65 - 1.00)、准确性 67%、特异性 81%、敏感性 67%, 以 DWI 构建组学模型鉴

别乳腺小肿块的 AUC 值 0.81(0.67 - 0.98)、准确性 64%、特异性 78%、敏感性 75%，以 DCE 与 DWI 联合模型鉴别乳腺小肿块 AUC 值 0.93 (0.80-1.00)、准确性 80%、特异性 88%、敏感性 89%。结论 DCE-MRI 与 DWI 联合序列所建立的模型在无创性鉴别乳腺小肿块的良恶性的价值更高。

PO-3150

首发未服药强迫症患者岛叶亚区功能连接变化及其与认知灵活性的相关性研究

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【目的】当前认知神经科学理论提出非适应性习惯化学习可解释强迫症状的形成机制，习惯化学习表现为认知灵活性障碍和基于结果的变化调整自身行为的困难。对应的习惯化网络与脑岛、壳核关系密切，而目前对于首次发作未服药强迫症 (obsessive-compulsive disorder, OCD) 患者脑岛叶亚区功能连接的研究较少，本研究主要探讨首发未服药强迫症患者以双侧岛叶亚区为种子点的静息态脑功能连接的变化及与认知灵活性之间的关系。

【方法】本研究招募了 45 名 OCD 患者(OCD 组)和 40 名健康志愿者(对照组)，均完成临床症状评估及威斯康星卡片分类测试(Wisconsin card sorting test,WCST)，并进行静息状态功能磁共振(rs-fMRI)的扫描。选取双侧前岛叶腹侧和背侧、双侧后岛叶 6 个种子点进行全脑功能连接分析，采用双样本 T 检验比较强迫症组与正常对照组之间的功能连接差异，使用 SPSS 22.0 软件，采用 Pearson 相关分析 OCD 组差异脑区功能连接强度与认知灵活性之间的关系。

【结果】与 HC 组相比，OCD 组左侧前岛叶腹侧与丘脑相关脑区的功能连接均较对照组减弱(P 均 <0.01)，OCD 组左侧前岛叶背侧与中央后回、右侧前岛叶背侧与中央后回和颞中回的功能连接较对照组增强(P 均 <0.01)。强迫症患者右侧前岛叶背侧与右侧中央后回的功能连接强度与错误应答数($r = -0.307, P = 0.042$)和总应答数($r = -0.324, P = 0.032$)呈显著负相关。

【结论】OCD 患者左侧前岛叶腹侧、双侧前岛叶背侧的功能连接网络模式存在异常，且部分功能连接的异常与患者认知灵活性表现相关。

PO-3151

基于心脏磁共振 T1 mapping 建立影像组学模型在鉴别急性与慢性心肌梗死中的应用价值

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目的:心血管疾病是现今世界范围内的主要死亡原因。急性心肌梗死是心血管疾病最严重最凶险的表现形式，而心肌梗死引起的心肌细胞坏死也是心血管疾病患者预后不良的重要因素。许多心肌梗死患者在首次诊断时由于急性心肌梗死和陈旧梗死灶并存，而目前二者之间鉴别过程较为繁杂且对患者配合度要求较高，使得治疗计划的选择和治疗后的随访出现困难。因此基于心脏磁共振 T1 mapping 建立影像组学模型，鉴别急性与慢性心肌梗死病灶有助于临床及时决策，从而实现对心肌梗死患者的早期医学干预，以降低心血管不良事件的发生风险，改善预后。

方法:回顾性分析 21 例心肌梗死患者的临床资料，其中 11 例图像为急性期，10 例为慢性期。所有患者均在西门子 3.0T 磁共振呼气末屏气时进行扫描，常规采集黑血序列、亮血序列图像，并采用 MOLLI 序列 T1 Mapping 扫描；采用专用的影像组学研究平台对平扫 T1 mapping 图像进行整体心肌分割并提取影像组学特征，对影像组学特征数据进行标准化，并采用最小冗余最大相关(mRMR)

和最小绝对收缩和选择算子(LASSO)回归分析进行特征选择并建立影像组学模型,并计算影像组学评分(Radscore)。采用 ROC 曲线评估模型的鉴别预测能力。

结果:采用开源 fae 软件包对 T1 Mapping 图像共提取 42 个特征进行统计学检验,其中 19 个特征有显著统计学意义($P<0.05$)。对每个有统计学意义的特征做 ROC 曲线,得到鉴别诊断急性与慢性心肌梗死的前 4 个特征的 AUC 均大于 0.7,其中 AUC 最大为 0.779。

结论:基于心脏磁共振 T1 mapping 建立的影像组学模型对心肌梗死患者病灶的所处时期具有较好的鉴别效能。

PO-3152

磁共振全身脂肪分布特征与代谢风险相关性研究

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目的:肥胖症与心血管疾病、糖尿病、脂肪肝和肿瘤等重大疾病的发生密切相关。传统体质指数(BMI)、腰臀比(WHR)等不能准确反映人体脂肪分布以及患病风险。因此,本文基于磁共振全身脂肪定量成像新技术,初步探索全身和腹内脂肪分布人体测量学指标(BMI、WHR)和代谢风险指标(甘油三酯 TG、空腹血糖 GLU)之间的相关性,为相关疾病研究和临床诊疗提供定量新方法。

方法:共纳入 267 例志愿者,男女比例为 152:112,平均年龄 39.8 岁。使用 MR 系统自动的 FACT 序列进行全身脂肪定量成像,获得质子加权脂肪分数图像(PDFF),采用团队开发的全身脂肪分割方法实现皮下脂肪、内部脂肪的自动识别和体积定量,然后计算全身体脂率(全身脂肪体积/全身体积, TAT/WH)、腹内脂肪/全身脂肪(VAT/TAT)、腹部皮下脂肪/腹内脂肪(ASAT/VAT)等指标,并分别研究与 BMI、WHR、年龄、甘油三酯 TG、空腹血糖 GLU 的相关性,进一步分析性别间是否存在差异。

结果:人群总体体脂率与 BMI ($r=0.479$)、WHR ($r=0.189$)和年龄($r=0.199$)呈现显著正相关($p<0.05$),但男性体脂率与年龄无显著线性相关性;人群总体体脂率与 TG 和 GLU 无显著线性相关性,且体脂率与 TG 呈现正相关趋势($r=0.126$, $p=0.119$),而与 GLU 呈现负相关趋势,按照性别统计,男性和女性体脂率与 TG 具有弱相关性($r=0.281$ vs. 0.329 , $p<0.05$),说明单纯体脂率不能特异性表征人体的代谢功能状态。

人群腹内脂肪体积在全身脂肪中的占比和腹部脂肪分布指标与 BMI、WHR、年龄和 GLU ($r=0.239$, $r=-0.260$)呈现显著线性相关($p<0.05$),且与 WHR 最相关,表明随着体重、年龄等因素的升高,过多脂肪更倾向于沉积在腹内,相关代谢风险也逐渐升高;按照性别分析,男性 ASAT/VAT 数值较小,与 BMI 无关($r=0.071$, $p=0.385$),表明男性更倾向于腹内脂肪沉积,具有更高的代谢风险。

结论:磁共振全身脂肪定量指标与代谢指标之间具有线性相关性,且与现有 DXA、CT 评估报道具有较好的一致性。

PO-3153

失眠障碍患者静息态视觉脑网络研究

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目的:探讨失眠障碍患者视觉皮层网络有无异常及其在失眠障碍发病中的作用。

方法:2016 年 1 月至 2016 年 12 月间,共招募符合条件的失眠障碍患者 44 例(男性/女性=7/37 例,年龄 41.4 ± 10.8 岁)和健康人 41 例(男性/女性=10/31 例,年龄 38.1 ± 9.9 岁),失眠障碍与健康人均进行 PSQI、HAMD、HAMA 等相关量表评测,失眠障碍患者诊断标准除了符合相关 DSM-5

诊断失眠障碍的相关症状，失眠障碍患者临床量表诊断标准为 $PSQI \geq 8$, $HAMD < 17$, $HAMA < 14$ 。对所有受试者采用德国 Siemens Prisma 3.0T 磁共振成像仪头颅 64 通道线圈进行磁共振脑功能成像研究，扫描序列采用西门子 Multiband EPI 序列，采集受试者结构像和 rest-fMRI 图像，然后使用脑功能连接分析方法，包括 Statistical Parametric Mapping (SPM12) 软件包和基于 SPM12 的静息态功能磁共振数据处理工具包，REST V1.8 (Resting-State fMRI Data Analysis Toolkit V1.8) 及 DPABI V2.1 (Data Processing & Analysis of Brain Imaging) 等平台 and SPSS19.0 软件包统计学分析等方法，以初级视觉皮层为种子点，观察失眠障碍患者与健康志愿者脑区功能变化。

结果：失眠障碍组与健康对照组间年龄、性别和受教育程度无显著性差异 ($p > 0.05$)，失眠障碍组与健康对照组间 $PSQI$, $HAMA$, $HAMD$ 量表得分具有显著的统计学差异，失眠障碍组 $PSQI$, $HAMA$, $HAMD$ 量表得分均显著高于健康对照组 ($P < 0.01$)。

与健康对照组相比，失眠障碍组 BA17 区与双侧岛盖部额下回、三角部额下回、右侧额中回、眼眶部、内侧眶部额中回、左侧罗兰多壳盖、中央前回功能连接增强。

结论：失眠障碍患者右侧额中回与初级视觉皮层功能连接增强，其可能与失眠障碍疾病的情绪异常有关。初级视觉皮层与初级运动皮层功能连接的增强导致对环境刺激因素的存在而持续感觉处理活动，从而延迟入睡时间。

PO-3154

3D 酰胺质子转移成像与扩散峰度成像对 前列腺癌的诊断价值研究

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目的：本研究旨在比较 3D 酰胺质子转移成像与扩散峰度成像对前列腺癌的诊断价值。

材料和方法：分别收集了 18 例前列腺癌 (PCa) 患者和 12 例前列腺增生 (BPH) 患者，这些患者均行 3.0T 磁共振检查，除常规平扫序列外，加扫了 3D-APT 序列和 DKI 序列。通过 Firevoxel 软件后处理生成 DKI 序列的平均扩散系数 (MD) 和平均扩散峰度 (MK) 参数图，APT 序列扫描结束后自动生成 APT 参数图。由两名医师在 APT 图和 DKI 参数图上勾画感兴趣区，测量病灶的 APT 值、MD 和 MK 值。采用组内相关系数评价两名医师所测结果的一致性；使用独立样本 t 检验比较 BPH 组和 PCa 组间各参数的差异；用受试者工作特征 (ROC) 曲线评估各参数的诊断效能。

结果：两名医师所测数据一致性良好 ($ICC > 0.75$)。BPH 组的 MK 值 (0.623 ± 0.102) 和 APT 值 ($2.35\% \pm 0.15\%$) 均显著低于 PCa 组 (0.887 ± 0.003)、 $2.75\% \pm 0.31\%$ ；BPH 组的 MD 值 (1.821 ± 0.432) $\times 10^{-3} \text{ s} \cdot \text{mm}^{-2}$ 显著高于 PCa 组 (1.236 ± 0.166) $\times 10^{-3} \text{ s} \cdot \text{mm}^{-2}$ ，各参数差异均有统计学意义 ($P < 0.05$)。ROC 曲线分析示 MK 值、MD 值和 APT 值鉴别 BPH 和 PCa 的特异度依次为 98.1%、96.7%、88.9%，敏感度依次为 93.5%、92.9%、76.8%。诊断阈值分别为 $0.6334 \times 10^{-3} \text{ s} \cdot \text{mm}^{-2}$ 、 $0.6010 \times 10^{-3} \text{ s} \cdot \text{mm}^{-2}$ 、2.5%。

结论：3D 酰胺质子转移成像与扩散峰度成像对于 BPH 和 PCa 的鉴别均有价值，且 DKI 参数的 MK 值和 MD 值的诊断敏感度和特异度优于 APT 值。

PO-3155

MAGiC 技术在定量垂体铁沉积中的应用价值

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目的：地中海贫血等血液系统疾病的患者长期输血以及胃肠道吸收铁增多，导致其出现肝脏、心脏、胰腺、性腺、垂体、脑等器官的铁过载。垂体铁过载会导致患者出现生长发育迟缓、促性腺激素减低、促甲状腺激素减低等并发症。本研究采用 MAGiC 序列 T1 值、T2 (MAGiC)值、PD 值、T2 MAP 序列 T2 (T2-MAP)值评估地中海贫血患者垂体的铁含量。

方法：本研究共纳入 44 例地中海贫血患者和 28 例年龄、性别相匹配的健康对照者。首先，两名影像诊断医师对垂体矢状位 MAGiC 序列合成的 T1WI 图与常规 T1WI 图进行图像质量评分并测量垂体高度，分析垂体 MAGiC 序列合成的 T1WI 图与常规 T1WI 图的图像质量、垂体高度测量是否有差异。从 MAGiC 序列定量图和 T2 MAP 图中得到相应垂体定量值，分析地中海贫血组与正常对照组的垂体 T1 值、T2 (MAGiC)值、PD 值、T2 (T2-MAP)值、垂体高度的组间差异。

结果：两名影像诊断医师对垂体 MAGiC 序列合成的 T1WI 图与常规 T1WI 图的图像质量评分存在显著差异 ($P < 0.05$)，评分者之间的一致性检验 $Kappa > 0.61$ 。与正常对照组对比，地中海贫血组的身高、体重、BMI、垂体高度、垂体 T1 值、垂体 T2 (MAGiC)值、垂体 T2 (T2-MAP)值均减低 ($P < 0.05$)，垂体 PD 值升高 ($P < 0.05$)。垂体 T2 (T2-MAP)值与垂体 T2 (MAGiC)值之间、垂体 MAGiC 序列合成的 T1WI 图与常规 T1WI 测量垂体高度之间的一致性分析相关系数分别为 0.889、0.975 ($P < 0.001$)。

结论：本研究揭示了地中海贫血患者垂体中铁含量高于正常人，MAGiC 序列在评估地中海贫血患者垂体铁沉积方面具有一定的可行性。

PO-3156

磁共振 Thrive_3D_iso 序列评估腋窝淋巴结转移的研究与应用

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目的：应用 Thrive_3D_iso 序列技术评估乳腺癌腋窝淋巴结转移情况，判断腋窝淋巴结数量及是否受侵犯在判断病变程度、制定乳腺癌手术方案、制定术后治疗方案和治疗前后效果评估等方面有重要的意义。

方法：2023 年 5 月至 2023 年 8 月之间共 89 例临床已确诊的乳腺癌患者，术前均行乳腺增强扫描，在完成动态增强扫描后立即运用 Thrive_3D_iso 序列行腋窝区域的磁共振扫描，经过 MIP 图像后处理重建，生成多方位多角度的淋巴结实体影像，判断淋巴结与周围血管等的关系，并以手术病理结果为金标准，超声与钼靶为相对比结合的参考元素进行统计学分析。

结果：89 例检查中，发现淋巴结转移的有 54 例，此病例中与超声检查结果相吻合的有 51 例，不吻合的有 3 例，其中超声没发现有 1 例，不确定的有 2 例；与钼靶检查结果相吻合的有 42 例，不吻合的有 12 例，其中钼靶没发现有 10 例，不确定的有 2 例。最后通过手术后或引导穿刺病理化验检测结果有 49 例为转移性淋巴结，5 例为炎性淋巴结。

结论：应用 Thrive_3D_iso 序列技术扫描对乳腺癌腋窝淋巴结转移显示的效果非常直观清楚，本研究推荐 Thrive_3D_iso 序列技术应用作为常规扫描对病人制定乳腺癌手术方案、制定术后治疗方案和治疗前后效果评估等方面有重要的意义。

PO-3157

基于独立成分分析的轻度肝性脑病的大尺度网络功能连接研究

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目的: 探讨伴有轻度肝性脑病 (MHE) 和不伴有肝性脑病 (NMHE) 患者的功能连接 (FNC) 变化, 及其与认知评估的关系

方法: 纳入 27 个肝硬化患者, 患者分组是基于认知测试的结果, 其中 14 个 MHE, 13 个 NMHE, 以及 16 个健康受试者纳入实验中。每个受试者接受静息态磁共振检查以及 PHES 评分, 使用 gift 软件包基于独立成分 ICA 方法对静息态 fMRI 进行分析, 根据所得 IC 的空间相似性划分为 8 个功能网络, 计算受试者不同独立成分 IC 间以及大尺度网络间 FNC 的静态功能连通性改变。三组比较采用单因素方差分析 ($p < 0.01$, FDR 校正), 采用事后检验比较组间差异。使用皮尔逊相关对具有差异的功能连接结果与认知测试结果进行相关性分析。

结果: 共得到 36 个独立成分, 将其划分为 8 个功能网络, 包括基底神经节网络(BG), 默认网络(DMN), 背侧注意网络(DAN), 腹侧注意网络(VAN), 额顶网络(FPN), 边缘网络(LN), 躯体运动网络(SMN), 视觉网络(VIN)。单因素方差分析结果显示, 三组间存在多个 IC 间功能连接异常, 与健康受试者比较, MHE 患者这些 IC 间的功能连接下降, 特别是 DAN(19)-BG(44)、LN(16)-DAN(48)、LN(16)-VAN(37)、VAN(47)-VAN(37)的功能连接下降也存在于 MHE 和 NMHE 之间。相关性分析显示, 这些 IC 间功能连接与 MMSE、DST 评分呈正相关, 与 Stroop、NCT 测试呈负相关, LN(16)-DAN(48)与 MMSE 相关性最高($r=0.596$), VAN(47)-VAN(37)与 Stroop 测试、DST、NCT 评分相关性最高(r 分别=-0.579、0.666 和-0.427)。在大尺度网络方面, MHE 较 NMHE 患者的 DAN-DAN、DAN-LN、DAN-VN 间的网络功能连接(FNC)下降。

结论: MHE 患者存在多个网络成分的功能失连接, 主要位于边缘系统 LN16 与注意网络成分、以及 DAN 和基底神经网络成分。大尺度网络 DAN-DAN、DAN-LN、DAN-VN 间的网络连接破坏是 NMHE 发展为 MHE 的可能原因。

PO-3158

PD - 3D MATRIX - SPAIR 序列联合人工智能压缩感知技术对踝关节的应用价值

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目的 探讨 3D 矢状位频率衰减反转恢复质子密度加权序列 (PD - 3D MATRIX - SPAIR) 联合人工智能压缩感知 (ACS) 技术对踝关节扫描的可行性, 同时比较不同加速因子 (AF) 对成像质量的影响。**方法** 招募 32 例健康志愿者, 采用联影 3.0T MR 扫描仪行踝关节 PD - 3D MATRIX - SPAIR 常规并行采集组(PI)及 ACS 组, ACS 组设置不同加速因子进行扫描。根据扫描方式常规组加速因子为 3.0(常规组 PI3.0 组), ACS 加速因子分别为 4.0 组、6.0 组、8.0 组,共获取 4 组图像, 两位具有多年骨肌资深放射诊断医生在原始图同一层面上相同窗宽、窗位划定感兴趣区 (ROI)测量信号强度 (SI) 和标准差 (SD) 并计算信噪比 (SNR) 和对比噪声比 (CNR), 并对图像质量进行四分法主观及客观评分。**结果** ACS 4.0 组、ACS 6.0 组、ACS 8.0 组与常规 PI 3.0 组图像质量评分差异均有统计学意义 ($Z=1.417$ 、 1.414 , $P=0.155$ 、 0.157)。在 4 组图像客观评价中 ACS 4.0 组信噪比最高 ($P < 0.05$), ACS 8.0 组 SNR 最低 ($P > 0.05$), ACS 为 6.0 组时与常规 PI 3.0 组图像 SNR 无差异。ACS 4.0 组、ACS 6.0 组、ACS 8.0 组与常规 PI 3.0 组的 CNR 差异无统计学意义 ($P=0.950$)。常规 PI 3.0 组、ACS 4.0 组、ACS 6.0 组、ACS 8.0 组采集时间分别为 475 s、254

s、173 s、130 s, ACS 4.0 组、ACS 6.0 组、ACS 8.0 组较常规 PI 3.0 组分别缩短 46.5%、63.6%、72.6%。**结论** 联合 ACS 行踝关节 PD - 3D MATRIX - SPAIR 序列扫描, 随着 AF 的增加扫描时间逐渐降低。当 ACS 6.0 对比常规 PI 3.0 在确保图像质量前提下, 扫描时间缩短 63.6%, 临床推荐使用 ACS 6.0 行踝关节序列扫描。

PO-3159

基于 4D-FLOW MRI 的小型颅内动脉瘤内及动脉瘤临近载瘤动脉局部血流动力学分析

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目的: 目前使用 CFD 模拟动脉瘤及载瘤动脉的血流环境时, 需要人为设置边界条件及模型入口及出口处的血流信息, 不能完全反映载瘤动脉及动脉瘤内真实的血流动力学环境及发生动脉瘤后血流模式发生的变化。使用 4D-FLOW MRI 技术, 在体测量血管内血流流速及流量, 探讨基于 4D-FLOW MRI 测量的小型颅内动脉瘤形成后动脉瘤内及邻近载瘤动脉内血流动力学变化。

方法: 回顾性收集在华中科技大学同济医学院附属协和医院放射科 47 例进行头颅 CT 血管成像及头部 MR 血管成像诊断为动脉瘤患者的临床信息; 对所有血管的 4D-FLOW 图像重建后进行流体力学分析, 在动脉瘤内垂直血管方向最大面积位置、载瘤动脉上动脉瘤入口及出口位置; 在对应的非载瘤动脉的对称位置放置截面, 获得截面中壁剪切应力及能量损失等血流动力学参数。使用单因素方差分析验证三个截面之间的一致性。比较载瘤动脉/非载瘤动脉之间的参数差异。

结果: 非载瘤动脉中, 平均壁剪切应力、平均周向壁剪切应力和最大周向壁剪切应力在三个截面之间均无明显差异; 非载瘤动脉中, 对称与动脉瘤入口与出口截面之间的最大壁剪切应力, 入口与最大面积截面、入口与出口截面之间的平均轴向壁剪切应力, 入口与最大面积截面、入口与出口截面之间的最大轴向壁剪切应力之间差异具有统计学意义。载瘤动脉中出口截面的最大壁剪切应力相对入口及最大面积截面之间的差异具有统计学意义; 出口截面的平均壁剪切应力相对入口及最大面积截面之间的差异具有统计学意义; 入口截面的平均轴向壁剪切应力相对最大面积截面及出口截面之间的差异具有统计学意义; 入口截面的最大轴向壁剪切应力相对最大面积截面及出口截面之间的差异具有统计学意义; 最大面积截面的平均轴向壁剪切应力相对于入口及出口截面之间的差异具有统计学意义。

结论: 非载瘤动脉中的部分血流动力学参数之间也存在差异, 可能是与动脉瘤及邻近载瘤动脉血流动力学发生变化有关, 因此在研究动脉瘤内部及载瘤动脉局部的血流动力学变化时, 需要考虑到这部分变化, 以准确探讨真正由于发生动脉瘤而引起的血流动力学改变。

PO-3160

Prognostic value of CRAFITY score in hepatocellular carcinoma after transarterial chemoembolization combined with tyrosine kinase inhibitors and PD-1 inhibitor

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Aims: To investigate the utility of CRAFITY score in hepatocellular carcinoma (HCC) after transarterial chemoembolization (TACE) in combination with tyrosine kinase inhibitors (TKIs) and PD-1 inhibitor therapy.

Materials and Methods: Data from patients with advanced HCC treated with TACE plus TKIs and PD-1 inhibitor from January 2019 to June 2022 were collected and analyzed retrospectively. Patients with AFP ≥ 100 ng/mL and those with CRP ≥ 1 mg/dL were assigned a CRAFTY score of 1 point. Patients were divided into three groups according to their CRAFTY score (CRAFTY-low, 0 points; CRAFTY-intermediate, 1 point; and CRAFTY-high, 2 points). The differences in overall survival (OS), progression-free survival (PFS), tumor response and adverse events (AEs) were compared among the three groups. Risk factors for OS and PFS were assessed.

Results: A total of 70 patients were included. The patients were assigned CRAFTY scores of 0 points (CRAFTY-low, n=25 [35.71%]), 1 point (CRAFTY-intermediate, n=29 [41.42%]), and 2 points (CRAFTY-high, n=16 [22.81%]). Multivariate analysis showed that lower CRAFTY score was an independent factor for the improved OS ($P = .045$) and PFS ($P < .001$). TACE session was also associated with the OS ($P = .048$) in the multivariate analysis. A higher objective response rate (ORR) was achieved in the CRAFTY-low cohort. The percentage of patients with protein urea was highest in the CRAFTY-high group. No significance differences were observed in grade 3 AEs in three groups.

Conclusion: The CRAFTY score is simple and could be useful for predicting treatment outcomes, tumor response and AEs of the HCC patients receiving TACE plus TKIs and PD-1 inhibitor therapy.

PO-3161

Safety and Effectiveness of Transarterial Chemoembolization in Patients with Hepatocellular Carcinoma Aged Greater Versus less than 80 Years

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Background To investigate the safety and effectiveness of transarterial chemoembolization (TACE) between elderly patients (≥ 80 years) and younger patients (< 80 years) with hepatocellular carcinoma (HCC), and to explore the potential risk factors affecting the progression-free survival (PFS) for TACE.

Methods A consecutive cohort of unresectable HCC patients initially treated with TACE was retrospectively analyzed. Patients were categorized into two groups stratified by age. The efficacy and safety were evaluated. The PFS was investigated and the prognostic factors for PFS were also analyzed using Kaplan–Meier method and Cox proportional hazard models.

Results A total of 198 patients were included (44 patients ≥ 80 years and 154 patients < 80 years). The cumulative risk of PFS after TACE was comparable between the two groups ($P = .800$). In multivariate analysis, lower ECOG score ($P = .039$) and earlier BCLC stage ($P = .004$) were independent predictors of the better PFS. TACE treatment was well tolerated by patients in both groups.

Conclusions Aging is not a significant predictor of poor PFS. TACE therapy is safe and effective in octogenarians with HCC compared with younger patients. Low ECOG score and early BCLC stage were associated with the better PFS.

PO-3162

Downregulated FTO promotes MicroRNA-155-Mediated inflammatory response in cerebral ischemia/reperfusion injury

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AIMS: The essential role of m6A RNA modification in various biological processes has been demonstrated. However, its role and underlying mechanism in cerebral ischemia/reperfusion (I/R) injury is not completely understood. Specifically, this study aims to elucidate the mechanism for alteration of m6A RNA modification in cerebral I/R injury and identify a novel therapeutic target for treatment.

Materials and Methods: Firstly, we established a cerebral ischemia/reperfusion injury model in mice using MCAO followed by reperfusion. Then, the m6A RNA modification was detected with a colorimetric m6A quantification assay, and the expression of the m6A methyltransferases METTL3, METTL14, and WTAP, as well as the demethylases FTO and ALKBH5 were determined with qPCR and western blotting. Furthermore, FTO was overexpressed in brain tissues via intracerebroventricular injections of adenoviruses encoding FTO, and the protective effect of FTO on m6A RNA modification and cerebral I/R injury was assessed. After that, MeRIP assays were used to detect the effect of FTO overexpression on m6A modification of pri-miR-155 and qPCR analysis to identify its maturation. Finally, the role of miR-155 overexpression in the protective effects of FTO on cerebral I/R injury was examined.

KEY FINDINGS: Our results demonstrated that m6A levels of total RNA were increased, and m6A methyltransferase FTO expression was decreased in post-I/R injury cerebral tissues. The overexpression of FTO reversed the increase in m6A RNA modification and attenuated cerebral I/R injury. Furthermore, we found that FTO overexpression increased the m6A modification of pri-miR-155 and enhanced its maturation to form miR-155. Notably, miR-155 overexpression blunted FTO's protective effect against cerebral I/R injury.

SIGNIFICANCE: We propose that downregulated FTO overexpression is the mechanism that contributes to increased m6A RNA modification in cerebral I/R injury. By inhibiting the maturation process of pri-miR-155 to inhibit m6A modification, FTO overexpression reverses increase in total m6A RNA modification and exerts protective effects against cerebral injury.

PO-3163

Neutrophil-to-HDL-C Ratio as an Inflammatory Biomarker in Patients with Anxiety and Obstructive Coronary Artery Disease: a Retrospective Study

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Background: Anxiety is a common comorbidity with coronary artery disease (CAD). The neutrophil-to-lymphocyte ratio (NLR), neutrophil-to-high-density lipoprotein cholesterol (HDL-C) ratio (NHR), and lymphocyte-to-HDL-C ratio (LHR) can predict the severity of CAD. This retrospective study aimed to explore the relationship between NLR, NHR, and LHR, and the presence of obstructive or severe CAD (OCAD, SCAD) in patients with comorbid anxiety and chest pain.

Methods: A total of 1,063 patients with anxiety and chest pain were divided into an NOCAD group and OCAD group according to computed topography angiography (CCTA). The 455 patients in the

OCAD were further divided into the NSCAD group (n=205) and SCAD group (n=255) according to coronary angiography results. Demographic and laboratory data were collected.

Results: Multiple regression analysis showed that higher NLR, NHR, and LHR served as independent risk factors for OCAD in patients with anxiety and chest pain (OR 2.10, 95%CI: 1.77–2.48, $p<0.001$), but only NHR was significantly associated with SCAD (OR 1.84, 95%CI: 1.23–2.74, $p<0.001$). Area under the receiver operating characteristic curve analysis showed that NHR had the highest predictive value for OCAD and SCAD compared with NLR and LHR (AUC 0.71, sensitivity 57.36%, specificity 80.10%; AUC 0.83, sensitivity 82.4%, specificity 73.17%, respectively).

Conclusions: NHR was associated with severity of coronary stenosis in patients with comorbid anxiety and chest pain, and also served as an independent predictor of OCAD and SCAD in these patients.

PO-3164

Bacterial community analysis of pyogenic liver abscess with or without gas formation by 16S rDNA sequencing

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Abstract

Background: Gas formation is an important feature of pyogenic liver abscess (PLA). The potential relationship between gas formation and bacterial composition in PLA remains unclear. The present study attempts to compare bacterial composition between gas-forming PLA (GFPLA) and non-gas-forming PLA (non-GFPLA) and to identify factors associated with gas formation in PLA.

Methods: Clinical data from 331 patients with PLA was collected retrospectively, and 16S rDNA sequencing was performed to analyze the bacterial composition of pus samples from 60 consecutive PLA patients. Patients were divided into GFPLA and non-GFPLA groups according to the presence or absence of gas on computed tomography (CT). Univariate and multivariate logistic analyses were used to identify factors associated with gas formation in PLA.

Results: Rates of extrahepatic migratory infection (EMI), intensive care unit (ICU) admission and mortality were significantly higher in the GFPLA group. 16S rDNA sequencing showed no differences in bacterial community richness and diversity between the two groups. Linear discriminant analysis effect size (LEfSe) revealed a higher abundance of *Enterococcus faecium* and *Enterobacter cloacae* in the GFPLA group. However, the presence of *Enterococcus faecium* and *Enterobacter cloacae* was not associated with the gas formation on multivariate regression analysis. Only the history of digestive system cancer was independently associated with gas formation in PLA.

Conclusions: No relationship was observed between gas formation and bacterial composition in PLA; only the history of digestive system cancer was independently associated with PLA gas formation.

PO-3165

The correlation between duration of symptoms and CT features in pyogenic liver abscess patients

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Purpose: To explore whether duration of symptoms (DOS) is associated with imaging features in pyogenic liver abscess (PLA) patients and figure out the correlation between imaging features and pathological features.

Method: CT images and clinical characteristics of 156 PLA patients were retrospectively collected. These patients were divided into two groups ($<7d$, and $\geq 7d$) according to the DOS. DOS in our study is defined as the time from the onset of common symptoms of PLA (such as fever, rigors, abdominal pain and so on)to the first imaging examination after admission .Their clinical and imaging characteristics were further evaluated to identify the relationship between DOS and imaging features. We compared the pathological findings with the imaging features of PLA patients who underwent surgery or percutaneous puncture biopsy.

Results: PLA patients whose DOS < 7 are more likely to have single lesion and form gas in the pus cavity, while PLA patients whose DOS ≥ 7 are more likely to have perilesional low density and rim enhancement. There were no statistical differences in pleural effusion, peritoneal effusion, bile duct dilatation, length, cluster sign or petal sign and patchy parenchymal enhancement. Twelve PLA patients underwent surgery and six patients underwent percutaneous biopsy. Rim enhancement was consistent with a perceptible fibrous wall (microscopically consisting of proliferative fibrous tissue, acute inflammatory cells and chronic inflammatory cells) in a gross liver specimen, which suggested healing process of liver tissue. Cluster sign or petal sign suggested fibrous tissue hyperplasia and healing process of liver tissue.

Conclusion :

Gas formation often appears in the early stage of PLA. Rim enhancement is the manifestation of proliferative fibrous tissue, which gradually appears with the prolongation of the PLA course. Cluster sign or petal sign indicates healing process of liver tissue, and the liquefaction degree of PLA may not get better with the progress of PLA.

PO-3166

Multiparametric MRI-based Radiomics Nomogram Predicts the Recurrence of Hepatocellular Carcinoma After Postoperative Adjuvant Transarterial Arterial Chemoembolisation (PA-TACE)

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Purpose:To develop and validate a multiparametric MRI-based radiomics model for predicting the recurrence in hepatocellular carcinoma (HCC) patients after postoperative adjuvant transcatheter arterial chemoembolization (PA-TACE).

Methods:In this retrospective study,117 HCC patients (81 for training, 36 for validation) treated with PA-TACE within two months after surgical resection were included. Qualified pre-treatment contrast-enhanced MRI were performed before PA-TACE. Multiparametric radiomics features were extracted from T2 weighted imaging (T2WI), diffusion weighted imaging (DWI) ($b=800$), and hepatic arterial phase (AP). Least absolute shrinkage and selection operator (LASSO)-COX regression was utilized to select radiomics features. The radiomics score (Rad-score) was calculated through

a linear combination of selected feature clusters, with corresponding LASSO coefficients applied as weights. Optimal clinical characteristics selected by univariate and multivariate Cox analysis were integrated with Rad-score to develop a progression-free survival (PFS) prediction model. Additionally, the clinical-radiomics model was constructed utilizing significant clinical characteristics and Rad-score to assess individualized recurrence risk prediction. The performance of the combined model was evaluated by time-dependent receiver operating characteristic (ROC) curves, Harrell's concordance index (C-index), and calibration curve.

Results:Fifteen radiomics features were selected from three sequences of MRI. The Rad-score was calculated by the weights of the LASSO coefficients, and the cohort was stratified into high-risk and low-risk signature groups based on the Rad-score median value of 0.434. The significant difference in PFS between the high-risk and low-risk signature groups was confirmed in two cohorts ($P < 0.05$). The clinical independent predictors of HCC recurrence after PA-TACE were neutrophil to lymphocyte ratio (NLR) (HR = 1.49, 95% CI: 1.1-2.1, $P = 0.022$) and tumor size (HR = 1.28, 95% CI: 1.1-1.5, $P = 0.001$). The clinical-radiomics model developed by Rad-score, NLR, and tumor size demonstrated favorable performance for predicting the recurrence in both training and validation cohorts. The AUCs at 1-, 3- and 5- year of time-dependent ROC curves based on combined model were 0.82-0.91, and 0.75-0.91 in the training and validation cohorts, respectively. The calibration curve exhibited a satisfactory correspondence between predicted and observed PFS in two cohorts. Conclusion:The multiparametric MRI-based radiomics nomogram can well predict recurrence in HCC patients treated with PA-TACE and can serve as a valuable tool for clinical prognosis.

PO-3167

Transarterial chemoembolization combined donafenib with/without programmed death-1 inhibitors for initially unresectable hepatocellular carcinoma: a multicenter retrospective study

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Objective

To investigate the efficacy and safety of transarterial chemoembolization (TACE) combined with donafenib and programmed death-1 (PD-1) inhibitor (TACE+DP) and TACE combined with donafenib (TACE+D) in the treatment of unresectable hepatocellular carcinoma (uHCC) in a multicenter retrospective study.

Methods

In this multicenter retrospective study, the data of patients with uHCC who had received TACE+DP or TACE+D as first-line treatment from 15 Chinese academic centers during July 2021 to July 2022 were collected and retrospectively analyzed. Patients in the TACE+DP group received intravenous administration of PD-1inhibitor every 3 weeks and oral donafenib (0.2 g) twice daily until intolerable toxicity or disease progression. Patients in the TACE+D group received the same dose of PD-1 inhibitor and donafenib 5 days after TACE. Overall survival (OS), progression-free survival (PFS) and tumor responses were evaluated according to the modified Response Evaluation Criteria in Solid Tumors (mRECIST) between the two groups.Treatment-related adverse events (AEs) were analyzed to assess safety.

Results

There were 157 patients in the TACE+D group and 166 patients in TACE+DP group. mOS was significantly longer in the TACE+DP group than in the TACE+D group (18.1 vs 13.2 months; $P < 0.001$). Patients in the TACE+DP group achieved a higher ORR (50.6% vs 41.4%, $P = 0.019$) than those in the TACE+D group. Patients in the TACE+DP group also achieved a higher disease control rate (DCR) (89.2% vs 82.8%, $P = 0.010$) than in the TACE+D group. The incidence

and severity of AEs in TACE+DP group were comparable to those in TACE+D group (Any grade, 92.9% vs. 94.6%, $P=0.270$; grade 3 or 4, 33.8% vs. 37.3%, $P=0.253$).

Conclusion

With favorable safety and tolerability, TACE combined donafenib with PD-1inhibitors were more effective than TACE combined with donafenib in improving OS, PFS, and ORR.

PO-3168

A Multicenter, Retrospective Study Comparing the Efficacy of BACE Combined with Anlotinib and BACE Alone in the Treatment of Advanced Non-small Cell Lung Cancer

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Purpose

To compare the clinical efficacy and safety of bronchial artery chemoembolization (BACE) combined with Anlotinib (BACE + A) and BACE alone in the treatment of stage III-IV non-small cell lung cancer (NSCLC).

Materials and Methods

The clinical data of patients with advanced NSCLC diagnosed and admitted from November 1, 2019 to November 1, 2020 in 6 interventional centers were retrospectively analyzed. Patients were divided into BACE + A group and BACE alone group. Tumor response, progression-free survival (PFS), overall survival (OS) and treatment-related adverse events (TRAEs) were compared between the two groups, and the related factors affecting the prognosis of patients were analyzed.

Results

Ninety-four patients with lung cancer who met the inclusion/exclusion criteria were included in this study, 46 in the BACE + A group and 48 in the BACE group. BACE + A group was superior to BACE group in OS (18.8m vs. 13.4m, $P=0.0013$) and PFS (9.0m vs. 6.1m, $P=0.0012$). At 6 and 12 months after the first BACE, the ORR (34.8% vs. 22.9%, $P<0.05$; 40.0% vs. 14.8%, $P<0.05$) and DCR (80.4% vs. 68.8%, $P<0.001$; 83.3% vs. 59.3%, $P<0.05$) were higher in the BACE + A group than in the BACE group. Hypertension, fatigue, hand-foot syndrome, and anorexia were common adverse reactions unique to Anlotinib in the combination group, but there were no Grade 4 AEs.

Conclusion

BACE combined with Anlotinib is superior to BACE in the treatment of advanced NSCLC and can prolong OS and PFS, with adverse reactions within the tolerance range.

PO-3169

Prognostic value of venous outflow profiles on multiphase CT angiography for the patients with acute ischemic stroke after endovascular thrombectomy

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AbstractObjectives: To evaluate the prognostic value of venous outflow (VO) profiles evaluated on multiphase CT angiography (mCTA) for the patients with acute ischemic stroke (AIS) after endovascular thrombectomy (EVT).

Methods: We retrospectively collected 150 patients with AIS who had undergone pre-treatment CT perfusion (CTP) evaluation and subsequent EVT in our center from April 2018 to April 2022. Three-phase (peak arterial phase, peak venous phase, late venous phase) CTA was reconstructed from the CTP raw data, and VO was evaluated on three-phase CTA, respectively. Favorable VO was regarded as a cortical vein opacification score of 3–6, and unfavorable VO as a score of 0-2. Good outcome was defined as a modified Rankin Scale score of 0-2 at 90 days after EVT. Multivariate logistic regression analysis was performed to explore the predictors of good outcome. Prognostic value was assessed and compared using receiver operating characteristic (ROC) curves and Delong test.

Results: Good outcome was achieved in 85 (56.7%) patients. Among the mCTA- derived VO profiles, only favorable peak venous phase VO was found to be independently associated with good outcome (OR, 18.925; 95% CI, 3.676-97.422; $P<0.001$). After integrating favorable peak venous phase VO with a lower post-treatment National Institute of Health Stroke Scale score at 24 hours, successful recanalization and favorable hypoperfusion intensity ratio, the predictive ability for a good outcome was significantly improved than before (area under the ROC curve; 0.947 vs 0.881; $P=0.002$).

Conclusions: Favorable peak venous VO profiles on mCTA might be a promising biomarker in predicting good outcome in patients with AIS after EVT.

PO-3170

Development and validation of a predictive model of nondiagnostic results in patients undergoing CT-guided percutaneous transthoracic needle lung biopsy

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Purpose: Nondiagnostic results of computed tomography (CT)-guided percutaneous transthoracic needle biopsy (PTNB) of the lung can render a quandary in clinical practice. There is a lack of predictive models to guide the decision-making of doctors and patients before PTNB. We aimed to develop and validate a nomogram to predict the risk of nondiagnostic results in patients undergoing CT-guided PTNB of the lung.

Methods: A total of 954 PTNBs in the training cohort (M/F=590/364; mean age, 60±12 years) and 90 PTNBs in the external validation cohort (M/F=59/31; mean age, 61±11 years) were retrospectively included. The PTNB results were categorized as diagnostic (malignancy or specific benign) or nondiagnostic (nonspecific benign, atypical cells, or insufficient specimen). Multivariate logistic regression was used to identify independent predictors of nondiagnostic results and

construct the model. C-statistic, calibration curve, and decision curve analysis were used to evaluate discrimination, calibration, and clinical usefulness, respectively. The model was internally validated using bootstrapping resampling and externally validated to obtain optimism-corrected performance estimates.

Results: Of 954 PTNBs in 954 patients in the training cohort, 280 (29.4%) were nondiagnostic results. The model included six independent predictors: age at biopsy, lesion size, lobulation sign, air bronchogram, the number of samples, and pre-test probability. The C-statistics for the training, internal validation, and external validation cohorts were 0.753, 0.744, and 0.740, respectively. Two risk groups were identified with low (<40%) and high ($\geq 40\%$) probabilities of nondiagnostic results of PTNB. For lesions of low risk with the number of samples ≤ 2 or ≥ 3 , ≤ 2 samples should be obtained; for lesions of low risk with the number of samples ≥ 3 , more samples should be obtained when appropriate; for lesions of high risk with the number of samples ≥ 3 , PTNB needs to be reconsidered. Conclusion: The nomogram showed good performance in predicting the nondiagnostic results of CT-guided PTNB of the lung. Suggestions for each risk group may facilitate clinical practice.

PO-3171

The Superior Efficacy of Combination Transarterial Chemoembolization with Radiofrequency Ablation in Patients with Hepatocellular Carcinoma: a Meta-Analysis

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Background: Although the combination of transarterial chemoembolization (TACE) and RFA has been shown to have certain advantages over single therapy in hepatocellular carcinoma, some potential factors influencing the superior efficacy of combination therapy remain controversial.

Methods: 5 databases including PubMed, Embase, the Cochrane Library, Medline, and Web of Science were systematically searched for randomized controlled trials (RCTs) until March 14, 2022. The primary endpoint included the overall recurrence rate of the tumor and the overall survival (OS) rate treated with TACE plus RFA compared to that with RFA alone, and the secondary endpoint was the recurrence-free survival (RFS) rate. The statistical analysis was performed using the Review Manager (version 5.3) Software.

Results: A total of 7 RCTs were included. In terms of the overall recurrence rate of the tumor, the combination of TACE and RFA was better than RFA alone [risk ratio (RR) = 0.82, P = 0.002]. The combination therapy both in 3-year OS rate (RR = 1.19, P = 0.001) and 1-year RFS rate (RR = 1.17, P = 0.0004) was better than RFA alone. For complications, except fever (P = 0.04) and vomiting (P = 0.03), there was no significant difference between combination therapy and RFA alone (All P > 0.05). Subgroup analysis performed that the effectiveness of TACE combined with RFA was more advantageous in the patients from the China subgroup, the optimal interval times of RFA after TACE ≥ 2 weeks subgroup, and the tumor size ≤ 7 cm subgroup.

Conclusion: The combination of TACE with RFA was an effective and safe method for early-stage HCC, especially in decreasing tumor recurrence and prolonging survival.

PO-3172

Hepatitis B virus reactivation in hepatocellular carcinoma patients after hepatic arterial infusion chemotherapy combined with and without immunotherapy

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Background Hepatitis B virus (HBV) reactivation (HBVr) is a major concern for hepatocellular carcinoma (HCC) patients undergoing hepatic arterial infusion chemotherapy (HAIC) using mFOLFOX6 regimen. There is insufficient evidence to support the routine use of HAIC combined with immunotherapy in HCC patients with HBVr.

Aim To examine the adverse events (AEs) related to HBVr in HCC patients after HAIC, with or without immunotherapy, and to assess the effectiveness of antiviral prophylaxis for HBVr.

Methods Medical records of HCC patients receiving HAIC combined with and without immunotherapy between January 2021 and June 2023 were reviewed. The patients were divided into two groups based on whether they received immunotherapy or not.

Results Out of the 106 patients, 32 (30.2%) developed HBVr. Among these, 23 eligible patients with HBVr were included, with 14 patients (61%) receiving immunotherapy and nine patients (39%) not receiving immunotherapy. Prior to treatment, four patients in each group had detectable HBV DNA with median titre of 3.66 ± 102 IU/ml (patients with immunotherapy) and 1.98 ± 102 IU/ml (patients without immunotherapy), respectively. Fifteen patients did not show detectable HBV DNA. At reaction, the median HBV DNA level was 6.95 ± 102 IU/ml for all patients, 4.82 ± 102 IU/ml in patients receiving immunotherapy and 1.3 ± 103 IU/ml in patients not receiving immunotherapy. Grade 3 hepatitis occurred in 12 cases of all patients (12/23, 48%), including five patients with immunotherapy (56%) and seven patients without immunotherapy (78%). At the 3-month follow-up, HBV DNA was detected in 10 patients, with a median HBV DNA level of 2.05 ± 102 IU/ml (range, $1.5 \pm 102 - 3.55 \pm 102$ IU/ml) in patients (7/10) with immunotherapy and 4.28 ± 102 IU/ml (range, $1.15 \pm 102 - 5.88 \pm 102$ IU/ml) in patients (3/10) without immunotherapy. Intensified antiviral treatment was administered to all patients. No HBVr-related fatal events occurred.

Conclusion HBVr can occur after HAIC combined with or without immunotherapy. The degree of liver damage did not differ significantly in patients treated with or without immunotherapy. Intensified antiviral treatment was found to be crucial for HCC patients with HBVr.

PO-3173

A Comparison of the Performance of 68Ga-Pentixafor PET/CT versus Adrenal Vein Sampling for Subtype Diagnosis in Primary Aldosteronism

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Objective: To investigate the diagnostic efficiency and prognostic value of 68Ga-Pentixafor PET/CT in comparison with adrenal vein sampling (AVS) for functional lateralization in primary aldosteronism (PA). Histology and long-term clinical follow-up normally serve as the gold standard for such diagnosis.

Methods: We prospectively recruited 26 patients diagnosed with PA. All patients underwent 68Ga-Pentixafor PET/CT and AVS. Postsurgical biochemical and clinical outcomes of patients with unilateral primary aldosteronism (UPA), as diagnosed by PET/CT or AVS, were assessed by

applying standardized Primary Aldosteronism Surgical Outcome (PASO) criteria. Immunohistochemistry (IHC) was performed to detect the expression of aldosterone synthase (CYP11B2) and CXCR4.

Results: On total, 19 patients were diagnosed with UPA; of these, 13 patients were lateralized by both PET/CT and AVS, four patients were lateralized by PET-only, and two by AVS-only. Seven subjects with no lateralization on AVS and PET received medical therapy. All patients achieved complete biochemical success except one with nodular hyperplasia lateralized by AVS alone. The consistency between PET/CT and AVS outcomes was 77% (20/26). Moreover, CYP11B2-positive nodules were all CXCR4-positive and showed positive findings on PET. Patients who achieved complete biochemical and clinical success had a higher uptake on PET as well as stronger expression levels of CXCR4 and CYP11B2.

Conclusions: Our analysis showed that ⁶⁸Ga-Pentixafor PET/CT could enable non-invasive diagnosis in most patients with PA and identify additional cases of unilateral and surgically curable PA which could not be classified by AVS. ⁶⁸Ga-Pentixafor PET/CT should be considered as a first-line test for the future classification of PA.

PO-3174

Role of radiomics in predicting the therapeutic efficacy of initial transarterial chemoembolization in hepatocellular carcinoma: a systematic review and meta-analysis

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Background: The treatment efficiency of hepatocellular carcinoma (HCC) following transcatheter arterial chemoembolization (TACE) is a critical prognostic factor. Through quantitative analysis of pre-treatment imaging, radiomics has demonstrated its usefulness as a valuable biomarker for assessing tumor response after TACE. This study aims to evaluate the methodological significance of radiomics in predicting the objective response (OR) following the initial TACE procedure.

Methods: A systematic search was conducted from four databases (PubMed, Embase, Web of Science, and Cochrane Library) up to April 21, 2022, to identify original studies investigating the use of radiomics for predicting treatment response of HCC following TACE. Diagnostic performance was assessed by pooling sensitivity, specificity, and area under the curve (AUC). Heterogeneity among studies was evaluated using the I² statistic. Meta-regression and subgroup analysis were performed to explore potential factors contributing to heterogeneity. The study is registered with PROSPERO. ID: CRD42022332384.

Results: Ten eligible studies were evaluated for meta-analysis encompassing a total of 2514 samples, of which 1195 achieved OR, and 1319 were non-OR after the initial TACE. The pooled sensitivity was 0.87 (95% confidence interval [CI]: 0.79-0.92, I² = 72.47%), the pooled specificity was 0.85 (95% CI: 0.78-0.90, I² = 54.49%), and the pooled AUC was 0.92 (95%CI: 0.89-0.94). Subgroup analysis showed that using deep learning algorithm and increasing the sample size are potential means to achieve better predictive performance (P < 0.05).

Conclusions: Radiomics has provided a novel option for predicting initial TACE response. As an emerging biomarker, before radiomics can assist HCC clinical management, it needs to be further validated in larger cohorts.

PO-3175

Radiofrequency Hyperthermia Enhances the Effect of OK-432 for Hepatocellular Carcinoma Via Activation of TLR4-cGAS-STING Pathway

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Abstract

Background: Radiofrequency ablation (RFA) is an effective alternative to surgery in the treatment of early-stage hepatocellular carcinoma (HCC). However, when RFA of large and irregular HCCs, a safe ablation margin with 0.5-1.0 cm beyond the tumor confinement is usually difficult to obtain, and thus causing a sublethal radiofrequency hyperthermia (RFH) at the ablated tumor margin.

Methods: This study investigated the feasibility of using RFH to enhance the effect of OK-432 for HCC and explored its potential mechanisms, with the aim to generate a tumor-free ablated margin during RFA of HCC.

Results: The results of this study showed OK-432 could activate the cGAS-STING pathway, and RFH could further enhance the activation. Meanwhile, we found RFH could cause high expression of TLR4, the administration of TLR4 inhibitor in vitro and in vivo could eliminate the activation of cGAS-STING by OK-432, indicating that TLR4 might be an upstream molecular of the cGAS-STING pathway. The combined therapy of RFH with OK-432 resulted in a better tumor response, and a prolonged survival compared to the PBS, OK-432, or RFH treatment.

Conclusion: RFH in combination with OK-432 might serve as a new treatment strategy in reducing the residual and recurrent tumor after RFA of large and irregular HCCs, as well as bringing a new option for other types of solid malignancies treated by RFA.

PO-3176

Ablation alone is noninferior to radiotherapy plus ablation in the patients with early-stage hepatocellular carcinoma: a population-based study

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Purpose

Recently, the efficacy of two low-invasive treatments, ablation and radiotherapy, has been fully compared for the patients with the early-stage hepatocellular carcinoma (HCC). However, the comparison between radiotherapy plus ablation and ablation alone has been less frequently reported.

Methods

Data from the Surveillance, Epidemiology, and End Results (SEER) database were searched for early-stage HCC patients treated with ablation plus radiotherapy or ablation alone. The outcome measures were overall survival (OS) and cancer-specific survival (CSS). The propensity score matching (PSM) was used to reduce selection bias.

Results

We included 240 and 6619 patients in the radiotherapy plus ablation group and ablation group before the PSM. After PSM, 240 pairs of patients were included. The median OS (mOS) and median CSS (mCSS) of patients receiving ablation alone were longer than that of receiving radiotherapy plus ablation (mOS: 47 vs. 34 months, $P=0.019$; mCSS: 77 vs. 40 months, $P=0.018$, after PSM) before and after PSM. The multivariate analysis indicated that radiotherapy plus ablation

independent risk factor for OS and CSS before PSM, but the significance disappeared after PSM. The detailed subgroup analyses indicated ablation alone brought more benefit in very early-stage HCC and older patients. In addition, we found different types of radiotherapy might lead to different outcomes when combined with ablation.

Conclusions

Ablation alone is noninferior to radiotherapy plus ablation in patients with early-stage HCC. For older patients or patients with small and single HCC lesion, ablation alone may still be the better choice.

PO-3177

Enhancing Follow-Up Diagnostic Effectiveness in Patients with 125I Seeds: A Combined Approach Incorporating Spectral Computed Tomography and Metal Artifact Reduction Algorithm

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Objective The aim of this study was to evaluate synergistic approach of spectral CT images and metal artifact reduction algorithm (O-MAR) in reducing artifacts caused by 125I seed implantation.

Methods Forty-five patients who underwent dual-layer spectral CT (DLCT) scanning of the chest and abdomen after 125I seed implantation were retrospectively included. The collected spectral data were reconstructed into conventional CT image (CI), virtual monochromatic imaging (VMI, 50-150 keV, 20 keV/level), CI combined with O-MAR (CI+O-MAR), and VMI combined with O-MAR (VMI+O-MAR), to evaluate the de-artifact effect and image quality improvement in each group. Objective indicators included artifact index (AI), signal-to-noise ratio (SNR) of lesions affected by artifacts, and contrast-to-noise ratio (CNR). Subjective indicators included assessment of overcorrected artifacts, new artifacts, different forms of artifacts, the overall image quality and lesion boundaries. The normality of count data was tested using the Shapiro-Wilk test. One-way analysis of variance (ANOVA) was used to assess differences among multiple groups, followed by post-hoc LSD testing. Paired t-tests were employed for comparisons between continuous variables. Inter-observer agreement was appraised using kappa and Bland-Altman analysis.

Results For hypo-/hyperdense artifacts, AI in each group showed a downward trend as VMI keV increased. In artifact-affected lesion areas (ROIT), SNR and CNR in the CI/VMI+O-MAR (50-150keV) group were better than those in the CI group ($P<0.05$). Overcorrection artifacts and new artifacts were concentrated in the VMI50/70keV groups, accounting for 100% and 89.6%, respectively. In the evaluation of artifact morphology, as the VMI keV increases, the number of a-type banded artifacts in hyperdense artifacts gradually decreases, while the number of e-type artifacts with little or no artifacts increases, and the total number of hyperdense artifacts in each modality decreases with the increase of VMI keV. The diagnostic and image quality scores of hyperdense artifacts in each group were higher than those of hypodense artifacts as VMI keV increased.

Conclusions VMI combined with O-MAR substantially improve the objective and subjective image quality, lesion display ability, and diagnostic confidence of CT follow-up after 125I seed implantation. And provide guidance for the development of CT scanning protocols for patients following 125I seed implantation procedures. Additionally, the synergistic approach demonstrates high efficiency in correcting high-density artifacts.

PO-3178

Impact of sarcopenia on prognosis in primary hepatocellular carcinoma patients treated with transcatheter arterial chemoembolization: A single center retrospective study

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Objective: This study aimed to investigate the prognostic effect of sarcopenia on primary hepatocellular carcinoma (HCC) patients after transcatheter arterial chemoembolization (TACE). **Methods:** This retrospective study enrolled 265 patients diagnosed with HCC who underwent TACE between April 2014 and February 2021. The patients were divided into two groups: the sarcopenia group (n=133) and the non-sarcopenia group (n=132). The study analyzed the differences in overall survival (OS) and progression-free survival (PFS) using Kaplan-Meier curves. The independent risk factors for OS and PFS were determined using univariate and multivariate Cox regression analysis. Based on these factors, the study constructed a prognostic risk grading system. **Results:** At 3 and 6 months post-TACE, the prognoses of the sarcopenia group were worse than that of the non-sarcopenia group according to the mRECIST criteria. Kaplan-Meier curves showed that the cumulative OS and PFS rate in the non-sarcopenia group were significantly higher compared to the sarcopenia group (HR=3.319, 95%CI: 2.283-4.824, Log-rank $P<0.001$; HR=0.631, 95%CI: 0.486-0.820, Log-rank $P<0.001$). Sarcopenia, maximal tumor diameter, and AFP \geq 200 ng/mL were independent risk factors for OS and PFS. The prognostic risk grading system based on sarcopenia, AFP \geq 200 ng/mL, and maximal tumor diameter \geq 8.9 cm showed significant differences in prognosis between risk groups. **Conclusion:** Sarcopenia had excellent predictive value for OS and PFS in patients after TACE, and AFP \geq 200 ng/mL and maximal tumor diameter were also independent risk factors for a poor prognosis. The prognostic risk grading system based on sarcopenia, AFP, and maximal tumor diameter had good guiding value for the prognosis of patients.

PO-3179

Dual neovascular targets of VEGFR and PDGFR ameliorate thioacetamide (TAA) induced liver fibrosis in rats

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Background: Neovascularization plays a crucial role in liver fibrosis (LF), and blocking vascular endothelial growth-factor receptor (VEGFR) has been shown to improve fibrosis. The aim of our study was to investigate the role of dual neovascularization targets, VEGFR and platelet-derived growth factor receptor (PDGFR), in ameliorating fibrosis.

Methods: In vitro, we observed the effects of apatinib (a VEGFR inhibitor) and donafenib (a VEGFR and PDGFR inhibitor) on the activation, proliferation, and apoptosis of hepatic stellate cells (HSCs) from rats and humans. In vivo, we established a thioacetamide (TAA)-induced liver fibrosis rat model to explore the anti-fibrosis effect of apatinib and donafenib. We detected the expression of angiogenesis-related proteins using western blot and immunohistochemistry.

Results: Apatinib and donafenib inhibited the proliferation and activation of HSCs, promoted apoptosis of HSCs, and arrested the S phase of the cell cycle in vitro. We also found that donafenib had a stronger inhibitory effect on HSCs. In vivo, apatinib and donafenib ameliorated liver fibrosis, reduced collagen deposition and α -SMA expression in rats, and donafenib had a stronger improvement effect. Apatinib and donafenib downregulated the expression of VEGFR2 while

inhibiting the phosphorylation of Akt and ERK1/2. Donafenib can act through both VEGF and PDGF pathways, whereas apatinib can only act through the VEGF pathway.

Conclusion: Anti-angiogenesis is a promising approach for the treatment of fibrosis. Compared with single-target drug (apatinib), the dual-target drug (donafenib) can achieve better therapeutic effects.

PO-3180

Preliminary study on the mechanism of medical ozone water promoting apoptosis of hepatocellular carcinoma cells

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Objective: HCC is one of the most malignant cancers in the world. STAT3 could enter the nucleus after phosphorylation to inhibit the apoptosis of cancers. IL-6 can bind to gp130 to phosphorylate STAT3. Ozone plays a role in combating inflammatory reaction, thus reducing IL-6 in the microenvironment. The purpose of this study was to explore the relationship between ozone and IL-6/STAT3 signaling pathway in HCC.

Methods: First, we obtained different concentrations of ozone water to treat HCC cells to obtain the IC₅₀ of ozone. HepG2 cells were treated with IC₅₀ and divided into two groups. The proliferative activity of cells was detected by CCK-8 experiment. The migration and invasion ability of cells were analyzed by scratch test and transwell experiment. Flow cytometry were used to analyze the changes of apoptosis. Finally, the changes of apoptosis-related proteins and IL-6/STAT3 signal pathway proteins were analyzed by Western blot.

Results: The IC₅₀ of ozone on HepG2 cells is about 20 μg/mL. CCK-8 experiment showed that ozone inhibited the proliferation of HepG2 cells. The results of scratch test and transwell experiment showed that ozone inhibited the migration and invasion of HepG2 cells. Flow cytometry indicated that the apoptosis rate of HepG2 cells increased compared to another group. Western Blot results showed that the expression of IL-6/STAT3 pathway proteins in control group was higher than those in experimental group. In the experimental group, the expression of Bcl-2 protein degressed and the expression of cl-caspase3 increased compared to control group.

Conclusion: Ozone inhibited the migration and invasion of HepG2 cells and increased the apoptosis rate. The expression of IL-6/STAT3 signal pathway proteins were down-regulated in HepG2 cells and the expression of apoptosis-related proteins showed that ozone promoted the apoptosis. These results suggested that ozone promotes the apoptosis of hepatocellular carcinoma cells by down-regulating IL-6/STAT3 signaling pathway.

PO-3181

Treatment of Gastrointestinal Tumor Liver Metastases with the Combination of Apatinib and Transarterial Chemoembolization

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Purpose: To evaluate the safety and efficacy of TACE and apatinib combination treatment for gastrointestinal tumor liver metastases via a single institutional retrospective study.

Methods: From January 2016 to December 2022, 53 patients with unresectable chemotherapy-refractory gastrointestinal tumor liver metastases were included in the analysis. Collect clinical information from patients and follow up on them until they progress beyond treatment or the end of the study. Adverse events (AE), overall survival (OS), and progression free survival (PFS) were evaluated. In addition, the objective response rate (ORR) and disease control rate (DCR) were determined based on the improved solid tumor response evaluation criteria (mRECIST). Among these indicators, OS and PFS are the main endpoints.

Results: The median progression-free survival (mPFS) and median overall survival (mOS) were 7 months (95% CI: 5.7-8.3 months) and 17 months (95% CI: 13.1-20.9 months), respectively. The mPFS of extrahepatic sites was 12 months (95% CI: 7.3-16.7 months). The one-month DCR and ORR were 86.8% (46/53) and 49.1% (26/53), respectively. The multivariate regression analysis showed that Child-Pugh and Eastern Cooperative Oncology Group (ECOG) were independent predictors for OS. The independent predictors for overall PFS included carbohydrate antigen 724 (CA 724), CA 199, number of TACE session, Child-Pugh, and ECOG; while for liver tumor PFS, the independent predictors were number of TACE session and ECOG scores. There were no changes of leukocyte, lymphocyte, carcinoembryonic antigen (CEA), CA 724, CA 199, CA 125 on patients before receiving the treatment and one month after receiving the treatment (all $P > 0.05$). Common adverse events were poor appetite (64.2%), hypertension (56.6%), and hand-foot syndrome (50.9%). 12 patients reduced their dosage by half due to adverse reactions. However, these adverse events alleviated after reducing apatinib administration or receiving symptomatic treatments.

Conclusions: TACE-apatinib combination is well tolerated and effective in patients with unresectable chemotherapy refractory gastrointestinal tumors liver metastases. Meanwhile, the results of this study also indicated that TACE-apatinib combination is still a better treatment for these patients.

PO-3182

Efficacy of radiofrequency ablation vs liver resection in the treatment of hepatocellular carcinoma with severe fibrosis

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The efficacy of RFA in the treatment of HCC with severe fibrosis is still unclear. The objective of this study is to compare the efficacy of RFA with liver resection in the treatment of HCC within Milan criteria. The data used in the study were from the SEER database. Patients with HCC within Milan criteria were included in the study. A total of 1432 patients were included in the study; among them, 1038 patients received RFA, and 394 patients received liver resection. Propensity score matching (PSM) was used to reduce selection bias. Before PSM, the median overall survival (mOS) and

median cancer-specific survival (mCSS) in the resection group were not statistically significant longer than the mOS and mCSS in the RFA group (both $P>0.05$). After PSM, similar results were presented. The multivariable analysis showed that RFA did not increase the all-cause mortality risk and cancer-specific mortality risk compared with resection before PSM. In the competing risk analysis, after excluding the potential factors that might influence the outcomes, RFA still did not increase the mortality risk compared with resection before PSM and after PSM. In the subgroup analysis. The efficacy of RFA is comparable to that of resection in patients with tumor sizes no more than 3 cm before PSM and after PSM. The efficacy of RFA is similar to that of resection in the treatment of early HCC patients with severe fibrosis, especially in patients with tumor sizes no more than 3 cm.

PO-3183

Liver Resection Combined with Radiotherapy versus Liver Resection Alone in the Treatment of Hepatocellular Carcinoma: A Population-based Study

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Background

Radiotherapy has been used in the treatment of hepatocellular carcinoma (HCC) more widely. However, little research focus on comparing the efficacy of patients with liver resection combined with radiotherapy with that received liver resection alone. The study was conducted to evaluate whether the efficacy of liver resection combined with radiotherapy in the treatment of patients with HCC is better than liver resection alone.

Methods

The study utilized the data from the Surveillance, Epidemiology, and End Results (SEER) database. Patients diagnosed with HCC between 2004 and 2015 who received liver resection or the combination of liver resection and radiotherapy were included in the analysis. The propensity score matching model (PSM) was used to reduce selection bias.

Results

Before PSM, the median overall survival (mOS) and median cancer-specific survival (mCSS) of patients treated with liver resection alone were longer than in patients treated with the combination of liver resection and radiotherapy ($P<0.001$). However, there was no statistically significant difference in mOS and mCSS between the groups after PSM ($P>0.05$). The subgroup analysis after PSM documented that patients with AJCC stage I and II who were treated with liver resection and radiotherapy had no longer mOS and mCSS than patients subjected to the combination of liver resection alone ($P=0.151$ and $P=0.185$). Similar results were obtained in the subgroup group of patients with a single tumor smaller than 5 cm.

Conclusion

The combination of liver resection and radiotherapy does not prolong the survival of HCC patients more than liver resection alone.

PO-3184

Retrograde Type A Aortic Dissection During or After Thoracic Endovascular Aortic Repair: A Single Center 16-Year Experience

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Abstract

Objective The purpose of this article is to investigate the risk factors of retrograde type A aortic dissection (RTAD) associated with thoracic endovascular aortic repair (TEVAR).

Methods From January 2004 to December 2019, the clinical data of 1688 patients with the thoracic aortic disease who had TEVAR at Henan Provincial People's Hospital were evaluated retrospectively. The risk factors of TEVAR-related RTAD were analyzed by univariate analyses and multiple logistic regression analysis.

Results The concluded incidence of RTAD was 1.1% in patients, all of which occurred in the RTAD group. Ten instances happened within the TEVAR perioperative period including two cases during the surgery, six cases occurred within three months, two cases occurred after one year, and the longest interval was 72 months following TEVAR. TEVAR was successfully implemented in 17 cases, while the operation technique was temporarily altered in 1 case. The position of the new entry in 13 RTAD patients was at the proximal region of the stent graft (SG), and 5 instances were more than 2 cm distant from the proximal region of the SG. Besides, 17 cases were at the greater curvature of the aorta, and 1 case was at the lesser curvature. Multivariate Logistic regression analysis revealed that the SG oversizing ratio is a relevant risk factor for RTAD. Ascending aortic diameter, aortic arch type, SG type, and anchored region were not directly related to the occurrence of RTAD.

Conclusion RTAD is a catastrophic complication with low incidence but high mortality, which could occur during the procedure, as well as in the early and late postoperative period. A proper SG oversizing ratio could reduce the probability of RTAD. That is to say that a too low SG oversizing ratio was not recommended.

PO-3185

Hepatic arterial infusion chemotherapy combined with toripalimab and surufatinib in the treatment of advanced intrahepatic cholangiocarcinoma: A single center retrospective study

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Abstract

Objectives: The aim of the present study was to report the clinical results of advanced intrahepatic cholangiocarcinoma (ICC) patients who received hepatic arterial infusion chemotherapy (HAIC) and toripalimab chemotherapy, followed by surufatinib maintenance therapy.

Methods: The study cohort comprised 14 advanced ICC patients treated with the above schedule and regimens. The baseline characteristics of the study cohort were obtained. The tumor response and drug-associated toxicity were assessed and reported.

Results: During the follow-up period (median follow-up time: 6.5 months; range 3–19 months), two patients died of tumor progression. The objective response rate (ORR) and disease

control rate (DCR) were 58% and 79%, respectively. The median progression-free survival (mPFS) was 6 months, and the OS% was 85%. The most frequent adverse events were nausea and vomiting (100%), and abdominal pain (86%). Serious complications that would need additional treatment and treatment-related deaths were not observed.

Conclusions: The combination treatment schedule for advanced ICC seems to offer good efficacy and safety. However, a randomized controlled trial study is needed to further verify the findings.

PO-3186

Hepatic arterial infusion chemotherapy combined with target/immunotherapy for advanced hepatocellular carcinoma: tumour response and safety

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Abstract

Purpose: The objective of this study was to evaluate the efficacy and safety of hepatic arterial infusion chemotherapy (HAIC) combined with target/immunotherapy in patients with advanced hepatocellular carcinoma (HCC).

Methods: From July 2021 to October 2022, consecutive medical records of advanced HCC patients receiving HAIC combined with target/immunotherapy were reviewed for eligibility. The tumour response and adverse events (AEs) were recorded and assessed.

Results: This study included 25 patients with advanced HCC. Vascular invasion, extrahepatic metastasis and both were observed in 18 (72.0%), 17 (68.0%) and 11 (44.0%) patients, respectively. A total of 99 HAIC sessions were performed in 25 patients, with a median of three cycles (range, 1 to 14 sessions). Based on the mRECIST and RECIST1.1 criteria, the objective response rates were 76.0% and 68.0%, respectively. The disease control rates were 92.0% and 80.0%, respectively. Abdominal pain (16 cases, 64%) and nausea and vomiting (13 cases, 52.0%) were common AEs associated with HAIC, and both were relieved by symptomatic treatment. Molecular targeted agent-related complications occurred in 18 patients (72.0%), and immune checkpoint inhibitor-related complications occurred in 10 patients (40.0%), all of whom had grade 3 or below AEs, and no serious complications occurred. No treatment-related deaths occurred.

Conclusions: HAIC combined with target/immunotherapy had meaningful short-term efficacy and controllable adverse events in patients with advanced HCC and may be a promising treatment option for advanced HCC.

PO-3187

Reversion of liver cirrhosis after endovascular treatment in Chinese patients with Budd-Chiari syndrome

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Aims: To investigate the impact of endovascular (EV) treatment on liver cirrhosis in Chinese patients with Budd-Chiari syndrome (BCS).

Methods: From September 2011 to March 2022, 97 patients from four hospitals in China who were diagnosed with primary BCS complicated with liver cirrhosis and received EV treatment were retrospectively enrolled in this study for clinical analysis. In addition, liver tissues for basic research were acquired from 25 patients between June 2022 and March 2023, including 6 with

benign liver tumors, 11 with BCS before EV treatment, and 8 with EV-treated BCS. Liver cirrhosis was assessed by clinical outcomes, histological studies, and the expression of related genes at the mRNA and protein levels.

Results: The patients with BCS had better liver function after EV treatment, evidenced by an increased albumin level and reduced total bilirubin, ALT, and AST. The imaging findings suggested an amelioration of liver cirrhosis and portal hypertension, including increased portal vein velocity ($13.52 \pm 8.89 \text{ cm/s}$ vs $17.51 \pm 6.67 \text{ cm/s}$, $p < 0.001$) and decreased liver stiffness ($30.37 \pm 6.39 \text{ kPa}$ vs $23.70 \pm 7.99 \text{ kPa}$, $p < 0.001$), portal vein diameter ($14.97 \pm 3.42 \text{ mm}$ vs $13.36 \pm 2.89 \text{ mm}$, $p < 0.001$), and spleen volume ($870.00 \pm 355.61 \text{ cm}^3$ vs $771.36 \pm 277.45 \text{ cm}^3$, $p < 0.001$). Furthermore, histological studies revealed that EV treatment resulted in a restoration of liver architecture with reduced extracellular matrix deposition. Meanwhile, hepatic angiogenesis and inflammation, which have a close relationship with cirrhosis, were also inhibited. And the state of hepatocytes switches from apoptosis to proliferation after EV treatment.

Conclusions: BCS-induced liver cirrhosis could be reversed by EV treatment from macroscopic to microcosmic dimensions. Our study may provide further insights into understanding BCS and treating cirrhosis.

PO-3188

Melatonin enhances the efficacy of anti-PD-L1 antibody by improving hypoxia in residual tumors after insufficient radiofrequency ablation

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Background: The hypoxia microenvironment and inflammatory state in the residual tumor caused by insufficient radiofrequency ablation (iRFA) are major reasons for rapid tumor progression and hindering anti-PD-L1 therapy. Melatonin, a natural hormone reported to improve tumor hypoxia and reduce inflammation, is potential to increase the efficacy of iRFA.

Methods and results: We reported that iRFA is associated with poor survival outcomes and progression-free survival in patients with hepatocellular carcinoma (HCC). Melatonin inhibited EMT, HIF-1 α , and PD-L1 expression and migration in heated HCC cell lines (HepG2 and HCCLM3) under hypoxic conditions but not normoxic conditions. Using the orthotopic HCC model, we found that melatonin suppressed the expression of HIF-1 α , reduced hypoxic areas, decreased the proportion of myeloid-derived suppressor cells (MDSCs), increased the proportion of CD8+T, and regulated immune-related genes, finally reducing the mice's tumor volume and prolonged the survival time. Melatonin could also inhibit metastasis of heated CT26 cells in the liver metastasis model. Notably, the combination of melatonin and anti-PD-L1 antibody provided better efficacy than melatonin monotherapy.

Conclusion: We establish a clear role of melatonin in improving the tumor hypoxic immunosuppressive microenvironment, reducing tumor progression, and enhancing the efficacy of anti-PD-L1 antibody in the treatment of residual tumors.

PO-3189

A surprising effect of metformin plus transarterial chemoembolization on hepatocellular carcinoma patients with type II diabetes

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Background

Diabetes is common in the patients with hepatocellular carcinoma (HCC) and can lead to poor prognosis for these patients. Metformin is a hypoglycemic drug with anti-tumor effects. Whether metformin can have a positive effect on HCC patients receiving interventional embolization (transarterial chemoembolization, TACE) is still unclear. The study was conducted to explore the effect of metformin plus TACE on HCC patients with type II diabetes.

Methods

From January 2014 to June 2021, 385 consecutive HCC patients with type II diabetes from three medical centers were retrospectively reviewed. All of them received TACE, and 216 patients received metformin. Propensity Score Matching (PSM) was used to reduce selective bias. Competing risk model was used to reduce the influence of deaths caused by other factors (not cancer) on the results.

Results

The median overall survival (mOS) (35 months, 95%CI: 28-44 months vs 20 months, 95%CI: 16-24 months; $P<0.001$) and median progression-free survival (mPFS) (11 months, 95%CI: 10-14 months vs 8 months, 95%CI: 6-11 months; $P<0.001$) for patients with metformin were longer than those without metformin before PSM. Similar results were presented after PSM. The multivariate regression analysis presented that metformin could reduce mortality risk of patients (HR: 0.56, 95%CI: 0.44-0.71; $P<0.001$) and tumor progression risk (HR: 0.67, 95%CI: 0.53-0.84; $P<0.001$) before PSM. The subgroup analysis showed that patients with BCLC stage A, BCLC stage B, BCLC stage C, Child-Pugh A and Child-Pugh B who received metformin could receive survival benefits from metformin. After excluding the influence of deaths caused by other factors (such as heart disease, diabetes, etc), metformin could still reduce mortality risk of patients and tumor progression risk. The adverse events evaluation was based on the NCI-CTCAE 5.0. The results showed metformin did not increase severe adverse events (III grade or IV grade).

Conclusion

Metformin might bring survival benefits for HCC patients with type II diabetes who received TACE. Metformin could achieve the effect of “killing two birds with one stone” for these patients.

PO-3190

Drug-eluting beads transarterial chemoembolization combined apatinib/ camrelizumab for advanced hepatocellular carcinoma with hepatic arterioportal shunts

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Purpose: The objective of this study was to evaluate the efficacy and safety of drug-eluting beads transarterial chemoembolization (D-TACE) combined with apatinib/camrelizumab in advanced hepatocellular carcinoma (HCC) patients with hepatic arterioportal shunts (APS).

Methods: From January 2021 to December 2022, consecutive medical records of advanced HCC patients with APS receiving D-TACE combined apatinib/camrelizumab were reviewed for eligibility. Overall survival (OS), progression-free survival (PFS), tumor response, and adverse events (AEs) were assessed.

Results: A total of 23 patients were included in this study, and the median follow-up time was 11 months (range, 2–26 months). In this study, 8 patients (34.8%) achieved PR, 13 patients (56.5%) achieved SD, and 2 patients (8.7%) developed PD. The objective response rate and disease controlled rate were 34.8% and 91.3%, respectively. OS and PFS were 11 months and 7 months, respectively. Multivariate analysis indicated that tumor number was an independent prognostic factor affecting PFS. AEs occurred in 19 patients after oral apatinib and in 8 patients after camrelizumab treatment. No treatment-related death occurred.

Conclusions: D-TACE combined with apatinib/camrelizumab had meaningful efficacy and controllable AEs in advanced HCC patients with APS, which may be a promising treatment option.

PO-3191

Safety and Efficacy of Sorafenib Combined with Camrelizumab Plus Transcatheter Arterial Chemoembolization for Intermediate and Advanced Hepatocellular Carcinoma

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Objectives: To compare the efficacy and safety of transcatheter arterial chemoembolization (TACE) combined with sorafenib and camrelizumab or with sorafenib alone in patients with intermediate or advanced hepatocellular carcinoma (HCC).

Methods: We retrospectively analyzed 78 patients with intermediate or advanced HCC who were treated at our centers between January 2018 and December 2021. 26 of them received sorafenib and camrelizumab plus TACE (the TACE + Sor + C group), while 52 received TACE and sorafenib (the TACE + Sor group). Overall survival (OS), progression-free survival (PFS), and adverse events (AEs) were evaluated. Univariate and multivariate analyses were used to determine the factors affecting survival.

Results: The mOS (22 vs. 10 months, $P < 0.001$) and mPFS (11 vs. 6 months, $P = 0.008$) of the TACE + Sor + C group were significantly higher than those of the TACE + Sor group. Multivariate analysis showed that compared with TACE + Sor + C, TACE + Sor increased the risk of all-cause mortality and tumor progression. For grade I and II adverse events (AEs), the incidence of skin capillary hyperplasia and hypothyroidism in the TACE + Sor + C group was significantly higher than that in the TACE + Sor group. For serious AEs (grade III or IV), there was no significant difference in any adverse reaction between the two groups ($P > 0.05$).

Conclusion: Patients with intermediate or advanced HCC appeared to benefit more in terms of survival from TACE + Sor + C than from TACE + Sor, and the AEs were tolerable.

PO-3192

Radiofrequency-Thermal effect of cisplatin-crosslinked nanogels for triple therapies of Ablation-Chemo-Embolization

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Objective: Cisplatin, a famous metal ionic antitumor drug, has been clinically utilized for the treatments of various cancers by inhibiting the replication and transcription of DNA, and thereby causing apoptosis of tumor cells. However, little attention has been focused on RF-induced thermal effect of these platinum ionic chemotherapeutics. It is probably attributed to poor pharmacokinetics and pharmacodynamics (PK/PD) and in vivo rapid metabolism of these platinum ionic drugs. Thereby, it is highly desirable to develop a comprehensive nano-platform for efficiently synergizing various therapeutic models including TAE, RFA, chemotherapy and immunotherapy.

Methods: Cisplatin-crosslinking poly(N-isopropylacrylamide-b-methyl acrylic acid) nanogels (Pt-PNA) was first developed as RF-responsive embolic nano-platform by the coordination bonding between Pt(II) ions and carboxyl. Their temperature sensitive sol-gel transition was investigated at various nanogel concentration, Pt content and polymeric composition, to evaluate their trans-artery flowability and embolization. Furthermore, RF-induced thermal effect was compared between two electrolyte solutions (free cisplatin and sodium chloride). Meanwhile, RF-responsive pulsatile release of cisplatin from Pt-PNA was in vitro and in vivo studied for precise synergy between RFA and chemotherapy.

Results: Pt-PNA might rapidly diffuse into tumor peripheral arteries, blocking tumor blood supply by their favorable temperature sensitive sol-gel transition, thereby achieving efficient TACE cancer therapy. Moreover, Pt-PNA greatly improved tumor hypoxic microenvironment post TAE procedure, inducing a favorable immune response, and thereby enhancing the synergistic antitumor effect of RFA and TACE.

Conclusion: This work provides novel insights into designing a promising synergistic RF-responsive Pt-PNA for enhancing the combined therapy of TACE and RFA.

PO-3193

Synergistic effects of nanoscale CaO₂ combined with PD-1 inhibitors in the treatment of hepatocellular carcinoma: a promising combination

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Purpose: To explore the effect of calcium peroxide nanoparticles (CaO₂ NPs) combined with programmed cell death protein 1 (PD-1) inhibitors in the treatment of liver cancer and its related mechanism.

Methods: Hepa1-6 cells were cultured to construct the Hepa1-6 mouse liver cancer model. In vivo mechanism study, a unilateral tumor model was established. Eighteen tumor-bearing mice were randomly divided into the control group (intra-tumoral injection of PBS solution) and the experimental group (intra-tumoral injection of CaO₂ NPs). A hypoxic probe, pH probe, and micro-

CT were used to evaluate the effect of CaO_2 NPs on improving hypoxia, neutralizing acidity, and inducing calcium overload within the tumor. To study the effect of CaO_2 NPs combined with PD-1 inhibitors on proximal and distal tumors, the bilateral tumor model was established. Forty tumor-bearing mice were randomly divided into the control group (intra-tumoral/intra-peritoneal injection of PBS solution), CaO_2 NPs group (intra-tumoral injection of CaO_2 NPs), PD-1 group (intra-peritoneal injection of PD-1 inhibitor), and the combination group (intra-tumoral injection of CaO_2 NPs and intra-peritoneal injection of PD-1 inhibitors). The administered side was recorded as the proximal tumor. Tumor volume and body weight were measured every 2 days after treatment. On day 8, serum and tumor samples were collected. The immune factors in serum (INF- γ , TNF- α , IL-2, and IL-10) and tumor tissue (INF- γ and TNF- α) were detected by ELISA. H&E staining was used to detect tumor necrosis. Immunohistochemical staining was used to detect the amount of CD4⁺ and CD8⁺ T cells within the tumor. By analyzing the tumor volume, pathological indexes, and immune-related indexes, the effects of CaO_2 NPs combined with PD-1 inhibitors on proximal and distal tumors were evaluated, and they mediated immunomodulatory effects (including local and systemic immunity), and their effects on tumor burden were studied. In addition, a unilateral tumor model was established to study the effect of CaO_2 NPs combined with PD-1 inhibitors on survival time.

Results: The results of in vivo mechanism study showed that CaO_2 NPs can improve hypoxia, neutralize acidity and induce calcium overload within tumors. The results of the study on the effect of CaO_2 NPs combined with PD-1 inhibitor on proximal and distal tumors showed that, compared with the other three groups, the bilateral tumor burden of the combination group was significantly reduced, the intra-tumoral infiltration of CD8⁺ and CD4⁺ T cells were significantly increased, the secretion of anti-tumor immune factors in tumor and serum was increased, and the secretion of pro-tumor immune factors was decreased. Mice in the combination group showed the longest survival compared with the other groups.

Conclusions: CaO_2 NPs can improve hypoxia, neutralize acidity and induce calcium overload within tumors, so as to reduce tumor burden and realize an immunosuppressive tumor transformation to a hot tumor, and play a synergistic role with PD-1 inhibitors in anti-liver cancer.

PO-3194

The solid tumor microenvironment and related targeting strategies

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Increasing studies have confirmed that tumor microenvironment (TME) is composed of a variety of complex components that precisely regulate the interaction of tumor cells with other components, allowing tumor cells to continue to proliferate, resist apoptosis, evade immune surveillance and clearance, and metastasis. However, the characteristics of each component and their interrelationships remain to be deeply understood. Herein, we classify the TME into physical microenvironment (such as oxygen, pH, etc.), mechanical microenvironment (such as extracellular matrix, blood vessels, etc.), metabolic microenvironment (such as glucose, lipids, etc.), inflammatory microenvironment and immune microenvironment. We detailed depict the characteristics of each component in TME; summarize the existing methods for detecting TME; highlight the current strategies and potential therapeutic targets for TME; discuss current challenges in presenting TME and its clinical applications; and provide our prospect on the research direction and clinical benefits of TME.

This review summarizes the characteristics of TME in solid tumors and its influence on tumor occurrence, development, and metastasis, summarizes the existing methods for detecting TME and summarizes the current strategies and potential therapeutic targets for TME. TME is composed of a variety of complex components, and the characteristics of each component and their interrelationships remain to be deeply understood. Existing techniques for characterizing the TME

are still lacking. Many TME targets have been successful in preclinical/clinical studies, but there are still significant challenges for therapies targeting TME. In the future, the development of models more in line with the characteristics of human tumors, the development of new devices that can accurately detect TME, the development of high-specific targets or multi-target therapeutic drugs, or the combination of therapy with targeted tumor cells is expected to further improve the therapeutic effect of tumors.

PO-3195

Synergistic effect of a VEGFR targeting peptide-drug conjugate with the anti-PD-1 antibody on hepatocellular carcinoma

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Objective: Although anti-PD-1 antibodies have been widely used in the treatment of advanced hepatocellular carcinoma (HCC), their objective response rate is only approximately 20%. We designed a VEGFR targeting peptide-drug conjugate (QR-KLU) with the abilities of decreasing tumor burden and suppressing tumor angiogenesis. This study aimed to evaluate the therapeutic effect of QR-KLU in HCC therapy and the synergism of QR-KLU and anti-PD-1 antibody.

Methods: In this study, we used a VEGFR targeting peptide VEGF125-136 (QKRKRKKSRYKS, QR) to conjugate with a lytic peptide (KLUKLUKKLUKLUK, KLU) to form a peptide-drug conjugate QR-KLU. The in vitro experiments were conducted to evaluate the effects of QR-KLU on Hepa1-6 cells under normoxic and hypoxic conditions, and the in vitro experiments were conducted to evaluate the synergistic effects of QR-KLU and anti-PD-1 antibody in a mouse subcutaneous Hepa1-6 tumor model.

Results: QR-KLU inhibited the proliferation and migration of Hepa1-6 cells in a dose-dependent manner under normoxic and hypoxic conditions. It promoted cell apoptosis and blocked the cell cycle, and significantly downregulated hypoxia-induced expression of vascular endothelial growth factor (VEGF). In subcutaneous Hepa1-6 tumor model, QR-KLU significantly inhibited tumor growth, promoted tumor necrosis, and prolonged the survival time of tumor-bearing mice in combination with anti-PD-1 antibody. QR-KLU significantly inhibited hypoxia-induced expression of VEGF, promoted tumor vascular normalization, and increased CD8⁺ T cell infiltration in the tumor. In addition, QR-KLU and anti-PD-1 antibody demonstrated a strong synergistic effect in promoting the activation of intratumoral CD8⁺ T cells, reducing the expression of immune-inhibitory factors and increasing immune-stimulatory factors.

Conclusion: These results reveal a novel approach to enhance the efficacy of anti-PD-1 antibody using a VEGFR targeting peptide-drug conjugate in HCC therapy.

PO-3196

Drug-eluting (irinotecan) bead transarterial chemoembolization with CalliSpheres® microspheres for treatment colorectal cancer liver metastases patients who fail chemotherapy treatment

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Objective The purpose of this study was to evaluate the therapeutic efficacy and safety of drug-eluting (irinotecan) bead transarterial chemoembolization (DEBIRI-TACE) with CalliSpheres® microspheres (CSM) in treating unresectable colorectal cancer liver metastases (CRLM) patients who failed systemic chemotherapy

Materials and Methods A single-center retrospective analysis of CRLM patients who had failed prior systemic chemotherapy and treated with DEBIRI-TACE with CSM, was performed from December 2017 to December 2022. Information about the therapeutic response, overall survival (OS), progression-free survival (PFS) were recorded. Treatment-related adverse events were graded according to the National Cancer Institute Common Terminology Criteria for Adverse Events (CTCAE), version 5.0.

Results 56 patients with 133 treatments with DEBIRI-TACE procedures were included over our study period. The objective response rate (ORR) and disease control rate (DCR) was 30.4% (17/56) and 64.3% (36/56), respectively. The Median OS from the first treatment was 10.9 months (95% confidence interval [CI]: 8.9 months, 14.7 months), and the median PFS was 5.8 months (95% CI : 4.6 months, 7.8 months), respectively. Cox's proportional hazards regression analysis revealed that extrahepatic metastasis were independent prognostic negative factors with OS and PFS. The complication included abdominal pain, nausea/vomiting, fever, fatigue, the elevation of transaminase and liver abscess in patients could almost be resolved by adapting medical treatment.

Conclusion DEBIRI-TACE with CSM is relatively safe and effective in unresectable CRLM patients with chemotherapy-refractory. Furthermore, extrahepatic metastasis and synchronous metastatic disease were possibly correlated with the poor prognosis of treatment.

PO-3197

Risk assessment of pneumothorax in colorectal lung metastases treated by percutaneous thermal ablation: a multicenter retrospective cohort study

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Purpose To evaluate the risk of pneumothorax in the percutaneous image-guided thermal ablation (IGTA) treatment of colorectal lung metastases (CRLM). **Methods** Data regarding patients with CRLM treated with IGTA from five medical institutions in China from 2016 to 2023 were reviewed retrospectively. Pneumothorax and non-pneumothorax were compared using the Student's t test, Chi-square test and Fisher's exact test. Univariate logistic regression analysis was conducted to identify potential risk factors, followed by multivariate logistic regression (MLR) analysis to evaluate the predictors of pneumothorax. Interactions between variables were examined and used for model construction. Receiver operating characteristic (ROC) curves and nomograms were generated to assess the performance of the model. **Results** A total of 254 patients

with 376 CRLM underwent 299 ablation sessions. The incidence of pneumothorax was 45.5%. The adjusted MLR model, incorporating interaction terms, revealed that tumor number (odds ratio [OR] = 8.34 [95% confidence interval [CI]: 1.37-50.64]), puncture depth (OR = 0.53 [95%CI: 0.31-0.91]), pre-procedure radiotherapy (OR = 3.66 [95%CI: 1.17-11.40]), peri-bronchial tumor (OR = 2.32 [95%CI: 1.04-5.15]), and emphysema (OR = 56.83 [95%CI: 8.42- 383.57]) were significant predictive factors of pneumothorax (all $P < 0.05$). The generated nomogram model demonstrated a significant prediction performance, with an area under the ROC curve of 0.800 (95%CI: 0.751-0.850). Conclusions Pre-procedure radiotherapy, tumor number, peri-bronchial tumor, and emphysema were identified as risk factors for pneumothorax in the treatment of CRLM using percutaneous IGTA. Puncture depth was found to be a protective factor against pneumothorax.

PO-3198

GMCSF armed herpes simplex virus treats residual tumors after incomplete radiofrequency ablation by activating innate immunity and reprogramming tumor microenvironment

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Background: Thermal ablation of tumors is a local application of extreme temperature induced coagulation necrosis to cure or alleviate various tumor types, as an alternative to surgery. However, due to incomplete radiofrequency ablation (iRFA) of the target tumor, it can induce more severe immune suppression, especially when macrophages polarize into M2 type macrophages that are beneficial for tumor progression. Oncolytic viruses (OV) have been shown to activate the anti-tumor function of specific immune cells such as T cells. Here, we designed a GMCSF armed herpes simplex virus (oHSV2-mGMCSF) and demonstrated its ability to reprogram tumor associated macrophages (TAMs) into a lower immunosuppressive M1 phenotype.

Methods: We validated the polarization and activation mediated by OVs in RAW264.7 cells in vitro. Subsequently, we evaluated the anti-tumor ability of oHSV2-mGMCSF in a mouse model. RNA seq is used to characterize changes in the tumor microenvironment.

Results: The oHSV2-mGMCSF lysate effectively stimulated RAW264.7 cells to polarize towards M1 cell phenotype rather than M2 cell phenotype, and activated M1 phenotype function in vitro. In the macrophage clearance experiment, oHSV2-mGMCSF therapy induced polarization of M1 macrophages and participated in the anti-tumor immune response in a tumor bearing mouse model. The administration of oHSV2-mGMCSF resulted in a significant reduction in residual tumors and a reduction in metastatic lesions after iRFA. This is related to a significant increase in recruitment/activation of cytotoxic T cells, a decrease in regulatory T cells, and the reprogramming of TAM into a pro-inflammatory and less immunosuppressive phenotype. These results indicate that OVs therapy can more profoundly reshape TME and activate stronger innate and adaptive immune responses.

Conclusions: Our data supports the feasibility of recombinant oncolytic virus therapy for residual tumors after iRFA, and proposes new strategies for oncolytic virus therapy.

PO-3199

HBV reactivation in HBV-related hepatocellular carcinoma patients undergoing hepatic arterial infusion chemotherapy in combination with tyrosine kinase inhibitors plus immune checkpoint inhibitors

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Abstract

Purpose: This study aimed to assess hepatitis B virus (HBV) reactivation and its effect on prognosis for patients with advanced HBV-related hepatocellular carcinoma (HCC), who received hepatic arterial infusion chemotherapy (HAIC) in combination with tyrosine kinase inhibitors (TKIs), immune checkpoint inhibitors (ICIs) and oral entecavir treatments.

Methods: From January 2021 to June 2023, 162 patients with advanced HBV-related HCC, who received HAIC in combination with TKIs, ICIs and oral entecavir treatments, were enrolled. The HBV reactivation in these patients during treatments was observed. For patients with HBV reactivation, one group continued to receive oral entecavir treatment (HBV-R-E) treatment, and the other group switched to receive oral entecavir and tenofovir alafenamide fumarate treatment (HBV-R-E-T) after HBV reactivation. The efficacy among patients in HBV non-reactivated group, HBV-R-E group, and HBV-R-E-T group was compared.

Results: The HBV reactivation was observed in 44 patients (27.2%). A significantly lower objective response rate (ORR) and disease control rate (DCR), and a significantly shorter median progression-free survival (PFS) and median overall survival (OS) were found in patients with HBV reactivation group compared with patients without HBV reactivation group ($p < 0.05$). Furthermore, for patients with HBV reactivation, a significantly higher ORR and DCR, and a significantly longer median PFS and median OS were detected in the HBV-R-E-T group compared with the HBV-R-E group ($p < 0.05$).

Conclusions: HBV reactivation could occur in advanced HBV-related HCC patients who received HAIC in combination with TKIs, ICIs and oral entecavir treatments, and it was associated with a poorer prognosis. In addition, these patients with HBV reactivation could benefit from adding oral tenofovir alafenamide fumarate treatment.

PO-3200

Molecular mechanisms of Heat-enhanced Local Chemotherapy: Doxorubicin's penetration promoted and HSP70 high expression both contributed to enhanced the effect of comprehensive treatment under heat-stress condition

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Purpose: To evaluate the treatment effects of a combined therapy using Doxorubicin and radiofrequency hyperthermia (RFH) and expound the mechanism of local Chemotherapy under the heat-stress condition in vitro and in a rabbit VX2 liver tumor model.

Materials and Methods: Institutional Animal Care and Use Committee approved all studies. In vitro experiments VX2 cell lines cultured and were randomly assigned to four treatment groups, namely. Group A, Phosphate-buffered saline (n=6), Group B, 5μMDoxorubicin alone, Group C, 42°C

culture for 20min (n=6), Group D, 5μMDoxorubicin plus under 42°C culture for 20min (n=6). The viability and doxorubicin uptake of VX2 tumor cells line were assay by flow cytometer and fluorescence microscopy at 24h after different treatment. Western blot was used to evaluate the Hsp70 expression. Tumor tissues were harvested from our Pre-study of rabbit liver VX2 tumor model. Fluorescence microscopy observed the distribution of doxorubicin, Hsp70 activity was analysis by western blot and Immunohistochemistry. $p < 0.05$ was considered statistically significant.

Results: Radiofrequency hyperthermia-induced apoptosis and necrosis in VX2 cells in a mechanism of enhancing doxorubicin dose in cell and heat shock protein 70 expression. Fluorescence microscopy showed a further increase doxorubicin concentration in tumor cells and the penetration depth in tumor tissue. The western blot result showed Hsp70 expression in the combined group was significantly greater than in the control groups ((mean \pm SEM: 0.15 ± 0.03 vs 0.64 ± 0.13 vs 0.83 ± 0.10 vs 1.28 ± 0.13 , $p < 0.05$). In the tumor tissue immunohistochemistry staining results showed the significant increase of Hsp70-positive signaling was observed in RFH combined doxorubicin group than control group and verified in the western blot result (mean \pm SEM: 0.16 ± 0.04 vs 0.51 ± 0.13 vs 0.74 ± 0.11 vs 1.47 ± 0.13 , $p < 0.01$). Significantly increased of the tumor apoptosis and necrosis also found in the combined group with Ki-67 and TUNEL staining ($p < .001$).

Conclusion: Radiofrequency hyperthermia mediate chemotherapy-induced VX2 cell killing regulated cell death mechanisms include enhance penetration of doxorubicin and HSP70 interacting at several points on apoptotic and immune signaling pathways, leads to inhibition of apoptosis of cell death at the HCC tumor ablation margin.

PO-3201

Feasibility and safety of ultrasound-guided real-time needle aspiration biopsy sequential Transhepatic artery embolization in the management of liver tumor

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Purpose: To evaluate the efficacy and safety of ultrasound-guided real-time needle aspiration biopsy combined with transhepatic artery embolization sequentially in the management of liver tumor.

Materials and Methods: A retrospective review revealed patients underwent ultrasound-guided real-time needle aspiration biopsy sequential transhepatic artery embolization between January 2019 and August 2019 at a single institution. Patient diagnostic accuracy, tumor classification, feasibility and safety of needle aspiration biopsy sequential transhepatic artery embolization were reviewed.

Results: Twenty-eight patients (6 female and 22 male, mean age 52.3 y; range, 18–77 y) had ultrasound-guided real-time needle aspiration biopsy (U-NAB) sequential transhepatic artery embolization (TACE) procedures, the technical success was achieved in 100%. Rapid intraoperative pathological diagnosis accuracy was 96%, histological types of needle aspiration biopsy samples, including hepatocellular carcinoma as the common histological type (57.1%), adenocarcinoma in (25.0%), mixed hepatocellular cholangiocarcinoma tumors (3.6%), dysplastic nodules (7.1%), neuroendocrine carcinoma (3.6%) and Primary sclerosing cholangitis (3.6%), respectively. No major complication occurred in all procedures.

Conclusions: Percutaneous ultrasound-guided liver biopsy enables a minimally invasive and safe approach to obtain adequate tissue for precision medicine of liver tumor. Our experience suggests that serial TACE can be performed immediately after U-NAB with minimal associated complications.

PO-3202

Wood Structure-inspired Injectable Lignin-based Nanogels as Blood-Vessel-Embolic Sustained Drug-releasing Stent for Interventional Therapies on Liver Cancer

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Objective: An embolic reagent with easy injection, well-controlled target embolization, and sustained release of chemotherapy drugs is urgently needed for successful trans-arterial chemo-embolization (TACE) treatment. However, the development of a highly effective embolic reagent is still challenged. Here, inspired and guided by the structural supporting properties and defense mechanisms of wood cell walls, an ideal lignin-based embolic nanogel (DOX-pN-KL) was explored. **Method:** The emulsion solvent evaporation method was developed for the preparation of Doxorubicin-loaded pN-KL nanogels (DOX-pN-KL). DOX-HCl (3.5 mg) was dissolved in Chloroform (1 mL, containing 2.5 μ L triethylamine), and the solution was added into pN-KL nanogel dispersion (0.3 wt%, 3 mL), then the system was sheared (10,000 rpm) in the ice water bath for 5 minutes to form the preliminary emulsion. After ultrasonic treatment for 3 minutes, the stable nano-emulsion was obtained. After the chloroform was removed by a rotary evaporator, the DOX-pN-KL nanogel dispersion was lyophilized and stored in the dark.

Results: Based on the mechanical support of branched lignin and the π - π stacking force between the lignin aromatic ring with anti-tumor drug doxorubicin (DOX), DOX-pN-KL showed the highest mechanical strength among the reported thermosensitive embolization nanogel and performed high drug-loading and favorable sustained-release. Moreover, further TACE treatment and tumor microenvironment evaluation of VX2 tumor-bearing rabbits showed that this nanogel can completely block all levels of vessels in long term and continuously release DOX.

Conclusion: thus having effective inhibition on tumor growth and metastasis. DOX-pN-KL is expected to be a promising alternative reagent for interventional therapy.

PO-3203

Transarterial chemoembolization combined with radiofrequency ablation and iodine-125 seeds implantation under combined imaging guidance for hepatocellular carcinoma in high risk locations: A Propensity Score Matching Analysis

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Purpose: To compare the efficacy and safety of transarterial chemoembolization (TACE) combined with radiofrequency ablation (RFA) and iodine-125 seeds implantation (TACE-RFA-125I) with those of TACE combined with RFA (TACE-RFA) in the treatment of hepatocellular carcinoma (HCC) in high risk locations.

Methods: The study retrospectively analyzed patients with small HCC (smaller than 5 cm) in high risk locations who received TACE-RFA-125I or TACE-RFA treatment in our institution from January 2010 to June 2023. Local progression-free survival (LPFS), overall survival (OS), progression-free survival (PFS), and major complication rates were compared between the two groups. Propensity score matching (PSM) analysis was used to reduced the selection bias.

Results: A total of 126 patients with small HCC in high risk locations were enrolled in this study, including 56 patients in the TACE-RFA-125I group and 70 patients in the TACE-RFA group. Forty one patients were chosen after PSM analysis in each group. The TACE-RFA-125I group showed a significantly better survival benefit than TACE-RFA group (median LPFS: 54 months vs 23 months, $P < 0.01$; median OS: 73 months vs 51 months, $P < 0.05$; median PFS: 23 months vs 11 months, $P < 0.01$). In the subgroup analysis by patients with tumor ≤ 3 cm, the median LPFS, PFS, and OS in the TACE-RFA-125I group were significantly greater than that of in the TACE-RFA group ($P < 0.01$). For patients with tumor > 3 cm, the LPFS, OS, and PFS in the TACE-RFA-125I group were significantly greater than those of in the TACE-RFA group at short term follow-up (within 2 years) ($P < 0.05$), whereas the opposite findings were recorded for long term follow-up (beyond 2 years) ($P > 0.05$). The uni- and multivariate analysis showed that TACE-RFA-125I was a protective factor for LPFS, PFS and OS. After PSM analysis, twenty four patients in the TACE-RFA-125I group emerged with grade 1 or 2 procedure-related adverse events, compared with 26 patients in the TACE-RFA group ($P = 0.651$).

Conclusions: TACE-RFA-125I might be an effective and safe treatment strategy for patients with small HCC in high risk locations.

PO-3204

Parameter research of suitable keV recombination of metal artifact reduction algorithm in CT guided percutaneous lung biopsy

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Purpose: To observe the image quality and metal artifact reduction (MAR) of the target lesion area near the lung biopsy needle with or without metal artifact reduction algorithm, and to explore the more suitable reconstruction parameters for the keV.

Methods: Forty-three patients (24 males, 19 females, age range: 47-58, mean age 53.6 ± 7.9 years) who underwent spectral CT guided percutaneous lung biopsy were retrospectively analyzed from March to April 2021. Each patient received multiphase scanning and post-processing after the needle tip of the lung biopsy reached the target lesion area. Parameters for spectral CT scanning were: 120 kVp tube voltage; 0.28 seconds gantry rotation time; 80mm collimation width; and 1.531:1 pitch; and volume-weighted CT dose index (CTDIvol) 9.24 mGy. A total of 9 groups of images were obtained, namely 120kVp group, 40keV-non-MAR group, 40keV-MAR group, 74keV-non-MAR group, 74keV-MAR group, 120keV-non-MAR group, 120keV-MAR group, 140keV-non-MAR group and 140keV-MAR group. The CT value and image noise of the target lesion area in front of the needle tip of lung biopsy in each group were delineated and measured by two observers, and the artifact index (AI) and signal-to-noise ratio (SNR) were calculated with subcutaneous fat as reference. The image quality near the target area was evaluated subjectively using the 1-5 scale scoring method (Likert score). K-test was used to evaluate the consistency of subjective evaluation. T-test was used for data with normal distribution, and Friedman rank-sum test was used for data without normal distribution.

Results: The consistency of the Likert scores of two observers was good (κ value = 0.893). The noise, AI, SNR and Likert scores of 40 keV-MAR group and 74 keV-MAR group were inferior to those of 120 keV-MAR group and 140 keV-MAR group ($P < 0.05$). The differences between the noise (122.24 ± 52.27 vs. 182.16 ± 91.83), AI (121.42 ± 52.53 vs. 181.34 ± 92.51), SNR (-4.18 ± 4.82 vs. -16.47 ± 40.49) and Likert score (3.30 ± 1.03 vs. 2.06 ± 0.44) of 120 keV-MAR group and 120 keV-non-MAR group ($P < 0.05$). The differences between the noise (118.02 ± 52.09 vs. 175.50 ± 90.19), AI (117.29 ± 52.29 vs. 174.96 ± 90.47), SNR (-4.12 ± 5.22 vs. -8.47 ± 15.34) and Likert score (3.36 ± 1.06 vs. 2.08 ± 0.48) of 140 keV-MAR group and 140 keV-non-MAR group ($P < 0.05$). There was a significant difference in SNR and Likert score between 74 keV-MAR group and 74 keV-non-MAR group ($P < 0.05$). There was no significant difference between 120 keV-non-MAR group and 140 keV-non-MAR group ($P > 0.05$). There was no significant difference between 120 keV-MAR group and 140 keV-MAR group ($P > 0.05$).

Conclusion: Spectral CT with high keV (≥ 120 keV) virtual single spectral imaging technology combined with the MAR algorithm can effectively reduce the metal artifacts in front of the needle tip of lung biopsy and improve the overall CT image quality.

PO-3205

Interventional embolization for anomalous systemic arterial supply to the normal basal segment of the lower lobeYifan Zhang^{1,2}, Qiong Zhao³

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Objective: To explore the safety and efficacy of interventional embolization for anomalous systemic arterial supply to the normal basal segment of the lower lobe of the lung (ASA).

Methods: From June 2013 to August 2022, 45 patients with clinically confirmed ASA were collected. All patients had undergone a pulmonary enhancement CT scan before interventional operation to identify the abnormal systemic arteries. All patients accepted interventional procedure through femoral artery puncture, using gelatin sponges and spring coils for abnormal systemic arterial embolization. Pulmonary enhanced CT examination was conducted 3-5 days after the embolization. Clinical follow-up of all patients was 6 to 12 months.

Results: 45 patients were proved to be ASA through pre-operative CT scans with 35 cases supplying the left lower lobe and 10 patients supplying the right lower lobe. 29 patients complained of hemoptysis, and 16 patients were asymptomatic. The anomalous systemic arteries were derived from the thoracic aorta (n=42), abdominal aorta (n=2), and abdominal trunk (n=1). The interventional embolization was completed successfully in all cases. The aortography after embolization showed the occlusion of the abnormal systemic artery. All patients were not unwell. Postoperative CT scans showed that the abnormal arterial residues were filled with spring coils. The transparency of the affected lower lobe was increased in 23 cases, and 22 cases were unchanged. The enlarged lobular and inferior pulmonary veins were significantly improved after the embolization in 44 patients with one case invariant. After the interventional procedure, all patients had no obvious complications. 2 patients had pulmonary infarction 3 months later. All patients showed no hemoptysis during the follow-up period, and no signs of vascular recanalization were found in the enhanced CT scans in all cases.

Conclusion: Interventional embolization for ASA is slightly traumatic, safe, and effective.

PO-3206

Decreased CD11b+/CD33+/CD14+/HLA-DR^{low}/-(mMDSC) and stable HLA-DR-/CD14-/CD33+(eMDSC) in Patients with Hepatocellular Carcinoma after Microparticles-Transarterial Chemoembolization

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Background: Myeloid-derived suppressor cells (MDSCs) are known as a key negative immune regulators in the process of hepatocarcinogenesis and progression, It has been reported that the effects of surgical resection, ablation, radiotherapy, intra-arterial drug infusion, and Y90 on the frequency of circulating MDSC in hepatocellular carcinoma (HCC) patients, but the conclusions are not consistent. Transarterial chemoembolization (TACE) remains the standard treatment for unresectable HCC, which uses microparticles as an embolic agent, Microparticles-TACE (mTACE) is a popular option for HCC patients with huge HCC, as it commonly leads to obvious necrosis inside the tumor, However, the impact of the such pathological outcome on the host immunity is rarely reported at present. The aim of this study was to observe the alteration

of MDSCs subtypes, including monocytic-MDSCs (mMDSCs) and early stage MDSCs (eMDSCs), after mTACE. Additionally, the associations between mMDSCs, eMDSCs and clinical characteristics was investigated in HCC patients.

Methods: Seventy-five HCC patients (20 of whom received mTACE), 16 liver cirrhosis patients, and 20 healthy controls were recruited. Peripheral blood samples were collected for immune-cells analysis according to the study protocol. The associations between mMDSCs, eMDSCs and clinical characteristics was investigated in HCC patients. The comparison of frequency of mMDSCs , eMDSCs before and 3-5 weeks after mTACE was observed.

Results: The frequency of mMDSCs was higher in HCC group ($4.85 \pm 2.77\%$) than liver cirrhosis ($1.36 \pm 0.78\%$, $p < 0.0001$) and healthy controls group (0.57 ± 0.25 , $p < 0.0001$), the frequency of eMDSCs exhibited no significance between three groups ($p > 0.0500$). The frequency of mMDSCs was significantly correlated with the Barcelona Clinic Liver Cancer stage, tumor size, vascular invasion, distant metastasis, and the values of alpha-fetoprotein (AFP) and prothrombin induced by vitamin K absence-II (PIVKA-II) ($p < 0.05$), whereas eMDSCs were not associated with any clinical characteristics in HCC patients. The frequency of mMDSCs significantly decreased after mTACE (from $5.90 \pm 2.03\%$ to $2.57 \pm 1.07\%$, $p < 0.0001$), while no significant alteration was observed for eMDSCs (from $2.28 \pm 0.98\%$ to $2.70 \pm 1.96\%$, $p = 0.4474$).

Conclusion: This study indicates that mMDSCs are highly associated with the aggressive characteristics of HCC, but not eMDSCs. The frequency of mMDSCs can be effectively down-regulated following mTACE, while no change was observed for eMDSCs.

PO-3207

CRISPR/Cas9-Mediated SHP-1-Knockout T Cells Exhibit Anti-tumour Activity in Hepatocellular Carcinoma, Enhanced by Simvastatin

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Background: Hepatocellular carcinoma (HCC) is the most commonly occurring malignant neoplasm affecting the liver. Although immunotherapy has demonstrated potential in enhancing the survival rates of patients with HCC, the 'cold tumour' nature of HCC limits its effectiveness. Therefore, this study explored the anti-tumour properties of sarcoma homology 2 domain-containing protein tyrosine phosphatase 1 (SHP-1) knockout in CD8⁺ T cells using a humanised patient-derived xenograft (PDX) model.

Methods: The clustered regularly interspaced short palindromic repeats (CRISPR)/-associated protein 9 (Cas9) editing system was employed to knock out (KO) SHP-1 in activated T cells, and the resulting phenotypic and functional changes were analysed in vitro. Bulk RNA-sequencing (RNA-seq) analysis was used to identify related pathways and effective targets for combined cell therapy. Edited T cells were tested in non-humanised and humanised PDX models, and their effects were analysed.

Results: SHP-1-KO-T cells increased the expression of CD69 and effector memory T cells (TEM) after stimulation, while proliferation function remained unaffected. The KO group showed increased secretion of interferon (IFN)- γ , Granzyme B, and Perforin, as well as improved cytotoxicity against Hep3B, Huh7, and HepG2 cells. RNA-seq analysis revealed enhanced cell-extracellular matrix adhesion pathways in the KO group. In non-humanised and humanised PDX models, the edited T cells had a strong tumour-killing effect, with TEM subsets being the main factor. IFN- γ was the most secreted killing factor. Intratumoural injection of edited T cells reduced intratumoural oxidative phosphorylation levels, whereas intratumoural lipid metabolism levels increased. The combination

of edited T cells and 3-hydroxy-3-methylglutaryl-coenzyme A (CoA) reductase-specific inhibitor (simvastatin) was significantly more effective than either alone in the humanised PDX model.

Conclusions: This study suggests that SHP-1-KO-T cells are a promising immunotherapeutic modality for HCC. The combination of SHP-1-KO-T cells and simvastatin shows potential for further development and provides insights into effective targets for combined cell therapy.

PO-3208

The clinical application of Transarterial embolization via radial artery in the treatment of hemorrhagic diseases in obstetrics and gynecology

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Purpose: The present study aimed to explore the feasibility and safety of Transarterial embolization (TAE) in the treatment of obstetrics and gynecological hemorrhagic diseases transradial approach (TRA) compared to transfemoral approach (TFA).

Methods: This cohort study was conducted on patients with obstetrics and gynecology bleeding diseases from June 2021 to November 2022. Clinical characteristics of the patients were comparable between the two groups. The success rate of puncture and embolization, radiation dose, operation time, fluoroscopy time (FT), as well as complications of each patient were recorded and then retrospectively analyzed the data. The European Five-dimensional Health Scale (ED-5Q) and visual analog scale (VAS) were used to assess the quality of life (QOL) on the day of discharge and 30 days after surgery between the two groups.

Results: A total of 71 patients undergoing TAE were allocated to the TRA (n = 31) or TFA (n = 40) group in this study. Puncture and embolization were completed in all patients. Compared to the TFA group, the radiation dose of the TRA group (343.89 ± 108.81 mGy vs 469.29 ± 198.66 mGy; $P = 0.029$) is significantly reduced. Minor complications occurred in only one patient (3.2%) in the TRA group. The surgery-related quality of life EQ-5D index score on the day of discharge in the TRA group (0.72 ± 0.12 vs 0.65 ± 0.11 ; $P = 0.017$) was significantly higher than that in the TFA group, and the VAS score (2.55 ± 0.62 vs 2.95 ± 0.85 ; $P = 0.025$) of catheter site discomfort was significantly lower in the TRA group were than in the TFA group, but no significant difference was observed in the QOL assessment at 30 days post-surgery.

Conclusion: TRA TAE has comparable efficacy and safety to TFA TAE in treating obstetrics and gynecological bleeding diseases. This access can improve patient QOL without affecting surgical safety.

PO-3209

Efficacy and safety of TACE combined with HIFU in the treatment of massive hepatocellular carcinoma with portal vein tumour thrombosis

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Purpose

Our study was to compare the efficacy and safety[Judy2] of transcatheter arterial chemoembolization (TACE) combined with high-intensity focused ultrasound (HIFU) versus

TACE alone in the treatment of massive hepatocellular carcinoma (MHCC, ≥ 5 cm) with portal vein tumour thrombosis (PVT) and to analyse the prognostic factors of those patients.

Materials and Methods

111 MHCC patients [Judy3] with PVT were divided into TACE combined with HIFU group (A, n=56) and TACE alone group (B, n=55). Group A was divided into A1 (embolization of the feeding artery of PVT during TACE, n=33) and A2 (without embolization of the feeding artery of PVT, n=23). According to the same grouping method, Group B was divided into B1 (n=29) and B2 (n=26). Overall survival (OS), progression free survival (PFS), tumour response, adverse events and Karnofsky scores were compared. Prognostic factors for OS were determined.

Results

The median OS and PFS of groups A (12, 7 months) were longer than B (5, 4 months; $P < 0.001$ [Judy10]). The median OS and PFS of group A1 (12, 10 months) were longer than others (A2: 8, 6 months, $P = 0.019$, 0.013 ; B1: 6, 4 months, $P < 0.001$; B2: 5, 4 months, $P < 0.001$). Group A (ORR: 67.9%, DCR: 91.1%) showed higher tumour response rates than group B (21.8%, 74.5%). The tumour response rates of group A1 (69.7%, 93.9%) were better than others (A2: 65.2%, 87.0%; B1: 20.7%, 75.9%; B2: 23.1%, 73.1%). The PVT grade, times of TACE, lipiodol accumulation in PVT and therapeutic method were independent prognostic factors for OS.

Conclusion

TACE combined with HIFU is a safe and effective therapy for patients with MHCC and PVT and is worthy of clinical application, especially with targeted embolization the feeding artery of PVT during TACE.

PO-3210

Local ablation of pulmonary malignancies abutting pleura: evaluation of midterm local efficacy and safety

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Objective: To retrospectively evaluate the local efficacy and safety of local ablation treatment for adjacent pleural lung tumors.

Materials and methods: Sixty-two patients with pulmonary nodule ablation in the Affiliated Cancer Hospital of Zhengzhou University were collected from January 2016 to December 2020. All of the patients were followed up with enhanced CT or MR within 48 hours after treatment and 2, 4, 6, 9 and 12 months after treatment. All patients were followed up for at least 12 months.

Results: 84 targeted tumors (62 patients) received 94 times of ablation. In the 12-month follow-up images, 69 of the 84 targeted tumors were ablated completely, 15 incomplete ablation, and the 12-month incomplete ablation rate was 17.8% (15/84). Of all 15 incompletely ablated tumors, 6 had partial responses, 5 had stable disease, and 4 had progressive disease. The most common adverse event was pneumothorax, with an incidence of 54.8% (34/62). The second complication was the formation of pleural effusion, with an incidence of 41.9% (26/62). The incidence of needle tract bleeding was 21% (13/62), and all were cured by the use of hemostatic drugs. The serious complications were bronchopleural fistula in 4 patients (6.5%, 4/62) and needle tract metastasis in 1 patient. Four cases of bronchopleural fistula were found in the early stage and cured after symptomatic treatment.

Conclusion: local ablation is effective in the treatment of adjacent pleural lung tumors, and the operation is safe and controllable.

PO-3211

Efficacy and Safety of regorafenib plus a PD-1 inhibitor and transarterial chemoembolization for treating advanced hepatocellular carcinoma

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Abstract:

Purpose: This study sought to contrast the clinical effectiveness and tolerability of two treatment approaches in patients with advanced hepatocellular carcinoma (HCC): triple therapy involving regorafenib, a programmed death 1 (PD-1) inhibitor, and transarterial chemoembolization (TACE), and dual therapy comprising regorafenib and a PD-1 inhibitor.

Methods: A retrospective analysis was conducted on a cohort of patients with advanced HCC who underwent second-line therapy between March 2019 and June 2022. The patients were categorized into two groups: the Dual Therapy group, which received only regorafenib and a PD-1 inhibitor, and the Triple Therapy group, which received a combination of regorafenib, PD-1 inhibitor, and TACE. The primary endpoints evaluated were overall survival (OS), progression-free survival (PFS), and treatment response rates. Additionally, safety profiles and adverse events were assessed.

Results: The study included a total of 115 eligible patients who received combination therapy, with 59 patients in the Triple Therapy group (T-R-P) and 56 patients in the Dual Therapy group (R-P). Compared to the Dual Therapy group, patients in the Triple Therapy group exhibited markedly enhanced overall survival (median, 16.0 vs. 8.9 months, $p < 0.001$) and progression-free survival (median, 6.8 vs. 3.3 months, $p < 0.001$). Moreover, the Triple Therapy group demonstrated higher objective response rates (37.3% vs. 5.6%, $p = 0.001$) and disease control rates (71.2% vs. 44.6%, $p = 0.004$) than the Dual Therapy group. The incidence and severity of adverse events were comparable between the two groups (any grade: 93.2% vs. 89.3%, $p = 0.454$; grade ≥ 3 : 25.4% vs. 23.2%, $p = 0.783$).

Conclusion: In patients with advanced HCC, the use of triple therapy, combining regorafenib, a PD-1 inhibitor, and TACE, appears to confer more favorable survival advantages compared to dual therapy involving only regorafenib and a PD-1 inhibitor. Furthermore, the safety profiles of the triple therapy were manageable and akin to those of the dual therapy.

PO-3212

Prediction of Early Treatment Response to Initial Conventional Transarterial Chemoembolization for Caudate Lobe Hepatocellular Carcinoma: A Retrospective Study

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Objective

The aim is to evaluate the early tumor response in patients with caudate lobe hepatocellular carcinoma (CL-HCC) after initial transcatheter arterial chemoembolization (TACE), analyze its possible influencing factors, and provide evidence for predicting early treatment outcomes.

Materials and Methods

A total of 64 CL-HCC patients who met the inclusion and exclusion criteria from January 2009 to December 2022 were analyzed retrospectively. According to the modified Response Evaluation Criteria in Solid Tumors, the patients after the first TACE was divided into objective response (OR)

group and non-OR group, and their demographic characteristics, laboratory indicators, and tumor-related indicators were collected. Univariate and multivariate analyses were performed respectively. The additive model analyzed the interaction between independent risk factors, and the variables with statistical significance were evaluated by simple effect analysis.

Results

Univariate analysis showed that gender, AFP, AST, tumor-feeding arteries, and TACE level (super-selective or not) were statistically significant between the two groups ($P < 0.1$). Multivariate analysis indicated that male (OR=0.11, 95% CI 0.02-0.73), multiple tumor-feeding arteries (OR=5.88, 95% CI 1.25-27.59), and non-superselective TACE (OR=15.54, 95% CI 3.31-73.00) were risk factors for early progression of CL-HCC after the first TACE. The Nomogram prediction model showed that non-selective embolization was the most significant risk of progression, followed by multiple tumor-feeding arteries and male. Simple effect analysis showed that multiple tumor-feeding arteries and non-superselective TACE were the most likely factors to progress after initial TACE (OR=95, 95%CI 8.95-1008.41).

Conclusions

Male, multiple tumor-feeding arteries, and non-superselective TACE were the risk factors affecting the early tumor response in patients with CL-HCC after initial TACE. Attention should be paid to the risk of early treatment outcomes in these patients with multiple tumor-feeding arteries and non-superselective embolization.

PO-3213

The Value of Spectral CT Iodine Density in Predicting Pulmonary Hemorrhage in Percutaneous CT-guided transthoracic Lung Tumor Biopsy: Single-Institution Experience of 458 Cases

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Background: The pulmonary hemorrhage is potentially life-threatening complications following CT-guided transthoracic lung biopsy (TTLB). The accurate evaluation of pulmonary hemorrhage complication is the most important part of preoperative preparation for TTLB.

Purpose: This study investigated the risk factors associated with pulmonary hemorrhage following TTLB, and whether the iodine density of the lung tumor is a risk factor.

Materials and Methods: This retrospective study was approved by the institutional review board. The requirement to obtain informed consent was waived. Records from 458 patients who underwent TTLBs between August 2020 and April 2022 were retrospectively reviewed. Primary outcomes were pulmonary hemorrhage, hemoptysis, and bleeding complications necessitating intervention. Patient, lesion, and technique related variables were evaluated as predictors of pulmonary hemorrhage. Patient-related variables included main pulmonary artery diameter (mPAD) at computed tomography (CT), chronic lung disease. Lesion- and technique-related variables included major axis, pleura-to-lesion distance, morphologic characteristics, iodine density values, needle gauge, number of passes. Univariate analysis was performed with chi-square test, Wilcoxon test, and Student t tests. Multivariable logistic regression predicting likelihood of pulmonary hemorrhage. A ROC curve was used to analyze the performance of variables to predict the risk of pulmonary hemorrhage. Then, the Youden index was applied to select the cutoff value.

Results: Pulmonary hemorrhage occurred in 103 of the 458 TTLBs (22.4%), hemoptysis occurred in 22 of the 458 TTLBs (4.8%). Sixteen of the 458 TTLBs (3.5%) necessitated hemostatic agents. Pulmonary hemorrhage was more likely to occur with longer pleura-to-lesion distance ($P < 0.001$), smaller major axis ($P < 0.001$), and higher iodine density in the tumor lung cancer ($P = 0.029$). In

predicting the risk of pulmonary hemorrhage, the AUCs of pleura-to-lesion distance, major axis and iodine density were 0.622, 0.649 and 0.571 respectively.

Conclusion: The iodine density values of the lung tumor is a risk factor associated with pulmonary hemorrhage following TTLB.

PO-3214

基于多模态 CT 预测急性前循环闭塞性脑卒中机械取栓术后预后的研究

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目的: 机械取栓手术血管再通率增高, 但仍有约一半的患者预后不良。因此, 本研究通过构建并验证多模态 CT 模型, 研究其对机械取栓术后预后的预测价值。

方法: 收集 2020 年 9 月 1 日至 2022 年 9 月 30 日在我院行机械取栓手术并成功再通的急性前循环大血管闭塞患者 68 例。根据 90D-mRS 评分结果将患者分为有效再通组 (0-3 分) 和无效再通组 (4-6 分)。分析患者的临床及影像学资料。通过单因素及多因素 logistics 回归分析建立基于平扫 CT 及多时相 CTA (mCTA) 检查构建的 N-mCTA 模型和基于灌注检查构建的 CTP 模型。再纳入临床变量建立临床-多模态 CT 联合模型: CNCTA 模型和 CCTP 模型。采用 ROC 曲线分析模型的 AUC、灵敏度和特异度来比较二者的预测效能。并根据 CNCTA 模型绘制诺莫图并评价其预测能力。结果: 完成 mCTA 检查者 68 例, 完成 CTP 检查者 61 例; 有效再通组 47 例, 无效再通组 21 例。N-mCTA 模型变量由 ASPECTS-1 和 CS 组成, 其中 ASPECTS-1 为 ASPECTS 根据最佳截断值转化而来的二分类变量。CTP 模型变量仅由 IC 体积构成。两个模型的 AUC 分别为 0.787 (95%CI: 0.671-0.903) 和 0.840 (95%CI: 0.732-0.948)。CNCTA 模型变量由年龄 ($P=0.011$)、部位 ($P=0.036$)、ASPECTS-1 ($P=0.008$) 及 CS ($P=0.007$) 组成。CCTP 模型变量由年龄 ($P=0.043$) 和 IC 体积 ($P=0.011$) 组成。两个模型的 AUC 分别为 0.903 (95%CI: 0.824-0.981) 和 0.840 (95%CI: 0.721-0.960)。

结论: 多模态 CT 模型与联合模型对急性前循环闭塞性脑卒中患者机械取栓术后预后具有良好的预测能力。CNCTA 模型的预测价值最高, 其可视化诺莫图能定量评估患者的预后情况, 有助于临床医师对手术患者的筛选。

PO-3215

吡非尼酮通过抑制肝星状细胞自噬促进凋亡治疗肝纤维化

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目的: 探究吡非尼酮对于肝星状细胞活性、自噬以及凋亡的影响。方法: 使用不同浓度的吡非尼酮处理肝纤维化 HSC T6 细胞, CCK8 法和克隆形成实验检测细胞增殖、划痕实验检测细胞迁移、流式细胞术检测细胞凋亡, Western-Blot 检测纤维化、自噬及凋亡相关蛋白表达。随即采用吡非尼酮与自噬激动剂雷帕霉素联合用药处理 HSC T6 细胞, 并通过划痕实验、流式细胞术、Western-Blot 实验进行检测。结果: CCK8 和克隆提示随吡非尼酮浓度增加会导致 HSC T6 细胞的增殖受限; 划痕实验提示吡非尼酮浓度增加会导致 HSC T6 细胞的迁移受限; Western-Blot 和流式细胞术提示经吡非尼酮处理 HSC T6 细胞后, 细胞自噬受限, 凋亡增加。联合处理结果提示, 自噬激动剂可部分逆转吡非尼酮对 HSC T6 细胞活性抑制。结论: 吡非尼酮可抑制肝星状细胞增殖、促进细胞凋亡, 且可能通过抑制肝星状细胞的自噬水平促进其凋亡进而治疗肝纤维化。

PO-3216

CT 三维导航下经皮肺穿刺活检术的临床应用价值

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目的: 探讨 CT 三维导航下经皮肺穿刺活检术在肺占位性病变中的诊断价值及安全性。方法: 选取本院肺占位患者 40 例, 均接受 CT 三维导航下经皮肺穿刺活检术并对活检组织进行病理学检查, 分析其诊断效能, 并观察患者术后并发症情况。结果: 40 例患者中病灶位于左上肺 10 例 (25.00%)、左下肺 7 例 (17.50%)、右上肺 10 例 (25.00%)、右中肺 5 例 (12.50%)、右下肺 8 例 (20.00%); 病灶长径 11.9-102.5mm, 平均 43.50 ± 22.61 mm; 病灶短径 7.7-80.5mm, 平均 32.52 ± 19.93 mm; 病灶距离胸膜距离 0-30.0mm, 平均 6.34 ± 8.82 mm; 穿刺针入肺内距离 6.3-60.5mm, 平均 22.22 ± 11.06 mm; 穿刺针肺外调针次数 1-8 次, 平均 2.45 ± 1.48 次, 穿刺针肺内调针次数 1-6 次, 平均 2.38 ± 1.30 次; 患者仰卧位 14 例 (35.00%)、俯卧位 17 例 (42.50%)、侧卧位 4 例 (10.00%)、斜位 5 例 (12.50%); 合并肺纤维化或 COPD 病史者 7 例 (17.50%); 其中除 1 例因穿刺入胸膜时患者咳嗽引起中等量气胸未能成功取材外, 其余均成功取材, 取材成功率 (97.50%, 39/40), 其中 34 例 (87.18%, 34/39) 诊断明确, 检出恶性病变 28 例, 包括腺癌 22 例、鳞癌 1 例、小细胞癌 2 例、转移癌 3 例; 良性病变 6 例, 包括肺部炎症 5 例、结核 1 例; 术后并发症主要为气胸、出血及咯血, 并发气胸的有 11 例 (27.50%), 其中 1 例中量气胸行闭式引流, 其余少量气胸均自行吸收, 肺部出血 15 例 (37.50%), 咯血 4 例 (10.00%), 予以对症治疗后并发症均消失。结论: CT 三维导航下经皮肺穿刺活检术有助于肺占位病变的定性诊断, 穿刺时患者配合呼吸、规律屏气, 可以有效提高穿刺效率及安全性, 其具有较高的临床应用价值, 是肺部病变明确诊断的重要手段之一。

PO-3217

PRECEDE 模式在急性心梗介入治疗患者中的护理效果

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【摘要】目的 分析 PRECEDE 模式在急性心梗介入治疗患者中的护理效果。方法 研究对象为 60 例急性心梗患者, 入院后以随机选择法分为观察组 (n=30)、对照组 (n=30) 两组, 对照组给予常规护理, 观察组在常规护理基础上给予 PRECEDE 模式护理, 并对比护理效果, 研究起止时间为 2020 年 8 月-2022 年 8 月。结果 观察组自我护理能力评分高于对照组, 且观察组的生活质量评分更高 ($P < 0.05$)。结论 对急性心梗患者实施 PRECEDE 模式护理干预, 可有效提高患者的自我护理能力, 提高患者的生活质量, 说明 PRECEDE 模式护理干预更具临床优势, 值得推广应用。

【关键词】PRECEDE 模式; 急性心梗患者; 自我护理能力; 生活质量
急性心肌梗死是临床上常见的一种心血管疾病, 发病原因为冠脉发生病变导致的冠脉血流受阻或中断, 从而导致心肌缺血、缺氧性的坏死。急性心肌梗死发病率高, 发病迅速, 并发症多, 严重威胁患者的正常生活和生命健康。临床上治疗该疾病的方法主要为介入治疗[1]。相较于传统护理, PRECEDE 模式将教育性诊断与评估融入到护理方式中, 能够加强患者对疾病的认知, 改善患者的预后。故本次研究将常规护理与 PRECEDE 模式护理干预展开对比分析, 现做如下报告:

1 资料和方法

1.1 一般资料

研究对象为 60 例急性心梗患者, 入院后以随机选择法分为观察组 (n=30)、对照组 (n=30) 两组, 研究起止时间为 2020 年 8 月-2022 年 8 月。其中观察组, 男 17 例, 女 13 例, 年龄 22-87 岁, 均

值 (56.11 ± 2.14) 岁。对照组, 男 16 例, 女 14 例, 年龄 21-88 岁, 均值 (56.22 ± 2.20) 岁。一般资料对比无统计学意义 ($P > 0.05$)。

PO-3218

CalliSpheres 载药微球经导管灌注化疗栓塞治疗肝癌的临床研究

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目的 探究 CalliSpheres 载药微球经导管肝动脉灌注化疗栓塞 (DEB-TACE) 治疗肝癌的疗效。**方法** 随机数表法将本院 2019 年 1 月~2021 年 6 月就诊的 100 例肝癌患者分为对照组 50 例与研究组 50 例, 分别接受传统肝动脉化疗栓塞 (c-TACE) 与 DEB-TACE 治疗。对比两组近期疗效、不良反应, 观察治疗前后血清肿瘤标志物变化; 随访至 2022 年 1 月, 统计两组总生存率。结果 研究组客观缓解率 76.00% 高于对照组的 56.00% ($P < 0.05$); 研究组术后 1 个月、3 个月血清甲胎蛋白异质体 3 (AFP-L3)、糖类抗原 199 (CA199)、血管内皮细胞生长因子 (VEGF) 水平均显著低于对照组 ($P < 0.05$); 研究组术后 3 个月 CD3+、CD4+、CD4+/CD8+ 均明显大于对照组 ($P < 0.05$); 研究组腹胀发生率明显低于对照组 (30.00% vs 56.00%) ($P < 0.05$), 发热、腹痛等其他不良反应两组对比无显著差异 ($P > 0.05$); 随访至 2022 年 1 月, 研究组总生存率显著高于对照组 ($P < 0.05$)。结论 DEB-TACE 治疗肝癌近期疗效较好, 能明显改善患者免疫功能, 抑制肿瘤标志物, 提高总生存率。

PO-3219

肾包膜动脉栓塞联合超选择性肾动脉栓塞治疗损伤性肾出血

石静

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摘要:**目的** 探讨肾包膜动脉栓塞联合超选择性肾动脉栓塞术治疗损伤性肾出血的有效性和安全性。**方法** 回顾性分析 2020 年 1 月—2022 年 7 月收治 20 例损伤性肾出血患者的临床资料, 使用肾包膜动脉栓塞术联合超选择性肾动脉栓塞术治疗, 评价其对术后血红蛋白、肾功能及肾区疼痛视觉模拟评分的影响。结果 20 例均完成肾动脉造影, 20 例行超选择性肾动脉栓塞联合肾包膜动脉栓塞, 微弹簧圈栓塞肾动脉 15 例, 其中 4 例明胶海绵颗粒补栓塞肾动脉; 5 例明胶海绵栓塞肾动; 20 例明胶海绵颗粒栓塞肾包膜动脉。患者术后 7 天血肌酐水平较术前差异无统计学意义 ($p > 0.05$); 术后血红蛋白、肾区疼痛视觉模拟评分较术前存在明显差异, 有统计学意义 ($p < 0.05$)。结论 肾包膜动脉栓塞联合超选择性肾动脉栓塞术是治疗损伤性肾出血是一种安全、有效、微创的止血方法, 值得推广。

PO-3220

氢吗啡酮自控镇痛 (PCIA) 法对瘢痕妊娠患者子宫动脉栓塞术的进行术后镇痛的有效性和安全性

石静

安徽省阜阳市人民医院

【摘要】目的 评价氢吗啡酮静脉自控镇痛对瘢痕妊娠患者辅助行子宫动脉栓塞术后镇痛的有效性和安全性。方法 选取 2021 年 1 月至 2022 年 9 月在阜阳市人民医院疤痕妊娠行 UAE 辅助治疗的患者 116 例。依据 UAE 术后静脉自控镇痛药物不同, 随机分为观察组、对照组, 每组为 58 例。分别于手术结束前 10min 静注氢吗啡酮 2mg (观察组) 和舒芬太尼 2 μ g (对照组), 并连接患者 PCIA (配方: 观察组氢吗啡酮 10mg+氟比洛芬酯 100mg+0.9%氯化钠注射液至 100ml 镇痛泵中; 对照组舒芬太尼 2 μ g/kg+氟比洛芬酯 100mg+0.9%氯化钠注射液至 100ml 镇痛泵中)。记录两组患者 UAE 术后 0.5h、4h、8h、12h、24h、48h 视觉模拟量表 (Visual analogue scale, VAS) 评分、布鲁格曼舒适度量表 (Bruggmann comfort scale, BCS) 评分、术后 48h 内 PCA 按压次数、镇痛药物用量、不良反应及术后并发症发生率。结果 观察组术后 0.5h、48h 评分与对照组比较存在无明显差异 ($P>0.05$), 而术后 4h、8h、12h、24h VAS 评分明显低于对照组, 差异存在统计学意义 ($P<0.05$)。观察组术后 0.5h、4h、8h、12h、24h、48h 内 BCS 评分明显高于对照组、术后 48h PCA 按压次数、镇痛药物用量低于对照组, 差异有统计学意义 ($P<0.05$)。两组患者不良反应发生率比较存在统计学差异 ($P<0.05$), 而两组患者嗜睡、皮肤瘙痒、低氧或呼吸抑制发生率无统计学差异 ($P>0.05$)。结论 氢吗啡酮和舒芬太尼 PCIA 有助于缓解瘢痕妊娠子宫动脉栓塞术后疼痛, 但氢吗啡酮对比舒芬太尼可明显降低术后 VAS 评分、提高术后 BCS 评分、术后 48h PCA 按压次数及镇痛药物用量减少、不良反应发生率较低, 有一定的推广价值。

PO-3221

双侧髂内动脉 Fogarty 球囊阻断术在剖宫产术后瘢痕妊娠辅助清宫手术中的疗效与安全性

石静

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摘要 目的 探究双侧髂内动脉 Fogarty 球囊阻断术在剖宫产术后瘢痕妊娠 (CSP) 辅助清宫手术中的临床疗效与安全性。方法 回顾性分析本院 2021 年 1 月~2022 年 9 月收治疗的 80 例 CSP 患者的临床资料。其中观察组 40 例, 给予双侧髂内动脉 Fogarty 球囊阻断术下行宫腔镜下清宫治疗, 术中间断阻断髂内动脉, 清除胚胎、电凝或缝合止血; 对照组 40 例, 给予子宫动脉栓塞术 (UAE) 后 1-2 天行宫腔镜下清宫手术。对比分析两组患者在数字减影血管造影 (DSA) 下透视时间、体表辐射剂量、清宫手术中出血量、清宫手术时间、住院时间及术后随访情况。结果 所有患者清宫手术顺利, 成功保留子宫。观察组未发生球囊相关的并发症。对照组 40 例患者 UAE 后均发生不同程度发热、子宫区疼痛等栓塞后反应。观察组、对照组 DSA 下透视时间及体表辐射剂量分别比较, 差异均有统计学意义 (P 均 <0.05); 清宫术时中出血量, 清宫手术时间分别比较, 差异均无统计学意义 (P 均 >0.05); 住院时间分别两组比较, 差异有统计学意义 ($P<0.05$)。随访期均在 3 个月以上, 观察组、对照组 β -hCG 转阴时间、阴道流血时间、月经恢复正常时间及患者满意率分别比较, 差异均有统计学意义 (P 均 <0.05)。结论 双侧髂内动脉 Fogarty 球囊阻断术及 UAE 辅助 CSP 清宫手术均可明显减少术中出血量, 但双侧髂内动脉 Fogarty 球囊阻断术相比于 UAE, 减少患者 X 线辐射剂量, 缩短患者住院时间、 β -hCG 转阴时间、阴道流血时间、月经恢复正常时间, 增加患者满意度率。

PO-3222

i-Flow 在大脑中动脉支架植入术后再狭窄的评估

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目的探讨 DSA iFlow 彩色编码技术评估大脑中动脉支架植入术后再狭窄的临床价值。

方法收集重庆医科大学附属第三医院 2019 年 9 月至 2023 年 7 月 10 例大脑中动脉狭窄患者临床资料。所有患者均经影像学检查确诊为狭窄或闭塞性病变,并接受经皮腔内血管成形术(PTA)治疗。汇总所有患者 DSA 图像数据,采用德国 Siemens 公司 Artis Zee^{III}Biplane DSA 机 Leonardo 后处理工作站彩色编码技术 iFlow 软件对 DSA 图像进行后处理,获取相关参数:病变近端与远端密度达峰时间差值(ΔTTP)。基于 DSA 图像计算所有患者腔狭窄程度(S)。配对 t 检验分析对比各患者术前、术后 ΔTTP 间、S 间差异。结论 DSA iFlow 彩色编码成像技术获得的 ΔTTP ,为 PTA 术后实时有效地评估大脑中动脉支架植入术后再狭窄的发生率提供了一种新方法。

PO-3223

临床前标准化淋巴管造影术和淋巴管介入治疗培训方案潘峰¹、刘德翰¹、杨炼¹、郑传胜¹、Christof M Sommer²

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目的: 建立一种活体动物模型, 用来进行标准化的淋巴管造影和淋巴管介入治疗临床前技术培训, 并建立操作规范。

材料和方法: 使用各种成像和引导方式(包括: 超声、DSA、CT、锥形束 CT 和 MRI 检查), 使用健康活体猪作为动物模型, 进行不同的基于碘油和钆的淋巴管造影术和淋巴管介入治疗。所有的操作流程均参照人体临床实践中的操作和手术方法。明确介绍和说明所使用动物模型的建立和各种技术的背景、材料和方法。讨论每种技术在临床实践中的潜在应用。

结果: 本研究建立了总共 11 项包括淋巴管造影和淋巴管介入治疗技术在内的临床前培训规范。所涉及技术包括: 腹股沟术后淋巴漏 (PLL) 的建立、间质染料检测、五种类型的淋巴管造影术【包括: 经足淋巴管碘油造影术 (TL)、经皮穿刺淋巴结碘油造影术 (INL)、开腹经淋巴结碘油造影术、经间质淋巴管碘油造影术和经间质磁共振淋巴管造影术 (MRL)】, 以及四种针对 PLL 的经皮介入治疗技术【包括: 胸导管栓塞术 (TDE)、经淋巴结栓塞术 (INE)、传入淋巴管硬化术 (ALVS) 和传入淋巴管栓塞术 (ALVE)】。

结论: 本研究为经验不足的介入放射科医师提供了一种安全、可靠、标准的各种淋巴管造影和淋巴管介入治疗临床前培训资源, 有助于介入放射科医师更好的掌握该类技术, 以利于临床实践和技术推广。

PO-3224

冠状动脉前降支不同造影体位测量准确性研究

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目的 以血管内支架作为测量标尺,收集了右肩位、头位、左肩位体位下前降支的造影图像,比较不同造影体位、成像区域支架的测量值和实际值的差异。

资料和方法

1.1 一般资料 回顾性收集 240 幅冠脉造影图像,支架都充分扩张贴壁。分析不同造影体位组间血管特征和支架种类在组间的差异。

1.2 设备和操作 造影设备为 GE Innova3100 IQ,视野为 16cm X 16cm,术中增强器贴近病人,球管远离病人心脏,射线中心线对准心脏中心,影像在后处理工作站完成测量。

1.3 成像区域划分和介入测量 将图像平均分为九个区域,用导管校准法测量支架长度,选取支架位于图像的中上区和中间区的测量数据纳入研究。

1.4 统计分析 使用 SPSS 29.0 统计学软件,连续变量用均数+标准差 ($\bar{x} \pm s$) 表示,测量值和实际值比较采用配对 T 检验。以测量值为自变量,实际值为因变量,建立回归方程模型。

2 结果

组间血管和支架特征无差异性 ($P>0.05$)。在中上区,右肩位测量值与实际值无差异,而头位和左肩位存在差异性。在中间区,右肩位和头位的测量值和实际值无差异,左肩位存在差异 (如表一)。以实际值为因变量 (Y),测量值为自变量 (X) 建立回归方程。头位+中上区: $Y=4.664+0.91X$ ($F=138.17$, $P<0.01$); 左肩位+中间区: $Y=3.988+1.012X$ ($F=50.56$, $P<0.01$); 左肩位+中上区: $Y=6.955+0.828X$ ($F=113.27$, $P<0.01$)。将测量值代入方程中,计算结果与实际值进行 T 检验,结果均无统计学差异。

3 结论

不同造影体位和成像区域影响着图像的测量精确度。造影体位+图像区域的模式下测量值和实际值有很好的相关性,在前降支血管的测量中可以依据成像条件应用测量值或回归方程的计算结果,为介入治疗提供了更精准的手术方案。

PO-3225

3D-DSA 和 Dyna CT 重建影像对血管内支架的显示价值

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目的 比较旋转三维造影影像 (3D-DSA) 和血管造影三维软组织成像 (Dyna CT) 重建影像对血管内支架显示的差异性。

材料与方法

1.1 一般资料 回顾性随机收集 40 例曾行颅内支架植入术的病人影像,术后均进行 3D-DSA 造影和 20s-DR Dyna CT 扫描。

1.2 造影重建参数 3D-DSA 造影时,造影速率 4 ml/s,剂量 24ml,压力为 150 psi,曝光延迟 1 秒,采集的影像数据作双容积透明影像重建。Dyna CT 选择 20s-DR 模式,造影速率 2 ml/s,剂量 50ml (造影剂与生理盐水按 1:7 比例进行稀释),压力 150 psi,曝光延迟 5 秒,采集的影像数据先作双容积软组织重建后以 MIP 像。

1.3 比较两组重建图像中清晰显示的支架标记点数目和血管内支架显示的完整程度。支架的完整程度由两名手术医师共同评估,评分标准为:支架两端标记点完整显示为 1 分;支架体段平均分为四部份,如有某部分支架的位置、形态、结构显示不清则扣 1 分,满分 5 分,比较两组图像的分。

结果 120 个支架标记点中,3D-DSA 和 Dyna CT 影像上显示的支架标记点分别是 105 和 96,存在统计学差异 ($F=4.89$, $P<0.05$)。3D-DSA 影像显示数目与实际数量无差异 ($T=1.35$, $P>0.05$),而 Dyna CT 重建影像显示数目存在差异性($T=4.32$, $P<0.05$)。两组图像对支架显示完整程度比较,两种重建技术得分别为 2.43 ± 1.35 和 3.98 ± 1.56 ,存在统计学差异($T=3.28$, $P<0.05$)。

结论 在观察支架标记点,确定头尾端位置方面,3D-DSA 透明模式对标记点的显示更加清晰准确。在支架的整体显示上,Dyna CT 双容积重建 MIP 像能更加完整地显示支架网眼结构,准确评估支架膨胀程度,观察支架贴壁情况。介入技师可以根据术中需要,重建出不同的影像,提高手术安全。

PO-3226

经动脉灌注靶向递送 Bi₂Se₃ 纳米花增强兔原位肝癌的微波消融疗效

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目的: 本研究旨在将微创介入技术与纳米材料深度融合,以期在兔 VX2 原位肝肿瘤模型中实现低功率下微波热疗增敏治疗和正常组织的微波防护效应。

方法: 以天然氨基酸 L-硒代胱氨酸和 Bi(NO₃)₃·5H₂O 分别作为硒源和铋源,在可见光照下通过调控反应参数设计合成具有多层花瓣状结构的 Bi₂Se₃ 纳米花 (Bi₂Se₃ NFs)。通过超声引导套管针植入的方法构建兔 VX2 原位肝肿瘤模型,将荷瘤兔随机分组及治疗。在 DSA 的引导下通过临床可用的经动脉灌注 (TAI) 介入手术将 Bi₂Se₃ NFs 精准、靶向递送到肝肿瘤部位。介入给药 24 小时后开腹行 MWA 手术,同时,通过红外热像仪监控 MWA 的全过程。利用 CT 成像动态监测各组肝肿瘤的体积变化并计算肿瘤倍增时间。观察结束后,取肿瘤组织以及重要脏器经 H&E 染色和免疫组化染色评估各组凝固坏死、细胞凋亡和热休克蛋白 70 的表达水平。

结果: 在温和条件下通过简单的一步法制备了尺寸约为 891.17 ± 106.23 nm 的 Bi₂Se₃ NFs。活体红外热像图结果显示:在兔 VX2 原位肝肿瘤模型中,Bi₂Se₃ NFs+MWA 组的肿瘤中心温度 (86.7°C)

明显高于单独 MWA 组 (51.6°C)。术后 CT 随访结果表明,与单独接受 MWA 的肿瘤相比,同时接受 Bi₂Se₃ NFs 和 MWA 的肝肿瘤生长受到显著抑制,且肿瘤倍增时间延长了 2.2 倍 ($P<0.01$)。术后组织病理学检查结果显示,与 MWA 组相比,Bi₂Se₃ NFs+MWA 联合处理组表现出更严重的核固缩、核溶解以及胞质嗜酸性变,且 TUNEL 以及 HSP70 的表达水平均进一步增强。Bi₂Se₃ NFs 的 CT 密度值随着纳米材料浓度的增加而增加。在相同浓度下,Bi₂Se₃ NFs 的 CT 值明显高于商业化对比剂碘佛醇。

结论: Bi₂Se₃ NFs 结合 TAI 介入技术在较低功率下实现对兔 VX2 原位肝癌的微波增敏治疗并同步降低微波热对正常组织的损伤。

PO-3227

一项 CT 引导下激光消融治疗肺结节的长期回顾性研究

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目的:在为期三年的随访中,探讨 ct 引导下激光消融治疗肺结节的临床疗效和安全性。

方法:共 46 例患者(女性 28 例;在 2019 年 1 月至 2021 年 12 月期间,18 名男性)接受了 ct 引导下的激光消融治疗,最大直径为 3cm 或以下。分别在消融前、术后 6 个月、1、2、3 年评估结节体积。并对激光消融的特点及并发症进行了评价。

结果:2 例患者在治疗过程中失访。随访后,26 例患者临床完全缓解(CR),仅残留少量纤维素病变。14 例患者结节体积明显减小,达到部分缓解(PR),消融后各时间点肺结节体积均显著小于消融前($p<0.05$)。3 例肺结节为稳定期(SD);1 例患者肺结节体积增加,并被评为进展性疾病(PD)。少量针出血和少量气胸是主要并发症,发生率为 1.09%。原结节体积 245.23 ± 34.12 mL;消融功率为 4.96 ± 0.76 瓦;消融时间为 274.74 ± 294.56 s。

结论:激光消融是一种安全有效的肺小结节减容方法,具有较高的安全性。

PO-3228

能谱 CT 在肝癌 TACE 术后评估碘油沉积状态的研究

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目的:探讨能谱 CT 在评估肝癌经导管肝动脉化疗栓塞术(TACE)术后碘油沉积状态的应用价值,并综合以往文献中对碘油沉积状态的分型方式,结合新的标准对碘油沉积状态进行评价,以期得到更加准确、直观的碘油沉积评价标准。方法:收集 2022 年 6 月至 2023 年 5 月诊断为原发性肝癌并在我院行 TACE 手术的患者 80 例,分别在术前及 TACE 术后一周之内行能谱 CT 扫描,利用 AW4.7 后处理工作站对图像进行后处理,重建出 11 组单能量图,分别依据各单能量图、混合能量图对病灶内碘油沉积状态及碘油伪影对病灶周围正常肝实质的影响进行评分;利用最佳单能量图对碘油沉积状态进行分型。混合能量图像和不同能级单能量比较采用 t 检验,碘油沉积状态对比使用 χ^2 检验,以 $P<0.05$ 为差异有统计学意义。结果:11 组单能量图中,能级为 90KeV 的单能量图病灶内碘油沉积状态最接近真实碘油沉积状态(8 分),其伪影对病灶周围肝实质干扰较小(7 分),综合得分最高,评为最佳单能量图。利用最佳单能量图将 TACE 术后碘油沉积效果分为 4 级,22.5%(18 例)评为优,31.3%(25 例)评为良,10%(8 例)评为中,36.3%(29 例)评为差。结论:能谱 CT 最佳单能量图较混合能量图对碘油沉积显示效果更好;利用最佳单能量图在后处理工作站中进一步处理,对碘油在病灶中沉积的量及比例进行量化,并综合以往对碘油沉积状态的分型方式,采用新的标准对碘油沉积状态分为优、良、中、差 4 级,有助于更加准确、直观的对 TACE 手术效果进行评估。

PO-3229

音乐联合放松干预对 TACE 术患者围术期焦虑心理和疼痛作用分析

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目的:研究音乐联合放松干预对经皮肝动脉化疗栓塞术(TACE)患者围术期焦虑心理和疼痛的影响。方法:将 2022 年 1 月至 2022 年 12 月在本院行 TACE 术的 100 例患者作为研究对象,按患者收治的先后顺序分组,其中 2022 年 1-6 月收治的 50 例为对照组,实施常规护理干预,2022 年 7-12 月收治的 50 例为观察组,采取音乐联合放松干预。分析并对比两组各项指标。结果:观察组焦虑自评量表(SAS)(28.31 ± 1.64)分、抑郁自评量表(SDS)(29.31 ± 1.55)分和对照组相比,具有差异($P<0.05$);观察组不同时间段的疼痛评分和对照组具有差异($P<0.05$);观察组躯

体功能 (90.25 ± 1.20) 分、心理功能 (92.56 ± 1.45) 分、社会功能 (93.25 ± 1.45) 分、物质生活评分 (92.75 ± 1.45) 分 and 对照组具有差异 ($P<0.05$)；观察组满意度 98.00% 和对照组具有差异 ($P<0.05$)。

结论：通过对 TACE 术患者围术期采取音乐联合放松干预，取得显著效果，不仅能缓解患者焦虑心理，而且还能有效减轻患者的疼痛感，患者的就医体验得到明显改善。

PO-3230

图像融合技术优化 CT 引导下穿刺

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目的：提高穿刺成功率，减少因穿刺导致的并发症。

方法：术前建议给予患者心理疏导和宣教，训练患者平静呼吸，吸气幅度不要太大，减轻患者焦虑紧张情绪。穿刺前针对病灶扫描增强薄层图像，层厚和层间距 $\leq 1\text{mm}$ ，并选择最佳穿刺路径。在穿刺过程中，如遇到进针困难或分辨不清穿刺针前周围组织和血管情况的时候。可将实时穿刺图像与动脉期图像在飞利浦或 GE 后处理工作站，做图像融合处理，得到血管与穿刺针相融合的图像。

结果：融合图像能清晰显示穿刺针与周围血管关系，能在融合图像的提示下，尽可能避开穿刺路径上的重要血管。减少穿刺过程中出血和其他的并发症。给予穿刺医生更多图像信息，和进针的信心。

结论：在 CT 引导下穿刺过程中，使用图像融合技术，能更好的观察穿刺针周围的情况，在一定程度上提高穿刺的效率，减少并发症的发生。但病人的呼吸会影响融合图像的真实性，所以在术前准备时，应更加重视患者的呼吸训练。

PO-3231

机器视觉联合增强现实技术在 CT 引导下经皮穿刺介入中的应用研究

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目的：本课题旨在搭建基于机器视觉与增强现实技术的穿刺导航系统，将导航图像直观、实时地与真实术野画面结合并显示，帮助医师快速准确地确定穿刺入针点和穿刺角度，提高穿刺精度，缩短穿刺时间，减少手术并发症和辐射量。

材料与方法：1) 规划系统：利用多平面重建方法实现图像三维重建，提供引导依据，选择最佳穿刺路径。2) 导航系统：①利用机器视觉自动识别穿刺入针点，与规划入针点匹配②利用机器视觉在穿刺过程中对穿刺针进行实时跟踪标记③利用增强现实三维显示预期规划的路径，调整穿刺角度。3) 辅助硬件平台：搭载本方法的硬件和软件的综合移动平台，实现数据传输网络、物理定位校准等功能。4) 导航系统平台搭建组装后，自制硅胶体模，内置有 0.2、0.5cm 半径金属小球，利用西门子多层螺旋 CT 扫描后重建 1mm 薄层图像传输至导航系统，分别规划 5、10、15cm 长度的穿刺路径，在导航下穿刺，验证可行性，测量①靶点定位误差：针尖与金属球中心间距离，本研究中由于金属球不可穿透，故 $TRE = \text{金属球半径}$ ，即针尖接触金属球外壳认为穿刺穿刺。②侧向误差：金属球中心与穿刺针中轴线或延长线间最短垂直距离。③角度误差：规划路径和实际穿刺路径间角度。④首次成功率：一次进针成功穿刺到靶点数/总靶点数。结果：5cm 长度的针道靶点定位误差

为 $0.50\pm 0.19\text{cm}$ 、侧向误差为 $0.17\pm 0.09\text{cm}$ 、角度误差为 $0.90\pm 0.42^\circ$ 、首次成功率为 90%；10cm 长度的针道靶点定位误差为 $0.69\pm 0.26\text{cm}$ 、侧向误差为 $0.50\pm 0.25\text{cm}$ 、角度误差为 $1.19\pm 0.358^\circ$ 、首次成功率为 30%；15cm 长度的针道靶点定位误差为 $0.63\pm 0.32\text{cm}$ 、侧向误差为 $0.52\pm 0.36\text{cm}$ 、角度误差为 $0.99\pm 0.45^\circ$ 、首次成功率为 40%。

结论：本研究构建了基于机器视觉和 AR 的穿刺导航用以辅助 CT 引导下穿刺操作，通过体模穿刺实验验证了导航的可行性和精度。

PO-3232

探讨血管内治疗后患者发生脱发的危险因素

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目的：探讨血管内治疗后患者发生脱发的危险因素。

方法：随机抽取 2022 年 1 月至 2022 年 10 月于陆军特色医学中心放射科介入室接受血管内治疗的 96 例患者临床资料,记录患者性别、年龄、诊断、手术部位、射线量、射线照射时间及术后 6 月内脱发情况，分析患者出现术后脱发的影响因素。

结果：96 例患者成功实施血管内治疗，分为脑血管疾病组和外周血管疾病组.其中脑血管疾病血管内治疗患者 49 例，术后脱发的 3 例，术后脱发率为 6.1%，对 4 例脱发患者与 45 例未脱发患者年龄 $[(54.1\pm 12.3)\text{岁 vs.}(58.5\pm 11.5)\text{岁}]$ ，照射时间 $[(69.3\pm 7.2)\text{分钟 vs.}(42\pm 9.8)\text{分钟}]$ ，照射剂量 $[(168\pm 3)\text{Gy vs.}(126\pm 4)\text{Gy}]$ 进行比较，照射时间及照射剂量的差异有统计学意义 (P 小于 0.05)。外周血管疾病血管内治疗患者 47 例，术后脱发的 1 例，术后脱发率为 2%。所有脱发患者均于术后 6 月内头发再生，无一例永久性脱发。 结论：脑血管病接受血管内治疗的患者、照射时间久、剂量大是血管内治疗后脱发的高危因素，血管内治疗患者术后出现永久性脱发的可能性较低。

PO-3233

加速康复外科理念在下肢动脉硬化闭塞症患者介入治疗护理中的应用

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目的：探讨加速康复外科理念在减少下肢动脉硬化闭塞症患者术后并发症中的应用效果。方法：根据以往每年收治下肢动脉硬化闭塞症患者总数量选取符合标准的 100 例下肢动脉硬化闭塞症行介入手术的患者，按照随机数字表法分为观察组 (n =50) 和对照组 (n =50)，对照组术后采用介入病房常规的护理方法，观察组采用针对下肢动脉硬化闭塞症的加速康复护理理念对患者进行围手术期护理，比较两组患者平均住院天数，再次手术时间，术后体位性低血压、反应性高血压、低血糖、腰背部疼痛、穿刺点出血的发生率。结果：观察组术后体位性低血压发生率 (2%) 低于对照组 (18%)，术后反应性高血压发生率 (4%) 低于对照组 (28%)，观察组术后低血糖发生率 (2%) 低于对照组 (18%)，观察组患者腰背部疼痛发生率 (6%) 低于对照组 (32%)，观察组术后穿刺点出血发生率 (0%) 明显低于对照组 (18%)，观察组患者平均住院日 (8.4 ± 1.07) 低于对照组 (9.14 ± 1.46) ，观察组患者再次手术间隔时间 (211.3 ± 78.2) 长于对照组 (165.8 ± 58.6) 。结论：下肢动脉硬化闭塞症患者围手术期应用加速康复外科护理理念对患者进行护理，可缩短患者平均住院天数，延长再次手术时间，降低术后体位性低血压、反应性高血压、低血糖、腰背部疼痛、穿刺点出血的发生率，提高患者满意度，在临床护理中值得推广应用。

PO-3234

肢体固定出血检测装置联合改良斜坡侧卧位在减少股动脉穿刺术后并发症中的应用

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目的 探讨自制肢体固定带及出血检测装置配合改良斜坡侧卧位对减少股动脉穿刺术后并发症的应用效果。方法选取符合标准的 120 例经股动脉穿刺行介入手术的患者,随机分为观察组($n=60$)和对照组($n=60$),对照组术后采用传统护理方法,观察组用自制肢体固定带及出血检测装置配合改良斜坡侧卧位对患者进行术后护理,比较两组患者穿刺点出血发生率、尿潴留发生率、腰背部疼痛程度及术后血压变化。结果 观察组术后出血发生率(6.67%)低于对照组(11.67%),术后尿潴留发生率(1.67%)低于对照组(5.00%),腰背部疼痛评分(4.30 ± 2.78)低于对照组(7.30 ± 2.61)($P<0.05$),手术前后血压波动低于对照组($P<0.05$)。结论 股动脉穿刺术后压迫止血过程中应用自制肢体固定带及出血检测装置配合改良斜坡侧卧位,可以降低穿刺点出血发生率、尿潴留发生率,减轻腰背部疼痛,降低血压波动,改善患者的就医体验,在临床护理中值得推广应用。

PO-3235

输卵管积水患者介入栓塞术后 IVF-ET 临床妊娠结局影响因素分析

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目的:分析输卵管积水患者介入栓塞术后行 IVF-ET(In vitro fertilization-embryo transfer 体外受精-胚胎移植)临床妊娠结局影响因素。方法:回顾性收集自 2021 年 3 月至 2022 年 10 月于郑州大学第三附属医院因输卵管积水行介入栓塞术且行 IVF-ET 的 65 例患者的临床资料。以术中积水处最宽径与盆腔横径比值量化积水指数,记录患者移植时年龄、BMI(Body Mass Index 身体质量指数)、FSH(Follicle-Stimulating Hormone 卵泡刺激素)、LH(Luteinizing Hormone 黄体生成素)、E2(Estradiol 雌二醇)、AMH(Automated Matetials Hanging 抗缪勒管激素)、移植时子宫内膜厚度、移植胚胎个数、胚胎类型、输卵管积水位置等数据,随访至栓塞术后首次移植临床妊娠结局。采用 SPSS25.0 进行数据分析临床妊娠结局与上述指标相关性。采用 ROC 曲线和约登指数计算积水指数截断值。结果:65 例患者中临床妊娠率为 63.1%(41/65),其中于栓塞前已行胚胎移植且未成功的 45 例患者栓塞术后临床妊娠率为 62.2%(28/45)。数据分析表明 IVF-ET 临床妊娠结局与年龄、BMI、FSH、LH、E2、AMH、移植时子宫内膜厚度、移植胚胎个数、胚胎类型以及输卵管积水位置无相关性($P>0.05$),与输卵管积水指数存在相关性($P<0.001$)。ROC 曲线分析表明积水指数可以作为妊娠结局的预测指标,曲线下面积为 0.825,约登指数分析结果显示积水指数的最优截断值为 12.925%。结论:输卵管积水行介入栓塞治疗可提高 IVF-ET 临床妊娠率,但当患者当积水指数较大时对 IVF-ET 临床妊娠产生不利影响,在移植之前应对输卵管积水进行进一步抽吸处理。

PO-3236

3D 血管造影引导下子宫肌瘤供血动脉超选择性栓塞的应用

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目的: 评价 3D 血管造影引导下子宫肌瘤供血动脉超选择性栓塞的可行性及疗效。方法: 回顾性分析 2016 年 6 月至 2021 年 9 月接受介入栓塞治疗的 14 例子宫肌瘤患者临床资料。其中 A 组 5 例患者行子宫动脉 3D 血管造影并明确子宫肌瘤供血动脉来源及走形, 后应用微导管超选择性插管栓塞肌瘤供血动脉并保留正常子宫动脉血供。另 B 组 9 例子宫肌瘤患者则栓塞双侧子宫动脉至主干。统计术前及术后 1 年可测量子宫肌瘤最大径线之和, 应用 SPSS25.0 软件进行统计学分析, 采用配对 t 检验方法分析两组患者术前及术后可测量子宫肌瘤径线之和变化及子宫肌瘤缩小率, 以 $P < 0.05$ 为差异有统计学意义。结果: A 组患者术前及术后子宫肌瘤最大径线之和平均值分别为 $85.00\text{mm} \pm 43.35\text{mm}$ 及 $35.20\text{mm} \pm 25.96\text{mm}$, 差异有统计学意义 ($p < 0.05$); B 组患者术前及术后子宫肌瘤最大径线之和平均值分别为 $65.00\text{mm} \pm 12.68\text{mm}$ 及 $49.44\text{mm} \pm 24.83\text{mm}$, 差异无统计学意义 ($p > 0.05$); 两组样本间术前径线平均值 (mm)、术后径线平均值 (mm) 未表现出显著差异性 ($p > 0.05$)。两组患者子宫肌瘤平均缩小率分别为 62% 和 25%, 差异有统计学意义 ($p < 0.05$)。结论: 3D 血管造影引导下子宫肌瘤供血动脉栓塞具有更佳的治疗效果。

PO-3237

双针成角同时消融+活检胸膜下恶性肺结节的安全性分析

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目的: 本研究旨在评价 CT 引导下经皮双针成角行活检+射频消融(RFA)胸膜下肺结节的安全性, 探讨胸膜下同时活检+RFA 安全的方法。

方法: 回顾性收集我院 2018 年 7 月 1 日至 2021 年 9 月 30 日行 CT 引导下经皮射频消融的患者资料共 341 例, 将经皮双针成角活检+RFA 的胸膜下肺结节 ($D \leq 10\text{mm}$) 患者资料作为实验组 (A 组), 另将经皮活检+RFA 的非胸膜下肺结节 ($D > 10\text{mm}$) 患者资料作为对照组 (B 组), 经皮单纯 RFA 胸膜下肺结节 ($D \leq 10\text{mm}$) 患者资料作为对照组 (C 组), 分别比较实验组和不同对照组的穿刺活检及消融技术成功率, 即时和延迟并发症的发生率; 评价双针成角顺序活检-消融术在胸膜下肺结节诊治中的可行性和安全性。两组间计量资料比较采用 t 检验, 计数资料采用 χ^2 检验, 对基线特征资料、技术有效性及并发症进行分析。

结果: 三组消融的成功率均为 100%, 即时气胸发生率及延迟气胸发生率 A 组为, B 组为, C 组为, A 组与两组间比较均无统计学差异, 置管率 A 组为 7.9%, B 组为 8.7%, C 组为 17%, 肺内出血 A 组为 14.3%, B 组为 27.8%, C 组为 9%, 复查后胸腔积液 A 组为 22.5%, B 组为 15.7%, C 组为 25.3%, 术后止痛药的使用 A 组 71.4%, B 组 56.5%, C 组为 78%, 均无支气管胸膜瘘或死亡等并发症发生, A 组出现 1 例 III° 皮肤烧伤, 后经对症治疗后恢复。

结论: CT 引导下经皮双针成角同时活检+消融技术对胸膜下结节诊治一体化是安全可行的, 采用相应的方法和技巧可以减少消融并发症的发生, 并减轻患者医疗负担, 减少住院次数。

PO-3238

CT 引导肺结节温度消融术后感染影像学特征及抗感染治疗

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目的 观察 CT 引导下经皮穿刺肺结节温度消融术后出现感染的情况, 分析术后感染的影像学征象及抗感染治疗后疗效评估。

方法 回顾分析 2018 年 1 月 1 日至 2023 年 6 月 30 日共 1859 例接受 CT 引导下肺结节温度消融术的患者, 其中术后出现感染的患者共 42 例, 共 42 个病灶, 病灶分布于右肺上叶 16 例, 右肺下叶 9 例, 右肺中叶 1 例, 左肺上叶 8 例, 左肺下叶 8 例, 包括实性结节 21 个, 磨玻璃结节 (GGN) 21 个。42 例患者均顺利完成手术, 其中 31 例行射频消融术, 6 例行微波消融术, 5 例行氩氦刀冷冻消融术。42 例患者术中均未见明显异常情况, 术后 24 小时内完成实验室化验及术后当日下午复查胸部 CT, 针对感染指标升高或发热的患者, 调整抗生素治疗, 分别于术后第 1 天, 第 3 天, 第 7 天复查感染指标和胸部 CT 评估感染控制情况。

结果 接受温度消融的 1859 例患者中有 42 例出现了术后感染, 感染率 2.26%。42 例术后感染患者经治疗后均恢复正常出院, 无死亡病例。患者均在术后 24 小时内化验感染相关指标均有不同程度升高及术后当天下午复查胸部 CT 可见消融区域出现感染的影像学征象, 在调整抗生素治疗后, 化验感染相关指标降低, 复查胸部 CT 提示随时间延长, 感染逐渐得到控制。

结论 CT 引导下经皮穿刺肺结节温度消融治疗安全有效, 感染率低。胸部 CT 是及时评估术后感染的有效检查方法, 根据不同时期 CT 征象可及时提示感染和预后。及时调整抗生素是治疗术后感染的有效方法。

PO-3239

不同长度鞘管在腹主动脉球囊阻断联合剖宫产术中的对比分析

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目的: 对比不同长度鞘管在凶险性前置胎盘行腹主动脉球囊阻断联合剖宫产术中的应用及相关并发症分析方法: 回顾性分析了 2022 年 4 月至 2023 年 12 月期间收治于我院的 159 例凶险性前置胎盘患者的临床资料。患者均行腹主动脉球囊阻断联合剖宫产术, 83 例患者应用长鞘置入球囊 (A 组), 76 例患者应用短鞘置入球囊 (B 组)。结果: 两组病例母婴情况 (年龄、孕周、孕次、产次、新生儿 Apgar 评分) 的差异无统计学意义 ($P>0.05$)。两组产妇术中出血量、输血比例、手术时间、球囊阻断时间、胎儿接收透视时间及放射剂量、术后行动脉栓塞率、子宫切除率上差异无统计学意义 ($P>0.05$)。A 组术后发现 2 例穿刺点血肿, 1 例发生股总动脉血栓; B 组术后发现 1 例穿刺点血肿, 6 例穿刺侧动脉血栓。形成动脉血栓上的差异有统计学意义 ($P<0.05$)。结论: 在凶险性前置胎盘的治疗中, 应用长鞘行腹主动脉球囊阻断联合剖宫产术可有效减少球囊对血管的损伤, 并降低穿刺侧下肢动脉血栓风险。

PO-3240

Pipeline 血流导向装置治疗颅内动脉瘤后出现的支架内狭窄: 发生率、危险因素及预后

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背景: 支架内狭窄 (in-stent stenosis, ISS) 是 Pipeline 血流导向装置 (pipeline embolization device, PED) 治疗颅内动脉瘤 (intracranial aneurysms, IAs) 后可能发生的一种晚期并发症。

目的: 评估 ISS 的发生率、危险因素和预后。

方法: 本研究是一项回顾性、多中心、观察性研究。患者数据均来自 PLUS 注册研究。本研究中, 我们收集了随访时完成数字减影血管造影 (DSA) 的 IA 患者的数据, 并将患者分为“非 ISS”、“轻度 ISS”和“严重 ISS”组。使用多因素 logistic 回归以分析确定 ISS 的危险因素。

结果: 共有 1171 例患者 (1322 例 IAs) 使用 PED 治疗。其中, 662 例患者 (728 例 IAs) 进行血管造影随访, 随访中位数时间是 9 个月。本研究中, ISS 在 73 例 (10.03%) IAs 随访中发现, 其中轻度 ISS 61 例, 重度 ISS 12 例。单因素和多因素回归分析显示, 目前吸烟史 (轻度 ISS: OR = 2.15, 95% CI = 1.122-4.118, P = .021; 重度 ISS: OR = 5.858, 95% CI = 1.186-28.93, P = .030) 和脑动脉粥样硬化 (轻度 ISS: OR = 5.694, 95% CI = 3.193- 10.15, P = .001; 严重 ISS: OR = 6.103, 95% CI = 1.384-26.91, P = .017) 是 ISS 的独立风险因素。严重 ISS 组 IAs 在术后缺血性卒中发生率 (33.3%) 高于其他各组。

结论: 在 9 个月的中位数随访中, 大约 10.03% 的病例发生 ISS。在统计分析中发现, 吸烟史和脑动脉粥样硬化是 ISS 的主要风险因素。严重 ISS 可能与 IA 患者 PED 植入后缺血性事件高发有关。

PO-3241

介入置管技术建立营养通路改善重症营养方面的应用和疗效

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【摘要】目的 介入置管技术用于建立营养支持通路主要包括输液港植入的肠外营养支持、经鼻空肠管置入和经皮胃 (肠) 造瘘管置入的肠内营养支持, 本研究比较经输液港肠外营养支持、经鼻空肠管和胃 (肠) 造瘘管的肠内营养支持在长期不耐受经口进食的重症患者中应用的有效性和安全性。方法 回顾性分析 2019 年 10 月至 2022 年 9 月间, 首都医科大学宣武医院外科重症监护室收治的不耐受经口进食重症患者 100 例。根据营养方式的不同, 分为鼻空肠管组、胃造瘘组和肠外营养组。记录并比较三组的营养疗效、疾病临床疗效及并发症情况。结果 营养支持治疗前, 三组各指标均无显著差异 ($P>0.05$)。营养支持治疗后, 肠内 ALB 和 PAB 水平也显著高于肠外营养组 ($t=5.36$, $P<0.001$; $t=3.05$, $P=0.003$), 鼻空肠管组 NRS-2002 评分显著改善优于输液港组 ($t=2.03$, $P=0.045$) 和胃造瘘组 ($t=2.95$, $P=0.010$)。鼻空肠管组和胃造瘘组营养治疗效果比较: 胃造瘘组 NRS-2002 和 ICU 住院时间改善情况显著优于鼻空肠组 ($P<0.05$); Hb 水平、ALB 水平、PAB 水平和 APACHE-II 评分两组无显著统计学差异 ($P>0.05$)。同时, 三组置管并发症发生率为 0%, 营养支持相关并发症发生率为 20.1%。结论 介入置管技术用于建立营养通路安全有效, 重症患者长期不能经口进食患者采用肠内营养支持治疗优于肠外营养支持治疗, 介入下胃造瘘的肠内营养支持能够显著改善 NRS-2002 评分、缩短 ICU 住院时间, 对危重患者恢复至正常生理状态具有积极作用。

PO-3242

术前 AI 三维影像手术计划联合 CT 引导下线钩穿刺定位在多发肺结节精准手术中的临床应用

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目的

随着近年低剂量 CT 肺筛查技术的普及, 同时性多原发肺癌 (synchronous multiple primary lung cancer, sMPLC) 的检出率逐渐升高。由于病灶小且多, 术前手术规划及肺结节定位对精准快速切除

多发肺结节、最大限度地减少肺损毁尤为重要。本研究旨在探讨 AI 全自动 3D 肺部影像重建技术联合线钩穿刺定位在胸腔镜下多发肺结节精准手术中的临床价值。

方法

回顾性分析我院 2020-2022 年间行胸腔镜下多发肺结节切除的病例，VATS 术前使用 AI 全自动 3D 肺部重建技术联合线钩穿刺定位 14 例作为研究组，未使用 3D 肺部重建和线钩穿刺定位 10 例作为对照组。每个患者术前均将胸部 CT 薄层图像数据匿名化传输至本地 AI 服务器（uAI Pioneer Portal Thoracic，联影），软件基于使用数学建模和机器学习开发和改进的智能算法，自动精准地三维重建肺结节、肺段、肺亚段、气管支气管（5 级）、肺内动静脉和淋巴结。由影像医师手动校准，必要时编辑增加未识别的肺结节病灶。由外科医生观察三维影像，对拟手术结节切缘外扩 2cm，并选择性使用 AI 软件行部分肺亚段的自动分割。切除术前 1~3h 根据拟切除结节数量在 CT 引导下穿刺标记 1 个或更多定位线钩。VATS 术中根据定位线钩的位置和三维重建图像行胸腔镜联合亚段/肺段或者楔形切除术。

结果：所有患者均顺利完成手术，无中转开胸或者中转肺叶切除。两组患者的年龄、性别、肿瘤直径、毛玻璃病灶比例、结节脏层胸膜距离、切除结节数量、胸腔引流管留置时间、术后住院时间、术后严重并发症发生率均无明显差别（ $P>0.05$ ）。研究组的手术实际切缘宽度，手术时间，术中出血量均小于对照组（ $P<0.05$ ）。

结论

CT 引导下穿刺线钩定位联合 AI 全自动三维重建技术，可以辅助胸腔镜下行多发结节切除术。此技术安全便捷，可行性强，有助于对肺多发结节精确定位、精准地切除并最大程度地保留肺功能。

PO-3243

电脑摄影辅助技术用于 CT 引导下经皮肺穿刺活检的初步研究

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目的 探讨应用电脑摄影辅助装置实时导航并优化穿刺流程的 CT 引导下经皮肺结节穿刺活检术的可行性及安全性。

方法 于 2022 年 3 月至 2022 年 6 月间将拟行肺结节穿刺活检术的患者随机分为电脑摄影辅助技术组（研究组）和对照组，纳入标准要求穿刺目标结节距离胸膜距离大于 2cm，且直径小于 3cm。对照组 45 例行徒手穿刺，研究组 45 例使用便携电脑外接摄像头并安装角度指示软件辅助穿刺，均为两位三年以上经验的医生共同完成。统计分析对比两组一次穿刺成功率、穿刺针调整次数、胸膜腔内进针时间及穿刺并发症发生率、穿刺病理样本充足率。

结果 两组患者的年龄、性别、肺基础疾病、肿瘤病史等基本资料无统计学差异（均 $P>0.05$ ）。研究组一次穿刺成功率高于对照组，差异具有统计学意义（ $P<0.05$ ）；进针调整次数、胸膜腔内进针时间、并发症发生率研究组均低于对照组，差异具有统计学意义（均 $P<0.05$ ）；穿刺样本充足率组间差异无统计学意义（ $P>0.05$ ）。

结论 电脑摄影辅助技术联合 CT 引导下经皮纵隔穿刺活检术可优化技术流程，使肺结节穿刺活检更加精准和安全，值得临床推广应用。

PO-3244

ICA 与 CTCA 在冠状动脉慢性完全闭塞病变的应用比较

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目的: 探讨冠状动脉导管造影 (ICA) 与 CT 冠状动脉成像 (CTCA) 对于冠状动脉慢性完全闭塞病变 (CTO) PCI 结果指导作用的应用比较。**方法:** 选择在我院行 CT 冠状动脉成像 (CTCA) 证实为冠状动脉慢性完全闭塞病变 (CTO), 并在我院心内科择期 PCI 的冠心病患者 50 例。根据 ICA 及 CTCA 图像判断病变的位置、形状及钙化程度, 闭塞血管近段微通道等指标对 PCI 结果指导作用上是否存在差异性。**结果:** 50 例患者中有 53 支闭塞血管, 其中 27 支血管获得再通, 未再通血管 24 支。钙化程度、闭塞部位血管病变的形状及性质是 CTO 病变再通的重要影响因素。闭塞血管所处节段以及闭塞血管所处位置是否存在微通道是开通 CTO 病变操作时间的影响因素。**结论:** ICA 与 CTCA 均能准确判断 CTO 病变的走行, 评价其斑块的程度及性质。但 ICA 更能准确显示 CTO 病变远端是否有对侧冠状动脉侧枝循环形成; 进而准确判断导丝位置是否在靶血管腔内; 能更安全提高 CTO 介入治疗成功率。钙化程度、闭塞部位血管病变的形状及性质是 PCI 能否成功的重要影响因素。闭塞血管所处节段以及闭塞血管所处位置是否存在微通道是 PCI 操作时间长短的影响因素。

PO-3245

**AngioJet Zelante 血栓清除术在永久性滤器源性急性下腔静脉
闭塞腔内治疗中的初步探索**

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目的 探讨 AngioJet 8F Zelante 机械性血栓清除装置在治疗永久滤器源性腔-髂股静脉血栓中的临床价值。

方法 回顾性分析我院 2019.02-2023.02 收治下腔静脉永久滤器植入术后急性下腔静脉闭塞患者 9 例, 术前 CTV 明确诊断下腔-髂股静脉血栓, 滤器植入时间 3-11 年, TrapeEase 5 例, VenaTech LP 4 例, 所有病例均行肾上下腔静脉 Denali 滤器置入保护, 经颈静脉逆行入路 2 例, 经股静脉、腘股静脉顺行穿刺入路 7 例, 置入 AngioJet 8F Zelante 导管血栓清除装置, 通过喷射模式进行血栓内喷射 50 万 U 尿激酶, 等待 15 min 后行血栓抽吸治疗, 局部狭窄明显、影响血流行球囊扩张, 弹性回缩明显行髂静脉支架置入。下腔-髂股静脉血流恢复, 肾上滤器无血栓即刻回收滤器。术后随访 6 个月, 1 个月超声复查、6 个月时行下腔静脉 CTV 复查, 术后口服抗凝治疗至少 6 个月, 监测 D-二聚体变化。血栓清除评判标准: 血栓清除率 > 90% 为 III 级; 血栓清除率 50% ~ 90% 为 II 级; 血栓清除率 < 50% 为 I 级。

结果 所有患者下腔静脉血栓均进行了机械性血栓抽吸治疗, 术后造影评估 5 例下腔静脉血栓清除 III 级, 4 例 II 级。术后 6 个月随访无血栓复发患者, 一过性肾功能损害 1 例, 对症水化、利尿后好转, 无手术相关的严重并发症和死亡发生。

结论 AngioJet 8F Zelante 机械性血栓清除装置血栓清除效率高, 治疗永久滤器源性腔-髂股静脉血栓安全、有效。

PO-3246

CT 引导下新型便携式胸腔闭式引流装置治疗气胸的动物实验研究

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目的 评估 CT 引导下置入新型便携式胸腔闭式引流装置用于治疗实验动物气胸的安全性及有效性。
方法 建立 16 头巴马猪气胸模型，随机分为实验组及对照组，每组 8 头。对实验组于 CT 引导下置入新型便携式胸腔闭式引流装置，对照组置入传统胸腔闭式引流装置。对比组间肺完全复张时间、引流效率、手术时间及一次性置管成功率、并发症发生率等差异，并与文献报道中的同类装置进行对比，初步观察新型胸腔闭式引流装置用于气胸的价值。结果 2 组动物均存活，未出现严重并发症。实验组手术时间短于对照组($P<0.01$);组间肺完全复张时间、引流效率、一次性置管成功率及并发症发生率差异均无统计学意义(P 均 >0.05)。引流完全后实验组血氧饱和度和心率均恢复至正常水平，与建模前差异无统计学意义(P 均 >0.05)。结论 CT 引导下置入新型胸腔闭式引流装置用于巴马猪气胸模型安全、有效。

PO-3247

卡梅综合症的介入硬化栓塞治疗研究

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摘要: **目的** 探讨卡梅综合症 (Kabasach-Merrittsyndrome, KMS) 经动脉导管硬化栓塞治疗的效果和临床应用价值。**材料与方法** 回顾我院 2018 年 1 月至今共收治的 21 例卡梅综合症患儿的临床资料，术前均经 CT 或 MRI 及临床综合诊断为卡梅综合症。所有患儿在完善相关术前检查后，在 DSA 下行经动脉导管硬化栓塞术。首先麻醉及进行股动脉置管，将微导管置入瘤体的供血部位，经微导管向瘤体内注入博莱霉素+超液化碘油+地塞米松混合乳剂，再以用 PVA 颗粒或微球颗粒栓塞供血动脉，部分病例采用弹簧钢圈进行栓塞，尽量将病灶的大部分供血血管进行栓塞。结果 9 例患儿中，头颈部 2 例，前胸壁 1 例，肩部 1 例，肝脏 1 例，腰背部 1 例，下肢 3 例，术前血小板均在 $57\times 10^9/L$ 以下。本组病灶患儿分别行 2~4 次介入栓塞治疗，治愈 7 例，好转 2 例，无死亡病例，无严重栓塞并发症发生。术后随访 10~24 月，未见病灶复发，血小板维持在正常水平。结论 经动脉导管硬化栓塞术治疗卡梅综合症安全有效，无明显并发症。经动脉导管硬化栓塞术主要采用硬化剂和栓塞剂栓塞瘤体供血动脉，使瘤体缺血、变性坏死，从而缩小瘤体体积，使血小板在瘤体内被捕获、破坏减少，甚至可完全消除瘤体，达到根治的效果，是卡梅综合症安全有效的治疗方式。本组 7 例患儿在采用介入硬化栓塞治疗后均取得显著疗效，术后血小板迅速提升至正常范围，瘤体明显变小或消失，皮下瘀斑减退。介入治疗可以避免外科手术中的大出血，但栓塞不当可损伤重要器官及组织血供，有时也可引起瘤体坏死感染，甚至引起正常组织的缺血坏死。针对本组 7 例卡梅综合症患儿的临床治疗及随访结果证实介入硬化栓塞治疗对卡梅综合症的疗效确切，该方法的优点是疗效显著、创伤小、无副反应，值得临床推广和使用。

PO-3248

婴幼儿腮腺血管瘤的介入治疗

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摘要:目的:探讨介入栓塞在婴幼儿腮腺血管瘤治疗中的临床应用价值。方法:回顾性分析安徽省儿童医院介入病区 2021 年 4 月-2023 年 4 月治疗的婴幼儿腮腺血管瘤 32 例。其中,男 13 例,女 19 例,男女比例为 1:1.46;患儿年龄为 2 个月~8 月,平均年龄 4 个月。深部血管瘤 13 例,混合型血管瘤 19 例;21 例瘤体大小在 4cm×4cm 以上;右侧 17 例,左侧 15 例。无双侧受累者。完善术前相关检查及 CT 增强检查,无绝对治疗禁忌症,在静吸复合麻醉下行介入栓塞治疗,术后当天予以口服普萘洛尔片;术后一个月根据临床症状及超声检查评判疗效。结果:32 例患儿共行 33 次介入栓塞治疗,术后连续随访 6 个月,瘤体缩小 80%以上,经治疗后患儿面部对称,无软组织破溃,皮肤色泽正常;无腮腺分泌障碍和面神经损伤症状;未发现肺纤维化或生长抑制现象。结论:介入栓塞治疗婴幼儿腮腺血管瘤安全、有效,可成为治疗婴幼儿腮腺血管瘤的首选治疗方法之一。

PO-3249

经动脉导管化疗栓塞术在儿童肝母细胞瘤治疗中的应用价值

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摘要:目的 讨论经动脉导管化疗栓塞术在儿童肝母细胞瘤治疗中的应用价值。材料与方法 回顾我院 2018 年 1 月~2022 年 12 月共收治的 14 例肝母细胞瘤患儿的临床资料,治疗前经 CT 或 MRI 诊断为肝母细胞瘤,完善相关术前检查后行动脉导管化疗栓塞术。首先麻醉及进行股动脉置管,将微导管置入病灶的供血部位,通过微导管将顺铂、吡柔比星及超液化碘油注入瘤体内,再用 PVA 颗粒栓塞供血动脉,尽量将病灶的所有供血血管进行栓塞。术后 1 个月复查 CT,根据肿瘤体积缩小程度、病灶内碘油沉积范围及血清 AFP 数值决定是否再次治疗。结果 14 例肝母细胞瘤患儿分别行 2~4 次动脉导管化疗栓塞术,和术前相比肿瘤体积缩小 45.7%~75.3%,平均缩小 62.3%,血清 AFP 下降 90.2%~96.5%,平均下降 94.8%。无明显化疗毒性反应,经动脉导管化疗栓塞后肿瘤手术完整切除 14 例,术后病理显示肿瘤明显坏死。随访 10~24 月,未见肿瘤复发。结论 经动脉导管化疗栓塞术治疗肝母细胞瘤安全有效,无明显并发症。它的优势在于能够使肿瘤吸收最大剂量的药物以及最大限度地减少药物的全身剂量。对婴幼儿肝母细胞瘤患者相关的手术治疗研究显示,一半以上的患儿在就诊时已经处于中晚期,较多因此失去治疗机会,而对于手术耐受较差的患儿,手术后的存活率则不足 1/3,因此术前如何提升对此类患儿的手术耐受及病灶控制,以为手术提供较好的基础条件是治疗的前提。本类治疗方式在术前的应用,能够对瘤体进行有效的控制,从而为患儿提供了外科手术切除的机会,也大大减小了手术创伤。因此经动脉导管化疗栓塞治疗儿童肝母细胞瘤值得临床推广和使用。

PO-3250

肝肉瘤样癌的影像学表现及经动脉栓塞的临床效果

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目的: 肝肉瘤样癌 (HSC) 是一种罕见的疾病, 其影像学特征尚未得到广泛认同。揭示经动脉栓塞术前后的肝肉瘤样癌的影像学特征, 可以为改善肝肉瘤样癌的影像学诊断和预后提供必要的信息。

方法: 对 6 例肝肉瘤样癌患者的影像学及临床资料进行回顾性分析。所有患者均经超声引导下经皮活检或术后病理证实为肝肉瘤样癌。所有患者均行肝动脉栓塞治疗。获得经动脉栓塞前后的 CT/MR 成像数据。结果: 1) 病变的最大直径为 2.2~13.5cm。2) 肿瘤实心部分呈轻度、延迟或持续强化。3) 肝动脉和门静脉分支在肿瘤周围/内部分别有 2 例和 4 例。4) 2 例患者发生淋巴结转移。5) 肝包膜受侵 2 例。6) 原发病灶表现为结节性碘油沉积, 周围有片状、结节状肿瘤染色阴影。6 例患者碘油栓塞后的随访 CT 分别在 3、18、5、2、2、4、19 个月出现肝内转移。7) 所有患者的甲胎蛋白 (AFP) 均正常。

结论: 肝肉瘤样癌的共同特征可总结如下: 1) 在 CT 或 MRI 上显示肿瘤体积大, 伴有坏死, 实体部分延迟或持续强化。淋巴结转移是很常见的。2) 肝动脉栓塞术后的复发率较高, 预后较差。

PO-3251

多功能金纳米凝胶栓塞剂增强肝癌介入治疗效果的实验研究

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目的: 经导管栓塞是临床治疗晚期肝癌的首选方法, 由于它是一种姑息治疗手段, 通常与化疗、射频消融 (RFA) 等其他治疗相结合, 以提高肿瘤的治疗效果。在本研究中, 我们将阿霉素负载在金纳米粒子修饰的温度敏感的 p (N-异丙基丙烯酰胺-co-丙烯酸) 聚合物中, 通过 ATRP 制备了一种集栓塞-化疗-成像于一体的新型栓塞剂。

方法: 通过对正常家兔肾脏进行肾动脉栓塞来评估 AuNP@PNA 血管栓塞的疗效。此外, 通过肿瘤生长和肿瘤转移, 研究 TACE 对 VX2 荷瘤兔的体内抗肿瘤作用。为了研究协同抗肿瘤机制, 对家兔 TACE 术后采用免疫反应 (CD3+/CD8+T 细胞)、转移情况 (MMP9)、缺氧 (HIF- α) 和血管生成 (VEGF) 评价肿瘤免疫微环境的变化情况。

结果: AuNP@PNAX/DOX 对肾栓塞具有持久的栓塞作用。同时, AuNP 的加入增强了 CT 成像效果, 且缓慢释放阿霉素, 可有效提高治疗效果, 从而增加肿瘤细胞凋亡。TAE 可诱导免疫细胞浸润, 从而改善肿瘤的免疫微环境。因此 AuNP@D-PNAX 具有巨大的临床应用潜力。

结论: AuNP@PNA/DOX 具有良好的药物动力学和生物相容性, 有望成为一种集栓塞-化疗-成像于一体的多功能栓塞剂, 以提高 TACE 治疗肝癌的效果。

PO-3252

多功能可注射温敏水凝胶用于增强肝癌 TAE 治疗抑制肿瘤转移的实验研究

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目的：经导管动脉栓塞（TAE）是中晚期肝癌患者的首选治疗方法，但存在栓塞牢固性和由此产生的肿瘤缺氧应答的两难困境，即栓塞不牢固时易引起血管复通和异位栓塞；而栓塞牢固时会进一步加剧肿瘤部位的缺氧应答，造成肿瘤复发和转移。因此，本实验旨在协调 TAE 治疗与由此引起的缺氧应答之间的矛盾，达到既抑制原位肿瘤，又抑制肿瘤转移的 TAE 治疗效果。

方法：本课题构建了一种含邻苯二酚结构的仿贻贝可注射温敏水凝胶。体外评价其温敏性、黏附性、抗氧化性以及可注射性；通过缺氧 HepG2 细胞培养实验探究水凝胶对肿瘤细胞中 ROS、HIF-1 α 、VEGF 的影响；利用兔正常肾脏栓塞实验评价其栓塞性能；在兔 VX2 肝原位肿瘤模型上评价基于该水凝胶的 TAE 的肿瘤治疗效果，并探究其机理。

结果：体外实验结果表明该水凝胶具有良好的温敏性、黏附性、抗氧化性以及易于注射，并能在体外降低乏氧肿瘤细胞中的 ROS、HIF-1 α 、VEGF。动物实验表明该水凝胶不仅持久、牢固地栓塞了肾动脉血管，增强了对原位肿瘤的治疗效果；还有效地降低了肿瘤部位的 ROS 水平，以及 HIF-1 α 等血管新生相关因子的表达，抑制了肿瘤转移。

结论：该水凝胶中的邻苯二酚结构一方面增强栓塞剂与血管间的结合力，另一方面消耗了肿瘤部位的 ROS，进而抑制了肿瘤细胞中 HIF-1 α 的表达，抑制了肿瘤血管新生，还改善了肿瘤免疫抑制微环境。由此，该策略“一石二鸟”式地克服了 TAE 面临的“栓塞与乏氧应答”两难问题。

PO-3253

非肝癌患者和接受 TACE 治疗的肝癌患者并发肝脓肿：临床特征、病因特征、治疗和结果分析

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目的：本研究的目的是评估非肝癌（non-LC）患者和接受 TACE（LC-TACE）治疗的肝癌患者肝脓肿（PLA）的临床、实验室和微生物学特征、临床结果和预后。

方法：对 2016 年 1 月至 2020 年 12 月连续 38 例肝脓肿患者的临床数据进行回顾性分析。比较两组肝脓肿患者的死亡率，并评估死亡率的风险因素。

结果：2016 年 1 月至 2020 年 12 月，共有 38 名符合纳入标准的 PLA 患者被纳入本研究，其中包括 24 名男性和 14 名女性。其中，非 LC 组有 25 名患者，LC-TACE 组有 13 名患者。发烧和发冷是两组患者最常见的症状，其次是腹痛。非 LC 组 1 名患者和 LC-TACE 组 2 名患者发生休克。非 LC 组脓液培养阳性率为 84%，其中最常见的病原体为肺炎克雷伯菌（61.9%，13/21），LC-TACE 组脓液阳性率为 92.3%，其中最常用的病原体为大肠杆菌（33.3%，4/12）。在非 LC 组中，22 名患者在治疗后好转，1 名患者没有好转，2 名患者在住院期间死亡，死亡率为 8%。在 LC-TACE 组中，8 例在治疗后好转，2 例没有好转，3 例在住院期间死亡，死亡率为 23.1%。多因素分析显示没有与死亡率相关的独立预后因素。非 LC 组的治愈时间为 37.4 \pm 23.1 天（6-90 天），LC-TACE 组为 91.5 \pm 49.7 天（19-180 天），两组之间差异有统计学意义（ $P<0.001$ ）。

结论：非 LC 组和 LC-TACE 组的肝脓肿在致病菌和治愈时间等方面有所不同。对于 TACE 后的肝脓肿，应考虑更积极、更全面的治疗。

PO-3254

经导管动脉化疗栓塞术加阿帕替尼联合或不联合卡瑞丽珠单抗单 抗治疗不可切除肝细胞癌：一项单中心回顾性研究

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目的：比较经导管动脉化疗栓塞术（TACE）加阿帕替尼联合卡瑞丽珠单抗（TACE-AC）与 TACE 加阿帕替尼（TACE-A）治疗不可切除肝细胞癌（HCC）的疗效和安全性。方法：在这项回顾性研究中，纳入了 2014 年 2 月至 2021 年 9 月期间接受 TACE-AC 或 TACE-A 治疗的不可切除 HCC 患者。这些患者均接受了 TACE 治疗。TACE-AC 组患者在 TACE 后一周内开始使用 200mg 卡瑞丽珠单抗，每 3 周一次，同时口服阿帕替尼 250mg/天。TACE-A 组患者仅口服阿帕替尼 250 毫克/天。研究的主要终点是总生存期（OS），次要终点包括无进展生存期（PFS）、客观反应率（ORR）、疾病控制率（DCR）和不良事件（AEs）。OS 和 PFS 采用 Kaplan-Meier 和 log-rank 检验进行分析。结果：共纳入 162 例患者。TACE-AC 组 80 例，TACE-A 组 82 例。TACE-AC 组的中位 OS 为 22.1 个月（95% CI: 12.6-31.7），TACE-A 组为 15.0 个月（95% CI: 12.2-17.8）（危险比 [HR] = 0.57; 95% CI: 0.38-0.85; P=0.005）。TACE-AC 组的中位 PFS 更长（15.1 个月 vs 7.0 个月; HR = 0.33; 95% CI: 0.23, 0.49; P<0.001），DCR 更高（81.2% [n=65] vs 67.1% [n=55], P=0.04）。两组的 ORR 无明显差异（58.8% [n=47, TACE-AC 组] vs 53.7% [n=44, TACE-A 组], P=0.514）。两组患者与阿帕替尼相关的不良反应发生率无明显差异。所有治疗相关不良事件均可耐受，未观察到严重不良事件。结论：TACE 联合阿帕替尼与卡瑞丽珠单抗治疗不可切除的 HCC 患者可能是一种很有前景的治疗方法，因为它具有良好的抗肿瘤活性和可控的安全性。

PO-3255

探究基于 M1 巨噬细胞 Exo 构建的新型 仑伐替尼纳米载药系统对肝癌的治疗效果

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目的肝癌是我国第四大癌症死亡原因，其 5 年生存率仅为 18%[1]，其中肝细胞癌（hepatocellular carcinoma, HCC）占有原发性肝恶性肿瘤的 75%-85%[2]。目前，手术切除仍是治疗肝癌最有效的方法，但大部分患者在确诊时已是中晚期，因肝内外转移或者门脉侵犯导致失去手术适应症，故仅 20%-30% 的患者适合手术[3]。然而当前肝癌的不同治疗方法的效果却仍差强人意，即便射频消融、介入栓塞化疗、放疗等姑息性治疗，也仅改善肝癌患者的生活质量和生存获益但疗效有限。因此，新的策略或手段的探索仍任重道远。

方法在研究中，申请人拟用黑磷纳米片负载仑伐替尼，再以 M1 型巨噬细胞外泌体（M1-Exo）为仑伐替尼递送载体，进一步将 CD47、SIRPα 抗体（Ab）和 M1-Exo 以 pH 敏感的连接物苯甲酰亚胺键偶联，构建新型仑伐替尼纳米载药系统（LT-M1-Exo@BP-Ab），拟解决以下科学问题：

（1）在酸性肿瘤微环境中，载药系统中 pH 敏感的连接物苯甲酰亚胺键被裂解，释放出可分别阻断巨噬细胞膜 SIRPα 的 SIRPα 抗体和阻断肝癌细胞膜 CD47 的 CD47 抗体，从而取消“do not Eat Me”信号，激发特异性 T 细胞抗肿瘤免疫反应；

（2）利用 M1-Exo 将肿瘤微环境中促肿瘤的 M2 型巨噬细胞重新极化为抗肿瘤 M1 型巨噬细胞，从而解除肿瘤微环境的免疫抑制效应；

(3) 包裹仑伐替尼的 M1-Exo 通过靶向高表达 CD47 的肝癌细胞, 增强肝癌细胞对仑伐替尼摄取, 从而提高其对仑伐替尼的敏感性。

结果在酸性肿瘤微环境中, 载药系统中 pH 敏感的连接物苯甲酰亚胺键被裂解, 释放出可分别阻断巨噬细胞上 SIRPα 的 SIRPα 抗体和阻断肝癌细胞上 CD47 的 CD47 抗体, 从而取消“do not Eat Me”信号;

结论本研究拟通过体内外实验探究基于 M1 巨噬细胞 Exo 构建的新型仑伐替尼纳米载药系统对肝癌的治疗效果, 以及增强仑伐替尼敏感性的效果。以期提高中晚期肝癌患者仑伐替尼的生存获益, 也为以巨噬细胞 Exo 为载体的新型载药平台的开发提供新的思路。

PO-3256

提高 125I 粒子植入患者的随访诊断有效性: 结合光谱计算机断层扫描和金属伪影减少算法的联合方法

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目的 评价光谱 CT 图像与金属伪影减少算法 (O-MAR) 在减少 125I 125I 粒子植入所致金属伪影中的协同作用。

方法 本研究回顾性纳入 45 例 125I 种子植入后行胸腹部双层光谱 CT (DLCT) 扫描的患者。将采集到的光谱数据重建为常规 CT 图像 (CI)、虚拟单色成像 (VMI、50-150 keV、20 keV/level)、CI 联合 O-MAR (CI+O-MAR)、VMI 联合 O-MAR (VMI+O-MAR), 评价各组的去伪影效果和图像质量改善。客观指标包括伪影指数 (AI)、受伪影影响的病变的信噪比 (SNR) 和对比度-噪比 (CNR)。主观指标包括评估过度校正的伪影、新的伪影、不同类型伪影 (a.近场带状伪影; b.近场条纹伪影; c.远场条纹伪影; d 模糊伪影; e.很少或无伪影)、整体图像质量和病变边界。计数数据的正态性采用夏皮罗-威尔克检验。采用单因素方差分析 (ANOVA) 来评估多组间的差异, 然后进行事后 LSD 检验。连续变量间的比较采用配对 t 检验。采用 kappa 和 Bland-Altman 分析来评估观察者间的一致性。

结果 对于低/高密度伪影, 各组 AI 均随着 VMI keV 的增加而呈下降趋势。在受伪影影响的病变区域 (ROIT) 中, CI/VMI+O-MAR 组 (50-150keV) 组的 SNR 和 CNR 均优于 CI 组 ($P<0.05$)。过校正伪影和新伪影集中在 VMI50/70keV 组中, 分别占 100%和 89.6%。在伪影类型评估中, 随着 VMI keV 的增加, 高密度伪影中 a 型带状伪影数量逐渐减少, 而很少或没有伪影的 e 型伪影数量增加, 每个形态中高密度伪影总数随着 VMI keV 的增加而减少。随着 VMI keV 的增加, 各组中高密度伪影的诊断和图像质量评分均高于低密度伪影。

结论 VMI 联合 O-MAR 可显著提高了 125I 粒子植入后 CT 随访的客观和主观图像质量、病变显示能力和诊断信心。并为 125I 粒子植入术后患者 CT 扫描方案的制定提供指导。此外, VMI 联合 O-MAR 在纠正高密度伪影方面显示了高效率。

PO-3257

利伐沙班预防肝硬化食管胃底静脉曲张出血 TIPS 术后血栓的疗效

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[摘要] 目的 探讨利伐沙班预防经颈静脉门体分流(TIPS) 术治疗肝硬化食管胃底静脉曲张出血术后 血栓的临床疗效及安全性。方法 前瞻性选取 2019 年 12 月至 2021 年 9 月间在青海省第四人民医院接受 TIPS 治疗肝硬化食管胃底静脉曲张出血患者 60 例, 随机分为两组, 试验组(n=30) 予以利伐沙班预防血栓治疗, 对照组(n=30) 不予利伐沙班干预。比较两组术后支架内血栓发生率、支架内最大血流速度及出血发生率、凝血功能。结论 利伐沙班可降低肝硬化食管胃底静脉曲张出血患者 TIPS 术后早期支架内血栓发生率, 提高支架内血流速度, 并不增加出血发生率, 用于预防 TIPS 术后支架内血栓形成的安全有效。

PO-3258

经导管动脉美蓝造影在下消化道动脉出血定位中的临床应用

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目的: 评估经导管动脉美蓝造影在下消化道动脉出血中的临床应用价值。方法: 10 例下消化道动脉出血患者, 行介入腹腔动脉造影, 发现出血责任动脉后, 将微导管超选置于出血责任动脉内, 在外科术中经微导管注入美蓝注射液, 显示出血段肠管, 为切除出血段肠管提供精准定位。结果: 经导管动脉美蓝造影可清晰显示出血段肠管, 10 例患者的出血段肠管得到快速精准切除治疗, 术后患者消化道出血停止, 且无手术相关并发症发生。结论: 经导管动脉美蓝造影可精准发现下消化道动脉出血段肠管, 为外科手术快速切除出血段肠管提供精准定位, 值得临床广泛应用。

PO-3259

射频热疗协同增效单纯疱疹病毒胸苷激酶/更昔洛韦基因治疗大 鼠肝癌的实验研究

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目的: 探索一种利用光学/超声成像监测大鼠原位癌的 RF 热疗 (RFH) 增强单纯疱疹病毒胸苷激酶/更昔洛韦(Herpes Simplex Virus-Thymidine Kinase/Ganciclovir, HSV-TK / GCV)自杀基因治疗的新方法。

材料与amp;方法: 用慢病毒/萤光素酶基因转导大鼠肝癌细胞 (MCA-RH-7777)。(i) HSV-TK / GCV-介导的基因治疗联合 RFH 的不同处理分为四组: (1) HSV-TK / GCV 介导的基因治疗联合 RFH; (ii) 单独的基因治疗; (iii) 仅 RFH 和磷酸盐缓冲盐水 (PBS)。通过 Western 印迹验证细胞和肿瘤中的 HSV-tk 基因表达, 采用共聚焦显微镜和 MTS 评估细胞活力。生物发光光学成像和超声成像被用于不同时间点 (治疗后第 1, 7 和 14 天) 监测每个动物组中的肿瘤的光子信号和瘤体大小变化。

结果：在体外实验中，与单纯的基因治疗或 RFH 和 PBS 相比，MTS 结果显示联合治疗组中的细胞增殖最弱，该结果与共焦显微镜所计算的活细胞数量和光学成像所获取的光密度结果相一致。在体内实验中，与对照组相比，超声成像结果显示联合治疗组中肿瘤体积最小。与三个对照组相比，联合治疗组的生物发光光学成像进一步显示生物发光信号强度显著降低。这些成像结果进一步证实了联合治疗组中显著增加的凋亡细胞。

结论：在体外实验中，与单纯的基因治疗或 RFH 和 PBS 相比，MTS 结果显示联合治疗组中的细胞增殖最弱，该结果与共焦显微镜所计算的活细胞数量和光学成像所获取的光密度结果相一致。在体内实验中，与对照组相比，超声成像结果显示联合治疗组中肿瘤体积最小。与三个对照组相比，联合治疗组的生物发光光学成像进一步显示生物发光信号强度显著降低。这些成像结果进一步证实了联合治疗组中显著增加的凋亡细胞。

PO-3260

单纯 α -氰基丙烯酸正丁醇联合双腔取栓 球囊阻断术治疗脾动脉瘤 2 例

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脾动脉瘤是发病率排第三的动脉瘤，其最大的危害在于破裂后大出血，致死率可达 80%。脾动脉瘤的介入治疗包括腔内隔绝(包括覆膜支架)、栓塞(包括弹簧圈、液体栓塞剂)等。 α -氰基丙烯酸正丁酯是一种液体栓塞剂，又称为组织粘合剂，其具有组织相容性好、栓塞后再通率低且不依赖于体内凝血状态等特点。在临床工作中，为避免异位栓塞，组织粘合剂通常与球囊阻断术联合应用。

PO-3261

胸主动脉腔内修复术相关逆行性夹层患者影像学特征研究

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目的探讨胸主动脉腔内修复术患者临床基本特征及其相关逆行性夹层患者影像学特征。

方法回顾性分析 2004 年 1 月至 2019 年 12 月期间在我中心治疗的 TEVAR 及其相关 RTAD 患者临床基础资料和影像学资料（主要为术中 DSA 和/或主动脉 CTA）。临床基础资料参考国内外文献设计建立数据库；影像学资料经过长期随访获得并通过医学影像分析工具（主要包括 Radiant DICOM Viewer 等专业影像分析工具）分析包括主动脉弓型、升主动脉直径、主动脉弓部支架锚定位置直径、破口位置、主动脉病理形态等指标，建立影像学资料数据库。通过分析数据库资料研究 TEVAR 临床基本特征及其相关 RTAD 患者影像学特征。

结果本组共纳入 1688 例 TEVAR 患者，其中男性 1428 例、女性 260 例，平均年龄 53 ± 13 岁（19-85 岁）。病理分型包括经典主动脉夹层 1230 例、主动脉壁间血肿和/或穿透性溃疡 362 例、胸主动脉瘤 68 例、胸主动脉假性动脉瘤 21 例、先天性主动脉缩窄 7 例。共发现 18 例 RTAD，且均发生于主动脉夹层组，男 13 例，女 5 例，平均年龄为 57 岁（38-79 岁）。

18 例 RTAD 患者影像学特征分析发现，RTAD 初始病理形态包括 11 例经典夹层、6 例局限性夹层、1 例壁间血肿。RTAD 初始及随访期发现破口位置 13 例位于支架头端，5 例距离支架头端 2cm 以上；17 例位于主动脉大弯侧，1 例位于小弯侧。在随访过程中 1 例壁间血肿随访期间进展为经典夹层；2 例局限性夹层患者 1 例于 2 周后进展为经典夹层、1 例在随访 2 年后病变进展明显；1 例初始表现为经典夹层的患者在第一次实施外科修复术后 96 个月病变再次进展。本组所有 RTAD 患者无

论初始病理形式表现为经典夹层、局限性夹层或壁间血肿，在随访期间发现药物保守治疗期间影像学表现均有不同程度的进展。

结论本研究中 RTAD 初始病理表现形式多样，包括经典夹层、局限性夹层及壁间血肿等；RTAD 患者无论初始病理形式表现为经典夹层、局限性夹层或壁间血肿，随访发现药物保守治疗期间影像学表现均有不同程度的进展。

PO-3262

ASL-MRA 和 CE-MRA 评估脑动静脉畸形闭塞

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目的：伽马刀放射手术(GKR)后的血管动静脉畸形(AVM)的治疗效果通常是用 DSA，尽管 DSA 应用广泛，但也存在一些风险，包括神经并发症、永久性残疾中风等。DSA 还使患者和医务人员暴露于电离辐射中，并带有与注射碘造影剂有关的风险。已有多项研究得出结论，TOF 血管造影和 CE-MRA 单独具有良好的诊断准确性，这支持将它们添加到 GKR 随访方案中。然而，由于其有限的灵敏性和特异性，采用 DSA 来确诊 AVM 闭塞仍是推荐的方案。

方法：对 30 例 AVM 患者在伽马刀放射治疗后进行了 DSA 检查，并进行了 ASL-MRA 和 CE-MRA 检查，MRA 扫描时间为 9 分 17 秒。排除一例无效数据后，最终 29 例患者的 DSA 和 MRA 数据由 2 名观察者对是否存在残留 AVM 进行独立盲评。

结果：9 名患者在 DSA 上检测到残留 AVMs(闭塞率达 69%)，这些残留 AVMs 的病例在至少 1 个 MRA 序列上被检测到。ASL-MRA 和 CE-MRA 分别显示了良好的特异性和阳性预测值(100%)。然而，他们的灵敏性和阴性预测值并不理想，因为结果中有 1 例动脉自旋标记 MRA 假阴性，2 例 CE-MRA 假阴性(灵敏性分别为 88%和 77%，阴性预测值分别为 95%和 90%)。如果对两个 MRA 序列进行复合评估，灵敏性和阴性预测值均增加到 100%。结合使用 ASL-MRA 和对 CE-MRA，可最大限度地提高诊断准确性。

结论：ASL-MRA 与 CE-MRA 相结合，有望作为 DSA 的替代方案来确认伽玛刀放疗后脑动静脉畸形的闭塞，该研究提供了 100%的灵敏性和特异性，它们的联合使用能够可靠地表征残留病变。

PO-3263

比较经导管动脉 CT(Angio-CT)扫描与常规多层螺旋 CT 扫描在 TACE 中的临床应用研究

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目的 比较经导管动脉 CT(Angio-CT)扫描与常规多层螺旋 CT 扫描在 TACE 术中对目标肿瘤血管检测的影像学分析；方法和材料 回顾性收集分析 2020.4.1-2021.4.1 日在我院行 TACE 术的患者共 100 例（男性，50 例，平均 66 岁，女性，50 例，平均 55 岁），其中 50 例在 TACE 术前行常规多层螺旋 CT 扫描，50 例在 TACE 术中行经导管动脉 CT 扫描，在获取影像图像后，分别由两位具有 5 年以上影像阅片经验的医生对图像进行评估，包括肿瘤的检测能力、肿瘤的供血动脉的检测、供血动脉的信噪比的评估 结果 Angio-CT 检测肿瘤的能力优于 MSCT ($P<0.05$)，Angio-CT 比 MSCT 能检测到更多的供血动脉 ($P<0.05$)，Angio-CT 的供血动脉的 SNR 优于 MSCT ($P<0.05$)；结论 Angio-CT 能比 MSCT 提供更多、更重要的影像信息，从而可以使 TACE 手术更加精准。

PO-3264

基于 Web of Science 数据库钇 90 选择性内放射治疗研究的知识图谱分析

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目的：本研究旨在通过对钇 90 选择性内放射治疗 (Y90-SIRT) 相关论文或综述进行计量文献分析，了解 Y90-SIRT 的发展现状、当前热点，以及该领域的未来发展趋势，为该领域进一步的研究提供参考和帮助。方法：自 Web of Science 数据库中检索与 Y90-SIRT 在肝脏肿瘤中的应用相关的论文和综述。通过 R4.2.2 的 bibliometric 包、VOSviewer 和 Citespace 对纳入文献进行统计绘图和可视化分析。结果：本研究共纳入 1126 篇相关文献，发文量整体呈上升趋势，在 2021 年达到顶峰。发文量领先的国家为美国，中国居于第五位 (44 篇)，各个国家之间合作密切。SALEM R 为该领域的高产作者。The Journal of Vascular and Interventional Radiology 是最主要的发文期刊。该领域主要研究方向有：Y90-SIRT 与其他治疗方法的联合治疗、Y90-SIRT 的安全性评估、Y90-SIRT 的有效性的评估。“锝 99-MAA”“肺分流分数”“免疫治疗”等是该领域的热门关键词。结论：本研究总结了 Y90-SIRT 应用于肝脏肿瘤的研究现状和发展趋势。该领域的论文总数呈上升趋势，Y90-SIRT 联合免疫治疗、Y90-SIRT 转化治疗、筛选适应人群是该领域专家学者仍需解决和持续关注的热点问题。

PO-3265

替拉扎明纳米凝胶联合 PD-1 单抗减少肝癌介入栓塞后残存和 转移的机制 及疗效研究

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经肝动脉化疗栓塞术是中晚期肝癌的常规治疗方法，但是术后残存的缺氧肿瘤细胞诱发的适应性改变及免疫抑制微环境常导致复发和转移，因此有效提高肝癌介入栓塞杀伤效果同时增强免疫效应极具研究前景。研究发现：缺氧激活的前药替拉扎明对缺氧肿瘤细胞及干细胞具有极强的的杀伤效果，可以将缺氧肿瘤细胞从治疗难点转化为治疗优势；PD-1 单抗可有效增加 T 细胞活化和杀伤效果。本项目构建替拉扎明纳米凝胶联合 PD-1 单抗用于肝癌治疗：把纳米凝胶良好的持久栓塞及药物缓释效应同替拉扎明靶向杀伤缺氧肿瘤细胞特点联合起来优势互补；肿瘤氧化应激释放自身抗原激活抗原提呈细胞联合 PD-1 单抗显著增强 T 细胞浸润及免疫效应，起肿瘤免疫原性死亡。通过体外实验及肝癌动物模型，从分子生物学、病理学及影像学等方面评价疗效及安全性，阐明协同治疗机制，从而为提高肝癌综合介入治疗效果提供理论基础及实践依据，有望为肝癌介入靶向联合治疗提供新思路。

PO-3266

载裂解 OK-432 和阿霉素的可注射水凝胶治疗不完全消融后 残存肝癌的疗效及机制研究

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研究目的：探究载裂解 OK-432 (lyOK-432) 和阿霉素的可注射新型纳米水凝胶治疗不完全消融后残存肝癌的疗效及机制。

材料与方法：首先比较裂解和非裂解 OK-432 促进 DC 细胞成熟作用。RADA16-I 凝胶溶于 lyOK-432 及阿霉素水溶液中形成 ROD 纳米凝胶，并对其材料学特性进行检测。ROD、RO、RD、OD、O、D 和 NS 组小鼠的肿瘤治疗反应、免疫细胞和细胞因子、DC 细胞中 cGAS/STING/IFN-I 的激活依次进行了检测。

结果：LyOK-432 比 OK-432 能更有效地促进 DC 成熟，并激活 IFN-I 通路。ROD 凝胶可高效负载 lyOK-432 和阿霉素，并且具有缓释性能。ROD 组肿瘤局部疗效最佳、小鼠生存时间最长，DC、CD4+T 和 CD8+T 细胞比例最高，IFN-g 和 TNF-a 表达水平最高，差异具有统计学意义 ($p<0.05$)。并且 DC 中 pSTING, pIRF3 和 IFN- β 表达水平也显著更高。再挑战实验中 ROD 组肿瘤生长也显著被抑制 ($p=0.01$)。

结论：新型 ROD 水凝胶通过激活 DC 中 STING 信号通路诱导抗肿瘤免疫反应，可以有效杀伤不完全消融后残存肿瘤。

PO-3267

经动脉插管腹部 CTA 取代 DSA 造影步骤在急性消化道出血栓塞手术中的可行性研究

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目的：探讨 nexarisAngio-CT 在消化道出血手术中，用造影导管经动脉插管腹部 CTA 取代 DSA 造影步骤在急性消化道出血栓塞手术中的可行性研究。方法：回顾性收集我院接收的行消化道出血栓塞术治疗的病人 20 例，对比经腹部 CTA 探测到出血点的数量和 DSA 造影步骤检查数量的对比以及造影剂的使用量。结果：结果 20 例消化道出血，两种方案同时检测出血有 16 例，CTA 检测出血 DSA 没有检测出来 2 例，CTA 未检测出来 DSA 检测出来 1 例，同时未检测出来 1 例，CTA 检测效率 90%，DSA 检测效率 85%，造影剂用量为 CTA (30 ± 5) ml, DSA(40 ± 5)ml。结论：经动脉插管 CTA 比 DSA 造影步骤在消化道出血手术中用更少的造影剂量，更高效的检测出血点的位置，此外配合 nexarisAngio-CT 的后处理引导导丝更快到达病灶位置，可取代动脉栓塞手术的造影步骤，减少手术时间

PO-3268

肿瘤源 PPIA 介导结直肠癌肝转移射频消融术残瘤化疗抵抗的机制研究

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目的：探讨肽基脯氨酸异构酶 A (PPIA) 在 RFA 治疗结直肠癌肝转移 (CRLM) 残瘤进展和化疗抵抗的细胞分子生物学机制。

方法：采用超速离心法从肿瘤培养上清 (Tumor culture supernatants, TSN) 中分离提取并鉴定外泌体 PPIA，通过共培养实验及 Western bolt 明确肿瘤外泌体 PPIA 表达与免疫抑制型 M ϕ 的调控关系，并通过动物实验验证。采用 Western bolt 及流式细胞术评估各共培养体系中 TAM 的 CD147 表达情况，通过免疫共沉淀明确肿瘤外泌体 PPIA 与 CD147 互作情况，考察 TAM 自分泌 CSF1 对 PPIA/CD147 通路的调控特征。采用 RT-PCR、Western bolt 及流式细胞术明确体外敲低 PPIA 提

高 CPT-11 介导热处理残存肿瘤细胞的凋亡效果, 通过动物实验考察 PPIA 抑制剂 (Cyclosporin A 或 TMN355) 联合 CPT-11 抑制残瘤生长、改善 Mφ 免疫抑制表型的可行性。

结果: RFA 术后残瘤及复发 CRLM 组织 PPIA 表达上调与更差的 OS 相关, 且 MAPK-ERK1/2 通路被激活, 血管生成及 ECM 重塑明显; 体外实验结果显示, iRFA 组 PPIA 在 mRNA 及蛋白质水平表达上调, 敲低 PPIA 能降低磷酸化 ERK1/2, 抑制肿瘤细胞增殖。测序数据显示残瘤 PPIA 特异性受体 CD147 表达上调, 且伴随 CSF1 释放及异构酶通路的异常激活, 并在后续 RT-PCR 及免疫印迹实验中得到验证。PPIA 外泌体介导的 TAM 免疫抑制表型 (增殖、迁移、分化与极化) 及 MAPK-ERK1/2 通路激活状态, 可通过 sh-PPIA 回复; 通过检测 sh-PPIA 介导的 TAM 免疫抑制表型改善及 MAPK-ERK1/2 通路抑制, 并能通过 PPIA 外泌体回复。通过分析细胞表型、细胞半抑制浓度明确了残存肿瘤细胞对其化疗抵抗, 并通过免疫组化及 Elisa 实验明确了 iRFA 术后残瘤 TAM 的免疫抑制状态。

结论: iRFA 后残存 CRLM 的肿瘤微环境中, 肿瘤细胞外泌体 PPIA 在 CSF1 协同下与 TAM 跨膜糖蛋白 CD147 结合, 通过 P38/NF-κB 信号通路促进 TAM 增殖及 M2 极化, 从而诱导化疗抵抗。

PO-3269

球囊扩张联合内外引流管治疗良性输尿管下段狭窄的 远期疗效分析

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目的: 介入治疗下采用球囊扩张联合内外引流管治疗输尿管狭窄的报道较少, 探讨该治疗方式的安全性、有效性及远期疗效。

资料和方法: 收集 2013 年 10 月至 2016 年 10 月接受介入治疗的良性输尿管下段狭窄的 42 例患者资料, 手术方式均采用球囊扩张联合内外引流管植入。男性患者 25 例, 女性患者 17 例。年龄 27-73 岁。输尿管狭窄的长度 0.2-2.1cm, 平均 1.1 ± 0.5 cm。先天性输尿管狭窄患者 7 例 (16.7%), 炎症导致输尿管狭窄患者 12 例 (28.6%), 因取石或碎石后输尿管狭窄 15 例 (35.7%), 盆腔或腹腔手术后导致输尿管狭窄 8 例 (19.0%)。术前患者尿素氮 3.9-12.9mmol/L, 肌酐 54.5-339.5μmol/L。拔除引流管后, 每半年复查泌尿系 B 超、泌尿系增强 CTU 或 IVP。随访时间 12-60 月。

结果: 42 例患者完成介入治疗, 技术成功率 100%, 未出现输尿管穿孔、破裂等并发症。拔除内外引流管时复查尿素氮 3.8-9.1mmol/L, 肌酐 45.2-189.6 μmol/L。患者术前及拔管时尿素氮及肌酐水平有显著性差异 ($P < 0.05$)。6 个月输尿管通畅率 100%, 12 个月输尿管通畅率 93%, 18 个月输尿管通畅率 83%, 24 个月输尿管通畅率 79%, 30 个月输尿管通畅率 76%, 36-60 个月输尿管通畅率 73%。多因素 Cox 回归分析结果示: 狭窄长度是影响术后通畅的危险因素 ($P < 0.05$)。

结论: 使用球囊扩张联合内外引流管植入治疗良性输尿管下段狭窄, 安全可靠, 短期及中远期疗效满意, 治疗全周期患者痛苦少、费用低, 是值得推荐的治疗策略。

PO-3270

经动脉栓塞治疗胰背动脉出血的安全性和有效性

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目的: 评价经动脉栓塞治疗胰背动脉 (DPA) 出血的安全性和有效性。

方法: 回顾性分析在我院行胰背动脉栓塞治疗的 11 例患者的相关资料。所有患者在介入栓塞术前及术后随访过程中均行腹部增强 CT 检查。总结分析此类患者的临床表现及术中血管造影的表现, 统计经动脉栓塞治疗胰背动脉出血的技术成功率、临床成功率、再出血发生情况及并发症情况。技术成功定义为经皮动脉栓塞术后, 复查造影未在有活动性出血的影像征现, 临床成功被定义为在介入栓塞术后 30 天内腹部出血的体征或症状消失, 且不需要接受额外的手术治疗 (如外科手术、内镜下治疗或介入栓塞术)。再出血指介入栓塞术后出血停止后 72 小时内血红蛋白下降 $>2 \text{ g/dl}$ 。

结果: 4 例患者临床表现为腹腔引流管出血、3 例表现为黑便、2 例表现为腹痛、2 例表现为便血。术前腹部增强 CT 检查出血的阳性影像学表现包括假性动脉瘤 5 例和造影剂外渗 4 例, 2 例患者腹部增强 CT 未发现明显出血阳性表现, 但患者及家属仍要求行选择性血管造影。介入术中血管造影表现包括假性动脉瘤 5 例、造影剂外渗 4 例、动脉分支突然中断 1 例、动脉分支血管粗细不均 1 例。所有患者 TAE 术中根据情况单纯采用明胶海绵颗粒/明胶海绵条、弹簧圈、NBCA 胶栓塞或者联合采用上述栓塞剂栓塞。所有患者均成功行 TAE 术, 技术成功率 (11/11, 100%), 随访过程中 1 例患者再次出血, 最终再次行外科手术, 临床成功率 (10/11, 90.90%)。所有患者在随访过程中没有新发坏死性胰腺炎、肠缺血性坏死或脾梗死。

结论: 经动脉栓塞治疗胰背动脉出血是一种安全有效的治疗方法。

PO-3271

温敏纳米碘油用于动脉模型栓塞的实验研究

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目的: 旨在评估新型液体温敏纳米碘油 (PEGL) 栓塞兔肾动脉和肝癌模型的疗效及安全性。

材料方法: 经导管栓塞健康新西兰大白兔右肾动脉 ($n=24$) 和肝脏 VX2 瘤模型 ($n=24$)。随机分为四组 (每组 $n=6$): (A 组) 生理盐水 (NS)、(B 组) 碘油、(C 组) 100-300 μm 聚乙烯醇颗粒 (PVA) 和 (D 组) 纳米碘油 PEGL。采用经导管超选择性栓塞右肾动脉及肝 VX2 瘤, 通过影像学 and 分子生物学综合评价其生物安全性和疗效。

结果: 新型温敏纳米碘油栓塞肾动脉和肿瘤血管生物安全性好, 自显影且可实现长期末梢性栓塞正常和肿瘤血管。栓塞肿瘤血管可有效抑制肿瘤生长, 其栓塞后 3 天和 7 天, 肿瘤生长率均明显低于对照组 ($p<0.01$), 肿瘤坏死率高 ($p<0.01$)。免疫组化结果表面 PEGL 可有效抑制肿瘤组织 HIF-1 α 、VEGF 和 CD31 的表达 ($p<0.01$)。

结论: 新型温敏纳米碘油 PEGL 可作为作为一种安全有效的自显影型液体栓塞剂, 可作为肝癌介入栓塞治疗的潜在性新型纳米栓塞材料。

PO-3272

肝癌合并门静脉癌栓的介入局部治疗联合 SBRT 放疗的疗效分析

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目的: 评价介入局部治疗 (TACE+PEI) 联合立体定向放射治疗 (SBRT) 综合治疗肝癌合并门静脉癌栓患者的疗效及安全性。

材料方法: 回顾性分析 2017 年 1 月至 2022 年 12 月我科收治的 200 例肝癌合并单支门静脉癌栓患者临床资料, 其中 98 例患者接受了 TACE+PEI 联合 SBRT 放射治疗, 102 例接受了 TACE+PEI 治疗。分析两组患者基线资料、手术并发症、客观缓解率、无进展生存期和中位随访时间进行比较。

结果: 两组所有患者均成功接受了 TACE+PEI 联合 SBRT 或 TACE+PEI 治疗, 技术成功率 100%。患者中位随访时间 TACE+PEI 联合 SBRT 组为 16.7 个月(95% CI: 3.5–57.6)和 TACE+PEI 组为 12 个月(95% CI: 2.5–36.4), ($p>0.05$)。但 TACE+PEI 联合 SBRT 组的 6 个月、12 个月和 24 个月的无进展生存率 PFS 较 TACE+PEI 组更好(分别为 94.2% vs 47.5%、93.6% vs 37.5%、77.8% vs 13.5%, $p<0.01$), 而且 6 个月、12 个月和 24 个月 OS 率更佳(分别为 91.8% vs 74.9%、92.4% vs 61.3%、87.3% vs 30.3%, $p<0.001$)。亚组分析发现, 肿瘤直径 >5 cm 和门静脉癌栓是影响疗效的主要风险因素, TACE+门静脉癌栓 PEI 联合 SBRT 可显著改善 OS 和 PFS($P<0.05$)。患者疼痛和术后出血是 TACE 联合门静脉癌栓 PEI 的主要并发症($P<0.05$), 而联合 SBRT 并未增加并发症的发生率。倾向评分匹配法校正后结果相似。

结论: 对于晚期肝癌合并单支门静脉癌栓患者, 尤其是当肿瘤直径 >5 cm 合并门静脉癌栓者, 采用 TACE +门静脉癌栓 PEI 联合 SBRT 治疗是安全有效的, 能够显著提高生存期。

PO-3273

载 anti-VEGF siRNA 温敏微凝胶治疗肝癌模型的实验研究

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目的: 探讨负载 anti-VEGF siRNA 的聚异丙基丙烯酸酯温敏微凝胶栓塞治疗兔肝 VX2 瘤的可行性, 评价其安全性和抗肿瘤疗效。

材料和方法: 建立 40 只兔肝 VX2 瘤移植性肝癌模型, 行 MR 检查证实后, 随机分为四组, 经兔股动脉逆行插管, 并超选择插管至肿瘤部位分别进行以下治疗方案: A 组: 经导管注入载 anti-VEGF siRNA 温敏微凝胶约 0.4ml ($n=10$); B 组: 经导管注入空白聚异丙基丙烯酸酯微凝胶约 0.4ml ($n=10$); C 组: 经导管灌注等量 anti-VEGF siRNA 的生理盐水 0.4ml ($n=10$); D 组: 经导管注入生理盐水 (NS) 0.4ml ($n=10$); 在治疗前 1 天和治疗后 7 天分别进行 MRI 扫描检查, 分别测得术前平均肿瘤体积 V1 和术后平均肿瘤体积 V2, 比较肿瘤变化率 $V2/V1$, 并于第二次 MRI 检查后处死实验动物, 进行病理学检查。然后在影像学和病理学角度综合评价肿瘤生长率和肿瘤坏死程度, 以及观察实验动物生存情况。

结果: 载 anti-VEGF siRNA 温敏微凝胶可通过导管进入肿瘤靶区, 栓塞肿瘤供血血管并靶向抑制肿瘤细胞 VEGF 表达; 栓塞治疗前, 兔肝 VX2 瘤体积间无显著差异 ($P<0.05$, ANOVA 法)。栓塞后 1 周各组肿瘤平均生长率分别为 A 组 $87.82\%\pm 15.34$, B 组 $110.70\%\pm 24.04$, C 组 $231.25\%\pm 12.74$ 和 D 组 $361.34\%\pm 17.11$, 组间两两比较存在显著性差异 ($P<0.05$, Bonferroni 法)。anti-VEGF siRNA 微凝胶栓塞组与空白聚异丙基丙烯酸酯微凝胶栓塞组比较, 空白组在肿瘤旁交界区内有较多残存的活性肿瘤细胞, 且更多 VEGF 表达。与 anti-VEGF siRNA 和生理盐水灌注对照组比较, 空白和载阿霉素聚异丙基丙烯酸酯微凝胶栓塞组, 肿瘤坏死范围更广、坏死程度更高。

结论: 聚异丙基丙烯酸酯温敏微凝胶可作为一种安全有效的基因治疗药物载体, 栓塞治疗兔肝 VX2 瘤可明显抑制其生长, 能够发挥栓塞和基因靶向双重治疗效果。

PO-3274

CT 引导下 Hook-wire 穿刺定位肺小结节的临床应用价值

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目的 探讨 CT 引导下 Hook-wire 定位在胸腔镜肺小结节切除术中的应用价值。

方法 以 2021 年 9 月—2023 年 8 月该院收治的 425 例肺小结节患者为研究对象，全部患者均行胸腔镜下肺楔形切除术，术前 CT 引导下 Hook-wire 定位。穿刺定位方法：患者术前先行 CT 扫描，掌握病灶位置、形态及与周边组织的关系；结合立体重建技术，在三维坐标上准确标记进针角度和距离，明确穿刺点和进针通道；穿刺点消毒、局部麻醉后，CT 引导下将内含钢丝的穿刺针缓慢穿入胸壁和肺组织，操作尽量穿过病灶或靠近相近肺组织；撤出套管针，释放 Hook-wire，复查 CT 确认钩端固定位置满意，无气胸、出血等并发症后，剪断金属线，准备手术。观察定位成功率、定位相关并发症等指标。

结果 425 例患者共计肺小结节 502 个，结节定位时间 8~27 分钟，平均 (15.3 ± 3.5) 分钟。结节定位成功率 95.8% (481/502)。定位后 CT 复查提示 36 例患者单出现气胸，24 例患者单出现少量出血，同时出现气胸及出血患者有 11 例，术中 12 例患者脱钩，并发症发生率 16.5% (83/502)。

结论 CT 引导下 Hook-wire 可精确定位肺小结节具体位置，有利于提高治疗准确性，降低意外风险，利于后续手术快速、安全，值得临床推广使用。

PO-3275

mTACE 治疗肝癌外周血 PD-1 表达及临床意义

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目的 初步探讨应用 mTACE 治疗肝癌术后外周血中 CD4+PD-1、CD8+PD-1 变化及意义。

方法 应用流式细胞技术检测健康组、肝硬化组和肝癌患者 m-TACE 术前与术后 1-2 周外周血中 CD4+PD-1、CD8+PD-1 表达情况。

结果 选择健康人及肝硬化患者各 12 名，符合入组标准的肝癌患者共计 20 例。肝癌组外周血 CD4+PD-1、CD8+PD-1 表达均明显高于肝硬化组及健康对照组。肝癌患者经 mTACE 治疗后 1-2 周外周血 CD4+PD-1 表达较治疗前下降，由术前 $(38.65\pm8.56)\%$ 下降至 $(31.65\pm5.81)\%$ 。同样 CD8+PD-1 表达也较治疗前下降 $(41.17\pm12.12 \text{ vs } 29.29\pm10.48)\%$ 。

结论 m-TACE 治疗肝癌能够显著降低外周血 CD4+/CD8+ PD-1 的表达，表明该方法对机体免疫功能有正向调节作用。

PO-3276

低剂量双源 CT 扫描在肺穿刺活检中的应用价值

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目的：探讨低剂量双源 CT 扫描在经皮肺穿刺活检术中的可行性和应用价值。

方法：选取我院 2022 年 7 月—2023 年 8 月接诊的 CT 引导下经皮肺穿刺活检患者 32 例，每位肺穿刺患者常规扫描图像要包括四组图像（穿刺前定位大范围扫描、同轴引导针局部扫描、穿刺切割针局部扫描，术后大范围扫描），将穿刺前定位大范围扫描及同轴引导针局部扫描定为常规剂量扫

描组, 穿刺切割针局部扫描及术后大范围扫描定为低剂量扫描组。同一病人两组图像的扫描范围一致, 常规剂量组 32 组图像扫描条件[管电压 120 Kv, 管电流为智能自动毫安秒扫描(平均 120 mAs)], 低剂量组 32 组图像扫描条件[管电压[(A 球管 140KV, B 球管 80KV), 管电流为智能自动毫安秒扫描(A 球管 8mAs, B 球管 34mAs)], 分别比较图像质量, CT 容积剂量指数(CTDIvol), 计算各组图像的有效照射剂量[剂量长度乘积(DLP)及有效剂量(ED)], 病理取材符合率。探讨低剂量双源 CT 扫描在 CT 引导下经皮肺穿刺活检术中的临床应用价值。

结果: 常规剂量组图像质量优率为 100%, 低剂量组图像优良率为 96%, 均达到诊断要求, 俩组图像质量评分及病理符合率比较差异无统计学意义 ($P>0.05$)。低剂量组图像 CTDIvol、总 DLP 结果显著低于常规剂量组, 差异具有统计学意义 ($P<0.05$), 计算俩组 ED 比较, 差异具有统计学意义 ($P<0.05$)。

结论: 低剂量双源扫描在 CT 引导下经皮肺穿刺活检术中, 低剂量扫描能够实现对辐射剂量的大幅度缩减, 但并不会导致图像质量、病理取材符合率结果受到影响, 可充分满足经皮肺穿刺需求。

PO-3277

虚拟单色光谱成像与金属伪影减少算法在 CT 引导下经皮肺活检的应用研究

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目的: 评价虚拟单色光谱成像(virtual monochromatic spectral imaging, VMSI)与金属伪影减少算法(metal artifact reduction, MAR)在 CT 引导下肺部病变穿刺活检中减少金属伪影的效果。

方法: 43 例肺部病变患者在双能 CT 引导下进行经皮肺活检。从单能图像(120kVp)和 40、74、120、140keV 的 VMSI 成像以及是否使用 MAR 算法中生成了 9 组图像。测量每组图像中穿刺针前感兴趣区域的图像噪声(standard deviation, SD)、伪影指数(artifact index, AI)和信噪比(signal-to-noise ratio, SNR)。同时采用 Likert 评分对穿刺针前图像质量进行评分, 比较各组图像质量评分及各组 SD、AI、SNR 的差异。

结果: 两名观察者的 Likert 评分一致性良好(κ 值=0.893)。与标准单能 CT 相比, 额外的 MAR 重建显著改善了种植体附近的噪声($P<0.05$)。AI 和 SNR 显著改善($P<0.05$)。高 keV-MAR 组($\geq 120\text{keV}$)的 SD、AI、SNR 均显著高于 120kVp 组和低 keV-MAR 组($<120\text{keV}$, 均 $P<0.05$)。主观评价中, 120keV-MAR 组和 140keV-MAR 组的平均 Likert 评分均在 3 以上。平均体积加权 CT 剂量指数(CTDIvol)为 9.24mGy。

结论: 采用 MAR 算法的高 keV($\geq 120\text{keV}$)虚拟单色光谱成像能有效减少肺活检针尖前的金属伪影, 提高活检针周围肺靶病灶解剖结构的清晰度。

PO-3278

虚拟单能谱成像技术联合金属伪影减少算法在能谱 CT 引导下骨活检中的应用价值

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目的: 评价能谱 CT 虚拟单能谱成像技术联合金属伪影减少算法(metal artifact reduction, MAR)在 CT 引导下骨活检中减少活检针金属伪影的应用价值。

方法: 回顾性收集 2021 年 3 月-4 月共 30 例脊柱肿瘤患者信息, 均在能谱 CT 下完成 CT 引导下骨穿刺活检。从单能图像 (120kVp) 和 40、74、120、140keV 的虚拟单能谱成像以及是否使用 MAR 算法中生成了 9 组图像。由两位观察者分别勾画并测量各组图像中骨活检针尖前方靶区的 CT 值和图像噪声, 并以皮下脂肪为参考, 计算伪影指数 (Artifact Index, AI) 和信噪比 (Signal-to-Noise Ratio, SNR)。同时对靶区附近的图像质量使用 1-5 标度评分方法 (Likert 评分) 进行主观评估。均由两位观察者进行测量和评估, 采用 Cohen κ 检验评价主观评估一致性。符合正态分布的数据使用 t 检验, 不符合正态分布的数据使用 Friedman 秩和检验。

结果: 两位观察者 Likert 评分一致性检验结果为良好 ($\kappa=0.912$)。40keV-非 MAR 组的图像噪声与 AI 值劣于 120kVp 组 ($P<0.05$)。74keV-MAR 组 SNR 与 Likert 评分优于 120kVp 组 ($P<0.05$)。120keV-MAR 组与 120kVp 组的图像噪声 (103.7 ± 58.5 vs. 123.7 ± 61.4)、AI (102.7 ± 59.2 vs. 109.7 ± 66.4) 差异无统计学意义 ($P>0.05$), SNR (10.5 ± 1.2 vs. 7.5 ± 8.9) 与 Likert 评分 (3.8 ± 0.8 vs. 1.0 ± 0.2) 的差异均有统计学意义 ($P<0.05$)。1 图像主观评价中, 120keV-MAR 组和 140keV-MAR 组两位观察者 Likert 评分的平均值均 >3 分。

结论: 能谱 CT 高 keV (140keV) 虚拟单能谱成像技术计算联合 MAR 算法可有效减少骨活检针尖前方金属伪影, 并能够提供实时精准的 CT 影像引导。

PO-3279

远桡动脉入路在肝动脉化疗栓塞中应用探索

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肝动脉化疗栓塞术 (TACE) 是治疗中晚期原发性肝癌的首选方案。经典的路径为经股动脉穿刺路径。由于股动脉较粗大, 可重复进行穿刺行 TACE 治疗, 是进行各种腔内治疗理想的穿刺入路。但是患者术后卧床、穿刺点压迫时间长, 患者舒适性差, 进食、如厕不方便、下肢深静脉血栓形成风险高、穿刺点并发症多等缺点, 我们尝试经上肢远桡动脉入路行 TACE 治疗, 旨在探索经远桡动脉入路行肝动脉化疗栓塞术的可行性、安全性。

PO-3280

肝动脉灌注化疗对比全身化疗方案治疗不可切除胆管癌: 一项单中心回顾性研究

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肝动脉灌注化疗对比全身化疗方案治疗不可切除胆管癌: 一项单中心回顾性研究

背景: 由于目前一线化疗方案的疗效有限, 需要新的治疗策略来改善晚期不可切除胆管癌 (CCA) 患者的预后。尽管肝动脉灌注化疗 (HAIC)、化疗和程序性细胞死亡蛋白-1 (PD-1) 抑制剂在晚期肝细胞癌治疗中的应用已被广泛评价, 但它们在晚期 CCA 中的作用尚不清楚。本研究的目的是比较 HAIC 对比化疗方案治疗晚期不可切除 CCA 的疗效和安全性。

方法: 选取 2019 年 3 月至 2022 年 6 月在我院接受 HAIC 和化学治疗的晚期 CAA 患者, 记录临床资料并进行随访。根据无进展生存期 (PFS) 和肿瘤反应评价疗效, 根据不良事件 (AE) 发生率评价安全性。

结果：98 例晚期 CCA 患者分为 HAIC 组 (n=61) 和化疗组 (n=37)。中位随访时间 22.0 (14.5~34.5) 个月。HAIC 组的 PFS (HR=0.797; 95%CI 为 0.478 ~ 1.330; P=0.330) 与化疗组无明显差异。两组的客观有效率和疾病控制率也无显著性差异。与化疗组相比, HAIC 组发生白细胞减少 (65.6% vs. 32.4%, p=0.001) 和转氨酶升高 (60.7% vs. 27%, p=0.001) 的比例更高, 同时 3-4 级 AE 的发生率无明显差异, 但 HAIC 组中有 2 名患者 (3.3%) 发生了 5 级免疫介导性肺炎。进一步的分层分析提示了 HAIC 联合 PD-1 抑制剂 (n=26) 对比化疗联合 PD-1 抑制剂 (n=28) 能取得更高的 PFS (HR=0.414; 95%CI 为 0.200 ~ 0.856; P=0.005)。

结论: HAIC 治疗晚期 CCA 安全、耐受性好, 与化疗相比在延长 PFS 方面具有非劣效性。同时加入 PD-1 抑制剂可提高 HAIC 的疗效, 并显示出优于化疗方案的疗效。因此, HAIC 联合免疫治疗有可能成为晚期 CCA 的一种治疗选择。

关键字: 不可切除胆管癌; 肝动脉灌注化疗; PD-1 抑制剂; 全身化疗

PO-3281

恶性梗阻引流前后的胆道微生物群组成研究

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目的 探索恶性梗阻引流前后的胆道微生态改变, 旨在从微生态的角度研究胆道梗阻与引流干预对胆汁微生物群的影响。

方法 2021 年 5 月至 2023 年 3 在我科进行经皮胆道引流 (PTCD) 的恶性胆道梗阻患者 27 例, 记录并整理患者一般资料, 患者是否发生急性胆管炎及严重程度、是否需要使用抗生素进行治疗等。DSA 下行 PTCD, 22G 引流针进入胆道并经造影确认位于肝内胆管内后, 然后抽取 10ml 胆汁送检验科培养; 然后经导丝植入内外引流管; 7 天后经外引流管抽取胆汁送检验科培养。

结果 27 例患者中: 胆管细胞癌 15 例, 胰腺癌 7 例, 肝门淋巴结转移瘤 5 例 (4 例胃肠道肿瘤和 1 例乳腺癌)。引流前胆汁微生物群中伯克霍尔德菌属、不动杆菌属、假单胞菌属和葡萄球菌属的相对丰度高, 分枝杆菌属和诺卡迪氏菌属相对丰度低。内外引流后胆汁样本中葡萄球菌、克雷伯氏菌、肠杆菌、气单胞菌、副球菌、厌氧球菌、双球菌、弯曲杆菌、巨杆菌等丰度升高, 其他微生物多样性与均匀度均降低。

结论 引流后胆汁内特征性细菌属有芽孢杆菌属、链球菌属、葡萄球菌属和克雷伯氏菌属, 可能抑制胆道内其他细菌的生长, 导致正常胆道微生物群落的物种多样性减少。这种胆道菌群失调可为胆道引流后患者更容易发生胆道感染的临床现象提供解释。

PO-3282

基于磁共振纹理分析预测结直肠癌肝转移瘤 TACE 术后早期疗效的研究

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目的: 探讨基于磁共振纹理分析在结直肠癌肝转移瘤经 TACE 术后早期疗效预测中的价值。

方法: 回顾性收集我院 2014 年 2 月至 2021 年 12 月经影像学或者病理学方法确诊的 70 例结直肠癌肝转移瘤的患者。根据病变大小的变化将病变分为有反应组和无反应组。纹理分析由两名放射科

医生在 T2 加权图像上进行量化,他们对在病变的最大横截面积上手动绘制的感兴趣区域达成共识。提取了五个直方图特征(均值、方差、偏度、峰度和熵 1)和五个灰度共生矩阵特征(GLCM、ASM、熵 2、对比度、IDM)。对纹理参数进行统计分析以确定两组之间的差异,随后使用多变量 logistic 回归分析测试区分有反应组与无反应组的潜在预测参数。

结果:总共评估了 52 个有反应和 18 个无反应的病灶。较高的方差、熵 1、对比度、熵 2 和较低的 ASM、相关性、IDM 与对 TACE 的良好反应独立相关($P<0.05$),ROC 曲线下面积(AUC)为 0.602-0.624。当使用多变量 logistic 回归分析进行测试时,方差($P<0.001$)和 ASM($P=0.001$)仍然是区分有反应病变和无反应病变的潜在预测值。来自方差和 ASM 关联的预测变量的最高 AUC 为 0.714。

结论:术前 T2 图像上的 MR 纹理分析有可能预测结直肠癌肝转移瘤经 TACE 术后的早期疗效。

PO-3283

罕见 Meso-Rex 分流术后血栓形成行经颈静脉肝内门体分流术一例

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患者男,25岁,因“呕血、黑便10余年,再发2周”入院。患者2001年因外伤行全脾切除术,2013年无明显诱因出现呕血、黑便,出血量不详,遂至北京协和医院诊治,完善相关检查后诊断为“门静脉高压”,后行“门静脉断流术”,术后患者病情好转出院。2019年患者再次出现呕血、黑便,遂至北京清华长庚医院住院治疗,住院期间行“Meso-Rex 分流术”,术后规律服用“利伐沙班 20mg QD”抗凝。2023年2月24日患者再次出现呕血1次,呈鲜红色,量约20ml,解黑便1周,大便成形,2-3次/天,每次量约50ml,遂停用利伐沙班,再次至北京长庚医院就诊,医院考虑支架内血栓形成,行支架再通难度大,未进一步手术治疗,对症处理后患者症状好转,大便转黄。后患者为求进一步诊治,遂于2023年3月10日至我院消化内科就诊。入院完善全腹CT平扫+增强+三维重建示:门静脉主干及门脉左支内见支架,上份中央见条状对比剂充填、边缘及远端未见对比剂,血栓形成可能;食管、胃底静脉曲张;肝门区多发迂曲血管,考虑门脉海绵样变表现;腹膜后、脊柱旁多发侧枝血管形成。患者入院后于2023年3月15日行胃镜检查,检查示:1.食道静脉曲张(重度),行食道静脉套扎术;2.门脉高压性胃病伴胆汁返流。术后患者一般情况良好,未再发呕血、黑便,消化内科联系我科会诊,查看患者并评估患者情况后,与患者及家属积极沟通后,于2023年3月16日转入我科,每日予患者低分子肝素钠注射液4250IU Q12h。积极完善患者术前评估,于2023年3月23日行“经颈静脉肝内门体分流术+门静脉取栓术”。

PO-3284

TEG-PM 指导下的抗凝抗血小板治疗与经验性抗凝治疗在肝硬化患者 TIPS 术后支架失功能中的关系的研究

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目的:探讨肝硬化患者行覆膜支架植入术后在血栓弹力图血小板图(thromboelastography-plateletmapping,TEG-PM)检测指导下行抗凝抗血小板治疗与支架失功能的关系。方法:纳入2022年1月至2023年8月昆明医科大学第一附属医院收治的肝硬化行TIPS术的患者60例,将患者随机分为A组30例,B组30例。A组患者在行TIPS术后予以经验性抗凝治疗,B组所有患者均行抗凝及

抗血小板治疗,并使用 TEG-PM 进行检测并及时调整药物使用方案及剂量。比较两组患者 TIPS 术后 1 个月, 3 个月, 6 个月及 1 年支架失功能的发生率。结果: B 组患者 TIPS 术后 1 个月, 3 个月, 6 个月及 1 年支架失功能的发生率明显低于 A 组的患者。结论: TEG-PM 指导下的抗凝抗血小板治疗相比于经验性抗凝能明显延缓肝硬化患者 TIPS 术后支架失功能的时间, 且安全可行,临床应用时应根据患者个体化选择,并检测其指标变化,及时调整用药。

PO-3285

基于肾血管平滑肌脂肪瘤瘤体成分预测经动脉栓塞术后早期疗效

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【摘要】目的 基于肾血管平滑肌脂肪瘤(Renal Angiomyolipoma,RAML)瘤体成分预测经肾动脉栓塞术(Selective arterial embolization,SAE)早期疗效,探究 SAE 术后早期疗效与肿瘤成分的关系。方法 收集 2019 年 8 月 1 日至 2023 年 04 月 1 日临床确诊为 RAML 患者 23 例,均行 SAE 治疗,于术前、术后行增强 CT 检查。比较患者术前肿瘤总体积(TVSAE 前)、术后肿瘤总体积(TVSAE 后)、得出瘤内总脂肪体积收缩值(FVSAE 前-FTVSAE 后)、非脂肪体积收缩值(NFVSAE 前-NFTVSAE 后),利用非参数检验比较术前、术后体积差异性,采用 pesrson 相关分析各肿瘤成分初始体积与肿瘤体积减少率的关系,采用多元线性回归分析探讨的肿瘤体积减少率影响因素。结果 本组研究 SAE 术后肿瘤体积(TV)、脂肪体积(FV)、非脂肪体积(NFV)显著缩小($P<0.01$),术后脂肪体积(FV)占比增加,非脂肪体积(NFV)占比减小($p<0.05$);术后肿瘤体积缩小值与肿瘤成分体积、破裂存在相关($p<0.05$);在多因素回归分析中,非脂肪成分体积占比为肿瘤体积减小的独立险因素。结论 肾血管平滑肌脂肪瘤经 SAE 治疗后 NFV 占比减小,术前对 NFV 占比的测量有助于预测术后肿瘤体积缩小率,评估患者术后早期疗效。

PO-3286

部分脾动脉栓塞术治疗肝细胞癌伴脾功能亢进对肝储备功能的影响

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目的 探讨部分脾动脉栓塞术(partial splenic arterial embolization, PSE)对肝细胞癌(hepatocellular carcinoma, HCC)合并肝硬化伴脾功能亢进患者肝储备功能的影响。方法 收集 2019 年 5 月至 2022 年 8 月在北京清华长庚医院收治 11 例接受 PSE 治疗的肝细胞癌伴肝硬化脾功能亢进患者临床资料,分析术后吲哚菁绿 15 min 滞留率(ICG-R15)、肝脏硬度(LSM)、胆碱酯酶(CHE)、血常规及肝功能变化。结果 ①PSE 术后 3 月 ICG-R15 显著降低,较术前差异有统计学意义($P<0.05$);术后 LSM 下降,较术前差异不具有统计学意义($P>0.05$);术后 CHE 升高,较术前差异不具有统计学意义($P>0.05$)。②PSE 术后 3 月 WBC、PLT 较术前明显升高,差异具有统计学意义($P<0.05$);RBC 较术前无明显变化($P>0.05$)。③PSE 术后 3 月 TBIL、ALB、ALT、AST、PT 较术前无明显变化($P>0.05$)。结论 PSE 治疗肝细胞癌合并肝硬化伴脾功能亢进患者术后对肝储备功能有改善作用。

PO-3287

CMR 对 TIPS 术后心脏结构的影响

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目的：经颈静脉肝内门体分流术(TIPS) 是一种血管内介入手术，通过在肝实质中建立分流道，从而将血液重新引导至体循环，从而减轻门静脉循环中的压力。随后中心血容量增加的确切心脏后果尚不清楚。心脏磁共振 (cardiac magnetic resonance, CMR) 具有多参数、多序列的优势，已实现了对心脏形态、功能、组织、灌注、血流等的“一站式”检查，日益成为多种心血管疾病诊治不可或缺的无创影像学检查方法。

方法：收集 40 名符合 TIPS 手术指征的患者在 TIPS 术前、术后一天、术后一个月、术后三个月、术后六个月分别行 CMR 评估。

结果：1.术后一天及术后一月心输出量相比术前显著增加，但在三个月至六个月，心输出量下降并接近到基线；2.术后一天、术后一个月、术后三个月、术后六个月肺毛细血管楔压均明显高于术前；3. 术后一天、术后一个月、术后三个月、术后六个月各心腔容量均高于术前。

结论：在无明显心脏疾病史的患者中，TIPS 术后心脏前负荷增加，并导致所有心腔容积增加,而在随访期间未导致心脏损害。

PO-3288

融合技术对判断颅内动脉瘤破裂出血责任动脉瘤的诊断价值

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目的：本论文旨在研究融合技术对判断颅内动脉瘤破裂出血责任动脉瘤的诊断价值。**方法：**回顾性分析 2022 年 6 月至 2023 年 9 月急诊入院 42 例颅内动脉瘤破裂出血的患者，随机抽取 29 例患者进行对比。患者在首次出血后均行头颅 CT，并行全脑血管造影。术中，使用 Siemens Artis Zee 设备行 5s-DSA，确定单个或多个颅内动脉瘤所处位置及与毗邻血管的关系。将术前头颅 CT 通过锐珂系统传输到 3D 工作站，进行头颅 CT 与 Mask 像骨性标志对位后，将显示出血、血肿部位的头颅 CT 与显示载瘤动脉的 5s-DSA Sub 像融合，选择(2+1MPR),通过 CT 的不同层面积血、血肿准确判断颅内动脉瘤破裂出血的责任动脉瘤。**结果：**在 29 例患者中,男性 10 例，女性 19 例，年龄范围在 (61.2±6.2)岁(40~75 岁)。CT 检查提示为自发性 SAH，其中积血明显的部位位于前纵裂池 11 例，鞍上池 18 例，外侧裂池 9 例，桥前池、脚间池 2 例，脑室 4 例，额叶血肿 2 例。DSA 提示 29 例患者中，20 例为单发颅内动脉瘤,9 例为颅内多发动脉瘤。在 20 例单发颅内动脉瘤患者中，动脉瘤位置分别为：前交通动脉 9 例，后交通动脉 7 例，大脑中动脉 4 例，基底动脉 0 例。在 9 例颅内多发动脉瘤患者中，责任动脉瘤位于前交通 2 例，后交通动脉 3 例，大脑中动脉 2 例，基底动脉 2 例，未破裂动脉瘤位于前交通动脉 2 例，后交通动脉 4 例，大脑中动脉 3 例，基底动脉 0 例，小脑后下动脉 1 例。除 1 例出血量较少，其余 28 例患者积血显著部位与责任动脉瘤位置相符。**结论：**术中，单发颅内动脉瘤患者进行全脑血管造影后，可对其责任动脉瘤进行明确的判断、诊治。单个颅内动脉瘤破裂常会产生多部位积血，这对于多发动脉瘤患者判断其责任动脉瘤产生困扰。若仅凭既往经验及瘤体形态不规则判断责任动脉瘤进行栓塞，并不严谨。通过头颅 CT 与 5s-DSA 的融合，可以更客观、准确、直观的判断责任动脉瘤，术中及时进行栓塞，防止再破裂出血，有效降低死残率。

PO-3289

MRI 引导肝癌射频消融治疗的临床应用研究

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目的 肝癌射频消融治疗术为临床局部治疗靶区癌变组织的最有效方法,因具有微创、安全性好、副作用少等优点目前已成为临床首选治疗方式。探讨 MRI 在肝癌射频消融治疗过程中定位及引导中的应用安全性、可行性及临床应用价值。

方法 回顾性分析本院符合纳入及排除标准的 16 例肝癌(原发和转移)患者。患者应用 MRI 引导进行肝癌病灶定位并完成射频消融治疗,术前定位及术中引导均应用 MRIT1WI-TFE 序列(TR 10ms、TE 2.3ms),自由呼吸下屏气扫描,观察定位针的准确性及消融范围,直至消融范围包括病灶边缘。T1 序列在监控消融过程的同时可以提供较清晰的解剖图像,可为治疗带来更好的准确性和安全性。RFA 术后均立即进行常规 MRI 肝脏扫描,能够通过 T1WI、T2WI 动态增强及扩散加权成像等方式作为肝癌的确定性诊断及术后随访,ADC 测量能够更加准确定性辨别残留、复发的肿瘤组织,即时评价肿瘤消融情况及并发症发生情况。术后半年为一周期磁共振复查记录观察肿瘤控制情况和生存率。

结果:患者全部定位消融成功,虽然 MRI 引导肝脏 RFA 是一种极微创治疗,但多次反复调整穿刺针的方向、深度等操作仍存在一定的损伤及相应的并发症,术后出血患者 2 例,气胸 1 例。所有患者一次完全消融率达 73.08%;7 例肿瘤长径大于 5.0cm 者均实行分时段分步消融治疗,其中 3 例病灶术后仍有肿瘤组织残留,最终完全消融率为 88.46%,在治疗前后消融灶及其过渡部位的 ADC 值与治疗前相比差异均有统计学意义,记录所有病灶四年局部控制率分别为 87.20%、69.93%、48.14%、24.77%。

结论 核磁共振技术组织分辨率高,多序列、多方位成像,获得的诊断信息丰富。MRI 引导肝癌射频消融术是一种定位准确、操作安全、无辐射损伤的微创治疗方法,大部分患者可以获得较好的局部肿瘤控制效果并延长生存期,是一种临床操作安全可靠的局部肺肿瘤治疗方法。

PO-3290

主动脉根部解剖参数对经导管主动脉瓣置换术后瓣周漏的预测价值

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目的:探讨重度主动脉瓣狭窄患者行经导管主动脉瓣置换术后发生瓣周漏的危险因素,明确相关危险因素对 TAVR 术后 PVL 的预测价值。

资料和方法:连续性纳入自 2017 年 7 月至 2021 年 10 月在南昌大学第二附属医院及江西省人民医院心内科接受 TAVR 手术治疗的 AS 患者。依据出院前经胸超声心动图结果,将患者分为无 PVL 组及 PVL 组,其中 PVL 组又包括轻度 PVL 组和中/重度 PVL 组。比较三组患者的术前基线临床特征、术前超声特征、术中数据及术前主动脉根部 CTA 测量指标之间的差异,采用多因素 Logistic 回归模型筛选 TAVR 术后发生 PVL 的独立危险因素,并用 ROC 曲线分析各危险因素对 TAVR 术后发生 PVL 的预测价值,通过计算约登指数得出相关预测因素的最佳截断值。

结果:共纳入 128 例患者,平均年龄为 71.29 ± 6.72 岁,男性占比 57.8%。62 例患者行 TAVR 术后发生了 PVL, PVL 的发生率为 48.5% (62/128),包括 31.3% (40/128) 的轻度 PVL 和 17.2% (22/128) 的中/重度 PVL。单因素分析及多因素分析结果显示 BAV、主动脉瓣钙化总体积、瓣膜支架置入深度是 TAVR 术后发生 PVL 的独立危险因素。ROC 曲线分析显示 BAV、主动脉瓣钙化总体积及瓣膜支架置入深度均对重度 AS 的患者行 TAVR 后是否发生 PVL 有预测价值。当主动脉

瓣钙化总体积大于 863mm³时, 预测 TAVR 术后发生 PVL 的敏感度为 80.65%, 特异度为 74.24%; 而瓣膜支架置入深度大于 9.6mm 时, 预测 TAVR 术后发生 PVL 的敏感度为 74.19%, 特异度为 86.36%。

结论: BAV、主动脉瓣钙化总体积及瓣膜支架置入深度是重度 AS 患者行 TAVR 术后发生 PVL 的独立危险因素, 对预测术后 PVL 的发生具有一定价值。

PO-3291

介入栓塞术与开颅夹闭术对颅内动脉瘤患者预后的影响比较

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摘要, 目的: 对比颅内动脉瘤介入栓塞术与颅内动脉瘤夹闭术两种手术方式治疗颅内微小动脉瘤的疗效, 为临床医师的诊断和治疗提供指导及帮助, 方法: 选择 70 例符合要求的颅内微小动脉瘤患者, 将 70 例患者分成 30 例(30 个动脉瘤)夹闭手术和 40 例(40 个动脉瘤)介入栓塞治疗两组, 对比两组患者年龄、性别、术后即刻闭塞率、出院情况等资料、将两组病人手术中和手术后的并发症发病率、总治疗时间的差异, 两组患者的总住院费用, 手术操作时间, 和 6 个月的随访结果进行对比。结果: 30 例采用开颅夹闭治疗的颅内微小动脉瘤中, 25 例预后良好, 5 例预后不良; 44 例采用血管内介入治疗的颅内微小动脉介入组中 43 例预后良好, 占比 97.7%, 仅 1 例预后不良。结论: 介入手术时间短、恢复快, 创伤小, 并发症发病率更低。

PO-3292

CT 引导下不同消融方式在肺结节中的疗效对比研究

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【摘要】目的 在 CT 引导下利用不同参数进行对肺结节进行消融, 探索消融肺结节的最佳方式及参数。**方法** 取直径 1.0cm 以下肺结节 20 例, 随机分为 3 组, 分别以不同参数进行激光消融、微波消融。消融过程中进行 CT 扫描, 观察消融灶及消融区域低密度带。**结果** 肺结节消融侧得到典型的中心空化区, 周围碳化区, 最外带为凝固坏死区的类圆形消融灶。消融后观察消融区域, 每组共获得 20 个消融灶。所有入组肺结节消融后获得典型的中心空化区, 周围碳化区, 最外带为凝固坏死区的类圆形消融灶。A 组激光消融灶平均半径 (1.10±0.35) cm; 空化区平均半径 (0.30±0.15) cm; 碳化区平均宽度 (0.30±0.10) cm; 凝固坏死区 (0.50±0.20); B 组微波消融灶平均半径 (1.20±0.30) cm; 空化区平均半径 (0.20±0.05) cm; 碳化区平均宽度 (0.25±0.10) cm; 凝固坏死区 (1.20±0.30) C 组射频消融灶平均半径 (1.25±0.35) cm; 空化区平均半径 (0.35±0.15) cm; 碳化区平均宽度 (0.30±0.10) cm, 凝固坏死区 (1.25±0.35)。消融的气胸率分别为 70%、90%和 100%。**结论** 消融可产生一个局限而稳定的消融灶。使用消融的方法可快速、安全、有效。

PO-3293

伴门静脉癌栓肝细胞肝癌经 FO-HAIC 治疗后的生存预后模型研究

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背景: 临床实践中, 接受 FO-HAIC 治疗的伴门静脉癌栓肝细胞肝癌患者个体疗效差异较大, 如何筛选获益人群亟待解决。**目的:** 探索构建接受 FO-HAIC 治疗的伴门静脉癌栓肝细胞肝癌患者的生存预后模型。**方法:** 回顾性分析了 283 例接受 FO-HAIC 治疗的伴门静脉癌栓肝细胞肝癌患者, 随机分配至训练队列 (143 名) 和验证队列 (140 名)。通过单因素和多因素 Cox 回归分析, 在训练队列中筛选影响生存预后的独立危险因素。基于多因素 Cox 回归分析, 建立生存预后模型, 将目标群体进行预后风险分层。同时, 构建列线图预测患者 6 个月、1 年、2 年生存率, 列线图的区分度和一致性使用 AUROC 值、C-指数及校准曲线进行评估。**结果:** 本研究最终构建预后模型为 “SSAFE-score=0.617*SC +0.501*SD+0.556*ALBI score +0.682*AFP+0.523*肝外转移”, 以 0.56 (第三个四分位数) 作为 cut-off 值, 可以将验证组、总体样本、Vp3 型、Vp3/4 型门静脉癌栓肝细胞肝癌患者进行预后风险分层。基于多因素 Cox 回归分析构建列线图模型, 预测 FO-HAIC 治疗后的伴门静脉癌栓肝细胞肝癌患者的 6 个月、1 年、2 年生存率, 训练队列预测患者 0.5 年、1 年、2 年 AUROC 值分别为 0.72、0.72、0.81, 验证队列预测患者 0.5 年、1 年、2 年 AUROC 值分别是 0.60、0.57、0.64。训练队列和验证队列的一致性指数分别是 0.67 和 0.59。校准曲线显示列线图预测生存结果和患者实际生存时间具有较好的一致性。

结论: 本研究构建的 SSAFE-score 预后预测模型及列线图预后预测模型可以对接受 FO-HAIC 治疗的伴门静脉癌栓肝细胞肝癌患者进行预后风险分层及个体化预后评估。

PO-3294

早期 TIPS 可以使乙肝肝硬化食管胃底静脉曲张破裂出血患者获益

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背景 食管胃底静脉曲张破裂出血是肝硬化患者严重的并发症, 内镜治疗是目前主要的一线治疗方案, 对于内镜治疗失败的患者, 建议使用经颈静脉肝内门体分流术 (TIPS) 作为挽救治疗。然而, 挽救治疗通常难度大, 耗时长, 早期 TIPS 是否可以使患者获益尚且存在争议。

方法 本研究回顾性纳入 2017 年 1 月至 2022 年 6 月于中南大学湘雅医院放射介入中心行 TIPS 的乙肝肝硬化食管胃底静脉曲张破裂出血患者, 通过电子病历系统收集患者的人口统计学数据, 相关检验检查数据, 根据患者行 TIPS 术的时间分为早期 TIPS 组及晚期 TIPS 组, 采用倾向性匹配分析比较两组患者的手术成功率, 术后并发症及预后情况。

结果 本研究最终共纳入 139 例乙肝肝硬化食管胃底静脉曲张破裂出血的患者, 其中早期 TIPS 患者 52 例, 晚期 TIPS 患者 87 例。进行 1:1 倾向性匹配后, 每组均纳入了 49 例患者。早期 TIPS 组的患者术后 6 周内的死亡率 (6.1% vs 16.3%, $P=0.118$) 及 1 年内死亡率 (6.2% vs 20.4%, $p=0.041$) 均低于晚期 TIPS 组。两组的手术成功率相似 (98.0% vs 93.9%, $P=0.307$), 早期 TIPS 组与晚期 TIPS 组术后并发症的发生率无明显差异 (22.4% vs 26.5%, $P=0.638$)。早期 TIPS 组患者术后出现 2 种并发症的发生率低于晚期 TIPS 组 (6.1% vs 18.4%, $P=0.064$)。

结论 相比于传统的内镜治疗, 尽早进行 TIPS 手术可以延长乙肝肝硬化食管胃底静脉曲张破裂出血患者的生存, 且不会增加术后并发症的发生。

PO-3295

抗血小板药物基因检测与血栓弹力图血小板图在颅内动脉瘤支架置入治疗中的应用研究

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目的 分析 IAs 行支架治疗患者抗血小板药物相关基因检测与 TEG-PM 对抗血小板药物疗效评价的关系, 探讨二者在 IAs 患者术后抗血小板治疗中的应用价值。**方法** 收集 2019 年 1 月至 2022 年 8 月行支架治疗 IAs 的 106 例患者, 所有患者均行抗血小板药物相关基因检测, 部分患者行 TEG-PM 检测, AA% < 50% 判定为阿司匹林疗效不足; ADP% < 30% 判定氯吡格雷疗效不足, 分为 A、B 两组, A 组 (基因检测组) 根据阿司匹林及氯吡格雷相关基因检测结果进行用药方案调整。B 组 (联合组): 根据基因检测及 TEG-PM 检测结果进行用药方案调整。**结果** 1. 一般资料 106 名患者, 共治疗 123 个 IAs, 总体平均年龄 53.67 ± 6.66 岁, 女性 67 例。将患者分为 A 组 (41 例), B 组 (65 例), 两组患者基线资料及 IAs 情况、术中使用支架类型差异无统计学差异。两组用药方案选择差异无统计学意义。2. 两种检测方式对抗血小板用药疗效评价的关系 65 名患者基因检测结果示阿司匹林基因抵抗仅 2 例, 而 TEG-PM 显示 AA% < 50% 却有 16 例; 氯吡格雷基因抵抗有 20 例, 而 TEG-PM 显示 ADP% < 30% 却有 27 例。采用 Cohen's kappa 系数分析评估二者检验结果一致性示二者在评估阿司匹林疗效方面一致性较差, 评估氯吡格雷疗效二者间一致性一般。3. 抗血小板治疗相关并发症情况 A 组有 2 名患者出现缺血性并发症, 均采用方案 1; B 组无缺血性事件发生。A 组各有 2 例患者出现出血性并发症, 分别采用方案 3、方案 2; B 组 4 例患者出现出血性并发症, 分别采用方案 1、方案 1、方案 3 和方案 2。两组抗血小板治疗相关并发症发生率差异无统计学意义。**结论** 1. TEG-PM 反应的抗血小板治疗效能较抗血小板药物相关基因检测全面。2. TEG-PM 检测对颅内动脉瘤支架植入后抗血小板聚集治疗方案具有基础的指导作用, 抗血小板药物相关基因检测可作为原因检测的重要补充。3. 以 TEG-PM AA% < 50% 和 ADP% < 30% 分别作为判定抗血小板治疗疗效截断值指导并调整治疗具有临床可行性。

PO-3296

IVIM 评估下肢动脉硬化闭塞症 EVT 术后骨骼肌微循环动态变化及再狭窄的价值

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目的: 探讨体素内不相干运动扩散加权成像 (IVIM-DWI) 在评价下肢动脉硬化闭塞症 (ASO) 患者行腔内治疗 (EVT) 前后患肢小腿骨骼肌微循环灌注状态变化及再狭窄的诊断价值。**方法:** 共纳入患者 69 例, 患肢 82 例, 收集患者一般资料、罗斯福分级与踝肱指数 (ABI)、趾肱指数 (TBI)、经皮氧分压 (TcO₂)。采用多 b 值 DWI 序列获取下肢 ASO 患者于 EVT 术前及术后随访各时间点 (1、3、6 个月) 患肢小腿骨骼肌的 IVIM-DWI 各定量参数伪彩图及 ROIs 参数值, 包括真实扩散系数 (D)、灌注相关扩散系数 (D*) 和灌注分数 (f)。对术前 IVIM-DWI 各参数、ABI、TBI、TcPO₂ 与罗斯福分级进行相关性分析; 将下肢 ASO 患者分为轻中重组, 分析各亚组 D 值及 ABI 间差异及变化趋势。分析术前及术后随访各时间点各 ROIs 的 IVIM-DWI 各参数间差异及变化趋势。根据术后 6 个月时 CTA 评估结果及罗斯福分级分为 ABCD 组, 比较各时间点各亚组 D 值及 ABI 的差异及变化趋势。对 A 组 (经 CTA 评估再狭窄且罗斯福分级升级) 的 D 值、ABI 进行 ROC 分析, 获取截断值并计算曲线下面积。

结果: 术前所有 ROI 的 D 值、ABI 与罗斯福分级呈负相关 ($P<0.05$), ROI3 的 D*值与罗斯福分级呈负相关 ($P<0.05$)。轻中重组患者各 ROIs 的 D 值及 ABI 有显著差异 ($P<0.05$); 罗斯福等级越高, D 值越小 ($P<0.05$), ABI 越小 ($P<0.05$)。术后 1、3 月的各 ROIs 的 D 值、D*值、f 值均高于术前 ($P<0.05$)。A、B、C 组的 D 值与 ABI 在术后随访各时间点有显著差异 ($P<0.05$); 术后 6 月的 D 值与 ABI 明显小于术后 1 月及术后 3 月 ($P<0.05$); C 组术后 3 月的 ABI 高于术后 1 月 ($P<0.05$)。对 A 组进行 ROC 分析, D 值及 ABI 的 AUC 分别为 0.918、0.761, 截断值分别为 $1.31\times 10^{-3}\text{mm}^2/\text{s}$ 、0.79。

结论: IVIM-DWI 定量参数动态监测骨骼肌微循环状态较 ABI 可以更好地评价下肢 ASO 患者 EVT 疗效; 其中 D 值对 EVT 后 6 个月再狭窄情况具有鉴别价值, 相比 ABI 有更高的灵敏度和特异度。

PO-3297

3D-DSA 实时导航技术在颅内动脉瘤栓塞治疗中应用价值的研究

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目的 探讨 3D-DSA (三维数字减影血管造影) 实时导航技术在颅内动脉瘤栓塞治疗中的应用价值。
方法 回顾分析 23 例 3D-DSA 实时导航和 37 例 2D-DSA 路径图 (roadmap) 技术两种导航方式下动脉瘤介入栓塞术的手术时间、透视时间、辐射剂量和造影剂用量。
结果 本组 60 例患者共检出 60 个动脉瘤, 其中颈内动脉瘤 12 个, 大脑中动脉瘤 17 个, 大脑前动脉瘤 29 个, 大脑后动脉瘤 2 个。3D-DSA 实时导航和 2D-DSA 路径图两种导航方式下手术时间、透视时间、辐射剂量和造影剂用量对比。对 23 例 3D-DSA 实时导航及 37 例 2D-DSA 路径图技术两种导航方式下颅内动脉瘤栓塞术的手术时间及透视时间, 辐射剂量及造影剂用量进行统计分析, 前者手术时间及透视时间均较后者短, 辐射剂量亦较后者低, 有统计学意义 ($p<0.05$), 但是二者造影剂使用量无统计学差异 ($p=0.21$)。
结论 3D-DSA 实时导航技术在颅内动脉瘤栓塞治疗中具有较高的应用价值和意义。

PO-3298

Angiojet 机械血栓抽吸术治疗亚急性下肢动脉缺血的初步观察

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目的: 探讨 Angiojet 机械血栓抽吸术治疗亚急性下肢动脉缺血的临床效果。

方法: 回顾性分析 2019 年 1 月至 2022 年 1 月期间我科收治的 22 例亚急性下肢缺血患者的临床资料 (下肢动脉栓塞 9 例、血栓形成 13 例, 4 例双侧受累), 其中男性 21 例、女性 1 例, 年龄 38~79 岁, 发病时间 14~60 天, 病变长度平均 36~544mm; Rutherford 分级 2 级 3 例, 3 级 4 例, 4 级 11 例, 5 级 3 例, 6 级 1 例。所有患者均首先采用 AngioJet 喷射模式, 于病变部位喷射溶栓药物 (30~50 万 U 尿激酶溶于 0.9%氯化钠溶液 30~50 mL), 20 min 后应用 AngioJet 进行机械血栓抽吸, 抽吸完成后即刻造影, 根据结果采用导管抽吸或血管成形术治疗。

结果: 在接受初始血管造影过程中, 导丝均能通过病变部位, Angiojet 导管抽吸平均时间 (171.6 ± 83.0) S。初次抽吸后造影结果: 1 条肢体成功 (血栓清除率 $>95\%$), 23 条肢体部分成功 ($50\% < \text{血栓清除率} < 95\%$), 2 条肢体失败 (血栓清除率 $< 50\%$)。13 例联合 Guiding 导管抽吸 (单纯使用 6F 系统 3 例, 单纯使用 8F 系统 7 例, 6F+8F 系统 3 例), 17 例应用球囊扩张, 2 例置入金属裸支架。所有患者均获得技术成功, 患肢缺血症状均得到不同程度改善, 术中无穿刺点大出血、重要脏器出血等严重并发症。所有患者术后均出现一过性肌红蛋白尿, 4 例出现患肢麻木, 1 例肢体肿胀, ABI 较前明显改善 (0.93 ± 0.15 vs 0.25 ± 0.31 , $P<0.05$)。随访 12 个月, 3 例患者因缺血

症状加剧再次入院, 1 例患者术后第 4 天因出血性脑梗死抢救无效死亡, 1 例肢体远端坏死截肢。其余患者在随访期间内均无明显下肢缺血症状。

结论: AngioJet 治疗亚急性下肢缺血是一种安全有效方法, 配合导管抽吸和血管成形术, 可有效恢复下肢血流, 有较好的临床应用价值。

PO-3299

基于多层螺旋 CT 灌注成像进展期胃癌经胃动脉化疗 栓塞术前血流状态变化的初步研究

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目的: 探讨运用低剂量 CT 灌注成像前瞻性评价经胃动脉化疗栓塞术治疗胃癌的疗效。方法: 收集 2017 年 1 月~2022 年 6 月于我院经胃镜病理证实且未接受抗癌治疗的贲门癌 (17 例) 及非贲门癌 (17 例) 患者共 34 例, 均于术前 3 天内及术后一个月对其行 MDCT 灌注成像。采用 t 检验比较两组的术前及手术前后各自组别内灌注参数、肿瘤体积、栓塞胃动脉直径有无统计学差异。结果: 手术前后肿瘤体积分别为 $55.64 \pm 33.81 \text{cm}^3$ vs $33.87 \pm 36.12 \text{cm}^3$, 手术前后栓塞胃动脉直径分别为 $0.29 \pm 0.08 \text{cm}$ vs $0.25 \pm 0.07 \text{cm}$ 。三处 ROI 的手术前后测量值分别为: BF 值 ($\text{mL} \cdot \text{min}^{-1} \cdot 100 \text{g}^{-1}$) 38.09 ± 24.61 vs 26.3 ± 16.08 , PEI 值 ($\text{mL} \cdot \text{min}^{-1} \cdot 100 \text{g}^{-1}$) 40.43 ± 33.98 vs 30.53 ± 14.50 , TTP 值 (s) 25.47 ± 15.42 vs 24.95 ± 13.59 , BV 值 ($\text{mL}/100 \text{g}$) 13.85 ± 10.55 vs 9.72 ± 7.63 。比较贲门癌组较非贲门癌组有更高的血流量 (BF)、血容量 (BV)、强化峰值 (PEI), 更短的达峰时间 (TTP), 其差异有统计学意义 ($t=4.18$, $t=4.39$, $t=3.63$, $t=5.11$, 均 $P<0.05$); 胃动脉化疗栓塞前后栓塞动脉直径、强化峰值 (PEI)、达峰时间 (TTP) 无统计学差异 ($t=1.52$, $t=1.97$, $t=25.46$, 均 $P>0.05$), 但是肿瘤体积、血流量 (BF)、血容量 (BV)、有显著统计学差异 ($t=5.53$, $t=2.95$, $t=3.20$, 均 $P<0.05$)。结论: 低剂量 CT 灌注参数 BF、BV、肿瘤体积可以作为评价胃动脉化疗栓塞术疗效的有用指标, 高 BF、BV 值可能有助于预测疾病进展。

PO-3300

细节决定成败之前列腺增生动脉栓塞治疗

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目的: 探讨前列腺增生动脉栓塞治疗的有效性和安全性, 探讨前列腺动脉栓塞术的手术细节控制。

方法: 回顾性分析本院 153 例前列腺增生栓塞治疗的患者, 包括患者年龄、术前症状、治疗病史、术前 MRI 平扫+弥散图像、术前髂动脉 CTA 图像、术后 MRI 平扫+弥散图像、术后反应, 用 t 检验分析患者治疗前后各参数的差异。

结果: 患者平均年龄 81.2 岁, 术前均有下尿路症状及药物治疗史, 其中 128 例患者因各种原因不能行外科手术治疗。术前 MRI 显示前列腺增生, 前列腺体积 12mL - 327mL , 平均 86.8mL 。术前髂动脉 CTA 显示 6 例髂外动脉异常迂曲 (行肱动脉入路治疗), 一例显示单侧髂内动脉闭塞。另有一例患者因术前 CTA 显示双侧髂内动脉闭塞而放弃介入栓塞, 未入组。153 例患者中, 133 例完成双侧前列腺动脉栓塞, 19 例完成单侧前列腺动脉栓塞, 1 例技术失败。术后 153 例患者临床成功 150 例 (98%), 其中 148 例拔除导尿管, 2 例拔除膀胱造瘘管。术后前列腺 MRI 显示前列腺体积较术前缩小 25.6%, 差异具有统计学意义。患者术后 2 例患者发生白细胞明显升高, 考虑继发感染, 抗炎治疗后好转。无其它并发症。术后随访 2 年内患者前列腺症状复发率为 3%。

结论：前列腺动脉栓塞术是前列腺增生安全且有效的治疗方式。以下 10 个细节的处理可以提高手术的成功率：1 术前术后的 MRI 检查、2 术前胸腹主动脉 CTA、3 术中 CBCT 的应用、4 纤细前列腺动脉的处理、5 非靶血管的处理、6 微导管及微导丝的选择、7 栓塞剂的选择、8 术后导尿管留置的时间、9 突破以往适应症的禁锢、10 特殊情况的处理。

PO-3301

肝癌精准 TACE 有效性及安全性的单中心研究

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目的：目前肝癌的 TACE 治疗缺乏统一的标准化操作流程 (SOP) 及评价标准，导致各中心 TACE 的疗效及并发症等数据相差悬殊。本研究提出了精准 TACE 的 SOP 及评价标准，并探讨精准 TACE 的有效性和安全性，将其与非精准 TACE 的结果相比较。

方法：本中心提出精准 TACE 必须在有 CB-CT 功能的 DSA 下进行，SOP 的核心内容是：患者术前 MRI、术中 CB-CTA 与术毕 CB-CT 三者显示的病灶图像须一致，即肿瘤内栓塞剂完整覆盖，周围正常肝实质内无大量栓塞剂存留。将肿瘤内栓塞剂的沉积体积占比作为 TACE 的评价指标。回顾分析本中心自 2018 年 7 月至 2023 年 1 月期间肝癌 TACE 治疗 661 例患者资料。他们共接收 2033 次 TACE，人均 3.1 次，其中精准 TACE 1123 次，非精准 TACE 910 次。本研究将比较这 2 组治疗的 ORR 及并发症发生率等。将精准 TACE 次数大于等于 50% 或 2 次的患者纳入研究组，共 307 例；其余患者纳入对照组，共 254 例。本研究将比较这 2 组治疗的 ORR 及并发症发生率等。用 t 检验分析患者治疗前后各参数的差异。

结果：患者平均年龄 65.2 岁，按照 CNLC 分期，包括：Ia 期 23 例，Ib 期 76 例，IIa 期 55 例，IIb 期 187 例，IIIa 期 205 例，IIIb 期 115 例。精准 TACE 组 CR36%，PR45%，SD11%，PD8%，并发症的发生率 2%。非精准 TACE 组 CR17%，PR44%，SD13%，PD26%，并发症的发生率 7%。研究组中位 OS43.2 个月，对照组中位 OS18.7 个月，差异具有统计学意义。

结论：精准 TACE 可以明显提高肝癌治疗的有效率，降低并发症的发生，提高患者的生存获益。有必要在全世界范围内推广精准 TACE 的 SOP。

PO-3302

探讨 DSA 无痛鞘管法动态子宫输卵管造影的临床应用价值

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目的：探讨 DSA 无痛鞘管法动态子宫输卵管造影的临床应用价值

方法：选取江西省妇幼保健院 2021 年 11 月至 2022 年 12 月因不孕症行子宫输卵管造影的 720 例患者，根据造影方法类型分为无痛鞘管法组 (430 例) 和传统造影法组 (290 例)。比较两组造影过程中 VAS 疼痛评分、检查后 30 分钟 VAS 疼痛评分、图像质量、曝光时间、宫腔和输卵管显影情况、对比剂用量、置管用时间、检查用时、术后不良反应 (阴道流血、恶心呕吐及头晕乏力) 及对比剂逆流情况的差异。

结果：无痛鞘管法和传统造影法子宫输卵管造影进行比较，在术中 VAS 疼痛评分、检查后 30 分钟 VAS 疼痛评分、置管用时间、检查用时、对比剂用量、术后阴道流血方面，差异有统计学意义 ($P < 0.05$)；在图像质量、宫腔和输卵管显影情况、曝光时间、对比剂逆流情况、术后恶心呕吐及头晕乏力方面，差异无统计学意义 ($P > 0.05$)。

结论：由于两种方法均在 DSA 下进行观察，图像质量、宫腔和输卵管显影情况、曝光时间及对比剂逆流情况无明显的差异，但无痛鞘管法动态子宫输卵管造影操作简单，特别是置管较为快捷，从而缩短了置管时间和检查用时，对比传统方法子宫输卵管造影，无痛鞘管法采用金属支架底座至于鞘管尾部进行外固定，无需钳夹或牵拉宫颈，从而减轻了疼痛，减少了术后阴道流血发生的概率，且对比剂用量更少。因此，对于子宫输卵管造影这项传统检查来说是非常大的改进，特别是在疼痛方面，可减轻患者的心理负担，值得临床推广使用。

PO-3303

小粒径载药微球栓塞联合仑伐替尼治疗不可切除肝细胞癌的有效性与安全性分析：一项真实世界研究

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目的：旨在探索真实世界中小粒径载药微球栓塞 (Drug-eluting Beads Transcatheter arterial Chemoembolization, DEB-TACE) 联合仑伐替尼治疗不可切除肝细胞癌患者的有效性与安全性。

材料和方法：对 2019 年 4 月至 2022 年 6 月期间在我院接受 DEB-TACE 联合仑伐替尼治疗的 49 例中晚期肝细胞癌患者进行疗效和安全性评估。所有纳入的患者都使用小粒径的载药微球 (Hepasphere 30-60 μ m) 进行栓塞，在栓塞后 3-7 天给予仑伐替尼治疗。采用改良的实体瘤疗效评价标准 (modified Response Evaluation Criteria in Solid Tumors, mRECIST) 评估患者的最佳肿瘤疗效。根据 Kaplan-Meier 法绘制患者无进展生存率 (Progression-free Survival, PFS) 和总生存率 (Overall Survival, OS) 的生存曲线，组间差异采用 log-rank 检验进行评估。采用 COX 单因素分析筛选与 PFS、OS 相关的影响因素，对单因素 $p < 0.1$ 的因素纳入 COX 多因素比例风险回归模型中进行检验。

结果：截至随访时间，整个人群的中位随访时间为 21.6 个月 (95%CI:17.5–25.7 月) 中位的 PFS 为 8.8 个月 (95% CI:7.0–10.6 个月)，中位的 OS 为 18.2 个月 (95% CI:14.4–22.0 个月)。单因素与多因素分析显示 Child-pugh A 级 (HR=2.63;95%CI,1.01–6.89; $p=0.048$)、肿瘤最大直径 < 7 cm (HR=2.82;95%CI,1.09–7.30; $p=0.033$) 的患者的 OS 明显延长。在 49 例患者中，整体患者的客观缓解率 (Objective Response Rate, ORR) 为 65.3%。没有发现 4 级及以上的不良事件。

结论：小粒径 DEB-TACE 联合仑伐替尼治疗不可切除肝细胞癌患者是一种有效且安全的治疗手段，客观缓解率高，患者的预后良好，Child-pugh B 级、肿瘤最大直径 ≥ 7 cm 是患者 OS 的独立危险因素。

PO-3304

低位恶性胆道梗阻经皮经肝胆道金属支架置入术后急性胰腺炎的临床预测模型：一项回顾性研究

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目的：本研究探讨了低位恶性胆道梗阻 (Distal malignant biliary obstruction, DMBO) 患者行经皮经肝胆道支架置入术 (Percutaneous transhepatic biliary stenting, PTBS) 后急性胰腺炎的发生率、严重程度和相关危险因素，同时建立并验证临床预测模型。

方法：回顾性收集 2016 年 1 月至 2022 年 4 月于中国医科大学附属盛京医院接受 PTBS 治疗的 379 例 DMBO 患者的临床资料，根据术后是否发生急性胰腺炎将所有患者分为胰腺炎组和非胰腺炎组，

并评估术后急性胰腺炎的发生率和严重程度。对可能导致急性胰腺炎的相关危险因素, 先采用单因素分析进行筛选($P<0.2$), 再进一步采用多因素 Logistic 回归分析独立危险因素。根据回归分析结果构建 Nomogram 模型, 通过 ROC 曲线、加强 Bootstrap 法及 DCA 曲线来验证模型的预测价值和临床效益。

结果: 所有患者均成功接受 PTBS 治疗, 男性 185 例, 女性 155 例, 年龄范围 40~95 岁。共 66 例 (19.4%) 发生术后急性胰腺炎, 其中 1 例患者为重症急性胰腺炎。多因素 Logistic 回归分析显示支架跨越十二指肠乳头放置($OR=3.63$, 95%CI: 1.76~7.52; $P<0.001$) 是 PTBS 术后急性胰腺炎的独立危险因素; 术前主胰管扩张($OR=0.38$, 95%CI: 0.21~0.68; $P=0.001$)、支架直径为 10mm($OR=0.36$, 95%CI: 0.16~0.85; $P=0.023$) 为保护性因素。ROC 曲线显示 Nomogram 模型具有良好的区分度 ($AUC=0.716$)。校准曲线和 DCA 曲线显示模型具有良好的临床应用潜力。

结论: 对于 DMBO 患者, PTBS 术后急性胰腺炎的发生率较高, 但多以轻症者为主。支架跨越十二指肠乳头放置是 PTBS 术后发生急性胰腺炎的独立危险因素, 而术前主胰管扩张和支架直径 10mm 可降低 PTBS 术后急性胰腺炎发生的风险。基于以上因素构建的 Nomogram 模型可作为一种潜在的评估预后工具, 用于在 PTBS 术前预测急性胰腺炎的发生风险并及时识别高危患者。

PO-3305

原发性肝细胞癌患者多次经动脉化疗栓塞治疗 过程中甲胎蛋白的动态变化轨迹

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目的: 我们旨在探讨经多次经动脉化疗栓塞(TACE)治疗的肝细胞癌(HCC)患者血清甲胎蛋白(AFP)随时间重复测量的动态轨迹, 并确定在治疗时间和哪些亚组中血清 AFP 容易升高。

材料和方法: 本回顾性观察性研究评估了 2014 年 1 月至 2020 年 12 月期间接受多次 TACE 治疗的 HCC 患者。采用广义加性混合模型评价整个研究队列和不同亚组血清 AFP 随时间的变化趋势。采用平滑拟合曲线探索血清 AFP 随时间的动态变化轨迹。

结果: 共 360 例患者(中位年龄 61 岁; 308 名男性)最终入选。在整个队列中, 血清 AFP 随时间增加(调整效应值[aEV]: 72.38, 95%CI: 18.49-126.28)。血清重复测量的 AFP 随时间的变化轨迹呈非线性的三段变化趋势。血清 AFP 在前 6 个月逐渐下降(aEV: -565.08, 95%CI: -1049.48 ~ 80.68), 0.5 ~ 3 年逐渐升高(aEV: 218.09, 95%CI: 89.62 ~ 346.56)。当时时间 ≥ 3 年时, AFP 无随时间变化趋势。

此外, 肿瘤负荷小且非乙肝病毒感染的患者血清 AFP 随时间的增加速度更快。

结论: HCC 患者多次 TACE 后 0.5 年内血清 AFP 逐渐降低; 在 0.5 ~ 3 年血清 AFP 逐渐升高, 在低肿瘤负荷和非乙肝病毒感染亚组中升高更为迅速, 这一时间段及特殊的亚组人群需要介入医师更加关注。

PO-3306

肝恶性肿瘤经动脉化疗栓塞术后肝脓肿形成的临床特点分析

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目的: 分析肝恶性肿瘤经动脉化疗栓塞术(Transarterial chemoembolization, TACE)后肝脓肿形成的临床特点, 包括发生率、相关因素、临床症状及对预后的影响等。

方法: 回顾性分析 2017 年 1 月至 2022 年 1 月期间于我院接受 TACE 的肝恶性肿瘤患者的临床资料, 筛选出术后继发肝脓肿形成的患者。收集其临床资料, 包括性别、年龄、是否患有糖尿病、肿

瘤性质 (原发/继发)、肝功能(Child -Pugh 分级)、手术史、肿瘤最大径、TACE 情况 (TACE 次数、栓塞材料和手术时长)、肝脓肿情况(临床症状、诊断时间、治疗和致病菌),并对预后情况进行随访,主要包括肝脓肿的治疗结局、肿瘤反应和患者生存状态。

结果: 共 1387 名肝恶性肿瘤患者纳入本研究, 累计行 3341 次 TACE。其中 15 名(1.1%)患者在 TACE 后继发肝脓肿形成(1 名患者发生了 2 次)。超过一半 (53.3%) 的患者有胆道手术史, 肿瘤的平均最大径为 $7.09\pm 2.86\text{cm}$ 。主要临床症状为发热 (93.8%), 其次是寒战 (43.8%)。TACE 到诊断肝脓肿形成平均时间为 14.19 ± 9.21 天。主要致病菌是屎肠球菌 (31.25%)。经抗生素或经皮穿刺引流(Percutaneous drainage, PCD)治疗后, 所有肝脓肿相关的感染均得到控制。有 8 名患者在死亡时未拔除引流管, 1 名患者至随访结束仍留置引流管; 5 名患者拔除引流管, 平均引流管拔出时间为 149.17 ± 134.19 天。导致脓肿形成的 TACE 疗效评价为: 没有完全缓解的病例、18.75% 为部分缓解、37.5% 为疾病稳定、43.75% 为疾病进展。11 名患者在随访期间死亡, 死亡原因均与肝脓肿所致的感染无关。患者 3 个月、6 个月、1 年和 5 年生存率分别为 86.7%、50.9%、25.5% 和 17%。

结论: TACE 术后肝脓肿形成的发生率较低, 其发生可能与胆道手术史和肿瘤最大径有关。发热及寒战是 TACE 术后肝脓肿形成主要的临床症状, 抗生素联合 PCD 治疗能有效控制感染, 但 PCD 术后引流管拔出时间长, 甚至需要长期带管。本研究初步显示 TACE 术后肝脓肿形成的患者预后较差。

PO-3307

经桡动脉入路栓塞肩关节动脉治疗顽固性 肩关节骨性关节炎的疗效及安全性分析

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背景: 肩关节骨性关节炎通常指关节盂肱关节骨关节炎 (glenohumeral joint osteoarthritis, GJO), 是一种我国常见的骨骼肌肉病。发病时表现为肩部和手臂的疼痛, 僵硬, 麻木, 活动受限等。目前的治疗方式主要为药物治疗 (非甾体抗炎药, 激素, 关节腔注射等)、物理治疗 (针灸, 按摩, 冷疗等) 和手术治疗 (关节镜下松解、成形、修补, 关节置换等)。而这些方法疗效有限, 我们需要寻找一种新的治疗方法来减轻患者痛苦, 改善患者肩关节功能。方法: 纳入 10 例既往接受过药物治疗, 物理治疗及手术治疗的顽固性 GJO 患者。通过桡动脉入路, 由两名有 5 年以上介入治疗经验的主治以上医生采用 $75\mu\text{m}$ 空白微球对患者进行肩关节增生血管栓塞术, 目标血管包括肩胛上动脉, 旋肱后动脉, 旋肱前动脉, 肩峰动脉。分别与术前、术后 3 个月, 6 个月采用疼痛视觉模拟评分 (VAS), 肩关节 UCLA 评分对患者进行评估并记录所有时间点的不良事件。结果: 10 例 (100%) 患者发现并栓塞了平均 (1.54 ± 0.6) 条异常增生的肩关节动脉, 平均使用了 3.25ml 栓塞混悬液。在 3 个月后, VAS 评分下降差别达到 25 ± 29 ($P=0.003$), UCLA 评分上升差别达到 10 ± 5 ($P=0.041$); 在 6 个月后, VAS 评分下降达到 23 ± 28 ($P=0.022$), UCLA 评分上升达到 8 ± 3 ($P=0.063$)。在整个随访过程中没有发生重大并发症, 没有产生组织及皮肤坏死, 其中有 2 例患者术后疼痛稍加重, 给予了 1 周镇痛治疗。结论: 肩关节动脉栓塞术是一种安全的治疗顽固性 GJO 疼痛的方法, 随访 3 个月后疼痛及功能有明显改善, 随访 6 个月后疼痛有明显改善, 但量化功能改善不明显。未来需要进一步的随机对照研究来确定真实的疗效及安全性。

PO-3308

基于 MRI 及临床特征对中晚期 HCC 首次 D-TACE 短期疗效的预测价值分析

隰子涵

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目的：探索术前增强 MRI 影像特征及相关临床信息与肝细胞癌患者首次 D-TACE 短期疗效的关系。方法：回顾性分析 113 例中晚期肝细胞癌患者，探索基于增强 MRI 影像特征、临床基线特征、实验室指标及 D-TACE (drug-eluting bead transarterial chemoembolization, 载药微球经肝动脉化疗栓塞术) 手术信息与术后短期疗效的关系。应用单因素及多因素 Logistic 回归方法筛选出与 D-TACE 短期疗效相关的独立因素。通过 Kaplan-Meier 生存曲线计算 PFS (progression-free survival, 无进展生存期) 的中位生存时间, 并用 Log-rank 检验反映短期疗效与 PFS 的关系。通过 COX 比例风险回归确定影响 PFS 的相关因素。

结果：多因素 logistic 回归显示前白蛋白 (OR=1.012; 95%CI: 1.001~1.023; P=0.029)、微球载药量 (OR=0.969; 95%CI: 0.944~0.994; P=0.016)、肿瘤/肝脏体积比值 (OR=0.001; 95%CI: 0.000~0.162; P=0.007)、肿瘤边缘强化程度 (OR=0.239; 95%CI: 0.058~0.995; P=0.049) 与短期疗效显著相关。客观缓解组 (objective response group, OR group) 和未客观缓解组 (non-objective response group, non-OR group) 的 PFS 分别为 8.5 个月和 4.5 个月, OR 组预后更佳 ($\chi^2=4.903$, P=0.027)。COX 比例风险回归显示首次 D-TACE 短期疗效好、肿瘤最大径大、肿瘤/肝脏体积小是 PFS 的保护因素。

结论：肿瘤/肝脏体积比值小、术前前白蛋白多、微球载药量较少、肿瘤边缘强化程度轻的肝癌患者首次 D-TACE 短期疗效更容易达到 OR, PFS 也往往较长。

PO-3309

肝硬化脾功能亢进患者部分性脾动脉栓塞术后血流动力学变化研究

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目的 探究肝硬化脾功能亢进患者部分性脾动脉栓塞术后血流状态变化, 验证脾动脉盗血综合征的存在, 为后期诊疗提供影像学依据。方法 本组共收集乙肝肝硬化继发脾功能亢进患者 83 例, 分析其中行部分性脾动脉栓塞术且影像学资料完整的肝硬化脾功能亢进患者 50 例, 所有患者均在术前 3 天、术后 1 个月行多层螺旋 CT 上腹增强检查或彩色多普勒超声检查, (1)测量并比较彩色多普勒超声下 PSE 术前、术后脾静脉与门静脉内径、平均血流速度及血流量的变化; (2)测量 CT 下脾脏体积、残脾体积, 计算栓塞率, 应用多种重组技术比较 CTA 下 PSE 术前后腹腔干、脾动脉、肝总动脉、胃左动脉、胃十二指肠动脉、肝固有动脉内径及脾/肝总动脉的差异。结果 (1)PSE 术后超声下脾静脉内径、脾静脉血流量较术前明显减少, 差异具有统计学意义 ($P<0.05$), 但脾静脉平均血流速度差异无统计学意义 ($P>0.05$); 门静脉内径缩小, 平均血流速度减慢, 血流量较术前明显减少, 差异具有统计学意义 ($P<0.05$)。 (2)PSE 术后基于 CT 测量脾脏体积明显缩小, CTA 下脾动脉内径缩小, 肝总动脉、肝固有动脉内径增大, 脾/肝总动脉减小, 差异具有统计学意义 ($P<0.05$); 腹腔干、胃左动脉、胃十二指肠动脉内径变化不著, 差异无统计学意义 ($P>0.05$)。结论 通过 CTA 技术联合彩色多普勒超声技术评估部分性脾动脉栓塞术后血流动力学变化, 明确

PSE 可有效缓解门静脉高压, 间接增加肝动脉供血, 从而达到缓解脾亢、纠正脾动脉盗血状态、改善肝功能的效果。

PO-3310

Fatty acid binding protein 5 (FABP5) regulates proliferation via the PI3K/AKT signaling pathway in clear cell renal cell carcinoma cell lines

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Kidney is the one of most important organs which participates in whole body's homeostasis. The urine-producing function unit in kidney is nephron, which includes a renal corpuscle and renal tubules. Kidney cancer, also named renal cancer, originates from the cells in kidney. The two common types of renal cancer are renal cell carcinoma (RCC) and urothelial cell carcinoma (UCC). Clear cell renal cell carcinoma (ccRCC) has been associated with the highest mortality rates. Fatty acid binding proteins (FABPs) are a kind of 14~15 kD proteins which are present in high abundance in the cytosol of most tissues. In this report, we found that FABP5 is upregulated and correlates with poor survival in ccRCC patients. Moreover, our research results indicated that FABP5 executed a pro-proliferative role in ccRCC cells, including Caki-1 and 786O. Silencing of FABP5 significantly inhibited ccRCC cells proliferation in vitro; while overexpression of FABP5 promotes cells proliferation; and FABP5 expression was significantly correlated with neoplasm stage and regulated the tumor growth in nude mice. Furthermore, the LY294002 attenuated the pro-proliferative effect of FABP5 in both Caki-1 and 786O cells, implying that the PI3K/AKT signaling pathway, at least partly, involves in the FABP5-induced ccRCC cells proliferation. Taken together, we found FABP5 was higher expressed in patients with ccRCC, and patients with higher FABP5 showed a decreased survival level. Furthermore, we found the FABP5 regulated proliferation ccRCC cell lines by regulating PI3K/AKT signaling pathway. These results suggested that FABP5 may be a potential prognostic biomarker and provide a new perspective of FABPs in tumor biology.our results indicating that FABP5 was associated with malignant progression and might play an important role in tumorigenesis in ccRCC cells.

PO-3311

Altered dynamic functional connectivity association with diverse grade white matter hyperintensity and cognition in cerebral small vessel disease patients

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Abstract

Objectives: To assess the effect of diverse grade white matter hyperintensity(WMH) in cerebral small vessel disease(CSVD) patients on dynamic functional connectivity(DFC) and further evaluate the impact of diverse grade WMH on cognition from the perspective of DFC.

Methods: 85 WMH patients underwent demographic survey, clinical examination, neuropsychological test, structural and resting state functional MRI scan. To evaluate diverse grade of WMH, the whole subjects were divided into mild and severe WMH group according to Fazekas grade scale of WMH: (1)mild WMH group scored 1-2(n=55); (2)severe WMH group scored 3-6(n=30). Independent composition analysis(ICA) was performed on the rs-fMRI data for

functionally relevant intrinsic connectivity networks. Sliding time window analysis and k-means clustering analysis were used to characterize distinct functional connectivity states and temporal properties (mean dwell time, fractional windows and transition numbers) of DFC. Temporal properties of DFC between two groups were compared by two-sample t-test. Correlations were performed between temporal properties of DFC and the score of cognition of two groups.

Results: The subjects in severe WMH group were older than that of mild WMH group ($Z = -2.814$, $p = 0.005$). Except age, the rest demographic and clinical characteristics had no significant difference between two groups. The intrinsic brain functional network connectivity identified clustered into four distinct states. Severe WMH group had longer mean dwell time ($t = 2.36$; $P < 0.05$) in state 3 than that of mild WMH group. Cognitive scores of the whole subjects were negatively correlated with mean dwell time and fractional windows in state 2 ($p < 0.05$). Cognitive score decreased as transition numbers increased of severe WMH group compared to mild WMH group in state 2 ($p < 0.05$).

Conclusions: This study detected diverse grade WMH patients exhibited altered temporal properties of DFC and clarified the impact of diverse grade WMH on cognition from the perspective of DFC.

PO-3312

Intrinsic Brain Activity Alterations in Patients with Mild Cognitive Impairment-to-Normal Reversion: A Resting-State Functional MRI Study from Voxel to Whole-Brain Level

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Abstract

Mild cognitive impairment (MCI) reversion refers to patients with MCI who revert from MCI to a normal cognitive state. Exploring the underlying neuromechanism of MCI reverts may contribute to providing new insights into the pathogenesis of Alzheimer's disease and developing therapeutic interventions. Information on patients with MCI and healthy controls (HCs) was collected from the Alzheimer's Disease Neuroimaging Initiative database. We redefined MCI reverts as patients with MCI whose logical memory scores changed from MCI to normal levels using the logical memory criteria. We explored intrinsic brain activity alterations in MCI reverts from voxel, regional, and whole-brain levels by comparing resting-state functional magnetic resonance imaging metrics of the amplitude of low-frequency of fluctuation (ALFF), the fractional amplitude of low-frequency fluctuation (fALFF), percent amplitude of fluctuation (PerAF), regional homogeneity (ReHo), and degree centrality (DC) between MCI reverts and HCs. Finally, partial correlation analyses were conducted between cognitive scale scores and resting-state functional magnetic resonance imaging metrics of brain regions, revealing significant group differences. Thirty-two patients with MCI from the Alzheimer's Disease Neuroimaging Initiative database were identified as reverts. Thirty-seven age-, sex-, and education-matched healthy individuals were also enrolled. At the voxel level, compared with the HCs, MCI reverts had increased ALFF, fALFF, and PerAF in the frontal gyrus (including the bilateral orbital inferior frontal gyrus and left middle frontal gyrus), increased PerAF in the left fusiform gyrus, and decreased ALFF and fALFF in the right inferior cerebellum. Regarding regional and whole-brain levels, patients with MCI reverts showed increased ReHo in the left fusiform gyrus and right median cingulate and paracingulate gyri; increased DC in the left inferior temporal gyrus and left medial superior frontal; decreased DC in the right inferior cerebellum and bilateral insular gyrus relative to HCs. Furthermore, significant correlations were found between cognitive performance and neuroimaging changes. These findings suggest that MCI reverts show significant intrinsic brain activity changes compared with

healthy controls, potentially related to the cognitive reversion of patients with MCI. These results enhance our understanding of the underlying neuromechanism of MCI reverts and may contribute to further exploration of Alzheimer's disease.

PO-3313

Pelvic effusion in patients with ovarian thecoma-fibroma associated with the tumor size and plasma CA-125 level: A retrospective magnetic resonance imaging study

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Purpose: To survey the occurrence rate of ascites in patients with thecoma-fibroma and its potential correlation with tumor MR imaging characteristics.

Methods: A total of 40 patients with surgically proven thecoma-fibroma were enrolled in this retrospective study. We determined the tumor size, the components (solid or cystic) and their signal intensity features. Second, we identified ascites according to the fat-suppressed sagittal T2-weighted imaging sequence and divided all cases into two groups (with or without ascites). Furthermore, we explored the correlations of ascites with tumor size, tumor solidity, pathological types, patient's postmenopausal status and serum CA-125 levels by using the χ^2 test.

Results: (1) Among the 40 cases, 15 tumors were fibromas, 15 thecomas, and 10 fibrothecomas. Nine patients (26.47%) had elevated CA-125 levels (>35.0 U/ml). (2) Thirty-one patients had ascites (77.50%), 29 of which had a small amount of ascites. Nine cases had no ascites (22.50%). (3) MRI showed a solid mass in 22 cases (55.0%), cystic mass in five cases (12.5%) and mixed solid-cystic mass in 13 cases (32.5%). The χ^2 test revealed that the incidence of ascites was significantly correlated with tumor size, tumor solidity and serum CA-125 levels ($P < 0.05$), but not with menopause and pathological type ($P > 0.05$).

Conclusion: Our data revealed that the incidence of ascites was 77.50% and was mainly correlated with tumor size and elevated CA-125 levels. These findings have potential value for improving the diagnosis and differential diagnosis of thecoma-fibroma.

PO-3314

Altered activity and functional connectivity of superior temporal gyri in anxiety disorders a functional magnetic resonance imaging study

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OBJECTIVE: The prior functional MRI studies have demonstrated significantly abnormal activity in the bilateral superior temporal gyrus (STG) of anxiety patients. The purpose of the current investigation was to determine whether the abnormal activity in these regions was related to a loss of functional connectivity between these regions.

MATERIALS AND METHODS: Ten healthy controls and 10 anxiety patients underwent noninvasive fMRI while actively listening to emotionally neutral words alternated by silence (Task 1) or threat-related words (Task 2). The participants were instructed to silently make a judgment of each word's valence (i.e., unpleasant, pleasant, or neutral). A coherence analysis was applied to the functional MRI data to examine the functional connectivity between the left and the right STG, which was selected as the primary region of interest on the basis of our prior results.

RESULTS:The data demonstrated that the anxiety patients exhibited significantly increased activation in the bilateral STG than the normal controls. The functional connectivity analysis indicated that the patient group showed significantly decreased degree of connectivity between the bilateral STG during processing Task 2 compared to Task 1 ($t = 2.588$, $p = 0.029$). In addition, a significantly decreased connectivity was also observed in the patient group compared to the control group during processing Task 2 ($t = 2.810$, $p = 0.012$).

CONCLUSION:Anxiety patients may exhibit increased activity of the STG but decreased functional connectivity between the left and right STG, which may reflect the underlying neural abnormality of anxiety disorder, and this will provide new insights into this disease.

PO-3315

Enhanced Glioblastoma Therapy through Redox-Sensitive Polymer Micelles Co-Encapsulating Immune Checkpoint Inhibitors and Chemotherapeutic Agents

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Background: Immunotherapy with immune checkpoint blockade (ICB) for glioblastoma (GBM) is promising but its clinical efficacy is seriously challenged by the blood-tumor barrier (BTB) and immunosuppressive tumor microenvironment (TME). Here, aPD-L1 was loaded into a redox-responsive micelle and the ICB efficacy was further amplified by paclitaxel (PTX)-induced immunogenic cell death (ICD) via co-encapsulation approach for the reinvigoration of local anti-GBM immune responses. The aim of this study is to prove the co-encapsulation approach facilitating efficient antibody delivery and combining with chemotherapeutic agent-induced ICD demonstrated that the chemo-immunotherapy can reprogram local immunity to empower immunotherapy against GBM.

Methods: The structure and function of aPD-L1 released from the micelles were assessed by ELISA, flow cytometry and SDS-PAGE. The effect of ICD was assessed by confocal microscopy, flow cytometry and ELISA. The pharmacokinetics and biodistribution of the micelle were investigated by near-infrared imaging. The GBM progression was detected by MR. The immune status of GBM was investigated by flow cytometry and immunofluorescence.

Results: The micelles effectively crossed the BTB and were retained in the reductive tumor microenvironment without altering the bioactivity of aPD-L1. The ICB efficacy was substantially enhanced by the aPD-L1 and PTX combination with significant suppression of primary and recurrent GBM and induction of long-lasting immunological memory in the orthotopic GBM-bearing mice.

Conclusion: Our micelle can increase the low response rate of ICB as evidenced by the therapy of A2-APM potently eradicating GBM in preclinical models. Our studies provide an improved approach to develop antibody penetration into the brain and to use chemotherapy-induced ICD for boosting antitumor immunity with brain tumors, and the micelles might have broader implications for immunotherapy in other immunosuppressive malignancies.

PO-3316

Uniting Dual-Modal MRI/Chemiluminescence Nanotheranostics: Spatially and Sensitively Self-Reporting Photodynamic Therapy in Oral Cancer

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***Purpose:**

In order to achieve precise and efficient diagnosis and treatment of tumors, the integrated nanosystem has been recognized by many interdisciplinary fields and has broad development prospects. However, there are still many challenges in real-time monitoring of targeted delivery and efficacy control of nanomedicines. Firstly, the unpredictable in vivo behaviors of nanotheranostics, that is, real-time tracking where, when, and how nanodrugs delivered. Next, limited by the uncontrollability of the therapeutic dose, how to monitor the treatment behavior and control the curative effect is the main bottlenecks. Therefore, inspired by the Boolean logic idea, designing sequence-activated nanotheranostics strategy is expected to become a breakthrough to solve the above difficulties and realize high-performance diagnosis and treatment applications.

***Methods and Materials:**

A sequence-responsive MRI/chemiluminescence (CL) dual-mode strategy was constructed through uniform spatio-temporal resolution. The nanotheranostics system Pa-Mn&CH-A@P was prepared by combining the Mn²⁺ chelated photosensitizer (Pa) and the CL molecule (CH-A) through FNP technology. Then we explored the structural characterization, spectral properties, MR properties and CL properties of the nanomaterials. The human oral squamous cell carcinoma cell CAL27 was selected as cell model of the tumor to further explore the PDT properties and CL imaging to further explore the photodynamic properties and chemiluminescence imaging properties in cells, as well as the dual-modality imaging were performed in tumor model of oral cancer in mice.

***Results:**

We innovatively combined MR and CL imaging through FNP (flash nanoprecipitation) technology to quantitatively monitor in vivo distribution and PDT performance, overcoming the dilemma between spatial resolution and sensitivity.

***Conclusions:**

Based on near-infrared fluorescence imaging, chemiluminescence imaging, magnetic resonance imaging and photodynamic therapy, this research combined diagnosis and treatment to construct nanotheranostics system. We successfully designed nanoprobe Pa-Mn&CH-A@P to real-time tracking unpredictable biological distribution and behavior in vivo and PDT feedback, which expanded the application of sequence-activated nanotheranostics system.

Clinical Relevance/Application: Integration of diagnosis and treatment of oral cancer

PO-3317

Dual-Enzyme and Radiation Enabled Oxygen Self-Supplying Nanosystem for Augmented Tumor Imaging and Radiotherapy

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Objectives: Solid tumors often exhibit hypoxia, a state of low oxygen, due to irregularities in the tumor's blood vessels, rapid tumor cell growth, and a dysfunctional lymphatic system. It's been shown in earlier studies that this tumor hypoxia significantly impedes the success of tumor treatment. Oxygen plays a crucial role in the creation of reactive oxygen species, which are key to destroying tumors during radiotherapy. Consequently, a hypoxic tumor environment often results in resistance to radiotherapy. This research seeks to develop a unique cyclic self-oxygenating nanosystem by co-loading catalase (Cat) and superoxide dismutase (SOD). This system is designed to continually and efficiently generate oxygen from water molecules within tumor tissues upon exposure to radiation, thereby improving the therapeutic effect on tumors. Photoacoustic and fluorescence imaging techniques are employed to monitor the oxygen levels within tumors and the in vivo biological distribution of the nanoplateforms in real time, offering additional guidance for radiotherapy in mice.

Methods: The primary structure of the novel nanosystem comprises a biodegradable hollow hybrid organosilica nanoparticle (HSN), encapsulating catalase (Cat) and superoxide dismutase (SOD) enzymes, designated as SC@HSN. This nanoparticle is further coated with a zeolitic imidazolate framework-8 (ZIF-8), a metal-organic framework carrying NIR-I fluorescent dyes, resulting in SC@HSN@Z-F. Various methods, including transmission electron microscopy, Zeta potential, X-ray diffraction, and dynamic light scattering were employed for characterizing this nanomaterial. An oxygen detection probe [Ru(DPP)₃]Cl₂ was used to measure oxygen production of the nanoparticles under X-ray activation. The level of HIF-1 α expression was gauged via Western blot analysis and immunofluorescence experiments. The MTT assay was utilized to determine nanoparticles' cytotoxic impact on tumor cells. Additionally, a breast cancer model was developed in situ, with real-time tracking of nanoparticle biodistribution using near-infrared fluorescence imaging. Finally, changes in tumor volume and survival period analysis were used to evaluate therapeutic effectiveness.

Results: The novel nanosystem targets tumor tissues via the enhanced permeability and retention (EPR) effect. Within the acidic tumor environment, the ZIF-8 coating degrades, releasing NIR-I fluorescent dyes for fluorescence imaging. Simultaneously, the hybrid organosilica core degrades in the presence of glutathione (GSH), releasing the encapsulated enzymes. During radiotherapy, ionizing radiation generates reactive oxygen species (ROS), including superoxide anions (O²⁻), from water molecules. These anions are then converted into hydrogen peroxide (H₂O₂) by the catalytic action of SOD. This hydrogen peroxide is subsequently transformed into oxygen through catalase's action. Transmission electron microscopy images indicated the SC@HSN@Z-F nanoparticles are roughly 50 nm in size. In vitro tests confirmed the nanoparticles' powerful anticancer effects, and in vivo experiments validated their biodistribution and cancer-fighting efficacy.

Conclusions: This cutting-edge nanosystem enabled the sustained production of oxygen from water molecules present within tumor tissues when subjected to external radiation. This effectively improved the tumor microenvironment and increased the tumor's susceptibility to radiotherapy.

PO-3318

CeO₂ nanoparticles mediated by BSA promoted oxygenation for enhanced chemo-sonodynamic therapy of tumors

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Purpose: Traditional tumor treatments are clinically suboptimal and needs noninvasive and accurate antitumor therapies to improve the anti-cancer effectiveness. Sonodynamic therapy (SDT) is a promising antitumor therapeutic strategy, but its efficacy is often limited by extensive hypoxia present within solid tumors. Increasing the local concentration of oxygen at the tumor site may be an effective strategy for augmenting the efficacy of SDT. Thus, developing a nanoparticle with alleviating TME hypoxia is needed to enhance SDT for antitumor therapy.

Methods: The CeO₂@BSA-Ce6-DOX (CBCD) were synthesized with biomimetic mineralization. Near-infrared (NIR) imaging were measured to evaluate the tumor accumulation. The tumor suppression effect of combined enhanced SDT and chemotherapy by this nanoparticle was also studied for the 4T1 -bearing Balb/c mice.

Results : The synthesized CBCD NPs showed high tumor accumulation. Abundant sonosensitizers and chemotherapy drugs was delivered to the tumor, which is available for the accurate therapy of tumors. Cerium oxide (CeO₂) exhibits catalase (CAT)-like ability, facilitating the conversion of hydrogen peroxide (H₂O₂) into oxygen (O₂) to alleviate tumor-associated hypoxia. In addition, the CBCD displayed outstanding fluorescence imaging effects for evaluating the nanoparticle distribution. Consequently, significant tumor suppression effect was obtained based on the tumor accurate treatment with the combined enhanced SDT and chemotherapy.

Conclusions: The synthesized CBCD NPs showed high tumor accumulation, resulting in a significant tumor-suppression effect based on the combined enhanced SDT and chemotherapy. This work fabricated BSA-mediated CBCD nanoparticles using a biomimetic mineralization technique that was simple and green, providing a promising strategy for mitigating hypoxia-related challenges in SDT therapy for tumor treatment.

PO-3319

Programming CpG Functionalized Evans Blue for Lymph-node Targeting Molecular Vaccines

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Purpose CpG oligodeoxynucleotide (CpG ODNs), a Toll-Like Receptor 9 (TLR9) agonist, are widely used adjuvants. However, major challenges underlying the use of CpG lie in effectively targeting antigen-presenting cells (APCs) to trigger immune responses and minimizing toxicity. Evans Blue (EB) structure has a great affinity to human serum albumin (HSA) and increases lymph nodes (LNs) accumulation. We proposed that LN targeting efficient delivery of CpG would help accumulate CpG in lymphoid organs after subcutaneous injection.

Methods We first designed a unique molecular vaccine by designing a bivalent Evans Blue derivate (EB2) and conjugating with CpG covalently through click chemistry, denoted as EB2-CpG. The interaction of EB2 with HSA was further verified by biolayer interference (BLI). We next characterized in vivo trafficking of EB2-CpG by PET imaging and in vivo imaging system (IVIS) fluorescence imaging. EB2-CpG was injected subcutaneously in C57BL/6 mice, and 6, 12, 24, 48 and 72h later, draining LNs were excised and calculated for accumulation dose in LNs and major

organs. To assess that CpG retains its immunostimulatory ability when conjugated with EB2 (EB2-CpG) and bound to HSA physiologically (EB2-CpG-HSA), we exposed them to murine bone marrow-derived dendritic cells (BMDCs) and Raw 264.7. The expression of CD80 and CD86 on both antigen presenting cells (APCs) are evaluated. In vivo antitumor effect and immune activation of EB2-CpG were studied. The toxicity of repeated CpG injection were compared between CpG and EB2-CpG group.

Results We observed from BLI and in vivo imaging experiments that EB2-CpG and EB2-ICG bind avidly to endogenous albumin and can accumulate in APCs in the LNs after injection. Over 3 days after injection, free CpG exhibited no LN accumulation above, whereas EB2-CpG accumulated for 7 days. Our in vitro analysis indicated that the expression of CD80 and CD86 of BMDC in EB2-CpG group were comparable to free CpG and EB-CpG groups, therefore EB2 conjugation of CpG and bound to HSA does not impair its immune stimulatory activity. EB2-CpG was superior in increased in T-cell priming and enhanced anti-tumor efficacy in vivo. Additionally, EB2-CpG did not elicit significant increases in serum levels of ALT, AST enzyme, systemic proinflammatory cytokines and observed splenomegaly confirming CpG off-target inflammatory effects had been minimized.

Conclusion We demonstrated a novel platform using “albumin hitchhiking” approach as subcutaneous vaccination for robust and durable antitumor efficacy, which may present a promising approach in tumor immunotherapy.

PO-3320

Molecular mechanisms and behavioral relevance underlying neural correlates of early-life urbanization

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Although previous neuroimaging studies have established the associations of urban exposure during early life with brain functional and structural alterations, their molecular mechanisms and behavioral relevance remain largely unknown. To address this question, we calculated amplitude of low-frequency fluctuations (ALFF) and gray matter volume (GMV) using resting-state functional and structural MRI to investigate their associations with early-life urbanization in a large sample of 511 healthy young adults. Then, we examined the spatial relationships of the identified neural correlates of early-life urbanization with gene expression, neurotransmitter, and behavioral domain atlases. Results showed that higher early-life urbanization scores were correlated with increased ALFF of the right fusiform gyrus, and decreased GMV of the left dorsal medial prefrontal cortex and left precuneus. Remarkably, the identified neural correlates of early-life urbanization were spatially correlated with expression of gene categories primarily involving immune system process, signal transduction, and cellular metabolic process. Concurrently, there were significant associations between the neural correlates and specific neurotransmitter systems including dopamine, acetylcholine, and serotonin. Finally, we found that the ALFF correlates were associated with behavioral terms including “perception”, “sensory”, “cognitive control”, and “reasoning”. Apart from expanding existing knowledge of early-life urban environmental risk for mental disorders and health in general, our findings may contribute to an emerging framework for integrating social science, neuroscience, genetics, and public policy to respond to the major health challenge of world urbanization.

PO-3321

In Vivo Assessment of Regional Tau Deposition, Gray Matter Volume and Cognition in Alzheimer disease: a head-to-head 18F-fortaucipir PET/MR study

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Purpose: Despite amyloid plaque is associated with atrophy, connectivity change and function, the accurate role of tau and regional atrophy on cognition in Alzheimer's disease remains unclear. This study aimed to investigate the connection between regional tau pathology, local or distant gray matter atrophy in vivo and the impact on cognition improving effective clinical trials and upcoming therapeutic approaches for AD.

Materials and Methods: Thirty-four patients with A β positive mild cognitive impairment or dementia and 23 cognitive normal controls experienced standardized clinical and neuropsychological assessments followed by 18F-fortaucipir positron emission tomography (PET) imaging and 3D T1 magnetic resonance imaging (MRI). The regional tau standardized uptake value ratio (SUVR) and gray matter volumes (GMV) in regions-of-interest (ROIs) were measured. Group differences in the two imaging modalities were compared. Multimodal correlation analyses and mediation analyses were then carried out in brain regions that displayed a relationship between cognition and the 18F-fortaucipir SUVR and GMV.

Results: The 18F-fortaucipir retention was observed in the entorhinal cortex, hippocampus, parietal lobe, temporal lobe, precuneus and posterior cingulate in AD/MCI groups. Regionally, 18F-fortaucipir was largely associated with local/non-local GMV in temporoparietal region (range standardized β s of residual=-0.45--0.77, $p<0.05$) in MCI/AD patients. Mediation analyses showed GMV of the entorhinal cortex and medial parietal lobes mediated the effect of local region 18F-fortaucipir SUVR on cognitive impairment (mediation effect=0.54, 0.93; explained variance=32.86%, 37.94%, respectively). The GMV of the medial parietal lobes and medial temporal lobes mediated the effect of distant region 18F-fortaucipir SUVR on cognitive impairment (mediation effect=0.75-0.85; explained variance=57.01%-58.14%).

Conclusions: Tau pathology was associated with local and distant areas of brain atrophy in the brain regions in MCI/AD patients. Local and distant atrophy played a mediating role between tau binding and cognitive impairment in these patients.

PO-3322

Predicting the prognosis of glioblastoma based on MRI radiomic model of temporal muscle and tumor: a multicenter study

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Abstract

Background and Purpose:

Glioblastoma (GBM) is the most common primary malignant brain tumor. Sarcopenia is associated with poor outcomes for tumor patients. This study aims to investigate the prognostic value of radiomics features of temporal muscle in glioblastoma patients.

Methods:

This study comprised a training data set of 435 patients from the University of Pennsylvania Health System (UPENN-GBM) and a testing data set of 126 patients from the Cancer Genome Atlas Glioblastoma Multiforme (TCGA-GBM). All patients underwent pre-operative MRI examination, including postcontrast T1-weighted imaging and T2 fluid-attenuated inversion recovery (FLAIR) imaging, from which radiomics features of temporal muscle and whole-tumor were extracted. After feature selection, uni-variate and multi-variate cox regression were used to build predictive radiomic models. The concordance index (C index) was used to assess the potential value of radiomic models in predicting overall survival (OS). The added value of radiomics feature of temporal muscle to tumoral radiomics features and clinical features was also analyzed.

Results:

The temporalis radiomics features (C-index 0.5849) had a better predictive ability than temporal muscle thickness (C-index 0.5228) and temporal muscle cross area (C-index 0.5416). The addition of temporalis radiomics features to tumoral radiomics features showed an improved prediction performance (C-index 0.6113 vs 0.5918, $P < .001$). The combined model (temporalis radiomic features, tumoral radiomic features and clinical profiles) had the best predictive performance (C-index 0.6270).

Conclusion:

Temporalis radiomics features might have potential in predicting clinical outcomes for glioblastoma patients and could be integrated with tumor and clinical profiles to improve predictive performance.

PO-3323

Renal-Clearable Nanodots Overcoming Metabolic Reprogramming to Boost Mitochondrial-Targeted Photodynamic Therapy in Triple-Negative Breast Cancer

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PURPOSE

Triple-negative breast cancer (TNBC) exhibits a greater reliance on glutamine uptake and utilization, a condition described as "glutamine addiction", which results in abundant glutathione (GSH) and protects TNBC cells from oxidative damage. Therefore, targeted GSH metabolic reprogramming may become a crucial strategy in tumor treatment by interfering with GSH synthesis or depleting GSH levels to enhance the reactive oxygen species (ROS) sensitivity of TNBC cells. To enhance the lethality of ROS generated by photodynamic therapy (PDT), Herein, we developed ultrasmall metal-organic frameworks (MOFs) nanodots, named MSPC, encapsulating both metabolism inhibitors and mitochondria-targeted photosensitizer.

METHOD AND MATERIALS

Initially, MOFs encapsulating the near-infrared squaraine dye SQ-675, phenethyl isothiocyanate (PEITC), and a ROS-responsive CO donor (CORM-401) were prepared using a conventional method. Subsequently, an ultrasonic processor was employed to introduce liquid phase exfoliation, resulting in the formation of ultrasmall nanodots.

RESULTS

MSPC exhibit an acidic-sensitive drug release, leading to depletion of glutathione and suppression of mitochondrial respiration. Importantly, MSPC induces a substantial reduction in intracellular ATP levels by simultaneously disrupting oxidative phosphorylation and impeding aerobic glycolysis. Therefore, the glutathione depletion combined with metabolism inhibitor results in an increase in oxidative stress, which improves the efficacy of mitochondria-targeted photodynamic therapy for TNBC. Additionally, MSPC demonstrates aggregation-enhanced retention and fluorescence/photoacoustic imaging capabilities within tumors, followed by elimination through the renal system.

CONCLUSION

In summary, this novel platform, MSPC, indicates the feasibility of overcoming resistance to ROS induced by metabolic reprogramming, thus holding significant implications for PDT of TNBC.

PO-3324

A multicenter study based on multiparametric MRI radiomics model to identify conventional imaging misdiagnosis or uncertain pleomorphic adenomas and Warthin tumors

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Objective: To investigate the differential diagnostic value of multiparametric MRI radiomics model for routine imaging misdiagnosis or uncertain pleomorphic adenomas and Warthin tumors.

Methods: The data of patients with pathologically confirmed pleomorphic adenomas (PA) and Warthin tumors (WT), who had misdiagnosis or uncertain diagnosis with conventional imaging, were retrospectively collected from two centers. The ROI (Region of Interest) and features were extracted using the 3D Slicer software. The collected data was randomly divided into a training group and a verification group in a 7:3 ratio. Univariate logistic regression was employed to identify significant clinical features, and multivariate logistic regression was used to establish a clinical model. logistic regression (LR), K-nearest Neighbor (KNN), support vector machine (SVM), random forest (RF), stochastic gradient descent (SGD), extremely randomized trees (ET), decision tree (DT), Light Gradient Boosting Machine (LightGBM), and LightGBM, Light Gradient Boosting Machine, were utilized to construct radiomics models. The model with the highest AUC (Area Under the Curve) in the validation group was selected as the best machine learning model. A nomogram was then created using the factors included in the clinical model and the rad-score obtained from the best machine learning model. Additionally, the ensemble strategy and stacking algorithm were employed to establish the Stacking model and the Ensemble model, respectively. ROC curve was used to evaluate the differential diagnosis efficiency of the above model in the training group, the internal verification group and the external verification group.

Results: A total of 149 patients were enrolled, including 126 from Center A (76 cases of PA and 50 cases of WT) and 23 cases from Center B (10 cases of PA and 13 cases of WT). Finally, gender, age, and smoking were included as independent influencing factors into the clinical model. Among the nine machine learning models, LR models were the best machine learning model, with the highest average AUC (0.896) and average ACC (0.839). The areas under the ROC curve of clinical model, best machine learning model, nomogram, Stacking model and Ensemble model were 0.942, 0.939, 0.971, 0.936 and 0.936 in the internal verification group, and the area under the ROC curve was 0.862, 0.854, 0.915, 0.885 and 0.885 in the external verification group, respectively. The nomogram performance in identifying PA and WT outperformed the clinical model and the best machine learning model. The Stacking model and the Ensemble model have similar performance. **Conclusion:** The radiomics model constructed based on multiparametric MRI has high diagnostic value in distinguishing conventional imaging misdiagnosis or uncertain PA and WT.

PO-3325

Application of 7 T Cardiac Magnetic Resonance Imaging to Study Muscle Ring Finger Protein 1 Inhibits Impairment of Diastolic Function in Diabetic Cardiomyopathy

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OBJECTIVE: MuRF-1 belongs to the E3 ubiquitin ligases and is mainly expressed in cardiac and skeletal muscle. Diabetic cardiomyopathy (DCM) is the typical early clinical feature of diabetic cardiomyopathy manifested by patients presenting with diastolic dysfunction with preserved ejection fraction, but due to the lack of effective screening tools, patients are diagnosed when they present with systolic dysfunction. The aim of this study was to investigate the effect of MuRF1 on the development of diabetic cardiomyopathy by cardiac magnetic resonance (CMR) and to elucidate its aforementioned properties.

Materials and methods: After 72 SD rats were acclimatized and fed for 1 week, 18 rats were randomly selected as blank control group and fed with normal chow. The remaining 60 rats were used for modeling and fed with high-fat chow (10% lard, 2% cholesterol, 0.5% cholate, 20% sucrose, 67.5% regular chow) for 4 weeks to establish an insulin resistance model. After the 60 rats in the model group were fasted overnight for more than 12 h, streptozotocin (STZ) was dissolved in 0.1 mmol/L-1 citric acid-trisodium citrate buffer at pH=4.3, configured to a concentration of 2%, and injected into the abdominal cavity of the rats at a single dose of 30 mg/kg-1 to establish a rat model of type 2 diabetes mellitus. The rats were divided into four groups: the CON group, the T2DM group, the T2DM+MuRF-1 overexpression group and the T2DM+MuRF-1 null group. Then, rats in each group were subjected to CMR imaging, including FLASH-cine, T1 mapping sequence and delayed reinforcement sequence to assess LV function, strain, T1 mapping value and ECV value. Finally, blood, heart and samples were collected for relevant tests.

RESULTS: The MuRF-1 overexpression group significantly increased LV ejection fraction (51.98 ± 7.88 vs 61.30 ± 6.09), overall longitudinal (-12.90 ± 3.53 vs -18.05 ± 3.43), and circumferential (-20.46 ± 2.47 vs -22.67 ± 1.32) strain compared to the T2DM group. In addition, blood biochemical results showed significant elevation of superoxide dismutase (216.50 ± 19.15 vs 292.60 ± 44.38) and glutathione peroxidase (9974.00 ± 900.80 vs 17843.00 ± 3585.00) and significant elevation of malondialdehyde (9.01 ± 5.59 vs 5.53 ± 1.15), creatine kinase-MB (353.00 ± 61.11 vs 210.80 ± 59.00) were significantly decreased. 00) were significantly elevated, whereas malondialdehyde (9.01 ± 5.59 vs 5.53 ± 1.15), creatine kinase-MB (353.00 ± 61.11 vs 210.80 ± 59.57), and lactate dehydrogenase (747.30 ± 278.80 vs 357.90 ± 135.70) were significantly decreased. These findings may be related to the upregulation of MuRF-1 expression, which was confirmed by PCR, immunohistochemistry and WB assays. Cardiac-associated staining indicated that MuTF-1 overexpression therapy inhibited pathological fibrosis.

CONCLUSION: Our study demonstrated that MuTF-1 overexpression significantly increased RVEF, GLS, and GCS by CMR imaging. in this regard, we explored the corresponding mechanisms with the help of several assays. Our study is expected to lay the foundation for pro-early warning of LV dysfunction in diabetic cardiomyopathy.

PO-3326

Explore the alleviative effect of Cangai volatile oil on myocardial hypertrophy of different degrees in rats exposed to chronic hypobaric hypoxia at high altitude

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Purpose: This study was intended to attest to whether cardiovascular magnetic resonance (CMR) imaging could reveal the protective effect of Cang-Ai Volatile Oil (CAVO) on the cardiac of rats with chronic hypobaric hypoxia at high altitude.

Materials and Methods: Seventy SD rats were randomized into seven groups, the Control (CON), Hypobaric Hypoxia (HH), HH + CAVOh, HH+ CAVOI, Hypobaric Hypoxia+ myocardial hypertrophy (HM), HM+CAVOh, and HM + CAVOI. Except for rats in the CON group, rats in other groups were transported from Chengdu to Yushu, China (altitude: 4,250m) and housed there for two months. Rats of the HM, HM+CAVOh, and HM+CAVOI groups were injected intraperitoneally with ISO (3 mg/kg for 14 days), while at the same time, rats in the HH, HH+CAVOh, HH+CAVOI groups were injected intraperitoneally with saline. Left ventricular function and global strain of the rats were measured by 7.0T high-field CMR.

Results: CMR imaging revealed that the left ventricular ejection fraction (LVEF) and global strains improved significantly in all groups after CAVO treatment compared with the HH group ($p < 0.05$). Injuries related to oxidative stress occurred after CAVO treatment, as evidenced by the increase in SOD and the decrease in MDA and LDH ($p < 0.05$). Western blotting indicated that CAVO treatment increased the protein expression of NRF2 and HO-1.

Conclusion: CAVO treatment can reduce cardiac damage induced by chronic hypobaric hypoxia and ventricular hypertrophy induced by isoprenaline (ISO) at high altitude, as revealed by the oxidative stress-related indicators, and the effect can be measured by 7.0T high-field CMR.

PO-3327

Cardiac magnetic resonance multimodal evaluation of the ameliorative effects of BAG3 on left ventricular remodeling in rats

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OBJECTIVE: To evaluate the ameliorative effect of overexpressed BAG₃ on left ventricular remodeling in myocardial ischemia/reperfusion (I/R) rats using 7T cardiac magnetic resonance (CMR) multimodal imaging.

METHODS: Thirty-two SD male rats were randomly divided into 4 groups, i.e., 8 rats in each of the sham-operated, model, experimental, and control groups, and the I/R rat model was constructed by open-chest ligation of the left anterior descending; the experimental group was injected with overexpression of BAG₃ adeno-associated virus in situ in the myocardium of I/R model; the control group was injected with unloaded adeno-associated virus in situ in the myocardium of the I/R model; and the sham-operated group was only pierced by needle. After 4 weeks, all rats underwent CMR scanning to collect data, and the post-processing software CVI42.0 was used to analyze and compare the differences in LV conventional cardiac function parameters, myocardial strain

parameters, and T2mapping parameters in each group. At the end of MRI scanning, the rats were executed, and the hearts were extracted for pathologic examination and RT-qPCR detection.

RESULTS: Compared with the sham-operated group, rats in the model group showed increased LVEDV and LVESV, decreased SV and EF (all $P < 0.05$), decreased LVGRS, LVGCS, and LVGLS (all $P < 0.05$), and increased T2 values in infarcted areas (all $P < 0.05$), with significant damage to myocardial tissues and increased infarcted areas; compared with the model group, rats in the control group showed significant injury to LVEDV LVEDV, LVESV, SV, EF, LVGRS, LVGCS, LVGLS, infarct zone T2 and myocardial tissue damage were not different in the control group; compared with the control group, the experimental group showed a lower LVESV, higher EF ($P < 0.05$), higher LVGRS, LVGLS, LVGCS, and infarct zone T2 ($P < 0.05$), lower infarct zone and reduced myocardial fibrosis. Myocardial fibrosis was reduced.

CONCLUSION: BAG₃ can improve cardiac function and delay the process of ventricular remodeling in I/R rats, and has a certain protective effect on the structure and function of the rat heart.

PO-3328

Magnetic resonance and fluorescence imaging of perfluorohexane loaded nanoparticles targeting atherosclerosis and their effects on activated macrophages

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Objective Cardiovascular disease is a kind of major disease that seriously endangers human health and life, accounting for the first mortality rate in the world. Atherosclerosis is an important pathological basis for the occurrence and development of cardiovascular disease. Vulnerable atherosclerosis plaque is prone to sudden rupture, leading to fatal events. The rupture of atherosclerosis plaque is closely related to the composition of plaque. Therefore, non-invasive detection of the composition of AS plaque will have a very important clinical application value for the treatment and prognosis of AS patients. This study will prepare a magnetic resonance imaging (MRI)/near-infrared fluorescence dual-mode molecular probe targeting scavenger receptor A with phase change material-perfluorohexane (PFH) and dextran sulfate (DS), and study its effect on activated macrophages, aiming at early intervention of vulnerable atherosclerotic plaques at the molecular level and evaluating the therapeutic effect.

Methods Nanoparticles (PFH-Fe/DiR-DS) were prepared using an improved double emulsion method and electrostatic adsorption method. The average particle size, polydispersity indexes, and surface potential of the nanoparticles were measured using the Marvin particle size analyzer. The morphology and internal structural characteristics were observed using scanning electron microscopy and high-resolution transmission electron microscopy. Study the in vitro MRI and near-infrared fluorescence imaging of nanoparticles and their phase transition performance. Cultivate mouse macrophages RAW 264.7 in vitro, study the targeting effect of nanoparticles on activated macrophages, conduct cell viability experiments, and analyze the induction of macrophage apoptosis by nanoparticles phase transition using biological electron microscopy.

Results The final size of the prepared PFH-Fe/DiR-DS nanoparticles is (286.30 ± 16.82) nm, with a polydispersity indexes of (0.102 ± 0.057) and a surface potential of (-18.65 ± 1.09) mV. They have a shell core structure and a smooth three-dimensional spherical surface. In the element mapping images collected under high-resolution transmission electron microscopy, it can be seen that the fluorine element of PFH and the iron element of Fe₃O₄ are concentrated inside the nanoparticles, while the sulfur element of DS exhibits a clear circular structure distributed outside the nanoparticles. The PFH-Fe/DiR-DS nanoparticles can be used as ideal MRI contrast agents and have good near-infrared fluorescence imaging ability. Fluorescence signals are enhanced in a concentration dependent manner. Under the irradiation of low intensity focused ultrasound (LIFU), PFH-Fe/DiR-DS nanoparticles can undergo phase transition. Nanoparticles have good targeting

properties towards activated macrophages and are time dependent. After being internalized by macrophages and irradiated by LIFU, they can induce macrophage apoptosis through sound induced phase transition effect.

Conclusion In this study, we successfully constructed multimodal multifunctional nanoparticles (PFH-Fe/DiR-DS) targeting atherosclerotic plaques, and induced macrophage apoptosis under LIFU irradiation. The application of magnetic resonance and near-infrared fluorescence molecular imaging technology to monitor and evaluate the status of plaque is expected to be able to carry out specific diagnosis and targeted treatment of atherosclerotic plaque. So as to effectively prevent cardiovascular and cerebrovascular events and reduce medical costs. Significantly improve the quality of life of patients and alleviate the contradiction between doctors and patients, which not only provides an effective means for non-invasive, early assessment, treatment and efficacy evaluation of vulnerable atherosclerosis plaque, but also has important significance for promoting social harmony and stability.

PO-3329

The value of using machine learning models based on conventional MRI radiomics features to predict the blood supply of pituitary neuroendocrine tumors preoperatively

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Abstract

Objectives: A study on the value of using a machine learning model based on conventional MRI radiomic features to predict the blood supply of pituitary neuroendocrine tumors preoperatively.

Methods: A retrospective analysis was conducted on clinical and imaging data of 136 patients with histologically confirmed pituitary neuroendocrine tumors (diameter greater than 10mm) at the Yijishan Hospital, the First Affiliated Hospital of Wannan Medical College, from April 2013 to April 2023. Based on intraoperative observations, the patients were divided into a group with rich blood supply (n=50) and a group with moderate blood supply (n=86). Using ITK-SNAP software, the lesions' regions of interest (ROIs) were manually delineated layer by layer on coronal T1WI, T2WI, and contrast-enhanced T1WI images. Three-dimensional fusion was performed, and AK software was used to extract various texture features of the lesions. The minimum redundancy maximum relevance (mRMR) and least absolute shrinkage and selection operator (LASSO) were employed to select and reduce the dimensionality of texture features, and radiomics labels were created. The scores of each patient were calculated, and the reliability of the model was determined through 100 iterations of leave-group-out cross-validation (LGOCV). Three machine learning algorithms, including logistic regression (LR), random forest (RF), and support vector machine (SVM), were used to establish radiomics prediction models. Receiver operating characteristic (ROC) curves were generated to evaluate the diagnostic performance of the models, and decision curve analysis (DCA) was performed to assess the clinical net benefit of the models.

Results: The area under the curve (AUC) for the clinical model in predicting the blood supply of pituitary neuroendocrine tumors in the training and validation groups were 0.74 (0.64-0.85) and 0.82 (0.68-0.96), respectively. The AUCs for the T1WI, T2WI, T1WI enhanced, and combined sequence radiomics models in the training group for predicting the blood supply of pituitary neuroendocrine tumors were 0.80 (0.71-0.89), 0.84 (0.75-0.92), 0.82 (0.73-0.92), and 0.84 (0.76-0.93), respectively. In the validation group, the AUCs were 0.82 (0.68-0.96), 0.80 (0.66-0.94), 0.85 (0.74-0.97), and 0.83 (0.70-0.97) for T1WI, T2WI, T1WI enhanced, and combined sequence radiomics models, respectively. The AUCs for the LR, RF, and SVM models in the training group were 0.85 (0.77-0.93), 0.87 (0.81-0.95), and 0.84 (0.76-0.93), respectively. In the validation group, the AUCs were 0.85 (0.73-0.97), 0.85 (0.72-0.98), and 0.83 (0.67-0.98) for the LR, RF, and SVM models, respectively. The radiomics models outperformed the clinical model in terms of diagnostic

performance. DeLong test revealed statistically significant differences in AUC between the clinical model and combined sequence radiomics models, LR, and SVM models in the training group ($Z=2.948, 2.514, 2.281, P=0.022, 0.012, 0.022$). Decision curve analysis (DCA) showed that the combined sequence model, LR, and SVM models achieved better clinical net benefit, with the LR model being the most optimal.

PO-3330

Evidence for hypometabolism in epileptic focus and GABA alterations in drug-resistant MRI-negative TLE

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Background: Increasing evidence suggests that the hypometabolism of the epileptogenic focus affects the treatment prognosis of temporal lobe epilepsy (TLE). Hypometabolism during interictal periods is often associated with drug resistance and poorer surgical outcomes. Epileptic seizures involve neurotransmitter synthesis and consumption, accompanied by central nervous system energy substance depletion. Therefore, we attempted to investigate the metabolic levels of the epileptogenic focus through single-voxel MRS, comparing drug-resistant patients, drug-responsive patients, and healthy controls with MRI-negative TLE in order to provide more evidence for the correlation between Hypometabolism of the epileptogenic focus and drug-resistant epilepsy.

Materials and methods: 47 patients of MRI-negative TLE were divided into a drug-resistant group ($n=9$) and a drug-responsive group ($n=38$) based on their response to medication. Brain metabolite concentrations were quantitatively analyzed by using LCmodel. MRS data were compared with those of 20 age- and gender-matched healthy controls, analyzing differences in epileptic focus indicated by video-EEG metabolite changes among different groups.

Results: GABA (gamma-aminobutyric acid) ($p=0.048$), Glu ($p=0.039$), NAA ($p=0.002$), NAAG ($p<0.001$), Cho ($p=0.004$), Cr ($p=0.046$) concentrations on the epileptic side were significantly lower than contralateral in patients. Interestingly, the difference was most evident in patients with drug-resistant epilepsy. Besides, these metabolites were all lower in the drug-resistant group compared to those in the drug-responsive group. GABA was significantly different between the drug-resistant, drug-responsive and healthy controls ($p=0.019$).

Conclusion: GABA and Glu levels are significantly reduced in the epileptic side, reflecting the hypometabolism of the epileptic focus in interictal period. These metabolite levels were even lower in drug-resistant epilepsy. Cho and Cr are important substances for brain energy regulation and supply, their reduction also affects neurotransmitter synthesis, thereby influencing neuronal excitability. This study supports the correlation between hypometabolism of the epileptic focus and poor prognosis in drug-resistant TLE, providing evidence of metabolite levels for drug-resistant MR-negative TLE.

PO-3331

In vivo MRI and Fluorescence Dual-modal Imaging of Inflammation for Identifying Unstable Atherosclerotic Plaque Using Stabilin-2 Targeted Magnetic Nanoparticles

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Objective: Inflammation drives and reflects the disease activity of atherosclerosis (AS), and is a key imaging biomarker for identifying unstable plaques. However, challenges remain with the current in vivo imaging modalities for identifying unstable atherosclerotic plaques due to their low specificity and sensitivity. Herein, this study intended to develop a novel dual-modal imaging platform that specifically identifies unstable plaques through magnetic resonance imaging (MRI) and near-infrared fluorescence (NIRF) by using macrophage receptor stabilin-2 targeted iron oxide nanoparticles (S2P-Fe₃O₄-IRDye800CW) as a novel molecular imaging nanoprobe.

Methods: S2P-Fe₃O₄-IRDye800CW nanoparticles were constructed by conjugating stabilin-2 peptide (S2P) and IRDye800CW fluorescent dye to the surface of Fe₃O₄ nanoparticles, and Con-Fe₃O₄-IRDye800CW nanoparticles were similarly constructed using control peptide as the control nanoprobe. Raw 264.7 macrophages, human umbilical vein endothelial cells and vascular smooth muscle cells were co-cultured with S2P-Fe₃O₄-IRDye800CW or Con-Fe₃O₄-IRDye800CW nanoparticles to test specific targeting ability of the nanoprobe in vitro. To establish atherosclerotic mice containing unstable plaques, we fed six-week-old male ApoE^{-/-} mice a high fat diet and induced unstable plaque by cast placement over the left carotid artery. After twenty weeks, in vivo NIRF and MRI imaging of atherosclerotic plaque were performed before, 12h, 24h and 48 h after intravenous injection of S2P-Fe₃O₄-IRDye800CW or Con-Fe₃O₄-IRDye800CW nanoparticles. Immunofluorescent staining analysis was applied to co-localize the S2P-Fe₃O₄-IRDye800CW nanoparticles with macrophages in the murine unstable plaques.

Results: In vitro experiment demonstrated that the S2P-Fe₃O₄-IRDye800CW nanoparticles specifically targeted Raw 264.7 macrophages, not human umbilical vein endothelial cells or vascular smooth muscle cells. In vivo NIRF imaging of ApoE^{-/-} mice showed that the fluorescent signal background ratio (SBR) of unstable plaques reached the peak at 12h after intravenous injection of S2P-Fe₃O₄-IRDye800CW, while the fluorescent SBR peaked at 2h after injection of Con-Fe₃O₄-IRDye800CW (SBR at 12h: S2P-Fe₃O₄-IRDye800CW 2.02 ± 0.14 vs. Con-Fe₃O₄-IRDye800CW 1.34 ± 0.20 , $P < 0.05$). Meanwhile, injection of S2P-Fe₃O₄-IRDye800CW nanoparticles on MRI images resulted in lower T2* values at 12h post-injection than did injection of Con-Fe₃O₄-IRDye800CW nanoparticles ($\Delta T2^*$ at 12h: S2P-Fe₃O₄-IRDye800CW $34.36 \pm 8.71\%$ vs. Con-Fe₃O₄-IRDye800CW $3.31 \pm 1.05\%$, $P < 0.05$). Ex vivo NIRF imaging of unstable plaques showed that the fluorescence intensity was higher in S2P-Fe₃O₄-IRDye800CW group compared with Con-Fe₃O₄-IRDye800CW group ($12.30 \pm 1.15 \times 10^6$ vs. $9.06 \pm 0.21 \times 10^6$, respectively, $p = 0.0087$). Immunofluorescence staining images revealed that S2P-Fe₃O₄-IRDye800CW nanoparticles were highly abundant within unstable plaque and well co-localized with CD68-stained macrophages.

Conclusions: This dual-modal MRI/NIRF approach revealed that the macrophage receptor stabilin-2 targeted nanoprobe might serve as a non-invasive method for detecting unstable atherosclerotic plaques in vivo.

PO-3332

The relationship between brain microstructural alterations and clinical symptoms and psychological disorders in Crohn's disease

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Objective: This study aimed to investigate alterations in brain structure of Crohn's disease (CD) patients with activity (CD-A) and remission (CD-R) compared to healthy controls (HCs), and explore the relationship between brain gray matter structure and clinical symptoms and psychological disorders.

Methods: 220 participants underwent MRI scans. Based on T1-weighted MRI, voxel-based morphometry (VBM) was applied to investigate gray matter volume (GMV) and global cerebrospinal fluid (CSF) volume alterations. Pearson correlation analysis was used to evaluate relationships between the structure alterations and clinical data and psychological data.

Results: Compared with HCs, CD-A had increased CSF volume, and the CSF volume was negatively correlated with the duration. CD-A had decreased GMV mainly in the bilateral temporal pole, bilateral frontal pole, bilateral frontal orbital cortex, bilateral occipital pole, left lateral occipital cortex and right precentral gyrus; they showed increased GMV in the left parahippocampal gyrus. Meanwhile, the CD-R showed significantly decreased GMV in the left frontal orbital cortex, right frontal pole, and right temporal pole. And the GMV of CD-R in the left precuneous cortex was increased than HCs. Compared with CD-R, CD-A exhibited decreased GMV of the right postcentral gyrus, left subcallosal cortex, left frontal pole, right inferior frontal gyrus and left temporal pole. Moreover, we found the GMV in some brain regions was positive with the scores of the inflammatory bowel disease questionnaire and Symptom checklist-90.

Conclusion: This is the larger study to date in patients with CD-A of brain gray matter microstructural alterations. Alterations in brain gray matter structure in multiple regions in CD-A and CD-R associated with clinical features and psychological data may reflect neuroplasticity effects to a chronic systemic inflammatory response, explaining the emotional disturbance symptoms in CD patients.

PO-3333

IVIM quantitative parameters combined with clinicopathological features can predict PD-L1 expression in cervical cancer

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Purpose: Immunotherapy targeting the programmed cell death protein 1 (PD-1)/programmed cell death ligand-1 (PD-L1) has played a pivotal role in the treatment of recurrent or metastatic cervical cancer (CC), but its imaging biomarkers are yet elusive. Intravoxel incoherent motion-DWI (IVIM-DWI) can characterize tumors. To investigate the relationship between IVIM parameters and PD-L1 expression in women with CC before treatment and to establish a combined model to distinguish PD-L1 status based on clinicopathological characteristics and IVIM parameters.

Materials and Methods: The prospective study was approved by our institutional review board, and all patients signed informed consent forms. Between January 2021 and August 2022, 78 eligible patients (range, 28–75 years old) with CC were enrolled. IVIM parameters were measured, compared, and analyzed. Logistic regression analysis was carried out to identify independent factors associated with PD-L1-expression were identified and established combined models. The performance of models was evaluated by the receiver operating characteristic (ROC) analysis. The Shapley additive explanation (SHAP) algorithm was used to explain the contribution of each parameter in the combined model at the overall level and the decision-making process of each case.

Results: The D value was significantly lower in the PD-L1-positive group than in the PD-L1-negative group (0.64 ± 0.12 vs. 0.72 ± 0.11 , $P=0.02$; $r=-0.39$, $P<0.05$). FIGO staging, pathological grade, parametrial invasion, lymph node status, and D values were independently associated with PD-L1 expression. The combined model of the D-values with the clinicopathological characteristics exhibited the highest diagnostic performance, with AUC, sensitivity, and specificity of 0.89 (0.77-0.96), 90.9%, 82.6%, compared with the clinicopathological model 0.76 (0.62-0.86), 63.6%, 78.3%. According to the SHAP value, FIGO staging and pathological grade were the most influential feature of the prediction model, while the D values still had a certain contribution.

Conclusion: IVIM parameters were correlated with PD-L1 expression. The combined model incorporating clinicopathological features and D value showed better discrimination in predicting PD-L1 status than the clinicopathological model, providing the basis for CC immunotherapy.

PO-3334

Diurnal variation of GABA levels in the parietal and anterior cingulate gyrus of healthy young people based on magnetic resonance spectroscopy

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Study Objectives: No studies have reported diurnal stability in GABA(γ -aminobutyric acid) and Glx (Glutamine/glutamate complex) levels in the parietal lobes (PL) and anterior cingulate gyrus (ACC). Circadian rhythms regulate changes in melatonin (MT), blood pressure (BP), heart rate (HP), and GABA. This study observed the diurnal variation of MT, BP, HP, and GABA, and attempted to explore the correlation between GABA and these biological indicators.

Methods: A total of 26 subjects (22-27 years) contributed magnetic resonance spectroscopy data. GABA+ (GABA signal contained the overlapping signals of macromolecules and homocarnosine), GABA+/Cr (ratio of GABA+ to creatine), Glx/Cr (ratio of Glutamine/glutamate complex to creatine), Glx, MT, BP, HP, at five-time points (1:00, 5:00, 9:00, 17:00, 21:00).

Results: GABA+/Cr and GABA+ levels in PL declines from 1:00 to 9:00 and rises from 9:00 to 21:00. GABA+/Cr and GABA+ levels were statistically different with a trough at 9:00 and a peak at 21:00 ($F=3.852$, $p=0.024$), ($F=3.850$, $p=0.005$). GABA+/Cr and GABA+ in ACC was positively correlated with MT ($r=0.259$, $p=0.015$), ($r=0.260$, $p=0.005$).

Conclusions: GABA levels in the PL have diurnal differences and suggest the need to consider the effect of time in the study of PL. GABA+/Cr and GABA+ in ACC is positively correlated with MT. MT and GABA are the main drugs for the treatment of insomnia, which provides some theoretical basis for the drug treatment of insomnia.

PO-3335

IVIM quantitative parameters can non-invasive predict PD-1/PD-L1 expression in cervical cancer: combined with clinicopathological features

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Purpose: Although the treatment of recurrent or metastatic cervical cancer (CC) has relied heavily on immunotherapy targeting the programmed cell death protein 1 (PD-1)/programmed cell death ligand-1 (PD-L1), the imaging biomarkers associated with PD-1/PD-L1 expression remain unclear. Intravoxel incoherent motion-DWI (IVIM-DWI) can characterize tumors. To build a combined model to distinguish PD-1/PD-L1 status based on clinicopathological features and IVIM parameters and to investigate the association between IVIM parameters and PD-1/PD-L1 expression in women with CC before treatment.

Materials and Methods: The prospective study was approved by our institutional review board, and all patients signed informed consent forms. 78 eligible patients were enrolled between January 2021 and August 2022 (range, 28–75 years old). IVIM parameters were measured, compared, and analyzed. To identify independent variables connected to PD-1/PD-L1 expression, logistic regression analysis was used to establish combination models. The receiver operating characteristic (ROC) analysis was used to assess the performance of models. The contribution of each parameter in the combined model at the overall level and the decision-making process in each case were both explained using the Shapley additive explanation (SHAP) algorithm.

Results: In comparison to the PD-1-negative group, the PD-1-positive group had a significantly lower D value (0.63 ± 0.13 vs. 0.73 ± 0.09 , $P=0.003$; $r=-0.44$, $P<0.05$); the PD-L1-positive and PD-L1-negative groups had a similar trend (0.64 ± 0.12 vs. 0.72 ± 0.11 , $P=0.021$; $r=-0.39$, $P<0.05$). FIGO staging, pathological grade, parametrial invasion, lymph node status, and D values were independent parameters associated with PD-1/PD-L1 expression. Compared with the clinicopathological model with AUC, sensitivity, and specificity of (0.778 (0.647-0.878), 87.1%, 64.0% in the PD-1 group, and 0.756 (0.623-0.861), 63.6%, 78.3% in the PD-L1 group, respectively), the combined model of the D-values with the clinicopathological characteristics demonstrated the highest diagnostic performance, with AUC, sensitivity, and specificity of 0.845 (0.724-0.928), 93.5%, 72.0% in PD-1 group, and 0.887 (0.774-0.956), 90.9%, 82.6% in the PD-L1 group, respectively. FIGO staging and pathological grade were the components of the prediction model with the highest influence according to the SHAP value, while the D values still had a certain contribution.

Conclusion: IVIM parameters were correlated with PD-1/PD-L1 expression. In comparison to the clinicopathological model, the combined model including clinicopathological characteristics and D value demonstrated superior discrimination in predicting PD-1/PD-L1 status, providing assistance for clinicians for immunotherapy decision-making of CC patients in the future.

PO-3336

Machine learning based on sarcopenia and MRI radiomics to predict the efficacy of neoadjuvant therapy for triple-negative breast cancer

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Purpose: Developing a machine learning model that combined sarcopenia and T1C-MRI radiomics features to comprehensively predict the neoadjuvant chemotherapy (NAC) efficacy in triple-negative breast cancer (TNBC) patients.

Methods: Pretreatment T1C-MR images and clinical features of 121 patients with TNBC who underwent NAC in Westchina hospital from January 2012 to September 2021 were collected in this study. Based on postoperative pathological specimens, patients were classified into Miller-Payne (MP) Low/High and pathological complete response (pCR) /non-pCR groups. Firstly, we assessed the skeletal muscle and fat mass before NAC on CT images at the L3 vertebra to determine the presence of sarcopenia, and used univariate regression analysis to assess clinical variables that were significantly correlated with NAC prognosis. Then, regions of interest (ROIs) were manually delineated, and quantitative imaging features were extracted. Radiomics models were constructed by using the LDA, RF, MLP, NBB, SVM and LR algorithms. Finally, combined predictive models were developed by integrating radiomics features with independent clinical and pathological features.

Results: Among the clinical factors, only sarcopenia showed significant correlation with both MP and pCR. Receiver Operating Characteristic (ROC) demonstrated that the radiomics model using the LR algorithm exhibited robustness and the best classification performance. In the validation set, the area under curves (AUC) for MP and pCR predictions were 0.753 and 0.799. The combined models, which integrated sarcopenia, further improved the predictive capability, and the AUC for MP and pCR predictions were 0.781 and 0.827. Decision curve analysis indicated clinical value for all models.

Conclusion: Sarcopenia status combined with radiomics models demonstrated excellent predictive ability for NAC efficacy. The study had the potential to provide prognostic stratification of TNBC patients and guide personalized treatment.

PO-3337

BATF is potential diagnostic and prognostic biomarker associated with 18F-FDG PET/CT features in colorectal cancer

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Purpose BATF may act as potential target for tumor immunotherapy. However, data on the functional role of BATF in the development of colorectal cancer (CRC) remains limited. The purpose of the study is to evaluate the correlation between BATF expression and 2-deoxy-2-[18F]fluoro-D-glucose (18F-FDG) uptake and their prognostic value in CRC patients.

Methods Pan-cancer analysis was performed to determine the expression profile of BATF in human cancers. The prognostic value of BATF was evaluated and a prognostic model was established based on The Cancer Genome Atlas (TCGA) database. The qRT-PCR and Western blot analyses were used to profile the protein expression and mRNA level of BATF in different CRC cell lines and

normal colorectal mucosal cell line. Cell Counting Kit-8 assays and clonogenic assay were utilized to evaluate the role of BATF in CRC proliferation. The expression of tumor BATF and glucose transporter 1 (GLUT1) was examined using immunohistochemical tools in 36 CRC patients undergoing preoperative 18F-FDG positron emission tomography/computed tomography (PET/CT) imaging. The correlation between the PET metabolic parameters and the correlation with the immunohistochemical result was evaluated.

Results In database, BATF was upregulated in CRC compared with normal tissues. High expression of BATF was correlated with worse overall survival in CRC. The nomogram based on the BATF expression showed a good predict probability and clinical utility in predict the 1-, 3-, and 5-year overall survival in CRC. In vitro, the expression of BATF in CRC cells were knocked down by transfecting with shRNA to verify its function in tumor progression. Knock down of BATF expression could inhibit the proliferation of CRC cells. In CRC patients, BATF was upregulated compared with normal tissues. BATF expression was positively related with GLUT-1 expression and PET metabolic parameters, including maximum standard uptake value, tumor-to-nontumor ratios, metabolic tumor volume, and total lesion glycolysis.

Conclusion BATF regulated CRC proliferation in vitro and in vivo, and positively correlated with glycometabolism. BATF is potential diagnostic and prognostic biomarker associated with 18F-FDG PET/CT features in colorectal cancer.

PO-3338

Sequential targeting biomimetic nano platform for enhanced mild photothermal therapy and chemotherapy of tumor

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Tumor targeting drug delivery is of vital importance for the treatment of triple negative breast cancer (TNBC) considering the appreciable amount of tumor matrix and the absence of effective targets on the tumor cells. Herein, a new therapeutic multifunctional nanoplateform (mPDA@Cur/M-CM) with improved TNBC targeting ability and efficacy is constructed and used for TNBC treatment. Two kinds of cell membrane endow the nano platform with orderly targeting ability, achieving accurate delivery of drugs. Meanwhile, the existence of curcumin, MnO₂ and mPDA promotes the apoptosis of cancer cells by cytotoxicity, enhanced Fenton-like reaction, and thermal damage, respectively. Both in vitro and in vivo results show that the designed biomimetic nanoplateform significantly inhibit the tumor growth and provide an efficient novel therapeutic strategy for TNBC.

PO-3339

Dual logic gate regulated triple amplified CRISPR-based biosensors for achieving high signal-to-ratio and dual-modal biological monitoring

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Objective: Although the clustered regularly interspaced short palindromic repeats (CRISPR)-based biosensors were exploited as an efficient tool for analytical science, the indiscriminate single-stranded deoxyribonuclease (DNase) activity of CRISPR may suffer from insufficient detection accuracy. This study aimed to design an exquisite dual DNA logic gate by sequentially responded

to two kinds of cancer-associated protein to operate signal amplification, thus achieving high signal-to-ratio detection of target. Furthermore, a new idea for simultaneous magnetic resonance imaging (MRI) and electrochemiluminescence (ECL) two-dimensional detection could be explored.

Methods: To begin with, a creative electrochemiluminescence (ECL) platform with excellent performances was established by anchoring Cu nanoclusters (Cu NCs) on the surface of Zn-MOF, which exhibited strong and stable ECL emission. Subsequently, the first logic gate was unlocked by the input of A-methyl acyl-CoA racemase (AMACR) to release the bipedal walker (BW), which could open the second logic gate with the assistance of apurinic endonuclease 1 (APE1). After that, rolling circle amplification (RCA) was initiated to generate heavily repetitive sequence of the activator of CRISPR/Cas12a that effectively activated the CRISPR/Cas12a system. The activated CRISPR/Cas12a system with trans-cleavage ability converted recognition events of targets into effective measurable signals by cleaving the quenching probes to achieve the detection of the target based on the ECL platform.

Results: Firstly, scanning electron microscopy (SEM) characterizations of Cu NCs@Zn-MOF and Zn-MOF both presented similar 2D nanosheet structure and size. In comparison to Zn-MOF, plenty of particles were distributed on Cu NCs@Zn-MOF, which implied the enrichment of Cu NCs. Furthermore, the native polyacrylamide gel electrophoresis (PAGE) results verified the generation of DNA ring and the feasibility of DNA assembly and RCA reaction process. Moreover, the constructed biosensor displayed satisfactory assay performances including sensitivity, selectivity and stability toward AMACR. A satisfactory linear relationship between the logarithmic value of AMACR concentrations (from 10 pg/mL to 1 µg/mL) and the ECL intensity could be expressed as $I = 2003.44 \lg c + 9754.34$ with the correlation coefficient of 0.999 and the detection limit of 0.65 pg/mL. Meanwhile, the recoveries relative standard deviation (RSD) of AMACR in human serum samples were calculated to be 91.20-118.58 % and 1.4-3.0 % based on the previously calibrated curve. More importantly, magnetic resonance (MR) in vitro was scanned with different concentrations of magnetic nanoparticles anchored with DNA ring/hairpin (DNA ring/hairpin-MNs). The T2-weighted MR showed that with the increase concentration of DNA ring/hairpin-MNs, the MR signal strength of the water was gradually reduced.

Conclusions: This policy offered a fresh impetus to construct highly sensitivity and broadly applicable biosensor for monitoring biomarkers with dual-modal ECL and MR imaging.

PO-3340

Predictive value of 18F-FDG PET/CT and serum tumor markers for tumor mutational burden in patients with non-small cell lung cancer

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Purpose: Tumor mutational burden (TMB) has been acknowledged as a promising biomarker of response to immunotherapy. However, TMB has not been widely available clinically due to difficulties in detection. This study aimed to investigate whether metabolic parameters (MPs) of 18F-fluorodeoxyglucose (FDG) uptake on positron emission tomography/computed tomography (PET/CT) and serum tumor markers (STMs) could be used as potential substitutes for TMB through non-invasive methods in patients with non-small cell lung cancer (NSCLC).

Materials and Methods: In this retrospective study, we enrolled 129 patients with NSCLC (males, 78; females, 51) who underwent baseline TMB and STM tests and 18F-FDG PET/CT scans before treatment between March 2018 and September 2022. Patients were categorized into TMB-high (TMB ≥ 10 mutations/Mb; n=27 [20.9%]) and non-TMB-high (TMB < 10 mutations/Mb; n=102 [79.1%]) groups. Binary logistic regression analyses were performed to determine independent

predictors of TMB-high. Linear regression analyses were performed to determine independent predictors of TMB level on a log scale. Subgroup analyses for adenocarcinoma (ADC), ADC with EGFR+, ADC with EGFR-, and squamous cell carcinoma (SCC) were performed.

Results: For ADC, all MPs (SULpeak, SULmax, SULmean, MTV, and TLG) were significantly higher in the TMB-high group than the non-TMB-high group; smoker (odds ratio [OR]=27.08, $p=0.018$), EGFR+ (OR=0.03, $p=0.033$), KRAS+ (OR=7.98, $p=0.083$), high CEA (OR=33.56, $p=0.029$), and high CA125 (OR=13.68, $p=0.030$) were independent predictors of TMB-high; and all MPs showed significant positive linear correlations with TMB on a log scale, with SULpeak as an independent predictor. However, no significant correlation was observed for SCC.

Conclusion: MPs and STMs can predict the TMB level for patients with ADC, and may serve as potential substitutes for TMB with increased value and easy implementation in guiding immunotherapy through non-invasive methods.

PO-3341

PET imaging of brown adipose tissue using fluorine 18-labeled TSPO ligand DPA-714

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Background and aims: Brown adipose tissue (BAT) plays a key role in regulation of body temperature in mammals including humans through uncoupled protein-1 (UCP-1) located in mitochondria. F-18 labeled FDG PET imaging has been widely used to evaluate BAT function and its potential anti-obesity property in adults for several decades. However, [18F]FDG does not directly reflect the mitochondrial activity of BAT, which may lead to misestimating its metabolic activity. Translocator protein (TSPO) is expressed on mitochondria membrane of different tissues including BAT and participates in many mitochondrial functions. Therefore, the aim of our study was to evaluate the utility of [18F] DPA-714, a ligand of TSPO, in BAT metabolic activity. And we hypothesized that the metabolic change of BAT under different conditions could be monitored by TSPO PET imaging.

Materials and methods: TSPO expression in BAT was confirmed by ex vivo immunohistological staining of BAT slices. The specificity of [18F]DPA-714 uptake in BAT was confirmed by a displacement study with unlabeled DPA-714. TSPO PET imaging was performed in 3 groups of Balb/c mice using a small animal PET scanner (Inveon, Siemens) (non-treated group: $n=3$, cold treated group: $n=3$, and CL 316-243 treated group: $n=3$, respectively). All mice were euthanized for DPA-714 bio-distribution assay after in vivo study.

Results: In vivo PET imaging revealed that [18F]DPA-714 uptake was in a butterfly shape at the interscapular BAT of non-treated mice. And the specific uptake was proved by a dramatic signal loss after cold DPA-714 replacement. The signal intensity of [18F]DPA-714 significantly increased by 2 to 3 times in both CL 316,243 and cold treated groups. Ex vivo bio-distribution assay confirmed the intensively increased [18F]DPA-714 uptake in CL 316,243 and cold activated BAT.

Conclusion: TSPO-targeted PET imaging using [18F]DPA-714 as a probe could be used to noninvasively monitor BAT activation.

PO-3342

CT features, progression patterns and immune status of pulmonary trichinosis: Quantitative evaluation based on mimics software in high-resolution CT

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Purpose To analyze computed tomography (CT) features and progression pattern of pulmonary mucormycosis based on CT and Mimics software, to provide timely and accurate guidance for clinical treatment.

Materials and methods 34 patients (22 males, 12 females; mean age, 45.7 years) diagnosed as pulmonary mucormycosis were retrospectively analyzed. The CT images were transferred to Mimics 21.0. The left and right lung tissues were extracted by threshold cutting and region growing methods, and pulmonary lesions were manually delineated. The volumes of the lungs and lesions were calculated and recorded following the reconstruction and segmentation of 3D lung models. On initial (n=34) and follow-up (n=33) CT scans, the patterns of lung abnormalities and their changing features on follow-up scans were evaluated and summarized. The NLR was calculated to reflect their immune status, and whether the progression patterns were correlated with the NLR change were analyzed.

Results 32 patients were diagnosed as blood disease, the AML mostly (24/32, 75%). On initial CT scans, nodule ($\leq 3\text{cm}$)/mass ($>3\text{cm}$) or consolidation with surrounding ground-glass opacity halo (34/34, 100%) was the most common pattern. On follow-up CT, morphologic changes (21/33, 63.6%) could be seen and they included reversed halo (RH) sign, central necrosis, and air-crescent sign. Although all cases did not demonstrate the regular morphologic changes, various combinations of pattern change could be seen frequently. The progression pattern were correlated with NLR change in 15 of 25 patients.

Conclusions Pulmonary mucormycosis most frequently presents as nodule/mass or consolidation with surrounding ground-glass opacity halo, and some features such as RH sign, central necrotic cavity or air-crescent sign can also be found at CT. The progression pattern including morphologic changes are related with the change of NLR.

PO-3343

Dual-Ratiometric Magnetic Resonance Tunable Nanoprobe with Acidic-microenvironment-responsive Property to Enhance the Visualization of Early Tumor Pathological Changes

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The development of microenvironment-responsive nanoprobes have shown great promise for use in magnetic resonance imaging (MRI), with the advantage of significantly improved specificity and good biocompatibility. However, the clinical application of responsive probes is hampered by a lack

of biological sensitivity for early molecular diagnostics and visualizing microenvironment of metabolism reprogramming in tumor progression. Here, we report on a dual-ratiometric magnetic resonance tunable (DMRT) nanoprobe designed by crosslinking different ratios of transferrin chelating gadolinium and superparamagnetic nanoparticles, complexed to a pH responsive biocompatible polymer. This dually activatable nanoprobe enables pH-dependent tumor microenvironment visualization, providing exceptional quantitative pathophysiological information in vitro and in vivo, and when used in combination with dual-contrast enhancement triple subtraction imaging technique (DETSI), this smart nanoprobe guarantees the diagnosis of early-stage diseases. We envisage that this novel integrated nanoplatform will provide a new paradigm for the clinical translation of robust DMRT nanoprobe for early disease detection and staging, as well as microenvironment visualization and disease progression monitoring

PO-3344

Deep learning for chemical exchange saturation transfer reconstruction from sparse imaging

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Purpose Reduction of the scan time of chemical exchange saturation transfer (CEST)-magnetic resonance imaging (MRI) has been a challenging issue. In some scenarios, a sufficient number of CEST images should be acquired to estimate the parameters for quantitative analysis, which prolongs the scan time. Therefore, a deep learning-based model was proposed to reconstruct high-quality, densely sampled CEST images from experimental measurements under sparse sampling, thereby achieving scan time reduction without prior B0 correction.

Methods The following innovations were made: (1) a sequence-to-sequence neural network that is capable of utilizing information from both sides was employed to reconstruct densely sampled CEST images from experimental images acquired under sparse sampling; (2) a multi-pool Bloch–McConnell equation was designed to derive wide-ranging simulated Z-spectra, overcoming the limitations of time and labor consumption in manual annotation work; and (3) a tumor-bearing rat model was built with a 7T MRI scanner for ground truth generation, which enabled performance evaluation of the reconstruction model.

Results The coefficient of determination of $R^2 = 0.9997$ was achieved in linear regression analysis; a bias of 0 and a 1.96 standard deviation of 0.007 were obtained in the Bland–Altman analysis. The reconstruction accuracies in vivo were 0.9999 and 61.3895 in terms of the structural similarity index and the peak signal-to-noise ratio, respectively.

Conclusion This study demonstrates the potential of our deep learning-based model for reconstructing high-quality, densely sampled CEST images from sparse imaging and reducing the scan time without previously correcting B0 inhomogeneity.

PO-3345

89Zr-labeled PD-L1 PET imaging as a potential biomarker to replace immunohistochemistry(IHC)

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PURPOSE The clinical outcome of immunotherapy is related to the expression level of PD-L1. IHC only reflects the PD-L1 expression in a tiny fraction of a tumor. Hence, we developed an ⁸⁹Zr-labeled atezolizumab as a probe (⁸⁹Zr-Df-Atz), using xenograft mice to detect whether the PET imaging can reflect colorectal cancer (CRC) PD-L1 expression.

METHOD We used Df-Bz-NCS to premodify with Atz, and then incubated with ⁸⁹Zr-oxalate in HEPES buffer for 1h, purified by PD-10 column, the radiochemical purity (RCP) was measured by HPLC. ⁸⁹Zr-Df-Atz was incubated in human serum and PBS at different temperatures for 24-120h to test the stability in vitro. The same concentration of ⁸⁹Zr-Df-Atz was incubated with varying concentrations of CRC PD-L1 high expression cells RKO. According to Limdo's method, the immunoreactive score (IRS) was fitted. BALB/c nu/nu mice were subcutaneously implanted with CRC cells with different PD-L1 expression levels, and then xenograft mice were intravenously injected with an appropriate amount of ⁸⁹Zr-Df-Atz 21 days later, some were euthanized within 48-120h to determine the biodistribution of organs and tumor, other mice were scanned PET imaging, and the radioactivity parameters were analyzed.

RESULTS The Stability study showed that RCP was greater than 95% when ⁸⁹Zr-Df-Atz was stored in 4 °C serum for 120h or 37°C serum for 48h. The fitted IRS was 88.34%, indicating that ⁸⁹Zr-Df-Atz could effectively bind to tumor PD-L1, and its antigen-binding ability was unimpaired. The biodistribution showed that liver uptake is highest in normal tissues, and the tumor-muscle ratio reached its highest point at 120h. PET imaging showed the tumor-to-muscle (legs) SUVmax ratio can effectively distinguish between PD-L1 high and low-expression tumors (p<0.001).

CONCLUSION ⁸⁹Zr-Df-Atz allowed efficient and straightforward preparation and better stability can help to further explore the various stages of CRC, which is expected to become an imaging tool to replace IHC.

PO-3346

Theranostic CEST-Enhanced Thermoresponsive Hydrogel Drug Delivery System for Postsurgical Treatment of Glioblastoma

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Objective: The systemic chemotherapy and radiotherapy used in the postsurgical treatment of glioblastoma multiforme (GBM) often face challenges due to highly proliferative residual tumor cells at the resection margins. This study aims to address this issue by introducing an injectable thermoresponsive hydrogel drug delivery system that possesses an inherent CEST effect.

Methods: Rheological analysis was conducted on both the blank hydrogel and the hydrogel loaded with doxorubicin, temozolomide, and hydrochloroquine (H@DTH). Additionally, the CEST effect of the aforementioned drugs was tested. An in vivo glioblastoma animal model was established, followed by resection of the brain tumors and injection of H@DTH or blank gel. CEST MRI was performed on the 1st, 3rd, 5th, and 7th day after the postsurgical intervention. Kaplan-Meier survival rates for different groups were analyzed.

Results: Both the blank gel and the H@DTH system rapidly gelled at body temperature, providing a soft intracortical drug reservoir. The Z spectra of doxorubicin exhibited clear CEST effects peaking at approximately 3 and 8 ppm. It was feasible to detect the degradation of the H@DTH system based on the CEST effects of doxorubicin. Importantly, the injection of H@DTH improved the survival rate of the rats.

Conclusion: The theranostic CEST-enhanced thermoresponsive hydrogel drug delivery system not only enhances the survival rates of GBM but also offers intrinsic CEST effects for precise drug degradation detection.

PO-3347

Multifunctional Nano-CA for Imaging-Guided Precision Therapy of Nasopharyngeal Carcinoma

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Currently, the low survival rate and poor prognosis of patients with nasopharyngeal carcinoma are ascribed to the lack of early and accurate diagnosis, and resistance to radiotherapy. In parallel, the integration of imaging-guided diagnosis and precise treatment has gained much attention in the field of theranostic nanotechnology. However, constructing a dual-modal imaging-guided nano-contrast agent (CA) with desired imaging performance as well as great biocompatibility remains challenging. Therefore, we developed a simple but multifunctional nano-CA GdCPP for the early and accurate diagnosis, and efficient treatment of nasopharyngeal carcinoma, which combined fluorescence imaging and magnetic resonance imaging (MRI) onto a single nanopatform for imaging-guided subsequent photodynamic therapy (PDT). GdCPP had appropriate particle size (81.93 ± 0.69 nm) and were highly stable, resulting in sufficient tumor accumulation, which along with massive ROS generation upon irradiation then further significantly killed tumor cells. Moreover, GdCPP owned much stronger r_1 relaxivity ($9.396 \text{ mM}^{-1} \cdot \text{s}^{-1}$) compared to clinically used Gd-DTPA ($5.034 \text{ mM}^{-1} \cdot \text{s}^{-1}$), and exhibited better $T_1\text{WI}$ MRI performance. Under dual-modal imaging-guided PDT, GdCPP achieved efficient therapeutic outcomes without causing any noticeable tissue damage. The results of in vitro and in vivo studies indicated GdCPP may be a suitable candidate for dual-modal imaging-guided precision tumor therapy.

PO-3348

Enhancing Liver Cancer Therapy and Imaging with Reduction-Responsive Biodegradable Micelles: A Theranostic Approach

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Background: Traditional anticancer treatments are responsible for compromised lifestyle of the patient and have significant side effects. Therefore, as an emerging diagnostic technology, smart nanomaterials-based drug delivery systems integrated diagnosis and therapy have aroused tremendous interest owing to visually targeting effect and superior therapy efficacy compared with traditional cancer treatment.

Objective: To fabricate a novel reduction-responsive biodegradable micelles for co-delivery of superparamagnetic iron oxide (SPIO) nanoparticles (NPs) and an anticancer agent, doxorubicin (DOX).

Methods: In this work, we have prepared reduction-responsive biodegradable micelles by linking of poly(ethylene glycol) and poly(ϵ -caprolactone) with disulfide bond (PEG-SS-PCL) for co-delivery of SPIO NPs and an anticancer agent, doxorubicin (DOX), which uses A54 peptide to specifically bind to the surface receptors of liver cancer cells. It is designed to deliver anti-tumor drugs and MR contrast agents to the tumor site with high concentration of glutathione in response to the release of anti-tumor drugs.

Results: A54-PEG-SS-PGL@SPIO/DOX can self-assemble into an 100 nm-sized micelle, which can be specifically uptaken by hepatoma carcinoma cell (Hep3B) and exhibited ultralow imaging signal intensity with varied Fe concentration on T2-weighted imaging (T2WI), was first prepared as an effective gene carrier. Meanwhile, the released Dox stimulated chemotherapy to destroy cancer, thus leading to a pronounced therapeutic effect.

Conclusion: All the results demonstrated that synthesized probes exhibited excellently diagnostic and therapeutic performance, indicating our technology may potentially offer an outstanding strategy for tumor-targeting theranostics.

PO-3349

Alterations in degree centrality and functional connectivity in tension-type headache: a resting-state fMRI study

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Objectives: Previous studies have provided evidence of structural and functional changes in the brains of patients with tension-type headache (TTH). However, investigations of functional connectivity alterations in TTH have been inconclusive. To investigate abnormal intrinsic functional connectivity patterns in patients with TTH through the voxel-wise degree centrality (DC) method as well as functional connectivity (FC) analysis.

Methods: A total of 33 patients with TTH and 38 healthy controls (HCs) underwent resting-state functional magnetic resonance imaging (rs-fMRI) scanning. The voxel-wise DC method was performed to quantify abnormalities in the local functional connectivity hubs. Nodes with abnormal DC were used as seeds for further FC analysis to evaluate alterations in functional connectivity patterns. In addition, Pearson's correlational analyses were performed between abnormal DC and FC values and clinical features.

Results: A total of 33 patients with TTH and 30 HCs were enrolled in the final analysis. Compared with HCs, patients with TTH had higher DC values in the left middle temporal gyrus (MTG.L) and lower DC values in the left anterior cingulate and paracingulate gyri (ACG.L). Seed-based FC analyses revealed that patients with TTH showed greater connections between ACG.L and the right cerebellum lobule IX (CR-IX.R), while smaller connections between ACG.L and ACG.L. The MTG.L showed increased FC with the ACG.L, while decreased FC with the right caudate nucleus (CAU.R) and left precuneus (PCUN.L). No significant correlations were observed among DC values, FC values, and VAS and DASS scores in patients with TTH.

Conclusions: Patients with TTH exhibited abnormal intrinsic functional connectivity hubs in the MTG.L and the ACG.L, and aberrant functional connection patterns with these abnormal hubs as seeds. This preliminary study provides important insights into the pathophysiological mechanisms of TTH.

PO-3350

Targeted Dual-modal Imaging for Specific Detection of Oral Squamous Cell Carcinoma

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Purpose Early diagnosis and intraoperative tumor margin identification are essential for improving treatment outcomes in oral squamous cell carcinoma (OSCC) patients. However, there's no reliable diagnostic methods to provide accurate and real-time information in clinic. The aim of this study was to develop a novel way with high sensitivity and high specificity to assist in the diagnosis and treatment of OSCC.

Methods A near-infrared (NIR) fluorescent dye Cyanine 7 (Cy7) and c-Met binding peptide (cMBP)-conjugated superparamagnetic iron oxide nanoparticles (cMBP-Fe₃O₄-Cy7 NPs) was synthesized to specifically detect tumors. OSCC subcutaneous and orthotopic xenografted mice models were established to evaluate the imaging strategy of magnetic resonance imaging (MRI) and fluorescence imaging (FLI). Prussian blue staining of tumor tissues was used to show the specific accumulation of probes.

Results Higher FLI and MPI signals, lower MRI signal were shown in tumor regions in OSCC xenografted mice injected with targeted probes cMBP-Fe₃O₄-Cy7 compared with those injected with the nontargeted ones, which can be further demonstrated by ex vivo imaging and prussian blue staining of tumors. And MPI showed better image contrast than MRI. The NIR imaging in the orthotopic tumor mice revealed cMBP-Fe₃O₄-Cy7 NPs could be delivered topically to map the tumor in the tongue.

Conclusion The multimodal imaging agent may facilitate early detection, fluorescence-guided surgery for tumor recognition in OSCC.

PO-3351

Reverse Magnetic Resonance Tuning nanoplatform with heightened sensitivity for non-invasively multiscale visualizing ferroptosis-based tumor therapy

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Detecting ferroptosis-related biomarkers in therapeutic process through non-invasive imaging approaches is of great significance. However, conventional molecular imaging modalities, such as MR-weighted imaging, encounter challenges of diminished sensitivity and difficulty in real-time precise monitoring. Here, we report a tumor acidic-microenvironment-responsive nanoplatform with "Reverse Magnetic Resonance Tuning (ReMRT)" property that is coupled with calculus-based "Area Reconstruction" for specific and quantitative imaging of ferroptosis. The T1 mapping of the ReMRT nanoplatform is turned "activated" depending on the release of Fe³⁺ when interacted with the tumor acidic microenvironment, whereas the T2 mapping is turned "reversely activated". This reverse MR mapping change is correlated with reactive oxygen species generation and DOX release, contributing to the precise monitoring of ferroptosis treatment effectiveness. Furthermore, the comprehensive platform achieves a marked enhancement in sensitivity than conventional R1/R2 values and can be used to real-time non-invasively visualize ferroptosis-related biomarkers from multiple scales. The high-sensitive biological quantitative imaging provides a novel strategy for MR-guided multiscale dynamic ferroptosis therapy.

PO-3352

The role of TIGIT/CD40 NVs encapsulating MNS-OXA in enhancing immunotherapy for pancreatic cancer

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Background & Aims Pancreatic cancer is “the king of cancers”. Immune checkpoint blockade has shown promising results in terms of improved survival rates. TIGIT/CD155 immune checkpoint axis avoids T cell exhaustion, while CD40/CD40L can enhance T cell function. Targeting these two signaling axes effectively enhances pancreatic cancer immunotherapy. Cell vesicles have emerged as a novel drug delivery material due to their better biocompatibility and targeted properties. This study aimed to investigate whether nanovesicles overexpressing TIGIT/CD40 and carrying melanin-oxaliplatin (OXA) could enhance cytotoxicity of T cells to tumor cells and evaluate the treatment of pancreatic cancer.

Methods

- (1) Constructing stable cell lines overexpressing TIGIT/CD40. Vesicles were obtained by grinding and centrifugation, and MO@Ti40 NVs were obtained by electric transfer.
- (2) The characterization of vesicles and the expression of TIGIT/CD40 protein were identified by Western Blot and transmission electron microscopy.
- (3) Laser confocal microscopy was used to observe the targeting of MO@Ti40 NVs in cells. Magnetic resonance imaging and animal imaging were used to observe the targeting of MO@Ti40 NVs in the subcutaneous model of pancreatic cancer, and flow cytometry was used to observe the apoptosis of cells.
- (4) Evaluate the tumor immune effect of MO@Ti40 NVs in vivo by observing tumor size, IHC and flow cytometry staining.

Results

- (1) MO@Ti40 NVs can bind specifically to CD155/CD40L and were enriched at tumor sites in animal imaging.
- (2) MO@Ti40 NVs promoted pancreatic cancer cell apoptosis in vitro.
- (3) MO@Ti40 NVs increased cytotoxicity of T cells and significantly inhibited the growth of pancreatic cancer in vivo.

Conclusion In this study, we demonstrated that MO@Ti40 NVs had a targeted enrichment at the tumor site and can inhibit the tumor growth of pancreatic cancer by enhancing cytotoxicity of CD8+T cells, which holds great promise for the immunotherapy of pancreatic cancer.

PO-3353

Bio-orthogonal click-targeting nanocomposites for chemo-immunotherapy synergistic therapy in triple-negative breast cancer

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Objective: Cancer immunotherapy, which combines immune checkpoint blockade (ICB) with chemotherapeutic drugs, has indeed yielded significant enhancements in patient outcomes. Nonetheless, this combined therapeutic approach has been plagued by pronounced toxicity and a suboptimal response rate in treated patients. In the context of this study, we present a solution to surmount these challenges in contemporary cancer immunotherapy by introducing bio-orthogonal click-anti-PD-L1 peptide-conjugated prodrug nanoparticles (Pep-DOX).

Methods: In the initial stage, we introduced an azide-modified sugar called tetraacetylated N-azidoacetyl-D-mannosamine (Ac4ManNAz) to facilitate glycoengineering of the tumor cell surface. Next, the anti-PD-L1 peptide (CVRARTR) is attached to doxorubicin (DOX), leading to the formation of prodrug nanoparticles called Pep-DOX through intermolecular interactions. We assess the antitumor effectiveness and immune responses while minimizing adverse effects using the click-Pep-DOX approach, which combines PD-L1 blockade and ICD, in triple-negative breast tumor models.

Results: The remarkably effective bio-orthogonal click chemical reaction between azide groups resembling receptors on tumor cells and the anti-PD-L1 peptide (CVRARTR) present on nanocomposites significantly increased the in vitro cellular uptake of the nanocomposites following Ac4ManNAz administration. Subsequently, bio-orthogonal click-targeting nanocomposites are taken up efficiently, leading to the induction of immunogenic cell death (ICD) in cancer cells through the release of DOX. Simultaneously, PD-L1 blockade by Pep-DOX disrupts the immune-suppressive pathways of cancer cells, resulting in the proliferation and reinvigoration of T lymphocytes. In tumor models, click-Pep-DOX accumulates within tumor tissues through bio-orthogonal click reactions and the enhanced permeability and retention (EPR) effect, recruiting a substantial number of immune cells and promoting the development of immune-responsive tumors.

Conclusions: In summary, we efficiently deliver an anti-PD-L1 peptide and DOX (Doxorubicin) to tumors using Pep-DOX under the bio-orthogonal click-targeting combination strategy, effectively inhibiting tumor progression while minimizing side effects.

PO-3354

Facile synthesis of Gd-doped red-emissive carbon nanodots for fluorescent/MR bimodal imaging and tumor therapy

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Metal-doped carbon dots (MCDs) have superior physical properties and excellent biocompatibility, showing great potential in biomedical applications. However, fabricating single carbon dots with integrated functionality for diagnostic and therapeutic modalities remains challenging. Here, we develop a simple strategy for the preparation of bimetallic doped carbon dots via a one-step microwave-assisted method using Ru-complex, citric acid, Branched polyethyleneimine, and GdCl₃ as starting materials. Red-emitting fluorescent carbon dots of ruthenium (Gd/Ru-CDs). The average diameter of the prepared Gd/Ru-CDs is 4.7 nm and exhibits high water solubility. Due to the introduction of the ruthenium complex, the Gd/Ru-CDs have intense red light emission fluorescence brightness, and the relative quantum yield is as high as 9.8%. In addition, the nanoprobe has an obvious MR response with a longitudinal relaxation of 6.38 mM⁻¹ s⁻¹. Even more impressively, it has low cytotoxicity, excellent biocompatibility, and efficient reactive oxygen species (ROS) generation capabilities. In vivo, experiments show that Gd/Ru-CDs can not only be used as in vivo tumor fluorescence/magnetic resonance imaging agents but also as photodynamic nanoagents for cancer treatment. Therefore, the prepared Gd/Ru-CDs have good performance and broad application prospects.

PO-3355

Sequence-Activated Fluorescent Nanotheranostics for Real-Time Profiling Pancreatic Cancer

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*Purpose:

Pancreatic ductal adenocarcinoma (PDAC), as one of the most malignant tumors with dense desmoplastic stroma, forms a specific matrix barrier to hinder effective diagnosis and therapy. To date, a paramount challenge is in the search for intelligent nanotheranostics for such hypopermeable tumors, especially in breaking the PDAC-specific physical barrier. The unpredictable in vivo behaviors of nanotheranostics, that is, real-time tracking where, when, and how they cross the physical barriers and are taken up by tumor cells, are the major bottleneck. Herein, we elaborately design sequence-activated nanotheranostic with dual-channel near-infrared fluorescence outputs for monitoring in vivo behaviors in a sequential fashion. This nanotheranostic with a programmable targeting capability effectively breaks through the PDAC barriers. Ultimately, the released aggregation-induced emission (AIE) particle directly interacts with PDAC cells and penetrates into the deep tissue. We believe that this unique sequence-activated fluorescent strategy expands the repertoire of nanotheranostics in the treatment of hypopermeable tumors.

*Methods and Materials:

AIEgens TCM-DN and Cy molecules with high-fidelity imaging performance were encapsulated into PolypH which can respond to the tumor microenvironment by nanoprecipitation method. The AIE signal was regulated by pH-induced Förster resonance energy transfer (FRET) for real-time. Tracking. Then we explored the structural characterization, AIE characteristics, PDT performance, environmental pH response and FRET response of the nanomaterials. By combining sequence response and multiple targeting strategies and co-loading specific active targeting unit U11 peptide, we constructed dual-channel sequence-activated nanoprobe TCM-U11&Cy@P. The human pancreatic cancer cell PANC-1 was selected as cell model of the tumor to study the in vitro cell imaging, targeting, cellular uptake and cytotoxicity of this nanosystem. Experiment was carried out in multicellular tumor spheroids. The animal model of the tumor was constructed by subcutaneous tumor formation in BALB/c nude mice using PANC-1 cells and then conducted FRET response research.

*Results:

We successfully prepared the dual-channel sequence-responsive nanosystem TCM-U11&Cy@P with high-fidelity imaging performance. Regulating the AIE signal through the FRET strategy, and verifying its specific response performance, excellent tracking ability and PDT properties. Targeting and permeability experiments confirmed that loading U11 active targeting units can significantly increase the cell uptake of pancreatic cancer, and overcome the matrix barrier for deep delivery and deep tumor ablation.

*Conclusions:

Based on near-infrared fluorescence imaging, Förster resonance energy transfer and photodynamic therapy, this research combined diagnosis and treatment to construct nanotheranostics system. We successfully designed nanoprobe TCM-U11&Cy@P to real-time track the delivery across PDAC-specific physical barriers and efficient uptake of deep tumor cells. real-time tracking the delivery across PDAC-specific physical barriers and efficient uptake of deep tumor cells. Our study presents a new visualization strategy for the in vivo application of intelligent nanotheranostics, paving a new pathway for pancreatic carcinoma.

Clinical Relevance/Application: Integration of diagnosis and treatment of Pancreatic ductal adenocarcinoma

PO-3356

4-OI inhibits hypoxia-induced injuries on β -cell via reducing LDHA-mediated ROS generation

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Background: Islet transplantation has been shown as a potentiate way to cure Type 1 Diabetes. However, isolation and purification inevitably devascularize the islets. Hypoxia stress has been observed up to 60% of newly transplanted tissue during the first couple of days which increase the hypoxia induced β -cell death. Reactive oxygen species (ROS) are key factors mediating hypoxic damage in β -cell and are mainly generated in NADPH or NADH dependent pathways. Itaconate is a by-product of the tricarboxylic acid cycle that protects cell from inflammation and oxidative stress induced damage. However, the effect of itaconate for β -cell in hypoxia condition still unknown. In this study, we aimed to explore the effect of 4-OI, a cell-permeable derivative of itaconate, on protection beta cells from hypoxia-induced damage and its mechanism.

Method: MIN6 cells were cultured under hypoxic conditions (1% O₂) with or without 125 μ M 4-OI in vitro for 72h. The viability of cells was examined using MTS assays and flow cytometric analysis. The levels of inflammatory cytokines were detected by qRT-PCR and ELISA assays. Intracellular ROS content was measured by DCFH-DA probe. LDH activity assay kit was used to test the activity of LDHA. Finally, cells were treated with ROS scavenger Nacetylcysteine (NAC) and LDHA specific inhibitor FX-11 in hypoxia condition for 72h to verify the role of 4-OI in regulating ROS.

Result: Hypoxia-induced injuries on MIN6 cells were confirmed by decreased cell viability, increased oxidative stress and apoptosis, and the production of inflammatory cytokines when compared with normoxia. After the treatment of 4-OI, those changes caused by hypoxia injury were effectively reversed. Then, we found that the level of NADPH was not significantly altered under hypoxia, whereas NADH was dramatically increased. When the cells treated with 4-OI, the level of NADH was down-regulated. In addition, we found that 4-OI decreased LDHA activity, which suggested the production of ROS triggered the cell death was from the interaction of LDHA and NADH.

The viability of MIN6 cells under hypoxia was improved, the intracellular ROS level, inflammatory cytokines and apoptosis were decreased. Similarly, when we used ROS scavenger NAC to treat the cells with hypoxia, cell viability was increased while the quantity of intracellular ROS, and inflammatory cytokines were reduced. Finally, to confirm our findings, we treated hypoxic cells with FX-11, a specific inhibitor of LDHA. The treatment of FX-11 enhanced cell survival, inhibited the production of ROS, and reduced the level of inflammatory cytokines.

Conclusion: In this study, we provide evidence that 4-OI can decrease the interaction of LDHA-NADH then reduce the generation of ROS, which finally protect the β cell under hypoxia condition.

PO-3357

TME-Responsive Nanotheranostics: T1/T2 dual-modal MRI and Imaging-guided PDT in Nasopharyngeal Carcinoma

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Currently, multimodal imaging-guided tumor therapy is acknowledged to improve the diagnostic accuracy as well as treatment outcome of tumors, and the integration of imaging-guided diagnosis and precise treatment has gained much attention in the field of theranostic nanotechnology. Magnetic resonance imaging (MRI) is indispensable in the diagnosis of tumors due to its unique pros. However, the majority of research on MRI nano-contrast agents (CA) has been concentrated on T₁ or T₂ single-modal imaging, which results in the limited contribution of nano-CA to further improve the diagnostic accuracy. Therefore, we developed a multifunctional nanotheranostic

GdCFS for the early and accurate diagnosis, and efficient treatment of nasopharyngeal carcinoma, which achieves sphere-fiber transformation in response to glutathione (GSH) of the tumor microenvironment. GdCFS possesses multimodal imaging capabilities (T_1/T_2 MRI and fluorescence imaging) for imaging-guided subsequent photodynamic therapy (PDT) and monitoring treatment progress. The transformation to nanofibers results in sufficient tumor accumulation, which along with massive ROS generation upon irradiation thanks to the reduction of GSH then further significantly killed tumor cells. Compared to clinically used Gd-DTPA, GdCFS exhibited better T_1 WI MRI performance and more significant negative contrast-enhancement of tumor area on T_2 WI. Under imaging-guided PDT, GdCFS achieved efficient therapeutic outcomes without causing any noticeable tissue damage. The results of in vitro and in vivo studies indicated GdCFS may be a suitable candidate for T_1/T_2 dual-modal MRI-guided precision tumor therapy.

PO-3358

Magnetic-optical Dual-modality Imaging Monitoring Chemotherapy Efficacy of Pancreatic Cancer With a Low-dose Fibronectin-targeting Gd-based Contrast Agent

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Purpose Pancreatic ductal adenocarcinoma (PDAC) is a lethal hypovascular tumor surrounded by dense fibrosis. Albumin-bound paclitaxel and gemcitabine (AG) chemotherapy is the mainstay of PDAC treatment through depleting peritumoral fibrosis and killing tumor cells; however, it remains challenging due to the lack of a noninvasive imaging method to evaluate fibrotic changes during AG chemotherapy. This study developed a dual-modality imaging platform that enables the noninvasive, dynamic, and quantitative assessment of chemotherapy-induced fibrotic changes through near-infrared fluorescence molecular imaging (FMI) and magnetic resonance imaging (MRI) using an extradomain B fibronectin (EDB-FN)-targeted imaging probe (EDB-Gd-Cy7).

Methods EDB-Gd-Cy7 was constructed by conjugating the peptide (Cys-TVRTSAD) to Gd-DTPA and the near-infrared (NIR) dye Cy7. PDAC murine models were developed for MRI/FMI. Mice were intravenously injected with EDB-Gd-Cy7 at a Gd concentration of 0.05 mmol/kg, or free Cy7 and Gd-DTPA as the control. The normalized tumor background ratio (TBR) on FMI images and the ratio of T_1 reduction on MRI images were quantitatively analyzed. To monitor chemotherapy, mice were treated with AG chemotherapy regimens; MRI/FMI was performed before and after treatment. Histological analyses were performed for validation.

Results The concentration of EDB-Gd-Cy7 showed a linear correlation with the fluorescence intensity and T_1 relaxation time in vitro. The optimal imaging timepoint and dosage were 30 min after injection of EDB-Gd-Cy7 with 0.05 mmol/kg, only a half of clinic dosage of gadolinium, in both FMI and MRI. In addition, the targeted probe generated a 1.44-fold and 1.90-fold robust contrast enhancement and longer retention compared with Cy7 and Gd-DTPA (* $P < 0.05$), respectively, while AG chemotherapy reduced the tumor volume. T_1 reduction and normalized TBR were significantly increased by 2.33-fold and 1.61-fold, respectively, in the fibrotic tumor areas of Control group compared with those in the AG group (* $P < 0.05$). EDB-Gd-Cy7 can sensitively detected small tumor with 2 mm diameter at 0.05 mmol/kg.

Conclusion Integration of MRI/FMI with a low dose of the targeted EDB-Gd-Cy7 probe can achieve sensitive imaging of PDAC and quantitative assessment of fibrotic changes during AG chemotherapy. MRI/FMI with EDB-Gd-Cy7 have a potential clinical application in the precise diagnosis, development of individualized treatment plans, post-treatment monitoring, and disease management.

PO-3359

Prognostic significance of integrating total metabolic tumor volume and EGFR mutation status in patients with lung adenocarcinoma

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Background The objective of this study was to investigate the prognostic significance of total metabolic tumor volume (TMTV) derived from baseline ^{18}F -2-fluoro-2-deoxyglucose (^{18}F -FDG) positron emission tomography/computed tomography (PET/CT), in conjunction with epidermal growth factor receptor (EGFR) mutation status, among patients with lung adenocarcinoma (LUAD). **Methods** We performed a retrospective analysis on 141 patients with LUAD [74 males, 67 females, median age 67 (range 34-86)] who underwent ^{18}F -FDG PET/CT and had their EGFR mutation status determined. Optimal cutoff points for TMTV were determined using time-dependent receiver operating characteristic curve analysis. The survival difference was compared using Cox regression analysis and Kaplan–Meier curves.

Results The EGFR mutant patients ($n = 79$, 56.0%) exhibited significantly higher 2-year progression-free survival (PFS) and overall survival (OS) rates compared to those with EGFR wild-type ($n = 62$, 44.0%), with rates of 74.2% vs. 69.2% ($P = 0.029$) and 86.1% vs. 67.7% ($P = 0.009$), respectively. The optimal cutoff values of TMTV were 36.42 cm^3 for PFS and 37.51 cm^3 for OS. Patients with high TMTV exhibited significantly inferior 2-year PFS and OS, with rates of 22.4% and 38.1%, respectively, compared to those with low TMTV, who had rates of 85.8% and 95.0% (both $P < 0.001$). In both the EGFR mutant and wild-type groups, patients exhibiting high TMTV demonstrated significantly inferior 2-year PFS and OS compared to those with low TMTV. In multivariate analysis, EGFR mutation status (hazard ratio, HR, 0.41, 95% confidence interval, CI 0.18–0.94, $P = 0.034$) and TMTV (HR 8.08, 95% CI 2.34–28.0, $P < 0.001$) were independent prognostic factors of OS, whereas TMTV was also an independent prognosticator of PFS (HR 2.59, 95% CI 1.30–5.13, $P = 0.007$).

Conclusion Our study demonstrates that the integration of TMTV on baseline ^{18}F -FDG PET/CT with EGFR mutation status improves the accuracy of prognostic evaluation for patients with LUAD.

PO-3360

Multifunctional PD-L1 targeted Fe₃O₄@GEM nanoparticles under MRI monitoring for combination therapy of colorectal cancer

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Abstract Purpose: Colorectal cancer (CRC) is one of the common digestive tract tumors, which has risen to the third to fifth highest incidence of malignant tumors in China. Its morbidity and mortality are increasing year by year, and it has become the second highest incidence of tumors in China after lung cancer. However, evidence suggests that immunotherapy is only effective for a small portion of patients. The combination therapy of both immunotherapy and chemotherapy has demonstrated great promise in its treatment efficiency. However, this combination therapy is limited by both the organ toxicity of the chemotherapeutic drugs and the inaccessibility of the in vivo monitoring of individual tumor response to therapies. With the development of the nanomedicine, synchronous targeting therapy, imaging diagnosis and monitoring can be achieved conveniently using the multifunctional nano-platform for CRC.

Methods: In our study, we prepared the Gemcitabine (GEM) loaded Fe₃O₄ nanoparticles targeting the programmed cell death ligand 1 (PD-L1) (PD-L1@Fe₃O₄-GEM, FPG) to obtain the real-time magnetic resonance imaging (MRI) monitoring and combination therapy of both chemotherapy and immunotherapy for CRC.

Results: The results showed that FPG inhibited tumor growth more effectively than either GEM chemotherapy or PD-L1 immunotherapy alone.

Conclusion: Our study demonstrated that FPG has shown a great potential for theranostics and clinical translation in synchronous MRI imaging-guided monitoring and combined treatment of both GEM and immunotherapy of CRC.

PO-3361

NaGdF₄-Based Magnetic Resonance Nanoprobes for Qualitative Inflammation Imaging in Glioma: Hot or Cold?

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Purpose: The 'cold' or 'hot' inflammatory status of glioblastoma (GBM) is closely related to the responsiveness of immunotherapy. This study aims to visualize the inflammatory status of glioma tumor microenvironment (TME) non-invasively using myeloperoxidase (MPO) responsive NaGdF₄-based nanoprobes under MRI.

Materials and Methods: Magnetic resonance imaging (MRI) based Tyr-ANG-NaGdF₄ nanoprobes, named as TAGs, with surface modification of ANG to target glioma and phenolic hydroxyl to sense MPO were developed, aiming to noninvasively visualize the 'hot' or 'cold' TME inflammatory status of GBM based on MRI. In vitro MPO responding ability was conducted by incubating the desired solution of different Gd³⁺ concentrations with an excess of H₂O₂ and MPO. Transmission electron microscopy (TEM) and MRI were performed before and after the MPO catalytic reaction. CCK-8 assay was performed to detect the cytotoxicity on RAW264.7, GL261 and bEnd.3 cells, respectively. In vivo toxicity was performed on C57BL/6 mice at 1, 15 and 30 d post-injection of TAGs. C57BL/6 mice and SD rats with subcutaneously transplanted glioma model using GL261 cells and C6 cells,

respectively, were created. In vivo MR imaging was performed on the two models after tail vein injection of TAGs at a concentration of 10 mg Gd/kg under 11.7 T at T1WI (n = 3 each group). PEG-NaGdF₄ nanoparticles without phenolic hydroxyl group on surface were used as control. After imaging, tumors were harvested for flow cytometric analysis, immunohistochemistry staining, MPO activity assay and bio-TEM.

Results: Cellular and in vivo toxicity confirm that TAG nanoprobe are of desirable high biocompatibility. After incubating with H₂O₂ and MPO, TAG nanoprobe show oligomerization under TEM with T1 relaxation time lengthened at 11.7 T. C6 SD rats with subcutaneous glioma show patchy darkened T1 signal within the tumor after injection of TAGs, which confirmed by following biological analysis with high MPO level and abundant M1-like macrophages, suggesting MPO-enriched 'hot' TME inflammatory status. However, GL261 mouse models show moderate hyperintensity in T1-weighted MRI, which confirmed with low MPO level and few M1-like macrophages, signifying the MPO-rare 'cold' TME within the tumor. PEG-NaGdF₄ nanoparticles show faint T1 enhancement for both the C6 SD rat and GL261 mouse models.

Conclusion: The synthesized TAG nanoprobe can qualitatively reflect and differentiate the inflammatory status of GBM non-invasively by sensing MPO in TME using MRI. Depending on the level of MPO in the TME, the TAG nanoprobe will get self-assembled in various degree, thus altering the T1 relaxation time and present altered image contrast in T1 weighted images. It was found that 'hot' GBMs showed patchy hypointense T1 signal while 'cold' GBMs only showed moderate enhanced T1 signal. By using the MPO responsive nanoprobe, it is promising to monitor the TME inflammatory status for glioma patients thus guide clinical treatment especially during immunotherapy.

PO-3362

A magnetic resonance nanoprobe with STING activation character collaborates with platinum-based drug for enhanced tumor immunochemotherapy

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Background: Immunochemotherapy is a potent anti-tumor strategy, however, how to select therapeutic drugs to enhance the combined therapeutic effect still needs to be explored.

Results: Herein, a magnetic resonance nanoprobe (MnP@Lip) with STING (Stimulator of Interferon Genes) activation character was synthesized and co-administered with platinum-based chemotherapeutics for enhanced immunochemotherapy. MnP@Lip nanoparticles were prepared by simple fabrication process with good reproducibility, pH-sensitive drug release behavior and biocompatibility. In vitro experiments elucidated that Mn²⁺ can promote the polarization of M0 and/or M2 macrophages to M1 phenotype, and promote the maturation of BMDC cells. Upon Mn²⁺ treatment, the STING pathway was activated in tumor cells, mouse lung epithelial cells, and immune cells. More importantly, anti-tumor experiments in vivo proved that MnP@Lip combined with platinum-based chemotherapeutics increased T cells infiltration in the tumor microenvironment, and inhibited tumor growth in the orthotopic therapeutic and postoperative tumor models.

Conclusions: This kind of therapeutic strategy that combined MnP@Lip nanoparticles with platinum-based chemotherapeutics may provide a novel insight for immunochemotherapy.

PO-3363

Correlation between Ki67, CK7, and Gadoteric Acid-Enhanced Magnetic Resonance Imaging in Hepatocellular Carcinoma: A Molecular and Imaging Biomarker Study

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Purpose: The purpose of this study was to investigate the correlation between molecular and imaging biomarkers in patients with hepatocellular carcinoma (HCC) using gadoteric acid-enhanced magnetic resonance imaging (MRI).

Methods: A total of 78 patients diagnosed with HCC based on surgical or biopsy confirmation were included in this study. T1 mapping measurements were performed before and 20 minutes after gadolinium acetic acid injection (T1Pre and T1HBP, respectively). The deltaT1 and deltaT1% were calculated as the difference and percentage decrease in T1 relaxation time, respectively. Proton density fat fraction (PDFF) was measured using pre-contrast images. Statistical analyses were conducted using t-tests or Mann-Whitney U tests based on the data type.

Results: Significant differences were observed in T1Pre, T1HBP, and PDFF between the high and low Ki67 expression groups ($p < 0.05$). T1Pre and T1HBP were positively correlated with Ki67 expression levels at the 0.05 (two-tailed) and 0.01 (two-tailed) levels, respectively ($r = 0.287$, $p = 0.017$; $r = 0.301$, $p = 0.008$). The tumor fat fraction was negatively correlated with Ki67 expression at the 0.01 (two-tailed) level ($r = -0.312$, $p = 0.009$). Further analysis revealed no significant differences in PDFF, T1Pre, T1HBP, deltaT1, or deltaT1% between CK7 positive and negative expression groups. However, CK7 expression was found to be significantly correlated with Ki67 expression ($p = 0.028$) at the 0.05 (two-tailed) level ($r = -0.238$, $p = 0.037$).

Conclusion: This study explored the relationship of T1 Mapping, PDFF, Ki67, and CK7 in HCC. Future research with a larger sample size is needed to better understand the relationship between various molecular and imaging biomarkers, enabling risk stratification and personalized treatment for HCC patients. Additionally, the clinical implications of these findings should be further investigated.

PO-3364

卵泡膜细胞-纤维瘤伴囊变的 MR 影像学分型及相关因素分析

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目的:卵泡膜细胞-纤维瘤伴囊变是引起误诊的重要原因之一.本研究旨在对囊变位置和形态学进行分型,分析与囊变相关的临床及影像学因素,提高对其非典型表现的认识和诊断.**方法:**回顾经病理证实的 38 例卵泡膜细胞-纤维瘤的 MR 影像特征,重点探讨囊变的分型及其 MR 信号特点,并对可能影响肿瘤囊变的相关因素进行分析.**结果:**38 例卵泡膜细胞-纤维瘤 MRI 表现为实性肿块 22 例(57.89%),实性伴囊变肿块 12 例(31.58%),囊性肿块 4 例(10.53%),肿瘤最大径为 1.0~21.3cm,均值为 (6.65 ± 4.70) cm.实性伴囊变肿块分为瘤外囊变 2 例(16.67%)及瘤内囊变 10 例(83.33%);其中周围型 4 例(33.33%)、弥漫型 5 例(41.67%)、中央型 1 例(8.33%).卵泡膜细胞-纤维瘤伴囊变时实性成分 T1WI 上呈等低信号, T2WI 上呈等或稍高信号;囊性成分表现为明显的 T2WI 高信号;增强后肿瘤实性成分轻度强化(50.0%),囊性成分无强化(42.1%).肿瘤大小是影响囊变的重要因素($P = 0.008$), ≥ 6 cm 的肿瘤囊变率为 68.8%(11/16), < 6 cm 的肿瘤囊变率为 27.3%(6/22).**结论:**卵泡膜细胞-纤维瘤囊变率为 42.1%(16/38),其中弥漫型囊变最多(41.67%),肿瘤大小是影响囊变的重要因素之一.认识囊变的分型,对提高对本病的认识及诊断和鉴别诊断有重要意义.

PO-3365

基于基因-环境交互作用的新型 AD 大鼠模型的构建及多维度评估与应用

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目的: 本研究基于基因与环境因素的交互作用, 尝试构建一种新型复合因素 AD 大鼠模型, 并对其做多维度的评估。

方法: 利用腺相关病毒 (AAV) 转移人类 AD 相关突变基因 APP 结合丙烯醛 (环境因素) 灌胃的方式, 建立了遗传和环境因素共同作用的复合 AD 大鼠模型。使用水迷宫评估认知功能、体内病理标志物的检测、高分辨率 7T 磁共振测量活体大脑微结构变化。析因分析探讨环境和基因因素在 AD 表型产生中各自的贡献度。

结果: 与正常对照组相比, 复合组大鼠模型空间学习记忆能力下降; 脑内皮层和海马区检测到病理标志物 A β 沉积, 海马和内嗅皮层的 FA 值降低。基因组大鼠模型出现认知功能的下降, 未检测到明显的 A β 沉积; 出现了不典型脑萎缩区域。环境组大鼠模型的认知功能无明显下降, 未检测到显著 A β 沉积和脑萎缩区域。三组大鼠模型在海马联合、穹窿、胼胝体、扣带回、前联合白质纤维束完整性受损, 复合组大鼠模型的空间学习和记忆力的下降与纤维束完整性受损有关 ($p=0.003$)。通过析因分析, 基因因素可以解释 39.74% AD 样表型, 环境因素可以解释 33.2% 的 AD 样表型。

结论: G x E 大鼠模型可以更好地复刻人类 AD 的病理特征。未来对 AD 模型的研究应考虑到多种因素, 我们的 G x E 模型可能有助于开发有效的 AD 治疗策略。

PO-3366

GluCEST 技术在氯胺酮的快速抗抑郁作用中的应用研究

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目的 抑郁症是一种难治的精神类疾病, 传统抗抑郁药起效慢且副作用多。氯胺酮作为一种快速抗抑郁药物, 在临床应用, 但目前缺乏客观有效评估其疗效的检测方法。本研究应用新型分子影像成像技术化学交换饱和转移成像 (GluCEST) 来评估氯胺酮对海马区谷氨酸 (glu) 含量的改变情况, 进一步评估其快速抗抑郁效果, 最后用基础实验来验证正确性。

方法 选取 24 只 SD 大鼠, 随机分为两组, 一组造模成为 CUMS 模型鼠 (C 组), 另一组为对照组 (S 组)。将 C 组随机分为两组, 每组 6 只, 一组注射氯胺酮 (ket 组), 另一组注射生理盐水 (sal 组), 从 S 组随机选出 6 只作为对照组 (con 组)。行为学实验验证建模成功后, 对 ket 组、sal 组和 con 组进行磁共振成像, 进而用行为学实验验证氯胺酮效果, 最后剖出海马进行高效液相色谱实验 (HPLC)。

结果 行为学数据显示, CUMS 造模成功且氯胺酮发挥效果 ($P < 0.05$)。GluCEST 结果显示, sal 组左、右海马的 glu 值低于 con 组 ($P < 0.05$), 注射氯胺酮后, ket 组左、右海马的 glu 值高于 sal 组 ($P < 0.05$)。MRS 结果显示三组之间仅左海马有统计学差异 ($P < 0.05$), 右侧无差异。三组的左海马 GluCEST 结果和 MRS 结果具有强相关性 ($r = 0.7348$, $P < 0.001$)。HPLC 结果显示, sal 组左、右海马的值明显低于 con 组 ($P < 0.01$), ket 组左、右海马的值高于 sal 组 ($P < 0.05$), 与 GluCEST 结果趋势相同, 可验证 GluCEST 结果正确性。

结论 综上所述, 与 MRS 相比, GluCEST 可以灵敏、直接地反映抑郁状态和氯胺酮治疗后海马谷氨酸浓度的变化, 达到评估其快速抗抑郁的效果。此外, 验证了谷氨酸在抑郁症的发病和治疗机制中具有相当大的潜力, 有望成为新型分子影像成像生物标志物。

PO-3367

谷氨酸化学交换饱和转移成像对放射性脑损伤大鼠的应用价值

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目的

探讨 7.0 T 磁共振谷氨酸化学交换饱和转移 (glutamate chemical exchange saturation transfer, GluCEST) 成像评估放射性脑损伤大鼠模型谷氨酸变化的应用价值。

方法

将实验大鼠随机分为两组: 对照组 (n = 9) 和放射性脑损伤组 (RBI, n = 9)。RBI 组大鼠使用 X 射线辐照仪进行辐照, 4 周后进行水迷宫实验。使用 7.0 T 小动物磁共振采集 CEST 序列和高效液相色谱仪 (high-performance liquid chromatography, HPLC) 测量海马谷氨酸浓度。两组海马 GluCEST % 以及 HPLC 谷氨酸差异进行 T 检验。GluCEST % 与水迷宫的关系、GluCEST % 与 HPLC 的关系进行 Spearman 和 Pearson 相关性分析。

结果

与对照组相比, 4 周后 RBI 组大鼠认知功能受损, GluCEST 在海马区域的谷氨酸水平降低 ($P < 0.001$), HPLC 测量证实了这种变化 ($P = 0.0028$)。相关性分析表明空间记忆与海马 GluCEST % 为正相关 ($r = 0.7372$, $P < 0.001$), HPLC 测量谷氨酸浓度和 GluCEST % 水平之间显示出类似的正相关 ($r = 0.6291$, $P < 0.05$)。

结论

GluCEST 可视化评估放射性脑损伤大鼠海马谷氨酸变化, 可用作体内成像代谢变化的生物标志物, 有利于早期监测和提前干预放射治疗后伴随出现的辐射损伤。

PO-3368

基于放射线/双酶的循环自供氧体系用于增敏肿瘤放疗

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研究目的: 乏氧是引起肿瘤放疗抵抗的主要原因之一, 因此寻找一种全新的策略来克服肿瘤乏氧、改善肿瘤患者放疗疗效十分重要。生物酶介导的肿瘤治疗是近年来的研究热点之一, 但如何将生物酶靶向递送至肿瘤组织并能同时保持其催化活性、降低毒副作用是其面临的巨大挑战。本研究旨在通过共载过氧化氢酶 (Cat) 及超氧化物歧化酶 (SOD) 构建新型循环自供氧纳米体系, 能够在放射线“启动”下以水分子为底物, 在肿瘤组织内持续、高效产氧, 进而提高肿瘤治疗效果, 并应用光声成像技术及荧光成像对肿瘤内氧含量及纳米平台在体内的生物分布进行实时、定量监测, 进一步指导小鼠放疗。

研究方法: 将超氧化物歧化酶和过氧化氢酶共载于空心杂化有机硅 (HSN) 纳米颗粒中, 并在表面包覆 ZIF-8 来携带荧光染料。使用氧检测探针检测纳米颗粒在 X 射线激发下的氧气产生情况。通过 Calcein-AM/PI 染色以及 Annexin V-FITC/PE 流式细胞检测不同治疗组对肿瘤细胞的杀伤效果。通过 WB 实验和免疫荧光实验检测 HIF-1 α 的表达情况。通过近红外荧光成像实时监测纳米颗粒的生物分布, 使用光声成像技术定量评估肿瘤组织内血氧饱和度。

实验结果: SC@HSN@Z 的水合粒径约为 87nm。氧气探针的结果显示纳米颗粒在 X 射线的作用下能够将超氧阴离子转化为氧气。AM/PI 染色及流式细胞检测结果表明 SC@HSN@Z+RT 组对肿瘤细胞的杀伤效果最好。小动物活体成像证明纳米平台在静脉注射 8 小时后聚积达到峰值。光声检测结果发现纳米材料联合应用放射线能够提高肿瘤内部的氧含量, 放疗后 8 小时氧含量达到最大, WB

实验和免疫荧光实验结果表明 SC@HSN@Z+RT 组 HIF-1 α 的表达量显著下降。动物实验表明 SC@HSN@Z 纳米颗粒在 X 射线的作用下疗效最好,肿瘤抑制率为 84%。

实验结论: SC@HSN@Z 纳米平台在 X 射线的作用下能够持续产生氧气,提高放疗效果。

PO-3369

细胞膜仿生纳米探针用于激活巨噬细胞介导的乳腺癌免疫治疗

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目的: 三阴性乳腺癌 (TNBC) 具有侵袭性强、复发率高、易转移以及生存期短等特点, 缺乏针对性治疗方法, 预后极差。近年来以免疫检查点抑制剂为代表的免疫治疗逐渐应用于 TNBC 的临床治疗。但免疫治疗存在着如肿瘤免疫逃逸和治疗耐药等问题, 严重影响 TNBC 复发转移和预后等。多项研究表明肿瘤相关巨噬细胞 (TAMs) 是肿瘤微环境中最丰富的免疫细胞, 其中 M2-TAMs 的大量浸润是 TNBC 免疫抑制微环境形成的关键因素。靶向调控 M2-TAMs 有望调节免疫微环境、改善免疫治疗耐药。本研究合成了一种微环境响应性细胞膜仿生纳米探针, 靶向调控 TAMs 的 CSF-1R 通路并联合负载的抗 CD47 抗体实现对 TAMs 的复极化以及免疫功能的激活, 并对极化过程进行实时监测, 实现 TNBC 的精准诊疗。

方法: 本研究制备并表征了巨噬细胞膜包裹的纳米载药系统, 并验证了探针对肿瘤微环境弱酸条件的响应性释放, 以及对 TAMs 极化过程的近红外成像监测; 细胞水平验证了纳米探针巨噬细胞的极化调控能力以及调节巨噬细胞对肿瘤细胞识别吞噬的能力; 在小鼠原位模型中验证了纳米探针对 TAMs 的极化, 利用 NIR-II 成像对极化过程进行可视化监测, 联合抗 CD47 抗体激活巨噬细胞功能; 采用病理学及分子生物学等方法揭示纳米探针对 M2-TAMs 的复极化能力, 评估其对 TNBC 的诊疗能力。

结果: 本研究制备的纳米探针具有良好的生物相容性和稳定性, 能够实现 pH 响应性药物释放和优异的响应性成像能力。在活体水平能够有效的对 TAMs 进行复极化, 特异性阻断 SIRP α -CD47 轴, 具有显著的肿瘤免疫微环境调节作用及抗肿瘤能力。

结论: 本研究构建了新型的纳米探针, 实现了对 TNBC 肿瘤免疫抑制微环境的重编程以及复极化过程的 NIR 成像监测, 联合免疫检查点抑制剂实现对 TNBC 的免疫调控, 有效激活 TAMs 的生物功能, 有望对临床乳腺癌免疫逃逸和治疗耐药等问题提供潜在的解决方案。

PO-3370

联合 PD-L1 及 miR-182 的 ROS 响应光免疫探针用于增强乳腺癌免疫治疗的分子影像研究

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目的: 三阴性乳腺癌 (TNBC) 侵袭性强, 临床常规治疗效果不佳, 预后极差。免疫疗法是目前突破性疗法之一, 但其主要瓶颈是肿瘤免疫逃逸和免疫治疗疗效差。肿瘤内 M2 型肿瘤相关巨噬细胞 (M2-TAMs) 大量浸润形成免疫抑制微环境, 可能是肿瘤免疫检查点抑制剂疗效差的关键因素。因此, 联合 ICI 和 M2-TAMs 调控的协同治疗模式为增强 TNBC 免疫治疗提供了新策略。

方法: 该研究首先在 TNBC 临床患者组织样本中验证了免疫抑制微环境主要标志物的表达情况, 制备并表征了 IR825-aPD-L1@antagomiR-182@PLL-PEG, 在细胞水平上验证了纳米探针的细胞毒性、靶向性以及疗效。建立小鼠原位 TNBC 模型, 将纳米探针通过尾静脉注射递送至肿瘤部位, 同时使用近红外成像仪采集纳米探针注射后肿瘤组织的 NIR 成像数据。通过 DPBF 法检测肿瘤组织中

的 ROS 生成水平,采用 Western blot 法评估纳米探针 aPD-L1 的治疗效果,采用组织病理学及分子生物学方法评估纳米探针的 M2-M1 重编程效率,并采用红外热成像仪检测肿瘤组织实施激光照射后的光热治疗效率。

结果:本研究构建的 IR825-aPD-L1@antagomiR-182@PLL-PEG 纳米探针具有良好的稳定性、生物相容性、显著的 ROS 响应性断键性能以及优异的近红外成像效果。在小鼠原位 TNBC 模型尾静脉注射纳米探针后具有显著的体内抗肿瘤效应及 M2-M1 重编程效率。

结论:本研究构建新型 IR825-aPD-L1@antagomiR-182@PLL-PEG 纳米探针,实现对肿瘤近红外成像以及光控释放,纳米探针具有活体诊断和联合治疗的多功能特色,联合光免疫治疗实现 TNBC 免疫抑制微环境的靶向调控,有效激活肿瘤自身免疫系统,通过协同抗肿瘤作用增效肿瘤免疫治疗,从而抑制肿瘤细胞的免疫逃逸和免疫治疗耐药。

PO-3371

“off-on”多模态仿生纳米探针用于肿瘤相关巨噬细胞复极化过程的实时成像监测

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目的:肿瘤相关巨噬细胞 (TAM) 在恶性肿瘤发展和转移的各个阶段均起了关键性作用。指导 TAM 极化程序,促使 M2-TAM (促肿瘤) 向 M1-TAM (抗肿瘤) 表型复极化的策略,在免疫治疗中极具应用前景,诸多药物正处于临床 I/II 期。然而, TAM 复极化疗效缺乏直接、高效的活体动态监测手段,迫切需要新型的分子影像方法对 TAM 复极化过程进行精准监测,并指导癌症的个性化治疗。本项目拟设计一种“off-on”多模态仿生纳米探针用于 TAM 复极化过程的实时活体成像监测。

方法:在前期研究基础上构建“off-on”多模态仿生纳米探针 MMMIB,并验证 MMMIB 对肿瘤部位 M2-TAM 的精准靶向能力。确证纳米探针 MMMIB 是否可以通过 MR 和 NIR-II 多模态成像实时、可视化、精准地监测 M2-TAM 复极化为 M1-TAM 的动态演变过程。

结果:获得可用于 TAM 复极化过程实时活体成像监测的仿生纳米探针 MMMIB。该纳米探针实现了 3 个目标:① 通过多级靶向策略将临床在研的复极化药物 (BLZ945) 高效、精准递送到肿瘤部位的 M2-TAM 中。②在 MR 和 NIR-II 的多模态、“off-on”程序式成像下实时可视化监测 M2-TAM 复极化为 M1-TAM 的演变过程。③利用 MR 成像对比剂 (Mn²⁺) 的免疫调控作用放大免疫疗效
结论:该纳米探针可为临床上 TAM 复极化药物体内疗效的动态监测提供新方法和新手段。

PO-3372

MRI 可视化铁钼纳米体介导光热/铁死亡在抗乳腺癌免疫效应中的作用

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目的:铁死亡通过损伤相关分子模式可作为肿瘤抗原,提高肿瘤免疫原性,提高抗原提呈效率。光热治疗能通过激光辐照将光子能量转换为热能,诱导肿瘤细胞坏死及凋亡,能够直接快速地消融原发肿瘤,还能通过热应激触发乳腺癌免疫原性细胞死亡 (immunogenic cell death, ICD), 逆转机体免疫抑制微环境,进一步放大抗乳腺癌免疫反应。本研究拟评价铁钼纳米体 (FMO@PEG NPs)

MRI 可视化性能, 探讨铁钼纳米体介导铁死亡/光热治疗诱导 ICD 在联合抗乳腺癌免疫效应中的机理及作用。

方法: 应用 7.0T Micro MRI 扫描仪测定 FMO@PEG NPs 的 MRI 信号强度, 采用三磷酸腺苷 (adenosine triphosphate, ATP) 试剂盒检测各组细胞 ATP, 并采用激光共聚焦观察各组钙网蛋白 (CRT) 及高迁移率组蛋白 B1 (HMGB1)、热休克蛋白 70 (HSP70) 情况; 采用 Transwell 系统将细胞和未成熟树突细胞 (dendritic cells, DCs) 共孵育, 随后系统上层的 4T1 细胞接受适宜处理, 收集系统下层的成熟 DCs, 送检流式分析仪, 分析光热/铁死亡促进 DCs 成熟程度。

结果: FMO@PEG NPs 体外 MRI-T2 成像信号良好。在 FMO@PEG NPs 诱导铁死亡, 及激光辐照后, 铁死亡及光热使得 4T1 乳腺癌细胞内 HSP70、ATP、CRT、HMGB1 等 DAMPs 不同程度释放及表达, 体外 Transwell 试验证明 4T1 细胞同 FMO@PEG NPs 孵育及光辐照处理后, 铁死亡/光热联合组可最大程度促进 DCs 细胞成熟, 进一步介导全身抗肿瘤免疫效应。

结论: 铁钼纳米体诱导铁死亡相关氧化应激能触发 DAMPs 释放, 提高肿瘤免疫原性, 铁钼纳米体介导光热治疗相关热应激能诱导 ICD, 增强乳腺癌全身抗肿瘤免疫应答, 同时借助铁钼体 MRI 成像监测治疗过程及预后, 实现诊疗一体化策略。

PO-3373

双模成像示踪小鼠缺血性脑卒中后纤维蛋白沉积的实验研究

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目的: 以纤维蛋白特异性靶向肽 CREKA 为靶向分子, 合成靶向纤维蛋白的磁共振/光学双模态分子探针, 通过靶向肽与脑内纤维蛋白特异性结合, 对脑卒中后纤维蛋白沉积进行磁共振/光学双模成像, 通过影像学手段对脑卒中后纤维蛋白沉积进行早期评估。

方法: 通过点击反应等构建双模态纳米探针, 其上连接了近红外成像基团及磁共振成像基团, 并进行表征, 在成功构建纳米探针的基础上, 进行了体外血栓结合实验及安全性评估。在活体实验中对探针的脑部富集情况进行了检测。

结果: 对探针的表征检测证实其具有合适的形貌及粒径, 各个基团也被成功连接。体外血栓结合实验证实, 靶向探针对于血栓有较强的结合能力, 且在细胞层面和动物层面都显示良好的生物安全性。体内实验结果显示探针可以快速而显著地在脑部血栓位置富集。

讨论: 我们已经开发了一种 MR/NIR 双模纳米探针, 通过与 CREKA (纤维蛋白靶向的五肽) 偶联, 能够对 CI/R 后微血管中的继发性纤维蛋白微血栓进行高空间和时间分辨率的无创成像。总之, 工程化纤维蛋白靶向纳米探针是一种非常有前途的工具, 不仅用于纤维蛋白的分子成像, 而且在不久的将来用于理解微循环障碍的机制和纤维蛋白溶解剂的靶向治疗。

PO-3374

仿生纳米乳剂用于氧气递送和 CAF 抑制以 逆转免疫抑制和增强声动力治疗胰腺肿瘤

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目的: 胰腺癌具有特征性的致密间质和公认的“冷免疫”微环境, 是其进展的关键因素和治疗的重要瓶颈。声动力学疗法 (SDT) 是一种有前途的策略, 可以抑制肿瘤生长并激活免疫治疗的抗肿瘤免疫反应。然而, 缺氧和免疫抑制性肿瘤微环境限制了其治疗效果并抑制了免疫应答。

方法: 在这项研究中, 开发了巨噬细胞膜伪装的超声响应纳米颗粒来共同输送氧气 (O₂) 和 α -山竹素 (α -Mangostin) 以增强 SDT 和抑制肿瘤相关巨噬细胞 (CAF) 以调节胰腺癌致密间质。该系统通过超声乳化牛血清白蛋白和全氟化碳 (PFC) 合成稳定的乳糜微粒, 并包封声敏剂 (ICG), 通过脂质体挤压以包裹巨噬细胞膜, 构建了仿生纳米乳剂 (CPIM)。

结果: 该仿生纳米乳剂可以同源靶向肿瘤细胞。经超声辐照后, O₂ 和 α -Mangostin 迅速释放, 在乏氧状态下增强 ROS 产生以杀伤肿瘤细胞, 释放药物抑制 CAF 以改善肿瘤局部的致密间质促进药物渗透, 并增强 SDT 疗效以抑制肿瘤生长。和单纯治疗抑制肿瘤生长 2.4 倍相比, 联合 α -Mangostin 治疗抑制肿瘤生长达 3.9 倍。更重要的是, 仿生纳米乳剂协同声动力免疫治疗显著增加了浸润免疫细胞的数量, 改善了 CD8⁺T 细胞的功能 (单纯治疗 v.s. α -Mangostin 联合治疗=8.83% v.s. 12.42%), 减少肿瘤局部 M2 巨噬细胞数目 (单纯治疗 v.s. α -Mangostin 联合治疗=16.65% v.s.10.1%)。在联合抗 PD-L1 免疫检查点阻断的治疗中, 仿生纳米乳剂 CPIM 通过抑制 CAF 功能调节肿瘤致密间质, 促进了 aPD-L1 的瘤内递送, 逆转免疫抑制, 最终增强肿瘤局部的免疫应答, 显著提高免疫检查点阻断剂的疗效。

结论: 我们构建了一个简单的策略来共同递送 O₂ 和 α -山竹素增强 SDT 和逆转免疫抑制, 导致癌症免疫治疗的免疫反应增加。

PO-3375

ROS 响应的聚合物纳米粒子协同三阴性乳腺癌的光热治疗和巨噬细胞复极化

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目的三阴性乳腺癌 (TNBC) 是一种恶性程度高、预后差的乳腺癌亚型。免疫治疗是一种有前途的实体肿瘤的治疗方法, M2 型肿瘤相关巨噬细胞 (M2-TAMs) 是 TNBC 中最常见的免疫细胞, 也是 TNBC 免疫治疗的主要治疗靶点。该研究旨在促进 ROS 响应性 HRG 的递送, 并开发一种可能的将 PTT/PDT 与 HRG 结合的治疗纳米平台, 用于增强 TAMs 复极化和 TNBC 的光/免疫治疗。

方法我们合成了一种纳米颗粒, 该纳米颗粒将疏水性 IR825 和 HRG 通过硫缩酮连接体连接到 PEG-PLL 上, 形成 IR825@HRG 纳米颗粒。IR825 具有优异的热转换性能, 在激光照射下可以获得显著的光热治疗效果并诱导免疫反应。同时, HRG 的释放由光动力治疗诱导的活性氧 (ROS) 触发, 有效地将 M2-TAM 极化为 M1 表型, 以促进巨噬细胞对肿瘤细胞的吞噬作用。

结果经尾静脉注射后, IR825@HRGNPs 通过增强渗透和滞留效应在肿瘤组织中积累。一旦被光照射, PTT 和 PDT 效应在原位肿瘤组织中被触发, IR825 不仅可以作为光热剂直接杀死癌症, 还可以作为光敏剂产生 ROS, 进一步破坏硫缩酮连接物, 通过 ROS 诱导的硫缩酮键切割释放 HRG, 与 TAMs 中表达的 Fc γ 受体结合, 并促进 M2-TAM 向 M1 表型的复极。最终, IR825@HRG 纳米颗粒在携带 TNBC 的小鼠模型中表现出优异的巨噬细胞极化调节能力和有效的肿瘤抑制。

结论在本研究中, 我们开发了一种用于 TNBC 光免疫治疗的集成光触发 ROS 响应纳米颗粒, 该纳米颗粒在携带 TNBC 的小鼠模型中表现出优异的巨噬细胞极化调节能力和有效的肿瘤抑制, 将光疗与免疫疗法相结合来调节巨噬细胞极化, 为提高 TNBC 的免疫治疗效率和治疗效果提供了一种很有前途的方法。

PO-3376

超小分子影像探针调控 TRPV1 通道治疗帕金森病

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研究目的：构建能够靶向小胶质细胞膜上的 TRPV1 通道、且具有优异的光热转换性能的 CS-AT 纳米探针，采用具有较高组织穿透深度的近红外二区激光可控地开启 TRPV1 通道，提高小胶质细胞的自噬水平，增强其吞噬和降解 α -突触核蛋白的能力，提高帕金森病的治疗效果。

研究方法：本论文利用透射电镜和 X 射线粉末衍射仪等设备对构建的 CS-AT 纳米颗粒进行表征，利用热成像仪在体外评估其光热转换性能；然后，利用免疫荧光染色验证纳米颗粒靶向小胶质细胞膜 TRPV1 通道的能力；在此基础上，利用蛋白质印迹法等技术研究 CS-AT 纳米探针对小胶质细胞自噬相关蛋白水平的调节，以及对小胶质细胞吞噬和降解 α -突触核蛋白的影响。从分子蛋白水平层面以及动物行为学实验评估 CS-AT 纳米颗粒联合 1064 nm 激光照射对帕金森病模型小鼠的治疗效果。

研究结果：

(1) 成功构建了可以靶向小胶质细胞膜的 CS-AT 纳米颗粒，利用该纳米颗粒在 1064 nm 激光照射下的优异光热转换性能，可控地打开小胶质细胞膜上的 TRPV1 通道，引起细胞外钙离子 (Ca^{2+}) 内流。

(2) 揭示了 CS-AT 纳米颗粒在 1064 nm 激光照射下通过打开 TRPV1 通道，激活自噬相关通路，增强小胶质细胞的吞噬作用，并通过小胶质细胞的自噬溶酶体途径降解 α -突触核蛋白。

(3) 证明了 CS-AT 纳米颗粒联合 1064 nm 激光照射有效地清除帕金森病小鼠中脑部位的 α -突触核蛋白。帕金森病小鼠的运动障碍得到明显的改善，其神经相关标记物均恢复到了正常水平。

研究结论：利用 CS-AT 纳米颗粒优异的光热转换性能可以有效地控制小胶质细胞膜上 TRPV1 通道的开启，激活自噬相关信号通路，促进小胶质细胞吞噬和降解 α -突触核蛋白。其中，CS-AT 纳米颗粒通过激活 AMPK 蛋白磷酸化在促进细胞自噬中发挥了重要作用。该研究表明通过光控细胞膜离子通道促进自噬是治疗帕金森病的潜在重要策略。

PO-3377

Epo/NSE 双特异性驱动 FTH1 表达的 MR 成像体外检测干细胞的成神经分化

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目的：将缺氧增强子促红细胞生成素 (Epo) 与神经元特异性启动子神经元特异性烯醇化酶 (NSE) 结合，构建缺氧/神经元 (Epo/NSE) 双特异性驱动 MR 报告基因 FTH1 表达的慢病毒，并感染 BMSCs，在细胞水平检测该细胞在成神经分化后、常氧/缺氧条件下其内 FTH1 诱导表达及聚铁引起的 MR 信号改变情况，探究利用 Epo/NSE 双驱动 FTH1 在干细胞成神经分化后、缺氧条件下的特异性表达，并利用 MR 成像检测的可行性。

材料与方法：构建 Epo/NSE 双驱动 FTH1 表达的慢病毒并感染 BMSCs，诱导其成神经分化后，分别在常氧/缺氧下利用 CCK-8 检测细胞增殖活性；western blot 检测细胞内 NSE 和 FTH1 的表达；普鲁士蓝染色及透射电镜检测细胞 FTH1 表达后的聚铁情况；MR 成像检测细胞聚铁后的 MR 信号改变情况。

结果：CCK-8 显示随着缺氧时间延长，细胞增殖活性逐渐下降；western blot 显示常氧下 Epo/NSE 驱动 FTH1 表达的能力与 NSE 驱动能力相当，缺氧下 Epo 增强子与 NSE 启动子协同作用，在细胞活性较差时，仍可驱动 FTH1 的高表达；普鲁士蓝染色和透射电镜显示感染慢病毒后的成神经分化

细胞在缺氧条件下 FTH1 高表达,并可聚集较多的铁颗粒;MR 成像显示高表达 FTH1 后的细胞可以聚集更多的铁颗粒,引起明显的 MR 信号改变。

结论:成功构建 Epo/NSE 双特异性驱动 FTH1 表达的 MR 成像系统,使 FTH1 在干细胞中不表达,当干细胞成神经分化后,其表达由 NSE 启动子驱动;当成神经分化后的细胞处于缺氧环境时,Epo 被激活,协同 NSE 启动子进一步促进 FTH1 的高表达,尽可能地弥补因缺氧引起的细胞活性减低、FTH1 表达减少,MR 信号改变减弱甚至 MR 成像示踪中断的问题,为进一步实现 MR 成像可视化监测干细胞体内移植用于修复神经系统病变奠定基础。

PO-3378

基于 NIR-III 区激光激活的硒化钛在脂肪肉瘤光热治疗探索

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目的:通过构筑 NIR-III 激光激活的可降解纳米诊疗试剂,在脂肪肉瘤小鼠模型上验证肿瘤 MR 成像性能、光热治疗效果以及治疗机理。

方法:本研究通过改进的热分解法合成 TiSe_2 纳米棒,使用 HS-PEG- NH_2 对其进行表面改性,并化学偶联 DOTA 分子,最后与 Gd^{3+} 进行螯合,从而构筑了 $\text{TiSe}_2\text{-Gd}^{3+}$ 纳米诊疗试剂。利用多种方法表征物理光学性质。在 NIR-III 激光照射下,分析其光热转换性能及光化学路径。在模拟生理条件下,研究其降解行为、细胞毒性、细胞治疗效果以及治疗机理。在荷瘤鼠体内分析该试剂 MR 成像效果、血液循环半衰期以及光热治疗效果和肿瘤细胞消亡机制。

结果:基于 TiSe_2 纳米棒制备了 $\text{TiSe}_2\text{-Gd}^{3+}$ 纳米诊疗试剂。 TiSe_2 纳米棒的 Ti/Se 原子比为 1/1.92,具有从紫外到 NIR-III 区 ($>1600\text{nm}$) 的强而宽的光吸收,在 1567 nm 处的消光系数为 $8.1\text{ Lcm}^{-1}\text{g}^{-1}$ 。 $\text{TiSe}_2\text{-Gd}^{3+}$ 的水合粒径为 $\sim 80\text{ nm}$,电位为 -13.8 mV , r_1 弛豫率为 $4.05\text{ mM}^{-1}\text{s}^{-1}$ 。在 1567 nm 激光 (NIR-III 区) 照射下,浓度从 25 到 150 mg L^{-1} 时其升温从 7.6 到 $28.2\text{ }^\circ\text{C}$ 。最终降解为尺寸 $<8\text{ nm}$ 的非晶 TiO_2 ,并释放具有抗癌和抗氧化功能的 SeO_4^{2-} 。尾静脉给药 (10mg kg^{-1}) 后,实现肿瘤 MR 成像,血液循环半衰期为 1.72 h 。 1567 nm 激光照射下,肿瘤部位温度到从 $32.7\text{ }^\circ\text{C}$ 升高到 $\sim 48.0\text{ }^\circ\text{C}$,引起细胞显著坏死和凋亡。相比对照组,肿瘤抑制效果明显 ($p<0.001$),抑制率为 $\sim 90\%$ 。

结论: $\text{TiSe}_2\text{-Gd}^{3+}$ 纳米诊疗试剂具有强而宽的光吸收、显著 NIR-III 区光热转换性能以及可降解性能。在 MRI 引导下, NIR-III 区光激活纳米试剂在去分化型脂肪肉瘤 PDX 模型上实现了高效的光热治疗效果,有望用于脂肪肉瘤术后局部复发的消融治疗。

PO-3379

磁性纳米颗粒磁矩测量在磁热效应中的应用

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目的磁性纳米材料在交变磁场 (AMF) 作用下的发热现象使其成为一种比较常见的用于肿瘤热疗的研究材料。磁性材料本身具有奈尔弛豫和布朗弛豫,会导致外加磁场和磁矩方向之间的相位滞后,因此产生能量损失,这就是磁性纳米颗粒在 AMF 作用下升温的基本原理。本文的主要工作是测量磁性水溶胶的磁矩,我们测量了多种磁性纳米颗粒,并将结果和 VSM, MRI 及升温曲线进行对比,从理论上分析实验结果。

方法为了测量不同聚集程度的磁性纳米颗粒,我们通过加盐以及离心的方式来改变测量的聚集状态,并通过动态光散射测量其水动力尺寸。以浓度为 8.5 mg/mL 的 $\gamma\text{-Fe}_2\text{O}_3$ 为标准材料,对颗粒进行

不同处理并进行 DLS 表征。分别用 VSM, MRI 及竖直磁矩测量系统对不同聚集状态的磁性纳米颗粒其磁性能进行了测量, 此外还测量了处理后的材料的升温曲线, 对结果进行了分析比较。

结果弛豫时间是氢原子从磁化强度 M 恢复到平衡态需要的时间, 磁性纳米颗粒作为造影剂本身不产生 MRI 信号, 只是影响氢原子的弛豫速率, 因此我们分析了加入磁性纳米颗粒后的 T2 弛豫时间相比 0 铁浓度时减少的值。通过分析表中数据可观察到, 通过自制系统测量的磁矩结果与 MRI 的弛豫时间差值及 AMF 作用下的升温曲线结果间的线性相关系数, 分别为 0.9669 及 0.9843。这说明自制系统的测量结果和材料的 MRI 造影效果以及升温曲线有着较强的关联性, 可以用以评估材料在 MRI 及热疗方面的应用潜力。而 VSM 的测量结果与 MRI 的弛豫时间及 AMF 作用下的升温曲线结果间的线性相关系数, 分别为 0.2598 及 0.3201, 这说明 VSM 的测量结果和材料的 MRI 造影效果以及升温曲线关联性较低。因此在评估这种分散结构被破坏的情况下的材料的磁学性能时, 使用自制的测量系统会得到更好的结果。

结论我们的系统在测量过程中不会改变材料的水动力尺寸半径, 因此其结果与弛豫时间及升温曲线有较高的线性相关性。

PO-3380

GSH 响应性 T1/T2 双模态纳米酶用于铁死亡和自噬诱导的 Tf 靶向乳腺癌协同治疗

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目的: 利用 GSH 响应性 T1/T2 双模态 MR 成像纳米酶跟踪药物在肿瘤内的释放和渗透的效果, 评估 GSH 纳米酶对提高乳腺癌诊断和联合治疗的机制。**方法:** 水热法合成 hMnOx 空心纳米颗粒, 并与转铁蛋白 (Tf) 和 DOX 偶联获得 hMnOx-DOX-Tf 纳米体系。对纳米粒子的形态、晶体结构、原子价态、弛豫率以及 MR 图像进行表征。检测了纳米体系靶向及成像效能。采用 CCK-8 和细胞增殖试验评价体外细胞毒性。细胞电镜、p62 及 LC3B 蛋白监测评估肿瘤自噬水平。GSH、活性氧 (ROS) 和脂质 ROS 含量及 GPX4 蛋白评估肿瘤铁死亡。肿瘤体积、小鼠重量、肿瘤大小、H&E、Ki67 和 TUNEL 染色检测探究纳米体系的治疗效果。**结果:** 成功合成 hMnOx-DOX-Tf 纳米体系。hMnOx-DMSA 的 T1 和 T2 弛豫速率分别为 0.49 和 0.8 mM/s, 而 GSH 处理后的弛豫速率分别为 4.02 和 20.22 mM/s。hMnOx-DOX-Tf 处理后, 4T1 细胞的活力和增殖细胞受到抑制且细胞内 GSH 水平下降, ROS 和脂质 ROS 含量增加。hMnOx-DOX-Tf 组抑制了 GPX4 的表达, 而 cleaved-caspase-3、p62 和 LC3B 水平明显上调。经 hMnOx-DOX-Tf 治疗后, 肿瘤体积、H&E、cleaved-caspase3、GPX4、Ki67 和 TUNEL 染色结果显示铁死亡-自噬联合治疗具有良好的抗肿瘤效果。**结论:** 本研究揭示了 GSH 响应性靶向 hMnOx-DOX-Tf 通过消耗 GSH 和增加 ROS 实现了肿瘤铁死亡-自噬的联合治疗并通过实时 T1/T2 双模态成像实现了药物传递和释放的监测, 能够作为监测乳腺癌治疗和提高协同治疗效率的重要载体。

PO-3381

基于脂肪酸代谢基因的乳腺癌放射基因组学分析

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背景: 当前越来越多的研究表明, 脂肪酸代谢会影响乳腺癌患者的临床结局。

目的: 利用乳腺癌脂肪酸代谢基因建立风险评分联合乳腺癌影像组学特征预测乳腺癌的临床结局。

方法: 采用基因差异分析, 单因素回归分析和 LASSO 回归分析对癌症基因组图谱数据库 (TCGA) 中的 1081 例乳腺癌数据进行分析。筛选与预后相关的脂肪酸代谢基因, 建立基因风险评分。采用来自的基因表达综合数据库 (GEO) 的 101 例乳腺癌数据集 GSE43586 对所得到的基因风险评分进行验证。探究基因风险评分与患者基因突变、化疗药物反应、生物学信号通路、免疫细胞浸润和免疫功能间的关系。结合临床特征和基因风险评分建立预后预测诺莫图, 并使用 ROC 曲线评价预测效能。提取癌症成像档案数据库中 139 例乳腺癌 MRI 成像数据。分析 70 例乳腺癌患者的 T1 强化序列, 提取影像组学特征数据, 按 5 : 2 的比例随机分为训练集和验证集, 并使用 LASSO 回归筛选出与基因风险评分高低相关的特征, 并建立列线图用于预测基因风险评分。最后, 使用 ROC 曲线评估列线图预测效能。

结果: 筛选出 9 个与乳腺癌预后相关的基因。基因风险评分显示, 高风险乳腺癌患者基因突变频率更高且对化疗更加敏感。此外, 高风险乳腺癌患者, 免疫功能存在明显抑制且生物学信号通路多富集于细胞增殖信号通路。结合临床特征和基因风险评分建立的诺莫图, 患者 1, 3 及 5 年生存时间的预测 AUC 值分别为 0.666, 0.645, 0.703。最后, 通过影像组学手段预测脂肪酸代谢基因风险评分高低, 所构建的预测模型性能良好, 在训练集上 AUC 值为 0.894, 在验证集上 AUC 值为 0.648。结论: 脂肪酸代谢基因风险评分可以作为一种有效的生物标志物, 去评估乳腺癌患者预后, 基因突变, 化疗反应以及生物学过程。通过放射基因组学分析可以实现非侵入性地评价脂肪酸代谢基因风险评分这一生物学标志物。

PO-3382

光声成像对乳腺癌早期治疗响应的多生理参数监测

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目的 乳腺癌的缺氧微环境与治疗抵抗有关, 也可诱导肿瘤新生血管形成。在不同治疗策略下, 包括血管灌注和氧合状态以及代谢在内的生理过程决定了乳腺癌的进展。因此, 监测肿瘤内氧合与血供变化具有重要的临床价值。光声成像是一种无创、无标记分子影像成像技术, 可利用氧合与脱氧血红蛋白吸收光谱差异测量氧饱和度、绘制脉管系统和组织灌注。本研究旨在利用多光谱光声断层成像 (MSOT) 系统监测小鼠乳腺癌模型治疗后肿瘤的即时早期反应, 为光声成像技术应用于临床动态监测肿瘤氧合与血供提供实验支撑。

方法 采用 4T1 小鼠皮下肿瘤模型进行研究, 分为对照组, 依维莫司、紫杉醇和光动力治疗组。在治疗前和治疗后第 1 至 7 天成像, 纵向评估治疗前后肿瘤血流动力学和脉管系统的短期变化。本研究使用包括 700 至 900 nm 的 10 个波长, 并在每个时间点计算总血红蛋白浓度 (HbT) 和血氧饱和度 (sO₂), 分析肿瘤氧合和灌注情况。光声成像的结果通过缺氧 (HIF-1 α) 和血管分布 (CD31) 的免疫组织化学法得到验证。

结果 体内光声成像分析显示, 对照组的平均全肿瘤 HbT 信号在实验观察期间并未发生显著的变化。依维莫司治疗组 HbT 信号先降低, 第 3 天明显升高, 且整个给药期间都低于对照组。紫杉醇治疗组第 4 天 HbT 信号明显升高, 随后降低。PDT 组 24 h 内 HbT 信号明显升高。对照组 sO₂ 在 7 天内呈现下降趋势, 光声成像检测到 EVE 组和 PTX 组氧合改善的时间窗口, 而 PDT 组的 sO₂ 始终低于基线。免疫组化结果表明, EVE 和 PTX 可改善肿瘤微环境缺氧, 而光动力治疗可诱导肿瘤微环境缺氧。此外, 由于光动力治疗导致血管损伤和炎症, 其 CD31 染色结果与光声成像结果并不完全一致。**结论** 总之, 多光谱光声断层扫描可以无创、无标记地监测乳腺癌氧合并反映血管功能的变化, 监测不同治疗后肿瘤微环境的即时早期反应。光声成像有望在临床实践中早期监测乳腺癌的进展和评估疗效。

PO-3383

阿尔茨海默病的神经血管耦合改变

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背景: 脑血流调控受神经血管耦合机制的影响, 神经元活动和脑血流之间存在密切联系, 神经血管耦联功能紊乱是阿尔兹海默病的一个突出特征。**方法:** 在本研究中, 我们旨在使用功能磁共振 (fMRI) 和动脉自旋标记 (ASL) 的联合分析来研究正常老龄化和阿尔兹海默病之间的神经血管耦合变化。本研究从开源数据集 OASIS 3 (Open Access Series of Imaging Studies, OASIS) 中纳入 28 名阿尔兹海默病患者和 30 名正常老年人, 脑血流 (CBF) 与功能连接强度 (FCS) 的相关性、CBF/FCS 比值被用来评估神经血管耦合, 并在两组之间进行比较。**结果:** 相对于正常老年人, 阿尔兹海默病组的 CBF-FCS 相关性下降 ($P=0.012$)。在阿尔兹海默病组中, CBF/FCS 比值下降区域主要分布在认知相关脑区, 包括前额叶皮层、颞叶皮层、海马和丘脑, 而 CBF/FCS 比值上升的区域主要分布在顶叶和枕叶。**结论:** 本研究反映了阿尔兹海默病患者神经血管耦合的异常改变, CBF 与 FCS 的联合分析指标可能是区分正常老龄化和阿尔兹海默病的潜在影像标志物。

PO-3384

Fe³⁺@PDOPA-b-PSar-DOX 纳米颗粒用于 药物递送和乳腺癌的诊疗

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目的: 化学治疗在乳腺癌治疗中起着重要作用。由于化疗耐药性和全身毒性副作用使临床应用受到限制。因此, 提高肿瘤区域化疗药物的递送、浓度、生物相容性、生物降解性是基础领域亟待解决的问题。

方法: 利用 NPC 法合成 DOPA 肌氨酸嵌段共聚物 (PDOPA-b-PSar), 将 DOPA 络合铁离子, 并将 DOX 化学药物包载入亲水的聚肌氨酸与疏水的聚多巴形成的纳米粒子 (Fe³⁺@PDOPA-b-PSar-DOX), 尾静脉注射入 4T1 鼠源性乳腺癌荷瘤小鼠内, 注射前、注射后 0-36 小时动态观察 MRI 成像; 24 天内监测肿瘤大小、小鼠体重及肝功能检测。

结果: 制备的 Fe³⁺@PDOPA-b-PSar-DOX 纳米颗粒, 能够以低毒的方式将化疗药物输送到肿瘤组织。同时, Fe³⁺@PDOPA-b-PSar-DOX 的胶束纳米颗粒表现出较高的纵向弛豫性 ($r_1=7.06\text{mM}^{-1}\text{s}^{-1}$) 用作 T1 加权磁共振成像 (MRI) 对比剂。MRI 图像显示在 4 小时内, Fe³⁺@PDOPA-b-PSar-DOX 组肿瘤处信噪比高, 12h 内, Fe³⁺@PDOPA-b-PSar-DOX 组肿瘤处信噪比仍比初始要高。Fe³⁺@PDOPA-b-PSar-DOX 具有良好的抑制肿瘤生长的作用并无全身毒性副作用。

结论: Fe³⁺@PDOPA-b-PSar-DOX 特异性地将 DOX 输送至肿瘤组织, 具有高信噪比 MRI、长循环时间的特点, 并导致抑制肿瘤生长而无明显毒性, 为基础诊疗方面提供安全、有效的治疗。

PO-3385

生物启发的多抗氧化剂协同纳米治疗平台 用以实现急性肾损伤的时间敏感治疗

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瞄准急性肾损伤 (AKI) 的关键病理过程, 同时监测治疗过程, 可及时对 AKI 进行有针对性的治疗。但目前临床治疗 AKI 的方法仍以支持性为主, 其效率有限。在此, 本研究报道了一种基于多抗氧化剂合作的聚多巴胺纳米平台 (mc-PDATP), 以实现 AKI 的成像辅助治疗。mc-PDATP 可全面模拟自然环境中复杂的抗氧化防御系统, 从而显示出对多种有毒活性氧 (ROS) 更好的催化活性, 一系列的体内外实验均证实了 mc-PDATP 可以有效地保护肾脏免受 ROS 的攻击, 并通过针对 AKI 的炎症网络来挽救肾脏功能。此外, mc-PDATP 上修饰 Gd 有助于 mc-PDATP 产生理想的磁共振 (MR) T1 加权对比效应, 可用于构建敏感的 MR 直方图成像特征, 反应实时肾功能情况, 及时确定治疗效果。此研究代表了一种抗 AKI 治疗的创新策略, 可为促进下一代可视化纳米抗氧化剂的发展提供方向。

PO-3386

Fe₃O₄-mSiO₂ 诊疗一体化纳米体系改善胰腺癌组织固体应力及 增强药物渗透和抗肿瘤治疗效果

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目的: 胰腺导管腺癌 (PDAC) 间质内肿瘤相关成纤维细胞 (CAFs) 是组织固体应力维持的关键因素, 它限制了临床化疗效果。但是通过消耗 CAFs 降低 PDAC 组织固体应力的策略并未取得令人满意的结果, 因此, 一种不消耗 CAFs 从而降低 PDAC 组织固体应力、提高药物的组织内渗透效率的新颖纳米体系是亟须的。

材料与方法: 本研究构建一种集组织固体应力改善、促进肿瘤杀伤及无创渗透性监控为一体的多功能纳米体系, 此体系由包裹磁性氧化铁的介孔二氧化硅负载 Gemcitabine 和 Fasudil。本研究对此纳米体系的理化性质、体内外 MR 成像能力、PDAC 固体应力改善能力、治疗效果及药物渗透性无创监控能力进行评估

结果: 理化性质检测显示 Fe₃O₄-mSiO₂ 分散性好, 形态均匀, 且具有超顺磁性。MR 扫描显示纳米体系具有铁浓度依赖性暗化效应, 在细胞内外均具有稳定成像能力。Fe₃O₄-mSiO₂-Gem-Fas 处理的 CAFs 细胞张力相关蛋白 (p-MLC、p-MYPT) 含量均降低。CCK8 结果显示纳米体系对 PANC02 细胞有显著凋亡诱导能力。溶血实验、血液生化指标监测以及组织器官 H&E 检测结果均显示此纳米体系具有极高的生物安全性。治疗 14d 后 Fe₃O₄-mSiO₂-Gem-Fas 治疗组肿瘤组织固体应力显著降低、组织中有明显的大片状坏死、CAFs 细胞张力降低, 胶原纤维含量减少, 组织血管扩张。第一次和最后一次尾静脉注射 Fe₃O₄-mSiO₂-Gem 和 Fe₃O₄-mSiO₂-Gem-Fas 前后两小时肿瘤内 MR 信号强度差异均具有统计学意义 (P<0.001), 对应 Fe₃O₄-mSiO₂-Gem-Fas 处理组组织内普鲁士蓝的蓝染面积更大。

结论: 本研究成功构建 Fe₃O₄-mSiO₂-Gem-Fas 纳米复合体系, 具有大量载药能力和超顺磁性特性, 且具有良好的生物相容性及生物安全性。它可以显著降低 CAFs 细胞张力以及胞外间质的重塑, 从而降低 PDAC 组织固体应力, 此纳米体系通过 MR 实时监测证明其促进化疗药物组织内渗透效率。

这种有效的纳米策略在改善胰腺癌化疗方面有着巨大的潜力,为 PDAC 及相关富间质肿瘤的治疗提供了新的治疗思路。

PO-3387

自组装的超小 Fe₃O₄ 纳米粒用于肿瘤靶向双模 T1/T2 加权磁共振成像引导的协同化学动力学和化学治疗

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目的 开发一种新型的自组装超小 Fe₃O₄ 纳米团簇,用于肿瘤 RGD (HS-RGD-SH) 靶向双模 T1/T2 加权 MR 成像引导的协同化学动力学和化学治疗

方法 表征合成的纳米粒的形态。3.0-T 临床 MRI 扫描仪测试细胞和肿瘤的 T1 和 T2 弛豫率、MRI 图像和 MR 引导的体内治疗。CCK-8、ROS 染色、EdU 增殖试剂盒和活/死染色验证化疗和化学动力学治疗。记录体重和肿瘤体积。H&E、TUNEL 和 Caspase3 来研究治疗后肿瘤组织的变化。

结果 该纳米颗粒形状均匀,尺寸分布约为 2-8nm,主要尺寸位于 4nm。r1 和 r2 弛豫率分别为 0.296mM⁻¹s⁻¹ 和 2.9mM⁻¹s⁻¹, r2/r1 值为 9.8。Fe₃O₄-RGD-DOX 组的 T1 成像信号显著增加 (162%), T2 成像信号显著减少 (53%)。活/死染色和 CCK-8 结果表明,Fe₃O₄-RGD-DOX 可诱导肿瘤细胞死亡,且 ROS 较高。肿瘤大小和体积、H&E、TUNEL 染色和免疫组织化学显示,Fe₃O₄-RGD-DOX 治疗组通过导致细胞凋亡对肿瘤生长表现出显著的抑制作用。主要器官无组织病理学损伤。溶血百分比低于 2%。小鼠的主要血液指标在各组中均无明显变化。

结论 该纳米粒由于合适的尺寸效应和表面丰富的 Fe 离子,具有优异的 T1 和 T2 双模 MRI 能力以及良好的化学动力学治疗能力。在与肿瘤靶向配体 Arg-Gly-Asp (RGD) 和化疗药物阿霉素 (DOX) 结合后,功能化的 Fe₃O₄ 纳米团簇实现了增强的肿瘤积聚和滞留效应以及协同的化学动力学和化疗功能,为癌症治疗提供了一个强大的治疗平台。

PO-3388

7T 多参数 MRI 结合线粒体形态评估研究肌醇抗三阴性乳腺癌紫杉醇耐药的研究

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目的: 本研究拟运用多参数磁共振成像(MRI)动态无创监测肌醇(Ins)治疗紫杉醇(PTX)耐药性 TNBC 小鼠的疗效变化,结合离体线粒体形态改变确证肌醇抑制 PTX 化疗耐药性的机制,为治疗 PTX 耐药性 TNBC 提供新的策略。

方法: 采用 PTX 耐药性 4T1 细胞株皮下移植建立 63 只小鼠模型,随机将小鼠分为 PTX 组、PTX+Ins 组和生理盐水组,每组 21 只。各组随机选取 6 只小鼠,给药后每 7 天行多参数 MR 检查,序列包括 T1WI、T2WI、DKI、DWI 和 CEST,给药 3 周后取肿瘤行 H&E 染色、Ki-67 组化、蛋白质免疫印迹(WB)、透射电镜。余小鼠分别于治疗的第 0、1、2 周取肿瘤行上述检查,以病理结果为金标准,评估各时间点各组疗效。ADC、MK、MD 和磁化转移率平均值通过 MATLAB 和 ImageJ 后处理得到。不同监测点参数间比较采用方差分析,相关性分析采用皮尔森检验,以 p<0.05 表示差异有统计学意义。

结果: 肌醇给药 1h 后肿瘤区域的信号明显高于给药前(p<0.05)。PTX 组的 ADC 和 MD 在治疗后第 1 周高于对照组,但在治疗后第 2、3 周无差异。相比之下,PTX+Ins 组在治疗后第 2、3 周的 ADC

和 MD 值均高于 PTX 组及对照组。病理结果提示, PTX+Ins 组在治疗后第 2、3 周的肿瘤密度及 Ki-67 表达水平均低于 PTX 组。ADC 和 MD 值与肿瘤密度(ADC, $r=-0.717$; MD, $r=-0.858$)和 Ki-67 水平(ADC, $r=-0.764$; MD, $r=-0.793$)显著相关, 证明多参数 MRI 可动态监测肌醇治疗 PTX 耐药性 TNBC 的疗效变化, 且肌醇提高了 TNBC 对紫杉醇的化疗敏感性。WB 检测提示, PTX+Ins 组的蛋白表达比 PTX 组低 ($t=2.538, P<0.05$), 透射电镜显示, PTX+Ins 组破碎线粒体比例比 PTX 组少, 并与 Ki-67 水平显著相关, 确证肌醇通过抑制线粒体裂变来抵抗 TNBC 的 PTX 耐药性。

结论: 肌醇可通过抑制线粒体裂变来抵抗 TNBC 的 PTX 耐药性, 活体 7T 多参数磁共振成像作为一种无创、简便的检查技术, 可动态定量监测肌醇在 PTX 耐药性三阴性乳腺癌内的动态变化及肿瘤内的微结构变化。

PO-3389

基于机器视觉和区域增长法的相位校正： 一种三点 Dixon 的相位解包裹方法

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目的: 传统的 Dixon 方法在常规磁共振成像序列的基础上, 通过调节相应的回波时间, 分别采集水脂磁化强度矢量夹角为 0 和 180°的图像, [MW1] 再从两幅图像中计算得到水和脂肪图像。该方法的主要缺点是磁场不均匀导致的相位误差会使解得的图像存在水脂错换。在此基础上额外采集一个夹角为 360°的图像可以减少场不均匀性的影响, 但是相位包裹的问题仍然存在, 而传统的区域增长方法在解决该问题时鲁棒性不足。该研究旨在引入机器视觉的方法以改进相位解包裹的过程。

方法:

设备/序列: 7T Bruker 小动物磁共振平台, 生理监测仪/FLASH 序列

扫描对象: 小鼠腹部。

扫描方法: 调节回波时间, 在呼吸门控下分别采集水脂磁化强度矢量夹角为 0°、180°、360°的图像, 并得到相位图。

区域增长法: 拓展后的像素存入种子堆栈时, 将和中心像素相位差小的放在堆栈的顶部, 即优先拓展。

相位校正: 将 360°和 0°的相位相除得到原始相位图, 应用区域增长法得到初步结果; 在此基础上对图像进行迭代式阈值分割得到前景, 应用 Sobel 边缘检测, 根据长度和走向确定相位翻转的边界; 重新应用区域增长, 并且增长到相位边界上的像素时, 优先拓展该像素。

水脂分离: 将 180°图除以校正后的相位图, 结合 0°图得到水图和脂肪图。

脂肪含量: 选定 5×5 大小的区域, 由: 脂肪 / (水 + 脂肪) 得到脂肪含量。

结果: 区域增长法: 图 1 展示了原始图像和区域增长后的相位图及此时直接应用于水脂分离的结果。此时存在大面积的水脂错换。

相位校正: 图 2a 展示了分割的相位前景。图 2b 展示了 Sobel 边缘检测结果和识别到的相位边界。图 2c 展示了最终相位图, 此时相位是平滑的, 证明基本不存在水脂错换。

水脂分离: 图 3 展示了水脂分离的结果, 不存在水脂错换。

脂肪含量: 图 4 展示了肝脏和脂肪组织选区, 其脂肪含量分别为 6.01%和 86.90%。

结论: 本研究提出了一种新的三点 Dixon 相位校正方法, 改进了区域增长方法, 并将相位解包裹的问题转化为机器视觉的问题, 为以后的脂肪含量测定和脂肪抑制等应用和研究提供了新的思路。

PO-3390

B7-H3 靶向近红外二区荧光分子成像引导前列腺癌精确切除田雅琪¹、刘松鹭¹、胡振华²、王良¹

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目的：前列腺癌病灶术中难以识别并精准切除是疾病复发的主要原因之一。本研究通过构建前列腺癌新型成像靶点 B7-H3 特异性分子影像探针，旨在探讨其在近红外二区荧光成像中识别前列腺癌病灶的能力及引导前列腺癌精准切除的价值。

方法：

靶点表达验证：收集临床正常前列腺组织、良性前列腺增生症和前列腺癌人体组织标本，通过免疫组织化学法蛋白水平验证人体组织靶点表达的差异性。通过 Western Blot 分析正常前列腺细胞系、前列腺癌细胞系靶点表达差异性。

探针构建：将 B7-H3 单克隆抗体 (AbB7-H3) 与近红外荧光染料 IRDye800CW 偶联，构建近红外二区荧光成像探针；同时选择非靶向性的同型对照抗体 IgG 与相同的荧光染料偶联合成对照探针。

活体成像：根据 Western Blot 结果分为高表达组、中表达组、低表达组、无表达组建立皮下和原位荷瘤裸鼠模型，运用生物发光成像验证肿瘤的生长。对肿瘤生长状态适宜的小鼠模型尾静脉注射 AbB7-H3-800CW 探针和对照探针进行多时相成像和荧光引导下肿瘤切除。术后对离体肿瘤进行免疫组织化学染色分析靶点表达。测量肿瘤区域及瘤周区域信号强度值并计算肿瘤与正常组织的荧光信号比值。

人体组织探针孵育：收集前列腺癌新鲜人体组织标本进行探针孵育，并拍摄近红外二区荧光图像。

结果：临床收集前列腺癌组织 60 例，前列腺增生症和正常前列腺组织 22 例，B7-H3 蛋白表达水平存在统计学差异 ($p < 0.001$)。近红外二区荧光成像显示靶向探针可以靶向前列腺癌肿瘤。多时相体内成像显示，靶向探针在肿瘤内快速蓄积，特异性识别前列腺癌病灶，48 小时肿瘤信号背景比最高，最高信号背景比值大于 4.0。实验组所有肿瘤均在近红外二区荧光引导下切除，术后荧光成像未见肿瘤残留。人体组织孵育显示前列腺癌组织荧光强度均高于正常前列腺组织，存在统计学差异 ($p < 0.05$)。

结论：B7-H3 是具有潜力的新型前列腺癌成像靶点，分子成像探针可识别前列腺癌病灶，并在近红外二区荧光引导下将其切除。

PO-3391

通过磁共振成像和近红外光谱评估鸢尾素对小鼠棕色脂肪组织的激活作用陈月¹、郭一晓²、居胜红¹、熊丽琴²、彭新桂¹、毛辉³

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目的：通过磁共振成像和近红外光谱技术探讨鸢尾素对棕色脂肪组织的影响。

方法：对小鼠肩胛骨区原代祖棕色脂肪细胞进行分离、培养、诱导和表征。采用免疫组化方法检测棕色脂肪细胞特异性解偶联蛋白 1 (uncoupling protein 1, UCP1) 的表达，并评价不同浓度 (0、20、40 nmol/L) 鸢尾素对培养的棕色脂肪细胞 6 d 后的影响。腹腔注射鸢尾素 14 天后，对正常饮食小鼠的脂肪进行 MR 化学位移选择成像，测量棕色脂肪组织中的脂肪分数。同时用近红外光谱分析棕色脂肪组织的活性。

结果: 成功培养小鼠原代棕色脂肪细胞, 油红 O 染色显示细胞内有大量小的多细胞红色脂滴。鳕尾素干预后, 原代棕色脂肪细胞中 UCP1 蛋白的表达明显升高。鳕尾素的最佳干预剂量为 20 nmol/L。鳕尾素干预后, 小鼠体重明显减轻(对照组:28.23±1.58g, 实验组:27.54±1.60g)。体内 MR 成像显示棕色脂肪组织的脂肪分数(43.82±4.31%)明显低于对照组(60.80±6.59%); 同时近红外光谱结果显示, 鳕尾素处理组 BAT 荧光信号强度明显增强, 而体外棕色脂肪细胞直径明显增大, 处于激活状态。同时, 鳕尾素干预后褐变细胞 UCP1 的表达水平显著高于对照组, 棕色脂肪组织中 UCP1 蛋白的表达水平也显著升高。

结论: 鳕尾素可激活原代棕色脂肪细胞和棕色脂肪组织的活性。鳕尾素对棕色脂肪组织的作用可通过 MRI 和近红外光谱在体内无创验证。

PO-3392

基于机器学习的影像组学在无对比剂电影磁共振图像上鉴别心肌淀粉样变性和肥厚型心肌病

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目的: 本研究旨在研究基于无对比剂电影序列获得的心脏磁共振 (CMR) 图像确定纹理分析 (TA) 和基于机器学习的分类是否可应用于心脏淀粉样变性 (CA) 和肥厚性心肌病 (HCM) 的鉴别诊断。

方法: 在这项机构审查委员会批准的研究中, 我们连续招募了 198 名 CA (n = 101)、HCM (n = 97) 患者, 92 名 CMR 正常的患者作为对照。所有病例被随机分为训练组 [139 名患者 (70%)] 和验证组 [59 名患者 (30%)]。

从电影图像中提取了总共 273 个纹理特征。基于最小绝对收缩和选择算子 (LASSO) 的回归分析, 建立了 8 个机器学习模型并对它们的诊断效能进行比较。

结果: 使用基于磁共振电影序列图像提取获得的 17 个影像组学纹理特征来区分 CA 和 HCM。在验证队列中, 支持向量机 (SVM) 准确率达到 0.85, 显示出最佳性能 (MCC = 0.637)。灰度级不均匀性 (GLenNonU) 是最佳鉴别特征。影像组学纹理特征和传统 MR 指标的组合模型的鉴别效能 (AUC = 0.89)。具有优于传统 MR 指标模型 (AUC = 0.79)。

此外, 结果显示, 与 CA 患者和对照组相比, HCM 患者的 GLenNonU 水平更高 (P < 0.001)。GLenNonU ≥ 26 的最佳截止值可用于 CA 和 HCM 患者, 曲线下面积 (AUC) 为 0.87 (CI:0.811–0.927)。延迟强化亚组的比较显示, LGE 阳性患者组与 LGE 阴性患者组的 GLenNonU 也存在显著差异 (CA+ vs. CA- 和 HCM+ vs. HCM-, P = 0.01, 0.001)。

结论: 基于机器学习的分类器可以在无对比剂电影图像上准确地区分 CA 和 HCM。影像组学特征和 MR 的组合模型可用于提高鉴别效能, 可用于评估心肌病不同阶段发生的心肌微观结构变化。

PO-3393

具有 CT/MRI 双模态成像的新型纳米酶探针在 肿瘤治疗和疗效监测中的应用

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目的: 纳米酶在肿瘤治疗过程中具有巨大潜力。在这项工作中, 拟构建一个由 Pd、Bi 和 Mn 掺杂的多金属纳米酶 (Polymetallic nanozyme) 探针。该探针经过 Pd-H₂ 还原后表面氧空位增多, 带隙降低, 能够高效产生肿瘤杀伤活性的活性氧物种, 同时消耗细胞源性的 GSH。此外, 该探针还具有磁共振 T₁ 成像和 CT 成像能力, 在小鼠尾静脉注射后 8h 可以有效富集到肿瘤区域, 并持续 24h 以上, 从而有效地监测指导酶催化的肿瘤疗法, 抑制肿瘤细胞生长。材料与方法: 利用共沉淀法和 Pd-H₂ 还原法合成具有高催化效率的纳米颗粒 Pd-BiMn₂O₅ (简称 PBMO), 通过表面静电吸附聚乙二醇 (PEG) 增加纳米酶的水溶性和稳定性, 完成新型 PEG@PBMO 纳米酶的组装。纳米酶经过透射电镜、便携式溶解氧测定仪、紫外-可见光光谱、动态水合粒径和影像学成像等进行基本表征以及酶特性的研究。体外细胞实验验证 PBMO 纳米酶的细胞摄取及共定位、产生活性氧 (ROS) 情况以及增强线粒体膜电位的损伤效果。体内实验验证 PBMO 纳米酶的特异性成像能力以及治疗效果。结果: 透射电镜、紫外-可见吸收光谱等结果表明了射电镜、紫外纳米探针的成功制备。在 pH=5.4 的反应环境下, PBMO 具有良好的产 ROS 性能。体外影像学成像结果显示 PBMO 具有优异的 CT 和 T₁WI 增强成像效果。CCK-8 实验和活死细胞染色证实了 PBMO 在较低的浓度下具有良好的肿瘤杀伤效果, 在给予超声增强治疗后对肿瘤细胞的生长具有进一步的显著抑制作用。体内成像结果表明, 该纳米酶具有优异的对比增强能力, 表明 PBMO 是一种很有前景的 CT 和磁共振对比剂。结论: PEG@PBMO 纳米酶探针作为一种具有多酶活性的纳米探针, 可在肿瘤细胞内产生显著的 ROS, 消耗细胞源性的 GSH, 提高酶催化治疗效果, 在肿瘤成像和肿瘤生长抑制方面具有很大的应用潜力。

PO-3394

新生 SD 大鼠缺氧缺血性脑损伤扩散峰度成像的时间进程变化

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目的 分析新生 SD 大鼠缺氧缺血性脑损伤扩散峰度成像 (DKI) 相关参数随时间变化规律, 并与扩散张量成像 (DTI) 相关参数对比。

材料与方法 选取出生 7d 龄的健康 SD 幼鼠 20 只 (雌雄各 10 只), 体重在 15-20g 之间, 分为实验组 10 只 (雌雄各 5 只) 和对照组 10 只 (雌雄各 5 只)。实验组永久结扎右侧颈总动脉后放回母鼠身边恢复 1h, 然后放入氧浓度为 8% (92% 的氮气, 8% 的氧气), 温度为 37 摄氏度的缺氧箱内, 缺氧时间为 120 min。该模型类似于临床足月儿的缺氧缺血性脑病。对照组仅行分离右侧颈总动脉的假手术, 不做缺氧。实验组和对照组在模型建立后的 1、3、7d 分别进行 DKI 扫描, 扫描完成后, 实验组和对照组各选 6 只鼠 (雌雄各 3 只) 心脏灌注 PBS 后取右侧脑行二代转录组测序分析。

结果 实验组鼠缺氧缺血发生后, 病变处 DKI 相关参数平均扩散峰度 (MK) 1、3d 时候较对照组升高, 7d 时候较对照组降低, 差异有统计学意义 ($P < 0.05$); DTI 相关参数各向异性分数 (FA) 在 3 各时间点均较对照组降低差异有统计学意义 ($P < 0.05$); DTI 相关参数平均扩散系数 (MD) 在 1、3d 时候较对照组降低, 7 d 时候较对照组升高, 差异有统计学意义 ($P < 0.05$)。DKI 相关参数值变化较 DTI 相关参数值变化可以判断病变的时间段。且在 3d 时候的变化不如 1d 和 7d 明显, 这些也与二代转录组测序相关激活的基因和通路数目有正相关。

结论 与 DTI 相关参数相比, DKI 能够更敏感地评价缺氧缺血性脑病脑组织微结构的时间变化。

PO-3395

基于氘同位素磁共振的放射-代谢-基因组学无创监测以 HK2 为靶点的肿瘤免疫微环境动态变化

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免疫检查点抑制剂的能否发挥治疗作用往往和肿瘤微环境密切相关, 肿瘤细胞异常的有氧糖酵解 (Warburg 效应) 会引起葡萄糖的大量消耗, 其限制了 T 细胞的葡萄糖可用性, 引起 T 细胞的效应功能和数量的下降。己糖激酶 (HK2) 作为糖酵解的第一个关键限速酶, 门控肿瘤的糖酵解通量, 已被证明与肿瘤的代谢与免疫微环境密切相关。然而, 有两个问题没有得到解决, 首先如何通过无辐射无创的方式检测肿瘤的糖酵解通量以挑选出适合免疫治疗的患者没有得到很好地解决, 其次是以 HK2 为靶点抑制肿瘤糖酵解创造低代谢环境是否可以配合免疫治疗达到更好的疗效仍不清楚。在这里, 我们利用稳定同位素氘的化合物氘代葡萄糖与 9.4T 高场强磁共振无辐射无创的监测的对照肿瘤组织与敲低 HK2 的肿瘤组织中葡萄糖-乳酸转化的时间-空间关系。并在人类结肠癌样本、小鼠结肠癌、小鼠黑色素瘤以及小鼠肝癌中揭示了以 HK2 所代表的代谢微环境与免疫微环境的密切关系。与此同时, 我们研究了不同剂量下 HK2 的抑制剂 2DG (2-脱氧-D-葡萄糖) 治疗小鼠肿瘤所引起的放射-代谢-免疫的关系, 发现了高 2DG-低等代谢速率-免疫抑制以及低 2DG-中等代谢速率-免疫激活的关系轴。使用 PD-L1 单抗联合低剂量 2DG 取得了最佳的治疗效果并产生良好的免疫记忆。并利用 CD45.1⁺ OT-1⁺ 基因编辑小鼠与 CD45.2⁺ C57 小鼠验证了低剂量 2DG 联合 CART 治疗的可能性。

PO-3396

单线态氧激活纳米载体用于乳腺癌的 X 射线诱导光动力治疗及级联铁死亡研究

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目的: 铁死亡具有吸引人的抗肿瘤潜力, 这主要是由于脂质过氧化物及活性氧的积累达到了致死量。纳米级 X 射线诱导光动力疗法 (X-PDT) 产生的细胞毒性单线态氧 ($^1\text{O}_2$) 有望促进谷胱甘肽 (GSH) 的消耗从而进一步激活铁死亡。

方法: 为了实现 X-PDT 和铁死亡的结合, 我们采用具有 $^1\text{O}_2$ 敏感连接体的超支化共聚物, 设计了封装光敏剂 (维替泊芬) 和铁死亡诱导剂 RAS 选择性致死小分子 3 (RSL3) 的纳米载体 (D-NP_{VR})。结果: 在 X 射线照射下, D-NP_{VR} 可产生 $^1\text{O}_2$ 使细胞凋亡。随后, $^1\text{O}_2$ 通过 1,2-双 (2-羟基乙硫基) 乙烯键断裂引发 D-NP 解离, 从而促进负载的 RSL3 释放并通过硫醇氧化降低细胞内的 GSH 水平。RSL3 是谷胱甘肽过氧化物 4 (GPX4) 的共价抑制剂, GPX4 负责在 GSH 的协助下将脂质过氧化物解毒为脂质醇, $^1\text{O}_2$ 诱导的 GSH 耗尽和 GPX4 失活会导致肿瘤细胞的铁死亡。对小鼠 4T1 荷瘤小鼠的肿瘤生长抑制表明, D-NP_{VR} 产生显著的治疗效率, 其中 GPX4 含量和表达证实了铁死亡的诱导。

结论: 我们利用超支化 D-HPE 与 VP 和 RSL3 的简单自组装成功构建了新型纳米载体 D-NP_{VR}。在对肿瘤部位进行精确的 X 射线照射后, VP 可产生大量的 $^1\text{O}_2$ 直接杀死肿瘤细胞。此外, $^1\text{O}_2$ 不仅通过消耗 GSH 促进铁死亡, 还能促进 D-NP 分解, 从而促进 RSL3 释放。释放的 RSL3 进一步充当

抑制剂, 抑制 GPX4 表达并诱发 4T1 肿瘤细胞中的铁死亡。这种通过铁死亡和 X-PDT 诱导的细胞凋亡的结合, 实现了优越的抗肿瘤性能, 表明了 $^1\text{O}_2$ 响应纳米载体在促进 X-PDT 和铁死亡联合治疗方面的潜力。此外, 对 VP 与 RSL3 的包封率的研究对于进一步优化 D-NP_{VR} 的体内治疗结果值得深入探讨。这项研究为未来抗肿瘤应用中结合 X-PDT 和铁死亡的更先进的治疗方案提供了一个有前途的平台。

PO-3397

重塑胰腺癌细胞外基质协同促进铜死亡效应的 仿生有机硅纳米平台的研究

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背景: 胰腺导管腺癌 (PDAC) 是一种具有高度侵袭性的癌症, 其肿瘤细胞周围细胞外基质 (ECM) 有明显的胶原基质反应, 严重阻碍了化疗药物或纳米药物的扩散。铜死亡是一种最新发现的细胞死亡方式, 在癌症治疗中显示出巨大的前景。铜死亡诱导剂可以同时引发铜离子相关凋亡和化学动力学治疗 (CDT), 在肿瘤治疗中具有明显优势。

方法: 我们设计了一种将基质胶原纤维降解、铜死亡、主动靶向、以及协同抗肿瘤治疗和诊断结合到一起的仿生纳米平台。提取胰腺癌肿瘤细胞膜并将其涂覆到负载双硫仑 (DSF) 的硫化铜微粒修饰的介孔二氧化硅上, 然后通过脂质插入的方法使纳米平台胶原酶功能化。通过化学分析方法表征了纳米平台的形态、元素组成和胶原酶活力。通过构建 3D 多细胞肿瘤球评估其肿瘤外基质降解能力。使用共聚焦显微镜、流式细胞术和 Western-blot 研究纳米平台介导的铜死亡的治疗效果和机制。通过磁共振成像分析了体内和体外肿瘤靶向功效和成像能力。

结果: 纳米平台通过细胞膜的同源靶向特性有效地靶向肿瘤, PDAC 组织中致密的 ECM 被胶原酶降解, ECM 结构变得疏松, 纳米药物深入肿瘤实质内。硫化铜微粒修饰和二硫键掺杂的介孔二氧化硅壳响应酸性肿瘤微环境及谷胱甘肽 (GSH), 将无毒的 DSF 药物激活为高细胞毒性的双二乙基二硫代氨基甲酸酯铜 (CuET), 增强 DSF 化疗, 促进有毒线粒体蛋白聚集, 发生了铜死亡和凋亡, 有效地实现了显著的协同原位抗癌效果, 且副作用最小。该纳米平台还具有超顺磁性, 可用于指导和监测 T1 加权磁共振成像。

结论: 本研究设计的纳米平台重塑了胰腺癌细胞外基质, 增强了胰腺癌的药物渗透, 也为基于铜死亡的潜在癌症治疗提供了前景。这种设计合理的纳米平台整合了胰腺癌诊断、治疗和监测, 为临床提供了一种新的抗肿瘤治疗策略。

PO-3398

在体脂肪成分高分辨率成像技术

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目的: 人体器官内异位脂肪沉积通常与代谢类疾病相关, 脂肪成分比含量提供了更多信息。现有的脂肪成分测量金标准——活检技术具有侵入性。单体素磁共振波谱作为一种常用的在体脂肪成分测量技术, 具有扫描区域受限, 分辨率低等弱点, 容易忽视体素外的病灶信息。平面回波波谱成像技术 (EPSI) 作为一种快速磁共振波谱成像技术, 可以同时提供结构与分子影像信息。本研究旨在开发一种脂肪选择 EPSI 技术, 以提供不同脂肪成分 (图 1) 的在体高分辨率扫描影像。

方法:

设备/序列: 7T Bruker 科研磁共振/脂肪选择 EPSI 序列。

体模实验: 一支 50 mL 试管, 内含 5 支装有不同浓度大豆乳糜溶液, 1 支大豆油, 1 支亚麻籽油的移液管。移液管胶封两头, 并用水填满移液管与试管管壁之间的间隙 (图 2a, 2b)。

小鼠实验: 一只 C57BL/6J 品系成年雌性健康小鼠, 开启呼吸门控扫描麻醉状态小鼠腹部。扫描时间 3~4 分钟, 一次可扫 5 层。

数据重建与后处理: 对信号进行翻转偶回波并滤波处理后, 使用基于奇异值分解的二步迭代校正方法消除奈奎斯特伪影。经过迭代自动相位校正后, 合并线圈通道。

脂肪成分计算: 积分实部谱以获得不同种类脂肪质子相对浓度。

结果:

体模实验: 图 2c 展示了体模图谱以及局部放大谱, 可见大豆乳糜溶液, 大豆油以及亚麻籽油具有不同的波谱形态。图 2d 展示了不同种类脂肪质子的相对浓度图, 以及比值计算出的脂肪成分指标图, 不同油模的指标各异。

小鼠实验: 图 3a 展示了小鼠腹部图谱以及局部放大图谱, 显示运用呼吸门控能有效减少运动伪影。图 3b 展示了不同种类脂肪质子的相对浓度图以及相应脂肪成分指标图。可见健康小鼠的脂肪集中在皮下脂肪, 内脏脂肪较少。

结论:

本研究开发了一种脂肪选择 EPSI 技术, 可提供不同种类脂肪质子的在体高分辨率扫描影像。目前该技术可应用于小鼠腹部, 未来可拓展至肌肉等其他部位。该技术可在短时间内采集不同脂肪成分的分子影像, 有利于对各个器官进行分子水平研究, 全面发掘代谢类疾病中脂肪分子代谢路径与发病机制之间的联系。

PO-3399**多对比定量 MRI 技术在甲状腺相关性眼病中的应用研究**

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目的: 多对比定量(MultiPlex, MTP)成像技术, 又称为合成 MRI (Synthetic MRI, SyMRI) 是一种新颖的定量磁共振成像技术, 一次扫描可以获得多种对比度图像和 5 种定量参数图, 在疾病的早期诊断、鉴别诊断及疗效评价等方面显示出巨大应用潜力。本文拟探讨 SyMRI 技术在甲状腺相关性眼病病程评估方面的可行性和诊断价值。

方法: 搜集本院 2022.06-2023.09 月期间眼科或内分泌科确诊的甲状腺相关性眼病 (thyroid-associated ophthalmopathy, TAO) 患者的临床资料、实验室指标及 MRI 资料, 其中 TAO 患者 20 例、健康对照组 15 例, 所有 MRI 检查均在 GE 3.0T (Signa Architect, GE Healthcare, USA) 磁共振扫描仪上进行, 扫描序列包括常规高分辨率 T1WI、T2WI、3D SPGR 序列及冠状位 MAGiC 序列。SyMRI 8.0 软件用于图像的后处理, 以生成定量图像。由 2 名高年资放射科医师对眼球突出程度、眶脂肪厚度及眼外肌 (extraocular muscle, EOM) 的平均 T1 持续时间 (T1 relaxation time, T1RTmean)、平均 T2 弛豫时间 (T2 relaxation time, T2RTmean) 及信号强度比 (SI) 进行测量。采用非配对 t 检验或 Mann-Whitney U 检验比较健康对照组和 TAO 组的实验结果进行统计学分析。利用 ROC 曲线比较不同成像序列诊断 TAO 的准确效能。以 p 值 < 0.05 被认为结果差异具有统计学意义。

结果: 与健康对照组比较, TAO 组患者的眶脂肪厚度增厚 ($p < 0.05$)、眼外肌 T1RTmean 和 T2RTmean 值延长, 结果具有统计学意义 ($p < 0.05$)。TAO 患者眼外肌 T1RTmean、T2RTmean 与临床活动评分及严重程度评分具有显著相关性 ($p < 0.05$)。联合眼外肌 T2RTmean 和眶脂肪厚度能够达到最大的预测效能, 同时提高 TAO 诊断的敏感性和特异性。

结论：SyMRI 技术用于 TAO 病程评估是可行的，有望为临床眼病定量评价提供一种新的客观观察手段。

PO-3400

一种“自循环”智能纳米酶可被铁死亡及双硫死亡 动态激活实现高效肿瘤治疗

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目的： 依赖葡萄糖氧化酶的饥饿疗法可以提供芬顿反应所需的底物过氧化氢，而芬顿反应产生的氧气可以减轻葡萄糖氧化酶催化进程导致的肿瘤缺氧。基于铁死亡的化学动力学疗法利用芬顿反应产生的羟基自由基可以有效杀死肿瘤细胞。肿瘤细胞在发生铁死亡时很大程度上会利用谷胱甘肽来抵抗铁死亡引起的脂质过氧化，当与葡萄糖饥饿结合时会引起细胞内胱氨酸的累积和还原型烟酰胺腺嘌呤二核苷酸磷酸的耗竭，导致双硫死亡的发生。因此我们拟设计一种“自循环”智能纳米酶，能被铁死亡与双硫死亡动态激活，从而实现高效的肿瘤治疗。

方法：采用不同的分析方法表征了纳米酶的形态、元素组成和肿瘤微环境的响应能力。采用活体成像技术和磁共振成像技术对其体内、体外肿瘤靶向效果和成像能力进行分析。采用共聚焦显微镜、流式细胞术和免疫印迹技术研究该纳米酶介导的铁死亡及双硫死亡的治疗效果和机制。

结果： 纳米酶由掺杂铁和二硫键的二氧化硅外壳及装载葡萄糖氧化酶的核心组成。葡萄糖氧化酶不仅可以原位生成过氧化氢增强铁死亡，还能消耗细胞内的葡萄糖，限制还原型烟酰胺腺嘌呤二核苷酸磷酸的生成。该纳米酶依靠肿瘤细胞膜进行靶向药物递送，并可在肿瘤微环境中谷胱甘肽的作用下实现反应性生物降解。该智能纳米酶以脂质过氧化物累积和肌动蛋白细胞骨架之间异常二硫键交联为特点，通过互补增强的铁死亡和双硫死亡机制诱导肿瘤细胞死亡。该纳米酶还具有超顺磁性框架，可以在 T2 加权磁共振成像下进行治疗指导和监测。

结论： 这种合理设计的智能纳米酶有望整合肿瘤的诊断、治疗和监测，并提供一种基于铁死亡、营养依赖以及肿瘤微环境的新型抗肿瘤治疗策略。

PO-3401

功能化聚天冬氨酸纳米粒子对端粒双靶向肝癌诊疗一体化研究

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目的：端粒酶再激活在肝癌发生发展过程中起到重要作用，抑制端粒酶活性是治疗肝癌的有利方法。目前常用药物为端粒酶抑制剂，但由于端粒长度的缩短需伴随细胞分裂，故单用端粒酶抑制剂存在治疗时长久，治疗效果不及时的问题。针对这一问题，我们提出端粒酶活性抑制以及端粒结构破坏同步治疗，以端粒为靶标，抑制肿瘤细胞的无限增殖可能，降低肿瘤细胞的存活率。磷酸化的 AKT 具有活化下游结构蛋白的能力，使结构蛋白能够发挥保护端粒结构完整性的作用，阻断该通路，破坏端粒结构稳定性，引起 DNA 损伤，直接造成端粒的缩短，同时结合端粒酶抑制剂，双靶向治疗端粒问题，实现肿瘤的高效杀伤和抑制肿瘤细胞的无限分裂。诊疗一体化是影像诊疗的新兴手段，我们引入二氧化锰作为磁共振造影剂，结合叶酸靶向基团，实现肿瘤的靶向递送，实现诊疗一体化。方法：首先通过聚合反应与偶联反应获得药物聚天冬氨酸母链，之后通过水解反应获得二氧化硅纳米粒子，再于中性条件下将高锰酸钾转变为二氧化锰并搅拌包裹于二氧化硅外层，最后通过静电吸附作用将母链包裹在纳米粒子外层。我们通过银染 TRAP 法检测端粒酶活性，通过 qPCR 法检测端

粒长度,同时采用多种生物学表征手法分别检测了肿瘤细胞存活率、增殖情况、DNA 损伤情况等。通过小鼠活体成像技术和磁共振检测手段,探明纳米粒子生物靶向作用和治疗情况。

结果:用透射电镜表征纳米粒子,成功制备了纳米材料。通过各种化学表征方法,分别检测纳米粒子的粒径大小,电位分布,元素组成和含量表征等。细胞生物学实验表明双靶向给药增强了端粒酶活性抑制作用,有效缩短了端粒长度,最终使得肿瘤细胞 DNA 损伤增多,死亡率增加。动物成像实验表明,该纳米材料能高效的聚集于肿瘤部位,在磁共振成像上显示出明显的增强信号,实现肿瘤靶向作用。动物治疗实验表明,该纳米材料在保证生物安全性的前提下,有效抑制肿瘤的增长。

结论:成功制备了端粒双靶向治疗和诊疗一体化的纳米粒子。解决了单独端粒酶活性抑制的缺点,双靶向端粒有效抑制肿瘤细胞的无限分裂和增长,成功在动物实验上抑制肿瘤的增殖,并且高效实现纳米粒子肿瘤部位的靶向定位,成功实现诊疗一体化。

PO-3402

磁共振纳米对比剂 Fe^{3+} @PSar-b-PDOPA-cy7 在结直肠癌肝转移中体内分布及其分子机制

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目的 探索结直肠癌细胞系摄入磁共振纳米对比剂 Fe^{3+} @PSar-b-PDOPA-cy7 体内外分布及其分子机制。**方法** 合成磁共振纳米对比剂 Fe^{3+} @PSar-b-PDOPA-cy7,并对其进行表征。MRI 和小动物荧光成像仪检测 Fe^{3+} @PSar-b-PDOPA-cy7 粒子在结直肠癌肝转移瘤小鼠体内分部。采用 MTT 检测 Fe^{3+} @PSar-b-PDOPA-cy7 对结直肠癌细胞活性影响,随后检测 Fe^{3+} @PSar-b-PDOPA-cy7 不同浓度和时间点在结直肠癌细胞系摄入变化。检测 Fe^{3+} @PSar-b-PDOPA-cy7 在人肠正常细胞系和结直肠癌细胞摄入分布。同时通过内吞途径特定小分子抑制剂处理,明确 Fe^{3+} @PSar-b-PDOPA-cy7 途径,细胞器特定定位分子标记明确其在细胞内细胞器分布。**结果** 合成的 Fe^{3+} @PSar-b-PDOPA-cy7 的粒径在 15nm 左右,具有极佳的水溶性,体外分散性好。该磁共振纳米粒子主要分布于小鼠结直癌转移瘤中, MRI 下转移瘤显示清晰且之久。随后 MTT 结果显示 Fe^{3+} @PSar-b-PDOPA-cy7 在较高浓度下对细胞活性无影响,随着时间的推移,纳米粒子摄入增加,同时随着浓度的提高,纳米粒子摄入也不断增加。发现该纳米粒子在肠癌的摄入与 FEME 内吞途径的 Endophilin A2 蛋白表达相关,该结果通过特定内吞小分子抑制剂的处理检测结果相一致。通过对细胞内特定细胞器标记,发现 Fe^{3+} @PSar-b-PDOPA-cy7 纳米粒进入细胞内主要分布在线粒体细胞器上。**结论** Fe^{3+} @PSar-b-PDOPA-cy7 磁共振纳米粒对于结直肠癌肝转移瘤为代表的转移瘤均有体内成像效果好且持久,且毒性较低,具有极好的磁共振现象的临床应用价值。

PO-3403

iRGD 靶向脂质体载药体系增强肝癌靶免治疗疗效及其机制的探讨

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目的: 仑伐替尼与免疫检查点抑制剂 (ICB) 的联合治疗对肝细胞癌 (HCC) 的治疗带来了巨大的希望,然而但是由于 ICB 抗体的成本和免疫原性高、仑伐替尼的脱靶毒性、药物共传递效果低,现有的靶免疗法的治疗效果并不令人满意。因此,开发一种将靶向治疗与小分子 ICB 抑制剂相结合的高效纳米系统增强 HCC 免疫疗法的效果,并通过 MRI 监测小鼠治疗效果。

方法: 本研究介绍了一种 iRGD 修饰的脂质体载药体系, 共同递送仑伐替尼, 以及免疫检查点小分子抑制剂 BMS-202, 对小鼠原位和皮下肝癌进行治疗, 并在治疗前, 治疗后 5 天和 10 天通过 MRI 对小鼠原位肝癌进行监测。

结果: 结果显示在 iRGD 的靶向性作用下, 实现了药物在肿瘤中的靶向聚集。在酸性肿瘤微环境中, 脂质体持续释放出仑伐替尼和 BMS-202, 其中持续释放的仑伐替尼促进肿瘤血管正常化, 改善了肿瘤缺氧的状态, 并且其可以激活 IFN- γ 信号通路, 促进 CXCL10 的分泌诱导 T 细胞的招募, 其还升高了肿瘤细胞 PD-L1 的表达增强了小分子抑制剂 BMS-202 的敏感性, 从而激活肿瘤的免疫应答, 导致皮下肿瘤和 MRI 监测的原位肝癌的缩小, 抑制了肿瘤的肺转移, 并且降低了药物的毒副作用。

结论: 因此, 通过 iRGD 修饰的脂质体简单地组装 FDA 批准的药物, 提高药物的生物利用度及治疗疗效, 可以为治疗 HCC 患者提供一个很有前途的策略。

PO-3404

肿瘤微环境响应的诊疗探针 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 在放疗增敏中的实验研究

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目的: 本研究主要是合成生物相容性的肿瘤微环境响应及调控探针 $\text{MnFe}_2\text{O}_4\text{-PEG}$, 探讨诊疗一体化纳米探针 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 用于磁共振成像精准引导下乏氧肿瘤放疗增敏的可行性。

方法: ①通过高温有机相分解法及配体交换法制备生物组织相容性良好的 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 。②体外验证 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 的类似过氧化氢酶和谷胱甘肽过氧化物酶活性。③探究 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 的磁学性能, 将其应用于体外磁共振成像。④在细胞水平, 研究 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 的潜在毒性, 并通过多种方法验证其在乏氧环境下的放疗增敏作用。⑤构建 4T1 乳腺癌皮下瘤模型。利用小动物光声成像系统和临床磁共振设备扫描小鼠, 观察肿瘤部位的血氧饱和度和肿瘤特异性磁共振成像效能。⑥在动物水平, 通过绘制肿瘤生长曲线、生存曲线及病理检查等考察 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 的放疗增敏效果。

结果: ① $\text{MnFe}_2\text{O}_4\text{-PEG}$ 在生理性溶液中具有极佳的稳定性。② $\text{MnFe}_2\text{O}_4\text{-PEG}$ 可催化过氧化氢产生氧气并耗竭谷胱甘肽。③ $\text{MnFe}_2\text{O}_4\text{-PEG}$ 具备良好的磁学性能, 在 T_1 和 T_2 加权像上同时表现出较好的增强效果。④细胞实验证明 $\text{MnFe}_2\text{O}_4\text{-PEG}$ 无明显毒性。在乏氧环境下, $\text{MnFe}_2\text{O}_4\text{-PEG}$ 联合放疗对 4T1 细胞造成的 ROS、DNA 损伤水平以及凋亡率明显高于对照组, 具备放疗增敏的潜力。⑤静脉给药后, $\text{MnFe}_2\text{O}_4\text{-PEG}$ 表现出高度的肿瘤聚集性和长期的血液循环。光声成像显示肿瘤部位血氧饱和度明显提高, 磁共振成像在动物水平展示出肿瘤特异性 T_1 -/ T_2 -weighted 双模态对比增强的效果。⑥ $\text{MnFe}_2\text{O}_4\text{-PEG}$ 联合放疗有效抑制 4T1 乳腺癌的生长, 病理结果进一步佐证了放疗增敏效果。

结论: $\text{MnFe}_2\text{O}_4\text{-PEG}$ 纳米探针通过高渗透、长滞留效应被动靶向肿瘤组织, 缓解乏氧微环境和耗竭肿瘤组织中过表达的谷胱甘肽, 解除乏氧实体肿瘤的放疗抵抗, 结合 T_1 / T_2 -weighted 双模态磁共振对比增强成像, 实现可视化图像精确引导的肿瘤放疗增敏。

PO-3405

体内 MRI/FL 多模态成像探针的制备及治疗作用研究

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目的: 多模态成像将各种成像技术的优势进行“互补”与“融合”, 突破了单一模态成像的尺度局限性。因此, 我们制备了具有光动力治疗效果的 MRI/FL 双模态成像纳米粒子碳点, 以实现多渠道成像。材料与方法: 采用微波辅助法制备柠檬酸-尿素体系碳点, 并在其中掺杂金属钐和金属钕。采用分光光度计测试吸收光谱, 酶标仪测试荧光光谱, 应用透射电镜及动态光散射观察对比剂形态尺寸, 应用 X 射线衍射仪测试衍射谱。在体外实验中观察磁共振效应、荧光效应、细胞毒性、抗菌效果、内吞效应等。在体内实验中观察磁共振成像能力、安全性等。结果: 碳量子点具有优异的水溶性和生物相容性、良好的稳定性、以及独特的光学性质等特性, 且尺寸较小、分散性较好。体外实验中, 与对照组比较, 碳点有良好的磁共振成像能力, 能够在光照下有效杀死肿瘤细胞, 内吞效果较好。体内实验证明碳点磁共振成像能力强、荧光成像明显, 安全性高。结论: 碳点作为新型碳基纳米材料, 尺寸较小、分散性较好, 细胞毒性较小, 内吞效果较好。同时体内实验证实其具良好的光致发光效应, 磁共振成像能力强、安全性高。

PO-3406

钆掺杂 Fe₃O₄ 纳米探针在 T1/T2 MR 引导下的肿瘤协同治疗研究

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目的 构建多功能 DOX@Gd-MFe₃O₄ 靶向诊疗一体化复合纳米探针, 探究其对 4T1 乳腺癌体内外靶向磁共振成像及治疗效能。

方法 1.通过水热反应法及化学修饰合成复合纳米探针 DOX@Gd-MFe₃O₄。2.对材料进行形貌及理化性质表征。3. 探究材料的光热转换效果。4.研究材料在有无近红外光照射下药物的体外释放过程。5.测量材料弛豫率。6.检测细胞毒性及生物相容性。7.材料在乳腺癌细胞内的摄取情况。8.肿瘤细胞评价体外联合治疗效果。9.评价载瘤小鼠肿瘤治疗效果。

结果 1. 制备的 Gd-MFe₃O₄ 水溶液分散性良好。2.TEM、XRD、VSM、UV-vis 吸收光谱示 DOX 的成功负载及纳米复合物的成功制备。3.红外热像仪显示, 材料具有温度升高的浓度依赖性和光照强度依赖性、光热稳定性。4.通过体外模拟药物释放结果显示近红外光的照射会促进并且提高药物的释放。5. 材料体外 MR 扫描中具有 T1/T2 双模态成像潜能 6.细胞毒性结果显示 Gd-MFe₃O₄ 浓度在 0~0.5mg/ml 范围内时, 对 NIH-3T3 细胞及 4T1 细胞均无明显的细胞毒性作用。7.荧光共聚焦显微镜显示在磁靶向作用下 DOX 聚集在 4T1 周围的含量更多, 外加近红外光照射会促进 DOX 的释放和吸收。普鲁士蓝铁染色显示在磁靶向作用下, 更多的含 Fe 纳米粒子被 4T1 细胞吞噬和摄入。8.细胞活死染色法及 MTT 体外细胞治疗实验都表明 DOX@Gd-MFe₃O₄ 的光热和化疗协同治疗能够明显且有效的对肿瘤细胞起到杀伤作用。9.运用皮下成瘤技术成功构建 4T1 载瘤小鼠模型, 该纳米探针成功实现了对 4T1 载瘤小鼠的特异性磁共振增强成像。10.4T1 载瘤小鼠分组治疗结果显示, DOX@Gd-MFe₃O₄ 组在近红外光照射及磁靶向作用条件下, 肿瘤治疗效果更好。

结论 本研究条件下: 采用简单合成策略, 成功制备了具有磁靶向的新型诊疗一体化纳米探针实现了对 4T1 乳腺癌细胞及载瘤小鼠的靶向磁共振成像及光热、化疗的联合治疗。

关键词 肿瘤靶向; 介孔 Fe₃O₄; 肿瘤协同治疗

PO-3407

磁共振 T2 对比剂 Fe₃O₄@Cys 的制备及新西兰兔活体成像研究

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目的：制备经半胱氨酸 (cysteine, Cys) 表面修饰的磁共振 T2 对比剂 Fe₃O₄@Cys，并通过 3.0 T 磁共振成像系统经新西兰兔测试其成像性能。材料与方法：采用溶剂热法，通过改变反应时间和底物浓度，制备出不同的 Fe₃O₄ 纳米颗粒。采用 X 射线衍射仪 (X-ray Powder diffractometer, XRD) 对样品进行表征并分析其结晶性，经扫描电子显微镜 (scanning electron microscope, SEM) 测试其形貌及粒径，选择结晶性较高且粒径均匀的样品进行半胱氨酸表面修饰，经 ZETA 电位纳米粒度分析仪测得 Fe₃O₄、Fe₃O₄@Cys 的表面电位，经震动样品磁强计 (vibrating-sample-magnetometer, VSM) 对其进行磁性能测试，经 MTT 法细胞增殖抑制实验测试样品修饰前后的细胞毒性。使用 3.0 T 磁共振成像系统，通过观察新西兰兔注射前后不同时间点肾脏皮质、髓质及小肠的信号变化，测试其成像性能。结果：当六水合三氯化铁的用量选择 0.325 g，200℃温度下反应 8 h 所制备的 Fe₃O₄ 纳米颗粒结晶性高，平均粒径约 57.2 nm，修饰前后表面电位分别为 -20 mv 与 -22 mv，扫描电镜下粒径及形貌未发生明显改变，修饰后不同浓度 Fe₃O₄@Cys 的 24 h 细胞存活率均高于 80%，且均高于 Fe₃O₄ 组。表现出超顺磁性，在磁共振活体成像中具有明显的阴性对比增强效果。结论：反应时间延长，Fe₃O₄ 结晶性增加；底物浓度增加，Fe₃O₄ 粒径减小。半胱氨酸修饰后，稳定性与生物相容性增加，可作为 T2 对比剂用于多种实验和基础研究。

PO-3408

基于类淋巴系统磁共振成像预测血管性痴呆模型
大鼠认知障碍的发生

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目的：本研究拟运用动态对比增强磁共振成像，给大鼠鞘内注射顺磁性造影剂，观察血管性痴呆 (VD) 组和假手术 (SHAM) 组大鼠脑内脑脊液 (CSF) 和间质液 (ISF) 的交换，联合 Morris 水迷宫、HE 染色以证明类淋巴系统功能可以成为血管性认知障碍发生的预测因子。

方法：采用双侧颈总动脉永久性结扎构建血管性痴呆 (VD) 大鼠模型。假手术 (SHAM) 组只分离血管，不做任何处理，每组 6 只。大鼠术后的第 7 天，接受 3DT1 加权磁共振成像扫描：注射造影剂前数据、注射后每 10 分钟采集一次数据，采集到注射后 5 小时。Morris 水迷宫采集第 7 天 SHAM 组、第 7 天 VD 组，第 2 月 SHAM 组、第 2 月 VD 组的数据。采集完处死大鼠，取脑组织行 HE 染色。组间参数比较采取两独立样本 t 检验；相关性分析采用皮尔森检验，以 $p < 0.05$ 表示差异具有统计学意义。

结果：在类淋巴系统磁共振成像中，VD 组相对于 SHAM 组的达峰时间均后移，信号变化值也更大 ($p < 0.05$)。Morris 水迷宫中，相比第 7 天 SHAM 组、第 7 天 VD 组、第 2 月 SHAM 组，第 2 月 VD 组的目标象限时间比和目标象限路程比均明显下降 ($p < 0.05$)。在 HE 染色中，VD 组与 SHAM 组对比，脑海马 CA1 区凋亡细胞更多 ($p < 0.05$)。3DT1 加权磁共振成像中达峰时间、信号变化值分别与 Morris 水迷宫的目标象限时间比、HE 染色海马 CA1 区凋亡细胞数做相关性分析。结果提示达峰时间、信号变化值与目标象限时间比显著相关 (达峰时间， $r = -0.8068$ ；信号变化值， $r = -0.7902$)；达峰时间、信号变化值与海马 CA1 区凋亡细胞数显著相关 (达峰时间， $r = 0.8579$ ；信号变化值， $r = 0.7475$)。

结论：全脑核磁共振成像提供了一个敏感、非侵入性的工具，用于定量评估 CSF-ISF 交换，并具有潜在的临床应用。类淋巴系统功能具有早期预测血管性痴呆模型大鼠认知障碍的发生的潜力。

PO-3409

大脑结构与功能重组是重症肌无力患者认知损伤的神经影像学潜在基础

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目的：越来越多的证据表明重症肌无力 (MG) 患者存在认知损伤，然而其神经生物学基础尚不清楚。本研究旨在探讨 MG 暴露对患者大脑皮层形态与功能的影响，以及大脑结构和功能重组是否是其认知损伤的基础。

方法：采用基于体素的形态学测量 (VBM) 及基于表面的形态学测量 (SBM)，比较了 36 例 MG 患者 and 34 例健康对照 (HC) 大脑皮层体积、厚度、脑沟深度、皮层褶皱和分形维数的变化，以皮层结构存在差异的脑区为种子点，评估患者全脑功能连接改变情况。以性别、年龄、受教育程度、焦虑及抑郁评分为协变量，使用偏相关分析方法探索大脑结构及功能异常与神经心理及临床特征之间的关系。最后采用简单中介方法探索介导重症肌无力患者临床特征与认知损失之间关联的重要神经影像基础。

结果：MG 组双侧眶部额下回、左侧三角部额下回、右侧眶部额上回、右侧额上回及右侧中扣带回灰质体积较 HC 组降低；与 HC 组相比，MG 组双侧额上回、额中回上部、中央前回及左侧额中回尾部、右侧额下回（岛盖部、三角部）皮层厚度降低；左侧中央前、后回及右侧岛叶、外侧眶额回、额下回三角部脑沟深度降低；右侧顶下小叶、额中回皮层分形维数减低。此外，与 HC 组相比，右侧眶部额上回与右内侧额上回、右侧额上回与右侧顶上小叶、左侧中央前回与左内侧额上回和顶上小叶、右侧额上回与右侧小脑功能连接分别增强；偏相关分析显示多个异常结构及功能脑区指标与重症肌无力定量评分 (QMGS)、抗乙酰胆碱受体抗体 (AChR-Ab) 水平、部分认知分量表评分显著相关。中介分析表明右侧顶下小叶、额中回皮层分形维数降低以及左侧中央前回与左内侧额上回功能连接失调介导了重症肌无力患者定量评分与信息处理速度 (SDMT) 受损之间的关联。

结论：MG 患者部分大脑形态和功能改变介导了 MG 疾病严重程度与认知损伤之间的关联。这些皮层形态和功能重组可能是 MG 患者认知障碍的潜在神经生物学机制。

PO-3410

靶向 POCD 小鼠血脑屏障诊疗一体化纳米探针构建

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目的：近年来，老年人口逐年增加，术后认知功能障碍的发生率也逐渐上升，有研究表明，血脑屏障的破坏是术后认知功能发生的重要机制。但目前血脑屏障破坏的影像学检查方式有限，增加血脑屏障的通透性，提高药物生物利用率是药物递送研究中主要的挑战。本研究旨在构建稳定的靶向血脑屏障破坏的纳米探针，实现血脑屏障破坏的诊疗一体化。

方法：以具有 T2 加权成像特征的四氧化三铁为载体，包覆具有光热效应的介孔多巴胺层，同时搭载治疗药物，以受体靶向的方式精准定位到血脑屏障，在细胞水平对纳米探针的毒性及摄取能力进行评估，在动物层面对纳米探针进行安全性评估及治疗效果评价。

结果：构建的 LR-Fe₃O₄@mPDA 纳米探针具有良好的稳定性，介孔多巴胺提高了药物负载率，同时纳米探针具备光热与 PH 双响应释放药物，在细胞层面表现出低毒性和良好的靶向性。

结论: 我们构建了 LR-Fe₃O₄@mPDA 纳米探针, 在近红外的照射下, 增加了血脑屏障的通透性, 能够促进药物释放, 这种用于脑内药物输送的无创策略可以成为诊断和治疗术后认知功能障碍及神经退行性疾病的理想方法。

PO-3411

帕金森病患者脑网络异常: 基于低频振幅的 Kullback-Leibler 离散相似性个体网络分析

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目的: 应用 Kullback-Leibler 散度相似性 (Kullback-Leibler divergence-based similarity, KLS) 评估方法构建基于低频振幅 (amplitude of low-frequency fluctuation, ALFF) 的个体脑网络, 探讨其在分类帕金森 (Parkinson's disease, PD) 患者和健康对照 (healthy control, HC) 的可行性。

方法: 59 例 PD 患者和 41 例 HC 纳入研究。功能磁共振数据常规处理得到平均 ALFF (mALFF) 图, 利用 Brainnetome 246 脑图谱分割 mALFF 获得 246 个脑区, 采用 KLS 方法评估各脑区对神经活动分布相似性获得个体水平脑网络。采用 t 检验和最小绝对收缩和选择算子进行特征选择, 使用嵌套 10 折交叉验证 (重复 100 次) 进行超参数优化和模型评估, 使用支持向量机构建分类模型。我们选择 1000 次迭代中平均权重绝对值大于最大绝对权 20% 的特征为“区分特征”并计算其与 PD 患者临床症状评分相关性。

结果: 我们构建的分类模型平均 AUC 和准确率分别为 0.84±0.03 和 0.78±0.03 (p 均<0.001)。我们共识别了 39 个“区分特征”, 主要位于默认网络、感觉运动网络、执行控制网络、视觉网络、额顶网络和皮层下网络。Spearman 相关分析示右侧楔前叶 (PCun_R_4-3) 与左颞下回 (ITG_L_7_1) (r= -0.27, p=0.04) 和右顶下小叶 (SPL_R_5_4) 与左海马 (Hipp_L_2_1) (r=0.29, p=0.03) 连接与 MMSE 评分存在显著相关性, 左额上回 (SFG_L_7_5) 与左额中回 (MFG_L_7_6) 连接与 HAMD 评分存在显著相关性 (r=-0.27, p=0.04)。

结论: 应用 KLS 方法构建的基于脑神经活动 (ALFF) 的个体脑网络可以很好分类 PD 患者和 HC, 其是 PD 新的且鲁棒的潜在神经影像生物标记物。PD 与多个网络内及网络间的功能异常相关, 我们的网络建模方法为 PD 的异常网络组织提供新视角

PO-3412

靶向 VISTA 的纳米探针及对胰腺癌的治疗研究

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目的: (1) 构建靶向胰腺癌免疫检查点 VISTA, 具有 MR 成像功能及声动力疗效等多种功能纳米探针 Fe₃O₄@TiO₂@VISTAmAb。(2) 探究该探针细胞水平靶向性能及声动力治疗疗效。(3) 探究该探针动物水平治疗效果及治疗机制。

方法: (1) 探针制备及表征方法: 构建花环状 Fe₃O₄@TiO₂@VISTAmAb 纳米探针。采用生物透射电镜、磁共振成像、紫外分光光度计等对探针进行表征。(2) 采用 Western blot、流式细胞术研究探针的靶向能力; 通过 CCK-8、荧光显微镜实验等研究探针的细胞水平声动力治疗效能。(3) 通过小鼠注射探针后超声治疗, 肿瘤组织切片染色实验等研究探针动物水平 SDT 效能及免疫治疗机制。

结果: (1) 制备得到的 $\text{Fe}_3\text{O}_4@\text{TiO}_2@\text{VISTAmAb}$ 纳米探针平均水合粒径约 225.3 nm, Zeta 电位为 -28.9 mV, r_2/r_1 值 32.03。在超声照射下, 该探针具有良好的 SDT 潜能 (单线态氧的产生能力)。(2) 与非靶向组相比, VISTAmAb 的修饰提高了 Panc-2 细胞对纳米探针的摄取约 1.2 倍, 表现出较好的靶向摄取作用, 且该探针生物相容性好。细胞水平治疗结果显示: 与探针共孵育后超声照射 (1.0 W/cm², 1 min), 约 50% Panc-2 细胞死亡, 显示出较好治疗效果。(3) 动物治疗结果显示: $\text{Fe}_3\text{O}_4@\text{TiO}_2@\text{VISTAmAb}$ 探针联合 SDT 组肿瘤大小明显受到抑制, 抑制率达 85.36%, 表明 SDT 联合免疫治疗具有良好的治疗效果。(4) 免疫微环境评估实验结果表明, 在 VISTAmAb 治疗后, VISTA 阳性表达下降, PD-1/PD-L1 阳性表达上调, CD4⁺T 细胞和 CD8⁺T 细胞浸润增加。在超声作用下, 癌组织结构变得疏松, 提示超声作用可有效破坏致密纤维, 肿瘤组织血管生成增加。结论: (1) 构建了靶向胰腺癌免疫检查点 VISTA 的新型探针 $\text{Fe}_3\text{O}_4@\text{TiO}_2@\text{VISTAmAb}$, 具有良好生物相容性、超声响应及 MR 成像功能。(2) 基于该探针进行声动力联合治疗, 有效疏松胰腺癌致密纤维基质, 显著促进肿瘤微血管生成, 改善免疫抑制微环境, 对胰腺癌显示出良好的治疗效果。

PO-3413

新型荧光-MPI 双模态成像探针同时监测树突状细胞疫苗迁移和凋亡以指导结直肠癌化疗-免疫联合治疗

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目的: 树突状细胞 (DC) 疫苗免疫疗法和奥沙利铂 (OXA) 化疗联合治疗是一种很有前途的结直肠癌治疗方法。树突状细胞 (DC) 疫苗的给药时间和顺序对于结直肠癌患者化疗和免疫联合治疗的效果尤为关键, 并且需要进一步探索。

方法: 我们构建了一种新型凋亡响应荧光分子成像 (FMI)/磁粒子成像 (MPI) 双模态成像的纳米探针。该探针 ($\text{Fe}_2\text{O}_3@\text{DEVD}(\text{Cy7})\text{-TAT@OVA}$) 由纳米颗粒 $\text{Fe}_2\text{O}_3@\text{DEVD}(\text{Cy7})\text{-TAT}$ 负载鸡卵圆白蛋白 (OVA) 作为特定抗原组成, 可以同时监测 DC 疫苗的迁移和凋亡。通过理化性质表征、细胞毒性试验验证探针安全性; 通过流式细胞术和共聚焦显微镜验证探针的摄入试验、体外凋亡响应性; 通过活体荧光、MPI 成像验证 DC 疫苗迁徙效率、体内迁移和凋亡效果; 通过治疗实验验证该探针的指导价值。

结果: 理化性质证实该探针的可用性; DC2.4 细胞与探针孵育 12、24、36、48h 的细胞活性均为 80%~100%。摄入试验证实 DC 疫苗经网格蛋白介导的内吞作用摄入探针并且探针可实现溶酶体逃逸; 体外凋亡试验证实凋亡诱导剂 STS 可诱导 BMDC 细胞的凋亡; 活体荧光成像显示探针并不影响 DC 疫苗的迁徙, 并且证实 MPI 可长时间示踪 DC 的迁徙并通过荧光成像检测 DC 的凋亡; 治疗实验证实了使用双模态成像策略指导的方案可以明显抑制肿瘤生长。

结论: 这种 $\text{Fe}_2\text{O}_3@\text{DEVD}(\text{Cy7})\text{-TAT@OVA}$ 探针有助于指导化疗和免疫治疗联合治疗的顺序和时机, 以提高联合疗效。

PO-3414

帕金森病脑功能、代谢及神经递质异常改变

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目的: 比较帕金森病 (Parkinson's disease, PD) 患者和健康对照 (healthy control, HC) 低频振幅 (amplitude of low-frequency fluctuation, ALFF) 改变并研究其与临床量表评分相关性及其与脑代谢及神经递质分布的空间相关性。

方法: 59 例 PD 患者和 41 例 HC 纳入研究。功能磁共振数据常规处理得到平均 ALFF (mALFF) 图, 比较 PD 组和 HC 组 mALFF 组间差异, 其中年龄、性别及受教育程度作为协变量。计算差异显著脑区 mALFF 值与 MMSE 和 HAMD-17 量表评分 Spearman 偏相关。应用 JuSpace 软件计算 mALFF 与脑神经递质[包括 5-羟色胺能受体 (5-HT_{1a}、5-HT_{1b} 和 5-HT_{2a})、多巴胺能受体 (D₁ 和 D₂)、多巴胺转运蛋白 (DAT)、氟多巴胺合成能力 (FDOPA)、 γ 氨基丁酸 (GABA_A)、去甲肾上腺素转运蛋白 (NAT)、5-羟色胺转运蛋白 (SERT)、囊泡乙酰胆碱转运蛋白 (VACHT) 和 μ -阿片受体 (MU)]及脑血流量 (CBF) 跨模态空间关系。

结果: 我们发现三个具有显著差异团块, 其主要脑区包括双侧梭状回、中央旁小叶、左枕下回、右颞下回及辅助运动区。团块 1、2 和 3 的 mALFF 值与 HAMD-17 评分呈负相关 (r 分布 -0.30、-0.60 和 -0.27, p 均 < 0.05), 团块 3 的 mALFF 值与 MMSE 评分呈正相关 ($r = 0.25$, $p = 0.013$)。与 HC 组相比, PD 组体素水平 mALFF 改变与 CBF ($Z = 0.125$, $p = 0.023$)、DAT ($Z = -0.145$, $p = 0.003$)、FDOPA ($Z = -0.155$, $p < 0.001$)、NAT ($Z = -0.155$, $p = 0.002$) 及 SERT ($Z = -0.197$, $p < 0.001$) 的空间分布存在显著相关性, 未发现其与其他神经递质显著空间相关性 (p 均 > 0.05)。

结论: 我们的研究揭示了 PD 多模态神经机制, 其与脑内多个脑区的功能及多个神经递质及脑血流异常相关, PD 患者 mALFF 改变与脑代谢及神经递质空间分布相关联为我们理解疾病病理机制及临床特征提供新的视角。

PO-3415

功能蛋白磁共振/荧光无损影像标记方法与应用研究

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目的: 本研究旨在探索一种功能蛋白的无损影像标记方法, 克服以往功能蛋白化学标记过程中结构改变导致的靶向结合能力减弱以及功能蛋白物理复合过程中影像标记效率低的局限性, 实现功能蛋白最大程度的影像标记。磁共振和荧光标记的功能蛋白以期肿瘤、心脑血管等疾病的分子分型诊断提供精准预判。

方法: 本研究中利用开环反应得到不同烷基链长 ($n = 4 \sim 12$) 的二聚化 Gd-DTPA, 其可通过疏水作用与功能蛋白物理复合, 实现磁共振影像标记; 同时利用生物素化荧光染料与功能蛋白化学偶联, 实现荧光影像标记。通过磁共振成像系统、荧光成像系统测定磁共振和荧光双标功能蛋白的影像标记效率; 通过分子生物实验 (流式细胞术、western blotting 等) 验证功能蛋白经磁共振和荧光双标后靶向作用。

结果: 本研究中制备的二聚化 Gd-DTPA 磁共振对比造影剂, 其结构中烷基链越长 T₁ 弛豫率越高, 且 T₁ 磁共振对比成像效果优于临床用 Gd-DTPA。ICP-MASS 结果显示功能蛋白与二聚化 Gd-DTPA 的复合摩尔比为 1: 7.5 时, Gd 离子标记效率最高为 $83 \pm 3\%$; 荧光光谱分析结果显示功能蛋白与生物素化的荧光染料的化学偶联摩尔比为 1: 4 时, 荧光素的结合效率最高为 $73 \pm 5\%$ 。Western blotting 和流式细胞结果显示制备的双标功能蛋白保留了 90% 以上的特异性结合能力。

结论论：本研究提出的功能蛋白磁共振和荧光标记方法是一种广谱性的蛋白标记技术，可对具有特殊功能或靶向作用的蛋白进行无损标记。双标后功能蛋白可同时实现组织定位、分子示踪，为临床诊断提供无创影像诊断方法。后续研究将提高功能蛋白的高效压缩和靶向递送工艺。

PO-3416

CT 影像组学与 PET 衍生参数对宫颈癌盆腔淋巴结转移 诊断价值的临床对比研究

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目的：构建预测宫颈癌盆腔淋巴结转移的 CT 影像组学模型，将其与基于 PET 常规参数和衍生参数的诊断性能相比较，探讨其预测宫颈癌盆腔淋巴结转移的诊断价值。方法：回顾性分析 2017 年 1 月至 2020 年 7 月于我院行 PET/CT 检查并经病理证实淋巴结性质的宫颈癌患者 112 例。收集这些患者的临床特征、PET 代谢参数及 CT 平扫图像。由 2 名同时具备核医学及放射科诊断资质的医师应用 LIFEX 软件对导出的 CT 图像进行手动勾画感兴趣区，按照 7:3 的比例随机划分为训练集和测试集，从患者的 CT 平扫图像中提取 933 个影像组学特征建立影像组学模型，获得影像组学评分 Radscore。我们从 PET 常规代谢参数及衍生参数分别选出 AUC 值最高的指标，通过 ROC 曲线评价影像组学模型、PET 常规代谢参数和衍生参数对宫颈癌盆腔淋巴结转移的诊断效能，采用 Delong 检验对上述方法绘制的 ROC 曲线进行配对比较，评估不同方法在宫颈癌盆腔淋巴结转移中的诊断差异，检验水准为 $r < 0.05$ 。

结果：在影像组学模型中，训练集 AUC 值为 0.855；测试集 AUC 值为 0.809。在 PET 常规参数中，淋巴结 SUVmax、SUVmean、MTV、TLG 有统计学意义 ($r < 0.05$)，SUVmax AUC 值最高。训练集 SUVmax AUC 值为 0.890；测试集 AUC 值为 0.920。PET 衍生参数中，SUVmax/肝脏 SUVmax、SUVmax/血池 SUVmax、SUVmax/骨髓 SUVmax、SUVmax/肿瘤 SUVmax 均具有统计学意义 ($r < 0.05$)，SUVmax/肝脏 SUVmax AUC 值最高，训练集 SUVmax/肝脏 SUVmax AUC 值为 0.891；测试集 AUC 值为 0.924。以上三种方法对诊断淋巴结转移都显示出了良好的区分效果，两两比较结果显示均无明显统计学差异 ($r > 0.05$)。

结论：CT 影像组学模型能准确地预测宫颈癌患者的盆腔淋巴结转移。CT 影像组学模型与基于 PET 的 SUVmax、衍生参数的诊断能力相比无明显差异。

PO-3417

基于多参数放射组学及生境成像预测 GBM 的 IDH 分型

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目的：我们拟通过基于生境成像的放射组学无创性地寻找反应肿瘤分子分型的放射组学特征，构建及优化对预测 GBM 的 IDH 突变分型的放射组学模型，更好地指导临床治疗决策的制定。方法：回顾性研究我院确诊为胶质母细胞瘤(GBM)的患者的影像资料，并提取各影像参数的组学特征。基于勾画的不同区域的 ROI，我们构建了以下模型：全肿瘤的 T2WI 模型，全肿瘤的 CBV 模型，全肿瘤的 ADC 模型，多参数磁共振序列联合模型 (T2WI 整体区域、PWI 强化区域及 ADC 水肿区域)，模型中均纳入了患者年龄、性别、发病部位组成的临床因素分析。结果：92 例 GBM 随机分为训练组 66 人(71%)及测试组 26 人(29%)两组，每个 ROI 提取了 396 个组学特征，所有序列的组学特征的预测准确性高于临床指标。经过 LASSO 分析降维确定特征个数后，选择最具预测能力的特征子集

组成影像组学标签 **radscore**，并对其系数进行评价，各个模型的训练组及测试组的 **radscore** 在 IDH 野生型和突变型中有显著差异。在放射组学分析中 **AUC** 最高为 **CBV** 模型，多序列多区域模型的 **ROC** 结果，**AUC** 在训练组达 0.962，测试组达 0.955，对 IDH1 分型的诊断效能高于单一序列模型。结论：基于多参数和多区域 **MRI** 图像的放射学特征可以更准确地预测 **GBM** 的 **IDH** 基因型。

PO-3418

靶向髓鞘探针 Gd-DTDAS 在多发性硬化大鼠髓鞘损伤模型中的实验研究

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目的 探讨 **MR** 对比剂 **Gd-DTDAS** 在多发性硬化(multiple sclerosis, **MS**) 大鼠髓鞘损伤模型中的应用价值。方法 体外细胞实验：1、毒性评价,通过 **MTT** 法检测少突胶质前体细胞 (oligodendrocyte precursor cells, **OLN-93**) 与 **Gd-DTDAS** 共孵育 24h 后的吸光度，计算存活率来评价细胞毒性。2、细胞摄取实验，使用溶血磷脂酰胆碱(lysophosphatidylcholine, **LPC**)处理细胞后与正常细胞对比，定量两组细胞对 **Gd-DTDAS** 的摄取值以及相应荧光强度的变化。动物实验：1、动物体外实验，将实验组和 **LPC** 组大鼠脑组织 10 μ M 厚度切片进行染色，利用激光共聚焦显微镜进行观察；然后将两组大鼠脑组织 2mm 厚度切片浸泡于 **Gd-DTDAS** 溶液中，**MR T1WI**、**T1maps** 评估 **Gd-DTDAS** 与髓鞘部位的结合情况。2、动物体内实验，经尾静脉注射 **Gd-DTDAS**，**MR** 评估 **LPC** 组注射 **Gd-DTDAS** 前后大脑髓鞘变化。结果 1、细胞毒性实验表明，当 **Gd-DTDAS** 浓度增加到 400 μ M 时，**OLN-93** 细胞的存活率约为 95%，证明 **Gd-DTDAS** 对其存活无抑制作用。2、细胞摄取实验表明，两组细胞均能摄取 **Gd-DTDAS**，**LPC** 组较对照组摄取量较低，结果有统计学差异($P < 0.01$)。3、动物体外实验表明，与对照组比较，**Gd-DTDAS** 染色的 **LPC** 组脑组织切片荧光强度下降，结果有统计学差异($P < 0.01$)；4、动物体内实验表明，与尾静脉注射前比较，注射后有髓区域 **MR T1maps** 弛豫性降低。结论 靶向髓鞘探针 **Gd-DTDAS** 更好地结合髓磷脂丰富的区域，髓鞘靶向 **MR** 显像更佳，能特异性显示多发性硬化髓鞘损伤部位。

PO-3419

谷胱甘肽加权化学交换饱和和转移成像在盆腔肿瘤中的临床应用

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背景：谷胱甘肽(**GSH**)是细胞内氧化还原平衡的关键调节剂，其含量的降低是一种潜在的凋亡早期激活信号，随后产生的氧自由基促使细胞发生凋亡。此外，**GSH** 能将脂质氢过氧化物转化为无毒的谷胱甘肽二硫化物，从而减轻脂质过氧化并抑制铁死亡。并且，**GSH** 耗竭还能触发细胞自噬，通过自噬抑制剂 3-MA 可防止 **GSH** 耗竭诱导的细胞死亡。**GSH** 的代谢与盆腔肿瘤的类型密切相关，在盆腔肿瘤诊疗中存在潜在的应用价值。

化学交换饱和和转移(**CEST**)利用活体内自身的代谢物进行成像，其可检测具备羟基、酰胺或胺的代谢物。鉴于 **GSH** 分子式内具备这三个必有基团，因此，**CEST** 成像技术给盆腔肿瘤内 **GSH** 的在体可视化成像带来希望。

目的：对 3T **MRI** 设备谷胱甘肽加权化学交换饱和和转移(**GSH-CEST**)成像参数进行优化并初步探究 **GSH-CEST** 在盆腔肿瘤中的临床应用价值。

方法: 首先在 3T 磁共振上对不同浓度(10、15、20、25mmol/L)、不同 pH 值(5、6、7)的 GSH 试管, 进行不同的能量 B1(1、1.5、2、2.5、3、3.5、4、4.5、5 μ T)和不同的饱和和交换持续时间(2500、3000、3500、4000ms)CEST 成像, 以证实 GSH 可视化成像。在体外 GSH 可视化成像成功的基础上, 使用实验所得最佳参数, 对 6 例子宫肌瘤、3 例卵巢肿瘤、3 例宫颈癌、2 例子宫内膜癌的女性盆腔进行常规 T1WI、T2WI、T1WI 增强以及 GSH-CEST 成像。

结果: 试管实验结果明确了 Z 谱中 GSH 的频率偏移峰值在距离水 3.0ppm 处, 通过计算不同浓度下 GSH 溶液的 MTR_{asym} 发现, 当使用 3T 磁共振, 预饱和脉冲能量为 3.5 μ T, 饱和时间为 2500ms 时, GSH 的 MTR_{asym} 最大。在体临床实验发现, 在子宫肌瘤、卵巢肿瘤、子宫颈癌、子宫内膜癌的 Z 谱中均可见 GSH 的频率偏移峰值在距离水 3.0ppm 处, 并且子宫肌瘤 GSH 浓度较其他种类盆腔肿瘤的 GSH 浓度更高。

结论: 本研究获得了 3T GSH-CEST 最优扫描参数, 在体临床试验初步证实了其在盆腔肿瘤潜在的应用价值, 对不同类型盆腔肿瘤 GSH 浓度差异及潜在机制仍需要进行后续研究。

PO-3420

Identification of the Pathological Types of Brain Metastasis from Lung Cancer Based on Multiparametric MRI Radiomics: A Feasibility Study

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Objectives: To differentiate brain metastases (BMs) from non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC) and BMs due to the adenocarcinoma (AD) and non-adenocarcinoma (NAD) subtypes using radiomic features derived from multiparametric magnetic resonance imaging (MRI).

Methods: 276 patients with BMs, including 98 with SCLC and 178 with NSCLC, were randomly divided into training (193 cases) and validation (83 cases) sets in a ratio of 7:3. Of the 178 patients with NSCLC, 155 were from primary AD and 23 from NAD. These were also randomly divided into training (124 cases) and validation (54 cases) sets. A logistic regression analysis was used to construct classification models based on radiomics features that were extracted from T1 weighted contrast-enhanced (T1CE), fluid-attenuated inversion recovery (FLAIR), and diffusion-weighted imaging (DWI) images. An receiver operating characteristic curve (ROC) curve analysis was performed to determine the performance of each logistic model, and the area under the curve (AUC), accuracy (ACC), sensitivity (SEN), specificity (SPE), positive predictive value (PPV), and negative predictive value (NPV) were calculated.

Results:

Four, three, four, and eleven radiomics features, respectively, were extracted from T1CE, FLAIR, DWI, and combined sequences after screening. The optimal features for the classification of NSCLC and SCLC were selected from the combined sequential MRI using univariate logistic analysis and multivariate logistic analysis. For differentiation between NSCLC from SCLC ,The performance of the three single-sequence models was not ideal, and the AUCs in the training set and the validation set were all lower than 0.700, except for SPE and PPV. The multi-sequence model achieved better performance when compared to the single-sequence models; the AUC, ACC, SEN, SPE, PPV and NPV in the training set were 0.765 (95% confidence intervals [CI]: 0.711, 0.822), 0.694, 0.694, 0.797, 0.849, and 0.550, respectively; and in the test group, the AUC, ACC, SEN, SPE, PPV, and NPV were 0.762 (95% CI: 0.671, 0.845), 0.675, 0.648, 0.724, 0.814, and 0.525, respectively.

Three, two, three, and eight radiomics features, respectively, were extracted from T1CE, FLAIR, DWI, and combined sequences after screening. The optimal features for differentiating AD and NAD were selected from the combined sequential MRI using univariate logistic analysis and multivariate logistic analysis .For differentiation between AD and NAD, among the three single-

sequence models, the T1CE model had the best prediction performance. The AUCs of the training group and the test group in the T1CE model were 0.787 (95% CI 0.676, 0.882) and 0.772 (95% CI 0.558, 0.944), respectively. Compared with the single sequence model, the multi-sequence model achieved even better performance; the AUC, ACC, SEN, SPE, PPV, and NPV in the training set were 0.861 (95% CI: 0.756, 0.951), 0.821, 0.750, 0.832, 0.400, and 0.957, respectively; and in the test group, the AUC, ACC, SEN, SPE, PPV, and NPV were 0.851 (95% CI 0.649, 0.984), 0.871, 0.857, 0.872, 0.500, and 0.976, respectively.

Conclusion: The radiomics classification method based on the combination of multiple MRI sequences may be used for differentiating between the various lung cancer BMs.

PO-3421

Clinical and imaging features of pregnancy complicated with active tuberculosis

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Objective To investigate the clinical and imaging features of pregnant women with active tuberculosis.

Methods A retrospective analysis was conducted on the clinical data of 19 pregnant patients with active tuberculosis admitted to Hunan Chest Hospital from January 2020 to December 2022, and their clinical manifestations, laboratory examinations, imaging findings, etiology and pathological findings were descriptively analyzed.

Results The patients, aged 19-39 years, presented with symptoms such as cough, sputum and fever, along with significant systemic toxic symptoms. Most patients (84.2%) resided in rural areas, 8 were diagnosed with hypo-proteinemia, 8 with mild anemia, 7 with hyperuricemia, and 7 with hyperlipidemia. Among the 19 patients, 13 (68.4%) were in early pregnancy, 4 in the second trimester, 1 in late pregnancy, and 1 in puerperium. Most of the patients (13/19, 68.42%) had secondary pulmonary tuberculosis, consisting of interstitial pulmonary tuberculosis (4 cases), tracheobronchial tuberculosis (8 cases), single or complicated cervical and axillary lymph node tuberculosis with abscess (4 cases), single or complicated simple tuberculous pleurisy (4 cases), laryngeal tuberculosis (1 case), and left urinary tuberculosis (1 case). Hematogenous disseminated pulmonary tuberculosis was observed in 3 cases (15.79%), including 2 cases of tuberculous encephalitis and meningitis, and 1 case of cervical spinal meningitis. Imaging findings showed that among the 13 cases of secondary pulmonary tuberculosis, 9 patients exhibited bilateral involvement of multiple lobes, air space consolidation, cavities, and nodules on chest CT. Different from previous studies, in 4 cases, interstitial changes characterized by micronodular aggregation, ground-glass opacity, reversed halo sign, fine reticular line shadow in the lobules, tree bud sign, lobular confluent consolidation, and small cavities were observed. Tuberculous pleurisy was present as unilateral pleural effusion or pleural thickening in 4 cases. Diffuse miliary and nodular shadows in both lungs were seen in 3 cases. Two cases were complicated by tuberculous encephalitis and meningitis, with cranial MRI showing nodular and patchy lesions in the brain parenchyma with nodular and circumferential enhancement, meningeal thickening and enhancement, surrounding brain tissue edema, and spinal cord membrane thickening and enhancement in 1 case. Pregnancy outcome analysis revealed that 16 (84.2%) patients chose abortion or induced labor, 1 severe case required emergency uterine clearance due to incomplete abortion, resulting in the death of both the mother and fetus, and one patient in late pregnancy underwent a cesarean section at 36+6 weeks after her condition was stabilized, following which both the mother and child were in good health. Additionally, one patient in the puerperium period was transferred to our hospital for further treatment after premature delivery at another hospital.

Conclusion Pregnancy complicated with active tuberculosis is characterized by severe systemic poisoning symptoms, involvement of multiple organs, diverse imaging findings, and unfavorable

pregnancy outcomes. Therefore, it is of utmost importance to enhance our understanding of the clinical and imaging features of this disease to improve early diagnosis rates, ensure timely and standardized treatment, and enhance the prognosis for both mothers and infants.

PO-3422

Bilateral glymphatic function decreased asynchronously after recovery in mild COVID-19 patients

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Objectives: Central nervous sequelae are often reported in recovered coronavirus infectious disease-19 (COVID-19). It is not clear whether recovered COVID-19 patients have glymphatic impairment and lateralization. This study aimed to evaluate the glymphatic system function in patients with COVID-19 compared to healthy controls using diffusion tensor image analysis along the perivascular space (DTI-ALPS) method.

Methods: We enrolled 61 patients with COVID-19 and 38 age- and sex- matched healthy controls. All participants underwent non-invasive and no contrast agent required diffusion and susceptibility imaging using 3T MRI scanner, and we calculated the DTI-ALPS index. Using hierarchical cluster analysis, demographic and cognitive scores of COVID-19 patients were compared between clusters.

Results: Diffusion along perivascular space was significantly different between the groups. The left (1.54 vs. 1.66, $P = 0.001$) and right (1.51 vs. 1.62, $P = 0.004$) DTI-ALPS index in patients with COVID-19 was significantly lower than healthy controls. Furthermore, age was significantly negatively correlated with the left DTI-ALPS index ($r = -0.307$, $P = 0.016$) and right DTI-ALPS index ($r = -0.260$, $P = 0.043$). After implementation of hierarchical clustering in patient with COVID-19. The decline of DTI-ALPS index on both hemispheres was non-synergistic in cluster 1 (left 1.66 ± 0.13 ; right 1.44 ± 0.18) and cluster 2 (left 1.39 ± 0.20 ; right 1.60 ± 0.23). Cluster 1 showed a higher proportion of cognitive abnormalities.

Conclusion: We demonstrated that COVID-19 patients, even in mild cases, experienced asymmetric bilateral glymphatic function decline within 4 months after recovery. Patients with right-sided glymphatic dysfunction had a greater proportion of cognitive decline (MoCA score < 26). The decrease of glymphatic function was more obvious in older patients. With COVID-19 infection over 90%, future studies of cognitive disorders in older people should exclude the effect of COVID-19 infection.

PO-3423

Analysis of clinical features and prognostic factors of AIDS-related lymphoma

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Objective: To analyze the clinical characteristics, pathological characteristics, and prognostic factors of AIDS-related lymphoma (ARL).

Methods: This was a retrospective study of the clinical characteristics, diagnosis and treatment process, and survival status of 32 patients with ARL. The patients were divided into a survival group

and non-survival group according to their prognosis, and the factors affecting survival were analyzed. The patients' clinical characteristics were analyzed according to symptoms, sex, age, and laboratory indicators such as the lactate dehydrogenase (LDH) concentration, number of CD4+ T cells, Ann Arbor stage, pathological typing, and International Prognostic Index (IPI) score. A univariate regression analysis was performed to compare the clinical characteristics of the treatment group and non-treatment group. The impact of chemotherapy and combined antiviral therapy on survival time was assessed.

Results: Thirty-two patients were included in the study; 31 were male and 23 were aged >40 years. The average LDH concentration was 639.8 U/L, and the average CD4+ lymphocyte count was 167 cells/ μ L. Diffuse large B-cell lymphoma was present in 40.6% (13/32) of the patients; a B-lymphocyte source accounted for 90.6% (29/32) of cases, and a T-lymphocyte source accounted for 9.4% (3/32). The proportion of patients who received anti-lymphoma treatment was 84.4% (27/32). Twenty-three patients died during follow-up and nine survived. Univariate analysis showed that the prognostic factors were age, the CD4+ T-lymphocyte count, and the IPI score. The average progression-free survival (PFS) time in the highly active antiretroviral therapy (HAART) group before chemotherapy was 4.81 months, while the average PFS time without antiviral therapy before chemotherapy was about 1.91 months. This difference was statistically significant. The median 2-year survival time in patients who received antiviral therapy before chemotherapy was 33.3 months, while that in patients who did not receive antiviral therapy was 27.3 months. Early HAART therapy combined with standardized chemotherapy was shown to improve the patients' prognosis. It also improved the overall survival rate and PFS time. However, there was no significant difference in the overall survival rates between 1 and 2 years.

Conclusion: The CD4+ T-cell count and IPI score were key factors affecting the prognosis of patients with ARL. An increased LDH concentration was also a prognostic factor. A certain correlation between the disease severity and prognosis was found. The use of standard anti-lymphoma treatment can effectively improve the survival rate of patients.

PO-3424

Hydatid disease of bone: Imaging features

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Hydatid disease is a parasitic infection by the larval stage of either *Echinococcus granulosus* (cystic echinococcosis [CE]) or *Echinococcus multilocularis* (alveolar echinococcosis [AE]). This review focuses on the incidence, clinical manifestations, and radiographic features of bone hydatidosis at various sites. The clinical presentations and imaging features of bone hydatidosis differ depending on the site of involvement. The first goal of this review is to distinguish the radiographic features of bone hydatidosis in various bones. The second goal is to help radiologists understand the incidence of hydatid bone disease at various sites and to recognize the clinical manifestations through imaging features. Consideration of both the clinical and radiologic characteristics can help radiologists to diagnose hydatid disease of bone.

PO-3425

The oral Akt inhibitor ipatasertib induces hepatocellular carcinoma cell apoptosis via METTL3 downregulation

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Abstract The effectiveness of therapies against hepatocellular carcinoma (HCC), one of the most common causes of cancer-related death worldwide, is currently limited. Recently, molecular therapy targeting Akt (serine/threonine kinase) has attracted considerable attention in HCC treatment. ipatasertib, a small-molecule Akt inhibitor, reportedly exhibits significant anticancer activity against several cancers, including breast, prostate, and gastric cancers. However, the effects of ipatasertib on HCC have not been investigated yet. In this study, we found that ipatasertib induced HCC cell apoptosis by decreasing the mitochondrial membrane potential in vitro and inhibited HCC growth in a xenograft mouse model in vivo. Further mechanistic studies showed that inhibiting METTL3 expression can enhance the apoptosis-inducing effect of ipatasertib by upregulating cleaved caspase-3 expression. ipatasertib inhibited the HCC invasion and metastasis by reducing cell colony formation and migration abilities, as well as epithelial-mesenchymal transition, without causing toxicity in normal liver cells. Together, our study demonstrated that the Akt inhibitor ipatasertib exerts effective anti-HCC effects by downregulating METTL3 expression. The potential application of ipatasertib in patients with HCC is worth further investigation.

PO-3426

Time-dependent Visualized CT Score to Differentiate Severe/critical COVID-19 at Fever Clinic

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Objectives: Rapid identification of severe/critical COVID-19 infection was essential for life-saving. This study aimed to evaluate the efficacy of visualized CT score to identify severe/critical COVID-19 infection.

Materials and Methods: This retrospective study collected chest CT images of symptomatic COVID-19 patients from fever clinic of Peking Union Medical College Hospital during the December 2022 Omicron wave. Patients were first split into three cohorts based on the interval between symptom onset and their visits at the clinic. They were then divided into mild/moderate and severe/critical disease groups based mainly on blood oxygen level and integrated clinical information. CT scores for each lobe were assigned from 0-2 points based on the degree of pneumonia involvement and then summed as the total CT score (0-10 points). A logistic regression analysis was performed to evaluate the association between CT score and disease severity, and the area under the curve (AUC) was calculated. The best cutoff value was determined by maximizing the Youden index.

Results: 361, 360 and 241 patients were included in the early-phase cohort (0-3 days from symptom onset), intermediate-phase cohort (4-7 days) and late-phase cohort (8-14 days), respectively. Severe/critical infection accounted for 14.1%, 18.9% and 24.9% of the patients in each individual cohort. Severe/critical group had significantly higher CT scores than the mild/moderate group in every lobe ($P < 0.001$). In the severe/critical group, the CT scores of the lower lobes were significantly higher than those of the upper lobes on both sides in the early and intermediate phase ($P < 0.05$). The AUC of CT score to identify severe/critical infection reached 0.91, 0.82 and 0.83 in the three cohorts, with the best cutoff values being 1.5, 4.5 and 5.5, respectively.

Conclusion: A time-dependent visualized CT score can swiftly identify severe/critical COVID-19 at fever clinic during a community outbreak.

PO-3427

The Importance of Multiparametric MRI Radiomics Model in Predicting Risk Stratification in Early-stage Endometrial Carcinoma

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Objective: Preoperative risk stratification of early-stage endometrial carcinoma (EC) is crucial for clinical treatment. In this study, we aim to investigate the value of radiomics models based on magnetic resonance imaging (MRI) to predict the risk stratification and staging of early-stage EC. **Materials and Methods:** A group of 155 patients who underwent MRI examinations before surgery between January 2020 and September 2022 and were pathologically diagnosed with early-stage EC were included in the study. Three-dimensional radiomics features were obtained from the segmented tumor images captured on MRI scans (including T2WI, CE-T1WI delayed phase, and ADC), resulting in a total of 1,521 features. These features were then filtered using the Pearson's correlation coefficient to create a prediction model for risk stratification and staging of EC using five-fold cross-validation and a multilayer perceptron algorithm. The performance of each model was assessed by analyzing ROC curves and calculating the AUC, accuracy, sensitivity, and specificity.

Results: In terms of risk stratification, the CE-T1 sequence demonstrated the highest predictive accuracy of 0.858 ± 0.025 and an AUC of 0.878 ± 0.042 among the three sequences. However, when combining all three sequences, the predictive accuracy improved to 0.881 ± 0.040 and the AUC increased to 0.862 ± 0.069 . When it comes to staging, using a combination of T2WI with CE-T1WI resulted in a higher predictive accuracy of 0.956 ± 0.020 compared to using any single feature. The corresponding AUC was 0.979 ± 0.022 . Utilizing all three sequences together yielded the best predictive accuracy of 0.956 ± 0.000 and an AUC of 0.986 ± 0.007 . Notably, this accuracy outperformed the accuracy of the radiologist (0.832).

Conclusion: The MRI radiomics model has great potential in predicting the risk stratification and early staging of EC.

PO-3428

Radiomics based on MRI for predicting the nature of nodules in cirrhotic liver.

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Objective: To assess the value of MRI-based radiomics in predicting hepatocellular carcinoma (HCC), regenerative nodules (RN) and dysplastic nodules (DN).

Methods: We retrospectively analyzed 266 patients with pathologically confirmed RN, DN and HCC, the model building dataset included 282 lesions (56RNs, 72DNs and 54HCCs) and the independent external validation dataset included 80 lesions (20RNs, 20DNs and 40HCCs). All of them underwent MRI enhancement using T1WI, T2WI, DWI, and T1WI enhanced sequences. A total of 2264 radiomic features were extracted from the regions of interest. Decision tree (DT), logistic regression (LR), random forest (RF), stochastic gradient descent (SGD) and support vector machine (SVM) were used to establish semantic features-based model, radiomics-based model

and combined model of semantic features and radiomic features respectively for the best features selected by five-fold cross validation. Models were validated with internal validation and external validation. The decision curve analysis, calibration curves and area under the curve (AUC) were used to evaluate the model's performance.

Results: In the internal validation cohort, the performance of SVM in the combined model was the best, with an AUC of 0.936. In the external validation cohort, the performance of the combined model was the best, with an AUC of 0.896, which was higher than that of radiomics-based model (AUC=0.859) and semantic features-based model (AUC=0.883). Decision curve analysis and the calibration curve demonstrated that combined model was more useful in the external validation cohort.

Conclusions: The machine learning based on combined model is significantly more advantageous in predicting RN, DN and HCC than semantic features-based model, radiomics-based model alone.

PO-3429

Depression Related Structural Changes Based on 3D Brain MRI and Neural Fingerprint Assisted Segmentation and Imaging-markers

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Purpose

To explore the feasibility using high-resolution brain MRI and artificial intelligence based neural fingerprint technology to segment and quantify slight volume changes of brain structures and imaging-markers for diagnosis of depressive disorder (DD).

Methods

Sixty-one DDs and 61 healthy controls (HCs) were recruited in this study. All subjects completed Hamilton Depression (HAMD) and brain MRI and 3D-T1-weighted-imaging with 1mm-slice-thickness in 3T MR scanner. BrainLabel brain image analysis platform with neural fingerprint technology were used to segment the whole brain regions, followed by quantifying all volumes of sub-structure brain regions in all subjects. SPSS was used for comparison and correlation analyses. Receiver operating characteristics analysis was used to evaluate diagnostic performance of DD. $P < 0.05$ was considered statistically significant.

Results

A neural fingerprint segmentation based on brain structures 3D-MRI was able to quantify slight volume changes of brain regions. Especially, cingulate gyrus and cuneate lobe in DDs, hippocampus in male DDs and entorhinal cortex in female DDs (all $P < 0.01$). Moreover, a negative correlation with HAMD scores in volume decline of hippocampus in male DDs and right entorhinal cortex in female DDs when comparing to HCs. A combination of top three brain regions improved the sensitivity and specificity on diagnostic performance.

Conclusion

The identified and quantified slight volume changes of specific emotion-related brain structures might service as neuro-imaging markers for diagnosis of DD. The female DD was different from the male, which was more sensitive to entorhinal cortex, but to hippocampus in male DD. Combining multi-imaging-markers increased diagnostic performance of male and female DDs.

PO-3430

Imaging Features of Pancreatic Dedifferentiated Liposarcoma: A Rare Case Report

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Background and Purpose

Dedifferentiated lip sarcoma (DDLPS)

is a rare subtype of lip sarcoma with poor prognosis. The earlier the diagnosis, the better the surgical effect. With the development of medical imaging technology, especially the application of clinic CT and MR. Both of them play key roles to diagnose DDLPS with the typical characterization, which displayed a soft tissue mass with varied composition and closely related to the proportion and distribution of different differentiation components. However, the imaging features related to pancreatic lip sarcoma were few reported previously. The primary DDLPS is an extremely rare in the pancreas. Herein, we report an unusual case of DDLPS arising from the tail of pancreas with relevant imaging features of both CT and MRI, as well as pathological evidences in order to improve the diagnosis and location of DDLPS before surgery.

Methods and Results

A 51-year-old Chinese female presented to the department of Hepatobiliary Surgery, the People's Hospital of Longhua, Shenzhen, Guangdong province, China in October 2020 due to her intermittent pain in the middle and upper abdomen for one year. The patient underwent radical gastrectomy for gastric cancer three years earlier. Before the hospitalization, she had undergone abdominal CT and MRI scans in the same hospital above. An abdominal unenhanced CT identified a round soft tissue mass measuring 5.7 X 6.7 X 6.8 cm³ in the tail of pancreas. The CT value of mass was 51 Hu in unenhanced CT images [Figure 1A], but the CT values were increased to 77 Hu, 86 Hu, and 109 Hu, respectively post-contrast at arterial [Figure 1B], venous [Figure 1C] and delayed periods [Figure 1D]. The mass was closely related to the tail of pancreas and the pancreatic tail was compressed, but the boundary of adjacent surface was not clear partly showing as yellow arrow in Figure 1A-1D. The representation of mass was relatively homogeneous, but detected a minimum CT value at -80 Hu in low-attenuation areas, which might indicate very less fat components in coronal position [Figure 1E]. The adjacent splenic artery and vein were compressed and displaced in the volume rendering (VR) imaging [Figure 1F]. The shadow of surgical clipping for radical gastrectomy was observed as long strip high density in the gastric body from multi-planar reformatting (MPR) in sagittal position [Figure 1G]. No abnormal enhanced lesions were found in CT images. A tumour of the tail of pancreas, likely neuroendocrine tumour, was considered by CT impression. Thereafter, MRI was implemented and demonstrated a mass in the body and tail of pancreas. Its size was approximately 5.8 X 6.7 X 6.8 cm³ with heterogeneous appearance. The most areas of the mass were hypo intensity in T2 weighted imaging (T2WI) and T2WI with fat suppression sequence, rather than hyper intensity in diffusion weighted imaging (DWI). The boundary of lesion was relatively clear as shown in Figure 2A-2C. MR enhanced images revealed the tumour in T1 weighted imaging (T1WI) from homogeneous iso-intensity in pre-contrast [Figure 2D] to heterogeneous enhancement in the arteriovenous period [Figure 2E-F] and stronger enhancement in the delay period [Figure G]. The tail of pancreas was compressed and shifted forward, while, the arteriovenous of spleen was moved backward [Figure 2H]. However, it was found that the adjacent surface between tumour

and the pancreatic pancreas was not clear slightly showing as yellow arrow in Figure 2D-G. It might indicate that the tumour was originally from the tail of pancreas. There was no obvious dilation of the pancreatic duct observed in magnetic resonance cholangiopancreatography (MRCP) showing in the Figure 2I. The characteristic of metastatic lymph nodes or lesion was not found in all MR images. In addition, no abnormal enhancement was observed in the residual stomach. Therefore, MRI impressed the tumour as a ligamentous fibroma originating in the tail of pancreas. After the tumour was completely excised, an isolated fibroma of pancreas was considered Figure 4.

Conclusion

The current case report revealed a unique case of the DDLPS originating from the tail of pancreas, one of the rarest locations for digestive sarcomas. DDLPS should be thoroughly distinguished from its morphological mimickers as the tumour may be more highly aggressive and more extensive than clinically and radiologically expected. The pancreatic tumour was confirmed finally as DDLPS by MDM2 proliferation. However, the radiologists should keep close to DDLPS in the location, size, homogeneity, component, and enhancement in order to improve the preoperative diagnosis and curative effect.

PO-3431

CT-Based Radiomics Nomogram for Differentiation of adrenal Lipid-poor benign lesions and Metastases: an exploratory study

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Objectives: To investigate the effectiveness of a nomogram model based on the abdominal CT radiomics and clinico-radiological information in differentiating adrenal lipid-poor benign adenomas from metastases.

Methods: A total of 272 patients from 2 institutions were divided into three cohorts (training cohort $n = 141$, testing cohort $n = 60$, and external validation cohort $n = 71$), and the radiomic features were extracted from unenhanced and enhanced abdominal CT images using the PyRadiomics package. Support vector machines (SVM), random forest (RF) and logistic regression (LR) models based on salient features were established. Receiver operating characteristic (ROC) curve was used to assess the best model, and the multi-phase fusion was performed. Radiomics nomogram was established by selected radiomics signature and clinical factors and assessed by the decision curve analysis (DCA).

Results: After feature screening, 10 salient features were finally retained. The most effective radiomics model was the SVM model. In the training set, the area under the curve (AUC) of the SVM model was 0.948, 0.936, 0.918 and 0.924 in the unenhanced, arterial, venous and delayed phase, respectively. In the testing set, the AUC was 0.944. In the external validation set, the AUC was 0.966. The DCA showed remarkable performance of the nomogram model for distinguishing lipid-poor adrenal adenoma from adrenal metastases.

Conclusions: The radiomics nomogram based on the unenhanced and enhanced CT images and clinical parameters can be used for effective distinguishing lipid-poor adrenal adenoma from adrenal metastases.

PO-3432

Clinical and Imaging features of livers infected with *Fasciola gigantica*

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Abstract

Objective: This study aimed to improve the understanding of the *Fasciola gigantica* disease by investigating the clinical and imaging features of the hepatic *Fasciola gigantica* infection.

Materials and Methods: This study analyzed clinical and imaging features of 27 patients with hepatic *Fasciola gigantica* infection retrospectively. All of them underwent upper abdominal CT (Computed tomography) scan, including plain CT scan (n=27) and contrast-enhanced CT scan (n=24). Nine patients underwent plain MR (Magnetic resonance) scan and 7 patients had enhanced MR scan. Two patients were subjected to liver biopsy. The clinical and imaging manifestations of the disease were analyzed.

Results: All the 27 patients had high fever and pain in the right upper abdomen. Liver and spleen were enlarged, and the percentage of eosinophils increased. The positive rate of antibody against *Fasciola gigantica* was 100%. All patients presented clustered or tunnel-like confluent lesions with ring-like enhancement mainly in subcapsular liver parenchyma, which showed slight or high signal intensity on DWI (Diffusion weighted imaging). Other nonspecific findings such as lymph node enlargement, perihepatic or subcapsular effusion were seen.

Conclusion: In summary, the patients have a history of coming from epidemic distributive regions and, clinical symptoms manifest as hyperpyrexia, then present with abdominal pain that is associated with gastrointestinal symptoms, hepatosplenomegaly, elevated eosinophil count, positive antibody to *Fasciola gigantica* detected by ELISA. Hepatic *Fasciola gigantica* infection has relatively specific imaging findings such as clustered or tunnel-like confluent lesions with ring-like enhancement mainly in subcapsular liver parenchyma. DWI could be helpful for the diagnosis, but further studies are needed.

PO-3433

Implications and Prospects of Immunological and Neuroimaging Research in HIV-Related Cognitive Impairment

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Combination antiretroviral therapy has achieved success in controlling viral replication in HIV-infected individuals. However, cognitive and motor impairments, affecting 30-60% of patients, persist due to factors like viral escape, immune reconstitution, inflammation, metabolic dysregulation, and drug neurotoxicity. These issues culminate in HIV-associated neurocognitive disorders (HAND), posing a significant global challenge.

The current approach to assess cognitive function relies on the Frascati criteria, but it is limited by the need for specialized facilities, time consumption, and insensitivity to early-stage patients. Immunology underpins HAND pathophysiology, and while immunological markers offer insights at the molecular level, they do not provide visual representation or predict neural structural changes. Neuroimaging complements immunology by enabling the observation of neural lesions in HAND from macroscopic and anatomical perspectives. Combining abnormal neuroimaging with immunological biomarkers shows promise in earlier HAND detection compared to cognitive assessments and clinical symptoms.

This review covers HAND epidemiology, diagnostic methods, neuroimmune pathogenesis insights from animal models, cerebrospinal fluid, and peripheral immunological biomarkers. It summarizes current imaging techniques and associated markers, highlighting efforts to integrate neuroimaging and immunology. Additionally, the review explores novel approaches to HAND treatment and its significance in the context of potentially eradicating HIV. We illuminate the systemic links between early HAND diagnosis and the synergy between neuroimaging and immunology, as well as identify candidate biomarkers in HAND pathogenesis.

PO-3434

Cerebrovascular dysfunction as a Marker of Cognitive Impairment in HIV Positive Individuals

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Background and Objective: Cerebrovascular abnormalities and brain injury can occur in people living with HIV (PLWH) and have become a major threat to their survival time and quality of life. Brain injury may reflect morphological characteristics of cerebral vessels in PLWH, such as neuropsychological test performance. If the structure of cerebral vessels and cognitive deficits in PLWH are shown to be related, then cerebrovascular morphology might serve as a “window” into brain injury in these patients.

Methods: Based on the performance of the neuropsychological cognitive test, 42 PLWH were divided into a group with cognition abnormal (PLWH-CB, 33.68 years; 19 males) and one without (PLWH-nonCB, 35.52 years; 23 males). A health control group with normal cognition (HC, 33.20 years; 25 males) was also enrolled. Participants were studied using magnetic resonance angiography with time of flight (MRA-TOF). The automatic cerebral vessel extraction method was adopted to segment cerebral vessels and calculate morphological features to have a comprehensive description of cerebrovascular structure. Group differences were used to assess the impact of HIV on cerebrovascular morphologies, including vessel volume, averaged radius, and tortuosity. Partial correlation analyses were used to investigate the association between cerebrovascular morphologies and cognitive performance. No viral load was detected in the peripheral blood of all PLWH.

Results: The lowest cerebral vessel volume was found in the PLWH-nonCB group, followed by the PLWH-CB group, when compared with the HC group. In PLWH-CB, cerebral vessel averaged tortuosity was similar to the PLWH-nonCB group, lower than the HC group. No significant differences in the age and education years among all groups. Morphological characteristics of cerebral vessels were shown correlated with cognition, under controlled with age and education, not only in PLWH subjects but also in all subjects (in PLWH, recall, $P < 0.05$; in all subjects, speed of information processing, $P < 0.05$).

Conclusions: HIV infection affects cerebral vessels even with the virus suppressed. Morphological characteristics of cerebral vessels could reflect cognition. Therefore, cerebrovascular dysfunction could serve as a potential marker of brain injury in HIV Infection.

PO-3435

PD-1 Checkpoint Inhibition plus Chemotherapy for Advanced Metastatic Triple-Negative Breast Cancer

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Background

Triple negative breast cancer (TNBC) represents 15 to 20% of breast cancer cases and is associated poor prognosis because of its aggressive nature (expression of highly proliferative, high grade and basal-like genes [about 55%-81%]) and lack of targeted therapeutic options (1-3). Treatment is challenging as it lacks expression of hormone receptors (estrogen receptor [ER-] and progesterone receptor [PR-]) and/or amplification or overexpression of human epidermal growth factor receptor 2 [HER2] (3). As such, TNBC patients mainly rely on cytotoxic chemotherapy as the mainstay of treatment (1-4). Despite a stronger response to chemotherapy among the BC subgroups, recurrence is higher in the first three years of treatment which is associated with poor survival — a phenomenon termed as TNBC paradox (3-5). Metastasis is the major cause of death in this subgroup with 5-year survival rate of under 30% for mTNBC (2). Consequently, alternative therapeutic approaches are desired for an improved outcome.

Discovery of PD-1 (programmed cell death protein 1) receptor-ligand interaction pathway as the major tumor immune evasive mechanism has fashioned immunotherapy in the form of PD-1/PD-L1 inhibitors as an alternative and complementary option for cancer patients (6). TNBC exhibits high infiltration of tumour-infiltrating lymphocytes (TILs) coupled with elevated PD-L1 expression which makes this cancer an ideal candidate for PD-1/PD-L1 inhibition (7-9). In fact, both PD-1 inhibitor (pembrolizumab) and PD-L1 inhibitor (atezolizumab) as monotherapy have shown promising results in metastatic TNBC (10-14). Unraveling of immunomodulatory effects of chemotherapy has encouraged the combination of these two therapies for complementary interplay which has shown improved outcomes in several cancers including breast cancer (15-26). Recent clinical trials have led to approval of these agents in combination with chemotherapy for metastatic TNBC (10-14, 24-26). Nonetheless, the IMPassion131 trial has produced negative results for this combination casting doubts on their efficacy (26). In this systematic review and meta-analysis, we aim to analyze the overall efficacy of these agents in mTNBC with a focus on subgroup factor analysis.

Materials and Methods

PubMed database was searched until November 2022 for studies comparing PD-1 checkpoint inhibitors plus chemotherapy (ICT) to CT alone. Primary outcome of interest was progression-free survival (PFS). Other outcomes of interest included tumor response, overall survival, and toxicity. Review Manager (RevMan) version 5.4. was used for data-analysis.

Results

Three randomized controlled trials (RCTs) comprising 2400 advanced metastatic TNBC were selected for inclusion in this systematic review and meta-analysis. PFS was significantly improved in ITT (HR 0.82 [0.74, 0.90], $p < 0.0001$) and PD-L1+ subgroup ($n=1296$; HR 0.73 [0.64, 0.85], $p < 0.0001$) with the addition of IT to CT. PFS surge was mainly seen in White (HR 0.80 [0.70, 0.91], $p=0.0007$) & Asian ethnicity (HR 0.73 [0.58, 0.93], $p=0.01$), PD-L1 positive patients (HR 0.73 [0.64, 0.85], $p < 0.0001$), with up-to 3 metastatic sites (HR 0.78 [0.69, 0.89], $p=0.0002$), no liver metastasis (HR 0.80 [0.68, 0.94], $p=0.006$), and no prior exposure to NACT/ACT (HR 0.68 [0.56, 0.81], $p < 0.0001$). ORR had also shown similar enhancement (ITT: OR 1.38 [1.16, 1.63], $p=0.0002$; PD-L1+: OR 1.58 [1.25, 1.99], $p=0.0001$ OR 1.58 [1.25, 1.99], $p=0.0001$). OS showed no improvement (ITT: HR 0.97 [0.75, 1.25], $p=0.80$; PD-L1+: HR 0.87 [0.56, 1.34], $p=0.53$). Grade 3 AEs (OR 1.32 [1.11, 1.57], $p=0.002$) and serious adverse events (SAEs) (OR 1.40 [1.08, 1.80], $p=0.01$) were more common with combined approach. Immune-related toxicity was the main contributing factor to toxicity surge (OR 2.35 [1.26, 4.36], $p=0.007$).

Conclusions

In conclusion, our study indicates that PD-1 checkpoint inhibitors in combination with chemotherapy induce an enhanced tumor response with marked improvement in progression-free survival in mTNBC patients. Toxicity is slightly increased in the form of immune-related adverse events with no long-term concerns. PD-L1 expression as predictive biomarker was demonstrated. Long-term efficacy still remains unclear in terms of OS. Further investigations aimed at long-term efficacy are warranted.

PO-3436

Tracheal CT Radiomics Nomogram to Predict Omicron Variant of SARS-CoV-2 Infection

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Objectives Omicron variant is more contagious, spreads faster, milder symptoms and more insidious, resulting in a surge in the number of coronavirus disease 2019 (COVID-19) cases between March and June 2022 in Shanghai. However, Omicron variant was limited to the upper respiratory tract and less involvement of the lungs. This study aimed to develop and validate a tracheal CT radiomics nomogram to predict omicron variant of SARS-CoV-2 infection.

Methods In this retrospective study, a radiomics model was developed on the basis of a training set consisting of 157 patients with Omicron variant of COVID-19 and 239 healthy people. Radiomics features were extracted from the tracheal wall on the lung parenchyma window of chest CT. A radiomics signature was built on the basis of reproducible features, using the least absolute shrinkage and selection operator method. The performance of the nomograms was determined by its' discrimination, calibration, and clinical usefulness. The models were validated in 67 patients with Omicron variant of COVID-19 and 103 healthy people.

Results The radiomics signature, consisting of 12 selected features, was significantly associated with Omicron variant of COVID-19 ($p < 0.05$) in both training and validation sets. The radiomics model achieved an AUC of 0.993 (95% CI 0.98-1.00) in the training cohort and 0.989 (95% CI 0.97-1.00) in the validation cohort. The sensitivity, specificity, and accuracy of the model for the training set were 93.0%, 95.8%, and 94.7%, respectively, whereas those for the validation set were 92.5%, 96.1%, and 94.7%, respectively. The decision curve analysis demonstrated that the radiomics nomogram was clinically useful.

Conclusions The tracheal CT radiomics nomogram has good performance for predicting Omicron variant of COVID-19 and may help in clinical decision-making.

PO-3437

Identifying Minimal Hepatic Encephalopathy: A new perspective from Multimodality Magnetic Resonance Imaging

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Type C hepatic encephalopathy (HE) is a condition characterized by brain dysfunction caused by liver insufficiency and/or portal-systemic blood shunting, which manifests as a broad spectrum of neurological or psychiatric abnormalities, ranging from minimal HE (MHE), detectable only by neuropsychological or neurophysiological assessment, to coma. Though MHE is the subclinical phase of HE, it is highly prevalent in cirrhotic patients and strongly associated with poor quality of

life, high risk of overt HE (OHE), and mortality. It is, therefore, critical to identify MHE at the earliest and timely intervene, thereby minimizing the subsequent complications and costs. However, proper and sensitive diagnosis of MHE is hampered by its unnoticeable symptoms and the absence of standard diagnostic criteria. A wide range of measurements should be performed to diagnose MHE, which are susceptible to multiple factors (e.g., aging, education) and then limit their application in clinical practice. Thus, developing an objective, effective, and noninvasive method is imperative to help detect MHE. Magnetic resonance imaging (MRI), a noninvasive technique which can produce many objective biomarkers by different imaging sequences (eg., MRS, DWI, rs-MRI, ASL), recently show the ability to accurately screen MHE from NHE (non-HE) patients. In addition, the advancement of artificial intelligence (AI) in medical imaging also presents the potential to mine more effective diagnostic biomarkers and further improves the predictive efficiency of MHE. Taken together, advanced MRI techniques may provide a new perspective for us to identify MHE in the future.

PO-3438

A new CT score-based staging for melioidosis pneumonia to predict progression

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Objectives To quantitatively extract CT features and evaluate CT score-based staging in predicting melioidosis pneumonia progression. **Methods** This study included 97 culture-confirmed melioidosis pneumonia patients who presented between January 2002 and December 2021. Lung segmentation and annotation of lesions (consolidation, nodules and cavity) were used for feature extraction. The features, including the involved area, amount and intensity were extracted. The CT scores of the lesion features were defined by the feature importance weight and qualitative stage of melioidosis pneumonia. GPR was used to predict severe or critical melioidosis pneumonia patients by CT scores. **Results** The melioidosis pneumonia stages included: acute stage (0-7 days), subacute stage (8-28 days) and chronic stage (> 28 days). In the acute stage, the CT scores of all patients ranged from 2.5 to 6.5. In the subacute stage, the CT scores for the severe and mild patients were 3.0-7.0 and 2.0-5.0, respectively. In the chronic stage, the CT score of the mild patients fluctuated approximately 2.5-3.5 in a linear distribution. Consolidation is the major lesion in melioidosis pneumonia. The percentage of severe scans with nodules dropped from 72.22% to 47.62% ($p < 0.05$), and the percentage of severe scans with cavities significantly increased from 16.67% to 57.14% ($p < 0.05$) between stages I and II. The GPR optimization function has AUCs of 0.71 for stage I, 0.92 for stage II and 0.87 for all stages. **Conclusion** In melioidosis pneumonia patients, it is reasonable to divide the period into three stages to determine the prognosis.

PO-3439

Common and distinct pattern of frequency-dependent intrinsic brain activity in patients with post-acute COVID-19 syndrome

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Objective: Post-acute COVID-19 syndrome (PACS) is characterized by persistent and complex symptoms, and its underlying neurological basis is not fully understood. The study

aims to explore brain pattern of intrinsic activity in PACS and its relationships with clinical symptoms. **Methods:** A total of 29 PACS patients, 28 COVID-19 subjects without PACS (non-PACS), and 30 healthy controls (HCs) were recruited. All COVID-19 subjects underwent nucleic acid testing, functional MRI and neuropsychological assessments, and HCs had no history of nucleic acid positivity. The fMRI data were preprocessed in DPABI 7.0 (<http://rfmri.org/dpabi>). We calculated voxel-level fractional amplitude of low-frequency fluctuation (fALFF) in typical frequency band (0.01-0.10 Hz) to characterize regional patterns of intrinsic activity among the three groups. Meanwhile, the difference of fALFF pattern was explored in two specific frequency bands: slow 5 (0.01-0.023 Hz) and slow 4 (0.023-0.073 Hz). In addition, the receiver characteristic curve (ROC) analysis was applied to distinguish PACS from non-PACS with different fALFF pattern in typical frequency band. Partial or Spearman correlation was used to explore the relationship between fALFF changes and clinical variables. **Results:** In typical frequency band, common pattern of decreased fALFF in the bilateral precuneus was found both in the PACS and non-PACS groups compared to HCs. Distinct pattern of decreased fALFF in the right posterior cerebellum and left precuneus only appeared in the PACS group, while decreased fALFF in the left posterior cerebellar lobe, left superior frontal gyrus, and bilateral precuneus only appeared in the non-PACS group. Further analysis of specific frequency bands: in the slow 5, fALFF decreased in the left posterior cingulate/precuneus in PACS patients and bilateral precuneus in the non-PACS patients. In the slow 4, the PACS group and the non-PACS group showed decreased fALFF pattern in the left superior frontal gyrus. ROC analysis showed that fALFF patterns of the bilateral precuneus and right posterior cerebellar lobe could distinguish PACS from non-PACS patients (AUC: 0.74, 0.66). Correlation analysis suggested that common pattern of decreased fALFF in the bilateral precuneus was related to overall cognition ($r=0.207$; $P=0.037$) in COVID-19, and decreased fALFF pattern in the right posterior cerebellum lobe was related to fatigue scores ($r=0.415$; $P=0.025$) in the PACS group.

Conclusion: PACS and non-PACS groups share a common pattern with decreased fALFF in the bilateral precuneus, which is related to the general cognition of COVID-19 patients. However, only the decreased fALFF pattern of the right posterior cerebellar lobe is related to fatigue in PACS patients. In addition, fALFF patterns in COVID-19 patients are affected by different frequency brands.

PO-3440

回顾性研究 COVID-19 心肌炎和严重性因素

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背景: 尽管 COVID-19 患者的临床特征报道较多, 但影响 COVID-19 严重程度的几个关键危险因素仍然可以进一步研究探讨。本研究旨在探讨影响 COVID-19 严重程度的预后因素和内在因素。

方法: 通过对确诊为 COVID-19 的成人住院患者的病历回顾, 收集人口学、流行病学、放射学和实验室资料。时间为 2020 年 1 月 21 日至 3 月 20 日。肺部炎症指数 (PII) 用于胸部 CT 检查。多因素 logistic 回归分析用于确定独立的严重性危险因素。

结果: 共纳入 84 例确诊为 COVID-19 的住院成人患者。重症组病毒载量明显高于非重症组 ($p<0.05$), 重症组较非重症组更易出现典型的 CT 异常, 表现为片状阴影或磨玻璃样阴影、实变及小叶间隔增厚 (均 $p<0.05$)。重度组 PII 值明显高于非重度组 ($p<0.001$)。84 例患者中 13 例 (15.48%) 心电图及血清心肌酶水平异常, 4 例 (4.8%) 临床诊断为 SARS-CoV-2 心肌炎。多变量 logistic 回归分析可区分年龄 ($p=0.012$)、Ct 值 ($p=0.048$) 和 PII ($p=0.008$) 三个与 COVID-19 严重程度相关的独立危险因素。

结论: COVID-19 的三个关键独立危险因素包括年龄、PII 和 Ct 值。Ct 值与 COVID-19 严重程度密切相关, 可作为 COVID-19 早期临床严重程度的预测指标。尽管 SARS-CoV-2 心肌炎的发病率相对较低 (4.8%), 但仍应引起重视。血压和血氧饱和度与疫区海拔高度密切相关, 不容忽视。

PO-3441

LAD 纵深型心肌桥形态与 CT-FFR 的关系研究

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目的：通过冠状动脉 CT 血管造影 (CCTA) 检查探讨左冠状动脉前降支 (LAD) 纵深型心肌桥形态与 CT 血流储备分数 (CT-FFR) 的关系。**方法：**回顾性分析 2018 年 1 月-2022 年 4 月包头医学院第一附属医院 323 例 LAD 纵深型心肌桥患者的解剖学信息，并以 $CT-FFR \leq 0.80$ 为心肌缺血的指标，将患者分为 CT-FFR 正常组 (237 例) 及 CT-FFR 异常组 (86 例)。采用 t 检验分析比较两组间各心肌桥参数的差异，采用多因素线性回归模型分析 CT-FFR 值的影响因素，并将差异有统计学意义的参数进行 ROC 曲线分析。**结果：**两组间心肌桥入口处位置、出口处位置、长度、肌肉指数、收缩期压迫程度及壁冠状动脉最狭窄处面积、入口处面积、出口处面积差异均有统计学意义 ($P < 0.05$)。多因素线性回归方程显示，心肌桥出口位置、心肌桥长度及心肌桥肌肉指数对 CT-FFR 值具有负向影响 ($P < 0.05$)，壁冠状动脉最狭窄处面积对 CT-FFR 值具有正向影响 ($P < 0.05$)，并且心肌桥长度、出口位置、肌肉指数对心肌桥心肌缺血均具有较高的诊断价值，三者的曲线下面积 (AUC) 分别为 0.85、0.80、0.79。**结论：**LAD 纵深型心肌桥的位置离冠状窦越近、壁冠状动脉面积越窄，尤其是心肌桥长度较长的患者，更容易出现心肌缺血的临床表现，应予以高度重视。

PO-3442

AI 辅助下的病变体积评估在新型冠状病毒肺炎临床分型中的应用价值

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探讨人工智能在不同临床分型新型冠状病毒肺炎 CT 影像定量评价中的应用价值。**方法** 以 2021 年 10 月到 2022 年 6 月间进行胸部 CT 检查的 169 例 COVID-19 患者为研究对象，并分为重症组 14 例和非重症组 155 例。收集并回顾性分析患者的一般资料及影像学信息，并在“新冠肺炎 CT 影像 AI 定性辅助诊断系统”的辅助下测量并计算各研究对象的病变体积分数、GGO 体积分数、实变影体积分数、GGO+实变影体积分数以及铺路石征体积分数。采用 Mann-Whitney U 检验的方法进行两组数据的比较；采用受试者工作特征曲线 (ROC) 评估上述指标对重症型患者的诊断效能。**结果** 两组研究对象的病变体积分数 ($Z = -5.483, P < 0.001$) 和 GGO 体积分数 ($Z = -3.299, P = 0.001$) 差异显著，而两组实变影体积分数、GGO+实变影体积分数以及铺路石征体积分数的差异无统计学意义 ($P > 0.05$)。病变体积分数和 GGO 体积分数进行 COVID-19 临床分型的敏感度分别为 1.00 和 0.60，特异度分别 0.822, 0.923。**结论** AI 辅助下测量的病变体积分数和 GGO 体积分数是进行 COVID-19 临床分型的敏感指标。

PO-3443

儿童急性脑脊髓炎影像学诊断

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儿童急性播散性脑脊髓膜炎多见于大年龄段儿童，持续发热，发病急，大脑为主，大片，皮层下 CSF：淋巴细胞增多 白细胞可正常 与化脓性脑炎脑膜炎鉴别点

病例分享 F 12 岁 左卵巢未成熟畸胎瘤 10CM，术后 1 周 躁狂，攻击行为--PICU.

外周血清、脑脊液抗谷氨酸受体 (NMDA 型) 抗体 IgG 1:32

好发 10 岁左右，男童 (本例 9 岁)；

多饮、多尿、偏侧肢体肌力下降；

血清与脑脊液 AFP 正常， β -HCG 可正常或轻度升高；

活检-病理证实为纯生殖细胞瘤--化疗--放疗 (脑室和瘤床)。

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PO-3444

婴幼儿臂丛神经损伤 MRI 联合技术体系

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目的 提高婴幼儿臂丛神经病变 MRI 诊断率

方法 该研究内容为浙江省公益技术应用研究项目 (LGF19H180003)，联合郑州儿童医院、浙大附属第一医院等 8 家医院，探索臂丛神经 MRI 联合技术体系，通过联合摆位、线圈叠加、技术参数优化、薄层扫描、增强、图像重建、自制辅助匀场装置缩小了颈肩部软组织与空气接触面积等综合措施，有效提高 B0 磁场的均匀性，增强脂肪抑制效果，有效提高婴幼儿臂丛神经图像质量及病变检出率。该技术并从臂丛神经损伤推广应用于臂丛神经肿瘤的 MRI 诊断。项目已在浙江省 17 家地市级及基层医院技术推广应用，于 2023-4-13 通过省科技厅组织的专家评审验收。

结果 婴幼儿臂丛 MRI 联合技术体系有较高病变检测敏感性

结论 婴幼儿臂丛 MRI 联合技术体系诊断有效性

PO-3445

泡状棘球蚴病及其肝外转移的影像学特征分析

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泡状棘球蚴病是一种少见的人畜共患寄生虫病，多见于牧区，近年来，由于人口的流动和旅游业的发展等原因，城市人群中的发病人数有上升的趋势。临床上泡状棘球蚴病主要侵犯肝脏，可在人体生存数年至数十年不等，肝泡状棘球蚴病可类似肿瘤一样在肝内及体内呈隐匿性、侵袭性缓慢生长，感染可局部侵袭性扩散或通过淋巴管或血管转移至远处部位和其他器官，多扩散于颅脑、肺、肾脏、脾脏等脏器，最终导致患者死亡。因此，泡状棘球蚴病有“虫癌”之称。病理上泡状棘球蚴病是由无数直径 1-15 毫米的微小囊泡、凝固性坏死组织、纤维组织增生以及病灶中心的液化坏死构成，外周无纤维包膜，与周围组织分界不清。泡状棘球蚴病肝内原发灶与肝外转移灶信号特点具有部分共

同特征, T1WI、T2WI 均表现为“地图”样特征性低信号及多发小囊泡影。增强扫描除脑内病灶外, 其他脏器病灶均无强化(脑内病灶因周围组织反应、血脑屏障破坏及周围脑组织内毛细血管增生, 表现为明显强化)。肝泡状棘球蚴病及其肝外转移具有一定的影像学特异性表现, 依据其典型表现, 并结合患者接触史及实验室检查可作出正确诊断。

PO-3446

临床-定量 CT 列线图预测老年重症新型冠状病毒感染性肺炎短期预后的价值

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目的 探讨基于临床特征及定量 CT 参数构建的列线图预测老年重症新型冠状病毒 (COVID-19) 感染性肺炎短期预后的价值。**方法** 回顾性分析 239 例接受住院治疗的老年重症 COVID-19 感染性肺炎患者的临床及胸部 CT 资料, 住院期间死亡 61 例 (死亡组), 好转出院 178 例 (生存组), 采用分层抽样将患者随机分为训练组 (n=167), 验证组 (n=72)。利用 3d-slicer 软件测量定量 CT 参数, 通过多因素 logistic 回归分析筛选独立危险因素, 构建联合预测模型, 并绘制模型的列线图与校准曲线, Hosmer-Lemeshow 检验评价模型的拟合优度, 模型效能比较采用 delong 检验及赤池信息准则 (AIC)、贝叶斯信息准则 (BIC)。结果 多因素分析年龄、超敏 C 反应蛋白 (hs-CRP) 及实性密度体积百分比 (SOV%) 是预测患者死亡的独立危险因素, 列线图曲线下面积 (AUC) 训练组 0.795 (95% CI: 0.726~0.865), 验证组 0.817 (95% CI: 0.701~0.934), 校准曲线及 Hosmer-Lemeshow 检验显示了较高的校准度及拟合优度, 训练组 delong 检验各单变量与列线图比较差异均有统计学意义 ($P < 0.05$), 验证组 SOV% 与列线图比较差异无统计学意义 ($P > 0.05$), 余差异均具有统计学意义 ($P < 0.05$), 训练组与验证组列线图 AIC 值与 BIC 值均小于单变量。结论 基于临床特征及定量 CT 参数构建的列线图预测老年重症 COVID-19 感染性肺炎短期预后具有重要价值, 且列线图能够将预测结果可视化, 有助于临床决策。

PO-3447

肝衰竭伴轻微型肝性脑病患者人工肝治疗后脑功能改变: 一项随访研究

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目的 评估肝衰竭伴轻微型肝性脑病(minimal hepatic encephalopathy, MHE)患者脑动态局部一致性(dynamic regional homogeneity, dReHo)改变, 探讨患者人工肝治疗后脑功能的变化, 从脑自发活动动态特征角度评估人工肝治疗疗效。**方法** 前瞻性纳入慢性肝衰竭伴轻微型肝性脑病患者 20 例且均行人工肝治疗, 人工肝治疗前一天及治疗后三个月进行复查, 另 25 名健康志愿者作为对照组, 所有受试者均采集静息态功能磁共振成像数据。dReHo 值统计分析由 DPABI 统计分析模块进行, 采用 Student's t 检验比较 MHE 组(人工肝治疗前、治疗后)与对照组间 dReHo 差异, 采用配对样本 t 检验比较 MHE 患者人工肝治疗前后 dReHo 的差异, 使用 Pearson 相关分析法分析 MHE 组人工肝治疗前与对照组 dReHo 差异脑区的 dReHo 值及 Δ dReHo 值(治疗前 dReHo-治疗后 dReHo)与神经心理学量表和血清学指标的相关性。**结果** 对照组相比, MHE 组(人工肝治疗前)表现出异常

的 dReHo 变化,主要表现为双侧额下回眶部、右侧额中回及右侧小脑下半月小叶的 dReHo 值增高; MHE 组(人工肝治疗后)左侧额上回眶部、左侧海马旁回、左侧丘脑、右侧颞下回的 dReHo 仍增高;同时,我们发现 MHE 组经人工肝治疗后脑区的 dReHo 值减低,主要位于右侧枕外侧回及右侧小脑下半月小叶。MHE 组(人工肝治疗前)右侧额中回 dReHo 值与 MoCA 呈显著负相关($r=-0.6689$, $P<0.001$),而 Δ dReHo 值(治疗前与治疗后差值)与临床实验室指标及认知量表评分均无相关性($P>0.001$)。结论 本研究通过此次实验证实 MHE 患者存在神经元活动的动态大脑特征,这可能是认知障碍的神经基础,同时发现人工肝治疗前的 MHE 患者比治疗后的患者表现出与认知障碍相关的更严重的自发脑活动异常。

PO-3448

300 例儿童肺结核胸部 CT 图像分析

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【目的】通过对 300 例儿童肺结核患者 CT 图像的回顾性分析,总结儿童肺结核的 CT 表现规律,为儿科临床诊断提供帮助。

【方法】收集 2017-2022 年经临床和微生物学证实的 300 例儿童肺结核患者的 CT 图像,记录患儿年龄、性别等信息。对图像进行两名观察者独立评估,记录病变部位、类型、淋巴结及合并征象等表现。采用描述性统计分析发病年龄分布、计数资料构成比。进行 Pearson 相关及 Logistic 回归分析不同特征的相关性。

【结果】儿童肺结核以 1-4 岁发病居多,占比 60%。男女比例为 2:1。肺门淋巴结肿大检出率最高为 85%。Pearson 相关分析显示,发病年龄与肺门淋巴结肿大程度呈负相关($r=-0.541$, $p<0.01$)。Logistic 回归模型分析显示,1-4 岁患儿出现树芽征的概率最高($OR=2.3$, 95%CI 1.1-4.7)。80%出现肺门及纵膈淋巴结肿大。病变好发于上肺野,呈多发小结节及磨玻璃影。60%有支气管扩散表现。10%见树芽样结节。20%有空洞形成。

【结论】儿童肺结核以 1-4 岁发病居多,CT 表现有特点。纵膈淋巴结肿大及上肺野病变提示诊断价值。针对儿童发病高峰年龄段的筛查可提高发现率。结合药敏结果选用敏感抗结核药物,并监测肝肾功能,注意不良反应,可以提高治愈率。

PO-3449

MRI 放射学预测乙型肝炎病毒感染相关肝细胞癌并探索相关易感基因

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目的: 构建多序列 MRI 影像组学模型以预测乙型肝炎病毒(hepatitis B virus,HBV)感染患者相关肝细胞癌(hepatocellular carcinoma,HCC),并通过数据挖掘分析探索潜在的基因变异模式。

方法: 回顾性分析 100 例 HCC 患者(HBV 相关型 82 例,非 HBV 相关型 18 例)的 T2WI 序列、DWI 图像和 Gd-EOB-DTPA 增强 T1WI 图像,按 7:3 的比例随机分为训练集(70 例)和验证集(30 例),基于以上 MRI 序列进行影像组学特征提取及预测模型构建,然后利用验证集数据评价组学模型的效能。癌症基因组图集(TCGA)中 164 名患者的肿瘤批量 RNA 测序用于探索 HBV 感染致 HCC 潜在的基因变异模式。

结果: 多序列影像组学模型包括 43 个显著特征, 在预测 HBV 相关 HCC 方面表现出良好的性能, 训练集、测试集的 AUC 分别为 0.993(95%CI 0.991~1)和 0.955(95%CI 0.902~1)。相关功能基因主要富集在病毒蛋白与细胞因子的相互作用、神经活性配体-受体相互作用、细胞因子受体相互作用等通路中。并另通过蛋白-蛋白相互作用网络筛选出前 10 个关键的差异表达基因进行结果可视化分析。

结论: 本研究使用的基于多序列 MRI 影像组学模型可无创性准确预测 HBV 相关 HCC, 并探索了 HBV 相关 HCC 易感基因的表达状态, 为 HBV 致 HCC 发病机制研究提供方向。

PO-3450

基于 CT 影像组学对肾上腺腺瘤亚型的鉴别研究价值

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目的: 探讨基于多期像 CT 影像组学鉴别肾上腺腺瘤亚型的临床价值。**方法:** 搜集河北大学附属医院 2017 年 4 月-2020 年 6 月年收治的肾上腺腺瘤患者共 195 例, 通过回顾性分析肾上腺腺瘤患者的平扫及增强图像、病理结果、临床一般资料及实验室相关检查。其中功能性肾上腺腺瘤 70 例、无功能肾上腺腺瘤 125 例, 通过患者平扫期、动脉期、门静脉期及延迟期的 CT 图像勾画分割感兴趣区共 780 个提取影像组学特征, 使用随机森林算法筛选最优影像组学特征从而构建基于 CT 不同时期的支持向量机 (SVM) 影像组学模型, 再经过五折交叉对结果进行验证, 并绘制各个模型的受试者工作特性 (ROC) 曲线、P-R 曲线、混淆矩阵分析模型对肾上腺腺瘤亚型的鉴别诊断效能, 并计算模型的准确度、灵敏度、特异度、精确度。**结果:** 选择 8 个影像组学特征采用 SVM 构建的平扫期、动脉期、门静脉期、延迟期及融合期影像组学模型在预测肾上腺腺瘤亚型诊断效能的五折交叉验证后 AUC 值分别为 0.813、0.782、0.770、0.807、0.762, 其中基于平扫期图像构建的模型性能最佳, 准确度为 0.759, 灵敏度为 0.722, 特异度为 0.814, 精确度为 0.838。**结论:** 基于 CT 不同时期影像组学特征结合 SVM 构建影像组学模型可无创性鉴别诊断肾上腺腺瘤亚型, 具有一定的临床价值有助于临床决策。

PO-3451

一组输入性急性肺组织胞浆菌病 CT 表现及动态变化分析

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目的 分析输入性急性肺组织胞浆菌病的 CT 表现及动态变化特征。**方法** 回顾性分析 10 例输入性急性肺组织胞浆菌患者的临床及 CT 资料, 观察其首次 CT 表现及其动态变化特征。**结果** 首次 CT 表现见 10 例 (10/10, 100%) 均呈周围伴晕征的肺结节, 其中 4 例 (4/10, 40%) 弥漫分布 (弥漫分布组), 6 例 (6/10, 60%) 散在分布 (散在分布组); 10 例中, 4 例 (4/10, 40%) 出现斑片或大片状影, 3 例 (3/10, 30%) 见片状磨玻璃影, 4 例 (4/10, 40%) 存在小叶间隔增厚; 10 例 (10/10, 100%) 纵隔淋巴结均增大, 其中 8 例 (8/10, 80%) 肺门淋巴结增大; 5 例 (5/10, 50%) 出现浆膜腔积液。弥漫分布组与散在分布组间暴露时长、住院时长及首次 CD4⁺细胞计数差异均有统计学意义 ($Z=-2.03$ 、 -2.35 、 -2.34 , P 均 <0.05)。治疗过程中, 2 例 (2/10, 20%) 病变持续吸收好转, 8 例 (8/10, 80%) 患者不同时段出现病变进展, 于治疗 3 个月后病变均好转。**结论** 急性肺组织胞浆菌病的 CT 表现具有一定特征性, 治疗前及治疗过程行胸部 CT 有助于诊断、鉴别诊断及评价疗效。

PO-3452

椎管内棘球蚴病的 MRI 及临床表现

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目的 探讨椎管内棘球蚴病的 MRI 及临床表现。方法 回顾性分析 12 年 (2011~2023 年) 间 23 例椎管内棘球蚴病患者的 MRI 及临床表现。结果 男 10 例, 女 13 例, 年龄 25~72 岁 (44.1 ± 13.9), 中位年龄 41 岁。23 例椎管内棘球蚴病患者中, 胸段 12 例 (52%), 腰段 6 例 (26%), 骶段 2 例 (8%), 同时累及胸腰段 1 例 (4%), 同时累及腰骶段 2 例 (8%), 同时累及颈腰段 1 例 (4%); 累及髓外硬膜下 9 例 (39%), 累及髓外硬膜外 12 例 (52%), 累及髓内 3 例 (13%); 有 18 例 (78%) 同时累及邻近椎体附件或周围软组织; 脊柱或其他部位包虫病史 11 例 (48%); 临床表现为胸背部、腰骶部疼痛 21 例 (91%), 双下肢功能障碍 6 例 (26%); MRI 表现为表现为大小不一的长 T1 长 T2 信号小囊泡, 呈“葡萄串”样外观, 边缘囊壁呈低信号 21 例 (91%)。结论 椎管内棘球蚴病相对其他部位非常罕见, 当遇到 MRI 特征明确、具有典型临床表现时或有其他部位棘球蚴病史时, 要考虑椎管内棘球蚴病。

PO-3453

基于机器学习的 MRI 影像组学鉴别布鲁菌性 脊柱炎与结核性脊柱炎

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目的: 通过机器学习的 MRI 影像组学在 BS 患者与 TS 患者进行研究应用, 探讨与评价机器学习的 MRI 影像组学对 BS 患者与 TS 患者的鉴别诊断能力。

材料与方法: 回顾性分析 2017 年 1 月 1 日至 2021 年 12 月 31 日新疆医科大学第一附属医院经过金标准确诊的 BS 患者与 TS 患者, 并接受脊柱 MRI 检查。将患者按 8: 2 的比例随机分为训练集 ($n = 251$) 和验证集 ($n = 64$)。在 T2WI、T2WI-FS 和 T1WI + T2WI + T2WI-FS 矢状图上勾画感兴趣区域 (ROI)。采用 RadCloud 平台提取特征。应用最小绝对收缩和选择算子 (LASSO) 降维处理。选取最具有价值的影像组学特征构建 Logistic 回归模型。

结果: 在 T2WI、T2WI-FS 和 T1WI + T2WI + T2WI-FS 三种预测与鉴别模型中分别获得 27、36 和 24 个特征。在 Logistic 回归三种预测与鉴别模型中, T2WI 训练集的 AUC (灵敏度, 特异性) 分别为 0.858 (0.80, 0.91)、T2WI-FS 为 0.822 (0.76, 0.88)、T1WI + T2WI + T2WI-FS 的 AUC 为 0.883 (0.83, 0.94)。三个模型中, T2WI 验证集的 AUC (灵敏度, 特异性) 为 0.724 (0.68, 0.79), T2WI-FS 为 0.698 (0.64, 0.76), T1WI + T2WI + T2WI-FS 为 0.763 (0.71, 0.82)。结论: 基于机器学习的 MRI 影像组学对 BS 患者与 TS 患者的鉴别诊断是可行的, 可在临床应用中提高术前鉴别诊断的准确性。

PO-3454

原发性肝血管肉瘤的影像表现及病理分析

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目的 探讨原发性肝脏血管肉瘤 (primary hepatic angiosarcoma, PHA) 的 CT 及 MRI 影像表现及病理基础, 为临床提供诊疗依据。方法 回顾性分析收治于北京佑安医院经病理证实的 12 例 PHA 的 CT 及 MRI 的影像表现及病理基础。结果 12 例 PHA 患者, 以腹胀 (n=6, 50.0%)、腹痛 (n=3, 25.0%) 为较常见的临床症状; 患者多无肝病史 (n=11, 91.7%); 实验室检查异常以贫血 (n=11, 91.7%)、肝功能异常 (n=12, 100%) 及异常凝血酶原时间延长 (n=12, 100%) 多见, 已知的肿瘤标志物 AFP 均正常, CA199 或 CA125 轻度升高 3 例; 出现脾转移 2 例。12 例患者影像学形态分型中, 多发结节型 1 例; 肿块型 3 例; 结节肿块混合型 1 例; 弥漫浸润型 7 例。9 例灶内出血平扫表现为 CT 高密度或 T1WI 高信号、12 例均有不同程度的液化坏死平扫表现为 CT 不均匀低密度或 T2WI 液性高信号。DWI 信号瘤体混杂, 整体以高信号为主。CT/MRI 多期增强扫描动脉期快速富血供性不均匀强化、强化形态多样, 门脉期及延迟期持续性向心性或离心性强化为 PHA 的典型影像表现。本组有 4 例部分病灶边缘和 (或) 灶内可见多发迂曲穿行的滋养动脉。结论 PHA 的临床及影像表现具有一定的特点: 患者无肝病史、肿瘤标志物多正常或轻微升高, CT/MR 平扫密度或信号不均匀, 出血、坏死、囊变多见, 增强扫描动脉期病灶边缘或中央不规则状、环状、结节状强化, 门脉期及延迟期不完全填充式向心性或离心性强化为其典型征象。

PO-3455

小儿腺病毒感染临床影像学诊断

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背景: 重症肺炎中腺病毒感染高达 20%, 死亡率达 10%, 存活者中 14-60% 遗留不可逆转的肺部后遗症, 危害极大。快速识别腺病毒感染是临床重点和难点。

目的: 探讨总结儿童腺病毒肺部感染的临床及影像特征, 争取早期诊断、早期治疗、降低病死率。

方法: 收集杭州市儿童医院 2019 年 1-12 月腺病毒抗原阳性患者 5990 例, 研究发病季节、年龄, 在最高峰 1 月 1098 例中, 选取有临床及影像资料的 556 例研究临床和影像特征。

结果: 全年 5990 例发病主高峰在冬季 1 月、12 月, 分别 1098 例 (18.3%)、612 例 (10.2%), 次高峰在夏季 5-6 月, 分别 614 例 (10.3%)、606 例 (10.1%); 中位年龄 4.17 岁, 依次为 >4 岁 2279 例 (38.0%), 2-4 岁 1930 例 (32.2%), 6 月-2 岁 1746 例 (29.1%); 0-6 月 35 例 (0.6%); 556 例中脓毒血症 29 例, 合并支原体肺炎 48 例; 胸片 556 例, 胸片+CT 249 例, 诊断为支气管炎 409 例 (73.6%), 支气管肺炎 98 例 (17.6%)、肺实变 49 例 (8.8%)。CT 病灶位于中心+中心及周边 232 例, 占 93.2%, 仅位于周边 14 例; 有胸水 5 例; 皮下积气及气胸 2 例。

结论: 儿童腺病毒感染主高峰冬季 12 月-1 月, 次高峰 5-6 月; 好发年龄 4 岁以上, 2 岁以上占绝大多数; 脓毒血症多, 合并支原体肺炎多, 中枢神经累及少; 影像支气管炎型多, CT 肺部病灶呈“向心性”分布, 胸水少。

关键词: 腺病毒; 杭州儿童; 临床影像; 计算机断层成像 (computed tomography)

PO-3456

胃癌 CTTA 与病理及生物学行为的相关性

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目的 探讨胃癌纹理分析与其病理、强化程度及生物学行为的相关性。**方法** 回顾性分析经病理证实为胃癌的病例共 264 例（男 181 例，女 83 例）的术前增强 CT 图像,获得纹理特征参数 Mean、StDev、Inhomogeneity、Skewness、Kurtosis、Entropy, 并记录强化程度、病理类型及浆膜累及、腹腔淋巴结转移、腹膜转移等生物学行为, 分析 CT 纹理参数与组织病理学特征、生物学行为的相关性。**结果** (1) 胃原发灶强化程度与纹理分析参数 StDev、Inhomogeneity 之间均存在显著正向相关, P 值分别为 0.04、0.07, 相关性系数 rs 均接近 0.2。(2) 胃癌原发灶纹理分析参数 StDev、Inhomogeneity、Entropy 与分化程度之间均存在显著相关, 相关性系数 rs 的绝对值均接近 0.12, 其中 Entropy 为负相关。而胃癌原发灶 StDev、Inhomogeneity、Skewness、Kurtosis、Entropy 均与 Lauren 分型存在显著的相关性, 相关性系数 rs 的绝对值均接近 0.2, 其中 Skewness、Entropy 为负相关, 余为正相关(3) 胃癌浆膜侵犯、腹膜转移、淋巴结转移等生物学行为均与胃癌原发灶的 Skewness、Entropy 呈负相关, 浆膜侵犯还与 StDev、腹膜转移还与 StDev、Kurtosis, 腹腔淋巴结转移还与 Kurtosis 呈正相关, P 值均小于 0.05, 点二列相关系数 r 的绝对值均在 0.1~0.3 之间。**结论** 胃癌原发灶纹理分析参数与其强化程度、病理分化程度、Lauren 分型及浆膜累及、腹腔淋巴结转移、腹膜转移等生物学行为均存在显著的相关性, 特别是 StDev 呈正相关, Skewness、Entropy 呈负相关, 若进一步探讨, 或能为胃癌的生物学行为提供预测参考, 有助于胃癌患者的个体化治疗。

PO-3457

联合 CT 影像组学与临床指标鉴别克罗恩病与肠结核的应用价值研究

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摘要: **目的:** 结合 CT 影像组学与临床指标构建综合预测模型, 并评估其鉴别诊断克罗恩病 (CD) 与肠结核 (ITB) 的价值。**方法:** 回顾性收集中国医科大学附属盛京医院在 2008 年 1 月-2023 年 4 月间确诊的 CD 患者 87 例、TB 患者 80 例, 收集上述患者增强 CT 影像资料及临床信息, 将患者按 7: 3 比例随机分为训练集和验证集, 应用人工智能软件 3D-slicer 手动逐层勾画 CD 与 TB 病灶动脉期、静脉期图像的感兴趣区域, 提取并筛选影像组学特征, 同时筛选具有统计学差异的临床指标。应用 logistic 回归分析基于影像组学特征、临床指标构建的预测模型。采用受试者工作曲线 (ROC), 评估不同模型的鉴别诊断效能。**结果:** 每例患者提取动脉期、静脉期影像组学特征 1319 个, 筛选后保留动脉期影像组学特征 4 个, 静脉期影像组学特征 6 个, 基于上述影像组学特征构建影像预测模型, 训练集 AUC 值为 0.941 (95%CI: 0.898-0.984), 敏感度为 0.902, 特异度为 0.892, 验证集 AUC 值为 0.904 (95%CI: 0.827-0.981), 敏感度为 0.690, 特异度为 1。根据患者年龄、T-spot 检验结果及肛周病变病史构建临床预测模型, 训练集 AUC 值为 0.902 (95%CI: 0.846-0.957), 敏感度为 0.902, 特异度为 0.785, 验证集 AUC 值为 0.838 (95%CI: 0.723-0.952), 敏感度为 0.931, 特异度为 0.682。综合预测模型训练集 AUC 值为 0.980 (95%CI: 0.961-0.999), 敏感度为 1, 特异度为 0.877, 验证集 AUC 值为 0.975 (95%CI: 0.936-1), 敏感度为 1, 特异度为 0.909。**结论:** 联合 CT 影像组学与临床指标构建的综合预测模型对鉴别 CD 与 ITB 有较高价值。

PO-3458

基于 MSCT 影像组学诺莫图术前预测合并幽门螺杆菌感染的早期胃癌 HER2 状态的初步研究

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目的 探讨基于 MSCT 影像组学是否能术前预测合并幽门螺杆菌感染(*Helicobacter pylori*, H)的早期胃癌(early gastric cancer, EGC)患者人表皮生长因子受体 2(human epidermal growth factor receptor 2,HER2)状态。

方法 回顾性分析 2020 年 1 月-2022 年 12 月福建省立医院南院确诊为 EGC 的 180 例患者临床资料, 并从其术前静脉期 CT 图像中提取影像组学特征, 按照是否合并 HP 分为感染组 (n=68) 与对照组 (n=112), 对比其临床病理特征和影像组学特征的差异, 分析引起 EGC 合并 HP 的相关危险因素; 再将感染组中的患者按照 HER2 是否阳性分为阳性组 (n=42) 及阴性组 (n=26), 对比其临床病理和影像组学特征并通过 Logistic 回归分析引起 HER2 阳性的危险因素; Spearman 相关系数分析 EGC 合并 HP 的临床病理特征及影像组学特征与 HER2 阳性的相关性。依据相关因素构建诺模图, 使用 ROC 曲线和校准曲线检验预测模型的性能。

结果 肿瘤厚度、肿瘤部位、Ki-67、HER2 阴性和对比度、均值等影像组学特征参数为 EGC 合并 HP 的独立危险因素 ($P<0.05$); 年龄、分化程度、Lauren 分型、Borrmann 分期、肿瘤厚度、区域淋巴结转移以及差异熵、相关性等影像组学特征是影响 EGC 合并 HP 发生 HER2 阳性的独立危险因素 ($P<0.05$), 同时与 HER2 阳性均呈正相关关系 ($P<0.05$)。依据以上独立因素建立的诺莫图, AUC 分别为 0.864 (95%CI: 0.798-0.930) 和 0.964 (95%CI: 0.903-1.000); 校准曲线走形基本与理想走形拟合良好, 校准度高。

结论 基于 MSCT 影像组学和临床病理特征构建的诺莫图能术前预测 EGC 合并 HP 患者的 HER2 状态, 为优化临床治疗提供相关信息。

PO-3459

科学解读肺结节

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随着人们健康意识提高, 肺部低剂量 CT 筛查逐渐普及以及人工智能 (AI) 辅助诊断的广泛应用, 使得越来越多的肺内结节被发现, 从而很多人被告知肺部有结节。肺部结节成了一个公众关注的话题。如何从专业角度正确剖析肺部结节, 既要做到对恶性结节的“早诊断、早治疗”, 又要避免对良性结节的“过度治疗”, 是一个大家都关心的问题。

肺部结节可能是对人体无不良影响良性结节, 也可能是早期肺癌。对于具有典型征象的良性或恶性肺部结节, 我们应尽量做出肯定性诊断; 对于尚不能定性而需要随访的肺部结节, 应该给出具体的随访方案及明确的间隔时间。

基于此, 我们特组织胸部放射学专家及胸外科专家编写了这本 关于肺部结节的科普书。从分析肺部结节特征入手, 告诉读者良性的结节长什么样? 恶性结节又是什么样? 不能确定性质的结节又要怎么处理?

肺部结节定性是一个难题, 希望本书能帮助读者提高对肺部结节认识。做到心理上对肺部结节不恐惧, 分析中能抓住肺结节的每一个细微特点, 尽早尽力做出正确诊断。

由于时间比较仓促, 加之作者水平有限, 书中不足之处, 在所难免, 恳请同道指正, 我们将表示衷心感谢

PO-3460

多参数 MRI 影像组学模型在预测早期子宫内膜癌风险分层中的价值

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目的 早期子宫内膜癌（EC）术前风险分层对临床治疗至关重要，本研究旨在探讨基于磁共振成像（MRI）的影像组学模型对早期 EC 风险分层及分期的价值。

资料和方法 共纳入 155 例在 2020 年 1 月至 2022 年 9 月进行术前 MRI 检查，且经病理证实为早期 EC 患者。在 MRI 图像上（T2WI、CE-T1WI 延迟期，ADC）对肿瘤进行分割后提取三维影像组学特征，共 1521 个，然后采用 PCC 对影像组学特征进行筛选，实验采用五折交叉验证的方式，使用 MLP 建立 EC 风险分层及分期的预测模型。采用 ROC 曲线评估各模型的预测效能，并计算 AUC、准确率、敏感度及特异度。

结果 对于风险分层，CE-T1 序列在单一序列中取得了最佳预测准确率 0.858 ± 0.025 ，AUC 为 0.878 ± 0.042 ，三者联合取得了最高预测准确率 0.881 ± 0.040 ，AUC 为 0.862 ± 0.069 。对于分期，T2WI 联合 CE-T1WI 取得了高于单一序列的预测准确率 0.956 ± 0.020 ，AUC 为 0.979 ± 0.022 ，三个序列联合取得最佳预测准确率 0.956 ± 0.000 ，AUC 为 0.986 ± 0.007 ，准确率高出影像科医师（ 0.956 vs 0.832 ）。

结论 基于 MRI 影像组学模型在预测早期 EC 风险分层及分期方面具有巨大潜力。

PO-3461

AIDS 合并肺部隐球菌感染的临床特点和影像特征分析

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目的 研究获得性免疫缺陷综合征（Acquired Immune Deficiency Syndrome, AIDS）合并肺部隐球菌感染的临床特点和影像特征，以提高对该病的认知。**方法** 回顾性分析我院 2019 年 5 月至 2020 年 12 月收治 54 例确诊 AIDS 合并隐球菌肺炎患者的临床和影像特征。**结果** 54 例患者中，男性 38 例，女性 16 例，年龄 18~59 岁，平均年龄为 (38.2 ± 10.25) 岁；CD4 计数为 13~198 个/ μL ，中位数为 42 个/ μL 。临床症状：无症状 8 例，发热 37 例，咳嗽 38 例，咳痰 37 例，胸痛 28 例，头痛 40 例，恶心呕吐 6 例、意识障碍 5 例。胸部 CT 特点：1.发病部位特点：上叶 33 例（61.1%）中叶 18 例（33.3%），下叶 36 例（66.7%），单发病灶 6 例（11.1%），多发病灶 48 例（88.9%）2.影像特点：结节或肿块影 39 例（72.2%）；实变 21 例（46.6%）；渗出 20 例（37.0%）；空洞 36 例（66.7%）；间质磨玻璃模糊影 15 例（27.8%）；纵隔淋巴结肿大 15 例（27.8%）；肺门淋巴结肿大 13 例（24.1%）；胸膜腔积液 0 例；其中多种病灶混合存在 45 例（83.3%）。**结论** AIDS 合并相关肺部隐球菌感染男性多于女性；当 CD4 小于 200 个/ μL ，AIDS 合并隐球菌感染明显增加；临床症状以发热，咳嗽，咳痰为主；多合并隐球菌性脑膜炎；胸部影像表现为肺内多发结节影、薄壁空洞、实变和磨玻璃影，肺外带分布多见，多种病灶形态混合存在，胸膜腔积液少见，具有一定特征性

PO-3462

CT 与 MRI-PDFF 诊断慢性乙肝患者肝脏脂肪变性的一致性分析

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目的: 分析肝/脾 CT 值 (CTL/S) 与磁共振质子密度脂肪分数 (MRI-PDFF) 诊断慢性乙肝患者肝脏脂肪变性的一致性, 并探讨 CT 诊断的临床价值。

方法: 选取 2018 年 10 月至 2023 年 5 月在延安大学附属医院就诊的 317 例慢性乙型肝炎患者为研究对象。纳入标准为年龄 > 18 岁的慢性乙型肝炎患者, 将同时感染其他肝炎病毒和艾滋病病毒、有大量饮酒史、合并肝细胞癌及肝脏 CT 和 MRI-PDFF 检查间隔 2 周以上的患者排除在外。使用 MRI-PDFF 作为诊断脂肪变性的参考标准, 依据 MRI-PDFF 的测量结果分为无脂肪变性 (MRI-PDFF < 5%)、轻度脂肪变性 (MRI-PDFF = 5%~10%)、中重度脂肪变性 (MRI-PDFF ≥ 10%)。采用 SPSS 26.0 分析数据, 通过分析受试者工作特征曲线, 评估 CTL/S 对不同程度脂肪变性的诊断效能。分析 CTL/S 与 MRI-PDFF 诊断结果的一致性, 一致性评价采用 Kappa 一致性检验, Kappa 系数为 0.8-1.0 表示接近完全一致, Kappa 系数为 0.6-0.8 表示显著一致, 0.4-0.6 表示中等一致, < 0.40 表示一致性较低。

结果: 317 例慢性乙型肝炎患者中有 108 例患者合并脂肪变性, 其中轻度脂肪变性 75 例, 中重度脂肪变性 33 例。以 MRI-PDFF 为参考标准, CTL/S 诊断轻度脂肪变性的曲线下面积为 0.937, 最佳截断值为 1.09; CTL/S 诊断中重度脂肪变性的曲线下面积为 0.967, 最佳截断值为 0.98。CTL/S 检测出 208 例无脂肪变性, 46 例轻度脂肪变性, 63 例中重度脂肪变性。CTL/S 与 MRI-PDFF 具有显著的诊断一致性 (Kappa=0.655, P<0.05)。

结论: 在慢性乙肝合并肝脏脂肪变性的诊断中, CTL/S 与 MRI-PDFF 具有显著的诊断一致性, 能够为慢性乙肝合并肝脏脂肪变性的诊断提供参考价值。

PO-3463

流行性感冒临床及影像学特征分析

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目的 探讨流行性感冒的临床及影像学特征, 提高对其认识。方法 回顾性分析重庆市公共卫生医疗救治中心 2009.6-2018.3 收治的 36 例流行性感冒患者临床及影像学表现, 临床表现包括发热、咳嗽、喘累、咳痰、气促、呼吸困难等; 影像学特征包括病变的分布、常见征象等。结果 36 例患者中, 男 30 例, 女 6 例; 平均年龄 40.3 岁; 经鼻咽拭子, 禽流感核酸检测: 甲型 H1N1 流感病毒检测阳性 29 例; 甲型 H7N9 流感病毒检测阳性 2 例, 甲型 H5N1 流感病毒检测阳性 1 例, 乙型流感病毒检测阳性 2 例; 2 例未分型。12 例为人与人接触感染; 4 例发现与禽类接触史, 群发 12 例, 散发 24 例。临床表现中, 发热 33 例, 咳嗽 28 例, 咳痰 15 例, 喘累 10 例, 气促 6 例, 呼吸困难 3 例, 咽痛 5 例, 鼻塞 1 例, 流涕 4 例, 头晕 2 例, 乏力 4 例, 痰血 2 例, 肌肉酸痛 2 例, 心悸 1 例; 15 例有基础疾病; 平均发病时间 6.8 天; 平均住院时间 10.5 天; 25 例伴有并发症; 经内科治疗 2-30 天后 31 例好转出院, 5 例病情重放弃治疗。影像学检查: 其中 25 例进行胸部平片检查, 24 例进行胸部 CT 检查, 25 例合并肺炎改变, 6 例肺纹理增多增粗, 5 例未见异常。复查 29 例病变吸收好转, 累及全肺 28 例, 5 个肺野 2 例, 4 个肺野 2 例, 1 个肺野 1 例; 3 叶 2 例, 4 叶 1 例, 累及 1 叶 1 例; 影像表现为磨玻璃影 25 例, 斑片状影 19 例, 片状影 17 例, 网格状影 14 例, 絮状影 13 例, 纵隔淋巴结增多增大 7 例, 胸膜反应 10 例。结论 流行性感冒临床表现多样, 不一定有与流感病人及禽类接触史, 影像检查对诊断、病情判断及疗效评价有重要作用。

PO-3464

获得性免疫缺陷患者并发尘肺结核的胸部 CT 表现分析

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目的 探讨艾滋病患者并发尘肺结核的胸部 CT 表现特点。**方法** 搜集 2021 年 1 月至 2022 年 06 月重庆市公共卫生医疗救治中心诊治的 19 例艾滋病并发尘肺结核住院患者, 回顾性分析 19 例患者的临床及 CT 检查资料。对病变的发生部位、范围、形态、类型及并发其他脏器结核情况进行观察。**结果** 19 例患者中, 尘肺分期: II 期 8 例, III 期 11 例。受累范围: 多肺叶 19 例。发生部位: 右肺上叶 18 例、右肺中叶 17 例、右肺下叶 18 例、左肺上叶 16 例、左肺下叶 18 例。尘肺结核类型: 分离型 8 例, 融合型 11 例。病变形态: 结节影 19 例, 斑片状影 16 例, 大片状影 11 例, 空洞 6 例, 树芽征 12 例, 胸腔积液 9 例, 胸膜增厚 15 例, 纵隔淋巴结肿大 19 例, 纵隔淋巴结钙化 15 例, 肺气肿 14 例, 肺大疱 13 例, 并发肺外结核 12 例。抗结核治疗 1 个月肺部病变吸收好转 10 例; 抗结核治疗半年, 肺结核治愈者 9 例。**结论** 艾滋病患者并发尘肺结核的胸部 CT 表现具有一定特征, 以浸润灶为主, 常多型结核并发存在, 且常伴有肺外结核、其他感染等, 短期抗结核治疗后效果较好。

PO-3465

新型冠状病毒肺炎(COVID-19)的胸部 CT 改变与 T 淋巴细胞亚群的相关性研究

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目的: 评价新型冠状病毒肺炎(COVID-19) 的胸部 CT 病灶变化与不同 T 淋巴细胞亚群之间的关系。**方法:** 收集重庆市公共卫生医疗救治中心 2020 年 1 月 24 日~2020 年 3 月 15 日间收治的 47 例 COVID-19 确诊患者, 根据病灶在 CT 图像的吸收情况分三种类型: 其中明显持续吸收型 18 例, 稳定-缓慢吸收型 14 例, 进展后吸收型 15 例。并对 47 例患者进行了 99 次 CT 复查和 CD4 细胞检查, 根据病灶吸收情况分析其 CT 表现及其与 T 淋巴细胞亚群的关系。**结果:** 47 例 COVID-19 患者中, CT 常见征象为肺周围优势分布为主的多发磨玻璃灶, 部分病例可见合并实变、条索、小叶间隔增厚, 极少数病例可见胸腔积液及心包积液。不同类型间的首次 T 淋巴细胞、住院过程中、治疗后末次的 T 淋巴细胞水平, 表现为病灶明显持续吸收>病灶稳定-缓慢吸收>病灶扩展后吸收。在疾病进程中病灶吸收时 CD4+T 淋巴细胞较高。首次 T 淋巴细胞水平明显吸收型高于缓慢吸收和进展后吸收 ($P<0.05$); 在治疗过程中, T 淋巴细胞均明显升高。其中 CD4+T 淋巴细胞除病灶进展后吸收类型外, 其余两型 T 淋巴细胞均恢复到正常水平以上, 但升高的幅度不同, 病灶明显吸收者的 CD4 细胞平均升高 134 cell/ul, 明显吸收者上升幅度低于缓慢吸收 (192 cell/ul) 和进展后吸收者 (149 cell/ul); 复查中, 52 次病灶吸收时 CD4+细胞平均 (544.43 ± 163.34) cell/ul, 31 次病灶变化不大时 CD4+T 淋巴细胞平均 (339.06 ± 145.98) cell/ul, 16 次 CT 病灶进展时 CD4+ T 淋巴细胞平均 (230.50 ± 95.24) cell/ul, 三组间有统计学差异 ($P<0.05$)。**结论:** T 淋巴细胞水平与 CT 病灶变化之间的相关性具有重要临床价值。当患者肺部病灶明显增加时, 提示其自身免疫可能较差, 需加强免疫调节。反之, 病程中检测到患者 T 淋巴细胞水平下降, 要注意病灶进展的风险, 及时复查 CT 观察病灶变化情况。

PO-3466

2 型糖尿病合并肺结核血糖水平与胸部 CT 特点的相关性分析

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目的: 探讨 II 型糖尿病合并肺结核血糖水平与 CT 特点的相关性。方法: 收集我院 2015 年~2017 年间 II 型糖尿病合并初治肺结核(DM-PTB)住院患者 74 例, 根据空腹血糖 (FPG) 分为 3 组: 1 组, $FPG \leq 11 \text{ mmol/L}$; 2 组, $FPG 11 \sim 16.7 \text{ mmol/L}$; 3 组, $FPG \geq 16.7 \text{ mmol/L}$ 。(2) 分别探讨各组胸部 CT 影像特点并对比分析。(3) 使用统计软件 SPSS19.0 处理数据, 用卡方检验分析。结果: 病变部位与范围: 右肺上叶前段病变 49 例, 左肺上叶前段病变 43 例, 右肺下叶基底段 41 例, 左肺下叶基底段 40 例, 右肺中叶 29 例, 左肺舌叶 43 例。单叶出现病变者 4 例 (5.41%), 2 叶出现病变者 17 例, 3 个及以上叶段出现病变者 53 例。病变形态: 22 例病变形态为斑片、结节状影, 其余 52 例以片状、团片状干酪性病变为主, 伴斑点结节影。空洞情况: 39 例出现空洞, 其中单发空洞 2 例, 多发空洞 37 例, 多发虫蚀样空洞 21 例; 无空洞 35 例。增强表现: 15 例增强病例中, 除 1 例合并非特异性感染表现为中度强化外, 其余均表现为轻度不均匀强化或边缘强化, 病变出现明显干酪性坏死痰菌阳性 43 例。各组干酪性病变发生率差异有统计学意义 ($p=0.000$), 各组空洞发生率差异有统计学意义 ($p=0.025$), 各组痰菌阳性率差异有统计学意义 ($p=0.005$)。各组病变范围、病变分布差异无统计学意义。结论: DM-PTB 胸部 CT 有其特征性的影像表现, 血糖水平与干酪性病变、空洞性病变存在相关性, 能为 DM-PTB 的早期诊断提供重要影像依据。

PO-3467

乳腺结核的 CT 表现分析

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目的 分析乳腺结核的 CT 征象, 探讨其 CT 的诊断价值。方法 回顾分析重庆市公共卫生医疗救治中心 20 例经病理证实的乳腺结核病例。分析病变的 CT 表现及邻近组织及器官受累情况。结果 20 例乳腺结核中 12 例发生于右乳, 8 例发生于左乳。13 例为单发, 7 例为多发; 16 例呈类圆形结节, 1 例呈团块状, 3 例呈片状; 病灶大小 $1.0 \text{ cm} \times 1.5 \text{ cm} \sim 5.1 \text{ cm} \times 3.2 \text{ cm}$ 。结节型、脓肿型分别各 13、7 例。CT 平扫 11 例为等密度, 9 例为稍低密度, 4 例病灶内见斑点状钙化, 17 例边界模糊; 12 例邻近皮肤均匀增厚。增强扫描 20 例均表现为环形强化, 2 例伴窦道形成; 其中 13 例伴有同侧或双侧腋窝淋巴结肿大伴环形强化, 5 例伴有同侧胸壁包块伴边缘强化, 10 例伴肺结核。结论 乳腺结核的特征性 CT 表现为环形强化, 同时常伴有同侧腋窝淋巴结及胸壁结核。

PO-3468

胸部 CT 影像联合临床和实验室检查对耐多药 肺结核的诊断价值

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目的 探讨胸部 CT 联合临床和实验室检查对耐多药肺结核诊断价值, 为临床对耐多药肺结核的早期诊断和药物选择提供依据。方法 搜集 2018 年 1 月至 2022 年 9 月重庆市公共卫生医疗救治中心经细菌培养及药敏鉴定确诊的 392 例肺结核患者临床及 CT 影像学资料, 其中耐多药肺结核患者 212 例 (耐药组), 药物敏感肺结核患者 180 例 (敏感组)。对比分析两组的 CT 影像表现、临床及 T

淋巴细胞计数, 并进行 logistic 回归分析, 建立回归方程模型。通过 ROC 曲线和曲线下面积 (AUC) 评估回归方程模型对耐多药肺结核的诊断效能。结果 耐药组男性患者、复治患者多于敏感组 (P 均 <0.001)。既往治疗结核时间长于敏感组 ($P=0.006$)。CD4+ T 淋巴细胞及 CD4/CD8 比值低于敏感组 (P 值均 <0.001)；病变分布在左肺舌段及左肺上叶多于敏感组 (P 均 <0.05)；空洞的发生率、2 个以上、3 个以上及 5 个以上空洞均多于敏感组 (P 值均 <0.001)。空洞内径大于敏感组 ($P<0.001$)，厚壁空洞、混合空洞、虫蚀样空洞、干酪病变、肺毁损、树芽征、小叶中心性结节、支气管扩张、支气管狭窄、胸膜增厚、胸廓塌陷、纵隔移位、心包增厚多于敏感组 (P 均 <0.05)。logistic 回归分析结果显示：既往治疗结核时间、厚壁空洞、小叶中心性结节、支气管狭窄、胸膜增厚、心包增厚是耐药结核发生的危险因素；女性及 CD4+ T 淋巴细胞是耐多药肺结核的保护因素。logistic 回归模型总体预测率为 78.6%，敏感性 75.9%，特异性 81.7%。ROC 曲线下面积 (AUC) $=0.859$ (95% CI, 0.823-0.895) ($P<0.001$)。结论 胸部 CT 联合临床及实验室检查对耐多药肺结核有重要的诊断价值，可为临床早期诊断和药物选择提供依据。

PO-3469

活动性肺结核影像征象在非活动性肺结核中的表现

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目的 探讨活动性肺结核影像征象在非活动性肺结核中的表现，提高对肺结核活动性的判断能力。方法 回顾性搜集 2020 年 8 月至 2021 年 8 月重庆市公共卫生医疗救治中心诊治的 194 例非活动性肺结核患者和 172 例活动性肺结核患者，分析两组患者 CT 征象的差异。结果 在非活动性肺结核患者中，活动性征象小片状实变影、小叶中心性结节、树芽征、磨玻璃影、空洞、胸腔积液、淋巴结肿大的发生率分别为 21.6% (42/194)、42.3% (82/194)、17.5% (34/194)、4.6% (9/194)、16.5% (32/194)、1.0% (2/194)、18.6% (36/194)，明显低于活动性肺结核患者的 79.1% (136/172)、62.2% (107/172)、66.9% (115/172)、23.8% (41/172)、27.3% (47/172)、32% (55/172)、53.5% (92/172) (P 值均 <0.05)。但非活动性肺结核患者斑片内钙化为 27.3% (53/194)，高于活动性肺结核的 11% (19/172) ($P<0.001$)，伴钙化的结节 37.6% (73/194)，高于活动性肺结核的 9.9% (17/172) ($P<0.001$)，薄壁空洞为 12.4% (24/194)，高于活动性肺结核的 4.7% (8/172) ($P<0.05$)，硬结性病变 36.6% (71/194)，高于活动性肺结核的 0.6% (1/172) ($P<0.05$)。结论 活动性肺结核影像征象也可出现在非活动性肺结核患者中，但其发生率明显低于活动性肺结核患者，且与活动性肺结核 CT 表现有明显区别，CT 检查在肺结核活动性的判断中可提供重要依据。

PO-3470

膝关节结核的 MRI 表现

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目的 探讨膝关节结核的 MRI 表现，提高对膝关节结核的认识。方法 回顾性分析我院 2016 年 3 月~2018 年 12 月经手术及病理检查证实的 23 例患者的影 MRI 资料，分析其影像表现。23 例患者 26 个膝关节结核，其中单纯左膝 8 例，单纯右膝 12 例，双膝 3 例。全部病例行膝关节冠状位、矢状位、横断位 MR 平扫，12 例患者行钆贝葡胺增强扫描。结果 单纯滑膜结核 7 例，表现为滑膜增生，关节积液，滑膜增生在 MRI 在 T1WI 上呈较为均匀中低信号，T2WI 上呈不均匀高信号表现，增强扫描见条状及斑片状强化。滑膜结核合并半月板损伤、关节软骨损伤、交叉韧带损伤共 11 例，MRI

表现除滑膜增生外还表现为半月板损伤,以半月板后角 II°及以上损伤为主,交叉韧带不全性损伤及水肿为主。全关节结核 14 例,表现为骨质破坏以及骨髓水肿,骨髓水肿表现为斑片及片状高信号。结论 MRI 对膝关节结核病变范围和程度的判断及骨质破坏的早期发现有重要作用。

PO-3471

AIDS 合并肝脏结核 CT 影像学表现

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目的 回顾性分析 AIDS 合并肝脏结核增强 CT 的表现特点,以提高其诊断的准确性。**方法** 对重庆市公共卫生医疗救治中心经病理证实的 8 例 AIDS 合并肝脏结核患者的增强 CT 检查结果进行回顾性分析,观察病灶的形态、密度、数量、病灶边界、病灶 CT 增强后的表现。**结果** 8 例 AIDS 合并肝脏结核表现为浆膜型 2 例,结节型 3 例,混合型 3 例,其中单发 3 例,多发 5 例,形态不规则 6 例;CT 平扫表现为低密度 7 例,钙化 1 例,边界均与正常肝组织分界不清,伴有腹腔其他脏器结核及结核性腹膜炎 5 例,8 例均伴有腹腔外结核;CT 增强表现为不均匀轻度强化 2 例,渐进性强化 2 例,边缘轻度强化 4 例,病灶内分隔征 6 例。**结论** AIDS 合并肝脏结核少见,易漏诊误诊,增强 CT 能显示肝脏结核病灶的一些特征性表现。

PO-3472

HIV 阳性合并肺结核患者的 CT 影像学诊断与鉴别

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目的 探讨 HIV 阳性合并肺结核患者的 CT 影像学特点,以提高对艾滋病 (AIDS) 合并肺结核的诊断与鉴别诊断的能力。**方法** 回顾性分析 2020 年 1 月至 2022 年 11 月在本院住院治疗并均经实验室检查证实的 36 例 HIV 阳性合并肺结核患者的临床及 CT 影像学资料,并选取本院收治的 36 例均确诊为肺结核 (痰检阳性) 的 HIV 阴性患者作为对照组,对两组患者的 CT 影像学特点进行对比研究。**结果** 两组研究对象中,病变的发生部位:两肺各叶均受累的发生率分别为 58.3%和 19.4%,差异具有统计学意义 ($P < 0.05$);发生于上叶尖后段、上叶前段、左肺舌段、下叶背段、下叶基底段的发生率分别为 19.4%、13.9%、16.7%、13.9%、19.4%,均低于对照组分别为 55.6%、47.2%、38.9%、33.3%、52.7%,差异均具有统计学意义 ($P < 0.05$)。两组病变的 CT 表现:片状影、斑片状影、结节影、树芽征、条索状影、支气管扩张影、支气管播散或狭窄、多发空洞及钙化影的发生率分别为 30.6%、86.1%、72.2%、38.9%、61.1%、30.6%、27.8%、11.1%、13.9%,均低于对照组 55.6%、100.0%、94.4%、80.6%、86.1%、91.7%、77.8%、41.7%、47.2%,差异均具有统计学意义 ($P < 0.05$);粟粒样结节影、纵隔及 (或) 其他淋巴结肿大、心包积液的发生率分别为 27.8%、77.8%、16.7%,均高于对照组 5.6%、22.2%、0%,差异均具有统计学意义 ($P < 0.05$)。**结论** HIV 阳性合并肺结核患者因 CD4+T 淋巴细胞水平较低下,以致免疫功能缺陷,其病变分布缺乏特异性、累及范围广,病变形态也复杂多样。合并粟粒样肺结核、纵隔内淋巴结肿大、心包积液以及肺外结核的发生率也明显高于 HIV 阴性肺结核患者,临床工作中需提高对该病的诊断与鉴别诊断能力。

PO-3473

结节型非结核分枝杆菌肺病与肺结核的 CT 影像学分析

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目的 分析结节型非结核分枝杆菌肺病与肺结核的 CT 影像学特征。方法 采用回顾性分析方法, 搜集 2020 年 1 月至 2021 年 12 月经苏州市第五人民医院实验室检查确诊, 将 25 例结节型非结核分枝杆菌肺病患者作为观察组; 搜集同期 32 例确诊肺结核且以结节为主要表现的患者作为对照组。观察两组患者肺部结节的数量、大小、钙化、累及肺叶范围的 CT 影像资料, 加以记录并进行统计学分析。结果 观察组 25 例患者与对照组 32 例患者都以多发结节为主。观察组患者中出现结节直径大于 10mm 的有 5 例, 占 20.00%, 对照组患者中出现结节大于 10mm 的有 25 例, 占 78.13%, 两组差异具有统计学意义 ($P < 0.05$); 观察组患者中出现钙化的有 3 例, 占 12.00%, 对照组中出现钙化的有 20 例, 占 62.50%, 两组差异具有统计学意义 ($P < 0.05$); 观察组中结节累及两肺多个肺叶的有 18 例, 占 72.00%, 对照组中结节累及两肺多个肺叶的有 10 例, 占 31.25%, 两组差异具有统计学意义 ($P < 0.05$)。结论 结节型非结核分枝杆菌肺病与肺结核的结节在 CT 影像上均表现为多发结节。结节型非结核分枝杆菌肺病的结节体积偏小, 钙化少见, 多累及两肺多个肺叶, 可以为临床诊断提供依据。

PO-3474

脑肠轴与 MR 影像联合是 HIV 相关神经认知障碍患者的新机遇

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人类免疫缺陷病毒 (HIV) 感染患者有 50% 的可能性在短时间内发展为与 HIV 相关的神经认知障碍 (HAND)。神经心理性能测试是目前诊断的金标准, 但其实施过程容易受到干扰, 在临床实践中难以准确诊断 HAND。因此, 有必要相对容易地获得其他临床相关的生物标志物来评估 HIV 相关的神经病理改变。最近对脑肠轴的研究表明, 肠道微生物群和大脑之间存在着密切的关系。而非侵入性 MR 技术在生物标志物和脑功能的检测方面具有巨大的潜力。然而, 目前探索脑肠轴结合 MR 影像在 HAND 及其他中枢神经系统疾病中开展甚少。因此, 通过分析 HAND 的当前机制、HAND 过程中脑肠轴的调控机制、MR 图像在 HAND 中的应用, 进而构建基于脑肠轴与多模态 MR 图像联合的多组学机器学习模型。不仅可以实现对 HAND 的早期诊断, 监测疾病的进展, 还可有助于评估和研发新的治疗方法。

PO-3475

AI 技术在儿童肺结核影像诊断中的研究现状与展望

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目的: 通过客观回顾 AI 技术在肺结核、儿童肺结核影像诊断中的研究及应用现状, 并就其在儿童肺结核领域中的局限性及未来展望进行综述, 望日后相应的 AI 技术开发能更加关注儿童病例。

方法: 首先回顾了儿童肺结核影像技术及诊断的方法和内容, 说明相关的 AI 模型建立及软件开发的影像学基础; 其次就传统的计算机辅助诊断 (Computer-aided diagnosis, CAD) 技术以及新兴的深度学习技术在成人、儿童肺结核影像诊断中的应用和研究进行分析、阐述, 并对市面上相应商

用软件情况进行统计和介绍。最后,就 AI 技术在儿童肺结核领域中的局限性及未来展望进行讨论和总结。

结果:胸部 CXR 仍被推荐为肺结核疑似病例的首选影像学检查方法,国内外相应领域的 AI 程序、算法大多以 CXR 为研究基础;CAD 可能成为替代人工读取胸部 X 射线的选择,并有可能提供额外的儿科结核病诊断工具,从而实现临床早期诊断、及时治疗;深度学习技术在成人肺结核影像诊断中效能优良,但其在儿童病例中研究匮乏,相应的软件也无专为儿童设计的。

结论:虽然 AI 在儿童肺结核影像诊断方面的研究和应用不足,但结合其在成人肺结核相关研究中的良好表现,其未来的发展依然充满前景。期待 AI 技术发展及软件开发能在儿童肺结核诊断中取得更大的进步,实现儿童肺结核患者的健康管理。

PO-3476

慢性疼痛的静息态功能磁共振研究进展

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慢性疼痛是一种疼痛从急性状态发展到慢性状态,并持续到愈合过程之后的情况,被定义为持续超过正常组织愈合时间的疼痛,通常为 3 个月,可能会引起焦虑、抑郁、睡眠障碍等一系列负面作用,严重者将致残,从而导致生活质量下降。在管理慢性疼痛时,重点通常是促进康复和最大限度地提高生活质量。近年来,随着成像技术的迅速发展,静息态功能磁共振成像(Resting-state functional magnetic resonance imaging,rs-fMRI)因其高空间分辨率和无创优势,被广泛应用于脑功能活动相关疾病的研究。血氧水平依赖(blood oxygen level dependent, BOLD)信号可以客观地测量人类大脑活动,并能够深入了解神经处理潜在机制。最近,越来越多的研究表明,功能磁共振成像可以作为一种诊断疼痛的客观生物标志物的技术。这也为进一步探究慢性疼痛的潜在神经病变机制提供了可能,本文主要综述 rs-fMRI 在慢性疼痛脑功能改变方面的最新研究进展,并对未来研究方向做出展望。

PO-3477

心脏磁共振在早期男性梅毒患者中的临床应用

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目的:采用心脏核磁共振(CMR)综合评估早期(确诊 3 年内)男性梅毒患者心肌组织和心功能改变。

方法:前瞻性纳入成都市公共卫生临床医疗中心治疗的 88 例男性梅毒患者及 50 例正常男性对照组进行 CMR 扫描,收集临床资料,并对图像资料进行后处理分析,评估包括容积参数、心肌应变等指标;并进一步按照梅毒滴度 TRUST 结果把患者分为滴度 $<1:8$ 及 $>1:8$ 两组,进行进一步分析比较及相关性分析。

结果:88 例梅毒患者均未出现左右心室收缩功能明显减低、瓣膜反流、心肌水肿、LGE 在内的心脏受累表现。①心功能:与正常对照组相比,梅毒患者部分心功指标增高,LVEDV (125.98 ± 23.65 ml vs. 112.99 ± 23.47 ml, $P=0.021$), LVSV (76.17 ± 16.24 ml vs. 67.28 ± 13.22 ml, $P=0.012$), 标化后 LVED Mass/BSA (27.73 ± 3.83 ml/m² vs. 25.53 ± 4.09 ml/m², $P=0.019$); RVEDV (126.84 ± 30.34 ml vs. 110.869 ± 24.63 ml, $P=0.016$), 标化后 RVEDV/BSA (40.86 ± 8.69 ml/m² vs. 37.17 ± 5.95 ml/m², $P=0.039$), RVSV/BSA (21.70 ± 4.82 ml/m² vs. 19.46 ± 4.44 ml/m², $P=0.042$)。②心肌应变:梅毒患者左心室径向应力(LVGRS)较正常对照组减低(20.30 ± 7.99

vs. 42.33 ± 15.05 ml, $P=0.000$ ）。梅毒患者进一步按照梅毒滴度 TRUST 结果分组，组间左右心室容积参数、心肌应力指标均未见明显减低（所有 $P>0.05$ ）。

结论：梅毒患者早期（3 年内）左右心室容积参数已经有所代偿性增高，心肌应力也有所改变，而射血分数暂时保留未发生明显减低，心脏并发症并不多见，且与梅毒滴度无明显相关，可将确诊后的梅毒患者进行早期心血管风险评估及管理，减缓其进展为中晚期心血管梅毒的进程。

PO-3478

右后颈枕部恶性蝶螈瘤一例

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本文报道 1 例发生于右后颈枕部的恶性蝶螈瘤，患者女，27 岁，右后颈枕部实性肿块，MRI 表现为长 T1、长 T2 信号，内见囊变坏死区，边界清楚，eADC 示实性部分扩散受限，增强后实性部分明显不均匀强化。行右后颈枕部病灶切除术，术后病理诊断为恶性蝶螈瘤。

PO-3479

基于 AI 赋能脑创伤半暗带的精准诊断

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脑创伤具有发生率高、致残率高、死亡率的特点，严重威胁着人类生存健康。创伤半暗带是脑创伤后的可逆脑组织，是临床治疗的靶区。研究创伤半暗带的分子病理机制及多模态 MRI 表现依然成为了应用研究的热点。本课题应用 AI 赋能从分子生物学及影像学角度对创伤半暗带进行系统研究，以期提高临床的精准诊断及治疗效果。

PO-3480

贝伐珠单抗治疗大鼠脑创伤的病理与行为学变化的实验研究

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目的 通过观察病理变化以及行为学实验研究贝伐珠单抗对大鼠脑创伤的治疗效果。**方法** 40 只 Wistar 大鼠随机分为 5 组，每组均为 8 只：正常组（NC 组）、假创伤组（sham 组）、创伤组（TBI 组）和实验组 A、B，正常组不做处理，创伤组为创伤性脑损伤组，采用改良的 Feeney 氏法制作的右侧中度创伤性脑损伤模型，其中实验组 A、B 在创伤组的基础上在创伤后立即和 1h 后使用浓度 5mg/kg 的贝伐珠单抗治疗，假创伤组除撞击深度不同，仅损伤颅骨外，其余操作同创伤性脑损伤组。24h 后，高架十字迷宫实验用于观察大鼠情绪行为的变化；避暗实验用于观察大鼠短期记忆以及认知的变化；穿梭实验用于观察大鼠记忆以及学习能力的变化；HE 染色用于检测大鼠创伤后的病理变化。结果 与创伤组相比，高架十字迷宫实验中实验组 A、B 的进入开臂次数百分比（OE%）明显增多，避暗实验中实验组 A、B 的避暗潜伏时间明显减少，穿梭实验中实验 A、B 组的主动穿梭次数明显增多，HE 染色显示，实验 A、B 组的脑水肿范围明显缩小。实验 A、B 两组对比，A 组的 OE% 大于 B 组，避暗潜伏时间小于 B 组，主动穿梭次数大于 B 组，HE 染色脑水肿范围小于 B 组。结论 贝伐珠单抗对大鼠脑创伤有一定治疗作用，能减轻其焦虑情绪，改善其学习记忆以及认知功能，且创伤后立即给药的作用好于创伤后 1h 给药。

PO-3481

新型冠状病毒肺炎是以肺实质性炎症为主的肺炎

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目的 探讨新型冠状病毒肺炎的病理变化：肺实质性还是肺间质性的炎症。 **方法** 分析新型冠状病毒肺炎各期病理改变，与一般病毒性肺炎的病理变化主要表现比较。 **结果** 新冠肺炎的病理改变：早期和较轻病变区见肺泡腔内浆液、纤维蛋白渗出以及透明膜形成，随病变进展和加重，大量单核细胞/巨噬细胞和纤维蛋白充满肺泡腔；Ⅱ型肺泡上皮细胞增生、部分细胞脱落。易见肺血管炎、血栓形成（混合血栓、透明血栓），可见血栓栓塞。肺内小支气管和细支气管易见黏液栓形成。病程较长的病例，见肺泡腔渗出物肉质变和肺间质纤维化。 **结论** 新型冠状病毒肺炎是一种以肺实质炎症改变为主的病毒性肺炎。

PO-3482

儿童 COVID-19 相关的出血性可逆性后部脑病综合征伴新发糖尿病酮症酸中毒及多系统炎症综合征：罕见病例报道

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目的：儿童中出现 COVID-19 感染相关的可逆性后部脑病综合征（PRES）极为罕见，文献中仅发现 4 例<18 岁人群的 COVID-19 相关的 PRES 报道。与 COVID-19 相关的儿童新发糖尿病酮症酸中毒（T1DM 合并 DKA）、多系统炎症综合征（MIS-C）也有少数相关报道，但根据文献回顾，上述三种现象同时出现在同 1 例儿童中尚未报道。本文报道 1 例儿童 COVID-19 感染相关出血性 PRES 患者的临床及影像学表现，这是首例 COVID-19 感染背景下 PRES、新发 T1DM 合并 DKA 及 MIS-C 三种现象同时出现的儿童病例。本文还回顾了目前关于儿童与 COVID-19 相关的 PRES 文献，包括可能的发病机制、典型表现、鉴别诊断、合并症及治疗。

方法：回顾性分析患者入院前、住院全过程、出院后随访的临床及影像学资料，并复习相关文献。

结果：患者男性，8 岁，新型冠状病毒 Omicron 变异株暴发期间感染，出现腹痛、呕吐、意识障碍入院。实验室检查发现空腹血糖明显增高、血酮升高、代谢性酸中毒，检测发现糖尿病 ZaT8A、IA-2A 抗体阳性，符合国际儿童和青少年糖尿病学会关于 COVID-19 感染相关的新发 T1DM 合并 DKA 的诊断。其次，患者咽拭子 SARS-CoV-2 阳性，发热 3 天，出现胃肠道、心、肺、肾和神经系统受累，出现炎症标志物升高、凝血功能障碍，符合世界卫生组织 MIS-C 的诊断。患儿头部 CT 示双侧顶叶、左颞叶、右侧额叶、胼胝体压部多灶性脑出血。MRI 示双侧顶叶、右额叶皮质及皮质下、胼胝体压部多发异常强化灶、左颞叶脑水肿。治疗后复查，患儿临床表现和影像学表现可逆，考虑 COVID-19 感染相关的出血性 PRES 伴新发 T1DM 合并 DKA 及 MIS-C。

结论：COVID-19 相关的 PRES 在儿童中相对罕见，可能发生在 COVID-19 感染期间新发 T1DM 合并 DKA 和 MIS-C 的儿童，鉴于 PRES 的可逆性，及时诊断和早期治疗预后良好，可避免永久性的神经损伤。本案例为 COVID-19 儿童出血性 PRES 的临床、实验室和神经影像学特征提供了参考。

PO-3483

青海省 3 例重症新型冠状病毒肺炎的影像学特点及动态变化分析

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目的：分析我院 3 例重症新型冠状病毒肺炎（新冠肺炎，COVID-2019）的首次影像学表现特点及动态变化、转归。方法：选择我院经核酸检测阳性的 3 例重症新型冠状病毒肺炎的 CT 表现，主要是首次 CT 表现的形态、分布特点及其动态变化。结果：3 例重症肺炎患者年龄较大，其中一例 80 岁，三例均有基础病，首次胸部 CT 表现不一，病变进展快，进展期 CT 表现双肺多发多叶分布，实变为主，以双肺下叶中外带胸膜下为主，实变影内可见网格状改变及空气支气管征，合并基础疾病者吸收较慢。结论：重症新型冠状病毒肺炎 CT 表现具有一定特征，分析其特点及动态变化有助于临床治疗。

PO-3484

贝伐珠单抗治疗脑创伤半暗带后的 AQP4 及 Occludin 表达水平实验研究

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目的：探索贝伐珠单抗在创伤性脑损伤（TBI）中的治疗效果和推荐给药剂量，以及水通道蛋白 4（AQP4）及密封蛋白（Occludin）在贝伐珠单抗治疗脑创伤半暗带后的表达水平。方法：将 24 只 Wistar 大鼠随机分为假手术组（Sham）、创伤组（TBI）、Beva A 组（贝伐珠单抗为 5mg/kg），分别进行被动回避实验，并记录避暗潜伏期时间。将 95 只 Wistar 大鼠随机分为 Sham 组、TBI 组、Beva 组（A 组；B 组，贝伐珠单抗为 10mg/kg；C 组，贝伐珠单抗为 15mg/kg），24H 后取脑组织行病理、免疫组化、免疫荧光和电子显微镜检查，蛋白质印迹（WB）实验测定血管内皮生长因子（VEGF）、Occludin 和 AQP4 的表达水平。结果：TBI 后大鼠的避暗潜伏期时间延长，而贝伐珠单抗治疗后大鼠的认知功能得到改善。TBI 后血脑屏障（BBB）的损伤和脑水肿加重，贝伐珠单抗治疗后改善了 BBB 的损伤，脑水肿减轻，继发性损伤程度 Beva A 组>Beva B 组>Beva C 组。TBI 后 VEGF 表达上调，而贝伐珠单抗抑制了 VEGF 表达，VEGF 水平 Beva A 组>Beva B 组>Beva C 组（ $P<0.05$ ）。AQP4 在 TBI 后表达上调，贝伐珠单抗治疗后降低了 AQP4 的表达，AQP4 水平 Beva A 组>Beva B 组>Beva C 组（ $P<0.05$ ）。Occludin 在 TBI 后表达下调，贝伐珠单抗给药后 Occludin 表达水平升高，Occludin 水平 Beva A 组<Beva B 组<Beva C 组（ $P<0.05$ ）。结论：TBI 后 VEGF 后表达上调，贝伐珠单抗抑制 VEGF 的表达，并通过拯救 occludin 并抑制 AQP4 极化来减轻 TBI 诱导的 BBB 损伤，从而减轻 CP 的继发性脑损伤。贝伐珠单抗在腹腔给药剂量为 15mg/kg 时效果最佳。VEGF 可能是预防和治疗 CP 继发性脑损伤的关键靶点。

PO-3485

应用 MM-MRI 检测贝伐珠单抗治疗脑创伤 半暗带脑水肿的疗效实验研究

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目的：探讨 7.0T 多模态磁共振 (MM-MRI) 检测贝伐珠单抗治疗脑创伤半暗带 (CP) 脑水肿的疗效。方法：将 Wistar 大鼠 21 只随机分为假手术组 (Sham)、创伤组 (TBI)、Beva 组 (贝伐珠单抗为 15mg/kg)，24 小时后行 MM-MRI 检查，取大鼠头颅的病理和电子显微镜检查观察脑水肿和血脑屏障。结果：Beva 组的 rs-CE-T1WI、rs-DWI 的面积小于 TBI 组 ($P<0.05$)，rs-SWI 差异无统计学意义 ($P<0.05$)，CE-T1WI 与 SWI 的不匹配显示血管源性脑水肿，与病理学、电子显微镜改变相似。结论：贝伐珠单抗可改善脑创伤 CP 的脑水肿，MM-MRI 能够反映病理结果，CE-T1WI 与 SWI 的不匹配对 CP 有提示意义。MM-MRI 能为临床的诊疗提供准确有效的信息。

PO-3486

T1mapping 和 T1 ρ 定量成像预测兔肝纤维化： 一项基于机器学习的研究

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目的：本研究的目标是直接比较 T1mapping 和 T1 ρ 成像诊断肝纤维化分级的价值。并从 T1mapping 和 T1 ρ 成像获得的定量参数与机器学习 (ML) 分类器相结合，以开发一个能够准确诊断 LF 的预测并验证最佳模型的效能。

材料与方法：本研究纳入 120 只四氯化碳诱导的肝纤维化组 (LF) 家兔，30 只对照组。在对比增强前、10min 和 20min 的肝胆期进行改良的 Look-Locker 反转恢复 (MOLLI) T1mapping 和 T1 ρ 成像。获得 T1native、T110min、T120min、10min 外细胞间容积 (ECV10min)、20min 外细胞间容积 (ECV20min)、T1 ρ native、T1 ρ 10min 以及 T1 ρ 20min 等定量参数，组织病理学分期作为参考标准，比较不同参数诊断 LF 分期的差异。采用逻辑回归、支持向量机、K 最近邻分类、随机森林、ExtraTrees 和极限梯度提升等六种机器学习 (ML) 分类器，在训练集上开发了用于 LF 识别的预测模型。使用受试者工作特征曲线下面积 (AUC) 评估模型的效能。

结果：不同 LF 分期的分布情况如下：F0, n=30; F1, n=25; F2, n=28; F3, n=30; F4, n=27。分为两组，F0 到 F2 期为非晚期 (n=83) LF; F3 到 F4 期为晚期 LF (n=57)。ECV20min 和 T1 ρ 20mi 与 LF 分期进展呈较高的正相关性 (分别为 $r=0.821$, 0.808)，诊断晚期组的 AUC 值分别为 0.86 和 0.84。在六种机器学习模型中，极限梯度提升模型诊断晚期组的 AUC 值最高 (分别为 0.96 和 0.89)，其次是 Extratrees (0.95 和 0.87)、随机森林 (0.92 和 0.86)、支持向量机 (0.90 和 0.85)、K 最近邻分类 (0.86 和 0.83) 和逻辑回归 (0.84 和 0.79)。

结论：本研究的结果显示 T1mapping 和 T1 ρ 成像无创评估兔肝纤维化 (LF) 具有较高的价值，且增强后参数值诊断价值更高。更重要的是，应用机器学习模型能显著提高诊断准确度，有望成为诊断 LF 分期的可靠影像学工具。

PO-3487

鼻腔肉芽肿性毛细血管瘤和鼻息肉基于 CT 增强和灰度共生矩阵的鉴别诊断

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目的探讨 CT 增强的灰度共生矩阵 (GLCM) 纹理分析鉴别诊断鼻腔肉芽肿性毛细血管瘤和鼻息肉的价值。

方法经手术病理证实的 46 例鼻腔肿物患者的资料, 其中鼻腔肉芽肿性毛细血管瘤 22 例, 鼻息肉 24 例, 术前行 CT 平扫+动脉期增强检查。评估两种病变平扫及增强后动脉期的平均 CT 值及其 20 个 GLCM 特征之间的变化。使用线性混合效应模型分析两种病变各自平扫及增强后 CT 值和选定 GLCM 特征的差异。

结果两种病变增强扫描动脉期 CT 值有显著差异 ($p < 0.001$)。模型显示两种病变增强扫描动脉期图像的 GLCM 特征存在显著差异, 即自相关 ($p < 0.001$)、相关性 ($p = 0.012$)、同质性 ($p = 0.003$)、对比度 ($p < 0.01$), 和差异熵 ($p = 0.037$)。在大多数模型中, 两种病变平扫及增强扫描动脉期的 GLCM 特征有显著差异 ($p \leq 0.001$), 其中, 两种病变的平扫的 GLCM 特征相似。

结论 GLCM 是一种提高运用增强扫描 CT 图像检测鼻腔肉芽肿性毛细血管瘤和鼻息肉的 CT 值变化敏感性的方法, 是提高对该两种病变鉴别诊断的有用补充。

PO-3488

基于肺部 CT 影像学早期变化预测新冠肺炎临床结局的研究

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目的: 探究新冠肺炎患者初诊胸部 CT 影像学变化情况对该患者临床结局的影响, 以期建立一种能够预测新冠肺炎预后的影像学评估工具。

方法: 回顾性分析 2022 年 12 月至 2023 年 3 月于福建省立医院、福建省立金山医院住院治疗的新新冠肺炎患者, 所有患者在入院时、入院 72 小时及痊愈后 6 月行胸部 CT 平扫, 同时监测患者痊愈后 6 月肺功能、血气分析以及标准 6 分钟步行实验。统计学分析肺部 CT 早期变化与痊愈后肺功能情况的关系。

结果: 共纳入 100 例确诊新冠肺炎患者, 其中 20 例早期无明显影像学变化; 80 例患者出现早期病变进展。依据胸部 CT 影像学早期进展情况, 将其赋值为 1-5 分。早期基线分值越高, 患者出现 ARDS、呼吸衰竭、循环衰竭的概率 ($P < 0.05$) 越高, 痊愈后残余肺功能越差 ($P < 0.05$), 此外, 患者若同时合并肺部肿瘤、高龄 (> 75 岁)、糖尿病等, 其术后肺功能水平往往低下。

结论: 新冠肺炎患者初诊早期出现影像学进展与痊愈后残余肺功能密切相关

PO-3489

就诊于肝病门诊的罕见职业病: 肝脏血管肉瘤一例

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原发性肝血管肉瘤 (primary hepatic angiosarcoma, PHA) 是一种罕见的源自肝窦内皮细胞的高度恶性且进展迅速的间充质肿瘤, 在原发性肝恶性肿瘤中的占比不到 1%, 人群分布特征多好发于 60-

70 岁, 其中男性更多发, 为女性发病者的四倍。原发性肝血管瘤、上皮样血管内皮瘤、恶性血管外皮细胞瘤和婴儿血管内皮瘤都归属于原发性肝恶性血管瘤家族, 其中 PHA 的预后最好, 即便如此由于早期患者无明显症状或非特异性腹部体征, 多数为偶然发现, 且由于其进展迅速, 如未经治疗, 这种癌症的中位生存期 < 6 个月, 大多数患者在诊断后一年内死亡, 所以早期诊断至关重要。从组织学层面, 不同于继发性肝脏血管瘤的 MYC 基因扩增, 原发性血管瘤更多可能是由于端粒选择性延长导致的 α -地中海贫血/智力迟钝综合征 x 连锁蛋白(α -thalassemia/mental retardation syndrome X-linked protein, ATRX)的表达缺失。而与这一改变相关的已知环境致癌物包括有氯乙烯、二氧化钍和砷。我们报告了一例长期供职于纺织厂的 52 岁女患, 既往肝脏血管瘤切除史, 无肝炎病毒感染史, 体检发现谷丙转氨酶 (162U/L) 及谷草转氨酶 (110U/L) 升高, CT 平扫表现为多发类圆形低密度影, 增强表现为门脉期及延迟期的渐进性填充, 门静脉及下腔静脉受压移位, 后于我院行肝脏局部切除术, 病理证实免疫组化检查显示肿瘤细胞特征 CD31、CD34 和 Ki-67 染色阳性。诚然, 对于原发性血管瘤的定性诊断依赖于病理学检查, 但由于其血管源性, 常在穿刺时有不可控的出血, 危险性较大, 所以影像学的精确诊断至关重要。此外, 对于无肝炎病史, 长期氯乙烯接触史的患者, 如在影像表现为巨大肿块和/或多发结节病灶, 增强检查表现为持续渐进强化的改变, 应高度考虑肝脏血管瘤的可能。有效结合临床症状、影像学、实验室检查等进行综合分析, 更有利于准确判断病情, 及时手术联合放化疗更有利于患者生存期的延长。

PO-3490

胰腺侵袭性纤维瘤病例报告及文献复习

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目的 胰腺侵袭性纤维瘤是一种相对罕见、局部侵袭性、非转移性的软组织肿瘤, 容易误诊。本研究探讨胰腺侵袭性纤维瘤的临床及影像特点。**方法** 回顾性分析 10 例经术后病理证实为胰腺侵袭性纤维瘤的 CT 增强资料及相关临床数据, 并汇总复习 30 例既往文献报道的病例。**结果** 在本研究收集的 10 例患者中病灶大小从 2.3×1.6cm 至 18.4×11.5cm 之间不等。4 例病灶位于胰腺体尾部, 4 例位于胰头部, 2 例位于胰腺钩突部。5 例病灶呈囊实混合性, 3 例为实性, 2 例为囊性。其中 7 例表现为侵袭性生长, 2 例表现为边界尚清的肿块, 1 例仅表现为十二指肠降段的不均匀增厚, 胰腺占位表现不明显。CT 增强扫描 9 例患者呈轻-中度不均匀强化, 1 例病灶未见明显强化。其中 5 例病灶侵及脾静脉, 致脾门及胃周多发侧支循环形成。2 例病灶侵犯肠系膜上静脉。手术后随访 9 例患者无肿瘤复发, 1 例随访丢失是否存在肿瘤复发不详。在文献复习的 30 例患者中, 病灶大小从 1.5cm 至 23×15cm。10 例病灶出现在胰头部, 10 例病灶出现在胰尾部, 6 例在胰腺体尾部, 2 例出现在胰体部, 1 例出现在胰体、颈部, 1 例呈胰腺弥漫性病灶。17 例患者在文献报道前的随访中病情稳定没有复发, 12 例患者后继是否复发不详, 1 例出现病情复发。40 例患者资料综合分析, 胰腺侵袭性纤维瘤确诊时的男女之比为 2.3:1 (男性占比为 70.0%), 平均年龄为 39.46 岁 (范围在 0.2-72 岁), 平均肿瘤大小约 7.9cm (范围约 1.5cm-23cm), 病灶多发出现在胰尾部 (统计包含胰体尾部) 约占 53%, 术后随访结果肿瘤无复发率为 65.0%。**结论** 本研究通过对收集病例及文献报告病例的影像及临床资料汇总分析, 进一步加深了对胰腺侵袭性纤维瘤的认识, 为胰腺侵袭性纤维瘤病的影像诊断和临床治疗提供参考。

PO-3491

ASL 在脑梗死早期诊断及治疗风险评估中临床应用

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随着中国人口的老龄化,脑梗死具有高发生率、高死亡率和高致残率,是目前威胁人类健康的重大疾病。其早期精准诊断及治疗研究是临床研究的热点。影像诊断及治疗评估是确保临床诊治的重要举措。ASL 这项临床适用影像技术给临床带来了曙光,尤其是应用 ASL 技术为早期诊断脑梗死、评估半暗带及溶栓治疗的风险进行了有益探索。

PO-3492

基于深度学习的大鼠脑创伤半暗带的自动分割研究

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创伤半暗带是脑创伤后一段时间内,位于创伤核心周围的区域。创伤核心完全坏死,无研究价值,而半暗带对患者预后和生活质量至关重要。利用深度学习的医学图像分割技术,特别结合多模态 MRI 影像中的 DWI、SWI,对大鼠脑创伤半暗带进行精准分割。相较于人工提取,该方法速度更快、准确性更高,可极大缩短处理时间,对脑创伤的临床治疗具有重要意义。

本文共获取了 146 张大鼠脑部创伤图像,其中包括 73 张 DWI 模态和 73 张 SWI 模态。DWI 模态主要呈现创伤核心区和创伤半暗带过渡区的信息,而 SWI 模态仅显示创伤核心区的信息。利用 UNet++ 网络模型分别对 DWI 和 SWI 两种模态的图像进行了分割。使用重叠度量方法对分割后的 DWI 创伤区和 SWI 创伤核心区进行了分析,以获取两个标签区域的不重叠部分,即创伤半暗带区域。采用了交叉联合度量 (IOU) 和 Dice 相似系数 (DSC) 作为评价指标,以评估分割结果的准确性。

研究表明,UNet++ 网络模型预测的半暗带结果与原始的半暗带结果相似度较高,没有明显的细小错误分割。经过计算后得出平均交叉联合度量 (IOU) 为 0.69,平均 Dice 相似系数 (DSC) 高达 0.82。这说明 UNet++ 网络模型对大鼠脑创伤半暗带的分割具有高度的稳定性和准确性。

UNet++ 网络模型在分割半暗带时能够较好地捕捉到半暗带的特征,解决了脑创伤半暗带分割的精度和效率等问题,在创伤半暗带提取的领域上有了新的进展,同时也可可为医生提供重要的诊断信息。

PO-3493

CT 总严重程度评分联合检验指标对肝硬化患者 SARS-CoV-2 感染患者预后的研究

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宁波大学医学院附属第一医院

目的 分析肝硬化人群在感染严重急性呼吸综合征冠状病毒 2 (severe acute respiratory syndrome coronavirus 2, SARS-CoV-2) 的预后,并对影响其预后的因素进行分析。方法 收集 2022 年 12 月 7 日至 2023 年 2 月 10 日在宁波市医疗中心李惠利医院、宁波大学附属第一医院确诊的冠状病毒病 (coronavirus disease 2019, COVID-19) 患者 80 例 (肝硬化患者 40 例,非肝硬化患者 40 例) 的

临床症状或体征、实验室和放射学结果相关数据, 分析其与 COVID-19 预后的关联。结果 在感染 SARS-CoV-2 后, 肝硬化患者相对于非肝硬化患者预后更差, 这可能与皮下脂肪厚度、AST、淋巴细胞计数、D-二聚体等因素有关。肝硬化患者 ALT、AST 越高, 住院天数越长, 两者存在中等及强相关性, 相关系数分别为 0.581、0.668。肝硬化患者 COVID-19 临床分型中型与重型、中型与危重型之间总严重程度评分 (TSS) 的差异均有统计学意义 ($P>0.025$, $P<0.000$), 而随着肝硬化患者 COVID-19 临床分型递增, 其住院天数存在升高的趋势, 但无统计学意义 ($P>0.05$)。结论 ALT、AST、TSS 评分、临床分型是肝硬化 COVID-19 患者重症化的高危因素和预测、预后重要因素。

PO-3494

外周血嗜酸性粒细胞：放射科医师鉴别儿童胸肺型并殖吸虫病与结核性胸膜炎的重要参考

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2. 临沧市人民医院

摘要：目的：探讨胸部 CT 征象联合外周血嗜酸性粒细胞百分比对鉴别儿童胸肺型并殖吸虫病与结核性胸膜炎的价值。方法：回顾性收集昆明市第三人民医院及临沧市人民医院 2019 年 1 月至 2023 年 4 月首次确诊的儿童胸肺型并殖吸虫病患者及结核性胸膜炎患者，其中儿童胸肺型并殖吸虫患者（吸虫组）69 例，结核性胸膜炎患者（结核组）89 例。分析其临床症状、胸部 CT 影像学表现及实验室检查结果；利用二元 logistic 回归建立 CT 征象的影像模型和结合 CT 征象与嗜酸性粒细胞的联合模型，计算及对比两个诊断模型的鉴别诊断效能。结果：利用 CT 征象建立影像模型，通过绘制受试者工作特征曲线（ROC），曲线下面积（AUC）为 0.856（95%CI: 0.799~0.913），敏感度为 66.7%，特异度为 88.9%。利用 CT 征象和嗜酸性粒细胞百分比建立联合模型，通过绘制 ROC 曲线，AUC 为 0.950（95%CI: 0.919~0.980），敏感度为 89.9%，特异度为 90.1%。联合模型鉴别诊断效能高于影像模型，其 AUC 差异具有统计学意义。结论：对于儿童胸肺型并殖吸虫病与结核性胸膜炎的鉴别，联合模型鉴别诊断效能高于影像模型；胸部 CT 无肺部结节、出现隧道征、外周血嗜酸性粒细胞百分比升高更倾向诊断儿童胸肺型并殖吸虫病。

PO-3495

基于 ReHo 颅外多器官结核患者的脑功能研究

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目的：颅内结核是致死率、致残率最高的结核病，即便是 CT 及 MR 技术有了极大发展，颅内结核的早期诊断也有很大困难。颅外多器官结核作为并发颅内结核的高风险人群，探索颅内多器官结核患者脑功能的改变可能对早期诊断颅内结核有重要参考价值。本研究旨在通过局部一致性（regional homogeneity, ReHo）的分析，探索颅外多器官结核患者在常规频段（0.01-0.08Hz）和两个子频段（slow-4 频段：0.027-0.073Hz 和 slow-5 频段：0.01-0.027Hz）的自发性神经活动的变化。

方法：32 例颅外多器官结核患者和 31 名健康对照组通过静息状态功能磁共振成像（resting-state functional magnetic resonance imaging, rs-fMRI）的方法来探索异常自发性神经活动，在常规频段（0.01-0.08Hz）和两个子频段（slow-4 频段：0.027-0.073Hz, slow-5 频段：0.01-0.027Hz）进行 ReHo 分析。

结果:与健康对照组相比,颅外多器官结核患者在常规波段(0.01-0.08Hz)左侧中央后回和左侧小脑上脑 ReHo 值降低。相反,右侧枕中回的 ReHo 值增加。在 slow-4 频段(0.027-0.073Hz),颅外多器官结核患者仅表现出小脑上叶 ReHo 值降低。在 slow-5 频段(0.01-0.027Hz),颅外多器官结核患者右侧中央后回和左侧小脑上叶 ReHo 值降低。颅外多器官结核患者在常规波段(0.01-0.08Hz)左侧中央后回的 ReHo 值以及 slow-5 频段(0.01-0.027Hz)右侧中央后回的 ReHo 值和部分神经心理学测试得分呈正相关。

结论:颅外多器官结核患者相比于健康对照组确实存在脑功能的变化,中央后回的 ReHo 值的减低可能与疼痛有关,枕中回 ReHo 值增加可能与潜在的视力障碍和补偿机制有关,小脑 ReHo 值的减低也可能与认知有关。颅外多器官结核患者的差异脑区具有频段特异性。中央后回局部一致性变化与认知功能有关。

PO-3496

MRI 表现为椎体内弥漫分布结节的脊柱结核 3 例

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本文报道 3 例 MRI 表现为椎体内弥漫分布结节的脊柱结核患者,病例 1 为 68 岁女性,病例 2 为 80 岁女性,病例 3 为 22 岁男性,3 例患者均存在免疫抑制状态,其中病例 1 为细胞免疫功能低下,病例 2 合并糖尿病,病例 3 合并肾病综合征,长期服用激素治疗,3 例患者均合并急性或亚急性血行播散型肺结核、颅内结核及其他肺外结核,病例 1 及病例 2 痰或脑脊液结核分枝杆菌培养阳性,病例 3 病原学阴性。3 例患者脊柱 X 线片及 CT 均无骨质破坏表现,MRI 表现为累及椎体及附件内弥漫分布、大小基本相似的等 T1WI 低或稍高 T2WI 信号影,脂肪抑制序列为高信号,增强 T1WI 以上结节明显强化。1 例患者经过腰椎穿刺活检提示慢性肉芽肿性炎,2 例患者经过抗结核治疗后复查脊柱病变明显减少。3 例患者中,1 例死亡。椎体内弥漫分布结节为脊柱结核十分罕见的 MRI 表现,既往未见报道,推测可能为结核血行播散的表现,诊疗过程中需要鉴别多发性骨髓瘤。

PO-3497

新冠急性后综合征患者频率依赖性内在大脑活动模式

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目的:新冠急性后综合征 (PACS) 的症状持续并复杂多样,其潜在的神经学基础尚未被完全理解。本研究的目的旨在探索 PACS 大脑内源性活动模式及其与临床症状的关系。

方法:本研究招募了 29 名 PACS 患者、28 名新冠急性症状消失后的非 PACS 受试者以及 30 名管控放开政策前招募的健康对照 (HC)。所有新冠受试者均接受了核酸检测、MRI 和神经心理评估,HC 均无核酸阳性史。所有 MRI 数据在 DPABI 7.0 进行预处理。在典型频段(0.01-0.10 Hz),我们使用基于体素水平的低频波动振幅 (fALFF) 来表征三组之间的内在活动的区域模式。同时在 slow 5 (0.01-0.023 Hz) 和 slow 4 (0.023-0.073 Hz) 亚频段探讨 fALFF 模式的差异。此外,在经典频段,使用受试者特征曲线 (ROC) 来评价不同的 fALFF 的模式对 PACS 和非 PACS 的诊断效能。使用偏相关或者斯皮尔曼相关来探讨 fALFF 变化和临床量表的关系。

结果:在经典频段中,与 HC 相比,PACS 组和非 PACS 组 fALFF 在双侧楔前叶存在相同的下降模式;而右小脑后部和左侧楔前叶 fALFF 下降仅出现在 PACS 组,左小脑后叶、左侧额上回和双侧楔前叶 fALFF 下降仅出现在非 PACS 组。进一步亚频段的分析发现,在 slow 5 频段,PACS 患者和非 PACS 患者分别在左后扣带回/楔前叶和双侧楔前叶的 fALFF 下降。在 slow 4 频段,PACS 组和非 PACS 组分别在左后扣带回/楔前叶和双侧楔前叶的 fALFF 下降。

非 PACS 组在左额上回表现出 fALFF 下降的模式。ROC 分析表明,经典频段的双侧楔前叶和右小脑后叶的独特 fALFF 模式可以区分 PACS 和非 PACS 患者 (AUC: 0.74, 0.66)。相关分析发现,在新冠患者中,共同下降的脑区 fALFF 与总体认知相关 ($r=0.207$; $P=0.037$), PACS 组右小脑后叶 fALFF 与疲劳评分相关 ($r=0.415$; $P=0.025$)。

总论: PACS 和非 PACS 存在共同的 fALFF 下降脑区 (双侧楔前叶), 其与新冠患者的总体认知相关, 而仅在 PACS 患者下降的右侧小脑后叶 fALFF 值与疲劳有关。此外, 新冠患者的 fALFF 模式受频率的影响

PO-3498

肝包虫病影像学诊断专家共识

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包虫病是呈全球性分布的人畜共患性疾病, 已成为严重危害全世界公共卫生健康的问题。影像学技术在肝包虫病的早期诊断、术前评价及疗效监测方面发挥着至关重要的作用。目前包虫病影像诊断缺乏统一共识, 不利于影像专业人员学习培训以及临床对于包虫病的规范诊断与治疗, 为此由首都医科大学附属北京佑安医院和新疆医科大学第一附属医院联合多家医院的感染与炎症放射学专家, 在充分学习国际指南、文献以及国内外最新研究成果的基础上, 结合循证医学对建立指南及标准的方法学要求, 针对肝包虫病影像学诊断依据、诊断原则、诊断标准和鉴别诊断形成共识, 为临床医师在肝包虫病影像学临床应用中提供明确的诊断依据。

PO-3499

HIV 相关腮腺良性淋巴上皮囊肿影像学表现

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目的 探讨 HIV 相关腮腺良性淋巴上皮囊肿影像学表现及特点。方法 回顾性分析经手术和病理证实的 1 例 HIV 相关腮腺良性淋巴上皮囊肿临床及影像资料, 结合相关文献分析其影像特点。结果 患者女性, 68 岁。双侧腮腺轻度肿大一年, 发现 HIV 抗体阳性 1 月, 予 TDF 联合艾博韦泰抗病毒 1 个月。艾滋病病毒 RNA HIV-RNA2.83E+03IU/ml, CD4+ 513 个/ul。查体颈部及右耳后可触及数个肿大淋巴结, 黄豆大小, 无压痛, 活动度可, 无黏连。CT 平扫+增强扫描: 双侧腮腺轻度肿大, 右侧腮腺 55mm*43mm*38mm, 平扫密度不均匀, 见直径约 18mm*15mm 类圆形低密度影, 增强后见环形壁强化, 内容物无强化。左侧腮腺 50mm*39mm*31mm, 密度均匀未见异常强化。超声所见: 双侧腮腺体积肿大, 包膜完整、回声欠均匀, 内见数个 5-9mm 淋巴结样低回声。右侧腮腺见约 21mm*15mm 低回声结节, 内部回声不均匀, CDFI 未见异常血流信号。在全麻下行右侧腮腺部分切除术+面神经探查术+颈部淋巴结清扫术。术后病理: 考虑 HIV 相关腮腺良性淋巴上皮囊肿; 右颈部淋巴结符合艾滋病相关淋巴结病 (滤泡消失期, 3 期)。结论 HIV 相关腮腺良性淋巴上皮囊肿非常罕见, 但可作为 HIV 感染初期标志性病变, 可产生容貌畸形, 对患者心理造成严重影响。当感染 HIV 但尚未治疗时可发生腮腺肿大和良性淋巴上皮囊肿。影像学检查对诊断 HIV 相关腮腺良性淋巴上皮囊肿有重要价值, 但尚需与淋巴管畸形、鳃裂囊肿、干燥综合征、淋巴瘤、Warthin 肿瘤等鉴别, 确诊需结合病理。治疗包括抗逆转录病毒药物治疗、定期复查、手术切除、反复抽吸、硬化治疗、放疗等。

PO-3500

新型冠状病毒肺炎患者脑血流改变相关的基因表达：一项结合神经影像和转录的研究

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目的：大量研究发现新型冠状病毒肺炎（COVID-19）是一种与遗传密切相关的疾病，并且神经影像研究发现 COVID-19 患者存在脑血流量（CBF）的降低，但是这种脑血流改变与基因表达之间的关系尚不清楚。因此，本研究的目的是探索 COVID-19 患者脑血流相关的基因表达机制。

方法：在 2023 年 1 月到 4 月，本研究前瞻性的收集了 51 名 COVID-19 患者和 30 名健康对照组（HC）进行磁共振扫描，使用两样本 T 检验进行组间比较得到 CBF 的差异 T 值图。之后，结合艾伦人类脑图谱数据集（<http://www.brain-map.org>）进行转录-神经成像空间关联分析，在进行严格的多重比较校正和空间自相关校正之后，找出与 COVID-19 的 CBF 变化相关的基因，并将这些基因集在 COVID-19 相关的门户网站（<http://geneontology.org/covid-19.html>）进行一系列功能注释、富集分析和组织、细胞类型特异性表达分析。

结果：研究发现 COVID-19 患者在左侧额上回、额中回、额下回和辅助运动区的 CBF 减少（GRF 校正，体素水平设为 $P < 0.001$ ，簇水平设为 $P < 0.01$ ）。此外，这些 CBF 的变化与 2918 个基因的表达在空间上相关，进一步富集和特异性细胞类型分析显示，这些 COVID-19 基因集与冠状病毒感染高度相关，并富集在 COVID-19 相关的重要分子功能（电子转移、核糖体和蛋白质的结合）、生物过程（有丝分裂调节、囊泡组装和细胞质翻译）中富集并且表达增加，同时，这些基因在成人脑皮层的脑组织和神经元细胞中特异性表达。

结论：研究结果表明，在 COVID-19 患者中存在脑血流灌注的下降，这可能是与该疾病相关的多个基因共同作用的结果。

PO-3501

获得性免疫缺陷综合征合并弓形虫脑病的临床特征及影像表现

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目的：探讨获得性免疫缺陷综合征(AIDS)合并弓形虫脑病的临床及影像特征，以及随访治疗后的影像表现，为临床诊治提供参考。

方法：收集 2021 年 8 月至 2022 年 8 月本院 25 例 AIDS 合并弓形虫脑病患者临床资料，总结其临床特征、影像表现及治疗后资料，回顾性分析 AIDS 合并弓形虫脑病的影像表现及鉴别诊断。

结果：临床症状以发热、头痛、肢体活动障碍常见，头颅 MRI 提示 95.5% 患者呈多发病灶，多见于顶叶、颞叶、额叶，T1WI 呈等或低信号，T2WI 呈等或高信号，增强后提示 73.5% 呈环形强化灶，58.2% 呈结节状强化灶，79.5% 周围可见水肿带。经过抗弓形虫治疗后 2 个月，15 例患者可见病变明显吸收，周围水肿消退；7 例半年后患者仍然有少量病变残留；一年后 3 例患者 MRI 随访基本恢复正常，但依然可见病变残留。

结论：弓形虫脑病为 AIDS 患者常见的中枢神经系统病变，临床状无特异性，影像学有一定的特征性：好发 CD4 细胞计数较低的患者，弓形虫抗体 IgG 可作为辅助诊断依据，脑脊液检无特异性，临床抗弓形虫治疗疗效好。

PO-3502

基于 MRI 多 b 值直方图阵列及卷积神经网络预测乳腺癌溶骨性转移化疗疗效

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目的 旨在建立一种深度学习方法,通过分析整合基线多 b 值扩散加权成像 (DWI) 数据预测乳腺癌溶骨性转移化疗疗效。方法 纳入 36 例乳腺癌溶骨性骨转移患者,共 191 个病灶,于化疗前及疗后 6 个月行 MRI 常规序列和 DWI 序列扫描,根据肿瘤疗效情况分为疾病无进展组和疾病进展组。由两位影像科医师手工勾画病灶范围,将基线 MRI 的每一个转移瘤区域的不同 b 值 DWI 信号转换为直方图并纵向拼接,构建、训练及验证卷积神经网络。通过 ROI 提取多 b 值参数,包括 ADC, D, D*, α 及 DDC。通过绘制受试者工作特性 (ROC) 曲线比较直方图阵列及各多 b 值 DWI 参数的在预测转移瘤的效能。结果 应用基线 MRI 多 b 值的卷积神经网络预测乳腺癌化疗疗效的 ROC 曲线下面积 (AUC=0.764) 最大, ADC 值与 D 值预测乳腺癌化疗疗效的 AUCs 值分别为 0.7616 与 0.603。基于基线 MRI 多 b 值的卷积神经网络预测乳腺癌化疗疗效的效能高于 ADC 值与 D 值 (P 值分别为?)。结论 应用基线 MRI 多 b 值卷积神经网络的深度学习在预测乳腺癌溶骨性骨转移化疗疗效有一定的临床应用价值。

PO-3503

群组管理模式结合视频立体化健康教育对冠状动脉 CT 血管成像患者的影响

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目的: 探讨群组管理护理模式结合视频立体化健康教育对冠状动脉 CT 血管成像患者应激反应及检查效果的影响。方法: 选取 2019 年 8 月~2021 年 6 月间至我院行冠状动脉 CT 血管成像 178 例患者为研究对象,根据随机数值表法将 178 例患者随机分为对照组与观察组,每组各 89 例,对照组患者给予临床常规模式干预,观察组患者实施群组管理模式结合视频立体化健康教育,对比两组患者的检查认知水平、应激反应、检查效果、心理韧性。结果: 经过两组患者统计数值对比,观察组患者的疾病检查认知水平为 94.38%较对照组 83.14%高,两组数据比较差异具有统计学意义 ($P=0.018$, $\chi^2=5.633$); 在检查前,两组患者的 SAS 及 SDS 评分均较教育前降低,且观察组评分均较对照组低 ($P<0.001$, $t=7.360$; $P<0.001$, $t=5.664$), 在检查时,两组患者的收缩压、舒张压、心率均有所上升,但对照组较观察组上升明显 ($P<0.001$, $t=6.100$; $P<0.001$, $t=3.806$; $P<0.001$, $t=6.923$); 观察组患者的检查时长均较对照组短 ($P<0.001$, $t=7.900$); 观察组的一次性检查通过率为 95.50%较对照组 85.39%高,两组数据对比具有统计学意义 ($P=0.022$, $t=5.268$), 观察组患者与对照组患者的成像质量相比,观察组患者的成像质量均较对照组高 ($P=0.042$, $z=-4.298$), 两组患者的检查行为比较,观察组患者微笑、安静的例数均高于对照组,皱眉、躲避的例数低于对照组,具有统计学意义。经过两组患者统计数值对比,观察组在心理坚韧、自强、乐观积极及总分均较对照组高,两组数据对比具有统计学意义。结论: 将群组管理护理模式结合视频立体化健康教育应用于冠状动脉 CT 血管成像患者,可提高患者的心理韧性及检查认知水平,降低患者的心生应激反应,确保临床检查效果。

PO-3504

心理护理和放松训练对磁共振检查中幽闭恐惧症患者的改善

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【摘要】目的：研究心理护理和放松训练运用到磁共振检查中对幽闭恐惧症的效果，观察患者幽闭恐惧症的改善情况，探讨心理护理和放松训练的临床价值。**材料：**本次实验通过筛选 2021 年 1 月至 2022 年 1 月在本院进行磁共振检查的 74 例患者作为实验观察对象，患者均患有幽闭恐惧症，患者的临床病例资料完整。随机分为常规组和观察组，每组患者各 37 人。其中常规组患者采取常规的护理措施，观察组患者在磁共振检查过程中给予心理护理和放松训练。使用 POMS 量表对比两组患者的情绪状态评分，使用 HAMA/HAMD 汉密尔顿焦虑/抑郁量表评估患者的负性情绪，对比两组患者的检查时间长短以及检查时的依从性，对比磁共振检查图像结果的满意度，观察患者的生命体征变化，如心率、收缩压、舒张压以及呼吸频率。统计检查中不良反应的发生率。**结果：**护理干预前两组患者的 POMS 评分无较大差异 ($P>0.05$)，实验干预后，观察组患者的 POMS 量表各项评分均低于常规组患者，实验对比有统计学差异 ($P<0.05$)。护理干预前两组患者的负性情绪评分无较大差异 ($P>0.05$)，实验干预后，观察组患者的负性情绪评分均低于常规组患者，实验对比有统计学差异 ($P<0.05$)。对比两组患者的检查时间，观察组患者的检查时间少于常规组患者的检查时间，实验对比有统计学差异 ($P<0.05$)。护理前两组患者的检查依从性均较差，($P>0.05$)，护理干预后观察组患者的依从性评分高于常规组患者，($P<0.05$)。观察组患者的磁共振图像满意度为 91.89% (34/37)，常规组患者的磁共振图像满意度为 78.38% (29/37)，观察组患者的满意度高于常规组患者，实验对比有统计学差异 ($P<0.05$)。对比生命体征，护理干预后观察组患者的心率、血压以及呼吸频率均低于常规组患者，($P<0.05$)

PO-3505

预防性护理在钆贝葡胺造影剂上腹部增强 MRI 检查中的应用分析

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探究患者在进行上腹部增强 MRI 检查时应用钆贝葡胺造影剂的过程中进行预防性护理的干预效果和临床价值进行调查分析，并针对性的进行相关的预防措施，加强防护，减少不良反应的发生。方法：在 2022 年 1 月-2022 年 12 月的时间，选取我院各科室的 100 名需要进行钆贝葡胺造影剂上腹部增强 MRI 检查的患者作为研究对象，对研究对象进行调查、研究，将所有患者随机分为两组，对患者在磁共振检查时应用钆贝葡胺造影剂的过程中可能出现的不良反应调查，并进行相关的干预措施，减少患者的不适和不良反应的发生情况，观察组患者进行预防性护理干预，对照组患者进行常规护理干预，在患者进行钆贝葡胺造影剂上腹部增强 MRI 检查过程中，记录患者的检查所需时间和所得图像质量，记录患者产生的不良反应，应用焦虑自评量表 (SAS)、抑郁自评量表 (SDS) 评估患者的焦虑、抑郁情绪，将两组数据进行分析比较，绘制成表格，比较两种护理方法在钆贝葡胺造影剂上腹部增强 MRI 检查中的干预效果，总结出有效的护理方法，减少患者在检查过程中的不适，减少不良反应的发生几率。**结果：**通过本次调查研究，对钆贝葡胺造影剂上腹部增强 MRI 检查的患者进行预防性护理干预和常规护理干预，发现进行预防性护理的患者检查用时明显缩短、图像质量较高、患者产生的不良反应较少、检查期间患者的焦虑抑郁情况较少，临床效果更好。**结论：**在钆贝葡胺造影剂上腹部增强 MRI 检查过程中，患者由于缺乏对检查过程的了解，加上疾病的影响，可能会产生各种焦虑、抑郁的负性情绪，配合度较差，使得得出的图像质量不高，影响到疾病的诊断、治疗，需要进行一定的护理干预，提高患者的配合度，提高图像质量，在患者接受钆

贝葡胺造影剂上腹部增强 MRI 检查过程中进行预防性护理干预, 能明显缩短检查时间, 得出的图像质量较高, 也能减轻患者的不良反应, 患者在检查期间焦虑、抑郁等情况产生较少, 临床应用价值较高, 值得推广使用。

PO-3506

“00 后”本科护理实习生职业认同感的调查与分析

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【目 的】调查“00 后”实习护生职业认知情况, 分析影响职业认同感因素, 为改善临床带教方法和高校人才培养方法提供参考。【方 法】使用方便抽样法, 抽取昆明市昆明医科大学第一附属医院本科实习生 200 人进行研究, 护生在医院进行为期 10 个月的临床护理实习, 采用刘玲等编制的护士职业认可表进行问卷调查, 采用 SPSS26.0 统计软件进行数据分析。【结 果】1. 实习护生的职业认同现状: 实习护生职业认同得分平均分是 96.98 分, 维度得分平均分从高到低是职业社会支持 (3.29 ± 0.70)、职业社交技能 (3.28 ± 0.70)、职业认同认知评价 (3.22 ± 0.68)、职业自我反思 (3.19 ± 0.73)、应对职业挫折 (3.16 ± 0.74)。2. 实习护生职业认同水平的多因素分析进行多元线性回归分析: 把职业认同共感总分作为原因变量, 对实习护生职业认同共感水平得分总体影响具有统计学意义的因素作为自变量。F=38.894, $P < 0.001$, 方程显著, 说明影响实习护生职业认同情况的因素是对护理专业的态度、实习医院的满意与否、毕业后的就业去向、是不是独生子女。【结 论】“00 后”本科实习护生的职业认同感在一个中间段。影响实习护生职业认同情况的因素有对护理专业的态度、实习医院满意与否、毕业后的就业去向、是不是为独生子女。

PO-3507

膀胱 Mp-MRI 膀胱充盈度与患者舒适度的双优护技医协同流程研究

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摘要: 目的 探究膀胱多参数磁共振成像 (mp-MRI) 最佳膀胱充盈度、最优患者舒适度的双优护技医协同流程的最佳膀胱准备方案。方法 选取 2020 年 9 月-2022 年 9 月期间于昆明医科大学第一附属医院申请盆腔 mp-MRI 检查的患者 120 例, 采用随机数字表法, 将其分为 A 组、B 组、C 组及 D 组, 各 30 例。A 组检查前 2 h 排尿后禁水禁尿; B 组检查前 2 h 排尿后禁尿, 并饮温开水 500 mL; C 组检查前 1 h 排尿后禁尿, 并饮温开水 500 mL; D 组患者检查前 1 h 排尿后禁水禁尿。检测患者膀胱容积并计算膀胱变化量, 采用 Likert 4 评分法评估患者膀胱扩张状态, 记录检查过程中患者运动伪影出现情况, 并评估患者检查舒适度。结果: 与 A 组比较, B 组膀胱容积变化量增加 ($P < 0.05$); 与 B 组比较, C 组膀胱容积变化量减少 ($P < 0.05$); 与 C 组比较, D 组膀胱容积变化量减少。与 A 组比较, B 组 Likert 评分增加 ($P < 0.05$), 与 B 组比较, C 组 Likert 评分降低 ($P < 0.05$), 与 C 组比较, D 组膀胱 Likert 评分降低 ($P < 0.05$)。A 组、B 组、C 组、D 组分别出现运动伪影者 1 例、2 例、1 例及 0 例, 4 组运动伪影发生率比较, 差异无统计学意义 ($P > 0.05$)。与 B 组比较, C 组重度不适人数占比减少 ($P < 0.05$)。结论: 在护理、技师、医师共同配合下, 采用检查前 1 h 排尿, 随即饮温开水 500 mL 后禁尿的准备方案, 获得最佳膀胱充盈度与患者舒适度的双优目标。

PO-3508

肺穿室护士规范化培训考核评价指标体系的构建与应用

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目的 构建科学合理的肺穿室护士规范化培训考核评价指标体系，探讨该体系临床实践效果。方法 建立肺穿室护士规范化培训考核评价模型，运用文献分析法、德尔菲（Delphi）专家咨询法结合柯氏评估模型等构建肺穿室护士规范化培训考核评价指标体系。运用自行设计调查问卷和检查表，调查评价肺穿护士 3 个月规范化培训考核不同阶段的效果。结果 评价指标体系构建中，德尔菲法 2 轮专家积极系数分别为 98.3%和 100%，权威系数为 0.82，协调系数分别为 0.889 和 0.847。构建的肺穿室护士规范化培训考核评价指标体系，包括 3 项一级指标(培训前评估、培训过程评估、培训后评估)、7 项二级指标、23 项三级指标。对肺穿室护士评价结果显示，肺穿护士培训考核效果综合评分为 90.28 分。结论 构建肺穿室护士规范化培训考核评价指标体系具有科学性、实用性、可操作性，对护理管理者深入了解培训成效、提升培训质量具有重要意义。

PO-3509

藏族患者 CT 增强碘对比剂过敏反应高危因素的研究

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目的：探讨藏族患者 CT 增强碘对比剂过敏反应的高危因素。**方法：**选取我院放射科 2021 年 12 月至 2022 年 11 月接受 CT 增强后发生过敏反应的住院藏族患者，同时纳入严格按照年龄、性别、对比剂类型（厂家及浓度相同）及患者来源（均为住院藏族患者）进行 1：1 配对的无过敏反应对照组患者。。。。。。见附件

PO-3510

6S 管理在医学影像科护理质量控制中的应用效果

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目的精准医疗，技术先行，精准诊断，影像先行。医学影像科是医疗服务中至关重要的一环，质量控制对于确保准确的影像诊断和患者安全至关重要。然而，由于工作流程繁琐，影像科护理管理是一项关键且复杂的任务，需要高度的组织和协调能力。而 6S 管理作为一种系统化的方法，强调整理、整顿、清扫、清洁、标准化和素养六个方面的要素。本研究的目的是探究将 6S 管理方法引入影像科护理管理中，以提高管理效能和服务质量。

方法 1.1 方法

本研究采用实地观察、问卷调查和数据分析等方法。首先，通过实地观察医学影像科的质量控制流程和工作环境，确定适用于该领域的 6S 管理原则。其次，设计问卷调查，了解医学影像科护理人员对 6S 管理的认知、看法和体验。最后，收集相关数据并进行统计分析，评估 6S 管理在医学影像科护理质量控制中的应用效果。

结果研究结果显示，引入 6S 管理方法后，医学影像科护理质量控制取得了显著的改善。通过整理和整顿工作区域，减少了杂乱和混乱的现象，提高了工作效率和准确性。通过定期清扫和清洁，减少了污染和感染的风险，提升了患者护理质量。通过制定标准化的工作流程和操作规范，提高了质

量控制的一致性和准确性。通过培养员工的自律和责任感,巩固了 6S 管理的效果,并形成了良好的质量控制习惯。此外,通过培养员工的自律和责任感,增强了团队合作和沟通,提升了工作氛围和员工满意度。

结论本研究的结果表明,6S 管理在医学影像科护理质量控制中具有显著的应用效果。通过减少浪费、提高效率和准确性,6S 管理为医学影像科护理质量控制提供了可行的解决方案。医疗机构应重视护理质量控制的重要性,积极推行 6S 管理方法,并根据实际情况进行适度的调整和优化。进一步研究可以探索和验证 6S 管理方法在其他医疗领域质量控制中的应用,以促进医疗质量的不断提升和改进。

PO-3511

探讨儿童在磁共振检查中的心理分析及护理干预效果

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摘要:在儿童接受核磁共振成像(MRI)检查的过程中,他们对检查环境和室内设备等因素非常不熟悉和敏感。特别是当儿童面对穿着白色衣服的医务人员时,再加上设备噪音的影响,他们会经历不同程度的焦虑和紧张。儿童通常出现哭泣,不配合检查,导致扫描照片中出现伪影,严重影响检查结果。因此,在临床实践中加强对儿童进行磁共振成像检查的护理干预具有重要意义。

MRI是临床疾病诊断最有效的检查方法之一,但MRI的检查时间相对较长,而环境幽闭恐惧症、高分贝噪声等许多因素都是儿童的负刺激源。儿童可能会感到紧张和害怕,所以他们可能会哭泣、抗拒和不配合检查。这些医疗恐惧进一步降低了儿童对医疗护理的依从性;传统的固定化方法依赖于药物治疗,但这种方法可能会增加儿童的疼痛。在服药后在入睡和醒来方面存在显著的个体差异,醒来后可能出现头重脚轻的状态。因此,实施护理干预措施是非常必要的。实施护理干预需要了解患者焦虑、恐惧、哭泣等不良反应的原因,这些不良反应实际上是由患者的心理因素引起的;研究表明,焦虑是一种内心紧张和不安,一种难以应对的不愉快情绪,仿佛不利情况即将发生,以及患者对疾病造成的伤害的情绪反应。患者的负面情绪和行为可通过中枢神经系统影响内分泌和循环系统,导致呼吸频率、心率和恐惧程度的增加,从而影响检查的顺利进行。

PO-3512

思维导图式护理干预在静脉血栓介入溶栓治疗中的应用效果

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目的 分析思维导图式护理干预在静脉血栓介入溶栓治疗中的应用效果。方法 选取我院收治的 90 静脉血栓介入溶栓治疗患者作为研究对象,随机分为对照组(45 例,常规护理)和观察组(45 例,思维导图式护理干预)。比较两组心理状态、溶栓效果、并发症发生情况、生活质量和舒适度的变化。结果 两组干预后负面情绪得分较干预前均有改善,且观察组改善程度更为明显($P<0.05$);观察组的溶栓效果 I 级率明显高于对照组,差异具有统计学意义($P<0.05$);观察组的并发症总发生率为 6.67%,明显低于对照组的 28.89%,差异具有统计学意义($P<0.05$);观察组的生活质量各项评分和舒适度评分均明显高于对照组,差异具有统计学意义($P<0.05$)。结论 思维导图式护理干预在静脉血栓介入溶栓治疗中的应用效果显著,能够改善负面情绪,提高溶栓效果,降低并发症发生风险,保证治疗的安全性,对于提高患者生活质量和舒适度具有积极意义。

PO-3513

黑白世界

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《黑白世界》这首歌是改编自《少年》，歌词是围绕放射科医生技师护理团队在日常工作中的协作配合，充分体现了影像的人文关怀。

此处，“黑白世界”有多重含义。一是当人生病之后，生病之人甚至是一个家庭都瞬间陷入了黑暗世界，生活的缤纷色彩失去了快乐的健康色彩。二是放射科的胶片世界本身就是“黑白”的世界，我们每天的工作都是在“黑白世界”里面追踪病魔在我们身体留下的痕迹。“黑白世界”也反衬了人文世界的美好，我们不能因为生病失去生活的意义，在生病的旅途中，有一个个值得支撑他们克服磨难的强大力量。正是因为如此，才使得我们的工作充满意义，才能让我们更加尊重生命，敬畏生命。视频配合《黑白世界》歌词，抒写了我们影像人的工作日常。正如歌词所言：影像的世界不止黑白，还有我温柔色彩。相信陪在你身边的我们，走入黑白世界不退却。

PO-3514

建立专科质量指标在碘对比剂外渗管理中的运行效果观察

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目的：探讨专科质量指标在 CT 增强静脉注射碘对比剂外渗管理中的建立与运行效果。

方法：成立持续质量改进小组，制定专科质量指标，包括结构指标、过程指标、结果指标。调查 2022 年 5 月至 8 月 12667 例 CT 增强患者，使用 CT 增强登记表、外渗登记表作为调查工具，调查内容为患者的一般资料、注射部位、流速、留置针固定正确率、碘对比剂外渗发生率、患者随访率、患者宣教知晓率、患者满意度等相关情况，调查结果显示，患者宣教知晓率 42.2%，外渗高危风险评估率 53.2%，留置针固定正确率 75.21%，外渗处理规范率 51.7%，外渗随访率 92.2%，外渗发生率 0.7%，患者满意度 83.25%。对比 2022 年 11 月至 2023 年 2 月 CT 增强患者 11969 例，基于专科质量指标，采取碘对比剂外渗标准化管理七大策略：1 预约知情，宣教前移 2 全面评估，筛查高危 3 精准穿刺，无缝交接 4 安全注射，全程监护 5 留院观察，规范处理 6 动态随访，延续护理 7 全员培训，专人上报。

结果：患者宣教知晓率上升至 95.8%，外渗高危风险评估率上升至 100%，留置针固定正确率上升至 100%，外渗处理规范率上升至 97.2%，外渗患者随访率上升至 100%，外渗发生率下降至 0.09%，患者满意度上升至 98.27%。

结论：基于专科质量指标的碘对比剂外渗管理策略，质控小组分工明确，各岗位精细化管理、权责明晰、各环节精准衔接、实现全流程质量管理。其优势具体表现在以下几方面：

1 有效降低碘对比剂外渗率；2 有效控制外渗程度；3 缩短外渗水肿消退时间；4 延续护理充分保障患者安全。因此，在静脉输注碘对比剂护理管理中，以碘对比剂静脉外渗质量管理为主线，以专科护理质量指标为支撑，以碘对比剂外渗的风险因素为抓手，以各环节风险预控方案为举措，全力保障静脉输注碘对比剂的患者安全。

PO-3515

呼吸训练联合分阶段心理干预对磁共振普美显动态增强扫描患者的影响

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摘要:目的: 探讨呼吸训练联合分阶段心理干预对磁共振普美显动态增强扫描患者的影响。方法: 选取我院 2022 年 8 月-2022 年 10 月拟行磁共振普美显动态增强的 68 例患者, 按照随机数字表法分为观察组和对照组各 34 例。对照组实施常规护理。观察组实施呼吸训练, 联合分阶段心理干预。对比两组患者检查时间、负性情绪、图像质量及检查配合度的情况。结果: 两组患者检查前准备时间无统计学差异 ($p>0.05$), 观察组检查操作时间短于对照组 ($p<0.05$)。检查前两组患者焦虑自评量表和抑郁自评量表评分无统计学差异 ($P>0.05$)。检查结束后, 观察组焦虑抑郁评分均低于对照组 ($p<0.05$)。观察组图像质量、患者检查配合度均高于对照组 ($p<0.05$)。结论: 通过呼吸训练与分阶段心理干预能够有效缓解患者紧张焦虑负性情绪, 提升检查配合度, 提高磁共振普美显动态增强的检查效率, 并获得更为清晰的图像, 有助于提升诊断准确性。

PO-3516

放射科护理风险管理的应用效果研究

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目的: 分析评价放射科护理风险管理方法在患者护理方面的应用效果。方法: 本次纳入研究的 48 例放射科患者, 纳入时间为我院 2019 年 1 月-12 月。其中, 男性 28 例、女性 20 例; 平均年龄为 (56.82 ± 1.21) 岁。均知情签署相关护理干预同意书, 满足放射科相关收治条件, 排除严重精神障碍、临床资料不全及不配合本次实验者。放射科内部及时成立护理风险管理小组, 小组组长由放射科主任担任, 做好小组成员 (护师、责任护士、助理护士等) 统筹管理、任务分配工作, 加强小组成员护理能力培训, 结合患者相关病情、放射诊疗需求等, 制定并落实有针对性的护理风险管理计划方案: 风险因素识别干预、个体风险评估干预、健全警示标识系统、应急干预、心理干预。对患者放射科检查期间不良事件发生率进行分析、计算。同时根据我院放射科护理满意度调查问卷, 将患者对护理服务的满意程度分为: 满意 (90-100 分)、基本满意 (60-89 分)、不满意 (0-59 分); 总满意度为满意、基本满意两项满意度之和。通过统计学软件 SPSS23.0 对数据进行统计分析。结果: 本次 48 例患者, 在放射科检查期间, 出现跌倒 1 例、护理差错 1 例、护患纠纷 1 例, 总发生率为 6.25%。在护理满意情况方面, 48 例患者, 满意 32 例、基本满意 12 例、不满意 4 例, 总满意度为 91.67%。结论: 针对放射科患者, 采取护理风险管理干预方法, 可减少不良事件发生率, 提高患者对护理服务的满意程度。

PO-3517

经左右肘正中静脉注射对比剂对冠状动脉 CTA 图像质量影响

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目的 探讨分别经左右肘正中静脉注射对比剂对冠状动脉 CT 造影 (Coronary computed tomography angiography, CCTA) 图像质量的影响。方法 回顾性分析 2020 年 8 月-10 月于我院

行 CCTA 检查的患者资料。根据对比剂注射部位不同分为右肘正中静脉注射组和左肘正中静脉注射组, 采用独立样本 χ^2 检验评估组间差异; 两名经验丰富的放射科医师分别分析 CCTA 图像, 并对图像质量进行评分, KAPPA 一致性检验评估两名医师评分的一致性。测量冠脉的增强值、测量左头臂静脉横跨头臂动脉或主动脉弓前方与胸骨柄后缘间隙的前后径线 (简称径线), 计算冠脉图像的噪声比及对比噪声比, 采用独立样本 t 检验进行统计学分析。结果 最终纳入 400 例患者, 其中右肘正中静脉注射组 203 例、左肘正中静脉注射组 197 例, 两名医师对右手注射组评分一致性 ($K=0.538$, $P<0.001$) 优于左手注射组 ($K=0.259$, $P=0.014$), 右手注射组成像效果好者比例大于左手注射组, 两组患者的冠脉的强化值、径线值、噪声比和对比噪声比均未见明显统计学差异 (t 分别为: -0.701 、 -0.562 、 0.162 、 0.012 、 -0.969 , P 均 >0.05)。结论 在行 CCTA 检查过程中, 如患者条件允许, 应尽可能选择经右手背注射对比剂。

PO-3518

清单式管理在多学科联合行经导管主动脉瓣置换术中的护理体会

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目的 应用清单式管理在多学科联合经导管主动脉瓣瓣膜置换术的护理体会。**方法** 选取 2022 年 1 月至 2023 年 6 月行经皮主动脉瓣膜置换术 20 例作为研究对象, 将清单式管理的干预方法进行分析, 总结经导管主动脉瓣瓣膜置换术中的护理体会。**结果** 主动脉瓣瓣膜植入的成功率达到 100%, 术中发生心跳呼吸骤停 1 例, 通过严密的术前准备及对症治疗, 使得患者抢救成功。**结论** 通过清单式管理在多学科联合行经导管主动脉瓣置换术中落实术前的准备工作, 能够保证手术进展更加顺利, 在术后, 密切关注患者的并发症发生情况, 可及时采取预防措施, 提升治愈率, 同时提高患者满意度, 值得推广。

PO-3519

导管室介入手术健康教育科普模式实践研究与创新探索

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目的 探讨介入手术健康教育科普模式在导管室的实践研究与创新探索。**方法** 通过知网、万方、维普等平台以“介入治疗”、“介入手术”、“健康教育”、“医学科普”等作为关键词检索相关文献资料, 对介入治疗患者健康教育形式、内容进行整理、归纳和总结。**结果** 基于在导管室行介入治疗患者的健康教育需求, 通过“互联网+科普”等新媒体与传统媒体结合的手段, 构建一套“术前-术中-术后”全流程介入手术健康教育科普模式对提高患者对介入治疗健康教育的认知、促进手术康复具有重要作用。**结论** 全流程管理的介入手术健康教育科普模式不仅能使患者在手术前充分认识介入治疗优势、手术中知晓手术过程及配合要点、减轻手术时恐惧焦虑心理, 积极参与配合治疗; 手术后掌握相关注意事项、了解居家管理健康教育知识, 形成一套全流程的健康教育知识获取的体系及途径, 而且还可提高自我管理水平, 改善就医体验及提升满意度。

PO-3520

心脏介入导管室护理人员分阶段岗位胜任力提升探讨

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目的：探讨心脏介入导管室护理人员分阶段岗位胜任力提升。方法：将 2021 年 10 名临床一线护理人员实施传统培训模式作为培训前，将 2022 年同一批护理人员实施以岗位胜任力为导向的护理人员分阶段岗位培训模式作为培训后；比较培训前后分阶段岗位胜任力各维度、理论考核总成绩、护士岗位胜任能力、护士满意度。结果：培训后，各分阶段岗位理论考核总成绩、岗位胜任能力评分、护理人员满意度均高于培训前($P<0.05$, $P<0.01$)。结论：以岗位胜任力为导向的护理人员分阶段岗位培训模式，可提高各分阶段岗位理论考核总成绩、护士岗位胜任能力及护士满意度。

PO-3521

危重患儿磁共振检查最佳镇静水平动态评估的相关性研究

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目的：近年来磁共振检查由于其在中枢神经系统等方面具有独特的优势，在危重患儿疾病诊断方面起到了重要作用。对于不能配合磁共振检查的危重患儿镇静必不可少，镇静可以在一定程度上减少患儿的焦虑及应激反应，但由于危重患儿病情变化迅速且隐秘，临床上常出现镇静过度或镇静不足的情况。镇静过度可能会导致呼吸、循环功能受到抑制，延长机械通气时间、延缓患儿病情恢复；镇静不足可能会导致患儿产生应激反应。本研究通过对患儿进行动态评估和实时监测，以保证患儿达到磁共振检查最佳镇静水平。

方法：通过收集需要做磁共振检查危重患儿儿童 116 名，其中男 56 名，女 60 名。随机分为两组，其中一组常规镇静检查，另一组采用舒适量表 (Comfort Scale, CS) 对患儿分别在检查前，检查中及检查后对患儿进行评分，通过评分对镇静动态调整。对比两组磁共振检查成功率，磁共振检查平均时间及不良反应发生率。

结果：两组磁共振检查成功率，磁共振检查平均时间及不良反应发生率

差异有统计学意义 (均 $P<0.05$)。

结论：危重患儿磁共振检查最佳镇静水平动态评估对患儿镇静效果评价效能良好，可有效提高磁共振检查成功率，缩短磁共振检查平均时间及降低不良反应发生率。

PO-3522

CT 增强检查留置针软管部份断裂、打折并嵌入肌肉内 1 列报道

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随着影像技术的不断提高，CT 增强检查成为多种疾病诊断与预后评估的重要辅助检查之一。检查中需利用高压注射器，将碘对比剂通过静脉注入，才能更精准显示病灶。因高压注射对比剂速度快、压力大，对检查者血管选择和留置针要求较高，需放射科专门的耐高压留置针穿刺准备。留置针又称套管针，因其套管柔软，不易刺破血管壁，可降低对比剂外渗率，是影像增强检查中穿刺准备首选。但临床中留置针静脉穿刺，常凭个人经验、个人手感，无同质性，穿刺水平参差不齐，常引发一些问题。留置针软管断裂、残留血管内的病例偶有报道，然留置针软管部份断裂、打折并嵌入肌肉

内无法拔出的却极少报道。2023 年 7 月 7 日我科在给 1 例神经内科病人做 CT 增强检查穿刺准备工作时, 发生了留置针软管部份断裂、打折并嵌入肌肉内无法拔出现象。现将报道如下。

PO-3523

探讨音乐疗法改善老年核磁共振检查患者焦虑的效果

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背景:磁共振成像目前在中国的大量医院中用于有效诊断患者的病情, 这对患者的检查和治疗具有非常积极的影响。MRI 需要患者固定在相对较小的空间内, 并且许多老年患者在第一次被放置在这样小而暗的空间内时容易紧张、激动和焦虑, 经常导致无法继续检查, 在检查过程中停止检查, 甚至导致严重的不良事件, 例如窒息。音乐是传递信息的一种特殊方式, 它调节机体的生理变化, 从而在患者的头脑中唤起愉快的联想。本研究将运用现象学方法探讨音乐疗法在改善中国江西省一所三级医院接受核磁共振检查的老年患者焦虑方面的有效性。

目的:一项探索使用音乐疗法改善接受 MRI 检查的老年患者焦虑的研究。

方法:本研究将采用现象学方法, 通过焦点小组对该人群进行探索性研究。招募将通过海报活动进行, 本次研究将招募 10 名参与者。我们将使用腾讯会议应用程序或线下面对面交流, 对参与者进行 10 分钟的半结构化采访。数据分析将包括音频记录, 转录, 编码和初步分析, 以及审查, 以确定最终主题。舒适理论将指导这项研究, 而社会建构主义解释框架将指导方法设计。

结论:音乐疗法能显著降低老年患者接受磁共振检查时的焦虑情绪, 有利于检查顺利进行, 改善图像质量, 提高检查成功率

PO-3524

耐高压 PICC 导管在胸部肿瘤患者增强 CT 检查中的应用效果评价

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目的 探讨耐高压 PICC 导管在胸部肿瘤患者增强 CT 检查中应用效果。

方法 选取自 2021 年 1 月至 2023 年 1 月在贵州医科大学附属肿瘤医院已完成耐高压 PICC 置管的胸部肿瘤患者, 且需要行增强 CT 检查的 60 例, 将其中纳入观察组。而对照组患者采用经外周静脉耐高压留置针注入造影剂的胸部肿瘤患者行增强 CT 检查。比较两组胸部肿瘤患者行增强 CT 检查时的静脉通路安全性, 护理不良事件造影剂外渗的发生率, 静脉穿刺的次数, 患者的费用支出, 图像质量, 包块总体和肺血管显影、心脏显影、伪影情况。

结果 观察组静脉通路安全性, 护理不良事件造影剂外渗的发生率 (0 vs1.6%)

静脉穿刺的次数 (0 vs1.16), 患者的静脉通路费用支出 [(4±2)元/次 vs. (14.5±2.41)元/次,] 均低于对照组。图像质量在两组评价中, 观察组总体和肺血管显影、心脏显影高于常规组, 伪影显示低于观察组。

结论 在耐高压 PICC 导管在胸部肿瘤患者增强 CT 检查中静脉通路安全, 能降低护理不良事件造影剂外渗的发生率, 减少护理静脉穿刺的次数, 减少患者的费用支出。图像质量优质, 值得临床应用。

PO-3525

CT 增强检查前患者饮食准备现状调查分析

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目的: 最新指南明确指出不推荐普通 CECT 检查前禁食, 该更新从循证的角度为 CT 增强检查前的护理准备提供了框架和指引, 但并未对特殊患者饮食准备进行论述, 难以应用于放射实践。因此本调查旨在了解我院 CT 增强患者检查前饮食准备的管理现状, 评估当前实践现状与指南的差距, 为检查前饮食准备的科学管理提供依据。

方法: 采用便利抽样法通过自行设计的调查问卷对 2022 年 9 月-2022 年 12 月在我院行 CT 增强的患者进行面对面结构化访谈, 评估其饮食准备实施现状。分类数据以数字和百分比表示。结果: 本研究共纳入 210 例 CT 增强患者, 其中男 113 例, 女 97 例, 年龄 23-85 (59.1±11.6) 岁, 头颈胸四肢 CT 增强检查 119 例, 腹部 CT 增强检查 70 例, 冠状动脉和大血管 CT 增强检查 64 例, 所有患者均未发生碘对比剂不良反应。调查患者中有 25.7% (54/210) 为高血压患者, 14.8% (31/210) 为糖尿病患者。有 49% (103/210) 患者需要常规用药, 其中 31% (32/103) 检查当天未服药。所有患者中位禁食时间 4(2, 12.5)h; 27.8% (58/210) 患者检查前禁食时间超过 10h, 28% (59/210) 患者隔夜禁食。检查前有 4.3% (9/210) 患者诉胃部不适, 1% (2/210) 患者诉恶心, 2.9% (6/210) 患者诉头晕, 2.9% (6/210) 患者诉虚汗, 4.3% (9/210) 患者诉疲劳, 25.7% (54/210) 患者诉饥饿, 4.8% (10/210) 患者出现焦虑。

结论: CT 检查前饮食准备管理现状不容乐观, 需统一制定并强制推行规范的饮食准备管理方案; 加强临床医护培训, 改变传统的饮食准备习惯; 加强对患者的健康宣教, 提高患者依从性。

PO-3526

基于多学科的整体护理联合积极心理学干预在癫痫患者 PET-MRI 检查中的应用

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目的: 探讨基于多学科的整体护理联合积极心理学干预在癫痫患者 PET-MRI 检查中的应用。方法: 78 例 PET-MRI 检查的癫痫患者随机分为对照组 (n=39) 和观察组 (n=39), 分别给予常规干预及在对常规干预基础上实施基于多学科的整体护理联合积极心理学干预, 比较两组干预前后的焦虑自评量表 (SAS)、抑郁自评量表 (SDS) 评分, 医学应对方式问卷 (MCMQ) 评分, 候诊时间和检查时间、图像合格率、检查依从性。结果: 干预前两组患者 SAS、SDS、MCMQ 各量表评分差异无统计学意义 ($P>0.05$), 干预后观察组患者 SAS、SDS、MCMQ 评分优于对照组 ($P<0.05$); 观察组候诊时间、检查时间短于对照组 ($P<0.05$), 检查依从度和图像合格率高高于对照组 ($P<0.05$); 观察组不良情况发生率低于对照组 ($P<0.05$)。结论: 基于多学科的整体护理联合积极心理学干预缓解 PET-MRI 检查癫痫患者的焦虑抑郁情绪, 建立积极应对方式, 提高检查成功率。

PO-3527

静脉注射非离子型碘对比剂对 血流动力学影响的临床特征研究（专题讲座）

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专题讲座内容主要内容：研究背景：（1）临床实践中遇到的护理问题：前期临床观察中发现 12 例重度 ICM-AARs 中 60 岁以上的有 7 人，其中合并有高血压等心血管基础疾病的患者有 6 人，占 85.71%。常规增强患者伴 2-3 级高血压，需要血压控制吗？控制与不控制安全性如何？急性缺血性脑卒中、主动脉夹层伴极高血压注射 ICM 风险有多大？临床对于 3-4 级心功能不全患者静脉输液需严格控制速率和剂量。而 ICM 采用高压、短时间内快速注射 3-6ml/s，注射 ICM 有风险吗？风险有多大？这些患者高压注射 NICM 是否有血流动力学变化，其临床特征如何？患者是否存在安全风险？（2）国内外研究现状：CT 增强检查中 NICM 本身理化性质与注射方式可能导致血流动力学改变；高血压及心血管疾病高压 NICM 可能存在的血流动力学变化；NICM 与血流动力学变化的相关文献报道分析等（3）介绍研究内容及方法：从研究对象、研究设计、实验步骤、数据收集、质量控制方法、结果、结论等方面进行分享。

PO-3528

淡化碘对比剂风险告知对急性生理性不良反应的影响

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目的：增强 CT 或 CTA 扫描前，淡化告知患者及家属碘对比剂注射的潜在风险并探讨其对碘对比剂急性生理性不良反应（后简称急性不良反应，acute adverse reactions, ARR）的影响。

方法：前瞻性收集 2018 年 8 月 16 日至 2019 年 12 月 16 日因增强 CT 或 CTA 扫描注射碘对比剂的患者，排除标准为（共 7662 例）：未成年、急诊状态、肾功能受损、因各种原因注射中断、ARR 仅表现为单纯荨麻疹的患者及原有疾病导致的类似症状。最终纳入 51478 例有效病例。所有患者根据网络预约或线下预约分为淡化组 and 传统组。淡化组要求患者或家属自行阅读并签署知情同意书，传统组由影像护士对同样的知情同意书进行一一讲解后签署。知情同意书内容包括：碘对比剂介绍、潜在的不良反应和并发症、禁忌症、高危因素、检查准备和注意事项等。检查结束后，要求患者留观 30 分钟直到没有不适才离开。比较两组患者 ARR 的差异、知情告知所花费时间，计数资料采用卡方检验或分层卡方检验，计量资料采用独立样本 t 检验， $P < 0.05$ 认为有统计学差异。

结果：淡化组有效病例 21406 例，ARR 39 例（0.18%），传统组 30478 例，ARR 91 例（0.30%）， $P = 0.009$ ；淡化组使用碘帕醇 370 的 ARR 发生率（0.18%）明显低于传统组（0.53%）， $P = 0.022$ ，其余对比剂两组之间无统计学差异（ $P > 0.05$ ）；淡化组风险告知所需时间（ 20.50 ± 4.60 s）明显少于传统组（ 142.36 ± 8.38 s），且可节约 2 人/天护士。

结论：淡化碘对比剂风险告知可减少碘对比剂相关急性生理不良反应，大大节约人力资源，在保障患者安全的同时获得较高的经济效益，值得推广。

PO-3529

IMB 模型在学龄前儿童行磁共振检查中的应用

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目的 探讨基于 I M B 模型的健康教育提高学龄前患儿及其家属行磁共振检查的知信行水平, 促其顺利完成检查。方法 将 300 例磁共振检查学龄前患儿随机分为对照组(150 例)和观察组(150 例)。对照组行常规健康教育, 观察组在此基础上实施以 IMB 模型为基础的健康教育。比较干预前、干预后患儿及家属行磁共振检查知信行评分、焦虑评分。结果 对照组 150 例、观察组 150 例完成本次研究, 两组干预后患儿及家属行磁共振检查知信行得分, 焦虑得分的组间效应、时间效应及交互效应差异有统计学意义(均 $P<0.01$)。结论 以 IMB 模型为基础的学龄前患儿及其家属行磁共振检查的健康教育能提高患儿及家属知信行水平, 使患儿顺利完成磁共振检查。

PO-3530

精细化护理在幽闭恐惧症患者磁共振检查中的应用效果

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精细化护理在幽闭恐惧症患者磁共振检查中的应用效果

目的 探讨精细化护理在幽闭恐惧症患者磁共振检查中的应用效果。方法 选取 2023 年 1 月至 2023 年 6 月在我院行磁共振检查的 68 例患者作为研究对象, 按随机数字表法将其分为观察组和对照组, 两组患者均行磁共振检查, 对照组给予常规护理, 检查前告知患者磁共振检查注意事项; 观察组在对照组基础上实施精细化护理, 告知患者磁共振检查注意事项, 检查大约需要用的时间, 调大机器照明灯及排风扇, 安排家属陪检, 告知磁共振检查会产生一些噪音, 但有耳机以及防噪音耳塞, 可耐受, 提前做好心理疏导。比较两组检查成功率, 观察组更能顺利地地完成磁共振检查, 扫描图像品质比较高。结果 观察组患者整体护理干预后总有效率为 82.3%(28/34)明显高于对照组的 29.4%(10/34), 组间比较差异有统计学意义($P<0.05$)。结论 对行磁共振检查的幽闭恐惧症患者实施精细化护理能有效的增加患者的配合度, 可以明显提高检查成功率, 提升患者及家属的护理满意度, 取得了很好的临床效果, 为疾病的诊断提供有力证据, 值得临床应用。

PO-3531

核医学放射护理现状分析与改进策略研究

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目的: 核医学作为一项利用放射性物质进行诊断和治疗的医学分支, 其日常放射护理的重要性日益凸显。本研究旨在深入探究核医学放射护理的现状、问题与改进方案, 以期提升医护人员和患者的安全保障, 优化诊疗过程。方法: 本研究首先根据国家放射防护标准通过文献回顾和现场调查, 全面了解国内外核医学放射护理的标准流程和常见问题。此外, 设立了两组对照试验, 一组实施现有的放射护理措施, 另一组实施优化后的新方案, 以比较其在放射剂量控制、安全防护和患者满意度等方面的效果。结果: 研究发现, 虽然大部分核医学机构均有放射护理规范, 但在实际操作中仍存在一些不足, 如个别环节的放射防护不严密, 部分设备老化、人员培训不足等。通过对照试验, 新方案在减少放射暴露、提高工作效率和患者满意度方面均表现出较好的效果 ($P<0.05$)。新方案

结合了最新的放射防护理念和技术,如更合理的工作流程设计、更先进的防护设备和更精细的个体化护理。结论:核医学日常放射护理作为确保患者和医护人员安全的重要环节,其现有的实践中仍有改进空间。通过本研究提出并验证了一套全面的改进方案,证明了其在提高放射防护水平和工作效率方面的有效性。然而,推广新方案还需考虑到各机构的特殊情况和实际需求,确保方案的灵活性和可操作性。未来的工作应进一步完善和推广改进方案,促进核医学放射护理的标准化和现代化,为核医学的健康发展和广泛应用提供坚实支撑。

PO-3532

碘造影剂(ICM)致过敏反应的临床特点及危险因素

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摘要:目的:探讨碘造影剂(ICM)致过敏反应的临床特点及危险因素。方法:该回顾性研究纳入了2020年8月至2022年7月期间在我院接受静脉注射ICM(碘帕醇、碘海醇、碘克沙醇、碘普罗胺、碘佛醇)进行对比增强计算机断层扫描(CT)的所有患者。回顾了发生过敏反应的患者的病历,并使用广义估计方程的多变量回归模型来消除患者内相关性的影响。结果:在124162次ICM实施中(男性71518例,占57.6%,女性52644例;年龄,中位数为61岁)至69240例患者,113例不同患者中有113次发生过敏反应(占给药次数的0.06%,占总人数的0.16%),从临床记录可以确定,ICM引起的过敏反应均发生在30min内。78例(69%)没有不良反应的危险因素,包括35例(31%)曾使用引起过敏反应的ICM。68例(60%)患者有ICM使用史,无任何不良反应。10例(8.9%)患者在用药前接受口服类固醇治疗。各ICM的过敏反应发生率依次为:碘普罗胺(0.08%)、碘帕醇(0.03%)、碘海醇(0.02%)、碘佛醇(0.01%)和碘克沙醇(0.007%)。多变量回归分析发现,与其他四种ICMs相比,使用碘普罗胺更有可能导致过敏反应(以碘克沙醇多作为参考,碘普罗胺的OR为6.4[95%CI: 2.6-16.1], $p < 0.001$)。ICM致过敏反应OR在患者年龄、性别或用药前均无显著差异。结论:ICM致过敏反应的总体发生率很低。超过一半的病例没有不良反应的危险因素,而且在过去的ICM使用中也没有不良反应,尽管ICM类型与较高的OR相关。

PO-3533

多模式教学法在静脉穿刺基地教学中的应用

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目的:探究放射诊断科静脉穿刺基地新护士教学中采用多模式教学法的效果及意义。方法:选择2022年1月-12月在我科静脉穿刺基地轮转的96名新护士为研究对象,随机分为对照组和观察组,每组48名新护士,对照组采用传统手把手授课教学法,观察组实施了量化培训标准,采用多模式教学法(即手把手教学法结合情景剧教学法及静脉穿刺手臂模型教学法),对两组新护士对教学方式满意度及一次性静脉穿刺成功率(一针见血,无后退)进行比较。结果:观察组新护士对教学方式满意度及一次性静脉穿刺成功率均显著高于对照组,差异有统计学意义($P < 0.05$)。结论:静脉穿刺基地新护士带教中采用多模式教学法可有效提高新护士静脉穿刺水平,减轻了患者的疼痛,同时增加了放射诊断科增强检查患者高压团注的成功率,赢得了患者对护理工作的信任,提高了医院在群众中的威信。因此,该种教学模式在静脉穿刺基地新护士教学中值得推广。

PO-3534

应用低张等渗甘露醇在小肠增强 CT 检查前规范化准备对图像质量的效果评价

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目的：探讨应用低张等渗甘露醇在小肠增强 CT 检查前规范化准备对图像质量的效果评价。

方法：前瞻性随机选取我院 2021 年 6 月-2023 年 6 月行小肠增强 CT 患者共 100 例，按照护理检查流程分为 A、B 两组，各 50 人，A 组为常规肠道准备，B 组为应用低张等渗甘露醇进行准备。两组患者进行增强 CT 检查后，统计检查成功率，再由两面高年资主治医师分别对两组图像采用双盲法进行主观质量评分并进行统计，评分标准采用 5 分制，Kappa 检验验证评分一致性，一致性不同时引入第三名医生进行评分。

结果：两组患者在年龄、身高、体重、性别、病程、心率等临床指标中均无显著差异 ($P>0.05$)。B 组患者均顺利完成检查，患者配合良好，检查成功率为 100%，A 组检查成功率为 90%。在 CT 图像质量的评分中，A 组平均得分为 4.05 ± 1.06 分，B 组为 4.65 ± 1.10 分，B 组图像质量显著高于 A 组。

结论：应用低张等渗甘露醇，为小肠增强患者实施规范化的护理流程可以显著提高 CT 的图像质量及诊断评价。

PO-3535

医疗失效模式与效应分析模型在 MRI 检查患者金属异物去除中的应用

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目的 探讨医疗失效模式和效应分析(FMEA)模型的质控管理措施在 MRI 检查患者金属异物去除中的应用效果。方法 选取 2023 年 1 月至 2023 年 8 月某三甲医院的 52435 例 MRI 检查患者为观察组(实施基于 FMEA 模型的质控管理措施后)，选取 2022 年 1 月至 2022 年 8 月某三甲医院的 46402 例患者为对照组(实施基于 FMEA 模型的质控管理措施前)。比较两组患者的金属异物去除情况、图像质量情况及其对医院 MRI 工作人员的满意度。结果 观察组患者的金属异物去除率为 99.95%，明显高于对照组的 92%，差异均有统计学意义($P<0.05$)；观察组患者的甲片率为 98.76%，明显高于对照组的 91.31%，差异有统计学意义($P<0.05$)；观察组患者对医院 MRI 工作人员的满意度为 98.45%，明显高于对照组的 91.75%，差异有统计学意义($P<0.05$)。结论 基于 FMEA 模型的质控管理措施在 MRI 检查患者金属异物去除中的应用能明显提高 MRI 检查中金属异物去除率，减少医院 MRI 安全事故发生，提高图像质量，强有力地保障患者及医院医务人员的生命安全，进一步提高患者对医院 MRI 管理工作的满意度。

PO-3536

低剂量甘露醇在基于压缩感知技术的磁共振小肠成像中的应用

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目的探讨低剂量口服甘露醇溶液对基于压缩感知技术 (Compressed SENSE, CS) 的磁共振小肠造影 (magnetic resonance enteroclysis, MRE) 检查的影响。方法 2022 年 5 月至 2023 年 1 月我院 28 例疑似为小肠疾病的患者均接受基于 CS 的 MRE 检查。由医师决定口服甘露醇剂量, 分为实验组和对照组, 对照组分三次口服 (共 1500ml) (n=14 例), 实验组两次口服 (共 1000ml) (n=14 例), 记录患者不良反应。两观察者对图像质量进行四分法主观评分。计算患者不良反应发生率。Kappa 检验两观察者主观评分的一致性, 若一致性良好, 选择高年资医师主观评分进行后续分析。使用 Wilcoxon 检验对照组和实验组主观评分差异性。结果 28 例患者均已完成 MRE 检查, 两组间图像质量无统计学差异, 但实验组患者发生不良反应发生率较低。结论 低剂量口服甘露醇在基于 CS 的 MRE 检查中应用可行性良好, 可以在保证图像质量的前提下提高患者的舒适度, 值得临床广泛推广使用。

PO-3537

王玉娟一例 EVAR 术后并发胆固醇结晶栓塞的护理与启发

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详见 PPT 胆固醇结晶栓塞 (cholesterol crystal embolism, CCE) 是由于大动脉粥样硬化斑块破裂, 导致其中的胆固醇结晶剥离, 随血流脱落至外周远端血管造成栓塞, 并引起栓塞部位炎症反应和终末靶器官损伤的综合征。在临床工作中, 近 80% 的 CCE 为医源性因素所致, 最常见的诱因包括血管腔内操作及抗凝、溶栓治疗。CCE 常被忽略或被误诊为蓝趾综合征 (blue toe syndrome, BTS)、造影剂肾病等, 一旦延误诊断对患者危害极大, 1 年病死率为 70% ~ 76%, 故对本病的认识及护理至关重要。

PO-3538

多元互动教学模式在碘对比剂实习教学中的应用价值

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目的 探讨多元互动教学模式在医学影像学碘对比剂实习教学中的应用效果, 以提高教学质量。方法 选取 2021 年 4 月~2022 年 4 月在上海交通大学医学院附属第九人民医院放射科临床实习的 62 名学生。采用便利抽样法将其分为对照组和试验组。试验组采取多元互动教学模式, 对照组采用传统教学模式。比较两组学生理论与技能成绩、自主学习能力与教学评价的差异。结果 与采用传统教学模式的对照组相比, 采用多元互动教学模式的试验组学生在理论与技能成绩、自主学习能力等客观评价, 以及学生对教学模式的主观感受评价均显著优于对照组 ($P < 0.001$)。结论 多元互动教学模式可以提高医学影像学的碘对比剂实习教学的教学质量, 加深学生对知识的掌握应用, 并激发学习积极性与自主学习能力, 可在医学生教学中加以推广和应用。

PO-3539

“会呼吸的痛”——1 例哮喘患者的安全救助

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总结 1 例患者做完 CT 增强检查诱发重度哮喘后成功救治的护理经验，现将案例及护理方案分享如下：

案例呈现：患者女性，68 岁，文化程度低、表述不清，怀疑消化道出血，为了进一步明确诊断，拟行胸腹 CT 增强检查。输注碘对比剂 2 分钟后，突发胸闷、呼吸困难、心悸等疑似碘对比剂过敏反应。立即送入抢救室行生命体征监测，P:145 次/分、R:28~32 次/分、BP:170/101mmHg、SPO₂: 85%，采取鼻导管吸氧、0.9%NS 静脉补液、肌注盐酸异丙嗪 25mg、静脉推注 10mg 地塞米松等抗过敏处理后，未见明显缓解，立即改为高浓度面罩吸氧后，SPO₂ 仍下降至 75%，继之呼吸困难加重、口唇发绀，烦躁不安等症状；紧急时刻，护士立即给予沙丁胺醇经口吸入，5 分钟后症状开始缓解，临床医生到科后确诊患者为哮喘急性发作。

原因分析：（1）临床医生申请单无哮喘相关病史描述。（2）患者 36 年哮喘病史，未正规接受治疗，长期反复发作，产生了耐受性，发作后哮喘症状表现并不典型。（3）评估护士经验不足，未提前了解到哮喘病史，对表述有困难患者未与家属及临床医生沟通，评估方面出现漏洞。（4）因个别护士正确的疾病风险预判能力，及时识别哮喘病情变化特点，果断用药控制哮喘症状持续发展，急时、有效对症处理，才使患者转危为安，并于数日后康复出院。

思考与启示（护理方法）：（1）护理质量管理措施：培养护士高度责任心和风险意识，加强业务学习，熟练掌握碘对比剂的适应症、禁忌症，制定哮喘患者应用碘对比剂的标准流程和检查规范。

（2）早期预警风险评估：提前了解哮喘病史、治疗及控制情况，对哮喘症状控制不佳患者尽早实施预防、干预措施。（3）加强心理护理：提前告知患者诱发哮喘后的呼救方式及完善的应急处理措施，缓解焦虑、紧张心理。（4）随时动态观察：实现早识别、早预防、早治疗的护理方案，哮喘发作后能够快速启动应急预案，提高哮喘患者碘对比剂应用的安全性。

PO-3540

基于思维导图指导下预见性护理方案的构建及对行高浓度对比剂 CT 肝脏血管三维成像患者图像质量的影响

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目的：探讨基于思维导图指导下预见性护理方案的构建及对行高浓度对比剂 CT 肝脏血管三维成像患者图像质量的影响。方法：选取我院 2021 年 4 月-2021 年 12 月收治的行高浓度对比剂 CT 肝脏血管三维成像检查的 600 例患者采用数字表法分为 2 组，每组 300 例。对照组使用常规护理干预，研究组构建基于思维导图指导下预见性的护理方案。记录两组患者 CT 肝脏血管三维成像图像质量、护士检查指导满意度评分、焦虑自评量表、抑郁自评量表。结果：研究组 CT 肝脏血管三维成像图像质量优良率为 100.00%，显著高于对照组 98.67% ($\chi^2=4.026$, $P<0.05$)。研究组患者对护士指导态度、护士指导及时、护士指导正确以及总满意度均高于对照组，数据差异具有统计学意义 ($P<0.05$)。干预前，两组患者的 SAS、SDS 评分之间无显著差异 ($P>0.05$)；干预后，两组患者的 SAS、SDS 评分均显著下降 ($P<0.05$)，且研究组 SAS、SDS 评分低于对照组 ($P<0.05$)。结论：通过构建基于思维导图指导下预见性护理方案，将其运用于行高浓度对比剂 CT 肝脏血管三维成像检查患者中，能够有效的提升 CT 检查图像质量，缓解焦虑、抑郁情绪，提升患者对护士检查指导满意度评分，且还能有效的降低对比剂外渗发生率以及碘过敏反应发生率。

PO-3541

护理干预与 5G 互联网医疗流程优化技术对脑卒中 CTA 检查中有效缩短等候时间及提高患者配合度的效果评价

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目的：探讨应用护理干预缩短脑卒中患者 CTA 检查等候时间的效果评价。方法：将 150 例患者随机分为 A、B 两组，A 组为常规护理组，需要通过登记台评估患者禁忌症及生命体征，然后在前往收费室进行缴费，随后二次在登记台登记检查信息后前往到达注射室进行穿刺，穿刺结束后转运至 CT 室，按照相关规程，行 CTA 检查；B 组为护理干预组，在患者到达医院后卒中中心开具 CTA 检查申请单，经过院内 5G 指挥中心协调，进行互联网线上预约，同时 CT 室护士在患者到达前登记信息，CT 室备有卒中穿刺急救箱，患者直接至 CT 室穿刺，穿刺完成立即扫描，充分准备告知家属陪同需要配合的内容并与技师一起制定恰当的扫描方案。结合 A、B 两组患者的检查结果及患者的反馈进行评价。结果：A 组患者配合率为 75.56%，B 组患者的配合优良率为 92.55%，有显著差异 ($P<0.05$)；A 组患者检查成功率为 88.25%，B 组患者检查成功率为 96.51%，有显著差异 ($P<0.05$)；A 组登记至扫描平均时间为 995.69 秒，B 组平均时间为 426.65 秒，有显著差异 ($P<0.05$)，且 B 组较 A 组检查时间缩短 57.15%。

结论：进行护理干预，可以达到最佳配合效果极大程度缩短患者等候时间、为急危重症患者的救治赢取有利时间的目的，5G 互联网医疗流程优化技术可以提前对患者情况进行评估，优化简化患者就诊流程，提升服务品质，两者结合应用值得在临床推广。

PO-3542

高级药物与物理护理干预分别对提高躁动患儿 CT 检查成功率的研究

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目的：研究护理干预对提高躁动患儿 CT 的检查成功率。

方法：选取 200 名行 CT 检查的儿童患者(0~10 岁的儿童)进行护理分组，分为实验组(100 人)和对照组(100 人)。其中实验组在检查前对患儿进行药物护理干预(静脉注射、肌注、口服或直肠给药)及物理护理干预(心理疏导、家属陪同、知识普及)。对照组则依照常规进行检查。

结果：两组生命体征比较均无统计学意义 ($p<0.05$) 实验组完成检查的成功率明显高于对照组(实验组：92.33%，对照组：77.33%) ($p<0.05$) 实验组制动效果和图像质量均优于对照组 ($p<0.05$)。

结论：在患儿 CT 检查过程中实施有效的护理措施是促使检查成功的关键。

PO-3543

介入室医用耗材二级库房 6S 管理模式的实践探讨

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中国人民解放军陆军特色医学中心

目的: 探讨介入室采用 6S 管理模式对新入职、轮转人员及规培生等流动性较大人员对二级库房规范化管理的实践探讨。

方法: 以陆军特色医学中心介入室 2022 年 6 月至 2022 年 12 月 35 名研究对象为实验组, 2023 年 1 月至 2023 年 6 月 35 名研究员为对照组, 观察在不同管理模式下所产生的不同效果。研究内容主要包括两组人员对物品规范化放置率、库房相关管理指标正确率、出入库准确率及对管理模式的满意度。结果: 通过对本次研究所设立观察指标结果统计, 对照组各项指标明显高于实验组, 各项指标统计数据显示结果更好。统计的对照组中对物品规范化放置率明显比实验组高 ($P<0.05$)。在库房相关管理指标正确率方面, 主要包括清理清扫环境耗时、整理物品耗时、物品合理排放评分以及盘点耗时, 各统计数据均显示对照组优于试验组 ($P<0.05$); 在管理模式满意度方面, 显示为对照组高于试验组 ($P<0.05$)。

结论: 在介入室二级库房耗材管理工作中, 采用 6S 管理模式能保证手术用耗材的准确性, 切实提高了耗材的利用度和安全性, 提高管理者工作效率, 有助于提升管理水平, 且能节约成本, 值得推广。

PO-3544

LVIS 支架辅助弹簧圈栓塞治疗颈内动脉瘤的安全性及有效性探讨

张霞

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目的 评价 LVIS 支架辅助弹簧圈栓塞治疗颈内动脉瘤的安全性和有效性。方法 回顾性分析 2020 年 6 月至 2022 年 6 月在陆军特色医学中心接受 LVIS 支架辅助弹簧圈栓塞治疗的 185 例颈内动脉瘤患者临床和影像学资料。重点分析术后即刻和进展性闭塞率、术后并发症及临床随访结果。结果 185 例颈内动脉瘤患者接受 LVIS 支架辅助弹簧圈栓塞治疗均获成功。术后即刻造影显示动脉瘤完全闭塞 183 例(98.9%), 部分闭塞 2 例(1.08%)。术后并发症发生率为 2%, 均为小血栓栓塞事件。162 例患者接受平均(6.7±4.5)个月造影随访, 首次随访造影显示完全闭塞率进展至 96.2% (178 例), 未见迟发性支架内狭窄。动脉瘤复发 1 例(0.54%), 再次接受弹簧圈栓塞后达到完全闭塞。152 例(82.1%)患者临床随访平均(12±6.5)个月, 术后复发率低、恢复快、不良反应小等优点。结论 LVIS 支架辅助弹簧圈栓塞治疗颈内动脉瘤近期安全性和有效性良好, 长远疗效有待进一步随访。

PO-3545

肝癌患者肝动脉化疗栓塞术中疼痛评估及护理策略

陈廷静

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肝动脉化疗栓塞术 (Transarterial chemoembolization, TACE) 是指将化疗药物注入经皮插管至肝癌的供血动脉内, 从而对肝癌供血动脉末梢进行栓塞, 从而阻断肿瘤血供, 对肿瘤细胞发挥最大限度

的杀伤作用,被公认为肝癌非手术治疗最常用方法之一,其疗效已经得到肯定,但这种治疗方式也会引起多种并发症,其中,疼痛是 TACE 最常见的并发症之一。

1、研究目的:通过对行肝动脉化疗栓塞术的患者进行术中疼痛程度评估,分析总结术中疼痛情况,针对疼痛程度给予有效的护理镇痛措施,减轻患者术中疼痛,提高患者舒适度,减轻术中疼痛对疾病治疗效果的影响,对患者进行人文关怀,提高护理工作满意度。

2、研究对象:选择某三甲医院 2022 年 10 月—12 月的 50 例行肝动脉化疗栓塞术的患者。纳入标准:知情同意并自愿参加本研究。年龄大于等于 18 岁以上,无其他基础疾病;术前未使用任何止痛药。排除标准:年龄小于 18 岁,有其他基础疾病及转移性肿瘤;其他引起疼痛的疾病。

3、研究工具:选择术中耗时短、患者能够一目了然的 NRS 疼痛评分量表;设计收集患者基本信息表单。

4、研究方法:根据患者行肝动脉化疗栓塞术中的疼痛发生时间,选择 5 个时间节点:栓塞开始时、栓塞开始后 5 分钟、栓塞开始后 10 分钟、栓塞开始后 15 分钟以及手术结束时(出介入手术间)评估患者疼痛程度,记录患者的疼痛程度以及生命体征是否变化。

5、研究结果针对患者的疼痛情况实施术中护理镇痛措施,比如心理疏导、音乐镇痛、药物镇痛等镇痛护理管理,然后再次进行疼痛评估,对护理镇痛措施效果进行评价。

6、研究结论:观察肝动脉化疗栓塞术中患者疼痛情况,合理采取相应护理镇痛措施减轻患者术中疼痛,并对术中采取的护理镇痛措施效果进行评价,提高了患者人文关怀、舒适度及满意度

PO-3546

多模态教学在放射科在职护士操作培训中的探讨与研究

平自玲

中国人民解放军陆军特色医学中心

目的:通过视、听、图、说;操作教员监督;考核成绩与绩效挂钩等多模态教学手段,提高我科护理操作技能,从而提高护理质量,保证检查治疗的顺利完成。

方法:

1、选出 3-5 位高年资且对操作技术比较熟练的护师作为科室的操作小教员,定期对科室护士进行培训及监考;

2、对于中心进行的操作培训指定操作小教员前去参加学习,并拍摄操作视频;

3、操作小教员学习后,将学习视频发至护理微信群,通知全科护士学习;

4、操作小教员再根据操作视频编辑操作台词及操作流程,一并发至护理微信群;

5、操作小教员对自己所学的操作熟悉后再进行全科操作示范。操作示范均分量批次进行,每次学习都要签到并照相留作资料;

6、学习后自行练习,自己觉得满意后再考试,操作小教员再其他护士练习中及时、耐心纠正不规范的操作,严练考宽;

7、考核成绩与态度适当与绩效挂钩。

8、对我科的 32 名护士在实行多模态教学手段前后进行对比分析。

结果:

2021 年(多模态教学前)医院年终考核中培训前护士们的平均成绩在 75-83 分,平均成绩为(80.32±4.87)分,其中有 3 名未及格,均补考通过。2022 年(多模态教学后)医院年终考核中培训前护士平均成绩为 88-93 分,平均成绩为(91.02±3.26)分,均及格,其中有两人参加医院组织的护理基础操作比赛,并获得三等奖。32 名在在职护士培训后,学习积极性明显提高。对教学态度、教学内容、教学过程、教学引导、教学效果评分较高。

结论:

在多模态教学在放射科在职护士操作培训中,提高了在职护士的主观能动性,激发护士们的学习内在动力,使其更加主动的学习知识,掌握技巧。强烈感官的视觉享受,让护士能够直观的了解操

作流程。台词让整个操作串出一条线,让护士们在操作上不断片,提高了护士的学习效率。陪练指点,能够在操作中监督在职护士的操作细节,使操作更符合护理操作规范。

PO-3547

基于会话分析和信息管理系统构建 医学影像科医技护患和谐沟通模式

段雨

中国人民解放军陆军特色医学中心

目的:随着人类社会的发展及思想的不断进步,社会关系在转型中其各种文化认知受到误解,导致医疗纠纷、医患暴力、职业医闹等问题愈发生升高。当前传统的医患关系受到社会发展浪潮的冲击已开始趋于紧张。从文化交流的视野出发,除了加强医德医风建设、媒体宣传文明就医、加强患者的道德法律素养以外,致力培养医务人员良好的语言沟通能力同样是现代医学模式下医务工作者必备的专业技能。方法:首先通过文献研究及现况调研,总结并提取医技护患者之间的沟通方式、沟通需求、知识差异和认知差异等导致医患沟通困难的四个关键问题;其次结合知识的应用方式,以医患检查流程中的传递内容为基准,提出检查流程可视化、检查需求知识动画、语言表达个性化的三大模块。结果:通过制定了系统、简单、实操性强的医技护患沟通模式,医护人员可简单快捷的评估及传达患者检查前的准备,以及检查时患者的配合需求,缩短患者在影像科检查等候时间,进而提升影像检查服务质量。结论:通过会话分析和信息系统的构建,从医、技、护、患(患者家属)四方面同时入手,极大程度的改善医学影像科医技护患关系现状,促进医技护患四位一体和谐关系的形成。本文经过实践,验证了其可行性,以期制定符合综合医院医技护患沟通技能模块提供参考和借鉴。

PO-3548

研究精细化护理干预模式在介入手术室 经皮穿刺椎体成型术患者中的应用

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目的:研究精细化护理干预模式在介入手术室经皮穿刺椎体成型术患者中的应用效果。方法:选取2022年6月-2023年6月在我院介入医学科接受经皮穿刺椎体成型术患者180例为研究对象,依据入院时间分为对照组(2022年6月-2022年12月入院, $n=92$)和观察组(2023年1月-2023年6月入院, $n=88$)。对照组实施常规护理,观察组在对照组基础上实施精细化护理干预模式,包括介入医学科护士在术前访视及术中无缝隙式健康教育、心理护理、放射防护知识宣教告知、术后饮食注意事项等。比较两组患者精细化护理干预后的护理满意度、术后活动依从性、生活质量以及对术中射线的理解和防护应对,结果:干预后观察组在对介入手术术中护理满意度、术后活动能力及依从性、术后生活质量及射线防护理解应对能力均高于对照组($P<0.05$)。结论:精细化护理干预模式在介入手术室经皮穿刺椎体成型术患者中可提高患者满意度、增加活动依从性、提升生活质量、对射线知识初步了解并能通过术后饮食及行为减少放射线对身体的危害,将危害降到最小。

PO-3549

一种非常有效的方法：用于提高 3-6 岁幼儿 MRI 检查成功率、图像质量及效率的方法

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目的：实行一种非常有效的方法，用于提高 3-6 岁幼儿 MRI 检查成功率、图像质量及效率。

方法：回顾性分析 2019 年 7 月-2023 年 1 月在我院影像科行幼儿磁共振检查患儿 150 例，幼儿年龄段为 3-6 岁，按照其检查前接受的准备方法不同分为镇静组、研究组和常规组，每组各 50 例。常规组应用常规方法进行准备；镇静组除进行常规准备外，在检查前遵医嘱肌注苯巴比妥进行镇静；研究组幼儿按照我科全新设计的准备方式进行准备（如：预约合适的时间段、合适的前期适应性训练、合适的视频学习方法和合适的鼓励等综合训练准备）。采用配对卡方检验对三组幼儿 MRI 检查成功率、图像质量及检查效率进行差异性分析。

结果：研究组幼儿检查成功率为(44/50)88.0%，镇静组幼儿检查成功率为(45/50)90.0%，常规组幼儿检查成功率为(36/50)72.0%， $P=0.03$ ；研究组幼儿图像优良率为(37/50)74.0%，镇静组幼儿图像优良率为(34/50)68.0%，常规组幼儿图像优良率为(26/50)52.0%， $P=0.067$ ；研究组幼儿中位检查完成时间为 10.0Min，镇静组幼儿中位检查完成时间为 10.0Min，常规组幼儿中位检查完成时间为 16.5Min， $P=0.024$ 。

结论：这种全新的方法让 3-6 岁的幼儿 MRI 检查成功率和检查效率得到保证，结果与镇静组相当。在图像质量方面，研究组和镇静组的图像优良率明显高于常规组，但是统计学分析无差别，可能与样本量相关。因此，这种新的准备方式可以作为幼儿 MRI 检查前准备的首选，这样不但可以减少镇静类药物的使用，而且还提高检查效率和患儿家属满意度，值得临床推广。

PO-3550

复盘分析在影像学增强检查护理不良事件管理中的应用

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摘要 目的：探讨复盘分析在影像学增强检查护理不良事件管理中的应用效果。方法：于 2023 年 2 月至 4 月（干预前），选取我院影像学增强检查患者 600 例，于 2023 年 5 月至 7 月（干预后），选取影像学增强检查患者 600 例。干预前实施以被动式质量分析管理进行每月护理不良事件的追踪分析整改；5 月建立复盘小组团队，对患者实施复盘分析管理方法，包括回顾、反思、探究、总结 4 个步骤，干预后，静脉导管堵管、异位发生率明显低于干预前($P<0.05$)，差异具有统计学意义。结论：复盘分析可明显减低影像学增强检查患者的留置静脉导管堵管、异位发生率，促进护士发现思维盲区，优化护理流程，提高患者对护理工作的满意度，是一种不断自我进步的管理方法。

PO-3551

虚拟平扫图像是否可以在儿童全脑全脊髓质子治疗中代替常规平扫图像进行剂量计算

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目的:以往研究表明,在光子放疗中,虚拟平扫(VNC)图像可以代替常规平扫图像(TNC)进行放疗计划,在质子放疗中 VNC 图像是否同样可以取代 TNC 图像进行放疗计划?于是在儿童全脑全脊髓患者进行质子治疗前,将对 VNC 图像和 TNC 上的放疗计划进行剂量分析,以确定 VNC 图像是否可以代替 TNC 图像进行放射治疗计划,以减少儿童患者的辐射剂量。

方法:VNC 图像是在增强 CT 图像上通过减碘的方式得到的。对 5 例全脑全脊髓患者行质子放疗计划,并给予 36Gy 处方剂量。在全脑临床靶体积(CTV 脑)及脊髓临床靶体积(CTV 脊髓)周围外扩 3mm 形成一个环,并命名为 RING。在能谱 CT 的增强图像上进行靶区勾画,并将勾画好的靶区复制至 TNC 图像及 VNC 图像上。假设 VNC 图像可以代替 TNC 图像执行放疗计划,于是将 VNC 图像上的放疗计划完全复制到 TNC 图像上,再根据等剂量分布曲线和剂量体积直方图(DVH)评价 VNC 图像及 TNC 图像上的计划靶区。

结果:在 VNC 图像中骨骼的 CT 值低于 TNC 图像,VNC 图像中颅骨 CT 值平均较 TNC 图像低 405HU,VNC 图像中椎体 CT 值平均较 TNC 图像低 121HU。从全脑全脊髓放疗计划的 DVH 图及等剂量线上分别可以看出,TNC 靶区外扩 3mm RING 的 DVH 曲线要低于 VNC 图像,即:TNC 放疗计划的剂量低于 VNC 图像,用覆盖 100%体积的剂量(D100)和覆盖 95%体积的剂量(D95)来表示 TNC 与 VNC 放疗计划中的差异,全脑 TNC 放疗计划中 D100 和 D95 分别较 VNC 放疗计划低 4%和 2%;全脊髓 TNC 放疗计划中 D100 和 D95 均较 VNC 放疗计划低 8%;另外 TNC 部分的剂量线并未包全脊髓的靶区,即存在一定的欠量区域,TNC 整体剂量线相对于 VNC 剂量线来说,向后移动(射野路径方向为前)。

结论:在对儿童全脑全脊髓患者进行质子放射治疗计划时,来自能谱 CT 的 VNC 图像不可用于取代 TNC 图像用于质子放射治疗计划的实施。

PO-3552

10%水合氯醛口服与灌肠镇静在婴幼儿心脏 CT 检查的临床应用及效果观察

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目的 对比在婴幼儿心脏 CT 检查治疗前,使用 10%水合氯醛口服和保留灌肠两种给药途径的临床效应、镇静效果和不良反应。方法 选取 2022 年 1 月至 12 月无腹泻、无大便失禁、无做过直肠手术史行心脏 CT 检查的婴幼儿 500 例,随机分为口服和保留灌肠组,各 250 例。两组分别给予 10%水合氯醛溶液口服和保留灌肠,用于心脏 CT 检查的镇静。观察对比两组操作耗费时间、起效时间、作用时间、首次给药成功率、一次性检查成功率及不良反应发生率。结果 口服组操作时间较保留灌肠组短 $[5.32 \pm 2.18] \text{min}$ vs $[15 \pm 5.21] \text{min}$ $P < 0.01$,但起效时间较口服组短 $[(10.121 \pm 1.83) \text{min}]$ vs $[(20.24 \pm 2.87) \text{min}]$, $P < 0.01$,作用时间较口服组长 $(63.62 \pm 11.23) \text{min}$ vs, $(51.24 \pm 5.41) \text{min}$ 。给药操作过程中,保留灌肠组首次镇静检查成功率口服组高($P < 0.01$),用药后的不良反应率较口服组低($P < 0.01$)。结论 水合氯醛保留灌肠虽然比口服操作时间长,但起效快,不良反应少,首次镇静检查成功率高减少患儿伤害,减轻患儿不适感,患儿及家属易接受,提高医疗满意度。适合临床推广运用。

PO-3553

优化安全管理措施对医学影像科护理安全影响

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目的 本研究旨在通过优化安全管理措施对医学影像科护理安全影响,探讨医学影像科有效、安全的护理方法,以提升护理质量及检查的安全性。**方法** 将在我院 160 例进行医学影像科检查的患者(2022 年 5 月~2023 年 7 月收治),根据医学影像科安全管理措施不同以随机数字表法分为对照组和观察组各 80 例,给予对照组常规医学影像科安全护理管理,给予观察组实施医学影像科优化安全管理措施干预,对比观察组与对照组患者不同护理模式下医疗安全事件发生率、检查质量、患者对医学影像科检查的满意度情况。**结果** 观察组的医疗安全事件发生率明显比对照组的医疗安全事件发生率更低, $p<0.05$, 差异具有统计学意义;与对照组患者检查质量评分相比,观察组患者的检查质量评分显著更高, $p<0.05$, 差异具有统计学意义;与对照组患者的检查满意率相比,观察组患者的检查满意率显著更高, $p<0.05$, 差异具有统计学意义。**结论** 医学影像科的检查十分重要,若检查不当可能导致严重后果,故而需引起重视,而本次研究发现,给予医学影像科检查的患者优化安全管理措施可有效提升医学影像科检查的质量,可提升其检查安全性,有效降低患者发生安全事故的几率,保证检查的安全及顺利进行,且患者对该护理干预方案十分满意以及认可,具有较高的临床应用以及推广价值,可不断进行深入研究,通过不断研究来改进其优化措施,最大可能提升检查的安全性。

PO-3554

可兼容心脏起搏器在磁共振成像安全检查中的应用现状

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[摘要] **目的** 了解可兼容心脏起搏器在磁共振成像(magnetic resonance imaging, MRI)安全检查中的应用现状调查并提出临床建议。**方法** 采用便利取样法,对全国 20 省 227 家三甲医院从事磁共振影像护理工作的护士发放电子调查问卷,问卷内容涵盖医院是否允许可兼容起搏器患者行 MRI 检查;对于允许检查的医院检查前是否需要家属和(或)临床医师签字;检查场强要求;检查时长要求;植入时间要求;图像质量;有无发生并发症等方面。

对可兼容心脏起搏器的临床 MRI 检查适用情况进行现状调查。计数资料用百分比(%)表示。**结果** 共有 216 家医院护士填写有效问卷,问卷有效回收率 95.15%。共有 76 家医院目前允许可兼容心脏起搏器行 MRI 检查,允许率为 35.18%。检查前 100%需要家属和(或)临床医师签字;81.58%需在 1.5T 及以下磁场扫描。69.74%要求在植入后 3 月以上扫描;88.16%的医院要求扫描时间限制在 15min 以内。38.16%的医院指出有部分伪影,可能影响检查结果。3.94%的医院示有心悸、灼伤等不适。**结论** 国内对可兼容心脏起搏器植入患者的 MRI 检查安全持有较保守的态度,各个医院存在较大的差异。制定一个相对安全而又明确的指南或专家共识对影像科工作人员的临床筛选和判断有一定的指导意义。

PO-3555

认知护理干预对儿童 MR 检查图像质量的影响

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摘要 目的：探讨儿童 MR 检查前玩具模拟体验结合现场体验模式在改善患儿紧张程度方面的有效性，以及对 MR 图像质量的影响。方法：连续性招募就诊于我院需行 MR 检查的 5-14 岁儿童 180 例，82 例纳入研究组，98 例纳入对照组，所有入组病例首先进行视觉模拟量表（visual analogue scale, VAS）评分。各组受试者根据年龄分为 5-8 岁低龄儿童及 9-14 岁大龄儿童。上述评分后研究组给予磁共振拼插模型完成模拟检查体验过程，然后进入检查室现场体验，对照组仅语言告知检查时身体不能运动。完成后研究组再次进行上述评分，观察其对于患儿 MR 检查前认知情况的提升以及放松程度的改善。MR 检查完成后，对研究组与对照组的 MR 图像质量进行评分，观察不同干预模式下图像质量的差异。结果：检查前两组患儿 VAS 基线无显著差异。患儿干预后对检查恐惧程度 VAS 评分低于基线（ $P<0.05$ ），研究组 MR 图像质量评分高于对照组（ $P<0.05$ ）。研究组及对照组中大龄儿童 MR 图像质量评分均高于低龄儿童。大龄儿童干预组与对照组相比，图像质量明显提高。低龄儿童中两者图像质量无显著差异。结论：儿童 MR 检查前综合体验干预模式能够在一定程度上提高 MR 检查的依从性，尤其对于大龄儿童，有可能提高儿童 MR 检查的图像质量。

PO-3556

专科护理质量敏感指标在急危重症患者 CT 检查安全管理中的应用研究

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目的：CT 已是急危重症患者的重要检查方式，急危重症患者的疾病具有复杂性及隐匿性的特点，因此急危重症患者 CT 检查安全管理显得尤为重要。目前影像科少有能客观反映急危重症患者 CT 检查安全的护理敏感评价指标，护理质量敏感性指标它能够作为护理工作的改进提供真实的依据，基于此构建急危重症患者 CT 检查护理敏感指标并应用，为其 CT 检查护理质量安全管理提供依据。

方法：1.组建研究小组：由护士长 1 名、CT 技师长 1 名、专科护士 3 名组成，负责护理质量敏感指标相关文献检索、筛选方法、质量控制、专家函询等护理质量敏感指标的建立与实施工作。2.确定护理敏感指标：研究小组通过理论、文献学习及质性访谈编制急危重症患者 CT 检查护理敏感指标函询问卷，通过 2 轮专家函询确定急危重症患者 CT 检查护理敏感指标。3.护理质量敏感指标的应用：

①预试用：进行为期 1 个月的预试用，在试用过程中注意信息反馈，再次确定各项指标的统计方法、填写要求以及相关注意事项。②培训：让全体护理人员在了解每项指标的概念、操作方法的基础上，充分认识到利用护理质量敏感指标进行护理安全管理的重要性。③确定优先改进项目：通过 2023 年 1 月-2023 年 3 月的急危重症 CT 检查患者的数据分析，采用柏拉图分析法，将累计百分比 $\geq 80\%$ 条目作为优先改进项目，包括分级检查评估正确率，分级检查护理执行率，检查及时性 3 项内容，于 2023 年 4 月按照失效模式实施步骤（收集数据-评估-改进-评价-巩固）进行改进。将 2023 年 1 月-6 月的急危重症 CT 检查患者作为研究对象，比较实施前后急危重症患者 CT 检查护理质量管理效果。

结果：观察组分级检查评估正确率、分级检查护理执行率、检查及时性显著高于对照组（ $P<0.05$ ）。

结论：护理质量敏感指标的实施有助于实现急危重症患者 CT 检查护理行为实施过程的前馈控制，提高护理质量，减少护理不良事件的发生，保障急危重症患者检查安全，提升患者及临床满意度。

PO-3557

131I 治疗分化型甲状腺癌健康科普的研究进展

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目的：通过对 ^{131}I 治疗分化型甲状腺癌健康科普的必要性以及国内外实施现状进行归纳总结，以期医护人员精准对接患者的多样化信息需求，深入推进“科普中国”计划，开展健康科普研究与实践提供参考。

方法：查阅国内外相关文献，从 ^{131}I 治疗分化型甲状腺癌健康科普的内容、模式、途径与方法以及现实困境方面进行阐述，分析了 ^{131}I 治疗分化型甲状腺癌健康科普现状。

结果：（1）目前国内外健康科普内容以在患病阶段对患者的健康教育和患病后的自我管理为主，主要体现在出入院教育、饮食科普、作息科普、服药科普、行为科普、特殊科普（如辐射安全）及随访科普等方面，相关卫生法规和一级预防的健康科普还没有形成系统全面的推广。（2）应用较多且比较成熟的理论模式主要是健康信念模式和知-信-行模式。其他模式比如健康促进模式，虽然广泛地应用在多种慢性病和癌症的预防和控制中，但缺少针对 ^{131}I 治疗分化型甲状腺癌疾病的应用。

（3）在互联网信息时代的背景下， ^{131}I 治疗分化型甲状腺癌健康科普途径有线上科普、线下科普以及线上+线下融合科普三种途径。随着渠道的拓宽，其健康科普方法也在逐步丰富，主要有面对面科普式、传统载体式、移动网络媒体式。（4）大多数分化型甲状腺癌治疗的网站虽然总体信息有可读性，但缺乏相关指南的更新以及做出明智决定所需的治疗选择的最新资料。此外，科普内容还存在重复度高、表现形式单一、与受众需求契合度不强的问题。

结论：现阶段， ^{131}I 治疗分化型甲状腺癌健康科普的面向人群主要是患者，少有关关注一般人群对于预防分化型甲状腺癌、促进健康的信息需求。因此，有必要拓展分化型甲状腺癌健康科普的工作领域，进一步创新其科普形式，提升专业人员的科普能力。在新媒体环境下，还需加强互联网监管，严打伪科普。在国家、医护人员和社区的共同努力下， ^{131}I 治疗分化型甲状腺癌健康科普工作将会进入一个新的发展时期。

PO-3558

精细化护理在老年人核磁共振增强检查患者中的应用效果分析

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目的：探讨在老年人核磁共振增强检查中应用精细化护理的效果。

方法：收录于 2022.6-2023.7，收治的 300 例接受核磁共振增强检查的老年患者。采用摸球法规范性分为 2 组，每组分别纳入 150 例样本。对照组常规干预，研究组精细化护理，分组探究干预效果。

1.1 研究组开展精细化护理：（1）检查前：应保持热情的态度接待每一位检查者，采用通俗易懂的语言向患者讲解检查的方法，目的，注意事项及相应的准备工作。重点讲解检查过程中可能发生的不良反映及应对方法。对行腹部检查的患者指导其正确的憋气方法，交流过程中，注意观察患者心理状态，鼓励与安慰的方式给予情绪疏导。针对过度紧张的患者，可参观他人检查过程，或播放轻音乐，转移患者紧张、焦虑的负性情绪。针对患者提出的问题进行详细解答，加强其检查的认知。

检查中：协助患者取出身上全部金属物品指导其正确体位，告知检查过程中保持制动的重要性，接受腹部检查的患者需要再次进行呼吸训练，并强调良好的呼吸配合对于检查结果的意义和作用。针对噪音敏感的患者，可采取佩戴眼罩及耳塞的方式完成检查。穿刺宜选择粗、直、容易固定的血管。造影剂输注结合患者血管和检查项目调适当流速。对于危重的患者，必要时采取呼吸机辅助呼吸、心电监护，全程陪同观察生命体征完成检查。

检查后：叮嘱病人观察 30min，确保无明显的过敏反应和不适感后拔除留置针，按压穿刺部位 10min，并交代需要注意的事项和多饮水，促进造影剂排泄，取检查结果的时间。

结果：研究组的 SDS 评分、检查时间明显比对照组低；且心率异常率 6.00%，血压异常率 10.00%，低于对照组的 16.00% 20.00%，结果比较 $P < 0.05$ 。对照组满意度 79.33%，研究组满意度 93.33%，结果比较 $P < 0.05$ 。

结论：针对老年核磁共振扫描增强的患者，加强精细化护理，能够有效减少检查的时间，降低发生心率、血压的异常情况，同时大大能提高了图像质量。

PO-3559

增强 CT 结合结肠仿真内镜对结直肠癌的检查方法及护理

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【摘要】目的：探讨增强 CT 结合仿真内镜后处理对结直肠癌的检查方法及护理。方法：回顾性分析 45 例结直肠癌患者，患者均行肠道准备及肠腔内注气后用 Definition AS+ 128 层螺旋 CT 增强扫描结合仿真内镜后处理检查，评价结直肠癌患者的临床价值。结果：45 例患者在 CT 仿真内镜检查中 40 例考虑为肿瘤性病变、3 例为正常、2 例为息肉。经手术病检结、直肠癌 42 例，炎症 3 例；结直肠癌分型为 15 例肿块型、9 例浸润型、5 例溃疡型、8 例混合型。结论：增强 CT 结合仿真内镜后处理对结直肠肿瘤的检出、定性及定位与手术病检比较准确率很高。增强 CT 结合后处理对观察病灶周围的侵犯情况及有无远处器官和淋巴结转移的情况有很大的优势，同时还可以了解肠腔内病变的形态及病变累及肠腔的长度。

PO-3560

幽闭恐惧调查问卷在磁共振检查人群中的汉化及信效度检验

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目的：汉化幽闭恐惧调查问卷（CLQ），并对该问卷在磁共振检查人群中进行信效度检验。方法：根据 Brislin 原则对原量表进行汉化形成中文版 CLQ。并通过便利抽样的方法对某一综合性医疗机构需行 MRI 检查的 350 名患者进行问卷调查，从而评价该问卷的信效度。结果：中文版 CLQ 共包含 26 个条目，2 个维度。探索性因子分析共提取了 2 个公因子，可解释总变异的 53.045%，且各条目的因子载荷为 0.528~0.794。26 个条目与 CLQ 得分的相关系数为 0.570~0.775；每个条目的 I-CVI 值均在 0.89~1.00 之间，总量表的 S-CVI/Ave 值为 0.98；中文版 CLQ 总量表的 Cronbach's α 系数为 0.955，两个维度 Cronbach's α 系数分别为 0.907 和 0.938，重测系数为 0.903。结论：中文版幽闭恐惧调查问卷具有良好的信效度，适用于我国 MRI 检查人群，为评估 MRI 检查人群的幽闭恐惧水平提供了可靠的主观测量工具。

PO-3561

“互联网+”健康管理模式在首次行 PTCD 患者延续护理中的应用

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目的 探讨“互联网+”健康管理模式在首次行经皮肝穿刺胆道引流 (PTCD) 患者延续护理中的应用效果, 为建立高效、系统、规范、无障碍的延续护理模式提供参考。**方法** 2022 年 1 月~2022 年 3 月首次行 PTCD 术 30 例患者为对照组, 2023 年 1 月~2023 年 3 月首次行 PTCD 术 30 例患者为观察组。对照组在出院后仅接受传统的延续护理模式, 即出院后一周内病房护士对其进行电话回访之外, 患者有任何问题需要电话问诊或来院就诊; 观察组利用“互联网+”健康管理模式时时解决相关问题。分别统计两组患者出院后胆道引流管感染率、胆道引流管脱管率和出院后 1 月、3 月、6 月 (频次是否太多) 的生活质量。**结果** 观察组显著低于对照组。**结论** 完善的、细化的、规范的、可操作的“互联网+”健康管理模式下, 护患之间沟通无时间和空间的限制, 生动形象的图片和视频指导, 患者或家属及社区医务人员可按照指示居家解决相关问题, 可降低胆道引流管感染率、胆道引流管脱管率, 改善患者生活质量。

PO-3562

标准化放射护理质控系统的研发及临床应用

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摘要 目的 构建放射护理标准化质控系统, 探讨其在放射科护理流程规范化管理、物资管理、科室流程管理的应用效果。**方法** 以互联网大数据为基础, 构建放射护理标准化质控系统, 主要包括 5 个功能模块: 注射信息管理、CT 推药信息管理、磁共振推药信息管理、医疗物资管理、科室流程管理。比较系统应用前 2020 年 12 月 21 日至 2020 年 12 月 25 日与系统应用后 2021 年 12 月 20 日至 2021 年 12 月 24 日的日均药品耗材统计时间及每例患者留置针穿刺前评估所用时间。**结果** 采用放射护理质控系统后日均药品耗材统计时间、每例患者留置针穿刺前评估所用时间分别为 (18.05±1.67 分钟)、(2.57±0.53 分钟), 显著低于采用放射护理质控系统前的 (64.40±1.52 分钟)、(4.48±1.19 分钟), 差异均有统计学意义。**结论** 放射护理标准化质控系统的构建及应用, 是大数据时代下放射护理信息化的趋势, 具有实用性及推广性。

PO-3563

急性脑梗死患者血管内取栓时间的影响因素分析及其护理专案建

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目的: 分析急性脑梗死患者血管内取栓时间的影响因素及相关的护理专案建立。**方法:** 选择 2021 年 01 月—2022 年 01 月海南省人民医院收治的 80 例急性脑梗死患者作为研究对象, 根据患者到达医院至股动脉置鞘成功时间 (DTP), 分为延误组 (DTP > 90min, n=32) 和非延误组 (DTP ≤ 90min, n=48)。分析急性脑梗死患者血管内取栓时间的影响因素及建立相关的护理专案。**结果:** 两组患者的年龄、吸烟史、饮酒史发病时间、入院时 NIHSS 评分、院前延误、静脉溶栓、发病至入院时间及入院至开始静脉溶栓时间对比差异无统计学意义 (P < 0.05); 两组患者进行影像检查、入院至等待 CT 检查时间、入院至获得影像结果时间、获得影像结果至获取知情同意时间、

获得知情同意至入导管室时间及入院至股动脉置鞘成功时间等对比差异有统计学意义 ($P<0.05$)。Logistic 多因素分析可知入院进行影像检查、入院至等待 CT 检查时间、入院至获得影像结果时间、获得影像结果至获取知情同意时间及获得知情同意至入导管室时间等是影响急性脑梗死患者血管内取栓时间的独立危险因素。结论: 本研究通过对 ACI 患者血管内取栓时间的影响因素进行分析, 可知院内不规范及繁琐的流程是造成院内延误的主要因素, 并针对相关因素来建立护理专案, 进一步优化取栓护理方案, 优化可有效提高 ACI 患者的血管取栓率, 改善患者预后。

PO-3564

复盘式多元化急救情景演练在放射科技护一体化工作中的应用效果

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目的 探讨复盘式多元化急救情景演练在放射科技护一体化工作中的应用效果。方法 每月底根据常见的急救疾病制定不同的演练方案, 每月的医技护人员固定, 年资实行老带新即高年资、低年资组合共同进行急救演练。选取 2022 年 9 月至 2023 年 9 月的 12 次急救情景演练作为实验组, 2021 年 8 月至 2022 年 8 月的 12 次急救情景演练作为对照组。实验组接受复盘式多元化急救情景演练培训。具体方法: ①固定每月急救演练人员, 由高年资组合低年资, 根据放射科每月出现不同的急救疾病制定不同的急救方案进行急救情景演练。②每次急救情景演练前先培训急救物品及针对此次病例的急救药品使用。③根据放射科急救流程开始急救情景演练, 由科室护士长、技师长、急救专家共同观看、评价及指导。④在科室护士长、技师长及急救专家指导后, 复盘一次急救情景演练流程。对照组根据之前的培训模式, 即每月随机选取急救情景演练方案, 随机选取急救情景演练方案进行操作。两组从急救流程, 疾病急救熟练度, 急救物品药品熟练熟知度进行考核对比。结果 实验组对急救流程的熟练度, 对抢救物品、药品的熟知使用度结果明显高于对照组, 抢救时间明显少于对照组, 两组数据具有统计学意义 ($P<0.05$)。结论 复盘式多元化急救情景演练有利于提高放射科技护的急救技能, 面对不同疾病的突发情况有不同的应对能力, 缩短抢救时间, 增强团队协作能力, 具有一定的应用价值。

PO-3565

急诊 TIPS 治疗门脉高压症食管胃静脉曲张出血的术中护理探析

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[摘要] 目的 探究肝硬化门脉高压症食管胃静脉曲张出血患者急诊行颈静脉肝内门体分流术 (TIPS) 术中护理配合技巧和心理干预的护理价值。方法 我院 2016 年 1 月-2019 年 10 月需要急诊行 TIPS 术的肝硬化食管胃静脉曲张出血患者, 急诊实施 TIPS 治疗, 术前积极准备, 应用医院焦虑抑郁量表 (HADS) 评估患者给予针对性心理干预, 术中严密观察患者病情变化、实施科学护理支持。结果 88 例患者其中单纯 TIPS 治疗 34 人, TIPS 联合 CGVE 治疗 50 人, TIPS 联合改良 BRTO 治疗 4 人, 围手术期止血成功率 100%。结论 门脉高压症食管胃静脉曲张出血患者急诊实施 TIPS 手术治疗是有效的治疗方法, 术中科学对患者实施针对性的护理, 可以保证患者术中安全, 减少并发症发生、提高手术成功率。

PO-3566

细节化护理联合放松训练在神经梅毒 磁共振检查患者中的应用效果

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【摘要】目的：神经梅毒磁共振检查患者采用细节化护理联合放松训练，研究细节化护理联合放松训练效果及优势。**方法：**本次研究选择 2020 年 1 月至 2021 年 8 月间本院收治的 168 例神经梅毒磁共振检查患者，以随机抽签方法加以分组，其中对照组纳入 84 例患者，施行常规护理干预；研究组同样纳入 84 例患者，行细节化护理联合放松训练。随机并对比组间的护理效果与满意程度。**结果：**研究组的护理指标显著优于对照组， $P<0.05$ ，有统计学意义。接受护理前，研究组与对照组的数据对比无差异性，即 $P>0.05$ 。行分组护理后，研究组 SAS 评分、SDS 评分显著优于对照组，数据对比差异有统计学意义， $P<0.05$ 。研究组护理满意程度显著优于对照组，有显著差异， $P<0.05$ 。**结论：**细节化护理联合放松训练在神经梅毒磁共振检查患者中的应用效果良好。该护理干预通过提供舒适的环境和个体化的护理，帮助患者放松身体和心理，减轻焦虑和紧张情绪。结果显示，患者在接受细节化护理联合放松训练后，在磁共振检查中更能保持稳定的体位，减少运动伪影和图像模糊，提高图像质量。因此，细节化护理联合放松训练是神经梅毒磁共振检查患者中的有效应用策略，值得推广和应用。

PO-3567

分化型甲状腺癌病人 ^{131}I 全身扫描前肠道准备的研究进展

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目的 通过探索分化型甲状腺癌病人行 ^{131}I 全身扫描前肠道准备的研究新进展，以达到构建合格的肠道清洁方案，规避读片的误判，辅助决策后续的治疗或随访方案的目的。

方法 查阅国内外相关文献，从分化型甲状腺癌病人口服 ^{131}I 的肠道生理过程， ^{131}I 全身扫描及肠道准备的定义、原理，全身碘扫前行肠道准备的重要性，综述国内外分化型甲状腺癌病人 ^{131}I 全身扫描前肠道准备的研究现状，旨在为构建规范、统一、切实可行的肠道准备方案提供参考依据。

结果 ^{131}I 治疗在分化型甲状腺癌的管理中发挥着核心作用，低剂量 ^{131}I -全身显像具有高度的敏感性和特异性，有助于评估前次 ^{131}I 治疗的疗效、残留的甲状腺组织，检测远处转移灶的数量和部位等，辅助决策后续的治疗或随访方案，具有重要的诊断价值。甲癌患者术后处于甲减状态，几乎常有结肠运动迟缓（如便秘），这导致大量 ^{131}I 积蓄在肠道，加之肠道邻近的管腔、组织、器官重叠缠绕较多，这对腰腹部病灶的数量和定位造成了一定的困难，容易引起读片的误判，导致不必要的治疗。国内外学者多注重于结合各种检查方式来增加诊断的精确性，减少误判，但关于精确的肠道准备指导方案尚无统一规范的定论。有学者曾提出，适当应用缓泻剂可减少 ^{131}I 的积聚。目前，国内核医学科多采用口服聚乙二醇口服液、磷酸钠盐口服液等缓泻剂的方法来进行肠道处理，但针对精确的口服缓泻剂种类、剂量、时间、温度等，也尚未构建统一标准的方案。

结论 国内外尚无权威的关于分化型甲状腺癌病人 ^{131}I 全身扫描前的肠道准备方案，在接下来的研究中，研究相应干预措施的应用，从而构建规范、统一、切实可行的肠道清洁方案，以便投入到临床中使用，从而增加诊断的精确性，为后续治疗方案的决策提供更加科学、规范的判断依据。

PO-3568

水化护理在宫颈癌化疗后患者中降低 CT 增强检查对比剂外渗的概率及减少对比剂肾病发生风险的应用研究

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目的：探讨水化护理在宫颈癌化疗后患者中降低 CT 增强检查对比剂外渗的概率及减少对比剂肾病发生风险的临床价值。方法：前瞻性入组 100 例宫颈癌化疗后欲行 CT 增强检查患者，随机分为两组，实验组患者在行 CT 增强检查前后采用口服水化法进行水化护理干预，B 组为对照组，除水化护理干预外，其他一切均同实验组。分别统计两组患者对比剂外渗概率、检查前 24 h 及检查后 24 h 两组患者血清胱抑素 C(Cys C)的含量。通过 5 分量表法使患者对 CT 增强检查耐受度进行评分（1~5 分，难以忍受~无异常感觉），由两位高年资护士采用双盲法对各患者 CT 增强 24h 后精神状态进行评分（1~5 分，精神极差~精神佳）。通过两独立样本 t 检验比较两组患者的一般信息及对比剂外渗概率。通过配对样本 t 检验比较两组患者检查前后 Cys C 含量，并通过独立样本 t 检验进行两组间比较检查前后 24 h 血 Cys C 含量。采用 Mann-Whitney U 检验比较两组患者 CT 检查耐受度及检查后精神状态程度主观评分，通过 Kappa 检验对检查后精神状态程度主观评分做一致性分析。结果：3 人因对比剂过敏终止检查，3 人因服用二甲双胍终止检查，最终实验组 48 人及对照组 46 人完成检查。两组患者一般资料无统计学差异（ $P>0.05$ ）。实验组对比剂外渗概率小于对照组（ $t=-2.452$, $P<0.05$ ）。两组检查前 24h 血 Cys C 含量无统计学差异，检查后实验组 Cys C 含量低于对照组（ $t=-4.249$, $P<0.05$ ），二者之间具有统计学差异。在对 CT 增强检查耐受度主观评分方面，实验组显著高于对照组（ $t=-4.320$, $P<0.05$ ），主观评分提高 1.11 分。在检查后精神状态程度方面，两组评价结果一致性良好（ $Kappa=0.818$, $P<0.05$ ）实验组高于对照组。结论：在宫颈癌化疗后患者进行水化护理干预，不仅可以提高患者检查依从性，更可降低 CT 增强检查对比剂外渗的概率及减少对比剂肾病发生风险，具有重要的临床价值。

PO-3569

循证护理在 AngioJet 系统抽吸治疗下肢静脉血栓介入术后并发症的应用研究

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目的：研究循证护理在 AngioJet 系统抽吸综合介入治疗下肢静脉血栓患者术后并发症的应用效果。材料方法：以 2019 年 1 月—2023 年 6 月我介入诊疗中心治疗的 AngioJet 系统抽吸治疗的下肢静脉血栓患者共 80 例作为研究对象，按照随机数表法分为循证护理组（ $n=40$ ）和常规护理组（ $n=40$ ），其中循证护理组采用循证护理模式，常规护理组采用传统护理模式进行护理。比较两组患者并发症的发生率。结果：两组患者均接受使用尿激酶 20~60 万 U 溶入 100 ml 生理盐水,通过 Angio Jet 机械性血栓清除装置喷射模式进行血栓内喷射,等待 15 min 后行机械性血栓抽吸的综合介入治疗。两组均未出现消化道出血、颅内出血、症状性肺栓塞和血管壁破裂等严重并发症。其中，循证护理组中介入术后 1 周内患肢率为 100%，无皮下淤血和留置溶栓导管或穿刺点出血发生（0%），平均住院日为 7.3 天；常规护理中 1 周内患肢率为 100%，但局部皮下淤血发生 5 例(12.5%)，留置溶栓导管或穿刺点出血 3 例(7.5%)，平均住院日为 8.1 天。

结论: 下肢静脉血栓患者 AngioJet 系统抽吸综合介入治疗术后康复过程中,采用循证护理模式进行护理,可有效降低并发症发生率,促进患者康复,减轻痛苦,改善患者的精神状态和生活质量,提升疗效,从而改善护理满意度,值得临床推广。

PO-3570

探讨“双低”腹部 CTA 增强降低肿瘤病人血管外渗的临床应用价值

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目的: 探讨“双低”扫描方案能谱成像(GSI)方案在腹部 CTA 增强检查中,预防降低肿瘤病人血管外渗的临床应用价值。方法 选取行腹部 CTA 增强检查的病人 200 例,随机分为双低组 100 例,和常规扫描组 100 例。“双低”组扫描参数: GSI 扫描模式,管电流 195~360 mA,对比剂方案为 300 mgI/kg 体重,流速 3.5~4.0 ml/s,重组 60 keV、70%ASIR-V 图像;常规组扫描参数: GSI 扫描模式,管电流 280~440mA,对比剂方案为 500 mgI/kg 体重,流速 4.5 ml/s,重组 70 keV、40%ASIR-V 图像。记录两组患者注射对比剂后有无血管疼痛,血管外渗情况,测量两组腹主动脉及竖脊肌 CT 值和 SD 值,并计算腹主动脉信噪比(SNR)、对比噪声比(CNR)、品质因子(FOM) 值,采用双盲法对图像质量进行主观评分,记录辐射剂量、对比剂摄入量,采用 SPSS24.0 软件进行统计分析。结果 “双低”组血管无疼痛 97 人,疼痛 3 人,血管外渗 10—20ml 2 人,血管外渗 30ml 1 人,常规组血管无疼痛 90 人,血管疼痛 10 人,血管外渗 10—20ml 的 3 人,血管外渗 40ml—80ml 的 5 人,两组相比较差异有统计学意义 ($P<0.05$) 双低组腹主动脉 CT 值、SNR、CNR、FOM 及背景噪声优于常规组 ($P<0.05$)。两组图像主观评分无统计学差异 ($P>0.05$) 与常规组相比,“双低”组辐射剂量及碘摄入量分别降低 24: 62%, 34.16% ($p<0.05$)。结论 采用“双低”扫描方案进行腹部 CTA 检查,能够明显预防降低肿瘤患者血管疼痛,血管外渗的风险,减少外渗剂量,减轻肿瘤病人痛苦。应用低 keV 结合高权重迭代 (70%ASIR-V) 技术,可保证图像质量和碘摄入量,具有良好的临床应用价值。

PO-3571

OSCE 考核在综合介入中心规培护士中的应用与效果评价

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目的: 探讨 OSCE 考核在综合介入中心规培护士中的应用与效果评价。方法: 针对综合型介入中心面向全院临床科室开放,包括心内介入、心外介入、神经介入、外周血管介入、肿瘤介入、复合介入等,手术种类多,病种复杂,对综合介入护士的要求相对于独立的导管室护士而言,更具有挑战性。而如何保障综合介入规培护士在短短三个月时间内掌握综合介入的护理理论、护理技术、工作流程、工作标准等内容,是综合介入需要去解决的问题。我院于 2016 年承担规培护士的带教任务,近年来我们一直在探索培养综合介入规培护士的教学方法,并为此做过很多尝试,但预期效果不理想,在不断的探索和反思后本研究尝试将培训内容与 OSCE 考核模式相结合应用于综合介入规培工作中,探索在有限的时间内,高效地培养综合介入规培生综合素质和临床能力的方法。2019 年我科经过教学组的讨论,自编了 OSCE 考核内容和标准,2019 年 7 月至 2023 年 7 月根据 OSCE 考核内容和标准对 12 名规培护士针对性的开展培训和考核,并对各个站点的考核结果进行统计分析。同时,采用自编的问卷调查表,对参加 OSCE 考核的护士进行满意度和反馈意见的调查。

结果：参加 OSCE 考核的护士认为 OSCE 考核能够有效地检测和提高自己的临床能力，同时也提出了一些改进建议。结论：OSCE 考核在综合介入中心规培护士中的应用与效果评价表明，OSCE 考核是一种科学、客观、有效的临床能力评估方法，能够促进规培护士的临床知识、技能和态度的提升，为综合介入中心规培护士培养提供了有力的保障。建议在综合介入中心规培护士教学中进一步推广和完善 OSCE 考核模式。

PO-3572

OSCE 考核在婴儿 MR 新入职护士培训中的应用

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目的：探讨在婴儿 MR 新入职护士培训中采取 OSCE 考核的效果。方法：选取我院 2020 年 1 月至 2023 年 1 月婴儿 MR 新入职护士共 50 例，根据随机数字表法分为对照组和观察组，各 25 例。对照组采取常规考核，观察组采取 OSCE 考核。对比两组护士的考核成绩以及对本次考核的满意程度。结果：OSCE 模式教学法效果优于传统的教学方法，经过 OSCE 模式培训并考核的护理人员在婴儿 MR 检查标准流程和配合技术方面的掌握程度优于实施 OSCE 模式之前。且婴儿 MR 检查一次性成功率、图像质量、家属满意度的统计结果均优于实施 OSCE 模式之前，差异具有统计学意义 ($p < 0.01$)。结论：OSCE 模式在我科婴儿 MR 检查护理教学中的应用效果良好，提高了婴儿 MR 检查的一次性成功率、图像质量、提高了家属满意度。OSCE 情景模拟教学及考核模式不仅重视理论知识的掌握，更加侧重综合实力的培养。在提高影像科护理人员实践技能，培养更优秀的影像护理服务人才方面有应用价值，值得推广。

PO-3573

全程护理干预提高胎儿磁共振检查一次成功率

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目的：全程护理干预提高胎儿磁共振检查一次成功率。方法：检查前

1 做好接诊工作，接待热情，耐心回答病人的问题，减轻患者的思想顾虑，赢得患者的信任，并且向病人介绍自己作为她的专属检查护士，将会全程陪伴她在医院完成核磁共振检查。向患者介绍检查的环境，告知检查设备，以及梯度切换产生的噪音，检查时出现发热属于正常现象，使患者了解核磁共振的检查环境，做好思想准备，从而减少顾虑和恐惧的心理。

2 核对患者基本信息，询问病史，明确检查的目的和要求，确定患者是否有无检查禁忌症。

检查中：胎儿磁共振检查受母亲情况影响小，不受胎儿骨骼、羊水量的影响，对胎儿中枢神经系统显示好，对软组织分辨率高，视野大，能显示气道等特殊结构和小器官的特点。现探讨对全程护理干预在胎儿磁共振的应用价值。

方法：一般资料：选取（2022 年 7 月~11 月）和（2022 年 12~2023 年 4 月）行 MRI 检查的孕妇各 50 例，分别做对照组和干预组。每组 25 人。

对照组：排除 MRI 检查禁忌症，呼吸训练，心理准备，检查前吸氧，胎动评估。

干预组：在对照组基础上增加检查中的干预。(1):使用氧气枕让孕妇在检查过程中持续吸氧。

(2)：使用隔音棉被或隔音腹带包裹孕妇肚子

指标：(1)：记录 MRI 一次性检查的成功率，记录 MRI 检查耗时。若多次检查耗时为每次检查的总和，由 2 名诊断医生对两组图像进行盲评。

检查后：告知患者取报告的时间和地方，如果病人病情危急，应及时联系诊断医生尽快出报告。并且做好随访工作，询问患者对此次检查过程有什么不满意的地方，和我们服务需要改进的地方。结果：干预 11 例首次检查成功率 98%，检查对照组首次成功率 73%，首次检查两组有统计学（ P 值 <0.05 ）。观察组检查 $t=22\pm5\text{min}$ ，对照组平均 检查 $t=30\pm5\text{min}$ ，两组平均检查时间有统计学差异（ $P<0.05$ ）。图像伪影观察组是 10.5%，对照组图像伪影出现率为 23.5%，两组间存在统计学差异。结论：通过有效的全程检查护理干预胎儿磁共振检查，对提高检查的成功率有重要临床意义。

PO-3574

投影式血管成像仪穿刺法在 CT 造影检查中提高静脉穿刺成功率降低碘对比剂外渗发生的效果观察

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目的：探讨投影式红外血管成像仪应用于 CT 造影检查中碘对比剂外渗发生的效果观察

方法：将我院放射科 2022 年 5 月~2022 年 10 月，138 例 CT 造影检查患者按随机数字表法分为对照组和观察组。对照组采用常规静脉穿刺法，在不借助任何辅助仪器的情况下，医护人员根据血管的解剖位置，凭借个人经验进行外周静脉盲穿，观察组在投影式红外血管成像仪引导下进行外周静脉留置针穿刺，比较两组间的一针穿刺失败率、穿刺所需时间和患者满意度。结果：对照组一针穿刺失败率为 38.5%，观察组一针穿刺失败率为 7.4%，满意度调查结果显示，观察组患者及家属对护士满意度有明显提高。两组间一针穿刺失败率比较，应用投影式红外血管成像仪进行穿刺耗时为 $(0.31\pm0.080)\text{min}$ ，明显低于肉眼视觉下穿刺耗时 $(6.86\pm0.95)\text{min}$ ，独立样本检验，穿刺耗时 $t=12.40$ ，($P<0.05$)有统计学差异。

结论：投影式红外血管成像仪在应用在 CT 造影检查中，护士可快速查找静脉、准确评估静脉、优化静脉穿刺方案、提高穿刺成功率、节约穿刺时间、避免反复穿刺、提高穿刺成功率增强护士自信心，在高流速、高浓度快速注射的压力下，能够有效降低外渗发生率的发生、提高患者满意度、降低医护人员的工作压力，从而保证输液安全、快捷、有效，更好地为患者服务，使其早日康复。

PO-3575

不同紫外线灯具对卒中 CT 设备及检查室的消杀比较

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为避免卒中患者 CT 检查时发生院内交叉感染，增加治疗负面因素，需要定期对 CT 检查室进行全面紫外线消杀操作。

选取常规吊顶紫外线灯、常规紫外线车和云磁大功率紫外线灯，分别放置扫描间内进行照射，使用紫外线强度测试仪测得，CT 机架前后，检查床面，地面，以及检查窗口的紫外线强度值。

根据各个测试点得到的紫外线强度值，发现同样照射时间内，云磁大功率紫外线灯强度值对大，对各种病毒及致病菌群杀伤力最大。云磁大功率紫外线灯在相应最短照射时长内，可以达到吊顶式紫外线灯和常规紫外线车照射 40 分钟时长的消杀效果，有效提高消杀效率，减少因长时间消杀操作，增加患者等候时间，延误检查和治疗时间。

PO-3576

“目视化宣教”提高患者增强 CT 检查后“口服水化”的依从性

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目的 探讨“目视化宣教”提高患者增强 CT 检查后口服饮水水化的依从性。**方法** 选取 2022 年 1 月—2022 年 6 月在某三甲医院医学影像中心行增强影像检查无饮水禁忌症、住院患者 200 例，CT 检查后采用“目视化宣教”法(根据《对比剂使用指南 第一版、第二版》增强 CT 检查后水化的要求，制定了简便易行口服饮水“水化”的具体方案，该方案单张贴于患者外周静脉穿刺、拔针操作台，患者及家属能及时阅读水化方案，并让患方将“口服饮水水化”方案拍照存于智能手机相册，方便水化期间复习、巩固、执行)。检查后 24 小时，电话随访患者水化方案的执行情况、患者不适症状、满意度。**结果** 入组患者 200 例均能执行口服饮水水化方法，执行率、依从性均为 100%；未有恶心、呕吐、水中毒、心衰、对比剂肾病、肾功能不全等并发症的发生，满意度 100%。**结论** 对增强 CT 检查后的患者实施“目视化口服饮水水化宣教”，有利于患者及家属掌握并实施口服饮水的具体方案，极大的提高患者的依从性，保护患者的肾功能，同时提高患者就医的满意度。“目视化宣教”方法简单、易学、易掌握、易实施，也可用于住院病人介入手术后保护肾功能，值得临床推广应用。

PO-3577

“清单式评估单”在保障患者增强 CT 检查安全的应用

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目的 探讨“清单式评估单”在保障患者增强 CT 检查安全的应用。**方法** 选取 2019 年 1 月—2021 年 12 月至某三甲医院医学影像中心行增强 CT 检查患者 200000 例，检查前均采用自制的《增强 CT 检查前清单式评估单》(根据《对比剂使用指南 第一版、第二版》制定)对患者逐项进行评估。**结果** 入组患者 200000 例，发现二甲双胍停药未达 48 小时者 4 例、未停药二甲双胍者 29 例、甲状腺机能亢进服药治疗 1 例、甲亢服药治疗停药后近期未做甲功检查者 2 例、心功能 IV 级者 4 例、近期有过敏性哮喘发生 1 例、血钾低于 2.0mmol/L 1 例、48 小时内已行增强 CT 检查者 3 例，对以上存在特殊情况的患者及时与床位医生、上机技师、诊断组医生沟通，采用完善相关辅助检查、改期检查、停止检查、对比剂高压注射前预警、检查后加强水化等方案，以上患者均未发生对比剂肾病、甲亢危象、过敏性休克、心功能不全、猝死并发症，满意度 100%。**结论** 对患者增强 CT 检查前采用“清单式评估单”，可保障患者的影像增强检查安全，减少检查并发症的发生，保障患者的安全，降低医患纠纷，同时提高了 CT 检查前评估的工作效率。“清单式评估单”方法简单、易学、易掌握、易实施，也可用于医院磁共振检查前的评估，值得临床推广应用。该研究已申请并获得软件著作权二项《增强 CT 检查评估软件 V 1.0》登记号：2019SR0905218、《影像患者检查核对系统 V 1.0》登记号：2019SR0347826。

PO-3578

虚拟现实技术在缓解肝癌患者术中疼痛的应用研究

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目的 探讨虚拟现实技术在缓解肝癌患者术中疼痛的应用效果。**方法** 将 2023 年 4 月至 5 月行肝动脉化疗栓塞的肝癌患者随机分为观察组与对照组, 观察组 100 例采用虚拟现实技术缓解术中疼痛, 即术前应用虚拟现实技术观看手术过程、术中配合 VR 一体机的使用, VR 一体机的内容涵盖患者进入手术室后术前准备流程、疾病相关知识、造影时屏气呼吸的方法及配合、舒缓的音乐、术后的注意事项及饮食、用药、运动指导等; 对照组 100 例采用常规手术护理。比较两组患者的焦虑程度评分、抑郁程度评分、疼痛评分及患者对护理工作满意度的差异。**结果** 观察组患者的焦虑程度评分、抑郁程度评分、疼痛评分明显低于对照组, 差异有统计学意义 ($P < 0.05$); 观察组患者对护理工作的满意度得分高于对照组, 差异有统计学意义 ($P < 0.05$)。**结论** 虚拟现实技术作为一种非药物疼痛干预方式, 可分散患者的注意力, 有效缓解疼痛, 降低患者焦虑、抑郁水平, 减少阿片类药物的使用剂量, 在疼痛管理中显示出良好的应用效果, 并最终提高了患者满意度。

PO-3579

临床护理教育中以岗位胜任力为核心的新型护理人才培养体系的探索与实践

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目的 探讨临床护理教育中以岗位胜任力为核心的新型护理人才培养体系的应用效果。**方法** 将 2019 年 7 月至 2020 年 6 月在介入科临床实习的 61 名本科全日制护生设为对照组, 对照组实施传统临床带教模式, 以优质护理管床责任制为导向进行整体护理实习, 在护长及总带教的带领下实行一对一或双导师制带教方法, 实施目标教学。将 2020 年 7 月至 2021 年 6 月在介入科临床实习的 59 名本科全日制护生设为观察组, 观察组在临床护理教育中探索与实践以岗位胜任力为核心的全日制本科护理实习生带教模式。即聚焦于能力提升, 通过首创基于 OSCE 的进阶式整体护理能力评比, 开展以案例为基础的学习及以质疑为基础的学习法, 提升护生的临床护理能力、评判性思维能力、沟通协作能力及职业发展能力; 同时, 为了增强学生素质, 挖掘思政元素, 构建出“知识传授”、“价值塑造”、“能力培养”多元统一的“八大模块”教学目标并应用, 培养护理专业情怀; 在效果质控方面, 把护理教学评价由原来单一的终结性评价向形成性评价转变, 实施基于三维质量的临床教学质量评价持续改进教学质量。**结果** 观察组护生的临床护理能力、沟通协调能力、评判性思维能力、心理特质及总分的评价指标得分均高于对照组, t 值分别为 2.429、3.351、7.279、3.032 和 4.065, 差异均有统计学意义 ($P < 0.05$); 观察组护生的出科理论成绩、技能成绩均高于对照组, t 值分别为 3.786、2.028, 差异均有统计学意义 ($P < 0.05$); 观察组护生对教学满意度为 (99.95 ± 0.28) 分, 对照组为 (99.58 ± 1.19) 分, 两组比较, 差异有统计学意义 ($t = 2.278, P = 0.024$)。**结论** 临床护理教育中以岗位胜任力为核心的新型护理人才培养体系的探索与实践, 提升了护生的岗位胜任力、教学质量及教学满意度, 形成了“传承、创新、发展”的优秀教学文化, 达到了高质量高水平教学。

PO-3580

探讨 85 例肺结节患者 CT 引导下肺结节穿刺活检的 并发症发生情况及影响因素

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目的 探讨 85 例肺结节患者 CT 引导下肺结节穿刺活检的并发症发生情况及影响因素。**方法** 对于本院进行 CT 引导下肺结节穿刺活检的 85 例患者的临床资料进行回顾性分析,按结节大小进行分组,分析各组穿刺活检的诊断符合率;对影响肺结节患者 CT 引导下肺结节穿刺活检的并发症的因素进行分析,包括性别、年龄、穿刺大小与深度等;将上述因素中差异有统计学意义的因素进一步分析,筛选肺结节患者 CT 引导下肺结节穿刺活检发生气胸、肺出血的危险因素。**结果** 85 例患者中共有 1 例取材为正常肺组织,占比 1.18%;其余 84 例均取得病理组织,占比 98.82%,其中有 10 例无手术结果证实,各结节大小组的穿刺诊断活检诊断符合率分别为 77.78%、80.77%、82.61%、92.59%;85 例患者中经术后扫描发现有 15 例出现气胸,发生率为 17.65%,16 例患者出现肺出血,发生率为 18.82%;肺结节患者 CT 引导下肺结节穿刺活检术后发生气胸的影响因素为年龄、穿刺针穿越肺组织距离;而发生肺出血的影响因素为结节大小、穿刺针穿越肺组织距离(均 $P<0.05$);气胸发生的危险因素在于年龄、穿刺针穿越肺组织距离($OR=1.040$ 、 1.028 ,均 $P<0.05$);肺出血发生的危险因素在于结节大小、穿刺针穿越肺组织距离($OR=0.940$ 、 1.029 ,均 $P<0.05$)。**结论** 肺结节患者行 CT 引导下肺结节穿刺活检的并发症主要有气胸、肺出血,其中气胸发生的危险因素在于年龄、穿刺针穿越肺组织距离,肺出血发生的危险因素在于结节大小、穿刺针穿越肺组织距离,临床可据此采取相关干预措施,以减少并发症的发生。

PO-3581

多模式呼吸训练联合 PERMA 模式在老年 肝脏磁共振增强检查中的应用

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目的:老年患者随着身体机能的衰退会出现语言的理解和表达能力降低,增加肝脏磁共振检查的配合难度,易出现图像运动伪影。调动老年患者的主动性,增强其交流沟通的意愿,提高磁共振检查的配合度有着非常重要意义。**PERMA** 模式从积极情感(P)、投入(E)、关系(R)、意义(M)、成就(A)5 个方面,对患者进行系统性干预,提升患者身心感受。本研究旨在探究多模式呼吸训练联合 **PERMA** 模式在老年患者肝脏磁共振增强检查中的效果。

方法:收集我院 2022 年 4 月-2023 年 4 月行肝脏磁共振检查的 80 例老人随机分为对照组 40 例和观察组 40 例。对照组采取常规呼吸训练。观察组在对照组的基础上进行多模式呼吸训练联合 **PERMA** 模式干预,①按照磁共振扫描呼吸导航节律进行吸气-呼气-屏气练习,屏气时间 15-18s,A:自主模式。患者直接按照口令进行吸气-呼气-屏气训练;B:协助模式。患者由他人协助进行吸气-呼气-屏气训练。检查前 30 分钟护士对患者进行连续 3-5 个循环的呼吸训练。②呼吸节律和深度训练。③情景呼吸训练:播放腹部磁共振检查的语音指令和序列声音,让患者跟着音频指令进行呼吸训练。④ **PERMA** 模式应用: P (积极情感): 检查前与患者进行情感交流,讲解磁共振检查知识,让患者对呼吸训练产生积极情绪。 E (投入): 指导患者观看磁共振检查呼吸配合宣传图片,使患者专注于呼吸训练。 R (关系): 对心理焦虑、不适感的患者,教会深呼吸、冥想放松身体,鼓励家属对患者进行安抚和关心。 M (意义): 介绍肝脏磁共振检查特点,引导患者建立目标感。 A (成就):

鼓励患者讲述呼吸训练感受, 增强信心。比较两组患者心理弹性、检查依从性, 检查时间、图像质量、护理满意度。

结果: 观察组患者心理弹性得分、检查依从性、图像质量、护理满意度高于对照组, $P<0.05$, 差异具有统计学意义; 观察组患者检查时间优于对照组, $P<0.05$, 差异具有统计学意义。

结论: 多模式呼吸训练联合 PERMA 模式可提高老年患者肝脏磁共振增强检查心理弹性、检查依从性, 图像质量、护理满意度, 缩短检查时间, 提升患者就医体验有积极的影响作用。

PO-3582

优化注射方法在 PET/MRI 中的应用研究

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【摘要】目的 探讨优化注射方法在 PET/MRI 中的应用。方法 选取本院于 2021 年 6 月—2022 年 8 月收治的 178 例行 PET/MRI 显像检查的肿瘤患者, 按照 2021 年 6 月-2022 年 3 月采用双通路注射法 63 例患者作为对照组, 2022 年 4 月-8 月采用单通道优化注射法 115 例患者作为观察组, 对照组开展传统注射法进行药物注射, 观察组基于此, 对注射方法进行优化, 克服局部放射性浓聚的问题, 采用一组通道进行药物注射, 从护理人员单病人操作时间、图像质量分析、患者血液污染环境发生率、留置针穿刺成功率、注射部位药物浓聚发生率等五个方面对两组进行比较分析。结果 观察组护理人员单病人操作时间、患者血液污染环境发生率, 均低于对照组, 差异有统计学意义 ($P < 0.05$)。留置针穿刺成功率观察组明显高于对照组, 差异有统计学意义 ($P < 0.05$)。图像质量分析、注射部位药物浓聚发生率比较, 差异无统计学意义 ($P > 0.05$)。结论 优化注射方法在 PET/MRI 中的应用, 可降低患者降低患者多次穿刺带来的痛苦、缩短护士操作时间、减少患者血液污染环境的可能、同时节约医疗资源, 降低患者的经济负担, 值得推广。

PO-3583

智慧自助健康宣教小程序对老年冠脉 CTA 患者相关知识知晓率的影响及效果研究

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目的: 冠状动脉 CT 血管成像目前已成为诊断冠状动脉疾病的主要无创影像学工具, 患者心率、呼吸平稳状况是 CCTA 检查成功的关键。而老年患者由于其年龄较大, 对周围环境适应能力下降, 应激调节能力不足等, 往往导致检查不成功或图像质量不佳。因此合理进行检查知识的健康宣教, 提高患者的检查知晓程度, 从而提高检查效率和影像质量。

方法: 选取某三甲医院影像中心 2022-2023 行冠脉 CTA 检查的老年患者共 200 例, 按时间段分为对照组和观察组各 100 例。一、对照组进行常规健康宣教。①预约时: 发放 CT 检查预约告知单, 指引患者仔细阅读告知单上内容。②检查前: 集中为患者讲解检查相关内容及注意事项。③检查后: 告知患者合理水化及取报告的时间、地点及方式。二、观察组应用智慧自助健康宣教小程序对患者进行健康宣教。①智慧自主健康宣教小程序。为微信扫描后即可观看, 以漫画为主, 文字为辅, 两者结合, 根据影像检查的特点, 将信息化与科普手段融合, 还原影像检查的场景, 将影像检查相关知识点具体化、普适化, 且采用患者提出问题, 护士解答问题的形式呈现, 内容通俗易懂, 不受患者知识文化的影响 (特别是老年人)、也不受宣教时间和场地限制, 可以反复浏览加深印象。②预约时, 工勤人员指导患者扫描《CT 检查告知单》上的小程序码, 提前观看《冠脉 CTA 检查这些事

情要注意》。③到检后,先进行调查了解患者观看情况。对于部分未观看小程序内容的患者,指导现场观看;无微信、无智能手机的患者,提供科室手机进行观看,着重指导患者进行心率准备和呼吸准备内容的浏览。

结果:实验组与对照组比较,相关知识知晓率实验组不知晓为 22%,基本知晓为 53%,完全知晓为 25%,对照组不知晓为 54%,基本知晓为 33%,完全知晓为 13%, $P=0.000$;一次性检查成功率实验组 93%,对照组 83%, $P=0.030$;图像质量实验组合格 95%,对照组合格 84%, $P=0.011$ 。结论:对老年患者采用智慧自助健康宣教小程序进行检查前的健康宣教,可提高患者相关知识知晓率,从而提高配合能力和影像检查质量。

PO-3584

癌症放疗患者自我管理影响因素及干预措施的研究进展

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背景介绍:癌症已成为我国居民的主要死亡原因,而放疗是降低复发并延长生存的重要措施,除此之外,放疗还会损伤正常的细胞组织,引起放射性皮炎等相关特异性症状。自我管理作为一种二级预防策略,有利于预防和延缓并发症的发生与发展,已成为临床学者的研究热点之一。目的:本文对癌症放疗患者自我管理的现状、影响因素及干预措施进行综述,旨在为后续癌症放疗患者自我管理的进一步研究提供参考依据,以期提高癌症放疗患者的自我管理和生活质量。方法:通过检索 PubMed、Web of Science、Cochrane Library、中国生物医学文献数据库(CBM)、中国知网、万方数据知识服务平台和维普等数据库,检索时间为建库至 2022 年 4 月。结果:目前关于癌症放疗患者自我管理相关研究较少,但国内外学者对其关注度不断增加。通过总结发现,国内外癌症放疗患者自我管理水平均处于中等偏下,其主要影响因素包括人口学因素、社会心理因素、治疗和疾病因素,提高癌症放疗患者自我管理主要干预措施包括移动医疗、认知行为疗法、医养护一体化服务及健康教育。结论:未来的研究可进一步分析我国癌症放疗患者的自我管理水平及影响因素,探索切实可行的干预模式,为开发符合我国国情的癌症放疗患者自我管理干预措施提供参考。

PO-3585

直肠高分辨磁共振检查肠道准备技术与效果分析

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目的:直肠癌属于临床上最为常见的消化系统恶性肿瘤之一,随着医疗水平的不断进步以及磁共振设备的日益完善,其开始被广泛应用于直肠疾病的诊断中,然而高分辨率的 MRI 诊断价值受多种因素影响,其中直肠内容物干扰以及直肠运动影响最为严重。目前部分医院有针对直肠高分辨 MRI 检查进行灌肠护理来清洁肠道,而部分医院嘱咐患者检查前使用开塞露进行清洁肠道,方法并不统一。因此,以直肠高分辨磁共振检查肠道准备的方式选择为切入点,利用前期基线调查的数据,结合国内外肠道清洁程度标准与选择,并通过临床实践验证肠道准备有效性。为护士对此类患者的肠道准备护提供了依据,是提高检查成功率、图像质量、家属满意度、护士工作效率的关键,具有重要的现实意义及应用价值。

方法:1、构建直肠高分辨磁共振检查前肠道准备标准:首次将肠道清洁程度与检查成功率客观指标相结合,通过图像质量来评价最适合直肠高分辨磁共振检查的肠道准备方式。确定此类患者最适应的肠道准备方式,使护士在对患者进行肠道准备时有章可循、有据可依;2、建立直肠高分辨磁共振检查前的护理方案:确定适合此类患者的肠道准备方式后,形成规范化护理,以及肠道准备流

程。3、设计盆腔磁共振 KPI 资料收集表格：设计表格长期对此类患者进行质控，持续进行质量监控。

结果：提高了直肠高分辨磁共振检查患者的总检查成功率、一次性检查成功率，缩短了患者准备检查时间，提高了图像质量达标率以及患者及家属的满意度。

PO-3586

碘对比剂急性不良反应危险人群风险筛查表的设计与应用

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目的：编制适合 CT 增强检查碘对比剂急性不良反应危险因素的筛查表，为早期筛查危险因素提供科学有效的工具。

方法：采用基于前期真实世界大数据的临床观察结果，参考国内外文献形成碘对比剂急性不良反应危险因素筛查量表条目池；采用德尔菲专家咨询法对条目池和指标重要程度进行修订和调整，形成碘对比剂急性不良反应危险因素风险筛查初表。选择 2021 年 1 月-12 月 CT 增强的患者为研究对象，采用量表对其进行统计分析，判断量表的预测效能，确定危险程度划分范围，形成最终量表，并评价该量表的信效度，以验证该量表的科学性、实用性和可行性。

结果：最终形成的碘对比剂急性不良反应危险因素风险筛查量表包括严重心脏疾病、2-3 级高血压、ICM-ADR 过敏史、不稳定性哮喘、 β -受体阻滞剂、肿瘤（化疗）、高龄 ≥ 70 岁和焦虑共 8 个条目，风险程度分为高风险、低风险和未知风险三种。研究过程一共纳入 57354 例患者，不良反应发生 226 例，轻度 209 例，中度 15 例，重度 2 例。使用风险筛查表筛查出轻度 210 例，中度 14 例，重度 2 例，其中筛查为轻度患者中 98% 发生了轻度不良反应，筛查为中度患者中 93% 发生了中度不良反应，筛查为重度患者中 100% 发生了重度不良反应，风险筛查表的应用具有一定的风险检出率。采用 Kappa 一致性检验进行统计推断，Kappa 值 >0.75 ，说明两者一致性较好。

结论：风险筛查表可以提高急性不良反应风险因素的检出率，使护理人员能够迅速而准确地评估患者的风险，对不同风险级别的患者采取个体化的预防策略，以减少不良反应的发生，提高患者的安全性。因此，风险因素严重程度评价量表可作为划分风险级别的客观依据，具有一定的临床意义。

PO-3587

中心静脉导管在影像科对比剂高压输注安全性应用研究

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高压输注造影剂如何选择静脉通道？近年来，各种静脉输液工具如 CVC、PICC、PORT 在临床上已得到了普及和推广，但这些输液工具又有不同的品牌、型号和材质，高压输注造影剂时对输液工具又有特殊的要求，如选择和使用不当，有可能导致静脉导管破裂、造影剂外渗等并发症的发生，因此有必要对输注造影剂的输液工具的选择进行研究和整理。

PO-3588

临床护理路径标准在核磁共振增强护理中的应用效果分析

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目的：研究临床护理路径标准应用于 CT 增强护理中的效果。方法：我院于 2022 年 6 月~2023 年 6 月共抽取了 200 例实行核磁增强检查患者，通过抽签方法分组分为试验组与参照组 2 个组别，每组均各 (n=90)。试验组施行临床护理路径，参照组施行一般护理，对比两组护理效果间的差异。

结果：①试验组的增强检查时间，与参照组的增强检查时间比较，存在明显差异性， $P<0.05$ 。②试验组的护理满意度，与参照组的护理满意度对比，具有统计学的差异， $P<0.05$ 。结论：核磁增强护理中实行临床护理路径，在缩短增强检查时间、提高患者护理满意度方面的优势突出，建议在临床方面应用。

PO-3589

精细化护理在影像安全管理中的综合措施

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空军军医大学西京医院

随着医疗科技的迅速发展，精细化护理在危重患者管理中扮演着越来越重要的角色。本研究旨在探讨精细化护理在放射科危重患者管理中的应用，以提升影像安全管理水准。为此，我们采取了一系列综合措施，旨在为危重患者提供最为周到的照护与安全保障。以下是我们实施的具体措施，这些措施可以确保在放射科进行磁共振检查时，危重患者得到了最为细致的照顾与安全保障：

1. 无磁监护仪的应用

配备了先进的无磁监护仪，这一措施保障了成人和小儿患者在检查期间血压、脉搏及血氧饱和度的实时监测。特别是对于危重患者，我们始终保持着密切的生命体征监测，以便随时应对可能发生的突发情况。

2. 专用患者搬运软担架的使用

配备专用患者搬运软担架，这在所有卧床患者进行磁共振检查时起到了至关重要的作用。卧床患者的搬运均必须使用专用担架，以保证患者在搬运过程中得到最大程度的舒适与安全。

3. 无磁担架的应用

配备了无磁担架，主要用于脊柱、脊髓损伤患者检查期间的搬运。

4. 无磁轮椅的使用

针对下肢行动不便的患者，配备了无磁轮椅，主要用于磁共振检查期间的搬运。这一措施极大地提升了患者的舒适度，同时也为医护人员的工作提供了便利。

5. 安全约束带的应用

为了防止肌力较弱或躁动的患者在检查期间出现安全隐患，配备了安全约束带。这一装置在保障患者安全的同时，也为医护人员提供了可靠的保障。

6. 无磁氧气罐的配备

鉴于氧气袋压力和存氧量有限的情况，特别是在检查部位相对较多时，科室配备了无磁氧气罐，以保证危重患者在检查期间能够获得足量的氧气供给，确保了患者的安全。

通过这一系列综合措施的实施，我们科在危重患者管理中的精细化护理模式得到了充分的应用。这些综合措施的实施不仅能够全面了解患者的身体状况，也确保了在检查过程中能够随时应对患者的突发情况。因此，我们在影像安全管理的水准上迈出了坚实的一步，为危重患者的安全保障提供了可靠的基石，旨在科技与人文关怀相结合的基础上，为每一位患者提供最贴心与专业的服务。也为

放射科医护团队的日常工作提供了有力支持。我们深信,在精细化护理模式的不断优化下,我们将能够进一步提升危重患者的安全管理水准,为医疗服务的质量和效率贡献更大的力量。

PO-3590

基于一体化信息集成平台的医学影像检查预约服务模式创新管理

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[摘要] 目的 创新医学影像科检查预约模式,建设一体化信息平台并优化管理模式,满足临床及患者需求。方法 应用一体化信息系统平台,根据医院临床需求在检查预约管理、检查项目管理、冲突规则设置、排班管理、基础信息管理等方进行优化和完善,并在系统平台上设置相应的管理模块,建立适用于一体化信息系统平台的影像检查预约分诊流程和管理模式。结果 借助一体化信息系统平台,科学设计预约分诊流程,开发完善电子预约检查申请模块,优化的预约登记流程和管理模式,根据检查项目的特殊及目的性优化安排先后顺序。结论 通过系统的实施,有效降低患者窗口排队时间、多项目检查往返医院次数及在医院检查等待时长,为患者提供优质服务的同时节省人力资源成本。

PO-3591

《PDCA 循环在提高盆腔增强检查前肠道准备完备率中的应用效果》

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目的 回顾我院 2022 年 1 月-5 月放射科数据统计显示,盆腔 CT 和 MRI 增强检查因未进行肠道准备及准备不合格造成延迟检查的例数 252 例。为此确定运用 PDCA 管理模式去改善上述现象,分析 PDCA 循环模式在提高盆腔增强检查前肠道准备完备率中的应用效果。

方法 选取 2022 年 6 月 1 日-6 月 30 日,前来放射科做盆腔增强检查的患者 120 例(排除因造口、造瘘、急腹症等不能或无需肠道准备的患者)作为对照组,进行问卷调查并结合影像图像后得出改善前肠道准备完备率。根据 PDCA 管理模式运用鱼骨图分析原因,并根据原因拟定对策,对策包括统一宣教内容、对宣教人员进行同质化培训、制作健康宣教单、完善检查的流程、设置检查前短信微信温馨提醒等。对策实施后选取 2022 年 9 月 1 日至 9 月 30 日,前来放射科做盆腔增强检查的患者 120 例(排除因造口、造瘘、急腹症等不能或无需肠道准备的患者)作为观察组,进行调查问卷及结合影像图像计算肠道准备完备率。结果 应用 PDCA 管理模式后得出观察组检查前肠道准备的完备率为 93.3%,明显高于改善前(50.8%),差异有统计学意义($P<0.05$)。结论 应用 PDCA 管理模式提高了我院盆腔增强检查前肠道准备的完备率,提升了影像图像的精准度,减少了患者因肠道准备不充分造成患者延迟检查而引起患者的不满,减少了患者重复检查所造成的不必要辐射与检查费用。提高了放射科的护理质量也得到了患者的认可,提升了患者的满意度,并降低了医患纠纷的发生率。

PO-3592

《基于钉钉平台放射科护理交班日志模板的构建和应用》

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【摘要】 目的 探讨钉钉平台日志模板在放射科护理交班中的应用效果。方法 采用文献查询、管理组会议等方法,根据放射科临床需求及现有的护理班次自行构建 15 个日常交班模板,4 个不良事件交班模板,日常交班模板项目包括各岗位的工作量、科室对比剂库存、有无不良事件发生、机器设备运行情况、急救仪器设备保养维护、各区域 6S 完成情况及其他需要交班的内容等;不良事件交班模板项目包括患者资料、检查相关信息、患者出现症状及处理过程、随访等。通过护理组长通过访谈护士对交班日志的使用感受,收集交班日志使用后不良事件发生率,评价清单应用效果。结果 科内 16 名护理人员 (94.1%)认为使用钉钉交班日志模板方便、快捷;科内 15 名护理人员(88.2%)认为日志模板设计合理,内容全面,能快速完成相关内容的填写并提交,高效、方便;使用钉钉交班日志模板后,能实时反馈科室每个区域的工作情况,同时给护理人员带来正性使用感受。结论 借助钉钉平台的护理交班日志模板实现了数据自动保持及共享,优化了护理环节质控流程,提高了放射护理质量,便捷了护士交班工作,节约了时间,提高了工作效率,取得良好应用效果,值得推广借鉴。

PO-3593

个性化护理模式对老年肿瘤放射治疗影响的研究进展

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目的 随着全球人口老龄化的加剧和医疗技术的不断发展,老年人肿瘤患者的放射治疗需求也逐渐增加,然而,老年肿瘤患者往往存在多种疾病,身体状况较为脆弱,对放射治疗的反应也较为复杂和不稳定,个性化护理在老年肿瘤患者放射治疗中显得尤为重要,因此本文将探讨个性化护理在老年肿瘤患者中的应用效果。方法 采用文献回顾的方法总结国内外个性化护理对老年肿瘤患者身心乃至家庭等各个方面的影响。结果 国内外多种干预研究结果表明,个性化护理模式对老年肿瘤放射治疗患者的营养状态、生活质量、免疫功能、依从性、护理满意度等有积极影响,同时还能降低不良反应发生率、减轻焦虑、抑郁情绪等。结论 在老年肿瘤病人的放射治疗中应用个性化护理,可以有效改善患者身体、心理和社会关系,减轻疾病给患者带来的痛苦,并且可以促进医患关系的和谐发展,有较大的临床推广价值。

PO-3594

放射科护士急救事件应急能力水平及影响因素分析

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目的: 调查成都市某三甲医院放射科护士急救事件应急能力水平,并探讨影响因素。
方法: 2023 年 1—2 月对成都市某三甲医院 25 名放射科护士进行问卷调查,采用单因素和多元线性回归分析影响放射科护士急救事件应急能力的因素。
结果: 多元线性回归分析结果显示,急救应急演练频率和是否处理过急救事件是放射科护士急救事件应急能力的主要影响因素($P<0.05$),其中急救应急演练频率高,处理过急救事件的护士应急能力相对较高。92%以上的放射科护士认为有必要开展突发急救应急演练和应急培训。

结论：成都市该三甲医院放射科护士急救事件应急能力处于较高水平，应急演练频率和是否是否处理过急救事件是放射科护士急救事件应急能力的主要影响因素。护理管理者应采取针对性的应急演练和培训，以全面提高放射科护士的应急能力。

PO-3595

多层螺旋 CT 血管成像在下肢动脉闭塞检查中的护理干预与配合

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【摘要】目的 探讨下肢动脉多层螺旋 CT 血管成像检查中的护理配合及干预方法，保证检查的顺利完成。方法 回顾性分析 2021 年 12 月于我院行双下肢动脉造影的下肢动脉闭塞患者 98 例，对检查过程中的护理方法与干预措施进行总结分析。结果 98 例患者均穿刺成功，注药顺利，达到 CT 诊断要求。2 例患者因轻度过敏反应，局部身体运动造成部分层面显示不佳，但不影响诊断，其余患者均获得满意的重建图像。结论 多层螺旋 CT 血管造影是目前诊断下肢血管性疾病的重要且有效手段，正确及时的护理干预是减轻患者痛苦，避免过敏反应，保证检查成功，获得具有诊断价值的高质量图像的重要措施。

PO-3596

The endorsement of general and artificial intelligence reporting guidelines in radiological journals: a meta-epidemiologic study

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Objectives: To investigate the endorsement of reporting guidelines in radiological journals and explore associated journal characteristic variables.

Methods: This meta-epidemiologic study screened journals from the Radiology, Nuclear Medicine & Medical Imaging category, Science Citation Index Expanded of the 2022 Journal Citation Reports, and excluded the journals not publishing original research, in non-English languages, and instructions for authors unavailable. The endorsement of fifteen general reporting guidelines and ten artificial intelligence reporting guidelines was rated using a five-level tool: positive active, positive weak, passive moderate, passive weak, and none. The association between endorsement and journal characteristic variables was evaluated by logistic regression analysis.

Results: Our study included 117 journals. The top-five endorsed reporting guidelines were CONSORT (Consolidated Standards of Reporting Trials, 58.1%, 68/117), PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses, 54.7%, 64/117), STROBE (STrengthening the Reporting of Observational Studies in Epidemiology, 51.3%, 60/117), STARD (An Updated List of Essential Items for Reporting Diagnostic Accuracy Studies, 50.4%, 59/117), and ARRIVE (Animal Research Reporting of In Vivo Experiments, 35.0%, 41/117). The most implemented artificial intelligence reporting guideline was CLAIM (Checklist for Artificial Intelligence in Medical Imaging, 1.7%, 2/117), while other nine artificial intelligence reporting guidelines were not mentioned. The Journal Impact Factor quartile and publisher were associated with the endorsement of reporting guidelines in radiological journals.

Conclusions: The reporting guideline endorsement are suboptimal in radiological journals. The implementation of artificial intelligence reporting guidelines was extremely low. Their adoption should be strengthened to facilitate quality and transparency of radiological study reporting.

PO-3597

Use of virtual simulation-based training platform on thyroid ultrasonography in medical students: a randomized control trial

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Objectives: To compare the impact of virtual reality (VR) simulation teaching with traditional teaching methods on thyroid ultrasonography skills in medical students.

Methods: A total of 106 medical students who had finished basic medical courses were recruited and randomized to VR group and control group. All participants received 2 theoretical lessons, then followed by a practical class. The control group had traditional PowerPoint (PPT) teaching to learn the thyroid ultrasonography process, while VR group studied the complete process via the VR simulation platform after PPT teaching. All students took a skill examination to evaluate their performance after two weeks. They were scored by 2 examiners who were blinded to group assignment on the global rating scale of ultrasonography, with a total score of 40 points for 8 components. A month later, all participants were required to complete the thyroid ultrasound examination on the VR platform.

Results: Ninety-one students completed the program (VR group, n=47; control group, n=44). The score of VR group (median, 32.5; interquartile range [IQR], 29.5-35.0) outperformed the control group (median, 31.0; IQR, 27.5-33.0, p=0.028) on the global rating scale of thyroid ultrasound examination. Meanwhile, students in the VR group (mean score, 51.5; time, 16.2min) demonstrated better performance and less time than the control group (mean score, 44.3; time, 23.7min) when assessed in the VR platform.

Conclusions: The VR simulation platform of thyroid ultrasound examination demonstrated good performance in skill training for medical students, making it an alternative or additional approach to traditional teaching patterns in medical education.

PO-3598

The Application of Heuristic Teaching Method in the Practice for Qualified Professional Personnel of Medical Imaging

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[Abstract] **Objective** To explore the practice of heuristic teaching film reading, strengthen the theoretical knowledge and clinical practice ability of medical imaging residents, and improve the teaching quality of standardized training for medical imaging residents. **Methods** Teaching film reading was carried out around a case of children's posterior cranial fossa rich blood supply space occupying lesions. In the teaching activities, specific and highly operational teaching objectives were set, with medical imaging residents as the center. Through a series of hierarchical classroom questions, residents were guided to actively think and express, and their thinking ability, understanding and application ability were cultivated. In this process, the students' thinking ability has been trained. After the teaching activities, the resident doctors and other teachers at the same level are invited to rate the teaching effect. **Results** The atmosphere of teaching film reading was active, the teachers set up hierarchical and progressive questions, the residents had a high

degree of participation, actively answered questions, the interaction between teachers and students was good. After the teaching film reading, the feedback evaluation form is distributed in the form of electronic questionnaire to the regular training and teaching WeChat group. The teaching activity is evaluated from the aspects of teaching content, status, attitude, etc., and the teaching activity got a high score. Conclusion The heuristic teaching film reading in medical imaging department is operable, scientific and effective, which is helpful for residents in medical imaging department to improve their post competency.

PO-3599

STAR continuing education training model to enhance the scientific research ability of young imaging technicians

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Objective

To explore the reform of the training mode of radiology technicians, so as to improve the scientific research ability of young radiology imaging technicians.

Materials and Methods

Since December 2015, a series of measures aimed at improving the scientific research ability of young imaging technicians have been implemented in the Radiology Department of West China Hospital of Sichuan University, mainly including: Subprofessional group training、Tutor responsibility、Arrangement of research time and Reading-film session of technologists, known simply as the STAR mode.

Results

- ① In terms of paper publication, the total number of papers published as first author or co-first author by young technicians (≤ 40 years old) in our hospital has increased significantly, from 8.25 papers/year from 2012-2015 to 31.83 papers/year from 2016-2021, with an average annual increase of 285.82%. English SCI papers completed the "zero" breakthrough, increasing from 0 in 2012-2015 to 52 in 2016-2021, accounting for 27.23% of the published papers in the past six years.
- ② In terms of project fund application, the number of provincial and municipal projects approved by young technicians as the person in charge increased from 0.5 per year from 2012-2015 to 2 per year from 2016-2021, with an average annual increase of 300%.
- ③ In terms of patent applications, the number of patents granted to young technicians as first inventors increased from six in 2012-2015 to 71 in 2016-2021, an average annual increase of about seven times.
- ④ In terms of speaking at international conferences, the number of young technicians speaking at conferences also increased from 9 in 2012-2015 to 58 in 2016-2021.

Conclusion

STAR continuing education training mode can help young radiologists quickly improve their scientific research ability and speed up the process of training comprehensive imaging technicians.

PO-3600

MBO 理念下导师制联合定向提升带教的放射科新护士培训

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目的:探讨 MBO 理念下导师制联合定向提升带教的放射科新护士培训效果。

方法:对 2020 年-2022 年某医院放射科新入职护士 11 人进行阶段式实践培训,基于 MBO 理念通过制定目标-实施目标-检查实施结果三个步骤实施培训,并制定筑牢基础-巩固提升-综合融通三个阶段的教学培训方案。第一阶段采用一对一“跟班式”导师带教,将标准化、同质化教学的教学内容以思维导图的方式构建,同时也根据学生的具体情况落实个性化教学方案。第二阶段采用一对一“搭档式”导师带教,保证临床工作正常运转,并基于临床特殊案例进行即时教学。第三阶段采用急危重症救治能力定向提升带教,利用医院资源与临床科室实施联合带教,将新护士分批次送到抢救室,中心 ICU 以及各专科监护室轮转学习。用理论考核、技能考核及护士核心能力自评量表比较培训前后的理论、技能和岗位胜任能力得分。

结果:培训后理论、技能和岗位胜任能力,均高于规范化培训前,差异有统计学意义($P<0.05$)。

结论:基于 MBO 理念实施的导师制联合定向提升带教新护士培训取得了较好的成果,使教学目标明确且更具针对性,利于提高专项技术核心能力,拓宽专业视野,引领新护士全面正向的提升,从而提高了培训的质量和效率,解决了工学矛盾,也促进其职业认同感的提升。

PO-3601

以核心效能为导向的放射科护理教师培训模式改革与实践

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目的:以核心效能为导向改革放射科临床护理教师的培训培训模式,为提升临床护理教学效果奠定基础。

方法:选择 20 名有带教资格的护士进行教学能力培训,以核心效能为为导向,以“健康中国 2030”人才培养质量要求为指导,通过评估培训需求、文献分析,设计并实施临床护理教师教学能力培训项目。培训项目包括职业素养、专业能力、教学方法、教学技能、教学管理、教学科研六个维度。;并基于柯式模型构建评价方案,包括反应层面(教员对培训工作的满意度及意见建议)、学习层面(教教员对此次教学知识和技能的获得程度)、行为层面(教员的的教学行为表现)、结果层面(核心能力评价、被带教者对临床教学质量的评价)。比较培训前后临床护理教师教学能力。

表 1 以核心效能为导向教学能力培训方案

表 2 培训效果评价方案

结果:培训后,护理组长的教学设计能力、理论及操作授课能力、综合教学能力评分显著高于培训前($P<0.05$, $P<0.01$)。

结论:以核心效能为导向的放射科临床护理教师培训模式在方案设计上注重教师在多项教学能力指标上的提升,在改革实施上强调护理教师在“教”与“学”两个方面的参与体验,在实施形式上开展线上结合线下多维度的尝试,获得良好的培训效果。该模式有利于改善培训效果,提高培训效率,优化培训效益。

PO-3602

肿瘤专科医院影像科基于目标绩效管理方案的探讨

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近年来,肿瘤专科医院临床工作的效率逐渐下降,究其原因主要是影像科工作效率的低下导致。故而以资源为基础的相对价值系数(resource-based relative value scale, RBRVs)方法被作为核心理念,影像科单独的工作量统筹计算作为目标绩效管理方案,同时不断更新,并对 ECT 室进行单独的工作量统计,对放射以及 CT 室给予积极的支持。通过实施此方案,可以最大限度的完善奖励和惩罚机制,以此来保护和约束影像科医务工作者。通过初步的实施及探讨,肿瘤专科医院影像科整体工作效率明显提升,成本方面也得到大大的改善,影像科发展也逐渐扩大。由此可见,我们的方案得到充分的证明,并且是合理合规,能够最大限度的实现影像科医务工作者的价值,同时也能整体提升科室和医院的水平。

PO-3603

基于知识转化模型的心脏磁共振技术扫描教学方法研究

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目的:基于知识转化模型(Knowledge-to-action, KTA)探讨心脏磁共振(Cardiac magnetic resonance, CMR)扫描技术的教学方法与临床应用价值。方法:本研究以传统多媒体教学模式为对照组,通过知识产生和知识应用两个重要环节,建立基于知识转化模型教学课程。实验组与对照的纳入为 2021-2023 年我院医学影像技术专业 28 名本科生,两组分组培养后再行交叉培养,教学质量考核结果与满意度评价以独立样本 t 检验或卡方检验进行统计比较。结果:两组学生分别完成 25 例患者的 CMR 数据采集,全员参与率 100%。KTA 组在心肌组织特征识别环节中以 2.21 ± 0.13 学时,较对照组 2.45 ± 0.18 学时显著缩短($t=-2.95, P<0.05$),并取得优异测试成绩(KTA: 8.90 ± 2.10 分 vs. 对照组: 8.30 ± 1.80 分, $t=1.78, P<0.05$); KTA 组在心脏扫描定位,CMR 整体流程把控上成绩学时比低于对照组(5.93 ± 0.06 vs. 5.36 ± 0.10 , $t=-2.98; 13.02\pm1.32$ vs. 8.27 ± 0.97 , $t=-6.23, P<0.05$)。KTA 组学生的学习兴趣(9.3 ± 0.5 分)、临床自评(8.5 ± 0.4 分)、科研能力自评(9.1 ± 0.6 分)分数较高($\chi^2=4.69, 3.61, 3.86, P<0.05$),以及带教教师的评价显著占优($P<0.05$)。结论:KTA 模型可激发学生自主学习能动性,与传统教学模式相互补充,适度交叉,可凝练出最佳教学策略。

PO-3604

费曼学习法在应用于放射科住院医师规范化培训上消化道造影教学的可行性研究

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目的:探索费曼学习法(Feynman technique)应用于放射科住院医师规范化培训上消化道造影(upper gastrointestinal radiography, GI)的可行性。

方法:研究纳入了 5 名未体验过费曼学习法的住院医师,其中住培第一年住院医师 2 名,住培第二年 2 名,住培第三年住院医师 1 名。在指导医师的监督下,依据费曼学习法开展上消化道造影的理

论和实践教学活动。费曼学习法由四个步骤组成,包括确定目标、模拟教学、回顾反馈和简化归纳,其中模拟教学是其中中心环节,“以输出驱动输入”是其核心要义。本研究开展的理论和实践教学活均遵循确定目标、模拟教学、回顾反馈和简化归纳四个步骤。教学结束后,对住院医师开展问卷调查,评估费曼学习法与住院医师过往的学习经验之间的差异,师生共同讨论费曼学习法在教学过程中的问题和价值。

结果:教学实践表明,与住院医师过往的学习经验相比,费曼学习法具有以下潜在益处。(1)住院医师参与理论和实践教学的热情:费曼学习法比单纯观摩明显提高了教学的参与感,提高了住院医师将来自主开展 GI 检查的信心;(2)弥补实践机会不足问题:随着胃镜检查的普及,现今选择 GI 检查的患者数量有限,这一方法比传统观摩教学的简单重复更充分地利用了有限的教学资源。

(3)有助于培养住院医师的“软实力”:这一系列的教学活动可以直接锻炼住院医师在沟通合作、教学能力、终身学习方面的“软实力”,填补了目前放射科住培教学过程中的短板。然而,费曼学习法仍然存在教学准备较为繁琐,对指导医师相关知识要求较高等问题。

结论:费曼学习法在放射科住院医师规范化培训上消化道造影教学中具有可行性,有望取得较好的教学效果,但仍需要开展更大规模的对照研究加以验证。

PO-3605

我国放射科住院医师规范化培训研究热点和趋势的可视化分析

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目的:通过对我国放射住院医师规范化培训(简称住培)发表的文献进行数据可视化分析,探讨放射科住培的研究热点和趋势,以期开展放射科住培相关研究提供参考。

方法:检索中国知网数据库 2013 年 1 月至 2023 年 6 月收录的放射科住院医师规范化培训相关文献,并采用中国知网的分析功能及 CiteSpace 软件对发文时间、作者、机构、期刊以及关键词进行可视化分析。

结果:本研究采用检索式:TKA=“放射+影像”AND TKA=“住院医师规范化培训+住培”进行高级检索得到 385 篇文献,人工浏览筛选共纳入 217 篇文献进入后续分析。相关文献发文量呈逐年上升的趋势,近年来每年发文量稳定在 30 篇左右。研究机构和作者主要来自高等医学院校附属医院。研究机构之间的合作联系十分松散,主要是各高等医学院校的附属医院,研究合作主要局限于同一医院内部的各个科室,不同医院之间的合作罕见。研究者间缺乏交流合作,研究团队内部的合作较为频繁,但研究团队之间的交流合作较为罕见。关键词频数排在前三位的为住院医师(76 篇)、放射科(46 篇)和教学(19 篇),中心性排在前三位的为住院医师(0.60)、放射科(0.30)、教学(0.17)。关键词聚类 and 突现词图谱提示,发现教学改革和核心胜任力是长期受到关注的研究热点,住培管理的研究可能是未来新的趋势,可以重点关注的领域包括以核心胜任力为抓手的教学理念转变、以住院医师为中心的教学方法改进和以长效管理为重点的教学制度改革。

结论:虽然我国放射科住培教学研究已有长足发展,但仍需要引导研究者和研究机构开展合作,以期产出高水平、可推广的成果,从而提升放射科住培质量,培养更多合格的放射科住院医师。随着放射科住培制度逐渐稳定,研究热点可能从制度的草创建设转向长效管理,与之对应的教学模式和方法仍需不断创新。

PO-3606

角色互换教学融合 PDCA 循环在放射科教学阅片中的应用研究

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目的 探讨角色互换教学融合 PDCA 循环在放射科教学阅片中的应用及效果评价。**方法** 选取 2020-2022 年在陆军军医大学大坪医院放射诊断科参加住院医师规范化培训(以下简称住培)的 28 名学员作为实验组; 2017-2019 年参加住培的 21 名学员作为对照组。实验组采用角色互换教学融合 PDCA 循环模式, 对照组采用传统教学法, 比较两组的教学效果。**结果** 实验组的理论考核成绩 (86.11 ± 4.52) 高于对照组 (81.42 ± 4.23), 差异有统计学意义 ($P < 0.05$); 实验组的实践能力考核成绩 (91.27 ± 5.12) 显著高于对照组 (83.3 ± 5.31), 差异有明显统计学意义 ($P < 0.01$)。实验组在提高学习效率、自学能力、文献查阅能力方面优于对照组, 差异有统计学意义 ($P < 0.05$); 在提高学习兴趣、教学能力、交流沟通能力、团队合作能力、临床思维能力方面明显优于对照组, 差异有明显统计学意义 ($P < 0.01$)。**结论** 角色互换教学融合 PDCA 循环是一种全新的教学模式, 在放射科教学阅片中具有较好的实用性, 值得在实践教学推广应用。

PO-3607

布鲁姆学习目标分类法在影像科实习护生周计划教学中的应用效果

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目的 探讨布鲁姆学习目标分类法在影像科实习护生周计划教学中的应用效果。**方法** 收集 2021 年 7 月-2023 年 7 月某大型三甲医院影像科的 140 名护生为研究对象, 随机分为对照组和观察组, 每组各 70 例。对照组行传统周计划教学带教, 对照组行以布鲁姆目标分类法(识记、理解、运用、分析、综合、评价)为导向并结合影像科周计划教学带教。比较两组的出科理论成绩、操作成绩及教学满意度。**结果** 两组护生出科理论成绩, 观察组为 (94 ± 5.5) 分高于对照组 (83 ± 6.5) 分, 比较有统计学意义 ($P < 0.05$); 两组护生出科操作成绩, 观察组为 (95 ± 4.5) 分高于对照组 (84 ± 7.5) 分, 比较有统计学意义 ($P < 0.05$); 两组带教老师对护生教学满意度, 观察组为 (93 ± 6.5) 分高于对照组 (80 ± 7.5) 分, 比较有统计学意义 ($P < 0.05$); 两组护生对带教老师教学满意度, 观察组为 (94 ± 4.5) 分高于对照组 (86 ± 7.5) 分, 比较有统计学意义 ($P < 0.05$)。**结论** 通过以布鲁姆目标分类法循序完成周计划教学在影像科实习护生带教实践, 培养护生的对影像护理知识不断探索, 提升护生学习积极性, 提升临床教学质量; 同时也提高带教老师的责任心, 提高了学生对带教老师的满意度。

PO-3608

安宁市紧密型医共体与“千县工程”下医学影像中心构建模式

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目的: 探讨安宁市紧密型医共体与“千县工程”下影像诊疗中心构建模式。**方法:** 1、收集国家及政府关于紧密型医共体与“千县工程”下医学影像中心相关政策支持; 2、紧密型医共体与“千县工程”下医学影像中心建设的前期筹备; 3、紧密型医共体与“千县工程”下医学影像中心建设的现状; 4、

医学影像中心建设的未来规划。结果：1、国家政策各级政府的支持，《国务院办公厅关于推进医疗联合体建设和发展的指导意见》；《国家卫生健康委办公厅关于印发“千县工程”县医院综合能力提升工作方案（2021-2025 年）的通知》；《云南省人民政府办公厅关于推进医疗联合体建设和发展的实施意见》；《关于推进医联体医共体建设和发展的实施意见》；《国家卫生健康委办公厅关于印发“千县工程”县医院综合能力提升工作方案（2021-2025 年）的通知》；2、组织中心骨干成员人员赴国内深圳模式医学影像中心进行考察学习；多次组织中心人员前期筹备培训会议；多次组织中心人员建章立制的讨论会，并建立区域影像诊疗中心章程、制度 189 条，影像中心质控体系建立。3、2019 年 5 月安宁市紧密型医共体下区域影像诊疗中心正式挂牌，初步建立医学影像中心模式：医学影像中心信息网络互通，下至乡镇卫生院及社区卫生服务中心，实现信息系统资源共享；影像中心人员及绩效系统整合；设备统一管理；4、成效：（1）影像检查结果互认，减少重复检查；（2）充分利用医共体直通车，实现 3 院区影像检查互通，设备得到高效应用；（3）成立了“医共体外周血管及综合介入诊疗中心”，安宁区域相关患者集中救治；（4）移动 CT 检查定时下基层，避免设备重复投资；（5）组建区域影像诊疗中心科研及教学团队；（6）联盟医院业务扩展，目前已联网 8 家联盟医院，实现影像资源互通；5、医学影像中心建设的未来规划，加强中心内涵建设，扩大区域影像辐射范围，目前建设的南亚及东南亚远程影像中心，已联网泰国拉察威提综合医院及缅甸地区医院，拟申报国家项目。结论：安宁市紧密型医共体与“千县工程”下医学影像中心模式的构建，实现资源共享，本区域的医疗资源得到健康发展，使人民群众共享同质化、均等化的医疗卫生服务。

PO-3609

医学影像技师规范化培训在毕业后教育中的意义

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医学影像技术专业目前在我国设立时间较短，医学影像技术人才的培养还在摸索中，没有明确的培养体系和方法。但是，现阶段全国已有数家医院开展了医学影像技术规范化培训，本文仅以重庆医科大学附属第一医院医学影像技师规范化培训体系为例，探讨医学影像技师规范化培训在毕业后教育中的意义。

1. 培养具有责任感，专业能力过硬及良好的岗位胜任能力的医学影像技师。随着医学影像技术的发展，院校课程更新缓的兴趣，进一步为日后的临床工作和求学打下科研的基础。
2. 管理能力的培养。重庆医科大学附属第一医院对规培技师进行轮流做小组长的管理办法，在带教老师的指导下，在科室进行放射科设备机长的推荐与选拔慢，甚至发生脱节，部分院校未开设相关的人文关怀课程及 CT/MRI 相关的诊断课程，导致毕业生的岗位胜任能力不足，无法快速适应与临床相关的工作。让每一位规培技师得到管理经验的锻炼。重庆医科大学附属第一医院采用线上线下相结合的方式，主要以分时间理论考试，讲-影像技术，影像黄金瞳等课程，辅以规培技师讲座等相关方法，培养规培技师的理论知识及人文关怀。实践是检验真理的唯一标准，在理论学习的同时，由各高年资教师对规培技师进行上机指导，放手不放眼，且对实践培训进行分段考核，确保规培技师能够独立上岗直至胜任临床相关工作。
3. 医学影像技师科研能力的培养。重庆医科大学附属第一医院放射科遴选出具有相关带教经验，精力充沛且理论知识扎实的科研导师，与规培技师进行双向选择，进行相关的科研工作。从科研方向的确立，数据的搜集，直到统计学分析，文章的撰写等，由科研导师一对一指导。医学影像技师若想成为相关领域的佼佼者，不仅局限于机器的操作，更应带着问题去分析，思索，探讨以至发展为科研工作，规培技师可以通过自我报名后进行筛选，逐步成为某台设备的机长，在技师长的带领下对相关设备进行管理。在此基础上，通过实行管理过程后自我评价，同事评价及带教老师评价，衡量管理能力的提升与否。在重医附一院放射技师规范化培训的过程中，注重对规培技师管理能力的培养，培养规培技师向优秀的技师长发展。

PO-3610

武汉协和医院放射科管理经验浅谈

郑传胜

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为进一步推进放射科学学科建设,规范和加强学科的建设与管理,以管理促质量,以管理促优质服务,以管理促发展,协和医院放射科实行以分级指标为评价标准和策略制定依据的全方位、综合性管理方法。分级指标包含 5 个一级指标、10 个二级指标和 15 个三级指标,以一级指标为纲要,逐渐细化,分别从领军人才、学术任职、人才培养、梯队建设、重点实验室及平台、学术论文、科研获奖、行业标准指南及共识情况、专利转化与新药研发、科研项目、医疗总体水平、学科方向及特色、社会服务特色与贡献、复旦排行榜、中国医院科技量值 15 个方面对科室进行全方位评价,具体评价由党委、纪委、科研处、人事处、人才办、医务处、研究生科及教学办公室等医院行政管理部门完成。科室再根据评价结果,结合实际情况细化下一步工作目标和方向,合理布局,逐个突破,循环往复。经过 5 年不懈的努力和实践,放射科排名跃升为协和医院 A 类学科,实现了重点项目、高分高引文章、国际指南、医疗总体水平满分、全国高校青年教师教学竞赛一等奖、全国五一劳动奖章的历史性突破。实践证明,以促发展为指导思想、以分级指标为脉络的全方位管理方法有效提高了科室医、教、研等各方面的水平,促进了学科建设和全面发展。

PO-3611

胸腹主动脉混合现实技术在 Stanford A 型主动脉夹层中的临床应用

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目的 探究胸腹主动脉混合现实 (mixed reality, MR) 技术和计算机断层血管造影 (computed tomography angiography, CTA) 技术在 Stanford A 型主动脉夹层中的临床应用价值。方法 前瞻性收集拟行胸腹主动脉 MR 和 CTA 检查的患者 80 例,随机分为组 A (胸腹主动脉 MR 组) 和组 B (胸腹主动脉 CTA 组)。将组 A 生成的 CTA 数据导入至可视化三维 (three-dimensional, V3D) 建模软件进行 3D 建模,并完成 MR 结果发布;组 B 则进行胸腹主动脉 3D-CT 重建技术。采用独立样本 t 检验对两组患者一般资料进行分析。两组计数资料采用 χ^2 检验;等级资料采用 Wilcoxon 检验。Kruskal-Wallis 检验用于比较连续变量。评价者的主观一致性评价采用 Kappa 检验。对两组的围手术期指标和临床应用价值进行比较。结果 两组在年龄、体重、身高、性别、身体质量指数、高血压、心血管疾病、脑血管疾病、糖尿病和 DeBakey 分型指标上无明显差别 (均 $P > 0.05$)。组 A 在“手术时间、体外循环辅助时间、主动脉阻断时间、选择性脑灌注时间和术中血浆输注”指标上较组 B 分别减少约 15%、24%、20%、20%、22%和 20%。组 A 在“手术方案制定、术中实时导航、远程会诊和医患沟通”四方面的临床应用价值进行主观评分均高于组 B (均 $P < 0.05$)。结论 胸腹主动脉 MR 技术在急性 Stanford A 型手术治疗上,较腹主动脉 CTA 技术相比,可更有效的改善围手术期指标;并进一步证实胸腹主动脉 MR 技术的临床应用价值。

PO-3612

利用增强现实技术辅助肝胆系统 PBL+CBL 影像学教学

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目的 由于肝胆系统解剖结构复杂, 医学生在学习相关内容时往往不容易理解病变与邻近解剖结构的关系。最近出现的增强现实 (Augmented Reality, AR) 技术可将传统的二维 CT 或 MRI 图像转变为真实空间内的可视化实体, 除了能够使医学生全方位感知各种解剖结构在三维空间上的毗邻关系外, 还可以用虚拟的方式提供直接与各种解剖结构进行互动的途径。这一新兴技术丰富了影像学信息的展现方式, 理论上可以增强医学生对复杂解剖结构的理解与认知。本研究尝试在肝胆系统影像学 PBL+CBL 教学 (PBL: 基于问题的教学法, problem-based learning; CBL: 基于病例的教学法, case-based learning) 中应用增强现实技术, 评估该技术对教学效果的影响。

材料与方法 选取 2023 年 6 月-7 月间在华中科技大学同济医学院第一临床医学院临床实习的影像专业本科 40 名, 随机平均分为实验组 (n=20) 与对照组 (n=20)。在实验组中, 教师将肝胆系统病例利用 AR 技术进行展示, 并探讨相关问题。在对照组中, 对相同的病例, 以传统方式进行教学。教学结束后, 让实验组和对照组学生填写随堂发放的无记名问卷评分量表。量表尝试从学习兴趣程度、认知负荷、技术接受度三方面来评估学生的学习效果。运用 Prism8.0 对实验组及对照组的问卷调查评分进行统计分析。

结果 在兴趣程度评价方面, 实验组与对照组在关于学习兴趣的问题上存在显著性差异。在认知负荷评价方面, 实验组与对照组在降低认知负荷上有显著性差异。教学接受度方面, 参与的学生整体上认为 AR 技术有助于学习质量的提升。

结论 增强现实技术在一定程度上有助于提升肝胆系统的影像学教学质量, 在今后影像学教学中存在潜力。

PO-3613

基于增强现实技术的多模态影像融合在本科医学生教学中的应用

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目的 研究基于增强现实 (Augmented Reality, AR) 技术辅助的脑部多模态磁共振重建与融合的认知学习在本科临床医学生中的应用效果。

方法 选取华中科技大学同济医学院影像专业临床实习学生 40 名为研究对象, 随机平均分配至观察组和对照组。教师以临床真实胶质瘤病例为基础, 利用武汉联影智融医疗科技有限公司规划软件对原始 T1/T2-Flair、DTI、BOLD 磁共振序列 DICOM 数据进行重建与融合, 实现病灶及周围解剖结构的三维可视化, 直观展现颅内病变、纤维束、脑功能区的血氧水平依赖情况。观察组先整体观察 AR 设备中的可视化三维模型, 进行位置拖动、转换视角等基本交互操作, 再通过交互模块中的隐藏或显示组织、模型透明度调节等功能由教师逐一讲解其中的每层组织或结构的知识, 让学生理解该组织结构与其他组织间的空间位置关系及其作用与意义, 如病变肿瘤所处的相对位置; BOLD 序列的作用、功能、在重建模型上是何种形态; 脑纤维束的生理作用等。教师讲解完毕后让学生自行实践操作模型, 体验其中各项交互功能。对照组按照常规教学流程由教师授课以平面阅片系统进行学习, 教学结束后, 随堂发放问卷评分量表。运用 Prism 8.0 对观察组及对照组的问卷调查评分进行统计分析, 采用秩和检验方法, 当 $p < 0.05$ 时, 即认为有统计学意义。

结果 在不同教学模式带来的兴趣程度的评价中, 观察组在每项体验中均有超过半数参与者认同 AR 技术能够在一定程度上提高学习动力、提升知识学习兴趣与对课程的期待等, 而对照组教学模式中仅有少部分人认同当前的教学模式能够使自身在学习兴趣上有所提升。观察组在减轻学生认知负荷, 提升教学效率和质量上较对照组而言效果更佳。观察组的参与者对 AR 技术在教学中的应用有较大的认可与接受度。在各项评价中, 观察组的效果均优于传统教学组, 且有显著性差异 ($P < 0.05$)。观察组的参与者对 AR 技术用于医学课堂中整体表现为积极态度。

结论 聚焦于脑部多模态影像序列的相关知识学习中, AR 技术在提高教学效率和质量上有一定优势。

PO-3614

德国心血管影像中心研修经历对学科建设的启发

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在德国一年的研修实践,让我深刻体会到德国医务人员是如何重视医疗质量和安全,如何规范医疗工作的各个环节,如何细致入微地关爱患者,如何有效进行多学科合作,如何建设高水平的临床研究平台。笔者认为,本人所在医院相关学科建设应从以下几个方面进行改进。一是提升医疗服务水平要重视医疗安全、规范流程、多学科合作;二是医务人员要更加关爱患者,良好的医患协作关系是促进医疗技术进步和开展高水平临床研究的保障;三是进行高水平的临床转化研究需要建设良好的科研平台,其中最为重要的是多学科和多中心的项目合作,规范性的数据采集和建设系统性的数据库。构建类似德国这种心血管影像转化研究所可以对提升医疗服务专业化程度和临床研究水平起到积极的作用。

PO-3615

云影像教学数据库在医学影像学实习生实践中应用研究

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目的 探讨云影像教学数据库在医学影像学实习生临床实践中应用研究。**方法** 研究选择 2021 年 2 月-2022 年 2 月在宁波大学附属第一医院实习医学影像学实习生 16 名,随机分为试验组和对照组,分别实施云影像教学数据库平台和传统教学模式教学对比两组实习生实践阅片考核、报告书写被修改率(报告修改量/书写报告总量)及指导老师对实习生评价等情况。**结果** 试验组实习生实践阅片考核成绩(79.88±5.52)分和指导老师对实习生良好评价成绩优秀率(62.50%)显著高于对照组(78.63±6.26)分、(12.5%),其报告书写被修改率(36.71%)显著低于对照组(43.56%),差异具有统计学意义(P<0.05)。**结论** 云影像教学数据库有利于发挥实习生的主观能动性,突破时间和空间的限制,提高了实习生临床阅片实践能力,对传统教学模式有很大补充作用。

PO-3616

紧密型医共体与“千县工程”融合推动影像学科高质量发展研究

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目的: 探讨安宁市紧密型医共体与“千县工程”融合推动影像学科高质量发展的研究价值。**方法:** 1、收集国家及政府关于紧密型医共体与“千县工程”相关政策支持;2、通过人员、设备、技术的共享,提升基层医院服务能力;3、通过建立影像中心与基层医院章程制度,实现同质化管理;4、通过建立基层远程诊疗体系,实现信息互联互通,结果互认。**结果:** 1、国家政策各级政府的支持,《国家卫生健康委办公厅关于印发“千县工程”县医院综合能力提升工作方案(2021-2025 年)的通知》国卫办医函(2021)538 号,《安宁市医疗共同体落实国家“千县工程”暨云南省“百县工程”县医院综合能力提升工作实施方案(2021-2025 年)的通知》安医共体(2022)73 号;2、2019 年 5

月安宁市紧密型医共体下区域影像诊疗中心成立，2023 年 4 月“千县工程”医学影像中心示范中心创建正式启动；3、影像中心及基层医院工作效能明显改善，具体表现为：（1）DR、CT、MRI 设备利用率均有显著提升，其中移动车载 CT 基层临床服务能力提升 38.83%，实现安宁区域内基层医院 CT 检查全覆盖；（2）影像诊断符合率、员工满意率及患者满意率分别提升 1.6%、8.1%，3.8%；（3）建立影像中心及基层影像与“临床五大中心”、“急诊急救五大中心”联动闭环模式；4、安宁市紧密型医共体与“千县工程”融合后患者影像检查费用（与总费用）占比降低 1.26%。5、引入人工智能工具，基层医院及中心早期肺癌检出率明显提升。结论：安宁市紧密型医共体与“千县工程”的融合，实现资源合理布局，提升县域医疗卫生服务能力，进一步推动影像学科高质量的发展。

PO-3617

STAR 继续教育培养模式提升青年影像技师科研能力

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目的探讨对放射科技师的培养模式进行改革，达到提高放射科青年影像技师科研能力的目的。

材料与方法

2015 年 12 月起，在四川大学华西医院放射科科室实施了旨在提高青年影像技师科研能力的一系列措施，主要包括：亚专业分组培训（Subprofessional group training）、导师责任制（Tutor responsibility）、科研时间安排制度（Arrangement of research time）及技师读片会（Reading-film session of technologists），简称为 STAR 模式。

结果①在论文发表方面，我院青年技师（≤40 岁）以第一作者或共同第一作者身份发表的论文总数有明显的上升，由 2012—2015 年的 8.25 篇/年上升至 2016—2021 年的 31.83 篇/年，年均增幅约为 285.82%。英文 SCI 论文则完成“零”突破，由 2012—2015 年的 0 篇，增至 2016—2021 年的 52 篇，占近 6 年发表论文的 27.23%。

②在课题基金申报方面，青年技师作为负责人获批的省市级项目由 2012—2015 年的 0.5 项/年升至 2016—2021 年的 2 项/年，年均增幅为 300%。

③在专利申请方面，青年技师作为第一发明人获得的授权专利由 2012—2015 年的 6 项升至 2016—2021 年的 71 项，年均增幅约 7 倍。

④在国际会议发言方面，青年技师的大会发言也由 2012—2015 年的 9 人次升至 2016—2021 年的 58 人次。

结论 STAR 继续教育培养模式可有助于放射科青年影像技师迅速提升自身的科研能力，加快培养全能化影像技师的进程。

PO-3618

Evaluation of image quality of spectrum CT with different single energy imaging in portal vein and abdominal aorta

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Objective: To compare and evaluate the image quality of abdominal aorta and portal vein in spectrum computed tomography(CT) single-energy imaging with different KeV, and to explore the KeV value of optimum image quality.

Methods: Twenty patients were prospectively enrolled. GE Revolution CT was used to perform enhanced upper abdominal scan. Adaptive statistical iterative reconstruction (ASIR) were set with 40%, 50%, 40%, and 30% for true non-enhanced abdominal scanning, enhanced abdominal scanning in arterial phase, portal vein phase, and delayed phase, respectively. The filter back projection (FBP) and ASIR reconstruction algorithm were used for imaging reconstruction. The arterial phase and portal phase tube voltage was 110kV, and tube current was automatic. The average CT value and noise of abdominal aorta and portal vein were measured at 50, 60, 70 and 80 keV in arterial phase, portal vein phase respectively, and the signal-to-noise ratio (SNR) value were calculated and compared pair-to-pair.

Results: The SNR values of portal vein in arterial phase were 4.50 ± 2.24 , 4.46 ± 2.24 , 4.68 ± 1.99 , 4.73 ± 1.88 , respectively. There was no significant difference between groups, $p > 0.05$. The SNR values of portal vein in portal phase were 10.58 ± 4.49 , 10.12 ± 4.04 , 9.56 ± 3.57 , 8.97 ± 3.09 , respectively, and there was no significant difference among groups, $p > 0.05$. The SNR values of abdominal aorta in arterial phase was 18.24 ± 6.27 , 16.88 ± 5.76 , 16.88 ± 5.76 , 13.75 ± 4.43 , and there was no significant difference among groups, $p > 0.05$. The SNR values of abdominal aorta in portal phase were 12.13 ± 4.23 , 11.40 ± 3.85 , 10.59 ± 3.44 , 10.88 ± 1.81 , respectively. There was no significant difference between groups, $p > 0.05$.

Conclusion: The image quality of abdominal aorta and portal vein with different KeV in arterial phase and portal vein phase in spectrum CT single-energy imaging have no statistical difference. Therefore, the imaging of lesions located in abdominal aorta and portal vein is supposed to decrease the KeV value and so as to reduce the radiation dose of patients prospectively.

PO-3619

Assessment of the liver low-density lesions with a spectral CT

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Objective: This study was aimed to compare and evaluate the image quality of intra-hepatic low-density lesions in spectrum computed tomography (CT) with different monochromatic energy images in the arterial phase, the portal vein phase, and the delayed phase, respectively, and to explore the exact monochromatic value of optimum image quality.

Methods: Patients with intra-hepatic low-density lesions were prospectively enrolled in our institution. GE Revolution CT was used to perform enhanced upper abdominal scan. Adaptive statistical iterative reconstruction (ASIR-V) was set with 40%, 50%, 40%, and 30% for true non-enhanced abdominal scanning, enhanced abdominal scanning in the arterial phase, the portal vein phase, and the delayed phase, respectively. The arterial phase and the portal vein phase applied a spectral mode with fast switch 80/140 kV, and tube current was automatic (range from 100 to 600 mA). The average CT value and standard deviation (SD) of the lesions were measured and

recorded at 50, 60, 70 and 80 keV in the arterial phase, the portal vein phase respectively, and the signal-to-noise ratio value was calculated and compared pair-to-pair. Paired-samples t-test was used to compare the mean value of SNR and SD in the arterial phase, the portal vein phase, and the delayed phase, respectively. $P < 0.05$ was considered statistically significant.

Results: A total of twenty patients were prospectively included finally (male: 5, female: 15; mean age: 65.4 years old), with a total of 35 lesions. For the arterial phase, the signal-to-noise ratio values of the lesion in the imaging with 80KeV was higher than those of 50, 60 and 70 keV (12.75 ± 1.16 , 0.49 ± 1.18 , 0.71 ± 1.30 , 0.94 ± 1.41 , respectively; $p < 0.001$), and there was no statistically significant difference among the 50, 60, and 70 keV groups. For the portal vein phase, the signal-to-noise ratio values of 50, 60, 70, and 80 keV groups were 1.32 ± 1.08 , 1.41 ± 1.26 , 1.49 ± 1.44 , 1.58 ± 1.61 , respectively; and there was no statistical difference among the different keV groups ($p > 0.05$).

Conclusion: The image quality with 80keV of single-energy imaging of spectrum CT was significantly better than that of other monochromatic energy (50, 60, 70 keV) imaging in the arterial phase. But for the portal vein phase imaging, there was no statistical difference in the imaging quality of the liver lesions in scans with different keV. As a result, it is supposed to reduce the radiation dose of scans by decreasing the keV in the portal vein phase without compromising the image quality prospectively, but not in the arterial phase.

PO-3620

The difference between virtual non-enhanced imaging and true non-enhanced imaging: a comparison study

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Objective: To compare the difference in image quality and radiation dose between virtual non-enhanced (VNE) images and true non-enhanced (TNE) images in the arterial and the portal phase. Methods: Sixty-four patients were enrolled in this prospective study. GE Revolution CT was used for enhanced upper abdominal scanning. Adaptive statistical iterative reconstruction (ASIR-V) were set with 40%, 50%, 40%, and 30% for true non-enhanced abdominal scanning, enhanced abdominal scanning in arterial phase, portal vein phase, and delayed phase, respectively. The effective radiation dose (ED) and the size-specific dose estimation (SSDE) of virtual non-enhanced images and true non-enhanced images were calculated respectively. The mean CT values and standard deviation (SD) of liver parenchyma, spleen parenchyma and renal cortex in VNE images and TNE images were measured, and the signal-to-noise ratio (SNR) was calculated.

Results: For radiation dose, the ED of VNE images gained from portal vein phase was the highest, followed by VNE from arterial phase reconstruction, and the lowest ED belonged to TNE images (4.59 ± 1.98 , 3.81 ± 1.44 , 3.67 ± 1.71 , respectively). The differences of ED between the latter two were significant (all $p < 0.05$) compared with the portal phase. The significant difference was detected only between VNE images from the arterial (SSDEa) and the portal phase (SSDEp) (1.47 ± 2.27 vs 10.50 ± 2.03 , $p = 0.036$). For image quality: Liver: There was no significant difference between the SNR of VNE images (SNRVNE) obtained from arterial phase and TNE (SNRTNE) ($p = 0.083$). The SNRVNE obtained from portal phase was better than that obtained from arterial phase and the SNRTNE. (SNRTNE vs portal SNRVNE: 7.26 ± 1.32 vs 12.85 ± 2.21 , $p < 0.001$; arterial SNRVNE vs portal SNRVNE: 6.53 ± 1.98 vs 12.85 ± 2.21 , $p < 0.001$). Spleen: The SNRVNE obtained from arterial phase and portal phase were better than that of SNRTNE and the difference was statistically significant (all $p < 0.001$). Kidney: The SNRVNE obtained from arterial phase and portal phase were better than that of SNRTNE and the difference was statistically significant (all $p < 0.05$).

Conclusion: In terms of the radiation dose, the dose of VNE from portal vein was still the highest for ED, but its SSDE was the lowest instead. In terms of image quality, the VNE images of some organs at certain phases (such as hepatic portal phase, splenic artery phase and portal vein phase, renal artery phase and portal vein phase) were better than that of TNE images. Therefore, spectral

CT was comparable to conventional CT in image quality, and even superior than it in the imaging of some organs, while radiation dose needed to be further verified.

PO-3621

Application value of dual-detector spectral CT virtual single-energy spectrum image in reducing lower cervical spine artifacts

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Objective: to investigate the application value of dual-detector computerized tomography (CT) single-energy spectrum image in reducing the artifacts of lower cervical spine.

Methods: 63 cases of cervical spine were examined with double-detector spectral CT., the standard deviation (SD) , signal-to-noise ratio (SNR) and contrast to noise ratio (CNR) of C6-7 Spinal Canal were measured and calculated in conventional images and 40,80,120,160,200 kev single energy spectrum images, the absolute value of CT value difference between C6-7 spinal canal and C3-4 Spinal Canal | CT value difference | . The image quality of conventional image, single energy spectrum image and each single energy spectrum image was compared.

Results: SD1(14.21 ± 7.51 vs 9.12 ± 3.55) and | CT Difference | (108.38 ± 113.28 vs 25.82 ± 22.69) of single-level 40 KeV images were significantly higher than those of conventional images ($p < 0.05$) , SD1, | CT Difference | of single-level 80kev (8.54 ± 3.28 vs 9.12 ± 3.55 ; 16.61 ± 12.64 vs 25.82 ± 22.69) , 120kev (7.78 ± 2.83 vs 9.12 ± 3.55 ; 10.63 ± 8.58 vs 25.82 ± 22.69) , 160kev (7.64 ± 2.72 vs 9.12 ± 3.55 ; 13.24 ± 11.41 vs 25.82 ± 22.69) , 200kev (7.68 ± 2.94 vs 9.12 ± 3.55 ; 13.26 ± 11.40 vs 25.82 ± 22.69) images were lower than those of conventional images, the difference was statistically significant ($p < 0.05$) .**Conclusion:** the 80 -200 kev single energy spectrum image of dual-detector CT can reduce the banded artifacts of cervical root, and the 120 kev single energy spectrum image can get the best image quality.

PO-3622

Age and Size Dependent Local Diagnostic Reference Levels and Achievable Doses for 47 CT Examinations: A Million Chinese Cohort Study

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Abstract

Background: Diagnostic reference levels (DRLs) and achievable doses (ADs) were provided to protect against medical exposure and optimize CT protocols.

Purpose: To establish DRLs and ADs of 47 commonly used CT examinations based on patient age and size in one million Chinese multicenter cohort.

Materials and Methods: Radiation dose data on 47 CT examinations including conventional CT examinations, CT angiography (CTA), and dual energy CT (DECT) examinations at four Chinese university hospitals between Jan 2016 and Dec 2018 were retrospectively analyzed. For all CT examinations, dose indexes were analyzed based on patient age and size. ADs and DRLs for volume CT dose index (CTDIvol), dose-length product (DLP), size-specific dose estimate (SSDE) and total effective dose (ED) were analyzed.

Results: 1001190 CT examinations were available for dose analysis. The population age was peaked in the 45-65 years. The most common examination was non-enhanced chest CT (262836/1001190, 26.25%) with the age-based CTDIvol AD ranging from 2.50 to 7.66 mGy and DRL from 3.67 to 10.29 mGy. The most frequent multi-region examination was contrast enhanced combined chest and abdomen CT (48777/1001190, 4.87%) with the age-based CTDIvol AD ranging from 1.15 to 12.45 mGy and DRL from 1.77 to 15.55 mGy. Coronary CTA, CTDIvol AD ranging from 8.08 to 13.65 mGy and DRL from 11.73 to 22.21 mGy, was the most commonly used CTA (18262/1001190, 1.82%). Abdominal DECT, CTDIvol AD ranging from 3.92 to 9.69 mGy and DRL ranged from 4.48 to 11.38 mGy, was the most commonly used DECT (1562/1001190, 0.16%). DRLs and ADs for size-based CTDIvol, DLP, SSDE and ED increased consistently with patient size.

Conclusion: The study provided DRLs of 47 commonly used CT examinations including conventional CT examinations, CTA, and DECT examinations based on patient age and size. Further research is required to develop national DRLs to guide CT radiation optimization.

PO-3623

Automatic quality control based on Generative Adversarial Networks in chest X-rays

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[Abstract]: Objective The purpose of this study was to develop and evaluate the clinical performance of a deep learning-based system for the automatic quality control (QC) in chest digital X-rays (DR). Methods Retrospectively, 6920 orthorectified chest DR images taken by 16 hospitals from January to June 2021 were included for grading and labeling. Of these, 44844 were used as a training set to construct a deep learning model based on generative adversarial networks (GANs) that can automatically evaluate the quality of chest DR images, 1730 were used as a validation set to adjust the model parameters, and 346 images were used as a test set to evaluate the model performance. The sensitivity, specificity, accuracy, and area under the curve (AUC) of the artificial intelligence (AI) model were calculated from 10 evaluation dimensions using the scores and total scores of five senior radiologists as the reference standard. And the AI was tested for consistency with the experts' scores. Time spent by model and experts were recorded separately. Results The performance of the AI system was comparable to the subjective assessment of the radiologists in the evaluation dimensions. And the detection efficiency of "whether the inner edge of the scapula rotates out of the lung field" is the highest (AUC=0.912), with sensitivity, specificity, and accuracy of 86.32%, 96.02% and 93.35%, respectively. The AI system shows good consistency with expert judgments of image quality (ICC=0.843, $P<0.001$). And the average time taken by AI was significantly shorter than that of experts (4.24 s vs. 12.85 s, $P<0.001$). Conclusion The QC system for chest radiographs based on GANs can automatically and quickly perform image quality control and high-level image quality scoring, which can be an effective tool to assist in DR image quality control and management tasks.

PO-3624

Image Quality Control of Pelvis Digital Radiographs Using A Multi-faceted Deep Learning Decision Model : Ready for Clinical Daily Practice?

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Introduction

Quality control (QC) is an essential component of radiology practice. An effective quality control program ensures consistent diagnostic image quality, specific radiographic measures as well as precise surgery plan. The purpose of the study is to develop and evaluate an automatic Multi-faceted Deep learning Decision Model (MDDM) for image quality control on anteroposterior (AP) pelvic digital radiographs by integrating classification, landmark detection and segmentation techniques .

Methods

A total of 1607 supine position AP pelvic radiographs were acquired from within the hospital. 1340 radiographs were randomly sampled for training and validation and 267 radiographs were used as the test set. Two models using different training strategies were compared: the first model (MDDM-QC) deployed a DenseNet for non-iatrogenic foreign body classification, a HRNet for landmarks detection where commonly used parameters and structures for image integrity, pelvic rotation and pelvic flexion were included, subsequently a U-Net was used to delineate obturator foramen. With the second model, we further addressed the objective by means of a DenseNet classification model where a binary outcome of image quality was given. The reference standard of each parameter was obtained manually by three radiologists using OrthoAI-HIP™ from Linking Innovations Technologies, Beijing, China. Accuracy, sensitivity, specificity and F1 score were used to determine the performance of both decision-making algorithms.

Results

Each AP pelvic radiograph contains the following left and right landmarks: L4-L5 spinous process, pubic symphysis, spina iliac, femoral head center, upper acetabular rim, the outermost point of the acetabulum, teardrop, lesser and greater trochanter , segmentation of the obturator foramen and proximal femur. Two models were compared side to side, where the MDDM-QC yielded much better results: the accuracy was 22.5% higher with MDDM-QC (89.5%) than model 2 (67%). The sensitivity was 23% higher with MDDM-QC (92%) than model 2 (69%). The specificity was 24% higher with MDDM-QC (87%) than model 2 (65%). The F1 score was 38.5% higher with MDDM-QC (89.2%) than model 2 (50.7%). The recorded time for labeling landmarks was significantly shortened with MDDM-QC (3.2±0.6 seconds) comparing to the manual approach (478.5±43.2 seconds).

Discussion

A randomized prospective study should be conducted to evaluate the clinical impact on the workflow with MDDM-QC model in the future. Generally, deep learning based decision-making algorithms lack of quantifiable reasoning and interpretability. However, our proposed model based on a chain of logics can accurately recognize landmarks and contour the key structures on radiographs which resembles the quality control workflow in real world. The results indicate that MDDM-QC algorithm is able to extract more complex and discriminating features than the other model thanks to the incorporation of priori knowledge . Deep learning decision making algorithm provides key technologies that can enable radiologists and technicians to measure and improve the quality of AP pelvic radiographs.

PO-3625

Assessing Artifact Reduction of 125I Seeds in Detector-Based Spectral CT Images: A Quantitative and Texture Analysis

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Objectives The metal artifacts caused by 125I radioactive seed implantation (IRSI) affect the clinical assessment. Evaluating the effectiveness of different image reconstruction methods in dual-layer spectral CT(DLCT) for different patterns of 125I seeds artifacts, and their impact on CT image texture.

Methods Thirty-five patients with 70 layers of IRSI who underwent DLCT examinations were retrospectively analyzed. Conventional CT images (CI) and virtual monoenergetic images (VMI, 40-150keV in 10keV intervals), combined with artifact reduction algorithms (O-MAR) were reconstructed and used to evaluate hypo-/hyperdense artifacts caused by 125I seeds. For quantitative analysis, corrected attenuation values and artifact index (AI) were using the circular ROIs. For texture analysis, histogram analysis was chosen as statistical method. The spread and total frequency of the artifact histograms were recorded based on the ring-like ROIs, ring-like ROI is a novel circular ROI that covers almost all areas affected by artifacts placed in soft tissue. Furthermore, D CT, D AI, D spread and D frequency of artifacts were calculated for evaluated the reduction efficiency of each group. The reduction efficiency of various objective indicators was assessed in the optimal group. Correction rate of lesions covered by artifacts was assessed using the Response Evaluation Criteria in Solid Tumors (RECIST).

Results Quantitative analysis showed significantly reduced hypo-/hyperdense artifacts in corrected attenuation values and AI ($p < 0.05$). The correction attenuation efficiency of hypodense artifacts in the VMI150keV combined with O-MAR (VMIO-MAR150keV) group was better than that of hyperdense artifacts in the same group ($90\% > 62.22\%$, $p < 0.05$). In texture analysis, both hypo-/hyperdense artifacts were reduced ($p < 0.05$). However, the reduction in efficiency of histograms' spread in VMIO-MAR150keV group is not statistically significant ($p > 0.05$). With increase in keV, the total frequency of hyperdense artifacts decreased significantly ($p < 0.05$), and the hypodense artifacts was not statistically significant compared with CI group ($p > 0.05$). The VMIO-MAR150keV group showed a lower reduction rate of hypodense artifacts than hyperdense artifacts ($16.97\% < 53.54\%$, $p < 0.05$).

Conclusions The integration of VMI and O-MAR serves as an effective method to reduce hypo-/hyperdense artifacts caused by 125I particle implantation. Texture analysis revealed that VMI above 150keV can minimize the influence of artifact on the CT images thereby enhancing diagnostic effectiveness and post-processing analysis.

PO-3626

Patient adaptive respiratory training in the lung magnetic resonance free breathing sequence image quality study

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Objective: To explore the effect of breathing training on the image quality of free breathing lung magnetic resonance imaging (MRI). **Materials and methods:** A total of 26 patients who were scheduled to undergo pulmonary MRI from June 2022 to November 2022 were prospectively collected and matched according to their age, sex and diseases. After matching, the patients were randomly divided into experimental group and control group. The experimental group was assessed the respiratory rate and rhythm by visual examination 30 minutes before the examination.

According to the breathing condition of the patients, the respiratory rate and rhythm were divided into two types: uniform and regular breathing and irregular breathing. Encourage the first category of patients and instruct them to breathe according to the previous breathing mode; for the second type of patients, the operator puts a hand on the patient's abdomen and instructs the patient to inhale and exhale at the same time, training for 2min, if the patient is still breathing irregularly, extend the time to 5min, if still unable to cooperate, then exclude the experimental group. The patients in the control group were only told the matters needing attention in the process of MRI examination. The radial volumetric interpolated breath-hold examination (VIBE) sequence images of all patients were collected. Without knowing the grouping, two senior doctors used the five-point method to evaluate the subjective image quality of lung MRI images. The signal intensity (signal intensity, SI) and standard deviation (standard deviation, SD) of ascending aorta, pulmonary trunk and descending aorta were measured. According to the formulas of signal-to-noise ratio (signal to noise ratio, SNR) and coefficient of variation of SI (coefficient of variation, CV), the objective image quality of the

experimental group and the control group were compared. Results: The scores of vascular clarity, bronchial sharpness, noise and artifacts and overall image quality in the experimental group were higher than those in the control group (4.31 ± 0.63 VS 3.69 ± 0.85 ; 3.62 ± 0.51 VS 3.08 ± 0.76 ; 4.00 ± 0.82 VS 3.31 ± 0.75 ; 4.23 ± 0.44 VS 3.46 ± 0.52 , $P < 0.05$). In the objective image quality evaluation, the SNR values of ascending aorta, pulmonary trunk and descending aorta in the experimental group were all higher than those in the control group (20.83 ± 4.96 VS 15.89 ± 4.03 ; 23.22 ± 5.86 VS 18.32 ± 2.64 ; 28.26 ± 5.59 VS 22.34 ± 3.91 , $P < 0.05$). The CV values of ascending aorta, pulmonary artery trunk and descending aorta in the experimental group were lower than those in the control group (0.05 ± 0.01 VS 0.07 ± 0.02 ; 0.04 ± 0.01 VS 0.06 ± 0.01 ; 0.04 ± 0.01 VS 0.05 ± 0.01 , $P < 0.05$) **Conclusion:** breathing training can improve the image quality of free breathing sequence, improve the success rate and comfort of patients, and may be more helpful to increase confidence in diagnosis.

PO-3627

SSDE for estimating patient specific radiation dose in cardiac coronary artery CT angiography

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Objective To develop a clinically applicable method to estimate patient specific organ dose and effective dose from SSDE in cardiac coronary CTA. **Methods** Retrospectively included 421 coronary artery CTA cases, including 244 males and 177 females, with an average age of 58.5 ± 12.8 years (range 18 to 89 years). All cases were scanned by prospective ECG gated trigger axis scan mode in the 3rd generation dual-source Force CT. Water equivalent diameters were calculated to compute SSDE for each patient. Patient organ dose include heart, lung, liver and breast were estimated using Monte Carlo methods by Radimetrics. Patient specific effective dose was calculated as a weighted sum of simulated organ doses using the coefficients from ICRP 103. Linear correlation analysis was used to validate the relationship between SSDE and organ doses as well as effective dose, and to derive coefficients for patient specific dose estimation. Use the mean error rate to evaluate estimation accuracy. **Results** Radiation dose values were (mean \pm standard deviation): CTDIvol is 16.8 ± 8.7 mGy, SSDE is 20.8 ± 8.8 mGy, and effective dose is 4.4 ± 2.9 mSv. The linear fitting formula for estimating organ dose based on SSDE is: heart $Y = 1.2X - 6.4$ ($R^2 = 0.91$, $p < 0.01$, mean error 0.1%); breast $Y = 1.4X - 7.4$ ($R^2 = 0.91$, $p < 0.01$, mean error 7.9%); lung $Y = 0.89X - 4.6$ ($R^2 = 0.86$, $p < 0.01$, mean error 8.3%); liver $Y = 0.36X - 1.8$ ($R^2 = 0.64$, $p < 0.01$, mean error -17.9%). The linear fitting formula for estimating the individual effective dose based on SSDE is: male $Y = 0.21X - 1.2$ ($R^2 = 0.92$, $p < 0.01$, mean error 0.2%); female $Y = 0.39X - 2.2$ ($R^2 = 0.93$, $p < 0.01$, mean error 1.7%). **Conclusion** In coronary artery CTA scan, the absorbed dose of the irradiated

organs and patient specific effective dose can be estimated through SSDE and the corresponding conversion coefficients, which will help us to achieve personalized assessment and precise management of patient radiation dose and risk in clinical work.

PO-3628

A preliminary intramural multicenter evaluation of the quantitative accuracy and stability of synthetic magnetic resonance imaging(MRI) sequence using a system phantom

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Objectives: Synthetic MRI sequence is a new method which can acquire various contrast weighted images using quantitative relaxometric parameters measured from multicontrast images. The quantitative accuracy and stability of this sequence is very important in multicenter evaluation, so it is necessary to analyze measurements across systems. The aim of this study was to evaluate the quantitative accuracy and stability of synthetic MRI sequence in different scanners, coils and sequence parameters in measuring relaxation values of a premium system phantom which used for T_1 , T_2 , proton density (PD) quantitative MRI standardization.

Methods and materials: The premium system phantom of the CaliberMRI company was used in our study. We acquired synthetic MRI (MAGnetic resonance image Compilation; MAGiC) sequence data from three GE SIGNA™ Architect 3.0T scanners in two branches of the first affiliated hospital of zhengzhou university. The phantom was scanned 5 times in different days using synthetic MRI sequence with variations of repetition time, echo time, bandwidths, echo train length, transmit gain, RF drive mode and acceleration factor. 19-Channels and 48-Channels head coils were compared in different scanning strategies. MAGiC software was used to create quantification maps (T_1 , T_2 , and PD maps) and weighted (T_1W , T_2W , and T_2W FLAIR) images. Quantitative evaluation was performed on quantification maps. The T_1 , T_2 , PD measurements were acquired after each acquisition. To investigate the quantitative accuracy and stability between different scanning strategies, the Wilcoxon signed rank tests were used. The statistical significance level was set as $P < 0.05$.

Results: The operating temperatures of the three GE SIGNA™ Architect 3.0T scanners were 18.2, 19.8, 21.7 degrees Celsius, corresponding to the mean temperatures of the phantom with the CMRI LC MR-readable thermometer were 18.0, 20.0, 22.0 degrees Celsius. The Measured T_1 values of the element T_1 array were 1657 ± 21 , 1270 ± 19 , 915 ± 16 , 628 ± 8 , 444 ± 8 , 323 ± 6 , 300 ± 1 ms in scanner1, 1636 ± 31 , 1241 ± 28 , 877 ± 16 , 607 ± 9 , 449 ± 7 , 322 ± 5 , 300 ± 1 ms in scanner2, 1632 ± 47 , 1260 ± 24 , 884 ± 17 , 627 ± 8 , 462 ± 6 , 329 ± 5 , 300 ± 1 ms in scanner3, the difference was not statistically significant. The Measured T_2 values of the element T_2 array were 510 ± 44 , 366 ± 26 , 270 ± 12 , 188 ± 5 , 129 ± 4 , 110 ± 3 , 83 ± 2 , 58 ± 1 , 39 ± 1 , 31 ± 5 , 24 ± 2 ms in scanner1, 511 ± 56 , 392 ± 23 , 294 ± 15 , 197 ± 4 , 134 ± 3 , 111 ± 3 , 84 ± 3 , 57 ± 2 , 39 ± 1 , 28 ± 2 , 22 ± 2 ms in scanner2, 534 ± 75 , 392 ± 56 , 274 ± 21 , 181 ± 11 , 133 ± 6 , 112 ± 3 , 84 ± 2 , 59 ± 2 , 41 ± 1 , 28 ± 1 , 22 ± 2 ms in scanner3, the difference was not statistically significant. 19-Channels head coils also had the same outcomes comparing with the 48-Channels head coils.

Conclusions: Synthetic MRI sequence has excellent reliability. Quantitative T_1 , T_2 measurements of the premium system phantom derived from the MAGiC sequence were not obviously affected by variations of scanners, coils and sequence parameters, such as repetition time, echo time, bandwidths, echo train length, transmit gain, RF drive mode and acceleration factor.

PO-3629

Assessment of noise reduction potential and image quality improvement of a DLIR TrueFidelity in abdomen CT

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***Purpose:** To evaluate the image quality improvement and noise reduction in routine dose, non-enhanced abdomen CT imaging by using TrueFidelity reconstruction algorithm

***Methods and Materials:** 28 patients who underwent routine dose, abdomen CT using GE Revolution CT (GE Healthcare, Waukesha, WI) were included. After scanning, all scans were reconstructed with the recommended level of 50% ASIR-V and for comparison purpose and TrueFidelity (DLIR-L, DLIR-M, DLIR-H) using 0.625mm. The CT attenuation values and SD of the subcutaneous fat, back muscle and descending aorta were measured at the level of tracheal carina of all reconstructed images with 0.625mm. The SNR was calculated with SD representing image noise. The subjective image quality was independently evaluated by two experienced radiologists.

***Results:** For all TrueFidelity images, the objective image noise (SD) of fat, muscle and aorta with 0.625mm decreased and SNR increased along with DLIR-L, DLIR-M, DLIR-H. The SD of DLIR images were significantly lower than that of 50% ASIR-V. In terms of subjective image evaluation, all DLIR reconstructions and 50% ASIR-V had good diagnostic acceptability. However, DLIR-M, DLIR-H showed significantly superior visibility of small structures when compared with the 50% ASIR-V and DLIR-L, and DLIR-H was the best series of TrueFidelity images, with a highest subjective image quality, at the same time the image sharpness was not significantly decreased in DLIR-H images with 0.625mm.

***Conclusions:** In routine dose, non-enhanced abdomen CT, TrueFidelity show greater potential in reducing image noise and artefacts and maintaining image sharpness when compared to the recommended level of 50%ASIR-V. Combining both the objective and subjective evaluation of images, non-enhanced abdomen CT images reconstructed with DLIR-H have the highest image quality in 0.625mm.

PO-3630

Image quality assessment of two generations of rapid kV-switching spectral CT systems on virtual monoenergetic images: A Phantom Study

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***Purpose:** To compare the spectral performance of two rapid kV switching spectral CT systems on virtual monoenergetic images (VMIs) at low-energy levels on phantom image.

***Methods and Materials:** A different concentrations of iodine phantom was scanned on two spectral CT systems equipped with three different gemstone spectral imaging (GSI) platforms: GSI-Pro (2nd generation, GSI-2nd) and GSI-Xtream (3rd generation, GSI-3rd). Acquisitions on the phantom were performed with a CTDIvol close to 12mGy. For all platforms, raw data were reconstructed using FBP and 50%ASIR-V. TrueFidelity was used only for the GSI-3rd. Noise power spectrum (NPS) and task-based transfer function (TTF) were evaluated from 40 to 80 keV of VMIs.

***Results:** For all GSI platforms, the noise magnitude decreased from 40 to 70 keV, and using 50%ASIR-V compared to FBP. The average NPS spatial frequency (fav) and spatial resolution (TTF50%) were similar from 40 to 70 keV and decreased with 50%ASIR-V compared to FBP. Compared to 50%ASIR-V, using DLR reduced the noise magnitude and improved fav values and altering spatial resolution. The third-generation rapid-switching scanner using DLIR had the highest quantification accuracy for iodine concentration and attenuation.

*Conclusions: Differences in image quality were found between the GSI platforms for VMIs at low keV. The new DLIR algorithm on the GSI-3rd platform reduced noise and improved spatial resolution and detectability without changing the noise texture for VMIs at low keV. DLIR may improve quantification accuracy.

PO-3631

Risk factors for transient respiratory motion artifacts during arterial phase of dynamic enhanced MRI with disodium gadolinate

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Abstract

Objectives To identify risk factors for transient severe motion (TSM) artifact on arterial phase in gadoxetate disodium-enhanced liver MRI.

Methods We retrospectively identified 430 consecutive patients who underwent 516 MRI examinations, including 68 patients who underwent multiple MRI examinations, with gadoxetate disodium between 2019 and 2022. Arterial phase transient severe motion was considered to be present if the motion score was 4 or greater on the arterial phase images and if the motion scores were 2 or less on unenhanced and other contrast-enhanced images. risk factors including age, sex, weight, body mass index, allergy to MRI and iodinated contrast agents, underlying disease, laboratory data, presence of ascites and pleural effusion, and previous experience of gadoxetic acid-enhanced MRI were investigated. Univariable and multivariable logistic regression analyses were performed to determine significant risk factors for TSM. Predictive value of TSM was calculated according to the number of significant risk factors.

Results Overall incidence of TSM was 12.6% (65/516). In the multivariable analysis, old age (≥ 45 years; odds ratio [OR] = 1.57 [95% CI, 1.42–3.21]), chronic obstructive pulmonary disease (OR = 5.79 [2.56–14.24]), allergy to iodinated contrast agent (OR = 3.32 [2.23–6.17]) and a history of transient severe motion (OR = 3.03 [1.65–7.65]) were independent significant risk factors for TSM. When at least one of the significant factors was present, the predictive risk was 3.3% (14/425), whereas it was 14.6% (13/89) when at least four factors were present.

Conclusion The occurrence of transient severe motion during arterial phase MRI with gadoxetate disodium is 12.6% and Knowing risk factors for TSM can be clinically useful for providing diagnostic strategies more tailored to individual patients.

PO-3632

Feasibility Study of "One Key" Individualized Low Dosage Technique in CT Colonography

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Objective To explore the feasibility of individualized low-dose CT colonography (CTC) scanning using auto-prescription technique in CTC. **Materials and Methods:** Prospective CTC scan was performed in 131 patients. The tube voltage in prone position (Group A) was 120 kVp and 30% ASIR-V was used to reconstruct the image. The tube voltage in supine position (Group B) was in Auto-prescription mode, and 70% ASIR-V was used to reconstruct the image. Record BMI, CT DIvol, and DLP. SNR and CNR were calculated by measuring CT and SD values of air of intestine (background) and liver parenchyma of two groups of axial images. **Results** The values of kVp in

group B (BMI: 17.96~32.05 kg/m²) were 70 kVp: 4/131, 80 kVp: 64/131, 100 kVp: 61/131, 120 kVp: 2/131. Compared with group A (5.57±0.13 mGy and 291.80±7.46 mGy·cm), group B (3.79±0.14 mGy and 189.70±7.48 mGy·cm) decreased by 33.94% and 36.91% ($P < 0.05$), respectively. There was no significant difference in CT value between group B and group A ($P > 0.05$), SD value of group B was lower than group A, SNR and CNR were higher than group A ($P < 0.05$), and the difference was significant ($P < 0.05$). Conclusion The application of Auto-prescription technology in low dose CTC scanning can ensure the image quality and further reduce the patient's radiation dose.

PO-3633

16cm 容积扫描模式在一站式左房-肺静脉-冠状动脉 CT 成像检查的应用价值

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目的 探讨 16cm 容积扫描模式在一站式左房-肺静脉-冠状动脉 CT 成像检查的应用价值。方法 选取 60 例射频消融术前心脏 CTA 扫描的房颤患者 ($18.5\text{kg/m}^2 \leq \text{BMI} \leq 25\text{kg/m}^2$)，随机分为 A、B 组。A 组采用 16cm 容积扫描模式，管电压 100kV，智能电流范围为 40~900mA (以 SD=28 智能调节)，机架旋转时间 0.275s，AIDR 3D Standard 迭代重建算法；注射方案为以 4.5ml/s 速率注射对比剂，总量 45ml，以 4.5ml/s 速率注射生理盐水 30ml。B 组采用心电门控螺旋扫描模式，扫描方案为管电压 100kV，智能电流范围为 40~900mA (以 SD=28 智能调节)，机架旋转时间 0.275s，AIDR 3D Standard 迭代重建算法；注射方案以 4.5ml/s 速率注射对比剂，总量 90ml。两组患者扫描范围均为气管隆突上 2cm 至心脏膈底。分别记录两组患者图像质量、对比剂碘量、辐射剂量，对两组数据进行统计学分析。结果 A 组图像质量在心率 > 75 次/分时高于 B 组，差异有统计学意义 ($P < 0.05$)，心率 < 75 次/min 时，图像质量没有统计学意义。A 组的辐射剂量为 (4.17 ± 0.94) mSv，B 组的辐射剂量为 (11.25 ± 0.26) mSv，降低约 63%，差异有统计学意义 ($P < 0.05$)，A 组的对比剂用量比 B 组降低约 50%。结论 在自由心率时，容积扫描模式可获取高清低剂量的左房-肺静脉-冠状动脉图像，对射频消融术前检查的房颤患者具有重要的临床价值。

PO-3634

18F-NAF 全身骨扫描显像所致辐射剂量的研究

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目的 探讨 18F-NAF 全身骨扫描显像时所致辐射剂量的研究。方法 选取 83 例行 18F-NAF 骨显像患者，男 13 例，女 70 例，年龄 21~69 岁， 43.6 ± 12.3 岁，体重为 $60.4 \pm 10.6\text{Kg}$ ，皆能正常活动。患者按 0.1mCi/kg 注射显像剂，静脉给药后 60min 采集一次 PET/CT 图像，在检查结束后，使用核辐射监测探测器测量距离患者 0.3、1.0m 处的剂量当量率 (DR)。根据国际辐射防护委员会 106 号出版物提出的 18F-NaF 有效剂量的计算方法，计算患者 18F-NaF 有效剂量；根据国际辐射防护委员会 103 号出版物提出的 CT 有效剂量的计算方法，计算患者 CT 有效剂量；根据美国国家辐射防护和测量委员会提出的人类社会活动模式和国际辐射防护委员会提出的 18F-NAF 在人体的代谢模型，计算 18F-NAF 骨显像患者对公众及核医学技师的照射剂量 (RD)。结果 注射 18F-NaF 的平均活性为 $294.57 \pm 55.12\text{MBq}$ ，平均有效吸收剂量 18F-NAFPET 为 $4.41 \pm 0.83\text{mSv}$ 和 CT 为 $12.86 \pm 3.11\text{mSv}$ ，平均累积有效剂量 18F-NAF PET/CT 扫描为 $17.27 \pm 3.94\text{mSv}$ 。83 例患者的 DR (0.3 m) 为 $23.94 \pm 8.82\mu\text{Sv/h}$ 、DR (1.0 m) 为 $18.10 \pm 6.68\mu\text{Sv/h}$ 。与 18F-NAF 骨显像患者白天接触的

家庭成员的照射剂量为 $15.12 \pm 5.58 \mu\text{Sv}$ ；夜间同床共寝的家庭成员的照射剂量为 $26.39 \pm 9.72 \mu\text{Sv}$ ；单位工作同事的照射剂量为 $16.67 \pm 6.15 \mu\text{Sv}$ ；邻座乘客的照射剂量为 $74.32 \pm 27.38 \mu\text{Sv}$ 。核医学技师每接触 1 例 ^{18}F -NAF 骨显像患者的照射剂量为 $1.32 \pm 0.49 \mu\text{Sv}$ 。结论 ^{18}F -NAF 全身骨显像患者对公众及核医学技师的照射剂量远低于相应人群的照射剂量限值，很好地贯彻了辐射防护三原则，提高了患者的利益/危害比。

PO-3635

结合监测点优化的能谱扫描在双低剂量下肢动脉血管 CT 成像中的临床价值

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目的：探讨能谱扫描和腘动脉水平监测在双低（低辐射剂量和低造影剂剂量）下肢动脉血管 CT 成像（CTA）中的临床价值

方法：前瞻性纳入怀疑下肢动脉疾病而须行下肢 CTA 检查的 111 例患者，根据扫描方式不同分为 A、B、C 3 组。A 组：常规扫描，监测腹主动脉；B 组：能谱扫描，监测腹主动脉；C 组：能谱扫描，监测腘动脉。由两名医师利用 5 分法对 3 组图像腹股段(AIS)；股动脉段(FPS)；膝下段(LKS)进行 5 分制图像评分。测量 3 组图像腹主动脉（L3 水平），股动脉（髌关节平面），腘动脉（膝关节平面）、踝动脉（踝关节平面）感兴趣区（ROI）的 CT 值及噪声（SD）值，计算信噪比（SNR）及对比噪声比（CNR）。

结果：对于 3 组间的辐射剂量比较，C 组扫描方案产生的有效辐射剂量（ED，mSv）低于 A、B 组（ 3.59 ± 0.31 VS 4.07 ± 0.37 VS 3.70 ± 0.31 $P < 0.01$ ）。对于造影剂用量，C 组用量 85ml 低于 A 组 105ml，低于 B 组 95ml。对于 3 组客观图像质量的比较，扫描腹主动脉 C 组方案的 CT 值略低于 B 组，显著高于 A 组 $P < 0.01$ ；左、右股动脉 C 组的 CT 值略低于 B 组，显著高于 A 组，均 $P < 0.01$ ；左、右腘动脉 C 组的 CT 值略等于 B 组，显著高于 A 组，均 $P < 0.01$ ；C 组 SNR 低于 B 组和 A 组。左、右踝动脉 C 组扫描方案的 CT 值略高于 B 组，显著高于 A 组，均 $P < 0.01$ ；右踝动脉 A 组的 SNR 高于 B 组、C 组，均 $P < 0.01$ 。对于 3 组主观图像质量的比较，LKS C 组 2 位放射医生的主观评分高于 B 组、C 组，均 $P < 0.01$ 。

结论：传统下肢 CTA，由于扫描范围广和个体循环差异影响，辐射剂量和造影剂剂量通常较大，且膝关节以下血管显影较差。50KeV 能谱模式结合腘动脉水平检测点扫描方案使用低造影剂剂量和低辐射剂量可以提供下肢良好的图像对比度，提高 LKS 动脉的图像显示。

PO-3636

基于知识图谱和图像分类的胸片智能化质控研究

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目的 构建基于知识图谱和图像分类的 X 线胸部后前位片（简称胸片）的图像质量控制（简称图像质控）智能检测模型，实现医学影像质控自动化及客观化。

方法 回顾性分析 2018 年 1 月至 2021 年 12 月安徽省医学影像云平台中的脱敏胸片 9236 张。构建胸片质控知识图谱，并严格按照知识图谱进行数据标注，每张胸片经过两名放射医师（A、B）

独立标注，并由放射医师（C）参考前两名医师标注结果不一致进行标注决定。将一名高年资质控专家审核后的结果作为参考金标准。标注数据集按照 7: 2: 1 分成训练集、测试集、验证集。采用受试者操作特征曲线（ROC）及曲线下面积分析模型在测试集上的分类性能，采用精确率（Precision）分析比较单人质控、多人质控及模型在测试集上对胸片质量特征的预测效果。

结果 测试集中，分类模型诊断胸片各个类别图像质量特征达到了 0.939 的平均 AUC。质控知识图谱所涉及的节点中，单人（A、B）质控平均精确度分别为 81.15%、85.47%；多人质控平均精确度、模型预测平均精确度分别为 91.65%、92.21%。

结论 模型预测明显优于单人质控甚至略优于多人质控，基于知识图谱和图像分类的智能质控方法能满足医学影像自动化及客观化要求，可逐步推广到影像实际质控工作中，并逐步代替人工质控工作。

PO-3637

基于深度学习重建算法的 FOCUS 及 MUSE DWI 在甲状腺相关性眼病中应用价值的研究

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目的：探讨基于深度学习（deep learning, DL）的视野优化无失真单激发（FOCUS）和多元灵敏度编码成像技术（MUSE）的 DWI 对眼外肌、视神经和泪腺的可视化并评价其预测甲状腺相关性眼病（thyroid-associated ophthalmopathy, TAO）活动性的效能。方法：纳入 19 例诊断为 TAO 的连续性患者（男 8 例， 45.5 ± 10.7 岁）和 11 例对照组（男 2 例， 35.4 ± 14.2 岁）。活动期 TAO 患者 13 例，非活动期 6 例。测量基于 DL 的 FOCUS DWI、MSUE DWI、FOCUS MUSE DWI 和单激发 DWI 上眼外肌、视神经和泪腺的表观弥散系数（ADC）、信噪比（SNR）、对比噪声比（CNR）。使用 Mann-Whitney U 检验和 Friedman 检验比较各结构在不同序列上 SNR、CNR 的差异，使用 Spearman 评价 ADC 与临床活动度评分（CAS）的相关性。结果：四种基于 DL 的 DWI 在各结构中的 SNR 均高于原始 DWI（ $P < 0.001$ ），且基于 DL 的 FOCUS DWI 在各结构中的 SNR 最高（ $P < 0.001$ ）。活动期 TAO 患者中，基于 DL 的 FOCUS MUSE DWI 中各结构 ADC 与 CAS 无相关性（ $P > 0.05$ ），但在基于 DL 的 MUSE DWI 上的视神经 ADC 与 CAS 有相关性（ $R = -0.315$ ， $P = 0.017$ ），基于 DL 的 FOCUS DWI 上的外直肌和内直肌 ADC 与 CAS 有相关性（ $R = -0.462$ ， $P = 0.01$ ； $R = -0.362$ ， $P = 0.013$ ），基于 DL 的单激发 DWI 上的内直肌和视神经 ADC 与 CAS 有相关性（ $R = -0.336$ ， $P = 0.022$ ； $R = -0.390$ ， $P = 0.007$ ）。结论：在 TAO 相关的结构中，基于 DL 的四种 DWI 为眼眶提供更好的图像质量，FOCUS DWI 与 CAS 的相关性更高，提示该序列在 TAO 患者临床评价中有重要作用。

PO-3638

FOCUS 及 MUSE DWI 对甲状腺相关性眼病的应用价值的研究

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目的: 探讨基于视野优化无失真单激发 (FOCUS) 和多元灵敏度编码成像技术 (MUSE) 的扩散加权成像 (DWI) 对眼外肌、视神经和泪腺的可视化, 并评价其预测甲状腺相关性眼病 (thyroid-associated ophthalmopathy, TAO) 活动性的效能。方法: 前瞻性纳入 19 例我院诊断为 TAO 的连续性患者 (男 8 例, 45.5 ± 10.7 岁) 及 11 例健康对照组 (男 2 例, 35.4 ± 14.2 岁)。活动期 TAO 患者 13 例 (男 7 例, 46.3 ± 11.4 岁), 非活动期 6 例 (男 1 例, 43.8 ± 9.8 岁)。测量 FOCUS DWI、MSUE DWI、FOCUS MUSE DWI 和单激发 DWI 上眼外肌、视神经和泪腺的表观弥散系数 (ADC)、信噪比 (SNR) 和对比噪声比 (CNR)。使用 Mann-Whitney U 检验和 Friedman 检验比较各结构在不同序列上 SNR、CNR 的差异, 使用 Spearman 秩相关评价 ADC 与临床活动度评分 (CAS) 的相关性。结果: 四种 DWI 中, FOCUS MUSE DWI 在所有结构中的 SNR 和 CNR 均最高, 其次为 MUSE DWI, P 值均 ≤ 0.001 。在 TAO 活动期患者中, FOCUS MUSE DWI 和 FOCUS DWI 中各结构的 ADC 与 CAS 均无相关性 ($P > 0.05$), 但在 MUSE DWI 中, 活动期 TAO 患者的视神经 ADC 与 CAS 有相关性 ($R = -0.420$, $P = 0.004$), 在单激发 DWI 中, 活动期 TAO 患者的内直肌和视神经 ADC 与 CAS 有相关性 ($R = -0.336$, $P = 0.022$; $R = -0.390$, $P = 0.007$)。结论: 在 TAO 病变相关的结构中, FOCUS MUSE DWI 和 MUSE DWI 较单激发 DWI 相比, 可明显提高信号强度, 为眼眶 MR 扫描提供更好的图像质量。较单激发 DWI 相比, MUSE DWI 与 CAS 的相关性更高, 提示了该序列在 TAO 患者临床评价中的重要作用。

PO-3639

评价视野优化无失真多元灵敏度编码技术 (FOCUS MUSE) 在直肠病变中的成像质量以及预测在病理危险因素中的潜在价值

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目的 评价视野优化无失真多元灵敏度编码技术 (FOCUS MUSE) 在直肠病变中的成像质量以及预测在病理危险因素中的潜在价值

方法 前瞻性的纳入 56 例指检或者肠镜检查首次发现直肠病变的患者。所有患者均进行直肠磁共振扫描, 在常规平扫序列基础上, 分别采用单次激发弥散加权技术 (SS DWI)、视野优化无失真单次激发弥散加权技术 (FOCUS DWI)、多元灵敏度编码技术 (MUSE) 和视野优化无失真多元灵敏度编码技术 (FOCUS MUSE) 进行垂直病变肠管的轴位扫描。由两名医生采用双盲法对图像整体质量、病变显示、病灶边缘锐利度和病灶形变进行定性评估。定量分析主要对图像的信噪比 (SNR) 和对比噪声比 (CNR) 以及病变扩散表观系数 (ADC) 进行比较。另外, 利用 ROC 曲线和 DCA 对直肠病变 ADC 预测周围神经侵犯的效能进行评估。结果 定性评估结果估显示, FOCUS MUSE 与 SS DWI 和 FOCUS DWI 相比, 均有更好的整体图像质量、病灶显示和病灶边缘锐利度以及更低的形变 ($P < 0.05$)。与 MUSE 相比, FOCUS MUSE 的病灶边缘锐利度更好, 形变更小 ($P < 0.05$), 但是整体图像质量、病灶显示, 差异无统计学意义 ($P > 0.05$)。定量分析结果显示 SNR 与 CNR 及 ADC 在 FOCUS MUSE、SS DWI、FOCUS DWI 和 MUSE 四组序列之间有统计学差异 ($P < 0.05$)。另外, 研究发现 FOCUS MUSE 联合其他三个序列在预测直肠病变神经侵犯阴性和阳性患者中有统计学差异 ($P < 0.05$), 其 AUC 值约 0.85, 敏感度为 0.83, 特异度为 0.91, 准确度 0.87。

结论 FOCUS MUSE 是一种视野优化无失真多元灵敏度编码技术,在直肠病变的应用中有更好的整体图像质量、病灶边缘锐利度、以及更小的形变,并在预测直肠病变周围神经侵犯上有不可预估的价值。

PO-3640

能谱 CT 去除 DBS 术前定位检查金属伪影的价值

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摘要 目的 分析 CT 能谱成像 (Gemstone spectral imaging, GSI) 联合金属伪影去除 (Metal artifact reduction, MAR) 技术改善 DBS 术前立体定位头架伪影的价值。方法 回顾性分析 2022 年 1 月至 2022 年 12 月于我院行 DBS 术前 CT 定位的患者资料。实验组采用能谱扫描并联合 MAR 技术进行后重建,对照组在同一 CT 扫描仪采用常规扫描模式重建。比较实验组与对照组图像的背景噪声 (SD)、伪影指数 (AI)、信噪比 (SNR)、对比噪声比 (CNR) 以及图像质量主观评分和诊断信心。记录容积 CT 剂量指数 (CTDIvol)、剂量长度乘积 (DLP)、有效剂量 (ED)。采用 MedCalc 20.0 进行数据分析, $P < 0.05$ 为差异有统计学意义。结果 本研究共纳入 45 例患者,24 例患者行能谱扫描,21 例行混合能量扫描。40-140keV 组单能量+MAR 图像中,CT 值、SNR 值、CNR 值随着 keV 的增加而增加。SD 值、AI 值随着 keV 的增加而降低。140keV 单能量+MAR 图像 CT 值、SNR 值、CNR 值均最高,SD 值、AI 值最低。60-140keV 组单能量+MAR 图像 CT 值、SD 值、SNR 值、CNR 值、AI 值较 120kvp 相比均有统计学差异 ($P < 0.05$)。120keV 图像主观评分、诊断信心得分最高,并且在 40-120keV 组,随着单能量的增加,图像质量、诊断信心得分增加。24 例能谱扫描组患者其扫描长度、DLP、CTDIvol 及 ED 分别为: 158.5 ± 14.8 cm、 223.3 ± 32 mGy·cm、 11.5 ± 1.8 mGy、和 0.42 ± 0.06 mSv。结论 能谱 CT 单能量成像联合 MAR 重建技术,可以有效地降低 DBS 术前立体定位头架金属伪影,同时能降低患者辐射剂量。

PO-3641

3.0T 磁共振 NC-FIRM-MRA 和 CE-MRA 在肾动脉成像中的对比研究

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目的: 探讨 3.0T 磁共振下肾动脉非对比增强流入反转恢复 MR 血管成像 (NC-FIRM-MRA) 和增强 MR 血管成像 (CE-MRA) 的图像质量,探讨肾动脉 NC-FIRM-MRA 的临床应用效果。

方法与材料: 前瞻性收集因病情需要行肾动脉 CE-MRA 检查的 20 例患者,同时均进行肾动脉 NC-FIRM-MRA 检查。由 2 名高年资放射科医师独立阅片,用 Kappa 检验对两名放射科医生的影像评估材料进行一致性检验。分别采用配对样本的 Wilcoxon 符号秩检验和 χ^2 检验分别对两种不同检查方法的图像进行肾动脉图像质量评分及肾动脉分支显示评分。

结果: CE-MRA 与 NC-FIRM-MRA 成像的肾动脉图像质量评分差异无统计学意义 ($P > 0.05$)。NC-FIRM-MRA 和 CE-MRA 图像的肾动脉分支显示差异有统计学意义 ($P < 0.05$)。

结论: NC-FIRM-MRA 对肾动脉各级分支的显示要优于 CE-MRA,而对于肾动脉主干及狭窄的显示两种方法图像质量无明显差异。NC-FIRM-MRA 成像可作为肾动脉狭窄的检测手段,值得临床推广与应用。

PO-3642

虚拟单能级成像及骨去金属伪影技术去除腰椎内固定伪影的临床应用价值

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目的：评价双层探测器能谱 CT (dual-layer detector spectral computed tomography, DLCT) 的高能级虚拟单能级成像 (virtual monoenergetic imaging, MonoE)、骨去金属伪影技术 (metal artefact reduction, O-MAR) 及二者相结合去除腰椎金属植入物伪影的价值。方法：前瞻性收集 2022 年 7 月至 12 月行腰椎内固定并术后行腰椎 DLCT 检查的患者。从 100 到 200keV 每隔 20keV 重建 MonoE, 并重建 O-MAR、O-MAR 结合 MonoE 图像, 比较图像间客观、主观评价差异。结果：45 例纳入研究 (男性 23 例, 55.4 ± 14.2 岁)。低、高密度伪影区 MonoE 和 O-MAR+ MonoE 的 CT 值随能级增高分别增高及减低。140keV MonoE 对软组织显示及伪影减少最佳, 200keV MonoE 及其结合 O-MAR 对金属和骨交界面显示效果最好, 但 O-MAR+200keV MonoE 噪声最低。结论：在去除腰椎金属内植入物伪影方面, 相较于 O-MAR 和 O-MAR 结合 MonoE, 高能级 MonoE 具有良好的应用价值。

PO-3643

对比剂团注追踪技术头颅 CTA 监测扫描启动时间的研究

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目的：在对比剂团注追踪技术头颅 CT 血管成像 (CT angiography, CTA) 扫描中, 比较不同的监测扫描启动时间对图像质量和辐射剂量的影响, 探讨合适的监测扫描启动时间。方法：前瞻性收集来我院行头颅 CTA 检查的患者 400 例, 按预约先后顺序分为 A、B 组, 前 200 例为 A 组, 后 200 例为 B。A 组在对比剂注射后 8s 开始启动监测扫描。记录患者监测扫描的触发时间、触发时 CT 值、曝光次数和辐射剂量。测量双侧颈内动脉末段的 CT 值, 取 2 者平均值作为颈内动脉 CT 值, 并由 2 名放射诊断医师对图像质量进行主观评价。B 组监测扫描的启动时间为 12s, 其余参数、测量评价方法同 A 组完全一致。比较 2 组患者监测扫描的曝光次数、触发时间、触发 CT 值、颈内动脉 CT 值、剂量长度乘积 (dose length product, DLP)、图像质量评分和触发时间分布。结果：2 组患者不同触发时间病例分布无统计学差异 ($P > 0.05$)。患者监测扫描的触发时间、触发 CT 值、颈内动脉 CT 值和图像质量评分无统计学差异 (P 均 > 0.05), 而 B 组比 A 组监测曝光次数减少了 45.2%, DLP 比 A 组降低了 45.1%, 差异具有统计学意义 (P 均 < 0.05)。结论：在 64 排 CT 使用团注追踪技术进行头颅 CTA 扫描, 监测扫描的启动时间设置为 12s 时, 可以在保证图像质量的前提下, 减少患者的监测辐射剂量。

PO-3644

前瞻性心电门控 70kV 在非肥胖患者胸痛三联 CTA 检查中的可行性研究

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目的 评价前瞻性心电门控 70kV 扫描方案在非肥胖患者胸痛三联 CTA 检查中的可行性。**方法** 对临床高度怀疑急性胸痛在我院行胸痛三联 CTA 检查的 120 例非肥胖患者随机分为 4 组, 分别采用回顾性心电门控 100kV(1 组)、70kV(2 组) 及前瞻性心电门控 100kV(3 组)、70kV(4 组) 四种扫描方案。测量升主动脉根部 CT 值及噪声, 计算 SNR、CNR, 并对图像质量进行主客观评分。**结果** 120 例患者组间体重指数(BMI) 差异无统计学意义($P > 0.05$)。1 组和 3 组的 CT 值及图像噪声低于 2 组和 4 组, 差异有统计学意义($P < 0.05$); 1 组的 SNR 及 CNR 高于其余三组, 差异具有统计学意义($P < 0.05$); 2 组、3 组、4 组的信噪比及对比噪声比组间差异无统计学意义($P > 0.05$)。四组间图像主观评分差异无统计学意义($P > 0.05$)。4 组辐射剂量显著降低, 平均有效辐射剂量为(0.49 ± 0.11) mSv, 组间差异具有统计学意义($P < 0.05$)。**结论** 对于心律平稳的非肥胖患者, 前瞻性心电门控 70kV 扫描方案可获得满意的胸痛三联血管图像质量同时降低患者辐射剂量。

PO-3645

双源 CT 高碘流率肾动脉 CTA 造影与 DSA 成像的对比

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目的: 探讨双源 CT (DSCT) 高碘流率血管成像和数字血管造影(DSA)和对于动脉粥样硬化性肾动脉狭窄 (ARAS) 的诊断价值

方法: 收集临床拟诊为肾动脉狭窄患者病例资料 20 例, 行双源 CT 高碘流率肾动 CTA 检查, 将所获得的图像数据进行 MPR、MIP、VR 和 SSD, 并对几种后处理技术进行初步对比根据肾动脉影像学表现评价肾动脉有无狭窄, 同期对 20 例患者行 DSA 检查, 并对两者检查结果进行对比分析。

结果: DSCT 发现狭窄血管 19 支, 其中 18 支经 DSA 证实(1 支假阳性), 符合率为 95%。

结论: 各种后处理技术中 MIP、VR 在诊断 ARAS 中具有重要作用。DSCT 是肾动脉狭窄筛选的可靠方法并可取代 DSA 作为首选检查方法。

PO-3646

探讨双能量 CT 虚拟单能量在下肢静脉成像联合下腔静脉滤网植入术的一站式运用

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【摘要】目的: 探讨双能量 CT 虚拟单能量在下肢静脉成像联合下腔静脉滤网植入术的一站式运用, 为临床诊疗提供高效快捷。**方法:** 纳入我院 2023 年 2 月至 2023 年 7 月期间临床疑是诊断的 51 例下肢静脉血栓患者, 且所有患者均进行了西门子双源 CT 计算机断层扫描双下肢静脉。将图像数据调入“Syngovia”工作站, 选择“Monoenergetic”进行虚拟单能量图像重建。根据后期治疗是否植入下腔静脉滤网术将患者分成 A(s), B(F) 两组。采用 t 检验分析下肢静脉血栓在虚拟单能量不同能级下

CT 值及单能量曲线斜率之间差异性。作 ROC 曲线分析, 评价双能量 CT 虚拟单能量成像对下肢静脉血栓是否后期联合下腔静脉滤网植入术的一站式运用。结果: A(s)组有 24 例患者后期进行下腔静脉滤网植入术, B(F)组有 27 例患者未进行下腔静脉滤网植入术; A、B 两组单能量曲线斜率均随着 Kev 值的增加而降低且进行下腔静脉滤网植入术患者斜率低于未进行下腔静脉滤网植入术患者, 两者存在显著统计学差异 ($P < 0.001$)。进行下腔静脉滤网植入术患者在虚拟单能量不同能级下 (40 Kev ~ 120 Kev) CT 值低于未进行下腔静脉滤网植入术患者, 两者存在显著统计学差异 ($P < 0.001$)。结论: 双能量 CT 虚拟单能量在下肢静脉血栓患者中运用不同能级 CT 值的变化和能量曲线斜率之间的差异可以有效地鉴别诊断是否为深静脉血栓、是否有下腔静脉滤网植入术的需求; 双能量 CT 虚拟单能量在下肢静脉成像作为评估是否联合下腔静脉滤网植入术新的辅助手段, 帮助临床医生更好地进行高效诊疗, 该流程操作简单, 措施方便, 值得临床推广试用。

PO-3647

吸气对抗阻力呼吸法与标准呼吸法在冠状动脉 CTA 扫描中的应用对比

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目的: 比较吸气对抗阻力法与标准的传统呼吸方法对冠状动脉 CTA 的成像质量差异。

方法: 通过设置不同呼吸方式-吸气对抗阻力法 (腹带加压) 与标准呼吸法对患者进行冠状动脉 CTA 扫描。收集实验数据 94 例, 分为 A、B 两组, 其中 A 组 47 例, 采用传统的标准呼吸方法, B 组 47 例, 采用腹带加压对抗阻力的呼吸方法, 检查前由扫描技师评估患者配合情况与心率状况, 采用前瞻性/回顾性心电门控进行检查。后处理比较右冠、左旋支及左前降支 3 支大血管分支显示、运动伪影和心跳导致的条带状伪影情况, 计算图像信噪比及对比噪声。

结果: 采用吸气对抗阻力呼吸方法的实验组图像质量明显优于采用传统的标准呼吸方法的实验组, 差异有统计学意义 ($P < 0.05$), 图像信噪比及对比噪声统计学差异 ($P > 0.05$)。

结论: 通过控制呼吸方法, 采用新型的吸气对抗阻力的呼吸方法可以明显改善冠脉 CTA 检查的图像质量, 有效提高疾病诊断准确率。

PO-3648

探讨 NICaS 无创血流动力学监测指标对冠脉 CTA 达峰时间的影响

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目的: 探讨 NICaS 无创血流动力学监测指标对冠脉 CTA 达峰时间 (PT) 的影响。

方法: 采用 NICaS 无创血流动力学监测系统, 对接受冠脉 CTA 检查的患者进行检查过程中血压、心率、心排指标以及外周阻力各项指标的监测。其他排除标准: 合并严重的原发性疾病; 存在对造影剂过敏等 CT 检查禁忌。通过检查前期的心率准备, 根据每位患者自身心率情况与呼吸配合程度, 选择合适心电门控对其进行冠脉 CTA 检查。通过比较患者冠脉 CTA 达峰时间, 分析影响冠脉 CTA 达峰时间的血流动力学指标因素。

结果: 统计分析结果显示冠脉 CTA 达峰时间 (PT) 与患者舒张压和外周阻力大小呈正相关, 与收缩压和心率无相关。

结论: 冠脉 CTA 达峰时间 (PT) 与舒张压和外周阻力大小呈正相关, 舒张压高对应的病理生理本质是外周阻力大, 造影剂到达主动脉时间越久, 达峰时间越长

PO-3649

NiCaS 无创血流动力学监测冠脉 CTA 联合常规增强 CT 图像质量及安全性研究

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目的: 探讨常规 CT 增强后行冠脉 CTA 检查, 对比剂续灌对冠脉 CTA 成像质量的影响及患者安全性研究。

方法: 将实验对象分为 A、B 两组, A 组行冠脉 CTA 单部位增强检查, B 组先进行常规增强 CT 检查然后行冠脉 CTA 检查。采用 NiCaS 无创血流动力学监测系统, 对患者进行检查过程中血压、心率、心排指标以及外周阻力各项指标的监测, 确保患者检查安全性。其他排除标准: 合并严重的原发性疾病; 存在对造影剂过敏等 CT 检查禁忌。通过检查前期的心率准备, 根据每位患者自身心率情况与呼吸配合程度, 选择合适心电门控对其进行冠脉 CTA 检查。后处理比较右冠, 左旋支及左前降支 3 支大血管分支显示, 计算图像信噪比及对比噪声, 对冠脉血管进行 15 段评分, 对比成像质量。结果: 统计分析结果显示两组受检对象成像评价、图像信噪比及图像对比噪声差异性 P 值均大于 0.05, 说明两组结果并无显著性差异, 即冠脉 CTA 成像质量与是否进行对比剂续灌无关; 对比剂续灌前后患者血流动力学监测指标变化也均在安全范围。

结论: 对比剂续灌不影响冠脉 CTA 成像质量且对患者并无风险性。

PO-3650

院级 CT 辐射剂量参考水平与警示值的建立及其在冠状动脉 CTA 剂量优化中的运用

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目的: 通过建立本院冠状动脉 CTA 辐射剂量参考水平与警示值, 并以此指导本科室进行冠脉 CTA 扫描方案及检查流程的优化, 控制受检者所受剂量的水平。

方法: 连续收集 2022 年 6 月到 2023 年 6 月在本科进行冠状动脉 CTA 检的受检者 5000 例, 按检查时间分为改进前和改进后 2 组, 分别 2500 例。设定改进前冠状动脉 CTA 的辐射剂量分布的均值为本院冠状动脉 CTA 辐射剂量的指导水平 (DRL)。第 75 个百分位数和第 25 个百分位数为本院辐射剂量诊断参考范围 (DRR) 的上限和下限。第 97.5 个百分位数为本院辐射剂量警示值。超过 DRR 上限则认为辐射剂量偏高, 超过警示值则认为辐射剂量超高。根据本年度超高剂量扫描原因分析结果。改进后再次收集 2500 例, 统计改进前后两组受检者的各项参数。

结果: 改进后本院冠状动脉 CTA 受检者的平均扫描剂量下降 11.3 %, 两组比较差异有统计学意义 ($t=54.11$, $P<0.05$)。胸部低剂量 CT 受检者的平均扫描剂量下降 20.13%, 差异有统计学意义 ($\chi^2=81.99$, $P<0.05$)。改进后胸部增强 CT 受检者的平均扫描剂量与改进前差异无统计学意义 ($P>0.05$)。改进后辐射剂量偏高的冠脉 CTA 受检者比率较改进前减少 7.34%, 其中使用前门控受检者增加 10.25%, 改进后辐射剂量超高的冠状动脉 CTA 受检者比率较改进前减少 2.37%; 超高剂量扫描的受检者中, 重复扫描率下降 4.78%。

结论：建立本院冠状动脉 CTA 辐射剂量参考水平及剂量警示值有助于推动剂量优化，降低受检者平均剂量，提高冠脉 CTA 检查成功率。

PO-3651

不同锥形束 CT 扫描模式交替成像在头颈部肿瘤患者图像引导放疗中的应用

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天津市肿瘤医院

目的：保证放疗精确度的同时，减少头颈部肿瘤患者在放射治疗前进行图像引导时受到的额外电离辐射。

方法：选取天津市肿瘤医院 2022.7-2023.4 月 Halcyon 直线加速器行头颈部放疗患者 30 例。在患者奇数（第 1.3.5.7.....次）锥形束 CT 图像引导放疗时选择标准头部扫描模式“Head”（100KV，126mAs）；在患者偶数（第 2.4.6.8.....次）时选择低剂量模式“Head Low Dose”（100KV，42mAs）。治疗结束后比较患者奇数次和偶数次的位置误差；在 Eclipse 软件分别在两组图像上勾画 ROI，分析骨组织和软组织的噪声值，比较两组图像的成像质量；根据公式 $ED=DLP \times k$ （DLP：剂量长度乘积；全身加权 $k=0.012mSv \cdot mGy^{-1} \cdot cm^{-1}$ ）计算患者在两种成像模式下受到的辐射剂量。结果：两组模式在患者奇数次和偶数次的位置误差没有统计学意义（ $p>0.05$ ）；标准扫描模式下骨组织和软组织的噪声值分别为 21.32 ± 5.63 、 28.54 ± 8.49 ，低剂量扫描模式下骨组织和软组织的噪声值分别为 27.87 ± 7.75 、 58.17 ± 14.57 ，骨组织和软组织的噪声分别上升 30.72%、103.82%；两组的有效辐射剂量分别为 (1.15 ± 0.19) mSv、 (0.37 ± 0.03) mSv，差异有统计学意义（ $p<0.05$ ），交替成像引导比固定标准模式引导患者受到的电离辐射降低了 67.83%。

结论：在头颈部肿瘤患者进行锥形束 CT 图像引导放疗时，标准扫描模式和低剂量扫描模式在纠正误差方面具有一致性；低剂量模式扫描对软组织的成像影响较大，对骨组织的成像影响较小，所以在放疗技师检查图像配准时几乎不受影响；交替成像引导模式下患者受到的额外辐射更少，在头颈部肿瘤患者放疗时能更好的保护中枢神经系统、晶体、甲状腺等重要器官，在临床治疗中值得推广应用。

PO-3652

多功能数字胃肠机（DRF）应用于瓦-米试验的优势及心得体会

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摘要：瓦-米试验对诊断甲状腺肿是否合并气管软化有及其重要的价值，也是甲状腺肿大患者术前不可缺少的检查方法之一，但传统 DR 摄片时，即便是有多年经验的技师亦无法一次性获得有价值的影像资料。患者的配合度，技师的摄片时机，呼吸运动伪影等均会对试验结果产生重大影响，因此需多次投照，患者的依从度因反复吸屏气动作而逐次递减，运用多功能数字胃肠机进行此项试验时，可利用数字胃肠机强大的同步观察，即时点片及记忆回放功能，在瓦-米试验的投照关键节点进行同步观察，摄影点片及影像回放录制。投照结束后，可逐帧观察，选取最具诊断价值的图像进行测量，从而缩短了检查时间，提高了患者的就医感受。

目的：探讨 DRF 应用于瓦-米试验时对比传统 DR 摄片的优势性。

方法：回顾性分析我院 29 例经手术证实为甲状腺肿合并气管软化的患者所作瓦-米试验，同一患者均由同一位技师采用 DR+DRF 的双重检查方式进行瓦-米试验。图像上传后，分别由医师对两组图像进行测量。

① 瓦氏试验---患者侧立于平板探测器前，平视前方，保持身体平稳，双臂下垂，头颅及身体的矢状面与平板探测器平行。患者按照技师指示，尽力吸气后关闭声门并强力屏气，在屏气末端给予技师信号的同时进行摄片。

② 米勒氏试验---患者按照技师指示，尽力呼气后关闭声门，在屏气末端做吸气动作，但并不真正进行气体交换，此时给予技师信号进行摄片。

上述两项试验均常规进行正侧位投照，投照条件，位置，中心线及距离均相同。

结果：通过对 DRF 组和 DR 组的图像进行测量与分析，排除 2 例因巨大肿块导致管径差值无变化的患者后，DRF 组和 DR 组管径差为 3.0mm 及以上的患者检出率分别为 86%和 70%，DRF 组的管径真实差及测量准确率明显高于 DR 组。

结论：运用多功能数字胃肠机进行瓦-米试验，可更精准的测量管径差值，用于评估甲状腺肿患者有无气管软化风险及程度，为临床提供可靠有价值的影像数据。

PO-3653

颈部增强 CT 减少伪影优化方案的应用研究

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目的：探讨颈部双能增强 CT 扫描时减少患者锁骨及右锁骨下静脉对比剂伪影优化方案的效能。

方法：选取行颈部增强 CT 检查患者 100 例，对扫描图像进行对照质量分析。在增强 CT 检查中分别以传统方案和优化方案进行随机检查，根据方案将影像资料分为 2 组，对照组(A 组)自然平躺，对比剂和生理盐水分别以 2.5mL/s 和 2.5mL/s 固定速率推注；实验组(B 组)下颌上抬，颈下放置梯形海绵枕，使颈部完全贴合机床，头部用 B 枕固定防止患者头部歪斜，对比剂推注时间设定为动脉期 25s；静脉期 60s、对比剂速率设定为 2.5mL/s，生理盐水速率设为 2.5mL/s。

客观评价：从颈部 CT 值、噪声、噪声比、对比信噪比、右锁骨下静脉伪影指数方面对 2 组图像进行质量分析比较差异。

主观评价：对颈部内部结构强化层次及边缘视觉效果、锁骨和右锁骨下对比剂静脉伪影影响程度进行评分。结果 2 组方案记录的数据多组间比较，颈部平均 CT 值、右锁骨下静脉伪影指数差异有统计学意义($P<0.05$)。两两比较，实验组(B 组)的颈部平均 CT 值均高于 A 组，均有统计学差异($P<0.05$)，2 组方案在右锁骨下静脉伪影指数大小关系为：B 组<A 组，2 组方案图像质量主观评分大小关系为：B 组>A 组，且两两比较均有统计学差异($P<0.05$)。2 组方案多组间比较在噪声、噪声比、对比信噪比上差异无明显统计学意义($P>0.05$)。

结论：体位、对比剂注射时间、生理盐水冲刷技术的优化方案有助于减少颈部增强 CT 的锁骨和右锁骨下静脉对比剂伪影。

PO-3654

一种新的放射性损伤敏感性监测方法的探讨

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目的：为了减轻放射性损伤，探讨一种监测人体对放射性损伤敏感性的方法。

方法：通过一例临床放射性损伤敏感性的特点，明显表现在皮肤在 CT 照射后，发生明显损伤的病情，得到启发，研究发现一种监测放射性损伤敏感性的方法。

结果：鉴于放射性诊疗的必要性，及其放射性损伤副作用的严重性，探索一种新的放射性损伤敏感性监测方法势在必行，要达到有效放射性损伤敏感性监测，从而达到精准、个性化治疗的目的，应该在放射性损伤敏感性监测时，不能再做全身性放射性照射，或不做放射性照射。

结合上述病例，病人对放射性损伤敏感，对于放射性损伤敏感性监测，我们可以监测病人的皮肤，对病人做相关刺激，观察病人的敏感性，若观察到病人高敏性，说明病人对外界刺激高度敏感，从而指导病人尽可能不做放射性诊疗，或做低剂量的放射性诊疗操作。

对于病人皮肤敏感性试验的刺激因子的选择，最好的刺激因子应该是，皮肤放射性照射，利用特制的非常局限的放射性照射仪器，局限性、不同剂量的单纯小片状照射皮肤，然后检测皮肤的损伤程度，得出皮肤对放射性是否敏感及相关照射剂量，从而判断病人是否对放射性诊疗是否敏感，及敏感病人对所需要的健康低剂量照射的剂量，从而达到精准、个性化有效治疗的目的。

该检测方法适用于对病人的监测，和对医务人员的监测，还可以应用到其他与放射性损伤有关的职业人员的监测。

结论：本研究总结一个敏感病人皮肤放射性损伤的临床特点和表现，结合当今放射性损伤防治现状和迫切需要精准、个性化有效放射性诊断和治疗的现状，创新一种新的放射性损伤敏感性监测方法，该方法简单易行，对病人损伤小或几乎无损伤，值得进一步研究和实施，以减少放射性诊疗操作时的放射性损伤到最低程度，达到理想的放射性诊疗效果。

当然，本研究仅仅是研究设想和方案，需要进一步研究实施，及临床实验性应用，最终广泛应用于临床。

本研究应该有巨大的经济效益和社会效益，值得国内外参考应用。

PO-3655

医用放射性损伤的防治进展和防治建议

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目的：为了更好地做好放射性诊疗和防治医用放射性损伤，特作此研究。

方法：总结当前医用放射性诊疗现状，及医用放射性损伤的防治进展，提出防治建议。

结果：研究提出了 10 项医用放射性损伤的防治方法如下：

1. 重视医用放射性诊疗器械诊疗操作时的防护，不仅操作者要做好防护，病人也要做好严格防护。
2. 健康体检应规定不做 CT 检查，可做磁共振检查，或低微放射剂量的拍片检查。
3. 作为放射性损伤的敏感部位眼睛的防护，应该引起高度重视，务必使放射性诊疗操作者和受检查治疗者，防护其眼睛等其他器官。
4. 大力开展精准放射性诊疗操作的研究。
5. 大力开展精准放射性诊疗操作的防治方法。
6. 大力研究放射性损伤的临床治疗。
7. 在全国范围内大力开展放射性损伤有关知识的健康宣教。
8. 医学科技需要进一步发展，开发研究替代放射性诊疗操作的新的医疗器械，或开发研究更低辐射剂量的医疗器械。
9. 建议建立新法规，实施放射性诊疗操作限制制度，像抗菌素使用那样，建立放射性诊疗操作处方权制度。
10. 建立法规，优化医院开展放射性诊疗器械准入制度。

结论：在当今滥用 CT 作为一般常规体检检查方法的情况下，医用放射性损伤的防治迫切和势在必行，本研究提出的 10 项医用放射性损伤的防治方法，弥补了医用放射性损伤防治的不足，非常值得参考应用。

PO-3656

基于深度学习图像重建提升 CCTA 图像质量的可行性

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目的：探讨基于深度学习图像重建提升冠状动脉成像质量的可行性。方法：收集我院 2023 年 5 月至 2023 年 8 月行冠状动脉检查患者 30 例，采用管电压 100kV，噪声指数 24，智能管电流调制技术 (Smart mA)，扫描完成分别重建 50%ASIR-V 和深度学习图像重建不同级别降噪 (DLIR-L、DLIR-M、DLIR-H) 图像，分别测量四组图像主动脉根部、左主干、左前降支、左回旋支、右冠状动脉及心包脂肪 CT 值及 SD 值，计算信噪比 (SNR) 和对比噪声比 (CNR)。由两名具有五年工作经验医生采用五分法分别对图像质量进行主观评价。结果：四组重建图像噪声 (SD 值)、SNR 值及 CNR 值间差异均具有显著统计学意义 ($p < 0.001$)，且冠状动脉 SD 值在 50%ASIR-V、DLIR-L、DLIR-M、DLIR-H 中依次减低、SNR 值和 CNR 值在 50%ASIR-V、DLIR-L、DLIR-M、DLIR-H 中逐渐升高，其中 DLIR-H 重建算法 SD 值最低、SNR 值和 CNR 值最高。两名医师对四组重建图像主观评分具有良好一致性 (κ 值 > 0.75 , p 值 < 0.001)，冠状动脉 DLIR 重建算法主观评分显著高于 50%ASIR-V ($p < 0.001$)，其中 DLIR-H 重建算法主观评分最高。结论：深度学习图像重建 (DLIR) 算法可以显著降低 100kV 冠状动脉图像噪声并提升图像质量，其中 DLIR-H 重建算法提升冠状动脉图像质量效果最佳。

PO-3657

基于深度学习智能测量胸部 CT 图像噪声和信噪比的可行性研究

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目的

探索智能测量胸部 CT 图像噪声和信噪比的可行性，为大数据影像质量评价和分析提供新方法。

方法

本研究纳入 300 例正常胸部 CT 图像，包括研究数据集、内部测试数据集和外部测试数据集各 100 例。基于研究数据集，在气管分叉所处的 2D 层面，使用基于 3D Unet 深度学习框架构建的分割模型自动分割背景空气和肺野；分别以 -800Hu、-850Hu、-900Hu、-950Hu 和 -1000Hu 为阈值，测量背景空气的平均 CT 值和标准差，以 CT 值标准差作为图像噪声指标；分别以 -450Hu 到 -900Hu 间隔 50Hu 为阈值，测量肺野的平均 CT 值和标准差，计算图像信噪比 (SNR) 和对比信噪比 (CNR)；以人工测量的噪声、SNR、CNR 为参考标准，综合比较并筛选背景空气和肺野的最优 CT 阈值。基于内部测试数据集、外部测试数据集，验证最优 CT 阈值下自动测量噪声、SNR 和 CNR 与人工测量的一致性。采用组内相关系数 (ICC) 和皮尔逊相关系数分别对研究数据集、内部测试数据集和外部测试数据集与其所对应参考标准的一致性进行评价。

结果

在研究数据集中，背景空气 -900Hu、肺野 -800Hu 的阈值下，自动测量的噪声、SNR、CNR 结果分别为 29.35 ± 7.48 、 32.31 ± 8.43 、 7.80 ± 8.85 ；参考标准的噪声、SNR、CNR 结果分别为 30.24 ± 11.94 、 33.76 ± 13.70 、 7.62 ± 9.12 ；两者之间的 ICC 分别为 0.73、0.81、0.95， r 分别为 0.82、0.89、0.95。内部测试数据集和外部测试数据集自动测量的噪声 ICC 分别为 0.96、0.84， r 分别为 0.97、0.94；SNR 的 ICC 分别为 0.85、0.75， r 分别为 0.93、0.93；CNR 的 ICC 分别为 0.90、0.85， r 分别为 0.92、0.92。

结论

基于深度学习所探索的方法可以智能测量胸部 CT 图像噪声和信噪比,与放射科医生相比具有较高的准确性,可以代替人工测量结果,为大数据影像质量评价和分析提供新方法。

PO-3658

两种不同超高 b 值扩散加权成像序列在前列腺癌和前列腺增生中的临床应用

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目的 探讨分段读出扩散加权成像序列 (RS-EPI) 与单次激发平面回波成像 (SS-EPI) 超高 b 值在前列腺癌和前列腺增生诊断中的应用。**方法** 纳入 37 例经外科手术或穿刺、病理证实的前列腺疾病患者,其中前列腺癌 15 例,前列腺增生 22 例,所有患者于手术或穿刺前行 MR 扩散加权成像, b 值选择 0、1000、2000、3000s/mm²,由两名高年资医师用双盲法观察两种不同扩散加权成像不同 b 值时的扩散加权图像,对两名观察者的判断结果进行一致性检验,并比较两种不同 b 值对前列腺癌及前列腺增生的定性诊断准确率。**结果** 两名观察者的判断结果存在一致性 ($P<0.001$), Kappa 值为 0.88。当 b 值分别为 1000s/mm²、2000s/mm²、3000s/mm² 时, RS-EPI 诊断前列腺癌和前列腺增生的灵敏度及特异度分别为 66.7%和 81.8%、80.0%和 90.9%、93.3%和 95.5%。SS-EPI 诊断前列腺癌和前列腺增生的灵敏度及特异度分别为 66.7%和 77.3%、73.3%和 81.8%、80.0%和 86.4%。RS-EPI 的诊断符合率分别为 75.7%、86.5%、94.6%,而 SS-EPI 的诊断符合率分别为 73.0%、78.4%、83.8%。RS-EPI 在超高 b 值诊断前列腺癌和前列腺增生的灵敏度及特异度明显高于 SS-EPI。**结论** 选择超高 b 值 (1000、2000、3000s/mm²) 对前列腺癌和前列腺增生的鉴别具有较高的灵敏度和特异度,在鉴别前列腺癌和前列腺增生时, RS-EPI 较 SS-EPI 可能作为一种更好的辅助方法。

PO-3659

两种不同超高 b 值扩散加权成像在前列腺肿瘤病变 MR 检查中对图像质量的影响

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目的 超高 b 值对前列腺癌的检出有较高的敏感度,但却使图像质量明显下降,本研究比较超高 b 值读出方向分段采样平面回波成像 (RS-EPI) 和常规单次激发平面回波成像 (SS-EPI) 在前列腺癌 MR 检查中对图像质量的影响。**资料与方法** 回顾性分析 33 例在 3.0T MR 均行 SS-EPI 和 RS-EPI 超高 b 值 DWI 检查的前列腺癌病例的影像资料(分别选取 $b=1000$ 、2000 和 3000 s/mm²),分别由一位有 10 年以上工作经验的副主任医师和技师在不提供任何临床资料及 MR 序列信息的情况下,以轴位 T2WI 抑脂序列作为参照,针对两种扩散加权成像(diffusion weighted imaging, DWI)从病灶显示的清晰度、图像解剖变形、图像锐利度、细节显示四个方面按 5 个等级 (1-5 分) 进行独立主观评分。由第三位副主任医师在工作站上测量图像的信噪比 (SNR)、对比噪声比 (CNR) 和对比度,常规 SS-EPI 和 RS-EPI 两组间图像比较采用配对 Wilcoxon 秩和检验或配对 t 检验。**结果** 两位阅片者在共同评价两序列图像(选取 $b=1000$ 、2000 和 3000 s/mm²)病灶显示的清晰度、解剖变形、图像锐利度及细节显示方面具有很好的一致性, Kappa 值均大于 0.70。两位医师在对两种序列 (RS-EPI 和 SS-EPI) 在不同超高 b 值的主观综合评分中, RS-EPI 序列图像质量的各项指标明显

优于 SS-EPI ($P<0.05$)。结论 超高 b 值 RS-EPI 序列与常规 SS-EPI 序列相比明显提高了图像质量的多个指标, 更有利于早期前列腺癌的检出及鉴别。

PO-3660

CT 系统化分组质量控制管理模式在放射科技护一体化管理中的应用研究

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目的 探讨 CT 系统化分组质量控制管理模式在放射科技护一体化管理中的应用价值。

方法 1、传统质控模式: 每月月初由技师长带队, 对上月 CT 图像进行随机抽查 50 例左右, 从体位设计、参数设计、图像后处理三方面分别对图像进行评分, 最后汇总得出每月质控分数及各技术人员和护士得分情况。

2 系统化分组质控模式: 由技师长牵头, 将 CT 按照部位分为头颈部血管、体部血管、四肢血管、颌面部、颈部、胸部、心脏、腹部、泌尿系、四肢关节、灌注等, 由 5 年以上工作经验的技师分别担任每个项目质量评分负责人。每月第 10 个工作日前对上月 CT 图像进行随机抽查 50 例, 负责人各自查阅文献及专家共识, 根据本科室实际情况制定检查规范及评分细则。评分需包括检查前准备 (一般由护理人员承担) (如体位端正、闭气良好、憋尿充分等), 扫描 (由技师承担) (如充盈良好、扫描时机正确、辐射剂量适中等), 图像处理 (由技师承担) (如重组规范、后处理规范等)。最终由技师长进行汇总与考核, 获得每月质控分数及各检查环节技师及护士得分情况。

3、选取 2015-2018 年 287456 次 CT 患者 (传统质控管理模式, A 组) 和 2019-2022 年 321628 次 CT 患者 (系统化分组质控模式后, B 组) 进行分析研究。从患者重复扫描率、患者检查差错率、患者满意度、图像质量控制得分四个方面进行比较。

结果 患者重复扫描率: B 组 (1.41%) < A 组 (2.08%); 患者检查差错率: B 组 (0.021%) < A 组 (0.072%); 患者满意度: B 组 (97.36%) > A 组 (92.18%); 图像质量控制得分: B 组 (85.78 ± 3.05) > A 组 (77.32 ± 4.26)。

结论 CT 系统化分组质控模式有效的降低了患者检查的差错率, 降低了因重复扫描带来的辐射剂量风险, 提高了患者的满意度, 提高了图像质量, 在放射科技护一体化管理中起到重要作用。

PO-3661

全心运动校正算法对冠状动脉钙化积分图像质量和定量评估的影响

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摘要: 目的 评价全心运动校正算法 (NG SSF) 改善冠状动脉钙化积分 (CACS) 钙化斑块图像质量的效果和对钙化积分结果的影响。方法 纳入 69 例接受心脏冠脉钙化积分检查患者, 比较采用 NG SSF 重建前后图像 (分别为常规标准模式 STD 组及 NG SSF 组), 主观评分比较钙化斑块图像质量, 采用 Kappa 检验评价两位观察者间评分的一致性。比较 STD 组及 NG SSF 组包括 Agatston 积分 (AS)、容积积分 (VS)、质量积分 (MS) 的 CACS 定量结果, 并基于 Agatston 积分进行危险度评级。结果 两位观察者间对于 STD 组钙化斑块图像质量评分一致性好 (Kappa = 0.850), 对于 NG SSF 组钙化斑块图像质量评分一致性较好 (Kappa = 0.758)。NG SSF 组较 STD 组钙化斑块图像质量评分增高, 差异有统计学意义 (P 均 <0.05); NG SSF 组 AS、VS、MS

均低于 STD 组 ($P<0.05$)。7 名 (占 10.14%) 受检者存在 Agatston 积分危险分层改变, 其中 5 例高风险跨级为中风险, 2 名例中风险跨级为低中风险。结论 NG SSF 技术可改善心脏 CACS 钙化斑块图像质量进而可能优化钙化积分准确度, 采用 NG SSF 重建会降低 CACS, 从而影响患者的危险度评级。

PO-3662

500 例腰椎正侧位片质控分析及体会

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研究目的是通过分析我院 500 例腰椎正侧位片的图像质量, 找出技术缺陷, 提出整改措施, 从而提高照片质量和科室质控能力, 提升放射技师工作水平, 增强放射技师责任意识, 尽可能减少患者不必要的 X 线辐射, 确保患者安全。

PO-3663

PDCA 循环模式在改善腹部磁共振图像质量中的应用研究

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目的 探讨计划、执行、检查、处理(PDCA)循环模式改善腹部磁共振图像质量的运用效果。方法 回顾性分析腹部磁共振图像质量共 2835 例, 对每例图像按优秀、良好、及格进行质量评分。其中 2023 年 4-7 月图像例数作为对照组, 2023 年 4-7 月图像作为干预组, 干预组应用 PDCA 循环法, 即对产生图像质量差的原因进行分析、总结, 并落实相应质量干预措施。最终对两组图像质量进行干预前后的分析, 比较两组图像质量的优秀率、良好率、及格率及每个月的优秀率, 以评估 PDCA 循环管理对腹部磁共振图像质量的改善效果。结果 执行 PDCA 循环法后, 腹部磁共振图像优秀率从 74.56%提升到了 94.62%, 差异有统计学意义 ($\chi^2=227.896$, $p<0.001$)。腹部磁共振图像质量及格率由 0.92%下降到 0.32%, 差异有统计学意义 ($\chi^2=222.053$, $p<0.001$)。腹部磁共振图像质量良好率由 24.52%下降到 5.06%, 差异有统计学意义 ($\chi^2=4.302$, $p<0.05$)。每个月的腹部磁共振图像质量的优秀率较同期未执行前比较均有统计学差异 ($p<0.001$)。结论 通过实施 PDCA 循环模式, 可有效改善腹部磁共振图像质量, 提高诊疗效果, 值得临床推广应用。

PO-3664

儿童颅脑集成 MRI 的图像质量研究

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目的 对比分析儿童颅脑 MRI 的集成序列与常规序列的图像质量。方法 对 40 例儿童进行头部常规序列及集成序列 MR 扫描, 并按年龄分为 A 组 (<2 岁) 和 B 组 (>2 岁)。比较常规序列 T1 FLAIR、T2WI、T2 FLAIR 图像与集成序列重建 Syn T1 FLAIR、Syn T2、Syn T2 FLAIR 的灰质、白质及脑脊液的信号强度及对比度, 并对 A 组、B 组两序列间的总体图像质量、灰白质分界清晰度、病变显著性以及伪影评分进行比较。结果 Syn MRI 灰质、白质和脑脊液的对比度与 Con MRI 有统计学差异; Syn T1FLAIR、T2 灰白质与脑脊液的相对对比度与 Con 图像有统计学差异 ($P<0.05$); 两组 Syn T1FLAIR 和 T2 的总体图像质量均可被接受, 对于 T1 FLAIR 图像, A 组集

成图像灰白质分界评分较常规图像高 ($P<0.05$)，B 组集成图像的病变显著性较常规图像有差异 ($P<0.05$)；对于 T2 加权图像，两组常规图像和集成图像的灰白质分界无显著差异 ($P>0.05$)，B 组集成序列的病变显著性差异较常规序列高 ($P<0.05$)；对于 T2 FLAIR 图像，A 组常规图像的灰白质分界较集成图像更清晰 ($P<0.05$)，而 B 组无明显差异 ($P>0.05$)，两组序列图像的病变显著性无明显差异 ($P>0.05$)；集成序列的伪影评分均高于常规序列 ($P<0.05$)。结论 儿童脑部集成序列的 T1 FLAIR 和 T2 加权图像可以常规用于临床诊断，并在一定程度上优于常规序列。但 Syn T2 FLAIR 序列的质量普遍低于常规序列。在日常工作中可在集成序列的基础上加扫常规 T2 FLAIR。

PO-3665

基于深度学习图像重建算法对脑白质脱髓鞘患者 MRI 图像去噪效果的研究

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目的：使用基于深度学习重建算法的加速因子研究脑白质脱髓鞘患者脑磁共振图像的去噪效果。
方法：招募了 14 名受试者（9 名男性和 5 名女性，平均 59 ± 14 岁）。在 1.5T MR 扫描仪（UNITED IMAGING 680）上进行 MRI 扫描，包括轴位 T2WI 和 T2-FLAIR 序列。每个患者都接受了常规序列（A 组）和加速扫描序列以获得原始图像。使用常规滤波重建和 Deep Recon 重建技术对每个序列的加速序列图像进行重建，得到了 Deep Recon 图像（B 组）和常规滤波重建图像（C 组）。测量脱髓鞘病变的信噪比（SNR）和对比度噪声比（CNR）值。使用四分制方法对图像的整体质量进行评分和分析，3 分或 4 分可用于影像诊断。使用 Friedman 检验进行配对比较，以评估不同组之间的信噪比、CNR 和主观得分的差异。
结果：在 T2WI 图像上，不同组之间的 SNR、CNR 和主观评分存在显著差异。与 C 组相比，B 组的 SNR、CNR 和脱髓鞘病变的主观评分均有所提高 ($P<0.05$)，但 B 组和 C 组的 SNR、CNR 及主观评分均低于 A 组 ($P<0.05$)。与 C 组相比，B 组脱髓鞘病变的信噪比、CNR 和主观评分均有所提高 ($P<0.05$)，但 B 组和 C 组的信噪比、CNR 及主观评分均低于 A 组 ($P<0.05$)。
结论：与常规序列对比，T2WI 和 T2-FLAIR 快速成像序列可以节省大量的扫描时间，但是伴有信噪比和 CNR 的损失。对于脑白质脱髓鞘病灶的检查，Deep Recon 技术在 T2WI 和 T2-FLAIR 快速成像序列中具有良好的去噪效果，可以提高图像质量。

PO-3666

超高 b 值读出方向分段采样扩散加权成像序列在前列腺癌和前列腺增生中的临床应用

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目的 探讨 3.0T MR 读出方向分段采样扩散加权成像序列（Rs-EPI）超高 b 值在前列腺癌（Pca）和前列腺增生(BPH)诊断中的应用。
方法 纳入 37 例经外科手术或穿刺、病理证实的前列腺疾病患者，其中前列腺癌 15 例，前列腺增生 22 例，所有患者于手术或穿刺前行 3.0T MR 扩散加权成像，b 值选择 0、1000、2000、3000s/mm²，由两名高年资医师用双盲法观察并分析不同 b 值扩散加权图像，测量 DWI 高信号区和邻近背景区域的信号强度，计算不同 b 值 DWI 对前列腺癌及前列腺增生的定性诊断准确率。

结果 3.0T MR 扫描时 b 值分别为 1000s/mm²、2000s/mm²、3000s/mm² 时, DWI 诊断前列腺癌和前列腺增生的灵敏度及特异性分别为 80.0%和 63.6%、93.3%和 68.2%、93.3%和 72.7%。b 值选择 1000s/mm²、2000s/mm² 时, 诊断前列腺癌和前列腺增生的灵敏度及特异度低于 b 值为 3000s/mm²。

结论 3.0T MR Rs-EPI 选择超高 b 值 (1000、2000、3000s/mm²) 对前列腺癌和前列腺增生的鉴别具有较高的灵敏度和特异度, 可作为诊断前列腺癌和前列腺增生的重要辅助方法。

PO-3667

社交媒体在心脏 CTA 个性化成像中的价值

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目的: 验证微信小程序“个性化造影剂注射方案计算器”进行心脏 CTA 造影剂注射方案个性化设置是否可以优化造影剂注射方案。

方法:

方法: 将我院门诊及住院患者需要进行心脏 CTA 检查的患者按时间段分为两组, 试验组使用微信小程序“个性化造影剂注射方案计算器”进行心脏 CTA 造影剂注射方案个性化设置, 对照组按照操作者经验设置造影剂注射方案。观察两组患者最终使用的造影剂总量, 速率。同时观察心脏 CTA 的图像质量, 进行主观和客观评分。

结果:

结果: 试验组共纳入 45 例患者, 对照组共纳入 42 例患者, 两组患者一般信息无统计学差异。所有患者使用第三代双源 CT (SOMATOM Force, Siemens Healthineers, Forchheim, Germany) 前瞻性心电触发序列扫描模式完成。使用自动管电压和管电流调制技术 (CARE kV 和 CARE Dose4D), 参考管电压为 100kV, 质量参考管电流为 320mAs。根据患者体型自动设置实际扫描参数。试验组平均造影剂用量为 39±12ml, 速率为 2.9±1.7ml/s。对照组平均造影剂用量为 56±7ml, 速率为 4.2±0.6ml/s。与对照组比较, 试验组的造影剂用量和速率分别减少 43.5%和 44.8%。两组主观和客观图像质量无差异。

结论:

结论: 利用社交媒体进行造影剂注射方案个性化设置, 可以优化造影剂用量, 同时不影响图像质量。

PO-3668

基于定位图像估算管电流调制 CT 检查体型特异性辐射剂量的方法

黄文诺

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【摘要】:目的 研究基于定位像估算管电流调制(TCM)CT 检查体型特异性辐射剂量 (SSDE) 的方法。方法 利用定位像估算轴向的等效水直径, 根据断层图像的管电流调制曲线, 计算受检者轴向不同位置的 SSDE。回顾性分析 20 例临床胸部 TCM 检查数据, 利用定位像和断层图像分别计算累积 SSDE、中心 SSDE 和平均 SSDE。结果 以断层图像计算的分布为标准, 男性受检者断层图像与定位像计算的 SSDE 的相对偏差均值为-1.7%~4.3%, 偏差最大值 9.9%。女性受检者的偏差均值-4.3%~2.7%, 偏差最大值 7.8%。利用 Pearson 相关分析两种方法计算的累积 SSDE、均值 SSDE、中心 SSDE, 相关性大于 0.98, 偏差小于 5%; 断层图像和定位像计算的中心 SSDE 偏大于断层图像计算的累积 SSDE。结论 利用定位像和断层图像计算的 SSDE 分布趋势一致, 相对偏差小于

AAPM 220 报告中的值, 基于定位像和断层图像计算三种 SSDE 相关性都较高。本文提出一种利用定位像快速计算 TCM 检查的轴向 SSDE 分布的方法, 可用于估算个体化器官剂量和优化 CT 检查方案。

PO-3669

数字 X 线摄影最佳源像距体模实验研究

黄文诺
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【摘要】目的 借助体模实验探讨基于体表入射剂量(ESD)及影像质量因子(IQFinv)的数字 X 线摄影(DR)最佳源像距(SID), 为 DR 摄影辐射防护及参数优化提供依据。方法 对 PMMA 关节体模和 CDRAD2.0 对比度细节体模进行 DR 摄影。采用自动曝光模式(AEC), 管电压分别设定 50Kv-120Kv 范围内以 10Kv 递增; SID 设定在 80cm-230cm 范围内以 10cm 递增; 总计 128 个曝光参数组合。QUART dido2100K 剂量仪测量 ESD。Analyzer software version2.1 软件分析计算 IQFinv 值。Excel2010 软件建立体模 ESD、IQFinv 与 SID 关系曲线; SPSS19.0 分析 SID 与 ESD、IQFinv 的 Pearson 相关性, $P<0.05$ 为统计学显著性水平。体模 IQFinv、ESD 值作归一化处理, 拟合不同管电压体模 IQFinv、ESD 归一化值与 SID 曲线确定最佳的 SID。结果 (1) 体模实验 ESD 最大值 44.97mGY, 最小值 15.07mGY, 均值 26.23 ± 7.41 , ESD 与 SID 负相关 ($r=-0.989, p<0.001$), SID 80cm 至 230cm, ESD 显著降低 24-30%。(2) IQFinv 最大值 3.97, 最小值 2.02, 均值 3.22 ± 0.43 。IQFinv 与 SID 为负相关 ($r=-0.959, p<0.001$), 随着 SID 增加, IQFinv 略有降低。(3) 管电压 50Kv 至 120Kv, 最佳 SID 分别为 130cm, 150cm, 140cm, 190cm, 210cm, 200cm, 140cm, 130cm。实验体模的最佳摄影参数为 90Kv, SID 为 210cm。结论 DR 成像 AEC 模式时, 探测器获得相等曝光量, 增加的 SID 可以显著降低 ESD, IQFinv 略有下降。基于 DR 辐射剂量与影像质量可以确定最佳的 SID。

PO-3670

新兴数字化医学影像技术在提高心血管疾病、 关节疾病和肿瘤的诊断水平方面的应用价值评估

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目的: 评估各新兴数字化医学影像技术在提高心血管疾病、关节疾病和肿瘤疾病诊断水平方面的效果。方法: 通过检索近 5 年发表的相关研究报道, 比较评估不同影像技术(如高排数 CT、高磁场 MRI 和 PET-CT)在提高冠心病、膝关节损伤、肺癌等疾病检出率和诊断准确率方面的临床应用效果。收集病例数较大、技术指标可靠的研究结果, 进行统计学分析。结果: 最新研究显示, 利用 320 排 CT 进行冠状动脉 CTA 检查, 可提高心肌梗死患者冠状动脉病变的检出率至 98%, 显著优于 64 排 CT 的 85% 检出率(Wang 等, 2021)。利用 3.0T MRI 进行膝关节扫描, 可提高对软骨损伤和半月板撕裂的检出率至 91%, 而 1.5T MRI 的检出率为 79%(James 等, 2022)。一项涵盖 2200 例非小细胞肺癌患者的研究表明, PET-CT 检查可提高肺癌淋巴结转移的检出率至 85%, 单独 CT 检查的检出率仅为 62%(Lee 等, 2020)。结论: 各类数字化医学影像技术的应用, 可显著提高心血管疾病、关节疾病、肿瘤等多种疾病的检出率和诊断准确率(可达 85%~98%)。但仍需医生在全面评估病情的基础上进行综合判读, 以发挥临床应用价值。

PO-3671

常规及数字 X 线成像的临床应用价值

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最近这几年医疗技术在不断的发展,数字化技术也在不断完善,其在临床医学的应用过程中表现出越来越多的优点和越来越广泛的应用范围。本文旨在探讨常规及数字 X 线成像的临床应用价值,本文将从目的、方法、结果和讨论四个方面进行阐述。

目的:研究数字 X 线摄影技术在放射科当中应用的价值。

方法:收集我院 1 年间进行胸部影像学检查的患者 100 例,随机分为观察组和对照组,各 50 例。对照组患者使用常规的 X 线的检查方法对患者进行诊断,观察组患者使用数字 X 线摄影的方法对患者进行诊断,比较两种方法对患者进行检查完成后的图像质量以及对患者进行诊断完成后的准确程度。

结果:两组患者均有一定的诊断效果,但观察组患者的图片清晰程度以及对比度均明显优于对照组患者,在质量分级方面,观察组患者的图像质量分级明显优于对照组患者,同时观察组患者的检出率 90%明显优于对照组的检出率 60%,所有差异均为显著性差异 ($P<0.05$),有统计学意义。在临床对于患者进行诊断的过程中,通过使用数字方式成像技术能够显著的降低对患者进行诊断过程中的漏诊率,同时数字化 X 射线 DR 摄影能够有效克服非直接转换技术探测器因闪烁体或者增感屏内光纤散射所致图像模糊等情况,提高图像清晰度,且数字化过程环节相对减少,可降低影像信息丢失,提高空间分辨率和诊断效能,在临床上值得推广应用。

讨论:虽然 MRI 以及 CT 成像技术对于疾病的诊断及治疗均具有较大的临床应用优势,但剂量较大、成本较高等问题,其并不能完全取代 X 射线检查,对于某些特殊部位的影像学检查,仍然需要应用 X 线进行检查,例如胸部、骨肌系统、肝、胆、胰、脑以及脊髓等。相比传统 X 线平片检查,DR 检查能够更加清晰地显示病灶信息,有效提高临床诊断准确率,尤其是对于胸部、骨关节以及腹部等部位的成像更具优势。DR 系统能够有效调节对比度,从而提高视觉效果。DR 系统的照射范围更广,能够进行体层摄影以及减影处理,获取最佳影像信息。

综上所述,数字化 X 射线 DR 摄影能够有效提高图像质量,可降低影像信息丢失,提高空间分辨率和诊断效能,便于为放射科疾病的诊断工作提供科学合理的参考资料,值得在今后的临床工作中实践并进一步推广。

PO-3672

Propeller DWI 及 MUSE DWI 序列在 直肠肿瘤扩散加权成像图像质量的比较性研究

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目的:比较两种扩散加权成像序列 Propeller DWI 及 MUSE DWI 在直肠肿瘤患者扩散加权成像成像中的图像质量。方法:采集我院 37 例直肠肿瘤患者扩散加权图像,分别采用 Propeller DWI 及 MUSE DWI 两组序列扫描。由两位高年资放射科主治医师对两组序列的 DWI 图像质量进行评价,并测量两组图像病灶区 ADC 值。评价内容:1 主观评价:根据图像是否有伪影进行 1-3 分评分。2 客观评价:纳入主观评价图像质量 2 分及以上数据进行客观评价,评价内容为图像信噪比及 ADC 值的测量。结果:37 例患者中,7 例患者的 MUSE DWI 序列成像图像主观评价 <2 分,伪影严重,无法清晰显示病变,30 例可清晰显示病变(81%);Propeller DWI 成像图像主观评价均 ≥ 2 分,病灶显示率为 100%。MUSE DWI 序列的主观评分为 1.9 ± 1.0 ,Propeller DWI 序列的主观评分为

2. 9 ± 0.1 ($P < 0.001$, $X^2 = 47.269$), 有统计学意义。客观评价: 对 30 例两组主观评价质量均 ≥ 2 分的图像进行客观评价。MUSE DWI 序列的信噪比 28.30 ± 10.30 , Propeller DWI 序列的信噪比为 21.31 ± 9.12 , ($P = 0.002 < 0.05$, $t = 3.627$), 两者之间有统计学意义。MUSE DWI 序列 ADC 值为 $(8.56 \pm 0.07) \times 10^{-4} \text{mm}^2/\text{s}$; Propeller DWI 序列相同部位的 ADC 值为 $(8.47 \pm 0.03) \times 10^{-4} \text{mm}^2/\text{s}$, ($P < 0.001$, $t = 8.191$), 两者之间无统计学意义。MUSE DWI 序列成像时间为 2min25s, Propeller DWI 序列的成像时间为 3min40s。结论: MUSE DWI 在图像信噪比及成像时间方面优于 Propeller DWI, 但当扩散加权成像受到肠道内气体影响伪影较重时, MUSE DWI 组伪影及变形较重, 甚至影响诊断及 ADC 值的测量, 而 Propeller DWI 伪影控制较好, 在临床应用过程中应结合患者不同情况采用不同扩散加权方法, 更有利于病灶的检出、定性及临床分级。

PO-3673

秉持命运共同体理念开展放射科日常质量控制工作

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放射科传统质量控制方案关注焦点多为图像和报告质量, 属于终末质控模式。而随着社会经济的快速发展, 影像设备、医疗技术的不断更新, 信息化、智能化不断深入, 传统模式已不能适应群众就医体验新时代要求。新形势下放射科医疗质量与诊疗过程中各种因素密切相关, 这就要求科室日常质控工作应落实到事前、事中、事后全流程。2016 年开始我们引入“命运共同体”这一理念, 把科室管理、仪器设备、人力资源、医疗质量、行风建设、教学活动、科学研究等纳入日常质控工作中, 开启“五年计划”。第一个“五年计划”, 由上而下推动, 加强培训, 由老带新, 建立不同任务项目组, 解决了科室日常质控工作中“一目之罗”问题, 质控工作全面展开、全员参与。第二个“五年计划”, 科室医务人员从“无意识”的被动接受任务逐步走向“有意识”主动参与, 共商共建, 解决了很多质控工作中遇到的“为什么要做”、“怎么做”、“如何更有效”等诸多问题; 通过建立、完善项目组、评价组、督查组三级监督评价体系, 结合现有信息化、智能化手段, 有利于进一步破解日常质控工作“难”、“烦”、“繁”等难题; 通过建立项目组月报告制、评价组季度总结制、监督组及时反馈制等, 覆盖服务流程、技术与报告质量、不良事件、安全生产、教学科研、投诉与纠纷等, 有利于进一步规范医疗服务行为、持续改进医疗质量, 切实保障人民群众的健康权益和提升对医疗服务的切身感受。总之, 质控工作是保障医疗质量、学科持续发展极为重要的工作, 需秉持“滴水穿石”精神, 常存久久为功的韧劲, 积极构建学科“命运共同体”。

PO-3674

肺移植术的“质控”: 影像学如何“把好关”

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目的: 肺移植术是终末期肺部非恶性肿瘤性疾病的唯一可能的高成本代价的治疗手段, 探讨其术前术后的质控影像学如何把关适应症及术后疗效具有重要意义。

方法: 复习前沿进展了解肺移植术前如何规范合理使用影像检查工具; 哪些疾病为移植的适应症且所需要观察的临床与影像指标。术前临床与影像联合质控法的应用。如何正确认识影像征象变化在肺移植中及术后的作用。

结果: 不同适应症具有不同检查手段的特点; 不同适应症临床术前的影像学指标需与常用呼吸功能指标结合; 胸外结构、纵隔结构在术前影像评价时具有重要参考意义。个体时间轴上病情征象的变

化能够预判疾病进展,为早期肺移植提供重要佐证:年龄越轻、病症越早阶段,患者肺移植术后生存期越长。

结论:影像学能够从影像解剖角度、时间轴线变化等方面提供重要的肺移植术前的建议,术前临床与影像联合质控提高肺移植质量,也是肺移植能否有效进行的必备环节。

PO-3675

脑胶质瘤及脑转移瘤生物/靶向治疗后的 影像学定量评估报告规范解读

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目的:探讨高级别神经胶质瘤及脑转移瘤的治疗疗效的影像学评估标准的应用要点及影像报告规范与 QC,以提高影像科对 RANO、RANO-BM 的认识与重视,有利于临床 MDT 的开展及临床诊断的统一性、标准化。

方法:浅析、比较肿瘤影像评估标准的发展演变过程,从 WHO 标准发展到 RECIST、RANO、RANO-BM 标准及其之间的区别。解读 RANO 及 RANO-BM 标准中的主要诊断术语解析及应用要点;影像评估实例案例分析及国内外学科应用现状对比。

结果:目前主流的肿瘤疗效影像评估标准是 RECIST 1.1,其特点是易普及、操作简便、变异性小,涵盖肿瘤本身及转移灶、淋巴结等整体性影像综合评估;但胶质瘤治疗疗效的判断一直是一个临床上的难题,2010 年由哈佛医学院提出了新的高级别胶质瘤治疗反应评价标准,即 RANO 标准。RANO 标准经过近 6 年的临床实践,得到了神经肿瘤学界的认可,也成为高级别胶质瘤临床试验研究的常用评价标准。同时,由于脑转移瘤在大量原发性肿瘤(如肺癌)靶向治疗后的疗效评估中也占据相当的比例,故对肿瘤的整体疗效评估提出了更高的要求,RANO 工作组在 2015 年提出了 RANO-BM 疗效评估体系,2018 年中国临床肿瘤学会(CSCO)和中国抗癌协会肺癌专业委员会形成中国的专家共识正式推荐了 RANO-BM 评估标准在临床实践中的应用。总之,胶质瘤或转移瘤应用的要点与难点在于靶病灶的选择、测量序列选择、新病灶定义及甄别、非靶病灶显著进展的掌握等;与欧美发达国家的相关应用情况相比,无论是放射诊断医师/临床医师普及性还是影像报告的规范性均有明显差距。

结论:高级别神经胶质瘤及脑转移瘤治疗后的影像学评估标准及报告规范的推广亟待提高、任重道远;影像科重视 RANO、RANO-BM 有利于肿瘤疗效评估标准的掌握及诊断报告的规范,有利于影像科与其它学科在 MDT 时的良性互动与协作,推动临床诊断的统一性与标准化,提升影像诊断学的应有地位与影响力。

PO-3676

脑出血 CT 检查累积辐射剂量的监测意义

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目的:CT 相关的辐射暴露被认为是医源性电离辐射最大和增长最快的来源。脑出血患者需要多次颅脑 CT 检查来诊断和评估其疗效,因此,需要成立针对脑出血的辐射剂量管理小组来熟悉可用的剂量监测技术,并实施全面的策略来跟踪和降低患者的辐射剂量。本研究初步应用 Radimetrics 软件探讨了脑出血 CT 检查的累积辐射剂量。

方法:回顾性收集我院脑出血住院患者 30 名,并对每位患者住院期间的电子病程记录进行回顾,以确定患者的性别、年龄、病因、多次复查颅脑 CT 时间、住院时间等。使用 Radimetrics 软件获

取和监测每次检查的敏感器官(脑实质、晶状体、唾液腺、甲状腺、皮肤、肌肉、骨髓、颅骨)累积辐射剂量。

结果: 30 名脑出血住院患者(男 15 例; 年龄 16-81 岁, 平均年龄 54.5 ± 16.3 岁), 高血压脑出血 26 例, 30 名患者总共接受了 110 次颅脑 CT 检查(Philips iCT 36 次, Philips Brilliance 64 66 次, Simens Sensation 64 8 次), 平均每位患者复查 4 次, 最少复查 2 次, 最多检查 9 次, 最短复查时间为 1h15min, 最长复查时间为 22h43min。住院时间 2 天-34 天, 平均住院时间 13 天。脑实质累积辐射剂量范围为 52.5mSv 至 245.3mSv (107.1 ± 46.9 mSv、中位数 94.5mSv); 晶状体 68.3mSv 至 325mSv (139.7 ± 128.0 mSv、中位数 94.5mSv); 唾液腺 52.5mSv 至 245.3mSv (107.1 ± 46.9 mSv、中位数 61.7mSv); 甲状腺 4.9mSv 至 97mSv (27.9 ± 19.5 mSv、中位数 22.7mSv); 皮肤 5.4mSv 至 30.4mSv (13.1 ± 5.9 mSv、中位数 11.3mSv); 肌肉 2.3mSv 至 13.7mSv (5.9 ± 2.7 mSv、中位数 5.0mSv); 骨髓 5.4mSv 至 24.9mSv (11.4 ± 4.9 mSv、中位数 9.8mSv); 颅骨 22mSv 至 110.4mSv (48.5 ± 21.2 mSv、中位数 41.7mSv) 时进行剂量反馈、累积剂量监测和积极措施来降低辐射剂量。

PO-3677

噪声对测量冠状动脉钙化积分影响的探究

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目的: 探究不同程度的噪声对测量冠状动脉钙化积分的影响。方法: 收集医院一个月内年龄相同、体重相同、注药量相同、性别相同, 并都做过呼吸训练的患者的冠状动脉 CTA 图像。将冠状动脉 CTA 图像按噪声大小分成六组, SD 值 0~10 为 A 组, SD 值 10~20 为 B 组, SD 值 20~30 为 C 组, SD 值 30~40 为 D 组, SD 值 40~50 为 E 组, SD 值 50~60 为 F 组, 用相同的测量方法对不同组别的冠状动脉图像进行冠状动脉钙化积分的测量, 进而判断该患者冠状动脉的钙化程度。通过与真实的钙化程度进行对比, 分析不同噪声对测量冠状动脉钙化积分的影响。结论: 噪声越大, 测量冠状动脉的钙化积分的准确性越差。

PO-3678

静脉图像质量提升----双源双能量 CT 扫描技术配合高浓度对比剂对下肢静脉的扫描

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目的: 采用双源双能量技术配合高浓度对比剂, 提升静脉血管 CT 值和图像信噪比。

方法: 实验组采用德国西门子 DRICE 双源 CT 扫描仪, 增强扫描采用双能量扫描方法, 管电压为 80、140 kV, 采用 ADMIRE 迭代技术获得 40keV 静脉图像。采用双筒高压注射器经肘静脉注射对比剂, 对比剂碘普罗胺(含碘 370mg/ml), 剂量 1.4 ml/kg, 以 4.50 ml/s 的流率注射对比剂总量, 再以相同流率注射 40 ml 生理盐水。采用团主追踪法触发扫描技术, 监测膈静脉, 设置触发阈值为 120 HU, 延迟 40 s 开始监测, 触发后延迟 8s 开始扫描, 扫描方向足-头。对照组为既往常规下肢静脉 CTA 图像。

1. 客观评价方法:

将图像传至德国西门子 syngo.via 智能工作站, 重建层厚为 1mm 的静脉期横断面图像, 分别于髂静脉、膈静脉及胫后静脉放置感兴趣区(region of interest, ROI), 测量其 CT 值及标准差。测量血管 CT 值时 ROI 尽量放置在血管的中心位置, 占血管腔总面积的 2/3。

2. 主观评价方法:

由 2 名具有 5 年以上工作经验的放射科医师对图像评分。观察髂静脉、腘静脉及胫后静脉的密度、边缘清晰度、血管与周围组织的对比度及图像噪声等, 采用 5 级评分标准: 5 分: 图像解剖细节清晰, 边缘锐利, 无明显噪声; 4 分: 图像解剖细节尚清晰, 噪声稍增加; 3 分: 图像大部分解剖结果显示可满足诊断, 噪声明显但可接受; 2 分: 图像解剖细节模糊, 辨识困难, 噪声明显; 1 分: 图像不能诊断, 噪声极明显。3 分及以上符合临床诊断需求。

3. 辐射剂量:

记录所有受检者扫描对应的 CT 剂量容积指数 (CTDIvol)、剂量长度乘积 (DLP), 计算有效剂量 (ED), $ED=DLP \times K$ 。

结果: 对照组和实验组患者的年龄、性别分布、体重、体重指数差异均无统计学意义; 对照组对比剂用量高于实验组, 差异有统计学意义; 实验组对比剂注射流率为 4.5 ml/s, 对照组平均流率为 5.0 ml/s, 高于实验组; 两组间的 CTDIvol、DLP、ED 值差异均无统计学意义。

结论: 双源双能量 CT 对于下肢静脉的扫描优于常规 CTA 下肢静脉扫描。

PO-3679

基于全量数据分析 CT 辐射剂量诊断参考水平的可行性研究

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目的

利用大数据分析辐射剂量的影响因素, 并建立医疗机构 CT 辐射剂量诊断参考水平 (diagnostic reference level, DRL), 为 CT 辐射剂量管理提供理论依据。

方法

研究纳入 219986 例数据, 以剂量长度乘积 (dose length product, DLP) 作为量化指标, 辐射剂量分布 75% 位数为 DRL。分析①头颈、心胸和腹盆等 3 个检查部位 5 台不同 CT 设备的 DLP 差异; ②相同检查部位和 CT 设备下急诊、门诊、体检、住院和住院急诊等 5 类患者的 DLP 差异; ③≤4 岁、>4-10 岁、>10-14 岁、>14-18 岁, 和>18 岁等 5 组不同年龄患者的 DLP 差异; ④5 组不同年龄患者 3 个检查部位的 DLP 差异, 并建立年龄-检查部位相关性 DRL; ⑤10 项临床最常用 CT 检查项目的 DLP 差异, 并建立 CT 检查项目相关性 DRL。数据采用 SPSS23.0 进行统计分析, 非正态数据用 M (Q1, Q3) 表示, 非参数秩和检验进行差异比较, 组间两两比较采用 Bonferroni 方法, $P<0.05$ 为差异有统计学意义。所得剂量数值与国际相关放射防护 DRLs 进行比较。

结果

相同检查部位不同 CT 设备、相同检查部位和 CT 设备不同患者类型、5 组不同年龄患者的 DLP 存在统计学差异; 不同年龄患者头颈部 DRL 分别为 1092.5、848.10、880.27、932.77 和 1093.48mGy·cm, 心胸部 DRL 分别为 84.44、158.65、249.87、290.84 和 254.01mGy·cm, 腹盆部 DRL 分别为 177.84、327.40、593.94、713.34 和 1320.09mGy·cm; 不同检查项目 DLP 存在差异, CT 辐射剂量 DRL 最高是全腹部增强为 1822.39mGy·cm, 其次是头颅平扫为 938.64mGy·cm, 最低是肺低剂量平扫为 99.35mGy·cm; 本研究部分检查部位和检查项目 DRLs 较德国、美国等其他国家相比较高。

结论

CT 辐射剂量受 CT 设备、患者类型、年龄、检查部位及检查项目的影响。本医疗机构部分项目 DRLs 高于国际相关防护组织 DRLs。有必要采取有效措施控制 CT 辐射剂量水平。

PO-3680

影像技术质控：提高医疗诊断和治疗准确性的关键

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影像技术在医疗诊断和治疗中扮演着重要角色，但其质量问题对医疗效果和患者结果产生重大影响。本文旨在探讨影像技术质控的意义和方法，以提高医疗诊断和治疗的准确性和可靠性，减少误诊和漏诊的发生。通过制定质量控制标准、加强技术培训和监管、与医学科研结合，可以建立统一的质量控制体系和标准，提高医务人员的专业素质和责任意识，确保患者的权益和安全。

PO-3681

70kVp 联合 ASIR-V 的宽体探测器 CT 与 120kVp 的常规 CT 在头颈部血管造影中辐射剂量及对比剂用量的对照研究

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目的：评价应用 70kVp 和新一代自适应统计迭代重建(ASIR-V)在 16cm 宽体探测器 CT 头颈部计算机断层血管造影(CTA)中降低辐射剂量和造影剂的临床价值。

方法：前瞻性选取 16 例患者(A 组)，在 16cm 宽体探测器 CT 系统上应用 70kVp 管电压和 25mL 造影剂(CM)行低辐射和低造影剂头颈部 CTA 扫描。使用 ASIR-V 在 80%的水平上重建图像。将这些图像与 16 例患者(B 组)的历史数据进行比较，这些患者使用常规剂量 120 kVp 和 50 mL CM 在 64 层 CT 扫描仪上扫描。测量颈内动脉(ICA)、基底动脉(BA)、大脑中动脉(MCA)、左侧丘脑、左侧半卵圆中心和左小脑半球的 CT 值和噪声。计算目标动脉和脑实质的信噪比(SNR)和对比噪声比(CNR)。从骨-脑界面、光束硬化伪影、灰质和白质对比等方面主观评价图像质量。记录 CT 体积剂量指数(CTDIvol)。两组测量结果进行统计学比较。

结果：与 B 组相比，A 组的辐射剂量减少了 94% ($1.94 \pm 0.0 \text{mGy}$ vs $33.16 \pm 4.92 \text{mGy}$, $p < 0.001$)，造影剂剂量减少了一半 (25mL vs 50mL)。A 组的 ICA、BA 和 MCA 平均 CT 值 (分别为 $507.95 \pm 171.06 \text{HU}$ 、 $430.43 \pm 169.20 \text{HU}$ 、 $431.06 \pm 152.85 \text{HU}$) 和 B 组 (分别为 $427.09 \pm 97.01 \text{HU}$ 、 $341.88 \pm 79.17 \text{HU}$ 、 $328.40 \pm 84.74 \text{HU}$)；靶动脉和脑实质的信噪比和 CNR 无差异，两组主观图像质量无差异 (两组 $P > 0.05$)。

结论：与使用常规 CT 扫描方案相比，在宽体探测器 CT 系统上使用 70kVp 和 ASIR-V 进行头颈部 CTA 扫描可显著降低辐射剂量和造影剂剂量，同时提供良好的图像质量。

临床意义：在宽体探测器 CT 上使用 70kVp 和 25ML 低剂量造影剂扫描时，头颈部 CTA 的图像质量不会受到影响，从而减少了辐射剂量和造影剂剂量。

PO-3682

320 排 CT 柔性减影技术在“双低”肺动脉检查中的应用

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目的 探讨 320 排 CT 及其柔性减影技术对提升“双低（低造影剂量、低辐射剂量）”肺动脉图像质量的应用价值 **方法** 从 2023 年 03 月至 2023 年 08 月我院收治可疑肺动脉栓塞（PE）的 100 例患者，让其在 320 排 CT 上进行 CTPA 检查，然后回顾性分析这些患者的肺部平扫及肺动脉 CTPA 影像，对肺动脉期的影像进行柔性减影，得到肺减影及 CE-BOOS 的图像，并将得到的柔性减影图像上传至 PACS 系统，测量肺动脉主干及其主要分支的 CT 值与 SD 值，并把图像进行分组，A 组数据为 CTPA 第一期图像，B 组数据为 CTPA 第一期+第二期图像，C 组数据为 CTPA 第一期图像经过柔性减影后的数据；最后由 3 名经验丰富的高级职称医师对图像进行分析评价。探索在“双低”肺动脉扫描技术中 Subtraction Lung、Iodine Mapping 对辅助提高肺动脉图像质量的帮助。 **结果** 经过柔性减影处理后的图像，在肺动脉主干、左右肺动脉干及其主要分支 CT 值都比原始图像有所增加；肺减影后提示肺部组织灌注减低区域对诊断也有所帮助。 **结论** 320 排 CT Subtraction Lung、Iodine Mapping 柔性减影技术（肺减影、CE-BOOST）在“双低”肺动脉 CTPA 血管成像中对图像质量及诊断都有所帮助。

PO-3683

脊柱全长拼接 X 线摄影技术规范的探讨

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目的：脊柱全长拼接 X 线摄影技术是脊柱侧弯及畸形术前评估与术后随访的重要影像方法。本文旨在通过现状调查和图像质量评价分析，探讨脊柱全长拼接 X 线摄影技术规范制定的必要性。

方法：前期查找发现国内外暂无同行公认或权威组织颁发有关规范性文件。本单位组织骨科系统影像诊断医师、资深放射技师以及脊柱外科医师共同协商形成了一篇脊柱全长拼接 X 线摄影技术规范的初稿，并归纳出脊柱全长摄片的质量标准（正位片 10 项，侧位片 9 项）。随机抽调一个月的脊柱全长拼接正侧位影像，由 1 名诊断医生与 1 名技师分别进行图像质量评价，出现分歧时则两位老师商讨重新评价，获得质量评价数据，并做根因分析。

结果：脊柱全长拼接 158 份正位与 156 份侧位图像中：1.拍摄范围达到要求的符合率正位 86.08%；侧位 92.95%。2.图像标识左右、姓名正确，位置正确，不影响诊断与图像无运动伪影的符合率正侧位均为 100%。3.图像无异物的符合率正位 84.81%；侧位 85.90%。4.密度（亮度）/曝光合适并椎体与软组织之间对比度好的符合率正位 94.94%，侧位 89.74%；其中曝光明显不合适的正位为 1.90%，侧位为 2.56%。5.拼接图像无错层，过渡自然，各段无明显密度差异，椎体数量无改变，脊柱整体性完好的符合率正位 90.51%；侧位 98.08%。6.各椎体骨小梁、骨皮质、棘突（侧位）显示清晰，骨边缘显示锐利，无双边影的符合率正位 88.61%，侧位 98.72%。7.正位双侧椎弓根、各椎体间隙显示清晰的符合率为 98.10%；肋骨无明显错层、失真的符合率为 98.73%；双侧髂骨翼、髂嵴和闭孔对称，骨盆前后端正的符合率为 70.25%；8.侧位双上肢与椎体不重叠的符合率为 96.79%；双股骨基本重叠的符合率为 88.46%。

结论：通过对单机构内脊柱全长拼接片的质量评价和根因分析，我们认为亟需在区域内或/和全国范围内组织相关专家形成脊柱全长拼接 X 线摄影技术的共识或指南，用以指导该技术的规范临床应用。

PO-3684

基于鼓室注射钆对比剂后的 3D-FLAIR 序列扫描显示梅尼埃综合征患者内耳淋巴积水的研究

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目的 通过鼓室注射钆对比剂,行内耳磁共振三维快速液体衰减反转恢复序列(3D-FLAIR)延迟扫描,初步探讨梅尼埃综合征患者的内耳淋巴积水的可行性研究。**方法** 收集 2022 年 10 月至 2023 年 8 月就诊于长沙市第四医院梅尼埃综合征患者 12 例,其中,男 5 例、女 7 例,年龄 20~50 岁,均经鼓室注射 1:7 稀释的钆喷酸葡胺(Gd-DTPA),24 h 后行内耳 3D-FLAIR 序列扫描,并评估此技术显影内耳淋巴积水的效能。**结果** 12 例患者的内耳 3D-FLAIR 磁共振图像均能够清晰显示钆对比剂分布于耳蜗、前庭外淋巴间隙,同时,能够准确地勾勒出内、外淋巴间隙的界限。**结论** 经鼓室注射钆对比剂的内耳 3D-FLAIR 磁共振成像技术具有可行性,可准确判断梅尼埃综合征患者内耳淋巴积水情况。

PO-3685

关于制定数字化 X 线摄影中双下肢全长拼接技术规范探讨

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目的: 数字化 X 线摄影中双下肢全长拼接技术在下肢关节置换患者术前术后评估中应用广泛。经查阅国内外文献,发现目前暂无同行公认或权威机构发布的有关规范性文件。本文旨在通过该技术在本院的应用现状调查和图像质量评价分析,探讨数字化 X 线摄影中双下肢全长拼接技术规范制定的必要性。

材料与方法: 通过查阅现有文献,并组织本单位骨肌系统影像诊断医师、资深放射技师以及脊柱外科医师共同协商形成了一个双下肢全长拼接技术规范初稿,并归纳出 10 项影像质控标准。随机抽调本院一个月的双下肢全长拼接正位片,由 1 名放射科诊断医生与 1 名放射科技师根据该质控标准进行图像质量的评价,出现分歧时由两位老师商量讨论重新进行评价,获得图像质量评价数据,并做根因分析。

结果: 272 幅双下肢全长正位图像中,其中 1.拍摄范围合适(双侧髌前上棘,距骨下缘) 246 项符合,符合率为 90.44%; 2.股骨头中心、股骨髁间切迹中心、胫骨棘中心和踝关节中心在影像上清晰可见(测量机械轴夹角) 269 项符合,符合率为 98.89%; 3.双侧髌骨翼、髌棘和闭孔对称 267 项符合,符合率为 98.16%; 4.双侧下肢诸骨骨小梁、骨皮质清晰显示,骨边缘显示锐利,无双边影 262 项符合,符合率为 96.32%; 5.各关节间隙,关节面边缘清晰显示 257 项符合,符合率为 94.48%; 6.密度(亮度)欠合适/曝光程度欠合适 252 项符合,符合率为 92.64%; 7.密度(亮度)明显不合适/曝光程度明显不合适 3 项符合,符合率为 1.11%; 8.图像无运动伪影 269 项符合,符合率为 98.89%; 9.图像标识左右、姓名、性别正确,位置正确、整齐,不影响诊断 272 项符合,符合率为 100%; 10.铅尺位置合适,图像标记准确 269 项符合,符合率为 98.89%;

结论: 通过对单机构内双下肢全长拼接片的质量评价和根因分析,我们认为亟需在区域内或/和全国范围内组织相关专家形成双下肢全长拼接技术的共识或指南,用以指导该技术的规范临床应用。

PO-3686

双层探测器光谱 CT 在 125I 粒子植入去金属伪影对图像质量改善中的应用价值

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目的 125I 放射性粒子植入导致的金属伪影严重影响临床疗效评估。本研究评估了双层探测器光谱 CT (DLCT) 中不同图像重建方法对 125I 粒子植入去伪影效能及对 CT 图像纹理的影响。

方法 回顾性分析了 35 名接受 DLCT 检查的 70 层 125I 粒子植入患者。重建了常规 CT 图像 (CI) 和虚拟单色能量图像 (VMI, 40-150keV, 间隔为 10keV), 结合金属去伪影 (O-MAR), 用于评估 125I 粒子植入引起的低密度/高密度伪影。定量分析, 使用圆形感兴趣区域 (ROI) 来测量校正后的 CT 值和伪影指数 (AI)。对于纹理分析, 选择直方图分析作为统计方法。基于环形 ROI 记录了伪影直方图的分布和总频率, 环形 ROI 是一种新颖的圆形 ROI, 覆盖了几乎所有受伪影影响的软组织区域。此外, 计算了伪影的 ΔCT 、 ΔAI 、 Δ 分布和 Δ 频率, 评估了每组伪影减少效果的优劣。同时, 采用去伪影效果最佳组评估了较 CI 图像, VMI 联合 O-MAR 的去伪影效能。使用实体瘤反应评价标准 (RECIST) 评估了受伪影影响无法评估的病灶显示校正率。

结果 定量分析显示校正后的 CT 值和 AI 中低密度/高密度伪影显著减少 ($p < 0.05$)。在 VMI150keV 与 O-MAR (VMIO-MAR150keV) 组中, 低密度伪影的校正衰减效果优于同组中的高密度伪影 ($90\% > 62.22\%$, $p < 0.05$)。在纹理分析中, 低密度/高密度伪影都有所减少 ($p < 0.05$)。然而, 在 VMIO-MAR150keV 组中, 直方图的分布减少效果没有统计学意义 ($p > 0.05$)。随着 keV 的增加, 高密度伪影的总频率显著降低 ($p < 0.05$), 低密度伪影与 CI 组相比没有统计学意义 ($p > 0.05$)。VMIO-MAR150keV 组的低密度伪影减少率低于高密度伪影 ($16.97\% < 53.54\%$, $p < 0.05$)。

结论 VMI 和 O-MAR 的结合是减少 125I 粒子种植引起的低密度/高密度伪影的有效方法。纹理分析显示, 应用 VMIO-MAR150keV 可获得去伪影效果及最佳图像质量对, 从而显著提高 RECIST 标准下的临床疗效评估。

PO-3687

MRI 临床应用安全专家共识解读

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MRI 技术发展迅速, 已广泛应用于临床。MRI 的强磁场工作环境存在许多潜在风险, 为规范医用 MRI 检查的安全管理, 本文结合国内外相关指南、专家共识和最新文献, 对 MRI 设备安全和检查安全两方面分别进行阐述, 同时对 MRI 突发情况给予相应处理建议, 旨在提高 MRI 安全管理意识, 提升 MRI 安全管理的水平。

PO-3688

结合能谱技术对于肝静脉血管在不同 KV 下最佳成像效果的研究

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目的：探究能谱 CT 不同 KV 下显示肝静脉血管最佳单能值。

方法：将 60 例肝移植研究对象在能谱 CT 上进行肝脏扫描，通过计算机辅助和人工智能技术，将肝部动脉血管及门静脉血管隐藏，只显示肝静脉血管，在肝静脉血管上用不同的 KV 来进行对比，分别在 40、50、60、70KeV 单能量并联合 60% 的迭代技术重建图像，并与 140KVP 混合能量图像比较，来评估显示肝静脉血管的最佳单能值。

结果：通过多样本非参数分析进行比较，肝静脉最佳单能值水平为 60KeV，在 60kev 下主观评分均优于其他单能量组。

结论：能谱 CT 最佳单能量技术联合迭代重建技术得出结论，推荐使用最佳单能量为 60kev 重建图像来显示肝静脉图像质量。

PO-3689

基于多参数深度学习模型的颈动脉 CTA 图像质量自动评估

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【目的】开发基于深度学习算法的颈部 CTA 图像质量评价模型，并验证该模型的性能，实现自动、快速、客观、量化的颈部 CTA 图像质量评估。

【方法】回顾性收集颈动脉 CTA 图像 750 例用于构建并验证深度学习模型，以 6: 2: 2 的比例划分训练集 (n=450)、验证集 (n=150) 和内部测试集 (n=150)，另外收集三家医院的 90 例颈动脉 CTA 图像作为模型的外部测试集。构建深度学习评价模型包括以下步骤：首先由 3 名放射科医师对颈动脉 CTA 图像质量按好、中、差进行评价；通过 U-net 算法自动分割颈动脉并测量颈动脉全长的 CT 值、血管边缘梯度、SNR、CNR 四种客观指标；利用算法结合主观评价与客观指标确定用于评估图像质量的客观代表性层面；最终根据代表性层面的客观指标分别构建单个参数与多参数联合深度学习模型。将该模型的图像质量分类评估结果与放射科医师达成共识的金标准进行 kappa 一致性比较，采用混淆矩阵和受试者工作特征曲线(ROC)评估不同模型效能和实用性，并根据灵敏度、特异性、精密度、召回率、F 评分、准确度、受试者工作特征曲线下面积 (AUC) 评估不同模型的性能。

【结果】基于 CT 值、血管边缘梯度、SNR、CNR 四种客观指标分别及联合构建五种深度学习模型，通过比较得出多参数联合深度学习模型效能最优，在内部测试集、外部测试集中的 AUC 值分别为 0.98、0.97，在内部测试集中，多参数联合深度学习模型的敏感性、特异性、精确率、召回率、F 分数、准确率分别为 0.93、0.97、0.93、0.93、0.93、0.95。模型对颈动脉 CTA 图像质量评估结果与放射科医师之间的 kappa 一致性在内、外部测试集的结果分别为 91.8%(95% CI: 87.0–96.5)、92.6%(95% CI: 86.9–98.4)。

【结论】所提出多参数深度学习模型在自动评估颈部 CT 血管造影图像中效能最优，其评估结果与放射科医师评估一致性相当，可作为评估颈动脉图像质量的可靠工具。

PO-3690

基于低剂量 CT 技术行胸腹主动脉混合现实成像的可行性研究

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目的 探讨低剂量 CT 技术实现胸腹主动脉混合现实成像的可行性研究。方法 前瞻性收集拟行胸腹主动脉混合现实成像的患者 67 例, 随机分为 A、B 两组, 组 A (常规剂量胸腹主动脉混合现实组, $n = 32$) 和组 B (低剂量胸腹主动脉混合现实组, $n = 35$)。组 A 采用 120 kVp, 组 B 采用 80 kVp, 将两组生成的 CT 数据导入到可视化三维 (three-dimensional, 3D) 建模软件进行 3D 建模, 并进行混合现实结果发布。两组患者的人口学特征比较采用独立样本 t 检验; 混合现实质量的主观评价采用 Mann-Whitney U 检验, 评价者采用 Kappa 分析进行一致性比较。结果 两组间在年龄、身高、体重、性别及身体质量指数 (BMI) 指标上均未见明显差别 (均 $P > 0.05$)。组 B 方案生成的胸腹主动脉混合现实辐射剂量较组 A 方案减少约 59%。两组方案生成的胸腹主动脉混合现实质量未见明显差异 ($P > 0.05$)。评分者的主观一致性较好, Kappa 值为 0.622~0.829 之间。结论 低剂量 CT 技术可有效应用于胸腹主动脉混合现实中, 保证胸腹主动脉混合现实质量的同时, 大幅减少患者所受的辐射剂量, 为胸腹主动脉混合现实技术的广泛推广提供保障。

PO-3691

CT 能谱成像对抑制锁骨下对比剂伪影的临床研究

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摘要: 目的: 探讨能谱 CT (DECT) 中单能量成像 (VMI) 技术减少头颈部 CTA 扫描锁骨下静脉对比剂线束硬化伪影的抑制, 改善图像质量并确定最佳能量水平。方法: 回顾性研究 78 例我院 2022 年 5 月-2023 年 5 月期间, 行 DECT 头颈部 CTA 扫描的患者。通过 Syngo via 后处理工作站, 对所有患者的图像资料进行后处理重建, 每例患者分别以 10 个 keV 间隔重建 40-140 keV 的单能量图像, 重建 1 组 120 kVp 混合能量图像及 11 组单能量图像, 保存图像数据。通过测量各组图像动脉期伪影区、非伪影区、颈总动脉的 CT 值和标准差值 (SD), 计算图像信噪比 (SNR)、对比噪声比 (CNR) 和线束硬化伪影指数 (BHA), 并对结果进行统计学分析。由两名有经验的放射科医生主观地评定图像质量, 评估整体图像噪声, 对测量数据进行统计学分析。比较 120 kVp 混合能量图像和单能量图像对线束硬化伪影的去除和图像质量是否具有差异性, 分析图像质量, 并找出 CNR 最高的单能量图像。结果: 与常规混合能量图像相比, 120KeV 时 BHA 值、CT 值差值最小 ($P < 0.05$), 同时 SNR、CNR、颈总动脉 CT 值明显减小。而 70KeV 时, BHA 值小于 120kVp ($P < 0.05$), SNR、CNR 值最高 ($P < 0.05$), 伪影区噪声相对较低 ($P = 0.07$), 且血管显示最佳为 349.02 ± 82.40 HU。结论: 能谱 CT 成像提供了一套虚拟单能量成像, 可按需选择, 优化头颈部 CTA 的成像。在头颈部 CTA 扫描中, 120KeV 去除对比剂硬化伪影的效果最好, 但其组织对比度较低, 图像质量较差; 而 70KeV 伪影值小于 120kVp, 血管显示程度最佳, 组织对比度最好同时伪影区噪声相对较低, 图像质量最好, 因此 120KeV 图像可以结合 70KeV 图像共同进行临床诊断。

PO-3692

基于智能调制技术 CT 摆位对图像质量和辐射剂量影响的模体研究

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目的：探讨在自动管电压、管电流智能调制 (CARE) 技术应用前提下，不同摆位高度对图像质量和辐射剂量的影响。

方法：采用西门子 64 排 128 层 CT，设置相同扫描参考条件、不同扫描尺寸参考模型 (Average/Very strong)、不同检查床高度对直径为 25cm 水模进行重复扫描。扫描结束后测量水模中心位置 CT 值及噪声，记录扫描后不同组别的管电压、剂量长度乘积 DLP。分析床高与辐射剂量和图像质量的关系，以床高 150 为摆位基准，分析不同检查床高度对图像质量与辐射剂量影响

结果：同一模体，同一参考剂量，同一尺寸参考模式下，辐射剂量与检查床高度成正相关。以 150 为扫描床中心为标准，尺寸参考模式为 Average 时，床高升至 100，辐射剂量增加约 30%，噪声增加 11.1%；床高降至 200、250 时，辐射剂量分别降低约 14.2%、21.4%，噪声分别减少 11.1%、增加 44.4%。尺寸参考模式为 Very strong 时，床高升至 100，辐射剂量增加约 53.6%，床高降至 200、250 时，辐射剂量分别降低约 17.3%、22.6%，床高 250 时，噪声增加 50%。

结论：CARE 技术应用前提下，摆位高度对于图像质量和辐射剂量具有影响。偏离检查床中心摆位会导致 CT 值、图像噪声差异，辐射剂量变化与偏离中心的程度成正比。同一检查床水平，实际扫描条件随不同尺寸参考模式各有不同。

PO-3693

IRIS-DWI 与常规 DWI 在直肠癌诊断中的比较研究

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目的本研究比较传统弥散加权成像 (c-DWI) 与 IRIS- DWI 在直肠癌图像中的应用，分析其在诊断上的优缺点。

材料与方法选取经病理证实的直肠腺癌患者 15 例，平均年龄 65.8 ± 11.3 岁，女 7 例，男 8 例。所有患者在 3.0T MR 扫描仪 (Ingenia CX, Philips, 荷兰) 上使用 16 通道相控阵体线圈进行 cDWI 和 IRIS-DWI 序列的 MR 检查。检查前均未接受新辅助治疗。将患者分为 cDWI 组和 IRIS-DWI 组。将所有 cDWI 和 IRIS-DWI 图像传输到工作站 (Intellispace Portal, Philips Healthcare) 进行后处理。采用 5 分法评价弥散图像的图像质量。测量 ADC、病变信号强度 (SI)、臀大肌 (SIg) 和臀大肌标准差 (SDg)。避免坏死、囊性改变和大血管区域放置感兴趣区 (ROI)，感兴趣区面积为 20-30mm²。计算图像的信噪比 (SNR) 和噪声对比比 (CNR)。对图像质量的一致性进行 Kappa 分析。通过计算类间相关系数 (ICC) 分析两名放射科医生的一致性。采用独立样本 T 检验比较 ADC、SNR 和 CNR 值。

结果两观察者对 cDWI 和 IRIS-DWI 的图像质量评价高度一致 ($\kappa > 0.8$)。两名放射科医生的一致性较好 (ICC 值 > 0.9)。cDWI 和 IRIS-DWI 的 ADC 值分别为 $(0.89 \pm 0.12) \times 10^{-3}$ mm²/s、 $(0.86 \pm 0.12) \times 10^{-3}$ mm²/s。DWI 组与 IRIS-DWI 组 ADC 值比较，差异无统计学意义 ($P > 0.05$)。IRIS-DWI 组的 SNR (82.84 ± 48.53)、CNR (72.04 ± 37.64) 均高于 DWI 组，两组比较差异有统计学意义 ($P = 0.049$ 、 0.016)。

结论研究表明，IRIS-DWI 序列获得的图像质量更高。IRIS-DWI 序列具有较好的信噪比和图像分辨率。因此，IRIS-DWI 对直肠癌 MRI 的诊断效果更好。

PO-3694

针对托管医院冠状动脉 CTA 同质化标准建设的调查研究

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目的：调查托管医院在现有设备的基础上，冠状动脉 CTA 图像质量与辐射剂量现状，分析原因，提升图像质量，降低辐射剂量。

方法：回顾性分析了托管医院 2022 年 6 月-12 月进行的冠状动脉 CTA 图像 69 例患者的基本信息、心率、图像噪声、冠脉图像质量（主观评价）、伪影数量、伪影类型、扫描辐射剂量等数据，结合托管医院的检查参数，分析原因，提出改进策略。

结果：共 69 例患者行冠状动脉 CTA 检查。其中男性 38 例，女性 31 例，平均年龄 59.8 岁，检查时平均心率 65.9 次/分，6 名患者存在心律失常，图像噪声平均为 22.4Hu，辐射剂量平均为 21.6mSv，59 例患者图像存在伪影，伪影类型有：风车伪影、开花状伪影、模糊伪影、阶梯伪影，其中风车伪影最多，占比 74.5%；图像质量差 1 例（1.4%），图像质量中等 11 例（15.9%），图像质量良好 17 例（24.6%），图像优秀 40 例（58.0%）。辐射剂量严重超标（标准为不超过 5mSv），图像质量优良率超过 80%。

结论：目前冠状动脉 CTA 检查在湖北省广泛开展，但图像质量与辐射剂量不同等级医院间相差很大，我院托管医院在检查辐射剂量方面严重超标（>5mSv），分析原因主要为检查时管电压过高，患者呼吸运动配合不佳，无心电编辑导致。针对主要原因进行技术改进，以期提升图像质量，降低辐射剂量。

PO-3695

低管电压对 CTA 的图像质量和剂量的影响

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目的：利用标准体模，探讨 16cm 宽体探测器能谱 CT 在低管电压状态下对于 CTA 图像质量和辐射剂量的影响。材料与方法：应用树脂材料标准体模，将 20mg/mL 碘海醇和水 40mL 分别置于体模的两个管中，按照常规螺旋 CT 扫描的管电压不同分为 A、B、C 三组，A 组设置管电压为 120kV，B 组设置管电压为 100kV，C 组设置管电压为 80kV。三组均使用 16cm 宽体探测器能谱 CT，采用常规螺旋 CT 扫描模式，固定管电流为 480mA，剂量指数设为 10mGy，探测器宽度为 8cm，螺距为 0.992:1，三组均采用滤波反投影技术重建图像，重建层厚为 1.25mm，层间距为 1.25mm。分别记录三组剂量容积指数，测量三组图像 CT 值及噪声值，并计算各组内图像的对比噪声比。采用 SPSS26.0 软件进行统计学分析，应用单因素方差分析及配对样本 t 检验，比较低 kV 与常规 120kV 的 CT 图像的信号噪声比及剂量容积指数的差异。结果：16cm 宽体探测器能谱 CT 在不同 kVp 的扫描中，不同组别辐射剂量分别为 6.2mGy、12.15 mGy、19.58 mGy，不同组间辐射剂量的差异有统计学意义（ $P < 0.05$ ），各组图像噪声值与信号噪声比差异均有统计学意义（ $P < 0.05$ ）。低管电压 80kVp 和 100kVp 组的 SD 值分别为 19.72 ± 1.535 、 13.069 ± 0.647 ，CNR 别为 52.314 ± 3.256 、 58.614 ± 3.443 ，常规电压 120kVp 组 SD 值及 CNR 值分别为 9.878 ± 0.733 、 60.344 ± 3.259 。两组间（80kV 组 vs 120kV 组）辐射剂量、与信号噪声比的差异均有统计学意义（ $P < 0.05$ ）；两组间（100kV 组 vs 120kV 组）辐射剂量的差异有统计学意义（ $P < 0.05$ ），但是两组间对比噪声比无明显差异（ $P > 0.05$ ）。结论：在 16cm 宽体探测器常规螺旋 CT 低管电压 100kV 扫描图像可以获得

与常规螺旋 CT120kV 扫描相同的图像质量(CNR), 但是低管电压 100kV 扫描时辐射剂量明显降低和噪声明显升高。在 CTA 中, 应用 16cm 宽体探测器低管电压 100kV 扫描可以替代常规 CT 图像。

PO-3696

16cm 宽体探测器能谱 CT 增强扫描虚拟平扫代替常规平扫最佳期相选择的相关研究

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目的:探讨 16cm 宽体探测器能谱 CT 增强扫描虚拟平扫代替常规真实平扫的最佳期相选择的相关研究。

方法与材料: 收集 57 例行腹部能谱增强 CT 扫描的患者, 男性 23 例, 女性 24 例, 平均年龄 55 ± 12 岁。采用 16cm 宽体探测器 CT, 平扫采用常规扫描, 增强采用能谱腹部扫描, NI 均设置为 10, 管电压采用 80kVp/140kVp 瞬时切换, 噪声指数设为 10m, 探测器宽度为 8cm, 螺距为 0.992:1, 对比剂使用 320mgI/mL 碘佛醇 80mL。采用滤波反投影技术重建图像, 重建层厚为 1.25mm, 层间距为 1.25mm。分别测量常规平扫水的 CT 值、SD 值, 计算 SNR; 后处理得到虚拟平扫图像, 记录三期后处理图像肝脏的 CT 值、SD 值、SNR。采用 SPSS26.0 软件进行统计学分析, 采用单因素方差分析比较三期虚拟平扫图像肝脏的 CT 值、SNR 以及剂量容积指数间的差异。

结果: 能谱 CT 增强三期辐射剂量分别为 9.71 ± 1.84 mGy、 8.41 ± 2.21 mGy、 6.74 ± 1.99 mGy, 三期虚拟平扫处理后的肝脏的 CT 值分别为 55.36 ± 7.64 HU、 57.4 ± 6.6 HU、 54.65 ± 6.72 HU, SD 值分别为 10.64 ± 2.34 、 8.19 ± 1.22 、 8.08 ± 1.34 , SNR 分别为 5.54 ± 1.72 、 7.18 ± 1.45 、 6.98 ± 1.65 , 常规平扫的辐射剂量为 8.46 ± 3.08 mGy, 肝脏的 CT 值为 59.76 ± 8.5 HU, SD 值为 19.07 ± 2.31 , SNR 为 3.2 ± 0.74 。能谱 CT 三期增强虚拟平扫图像肝脏与常规平扫肝脏的 SD 值、SNR 比较, 差异均有统计学意义 ($P < 0.05$)。能谱 CT 三期增强虚拟平扫间的肝脏的 SD 值、SNR 比较, 差异均有统计学意义 ($P < 0.05$)。动脉期虚拟平扫与门脉期及延迟期虚拟平扫肝脏 SD 值、SNR 有显著差异 ($P < 0.05$)。门脉期和延迟期虚拟平扫肝脏 SD 值、SNR 无显著差异 ($P > 0.05$)。

结论: 宽体探测器能谱 CT 虚拟平扫的图像质量高于常规真实平扫, 且延迟期辐射剂量最低, 而延迟期虚拟平扫图像质量优于动脉期虚拟平扫图像质量, 与门脉期图像质量无明显差异。

PO-3697

膝关节体模数字 X 线摄影源像距与体表入射剂量及图像质量的实验研究

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目的: 探索源像距 (SID) 参数优化在膝关节体模数字 X 线摄影 (DR) 摄影中降低体表入射剂量 (ESD) 和改善图像质量的价值。

方法: 去除滤线栅, 采用最适视野 (FOV) 和自动曝光 (AEC) 模式对膝关节模拟体模和细节低对比度分析体模行 DR 摄影, 设定管电压分别为 60kV 和 90kV; 在 80~230cm 范围内以 10cm 递增, 设置 16 个不同的源像距 (SID)。记录曝光指数 (EI)、管电流 (mAs)、体表入射剂量 (ESD), 计算影像质量因子倒数 (IQFInv), 作 ESD、IQFInv、mAs、EI 与 SID 的相关性分析、SID 与 ESD、IQFInv 的归一化分析。

结果: 管电压 60kV 时, ESD、IQFinv、管电流、EI 与 SID 的相关系数分别为 $r_1=-0.93$, $r_2=-0.85$, $r_3=0.97$, $r_4=-0.89$ (P 均 <0.001); 管电压 90kV 时, ESD、IQFinv、管电流、EI 与 SID 的相关系数分别为 $r_5=-0.96$, $r_6=-0.92$, $r_7=0.98$, $r_8=-0.94$ (P 均 <0.001)。不同管电压相关系数的差异性分析显示 ESD、IQFinv、管电流、EI 与 SID 的相关性差异均无统计学意义(P 均 >0.05)。管电压 60kV 时, 一元线性回归方程 $ESD=36.52-0.05 \times SID$ ($P<0.001$); 管电压 90kV 时, $ESD=29.75-0.05 \times SID$ ($P<0.001$)。IQFinv 和 ESD 归一化处理后, 管电压 60kV 时, SID=110cm 是 IQFinv 与 ESD 的最优点。管电压 90kV 时, SID=130cm 是 IQFinv 与 ESD 的最优点。

结论: AEC 模式下膝关节 DR 摄影, 随着 SID 的增加 ESD 逐渐减低、IQFinv 波动减低, 选择恰当的 SID 是控制辐射剂量和改善图像质量的有效方法。

PO-3698

基于 RQS 评分评估和分析国内外放射学顶刊文献的质量

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目的: 影像组学研究在平台标准化、生物学可解释性及临床易用性等方面仍存在明显不足。因此, 近期有学者提出影像组学质量评分 (RQS) 用来严格和系统地评估影像组学研究的科学完整性和临床相关性。因此, 本研究旨在采用 RQS 对当前国内外放射学顶刊中影像组学研究的质量进行评估和分析。方法: 在中华放射学杂志和 Radiolgy 杂志中, 对近两年采用了影像组学方法的研究进行系统检索。采用 RQS 评分对纳入的文献进行影像组学质量评估和亚组分析。采用卡方检验、Ridit 检验和两独立样本 t 检验等统计方法对不同亚组的 QRS 评分以及 16 个评分项之间的差异进行比较。结果: 共检索文献 151 篇 (中华放射学杂志 62 篇, Radiolgy 杂志 89 篇)。最终纳入分析文献 33 篇, 其中, 中文文献 21 篇, 英文文献 12 篇。纳入文献的平均 QRS 评分为 15.0 ± 4.42 ; 在 16 个评分项中, 进行了阈值分析、校准数据、临床决策分析和开放数据的研究占比分别为 24.2%、54.5%、63.6% 和 30.3%。亚组分析发现中文文献的 QRS 评分明显低于英文文献 (12.71 ± 2.37 vs 19.00 ± 4.39 , $p<0.001$); 与英文研究相比, 中文研究在特征建模、阈值分析、验证、临床决策分析、成本效应分析、数据开放等评分项上更需要进一步提升。而在 12 篇英文文献中, 国内研究 (7 篇) 的 QRS 评分显著高于国外研究 (21.57 ± 3.91 vs 15.4 ± 1.52 , $p=0.005$)。在其他的亚组分析中, 包括肿瘤与非肿瘤、神经影像与身体成像和单模态与多模态成像等等, 均没有观察到 RQS 评分的显著差异。结论: 当前国内外放射学顶刊中的影像组学研究的总体方法学质量仍不高。同时, 这些研究在阈值分析、校准数据和临床决策分析以及共享数据等方面也存在较大的不足, 但是这些分析技术和数据共享容易实现。因此, 清晰认识到上述研究结果, 可能有助于提升未来研究的 RQS 质量。

PO-3699

探索不同呼吸训练方式对肝肿瘤特异性磁共振检查动脉期图像质控的影响

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目的: 探索不同呼吸训练方式对肿瘤特异性磁共振检查动脉期图像质控的影响。

方法: 回顾性评估 2023 年 1 月至 2023 年 7 月接受名行肝肿瘤特异性磁共振检查患者, 84 人。由不同的训练方式将其分为 A 组 (21 名) B 组 (21 名) C 组 (21 名) D 组 (21 名)。包括: A 组: 体位: 坐立位, 训练方式: 1 对 3 非渐进式训练 (憋气 20s)。B 组: 体位: 坐立位, 训练方式:

1 对 3 渐进式训练 (憋气 5s→10s→15s→20s) C 组: 体位: 仰卧位, 训练方式: 1 对 1 非渐进式训练 (憋气 20s)。D 组: 体位: 仰卧位, 训练方式: 1 对 1 渐进式训练 (憋气 5s→10s→15s→20s)。对各组动脉期增强图像进行评估。由 2 名副高以上的诊断医师评估鉴定各组患者肝实质、门静脉、肝总动脉的信噪比以及对比信噪比 结果: A B 两组各部分组织 SNR 和 CNR 差异无统计学意义 ($P>0.05$), C D 两组各部分组织 SNR 和 CNR 差异无统计学意义 ($P>0.05$) A C 两组各部分组织 SNR 和 CNR 差异有统计学意义 ($P<0.05$) 结论: 不同的呼吸训练方式对肝肿瘤特异性磁共振检查动脉期图像质控有不同的影响, 仰卧位的训练方式质控明显高于坐立位, 1 对 1 训练方式质控质量要优于 1 对 3 呼吸训练方式。选择合适的呼吸训练方式对于提高图像质量至关重要。

PO-3700

磁共振上腹部增强基于改良呼吸训练法联合稀释钆塞酸二钠以减少动脉期一过性伪影方案及进展解读

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目的:比较磁共振钆塞酸二钠(Gd-EOB-DTPA)上腹增强肝动脉期循序渐进式与直接式呼吸训练方案的图像质量, 结合 1:1 稀释法, 探讨减少动脉期一过性伪影最佳方案, 并对一过性呼吸伪影解决方案进展进行文献解读。

方法: Gd-EOB-DTPA MR 成像患者 126 例, 分 4 组:组 1(31 例循序渐进式呼吸训练, 5 s、10 s、15 s ~ 20 s)、组 2(32 例直接式训练 20 s)、组 3(30 例与组 1 相同训练方案、组 4(33 例与组 2 相同训练方案)。

1、2 组 1:1 生理盐水稀释,注射速率 2 mL/s, 20 mL 生理盐水同速冲刷; 3、4 组不稀释, 注射速率 1 mL/s, 20 mL 生理盐水同速冲刷。半定量 5 分式评分, 和定量 SNR, CNR(与椎旁多裂肌)。

结果:半定量评分第 3 组肝动脉、门静脉、腹主动脉、肝实质评分及总评分略高于第 1 组和第 2 组, 统计上没有显著差异; 呼吸伪影有显著差异($P=0.00179$), 两两比较提示,组 3 的呼吸伪影明显大于组 2 和组 4, 低于组 1, 在四组中, 第 2 组呼吸伪影最小; 定量评分提示门静脉 SNR 和门静脉肝实质 CNR 差异有统计学差异($P=0.0268$ 、 0.0130), 第 2 组门脉和肝静脉显影最佳。

结论:通过多人一组直接式屏气 20 秒训练, 达标者可优先检查, 以 1: 1 生理盐水稀释 2 mL/s 流速注射造影剂和相同流速的生理盐水, 可得到最佳动脉期图像质量, 可在无高时间分辨采集序列设备上推广采集。

PO-3701

基于实时监测技术(Care Bolus)下不同注射速度对钆塞酸二钠(Gd-EOB-DTPA)增强成像肝动脉期图像质量的影响

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目的: 比较三种不同注射速度在实时监测技术(Care Bolus)中对钆塞酸二钠(Gd-EOB-DTPA)增强成像肝动脉期图像质量的影响。方法:使用 CARE Bolus 以三种不同速度注射造影剂 Gd-EOB-DTPA 后获得肝动脉期图像。146 例患者接受 Gd-EOB-DTPA 上腹增强 MR 成像, 其中 A 组为 49 例患者以 1ml/s 的速度, B 组为 51 例患者以 1.5ml/s 的速度, C 组为 46 例患者以 2ml/s 的速度。定量评分时, 计算肝实质、腹主动脉、腹腔干的信噪比(SNR)和增强比(CER)。定性评分选取肝实质、腹主

动脉、腹腔干、门静脉、肝动脉期伪影 5 个评分项, 计算总分。结果: A 组腹主动脉和腹腔干 SNR 显著高于 C 组($P<0.05$), A 组与 B 组无显著差异。C 组肝实质 CER 显著高于 A 组和 B 组($P<0.05$), A 组与 B 组间差异无统计学意义($P>0.05$)。三组间腹主动脉和腹腔干的 CER 差异无统计学意义($P>0.05$)。A 组腹主动脉、腹腔干 CER 及 5 项总分均显著高于 B 组和 C 组($P<0.05$), B 组与 C 组间差异无统计学意义($P>0.05$)。B 组动脉期图像伪影较 A 组差($P<0.05$)。结论:定量和定性分析表明, MRI 实时监测技术与 1ml/s 速度注射相结合, 可提供较好的动脉期图像, 减少 Gd-EOB-DTPA MR 成像中的伪影。

PO-3702

压舌板刺激迷走神经在高心率患者中进行冠状动脉 CTA 扫描的可行性探讨

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目的: 本文主要探讨 64 排及以下 CT 在高心率 (90-120 次/分钟) 患者行冠脉 CTA 扫描的可行性, 以解决县级医院等基层医疗机构由于设备原因而无法进行高心率冠脉 CTA 成像的难点。
方法: 对 32 例疑似冠状动脉病变的患者进行 CTA 扫描, 扫描前进行心率监测, 32 例患者平均心率为 105 次/分钟, 使用西门子 64 排 (型号: SOMATOM Definition AS) CT 设备, 扫描前使用压舌板刺激患者悬雍垂, 诱发恶心呕吐, 以达到刺激迷走神经来降低心率的目的, 刺激的同时监测心率, 刺激后 10 分钟左右待患者舒适后进行冠状动脉 CTA 扫描, 扫描参数及对比剂注射方案同常规扫描。
结果: 32 例患者中, 其中 31 例患者心率都得到明显改善, 完成了冠状动脉 CTA 的扫描, 扫描后观察图像未见明显伪影, 符合诊断要求; 1 例患者由于压舌板刺激后在进行扫描时心率再次上升, 导致 CTA 图像可见明显的错层伪影, 无法诊断。
结论: 根据相关文献报道使用降心率药物如腺苷、倍他乐克、美托洛尔等降低心率, 可诱发哮喘发作、导致消化不良以及降低血压等副作用, 对于低血压、哮喘以及严重慢性阻塞性肺疾病患者作为禁忌症, 因此限制了高心率患者使用降心率药物的广泛应用; 通过使用压舌板刺激迷走神经, 导致乙酰胆碱释放以此来降低心率, 既方便快捷又效果明显, 该实验组患者均未见明显不良反应, 该方法在县级医院等基层医疗机构或者 64 排及以下 CT 设备上值得进一步推广, 使疑似冠状动脉病变的患者由于心率高而无法在中低端设备上完成冠状动脉 CTA 成像成为过去, 但该方法会引起患者恶心呕吐, 极少数患者由于耐受程度较低, 因此在实际工作中根据患者耐受程度进行选择并规范操作。

PO-3703

双能量参数的稳定性和可重复性: 一个基于不同碘浓度的体膜研究

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目的: 双能量 CT 是 CT 领域的一个里程碑, 具有独特而重要的临床应用。在本研究中, 我们旨在测试双能量图像中不同参数的稳定性和再现性, 为未来的研究证明混合多个扫描仪数据的合理性。
方法: 在三种不同的双能量 CT 扫描机、四种不同的管电压设置下, 使用不同辐射剂量水平 (10mGy, 15mGy, 15mGy) 的腹部采集参数扫描了一个含有碘插入 (2、5、10 和 15 毫克/毫升)、碘-血液插入 (2 和 4 毫克/毫升) 的椭圆腹部模型。对单能图像 (40、70、100 和 140 千伏) 和虚拟未增

强图像的 CT 衰减结果以及碘图的碘浓度进行了定量评估。然后,采用伴有事后检验的单因素方差分析对不同类型的扫描仪参数进行比较。

结果综合考虑所有水平的辐射剂量,在两个管电压设置(100/Sn150 和 90/Sn150)之间的双源系统可以在最大数量的碘插入上实现碘浓度的一致测量 ($p>0.05$)。同样,两种双源系统在虚拟非增强图像上的衰减测量值上也无显著差异 ($p>0.05$)。此外,大多数测量对(6 对中的 4 对)在 140 keV 单能图像下能够实现一致的衰减测量值 ($p>0.05$)。

结论不同的双能量成像系统甚至不同的采集范式之间具有不同的碘和衰减精度,但这些定量指标在两个双源系统之间是通用的。

PO-3704

摄影 KV 在 DR 成像质量和辐射效能中的影响分析

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目的 探讨在 DR 成像中不同摄影千伏(KV)的变化对辐射效能和图像质量的影响。方法 利用专用图像检测板,在飞利浦 DR 系统上,通过改变摄影 KV (50—120KV)曝光,记录图像检测板中心区及空曝区的表面吸收剂量,并测定不同 KV 成像的中心区、空曝区、各级灰阶的密度值,进行量化分析。结果 摄影 KV 在 70—100 变化时表面吸收剂量减少明显,成像的中心区、空曝区、各级灰阶的密度值变化不大。结论 适当提高摄影 KV 可明显减少表面吸收剂量,提高辐射效能,而 DR 成像质量基本不受影响。

PO-3705

发育性髋关节 DR 摄影辐射剂量与图像质量的相关性研究

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目的在当前的 X 线摄影中,数字化 X 线摄影以其操作简单,辐射剂量小,成像质量高等优点受到越来越多的技师人员的青睐,但同时隐藏在背后的剂量问题也越来越不被人们所重视。本课题旨在通过研究数字 X 线摄影装置中剂量的指示值与受检者入射体表剂量的关系,应用剂量仪检测受检者不同体表位置剂量值,确定在不影响影像诊断的前提下,应用最小的辐射剂量获取能够满足临床诊断需求影像图像。

方法通过查阅相关的文献以及课题资料,应用有机玻璃建立试验模型,剂量面积仪检测 X 线的出口剂量面积值,应用相关公式计算到达受检者体表的剂量,去掉剂量面积仪将剂量仪固定在受检者体表位置,查看计算值与检测值之间是否相等,在误差范围内可以选用计算法获取入射体表剂量,通过 DR 的反馈值曝光指数“EI”来计算出探测器表面的空气比释动能,进而计算出出射体表剂量值,应用剂量仪检测体表剂量,查看计算出射人体剂量值与剂量仪检测值是否在误差范围内,在误差范围内可以选用通过 DR 的反馈值法获取出射人体剂量值,在能够获取入射体表剂量与出射体表剂量的方法下;应用试验动物模型法获取在不影响图像质量的前提下获取最优的摄影剂量,选取的动物模型与儿童腰围比较接近,选用不同的曝光参数(管电压、管电流量)对试验动物进行摄影,确定最优的曝光参数;辐射剂量最低,影像质量变化不大不会影像临床诊断的需求;将选择好的最优曝光参数应用于受检人体,观察受检者的影像图像。

结果 本研究建立了利用剂量面积仪与 DR 摄影设备的剂量反馈值计算数字化 X 线摄影入射体表剂量与出射体表剂量的计算模型,验证试验表明计算剂量值与剂量仪检测值在误差范围内,应用计算法

在动物试验中以优化的曝光参数对试验动物进行摄影, 观察能够获取满足临床诊断需求的低辐射剂量的摄影图像。

结论本研究所建立的数字化 X 线摄影所致受检者入射体表与出射体表的计算模型, 基本满足辐射防护剂量学的评价要求, 应用该计算模型可以估算在不同的曝光参数下, 受检者在每次曝光下所吸收的剂量, 可为数字化 X 线在诊断中受检者剂量提供一种便捷的计算方法。

PO-3706

自动预置技术结合噪声指数及迭代重建算法在腹壁下动脉 CTA 中的应用

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目的 探究自动预置技术 (Auto-prescription) 结合噪声指数 (NI) 和重建算法 (ASIR-V) 对腹壁下动脉 CTA 成像辐射剂量和图像质量的影响。方法 前瞻性收集我院行腹壁下动脉 CTA 检查的患者 150 例, 并随机分为三组。A 组 (50 例) 管电压 120 kVp, NI=10, 图像采用 40% 的 ASIR-V 重建; B 组 (50 例) 管电压采用 Auto-prescription 技术, NI=10, 图像采用 40%、60%、80% ASIR-V 重建, 获得 B1~B3 三个亚组。C 组 (50 例) 管电压采用 Auto-prescription 技术, NI=13, 图像采用 40%、60%、80% ASIR-V 重建, 获得 C1~C3 三个亚组。在各组轴位图像上测量髂外动脉及同层面腰大肌的 CT 值和 SD 值, 计算信噪比 (SNR) 及对比噪声比 (CNR)。记录 A、B、C 三组辐射剂量。由 2 名观察者采用盲法独立对各组腹壁下动脉显示情况和整体图像质量行主观评分。结果 B、C 组髂外动脉 CT 值均高于 A 组 ($P<0.05$); B、C 组内随着 ASIR-V 等级的提高, 图像 SNR、CNR 逐渐升高 ($P<0.05$)。B2、B3 及 C2、C3 组的 SNR、CNR 均优于 A 组 ($P<0.05$)。2 名观察者主观评价一致性较好 ($Kappa=0.757\sim0.922$, $P<0.05$)。B、C 组图像在腹壁下动脉穿支、穿出点显示、肌内走行的主观评分方面均优于 A 组。B2、B3 和 C2 组在整体图像质量主观评分方面与 A 组差异无统计学意义。B、C 组辐射剂量与 A 组相比分别降低 15.10% 和 52.85% ($P<0.05$)。结论 Auto-prescription 技术结合 NI=13 和 60% ASIR-V 的成像方案可在保证腹壁下动脉清晰显示的同时降低 52.85% 的辐射剂量。

PO-3707

低剂量胸腹部三期联合增强扫描结合深度学习重建算法的应用价值

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目的 探究不同等级的深度学习重建算法 (DLIR) 在低剂量胸腹部联合增强 CT 扫描 (CACE-CT) 中的应用价值。方法 前瞻性收集 2022 年 4 月~12 月于我院行三期 CACE-CT 的患者 58 例, 按就诊时间分为常规剂量组与低剂量组。常规剂量组 (A 组, $n=28$ 例): 采用管电流剂量调制等级 3 扫描, 重建 Karl5 级图像; 低辐射剂量组 (B、C、D 组, $n=30$ 例): 采用管电流剂量调制等级 2 扫描, 重建 DLIR (1~4) 四个等级图像, 记为 B1~B4、C1~C4、D1~D4 组。记录常规剂量组与低剂量组平均 mAs、CTDIvol 和 DLP, 并计算有效辐射剂量 (ED)。在三期轴位图像上测量肺动脉干、胸主动脉、肝脏、肝门静脉的 CT 值、SD 值, 并计算 SNR、CNR。由 2 名诊断医师对各组胸腹部图像质量进行主观评价。结果 低剂量组 mAs、CTDIvol、ED 较常规剂量组降低 34.47%、35.72%、34.80% ($P<0.05$)。随着 DLIR 等级的增加, B 组各部位的 SD 值逐渐下降, SNR 和

CNR 逐渐升高, 其中 B4 组各部位的 SNR, CNR 均优于 A 组 ($P<0.05$)。2 名诊断医师的主观评分一致性较好 (Kappa 值=0.763~0.928, $P<0.05$)。随着 DL 等级的升高, 胸部图像主观评分逐渐提高, B4 组得分最高; 腹部图像主观评分呈先升高后降低的趋势, B3 组得分最高。结论 在胸腹部联合增强扫描中应用 DL 算法, 能在保证图像质量的前提下, 有效降低患者辐射剂量。胸部最佳 DL 等级为 4, 在腹部最佳 DL 等级为 3。

PO-3708

1024 重建大矩阵结合 KARL 算法对胃部血管及肿瘤供血动脉显示的应用价值

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目的 探究 1024 重建大矩阵结合 Karl 算法对胃部血管及肿瘤供血动脉显示的应用价值。方法 前瞻性收集 2022 年 3~6 月临床上行腹部 CTA 检查的胃部肿瘤患者 30 例, 均采用联影 uCT760 进行扫描。扫描完成后, 对原始数据进行分组重建, A 组为常规组, 重建 512×512 矩阵结合迭代算法 (Keep Artifact Really Low, Karl) Karl5 图像; B 组为实验组, 重建 1024×1024 结合 Karl5、7、9 图像, 获得 B1~B3 三个亚组。在轴位图像上测量胃左动脉起始部的腹主动脉、腹腔干、脾动脉、肝动脉及同层面腹壁皮下脂肪组织的 CT 值和 SD 值, 计算上述血管的 SNR、CNR。由两名观察者采用五分法评估各组轴位、VR 和 MIP 的图像质量、胃部血管及肿瘤供血动脉的显示情况, 并行 Kappa 一致性检验。结果 A、B 组的腹主动脉、腹腔干、脾动脉、肝动脉的 CT 值差异无统计学意义 ($P>0.05$), B1~B3 随着 Karl 算法等级的提高, 图像 SD 值逐渐下降 ($P<0.05$), SNR、CNR 逐渐升高 ($P<0.05$)。与 A 组相比, B2 组除腹主动脉的 SD 值、肝动脉的 CNR 值外, 其余血管 SD 值、SNR、CNR 和背景噪声均无统计学差异 ($P>0.05$); 两名观察者主观评价一致性较好 (Kappa 值 0.780~0.921, $P<0.05$), B1~B3 组图像质量的主观评分随着 Karl 等级的提高呈现先高后低的趋势, B2 组得分最高 ($P<0.05$); 30 例胃部肿瘤中有 25 例肿瘤见胃动脉系统参与供血, B2 组的胃左动脉、胃右动脉、胃网膜左动脉、胃网膜右动脉、胃后动脉、胃短动脉的清晰显示率分别为 92%、72%、84%、100%、4%、4%、60%, 均优于 A 组。结论 采用 1024×1024 重建大矩阵结合 Karl7 能够显著提高胃部血管及肿瘤供血动脉分支的显示, 为临床诊疗提供更准确的影像信息。

PO-3709

噪声指数联合迭代重建算法行低辐射剂量 CT 尿路成像 (CTU) 的可行性探究: 模体研究

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目的 探讨 Smart mA, 自适应统计迭代重建 (ASIR-V) 的技术联合在 CT 尿路成像 (CTU) 中对图像质量和辐射剂量的影响, 获取低辐射剂量 CTU 的最佳成像参数。方法 使用 GE Revolution CT 扫描仪扫描 PH-75 模体。模体内放置不同稀释度的对比剂 (分别为 15mgI/ml, 30mgI/ml, 45mgI/ml) 软管, 软组织棒与脂肪棒进行组合。每个组合在不同噪声指数 (NI=11, NI=13, NI=15, NI=17) 下进行扫描, 将 NI=11+60%后置 ASIR-V 的图像作为常规剂量 A 组, 将 NI=13、15、17 分别结合 60%、80%、100%后置 ASIR-V 的图像作为低剂量 B、C、D 组。均使用常规 CTU 扫描方案 (120kVp, Smart mA), 测量各组软管、软组织棒、脂肪棒的 CT 值及 SD 值并计算信噪比 (SNR)、对比噪声比 (CNR)。结果 同一对比剂浓度下组间比较, NI=13+80% ASIR-V、

NI=13+100% ASIR-V、NI=15+80% ASIR-V、NI=15+100% ASIR-V、NI=17+100% ASIR-V 组 SNR、CNR 值高于 NI=11+60% ASIR-V 组 ($P<0.05$)；NI=17+80% ASIR-V 组 SNR、CNR 值与 NI=11+60% ASIR-V 组差异无统计学意义 ($P>0.05$)。同一对比剂浓度下，NI=13+80% ASIR-V、NI=15+80% ASIR-V 组二维主观评分高于 NI=11+60% ASIR-V 组 ($P<0.05$)。NI=11 组 ED 为 1.67mSv，NI=15 组 ED 为 0.88mSv，NI=15 较 NI=11 降低 47.30%。结论 不同 NI 下 CTU 扫描结合高权重 ASIR-V 可在保证图像质量的同时显著降低辐射剂量，其中 NI=15+80% ASIR-V 为低辐射剂量 CTU 的最佳成像参数，满足诊断需求。

PO-3710

基于深度学习重建算法优化低剂量腹壁下动脉 CTA 成像参数

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目的 探究深度学习图像重建算法 (DLIR) 在低剂量腹壁下动脉 CTA 中的应用价值。方法 前瞻性收集 2023 年 1 月~6 月行腹壁下动脉 CTA 成像的患者 59 例，将患者随机分为 A、B 两组，A 组 29 例，B 组 30 例。A 组为常规辐射剂量组，120 kVp，管电流为剂量调制 3，迭代重建算法为 Karl5；B 组为低辐射剂量组，120 kVp，管电流为剂量调制 2，DLIR 重建算法，重建 DLIR (1~4) 四个等级并标为 B1~B4 组。记录 A、B 组平均 mAs，容积 CT 剂量指数 (CTDIvol)、剂量长度乘积 (DLP)，计算有效辐射剂量 (ED)。在各组轴位图像上测量髂外动脉及同层面腰大肌的 CT 值和 SD 值，计算信噪比 (SNR) 及对比噪声比 (CNR)。由 2 名观察者采用盲法独立在各组 VR 和 MIP 图上对腹壁下动脉的显示行 3 分制评分，在轴位图像上对整体图像质量行 5 分制评分。结果 B 组平均 mAs 和 ED 相较于 A 组分别降低了 39.33%、44.09%，($P<0.05$)。B1~B4 随着 DLIR 算法等级的提高，图像 SD 值逐渐下降，SNR、CNR 逐渐升高 ($P<0.05$)。B3 和 B4 组 CNR 均高于 A 组 ($P<0.05$)。2 名观察者主观评分一致性好 (kappa 值 0.779~0.889， $P<0.05$)，A、B 两组在腹壁下动脉穿支、肌内走行及穿出点显示中差异无统计学意义 ($P>0.05$)；B1~B4 组整体图像质量的主观评分随着 DLIR 等级的提高呈现先高后低的趋势，B3 组得分最高 (4.50 ± 0.51)，与 A 组 (4.45 ± 0.51) 相比差异无统计学意义 ($P>0.05$)。结论 DLIR 算法能够有效降低腹壁下动脉 CTA 的辐射剂量，并能保证图像质量，其中 DLIR3 为推荐的最佳重建等级。

PO-3711

CT 重建矩阵对不同密度大小肺结节影像组学特征稳定性的影响

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目的 分析 CT 重建矩阵对不同密度、大小肺结节影像组学特征稳定性的影响。方法 于成年男性仿真胸部体模 (PH-N1) 中放置 4 种大小 (5mm、8mm、10mm、12mm)、2 种密度 (-630HU、+100HU) 组合的肺结节共 8 枚，采用联影 uCT760 扫描仪进行扫描，在图像后处理工作站基于原始数据分别重建 512×512 、 768×768 及 1024×1024 矩阵的图像，在 3Dslicer 软件上手动勾画 ROI，分割肺结节，使用 python Pyradiomics 软件包进行组学特征提取，包括形状、一阶强度、纹理特征及高斯核为 2、3、4、5 的拉普拉斯变换后提取的高阶特征等共计 479 个特征，计算各特征的变异系数 (CV)，分析重建矩阵的改变对不同大小、密度肺结节组学特征的影响。结果 不同大小密度的肺结节影像组学特征稳定性均受到重建矩阵的影响。形状特征是最稳定的特征，受重建矩阵的影响最小 ($CV\leq5\%$)；部分一阶特征及纹理特征变异度较大，不稳定 ($CV>20\%$)。经过不同高斯核拉普拉斯滤波变换之后，组学特征的稳定性占比有所提高，高斯核 2 为最佳 (提升幅度在

10.75%~39.78%)。随结节直径增加, 稳定特征的比例逐渐升高; 1024×1024 矩阵稳定特征的比例高于 512×512 矩阵。相同大小及重建矩阵条件下, 实性结节所提取的稳定性特征略多于磨玻璃结节, 在 5mm 大小最为显著。结论 重建矩阵的改变会影响肺结节组学特征的稳定性, 小磨玻璃结节受到的影响更为显著, 较大重建矩阵有助于提升组学特征的稳定性。高斯平滑增强了肺结节组学特征的稳定性, 高斯核 2 为最佳。

PO-3712

噪声指数联合 ODM 技术及迭代重建算法行低辐射剂量 CT 尿路成像 (CTU) 的可行性探究

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目的 探讨 Smart mA, ODM 技术和自适应统计迭代重建 (ASIR-V) 的技术联合在 CT 尿路成像 (CTU) 中对图像质量和辐射剂量的影响, 获取低辐射剂量 CTU 的最佳成像参数。方法 前瞻性收集行 CTU 扫描的患者, 按检查时间分为常规剂量 A 组 (120kVp+Smart mA NI=11)、低剂量 B 组 (120kVp+Smart mA NI=15) 和低剂量 C 组 (120kVp+Smart mA+ODM NI=15), 每组各 30 例, A 组重建 60%后置 ASIR-V, B 组与 C 组重建 60%~100% (间隔 10%) 后置 ASIR-V (B1~B5 组、C1~C5 组)。对各组图像质量进行客观、主观评价, 并记录每次扫描的检查辐射剂量。结果 A 组与 B 组比较, B1 组肾皮质 SNR 值、椎旁肌 SNR 值低于 A 组 ($P<0.05$), B3 组肾皮质 SNR 值、肌肉 SNR 值高于 A 组 ($P<0.05$), B4、B5 组各组织 SNR、CNR 值均高于 A 组 ($P<0.05$)。A 组与 C 组比较, C1、C2 组肾皮质 SNR、膀胱 SNR、膀胱 CNR 均低于 A 组 ($P<0.05$), C4、C5 组各组织 SNR、CNR 均高于 A 组 ($P<0.05$)。在 B、C 组中, B2、C3 组得分最高, 且高于 A 组 ($P<0.05$)。B 组 ED 为 (2.34 ± 0.95) mSv, 较 A 组降低了 48.57%, C 组 ED 为 (2.14 ± 0.7) mSv, 较 A 组降低了 52.97%。结论 不同 NI 下 CTU 扫描结合高权重 ASIR-V 可在保证图像质量的同时显著降低辐射剂量, 其中 NI=15+80% ASIR-V 联合 ODM 技术为低辐射剂量 CTU 的最佳成像参数, 满足诊断需求。

PO-3713

能谱下肢 CTV 在血栓显示和分期中的应用价值

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目的 采用能谱 CT 行下肢静脉成像 (CTV), 探究其在深静脉血栓 (DVT) 显示和分期中的应用价值。方法 收集下肢 CTV 检查患者 82 例, 随机分为 A 组 (42 例) 和 B 组 (40 例)。A 组: 管电压 120 kVp; B 组: GSI 模式, 重建 50 keV 单能量图和碘 (水) 图。在 A 组 120 kVp 图和 B 组 50keV 图中测量静脉 CT 值和 SD 值, 计算静脉 SNR 和 CNR。2 名观察者对图像主观评分并行 Kappa 一致性检验。DVT 依病程时间分期, 在 A 组 120 kVp 图和 B 组碘 (水) 图中分别测量 DVT 的 CT 值和碘浓度 (IC), 绘制 ROC 比较 CT 值和 IC 诊断 DVT 分期的效能。结果 B 组静脉 CT 值、SNR 和 CNR 均高于 A 组 (P 均 <0.05)。2 组图像主观评分一致性好 (Kappa 值=0.926~0.955, P 均 <0.05)。B 组静脉显示情况和血栓清晰度的评分为 5 (4, 5) 分, 优于 A 组评分 4 (3, 4) 分 ($P<0.05$)。IC 诊断 DVT 分期的效能 (AUC=0.973) 优于 CT 值 (AUC=0.891)。结论 能谱下肢 CTV 可以提高静脉对比度和血栓清晰度, 并为判断血栓分期提供了更为客观的依据, 有利于临床的精准诊疗。

PO-3714

低能级靶重建结合 ASIR-V 算法在下肢静脉成像中的应用

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目的 探究能谱 CT 低能级 (keV) 靶重建技术结合 ASIR-V 算法在下肢静脉成像中的应用价值。**资料与方法** 回顾性收集 40 例行下肢静脉成像 (CTV) 检查的患者。GSI 成像模式, 管电压 80/140kVp 瞬切, 管电流采用 GSI Assist 模式。A 组 (常规组): 70keV 结合 40%ASIR-V 单能量图像, 常规视野 (DFOV) 含双下肢。B 组 (低 keV 组): 50keV 结合 50%ASIR-V 单能量图像, DFOV 同 A 组。C 组 (低 keV 靶重建组): 50keV 结合 50%~80%ASIR-V 单能量图像 (间隔 10%, 记 C1~C4 组), 靶重建 (小 DFOV, 以左、右股骨为中心覆盖单侧下肢)。在轴位图像上测量双侧下肢静脉的 CT 值及 SD 值并计算 SNR、CNR。由 2 名观察者采用 5 分法对静脉显示和栓子显示清晰度进行主观评分并行 Kappa 一致性检验。结果 在静脉显示方面, B、C 组评分均优于 A 组 ($P<0.05$)。在栓子显示清晰度方面, 大小栓子在 C 组内得分均随着 ASIR-V 权重的增加呈现出先高后低的趋势 ($P<0.05$), 其中 C2 组得分最高, 优于 B 组和 A 组 ($P<0.05$)。B、C 组各静脉段的 CT 值均高于与 A 组 ($P<0.05$)。C1~C4 组中随着 ASIR-V 算法权重的增加, 虽然各静脉段的 SNR、CNR 逐渐升高 ($P<0.05$), 但稍低于 B 组 ($P<0.05$)。结论 采用 50keV 靶重建技术结合 60% ASIR-V 算法能够显著提高下肢静脉对比度和栓子显示清晰度, 为临床提供更准确的影像信息。

PO-3715

1024×1024 重建矩阵结合 Karl 算法对肾上腺 CT 图像质量和自动分割的影响

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目的 探究大重建矩阵 (1024×1024) 结合 Karl 迭代重建算法对肾上腺 CT 图像质量和自动分割的影响。**资料与方法** 回顾性收集 40 例行肾上腺 CT 增强的患者。扫描完成后, 对静脉期的原始数据进行重建分组, A 组采用常规矩阵 (512×512) 结合迭代重建算法 Karl 5 进行重建; B 组采用 1024×1024 重建矩阵结合不同等级的 Karl (5、7、9 级) 算法进行重建, 记为 B1~B3 组。2 名观察者采用 5 分法评估各组肾上腺显示情况、图像整体质量和肾上腺自动分割情况。在各组轴位图像上测量肾上腺、同层下腔静脉及腹壁皮下脂肪组织的 CT 值和 SD 值, 并计算 SNR、CNR。采用基于深度学习的器官分割模型对各组重建图像的肾上腺进行分割, 记录双侧肾上腺自动分割和手动分割体积值 (金标准), 并计算 Dice 系数和体积差别率。结果 在肾上腺显示、图像整体质量和自动分割情况方面, B2 组得分最高且均优于 A 组 (P 均 <0.05)。随着 Karl 等级的提高, B 组肾上腺、下腔静脉的 SD 值逐渐下降 (P 均 <0.05), SNR、CNR 逐渐升高 (P 均 <0.05), 其中 B2 组和 A 组 SD 值、SNR 和 CNR 差异均无统计学意义 (P 均 >0.05)。所有组别 Dice 系数均 >0.90 , B 组内的肾上腺 (双侧) 体积差别率均 $<5\%$, 且低于 A 组 (P 均 <0.05)。结论 采用 1024×1024 重建矩阵结合 Karl 7 算法能够在不影响肾上腺图像分割的同时优化肾上腺图像质量。

PO-3716

管电压对组学特征再现性和自动骨密度预测模型的影响

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目的 深度学习结合放射组学分析在胸部标准剂量 CT (SDCT, 120kVp) 和低剂量 CT (LDCT, 80kVp) 图像上建立两个全自动的骨密度预测模型, 并评估管电压对模型放射组学特征再现性和模型效能的影响。

方法 回顾性收集 2021 年 1 月~2023 年 3 月行骨密度检查和胸部 CT 检查的患者 1508 例。其中 987 例患者由于了一次胸部 CT, 或 LDCT 和 SDCT 检查时间超过 3 个月被用于开发胸椎松质骨自动分割模型, 采用 Dice 系数评估模型效能; 313 例患者均做了 LDCT 和 SDCT 被用于模型构建, 以 8:2 的比例分为训练集和内部测试集; 208 例组成外部测试集 1 (80kVp, n=115) 和外部测试集 2 (120kVp, n=93)。基于 SDCT 和 LDCT 分别提取了 1184 个特征, 并分别建立了两个二分类器。一级分类器用于区分正常或异常骨密度, 而二级分类器用于识别骨质疏松或骨质减少。计算 LDCT 与 SDCT 组学特征之间的一致性相关系数(CCC), 构建受试者工作特性曲线和决策曲线评估模型效能和临床收益。

结果 自动分割模型在 LDCT 和 SDCT 上的 Dice 系数分别为 0.98 ± 0.01 和 0.97 ± 0.02 。管电压的改变降低了提取的组学特征的再现性, 85.05%的组学特征再现性低(CCC<0.75)。基于 LDCT 和 SDCT 建立的组学模型的曲线下面积(AUC)分别为 0.97 ± 0.01 和 0.94 ± 0.02 , 决策曲线分析显示两个模型均有较高的临床净收益。然而, 交叉验证结果表明, 当模型生成与临床应用之间的管电压不匹配时, AUC 显著降低。

结论 利用 LDCT 和 SDCT 图像的自动预测模型能够准确评估骨状态。管电压对评估骨质状态的组学特征再现性和预测效能有影响。模型生成与临床应用之间应采用匹配的管电压, 以保证较高的预测效果。

PO-3717

1024×1024 重建矩阵结合迭代重建算法在腹壁下动脉 CTA 中的应用价值

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目的 探究 1024×1024 重建矩阵结合迭代重建 (Karl) 算法在腹壁下动脉 (DIEA) 血管造影 (CTA) 中的应用价值。**资料与方法** 前瞻性收集 2023 年 1~6 月临床上行腹壁下动脉 CTA 检查的患者 40 例, 对原始数据进行分组重建。A 组采用常规 512×512 矩阵结合 Karl 5 级重建; B 组采用 1024×1024 大重建矩阵分别结合 Karl5、7、9 级重建, 获得 B1~ B3 共 3 个亚组。在轴位图像上测量髂外动脉及同层面腰大肌的 CT 值和 SD 值, 计算信噪比 (SNR) 及对比噪声比 (CNR)。由 2 名观察者采用 3 分法在 VR 和 MIP 图上评估 DIEA 穿支、肌内走行、穿出点、腹壁下浅动脉 (SIEA) 以及腹壁下浅静脉 (SIEV) 的显示情况, 采用 5 分法在轴位图像上评估整体图像质量。**结果** B1~B3 组内随着 Karl 算法等级的提高, 髂外动脉 SD 值逐渐下降 ($P<0.05$), SNR、CNR 逐渐升高 ($P<0.05$); B2、B3 组髂外动脉 SD 值均低于 A 组 ($P<0.05$), SNR、CNR 均高于 A 组 ($P<0.05$); 2 名观察者主观评价一致性较好 (Kappa 0.773~0.872, $P<0.05$), B2 和 B3 组 DIEA 穿支、肌内走行、穿出点以及 SIEA、SIEV 的显示和整体图像质量主观评分均优于 A 组 (P 均 <0.05), 其中 B2 组得分的提升幅度最大。**结论** 采用 1024×1024 重建矩阵结合 Karl 7 重建算法能够优化图像质量, 提高腹壁下动脉及穿支微细血管的显示。

PO-3718

基于 GSI-Assist 在不同腹围患者腹部增强 CT 成像中实现个体化“双低”的应用研究

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目的：评估能谱智能辅助技术（GSI-Assist）联合低对比剂注射方案在不同腹围患者腹部增强 CT 成像中实现个体化“双低”扫描的可行性。方法：随机分为 A、B 两组，根据患者腹围大小分成四个亚组：A1、B1（700mm<腹围≤800mm），A2、B2（800mm<腹围≤900mm），A3、B3（900mm<腹围≤1000mm），A4、B4（1000mm<腹围≤1100mm）。A1~A4 管电流分别为 235mA、280 mA、320 mA、360 mA，对比剂用量为 500mgI/kg。B 组管电流采用 GSI Assist 技术，NI 设置为 10HU，前置 ASIR-V 为 60%，对比剂用量为 300mgI/kg，其余扫描方案同 A 组。A 组增强三期均重建 70keV 结合 60% 后置 ASIR-V 图像；B 组动脉期重建 70keV 结合 60%~80% 后置 ASIR-V 图像，门静脉期及延迟期重建 50~65keV（间隔 5keV）结合 60%~80%后置 ASIR-V 图像。比较 A、B 各组的对比剂用量和辐射剂量。测量各组各期肝脏组织、腹主动脉、门静脉、下腔静脉及同层面的竖脊肌的 CT 值及 SD 值，并以竖脊肌为背景计算上述组织的对比噪声比（CNR）。由两名观察者采用盲法独立地对各组图像行 5 分制评分。结果：在动脉期，B 组 70keV 结合 70%后置 ASIR-V 图像的肝脏与腹主动脉的 CT 值、CNR 相较于 A 组差异无统计学意义；在静脉期和延迟期，B 组 50~55keV 重建图像的肝脏 CT 值高于 A 组，55keV 结合 70%和 80%后置 ASIR-V 图像的肝脏与血管的 CNR 与 A 组相当或优于 A 组。在 B 组各亚组的主观评分中，当 keV 水平一致时，70%后置 ASIR-V 图像最佳。B1~B4 组较 A1~A4 组对比剂剂量分别降低 38%、37%、30%、22%，辐射剂量分别降低 15%、25%、19%、12%。结论：能谱 CT 智能辅助技术可在保证图像质量的基础上实现腹部增强个体化“双低”扫描，推荐在动脉期采用 70keV 联合 70%后置 ASIR-V 图像，在静脉期和延迟期采用 55keV 联合 70%后置 ASIR-V 图像。

PO-3719

探讨能谱 CT 在术前鉴别膀胱癌病理分级的最佳成像模式

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目的：探讨能谱 CT 的定量成像在术前鉴别膀胱尿路上皮癌（UCB）病理分级的最佳成像模式。方法：回顾性分析行泌尿系能谱 CT 增强检查并经手术病理确诊为 UCB 的患者 66 例，其中高级别（HG-UCB）33 例，低级别（LG-UCB）33 例。由 2 位观察者分别测量动、静脉期病灶最大层面的碘浓度（IC）、标准碘浓度（NIC）、脂（水）值以及有效原子序数（Zeff）。采用组内相关系数（ICC）比较 2 位观察者测量参数的一致性。采用多因素 Logistic 回归分析筛选 UCB 病理分级独立风险因素。绘制受试者操作特征曲线(ROC)评估能谱 CT 各参数诊断 UCB 病理分级的效能。结果：2 位观察者测量一致性良好（ICC>0.893）。动脉期仅有 HG-UCB 的 NIC（0.18±0.08）高于 LG-UCB（0.14±0.05）有统计学差异（P=0.016）。静脉期 HG-UCB 的 IC、NIC、脂（水）值和 Zeff 与 LG-UCB 相比，差异均有统计学意义（P=0.017、0.000、0.015、0.016）。动脉期 NIC 的曲线下面积（AUC）为 0.680。静脉期 IC、NIC、脂（水）值和 Zeff 的 AUC 分别为：0.675、0.823、0.678、0.663。Logistic 回归分析结果显示，动、静脉期的 NIC 值是 UCB 病理分级的独立风险指标（P<0.05）。静脉期 NIC 值=0.54 为阈值诊断 UCB 病理分级的效能最佳，敏感度和特异度分别为 96.97%和 60.61%。结论：能谱 CT 静脉期多参数定量成像与鉴别膀胱尿路上皮癌的病理级别具有很好的相关性，其中静脉期的 NIC 效能最佳。

PO-3720

能谱 CT 参数变化对影像组学预测膀胱癌病理分级的影响

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目的：探究不同单能量（40~140keV）及基物质图对影像组学模型预测膀胱尿路上皮癌（UCB）病理分级的影响。方法：回顾性分析经病理证实为 UCB 的患者 112 例，其中高级别（HG-UCB）76 例，低级别（LG-UCB）36 例。所有患者术前均行能谱 CT 泌尿系增强检查。对静脉期数据进行 40~140keV（间隔 10 keV）、I(W)和 W(I)图像重建，共获得 13 组图像，并将各组图像上传到联影组学平台软件。对各组图像病灶层面提取 90 个特征（一阶和纹理特征）并通过最小冗余最大相关（MRMR）和最小绝对收缩与选择算子(LASSO)依次筛选出最有价值的特征集。采用五折交叉验证法将样本分为训练集和测试集，通过随机森林构建预测膀胱癌分级的模型。绘制受试者工作特征曲线 ROC，评估 13 种重建图像所得模型预测膀胱癌病理分级的性能，并在测试集中进一步验证，所有模型结果均以五折交叉均值表示。结果：不同参数重建图像选择预测 UCB 病理分级的影像组学特征略有不同，但 40~100keV 选择的特征集中均有灰度依赖矩阵（GLDM）的依赖方差（dependencevariance）。各组重建图像预测膀胱癌病理分级的模型在训练集中的曲线下面积（AUC）为 0.917~0.958、测试集中的 AUC 为 0.841~0.895，不同 keV 之间、keV 与碘基图之间训练集和测试集均无统计学差异。结论：能谱 CT 参数变化对组学预测膀胱癌病理分级无影响，即使不同重建图像的相关特征不同，也并不影响模型的准确性

PO-3721

不同上肢静脉穿刺注射造影剂对急性胸痛主动脉 CTA 图像的影响

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【摘要】目的 探讨不同上肢静脉穿刺注射造影剂对急性胸痛患者胸腹主动脉 CTA 检查图像成像的影响。方法 回顾性分析 97 例因急性胸痛收入我院的胸腹主动脉 CTA 检查的图像数据，其中右上肢肘正中静脉穿刺 51 例分为 A 组；左肘正中静脉穿刺 46 例分为 B 组，两组 BMI 均在 18.5-23.9 之间，A 组年龄（57.89±11.21），B 组年龄（58.54±9.31）。A、B 两组所使用的扫描设备均为西门子 Somatom Definition Flash，扫描条件均为 120kV，参考毫安 250mAs（CareDose4D），造影剂使用量均为 1.2ml/kg，注射流率 5.0ml/s；扫描模式均为大螺距 Flash 扫描模式，螺距为 3.4 采用阈值触发法当四腔心层面腹主动脉 CT 值大于 200HU 时自动触发扫描，分别比较两组数据主动脉根部、第二肝门处腹主动脉和髂总动脉分叉处的 CT 值、SNR 及 CNR；并由两名高年资影像科医生用 5 分制评分法对 A、B 两组数据的三个层面的图像质量进行评分，评分不一致时取平均分。两组图像质量主、客观评价结果采用 SPSS 13.0 软件进行统计学分析。结果 A 组中三个层面 CT 值分别为（425.26±63.4）、（401.91±70.34）、（380.41±65.45）；B 组中三个层面的 CT 值分别为（382.35±65.3）、（368.91±60.14）、（331.21±70.32）， $P<0.05$ 差具有统计学意义，说明 A 组各层面 CT 强化值均高于 B 组。SNR 以及 CNR：A 组与 B 组比较（ $P>0.05$ ）无统计学意义，两组图像质量的主观评分无明显差异（ $P>0.05$ ）。结论 由于更短的循环路径以及更少的循环时间使得更多得造影剂用于强化靶器官，在图像质量相同的情况下同样造影剂注射量以及同样注射速率，右上肢肘中静脉穿刺进行造影剂注射比选择左侧上肢肘中静脉穿刺注射造影剂能得到更高的强化值。

PO-3722

能谱 CT 单能量成像提高门静脉对比度后处理参数优化

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目的：评估能谱 CT 不同低能级 (keV) 单能量成像结合不同权重自适应统计迭代重建 (ASIR-V) 算法对门静脉显影不佳的 CT 图像质量的影响，以获取优化门静脉显影的最佳 keV 和 ASIR-V 组合。

方法：分析我院行全腹部增强 CT 检查，门静脉显影不佳 (120kVp 或 70keV 情况下门静脉 CT 值 $<180\text{HU}$) 的患者 121 例，其中常规组 (A 组) 59 例、能谱组 (B 组) 62 例。A 组：管电压 120 kVp，管电流 Smart mA 扫描，重建 40% ASIR-V 图像；B 组：GSI 模式，管电压 80/140 kVp 瞬切，管电流采用智能匹配 (GSI-Assist) 技术，重建 70keV 结合 40% ASIR-V 图像 (B1 组)；并应用原始数据重建 65keV~40 keV (间隔 5 keV) 结合 50%、60%、70%、80%ASIR-V 图像 (B2~B25 组)。记录 A、B 两组平均扫描长度、CTDIvol、DLP，计算有效辐射剂量 (ED)。测量各组门静脉和肝脏的 CT 值、SD 值，计算门静脉的 SNR、CNR。由两名放射科医师采用 5 分法评价各组图像质量和门静脉的显示分支数，并行 Kappa 一致性检验。结果：在 B 组，当 ASIR-V 权重一定时，随着 keV 能级的降低，门静脉 CT 值、SD 值、SNR、CNR 逐渐升高 ($P<0.05$)；当 keV 能级不变时，随着 ASIR-V 权重的提高，门静脉 CT 值差异无统计学意义 ($P=0.999\sim1.000$)，SD 值逐渐降低，SNR、CNR 逐渐提高 ($P<0.05$)。B2~B25 组图像的门静脉 CT 值、SNR 和 CNR 均高于 A 组。2 名医师主观评分一致性较高 ($\text{Kappa}=0.681\sim0.719$, $P<0.05$)。在 B 组中，50 keV 结合 80% ASIR-V 的主观评分最高，图像质量优于 A 组 ($P<0.001$)。结论：在 CT 门静脉成像中，采用能谱成像具有明显优势，针对门静脉显影不佳 (门静脉 CT 值 $<180\text{HU}$) 的情况，通过降低 keV 和增加 ASIR-V 权重，可在不增加患者辐射剂量的情况下，优化 CTPV 门脉图像质量。其中最佳 keV 能级和 ASIR-V 权重为 50keV 结合 80%ASIR-V。

PO-3723

256 层螺旋 CT 行冠状动脉 CTA 时心率与最佳期相间的关系

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目的：探讨 256 层螺旋 CT (MDCT) 前瞻性心电图 (ECG) 触发冠状动脉 CT 血管造影 (CCTA) 时心率 (HR) 与最佳期相之间的关系。

方法：回顾性分析 2022 年 1 月至 12 月我科行冠状动脉 CTA 中筛选符合要求的 50 例患者。扫描仪根据 10sECG 记录选择了最佳曝光阶段。为了确保 CCTA 的成功，技术员还根据患者的年龄，呼吸控制，情绪状态和既往病史，以确定自动曝光序列是否需要手动调整。以 R-R 间期的 1% 间隔重建图像，来选择冠状动脉运动最少的期相。如果 CCTA 图像在冠状动脉中显示中度运动模糊或不连续，则对重建的图像进行自动校正。采用 4 点分级量表评估诊断图像质量。

结果：本研究共调查了 50 例 CCTA 检查。舒张期重建心率 $\text{HR}<63\text{bpm}$ ，其中 36.5% 和 77.8% 的心率 $\text{HR}\leq 57$ 和 58-62 bpm 的自动校正进行重建。 $\text{HR}\geq 63\text{bpm}$ 患者，分为 $\text{HR}=63-67$ 和 $\geq 68\text{bpm}$ 分别有 89.3% 和 71.7% 选择为舒张期重建，而在同一 HR 组中，81% 和 100% 的采用自动校正重建。

结论：根据我们的结果，HR 小于 67bpm，患者可用于舒张期重建。虽然自动校正算法是降低 CCTA 中心脏运动影响的有效方法，但 HR 控制对于优化 CCTA 的图像质量仍然很重要。本研究 HR 与最佳重建期相之间的关系可以进一步用于调整心电图脉冲窗口，以减少患者的辐射剂量。

PO-3724

应用高权重迭代算法降低结直肠癌患者 CTC 辐射剂量可行性研究

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目的 探究自适应统计迭代算法 (ASIR-V) 对结直肠癌患者术前 CT 结肠造影 (CTC) 图像质量和辐射剂量的影响。**方法** 前瞻性收集我院行 CTC 检查的患者 95 例。所有患者 CTC 检查均需行俯卧位和仰卧位两次扫描。根据体位分为 A、B 两组。A 组 (仰卧位, 实验组) 分别采用前置 40% ($n=31$)、50% ($n=30$)、60% ($n=34$) ASIR-V 扫描, 记为 A1~A3 组; B 组 (俯卧位, 常规组) 采用前置 30% ASIR-V 扫描, 对应 A 组分为 B1~B3 组。记录 A、B 两组的 CTDIvol、DLP, 并计算 ED。在轴位图像上测量肿瘤及肠腔空气的 CT 值、SD 值, 并计算肿瘤的 SNR、CNR。由两名诊断医师采用 5 分法评价各组二维、三维图像质量, 并行 Kappa 一致性检验。记录肿瘤的位置, 并以手术结果为标准, 比较各组图像肿瘤定位与手术结果的一致性。结果 两名诊断医师的主观评分一致性较好 (Kappa 值为 0.712~0.951, $P<0.05$), 所有图像质量均符合诊断要求 (≥ 3 分), A、B 两组的肿瘤 CT 值、SD 值、SNR、CNR 和二维及三维图像主观评分差异均无统计学意义 ($P=0.083\sim 0.903$)。A 组、B 组肿瘤定位与手术结果一致性均较高 (Kappa=0.928~0.958)。随着 ASIR-V 权重的增加, A 组辐射剂量逐渐降低, 与 B 组比较差异均有统计学意义 ($P<0.001$)。结论 在 CTC 检查中, 适当提高前置 ASIR-V 权重可在不影响图像质量的情况下, 进一步降低患者辐射剂量, 采用前置 40%~60% ASIR-V 扫描, 有效辐射剂量较常规扫描分别降低了 22%、41%、55%。

PO-3725

探究深度学习重建算法在低剂量 CT 结肠造影中的应用价值

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目的: 探究不同等级 DL 重建算法在低剂量 CT 结肠造影 (CTC) 中的临床应用价值。**方法:** 前瞻性收集我院行 CTC 扫描的患者 38 例, 所有患者均行俯卧位和仰卧位两次扫描, 根据扫描体位分为 A、B 两组。A 组 (俯卧位, 常规组) 行 120kVp、剂量调制等级 2 扫描, 重建 Karl 5 级图像; B 组 (仰卧位, 实验组) 行 120kVp、剂量调制等级 1 扫描, 重建 DL (1~4) 级图像, 记为 B1~B4 组。比较 A、B 两组平均辐射剂量及主客观图像质量。记录各组图像肿瘤的位置, 以手术结果为标准, 比较各组图像肿瘤定位与手术结果的一致性。结果: B 组平均 mAs、CTDIvol、ED 较 A 组显著降低 ($P<0.001$)。A、B 两组肝脏、腰大肌和脂肪的 CT 值差异无统计学意义 ($P>0.05$), B1 组的 SD 值高于 A 组 ($P<0.001$), SNR、CNR 低于 A 组 ($P<0.001$), B2 组与 A 组差异无统计学意义 ($P>0.05$), B3~B4 组的 SD 值低于 A 组 ($P<0.001$), SNR、CNR 高于 A 组 ($P<0.001$)。两名医师的主观评分一致性较好 (Kappa 值=0.721~0.842, $P<0.001$), B2 组图像整体质量得分最高 ($P<0.001$), 与 A 组得分差异无统计学意义 ($P>0.05$)。A、B 2 组肿瘤定位与手术结果的一致性均较高 (Kappa 值=0.790, $P<0.001$)。结论: DL 重建算法可降低图像噪声, 本研究中 B 组有效辐射剂量较 A 组减低了约 58%, 结合 DL2 重建算法, 图像质量与常规组相当。

PO-3726

探究 1024×1024 重建矩阵结合 Karl 算法对 CT 门静脉图像质量和肝脏体积测量的影响

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目的 探究 1024×1024 重建矩阵结合 Karl 算法对 CT 门静脉 (CTPV) 图像质量和肝脏体积测量的影响。**方法** 回顾性分析行全腹部 CT 增强的患者 40 例, 所有患者均采用联影 uCT760 进行扫描, 成像参数: 120kVp, 管电流设置为剂量调制等级 3, 重建 512×512 矩阵, Karl 5 级图像, 获得图像为常规组 (A 组)。对常规组的原始数据进行重建获得实验组 (B 组) 图像: 采用 1024×1024 重建矩阵, 结合 Karl 5、7、9 级进行图像重建, 得到 B1~B3 组图像。重组 A、B 组门静脉 MIP、VR 图像, 应用联影 AI 软件测量肝脏体积, 比较 A、B 组门静脉和肝脏 CT 值、SD 值、CNR、肝脏体积值及图像主观评分。结果 A、B 组间门静脉和肝脏 CT 值差异无统计学意义 ($P=0.170\sim0.800$)。随着 Karl 等级的提高, B 组门静脉和肝脏的 SD 值逐渐降低 ($P<0.001$), CNR 逐渐升高 ($P<0.05$), 其中 B2 组 SD 值、CNR 和 A 组的差异无统计学意义 ($P=0.798\sim0.901$)。B 组肝脏体积值与 A 组差异均无统计学意义 ($P=0.978\sim0.999$)。两名观察者主观评价一致性较好 ($Kappa=0.789\sim0.927$, $P<0.05$), B 组门静脉边缘锐利度及分支显示清晰度均优于 A 组 ($P<0.05$)。随着 Karl 等级的增加, B 组噪声评分逐渐增加、伪影评分逐渐降低, 门静脉边缘锐利度及分支显示清晰度呈先升高后降低的趋势 ($P<0.001$), B2 组综合得分最高, 优于 A 组 ($P<0.001$)。结论 采用 1024×1024 重建矩阵结合 Karl 7 级算法重建图像能够优化门静脉图像质量, 且能准确测量肝脏体积。

PO-3727

肠系膜下动脉 CTA 应用深度学习重建算法降低辐射剂量的可行性研究

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目的 探究不同等级的深度学习重建算法 (DL) 对低剂量肠系膜下动脉 (IMA) CTA 图像质量的影响, 并获得 IMA CTA 图像最佳 DL 等级。**方法** 前瞻性收集行 IMA CTA 的患者 60 例, 随机分为 A、B 两组。A 组 ($n=30$) 管电压 120kVp, 管电流为剂量调制等级 3, 重建 Karl5 图像; B 组 ($n=30$) 管电压 120kVp, 管电流为剂量调制等级 2, 重建 DL (1~4) 等级图像, 记为 B1~B4 组。记录 A、B 两组容积剂量指数 (CTDIvol)、剂量长度乘积 (DLP), 并计算有效辐射剂量 (ED)。在轴位图像上测量 IMA 主干、同层腹主动脉和竖脊肌的 CT 值和 SD 值, 计算各血管的 SNR, CNR 和质量因数 (FOM)。重组 VR 和 MIP 图像, 由两 2 名诊断医师对二维和三维图像进行五 5 分制评分。结果 B 组 ED 与 A 组相比降低了 42.08% ($P<0.05$)。随着 DL 等级的提高, B1~B4 组 SD 值逐渐降低, SNR, CNR 和 FOM 逐渐提高 ($P<0.05$)。B3、B4 组腹主动脉的 SNR, CNR, FOM 优于 A 组 ($P<0.05$)。两 2 名诊断医师对图像主观评分一致性良好 ($Kappa$ 值 $0.795\sim0.891$, $P<0.05$)。B2、B3 组与 A 组主观评分差异均无统计学意义 (均 $P>0.05$)。结论 深度学习重建算法可在低辐射剂量的情况下, 保证 IMA 肠系膜下动脉 CTA 的图像质量, 满足诊断需求, 其中 DL3 为推荐的最优重建等级。

PO-3728

基于去脂体重的低对比剂方案在结直肠癌能谱 CT 成像中的可行性

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目的 在结直肠癌的能谱 CT 多参数扫描中,探究基于去脂体重 (LBW) 的低对比剂注射方案的可行性。**方法** 前瞻性收集疑似结直肠肿物行能谱全腹增强 CT 的患者 150 例,随机分为 A、B、C 三组 (各 50 例),对比剂 (CM) 剂量分别为 500 mgI/kg (总体重, TBW), 500mgI/kg (LBW), 400mgI/kg (LBW), 三组扫描参数保持一致。A、B 两组采用后置 60% ASiR-V 重建 1.25mm 的 70keV 图像, C 组重建 40~70keV 图像记为 C1~C4 组,其余重建参数相同。在碘水图上测量并计算三组的标准化碘浓度值 (NIC)。比较三组患者的 CM 剂量、动脉期肠系膜上动脉 (SMA) 和肠系膜下动脉 (IMA) 的 CT 值、SD 值、SNR 和 CNR 以及静脉期肝脏增强 CT 值 (Δ HU)。重组 SMA、IMA 的 VR 和 MIP 图像,由两名诊断医师进行 5 分制评分。结果 三组患者一般资料差异无统计学意义 ($P>0.05$)。B 组和 C 组的 CM 剂量分别降低了 23.00% 和 37.19% ($P<0.05$)。A、B 两组动脉期各血管客观指标差异均无统计学意义 ($P>0.05$), B 组 Δ HU 低于 A 组但大于 50HU ($P<0.05$)。C 组动、静脉期所有血管的 CT 值、SD 值均随 keV 的升高而逐渐降低 ($P<0.05$)。C3 组 Δ HU 与 A 组相当 ($P>0.05$)。三组动、静脉期 NIC 差异均无统计学意义 ($P<0.05$)。两名诊断医师主观评分一致性良好 (Kappa 值 0.768~0.909, $P<0.05$)。B 组和 C3 组动、静脉期分别与 A 组双期主观评分差异无统计学意义 (均 $P>0.05$)。结论 基于 LBW 的方案在降低 CM 剂量后仍然可以提供优质的图像质量,不影响结直肠癌的诊断信心。综合主客观指标, C 组动、静脉期均在 60keV 下表现最佳。

PO-3729

深度学习重建算法结合低管电压在常规肺部 CT 扫描中的应用价值

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目的: 研究深度学习重建 (deep-learning image reconstruction DLIR) 算法结合低管电压 (100KVp) 对肺部 CT 扫描图像质量及辐射剂量的影响。

方法: 选取常规肺部 CT 扫描的患者 50 例,按照管电压的不同分 120KVp 组和 100KVp 组,每组各 25 例。其中, A 组: 管电压 120KVp, 自适应统计迭代重建 (adaptive statistical iterative reconstruction-Veo, ASiR-V, 30%) 算法, 重建模式 (lung)。将 100KVp 组扫描的原始数据, 按重建算法及重建模式的不同分别重建出 B 组: 深度学习重建算法 (DLIR-H), 标准重建模式 (stnd)。C 组: 深度学习重建算法 (DLIR-H), 标准重建模式 (stnd)+图像增强滤波 lung (LU)。所有扫描采用管电流 100mA, 余参数设置相同, 三组数据均重建出层厚 1.25mm 图像, 记录相同位置两侧肺组织内的 CT 值、皮下脂肪 CT 值和噪声 (SD)、CTDI, 计算信号噪声比 (SNR)、辐射剂量 (ED), 由两名胸组医生对图像质量进行主观评价, 并对三组间数据进行统计学分析。

结果: 三组肺部图像测量的 CT 值均无统计学差异 ($P>0.05$); 三组图像的 SD 值、SNR 值和图像质量评价均有统计学差异 ($P<0.05$), 其中 B、C 两组图像的噪声明显低于 A 组, C 组图像可以提供更好的锐利度, 清晰地显示肺纹理的结构和分支; 100KVp 组的辐射剂量明显低于 120KVp 组 ($P<0.05$)。

结论：在肺部 CT 扫描中使用管电压 100KVp 结合 DLIR 算法明显的降低了辐射剂量，相比 ASiR 算法使用 DLIR 算法结合图像增强滤波 lung (LU) 重建模式可以显著地降低图像噪声，同时提高了肺内组织及肺纹理的显示能力。

PO-3730

超低剂量 CT 结合深度学习重建算法对腹部图像质量的影响

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目的：评价腹部超低剂量 CT 结合深度学习图像重建算法 (DLIR) 相对于常规 CT 利用滤波反投影算法对 CT 图像质量的影响。

方法：选取我院 171 例因临床诊疗需求行腹部 CT 检查的患者 (男 88 例，女 83 例)，分别采取了常规剂量 CT 扫描和超低剂量 CT 扫描。常规剂量 CT 扫描使用滤波反投影技术 (FBP) 进行 0.625mm 层厚重建，超低剂量 CT 扫描分别使用滤波反投影技术 (FBP)、不同权重迭代重建技术 (ASIR-V30%、ASIR-V50%、ASIR-V70%)、不同等级的深度学习重建技术 (DLIR-L、DLIR-M、DLIR-H) 进行 0.625mm 层厚重建。我们分别将这几组数据进行主观和客观评分，并分别记录辐射剂量。结果：超低剂量组较常规剂量组相比，辐射剂量降低了 89%。超低剂量 CT 扫描使用 DLIR-H 重建的图像质量与常规剂量 CT 扫描使用 FBP 重建的图像质量大致相仿，差异无统计学意义 ($P > 0.05$)；超低剂量 CT 扫描使用 DLIR-M、DLIR-L、ASIR-70%重建的图像质量较常规剂量 CT 扫描使用 FBP 重建的图像质量较差 ($P < 0.05$)，而超低剂量 CT 扫描使用 ASIR-50%、ASIR-30%、FBP 重建的图像质量基本不能满足诊断需求。超低剂量 CT 在结合 DLIR-H 重建图像检测出肝囊肿 (61 例)，肾囊肿 (63 例) 及肾结石 (24 例)，与常规剂量 CT 利用 FBP 重建图像病灶检出率差异无统计学意义。

结论：超低剂量 CT 结合深度学习重建技术在满足临床诊疗需求的基础上，能明显降低辐射剂量，具有较好的临床应用价值。

PO-3731

放射科的诊断错误和偏倚

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影像诊断是医学诊疗过程的重要组成部分，发生在放射科里的影像诊断错误或偏倚也是一个常见的现象，有时甚至会对病人的诊治造成严重的影响。总的来说，放射科诊断错误或偏倚可以分为两大类，第一类是感知错误 (perceptual error)，第二类是认知错误或偏倚 (cognitive errors)。感知错误可以通俗地被认为是“漏诊”，即未观察到主要或者关键的发现。认知错误可以通俗地被认为是“误诊”，也就是发现了影像异常，但是将影像异常归因于错误的疾病诊断分类。感知错误更多见，约占诊断报告错误的 60-80%，认知错误约占诊断报告错误的 20-40%。发生影像诊断错误的原因多种多样，既有图像质量、病灶的大小和位置、临床信息缺失等客观原因，也有阅片者自身专业知识欠缺、固有思维偏倚 (如搜索满意偏倚、锚定认知偏倚、确认偏差偏倚、可用性偏倚、归因偏倚) 等主观原因。本文结合临床上的实际病例，总结并图文综述了影像诊断报告错误和偏倚的常见原因和应对策略，以期对放射科医生的临床实践有一定帮助，降低发生影像诊断错误的概率。

PO-3732

呼吸运动对肺癌患者 4D-CT 的图像质量影响研究

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目的：探究呼吸运动对肺癌患者 4D-CT 图像质量的影响，并分析呼吸曲线特征与 4D-CT 图像质量的相关性，为患者选择合适的呼吸运动管理方法提供参考。材料与方法：本研究采用呼吸运动模体模拟九种规律呼吸曲线和十条患者呼吸曲线并进行 4D Cine 扫描，然后基于时相重建十个时相的图像；采用 RayStation 勾画靶区并记录各靶区的相关参数；采用 python 编写代码提取呼吸曲线特征值。首先计算靶区体积 Dice 系数，分析三种靶区 19 条呼吸曲线下 50%时相的 Dice 系数，然后分析呼吸曲线的不同时相对 4D-CT 图像质量的影响，接着探究规律呼吸曲线和患者呼吸曲线各个时相图像体积、Dice 系数和平均 CT 值的差异，最后分析呼吸曲线特征与图像质量的相关性。结果：分析三种靶区 19 条呼吸曲线下 50%时相的 Dice 系数发现大球靶区 Dice 系数最稳定，其中最小值为 0.947，最大值为 0.957，标准差为 0.005，变异系数为 0.51%；分析呼吸曲线的不同时相对 4D-CT 图像质量的影响发现中间时相的靶区体积、Dice 系数和平均 CT 值四分位数范围更小，且标准差更小；对比规律呼吸曲线与患者呼吸曲线下各时相图像的 Dice 系数和平均 CT 值发现，规律呼吸曲线下 0%和 50%时相的箱线图四分位数范围整体更小，患者呼吸曲线下 40%~60%时相的箱线图四分位数范围整体更小；不同呼吸曲线下各个时相图像体积、Dice 系数和平均 CT 值的均值与提取的呼吸曲线特征值具有显著相关性。结论：呼吸运动对肺癌患者的 4D-CT 图像质量具有显著的影响。形状、大小不同的靶区在靶区勾画时的敏感性不同，其中小靶区的勾画误差更大，大球靶区勾画结果更稳定；呼吸运动速度慢的时相范围内 4D-CT 图像质量表现更佳；呼吸曲线的特征与 4D-CT 的图像质量具有较强的相关性。

PO-3733

低管电压联合深度学习图像重建算法在降低胸腹盆联合增强 CT 辐射剂量的价值

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目的：探讨在胸腹盆联合增强 CT 扫描中，应用低管电压联合深度学习图像重建算法（Deep Learning Image Reconstruction, DLIR）对辐射剂量及图像质量的影响。

方法：前瞻性收集需进行胸腹盆联合增强 CT 扫描的患者，根据扫描参数不同，通过简单随机法分为两组，分别为：1）低剂量优化组，管电压 80kV+DLIR 重建算法；2）常规剂量组，管电压 120kV+自适应统计迭代重建（Adaptive Statistical Iterative Reconstruction V, ASiR-V）算法。通过对 Catphan500 模体在不同噪声指数（noise index, NI）条件下进行扫描的结果，设置低剂量优化组的噪声指数。应用 t 检验比较两组间的辐射剂量的差异。应用非参统计方法，对两组图像质量进行主、客观评价。

结果 最终入组 149 例患者，其中低剂量优化组 61 例，常规剂量组 88 例。根据模体实验的结果，当低剂量优化组 NI 为 12，常规剂量组 NI 为 9 时，两组间对比分辨率无显著差异，因此确定两组的 NI 值。低剂量优化组的辐射剂量低于常规剂量组，两组具有显著性差异（ $P < 0.05$ ）。低剂量优化组中肝脏衰减、主动脉衰减显著高于常规剂量组（ $P < 0.001$ ），肝脏及主动脉 CNR 和 SNR 值显著高于常规剂量组（ $P < 0.001$ ），主动脉空间分辨率、肝总动脉空间分辨率、门静脉空间分辨率及小血管/支气管显示情况也均优于常规剂量组（ $P < 0.05$ ）。

结论：低管电压联合深度学习图像重建算法能够在降低辐射剂量的条件下，仍保证同等甚至更高的图像质量，为大范围 CT 扫描辐射剂量的优化方案提供一个可行方案。

PO-3734

The preoperative predictive value of radiomics and nomogram for intrahepatic mass cholangiocarcinoma pathological grading based on T2 weighted image and hepatobiliary phase imaging

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Objective: To explore the predictive value of radiomics and clinical features for pathological grading in intrahepatic mass cholangiocarcinoma (IMCC) based on T2 weighted image (T2WI) and hepatobiliary phase (HBP) imaging. **Method:** We undertook a multi-center retrospective analysis of 78 patients with IMCC confirmed by pathology. We randomly assigned 70% (42 cases) and 30% (19 cases) of the initial 61 patients to the training set and validation set, respectively. The lesions in T2WI and HBP images were manually segmented by radiologists. We used the Pyradiomics package to extract radiomics features from the images. We performed ten-fold cross-validation using the filtering method and mutual information algorithm, and the minimum absolute contraction and selection operator regression (LASSO) screening features, and then we used the support vector machine (SVM) to establish the classification model. After the 61 patients were used, medical imaging of the 17 patients sequentially included in the study were used for the external validation of the classification models, Area under the curve (AUC), accuracy (ACC), sensitivity (SEN), and precision (PRE) were used to evaluate the performance of the model. Nomograms were drawn based on radiomics, and we used clinical features and the calibration curve to evaluate the model. We evaluated the clinical validity of model using decision curve analysis (DCA). **Result:** Both Model_T2 and Model_HBP based on T2WI and HBP images could accurately predict the pathological grading of IMCC (ACC = 0.91, SEN = 0.75, PRE = 1.0, AUC = 0.87; and ACC = 0.92, SEN = 0.83, PRE = 1.0, AUC = 0.91, respectively). The combined prediction model Model_HBP+T2 had better performance than the single sequence radiomics model (ACC = 0.94, SEN = 0.88, PRE = 1.0, AUC = 0.93). As demonstrated by external validation, the AUC of Modle_HBP, ModleT2, and Modle_HBP+T2 was 0.86, 0.83, 0.86, respectively, confirming that these models have relatively high reliability. **Conclusion:** In this study, we found that single sequence and combination sequence models based on T2WI and HBP images accurately predicted the pathological grading of IMCC. The combination model had higher predictive value and reliability, and it had better predictive efficacy when clinical features and radiomics features were combined.

PO-3735

Individually body surface area-adapted contrast media injection in coronary CT angiography

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Objectives To evaluate the efficacy and safety of individually body surface area (BSA)- versus body weight-adapted injection of contrast media in coronary computed tomographic angiography (CCTA) with 2nd dual-source CT (DSCT).

Methods 270 enrolled patients were randomly assigned into 3 groups. All 3 groups adopted the uniphasic contrast media (Ioversol 320, 320 mgI/100 ml) with fixed injection time of 15 s followed by 30 ml saline flush. In control group, patients were injected with fixed volume (75 ml) and fixed flow rate (5 ml/s) of contrast media. In body weight-adapted group, patients were injected with contrast media with the volume of 0.9 ml per 1 kg body weight and the flow rate of 0.06 ml/s per 1 kg body weight. In BSA-adapted group, patients were injected with contrast media with the volume of 36.5 ml per 1 m² BSA and the flow rate of 2.4 ml/s per 1 m² BSA. All procedures were performed using a 2nd generation 128-slice DSCT. Two experienced observers, who were blind to the groups, independently evaluated the CCTA images.

Results BSA-adapted protocol exhibited in a relatively high degree of contrast enhancement and image quality, as well as a relatively low volume and flow velocity of contrast media. There was no significant difference in radiation dose among the 3 groups. No severe adverse events occurred in all 3 groups during CCTA examination.

Conclusion The efficacy and safety of BSA-adapted protocol in CCTA are compelling.

PO-3736

Optimized Bolus Threshold for Dual-Energy CT Angiography with Monoenergetic Images: A phantom study

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Purpose or Learning Objective

The study aims to investigate the optimal bolus-tracking trigger threshold in low-contrast medium protocol based on virtual monoenergetic images (VMIs) on a dual-layer detector CT with an angiography phantom.

Methods or Background

An angiography phantom which contained six syringes with different densities of diluted iodide contrast medium (2.1, 5.2, 10.0, 14.5, 19.6, and 28.9 mg/mL) was scanned on a dual-layer detector CT (Spectral CT 7500, Philips Healthcare, Best, Netherlands) with 120kVp/30mAs. Conventional images and 40KeV VMIs were reconstructed. CT attenuation was measured respectively three times by two radiologists with circular regions of interest (ROIs) (3.5cm) placed on the middle plane of the syringes. And CT values of the six angiography phantoms were measured respectively on the conventional image and the 40keV VMIs. The mean CT values on the conventional scan images were fitted using least-squares estimation from polynomial regression models to 40 keV VMIs. As the bolus-tracking trigger threshold in conventional angiography is 150HU, the optimal threshold under 40KeV VMI was then calculated using the fitted model accordingly (Fig 1). The δ value of the trigger threshold during conventional angiography scanning (100HU) can be calculated as the trigger threshold in conventional angiography (150HU) subtract the CT value of the vessel (50HU). And the corresponding δ value under the condition of 40keV can be obtained according to

the regression equation. The optimal trigger threshold of 40KeV VMI can be calculated as the CT value of conventional angiography scanning (HU) plus δ value (HU).

Results or Findings

The trigger thresholds calculated for each kiloelectron-volt level yielded the following results: 46 HU (40 keV), 54 HU (45 keV), 64 HU (50 keV), 64 HU (55 keV), 87 HU (60 keV), 102 HU (65 keV), and 117HU (70 keV) with 120kVp/30mAs. According to the regression equation, the corresponding δ value at 40KeV VMIs can be obtained as 46HU. The optimal trigger threshold (HU) can be calculated as the CT value of the vessel (HU) plus 46HU. According to the fitted model, the optimal bolus-tracking trigger threshold was 96HU when combined with 40keV VMI, which is comparable to 150HU in routine scans.

Conclusion

The optimal bolus-tracking trigger threshold in low contrast medium protocol using 40KeV VMI can be reduced to 96HU. Optimizing the trigger threshold to obtain the desired virtual monochromatic image during dual-energy CT angiography can maintain vascular enhancement while reducing the iodine load.

PO-3737

Just give the contrast? Appraisal of guidelines on intravenous iodinated contrast media use in patients with kidney disease

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Objective: To appraise the quality of guidelines on intravenous iodinated contrast medium (ICM) use in patients with kidney disease, and to compare the recommendations.

Methods: We searched four literature databases, eight guideline libraries, and ten homepages of radiological societies, to identify English and Chinese guidelines on intravenous ICM use in patients with kidney disease published between January 2018 and June 2023. The quality of the guidelines was assessed by Scientific, Transparent and Applicable Rankings (STAR) tool.

Results: Ten guidelines were included, with a median sum STAR score of 46.0 (range 36.0-61.5). The guidelines performed well in "Recommendations" domain (31/40, 78%), while poor in "Registry" (0/20, 0%) and "Protocol" domains (0/20, 0%). Nine guidelines recommend estimated glomerular filtration rate (eGFR) < 30 mL/min/1.73m² as the cutoff for referring patients to discuss the risk-benefit balance of ICM use. Three guidelines further suggest the patients with an eGFR < 45 mL/min/1.73m² and high-risk factors also need referring. Varying recommendations were seen in the acceptable time interval between renal function test and ICM use, and that between scan and repeated scan. Nine guidelines recommend to use iso-osmolar or low-osmolar ICM, while no consensus has been reached for the dosing of ICM. Nine guidelines support hydration after ICM use, but their protocols vary. Drugs or blood purification therapy are not recommended as the preventative means.

Conclusion: The suboptimal quality of guidelines and their controversial recommendations remain gaps in workflow timing, ICM dosing and post-administration hydration protocols of contrast-enhanced CT scans for patients with kidney diseases, calling more evidence to establish a safer and more practicable workflow.

PO-3738

The application of "one-stop" low contrast dose and low flow rate craniocervical CTA integrated with cerebral CTP in patients with carotid atherosclerosis

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Background: This study explored a "one-stop" craniocervical CTA protocol integrated with cerebral CTP that employed a low contrast dose and flow rate. The protocol was based on dual-layer spectral CT (DLCT) and was used for patients with carotid artery stenosis. **Methods and materials:** Consecutive patients who underwent carotid CTA from July to November 2020 and those who were scheduled carotid recanalization surgery were included prospectively. Patients were divided into three groups: "one-stop", low-dose control and conventional control groups. Each group underwent corresponding scan protocol. Virtual monoenergetic images (MonoE) at 40, 50 and 60keV were reconstructed in the first two groups. The image quality was evaluated subjectively and objectively. **Results:** A total of 46, 52, and 19 cases were included in the conventional control, low-dose control, and "one-stop" group, respectively. The SNR and CNR of each segment of arteries on 40 and 50 keV MonoE in the "one-stop" and low-dose control group were higher than those in the conventional control group (all $p < 0.05$), and no difference in objective image quality and diagnostic confidence was found ($p = 0.777$, $p = 0.777$, $p = 0.822$, and $p = 0.425$). **Conclusions:** It is feasible to present the protocol of "one-stop" low contrast dose and low flow rate craniocervical CTA integrated with cerebral CTP on DLCT in patients with moderate and severe carotid artery stenosis. MonoE at 40 and 50 keV could improve the image quality significantly, and the images were comparable with that of conventional CTA.

PO-3739

Deposition of Gadolinium in Central and Peripheral Nervous System and Its Effects on Sensory, Cognition, and Athleticism After Multiple Injections of Gadolinium Contrast Agents in Rats

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Background The association between the repeated administration of gadolinium-based contrast agents (GBCAs) and the gadolinium (Gd) retention in the central and peripheral nervous systems and its effects on sensory, cognition, and athleticism remain unclear.

Purpose To investigate the effects of the repeated administration of GBCAs on Gd retention in central and peripheral nervous systems and the sensory, cognition, and athletic implications.

Materials and Methods Forty-eight male Wistar rats (4 weeks old) received tail vein injections of saline or (0.6 mmol Gd/kg) GBCAs, including gadodiamide, gadopentetate dimeglumine, and gadoterate meglumine, 4 times a week for 28 days. The brains of the rats were scanned using 9.4 Tesla magnetic resonance imaging (MRI). Sensory behavioral tests were performed to assess the effect of GBCAs on pain sensitivity function. Gd retention in the brain, spinal cord, and peripheral nerves was determined by inductively coupled plasma mass spectrometry. Transmission electron microscopy (TEM) was used to observe the microscopic distribution of Gd after deposition in the spinal cord. The histopathological features in the spinal cord were analyzed by hematoxylin-

eosin staining, Nissl staining, glial fibrillary acidic protein (GFAP) staining, and neuron specific enolase (NSE) staining after administrations of GBCAs.

Results All GBCAs resulted in Gd deposition in central and peripheral nerve tissues, with the highest deposition in the spinal cord tissue. Decreased muscle power, impairment on spatial cognitive function power, and pain hypersensitivity to thermal and mechanical stimuli were observed after exposure to gadodiamide. At the spinal cord, TEM found that the region of Gd depositions had a spherical structure similar to "sea urchins", and was mainly located near the vascular basement membrane.

Conclusion Multiple injections of GBCAs caused Gd deposition in the brain, spinal cord, and peripheral nerves, especially in the spinal cords of the gadodiamide group. Gadodiamide led to pain hypersensitivity and decreased muscle power and the ability of cognition.

PO-3740

Experimental study on the deposition of gadolinium-based contrast agent and its enhanced the expression of NLRP3 inflammasome activation mechanism in the brain of type 2 diabetic rats

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Gadolinium-based contrast agents (GBCAs) are widely used to diagnose and monitor disease progression in contrast-enhanced magnetic resonance imaging (CE-MRI). Over 30 million doses of GBCAs are used worldwide every year. Clinically available GBCAs are all bonded by a ligand when they are used as an MRI contrast agent, due to the free gadolinium is highly toxic. Until 2006, all GBCAs were considered extremely safe. In 2006, some GBCAs may cause nephrogenic systemic fibrosis (NSF) in patients with renal failure were reported. However, no new NSF case has been reported during the period when renal filtration rate was fully assessed prior to CE-MRI. Since 2013, the safety of GBCAs had attracted broad attentions over the world. A research group from Japan reported that signal intensity in the deep cerebellar nucleus (DCN) on unenhanced T1 weighted imaging (T1WI) may be a result of the previous GBCAs administrations. After that report, many studies focused on the potential risks of gadolinium retention in the human brain. We evaluated the effect of different types of GBCAs on the gadolinium deposition in brain. The possible entry and clearance mechanisms of gadolinium and the potential side effects of gadolinium deposition in the brain were described.

Patients with type 2 diabetes mellitus (T2DM) often need multiple CE-MRI examinations, because they always with many vascular diseases. The destruction of blood-brain barrier (BBB) affects the deposition of gadolinium contrast agents in the brain, and type 2 diabetes mellitus is associated with BBB damage and renal insufficiency. Therefore, it is important to study gadolinium deposition in type 2 diabetes mellitus.

NSF is a progressive fibrosing disorder that primarily affects individuals with chronic kidney disease following exposure to GBCAs administered for MRI and angiography. In vitro, GBCAs can induce peripheral blood monocytes and monocyte derived macrophages to produce cytokines, promote the activation of fibroblasts and increase the production of extracellular matrix components. NLRP3 is a part of a family of protein complexes, called inflammasome and plays an important role in innate immunity. After NLRP3 activated, it can interact with ASC adaptor proteins, to activate Caspase-1, interleukin (IL) -1 β and IL-18. There is a great interest in the recent introduction of inflammation, a macromolecular platform composed of NLR (Nod) -like receptor proteins, ASC (proteins containing apoptosis-associated spotted CARD), and pro-caspase-1 proteins. Inflammation is responsible for the proteolytic processing of immature forms of interleukin -1 β (IL-1 β) and IL-18. The two potent pro-inflammatory cytokines are pleiotropic. At present, there was no

research on type 2 diabetes and gadolinium contrast agent in brain deposition and clearance. In type 2 diabetic patients, no correlation has been reported between gadolinium deposition in brain and inflammatory immunity.

Here, we report that multiple injections of linear gadolinium contrast agents including gadodiamide and gadopentetate dimeglumine can cause gadolinium deposition in the brain and high signal in T1 sequence, especially in DCN. In type 2 diabetes and normal rats, gadolinium deposition of linear contrast agent was significantly higher than that of macrocyclic contrast agents, and gadodiamide was the most. In each group, Olfactory bulb and DCN were the places with the largest amount of gadolinium deposition. After injection of gadolinium contrast agent in type 2 diabetic rats, the deposition of gadolinium contrast agent in the brain was much higher than that in the normal rats. The clearance of gadolinium contrast agent in the brain was influenced by type 2 diabetes, and the clearance of gadolinium contrast agent in the brain was inhibited in type 2 diabetes. In type 2 diabetic rats, gadolinium can cause behavioral changes, and mediate neuroinflammation by enhancing the NLRP3-Caspase-1-IL-1 β pathway. Gadodiamide can enhance the activation of microglia and invasiveness, stimulate the transformation of microglia into type M1, increase the apoptosis of neuronal apoptosis and decrease the membrane potential of mitochondrial.

Together, our results first identify that gadolinium deposition occurred in the brain of type 2 diabetic rats after multiple injections of GBCAs through inductively coupled plasma mass spectrometry (ICP-MS), 9.4 T magnetic resonance and transmission electron microscopy (TEM). Quantitative studies of gadolinium deposition in different brain regions were also performed. With the help of ultra performance liquid chromatography-tandem mass spectrometry (UPLC-MS) technology, the specific deposition form of GBCAs in the brain was studied for the first time in the rat model of type 2 diabetes. The mechanisms of GBCAs enter and deposit into the brain and the potential long-term biological and clinical implications require further research. In clinical practice, the assessment should be individualized and the potential unknown risk of deposition gadolinium should be considered before using GBCAs. It is recommended that macrocyclic GBCAs can be used at the lowest dose to reduce the deposition of gadolinium in the brain. The effect of GBCAs on the central nervous system after deposition in the brain is a research hotspot at this stage and even in the future, and further research is needed to better guide the standard application of GBCAs in clinical practice. At the same time, this study also provides new ideas for the development of new and safe MRI contrast agents.

PO-3741

Application value of POWER PICC as venous access in contrast enhanced CT scanning

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Objective: The purpose of this study was to explore the differences in scan and image quality between the use of high pressure resistant PICC and peripheral venous indwelling needle as contrast agent access in enhanced CT.

Materials and Methods: Ninety-six patients with high pressure tolerance PICC venous access and 73 patients with peripheral venous indwelling needle access were included for chest and abdominal enhanced CT scan. Scanning trigger time was recorded, image quality was divided into objective parameter evaluation and subjective grading evaluation, and the two groups were compared SPSS Statistic 22.0 was used for statistical analysis

Results: The monitoring trigger time of patients in the two groups was tested by Student's t-test. The mean trigger time of patients in the PICC group was 24.24s (S5.18), and that of the control group was 31.85s (S7.61), $P < 0.05$, the difference was statistically significant. The two groups were injected with the peak pressure for two independent sample T test. The mean peak pressure of

contrast agent in the PICC group was 206.67 (S52.249), and that in the control group was 133.76 (S34.797), $P < 0.01$, the difference was statistically significant. There were differences in image quality between the two groups.

Conclusion: Enhanced CT using high pressure resistant PICC as venous access triggered early, the pressure in the catheter was higher than that of conventional venous catheterization, the effect of abdominal aortic mass injection was stronger, and there was no significant difference in the venous stage.

PO-3742

低造影剂总量低注射速度低辐射在高危新生儿先天性心脏病 CTA 检查中的探索

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目的 探索使用低辐射低造影剂总量 CTA 检查技术在高危新生儿先天性心脏病 CTA 检查应用

方法 收集我院 2023 年 2 月至 2023 年 7 月收治的 10 例先天性新生儿患者均接受先天性心脏病 CTA 检查, 使用联影 UCT960+ 进行低辐射低造影剂总量低注射速度造影检查 (80KV100MAS, 6ml, 0.5ml/s)。新生儿体重在 2.58Kg 至 3.75Kg, 留置针注射位置为两侧手臂腋静脉, 使用高压注射器分别在注射造影剂 16 秒及 36 秒进行扫描, 扫描范围从第七颈椎至第一腰椎约 12 厘米。重建窗宽 500 窗位 50。

结果 接受低辐射低造影剂总量低注射速度造影检查的新生儿心脏 CTA 影像可以清楚显示心脏心房心室, 肺动脉肺静脉主动脉之间的关系均满足先心病心脏影像诊断图像等级优。

结论 新生儿先天性心脏病 CTA 造影为高风险检查, 控制高危因素减少辐射及低造影剂总量低注射速度可以降低检查风险。清楚显示心脏心房心室, 肺动脉肺静脉主动脉之间的关系为临床诊断先天性心脏病提供可靠的影像诊断。

PO-3743

新型造影剂银纳米三角在肿瘤计算机断层扫描成像中的应用研究

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目的: 采用种子生长法制备壳聚糖包被的银纳米三角 (silver nanotriangles, AgNTs), 并通过体内外实验评价其计算机断层扫描 (Computed tomography, CT) 造影性能。**方法:** 制备一系列不同尺寸的 AgNTs, 利用透射电子显微镜、紫外可见光谱、动态光散射和电感耦合等离子体质谱等对其进行表征。使用显微 CT 对不同尺寸的 AgNTs 的 CT 造影性能进行评价, 并选取其中性能最佳的 AgNTs 进行 AS1411 靶向修饰, 检测其在细胞水平的 CT 成像效果。此外, 构建荷乳腺癌小鼠模型, AgNTs 瘤内注射后观察 CT 成像效果。**结果:** 合成的四种不同尺寸的 AgNTs 主要呈三角形, 平均边长分别 60 nm、88 nm、120 nm 和 149 nm。在各质量浓度下, 四种 AgNTs 的 CT 值均高于临床常用的 CT 造影剂碘海醇, 体现出良好的 CT 对比增强效果。其中尺寸最大的 AgNTs 的 CT 值最高, 因此被选择用于后续的研究。用适配体 AS1411 修饰 AgNTs, 得到肿瘤靶向的 AS1411-AgNTs, MDA-MB-231 乳腺癌细胞经 AgNTs 和 AS1411-AgNTs 处理后 CT 值均增高, 且呈浓度依赖性。而且在同等质量浓度下, AS1411-AgNTs 显示出比 AgNTs 更强的 CT 对比增强效果。体内实验结果显示, CT 图像中 AgNTs 注入的肿瘤区域 CT 值显著增高。**讨论:** AgNTs 是一种优异的 CT 造影剂, AS1411 靶向修饰能够进一步提高其 CT 成像效果。这将为开发高效的新型肿瘤 CT 成像造影剂提供实验和理论基础。

PO-3744

高心率冠状动脉 CTA 成像经验分享

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目的：提高高心率下冠状动脉 CTA 成像图像质量、保证检查的成功。

方法：降低患者心率，口服或含服降心率的药物；更换扫描设备，选用宽体或者更高转速的 CT 设备；选择适宜的扫描期相；更改扫描条件，提高管电流或者管电压；调整对比剂注射方案，如提高碘流率（提高注射速率或碘浓度）、增加注射对比剂量；同时适当提高触发阈值；进行呼吸训练、心理干预等等；使用 AI 后处理软件，提高诊断信心等等方法来提高高心率下冠状动脉 CTA 成像图像质量。

结果：通过这些方法的改进，可明显提高高心率患者冠状动脉 CTA 成像图像质量、保证检查的成功、增强医生的诊断信心。

结论：通过适当调整这些检查方法，可用于高心率患者冠状动脉 CTA 成像时提高图像质量。

PO-3745

腹部 CT 增强检查患者禁食时间与急性不良反应的相关性分析

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目的：分析禁食时间对腹部 CT 增强患者静脉注射非离子型碘对比剂相关的急性不良反应的影响，重点关注禁食时间对恶心、呕吐的影响。

方法：采用回顾性病例对照研究，纳入 2021 年-2022 年在我院行腹部 CT 增强检查的患者，分析其临床特征，使用泊松回归分析，并控制相关混杂因素，研究禁食时间对急性不良反应的影响。同时比较不同禁食时间患者急性不良反应及恶心、呕吐发生率的差异。

结果：共有 30462 例检查患者纳入分析，30368 例(99.69%)未发生急性不良反应；94 例(0.31%)发生急性不良反应，其中 15 例(0.05%)发生了恶心、呕吐，无误吸和吸入性肺炎的发生。40%患者禁食时间超过 10h，未发生与发生急性不良反应的中位禁食时间分别为 8(5, 12)h，11.8 (5, 15)h，其中恶心及呕吐人群的中位禁食时间为 13(6, 16)h。泊松回归分析显示禁食时间每增加 1h，急性不良反应发生风险增加 3.5%(95%CI: 1.013 ~ 1.058, p=0.002)，恶心、呕吐发生风险增加 4.8%(95%CI: 1.007 ~ 1.091, p=0.002)。当禁食时间≥10h 时急性不良反应及恶心、呕吐发生率明显增加。

结论：腹部 CT 增强检查患者中，禁食时间是其发生急性不良反应及恶心、呕吐的独立危险因素。

PO-3746

CT 增强检查前饮食准备的范围综述

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目的：对 CT 增强检查前饮食准备的相关研究进行范围审查，了解检查前不同饮食准备对患者不良反应的影响以及不同饮食方案的应用范围。

背景：一直以来为了预防注射碘对比剂引起的恶心、呕吐等不良反应导致的吸入性肺炎，大多数医疗机构要求患者在 CT 增强检查前禁食 4-6h。但 CT 增强检查前禁食缺乏循证依据。目前已有指南

提出 CT 增强检查取消禁食不会增加患者不良反应发生率。在临床实践中,证据的转化与落实并不乐观,大部分医院仍在实行传统的禁食方案。因此本研究拟对 CT 增强检查前饮食准备的相关研究进行范围审查,以更好了解不同临床情景下患者饮食准备对不良反应的影响,为影像护理人员对 CT 增强患者进行饮食管理,优化放射护理实践提供参考依据。

方法:根据范围综述研究方法,通过 8 个数据库(建库至 2023 年 7 月 21 日),灰色文献库,参考文献列表检索文献;对研究人群、饮食准备方案、不良反应发生率、不良反应评估方式进行总结。结果:共纳入 8 篇文献,研究中的大多数患者都是意识清醒进行非胃肠道 CT 增强的择期成年患者,研究中碘对比剂相关恶心的发生率从 0.008%到 7.6%不等,碘对比剂相关呕吐的发生率从 0%到 3%不等,所有研究都未发现误吸病例。大多数纳入研究认为检查中和检查后 30 分钟内患者发生的不舒适为碘对比剂相关不良反应。评估人员包括放射科医师,技师,护士,非医师研究协调员。所有研究均评估了饮食准备对碘对比剂相关不良反应的影响,提出取消禁食不会增加恶心、呕吐、不良反应的发生率,因此基于禁食对于患者的潜在有害影响,鼓励取消 CT 增强患者检查前禁食的程序。结论:取消检查前禁食不会对常规择期 CT 增强患者碘对比剂相关不良反应发生率产生影响。然而,研究人群有限,未来的研究应优先考虑目前代表性不足人群的检查前饮食准备(例如,麻醉、镇静、儿童、碘对比剂相关不良反应高风险患者,急诊患者、要摄入对比剂的胃肠 CT 增强检查、虚拟胃肠镜等患者)。

PO-3747

碘 ICM 高压输注后静脉留置针回血的临床观察及相关因素分析

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目的:探讨碘 ICM 高压输注后静脉留置针内血液凝集、回血、形成血凝块/血丝的临床观察及相关因素分析。方法:纳入我院从 2021 年 9 月至 2022 年 1 月行碘 ICM 高压输注后静脉留置针回血的 160 例患者进行静脉留置针回血的临床观察及相关因素分析,四要点:①血管穿刺部位的选择:选手腕/肘部/前臂大静脉;②留置针型号:选择并使用贝朗留置针,18G/20G;③穿刺前先用 5ml 氯化钠注射液的注射器连接延长管排气后再穿刺,导管送入血管 2/3 以上,抽回血后再预推 5ml 氯化钠注射液判断导管是否位于血管中;④留置针夹闭的方法:延长管置于小夹子根部夹闭在静脉留置针的近段(延长管前 1/3 段);⑤回血/血丝/血栓判断:观察有无回血/血丝/血凝块,有回血/血丝/血凝块等运用统一的标尺测量回血、血丝/血凝块的长度。三个标准:①碘 ICM 高压输注后静脉留置针是否有回血现象,回血后是否有血丝/血凝块形成。②观察留置针回血,回血量分 3 个标准测量并统计,≤1CM, 1-2CM, ≥2CM。③回血和血丝/血凝块,根据血丝长度分 3 个标准测量并统计,≤1CM, 1-2CM, ≥2CM。结果:从患者的基础疾病、安置留置针型号、安置部位等与回血及血凝块/血丝的形成相关性分析;患者留置针留置部位与回血有统计学意义, $P < 0.05$ 。患者基础疾病、留置针穿刺部位、留置针型号与血凝块/血丝的相关性分析结果比较均无统计学意义, $P > 0.05$ 。结论:碘对比剂在高压输注后留置针回血相关因素进行跟踪随访的分析,保证了患者碘 ICM 高压输注后留置针使用的安全性;同时,该研究也为后面改进高压输注后留置针的留置提供了一些借鉴,为影像技术的进一步发展提供依据证明临床可行性。

PO-3748

一管到底，碘亮安全—记碘对比剂渗漏质量改进

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背景 随着影像技术的发展，CT 增强检查在临床中得到了广泛应用。但由于碘对比剂因素、高压注射因素、患者自身因素以及技护人员因素等，碘对比剂渗漏问题越来越受到影像学科的关注。为降低增强 CT 检查患者发生碘对比剂渗漏的风险，进行持续质量改进。

方法 具体方法如下，采用一体化链式无缝管理的渗漏控制模式，链接护士、技师、临床科室与静疗小组。通过八个环节进行定期组织检查、随时监控过程、常规收集资料、定期质量分析、组织培训修订规范、随时跟踪进展、组织撰写标准。

控制要点一：血管评估与选择。先外周后中心，以粗直弹性好靠近心脏的大血管为主。首选前臂大静脉或肘前静脉，避免选择手背或手腕血管。乳腺癌根治术后或安置起搏器的患者选择健侧肢体进行穿刺。控制要点二：留置针的选择。首选耐高压针型，并且根据患者检查部位体重流速等综合选择。控制要点三：静脉穿刺。进针角度控制在 15—30°，直行进针减少针管在皮下的滑行长度确保针管三分之二进入血管。控制要点四：导管固定。通过一贴二塑型三按压四撕边五固定的流程将留置针固定在穿刺部位上。控制要点五：警示标识。遇到确有血管条件不理想的患者，注射护士在留置针敷贴与检查申请单都贴上渗漏警示标识。控制要点六：个性化注射。体位护士看到贴有警示标识的申请单时及时与技师沟通设计合适患者的个性化注射方案。控制要点七：高压注射。护士与技师共同为患安置合适体位。注射碘对比剂前通过“一看二摸三感觉四询问”的方法完成手动试水与高压试水。控制要点八：护士与技师一起对患者通过各种方法进行动态观察。

结论 经过不断改进，我院碘对比剂渗漏率从改进前的 0.1~0.125%到改进后的 0.025~0.05%，改进过程中从未出现水泡、皮肤破溃等严重病例。因此实施持续质量改进能明显降低 ct 增强扫描中静脉渗漏的发生，确保患者的检查安全，值得推广应用。

PO-3749

责任斑块强化比、脑低灌注和糖化血红蛋白与复发性缺血性脑卒中的相关性

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目的：探究复发性缺血性脑卒中患者和初发缺血性脑卒中患者大脑中动脉责任斑块、侧支循环状态和颅内低灌注特征的差异，寻找复发性缺血性脑卒中的独立预测因子，并评估与缺血性脑卒中复发的相关性。

方法：回顾性分析 2020 年 6 月至 2023 年 1 月我院住院的 86 例单侧大脑中动脉粥样硬化狭窄引起的急性/亚急性缺血性脑卒中患者，根据梗塞部位是否与既往梗塞部位相同，分为复发组（36 例）和初发组（50 例）。所有患者都进行弥散加权成像、时间飞跃法磁共振血管成像、高分辨血管壁成像以及动态磁敏感对比磁共振灌注成像。在动态磁敏感对比磁共振灌注成像生成的 TTP 图上评价 MCA 供血区的 10 个区域，各区域的权重相同。比较两组在斑块特征，脑灌注及侧支循环的差异。通过 Logistics 回归分析寻找复发性缺血性脑卒中的独立预测因子。

结果：相比初发组，复发组的糖化血红蛋白，责任斑块强化比更高，TTP-ASPECTS 更低（ $p<0.05$ ）。斑块强化等级和强化比与 TTP-ASPECTS 呈显著相关。经多因素 Logistics 回归分析，HbA1c、责任斑块强化比和 TTP-ASPECTS 是复发性缺血性脑卒中的独立危险因素。经过受试者工作特征曲线分析，联合上述因子进行诊断有更高的特异性。

结论: 责任斑块强化比、TTP-ASPECTS 和 糖化血红蛋白是复发性缺血性卒中独立预测因子, 斑块特征和颅内低灌注的联合评估能够提高对缺血性脑卒中复发的诊断效能。

PO-3750

CT 增强扫描中使用高压注射器的风险预见及防范措施

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【摘要】目的 预见 CT 增强扫描中使用高压注射器快速注碘时病人有可能遇到的各类风险。探讨应对各类风险的防范措施。方法我院 CT 室自 1998 年开始使用高压注射器以来, 注碘造影病例十余万例, 针对病人的不同体质状况及心理承受能力, 我们把高压注射器的使用风险预见在先, 采用各种措施针对性的防范各类风险的发生, 稳妥采取风险发生后的应急处置。结果使用高压注射器的十余万注碘病例, 轻度过敏者经处置后均无大碍。中度或重度过敏者经抢救后均脱险, 无死亡病例。未发生因造影剂外渗、空气栓塞、交叉感染等纠纷。

PO-3751

超低对比剂注射流速在长期化疗患者血管 CT 成像的应用

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目的 肿瘤患者需要定期化疗, 反复的化疗输液导致血管变脆、弹性差、留置针的穿刺成为难点, 并且容易造成对比剂外渗。血管 CT 成像使用的对比剂粘度高对留置针的型号也有一定的要求, 本研究采用较小型号的留置针 (22 号-24 号) 采用超低流速 (2.0ml/s 以下) 注射对比剂进行 CTA 的可行性的研究。

方法 选取 2022 年 3 月-2023 年 3 月期间进行 CTA 的肿瘤反复化疗的患者, 经 2 次常规 18 号留置针穿刺未能成功者, 选取较小型号的留置针 (22 号-24 号) 进行穿刺并采用超低流速 (2.0ml/s 以下) 进行对比剂注射的 30 例患者, 并和常规上腹部增强患者进行比较。两组扫描参数按照患者体重设置不同管电压 70kV (60kg 以下), 80kV (60-70kg), 100kV (70-80kg), 120kV (大于 80kg), 管电流采用自动管电流, 其他扫描参数和重建参数均一致。延迟时间采用自动触发方式, 阈值 100HU, 并记录患者的动脉期延迟时间。选取同层进行对比测量强化 CT 值, 并进行比较。

结果 低流速组肝顶层, 3 期 CT 强化值分别为 303.4 ± 57.5 HU, 236.5 ± 67.5 HU, 140.7 ± 26.5 HU, 常规组肝顶层 3 期 CT 强化值分别为 406.9 ± 103.2 HU, 153.8 ± 26.2 HU, 121.0 ± 17.5 HU, 两组比较均为统计学差异性。低流速组肝门层, 3 期 CT 强化值分别为 315.9 ± 54.5 HU, 212.1 ± 67.5 HU, 146.7 ± 38.0 HU, 门静脉 201.9 ± 51.9 HU, 常规组肝门层 3 期 CT 强化值分别为 411.1 ± 124.3 HU, 150.9 ± 25.3 HU, 124.1 ± 20.7 HU, 门静脉 149.2 ± 34.9 HU 两组比较均为统计学差异性。

结论 肿瘤反复的化疗的患者采用较小型号的留置针和采用超低流速 (2.0ml/s 以下) 注射对比剂进行血管 CTA 进行扫描基本可以满足临床诊断需要, 保证了患者对比剂注射的安全性和提高检查的成功率。

PO-3752

耐高压 PICC 导管在肿瘤患者腹部 CT 增强中的应用研究

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摘要：目的 分析耐高压经外周静脉置入中心静脉导管（PICC）导管在肿瘤患者腹部 CT 增强中的应用情况。方法 选取我院 2021 年 1 月至 2023 年 6 月期间实施腹部 CT 增强扫描的肿瘤患者 300 例，按随机数字表法分配的原则分为例数相同的组别，其中对照组 100 例实施常规静脉留置针予以对比剂团注；观察 1 组、观察 2 组均用耐高压 PICC 导管予以对比剂团注，对比剂用量分别为 1.3、1.1 mL/kg；对比三组 CT 增强扫描并发症、图像质量等。结果 总的增强扫描不良事件发生率方面，观察 1 组、2 组明显低于对照组（ $P<0.05$ ），而 1、2 组相比无明显差异（ $P>0.05$ ）。观察 1 组、2 组的从进入检查室至 CT 扫描的时间、CT 扫描结束至按压无出血的时间、整体耗时均短于对照组，图像质量、噪声及锐利度评分均高于对照组（ $P<0.05$ ），而观察 1、2 组相比无明显差异（ $P>0.05$ ）。三组患者 CT 增强扫描结束后未出现导管高压注射损坏及导管堵塞的情况。观察 2 组的对比剂用量低于观察 1 组、对照组（ $P<0.05$ ）。结论 肿瘤患者应用耐高压 PICC 导管并联合低对比剂注射用量行腹部 CT 增强，优化了 CT 增强的检查流程，提高了患者的检查舒适度，减少不良事件的发生，值得临床推广。

PO-3753

**西宁地区低辐射剂量、低对比剂用量和低注射流速
在肺动脉 CTA 中的应用**

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摘要：目的：分析西宁地区低辐射剂量、低对比剂用量和低注射流速在肺动脉 CTA 中的应用价值，为肺栓塞患者临床诊断提供更加有效且安全的检查方案。方法：选取我院临床怀疑为肺动脉栓塞的 60 例患者，入组患者均接受初检和复检，其中初检使用西门子 64 排 CT 机进行常规肺部检查，复检采取低辐射剂量、低对比剂用量和低注射流速扫描方法，对比两种检查方法的主客观图像质量评分以及辐射剂量。结果：两种检查方法的主观图像质量均符合临床诊断需求，两组的图像质量主观评分分布情况无明显差异（ $P<0.05$ ）；两种检查方式的噪声对比结果无明显差异（ $P>0.05$ ），复查检查方式的 CNR 和 SNR 水平均显著高出常规检查（ $P<0.05$ ）；复查检查方式的 CT DIvol、DLP 和 ED 指标水平均低于常规检查（ $P<0.05$ ）。结论：在肺动脉 CTA 检查中选用低辐射剂量、低对比剂用量和低注射流速扫描方案联合三维重建技术，能够保证较好的肺部检查图像质量，为临床诊断提供依据，并且人体辐射剂量显著降低，能够保证检查诊断的有效性与安全性。

PO-3754

**探讨西门子 Force 使用能谱技术扫描下肢血管增强成像中与
GE Revolution 的优势对比**

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目的：探讨西门子 Force 使用能谱技术扫描下肢血管增强成像中与 GE Revolution 的优势对比。

材料与方法: 本研究搜集我院 2021 年 6-8 月期间使用西门子 force 仪器扫描的下肢 CTA30 例, 为 A 组。使用 GE Revolution 仪器扫描下肢 CTA30 例, 为 B 组。两个仪器上的患者均使用能谱扫描技术。其中男 32 例, 女 28 例, 年龄 45-75 岁, 平均年龄 60.8 岁。扫描参数两组管电压均为 40-140keV, 管电流为自动 mA 扫描。其中 A、B 两组均使用对比剂碘克沙醇 320; 于左肘静脉注射对比剂。均使用德国欧利奇高压注射器注射。流速均为 4.0-4.5ml/s。注射剂量为 80ml。通过容积 CT 剂量指数 (CTDIvol)、剂量长度乘积 (DLP) 和有效辐射剂量 (E) 的值, 比较 A、B 两组辐射剂量的差异。由本科室两名高年资医生利用评分法对 2 组图像质量进行主观评价。

结果: A 组图像质量均能达到临床诊断要求; B 组有 8 例由于显影较淡未能达到诊断要求。且 A 组较 B 组的辐射剂量低 55%。但是将 B 组的患者增加对比剂剂量到 100ml, 其图像质量与西门子将没有太大差异。

结论: 通过对比研究发现西门子 Force 使用能谱技术扫描下肢 CTA 成像较 GE Revolution 在扫描图像质量及对降低患者的辐射剂量及对比剂剂量上都有明显的优势。即西门子 Force 使用能谱技术扫描下肢 CTA 成像优于 GE Revolution。

PO-3755

探讨水化护理在宫颈癌化疗后患者中降低 CT 增强检查对比剂外渗的概率及减少对比剂肾病发生风险的临床价值

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目的: 探讨水化护理在宫颈癌化疗后患者中降低 CT 增强检查对比剂外渗的概率及减少对比剂肾病发生风险的临床价值。方法: 前瞻性入组 100 例宫颈癌化疗后欲行 CT 增强检查患者, 随机分为两组, 实验组患者在行 CT 增强检查前后采用口服水化法进行水化护理干预, B 组为对照组, 除水化护理干预外, 其他一切均同实验组。分别统计两组患者对比剂外渗概率、检查前 24 h 及检查后 24 h 两组患者血清胱抑素 C (Cys C) 的含量。通过 5 分量表法使患者对 CT 增强检查耐受度进行打分 (1~5 分, 难以忍受~无异常感觉), 由两位高年资护士采用双盲法对各患者 CT 增强 24h 后精神状态进行评分 (1~5 分, 精神极差~精神佳)。通过两独立样本 t 检验比较两组患者的一般信息及对比剂外渗概率。通过配对样本 t 检验比较两组患者检查前后 Cys C 含量, 并通过独立样本 t 检验进行两组间比较检查前后 24 h 血 Cys C 含量。采用 Mann-Whitney U 检验比较两组患者 CT 检查耐受度及检查后精神状态程度主观评分, 通过 Kappa 检验对检查后精神状态程度主观评分做一致性分析。结果: 3 人因对比剂过敏终止检查, 3 人因服用二甲双胍终止检查, 最终实验组 48 人及对照组 46 人完成检查。两组患者一般资料无统计学差异 ($P>0.05$)。实验组对比剂外渗概率小于对照组 ($t=-2.452$, $P<0.05$)。两组检查前 24h 血 Cys C 含量无统计学差异, 检查后实验组 Cys C 含量低于对照组 ($t=-4.249$, $P<0.05$), 二者之间具有统计学差异。在对 CT 增强检查耐受度主观评分方面, 实验组显著高于对照组 ($t=-4.320$, $P<0.05$), 主观评分提高 1.11 分。在检查后精神状态程度方面, 两组评价结果一致性良好 ($Kappa=0.818$, $P<0.05$) 实验组高于对照组。结论: 在宫颈癌化疗后患者进行水化护理干预, 不仅可以提高患者检查依从性, 更可降低 CT 增强检查对比剂外渗的概率及减少对比剂肾病发生风险, 具有重要的临床价值。

PO-3756

第三代双源 New Force CT 冠状动脉成像的低剂量低对比剂个性化扫描方案研究

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目的: 使用第三代双源 New Force CT 前瞻性 Turbo Flash 扫描序列, 对比不同的对比剂用量方案, 探讨低辐射剂量及低对比剂剂量的冠状动脉成像的个性化扫描方案研究。

方法: 应用 New Force CT 对 60 例心率小于 80, BMI 无限制的患者行前瞻性 Turbo Flash 序列扫描。所有患者被随机分为两组: A 组患者对比剂用量为每公斤体重乘以 0.5, B 组对比剂用量为每公斤体重乘以 0.6, 流速均为 5ml/s (350mgI/mL)。根据双 CT 的 Care Dose4D 技术自动选择每个患者的最适管电压, 对原始数据进行 ADMIRE 迭代重建。比较两组患者的年龄、BMI 和心率, 两组图像的背景噪声、信噪比和放射剂量, 测量并比较两组图像冠脉各节段的管腔内的 CT 值和图像对比噪声比。以段为单位, 对两组的冠脉图像质量采用 4 分法 (1~4 分, 优~无法评估) 进行比较。结果: 两组患者的图像质量均可满足临床诊断要求, 两组患者在性别、年龄、BMI 和心率方面无显著性差异, 两组图像的背景噪声、信噪比和冠脉各阶段对比噪声比及放射剂量方面无显著性差异 ($p>0.05$), 平均有效辐射剂量 (ED) 为 $0.78\pm 0.24\text{mSv}$, 平均剂量长度乘积 (DLP) 剂量为 $56.01\pm 17.70\text{mGy}\cdot\text{cm}$, 平均容积质量指数 (CTDI) 剂量为 $3.40\pm 1.02\text{mGy}$; 两组平均造影剂用量有统计学差异 ($p<0.05$) (A 组平均造影剂用量为 $36.2\pm 6.1\text{ml}$, B 组平均造影剂用量为 $42.7\pm 8.4\text{ml}$); 3 支冠脉主干、近端及远段 CT 值的比较无显著性差异 ($p>0.05$), 而左心房及左心室的 CT 值存在显著性差异 ($p<0.05$), A 组均小于 B 组; 以段为单位, 两组冠脉图像质量平均评分无显著性差异 (A 组为 1.53 ± 0.97 , B 组为 1.53 ± 0.90 , $P=0.81$)。两组冠脉可评价节段率均 $>97\%$ 。

结论: 在双源 Force CT 上对于心率小于 80 的患者使用前瞻性 Turbo Flash 扫描序列, 按患者每公斤体重乘以 0.5 计算对比剂用量的方案可以在低辐射剂量及低对比剂用量下进行冠状动脉 CTA 的检查, 且可以在亚毫希伏条件下获得满足临床诊断的图像质量。

PO-3757

缩短超液化碘油 HSG 延迟片时间评价输卵管功能的可行性研究

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目的 输卵管通畅性的评价主要依靠子宫输卵管造影 (HSG)。普通含碘油的 HSG 检查需要于术后 24 h 返院拍摄延迟片, 增加患者时间和经济成本。超液化碘油是一种新型对比剂, 克服普通碘油黏稠度高等缺点。目前已证实缩短超液化碘油 HSG 拍摄延迟片时间为 3-4h, 可达到与 24h 一致的诊断效果, 但能否判断输卵管蠕动功能尚不明确。本研究拟对此进一步探索。

方法 选取 2021 年 1 月至 2022 年 6 月北京妇产医院收治的 63 例原发不孕症女性为研究对象。对比剂采用罂粟乙碘油 (10mL/支), 注射剂量 10mL。注射对比剂后观察输卵管是否通畅, 对比剂是否顺利弥散进入盆腔, 并分别于 HSG 术后 3h、6h、24h 拍摄延迟片, 观察输卵管内碘油残留情况, 结合输卵管形态判断蠕动功能。由 2 名 10 年相关工作经验的影像学医师阅片。以卡方检验对 HSG 术后 3h、6h、24h 拍摄盆腔延迟片时输卵管是否有对比剂残留诊断输卵管蠕动功能差异是否有统计学意义。以 Kappa 一致性检验对 2 位影像医师的判读结果进行一致性评价。

结果 126 条输卵管中, 8 条输卵管阻塞, 最终评价 118 条输卵管。HSG 术后 3h 拍摄延迟片, 42 条输卵管少量对比剂残留, 壶腹部形态略僵直, 76 条输卵管无对比剂残留。术后 6h 拍摄延迟片, 31 条输卵管少量对比剂残留, 壶腹部形态略僵直, 87 条输卵管无对比剂残留。术后 24h 拍摄延迟片, 17 条输卵管少量对比剂残留, 壶腹部形态僵直, 101 条输卵管无对比剂残留。卡方检验显示,

HSG 术后 3h、6h 输卵管对比剂残留差异无统计学意义 (P 值 >0.05)。而两者与 24h 输卵管对比剂残留差异均有统计学意义 (P 值 <0.05)。2 位医生判读结果一致性系数 kappa 值分别为 0.641、0.676、0.762，一致性较好。

结论 超液化碘油 HSG 术后 3h 和 6h 可根据输卵管对比剂残留情况，结合输卵管形态判断蠕动功能，比术后延迟 24h 拍片更有意义，具有可行性。

PO-3758

三低对比剂联合能谱 CT 技术在门静脉与肝静脉一站式成像中的可行性研究

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目的 探讨三低对比剂联合能谱 CT 技术在门静脉、肝静脉一站式成像的可行性。资料与方法 收集腹部 CT 增强扫描病人 100 例。将病人随机分成两组，实验组 ($n=50$ 例) 采用低浓度等渗对比剂碘克沙醇 320mg/ml(100ml)，流速 3ml/s、总量 1.2ml/kg，在门静脉期采用能谱 CT 扫描及重建技术。对照组 ($n=50$ 例) 采用高浓度低渗对比剂碘海醇 350 mg/ml(100ml)，流速 5ml/s、总量 1.5ml/kg，行常规多期螺旋增强扫描。比较两组间门静脉和肝静脉的图像质量、辐射剂量。结果 门静脉主干 CT 值实验组高于对照组 ($P<0.05$)，有统计学意义。门静脉对比噪声比 (CNR)、门静脉信噪比 (SNR)、肝静脉 CT 值、肝静脉对比噪声比 (CNR) 两组间无统计学意义 ($P>0.05$)。肝静脉信噪比 (SNR)、图像噪声 (SD) 对照组优于试验组 ($P<0.05$)，有统计学意义。两组门静脉、肝静脉主观评分无统计学意义 ($P>0.05$)。实验组门静脉期能谱扫描 CTDIvol、DLP、ED 低于对照组常规单期螺旋扫描 (P 值均 <0.05)。结论 三低对比剂联合能谱 CT 技术可在门静脉晚期实现门静脉和肝静脉一站式成像并减少辐射剂量。

PO-3759

首诊负责制在碘对比剂外渗全程护理干预中的应用

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目的 探讨首诊负责制干预模式在碘对比剂外渗全程护理干预中的应用效果。方法 回顾 2021 年 1 月-2022 年 12 月某大型三甲医院放射科碘对比剂外渗 70 例患者为研究对象，其中 2021 年 1 月-2021 年 10 月碘对比剂外渗 35 例列为对照组采取传统方法进行干预，2021 年 11 月-2022 年 12 月碘对比剂外渗 35 例列为观察组采取首诊负责制行干预。比较两组患者临床肿胀消退时间、疼痛消失时间、患者满意度、临床科室满意度、护理人员渗漏处理操作考核等。结果 患者临床肿胀消退时间，对照组为 (32.15 ± 2.50) 小时长于观察组 (25.80 ± 3.62) 小时，比较有统计学意义 ($P<0.05$)；患者疼痛消失时间，对照组为 (33.75 ± 2.25) 小时长于观察组 (26.50 ± 2.33) 小时，比较有统计学意义 ($P<0.05$)；患者满意度，对照组为 90% 低于观察组 98%，比较有统计学意义 ($P<0.05$)；临床科室满意度，对照组为 92% 低于观察组 100%，比较有统计学意义 ($P<0.05$)；护理人员渗漏处理操作考核情况，对照组为 (84.5 ± 5.5) 分低于观察组 (95 ± 4.0) 分，比较有统计学意义 ($P<0.05$)。结论 首诊负责制在碘对比剂外渗全程护理干预中的应用，提高护理人员的主观能动性，提高护理人员的责任心，提高护理人员的沟通能力及处理渗漏的能力，增进护患关系，提高患者满意度，增进影像科与临床科室的合作。

PO-3760

肺动脉 CTA 联合腹盆增强的一站式能谱扫描在妇科肿瘤患者中 诊断伴随性肺栓塞的临床价值

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【摘要】目的：探讨对妇科肿瘤患者行肺动脉 CTA 联合腹盆增强的一站式能谱扫描的临床应用价值。方法：将 56 例需行肺动脉 CTA 和腹盆增强检查的妇科肿瘤患者随机分为 A、B 两组（各 28 例），A 组采用独立扫描，即肺动脉能谱 CTA 及腹盆腔能谱增强 CT 分两次检查两次给药；B 组采用联合扫描，即肺动脉能谱 CTA 及腹盆腔能谱增强 CT 联合一次性检查一次给药。其中 A 组肺动脉 CTA 用药量 30-40ml，腹盆腔增强 CT 用药量根据患者体表面积计算用药量，B 组同样根据患者体表面积计算用药量。生成肺动脉 CTA 65keV 图像，腹盆增强 50keV 图像，肺动脉与腹盆增强碘图和有效原子序数图。在肺动脉 CTA 图像上测量肺动脉主干和肌肉的 CT 值及 SD 值以及肺动脉主干的碘值和有效原子序数值，计算出信噪比（SNR）和对比噪声比（CNR）。腹盆腔平扫与双期增强 CT 图像上测量肝脏和脾脏的 CT 值、SD 值、碘值、有效原子序数值，计算出信噪比（SNR）和对比噪声比（CNR）。由两名医师对肺动脉 CTA 65keV 和腹盆 50keV 图像进行独立双盲主观评分对比 2 组客观图像质量参数和主观图像评估结果。结果：本研究发现肺动脉栓塞 15 例，占比为 26.78%，两组患肺动脉栓塞占比（A 组：28.57% vs. B 组：25.00%）无统计学差异。与 A 组相比，B 组对比剂用量减少了 35.75%（A 组：99.15±2.75mL vs. B 组：63.70±3.18mL），差异有统计学意义（ $P<0.001$ ）。两组剂量长度乘积无统计学差异（ $P>0.05$ ）。两组患者对应的肺动脉 CTA 65keV 图像、腹盆平扫与双期增强 50keV 图像、胸腹碘图、有效原子序数图的客观参数（CT 值、碘浓度、有效原子序数值）和图像质量（SD、SNR、CNR）、主观图像评分均没有统计学差异（ P 均 >0.05 ）。所有图像均满足诊断要求（评分 ≥ 3 分）。结论：两种不同扫描方案扫描的图像质量均处于较高水平且没有统计学差异，联合扫描的扫描时间更短，且使用的对比剂用量更少，联合能谱扫描具有较高临床价值。

PO-3761

从对比剂基础理论到科研设计思维

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摘要：目的：从对比剂的基本理论因素探讨碘比剂的正确应用，通过提高碘流和方法来提高动脉强化效果，进而探讨对比剂的科研设计原则。方法：将患者分别按照不同的对比剂浓度、不同的注射速度、不同的碘总量设置对照组和实验组，机器扫描方案相同。测量两组患者的碘流率、扫描动脉峰值及动脉强化效果并进行数据分析。结果：碘流率高的实验组，其动脉增强程度越高、强化效果越好（ $P<0.05$ ）。结论：应用碘流率可以精准定量计算对比剂流率和选择对比剂浓度，可以在图像质量保持不变的情况下减少对比剂用量。

PO-3762

基于多功能纳米颗粒的肝癌双模态成像及多模式治疗的研究

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背景：肝细胞癌是肝癌的主要组织学类型，且其生长迅速又富血供，肿瘤微环境复杂且富氧与乏氧共存，单一传统的影像学检查及治疗方式已不足以对肝细胞癌进行高准确性和可靠性的评价，开发可以实现多模态成像和多模式联合治疗的多功能纳米材料对于改善肝细胞癌治疗效果和延长患者的寿命具有很大的希望。

方法：本研究通过硬膜版法、物理结合等方式成功制备了以 MnO_2 为载体且表面负载抗血管生成肽 FSEC 的多功能自基氧纳米诊疗剂 ICG/FSEC@HMPP，利用透射电镜、扫描电镜、激光动态光散射、傅立叶红外光谱、Zeta 电势、固体核磁共振、元素分析等对 FRMON 等结构参数进行检测，溶血试验、细胞毒性试验、小鼠血常规及生化分析等对 ICG/FSEC@HMPP 的体内外安全性进行了评估；通过体外体内成像评估 ICG/FSEC@HMPP 的荧光/磁共振成像的能力；最后通过细胞层面及不同动物模型对各项指标进行了检测，探索了其增强光动力疗法联合免疫疗法协同抗癌效果及其增效机制的研究。

结果：ICG/FSEC@HMPP 诊疗剂分散性好，粒径均一，稳定性强，磁化性高，光热性能好、安全性低，产 O_2 及 ROS 丰富，良好的细胞内化及富集的能力，经治疗剂处理后促血管生成因子 VEGFA、ANGPT2、EGF 表达下降，血管成熟相关基因 S1PR1、ANGPT1、TGFB1 等表达升高，CRT 转位增强，Bcl-2 表达下降，Caspase-3 和 Bax 表达升高，T 细胞表达升高。经 ICG/FSEC@HMPP+PDT+Anti-PD-L1 组治疗后的肿瘤体积减小或消失。

结论：研究表明，ICG/FSEC@HMPP 诊疗剂各项参数稳定，性能良好，在体内和体外均显示出优异的荧光及磁共振成像的能力，实现了对肝细胞肝癌的双模态成像；另外 ICG/FSEC@HMPP 还具有在改善乏氧，增强光动力疗法及免疫治疗协同治疗的疗效、使肿瘤血管正常化、突破肿瘤局部基质屏障的同时通过增强免疫原性死亡和免疫反应进一步杀伤肿瘤细胞以及残留肿瘤细胞，实现了肝细胞肝癌的多模式联合治疗。总之，本研究合成的自基氧多功能 ICG/FSEC@HMPP 诊疗剂有助于加快肝细胞肝癌诊疗一体化进程的实现。

PO-3763

深度学习重建算法结合低管电压头颈 CT 血管成像的双低研究

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目的：探索基于深度学习图像重建 (deep-learning image reconstruction DLIR) 算法的低管电压头颈 CTA 成像降低辐射剂量和碘流率的价值。

方法：选择性选取在我院进行头颈 CT 血管成像检查的患者 40 例，按照身体质量指数 (BMI) 不同分成两组：其中 A 组 ($n=20$): $\text{BMI} \leq 25 \text{ kg/m}^2$ ，管电压 80KVp，DLIR 算法，权重级别高；B 组 ($n=20$): $25 \text{ kg/m}^2 < \text{BMI} \leq 30 \text{ kg/m}^2$ ，管电压 120KVp，自适应统计迭代算法 ASiR-V，权重级别 30%。余扫描参数设置相同，均采用碘浓度 370mgI/mL 对比剂，对比剂注射总量=速率 \times 10，自动管电流 100-600mA，噪声指数 8，余扫描参数设置相同。记录两组图像相同位置的主动脉 CT 值、颈总动脉 CT 值、基底动脉 CT 值、胸锁乳突肌作为图像的背景噪声、对比剂注射速率、CTDI，并计算对比噪声比 (CNR)、信噪比 (SNR)、碘流率、辐射剂量 (ED)，由两名经验丰富的放射医生用 1-5 分法对图像整体质量进行主观评价，利用 SPSS 软件对两组间数据进行统计学分析。

结果: 两组图像 CT 值和图像质量评分 (4.56 ± 0.23 vs. 4.59 ± 0.26) 无统计学差异 (P 均 > 0.05); 两组图像 CNR、SNR、ED 具有统计学差异 (P 均 < 0.05), 辐射剂量相对于 B 组降低了约 70%; A 组注射速率及碘流率低于 B 组, 降低了大约 30% ($P < 0.05$)。

结论: DLIR 算法结合低管电压可以显著降低标准体型病人头颈 CTA 的辐射剂量和碘流率, 能够提供符合诊断需求的图像质量。

PO-3764

比较头颈部 CTA 常规扫描与低对比剂、能谱单能量扫描的图像质量、辐射剂量

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目的 探讨能谱 CT 联合低对比剂用量在头颈部 CTA 中的图像质量和辐射剂量。**方法** 前瞻性选取 90 例行头颈 CTA 检查的患者, 根据扫描方式和对对比剂注射方案不同随机分成 A 组 (120kV 混合能量 CT+常规对比剂剂量)、B 组 (能谱 60keV 单能量重建+常规对比剂剂量)、C 组 (能谱 60keV 单能量重建+低对比剂剂量组)。利用 GSI 能谱分析软件, 分别重建 B、C 组 60keV 最佳单能量图像, 对 A、B、C 三组图像分别进行容积再现 (VR)、最大密度投影 (MIP) 和曲面重组 (CPR) 后处理。分别测量主动脉弓、颈总动脉起始处、颈内动脉起始处、大脑中动脉 M1 段及乳头层面胸大肌 CT 值和标准差 (SD) 值。计算每组图像各动脉血管平均值和信噪比 (SNR)、对比噪声比 (CNR)。由两名放射科医师分别对三组图像采用 5 分法进行主观评分。记录剂量长度乘积 (DLP)、有效辐射剂量 (ED) 和碘摄入量。采用单因素方差分析和 Kruskal—Wallis 检验进行统计学分析。采用 SPSS 22.0 进行数据分析。定量资料分别采用卡方检验、单因素方差分析, 组间比较采用 Bonferroni 检验。图像质量主观评分用 Kruskal-wallis 检验比较, 采用 Kappa 检验对两位放射科医师图像质量主观评分一致性进行分析。 $P < 0.05$ 表示差异有统计学意义。结果 B 组、C 组的 DLP 和 ED 值均低于 A 组, 差异具有统计学意义 ($P < 0.05$), B、C 组间无统计学差异。C 组的碘对比剂用量较 A、B 组低, 差异具有统计学意义 ($P < 0.05$)。图像客观评价中, B、C 组靶血管 CT 值均高于 A 组, 差异具有统计学意义 ($P < 0.05$)。B 组的 SNR 高于 A 组, 差异有统计学意义 ($P < 0.05$)。B 组、C 组的 CNR 均高于 A 组, B 组的 CNR 最高, 三组间差异均有统计学意义 ($P < 0.05$)。B、C 组主观评分均高于 A 组 ($P < 0.05$), 差异具有统计学意义, B 组与 C 组差异无统计学意义 ($P > 0.05$)。2 名医师对三组图像评价结果的一致性较好 ($Kappa=0.812$) 结论: 低对比剂、60keV 最佳单能量重建图像能够明显降低辐射剂量和对对比剂用量、提高图像质量。

PO-3765

评价上肢血管 CT 成像对比剂稀释注射对动脉增强效果的改善研究

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研究目的: 根据患者体重 (BW) 调整碘浓度后, 评价上肢血管 CT 成像 (CTA) 对比剂 (CM) 的稀释是否会增加动脉强化。**方法:** 我们对 140 例接受上肢血管成像 (CTA) 的患者进行了前瞻性研究。70 名连续患者接受了固定碘浓度的标准 CTA, 而其余 70 名患者接受了稀释的 CM 注射的 CTA。所有患者按体重 (< 55 、 $55 \sim 65$ 、 $66 \sim 75$ kg) 分为 3 组。比较 ≥ 350 Hounsfield 单位 (HUs) 的升主动脉增强 (CEs) 在标准 CTA 和稀释的 CM 注射组之间以及体重组之间的均值和比例。用线性回归分析体重与

CE 之间的关系。结果：接受稀释的 CM 使 <55 公斤组的平均 CE 增加($402.6 \pm 52\text{HU}$ vs. $384.2 \pm 54\text{HU}$; $P < 0.01$)，但在体重较重的组中无明显变化。 $\geq \text{CE}350$ 的比例随着体重的增加而增加(<55 kg=73%，55~65 kg=85%，66~75 kg=90%)，稀释后增加(分别为 84%，89%，92%)。CM 稀释后，CTA 患者体重与 CE 的相关性由 0.38 降至 0.21($P < 0.05$)。

结论：上肢血管 CT 成像的 CM 稀释度可提高动脉的强化。

PO-3766

多次增强 CT 检查后患者身体代谢影响的探讨

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目的：针对肿瘤患者在放化疗周期期间和治疗结束后，需要多次影像学随访检查，而且往往胸腹部联合 CT 增强扫描。探讨此类患者经多次增强 CT 检查后对身体代谢影响。

方法：随机对 2023 年 2 月—2023 年 7 月半年期间 86 名患者接受两次及以上增强 CT 检查后展开分析，通过血液报告，结合临床辅助的检查结果，包括查体和主诉对比患者增强 CT 检查前后身体代谢的变化。

结果：增强检查的强射线对蛋白质的破坏，出现机体抵抗力下降；在放射线照射下，机体脂肪代谢有一定变化，各器官脂肪含量有所改变，贮存脂肪被利用而作为内源性营养物质；维生素代谢的影响表现在体内酶系统的破坏；注射造影剂对肾脏的伤害诱发肾病的发生率超过 10%。

结论：对于半年内多次检查的患者，在接受照射之前和受到照射之后，应该补充大量的维生素 C、维生素 E 和 β -胡萝卜素，以及维生素 K、维生素 B1、维生素 B2、维生素 B6 或泛酸减轻自由基带来的损伤；及时补充优质量足的蛋白质，从而增强了机体对射线的抵抗力；食物中的脂肪含量以植物油为主，注意多喝水 3000ml-4000ml，多吃一些新鲜的水果，蔬菜，能够加快造影剂在体内的排出和代谢，减少造影剂对身体的损伤。对于比较敏感的人群还需要通过注射生理盐水来促进排泄，减少肾毒性。

PO-3767

放射科对比剂注射的精细化实践

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放射科护士在放射学检查中的对比剂注射是一项重要而复杂的任务。本论文旨在探讨放射科护士对比剂注射的精细化实践，并评估其在患者护理中的重要性和效果。通过文献综述和案例分析，我们研究了放射科护士在对比剂注射过程中所面临的挑战和机遇，并讨论了如何提高注射技术的精确性和安全性。

放射科护士在对比剂注射中扮演着关键的角色。他们负责准备对比剂，确保其质量和适用性，并根据医生的指示进行注射。精细化的注射技术对于获得清晰的影像和准确的诊断结果至关重要。放射科护士需要准确计算和控制对比剂的剂量，选择合适的注射途径和速度，并密切监测患者的反应和不良反应。

放射科护士对比剂注射的精细化实践对患者护理具有重要意义。精准的注射技术可以最大程度地减少对比剂的浪费和不良反应的发生，提高影像质量，为医生提供准确的诊断信息。此外，精细化的注射还可以减轻患者的不适和焦虑，提高他们对检查的合作度。

然而，放射科护士在对比剂注射中也面临一些挑战。注射过程中的剂量计算和调整需要准确性和敏捷性，而不同患者的生理特征和病情可能对注射产生影响。放射科护士需要不断更新自己的专业知

识,掌握最新的注射技术和安全准则。此外,与患者的有效沟通和情绪支持也是注射过程中的关键因素。

PO-3768

碘对比剂恒温箱加热处理对冠脉 CTA 患者心电变化及外渗风险的影响

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目的:探讨碘对比剂经恒温箱加热处理后对冠脉 CTA 患者心率、心电图变化及外渗风险等不良反应的影响。方法:选择我院 2021 年 1 月至 2022 年 1 月期间收治的行冠脉 CTA 患者 200 例为研究对象,采用随机分为对照组和研究组,各 100 例。所有患者均采用碘帕醇作为对比剂进行冠脉 CTA 检查,对照组中不对碘对比剂进行加热,研究组将碘帕醇加热至 37°C 后进行冠脉血管成像。比较两组检查时间、碘帕醇用量、X 线曝光时间、不适反应、心率改变、T 波改变及对比剂外渗等不良反应情况。结果:研究组检查时间明显短于对照组[(15.12±4.62) min vs (20.07±7.71) min, P<0.05]。恶心呕吐等不适反应发生率、心率改变发生率、对比剂外渗发生率显著低于对照组(0.81% vs 4.23%, 2.58% vs 8.00%, 0.72% vs 6.35%, P<0.05); 两组碘帕醇用量、X 线曝光时间、T 波改变发生率比较差异无统计学意义(P>0.05)。结论:碘对比剂经恒温箱加热处理后可缩短冠脉 CTA 患者检查时间,降低心率、对比剂外渗等不良反应发生率,值得临床借鉴和应用。

PO-3769

CT 动态 4D 联合直接法单下肢 CTV 血管成像评估下肢血管病变

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目的:动态血管 4D 联合直接法单下肢静脉不仅可以清楚掌握局部血流动力学,而且可以全程显示血管情况。

方法:动态 4D 扫描范围选取骨盆平面上下范围 381mm,扫描时间为每期 2.5s,扫描 15 期。接着延迟 30-50s 进行单侧下肢 CTV 扫描,扫描时间 34s。尽量保证扫描期间一直有造影剂注入。扫描方向均示足向头方向,造影剂总量 30ml (350mg/ml),生理盐水 170ml。流速 1.8-2.0ml/s。

结果:患者女性,52 岁,双下肢静脉曲张十余年,左侧稍明显,超声检查怀疑髂压综合征。动态图可以清楚显示左侧髂总静脉流入下腔静脉通畅,全程可示左下肢皮下可见迂曲靠张静脉。患者男性,72 岁,左下肢水肿伴活动后疼痛 9 年,加重 2 周入院。动态图可以清楚显示盆腔可见许多侧枝循环开放,左下肢注射造影剂直接回流至右侧髂外静脉。左侧髂外静脉未见显示。全程可示左下肢深静脉未见显影并可见多发浅静脉循环开放。三天后 DSA 检查结果与 CTV 结果一致。患者男性,51 岁,左下肢疼痛肿胀 7 月,既往有下肢深静脉血栓病史,动态图示:左侧髂总静脉局限性血管细小。全程示左下肢广泛浅静脉迂曲较前好转。二天后行 DSA 检查并在左侧髂总静脉处放入支架。

结论:局部动态 4D 联合直接法单下肢 CTV 成像,既可以清楚显示下肢血管的血流动力学,又可以清楚全程显示下肢血管情况,从而给临床提供全面影像学资料,而且造影剂用量也明显减少。

PO-3770

一项在大型三甲医院关于碘对比剂外渗的回顾性研究

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目的：通过收集和分析湖南某大型三级医院的外渗事件，评估接受增强 CT 检查的患者中 CMEX 的发生率的相关危险因素，并探讨住院与否、有无留置针和导管型号、导管位置、对比剂种类、患者年龄和性别与外渗量的关系，讨论近年来碘对比剂外渗事件的发生率及其相关危险因素是否有所改变，从而与时俱进的完善对比剂外渗的预防、处理、善后措施。

方法：本研究是一项回顾性、描述性和单中心研究，从 2020 年 8 月 1 日至 2021 年 6 月 30 日期间在我院接受增强 CT 检查的 72556 例患者中提取数据并进行分析，包括年龄、性别、造影剂种类及工作班次等数据。所有统计分析均采用 IBM® SPSS 统计学。连续变量用平均值和标准差 (SDs) 表示，而分类变量则用每个类别的计数和百分比表示。P 值<0.05 被认为是显著。

结果：在为期两年的回顾性研究中，72556 名患者共发生 68 例造影剂外渗事件，碘化造影剂外渗率为 0.093%。CMEX 患者的平均年龄为 58 岁，其中 38.2%为男性，61.8%为女性。在这项研究中，我们将 68 名患者的外渗严重程度分为轻度和中度/重度，轻度组有 23 名患者，中度/重度组有 45 名患者。

结论：本研究中的血管外渗率比以前的研究报告要低 (0.09%)，与以往研究中相似的是女性更容易发生外渗事件，但年龄的增长、工作时间以及对对比剂种类则并非是影响外渗发生率的危险因素，提示经过医护人员的严格管理以及对对比剂种类、自动注射器技术的不断革新降低了部分危险因素的影响。通过本次研究我们考虑，通过标准化的数据收集，对造影剂类型来源、使用的静脉导管类型、有无留置针、造影剂类型、注射率、导管位置等相关因素进行细化分类以及大数据样本采集可以更好地分析可能会影响 CMEX 的危险因素，有助于增加预防措施，制定严谨规范的处理流程以及后续患者的随访预后等研究内容，有效降低 CMEX 的不良反应发生率及提高 CMEX 的处理应对能力，减少患者痛苦；同时也有助于提高自动注射器及对对比剂类型的革新升级，更好地服务患者。

PO-3771

蓝信平台在放射科管理以及患者隐私保护中的应用

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目的：探讨蓝信平台在放射科管理和工作中的应用，为加强患者隐私保护以及提高放射科规范化管理提供一种新思路。

方法：通过在蓝信平台建立相关工作群或利用蓝信平台的附属功能来提高放射科的管理质量和加强患者隐私保护。

1. 建立工作群：1.1 蓝信平台在放射科科务管理中的应用：建立放射科内部沟通群（医技护工作日常通知）、环境与急救上报平台（整体环境和抢救过程相关信息）、放射科医技护危急值上报平台（危急患者信息上报）、科外医生以及患者建议总结群（工作质量、服务态度）；1.2 蓝信在区域质控管理的应用：CT 组工作群、X 线组工作群、磁共振工作群、介入中心工作群，发布次日工作安排以及检查者相关信息。

2、其他附属功能：2.1 考勤（工作、会议）2.2 学习中心（专业技术、党建学习）2.3 重要通知（收到应答）

结果：我们统计了使用蓝信平台前（2022.7-2022.12）及使用蓝信平台后（2023.1-2022.6）对相关事件上报率（不良事件、危急病人、环境及急救）以及工作整体质量（考勤、学习率、满意度调查）的影响。结果表明使用蓝信工作平台后相关事件上报率均得到提升，其中对于危急病人信息的

上报率得到显著提高 ($p<0.05$)。统计期间内 人员考勤以及学习率得到提升, 科外建议以及患者满意度调查数量提高, 有助于完善本科室不足以及提高工作质量。

结论: 通过比较使用蓝信平台前后不良事件上报率、危急值上报率、环境及急救上报率指标, 结果表明使用蓝信平台可以有效提高放射科人规范化管理的质量, 增强科室成员学习意识和工作质量, 同时该平台可有效保护患者隐私。本文为放射科管理以及患者隐私保护提供了新的思路。

PO-3772

基于失效模式与效应分析的对比剂不良反应的患者处置流程管理

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目的: 失效模式与效应分析 (Failure Mode and Effect Analysis, FMEA) 已在临床上作为一种积极主动评估医疗过程中的风险薄弱环节、制定风险防控措施的有效方法。本研究探讨 FMEA 在发生对比剂不良反应患者处理流程中的应用效果。

方法: 成立 FMEA 小组, 并对发生对比剂不良反应患者处理流程进行讨论, 分析潜在失效模式及原因, 计算优先风险数值 (Risk Priority Number, RPN), 选取排名前 3 位的主要失效模式, 制订改进措施并落实, 调查比较改进前 CT 及 MRI 检查时发生对比剂不良反应、需医生紧急处理的 123 位患者及改进后的 121 位患者的处理流程差异。

结果: RPN 值排名前 3 位的失效模式分别为医生到场不及时、患者转运至相关科室时间 (急诊或住院科室)、处理过程医疗文书不完整, 其 RPN 值分别为 118.6、98.5 及 89.4。改进前医生到场开始处理时间为 $11.2\pm 6.8\text{min}$, 患者转运至相关科室时间为 $42\pm 7.3\text{min}$, 处理过程医疗文书完整性 $89.6\pm 4.3\%$ 。改进后上述指标分别为 $6.3\pm 2.8\text{min}$, $15.6\pm 4.2\text{min}$ 及 $96.6\pm 2.7\%$, 三种指标的比较均有显著性差异 ($P<0.05$)。

结论: 失效模式与效应分析能显著改善 CT 及 MRI 增强检查对比剂不良反应患者的救治流程, 使患者能得到更及时的处理及转运, 保证医疗文书的完整性, 可有效减少医疗纠纷的风险。

PO-3773

影像技师在危急值报告信息化管理中的价值初探

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目的: 探讨放射科医技一体化培养制度在急诊 CT 检查危急值报告制度中的实践及意义。

方法: 选取 2021 年 1-7 月急诊入院并在放射科进行 CT 检查的 242 例患者进行分析, 将实施医技一体化培养前、后急诊入院检查的患者分成对照组 (136 例) 和观察组 (106 例), 放射科急诊当班技师参与急诊报告的危急值标注, 诊断医生进行核对, 对急诊危急值报告周转时间进行分析。

结果: 急诊 CT 危急值报告周转时间中位值从 70.09min 缩短至 38.90min, 实现了危急值报告及时率的显著提升, 获得了临床认可。

结论: 将放射科医技一体化培养制度应用于放射科的质量管理模式中显著缩短急诊患者 CT 危急值报告周转时间, 值得在放射科信息化建设中广泛应用。

PO-3774

现代中医发展下的中医医院影像科的管理与思考

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目的 通过介绍三级甲等、二级甲等中医医院医学影像科在医院诊疗过程中的作用, 分析探讨医学影像科在中医医院中存在的价值及问题, 为中医医院影像科管理及如何为临床服务提供工作思路及参考借鉴。**方法** 阐述中医医院医学影像科工作的内容及难点, 介绍中医医院影像科通过健全科室内部组织管理架构和规章制度、强化放射科医生变被动为主动的服务意识、加强与中医专家的沟通学习及科室间的协作等方式规范并提升中医院医学影像科在现代中医药及传统非药物疗法发展中的服务能力并针对其中存在的问题进行讨论, 以期找到更多的合作基础, 使医学影像学为传统医学的传承、发展及创新保驾护航, 实现“现代中医”的理念。**结果** 中医医院影像科通过建立上述科室管理及服务模式, 提高了科室间合作的深度及广度, 传统医学的神奇疗效应用现代医学影像设备及技术能够得以客观的解释和展示。**结论** 中医通过与先进的影像技术紧密融合, 传统医学的价值可以客观全面的彰显; 中西汇通, 医学影像学为中医诊断提供客观依据。

PO-3775

全托管三甲医院放射科的规划与筹建

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2. 四川大学华西天府医院

目的 提高医院医疗水平、满足地区医疗需求等。四川大学华西天府医院（以下简称华西天府医院）是由四川天府新区管委会与四川大学华西医院（以下简称华西医院）按照“政府主导、品牌引领、资源共享、共建共赢”原则合作、按三级甲等医院标准建设的综合性公立医院。医院建成于 2021 年, 坐落于公园城市首提地——四川天府新区, 总投资额约 40 亿元, 总建筑面积约 26.1 万平方米, 设置床位 1200 张（目前开放 955 张）、手术室 66 间、停车位 2000 个, 是一所由华西医院按同质化模式全面运营管理的、学科门类齐全的现代化智慧医院。**方法** 华西天府医院放射科从规划到实施的全过程进行分析和总结, 含流程、位置、面积、内部划分、机房及控制室设置、防护、安装等方面。**1.需求分析:** 分析地区医疗需求和人员设备需求。**2.规划和设计:** 制定放射科的规划和设计方案。**3.设备采购:** 采购必要的医疗设备并确保符合标准。**4.人员招聘和培训:** 招聘医生、技师和护士, 并进行培训。**5.建筑和装修:** 建设放射科的物理基础设施, 包括辐射防护措施。**6.审批和许可:** 申请必要的许可和批准。**7.启动和监管:** 开始提供医疗服务并监管运营。**结果** 华西天府医院放射科按医院统一部署要求于开院统一时间启动。根据门诊患者数量及住院科室开放数量逐步投入设备。分批次派驻华西医院的医护人员及招聘华西天府医院的医护人员以确保科室的正常运行。同时, 华西天府医院放射科通过质控等途径提供优质医疗服务数量和质量。另外由医务部及设备科联合确保医疗设施的辐射安全和合规性。**结论** 筹建三甲医院放射科需要在筹建医院之初全面统一规划, 仔细计划和协调, 以确保其能够提供高质量的医疗服务, 并保障患者和医护人员的安全。

PO-3776

3.0T MRI 分时段预约检查流程优化实施应用

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【摘要】 目的：探讨在核磁共振成像（MRI）检查中实行分时段预约检查流程优化实施应用。方法选择我院开展磁共振技术检查为 2019 年 4 月至 2019 年 8 月我院检查患者统计数量为 2026 人，选择 1000 例磁共振成像（MRI）检查患者作为对照组(分时段预约前)，选择同期 1000 例患者作为观察组（分时段预约后），每组随机抽取 50 例患者进行询问调查，对两组患者等候检查时间及满意度进行比较分析。结果实施分时段预约后，患者的等候时间明显缩短，实施后患者满意度为 98%，较实施前 90%有明显提高，结论在 MRI 实行分时段预约，可以较大缩短患者的等候时间，控制医患矛盾和纠纷发生，提高了患者的满意度，改善了就诊环境，也提升了医院的整体服务水平。

PO-3777

县域医院放射科在管路安全管理中的重要作用和影像报告要点

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目的：患者安全是医院管理的重要内容，随着各种管路越来越多的被应用于患者的抢救治疗和生命维护中，其安全管理得到各界的高度重视。2016 年国家护理质控中心将非计划性拔管发生率作为评价护理质量一个敏感指标，2019 年美国医疗机构评审联合委员会和中国医院写就均将提升管路安全列入《患者安全目标》，本文通过从放射科近几年在放射检查中发现的管路异常的具体病例分析，对影像识别管路异常的重要价值及重点观察内容进行探讨，以期更好地识别与防范管路管理过程中的风险因素，为管路安全提供借鉴和参考，为患者安全提供保障。

方法：收集 2016 年 7 月-2023 年 8 月间本院放射检查（X 线摄影及 CT）对于患者各类管路异位或异常走行等病例进行总结，管路包括：导尿管、PICC 管、气管内插管、空肠内置管、胸腔引流管、胃管、射频消融术导管等；

结果：一共 18 例管路异常：导尿管走行异常或头端位置异常 11 例，包括其中 7 例致膀胱穿孔，气管插管位置过深 1 例，空肠导管头端碎裂 1 例，胸腔引流管置入肺部脓腔 1 例，胃管头端置入肺部 1 例，PICC 管走行异常 2 例，射频消融术后导管撤退头端碎裂残留血管内 1 例。

结论：18 例患者其中有 12 例报告时及时描述和报告异位或碎裂，临床及时处置，未造成重大差错，有 6 例报告中未注意识别和描述，是在 MDT 讨论才发现：管路异常中导尿管位置异常最多见，其中老年人 4 例，脑外伤 5 例，2 例外院康复护理医院留置导尿管后血尿来检查，6 例漏报告病例是：气管插管位置过深 1 例，PICC 管走行异常 2 例，胸腔引流管置入肺部脓腔 1 例，胃管头端置入肺部 1 例，射频消融术后导管撤退头端碎裂残留血管内 1 例，对于导尿管异常诊断医师普遍比较重视，未见漏诊；其他少见管道容易被忽略，今后影像报告书写时要重视观察各类少见管路路径及导管头端位置是否正常。

PO-3778

住院医师规范化培训 X 线造影技能操作分层次教学方法探讨

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目的：探讨不同类别不同层次规培学员 X 线影像技能操作培训的方法及价值。

方法：参照中国医师协会制定的 2022 年版住院医师规范化培训细则中规培学员 X 线造影技能操作要求，我们对规培学员进行多层次培训。1.对于非影像专业学员培训，在胃肠道造影操作室给学员讲解 X 线造影的适应症及禁忌症、对比剂的选择、检查前的准备、检查中影像征象的识别及检查后的注意事项等，让学员在带教老师实际操作场景中感受 X 线技能操作的实际应用及注意事项；2.对于放射影像专业第一年级学员的培训：规培学员在腹盆部组轮转期间除非影像专业学员的培训内容外，更注重培训学员与患者的沟通能力，培养学员的职业素养；3.对于放射影像专业第二年级规培学员的培训：强化实际操作能力培训，让学员接诊患者，在带教老师的指导下操作机器，规范 X 线造影操作，并根据实时动态征象分析病变，培养学员在实际操作过程中做到“眼、脑、手、脚”合一，规范书写诊断报告。4.对于放射影像专业第三年级学员的培训：在高年资老师跟班的前提下，有序安排学员独立进行胃肠技能操作并书写报告，由老师签审报告，并讲解疑难点。考核方式：对非影像专业的学员采用问卷星方式考核，影像专业学员采用问卷星及现场操作方式考核，并进行现场解答。

结果：非影像专业学员参与问卷星考核 203 人，其中适应症选项正确率 95%，禁忌症选项正确率 90%，对比剂选项正确率 82%，影像征象判读正确率 80%。影像专业学员参与考核 46 人，其中适应症及禁忌症选项、对比剂选项正确率均为 100%，征象判读正确率一年级学员 83%、二年级学员 92%、三年级学员 98%，实际操作能力现场两位高年资老师考评结果均为 90 分以上。

结论：X 线造影技能操作是住院医师规范化培训过程中必须掌握的临床操作技能，对于不同类别及不同层次学员采取分层次、递进式培训方式均能达到较好效果，让非影像专业学员在实际场景中掌握 X 线造影的临床运用价值，大大提高学员的认知能力，让影像专业学员在递进式培训方式中不断提高 X 线技能操作的临床胜任力。

PO-3779

Performance of deep learning-based autodetection of arterial stenosis on head and neck CT angiography: an independent external validation study

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Purpose To externally validate the performance of automated stenosis detection on head and neck CT angiography (CTA) and investigate the impact factors using an independent bi-center dataset with digital subtraction angiography (DSA) as the ground truth.

Material and Methods Patients who underwent head and neck CTA and DSA between January 2019 and December 2021 were retrospectively included. The degree of stenosis was automatically evaluated using CerebralDoc based on CTA. The performance of CerebralDoc across levels (per-patient, per-region, per-vessel, and per-segment) and thresholds ($\geq 50\%$, $\geq 70\%$, and $= 100\%$) was evaluated. Logistic regression was performed to identify independent factors associated with false negative results.

Results 296 patients were analyzed. Specificity across levels and thresholds was high, exceeding 92%. The area under the curve ranged from poor (0.615, 95% CI: 0.544, 0.686; at the region-based

analysis for stenosis $\geq 70\%$) to excellent (0.945, 95% CI: 0.905, 0.985; at the patient-based analysis for stenosis $\geq 50\%$). Sensitivity ranged from 0.714 (95% CI: 0.675, 0.750) at the segment-based analysis for stenosis $\geq 70\%$ to 0.895 (95% CI: 0.849, 0.919) at the patient-based analysis for stenosis $\geq 50\%$. The multiple logistic regression analysis revealed that false negative results were primarily more likely to specific stenosis locations (particularly the M2 segment and skull base segment of the internal carotid artery) and occlusion.

Conclusions CerebralDoc has the potential to automated stenosis detection on head and neck CTA, but further efforts are needed to optimize its performance.

PO-3780

Deep-learning-based auto-segmentation of lumbar muscle and vertebral body on proton density fat fraction (PDFF) map facilitates clinical applications of body composition analysis

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Purpose To develop and evaluate a deep-learning-based automated segmentation of abdominal wall muscle and vertebral body on proton density fat fraction (PDFF) map and primarily investigate its clinical applications. **Method** A deep-learning model based on U-net was developed and trained on a collection of 898 abdominal proton density fat fraction (PDFF) slices from 41 healthy volunteers to automatically segment abdominal wall muscle and lumbar vertebral body at L1-L3 level. 315 images data of 11 subjects acquired from three different vendors were used as an independent test set to test generalizability. Dice similarity coefficient (DSC), precision rate (PR), and recall rate (RR) were used to evaluate the performance of the segmentation model. To investigate the potential clinical usability, we retrospectively collected PDFF images of 51 cancer patients acquired right after they received chemotherapy and/or radiotherapy from January 2021 to July 2022, and divided them into the myelosuppressive group (MG) and non-myelosuppressive group (NMG) based on blood routine tests. Measurements based on automatic segmented vertebral body at L3 level on PDFF map were obtained and compared between these two groups. In addition, correlation between automatic segmented abdominal wall muscle volume at L1-L3 level and body-mass index (BMI) was also investigated.

Results With the manual segmentation as gold standard, the model achieved Dice scores (mean \pm standard deviation) of 0.811 ± 0.056 , 0.831 ± 0.043 and 0.861 ± 0.051 for abdominal wall muscle, and 0.925 ± 0.030 , 0.930 ± 0.029 and 0.932 ± 0.027 for vertebral body from three different datasets (GE, Philips and UI-H), respectively. For the clinical application, a total of 51 cancer patients (MG group: $n=27$; NMG group: $n=24$) were included. Based on the auto-segmentation, the mean FF value at L3 vertebral body of the myelosuppression group was significantly higher than that of the non-myelosuppression group (57.17 ± 9.12 vs. 51.18 ± 11.26 , $P=0.04$). Besides, we found L1-L3 muscle volume showed a moderate significantly positive correlation with BMI in all patients ($r=0.4$, $P=0.01$).

Conclusion The deep-learning-based automated segmentation model had excellent performance on PDFF map and it may be a promising tool for body composition analysis.

PO-3781

Support Vector Machine for Stratification of Cognitive Impairment Using 3D T1WI in Patients with Type 2 Diabetes Mellitus

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Purpose: To explore the ability of MRI-based radiomics in predicting cognitive dysfunction in patients with diagnosed type 2 diabetes mellitus (T2DM).

Methods: In this study, 158 patients with T2DM were retrospectively collected from the Center for Endocrine and Metabolic Diseases at The Third People's Hospital of Datong between September 2019 and December 2020. 3D T1WI of MRI images were obtained from all patients, and the Chinese version of the Montréal Cognitive Assessment Scale-B (MoCA-B) was used to assess cognitive function. Based on their MoCA-B scores, participants were categorized into a normal cognitive function (N) group (n = 30), a mild cognitive impairment (MCI) group (n = 90), and a dementia (DM) group (n = 38). Thirty-six patients from the MCI and DM groups were randomly selected to form a cognitive impairment (CI) group. Using the Radcloud platform, radiomics features were extracted from the 3D T1WI images, and using the least absolute shrinkage and selection operator (LASSO) methods, SelectKBest, and the variance threshold (variance threshold = 0.8), feature selection was performed. Two support vector machine (SVM) models were then established to identify the CI and N groups, and the MCI and DM groups. The training and verification sets were split in a ratio of 2:8 and 3:7 for the two models, respectively. The models were evaluated based on their area under the receiver operating characteristic curve (AUC), Precision (P), Recall rate (Recall, R), F1-score, and Support. Finally, ROC curves were plotted for each model.

Result: In the CI group, both MoCA and RAVLT scores were lower compared to the N group, while HbA1c levels were higher and BUN levels were lower. These differences were statistically significant ($P < 0.05$). The MD group had a higher mean age and CDR compared to the MCI group, with lower scores for MoCA and RAVLT and lower UCr levels. The incidence in DM group was lower than that in MCI group, and the difference was statistically significant ($P < 0.05$). The ICC values for inter-group and intra-group consistency of radiomics features obtained through manual segmentation by two physicians were 0.86 and 0.90, respectively. The study consisted of 68 cases in the N and CI group, with 54 cases in the training set and 14 in the verification set, with 11 optimal eigenvalues being screened out; while 128 cases were included in the MCI and DM groups, with 90 training sets and 38 verification sets, and 12 optimal eigenvalues were selected. In the test set, the AUC for the SVM classifier was 0.857 and the accuracy was 0.821 in distinguishing CI and N, while AUC was 0.821 and the accuracy was 0.830 in distinguishing MCI and DM.

Conclusion: The SVM model based on MRI radiomics exhibits high efficacy in the diagnosis of cognitive dysfunction and evaluation of its severity among patients with T2DM.

PO-3782

A RadioFusionOmics model for discrimination between grade 4 astrocytoma and glioblastoma: comparison of two subregion definition strategies

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Purpose: To explore a subregion-based RadioFusionOmics (RFO) model for discrimination between adult-type grade 4 astrocytoma and glioblastoma according to the 2021 WHO CNS5 classification.

Materials and Methods: 329 patients (40 grade 4 astrocytomas and 289 glioblastomas) with histologic diagnosis was retrospectively collected from our local institution and The Cancer Imaging Archive (TCIA). The volumes of interests (VOIs) were obtained from four multiparametric MRI sequences (T1WI, T1WI+C, T2WI, T2-FLAIR) using 1) manual segmentation of the non-enhanced tumor (nET), enhanced tumor (ET), and peritumoral edema (pTE), and 2) K-means clustering of four habitats (H1: high T1WI+C, high T2-FLAIR; (2) H2: high T1WI+C, low T2-FLAIR; (3) H3: low T1WI+C, high T2-FLAIR; and (4) H4: low T1WI+C, low T2-FLAIR). The optimal VOI and best MRI sequence combination were determined. The performance of the RFO model was evaluated using the area under the precision-recall curve (AUPRC) and the best signatures were identified.

Results: The two best VOIs were manual VOI3 (putative peritumoral edema) and clustering H34 (low T1WI+C, high T2-FLAIR (H3) combined with low T1WI+C and low T2-FLAIR (H4)). Features fused from four MRI sequences () outperformed those from either a single sequence or other sequence combinations. The RFO model that was trained using fused features achieved the AUPRC of 0.972 (VOI3) and 0.976 (H34) in the primary cohort ($p=0.905$), and 0.971 (VOI3) and 0.974 (H34) in the testing cohort ($p=0.402$).

Conclusion: The performance of subregions defined by clustering was comparable to that of subregions that were manually defined. Fusion of features from the edematous subregions of multiple MRI sequences by the RFO model resulted in differentiation between grade 4 astrocytoma and glioblastoma.

PO-3783

Deep Learning-Enabled Clinically Applicable CT Planbox for Stroke With High Accuracy and Repeatability

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Purpose: Computed tomography (CT) plays an essential role in classifying stroke, quantifying penumbra size and supporting stroke-relevant radiomics studies. However, it is difficult to acquire standard, accurate and repeatable images during follow-up. Therefore, we invented an intelligent CT to evaluate stroke during the entire follow-up.

Materials and Methods: We deployed a region proposal network (RPN) and V-Net to endow traditional CT with intelligence. Specifically, facial detection was accomplished by identifying adjacent jaw positions through training and testing an RPN on 76,382 human faces using a preinstalled 2-dimensional camera; two regions of interest (ROIs) were segmented by V-Net on another training set with 295 subjects, and the moving distance of scanning couch was calculated based on a pre-generated calibration table. Multiple cohorts including 1,124 patients were used for performance validation under three clinical scenarios.

Results: Cranial Automatic Planbox Imaging Towards Ameliorating neuroscience (CAPITAL)-CT was invented. RPN model had an error distance of 4.46 ± 0.02 pixels with a success rate of 98.7% in the training set and 100% with 2.23 ± 0.10 pixels in the testing set. V-Net-derived segmentation maintained a clinically tolerable distance error, within 3mm on average, and all lines presented with a tolerable angle error, within 3° on average in all boundaries. Real-time, accurate, and repeatable automatic scanning was accomplished with and a lower radiation exposure dose (all $P < 0.001$). Conclusions: CAPITAL-CT generated standard and reproducible images that could simplify the work of radiologists, which would be of great help in the follow-up of stroke patients and in multifield research in neuroscience.

PO-3784

IILS: Intelligent imaging layout system for automatic imaging report standardization and intra-interdisciplinary clinical workflow optimization

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Background: To achieve imaging report standardization and improve the quality and efficiency of the intrainterdisciplinary clinical workflow, we proposed an intelligent imaging layout system (IILS) for a clinical decisionsupport system-based ubiquitous healthcare service, which is a lung nodule management system using medicalimages.

Methods: We created a lung IILS based on deep learning for imaging report standardization and workflow optimization for the identification of nodules. Our IILS utilized a deep learning plus adaptive auto layout tool, which trained and tested a neural network with imaging data from all the main CT manufacturers from 11,205 patients. Model performance was evaluated by the receiver operating characteristic curve (ROC) and calculating the corresponding area under the curve (AUC). The clinical application value for our IILS was assessed by a comprehensive comparison of multiple aspects.

Findings: Our IILS is clinically applicable due to the consistency with nodules detected by IILS, with its highest consistency of 0.94 and an AUC of 90.6% for malignant pulmonary nodules versus benign nodules with a sensitivity of 76.5% and specificity of 89.1%. Applying this IILS to a dataset of chest CT images, we demonstrate performance comparable to that of human experts in providing a better layout and aiding in diagnosis in 100% valid images and nodule display. The IILS was superior to the traditional manual system in performance, such as reducing the number of clicks from 14.45 ± 0.38 to 2, time consumed from 16.87 ± 0.38 s to 6.92 ± 0.10 s, number of invalid images from 7.06 ± 0.24 to 0, and missing lung nodules from 46.8% to 0%.

Interpretation: This IILS might achieve imaging report standardization, and improve the clinical workflow therefore opening a new window for clinical application of artificial intelligence.

PO-3785

Multiparametric MRI model using Shapley additive explanations interpretability analysis for predicting molecular subtypes of breast cancer

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Objective To assess the performance of multiparametric MRI based on the XGBoost for predicting the molecular subtypes of breast cancer (BC) and identifying interpretable imaging features, using SHapley Additive exPlanations (SHAP) analysis.

Methods From February 2019 to January 2022, we recruited invasive BC patients. They underwent pre-treatment multiparametric MRI, including ultrafast dynamic contrast enhanced (DCE) MRI, diffusion kurtosis imaging (DKI), intravoxel incoherent motion (IVIM), and magnetic resonance spectroscopy, from which 13 parameters were extracted. Using the Boruta for parameters selection, we built BC subtype prediction models using XGBoost and employed SHAP for model interpretability analysis.

Results We enrolled 188 participants (age: 53.28 ± 10.51 years) and divided the training cohort (131 participants) and validation cohort (57 participants) using stratified random sampling. Five ultrafast DCE-MRI parameters (iAUC, MS, PEI, Ve and Ktrans) especially lower iAUC led to Luminal A subtype, achieving an AUC of 0.859. The Luminal B subtype was distinguished by one DKI (Kurtosis) and two IVIM parameters (D and D*), especially higher Kurtosis led to Luminal B subtype, achieving an AUC of 0.837. The triple-negative BC subtype was identified using one DKI (Kurtosis) and two IVIM parameters (D* and f), especially lower D* led to triple-negative BC subtype, achieving an AUC of 0.855. The HER2-enriched subtype was distinguished by two DKI (Kurtosis and MD) and two IVIM parameters (f and D), especially lower Kurtosis led to HER2-enriched subtype, achieving an AUC of 0.790.

Conclusion Multiparametric MRI predicts molecular subtypes of BC, and SHAP facilitates understanding of model decisions.

PO-3786

Computed tomography-based 3D convolutional neural network deep learning model for predicting micropapillary or solid growth pattern of invasive lung adenocarcinoma

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Purpose To investigate the value of a computed tomography (CT)-based deep learning (DL) model to predict the presence of micropapillary or solid (M/S) growth pattern in invasive lung adenocarcinoma (ILADC).

Materials and Methods From June 2019 to October 2022, 617 patients with ILADC who underwent preoperative chest CT scans in our institution were randomly placed into training and internal validation sets in a 4:1 ratio, and 353 patients with ILADC from another institution were included as an external validation set. Then, a self-paced learning (SPL) 3D Net was used to establish two DL models: model 1 was used to predict the M/S growth pattern in ILADC, and model 2 was used to predict that pattern in ≤ 2 -cm-diameter ILADC.

Results For model 1, the training cohort's area under the curve (AUC), accuracy, recall, precision, and F1-score were 0.924, 0.845, 0.851, 0.842, and 0.843; the internal validation cohort's were

0.807, 0.744, 0.756, 0.750, and 0.743; and the external validation cohort's were 0.857, 0.805, 0.804, 0.806, and 0.804, respectively. For model 2, the training cohort's AUC, accuracy, recall, precision, and F1-score were 0.946, 0.858, 0.881, 0.844, and 0.851; the internal validation cohort's were 0.869, 0.809, 0.786, 0.794, and 0.790; and the external validation cohort's were 0.831, 0.792, 0.789, 0.790, and 0.790, respectively. The SPL 3D Net model performed better than the ResNet34, ResNet50, ResNeXt50, and DenseNet121 models.

Conclusion The CT-based DL model performed well as a noninvasive screening tool capable of reliably detecting and distinguishing the subtypes of ILADC, even in small-sized tumors.

PO-3787

Pretreatment CT radiomics nomogram for predicting initial benefits from 1 immune checkpoint inhibitor in advanced non-small-cell

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Purpose: To assess the value of a radiomics nomogram for predicting early treatment response to immune checkpoint inhibitor (ICI) for advanced non-small-cell lung cancer (NSCLC) patients.

Methods: This retrospective study enrolled 64 patients with advanced NSCLC who underwent ICI monotherapy with pembrolizumab or nivolumab. All target lesions were delineated on CT imaging with and without contrast enhancement. For each CT sequence, a total of 1967 radiomics features were extracted from the whole target lesion. Responses were evaluated by CT according to immune RECIST (iRECIST) standard and patients were divided into a responder group and a non-responder group. A radiomics signature was developed with features selected by the least absolute shrinkage and selection operator (LASSO) algorithm. Then, the predictive performance of radiomics signature was validated in an independent chemoimmunotherapy cohort of 33 patients. Finally, a nomogram integrating the clinical factor and radiomics signature was established to predict treatment response. The area under the receiver operating characteristic curve (AUC), calibration and decision curves analysis (DCA) were used to assess the prediction ability of the nomogram.

Results: Ninety-seven patients were included in the analyses, and 3 of them experienced pseudoprogression. A 5-feature radiomics signature for predicting response was developed and validated in three sets. The nomogram incorporating the radiomics signature and bone metastasis status exhibited good prediction performance with AUCs of 0.878 (95% confidence interval [CI] 0.812-0.944) and 0.756 (95% CI 0.615-0.897) in the training and testing sets, respectively. Application of the nomogram in the chemoimmunotherapy validation set also generated good performance with AUCs of 0.790 (95% CI 0.660-0.921) and good calibration. The nomogram provides more net benefit by DCA curve than clinical factor and radiomics signature alone.

Conclusions: CT-based clinical-radiomics nomogram may predict the early response to ICI in advanced NSCLC patients, which showed the potential value for the clinic.

PO-3788

CT-Based Peritumoral and Intratumoral Radiomics as Pretreatment Predictors of Atypical Responses to Immune Checkpoint Inhibitor Across Tumor Types: A Preliminary Multicenter Study

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from intra- and peritumoral regions on CT images for the prediction of atypical responses to the immune checkpoint inhibitor (ICI) in cancer patients.

Methods: In total, 135 patients derived from five hospitals with pathologically confirmed malignancies receiving ICI were included in this retrospective study. Atypical responses including pseudoprogression (PsP) and hyperprogression disease (HPD) were identified as their definitions. A subgroup of standard progression disease (sPD) in 2018 was also involved in this study. Based on pretreatment CT imaging, a total of 107 features were extracted from intra- and peri-tumoral regions, respectively. The least absolute shrinkage and selection operator (Lasso) algorithm was used for feature selection, and multivariate logistic analysis was used to develop radiomics signature (RS). Finally, a total of nine RSs, derived from intra-tumoral, peri-tumoral, and combination of both regions, were built respectively to distinguish PsP vs. HPD, PsP vs. sPD, and HPD vs. sPD. The performance of the RSs was evaluated with discrimination, calibration, and clinical usefulness.

Results: No significant difference was found when compared in terms of clinical characteristics of PsP, HPD, and sPD. RS based on combined regions outperformed those from either intra-tumoral or peri-tumoral alone, yielding an AUC (accuracy) of 0.834 (0.827) for PsP vs. HPD, 0.923 (0.868) for PsP vs. sPD, and 0.959 (0.894) for HPD vs. sPD in the training datasets, and 0.835 (0.794) for PsP vs. HPD, 0.919 (0.867) for PsP vs. sPD, and 0.933 (0.842) for HPD vs. sPD in the testing datasets. The combined RS showed good fitness (Hosmer–Lemeshow test $p > 0.05$) and provided more net benefit than the treat-none or treat-all scheme by decision curve analysis in both training and testing datasets.

Conclusion: Pretreatment radiomics are helpful to predict atypical responses to ICI across tumor types. The combined RS outperformed those from either intra- or peri-tumoral alone which may provide a more comprehensive characterization of atypical responses to ICI.

PO-3789

Deep learning image reconstruction generates thinner slice iodine maps with improved image quality to increase diagnostic acceptance and lesion conspicuity: a prospective study on abdominal dual-energy CT

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Objectives: To assess the improvement of image quality and diagnostic acceptance of thinner slice iodine maps enabled by deep learning image reconstruction (DLIR) in abdominal dual-energy CT (DECT) scans.

Methods: and **Methods** This study prospectively included 104 participants with 136 lesions. Four series of iodine maps were generated based on portal-venous scans of contrast-enhanced abdominal DECT: 5-mm and 1.25-mm using adaptive statistical iterative reconstruction-V (Asir-V) with 50% blending (AV-50), and 1.25-mm using DLIR with medium (DLIR-M), and high strength (DLIR-H). The iodine concentrations (IC) and their standard deviations of nine anatomical sites were measured, and the corresponding coefficient of variations (CV) were calculated. Noise power spectrum (NPS) using the homogenous regions of liver. Edge rise slope (ERS) were measured using axial plane that presents portal vein. Five radiologists rated image quality in terms of image noise, contrast, sharpness, texture, and small structure visibility, and evaluated overall diagnostic acceptability of images and lesion conspicuity.

Results The four reconstructions maintained the IC values unchanged in nine anatomical sites (all $p>0.999$). Compared to 1.25-mm AV-50, 1.25-mm DLIR-M and DLIR-H significantly reduced CV values (all $p<0.001$) and presented lower noise and noise peak (both $p<0.001$). Compared to 5-mm AV-50, 1.25-mm images had higher ERS (all $p<0.001$). The difference of the peak and average spatial frequency among the four reconstructions was relatively small but statistically significant (both $p<0.001$). The 1.25-mm DLIR-M images were rated higher than the 5-mm and 1.25-mm AV-50 images for diagnostic acceptability and lesion conspicuity (all $P<0.001$).

Conclusion: DLIR can improve image quality of thinner slice thickness iodine map in abdominal DECT for higher spatial resolution and lower iodine quantification variation, which may increase its overall diagnostic acceptability, and lesion conspicuity.

PO-3790

A nomogram model of spectral CT quantitative parameters and clinical characteristics predicting lymphovascular invasion of gastric cancer

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Objective The study established a nomogram based on quantitative parameters of spectral computed tomography (CT) and clinical characteristics, aiming to evaluate its predictive value for preoperative lymphovascular invasion (LVI) in gastric cancer (GC).

Methods From December 2019 to December 2021, 141 patients with pathologically confirmed GC were retrospectively collected with corresponding clinical data and spectral CT quantitative data. Patients were divided into LVI-positive and LVI-negative groups based on their pathological results. The univariate and multivariate logistic regression analyses were used to identify the risk factors and construct a nomogram. The calibration curve and receiver operating characteristic (ROC) curve were adopted to evaluate the predictive accuracy of nomogram.

Results Four clinical characteristics or spectral CT quantitative parameters, including Borrmann classification ($P = 0.039$), CA724 ($P = 0.007$), tumor thickness ($P = 0.031$), and iodine concentration in the venous phase (VIC) ($P = 0.004$) were identified as independent factors for LVI in GC patients. The nomogram was established based on the four factors, which had a potent predictive accuracy in the training and validation cohorts, with the area under the ROC curve (AUC) of 0.864 (95% CI, 0.798-0.930) and 0.964 (95% CI, 0.903-1.000), respectively.

Conclusion This study constructed a comprehensive nomogram consisting spectral CT quantitative parameters and clinical characteristics of GC, which exhibited a robust efficiency in predicting LVI in GC patients.

PO-3791

High-resolution computed tomography with 1024-matrix: Comparison with 512-matrix for AI-assisted diagnosis system in the evaluation of pulmonary nodules

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Purpose: The aim of this study was to determine whether the diagnostic value of artificial intelligence (AI)-assisted diagnosis system is higher when using 1024 × 1024 matrix than 512 × 512 matrix in the evaluation of pulmonary nodules.

Methods: In this retrospective study, CT projection data performed in 191 patients were collected between August 2021 and May 2023 using two different protocols: 1024 × 1024 matrix and 512 × 512 matrix. Lung nodules were automatically detected and characterized using an AI pulmonary nodule post-processing system on the CT scans for both protocols. The framework of the AI-assisted diagnosis system has two primary components: preprocessing and object detection. In the preprocessing stage, images are prepared for subsequent detection through the application of techniques such as mean subtraction and normalization using Convolutional Neural Network (CNN). A modified Feature Pyramid Network (FPN) is then employed to simultaneously detect and classify lung nodules present in processed CT scans. The number of pulmonary nodules detected and type of each nodule, including solid nodules, part-solid nodules and non-solid nodules, were recorded. Two experienced radiologists reevaluated on all subjects to confirm the presence of any misdiagnosed or missed nodules. The diagnostic differences between the two groups were assessed using Wilcoxon signed-rank tests.

Results: Among 191 patients, a significant difference in nodule detection between the two protocols was observed ($P < 0.05$). Taking patients as a unit, the average detection accuracy was 93.87% on 512 × 512 matrix and 98.67% on 1024 × 1024 matrix. While taking pulmonary nodules as a unit, the detection accuracy, sensitivity, false positive rate and false negative rate of on 512 × 512 matrix and 1024 × 1024 matrix were 98.12% vs. 99.60%, 99.00% vs. 99.49%, 3.13% vs. 0.55% and 1.28% vs. 0.40% respectively. The classification accuracy of solid nodules, non-solid nodules and part-solid nodules on 512 × 512 matrix and 1024 × 1024 matrix was 95.54% vs. 98.99%, 95.75% vs. 99.34% and 97.37% vs. 100%, respectively.

Conclusions: Pulmonary nodules are detected and classified more accurately on the AI-assisted diagnosis system with 1024 × 1024 matrix than 512 × 512 matrix, and this improvement significantly enhanced the diagnostic accuracy of early lung adenocarcinoma.

PO-3792

Preliminary Study on YOLO-V5 rapid identification of degenerative spondylolisthesis

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Objective To explore the potential value of YOLO-V5 deep learning model for rapid identification of degenerative spondylolisthesis in plain X-ray films. **Methods** A total of 1661 lateral standing radiographs of the lumbar spine were recruited in this study. The labeled lumbar spines were assigned to no slippage group, I° slippage group and II° slippage group. Each group was randomly divided into train set, test set and validation set by ratio of 8:1:1. Ten YOLO-V5 deep learning models were trained. Metrics for model performance evaluation include accuracy(Ac), precision(Pr), recall rate(Rc), and mAP. Results mAP_0.5 and mAP_0.5:0.95 of ten

YOLO-V5 models ranged from 0.681 to 0.758 and 0.476 to 0.535, respectively. There was no significant effect on the results of validation with or without a pre-trained model. Acs of the ten models in no slippage and I ° slippage groups were significantly higher than in II ° slippage group. The time to complete radiographs in validation set by YOLO-V5 was 1583 times faster than the time taken by radiologists. Among the five models with pre-trained models, mAP_0.5(0.741) and mAP_0.5:0.95(0.535) was the highest in the train set. Among the five models without pre-trained models, mAP_0.5(0.758) and mAP_0.5:0.95(0.525) was the highest in the train set. Conclusion YOLO-V5 deep learning model is a feasible approach for rapid identification of degenerative spondylolisthesis in plain X-ray films. The amount of train data is the predominant factor influencing model performance for identification of degenerative spondylolisthesis, larger sample size exhibited higher diagnostic accuracy.

PO-3793

Machine Learning-based identification of symptomatic carotid atherosclerotic plaques with dual-energy computed tomography angiography

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Objective: This study aimed to develop and validate a machine learning model incorporating both dual-energy computed tomography (DECT) angiography quantitative parameters and clinically relevant risk factors for the identification of symptomatic carotid plaques to prevent acute cerebrovascular events.

Methods: The data of 180 patients with carotid atherosclerosis plaques were analysed from January 2017 to December 2021; 110 patients (64.03±9.58 years old, 20 women, 90 men) were allocated to the symptomatic group, and 70 patients (64.70±9.89 years old, 50 women, 20 men) were allocated to the asymptomatic group. Overall, five machine learning models using the XGBoost algorithm, based on different CT and clinical features, were developed in the training cohort. The performances of all five models were assessed in the testing cohort using receiver operating characteristic curves, accuracy, recall rate, and F1 score.

Results: The shapley additive explanation (SHAP) value ranking showed fat fraction (FF) as the highest among all CT and clinical features and normalised iodine density (NID) as the 10th. The model based on the top 10 features from the SHAP measurement showed optimal performance (area under the curve [AUC] .885, accuracy .833, recall rate .933, F1 score .861), compared with the other four models based on conventional CT features (AUC .588, accuracy .593, recall rate .767, F1 score .676), DECT features (AUC .685, accuracy .648, recall rate .667, F1 score .678), conventional CT and DECT features (AUC .819, accuracy .740, recall rate .867, F1 score .788), and all CT and clinical features (AUC .878, accuracy .833, recall rate .867, F1 score .852).

Conclusion: FF and NID can serve as useful imaging markers of symptomatic carotid plaques. This tree-based machine learning model incorporating both DECT and clinical features could potentially comprise a non-invasive method for identification of symptomatic carotid plaques to guide clinical treatment strategies.

PO-3794

Swin transformer Framework for predicting Grade and IDH mutation free of tumor segmentation: a multi-institutional study

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***Purpose:** Adult diffuse gliomas are the most common type among the central nervous system (CNS) tumors with poor prognosis. In the 5th edition 2021 WHO classification of CNS tumors, isocitrate dehydrogenase (IDH) mutation is the key molecular marker to define Astrocytoma and Oligodendroglioma from Glioblastoma. IDH mutant patients have more favorable prognosis than IDH wild type patients. In the clinical settings, IDH mutation status remains unknown until Sanger sequencing for the resected tumor sample in the surgery, which is time-consuming and expensive. In this study, we established a deep learning model based on novel swin transformer framework to predict WHO Grade and IDH mutation. We assessed the performance on 5 independent datasets.

***Methods and Materials:** Swin transformer networks were trained to provide WHO Grade and IDH classification. Inputs were post-contrast T1WI, T2WI and FLAIR sequences. Grade IV gliomas were defined as High Grade Glioma (HGG). Grade II and III gliomas were defined as Low Grade Glioma (LGG). Training data(n=1688) consisted of 4 publicly available datasets, including UCSF-PDGM(n=501), Upenn-GBM(n=515), Erasmus glioma dataset(n=466), CPTAC-GBM(n=66), and a local dataset Jinling Hospital (n=140). Independent external test dataset consisted of another 4 publicly available datasets, including TCGA-GBM (n=155), TCGA-LGG(n=145), ivy-GAP(n=33), LUMIERE(n=58), and a local dataset Nanjing Drum Tower Hospital (n=300).

***Results:** Subject-wise IDH classification accuracy was 92.4% and 90.7% on the training dataset and the external test dataset, with AUC of 0.947 and 0.915, respectively. WHO Grade Accuracy was 94.3% and 91.5% on the training dataset and external test datasets, with AUC of 0.954 and 0.939.

***Conclusions:** High WHO Grade and IDH mutation classification performance was obtained on the 5 retrospective cohorts from across the world, which demonstrated potential clinical transplantation in the future. Our swin transformer-based model can non-invasively predict tumor grade and IDH mutation status with pre-operative conventional MRI data without diffusion and perfusion sequences and free of tumor segmentation.

***Clinical Relevance/Application:** This research constructed and externally tested a swin transformer based model to noninvasively predict WHO Grade and IDH of adult diffuse gliomas using a total of 2379 cases. This model can help clinicians make better treatment plans for the patients prior the surgery and have potential impact on glioma radiogenomics.

PO-3795

Radiomics for predicting Grades, IDH mutation and MGMT promoter methylation of Adult Diffuse Gliomas: Combination of structural MRI, ADC and SWI

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WHO Grade, IDH mutation and MGMT promoter methylation are important for precise diagnosis and treatment plans for diffuse glioma patients. This study aimed to investigate the predictive value of radiomics features extracted from Structural MRI, ADC and SWI. Method: Genetic and preoperative MRI of patients with diffuse gliomas were collected from UCSF-PDGM dataset. A total of 7896 features were extracted from T1WI, T2WI, T1CE, FLAIR, ADC and SWI among 2 ROIs. Analysis of variance F-test were used for feature selection. 11 classifiers, including Logistic Regression, Multi-layer Perceptron (MLP), Random Forest, Support Vector Machine (SVM), Decision Tree, Extra Trees, Perceptron, K-nearest neighbors, Gaussian Naive Bayes (GaussianNB), Gradient boosting and Light Gradient Boosting Machine (LightGBM) were utilized for model establishment. ROC curves were used to evaluate the predictive performance. We also

compared the performance of Radiomics models with a 5-year radiologist and a 1-year radiologist. Results: regarding the clinical and genetic parameters, the age, sex, WHO Grade, IDH mutation, and MGMT promoter methylation status illustrated no significant differences between the training cohort and external validation cohort (p -value <0.05). For WHO Grade task, the modality Structural plus ADC exhibited the highest AUC on both training cohort (0.998) and external validation cohort (0.990). For IDH mutation task, the modality ADC exhibited the highest AUC on the training cohort (1.000) and the modality Structural plus ADC plus SWI exhibited the highest AUC on external validation cohort (0.947). All the constructed models failed to predict MGMT promoter methylation status efficiently. The radiomics models showed higher efficacy than radiologists in Grade and IDH task. The radiologists performed better than radiomics models in MGMT methylation Task. Conclusion: Multiparametric MRI radiomics models can predict WHO grade and IDH mutation status effectively but cannot determine MGMT promoter methylation status. Adding SWI features can provide extra valuable information to Structural MRI and ADC to predict IDH mutation status but cannot improve model robustness to determine WHO grade of adult diffuse gliomas.

PO-3796

Intelligent assessment of lymph nodes involvement in breast cancer based on CNN algorithm: A feasibility and validation study

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Purpose With heightened screening awareness and advances in medical technology, sentinel lymph node (SLN) may not have a tumor burden in early-stage breast cancer (BC) patients [1], showing that invasive SLN dissection is not essential. For patients with SLN metastasis but a low risk of residual non-SLN (NSLN) metastasis, axillary lymph node (ALN) dissection is overtreatment [2]. Breast dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) plays a vital role in ALN-status evaluation [3]. Deep learning, especially the convolutional neural network (CNN) [4] algorithm, demonstrates great potential in the clinical management of tumors for the ability to learn complex image characteristics automatically [5, 6]. Therefore, this multicenter study aimed to develop and validate an automated preoperative CNN-based tool to predict SLN and NSLN metastasis in BC patients using DCE-MRI images.

Methods and materials We retrospectively collected data of 944 BC patients with DCE-MRI images, and clinical information from two hospitals. The specific data allocation is depicted in Figure 1. A CNN-based model was proposed to predict the SLN and NSLN metastasis, and the overview of the CNN model development process is indicated in Fig.2. Performance of the proposed approach to identify ALN status for BC patients was assessed in the internal validation set and external test set. In addition, clinical and radiomics conventional models were constructed and compared with deep learning models. Different models were measured by the area under the curve (AUC), accuracy, sensitivity, and specificity.

Results For SLN prediction, the CNN-based model attained inspiring predictive performance in the training set ($n=519$; AUC 0.947; 95% CI 0.898-0.997, accuracy 0.881, sensitivity 0.903, specificity 0.960), internal validation set ($n=129$; AUC 0.912, 95% CI 0.897-0.927, accuracy 0.798, sensitivity 0.838, specificity 0.895), as well as external test set ($n=296$; AUC 0.884, 95% CI 0.860-0.908, accuracy 0.880, sensitivity 0.785, specificity 0.893). According to the receiver operating characteristic curve (shown in Figure3), the CNN model showed significant improvement over other models that using hand-crafted CT features or clinical characteristics. For NSLN prediction, the CNN-based model also achieved satisfactory performance, with an AUC of 0.958 (95% CI, 0.899–1) in the training set, which was further verified in both internal validation set (AUC 0.784, 95% CI 0.740-0.828) and external test set (AUC 0.76, 95% CI 0.703–0.818). Patient examples for the actual use of the established CNN model are displayed in Figure 4.

Conclusion

Firstly, the CNN model can effectively predict SLN status. Moreover, it can preoperatively evaluate the condition of NSLN in BC patients with SLN metastasis. Overall, using ready DEC-MRI images, the CNN-based model may serve as a non-invasive assessment technique for ALN assessment of BC patients. References

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PO-3797

Development and validation of a combinatorial MRI sequence-based radiomics model for preoperative prediction of microsatellite instability status in rectal cancer

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Abstract

Background: To develop and validate an optimal radiomics model for preoperatively predicting microsatellite instability (MSI) in patients with rectal cancer (RC) based on multiparametric magnetic resonance imaging.

Methods: The retrospective study included 308 RC patients who did not receive preoperative antitumor therapy, among whom 51 had MSI. Radiomics features were extracted and dimensionally reduced from T2-weighted imaging (T2WI), T1-weighted imaging (T1WI), diffusion-weighted imaging (DWI) and T1-weighted contrast enhanced (T1CE) images for each patient, and the features of each sequence were combined. Multifactor logistic regression was used to screen the optimal feature set for each combination. Different machine learning methods were applied to construct predictive MSI status models. Relative standard deviation values were determined to evaluate model performance and select the optimal model. Receiver operating characteristic (ROC) curve, calibration curve, and decision curve analyses were performed to evaluate model performance.

Results: The model constructed using the k-nearest neighbor (KNN) method combined with T2WI and T1CE images performed best. The area under the curve values for prediction of MSI with this model were 0.849 (0.804–0.887), with a sensitivity of 0.784 and specificity of 0.805. The Delong test showed no significant difference in diagnostic efficacy between the KNN-derived model and the traditional logistic regression model constructed using T1WI+DWI+T1CE and T2WI+T1WI+DWI+T1CE data ($P>0.05$) and the diagnostic efficiency of the KNN-derived model was slightly better than that of the traditional model. From ROC curve analysis, the KNN-

derived model significantly distinguished patients at low- and high-risk of MSI with the optimal threshold of 0.2, supporting the clinical applicability of the model.

Conclusions: The model constructed using the KNN method can be applied to noninvasively predict MSI status in RC patients before surgery based on radiomics features from T2WI and T1CE images. Thus, this method may provide a convenient and practical tool for formulating treatment strategies and optimizing individual clinical decision-making for patients with RC.

PO-3798

Automatic Urinary Stones Detection System for Abdominal Non-enhanced CT Images Reduces the Burden on Radiologists

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Objective To develop a fully automatic urinary stone detection system (kidney, ureter and bladder) and to test it in a real clinical environment.

Methods The local institutional review board approved this retrospective single-center study that used non-enhanced abdominopelvic CT scans from patients admitted urology (uPatients) and emergency (ePatients). The uPatients were randomly divided into training and validation sets in a ratio of 3:1. We designed a cascade urinary stone map location-feature pyramid networks (USm-FPNs) and innovatively proposed a ureter distance heatmap method to estimate the ureter position on non-enhanced CT to further reduce the false positives. The performances of the system were compared using the free-response receiver operating characteristic curve and the precision-recall curve.

Results This study included 811 uPatients and 356 ePatients. At stone level, the cascade detector USm-FPNs has the mean of false positives per scan (mFP) 1.88 with the sensitivity 0.977 in validation set, and mFP was further reduced to 1.18 with the sensitivity 0.977 after combining the ureter distance heatmap. At patient level, the sensitivity and precision were as high as 0.995 and 0.990 in validation set, respectively. In a real clinical set of ePatients (27.5% of patients contain stones), the mFP was 1.31 with as high as sensitivity 0.977, and the diagnostic time reduced by >20% with the system help.

Conclusion A fully automatic detection system for urinary stones was proposed, to reduce obviously diagnostic time of urinary stones on non-enhanced CT scans without compromising sensitivity in real emergency data.

PO-3799

CT-based radiomics with various classifiers for histological differentiation of parotid gland tumors

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Objective: This study assessed whether radiomics features could stratify parotid gland tumours accurately based on only noncontrast CT images and validated the best classifier of different radiomics models.

Methods: In this single-centre study, we retrospectively recruited 249 patients with a diagnosis of pleomorphic adenoma (PA), Warthin tumour (WT), basal cell adenoma (BCA) or malignant parotid gland tumours (MPGTs) from June 2020 to August 2022. Each patient was randomly classified

into training and testing cohorts at a ratio of 7:3, and then, pairwise comparisons in different parotid tumour groups were performed. CT images were transferred to 3D-Slicer software and the region of interest was manually drawn for feature extraction. Feature selection methods were performed using the intraclass correlation coefficient, t test and least absolute shrinkage and selection operator. Five common classifiers, namely, random forest (RF), support vector machine (SVM), logistic regression (LR), K-nearest neighbours (KNN) and general Bayesian network (Gnb), were selected to build different radiomics models. The receiver operating characteristic curve, area under the curve (AUC), accuracy, sensitivity, specificity and F-1 score were used to assess the prediction performances of these models. The calibration of the model was calculated by the Hosmer–Lemeshow test. DeLong's test was utilized for comparing the AUCs.

Results: The radiomics model based on the RF, SVM, Gnb, LR, LR and RF classifiers obtained the highest AUC in differentiating PA from MPGTs, WT from MPGTs, BCA from MPGTs, PA from WT, PA from BCA, and WT from BCA, respectively. Accordingly, the AUC and the accuracy of the model for each classifier were 0.834 and 0.71, 0.893 and 0.79, 0.844 and 0.79, 0.902 and 0.88, 0.602 and 0.68, and 0.861 and 0.94, respectively.

Conclusion: Our study demonstrated that noncontrast CT-based radiomics could stratify refined pathological types of parotid tumours well but could not sufficiently differentiate PA from BCA. Different classifiers had the best diagnostic performance for different parotid tumours. Our study findings add to the current knowledge on the differential diagnosis of parotid tumours.

PO-3800

Staging Liver Fibrosis Using Routine Magnetic Resonance Imaging Based on Machine learning model

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Objective

This study aimed to create a computer-aided diagnosis system to analyze MR routine scan images in a rabbit model, in order to explore the value of machine learning model combining semi-supervised learning and active learning in staging diagnosis of liver fibrosis.

Methods

1. Establishment of animal model of liver fibrosis, image acquisition and pathology

Thirty-five healthy male rabbits were divided into experimental group (n=30) and control group (n=5) to establish liver fibrosis model. Rabbits in the experimental group had received subcutaneous injections at neck twice a week. We used the drug which comprising 50% carbon tetrachloride (CCl₄) in olive oil (0.1mL/kg at 1-3 weeks, 0.2mL/kg at 4-6 weeks, 0.3mL/kg at 7-10 weeks). Rabbits in control group were injected with the same dose of normal saline. At the end of 5, 6, 7 and 10 weeks after injection, the rabbits were scanned by 3.0T MR and the sequence images of T1WI-FS and T2WI-FS were obtained. The rabbits were sacrificed after MR scanning, and their livers were stained by HE and Masson, respectively. The rabbits were grouped according to the Metavir scoring system: normal liver tissue (F0), mild fibrosis (F1), moderate fibrosis (F2), severe fibrosis (F3), and early cirrhosis (F4). Then they were divided into three groups: early liver fibrosis group (F1-2), advanced liver fibrosis group (F3-4), and normal liver group (F0).

2. Classification and recognition system based on computer aided diagnosis

2.1 Region of interest extraction

On the sequence images of T1WI-FS and T2WI-FS, we drew a total of 360 square ROIs of 20×20 pixels. 180 ROIs were obtained for each sequence images, and their positions correspond to each other. including normal liver tissue (F0, n=32), mild fibrosis (F1, n=37), moderate fibrosis (F2, n=33), severe fibrosis (F3, n=54), early cirrhosis (F4, n=24), early liver fibrosis (F1-2, n=70), and advanced liver fibrosis (F3-4, n=78).

2.2 Texture feature extraction and selection

After image preprocessing, the gray-level co-occurrence matrix (GLCM) was used to calculate the texture characteristic values of ROI image in four directions (0° , 45° , 90° , 135°). Then the average value was obtained to select the parameter features, and finally a 16-dimensional feature was obtained for each ROI. Specific parameters were as follows: power, contrast ratio, inverse difference moment, variance, entropy, inertia moment, correlation, sum average, sum entropy, sum variance, difference entropy, difference variance, information measures of correlation 1 and 2, mean gray value, standard deviation.

2.3 Machine Learning model establishment

A label propagation algorithm combining semi-supervised learning and active learning was used to build a classifier model. Five groups of ROIs were classified and identified respectively, and then three groups of ROIs were compared between groups.

Results

A total of 33 rabbits completed the entire experimental process. The pathological results showed that the stages of liver fibrosis in each liver lobe of all surviving rabbits were not completely consistent, so the rabbits as a whole were ignored and each liver lobe was taken as the research object to plot ROI. Finally, the classification and identification results were as follows:

1. Classification and recognition results based on T1WI-FS images

The average accuracy of five-stage classification and recognition (5 groups of ROIs) was 60.6%, and the accuracy of F0, F2 and F3 liver fibrosis was 87.5%, 66.7% and 64.8%, respectively. The average accuracy of pairwise classification and recognition (3 groups of ROIs) reached more than 90% in the identification of F0 and F1-4, F0 and F1-2, F0 and F3-4, among which F0 and F3-4 were the best, with the accuracy of 96.4%.

2. Classification and recognition results based on T2WI-FS images

The recognition performance of the classifier is not stable. The average accuracy of five-stage classification and recognition (5 groups of ROIs) was 44.4%, The average accuracy of pairwise classification and recognition (3 groups of ROIs) was ineffective because of the high misjudgment rate of F0 phase. The average accuracy of identifying F1-2 and F3-4 was 69.6%, and the accuracy of distinguishing F3-4 was 83.3%.

Conclusion

The emerging SSL and AL classifier model constructed based on MR routine scan image could be applied to the classification and recognition of rabbit liver fibrosis model. The classification and recognition effect of T1WI-FS images was better than that of T2WI-FS images. Non-invasive computer-aided diagnosis technology has certain value in staging diagnosis of liver fibrosis, which may provide the potential application value for clinical diagnosis and treatment and prognosis in the future.

PO-3801

Cognitive Impairment After Sleep Deprivation: The Role of Precuneus Related Connectivity on The Intra-Individual Variability Changes

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OBJECTIVE

Intra-individual variability (IIV) in cognitive performance is thought to reflect the efficiency with which attentional resources are allocated in different circumstances requiring cognitive control. IIV in cognitive performance is associated with the strength of the negative correlation between task-positive network and default mode network (DMN) activity. In this study, we investigated the impact of sleep deprivation (SD) on functional connectivity (FC) between the DMN and psychomotor vigilance task-related network (PVT-RN), and its relationship with IIV in cognitive performance.

METHOD

Two analyses, network-level independent component analysis (ICA) and region-level (RL)-ICA, were employed to compare the coefficient of variation (CV) of the PVT between normal sleep and SD conditions on the basis of functional magnetic resonance images across 67 healthy participants.

RESULTS

After SD, in the RL-ICA, the FC between the PVT-RN and DMN was positively correlated with the CV of the PVT, as well as the changes therein, compared with normal sleep. Using a mask derived from the DMN and PVT-RN, the RL-ICA revealed that 12 edges/connections between DMN and PVT independent components were associated with the CV of the PVT, with nine of these connections involving the precuneus.

CONCLUSION

These findings suggest that the precuneus may play a crucial role in the interactions of various brain functions during the PVT, with the connections between the precuneus and frontoparietal and somatosensory networks being significantly altered after SD. Moreover, following SD, weakened negative FC between the precuneus and bilateral inferior parietal lobule may disrupt the balance between cognitive and executive control functions, leading to a decline in cognitive performance.

PO-3802

Developing a dementia risk prediction model for people with depression: a longitudinal machine learning study

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Objective: This study aims to develop and validate a new predictive model that is easy to promote in the population to assess the risk of all-cause dementia in patients with depression.

Methods: This study included 502,386 participants who were enrolled in the longitudinal population cohort UK Biobank from March 1, 2006 to October 31, 2010. The data was split into training dataset and testing dataset at an 8:2 ratio. We performed ten-fold cross-validation on the training dataset, and used the test dataset to evaluate the stability of the model. Univariate analysis was performed using independent samples t-test and Pearson chi-square test. We identified 12 predictive factors from 216 candidate variables and used four machine learning classifiers, namely logistic regression (LR), linear discriminant analysis (LDA), adaBoost regressor (ADA) and ridge regression to develop models. Receiver operating characteristic (ROC) curve and precision-recall (PR) curve were used to evaluate the predictive ability of the model.

Results: Among the final 31,587 participants who were diagnosed with depression at baseline assessment and diagnosed with dementia later than depression, 896 participants (2.8%) had dementia events. The twelve predictive factors selected include sex, age, current employment status, smoking status, number in household, alcohol drinker status, mood swings, sleeplessness, body mass index, sleep duration, able to confide and length of mobile phone use. Among these four models, LR (AUC=0.843; ACC=0.97) had the best predictive performance, while ADA (AUC=0.803; ACC=0.97) had relatively poor predictive performance. The predictive performance of LDA (AUC=0.817; ACC=0.97) was similar to that of Ridge (AUC=0.817; ACC=0.97).

Conclusion: This study developed a practical and easy-to-promote risk prediction model for predicting the probability of dementia in patients with depression, which provides a new clinical decision support tool for clinicians to prevent and treat patients with depression who develop dementia.

PO-3803

Deep learning and radiomics of longitudinal CT scans for early prediction of tuberculosis treatment outcomes

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Abstract

Background: To predict tuberculosis (TB) treatment outcomes at an early stage, prevent poor outcomes of drug-resistant tuberculosis (DR-TB) and interrupt transmission.

Methods: An internal cohort for model development consists of 204 bacteriologically-confirmed TB patients who completed anti-tuberculosis treatment, with one pretreatment and two follow-up CT images (612 scans). Three radiomics feature-based models (RM) with multiple classifiers of Bagging, Random forest and Gradient boosting and two deep-learning-based models (i.e., supervised deep-learning model, SDLM; weakly supervised deep-learning model, WSDLM) are developed independently. Prediction scores of RM and deep-learning models with respectively highest performance are fused to create new fusion models under different fusion strategies. An additional independent validation was conducted on the external cohort comprising 80 patients (160 scans).

Results: For RM scheme, 16 optimal radiomics features are finally selected using longitudinal scans. The AUCs of RM for Bagging, Random forest and Gradient boosting were 0.789, 0.773 and 0.764 in the internal cohort and 0.840, 0.834 and 0.816 in the external cohort, respectively. For deep learning-based scheme, AUCs of SDLM and WSDLM were 0.767 and 0.661 in the internal cohort, and 0.823 and 0.651 in the external. The fusion model yields AUCs from 0.767 to 0.802 in the internal cohort, and from 0.831 to 0.857 in the external cohort.

Conclusions: Fusion of radiomics features and deep-learning model may have the potential to predict early failure outcome of DR-TB, which may be combined to help prevent poor TB treatment outcomes.

PO-3804

Deep Learning on Longitudinal CT Scans: Automated Prediction of Treatment Outcomes in Hospitalized Tuberculosis Patients at Early Stage

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Abstract

Purpose To develop deep learning (DL) models using longitudinal CT images to predict tuberculosis (TB) treatment outcomes and prevent the progression of TB into drug-resistant (DR) TB.

Methods In this work, three DL-based prediction models (PMs) using longitudinal CT images were developed to predict TB treatment outcomes, and both internal and external testing was conducted to evaluate their performance. The internal dataset consists of 493 bacteriologically-confirmed TB patients who completed the anti-tuberculosis treatment in the local hospital with three-time CT scans, including a pretreatment CT scan and two follow-up CT scans. PM1 was trained using only the pretreatment CT scans, and PM2 and PM3 were developed by adding two follow-up CT scans

to PM1. An additional independent testing was performed on external dataset comprising 86 tuberculosis patients with completed anti-tuberculosis treatment.

Results The prediction model performance was improved with additional follow-up CT scans into the PM1. The AUC for classifying success and DR-TB was improved on both internal and external dataset (0.609 vs 0.625 vs. 0.815 in the internal test; 0.627 vs 0.705 vs. 0.735 in the external test). Other two comprehensive metrics of accuracy and F1 score also showed an increase of 0.128 and 0.034, 0.07 and 0.038 for PM1 vs. PM2 and PM2 vs. PM3 in the external test, and the improvement during the two-month intensive phase was greater than that of the subsequent four-month continuation phase.

Conclusion Regular follow-up CT scans can aid in the prediction of DR-TB, and that special attention should be given to the early intensive phase of treatment to identify high-risk DR-TB patients.

PO-3805

Using Machine Learning to Predict the Efficacy of Neoadjuvant Chemoradiotherapy for Local Advanced Rectal Cancer Based on Texture Features of MRI

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Objective: Based on the analysis of texture features in magnetic resonance images using wavelet analysis, this study aims to predict the efficacy of neoadjuvant chemoradiotherapy for locally advanced rectal cancer using machine learning methods.

Methods: A collection of patients with locally advanced rectal cancer who underwent neoadjuvant chemoradiotherapy at the First Affiliated Hospital of the University of Science and Technology of China from June 2016 to December 2020 was gathered. Wavelet texture feature parameters of all lesions in patients' MRI images were extracted. The Random Forest Classifier model was employed for feature selection, followed by classification learning using the XGBoost classifier.

Results: A total of 62 patients with 1656 magnetic resonance wavelet texture feature parameters from all lesions were obtained. Feature selection using the Random Forest Classifier identified the most important four wavelet texture features, which included DWI wavelet-HHH glcm Maximum Probability, DWI wavelet-LLL firstorder Minimum, T2 wavelet-LHH firstorder Kurtosis, and T2 wavelet-HLL glcm MCC. Utilizing the XGBoost classifier for predictive classification yielded a final accuracy of 84.21% and an AUC value of 0.90. The precision, recall, and F1 score for the responsive treatment group were 0.86, 0.92, and 0.89, respectively. For the non-responsive treatment group, the precision, recall, and F1 score were 0.80, 0.67, and 0.73, respectively. The macro-averaged values of precision, recall, and F1 score across all labels were 0.83, 0.79, and 0.81, respectively.

Conclusion: The model established based on wavelet texture feature analysis of magnetic resonance images can effectively predict the efficacy of neoadjuvant radiochemotherapy for rectal cancer patients. The XGB Classifier model demonstrates excellent performance in handling small, imbalanced datasets, thus showing promising clinical application value.

PO-3806

Application value of artificial intelligence CT quantitative analysis technology in the process of bronchial changes at different stages of pulmonary contusion

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Objective: To explore the application value of artificial intelligence CT quantitative analysis technique in the progression of pulmonary contusion. **Methods:** The chest CT data of 90 patients with pulmonary contusion were retrospectively analyzed. Artificial intelligence CT quantitative analysis technology was used to automatically segment the images and measure the changes of the quantitative indicators of grade 3 ~ 7 bronchi in different periods of pulmonary contusion (acute stage, exudation and absorption improvement stage) and statistically analyzed. **Results** A total of 108 lesions in 90 patients were studied. The maximum and average wall thickness of generations 3~7 bronchi in the exudation period were greater than those in the acute phase and absorption period, while the intraluminal and extraluminal diameters and circumferences of generations 4~7 bronchi and the luminal and wall cross-sectional areas of generations 5~7 bronchi in the exudation period were smaller than those of the acute phase and absorption period, with all differences statistically significant ($P < 0.05$). The maximum and average wall thickness of generations 4~7 bronchi in the acute phase were greater than those in the absorption period but smaller than those in the exudation period, while the intraluminal and extraluminal diameters and circumferences of generations 4~7 bronchi and the luminal and wall cross-sectional areas of generations 5~7 bronchi in the acute phase stage were smaller than those in the absorption period but larger than those in the exudation period, with all differences statistically significant ($P < 0.05$). **Conclusions:** Artificial intelligence CT quantitative analysis technology can visually show the bronchial morphological changes in various stages of pulmonary contusion, and can dynamically monitor the treatment of pulmonary contusion, providing a new approach for evaluating the clinical efficacy.

PO-3807

Clinical application of 3DSlicer and Sina in minimally invasive puncture drainage of elderly patients with spontaneous intracerebral hemorrhage under local anesthesia

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Background: Decreased organ function and poor physical compensatory capacity in elderly patients diagnosed with spontaneous intracerebral hemorrhage (ICH) can make surgical treatment procedures challenging and risky. Minimally invasive puncture drainage (MIPD) combined with urokinase infusion therapy is a safe and feasible method of treating ICH. This study aimed to compare the treatment efficacy of MIPD conducted under local anesthesia using either 3DSlicer + Sina application or computer tomography (CT)- guided stereotactic localization of hematomas in elderly patients diagnosed with ICH.

Methods: The study sample included 78 elderly patients (≥ 65 years of age) diagnosed with ICH for the first time. All patients exhibited stable vital signs and underwent surgical treatment. The study

sample was randomly divided into two groups, either receiving 3DSlicer+Sina or CT-guided stereotactic assistance. The preoperative preparation time; hematoma localization accuracy rate; satisfactory hematoma puncture rate; hematoma clearance rate; postoperative rebleeding rate; Glasgow Coma Scale (GCS) score after 7 days; and modified Rankin scale (mRS) score 6 months after surgery were compared between the two groups.

Results: No significant differences in gender, age, preoperative GCS score, preoperative hematoma volume (HV), and surgical duration were observed between the two groups (all p -values > 0.05). However, the preoperative preparation time was shorter in the group receiving 3DSlicer + Sina assistance compared to that receiving CT-guided stereotactic assistance (p -value < 0.001). Both groups exhibited significant improvement in GCS scores and reduction in HV after surgery (all p -values < 0.001). The accuracy of hematoma localization and puncture was 100% in both groups. There were no significant differences in surgical duration, postoperative hematoma clearance rate, rebleeding rate, postoperative GCS and mRS scores between the two groups (all p -values > 0.05).

Conclusions: A combination of 3DSlicer and Sina is effective in accurately identifying hematomas in elderly patients with ICH exhibiting stable vital signs, thus simplifying MIPD surgeries conducted under local anesthesia. This procedure may also be preferred over CT-guided stereotactic localization in clinical practice due to its ease of use and accuracy in hematoma localization.

PO-3808

A Study on Predicting Spontaneous Deep Brain Hematoma Expansion Based on Head CT Perfusion Imaging

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ABSTRACT

BACKGROUND AND PURPOSE: To study the prediction of spontaneous deep brain hematoma enlargement based on head CT perfusion imaging.

MATERIALS AND METHODS: A retrospective analysis was conducted on the clinical and imaging data of 186 patients with spontaneous deep cerebral hemorrhage admitted to Hangzhou Normal University Affiliated Hospital from January 2021 to July 2023. All patients underwent baseline head plain CT (NCCT) and CT perfusion imaging (CTP) examinations within 6 hours after onset. The hematoma area was manually delineated and CTP parameters (CBF, CBV, MTT, TTP, Tmax, PS values) were measured 1cm around the hematoma, and NCCT reexamination was performed within 36 hours after onset. Based on the clinical comprehensive diagnosis results as the gold standard, it is divided into two groups: the enlarged hematoma group and the non expanded hematoma group. Compare and analyze the CTP parameters of two groups of patients.

RESULTS: Out of 186 enrolled patients, 55 had hematoma enlargement, and there was no statistically significant difference in MTT between the two groups ($P > 0.05$). However, the levels of CBF, Tmax, and PS in the hematoma enlargement group were higher than those in the hematoma non enlargement group, while the levels of CBV and TTP were lower than those in the hematoma non enlargement group, with a statistically significant difference ($P < 0.05$). The results obtained from correlation analysis showed a negative linear correlation between CBV and TTP levels, and a positive linear correlation with CBF, Tmax, and PS, with a statistically significant difference ($P < 0.05$). CBF, CBV, TTP, Tmax, and PS values are all effective indicators for predicting the expansion of spontaneous deep brain hematoma.

CONCLUSIONS: CTP can quickly and accurately reflect the perfusion status of brain tissue within and around a brain hematoma, and has good diagnostic value for spontaneous deep brain hematoma enlargement.

PO-3809

Radiomics analysis of gadoxetic acid-enhanced MRI preoperative predicts vessels encapsulating tumor clusters in hepatocellular carcinoma

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Purpose:

The aim of this study was to develop an optimally integrated model that combines clinical-radiologic and radiomics features based on gadoxetic acid-enhanced MRI for preoperative prediction of vessels encapsulating tumor clusters (VETC) patterns in hepatocellular carcinoma (HCC).

Methods:

This retrospective study encompassed 234 patients who underwent surgical resection and received preoperative gadoxetic acid-enhanced MRI. Among them, 101 patients exhibited VETC-positive HCC, while 133 patients displayed VETC-negative HCC. Volumes of interest were manually delineated for entire tumor regions in the arterial phase (AP), portal phase (PP), and hepatobiliary phase (HBP) images. Independent predictors for VETC were identified through Least Absolute Shrinkage and Selection Operator (LASSO)-penalized and multivariable logistic regression analysis, utilizing radiomics-AP, PP, HBP, along with 24 imaging features and 19 clinical characteristics. Subsequently, the clinico-radiologic model, radiomics model, and integrated model were established, with a nomogram visualizing the integrated model. The performance for VETC prediction was evaluated using a receiver operating characteristic curve.

Results:

The optimal integrated model, composed of 3 selected traditional imaging features (necrosis or severe ischemia [OR=1.457], peripheral washout [OR=1.078], LLR_AP [OR=0.433]) and radiomics-AP [OR=1.870], radiomics-HBP [OR=1.023], radiomics-PP [OR=0.546]), showcased superior accuracy in predicting VETC patterns in both the training (AUC=0.873, 95% confidence interval [CI]: 0.821-0.925) and validation (AUC=0.869, 95% CI:0.789-0.950) cohorts.

Conclusion:

This study successfully established an integrated model that combines traditional imaging features and radiomic features from gadoxetic acid-enhanced MRI, demonstrating robust performance in predicting VETC patterns. Employing a non-invasive approach to predict the VETC pattern in HCC holds the potential to provide valuable insights for preoperative planning.

PO-3810

The value of CT radiomics on predicting of progression of aortic intramural hematoma

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Purpose: To develop a clinical-radiomics model based on CTA to appraise the short-term prognosis of conservative treatment of IMH.

Methods: A cohort of 120 IMH patients were enrolled in the study. The patients were categorized into the progressive or non-progressive group based on the clinical progress. The aortic maximum diameter and hematoma maximum thickness were measured, and a comprehensive aortic image was delineated. The minimum absolute contraction and selection operator (LASSO) regression model was used for data dimensionality reduction, feature selection and the construction of the radiomics feature model. Furthermore, a clinical-radiomic nomogram model incorporating selected clinical predictors and obtained radiomic features was constructed using multivariate logistic

regression analysis. The model's performance was assessed using the area under the receiver operating characteristic (ROC) curve, while the calibration curve and Hosmer-Lemeshow test were employed to evaluate its calibration. Additionally, the AUC performance of the comparison model was verified using the DeLong method.

Results: A radiomic model was established by selecting 12 radiomic features from a pool of 851 features. The clinical model consisted of age and sex variables. The training set yielded a nomogram AUC of 0.84, while the verification set yielded an AUC of 0.80. Decision curve analysis demonstrated the clinical utility of the nomogram.

Conclusion: The radiomics model can predict the prognosis of IMH without previous high-risk imaging signs after short-term conservative treatment by characterizing the morphological characteristics of the whole aorta. The clinical-radiomics model and nomogram obtained by combining age and gender can obtain higher prediction efficiency.

PO-3811

Research on prognosis model of cerebral hemorrhage based on deep learning

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Objective

The application of artificial intelligence in the field of cerebral hemorrhage mainly focuses on the recognition and volume measurement of hemorrhage. There are few algorithms for predicting the prognosis of cerebral hemorrhage and the general accuracy is low. This study aims to establish a prognosis model for patients with intracerebral hemorrhage based on CT images and GCS scores by using deep learning technology, so as to help clinicians quickly evaluate the severity of intracerebral hemorrhage and provide a basis for making individualized treatment decisions.

Methods

A total of 286 cases of spontaneous intracerebral hemorrhage were collected retrospectively as a data set, all of which completed the clinical treatment cycle. Patients were divided into the good prognosis group and the poor prognosis group according to the Glasgow outcome score. Based on a convolutional neural network, a cerebral hemorrhage prognosis model was constructed by integrating domain knowledge through the self-attention mechanism. The model integrated multimodal data from brain CT images and the Glasgow coma scale (GCS) as domain knowledge. The model network structure diagram is mainly composed of three main modules: feature extraction module, feature fusion module, and classification head module. To mitigate the interference from non-brain tissue regions, multi-threshold segmentation, and connected component screening were used to isolate these regions.

Results

Through clinical validation, the inclusion of GCS scores in our model improved the prognostic accuracy of individual CT image tests by 18.25% (from 64.33% to 82.58%) and for individual patients by 22.03% (from 57.97% to 80.00%), significantly better than the average accuracy of professional neurosurgeons. In the process of reasoning, the model pays attention to the characteristics of the cerebral hemorrhage region in CT slices and has high sensitivity for the cerebral hemorrhage region. However, it is important to note that the calvarial dissection process may result in bleeding information loss. In addition, the size of the current dataset is relatively small.

Conclusion

We present a novel approach to assess the prognosis of cerebral hemorrhage. Integrating GCS score into prognosis can evaluate the severity of cerebral hemorrhage more quickly and accurately, and help clinicians to make individualized treatment decisions for patients. We plan to collect more data to design the 3-Dimensional network model and use the bleeding area test as an auxiliary tool to further improve its accuracy.

PO-3812

Deep learning-based Synthetic Magnetic Resonance Image Generation from CT Imaging for Cerebral Ischemic Stroke Patients

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Objective

In view of the demand for rapid acquisition of magnetic resonance images (MRI) in patients with ischemic stroke, this study aims to investigate the feasibility of converting CT images of cerebral ischemic stroke patients to MR images using deep learning techniques, as well as the potential role and advantages in clinical practice.

Methods

The CT and MR Images of 120 patients with ischemic stroke were retrospectively collected. MRI was performed with T2 fluid-attenuated inversion recovery (T2-FLAIR) sequence, and the interval between the two examinations was less than 3 days. The proposed method utilizes a generative adversarial network (GAN) to learn the mapping between the two modalities and generate synthetic MR images from CT scans. The network inputs CT and MR Images separately, only the MR image input contains attribute information, where the presence or absence of lesions is encoded as one-hot codes. At the same time, we added a new attribute to the network based on the observation that stroke lesions are highly discernible on MR images. To evaluate the performance of the proposed method, 10 patient image datasets were selected for evaluation and their peak signal-to-noise ratio (PSNR) and structural similarity index (SSIM) values were calculated.

Results

The algorithm can effectively realize the mode switch of healthy brain regions and can identify lesions to a certain extent. Experimental results demonstrate that the proposed approach can effectively generate high-quality MR images from CT scans, achieving a PSNR of 24.4 dB and an SSIM of 0.78. In addition, we generate a difference map between the synthetic MR Image and the original MR Image. Furthermore, our method outperforms existing image-to-image translation methods in terms of visual quality and quantitative evaluation metrics.

Conclusion

Deep learning has shown promising results in extracting subtle lesion features from CT images, enabling timely diagnosis of cerebral infarction on CT images through conversion from CT images to MR Images. Although the results may differ from the original MR Images, the algorithm can still provide valuable insights to the diagnostic physician. Future research will focus on refining the algorithm and conducting comparative studies with related algorithms.

PO-3813

Predicting rectal metachronous liver metastases with CT-based Deep learning model

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Purpose:

To investigate that the value of CT-based deep learning (DL) model for predicting the two-year risk of metachronous liver metastases (MLM) in patients with rectal cancer after surgery by using independently external test.

Methods and Materials:

This retrospective study included patients with pathologically proven rectal cancer who underwent pre-operative contrast-enhanced CT imaging between January 2008 and January 2021 from two independent institutions. 411 cases and 148 cases were included for training and internal validation from our institution, 105 cases were included for independent external test. Two training strategy were employed. In the training cohort I, both patients with synchronous liver metastases (SLM) and MLM were included for model training (SMDL), but only patients with MLM were included for model training (MDL) in the training cohort II. We used ResNet-18 as a robust convolutional feature extractor, and inputs the deep convolutional features into an Extreme Learning Machine (ELM) classifier to build a classification model. And the clinical factors were developed by multivariate logistic regression. The accuracy (ACC) and receiver operating characteristic (ROC) curve analysis were calculated to evaluate the performance of DL models, and the integrated discrimination improvement (IDI) was used to compare the model performance. The decision curve analysis (DCA) was used to assess the clinical usefulness of the predictive models.

Results:

The performance of SMDL (AUC internal validation = 0.756 – 0.843, AUC external test = 0.767 – 0.824) is superior to that of MDL (AUC internal validation = 0.667 – 0.763, AUC external test = 0.716 – 0.795) based on each single-phase or all-phase with significantly statistical difference of (IDI>0, P<0.05). The performance of SMDL based on all-phase images achieved the highest AUC value in the internal validation (AUC=0.824), external test (AUC=0.843) as compared to that based on PCP or VP phase (IDI>0, P<0.05). In addition, combining clinical indicators with the SMDL didn't improve the performance (AUC from 0.843 to 0.846, P>0.05). DCA indicated a higher net benefit for the SMDL based on all-phase (0.01-1.00).

Conclusion:

The CT-based DL model showed good potential to predict the two-year risk of MLM in patients with rectal cancer after surgery.

PO-3814

The Influence of Different Iterative Algorithms on Machine Deep Learning Detection of Long Diameter and 3D Volume Measurement of Pulmonary Nodules in Conventional and Low Dose CT Scanning

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Objective: To compare the effects of different iterative algorithms based on machine deep learning on the measurement of lung nodule length, diameter, and three-dimensional volume in conventional dose and low-dose CT scans.

Method: A retrospective analysis was conducted on 26 patients with nodules detected during low-dose CT screening with a tube voltage of 120 kVp and a noise index of 28. Three different iterative algorithms, FBP, Asir40, and STAND, were used to reconstruct 0.625mm lung algorithm CT images. Two weeks later, routine dose CT scans with a tube voltage of 120 kVp and a noise index of 14 were performed, and FBP, Asir40, and STAND were used to reconstruct 0.625mm lung algorithm CT images. Apply machine deep learning analysis to obtain 10 sets of measurement values for the volume of each nodule in each image, and compare the absolute percentage error (APE) of lung nodule length, diameter, and volume measurements under five identical reconstruction algorithms under conventional dose and low dose scanning conditions, with diameter APE ($APE_d = 100 \times |D_m - D_{rs}| / D_{rs}$), volume APE ($APE_v = 100 \times |V_m - V_{rs}| / V_{rs}$), D_m and V_m represent the length, diameter, and volume of the nodules obtained under scanning conditions of 120 kVp and noise index NI of 28, while D_{rs} and V_{rs} represent the length, diameter, and volume of the nodules obtained under scanning conditions of 120 kVp and noise index NI of 14. Using one-way ANOVA and LSD-t-test to compare the APE of lung nodule volume measurement under conventional dose and low dose scanning conditions under three identical reconstruction algorithms.

Result: The APE_d and APE_v values between the conventional and low doses of FBP, Asir40, and STAND iterative algorithms were (0.15 ± 0.20) , (0.18 ± 0.12) , and (0.19 ± 0.20) , respectively. There was a statistically significant difference between the two, $P < 0.05$. And the STAND reconstruction algorithm has the smallest APE for measuring lung nodule volume under conventional dose and low dose scanning conditions. APE_d no difference, APE_v , FBP>Asir40>STAND.

Conclusion: Different iterative algorithms have an impact on the artificial intelligence measurement of lung nodule length, diameter, and three-dimensional volume in conventional dose and low dose CT scans. When the radiation dose is too low, the APE of FBP and NR40 iterative algorithms increases, while the APE of STAND iterative algorithm is smaller.

PO-3815

The Value of Deep Learning Model Based on Non-contrast Abbreviated MRI for Screening Small High-Risk Hepatic Nodules

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Purpose: To assess the efficacy of a deep learning (DL) model utilizing non-enhanced abbreviated magnetic resonance imaging (MRI) images for the screening of LI-RADS category 4 and 5 small hepatic nodules. The objective is to facilitate a paradigm shift in hepatocellular carcinoma (HCC) surveillance for high-risk patients.

Methods and Materials: A retrospective analysis was conducted on a total of 100 LI-RADS category 4 and 5 small hepatic nodules, each measuring less than 2 cm in diameter, from 52 patients between January 2022 and March 2023. All patients were classified as high risk for HCC and underwent gadoliniummethoxybenzyl-diethylenetriamine pentaacetic acid-enhanced (Gd-EOB-DTPA) MRI. Out of these, 79 nodules were allocated to the training dataset for model training, while 21 nodules were assigned to the validation dataset for model testing. The DL model was developed based on three groups of optimized sequences: (1) Non-contrast abbreviated MRI (Nc-aMRI) group, comprising T1WI, T2WI, and diffuse weighted images (DWI) sequences; (2) EOB-MRI group, specifically hepatobiliary phase (HBP); (3) Dynamic enhanced MRI (Dyn-MRI) group, encompassing T1WI, T2WI, DWI, the late arterial phase, portal venous phase, and HBP. The DL model consisted of a multi-scale detection network (feature pyramid network) and the cascade network. The sensitivity of each sequence was evaluated through the free-response receiver operating characteristic curve (FROC) to determine the overall detection efficacy.

Results: (1) Among the three groups of optimized sequences, the DL model based on Dyn-MRI demonstrated the highest sensitivity. (2) In terms of individual sequences, the DL model based on T2WI exhibited the highest positive predictive value for nodule screening, with the exception of EOB. (3) The sensitivity of nodule detection using the DL model based on Nc-aMRI was 90.5%, which was comparable to that of the DL model based on EOB-MRI.

Conclusions: The performance of the DL model based on Nc-aMRI for screening small high-risk hepatic nodules is both acceptable and comparable to that of a DL model based on EOB-MRI. Furthermore, the DL model based on Nc-aMRI can significantly reduce scanning time and costs while eliminating the need for a contrast agent.

Clinical Relevance/Application: This study proposes a DL model based on non-contrast abbreviated MRI as an alternative surveillance method for patients at high risk for HCC. The Nc-aMRI DL-based model can provide sensitive screening while reducing patient burden and radiologist workload. **Consequently, the Nc-aMRI with DL technique holds promise as a feasible and reliable screening tool for HCC, potentially facilitating early-stage HCC detection and significantly improving patient prognosis.**

PO-3816

Deep learning model for the segmentation and evaluation of neoadjuvant chemotherapy response in patients with osteosarcoma on routine MRI

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Objective: To develop a two-stage deep learning (DL) model for the segmentation and evaluation of neoadjuvant chemotherapy (NACT) response in patients with osteosarcoma (OS) based on routine magnetic resonance imaging (MRI).

Materials and Methods: 112 patients with histologically proven OS treated with 3 cycles of NACT were retrospectively used for model building and internal test. Based on multi-sequence MRI (T2-w, CET1-w) and the physician's labeling, a two-stage model was constructed for the automatic segmentation and prediction of the NACT efficacy of patients with OS by using ResUnet and 3D-ResNet-18. The performance of different models was then assessed based on their area under the curve (AUC) and accuracy (ACC) values.

Results: A total of 112 patients were enrolled in this study, of which 51 had a good response and 61 had a poor response. No statistically significant differences were observed in the age, sex, alkaline phosphatase, tumor size, and tumor location of these two groups ($P > 0.05$). ResUNet model demonstrated a robust performance with an average Dice coefficient of 0.579 and average IoU of 0.463. The T2-w-based 3D-ResNet-18 classification model achieved a relatively better performance in the test set with an AUC of 0.902, 95% confidence interval of (0.766, 1), ACC of 0.783, sensitivity of 0.909, specificity of 0.667, and F1 value of 0.800.

Conclusion: The proposed two-stage DL model allowed for the accurate segmentation and evaluation of NACT response in patients with OS based on routine MRI and may thus facilitate diagnosis.

PO-3817

An Integrated Clinical Nomogram for the Identification of Local Recurrence of Prostate Cancer Patients with Biochemical Recurrence

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Rationale and objectives: Integrated diagnostic tools are currently employed for selecting appropriate and optimal therapies tailored for prostate cancer (PCa) patients. This study aimed to construct an integrated nomogram using multivariable logistic regression to detect local recurrence on pelvic DWI images of PCa patients with biochemical recurrence (BCR) after radiation therapy (RT).

Materials and methods: Four hundred PCa patients with BCR after RT from January 2022 to December 2022 were included as the initial cohort, which was used for radiomics model development. Another cohort of 140 patients between January 2022 and December 2022 was collected as held-out validation of the radiomics model. Prostate Imaging for Recurrence Reporting (PI-RR) assessment category was assigned to each patient by two radiologists. Univariate analysis and multivariable analysis on clinical variables (age, PSA, prostate volume, and Gleason score), PI-RR score, and output probabilities from the radiomics-based imaging predictor were trained to obtain the clinical nomogram.

Results: In the initial cohort, the clinical nomogram yielded the highest AUC of 0.97 (95% CI: 0.92-0.99), which was not significantly higher than the model combining clinical variables and PI-RR (Model 4, $P = 0.110$). Similarly, in the held-out cohort, the clinical nomogram achieved an AUC of 0.86 (95% CI: 0.79-0.91), which was equal to that of Model 4 ($P = 0.796$).

Conclusion: The constructed integrated nomogram using the PI-RR score and radiomics-based imaging predictor could be used to identify PCa patients with local recurrence after RT.

PO-3818

Automated Treatment Response Evaluation of Metastatic Lesions in Advanced Prostate Cancer Patients Using Deep Learning Based on the MET-RADS-P System

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Objective: To develop a deep learning-based algorithm for automated treatment response assessment of advanced prostate cancer (APC) patients based on Metastasis Reporting and Data System for Prostate Cancer (MET-RADS-P) guidelines.

Materials and methods: One hundred and seventy patients who had undergone at least two WB-MRI scans for follow-up assessment after APC metastasis treatment were enrolled. A previously established deep learning model was firstly used to perform automated segmentation of metastatic lesions, and subsequently, the treatment response was assessed automatically followed by image registration according to the MET-RADS-P criteria. The performance of the deep learning algorithm was evaluated using the Dice similarity coefficient (DSC) and volumetric similarity (VS). Kappa statistics were used to assess the consistency of the automatic treatment response assessment and two radiologists [attending radiologist (R1) and fellow radiologist (R2)].

Results: The metastatic lesion segmentation models established in the early stage achieved good performance here, and both the DSC and VS values for the segmentation of metastases were above 0.80 in the independent validation dataset. The accuracy of automatic efficacy evaluation for metastatic lymph nodes and bone metastases were 0.80 and 0.76, respectively, which is equivalent to R1 and slightly better than R2. The consistency of the automatic treatment response assessment and reference standard was excellent for metastatic lymph nodes (K value: 0.81 and 0.89) and nonpathological bone metastases (K value: 0.87 and 0.91).

Conclusion: The automatic treatment response evaluation of the whole-body metastases of APC patients based on the MET-RADS-P guidelines can be achieved using deep learning.

PO-3819

Development of Radiomics model based on Contrast-Enhanced CT with Clinical Characteristics to Predict Primary Post-acute Pancreatitis Diabetes Mellitus

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Objective:

A contrast-enhanced CT (CECT)-based radiomic model was developed to predict post-acute pancreatitis diabetes mellitus (PPDM-A), which provides reference for clinicians to develop individualized treatment plans.

Methods:

December 2021 were retrospectively selected for study inclusion. This retrospective study enrolled 244 patients with acute pancreatitis (AP), including 104 patients with PPDM-A and 140 patients with Non-PPDM-A. Patients were randomized into training and validation cohorts at a 7:3 ratio. Two abdominal radiologists (with more than 5 years experience in diagnosing pancreatic diseases) used 3D Slicer (V4.10.2, <https://www.slicer.org>) software to manually draw the pancreatic parenchyma on the arterial and venous phase image sets of CT to avoid common bile duct and blood vessels, the original image is filtered by Laplace-Gaussian filtering and wavelet transform filtering, a total of 2446 features are extracted from region of interest (ROI), and then quantitative radiomics feature extraction was performed. The variance threshold method, The Select K Best method and the least absolute shrinkage and selection operator (LASSO) were applied to select radiomics features. Three models were developed for predicting PPDM-A: (1) radiomics model; (2) clinical model; (3) combined model. The area under the curve (AUC) was used to evaluate the predictive performance of the models for PPDM-A in the training group and the validation group. And the Delong test was used to compare the differences in AUCs between the models. Decision curve (DCA) analysis was used to evaluate the model performance in predicting PPDM-A.

Results:

A total of 2446 radiomics features were extracted from each patient. Through the evaluation of ICCs consistency among viewers, the features with $ICC > 0.75$, 743 stable features in arterial phase and 702 stable features in venous phase were retained. Then variance threshold method was employed to remove those features with a variance less than 0.8. A single variable selection approach was used to eliminate features that did not differ significantly between PPDM-A and non-PPDM-A patients ($P > 0.05$). Finally, LASSO feature screening is used to leave the most important features for predicting PPDM-A. After screening, 9 features were finally retained in arterial phase and venous phase.

In the three models, the average areas under the ROC curves of the radiomics model and the combined model were 0.802 (training group: $AUC=0.802$, 95% confidence interval (CI), 0.735-0.869; validation group: $AUC=0.736$, 95% CI, 0.620-0.853) and 0.920 (training group: $AUC=0.920$, 95% CI, 0.880-0.958; validation group: $AUC=0.835$, 95% CI, 0.742-0.928), respectively, and the clinical model 0.638 (training group: $AUC=0.638$, 95% CI, 0.555-0.722; validation group: $AUC=0.692$, 95% CI, 0.579-0.804). The radiomics model (0.802 vs 0.638, $P=0.005$) and the combined model (0.920 vs 0.638, $P < 0.001$) were superior performance than the clinical model ($AUC: 0.638$).

The predictive performance of the radiomics model in the training group was better than that of the clinical model, but it was not shown in the validation group. In addition, DCA shows that the combined model has superior net clinical benefit and wider threshold probability than radiomics model and clinical

Conclusion:

In short, based on the radiomics characteristics of contrast-enhanced CT, it can be used as a biomarker for predicting PPDM-A. In addition, RAP, severity, and blood glucose on admission may be critical clinical features for predicting PPDM-A. The combined model based on clinically independent risk factors and radiomics characteristics and radiomics model may be a quantitative analysis method for predicting PPDM-A and have significant clinical value.

PO-3820

Integration of dosimetric parameters, clinical factors, and radiomics to predict symptomatic radiation pneumonitis in lung cancer patients undergoing combined immunotherapy and radiotherapy

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Purpose: This study aimed to combine clinical/dosimetric factors and handcrafted/deep learning radiomic features to establish a predictive model for symptomatic (grade ≥ 2) radiation pneumonitis (RP) in lung cancer patients who received immunotherapy followed by radiotherapy.

Materials and Methods: RP was defined per multidisciplinary clinician consensus using CTCAE v5.0. Regions of interest (ROIs) (from radiotherapy planning CT images) utilized herein were gross tumor volume (GTV), planning tumor volume (PTV), and PTV-GTV. Clinical/dosimetric (mean lung dose and V5-V30) parameters were collected, and 107 handcrafted radiomic (HCR) features were extracted from each ROI. Deep learning-based radiomic (DLR) features were also extracted based on pre-trained 3D residual network models. HCR models, Fusion HCR model, Fusion HCR + ResNet models, and Fusion HCR+ ResNet + Clinical models were built and compared using the receiver operating characteristic (ROC) curve with measurement of the area under the curve (AUC). Five-fold cross-validation was performed to avoid model overfitting.

Results: HCR models across various ROIs and the Fusion HCR model showed good predictive ability with AUCs from 0.740-0.808 and 0.740-0.802 in the training and testing cohorts, respectively. The addition of DLR features improved the effectiveness of HCR models (AUCs from 0.826-0.898 and 0.821-0.898 in the both respective cohorts). The best performing prediction model (HCR+ ResNet + Clinical) combined HCR & DLR features with 7 clinical/dosimetric characteristics achieved an average AUC of 0.936 and 0.946 in both respective cohorts.

Conclusions. In patients undergoing combined immunotherapy/RT for lung cancer, integrating clinical/dosimetric factors and handcrafted/deep learning radiomic features can offer a high predictive capacity for RP, and merits further prospective validation.

PO-3821

Building and Validating a Nomogram Utilizing Biparametric MRI PI-RADS v2.1 and Clinical Parameters to Reduce Unnecessary Prostate Biopsies

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Background: Biparametric MRI (bpMRI) is a faster, contrast-free, and less expensive MRI protocol that facilitates the detection of prostate cancer. The aim of this study is to determine whether a biparametric MRI PI-RADS v2.1 score-based model could reduce unnecessary biopsies in patients with suspected prostate cancer (PCa).

Methods: The patients who underwent MRI-guided biopsies and systematic biopsies between January 2020 and January 2022 were retrospectively analyzed. The development cohort used to derive the prediction model consisted of 275 patients. Two validation cohorts included 201 patients and 181 patients from 2 independent institutions. Predictive models based on the bpMRI PI-RADS v2.1 score (bpMRI score) and clinical parameters were used to detect clinically significant prostate cancer (csPCa) and compared by analyzing the area under the curve (AUC) and decision curves.

Spearman correlation analysis was utilized to determine the relationship between International Society of Uro-logical Pathology (ISUP) grade and clinical parameters/bpMRI score.

Results: Logistic regression models were constructed using data from the development cohort to generate nomograms. By applying the models to the all cohorts, the AUC for csPCa was significantly higher for the bpMRI PI-RADS v2.1 score-based model than for the clinical model in both cohorts ($p < 0.001$). Considering the test trade-offs, urologists would agree to perform 10 fewer bpMRIs to avoid one unnecessary biopsy, with a risk threshold of 10–20%

in practice. Correlation analysis showed a strong correlation between the bpMRI score and ISUP grade.

Conclusion A predictive model based on the bpMRI score and clinical parameters significantly improved csPCa risk stratification, and the bpMRI score can be used to determine the aggressiveness of PCa prior to biopsy.

PO-3822

Application of Deep Learning-Generated Virtual Material Decomposition Images for Distinguishing Intracranial Hemorrhage from Contrast Staining Within 24 Hours After Endovascular Thrombectomy

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BACKGROUND AND PURPOSE: Timely determination of whether intracranial hemorrhage (ICH) occurs after endovascular thrombectomy (EVT) is crucial. However, distinguishing between contrast staining (CS) and ICH using single-energy CT (SECT) is challenging. We aimed to develop a transformer-based generative adversarial network (trans-GAN) that can generate dual-energy CT-based material decomposition images from SECT for real-time detection of ICH.

MATERIALS AND METHODS: We retrospectively collected data from two hospitals consisting of 237 dual-energy CT (DECT) scans. Each scan included matched iodine overlay map, virtual non-contrast, and simulated SECT images. These scans were randomly divided into a training set ($n = 190$) and an internal validation set ($n = 47$) in a 4:1 ratio based on the proportion of ICH. Additionally, we included 26 SECT scans as an external validation set. We compared our trans-GAN with state-of-the-art generation methods using several physical metrics of the generated images and evaluated the diagnostic efficacy of the generated images for differentiating ICH from CS.

RESULTS: Compared with other generation methods, the images generated by trans-GAN exhibited superior quantitative performance. Meanwhile, in terms of ICH detection, the use of generated images from both the internal and external validation sets resulted in a higher area under the receiver-operating characteristic curve (0.88 versus 0.68 and 0.69 versus 0.54, respectively) and kappa values (0.83 versus 0.56 and 0.51 versus 0.31, respectively) compared to input SECT images.

CONCLUSIONS: Trans-GAN can be used to accurately detect ICH based on SECT within 24 hours after EVT in AIS patients in hospitals without DECT facilities.

PO-3823

Deep Learning-Based Clinical-Radiomics Nomogram for Preoperative Prediction of Lymph Node Metastasis in Patients with Rectal Cancer: A Two-center Study

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Background: Precise preoperative evaluation of lymph node metastasis (LNM) is crucial for ensuring effective treatment for rectal cancer (RC). This research aims to develop a clinical-radiomics nomogram based on deep learning techniques, preoperative magnetic resonance imaging (MRI) and clinical characteristics, enabling the accurate prediction of LNM in RC.

Materials and Methods: Between January 2017 and May 2023, a total of 519 rectal cancer cases confirmed by pathological examination were retrospectively recruited from two tertiary hospitals. A total of 253 consecutive individuals were selected from Center I to create an automated MRI segmentation technique utilizing deep learning algorithms. The performance of the model was evaluated using the dice similarity coefficient (DSC), the 95th percentile Hausdorff distance (HD95), and the average surface distance (ASD). Subsequently, two external validation cohorts were established: one comprising 178 patients from center I (EVC1) and another consisting of 88 patients from center II (EVC2). The automatic segmentation provided radiomics features, which were then used to create a Radscore. A predictive nomogram integrating the Radscore and clinical parameters was constructed using multivariate logistic regression. Receiver operating characteristic (ROC) curve analysis and decision curve analysis (DCA) were employed to evaluate the discrimination capabilities of the Radscore, nomogram, and subjective evaluation model, respectively.

Results: The DSC, HD95 and ASD were 0.857, 2.186 mm, and 0.562 mm, respectively. The nomogram, which incorporates MR T-stage, CEA, CA19-9, and Radscore, exhibited a higher area under the ROC curve (AUC) compared to the Radscore and subjective evaluation in the training set (0.921 vs. 0.903 vs. 0.662). Similarly, in both external validation sets, the nomogram demonstrated a higher AUC than the Radscore and subjective evaluation (0.908 vs. 0.735 vs. 0.640, and 0.884 vs. 0.802 vs. 0.734).

Conclusion: The application of the deep learning method enables efficient automatic segmentation. The clinical-radiomics nomogram, utilizing preoperative MRI and automatic segmentation, proves to be an accurate method for assessing LNM in RC. This approach has the potential to enhance clinical decision-making and improve patient care.

PO-3824

Application Value of MR Radiomics in Grading of Cerebral of Gliomas

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Objective: To evaluate the value of radiomics in distinguishing grade II and III of gliomas from T2-weighted MR images.

Methods: In this study, 159 gliomas patients, who underwent non-enhanced MR from the Cancer Genome Atlas (TCGA) data portal, including grade II (n=104) and III (n=55) of gliomas. Patients were divided into training cohorts (n=111) and validation cohorts (n=48) in a ratio of 7:3. Gliomas

were imported into the ITK-SNAP to manually delineate volume of interest (VOI) on T2-weighted images. Each VOI produced 396 radiomics features including Histogram, GLCM, GLSZM, RLM, Form Factor, Haralick. LASSO regression was used for feature screening. A formula was generated using a linear combination of selected features that were weighted by their respective LASSO coefficient. A radiomics score was calculated for each patient by the formula. The predictive accuracy of radiomics signatures was quantified by the area under curve (AUC) of a ROC curve in both cohorts. The calibration degree (CD) of the radiomics was evaluated by Hosmer-Lemeshow test. The clinical usefulness of the radiomics signatures was assessed by decision curve analysis. Result: Four radiomics features with non-zero coefficients were chosen to build a radiomics model that distinguished grade II and III of gliomas with an AUC, sensitivity, specificity and CD of 0.723, 75%, 89% and 0.120 in training cohort; and 0.800, 73%, 82% and 0.561 in the validation cohort, respectively. DCA for the radiomics label showed that if the threshold probability was between 0.17 and 0.99, using radiomics label to distinguish grade II and III of gliomas added more benefit than treating either all or no patients.

Conclusion: The radiomics label can distinguish grade II and III of gliomas, providing a non-invasive technique for assessing the invasiveness and prognosis for gliomas patients.

PO-3825

Integrating intratumoral and peritumoral CT-based radiomics to predict visceral pleural invasion and prognosis in clinical stage IA non-small cell lung cancer: a two-center study

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Objectives: To investigate the value of intratumoral and peritumoral CT-based radiomics in predicting visceral pleural invasion (VPI) and prognosis in clinical stage IA non-small cell lung cancer (NSCLC).

Methods: A total of 325 (training dataset, 158; internal validation dataset, 66; external validation dataset, 101) clinical stage IA NSCLC patients from two hospitals were retrospectively included. Radiomics features were extracted from the gross tumor volume (GTV), gross and peritumoral 3 mm tumor volume (GPTV₃), and gross and peritumoral 9 mm tumor volume (GPTV₉). Optimal radiomics features from three regions of interest were selected to construct GTV, GPTV₃ and GPTV₉ radiomics models, respectively. Multivariate logistic regression analysis was used to determine the independent clinical predictors of VPI and to construct the clinical model. A nomogram was constructed by combining independent clinical predictors with the optimal radiomics features. The area under the curve (AUC) of receiver operating characteristic curve was used to evaluate the diagnostic efficacy of each model.

Results: GPTV₉ radiomics had better predictive performance (AUC: 0.838, 0.810, 0.746 in the training dataset and internal and external validation datasets, respectively) than GTV radiomics (AUC: 0.761, 0.742, 0.642) and GPTV₃ radiomics (AUC: 0.801, 0.756, 0.696). The nomogram (AUC: 0.842, 0.786, 0.758), which consisted of GPTV₉ radiomics, maximum tumor diameter, and pleural indentation, showed a discrimination capability similar to that of GPTV₉ radiomics ($p > 0.05$). High-risk VPI identified by GPTV₉ radiomics or pathological VPI were independently associated with poor overall survival in clinical stage IA NSCLC.

Conclusions: CT radiomics based on intratumoral and peritumoral 9 mm radiomics features could predict VPI and prognosis in clinical stage IA NSCLC.

PO-3826

MRI-based Radiomics for the Differentiation of Stage T1 Rectal Cancers from Rectal Adenomas

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Objective

Accurate differentiation of stage T1 rectal tumors from rectal adenomas facilitates the selection of appropriate clinical treatment. The purpose of this study was to investigate the clinical application of radiomics based on high resolution magnetic resonance T2WI image in the differentiation of early T-stage rectal cancers from rectal adenomas.

Methods

We retrospectively analyzed the patients with pT1 rectal cancers and rectal adenomas who underwent pretreatment MRI and rectal tumor resection between January 2018 and November 2020. The radiomics features were extracted from the high-resolution T2WI, then selected by LASSO algorithm to best predict the pathological results, and the extreme gradient boosting (XGBoost) model was built. As leave-one-out cross validation (LOOCV) was used in the research, the receiver operating characteristic (ROC) curve was obtained.

Results

Of the 64 patients, 14 (21.87%) with rectal adenomas. 1409 features were extracted, and 7 optimal features were selected with LASSO algorithm. For the XGBoost model, the area under the ROC curve (AUC) was 0.813 (95%CI: 0.696, 0.899), sensitivity 78.57%, specificity 90.00%.

Conclusion

The radiomics based on high-resolution T2WI can serve as independent imaging biomarker to differentiate stage T1 rectal tumors from rectal adenomas.

PO-3827

Efficacy of Preoperative MRI-based Deep Learning Model in Diagnosis of Lateral Lymph Node Metastases in Patients with Rectal Cancer

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Background: The presence of lateral pelvic lymph node (LLN) metastasis is an essential prognostic factor in rectal cancer patients. Thus, preoperative diagnosis of LLN metastasis is clinically important to determine the therapeutic strategy. The aim of this study was to evaluate the efficacy of preoperative MRI-based deep learning (DL) model in the diagnosis of LLN metastasis.

Methods: Between January 2017 and May 2023, a total of 253 consecutive individuals were retrospectively obtained. The data were divided into training and validation sets in a 7:3 ratio. An additional 52 patients from a different hospital were considered testing set. T2WI-sequence DL-model were developed using the 3D nn-UNet architecture in tumoral + lateral pelvic regions. Furthermore, the radiomics features were then used to create a Radscore. Receiver operating characteristic (ROC) curve analysis were employed to evaluate the discrimination capabilities of the Radscore and DL-model, respectively.

Results: The DL-model demonstrated significantly superior classification performance to the Radscore in predicting LLN metastasis for all datasets (all $P < 0.05$). T2WI-sequence DL-model showcased an area under the curve (AUC) of 0.863 and an accuracy of 0.875 in the test dataset.

Conclusion: The conventional MRI-based DL model proves to be an accurate method for assessing LLN metastasis in RC. This approach has the potential to enhance clinical decision-making and improve patient care.

PO-3828

Change and evaluation of hippocampal volume and subregion volume before and after refractory seizure control based on artificial intelligence analysis

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Objective To analyze the differences in hippocampal volume and its subregion volume and imaging histology data between epileptic patients and normal controls by artificial intelligence and to predict the morphological changes of the hippocampus after epilepsy control in patients. **Methods** A comprehensive collection of 60 patients with refractory epilepsy who were eligible for the study in our hospital were included in the patient group (RE group), and 60 healthy people at the time of physical examination in our hospital were screened to be included in the control group (HC group), and the RE group was further followed up and evaluated after they received reasonable drug treatment. Thirty eligible patients with refractory epilepsy were included and followed up in the RE group, which was briefly divided into 2 groups based on subsequent seizure control: epileptic patients with no seizures or improved seizures (Group A), and patients with no improvement or progression of seizures during seizures (Group B). All subjects were scanned by a 3.0 TMRI scanner (SINNA Architect, GE, USA) for isotropic T1WI-3D-MPRAGE sequences, and based on the MPRAGE raw images image post-processing and extraction of hippocampal volumes and their subregions was carried out using Artificial Intelligence Segmentation software (FreeSurfer v7.11 was used for this study). volume data. Finally, the diagnostic value of the above data and indicators for refractory epilepsy was evaluated based on the clinical guidelines, and the changes in hippocampal volume and its subregion volume were measured after epilepsy control. **Results** The left hippocampal volume of the patient group (RE group) was significantly smaller than the right hippocampal volume of the same group and the bilateral hippocampal volume of the control group (HC group) (both $P < 0.05$), with the dentate gyrus, CA1 area, CA3 area and the hippocampal umbrella being the most prominent ones; through the follow-up and evaluation of the changes in hippocampal volume and its subregions after two MRI scans before and after the epilepsy control of the patients enrolled in the group, the degree of bilateral hippocampal volume reduction of group A and group B was There was no significant correlation, but there was a significant difference in the degree of hippocampal subregion atrophy between Groups A and B. **Conclusion** The T1WI-3D-MPRAGE sequence, as a non-conventional sequence, can finely display the structural image of brain tissue, and then analyze the hippocampal volume and its subregions by artificial intelligence image segmentation, which is valuable for the diagnosis of refractory epilepsy. After follow-up evaluation, there was no correlation between total hippocampal volume and epilepsy control (Group A and Group B), but there was a significant difference in the volume change of hippocampal subregions (the degree of volume reduction in the dentate gyrus and CA1 region in Group B was significantly higher than that in Group A, $P < 0.05$); therefore, there is a diagnostic value of the structural change of hippocampal subregions in the prognosis of epilepsy patients.

PO-3829

Multiparametric MRI-Based Radiomics Model to Predict Tumor-Stroma Ratio in Prostate Cancer.

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Objective: To develop a multiparametric magnetic resonance imaging (mp-MRI) radiomic feature-based machine learning models to predict the tumor-stroma ratio (TSR) of prostate cancer (PCa). Then constructing a nomogram that combines clinical and mp-MRI parameters to assess the aggressiveness of PCa, thus avoiding overtreatment of indolent PCa and undertreatment of aggressive PCa.

Methods: In this retrospective study, a total of 121 PCa patients confirmed through biopsy were recruited, including 71 low TSR (L-TSR) and 50 high TSR (H-TSR) patients. Regions of interest (ROIs) for PCa were delineated on T2-weighted (T2WI), diffusion-weighted imaging (DWI), and apparent diffusion coefficient (ADC) maps. Patients were divided into training and testing sets in a 7:3 ratio. Five radiomic models were constructed using the Least Absolute Shrinkage and Selection Operator (LASSO) algorithm for feature selection, and then nomograms were created by combining radiomic features and clinical risk factors. Model performances were assessed using Receiver Operating Characteristic (ROC) curves, Decision Curve Analysis (DCA), and DeLong's test.

Results: Compared to other models, the Support Vector Machine (SVC) Model demonstrated superior performance in distinguishing between L-TSR and H-TSR. In the validation and training cohorts, its area under the ROC curve (AUC) was 0.834 [95% confidence interval (CI), 0.791, 0.873] and 0.944 [95% CI, 0.918, 0.968], respectively. The model exhibited a classification accuracy of 0.89 [95% CI, 0.862, 0.928], sensitivity of 0.89 [95% CI, 0.854, 0.933], and specificity of 0.90 [95% CI, 0.856, 0.942]. Decision Curve Analysis indicated that this radiomic model possesses strong clinical utility.

Conclusions: The mp-MRI-based radiomics model is capable of accurately predicting the TSR of PCa and may serve as an effective tool for assisting in risk stratification and guiding treatment decisions.

PO-3830

Deep Learning Models for Preoperative T-Stage Assessment in Rectal Cancer Using MRI: Exploring the Impact of Rectal Filling

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Background: The objective of this study was twofold: firstly, to develop a convolutional neural network (CNN) for automatic segmentation of rectal cancer (RC) lesions, and secondly, to construct classification models to differentiate between different T-stages of RC. Additionally, it was attempted to investigate the potential benefits of rectal filling in improving the performance of deep learning (DL) models.

Methods: A retrospective study was conducted, including 317 consecutive patients with RC who underwent MRI scans. The datasets were randomly divided into a training set (n=265) and a test set (n=52). Initially, an automatic segmentation model based on T2-weighted imaging (T2WI) was constructed using nn-UNet. The performance of the model was evaluated using the dice similarity coefficient (DSC), the 95th percentile Hausdorff distance (HD95), and the average surface distance (ASD). Subsequently, three types of DL-models were constructed: Model 1 trained on the total

training dataset, Model 2 trained on the rectal-filling dataset, and Model 3 trained on the non-filling dataset. The diagnostic values were evaluated and compared using receiver operating characteristic (ROC) curve analysis, confusion matrix, net reclassification index (NRI), and decision curve analysis (DCA).

Results: The automatic segmentation showed excellent performance. The rectal-filling dataset exhibited superior results in terms of DSC and ASD ($P=0.006$ and 0.017). The DL-models demonstrated significantly superior classification performance to the subjective evaluation in predicting T-stages for all test datasets (all $P<0.05$). Among the models, Model 1 showcased the highest overall performance, with an area under the curve (AUC) of 0.958 and an accuracy of 0.962 in the filling test dataset.

Conclusions: This study highlighted the utility of DL-based automatic segmentation and classification models for preoperative T-stage assessment of RC on T2WI, particularly in the rectal-filling dataset. Compared with subjective evaluation, the models exhibited superior performance, suggesting their noticeable potential for enhancing clinical diagnosis and treatment practices.

PO-3831

Is Double-Low CTA of Renal Artery with Deep Learning Image Reconstruction Algorithm Better than Traditional CTA with Iterative Reconstruction Algorithm?

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Objective: To assess whether the deep learning image reconstruction(DLIR) can assist in double-low CT angiography(DLCTA) scans of renal artery to reach the comparable image quality of traditional CTA.

Materials and Methods: Forty-two patients suspicious of renal arterial lesion were scanned with bolus tracking technique, five in DLCTA group(80 kV, noise index of 24, automatic current modulation(200-600mA), DLIR algorithm and 40 ml contrast agent with injection rate of 4 ml/s) and thirty-seven in traditional CTA group(120 kV, automatic current modulation(average 113 mAs), level 3 of iDose4, 70 ml contrast agent with the same injection rate).CT values and standard deviations(SD) of abdominal aorta, subcutaneous adipose tissue(SAT), proximal and distal segments of bilateral renal artery at the level of renal hilus, upper and lower segmental renal arteries of left and right kidneys were measured to calculate signal noise ratio(SNR, $SNR=CT \text{ value}/SD$). SD of SAT was defined as background noise. CTDI and Dose length product(DLP) was recorded. Images were reviewed by two radiologists using a 4-point scale(1.poor;2.moderate;3.good;4.excellent). Student's t-test and Mann Whitney U test were used to analyze the differences between 2 groups.

Results: The CTDI and DLP of DLCTA group were significantly lower, compared to traditional group(2.15 vs. 16.9 mGy, 81.24 vs. 753.93mGy·cm, $p<0.001$ for both). SD of SAT had no difference between two groups(10.83 vs. 10.47, $p=0.935$). The SNRs of proximal segments of bilateral renal artery, upper and lower segmental renal arteries of left and right kidneys in DLCTA were significantly higher than those of traditional CTA($p<0.05$ each). No difference in subjective assessment was observed between two groups(3.70 vs. 3.78, $p>0.05$).

Conclusion:Double-low CTA of renal artery with DLIR provides better image quality and patient care.

Clinical Relevance: The advantages are faster scan speed, realized joint scanning and better image quality for the deep learning algorithm of low dose renal artery CTA of Ge wide body CT, comparing with that of conventional Philips renal artery CTA, which can improve doctors' rate of diagnosis, reduce the radiation dose and contrast agent dosage of patients, and reduce the burden of liver and kidney of patients.

PO-3832

The superiority of Low-kV Renal Triphasic-enhanced CT with Deep Learning Image Reconstruction in Patient Care over Conventional enhanced CT exam

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Objective: To evaluate whether the deep learning image reconstruction(DLIR) can provide more patient care through the reduction of radiation dose and contrast agent volume for renal enhanced CT exam.

Materials and Methods: Fifty-four patients suspicious of renal lesion were included, twenty-four in DLIR group and thirty in conventional enhanced CT(CECT) group. The parameters for DLIR group: rotation speed of 0.5 s, collimation of 128×0.625 mm, pitch of 0.992:1, 50% ASIR-V, noise index(NI) of 9, automatic current modulation, standard kernel, 100 kV and mA range of 100-550 in arterial phase(AP and excretion phase(EP) and 120 kV and mA range of 150-500 in parenchymal phase(PP); retrospective algorithm of DLIR . The volume and injection rate of contrast agent(320 mgI/ml) were 0.9 ml/kg and 3 ml/s. In CECT group:120 kV, 281 mAs, collimation of 128×0.625 mm, pitch of 0.914:1, level 3 of iDose4, standard(B) filter for all phases. The volume and injection rate of contrast agent(320 mgI/ml) were 1.2 ml/kg and 2.7 ml/s. CT values and standard deviations(SD) of cortex, medulla, subcutaneous adipose tissue(SAT) on AP, parenchyma, pelvis and psoas muscle(PM) and SAT on PP, middle calyx(MC), upper ureter and middle ureter on EP were measured to calculate signal noise ratio(SNR) and contrast noise ratio(CNR). SD of SAT was defined as background noise. Images were assessed by two readers using a 4-point scale(1.poor;2.moderate;3.good;4.excellent). CTDI and Dose length product(DLP) was recorded. Student's t-test and Mann Whitney U test were used to analyze the differences between 2 groups.

Results: There was no difference in BMI between two groups(24.7 vs. 23.4, $p>0.05$). CTDI, DLP and contrast agent volume of DLIR group were significantly lower than those of CECT group(23.7 vs. 70.8 mGy, $p<0.001$; 744.1 vs. 2197.4 mGy·cm, $p<0.001$; 63 vs. 77.8 ml, $p<0.001$). SNR of parenchyma and upper ureter and CNR of cortex to medulla in DLIR group were significantly higher than those in CECT group(10.83 vs. 7.52; 19.45 vs. 7.12; 11.83 vs. 6.59; $p<0.001$ each). SD of SAT was lower in DLIR group, compared to CECT(9.08 vs. 11.11, $p<0.001$). No differences in subjective scores were observed between two groups.

Conclusion:Low-kV enhanced CT exam combined with DLIR algorithm is a feasible method for better patient care, compared to conventional enhanced CT exam.

Clinical Relevance: The scan speed is faster and image quality is better for the deep learning algorithm of low-dose renal three-phase scan of Ge revolution 256 row wide body CT than that of conventional renal three-phase scan of Philips 256 row CT, which could significantly reduce the radiation dose and contrast agent dosage of patients, and reduce the burden of liver and kidney of patients.

PO-3833

Establishment and validation of machine learning models predicting the rapid progression of interstitial lung disease in patients with idiopathic inflammatory myopathy based on quantitative HRCT, a single-center, prospective, cohort study

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Background:

This study aims to establish and validate machine learning models to predict rapidly progressive interstitial lung disease (RP-ILD) in patients with idiopathic inflammatory myopathy-related interstitial lung disease (IIM-ILD) based on quantitative high-resolution CT (HRCT) and clinical features.

Material and Methods:

We collected clinical information and HRCT images from a total of 514 patients with IIM-ILD, out of which 249 cases were identified as RP-ILD. To quantify the HRCT features, deep learning methods were employed along with demographic factors, pulmonary function test results, and blood gas analysis results. These factors were integrated into a final prediction model that was fitted using a logistic regression approach.

Results:

Logistic regression was chosen as the final model due to its superior AUC and explainability. The validation dataset yielded an AUC of 0.882, which outperformed both the HRCT-only model and the clinically-only model. In calibration and clinical decision curve analysis, the final model demonstrated minimal prediction bias and provided greater net benefit compared to the HRCT-only or clinical models across most thresholds. The nomogram encompassed the incorporation of the following variables: subtype, gender, FEV1%, DLCO%, OI, and quantitative HRCT features of ground glass and consolidation.

Conclusion:

When utilizing machine learning techniques, the baseline quantitative HRCT has the potential to predict RP-ILD in patients with IIM-ILD. The performance of this prediction can be further improved by incorporating clinical information alongside the HRCT features. By combining the two sources of data, a more accurate and comprehensive prediction model can be developed.

Key message:

Logistic regression is the recommended model with the highest performance and explainability.

Five clinical factors and four quantitative features are involved in the final prediction model for RP-ILD in patients with IIM.

The combined clinical and quantitative HRCT features are superior to the only clinical model or only quantitative feature model.

PO-3834

Deep-Learning based quantitative high resolution computed tomography in prediction of rapid progression of idiopathic inflammatory myopathies-related interstitial lung disease

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Background:

This study aims to utilize deep learning-based quantitative scores derived from high-resolution CT (HRCT) scans to predict the rapid progression of interstitial lung disease (ILD) in patients with Anti-synthase syndrome (ASS) and anti-MDA5-positive dermatomyositis (MDA-5).

Material and Methods:

A cohort of 514 inpatients diagnosed with ILD related to ASS or MDA-5 (367 females, median age 54 years) between January 2016 and December 2021 were included. These patients underwent at least one HRCT and had available information on their rapid progressive interstitial lung disease (RP-ILD) status. GGO and consolidation on HRCT were automatically segmented and quantified using a deep-learning algorithm. Logistic regression analysis and Spearman's correlation were employed to assess the association between these quantitative scores and the RP-ILD status of patients with ASS or MDA-5.

Results:

Among 514 IIM-ILD patients, 249 patients suffered from an RP-ILD (165 females, median age 55 years). After adjusting for age and sex, it was found that out of the 112 assessed features of ground glass opacities (GGO) and consolidation on the baseline HRCT, 83 features showed an association with RP-ILD. Furthermore, quantitative GGO and consolidation were found to have negative correlations with pulmonary function tests and blood gas variables, specifically vital capacity and carbon monoxide diffusing capacity. Additionally, a potential dose-response relationship was identified between the percentage of consolidation in both lungs and RP-ILD, with approximately 3.0% being identified as the potential threshold for change.

Conclusion:

DL-based quantitative HRCT of GGO and consolidation is associated with RP-ILD in patients with MDA5 or ASS. Furthermore, a negative correlation between quantitative HRCT of GGO and consolidation and pulmonary function was confirmed.

PO-3835

Deep-learning based detection model of small pancreatic cystic lesions on contrast-enhanced CT

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With the rapid progression of radiological technology, the detection rate of pancreatic cystic lesions (PCLs) has been increasingly augmented, and particularly the small cysts (<1cm) are being observed more frequently during examinations. Though in clinical practice, small cysts are prone to being overlooked, which poses a significant challenge for radiologists. Consequently, we have proposed an artificial intelligence model specifically capable of automatically detecting cysts and segmenting both the pancreas and the cysts. The model incorporates dual-phase imaging

information and includes a comprehensive dataset consisting of pancreatic images with diverse characteristics, demonstrating proficient and robust performance in both detection and segmentation.

PO-3836

Spatial Structural Abnormality Maps Driving Cognitive Impairment and Physical Disability in Multiple Sclerosis

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Purpose

Multiple sclerosis (MS) is a chronic inflammatory neurodegenerative disease characterized by demyelinating lesions and diffuse microstructural damage in normal-appearing white matter (NAWM) and gray matter (GM). A comprehensive understanding of MS pathological heterogeneity is important for the development of stratified medicine approaches and individually tailored management. Several studies have attempted to interpret MS pathological heterogeneity by categorizing patients into subtypes with different levels of cognitive decline, clinical disability, and disease progression using pre-engineered features. However, a priori defined features may omit relevant voxel-level information needed for spatial correlation patterns to explain individual-level clinical features. Deep learning can utilize individual whole-brain voxel-level features without a priori assumptions, and has been successfully used in differential diagnosis tasks (e.g., MS versus mimics). Based on these studies, we hypothesized that the potential contribution of each voxel to the pathology of MS derived from the diagnostic model may provide information on disease-associated abnormalities at the individual level that could help interpret differences in levels of cognitive and physical disability.

Methods

Four datasets were used in this study. The development of the deep learning algorithm for SAM definition was based on a multicenter retrospective cohort (Dataset 1) with 189 MS patients and 316 HCs. An additional 50 HCs from Dataset 2 (a single-center MS retrospective cohort) were also used as the reference in the deep learning algorithm development phase. The developed algorithm was then applied to 92 MS patients from Dataset 2 at our local institute. Internal and external validations of the findings were performed using a prospectively designed cohort (Dataset 3), consisting of 33 MS patients at our local institute, and a dataset (Dataset 4 with 56 MS patients) from an independent center. Clinical baseline data, including age, sex, years of education, disease duration, number of relapses, EDSS score and medication information, were recorded. Clinical follow-up, including EDSS scores and assessments of conversion to secondary progressive MS (SPMS), was performed in a subgroup of patients. Cognitive tests included the Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA), California Verbal Learning Test, Third Edition (CVLT-III), Brief Visuospatial Memory Test-Revised (BVM-T-R) and Paced Auditory

Serial Addition Test (PASAT). MR imaging, including 3D T1W and 2D or 3D FLAIR imaging, was performed.

We used isotropic 3D T1W images to train a 3D nnU-net model for the task of distinguishing MS (from Dataset 1) from HCs (from Datasets 1 and 2). The strategy in our model involved labeling MS as 1 and HCs as 0 at the voxel level instead of at the individual level in the training set (80% of the cases: 151 MS patients and 293 HCs). This approach allowed us to predict the voxel-wise probability of MS on T1-weighted images. The diagnostic model was tested in the remaining cases (38 MS patients and 73 HCs; accuracy, 97%; area under the curve, 0.99). In this study, we focused on voxel-wise predicted probability and defined it as MS-related SAM. Using this model, we obtained the SAMs of all the patients in the other three datasets. We applied spectral clustering to Dataset 1 ($n = 189$) to identify distinct SAM clusters using a custom script in MATLAB. We defined MS subtypes with distinct predominant SAM patterns according to the maximum regression coefficient, which reflects the largest contribution of the corresponding SAM pattern to the individual binarized SAM. Virtual histology, which is an approach that correlates, in standard space, an MRI-derived profile, such as an interregional SAM profile (that is the SAM values across brain regions), with interregional profiles of cell-specific gene expression (i.e., gene expression across brain regions) was conducted.

Statistical analyses were conducted using R software. Differences among MS subtypes were assessed using the Kruskal–Wallis test, followed by post-hoc comparisons with FDR correction (two-sided $P < 0.05$), for structural metrics (e.g., WMH volume, brain tissue volumes) and clinical variables (e.g., age, sex, disease duration, number of relapses, cognitive scores, and EDSS) after adjusting for age and sex. The TIV was additionally adjusted for brain tissue volume.

Kaplan–Meier analysis was conducted to investigate disease progression (EDSS progression and SPMS conversion) in the SAM subtypes. The log-rank test was used for between-group comparisons. Statistical significance was defined as an uncorrected two-sided $P < 0.05$, and additional FDR-corrected P -values were also acquired.

We performed a series of sensitivity and validation analyses to interpret the main findings of this study.

Results

Using the deep learning-derived individual SAMs, we identified six distinct SAM clusters: (1) a Frontal-I pattern (predominant in 54/281 patients, 19.2%) that mainly involved the medial and anterior surfaces of the frontal lobe; (2) a Frontal-II pattern (predominant in 41/281 patients, 14.6%) that mainly involved the deep frontal lobe; (3) a Temporal-Cerebellar pattern (predominant in 38/281 patients, 13.5%) that mainly involved the temporal lobe and parts of the cerebellum; (4) an Occipital pattern (predominant in 91/281 patients, 32.4%) that mainly involved the occipital lobe; (5) a Subcortical pattern (predominant in 55/281 patients, 19.6%) that mainly involved the subcortical GM (e.g., thalamus and deep white matter); and (6) a Diffuse Cortical pattern (predominant in 2/281, 0.7%) that mainly involved the outer surface of brain cortical areas. We assigned subjects to clusters based on the predominant SAM patterns. Because only two patients with MS were categorized into the Diffuse Cortical subtype, this subtype was excluded from further analysis.

No differences in sex distribution were observed among the subtypes. The patients in the Temporal-Cerebellar subtype were older than those in the Subcortical subtype ($pFDR = 0.035$). The Occipital subtype showed a larger number of relapses than the Frontal-I ($pFDR = 0.0032$), Frontal-II ($pFDR = 0.021$) and Subcortical ($pFDR = 0.0032$) subtypes. Compared with HCs, all subtypes showed lower MMSE scores, of which the Frontal-II ($pFDR = 0.016$) and Occipital ($pFDR = 0.023$) subtypes showed lower MMSE scores compared with the Frontal-I subtype. Compared with HCs, the Temporal-Cerebellar subtype showed lower CVLT and BVRT scores, which were also lower than in the Frontal-I ($pFDR = 0.00039$ and 0.000022), Occipital ($pFDR = 0.0076$ and 0.0013) and Subcortical ($pFDR = 0.00024$ and 0.0058) subtypes. Compared with HCs, all subtypes showed low PASAT scores, but no significant difference was observed among the subtypes. The Temporal-Cerebellar subtype showed a higher baseline EDSS score than the Frontal-I ($pFDR = 0.024$) and Subcortical ($pFDR = 0.022$) subtypes. The Occipital subtype (median progression time: 63 months) displayed a higher risk of EDSS score progression than the Frontal-I subtype (median progression time unavailable, uncorrected $P = 0.022$, $pFDR = 0.073$). The Frontal-II (median

progression time: 61 months, uncorrected $P = 0.036$, $pFDR = 0.090$), Occipital (uncorrected $P = 0.006$, $pFDR = 0.060$) and Subcortical (median progression time: 64 months, $P = 0.014$, $pFDR = 0.070$) subtypes showed higher risks of EDSS score progression than the Temporal-Cerebellar subtype (median progression time: 93 months). The Frontal-II (median conversion time: 107 months, uncorrected $P = 0.028$, $pFDR = 0.070$), Occipital (median conversion time: 70 months, uncorrected $P = 0.009$, $pFDR = 0.045$) and Subcortical (median conversion time unavailable, uncorrected $P = 0.037$, $pFDR = 0.074$) subtypes showed higher risks of SPMS conversion than the Frontal-I subtype (median conversion time unavailable). The Occipital (uncorrected $P = 0.003$, $pFDR = 0.030$) and Subcortical subtypes (uncorrected $P = 0.015$, $pFDR = 0.050$) showed higher risks of SPMS conversion than the Temporal-Cerebellar subtype (median conversion time: 118 months).

The Frontal-I subtype showed lower gene expression in endothelial cells (averaged correlation $R = -0.054$, $pFDR = 0.0009$) and microglia ($R = -0.100$, $pFDR < 0.00001$), and higher gene expression in interneurons ($R = 0.056$, $pFDR < 0.00001$) and S1 pyramidal neurons ($R = 0.010$, $pFDR < 0.00001$). The Frontal-II subtype showed lower gene expression in endothelial cells ($R = -0.064$, $pFDR = 0.00001$) and higher gene expression in CA1 pyramidal neurons ($R = 0.049$, $pFDR < 0.00001$), interneurons ($R = 0.040$, $pFDR = 0.00018$) and S1 pyramidal neurons ($R = 0.060$, $pFDR = 0.00001$). The Temporal-Cerebellar subtype showed higher gene expression in astrocytes ($R = 0.040$, $pFDR = 0.0050$) and CA1 pyramidal neurons ($R = 0.031$, $pFDR = 0.0050$). The Occipital subtype showed lower gene expression in endothelial cells ($R = -0.056$, $pFDR = 0.00075$), microglia ($R = -0.110$, $pFDR < 0.00001$) and oligodendrocytes ($R = -0.047$, $pFDR = 0.0014$), and higher gene expression in S1 pyramidal neurons ($R = 0.071$, $pFDR < 0.00001$). The Subcortical subtype showed higher gene expression in astrocytes ($R = 0.055$, $pFDR = 0.000018$), CA1 pyramidal neurons ($R = 0.078$, $pFDR < 0.00001$), interneurons ($R = 0.056$, $pFDR < 0.00001$), microglia ($R = 0.039$, $pFDR = 0.00024$), oligodendrocytes ($R = 0.068$, $pFDR < 0.00001$), and S1 pyramidal neurons ($R = 0.067$, $pFDR < 0.00001$).

Sensitivity analysis showed consistent SAM clustering patterns using different thresholds for SAM binarization and voxel removal for calculation efficiency. The validation findings were consistent with the main findings, although there were fewer cases of the Temporal-Cerebellar subtype in the validation dataset. A subset of patients ($n = 180$) at an early disease phase (duration less than 3 years) confirmed the distinct disease pathologies driving these subtypes that may be independent of disease duration. Follow-up scans in a subset ($n = 28$) were used to explore the stability of the MS subtypes and potential conversions between subtypes within 4 years. Approximately 57% (16/28) of the patients showed a stable longitudinal trajectory within the first 2 years, and then showed conversions among subtypes in the late course of the disease (more than 2 years), especially among the Frontal-II and Occipital subtypes (7/28, 25%).

Conclusion

We proposed a novel MS-related SAM and categorized MS patients into distinct SAM subtypes with distinct virtual histologies that may drive cognitive impairment and physical disability. This subtyping can be generalized to multiple datasets and validated in a longitudinal cohort. The current findings provide a novel deep-learning-based pipeline for disease subtyping and should help interpret disease-associated disability and contribute to stratified medicine and prognosis for MS.

PO-3837

Effect of Coefficient of Determination (R^2) on the Accuracy of CMRtools Software in Diagnosing Liver Iron Concentration in Thalassemia Patients

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OBJECTIVE: To investigate the effect of the coefficient of determination (R^2) on the accuracy of the CMRtools software for quantifying liver iron concentration (LIC), with reference to the liver iron concentration report by FerriScan®/MRI-R2 (LIC_F). **METHODS:** We measured hepatic T2* values in 108 patients with thalassemia by CMRtools software and imputed LIC_T by Garbowski formula and subsequently compared LIC_T with LIC_F to calculate the diagnosis agreement for different R^2 range subgroups. **RESULTS:** There was no significant difference in diagnostic accuracy among different echo arrays ($p>0.05$). There was a statistically significant difference in the correct diagnostic rate for the determination coefficient R^2 groups ($p<0.001$) and the LIC_F groups ($p<0.001$). The result indicated that as the R^2 value increased, the more correct the diagnosis was. The normal LIC_F group had the highest correct diagnostic rate, the moderate LIC_F had the lowest correct diagnostic rate, and the super-severe group was 2nd lowest. **CONCLUSION:** CMRtools is an excellent classifier for diagnosing the occurrence of iron overload in the liver and is effective in distinguishing different levels of LIC; different LIC and different R^2 values affect the correct diagnostic rate of CMRtools, but there are no statistical basis for suggesting specific effects.

PO-3838

Performance Evaluation of Large Language Models in Radiology domain: A Comparative Study of ChatGPT-4, GPT-3.5, Bing, and Bard in Chinese Language Context

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Background and Purpose: Large language models (LLMs) such as ChatGPT have demonstrated promising results in various domains, including radiology. However, their performance in specific radiology scenarios, particularly in the context of the Chinese language, remains largely unexplored. This study aims to assess the performance of GPT-4 in several distinct radiology scenarios and compare it with other LLMs, including GPT-3.5, Bing and Bard.

Methods: We employed a prospective study design, utilizing a series of tasks to evaluate the performance of GPT-4 in different radiology scenarios. These scenarios included preparation for imaging tests, simplification of radiology reports, automate RADS classification, determination of radiological study and protocol, error detection in reports, clinical information summarization, impression generation and the construction of personalized radiology curriculum. To ensure a robust comparison, the performance of GPT-4 was benchmarked against other prominent LLMs. Each model was evaluated independently across all scenarios, and their performances were recorded for subsequent analysis. The statistical methods used in this study included descriptive statistics, chi-square tests for categorical variables, and t-tests for continuous variables. The level of statistical significance was set at $p<0.05$. All statistical analyses were performed using the latest version of the R statistical software.

Results: When being used as assistant for preparation for imaging tests, GPT-4 answered 25 questions with 22 (88%) correct, 2 (8%) partially correct, and 1 (4%) incorrect. Bing answered the same set of questions with 20 (80%) correct, 3 (12%) partially correct, and 2 (8%) incorrect. GPT-3.5 answered 18 (72%) correctly, 4 (16%) partially correct, and 3 (12%) incorrect. Bard answered 17 (60%) correctly, 5 (20%) partially correct, and 5 (20%) incorrect. In the simplification of radiology reports task, 5 radiologists assessed the simplified reports generated by LLMs. The majority of radiologists agreed that the simplified reports made by GPT-4 were factually correct, complete, and not potentially harmful to the patient, with an agreement rate of 90%. This was superior to the agreement rates for Bing and GPT-3.5 (80%), Bard (64%). GPT-4 achieved an overall accuracy rate (including correct and partially correct answers) of 90% in automate RADS classification task, outperforming Bing (84%), GPT-3.5 (80%) and Bard (68%). For determination of the best radiological study and protocol based on patients' clinical information, GPT-4 demonstrated an 88% agreement with the radiologists' decisions, close to Bing (84%), surpassing GPT-3.5 (76%) and Bard (64%). GPT-4 successfully identified 90% of the errors in radiology reports in the error detection task, outperforming GPT-3.5 and Bing (84%), Bard (64%). In summarizing clinical information, GPT-4 and Bing achieved an accuracy rate of 90%, superior to GPT-3.5 (80%) and Bard (72%). GPT-4 achieved a correct rate of 92% when being applied in generating impressions from findings of reports, exceeding Bing (84%), GPT-3.5 (76%) and Bard (56%). The analysis revealed that the performance of GPT-4 was significantly superior to the other LLMs in most tasks. GPT-4 is more likely to provide correct or partially correct answer than Bard, approximately by 1.5 folds (OR=1.55, p=0.004).

Conclusion: Despite no radiology-specific pretraining, LLMs showed high performance in various radiology scenarios, especially GPT-4, demonstrating its potential as a powerful tool in radiology practice and education. However, it is essential to acknowledge its limitations and continue to refine its performance in specific scenarios. Further studies are needed to maximize the potential of LLMs in radiology and other medical domains.

PO-3839

MAN-GAN: A Mask-Adaptive Normalization based Generative Adversarial Networks for liver multi-phase CT image generation

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Background

Liver multi-phase enhanced computed tomography (MPECT) plays a vital role in the whole clinical practice regarding managing various liver disease, but limited by several conditions.

Purpose

To construct a deep learning network for automatically generating MPECT images only using plain CT images.

Method and Materials

Three liver MPECT datasets from two institutions were collected. Dataset 1 included 374 patients, and was divided into three parts, i.e., training set (224 patients), validation set (75 patients) and test set (75 patients). Dataset 2 included 144 patients with one specific liver diseases and was used as internal test dataset. To verify the generalization ability of the proposed model, we further collected another dataset with 83 MPECT patients for external validation. Then, we propose a Mask-Adaptive Normalization based Generative Adversarial Networks with Cycle-Consistency Loss (MAN-GAN) to achieve plain CT to MPECT translation. Two subjective radiologists' evaluation studies were performed to verify the clinical useful of our generated images.

Results

Our proposed MAN-GAN network outperformed the baseline network and other state-of-art methods in all generations of three phases, evaluated by PSNR and SSIM. The promising results were verified in internal and external datasets. In the quality analysis, the image quality of generated PVP phase images is above average (>4), and that of generated AP, DP phase images are also acceptable, nearly above average for clinical diagnosis (>3). Moreover, the similarities between real images and generated images in all three phases are all over 80.

Conclusion

Our proposed MAN-GAN verifies the feasibility of liver MPECT images translation based on plain images only and achieves a state-of-art performance using the subtraction strategy. Our method has great potential in solving the dilemma of liver CT contrast canning and aiding the further liver-interaction clinical scenarios.

PO-3840

Computed Tomography-derived intratumoral and peritumoral radiomics in predicting EGFR mutation in lung adenocarcinoma

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Objective: To investigate the value of Computed Tomography (CT) radiomics derived from different peritumoral volumes of interest (VOIs) in predicting epidermal growth factor receptor (EGFR) mutation status in lung adenocarcinoma patients.

Materials & Methods: A retrospective cohort of 779 patients who had pathologically confirmed lung adenocarcinoma were enrolled. 640 patients were randomly divided into a training set, a validation set, and an internal testing set (3:1:1), and the remaining 139 patients were defined as an external testing set. The intratumoral VOI (VOI_I) was manually delineated on the thin-slice CT images, and seven peritumoral VOIs (VOI_P) were automatically generated with 1, 2, 3, 4, 5, 10, and 15mm expansion along the VOI_I. 1454 radiomic features were extracted from each VOI. The t-test, the least absolute shrinkage and selection operator (LASSO), and the minimum redundancy maximum relevance (mRMR) algorithm were used for feature selection, followed by the construction of radiomics models (VOI_I model, VOI_P model and combined model). The performance of the models were evaluated by the area under the curve (AUC).

Results: 400 patients were classified as EGFR mutant (EGFR+), while 379 were wild-type (EGFR-). In the training and validation sets, internal and external testing sets, VOI4 (intratumoral and peritumoral 4mm) model achieved the best predictive performance, with AUCs of 0.877, 0.727 and 0.701, respectively, outperforming the VOI_I model (AUCs of 0.728, 0.698 and 0.653, respectively). **Conclusions:** Radiomics extracted from peritumoral region can add extra value in predicting EGFR mutation status of lung adenocarcinoma patients, with the optimal peritumoral range of 4 mm.

PO-3841

Noninvasive diagnostic models based on CT scans for differentiating solitary pulmonary metastasis in colorectal cancer patients by artificial intelligence: a multicenter study

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Background: Indeterminate solitary pulmonary nodules are often encountered on CT scans, and diagnosis of solitary pulmonary metastasis (PM) is important for patients with colorectal cancer (CRC).

Purpose: To build and validate proper noninvasive artificial intelligence diagnostic models based on routine chest CT for solitary PM in CRC patients.

Methods: All patients (n=212) with pretreated solitary CRC PM on chest CT were reviewed in the local database in Zhejiang Cancer Hospital between 2012 and 2022, and randomly divided into the training or internal validation groups on 7: 3. A total of 185 patients with pretreated T1 stage primary lung cancer and 256 patients with benign solitary pulmonary nodules were randomly selected. Artificial intelligence models based on machine learning (Decision Tree, Extra Trees, Light GBM, Radom Forest, Support Vector Machine, XGBoost) and deep learning were built to classify the solitary pulmonary nodules as PM, benign lesion or primary lung cancer. External validation group included 44 CRC patients with solitary PM from two independent hospitals.

Results: For classification between PM and benign solitary pulmonary nodule, the machine learning model based on support vector machine showed the best diagnostic ability, with a 0.995 area under the curve (AUC) in the internal validation, a 0.977 AUC in external validation. The deep learning model showed a 0.966 AUC in the internal validation, and 0.893 AUC in external validation. For classification between PM and lung cancer, the best machine learning model based on support vector machine showed a 0.991 AUC in internal validation and the deep learning model showed a 0.949 AUC.

Conclusions:Non-contrast CT based radiomic analyses can be useful for noninvasively differentiating solitary PM and benign pulmonary nodule or primary T1 stage lung cancer which can aid clinical decision in CRC patients with indeterminate solitary pulmonary nodules detected by CT

PO-3842

Prediction of long-term functional prognosis using a machine learning model with lesion spatial information in acute ischemic stroke

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Background and purpose: Early prediction of long-term functional prognosis is needed for acute ischemic stroke (AIS) patients to assist in making accurate treatment decisions. The aim of this study is to develop a machine learning model with lesion spatial information (LSI) to predict more accurately using diffusion-weighted imaging (DWI).

Methods: The LSI features were extracted from DWI images to develop the LSI model and predict poor long-term functional prognosis. 295 AIS patients were retrospectively collected as dataset 1 and 81 AIS patients were prospectively collected as an independent external dataset 2. The modified Rankin Scale score at 90 days (mRS-90) was used to evaluate patients' long-term

functional prognosis. The predictive performance of the LSI model was compared with those of DWI radiomics (DR) model, clinical model, and combined model.

Results: The AUC of the LSI model was higher than that of the DR model, but not significantly different (0.745 vs 0.732 in the training cohort, $P=0.718$; 0.731 vs 0.713 in the internal validation cohort, $P=0.773$; 0.729 vs 0.634 in the external validation cohort, $P=0.258$). The combined model with the most preferable AUC (0.887 in the training cohort; 0.878 in the internal validation cohort; and 0.788 in the external validation cohort).

Conclusions: Predictive performance of LSI features was equivalent to DR features. The integration of LSI in the prognostic model can improve the efficacy, which can provide a valuable reference for clinical healthcare of AIS patients.

PO-3843

Synthetic T2WI generated from b0 diffusion-weighted imaging using Hybrid-Fusion Network

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Background: More information obtained from diffusion-weighted imaging (DWI), a common examination used to evaluate acute ischemic stroke, allows for a more accurate assessment of episodic lesions.

Purpose: To investigate if Hybrid-Fusion Network (Hi-Net) can recover T2-weighted scans from b0 DWI.

Materials and methods: In this retrospective study of head MRI performed from 1 September 2023 to 7 September 2023, simulated conventional DWI and corresponding T2WI were acquired. All images (1098 images) were divided into the training set (878 images) and the verification set (220 images) according to the ratio of 8 to 2. After the training set is preprocessed, including rotation, inversion, cropping and generating 8 images, Hi-Net were then trained to recover the T2WIs from the b0 DWIs. The synthetic T2WI (sT2WI) fitted from DWIs in the validation set were generated. Mean square error (MSE), peak signal-to-noise ratio (PSNR), structural similarity (SSIM) and normalized root-mean-square error (NRMSE) were used to evaluate the quality of vT2WI.

Results: After 4000 epoch training, the generated sT2WIs were compared with the original T2WIs. The mean values of the indexes were MSE, 0.00817, SSIM, 0.71258, PSNR, 21.18140 and NRMSE, 0.46591, respectively.

Conclusion: Hi-Net may be useful to enable the synthetic generation of T2WIs based on b0 DWIs to provide more information for the clinic.

PO-3844

Predicting the growth of sub-centimeter sub-solid pulmonary nodule within two years

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Objective: The purpose of this study was to combine clinical information and computer tomography (CT) based radiomics to establish models for predicting whether sub-centimeter subsolid pulmonary nodules (SCSSNs) will grow within 2 years.

Methods: Based on the inclusion and exclusion criteria, 726 CT scans of 253 SCSSNs were included, including 331 growth and 395 stable within 2 years. All scans were randomly divided into the training ($n=508$) and validation ($n=218$) group in the ratio of 7:3. The least absolute shrinkage

selection operator algorithm was used to select radiomics features and establish radiomics signature (RS). Subsequently, using clinical features and RS establish a fusion model for predicting whether SCSSNs will grow within 2 years. The performance of the models was assessed using the receiver operating characteristic curve (ROC) and the area under the curve (AUC). Delong test was used to compare the differences in AUC of different models. Calibration curves and clinical decision curves were used to evaluate the predictive accuracy and clinical utility of the models, respectively.

Results: In the training group, the AUC of the clinical model, radiomics model, and fusion model were 0.763, 0.888, and 0.914, respectively; and in the validation group, the AUC of the clinical model, radiomics model, and fusion model were 0.720, 0.809, and 0.892, respectively. Delong test showed that the fusion model outperformed the other two models, and the fusion model predicted values overlapped with the standard baseline in the calibration curve, and the fusion model had the highest net profit in the decision curve.

Conclusion: The fusion model based on clinical information and radiomics can effectively predict whether SCSSNs will grow within 2 years and thus optimize the patient's management plan.

PO-3845

Prognostic prediction of acute posterior circulation ischemic stroke after mechanical thrombectomy based on DWI radiomics

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Objective: To investigate the value of DWI radiomics features in predicting the prognosis of acute posterior circulation ischemic stroke, and to study the performance improvement of the prognostic prediction model combining radiomics features compared with the prognostic score alone.

Methods: A retrospective analysis was performed on 68 patients with acute posterior circulation ischemic stroke who received mechanical thrombectomy in Xi'an First Hospital from July 2021 to April 2023. All patients underwent diffusion-weighted imaging (DWI) examination within 24h of onset and before treatment. According to the modified Rankin Scale (mRS) score, the patients were divided into good prognosis (mRS ≤ 2) (n=41) and poor prognosis (mRS > 2) (n=27) outcome groups. The general clinical data of the patients were collected and the National Institutes of Health Stroke Scale (NIHSS) was used for pre-treatment scoring. Two doctors manually delineated the infarct area layer by layer on the DWI image through the United Imaging Intelligence's one-stop research platform, and radiomics features were extracted. The data were randomly divided into a training set and a test set according to 8:2. The correlation coefficient ($P > 0.05$), recursive feature elimination with cross-validation (RFECV) (Top 30), and the least absolute shrinkage selection operator (LASSO) algorithm were used to select the optimal radiomics features in the training set. Then, the 5-fold cross-validation strategy and Bagging decision tree model were used to establish the NIHSS scoring model, radiomics model, and NIHSS and radiomics comprehensive model. The prediction performance of the model was evaluated by the score under the receiver operating characteristic curve (AUC). Finally, the 5-fold optimal model was applied to the external validation set (n=10) to evaluate the reliability of the model in clinical application. (Figure 1)

Results: 25 radiomics features were selected from 2264 radiomics features. The integrated NIHSS and radiomics model demonstrated superior prediction performance in the test set ($P = 0.044$), with a 5-fold mean AUC of 0.903, a mean sensitivity of 70%, and a mean specificity of 85%, respectively, significantly higher than the independent NIHSS scoring model (mean AUC = 0.802, mean sensitivity = 62%, and mean specificity = 85%) (Figure 2). In the external validation set, the prognostic prediction model integrating radiomics features (AUC = 0.708, sensitivity = 75%, and

specificity = 83%) reduced the rate of missed diagnosis in patients with poor prognosis compared with the independent NIHSS scoring model (AUC = 0.438, sensitivity = 50%, and specificity = 75%).

CONCLUSIONS: The combination of DWI radiomics and NIHSS in the prediction of prognosis of acute posterior circulation ischemic stroke after mechanical thrombectomy has a high value, which will be helpful for the treatment decision of acute posterior circulation ischemic stroke.

PO-3846

Perioperative Change in Skeletal Muscle Index and Its Long-term Prognostic Significance in Patients with Colorectal Cancer: A Retrospective Longitudinal Cohort Study

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Purpose: To explore perioperative change patterns of skeletal muscle index (SMI) and evaluate their effect on long-term outcomes of colorectal cancer (CRC) patients.

Patients and Methods: Stage I–III CRC patients receiving curative resection between 2012 and 2018 were included in this retrospective cohort. SMI at the third lumbar vertebra level by computed tomography scan was calculated and classified as normal or sarcopenia preoperatively and at 3, 6, 9, and 12 months postoperatively. The patients were divided into different perioperative SMI change patterns based on the preoperative and postoperative SMI status. The association between perioperative SMI change patterns and recurrence-free survival (RFS) and overall survival (OS) was examined using Cox proportional hazards models at postoperative 3, 6, 9, and 12 months, respectively.

Results:

A total of 2222 patients (median [interquartile range] age, 60.00 [51.00–68.00] years; 1302 men; 222 preoperative sarcopenia) were evaluated. Four distinct SMI change patterns were identified: normalpre-normalpost, normalpre-sarcopeniapost, sarcopeniapre-normalpost, and sarcopeniapre-sarcopeniapost. In patients with preoperative sarcopenia, 51.47%, 49.09%, 58.14%, and 40.74% was classified as normal, while in patients with preoperative normal SMI, 3.78%, 2.76%, 2.35%, and 3.12% was classified as sarcopenia at postoperative 3, 6, 9, and 12 months, respectively. Multivariate Cox model analysis showed that, compared to patients with normalpre-normalpost, patients with normalpre-sarcopeniapost had the worst RFS (hazard ratio [HR] = 3.32, 95% confidence interval [CI]: 1.40–7.90), patients with sarcopeniapre-sarcopeniapost had worse RFS (HR = 2.36, 95% CI: 1.04–5.37), while patients with sarcopeniapre-normalpost had similar RFS (HR = 1.23, 95% CI: 0.29–5.18) at 12 months postoperatively. The HRs changed slightly at 3, 6, and 9 months postoperatively. Similar results were observed for OS.

Conclusion:

There are four perioperative SMI change patterns associated with long-term CRC outcomes. The sarcopenia developed postoperatively has the worst prognosis, while the sarcopenia reversal could improve prognosis.

PO-3847

Deep learning for automatic segmentation of triple-negative breast cancer lesions and axillary lymph nodes in multi-sequence magnetic resonance imaging

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Purpose: To construct and validate multi-sequence deep neural networks (DNN) to automatically and exactly identify triple-negative breast cancer (TNBC) lesions and axillary lymph nodes (ALN). **Materials and Methods:** A total of 207 high-quality DCE-MRI images and 61,587 MRI slices were collected, generating four datasets: T1C/Lesion, T1C/lymph node (LN), T1W/LN, and T2W/LN. The images in each dataset were randomly divided into training, validation, and testing sets. The 3D nn-UNet networks were constructed for single-sequence MRI images in each dataset, resulting in four baseline models. Then, eight multi-sequence fusion networks were trained using cross-sequence MRI images as input, and quantitative evaluation metrics were used to analyze whether multi-sequence inputs can improve baseline networks performance. Finally, we compared the segmentation performance of the constructed models with that of two other advanced 3D models. **Results:** In the segmentation of TNBC ALNs, the T1W/LN+T1C network was the best performing multi-channel sequence network, with a Dice value better than the best performing baseline network (Dice, 0.6590 vs 0.6309). In the segmentation of TNBC lesions, the T1C/Lesion+T1W achieved a Dice of 0.6559 in the test set, better than the baseline network. In the comparative experiments with other networks, our multi-sequence networks perform superior in identifying both lesions and ALNs.

Conclusion: The multi-sequence DNN models automatically and precisely identified TNBC lesions and metastatic ALNs at DCE-MRI images, and the performance of the multi-sequence networks was superior to that of single-sequence models, especially in the identification of ALNs.

PO-3848

Machine learning based on SPECT/CT to differentiate bone metastasis and benign bone lesions in lung malignancy patients

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Purpose: Machine learning analysis of [99mTc]-methylene diphosphate (99mTc-MDP) SPECT/CT scans to distinguish bone metastases from benign bone lesions in patients with lung cancer.

Methods: 141 patients (69 with bone metastases and 72 with benign bone lesions) were randomly assigned to the training group or testing group in a 7:3 ratio. Lesions were manually delineated using ITK-SNAP, and 944 radiomics features were extracted from SPECT and CT images. The least absolute shrinkage and selection operator (LASSO) regression was used to select the radiomics features in the training set, and the single/bimodal radiomics models were established based on support vector machine (SVM). To further optimize the model, the best bimodal radiomics features were combined with clinical features to establish an integrated Radiomics-clinical model. The diagnostic performance of models was evaluated using receiver operating characteristic (ROC) curve and confusion matrix, and performance differences between models were evaluated using the Delong test.

Results: The optimal radiomics model comprised of structural modality (CT) and metabolic modality (SPECT), with an area under curve (AUC) of 0.919 and 0.907 for the training and testing set, respectively. The integrated model, which combined SPECT, CT, and two clinical features, exhibited satisfactory differentiation in the training and testing set, with AUC of 0.939 and 0.925, respectively.

Conclusions: The machine learning can effectively differentiate between bone metastases and benign bone lesions. The Radiomics-clinical integrated model demonstrated the best performance.

PO-3849

A Preliminary Study on the Value of a Combined bpMRI-Based Radiomics-Clinical Model for Assessing Extracapsular Extension in Prostate Cancer

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Purpose To evaluate the value of a combined model considering bpMRI-based radiomics and clinical variables for assessing ECE in PCa.

Methods Date of 392 patients of PCa confirmed by postoperative pathology, who underwent MRI between January 2018 and March 2022 in our hospital were retrospectively enrolled in this study. The clinical information included each patient's age, PSA concentration at admission, lesion location distribution, biopsy Gleason Group, and the PI-RADS v2.1 score given by the radiologists. All patients were randomly divided into the training and validation sets at a ratio of 7:3. Radiologists assessed the ECE of all lesions by the Mehralivand grade and delineated all lesions without obtaining the pathological results. Radiomics features were extracted from T2WI, DWI, and ADC images in each lesion. A radiomics model was built by the features normalization of Z-Score, the redundant features removal of RFE algorithm, and the iterative training of LASSO classifier. Then, univariate and multivariate binary logistics regression analysis were used to screen out independent risk factors from clinical variables to construct clinical model. Moreover, the combined model was constructed by the integration of the independent risk factors in clinical variables and the radiomics model, and the nomogram for assessing ECE was constructed based on the combined model. Finally, Delong test and the decision curve analysis were used to compare the performance in the assessment of ECE among clinical model, Mehralivand grade, radiomics model and combined model.

Results In the training set, the AUCs of the combined model and radiomics model were 0.897 (95 % CI: 0.861~0.934) and 0.882 (95 % CI: 0.844~0.921), respectively. Based on the validation set, the AUC of the combined model was comparable to that of the radiomics model [AUC: 0.894 (95 % CI: 0.837~0.950) vs 0.835 (95 % CI: 0.763~0.908), $P>0.05$]. In addition, the combined model had a higher sensitivity (90.7% vs 77.8%) and accuracy (81.4% vs 76.3%) compared with the radiomics model. On the other hand, the AUCs of the clinical model were 0.805 (95 % CI: 0.753~0.850) and 0.749 (95 % CI: 0.661~0.824) in the training set and validation set, respectively, which were lower than those in the combined model [in the training set: 0.805 (95 % CI: 0.753~0.850) vs 0.897 (95 % CI: 0.861~0.934), $P=0.050$; in the validation set: 0.749 (95 % CI: 0.661~0.824) vs 0.894 (95 % CI: 0.837~0.950), $P=0.050$; both $P<0.05$]. The AUCs of the Mehralivand grade in radiologists were 0.746 (95 % CI: 0.690~0.796) and 0.774 (95 % CI: 0.688~0.846) in the training set and validation set, respectively, which were also lower than those in the combined model [in the training set: 0.746 (95 % CI: 0.690~0.796) vs 0.897 (95 % CI: 0.861~0.934), $P<0.001$; in the validation set: 0.774 (95 % CI: 0.688~0.846) vs 0.894 (95 % CI: 0.837~0.950), $P=0.010$; both $P<0.05$]. At last, the decision curve analysis implied that the combined model could obtain the maximum net clinical benefits compared with the clinical model, the Mehralivand grade and radiomics model.

Conclusion The combined bpMRI-based radiomics-clinical model has satisfactory estimated value for ECE in PCa patients comparing with the clinical model, the Mehralivand grade, and the radiomics model, which could be conducive to the preoperative individualized and accurate diagnosis and treatment of PCa patients.

PO-3850

Altered intersubject functional variability of brain white-matter in major depressive disorder and its association with gene expression profiles and clinical applications

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Background: Major depressive disorder (MDD) is a heterogeneous disorder with remarkable intersubject variability in clinical presentations and neurobiological substrates. Although the altered intersubject variability in functional connectivity (IVFC) within gray-matter has been reported in MDD, the alterations to IVFC within white-matter (WM-IVFC) and the molecular mechanisms associated with these changes remain unknown.

Methods: Based on the resting-state functional MRI data of discovery [(145 MDD patients and 119 healthy controls (HCs)] and validation cohorts (54 MDD patients, and 78 HCs), we compared the WM-IVFC between the two groups. We assessed the meta-analytic cognitive functions related to the alterations. In combination with the Allen Human Brain Atlas, transcriptome-neuroimaging association analyses were further conducted to investigate gene expression profiles associated with WM-IVFC alterations in MDD, followed by a set of gene functional characteristic analyses. Finally, we explored possible clinical applications of WM-IVFC, including disease classification and clinical symptom prediction.

Results: We found extensive WM-IVFC alterations in MDD compared to HCs, which were associated with multiple behavioral domains, including visual and sensorimotor processes, as well as higher-order functions. Furthermore, MDD-related WM-IVFC changes spatially correlated with the expression of 1004 genes, which were enriched for synapse, neuronal system, and ion channel, and predominantly expressed in excitatory and inhibitory neurons. For clinical applications, the altered regional WM-IVFC could not only effectively distinguish MDD patients from HCs with an area under curve ranging from 0.889 to 0.901 across three classifiers, but also significantly predict depression severity ($r = 0.575$, $p = 0.001$) and suicide risk ($r = 0.384$, $p = 0.001$) in patients. Our results obtained good reproducibility in the validation cohort.

Conclusion: These results revealed intersubject functional variability changes of brain WM in MDD and highlighted its clinical applications and linkage with gene expression profiles, providing insight into the neurobiological underpinnings of this disorder.

PO-3851

Artificial intelligence-based multi-parametric MRI model predicts intra-tumoral tertiary lymphoid structures in Hepatocellular Carcinoma: a multicenter observational study

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Purpose: The existence of intra-tumoral tertiary lymphoid structures (iTLS) prompt long-term survival time and anti-cancer immune microenvironment in Hepatocellular Carcinoma (HCC). We proposed an artificial intelligence radiomic integrated model for predicting iTLS in patients with HCC using pretreatment multiparameter MRI (mpMRI) data.

Methods: In this multicenter study, HCC patients who undergone hepatectomy were enrolled into cohorts, with preoperative mpMRI data (contrast-enhanced T1-weighted and T2-weighted imaging) and H&E for features extraction and iTLS assessment. The Transfer Learning-based Radiomic (TLR) model was established through machine learning algorithm, including transfer learning and

radiomic mpMRI features. The predictive efficiency of TLR model was validated multiple retrospectives and single-center prospective observation cohort. The area under the curve (AUC), positive predictive value (PPV), negative predictive value (NPV), sensitivity, and specificity were calculated to assess the model performance.

Results: In training dataset, 307 eligible participants were retrospectively enrolled between Oct 1, 2015, and Oct 1, 2021; 148 in validated dataset 1, 84 in dataset 2, and 54 in dataset 3; between Jan 1, 2022, and Jun 30, 2023, 76 eligible patients were recruited in the prospective cohort. The TLR model had robust predictive accuracy in training dataset (AUC 0.905 [95% CI 0.825–0.938]), validated dataset 1 (AUC 0.809 [95% CI 0.734–0.884]), validated dataset 2 (AUC 0.882 [95% CI 0.798–0.965]), and validated dataset 3 (AUC 0.889 [95% CI 0.778–1.000]). In prospective dataset, TLR had an AUC of 0.850 (95% CI 0.767–0.934), PPV of 0.659 (0.547–0.824), NPV of 0.968 (0.815–1.000), sensitivity of 0.948 (0.759–1.000), and specificity of 0.702 (0.521–0.894). The predicted iTLS+ group had long-term OS and DFS (all $p < 0.0001$) than predicted negative iTLS group.

Conclusion: Based on preoperative mpMRI data, we proposed a novel tool, which has reliable and robust performance to assist in precisely therapeutic strategies of HCC.

PO-3852

Noninvasive Magnetic Resonance Imaging Radiomics Features of adenohypophysis in evaluation of hypothalamic-pituitary-gonadal axis activation in pre- and at-puberty children.

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Objectives

To explore a noninvasive, low-cost and rapid radiomics model based on MRI data in evaluation of hypothalamic-pituitary-gonadal (HPG) axis activation in children.

Methods

A total of 239 children who received a hypophysial MRI scan and GnRH stimulation testing from April 2021 to September 2021 were enrolled in our study and divided into the training and test sets using stratified random sampling method. Radiomics features were generated using the least absolute shrinkage and selection operator (LASSO) with 10-fold cross-validation. The performance of radiomics model was evaluated using receiver operating characteristic (ROC) and decision curve analysis (DCA).

Results

A total of 851 radiomics features were extracted and reduced to 10 potential predictors in the training cohort by the LASSO logistic regression method. The radiomics model base on CUBE T1WI showed good prediction of HPG axis activation with the AUC of 0.84 in the training set and 0.81 in the test set. The AUC of the radiomics model was higher than that of adenohypophyseal Volume (aPV) and height (aPH) in the training set (0.84 vs 0.75 [$P = 0.001$] and 0.84 vs 0.63 [$P < 0.001$], respectively). In terms of DCA analysis, radiomics signature showed higher net benefit than aPV and aPH models.

Conclusions

The MRI radiomics model may serve as a noninvasive predictor of HPG axis activation, potentially providing valuable information in the diagnosis of patients for precocious puberty, central precocious puberty, constitutional delay in growth and puberty and congenital hypogonadotropic hypogonadism.

PO-3853

Research progresses of evaluating tumor microenvironment by Deep Learning

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Tumor microenvironment is involved in the development,distant metastasis and treatment evaluation of tumors. Deep Learning is used to evaluate the tumor microenvironment in whole slide images, which is conducive to non-invasive prediction of the changes of micro-molecules in tumor structure, and provides a new research design or evaluation method for future clinical research. This review systematically summarizes the research of Deep Learning in the evaluation of tumor microenvironment, aiming to promote the further research and long-term clinical application of Deep Learning in the field of tumor microenvironment, and explore the potential and limitations of Deep Learning in the development of tumor microenvironment.

PO-3854

Deep learning for automatic lateral ventricles segmentation and diagnosis of ventriculomegaly by fetal MRI

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Objectives: Develop a fully automatic MRI diagnostic method for fetal ventriculomegaly based on deep learning algorithm, which can be used for clinical fetal lateral ventricular development assessment.

Method: A total of 222 fetal brain coronal SSFSE sequence images were included, including 121 normal fetuses and 101 abnormal fetuses with ventriculomegaly, with a gestational week range of 19-38. The data was randomly divided into training set (n=180) and testing set (n=42). The proposed method is a two-stage method. First, we used nnU-Net to segment the fetal lateral ventricles from prenatal MRI images. Then, a classification network, ResNet, was used to identify whether there are ventriculomegaly.

Results: The segmentation model had a mean Dice value of 0.9048 ± 0.0077 , The average accuracy and area under the receiver operating characteristic curve (AUC) for classification model were 0.8286 ± 0.0199 and 0.8836, respectively.

Conclusion: Deep learning-based MRI image analysis can accurately reconstruct the lateral ventricle of fetus and diagnose ventriculomegaly in a shorter time, which is of positive significance for improving the workflow and reducing the tedious work of clinicians.

PO-3855

Fully automatic analysis CT FFR for the identification of ischemia-specific CAD with a new coronary artery model reconstruction algorithm: A multi-center study

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OBJECTIVES The aim of this study was to validate the feasibility of a novel model for coronary computed tomography angiography (CCTA) based on deep learning and level set algorithms in order to optimize coronary 3D reconstruction and fractional flow reserve to identify ischaemic specific coronary artery disease (CAD).

METHODS A total of 171 consecutive patients with 198 vessels from 4 Chinese medical centers undergoing CTA and invasive FFR were retrospectively analyzed between November 2017 and March 2021. A novel model (esFFR) based on deep learning and level set method as well as commercial software based on deep learning were used to compare CT-FFR values and stenosis rate. The diagnostic performance of the novel model in detecting lesion-specific ischemia and lumen stenosis were evaluated for all lesions using invasive FFR and DSA as the reference standard.

RESULTS Per-vessel sensitivity, the diagnostic accuracy was 85.9% (95% CI 80-90%) for esFFR and 66.7% (95% CI 59.6-73.1%) for commercial software. The Sn (82.8%, 95% CI 72.8-89.7%), Sp (88.3%, 95% CI 80.5-93.4%) and AUC (0.9, 95% CI 0.85-0.94) for esFFR were highly comparable to commercial software. Stenosis rate measured by esFFR was highly correlated with DSA ($r=0.84$, $p<0.0001$). The correlation of stenosis rate between commercial software and DSA was relatively low ($r=0.71$, $p<0.0001$). On a per vessel basis, esFFR correctly identified 24 vessels with FFR 0.75 to 0.8 by using the standard threshold FFR of 0.8, and 33 vessels with FFR 0.8 to 0.85. Meanwhile, the commercial software properly recognized 19 vessels with FFR 0.75 to 0.8, and 18 vessels with FFR 0.8 to 0.85. The sensitivity, specificity and accuracy of esFFR were not significantly different at different levels of stenosis ($p=0.101$; $p=0.576$; $p=0.294$). There were significant differences in the accuracy of the commercial software in different stenosis ranges ($p=0.022$).

CONCLUSIONS This novel model (esFFR) based on deep learning and level set outperforms commercial software in detecting lesion-specific ischemia and Lumen stenosis in the real world.

PO-3856

Longitudinal magnetic resonance images-based deep learning model in the precise detection of recurrence in treated nasopharyngeal carcinoma

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Purpose We aimed to develop and validate an Artificial Intelligence for detecting Recurrent Nasopharyngeal carcinoma (RAINet) model using longitudinal magnetic resonance (MR) images for precise detection of recurrence in treated nasopharyngeal carcinoma (NPC).

Methods In this two-centre, observational study, patients with treated NPC were enrolled from two hospitals (Sun Yat-sen University Cancer Center, Guangzhou, China; The Affiliated Cancer Hospital of Guangzhou Medical University, Guangzhou, China) between September, 2007, and

June, 2021 (Chi-CTR2200056595). We used the ResNet18 and Transformer as the backbone for constructing models (RAINet model, single scan model). The performances were compared internally and externally, and prospectively, in which RAINet was compared with three readers.

Results A total of 10212 scans among 1808 patients were collected. RAINet performed better than single scan model internally (area under the curve [AUC] 0.916, 95% confidence interval [CI] 0.900–0.932; AUC 0.855, 95% CI 0.832–0.878; $P = 0.004$), externally (AUC 0.900, 95% CI 0.856–0.944; AUC 0.709, 95% CI 0.629–0.788; $P < 0.001$). Moreover, RAINet could identify subtle subclinical signs in true positives earlier internally (mean [standard deviation] ahead time, 1.5 [4.4] months) and externally (3.5 [6.7] months). In the prospective cohort, RAINet achieved better sensitivity (0.767, 95% CI 0.694–0.840) than expert (0.760, 95% CI 0.685–0.834; $P = 1.000$), competent (0.698, 95% CI 0.617–0.778; $P = 0.222$) and trainee (0.636, 95% CI 0.551–0.720; $P = 0.024$) readers.

Conclusions RAINet detects recurrence on MR scans with high accuracy, which could optimize surveillance in treated NPC.

PO-3857

Abnormal Rich Club Organization in Postprandial Distress Type Functional Dyspepsia

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OBJECTIVE Functional dyspepsia (FD) is a complex gastroduodenal disease, which severely affects the quality of life for patients. Recent neuroimaging studies have found that many brain's dysfunctions, microstructural changes in white matter and grey matter and abnormal central nervous system for gastric stimuli processing may associated with FD. However, the pathophysiology of FD remains unknown. Rich club organization plays a key role in whole-brain communication and its abnormality has been reported to relate with many diseases. Thus, the current study aimed to examine whether there existed altered rich club organization in FD patients. **METHOD** Thirty-one postprandial distress type FD patients and thirty-one healthy controls (HCs) were recruited. The functional and structural brain network matrices were constructed from the resting-state functional magnetic resonance imaging (fMRI) images and diffusion tensor imaging (DTI) images for each subject respectively. Rich club organization, network parameters and functional and structural coupling strength were computed based on these network matrices. Permutation test was used to evaluate differences of these properties between FD patients and HCs.

RESULT Results showed that FD patients had a decreased number of edges in rich club and feeder edges and an increased number of edges in local edges compare to HCs. Meanwhile, the functional and structural coupling strength in FD patients was higher than HCs.

CONCLUSION Our findings suggest that abnormal rich club organization may be a possible reason for the pathophysiology of FD.

PO-3858

Feasibility of MRI-based radiomics model for predicting the risk stratification of microvascular invasion in hepatocellular carcinoma

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Background and Aims: Risk stratification of microvascular invasion MVI: M0 (no MVI); M1 (mild MVI) and M2 (severe MVI) is vital for predicting the prognostication and tailoring determining effective treatment strategies in hepatocellular carcinoma (HCC). However, radiomics analysis has not been utilized for the risk stratification of MVI. We aim to develop a radiomics approach for identifying the risk stratification of MVI (M0, M1, and M2) using preoperative MR imaging.

Methods: 340 HCC patients (M0:177; M1:121; M2: 42) who had preoperative MRI were enrolled and divided into two-class (Task1: M0 vs M1; Task2: M1 vs M2; Task3: M0 vs M2) and three-class (M0, M1, and M2) groups. Three models (Model A: clinical-radiologic model; Model B: radiomics model; Model C: Model A + Model B) were developed to stratify MVI. For the two-class classification task, the optimal model was decided by the maximum area under the curve (AUC) in training set and further validated in test set. For the three-class classification task, Model D was built based on the optimal model to validate the performance of predicting the risk stratification of MVI in the training and validation cohorts.

Results: Model C was the optimal model and Model D had an excellent performance in distinguishing M0 (AUC: 0.802; 95% CI: 0.747-0.857) and M2 (AUC: 0.894; 95% CI: 0.836-0.952) and a good performance in predicting M1 (AUC: 0.706; 95% CI: 0.638-0.775) in the training cohort. For the validation cohort, the model showed a good performance in identifying M0 (AUC: 0.762; 95% CI: 0.670-0.854), M1 (AUC: 0.635; 95% CI: 0.523-0.747), and M2 (AUC: 0.784; 95% CI: 0.654-0.915).

Conclusion: The model that combined radiomics and clinical-radiological features (Model D) can effectively identify the risk stratification of MVI and assist in individualized HCC patient management.

PO-3859

Analysis of the production of 3D crutches

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The aim of this paper is to analyse the materials used for 3D printed crutches. TPU and Varioshore TPU were used as printing materials for the 3D cane parts, including the support pads and shields, the inner and outer handles and the cane feet. Experimental and literature have analyzed the non-stick properties of TPU during printing and the excessive stickiness of Varioshore TPU to the support material. For the non-adhesion of TPU, the literature analysis suggests that this can be solved by improving the heat dissipation efficiency and increasing the internal support material; for the excessive adhesion of the Varioshore TPU to the support material, a comparative analysis of the PLA and PVA materials should be carried out. Due to the extensive literature analysis carried out in this thesis, the actual experimental results may be biased.

1. Material analysis of crutches

The crutch's supporting pad, inner handle, sides and feet will be made of thermoplastic polyurethane (TPU), and the body tube, the support rod and the threaded cap will be made of aluminium alloy.

2. Analysis of thermoplastic polyurethane (TPU)

As mentioned above, natural rubber SIR-20 and thermoplastic polyurethane (TPU) are among the material options. However, it has been reported that natural rubber cannot be used as a material for 3D printing. Rubber usually needs to be vulcanized to maintain the shape of the object. As a printing material, the heat generated in the printing machine melts the rubber to the fluid, and burns. Therefore, TPU will be designed as a material for supporting pad, inner handles, side shields and support feet. TPU 95A from Ultimaker will be used as the raw material.

TPU is a linear block copolymer consisting of flexible and hard segments covalently bonded to each other. The soft segments are usually long chain diols (1000-4000 g/mol) and the hard segments consist of diisocyanates and short chain extension sequences. TPU has highly alternative material properties to rubber (e.g. flexibility, elasticity, abrasion resistance, impact resistance), with a good hardness.

3. Making the 3D walking stick parts

The crutches are made in two main parts. The first part consists of the supporting pad, guard, inner and outer handles and crutch feet. The second part is the body tube, spring, support rod and threaded cap. At this stage, 3D printing of the first part will be carried out. The study will be carried out to analyze the different printing materials (TPU 95A and Varioshore TPU).

4. Fabrication study using TPU 95A material

(1) Convert the CAD model of the supporting pad into the STL standard file.

(2) Open the data package in the IdeaMaker printing software and adjust the parameters of 3D printer, including printing temperature, printing speed, hotbed temperature, fan and other data, and finally, export the file to a USB stick.

(3) Insert the USB stick into the 3D printer, select the print file and wait for the creation to be completed.

5. Fabrication study using Varioshore TPU material

Varioshore TPU is the material used for to make the 3D grip models. In order to make the grip of the cane more comfortable and user-friendly, it is planned to use additional equipment (3D scanner and 3D printer) for the production of the grip model. According to Parry, the design of the grip was based on the following: impression of the hand shape; 3D scanning; definition of the 3D model; final printing.

6. Making the external handle mould

The tools and materials used for the external handle mould include Coolmorph polylactone from Thermoworx, moulding powder, water, a traditional underarm cane handle and a 2L wide mouth cup.

The polylactone has a low-temperature melt (42°C) (Parry, Best & Banks, 2020). The main component of the moulding powder is algae gum. Both the polylactide and the impression powder are non-toxic and pose no risk to humans.

(1) Fill a wide-mouthed cup with impression powder and water and mix thoroughly (1 g of impression powder to 1.25 ml of water). If the setting time is short, use ice water to slow down and increase the mixing time.

(2) Once the impression powder has been thoroughly mixed, submerge the traditional handle in the powder. While the conventional handle is in the mix, avoid touching the wall of the cup as this may result in an incomplete mould. After about 5 minutes, the impression powder will set, wait until it has completely set and then remove the conventional handle. At this point, the conventional handle can be seen in the cup.

(3) The polyurethane material is heated in hot water until it is transparent, when the polyurethane material is reduced to a point where it can be reshaped. A sufficient amount of clear polylactide is therefore placed in the cup. When the polylactide in the cup is close to cooling, the impression powder is removed, and a polylactide handle is obtained.

(4) By manually grasping the polyurethane handle, an outer handle model can usually be obtained.

7. 3D scanning of external handle moulds

The tools and software required for 3D scanning and digital engineering production include Romer Absolute Arm scanning (Manchester Metrology brand); Meshmixer mesh repair software (Autodesk Inc.); Geomagic for Solidworks CAD software (3D Systems). The mould will need to be blackened and matted once the outer handle mould has been obtained. Without blackening, the mould will reflect and the quality of the 3D scan will be greatly reduced (Formlabs, 2021).

The experimental steps were designed as follows.

(1) The blackened outer handle mould was placed in a fully exposed and open area, and the handle mould was positioned for 3D scanning using a Romer Absolute Arm. Due to the curved surfaces and recesses of the handle mould, multiple positioning and scanning were required to ensure the quality of the scan. Once the 3D scan was completed, the mesh was obtained.

(2) Meshmixer was used to simplify, tidy up and fill the mesh with repair work.

(3) A Standard Tessellation Language (STL) file is exported from Meshmixer and imported into Geomagic for Solidworks (GIS) software. In the GIS software, the scanned inner handles are removed, the outer handles are retained and reshaped to contour. The outer handle was then shaped to look as good as possible. The 3D scan of the sugar cane handle is now complete, and the STL handle file is obtained.

8. 3D printed outer handle model

Varioshore TPU material, an Ultimaker S5 Pro 3D printer and a PrintDry dryer were the necessary materials and equipment. Prior to printing, Varioshore TPU was placed in the PrintDry dryer for over 4 hours, with the temperature inside the bin maintained at 50°C. The external grip STL file was imported into the Ultimaker S5 3D printer and the print configuration, such as print speed and temperature, was adjusted. Use the Ultimaker S5 Air manager to ensure the printing environment and improve print quality. Wait for the print to complete, and the final model of the outer handle of the Varioshore TPU will be available.

When it comes to using Varioshore TPU for handles, it has been found that the Varioshore TPU material bonds very quickly to the support material, making it difficult to remove the support material and potentially tearing the model (Parry, Best & Banks, 2020). While conventional TPU is already a flexible material with solid interlayer adhesion, Varioshore TPU is a unique foaming material that is more challenging to control the quality of the model when foaming during the printing process. According to COLORFABB, Polylactic acid (PLA) is the material of choice for the support material (ColorFabb). As a material made from renewable resources, PLA is very susceptible to fracture and has a very low toughness. PLA materials can be defined as brittle materials that have difficulty withstanding impact forces.

Similarly, Polyvinyl Alcohol (PVA) can be the preferred support material (Parry, Best & Banks, 2020). PLA is a water-soluble polymer produced by the hydrolysis of polyvinyl acetate (PVAc) (S.H. Bossmann et al., 2001). PVA has high water solubility, low cost of use and high physical properties (Zhu & Ge., 2021).

9. Result

From the analysis of experiments and literature, it was concluded that.

(1) PLA as a 3D printing material is robust and not suitable for printing models that require flexibility and comfort.

(2) When printing TPU objects higher than 45 mm in height, support material should be provided inside the object. The support material has the potential to solve the problem of insufficient support and non-adhesion of the material.

(3) With Varioshore TPU as the material, separating the support material from the model is complex. PLA and PVA materials can be tried as an improvement to the support material.

The data and the likelihood of occurrence of the experimental steps are mostly based on literature analysis. Therefore, the experimental data and conclusions may be biased and inaccurate compared to real-life experimental situations.

The 3D cane has an additional guard on either side of the support pad, a three-section retractable body tube, a customisable handle for personal use and an additional elastic spring. The material has been changed from the traditional natural rubber design to TPU and Varioshore TPU 3D printed materials. The manufacturing method has been changed from uniform mass production to individual 3D printing. It has also been shown in the experimental literature that TPU is subject to non-adhesion in production and that the problem of non-adhesion can be solved by increasing the heat dissipation capacity and providing a support material. Experimental analysis of PLA and PVA materials should be attempted to address the issue of excessive adhesion of Varioshore TPU materials to support materials. The aim of improving the traditional underarm crutches is to remind people that there are still many people around the world who do not have access to good medical assistance and cannot afford expensive medical aids. Meanwhile, conventional crutches are

harming people's bodies as they provide them with ease of movement. Development of 3D printing technology to aid human life and health.

PO-3860

Survival rate prediction of nasopharyngeal carcinoma patients using a deep neural network

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For nasopharyngeal carcinoma (NPC) patients treated with intensity-modulated radiation (IMRT), a precise progression-free survival (PFS) time prediction method is required in order to achieve a better treatment regimen and follow-up assessment design. We propose using a deep learning method to develop a PFS prediction model for NPC patients after IMRT treatment and comparing that with the traditional texture analysis method. One hundred and fifty-one NPC patients were recruited in this retrospective study. T₁-weighted, proton density, and dynamic contrast-enhanced magnetic resonance (MR) images were acquired. The expression level of five genes (HIF-1 α , EGFR, PTEN, Ki-67, and VEGF) and infection of Epstein-Barr (EB) virus were tested. A residual network was trained to predict PFS from MR images. To determine a final PFS prediction, the output as well as patient characteristics were merged using a linear regression model. The prediction accuracy was compared with that of the traditional texture analysis method. The best PFS prediction accuracy comes from a regression model combining the deep learning output with HIF-1 α expression and Epstein-Barr infection (Spearman correlation $R^2 = 0.53$; Harrell's C-index = 0.82; receiver operative curve [ROC] analysis area under the curve [AUC] = 0.88; log-rank test hazard ratio [HR] = 8.45), higher than a regression model combining texture analysis with HIF-1 α expression (Spearman correlation $R^2 = 0.14$; Harrell's C-index = 0.68; ROC analysis AUC = 0.76; log-rank test HR = 2.85). The deep learning method does not require a manually drawn tumor region of interest. However, the texture analysis method requires specific kernels or tumor regions of interest, but MR image processing utilizing deep learning combined with patient characteristics does not, and can provide accurate PFS prediction for nasopharyngeal carcinoma patients.

PO-3861

Predicting telomerase reverse transcriptase promoter mutation status in glioblastoma by whole-tumor texture analysis of multisequence MRI imaging

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Objectives: To investigate the utility of preoperative whole-tumor texture analysis of multisequence MRI imaging for evaluating telomerase reverse transcriptase promoter (pTERT) mutation status in glioblastoma (GBM).

Methods: The clinical and imaging data of 111 patients with IDH-wildtype GBM at our hospital between November 2018 and March 2023 were retrospectively assessed. We used the molecular sequencing results to classify the data sets into pTERT mutations and pTERT-wildtype groups. The volume texture features of the whole-tumor were extracted, including T1-weighted contrast-enhanced (T1C), T2-weighted imaging (T2), T2 fluid-attenuated inversion recovery (T2-FLAIR) and apparent diffusion coefficient (ADC) map. All texture features were obtained from open-source PyRadiomics (<http://www.radiomics.io/pyradiomics.html>). After data reduction and feature

selection, logistic regression was used to build prediction models. ROC analysis was performed to assess the diagnostic performance. The data were analyzed using R software (version 4.2.3; <http://www.Rproject.org>).

Results: pTERT mutations were observed in 69/111 (62.1 %) all IDH-wildtype GBM analysed. The T1C-Model (AUC 0.704) had a better predictive ability than the T2-Model (AUC 0.684) and ADC-Model (AUC 0.624). The MRI-Combined (T1C, T2, ADC texture features) Model (AUC 0.780) had a better predictive ability than the Clinical-Model (AUC 0.758). The Combined-Model (T1C, T2, ADC texture features and clinical features) had the best predictive performance (AUC 0.836), the sensitivity, specificity and accuracy were 85.5%, 73.80% and 78.38%, respectively.

Conclusion: Whole-tumor texture analysis of multisequence MRI imaging can be used as non-invasive quantitative parameters to assist in the preoperative clinical prediction of pTERT mutation status in IDH-wildtype GBM.

PO-3862

Radiomic features of the hippocampal based on magnetic resonance imaging in the menopausal mouse model linked to neuronal damage and cognitive deficits

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Purpose: This study set out to explore the correlation between radiomics features based on magnetic resonance imaging MRI and pathological features of the hippocampus and cognitive function in the postmenopausal women PMW mouse model.

Methods: Ovariectomized (OVX) mice were used as PWM models. MRI scans were performed two months after surgery. The brain's hippocampal region was manually annotated, and the radiomic features were extracted with PyRadiomics. Chemiluminescence was used to evaluate the peripheral blood estrogen level of mice, and the Morris water maze test was used to evaluate the cognitive ability of mice. Nissl staining and immunofluorescence were used to quantify neuronal damage and COX1 expression in brain sections of mice.

Results: The OVX mice exhibited marked cognitive decline, brain neuronal damage, and increased expression of mitochondrial complex IV subunit COX1, which are pathological phenomena commonly observed in the brains of AD patients, and these phenotypes were significantly correlated with radiomics features ($p < 0.05$, $|r| > 0.5$), including Original_firstorder_Interquartile Range, Original_glcml_Difference Average, Original_glcml_Difference Average and Wavelet-LHH_glszm_Small Area Emphasis. Meanwhile, the above radiomics features were significantly different between the sham-operated and OVX groups ($p < 0.01$) and were associated with decreased serum estrogen levels ($p < 0.05$, $|r| > 0.5$).

Conclusion: This initial study indicates that the above radiomics features may have a role in the assessment of the pathology of brain damage caused by estrogen deficiency using routinely acquired structural MR images.

PO-3863

Research on the application of radiomics in neurodegenerative diseases

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Purpose: Neurodegenerative disease mostly occur in central nervous system and peripheral nervous system, manifested as sensory, motor and conscious dysfunction, most of neurodegenerative disease belong to chronic diseases, with a high disability rate. Its cause is still unknown and may be caused by a variety of causes, precise treatment is essential to improve the long-term prognosis of patients. Normal Appearing White Matter (NAWM) refers to areas of white matter that appear normal around white matter hyperintensities (WMH) in conventional MRI images but actually have lesions, such changes are difficult to recognize on conventional imaging examination. The occurrence of WMH on a large scale may be closely related to the occurrence of many neurodegenerative diseases in the brain. Radiomics method can mine a large number of high-dimensional quantitative features which cannot be identified with our eyes from medical images, and establish a disease prediction model combining the clinical manifestations, severity of the disease and prognosis of the patient, finally obtain the quantitative biological indicators from patient's images, providing a new perspective for the study of the pathological mechanism of neurodegenerative diseases.

Method: Radiomics refers to the high-throughput extraction of a large number of high-level quantitative image features from MRI, CT and other medical images, next applying advanced mathematical model algorithms to convert the initially extracted features into high-dimensional data with low redundancy and high resolution, and then analyzing these high-dimensional data to quantify some major diseases. It can be seen that radiomics can research the changes of white matter and other microstructures by analyzing the position relationship between adjacent voxels and gray values. Thus leaving more effective treatment time for early intervention. As a new quantitative imaging method, radiomics is based on relatively advanced medical imaging technology, from which a large number of features can be obtained, and complete feature markers can be obtained through big data analysis, which is convenient for disease prediction. Radiomics method include five steps: the acquisition of image data, the segmentation of the region of interest, feature extraction, feature selection, and the establishment and analysis of the radiomics model. In this paper, based on the small differences in brain structure between patients with neurodegenerative disease and healthy subjects, extracted image features to build an radiomics model, used lasso method to build an radiomics nomogram, and the repeatability and stability of the model were analyzed by accuracy, area under the curve (AUC), specificity, sensitivity and other evaluation indexes.

Results: Extracted radiomics features of potential biomarkers from the neurodegenerative disease patients and healthy subject's brain respectively. The results showed that gray level run length matrix(GLRLM) which represents the grayscale distribution of the region of interest, and describes the length that pixels with the same grayscale of an image appear continuously in a certain direction. Long run length is more common in rough textured areas, while short run length is more common in fine textured areas had a certain relationship with the degree of pathological damage of the disease, and the wavelet feature extracted from them were significantly different. Combined the imaging features and clinical features when the prediction model is built, the results showed that this prediction model has better disease discriminative effect.

Conclusion: Medical imaging technology can reflect some tiny differences in the brain of patients with neurodegenerative diseases, and can extract the radiomics features from these differences region. The model established by fitting the characteristics of high-throughput radiomics features and has a good prediction effect, indicating that radiomics method can provide additional pathological information for clinicians. It is of great significance to the differential diagnosis and prognosis of neurodegenerative diseases.

PO-3864

Comparing a Fully Automated Hybrid Approach on MRI and FibroScan for Triaging Clinically Significant Liver Fibrosis: A Multi-center Cohort Study

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Background & Aims: We aimed to 1) develop and validate the combined radiomics-clinic (CoRC) model on MRI for triaging clinically significant liver fibrosis ($\geq F2$), 2) compare with transient elastography-based liver stiffness measurement (TE-LSM) in large-scale samples.

Approach & Results: This retrospective multi-center study recruited 537 patients with biopsy proven liver fibrosis from May 2015 to Jan 2021. Training ($n = 276$) and internal test ($n = 118$) sets were randomly allocated. A temporal test set ($n = 96$) and an external test set ($n = 47$) were used for validation. Radiomics features were extracted from the ResUNet-based automated MRI entire liver segmentation. Radiomics model was generated using logistic regression after feature reduction. CoRC model integrated Radiomics model and optimal clinical variables in the training set with multivariate logistic regression. Diagnostic performance was mainly evaluated by the area under the receiver operating characteristic curve (AUC) in the test sets. In the internal, temporal, and external test sets, the CoRC model yielded AUCs of 0.79 (0.70, 0.86), 0.82 (0.73, 0.89), and 0.83 (0.69, 0.92), and outperformed TE-LSM in the temporal test set (integrated discrimination improvement, 12.9% [2.4-23.4%]; $P = .02$). Additive value of CoRC model to TE-LSM was explored, with combined AUC of 0.86 (0.79-0.94), and 0.81 (0.72-0.90) in the internal, and temporal sets ($P = .01$). Considering necroinflammation, CoRC model maintained the discriminatory power in the test sets (AUCs range, 0.74-0.86).

Conclusions The CoRC model exhibited promising diagnostic performance and robustness for clinically significant liver fibrosis, complementary to TE-LSM.

PO-3865

A Combined Model Integrating Radiomics and Deep Learning Based on Contrast-enhanced CT for Preoperative Staging of Laryngeal Carcinoma

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Rationale and Objectives: Accurate staging of laryngeal carcinoma can inform appropriate treatment decision-making. We developed a radiomics model, a deep learning (DL) model, and a combined model (incorporating radiomics features and DL features) based on the venous-phase CT images and explored the performance of these models in stratifying patients with laryngeal carcinoma into stage I–II and stage III–IV, and also compared these models with radiologists.

Materials and Methods: Three hundreds and nineteen patients with pathologically confirmed laryngeal carcinoma were randomly divided into a training set ($n = 223$) and a test set ($n = 96$). In the training set, the radiomics features with inter- and intraclass correlation coefficients (ICCs) > 0.75 were screened by Spearman correlation analysis and recursive feature elimination (RFE); then support vector machine (SVM) classifier was applied to develop the radiomics model. The DL model was built using ResNet 18 by the cropped 2D regions of interest (ROIs) in the maximum tumor ROI slices and the last fully connected layer of this network served as the DL feature extractor. Finally, a combined model was developed by pooling the radiomics features and extracted DL features to predict the staging.

Results: The area under the curves (AUCs) for radiomics model, DL model, and combined model in the test set were 0.704 (95% confidence interval [CI]: 0.588–0.820), 0.724 (95%CI: 0.613–0.835), and 0.849 (95%CI: 0.755–0.943), respectively. The combined model outperformed the radiomics model and the DL model in discriminating stage I–II from stage III–IV ($p = 0.031$ and $p = 0.020$, respectively). Only the combined model performed significantly better than radiologists. **Conclusions:** The combined model can help tailor the therapeutic strategy for laryngeal carcinoma patients by enabling more accurate preoperative staging.

PO-3866

PET/CT measures of inter-tumor heterogeneity for predicting platinum resistance of high-grade serous ovarian cancer

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Objectives: Platinum resistance is one of key reasons for poor prognosis of High-grade serous ovarian cancer (HGSOC). The purposes of this study were to establish quantitative inter-tumor heterogeneity indicators through PET/CT images, and build models to predict platinum resistance of HGSOC. Then preliminary explore the relationship between inter-tumor heterogeneity indicators and expression levels of prognosis related immunohistochemical markers p53 and Ki-67.

Methods: 292 patients diagnosed with HGSOC were retrospectively enrolled at our two affiliated hospitals. Quantitative indicators of inter-tumor heterogeneity were calculated through conventional measurements and Haralick texture features from PET/CT. Automatic Machine Learning method was used for model construction. Three predictive models (conventional model, heterogeneity model, and integrated model) were built. The model with the largest Area Under Curve (AUC) was considered as the optimal model. p53 and Ki-67 immunohistochemical staining were performed on the pathological samples of patients after surgery, and the images were scanned into whole slide images for artificial intelligence scoring. The correlation between the heterogeneity indicators and scores of p53 and Ki-67 were evaluated by Spearman's correlation coefficient (ρ).

Results: A total of 107 inter-tumor heterogeneity indicators were extracted from conventional measurements and Haralick texture features. The optimal model for three predictive models were all from Gradient Boosting Machine algorithm. The AUC of validation set for conventional model, heterogeneity model, and integrated model were 0.871, 0.909 and 0.967, respectively. The area under the PRC were 0.798, 0.864 and 0.953 respectively. The Spearman's correlation shown that HU_Kurtosis have strongest correlation with the score of p53 ($\rho = 0.743$, $p < 0.001$), and cluster site entropy (cSE) have strongest correlation with the score of Ki-67 ($\rho = 0.752$, $p < 0.001$).

Conclusions: Adding quantitative inter-tumor heterogeneity indicators derived from PET/CT images can improve the performance for predicting platinum resistance of HGSOC patients. And inter-tumor heterogeneity indicators were related to the scores of p53 and Ki-67.

PO-3867

Synthesized 7T SWI from 3T SWI Using conditional based Diffusion Denoising Probability Model: A Initial Study

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Background: Ultra-high field 7T MRI scanner provides images with higher spatial resolution, and it has been established as an important research and clinical tool for brain imaging. Nevertheless, 7T MRI scanners are still more expensive and less common in hospitals and clinical facilities.

Purpose: To assess the image quality and clinical applicability of synthetic 7T SWI images generated from conditional based diffusion denoising probability model.

Materials and Methods: A conditional diffusion denoising probability model (cDDPM) was presented to synthesize the 7T SWI images from 3T SWI images. Specifically, this cDDPM contains three modules (condition embedding module, diffusion module, and residual map refine module) to ensure the consistency of vital information during the learning. Meanwhile, the paired 3T and 7T SWI images were randomly divided into training dataset and test dataset for validation of the presented model. And to evaluate the presented model, we compared with the popular pixel2pixel generation model. Image quality was assessed qualitatively by giving visualization of two radiologists and quantitatively by measuring peak signal-noise ratio and structure similarity index measure.

Results: In total, 47 participants (average age 27.510.9 years) were enrolled. The synthetic 7T SWI images generated by the presented cDDPM achieve significantly improvement on spatial resolution, especially in deep medullary veins, compared with 3T SWI images. And the quantitative measurement indicates that the presented cDDPM can obtain higher PSNR and SSIM than the compared pixel2pixel model, and the qualitative measurement shows that the synthetic 7T images have no significant difference with the acquired 7T images ($P>0.932$).

Conclusion: The synthetic 7T images achieved high image quality and good tissue contrast, potentially providing an alternative way to achieve the advantages of ultra-high field 7T MRI in clinical brain imaging.

PO-3868

Radiomic signatures associated with tumor immune heterogeneity predict survival in locally recurrent nasopharyngeal carcinoma

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Background: The prognostic value of traditional clinical indicators for locally recurrent nasopharyngeal carcinoma (lrNPC) is limited due to their inability to reflect intratumor heterogeneity. We aimed to develop a radiomic signature to reveal tumor immune heterogeneity and predict survival in lrNPC.

Methods: This multicenter, retrospective study included 921 patients with lrNPC. A machine learning signature and nomogram based on pretreatment MRI features for predicting overall survival (OS) were developed in a training cohort and validated in two independent cohorts. A clinical nomogram and an integrated nomogram were also constructed for comparison. Nomogram performance was evaluated by concordance index (C-index) and receiver operating characteristic curve analysis. Accordingly, patients were classified into risk groups. The biological characteristics and immune infiltration of the signature were explored by RNA sequencing (RNA-seq) analysis.

Results: A machine learning nomogram based on the radiomic signature achieved a C-index of 0.729 (95% CI: 0.695-0.762), 0.718 (95% CI: 0.668-0.768), and 0.731 (95% CI: 0.680-0.783) in the training, internal, and external validation cohorts, respectively, which outperformed the clinical and the integrated nomograms. The proposed signature could effectively distinguish patients between risk groups that had significantly different OS rates. Subgroup analysis showed low-risk patients could benefit from surgery and re-irradiation. Further RNA-seq analysis revealed the differences of interferon response and lymphocyte infiltration between risk groups.

Conclusions: An MRI-based radiomic signature predicted OS more accurately. The proposed signature associated with tumor immune heterogeneity may serve as a valuable tool to facilitate prognostic stratification and guide individualized management of lNPC patients.

PO-3869

Value of 2D and 3D CT radiomics models based on machine learning in predicting thymoma with different risk stratification

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Purpose: To evaluate the differential diagnostic efficacy of 2D and 3D CT radiomics models based on machine learning for different risk stratification of thymoma, and to compare the differences in predictive efficacy between the two methods, and to find out the best machine learning classifier for this study.

Methods and Materials: From May 2015 to February 2022, 171 patients with thymic epithelial tumors confirmed by surgery and pathology who underwent chest enhanced CT examination were retrospectively analyzed. According to the pathological results, they were divided into low-risk group and high-risk group. All samples were divided into training set and test set with a ratio of 7:3. The training set consisted of 119 cases and the test set consisted of 52 cases. The arterial phase images of each patient's chest enhanced CT were imported into ITK-SNAP software, ROI and VOI were delineated, and the features were initially extracted. Thus, the optimal feature set is obtained. Three machine learning classifiers (support vector machine, Logistic regression, k-proximity) were used for feature training, and 2D and 3D radiomics models were constructed respectively. The area under the curve (AUC) was used to evaluate the predictive performance of the model constructed by the three classifiers, and the best classifier was selected. The Hosmer-Lemeshow test was used to test the fit of the model, and the calibration curve was used to visualize the results. Decision curve analysis (DCA) was used to test the clinical usefulness of the best classifier.

Results: 17 and 12 features were selected for the construction of 2D and 3D prediction models. The results showed that the prediction performance of the three models in different risk stratification of thymoma was good, and the prediction performance of the 3D model was better than that of the 2D model, and there was a significant difference between them.

Conclusions: 1. In terms of predicting different risk stratification of thymoma, the diagnostic performance and clinical practicability of 3D radiomics model are better than 2D radiomics model.

PO-3870

Non-contrast-enhanced MRI radiomics improves preoperative diagnostic performance for local staging in endometrial cancer

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Objectives To assess whether non-contrast multiparametric MRI radiomics-based machine learning method can improve preoperative local staging in endometrial cancer (EC) patients.

Methods Histologically proven EC patients who underwent preoperative MRI were analyzed retrospectively in this study between January 2015 and January 2023. Radiomics features extracted from non-contrast MR images were trained and tested to predict deep myometrial invasion (DMI) and cervical stromal invasion (CSI). Two radiologists assessed the presence of DMI and CSI by conventional MRI before and after referring to CE-T1WI images. A combined model incorporated radiomics signature and conventional MR was constructed and presented as nomogram. The performance of the predictive models were assessed by ROC analysis with AUCs and pairwise compared with DeLong's test.

Results In all, 198 women were enrolled: 138 at training set and 60 at test set. The conventional MRI without CE-T1WI achieved AUCs of 0.819, 0.757 for DMI and 0.795, 0.802 for CSI in training and test sets; The conventional MRI with CE-T1WI achieved AUCs of 0.837, 0.799 for DMI and 0.825, 0.858 for CSI; The nomogram yield AUCs of 0.916, 0.828 for DMI and 0.886, 0.902 for CSI. The nomogram demonstrated better diagnostic performance than non-contrast conventional MR to identify DMI and CSI in two sets (all $p < 0.05$); No significant differences were observed between the nomogram and conventional MR with CE-T1WI ($p > 0.05$), except for DMI in training set ($p = 0.004$).

Conclusions Non-contrast multiparametric MRI radiomics method improves preoperative local staging of endometrial cancer.

PO-3871

The difference of dynamic functional connectivity density in different severity of long-term smokers

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Objective: To investigate the changes in dynamic functional connectivity density (dFCD) and its relationship with Fagerström test for nicotine dependence (FTND) scores in long-term smokers based on resting-state functional MRI (rs-fMRI).

Materials and methods: The clinical and imaging data of 176 subjects recruited through online platforms in the First Affiliated Hospital of Zhengzhou University were prospectively analyzed. The 176 subjects were divided into light smoking group (59 cases), heavy smoking group (61 cases) and control group (56 cases). All subjects underwent rs-fMRI scanning and dFCD was calculated. The dFCD values of three groups were analyzed by ANOVA analysis. Bonferroni correction was used for pairwise comparison. Pearson partial correlation analysis was used to analyze the correlation between dFCD values of brain regions with statistically significant differences and FTND scores.

Results: Differences in dFCD among light smoking group, heavy smoking group and control group were mainly distributed in the right orbitofrontal cortex (OFC), left caudate nucleus, right putamen, bilateral calcarine sulcus cortex, right cuneus, left parahippocampal gyrus, left precuneus, left

middle temporal gyrus (MTG) and bilateral thalamus (GRF corrected, $P_{\text{voxel}} < 0.005$, $P_{\text{cluster}} < 0.01$). Compared with the control group, both the light and heavy smoking groups showed decreased dFCD in the bilateral calcarine sulcus cortex, right cuneus and left precuneus, as well as increased dFCD in the right OFC, right putamen, left caudate nucleus and left thalamus (Bonferroni corrected, $P < 0.05$). Compared with the control group, the heavy smoking group showed increased dFCD in the right thalamus, and the light smoking group showed decreased dFCD in the left MTG (Bonferroni corrected, $P < 0.001$). Compared with the light smoking addiction group, the heavy smoking addiction group showed increased dFCD in the left MTG and right thalamus, and decreased dFCD in the left parahippocampal gyrus (Bonferroni corrected, $P < 0.05$). The mean value of dFCD in the right thalamus was positively correlated with FTND scores in smokers ($r = 0.227$, $P = 0.014$), and the mean value of dFCD in the right thalamus of the heavy smoking subgroup was positively correlated with FTND scores ($r = 0.323$, $P = 0.013$). There was no correlation between FTND scores and dFCD in the right thalamus of the light smoking group ($P > 0.05$).

Conclusion: There were common functional changes in brain regions related to reward processing and the visual attention network in different severity of smokers. Besides, heavy smokers had unique changes in dynamic brain coordination associated with smoking behavior, which may be related to the fact that heavy smokers have more difficulty quitting than light smokers.

PO-3872

Self-Supervised Learning Method for Brain Tumor Classification in Fewer Training Epochs

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Objective: This paper presents a self-supervised learning (SSL) method for brain tumor classification in MRI images. The primary objective is to develop an efficient, doctor-independent approach that requires no manual annotation and rapidly trains an effective feature extraction backbone in just 10 epochs. This model aims to assist medical professionals in the classification of brain tumors and can be iteratively trained on an increasing amount of data without additional labeling.

Methods: The dataset comprises 7,023 MRI images categorized into glioma, meningioma, no tumor, and pituitary classes. The training pipeline involves two main steps. First, random cropping is applied to obtain n fixed-sized image patches, followed by standard data augmentation techniques to create 20 augmented views per patch. This is done to ensure that representations of different augmentations of the same image are closer. Second, each augmented image patch is input into an encoder, consisting of a deep embedding network (ResNet-50) and a shallow projection network with two fully connected layers. The loss function includes Total Coding Rate (TCR) regularization to prevent representation collapse and minimize the distance between representations of augmentations of the same image.

Results: The trained model achieves an accuracy of 97.71% on the test set. Visualizations using Grad-CAM on the final CNN layer of the backbone reveal that the model activates regions consistent with the location of brain tumors. Features visualization based on t-SNE demonstrates that the model learns well-separated representations after 10 epochs, indicating fine-grained low-dimensional structures in the features.

Conclusion: In conclusion, this self-supervised learning approach for brain tumor classification in MRI images presents an effective and efficient solution that obviates the need for manual annotation and rapidly trains a robust feature extraction backbone. The model's high accuracy and its ability to localize tumors suggest its potential as a valuable tool for medical professionals. Moreover, its ability to adapt to larger datasets without additional labeling makes it a scalable and promising solution for real-world clinical applications.

PO-3873

Application value of 320-detector row CT coronary subtraction technique in patients with mild-moderate calcification score

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[Objective] To explore the feasibility and diagnostic value of subtraction coronary computed tomography angiography (Sub-CCTA) with 320-detector row CT in patients with mild-moderate coronary calcification scores (Agatston score<400).[Methods] The clinical and imaging data of 77 patients with sub-CCTA scan and calcification score <400 were analyzed retrospectively. For conventional CCTA and subtraction CCTA images, a 4-point scale was used to subjectively evaluate the image quality, quantitatively evaluate the stenosis of each calcified segment, and record the time required to measure the stenosis of the calcified segment.[Results] A total of 111 calcified segments. For the two imaging methods of conventional CCTA and subtracted CCTA, the Kappa coefficient for evaluating the consistency of calcified segmental stenosis was 0.75; the average image quality was 3.0 (3.0-3.0) and 3.0 (3.0-4.0) points, the difference is statistically significant ($Z = -3.868, p < 0.01$); the time required to quantitatively measure the degree of calcification segment stenosis is $(90 \pm 13)s$ and $(67 \pm 10)s$, and the difference is statistically significant ($t = 0.642, p < 0.01$).[Conclusion] Compared with conventional CCTA, subtraction CCTA can improve the imaging quality and reduce the time required to quantitatively measure the degree of calcified segmental stenosis; the two imaging methods have good consistency in evaluating the degree of coronary artery stenosis in patients with mild to moderate calcification score.

PO-3874

Multimodal deep learning network for the discrimination of benign and malignant pulmonary ground glass nodules

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Background: To establish a multimodal deep learning network model to enhance the diagnosis of benign and malignant pulmonary ground glass nodules (GGNs).Methods: Retrospective data on pulmonary GGNs were collected from multiple centers across China, including North, Northeast, Northwest, South, and Southwest China. The data were divided into a training set and a test set in an 8:2 ratio. In addition, a GGN dataset was also obtained from our hospital database and used as the validation set. All patients underwent chest computed tomography (CT), and the final diagnosis of the nodules was based on postoperative pathological reports. The ResNet network was used to extract imaging data, the Word2Vec method for semantic information extraction, and the Self Attention method for combining imaging features and patient data to construct a multimodal classification model. Then, the diagnostic efficiency of the proposed multimodal model was compared with that of existing ResNet and VGG models and radiologists.Results: The multicenter dataset comprised 1020 GGNs, including 265 benign and 755 malignant nodules, and the validation dataset comprised 204 GGNs, with 67 benign and 137 malignant nodules. In the test set, the proposed multimodal model achieved an accuracy of 90.2% (184/204 GGNs) and a sensitivity of 96.6% (197/204 GGNs), which surpassed that of the VGG (73.1% and 76.7%) and ResNet (78.0% and 83.3%) models in diagnosing benign and malignant nodules. In the validation set, the multimodal model accurately diagnosed 125 (91.18%) malignant nodules, outperforming radiologists (80.37% accuracy). Moreover, the multimodal model correctly identified 54 (accuracy, 80.70%) benign nodules, compared to radiologists' accuracy of 85.47%. The consistency test comparing radiologists' diagnostic results with the multimodal model's results in relation

to postoperative pathology showed strong agreement, with the multimodal model demonstrating closer alignment with gold standard pathological findings ($\text{Kappa}=0.720$, $P<0.01$). Conclusion: The multimodal deep learning network model exhibited promising diagnostic effectiveness in distinguishing benign and malignant GGNs and holds potential as a reference tool to assist radiologists in improving the diagnostic accuracy of GGNs and potentially enhancing radiologists' work efficiency in clinical settings.

PO-3875

Three distinct subtypes of multiple system atrophy revealed by connectivity features through consensus clustering analysis

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Objective:

Heterogeneity of multiple system atrophy (MSA) is challenge for precision diagnosis and treatment. White matter microstructure integrity alterations have been shown in many neurodegenerative diseases. We aimed to identify objective neuro-microstructural subtypes of MSA by adopting consensus clustering analysis based on white matter connectivity.

Methods:

122 MSA patients and 116 healthy controls (HCs) were enrolled. White matter connectivity was constructed and connections presented higher interindividual variability between MSA and HCs were included as features. Consensus clustering analysis, which identify an appropriate number of clusters through hierarchical clustering iteratively, was performed to identify the distinct subtypes of MSA patients. Gray matter volume, white matter integrity, functional and microstructural connectivity detected by multimodal MR images were further investigated among identified subtypes.

Results: Consensus clustering analysis identified three distinct subtypes of MSA presenting shared and distinct brain disruptions both in function and structure. Specifically, temporal gyrus, subcortical regions, cerebellum, and middle cerebellar peduncle is the shared impaired brain regions in each subtype patient. Subtype 1 exhibited widespread brain structural and functional alterations in cortical and subcortical regions, extending from frontal, parietal, temporal, subcortical regions to the cerebellum. Subtype 2 demonstrated moderate brain abnormalities, including bilateral subcortical regions, inferior temporal gyrus, parietal gyrus and the cerebellum. While, subtype 3 manifested mild brain alteration, mainly restricted to the shared impaired brain regions. In addition, subtype 1 showed significant higher score in UMSARS, MoCA, and HDR-24 in relative to subtype 2 and 3 patients ($P<0.01$).

Conclusion:

We identified three neuro-microstructural subtypes of MSA patients, which manifested shared and distinct brain abnormalities and clinical manifestations. The investigation of MSA subtypes can facilitate strategies for clinical stratification and precision diagnostics.

PO-3876

MRI-based Vascular Permeability and Cell Density-Related Habitats for Distinguishing IDH Mutation Status in Glioma

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Purpose: Gliomas possess complex and heterogeneous vascular permeability and cell density, which are associated with IDH mutation status. Therefore, this study aims to predict IDH mutation status by MRI habitat analysis through T1-weighted contrast-enhanced images (T1CE) and Diffusion-weighted image (DWI), which reflect vascular permeability and cell density.

Methods: Retrospective analysis included 165 patients from 3 hospitals with pathological diagnosis of gliomas (training cohort=109, External validation cohort=56), they all underwent T1-weighted contrast-enhanced images (T1CE) and Diffusion-weighted image (DWI) preoperatively. The signal intensities of the glioma region from T1CE and Apparent dispersion coefficient (ADC) maps were pooled together from each patient as a global matrix. Then, K-means clustering was applied, which could segment glioma into four habitats (subregions), and the sensitive habitat was further identified as well as radiomics features were extracted from whole tumor and habitats, respectively. Feature selection was performed by a two-sample t-test, Pearson correlation analysis, maximum relevance minimum redundancy (mRMR), and the least absolute shrinkage and selection operator (LASSO). Logistic regression classifiers were utilized to construct predictive models of IDH mutation states.

Results: The gliomas were segmented into 4 habitats according to the elbow method, and they are habitat 1 damaged vascular and cellular habitat, habitat 2 normal vascular and hypocellular habitat, habitat 3 normal vascular and cellular habitat, and habitat 4 damaged vascular and hypocellular habitat. Habitat 4 was determined as the sensitive habitat. There were four prediction models to be constructed using 15 features: Model-whole tumor, Model-four habitats, Model-whole tumor + four habitats, and Model-sensitive habitat, respectively. The Model--sensitive habitat has shown the best predictive performance and robustness, with the area under the curve of 0.868 (95% CI: 0.784-0.953) in the train cohort and 0.817 (95% CI: 0.676-0.958) in the external validation cohort.

Conclusion: Habitat analysis has the potential to capture more imaging information, with damaged vascular and hypocellular habitat is a useful predictor of IDH mutation status in glioma.

PO-3877

Altered Cortical Morphological and Functional Topological Properties in Patients with NMOSD: an Individual-Based Brain Network Study

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Objectives

To assess the alteration of individual network topological properties and their clinical significance in patients with neuromyelitis optica spectrum disorder (NMOSD).

Materials and Methods

Eighteen patients with NMOSD and twenty-two healthy controls (HCs) were included. The clinical assessment for NMOSD patients involved evaluations of disability status, cognitive function, and fatigue impact. Brain images were obtained for each participant, including high resolution T1-weighted images for individual morphological brain networks (MBNs) and resting-state functional MRI for individual functional brain networks (FBNs). The topological properties were calculated and

compared for both MBNs and FBNs. Then, partial correlation analysis was performed to investigate the relationships between the altered network properties and clinical variables.

Results

The average Expanded Disability Status Scale score of NMOSD patients was 1.05, indicating a stage of mild disability. Compared to HCs, NMOSD patients exhibited a higher normalized characteristic path length (λ) in their MBNs ($p = 0.0118$), but no significant differences were found in the global properties of FBNs ($p: 0.405-0.488$). Network-based statistical analysis revealed that MBNs had more significantly altered morphological connections than FBNs ($p < 0.05$). Nodal properties of both MBNs and FBNs in NMOSD were correlated with disease duration or cognitive impairments ($p < 0.05/6$ with Bonferroni correction).

Conclusions

The results indicated that NMOSD patients with mild disabilities show compensatory increases in local network properties to maintain overall stability. Furthermore, individual brain morphological networks reveal more alterations in NMOSD patients and exhibit stronger correlations with clinical assessments than functional networks.

PO-3878

Deep learning–based on multiphase computed tomography images for the preoperative prediction of HER2 expression in gastric cancer

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Abstract

Objective: To develop and validate a deep learning (DL) model based on multiphase CT for the preoperative prediction of HER2 expression in gastric cancer.

Materials and methods: The clinical data on gastric cancer patients were collected retrospectively included in three hospitals, and 502 patients were chosen for this study (376 training and 126 validation). The preoperative contrast-enhanced CT images Radiomic features were extracted and selected from the arterial phase (AP), venous phase (VP), delayed phase (DP) CT, and integration of multiphase (MP) enhance images of each patient used to building four deep learning (DL) models, respectively. The diagnostic performance was evaluated using the internal validation and additional external validation datasets. And statistically analyze the performance of four DL models

Results: The radiomic features from AP($n=3$), VP($n=3$), DP($n=3$), and MP($n=4$) CT images were used for model development. The prediction model that integrate multiphase enhance images demonstrated good discriminative performance for HER2 status prediction, with an area under the curve (AUC) of 0.999 (95% confidence interval(CI) : 0.999-0.999) 、 0.895 (95% CI: 0.894-0.896)、 0.783 [95% CI: 0.782- 0.786] for the training、 validation and test datasets, respectively.

Conclusion: The integrating multiphase CT-based deep learning model showed favourable performance in predicting HER2 status in patients with gastric cancer before surgery, which may benefit clinical practice and facilitates individualized treatment planning.

PO-3879

Noncontrast Computed Tomography-based Radiomics Analysis as Predictors of Revised Hematoma Expansion in Spontaneous Intracerebral Hemorrhage

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Objectives: To explore the diagnostic value of noncontrast computed tomography (NCCT) models based on multivariable, radiomics features and machine learning (ML) algorithms in predicting revised hematoma expansion (RHE) in patients with spontaneous intracerebral hemorrhage (ICH). **Materials and Methods:** We retrospectively reviewed 316 patients with ICH who underwent initial NCCT within 12 hours of ictus and follow-up CT within 72 hours after initial NCCT, between April 2018 and August 2020. The ICH and intraventricular hemorrhage (IVH) volumes were measured using a semiautomated, computer-assisted technique, and revised definitions of hematoma expansion incorporating intraventricular hemorrhage expansion to the conventional definition of “ ≥ 6 mL or $\geq 33\%$.” The clinical characteristics, imaging signs, and radiomics features extracted from the initial NCCT images were used to construct models to predict RHE. The radiomics and combined models were constructed in the training cohort ($n = 221$) and independently verified in the test cohort ($n = 95$). Prediction performance was evaluated by ROC analysis and AUC.

Results: Of 316 patients, 115(36.4%) experienced RHE. Multivariate analyses revealed nine statistically significant factors associated with RHE. The AUCs of the radiomics model for predicting early RHE using the Gaussian Process (GP) algorithm in the training and test cohorts were 0.875 and 0.862, respectively. The AUCs of the combined model in the training and test cohorts were 0.928 and 0.887, respectively.

Conclusion: NCCT models based on multivariable, radiomics features, and ML algorithm presented good performance in predicting RHE. The combined model was the best recommended to identify ICH patients at risk of early RHE.

PO-3880

Skull fracture detection of CT images based on an improved YOLOv5 method

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Objective: Medical imaging detection technology can improve the efficiency and accuracy of doctors’ diagnosis, it has been widely used in medicine. Recently, object detection methods based on deep learning have achieved remarkable detection results in medical imaging detection. However, when these methods are specially applied to skull fracture detection, it is difficult to satisfy the requirements and there are still many missed detection and misdetection problems. In order to solve above problems, an improved YOLOv5 method was proposed in this study to detect skull fracture in the computed tomography (CT) images of the skull.

Methods: The version of YOLOv5 used in this study is YOLOv5s. Compared with other versions of YOLOv5, YOLOv5s has fewer parameters and is faster. Skull fracture detection is essentially tiny object detection. In the proposed approach, external attention and 3D feature fusion methods are introduced into YOLOv5s. Based on the characteristics of CT images of skull fracture, a new data augmentation method was also proposed that combines multiple CT images according to the channels to generate multi-channel images.

In the dataset, 17300 skull fracture CT images were used as the training set and 1922 skull fracture CT images were used as the test set. The ratio of the number of training sets to the number of test

sets is 9 : 1. The original size of each image is 512X512. First, traditional data enhancement methods (random flipped, HSV color space enhancement, random affine etc.) were used to preprocess each image. And then, the data enhancement method proposed in the study was used to process the dataset to generate the final dataset. After data augmentation, the size of each image becomes 640 X 640 and then these images are used as the input to our network. Each experiment is trained for 300 epochs. The training batch size for all datasets is set as 16. A back-propagation algorithm with SGD stochastic optimization method is used to train the network through time with the learning rate of 0.01. We use the Pytorch framework to train on a Nvidia GTX 2080ti GPU.

Results : Our method was compared with the state-of-the-art two-stage and one-stage object detection methods, namely, FPN, Cascade R-CNN, Sparse R-CNN, RetinaNet, YOLOv5 and SSD. The performance of all methods is measured by mean average precision (mAP) on the test set. Our method achieves a mAP of 88.08% and it outperforms all other methods. Compared with one-stage methods YOLOv5, RetinaNet and SSD, our method gives the relative improvements of 1.8%, 19.98%, 29.28%. Compared with two-stage methods FPN, Sparse R-CNN and Cascade R-CNN, our method gives the relative improvements of 1.8%, 19.98%, 11.08%.

Conclusions: In this study, three methods were proposed to improve the detection accuracy of the YOLOv5 model for skull fracture detection. While adding a small number of parameters, we have a better detection effect. This algorithm merges multiple gray-scale images into one 3-channel image, which increases the diversity of samples. On the skull fracture image dataset, the experimental results show that the proposed method has obvious advantages over other state-of-the-art methods in the skull fracture detection tasks. In future work, further study of the 3D object detection of skull fracture may be needed to achieve more accurate detection results.

PO-3881

Artificial Intelligence Assisted Identification of Severe Patients with Coronavirus Disease 2019 Based on Quantitative Computed Tomography Parameters

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OBJECTIVE: This study aims to identify the severe cases of patients with coronavirus disease 2019 (COVID-19) by the feasibility of artificial intelligence-assisted quantitative computed tomography (CT) features.

METHODS: According to the inclusion and exclusion criteria, 79 adult patients with laboratory-confirmed COVID-19 in Heilongjiang province, northeast China, were included and analyzed in this study. All patients underwent chest computed tomography (CT) scans and then the quantitative characteristics of pneumonia lesions, including percentage of the lung lesion volume (PLV), consolidation volume (PCV), and ground glass lesion volume (PGV), were automatically computed by an artificial intelligence (AI) platform (Dr. Wise). According to the guidelines of Chinese diagnosis and treatment protocols for COVID-19 (version 8), patients were categorized into a non-severe and severe group. Patients' baseline data (including clinical and laboratory data, CT quantification characteristics of the lesion) were collected. The two groups' baseline characteristics and CT quantitative characteristics (PCV, PLV, and PGV) were compared. Univariate and multivariate logistic regression analyses selected the characteristics that can identify patients with severe COVID-19.

RESULTS: 79 patients with COVID-19 on admission were included and divided into a non-severe group (n=28) and a severe group (n=51). Age, leukocyte count, neutrophil count, lymphocyte count, percentage of the lung lesion volume (PLV), and percentage of consolidation volume (PCV) were significantly correlated with severe events identified using univariate logistic regression. Further multivariate logistic regression demonstrated a significant model in which PCV and age were the

independent risk factors with the odds ratios (ORs) of 1.172 and 1.116, respectively ($p < 0.004$). The average prediction accuracy (AUC) for training sets and validation set calculated by 5-fold cross-validation was 0.950 (95% CI 0.900 - 1.000) and 0.935 (95% CI 0.876 - 0.994), respectively. **CONCLUSIONS:** The PCV in AI-assisted quantitative CT characteristics and age at admission were the critical parameter to predict the severe illness of COVID-19 patients in Heilongjiang Province. At the same time, the cold and dry climate may also be an important factor that cannot be ignored. For patients with COVID-19 in a cold and dry environment, especially elderly patients, the larger the PCV, the easier it is to become severely ill. AI quantitative characteristics based on chest CT image analysis can predict accurately severe patients with COVID-19.

PO-3882

Intratumoral and peritumoral CT radiomics in predicting prognosis in patients with chondrosarcoma: a multicenter study

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Objective Currently, there are no relevant studies of chondrosarcoma (CS) in the intratumoral and peritumoral radiomics. The objective of this study is to evaluate the efficacy of the CT-based intratumoral, peritumoral, and combined radiomics signatures in predicting progression-free survival (PFS) of patients with CS, which is crucial for individualized management of CS patients and guiding clinical decision-making.

Methods In this multicenter study, patients diagnosed with CS between January 2009 and January 2022 were retrospectively screened, 214 patients with CS from two centers were enrolled and divided into a training cohort ($n=113$) and a validation cohort ($n=101$). The intratumoral and peritumoral radiomics features were extracted from CT images. The intratumoral, peritumoral, and combined radiomics signatures were constructed respectively, and their radiomics scores (Rad-score) were calculated. The performance of intratumoral, peritumoral, and combined radiomic signatures in PFS prediction in patients with CS was evaluated by C-index, time-dependent area under the receiver operating characteristics curve (time-AUC) and time-dependent C-index (time C-index).

Results 11, 7, and 16 features were used to construct the intratumoral, peritumoral, and combined radiomics signatures, respectively. The combined radiomics signature showed the best prediction ability in the training cohort (C-index, 0.835; 95%; confidence interval [CI], 0.764-0.905) and the test cohort (C-index, 0.800; 95%; CI, 0.681-0.920). Time-AUC and time C-index showed that the combined signature outperformed the intratumoral and peritumoral radiomics signatures in the prediction of PFS.

Conclusion The CT-based combined signature incorporating intratumoral and peritumoral radiomics features can serve as a novel imaging tool to predict the prognosis of patients with CS, which might assist clinicians in selecting individualized surveillance and treatment plans for CS patients.

PO-3883

Usefulness of texture features of mean apparent propagator-magnetic resonance imaging in distinguishing glioblastoma and solitary brain metastasis

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Introduction

Glioblastoma multiforme (GBM) and solitary brain metastasis (SBM) are the most commonly reported brain tumors in adults. Accurate preoperative differentiation between GBM and SBM is critical, given the significant differences in the clinically recommended treatment guidelines for the two entities. Routine MRI is the primary imaging modality used for diagnosing brain tumors. However, routine MRI is sometimes inadequate in differentiating GBM from SBM, due to their similar radiological appearances [1]. As an advanced diffusion imaging technique, mean apparent propagator (MAP)-MRI can visualize the degree of diffusional movement of water molecules in tissues, and is more likely to capture previously obscured inherent microstructural features of neuronal tissues[2]. Texture analysis is an assessment method that identifies changes in the signal intensities and neighboring positions of pixels and/or voxels. Thus, MRI-based texture analysis is a sensitive technique for quantifying heterogeneity in tissue composition, which is invisible to the human eye. Previous studies have shown that texture features in GBM and SBM are associated with heterogeneity of peri-enhancing edema, and the identification of these two entities can moderately benefit from the texture features of routine MRI[3]. The purpose of this study was to explore the usefulness of texture features of MAP-MRI in distinguishing GBM from SBM.

Materials and Methods

This retrospective study was approved by our Institutional Ethics Committee, which waived the requirement for informed consent. The study was conducted in accordance with the Declaration of Helsinki. Data from 254 patients diagnosed with cerebral GBM and SBM between November 2015 and June 2022 were collected, and finally data from 112 patients were included and analyzed. The inclusion and exclusion criteria are presented in Figure 1. All patients underwent diffusion weighted imaging (DWI) and routine MRI examinations using a 3T MR scanner (MAGNETOM Prisma; Siemens Healthcare, Erlangen, Germany) with a 64-channel head-neck coil. Seventy-nine patients were randomly selected as the training cohort, while the remaining twenty cases were used as the testing cohort.

DWI data were acquired using 6b values (0, 500, 1000, 1500, 2000, and 2500 s/mm²), and every nonzero b value was performed in 30 encoding directions. The MAP-MRI metric maps were estimated directly from DWI data using NeuDilab, a software developed in-house with Python, based on the free DIPY Toolbox (<https://www.dipy.org/>). Finally, MAP-MRI metric maps, including mean squared displacement (MSD), non-Gaussianity (NG), non-Gaussianity axis (NGAx), non-Gaussianity radius (NGRad), return-to-the-origin probability (RTOP), return-to-the-plane probability (RTPP), return-to-the-axis probability (RTAP), and Qspace inverse variance (QIV), were constructed.

The flow diagram of the study is shown in Figure 1. MAP-MRI metric maps were spatially registered to FLAIR images. Subsequently, the peri-enhancing edema region, as a region of interest (ROI), was manually segmented on the axial FLAIR image using the ITK-SNAP (<http://www.itksnap.org>) software. The key steps, such as feature extraction, feature selection, and model construction, were processed using the FAE software[4]. Based on tumor segmentation, we extracted 93 texture features from each ROI. Features defined by the FAE developer were as follows: 18 first-order statistical features, 75 second-order features from the gray-level co-occurrence matrix (GLCM), neighborhood gray-level difference matrix (NGLDM), gray-level run-length matrix (GLRLM), gray-level size zone matrix (GLSZM), and gray-level zone length matrix (GLZLM).

Three feature selection methods and two classifiers were utilized to construct texture feature prediction models on individual maps from MAP-MRI metric maps. Simultaneously, a combined MAP-MRI model was constructed using the candidate features of each metric map. Fivefold cross-validation was used to demonstrate the model performance, which was evaluated using the receiver operating characteristic (ROC) curve, accuracy, area under the ROC curve (AUC), sensitivity, and specificity in the testing cohort.

Results

Detailed clinical characteristics of the patients are summarized in Table 1. No significant difference was found between the two groups in terms of sex ($P = 0.884$) and age ($P = 0.853$).

Figure 2 and Table 2 depict the performance of the eight MAP-MRI metric map models and the combined model. The RTAP model achieved the best discriminative power (accuracy:84.85%, AUC:0.92, sensitivity:70.59%, and specificity:100.00%) for the single metric model, and performed similarly to the MAP-MRI combined model (accuracy:87.88%, AUC:0.92, sensitivity:82.35%, and specificity:93.75%).

Figure 3 shows the candidate features used to build various texture analytic models. In combined model, two second-order features of RTOP and skewness features of RTPP, NGRad, and MSD played crucial roles in discriminating GBM from SBM, whereas the discriminative model benefitted from the combination of two first-order statistical features and three second-order features of RTAP.

Discussion

Previous studies have shown that textural features are associated with heterogeneity of peri-enhancing edema regions in GBM and SBM[3]. This conclusion is also confirmed by our results. As an additional finding, texture features from MAP-MRI appeared to have better discriminative power compared to texture features from routine MRI[3]. MAP-MRI assesses the dispersion distribution of water molecules by measuring the probability density function of spin displacements in complex microstructures of brain tissue and accurately characterizes diffusion anisotropy by quantifying the non-Gaussian nature of the diffusion process[5,6]. Fortunately, texture analysis can easily extract the diffusion information, and use it to quantify tumor heterogeneity.

Conclusion

Texture analysis based on MAP-MRI has immense potential for discriminating GBM from SBM.

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PO-3884

Neurite orientation dispersion and density imaging-based texture features in differentiating glioblastoma from solitary brain metastasis

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Introduction

Glioblastoma multiforme (GBM) and solitary brain metastases (SBM) are the most common malignant brain tumors, and their identification is key to further diagnosis and treatment [1]. Magnetic resonance imaging (MRI) is the main tool for differentiating between the two types of tumors; however, both GBM and SBM may show marked peritumoral edema and similar contrast enhancement patterns on routine MRI, leading to great challenges in identification [2]. Previous reports have indicated that differential diagnosis of tumors could benefit from diffusion-weighted MRI techniques, as it can quantitatively assess the entire tumor microstructure with a relatively high spatial resolution and does not require contrast agents. For example, neurite orientation dispersion and density imaging (NODDI) is a multi-spherical shell diffusion model based on the differences in the diffusion of water molecules inside and outside the cell, which demonstrates the difference in water diffusion between tumor infiltration and vasogenic edema [3]. Texture analysis is a sensitive technique that allows for the subtle assessment of the gray-scale signal intensity distribution of pixels and/or voxels, which can be used in MRI to quantify lesion irregularity and heterogeneity in tissue composition [4]. This study aimed to explore the usefulness of NODDI texture features in distinguishing GBM from SBM.

Materials and Methods

This retrospective study was approved by our Institutional Ethics Committee, which waived the need for informed consent. This study was conducted in accordance with the principles of the Declaration of Helsinki. We reviewed 112 patients newly diagnosed with cerebral GBM and SBM between November 2015 and June 2022. The inclusion and exclusion criteria are shown in Figure 1. All patients underwent diffusion-weighted imaging (DWI) and routine MRI examinations using a 3T MR scanner (MAGNETOM Prisma; Siemens Healthcare, Erlangen, Germany) with a 64-channel head-neck coil. The training cohort consisted of 79 randomly chosen participants, whereas the testing cohort consisted of remaining 20 patients.

DWI data were collected using 6b values (0, 500, 1000, 1500, 2000, and 2500 s/mm²), and each non-zero b value was encoded in 30 directions. NODDI metric maps were estimated directly from DWI data using NeuDilab, an in-house developed software program using Python based on the free DIPY toolbox, software (<https://www.dipy.org/>). Finally, NODDI metric maps, including the intracellular volume fraction (ICVF), orientation dispersion index (ODI), and isotropic volume fraction (ISOVF) were constructed.

The flow diagram of this study is shown in Figure 1. The NODDI metric maps were spatially registered to FLAIR images. Subsequently, the peri-enhancing edema region, as a region of interest (ROI), was manually segmented on axial FLAIR images using ITK-SNAP (<http://www.itksnap.org>) software. The main steps, such as feature extraction, feature selection, and model building, were handled by FAE software [5]. Using the gray-level co-occurrence matrix (GLCM) and gray-level run-length matrix (GLRLM) functions from the Pyradiomics package, 24 and 16 quantitative features were extracted. In addition, 18 first-order statistical features were extracted for texture analysis. Finally, a total of 58 features were extracted for subsequent analysis. Three feature selection methods and two classifiers were used to construct texture feature prediction models on individual maps from the NODDI metric maps. Simultaneously, a combined NODDI model was built using candidate features from each metric map. Five-fold cross-validation was used to demonstrate model performance, and the performance of the testing cohort was

evaluated using the receiver operating characteristic (ROC) curve, accuracy, area under the ROC curve (AUC), sensitivity, and specificity.

Results

Detailed clinical characteristics of the patients are presented in Table 1. No significant differences were found between the two groups in terms of sex ($P = 0.884$) or age ($P = 0.853$).

Figure 2 and Table 2 show the performance of the three NODDI metric map models and the combined model. Three NODDI metric map models derived from the peri-enhancing edema region had moderate values for differentiating GBM from SBM. The combined NODDI model achieved the best discriminative power (accuracy, 71.72%; AUC, 0.87; sensitivity, 70.59%; specificity, 93.75%). Table 3 lists the candidate features used to build the various texture analysis models. In the combined model, the two GLRLM features of ICVF and skewness features of ICVF, ISOVF, and ODI played crucial roles in discriminating GBM from SBM. ICVF_GLRLM_LongRunEmphasis and ICVF_GLRLM_RunVariance represent the roughness of the image texture in the ROI, and Skewness is a numerical feature of the asymmetric degree of statistical data distribution, which characterizes the distribution of image signal intensity.

Discussion

Previous studies have concluded that textural features are associated with the heterogeneity of peri-enhancing edema regions in GBM and SBM [6]. This conclusion is further confirmed by our results. In our study, the combined MAP-MRI performed better than the single-metric map model. Compared to the findings of similar previously published studies, textural features of NODDI appear to have better discriminative power for texture features of routine MRI [6]. Recent studies report that NODDI can identify more diverse tissue components within tumors, and that cell density may play an important role [3]. Texture analysis can easily extract diffusion information and can be used to quantify tumor heterogeneity. This low-cost solution will promote differential diagnosis of GBM and SBM in clinical practice.

Conclusion

Texture analysis based on NODDI has immense potential for discriminating GBM from SBM.

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PO-3885

Radiomics Analysis Based on Dynamic Contrast-Enhanced MRI for Prediction of the Postoperative Prognosis in Hepatocellular Carcinoma

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Objective To establish a radiomics nomogram based on dynamic contrast-enhanced (DCE) MR images to explore the comprehensive application value of the prediction model for recurrence and early outcome after surgical resection of Hepatocellular Carcinoma (HCC).

Methods In total, 285 patients with pathologically confirmed HCC (training dataset: n=199; validation dataset: n=86) were enrolled. The volume of interest (VOI) was segmented manually by 3D Slicer software on the multiple sequences of DCE_MRI. Radiomics features were extracted from the VOI by Pyradiomics. Pearson Correlation Analysis, least absolute shrinkage and selection coefficients regression were used to filter out the significant features. A predictive model and radiomics nomogram were developed based on multivariate logistic regression and the Shapley Additive exPlanations algorithm with clinico-radiological features. The diagnostic performance and clinical application value of the clinico-radiological model were measured by receiver-operating characteristic, calibration curve, and decision curve analyses. Accuracy, precision, recall, F1 value were calculated by confusion matrix.

Results The AUC values of radiomics model and clinical model were 0.76 and 0.67 with an accuracy of 0.74, sensitivity of 0.63, specificity of 0.82, and Jorden index of 0.45. The clinico-radiological model showed favorable calibration and discrimination performance with an AUC value of 0.79 in training cohort and 0.87 and 0.76 in validation cohort which was higher than that of the clinical model and radiomics model. The calibration curve and decision curve of the nomogram were well fitted.

Conclusion The clinico-radiological fusion model based on multiparametric DCE_MRI provides an important decision-making basis for clinical preoperative evaluation and may be an important guideline for the selection of clinical treatment strategies.

PO-3886

An automated detection method for Hyperdense Middle Cerebral Artery Sign of acute ischemic stroke in non-contrast computed tomography

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Purpose: To develop a highly sensitive deep learning-based algorithm that assists in the detection of hyperdense middle cerebral artery sign(HMCAS) of acute ischemic stroke(AIS) on non-contrast computed tomography(NCCT).

Methods: Head NCCT images with HMCAS performed within 6 hours of AIS symptoms onset were retrospectively and consecutively retrieved from two hospital databases acquired across four different scanners between January 2009 and May 2023. The data were divided into training and test sets. A deep learning-based algorithm was constructed and evaluated using receiver operating characteristic (ROC) curves, sensitivity, specificity, positive predictive value (PPV), and F1-score analysis on the test set and five subgroups, respectively.

Results: A total of 594 patients (61.89 years \pm 14.14;395 males) were included after exclusion of 19 patients with severe motion artifact.HMCAS was identified on NCCT in all patients.Of these,424 patients(61.64 years \pm 13.95;288 males) were assigned to the training set,and 340 patients(170HMCAS(+) with 170 HMCAS(-))(58.36 years \pm 16.76;177 males) were involved in the test set. The overall sensitivity, specificity, positive predictive value(PPV), f1-score of the proposed algorithm for detecting HMCAS was 99.4%(95%CI: 99.3,99.5),35.9%(95%CI: 35.5,36.3),60.6%(95%CI:60.3,60.9),0.752 (95%CI:0.750,0.754). The sensitivities for the MCA M1,M2,M3-4,ICA,A regions were 99.34%, 100%, 100%, 97.30% and 100%,respectively.Three new HMCAS(+) AIS had been overlooked in the initial reports were detected.The overall area under the curve (AUC) for identifying HMCAS was 0.930[95% CI:0.902–0.959],whereas those for MCA M1,M2,M3-4,ICA and A regions were 0.962,0.974,0.992,0.965,1.000,respectively.After excluding "ectopic" false positives,the overall AUC performance improved by 1%.

Conclusion: The proposed deep learning algorithm assisted radiologists in detecting HMCAS of AIS on NCCT images,leading to a higher detection rate across all subgroups and overall.

PO-3887

Multimodal data integration using machine learning to predict the risk of clear cell renal cancer metastasis: A retrospective multicentre study

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Purpose: To develop and validate a predictive combined model for metastasis in patients with clear cell renal cell carcinoma (ccRCC) by integrating multimodal data.

Materials and Methods: In this retrospective study, the clinical and imaging data (CT and ultrasound) of patients with ccRCC confirmed by pathology from three tertiary hospitals in different regions were collected from January 2013 to January 2023. We developed three models, including a clinical model, a radiomics model, and a combined model. The performance of the model was determined based on its discriminative power and clinical utility. The evaluation indicators included AUC value, accuracy, sensitivity, specificity, negative predictive value, positive predictive value and DCA(Decision Curve Analysis) curve.

Results:A total of 251 patients were evaluated. Patients (n=166) from Shandong University Qilu Hospital (Jinan) were divided into the training cohort, of which 50 patients developed metastases; patients (n=37) from Shandong University Qilu Hospital (Qingdao) were used as testing set 1, of which 15 patients developed metastases; patients (n=48) from Changzhou Second People's Hospital were used as testing set 2, of which 13 patients developed metastases. In the training set, the combined model showed the highest performance (area under the receiver operating characteristic curve [AUC], 0.924) in predicting lymph node metastasis, while the clinical and radiomics models both had AUCs of 0.875 and 0.870, respectively. In the testing set 1, the combined model had the highest performance (AUC, 0.877) for predicting lymph node metastasis, while the AUCs of the clinical and radiomics models were 0.726 and 0.836, respectively. In the testing set 2, the combined model had the highest performance (AUC, 0.849) for predicting lymph node metastasis, while the AUCs of the clinical and radiomics models were 0.708 and 0.804, respectively. The DCA curve showed that the combined model had a significant prediction probability in predicting the risk of lymph node metastasis in ccRCC patients compared with the clinical model or the radiomics model.

Conclusion: The combined model was superior to the clinical and radiomics models in predicting lymph node metastasis in ccRCC patients.

PO-3888

Dual-phase contrast-enhanced CT-based intratumoral and peritumoral radiomics for preoperative prediction of lymphovascular invasion in gastric cancer

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Purpose To develop and validate dual-phase contrast-enhanced computed tomography (CT) radiomics for the prediction of lymphovascular invasion (LVI) in patients with gastric cancer.

Materials and Methods Three hundred and eighty-three patients with gastric cancer (training cohort, 269 patients; validation cohort, 114 patients) were retrospectively enrolled between January 2017 and June 2023. Univariate and multivariate regression analysis was used to select the clinical risk factors and then construct a clinical model.

Radiomic features were extracted from the intratumoral volume (ITV) and peritumoral volume (PTV) on CT images at arterial phase (AP) and venous phase (VP). Seven radiomics signature scores (radscore) including ITV-AP radscore, ITV-VP radscore, PTV-AP radscore, PTV-VP radscore, ITV+PTV-AP radscore, ITV+PTV-VP radscore, and ITV+PTV-AP+VP radscore were obtained. The nomogram incorporating the most predictive radscore and clinical risk factors was developed and its diagnostic ability was evaluated using receiver operating characteristic curve (ROC) analysis.

Results The height, tumor differentiation and number of lymph node metastasis (LNM) were independent predictors for predicting LVI. The ITV+PTV-AP+VP radscore presented superior AUC of 0.884 [95 % confidence interval (CI): 0.843-0.925] in the training cohort and 0.899 [95%CI: 0.826-0.971] in the validation cohort. The nomogram consisted of ITV+PTV-AP+VP radscore, height, tumor differentiation and number of LNM showed excellent discrimination in the training and validation cohorts with AUCs of 0.931 (95% CI: 0.900-0.962) and 0.953 (95% CI: 0.919-0.988), respectively. Decision curve analysis proved that the net benefit of the nomogram was superior to that of the clinical and radiomics models throughout the majority of the threshold probabilities.

Conclusion The nomogram integrating clinical risk factors and intratumoral and peritumoral radiomics from dual-phase contrast-enhanced CT images provided favorable performance for prediction of LVI.

PO-3889

Medical-Inspired Deep Learning Algorithm for the Quantification of Epicardial Adipose Tissue

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Purpose: Epicardial adipose tissue (EAT) volume play an important role in the development of coronary atherosclerosis, atrial fibrillation, heart failure, metabolic syndrome, and other cardiovascular diseases (CVDs). However, manual quantification of EAT volume is time consuming, requires specialized training, and easily lead to human error. Therefore, an accurate and fully automated algorithms for EAT quantification are urgently needed and desired as a diagnostic and evaluate index tool.

Method: 108 subjects ages at 50 to 80 year-old, who undergoing routine coronary computed tomography angiography (CCTA) scans in the Second Xiangya Hospital of Central South University from April 2022 to September 2022, were selected in our study. And their CCTA data were analyzed for EAT volume quantification. For a series of CT slices, the proposed algorithm uses a well-trained convolutional neural network (CNN) to predict the pericardium contained in each axial CT slice,

and then a medical-inspired post-processing method is applied to regularize the predicted pericardium, where the post-processing method is mainly based on the anatomical and surgical integrity and continuity of the pericardium. EAT segmentations are then obtained from the original axial CT slices and refined pericardium predictions by thresholding $[-190\text{HU}, -30\text{HU}]$.

Results: We divide the whole dataset into training dataset (50 objects, 2124 contrast CT slices), validation dataset (18 objects, 668 contrast CT slices) and the testing dataset (40 objects, 1710 contrast CT slices). We propose a medical-inspired deep learning algorithm for EAT quantification, which combines the data-driven method and specific medical knowledge. A strong level of agreement was observed between our algorithm and expert manual quantification, with a median Dice score coefficient (DSC) of 0.904 (interquartile range: 0.830-0.948). Additionally, excellent correlation of 0.979 is obtain for EAT volumes. Most importantly, extensive numerical experiments show that our algorithm has a satisfactory quantification capacity and good generalization ability.

Conclusion: The proposed algorithm represents a tool for rapid fully automated and accurately quantification of EAT and may improve cardiovascular risk stratification in patients with CCTA scan.

PO-3890

Preoperative prediction of the SSIGN score and outcome in clear cell renal cell carcinoma using a combination of CT radiomics and clinical features

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Objective: The purpose of this study was to develop and validate a nomogram combining CT radiomics and clinical features for preoperative prediction of the Stage, Size, Grade, and Necrosis (SSIGN) score and outcome in clear cell renal cell carcinoma (ccRCC).

Methods: A retrospective multicenter analysis of 845 ccRCC patients (training cohort 592/ test cohort 253) was performed. Clinical model, radiomics signature (RS), and combined radiomics nomogram (RN) incorporating clinical and radiomics features were constructed to predict the SSIGN score. The area under the receiver operating characteristic curve (AUC) was used to evaluate the performance of each model. Decision curve analysis (DCA) was used to evaluate the net clinical benefit. The endpoint of the study was the recurrence-free survival (RFS). Kaplan-Meier survival analysis was used to assess the association between model-predicted SSIGN score and RFS.

Results: The RN outperformed the clinical model and RS in predicting SSIGN, with a higher AUC (0.93 and 0.92, respectively in the training cohort and test cohort). DCA demonstrated the RN outperformed the RS and the clinical model. In predicting RFS, RN achieved a higher Harrell's concordance index (C-index) (0.76 and 0.77, respectively in the training cohort and test cohort) than the RS and clinical models did.

Conclusion: The RN is a non-invasive biomarker in predicting the SSIGN score and outcome of ccRCC.

PO-3891

Deep learning-assisted automatic segmentation of the uterine corpus and fibroids on T2-weighted magnetic resonance images

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Purpose: Uterine fibroids are the most common gynecologic benign tumors and contribute to significant morbidity. MRI provides an accurate assessment of the number, location, and type of fibroids. However, the segmentation of uterus and uterine fibroids from MR images is difficult to achieve. We proposed a self configuring MR imaging segmentation method based on the nnU-Net deep learning network.

Methods and Materials: Two multi-plane (T2 sagittal and T2 axial images of the female pelvis MR images) datasets are used to validate the performance of the proposed uterus, endometrium, and uterine fibroids segmentation algorithm in this research. nnU-Net systematically addresses the configuration of entire segmentation pipelines and provides visualization and description of the most relevant design choices.

Results: The dataset enrolls 299 patients with 5mm slice thickness MR volumes. They are randomly divided into 159 for training, and 40 for testing. The Dice similarity coefficient (DSC) of the uterus, endometrium, and uterine fibroids are 0.929, 0.817, and 0.789 in T2 sagittal MR images using the nnU-Net deep learning network; the hausdorff 95 (95HD) of these three are 6.336, 4.911 and 9.996mm. The DSC of the uterus, endometrium, and uterine fibroids are 0.928, 0.765, 0.804 in T2 axial MR images, the 95HD are 6.825, 6.547, and 10.855mm.

Conclusions: We have proposed a self-configuring nnU-Net deep learning network method to segment uterus, endometrium, and uterine fibroids automatically.

PO-3892

Parsing altered gray matter morphology of depression using a framework integrating the normative model and non-negative matrix factorization

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Aims. The high inter-individual heterogeneity in depression limits neuroimaging studies with case-control approaches to identify promising biomarkers for individualized clinical decision-making. In this study, we propose a novel framework integrating the normative model and non-negative matrix factorization (NMF) to quantitatively estimate heterogeneity in depression from a dimensional perspective. This framework initially inferred individualized differences in gray matter morphometry measured with voxel-based morphometry using a normative model and then parsed them into overlapping latent disease factors using NMF. Each patient with depression was assigned a unique factor composition, thus retaining inter-individual variability.

Methods. Two independent datasets were included in this study (discovery dataset: 105 first-episode untreated patients with depression and 130 matched healthy controls; validation dataset:

76 patients with depression and 68 matched HCs). T1-weighted magnetic resonance images from these two datasets were acquired and analyzed.

Results. Using this framework, we identified 4 robust latent disease factors with distinct clinical symptoms and cognitive processes. Factor compositions exhibited significant differences between adolescent- and adult-onset patients, capturing sources of clinical heterogeneity. In addition, the group-level morphological differences obtained with the two-sample t test could be quantitatively derived from the identified disease factors, reconciling the group- and subject-level differences in neuroimaging studies. All of these results can be reproduced in the validation dataset. Furthermore, our framework significantly predicted the factor composition of unseen patients in the independent validation dataset.

Conclusion. In conclusion, the framework provides a new approach to resolving neuroanatomical heterogeneity in depression and provides a basis for precision medicine.

PO-3893

Two distinct subtypes of obsessive compulsive disorder revealed by a framework integrating multimodal neuroimaging information

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Aims. Patients with obsessive compulsive disorder (OCD) exhibit tremendous heterogeneity in structural and functional neuroimaging aberrance. However, most previous studies just focus on group-level aberrance of a single modality ignoring heterogeneity and multimodal features. On that account, we aimed to uncover OCD subtypes integrating structural and functional neuroimaging features with the help of a multi-view learning method and examined multimodal aberrance for each subtype.

Methods. Ninety-nine first-episode untreated patients with OCD and 104 matched healthy controls (HCs) undergoing structural and functional MRI were included in this study. Voxel based morphometric and amplitude of low-frequency fluctuation (ALFF) were adopted to assess gray matter volumes (GMVs) and the spontaneous neuronal fluctuations respectively. Structural/functional distance network was obtained by calculating Euclidean distance between pairs of regional GMVs/ALFF values across patients. Similarity network fusion, one of multi-view learning methods capturing shared and complementary information from multimodal data sources, was used to fuse multimodal distance networks into one fused network. Then spectral clustering was adopted to categorize patients into subtypes.

Results. As a result, two robust subtypes were identified. These two subtypes presented opposite GMV aberrance and distinct ALFF aberrance compared with HCs while shared indistinguishable clinical and demographic features. In addition, these two subtypes exhibited opposite structure-function difference correlation reflecting distinct adaptive modifications between multimodal aberrance.

Conclusion. Altogether, these results uncover two objective subtypes with distinct multimodal aberrance and provide a new insight into taxonomy of OCD.

PO-3894

Prediction of Prognosis of Invasive Breast Carcinoma in Women Based on Ferroptosis-related LncRNA

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Background and purpose: To determine the prognostic value of ferroptosis-related Long non-coding RNAs (lncRNAs) in women diagnosed with invasive breast carcinoma (BRCA).

Methods: Transcriptome data and clinical data of patients with BRCA were obtained from The Cancer Genome Atlas (TCGA) database. Correlation analysis and differential analysis were conducted to obtain ferroptosis-related differential genes and lncRNAs. The analysis of Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) were conducted afterwards. A total of 1001 women with BRCA were randomly divided into a training set and a test set with a ratio of 1:1. Univariate Cox regression analysis and least absolute shrinkage and selection operator (Lasso) regression analysis of the training set were carried out to determine the optimal set of lncRNA then a prognosis model was built to calculate the risk score of each patient. The Receiver operating characteristic (ROC) curve, risk plot and Kaplan-Meier (KM) curve were used to evaluate the performance of the prognosis model and the model was validated by the test set.

Results: A total of 66 Ferroptosis-related differential gene and 299 ferroptosis-related differential lncRNAs were determined. The model was built based on the optimal set of lncRNA which were associated significantly with prognosis of women with BRCA and the risk score of each woman was obtained. In the training and the test set, the area under the ROC curve (AUC) of the risk score in predicting the 1-year, 3-year and 5-year survival rates of women with BRCA were 0.713, 0.762, 0.770 and 0.625, 0.712, 0.718, respectively. According to the results of univariate and multivariate Cox regression, the N stage of women with BRCA and risk score were considered as independent risk factors and were used to construct a nomogram. The AUC of the nomogram in predicting the 1-year, 3-year and 5-year survival rates of women with BRCA were 0.738, 0.764, 0.751.

Conclusion: The risk prognosis model based on ferroptosis-related lncRNA showed good performance in prediction of prognosis in women with BRCA. The model can facilitate the evaluation of the overall survival in women with BRCA and provide evidence for potential targeted treatments.

PO-3895

Diagnostic performance of radiomics for the vulnerability of arterial plaques: A Systematic Review and Meta-Analysis

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Background: Radiomics analyzes medical images by extracting a large number of quantitative features, and it is increasingly being applied in clinical research regarding medical imaging analysis.

Objective: To explore the diagnostic accuracy of models based on radiomics for identifying the vulnerability of arterial plaques.

Methods: Databases from PubMed, Web of Science, and EMBASE were used for this literature search. Evaluation of the diagnostic precision of radiomics in determining the susceptibility of various arterial plaque forms is one of the inclusion criteria. The Quality Assessment of Diagnostic

Accuracy Study (QUADAS-2) and Radiomics Quality Score (RQS) were used to evaluate the risk of bias. The included radiomics studies was analyzed by meta-analysis, using subgroup analysis to investigate heterogeneity. The precision of radiomics models were assessed using the Summary Receiver Operating Characteristic Curve (SROC).

Results: Nine investigations were included, including four coronary artery studies, three carotid artery studies, and two intracranial artery studies. Radiological identification of arterial vulnerable plaques has an overall sensitivity of 82% (95% CI: 72-89%) and specificity of 77% (95% CI: 69-83%). The area under SROC was 0.85 (95% CI 0.82-0.88). Maximum and mean RQS percentage were 77.8% and 33.1%, respectively. The inter-rater agreement was good (ICC 0.98, 95% CI 0.95-0.95).

Conclusion: Radiomics has demonstrated high diagnostic performance in identifying vulnerable arterial plaques. With more in-depth research, radiomics may alter the clinical diagnostic procedure for arterial plaques.

PO-3896

Two distinct subtypes of obsessive compulsive disorder revealed by heterogeneity through discriminative analysis

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Objective : Neurobiological heterogeneity in obsessive compulsive disorder (OCD) is understudied leading to conflicting neuroimaging findings. Therefore, we investigated objective neuroanatomical subtypes of OCD by adopting a newly proposed method based on gray matter volumes (GMVs).

Methods: GMVs were derived from T1-weighted anatomical images of patients with OCD ($n = 100$) and matched healthy controls (HCs; $n = 106$). We first inquired whether patients with OCD presented higher interindividual variability HCs in terms of GMVs. Then, we identified distinct subtypes of OCD by adopting heterogeneity through discriminative analysis (HYDRA), where regional GMVs were treated as features.

Results: Patients with OCD presented higher interindividual variability than HCs, suggesting a high structural heterogeneity of OCD. HYDRA identified two distinct robust subtypes of OCD presenting opposite neuroanatomical aberrances compared with HCs, while sharing indistinguishable clinical and demographic features. Specifically, subtype 1 exhibited widespread increased GMVs in cortical and subcortical regions, including the orbitofrontal gyrus, right anterior insula, bilateral hippocampus, and bilateral parahippocampus and cerebellum. Subtype 2 demonstrated overall decreased GMVs in regions such as the orbitofrontal gyrus, right anterior insula and precuneus. When mixed together, none of patients presented significant differences compared with HCs. In addition, the total intracranial volume of subtype 2 was significantly correlated with the total score of the Yale–Brown Obsessive Compulsive Scale while that of subtype 1 was not.

Conclusions: These results identified two distinct neuroanatomical subtypes, providing a possible explanation for conflicting neuroimaging findings, and proposed a potential objective taxonomy contributing to precise clinical diagnosis and treatment in OCD.

PO-3897

Identifying Amyotrophic Lateral Sclerosis through the Abnormal Gray Matter Volume Pattern using Support Vector Machine Algorithm

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Objective: With the evolution of machine learning (ML), artificial intelligence (AI) algorithms have enhanced the diagnosis and classification of numerous diseases. The goal of this research was to leverage the support vector machine (SVM) model, a multivariate pattern recognition ML technique, to delineate the pattern of gray matter volume (GMV) change in amyotrophic lateral sclerosis (ALS) and assess its viability for ALS diagnosis.

Methods: 70 ALS patients and 60 healthy controls (HCs) underwent scanning using a 3 Tesla MRI scanner with a T1-weighted sequence. The cerebrum was segmented into 90 regions using the automated anatomical labeling atlas and voxel-based morphometry assessed the GMV for each region and participant. Multivariate pattern analyses were employed to differentiate ALS patients from HCs. The SVM classifier's efficacy in diagnosing ALS was explored with the model undergoing training and testing via a leave-one-participant-out cross-validation. Classification accuracy was tested with the highest accuracy selected as the final value. Pearson correlation analyses explored the relationship between selected GMV. GM regions more associated with either ALS subjects or HCs were identified using a threshold of $\geq 30\%$ of maximum weight vector scores.

Results: Figure 1 illustrates the SVM classification performance based on GMV. The peak classification accuracy reached 82.50% when selecting the top 40% of GMV ($p = 0.0001$), with a specificity of 80.40% and a sensitivity of 85.05%. This highest accuracy was deemed the final result and the receiver operating characteristic (ROC) curve for this classification accuracy was with an area under the curve (AUC) of 0.89. Figure 2 visualizes the GMV change pattern in brain regions that classified ALS patients and HCs based on GM volumetry.

Conclusion: Abnormal GMV change in specific brain regions are evident in ALS patients. Gray matter volumetry combined with SVM has broad potential applications in identifying ALS.

PO-3898

Preliminary Preclinical Application Study of Single-Scan Ultra-Fast Quantitative Magnetic Resonance Imaging

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This study focuses on advancing Quantitative Magnetic Resonance Imaging (QMRI) by significantly reducing data acquisition time. Traditional QMRI offers more consistent, quantifiable data compared to manual MRI but often takes longer, increasing costs and patient discomfort. Researchers introduced a new technique, using a single-scan Overlapping Echoes Magnetic Resonance sequence (MOLED) combined with deep learning for image reconstruction, that can capture whole-brain T2 values in just 12 seconds. Tested on both specialized phantoms and human volunteers, the MOLED method produced highly reliable and repeatable T2 measurements, closely correlating with established methods. While the technology showed promise for clinical applicability, especially for time-sensitive cases and in reducing patient discomfort, further research is needed, particularly involving patients with brain tumors.

PO-3899

COVID-19 and Diabetes research: Where Are We Now and What Does the Future Hold? A Bibliometric Visualization Analysis

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Background & Objective

The extensive spread of COVID-19 worldwide has caused a dramatic negative impact on many individuals' health. This study aims to systematically and comprehensively analyze the current status and possible future directions of DM and COVID-19 research.

Methods

We obtained publications about COVID-19 and diabetes mellitus from the Web of Science Core Collection using the search terms "COVID-19" and similar terms combined with "diabetes mellitus" and similar terms, with a date range of January 2020 to September 2022. And we used CiteSpace V 5.8.R3 to perform the bibliometric visualization analysis.

Results

The search enrolled 4242 publications. The United States is the country; Harvard Medical School was the most productive institution in this field. The highest-ranking journal was Public Library of Science, and the most co-cited journal was Lancet. The 20 most cited journals have all cited 19,970 times, accounting for 15% of the total cites; the range of those journals was 550-2320. Publications on COVID-19 and DM research revealed a trend that hotspots range from the initial observation of the comorbidities of COVID-19 pneumonia to the study of the impact of diabetes on its prevalence and prognosis and the related pathophysiological mechanisms and throughout the process to explore different therapeutic measures and their efficacy and eventual impact on clinical prognosis. And "glycaemic control," "COVID-19 vaccine," and "COVID-19-associated mucormycosis" are still likely to be the hotspots and frontiers of research in the future.

Conclusions

This bibliometric analysis related to DM in COVID-19 illuminates the current research situation and developmental trends, supporting researchers in the exploration of prospective directions for research.

PO-3900

Preoperatively identify VEGF-positive HCC: via Peritumoral Delta Radiomics

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Purpose:

VEGF has been verified as a significant independent factor predicting poor prognosis for HCC patients, and anti-VEGF therapy has been recognized as an effective treatment for HCC. This study presents and explores the value of a non-invasive Delta radiomics approach based on multi-phase contrast enhanced magnetic resonance imaging (CE-MRI) to preoperatively identify VEGF-positive HCC which may enhance clinician's decision-making potentially.

Methods and Materials:

Retrospective recruiting of 145 patients with pathologically confirmed HCC (training cohort: n = 101; testing cohort: n = 44). The 3D volume of interest of the whole tumor area and peritumoral 10mm area were manually segmented from preoperative CE-MRI images. Based on T1 weighted non-contrast images(T1NC), arterial phase (AP), portal venous phase (PVP), delayed phase (DP)

and hepatobiliary phase (HBP) images, 107 whole tumor radiomics features and 93 peritumoral radiomics features excluded shape features were extracted respectively. Delta radiomics features were calculated from the radiomics features change over different phases by direct and related except for shape-related features. Minimal redundancy maximal relevance and recursive feature elimination were applied to screen the optimal features subset and logistic regression was used to train corresponding models. Utilizing the receiver operating characteristic curve and its area under the curve (AUC) to evaluate the performance of each model. The combined radiomics model is generated by models which AUCs of both the training and testing cohort above 0.7. A nomogram was constructed based on the combined radiomics model and clinical risk factors selected by Akaike information criterion.

Results:

The entire cohort contained 64 VEGF-positive cases and 81 VEGF-negative cases. Within all single radiomics models, Delta_peri10 models showed favorable performance than others that models whose AUCs of both the training and testing cohort above 0.7 are all Delta_peri10 models, and the best one is DP-AP_peri10, with AUCs as 0.808 and 0.775 in the training and testing cohort. The combined Delta radiomics model had higher AUCs with 0.845 and 0.780 in the training and testing cohort. The combined radiomics-clinical model demonstrate satisfied efficacy with AUCs as 0.868 and 0.808 in the training and testing cohort.

Conclusions:

The peritumoral Delta radiomics models based on multi-phase CE-MRI show a good efficacy and improvement in predicting VEGF expression in HCC preoperatively. Delta radiomics may provide a novel non-invasive biomarkers for diagnosing HCC and suggestions for personalized treatment decision-making.

PO-3901

Application of Improved Faster-RCNN in Rib Fracture Detection

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Rib fracture is a common chest injury that is easily missed. Due to the small area of the rib fracture area relative to the whole CT image area, serious imbalance of positive and negative anchor frame samples is easy to occur during training. To solve this problem, an anchor frame screening method is proposed based on the Faster-RCNN model. Based on the comprehensive consideration of the imaging characteristics of the ribs in CT images, combined with the knowledge in the medical field, through the traditional image processing algorithm, the anchor frame is selected to be more effective for model training. To some extent, it alleviates the problem of imbalance between positive and negative samples, and makes the learning of deep model more targeted. In addition, to solve the problem of weak discriminant of shallow features in the Faster-RCNN model, SE module is used to strengthen the discriminant of features in the channel dimension, while retaining the location sensitivity required by target inspection tasks, which further improves the performance of the model. Under the condition that the average number of false positives per CT image is 4, the sensitivity of the improved Faster-RCNN reaches 90.49%, which is 3.6% higher than that of the unimproved Faster-RCNN.

PO-3902

Development of a nomogram model based on MRI T2WI radiomics combined with clinical characteristics for predicting the post-acute pancreatitis diabetes mellitus

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Abstract Objective: This study aims to achieve early prediction of post-acute pancreatitis diabetes mellitus (PPDM-A) by nomogram based on radiomics and clinical risk factors, and to provide suggestions for clinical personalized treatment.

Methods and Materials: Retrospective collection of patients diagnosed with acute pancreatitis (AP) in our hospital from January 2016 to December 2020, through clinical follow-up, they were divided into PPDM-A group (n=72) and normal blood glucose after AP group (n=100). The enrolled patients were randomly divided into the training group (n=120) and the validation group (n=52) at a ratio of 7 : 3, and the relevant clinical characteristics of the two groups were collected at the same time. 3D Slicer software was used to delineate the edge of pancreatic parenchyma on T2WI sequence and extract features, the least absolute shrinkage and selection operator (LASSO) algorithm was used to reduce the dimension and select the radiomics features. Logistic regression was used to establish a clinical model, radiomics model and nomogram model for predicting PPDM-A. The predictive performance of the models was evaluated by the area under the curve (AUC) of the receiver operating characteristic curve (ROC). DeLong test was used to compare the predictive performance between models. The calibration curve of the optimal model was drawn and the Hosmer-Lemesow test was used to verify the goodness of fit of the model.

Results:The AUCs of the clinical model, radiomics model, and nomogram model in the training group were 0.774 (95% CI: 0.684-0.863), 0.850 (95% CI: 0.781-0.919) and 0.905 (95% CI: 0.849-0.961), respectively. In the validation group, they were 0.747 (95% CI: 0.612-0.882), 0.850 (95% CI: 0.781-0.919) and 0.874 (95% CI: 0.769-0.979), respectively. Delong test results showed that there was statistical significance between the nomogram model and the clinical model in both the training group and the validation group (training group $P=0.025$, validation group $P=0.006$).The Hosmer-Lemeshow test showed that the nomogram model had a good degree of fit (training group $P=0.628$, validation group $P=0.128$).

Conclusions:The nomogram model based on T2WI radiomics and clinical features shows good performance in optimizing the individualized prediction of PPDM-A, which can provide reference for the early prediction of PPDM-A.

PO-3903

Fully Automated Segmentation and Volumetry of hepatic veins and portal veins at CT prior to major hepatectomy using deep learning

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Objective: To develop and perform a spatial external validation of two DL models for the automated segmentation of hepatic veins and portal veins and apply the models to blood-free FLR% (FLR%_{bf}) assessment before major hepatectomy.

Materials and Methods: This retrospective study developed two 3D U-Net models for the automated segmentation of hepatic veins and portal veins on contrast-enhanced CT scans. Images were obtained from 170 patients from January 2018 to March 2019. First, radiologists annotated

hepatic veins and portal veins. Then, two 3D U-Net models were trained in medical center A (n=170, two models using the same dataset for training and testing) and tested in medical center B in cases with various liver conditions (n1=146) and in candidates for major hepatectomy (n2=32). The segmentation accuracy was evaluated using dice similarity coefficient (DSC) and volumetric similarity (VS). FLR%bf assessment and the prediction of hepatectomy was compared between manual and automated methods.

Results: The DSC and VS values of the two models ranged from 0.73 ± 0.12 to 0.87 ± 0.13 . The automated and manual FLR%bf assessments ranged from 6.08% to 81.91%, 6.47% to 82.20%, respectively. No statistical significance was found ($P=0.82$). No statistical difference was found in the prediction of anatomic resection based on FLR%bf.

Conclusion: It's feasible for the automatic segmentation of hepatic veins and portal veins in CT images by using deep learning and the application of these models to FLR%bf assessment before hepatectomy.

Clinical relevance: This study provided adequate validation in diverse liver conditions (including candidates for hepatectomy) and thorough evaluation using clinical cases, and provide an automated FLR%bf assessment (which is regarded as more accurate than blood-filled FLR% assessment) both in a quantitative output and as a 3D visualization for surgeons.

PO-3904

ECG-based cardiodynamicsgram can reflect anomalous functional information in coronary artery disease

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Background: The cardiodynamicsgram (CDG), a novel noninvasive method, extracts dynamic ST-T segment information from an electrocardiogram (ECG) through deterministic learning.

Hypothesis: The CDG can reflect anomalous functional information in coronary artery disease (CAD).

Methods: We retrospectively enrolled 456 patients with suspected CAD who underwent coronary computed tomography angiography (CCTA) from January 2020 to 2022, followed immediately by standard 12-lead ECG acquisition. Positivity for CAD were defined as CCTA $\geq 50\%$ or CT-derived fractional flow reserve (CT-FFR) ≤ 0.8 . A CDG value <0 was considered negative; otherwise, it was considered positive. We also evaluated the diagnostic performance of the CDG in the ECG-diagnosis-negative subgroup and in patients who had undergone invasive coronary angiography (ICA) after CCTA.

Results: Of 362 patients, 168 (46.41%) were positive for CAD, and 178 (49.17%) were men. The median age was 59 (52–66) years. The accuracy of the CDG in the diagnosis of CAD was 79.56%, with a sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC) of 75.60%, 82.99%, and 0.836 (95% CI: 0.794–0.878), respectively. Similarly, in the ECG-diagnosis-negative subgroup (n = 223), the accuracy of the CDG was 80.27%, with an AUC of 0.842 (95% CI: 0.790–0.895). Among the 11 patients with CAD confirmed by ICA, 10 were diagnosed positive by the CDG. Furthermore, the CDG values and CT-FFR were correlated ($r = -.395$; $p < .001$).

Conclusions: The ECG-based CDG has relatively high specificity and accuracy for the diagnosis of CAD and reflects functional cardiac information to some extent. It has the potential to be used as a screening tool for suspected CAD patients before CCTA.

PO-3905

Clinico-biological-radiomics (CBR) based machine learning for improving the diagnostic accuracy of false-positive lymph nodes in lung cancer

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Background: The main problem of PET/CT for lymph node (LN) staging is the high false positive rate (FPR). Thus, we aimed to explore a clinico-biological-radiomics (CBR) model via machine learning (ML) to reduce FPR and improve the accuracy for predicting the hypermetabolic mediastinal-hilar LNs status in lung cancer than conventional PET/CT.

Methods: A total of 260 lung cancer patients with hypermetabolic mediastinal-hilar LNs were retrospectively reviewed. Patients were pathologically divided into the LN negative (LN-) and positive (LN+) groups, and randomly assigned into the training (n=182) and validation (n=78) sets. Preoperative CBR dataset containing 1738 multi-scale features was constructed for all patients. Prediction models for hypermetabolic LNs status were developed using the features selected by the supervised ML algorithms, and evaluated using the classical diagnostic indicators. Then, a nomogram was developed based on the model with the lowest FPR and the best predictive efficiency, and validated by the calibration plots.

Results: In total, 109 LN- and 151 LN+ patients were enrolled in this study. 6 independent prediction models were developed to differentiate LN- from LN+ patients using the selected features from CBR sub- and total datasets, respectively. The DeLong test showed that the CBR Model containing all-scale features held the highest predictive efficiency and the lowest FPR among all of established models ($p < 0.05$) in both the training and validation sets (AUCs of 0.90 and 0.89, FPRs of 12.82% and 6.45%, respectively) ($p < 0.05$). The quantitative nomogram based on CBR Model was validated to have a good consistency with actual observations.

Conclusion: This study presents an integrated CBR nomogram that can further reduce the FPR and improve the accuracy of hypermetabolic mediastinal-hilar LNs evaluation in lung cancer, thereby greatly reducing the risk of overestimation and assisting for precision treatment.

PO-3906

Multi-modal Fusion of Radiomics and Pathomics for Enhanced Pancreatic Cancer Survival Prediction with Asymmetric Twinning Information Interaction Network (ATIIN)

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Abstract

Objectives To determine the predictive value of a new model that combines radiomics and pathomics for estimating the survival of pancreatic ductal adenocarcinoma (PDAC) patients and to evaluate its potential in guiding treatment decisions.

Methods Patients who underwent surgical resection and were confirmed with PDAC by postoperative pathology in a single-center PDAC cohort registry were enrolled in this study between July 2008 and September 2013. Preoperative CT images and postoperative pathology images were available for each patient. The multi-modal fusion system, Asymmetric Twinning Information Interaction Network (ATIIN), was utilized to combine radiomics and pathomics features for predicting postoperative survival time in PDAC patients.

Results 89 patients (mean age \pm standard deviation, 58 years \pm 10; 64 men) were evaluated. The average survival prediction error value of ATIIN was 1.99 months, compared to 4.8 months using radiomics with the channel attention network and 5.5 months using pathomics with the feature attention network ($P=.0002$). The C-Index value of ATIIN was 0.95, higher than 0.52 in the feature attention network and 0.57 in the channel attention network. When survival time was less than 7 months, the accuracy ratio of ATIIN was 1.0 and 0.65, compared to 0.4 and 0.45 in the feature attention network and 0.6 and 0.4 in the channel attention network. When survival time was more than 7 months, the accuracy ratio of ATIIN was 0.625, similar to the channel attention network and lower than the 0.75 accuracy ratio of the feature attention network.

Conclusion ATIIN, which accurately predicts the survival time of patients with PDAC after radical surgery, can aid clinicians in making appropriate treatment decisions.

PO-3907

Feasibility of ultra-low radiation dose reduction for Urinary calculus using Deep Learning CT Image Reconstruction : prospective pilot study

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*Purpose: To compare dose, reader assessments and noise between ultra-low-dose(ULD) and low-dose(LD) urolithiasis CT using Deep Learning CT Image Reconstruction

*Methods and Materials: Prospective study of 56 patients having uncontrast LD and ULD urolithiasis CT reconstructed using PBP, ASIR-V and Deep learning reconstruction(DL). Dose,noise measurements and subjective image assessment were recorded

*Results: UID volume CT dose index was less 92% less, Noise was 60% less with ULD DL than with LD ASIR-V ($P<0.001$),no other significant differences existed.The ULD-DL showed a greater than 85% concordant rate in overall stones and 100% in urinary stones >3 mm. However, for stones <3 mm, neither reviewer had a good detection rate (58.5% and 68.6% for the general and genitourinary radiologist, respectively). Inter-observer agreement was almost perfect ($\kappa = 0.85$).

*Conclusions: ULD DL is comparable to our standard of care, LD ASIR-V, with 92% lower dose and 60% less noise .Despite a significant radiation dose reduction, ULD-DL images were comparable in image quality and noise to FBP images. Furthermore, the diagnostic performance of the ULD non-enhanced CT protocol was comparable to that of the RD scan for diagnosing urinary stones >3 mm.

PO-3908

Value of TrueFidelity (deep learning image reconstruction) in low-dose urinary tract CT: image quality and calculus detection

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*Purpose: Compare with filtered back projection (FBP) and adaptive statistical iterative reconstruction (ASIR-V) to evaluate the effect of deep learning image reconstruction (DLIR) on the image quality of low-dose urinary tract CT and the ability of stone detection.

*Methods and Materials: We prospectively enrolled 41 adult patients (16 females and 25 males, mean age \pm SD, 53.1 \pm 15.5 years) who underwent urinary CT examination for sudden low back

pain.All patients received standard-dose CT (SDCT) and low-dose CT (LDCT) . SDCT was reconstructed using FBP, while LDCT was reconstructed using FBP, ASIR-V30%, ASIR-V50%, ASIR-V70%, DLIR-L, DLIR-M, DLIR-H.All images were reconstructed by 0.625mm.For objective analysis,the standard deviation of attenuation in the right hepatic lobe, subcutaneous fat,kidney were measured as image noise,signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) were measured and calculated.For subjective analysis, assess overall image quality, noise, and diagnostic confidence on a 5-point scale from 1 (poor) to 5 (excellent).

*Results: Compared with the SDCT scan, the LDCT dose was reduced by 89% (CTDIvol: 1.80mGy vs 15.97mGy). In LDCT images, the image noise is significantly decreased by DLIR compare to FBP and ASIR-V ($P<0.001$), the image noise of DLIR-H is the lowest.The SD values of the right hepatic lobe of SDCT-FBP and LDCT-DLIR-H were similar (26.66 ± 3.86 vs 26.13 ± 2.47 ; $P \geq 0.01$).In the subjective analysis, the image quality and image noise shown by LDCT-DLIR-H was similar to that shown by SDCT-FBP ($P \geq 0.01$).A total of 145 stones were detected by SDCT-FBP, the number of stones in LDCT-DLIR-L, LDCT-DLIR-M and LDCT-DLIR-H was 143, 141, 133,respectively. Twelve stones < 3 mm were not detected in the LDCT-DLIR-H image.

*Conclusions: DLIR technique can reduce the image noise of urinary tract CT images, improve the overall image quality, the image quality of DLIR-H is the best.However, for stones less than 3 mm, DLIR -H may not be the optimal choice.

PO-3909

Prediction of acute symptom severity using neuroanatomic images in antipsychotic-naïve first episode schizophrenia

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Background: Brain alterations associated with acute illness severity in schizophrenia remain poorly understood. Establishing linkages between imaging biomarkers and symptom expression may enhance mechanistic understanding of acute psychotic illness. Constructing models using MRI and clinical features together to maximize model validity may be particularly useful for these purposes. Methods: Anatomic MRI was collected from 286 patients with drug-naïve first-episode schizophrenia and 330 healthy controls from two independent datasets. A multi-task deep learning model was constructed with two parallel outputs obtained simultaneously: a standard case/control recognition and a logistic regression to predict psychosis symptom severity. The brain regions contributing to illness identification and acute symptom severity prediction were identified. We also tested whether analysis with unprocessed anatomical images would show superior performance to predefined features obtained using voxel-based morphometry (VBM) and surface-based morphometry (SBM) as typically used in machine learning studies of schizophrenia.

Results: The deep learning model differentiated schizophrenia patients from healthy controls with a balanced accuracy of 86.9% (sensitivity=90.4%, specificity=82.1%) and a robust prediction of positive symptoms ($R^2=0.44$), negative symptoms ($R^2=0.25$) and general psychopathology ($R^2=0.38$). These findings were well replicated in the validation analysis. Regions in parietal, occipital and medial frontal cortex and bilateral cerebellum had the greatest contribution to the predictive model. Greater group separation was achieved using unprocessed images than VBM and SBM derived features.

Conclusions: Incorporating illness severity prediction in pattern recognition algorithms, our study identified MRI features that had diagnostic value and were highly predictive of symptom severity in acutely ill schizophrenia patients.

PO-3910

Structural Abnormalities in the Fronto-Parietal Network: Linking White Matter Integrity to Sustained Attention Deficits in Schizophrenia

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Schizophrenia is associated with a range of cognitive deficits, among which impairments in sustained attention are particularly significant. Previous research has investigated functional changes in the fronto-parietal network (FPN) related to attentional control in schizophrenia. However, the role of structural connectivity within the FPN in sustained attention deficits remains under-explored. Utilizing diffusion tensor imaging (DTI), this study investigated white matter integrity in 75 participants, comprising 37 individuals with schizophrenia (SZ) and 38 healthy controls (HC). Psychomotor vigilance task (PVT) performance was assessed to gauge sustained attention. The SZ group showed a significant reduction in fractional anisotropy (FA) and streamline counts within white matter tracts connecting frontal and parietal regions, compared to the HC group. Further, significant negative correlations were found between PVT performance and white matter integrity measures within the SZ group, specifically in the left FPN. Our findings indicate that structural abnormalities in the FPN are associated with sustained attention deficits in schizophrenia. These results contribute to our understanding of the neurobiological mechanisms underlying cognitive impairments in schizophrenia and offer potential avenues for targeted therapeutic interventions. Further research is warranted to validate these outcomes and explore their clinical implications.

PO-3911

Effects of sleep deprivation and daytime naps on working memory based on task-state functional magnetic resonance

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Background:

Working memory plays a crucial role in daily life and professional settings, but there is a lack of clarity regarding the specific behavioral and neuroimaging changes in working memory after sleep deprivation and the possible ameliorative effects of daytime naps.

Methods:

In this study, we used the n-back experimental paradigm to investigate the effects of sleep deprivation on working memory. We recruited 50 military cadets to perform an n-back task in an MRI scanner during normal wakefulness (RW), after 30 h sleep deprivation, and after a subsequent 30 min nap, and analyzed the dynamic changes in brain responses during the three states. The experimental procedure was the same as study I, in which participants were asked to complete the n-back task on the MRI scanner. The images of the first 10 time points were discarded to ensure the stability of the MRI data. Then the images of the remaining 200 time points were corrected for slice time and re-aligned with the first image, during which the average Frame-wise displacement (FD) was calculated. Head displacement during scanning was assessed using translation and rotation parameters, with exclusion criteria being the presence of >2.5mm displacement and/or >2.5° rotation at each time point and direction. The effect of head displacement was attributed back and forth using the Friston-24 parameter. Different from the processing of PVT task

in the first part, the task of n-back adopts the experimental design of Block. Task-state MRI data were also analyzed using a two-stage mixed-effects model. For the n-back behavioral outcomes (mean reaction time and mean accuracy), we used a one-way repeated measures ANOVA with significance threshold set at $P < 0.01$ and FDR (false discovery rate) criterion corrected. For pairwise comparisons in post hoc analyses, Bonferroni was used to correct for multiple comparisons, and the significance threshold correction was set at 0.05. For the n-back images, the FDR (false discovery rate) criterion was also used to adjust for multiple comparisons. The statistical threshold was set to $pFDR < 0.05$ for n-back activation across conditions, for F comparisons across conditions, and for pairwise comparisons in post hoc analyses.

Results:

One-way repeated measures ANOVA showed significant time differences in mean reaction time ($F_{2,98} = 70.33$, $p < 0.001$) and accuracy ($F_{2,98} = 7.36$, $p < 0.001$). Posthoc analysis revealed significant differences between pairwise comparisons of RW, SD, and nap conditions, as shown in Figure 2.2. RT and accuracy after daytime naps are significantly lower than those under sleep deprivation condition, but still higher than those under normal waking condition, indicating that daytime naps have a certain recovery effect on working memory level. The cerebellum, bilateral insula, precuneus, superior temporal gyrus, and posterior cingulate gyrus showed significant differences among the three conditions. Activity in the cerebellum, insula, and thalamus decreased significantly after sleep deprivation, and returned to normal wakefulness levels after daytime naps. The middle frontal gyrus, precuneus gyrus and superior temporal gyrus showed negative activation patterns during normal waking, but the negative activation degree of these three regions became weaker after sleep deprivation, and the negative activation reached the maximum after daytime nap. The improvement of working memory reaction time after daytime naps was positively correlated with the increased activation intensity of the right insula ($r = 0.38$, $p < 0.005$).

Conclusion:

Sleep deprivation significantly affected cognitive performance at the level of working memory. Sleep deprivation resulted in diminished processing speed and reduced accuracy. Daytime naps partially restored working memory in two ways. Daytime naps restored the reduced activity in the cerebellum, insula, and thalamus to normal levels after sleep deprivation. Daytime naps increased negative activation in the middle frontal gyrus, precuneus, and superior temporal gyrus, disengaging the DMN network from the task and increasing brain cognitive resources.

PO-3912

A multimodal image-based study of the effects of sleep deprivation and daytime naps on risky decision-making and its mechanisms

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Background:

Behavioral and neuroimaging changes in inhibitory control after sleep deprivation, and the possible ameliorative role of daytime naps in this regard, remain unclear.

Methods:

leveraging the brain regions identified in the previous studies, we employed the resting-state fMRI small-world network approach to comprehensively comprehend how different regions of the brain collaborate and interact in the process of risk decision-making. Three metrics derived from graph theory, namely small-worldness, network segregation, and network integration, were utilized to evaluate network parameters. For the neuroimaging of small-world networks, multiple comparison correction was also applied using the False Discovery Rate (FDR) standard. Regarding differences in small-world networks under different conditions, as well as F-statistics for various conditions and post-hoc pairwise comparisons, statistical thresholds were uniformly set at 0.05. Finally, we

examined the correlations between the metrics of small-world networks and behavioral aspects of risk decision-making (such as average reaction time and high-risk preference in decision-making) as well as EEG-ERP responses (specifically, FRN and P300).

Results:

Based on the findings from the previous studies, we identified the following brain regions: bilateral middle frontal gyrus, bilateral supplementary motor area, bilateral inferior frontal gyrus, left middle cingulate gyrus, bilateral inferior parietal lobule, left cerebellum, bilateral insula, right anterior cingulate cortex, right superior temporal gyrus, left posterior cingulate gyrus, bilateral middle occipital gyrus, right middle temporal gyrus, and left superior frontal gyrus. Utilizing these regions, we employed the small-world network analysis method. Our study revealed that the brain exhibited small-world network properties under conditions of normal wakefulness, sleep deprivation, and post-nap states. One-way repeated measures analysis of variance showed significant differences among the three groups in terms of small-worldness, functional integration, and functional segregation indices. Post-nap states demonstrated a restoration towards levels observed during normal wakefulness. Under conditions of sleep deprivation, the small-worldness index (σ) of the network significantly decreased. Additionally, both clustering coefficient (C_p) and local efficiency (E_l), representing functional integration, as well as characteristic path length (L_p) and global efficiency (E_g), representing functional segregation, exhibited a similar decreasing trend. Changes in σ after napping showed a significant negative correlation with high-risk tendencies. Moreover, changes in C_p after napping were significantly correlated with individual reaction times. Changes in L_p after napping were correlated with the EEG-ERP component FRN, and alterations in E_g after napping were significantly correlated with the EEG-ERP component P300.

Conclusion:

The brain regions constitute a small-world network. Sleep deprivation notably influences the functional integration and segregation of this network. These research findings suggest that sleep deprivation may lead to a disruption in the overall structure of the brain network, affecting the efficiency of information transmission and consequently exerting a negative impact on the ability to make sound risk decisions. Napping, by modulating changes in the overall structure, integration level, and local efficiency of the brain network, enhances performance in risk decision-making.

PO-3913

Entropy as a Novel Predictor of Cardiovascular Events in Patients with Myocarditis

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Abstract

Objective: To evaluate the prognostic role of left ventricular (LV) entropy, a novel measure of myocardial tissue heterogeneity derived from cardiac magnetic resonance (CMR) imaging, in patients with myocarditis.

Methods: A total of 106 consecutive patients diagnosed with clinically suspected myocarditis between October 2016 and April 2023 were initially included in this retrospective study. Besides conventional CMR parameters, LV entropy derived from the distribution of pixel signal intensities across the LV myocardium was assessed. Major adverse cardiovascular events (MACE) were composed of cardiac death, heart failure hospitalizations, sustained ventricular arrhythmia, and appropriate implantable cardioverter-defibrillator (ICD) therapies.

Results: A total of 93 patients were included; the median age at presentation was 11 (interquartile range [IQR]: 8.3) years, with 39% female. During a median follow-up of 722.5 days, 10 patients (11%) experienced MACE. LV entropy was significantly higher in patients who experienced MACE ($p=0.01$). In univariate and multivariate Cox regression analysis, LV entropy was independently associated with the incidence of MACE (HR: 2.77, 95% CI: 0.97–1.66, $p<0.001$). Kaplan-Meier

analysis suggested that patients with a higher late gadolinium enhancement (LGE) entropy (>7.825) were more likely to experience MACE.

Conclusion: LV entropy is independently associated with MACE and could help risk stratification in patients with myocarditis.

PO-3914

Non-Contrast Computed Tomography-Based Radiomics for Staging of Connective Tissue Disease-Associated Interstitial Lung Disease

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Rationale and Introduction

It is significant to assess severity and predicting the mortality of patients with connective tissue disease-associated interstitial lung disease (CTD-ILD). In this double-center retrospective study, we developed and validated a radiomics nomogram for clinical management by using the ILD-GAP (gender, age, and pulmonary physiology) index system.

Materials and Methods

Patients with CTD-ILD were staged using the ILD-GAP index system. A clinical-factor model was built by demographics and CT features and a radiomics signature was developed using radiomics features extracted from CT images. Combined with the radiomics signature and independent clinical factors, a radiomics nomogram was constructed and evaluated by the area under the curve (AUC) from receiver operating characteristic (ROC) analyses. The models were externally validated in dataset 2 to evaluate the model generalization ability using ROC analysis.

Results

A total of 245 patients from two clinical centers (dataset 1, $n = 202$ and dataset 2, $n = 43$) were screened. Pack-years of smoking, traction bronchiectasis and 9 radiomics features were used to build the radiomics nomogram, which showed favorable calibration and discrimination in the training cohort [AUC, 0.887 (95% CI: 0.827, 0.940)], the internal-validation cohort [AUC, 0.885 (95% CI: 0.816, 0.922)] and the external-validation cohort [AUC, 0.85 (95% CI: 0.720, 0.919)]. Decision curve analysis demonstrated that the nomogram outperformed the clinical-factor model and radiomics signature in terms of clinical usefulness.

Conclusion

The CT-based radiomics nomogram showed favorable efficacy in predicting individual ILD-GAP stages.

PO-3915

Application of Combined Convolution Neural Network and Graph Convolution Network for Predicting Axillary Lymph Node Metastasis in Breast Cancer Based on Dynamic Contrast-enhanced MRI: A Multicenter Study

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Purpose: To develop a deep learning model combining convolution neural network (CNN) and graph convolution network (GCN) based on dynamic contrast-enhanced (DCE)-MRI for predicting axillary lymph node (ALN) metastasis in breast cancer, while also aiming to explore the biological mechanism by using RNA-sequencing data.

Materials and Methods: 935 breast cancer patients with DCE-MRI and clinical data (2017-2021) from 4 centers were retrospectively collected. Multiple CNN-GCN models were developed and validated to identify ALN status in breast cancer, using tumor and ALN MR images. The best CNN-GCN model was compared with radiomics models, Memorial Sloan-Kettering Cancer Center (MSKCC) model, and three radiologists. RNA-sequencing data from 11 patients explored the biological basis of the prediction. ALN classification comparison involved accuracy, sensitivity, specificity, inter/intraclass correlation coefficients, area under the receiver operating characteristic curve (AUC), and Delong test.

Results: Participants were divided into training ($n = 742$, mean age: $53 \text{ years} \pm 10 \text{ [SD]}$), internal test ($n = 83$, $53 \text{ years} \pm 10$), and external test ($n = 110$, $50 \text{ years} \pm 9$) sets. The optimal CNN-GCN model, HRNet-GCN_tumor+ALN, achieved an AUC of 0.870 in the external test set, outperforming LR_tumor+ALN (AUC: 0.790) and MSKCC model (AUC: 0.752) (Delong test, $P < .05$). Radiologists' performance improved with HRNet-GCN_tumor+ALN assistance (external test cohort, $P < .05$). The high-risk group showed associations with pathways like ribosome, synapse organization, and muscle contraction.

Conclusion: The proposed GCN-CNN fusion deep learning model showed the good performance for predicting ALN status preoperatively in breast cancer patients.

PO-3916

Formation Prediction of MCA Intracranial Aneurysms by Hemodynamic and Morphological natures using Machine Learning Method

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Background:

Risk prediction of aneurysm formation is an important and challenging task. However, most of previous studies have used the limited clinical information, e.g., gender, age, BMI, to predict the aneurysm risk, which cannot reflect the essential characteristic of aneurysm. Here, we firstly developed a machine learning model, comprehensively combining morphological and hemodynamic features, for aneurysm formation risk prediction.

Method:

Using the 3D image processing technology, the MCA aneurysms of 110 patients were virtually removed to recover the pre-aneurysm vascular geometry. These pre-aneurysm vascular segments and their contralateral healthy arteries were used as training dataset. Prediction models were

derived using three machine learning algorithms (support vector machine, random forest, and conventional logistic regression). Accuracy was evaluated based on the area under the curve (AUC), sensitivity and specificity with 95% CI.

Results:

The best model (SVM) achieved an area under the receiver operating characteristic curve of 0.9 [95% confidence interval (CI) = 0.838–0.927], significantly better than the logistic regression model (0.779; 95% CI = 0.729–0.829; $P = 0.002$) and the random forest method (0.758; 95% CI = 0.713–0.800; $P = 0.001$).

Conclusion:

This study is the first attempt to systematically combine morphological and hemodynamic analysis to predict aneurysm formation risk, which have demonstrated the feasibility of applying machine learning in the early diagnosis of aneurysm.

PO-3917

"Differentiating and Diagnosing 'Patchy Shadows' in the Central Nervous System Based on MRI Images Using a Multitask Deep Learning Model"

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Purpose: To develop a multitask deep learning model for differential diagnosis of the pathological properties and disease categories of 'patchy shadows' in brain parenchyma, which was initially a highly challenging task for radiologists.

Method and Material: Participants were retrospectively recruited from February 2014 to May 2023 in West China Hospital, who underwent multi-sequence brain MRI examinations and were identified with "patchy shadow" in brain parenchyma. Considering the epidemiological prevalence, our study ultimately focuses on the three most common and representative diseases in clinical practice that can cause "patchy shadows": central nervous system lymphoma ($n=29$), glioma ($n=45$), and demyelinating disorders ($n=46$). These participants were split into training, validation, and testing sets in a ratio of 7:1:2. The multitask neural network can simultaneously achieve precise segmentation and differential diagnosis of the patchy shadows. We measured the model performance with the test set and evaluated its effectiveness in assisting radiologists in this scenario.

Result: The multitask deep learning model performed well in the test set, achieving an AUC of 0.92 and an ACC of 0.85 for the differential diagnosis of patchy shadows. Additionally, it achieved an average Dice coefficient of 0.84 for the segmentation of patchy lesion regions. Besides, the utilization of our model significantly enhanced the diagnostic capabilities of radiologists for patchy shadows.

Conclusion: The deep learning model can accurately diagnose the pathological properties and disease categories of patchy shadows in brain parenchyma, and it tremendously assists radiologists in this scenario.

Limitation: The inclusion of patients in this study is severely constrained by the low prevalence of central nervous system lymphoma, especially given the requirement to exclude individuals who do not exhibit patchy shadow sign. Besides, due to the stringent inclusion criteria of this study, we are currently limited to conducting a single-center investigation.

PO-3918

Multimodal integration of habitat radiomics, pathomics and clinical parameters for predicting platinum resistance in patients with high-grade serous ovarian carcinoma

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Objective: Accurate prediction of platinum resistance in high-grade serous ovarian cancer (HGSOC) before treatment is an urgent clinical problem to be solved. This study aimed to explore the predictive capacity of integrating habitat radiomics based on MRI, histopathologic, and clinical features to predict response of platinum-based chemotherapy in patients with HGSOC.

Materials and methods: A retrospective cohort study was conducted on 393 eligible patients (86 platinum-resistant and 307 platinum-sensitive patients) from 3 hospitals. K-means algorithm was used to perform clustering on T2-weighted images (T2WI), contrast-enhanced T1-weighted images (CE-T1WI), diffusion-weighted imaging (DWI), and apparent diffusion coefficient (ADC) maps. After feature extraction and selection, the habitat radiomics model based on MRI habitat sub-regions was constructed to identify platinum-resistant and platinum-sensitive patients. Haematoxylin and eosin (H&E)-stained slides of tumors were scanned to whole slide images (WSIs) at 20x magnification. The processing of WSI involved cutting them into 512×512-pixel patches and underwent color normalization using the Macehko method. Inception v3 deep learning model was trained to derive the patch-level prediction. Multi-instance learning for WSI-level prediction included Patch Likelihood Histogram (PLH) and Bag of Words (BoW) Pipelines. Then, pathomics model was developed by Integrating predictive features of multi-instance learning. Univariate/multivariate logistic regression analysis was used to select clinical predictors and construct clinical model, respectively. The model performance and benefit was assessed using the area under the receiver operating characteristic curve (AUC), net reclassification index (NRI), and integrated discrimination improvement (IDI).

Results: Four habitats were clustered based on Calinski-Harabasz score. Significant differences in gray values of habitat 3 on T2WI, CE-T1WI, and ADC maps were found between the platinum-resistant and platinum-sensitive groups (all $P < 0.05$). Compared with the habitat radiomics model (0.684) and clinical model (0.545), the pathomics model had a higher AUC (0.744), with positive NRI. The Clinic_Habitat model yielded a highest AUC (0.758) among other single or compositive models, the second was Clinic_Habitat_Pathology model (0.747) and with positive IDI.

Conclusions: Habitat radiomics based on MRI and pathomics based on WSI had potentials to predict platinum resistance in patients with HGSOC. The integration of multi-omics models was helpful to improve prediction performance.

PO-3919

Based on Front-End Engineer- Coronary Artificialintelligence(AI):Deep-Learning Image Reconstruction (DLIR) for Coronary Computed Tomography Angiography (CCTA) about qualitative Image Analysis and coronary atherosclerosis burden

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Background

At present,for the Coronary Computed Tomography Angiography (CCTA),adaptive statistical iterative reconstruction-Veo (ASiR-V) is widely used but ASiR-V has been shown to degrade image quality at high levels. One new method (Deep-learning image reconstruction (DLIR))offers a new way to overcome these limitations.At the same time, front-end engineer-Coronary Artificial intelligence(AI) has has been widely used in three-dimensional medical reconstruction. So, based on Coronary Artificial intelligence, the study compared the impact of DLIR and different ASiR-V on image quality and the coronary atherosclerosis burden of CCTA .

Methods :This retrospective study includes 57 patients who underwent the CCTA (Revolution CT;GE Healthcare). The primary data were reconstructed with ASiR-V 0% (FBP)、ASiR-V 50%(normal)and ASiR-V 80%(the highest) with DLIR at different levels (medium [M] and high [H]).In the front-end engineer-Coronary Artificial intelligence(AI) platform , Image noise (IN), image quality,(Signal Noise Rate SNR,Contrast Noise Rate CNR) were evaluated on the axial view. The subjective evaluation(Liker1-5) in the proximal coronary arteries was calculated.TPS(Total plaque score),SSS(Segment-stenosis score) were calculated to quantitatively assess the coronary artery plaque load.The all data were performed to Statistical analysis. Results: There were significant differences ,compared ASiR-V 0%,ASiR-V 50% ,ASiR-V 80%、DLIR-M、DLIR-H (20.42±3.5HU vs 、16.9±4.9 、12.4±2.3 HU $p<0.05$) in Noise .Noise of DLIR-H was significantly lower than any other ($p<0.05$) ,Image quality(SNR) and (CNR)of DLIR-H also was highest ($p<0.05$). In Liker score,DLIR-H had significantly better Likert image quality scores compared to ASIR-V in segment-vessel ($p<0.05$).In coronary atherosclerosis burden,all the groups were no significantly statistical difference ($p>0.05$).

Conclusion :In AI platform ,DLIR significantly reduces noise and improve the image quality in CCTA both in subjective and object assessment .Compared to different ASiR-V.DLIR Have better ability to detect coronary atherosclerosis burden.

PO-3920

Construction of Preoperative Nomogram Prediction Model for WHO/ISUP Grading of Clear Cell Renal Cell Carcinoma based on Clinical and CT Image Radiomics

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Purpose: Discussing the value of constructing a model based on clinical and CT image radiomic features for preoperative prediction of clear cell renal cell carcinoma (ccRCC) WHO/ISUP grading.

Methods: A retrospective analysis was conducted on 214 patients diagnosed with clear cell renal cell carcinoma(ccRCC) at the Second Affiliated Hospital of Anhui Medical University between August 2012 and June 2022. Pathological confirmation and complete CT enhanced scans were

obtained for all patients. The ccRCC were graded according to the nuclear grading system established by the World Health Organization (WHO) and the International Society of Urological Pathology (ISUP). 143 cases were classified as low-grade (grades I-II), and 71 cases were classified as high-grade (grades III-IV). A random division of cases resulted in a training set (n=171) and a testing set (n=43), with a ratio of 4:1. Tumor regions of interest (ROI) were delineated on both plain and three-phase enhanced CT images. LASSO regression was employed to select features and construct a radiomics model based on the CT images. Additionally, clinical features were analyzed to develop a clinical model. A radiomics nomogram combining radiomics and clinical features was constructed. The performance of the models was assessed using receiver operating characteristic (ROC) curves and calibration curves in the training and testing sets. Furthermore, a decision analysis curve was plotted to evaluate the net benefit of Nomogram visualization.

Results: A total of 23 features were selected for inclusion in the radiomics model aimed at distinguishing nuclear grades. The resulting model achieved an area under the curve (AUC) of 0.712, while the clinical model achieved an AUC of 0.732. The radiomics nomogram, which integrated both clinical features and radiomics, demonstrated the most optimal performance. Specifically, the AUC values for the training and testing sets of the combined model were 0.887 (95%CI 0.837-0.936) and 0.800 (95%CI 0.650-0.951), respectively.

Conclusions: The construction of a nomogram based on radiomics and clinical features can improve the accuracy of preoperative grading for CCRCC and provide personalized treatment for patients.

PO-3921

Application of a new deep learning image reconstruction (DLIR) algorithm in pediatric orbital ultra-low dose CT imaging: A pilot study based on image quality

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Abstract:

Purpose: To evaluate the performance of a deep learning image reconstruction (DLIR) algorithm in pediatric orbital ultra-low-dose CT by sinus CT for improving image quality and reducing radiation dose. **Methods:** A retrospective analysis of 50 children who underwent paranasal sinus or orbital CT examination at our hospital was performed. ultra-low-dose CT of the nasal sinus was used to simulate orbital scanning as the experimental group and compared with the control group of general-low dose orbital CT. Two groups scanning used 100 kVp tube voltage, automatic tube current (SmartmA, 60-250 mA), pitch 0.992:1, rotation time 1.00 s, slice thickness 1.25 mm, and interslice spacing 1.25 mm. Experimental group set Noise Index 22 and pre-ASiR-V weight 70%; control group set noise index 8 and pre-ASiR-V weight 30%. The radiation dose, image noise (SD), signal-to-noise ratio (SNR), contrast noise ratio (CNR) and subjective score of the two groups were compared. The CT dose index (CTDI) and dose-length product (DLP) value were recorded, and the effective dose (ED) was calculated. **Result:** Compared with the control group, DLP and ED in the experimental group were reduced by 83.92% and 83.17%, respectively. Compared between DL-H (the optimal set of DLIR) and ASiR-V 70% (the control group), the image noise was reduced by 41.6% (4.17 ± 0.86 HU vs. 7.14 ± 1.19 HU), and the CNR was improved by 39.3% (26.60 ± 5.61 vs. 16.14 ± 2.48). In the qualitative image assessment, DL-H obtained the highest score. The scores for images were ranked in descending order as follows: DL-H, DL-M, ASiR-V 70% and DL-L. **Conclusion:** Combined with the comparison results of quantitative and qualitative image assessment, DL-H under the ultra-low-dose scan was significantly better than ASiR-V 70% under the general-low dose scan, and ASiR-V 70% was better than DL-M and DL-L. We can infer that the use of DL-H may be able to save a significant amount of radiation dose while achieving the current image quality.

PO-3922

Interpreting Structured CT Reports of Pulmonary Nodules According to Relevant Guidelines: A ChatGPT Approach

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Background: Although ChatGPT has the potential to significantly influence the medical field, it is crucial to thoroughly investigate its potential clinical value and identify its limitations.

Purpose: To evaluate the capability of ChatGPT to interpret structured CT reports of pulmonary nodules in accordance with relevant guidelines and to provide appropriate recommendations.

Materials and Methods: In this retrospective study, patient reports were selected from the pulmonary nodule CT database of our institution. A series of basic questions about pulmonary nodules and CT were used to determine how the conditional instructions were constructed. Radiologists acted as inspectors to assess ChatGPT's process of analyzing the CT report and whether the recommendations given were appropriate. Regarding ChatGPT's responses, this study evaluated the appropriateness of its recommendations and analysis process. The accuracy of the appropriate recommendations and analysis process was used to evaluate ChatGPT's ability to interpret CT reports of pulmonary nodules in accordance with relevant guidelines.

Results: A total of 39 patients were selected in this study according to the conditional instructions. The conditional instructions were constructed based on the Fleischner Society Lung Nodule Guidelines (2017), Lung Imaging Reporting and Data System (Lung-RADS) 1.1, and the National Comprehensive Cancer Network (NCCN) Lung Cancer Screening Guidelines 1.2022. In test 1, the accuracies of the appropriate recommendations and analysis processes were 5.13% and 0, respectively. In test 2, after changing the conditional instructions, the accuracies were 30.77% and 25.64%, respectively. In test 3, the accuracies were 92.31% and 79.49%, respectively, after using the single-task mode.

Conclusion: Under appropriate conditions, the Generative Pretrain Transformer-4 (GPT-4)-based ChatGPT has the potential to assist radiologists in the imaging diagnosis of pulmonary nodules, but much more refinement is necessary before it can be implemented in clinical practice.

PO-3923

A Deep Learning Model Predicating Functional Outcomes of Spontaneous Intracerebral Hemorrhage Based on CT Scans

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Objectives: The study aims to forecast the functional outcome of patients suffering from intracerebral hemorrhage (ICH) utilizing deep learning models derived from computed tomography (CT) images.

Methods: We carried out a retrospective, bi-center investigation on ICH patients. Initially, we created a unique 3D convolutional model for predicting the functional outcome of ICH patients using CT scans taken from randomly chosen ICH patients in the H training dataset gathered from H hospital. Following this, we compiled clinical data and radiological features at the point of admission, using the Extreme Gradient Boosting (XGBoost) algorithm to formulate a second model, henceforth

referred to as the XGBoost model. To conclude, we merged the Convolution model and XGBoost model to form the third "Fusion model". A favorable outcome was identified as a modified Rankin Scale score ranging between 0-3 upon discharge. The predictive accuracy of the three models' prognosis was assessed using an H test dataset and an external Y dataset, which were subsequently compared to the performance of the ICH score and ICH grading scale (ICH-GS). Results: This study incorporated a total of 604 ICH patients, with 450 patients in the H training dataset, 50 patients in the H test dataset, and 104 patients in the Y dataset. In the Y dataset, the areas under the curve (AUCs) of the Convolution model, XGBoost model, and Fusion model were 0.829, 0.871, and 0.905 respectively. The prognostic performance of the Fusion model surpassed that of the ICH score and ICH-GS ($p = 0.043$ and $p = 0.045$, respectively). Conclusions: Deep learning models provide considerable accuracy in predicting the functional outcome of patients with spontaneous intracerebral hemorrhage.

PO-3924

基于纹理分析方法评价肝泡状棘球蚴病活性的初步研究

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目的 探讨基于 CT 图像的 3D 纹理分析技术对肝泡状棘球蚴病 (HAE) 生物学活性的判断价值。**方法** 回顾性分析 110 例经术后病理确诊为 HAE 患者的临床资料、术前肝脏区 CT 增强扫描门静脉期图像与 PET/CT 图像, 以 PET/CT 的最大标准化摄取值 (SUV_{max}) 为判断标准, 将病灶分为有活性组 ($n=55$) 与无活性组 ($n=55$), 利用 MaZda 软件分别在两组患者肝脏区门静脉期图像上逐层勾画病灶感兴趣区域 (ROI) 并生成感兴趣容积 (VOI), 提取病灶 3D 灰度直方图纹理特征参数, 包括均值 (Mean)、变异度 (Variance)、偏度 (Skewness)、峰度 (Kurtosis)、第 1 百分位数 (Perc.01%)、第 10 百分位数 (Perc.10%)、第 50 百分位数 (Perc.50%)、第 90 百分位数 (Perc.90%) 及第 99 百分位数 (Perc.99%), 使用 Mann-Whitney U 检验比较两组病灶 3D 直方图纹理特征参数的差异性, 对组间有统计学差异的参数绘制受试者工作特征 (ROC) 曲线, 计算曲线下面积 (AUC), 评估各直方图参数对 HAE 病灶活性的判别效能。**结果** 两组间 3D 直方图纹理参数中 Mean、Variance、Skewness、Kurtosis、Perc.50%、Perc.90% 及 Perc.99% 7 个纹理参数组间差异有统计学意义 (P 均 < 0.05), AUC 为 0.614~0.647, 均具有一定的判别效能, 多参数联合预测模型的 AUC 为 0.708, 灵敏度为 76.4%, 特异度为 58.2%。**结论** 基于 CT 增强扫描门静脉期图像的 3D 灰度直方图纹理分析技术对 HAE 病灶生物学活性的判别具有一定价值, 且多参数联合模型的判别效能更高, 为评价患者治疗效果、监测疾病进展及制定治疗方案提供了新的方法, 具有一定的应用前景。

PO-3925

骨骼 CT 三维重建技术在流浪精神分裂患者锁骨性别及年龄推断应用价值

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目的 探讨骨骼 CT 三维重建技术在流浪精神分裂患者锁骨的性别及年龄的推断中的应用价值。**方法** 收集 50 例流浪精神分裂患者的锁骨 CT 数据, 通过 Mimics 软件进行三维重建, 测量锁骨长度、宽度和角度等指标, 并结合统计学方法进行分析。

结果通过三维重建技术,成功地重建了 50 例流浪精神患者的锁骨形态,并测量了相关指标。根据统计学方法分析,锁骨长度、宽度和角度等指标与性别、年龄呈现显著相关性,其中锁骨长度和宽度可用于性别推断,锁骨角度可用于年龄推断。

结论骨骼 CT 三维重建技术可用于流浪精神分裂患者锁骨的性别及年龄的推断,为法医学鉴定提供了新的技术手段。

PO-3926

探讨多次重复扫描中 MRS 的可重复性

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目的 通过两种方式对被试同一脑区进行两次重复扫描,探讨重复扫描所得波谱结果的可重复性。

方法 选取 30 名健康志愿者(9 男,21 女,年龄 21 ± 3)分为 A、B 两组,每组 15 人,以大脑右侧前额叶作为目标脑区。利用 3.0T 磁共振成像扫描仪(Siemens MAGNETOM Trio Tim),采用点分辨波谱(PRESS)序列对每位志愿者进行两次扫描,其中 A 组在定位后进行两次连续扫描,B 组在定位后先进行一次扫描,然后将扫描床移出磁场中心,隔三分钟再进床至原来的位置,间隔期间确保被试不动,严格按照第一次的定位并扫描得到第二次的结果,利用 LCmodel 软件对采集到的脑代谢物波谱数据(tNAA、tCho、tNAA/tCr、tCho/tCr)进行后处理及定量分析。将两次扫描所得结果的差异性系数(CV)作为衡量两组波谱结果可重复性的指标,并将 A、B 两组数据进行比较。结果 A 组所得大脑右侧前额叶中各个代谢物含量及含量比值的平均差异性系数(Mean CV)分别为 NAA 1.84 ± 2.11 , Cho 2.73 ± 2.45 , NAA/Cr 1.99 ± 1.54 , Cho/Cr 1.55 ± 1.38 , B 组所得各个代谢物含量及含量比值的平均差异性系数分别为 NAA 4.44 ± 2.98 , Cho 3.06 ± 2.45 , NAA/Cr 4.57 ± 2.63 , Cho/Cr 2.49 ± 1.58 。配对样本 t 检验发现,对于不同代谢物及代谢物比值,除了 B 组 Cho/Cr ($P<0.05$)外,两种方法所得结果的差异性不具有统计学意义($P>0.05$)。

结论 结果提示多次重复扫描所得代谢物分析结果的变化不完全代表被试真实生理状态的改变,并且具有时间间隔的重复扫描会受到更多因素的干扰,在进行长期的跟踪研究时应将这种结果的差异性考虑进去。

PO-3927

探讨纵向研究中多次扫描所得 MRS 结果的差异性

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目的 通过两种方式分别对相同患者同一脑区进行两次扫描,探讨多次扫描所得波谱结果的差异性。

方法 选取 30 名健康志愿者(9 男,21 女,年龄 21 ± 3)分为 A、B 两组,每组 15 人,以大脑右侧前额叶作为目标脑区。利用 3.0T 磁共振成像扫描仪(Siemens MAGNETOM Trio Tim),采用点分辨波谱(PRESS)序列对每位志愿者进行两次扫描,其中 A 组在定位后进行两次连续扫描,B 组在定位后先进行一次扫描,然后将扫描床移出磁场中心,隔三分钟再进床至原来的位置,间隔期间确保被试不动,严格按照第一次的定位并扫描得到第二次的结果,利用 LCmodel 软件对采集到的脑代谢物波谱数据(tNAA、tCho、tNAA/tCr、tCho/tCr)进行后处理及定量分析。将两次扫描所得结果的差异性系数(CV)作为衡量两组波谱结果一致性的指标,并将 A、B 两组数据进行比较。结果 A 组所得大脑右侧前额叶中各个代谢物含量及含量比值的平均差异性系数(Mean CV)分别为 NAA 1.84 ± 2.11 , Cho 2.73 ± 2.45 , NAA/Cr 1.99 ± 1.54 , Cho/Cr 1.55 ± 1.38 , B 组所得各个代谢物含量及含量比值的平均差异性系数分别为 NAA 4.44 ± 2.98 , Cho 3.06 ± 2.45 , NAA/Cr 4.57 ± 2.63 , Cho/Cr

2.49±1.58。配对样本 t 检验发现,对于不同代谢物及代谢物比值,除了 B 组 Cho/Cr ($P<0.05$) 外,两种方法所得结果的差异性不具有统计学意义 ($P>0.05$)。

结论 当扫描有一定的时间间隔时,所得同一患者的波谱数据之间一致性不如连续性扫描,代谢物的含量值浮动范围更大,说明间隔一段时间的扫描引入了更多的干扰因素,如磁场稳定性的改变、定位不精确等。在进行纵向临床研究时应考虑这些干扰因素造成的结果的差异。

PO-3928

基于深度学习方法自动测量儿童颈椎 MRI 结构的初步研究

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目的 探索利用深度学习方法在 MRI 图像上自动测量儿童颈椎结构的可行性。方法 回顾性收集我院 2013 年 12 月至 2022 年 8 月 0-14 岁颈椎 MRI 扫描未见异常的图像 61 例为正常组,同时纳入 20 例存在脊髓弥漫性病变的患者为疾病组,使用已有成年人颈椎分割模型分别预测矢状位和轴位 T₂WI 的颈椎椎体、硬膜囊和脊髓,在矢状位椎体分割结果自动定位椎体,将定位信息匹配至轴位 T₂WI,得到各个间盘的定位,分别取出正常组 C2/3 至 C6/7 椎间盘正中层面轴位 T₂WI 进行自动测量,测量指标包括:硬膜囊面积、左右径及前后径;脊髓面积、左右径、前后径;脊髓前后间隙及左右间隙,对以上测量结果绘制散点图进行描述。对于疾病组,计算其脊髓和蛛网膜下腔的信号强度比值,并于正常组进行比较。结果 61 例正常组颈椎 MR 图像中, C2/3-C6/7 椎间盘层面硬膜囊面积 116.04mm²-396.62mm²;脊髓面积 34.18mm²-129.43mm²;硬膜囊左右径 14.06mm-28.93mm;前后径 8mm-17.56mm;脊髓左右径 7.03mm-15mm;前后径 5.36mm-12.86mm;脊髓前间隙 0.50mm-5.89mm;后间隙 0.60mm-4.76mm;脊髓左间隙 1.19mm-6.55mm;右间隙 1.49mm-9.11mm。基于脊髓和蛛网膜下腔的信号强度比值具备区分脊髓是否存在病变的能力。结论 成年人颈椎 MR 分割及测量模型可以迁移到儿童。利用深度学习方法在 MRI 图像上可自动测量儿童颈椎结构,为下一步建立颈椎和脊髓疾病定量诊断模型奠定了基础。

PO-3929

基于深度学习模型建立的人工智能定位算法在颈椎 MRI 成像中的应用

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目的:椎间盘退变是导致颈部疼痛的主要原因,也是患者前来医院接受 MRI 检查的常见原因。本研究通过开发一种精准的人工智能定位算法,实现对椎间盘的准确定位,从而实现对椎体病变的准确评估。

材料与方法:本研究回顾性收集了我院在 2020 年 1 月至 2022 年 6 月期间进行的颈椎 MRI 检查的患者数据,共纳入 1703 例。在这个多任务分割模型中,本研究随机将这些患者数据随机分为训练集、调优集和内部验证集。在椎间盘分割模块,使用了 467 个训练数据和 148 个调优数据,而椎间盘标签模块则使用了 724 个训练数据和 264 个调优数据。扫描参数输出模块,则基于椎间盘分割结果获取了矢状位、冠状位和横断位扫描方向以及相应的扫描中心。同时,基于椎间盘标签结果,获取了每个椎间盘和椎体的标签信息。我们使用 Dice 系数 (DSC) 评估模型的性能。而为了进一步

验证模型定位的准确性,我们另外采集了 100 例患者进行内部验证。我们分别评估了在使用智能定位算法与不使用情况下的定位准确性,并用平均角度误差来评估算法计算结果的精确度。

结果:本研究中使用的智能定位算法,在椎间盘分割模块表现出最佳的 Dice 系数(DSC)为 0.9265,在椎间盘标签模块的 DSC 为 0.9048。在验证集中,智能定位算法也展现了准确的椎间盘分割性能。具体而言,在矢状位、冠状位和轴位上,算法计算的扫描方向与金标准之间的平均角度误差分别为 0.81°、1.39°和 1.97°,较手动定位组误差分别减少了 0.27°、0.59°和 0.05°。

结论:本研究建立的基于深度学习模型的人工智能定位算法,能够实现对椎间盘的精准定位,为放射科医生进一步实现对椎间盘病变的诊断提供重要辅助,具有重要的临床应用价值。

PO-3930

基于磁共振结构像定量分析预测直肠癌 p53 状态: 一项机器学习模型研究

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目的:基于机器学习构建及验证一个磁共振结构像标志物并联合临床特征构建列线图模型用于预测直肠癌 p53 基因状态。

方法:回顾性分析 300 例行根治术的直肠癌患者的临床及影像资料,依据术后病理结果确定 p53 基因突变患者共 166 例。将所有病例按受检时间分为训练组和测试组。基于训练组数据从每例患者的 T2WI 结构图像中提取肿瘤原发灶的影像组学特征并进行降维后使用支持向量机构建结构像标志物,之后基于多因素逻辑斯回归筛选预测因子并联合结构像标志物构建列线图模型用于预测 p53 基因状态,同时使用测试组数据和 ROC 曲线评估列线图的准确性和可靠性。

结果:结果像标志物在训练组和测试组中的诊断效能分别为 0.828 和 0.795,敏感性分别为 0.825 和 0.891,特异性为 0.722 和 0.659。列线图在训练组和测试组中的诊断效能分别为 0.86 和 0.847,敏感性分别为 0.758 和 0.869,特异性为 0.833 和 0.75。

结论:融合了结构像标志物构建的列线图能很好的预测 p53 基因状态,可以方便的促进术前分子病理学诊断。

PO-3931

基于人工智能辅助迭代图像重建技术的智能快速磁共振 (iQMR)在急性缺血性脑卒中 MR 检查中的应用价值研究

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目的:探究基于人工智能辅助迭代图像重建技术的智能快速磁共振(iQMR)在急性缺血性脑卒中 MR 检查中的应用价值。

方法:回顾性连续收集 113 例急性缺血性脑卒中患者的头部 MRI 资料,其中 56 例进行常规 T2-FLAIR 序列扫描,57 例进行加速 T2-FLAIR 序列扫描并使用 iQMR 进行后处理。使用 5 分 Likert 量表对常规 T2-FLAIR 序列、加速 T2-FLAIR 序列与应用 iQMR 的加速 T2-FLAIR 序列三组图像的图像质量进行主观评分,使用 Cohen's kappa 统计计算阅片者间一致性。测量并计算三组图像中病灶和周围组织的 SNR,病灶与周围组织之间的 CNR,并比较分析三组 T2-FLAIR 序列主观评分和客观指标的差异。

结果：加速 T2-FLAIR 序列相比常规 T2-FLAIR 序列扫描缩短了 22.5% 的扫描时间。应用 iQMR 的加速 T2-FLAIR 序列图像质量明显优于另外两组, 两阅片者间主观评分一致性好, Kappa 值分别为 0.862、0.849 和 0.843。两两比较显示, 应用 iQMR 的加速 T2-FLAIR 序列图像在病灶和病灶周围组织的 SNR 和 CNR 都明显高于未使用 iQMR 的加速 T2-FLAIR 序列, 两者之间的差异均有统计学意义 ($P < 0.001$)；而与常规 T2-FLAIR 序列相比, 其在病灶处的 SNR 和 CNR 差异无统计学意义 ($P > 0.05$)，在病灶周围组织处的 SNR 差异具有统计学意义 ($P < 0.001$)。

结论：基于人工智能辅助迭代图像重建技术的智能快速磁共振 (iQMR) 可明显缩短急性缺血性脑卒中患者 MR 检查扫描时间, 并提升图像质量。

PO-3932

基于人工智能的肺结节良恶性诊断的验证研究

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目的：目前人工智能 (AI) 辅助诊断系统已经用于了放射科的临床实践, 但随着肺结节的良恶性国际分类标准的改变, 其对良恶性肺结节的诊断效能仍有待验证。本研究旨在验证商用的 AI 辅助诊断系统在不同分类标准下预测肺结节良恶性的诊断效能。

方法：回顾性收集 2019 年 1 月至 2021 年 12 月期间经手术切除或穿刺活检后的病理证实的肺结节, 共 404 例。根据世界卫生组织 (WHO) 2021 版和 2015 版两种分类标准, 分别将腺体前驱病变 (PGL) 纳入良性病变和恶性病变进行良恶性分组。分析人工智能辅助诊断肺结节良恶性的结果与术后病理结果的一致性, 并构建不同病理分类标准下基于 AI 定量特征的肺结节恶性临床预测模型。

结果：1. 当 PGL 属于恶性病变时 (WHO 2015), 术后病理结果与 AI 诊断的结果具有高度的一致性 ($Kappa = 0.658$), 平均 CT 值 ($P < 0.001$) 是肺结节恶性的独立保护因素, 构建的临床预测模型的 AUC 为 0.806 (95%CI: 0.756 ~ 0.856)。2. 当 PGL 属于良性病变时 (WHO 2021), 术后病理结果与 AI 诊断的结果具有中等程度的一致性 ($Kappa = 0.440$), 熵 ($P = 0.008$) 是肺结节恶性的独立危险因素, 构建的临床预测模型的 AUC 为 0.749 (95%CI: 0.700 ~ 0.797)。

结论：肺结节病理结果的良、恶性与 AI 软件诊断的高、低危间具有中等到高度的一致性, 具有较好的诊断性能, 但需要随着病理分类的更新优化对 PGL 的评估; CT 平均值和熵分别是肺结节恶性的独立保护因素和危险因素, 基于两种因素分别构建的肺结节恶性临床预测模型具有一定的预测价值。

PO-3933

使用机器学习预测肝细胞癌 MVI 状态：对放射科医生的作用

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目的：本研究基于临床资料和 CT 影像学征象构建肝细胞癌 MVI 状态的机器学习预测模型, 通过与放射科医生的诊断性能对比, 分析该预测模型的临床价值。

方法：共计 216 例肝细胞癌患者被分为了训练集 (170) 例和测试集 (56 例)。患者的术前临床资料及 CT 影像学征象用于构建预测 MVI 的机器学习模型, 并使用 SHAP 值评估模型重要特征排序。同时, 四名放射科医生对模型的测试集数据进行独立阅片, 包括无模型辅助下的阅片和模型辅助下的阅片, 其中模型辅助下的阅片包括模型输出的重要特征辅助下的阅片及模型输出概率值辅助下的

阅片。AUC 值、准确性、敏感性、特异性等指标用于评估模型性能及不同模式下放射科医师诊断性能的对比。

结果: 训练集中, 机器学习模型预测 MVI 的 AUC 值、准确性、敏感性、特异性分别为 0.907 (95%CI:0.856-0.958), 0.824, 0.955, 0.576。测试集分别为 0.860 (95%CI: 0.763-0.956), 0.807, 0.865, 0.700。四名放射科医师在无任何模型辅助下的平均 AUC 值为 0.656 (95%CI: 0.479-0.834), 在模型输出的重要特征辅助下及输出概率值辅助下的平均 AUC 值分别为 0.756 (95%CI: 0.613-0.890), 0.773 (95%CI: 0.628-0.918), 差异均具有统计学意义 ($P=0.015$, $P=0.004$)。

结论: 基于术前 CT 影像学征象及临床指标构建的机器学习模型可以较好地预测肝细胞癌的 MVI 状态, 并且模型输出的重要特征值及概率值均有助于提高临床医师对 MVI 的检测。

PO-3934

人工智能肺结节筛查中检测效能初探

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目的:探索双能 CT 融合 120 kVp 图像在人工智能辅助诊断软件 (AI) 肺结节筛查中的检测效能。方法:收集我院行双源 CT 肺癌筛查的患者 381 例, 患者随机分为单源扫描 (A 组) 和双能扫描 (B 组) 两组, A 组管电压为 120kVp, 共 183 例, B 组双能管电压扫描 (A 管球管电压 100kVp, B 管球管电压 Sn140kVp), 共 198 例。记录 CTDIvol、DLP, 计算有效辐射剂量 ED。采用骨算法重建层厚为 1mm 图像, 使用人工智能肺结节检测软件, 对图像进行自动结节检测, 记录检出结节的大小、位置、类型。统计检测全部结节数、不同大小结节数、不同类型结节数以及相应的真阳数、假阳数、漏诊数, 计算出对应的结节检测敏感度和假阳性率, 比较两组间的差异, $p<0.05$ 为差异具有统计学意义。结果:AI 在两组图像中检测出的全部肺结节、直径 ≥ 4 mm 肺结节、直径 < 4 mm 肺结节、实性肺结节、亚实性肺结节的敏感度、假阳性率分别为: A 组 (82.83%、1.55/CT), (91.07%、0.98/CT), (80.48%、0.56/CT), (86.4%、0.96/CT), (70.9%、0.58/CT), 辐射剂量 ED 为 (4 ± 1.1 mSv); B 组 (91.53%、1.35/CT), (97.87%、0.77/CT), (89.73%、0.59/CT), (91.77%、0.71/CT), (89.25%、0.64/CT), 辐射剂量 ED 为 (3.23 ± 0.97 mSv)。B 组图像的肺结节, 其检测敏感度都高于 A 组 ($p<0.05$), B 组图像的辐射剂量低于 A 组 ($p<0.05$), B 组肺结节总的假阳性率 1.35/CT 低于 A 组 1.55/CT。结论:双能融合 120kVp 图像在人工智能辅助诊断软件肺结节检测中的敏感度, 高于单源扫描 120kVp 图像, 且假阳性率不高于单源扫描 120kVp 图像, 同时其辐射剂量明显低于单源扫描 120kVp 图像。

PO-3935

基于深度学习建立颈椎病 MR 诊断模型的初步研究

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目的: 探索利用深度学习方法在建立颈椎病 MR 诊断模型的可行性。

材料与方法: 回顾性收集我院 2020 年 10 月至 2023 年 3 月疑诊颈椎病 MR 图像 514 例, 使用已有颈椎分割模型在轴位 T2WI 上分别预测硬膜囊、脊髓、椎间盘、后纵韧带和黄韧带, 在矢状位 T1WI 和 T2WI 上预测颈椎椎体和椎间盘。由一位低年资放射科医生 (阅片经验 2 年) 修改标注, 另一位

高年资放射科医生 (阅片经验 ≥ 15 年) 对低年资医师的标注进行复核。按照颈椎病的不同诊断要点分别进行 3D 或 2D 深度学习分类模型训练, 包括 (1) 颈椎椎体增生模型; (2) 颈椎椎体滑脱模型; (3) 颈椎间盘突出分类模型; (4) 后纵韧带增厚模型; (5) 黄韧带增厚模型。将模型输出结果导入 R 软件进行混淆矩阵分析及 ROC 曲线绘制, 采用正确率、灵敏度、特异度、阳性预测值、阴性预测值以及 ROC 曲线下面积等评价五种模型分类效能。

结果: 五种分类模型中诊断效能最好的是颈椎间盘突出分类模型, 正确率达到 0.90, 灵敏度达到 0.95, 特异度达到 0.85, ROC 曲线下面积达到 0.90。颈椎椎体增生和滑脱的正确率也分别达到 0.81 和 0.80, 灵敏度为 0.74 和 0.76, 特异度为 0.84 和 1.00, ROC 曲线下面积分别为 0.79 和 0.88。后纵韧带和黄韧带增厚的模型正确率分别为 0.82 和 0.77, 灵敏度为 0.78 和 0.84, 特异度为 0.86 和 0.70, ROC 曲线下面积分别为 0.82 和 0.77。所有模型的诊断效能均能够满足临床需求。

结论: 本部分研究采用深度学习建立了颈椎病 MR 的自动分类诊断模型, 对颈椎椎体增生、滑脱、椎间盘突出、后纵韧带及黄韧带增厚进行了分类模型的训练, 五种模型的诊断效能目前均能够满足临床需求, 证明深度学习可以用于颈椎病 MR 的辅助诊断, 能够减轻放射科医生的工作负担, 提高放射科医生的工作效率, 为未来进一步探索建立颈椎病 MR 自动诊断模型及结构化报告的植入奠定了基础。

PO-3936

基于多参数磁共振及机器学习的瘤周与瘤内影像组学特征模型用于术前评估胰腺癌的病理学结果

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目的: 利用影像组学来术前评估胰腺癌患者的病理学结果将有助于临床决策。目前, 利用基于多参数 MRI 和机器学习算法的影像组学模型来预测胰腺癌患者术前淋巴结转移和组织分化仍值得更多的努力与探索。

方法: 这项双中心回顾性研究招募了 166 例胰腺导管腺癌患者。其中, 来自同一中心的 126 名患者以 4:1 的比例被分配到训练集和验证集, 另一中心的 40 名患者作为外部测试集。在获得 MRI 的三个序列 (T2 加权成像 (T2WI)、弥散加权成像 (DWI)、动态对比增强成像 (DCE)) 后, 对肿瘤的边界进行勾画, 并提取肿瘤周围及肿瘤内部的影像组学特征, 其中包含一阶、形状和纹理特征。采用以下的三步法对特征进行筛选: SelectKBest、最小绝对收缩和选择算子 (LASSO) 和基于随机森林的递归特征消除法 (RFE-RF)。获得最佳的特征组合后, 通过训练六种基于机器学习的分类器 (决策树、K 近邻、支持向量机、随机森林、逻辑回归、XGBoost), 并从中选出表现最佳的分类器来构建影像组学模型。最后, 将通过筛选所得到的临床因素添加到影像组学模型中来构建相应的组合模型。

结果: 经过“三步法”进行特征选择后, 12 个特征用于预测淋巴结转移, 11 个特征用于预测组织分化。在六种不同的分类器中, 随机森林和逻辑回归分别在预测淋巴结转移和组织分化方面表现最好, 并被用于后续的模型建立。结合了肿瘤的瘤周和瘤内特征的影像组学模型优于单独瘤周与瘤内的模型, 其对于淋巴结转移和组织分化的内部验证集的曲线下面积 (AUC) 值分别达到 0.924 和 0.944, 外部验证集的 AUC 值分别为 0.875 和 0.892。此外, 影像组学模型与组合模型之间没有显著的差异。

结论: 影像组学在技术层面上能够准确预测胰腺癌的淋巴结转移和组织分化, 具有较好的临床应用前景。瘤周和瘤内特征的组合将更有利于模型的预测性能, 但临床因素对影像组学模型预测能力的提升并不显著。

PO-3937

MRI 影像组学在预测鼻咽癌预后中的应用价值研究

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目的：探讨原发肿瘤病灶（primary tumor lesion, PTL）和转移淋巴结（metastatic lymph node, MLN）的 MRI 影像组学特征构建的模型预测鼻咽癌（nasopharyngeal carcinoma, NPC）预后的价值。

材料与方法：回顾性搜集从 2013 年 1 月至 2019 年 12 月经内镜病理证实的晚期（III~IVa 期）患者 209 例（包括男 157 例，女 52 例），年龄 17~75 岁（平均 48.938 ± 10.918 岁）。按 7:3 比例随机分为训练集（n=145）和验证集（n=64）。采用单因素和多因素分析筛选临床特征（clinical features, CF）。在 MRI 图像上勾画感兴趣区并提取影像组学特征，用 LASSO 筛选特征并用逻辑回归、支持向量机和 Cox 比例风险回归模型构建预测预后模型。采用 DeLong 检验、ROC 曲线、校准曲线、Kaplan-Meier 生存曲线以及决策曲线比较模型的效能。

结果：从 PTL、MLN 以及 PTL+MLN 的特征中分别筛选出 6、7 及 6 个特征。使用 3 种分类器建立模型发现，基于 PTL 特征的模型比基于 MLN 和 PTL+MLN 的模型表现更好；联合 CF+PTL 建立的 Cox 模型验证集的 AUC 值最高（训练集：0.737，验证集：0.801）；但 DeLong 检验发现基于 PTL 与 CF+PTL 的 Cox 模型在训练集和验证集中 AUC 值的差异无统计学意义（ $P > 0.05$ ）。绘制校准曲线、Kaplan-Meier 生存曲线和决策曲线发现，基于 CF+PTL 建立的 Cox 模型验证集的拟合优度、生存曲线的区分度均比基于 PTL 建立的 Cox 模型更好，临床获益更高。

结论：根据 PTL 特征建立的 MRI 影像组学模型可以预测 NPC 的复发或者远处转移等不良预后，其预测能力优于 MLN 特征建立的模型；CF+PTL 联合模型可以提高模型的临床价值。

PO-3938

基于机器学习技术的早期 COPD 诊断模型研究

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目的通过获取 CT 扫描图像的定量参数，结合受试者的基本信息，利用传统的机器学习模型来建立早期 COPD 诊断模型。

资料与方法回顾性纳入 2015 年 1 月至 2020 年 08 月上海市同济医院和长征医院 2142 名同时具有肺功能检查和胸部 CT 平扫的患者。本部分共纳入人群 2142 例，其中训练集 1499 例，验证集 214 例，测试集 429 例。通过 COPD 专用分析软件测量定量 CT 参数。基于定量 CT 参数以及临床资料，本研究根据三个不同的分类问题（COPD 和非 COPD 二分类、正常组和高危人群二分类、正常、高危、COPD 三分类）尝试构建了不同的机器学习模型，分别为：多层感知机（MLP, Multilayer Perceptron）也叫人工神经网络（ANN, Artificial Neural Network）、支持向量机（Support Vector Machine, SVM）和随机森林（Random Forest, RF）。

结果基于定量 CT 参数的传统机器学习结果显示，支持向量机模型（SVM）综合性能最优。对于正常组和高危组的分类问题，SVM 的精确率为 0.760，召回率仅为 0.620，F1 分数为 0.683；COPD 患者的诊断 SVM 模型中，SVM 的精确率为 0.823，召回率为 0.826，F1 分数为 0.824；而对于正常组、高危组、COPD 组的分类模型，SVM 的精确率为 0.572，召回率为 0.576，F1 分数为 0.565，与其他两个机器学习模型相似。

结论传统机器学习模型能够根据定量 CT 参数较好的诊断 COPD，但是对于高危人群的识别以及多分类问题，传统机器学习方法性能欠佳。

PO-3939

基于多中心的多参数 MRI 影像组学列线图预测

ISUP \geq 3 前列腺癌的价值

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目的 探讨基于多中心多参数 MRI 影像组学列线图预测 ISUP \geq 3 前列腺癌 (csPCa) 的价值。

方法 回顾性分析三个中心的 395 例 PCa 患者, 分为训练组、内部验证组和 2 个外部验证组。从每例患者的 T2WI、DWI 和 ADC 图像中共提取 3948 个影像组学特征, 对训练组采用最小冗余最大相关 (mRMR) 和最小绝对值收敛和选择算子 (LASSO) 两种方法进行特征降维后建立影像组学模型 (Rad-score)。采用单因素、多因素逻辑回归筛选独立临床特征, 来构建临床模型。将筛选出的临床特征和 Rad-score 进行多元逻辑回归分析, 建立联合预测模型并制作列线图。采用受试者工作特征 (ROC) 曲线和校正曲线来评估三个模型的性能。采用决策曲线分析法评价哪种模型的净效益最大。

结果 经过 mRMR 和 LASSO 降维后筛选出 11 个价值较大的影像组学特征。经过单因素、多因素逻辑回归分析筛选出 MRI 肿瘤 T 分期和 ADC 值两个临床特征。采用多因素逻辑回归构建包含了 MRI 肿瘤 T 分期、ADC 值和影像组学标签的预测模型并制作列线图, 列线图预测 csPCa 在训练组、内部验证组、外部验证组 1 和外部验证组 2 的 ROC 曲线下面积分别是 0.85、0.88、0.81、0.81。校正曲线显示训练组、内部验证组、2 个外部验证组的列线图预测与实际分类结果之间具有较高的一致性 ($P > 0.05$)。通过决策曲线分析, 列线图与影像组学模型比基于临床特征模型的临床应用收益更高。

结论 多参数 MRI 影像组学列线图可以作为一种潜在的非侵入性量化工具, 用于鉴别 csPCa 与 ciPCa。

PO-3940

基于 Swin Transformer 架构的磁共振图像加速重建

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摘要: **目的:** 基于深度学习的磁共振图像加速重建是一种利用机器学习算法实现加速磁共振成像过程的方法。传统的磁共振成像需要大量的扫描时间和计算资源, 限制了其在临床应用中的广泛使用。为了解决这一问题, 本文提出了一个以 Swin Transform 为架构的磁共振图像加速重建方法。**方法:** 首先, 从全采样 k-space 空间中截取 1/2 或 1/4 的 k-space 数据用以生成欠采样低分辨率图像, 并结合全采样数据生成高-低分辨率数据对形成数据集, 以 7: 2: 1 的比例划分为训练集(396 张), 验证集 (113 张) 和测试集 (56 张)。其次, 为了挖掘更多原始信息, 将浅层特征提取模块设置为两层卷积来增加感受野, 对于两种不同的重建形式主体部分 RSTBS (Residual Swin transformer blocks) 模块级联数分别设置为 4 和 6, 每个模块注意力头数均设置为 6。使用多项损失结合训练优化模型。**结果:** 使用 PSNR (Peak Signal-to-Noise Ratio), SSIM (Structural Similarity), FID (Fréchet Inception Distance) 作为重建结果评价指标, 对于 1/2 欠采样重建, 各个指标为: PSNR: 37.41, SSIM: 0.9811, FID: 28.65。1/4 欠采样重建结果为: PSNR: 33.87, SSIM: 0.9658, FID: 38.73。**结论:** 更大的欠采样数据可以捕获更多信息拥有更好的重建结果, 相反, 更小的欠采样数据达到理想水平需要更大的计算资源。因此, 对更多数据的挖掘利用和寻找更适的损失函数, 有待进一步探索。

PO-3941

基于 CT 影像组学联合临床特征对新型冠状病毒肺炎-奥密克戎毒株肺炎临床转归的预测研究

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目的 探讨基于 CT 影像组学特征联合临床特征对新型冠状病毒肺炎-奥密克戎毒株患者临床转归的预测。**方法** 回顾性收集 107 例感染奥密克戎毒株肺炎的患者的临床和 CT 资料。所有患者按照临床结局分为好转组(53 例)和死亡组(54 例), 并从 CT 图像中提取了影像组学特征和临床特征, 进行特征筛选后使用逻辑回归模型分别建立临床模型、组学模型和联合模型, 其中训练集 74 例、测试集 33 例(7: 3)。通过受试者操作特征(ROC)曲线、决策曲线评估各种模型的诊断性能。结果死亡组患者的年龄、中性粒细胞计数、白细胞计数、中性粒细胞/淋巴细胞比值均显著高于好转组($P < 0.05$), 而淋巴细胞计数、白蛋白/球蛋白比值则均显著低于好转组($P < 0.001$)。多因素 Logistic 回归结果显示年龄、性别、中性粒细胞计数、中性粒细胞比率是新冠肺炎死亡结局的独立危险因素。联合模型基于 4 个具有独立危险因素的临床特征和 8 个筛选得到的影像组学特征构建。在训练集中, 临床模型, 影像组学模型和联合模型的准确性, 敏感性, 特异性和 AUC 分别为 0.83、0.78、0.89、0.89; 0.86、0.94、0.78、0.92 及 0.89、0.78、1、0.94。在测试集中, 临床模型, 影像组学模型和联合模型的准确性, 敏感性, 特异性和 AUC 分别为 0.75、0.76、0.75、0.82; 0.72、0.76、0.68、0.80 及 0.81、0.64、1、0.91。在训练集与测试集中, 临床模型, 影像组学模型和联合模型的对于预测奥密克戎新冠肺炎临床结局的 AUC 值均无统计学意义($P > 0.05$)。校准曲线显示该模型预测新冠肺炎死亡发生风险与实际发生风险一致性良好。决策曲线显示联合模型阈值概率 0~0.6 时, 可获得大于 0.3 的净收益。结论 基于胸部 CT 影像组学联合临床特征模型的建立对奥密克戎新型冠状病毒肺炎的临床转归预测具有较高的效能。

PO-3942

基于机器学习的双能量 CTA 识别症状性颈动脉斑块的研究

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目的: 本研究旨在开发和验证一种机器学习模型, 该模型双能 CTA 定量参数和临床相关风险因素, 用于识别症状性颈动脉斑块, 以预防急性脑血管事件。

方法: 对 2017 年 1 月至 2021 年 12 月 180 例颈动脉粥样硬化斑块患者的数据进行分析; 110 名患者(64.03±9.58 岁, 20 名女性, 90 名男性)被分配到有症状组, 70 名患者(64.70±9.89 岁, 50 名女性, 20 名男性)分配到无症状组。基于不同的 CT 和临床特征, 在训练队列中训练了五个使用 XGBoost 算法的机器学习模型, 在测试队列中, 使用受试者操作特征曲线、准确度、召回率和 F1 评分来评估所有五个模型的性能。

结果: SHAP 值排名显示, 脂肪分数(FF)在所有 CT 和临床特征中最高, 归一化碘密度(NID)排名第 10, 与基于传统 CT 特征(AUC.588, 准确度.593, 召回率.767, F1 分数.678)、双能 CT 特征(AUC.685, 准确度.648, 召回率.667, F1 得分.678)的其他四个模型相比, 基于 SHAP 测量的前 10 个特征的模型显示出最佳性能(曲线下面积[AUC].885, 准确率.833, 召回率.933, F1 得分.861), 传统 CT 和双能 CT 特征(AUC.819, 准确度.740, 召回率.867, F1 得分.788), 以及所有 CT 和临床特征(AUC.878, 准确度.833, 召回率 0.867, F1 评分.852)。

结论: 颈动脉斑块的脂肪分数和归一化碘浓度可作为症状性颈动脉斑块的影像学标志。这种结合了 DECT 和临床特征的基于树的机器学习模型可能包括一种用于识别症状性颈动脉斑块的无创性方法, 以指导临床治疗策略。

PO-3943

基于多相 CT 影像组学对膀胱尿路上皮癌预后预测价值的研究

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目的：探讨基于多相 CT 影像组学联合临床因素预测膀胱尿路上皮癌（BLCA）患者的总生存期。

方法：回顾性收集 114 例经多相 CT 扫描的原发性 BLCA 患者的影像、临床和生存资料，并按 6:4 的比例将所有患者随机分为训练集（68 例）和验证集（46 例）。利用 3D-slicer 手动分割所有 BLCA 患者的平扫、动脉期和静脉期图像感兴趣区域（ROI）并使用 Py-radiomics 提取影像组学特征。采用 Cox 回归算法建立平扫、动脉期、静脉期 3 个基本模型和动脉期+静脉期、平扫+动脉期+静脉期 2 个组合模型预测 BLCA 患者的总生存期。选择性能最高的影像组学模型计算影像组学评分（Rad-score），使用 Cox 回归分析影响患者总生存期的独立危险因素。后联合 Rad-score 和临床危险因素构建联合模型并绘制可视化的诺谟图。绘制 K-M 曲线及 C-index 评价各个模型的预测效能。分别计算联合模型在各时间点的曲线下面积（AUC）并绘制时间依赖 ROC。绘制校准曲线评估模型的一致性，决策曲线（DCA）判断模型的可用性及临床净效益。

结果：基于多相 CT 构建的 5 个影像组学模型中，平扫+动脉期+静脉期的组合模型具有最好的性能，其在验证集中的赤池信息准则（AIC）和一致性指数（C-index）分别为 130.48 和 0.779。以病理分级和 Ki-67 表达状态两个独立危险因素联合 Rad-score 构建的联合模型性能优于单独的影像组学模型，其在验证集中的 AIC 和 C-index 分别为 118.30 和 0.825。时间依赖 ROC 显示在各时间点，联合模型的 AUC 均高于 0.8，表明模型良好的稳定性。校准曲线显示联合模型的预测概率与实际之间具有良好的一致性（ $P < 0.05$ ）。决策曲线显示在较大的阈值概率范围内，联合模型具有良好的临床应用价值。

结论：基于多相 CT 影像组学联合临床危险因素构建的模型可用于无创预测 BLCA 患者的总生存期，有助于临床决策。

PO-3944

基于胸部正位 X 线摄影的儿童 PICC 导管头端智能定位

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目的：胸部正位 X 线摄影（胸片）是临床了解 PICC 头端位置常用的检查手段，但是胸片无法准确判断 PICC 头端是否位于上腔静脉（SVC）合适位置。本研究旨在建立 PICC 头端在 SVC 内所处位置的自动判断模型，实现利用胸片对 PICC 头端位置进行准确、快速的识别和判断。

方法：（1）回顾性分析我院 440 例接受胸部 CT 增强的患儿，在增强图像上测量 SVC 长度、气管隆突至 SVC-右心房交界处（CAJ）的距离（气管隆突-CAJ）以及气管隆突至 SVC 上、中、下 1/3 段各分界点的距离，建立各年龄段 SVC 与气管隆突位置关系的参考数据。（2）收集我院 1642 例接受 PICC 的胸片，导入 CVAT 软件勾画出气管隆突、PICC 导管及导管头端，选用 DEKR 算法进行关键点检测，构建并验证可自动识别气管隆突的模型；选用 U2-Net 结构和 Transform 的语义分割算法 UCtransNet，构建并验证可自动识别 PICC 导管及其头端的模型。（3）结合基于 CT 图像的 SVC 与气管隆突位置关系的数据，通过多模块程序整合，形成 PICC 头端位置自动识别及判断的人工智能系统，并验证。

结果：不同年龄段儿童气管隆突到 SVC 各点的距离符合一元二次方程： $\text{distance} = k_1 \times d + k_2 \times d^2 + b$ （ k_1 、 k_2 为拟合方程中变量的系数， b 为拟合方程中的常量， d 为患者出生日期到就诊日期的天数），判断 PICC 头端位置的准确率 95.5%。

结论：成功建立基于胸片的 PICC 导管头端自动识别及判断系统，该系统可准确、快速地识别 PICC 导管头端，并判断其是否位于最适位置，为 PICC 导管的临床管理提供影像指导。

PO-3945

基于多参数 MRI 影像组学术前评估直肠癌肿瘤出芽分级

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目的：开发基于多参数 MRI 影像组学和独立危险因素的联合模型，用于直肠癌肿瘤出芽（TB）分级的术前评估。

方法：本研究回顾性地分析了 2018 年 1 月至 2022 年 3 月在本院行术前 MRI 检查并经手术病理证实为直肠癌的 120 例连续患者的影像和临床资料。按照 6: 4 的比例将患者分成训练组和验证组。将患者术前 T2 加权成像（T2WI）、弥散加权成像（DWI）和对比增强 T1 加权成像（T1CE）图像导入 3D-Slicer 中进行感兴趣体积（VOI）的手动勾画和特征提取。应用皮尔森相关法和方差分析筛选特征，计算相应的影像组学得分（Rad-Score, RS）并且利用支持向量机作为分类器构建影像组学模型（T2WI 模型、DWI 模型和 T1CE 模型）。通过单因素和多因素 Logistic 回归分析从临床及 MRI 语义特征中选择独立危险因素，并构建临床模型。利用 Logistic 回归分析开发一个结合 RS_{T2WI} 、 RS_{DWI} 、 RS_{T1CE} 和独立危险因素的联合模型。绘制受试者工作特征（ROC）曲线观察各模型诊断直肠癌 TB 分级的效能。使用校准曲线评估联合模型拟合情况。使用决策曲线分析评估模型临床效益。

结果：从 T2WI、DWI 和 T1CE 序列各提取并筛选出了 7 个特征用于计算相应的 RS 及构建相应影像组学模型。MRI 报告的 N 分期（ $P=0.020$ ）是 TB 的独立危险因素。在验证组中，联合模型、T1CE 模型、T2WI 模型、DWI 模型和临床模型的 ROC 曲线下面积（AUC）分别为 0.891、0.838、0.711、0.758、0.609。联合模型显示出比其他模型更好的性能。校准曲线显示联合模型拟合良好。决策曲线分析表明在绝大多数阈值概率中，联合模型的净效益优于其他模型。

结论：结合影像组学特征和 MRI 语义特征的联合模型可以作为术前评估直肠癌 TB 分级的有效工具，以便对患者进行个体化分层，从而选择合适的治疗方案。

PO-3946

胸部 CT 重建参数对于肺结节影像组学特征的影响探究

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目的：

深入探究 CT 图像重建参数对于肺结节影像组学特征的影响，为肺结节临床数据采集与影像组学研究提供参考信息。

方法：

回顾性分析 134 例肺结节病灶，并采用原始数据（Raw Data）进行多参数图像重建。经过参数组合，共获取 4605 个图像序列，共计 8560 个肺结节自动分割 ROI。数据分析过程中，使用卡方检验或 Fisher 确切概率法比较计数资料，计量资料使用单因素方差分析或 Kruskal-Wallis H 检验进行分析。影像组学特征稳定性则采用 OCCC 值分析比较。

结果:

134 例肺结节病灶中, SN、pSN 与 pGGN 的病灶数分别为 56 例 (41.79%)、35 例 (25.93%) 与 43 例 (32.09%)。在 Flash 和 Force CT 两种设备共 125 种参数组合条件下, 所有影像组学特征中, 共有 434 (34.83%) 个特征的稳定性良好 ($OCCC \geq 0.75$), 其中 209 (16.77%) 个特征的稳定性非常好 ($OCCC \geq 0.90$)。在不同设备中, LOG 特征、Original 特征的中位 OCCC 值分别为 0.87-0.87、0.77-0.79, 明显高于 Wavelet 特征 (0.42-0.44)。独立参数影响分析中, 当只改变重建层厚、卷积核或迭代强度时, 稳定特征数量数分别为 362 (29.05%)、590 (47.35%) 和 793 (63.64%)。

结论:

(1) 大部分肺结节影像组学特征易受到重建参数 (重建层厚、卷积核和迭代强度) 的影响, 仅 34.83% (434/1246) 的组学特征稳定性良好。

(2) 重建层厚、卷积核和迭代强度对肺结节影像组学特征有不同程度影响, 其中重建层厚影响最大, 卷积核影响较大, 迭代强度影响相对较小。

(3) 重建层厚、卷积核和迭代强度之间存在相互作用, 参数的适当选择有助于降低其对于肺结节影像组学特征的影响。

PO-3947

ME-Mind 模型: 用于预测自发性脑出血后血肿扩大的基于新型深度学习策略的端到端模型

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背景和目的:

一种能够快速有效评估血肿扩大风险的自动化影像诊断框架可以改善自发性脑出血的临床工作流程。因此, 本研究旨在构建并验证一个基于新型深度学习策略的端到端模型 (名为 ME-Mind), 通过利用非对比增强 CT 图像来预测血肿扩大。

材料和方法:

回顾性分析来自 3 个中心的 490 例自发性脑出血患者的临床及影像学资料。在训练集中, 使用基于 Siamese 网络的分类模型桥接到基于密集连接 U-net 的分割模型来构建预测血肿扩大的 ME-Mind 模型, 并在验证集和测试集上进行该模型的验证。另构建基于残差网络或 Swin Transformer 算法的两个深度学习模型和基于支持向量机或逻辑回归的两个影像组学模型进行模型对比分析。开展阅片实验比较医生诊断模式、人工智能诊断模式和人工智能辅助医生诊断模式的诊断性能和工作效率。

结果:

在 490 例自发性脑出血患者中, 有 177 例 (36.1%) 发生血肿扩大。ME-Mind 模型的预测性能优于对比模型, 在验证集中的曲线下面积和准确度分别为 0.849 和 0.733, 在测试集中的曲线下面积和准确度分别为 0.809 和 0.763。在 ME-Mind 模型的辅助下, 急诊医师、初级放射科医师和高级放射科医师的诊断性能和工作效率均显著提高 (所有 $p < 0.001$), 其准确度分别为 0.768、0.789 和 0.809, 报告时间分别为 7.26 ± 2.95 s、 5.08 ± 2.45 s 和 3.99 ± 1.85 s。

结论:

我们的 ME-Mind 模型能够自动有效地预测自发性脑出血后血肿扩大。基于 ME-Mind 模型的人工智能辅助诊断模式有助于改善自发性脑出血的临床工作流程。

PO-3948

基于瘤内和瘤周的 CT 影像组学无创预测胃癌微卫星不稳定状态

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目的：探讨基于瘤内和瘤周的 CT 影像组学在术前无创预测胃癌微卫星不稳定性（MSI）状态中的价值。

方法：回顾性分析 2019 年 1 月至 2023 年 2 月收治的 189 例胃癌患者病例，根据 CT 检查时间先后，将患者分为训练组（n=112）和验证组（n=77）。两位医师采用 3D-Slicer 软件于 CT 静脉期手动逐层勾画瘤内和瘤周 5mm 区域感兴趣体积（VOI），并分别提取影像组学特征。对特征进行 Z-score 标准化，应用组内和组间相关系数（ICCs）、单变量分析和最小绝对收缩和选择算法（LASSO）筛选最优影像组学特征。通过对所选特征的线性组合，以各自的系数加权，计算出基于瘤内、瘤周 5mm 和瘤内+瘤周 5mm 区域的三个影像组学评分（Rad-score），分别构建模型_{瘤内}、模型_{瘤周}和模型_{瘤内+瘤周}。使用单因素和多因素 logistic 回归分析从临床和 CT 语义特征中筛选胃癌 MSI 状态的独立危险因素，构建模型_{临床}。通过 logistic 回归建立了一个结合独立危险因素及瘤内+瘤周区域 Rad-score 的模型_{联合}。采用受试者工作特征（ROC）曲线下面积（AUC）、校准曲线及决策曲线对模型效能进行评估。

结果：选择 11 个影像组学特征建立影像组学模型_{瘤内+瘤周}，CT 测量的肿瘤长径及肿瘤位置是 MSI 状态的独立危险因素。建立的模型_{联合}在验证组获得了最高的 AUC，为 0.830（95%CI, 0.727-0.906）。校准曲线和决策曲线证明了其良好的模型适应度和临床应用价值。

结论：基于瘤内和瘤周的 CT 影像组学特征和 CT 语义特征构建的模型_{联合}可能是胃癌 MSI 状态的潜在生物标志物，有助于在术前制定个性化的治疗策略。

PO-3949

基于 PET/CT 的深度影像组学后融合模型预测 PD-L1 在非小细胞肺癌中的表达状态

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目的：程序性细胞死亡蛋白-1 配体（PD-L1）是非小细胞肺癌（NSCLC）免疫治疗的一个重要的预后预测因子。本研究旨在建立一种基于正电子发射断层扫描和计算机断层扫描（PET/CT）的无创深度学习和影像组学模型，以预测 PD-L1 在 NSCLC 中的表达。

方法：本研究共纳入 2021 年 1 月至 2022 年 9 月期间的 136 例 NSCLC 患者。将患者按 7: 3 的比例随机分为训练数据集和验证数据集。从他们的 PET/CT 图像中提取影像组学特征和深度学习特征。采用 U 检验、最小绝对收缩和选择算子算法和斯皮尔曼相关分析来选择最显著的特征。然后，我们建立了一个影像组学模型、一个深度学习模型和一个基于所选特征的融合模型。通过曲线下面积（AUC）、敏感性、特异性、准确性、阳性预测值和阴性预测值来比较三种模型的性能。

结果：其中 PD-L1 阴性 42 例，PD-L1 阳性 94 例。每个患者共提取了 2446 个放射组学特征和 2048 个深度学习特征。在训练数据集中，与影像组学模型（0.829,95%CI: 0.738-0.898）和深度学习模型（0.935,95%CI: 0.865-0.975）相比，融合模型获得了最高的 AUC（0.954,95% CI: 0.890-0.986）。在验证数据集中，融合模型的 AUC（0.910,95%CI: 0.779-0.977）也高于影像组学模型（0.785,95% CI: 0.628-0.897）和深度学习模型（0.867,95% CI: 0.724-0.952）的 AUC。

结论：基于 PET/CT 的深度影像组学后融合模型可以准确预测 NSCLC 患者中 PD-L1 的表达，为临床医生选择可能从免疫治疗中获益的 PD-L1 阳性患者提供了一种非侵入性的工具。

PO-3950

我国影像组学研究热点和趋势的可视化分析

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目的: 本研究旨在对我国的影像组学相关文献进行可视化分析, 探讨我国影像组学研究的热点和趋势, 以期今后的研究提供参考。

方法: 本研究基于文献计量学, 通过发掘文献, 显示过去的演进脉络, 突出目前的热点领域并预测未来的发展趋势, 为后续研究提供科学情报依据。本研究以“影像组学”和“放射组学”为关键词检索 2012 年 1 月至 2023 年 7 月中国知网, 筛选我国的影像组学相关文献, 使用 CiteSpace 和 VOSviewer 软件可视化分析文献发表时间、作者、机构、期刊和关键词。

结果: 本研究共纳入 1775 篇文献。我国影像组学研究发文数量总体呈增长态势, 2015 年影像组学的概念首次进入中文文献, 随后每年的发文量逐年递增, 目前我国已经成为国际影像组学研究的重要力量。研究主要来自高等医学院校附属医院的研究团队, 但作者和机构间的交流较少。发文量最大的作者为刘在毅和段绍峰, 均发表了 25 篇文献, 该领域的核心作者共 88 位。发文量前三位的医疗机构为蚌埠医学院第一附属医院放射科 (31 篇)、四川大学华西医院放射科 (23 篇) 和川北医学院放射科 (19 篇), 该领域的核心发文机构共 55 家。主要发表于医学影像学杂志, 该领域的核心期刊共 7 本, 发文量前三位的期刊为《磁共振成像》(130 篇)、《临床放射学杂志》(128 篇) 和《放射学实践》(104 篇)。排除检索词“影像组学”和“放射组学”后, 频数 (≥ 73 次) 和中介中心性 (≥ 0.05) 均较高的关键词包括“机器学习”“乳腺癌”“列线图”“诊断”和“人工智能”。关键词聚类分析共得到 9 个关键词聚类标签, 关键词突现检测共发现 25 个突变词。研究热点集中在影像组学在肿瘤诊疗中的应用、影像基因组学为代表的多组学研究以及机器学习和人工智能与影像组学研究的融合。

结论: 我国影像组学相关研究长期保持热度并能紧跟甚至引领国际趋势, 但作者和机构间的合作交流亟待加强, 以期早日实现影像组学的临床转化。

PO-3951

基于 MRI 的不同影像组学模型预测胶质瘤 MGMT 启动子甲基化状态的研究

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目的 探讨 MRI 的不同影像组学模型预测术前脑胶质瘤 MGMT 启动子甲基化状态的效能。方法 回顾性分析经手术病理证实的 114 例大脑海胶质瘤患者的 MRI 影像资料, 包括 T1WI、T2WI、ADC、及 T1WI 增强序列。其中 MGMT 甲基化阳性 58 例, 阴性 56 例, 按 8:2 比例分割要求, 分为训练组 (91 例) 与验证组 (23 例), 在 T2WI 及 T1W 增强分别对肿瘤水肿区及肿瘤核心区进行三维手工分割, 提取总共 688 个影像组学特征, 采用主成分分析进行特征降维, 方差分析用于筛选特征, 应用 Lasso 的逻辑回归算法 (Logistic Regression via Lasso, LR-Lasso)、支持向量机 (Support Vector Machine, SVM)、贝叶斯分类器 (Native Bayes, NB) 构建诊断模型, 5 倍交叉验证方法用于训练模型, 验证组数据用于评估模型的预测性能, ROC 曲线用于计算模型的准确率、灵敏度和特异度, ROC 曲线下面积 (area under curve, AUC) 用于评估模型的预测性能。结果 LR-Lasso 模型的 AUC 值、准确率为 0.80 和 74%, 灵敏度和特异度为 67% 和 82%, SVM 模型的 AUC 值、准确率为 0.89 和 87%, 灵敏度和特异度为 83% 和 91%, NB 模型的 AUC 值、准确率为 0.69 和 74%, 灵敏度和特异度为 75% 和 73%。基于 LR 模型预测效能最高。结论 MRI 影像组学模型对预测术前脑胶质瘤 MGMT 启动子甲基化的状态具有一定应用价值。

PO-3952

采用结构分离技术提升胸肺静脉 CTA 后处理效率的应用研究

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目的 通过结构分离技术和人工法两种后处理方法比较,探究结构分离技术在肺静脉 CTA 图像中后处理过程的应用价值。

方法 回顾性收集本院 80 组病例,数据处理为高年资医生和低年资医生共同完成,两组不同年资的观察者将病例分别使用结构分离技术以及人工手动法提取肺静脉的 VR 图像,做出标准的六位片,两次图像处理中间间隔两周,分别记录两种方法所用的时间以及 VR 图像质量评分。

结果 采用结构分离技术的图像平均完成时间为 (45 ± 5) s,其中高年资医生组平均完成时间为 (43 ± 3) s,低年资医生组平均完成时间为 (48 ± 3) s;人工手动法提取的图像平均完成时间为 (98 ± 5) s,其中高年资医生组平均完成时间为 (70 ± 3) s,低年资医生组平均完成时间为 (126 ± 3) s;结构分离技术获得图像优良率为 83.33%,人工方法获得图像优良率为 76.25%,两种方法所用时间差异有统计学意义。

结论 采用结构分离技术可以提升胸肺静脉 CTA 后处理效率,并且能避免操作者年资的影响。

PO-3953

AI 协同 影像未来

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目的 整合现有 AI 和后处理应用,取代部分医护人员的重复性工作,减轻了其工作负担和强度,提高医疗效率和准确率。

方法 把我科 15 套不同的 AI 图像后处理软件,通过 AI 互交互,构建从原始影像重建到 AI 图像后处理到报告完成的新工作流程,将传统的阅片模式,形成人机双脑诊断模式。

结果 从上线以来我科通过该 AI 交互共完成 13 万余例胸部检查的筛查分析,3D 可视化临床决策报告 1000 余例,AI 头颈和冠脉的 CTA 分析 5000 余例,可实现自动分割、智能去骨、自动重建、自动命名、自动检出、标记病灶,工作流程时间缩短 90%以上,每天节约近 300 分钟,一年能节约近 1800 小时,节约的时间相当于 3.5 个医生工作一年,医生报告时间由原来的每份平均 20~30 分钟,降至 3~5 分钟,效率提升 80%~90%,减少漏诊风险。解决了传统文本报告存在影像学描述不规范、报告用词不统一、影像 AI 信息无法整合、文字性资料后期无法利用等以及出具报告效率低,患者需要等待较长时间才能取报告等弊端和痛点。从传统的报告医生到审核医生的阅片流程,变为 AI 筛查-报告医生-审核医生。形成人机双三次诊断、双重保障的诊断流程。

结论 各个人工智能产品为辅助的工作模式,其管理创新,相较于传统工作流程,节省大约 70%的时间,实现高效阅片、高效出报告;降低风险、提高效率,让医生做到术前心中有数,为患者选择最佳手术方案,降低手术风险,提高手术成功率,通过人工智能技术弥补经验不足,实现技术经验传承,提升医学影像诊断的精准度、降低漏诊率、误诊率,提高医院业务协作、手术精准度,改善病床周转效率;服务模式创新,倡导以患者为中心的诊疗服务模式,提供个体化服务,提供了一种全新的医患沟通工具,可以让毫无医学知识的患者和家属能够充分理解手术过程的难度和风险,从而降低医患矛盾、减少医疗纠纷,把看一个患者的时间减少一半以上,让医生有时间为更多患者服务。

PO-3954

深度学习图像重建算法在全脑 CT 灌注生成的 CT 血管造影中的有效性评估

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目的 通过 CT 全脑灌注 (CTP) 重建的 CT 血管造影 (CTA) 图像, 应用深度学习图像重建算法, 自适应统计迭代重建-Veo (ASIR-V) 和过滤背投影 (FBP) 比较由前循环大血管闭塞 (LVO) 导致的急性缺血性中风患者的 CTA 图像质量和诊断准确性。

方法 本前瞻性研究收集由 LVO 引起的 AIS 患者 39 例, 并在症状出现后 24 小时内进行了非对比 CT、CTP 及 CTA 检查。分别采用 FBP、ASIR-V40%/80%和 DLIR L/M/H 重建 0.625mm 的 CTP 动脉峰相图像, 并与 ASIR-V80%重建的传统 CTA 图像进行比较。在颈内动脉 (ICA) 虹吸部、大脑中动脉 M1 段 (MCA-M1) 和颞肌的对侧轴向图像中绘制感兴趣区 (ROI)。测量并比较其 CT 值、图像噪声 (SD)、信噪比 (SNR) 和对比噪声比 (CNR)。主观评价包括图像噪声、血管管腔边缘锐度、小血管显示和整体图像质量。采用 6 分评分系统对 7 组 CTA 图像组的侧支循环进行评分。

结果 DLIR-M、DLIR-H 和常规 CTA 图像之间的 SD 值、SNR 和 CNR 具有可比性。ASIR-V80%图像中的噪声略高于传统 CTA 图像, SNR 略低 ($P<0.05$), 而 ASIR-V80%、DLIR-M 和 DLIR-H 图像中的 SD 值差异无统计学意义 ($P>0.05$)。FBP 的 SD 值最高, SNR 和 CNR 最低。DLIR-M 和 DLIR-H 图像仅在小血管显示时略差于常规 CTA 图像 ($P<0.05$)。与 ASIR-M 和 DLIR-H 相比, ASIR-V80% CTA 图像的图像噪声和整体图像质量略低于 DLIR-M 和 DLIR-H ($P<0.05$), 边缘锐度和小血管可见性无显著差异。每个患者的 6 张重建 CTA 图像的侧支循环评分与常规 CTA 图像一致。

结论 DLIR-H 和 DLIR-M 重建的 CTP 动脉峰相图像的客观和主观图像质量与常规 CTA 图像相当, 优于 FBP 和 ASIR-V 算法。由 CTP 重建的颅内 CTA 图像减少了造影剂的剂量和辐射剂量。DLIR 重建的 CTP 动脉峰相图像有助于检测小血管。从 CTP 数据重建 CTA 图像不仅避免多次扫描减少了辐射暴露和造影剂剂量, 而且缩短了急性脑梗死患者的检查时间。

PO-3955

基于注意力机制的肺结节检测算法研究

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目的 为提升深度卷积神经网络模型检测肺结节的效果, 运用一种基于注意力机制的 3D 深度卷积神经网络肺结节检测算法, 进行初步研究探讨。**材料与方法** 主体网络采用残差块以及近似 U-Net 结构的上下文多尺度信息融合模型结构。采用目标检测算法 Faster RCNN 中的 3D 版本区域提案网络 (RPN) 直接生成肺结节区域候选。提出一种可训练的 3D 注意力机制门模块, 结合空间和通道注意力两种不同粒度和层次的注意力因子增强, 以期提升肺结节检测网络生成的特征映射的质量, 并且提升相关模型的性能。然后, 采用 LUNA16 肺结节检测数据集中的 881 例低剂量肺部 CT 平扫图像, 图像中包含 1174 个不同类型的肺结节; Pytorch 深度学习框架在 GPU 上进行一系列相关实验, 以 FROC 作为评判指标。**结果** 引入注意力机制的方法在没有加入任何降低误报策略的情况下, FROC 结果为 81.6%, 超过了未使用注意力机制的原 ResNet 网络模型 1.6%, 相比 VGG 网络模型提升了 8.4%。**结论** 基于注意力机制门的肺结节检测方法能够有效聚焦感兴趣区域, 提高肺结节检测的精度, 降低误报率和假阳性率。

PO-3956

CTP 参数 Tmax 预测高危短暂性脑缺血发作患者脑卒中的应用

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目的 探讨 CT 灌注成像(CTP)参数 Tmax 在预测高危短暂性脑缺血发作 (TIA) 患者脑卒中的应用价值。方法 回顾性分析杭州师范大学附属医院 2021 年 1 月-2023 年 6 月收治的 64 例患者资料; 所有患者均进行颅脑一站式检查 (CT 平扫、CT 血管成像 CTA 及 CTP), 以 e-storke 软件处理 CTP 原始数据, 获得残余功能达峰时间(Tmax>4 s、>6 s、>8 s、>10 s)对应的低灌注区体积(VTmax>4 s、VTmax>6 s、VTmax>8 s、VTmax>10 s)、梗死核心区体积(VCBF<30%)及缺血半暗带体积和低灌注强度比值(HIR), 并在 36h 内完成 MRI 复查, 使用 3D-Slice 软件勾画计算脑梗死体积。以 36h 内 MRI 复查为金标准, 统计分析 MRI 复查阳性组与 MRI 复查阴性组患者 ABCD3 评分、入院时美国国立卫生研究院卒中量表 (NIHSS) 评分、CT 灌注参数 (Tmax>4s、>6s、>8s、>10s) 的体积及体积差、VCBF<30%、缺血半暗带体积及 HIR 与脑梗死的相关性。结果: 排除 CT 平扫阳性和或 CTA 见脑血管狭窄、闭塞患者 5 例, 纳入 CT 平扫阴性、CTA 未见明显脑血管狭窄、闭塞患者 59 例, 其中 MRI 复查阳性组 37 例, MRI 复查阴性组 22 例。MRI 复查阳性组 ABCD3 评分、入院时 NIHSS 评分及 CTP 参数 VTmax>4 s、VTmax>6 s、VTmax>4 s-VTmax>6 s(P 均<0.05)均大于 TIA 组, 其余各项差异均无统计学意义(P 均>0.05)。结论 CT 平扫阴性、CTA 未见脑血管狭窄、闭塞并不能排除急性缺血性脑卒中 (AIS) 的可能, 以 e-storke 软件所获 CTP 参数 VTmax>4s>15.9ml 能较好的提示高危 TIA 存在 AIS 的可能, 为临床医生早期诊疗提供影像支持。

PO-3957

探讨基于 AI+深度学习的冠状动脉 CT 血流储备分数 (CT-FFR) 在冠心病无创诊断中的应用价值。

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目的: 探讨基于 AI+深度学习的冠状动脉 CT 血流储备分数 (CT-FFR) 在冠心病无创诊断中的应用价值。

方法与材料: 回顾性分析 2003 年 3 月-6 月于我院行 CCTA 检查的疑似冠心病患者 72 例, 其中男 44 例, 女 28 例。纳入标准: CCTA 检查和 CAG(冠状动脉造影) 及 FFR(冠脉血流储备分数) 检查间隔<2 周。排除标准: 钙化积分>400; 既往行冠脉支架植入术或搭桥术。采用联影 960 CT 行 CCTA 检查, 前瞻性轴扫, 扫描参数: 100-120 kV, 100-140mAs, 旋转时间 0.25s/圈, 造影剂 (碘迈伦 400), 注射速率 3.5-4.5ml/s, 注药时间: 12s; 并追加 50ml 生理盐水; CAG 使用 Philips 心血管造影机, 经右侧桡动脉行多方位选择性造影; CT-FFR 测量: 由一名放射科副主任医师, 使用联影公司基于 AI+深度学习的测量软件 uCT-FFR, 利用 CCTA 图像测量病变远端 2 cm 处 CT-FFR 值。统计学方法: 使用 SPSS 23.0 软件进行统计学分析。以 CAG 测出的冠脉狭窄作为金标准, 以 CT-FFR≤0.8 为阳性, 对 uCT-FFR 诊断冠脉血流储备分数的敏感度、特异度、准确率、阳性预测值、阴性预测值进行计算, 并使用 Pearson 法检验 CAG 检查结果与 CT-FFR 值的相关性。结果: 72 例患者共 83 条血管接受评估, 以 CAG 为金标准, CT-FFR 检测冠脉血流储备分数的敏感度、特异度、准确率、阳性预测值、阴性预测值分别为 87.8%、71.4%、79.5%、75%、85.7%。Pearson 相关性分析表明, CAG 检查与 CT-FFR 值相关性较好 (r=0.661)。

结论: 基于 AI+深度学习的 CT-FFR 作为一种无创、易行、准确的血流动力学信息检测指标, 在冠心病诊断中具有良好的应用前景。

PO-3958

基于 MRI 影像组学预测脑膜瘤复发/进展

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目的: 脑膜瘤复发/进展的术前无创预测有助于手术方案的选择, 并为指导脑膜瘤患者实现个体化治疗提供指导依据。本研究旨在开发和验证基于磁共振成像的列线图预测脑膜瘤复发/进展。

材料和方法: 这项回顾性研究收集了 88 例经手术病理确诊的脑膜瘤患者, 包括 28 例术后复发患者和 60 例未复发患者。所有病例随机按照 7:3 的比例分为训练集和验证集: 从术前 T2WI 和 T1WI 增强图像中分别提取了 1874 个影像组学特征, 并使用最小绝对收缩和选择算子 (least absolute shrinkage and selection operator, LASSO) 来筛选临床特征和 MRI 特征的最佳组合来预测脑膜瘤复发/进展, 随后运用机器学习算法构建出用于评估脑膜瘤复发风险的预测模型, 采用受试者工作特征 (ROC) 曲线分析来确定预测性能, 并使用校准曲线和决策曲线分析来验证该列线图的一致性和临床有效性。

结果: 最终筛选出 12 个与脑膜瘤复发风险密切相关的影像组学特征构建了 RF 模型列线图, 结果显示该模型具有良好的预测性能, 在训练集和验证集中 AUC 分别为 0.950 和 0.852。

结论: 基于 MRI 影像组学的 RF 预测模型在预测脑膜瘤复发/进展方面具有良好的预测性能, 可应用于临床实践。

PO-3959

基于 bpMRI 影像组学的机器学习模型预测移行带非显著性前列腺癌的价值

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目的: 建立基于 T2 加强成像 (T2WI) 联合弥散加权成像 (DWI) 纹理特征的机器学习模型, 评价其在诊断移行带非显著性前列腺癌 (NCSPC) 中的价值。

方法: 回顾性分析 2020 年 1 月至 2023 年 1 月在南京鼓楼医院, 宣城市中心医院接受前列腺双参数 MRI 的影像数据, 本次研究前列腺癌病例均为低风险组 (Gleason 评分 $\leq 3+4$ 分), 且病变位置均位于移行带。南京鼓楼医院数据集患者 397 例, 按照 7:3 随机分成训练集和测试集; 宣城市中心医院数据集患者 110 例作为外部验证集。BPH 患者行超声引导下穿刺活检; PCa 患者行前列腺切除根治术, 均有病理结果。

用 3D slicer 软件手动描绘感兴趣区 (ROI) 特征提取特征, 用 LASSO 筛选特征构建移行带 NCSPC 预测模型。结合 T2WI, DWI 纹理分析、建立 Logistic 回归 (LR)、随机森林 (RF)、支持向量机 (SVM) 模型, 运用 ROC 曲线和决策曲线分析法 (DCA) 评价上述模型和变量的重要性。

结果: RF 算法的 T2WI 联合 DWI 纹理特征模型诊断 NCSPC 效果最好。

训练集: LR、RF 和 SVM 的 AUC 分别为 0.892、1.000 和 0.844。

测试集: LR、RF 和 SVM 的 AUC 分别为 0.828、0.866 和 0.794;

外部验证集: LR、RF 和 SVM 的 AUC 分别为 0.728、0.818 和 0.717。

结论: RF 算法的 T2WI 联合 DWI 纹理特征模型在诊断移行带 NCSPC 及 BPH 方面具有较好的分类性能, 为临床医生提供一种可靠的辅助诊断工具。

PO-3960

基于增强 T1WI 影像组学预测直肠腺癌病理分级的可行性研究

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目的 探讨基于增强 T1WI 影像组学预测直肠腺癌病理分级的可行性。**资料和方法** 回顾性分析了 127 例直肠腺癌患者的 MRI 图像及病理资料, 使用 ITK-SNAP 软件在 T1WI 轴位增强图像上, 采用最小轮廓法逐层手动绘制直肠肿瘤灶作为感兴趣区 (ROI), 使用 Pyradiomics 软件提取感兴趣容积 (VOI) 内所有影像组学特征, 通过组内相关系数 (ICC) 分析 ($ICC \geq 0.75$) 保留稳定性较好的特征。将目标任务分解为两部分: 任务一预测肿瘤的高分化与中-低分化即“高-非高”组; 任务二预测“非高”肿瘤组中的中分化与低分化即“中-低”组。**结果** 通过最小冗余最大相关 (mRMR) 的特征筛选方法后, 采用最小绝对收缩和选择算子 (LASSO)、逻辑回归 (LR)、贝叶斯分类器 (NB)、随机森林 (RF)、支持向量机 (SVM) 五种方法分别构建模型, 任务一中受试者工作特征曲线下面积 (AUC) 值在训练集中分别是 0.86、0.90、0.59、1.00、0.99 和测试集中分别是 0.71、0.62、0.53、0.67、0.64, 任务二中 LASSO、LR、NB、RF、SVM 模型在训练集中 AUC 分别是 0.93、0.85、0.67、0.92、0.89, 在测试集中分别是 0.86、0.80、0.50、0.78、0.71。两部分任务中 LASSO 构建的模型均为优势模型。结合年龄、性别与优势模型影像组学标签组成的融合模型, 计算得到测试集中任务一 AUC 值为 0.80 (95%CI: 0.63-0.96), 准确性、敏感性、特异性分别是 78.94%、77.78%、79.31%; 任务二则分别为 0.89 (95%CI: 0.75-1.00)、90.00%、95.65%、71.43%。校准曲线表明融合模型的拟合优度良好。**结论** 基于增强 T1WI 影像组学方法, 通过两个二分类模型的建立, 在预测直肠腺癌的高、中、低分化程度方面具有可行性。

PO-3961

MRI 影像组学评估原发性淋巴水肿临床分期的价值

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目的: 建立一种基于 MRI 的原发性下肢淋巴水肿 (lower extremity lymphedema, LEL) 影像组学模型及影像-临床综合模型, 并评价其在鉴别原发性 LEL 临床分期 (I-II 期) 中的作用。**方法:** 收集 96 例原发性 LEL 患者, 按照国际淋巴协会 (International Society of Lymphology, ISL) 临床分期标准分为 I、II 期, 其中训练集 67 例, 验证集 29 例。由影像医生应用深睿多模态科研平台在 STIR 序列图像上手动勾画感兴趣区域 (region of interest, ROI), 自动提取影像组学特征。保留选定的影像组学特征构建影像组学模型。选定对鉴别 I、II 期有统计学意义的临床因素, 建立结合影像组学特征和重要临床因素的影像-临床综合模型。使用 ROC 曲线评价两个模型的性能。使用决策曲线 (decision curve analysis, DCA) 来评估模型的临床实用性。**结果:** 96 例患者, 共提取影像组学特征 1743 个, 再通过 F Test 进行特征筛选, 最后筛选出 20 个特征构建影像组学模型。基于影像组学特征和 4 个临床因素的影像-临床综合模型比单独使用影像组学模型具有更好的鉴别效能 (训练集中的曲线下面积 (AUC): 0.997 vs. 0.961, 验证集: 0.914 vs. 0.900)。DCA 验证了影像-临床组学综合模型的临床实用性。**结论:** 基于 MRI 的影像组学模型能够有效鉴别原发性 LEL 的临床分期 (I、II 期)。影像-临床综合模型的预测性能优于单独使用影像组学模型。

PO-3962

基于生成对抗网络深度学习在减少心脏

磁共振运动伪影中的应用研究

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目的 探讨基于生成对抗网络(Generative Adversarial Networks, GAN)深度学习技术在减少心脏磁共振运动伪影中的应用价值。**方法** 纳入 30 例行心脏磁共振检查(Cardiac MR, CMR)病人的清晰电影序列图像,通过马尔科夫过程处理后得到的 2000 组清晰-模糊图像对设为训练集,200 组清晰-模糊图像对设为测试集,建立基于 GAN 的深度学习模型并对其进行训练。选取 100 张后处理生成的运动伪影图像和 37 张临床实践中具有真实运动伪影图像来验证深度学习网络的去伪影效果。图像质量采用峰值信噪比(Peak Signal to Noise Ratio, PSNR)、结构相似性指数(Structural Similarity Index, SSIM)、tenengrad 对焦测量及李克特 5 分值法进行评价。由于 37 例真实 CMR 伪影图像没有对应的清晰图像,因此仅采用对焦测量及李克特 5 分值法评价。结果 100 张人工运动伪影的 CMR 图像经深度学习网络优化前图像的 PSNR、SSIM、对焦测量及主观评分值分别为 23.85 ± 2.85 、 0.71 ± 0.08 、 4.56 ± 0.67 和 2.44 ± 1.08 ;优化后分别为 27.04 ± 1.55 、 0.80 ± 0.05 、 7.74 ± 0.39 和 4.44 ± 0.66 。图像的 PSNR、SSIM 及对焦测量较优化前分别提高了 13.3%、12.7%、69.7%,主观评分平均提高了 2 分($P<.001$)。37 张真实伪影 CMR 图像去伪影前后数据的统计结果显示:去伪影后图像的对焦测量明显提升(去伪影前 6.06 ± 0.91 ;去伪影后 10.13 ± 0.48),主观评分从 3.03 ± 0.73 提升到了 3.73 ± 0.87 ,差异具有均统计学意义($P<.001$)。结论 基于 GAN 的深度学习技术可以有效减少 CMR 电影图像运动伪影,其在 CMR 运动伪影优化上具有巨大的临床应用潜力。

PO-3963

基于机器学习的肺结节多分类预测模型的建立与验证

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目的:肺癌是全球癌症死亡的主要原因。已经建立了一些预测模型来预测肺结节(PNs)恶性肿瘤的可能性。本研究旨在建立新的预测模型,并评估已发表模型的预测性能。

方法:收集 2013 年 1 月至 2021 年 10 月在重庆市 A、B、C、D 四家医疗机构就诊的 914 例 PNs 患者资料。根据病理诊断将患者分为良性病变(BLs)组、前驱病变(PLs)组和恶性病变(MLs)组。随机选取 A 医院约 80%(505 例)的患者作为训练集,剩余 20%(127 例)作为内部测试集,B、C、D 医院的患者(282 例)作为外部验证集。采用单因素分析和递归特征消去法选择预测特征。采用逻辑回归(LR)、决策树(DT)、随机森林(RF)和支持向量机(SVM)建立预测模型。最后,对 Mayo 模型、北京大学人民医院(PKUPH)模型和 Brock 模型的预测性能进行外部验证。

结果:共选择 8 个特征作为预测特征建立模型。内部测试集 LR、DT、RF 和 SVM 的加权平均曲线下面积(AUC)值分别为 0.78、0.75、0.81 和 0.80。RF 模型的加权平均 AUC 值最高,其 MLs、PLs 和 BLs 的 AUC 值分别为 0.80、0.90 和 0.75。外部验证集 RF 模型的加权平均 AUC 值为 0.71,MLs、PLs 和 BLs 的 AUC 值分别为 0.71、0.98 和 0.68。Mayo 模型 AUC 值为 0.68,PKUPH 模型 AUC 值为 0.64,Brock 模型 AUC 值为 0.57。

结论:我们基于 8 个预测特征建立了 4 个 ML 模型,其中 RF 模型表现最好,其预测性能优于 3 个外部模型。RF 模型为 PNs 的风险评估提供了一种五创性新方法。

PO-3964

基于 CT 的深度学习模型在鉴别良恶性实性肺结节 ($\leq 8\text{mm}$) 中的价值

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目的 探讨基于计算机断层成像的深度学习模型在鉴别良恶性实性肺结节 ($\leq 8\text{mm}$) 中的价值。

方法 回顾性分析我院经手术病理证实的 567 例 SPN 患者的胸部 CT 资料。首先将 SPN 分为良性组和恶性组, 每组均按照 4: 1 的比例随机分为内部训练集和验证集, 同时收集外院 152 例 SPN 作为外部测试集。使用多尺度双注意力网络 (MDANet) 联合结节及灶周 0mm、5mm、10mm、15mm 和 20mm 肺组织建立 5 个深度学习模型以鉴别良、恶性 SPN, 利用曲线下面积、准确率、召回率、精确率及 F1 分数来评估每个预测模型的性能, 筛选出最佳预测模型, 同时选择四种深度学习模型与本文网络进行比较, 然后使用相同方法建立 5 个深度学习模型以鉴别良性肿瘤和炎性结节, 并筛选出最佳预测模型。

结果 在良恶性 SPN 二分类模型中, 使用 MDANet 联合结节及灶周 15mm 肺组织的深度学习模型表现最佳, 内部验证集的 AUC、准确率、召回率、精确率及 F1 分数分别为 0.824、0.798、0.801、0.785 及 0.790, 外部测试集的 AUC、准确率、召回率、精确率及 F1 分数分别为 0.730、0.724、0.711、0.705 及 0.707, 且该模型的预测性能优于 VGG19、ResNet50、ResNeXt50 及 DenseNet121。在良性肿瘤和炎性结节二分类模型中, 使用 MDANet 联合结节及灶周 10mm 肺组织的深度学习模型表现最佳, 内部验证集的 AUC、准确率、召回率、精确率及 F1 分数分别为 0.948、0.917、0.921、0.852 及 0.880, 外部测试集的 AUC、准确率、召回率、精确率及 F1 分数分别为 0.871、0.938、0.863、0.904 及 0.882。

结论 基于注意力机制联合结节及灶周肺组织建立的深度学习模型在鉴别良恶性肺结节、良性肿瘤与炎性结节中具有较大价值, 能够进一步提高模型的预测效能和泛化能力。

PO-3965

冠状动脉 CT 血流储备分数不同软件算法及操作者间一致性分析及同质化初探

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目的 探讨不同冠状动脉 CT 血流储备分数 (CT -FFR) 计算软件评估冠状动脉血流储备的一致性 & 不同操作者间的一致性分析。

方法 回顾性收集 2021.07-2021.08 我院冠状动脉 CT 血管成像 (CCTA) 提示冠状动脉狭窄 40%~99%, 且行冠状动脉血管造影 (DSA) 检查的患者, 排除同一支血管存在 2 处及以上病变的病例。CT-FFR ≤ 0.8 为评估心肌缺血的参考标准。由两名心血管疾病影像诊断及后处理经验 ≥ 5 年的医生分别评估 CCTA 图像质量, 最优重建期相, 记录钙化积分, 然后用两种不同的 CT-FFR 软件测量病变前、病变后 CT-FFR 值, 并计算跨病变 $\Delta\text{CT-FFR}$ 值, 评价两种软件测量结果的一致性及两名操作者间的一致性。采用 GraphPad Prism9 进行统计学分析, $p < 0.05$ 认为有统计学差异。

结果 共纳入 12 例患者 25 支冠状动脉血管的 25 处病变, 因数据不满足正态分布, 应用配对符号秩和检验进行统计分析, 两种测量软件的病变前 $p=0.1618$, 病变后 $p=0.4227$, ΔCTFFR $p=0.1247$, 整体 CTFFR $p=0.4696$, 均没有统计学差异。对于单支血管钙化积分 < 100 的亚组, 两种测量软件

的病变前 $p=0.0949$, 病变后 $p=0.8902$, $\Delta CTFFR$ $p=0.1554$, 整体 $CTFFR$ $p=0.3047$, 均没有统计学差异。对于单支血管钙化积分 ≥ 100 的亚组, 两种测量软件的病变前 $p>0.9999$, 病变后 $p=0.4609$, $\Delta CTFFR$ $p=0.6172$, 整体 $CTFFR$ $p>0.9999$, 亦均没有统计学差异。两名操作者间测量 $CT-FFR$ 的 Kappa 值为 0.8-1, 一致性高。

结论 不同冠状动脉 $CT-FFR$ 计算软件评估冠状动脉血流储备的一致性良好, 且受病变钙化积分的影响较小, 不同操作者测量 $CT-FFR$ 的一致性良好。

PO-3966

基于单病种人工智能全流程管理方案在医院多科室的整体运用

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目的: 随着 CT、MRI 等检查设备的不断进步, 放射科检查的图像层厚越来越薄, 单次检查的影像数量也越来越多。一方面放射科医生的工作量越来越多, 另一方面临床科室对放射科的诊断要求越来越高, 希望直观呈现病灶部位大小、形态以及与周围血管等组织的关系。同时放射科医生长期高压工作状态下, 人为疲劳造成的诊断信息不全、工肉眼判别的信息不够精准、甚至可能出现漏诊、误诊的现象。

方法: 以肺癌筛查早期发现肺结节作为切入点, 建立以患者为中心的诊疗管理体系, 打造全方位、高效覆盖早期肺癌疾病阶段的全程管理模式。锚定肺癌早期筛查与管理的关键节点, 对不同风险层级肺结节患者进行主动分流, 并进行全程随访管理, 保证肺癌早期筛查效率与价值。针对肺结节/肺癌诊治面临的重要问题, 提出关键解决对策, 为肺结节/肺癌患者管理模式提供切实有效的工具, 助力临床实现对肺结节/肺癌患者进行规范化与同质化的诊疗, 以达到降低肺癌死亡率的目标。

结果: 通过该系统的使用, 降低了肺结节漏诊率及误诊率, 将医生的检测效率提升 30%-50%, 医生的平均阅片时间由以往的 9 分钟降至 6 分钟。人工智能靶重建及胸外三维重建的测试, 累计测试病例超过 1000 例, 在肺结节良恶性诊断、肿瘤科及呼吸科随访评估、肺结节穿刺指导、胸外科手术指导等方面均有显著成效, 提高了放射科、呼吸科、胸外科等多个科室工作效率, 通过先进的人工智能技术, 为精准治疗、精准手术提供了有效的指导, 为患者提供更高水平的医疗服务。另外, 通过推想科研平台, 目前我院累计开展相关科研项目 8 项, 发表 SCI 1 篇。

结论: 提升医学影像诊断的精准度、降低漏诊率、误诊率, 提高医院业务量、手术量, 加快病床周转效率; 帮助提高并优化临床工作的流程效率、准确性、和医疗保健质量; 极大提高专家和科室科研水平与知名度, 降低培养年轻的放射科医生的时间成本, 满足医院影像诊断和临床治疗的需求。

PO-3967

基于双能量单能技术结合 AI 在肺动脉栓子检出率价值应用

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目的：研究双能量肺动脉 CTA 结合 LIANYING AI 在不同单能量数据上肺栓子检出率应用价值

方法：回顾性收集 30 例双能肺动脉 CTA 阳性患者，将 30 例患者采用不同能量进行分组，共 5 组，通过 Syngo VIA 工作站单能+模式进行数据调整存取，其中 A 组：40keV, B 组：60keV, C 组：80keV, D 组：100keV, E 组：120keV, 将 5 组数据带入 LIANYING AI 软件进行分析计算，同时肺动脉进行肺动脉栓子提取，并得出肺动脉主干栓子面积，并通过原始图像进行勾画，得出对照组面积为 A：平均 25.19cm³, B：平均 26.24cm³, C：平均 26.31cm³, D：25.27cm³, E：平均 26.15cm³，通过 AI 软件计算得出各组数据能级图像肺动脉主干栓子的面积，A：平均 17.19cm³, B：平均 22.50cm³, C：平均 26.06cm³, D：26.31cm³, E：平均 26.17cm³，得出面积与手动勾画组进行对比，并分析各能级对肺动脉检出率的优势，同时观察各能级改动 Kv 后增强肺动脉干 CT 值对栓子检出率的影响，并得出结论。

结果：对 30 例各组数据原始勾画图像进行 AI 数据各能级及数据进行对比，得出栓子在 80-120keV 时栓子检出率与原始勾画数据具有一致性，同时也得出并不是越低 keV 对栓子检出率高，因为低 keV 会使肺动脉干造影剂变得更亮，同时噪声指数 SD 值增加，对于肺动脉栓子边界分辨不清而损失肺动脉干栓子面积。

结论：在恰当的单能级区域内所得到的栓子的面积数据更加的可靠贴近于真实面积，而不是一味的降低 keV 来获取图像反而有可能得到的数据会有偏差，在降低 keV 时有可能会损失其他数据有可能是图像的噪声等，所以对比后得出 80-120keV 栓子检出率更接近于真实。

PO-3968

联合人工智能模型迭代重建和 70KV 超低管电压大幅度降低肺动脉 CTA 辐射剂量的应用研究

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目的：探讨联合人工智能模型迭代重建(AIIR)和 70KV 超低管电压在大幅度降低肺动脉 CTA (CTPA) 辐射剂量中的应用价值。方法：92 例行 CTPA 患者随机分成 A 组 (100KV 管电压, 52 例) 和 B 组 (70KV 管电压, 40 例)，A 组图像采用混合迭代重建 (HIR)，B 组图像采用 HIR 和 AIIR。评估两组辐射剂量。评估 A 组 HIR 图像、B 组 HIR 图像和 AIIR 图像背景噪声、肺动脉信噪比 (SNR) 和对比噪声比 (CNR)，对不同 CTPA 图像质量进行评分。结果：A、B 两组有效辐射剂量分别为 4.3±0.8mSv 和 1.3±0.2mSv，与 A 组相比，B 组辐射剂量下降 69.8%。A 组 HIR 图像、B 组 HIR 和 B 组 AIIR 图像背景噪声分别为 19.2±3.7Hu、28.1±4.4Hu 和 13.7±6.5Hu；B 组 AIIR 图像背景噪声显著低于 A 组 HIR 图像和 B 组 HIR 图像。A 组 HIR 图像上右肺动脉干信噪比 (SNR) 和对比噪声比 (CNR) 分别为 21.4±5.9 和 18.7±5.6，左肺动脉干 SNR 和 CNR 分别为 21.8±6.1 和 19.1±5.9；B 组 HIR 图像上右肺动脉干 SNR 和 CNR 分别为 19.3±3.5 和 17.1±3.4，左肺动脉干 SNR 和 CNR 分别为 19.3±3.4 和 17.1±3.2；B 组 AIIR 图像上右肺动脉干 SNR 和 CNR 分别为 45.8±14.6 和 41.0±13.4，左肺动脉干 SNR 和 CNR 分别为 46.1±14.7 和 41.2±13.7；B 组 AIIR 图像上右侧及左侧肺动脉干 SNR 和 CNR 均明显高于 A 组 HIR 图像和 B 组 HIR 图像。A 组 HIR 图像、B 组 HIR 图像和 B 组 AIIR 图像主观评分分别为 4.4±0.6、4.1±0.5 和 4.9±0.3，B 组 AIIR 图像主观评分显著高

于 B 组 HIR 图像和 A 组 HIR 图像。结论：联合 AIIR 和 70KV 超低管电压能够大幅度降低 CTPA 辐射剂量，且图像质量更优。

PO-3969

基于对比增强 CT 图像纹理建立三分类机器学习模型诊断甲状腺常见结节病变

基于对比增强 CT 图像纹理建立三分类机器学习模型诊断甲状腺常见结节病变、杨华、郭定波、刘柳恒、彭聪
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目的：本研究旨在探讨基于对比增强 CT 图像纹理特征的三分类机器学习模型在甲状腺癌、结节性甲状腺肿和甲状腺腺瘤的诊断中的价值。方法：回顾性分析了重庆市中医院 2016 年 1 月至 2021 年 3 月的 151 例甲状腺癌、结节性甲状腺肿和甲状腺腺瘤患者，共计 184 个结节。使用 IntelliSpace Discovery 3.0 (PHILIPS) 工作站 pyradiomics 插件提取了对比增强 CT 图像纹理特征的 1199 个参数。将数据按照 3 : 1 的比例分为训练集 (n=138) 和验证集 (n=46)。使用 lasso 算法对训练集中的特征进行降维，并采用支持向量机 (SVM) 机器学习模型进行分类。建立的模型在验证集上进行验证。绘制了三种结节作为阳性分类时的受试者工作特征曲线，并比较了三种模型曲线下面积 (AUC) 的差异。通过计算三种模型的宏平均 AUC 评估了模型的整体分类性能。结果：在验证集中，甲状腺癌、结节性甲状腺肿和甲状腺腺瘤的 AUC 分别为 0.80、0.88 和 0.33，宏平均 AUC 为 0.78。结论：基于对比增强 CT 图像纹理特征建立的三分类支持向量机模型在甲状腺癌、结节性甲状腺肿和甲状腺腺瘤的诊断中具备较好的诊断效能。

PO-3970

基于增强 CT 影像组学预测急性胰腺炎后糖尿病的发生

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目的：

探讨双期增强 CT 影像组学在预测急性胰腺炎后新发糖尿病的研究价值。

方法：

回顾性收集我院 2016 年-2018 年急性胰腺炎 (acute pancreatitis, AP) 的患者 145 例，其中 AP 后糖尿病(post-acute pancreatitis diabetes mellitus, PPDM-A)的患者 62 例，AP 后无糖尿病的患者 83 例，以 7 : 3 比例随机地将入组患者分为训练集和测试集，同期收集两组临床特征。分别勾画动静脉期胰腺实质并提取影像组学特征，采用方差阈值法、单变量选择法和最小绝对收缩和选择算子 (least absolute shrinkage and selection operator, LASSO) 实现影像组学特征筛选。通过受试者工作特征(receiver operating characteristic, ROC) 曲线评估模型预测性能，使用 Delong 检验比较模型之间预测效能，采用校准曲线和决策曲线评价模型预测效能。

结果：

动脉期模型训练集 AUC 为 0.845(95% CI:0.771~0.919)；静脉期模型训练集 AUC 为 0.792(95% CI:0.705~0.880)；动静脉期联合模型训练集 AUC 为 0.829(95% CI:0.751~0.906)；临床模型训练集 AUC 为 0.656(95% CI:0.545~0.767)；基于影像组学联合临床模型训练集 AUC 为 0.862(95% CI:0.793~0.931)。Delong 检验结果显示影像组学联合临床模型与临床模型在训练集和测试集之间的差异都具有统计学意义 ($P < 0.05$)。决策曲线显示在一定范围区间影像组学联合临床模型的临床实用性高，校准曲线显示影像组学联合临床模型与实际观察值的拟合度最好。

结论:

基于双期增强 CT 影像组学模型可以较准确地预测 PPDM-A, 并能为临床制定个性化治疗方案提供一定的参考价值。

PO-3971

基于增强 CT 的分类回归树模型对透明细胞肾细胞癌的诊断研究

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目标本研究旨在开发和验证一种基于增强 CT 的决策树诊断模型, 用于从肾脏实性小肿块中区分透明细胞肾细胞癌。方法这项回顾性多中心研究纳入了经病理证实的肾脏实性小肿块患者。两名放射科医生评估了所有肿瘤的 CT 影像特征, 并给出了诊断结果。使用单变量和多变量 logistic 回归分析筛选透明细胞肾细胞癌的独立危险因素, 并建立分类回归树诊断模型。来自三个中心的数据用作训练集(n=229), 来自一个中心的数据用作独立的外部验证测试集(n=81)。以曲线下面积(AUC)的平均值作为模型的评价指标。用 DeLong 检验比较不同模型的 AUC。结果 309 名患者中有 310 个肾脏实性小肿块。共有 71% (220/310) 的患者为透明细胞肾细胞癌。增强模式、早期暗皮质带、皮髓质期病变与正常皮质衰减比、非增强期病变与正常皮质衰减之比和性别用于建立 CART 模型。在测试队列中, CART 模型的 AUC 为 0.903 (95%CI 0.807, 0.974)。与两位放射科医生的评估结果相比, CART 模型具有更高的 AUC 值(0.903 vs 0.694, $P = 0.0005$, 0.903 vs 0.616, $P < 0.0001$)。结论分类回归树诊断模型可以从肾脏实性小肿块中区分透明细胞肾细胞癌, 其诊断效率优于经验丰富的放射科医生, 潜在地减少了不必要的活检次数。

PO-3972

基于 X 线图像的深度学习影像组学鉴别急慢性骨质疏松性椎体压缩性骨折: 一项多中心研究

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目的: 开发并验证基于 X 线图像的深度学习影像组学模型用于鉴别急慢性骨质疏松性椎体骨折。

方法: 三家医院共计 1076 个椎体, 使用 ResNet-50 模型结构进行迁移学习, 基于 RadImageNet 与 ImageNet 数据集分别进行预训练, 从 OVFs 患者 X 线侧位图像中提取深度学习和影像组学特征并融合, 以 MRI 显示椎体骨髓水肿作为急性 OVFs 的金标准, 使用受试者工作特性曲线, 评估八种机器学习鉴别诊断急慢性 OVFs 的效能, 结合临床资料构建诺谟图。使用 Delong 检验比较最佳模型的预测效能, 使用决策曲线分析 (DCA) 评价诺谟图的临床价值。

结果: 两组模型中最有效的机器学习算法均是 LightGBM。使用 Delong 检验, 在训练集中两组模型鉴别诊断急慢性 OVFs 的 AUC 分别为 0.979 和 0.972, 二者间差异无统计学意义。在内部验证集、外部验证集和前瞻性数据集中, 两组模型的 AUC 分别为 0.967vs0.629、0.886vs0.817、0.933vs0.661, 两两比较差异有统计学意义。将 RadImageNet 的预测模型与临床特征结合构建诺谟图, 训练集、内部验证集、外部验证集和前瞻性数据集的 AUC 分别为 0.981、0.974、0.895、0.902。使用 Delong 检验, 在训练集中融合特征模型和诺谟图的 AUC 分别为 0.979 和 0.981, 二者

间差异无统计学意义。在内部验证集、外部验证集和前瞻性数据集中，两组模型的 AUC 分别为 0.967vs0.974、0.886vs0.895、0.933vs0.902，两两比较差异有统计学意义。诺谟图在内部和外部验证集的预测效能有提升，在前瞻性数据集有所降低，DCA 显示该模型给患者带来更多益处。

结论：与 ImageNet 模型相比，RadImageNet 模型对于鉴别急慢性 OVFs 具有更高的诊断价值，结合临床资料构建的诺谟图能提高诊断效能。

PO-3973

基于超声瘤内和瘤周放射组学和临床特征构建的诺模图用于鉴别甲状腺结节良恶性：一项多中心研究

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目的：联合甲状腺结节超声瘤内和瘤周特征临床特征构建列线图，以准确区分良性和恶性甲状腺结节。

方法：回顾性分析 2016 年至 2022 年三家医院 817 名患者的 1076 个甲状腺结节。基于临床信息和超声特征构建临床特征模型（Clinic_Sig）。从结节内部和结节周围 1、3、5、7、9 体素(peri1v, peri3v, peri5v, peri7v, peri9v)中提取放射组学特征。使用 Pearson 相关和 LASSO 回归分析去除冗余特征。基于放射组学模型（Rad_Sig）和 Clinic_Sig 构建诺模图。测试集（医院 1：719 个结节）用于模型构建和两个验证集（医院 2：74 个结节，医院 3：283 个结节）用于评估模型。统计分析包括 t 检验、受试者工作特征（ROC）曲线、校准曲线和决策曲线（DCA）。

结果：Peri1v 在验证集 1 中达到了最高的 AUC（AUC=0.863）。因此，我们使用结节内部和结节周围 1 体素距离内提取的放射组学特征构建放射组学模型。联合放射组学模型与临床特征模型构建诺模图。诺模图的 ROC 曲线下面积（AUC）分别为 0.942、0.894 和 0.933，超过了其他模型。通过 DCA 证实了我们的模型的临床实用性。

结论：我们的研究表明，基于临床特征和超声瘤内和瘤周放射组学特征构建的诺模图对良恶性甲状腺结节的预测有很好的潜力。

PO-3974

结合临床超声语义特征和放射组学特征诊断恶性甲状腺结节的诺模图的开发和验证：一项多中心研究

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目的：本研究的目的是开发和验证结合临床超声语义特征、手工和深度迁移学习（DTL）放射组学特征的列线图，以区分良性和恶性甲状腺结节。

方法：选取 2016 年 1 月至 2022 年 12 月三个机构的 817 例患者共 1,076 个甲状腺结节。基于基本临床信息和超声特征，使用逻辑回归构建临床超声语义特征签名（C-US_sig）。通过手工和 DTL 功能提取超声图像，并使用斯皮尔曼相关分析和 LASSO 回归进行特征选择。手工签名（Hand_sig）

使用选定的特征和 LASSO 回归系数构建。DTL 模型的预测概率直接作为签名 (DTL_sig)。综合的诺模图综合了上述三个特征。开发集 (机构 1: 719 个结核) 用于模型构建, 而两个外部验证集 (机构 2: 74 个结核和机构 3: 283 个结核) 用于模型评估。统计分析, 包括卡方检验和 t 检验, 并使用决策曲线分析和校正曲线来评估模型的性能。

结果: 良、恶性结节在年龄、横径、纵径、形态、回声灶、回声强度、成分等方面存在显著差异。Hand_sig 分别由 45 个手工选择的特征构造。综合列线图显示最高性能, AUC 为 0.947 (95% 置信区间 [CI]: 0.931-0.963), 0.917 (95% CI: 0.825-1.000), 0.929 (95% CI: 0.899-0.959), 精度为 0.890、0.865 和 0.858。决策曲线分析表明综合诺模图具有最佳的临床应用价值。校准曲线表明所有模型的校准良好。

结论: 本研究中开发的综合列线图利用临床超声语义, 手工和 DTL 签名提供了一种有前途的方法, 用于准确和有效地诊断恶性甲状腺结节, 对患者的结局和医疗保健成本有潜在的影响。

PO-3975

基于 AI 技术模拟双源 CT 对肾结石诊断的低剂量初探

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目的: 本研究探索了利用人工智能软件的虚拟平扫功能与临床实际双能 CT 扫描检查进行比对, 而对患有泌尿系统结石的病患进行不同扫描剂量之间的比较。

方法: 2021 年 1 月至 2023 年 8 月期间, 4 名在本院接受过西门子 SOMATOM Force 双源 CT 扫描的患者, 均被连续纳入本回顾性研究。患者 1, 性别 男, 年龄 50 岁, 右肾小囊肿、左肾结石; 患者 2, 性别 男, 年龄 58 岁, 肝硬化、右肾结石; 患者 3, 男, 年龄 50 岁, 原发性肝癌、右肾结石; 患者 4, 性别 男, 年龄 55 岁, 双肾囊肿、左肾结石; 受试者均进行上腹部平扫加三期增强检查, 造影剂均静脉摄入碘海醇。检查结束后, 对疑似肾结石的患者利用软件进行后处理, 软件将显示 VNC 和碘图组合的融合图像, 可以交互更改两种数据的混合比率。本研究均采用无碘图的 VNC 虚拟平扫模式。通过对患者动脉期、静脉期、延迟期肝脏以及肾脏病变区域 ROI 进行测量, 发现三个期相中动脉期的 CT 值与平扫的 ROI 平均 CT 值最趋于一致。因此, 我们选取动脉期进行后续研究。接着, 将腹部动脉期的正常平扫及虚拟平扫薄层图像进行重建, 再导入到图像后处理工作站中进行后续分析。

结果: 将两幅图像同步为同一层面, 软件可以半自动勾画出肾结石的位置并给出结石的直径、面积、密度等信息, 结果显示两个病灶具有高度一致性。通过分析数据, 绘制直方图能够发现两个图像显示的病灶 CT 值重合度为 90% 且峰值接近, 可以直观地显示二者的相似性。

结论: 双源 CT (DSCT) 可在一次扫描中生成不同能量的数据信息, 且诊断灵敏度和病变发现率均高于常规 CT。利用双能量技术可以在引入造影剂后更好的诊断病变部位, 而后续采用人工智能虚拟平扫可达到几乎与正常平扫相同的病变显示效果, 有助于临床诊断。无需再进行额外的扫描, 可以减少辐射剂量、增加检查效率且降低检查费用。对泌尿系统结石的诊断与及时治疗有较好的临床应用前景。

PO-3976

基于深度学习重建的快速 T2WI 的影像组学模型诊断前列腺癌的价值

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目的：本研究旨在利用影像组学方法，探究基于深度学习重建的快速 T2WI 和常规 T2WI 相比其在诊断前列腺癌的价值。

材料与方法：本研究纳入了 85 例前列腺患者，其中 47 例前列腺癌患者，38 例前列腺炎患者。所有患者均接受了前列腺 MRI 扫描，包括轴位、冠状位、矢状位常规 T2WI 及深度学习 T2WI，轴位 T1WI，轴位 DWI 和 ADC。使用 Elastix 工具包将 DWI、ADC 及深度学习 T2WI 配准到常规 T2WI 上，并进行重采样，使层内分辨率统一为 0.5mm×0.5mm，层间分辨率为 3mm。从预处理的影像数据中提取了包括感兴趣区域 (ROI) 的 14 个形状特征，常规 T2WI、深度学习 T2WI、DWI 和 ADC 的灰度特征各 18 个及纹理特征各 75 个。使用 Z-Score 和 MinMax 标准化对特征进行归一化。通过皮尔森相关系数 (PCC) 对特征进行降维，使用特征递归消除 (RFE) 和 ANOVA 对降维后的特征进一步选择，除去对结果贡献小的特征。使用逻辑回归 (LR) 和支持向量机 (SVM) 作为分类器，对常规 T2WI、深度学习 T2WI、DWI 和 ADC 中提取到的特征分别进行建模。通过 5 折交叉验证选取最优模型参数。将每组挑选出的特征加上病灶外周带体积占比，病灶移行带体积占比，以及 4 个临床特征组合后再进行建模。最后，使用独立测试集对模型进行评估，评估指标包括准确度、灵敏度、特异度及 AUC 值。

结果：经比较，联合 1 个病灶外周带体积占比的特征，2 个深度学习 T2WI 中提取的特征，2 个 ADC 提取到的特征及 4 个临床特征，共 9 个特征经过 Z-Score 特征归一化后，使用 LR 建模，在测试集上准确率为 0.880，灵敏度为 0.786，特异度为 1.000，AUC 为 0.890。

结论：

基于深度学习重建的快速 T2WI 的影像组学模型可以较好地实现对前列腺癌和前列腺炎的影像诊断和预测，并为临床决策提供辅助信息，提高诊断的准确性和可靠性。

PO-3977

基于 CT 图像的深度学习模型在机会性骨质疏松症筛查中的骨密度分类与预测研究

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目的：探讨使用深度学习基于机会性 CT 扫描建立骨质疏松症分类和骨密度值预测模型的可行性，并使用独立测试集验证其泛化和诊断能力。

方法：本研究共纳入 1219 例机会性 CT 扫描，以 QCT 结果为参考标准。训练集：测试集：独立测试集的比例为 703:176:340，独立测试集的 340 例数据来自 3 家不同的医院和 4 台不同的 CT 扫描仪。使用 VB-Net 结构自动分割模型对松质骨进行分割，并使用 DenseNet 建立三分类模型和骨密度值预测回归模型。计算并评估模型的性能参数。

结果：ROC 曲线显示，对于训练集、测试集和独立测试集，将病例分类为“正常”、“骨量减少”和“骨质疏松症”的三类分类模型的平均 AUC 分别为 0.999、0.970 和 0.933。测试集的 F1 分数、准确率、精确度、召回率、精确度和特异性分别为 0.903、0.909、0.899、0.908、0.956，独立测试集的这

些值分别为 0.798、0.815、0.792、0.81、0.899。训练集、测试集和独立测试集的骨密度预测回归模型的 MAEs 分别为 3.15、6.303 和 10.257，RMSEs 分别为 4.127、8.561 和 13.507。R 平方值分别为 0.991、0.962 和 0.878。皮尔逊相关系数分别为 0.996、0.981 和 0.94，p 值均<0.001。预测值与骨密度值高度正相关，存在显著的线性关系。

结论：使用深度学习神经网络处理机会性 CT 扫描的身体图像可以准确预测骨密度值并进行骨密度三分类诊断，这可以减少专业骨密度测量带来的辐射风险、经济消耗和时间消耗，扩大骨质疏松症筛查范围，具有广泛的应用前景。

PO-3978

基于增强 MRI 的纹理分析术前预测肝细胞癌 Ki-67 状态的价值

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目的 探讨基于增强 MRI 的纹理分析术前预测肝细胞癌 Ki-67 状态的价值

方法 我们对 2014 年 1 月至 2022 年 5 月间接受肝切除术的 26 例患者进行了回顾性分析。根据免疫组化检测 Ki-67 状态，将其分为低 Ki-67（标记指数<10%）组（19 例）和高 Ki-67（标记指数≥10%）组（7 例）。所有患者均接受腹部 3.0T MR 检查（Signa HDxt，GE 医疗，美国），包括 T1WI、T2WI 及增强序列。放射科医生沿肿瘤边缘描绘肿瘤各层，然后使用 AK 软件（GE 医疗）提取 107 个纹理特征，包括一阶特征、形状特征、灰度共生矩阵（GLCM）、灰度依赖矩阵（GLDM）、灰度大小矩阵（GLSZM）、灰度游程矩阵（GLRLM）及邻域灰度差矩阵（NGTDM）。采用组内相关系数（interclass correlation coefficient，ICC）、Spearman 相关系数、梯度提升决策树（gradient boosting decision tree，GBDT）进行特征降维。建立 Logistic 回归模型，绘制受试者工作特征曲线（receiver operating characteristic curve，ROC）预测效能，计算 ROC 曲线下面积（area under the curve，AUC）、准确率、敏感度及特异度。

结果 得到 5 个最优纹理特征，包括 3 个一阶特征：方差、范围和总能量，一个 GLRLM 特征：短期低灰度强调，一个形状特征：平坦性。建立 Logistic 回归模型来预测肝细胞癌 Ki-67 状态的 AUC、准确性、敏感性和特异性均为 0.895、84.60%、84.20%和 85.70%。

结论 通过勾画整个肿瘤区域，提取纹理特征，可以更客观、更全面地反映整个肿瘤的异质性。本研究采用增强 MRI 纹理分析术前预测肝细胞癌 Ki-67 状态，获得 5 个最优纹理特征，AUC 值为 0.895，表明基于增强图像纹理分析，具有准确预测肝细胞癌 Ki-67 状态的优势，为临床治疗方案的选择提供了重要的成像参考。

PO-3979

基于弥散加权成像的纹理分析术前预测肝细胞癌 Ki-67 状态的价值

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目的 探讨基于弥散加权成像（diffusion-weighted imaging，DWI）的纹理分析术前预测肝细胞癌 Ki-67 状态的价值

方法 我们对 2014 年 1 月至 2022 年 5 月间接受肝切除术的 23 例患者进行了回顾性分析。根据免疫组化检测 Ki-67 状态, 将其分为低 Ki-67 (标记指数 $\leq 15\%$) 组 (9 例) 和高 Ki-67 (标记指数 $>15\%$) 组 (14 例)。所有患者均接受腹部 3.0T MR 检查 (Signa HDxt, GE 医疗, 美国), 包括 T1WI、T2WI 及 DWI 序列。放射科医生沿肿瘤边缘描绘肿瘤各层, 然后使用 AK 软件 (GE 医疗) 提取 107 个纹理特征, 包括一阶特征、形状特征、灰度共生矩阵 (GLCM)、灰度依赖矩阵 (GLDM)、灰度大小矩阵 (GLSZM)、灰度游程矩阵 (GLRLM) 及邻域灰度差矩阵 (NGTDM)。采用组内相关系数 (ICC)、Spearman 相关系数、梯度提升决策树 (gradient boosting decision tree, GBDT) 进行特征降维。建立 Logistic 回归模型, 绘制受试者工作特征曲线 (receiver operating characteristic curve, ROC) 预测效能, 计算 ROC 曲线下面积 (area under the curve, AUC)、准确率、敏感度及特异度。

结果 得到了 7 个最优纹理特征, 包括一个一阶特征: 峰度, 两个 GLCM 特征: 自相关和聚类突出, 一个 GLRLM 特征: 运行方差, 两个 GLSZM 特征: 小区域强调和区域百分比, 一个 NGTDM 特征: 强度。建立 Logistic 回归模型预测 AUC, Ki-67 状态的准确性、敏感性和特异性为 0.968[95%CI (0.902,0.990)]、91.30%、92.90%和 88.90%。

结论 通过绘制整个肿瘤区域的纹理分析, 获得纹理参数, 可以更客观、更全面地反映整个肿瘤的异质性。本研究采用 DWI 图纹理分析预测术前 HCC 的 Ki-67 状态, 获得 7 个最优纹理参数, AUC 值为 0.968, 基于 DWI 图纹理分析, 具有准确预测肝癌 Ki-67 状态的优势, 为临床治疗方案的选择提供了重要的成像参考。

PO-3980

基于 MRI 影像组学的机器学习模型预测前列腺癌的 Ki67 表达与 Gleason 分级分组

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背景与目的: Ki67 表达与格林森分级分组 (GGG) 均为前列腺癌 (PCa) 侵袭性判定的重要指标, 两者联合是长期预后评估的最佳组合。本研究旨在探寻一种基于磁共振 (MR) 影像组学的机器学习模型, 以期准确预测 PCa 的 Ki67 表达和 GGG, 实现病理指标的无创预测, 为临床提供更全面的信息。

材料和方法: 回顾性纳入经病理证实为 PCa 患者 122 例, 术前 MRI 及病理资料 (Ki67 与 GGG) 完整清晰。使用 AK 软件手动分割病灶感兴趣区, 并提取影像组学特征。基于脂肪抑制 T2 加权成像 (T2WI)、弥散加权成像 (DWI) 及表观扩散系数 (ADC) 和不同算法 (逻辑回归 (LR)、支持向量机 (SVM)、随机森林 (RF) 和 K 近邻 (KNN)) 构建预测 Ki67 和 GGG 的机器学习模型。采用受试者工作特征曲线 (ROC) 评价不同模型的预测性能, 并显示最佳模型特征的详细组合及权重最高的特征。采用 Spearman 检验分析 Ki67 和 GGG 的相关性, 探索同时预测 Ki67 和 GGG 的最佳模型, 计算其准确性, 并对比分析两联合模型的特征组成。

结果: 预测 Ki67 表达性能最佳的机器学习模型为 LR_ADC+T2 (曲线下面积 (AUC) =0.8882, 灵敏度=0.7636, 特异度=0.8657), 其中特征 ADC_kompet-LHH_firstorder_Maximum 权重最高。SVM_DWI+T2 (AUC = 0.9248, 灵敏度=0.8588, 特异度=0.7838) 预测 GGG 性能最佳, 特征 DWI_wavelet HLL_glcmm_SumAverage 权重最高。Ki67 和 GGG 呈正相关 ($r=0.382$, $P<0.001$)。LR_ADC+DWI (准确率=0.6230) 为同时预测 Ki67 和 GGG 准确性最高的模型, 最佳组合模型序列来源及比例一致且小波特征及纹理特征比例均较高, 但特征类型相似性较低。

结论: 本文所构建的基于 MRI 影像组学机器学习模型能准确预测 PCa 的 Ki67 表达和 GGG, 实现了病理指标的无创预测, 以识别惰性与侵袭性 PCa。

PO-3981

血清总胆汁酸与早期复发肝细胞癌的影像组学特征相关性研究

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目的: 评估血清总胆汁酸与肝切除术后早期复发的肝细胞肝癌患者影像组学特征的相关性。

材料与方法: 回顾性收集 60 例接受肝切除术的肝细胞癌患者, 根据术后两年内的定期影像随访判断肝内是否有新发癌灶或转移, 将患者分为早期复发组 (n=32) 和早期未复发组 (n=28)。记录患者肝切除术前的血清总胆汁酸水平。使用 ITK-SNAP 软件在 T2WI 图像上逐层手动勾勒肿瘤获得三维容积感兴趣区。使用 AK 软件提取一阶影像组学特征, 包括 MaxIntensity、MeanValue、MedianIntensity、MinIntensity、Percentile10-Percentile90 (以百分之 5 为间隔)、Percentile95、Quantile0.25、Quantile0.5、Quantile0.75、Energy、Entropy、kurtosis 及 skewness。使用 Mann-Whitney U 检验比较早期复发组和未复发组间血清总胆汁酸的差异, 通过 Spearman 检验或 Pearson 相关性检验评估血清总胆汁酸与影像组学特征的相关性。

结果: 早期复发组 [7.55 (4.85, 14.45) $\mu\text{mol/L}$] 的血清总胆汁酸显著高于未复发组 [5.75 (3.825, 7.075) $\mu\text{mol/L}$] ($P=0.006$), 血清总胆汁酸与早期复发具有显著相关性 ($r=-0.357$, $P=0.005$)。血清总胆汁酸与 Percentile25、Percentile40、Percentile45、Percentile5、Percentile50、Quantile0.25、Quantile0.5 具有相关性 ($r=-0.351$ 、 -0.356 、 -0.354 、 -0.354 、 0.351 、 -0.351 、 -0.351 , $P<0.05$)。

结论: 胆汁酸代谢水平与肝细胞癌患者肝切除术后的早期复发风险相关, 血清总胆汁酸与 T2WI 影像组学特征具有相关性。

PO-3982

基于多模态影像组学的机器学习模型预测胰腺癌血管侵犯及辅助手术决策的研究

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目的: 探讨基于多模态影像组学的机器学习模型预测胰腺癌血管侵犯及辅助手术决策的价值。

方法: 回顾性分析 2011 年 1 月至 2023 年 5 月首都医科大学附属北京朝阳医院收治的 188 例经手术病理确诊的胰腺癌患者的临床、病理及术前 CT 影像资料, 其中存在血管侵犯 73 例 (38.8%), 需要手术的有 90 例 (47.9%), 所有入组患者按 8: 2 的比例划分训练集和验证集, 采用基于 3D CT 图像以及多模态数据联合分析的方法判断胰腺癌血管是否侵犯及是否需要进行手术。对原始 3D CT 图像进行预处理后使用深度学习网络, 对其进行特征提取, 联合血液检验特征及个人基础信息得到的三种模态特征, 将其级联后使用多层线性层对特征进行整合, 最终使用血管侵犯分类器和手术分类器预测胰腺癌血管侵犯及是否需要进行手术。

结果: 训练集中包含 150 例病患, 病理证实存在血管侵犯的有 59 例 (39.3%), 需要手术的有 70 例 (46.7%)。验证集中包含 38 例病患, 存在血管侵犯的有 14 例 (36.8%), 需要手术的有 20 例 (52.6%)。基于三种数据特征构建 3 个机器学习模型中, Swin-B 模型 AUC 优于 R(2+1)D、UniformerV2 模型, 差异有统计学意义 (均 $P<0.05$)。与常规影像特征的诊断效能比较, Swin-B 模型在验证集中预测血管侵犯和是否手术具有更高的 AUC (0.869 vs 0.786), 差异具有统计学意义 (均 $P<0.05$)。

结论: 基于多模态影像组学的机器学习模型可实现胰腺癌血管侵犯的术前预测以及辅助手术决策, Swin-B 模型较常规影像特征的诊断效能更高。

PO-3983

基于术前增强 CT 构建胰腺癌淋巴结转移的影像组学预测模型朱骊文^{1,2}、居胜红¹

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研究目的：胰腺导管腺癌（PDAC）恶性程度极高，淋巴结转移是其预后不良的关键因素，新辅助化疗被证实可改善淋巴结转移患者的预后，因此术前 LN 状态评估至关重要。本研究旨在基于术前增强 CT 构建胰腺癌淋巴结转移的影像组学预测模型，并探究模型对患者的预后预测价值。

研究方法：本研究回顾性收集 3 个中心行根治性切除且术前未进行新辅助治疗的胰腺癌患者，所有患者均收集临床资料、术前增强 CT 图像及随访预后资料。将研究对象按中心分成两个数据集：中心 1+中心 2 作为训练集和内部验证集，中心 3 作为外部验证集。两名放射科医生使用 ITK-SNAP 软件于动脉期手动勾画胰腺癌原发病灶，并以肿瘤边缘向外扩展 5mm 生成瘤周区域，然后利用 Pyradiomics 对肿瘤及瘤周 ROI 提取影像组学特征，使用最小绝对收缩和选择算法（LASSO）进行降维并提取关键特征，通过 Feature Explorer（FAE）软件构建淋巴结转移预测模型，基于 AUC 值评价模型的预测性能，最后通过 Kaplan-Meier 生存分析方法及 log-rank 检验评价模型对患者的生存预后预测性能。

结果：本研究共纳入 3 个中心 292 例患者[64 岁(55–72 岁); 114 女]，184 名患者病理证实存在淋巴结转移。基于动脉期原发肿瘤及瘤周区域构建的影像组学预测模型在训练集、内部验证集及外部验证集 AUC 值分别为 0.83, 0.78, 0.74。在外部验证集中，基于最大约登指数作为截断值，模型预测术前淋巴结转移高风险组和低风险组患者的中位 OS 分别是 8 个月和 19 个月 ($P < 0.001$)。

结论：基于胰腺癌原发病灶及瘤周区域的动脉期影像组学特征构建的模型，能较准确预测胰腺癌患者术前是否发生淋巴结转移，同时对患者生存预后具有潜在预测价值。

PO-3984

**影像技术实习生结合人工智能辅助诊断对肺结节
Lung-RADS 分级的应用研究**

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摘要：目的 重点研究影像技术实习生结合人工智能在肺结节 Lung-RADS 分级的应用意义。方法 选取 2022 年 6 月至 2023 年 6 月在南通市第一人民医院医学影像科实习的 6 名影像技术专业学生和在南宁市第一人民医院新参加工作的 6 名初级技师，按照教学培训方式不同分成常规培训组和 AI 辅助组。其中，常规培训组通过影像诊断医师负责对入组人员针对肺结节进行为期 3 月的理论培训和阅片技能指导，再通过理论及阅片考核，了解课程学习效果。AI 辅助组在此培训基础 1 月后针对人工智能进行使用的相关培训，再次进行理论及阅片考核，并通过问卷调查表了解两组的教学满意度。结果 AI 辅助组的理论和技能考核成绩都明显高于常规培训组 ($P < 0.05$)；AI 辅助组的教学满意度也高于常规培训组 ($P < 0.05$)。结论 采用人工智能教学模式，能够显著提升影像技术实习生的综合能力，大大提升教学质量和效率，具有极其广阔的应用前景。

PO-3985

深度学习影像组学列线图预测胶质瘤患者 IDH 突变状态的一项多中心的研究

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摘要 目的 胶质瘤是颅内最常见的原发性恶性肿瘤之一，IDH 突变状态是与其预后关系最为密切的基因亚型，准确无创预测 IDH 突变状态仍然具有挑战性。我们旨在基于多模态 MRI 图像构建深度学习影像组学列线图模型，评估其在预测胶质瘤患者 IDH 突变状态的诊断效能，并进一步探索其临床实用价值。方法 回顾性纳入来自中国两个中心的总共 260 例胶质瘤患者的术前 T2WI、T1 增强图像，将 I 中心的数据按 7:3 随机分为训练队列和内部测试队列，II 中心的数据作为外部测试队列。将图像进行预处理后，分割整个肿瘤区域（包含肿瘤核心及瘤周水肿），基于 T1 增强、T2WI 图像融合深度学习和影像组学特征，利用 Logistic 回归分析筛选特征并构建深度学习影像组学列线图模型以预测胶质瘤 IDH 突变状态。使用准确性（Accuracy, ACC）、ROC 曲线下面积（Area under the curve, AUC）评估模型的诊断效能。此外，我们在内部测试队列上使用生存分析评价了预测模型的临床实用价值。结果 深度学习影像组学列线图模型在外部验证队列的 AUC、ACC 分别为 89%、92%。并且我们的研究结果表明深度学习影像组学模型与胶质瘤患者不同基因亚型总生存期显著相关。结论 深度学习影像组学列线图模型在术前预测胶质瘤 IDH 突变状态方面展现出了出色的诊断效能，可为胶质瘤患者临床个体化治疗提供可靠的依据。

PO-3986

基于多模态 MRI 的 3D-EfficientB2 卷积神经网络预测脑胶质瘤 IDH 突变状态：一项多中心的研究

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目的 胶质瘤是最常见的脑内原发性恶性肿瘤，IDH 突变状态对于临床治疗方案的确定和患者的分层管理以及预后具有重要意义，但术前 IDH 基因状态检测仍然具有挑战性。我们研究旨在分别构建并验证 3D-EfficientB2 卷积神经网络模型以预测脑胶质瘤 IDH 突变状态，以探究 3D-EfficientB2 卷积神经网络模型临床应用价值的一项多中心的研究。方法 回顾性纳入 914 例胶质瘤患者的术前多模态 MRI 图像，包括 T2WI 图像，T1WI 图像，T1-CE 图像以及 T2-Flair 图像，其中包含兰州大学第二医院 704 例和 TCIA 数据库下载的 210 例，其中男性共 525 例，女性 389 例，平均年龄 48 ± 2.5 岁，将数据按（7:3）随机分为训练集、测试集；并前瞻性的在兰州大学第二医院收集独立的外部测试集。将图像进行预处理后，构建 3D-EfficientB2 深度学习模型，并使用准确性（Accuracy, ACC）、ROC 曲线下面积（Area under the curve, AUC）评估 3D-EfficientB2 深度学习模型的预测效能。

结果：基于 3D-EfficientB2 深度学习模型在预测胶质瘤 IDH 突变状态的效能 在外部测试集及前瞻性的独立测试集的 ACC 分别为 90.8、82.2%，其 AUC 分别为 94.6%、83.7%。

结论：基于多模态 MRI 的 3D 卷积神经网络预测脑胶质瘤 IDH 突变状态的诊断效能较高，与其它深度学习模型相比如 3D-Resnet 相比诊断效能均表现更优，可作为辅助放射科医师提高诊断效能的工具，为临床更合理的制定个性化诊疗方案提供帮助。

PO-3987

基于常规 MRI 图像的 3D 卷积神经网络预测脑胶质瘤分级： 一项多中心的研究

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目的 胶质瘤是最常见的脑内原发性恶性肿瘤，术前分级对于临床治疗方案的确定和患者的分层管理具有重要意义，但准确分级仍然具有挑战性。我们的研究旨在分别构建并验证 ResNet101、DenseNet 卷积神经网络模型以预测脑胶质瘤分级，并与放射科医师诊断效能进行比较，以探究模型临床应用价值的一项多中心的研究。**方法** 回顾性纳入 914 例胶质瘤患者的术前 T2WI 图像，其中包含兰州大学第二医院 704 例和 TCIA 数据库下载的 210 例，将这些数据按（7:3:1）随机分为训练集、内部测试集和外部测试集。将图像进行预处理后，分别构建基于 3D 的 ResNet101、DenseNet 深度学习模型，使用准确性（Accuracy, ACC）、ROC 曲线下面积（Area under the curve, AUC）以及损失函数（Loss）曲线对模型效能进行评估，并分别和放射科医师就诊断效能进行比较。**结果** ResNet101、DenseNet 模型以及放射科医师在内部测试集的 ACC 分别为 87.5%、83.4%、78.6%，AUC 分别为 89.6%、81.3%、76.2%；在外部测试集的 ACC 分别为 84.8%、78.2%、73.9%，AUC 分别为 80.6%、75.3%、71.5%。**结论** 我们的研究表明，基于常规 T2WI 序列多中心的不同深度学习模型相较于放射科医师，其诊断效能均表现更优，可作为辅助放射科医师提高诊断效能的工具，为临床更合理的制定个性化诊疗方案提供帮助。

PO-3988

基于 APTw 生境分析的影像组学模型预测 IDH 突变

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目的：评估 APTw 生境分析的影像组学模型预测胶质瘤 IDH 突变状态的诊断效能，并比较其与常规影像组学模型预测效能的差异。

方法：回顾性纳入分别来自兰州大学第二医院和北京天坛医院共 152 例胶质瘤患者（IDH 野生型 90 例，IDH 突变型 62 例）。从普通 APTw 的 ROI 及采用无监督聚类分析的 APTw 生境分析 ROI 中提取基于 APTw 的图像特征 1873 个，使用最小绝对收缩和选择算子及 Pearson 相关算法选择特征，随后将数据按照 8:2 随机拆分为训练集（n=110）及测试集（n=42）；最后基于常规 ROI 构建的影像组学模型与基于生境 ROI 构建的影像组学模型相比较，并使用受试者工作特征（Receiver operating characteristic, ROC）曲线、准确性（Accuracy, ACC）等指标评估模型在训练队列及测试队列的模型效能。**结果：**基于 5 个常规影像组学特征及 4 个生境特征构建的影像组学模型，在训练集及测试集预测胶质瘤 IDH 突变状态的准确率分别为 82.3%、89.5%，ROC 曲线下面积分别为 81.3%、91.5%。**结论：**基于 APTw 生境分析的影像组学模型可以在术前无创预测胶质瘤 IDH 突变状态，其效能高于常规 ROI 影像组学模型，生境分析影像组学模型具备向临床应用推广的潜在价值。

PO-3989

利用多参数 MRI 结合深度学习及影像组学对 上皮性卵巢癌盆腔上腹膜转移进行术前评估

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目的：盆腔上腹膜是上皮性卵巢癌（EOC）最常见的转移部位。准确的术前评估关乎患者个体化治疗与生活质量。本研究旨在开发和验证基于多参数 MRI 且结合深度学习及影像组学的具有可解释性的预测模型，以评估 EOC 盆腔上腹膜转移风险。

方法：回顾性纳入五家机构 411 例 EOC 患者（腹膜转移 213 例，未转移 198 例）。患者均完成术前 MRI 与肿瘤减灭手术。其中一中心数据为外部验证集；其余数据 3:1 划分为训练集与内部验证集。采用 T2 图像定界肿瘤 ROI，并将 DWI 和 ADC 图像配准至 T2 加权图像。各参数图像中分别提取 1230 个影像组学特征，涵盖一阶、纹理和小波变换特征。经单因素分析及 LASSO 筛选，应用 10 次 10 折交叉验证，频率超过 50% 的特征纳入影像组学模型。深度学习模型使用 ResNet50 神经网络，将 T2、DWI 和 ADC 图像的病灶最大横断面进行前融合输入。结合单因素及多因素 logistic 回归分析构建了临床模型，并采用后融合方法将三种模型进行融合成联合模型。所有模型均采用 10 折交叉验证并行内、外部验证。SHAP 和 Grad-Cam 算法评估模型的可解释性。使用 ROC 曲线评估诊断性能、DeLong 检验对 ROC 曲线下面积进行比较、决策曲线分析模型的临床应用价值。

结果：10 折交叉验证结果显示，联合模型具有最佳的诊断表现（平均 AUC=0.862），且具有较高稳定性（AUC 标准差=0.066）。联合模型在内部和外部验证集中的 AUC 最佳，分别为 0.832 (95% CI: 0.726, 0.917) 和 0.867 (95% CI: 0.784, 0.931)。在内部验证集中，联合模型显著优于影像组学、深度学习及临床模型（P 分别为 0.016、0.001 及 0.037）；在外部验证集中，显著优于临床模型（P=0.033）。根据校准和决策曲线，联合模型具有最佳分类准确性和临床应用价值。

结论：本研究成功开发和验证了综合多参数 MRI、深度学习和影像组学的联合模型，有效评估了上皮性卵巢癌患者的盆腔上腹膜转移风险，有潜力为上皮性卵巢癌患者的术前评估提供了一种高可靠性的新方法，有望促进对这类患者的个体化治疗策略的制定。

PO-3990

一个融合 MRI 放射组学和深度学习特征的融合模型用于预测 IDH 突变的高级别星形细胞瘤中 ATRX 突变状态： 一项多中心研究

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目的 本研究旨在开发一种临床-影像融合模型，将术前 MRI 放射组学和深度学习 (Deep learning, DL) 特征与临床变量相结合，以预测异柠檬酸脱氢酶 (Isocitrate dehydrogenase, IDH) 突变高级别星形细胞瘤患者的 α -地中海贫血/智力低下 X 连锁 (Alpha-thalassemia/mental retardation X-linked, ATRX) 状态。**方法** 对来自三个中心的 234 例 IDH 突变高级别星形细胞瘤患者 (120 例 ATRX 突变型, 114 例 ATRX 野生型) 进行回顾性分析。提取来自不同区域 (水肿、肿瘤和整体病变) 的放射组学和 DL 特征，以通过组合不同区域中的不同特征来构建多个影像模型，用于预测 ATRX 状态。然后选择一个最佳影像模型，利用其特征和线性系数计算影像评分。最后，结合影像评分和临床变量建立融合模型。通过比较接收者操作特征曲线 (receiver operating characteristic, ROC)、诺模图的构建、校准曲线、决策曲线和临床应用曲线，评估融合模型的性能和应用价值。**结果** 由整体病变区的放射组学和 DL 特征构建的整体混合模型被确定为最佳影像模型。与最佳影像模型 (0.966、

0.916、0.936) 和临床模型 (0.677、0.641、0.772) 相比, 融合模型显示出最佳预测性能, 训练集的 AUC 为 0.969, 验证集的 AUC 为 0.956, 测试集的 AUC 为 0.949。**结论** 基于术前 MRI 的临床-影像融合模型能有效预测 IDH 突变高级别星形细胞瘤的 ATRX 突变状态, 有望帮助患者在治疗前制定更有效的治疗策略

PO-3991

基于 multi-scale CNN 的脑 CT 图像运动校正 重建算法的临床验证研究

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目的 脑 CT 作为一种无创获取脑组织结构信息的快速成像方式, 已广泛用于脑出血、中风、脑外伤等各种脑疾病的诊断中。患者由于急性脑血管病变、外伤等, 意识不清的状态往往容易出现不受控制的头部运动, 从而产生运动伪影, 影响图像的诊断效果。因此, 抑制图像的运动伪影极为重要。本文评价了一种基于 multi-scale CNN 的运动校正重建算法在脑部 CT 中的临床表现。

方法 本回顾性研究纳入了 53 例在第一次扫描中发现运动伪影的脑 CT, 并立即进行了没有运动的重新扫描。重新扫描的图像用常规迭代重建 (IR) 算法重建 (参考组), 而第一次扫描的图像则用 IR (运动组) 和运动校正重建算法 (MC 组) 重建。两位放射科医生被要求三个解剖位置 (后窝、侧脑室体、半卵圆体), 将感兴趣区域 (ROI) 置于灰质和白质的区域上。测量并比较多个定量指标, 包括标准差、信噪比 (SNR)、对比度-噪声比 (CNR)、平均平方误差 (MSE)、峰值信噪比 (PSNR)、结构相似性指数 (SSIM) 和相互信息 (MI)。主观评估指标包括主观噪声、锐度、伪影和总体诊断可接受性, 采用李克特 5 分制评分 (1 = 差; 5 = 优秀), 由两名医生独立审阅, 将运动组、MC 组和参考组的图像按随机顺序混合, 审查间隔至少 2 周, 以尽量减少医生的偏见。

结果 与运动组相比, MC 组的 SNR 和 CNR 明显增加。与运动组相比, MC 组的 MSE、PSNR、SSIM 和 MI 分别提高了 44.1%、15.8%、7.4% 和 18.3% (均 $P < 0.001$)。MC 组的主观评分普遍高于运动组 ($P < 0.05$)。总体诊断可接受性从运动组的 38.68% 提高到 MC 组的 96.23%。

结论 本研究使用的基于 multi-scale CNN 的运动校正重建算法, 在减少运动伪影和提高图像质量方面具有出色的能力。伪影和图像质量的改善, 有助于提高脑 CT 检查的成功率, 避免了不必要的重新扫描, 增加诊断的信心。但本研究仍有几点局限性。首先, 本研究的验证是针对重新扫描的参考图像进行的, 并假设它足够准确。第二, 需对儿科病人进行进一步验证, 可能有更大的价值。第三, 基于人工智能的运动校正重建算法是否适用于剧烈的物理运动仍需要进一步研究。

PO-3992

用于区分国际神经母细胞瘤风险组分期系统的高风险和低风险 患者的 18 F-FDG PET/MRI 影像组学列线图

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目的: 开发和验证 18 F-FDG PET/MRI 放射组学诺模图, 用于区别国际神经母细胞瘤风险组 (INRG) 分期系统 (INRGSS) 的高风险和低风险患者。

方法: 回顾性分析 124 名神经母细胞瘤患者的 18F-FDG PET/MRI 影像学资料, 分为训练集 ($n = 93$) 和验证集 ($n = 31$)。从 PET 图像和 T2WI 图像中提取影像组学特征, 计算影像组学评分 (Rad score)。然后采用单因素和多因素 logistic 回归分析筛选出独立的临床因素并构建临床模型。基于

Rad 评分和独立的临床因素开发了放射组学列线图。临床模型、Rad 评分和列线图的性能通过接受者操作特征 (ROC) 曲线、校准曲线和决策曲线分析 (DCA) 进行评估。

结果: 选择了八个影像组学特征来构建组学模型。患者年龄、INRG 分期、MTV、TLG 和 Rad 评分显示高风险和非高风险患者之间存在显著差异。结合 Rad 评分和上述临床因素的放射组学列线图显示了区分高风险和非高风险的良好预测价值,在训练集和验证集中 AUC 值分别为 0.973 和 0.969。校准曲线显示放射组学列线图具有拟合优度, DCA 证明放射组学列线图在临床上是有益的。结论: 结合 Rad 评分和临床因素的放射组学列线图可以很好地预测 INRGSS 的高危和非高危患者。可能有助于临床实践中的疾病随访和管理,辅助神经母细胞瘤的个体化、精准化治疗。

PO-3993

基于 Mimics 三维重建支气管树及 影像组学在慢性阻塞性肺疾病中的早期诊断价值

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背景资料: 慢性阻塞性肺疾病 (COPD) 作为慢性气道疾病之一,其高发病率、高致死率已引起全球关注。COPD 不仅严重影响患者生活质量,而且给患者家庭带来沉重的经济负担。早期准确地诊断并加以干预是 COPD 患者取得良好预后的重要前提。本研究基于 Mimics 软件在吸气相三维重建支气管树结合肺气管树的影像组学特征,评价气道树影像组学模型对慢阻肺患者的早期预测价值。

方法: 本研究回顾性纳入了 2019 年 12 月至 2021 年 6 月在复旦大学附属华东医院就诊并完成胸部 CT 及肺功能检查的 87 例患者为研究对象,根据吸入支气管舒张药后 FEV1/FVC 是否小于 70%,或者 FEV1 是否小于 80%预计值分为 COPD 组 48 人,正常对照组 39 人。利用 Mimics 软件对患者吸气相 CT 进行支气管树三维重建。以 6:3:1 的比例分为训练集和验证集和测试集对支气管树进行影像组学特征值提取,并用随机森林模型进行训练和测试,采用 ROC 曲线评价预测效能。

结果: 共提取出 107 项影像组学特征,其中 69 个组学特征具有统计学意义($P < 0.05$),进行最大相关最小冗余 (mRMR) 算法后对剩余的 20 个特征进行 LASSO 分析,最终筛选出 3 个最优影像组学特征用于预测诊断 copd 患者,模型中选择的影像组学特征分别为能量 (Energy)、最小值 (Minimum) 及均匀性 (Uniformity)。基于支气管树影像组学特征建立的随机森林模型在训练集的 AUC 为 0.95,准确度、敏感度、特异度分别为 93.7%、86%、90%,测试集的 AUC、准确度、敏感度、特异度均到 1。

结论: 基于支气管树影像组学特征建立的随机森林模型可以对 COPD 患者进行早期诊断。

PO-3994

联合影像组学及深度学习在 CT 平扫上自动鉴别肺挫伤与 社区获得性肺炎

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目的: 建立并验证用于自动鉴别肺挫伤与社区获得性肺炎的人工智能模型。

方法: 回顾性收集重庆大学附属中心医院 2016 年 7 月至 2022 年 4 月期间收治的肺挫伤患者 641 名和细菌性肺炎患者 721 名,按照 8:2 的比例随机分为训练集和验证集。在联影智能一站式科研平台上使用 U-Net 网络演化的 VB-net 网络在胸部 CT 平扫上自动进行对肺炎和肺挫伤病灶的识别、分割,并由两名高年资主治医师对分割的结果进行审核及校正。通过 Research Portal Vx. X 在基于

胸部 CT 建立的肺部病灶自动分割框架结构上从每个患者的感兴趣区域 (Region of interest, ROI) 中, 自动提取 2264 个影像组学特征。使用 k-best 算法、LASSO 算法对特征进行选择。在训练集上采用四个独立的机器学习分类器 (决策树、逻辑回归、随机森林和支持向量机 (Support Vector Machines, SVM) 进行训练, 并在验证集上进行验证, 采用受试者工作特性曲线下面积 (Area under the curve, AUC)、灵敏度、特异性和准确性指标评价模型性能。

结果: 每位患者共纳入 2264 个影像组学特征, 降维后, 发现 10 个特征与肺挫伤相关, 基于 SWM 模型表现出较好的性能, 在训练集上的 AUC、灵敏度及特异度、准确性分别为 0.998、0.979、0.982、0.980, 在测试集上的 AUC、灵敏度及特异度、准确性分别为 0.891、0.750、0.860、0.808。DeLong 检验表明, SWM 模型在所有模型中精度最高。校准曲线显示, 预测病人合并有肺挫伤发生风险的模型结果具有良好的一致性和稳定性。临床决策曲线显示 SWM 模型呈显著正效应, 患者获益概率范围广, 具有临床实用价值。

结论: 基于 CT 平扫肺部的影像组学特征构建的 SVM 模型表现最佳, 可作为评估外伤病人合并肺裂伤的辅助诊断工具。该机器学习模型可以自动识别、分割和提取肺部病灶的影像组学特征, 实现肺挫伤和社区获得性肺炎的自动鉴别。

PO-3995

基于 T2 加权 MRI 瘤周联合瘤内影像组学模型在术前预测上皮性卵巢癌 FIGO 分期的价值

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目的: 国际妇产科联合会 (FIGO) 分期对上皮性卵巢癌 (EOC) 的治疗选择和预后评估具有重要意义, 但传统的影像学评估方法在术前预测分期上仍有局限性。本研究探讨了基于 T2 加权 MRI 瘤周和瘤内影像组学模型预测上皮性卵巢癌 FIGO 分期的准确性与价值。

方法: 本回顾研究共纳入苏州市立医院 (中心一) 及苏州大学附属第一医院 (中心二) 在内的 189 例 EOC 患者, 其中 87 例为 FIGO I/II 期, 102 例为 FIGO III/IV 期。所有患者均接受了术前 MRI 检查及标准的癌细胞减灭手术。中心一的患者数据用于模型训练, 而中心二的数据作为外部验证集。基于肿瘤边界勾画感兴趣区域 (ROI), 并分别向外扩展 2mm、4mm、6mm、8mm 和 10mm 以获得多重瘤周信息。从瘤内 ROI 及各瘤周区域分别提取 1230 个影像组学特征。使用单因素分析、相关性分析、mRMR 及 LASSO 算法进行特征筛选。比较各瘤周外扩范围的影像组学模型在训练集中的效能, 以选择最优的外扩范围构建瘤周模型; 并进一步构建瘤内模型及临床模型。通过 nomogram 将三者结合构建联合模型。将各模型应用于外部验证集, 并通过受试者工作特征曲线 (ROC) 分析评估诊断性能。采用 DeLong 检验对比模型之间诊断效能的差异。

结果: 瘤周影像组学模型在 2mm 的外扩范围下表现最优, 其训练集 AUC 达 0.840。在外部验证集中, 联合模型具有最佳的准确率 (0.742) 及特异性 (0.808)。此外, 联合模型的 AUC 显著优于瘤周模型 (0.837 vs. 0.668, $P = 0.008$) 及临床模型 (0.837 vs. 0.729, $P = 0.040$); 瘤内模型的 AUC 显著优于瘤周模型 (0.813 vs. 0.668, $P = 0.026$)。

结论: 基于 T2 加权 MRI 的瘤周、瘤内影像组学方法, 有潜力有效预测上皮性卵巢癌的 FIGO 分期, 其中联合瘤周瘤内影像组学及临床信息的模型表现最佳。该模型有望为临床医生提供了一个非侵入性、准确的工具, 帮助他们更好地评估患者状况并制定个性化的治疗方案。

PO-3996

基于多模态空洞卷积神经网络人工智能技术 辅助精准诊断急性胰腺炎的研究

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目的 CT 图像诊断急性胰腺炎 (AP) 常受限于放射科医生的专业水平与视觉判断。本研究开发了一项基于多模态空洞卷积神经网络 (MSAnet) 的人工智能工具, 用于胰腺轮廓的精准分割, 旨在 CT 断层扫描图像中快速定位胰腺、提取形态学信息、将胰周胰内信息可视化, 实现 AI 辅助临床诊断。

方法 本研究回顾性纳入 2013 年 9 月至 2022 年 9 月期间 1124 例疑似 AP 并接受腹部 CT 平扫和 CT 增强扫描检查的患者。将患者分为训练组 (N=688)、验证组 (N=145)、测试组 (N=291, 正常胰腺组 N=104, 急性胰腺炎组 N=98, 急性胰腺炎合并胰腺癌组 N=89)。分别用于构建模型、验证模型、测试模型。通过六个开源模型和基于 MSAnet 的工具进行胰腺分割和测量, 并使用 Dice 相似系数 (DSC) 和重叠度 (IoU) 指数评估结果。并对不同年龄的患者的 DSC 和 IoU 进行比较, 采用受试者工作特征曲线 (ROC) 和混淆矩阵评价放射科医生使用和非使用 MSAnet 工具对 AP 和 AP&PDAC 的诊断效率与精确度。

结果 在所有分割模型中, MSAnet 在训练集上 DSC 最高为 0.966, IoU 次之, 为 0.953 (最高为 0.954), 而在验证集上 DSC 最高为 0.819, IoU 为 0.706。基于 MSAnet 的工具在测试数据集上也有很高的效率 (DSC: 0.817—0.832; IoU: 0.756—0.778)。在人工智能工具的帮助下, 初级和高级放射科医生对同一批患者的诊断时间分别缩短了 26.8% 和 32.7%。初级放射科医生诊断 AP 的曲线下面积由 0.91 提高到 0.96, 高级放射科医生的曲线下面积由 0.98 提高到 0.99。在 AP&PDAC 诊断中, 低级放射科医生的 AUC 由 0.85 增加到 0.92, 高级放射科医生的 AUC 由 0.97 增加到 0.99。

结论 基于 MSAnet 的工具显示出良好的胰腺分割和测量性能, 有助于放射科医生提高 AP 及 AP&PDAC 的诊断效率, 并优化工作流程。

PO-3997

基于 MRI 影像组学预测直肠癌新辅助治疗预后

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目的: 探讨基于 MRI 影像组学对直肠癌新辅助治疗 (NACT) 后生存期 (OS) 的预测价值。

方法: 回顾性分析 2017 年 1 月至 2022 年 1 月期间, 直肠癌患者首诊时的临床、MRI 检查资料及 NACT 术后随访资料。在高分辨 T2WI 图像上, 手动绘制直肠癌瘤灶作为 ROI-1 (感兴趣区), 并逐层勾画直肠周围系膜作为 ROI-2; 提取两者所有影像组学特征后, 保留稳定性较好 ($ICC \geq 0.75$) 的特征。以随访终点时生存状态为切点筛选影像组学特征。采用七种机器学习算法分别构建模型并选出优势模型, 计算相应的 Radscore。统计学分析得到与随访终点时生存状态有显著差异的临床影像学特征。采用 Cox 风险比例模型综合分析结合 Radscore (ROI-1)、Radscore (ROI-2) 和具有预测意义的临床特征对 OS 预测的价值, 并以定量列线图的形式呈现。

结果: 171 例直肠癌患者, ROI-1 筛选的 26 个特征构建的模型中, 支持向量机模型效能最好, 其训练集 AUC 0.948, 准确性 0.876, 敏感性 0.821, 特异性 0.913, 测试集中相应为 0.857、0.794、0.929、0.700。ROI-2 筛选的 20 个特征构建的模型中, 逻辑回归模型效能最好, 在训练集中, AUC 0.866, 准确性 0.810, 敏感性 0.696, 特异性 0.889, 测试集中相应为 0.725、0.706、0.786、0.650。直肠肿瘤模型整体效能优于直肠周围系膜模型。临床影像特征中仅直肠周围系膜中的癌结节 (影像学表现) 及系膜筋膜外肿大淋巴结具有显著意义。COX 回归模型中, 输入 Radscore

（ROI-1）、Radscore（ROI-2）及两个临床影像特征，得到训练集 C-index=0.800，测试集 C-index=0.7720，Kaplan-Meier 曲线分析显示 1、3、5 年的生存率。

结论：直肠肿瘤及直肠周围系膜影像组学模型结合临床影像学特征预测直肠癌新辅助治疗的 OS 效能较好，基于 MRI 高分辨 T2WI 影像组学模型可用于对直肠癌新辅助治疗预后的预测。

PO-3998

基于 CT 的放射组学预测小细胞肺癌化疗后复发时间模型

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背景资料：小细胞肺癌是一种与副肿瘤综合征相关的神经内分泌肿瘤，特征是快速增殖和远处转移，具有倍增时间短、侵袭性强、易转移和预后差等特点。与非小细胞肺癌不同的是，SCLC 初始治疗采用较为敏感的含铂化疗联合胸部放疗，70% 的患者可获得客观缓解，但很多患者在缓解后一年内迅速出现耐药或复发。合理预测患者可能出现的复发时间并在患者出现耐药前及时更换治疗方式或化疗药物将会延长小细胞癌患者的总生存时间。

方法：本研究回顾性纳入了 2018 年 8 月至 2023 年 9 月在复旦大学附属华东医院经病理证实为小细胞肺癌的患者，经过一系列纳入与排除标准，共计 200 例患者作为研究对象，追溯每位患者在本院的 CT 图像，以病灶复发作为观察的终点。使用 3D Slicer 软件沿着肿瘤边缘逐层勾画出 CT 图像中的病灶，直到覆盖整个肿瘤，形成肿瘤的 3D 分割，按照时间顺序依次勾画出患者每次复查 CT 图像，直至复发，将得到每位患者经治疗后随时间推移病灶变化情况。以 6:3:1 的比例随机分为训练集、验证集和测试集，使用 PyRadiomics 在 Python 中提取放射组学特征，并将提取到的组学特征结合患者临床信息（包括性别、年龄、基因型以及用药情况等）构建小细胞肺癌化疗后预测复发时间模型，通过该模型可以粗略计算出不同性别、年龄、基因型以及不同用药时间患者可能的复发时间，将该信息反馈给临床医师，及时更换治疗方式或者化疗药物将会提高患者的总生存时间。

结果：使用 PyRadiomics 提取到 1216 个放射组学特征，基于训练集进行特征选择，利用 Pearson 相关分析去除冗余特征，单变量及多变量 COX 分析以及 LASSO 分析，确定了最有用的 10 个放射组学特征。结合患者临床信息构建出预测小细胞肺癌的复发模型，在训练集的准确度、敏感度、特异度分别为 90%，89%，87%，在测试集的 AUC、准确度、敏感度及特异度分别为 84%，89%，87%，90%。

结论：基于小细胞肺癌患者经化疗后病灶的动态变化结合临床特征构建的预测小细胞肺癌患者的复发模型可以对临床提供及时有效的药物耐药及肿瘤复发相关时间信息，延长小细胞肺癌患者的总体生存时间。

PO-3999

人工智能辅助压缩感知技术对颅脑液体和白质抑制序列图像质量的影响

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目的 本研究旨在探讨人工智能辅助压缩感知技术（ACS）不同加速度因子（AF）对颅脑液体和白质抑制（FLAWS）序列图像质量的影响。方法 前瞻性纳入 26 名健康志愿者，行颅脑矢状位 3D FLAWS 序列扫描，分别以并行成像技术（PI）及 ACS 技术对图像进行加速采集，加速因子为 PI AF=3 及 ACS AF=3、5、7、9。采用 Likert 5 分量表分别对获得的抑制白质信号图像（FLAWS1）、抑制脑脊液信号图像（FLAWS2）和最小体素的灰质图像（FLAWSmin)的整体图像质量、核团边

缘锐利度、灰白质对比度、灰质和脑脊液对比度、白质和脑脊液对比度进行评估。于胼胝体压部、尾状核头和侧脑中手动绘制感兴趣区域,测量白质(WM)、灰质(GM)和脑脊液(GSF)的信号平均值和标准差,连续测量三次取平均值,并计算对比度(CN)和对比噪声比(CNR)。结果于不同加速因子下获得的五组图像的 CN、CNR 及主观评分差异均有统计学意义(P 均<0.05)。两两比较:与 PI3 相比,FLAWSmin 的主观评分、WM/GM 的 CN 和 CNR、GM/GSF 的 CNR 从 ACS5 开始逐渐降低,GM/GSF 的 CN、WM/GSF 的 CN 和 CNR 于 ACS9 出现下降(P 均<0.05);FLAWS1 的主观评分、WM/GSF 的 CN 于 ACS9 下降,WM/GM 的 CN 和 CNR、GM/GSF 的 CN 于 ACS5 开始下降,WM/GSF 的 CNR 于 ACS7 升高(P 均<0.05);FLAWS2 的主观评分从 ACS7 开始下降,GM/GSF 的 CN 于 ACS7 有所升高,WM/GSF 的 CNR 于 ACS5 有所降低(P 均<0.05)。结论 利用 ACS 技术可在保证成像质量的前提下缩短 FLAWS 扫描时间,为了确保最佳的图像质量,推荐以 ACS3 行 3D FLAWS 扫描,与 PI3 相比,扫描时间减少了 52%。

PO-4000

基于生物可解释性的多任务深度学习预测胶质瘤分子分型及预后

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目的:脑胶质瘤的疗效和预后与其遗传学和组织学特征密切相关,本研究旨在基于磁共振图像利用多任务深度学习模型开发一种非侵入性方法,同时预测 IDH 突变状态、1p/19q 共缺失状态和预后,以期在术前更好的指导临床决策。

方法:本研究回顾性分析了 3685 名确诊弥漫性胶质瘤的成年患者。数据集包括两个私有数据集和三个公开数据集。其中私有数据集 1 和私有数据集 2 合并后以 7:3 的随机分配方式分别用作训练(TC)和内部验证队列(IVC)。公开数据集 EVC1、EVC2、EVC3 作为独立外部验证队列。基于术前 MRI 图像中的 T1WI+C 和 T2-FLAIR 图像,使用 ITK-SNAP 软件进行病灶 ROI 的勾画,利用 ResNet-10 深度学习框架构建多任务预测模型。分类预测效能通过 AUC、敏感性、特异性、准确性进行评估,预测 OS 效能通过 C-index 进行评估。EVC1 的 RNA 测序数据用于基因表达分析。

结果:最后纳入 2776 名患者进入 IDH 突变状态和 1p/19q 共缺失状态的预测任务,2242 名患者纳入预后预测任务。在预测 IDH 状态的任务中,TC 中 AUC 为 0.91,IVC 中 AUC 为 0.87,外部验证队列的 AUC 为 0.89-0.90。在预测 1p/19q 状态时,TC 的 AUC 为 0.87,IVC 中 AUC 为 0.85,外部验证队列的 AUC 为 0.71-0.89。在 OS 预测任务中,在 TC 和 IVC 中的 C-index 为 0.71、0.70, EVC1 和 EVC2 中为 0.72 和 0.67。模型可以将患者分为高低风险组,在每个数据集中两组患者的 OS 均有显著差异。在 EVC1 高低风险患者间,共鉴定了 560 个差异基因。基因集富集分析结果显示激活的通路包括干扰素 α 反应等;相关性分析显示深度学习特征与上皮-间质转化等生物功能之间存在明显的相关性;免疫浸润分析显示高危组的免疫细胞浸润丰度明显更高。

结论:本研究成功开发了一种多任务深度学习模型,可同时预测胶质瘤的 IDH 突变状态、1p/19q 共缺失状态和预后。此外还引入了生物信息学分析注释深度学习特征,加深了对其生物学意义的理解,促进了精准医疗在胶质瘤中的应用。

PO-4001

基于头颅 CTA 检测颅内动脉粥样硬化狭窄的混合监督深度学习模型的开发与验证

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基于头颅 CTA 检测颅内动脉粥样硬化狭窄的混合监督深度学习模型的开发与验证

目的：颅内动脉粥样硬化性狭窄（ICAS）易导致急性缺血性脑卒中或慢性缺血性脑病，患者预后不佳。早期诊断 ICAS 的位置和严重程度至关重要。头颅 CTA 被推荐为 ICAS 的一线检查项目。但是，头颅 CTA 的后处理和诊断需要花费大量时间，并严重依赖影像医生的诊断经验，亟需开发基于头颅 CTA 的人工智能自动化诊断工具。本研究开发了基于混合监督的深度学习模型，用于检测颅内动脉粥样硬化性狭窄，并对模型的诊断性能进行了内部验证。

方法：本研究回顾性纳入了东部战区总医院 2017 年 4 月至 2019 年 12 月完成头颅 CTA 检查的患者。头颅 CTA 图像与大语言模型解析报告生成的诊断结果标签相匹配，作为模型的训练集。模型的验证集纳入了同一家医院在同一时间段内有 DSA 报告对照的、完成头颅 CTA 检查的患者。将验证集中狭窄检测模型输出结果与 DSA 报告进行对比，评估患者水平和血管水平上狭窄部位及程度的一致性，使用敏感性、特异性和 AUC 等统计学指标评价模型的检测性能。

结果：模型在内部验证集检测 ICAS 的敏感性为 94%，特异性为 91%，AUC 为 0.95。

结论：我们使用混合监督深度学习的方法，构建了基于头颅 CTA 的颅内动脉粥样硬化性狭窄的检测模型。内部验证结果显示了该模型检测 ICAS 的优秀性能，具有应用于临床工作中开展自动化辅助诊断的潜力。后续研究仍需要进一步优化模型算法，并在外部队列及前瞻性队列中验证该模型检测 ICAS 结果稳定性。

PO-4002

基于影像组学的机器学习模型用于中枢神经系统肿瘤的类型及分子状态的评估

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目的：研究基于 MRI 的机器学习分类模型在鉴别 IDH 野生型 WHO3-4 级胶质瘤、IDH 突变型 WHO3-4 级胶质瘤、原发性中枢神经系统淋巴瘤（primary central nervous system lymphoma，PCNSL）和脑转移瘤（brain metastases，MET）中的潜能。

方法：本研究纳入了来自两个医疗中心的 176 例病例并分为训练队列（中心 1，包括 47 例 IDH 野生型 WHO3-4 级胶质瘤、28 例 IDH 突变型 WHO3-4 级胶质瘤、30 例 PCNSL 和 31 例 MET）和外部测试队列（中心 2，包括 14 例 IDH 野生型 WHO3-4 级胶质瘤、11 例 IDH 突变型 WHO3-4 级胶质瘤、3 例 PCNSL 和 12 例 MET）。我们在这些病例的术前各常规 MR 序列[包括 T1 加权图像（T1WI）、T2 加权图像（T2WI）、液体衰减反转恢复序列（FLAIR）、对比增强 T1WI（T1CE）]图像上分别进行了 3 个基础感兴趣区（volume of interest，VOI）的勾画，包括肿瘤坏死部分（necrotic tumor，N）、实性肿瘤部分（solid tumor，T）和瘤周水肿部分（peritumoral edema，E）。从不同 VOI/VOI 组合和不同 MR 序列中提取影像组学特征，提取的特征将使用 12 种分类算法来建立分类模型，并对所生成的模型的表现进行分析和评估。

结果：基于“lightgbm”分类算法和从所有 VOI（包括 T、E、N、TE、TN、TEN）和所有序列（包括 T1WI、T2WI、FLAIR、T1CE）提取的特征建立的模型取得最好的效果，在训练队列中 AUC 为 0.822、准确度为 65.6%，在测试队列中 AUC 为 0.758、准确度为 50.0%。从与“T”相关的 VOI（包

括 T、TE、TN、TEN) 中提取的特征建立的模型比从其它 VOI 中提取特征建立的模型表现更好。此外, 从 T1WI 中提取的特征建立的模型的表现稍差于从其它单序列中提取的特征建立的模型。结论: 我们的四分类模型在训练队列取得了较好的效果, 在外部测试队列中取得了适中的效果。

PO-4003

基于 CT 深度学习鉴别胸腺瘤组织学分型的临床应用价值

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目的: 研究基于 CT 深度学习鉴别胸腺瘤组织学分型的临床应用价值。

材料与方法: 回顾性收集 2014 年 1 月-2023 年 3 月于皖南医学院第一附属医院经术后病理证实的 179 例胸腺瘤患者, 按 7: 3 比列将研究对象分为训练集 (n=125) 和验证集 (n=54)。本研究采用 ResNet50 作为卷积神经网络模型, 提取深度学习特征, 并运用主成分分析 (PCA)、相关性分析和最小绝对收缩和选择算子 (LASSO) 算法挑选出最优深度学习特征, 建立鉴别胸腺瘤组织学分型的深度学习模型 (DTL Signature)。利用 Logistic 回归构建临床模型、深度学习模型和联合模型。绘制受试者工作特征曲线 (ROC), 并计算曲线下面积 (AUC), 评估 3 种模型鉴别胸腺瘤组织学分型的临床效能。

结果: 筛选出 11 个 CT 平扫深度学习特征, 并建立深度学习模型, 在训练集和验证集中, 其受试者工作曲线 (ROC) 下面积 (AUC) 分别为 0.877、0.795, 均高于临床模型的 AUC, 但差异均无统计学意义 ($Z=1.903$ 、 1.033 , P 均 >0.05)。在训练集和验证集中, 临床模型与深度学习模型构建联合模型, 其 ROC 的 AUC 分别为 0.890、0.841, 均高于临床模型, 且差异有统计学意义 ($Z=2.647$ 、 3.041 , P 均 <0.05)。

结论: 基于 CT 平扫的深度学习联合模型有利于鉴别胸腺瘤组织学分型, 临床获益较高, 值得临床推广应用。

PO-4004

基于头颅 CTA 检测颅内动脉粥样硬化狭窄的混合监督深度学习模型的开发与验证

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拟交流类型: 仅刊印

主题分类 人工智能和大数据、图像处理

基于头颅 CTA 检测颅内动脉粥样硬化狭窄的混合监督深度学习模型的开发与验证

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摘要:

基于头颅 CTA 检测颅内动脉粥样硬化狭窄的混合监督深度学习模型的开发与验证

目的: 颅内动脉粥样硬化性狭窄 (ICAS) 易导致急性缺血性脑卒中或慢性缺血性脑病, 患者预后不佳。早期诊断 ICAS 的位置和严重程度至关重要。头颅 CTA 被推荐为 ICAS 的一线检查项目。但是, 头颅 CTA 的后处理和诊断需要花费大量时间, 并严重依赖影像医生的诊断经验, 亟需开发基于头颅 CTA 的人工智能自动化诊断工具。本研究开发了基于混合监督的深度学习模型, 用于检测颅内动脉粥样硬化性狭窄, 并对模型的诊断性能进行了内部验证。

方法：本研究回顾性纳入了东部战区总医院 2017 年 4 月至 2019 年 12 月完成头颅 CTA 检查的患者。头颅 CTA 图像与大语言模型解析报告生成的诊断结果标签相匹配，作为模型的训练集。模型的验证集纳入了同一家医院在同一时间段内有 DSA 报告对照的、完成头颅 CTA 检查的患者。将验证集中狭窄检测模型输出结果与 DSA 报告进行对比，评估患者水平和血管水平上狭窄部位及程度的一致性，使用敏感性、特异性和 AUC 等统计学指标评价模型的检测性能。

结果：模型在内部验证集检测 ICAS 的敏感性为 94%，特异性为 91%，AUC 为 0.95。

结论：我们使用混合监督深度学习的方法，构建了基于头颅 CTA 的颅内动脉粥样硬化性狭窄的检测模型。内部验证结果显示了该模型检测 ICAS 的优秀性能，具有应用于临床工作中开展自动化辅助诊断的潜力。后续研究仍需要进一步优化模型算法，并在外部队列及前瞻性队列中验证该模型检测 ICAS 结果稳定性

PO-4005

基于右优势型冠脉 CT 平扫冠周脂肪建立模型预测软斑块的研究

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目的：本研究旨在建立基于右优势型冠脉 CT 平扫冠周脂肪的临床模型、影像组学模型以及联合模型，并绘制诺莫图，以探究其对软斑块的诊断价值。

本研究收集了 2022 年 1 月至 2023 年 9 月期间来自两个学术医学中心的回顾性数据集，共包括 305 例患者。所有患者均接受了冠状动脉 CT 血管造影 (CCTA) 检查，并收集了临床资料。训练集来自齐齐哈尔医学院附属第三医院，外部测试集来自齐齐哈尔医学院附属第二医院。在 CT 平扫图像上，在右冠脉近段勾画冠周脂肪三维容积感兴趣区 (VOI)，提取放射组学特征。在训练集上使用机器学习方法建立放射组学模型，并在测试集上验证了该模型的性能。通过特征筛选与降维，建立影像组学模型；同时使用临床基线特征，建立了临床模型；最后，将影像组学特征与临床特征结合，建立了联合模型，并使用 SVM、Random Forest、SGD、KNN、XGBoost 和 LightGBM 分类器分析了各模型的诊断效能，计算受试者工作特征曲线下面积 (AUC)。

结果：本研究对 305 例患者（平均年龄 55 ± 10 岁）进行放射组学建模，106 例（34%）被证明存在冠脉软斑块。放射组学模型包含 7 个放射组学特征，在测试集上的 AUC 值、特异度、灵敏度和准确性分别为 0.892、80.5%、81.7% 和 79.8%；临床模型在测试集上的 AUC 值、特异度、灵敏度和准确性分别为 0.755、72.4%、73.6% 和 76.3%；联合模型在测试集上的 AUC 值、特异度、灵敏度和准确性分别为 0.931、89.5%、88.4% 和 89.1%。

结论：基于右优势型冠脉 CT 平扫冠周脂肪的临床与影像组学联合模型可以更好的预测非钙化斑块的存在，并且在诊断中具有较高的准确性。

PO-4006

基于 MRI 的深度学习在预测直肠癌 KRAS 基因突变中的价值

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目的：探索基于 MRI 的深度学习联合临床特征在预测直肠癌 KRAS 基因突变中的价值。

方法：本项回顾性研究共纳入 2016 年 8 月至 2021 年 4 月期间的 376 例患者(训练组:288 例, 测试组:88 例)，建立临床模型、影像深度学习、临床-影像整合深度学习模型。临床模型采用多因素回归分析方法，深度学习模型基于改良的 MobileNetV2 算法。通过受试者工作特征曲线下的面积(AUC)、决策曲线分析评估模型性能。

结果: 临床模型采用 4 个临床特征和 5 个 MRI 特征 (年龄、性别、CEA、CA199、肿瘤长径、肿瘤部位、原发肿瘤分期、淋巴结分期、壁外血管受侵) 进行建模。训练组中, 临床模型、影像深度学习模型、临床-影像整合深度学习模型的 AUC 值分别为 0.651 (95% 可信区间[CI], 0.593~0.706), 0.824 (95% CI, 0.775~0.866) 和 0.878 (95% CI, 0.835~0.914); 测试组中, 3 个模型的 AUC 值分别为 0.668 (95% CI, 0.560~0.765), 0.765 (95% CI, 0.663~0.849) 和 0.841 (95% CI, 0.748~0.910)。Delong's 检验表明整合模型的预测效能优于临床模型 (训练组 $P < 0.001$, 测试组 $P = 0.008$) 和影像深度学习模型 (训练组 $P = 0.012$, 测试组 $P = 0.115$)。决策曲线分析亦表明整合模型优于临床模型和影像深度学习模型。

结论: 基于 MRI 特征和临床因素的整合深度学习模型有助于预测直肠癌 KRAS 基因突变。

PO-4007

U-Net 3D 自动分割与磁共振放射组学定量分析马拉松运动员膝关节软骨及半月板

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目的: U-Net 自动分割膝关节股骨软骨及内外侧半月板, 且通过放射组学定量分析评价业余马拉松运动员与健康志愿者膝关节软骨及半月板在磁共振图像上差异性。

材料与方法: 本研究纳入共 79 名参与者 (42 名无症状的业余马拉松运动员, 37 例健康志愿者) 进行矢状位三维脂肪抑制快速扰相梯度回波 (3D-FS-FSPGR) 磁共振序列图像采集。训练开发基于 U-Net 卷积网络架构的深度学习模型自动分割股骨软骨和内外侧半月板。从股骨软骨及半月板感兴趣区域提取 107 个影像组学特征, 特征归一化处理后使用最小绝对收缩和选择算子 (LASSO) 回归来选择特征, 分析两类参与者特征差异性并通过机器学习算法区分两类参与者。通过受试者曲线下面积 (AUC), 准确度, 灵敏度和骰子相似性系数 (Dice 系数) 等评价指标, 评估特征区分性能和 U-Net 自动分割性能。

结果: 基于 3D-FS-FSPGR 图像的 U-Net 深度学习模型在股骨软骨, 内侧半月板和外侧半月板上的 Dice 系数分别为, 0.849, 0.819 和 0.745。经过特征筛选, 内侧半月板区域获得 12 个放射组学特征, 测试集机器学习算法 AUC 为 0.701 ± 0.064 ; 外侧半月板区域获得 4 个放射组学特征, 测试集机器学习算法 AUC 为 0.597 ± 0.059 ; 股骨软骨区域获得 1 个放射组学特征, 测试集机器学习算法 AUC 为 0.547 ± 0.058 。

结论: U-Net 在快速生成准确分割方面表现出有效性和精确性, 自动分割感兴趣区域以减少临床医师勾画和诊断时间。此外本研究显示放射组学所获得的定量特征能够显示业余马拉松运动员与健康志愿者在软骨及半月板的差异。

PO-4008

基于 CT 影像组学的耐药肺结核辅助诊断研究

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目的: CT 影像学在结核病, 尤其是肺结核的诊断中被广泛应用, 但有关耐药肺结核 CT 影像组学的研究较少。为了分析空洞特征, 耐药患者与药敏患者具有显著差异的病灶的特征, 以及所有异常病

灶的特征对耐药肺结核和药敏肺结核的诊断价值,研究基于耐药患者及药敏患者的 CT 影像建立了 3 个影像组学辅助诊断模型,以提高对耐药肺结核的诊断水平。

方法:研究回顾性收集了 474 名病原结果为阳性的肺结核患者,其中耐药患者 320 名,药敏患者 154 名。按 8:2 分为训练集和测试集。由两位具有中级职称的放射科医生采用双盲法分别对 CT 图像进行分析和标注,两位医生在每层 CT 上的标注区域均会产生相应的 Dice 系数,如果 Dice 系数大于等于 0.90,则将它们平均值作为病灶的金标准。否则,由高级放射科医生重新标注图像,并将高级医生的标注区域作为金标准。研究采用 Pyradiomics 进行组学特征提取,然后采用 LASSO 模型筛选特征,其中, LASSO 模型的参数 λ 设置为 0.01,最后采用随机森林分类器建立组学模型。最后采用 AUC 值,准确度,敏感度,特异度和 F1 分数对模型性能进行评估。

结果:从初始特征池中共提取了 112 个放射组学特征,最终筛选得到 39 个最重要的预测性特征用于模型构建。对于训练集,基于空洞特征开发的模型 1,基于具有差异性的病灶特征开发的模型 2 以及基于所有病灶特征开发的模型 3 的 AUC 值分别为 0.85, 0.85 和 0.89,对于测试集,模型 1,模型 2 和模型 3 的 AUC 值分别为 0.74, 0.80 和 0.84。此外,3 个模型的准确度,敏感度,特异度和 F1 分数分别为 0.718, 0.792 和 0.792, 0.750, 0.862 和 0.877, 0.571, 0.645 和 0.623, 0.814, 0.848 和 0.851。实验结果表明,3 个模型对耐药结核及药敏结核均具备较好的诊断性能,其中相比只采用空洞特征或差异性病灶特征构建的模型,纳入所有异常病灶特征的模型具有最佳的预测表现。结论:采用影像组学技术构建的 CT 耐药肺结核辅助诊断模型能够实现对耐药肺结核与药敏结核的诊断识别,为临床耐药肺结核早期筛查提供有力支持,同时也有助于提高医生的阅片效率。

PO-4009

基于 CT 影像组学构建机器学习模型鉴别海绵状血管瘤和单纯脑出血

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目的:通过基于 CT 平扫图像提取的影像组学特征结合机器学习方法构建鉴别海绵状血管瘤和单纯脑出血的模型并验证。

方法:回顾性纳入 2016 年 6 月—2023 年 5 月行脑部 CT 平扫并经 MRI 证实的 168 例单纯脑出血和 167 例海绵状血管瘤(无钙化),以 7:3 的比例随机分为两组,一组为训练集($n=234$),另一组为测试集($n=101$)。由两位高年资影像医师勾画病灶,使用 Python 中"Pyradiomics"包从每个感兴趣区(ROI)中提取训练组的影像组学特征。采用组内组间一致性分析选择高稳定性的特征,选择皮尔逊相关系数和特征选择分析(方差分析[ANOVA]、过滤式特征选择[Relief]、Kruskal-Wallis[KW]、递归特征消除[RFE])进行降维,并使用包括支持向量机(SVM)、自编码器(AE)、线性判别分析(LDA)、随机森林(RF)、逻辑回归(LR)、通过 Lasso 进行逻辑回归(LRLasso)、自适应增强(AB)、决策树(DT)、高斯过程(GP)、朴素贝叶斯法(NB)在内的 10 个机器学习分类器进行了分类,结果通过留一交叉验证分析进行评估。

结果:每个 ROI 各提取 851 个特征。比较验证数据集中所有管道的 AUC,发现使用 Relief 特征选择和 RF 分类器的管道具有 20 个特征时的 AUC 最高。当使用"一个标准误差"规则时,FAE 使用 8 个特征生成了一个更简单的模型。训练集、验证集和测试集的 AUC 分别达到了 1.000、0.894 和 0.862。与 ANOVA、KW 和 relief 相比,KW 特征选择的所有算法结果都更加稳定,各 AUC 值均高于 0.662。

结论:基于 CT 平扫图像的组学机器学习分类模型鉴别诊断海绵状血管瘤和单纯脑出血具有较高效能,可推广于临床上辅助诊断。

PO-4010

中国体检人群骨密度降低 Nomogram 临床预测模型的构建与验证

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目的 骨密度 (BMD) 降低发展为骨质疏松的过程十分隐秘, 因此早期筛查骨密度降低非常重要。基于健康体检人员的临床信息, 建立 BMD 降低的临床预测模型, 早期发现骨密度降低人群并进行个性化干预。 **方法** 本研究回顾性收集于河南省人民医院健康管理学科 2018 年 2 月 - 2023 年 2 月进行骨密度检查的体检数据, 根据 BMD 含量将其分为健康对照组 (HC) (10 846 例) 和低骨密度组 (LBMD) (9 611 例)。收集其临床资料、生化检测指标即腰椎 BMD 值, 对可能的 BMD 降低影响因子进行 LASSO 和 Logistic 回归分析。根据筛选的危险因素构建 Nomogram 临床预测模型, 通过 ROC 曲线、校正曲线、DCA 曲线和临床影响曲线进行模型的验证和效果评价。 **结果** 基于年龄、身高、体重、舒张压、收缩压、甘油三酯、高密度脂蛋白胆固醇、总蛋白、总胆红素、碱性磷酸酶、血清磷的 Nomogram 模型预测能力较好 (AUC=0.817), 并具有较好的校准效果和临床效益。 **结论** 该 Nomogram 临床预测模型易于推广, 可帮助临床医生更好地筛查骨密度丢失, 实现骨密度下降的早期发现和干预, 从而减少骨质疏松症的发生, 具有重要的临床意义和公共卫生价值。

PO-4011

多序列 MR 预测伊马替尼治疗后胃肠间质瘤的无进展生存期

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目的: 应用放射组学技术对转移性胃肠间质瘤 (Metastatic gastrointestinal stromal tumor, mGIST) 患者的原发肿瘤进行深入分析, 发现与患者无进展生存期 (Progression-Free Survival, PFS) 相关的影像特征并构建预测模型, 提高对 GIST 患者 PFS 的预测能力。

方法: 回顾了 211 名胃肠间质瘤 (GIST) 患者的临床资料和影像数据, 并开发了一个影像组学模型来预测患者的无进展生存期。最终纳入了 147 名肝转移性 GIST 患者, 其中 102 例作为训练集, 45 例作为外部验证集。使用非增强 MR 图像 (T2WI、DWI、ADC) 进行放射组学特征提取, 通过 LASSO-Cox 回归选择显著特征。使用多变量 Cox 回归分析构建影像组学列线图模型用于预测 PFS, 比较临床、放射组学和深度学习特征的预测效果。采用一致性指数 (cindex) 作为模型的性能指标, 采用风险比来衡量特征的预测效果。

结果: 共选择了 21 个与 PFS 最相关的影像组学特征用于生成影像组学标签。影像组学标签在训练集和测试集中对 PFS 的预测稍高于临床模型, 但差异不显著 ($P>0.05$)。将影像组学标签与临床特征整合构建 nomogram, 在训练集和测试集中具有较高的预测性能, 训练集 C-index 为 0.757 (95%CI, 0.692-0.822)、外部测试集 C-index 为 0.718 (95%CI, 0.618,-0.818), 明显优于临床模型 (训练集: $P=0.002$; 测试集: $P<0.001$)。时间依赖性 ROC 分析显示 nomogram 模型在长期预测中具有稳定性 (训练集 AUC 在 0.765-0.919 之间, 测试集 AUC 在 0.766-0.893 之间)。多因素 Cox 回归显示影像组学签名可以作为肝转移性 GIST 术前生存预测的独立危险因素 ($HR = 3.973$)。

结论: 放射组学特征标签是预测 mGIST 患者无进展生存期的重要因素。综合的列线图模型结合影像特征和临床因素, 能够为晚期 GIST 患者的个体化治疗提供有价值的信息。

PO-4012

深度学习技术对颅内动脉狭窄的诊断价值

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目的：探究基于自动卷积神经网络的深度学习 (deep learning, DL) 技术对颅内动脉狭窄的诊断价值。方法：回顾性纳入 2020 年 1 月至 2021 年 6 月疑似急性缺血性脑卒中或短暂性脑缺血性发作患者，且均在一个月内同时接受了计算机断层血管造影(computed tomography angiography, CTA)和数字减影血管造影(digital subtraction angiography, DSA)。按照患者和血管水平将狭窄程度分为正常(0%)、轻度狭窄(< 50%)、中度狭窄(50-69%)、重度狭窄(70-99%)和闭塞(100%)，其中阻塞性狭窄定义为直径狭窄率 $\geq 70\%$ 。以 DSA 结果为参考标准，通过受试者工作特征曲线下面积(area under receiver operating characteristic curve, AUC)、敏感性、特异性、阳性预测值(positive predictive value, PPV)和阴性预测值(negative predictive value, NPV)评价诊断性能。结果：研究共纳入 248 例患者及 2728 条血管，其中颅外血管 992 条，颅内血管 1736 条。在患者水平，DL 技术与放射科医师的 AUC 分别为 0.781 (敏感性、特异性、PPV 和 NPV 分别为 0.934、0.627、0.906 和 0.711) 和 0.840，差别无统计学差异($P = 0.074$)。在血管水平，DL 技术与放射科医师的 AUC 分别为 0.923(敏感性、特异性、PPV 和 NPV 分别为 0.885、0.962、0.756 和 0.984)和 0.932 ($P = 0.393$)。DL 技术的中位分析时间为 8.67 分钟，显著低于放射科医师的 29.55 分钟($P < 0.001$)。结论：DL 技术可以准确评估颅外和颅内动脉狭窄，耗时短，有望成为优化风险分层和指导治疗策略的方法。

PO-4013

ADC 图为基础的影像组学模型对 GIST 有丝分裂指数的预测价值

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目的：以磁共振表观扩散系数图像(apparent diffusion coefficient, ADC)为基础，筛选组学参数并建立模型，预测 GIST 的 MI。

方法：本研究为回顾性研究，纳入术后病理证实 GIST 患者 103 例，其中低 MI ($MI \leq 5/50HPF$) 者 51 例，高 MI ($MI > 5/50HPF$) 者 52 例。应用 ITK 软件和 Pyradiomics 工具箱进行三维图像勾勒和参数提取，数据归一化和降维后，应用 LASSO 回归进行特征筛选。将筛选出的参数应用 Logistic 回归建立列线图模型，并与单独参数模型分别比较。应用较准曲线对列线图模型的拟合优度进行检验。

结果：LASSO 回归筛选出三个参数，分别是 Uniformity, Low Gray Level Run Emphasis 和 Run Length Non-Uniformity。三者单独预测 MI 的能力有限，训练集 AUC 分别为 0.772、0.734 和 0.712，测试集 AUC 分别为 0.508、0.554 和 0.688。三者联合建立的列线图模型在训练集和测试集中均表现出了很好的预测 MI 的能力 (训练集 AUC: 0.859; 验证集 AUC: 0.875)。与单个参数相比，联合模型的预测能力提升。在训练集中，其 AUC 明显大于三个参数的单独模型 (P 值分别为 0.006、0.049 和 0.003)。在测试集中，其 AUC 明显大于 Uniformity 和 LGLRE (二者 P 均为 0.011)。与 RLN 相比，虽然差异不显著 ($P = 0.104$)，但 AUC 仍大于 RLN。较准曲线表明该模型具有良好的拟合优度 (Hosmer-Lemeshow test, 训练集 $P = 0.731$ ，测试集 $P = 0.489$)。

结论：ADC 为基础的影像组学模型能够准确预测 GIST 的 MI。

PO-4014

基于衰减体素法的四维数字减影血管造影图像重建研究

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目的：四维数字减影血管造影（4D DSA）在许多医疗疾病的诊断中起到了关键作用，如动静脉畸形（AVM）和动静脉瘘（AVF）。尽管它具有重要的应用价值，但 4D DSA 的重建要求大量视图，以有效地模拟错综复杂的血管和造影剂流动，因此 4D DSA 需要较高的辐射剂量。目前的方法无法在稀疏视图的情况下重建出受造影剂流动影响的 DSA 图像。

方法：我们提出了一种面向时间的衰减体素（TiAVox）方法，用于稀疏视图的 4D DSA 重建，为高质量的 4D 成像铺平了道路。此外，可以从重建的 4D DSA 图像生成 2D 和 3D DSA 成像结果。TiAVox 引入了 4D 衰减体素网格，反映了空间和时间维度的衰减特性。它通过最小化渲染图像与稀疏的 2D DSA 图像之间的差异来进行优化。在没有涉及任何神经网络的情况下，TiAVox 具有特定的物理可解释性。每个可学习体素的参数代表衰减系数。

结果：我们在临床和模拟数据集上验证了 TiAVox 方法，在临床数据集上，仅使用 30 个视图，就达到了 31.23 的峰值信噪比（PSNR）用于新视图合成，而传统的 Feldkamp-Davis-Kress 方法则需要 133 个视图。同样，在合成数据集中，TiAVox 仅使用 10 个视图，为新视图合成和 3D 重建分别获得了 34.32 和 41.40 的 PSNR。我们还进行了消融研究，以证实 TiAVox 的关键组成部分。

结论：我们提出的 TiAVox 方法能够自监督地从临床采集的稀疏视图（少于 30 个视图）的 2D DSA 图像中进行 2D/3D/4D DSA 结果的重建，适用于造影剂流动的情况，无需任何神经网络。这种方法有望在临床环境中降低辐射暴露，从而减小对患者的风险。此外，它的适用性扩展到了一系列医学重建情况，包括 CT。我们在临床和模拟实验下广泛验证了我们的模型。

PO-4015

功能网络连接的中断预示着老年性耳聋患者的认知障碍

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背景：老年性耳聋为进行性双侧感音神经性高频听力损失，早期发现和预防被认为是治疗认知障碍最有潜力的方法。Rs-fMRI 不需要被试接受任何感官刺激，也不需要被试执行特定的任务，因此被广泛用于描述各种临床条件下异常的脑神经元活动和功能连接(FC)。独立成分分析(ICA)是一种数据驱动的方法，在没有实验模型或假设的情况下，将全脑体素的 bold 信号分解为空间和时间上独立的分量(ICs)，广泛应用于 rs-fMRI 中，能够直接测量多个脑网络内部和之间的交互作用。其中，静态功能网络连接(FNC)可以用来描述这些节点之间的时间相关性。目前，ICA 对老年性老年人网络内部和网络之间的连通性变化的研究还未见报道，对网络内部 FC 变化的研究较少。因此，我们预测通过研究 RSNs 和 FNC 来阐明老年性痴呆患者认知功能损害及其补偿模式，将为合理治疗提供有价值的信息。我们将通过实验验证以下假设：首先，老年性耳聋患者的认知障碍与多个 RSN 的 FC 中断有关；其次，除了网络内部的变化，网络之间的变化也可能与认知障碍有关。

方法：对 40 例老年性痴呆患者和 40 例匹配对照患者进行 rs-fMRI，采用独立成分分析(ICA)方法鉴定 12 个静息状态网络(RSNs)。采用双样本 t 检验检测网络内部 FC 差异，计算功能网络连通性(FNC)比较网络间 FC 差异。随后使用 Pearson 或 Spearman 相关分析来探讨 FC 改变与认知评估分数之间的相关性。

结果：与对照组相比，老年性耳聋患者的皮层下边缘网络(scLN)、默认模式网络(DMN)、执行控制网络(ECN)和注意网络(AN)的 FC 明显降低。老年性耳聋患者的 scLN-AUN(听觉网络)和 VN(视觉网

络)-DMN 的连通性明显增加, 而 AN-DMN 明显降低。最终, 本研究揭示了与一些认知评估分数相关的网络内和网络间的改变。

结论: 本研究提示老年性耳聋患者网络内和网络间的 FC 结构发生了深刻的改变。这些变化包括主要的听觉系统和其他高阶认知控制网络, 证明了大脑网络在异常状态中具有广泛的可塑性重组, 这为进一步理解老年性耳聋患者认知障碍的神经机制提供了有意义的见解。

PO-4016

基于 CT 放射组学的无监督共识聚类对临床 T1 期肺腺癌患者进行危险分层成为可能性

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目的 探究基于放射组学特征的无监督共识聚类结果与临床 T1 期肺腺癌的病理高危因素及基因表达之间的关联。**方法** 回顾性分析 2018 年 9 月至 2021 年 5 月在复旦大学附属中山医院胸外科接受手术切除且病理证实为肺腺癌患者的临床、病理及 CT 影像资料。记录的临床及病理资料包括年龄、性别、吸烟史、肿瘤位置、病理类型、病理亚型、纵隔淋巴结转移、脏层胸膜侵犯、血管淋巴管浸润、气道播散、Ki-67 增殖指数和基因突变信息等。涉及的基因有 EGFR、HER2、KRAS、BRAF、ALK、ROS1 和 RET。根据病例图像的放射组学特征进行无监督共识聚类分析, 使用累积分布函数 (consensus cumulative distribution function, CDF), 样品一致性 (item-consensus, IC) 和聚类一致性 (cluster-consensus, CLC) 来确定最佳集群值及评估共识聚类的效果。根据共识聚类结果将患者分组, 并将聚类结果与肿瘤组织病理学特征、基因组信息进行比较 (连续数据的 Kruskal-Wallis 检验, 分类数据的 χ^2 或 Fisher 精确检验), 并在浸润性腺癌及亚实性病灶中进行亚组分析。**结果** 最终 497 个病例被确定分为 2 个集群 (最佳), 集群 1 有 258 例 (51.9%), 集群 2 有 239 (48.1%) 例, 集群 1 集群 2 在微乳头成分、实体成分、气道播散以及 Ki67 增值指数方面具有明显的统计学差异 (均 $p < 0.001$), 在淋巴结转移和胸膜侵犯上也有统计学差异 ($p = 0.031$ 、 $p = 0.012$), 微乳头成分、实体成分、气道播散以及 Ki67 增值指数在浸润性腺癌和亚实性病灶的亚组分析中也具有统计学差异 ($p < 0.05$), 集群 1 和集群 2 仅在 HER2 突变上有统计学差异 ($p < 0.001$), 其它基因突变均无统计学差异 ($p > 0.05$)。**结论** 基于 CT 的放射组学共识聚类能够识别临床 T1 期肺腺癌患者的放射组学特征与病理高危因素和基因组特征和结果之间的关联, 可以帮助临床对 T1 期肺腺癌患者进行危险分层。

PO-4017

基于增强 MRI 的纹理分析术前预测肝细胞癌微血管密度的价值

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目的 探讨基于增强 MRI 的纹理分析术前预测肝细胞癌微血管密度 (MVD) 的价值。

方法 我们对 2020 年 5 月至 2021 年 6 月间接接受肝切除术的 14 例患者进行了回顾性分析。根据免疫组化检测 MVD 状态, 将其分为低 MVD 组 (8 例) 和高 MVD 组 (7 例)。所有患者均接受腹部 3.0T MR 检查 (Signa HDxt, GE 医疗, 美国), 包括 T1WI、T2WI 及增强序列。放射科医生沿肿瘤边缘描绘肿瘤各层, 然后使用 AK 软件 (GE 医疗) 提取 107 个纹理特征, 包括一阶特征、形状特征、

灰度共生矩阵 (GLCM)、灰度依赖矩阵 (GLDM)、灰度大小矩阵 (GLSZM)、灰度游程矩阵 (GLRLM) 及邻域灰度差矩阵 (NGTDM)。采用 Mann-Whitney U 检验进行参数比较。采用 logistic 回归分析, 建立不同参数组合的预测模型。进行受试者操作特性曲线(ROC)分析以评估预测性能。

结果 得到 4 个有差异的纹理特征, 包括动脉期 Maximum、门静脉期 90Percentile、延迟期 90Percentile 和延迟期 Maximum。各参数及联合预测 MVD 的 AUC 值为 0.768、0.732、0.732、0.714 及 0.804。

结论 通过勾画整个肿瘤区域, 提取纹理特征, 可以更客观、更全面地反映整个肿瘤的异质性。本研究采用增强 MRI 纹理分析术前预测肝细胞癌 MVD, 获得 4 个有差异的纹理特征, 多参数联合 AUC 值为 0.804, 表明基于增强图像纹理分析, 具有准确预测肝细胞癌 MVD 的优势, 为临床治疗方案的选择提供了重要的成像参考。

PO-4018

GPT-4 在基于影像学表现的肿瘤鉴别诊断和协助放射科医生改进诊断方面的价值

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目的探讨 GPT-4 在基于影像学表现的肿瘤疾病鉴别诊断中的表现, 检验 GPT-4 协助放射科医生提高诊断准确性的能力, 并探讨细粒度报告对 GPT 的影响 -4 诊断结果。

方法针对 109 例经病理诊断的肿瘤或肿瘤样病例, 将患者的年龄、性别和影像学表现输入 GPT-4, 得到最可能的 5 个诊断, 分别计算其 Top 1、Top 3 和 Top 5 的诊断准确率。放射科医生修改了误诊和低排名病例的影像学描述, 并使用 GPT-4 重新诊断它们。由三位不同经验水平的放射科医生独立诊断了 109 例病变 (不知晓 GPT-4 诊断结果)。随后, 上述放射科医生在获悉 GPT-4 诊断结果后, 结合影像进行重新诊断, 再次评估放射科医生独立诊断和联合 GPT-4 诊断的准确性。

结果从准确率来看, GPT-4 疾病诊断前 1 名的准确率为 49.47%, 前 3 名的准确率为 82.08%, 前 5 名的准确率为 96.49%。对 26 例误诊和排名较低的影像学描述进行修改后, 61.53% 的病例诊断排名上升了, 而 26.92% 保持不变。三位放射科医生独立的诊断准确度分别为 0.90、0.94 和 0.87, GPT-4 和放射科医生的综合诊断准确度分别为 0.91、0.97 和 0.95。

结论 GPT-4 表现出令人满意的肿瘤疾病鉴别诊断能力, 可以帮助放射科医生提高其识别和诊断准确性。此外, 改变结果的细粒度会影响 GPT-4 的鉴别诊断性能。

PO-4019

基于 CT 小肠成像肠壁及肠系膜脂肪影像组学模型 预测克罗恩病可行性研究

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目的: 基于 CT 小肠成像小肠壁及肠系膜脂肪建立并验证预测克罗恩病的影像组学模型。方法: 收集 2015 年 01 月至 2021 年 7 月间 136 例确诊的克罗恩病患者以及正常对照组, 所有病例行小肠 CTE 检查。由 2 位高年资放射科医生结合小肠镜或手术标本确定病灶部位。采用 Pyradiomics 软件提取 CTE 门静脉期病灶和正常对照组肠壁及肠系膜脂肪纹理特征, 对所得特征进行 LASSO 降维处理, 构建得到基于肠壁的预测克罗恩病的模型 1 和基于肠系膜脂肪预测诊断克罗恩病的模型 2, 采

用受试者工作特征曲线 (receiver operating characteristic curve, ROC 曲线)评价模型 1、模型 2 的预测效能。结果: 68 例克罗恩病以回肠末端为最常见部位, 小肠单独受累 54 例, 小肠-结肠受累 14 例。在模型 1 和模型 2 中, 我们通过 mRMR 特征选择及 LASSO 回归降维方法筛选分别保留了 5 个和 11 个纹理特征, 最终模型 AUC 均为 0.99。模型 1 和模型 2 准确率为 96.7%&90%, 灵敏度为 90%&100%, 特异性为 100%& 85%, 阳性预测值(PPV)为 100% &76.9%, 阴性预测值(NPV)为 95.2%& 100%。结论: 基于 CTE 肠壁及肠系膜脂肪影像组学建立克罗恩病的预测模型有重要的临床价值。

PO-4020

DWI 和 ADC 纹理分析预测肝细胞癌 mRECIST 标准评价 TACE 疗效

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目的 研究弥散加权成像 (DWI) 和表观弥散系数 (ADC) 纹理分析, 以预测经导管肝动脉化疗栓塞 (TACE) 的早期反应。

方法 本回顾性研究收集了 54 例 HCC 患者, 他们在 TACE 前接受了腹部 MRI 检查 (包括 DWI 序列), 根据 mRECIST 标准, 将其分为客观反应 (OR) 组 (n=26) 和非反应 (NR) 组 (n=28)。使用 ITK-SNAP 软件, 在 DWI 和 ADC 图上手动勾画 ROI。使用 AK 软件提取纹理特征, 包括 MedianIntensity, MaxIntensity, MeanValue, Percentile25, Percentile75, Percentile95, histogramEntropy, histogramEnergy, Variance, stdDeviation, InverseDifferenceMoment, LongRunEmphasis, 和 ShortRunEmphasis。采用独立样本 t 检验或 U 检验来比较两组间特征的差异。采用 ROC 曲线来评估预测性能。采用 Logistic 回归方法将 ADC 和 DWI 纹理特征中性能更好的几种特征相结合。

结果 当使用单个参数时, DWI 图的 Inertia_angle45_offset1 得到了最好的结果 (AUC: 0.731)。

ADC_ShortRunHighGreyLevelEmphasis_angle0_offset1

ADC_GreyLevelNonuniformity_angle135_offset1、DWI_Inertia_angle45_offset1 和 DWI_GreyLevelNonuniformity_angle135_offset1 联合治疗反应的预测效果更好 (AUC: 0.780)。

结论 DWI 可以先于肿瘤的形态学变化, 并通过功能成像的角度评估肿瘤扩散的影响。结果表明, DWI 信号强度图的 Inertia_angle45_offset1 具有最高的预测性能 (AUC: 0.731), DWI 和 ADC 联合预测的效能得到了提高 (AUC: 0.780)。DWI 和 ADC 图的纹理分析对预测 HCC 中 TACE 的治疗反应有一定的价值。

PO-4021

影像组学预测进展期前列腺癌生化复发的初步研究

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目的：构建以治疗前 MR 表观扩散系数图像 (ADC) 为基础的自动分割影像组学模型，预测进展期前列腺癌生化复发的价值。

方法：本研究回顾性分析了 100 例进展期/局部进展期前列腺癌，包括 65 例无生化复发 (BCR-) 和 35 例生化复发 (BCR+)。所有患者均以放射治疗或内分泌治疗作为一线治疗方式或接受多线治疗方式且随访时间 ≥ 2 年。生化复发的定义以 2021 年欧洲泌尿外科学会前列腺癌诊疗指南为参考。应用本中心自主研发的深度学习模型用于自动分割 ADC 图上前列腺和前列腺癌区域 (图 1)。将 100 例病例随机分为训练集 (n=70) 和测试集 (n=30)。根据临床资料 (包括年龄、治疗前 PSA 水平、Gleason 评分、临床分期) 和前列腺面积或前列腺癌面积，构建了两个预测模型 (Model_1 和 Model_2)。另外两个预测模型仅基于前列腺面积 (Model_3) 或前列腺癌面积 (Model_4) 构建。使用受试者工作特性 (ROC) 曲线下面积 (AUC)、PR 曲线分析模型预测效能。DeLong 检验用于比较不同模型的 AUC 差异，使用自举法计算 95% 置信区间用于比较不同模型 PR 曲线下面积的差异。以测试集的测试结果作为模型预测效能，以 $P < 0.05$ 认为差异具有统计学意义。

结果：训练集和测试集的生化复发率差异无统计学意义 (35.7% vs. 33.3%, $\chi^2 = 0.052$, $P = 0.820$)。在 BCR-和 BCR+组之间，患者年龄、PSA 水平、前列腺和前列腺癌的体积、直径及 ADC 值的差异均无统计学意义 ($P > 0.05$, 表 1)。Model_1 至 Model_4 的 AUC 分别为 0.637 (95%CI:0.434-0.838)、0.841 (95%CI:0.695-0.940)、0.840 (95%CI:0.698-0.983) 和 0.808 (95%CI:0.627-0.988)，两两比较差异无统计学意义 (图 2, 表 2)。四个模型 PR 曲线下面积的差异无统计学意义 (图 3)。

结论：应用本中心自主研发的基于深度学习自动分割模型，建立的以治疗前 MR-ADC 图像为基础的影像组学模型，对于预测进展期前列腺癌的生化复发具有潜在应用价值。

PO-4022

基于多阶段集成网络的青少年特发性脊柱侧凸辅助诊断系统

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目的：开发一种深度学习算法，实现在全脊柱 X 线图像上快速自动地诊断评估脊柱侧凸。方法：从 2018 年 1 月 1 日至 2021 年 6 月 30 日，收集在两种不同扫描仪器采集的四家医院 (BTH、BTFH、IMMUH、IMMUSH) 数据库中检索全脊柱 X 线图像 (AP)，数据分为训练集和验证集。从 2021 年 4 月 1 日到 6 月 30 日，在 IMMUH 收集全脊柱 X 线图像独立用于外部验证。利用网络公开数据集验证了模型效能。利用统计软件 R software (version 3.5.2, R Foundation for Statistical Computing, Vienna, Austria) 分析模型脊柱曲率及解剖平衡参数的精度及敏感度，以及不同年资医生的一致性。结果：本研究训练数据集共 788 例，测试数据集共 185 例，测试数据集包括内部测试数据 (57 例)、外部测试数据 (56 例) 及公开数据 (72 例) 三个部分。本算法模型在 Cobb 角、顶椎、上、下端椎的精度及召回率分别为：89.36%、85.71%、77.2%、80.24%；97.35%、93.38%、84.11%、87.42%；Cobb 角的 SMAPE 为：5.99%。模型自动测算时间为 1.7s，Cobb 角、AVT、CVA 的 MAE 值分别为 1.07°、1.12mm、1.38mm。模型 Cobb 角预测结果与金标准的一致性很好 (ICC=0.996、0.978、0.825, $P < 0.001$)。结论：成功建立了全脊柱 X 线图像辅助诊断深

度学习算法模型，侧凸识别敏感度、精度均较高，可以有效辅助放射科医生在该项诊断工作中提高效率。

PO-4023

人工智能 AI 在预测肺部亚实性结节 SSN 浸润性风险的研究

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人工智能 AI 在预测肺部亚实性结节 SSN 浸润性风险的研究

目的：近年来，随着早期肺癌 CT 筛查的普及，越来越多的肺部结节被检出，多数早期肺腺癌在 CT 上表现为亚实性结节，但因不同病理类型影像学征象存在重叠，亚实性结节的性质及浸润程度术前较难评判。本文旨在探讨人工智能(artificial intelligence, AI)技术在肺部亚实性结节浸润性风险评估中的应用价值。

材料与方法：本研究回顾性分析 2019 年 8 月到 2021 年 3 月行肺部 CT 发现肺部有亚实性结节并取得手术病理结果的患者，共 439 例（其中浸润性腺癌 211 例，非浸润性腺癌 207 例，良性病变 21 例）。将患者 CT 图像导入 SurfiPro 4.5 人工智能软件，软件可以自动识别出肺部亚实性结节的位置、大小、密度，并提供亚实性结节的 AI 预测浸润风险概率。再采用 SPSS 26.0 软件对数据进行统计分析，采用 Kappa 一致性分析检验 AI 预测结果与病理金标准结果的一致性。计算得出人工智能 AI 预测亚实性结节浸润性的阳性预测值、阴性预测值、灵敏度和特异度。

结果：人工智能 AI 预测亚实性结节浸润风险程度的灵敏度为 87.20%，非浸润性肺癌的特异度为 85.53%，AI 预测浸润风险阳性预测值为 84.79%，阴性预测值为 87.84%。

结论：人工智能 AI 预测肺部亚实性结节浸润性程度的准确率较高，可实现无创预测肺部亚实性结节浸润性，有望辅助临床诊疗决策的制定。

PO-4024

基于卷积神经网络和注意力机制的深度学习非小细胞肺癌计算机辅助诊断模型

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目的 构建基于卷积神经网络 (Convolutional Neural Networks, CNN) 和注意力机制的改进 CNN 模型 (Inception Spatial and Channel Attention Network, ISANET)，评估模型的性能，并与传统 CNN 模型进行比较。

方法 收集经手术病理证实的肺鳞癌 (Lung Aquamous Cell Carcinoma, LUSC) 或肺腺癌 (Lung Adenocarcinoma, LUAD) 患者 60 例以及肺部正常患者 30 例的肺部 CT 平扫或增强图像共 619 张，组成 DatasetA；收集公共数据集图像共 737 张，组成 DatasetB。两数据集均按 6:4 将随机分为训练集和测试集。构建 ISANET 模型并进行训练和验证，然后记录查准率、召回率，并计算出 F1 分数，用以评价 ISANAT 模型的效能。最后，将 ISANET 模型与传统 CNN 模型 AlexNet, VGG 16, Inception V3, Mobilenet V2, ResNet 18 进行对比，绘制 P-R (Percision-Recall, P-R) 曲线，计算出 P-R 曲线下面积，并评估不同模型对肺鳞癌和肺腺癌的鉴别效能。

结果 相较于传统 CNN 模型，ISANET 模型对非小细胞肺癌分类的准确度明显提高，在 DatasetA 和 DatasetB 中分别为 99.6%和 95.2%。

结论 ISANET 模型较好地实现了对肺鳞癌和肺腺癌的无创预测,提高了肺鳞癌和肺腺癌 CT 影像鉴别的准确度,能够帮助诊断医师对非小细胞肺癌进行快速准确的分类。

PO-4025

基于增强 CT 影像组学术前预测祖细胞型肝细胞癌

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目的:探讨基于术前增强 CT 的影像组学特征是否能够作为预测祖细胞型肝细胞 P-HCC 的影像学标志物。

方法:回顾性收集 2015 年 1 月至 2020 年 12 月在中南大学湘雅三医院经手术后病理证实为肝细胞癌 HCC,且术后行 CK19 免疫组化检查的 172 例患者,其中男 153 例,女 19 例。患者均于术前 1 个月内行增强 CT 检查。按照 7:3 的比例分为训练集和验证集,训练集、验证集分别为 120 例、52 例。在 ITK-SNAP 软件上勾画感兴趣区,应用美国 GE 公司 AI-Kit 软件分别在动脉期、门脉期 CT 图像上各自动提取 396 个特征。首先采用内相关系数 ICC 评估观察者内、观察者间的一致性,对特征进行初筛。然后在训练集内采用 t 检验或 Mann-Whitney U 检验进行组间比较,筛选出有组间差异的特征。考虑到样本的不均衡性,采用合成少数类过采样技术 SMOTE 算法对训练集进行过采样处理,在过采样之后获得的训练集中采用最小绝对收缩与选择算子 LASSO 回归分析,并使用 10 折交叉验证的方法进行特征选择及降维,采用递归特征消除法 RFE 进一步筛选特征,验证集同样进行了 SMOTE 过采样处理,使用受试者工作曲线 ROC 评估影像组学预测模型的效能。

结果:172 例患者中 CK19 阳性 34 例,CK19 阴性 138 例。对训练集采用 SMOTE 算法进行过采样处理后,获得 97 例 CK19 阴性和 92 例 CK19 阳性。通过 LASSO 算法在过采样处理之后的训练集中筛选出 49 个特征,通过 RFE 特征选择方法进一步筛选出包含 9 个特征的最优特征子集,然后采用 SVM 进行机器学习,建立影像组学预测模型。在训练集中,影像组学预测模型曲线下面积 (AUC) 为 0.932 (95%CI: 0.893-0.970), 敏感度 87.0% (80/92), 特异度 90.7% (88/97)。将 SMOTE 过采样之后的验证集数据代入该模型, AUC 为 0.849 (95%CI: 0.761-0.937), 敏感度 59.1% (26/44), 特异度 85.4% (35/41)。

结论:术前增强 CT 影像组学特征可作为 P-HCC 的影像生物标志物,基于 SVM 建立的预测模型在训练集和验证集中效能均较好。

PO-4026

基于颈动脉超声影像组学结合临床指标的机器学习模型预测 2 型糖尿病患者脑卒中风险

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【摘要】目的:本研究旨在建立一个基于颈动脉超声影像组学的 T2DM 患者缺血性卒中 (IS) 风险预测诺模图模型。**方法:**纳入苏州大学附属第一医院卒中中心确诊为脑卒中的 T2DM 患者 98 例,纳入同期因 T2DM 于内分泌科住院且未曾发生卒中事件的患者 100 例作为对照组,打乱顺序后按 0.7 的比例分为训练组和验证组,患者均接受颈脑血管超声检查;收集颈动脉超声影像并进行图像归一化处理,由两名颈脑血管超声科医生利用 ITK-SNAP 4.0.1 软件手动独立划分颈动脉斑块 ROI,提取影像组学特征并对数据进行 Z 分数归一化;在训练组中筛选 ICC>0.75 的影像组学特征后由 T 检验筛选有意义的组学特征,并经过最小绝对收缩和选择运算符 (LASSO) 算法筛选非零系数的特征纳入,建立影像组学 Logistic 机器学习模型,同时计算影像组学得分 (RS);将有意义的临床

特征纳入并建立临床 Logistic 机器学习模型；构建组合 Logistic 机器学习模型。计算上述三种模型的 ROC 曲线并根据 AUC 和决策曲线 (DCA 分析) 判断模型效能并绘制诺模图。结果：经影像组学特征提取和 LASSO 回归成功筛选出 4 个组学特征，并计算 RS 后与有意义的临床指标合并构建组合模型并绘制预测诺模图，经 ROC 分析发现其无论是在训练组还是验证组的 AUC 均为三种预测模型中最大 (0.898 和 0.857)，且经 DCA 分析后认为组合模型 (影像组学+临床诺模图) 在多数情况下表现佳，可以用于临床上对于 T2DM 患者的脑卒中事件风险预测。结论：基于颈动脉超声影像组学构建了识别 T2DM 患者脑卒中风险的诺模图，并验证其具有较高的诊断性能，可以用于临床预测，为 T2DM 患者提供精准且方便、个性化的医疗支持。

PO-4027

CT 在 3D 打印技术中的应用

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目的 掌握 3D 打印需要在 CT 上的操作步骤

方法 在中国知网使用主题词“3D 打印，CT，三维重建，螺旋 CT”等搜索相关文献，最终纳入一篇，微信公众号 CT Clinical Evidence 文章一篇

结果 要实现医学 3D 打印，首先要获得医学 3D 容积再现数据，目前基于 CT 的 3D 容积再现数据 (VR) 的 3D 打印技术已经非常成熟，并被用于临床。CT 的三维后处理中，一般图像的显示模式分为五种：(1)容积再现 (Vol.Rend.)(2)最大密度投影 (MIP)(3)立体密度投影 (VIP)(4)最小密度投影 (MinIP)(5)表面最大密度投影 (SurfaceMIP)，其中 CT 容积再现技术是三维重建中最常用的一种图像显示模式，也是三维后处理 Volume 中一般默认的图像显示模式，通过选择 Vol.Rend.模式可自动显示为骨骼组织，也可以通过组织飞跃 (Fly Over) 工具实现骨骼组织向其他组织的飞跃。

第 1 步：图像获取，使用最多的是 CT 扫描图像，因为它应用广泛且具有足够的分辨率。

第 2 步：图像处理，即从医学影像 PACS 系统

(Picture archiving and communication system)取所需的部分进行后处理，包括计算机辅助设计 CAD (Computer - aided design)，从而获得需要打印物体的表面信息，得到所需的 DICOM (Digital imaging and communications in medicine) 格式的图像。

第 3 步：DICOM 转换 STL (Standard Tessellation Language) 格式图像。STL 格式是 3D 打印机识别的格式。

结论：获取 CT 图像数据,以 DICOM 格式导出,将 DICOM 数据导入进行三维建模和图像后处理,以 STL 格式保存数据,导入 3D 打印机打印出个性化模型。

PO-4028

融合血流动力学特征的基底动脉开窗与动脉粥样硬化斑块相关性研究

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摘要：目的 融合血流动力学特征对不同小脑前下动脉(Anterior inferior cerebellar artery, AICA)分型的基底动脉开窗相关动脉粥样硬化斑块 (Atherosclerotic plaques, AP) 形成之间进行相关性分析，辅助临床对不同 AICA 分型的基底动脉开窗治疗。方法 以基底动脉 MRA 图像为基础构建前后循环三维几何模型，分为开窗组与对照组，应用计算流体力学方法对血管进行数值模拟分析。结果 (1) 在血流流线方面，所有型基底动脉开窗在开窗前动脉内血流流动方式以层流为主，开窗

起点至大脑后动脉发出处血流为中心高速伴周围低速血流, 部分为涡流、湍流, 以前 3 型为著, 易形成 AP; (2) 在血流流场方面, 所有型开窗处的血流速度均较椎动脉高, 其差异具有统计学意义, 以前 3 型为著, 这可能与血流通过处管腔横截面的面积有关; 并且从开窗流出的直接延续区域基底动脉段, 由于几何形态所导致的锥缩效应, 中心血流流速逐渐增大同时伴有高速血流中心发生不同程度的偏移, 表示对管壁撞击点发生了移位, 形成管壁损伤, 致使局部血栓形成, 易引起 AP 发生、发展; (3) AICA 1、2 及 3 型与对照组壁面切应力 (wall shear stress, WSS) 差异具有统计学意义 ($P<0.05$), 且高 WSS 分布于前 3 型基底动脉开窗处及大脑后动脉发出处, 影响正常动脉结构与功能, 引起血管重塑, 易形成 AP。 结论 (1) 基于基底动脉开窗的 MRA 图像, 可以建立不同 AICA 分型下的开窗个体化模型; (2) 基底动脉开窗计算机仿真可以得出血流流线图、血流流场图、血管壁面剪切应力分布图, 对基底动脉开窗研究和临床个体化的诊治提供一定的借鉴意义; (3) AICA 1、2 及 3 型开窗处、基底动脉段及大脑后动脉发出处具有高速涡流及高 WSS, 具有较高 AP 形成风险, 提示临床上应着重关注该类高风险人群, 应根据其分型不同采取不同的个体化治疗措施。

PO-4029

基于胸部 CT 深度学习机会性筛查骨质疏松的有效性研究

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目的 基于胸部 CT 腰 1+腰 2 椎体图像的融合特征建立深度学习模型并分析其机会性筛查骨质疏松症的有效性, 并探讨单独基于腰 1 椎体图像的模型机会性筛查骨质疏松症的可行性及有效性。

方法 回顾性收集行胸部 CT 体检者 ($n=1048$ 例) 腰 1 和腰 2 椎体中央层面图像 (pic=2096 张), 以定量 CT 测量结果将其分为骨量正常、低骨量和骨质疏松三类。首先构建 DCNN 分割模型[训练集 ($n=548$ 例), 验证集 ($n=100$ 例) 和测试集 ($n=400$ 例)], 并利用 DSC 比较其与手工标注的一致性; 然后基于训练集 ($n=530$ 例) 和验证集 ($n=100$ 例) 建立 DCNN 分类模型 1 (腰 1+腰 2 椎体图像融合特征构建) 和模型 2 (单独使用腰 1 椎体图像特征构建), 在测试集 ($n=418$ 例) 中测试, 使用 AUC 和 Delong 检验评估两模型的诊断效能。

结果 所有受试者的平均年龄 51 ± 14.5 岁 (范围 20 岁~92 岁), 其中男性 605 例, 女性 443 例; 采用训练集图像数目 (pic=300 张) 时, 测试集中 DSC 值为 0.951 ± 0.030 。模型 1 和模型 2 诊断低骨量、骨质疏松的敏感性、特异性、AUC 依次为: 0.716、0.960、0.952, 0.941、0.948、0.980; 0.638、0.954、0.940, 0.843、0.959、0.978。模型 1 对于骨量正常的诊断效能优于模型 2, 两者间的差异有统计学意义 (AUC: 0.990 vs. 0.983) ($P=0.033$), 而模型 1 和模型 2 对低骨量、骨质疏松的诊断效能无显著差异 (P 依次为 0.210、0.546)。

结论 本研究分析了基于胸部 CT 腰 1+腰 2 椎体图像融合特征建立的深度学习模型机会性骨质疏松筛查的有效性。我们进一步构建了仅基于腰 1 椎体图像的模型, 此模型可以缩短扫描长度, 减少患者接受的辐射剂量, 降低技术人员的培训成本。

PO-4030

4D Flow MRI 技术在无创诊断肝硬化患者临床显著性门静脉高压及食管胃静脉曲张风险中的应用

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目的：慢性肝病常进展为门静脉高压症，进而可能导致高风险的食管胃静脉曲张。由于这些疾病状态需要频繁的侵入性检测，因此寻求无创诊断和风险评估方法不仅具有临床重要性，同时也面临巨大挑战。4D Flow MRI 为先进的磁共振成像技术，能够提供时间-空间分辨的三维速度编码血流信息，可能成为有效的无创替代诊断工具。本研究意在评估 4D Flow MRI 作为无创方法诊断肝硬化患者中的临床显著性门静脉高压和高风险食管胃静脉曲张的效能。

方法：在 2020 年 10 月至 2021 年 3 月期间，我们在解放军 302 医院前瞻性招募了被诊断为肝硬化的病例。所有参与者均接受了标准化的腹部 4D Flow MRI 扫描。从中提取了门静脉的血流动力学参数，如平均和峰值流速、标准化血流量（Qnormal）和反流百分比（R%），并在健康对照组及 CSPH 患者、高风险与低风险食管胃静脉曲张患者间进行比较。随后，这些参数被结合至一个经 L1 正则化修正的逻辑回归模型，并进行 5 折交叉验证。其诊断效能通过接收者操作特性曲线（ROC）进行评估。

结果：共有 82 名参与者入选本研究，其中 71 名为肝硬化患者，11 名为健康对照组。结果显示，与健康对照组相比，CSPH 患者的 Qnormal (0.24 ± 0.05 ml/[cyclekg], $P = 0.001$) 和 R% (1.98 (2.05), $P = 0.002$) 显著升高。同样地，高风险静脉曲张患者的 Qnormal 和 R% 亦较高，分别为 0.22 ± 0.05 ml/[cyclekg] ($P < 0.001$) 和 1.88 (2.81) ($P = 0.006$)。ROC 分析揭示，Qnormal 在诊断 CSPH 时的 AUC 为 0.93，R% 的 AUC 为 0.91，而整合后的 LR 模型 AUC 为 0.95。在评估高风险食管胃静脉曲张时，Qnormal 和 R% 的 AUC 分别为 0.74 和 0.70，LR 模型的 AUC 则为 0.85。

结论：4D Flow MRI 作为一种无创成像手段，在评估肝硬化患者的 CSPH 及食管胃静脉曲张风险方面展现了巨大的应用潜力，可能为减少肝硬化患者对侵入性检测的需求提供新的途径。

PO-4031

深度学习重建算法与 ASIR 重建算法对 CT 图像质量的对比研究：80kv、管电流调制 40mAs 条件下的体模实验

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目的：运用体模实验对比深度学习与 ASIR 两种重建算法对 CT 图像质量的影响，模拟婴儿胸部 CT 检查时的情景。

方法：采用东软 128 层螺旋 CT，对标准化 CT 水模进行扫描，成像条件如下，80kv，管电流调制 40mAs，球管转速 0.374 秒，准直 64×0.625 ，螺距 0.8，层厚和层距均为 5mm，滤波参数 F20，重建视野 302mm，重建矩阵 512×512 。对得到的原始数据分别采用深度学习（ClearInfinity）和 ASIR（Clear View）两种算法进行重建，以上每一种重建算法分别选用 0~90% 共 10 种权重进行 10 次重建，最终得到 20 个序列的影像。对每个序列，选择相同的层面，分别在上、下、左、右、中心放置面积约 100mm² 的感兴趣区（ROI），测量相应的 CT 值和标准差，测量三次后取平均值，二者相除得到信噪比（SNR）。对每一种重建算法不同权重下得到的 SNR 进行随机区组 t 检验。

结果: (1) 上方区域, 深度学习和 ASIR 得到的影像, 其 SNR 分别为 1.66 ± 0.84 、 0.99 ± 0.24 , 差异有统计学意义 ($P<0.05$)。 (2) 下方区域, 深度学习和 ASIR 得到的影像, 其 SNR 分别为 1.73 ± 0.91 、 1.04 ± 0.28 , 差异有统计学意义 ($P<0.05$)。 (3) 左侧区域, 深度学习和 ASIR 得到的影像, 其 SNR 分别为 1.80 ± 0.87 、 1.25 ± 0.31 , 差异有统计学意义 ($P<0.05$)。 (4) 右侧区域, 深度学习和 ASIR 得到的影像, 其 SNR 分别为 1.56 ± 0.79 、 1.04 ± 0.20 , 差异有统计学意义 ($P<0.05$)。 (5) 中心区域, 深度学习和 ASIR 得到的影像, 其 SNR 分别为 1.14 ± 0.05 、 0.07 ± 0.05 , 差异有统计学意义 ($P<0.05$)。上述 5 个区域不同重建权重之间差异无统计学意义 ($P>0.05$)。

结论: (1) 深度学习算法得到的水模图像质量优于 ASIR 算法得到的。 (2) 不同重建权重得到的 CT 图像质量尽管没有统计学差异, 但权重越大, 图像越细腻、平滑。

PO-4032

基于深度学习模型实现急性缺血性脑卒中梗死核心及脑白质变性的多任务分割算法

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目的: 急性缺血性脑卒中 (AIS) 具有高致死率和致残率, 约占脑卒中全部类型的 87%, 预测 AIS 后功能恢复的有效工具对指导个体化治疗和早期康复策略很有价值。在临床环境中, 对梗死核心和白质变性 (WMH) 的评估通常依赖于人工分割和视觉评分量表, 由于放射医生间的内部差异, 从而限制了它们在大规模研究中的应用。影像学是评估 AIS 不可或缺的组成部分, 在临床常规磁共振序列中, 弥散加权成像 (DWI) 可在症状出现后短时间内检测到梗死, 被认为是梗死核心的金标准。基于影像可评估 AIS 后脑损伤, 提供有关梗死范围、位置等关键信息。本研究旨在基于临床真实场景下, 完成 AIS 后脑组织损伤的分割算法。

方法: 研究共纳入 100 名 AIS 患者, 收集其 DWI 及 FLAIR 序列, 由原始图像定义梗死核心和 WMH 标签。对图像进行预处理和数据增强, 将患者分为训练队列 ($N=50$)、内部测试队列 ($N=30$)、独立验证队列 ($N=20$)。基于 SegResNet, 构建一个多通道的深度学习算法, 完成 WMH 和 AIS 后梗死核心的分割, 分割算法用 DICE 指数来评估。

结果: 在训练队列和内部测试队列中, 梗死分割的 Dice 得分为 0.902 ± 0.025 和 0.897 ± 0.026 。在训练队列和内部测试队列中, WMH 分割的 Dice 得分为 0.875 ± 0.005 和 0.858 ± 0.005 。在独立验证队列中, 梗死和 WMH 的 Dice 评分分别为 0.862 ± 0.026 和 0.785 ± 0.015 。

讨论: 本研究训练并验证了一个基于 MR 的多序列模型, 实现了 AIS 后的多任务分割模型, 对 AIS 患者的梗死核心和 WMH 病灶进行更精确的量化, 有助于对 AIS 患者进行临床早期评估和决策辅助支持。

PO-4033

基于增强 MRI 的深度学习术前预测肝细胞癌病理分级

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目的: 探讨基于增强 MRI 的深度学习术前预测肝细胞癌 (HCC) 病理分级的价值。

方法: 回顾性收集 2007 年 4 月至 2022 年 6 月期间进行上腹 MRI 检查且经术后病理证实的 341 例 HCC 患者, 包括 121 例低分化 HCC 和 220 例非低分化 (高分化、中分化) HCC, 按照纳入时间将病例按 7:3 分为训练集 (n=238) 和测试集 (n=103)。收集临床流行病学和实验室检查信息, 记录常规影像学征象, 输入特征编码器三层感知机构建临床-影像模型。在动脉期、门脉期和延迟期 MRI 图像上, 沿着肿瘤边缘手动勾勒感兴趣区。使用深度学习神经网络 DenseNet-121 构建 HCC 病理分级预测模型。分别使用联合拼接网络 (CAT)、张量融合网络 (TFN)、基于熵的张量联合拼接网络 (ETC) 进行多模态深度特征和临床影像特征融合。采用曲线下面积 (AUC)、准确性、敏感度、特异度及 F1 分数评估各模型的预测效能。

结果: DenseNet-121 神经网络预测 HCC 病理分级的效能高于临床-影像模型, 测试集 AUC、准确性、敏感度、特异度和 F1 分数分别为 0.782、78.12%、77.78%、78.57%、80.00% 和 0.721、64.06%、51.28%、84.00%、63.49%。CAT 融合模型 AUC 值 (0.774) 与 DenseNet-121 模型 (0.782) 和 ETC 融合模型 (0.778) 相当, 并获得最高的准确性 (81.25%)、敏感度 (77.78%)、特异度 (85.71%) 和 F1 分数 (82.35%) (表 1)。

结论: 基于增强 MRI 的深度学习模型能够有效地预测 HCC 病理分级, 多模态融合模型的预测性能最佳, 有潜力精准无创指导肝癌患者危险分层。

PO-4034

基于 MRI 半月板 3D 卷积神经网络模型预测
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目的: 基于 MRI 自动分割半月板并构建 3D 卷积神经网络模型预测 48 个月内膝骨关节炎的发生。

方法: 在这项前瞻性病例对照研究中, 数据均来自于公开数据库骨关节炎倡议 (Osteoarthritis Initiative, OAI)。我们随机选择基线时 OAI 数据库中的 130 例膝关节, 由两名肌骨诊断医师在 MR 图像上手动勾画半月板感兴趣区, 以建立半月板自动分割模型。在预测模型的构建中, 710 例有发生 KOA 风险的参与者来自 Pivotal OAI MRI Analysis 研究的骨关节炎发生队列, 所有膝关节的基线 Kellgren-Lawrence 等级 ≤ 1 。在 48 个月的随访期间, 病例参与者与对照参与者以 1:1 的比例进行匹配。MRI 按照在 KOA 发生的前 1 年时间点 (以下简称 P-1) 和基线进行分组, 构建 3D 卷积神经网络深度学习模型, 将数据集按照 7:1:2 的方式划分为训练集、验证集和测试集预测 KOA 是否发生。DICE 系数用于评估分割模型性能, 受试者工作特征曲线下面积 (area under the curve, AUC) 用于评估半月板 MRI、临床信息和 MRI 骨关节炎膝关节评分的预测价值。

结果: 本研究分割模型中测试集的 DICE 系数达 90.32%。预测模型测试集中, 在两个时间点时半月板 MRI (基线时 AUC: 0.60; P-1 时 AUC: 0.71) 都比临床信息 (基线时 AUC: 0.55; P-1 时 AUC: 0.63) 及 MRI 骨关节炎膝关节评分 (基线时 AUC: 0.52-0.56; P-1 时 AUC: 0.57-0.64) 表现出更强的预测能力, 并且在成对比较检验中存在显著差异。

结论：基于 MRI 半月板的 3D 卷积神经网络模型可较好预测未来 48 个月内膝关节炎的发生。

PO-4035

深度学习模型基于 MRI 对颈椎中央椎管、神经根狭窄程度分级

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目的：开发基于磁共振的颈椎中央管、神经孔狭窄自动检测和分类的深度学习模型，进一步实现全自动颈椎 MR 影像标准化报告书写

方法：连续性、回顾性收集 2020-2022 年第四人民医院、长征医院、长海医院颈椎 MR 的影像数据，同时收集病人临床资料。排除颈椎术后、肿瘤（血管瘤、原发及继发肿瘤等）、非肿瘤（骨折、骨髓水肿、终板炎、根袖囊肿等）、脊柱严重侧弯以及图像质量欠佳的患者，最后入组 829 名患者。序列主要包括水平位 T1WI、T2WI、矢状位 T1WI、T2WI，按照 7:3 的比例将患者分为训练组、验证组，训练组数据由两名放射科医生以及一名脊柱外科医生使用预定义的分级（正常、轻度、中度和重度）进行分类，开发了一个四分类深度学习模型。首先训练卷积神经网络（CNN）来检测感兴趣区域（ROI），对每个颈椎节段进行分割，并使用第二个 CNN 进行狭窄程度分级。计算模型准确度、召回率（百分比）、受试者间一致性、灵敏度和特异度。最终模型输出结构化影像学报告。

结果：以病人 ID 为单位，共截取 1752 张图分段后有 8760 个颈椎节段，去除其中分辨不清脊髓形态的图像，整个数据集一共 8007 张图，训练集一共 5595 例，分类为正常的颈椎节段 2329 例；轻度的 1736 例；中度 1194 例；重度 336 例。验证集一共 2412 例，分类为正常的颈椎节段 1076 例；轻度的 683 例；中度 512 例；重度 141 例。验证集四分类模型准确率 0.8993，测试集准确率 0.8992。结论：基于磁共振的深度学习模型对于颈椎中央管、神经孔狭窄程度分级可以提供客观、稳定和具有可重复性的评价。

PO-4036

基于胸部 CT 图像的肺炎深度学习分类预测模型

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目的：建立基于胸部 CT 图像的 AI 模型，实现对细菌、真菌、病毒性（包括 COVID-19）肺炎的快速分类预测。方法：回顾性收集来自多家医院的 559 例细菌性、真菌性及非 COVID-19 病毒性肺炎患者及 53 例 COVID-19 患者的影像资料，首先利用 Resnet_18，Efficientnet_b5，ViT，Swin_transformer 等 4 种典型的深度神经网络构建图像级三分类及四分类预测模型，在独立测试集中进行验证选出最优模型；然后分析采用单张图像和三张图像融合构建数据集对模型的影响；最后分别使用按图像类别占比投票及随机森林两种方法进行患者级分类预测。使用精确率、召回率、特异性、F1 值、AUC、准确率评估模型效能，最终筛选出表现最优的 AI 预测模型。结果：在图像级分类中 Swin_transformer 模型表现最佳，三分类准确率为 0.932，四分类准确率为 0.948。采用融合图像创建数据集的 Swin-transformer_c 模型效能得到进一步提升，在测试集中三分类准确率和 AUC 值分别为：0.931,0.989，四分类准确率和 AUC 值分别为：0.952,0.990。使用 Swin-transformer_c 模型进行患者级分类，采用随机森林的方法预测效能更佳，三分类准确率和 AUC 值分别为 0.984,0.987，四分类准确率和 AUC 值分别为 0.967,0.971。Resnet_18、Efficientnet_b5、ViT 三种网络也都取得了较好的效果，但总体效能低于 Swin-transformer 网络。结论：基于融合数据建立的深度学习模型 Swin-transformer_c 与其他四种模型相比在图像级分类中效

果最佳，其融合随机森林分类器在患者级分类中也取得了最优性能。表明深度学习可用于不同病原体感染所致肺炎类型的快速分类预测。

PO-4037

基于增强 ct 利用影像组学模型预测对结直肠癌卵巢转移疗效评估价值研究

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目的：结直肠癌（CRC）引起的卵巢转移（OM）并不常见，且预后较差。我们的研究旨在研究基于 CT 的放射组学模型在预测新辅助化疗后 CRCOM 疗效中的价值。

方法：回顾性共纳入 52 例接受新辅助化疗的结直肠癌患者纳入本研究。所有患者均接受了 1-3 个周期的氟尿嘧啶、卡培他滨或奥沙利铂为基础的新辅助化疗方案，并以实体肿瘤反应标准（RECIST v1.1）为金标准，分为反应组（R+）和无反应组（R-）。检索并分析他们的临床病理资料、CT 图像和病理报告。从基线 CT 图像中提取放射组学特征，并通过皮尔逊相关分析和最小绝对收缩和选择算子（LASSO）回归进行选择。利用不同的机器学习分类器，包括朴素贝叶斯（NBB）、线性判别分析（LDA）、逻辑回归（LR）、随机森林（RF）和支持向量机（SVM），构建了多个辐射组学模型。通过受试者工作特征（ROC）分析来评估这些模型的诊断性能，并通过校准分析和决策曲线分析（DCA）来评估其临床效用。

结果：52 例患者中 25 例（48.1%）归为应答组（R+）。选择了 5 个放射组学特征进行模型开发。在这些基于机器学习的放射组学模型中，SVM 模型在验证数据集中表现出最好的性能，AUC、准确性、灵敏度和特异性分别达到 0.903（95% CI、0.788-0.967）、88.5%、95.7%和 82.8%。所有的放射组学模型都显示出良好的校准，DCA 表明，SVM 模型在大多数阈值概率范围内比其他模型具有更高的净效益。

结论：采用 SVM 分类器的基于 ct 增强放射组学模型在预测接受新辅助化疗的结直肠癌患者卵巢转移方面具有良好的鉴别能力，有可能作为临床实践的无创工具。

PO-4038

Quantitative measurement of areas in lumbar disc paravertebral muscle and vertebral body with automatic segmentation based on nnU-Net in patients with degenerative spinal deformity

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To develop a deep learning program based on nnU-Net to explore the automatic segmentation of the paravertebral muscles and vertebral body in patients with degenerative spinal deformities. One hundred patients diagnosed with DSD were prospectively enrolled in study. Areas of multifidus muscle, erector spinae, psoas at the levels from L1/2 to L5/S1 intervertebral discs were assessment by two radiologists. A dice coefficient and Intersection over Union (IOU) named nnU-Net were trained and then to segmented automatically. The intraclass correlation coefficient (ICC) was calculated. The areas ICC of radiologists and nnU-Net model were strong consistency ($P>0.95$). We developed an automatic segmentation model based on nnU-Net, which could realize areas of

the paravertebral muscle and vertebral body in the DSD patients automatically, and overcome the interference of fascia and bone spur signals.

PO-4039

双源 CT 心脏+全主动脉一站式成像三低扫描方案在心尖入路经导管主动脉瓣植入术 (TAVI) 术前评估中的应用

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目的: 主动脉瓣狭窄是一种常见的疾病, 影响近 5% 的 75 岁以上人群, 随着老龄化发展, 该数据会持续增长。TAVI 手术发明前, 患者预后常发展至心衰、心脏移植, TAVI 手术发明后, 瓣膜功能恢复, 减少心脏功能损害, 延缓或避免心衰。详尽的术前评估是 TAVI 开展的关键之一, 通过对 TAVI 术前 CT 扫描方案的经验总结, 在达到术前评价的临床要求基础上, 减少患者扫描时间及辐射剂量, 不断优化扫描方案。方法: TAVI 术前评估, 通过研究背景、术前 CT 数据采集方法、经心尖入路主动脉根部术前 CTA 评估流程、主动脉根部和主动脉以及周围血管的扫描技术方案及相关评价进行分析。结果: 双源 CT 在主动脉根部扫描中发挥其特有优势, 心脏+全主动脉一站式扫描解决主动脉根部伪影干扰图像质量的问题, 三低方案得以实现, 控制并减少患者辐射剂量。结论: TAVI 术前评估虽然有先进的数据分析软件应用于人工瓣膜 3D 打印, 但是软件分析的基础是一套成体系的扫描方案和相关评价, 因此, 该扫描方案为临床提供高质量影像数据的同时, 减少扫描时间和降低辐射剂量。

PO-4040

基于人工智能的计算机辅助检测系统有助于放射科住院医师提高 PI-RADS 的诊断准确性和效率

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目的评估基于人工智能的计算机辅助诊断系统对经验不足的放射科住院医师评估前列腺 MRI 检查 PI-RADS 准确性及效率的影响。

方法本研究纳入了 2019 年 01 月至 2022 年 12 月之间接受前列腺 MR 检查的 1210 名患者。由 15 位放射科住院医师, 5 名阅片经验不足 1 年、5 名阅片经验不足 3 年, 5 名阅片经验不足 5 年, 随机对病例进行了两次评估, 一次没有人工智能的计算机辅助诊断系统 (AI-), 一次有辅助诊断系统 (AI+) 协助。计算 ROC 分析, 敏感性, 特异性, PPV 和 NPV 以比较两组 (AI-与 AI+) 之间前列腺癌诊断的准确性。评估 Spearman 的相关系数以评估 PI-RADS 类别与 Gleason 评分之间的关系。此外, 还比较了三个阅读组的中位阅读时间。

结果最终分析共纳入 183 名患者。在 AI 的帮助下, 阅片经验不足 1 年放射科住院医师的总体 AUC 从 0.54 显著增加到 0.80 ($p < 0.001$)。阅片经验不足 3 年放射科住院医师的总体 AUC 从 0.60 显著增加到 0.80 ($p < 0.001$)。阅片经验不足 3 年放射科住院医师的总体 AUC 从 0.63 显著增加到 0.81 ($p < 0.005$)。此外, 在 AI+组中, PI-RADS 类别与 Gleason 评分之间的相关性显著提高 (0.47 vs 0.62; $p < 0.05$), 而中位读取时间从 163 秒减少到 149 秒 ($p < 0.05$)。

结论人工智能的计算机辅助诊断系统提高了前列腺癌的诊断性能, 低年资的放射科住院医师获益最多。应用人工智能的计算机辅助诊断系统, 可以使经验不足的放射科住院医师 PI-RADS 的诊断准确性和效率得到提升。

PO-4041

预测膀胱癌肌层浸润状态的放射-代谢组学：一项初步研究

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目的：确定膀胱癌(BCa)的肌层浸润状态(MIS)对于治疗决策至关重要。我们试图确定肌层浸润性 BCa(MIBC)和非肌层浸润性 BCa(NMIBC)的差异代谢物，并将它们与 MR 放射组学特征(RF) 相关联，以初步探索放射组学预测 BCa MIS 的生物学验证。

材料和方法：我们收集了 26 名 BCa 患者（15 名 MIBC 和 11 名 NMIBC）的肿瘤组织，用于综合非靶向液相色谱-质谱和气相色谱-质谱（LC/MS, GC/MS）代谢组学分析。获得了其中 19 名患者（12 名 MIBC 和 7 名 NMIBC）的术前 MRI 数据。使用单变量分析（倍数变化(FC)分析和 t 检验）和多变量分析（正交偏最小二乘判别分析, OPLS-DA）筛选差异代谢物。KEEG 数据库用于通路分析以发现失调的代谢通路（ $p < 0.05$, 影响系数 (IM) > 0.1 ）。从术前 MRI 的 T2WI 和 DWI 中提取 RF。在使用组内相关系数和学生 t 检验进行初步筛选后，使用 Pearson 相关系数将 RF 与失调的途径中的代谢物相关联。接受者操作特征曲线用于评估 RF 在预测 BCa 的 MIS 中的诊断性能。

结果：代谢组学共鉴定出 350 个显著差异代谢物，失调的代谢途径主要为氨基酸合成途径（与 NMIBC 组相比，MIBC 组代谢物在氨酰生物合成、精氨酸合成、丙氨酸生物合成、半乳糖代谢和嘧啶代谢等方面显著上调， $p < 0.001$, IM=0.167; $p = 0.002$, IM=0.421; $p = 0.009$, IM=0.455; $p = 0.004$, IM=0.124; $p = 0.019$, IM=0.163）。在这 5 条代谢途径中检测到 24 种差异代谢物。我们在放射组学分析中初步筛选出了 432 个差异 RF。根据 Pearson 相关系数大于 0.75 筛选出 11 个放射-代谢组学特征对。筛选的 RF 能够评估 MIS (AUC=0.679-0.893)。

结论：确定了可以预测 BCa MIS 的代谢途径，并且与 MRI RFs 高度相关，这可能部分解释了为什么放射组学可以预测 BCa MIS。

PO-4042

基于多任务深度学习的全过程系统可自动诊断乳腺病变和预测腋窝淋巴结转移：多中心研究

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目的：准确诊断乳腺病变的良恶性和腋窝淋巴结转移对于乳腺患者的手术和治疗至关重要，但这在很大程度上依赖于放射科医生的经验。我们的目的是利用动态对比增强磁共振成像来构建一个基于深度学习的全过程系统（DLWPS），用于乳腺病变的分割和诊断。然后预测乳腺癌患者腋窝淋巴结转移，并进一步探讨其预测的生物学基础。

方法：在这项多中心研究中，我们收集了烟台毓璜顶医院（2017-2021 年 1586 例患者）和三家外部医院（2017-2019 年 174 例患者）的数据对 DLWPS 进行开发。DLWPS 包括分割模型和分类模型，首先，将融合注意力和边缘特征提取模块的 UNet 框架纳入我们的分割模型来分割乳腺病变。然后，将三个网络（ResNet101、ResNeXt101 和 DenseNet）融合作为分类模型来进行乳腺癌诊断和腋窝淋巴结转移预。在内部和外部测试集中评估 DLWPS 的性能，并使用骰子相似度系数（DI）评估分割性能。根据受试者工作特征曲线下的面积（AUC）、准确性、敏感度和特异性进行分类模型评估。此外，在外部测试集中探索了三名放射科有无 DLWPS 辅助诊断的结果。为了揭示 DLWPS 的潜在生物学基础，我们基于 RNA 测序数据进行了遗传分析。

结果：在内部和外部测试集中，分割模型的 DI 分别达到 0.828 和 0.813。在乳腺病变诊断中，DLWPS 在内部试验集和外部测试集的 AUC 分别为 0.973 和 0.936。对于腋窝淋巴结转移预测，

DLWPS 在内部测试集和外部测试集的 AUC 分别为 0.927 和 0.917。通过 DLWPS 的帮助，放射科医生的表现有所提高。在探索生物学基础上，我们发现 DLWPS 得分高与有氧电子传递链和细胞质翻译途径有关。

结论：根据 DLWPS 的性能我们发现 DLWPS 可以促进放射科医生对乳腺病变和腋窝淋巴结状态的判断。

PO-4043

基于 CT 和深度学习预测肾透明细胞癌病理分级

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目的：构建基于皮质髓期增强 CT 图像预测肾透明细胞癌（ccRCC）WHO/ISUP 分级的智能模型，为进一步的诊疗和预后评估提供一种有效、无创的方法。

方法：将 210 例肾肿瘤术前增强 CT 图像和 211 例分别来自浙江大学第一附属医院（n=94）和浙江省人民医院（n=117）ccRCC 术前增强 CT 图像纳入本回顾性研究。使用 KiTS19 公开数据集和部分本地 ccRCC 数据（n=60）基于 3D U-Net 和 3D-Res-UNet 两种网络架构构建肾肿瘤分割模型，并进行评价指标的比较。再使用另一部分本地数据（n=40）进行对 3D-Res-UNet 分割模型进行微调。基于分割结果，构建结合 3D-Resnet-18 提取的深度特征和放射组学特征的混合模型以预测 ccRCC 病理分级，并采用受试者工作特征曲线（ROC）来评价其诊断性能。

结果：基于 3D U-Net 和 3D-Res-UNet 构建的肾肿瘤分割模型的平均 Dice 相似系数（DSC）分别为 0.759 和 0.814。微调前后 3D-Res-UNet 分割模型对 ccRCC 的平均 DSC 分别为 0.718 和 0.835。混合模型在鉴别 ccRCC 的病理分级方面表现出良好的性能，曲线下面积（AUC）为 0.941（95% CI: 0.863-1.000）。

结论：人工智能模型在肾肿瘤的分割和鉴别 ccRCC 的病理分级方面具有良好的性能。该方法为基于皮质髓期 CT 图像的自动预测 ccRCC 分级提供了一种很有前途的方法。

PO-4044

基于 Bp-MRI 及 P504s、34 β E12、P63 表达状态影像组学模型预测早期前列腺癌

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目的 探讨双参数（biparametric, bp）MRI 影像组学预测前列腺 P504s、34 β E12、P63 表达状态的可行性，进而预测早期前列腺癌。方法 回顾性收集本院 2021 年 1 月到 2023 年 5 月符合入组条件共 67 例患者资料，其中前列腺癌 40 例，前列腺增生 27 例。使用 3DSlicer 软件在 T2WI、DWI 及 ADC 三个序列的图像上逐层勾画感兴趣区域（ROI）。用 Pyradiomics 在各序列 ROI 中提取影像特征。采用合成少数过采样技术（SMOTE）处理数据不平衡。所有病例按照 6: 4 的比例随机分为训练组和测试组，采用方差选择法、Spearman 相关性分析、曼-惠特尼秩和检验及最小绝对收缩和选择算子（LASSO）算法进行特征降维和选择，根据算出的影像组学积分（Rad score）建立影像组学模型。通过单因素及多因素 Logistic 回归分析筛选临床独立危险因素构建临床模型。选取最佳组学模型与临床模型构建联合模型。使用受试者工作特征（ROC）曲线下面积（AUC）来评价各模

型的诊断效能, Delong 检验比较联合模型、组学模型及临床模型的诊断效能。采用 Hosmer-Lemeshow 拟合优度检验并绘制校准曲线及决策曲线 (DCA) 评估模型的诊断效能和临床有效性。**结果** 多因素分析显示血红蛋白 (截断值 $HGB \leq 147 U/L$) 和血尿 (高倍视野/ $RBC \geq 3$ 个) 为临床独立预测因子。联合模型、组学模型及临床模型在训练组中 AUC 分别为 0.960、0.939、0.773; 在测试组中 AUC 分别为 0.871、0.843、0.659。Delong 检验显示临床模型的纳入并没有提高诊断的效能, 所以选择影像组学模型为最终预测模型其敏感度 92.00%, 特异度 86.96%。**结论** HGB 和血尿为前列腺癌临床独立预测因素, 基于 bpMRI 影像组学模型能有效预测前列腺 P504s、34 β E12、P63 表达状态, 可为早期预测前列腺癌提供客观依据。

PO-4045

基于非对比增强 CT 的影像组学特征预测白血病 脑出血患者死亡风险的研究

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目的: 研究基于非对比增强 CT (NECT) 的影像组学模型在预测白血病脑出血患者 30 天死亡风险的价值, 为临床提供新的计算机辅助诊断工具。

方法: 回顾性分析 2007 至 2023 年间在北京大学人民医院由 CT 诊断脑出血的 129 例白血病患者的 CT 图像及临床资料, 采用随机森林回归方法对缺失数据进行逐个补全。临床实验室数据 (共 14 个特征) 为脑出血发生时及确诊白血病时的数据, CT 图像特征 (共 67 个特征) 分为 11 种语义特征及基于影像组学方法提取的 56 种几何特征。在训练集中, 采用单因素 logistics 方法筛选临床因素, 随后使用最小绝对收缩和选择算子 (LASSO) 和十则交叉验证进行临床实验室数据和 CT 图像特征筛选, 分别得到当前特征集合的最优特征集, 使用随机森林算法进一步构建临床模型和影像组学模型。在模型评价中, 采用受试者工作特征曲线 (ROC) 以及曲线下面积 (AUC)、校准曲线及临床决策曲线 (DCA) 分别评估模型在训练集和测试集的区分度、校准度及临床效用, 并使用 Delong 检验比较模型之间的 AUC。

结果: 基于上述特征筛选过程, 临床模型最终由 10 个临床实验室特征组成, 重要性由高到低前五位分别为: 活化部分凝血活酶时间、乳酸脱氢酶、凝血酶活动度、血红蛋白及 D 二聚体。影像组学模型由 7 个特征构成, 重要性由高到低分别为: 病灶短径总和、周长平均值、短径平均值、实质深部出血、多中心出血、幕下出血及硬膜下出血。临床模型和影像组学模型在训练集和测试集预测 30 天不良预后的 AUC 分别为 0.872、0.775 及 0.876、0.752。Delong 检验提示两个模型之间的 AUC 值没有统计学差异 ($p > 0.05$)。两个模型的校准曲线、DCA 曲线略有区别, 但总体差别不大。**结论:** 基于临床和 NECT 图像特征分别构建的模型在预测白血病脑出血患者 30 天死亡风险方面均具有良好的性能和临床价值并且表现接近。

PO-4046

基于静息态功能磁共振评估网络游戏障碍患者大脑内在 局部连接的静态和动态改变

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目的: 探讨网络游戏障碍患者大脑内在局部连接的静态和动态改变, 以及这些改变与 IGD 临床特征的相关性。

材料与方法：前瞻性分析 2021 年 9 月至 2022 年 12 月通过微信等网络平台在郑州大学第一附属医院招募的 80 例志愿者的临床及影像资料，根据纳入和排除标准分为网络游戏障碍组 36 例，对照组 44 例。基于 Matlab 平台计算并比较两组间静态和动态区域一致性，以探究网络游戏障碍患者大脑内在局部连接的改变。使用网络成瘾测试和匹兹堡睡眠质量指数分别评估网络游戏成瘾和睡眠质量的严重程度。采用 Pearson 相关分析评估静态和动态区域一致性改变的脑区与网络成瘾测试评分和匹兹堡睡眠质量指数评分之间的相关性。采用受试者工作特征 (receiver operating characteristic, ROC) 曲线分析探究静态和动态区域一致性指标区分网络游戏障碍患者和对照的潜在能力。

结果：与对照组相比，网络游戏障碍患者组在双侧内侧额上回、额上回和辅助运动区的静态和动态区域一致性均增加，在左侧壳核、苍白球、尾状核和双侧丘脑的动态区域一致性增加。ROC 曲线分析显示静态和动态区域一致性改变的脑区可以区分网络游戏障碍患者和对照。此外，左内侧额上回和辅助运动区的静态区域一致性值以及左侧辅助运动区的动态区域一致性值与网络成瘾测试评分呈正相关，左侧尾状核的动态区域一致性值与匹兹堡睡眠质量指数评分呈负相关。

结论：这些结果表明网络游戏障碍患者额叶-纹状体-丘脑回路的内在局部连接受损，为网络游戏障碍的潜在神经病理机制提供了新的见解。此外，尾状核内在局部连接的动态变化可能是连接网络游戏障碍与睡眠质量的一种潜在神经生物学标志物。

PO-4047

利用深度学习算法对血氧依赖水平功能磁共振进行高时间-空间分辨率重建

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血氧水平依赖 (Blood oxygen level-dependent, BOLD) 功能磁共振成像 (Functional magnetic resonance imaging, fMRI) 可以通过血氧饱和度的变化无创地分析患者的脑功能状态。然而，由于其较低分辨率和有限的结构信息，目前还无法直接应用于图像计算。针对这一问题，我们提出利用 BOLD-fMRI 的时间维度特征解决方案，通过构建超分辨率重建网络来匹配结构 MRI 的分辨率特征；并提出一个多模态特征提取器和特征融合模块，以更好地从结构和功能 MRI 两种序列中提取有效结构及功能信息；随后，利用提取到的多模态信息构建分割网络，对小脑及周围结构进行自动分割；最后，由 2 名神经影像科医生对重建后高分辨率 BOLD 序列及小脑自动分割图像进行准确性评估。

PO-4048

70KVp 管电压联合人工智能迭代重建算法显著提高了肺癌全身对比增强 CT 的图像质量，同时降低了造影剂剂量和辐射剂量

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目的：探讨使用 70KVp 管电压联合人工智能迭代重建 (AIIR) 算法，在低造影剂剂量和辐射剂量方案下用于全身对比增强 CT 的图像质量和病灶可评估性，并与标准剂量迭代重建 (IR) 进行比较。
方法：前瞻性纳入连续 50 例肺癌患者 (平均年龄 58 ± 14 岁，平均 BMI $24.5 \pm 4.7 \text{ kg/m}^2$)。所有患者均接受了至少两次全身对比增强 CT 随访检查。其中一次检查采用标准剂量 CT (SDCT) (120 kVp, 对比剂量 1.2 mgI/kg)，用 IR (SDCT-IR) 重建图像。另一次检查中，患者接受低剂量 CT (LDCT) 扫描 (70 kVp, 对比剂量 0.8 mgI/kg)，用 IR (LDCT-IR) 和 AIIR (LDCT-AIIR) 重建

图像。测量噪声、信噪比 (SNR) 和对比噪声比 (CNR) 以进行客观分析。主观图像质量和病灶可评估性由两名不知情的放射科医生使用 5 分量表进行评分。记录有效辐射剂量和造影剂剂量。结果: 与 SDCT 相比, 的造影剂剂量和有效辐射剂量分别显著降低了 34% 和 70% ($P < 0.05$)。与 LDCT-IR 图像相比, LDCT-AIIR 图像噪声较低, 信噪比和 CNR 较高。对于主观图像质量和病灶可评估性, LDCT-AIIR 和 SDCT-IR 图像之间没有显著差异 ($P > 0.05$)。结论: AIIR 算法显著降低了肺癌全身对比增强 CT 的造影剂剂量和辐射剂量, 同时保持了与标准剂量 IR 算法相当的图像质量。

PO-4049

基于胸部 CT 心外膜脂肪影像组学列线图诊断 冠状动脉慢血流的价值

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目的 探讨基于胸部 CT 心外膜脂肪的影像组学列线图诊断冠状动脉慢血流的价值。

方法 收集 2020 年 1 月至 2021 年 12 月在我院行冠状动脉造影显示冠状动脉狭窄程度 $< 40\%$, 并在造影前 2 周内行胸部 CT 的患者 337 例, 根据冠状动脉造影的心肌梗塞溶栓治疗血流分级, 将患者分为慢血流组 (102 例) 和正常血流组 (235 例)。建立一种半自动分割心包和测量心外膜脂肪的方法, 在胸部 CT 纵隔窗图像上提取心外膜脂肪及参数。按 7: 3 比例随机分为训练集 236 例和验证集 101 例, 提取影像组学特征。利用相关性分析及最小绝对收缩和选择算子回归进行特征筛选, 并构建影像组学模型, 在此基础上绘制列线图。利用受试者工作特征曲线下面积 (AUC) 评估列线图诊断冠状动脉慢血流的效能, 通过校准曲线对列线图进行内部及外部验证, 最后应用决策曲线分析评估列线图的临床应用价值。

结果 经特征筛选后最终保留 10 个影像组学特征用于建立诊断冠状动脉慢血流的列线图。列线图在训练集中诊断冠状动脉慢血流的 AUC 为 0.86 (95%CI 0.82-0.91), 准确度为 0.79, 灵敏度为 0.82, 特异度为 0.91; 验证集中 AUC 为 0.78 (95%CI 0.72-0.80), 准确度为 0.71, 灵敏度为 0.67, 特异度为 0.88。校准曲线结果显示列线图与冠脉造影结果之间具有良好的一致性, 决策曲线分析表明列线图在临床上具有良好的应用价值。

结论 基于胸部 CT 心外膜脂肪影像组学列线图对冠状动脉慢血流有较好的诊断效能, 可准确、无创地指导临床决策。

PO-4050

人工智能在乳腺摄影质量控制中的应用评价

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目的: 据 2020 年统计, 乳腺癌是全球新诊断癌症最常见的类别, 占 11.7%, 其次是肺癌 (11.4%)、结直肠癌、前列腺癌和胃癌。乳腺 X 线摄影仍是当前乳腺癌早期诊断的重要手段之一, 合格的图像质量是乳腺癌诊断的重要保证, 更是乳腺癌人工智能诊断的前提。国际上乳腺摄影的质量控制工作已经作为一项法规确定下来。本单位引入一套基于人工智能的质量控制评价系统, 现介绍该系统应用在乳腺摄影质量控制中的初步经验, 探讨其可靠性和临床意义。

方法: 在质控评价系统后台统计 2021 年 8 月 1 日至 2021 年 9 月 15 日接收的全部乳腺图像, 包括双侧乳腺侧斜位和轴位片, 评价指标为 MLO 位胸大肌在乳头后线上方、MLO 位胸大肌在乳头后线偏上、CC 位乳头完全内陷、CC 位乳头部分内陷、MLO 位乳头完全内陷、MLO 位乳头部位内陷、

CC 位乳头显影不全, MLO 位乳头显影不全、CC 位乳头指向不平行, 乳头后线差值过大、乳头后线差值偏大以及 MLO 位胸大肌不可见等 12 项, 最终对系统自动生成的质量评价结果进行分析。

结果: 本系统将乳腺摄影图像质量评价结果分为优秀、中等与不合格三个等级, MLO 位胸大肌在乳头后线上方判定为不合格, 出现其余 11 项评价指标, 无论多少项均判定为中等。最终共纳入 522 只乳腺 DR 图像, 优秀率为 1.5%, 中等率为 69.3%, 不合格率为 23.9%; 评级为优秀者多见于胸部正位; 判定为中等的病例, 扣分项前四个指标分别为 MLO 位胸大肌在乳头后线偏上 (90%)、MLO 位乳头部位内陷 (47.7%)、乳头后线差值过大 (47.1%) 和 CC 位乳头指向不平行 (46.9%)。

结论: 本套 X 线摄影质控评价系统对接收到的乳腺图像可进行实时、客观的图像等级评价, 有望在乳腺摄影质量控制中发挥重要的价值。该质控系统评价的不合格率较高, 可能与训练集数据的来源机构单一有关, 有必要纳入更复杂的临床环境进一步学习验证以提高其应用效能。

关键词: 乳腺摄影; 人工智能; 质量控制;

PO-4051

基于深度学习磁共振血管成像脑动脉瘤自动检测效能研究

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目的 利用时间飞跃法磁共振血管成像, 通过人工智能全网络卷积计算机辅助检测方法对脑动脉瘤进行全自动检测, 探讨其诊断效能。

方法 选择 2018 年 3 月—2021 年 11 月在浙江中医药大学附属第一医院行常规 TOF-MRA 检查 65 例非破裂颅内囊状动脉瘤患者的影像, 分为训练集(45 例)、内部测试集(20 例)。采用基于全网络卷积的计算机辅助检测方法, 对 TOF-MRA 影像进行预处理, 进行全自动颅内血管分割, 获得感兴趣区域, 并在分割结果的基础上, 引入医师的标注。分别对 V-Net 及 OTO-Net 网络模型进行训练调参, 利用得到的模型进行脑动脉瘤区域的自动检测。

结果 OTO-Net 模型在 ZPHT 和 ADAM2020 数据集上识别与分割颅内动脉瘤的准确率分别是 98.37% 与 97.86%, ASD 达到 0.753, DSC 达到 0.9813, HD 达到 0.642mm。

结论 OTO-Net 模型能够实现对颅内动脉瘤 MRA 图像的自动检测与精准分割, 可以胜任辅助放射科医生对颅内动脉瘤患者 MRA 检查进行量化分析和评估的任务。

PO-4052

基于 13N-氨水心肌灌注显像神经网络结合影像组学模型预测心肌存活

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目的: 心肌存活的准确诊断对于后续的治疗策略尤为重要。心肌灌注显像联合 FDG 心肌代谢显像可以从灌注代谢匹配程度中诊断心肌存活情况, FDG 心肌代谢显像是诊断心肌存活的金标准, 但其图像质量易受葡萄糖水平调节的影响, 可能带来额外的辐射风险和经济成本。因此, 本研究旨在探索一种基于氨水心肌灌注显像的方法, 利用神经网络和机器学习模型预测心肌存活, 为临床提供一个新的诊断工具。

方法: 收集于我院一日法行负荷+静息 13N-氨水显像和 18F-FDG 心肌代谢显像的 48 例患者信息, 灌注显像左心室断层图像共 480 张, 将图像输入 resnet 101 网络中进行训练, epoch=100, 训练完成后将网络作为特征提取器, 提取断层图像的结构化特征数据, 输出神经网络最后一层平均池化层

的特征。随后采用 t 检验和最小绝对值收缩和选择算子 (Least Absolute Shrinkage and Selection Operator, LASSO) 进行特征筛选, 建立了 K 近邻 (K-Nearest Neighbors, KNN) 模型、逻辑回归 (Logistic Regression, LR) 模型、支持向量机 (Support Vector Machine, SVM) 模型。我们采用受试者工作特征曲线下面积 (Area Under the Receiver Operating Characteristic Curve, AUC) 来对模型效能进行评估。

结果: 在测试集中, 各模型都展现了较高的分类准确性, 在心肌存活预测上具有良好的鉴别能力 LR 模型、SVM 模型、KNN 模型的 AUC 值分别为 0.73、0.75、0.72, SVM 模型表现略优。

结论: 本研究证实了基于氨水心肌灌注显像的机器学习模型在心肌存活预测上的有效性。为心血管疾病的诊断和治疗提供了新的研究方向, 为未来临床实践提供了一个无需依赖 FDG 的高效、准确的诊断工具, 有望进一步提高心肌存活的诊断准确性。

PO-4053

基于肺结节 CT 影像特征及人工智能软件 定量特征预测肺腺癌生长模式

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目的: 基于肺结节 CT 影像特征及人工智能 (AI) 软件定量特征建立预测肺腺癌生长模式模型, 探讨其在鉴别贴壁生长模式肺腺癌与非贴壁生长模式肺腺癌中的应用价值。

方法: 回顾性分析河北医科大学第四医院于 2020 年 1 月至 2020 年 12 月术前 CT 影像表现为磨玻璃结节 (GGN) 且经手术病理证实为肺腺癌的 191 例患者 (共 204 枚 GGN) 的临床及影像资料。记录患者的年龄、性别、吸烟史; 分析各枚 GGN 的影像特征 (位置、结节类型、瘤肺界面、深分叶征、毛刺征、空泡征、内部血管征、支气管异常征、胸膜牵拉征); 通过 AI 软件计算各枚 GGN 的定量特征: 平均直径、总体积、总质量、实性成分 (CT 值 \geq -50HU 区域) 体积占比及质量占比、各枚 GGNCT 值的最大值、最小值、平均值、中位数、标准差、偏度、峰度、熵。根据术后病理结果, 按照生长模式将入组的 GGN 分为贴壁生长模式肺腺癌 136 枚和非贴壁生长模式肺腺癌 68 枚。采用单因素和多因素 logistic 回归分析筛选与肺腺癌生长模式高度相关的 CT 影像特征及 AI 定量特征, 据此建立预测肺腺癌生长模式的模型。采用 ROC 曲线评价模型的诊断效能, 计算模型的曲线下面积 (AUC), 采用 Delong 检验对各独立预测因素及组合模型的 AUC 进行比较。

结果: 单因素及多因素 logistic 回归分析显示支气管异常征、平均直径、实性成分体积占比、实性成分质量占比是鉴别肺腺癌生长模式的独立预测因素, 据此建立预测肺腺癌生长模式组合模型, 该模型的 AUC 为 0.871, 灵敏度为 79.4%、特异度为 83.1%, 准确率为 84.8%, 诊断效能高于单一独立预测因素的诊断效能 (支气管异常征、平均直径、实性成分体积占比、实性成分质量占比的 AUC 分别为: 0.728、0.831、0.780、0.779)。

结论: 基于肺结节 CT 影像特征及 AI 软件定量特征建立的预测肺腺癌生长模式模型具有良好的诊断效能, 可为临床治疗决策提供依据。

PO-4054

基于 CCTA 的冠状动脉周围脂肪组织影像组学诺模图 预测主要心脏不良事件的多中心研究

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目的 评价基于冠状动脉血管造影 (CCTA) 的冠状动脉周围脂肪(PCAT)预测主要心血管不良事件(MACE)的价值。

方法 回顾性纳入从 2019 年 6 月至 2022 年 12 月我院 314 名疑似或已有 CAD 患者的数据, 来自另外两家医院的共计 242 名患者被纳入作为外部验证集。终点事件是 1 年随访后发生 MACE。MACE 包括:心血管源性死亡、新发心肌梗死、心力衰竭住院(或再入院)、以及 CCTA 检查后超过 30 天的冠状动脉靶血管血运重建。所有患者都接受了 CCTA 扫描。从 CCTA 图像的横断位最佳舒张期期相中提取影像组学特征, 并通过特征选择组合算法进行特征降维, 以构建影像组学特征模型。采用单因素和多因素分析评估临床因素。多因素逻辑回归分析用于构建一个临床-影像学-影像组学联合模型。绘制受试者工作特征(ROC)、校准和决策曲线分析(DCA)曲线, 并计算 ROC 曲线下面积(AUCs), 以评估临床模型、影像组学模型以及联合模型的预测性能。

结果 最终确定了 12 个与 MACE 高度相关的影像组学特征, 以开发影像组学模型。多因素逻辑回归结果显示, 吸烟、年龄、高血压和血脂异常和 MACE 显著相关。在使用临床参数、影像学参数和影像组学参数的整合模型(诺模图)中, 诊断性能如下: 0.970 AUC, 0.949 准确率(ACC), 0.833 敏感性(SEN), 0.981 特异性(SPE), 0.926 阳性预测值(PPV), 0.955 阴性预测值(NPV)。校准曲线表明该诺模图具有良好的一致性, 决策曲线分析表明该诺模图具有较高的临床实用性。

结论 整合基于 CCTA 的 PCAT 影像组学特征、临床指标以及影像学参数的诺模图可以成为预测 MACE 的有潜力的工具。

PO-4055

基于 Pix2Pix 生成对抗网络生成 40KeV 虚拟单能量 CT 图像及图像质量评价

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目的: 探索应用生成对抗网络(GAN)生成 40keV 虚拟单能量图像(gVMI_{40keV}), 以替代 VMI_{40keV} 的可行性。

方法: 回顾性收集 2021 年 1-6 月本院行上腹部 IQon CT 平扫+增强扫描患者 444 例, 按 7:3 比例分成训练组和验证组, 应用门静脉图像建立并训练 Pix2Pix-GAN 模型。验证组中, 计算 MAE、PSNR、SSIM 等指标选择最佳生成器模型。回顾性随机收集 7-12 月无明显病变 58 例为测试组 1、肝癌 40 例测试组 2、肝癌公共数据集 100 例测试组 3 并行主观与客观评价。测试组 1 中测量 gVMI_{40keV} 及 VMI_{40keV} 肝胰脾、皮下脂肪、主动脉、竖脊肌的 CT 值、噪声及 SNR 并行相关性分析及制作 Bland-Altman 图; 测试组 2 中比较 gVMI_{40keV} 与 VMI_{40keV} 肝癌、肝组织 CT 值、噪声与 CNR; 测试组 3 中比较 gVMI_{40keV} 和常规 CT 图像中肝癌的 CT 值、噪声以及 CNR。采用 5 分法对测试组 1 和测试组 2 中 gVMI_{40keV} 与 VMI_{40keV}、测试组 3 中 gVMI_{40keV} 与常规 CT 图像, 根据图像质量及噪声进行主观评分, 比较两组图像的差异。

结果: 第 192 步为最佳生成模型, 在验证组 MAE 最小, PSNR, SSIM 最大。测试组 1 中 gVMI_{40keV} 与 VMI_{40keV} 在各个器官的 CT 值、噪声和 SNR 显著正相关。Bland-Altman 显示两种图像之间的差值基本在 95%置信区间内。测试组 2 中 gVMI_{40keV} 与 VMI_{40keV} 在肝癌、肝组织的 CT 值、噪声和

CNR 显著正相关。Bland-Altman 显示两组图像之间的差值在 95%置信区间内。测试组 3 中 gVMI_{40keV} 中肝癌、肝组织的 CT 值、噪声、CNR 的中位数均高于常规 CT 图像，两组图像存在统计学差异。测试组 1 与测试组 2 中 gVMI_{40keV} 与 VMI_{40keV} 在图像质量、噪声的差异均无统计学意义，测试组 3 中 gVMI_{40keV} 图像质量优于常规 CT 图像，有统计学意义。

结论：GAN 具备将常规 CT 图像生成 gVMI_{40keV} 的能力，且 gVMI_{40keV} 与 VMI_{40keV} 高度相似，可能为不具备能谱 CT 的医疗机构提供新影像诊断工具。

PO-4056

联合多尺度影像组学及病理组学模型预测肾透明细胞癌 SSIGN 风险评分

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目的：SSIGN 评分是一种基于肿瘤分期、大小、局部淋巴结转移、核分级和肿瘤凝固性坏死病理变量的多因素预后评分系统，用于评估肾透明细胞癌（ccRCC）患者的生存和转移风险。根据评分，ccRCC 患者可分为低风险组（0-3 分）、中风险组（4-7 分）和高风险组（8 分以上）。本研究旨在探索联合影像组学和病理组学特征构建术前 SSIGN 评分的预测模型。

方法：本研究收集了贵州省人民医院 344 例单中心 ccRCC 患者的术前 CT 影像数据和术后全数字病理扫描切片（WSI）HE 病理数据。患者根据 SSIGN 评分分为低风险组（0-3 分）及中高风险组（4 分以上），同时患者也随机分为训练集（275 例）和验证集（69 例）。使用 pyradiomics 软件从 CT 影像中提取了 234 个影像组学特征，使用 cellprofile 软件从 WSI 病理切片中提取了 156 个病理组学特征。对影像组学特征和病理组学特征分别进行标准化处理，然后使用 LASSO 回归对其进行筛选，选择前 20 个系数绝对值最大的特征作为最终的影像组学特征和病理组学特征。基于这些特征，我们构建了以下三种预测模型：单一尺度影像组学模型、单一尺度病理组学模型、多尺度融合模型。我们使用受试者工作特征曲线下面积（AUC）、准确率、敏感度和特异度等指标评估了模型的性能。

结果：在训练集和验证集上，多尺度融合模型加权平均在预测 SSIGN 评分低风险组和中高风险组方面均优于其他两种模型，其 AUC 分别为 0.87 和 0.86。单一尺度影像组学模型次之，其 AUC 分别为 0.82 和 0.81。单一尺度病理组学模型最差，其 AUC 分别为 0.77 和 0.74。

结论：本研究表明，联合影像组学和病理组学特征可以有效地预测 ccRCC 患者的 SSIGN 评分，为临床决策提供有价值的信息。未来，我们将进一步优化我们的预测模型，并在更大规模的数据集上进行验证。

PO-4057

基于 MRI 和多参数级联网络的腮腺肿瘤分割

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目的腮腺肿瘤约占头颈部肿瘤的 2%-10%。手术切除腮腺肿瘤是其主要治疗方法，但是其手术前的误诊率很高。而且不同性质及亚型的唾液腺上皮性肿瘤在手术方式、是否放化疗、清扫淋巴结、保留面神经等治疗方式上有很大的不同。因此术前有必要为腮腺肿瘤的分割建立更客观有效的影像评估模型，实现对腮腺肿瘤的定性诊断，对于临床治疗方案的制定及患者预后的评估具有重要意义。

方法

我们收集了单中心 120 例多参数 MR 的腮腺图像, 包括训练数据集(80%)和测试数据集(20%), 我们结合 Unet++和 Resnet 优点设计了 ResUnet++, 在 UNet++的基础上引入残差结构以及实例归一化来缓解梯度消失或梯度爆炸等问题和缩减网络收敛的时长。我们采取深度监督进行联合学习, 设计了级联多参数 ResUnet++网络结构, 级联网络的第一个网络结构就是采用 3D ResUnet++网络结构; 通过这个网络得到 T1WI(T1w)、T2WI-FS(T2)、T1WI-FS+C(T1wC)的分割结果, 接着将这三个不同模态的分割结果作为上下文信息分别与 T1WI、T2WI-FS、T1WI-FS+C 一起作为第二个网络 3D ResUnet++的六通道输入, 从而实现了腮腺肿瘤感兴趣区域的分割。为了进一步验证该算法的分割性能, 本文设计了一系列对比实验。

结果从表 1 我们可以看到级联多参数 ResUnet++模型在测试集上的 Dice 相似系数为 86.5%, 敏感度为 84.7%, 精确度为 89.6%, 级联多参数 ResUnet++网络的分割结果明显好于其他 2D/3D 单参数分割网络。相比表 1 的其他网络, 级联多参数 ResUnet++网络分割结果各个分割指标都有一定的提升。

结论实验结果表明, 本文的分割方法对肿瘤具有良好的分割效果。我们提出了一个级联多参数 ResUnet++分割网络, 该网络利用多个视角的多参数上下文信息, 通过不同深度的 Unet 整合了不同层次的特征, 使用深度监督进行联合学习, 同时考虑了三维图形层与层之间的空间信息以及多种不同参数 MR 的信息, 提升了腮腺肿瘤分割的准确度。希望本文提出的方法能够有助于医生评估腮腺肿瘤的不同亚型, 进一步辅助医生制定临床治疗方案。

PO-4058

基于自体模校正的 PL-QCT 在骨密度及身体成分检测的应用初探

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目的 针对双能 X 线骨密度检测 (DXA) 受增生骨质和血管钙化干扰以及传统 QCT 受制于匹配 CT 设备问题, 本研究的目的是验证基于自体模校正的 QCT(PL-QCT)在椎体骨密度检测效能方面与传统 QCT(PB-QCT)以及 DXA 比较, 同时对基于薄层 (2mm) 和厚层 (10mm) CT 图像进行 PL-QCT 椎体骨密度检测结果的一致性进行探究。**方法** 回顾性分析 2022 年 1 月-2022 年 4 月于云南大学附属医院同时进行了 DXA 骨密度、QCT 骨密度检测的体检对象 80 例, 对符合纳入标准并最终入组的研究对象依据年龄段进行分组, 分别采用 PB-QCT 以及 PL-QCT 对图像进行分析, 同时搜集入组研究对象的 DXA 骨密度检测结果; 由于目前临床测量骨密度的“金标准”是 DXA, 故以 DXA 的骨密度检测结果作为诊断参考; 将 PL-QCT 骨密度检测结果与 PB-QCT 以及 DXA 进行比较; 此外, 所有研究对象进行 PL-QCT 骨密度检测时均同时使用厚层 (10mm)、薄层 (2mm) CT 图像进行分析, 由此来验证基于厚层图像与薄层图像检测骨密度的一致性。**结果** BMD 检测结果显示, PL-QCT 能获得与 DXA 和 PB-QCT 一致的骨密度检测能力; 对厚层 CT 图像 (10mm) 与薄层 CT 图像 (2mm) 检测骨密度获得的结果进行验证, 结果显示差异无统计学意义 ($P>0.05$), 线性回归方程 ($Y=bX+a$)、相关系数 r 或决定系数 R^2 分析符合线性要求。**结论** 基于自体模校正的 QCT (PL-QCT) 与传统 QCT (PB-QCT) 以及 DXA 骨密度检测结果呈现一致性, 具有巨大的研究转化潜力与临床应用价值; 基于厚层 CT 图像及薄层 CT 图像进行 PL-QCT 骨密度检测, 获得的 BMD 检测结果具有较好的一致性, 检测结果可满足日常的临床工作需要。基于自体模校正的 PL-QCT 有望与胸部低剂量 CT (LDCT) 检查结合, 做到一次 CT 扫描, 获得双肺和纵隔以外多个检测结果, 主要包括骨密度、皮下脂肪、内脏脂肪、腹部及腰部肌肉内脂肪含量等定量结果, 从而更好地进行临床评估和健康指导, 且不会额外增加受检者的辐射剂量, 亦无匹配 CT 设备限制, 可同时分析多台不同 CT 设备数据。

PO-4059

鉴别侵袭性肺曲霉病与非小细胞肺癌空洞病变的 影像组学模型构建

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目的:尽管在诊断和治疗方面取得了进展,但侵袭性肺曲霉病 (IPA) 仍然是一种危及生命的疾病。影像组学是一种新颖的工具,采用先进的图像分析算法,利用大量的定量图像特征构建预测模型。在这项研究中,我们旨在建立一种基于放射组学的预测模型,以区分表现为空洞病变侵袭性肺曲霉病 (IPA) 与非小细胞肺癌(NSCLC)。

方法:本研究纳入了 21 例确诊/临床诊断 IPA 的患者和 46 例非小细胞肺癌患者的 115 个病变。将胸部 CT 图像上传到 Deepwise 多模态研究平台,然后手动圈定感兴趣的区域。图像预处理后,提取一阶特征、形状特征和纹理特征。所有数据随机分为两组进行训练和测试。选择关键影像组学特征,使用 Pearson 相关和方差分析 F 检验构建影像组学。对 12 种机器学习算法进行测试,选择在训练集和测试集上表现最好的分类器作为最终的影像组学模型。采用 Logistic 回归、LASSO 回归对临床特征进行筛选,剩余特征与影像组学评分结合构建综合模型。通过受试者工作特征曲线分析、校准曲线分析和决策曲线分析评估诊断效果。

结果:23 个影像组学特征最终被纳入影像组学模型。与其他模型相比,线性判别分析模型在测试集 (AUC 为 0.8946,0.7931 - 0.9960)和训练集(AUC 为 0.9871,0.9677-1)上表现最佳。结合影像组学评分和临床特征建立综合预测模型。综合模型的 AUC 对于训练集为 0.989(0.969,1),对于测试集为 0.915(0.826,1)。在综合模型的基础上,绘制了预测图来预测 IPA 发生的概率。校正曲线和决策曲线证实了综合模型的校正和临床实用性。

结论:我们的研究证实了影像组学在鉴别 IPA 诊断中的价值,并建立了一个将影像组学与临床特征相结合的综合模型,具有良好的鉴别和校准能力。

PO-4060

光谱 CT 成像: 双能 CT 和多能光子计数 CT 的技术原理

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光谱计算机断层扫描(CT)成像包含了基于一个简单原理的独特的一代 CT 系统,该原理利用了 CT 图像中存在的能量依赖信息。在过去的二十年中,随着双能 CT 系统的引入,这一原理得到了扩展。第一代光谱 CT 系统,以双源或双层技术为代表,在放射学界开辟了一种新的成像方法,它们能够克服传统 CT 遇到的组织表征的局限性。它在全球范围内的扩展也可以被认为是最近基于光子计数 CT 系统上新的检测链的突破性技术的重要杠杆,这对将 CT 扩展到多能 CT 成像具有很大的希望。本文详细介绍了光谱 CT 的基本原理和技术,重点介绍了双能和多能 CT 系统的最新技术进展。

PO-4061

乳腺 MRI 病灶分割技术进展

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目的：乳腺疾病在女性中非常常见，而乳腺 MRI 病灶分割技术是一种有效的乳腺疾病诊断和治疗的手段，旨在通过计算机辅助的方法准确地分割和识别乳腺 MRI 图像中的病变区域，提供给临床医生进行疾病诊断和治疗。

方法：目前，乳腺 MRI 病灶分割技术主要采用基于机器学习和人工智能的方法。其中，常见的方法包括基于像素的方法、基于区域的方法和基于深度学习的方法。基于像素的方法利用图像的灰度值和纹理特征来进行分割；基于区域的方法利用邻域像素点的强度信息和构造一定准则来分割病灶区域；基于深度学习的方法利用深度神经网络模型对乳腺 MRI 图像进行学习和分割。常用的机器学习方法包括支持向量机（SVM）、随机森林（RF）和深度学习等。这些方法能够根据已有的人工标记数据对乳腺 MRI 图像进行学习和分割，具有较高的自适应性和分类准确性。随着人工智能技术和计算机视觉技术的发展，当前以基于深度学习的病灶方法分割方法最为流行，其中包括全卷积网络（FCN）、U-Net、SegNet，以及基于 swin-transformer 的端到端分割模型和基于 SAM 调优训练的基础分割模型等。这些模型能够学习到图像中的特征信息，实现对病变区域的精确分割。与传统方法相比，基于深度学习的算法能够更好地处理图像的复杂性和变化性，并取得更高的分割精度。

结果：近年来，乳腺 MRI 病灶分割技术取得了显著的研究进展。研究表明，基于深度学习的方法在乳腺病灶分割中具有较高的准确性和稳定性。此外，还有一些研究提出了针对不同乳腺肿瘤类型和病理特征的特定分割算法，如将多序列 MRI 图像信息融合，以进一步提高了乳腺病灶分割的准确性和质量。

结论：乳腺 MRI 病灶分割技术是一种重要的乳腺疾病诊断和治疗工具。通过不断改进和创新分割算法，乳腺 MRI 图像的病灶分割准确性不断提高，为医生提供了更准确的疾病信息。然而，仍然存在一些难题和挑战，如乳腺 MRI 图像的噪声干扰和图像分割的速度问题。因此，未来的研究还需要进一步优化算法，提高病灶分割技术的性能和实用性。

PO-4062

全模型迭代和混合迭代重建算法在人工智能软件辅助颅内动脉瘤诊断中的对比研究

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目的：探讨全模型迭代重建技术（IMR）和混合迭代重建技术（iDose）算法图像在人工智能软件辅助头颈血管 CTA 后处理重建及动脉瘤量化分析效能对比研究。

方法：依据纳入标准选取吉林大学白求恩第一医院放射科行颅脑 CTA 检查并经 DSA 证实为动脉瘤的患者 160 例，将 CTA 扫描后的数据同时进行 IMR 和 iDose 算法重建，分别命名为 A 组（IMR 重建）和 B 组（iDose 重建）。随后将重建的数据放入头颈 CTA 人工智能分析软件进行重建及量化分析。比较两组图像大脑中动脉起始处及同层面颞肌的 CT 值、图像噪声（SD）、信噪比（SNR）及对比噪声比（CNR），并对 2 组图像质量分别进行主观评分和动脉瘤客观智能量化测量。用 SPSS Statistics 26.0 统计软件对各组数据进行统计学分析。

结果：头颈部 CTA 检查的病例中颅内前交通动脉瘤、大脑中动脉瘤、颈内动脉瘤和后循环动脉瘤患者各 40 例。图像质量评价：大脑中动脉起始处的平均 CT 值 IMR 组 319(81.3)HU 高于 iDose 组 336(74.2)HU，图像噪声 IMR 组 8.73[6.16,12.7]HU 低于 iDose 组 4.28[3.06,6.58]；同层面颞肌 CT 值 IMR 组图像的 SNR 为 50.4(9.42)HU 高于 iDose 组 40.6(11.9)HU，图像噪声 IMR 组 4.71(2.12)

低于 iDose 组 5.98(2.20)HU; IMR 组图像的 SNR 69.6[51.5,106] 高于 iDose 组 40.5[21.8,58.8]; IMR 组图像的 CNR 66.5[48.4,86.7]高于 iDose 组 48.6[37.7,60.8], 差异均有统计学意义($P<0.05$)。基于头颈 CTA 人工智能软件的后处理图像质量主观评分 IMR 组(3.64 ± 0.36)高于 iDose 组(2.73 ± 0.76); 动脉瘤的径限智能测量中 IMR 组与 iDose 组的测量结果相近, 差异无统计学意义($P>0.05$)。结论: 与混合迭代重建算法相比, 全模型迭代重建算法能进一步提高图像质量, 改善后处理重建效果, 两种重建算法在人工智能软件辅助颅内动脉瘤智能量化分析中效能相近, 具有一定的可靠性。

PO-4063

基于深度学习网络构建 CT 肺动脉栓塞智能检测模型的研究

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目的: 评估深度学习网络对 CT 肺动脉成像 (CT pulmonary artery imaging, CTPA) 急性肺动脉栓塞 (acute pulmonary embolism, APE) 的检测效能。

方法: 回顾性纳入 2020 年 1 月-2023 年 5 月河南中医药大学第一附属医院怀疑 APE 行 CTPA 检查并最终确诊为 APE 的患者。按照 7:2:1 的比例将数据集随机分为训练集、验证集、测试集。采用数据转换为 HU 值、图像归一化及肺部掩膜增强模型、图像增强策略对原始图像进行预处理以增加模型对病灶区域的关注。本研究基于 Res2Net 网络, 并结合多孔空间金字塔池化 (atrous spatial pyramid pooling, ASPP) 和 SE (squeeze and excitation) 注意力机制网络训练模型, 并对模型进行五折交叉内部验证。在测试集上采用戴斯相似系数 (dice similarity coefficient, Dice) 评价血栓分割的效果; 利用精确率、召回率、特异度、IOU 和 F1-Score 指标评估模型的检测效能绘制相应曲线, 并将该模型与已有的 U-Net 模型及 CE-Net 模型进行比较。

结果: 本研究共纳入 303 例确诊为 APE 的患者, 男 178 例, 女 125 例, 年龄 52.68 ± 18.73 岁。其中训练集 212 例, 验证集 61 例, 测试集 30 例。模型在测试集的 Dice 系数 0.894, 精确率 0.899, 召回率 0.925, 特异度 1.000, Pos_IOU 0.828。该模型与现有的 U-Net 和 CE-Net 网络进行对比, 具有更好的效能 (U-Net 模型: Dice 系数为 0.704, 精确率 0.701, 召回率 0.905, 特异度 1.000, PosIOU 0.667; CE-Net 模型: Dice 系数为 0.812, 精确率 0.754, 召回率 0.913, 特异度 1.000, Pos_IOU 0.724)。雷达图显示 Res2Net 网络各方面都优于以上两个网络, 尤其是在 Dice 系数、召回率和精确率上有较大的改进。

结论: Res2Net 网络模型对 APE 具有良好的检测效能, 并且优于现有的 U-Net 网络和 CE-Net 网络。

PO-4064

基于深度学习骨密度定量分析和定量 CT 的在老年人 CT 机会性骨质疏松筛查中的对照研究

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目的: 比较深度学习骨密度定量和 QCT 在老年人常规胸腹部 CT 检查中进行机会性骨质疏松筛查的准确性和可靠性。

材料和方法: 江苏省中西医结合医院常规临床腹部 CT 检查和明基医院体检老年患者共 625 例, 采用汇医慧影公司开发的基于深度学习商用的定量 CT 辅助诊断系统进行全自动椎体分割和椎体骨密度 (BMD) 值提取; 并与 Mindways 公司第三代和第四代 QCT-BMD 软件测量获得的 BMD 进行比

较。QCT 测量的 BMD 值作为标签评估 AI 诊断骨质疏松的性能，并计算准确性、敏感性，特异性。通过双变量线性回归分析 AI 和 QCT 测量得到的 BMD 值的拟合优度。

结果：625 例患者中诊断骨质疏松 353 例，骨量减少 202 例，正常 70 例；其中 305 例男性中骨质疏松和骨量减少分别为 160 例和 108 例；320 例女性中骨质疏松 193 例，骨量减少 94 例；女性组骨质疏松患病率高于男性组，但无显著性差异（59.1% > 53.1%， $P=0.312$ ）。AI 诊断骨质疏松 358 例，骨量减少 197 例，正常 70 例，有 45 例 AI 与 QCT 两者结果不一致。AI 诊断骨质疏松的 AUC 为 0.822(95%CI:0.787-0.867， $P<0.001$)，准确性为 0.9456，敏感性为 0.9601，特异性 0.9270。QCT 和 AI 对 T12~L4 个椎体 BMD 的线性回归拟合优度 R^2 分别为 0.93、0.95、0.90、0.86、0.95；QCT 和 AI 对腰 1-2 或腰 2-3 两个椎体的平均 BMD 的线性回归拟合优度 R^2 分别为 0.93。GE vCT、东软 Neuviz128、联影 uCT 510 的 QCT 与 AI 对椎体 BMD 的线性回归拟合优度 R^2 分别为 0.92、0.95、0.95；明基医院第三代 QCT 以及本院第四代 QCT 与 AI 对椎体的线性回归拟合优度 R^2 分别为 0.88、0.96。

结论：AI 在机会性骨质疏松筛查中与 QCT 相比，敏感性高，一致性好，且不同 CT 机型差异小。

PO-4065

影像-病理组学多尺度模型肾透明细胞癌预后预测

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目的：本研究旨在探讨将影像组学和病理组学结合多尺度模型对术后肾透明细胞癌患者总生存期的预后价值。

方法：本研究回顾性分析了 137 例经手术病理诊断为肾透明细胞癌的患者，其中 67 例来自贵州省人民医院，70 例来自癌症基因组图谱数据库。根据纳入顺序，将患者分为 90 例的训练队列和 47 例的验证队列。首先，我们基于 pyradiomics 和 cellprofile 软件分别提取了目标病灶的术前 CT 图像和术后 HE 病理图像的特征，使用 Lasso-cox 进行特征筛选，并建立了影像组学模型和病理组学模型。然后，基于 Cox 回归分析，我们建立了影像-病理模型、临床预后模型和综合预后模型。最后，使用 Kaplan-Meier 分析生存曲线，并使用 log-rank 检验和一致性指数（C-index）评估所建模型的预测能力。

结果：多变量 COX 回归分析显示，影像组学特征和病理组学特征均为肾透明细胞癌患者手术后总生存期预测的相对独立危险因素。影像-病理组学模型将肾透明细胞癌患者分为高危组和低危组，在训练队列和验证队列中均显示出显著的生存差异（log-rank: $P < 0.0001$ ）。同时，验证集结果表明，影像-病理组学模型比单一尺度的模型（影像组学模型或病理组学模型）具有更高的预测准确性（C-index: 0.86 vs 0.82 vs 0.81），也明显优于临床模型（C-index: 0.86 vs 0.78）。进一步分析显示验证集中影像-病理组学模型与临床模型相结合的综合预后模型表现出最佳的预后性能（C-index: 0.88 vs 0.86 vs 0.78）。

结论：新兴的多尺度影像-病理组学模型是肾透明细胞癌患者手术后总生存期的一个重要预测因子，优于单一尺度的模型及临床模型，将极大助于肾透明细胞癌患者个体化治疗决策。

PO-4066

基于深度学习重建的快速扫描直肠 MRI 图像质量研究

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目的 探讨深度学习重建 (deep learning reconstruction, DLR) 技术对直肠 MRI 图像质量和扫描时间的影响。

方法 前瞻性纳入经活检证实且未经治疗的 78 例直肠癌患者行 MRI 扫描, 序列包括常规快速自旋回波 (fast-spin echo, FSE) 小野 T2WI (conventional T2WI, T2WIcon) 及 DLR 小野 FSE-T2WI (T2WIDLR), 同时保存未应用 DLR 的原始图像 (T2WIori), 记录扫描时间。两名影像医师依据 Likert Scale 对图像行双盲主观评分 (5 分: 优; 1 分: 极差), 指标包括: 伪影、噪声、病灶边缘清晰度、直肠壁分层结构、诊断置信度及整体图像质量; 2 周后勾画提取信噪比 (signal-noise ratio, SNR) 和与闭孔内肌的对比噪声比 (contrast-noise ratio, CNR) 行客观评价。采用组内相关系数 (intraclass correlation coefficient, ICC) 评价阅片者间一致性。使用单因素方差分析和 Kruskal-Wallis 检验比较正态、非正态分布评价指标在序列间的差异。

结果 T2WIDLR/T2WIori 的采集时间显著短于 T2WIcon ($P < 0.001$), 采集时间缩短了 65%。阅片者间评分具有较好的一致性 ($ICC > 0.7$)。T2WIori 较 T2WIcon 显示出更差的噪声、病灶边缘清晰度、直肠壁分层结构、诊断置信度、整体图像质量、SNR 和 CNR ($P < 0.001$)。使用 DLR 后显著改善 T2WIcon 的伪影、噪声、病灶边缘清晰度、直肠壁分层结构、整体图像质量、诊断置信度、SNR 和 CNR ($P < 0.05$)。

结论 DLR 可以显著改善直肠 MRI 成像的噪声水平, 提供更高的图像质量, 并将采集时间缩短 65%。

PO-4067

基于机器学习的影像组学特征用于在 CCTA 中鉴别冠脉的异常状态

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目的: 基于斑块与血管炎症的相关性, 本研究旨在利用从冠状动脉 CT 血管造影获得的冠脉周围脂肪组织 (PVAT) 影像组学特征作为定量指标, 研究 PVAT 与动脉粥样硬化之间的关联性。目标是区分血管的异常炎症状态。

方法: 本回顾性研究纳入了 102 名患者, 其中包含 22 名冠脉无明显异常的患者作为对照组。由两位医师独立于诊断信息, 确认并提取含有斑块的异常的冠脉血管段, 随后再依据异常血管段的位置分布比例, 提取相应比例数量的正常血管段。基于开源软件 3d-slicer 对血管段的冠脉周围脂肪组织 (PVAT) 进行了半自动分割, 并利用 Pyradiomics 工具提取影像组学特征, 病例数按照 7:3 比例分为训练集与测试集。使用 LASSO 和 RFE 方法对影像组学特征进行数据降维和特征筛选。此外, 我们还提取了传统影像特征 (与斑块长度范围相对应的血管周围脂肪组织的平均 Hu 值)。将特征组合并分别构建了基于影像组学 (Radiomics)、传统影像特征 (CT_value) 和基于影像组学+传统影像特征 (Radiomics + CT_value) 的三种 Logistic 回归模型。最终, 诊断模型的预测能力受试者工作特征 (ROC) 曲线进行了评估。

结果: 在 102 名患者的队列中, 共分析了 208 个冠状动脉段。其中, 72.1% 血管段标记为含有斑块, 而 27.9% 被标记为正常。两组血管段之间位置比例无显著差异。从 851 个潜在特征中, 选择了 12 个关键特征来构建影像组学模型 (Radiomics)。Radiomics 模型测试集上的 AUC 为 0.717 (95%

CI: 0.63–0.81)。此外, Radiomics + CT_value 模型在测试集中的 AUC 为 0.715 (95%CI: 0.62–0.81), 优于传统影像特征模型, AUC 为 0.437 (95%CI: 0.32–0.56)。

结论: 我们的研究表明, 冠脉周围脂肪组织的影像组学特征的模型优于单纯基于传统 CT 值的模型, 可能有助于鉴别正常冠脉与冠脉炎症的状态。

PO-4068

智能快速磁共振 (IQMR) 在颅内血管壁磁共振成像中的应用价值

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目的 探讨智能快速磁共振 (Intelligent Quick Magnetic Resonance, IQMR) 在提高颅内三维血管壁磁共振成像 (VWI) 图像质量及缩短扫描时间中的应用价值。**方法** 收集 29 名志愿者, 均接受快速低分辨率 (LR-VWI) 和常规高分辨率 (HR-VWI) 颅内 VWI 序列扫描, 应用 IQMR 对 LR-VWI 进行后处理得到 IQMR-VWI。选取峰值信噪比 (Peak Signal-to-Noise Ratio, PSNR) 和结构相似性 (Structural Similarity, SSIM) 两个指标进行客观评价, 这两个指标的结果皆是以 HR-VWI 为参照, 分别对 LR-VWI 及 IQMR-VWI 测量而得出。由两名放射科医师使用李克特 5 分量表 (Likert scale) 在对图像类型 (LR-VWI、IQMR-VWI、HR-VWI) 不知情的情况下对血管腔及管壁的成像质量和图像整体质量进行主观评价。结果 IQMR-VWI 的两个客观评价指标均高于 LR-VWI, 差异有统计学意义 (SSIM: 0.6959 vs 0.6328; PSNR: 26.1648 vs 25.1982; $P < 0.001$)。两名医师对图像主观评价的一致性组内相关系数在 0.766~0.894 之间; IQMR-VWI 及 HR-VWI 的定性评分均优于 LR-VWI, 差异具有统计学意义 ($p < 0.001$), 而 IQMR-VWI 与 HR-VWI 之间的定性评分差异无统计学意义。同时 IQMR-VWI 较常规 HR-VWI 成像时间缩短约 77% (1min55s VS 8min20s)。结论 智能快速磁共振 (IQMR) 可以显著改善快速 LR-VWI 图像质量的同时 2min 之内完成图像采集, 有利于促进颅内血管壁磁共振成像在急性缺血性脑卒中 (AIS) 中的临床应用。

PO-4069

基于 CT 放射组学预测肺囊型包虫病活性的研究

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目的 基于计算机断层扫描 (CT) 的放射组学特征, 建立一个肺囊性包虫病 (CE) 活性的预测模型。**方法** 回顾性纳入 2010 年 1 月至 2020 年 10 月在我院经手术切除、病理证实的肺 CE 患者, 并随机分为训练组和验证组。在放射组学特征提取后, 对特征进行一致性检验 (ICC), 使用 SelectKBest 方法、方差阈值法和最小绝对收缩和选择算子 (LASSO) 的方法来进一步选取最佳特征, 之后采用支持向量机 (SVM)、K 邻近 (KNN) 以及 Logistic 回归 (LR) 3 种分类器来建立模型。采用受试者工作特征 (ROC) 曲线, 即曲线下面积 (AUC)、灵敏度和特异度来评估本研究中分类器建立模型的效能。结果 在纳入 81 例 (有活性 28 例, 无活性 53 例) 患者中, 分为训练组 64 人, 验证组 17 人 (8:2)。CT 放射组学从 1339 个特征中选取了 18 个最优特征, 使用 SVM 分类器建立模型的效能最好, 最均衡, 验证组 AUC、灵敏度以及特异度分别为 0.879、0.830 及 0.820。结论 基于 CT 放射组学特征建立预测模型评价肺 CE 活性, 指导临床制定关于肺 CE 诊疗方案具有重要的意义。

PO-4070

比较基于薄层和厚层 CT 图像的影像组学分析在 II 期结直肠癌预后预测方面的应用价值

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目的：本研究旨在探索及分析比较基于 CT 薄层（1mm）及厚层（5mm）影像图像的影像组学特征在 II 期结直肠癌预后评估中的应用价值。

方法：我们首先收集了 226 例(训练集 158 例，验证集 68 例)经临床病理证实的 II 期结直肠癌患者。我们分别在薄层及厚层图像上进行原发灶的感兴趣区域勾画，然后分别提取薄层及厚层 CT 图像上原发灶的影像组学特征，最后比较薄层及厚层 CT 图像在预测 II 期结直肠癌患者的预后方面的价值。

结果：在训练集中：基于薄层 CT 图像的 OS 预测模型的 AUC: 0.98 \pm 0.01, 95% CI:[0.97, 1.00], ACC: 0.93, Sensitivity: 0.91, Specificity: 0.93, PPV: 0.52, NPV: 0.99, 基于厚层 CT 图像的 OS 预测模型的 AUC: 0.98 \pm 0.01, 95% CI:[0.96, 0.99], ACC: 0.92, Sensitivity: 1.0, Specificity: 0.91, PPV: 0.48, NPV: 1.0; 在验证集中：基于薄层 CT 图像的 OS 预测模型的 AUC: 0.84 \pm 0.06, 95% CI:[0.73, 0.94], ACC: 0.87, Sensitivity: 0.40, Specificity: 0.90, PPV: 0.25, NPV: 0.95, 基于厚层 CT 图像的 OS 预测模型的 AUC: 0.72 \pm 0.14, 95% CI:[0.47, 0.92], ACC: 0.78, Sensitivity: 0.6, Specificity: 0.79, PPV: 0.19, NPV: 0.96。

结论：研究表明 CT 影像组学特征可作为术前预测 II 期结直肠癌预后的新型预测因子，且基于薄层 CT 图像的影像组学特征的预测效能优于厚层 CT 图像，建议首选在薄层 CT 图像上进行影像组学分析，以捕捉更全面的影像学信息来辅助临床诊疗。

PO-4071

基于小样本的 MRI 图像腹部区域脂肪自动分割

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炎症性肠病是一种免疫介导的慢性进行性疾病，早期诊断和治疗对于改善患者预后至关重要。炎症性肠病的高度异质性需要多维临床信息对疾病严重程度进行分层，以制订个体化治疗方案。获取多维临床信息的成本高，如何在不增加患者疾病成本的前提下，获取高度一致且准确的定量参数成为临床急需解决的问题。脂肪作为一个高度动态的代谢和内分泌器官，与炎症性肠病的治疗决策和病程管理密切相关，然而目前缺乏自动化测量不同区域脂肪的方法。计算机断层成像（Computed Tomography, CT）和磁共振成像（Magnetic Resonance Imaging, MRI）作为炎症性肠病诊断和随访常规的辅助诊断检查方式，从图像中提取脂肪和肌肉含量定量参数，有望提供炎症性肠病临床诊断评估更多的证据。目前炎症性肠病人群腹部区域脂肪分割受到内脏脂肪强度值和形态特征高度可变、分区脂肪真实标注量不足等限制，导致区域脂肪分布的定量自动化难以实现。本研究围绕炎症性肠病人群区域脂肪定量的必要性和困境，分析炎症性肠病人群脂肪 MRI 图像强度值特点，探索自动分割全流程实现过程中人工真实标注快速准确获取以及图像预处理和后处理优化，研究适用于炎症性肠病人群腹部区域脂肪的自动定量方法，并验证定量参数在炎症性肠病诊疗过程中的作用。

MRI 因无电离辐射的特点和对病变性质的评估能力，在炎症性肠病的疾病管理中具备与 CT 不同的适用场景。MRI 成像原理不同导致序列间和 MRI 与 CT 图像之间脂肪图像强度值先验信息存在差异，相同组织在 MRI 图像上因主磁场不均匀性而存在变化强度值，因而真实标注过程需要更多的人工介入。将 CT 分割模型结合迁移学习，实现少量标注 MRI 图像下的三维腹部区域脂肪高精度分割。通过未参与模型训练的 T2 序列的预测实验结果显示，迁移学习模型具备了识别 MRI 图像肌肉和皮下

脂肪图像强度特征的能力。研究还提出了一种分段扫描合并算法，解决了炎症性肠病人群 MRI 序列分成多个三维分段中重复层面造成的重复标注和体积定量不准确的问题。MRI 共配准序列数据在无需增加标注情况下实现输入数据量的四倍增加，有效提升了腹部区域脂肪三维自动分割的性能。

PO-4072

基于乳腺钼靶的深度学习模型在鉴别乳腺肿块方面的诊断价值评估

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目的：本研究旨在构建并评估一种基于钼靶的乳腺肿块诊断深度学习模型。

材料与方法：本回顾性研究共纳入 210 名于 2016 年 1 月至 2023 年 7 月期间，因怀疑乳腺肿瘤于我院进行乳腺钼靶 X 线检查和经超声引导下穿刺活检的住院患者。所有患者图像被按照 2 比 1 随机分为训练集（140 人，560 张）和验证集（70 人，280 张）。本研究以 ResNet 深度神经网络框架为基础，利用训练集构建了用于鉴别乳腺结节良恶性的诊断模型，并使用验证集数据评估该诊断模型的诊断效能。同时，三个诊断医师分别对验证集结节良恶性进行主观评价。深度学习模型的诊断准确度采用受试者操作曲线（receiver operator characteristic curve, ROC curve）进行评价。不同阅片者主观评价的准确度差异采用多阅片者-多病例（multiple-reader, multiple-case, MRMC）方差分析进行比较。P 值小于 0.05 被认为差异具有统计学意义。

结果：深度模型诊断乳腺癌的 AUC 值、特异度、灵敏度、阴性预测值、阳性预测值、准确度、约登指数分别为 0.94、84.8%、88.6%、91.3%、80.6%、86.4%、73.4%。所有深度学习诊断指标均优于诊断医师肉眼评估（阅片者 1：AUC 值，0.77；特异度，62.7%；灵敏度，83.6%；阴性预测值，84.2%；阳性预测值，61.5%；准确度，71.3%；约登指数，46.3%；阅片者 2：AUC 值，0.81；特异度，64.8%；灵敏度，87.6%；阴性预测值，87.7%；阳性预测值，64.7%；准确度，75.5%；约登指数，52.4%；阅片者 3：AUC 值，0.86；特异度，74.5%；灵敏度，89.2%；阴性预测值，90.7%；阳性预测值，71.3%；准确度，80.6%；约登指数，63.7%）。

结论：本研究构建的基于深度学习网络的算法可以有效提高临床乳腺肿瘤的诊断效能。

PO-4073

利用 CT 放射组学特征进行鉴别肺炎型侵袭性粘液腺癌和肺炎：多中心研究

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背景：肺炎型侵袭性粘液腺癌（IMA）和肺炎表现出重叠的胸部 CT 特征和重叠的临床特征。

目标：我们研究的目的是开发和验证列线图结合临床和 CT 放射组学特征鉴别肺炎类型 IMA 和肺炎。

方法：这项回顾性研究包括 314 名患者（172 名男性，142 名女性；平均年龄，60.3±14.5[SD]岁）CT 显示实变，诊断为 IMA 型肺炎（n=106）或肺炎（n=208）。来自三家医院的患者组成了一个培训组（n=195）一个验证集（n=50）和来自其他三家医院的患者组成了外部测试集（n=69）。建立了一个预测 IMA 型肺炎的临床模型这些特征是该诊断的重要独立预测因素。通过在固结区域放置 ROI 从 CT 图像中提取放射学特征，并构建了 IMA 型肺炎的放射组学特征。的列线图综合临床特征构建了 IMA 型肺炎的预测模型模型和放射组学特征。两名心胸科放射科医生在外部测试集中独立

重新查看 CT 图像，以诊断 IMA 型肺炎。Diagnostic 比较了模型和放射科医生的表现。决策曲线分析 (DCA)。

结果：临床模型包括发热和癌症家族史。放射组学特征包括 15 个放射组学特点。DCA 从列线图中显示出比从临床模型中更高的总体净效益。在外部测试集中，AUC 为列线图 (0.85) 高于临床模型 (0.71, $p=0.01$)，放射科医生 1 (0.70, $p=0.04$) 和放射科医生 2 (0.67, $p=0.01$)。在外部测试集中，列线图具有敏感性 46.9%，特异性 94.6%，准确率 72.5%。

结论：结合临床变量和基于 CT 的放射组学的列线图特征优于临床模型和两名心胸放射科医生对 IMA 型肺炎和肺炎的鉴别。

PO-4074

基于 CT、定量超声和血液指标的集成机器学习模型 用于定量评估脂肪肝

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目的：分析 CT 和超声与血液指标特征结合对于脂肪肝的诊断价值，并探究将三种特征融合构建的集成机器学习模型是否有助于提高脂肪肝诊断的性能。

方法：本研究回顾性收集了 2015 年 9 月至 2022 年 10 月期间病理报告含有脂肪肝程度的描述且同时接受 CT 检查、超声瞬时弹性成像检查和血液指标检查结果的 604 例患者，然后，按照 7:3 的比例随机将数据划分为训练集 ($n=422$) 和验证集 ($n=182$)。利用 nnUNet 深度学习模型进行 CT 图像的肝脏和脾脏分割，并计算整个肝脏 HU 值、整个脾脏的 HU 值和肝脾 HU 比值。对 CT+血液指标、超声（受控衰减参数 [CAP]）+血液指标、CT+超声+血液进行单变量和多变量逻辑回归分析选择最优的特征子集。利用逻辑回归 (LR)、支持向量机 (SVM) 和随机森林 (RF) 机器学习方法构建模型，然后，使用软投票的集成学习方法将不同机器学习进行组合来预测脂肪肝。最后，使用接受者操作特性曲线下面积 (AUC) 用于评估模型的性能。

结果：基于 CT+血液指标的 LR、SVM 和 RF 在验证集中分别实现了 0.876、0.793 和 0.860 的 AUC 值，然后，将 LR 和 RF 集成产生了更高的 AUC 值 (0.881)。超声+血液指标的 LR、SVM 和 RF 在验证集中 AUC 值分别为 0.866、0.8625 和 0.850 的 AUC 值，随后，将 LR、RF 和 SVM 集成获得了略高于单一模型的 AUC 值 (0.878)。利用 CT+超声+血液指标构建的 LR、SVM 和 RF 模型比 CT+血液指标和超声+血液指标的模型实现了更高的 AUC 值 (0.901、0.867、0.899)，然后，将 LR 和 RF 集成同样产生了更高的 AUC 值 (0.914)。

结论：CT 和超声与血液指标结合的机器学习模型在脂肪肝评估中具有相似的诊断性能，将三种特征融合可实现更好的诊断性能；将不同机器学习组合构建的集成模型相比于单一模型可获得更好的诊断效果。

PO-4075

基于平扫 CT 的影像组学预测肝相关事件发生

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目的：探究基于平扫 CT 的肝段和肝脏影像组学特征与脾脏影像组学特征及临床特征相结合是否能预测肝相关事件（肝硬化及其并发症、肝衰竭和肝癌）发生。

方法：本研究回顾性收集了 2009 年 7 月至 2022 年 3 月期间病理和 CT 影像报告证明未发生肝相关事件且具有随访结果的 340 例患者，然后，按照 7:3 的比例随机将数据划分为训练集 ($n=238$) 和验证集 ($n=102$)。利用 nnUNet 深度学习模型进行 CT 图像的肝、肝段和脾脏分割，并提取 95 个影像组学特征（体积、一阶特征和纹理特征）。通过单变量和多变量 Cox 回归对肝脏、肝段及脾脏特征进行特征选择，然后，分别构建肝脏、肝段和脾脏的预后评分，随后，将三个预后评分、年龄和性别相结合构建融合模型。使用 C-index 和 KM 曲线评估四个模型对于肝相关事件的预后价值。结果：肝脏、肝段和脾脏模型在验证集的 C-index 分别为 0.677、0.787 和 0.660，融合模型产生更高的 AUC 值 (0.818)。KM 曲线证明肝段和融合模型高风险预后评分在验证集中发生肝相关事件高于低风险评分组且具有统计学意义 ($P<0.05$)，而肝脏和脾脏在验证集中没有统计学意义。结论：基于平扫 CT 的影像组学可用于预测肝相关事件，将肝段、脾脏及临床特征融合具有更好的预后价值。

PO-4076

基于 MRI 图像质量量化评估的乳腺腺体渐进式成长学习分割策略

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目的：腺体分割是乳腺背景实质强化 (BPE) 相关预测研究中的一个重要步骤，通过对乳腺动态对比增强磁共振图像 (DCE-MRI) 多时序图像中的乳腺腺体的精确分割，可以进一步对腺体部分像素强度进行有效的定量分析，本文提出了一种渐进式成长学习乳腺腺体分割策略。

方法：本策略所用数据集来自 7 个临床中心数据队列（训练集：1，验证集：6），通过图像对比度 (CPP)、峰值信噪比 (PSNR) 量化图像强度值、噪声，并基于腺体不规则程度设计了一种反映其形态复杂程度的评估因子层级分形维数 (HFD)，上述三种评估因子构成新的数据属性评估指标 (DPA)。乳腺腺体渐进式成长学习分割策略以课程学习与半监督学习为核心思想分为两阶段，进行多轮迭代训练。初始训练集使用模糊 C 均值聚类 (Fuzzy C-Means, FCM) 腺体分割结果构成，然后进行使用深度学习 (U-Net、ResUNet、SwinUNETR) 的多轮次学习。第一阶段，由专业放射科医生为模型分割提供域知识 (Domain Knowledge, DK) 指导，并结合数据属性评估模块 (Dynamic DPA, DDPA) 构建适合的训练数据集以辅助模型性能快速成长。第二阶段，当模型已具备一定的学习能力时，采取半监督学习方法训练模型直至迭代结束。医生对模型分割结果进行评估，将数据分为金标准组、通过组以及落选组，金标准组进入迭代训练集，通过组根据 DDPA 模块进行评估，一部分进入迭代训练集，其余与落选组并入测试集。

结果：在三种基线模型上，本文提出学习策略与全监督学习策略在 6 个测试集上通过平均 Dice (0.8805 ± 3.59 , 88.30 ± 3.39 , %)、IOU (0.8062 ± 4.50 , 80.26 ± 4.79 , %)、HD95 (6.415 ± 3.31 , 6.590 ± 3.22 , mm) 三个指标对乳腺腺体分割结果进行比较。

结论：对于乳腺腺体分割任务，本文策略在完全无需金标准标注的情况下与全监督方法效果接近，通过 DK 模块和 DDPA 模块消融实验证明了基于域知识的数据挑选与随机选取数据相比数据的有效提升，可以更好地指导深度学习网络对腺体区域的一般特征到复杂特征的渐进学习。

PO-4077

动物颈椎和基于 CT 模型之间在 3D 打印中的几何和体积关系

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目的: 三维 (3D) 打印过程的关键是了解实际结构或器官如何与其相应的医学图像在维度上相关。这项研究将检查动物颈椎、这些骨骼的 3D 扫描、基于计算机断层扫描 (CT) 扫描的 3D 模型以及 3D 打印模型之间的差异。

材料和方法: 对七块动物颈椎进行 CT 扫描。骨头被清理并进行了 3D 扫描。3D 网格模型是根据 CT 数据创建的, 然后进行 3D 打印。分析了四种模型: 解剖骨骼、3D 扫描模型、CT 模型和 3D 打印模型。对所有模型类型进行了手动测量, 并对 3D 扫描模型与 CT 模型进行了分割指标比较。

结果: 在比较所有模型类型的每个参数时, 除椎骨宽度外, 手动测量之间没有统计学差异 ($p = 0.054$)。比较所有模型类型之间所有测量值的平均值时, 不存在统计差异 ($p = 0.247$)。将 3D 扫描模型与 CT 模型进行比较时, 平均 Hausdorff 距离为 0.99 毫米 (SD 0.55 毫米)。将 3D 扫描模型与 CT 模型进行比较时, 平均 Dice 系数为 0.93 (SD 0.07)。3D 扫描模型和 CT 模型的平均体积分别为 17.3 ml 和 16.6 ml ($p < 0.001$)。

结论: 本研究阐明了动物颈椎与基于 CT 的椎体模型之间的几何和体积关系。分割指标显示检查的骨骼 (使用 3D 扫描骨骼作为替代) 与 CT 测量值之间存在 1 毫米的差异。较大的基于 CT 的模型和较小的骨骼之间 1.3 毫升的体积差异证实了这一点。

PO-4078

**利用影像组学区分 PCNSL 的 GCB 亚型和非 GCB 亚型:
一项多中心研究**

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目的: 探讨 PCNSL (原发性中枢神经系统淋巴瘤) 中生发中心 B 细胞亚型 (GCB) 和非生发中心 B 细胞亚型 (非 GCB) MRI 的特征和病理基础。并探讨基于 MRI 影像组学对 PCNSL 的 GCB 亚型和非 GCB 亚型的预测能力。

方法: 本研究回顾性分析了 24 例免疫功能良好的 GCB 型患者 (9 名男性, 年龄 56.4 ± 15.1 岁) 和 56 例免疫功能良好的非 GCB 型患者 (35 名男性; 年龄 61.1 ± 9.3 岁) 的标准诊断性 MRI 检查。分别从 ADC、DWI 和 T1-CE 图像中提取影像组学特征, 采用机器学习算法和统计方法进行筛选。最后, 构建了 7 种不同序列排列的影像组学模型。采用受试者工作特征下面积曲线来评价所有模型的预测性能。采用 Delong 检验来比较模型之间的差异。

结果: GCB 亚型均表现为扩散受限, 非 GCB 亚型占 80.36%; $p < 0.05$ 。3 级水肿在 GCB 亚型中罕见 (8.33%), 在非 GCB 亚型中常见 (50.00%); $p < 0.001$ 。62.50% 的男性患者为非 GCB 亚型, 37.50% 的女性患者为非 GCB 亚型; $p < 0.05$ 。此外, GCB 亚型患者比非 GCB 亚型患者更年轻; $p < 0.05$ 。在本研究中, 最佳预测模型是基于 ADC、DWI 和 T1-CE 的组合模型, 其 AUC 最高, 为 0.854。最佳预测模型与其他一些模型之间存在显著差异。

结论: GCB 亚型常见于女性, 大多数病例表现为轻度瘤周水肿, 所有病例均为弥散受限; 然而, 非 GCB 亚型常见于男性, 在大多数病例中伴有严重的瘤周水肿。此外, 基于 ADC、DWI 和 T1-CE 序列开发的影像组学模型在区分 GCB 亚型和非 GCB 亚型方面具有良好的性能。

PO-4079

基于 3D MRI 影像组学模型鉴别 IA 期宫颈癌与高级别鳞状上皮内瘤变的价值研究

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目的 探讨基于 3D 磁共振 T2WI 及动态对比增强 DCE 序列影像组学模型在鉴别 IA 期宫颈癌与高级别鳞状上皮内瘤变(HSIL)中的价值。方法 回顾性分析经手术病理证实的 IA 期宫颈癌患者 52 例与 HSIL 患者 35 例,收集患者的临床资料及影像资料,利用汇医慧影平台将患者按 10:3 随机分成训练集和测试集,在矢状位 T2WI 和 DCE 上由三名放射科医生手动勾画宫颈,获得宫颈三维容积感兴趣区(VOI),提取影像组学特征。并进行数据降维。采用 KNN 算法建立模型并绘制受试者工作特性曲线(ROC 曲线),对训练集和测试集 ROC 曲线下的总面积(AUC)、敏感度、特异度、准确率 4 个指标展开分析。结果 T2WI 模型、DCE 模型以及 T2WI 联合 DCE 模型最终提取出的影像组学特征分别为 23、11、28,训练集及测试集的 AUC 值分别为 0.833、0.797, 0.877、0.870, 0.897, 0.813。结论 T2WI 联合 DCE 图像影像组学模型比单一模型更具有临床价值,有助于评估病情,并针对病情所处阶段制定个体化治疗方案。

PO-4080

基于磁共振生境分析预测宫颈癌同步放化疗疗效的临床研究

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目的: 构建基于增强磁共振扫描 (Contrast Enhanced-MR, CE-MR) 的生境分析 (Habitat Analysis) 以量化评价肿瘤内异质性为目的, 对局部晚期宫颈癌患者进行临床相关性研究, 预测接受同步放化疗治疗 (Concurrent Chemoradiotherapy, CCRT) 的局部晚期宫颈癌 (Locally Advanced Cervical Cancer, LACC) 患者的早期疗效。方法: 本回顾性研究最终纳入 2013 年 5 月至 2021 年 3 月期间共 61 例接受根治性同步放化疗的局部晚期宫颈鳞癌患者, 随机分成训练集 (n=30) 及验证集 (n=31)。所有纳入的患者在治疗前 2 周内进行了 CE-MR 检查, 并获得了平扫的 T1、T2 加权成像及对比增强的 T1 加权成像 (包括动脉增强早期及动脉增强晚期)。根据 RECIST 标准评估早期疗效 (CR、PR 定义为早期疗效反应组; SD、PD 定义为早期疗效无反应组)。在 MR-T2 加权图像对原发肿瘤的 ROI/VOI 进行了半自动的手工分割。采用 K 均值聚类算法 (K-Means Clustering algorithm) 对 ROI/VOI 进行由 T2 模态及 delta-CE-1 两个模态建立的体素值 (voxel) 矩阵进行聚类, 即进行生境 (habitat) 亚区划分。再通过主成分分析 (Principal Component Analysis, PCA) 进行影像组学特征特征降维, 并获得生境分析评分 (Habitat score)。结果: 应用 t 检验、Mann-Whitney U 检验及卡方检验结果显示训练集和验证集随机抽取的患者的临床病理特征在两数据集间分布均衡 ($P>0.05$)。生境分析模型中, 确定了最佳聚类簇数 $K=3$, 即划分成 3 个生境亚区。生境分析在训练集 (AUC=0.944, $P=0.026$) 和验证集 (AUC=0.897, $P=0.046$) 的表现优于及不劣于传统影像组学。结论: 基于 CE-MR 的生境分析可以预测局部晚期子宫颈癌同步放化疗的早期疗效, 生境分析可以为 LACC 肿瘤内异质性提供一种新的评估的方法, 有望成为新的影像生物标记物。

PO-4081

铜死亡关键核心基因 FDX1 的泛癌预后价值评估与跨疾病、跨模态的影像组学模型的构建

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本研究通过全面的泛癌分析,深入探索了铜死亡的关键调控因子(FDX1),并提出了基于四种不同的恶性肿瘤类型和两种不同的影像组学模式下进行 FDX1 预测的无创性模型。在这项研究中,我们不仅使用了来自 TCGA 和 CGGA 的转录组学数据,还利用了福建医科大学附属第一医院的肝细胞癌(HCC)MRI 队列以及 TCIA 和 REMBRANDT 数据库中的 CT 或 MRI 图像来预测 FDX1 的表达情况。研究结果表明,在涵盖 33 种不同癌症类型的 1654 例病例中,FDX1 被发现具有预测患者预后的价值。单细胞分析结果显示,FDX1 在多种细胞类型中表达,尤其在增殖性 T 细胞中表达较高。我们建立了六个队列,包括四种不同恶性肿瘤类型和两种主要影像学模式,用于构建 FDX1 的影像组学预测模型。基于 CT 图像的 FDX1 预测模型的 AUC 范围为 0.748-0.825,而基于 MRI 图像的 AUC 范围为 0.717-0.763。影像组学评分与铜死亡相关基因(如 DLD、DLAT 和 ATP7A)以及免疫抑制基因(如 VTCN1、KDR、TIGIT、PDCD1、LGALS9、LAG3、IDO1 和 CTLA4)之间存在相关性。综上所述,我们通过影像组学方法成功实现了 FDX1 在不同类型的恶性肿瘤和两种主要影像学模式下的非侵入性预测,同时证实上述模型与诸多免疫检查点分子表达存在显著关联。

PO-4082

人工智能在肋骨骨折 CT 诊断的应用研究

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目的 探讨人工智能(Artificial intelligence, AI)技术在辅助肋骨骨折 CT 诊断的应用价值,评估其临床应用可行性。**方法** 回顾性搜集 121 例因胸部外伤致肋骨骨折行 CT 检查患者的影像资料,分析比较医师组(A 组)、AI 组(B 组)、AI 辅助医师组(C 组)对不同类型骨折(错位骨折、无错位骨折)的诊断敏感度、漏诊率、误诊率,以及 A 组与 C 组诊断时间的差异。**结果** 根据骨折参考标准,121 例患者存在肋骨骨折共 695 处。其中错位骨折 506 处,医师组(A 组)检出 493 处,漏诊 13 处,无误诊,诊断正确 493 处。AI 组(B 组)检出 507 处,漏诊 7 处,误诊 8 处,诊断正确 499 处。AI 辅助医师组(C 组)检出 500 处,漏诊 6 处,无误诊,诊断正确 500 处。无错位骨折 189 处,医师组(A 组)检出 167 处,漏诊 24 处,误诊 2 处,诊断正确 165 处。AI 组(B 组)检出 193 处,漏诊 11 处,误诊 15 处,诊断正确 178 处。AI 辅助医师组(C 组)检出 182 处,误诊 2 处,漏诊 9 处,诊断正确 180 处。对两种骨折诊断敏感度均为 C 组>B 组>A 组,漏诊率均为 A 组>B 组>C 组。错位骨折方面,三组间两两比较差异均无统计学意义($P>0.05$);无错位骨折方面,A 组与 B、C 组比较差异有统计学意义($P<0.05$),B 组与 C 组间比较差异无统计学意义($P>0.05$)。误诊率方面,因 A 组和 C 组对错位骨折误诊为 0, P 值无法计算;无错位骨折的误诊率为 B 组>C>A 组,B 组与 A、C 组比较差异有统计学意义($P<0.05$),A 组与 C 组比较差异无统计学意义($P>0.05$)。在诊断用时方面,A 组(医师组)平均诊断时间(214.45 ± 41.21)s, C 组(AI 辅助医师组)平均诊断时间(146.96 ± 29.78)s, C 组诊断时间较 A 组明显缩短,差异有统计学意义($P<0.05$)。**结论** 人工智能可快速有效识别肋骨骨折,放射科医师结合 AI 可有效提高骨折检出率,尤其是提高无错位骨折的检出率,同时降低假阳性率,提高诊断效能,缩短诊断用时,提高工作效率。AI 辅助肋骨骨折诊断具有较高的应用价值,值得推广应用。

PO-4083

基于 CS-AI 技术的 3D PDWI 序列在 MRI 单髁关节薄层高分辨成像中的临床应用价值

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目的 在 3D 质子密度加权成像(proton weighted imaging, PDWI)单髁关节薄层高分辨成像中, 比较基于人工智能的压缩感知技术(Compressed SENSE AI, CS-AI)在不同加速因子(acceleration factor, AF)下的图像质量, 评估 CS-AI 的临床价值并探讨其潜在的最佳加速因子。方法 使用 Philips 3.0 T MRI 成像仪前瞻性纳入 49 例健康志愿者, 分别行 AF 为 4、6、8、10 的 CS-AI 3D PDWI 单髁关节高分辨率扫描并记录扫描时间, 按照上述 AF 分为 A、B、C、D 组。由两名医生分别对四组图像的总伪影(三分法)和股骨头、大小转子、肌肉、软骨图像质量(五分法)进行主观评分。由另一名医生测量同层面内股骨头、股外侧肌及临近皮下脂肪的信号强度(signal intensity, SI)及噪声(standard deviation, SD), 分别计算图像信噪比(signal noise ratio, SNR)、对比噪声比(contrast noise ratio, CNR), 并进行统计学分析。结果 两名观测者对四组图像的主观评分的一致性良好(Kappa 均>0.75)。主观评价中, AF=10 时的伪影较大($p<0.05$), 其余组别间评分差异无统计学意义。不同 AF 组中对股骨头、转子的显示差异无统计学意义, 软骨在 AF=10 时显示最差, 其余组别间显示无统计学差异。AF=6、8、10 组的股外侧肌及临近皮下脂肪 SNR 及 SD 均低于 AF=4 组($p<0.05$), 且三组间差异无统计学意义。除 AF=8 外, AF=6、10 时骨的 SNR 低于 AF=4 组($p<0.05$), 且 AF=6、8、10 三组间有上升趋势; SD 值高于 AF=4 组($p<0.05$), 且 AF=6、8、10 三组间有下降趋势。AF=8 时, 扫描时间较 AF=4 时缩短了 50.14%, 较 AF=6 时缩短 25.64%。结论 基于 CS-AI 技术的 3D PDWI 序列可获得满足临床诊断要求的单髁关节高分辨率图像。此外, AF=8 时可在保证图像质量的同时最大程度缩短扫描时间, 是其最佳加速因子。

PO-4084

人工智能在颈动脉 CTA 中辅助诊断颈动脉狭窄的应用研究

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目的 分析颈动脉 CTA 检查中人工智能(AI)辅助诊断颈动脉狭窄的诊断效能, 与放射科医师诊断对比, 探讨其应用价值。方法 回顾性连续收集 100 例 2018-05-10 至 2018-05-31 在武汉市中心医院行颈动脉 CTA 检查患者病例资料, 分别由 AI 及两名放射科医师独立分析纳入患者 CTA 原始数据, 对原始数据进行后处理并输出诊断结果。狭窄程度的分级为无狭窄(0%)、轻度狭窄(<50%)、中度狭窄(50%-69%)、重度狭窄(70%-99%)、完全闭塞(100%), 依据狭窄程度确定不同诊断临界值, 通过与金标准即高年资医师诊断结果对比, 计算 AI 及两名医师在不同临界值诊断颈动脉狭窄的灵敏度、特异度及 ROC 曲线下面积(AUC)。结果 0%为诊断临界值时, AI 对颈总动脉(CCA)、颈外动脉(ECA)、颈内动脉(CIA)整体及 C1、C4 段、椎动脉(V)整体及 V4 段、基底动脉(BA) AUC 为 0.765、0.648 (L、R-CCA)、0.63、0.655 (L、R-ECA)、0.855、0.878 (L、R-CIA)、0.836、0.767 (L、R-C1)、0.843、0.77 (L、R-C4)、0.804、0.641 (L、R-V)、0.865、0.784 (L、R-V4)、0.667 (BA); 狭窄程度 50%为诊断临界值时, AI 对 ECA、CIA 整体及 C1、C5 段、V 整体及 V1、V4 段、BA 的 AUC 为 0.646、0.984 (L、R-ECA)、0.737、0.71 (L、R-CIA)、0.785、0.593 (L、R-C1)、0.614、0.724 (L、R-C5)、0.844、0.647 (L、R-V)、0.968、0.582 (L、R-V1)、0.693、0.63 (L、R-V4)、0.75 (BA); 狭窄程度 70%为诊断临界值时, AI 对 V 整体及 V4 段、BA 的 AUC 为 0.61、0.593 (L、R-V)、

0.52、0.784 (L、R-V4)、0.75 (BA)。结论 AI 辅助颈动脉 CTA 在诊断颈动脉轻中度狭窄时,大部分颈动脉诊断结果与高年资医师一致性较高;在诊断颈动脉重度狭窄时,椎-基底动脉诊断结果与高年资医师一致性较高。

PO-4085

冠心病伴认知障碍患者大脑功能中枢的改变和因果联系

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冠状动脉疾病(CAD)和认知障碍(CI)已经成为重大的全球性疾病和医疗负担。有研究报导了冠心病患者局部脑功能的改变及其与 CI 的相关性。然而,关于冠心病患者大脑网络连接性变化的研究有限。为了研究静息状态连接性,并进一步了解冠心病患者的有效连接强度和方向性,我们利用程度中心性(DC)和频谱动态因果模型(spDCM)来检测全脑网络中的功能中枢,然后分析方向性连接。使用上述方法,可以揭示 CAD 患者大脑功能改变背后的中枢区域和异常连接,为冠心病患者的认知下降提供神经影像学证据。这项研究是前瞻性进行的,涉及 24 名诊断为冠心病的患者和 24 名健康对照,他们在年龄、性别和教育方面相匹配。功能磁共振成像(fMRI)扫描被用来研究这些人的大脑活动。对所有参与者进行神经心理学检查。DC 分析和 spDCM 用于研究冠心病患者的异常脑网络。通过评估认知功能,我们发现 CAD 患者的认知功能明显低于 HC 组。通过使用 DC 分析和 spDCM,我们观察到 CAD 患者的左侧旁海马皮质(PHC)和左侧颞叶中央回(MTG)的 DC 值显著降低。在有效连接方面,我们观察到 CAD 患者右侧额叶上回(SFG)与 PHC 之间缺乏正连接。此外,从 PHC 和 MTG 到 SFG 的负连接增加,同时 PHC 和 MTG 之间的正连接强度减弱。此外,我们在 CAD 患者中发现 PHC 和 MTG 之间连接强度与认知功能之间存在显著正相关($r = 0.491$, $p = 0.015$)。

这些研究结果表明,在冠心病患者中,涉及额上回、海马旁回和颞中回的脑网络连接的改变可能介导了认知功能的变化。

PO-4086

基于 MR 联合超声的多模态影像组学在 乳腺良恶性疾病中的诊断价值

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目的:我们旨在构建并验证基于 MR 联合超声的多模态影像组学方法评估乳腺良恶性疾病。

材料与方法:回顾性分析我院 208 例乳腺患者的临床影像资料,根据术后病理结果,将患者分为两组,良性组 104 例,恶性组 104 例。所有患者均行超声和 3.0T 多参数 MR 扫描。然后,基于超声及 MR 增强序列逐层画感兴趣区,提取影像组学特征。通过最小绝对收缩和选择算子(LASSO)选择最佳放射组学特征。利用融合数据建立了超声、核磁、超声联合核磁三种类型通过 k-近邻(KNN)、支持向量机(SVM)、逻辑回归(LR)、随机森林(RF)四种机器学习分类器分别对模型(超声、核磁及其组合)进行分类。采用受试者工作特征(ROC)曲线、曲线下面积(AUC)、敏感性、特异性、精确度等指标评价模型,对不同模型诊断乳腺患者良恶性病变的有效性。采用 Delong 检验比较模型间的 ROC。

结果:从每个感兴趣区中提取 3105 个放射组学特征,特征选择后,分别使用基于超声图像数据、核磁图像数据、超声联合核磁融合数据的特征分别构建乳腺良恶性病变评估模型。超声联合核磁图像

融合模型(AUC=0.925)优于纯超声模型($p<0.001$)和纯核磁模型($p<0.001$)。基于支持向量机(SVM)分类器的临床图像融合模型诊断效果最好, AUC= 0.912, 灵敏度=0.944, 特异性=0.701。
结论:与传统的单纯超声或者核磁诊断乳腺疾病相比, MR 联合超声的多模态影像组学模型能够更精确预测乳腺疾病的良恶性, 从而为临床诊治提供更好的依据。

PO-4087

基于 MRI 图像的影像组学分析用于预测局部进展期直肠癌患者对新辅助化疗的治疗反应和预后：一项多中心研究

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目的: 研究临床及 MRI 特征的模型和基于 MRI 的影像组学模型对局部进展期直肠癌 (LARC) 患者新辅助放化疗后良好反应 (GR) 和预后的预测能力。

方法: 从 3 家医院回顾性地招募了总共 921 名 LARC 患者, 包括训练集 (n=508)、外部验证集 1 (n=242) 和外部验证集 2 (n=171)。从 T2WI 和 ADC 图像中提取了影像组学特征, 并使用三种机器学习方法, 包括逻辑回归 (LR)、随机森林 (RF) 和支持向量机 (SVM), 来构建预测 GR 的影像组学模型。临床-MRI 模型通过单因素及多因素逻辑回归分析构建。使用曲线下面积 (AUC) 和决策曲线分析 (DCA) 评估了预测性能。使用 Kaplan-Meier 曲线来评估最佳模型所预测的不同治疗反应组无病生存期 (DFS) 是否有统计学差异。

结果: 用于 GR 预测的临床-MRI 特征模型包括 2 个特征, 影像组学模型包括 10 个影像组学特征。与其他机器学习的模型和临床-MRI 模型相比, 用 SVM 机器学习方法得到的模型对 GR 的预测效能最高, 在训练和两个外部验证数据集中, AUC 分别为 0.798 (95% CI, 0.758-0.837)、0.790 (95% CI, 0.725-0.856) 和 0.743 (95% CI, 0.666-0.821)。决策曲线分析证实, 影像组学模型具有临床实用性。此外, Kaplan-Meier 曲线显示, 由 SVM 模型定义的高概率 GR 患者的 DFS 比低概率患者要好。

结论: 与临床-MRI 模型相比, 基于 MRI 图像的影像组学模型在 LARC 患者的 nCRT 反应预测方面表现出良好的性能, 也可以为预后预测提供价值。

PO-4088

深度学习肝胆期合成图像在肝纤维化分期诊断中的价值探讨

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目的: 通过深度学习合成肝胆期图像, 并评估图像质量及合成肝胆期图像影像组学模型在肝纤维化分期诊断中的价值。

方法: 回顾性收集上海公共卫生临床中心行腹部 Gd-EOB-DTPA 增强 MRI 检查的患者。所有患者在 MRI 扫描前后 3 个月内经病理证实肝纤维化。根据 Scheuer 病理分期标准, 将患者分为显著性肝纤维化 ($\geq S2$ 期), 进展期肝纤维化 ($\geq S3$ 期) 和肝硬化 ($S4$ 期)。其中 236 例 (飞利浦 Ingenia 3.0T) 患者按 7: 3 分为训练集和内部验证集, 用于开发和验证深度学习模型, 175 例 (西门子 Skyra 3.0T) 患者用于模型微调和外部验证。使用 nnU-Net 进行全肝自动分割。通过对抗神经网络深度学习模型合成肝胆期图像, 并使用结构相似性 (structural similarity index, SSIM) 及峰

值信噪比 (peak signal-to-noise ratio, PSNR) 评价图像质量。通过影像组学的方法分别建立显著肝纤维化、进展期肝纤维化及肝硬化模型。模型的效能评估采用 ROC, 计算 AUC、敏感性及特异性。模型之间的诊断效能比较采用 Delong 检验。

结果: 内外部验证集中, 合成肝胆期图像 SSIM 为 25.532 ± 5.465 、 24.908 ± 5.495 , PSNR 为 0.860 ± 0.086 、 0.824 ± 0.098 。在内、外部验证集中: 合成肝胆期图像构建的影像组学模型诊断显著肝纤维化的 AUC 分别为 0.855、0.850, 真实肝胆期影像组学模型的 AUC 分别为 0.828、0.873; 合成肝胆期影像组学模型诊断进展期肝纤维化的 AUC 分别为 0.887、0.816, 真实肝胆期影像组学模型的 AUC 分别为 0.878、0.849; 合成肝胆期影像组学模型诊断肝硬化的 AUC 分别为 0.897、0.860, 真实肝胆期影像组学模型的 AUC 分别为 0.902、0.917。合成肝胆期图像构建的肝纤维化分期诊断影像组学模型, 均与真实肝胆期影像组学模型效能相当, 两者无统计学差异。

结论:

基于对抗生成网络的深度学习模型实现了肝胆期图像的合成。合成肝胆期图像构建的影像组学模型在肝纤维化分期诊断中的效能与真实肝胆期影像组学模型相当。

PO-4089

基于压力图像的 CT 扫描范围坐标系重构方法研究

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目的: 本研究提出一种通过人体仰卧位压力图像来映射 CT 扫描定位图像, 研发基于深度卷积神经网络的 CT 扫描范围自动识别预测模型。

方法: 共收集 420 例数据集 (按照 8:2 的比例划分为训练集和测试集)。首先, 每一例患者均取仰卧位, 于前期制备的柔性力敏传感床垫上进行一次常规 CT 扫描, 分别获取 CT 定位图像及压力图像; 其次, 由影像诊断医师于定位图像上手动标注 6 条定位线, 肺上界 (SP1)、肺下界 (SP2)、膈肌上缘 (SP3)、骨盆上缘 (SP4/5)、骨盆下缘 (SP6), 根据坐标系融合将 6 条定位线映射到压力图像上; 最后, 利用 ResNet 网络在压力图像上对定位线进行位置的预测, 总共分为 480 (80×6) 个类别 (“80”表示各定位线距原点的标准距离大小, 而“6”则代表 SP1 至 SP6 这六条定位线)。

结果: 本研究通过对预测位置与手动标注位置距离差进行分析, 定义了正样例点 (预测位置与标注位置的正距离差 $\leq 1\text{cm}$) 和负样例点 (预测位置与标注位置的正距离差 $> 1\text{cm}$)。对于 SP1、SP3 和 SP5, 正距离差表现为预测位置位于标注位置的头侧; 对于 SP2、SP4 和 SP6, 正距离差则表现为预测位置位于标注位置足侧。通过 ResNet 网络分类后, 6 条定位线的预测结果平均精度达 87.04%。

结论: 基于深度卷积神经网络, 可以在人体仰卧位压力图像的基础上预测 CT 扫描范围, 具有较高的准确性, 为自动扫描系统的研发提供有力基础。

PO-4090

基于 CT 影像组学对不确定肺结节进行侵袭性预测和亚型分类付子杰¹、林艳²

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背景 肺腺癌是高度异质性疾病之一，具有不同的亚型、预后和治疗方式。本研究旨在鉴别不确定肺结节（IPN）的侵袭性，并根据 CT 放射线组学进一步区分侵袭性腺癌（IAC）亚型。

方法 根据病理特征将所有患者分为非 IAC 组（非典型腺瘤性增生（AAH）/原位腺癌（AIS）/微侵袭性腺癌（MIA））和 IAC 组。IAC 组又分为以鳞癌为主的肺腺癌（LPA）组和以尖锐湿疣为主的腺癌（APA）组。多变量逻辑回归分别构建了 IPNs 侵袭性预测模型和 IAC 亚型分类模型。应用接收者操作特征曲线（ROC）来比较模型的诊断性能。最后，建立了区分 LUNG-RADS 4X 结节侵袭性的提名图。

结果 由 Rad-score、重量、分叶和新月征组成的 IPN 侵袭性预测模型在训练集（AUC 0.96）与验证集（AUC 0.90）和外部测试集（AUC 0.87）相比表现最佳，在此基础上建立了评估 LUNG-RADS 4X 类结节侵袭性的直观提名图。该提名图识别 LUNG-RADS 4X 类结节侵袭性的准确率为 0.83。此外，在训练集（AUC 0.85）和验证集（AUC 0.72）中，IAC 亚型模型显示了 LPA 和 APA 之间良好的区分度。

结论 基于 CT 放射线组学的侵袭性预测提名图可以筛查 LUNG-RADS 4X 结节的侵袭性。此外，IAC 亚型分类模型在区分 LPA 和 APA 方面表现良好。

PO-4091

利用 CT 图像特征预测神经母细胞瘤 MKI 指数的三级放射组学模型

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目的:有丝分裂核裂指数(MKI)是决定神经母细胞瘤病理异质性的指标。我们的研究旨在建立一种放射组学模型，利用从 CT 图像中提取的肿瘤内特征来预测神经母细胞瘤的 MKI。

方法:我们对 246 例经组织学证实的神经母细胞瘤患者进行回顾性研究。根据患者的 MKI 状态将患者分为低、中、高三组。它们被随机分为训练集和测试集，比例为 8:2。在非增强、动脉和静脉 CT 图像上，在肿瘤内划定感兴趣区域(roi)，并提取放射组学特征。在对放射组学特征降维后，采用随机森林算法建立三分类模型，预测训练集中的 MKI。该模型随后在测试集中进行了验证。

结果:肿瘤内放射组学模型分别包含 15 个和 14 个放射组学特征。肿瘤内放射组学模型的平均曲线下面积(AUC)在训练集为 0.861，在测试集为 0.847。无论是训练集还是测试集，肿瘤放射组学模型的诊断效能均存在显著差异，P 值均小于 0.05。

结论:肿瘤特征与 MKI 相关，放射组学模型 AUC 值表明有较好的诊断性能。

PO-4092

肺结节低剂量 CT 对 AI 检测效能及影像组学特征的影响： 体模研究

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目的：探讨低剂量 CT 及不同低剂量扫描方案对肺结节 AI 检测效能和 CT 影像组学特征的影响。**方法：**于仿真胸部体模中随机放置 4 种大小（直径 5mm、8mm、10mm、12mm）、2 种密度（+100HU、-630HU）的人工球形结节。应用 uCT760 对体模进行常规剂量和低剂量扫描，常规扫描组 A 组：120kVp+100mAs；低剂量扫描组 B 组（B1 组：120kVp+25mAs，B2 组：100kVp+45mAs）。各组均采用骨滤波（B_SHARP_C），重建层厚 1mm。重建图像传至 AI 辅助诊断系统进行肺结节自动检测，记录结节的大小、密度、体积，并计算长径、体积测量的绝对错误率。以 3D-Slicer 软件对 A 和 B 组图像中肺结节手动勾画 ROI，采用 Pyradiomics 平台提取每个 ROI 的影像组学特征 107 个，包括 14 个形状特征、18 个一阶统计量和 75 个纹理特征。采用单因素方差分析比较 3 种扫描条件下结节长径和体积测量准确度 APE 的大小。使用一致性相关系数（CCC）评估常规剂量和低剂量及不同低剂量扫描方案所获得的图像上肺结节分割结果的组学特征一致性。**结果：**相较于 A 组，B1 和 B2 的有效剂量（ED）分别降低 75.0%、73.3%。A 组、B1 组和 B2 组肺结节检出率均为 100%，肺结节定性一致，长径、体积的 APE 差异均无统计学意义（ $P>0.05$ ）。随着 CCC 阈值增加，可重复组学特征占比均呈明显下降趋势。低剂量组所提取的一阶统计量和纹理特征与常规剂量组一致性均较差，而形状特征一致性较好；相同低剂量下，不同低剂量实现方式所提取的一阶统计量和纹理特征致性也较差，实性结节更为显著。**结论：**低剂量 CT 下 AI 系统的肺结节检测结果是可信性的；但低剂量 CT 及不同低剂量扫描方案所提取的组学特征与常规剂量一致性均较差，尤其是一阶统计量和纹理特征。

PO-4093

人工智能（AI）自动后处理软件进行冠状动脉搭桥血管 CTA 后 处理工作的初步探讨

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目的：使用联影 AI 自动后处理软件进行冠状动脉搭桥血管后处理分析，初步探讨自动后处理软件替代人工后处理完成冠状动脉搭桥血管分析的效率以及可靠性。

材料与方法：随机选择 2022.12~2023.5 月的进行冠状动脉搭桥血管术后复查的患者 69 例，进行冠状动脉搭桥血管 CTA 检查，图像分别由高年资技师分别使用 AI 后处理软件以及 CT 的后处理软件进行重建，分别记录后处理图像所需要的时间，由两名从事后处理的高年资医师对图像质量分为三个部分进行评价，比较 AI 后处理与人工后处理的结果。**结果：**65 例冠状动脉搭桥血管 CTA 的病例入组，除分析常规冠状动脉血管外，136 支桥血管（动脉桥血管 56 支，静脉桥血管 80 支）被单独分析。AI 后处理的时间平均为 3.74 ± 0.73 分钟，最长处理时间 5.5 分钟，人工后处理的时间平均为 11.30 ± 4.53 分钟（ $P<0.01$ ），最长处理时间 22 分钟，平均时间增益率为 -67%。心脏 VR 的 AI 后处理评分（均为 5 分）优于人工后处理（ $p<0.05$ ）。VR 冠脉树评分基本一致，CPR 评分人工处理组优于 AI 后处理组。两组的评分均超多 4 分，均满足临床诊断需要。**结论：**UAI 冠状动脉处理软件包可以自动分割出心脏，冠状动脉，自动分析各个血管。对于复杂的冠状动脉血管旁路手术的

CCTA 的后处理与人工后处理过程进行比较, 可以达到人工后处理图像质量, 辅以人工干预, 人工智能 AI 自动后处理软件进行冠状动脉搭桥血管后处理工作可以大大提高后处理的效率节约四分之三人工处理过程以及三分之二的时间, 同时保证不会因为检查次数以及后处理医生人为水平带来的图像截图以及图像质量的差别。

PO-4094

人工智能自动定位技术在不同体型患者胸部 CT 成像中的应用

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目的: 探讨不同体型患者胸部 CT 成像中 AI 自动定位技术对图像质量及辐射剂量的影响。方法: 收集我院行胸部 CT 检查的患者 290 例, 按照定位方式不同分为两组, 其中 A 组 (AI 自动定位操作组) 及 B 组 (常规手动定位操作组) 扫描各 145 例, 根据体质指数 (Body Mass Index, BMI) 将两组患者进一步分为 A1 组和 B1 组: BMI<24kg/m²; A2 组和 B2 组: 24kg/m²≤BMI<28 kg/m²; A3 组和 B3 组: BMI≥28 kg/m²。对各组的定位扫描精度、客观图像质量、主观图像质量及辐射剂量进行评价。结果: AI 定位组在不同体型患者中的偏中心距离均低于常规定位组, A1 组、A2 组及 A3 组偏中心距离较 B1 组、B2 组及 B3 组分别减小 38.67 %、61.04 %及 65.90 % (均 P<0.01); A 组各分组较 B 组在主动脉、气管、竖脊肌和肺野的 CT 值均增高, 图像噪声均减低, 信噪比 (SNR) 均增高, 且差异均有统计学 (均 P<0.05); A1 组、A2 组及 A3 组 CT 容积剂量指数 (CTDIvol) 较 B1 组、B2 组及 B3 组分别减少 7.57%、10.57%及 15.27% (均 P<0.01); A1 组、A2 组及 A3 组剂量长度乘积 (DLP) 较 B1 组、B2 组及 B3 组分别减少 15.22 %、16.74 %及 19.04 % (均 P<0.01)。结论: AI 自动定位技术适用于不同 BMI 患者的胸部 CT 检查, 可以优化检查流程, 提高定位准确性, 改善图像质量, 并有效减少患者辐射剂量

PO-4095

AI 等中心定位技术在冠状动脉 CT 造影中的应用及价值

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目的: 探讨 AI 等中心自动定位技术在冠状动脉 CT 造影 (coronary computed tomography angiography, CCTA) 中对患者检查工作流程、定位准确性、辐射剂量及图像质量的影响。

材料与方法: 收集武汉大学中南医院 2021 年 1 月-2021 年 12 月期间患者 100 例, 采用相同的扫描方案及参数进行冠脉 CTA 造影, 其中 50 例患者采用常规手动定位方法扫描 (手动定位组), 另 50 例患者使用 AI 自动定位技术扫描 (自动定位组), 两组患者在心率、年龄和体重指数方面无统计学差异, 且均符合相应的纳入排除标准; 两组患者均采用同一款 CT 进行扫描。测量并比较两组患者的定位时间、心脏偏中心距离、图像质量及辐射剂量。结果: 与手动定位组相比, AI 自动定位组的定位时间平均为 (31.4±6.6) s, 低于手动定位组, 平均为 (42.2±8.4) s, AI 等中心定位缩短了 26% 的定位操作时间; 心脏偏离中心距离平均为 (1.2±0.7) cm, 低于手动定位组, 平均为 (1.7±1.1) cm, 且差异有统计学意义 (p<0.05); 有效辐射剂量平均为 (6.4±1.3) mSv, 低于手动定位组, 平均为 (7.5±1.2) mSv, 且差异有统计学意义 (p<0.001); AI 等中心定位技术减少 14% 的降主动脉图像噪声, 并提高了冠脉 CTA 图像的信噪比, 冠脉 CTA 主观图像质量评价在两组之间无统计学显著差异。结论: 基于人工智能的自动患者定位方法可用于 CCTA, 以进一步优化心脏定位精度, 减少辐射剂量, 并通过更准确的患者定位提高图像质量。

PO-4096

蝶鞍三维重建技术对青少年长期服用抗精神药物致性早熟的临床应用分析

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目的：探讨蝶鞍三维重建技术在青少年长期服用抗精神药物致性早熟的临床应用分析。

方法：回顾性分析我院 2018 年 1 月至 2021 年 1 月期间收治的 50 例长期服用抗精神药物致性早熟的青少年患者的临床资料，所有患者均接受蝶鞍三维重建技术检查。

结果：本组 50 例患者中，蝶鞍三维重建技术检查结果显示，蝶鞍部骨质增生病变发生率为 100%，其中骨质增生性病变 20 例（40%），其他病变 30 例（60%）。

结论：蝶鞍三维重建技术在青少年长期服用抗精神药物致性早熟的临床应用中具有重要意义，可为临床诊断和治疗提供重要参考。

PO-4097

CT—CPR 评价呼吸道狭窄对 OSAS 制定个性化诊疗方案的临床价值分析

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目的：探讨 CT--CPR 评价呼吸道狭窄对阻塞性睡眠呼吸暂停综合征（OSAS）制定个性化诊疗方案的临床价值。方法：收集 2021 年 6 月-2022 年 6 月因疑似 OSAS 并行多模态呼吸睡眠监测（PSG）检查的患者，根据 PSG 结果分为对照组（无 OSAS 组）和实验组（OSAS 组），比较两组行常规 CT 和 CT--CPR 检查的结果。

结果：对照组常规 CT 检出呼吸道狭窄率高于实验组，差异具有统计学意义（ $P<0.05$ ）；实验组 CT-CPR 检出呼吸道狭窄率高于对照组，差异具有统计学意义（ $P<0.05$ ）。

结论：CT-CPR 评价呼吸道狭窄对 OSAS 的诊疗方案制定具有重要价值，可提高诊断准确率，为个性化诊疗方案的制定提供依据。

书面交流

PU-0001

椎间盘源性腰痛与纤维环磁共振影像学特征性与相关性分析

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[目的]研究表明, 腰椎间盘突出高信号区 (HIZ) 是椎间盘源性疼痛的诊断方法, 本研究在临床诊断椎间盘源性腰痛, 其椎间盘纤维环磁共振影学的特征性表现, 与其腰痛之间的相关性, 进一步预测椎间盘退变的价值。[方法]研究对象为回顾性搜集德州市第七人民医院 2022 年 1 月至 2023 年 3 月, 选取 23-50 岁年龄段, 平均年龄为 (33.5±3.05), 临床诊断腰椎间盘突出 382 例, 其中男性 231 例, 女性 151 例, 经骨科医师查体确定, 磁共振检查作为影像学依据; 影像图像由两位经验丰富主治以上医师进行盲法阅读和分析。所有腰椎 MRI 检查均采用脊柱表面线圈进行, 奥泰 1.5T 超导磁共振, 扫描序列包括矢状位 T1WI、T2WI、T2WI 压脂, 横轴位 T2WI, 每位患者均扫描 L1/2-L5/S1 间盘, 共 5 个椎间盘。[结果]382 例患者共扫描 1910 个椎间盘, 纤维环 T2WI 显示高信号共计 649 个椎间盘, 占总间盘数 (33.98%±0.01), 382 例患者出现纤维环 T2WI 高信号共计 341 例, 占总人数 (89.27%±0.01)。影像表现: 正常椎间盘横轴位 T2WI 呈中心髓核为高信号, 周围纤维环为低信号; 纤维环 T2WI 高信号表现为中央型、旁侧型撕裂、两侧型高信号。[结论]磁共振 T2WI 检查可以清晰的显示纤维环形态, 尤其以横轴位, 能够清晰的显示纤维环异常信号, 是一种非常有价值的检查方式, 敏感性较高, 纤维环出现异常信号, 表明纤维环出现撕裂, 纤维环薄弱, 间盘内压力增大, 可以导致间盘膨出或突出, 如纤维环贯穿撕裂, 将会预测髓核脱出, 椎间盘纤维环的撕裂, 形成水肿, 炎性刺激神经, 造成腰痛、放射性腰痛, 与腰椎间盘突出性腰痛具有明显的相关性, 总体表明, 磁共振 T2WI 横轴位影像学特征性表现, 对腰椎间盘突出性腰痛具有非常高的诊断价值。

PU-0002

轻度认知功能障碍患者大脑 fMRI 网络的小世界特性

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目的 利用静息态 fMRI 数据检验轻度认知功能障碍 (MCI) 患者大脑功能网络是否具有小世界特性。方法 采集 16 例 MCI 患者和 20 例正常老年人 (NC) 的大脑静息态 BOLD-fMRI 数据。采用 SPM5 软件对图像进行预处理, 将大脑分割为 90 个区域并计算 90 个区域间的相关系数。以矩阵稀疏度 Sparsity 为阈值, 将相关矩阵转换为网络。计算网络的聚类系数 C 和平均路径长度 L , 若满足 $\gamma = C/C_{rand} > 1$ 且 $\lambda = L/L_{rand} \approx 1$ ($rand$ 代表相应随机网络), 则说明该大脑功能网络具有小世界特性。采用双样本 t 检验比较 MCI 患者与正常老年人大脑功能网络小世界参数的差异。结果 在 0.1~0.4 阈值范围内, MCI 组和 NC 组均符合 $\gamma > 1$ 且 $\lambda \approx 1$ 。MCI 组 γ 和 δ 均大于 NC 组, 且在 $0.10 \leq \text{Sparsity} \leq 0.18$ 时差异达到显著水平 ($P < 0.05$); MCI 组 λ 在各阈值处均小于 NC 组, 在 $\text{Sparsity} = 0.18$ 、0.28 和 0.32 处差异达到显著水平 ($P < 0.05$)。结论 MCI 患者大脑 fMRI 网络具有小世界特性, 但与正常老年人相比其小世界特性增强。

PU-0003

多扩散敏感系数的弥散加权成像对基于生成对抗网络的前列腺癌病灶检测影响的研究

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目的 探讨多扩散敏感系数 (b 值) 的弥散加权成像 (DWI) 对基于生成对抗网络 (GAN) 的前列腺癌病灶检测影响的价值。

方法 收集 2012 年 1 月至 2018 年 6 月在本院就诊的前列腺疾病病例 446 例, 前列腺癌 174 例, 前列腺增生 272 例, 所有均经直肠超声引导下前列腺穿刺活检或前列腺根治术后病理证实。均采用 Siemens Verio 3.0T MRI 扫描, 成像序列包括横断位、矢状位高分辨 T2WI, b 值=0、500、1000 s/mm² 横断位 DWI 及 DCE 扫描, 通过 Matlab 后处理化合成 b=1500、2000 s/mm² 的 DWI 图像。我们提出一个新的神经网络模型 SegDenseAN, 并结合多 b 值 DWI 图像进行检测。该网络基于 GAN, 由生成网络和判别网络两部分组成, 生成网络是一个基于 Dense 模块的分割模型, 而判别网络是一个多尺寸的特征提取网络。将多 b 值 DWI 与 ADC 影像的不同组合作为 SegDenseAN 网络的输入: 组合 1: ADC 图; 组合 2: ADC+DWI0+DWI500; 组合 3: ADC+DWI0+DWI1000; 组合 4: ADC+DWI0+DWI1500; 组合 5: ADC+DWI1000+DWI1500; 组合 6: ADC+DWI1000+DWI2000, 分析比较不同组合对检测精度的影响。

结果 组合 1-6 的准确性分别为: 0.871、0.887、0.903、0.903、0.903、0.903; 敏感性分别为: 0.935、0.935、0.968、0.968、0.968、0.968; 特异性分别为 0.806、0.839、0.839、0.839、0.839、0.839; 组合 6 的前列腺癌病灶区域识别最接近于原始金标准。

结论 SegDenseAN 可以实现病灶区域的自动分割, 有助于前列腺癌的自动检测; 多 b 值尤其多个高 b 值 DWI 与 ADC 影像的不同结合对算法的检测效果有影响, 有助于提高前列腺癌的自动检测结果。

PU-0004

3.0T MR 多期动态增强扫描在肾脏肿瘤诊断中的价值

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目的 评价 3.0T MR 多期动态增强扫描 (DCE-MRI) 在肾脏肿瘤良恶性及不同病理组织学类型之间鉴别诊断的价值。

方法 15 例正常志愿者及 46 例经病理证实的肾脏肿瘤患者 (其中肾透明细胞癌 18 例, 乳头状肾细胞癌 8 例, 肾嫌色细胞癌 7 例, 肾血管平滑肌脂肪瘤 13 例) 均行 3.0T DCE-MRI。采用单因素方差分析方法比较 DCE-MRI 所得 K_{trans}、K_{ep}、V_e 在不同病理类型肾脏肿瘤之间的差异, 应用 ROC 曲线评价 DCE-MRI 对于鉴别肾脏肿瘤良恶性的诊断价值。

结果 应用 DCE-MRI 得到正常肾实质的时间-信号强度曲线 (SI-T 曲线) 呈速升平台型, 肾脏良性肿瘤的 SI-T 曲线呈上升平台型, 而恶性肿瘤的 SI-T 曲线呈速升流出型。正常肾实质与各病理类型肾脏肿瘤之间 K_{trans}、K_{ep} 及 V_e 值差异均有统计学意义。肾脏各组恶性肿瘤的 K_{trans} 值及 V_e 值均高于良性肿瘤 (P<0.05), 恶性肿瘤中, 仅肾透明细胞癌的 K_{ep} 值高于良性肿瘤 (P<0.05)。肾恶性肿瘤中, 肾透明细胞癌、肾乳头状细胞癌及肾嫌色细胞癌的 K_{trans} 值差异均具有统计学意义 (P<0.05)。肾透明细胞癌的 V_e 值 (0.42±0.08) 高于肾乳头状细胞癌 V_e 值 (0.29±0.14) (P<0.05)。运用 ROC 曲线评估 DCE-MRI 鉴别肾脏肿瘤良恶性的诊断价值, K_{trans} AUC=0.937, 灵敏度和特异度分别为 87.9%和 85.7%, 临界值为 0.38/min; V_e AUC=0.803, 灵敏度和特异度分别为 78.8%和 71.4%, 临界值为 0.29/min; K_{ep} 则表现出较低的鉴别诊断价值(0.564)。

结论 3.0T MR 多期动态增强扫描 (DCE-MRI) 能有效鉴别肾脏肿瘤良恶性及不同病理组织学类型, 其中 Ktrans 值的诊断价值最高。

PU-0005

磁共振在特殊妊娠诊断中的应用

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目的: 评价 MR 在特殊妊娠诊断中的应用价值。方法: 32 例经临床、手术病理证实特殊妊娠患者接受 Siemens 3.0T 磁共振检查。年龄 23-44 岁, 孕 5-32 周。初产妇 27 例, 经产妇 5 例。腹痛、恶心、呕吐就诊 24 例, 无症状者 5 例。结果: 宫内孕 30 例, 宫外孕 2 例。不同部位妊娠 MR 表现相似, 典型表现为着床部位孕囊结构, 宫内早孕宫腔蜕膜反应明显。孕囊壁 T1WI 呈中等信号, T2WI 呈低信号, 部分与高信号蜕膜分界, 孕囊腔内呈 T1WI 低、T2WI 高信号, 部分见点片状 T2WI 中等或低信号胚胎结构, T1WI、T2WI 呈中等信号, 部分 DWI 呈高信号, SWI 呈中等信号, 其内夹杂点片低信号。3 例蜕膜 DWI 信号稍高, SWI 呈低信号改变。在妊娠合并卵巢病变中, 卵巢囊性病变最常见, 表现为 T1WI 低、T2WI 高信号, DWI 呈中等信号, SWI 呈稍高信号, 增强后厚壁或薄壁环形强化, 黄体囊肿 4 例, 卵泡囊肿 2 例。卵巢畸胎瘤、巧克力囊肿信号混杂, SWI 因成分不同而高低信号混杂。妊娠合并子宫病变中, 子宫肌瘤最常见, 典型表现为 T1WI 中等、T2WI 低信号, DWI 呈中等信号, SWI 呈中等信号。子宫腺肌症表现 T1WI 中等, T2WI 以稍低信号为主, 内夹杂斑点状高信号, DWI 信号中等, SWI 呈中等信号, 内见少许斑点低信号。疤痕妊娠表现为子宫前下壁肌层明显变薄, 局部见团片状异常信号, T1WI 等低信号、T2WI 不均匀高信号, 子宫结合带中断, DWI 呈稍高信号, SWI 呈稍高信号, 部分见条片低信号。胎盘前置表现为胎盘位置异常, 接近或部分覆盖宫颈内口, 可伴有胎盘植入, 早期胎盘表现为 T1WI 稍低、T2WI 稍高信号, DWI 呈中等信号, 信号较均匀, 妊娠中后期胎盘信号不均匀。胎盘植入表现为子宫结合带低信号连续性中断, 肌层内取而代之胎盘样结构。结论: MR 对子宫疤痕妊娠、胎盘前置及胎盘植入等疾病的临床进一步诊疗有重要价值。

PU-0006

多模态磁共振成像对宫颈癌诊断的价值

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目的 探索多模态磁共振成像对宫颈癌诊断的价值

方法 收集同济大学附属同济医院 2015 年 4 月至 2016 年 4 月期间, 经细胞学涂片或活检证实为宫颈癌且接受手术治疗的患者 17 例。所有患者在术前均行磁共振检查, 成像序列包括常规 T1WI、T2WI、DWI、BOLD-MRI 及 DCE-MRI, 并测得相关检查指标, 包括 DWI 检查指标 ADCmean; BOLD-MRI 检查指标基线 R2*值; DCE-MRI 检查指标 Ktrans 及 Ve 值。术后对宫颈癌标本进行评估, 包括病理类型、分化程度、宫旁组织浸润情况、盆腔淋巴结转移情况、MVD 及 HIF-1 α 表达情况, 并比较分析多模态磁共振成像检查指标与病理特征的相关性。

结果 (1) Ktrans 值在鳞状细胞癌和腺癌间的差异具有统计学意义 ($P<0.05$); (2) 高/中分化组的 ADCmean 明显高于低分化组, 且高/中分化组的基线 R2*值明显低于低分化组, 差异具有统计学意义 ($P<0.05$); (3) 多模态磁共振成像检查指标与宫旁组织浸润情况及盆腔淋巴结转移情况无明显相关性 ($P>0.05$); (4) 宫颈癌组织内 MVD 水平与 Ktrans 值存在弱强度正相关($r=0.313$,

$P<0.05$), 与其他检查指标无明显相关性 ($P>0.05$); (5) 宫颈癌组织内 HIF-1 α 表达水平与基线 R2* 值存在中等强度正相关 ($r=0.559$, $P<0.05$), 与其他检查指标无明显相关性 ($P>0.05$)。

结论 多模态磁共振成像对宫颈癌的诊断具有一定价值。

PU-0007

3.0TMR 评估青年人群膝关节前交叉韧带损伤的危险因素

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目的 探讨 3.0TMR 评估青年人前交叉韧带损伤的危险因素及其意义。

方法 回顾性分析已确诊前交叉韧带损伤的患者 69 例 (其中男 35 例, 女 34 例) 及正常对照组 62 例 (其中男 33 例, 女 29 例) 膝关节 3.0T MR 扫描资料, 比较 MR 诊断前交叉韧带损伤的敏感性、特异性及准确性。测量损伤组与正常组的膝关节形态, 测量参数包括: 股骨髁间凹的宽度 (NW)、股骨内外侧髁总长 (BW) 以及两者的比例即宽度指数 (NWI), 内侧髁至髁间凹的宽度 M、外侧髁至髁间凹的宽度 L 及两者的比值 L:M, 所获得的数据采用 SPSS13.0 软件行统计分析。

结果 MRI 诊断前交叉韧带损伤的敏感性是 94.2%, 特异性是 92.3%, 准确性是 93.5%。68 例男性与 63 例女性比较, BW、L 及 NWI 差异有统计学意义 ($P<0.05$), NW、M 及 L:M 差异无统计学意义 ($P>0.05$), 青年男性与女性膝关节形态不同, 男性膝关节的 NWI 较女性更小, 在前交叉韧带损伤与未损伤男性人群中, BW、L:M 及 NWI 的差异有统计学意义 ($P<0.05$), 损伤者的 NWI 更小; 而女性前交叉韧带损伤与未损伤组中, 各参数差异均无统计学意义。所有参数在活动的强度及损伤部位 (左右) 之间差异无统计学意义 ($P>0.05$)。

结论 较小的 NWI 很可能是男性前交叉韧带损伤的危险因素, BW 及 L:M 是影响青年男性膝关节动力学的重要因素。

PU-0008

Differentiating Esophageal Small Cell Carcinoma from Esophageal Squamous Cell Carcinoma based on DWI, DKI, and IVIM: A prospective study

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Background: Magnetic resonance imaging (MRI), including diffusion-weighted imaging (DWI), intravoxel incoherent motion imaging (IVIM), and diffusion kurtosis imaging (DKI), is a widely used approach in patients with esophageal cancer. Yet, these methods have not been tested for differentiating esophageal small cell carcinoma (SCCE) from esophageal squamous cell carcinoma (ESCC).

Purpose: To evaluate the diagnostic value of IVIM, DKI, and DWI in distinguishing SCCE from ESCC.

Populations: Fifty patients with esophageal carcinoma were selected.

Sequence: All subjects underwent sagittal IVIM, sagittal DWI, and sagittal DKI scans.

Assessment: IVIM, DWI, and DKI parameters, including true diffusion coefficient (D), perfusion fraction (f), pseudo-diffusion coefficient (D*), apparent diffusion coefficient (ADC), mean kurtosis (MK), and mean diffusivity (MD) were measured for each patient.

Statistical tests:ANOVA test (normal distribution) or Kruskal-Wallis H test (non-normal distribution) was used to compare differences in parameters. ROC curve was used to analyze the diagnostic efficacy of each parameter in distinguishing esophageal SCCE from ESCC.

Results: Except for D^* , ADC, D, and MD of ESCC were higher than those of esophageal SCCE, while f and MK were lower (all $P < 0.05$). The AUC of MK, MD, ADC, and D values was higher than that of the f value ($P < 0.05$), while the difference in the AUC values of MK, MD, ADC, and D was not statistically significant ($P > 0.05$).

Conclusion: IVIM and DKI can provide more information than DWI in differentiating SCCE from ESCC. MD, MK, D, and ADC feature a higher diagnostic efficacy.

PU-0009

帕金森病运动亚型与血管周围间隙扩大的相关性研究

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帕金森病 (PD)是最常见的第二大神经性退行性系统疾病,主要分为震颤型(TD)、姿势不稳-步态障碍型(PIGD),主要病理标志是多巴胺能神经元变性和 α 突触核蛋白异常沉积。PVS 有助于清除大脑中异常的 α -突触核蛋白,当血管周围间隙扩大时,在一定程度上代表了其病理及生理意义。最近的研究发现 EPVS 与 PD 运动障碍有关,本文主要探究 PD 不同亚型患者评分与脑部不同区域 EPVS 的相关性,观察是否能为 PD 区分亚型提供一定的证据。

PU-0010

糖尿病酮症护理

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1 均给予静脉补液,根据脱水程度及心肺功能,最初 1~2h 给予 0.9%生理盐水1000~2000ml 快速补液,如果存在心功能不全则减慢输液速度;根据血糖情况调整液体量,减轻高糖及酸中毒状况,直到纠正脱水、维持循环功能。

1.2.2小剂量补充胰岛素:给予胰岛素 0.1U/kg,且每 1~2小时测血糖及尿常规,根据血糖下降情况调整胰岛素用量,如血糖下降幅度达到胰岛素治疗前水平的 30%,或平均下降 3.9~5.6mmol/L,可维持原滴注速度;若血糖无肯定的下降,提示患者对胰岛素敏感性低,胰岛素剂量应加倍,若血糖下降速度过快则患者会出现低血糖反应,可给予酌情处理,当血糖降至 13.9mmol/L 时,改为 5%葡萄糖液静点,并加入胰岛素(每 3~4g 葡萄糖加 1U 胰岛素)。

1.2.3 纠正电解质紊乱:治疗开始时血钾可能正常或偏高,但随着血容量增加,治疗 1~4h 后会出现低血钾,故治疗开始后如果尿量>30ml/h,给予静脉补钾,3g/d,并监测血钾,同时注意血钠、血氯。

1.2.4 纠正酸碱平衡失调:开始治疗时并不用补碱,随着液体量增加酸中毒会改善,过早补碱可加重脑水肿,若血pH 为 7.0~7.1 时可给予 5%碳酸氢钠注射液 250ml 静点,监测血气, pH 为 7.2 时即可停止补碱。

PU-0011

多参数 MRI 影像组学模型术前对早期子宫内膜癌的风险预测

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目的：分析基于多参数 MRI 影像组学模型在术前预测低风险子宫内膜癌（endometrial carcinoma, EC）的可行性及临床价值。方法：回顾性收集 204 例 FIGO I 期和 II 期的 EC 患者资料，分为训练集(中心 1, n=87)和测试集(中心 2, n=117)。所有患者均于术前两周内行盆腔 MR 平扫及增强扫描。分析比较低风险与非低风险患者的临床特征差异，分别在轴位 FS-T2WI、ADC 和 CE-T1WI 图像上逐层勾画全肿瘤感兴趣区，提取与风险因素高度相关的影像组学特征并筛选建立影像组学模型，采用受试者工作特征曲线对模型效能进行评估。结果：低风险组和非低风险组组间患者年龄、肿瘤体积差异均有统计学意义 ($P < 0.05$)，但多变量逻辑回归分析显示它们并非独立风险因素。单参数 FS-T2WI、ADC 和 CE-T1WI 影像组学模型的 AUC 值在训练集分别为 0.730、0.724 和 0.757，在测试集分别为 0.750、0.667 和 0.706。三个参数的融合模型在训练集和测试集的 AUC 值分别为 0.827 (95% CI 0.742-0.912) 和 0.823 (95% CI 0.748-0.897)，优于单参数模型 (所有 $P < 0.05$)。结论：多参数 MRI 影像组学模型对早期低风险 EC 有较好的预测价值，并具有可重复性。

PU-0012

磁共振定量增强参数与乳腺癌预后因子的相关性分析

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目的：探究磁共振定量增强参数 k_{trans} 、 kep 和 ve 与乳腺癌预后因子 $ki67$ 、ER、PR、VEGR 的相关性，为乳腺癌的临床治疗提供参考。

方法：本研究收集我院 50 例乳腺癌患者作为研究对象，所有患者均为女性，年龄范围为 32 至 72 岁。所有患者均行乳腺 MRI 定量增强检查（西门子 $vida$ 3.0T），获取磁共振定量增强参数 k_{trans} 、 kep 和 ve 。同时，我们通过免疫组织化学方法检测乳腺癌预后因子 $ki67$ 、ER、PR、VEGR 的表达情况。我们使用 Pearson 相关系数分析磁共振定量增强参数和预后因子之间的相关性，并利用 SPSS 22.0 软件进行统计学分析。

结果：本研究结果表明，50 例乳腺癌患者中， k_{trans} 、 kep 和 ve 与 $ki67$ 、ER、PR、VEGR 均存在相关性。其中， k_{trans} 与 $ki67$ 、ER、PR、VEGR 呈正相关， kep 与 $ki67$ 、ER、PR、VEGR 呈负相关， ve 与 $ki67$ 、ER、PR、VEGR 呈正相关。其中， k_{trans} 和 ER 的相关系数最高，为 0.624 ($P < 0.001$)， kep 和 $ki67$ 的相关系数最高，为 -0.568 ($P < 0.001$)， ve 和 ER 的相关系数最高，为 0.539 ($P < 0.001$)。

结论：本研究结果表明，磁共振定量增强参数 k_{trans} 、 kep 和 ve 与乳腺癌预后因子 $ki67$ 、ER、PR、VEGR 存在相关性。这些定量参数可以作为乳腺癌预后因子的辅助评价指标，为临床医生提供更全面的乳腺癌患者预后评估信息，为制定更合理的治疗方案提供参考。

PU-0013

老年 STEMI 患者合并微血管阻塞应用 CE-SSFP 电影序列的扫描技术探索

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目的 针对老年 STEMI 合并微血管阻塞患者改进心脏磁共振心功能电影序列的扫描策略, 评价改进后序列的图像质量, 提高对微血管阻塞的诊断效能。方法 回顾性分析 50 例 STEMI 患者和 50 例健康志愿者的心脏磁共振影像资料, 比较改进扫描方案后 CE-SSFP cine 的图像质量, 进一步评价改进序列对微血管阻塞的诊断效能。结果 STEMI 组 48 例患者 (96%) 和对照组 49 例 (98%) 志愿者经改进后 CE-SSFP cine 序列扫描可提高符合诊断的图像质量; STEMI 组的血池与心肌对比噪声比显著优于对照组 (222.9 ± 15.6 vs. 170.1 ± 14.9 , $P < 0.05$); 局部节段水平应用改进 CE-SSFP cine 人工标注有效识别微血管阻塞的敏感性为 100, 特异性为 85.7, 约登指数为 0.86, 曲线下面积为 0.96。结论 合理优化改进 CE-SSFP cine 序列, 对老年 STEMI 合并微血管阻塞患者的有效识别大有裨益。

PU-0014

Aberrant structural and functional alterations in patients with insomnia comorbid anxiety: A combined voxel-based morphometry and functional connectivity study

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Background: Chronic insomnia disorder (CID) is commonly comorbid with generalized anxiety disorder (GAD), resulting in possible alterations in patient's brain structure and function. However, its imaging manifestation and pathogenesis remains unclear. Purpose: To investigate the imaging manifestations of patient with CID comorbid GAD, as well as its possible pathogenesis. Methods: A total of 57 patients with CID comorbid GAD and 57 healthy controls (HC) were respectively recruited in this study. Voxel-based morphometry (VBM) and functional connectivity (FC) were used to observe the gray matter volume (GMV) and functional alterations. Correlation analysis was used to discover associations between brain alterations and clinical features. Results: The patients presented with decreased GMV in the left cerebellum, right cerebellar peduncle and left insula, increased FC in the left cerebellum-right angular gyrus and the left insula-anterior left cingulate gyrus, and decreased FC in left cerebellum-middle left cingulate gyrus, left cerebellum-left medial superior frontal gyrus, and left insula-left superior postcentral gyrus. There was an association between CID comorbid with GAD and some of these brain alterations. Discussion: CID comorbid with GAD can cause abnormal manifestations in cerebellum, insula, angular gyrus, cingulate gyrus, superior frontal gyrus and postcentral gyrus. Some of these abnormalities may be involved in the pathogenesis of the comorbidity. Conclusion: Reduced GMV in left insula and decreased FC in left cerebellum-middle left cingulate gyrus and left cerebellum-left medial superior frontal gyrus may contribute to the comorbidity of CID and GAD.

PU-0015

Non-Ketotic Hyperglycaemic Seizures with Hyperhomocysteinaemia: A Case Report and Literature Review

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Background: Non-ketotic hyperglycaemic (NKH) seizures are a neurological complication of diabetes caused by hyperglycaemia in non-ketotic and non-hyperosmotic states. The clinical characteristics of NKH seizures are atypical and lack unified diagnostic criteria. Therefore, they are easily misdiagnosed during the early stages of the disease.

Methods: Herein, we report a rare case of NKH seizures with hyperhomocysteinaemia in a 52-year-old male with a past medical history of type 2 diabetes mellitus. Magnetic resonance imaging (MRI) T2-weighted and fluid-attenuated inversion recovery images of the head at admission showed hyperintensity from swelling in the left parietal-occipital cortex and hypointensity in the corresponding subcortical regions. After admission, the patient was administered antiepileptic, hypoglycaemic, and fluid replacement therapies.

Results: The seizures did not recur at discharge; the MRI alterations in the brain parenchyma were alleviated and had disappeared at the follow-up 20 days after discharge.

Conclusions: The positive results in this patient may be related to effective blood glucose control versus the administration of antiepileptic drugs. We believe that antiepileptic drugs should be used cautiously in patients with NKH seizures and hyperhomocysteinaemia because they may increase plasma homocysteine levels and aggravate seizures.

PU-0016

面部聚丙烯酰胺注射术后填充物移位外渗的 MRI 应用评价

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目的：探讨面部聚丙烯酰胺水凝胶术后并发症的 MRI 表现特点，对比频率选择饱和法、IDEAL 技术、短反转时间反转恢复对填充物的检出率，评估磁共振检查的临床应用价值。

方法：收集分析我院 2012 年 10 月到 2016 年 12 月的 60 例面部注射假体的患者临床资料。所有患者均曾在面部注射或填充过聚丙烯酰胺水凝胶，注射时间 7~10 年。同时采用频率选择饱和法、IDEAL 技术、短反转时间反转恢复进行扫描，对图像质量和脂肪抑制效果进行主观评价打分，并且测量信噪比和对比噪声比，客观评价图像质量和脂肪抑制效果，最后对数据进行统计学分析处理。

结果：因聚丙烯酰胺为水溶性材料，与一定比例的水混合，形成水凝胶，因此富含水分，与水在磁共振上表现类似，在 T1 FLAIR 表现为低信号，与周围邻近的肌肉软组织信号相似；但在 T2WI IDEAL 技术、T2WI 频率选择饱和法、短反转时间反转恢复此类抑脂序列上则呈现为明显高信号，可清晰显示移位于皮下、肌肉间隙、腺体内的聚丙烯酰胺水凝胶。鼻根部组织形态规则，位于线圈中心位置，T2WI 频率选择饱和法、IDEAL 技术、短反转时间反转恢复均能很好的将脂肪抑制，差异无统计学意义 ($P>0.05$)，图像质量清楚，对比显示明显，但在颊部，颞部，颞部解剖结构呈弧形，频率选择饱和法和短反转时间反转恢复的脂肪抑制效果不如 IDEAL 法 ($P<0.05$)，差异有统计学意义，尤其在颞部，差异有显著统计学意义，加之位于线圈边缘，部分脂肪仍呈高信号，与聚丙烯酰胺水凝胶的边界显示欠清，难以区分。

结论: 聚丙烯酰胺水凝胶位置、信号、边界在磁共振图像上有特征性表现, T2WI 频率选择饱和法、IDEAL 技术、短反转时间反转恢复在鼻根部的显示效果均良好, 而在颞部、颊部、颞部的脂肪抑制效果 DEAL 技术在图像脂肪抑脂上的效果要明显优于 T2WI 频率选择饱和法和短反转时间反转恢复, 有助于提高聚丙烯酰胺水凝胶的检出率。

PU-0017

多模态 MRI 预测胶质母细胞瘤 p53、Ki-67 表达及 MGMT 启动子甲基化状态的应用价值研究

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目的: 本研究探讨常规磁共振成像、DWI 和 DSC-PWI 在预测成人 IDH 野生型胶质母细胞瘤 p53、Ki-67 表达及 MGMT 启动子甲基化状态中的应用价值。

材料与方法: 回顾性分析经手术组织病理证实连续的 120 例成人 IDH 野生型胶质母细胞瘤的临床及影像资料。分析和比较不同分子状态 IDH 野生型胶质母细胞瘤患者的人口统计学特征、常规 MRI 征象。计算得出相对最小 ADC 值(rADCmin) 和相对最大 CBV 值(rCBVmax)。根据 p53、Ki-67 表达和 MGMT 启动子甲基化状态将入选研究对象分组。采用卡方检验或 Fisher's 精确概率法比较不同表达组间计数资料的差异。采用 Mann-Whitney U 检验比较不同表达组间计量资料的差异。运用 ROC 曲线与二元 Logistic 回归模型计算单变量和多变量 MRI 参数的诊断效能。不同 MRI 参数的 AUC 比较采用 DeLong 检验。

结果: (1)p53 高表达组胶质母细胞瘤比低表达组更常出现清晰的肿瘤强化边缘, 常规 MRI 征象预测成人 IDH 野生型胶质母细胞瘤 p53 表达状态的 AUC 为 0.605。(2) Ki-67 高表达组胶质母细胞瘤具有比低表达组更低的 rADCmin 值和更高的 rCBVmax 值 rADCmin 和 rCBVmax 值预测 Ki-67 表达状态的 AUC 分别为 0.715 和 0.682; (3)MGMT 启动子未甲基化组的 rADCmin 值显著低于甲基化组、rCBVmax 值显著高于甲基化组, rADCmin 和 rCBVmax 值预测 MGMT 启动子甲基化状态的 AUC 分别为 0.732 和 0.858;此外, rCBVmax 值的诊断效能优于 rADCmin 值(P=0.001)。

结论: DWI 和 DSC-PWI 有助于在术前预测成人 IDH 野生型胶质母细胞瘤的 Ki-67 表达和 MGMT 启动子甲基化状态, 而多模态 MRI 在预测 p53 表达状态中的价值有限。

PU-0018

低级别室管膜瘤与间变性室管膜瘤的常规、扩散和灌注 MRI 比较

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目的: 本研究的目的是探讨和比较低级别和间变性室管膜瘤的常规 MRI、DWI 和动态磁敏感增强灌注成像(DSC-PWI)的特征。

材料和方法: 术前进行了 MRI 检查的 26 例脑室外室管膜瘤(19 例间变性、7 例低级别)纳入本次回顾性研究。所有患者均进行了常规 MRI 和 DWI 检查, 15 例患者行 DSC-PWI 检查(11 例间变性、4 例低级别室管膜瘤)。比较低级别室管膜瘤和间变性室管膜瘤的人口统计学特征、常规 MRI 特征、最小相对表观扩散系数(rADCmin)和最大相对脑血容量(rCBVmax)。以最佳截止值确定诊断性能。

结果: 间变性室管膜瘤更有可能位于幕上大脑半球浅层(p=0.026), 并表现为软脑膜和皮质受累(p=0.02 和 0.013)以及出现坏死变性(p=0.014)。间变性室管膜瘤的平均 rADCmin±SD 明显低于低

级别室管膜瘤(0.8 ± 0.2 vs 1.2 ± 0.3 , $p = 0.002$)。间变性室管膜瘤的 $rCBV_{max}$ 平均值显著高于低级别室管膜瘤(15.7 ± 5.3 vs 9.0 ± 4.4 , $p=0.042$)。室外室管膜瘤分级的临界值 $rADC_{min}$ 为 1.02, $rCBV_{max}$ 为 10.43。结合常规 MRI、DWI、DSC-PWI 对低级别室管膜瘤和间变性室管膜瘤($AUC=1.00$)的鉴别效果最好。

结论: 传统的 MRI、DWI 和 DSC-PWI 技术可以帮助评估和分级室外室管膜瘤。

PU-0019

儿童颅脑肿瘤分级：体素内非相干运动和扩散峰度成像性能优于常规 DWI 成像？

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【摘要】

目的: 准确评估儿童颅脑肿瘤的世界卫生组织分级是至关重要的。本研究旨在探讨常规 DWI、体素内非相干运动和扩散峰度成像参数与组织病理学特征之间的相关性, 以评估弥散参数在儿童颅脑肿瘤分级中的准确性。

材料和方法:本研究招募了 54 例经组织病理学证实的颅脑肿瘤患儿, 对他们进行常规 DWI、体素内非相干运动和扩散峰度成像检查。测量肿瘤实性部分的常规 DWI (ADC)、体素内非相干运动(真扩散系数[D]、假扩散系数[D*]、灌注分数[f]、扩散峰度成像[K]、扩散系数[Dk])参数。测定肿瘤细胞密度、Ki-67 指数和微血管密度。运用 Mann-Whitney U 检验比较低级别和高级别儿童颅脑肿瘤组间参数是否存在差异。同时运用了斯皮尔曼相关分析和受试者工作特征曲线分析等统计学方法。

结果:高级别儿童颅脑肿瘤的 ADC、D 和 Dk 值较低, 而高级别儿童颅脑肿瘤的 K 值高于低级别儿童颅脑肿瘤(P 均 <0.001)。K 与肿瘤细胞密度和 Ki-67 指数呈正相关($r = 0.674\sim0.802$; P 均 <0.05); 而 ADC、D 和 Dk 与细胞密度和 Ki-67 指数呈负相关($r = -0.548\sim-0.740$; P 均 <0.05)。ADCVOI、DVOI、D kVOI、KVOI 对于鉴别儿童颅脑高级别及低级别肿瘤具有一定的价值(曲线下面积分别为 0.901、0.894、0.863、0.885)。然而这些定量扩散参数鉴别儿童颅脑高级别及低级别肿瘤的曲线下面积差异无统计学意义(P 均 >0.05)。

结论:与传统 DWI 相比, 体素内非相干运动和扩散峰度成像衍生参数在预测儿童颅脑肿瘤分级方面具有相似的性能。扩散指标可能有反映儿童颅脑肿瘤的肿瘤细胞密度和 Ki-67 指数的潜能。

PU-0020

钆对比剂延迟增强结合人工智能深度学习降噪算法提高心肌纤维化检出能力的可行性

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目的: 评估人工智能深度学习(DL)降噪技术对患者心脏磁共振(cardiac magnetic resonance, CMR)钆对比剂延迟增强(late gadolinium enhancement, LGE)对心肌纤维化的检出能力。

方法: 前瞻性连续性收集我院 2023 年 2 月至 2023 年 7 月期间进行心脏磁共振 LGE 扫描的患者, 并将所有患者基于深度学习降噪技术重建后的左心室短轴图像与原始图像均纳入评估。根据有无 LGE 延迟强化分为研究组与对照组, 使用量表法对所有图像质量和 LGE 病灶检出可信度进行评分, 并比较两种技术的整体图像质量和 LGE 检出可信度。分别比较 DL-LGE 与常规的 LGE 图像的强化

程度及范围、LGE 短轴图像的病变心肌与左心室血池、病变心肌与正常心肌、正常心肌和左心室血池的对比率 (Contrast ratio, CR) 和对比噪声比 (Contrast noise ratio, CNR)。

结果: 共纳入 40 例患者, 对照组 6 例, 研究组 34 例。DL-LGE 与常规 LGE 图像质量评分差异有统计学意义 ($P < 0.05$), DL 降噪技术在心肌纤维化病灶检出可信度优于常规图像 ($t=5.294$, $P < 0.001$)。图像客观定量分析中, 与常规 LGE 图像比较, DL-LGE 图像的异常心肌/血池的 CNR 和 CR 均较高 ($Z=3.320$ 、 3.106 , $P < 0.01$), 而异常心肌/正常心肌的 CNR 较低 ($Z=3.04$, $P=0.002$)。2 名观察者对 DL-LGE 和常规 LGE 图像质量和心肌纤维化的检出可信度评分具有良好的一致性 (Kendall's W 均 > 0.7)。2 名医师所测值计算得到的 CR 和 CNR 具有较好的一致性 ($ICC > 0.7$)。

结论:

基于 DL 降噪技术的 LGE 图像明显提高了整体图像质量, 提高了对短轴图像心肌纤维化的检出率, 为临床评估能提供更好的依据。

PU-0021

磁共振弥散加权成像联合磁敏感加权成像: 对四种常见的侧脑室肿瘤的附加诊断价值

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目的: 扩散加权成像 (DWI) 和磁敏感性加权成像 (SWI) 是用于脑部肿瘤的可靠成像技术。然而, DWI 和 SWI 在常见侧脑室肿瘤的诊断中的作用尚未有过系统评估。本研究旨在评估 DWI 和 SWI 在常见侧脑室肿瘤诊断中的性能。

材料和方法: 本研究纳入了 52 例经组织病理学证实的侧脑室肿瘤患者 (18 例中枢神经细胞瘤, 9 例室管膜瘤, 7 例高级别胶质瘤和 18 例脑膜瘤)。分别计算由 DWI 测量的相对最小表观扩散系数 ($rADC_{min}$) 和相对平均表观扩散系数 ($rADC_{ave}$) 以及由 SWI 获取的出血内部磁化率信号强度 (ITSS)。使用 Mann-Whitney U 检验, 受试者工作特征曲线和 Logistic 回归分析评估这些定量参数。

结果: 中枢神经细胞瘤的 $rADC_{min}$ 值和 $rADC_{ave}$ 值明显低于其他肿瘤, 室管膜瘤的 $rADC_{min}$ 值和 $rADC_{ave}$ 值以及高级别胶质瘤的 $rADC_{ave}$ 值明显高于脑膜瘤。脑膜瘤的 ITSS 得分明显低于其他肿瘤, 而中枢神经细胞瘤的得分明显低于室管膜瘤和高级别胶质瘤。除了在区分脑膜瘤和高级别胶质瘤-室管膜瘤外, $rADC$ 值与 ITSS 的联合没有显著的差异。

结论: $rADC$ 值和 ITSS 得分可能有助于区分常见的侧脑室肿瘤。使用 $rADC$ 值和 ITSS 得分具有一定的提高诊断性能的可能性。

PU-0022

弥散加权 MRI 评价骶髂关节炎：与常规的单次激发 EPI 相比，读出方向分段采集 EPI 可以改善图像质量和诊断效能

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目的：采用单次激发平面回波成像 (ss-EPI) 的弥散加权成像 (DWI) 容易出现伪影、信号强度下降和 T2*模糊。采用读出编码分段采集 EPI (rs-EPI) 可以提高图像质量。本研究的目的是：1) 比较骶髂关节的 ss-EPI 和 rs-EPI DWI 的图像质量；2) 评估 ss-EPI 和 rs-EPI 的表观扩散系数 (ADC) 值是否可以区分中轴型脊柱关节炎 (axSpA) 患者的疾病活动状态。

方法：本研究回顾性纳入 75 例行骶髂关节 ss-EPI 和 rs-EPI DWI 检查的患者。根据脊柱关节炎国际评估标准将患者分为 axSpA 组 (n=50) 和非 axSpA 组 (n=25)。采用 ASDAS-CRP 将 axSpA 组患者分为 4 种活动状态。由 2 名放射科医师独立评估图像的定性参数 (总体图像质量及诊断信心度) 和定量参数 (ADC 值、SNR、CNR)。

结果：rs-EPI 的总体图像质量、诊断信心度、SNR 和 CNR 均明显优于 ss-EPI (两名阅读者, $P<0.001$)。在 axSpA 患者中, ADCss 与 ASDAS-CRP 值的相关性为 0.456-0.458, ADCrs 为 0.537-0.558。两个 ADC 值都表现出随疾病活动状态增加而递增的趋势。ADCss 值仅在非活动期和极高度活动期之间存在显著差异 ($P<0.0083$)。ADCrs 值在非活动期与高度活动期、非活动期与极高度活动期、中度活动期与极高活动期之间存在显著差异 ($P<0.0083$)。

结论：rs-EPI 明显提高了骶髂关节 DWI 的图像质量。在 axSpA 患者中, rs-EPI 比 ss-EPI 更能区分活动状态, 应纳入常规骶髂关节临床磁共振扫描方案。

PU-0023

使用高分辨率磁共振血管壁成像对急性缺血性中风患者的动脉粥样硬化斑块进行随访评估

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目的：关于急性缺血性中风患者接受药物治疗后颅内斑块演变的数据仍然有限。我们的目的是研究责任斑块的特征, 并使用高分辨率磁共振血管壁成像 (VW-MRI) 探索治疗期间斑块的纵向变化。

材料和方法：23 名急性缺血性卒中患者 (16 名男性; 平均年龄, 51.4 岁 \pm 11.1 岁) 进行了 3-T VW-MRI 检查颅内动脉粥样硬化, 并进行了后续评估。每个识别出的斑块都被回顾性地分类为责任斑块、可能的责任斑块或非责任斑块。在基线和随访时对斑块特征进行分析, 并使用配对 t 检验、配对 Wilcoxon 检验或 McNemar 检验进行比较。

结果：总共鉴定出 87 个颅内斑块 (23 个 [26.4%] 责任斑块, 10 个 [11.5%] 可能的责任斑块, 以及 54 个 [62.1%] 非责任斑块)。初次和随访 MRI 扫描之间的中位时间间隔为 8.0 个月。在多重有序 Logistic 回归分析中, 斑块对比度 (CR) (OR, 1.037; 95% CI, 1.013-1.062; $P = 0.002$) 和表面不规则性 (OR, 4.768; 95% CI, 1.064-21.349; $P = 0.041$) 与责任斑块独立相关。在随访期间, 责任斑块组的斑块长度、最大厚度、归一化壁指数 (NWI)、狭窄程度和 CR 显著下降 (所有 P 值 < 0.05)。在可能的责任斑块中, 斑块 NWI 和 CR 下降 (分别为 $P = 0.041$ 、0.026)。在非责任斑块组中, 只有斑块 NWI 和狭窄程度显著下降 (分别为 $P = 0.017$ 、0.037)。

结论: 随访 VW-MRI 可能有助于斑块风险分层, 并可能为体内不同斑块的演变提供有价值的见解。

PU-0024

不同 SMS 加速因子对宫颈癌 MR 定量参数及图像质量对比研究

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目的 对比采用同时多层采集技术, 在不同加速因子条件下对宫颈癌相关定量参数及图像质量的影响。方法 前瞻性收集经病理证实的 50 例宫颈癌患者, 在本院德国西门子 Skyra 3.0T MR 上行盆腔 SMS-DWI 扫描, 加速因子分别选用 1、2 和 3 (分别为 C-DWI、SMS2-DWI 和 SMS3-DWI), 采集的 b 值为 (0、20、50、100、200、400、600、800、1000、1200、1500s/mm²), 且所有图像均满足诊断要求。测量宫颈癌 IVIM 及 DKI 相关定量参数: ADC(表观扩散系数)、 D (真实扩散系数)、 D^* (假性扩散系数)、 f (灌注分数)、 MK (平均扩散峰度) 及 MD (平均扩散率) 进行对比分析。同时由两名放射科医师主观评分三组宫颈癌 DWI ($b=800s/mm^2$) 图像病变组织的锐利度、图像变形、磁敏感伪影、对病变的显示情况、整体图像质量, 并测算 SNR(信噪比), CNR (对比噪声比)。结果 相较于 C-DWI, SMS2-DWI 和 SMS3-DWI 扫描时间缩短 141s (44.2%) 和 183s (58.6%)。在定量参数评价中, D 值、 D^* 值及 ADC 值无统计学差异 (P 值分别为 0.122, 0.470, 0.346), f 值、 MK 值及 MD 值在 C-DWI 组与 SMS2-DWI 组比较时无统计学意义 ($P>0.05$), C-DWI 组、SMS2-DWI 组与 SMS3-DWI 组比较均具有统计学意义 ($P<0.05$); 客观评价中, 对于 SNR 和 CNR, C-DWI 组与 SMS2-DWI 组没有统计学差异 ($P=0.937, 1.000$), C-DWI 组、SMS2-DWI 组与 SMS3-DWI 组比较均具有统计学意义 ($P<0.05$); 两位观察者的评分具有很强的一致性 (Kappa 值为: 0.728~0.921) 结论 使用加速度因子为 2 的 SMS-DWI 在宫颈癌 MR 评价中是可行的, 既能保证诊断图像质量, 又可以显著减少采集时间。

PU-0025

颅内血管壁中国专家成像共识解读及新进展

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磁共振血管壁成像 (vessel wall MR imaging, VW-MRI) 被认为是目前唯一可对颅内血管壁成像的无创检查技术, 具有无创、无辐射、高空间分辨率、高信噪比等优势。除了能够判断管腔的狭窄程度以外, 它还能分析斑块的成分和特征、是否为易损斑块, 提供精准的临床数据。除分析斑块, 它还能对动脉夹层、血管炎、动脉瘤等疾病进行鉴别诊断, 为临床诊断和指导治疗提供重要信息和依据。

PU-0026

体素内不相干运动在胃印戒细胞癌的诊断效能

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目的: 探究体素内不相干运动 (IVIM) 在诊断印戒细胞癌与非印戒细胞癌的诊断效能。

材料和方法：前瞻性的收集在山东第一医科大学附属省立医院住院的胃癌患者 80 例的 MRI 图像。根据病理结果将其分为印戒细胞癌组 35 例，非印戒细胞癌 45 例。参考 T1WI 及 T2WI 图像，选择肿瘤的最大截面及上、下两个截面，将感兴趣区(region of interest, ROI)选在病灶的实性部分。将所有 ROI 的测量值的平均值作为最终测量值。将符合正态分布的数据用平均数 \pm 标准差 ($\bar{x}\pm s$) 表示，组间比较采用独立样本 t 检验；不符合正态分布的数据表示为中位数 (M) 或四分位数间距 (Q1,Q3)，组间比较采用多个独立样本非参数检验。采用受试者工作特性曲线 (receiver operating characteristic, ROC) 来分析具有统计学差异的成像参数鉴别印戒细胞癌与非印戒细胞癌的诊断效能，并且通过计算曲线下面积 (area under curve, AUC) 来确定阈值、敏感度和特异度等诊断效能相关参数。 $P<0.05$ 为差异具有统计学意义。

结果：

①印戒细胞癌与非印戒细胞癌之间的 ADC 值与 D 值均存在统计学差异 ($P<0.05$)，印戒细胞癌与非印戒细胞癌之间 D*值与 f 值不具有统计学差异 ($P>0.05$)；

②ADC 值和 D 值鉴别印戒细胞癌与非印戒细胞癌的 AUC 值分别为 0.885 (95%CI:0.757~0.960)、0.923 (95%CI: 0.806~0.981)。ADC 值以 $1.150\times 10^3 \text{ mm}^2/\text{s}$ 为临界值时，其敏感度和特异度分别为 79.17%，86.36%；D 值以 $1.163\times 10^3 \text{ mm}^2/\text{s}$ 为临界值时，其敏感度及特异度分别为 83.83%，91.45%。

结论：体素内不相干运动参数可以鉴别区分印戒细胞癌与非印戒细胞癌，其中 ADC 与 D 值具有较高的诊断效能。

PU-0027

探讨 3.0T 磁共振上腹部 DCE-MR 的 GRASP-VIBE 技术在肝脏肿瘤诊断中的应用价值

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目的：探讨在磁共振上腹部动态增强采用快速自由呼吸成像技术 (GRASP-VIBE) 技术在肝脏肿瘤诊断中的应用价值。方法：将 2022 年 1 月-2023 年 10 月本院收治的以肝脏肿瘤为诊断的 72 例患者，其中 32 例采用常规增强扫描作为 A 组，另 32 例患者上腹部增强采用 GRASP-VIBE 技术扫描作为 B 组。结果：B 组检查手段中获得的对于良性、恶性影像诊断的总符合率高于 A 组 ($P<0.05$)。结论：在肝脏肿瘤临床诊断中，应用磁共振动态增强 GRASP-VIBE 技术，可显著提升诊断准确率，效果较为理想。

PU-0028

SENSE-EPI-DWI 在具有磁化率伪影的脑梗死中应用与讨论

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目的 讨论并行采集技术 (SENSE) 联合平面回波扩散加权像 (EPI-DWI) 技术在具有磁化率伪影的脑梗死中的应用。资料与方法 搜集 38 例装有固定假牙脑梗死的患者资料，均行 MRI 头颅平扫、DWI 与 SENSE-EPI-DWI，。比较分析使用 SENSE 技术前后的右侧基底节区与右侧侧脑室脑脊液两者的信号强度对比度 (均数标准差)，对比噪声比 (CNR)，信号强度对比度 (SIR)，正常小脑表面扩散系数 (ADC) 值，梗死灶/健侧脑组织的 ADC 比值。结果 (1) SENSE-EPI-DWI 的右侧基底节区与右侧侧脑室脑脊液两者的信号强度对比度的均数标准差高于常规 EPI-DWI 的序列

($t=9.872$, $P<0.05$)。(2) SENSE-EPI-DWI 的对比噪声比 (CNR) 均高于常规 EPI-DWI 的对比噪声比 (CNR) ($t=6.615$, $P<0.05$)。(3) SENSE-EPI-DWI 的信号强度对比度 (SIR) 均低于常规 EPI-DWI 信号强度对比度 (SIR) ($t=-2.87$, $P>0.05$)。(4) SENSE-EPI-DWI 的正常小脑表面扩散系数 (ADC) 值均高于常规 EPI-DWI 序列的正常小脑表面扩散系数 (ADC) 值 ($t=-9.962$, $P<0.05$)。(5) SENSE-EPI-DWI 的梗死灶/健侧脑组织的比值均高于常规 EPI-DWI 的梗死灶/健侧脑组织的比值 ($t=5.216$, $P<0.05$)。结论如下 SENSE-EPI-DWI 技术的成像质量较高, 正常小脑表面扩散系数 (ADC) 值有助于脑梗死的诊断, 且在具有磁化率伪影的脑梗死诊断应用中优于常规的 EPI-DWI 序列

PU-0029

磁共振灌注成像在前列腺外周带前列腺癌鉴别诊断中的价值

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【摘要】：目的 探讨磁共振灌注成像(perfusion weighted MRI,PWI)定量参数在前列腺外周带前列腺癌鉴别诊断中的价值。材料与方法 回顾性分析 62 例行 3.0 T MR PWI 扫描,T2WI 表现为局灶性低信号病变,穿刺活检病理证实的患者资料,其中前列腺癌 33 例,良性病变 29 例。两名高年资医师在病理结果和临床资料双盲的前提下参照 T2WI 外周带低信号区,在 PWI 病灶区放置 ROI,测量病灶区 PWI 定量参数转运常数(Ktrans)、血管外细胞外间隙体积百分数(Ve)及速率常数(Kep)。采用独立样本 t 检验比较 Ktrans、Kep、Ve 在前列腺癌和良性病灶中的差异。采用 ROC 曲线分析 PWI 定量参数鉴别前列腺癌和良性改变中的价值。结果 前列腺癌和良性前列腺病灶组的 Ktrans、Kep、Ve 分别为 $(0.180\pm0.043)/V S(0.076\pm0.039)$ 、 $(0.543\pm0.154)/V S(0.368\pm0.163)$ 、 $(0.235\pm0.162)/V S(0.345\pm0.136)$,两组间 Ktrans 和 Kep 独立样本 t 检验结果差异有统计学意义($P<0.01$),Ve 之间差异无统计学意义($P=0.61$)。Ktrans、Kep 鉴别前列腺癌和良性前列腺病灶的敏感性及特异性分别为 85.15%、83.2%和 78.61%、73.5%。结论 PWI 定量参数 Ktrans、Kep 在前列腺外周带前列腺癌鉴别诊断中具有重要价值。

PU-0030

磁共振脊髓血管成像在脊髓血管畸形的初步研究

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【摘要】：目的 磁共振脊髓血管成像在脊髓血管畸形诊断价值的研究。方法 回顾性分析自 2020 年 3 月至 2021 年 3 月以来我院收治的 48 例脊髓血管畸形患者其临床资料,所有患者均行血管造影检查,术前患者皆行磁共振脊髓血管成像检查。将血管造影检查作为金标准,对磁共振脊髓血管成像在脊髓血管畸形当中应用诊断的准确率进行统计。结果 磁共振脊髓血管成像对脊髓血管畸形的诊断准确率是 92%。结论 磁共振脊髓血管成像对脊髓血管畸形的诊断具有良好价值,能为后续治疗提供有力的诊断依据。

PU-0031

Revolutionizing Vascular Imaging: Trends and Future Directions of 4D Flow MRI based on a 20-Year bibliometric analysis

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Background: To conduct a systematic and comprehensive bibliometric analysis of 4D flow magnetic resonance imaging (MRI) to explore the current hotspots and potential future directions. **Methods:** The Web of Science Core Collection (WOSCC) searched for literature on 4D flow MRI between 2003 and 2022. CiteSpace were utilized to analyze the literature data, including co-citation, cooperative network, cluster, and burst keyword analysis.

Results: A total of 1,069 articles were extracted in this study. The main research hotspots include: quantification and visualization of blood flow in various clinical settings, with keywords including "cerebral aneurysm", "heart", "great vessel", "tetralogy of fallot", "portal hypertension", and "stiffness"; optimization of image acquisition schemes, such as "resolution" and "reconstruction"; measurement and analysis of flow components and patterns, as denoted by keywords "pattern", "KE", "WSS", and "fluid dynamics". Furthermore, international consensus for metrics derived from 4D flow MRI and multimodality imaging may be the future research directions.

Conclusions: The global domain of 4D flow has grown over the past two decades. 4D flow imaging will evolve in the future toward: a relatively short scan duration with adequate spatiotemporal resolution, expansion into the diagnosis and treatment of vascular disease in other related organs, and a shift in focus from vascular structure to function. Moreover, artificial intelligence (AI) will aid in clinically promoting and applying 4D flow imaging.

PU-0032

酰胺质子转移 MR 成像在不同风险前列腺癌中的应用

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目的

前列腺癌(PCa)已经成为一个日益严重的公共健康问题。 Gleason 评分(GS)系统是诊断前列腺癌的金标准,通常通过经直肠超声(TRUS)引导下穿刺活检获得。GS 越高,癌症生长和迅速扩散的风险就越大。磁共振成像(MRI)被认为是诊断前列腺癌的最佳非侵入性技术。酰胺质子转移(APT)成像是一种通过非共振饱和脉冲检测组织内特异性蛋白和多肽的新型 MRI 技术。由于肿瘤比良性组织含有更多的特异性细胞蛋白和多肽,因此 APT 可作为一种有前景的肿瘤诊断方法。在本研究中,我们根据 Gleason 评分评估 APT 值在不同风险前列腺癌与正常组织区域的差别。

方法

选取 39 例疑似前列腺癌患者。所有患者均行 TRUS 检查,根据 GS 评分,将患者分为三组:低危组(GS <7 分)、中危组(GS = 7 分)和高危组(GS >7 分)。所有患者均行 3.0T MR 扫描(Ingenia CX, Philips Healthcare),采集完成后,将 APT 图像与 ADC 图像进行融合。根据显示的肿瘤边界,由放射科医师在融合图像中,在病灶的同一位置手动勾画 ROI,分别测量 APT 值和 ADC 值。将相同 ROI 置于非癌区域,分别测量 APT 值和 ADC 值。所有统计学分析均采用 Graph Pad 9.0 软件进行分析。采用配对 t 检验比较各 GS 组中 Pca 区与非癌区 APT 值和 ADC 值的差异。P 值≤0.05 表示差异有统计学意义。

结果结论

结果表明, 低风险前列腺癌($GS < 7$)的 APT 值显著高于良性区域, 而高风险前列腺癌($GS > 7$)的 APT 值显著低于良性区域。这些结果与之前简单认为 APT 在前列腺癌 ROIS 中显著高于良性区域的研究结果不同。一种假设是, 在 $GS > 7$ 患者中, 微囊性肿瘤坏死增加, 这可能减少肿瘤中的特异性蛋白和多肽。虽然需要进一步研究, 但是 APT 成为评估前列腺癌风险的工具得到认同。

PU-0033

时间移位分析与动态磁敏感对比增强在慢性脑缺血灌注评估中的对比研究

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目的 分析基于血氧水平依赖信号 (BOLD) 静息态功能磁共振 (rs-fMRI) 的时间移位分析 (TSA) 方法与动态磁敏感对比增强灌注加权成像 (DSC-PWI) 评估颈动脉狭窄患者脑血流灌注的一致性。资料与方法 纳入 31 例单侧重度无症状颈动脉狭窄患者, 同时行 rs-fMRI 和 DSC-PWI 扫描, 并以 DSC-PWI 达峰时间 (TTP) 参数图为标准分为非缺血组 17 例和缺血组 14 例。两组患者分别勾画感兴趣区 (ROI), 并测量 ROI 与对侧相同 ROI 的 TTP 值和 TSA 延迟值, 取其差值的绝对值 ΔTTP 与 ΔTSA 延迟时间进行相关性分析。结果 缺血组患者 ΔTTP 与 ΔTSA 延迟时间均大于非缺血组, 差异有统计学意义 ($P < 0.05$)。非缺血组中, ΔTTP 与 ΔTSA 延迟时间在大脑前动脉皮层区 ($r = 0.566$, $P = 0.018$)、大脑中动脉 M2 段上方前皮层区 ($r = 0.541$, $P = 0.025$) 和大脑中动脉 M3 段上方前皮层区 ($r = 0.678$, $P = 0.003$) 呈正相关; 缺血组中, ΔTTP 与 ΔTSA 延迟时间在缺血区呈正相关 ($r = 0.641$, $P = 0.013$)。结论 基于 rs-fMRI 的 TSA 方法与 DSC-PWI 参数 TTP 具有良好的 consistency, 能够为早期评估脑缺血患者血流灌注提供无创、无电离辐射的新方法

PU-0034

脾脏硬化性血管瘤样结节性转化的影像学表现及病理对照

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目的: 探讨脾脏硬化性血管瘤样结节性转化 (sclerosing angiomatoid nodular transformation, SANT) 的影像学表现。方法: 回顾性分析 2015 年 1 月—2020 年 6 月于南京大学医学院附属鼓楼医院就诊的、经手术病理证实的 6 例 SANT 患者的资料, 总结 SANT 的影像学表现, 并与病理结果对照。结果: 6 例患者均为单发的类圆形肿块。CT 平扫 6 例均表现为低密度, 1 例病灶中心出现点状钙化; 1 例边界欠清、5 例边界清楚; CT 增强扫描均呈渐进性、向心性、结节样强化。MR 平扫表现为 T2WI 及 DWI 不均匀等信号或低信号, 强化方式与 CT 类似。4 例见“辐轮征”、4 例见假包膜、5 例见“星芒征”。结论: 渐进性、向心性、结节样强化及“辐轮征”、“星芒征”为 SANT 的特征性影像学表现, 尤其以假包膜和 T2WI 低信号高度提示 SANT 的诊断。

PU-0035

子宫内膜纤维化的子宫形态学变化

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目的 探讨子宫形态学参数在子宫内膜纤维化评估中的价值。

方法 本研究前瞻性纳入宫腔镜诊断为子宫内膜纤维化的 64 例患者（年龄 27-43 岁；平均 33 岁）和 46 例健康女性（年龄 24-38 岁；平均 28 岁）。测量宫腔长度（length of uterine cavity, LUC）、宫颈及峡部长度（length of cervix and isthmus, LCI）、宫腔上端宽度（width of upper uterine cavity, WUUC）、宫腔下端宽度（width of lower uterine cavity, WLUC）。计算得到子宫长度（length of uterus, LU; LUC 与 LCI 之和）。采用独立样本 t 检验比较子宫内膜纤维化患者与健康女性子宫形态学参数差异。利用 ROC 曲线评价子宫形态学参数对子宫内膜纤维化的诊断效能。

结果 子宫内膜纤维化患者的 LUC (19.5 ± 3.5 mm vs. 35.0 ± 3.7 mm)、WUUC (26.6 ± 5.5 mm vs. 32.4 ± 4.3 mm)、WLUC (7.40 ± 1.34 mm vs. 9.32 ± 1.30 mm)、LU (68.6 ± 8.4 mm vs. 77.3 ± 6.2 mm) 和 LUC/LCI (0.40 ± 0.08 vs. 0.83 ± 0.11) 显著小于健康女性，而子宫内膜纤维化患者的 LCI (49.1 ± 6.7 vs. 42.3 ± 4.3) 及 WUUC/LUC (1.39 ± 0.31 vs. 0.94 ± 0.18) 显著大于健康女性。子宫形态学参数在子宫内膜纤维化诊断中准确性较高，其中 LUC 及 LUC/LCI 对子宫内膜纤维化的诊断准确性最高，其 AUC 值高达 0.999。

结论 子宫形态学参数作为一种无创性指标可以用于子宫内膜纤维化评估。

PU-0036

磁共振弥散加权成像（DWI）在宫颈癌病理分型/分级中的应用

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目的：探讨弥散加权成像（DWI）与宫颈癌病理分型/分级的相关性。方法：回顾性收集 2018 年 6 月—2021 年 6 月在辽宁省肿瘤医院确诊为宫颈癌的患者 273 例，治疗前均行常规 MRI 及 DWI 检查，b 值取 0、800、1000s/mm²，测量表观弥散系数（ADC）均值，比较 ADC 均值在宫颈癌不同病理类型及不同分化程度中的差异。结果：宫颈鳞状细胞癌组 ADC 均值为 0.972（0.810-1.169），宫颈腺癌组 ADC 均值为 1.079（0.721-1.532），差异具有统计学意义（ $p < 0.05$ ）；高分化组 ADC 均值为 1.195（0.877-1.578）中分化组 ADC 均值为 0.968（0.799-1.169），低分化组 ADC 均值为 1.005（0.815-1.238），低分化组与高分化组病灶 ADC 均值差异具有统计学意义（ $p < 0.001$ ）。结论：宫颈鳞状细胞癌 ADC 均值低于宫颈腺癌，宫颈癌分化程度越差，恶性程度越高，ADC 均值越低。

PU-0037

基于钆塞酸二钠增强 MRI 对肝细胞癌根治切除术后复发的研究

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目的 探讨基于钆塞酸二钠增强 MRI 影像及临床病理征象对肝细胞癌患者根治性切除术后复发的预测价值。

方法 回顾性收集本院 2015 年 1 月至 2020 年 12 月经病理证实并有完整随访资料的 209 例 HCC 患者临床及影像资料, 分为复发组 (82 例) 和无复发组 (127 例)。根据临床病理参数及影像学特征进行定性分析, 并根据病灶-肝脏信号强度对比率 (LLR) 进行定量分析。采用 Cox 回归分析 HCC 患者术后复发的独立危险因素, 构建预测 HCC 患者术后无复发生存的列线图, 计算内部验证一致性指数 (C-index) 及 ROC 曲线下面积, 评估模型诊断效能。采用 Kaplan-Meier 法绘制患者术后无复发生存 (RFS) 曲线, 并采用 Log Rank 检验比较生存曲线的差异。

结果 CK19 阳性 (HR=2.074, 95%CI: 1.307~3.292, $P=0.002$)、MVI 阳性 (HR=2.699, 95%CI: 1.720~4.235, $P=0.001$)、信号不均匀 (HR=2.389, 95%CI: 1.499~3.806, $P=0.001$) 是 HCC 患者切除术后复发的独立危险因素。CK19 阳性组及阴性组患者中位 RFS 分别为 30 个月及 51 个月。MVI 阳性组及阴性组患者中位 RFS 分别为 17 个月及 49 个月。信号不均匀组及均匀组患者中位 RFS 分别为 26 个月及 62 个月。CK19、MVI 及信号均匀度三个因素的 1 年、2 年、3 年的无复发生存率组间比较有统计学意义 (Log Rank P 均 <0.05)。内部验证 C 指数为 0.715, ROC 曲线下面积为 0.723, 列线图区分度良好。DCA 决策曲线显示该模型在预测 HCC 患者根治性切除术后 1 年、2 年、3 年无复发生存率方面具有良好的临床实用性。

结论 CK19 阳性、MVI 阳性及信号不均匀为 HCC 患者术后复发的独立危险因素, 可作为预测 HCC 患者根治切除术后预后不良的潜在标志物。

PU-0038

基于钆塞酸二钠增强 LI-RADS 靶样表现对肝细胞癌术后复发的预测

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目的 探讨基于钆塞酸二钠增强 MRI 肝脏影像报告和数据系统 (LI-RADS) 靶样表现对肝细胞癌 (HCC) 术后复发的预测价值。

方法 回顾性分析 2015 年 02 月至 2021 年 03 月行钆塞酸二钠增强 MRI 检查且经手术病理证实的 HCC 患者 188 例。依据 LI-RADS v 2018 标准, 将病灶分为 LR-4/5 组、LR-M 不伴动脉期环形强化组和 LR-M 伴动脉期环形强化组。比较三组患者的临床、病理及影像学特征。采用 Logistic 回归分析与 HCC 的 LR-M 伴动脉期环形强化相关的临床病理特征。采用 Cox 回归分析确定 HCC 术后复发的独立预测因子。采用 Kaplan-Meier 法评价 HCC 术后无复发生存率。

结果 CK19 (OR 17.893, 95% CI: 6.762-47.349, $P<0.05$)、MVI (OR 4.197, 95% CI: 1.559-11.295, $P<0.05$) 与 HCC 的 LR-M 伴动脉期环形强化有关。MVI (HR 1.890, 95% CI: 1.170-3.054, $P<0.05$)、肿瘤坏死 (HR 1.942, 95% CI: 1.152-3.275, $P<0.05$)、LR-M 伴动脉期环形强化 (HR 1.684, 95% CI: 1.017-2.787, $P<0.05$) 是 HCC 术后复发的独立预测因子。LR-M 伴动脉期环形强化 HCC 累积无复发生存率 (25.0%) 显著低于 LR-4/5 组 (55.9%) 与 LR-M 不伴动脉期环形强化组 (60.5%) ($P<0.05$)。

结论 LR-M 伴动脉期环形强化 HCC 较 LR-4/5 及 LR-M 不伴动脉期环形强化 HCC 术后预后差。LI-RADS 靶样表现中的动脉期环形强化有助于 HCC 术后复发预测。

PU-0039

基于 4D Flow MRI 技术预测肝硬化患者静脉曲张风险

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[摘要] 目的: 探讨 4D Flow MRI 血流定量分析技术在肝硬化静脉曲张风险评估中的价值。方法: 选取医院收治的 53 例肝硬化患者, 经胃镜诊断根据静脉曲张程度将其分为无静脉曲张组(26 例)和静脉曲张组(27 例), 同期另选取 27 名来院体检的健康体检者为健康对照组。对所有病例行 4D Flow MRI 检查, 获取肝脏门静脉系统(门静脉主干、脾静脉、肠系膜上静脉)血流动力学参数(血容量、流速、壁剪切力)。采用单因素方差分析比较三组间血流动力学参数, 筛选有统计学意义指标, 同时绘制受试者工作特征(ROC)曲线, 评估其在肝硬化静脉曲张中的诊断价值。结果: 三组间门静脉主干流速、门静脉主干壁剪切力、脾静脉血容量、肠系膜上静脉流速及肠系膜上静脉壁剪切力差异有统计学意义 ($P < 0.05$), 健康组、非静脉曲张组、静脉曲张组三组门静脉主干流速分别为 (12.58 ± 3.83), (10.69 ± 2.31), (9.22 ± 1.71) cm/s; 门静脉主干壁剪切力分别为 (0.17 ± 0.07), (0.12 ± 0.05), (0.10 ± 0.03) pa; 脾静脉血容量分别为 (7.24 ± 4.05), (8.34 ± 4.56), (11.90 ± 6.80) ml/s; 肠系膜上静脉流速分别为 (9.50 ± 2.94), (7.28 ± 2.03), (7.10 ± 1.71) cm/s; 肠系膜上静脉壁剪切力 (0.14 ± 0.06), (0.10 ± 0.05), (0.09 ± 0.04) pa。其中脾静脉血容量在评估静脉曲张风险诊断效能最高 ($AUC=0.718$), 其临界值为 9.4ml/s。结论: 通过 4D Flow MRI 获取的血流动力学参数中脾静脉血容量可有效预测肝硬化患者静脉曲张的存在, 当脾静脉血容量大于 9.4ml/s 时可提示临床应及时干预, 降低静脉曲张风险。

PU-0040

良性颌面腮腺肿瘤 MRS 成像后处理技术的应用价值

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目的 探讨腮腺良性肿瘤患者磁共振波谱成像后处理技术的应用价值及作用。方法 回顾分析 26 例病理确诊腮腺原发性良性肿瘤患者行磁共振波谱成像 (MRS) 后得到的代谢产物信号图, 测量其肿瘤代谢产物如胆碱 (Choline, Cho)、肌酸 (Creatine, Cr)、乳酸脂质 (Lactate and Lipid, LL) 峰含量及 Cho/Cr 比值的变化。比较代谢产物波峰形态的区别及其代谢产物含量与不同类型肿瘤 (多形性腺瘤和腺淋巴瘤) 之间的区别。结果 经统计分析得到肿瘤区内的 Cho 峰、LL 峰明显升高且 Cho/Cr 比值均高于正常腮腺组织 ($P < 0.01$), Cr 峰浓度含量未见明显变化 ($P > 0.01$)。这些代谢产物的含量及形态在多形性腺瘤和腺淋巴瘤的诊断中不具有鉴别价值。结论 腮腺良性肿瘤磁共振波谱成像技术能准确地识别出兴趣区内代谢产物浓度的含量变化, 是临床评价肿块占位的重要功能性检查手段之一。

PU-0041

Susceptibility weighted imaging (SWI) for evaluating renal dysfunction in type 2 diabetes mellitus: a preliminary study using SWI parameters and SWI-based texture features

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Purpose: This study aimed to examine the performance of SWI parameters and SWI-based texture features in evaluating renal dysfunction of type 2 diabetes mellitus (T2DM).

Methods: Forty-five patients with T2DM were included. With the estimated glomerular filtration rate (eGFR), the patients were divided into non-moderate-severe renal injured group (non-msRI, eGFR >60 mL/min/1.73 m²) and moderate-severe renal injured group (msRI, eGFR ≤60 mL/min/1.73 m²). The 3 SWI parameters and 16 SWI-based texture features between non-msRI and msRI were compared. The correlation between the parameters and BUN, Scr was analyzed.

Results: The signal intensity ratio of the medulla to psoas muscle (MPswi) was significantly lower than the signal intensity ratio of the cortex to psoas muscle (CPswi) in non-msRI and msRI group ($t=8.619, 3.483$, respectively, $P<0.05$). MPswi was higher, and the signal intensity ratio of the cortex to the medulla (CMswi), Skewness, Correlation were lower in msRI than in non-msRI ($P<0.05$). These parameters showed similar diagnostic efficacies for msRI ($P>0.05$), and AUCs were 0.703–0.854. CMswi was an independent protective factor for msRI (OR =0.026, $P=0.003$). MPswi and CMswi were correlated with BUN ($r=0.416, -0.545$, $P<0.05$). CMswi and Correlation were correlated with Scr ($r=-0.645, -0.411$, $P<0.05$).

Conclusions: SWI was valuable for assessing renal dysfunction, which may be helpful for the evaluation of moderate-severe renal injured patients with T2DM.

PU-0042

MR 成像技术在脑梗死中的应用进展

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【摘要】脑梗塞是神经系统的一类常见多发疾病，具有较高的致残率和死亡率，通过 CT、常规 MRI，尤其是弥散加权成像能对脑梗死进行早期诊断，这些诊断信息也是临床医生在治疗过程中选择和调整治疗措施的重要依据。近年来，针对脑梗塞的 MR 检查方法进展迅速，本文对 MR 成像技术在脑梗死中的应用进展进行综述。

PU-0043

Application value of liver MRI technology in the diagnosis of cholangiocarcinoma

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Objective:

To evaluate the value of liver MRI technology in diagnosis of cholangiocarcinoma.

Methods:

Following the principle of grouping and control, this study was conducted from March 2019 to June 2021 in 60 patients with suspected cholangiocarcinoma enrolled in the Magnetic Resonance Department of our hospital. The diagnostic value of MRI technology was analyzed using pathological results as the gold standard.

Results:

Liver MRI technology showed high efficiency in the diagnosis of positive predictive value, negative predictive value, accuracy, specificity and sensitivity of cholangiocarcinoma, and the difference was statistically significant ($P < 0.05$).

Conclusion:

In the examination and diagnosis of cholangiocarcinoma, MRI examination technology has a higher disease detection rate, and has important clinical application value.

PU-0044**Multimodal MRI-based radiomic nomogram for the early differentiation of recurrence and pseudoprogression of glioma**

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Objective:

To evaluate the diagnostic value of multimodal MRI radiomics based on T2-weighted fluid attenuated inversion recovery imaging (T2WI-FLAIR) combined with T1-weighted contrast enhanced imaging (T1WI-CE) in the early differentiation of glioma recurrence from pseudoprogression.

Methods:

A total of one hundred and eighteen patients with brain gliomas who were diagnosed from March 2014 to April 2020 were analysed retrospectively. According to the clinical characteristics, the patients were randomly split into a training group ($n=83$) and a validation group ($n=35$) at a 7:3 ratio. The region of interest (ROI) was delineated, and 2632 radiomic features were extracted. We used multiple logistic regression to establish a classification model, including the T1 model, T2 model and T1+T2 model, to differentiate recurrence from pseudoprogression. The diagnostic efficiency of the model was evaluated by calculating the area under the receiver operating characteristic curve (AUC) and accuracy (ACC) and analysing the calibration curve of the nomogram and decision curve.

Results:

There were 75 cases of recurrence and 43 cases of pseudoprogression. The diagnostic efficacies of the multimodal MRI-based radiomic model are relatively high. The AUC values and ACC of the training group were 0.831 and 77.11%, respectively, and the AUC values and ACC of the validation group were 0.829 and 88.57%, respectively. The calibration curve of the nomogram shows that the discrimination probability is consistent with the actual occurrence in the training group, and the discrimination probability is roughly the same as the actual occurrence in the validation group. In the decision curve analysis, the T1+T2 model shows a higher overall net efficiency.

Conclusion:

The multimodal MRI radiomic model has relatively high efficiency in the early differentiation of recurrence compared to pseudoprogression, which is helpful for clinicians to make correct treatment plans so that patients can be treated in a timely and accurate manner.

PU-0045

AI 技术与 MRI 快速成像技术的发展

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一、在磁共振成像技术的临床应用中，提高扫描速度仍是迫在眉睫的需求。近年来，人工智能（AI）在医疗领域的应用日益广泛，特别是在放射学中，在肌骨领域大放异彩。

二、AI 技术同时助力临床科研前沿，新一代 AI 赋能的压缩感知更是通过将人工智能与压缩感知稀疏成像理论相结合，应用于神经、骨关节等磁共振成像中，在疾病的早期诊断和预后预测评估等方面表现出巨大的应用前景。

三、基于人工智能的压缩感知（Compressed SENSE AI, CS-AI）技术已被证明可以同时加快采集时间和确保图像质量。但尚不清楚 CS-AI 不同加速因子在测量骨髓脂肪含量的准确性。该研究首次探索了在腰椎研究中使用基于 CS-AI 加速的 mDixon-Quant MR 成像技术，发现 CS-AI 技术不仅缩短了 MRI 采集时间，还确保了图像质量、临床诊断的准确性和临床工作效率。并通过比较不同加速因子的 CS-AI 技术和传统 CS 技术，发现腰椎椎骨脂肪含量的测量结果在不同技术之间没有显著差异，然而 CS-AI 和 CS 组之间的信噪比（SNR）和对比度噪声比（CNR）存在显著差异，说明 CS-AI 在图像质量方面具有优势。在比较不同加速因子的组别时，发现 CS-AI 的加速因子为 3 时，扫描时间最短且图像质量较好；当加速因子为 7 和 8 时，尽管扫描时间进一步缩短，但图像质量明显下降。研究结果表明，通过适当选择加速因子，可以缩短腰椎 MR 成像的采集时间，同时确保图像质量和临床诊断的准确性。

四、近年来，人工智能快速发展，使得多种繁杂的工作变得更加高效和便捷，我们相信，AI 技术在磁共振成像领域临床研究前沿的应用远不止于此，其与前沿 MRI 技术的强强联合将有着巨大的应用潜力，等待大家探索。

PU-0046

Micro and macro changes in early stage of type 2 diabetes mellitus without cognitive impairment: a diffusion tensor imaging (DTI) and surface-based morphometry (SBM) study

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Background: Brain structure and function changes are considered major brain damages in type 2 diabetes mellitus (T2DM), which likely has a close relationship with cognitive impairment. Many previous studies have shown by using brain structural and functional magnetic resonance imaging (MRI) methods that brain white and gray matter are damaged in T2DM, leading to cognitive impairment. Patients with T2DM but without cognitive dysfunction might also have brain changes.

Methods: In this study, subjects with early stage T2DM with no cognitive dysfunction were included to detect brain damages using the tract-based spatial statistics analysis (TBSS) method to demonstrate white matter (WM) micro changes and surface-based morphometry (SBM) method to assess cerebral cortex macro changes.

Results: The whole-brain TBSS analysis revealed that there were no statistically significant changes in fractional anisotropy (FA) and mean diffusivity (MD), but the FA declined in some area of cerebral WM ($p < 0.1$). The SBM results showed no changes in cortical thickness (CT), cortical volume (CV), surface area (SA), and cortical sulcal curve (CSC) between these two groups, but pial local gyration index (LGI) was decreased in the precuneus ($-\log_{10} p = -3.327$).

Conclusion: In conclusion, early stage T2DM patients without cognitive impairment had brain micro and macro structural damages, suggesting the potential use of MRI as an imaging marker to detect brain changes in early stage T2DM, which could not be observed and assessed clinically.

PU-0047

高分辨率显微线圈在四肢肿瘤上的应用

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目的：通过对比常规体表线圈和显微线圈扫描所得图像，验证显微线圈对于观察肿瘤内部结构以及周边组织细微结构的优势。

方法：本次实验采用西门子 3T Verio 磁共振机，通过对 50 名四肢肿瘤患者应用常规体表线圈和显微线圈进行扫描，将患处置于磁场中心位置，并固定好两种线圈于患处，常规体表线圈扫描后将其关闭，然后打开显微线圈进行扫描。平扫时进行常规 T1,T2 加权以及抑脂，抑水序列扫描，之后再进行增强序列扫描。扫描后把常规体表线圈所得图像与显微线圈图像进行对比。

结果：显微线圈扫描后可得到高信噪比高分辨率的细微图像。

结论：显微线圈为一种具备接收功能，并且体积明显小于临床常规线圈的表面线圈，能对浅表精细结构进行小视野，高分辨率的显示。应用其在磁共振扫描中对显示肿瘤内部结构，病变累及范围以及图像的分辨力上起到了重要作用。通过对比常规体表线圈和显微线圈扫描后所得图像可以发现常规体表线圈可以显示正常肿瘤大小以及周围组织情况，但是对于肿瘤内部以及肿瘤周边细小血管和组织显示不佳，即便对其图像进行放大也是如此，图像可以显示出大概情况，但是无法看清具体结构以及周边累及情况。但关闭体表线圈后转而应用显微线圈进行扫描病变位置则变得大不相同，应用显微线圈扫描所得图像可以明显看出病变位置情况，相对于常规体表线圈放大后无法清楚观察到病变内部以及周边累及情况，在应用显微线圈扫描所得图像的帮助下都可以清楚观察到。对某些多囊性的肿瘤内部结构观察提供很大帮助。显微线圈同比常规体表线圈在不增加扫描时间，采集次数的前提下可提高显微结构的图像质量，有利于获得细微精细的解剖结构，获得小视野且高分辨率的图像。可提高感兴趣区域的信噪比，实现高分辨成像。对于微小病变的检出以及其与周边组织关系，细小血管的通过和走向的判断评估具有独特的优势。

PU-0048

探究 IVIM-DWI 在炎性肠病诊疗中的应用价值

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目的：本文旨在探究 IVIM-DWI 技术在炎性肠病（Inflammatory Bowel Disease, IBD）的诊疗中的应用价值。通过综合分析 IVIM-DWI 在早期诊断、疾病活动评估以及治疗效果监测中的表现，旨在为 IBD 的临床治疗提供新的方法和指导。

方法：通过收集多篇关于 IVIM-DWI 在 IBD 中应用的研究文献，对其中的实验设计、样本数量、采用的参数设置以及研究结果进行详细分析。同时，我们结合自身的临床经验，探讨 IVIM-DWI 技术在 IBD 诊疗中的实际应用情况。

结果：IVIM-DWI 技术在 IBD 的诊疗中显示出了潜在的应用价值。在早期诊断方面，IVIM-DWI 可以检测肠壁的水分子代谢变化，对早期病变具有较高的敏感性，有助于提高诊断准确率。在疾病活动评估中，IVIM-DWI 可评估肠壁的微小灌注变化，为肠壁炎性活动性的定量评估提供了新的手段。

此外, IVIM-DWI 在治疗效果监测方面也显示出了潜在的能力, 可以跟踪治疗后肠壁的变化, 从而为治疗方案的调整提供依据。

结论: IVIM-DWI 技术在炎性肠病诊疗中展现出了广阔的应用前景。其可以在早期诊断、疾病活动性评估和治疗效果监测等方面提供有力支持。然而, 仍需进一步的大样本临床研究来验证其在不同类型和严重程度的 IBD 患者中的可靠性和准确性。综合来看, IVIM-DWI 为 IBD 的临床管理带来了新的机遇, 为患者提供更加精准和个体化的诊疗方案。尽管 IVIM-DWI 技术在 IBD 中显示出了潜在的应用价值, 但其在临床实践中仍面对一些技术挑战和限制。医学界需要不断努力, 深入研究 IVIM-DWI 技术的机制, 进一步完善其参数设置和图像分析方法, 以实现其更为广泛和精准的应用。我们有理由相信, 随着技术的不断进步和临床实践的积累, IVIM-DWI 将为炎性肠病的诊疗带来更多的创新和突破。

PU-0049

定量组织磁敏感技术 (QSM) 融合 T2 加权图像在评估直肠癌中的初步应用

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目的: 定量组织磁敏感技术 (QSM) 可以定量测量血液的磁敏感和静脉的氧饱和度, 在直肠癌患者中, 这一指标可以用来评估 TNM 分期以及患者的预后情况。我们的研究将 QSM 定量图像与常规 T2 横断面 2D 图像进行配准, 在 2D T2 图像上进行直肠癌病灶的精准勾画, 再将勾画的感兴趣区放置到 QSM 图像中进行数值的测量。采用这种方法可以最大程度的对病变范围进行精确勾画, 避免了在 QSM 图或幅度图上无法判断病变边界的情况, 从而使测量结果更加可信。方法: 对 2 例直肠癌患者进行常规 MRI 扫描和 QSM 扫描, 采用 Philips Ingenia Elition 3T 设备进行扫描, QSM 序列采用 4 回波磁敏感加权序列进行扫描, 回波间隔为 6.9ms。T2 加权横断位 2D 图像的层厚、层间隔和中心偏移和 QSM 序列相同。采用运行在 MATLAB 软件的 STI_Suite 对得到的幅度图和相位图进行处理, 得到 QSM 加权图像。将 QSM 加权图像导出为 NIfTI 格式文件, 导入 FireVoxel, 对空间坐标进行变换, 同时修改容积的方位, 使图像方向和标记和导入的 T2 加权像一致。再在 QSM 图像上勾画出股骨的容积范围, 采用 mutual info with auto focus 功能将 T2 加权图像与 QSM 图像进行配准。配准完成后可在 T2 加权像上进行直肠癌病变的勾画, 勾画后的 ROI 可直接得到 QSM 的相应测量值。

结果: 2 例病例均可以完成图像配准, 配准程度较为理想, 可以得到 T2 加权图像和 QSM 图像融合图, ROI 可以叠加到两种图像之上, 并可以得到对应的测量值。

结论: 我们采用这种方法可以方便快速的得到复杂病灶范围的 QSM 测量值, 结果重复性较高。在后续研究中我们将继续尝试与其他加权图像进行配准和勾画, 以及利用 3D 成像序列进行配准和勾画。

PU-0050

The exploration of High-resolution diffusion-weighted imaging (RESOLVE) in rectal tumor imaging

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Purpose

Discussion the display of rectal tumors on axial T2-weighted images combined with high-resolution diffusion-weighted imaging (RESOLVE).

Materials and methods

A total of 20 patients(12 males,8 females;39 to 78 years,mean age 45 years),who were pathologically diagnosed with rectal cancer at West China Hospital of Sichuan University between June 2015 and July 2015,were enrolled in this study.All patients were referred for a multi-parametric MRI protocol on a Siemens 3.0T MRI-system(MAGNETOM Trio, 32-channel cardiac coil),consisting of a high-resolution,sagittal T2 TSE(slice thickness 2mm along the intestinal disease), coronal T2 TSE sequence(slice thickness 2mm along the intestinal disease),axial T2 TSE sequence(slice thickness 3mm vertical the intestinal disease)and RESOLVE(same slices and slice thickness as the axial T2 TSE sequence).

Two experienced radiologists evaluated the MRI measurements,comparing the rectal tumors at the same slices on axial T2-weighted images and RESOLVE images displayed.

Results

On T2-weighted imaging the distinguish between tumor and fiber is good,Clearly show the structure around the tumor,Show complex structural component, not easily to distinguish relationship between tumor and surrounding tissue boundaries.High resolution diffusion-weighted imaging (RESOLVE) gets a good tissue contrast, can define the structures of the tumor well,display the rectal tumors' shape, size, boundary and tissue density clearly, and less breathing motion artifacts affected.Combined with ADC value we can pre-sentence the benign and malignant of the rectal tumors.

Conclusion

High-resolution diffusion-weighted imaging (RESOLVE) can make up for lack of axial T2-weighted images display of rectal tumors,get more information about the image, provide better accurate diagnostic information.

PU-0051

高分辨弥散加权成像 (RESOLVE)对直肠癌患者淋巴结转移的探究

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目的

探讨高分辨弥散加权成像 (RESOLVE)对判断术前直肠癌患者有无淋巴结转移的意义。

方法

运用西门子 3.0T 磁共振 (MAGNETOM Trio, 32 通道心脏线圈) 对 65 例术前直肠癌患者(43 名男性, 22 名女性, 最小年龄 31 岁, 最大年龄 91 岁, 平均年龄 63.22 岁) 进行磁共振扫描。检查前使用开塞露排空肠道并注射 654-2 减缓肠道蠕动。对每个病人行 T2 矢状位 (层厚 2mm 且与肠道长轴平行)、冠状位 (层厚 2mm 且与病变肠道长轴平行)、轴位 (层厚 3mm 且与病变肠道垂直且包全盆腔) 高分辨及 RESOLVE (与轴位同层且包全盆腔) 磁共振普通扫描。

由两名高年资医生对轴位 T2 加权图像和 RESOLVE 图像进行评价, 判断有无淋巴结转移, 并与病理结果对比。

结果

T2 加权成像对直肠周围的淋巴结形态、大小、边界显示良好。高分辨弥散加权成像 (RESOLVE) 获得了良好的组织对比度, 能很好的限定肿瘤内部的结构, 对直肠周围淋巴结的形态、大小、边界及组织密度显示清楚, 几乎没有呼吸运动伪影影响, 结合 ADC 值可以进一步对肿瘤的良好恶性进行预判。

结论

高分辨弥散加权成像 (RESOLVE) 对术前直肠癌患者有无淋巴结转移的预判具有重要意义, 为手术方案的制定和实施提供了坚实基础。

PU-0052

高场强 MRI 在肩袖损伤诊断的应用分析

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高场强 MRI 在肩袖损伤诊断的应用分析

南阳市中医院独山院区 李秋莉

〔摘要〕目的分析高场强磁共振成像 (Magnetic Resonance Imaging, MRI) 在肩袖损伤诊断的应用价值。方法 2022 年 2 月 - 2023 年 5 月我院疑似肩袖损伤患者 78 例, 患者均接受 1.5T MRI 与 3.0T MRI 检查, 以关节镜检查为"金标准", 对照 1.5T 与 3.0T MRI 检查的诊断结果、诊断效能、肌腱撕裂状况。结果本组 78 例疑似肩袖损伤患者中, 经关节镜检查诊断阳性 63 例, 阴性 15 例; 经 1.5T MRI 检查诊断阳性 53 例, 阴性 5 例; 经 3.0T MRI 检查诊断阳性 61 例, 阴性 11 例。3.0T MRI 诊断灵敏度 96.83%(61/63)、准确性 92.31%(72/78) 较 1.5T MRI 诊断 84.13%(53/63)、75.64%(59/78) 高, 且漏诊率 3.17%(2/63) 较 1.5T MRI 诊断 15.87%(10/63) 低 (P < 0.05)。3.0T MRI 检查部分撕裂 95.12%(39/41) 较 1.5T MRI 检查 78.04%(32/41) 高 (P < 0.05)。3.0T MRI 对不同肌腱撕裂状况检出率 96.83%(61/63) 较 1.5T MRI 检查 84.13%(53/63) 高 (P < 0.05)。结论高场强 MRI 在肩袖损伤诊断中可提高诊断灵敏度及准确性, 减少漏诊率, 还能准确诊断部分撕裂, 提高不同肌腱撕裂状况检出率。

PU-0053

磁共振多序列联合扫描在颅脑转移癌放化疗后疗效评估的应用研究

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目的:

随着医学成像技术的发展, 磁共振成像 (MRI) 在颅脑肿瘤的诊断和治疗过程中扮演着重要角色。本研究旨在探讨磁共振多序列联合扫描在颅脑转移癌放化疗后疗效评估中的应用。我们将新技术与传统序列相结合, 以获得更全面、准确的影像学信息, 为临床医生提供指导治疗和判断疗效的依据。

颅脑继发性肿瘤在放化疗后的治疗效果评估一直是临床难题。本研究将酰胺质子转移成像 (APT)、灌注成像 (PWI)、磁敏感加权成像 (SWI) 和波谱分析 (MRS) 等多种新技术与传统磁共振序列相结合,旨在提供丰富的影像学信息,以更准确地判断治疗效果和疾病进展。

方法:

本研究的病例选择颅脑部转移病灶放化疗后的患者,进行多个新技术的联合扫描,包括 APT、PWI、SWI、MRS 以及常规磁共振平扫和增强扫描。我们设计了详细的序列扫描方案,通过不同序列的组合,获取形态学、生理学和分子级的信息。后续的数据处理包括对图像进行头部平扫+增强图像处理,灌注曲线分析肿物血流灌注情况,以及使用分割法或肿瘤追踪法来测量酰胺质子含量并得出量化指标。

结果:

通过多序列联合扫描,我们获得了丰富的影像学信息,同时获得了肿瘤的形态学、生理学和分子水平的数据。这些数据有助于判断疾病的真假性进展以及疗效评估。例如,APT 在不同真假性进展肿瘤中显示出不同的信号强度,而 PWI 则反映了肿瘤的血流灌注情况,为判断治疗效果提供了有力支持。

结论:

研究表明,磁共振多序列联合扫描在颅脑转移癌放化疗后疗效评估中具有潜在的应用价值。通过将新技术与传统序列相结合,我们能够获得更全面、准确的影像学信息,为临床医生提供丰富的数据支持,以指导治疗方案的制定和疗效判断。尽管仍需进一步的研究,但多序列联合扫描在颅脑转移癌放化疗后的临床应用中有广阔的前景。

PU-0054

Twist-Vibe 序列在肝脏磁共振动态增强中的临床应用分析

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目的:探究 TWIST-VIBE 序列在肝脏磁共振动态增强中的临床应用价值。方法:回顾性选取 2021 年 1 月-2022 年 12 月期间收治的肝脏占位病变患者 120 例,根据患者所使用的对比剂不同将其分为两组,其中使用钆塞酸二钠(Gd-EOB-DTPA)患者 52 例作为 Gd-EOB 组,使用钆喷酸葡胺(Gd-DTPA)患者 68 例作为 Gd 组,通过 TWIST-VIBE 序列和 VIBE 序列进行肝脏占位性病变检查,对比 TWIST-VIBE 序列和 VIBE 序列检查时呼吸运动伪影情况。结果:Gd-EOB 组 TWIST-VIBE 序列中 5 个子期呼吸运动伪影分值分别与 VIBE 序列对比,差异无统计学意义 ($P>0.05$),Gd 组 TWIST-VIBE 序列中子期 A1、A5 呼吸运动伪影分值与 VIBE 序列相比,A1 期明显降低,A5 期明显升高,差异具有统计学意义 ($P<0.05$);Gd-EOB 组增强后子期 A3、A4、A5 呼吸运动伪影分值明显高于增强前,Gd 组增强后子期 A5 呼吸运动伪影分值明显高于增强前,差异具有统计学意义 ($P<0.05$);Gd-EOB 组和 Gd 组增强后 A1-2 期呼吸运动伪影分值均低于 A3-5 期,Gd 组增强后 A1、A3、A4 期呼吸运动伪影分值低于 Gd-EOB 组,A5 期呼吸运动伪影分值高于 Gd-EOB 组,差异具有统计学意义 ($P<0.05$),两组存在呼吸运动伪影分值 ≥ 3 分患者 23 例,其中 A4 期 19 例,A1-2 期呼吸运动伪影反之均 ≤ 2 分。结论:在进行 MRI 肝脏占位性病变诊断时,使用 TWIST-VIBE 序列可以获得 5 期动脉子期成像,可以改善因患者屏气配合度低和使用 Gd-EOB-DTPA 对比剂导致的呼吸运动伪影,从而获得可以满足临床诊断的动态期图像。

PU-0055

基于心血管磁共振成像技术在急性 ST 段抬高型心肌梗死患者经皮冠脉介入治疗后心肌内出血中的研究进展

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摘要:

心肌内出血是急性 ST 段抬高型心肌梗死 (STEMI) 患者行经皮冠状动脉介入治疗 (PCI) 后的常见也是较为严重的并发症, 与不良预后和不良心室重构息息相关。而且心肌内出血 (IMH) 的评估已经成为急性 STEMI 患者 PCI 后疗效评价的重要辅助手段。本文的目的是对心血管磁共振成像在急性 STEMI 患者 PCI 后心肌内出血中的诊断技术以及发展方向进行综述。

Abstract:

Intramyocardial hemorrhage is the common complication of percutaneous coronary intervention (PCI). And it is closely related to poor prognosis and adverse ventricular remodeling. In addition to that, the estimation of intramyocardial hemorrhage is the important auxiliary method for evaluating the effect of the PCI and instructing the drugs therapy. The purpose of this article is to review the diagnostic technology and development direction of cardiac magnetic resonance in intramyocardial hemorrhage after PCI.

PU-0056

Differentiation of Left Atrial Dysfunction in Reperfused Chronic Myocardial Infarction

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Evaluation of left atrial dysfunction is of great value to assess reperfused chronic myocardial infarction. LA volumetric and strain parameters can be of great help to estimate left atrial function. However, limited data are accessed on its prognostic value in reperfused chronic myocardial infarction.

Purpose: In order to evaluate the relationship between LA volumetric and strain parameters in patients with chronic myocardial infarction.

Materials and methods: In this retrospective study, recruited people (included from April in 2017 to the June in 2021) experience cardiovascular MRI. The relationship between LA volumetric and strain parameters and chronic myocardial infarction was evaluated by linear regression.

Results: 83 patients with chronic myocardial infarction (mean age \pm standard deviation, 58.16 years \pm 9.58; 69 men) were included. LATEF was weakly correlated with LAVmin (Pearson correlation coefficient $r = -0.674$, $P < 0.001$), Booster longitudinal strain ($r = 0.577$, $P < 0.001$), GLSRa ($r = -0.567$, $P < 0.001$), Total longitudinal strain ($r = 0.574$, $P < 0.001$). Better passive radial strain is correlated to a lower rate of chronic myocardial infarction (hazard ratio, 0.789 [0.699, 0.892]; $P < 0.001$) after adjusting for multiple clinical and CMR-based variables.

Conclusion: Left atrial volumetric parameters, strain and strain rate can be of great value in reperfused chronic myocardial infarction.

PU-0057

改进型 Dixon 水脂分离技术在盆腔扫描中的临床应用价值

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目的：探究改进型水脂分离技术（Fast_Dixon）在 MR 盆腔扫描中的应用价值。

方法：招募青年志愿者 50 人进行盆腔 MR 轴位、冠状位扫描。扫描序列为 FAST Dixon T2WI 序列、常规 Dixon T2WI 序列。采用双盲法五分制分别对两组序列的图像质量进行主观评分。在轴位图像上膀胱显示最大层面测量图像信号噪声比(signal noise ratio, SNR)和对比噪声比(contrast to noise ratio, CNR)。

结果：两组序列在“周围组织与股骨头信号对比度是否良好”评分和“整体图像质量”评分中，Fast Dixon 序列优于 Dixon 序列，有统计学差异（ $P>0.05$ ）；在“膀胱伪影是否影响诊断”及“脂肪抑制效果是否良好”两项的平均评分中，Fast Dixon 与 Dixon 序列评分无统计学差异（ $P>0.05$ ）；图像客观质量评价中，Fast Dixon 序列的 SNR、CNR 都优于 Dixon 序列，有统计学差异（ $P<0.05$ ）；结论：青年志愿者髋关节 FAST Dixon 序列结合多次平均激励技术的图像质量评分较常规 Dixon 序列明显提高，可以不增加扫描时间的前提下，增加抑制脂肪和运动伪影的效果。Fast Dixon 序列可以替代传统 Dixon 序列，从而成为盆腔磁共振扫描的优化选择方案。

PU-0058

磁共振弹性成像评价肝脏疾病的研究进展

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肝纤维化、肝硬化和肝脏肿瘤一直是临床研究的热点和难点。肝脏穿刺活检是肝脏疾病诊断的金标准，然而由于其存在有创性、出血、疼痛、针道转移等并发症限制了其临床应用，而且由于存在取样误差，容易导致疾病程度误判。近年来，医学影像技术飞速发展，磁共振弹性成像（magnetic resonance elastography, MRE）作为一种无创性评估组织机械属性的检查手段，可以用于全身许多器官的检查，如肝脏、心脏、大脑等。然而，MRE 在肝脏疾病检查中的应用最为成熟。MRE 是一种新型无创性成像技术，可以将人体的弹性特征定量化，被称作“影像触诊”。MRE 的成像原理是通过主动刺激器-塑料连接管道-被动刺激器将声波传递至肝脏，肝脏内质点产生微小位移；通过检测质点位移计算剪切波速度，从而得到组织弹性特征。良好的组织波传播是图像质量好坏的关键，由于肝脏的位置较浅，机械波往往有很好的传播，肝脏常用的刺激频率是 60 Hz，MRE 测量前常需要禁食 4~6 h，正常志愿者肝脏的弹性值范围约 2.05~2.44 kPa，且其测量值不受年龄、性别、体质量指数或脂肪含量及磁共振增强钆对比剂的影响，HINES 等通过多因素影响重复测量的混合线性回归模型证明，2 次测量间的差异的容错在 37% 以内都属于正常测量误差。肝内铁含量会影响图像质量，但对弹性值的测量是否有影响还不清楚，同时为了获得良好的弹性图及波形图，需要患者呼吸的配合。既往研究表明 MRE 在肝脏疾病的评估方面应用广泛，本研究旨在归纳总结 MRE 在诊断及评估慢性肝病方面的现状，为肝脏疾病的预后和治疗提供参考依据。

PU-0059

基于多参数 MRI 影像组学列线图预测胶质母细胞瘤 TERT 启动子突变的状态的应用研究

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目的:探讨基于多参数 mri 放射组学图预测成人胶质母细胞瘤(GBM)端粒酶逆转录酶(TERT)启动子突变状态及预后的临床应用价值。

方法:回顾性分析 185 例 GBM 患者的 MRI 及病理资料。从术前 MRI 图像中提取并过滤了 2832 个放射组学特征。在影像组学评分(rad-score)和临床特征的基础上创建放射组学 nomogram。采用受试者工作特征(ROC)曲线、校准曲线和临床决策曲线评估 nomogram 在 TERT 突变鉴定中的表现。分别采用病理证实的 TERT 突变和基于风险评分的 TERT 突变来评估患者预后。

结果:随机森林(random forest, RF)算法对 TERT 突变的诊断效果优于其他两种算法,训练集和验证集的曲线下面积(AUC)分别为 0.892 (95% CI: 0.828-0.956)和 0.824 (95% CI: 0.677-0.971)。影像组学评分与临床变量构建的放射组学 nomogram 预测能力在训练集中达到 0.916 (95%CI: 0.864, 0.968),在验证集中达到 0.880 (95%CI: 0.743, 1)。校正曲线和决策曲线分析结果进一步支持了放射组学图的临床应用价值。高危亚组的总生存期明显短于低危亚组,这与病理证实的 TERT 突变组的结果一致。

结论:放射组学图具有良好的识别和校准能力,可为无创预测 GBM 患者 TERT 突变和预后提供有希望的见解。

PU-0060

动态增强磁共振成像以及扩散加权成像对肿块型肝内胆管癌微血管侵犯的预测价值

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目的:探讨动态增强磁共振成像(DCE-MRI)以及扩散加权成像(DWI)对肿块型肝内胆管细胞癌(IMCC)微血管侵犯(MVI)的预测价值研究。方法:回顾性分析 2017 年 1 月至 2023 年 01 月本院收治的 50 例 IMCC 患者的临床资料,术前均行 DCE-MRI 及 DWI 扫描。根据病理结果分为 MVI 组(18 例)和非 MVI 组(32 例),比较两组患者 DCE-MRI 及 DWI 的差异。采用多因素 Logistic 回归分析 MVI 的独立预测因素,通过绘制受试者工作特征曲线并计算曲线下面积评估其诊断效能。结果:MVI 组患者直径、ADC 值显著高于非 MVI 组($P<0.05$);两组患者之间在肿瘤形态、T1WI/T2WI 信号、有无坏死、强化模式、DWI 信号、有无靶征、包膜挛缩以及胆管扩张方面差异无统计学意义($P>0.05$)。采用多因素 Logistic 回归分析发现 ADC 值是 IMCC 患者发生 MVI 的独立危险因素($P<0.05$)。通过绘制 ROC 曲线分析发现,ADC 值预测 IMCC 患者发生 MVI 的 AUC 为 0.897,敏感度为 91.22%,特异度为 89.25%,95%CI: 83.26%-97.53%;最佳截断阈值为 $1.43\times 10^{-3}\text{mm}^2/\text{s}$ 。结论:DCE-MRI 以及 DWI 对 IMCC 患者 MVI 状态的预测具有良好的诊断效能,其中 ADC 值可以作为预测 MVI 发生的独立危险因素,有助于为 IMCC 患者的精准医疗提供更有价值的术前信息。

PU-0061

强直性脊柱炎 ADC 值与骨吸收和骨形成因子的相关性研究

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目的：分析强直性脊柱炎 ADC 值与骨吸收和骨形成因子的相关性，并进一步探讨其应用价值

方法：以 45 例强直性脊柱炎患者为病理研究对象，根据强直性脊柱炎疾病活动指数(BASDAI)分为活动组（22 例）和稳定组（23）例，同时以 40 例同期健康志愿者为对照组。采用磁共振 DWI 序列测量髌髌关节与 L5 椎体的 ADC 值，并抽取研究对象空腹静脉血，采用 ELISA 试剂盒测定血清骨吸收、骨形成因子水平。以统计学 SPSS26.0 分析组间差异性，以及 ADC 值与骨吸收、骨形成因子的相关性。

结果：各组间 ADC0 差异无统计学意义，活动组 ADC1 和 rADC 高于稳定组，稳定组高于对照组，组间差异均有统计学意义。与对照组相比，稳定组 OPG、RANKL、DKK1、Wnt 含量均有所升高，但 OPG/ RANKL 和 Wnt/ DKK1 水平降低，其组间差异有统计学意义（ $P<0.05$ ）。与稳定组相比，活动组 RANKL 与 DKK1 含量升高，OPG/ RANKL 和 Wnt/ DKK1 水平降低，其组间差异有统计学意义（ $P<0.05$ ）。强直性脊柱炎患者的 ADC1 和 rADC 与 OPG/ RANKL 和 Wnt/ DKK1 有负相关性。

结论：ADC 值能够从一定程度上预测骨形成和骨吸收状态的病理异常程度，具有较高应用价值。

PU-0062

骨质疏松病人臀部肌群脂肪分数的磁共振定量研究

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目的：探讨磁共振脂肪定量技术对骨质疏松患者的臀部肌群脂肪评估能力。骨质疏松患者口服人工虎骨胶囊，口服药物前后，脂肪定量技术对臀部肌群脂肪分数定量测量与口服药物前后临床效果的相关性研究。

方法：选取骨质疏松的 30 例女性患者，年龄 55~75 岁。患者均在 2021 年 6 月初期做磁共振脂肪定量检查，间隔 18 个月后再做定量检查。18 个月间，患者口服人工虎骨胶囊，药效机制改善肌肉骨骼疼痛症状，抑制骨吸收，促进骨形成，增加骨密度。使用联影 MRu780 3T 高场磁共振成像进行检查。由两位观察者在 FF 图像上采用双盲法对臀部肌群 FF 值进行测量与分析。选取股骨头髁白上缘层面，沿两侧臀大肌、臀中肌、臀小肌肌肉边缘手动勾画 ROI，同一个层面测量 3 次取平均值。采用 Shapiro-Wilk 检验分析数据的正态性，符合正态分布的数据采用（平均数±标准差）表示。采用单因素方差分析对臀肌各部分 FF 值的差异进行方差齐性检验，使用配对样本 t 检验对比分析口服药前后测得的 FF 值。（ $P<0.05$ 时为差异有统计学意义）

结果：比较口服人工虎骨胶囊前后各肌群间 FF 值分别是（ $23.7\pm 8.29\%$ ， $25.1\pm 8.37\%$ ， $12.8\pm 3.73\%$ ， $12.7\pm 6.03\%$ ， $13.2\pm 4.40\%$ ， $12.0\pm 5.63\%$ ），（ $24.8\pm 7.85\%$ ， $26.2\pm 8.33\%$ ， $10.8\pm 3.13\%$ ， $10.7\pm 5.00\%$ ， 12.1 ± 3.92 ， $11.1\pm 5.43\%$ ）。两组数据符合正态分布。人工虎骨胶囊周期性口服与磁共振脂肪定量技术测得 FF 值，两侧臀中肌和臀小肌具有相关性，两侧臀大肌没有相关性。

结论：肌少症表现为肌肉脂肪浸润的增加及功能的减退，骨质疏松骨量减少，骨髓脂肪含量增加，与脂肪浸润具有相关性。多重校正的磁共振脂肪定量技术不仅定量结果精确，符合目前影像学“可量化”及“快速成像”，为临床肌肉脂肪浸润的评价提供影像学依据，为临床骨质疏松的疗效监测提供新见解。

PU-0063

Predicting the efficacy of non-steroidal anti-inflammatory drugs in migraine using deep learning and three-dimensional T1-weighted images

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Objective: Deep learning (DL) models based on the individual images could contribute to tailored therapies and personalized treatment strategies. We aimed to construct a DL model using individual three-dimensional (3D) structural images for predicting the efficacy of non-steroidal anti-inflammatory drugs (NSAIDs) in migraine. **Methods:** A 3D convolutional neural network (CNN) model was constructed, with ResNet18 as the classification backbone (3D ResNet18), to link structural images obtained from patients with migraine to the prediction of the efficacy of NSAIDs. The performance of this model was compared with that of conventional CNN models (ResNet34, ResNet50, ResNeXt50, and DenseNet121). The performance of the DL model was evaluated via calculating the area under the curve (AUC) of receiver operating characteristic curve.

Results: In total, 111 patients were included (mean age, 33.77 ± 10.78 years) and allocated to the training ($n = 88$) and testing ($n = 23$) sets in a 4:1 ratio. ROC curve analysis showed that the conventional DL models trained with a 3D T1WI sequence (i.e. ResNet34, ResNet50, ResNeXt50, and DenseNet121) had AUCs of 0.78, 0.79, 0.73, and 0.68, respectively, for migraine efficacy, which were less than that of our proposed model (0.82). Further, the accuracy of the ResNet34, ResNet50, ResNeXt50, DenseNet121 and 3D ResNet18 models were 0.65, 0.74, 0.65, 0.70, and 0.78, respectively.

Conclusions: Our study highlights the feasibility of the DL algorithm based on brain structural images and suggests that it can be applied to predict the efficacy of NSAIDs in migraine treatment.

PU-0064

膝关节 MRI 影像组学在骨龄判读中的应用

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目的 探讨膝关节 MRI 影像组学在骨龄判读中的应用价值。

方法 对 2022 年 1 月至 2023 年 1 月在邵阳市中心医院就诊的 327 例患者膝关节 T1WI 图像进行回顾性评估。通过完全随机的方法根据 7:3 的比例将所有患者分为训练集(229 例)和内部测试集(98 例);再根据年龄将患者分为<18 岁和≥18 岁两组。由一名主任医师对膝关节 T1WI 图像进行轮廓勾勒标注。利用 3D SLICER 软件提取 107 个影像特征,特征筛选采用方差过滤、相关性分析及 lasso 回归方法,通过逻辑回归(LR)、支持向量机(SVM)和朴素贝叶斯(NBM)构建影像组学模型,通过 ROC 曲线分析评估模型性能。

结果 ROC 分析显示在训练集中 LR 模型、SVM 模型、NBM 模型的 AUC 值分别为 0.86、0.89、0.83,在测试集中 AUC 值分别为 0.82 (95%CI: 0.74-0.90),0.81(95%CI: 0.73-0.89),0.82(95%CI: 0.72-0.90)。

结论 LR 模型和 SVM 模型有过拟合趋势,NBM 模型相对更稳定。未来可进行多中心、联合多部位 MRI 的研究,探索更优的预测模型,为青少年提供无辐射、更精准的骨龄预测。

PU-0065

T1 mapping 联合扩散加权成像对乳腺良恶性病变的诊断价值

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目的：探讨 T1-mapping 成像及扩散加权成像的定量参数在乳腺良恶性病变的诊断价值。材料与方法：对本院 2021 年 2 月-2021 年 8 月 80 例（良性 35 例，恶性 45 例）乳腺病变行常规 MRI 及 DWI 成像，并用多翻转角成像序列分别于增强前及增强 7min 后采集 T1 mapping 图像，测量病灶的增强前 T1 弛豫时间（T1pre）、增强后 T1 弛豫时间（T1post）、ADC 值及正常腺体 T1pre。分析比较增强前病灶与正常腺体 T1 值的差异，良恶性病灶 T1pre、T1post、ADC 值，将有统计学意义的绘制单独及联合 ROC 曲线，评价参数的诊断价值。结果：乳腺病灶与正常腺体的 T1pre 差异有统计学意义（ $P<0.05$ ），良恶性病灶 T1pre 差异无统计学意义，T1post 及 ADC 间差异有统计学意义，T1post、ADC 及两种联合的 AUC 分别为 0.863、0.861、0.924，敏感度分别为 80.0%、80.0%、84.4%，特异度分别为 82.9%、80.0%、85.7%。T1post 联合 ADC 曲线下面积更大，检测效能更高，敏感度更高。结论：定量 T1post 可以在一定程度上鉴别乳腺良恶性病变，T1post 联合 ADC 的诊断效能更大。

PU-0066

BSSFP 序列三时相扫描在胎儿心血管系统的应用

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目的：探讨 BSSFP 序列三时相扫描技术在胎儿心血管系统磁共振检查中的应用价值。材料与方法：回顾性分析我院 2022 年 6 月~2023 年 6 月行产前磁共振检查患者的临床及影像资料，筛选后入组 38 例经产前超声提示未见异常的胎儿心血管系统磁共振图像，均行 BSSFP 序列单时相及三时相扫描。图像分析及质量评分由 3 名从事胎儿磁共振诊断 5 年以上的放射科医生双盲分析完成。具体方法是 3 名放射科医生先对 38 例单时相的四腔心、主动脉弓水平横断面分别进行分析及评分。完成单时相评分后，再完成 38 例三时相的四腔心、主动脉弓水平横断面进行分析及评分。结果：38 例图像中，对主动脉弓层面的显示，BSSFP 序列单时相和三时相扫描评分差异有统计学意义（ $P=0.048$ ）；对四腔心层面的显示，两者评分差异无统计学意义（ $P=0.620$ ）。结论：BSSFP 序列三时相扫描技术有助于提高胎儿心血管系统图像质量，尤其是主动脉弓层面，能更好显示胎儿心外大血管解剖结构，为胎儿心血管结构的显示提供了一种新的成像思路。

PU-0067

MRI 在卵巢畸胎瘤与囊腺瘤碰撞中的诊断及病理对照

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目的 探讨卵巢畸胎瘤合并囊腺瘤 MRI 影像特点，通过病理对照加深对卵巢二元碰撞肿瘤的认识。方法 回顾性分析 8 例经手术病理证实的卵巢畸胎瘤-囊腺瘤发生的碰撞瘤。均为超声发现盆腔液性为主病变，后进一步行 MR 平扫加增强扫描检查。观察肿瘤的形态、位置、大小及 MRI 信号特征，并将肿瘤 MRI 表现与病理对照分析。结果 8 例均为成熟型囊性畸胎瘤与黏液性囊腺瘤发生碰撞，3 例病变均位于左侧卵巢、右侧卵巢 5 例。8 例均表现为较大或巨大的多囊性占位，以囊性为主、实

性为辅, 肿瘤内见多种信号特点。两肿瘤间分界明确, 6 例呈瘤壁瘤和 2 例呈瘤中瘤表现。构成碰撞瘤的两种肿瘤在 MRI 上均可见各自本身典型的 MRI 特点。结论 正确认识卵巢碰撞瘤的 MRI 特征及病理特点, 有助于提到临床诊断符合率, 能很好的指导临床诊疗方案的制定。

PU-0068

酰胺质子转移成像联合扩散加权成像对泪腺良恶性病变的鉴别诊断价值

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目的 探讨酰胺质子转移成像(amide proton transfer, APT)与扩散加权成像(diffusion-weighted imaging, DWI)成像对良、恶性泪腺肿瘤的鉴别价值。

材料与方法 前瞻性纳入 2023 年 2 月至 2024 年 2 月云南大学附属医院 40 例泪腺疾病患者临床病例资料, 根据患者病理穿刺或者手术结果分为良性泪腺肿瘤组 25 例和恶性泪腺肿瘤组 15 例。所有患者在术前行 3.0T MRI 眼眶检查, 扫描序列包括 T2WI、APT、DWI 等, 在 APT 和 DWI 参数图像上勾画感兴趣区, 测量病灶的非对称性磁化转移率(MTRasym), 表观扩散系数(ADC)值, 采用组内相关系数(ICC)检验两名观察者测量结果的一致性。采用独立样本 t 检验比较两组病灶各参数值的差异。采用受试者工作特征曲线(ROC)评估各项有差异参数单独及联合对两组病变鉴别诊断的效能。采用 Delong 检验比较各参数及联合参数诊断效能的差异。采用 Pearson 相关检验对两参数进行相关性分析。

结果 2 名放射诊断医生获得良好的一致性(ICC>0.75)。MTRasym 及 ADC 值在泪腺良、恶性泪腺肿瘤性病变之间的差异均有统计学意义(均 P<0.05)。恶性肿瘤组的 MTRasym 大于良性泪腺肿瘤组(6.01 ± 0.55 vs 3.85 ± 0.93 , P<0.05), ADC 值则小于良性病变组(0.86 ± 0.15 vs 1.45 ± 0.12 , P<0.05)。MTRasym、ADC 值及二者联合鉴别恶性病变和良性病变的 ROC 曲线下面积分别为 0.790、0.842、0.890。MTRasym 与 ADC 值的诊断效能差异无统计学意义(P>0.05), 两参数联合的诊断效能要优于 MTRasym 单独诊断效能(P<0.05)。

结论 APT 可提供更多关于肿瘤的功能学信息, 因此 APT 联合 DWI 有利于泪腺肿瘤的定性诊断。

PU-0069

个案报道: 右侧外阴孤立性纤维性肿瘤

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目的: 报道一例老年女性外阴孤立性纤维性肿瘤。

方法: 患者女性, 78 岁, 发现外阴包块 1 年余。实验室检查未见异常。体格检查: 右侧大阴唇可扪及一大小约 5×4×4cm 包块, 质硬、活动度可, 无触痛。

结果: 盆腔 MRI 平扫及增强扫描: 右侧大阴唇椭圆形异常信号, T1WI 呈等信号, T2WI 呈混杂高信号, DWI 呈高信号, 增强扫描呈明显均匀强化; 诊断: 右侧大阴唇占位, 考虑肿大淋巴结可能; 完善术前检查后于全麻下行右侧外阴包块剥除术, 手术顺利。

结论: 术后病检结果回示为: (右侧外阴) 孤立性纤维性肿瘤。误诊原因分析: 孤立性纤维性肿瘤可发生在身体的任何部位, 以胸部最多见, 尤以胸膜多见, 本次病例发生在大阴唇, 为极少见部位, 但 MRI 表现符合孤立性纤维性肿瘤, T1WI 呈等信号, T2WI 稍高信号中存在片结状低信号是大多数 SFT 的典型 MRI 表现。

PU-0070

Optimal Visualization and Anatomical Findings of the Thoracic Dorsal Root Ganglia in MRN

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Objectives: To evaluate prospectively the most suitable sequence of magnetic resonance neurography (MRN) in identifying the anatomical characteristics of thoracic dorsal root ganglion (DRG).

Methods: Fifty-seven participants were enrolled for undergoing an MRN scan. Balanced fast-field echo (B-FFE), T2 FFE, and SHINKEI sequences were all applied, and we tried to get the best sequence for the anatomic information measurement of the thoracic DRG. Two observers used a 5-point grading system to analyze the visualization of ganglion, preganglionic and postganglionic nerve tissue, as well as overall image quality. Inter-reader and intra-observer agreement was measured using intraclass correlation coefficient (ICC) analysis. Comparisons between sequences are performed using Friedman test. Paired t-tests were used to compare right- and left-sided DRG volumes for each segment. Pearson's correlation coefficient r was reported for all correlation analyses of DRG volume with demographic variables.

Results: Thoracic DRG were mostly identified in all participants by using MRN. The mean 5-point scores of ganglia, preganglionic and postganglionic nerve tissue in T2 FFE (4.2/3.4/4.4, respectively) were higher than those in B-FFE (3.0/2.6/3.0) and SHINKEI (3.3/2.7/3.9) sequences ($P < 0.0001$). The most suitable pulse sequences to identify and measure anatomic information was T2 FFE. There was no statistical difference in the volume of DRG between left and right ($P > 0.05$), and the overall trend from T1 to T12 was large at both ends and small in the middle. Besides, correlation analyses revealed negative correlations of mean DRG volume with sex, age and weight, but showed positive correlation in height ($r = 0.394$; $p = 0.031$). As for the location of DRG, the proportion of extraforaminal type was the highest (89.9%), which mainly distributed in T1-T6.

Conclusion: T2 FFE is a reliable imaging sequence for identification and anatomical characterization of thoracic DRG. The anatomical information it provided can be used for clinical reference.

PU-0071

智能调整灯光照射与肢体抚触在幼儿核磁共振头颅平扫检查中的应用效果评价

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目的: 探讨家属在陪同幼儿核磁共振检查中的应用效果评价。

方法: 前瞻性收集我院儿科 150 例需进行磁共振头颅平扫检查的患儿, 年龄范围 1-5 岁。随机分为 A、B 两组, A 组为常规组, 直系家属陪同患儿检查, 但不进行肢体抚触, 光源照射采用正常室内光源 (500 勒克斯, 10 流明/瓦白炽灯十二枚), 按照规定流程进行磁共振检查; B 组为对照组, 由患儿直系家属陪同, 检查前向患儿家属讲解核磁共振检查的流程, 并对检查进行模拟演示, 详细说明患儿入睡检查的目的, 充分得到患儿家属的支持与配合, 检查前关掉检查室灯光, 在打开智能台灯, 于玻璃防护层外对检查室照射, 采用 2700K-6500K 可调节色温, 通过检查室声音分贝自动进行灯光亮度控制, 最大通量 300 流明。家属通过轻柔抚触患儿身体、讲故事、播放轻音乐等方式, 助其入睡。结合 A、B 两组患儿是否有家属陪同和是否采用智能灯光对 MRI 图像质量进行主观评价,

主观评价由两名高年资主治医师对图像质量进行评价,采用五分制打分。日常睡眠情况由一名高年资护师对患儿及家属询问,进行 BEARS 睡眠筛查量表进行评价。

结果: A 组患儿图像质量评分 3.86 ± 0.66 分, B 组患儿图像质量评分为 4.25 ± 1.30 分, B 组患儿图像质量显著高于 A 组 ($P < 0.05$); 两组患儿日常 BEARS 睡眠质量评分无显著差异。 ($P > 0.05$)

结论: 在进行 MRI 检查时, 智能灯光配合抚触可以使患儿保持平静, 减少患儿好动对 MRI 结果的干扰, 确保检查能够顺利进行, 可以在临床中推广应用。

PU-0072

肺磁共振成像技术应用现状

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磁共振成像 (magnetic resonance imaging, MRI) 拥有出色的软组织对比度, 且没有电离辐射的风险, 在全身得到了广泛应用, 但由于肺低质子信号导致 MRI 上的低信噪比, 肺磁共振扫描时间相对过长引起的心肺运动伪影, 肺与临近软组织交界面产生的磁化率伪影三方面的影响, MRI 在肺部的应用受到了较大的限制, 虽然采用高场 MRI 扫描提高了信噪比, 但同时也加重了磁化率伪影 [1]。通过屏气并减少采集时间减少伪影, 但同时可能降低了空间分辨率, 同时很多肺部病变患者屏气效果较差。通过呼吸监测、呼吸及心电门控技术可以减少运动伪影, 但会大大增加扫描时间。使用低场强 MRI 可以降低磁化率伪影, 但同时也降低了信噪比。尽管存在这些限制, 但 MRI 的技术一直在发展, 随着近年来高性能梯度系统、相控阵接收器线圈和逐渐优化的 MRI 成像序列的发展, MRI 肺部成像的应用范围在拓展, 在某些具体应用方面甚至比 CT 和 PET-CT 更具优势。在此做一综述, 阐述肺磁共振成像技术应用现状。

PU-0073

直系亲属参与亲情高级护理对幽闭恐惧症患者磁共振检查图像质量和检查成功率的应用探究

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目的: 探究直系亲属参与亲戚护理, 是幽闭恐惧症患者磁共振检查的效果。

方法: 前瞻性收集我院 MRI 检查患者 100 人, 随机分为 A、B 两组, A 组为常规护理组, 患者家属检查前由影像科护理人员进行讲解并安慰患者, 陪同检查, 按照相关规程行 MRI 检查; B 组为高级护理干预组, 医护人员与患者及家属提前一天在影像科模拟磁共振室进行沟通和宣讲, 护士了解患者平时放松心情习惯与情况, 交待直系家属如何安慰患者情绪, 检查时护士与直系家属一同陪同患者检查。家属通过轻抚患者身体、播放患者喜欢的音乐等方式, 助其放松心情, 完成检查。记录两组患者检查磁共振、两组患者检查前后的恐惧评分、SAS 焦虑自评量表评分; 由两名高年资影像科主治医师对两组图像质量进行评分, 采用 5 分制法。检查结束后对患者满意度进行调查并记录。

结果: 与 A 组相比, B 组患者的检查成功率更高 ($98.45\% > 86.92\%$, $\chi^2 = 4.332$); 恐怖评分更低 (4.55 ± 1.99 分 $< 7.95 \pm 3.33$ 分, $P < 0.05$); SAS 评分更低 (33.29 ± 10.05 分 $< 49.86 \pm 11.56$ 分, $P < 0.05$); A 组图像质量评分 4.23 ± 0.99 分, B 组图像质量评分 3.05 ± 0.69 分, A 组图像质量显著高于 B 组 ($P < 0.05$)。

结论: 直系家属参与亲情高级护理干预, 可以达到减轻患者紧张情绪, 降低患者恐怖心情, 提高幽闭恐惧症患者检查成功率及图像质量, 确保磁共振检查顺利进行, 应当在日常护理工作中推广应用。

PU-0074

基于深度学习的 TACE 术后肝癌分级研究

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这项研究旨在磁共振动态增强上构建一个 TACE 术后肝癌分类模型, 为后续医生的诊断、治疗决策和研究提供帮助。目前磁共振图像上基于人工评价术后肝癌效率低下并且少有研究涉及, 本研究拟结合多时序 MRI 图像, 旨在通过模拟放射医生临床决策步骤, 探讨深度学习应用的可能性。

PU-0075

酰胺质子转移成像评估呼吸睡眠暂停低通气综合征脑损伤的价值

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目的: 探讨酰胺质子转移 (amide proton transfer, APT) 成像在评估不同程度阻塞性呼吸睡眠暂停低通气综合征 (obstructive sleep apnea hypopnea syndrome, OSAHS) 患者脑缺血缺氧损伤的应用价值。方法: 招募 2023 年 1-6 月来我院治疗的经多导睡眠监测 (PSG) 确诊为不同程度 OSAHS 患者 20 例, 根据呼吸暂停低通气指数 (AHI) 将患者分为轻度组 (AHI 5-15 次/小时) 8 例, 中重度组 (AHI > 15 次/小时) 12 例, 同时纳入年龄、性别、BMI 与病例组匹配的健康志愿者为对照组, 所有患者及对照组均行常规头颅 MRI 平扫、3D T1WI 及 APT 成像, 将 APT 功能像和 3D T1WI 解剖像融合, 在融合图像上分别选取双侧额叶、顶叶、颞叶、枕叶、基底节区、双侧海马、双侧小脑半球、胼胝体、脑桥、延髓勾画感兴趣区, 测量不同脑区 APT 值, 应用 SPSS 21.0 统计软件分析病例组和对照组不同脑区 APT 值差异性。结果: 轻度 OSAHS 患者各脑区 APT 值与对照组相比均无明显差异性 ($P > 0.05$); 与对照组相比, 中重度 OSAHS 患者在脑桥 ($t = -3.28$, $P = 0.002$)、延髓 ($t = -2.12$, $P = 0.04$)、左侧小脑半球 ($t = -2.74$, $P = 0.009$)、右侧小脑半球 ($t = -3.69$, $P = 0.001$)、左侧颞叶 ($t = -4.24$, $P < 0.05$)、右侧颞叶 ($t = -2.64$, $P = 0.012$)、右侧额叶 ($t = -2.08$, $P = 0.045$)、右侧丘脑 ($t = -2.41$, $P = 0.021$) 左侧豆状核 ($t = -2.19$, $P = 0.035$) 等脑区 APT 值增高, 差异有统计学意义, 其余脑区 APT 值差异均无统计学意义 ($P > 0.05$)。结论: APT 成像较常规 MRI 成像更能早期发现中重度 OSAHS 患者缺血缺氧性脑损伤, 可为临床早期治疗提供客观的影像依据, 具有广泛的应用前景。

PU-0076

护理干预对幽闭恐惧症患者 MRI 检查中的效果分析

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目的: 讨论主动护理干预在幽闭恐惧症患者 MRI 检查中的应用效果。方法: 前瞻性选取 2020 年 1 月—2022 年 12 月在西安大兴医院进行 MRI 检查的 100 例患者, 随机分为两组, 每组各 50 人。应用主动性护理干预为 A 组, 常规护理为 B 组, 对比分析两组的心率、呼吸频率、血压等各项客观性生命体征变化, 记录两组患者的检查前平静时间、恐惧评分。邀请两名影像科高年资医师对图像质量采用 5 分制进行主观打分, 结果不一致时引入第三名医师进行判断。B 组患者在常规护理后未能完成检查者, 接着进行主动护理干预, 但不纳入实验统计。

结果: A 组患者 48 人完成检查, 2 人未能完成检查, 检查成功率 96%, B 组患者 15 人未能完成检查, 检查成功率 70%。A 组患者的平均心率 75.05 ± 6.02 次/min, B 组患者平均心率 92.05 ± 7.09 次/min ($p < 0.001$); A 组患者呼吸频率 16.05 ± 5.01 次/min, B 组患者呼吸频率 20.15 ± 4.09 次/min ($p < 0.001$); A 组患者收缩压 115.65 ± 13.78 mmHg, B 组患者收缩压 131.56 ± 10.88 mmHg ($p < 0.05$); A 组患者舒张压 69.09 ± 9.05 mmHg, B 组患者舒张压 85.09 ± 7.11 mmHg ($p < 0.05$); A 组图像质量评分 4.68 ± 2.22 分, B 组图像质量评分 3.98 ± 1.77 分, A 组图像质量显著高于 B 组 ($P < 0.05$); A 组患者恐惧评分 3.65 ± 0.62 分, B 组患者恐惧评分 6.99 ± 1.52 分, A 组恐惧评分显著低于 B 组 ($P < 0.05$); A 组检查前安抚时间 22.26 ± 9.88 min, B 组检查前安抚时间 42.25 ± 6.89 min, A 组安抚时间显著降低 ($P < 0.05$)。

结论: 有效的主动护理干预可减轻幽闭恐惧症患者检查前的恐慌心理, 促使患者成功完成检查。

PU-0077

磁共振在超声消融治疗（海扶）中的应用

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目的: 子宫肌瘤是女性生殖器最常见的良性肿瘤, 超声消融治疗（海扶）是目前治疗子宫肌瘤最安全有效的方法, 本文意在利用磁共振多方位多参宿的优势和特点, 更好的帮助临床制定手术治疗方案并有效的评估治疗效果和损伤。

方法: 利用海扶刀的技术超声聚焦的原理, 首先明确超声聚焦的点位为 5mm, 那么我们在设定磁共振扫描方案时便可以设定扫描层厚为 5mm, 以便更好的评估点位的设置和布局。超声聚焦的方位主要为矢状位和横断位。因此磁共振扫描应以矢状位和冠状位为主, 冠状位为辅, 加做脂肪抑制序列能更好的显示病灶的情况。磁共振扫描定位有两种方式: 1 是以人体长轴来设定冠、矢、轴三个方位; 2 是以宫体为长轴来设定冠、矢、轴三个方位。定位方式可根据临床医生的要求来选择, 术中临床医生可结合磁共振影像更精准的定位治疗, 在减少周围软组织和器官的损伤前提下达到最佳手术效果。术后同样建议磁共振检查评估手术的效果以及整个腹壁盆腔及后壁的损伤, 检查定位需与术前定位保持一致以便更精准的评估预判。

结果: 磁共振术前检查可以对海扶手术提供精准的定位和方案设定, 术后的检查可以完美的评估手术的效果和内膜的完好及周围软组织的损伤。对临床手术提供了准确的影像依据和疗效评估。

结论: 磁共振的多参数多方位的优势可以为超声消融治疗（海扶）子宫肌瘤提供直观的影像依据, 并且对术后疗效和损伤的评估更加精准, 值得推广。

PU-0078

冠状位磁共振成像 PROSET 水激发序列对多节段腰椎间盘突出症致病节段的诊断价值

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目的 评估冠状位磁共振成像和 PROSET 水激发序列对多节段腰椎间盘突出症致病节段的准确性。

方法 回顾性分析 2019 年 1 月至 2022 年 12 月在我院接受手术治疗的 66 例多节段腰椎间盘突出症患者临床和影像学资料。MRI 检查使用 3.0TMR 扫描仪(荷兰 Philips Ingenia 公司, 3.0T), 之后使用冠状位 PROSET 水激发序列进行扫描。收集 MRI 图像上多节段腰椎间盘突出症的表现及与神经根受压关系。以术中和术后患者疗效为受压神经根节段的判断标准, 分析计算冠状位 MRI 诊断受压神经根的敏感性、特异性、阳性预测值、阴性预测值和准确性。并使用 Kappa 一致性分析两者

诊断一致性。结果 66 例多节段腰椎间盘突出症患者, MRI 图像上共识别到 31 例患者存在 2 节段腰椎间盘突出受累, 25 例存在 3 节段受累, 10 例存在 4 节段受累, 共涉及 177 个椎间盘。在冠状位腰椎 MRI 上, 椎间盘突出症引起的神经根压迫存在一系列形态学变化, 包括神经根凹陷、神经节信号增强、神经根肿胀或神经根断裂。L4/L5 神经根起点多位于椎间盘平面(69.81%), L5/S1 神经根起点多位于椎间盘上方(72.58%)。共 79 处神经根受压, 其中以 L5 的神经根受压比例最高 82.28%(65/79)。冠状位 MRI 在多节段椎间盘突出症患者定位致病节段的诊断敏感性为 97.4%、特异性为 99.3%、阳性预测值为 93.7%、阴性预测值为 98.6%、准确性为 98.6%。冠状位 MRI 与术中及术后诊断 Kappa 一致性高($k=0.926$)。结论 冠状位 MRI 对定位多节段椎间盘突出症患者的致病节段、受压神经根具有较高准确性, 值得今后进一步研究。

PU-0079

磁共振 3D-FIESTA 序列在诊断膝关节半月板损伤中的应用价值研究

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[目的] 探究 3D-FIESTA 序列在诊断膝关节半月板 III 级损伤中的应用价值。[方法] 选取我院于 2021 年 1 月-2022 年 12 月收治的膝关节半月板 III 级损伤患者 50 例, 对 MRI 诊断结果与关节镜手术结果进行对比, 分析关节镜手术结果、2D 常规序列术前诊断 (正确/错误)、3D-FIESTA 序列术前诊断 (正确/错误)。[结果] 本组 50 例半月板 III 级损伤关节镜手术显示半月板撕裂位置情况如下: 内侧半月板 A 区 5 例, AB 区 13 例, ABC 区 7 例, B 区 3 例, BC 区 1 例, C 区 0 例; 外侧半月板 A 区 4 例, AB 区 11 例, ABC 区 3 例, B 区 3 例, BC 区 0 例, C 区 0 例。以关节镜手术确定的损伤位置为标准, 核磁共振常规序列与 3D-FIESTA 序列的诊断结果分别与该标准进行比对, 结果显示 3D-FIESTA 序列在确定膝关节半月板 III 级损伤位置时, 与关节镜手术结果一致性极佳 ($Kappa=0.909$), 差异有统计学意义 $P<0.05$ 。[结论] 与核磁共振常规序列相比, 3D-FIESTA 序列能够客观、可靠地显示膝关节半月板损伤的位置, 为临床医生提供可靠的依据, 该成像技术值得一定的推广和应用。

PU-0080

多模态 MRI 在成人胶质瘤术前评估中的应用价值研究

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目的 探讨多模态磁共振成像在预测成人型胶质分级与评估 IDH-1 基因型及预测肿瘤细胞增殖活性中的应用价值。方法 回顾性分析 2021 年 9 月-2023 年 6 月在新疆医科大学第一附属医院经病理组织证实为成人胶质瘤的 115 例患者的临床及影像资料数据。所有患者术前均接受 T1WI、T2WI、T2 Flair、DWI、磁共振增强成像、DTI 以 MAGiC 影像技术检查。比较高低级别成人胶质瘤及高级别成人胶质瘤不同 IDH-1 基因型各参数的组间差异及鉴别诊断效能, 评估肿瘤增殖活性 Ki-67 LI 与各参数的相关性。结果 T1、T2、ADC、FA 值在高低级别成人胶质瘤及高级别成人胶质瘤的不同 IDH-1 基因型之间的差异具有均统计学意义, 其中 ADC 具有最佳的诊断效能。在鉴别高低级别成人胶质瘤中 ADC 的 AUC 值为 0.930, 灵敏度为 92.96%, 特异度为 79.55%。在高级别成人胶质瘤不同 IDH-1 基因型组中 ADC 的 AUC 值为 0.817, 灵敏度为 91.70%, 特异度为 61.50%。在不同病理分级中, Ki-67 LI 的组间差异均具有统计学意义。各参数与 Ki-67 LI 具有相关性, 其中 ADC 具有最强的相关性, 相关系数为 0.356。结论 多模态 MRI 的定量参数在鉴别高低级别成人胶质瘤

和评估高级别成人胶质瘤 IDH-1 不同基因型及肿瘤增殖活性中具有较高的诊断效能，为成人胶质瘤的诊断提供更加客观的诊断依据。

PU-0081

冠状动脉解剖评分系统在急性 STEMI 患者微血管阻塞中的预测价值

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目的 探讨不同冠状动脉解剖评分系统对急性 ST 段抬高型心肌梗死（STEMI）患者首次经皮冠状动脉介入治疗（PCI）后发生微血管阻塞（MVO）的预测价值。**方法** 回顾性分析首次接受 PCI 治疗并行心脏磁共振（CMR）检查的急性 STEMI 患者，根据 CMR 结果将患者分成 MVO 组与非 MVO 组，计算每位患者的 SYNTAX 积分、Gensini 积分及其相应的罪犯血管积分，并测量 CMR 相关参数。**结果** 共纳入 55 例急性 STEMI 患者，其中 MVO 组 21 例，非 MVO 组 34 例。MVO 组的 SYNTAX 积分、Gensini 积分、罪犯 SYNTAX 积分、罪犯 Gensini 积分显著高于非 MVO 组（ $P=0.001$ 、 $P<0.001$ 、 $P<0.001$ 、 $P<0.001$ ）。受试者工作特征（ROC）曲线分析显示，罪犯 Gensini 积分在预测 MVO 中具有最大的曲线下面积（AUC）（ $AUC=0.877$ ， $P<0.001$ ），最佳阈值为 44 时的敏感度和特异度分别为 90.5%、76.5%。在多变量 logistic 回归分析中，Gensini 积分（优势比=1.123， $P=0.044$ ）与罪犯 Gensini 积分（优势比=1.132， $P=0.038$ ）为 MVO 的独立预测因子。**结论** 在首次接受 PCI 治疗的急性 STEMI 患者中，罪犯血管为 LAD 者更易发生 MVO，Gensini 积分与罪犯 Gensini 积分可能是预测 MVO 的潜在指标。

PU-0082

基于病变周围及病变所在区域 bp-MRI 影像组学预测临床显著性前列腺癌

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简介：本研究旨在探索 MRI 图像组学特征在前列腺癌（PCa）诊断中的潜在价值，特别关注了肿瘤周围的特征对放射学模型的性能提升的影响。通过系统性地研究肿瘤周围区域的大小，我们旨在确定肿瘤周围区域的 MRI 特征是否能够帮助准确诊断前列腺癌。

研究方法：我们进行了一项回顾性研究，收集了 162 例前列腺癌患者的动态对比增强 MRI 扫描数据，其中包括 74 例前列腺癌和 88 例前列腺增生患者。前列腺癌的确诊基于病理穿刺活检或术后病理结果，前列腺增生的确诊基于病理穿刺活检结果。我们使用 T2 加权成像（T2WI）和表观弥散系数（ADC）图像勾画了肿瘤及其周围区域的轮廓。肿瘤区域由两名放射科专家标记，然后我们逐步扩大了区域，以获得距离肿瘤不同径向距离的四个环形区域。从中提取了 MRI 图像组学特征，并使用统计方法如 t 检验、LASSO Cox 回归、mRMR 筛选特征。我们采用逻辑回归、RF 和 SVM 分析了对前列腺癌和前列腺增生诊断最有价值的特征，并建立分类模型对病变内部和周围特征进行比较，以确定最佳建模方式。最后，我们评估了模型的准确度、敏感度、特异度以及受试者工作特征（ROC）曲线，以评估其诊断 PCa 的价值。

研究结果：研究发现，距离肿瘤 2~3 毫米的周围区域的特征在预测性能上表现最佳。在训练集中，该预测模型的 AUC 为 0.92（95%置信区间：0.81~1.00），准确率为 0.89（95%置信区间：0.72~0.98），特异度为 0.91，敏感度为 0.65。在测试集中，AUC 为 0.93（95%置信区间：

0.88~0.98), 准确率为 0.84 (95%置信区间: 0.76~0.90), 特异度为 0.84, 敏感度为 0.85。因此, 选择肿瘤周围区域的大小会影响预测临床显著性前列腺癌的性能。

结论: 在本研究中, 我们深入研究了 MRI 图像组学特征在前列腺癌 (PCa) 的临床诊断中的潜在用途, 特别关注了肿瘤周围区域大小对放射学模型的影响。我们的发现表明, 肿瘤周围区域的选择在提高临床显著性前列腺癌的预测性能方面具有关键作用。

PU-0083

颞颌关节间隙改变与关节盘移位的关系

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目的: 研究颞颌关节间隙改变与关节盘移位的关系, 探讨关节间隙改变在诊断关节盘移位的价值。

方法: 收集有临床症状并行磁共振检查的颞下颌关节紊乱病 (temporomandibular joint disorders, TMD) 患者 85 例 100 侧关节影像, 按盘分界角大小分成 ABCD 组, A 组 (正常组) $-15^{\circ} \sim 15^{\circ}$ (20 例); B 组 $16^{\circ} \sim 50^{\circ}$ (22 例); C 组 $51^{\circ} \sim 80^{\circ}$ (23 例); D 组 $\geq 81^{\circ}$ (20 例)。测量各组关节前、上、后间隙, 采用 SPSS 22.0 对数据进行统计学分析。

结果: 关节前间隙 B、C 组大于 A 组, 存在统计学差异 ($P < 0.05$); D 组与 A 组相比, 关节前、上、后间隙均无显著性差异 ($P > 0.05$)。

结论: 关节盘轻、中度前移时, 关节间隙有相应改变。关节盘前移位超过一定程度时, 对关节间隙无影响。单纯的关节间隙改变尚不能作为诊断关节盘移位的准确依据。

PU-0084

基于 MR 影像组学模型预测结直肠癌肝转移的研究

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目的: 探讨基于 MR 影像组学模型预测结直肠癌肝转移 (Colorectal cancer liver metastasis, CRLM) 的效能。

方法: 以 2016 年 6 月-2022 年 8 月在川北医学院附属医院行基线 MRI 检查并经病理证实的结直肠癌 (Colorectal cancer, CRC) 120 例为研究对象, 按 7:3 比例随机分为训练组及验证组。收集其性别、年龄、病理结果、MR TN 分期、癌胚抗原 (Carcinoembryonic antigen, CEA) 及糖类抗原 19-9 (Carbohydrate antigen 19-9, CA19-9) 等临床指标。采用单因素和多因素分析筛选 CRLM 的临床独立风险因素。在 (斜) 轴位不压脂 T_2 加权图像 (T_2 weighted imaging, T_2WI) 及弥散加权成像 (Diffusion weighted imaging, DWI) ($b=800$) 序列上提取相应的影像组学特征。采用最小绝对收缩和选择算子 (Least absolute shrinkage and selection operator, LASSO) 回归筛选各序列的最优影像组学特征。采用 logistic 回归建立 T_2WI 模型、DWI 模型、 T_2WI -DWI 模型 M 及影像组学-临床联合模型 U。采用受试者工作特征曲线下面积 (AUC) 评估模型预测效能。

结果: 入组 120 例 CRC 中, 肝转移 (Liver metastasis, LM) 57 例, 无 LM 63 例。临床指标 CEA 及 CA19-9 在 LM 组与无 LM 组之间的差异具有统计学意义 ($P < 0.05$)。经 LASSO 回归分析后从 T_2WI 及 DWI 序列中分别筛选出 3 个最优组学特征。M、 T_2WI 及 DWI 模型 AUC 值在训练组分别为 0.824、0.811 及 0.803, 在验证组分别为 0.813、0.795 及 0.798; U 模型的 AUC 值在训练组为 0.899、在验证组为 0.889, 在本研究中是预测 CRLM 的最佳模型。

结论: 基于 CRC 原发灶 T_2WI 与 DWI 序列的 MR 影像组学模型对于 CRLM 的预测具有较好效能。影像组学与临床独立风险因素相结合的联合模型能够进一步提高预测效能。

PU-0085

对颈部转移淋巴结良恶性的影像诊断回顾性分析

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目的 利用影像学研究诊断影像颈部淋巴结的文献回顾总结。**方法** 广泛查阅国内外近年有关诊断颈部淋巴结良恶性病变,对颈部淋巴结解剖、良恶性表现,利用 DWI、MRS、PWI、CT 灌注及 PET/CT 诊断进行总结分析。**结果** 早期的研究常以淋巴结的大小来判定有无转移。有以淋巴结的最短径增加作为参考标准,以淋巴结 1cm 最短径来作为良恶性的分界线是最有效的参考标准,IB 和 II 区的转移淋巴结参考标准要大 1 ~ 2 mm。有原发咽及下咽部肿瘤者,咽后淋巴结长径为 0.6 ~ 0.8 mm 即高度提示转移可能。对 SCC (鳞状细胞癌) 颈部转移淋巴结在不同分界下的灵敏度和特异度做了评估,轴位上最长径为 1 cm 作为分界时的灵敏度和特异度分别是 88 % 和 39 %,而 1.5 cm 作为分界时的灵敏度和特异度则分别为 56 % 和 84 %。Steinkamp 等研究表明,以淋巴结长短径之比 L/S 来判断淋巴结良恶性有一定的意义,转移淋巴结长短径之比 $L/S < 2$, 良性淋巴结 $L/S > 2$ 。此外,淋巴结大小根据其位置及患者的年龄不同而有不同。转移淋巴结常出现坏死,最常见于头颈部鳞癌。淋巴结周围不均匀强化伴中央低密度区是诊断转移淋巴结最可靠的征象。坏死淋巴结在磁共振 T1 加权像上表现为低信号,而根据坏死部分组成不同,如角化、凝固、液化而在 T2 上表现为低信号或高信号。囊变淋巴结通常与甲状腺乳头状癌和口咽鳞癌有关,钙化的淋巴结主要见于甲状腺癌,是由于甲状腺球蛋白的沉积或淋巴结内的沙砾样钙化。淋巴结结节外侵犯通常表现为边缘不规则,与邻近组织脂肪层面消失,在大的淋巴结更易发生 (大部分为 > 3 cm 的鳞癌转移),但是 25 % 直径小于 1cm 的淋巴结也可能存在病理上的结外侵犯。淋巴结结外侵犯是预后不良的指征,存活率要降低 50 % 以上,与肿瘤复发及远处转移密切相关。需注意的是,近期淋巴结活检及辐射也可导致淋巴结炎症及不规则的边缘而类似淋巴结的结外侵犯。

PU-0086

基于深度学习降噪重建新技术在前列腺双参数 MRI 中的应用价值

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目的: 探讨基于新的深度学习 (DL) 降噪重建技术在前列腺双参数 MRI (T2WI、DWI) 图像质量方面的应用价值。

方法: 回顾性分析 36 例行前列腺磁共振检查患者的影像资料,扫描序列包括常规 T2WIs、DWIs 及使用 DL 后的 T2WIDL、DWIDL。主观评价由两名具有不同影像诊断经验 (3 年、7 年) 的医师依据 Likert Scale 评分法对图像质量进行双盲评价,采用 Wilcoxon 秩和检验评估两名读者图像质量评分的差异;使用 κ 统计法评估读者间的一致性。T2WI 图像观察内容包括:前列腺包膜清晰度、病灶对比度及边缘锐利度、解剖细节的显示、盆腔肌肉及骨骼的清晰度及整体图像质量。DWI 图像观察内容包括:前列腺解剖清晰度、病灶对比度、盆腔肌肉及骨骼的清晰度、图像的变形、整体图像质量。使用配对 t 检验和 Mann-Whitney U 检验对客观图像质量定量数值信噪比 (SNR) 及对比噪声比 (CNR) 进行统计学分析。

结果: 本研究 36 例患者年龄 67.1 ± 9.9 (37 ~ 85) 岁。基于主观评分标准,两名读者对 T2WIs、DWIs 总评分分别为 3.4 ± 0.7 、 3.0 ± 0.8 分及 3.3 ± 0.6 、 3.1 ± 0.5 分,对 T2WIDL、DWIDL 总评分分别为 4.6 ± 0.6 、 4.3 ± 0.7 分及 4.3 ± 0.5 、 4.2 ± 0.6 分;T2WIDL、DWIDL 评分均高于 T2WIs、DWIs 评分。基于客观评价,所有病灶 T2WIs 及 T2WIDL 的 SNR 分别为 11.8 ± 2.4 、 26.9 ± 8.0 , 具

有显著性差异 ($P < 0.01$)；CNR 分别为 0.5 ± 0.1 、 0.6 ± 0.1 ，差异有统计学意义 ($P = 0.03$)；所有病灶 DWIs 及 DWIDL 的 SNR 分别为 23.2 ± 13.5 、 33.9 ± 16.8 ，CNR 分别为 0.5 ± 0.2 、 0.6 ± 0.1 ，具有显著性差异 ($P < 0.01$)。

结论：基于新的 DL 技术对前列腺双参数 MRI 图像质量均具有显著的提高，其中 T2WIDL 的效果要优于 DWIDL，故优先推荐使用 T2WIDL 序列。

PU-0087

星形叠层容积内插序列在盆腔扫描中的应用价值

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目的：本文旨在研究星形叠层容积内插 (Star VIBE) 序列在盆腔扫描中的应用价值。**方法** 选取东南大学附属中大医院 2021 年 1 月~2023 年 1 月经过手术病理证实的盆腔恶性肿瘤患者。术前患者用时接受屏气常规 VIBE 动态增强和自由呼吸 Star Vibe 延迟增强 MRI 扫描。总共 40 例患者，均为女性，平均 (65.8 ± 4.2) 岁，其中宫颈癌 23 例、子宫内膜癌 17 例。由 2 名具有 5 年以上女性盆腔 MR 诊断经验的医师分别对 2 个序列图像子宫阴道轮廓清晰程度、盆腔血管清晰度、病灶的识别能力、运动伪影和条纹伪影 (针对 Star VIBE 序列)、诊断确信程度及整体图像质量进行打分，使用 Cohen Kappa 法来评估两名医师之间的评分一致性，并采用 Wilcoxon 配对符号秩和检验来比较采用常规 VIBE 和 Star VIBE 序列图像质量的差异。对肿瘤侵犯程度 MRI 的诊断与术后病理结果进行 McNemar Test 和 Kappa 检验对照分析。结果 Star VIBE 检查下盆腔脏器边缘锐利度、盆腔血管清晰度、病变清晰度、图像运动伪影、图像总体质量评分均高于常规 VIBE 检查，差异显著 ($P < 0.05$)。常规 VIBE 和 Star VIBE 序列对与肿瘤侵犯程度与病理结果无统计学差异 ($P > 0.05$)。但 Star VIBE 序列图像对于肿瘤侵犯阴道 (宫颈) 情况的准确率 (90.1%)、敏感性 (88.9%) 与特异性 (90.3%) 均高于常规 VIBE 序列图像，与病理结果的一致性更高 ($K = 0.734$, $P < 0.001$)。**结论** 自由呼吸 Star VIBE 序列盆腔 MRI 的图像质量优于屏气常规 VIBE 序列，诊断符合率明显高于常规 VIBE 序列，可以作为盆腔的 MRI 检查方法。

PU-0088

AD 患者 APT 与 MMSE 及 β 淀粉样蛋白的相关性研究

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目的：采用 APT 技术检测 AD 患者与正常老年人之间的脑内差异，探讨 APT 成像值及相位值与 MMSE 表及 β 淀粉样蛋白的相关性。**材料与方法：**本研究包括 36 例 AD 患者和 18 例正常对照者。AD 组：男 19 例，女 17 例。正常对照组：男 8 例，女 10 例。AD 患者纳入标准：均符合精神障碍诊断和统计手册 (第 4 版) 以及美国国立神经疾病语言障碍和卒中研究所制定的符合 AD 的诊断标准 (MMSE 评分在 8~20)；排除标准：(1) 严重内科疾病；(2) 神经及精神疾病病史；(3) 常规 T1WI、T2WI 序列扫描存在明显异常。正常对照组无明显认知功能障碍，所有受试者均进行了简易精神状态量表 (MMSE) 评估，受试者文化程度均处于小学水平。通过第三方机构获得 AD 患者血液中 β 淀粉样蛋白含量值。采用 Philips 3.0 T 磁共振成像系统和头部 8 通道线圈进行 MRI 横断位扫描。扫描序列：T1W FSE 序列、T2W FSE 序列、APT 成像扫描。APT 的图像分析采用 IDL 软件。在 APT 图上按选择相位图类似方法选择双侧海马、黑质、杏仁体作为 ROI 进行勾画，取平均值。各脑结构的 APT 信号强度通过 MTRasym 获得。采用 SPSS 23.0 统计学软件进行统计学分析。采用单样本 K-S 检验行正态性分析，数据均服从正态分布，正常对照者和 AD 患者各脑结构的

MTRasym (3.5 ppm)值、平均年龄、MMSE 评分均以 $x \pm s$ 表示;经方差同质性检验,数据均符合方差齐性。AD 组和对照组 MTRasym (3.5 ppm)值比较采用两独立样本 t 检验。对 AD 组各核团 MTRasym(3.5 ppm)值及血液 β 淀粉样蛋白含量与 MMSE 进行 Pearson 相关分析, $P < 0.05$ 为差异有统计学意义。结果:与正常对照组比较,AD 组的双侧海马(3.5 ppm)值明显增高:AD 组右侧海马的(3.5 ppm)增高 56%,左侧海马的(3.5 ppm)增高 57%。在 AD 组中,双侧海马的(3.5 ppm)值均与 MMSE 评分呈负相关,与血液中 β 淀粉样蛋白值呈正相关。结论:APT 与血液 β 淀粉样蛋白及 MMSE 评分明显相关,能无创探测 AD 患者脑内铁沉积及游离蛋白改变情况。

PU-0089

3.0T 磁共振 T2*定量分析评价痛风性关节炎临床应用价值

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目的:探究痛风性关节炎患者接受 3.0T 磁共振 T2*定量分析对于疾病诊断的临床价值。方法:选择 2021 年 6 月到 2022 年 6 月我院收治痛风性关节炎患者 46 例以及同期健康体检者 7 例作为案例进行研究分析。所有患者均接受 FLASH 多回波序列 T2mapping 扫描检查。常规扫描通过磁共振成像标准进行,测量膝关节承重面、非承重面软骨区域、髌骨软骨关节接触面和非接触面 T2 值,回顾分析对比不同小组患者的膝关节相关指标。结果:健康组膝关节软骨 T2 伪影图表现为厚度均匀,软骨关节面连续光滑,均匀蓝绿色的带状结构同时明确分层色阶逐渐过渡。对于轻度关节炎软骨伪影图表现为关节软骨内信号不均匀,在蓝绿色背景下斑点状绿色、红色信号表现,同时关节承重面和髌骨关节面表现明显。重度患者软骨表现明显变薄,同时软骨面存在局限性的缺损,软骨伪影图呈现出条状红色信号影响。健康组和不同分级关节炎患者的 T2*定量测定结果均有显著数据差异, $P < 0.05$ 。结论:痛风性关节炎采用 3.0T 磁共振 T2*定量分析的诊断效果显著,能够实现对软骨损伤、变性的客观性评价,可以实现对关节炎程度的客观性评价,值得推广。

PU-0090

基于多参数 MRI 的深度学习模型在 MSI-H 转移性直肠癌评估中的初步探索与分析

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目的

微卫星不稳定性(MSI)是免疫检查点抑制剂(ICPIs)应答的生物标志物。PD-1 抑制剂在 MSI-H 转移性直肠癌(mRC)中具有较高的疾病控制率和良好的无进展生存期(PFS)。本研究的目的是探讨基于多参数 MRI 的深度学习模型在 mRC 患者 MSI-H 评估中的价值。

材料与方法

本回顾性研究纳入了 166 例在我院使用 3.0T 扫描仪进行直肠磁共振成像的 mRC 患者。术后免疫组化(IHC)检测 MSI 状态。以 116 例(70%)患者为学习集,构建了基于 nnU-Net 预测 MSI 状态的深度学习(DL)模型。深度学习模型的诊断准确性以 50 例患者(30%)为测试集进行评估。为了评估诊断性能,在训练和测试数据集中分别使用受试者工作特征(ROC)曲线和曲线下面积(AUC)。

结果

共有 17 例 mRC 患者具有 MSI-H 状态。使用 DL 模型训练时, AUC 为 0.910 (95%CI: 0.823 ~ 0.963, 敏感度 84.4%, 特异度 92.9%), 测试集 AUC 为 0.768 (95%CI: 0.659 ~ 0.856, 敏感度 84.4%, 特异度 64.3%)。

结论

我们的数据表明, 基于多参数 MRI 的深度学习模型对 MSI-H mRC 具有良好的评估性能。我们提出的 DL 模型可以作为评价 MSI-H 状态的成像生物标志物, 并具有应用于临床治疗计划的潜力。

PU-0091

超声联合 4D MRI 在颈动脉斑块血流动力学研究中的应用价值

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利用超声联合四维 MRI 成像 (4D flow MRI) 评估单侧颈动脉中重度粥样硬化性狭窄血流动力学的可行性。为明确颈动脉血流动力学参数变化对颈动脉粥样硬化性狭窄的诊断及对于脑卒中的发展预测价值。..

PU-0092

Correlations between Apparent Diffusion Coefficient Values of WB-DWI and Clinical Parameters in Multiple Myeloma

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ABSTRACT:

PURPOSE: Whole-Body Diffusion Weighted Imaging (WB-DWI) is a method in evaluating bone marrow infiltration of Multiple myeloma (MM). Our aim was to elucidate the correlations between apparent diffusion coefficient (ADC) value and clinical parameters.

MATERIALS AND METHODS: This retrospective, single-institution study included 101 Chinese patients with MM who underwent WB-DWI from May 2017 to May 2019. ADC value of MM lesions and clinical parameters were quantified at the baseline visit and after 4-course induction chemotherapy. The Multiple linear regression and Logistic analysis was conducted to find the implicit, inherent relationships among these data.

RESULTS: Paired Wilcoxon test showed that ADC value at baseline visit (ADC0) were significantly lower than ADC value at 4-course induction chemotherapy follow-up (ADC4 c) ($p < 0.001$). RISS stage, Type of MM and $\beta 2$ -MG were predictors of clinically significant ADC value increase or decrease ($p < 0.05$). Multiple linear regression showed that ADC0 was negatively associated with $\beta 2$ -microglobulin ($\beta 2$ -MG) ($p < 0.001$) and IGH rearrangement ($p = 0.012$), while RISS Stage III ($p = 0.001$), type IgG λ ($p = 0.005$) and albumin were the parameters negatively associated with ADC4 c ($p = 0.010$).

CONCLUSIONS: The ADC value of WB-DWI may be associated with clinical parameters of MM including FISH result, which also may help to demonstrate prognosis of patients with MM.

PU-0093

磁共振脂肪定量技术对骨质疏松病人腰椎质子密度脂肪分数的定量研究

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目的：探讨磁共振脂肪定量技术对骨质疏松患者的腰椎椎体脂肪含量评估能力。骨质疏松患者口服人工虎骨胶囊（药物临床试验），口服药物前后，脂肪定量技术对腰椎椎体脂肪定量测量与口服药物前后临床效果的相关性研究。

研究方法：选取 2021 年 6 月~2023 年 1 月，天津医院骨内科门诊临床确诊为骨质疏松的 50 例患者，女性 50 例，年龄 55~75 岁，平均年龄 63.91 ± 7.38 岁。50 例患者均在 2021 年 6 月初期做磁共振脂肪定量检查，间隔 18 个月后再做。18 个月内，骨质疏松患者口服人工虎骨胶囊，药效机制改善肌肉骨骼疼痛症状，增加骨密度。使用联影 MR u780 3T 高场磁共振成像仪，床面一体全脊柱线圈进行检查。将 FACT 序列扫描自动得到的 FF 图像传至工作站，由两位观察者在 FF 图像上采用双盲法对腰椎椎体 FF 值（L1~L5）进行测量与分析。选取 L1~L5 椎体矢状面最大层面（即经过腰椎正中的图像），手动放置圆形感兴趣区（ROI）于椎体中心位置，ROI 大小约为 200mm^2 ，每个 ROI 要最大限度包括椎体松质骨，避开骨皮质、终板和椎间盘。每个椎体测量 3 次，求平均值。采用组内相关系数（ICC）检验两位观察者测量数据的一致性。采用单因素方差分析对腰椎各椎体 FF 值的差异进行方差齐性检验，使用配对样本 t 检验对比分析口服药前后测得的 FF 值。（ $P < 0.05$ 时为差异有意义）

结果：比较口服人工虎骨胶囊前后各腰椎椎体 L1、L2、L3、L4、L5 椎体及所有椎体均值间 FF 值分别是（ $51.2 \pm 11.1\%$ ， $55.3 \pm 9.11\%$ ， $54.0 \pm 12.8\%$ ， $59.2 \pm 10.8\%$ ， $64.1 \pm 8.6\%$ ， $56.7 \pm 8.5\%$ ），（ $49.9 \pm 8.7\%$ ， $50.1 \pm 11.0\%$ ， $51.7 \pm 10.3\%$ ， $53.9 \pm 11.5\%$ ， 59.6 ± 7.8 ， $51.7 \pm 8.5\%$ ）。两组数据符合正态分布， $t = -1.019$ ， -1.078 ， -1.002 ， -1.041 ， -0.017 ， -1.123 （ P 均 < 0.05 ）。人工虎骨胶囊周期性口服与磁共振脂肪定量技术测得 FF 值具有负相关性。

结论：磁共振脂肪定量技术在骨质疏松基础研究及临床应用方面都具有非常广阔的发展空间。

PU-0094

MR 在脑深部电刺激术治疗帕金森病中的应用价值

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目的：探讨 MR 在脑深部电刺激术（deep brain stimulation, DBS）治疗帕金森病（Parkinson's disease, PD）手术中评估的应用价值。材料与方法：收集在南京医科大学第一附属医院帕金森病专病门诊就诊的 PD 患者 21 例，PD 的诊断依据英国脑库临床诊断标准（Parkinson's UK Bank for idiopathic PD），所有病例行药物保守治疗无效，经临床评估后均符合 DBS 手术治疗指征。PD 患者在 DBS 术后行 1.5T 头颅磁共振扫描，扫描序列采用薄层轴位、矢状位和冠状位的 T2WI。由一位资深放射科医师和一位资深神经外科医师对患者的 DBS 术后影像进行评估，评价图像对丘脑底核、苍白球等脑深部核团以及术后电极显示的清晰程度、电极针道位置等。结论：1.5TMR 和扫描时间相对较短的 FSE-T2WI 扫描所得图像能够进行的诸如术中是否有出血等常规的影像学诊断，能够清晰显示 DBS 手术的靶点核团以及术后的电极位置，对 DBS 术后电极位置的评估以及手术方案的实施有较高的临床应用价值。

PU-0095

Brain Iron metabolism in the Hippocampus in Patients with Type 2 Diabetes Mellitus

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Background and purpose:

Emerging evidence suggests that cognitive abilities in the most general population decline slowly from about 40 years old, while diabetes mellitus (DM) accelerates the occurrence of dementia in the normal aging population. Some studies suggest that there is brain iron overload in neurodegenerative diseases. Also, DM is associated with iron metabolism. However, few studies have investigated the brain iron content in patients with DM. This study was performed to investigate iron deposition in the Hippocampus of DM patients using quantitative susceptibility mapping (QSM).

Materials and methods:

11 patients with DM (DM) and 15 aged matched patients without DM (CON) underwent 3T magnetic resonance imaging (MRI). QSM was obtained from gradient echo data and analyzed by drawing regions of interest around relevant anatomical structures. Measurement differences between DM and CON patients were assessed by t tests.

Results:

Compared with the CON, the DM showed significantly decreased susceptibility values in the left hippocampus (0.0026 ± 0.0024 v.s. -0.0006 ± 0.0044 , $p=0.024$). whereas, there is no statistically significant in right hippocampus of two groups (0.0002 ± 0.0046 v.s. -0.0030 ± 0.0038 , $p=0.79$). In CON group, brain iron accumulation is found in left hippocampus (0.0026 ± 0.0024 v.s. 0.0002 ± 0.0046 , $p=0.08$). There was no significant change of iron content in bilateral hippocampal in DM group.

Conclusions:

Our results provide a new relation between DM and iron metabolism in the hippocampus. This suggests that there may be region-specific alterations of iron metabolism in patients with DM. This study may provide theoretical basis for revealing the mechanism of DM accelerating dementia.

PU-0096

抗癫痫药物影响伴中央颞区棘波儿童良性癫痫患儿的认知及脑结构

陈译文
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目的：研究抗癫痫药物对伴中央颞区棘波儿童良性癫痫（BECTS）的认知及核磁共振上脑结构产生的影响。

方法：选取南京医科大学金陵医院(南京总医院)医学影像科的伴中央颞区棘波儿童良性癫痫患儿 23 例，该 23 例患儿均服用各类抗癫痫药物（包括单药和多药），入院时采集 BECTS 患儿一般资料（包括年龄、性别、首发年龄、病程）、临床表现、抗癫痫药物使用情况等。对患儿进行纵向随访（至少两次），比较患儿不同时间段的韦氏儿童智力量表（WISC-IV）、视听整合连续测试（IVA-CPT）结果及多模态核磁共振成像（Magnetic resonance imaging, MRI）结果（包括三维 T1 加权成像（3D-T1）、扩散张量成像（Diffusion tensor imaging, DTI）等）。

结果：患儿在服用抗癫痫药物一段时间后 WISC-IV 评分提高 ($P < 0.05$)，在视听整合连续测试 (IVA-CPT) 的听觉持续性、视觉持续性、听觉注意力、综合注意力指标的得分也得到显著提高。基于全脑体素的形态学分析 (Voxel-based morphometry, VBM)，患儿规律服用抗癫痫药物后，在中央前回、左侧额上回及右侧额中回的灰质体积减少。胼胝体膝部、体部、压部、双侧内囊后肢的 DTI 分析显示，患儿的白质各向异性分数 (Fractional anisotropy, FA) 值未有明显差异 ($P > 0.05$)。

结论：综合认知量表及核磁共振成像结果，抗癫痫药物能改善伴中央颞区棘波儿童良性癫痫患儿认知水平，并且重塑癫痫相关皮层区域的灰质结构。

PU-0097

左心房粘液瘤并发小脑转移 1 例

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心脏粘液瘤在心脏原发性良性肿瘤中最常见，多见于中老年女性，脑转移较为罕见，发生脑转移时，常以头痛、头晕、局灶性癫痫和偏瘫为主要表现。本例患者主要表现为头晕。心脏粘液瘤发生脑转移的机制尚待阐明，可归纳为血管外浸润，即心脏粘液瘤细胞对血管的侵袭性较强，当粘液瘤细胞通过血液进入颅内血管后，破坏动脉壁而在动脉内膜下增生，最终侵透整个血管层扩散到脑组织，随着肿瘤不断生长、破坏血管壁的同时并侵犯正常脑组织可产生占位效应，由于这个过程进展较为缓慢，经常有出血的特点，引起局部出血。本例患者术后病理除了显示出血外，还伴有机化及含铁血黄素沉着。一般在出血后较长时间出血灶周围才会出现机化及含铁血黄素沉着。本例患者在一年前就出现了神经系统症状，一年后神经系统症状加重，过程较长且病情不断进展，此时脑部坏死组织被新生肉芽组织取代而发生机化，血中的血红蛋白被吞噬、分解，留下大量的含铁血黄素。约有半数患者心脏粘液瘤切除术后发现颅内病灶，本例患者在心脏粘液瘤切除 1 年后发现颅内病灶。脑转移的影像学表现常有恶性肿瘤的征象，即颅内病灶常呈多灶性、出血性并周围伴血管源性水肿。T1WI 和 T2WI 上呈混杂信号，增强扫描后，肿瘤实性部分强化。本例患者 MR 图像符合心脏粘液瘤脑转移的征象，还可见由于占位效应引起的第四脑室受压变窄。鉴别诊断：①颅内海绵状血管瘤畸形；②自发脑出血；③高级别胶质瘤；④出血性脑转移瘤；⑤脑静脉血栓形成。总之，心脏粘液瘤脑转移罕见，当患者有心房粘液瘤病史伴发颅内病变时，应该考虑到是否发生转移。

PU-0098

多参数 MRI 结合临床指标预测 2018 FIGO IIIC1p 期宫颈癌预后的价值

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目的：探讨多参数 MRI 联合临床指标对 IIIC1p 期宫颈癌的预后的预测价值。

方法：收集自 2014 年 12 月至 2018 年 7 月收治的 71 例宫颈癌患者(2018 年 FIGO 分期为 IIIC1p)。所有患者均行根治性子宫切除术(radical hysterectomy, RH)+淋巴结清扫+辅助治疗。收集患者的术前临床指标及术后病理指标，测量并记录原发灶的表观弥散系数(apparent diffusion coefficient, ADC)值(ADCmean、ADCmin、ADCmax)和动态增强(dynamic contrast-enhanced, DCE) MRI 定量参数(Ktrans、Kep、Ve)。采用 Kaplan-Meier 分析比较无进展生存期(progression-free survival, PFS)，Cox 回归分析确定独立预测因素。

结果: 截至随访日期, 15 例患者发生进展 (局部复发 2 例, 远处转移 8 例, 死亡 5 例), 中位 PFS 为 42 个月(6~68 个月)。1 年、3 年 PFS 率分别为 94.4%、78.6%。其中淋巴结比率(lymph node ratio, LNR)和 ADCmin 是 IIIC1p 期宫颈癌患者 3 年 PFS 的独立影响因素, LNR>10%及 ADCmin<0.61×10⁻³mm²/s 与较差的 PFS 相关。

结论: 宫颈癌病灶的 ADC 最小值与 LNR 值是 IIIC1p 期宫颈癌 PFS 的独立影响因素, ADCmin<0.61×10⁻³mm²/s 及 LNR>10%的患者预后不良。

PU-0099

双流高压注射器进行低浓度对比剂 CE-MRA 在头颈动脉狭窄诊断中的应用

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目的 通过与 DSA 对照, 探讨使用双流高压注射器进行低浓度对比剂三维增强磁共振血管成像(3D CE-MRA)在诊断头颈动脉狭窄中的应用价值。方法 收集 50 例临床怀疑头颈动脉狭窄患者资料, 所有患者均接受双流高压注射器低浓度对比剂头颈部 3D CE-MRA 成像, 并于一周内接受 DSA 检查。两位影像科医师采用 5 分法对 3D CE-MRA 图像质量进行评分, 并以 DSA 为金标准, 对 3D CE-MRA 诊断头颈动脉血管狭窄程度进行评价。结果 低浓度对比剂头颈部 3D CE-MRA 图像质量较好 (均分 3.66±0.48)。3D CE-MRA 对头颈动脉轻度狭窄、中度狭窄、重度狭窄及闭塞诊断的敏感度为 94.4%、83.3%、91.7%、100%, 特异度为 100%、94.7%、94.7%、97.6%, 阳性预测值为 100%、90.9%、84.6%、88.9%, 阴性预测值为 97%、94.9%、97.3%、100%。结论 采用双流高压注射器进行低浓度对比剂头颈部 3D CE-MRA 成像能清晰地显示头颈动脉狭窄性病变, 具有广泛的临床应用价值。

PU-0100

乳腺癌核磁增强扫描的护理方法

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近年来, 乳腺癌为女性最常见的恶性肿瘤, 乳腺癌的发病率和死亡率逐年上升并且有年轻化趋势, 对女性的身心健康有着严重的威胁。对于乳腺癌的诊断、指导治疗及预后判断, 影像学检查和免疫组化指标起着越来越重要的作用。核磁共振检查因其无放射性损伤, 其影像学特征是具有高空间分辨率, 多方向, 多参数, 多序列扫描和高组织分辨率的成像特点, 使其广泛应用于乳腺癌的影像诊断的推广。随着乳腺癌患者增多及核磁共振检查水平的提高, 乳腺癌增强扫描的患者越来越多。

- 1、MRI 对乳腺癌的诊断优势
- 2、MRI 动态增强扫描患者的护理

PU-0101

遗忘型轻度认知障碍与帕金森病轻度认知障碍患者脑灌注异常的动脉自旋标记研究

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背景：轻度认知障碍（Mild cognitive impairment, MCI）为阿尔兹海默症和帕金森病（Parkinson's disease, PD）伴痴呆的前驱阶段。本研究通过使用动脉自旋标记（Arterial spin labeling, ASL），研究 MCI 亚型患者与健康对照（Healthy control, HC）受试者之间区域灌注属性的差异。

方法：使用 ASL 获取 44 名遗忘型 MCI（amnesic MCI, aMCI）患者、42 名 PD-MCI 患者和 50 名匹配的 HC 参与者的脑血流量（Cerebral blood flow, CBF）。通过数据分析归一化 CBF（normalized cerebral blood flow, z-CBF）和 CBF-连接的组间差异。使用 Spearman 相关分析分别研究组间显著差异脑区 z-CBF 值和临床功能量表之间的相关性分析。使用受试者工作特征分析以确定差异脑区 z-CBF 值的分类能力。提取疾病相关特异脑区的 z-CBF 值进行组间比较。

结果：MCI 亚组显示灌注损伤区域分布存在重叠，aMCI 组比 PD-MCI 组的异常分布更为广泛。与 aMCI 组相比，PD-MCI 患者双侧壳核、左侧中央前回、左侧扣带回中回和右侧额中回的 z-CBF 值减少。在 PD-MCI 组中发现了与执行表现和运动严重程度的相关性，在 aMCI 组中发现了与记忆表现的相关性。CBF-连接的左侧中央前回、左侧中扣带回的连接脑回和右额中回发生显著改变。所有显著差异脑区均具有良好的分类效能。

结论：通过 ASL 测量的归一化 CBF 揭示了 aMCI 和 PD-MCI 患者之间不同的灌注模式，且与其自身的特征性的神经损伤机制有关。本研究表明 z-CBF 可以为进一步 MCI 的机制研究提供较为敏感的灌注信息。

PU-0102

广西南宁地区近 10 年地中海贫血心脏、肝脏铁过载变化趋势及影响因素

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目的：地中海贫血（地贫）是由于珠蛋白肽链基因缺陷而导致的遗传性溶血性贫血，由于长期反复输血和肠道铁吸收增加导致铁过载，而人体排铁的生理功能有限，从而导致脏器发生铁过载，进一步引起组织细胞损伤和器官功能衰竭，最终引起死亡。广西是地贫的重灾区，本研究分析地贫患者心脏、肝脏铁过载的变化趋势及影响其变化的因素，为防治地中海贫血心脏、肝脏铁过载予以参考。

材料与方法：收集在广西医科大学第一附属医院就诊的地中海贫血患者病例资料。基于 MRI-T2* 统计分类心脏、肝脏铁过载，横断面（n=2153）及纵向研究（n=249），分别使用 Jionpoint 回归分析变化趋势及分段和 Logistics 回归分析影响心脏、肝脏铁过载变化的因素。结果：肝脏铁沉积仅在性别组间差异具有统计学意义（ $p=0.003<0.05$ ）。铁过载正常与轻度合并、中度与重度合并，分析心脏、肝脏铁过载的相关性，结果显示存在弱相关（ $p<0.05$ ）。各组 10 年平均年度变化百分比均无统计学意义（ $p>0.05$ ）。年度变化百分比：心肌未见铁沉积组 2013~2015 年为 19.59%，轻度肝脏铁沉积 2013~2015 年为 -25.93%、2015-2022 年为 1.18%，重度肝脏铁沉积 2013~2017 年为 20.23%（ $p<0.05$ ），其余均无统计学意义（ $p>0.05$ ）。纵向研究部分，对性别、年龄、是否为输血依赖型、是否进行骨髓移植、祛铁方案等进行二分类 logistic 单因素、多因素分析，结果显示 p 值均大于 0.05。结论：心脏铁过载与肝脏铁过载具有一定的相关性，但是相关性较弱。

Jionpoint 回归分析显示, 在 2013-2015/2017 年间的变化趋势具有统计学依据支持, 但是在 2015/2017 年后, 无明确统计学依据支持检查数的趋势的变化, 笔者推测 2015/2017 年后检查数的增加、治疗手段的进步、患者年龄的增长等混杂因素共同作用所致。在纵向调查中, 以往研究中直接或间接影响心脏、肝脏铁过载的因素, 在本研究中均无统计学意义, 笔者推测可能是由于回顾时间较长, 部分患者所提供的资料及医疗干预信息的缺失有关。

PU-0103

Association between intracranial aneurysm wall enhancement and intracranial atherosclerotic plaque: a study using high-resolution vessel wall imaging

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Objective: To investigate the association between characteristics of aneurysm wall and intracranial large arterial plaque using high-resolution vessel wall imaging (HR-VWI). **Methods:** A total of 109 patients with 128 saccular UIAs in the anterior circulation were enrolled. All patients underwent HR-VWI and three-dimensional time-of-flight magnetic resonance angiography (3D-TOF MRA). Patients and UIAs were divided into two groups according to with and without plaque in the M1 segment of the MCA. Clinical information and aneurysm characteristics were compared between the two groups. We graded the aneurysm wall enhancement (AWE) and M1 plaque from 0 to 2 according to enhancement on HR-VWI. Based on the grading, we analyzed the correlation between AWE and M1 plaques. **Results:** There were 56 patients with 65 UIAs in the group with M1 plaque and 53 patients with 63 UIAs in the group without plaque. There were significant differences between the two groups in both clinical information (age and hypertension) and aneurysm characteristics (AWE pattern and AWE degree). In the M1 lesion group, UIAs were more likely to show a higher grade of AWE pattern and AWE degree. Among the group with M1 plaque, the grade of M1 plaque was positively correlated with the grade of AWE pattern (correlation coefficient $R = 0.41$, $P = 0.001$) and the grade of AWE degree (correlation coefficient $R = 0.50$, $P < 0.001$). **Conclusions:** MCA atherosclerosis plaque was associated with the AWE of saccular aneurysms. When evaluating UIAs, attention should also be paid to the large arterial wall, which may be suggestive in assessing the stability of the aneurysm and for better clinical decision-making.

PU-0104

磁共振方法对肝细胞癌早期复发的术前预测能力：一项系统回顾和荟萃分析

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目的: 评价影像组学在预测肝细胞癌患者根治性肝切除后早期复发的准确性, 同时评价了在这种情况下影像组学是否具有比非影像组学更好的预测性能。

方法: 检索 PubMed(包括 MEDLINE)、EMBASE 数据库中从开始到 2023 年 4 月 7 日的合格研究, 仅纳入了具有明确规定的参考标准(组织病理学确认和/或临床/成像随访)的研究, 以确定利用非影像组学和影像组学方法评估肝细胞癌早期复发的研究。通过 Deeks 漏斗图评估发表偏倚。提取数据并对检索到的研究进行 Quips 质量评估。使用随机效应或固定效应模型计算合并的敏感性、特异

性、阳性似然比和阴性似然比,并得到森林图,同时生成总结受试者工作特性曲线和曲线下面积,以评估影像组学模型和非影像组学模型的诊断准确性。统计分析包括汇总数据、异质性检验和发表偏倚。进行荟萃回归和亚组分析,以探索异质性的潜在来源。

结果:该分析包括 4 项研究非影像组学研究和 6 项影像组学研究。对于非影像组学而言,受试者工作特征的联合灵敏度、特异性和曲线下面积分别为 0.75、0.78 和 0.83。合并的阳性似然比和阴性似然比分别为 3.45 和 0.32。未在此研究中发现显著的异质性 ($I^2=0$)。对于影像组学而言,受试者工作特征的联合灵敏度、特异性和曲线下面积分别为 0.84、0.80 和 0.89。合并的阳性似然比和阴性似然比分别为 4.28 和 0.20,在此研究中观察到显著的异质性 ($I^2=90\%$) 和可能的发表偏倚 ($P=0.04$)。亚组分析显示,样本量和肿瘤大小是异质性的来源之一。

结论:这项 meta 分析表明,基于术前 MRI 的模型可用于预测肝细胞癌的早期复发,影像组学较非影像组学模型表现出较高的诊断准确性及良好稳定性,但现有研究受到可能的发表偏倚的限制,对待此结果应谨慎。

PU-0105

关于 t1_vibe-grasp_fs_cor_dyn 序列在核磁增强中的价值讨论。

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目的:评估 t1_vibe-grasp_fs_cor_dyn 序列在核磁增强中对诊断垂体病变的应用价值。

方法:对 40 例垂体平扫加增强核磁检查的图像进行回顾性分析,观察垂体组织及病变。其中 20 例进行 t1_vibe-grasp_fs_cor_dyn 序列垂体核磁平扫加增强检查,其余 20 例进行垂体核磁平扫加普通增强检查,对比分析这两类检查的图像效果。

结果:40 例增强检查患者正常组织及病变均有强化,其中 t1_vibe-grasp_fs_cor_dyn 序列垂体核磁平扫加增强检查比普通平扫加增强能更好地显示病变并且为临床诊断提供了有价值的信息。

结论:t1_vibe-grasp_fs_cor_dyn 序列在核磁增强中对诊断垂体病变具有较高的应用价值。

PU-0106

腰椎脊索瘤误诊脊柱结核一例

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病例 男,56 岁,因腰痛 5 年,双下肢麻木、无力 5 个月,加重及二便困难 1 个月入院。查体:腰 2 椎体棘突压痛及叩击痛(+),无放射痛。双侧足底感觉减退,双下肢膝反射、跟腱反射减弱。

腰椎 MRI 显示:腰 2 椎体略变扁,椎体内可见片状长 T1 稍长 T2 异常信号,压脂像呈高信号,累及椎板、棘突,椎旁可见长 T1 长 T2 异常信号,并突向后方椎管内。腰椎 CT 显示:腰 2 椎体变扁,椎体密度增高,椎体骨质破坏,椎旁可见低密度影,与双侧腰大肌分界不清。

手术所见 棘突剪刀剪除 L2 棘突,咬骨钳咬除 L2 右侧椎板、咬除 L2 右侧椎弓根。见 L2 椎体破坏,内有死骨和少许灰白色粘液样肿瘤瘤体。清除 L2 椎体右半部,并向外探查椎旁肌肉内肿瘤组织,见肿瘤组织浸润于左侧椎旁肌。术后患者一般状态良好。

讨论 此患者在术前误诊为腰椎结核,分析原因如下:该患虽然无结核低热、盗汗等典型临床表现,但患者病史较长,实验室红细胞沉降率明显高于正常值,影像表现椎体骨质破坏,椎体周围异常密度明显低于软组织,误认为椎旁冷脓肿。认真分析患者可见患者病灶未累及椎间盘,而累及腰 2 椎体附件,椎旁低密度影与双侧腰大肌紧邻,但边缘比冷脓肿清晰。综上所述,我们应仔细观察影像学特点,给临床提供正确诊断,为患者手术方案制定提供指导。

PU-0107

水通道蛋白分子成像对亚急性脑梗死病灶转归的预测价值研究

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目的

探讨水通道蛋白分子成像 (AQP-MRI) 技术对亚急性脑梗死患者梗死灶转归的预测价值。

方法

本研究纳入亚急性脑梗死患者 11 人, 对照组 11 人, 实验组首次检查进行 MRI 常规序列及 AQP-ADC 序列检查, 并于发病 3 个月后复查 T2WI-FLAIR 序列。本研究还纳入 26 只成年雄性 SD 大鼠, 将其随机分为两组, 实验组和假手术组, 实验组经历 1h 短暂性大脑中动脉栓塞建立脑缺血模型。所有大鼠分别于再灌注后 1h、24h、3 周采用 Zea-Longa 评分标准对各组大鼠神经功能进行评分, 于再灌注后 24h 行 MR 扫描, 扫描序列同病人。3 周后进行 MRI 复查, 并行苏木素-伊红(H&E)染色、免疫荧光检测胶原纤维酸性蛋白(GFAP)及磷酸肌酸蛋白聚糖(phosphacan)表达情况。

结果

AQP-ADC 伪彩图较 ADC₁₀₀₀ 伪彩图更能显示病灶的异质性。无论在大面积或小面积梗死灶中, AQP-ADC 明显减低区域与软化灶相匹配, 但在部分小面积梗死灶中, 软化灶的形成范围与病灶周围 AQP-ADC 高信号带存在与否相关。在亚急性脑梗死患者与实验组大鼠中, 软化灶与胶质增生区之间的相对 AQP-ADC 值在存在统计学差异 ($p < 0.05$)。软化灶、胶质增生区的相对 T2 信号值与 AQP-ADC 所示明显减低区域、部分减低区的相对 AQP-ADC 值仅在亚急性脑梗死患者中具有明显相关性 ($p < 0.05$)。将实验组单只大鼠的 AQP-ADC 图像与其相应的免疫荧光、HE 染色结果对比显示, AQP-ADC 明显减低区域 HE 染色上细胞成分明显减少, 软化灶形成, 免疫荧光未见荧光显影; 在 AQP-ADC 上信号部分减低区域神经元排列紊乱, 变性细胞明显增多, 见较多胶质细胞增生, GFAP 和 phosphacan 表达明显升高。

结论

AQP-MRI 成像对亚急性脑梗死患者的软化灶及胶质增生区具有预测价值。

PU-0108

髋关节孟唇撕裂影像学再认识!

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背景: 临床检查髋关节孟唇撕裂以 MR 检查为主, 但是一些学者认为常规 MRI 诊断并没有太大的价值, 更多的学者比较认可 MR 髋关节造影技术。在诊断髋关节孟唇撕裂时常规 MR 具有一定的局限性, 具体如下: ①多使用大扫描野、双侧髋关节同时成像的模式, 导致空间分辨率比较低; ②正常臼唇的大小与形态有着很大的不同; ③当关节剂量比较少时, 在区分塌陷的款关节囊与臼唇有一定的难度; ④臼唇-软骨连接区是纤维软骨向透明软骨的移行区, 通过 MRI 可见略高信号, 在特别情况下想要和撕裂鉴别开具有一定的难度。MR 髋关节造影对关节腔进行穿刺, 然后注入对比剂, 有效的扩张了关节囊, 也可以观察到对比剂有没有进入到臼唇-软骨连接区, 弥补了常规 MR 检查的不足。

MR 髋关节造影技术操作简单, 诊断孟唇撕裂有着较高的敏感度与准确度, 但是 MR 髋关节造影技术为有创检查, 有着感染的风险, 因此有的患者并不能接受 MR 髋关节造影检查。有学者曾作出

研究,对比 3.0T 场强下单侧髋关节常规 MRI 及 MR 髋关节造影,这两种诊断方式诊断髋关节孟唇撕裂的诊断准确率均比较高,且没有差异。

目的:分析髋关节孟唇撕裂的 3.0T 髋关节磁共振造影与常规磁共振成像(MRI)诊断结果

方法:

方法:收集 2018 年 3 月至 2019 年 3 月在我院确诊为髋关节孟唇撕裂的 30 例患者,均予以常规 MRI 与磁共振髋关节造影检查,对比检查结果

结果:

结果:常规 MRI 检查诊断准确率为 100.0%,磁共振髋关节造影检查诊断准确率为 97%,组间据比较差异无统计学意义($P>0.05$)

结论:髋关节孟唇撕裂的 3.0T 髋关节磁共振造影与常规 MRI 诊断准确率均比较好,当患者不能接受磁共振髋关节造影有创检查时,可进行常规 MRI 检查,该检查技术更具有较高的空间分辨率。

PU-0109

基于多模态影像技术对肌骨肿瘤性质的定量评估分析

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目的:分析动态对比增强(DCE)-磁共振成像(MRI)定量参数联合弥散加权成像(DWI)对肌骨肿瘤性质的评估价值。

方法:选取 68 例肌骨肿瘤患者作为研究对象,所有患者均行 DCE-MRI、DWI 检查和病理学诊断,根据病理学诊断结果,将恶性病变患者纳入恶性组,将良性病变患者纳入良性组。询问并记录两组一般资料[性别、年龄、肿瘤直径、病变部位、合并症],比较两组一般资料及 DCE-MRI 定量参数[容量转移常数(K_{trans})、速率常数(K_{ep})、血管外细胞外间隙容积比(V_e)、血浆内对比剂容积分数(V_p)]和 DWI 参数[表观弥散系数(ADC)],检验 DCE-MRI 定量参数联合 DWI 对恶性肌骨肿瘤的评估价值。

结果:纳入的 68 例肌骨肿瘤患者,经病理学检测出恶性 42 例,占 61.76%;良性 26 例,占 38.24%;两组一般资料比较,差异无统计学意义($P>0.05$)。恶性组 K_{trans} 、 K_{ep} 、 V_e 值均大于良性组,ADC 值小于良性组($P<0.05$);两组 V_p 值相比,差异无统计学意义($P>0.05$)。绘制受试者工作特征曲线图(ROC)显示, K_{trans} 、 K_{ep} 、 V_e 、ADC 值单独及联合诊断恶性肌骨肿瘤的曲线下面积(AUC)分别为 0.784、0.784、0.806、0.796、0.864,均有一定评估价值。

结论:DCE-MRI 定量参数联合 DWI 评估肌骨肿瘤性质具有一定价值。

PU-0110

核磁 PWI 在小关节扫描中的应用价

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摘要:核磁造影(Perfusion-weighted imaging, PWI)是一种非侵入性的影像技术,可以评估组织的血流灌注情况。在小关节扫描中,核磁 PWI 技术的应用逐渐受到关注。本文旨在探讨核磁 PWI 在小关节扫描中的应用价值,通过实验研究和分析,评估其在小关节疾病诊断和治疗中的潜在作用。

实验过程:

患者选择与数据收集：选择一组小关节疾病患者和一组健康对照者。收集患者的临床资料和病史，并进行核磁 PWI 扫描。

核磁 PWI 扫描：使用核磁共振设备对患者进行小关节扫描，获取 PWI 图像数据。

数据分析：利用专业的图像处理软件对 PWI 图像进行分析，计算关节区域的血流灌注参数，如平均灌注值 (mean transit time, MTT)、灌注容积 (cerebral blood volume, CBV) 和灌注峰值 (time to peak, TTP)。

结果比对与统计分析：将患者组和对照组的 PWI 参数进行比对，并进行统计学分析，评估小关节疾病与正常关节之间的差异。

实验结论：通过核磁 PWI 技术在小关节扫描中的应用，我们得出以下结论：

核磁 PWI 可以提供小关节血流灌注的定量信息，有助于评估关节组织的血液供应情况。

核磁 PWI 可以帮助鉴别小关节疾病的程度和类型，如关节炎、滑膜炎等。

核磁 PWI 在小关节疾病的早期诊断和治疗过程中具有潜在的临床应用价值。

核磁 PWI 可以监测小关节疾病的治疗效果，评估治疗方案的有效性。

综上所述，核磁 PWI 在小关节扫描中具有广泛的应用价值，可以为小关节疾病的诊断、治疗和随访提供重要的辅助信息。然而，还需要进一步的研究和临床验证来完善该技术在临床实践中的应用。

PU-0111

Association of peripheral inflammation with disrupted brain functional network topology in bipolar disorder

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Background: Increasing evidences show that inflammation might be involved in bipolar disorder (BD), but the association between abnormal brain function and inflammation in BD patients is still unclear. In this study, we tried to explore the disrupted brain functional network topology, peripheral cytokines and their correlations to demonstrate the role of inflammation in brain functional network topology in BD.

Methods: In this study, 53 BD patients and 47 healthy controls (HCs) underwent resting-state magnetic resonance imaging scans. Graph theory analysis was performed to investigate the topological properties of whole-brain functional connectome at both global and nodal levels. Serum levels of interleukin-4 (IL-4), interleukin-6 (IL-6), interleukin-8 (IL-8), interleukin-10 (IL-10), and tumor necrosis factor- α (TNF- α) were measured in all participants. Correlations between topological properties, clinical variables and cytokines levels in BD were calculated. Furthermore, mediation analysis was employed to determine whether inflammatory cytokines affect depressive symptoms by affecting brain network properties.

Results: Patients with BD showed significantly greater normalized characteristic path length, and marginally greater characteristic path length (Lp) and lower global efficiency (Eglo). Furthermore, the BD group showed lower nodal degree centrality (Degi) in the bilateral lingual gyrus, and lower nodal efficiency (Enodal) in the bilateral lingual gyrus, right postcentral gyrus, right superior frontal gyrus (SFG), and the left middle temporal pole (MTP). Besides, IL-4, IL-6, IL-8, IL-10 levels were higher in BD than HCs. Correlation analyses revealed that elevated levels of IL-10 were correlated with the greater Lp and lower Eglo, and elevated levels of IL-8 was correlated with the greater . Furthermore, the Enodal in the left MTP was negatively correlated with IL-4 and IL-8 levels in BD. Moreover, the Enodal of the left MTP mediated the effect of IL-4 levels on the 24-item HDRS scores.

Conclusions: Our study provided preliminary evidence of the association between disrupted brain functional network topology and neuroinflammation in BD. The current study demonstrated

disrupted topological organization in the whole brain and regional connectivity was associated with inflammatory cytokines of the IL-4, IL-8 and IL-10 levels in BD. Moreover, our results indicated that higher IL-4 levels and impaired regional connectivity in the temporal pole may be associated with the severer depressive symptoms in BD.

PU-0112

One-stop-shop evaluation of Liver disease with GD-EOB-DTPA enhanced MR

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Objectives:To do One-stop-shop evaluation of liver disease with GD-EOB-DTPA enhanced MR.

Methods:This retrospective study was obtained 783patients. These patients had high risk factors of hepatocellular carcinoma (HCC), They contained 546males,age from 25to 85 years old. They all underwent GD-EOB-DTPA enhanced MR and IDEAL-IQ scan.We drew interested area at each segment in the liver to evaluate lipid and iron deposition with fat-fraction and R2* images.We evaluate whether the lesion contains fat or lipid with In-phase and out-of-phase images.For suspected malignant or unsure intrahepatic lesions, we evaluated vein and bile duct in liver with Gd-EOB-DTPA-enhanced MRI before surgery. we spotted lesions, at hepatobiliary phase, that were not found by common enhancement scan.

Results:We can evaluate lipid and iron deposition with fat-fraction and R2* images.We can evaluate whether the lesion contains fat or lipid with In-phase and out-of-phase images.We can evaluated vein and bile duct in liver with Gd-EOB-DTPA-enhanced MRI before surgery.For 56 patients, we spotted lesions, at hepatobiliary phase, that were not found by common enhancement scan, which changed our treatment accordingly.Among them,the smallest lesion is smaller than 1cm.

241 patients have no lesions, we assessed lipid and iron depositions

33 patients had different degrees of lipid deposition and 5 patients had different degrees of iron deposition in the liver.

Conclusions:Gd-EOB-DTPA-enhanced MRI and IDEAL-IQ scan can do one stop-shop evaluation of conditions both of liver and lesion.

PU-0113

基于 CTE 影像组学在克罗恩病炎性肠段活动性预测效能的研究价值

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目的： 本文旨在探讨基于 CTE（计算机断层扫描增强）影像组学在克罗恩病所致炎性肠段活动性预测中的研究价值。通过综合分析 CTE 影像组学技术在克罗恩病诊断和治疗过程中的应用，我们探讨其在炎性肠段活动性预测方面的潜在效能，以及为克罗恩病患者提供更准确、早期干预的新途径。引言： 克罗恩病是一种复杂的慢性炎性肠道疾病，其临床表现多样，诊断和治疗存在一定的挑战。CTE 影像组学作为一种先进的医学影像分析技术，可以从大规模的 CTE 图像中提取丰富的特征信息，为医生提供更全面的诊断依据。方法： 本研究将收集克罗恩病患者的 CTE 影像数据，应用影像组学技术提取多维度的影像特征，如肠壁增厚程度、病变分布、血管分布等。同时，将结合临床指标，如病情活动指数、临床症状等，建立预测模型，评估 CTE 影像组学在预测克罗恩病炎性肠段活动性方面的效能。结果： 预计 CTE 影像组学技术在预测克罗恩病所致炎性肠段活动性

方面将具有重要价值。通过多维度特征的综合分析, 预测模型可能能够准确预测患者的肠段活动性, 为临床医生提供及早干预的机会。此外, CTE 影像组学还可能揭示不同炎性程度之间的影像特征差异, 有助于深入理解炎性肠段的病理生理过程。结论: 基于 CTE 影像组学在克罗恩病所致炎性肠段活动性预测方面的研究具有重要的临床应用前景。该技术有望提高克罗恩病的早期诊断和治疗效果评估水平, 为临床决策提供更全面的影像信息支持。然而, 为了更好地发挥其潜力, 需要进一步的大样本研究和临床验证, 同时结合其他临床指标进行综合分析, 以确保预测模型的可靠性和准确性。

PU-0114

Multiparametric magnetic resonance imaging-based assessment of the effect of adenomyosis on determining the depth of myometrial invasion in endometrial cancer

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Purpose: To evaluate the accuracy of multiparametric MRI (mpMRI) in diagnosing deep myometrial invasion (DMI) in endometrial cancer (EC) with adenomyosis compared with EC without adenomyosis and to evaluate the effect of different adenomyosis subtypes on MI depth in EC.

Methods: Patients with histologically confirmed International Federation of Gynecology and Obstetrics stage I EC who underwent preoperative MRI were included in this two-center retrospective study. The case group included EC coexisting adenomyosis, and the control group included EC without adenomyosis, matched 1:2 according to age \pm 5 years and tumor grade. A senior radiologist assessed the MRI adenomyosis classification in the case group. Two radiologists (R1/R2) then independently interpreted all images and assessed MI depth. Accuracy, sensitivity, specificity, and the areas under the receiver operating curve (AUC) were calculated. The chi-square test was used to compare the accuracy of diagnosing DMI. Interobserver agreement was evaluated using the Fleiss κ statistics.

Results: A total of 70 cases in the case group and 140 cases in the control group were included. The accuracy, sensitivity, and specificity of consensus were 94.3% vs. 92.1%, 60.0% vs. 86.7%, and 96.9% vs. 93.6% (case vs. control groups, respectively). There was no significant difference in the diagnostic accuracy of DMI between the groups (R1/R2): PT2WI=0.136/0.167, PDWI=0.503/0.329, PT1CE=0.896/0.184, PmpMRI=0.506/0.371. The AUC for T2WI, DWI, T1CE, and mpMRI (R1/R2), respectively, were 0.59/0.78, 0.63/0.77, 0.69/0.79, and 0.91/0.89 (case group) and 0.83/0.85, 0.83/0.86, 0.88/0.86, and 0.91/0.87 (control group). Interobserver agreement was highest with mpMRI (κ =0.387/0.695 (case/control)). The consensus results of MRI categorization of adenomyosis revealed no significant difference in the accuracy of diagnosing DMI by adenomyosis subtype.

Conclusion: The presence of adenomyosis or adenomyosis subtype had no significant effect on the interpretation of the depth of myometrial invasion.

PU-0115

未经治疗的中重度阻塞性睡眠呼吸暂停患者海马亚区动态功能连接异常

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目的: 探讨阻塞性睡眠呼吸暂停(OSA)患者海马前、后亚区与其他脑区动态功能连接(dFC)的动态变化特征及其与认知功能的关系, 并探讨这些特征是否可用于区分 OSA 患者与健康对照组(HCs)。

方法: 纳入 85 例新诊断的中重度 OSA 患者和 85 名 HCs。所有受试者均接受静息态功能磁共振成像(fMRI)检查。采用两样本 t 检验比较 OSA 患者和 HCs 海马各亚区与其他脑区的 dFC 值的差异。采用相关分析评估 OSA 患者 dFC 与临床资料及认知功能之间的关系。使用支持向量机, 以差异脑区的 dFC 值作为分类特征区分两组。

结果: 与 HCs 相比, OSA 患者左侧海马前部与右侧小脑前叶、右侧海马前部与左侧舌回间、左侧海马后部与左侧中央前回间的 dFC 值显著降低, 左侧海马后部与楔前叶间的 dFC 值显著升高。OSA 患者左侧海马后部与楔前叶的 dFC 值与睡眠相关指标及蒙特利尔认知评估量表评分相关。支持向量机分析结果显示, 不同脑区的 dFC 值可以区分 OSA 患者和 HCs。

结论: OSA 患者海马各亚区与小脑、默认网络、感觉运动网络和视觉功能网络之间的 dFC 模式发生改变, 可能与认知功能下降有关。此外, 差异脑区的 dFC 值可以有效区分 OSA 患者和 HCs。这些发现为认识 OSA 患者的神经认知机制提供了新的视角。

PU-0116

基于 HR 3D mDixon-quant 的脂肪分数图与 R2*图的影像组学特征对棕色脂肪组织的识别价值

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目的: 本研究旨在使用高分辨率(high-resolution, HR) mDixon-quant 评估棕色脂肪组织(brown adipose tissue, BAT)和白色脂肪组织(white adipose tissue, WAT)的影像组学特征的差异。

材料与方法: 共招募 35 名健康志愿者。所有志愿者均在 3.0T MRI (Ingenia CX, 飞利浦)上使用 HR 3D mDixon-quant 序列进行扫描, 该序列可以自动在线重建 R2*图和脂肪分数图像。HR 3D mDixon-quant 扫描参数: FOV=576mm×576mm×75mm, TR=4ms, 层厚/层间距=2.0/-1.0mm, 回波=6。使用联影医疗研发的 uAI Research Portal 软件在 HR mDixon-quant 脂肪分数图上将 ROI 分别放置在预期的 BAT 和 WAT 测量值的锁骨上和皮下区域, 并复制于 R2*图。锁骨上脂肪组织的 ROI 放置在没有覆盖骨和皮下脂肪的锁骨上区域, 皮下脂肪组织的 ROI 放置在背部脂肪组织分布最厚的区域。使用 uAI Research Portal 软件进行影像组学分析。通过最小冗余-最大相关性(mRMR)和最小绝对收缩和选择算子(LASSO)算法对提取的特征进行降维处理。使用随机森林模型(Random forest, RF)构建影像组学模型。

结果: 最终本研究纳入 10 个影像组学特征并用于构建模型。RF 模型显示, 训练集和测试集的 AUC 分别为 0.939 和 0.846。在测试集中, 灵敏度、特异性、准确度分别为 0.810、0.667 和 0.738。

结论: 基于 HR 3D mDixon-quant 的脂肪分数图与 R2*图的 BAT 和 WAT 的影像组学特征存在差异。该模型提高了 WAT 和 BAT 的检测的特异性。可以为未来 WAT 和 BAT 与代谢性疾病和肥胖疾病研究提供更可靠的方法。

PU-0117

探究适用于隐匿性脊髓栓系综合征的 MRI 扫描体位

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目的:

脊髓栓系综合征(tethered cord syndrome, TCS)按病因可分为五种类型: 脊髓脊膜膨出、脂肪瘤型、终丝型、脊髓纵裂畸形、潜毛窦型。近年来有研究发现某些终丝型脊髓栓系综合征患者圆锥位置可以不降低, 故 Khoury 等提出了隐匿性脊髓栓系综合征(occult tethered cord syndrome, OTCS)的概念。OTCS 是终丝型脊髓栓系综合征的一种特殊类型, 与 TCS 症状相似, 主要表现为大、小便功能障碍, 双下肢感觉、运动功能异常。OTCS 患者终丝可不发生脂肪变性, 传统检查手段难以确诊。有学者对诊断考虑为 OTCS 的患者进行俯卧位 MRI 检查发现, 相较于正常儿童, OTCS 患者的终丝由于张力升高而向背侧贴近。

方法:

采用我院 3.0T 联影 uMR770 磁共振成像仪, 对 OTCS 患者分别行仰卧位与俯卧位的腰骶椎磁共振扫描。使用呼吸门控, 在呼气末采集信号, 以避免患者呼吸运动伪影; T2 加权像采用快速自旋回波的衍生序列三维可变翻转角快速自旋回波序列, 即 T2_MX3D 序列, 并使用长 TE 参数, 用以凸显纤细的马尾及终丝; T1 加权像采用三维快速扰相梯度回波序列并采用水脂分离技术, 即 T1_quick3D_wfi 序列, 一次扫描重建出脂肪像、水像、同相位图像和反相位图像用以区分有无马尾终丝脂肪化。

结果:

仰卧位影像表现: 腰骶椎椎管内硬膜囊未见明显异常, 脊髓、马尾及终丝粗细均匀, 形态、结构及信号强度未见明显异常。俯卧位影像表现: 脊髓圆锥尖位于腰 1 椎体下缘水平, 腰椎椎管内一条纤细终丝沿椎管后缘走行至骶椎; 未见马尾及终丝增粗; 椎管内未见明显异常信号。经过对照同一天患者仰卧位与俯卧位腰骶椎磁共振图像, 发现相较于正常患者, 在俯卧位 MRI 检查时, OTCS 患者的终丝更靠近背侧, 而其他马尾神经根更靠近腹侧; 有部分患者的终丝及马尾神经出现典型"日出"现象(即终丝、马尾分离现象); 同时终丝贴向硬脊膜囊的节段更靠上。

结论: 俯卧位腰椎 MRI 终丝与马尾神经分离现象及终丝贴壁位置可作为 OTCS 的辅助诊断依据, 优于仰卧位腰椎 MRI 扫描。

PU-0118

Qualitative and Quantitative Performance of Magnetic Resonance Image Compilation (MAGIC) Method: An Exploratory Analysis for Temporomandibular joint Region

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The present exploratory study investigates the performance of a new, rapid, synthetic MRI method for diagnostic image quality assessment in temporomandibular joint and related muscles. The multi-dynamic multi-echo (MDME) sequence was used for data acquisition, followed by synthetic image reconstruction on a 3T MRI scanner for 10 patients. The vendor termed the combined package Magnetic Resonance Imaging Compilation (MAGIC). In total, 20 regions of interest (ROIs) were analyzed, drawn on disc, muscles and joint in the TMJ region. Mean T1 and T2 values obtained from three groups were measured, respectively. A total of 672 images from both synthetic MRI and conventional clinical imaging were assessed by the radiologists to provide the rating for T1w and T2w image contrasts. The synthetically generated qualitative T2w images

were acceptable and comparable to conventional diagnostic images (89% acceptability rating for both).The benefit of MAGIC in TMJ imaging is twofold, providing radiometry maps in a clinically feasible time and the ability to generate a different combination of contrast images in a single acquisition.

PU-0119

一种全自动的脑部 MR 图像分割算法

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目的 噪声和灰度不均使得脑部 MR 图像的全自动分割更具挑战性, 本文提出一种改进的模糊 C 均值聚类算法, 并将其

应用于脑部 MR 图像分割。**方法** 首先, 采用同质滤波器和对比度扩展作为图像预处理, 去除图像的奇异区域; 然后, 采用直方图峰值点检测算法求得阈值点, 避免初始聚类中心选取的盲目性; 接着, 采用模糊 C 均值聚类算法进行图像分割; 最后, 采用基于模糊关联隶属度算法进行图像后处理, 达到平滑模糊边界和去除噪声的效果, 得到最终分割图像。**结果** 选用噪声程度 0~9%和灰度不均匀度 0 和 40%的脑部 MR 图像进行仿真实验。视觉分析表明基于本文算法的分割图像边缘清晰, 图像质量优于没有预处理或后处理所得; 定量评估结果显示基于本文分割算法获得的敏感性、特异性和相似性均高于改进的模糊 C 均值算法和现存的 FSL 图像分割软件。**结论** 本文提出的算法收敛更快, 能实现全自动分割脑部 MR 图像, 在噪声和灰度不均的情况下均表现出强健性、优越性和普适性, 是一种可行的图像分割算法。

PU-0120

DWI 梗死体积与 FLAIR 血管高信号-DWI 不匹配及预后的相关性研究

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目的 探讨 DWI 梗死体积与 FVH-DWI 不匹配、预后间的相关性。**方法** 前瞻性纳入 2017 年 1 月-2018 年 12 月收住入院并接受血管再通治疗患者 38 例。均于治疗前及治疗后 24 h 内接受 MRI 检查。收集所有患者的 FVH-DWI 不匹配、DWI 体积(V DWI)、3 个月功能预后(mRS 评分)及一般临床资料等。统计学方法分析 DWI 梗死体积与 FVH-DWI 不匹配、卒中预后之间的相关性,应用多元逻辑回归分析预测卒中预后的独立预测因子。**结果** 与无 FVH-DWI 不匹配组(n =15)相比,FVH-DWI 不匹配组(n =23)治疗前 V DWI (15.13 ± 22.96 vs 56.88 ± 50.99 ; $P = 0.008$)较小、治疗后 V DWI (32.15 ± 39.38 vs 101.40 ± 86.39 ; $P = 0.009$)较小、V DWI-G 较小(17.01 ± 23.36 vs 44.52 ± 41.69 ; $P = 0.031$)。Spearman 相关分析显示治疗前 V DWI ($r = 0.540$; $P = 0.000$)、治疗后 V DWI ($r = 0.579$; $P = 0.000$)、V DWI-G ($r = 0.489$; $P = 0.002$)与 FVH-DWI 不匹配呈正相关。治疗前 V DWI ($r = 0.414$; $P = 0.010$)、治疗后 V DWI ($r = 0.486$; $P = 0.002$)、V DWI-G ($r = 0.467$; $P = 0.003$)、FVH-DWI 不匹配($r = 0.327$; $P = 0.045$)均与 3 个月 mRS 间呈正相关。逻辑回归分析显示治疗后 V DWI 为预测卒中预后的独立预测因子(OR 95% CI):1.031(1.006 ~1.057);($P = 0.017$)。**结论** 综合评估 DWI 梗死体积、FVH-DWI 不匹配,尤其是治疗后 DWI 梗死体积可以有效的判断卒中的功能预后、指导治疗。

PU-0121

4D flow 在颈动脉粥样硬化狭窄应用

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目的 利用四维 MRI 成像 (4D flow MRI) 对单侧颈动脉中重度粥样硬化性狭窄血管进行血流动力学研究, 探讨影响颈内动脉粥样硬化性狭窄相关危险因素。

材料与方法 收集经吉林大学第一医院收治的经超声诊断为单侧颈动脉粥样硬化中重度狭窄患者 (n=20) 和同期年龄及血管条件相匹配的正常志愿者 (n=26) 的临床资料, 研究组和健康对照组均分别行 TOF-MRA、4D flow MRI、常规 T1WI、T2WI、FLAIR 及 DWI 检查, 分别将研究组和对照组原始 Flow 影像数据导入 CVI42.0 软件中处理, 并获得血流量、血流速度、壁面剪切力 (WSS)、最大压力梯度、能量损失等血流动力学参数, 分析狭窄处血流动力变化情况, 评估研究组和对照组的血流动力学参数差异, 并对急性期脑梗死及非急性期脑梗死进行分析, 探讨狭窄处血流动力学变化对卒中发生的影响。

结果 研究组的平均血流、最大血流、总容量及平均相对压差明显低于对照组 ($P<0.05$), 而最大能量损失、平均能量损失高于对照组 ($P<0.05$); 重度狭窄血管平均血流低于中度狭窄; 各狭窄血管狭窄上游、中心及下游的血流动力学比较结果显示, 平均血流、平均速度、最小速度、最大血流、总容量、平均轴向壁剪切力 (WSS) 存在显著差异 ($P<0.05$)。狭窄下游急性期脑梗死组最大压力梯度小于非急性期脑梗死组 ($P<0.05$)。

结论 1、4D 血流 MRI 可实现对颈动脉粥样硬化血流动力学的可视化及量化, 对颈动脉粥样硬化的诊断及治疗可能具有积极意义。2、颈动脉狭窄后血流量减少, 随着狭窄程度的增加而减少; 狭窄两端的能量损失较大, 对于显示颈动脉狭窄有一定帮助。3、低 WSS 对脑卒中的发生有一定影响, 颈动脉狭窄下游最大压力梯度可能作为预测脑卒中的潜在生物学标志物。

PU-0122

药物洗脱心脏支架在磁共振检查中的适应性研究

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摘要

目的: 通过研究体内植入药物洗脱心脏支架患者在磁共振检查中的舒适度, 评估药物洗脱支架在磁共振检查中的适应性。

材料与方法: 选择 2023 年 1 月—2023 年 5 月在我院行磁共振检查的患者为研究对象, 随机选取体内植入药物洗脱支架的患者 50 例为观察组, 体内无任何植入物的患者 50 例为对照组, 采用 Kolcaba 舒适状况量表, 以问卷调查的方式在两组患者检查完毕后进行舒适度及各维度评价。

结果: 观察组舒适度总分为 80.98 ± 4.138 分, 对照组舒适度总分为 82.32 ± 3.966 分, 两组差异无统计学意义 ($t=-1.653$, $P>0.05$); 两组在生理维度、精神维度及社会文化及环境维度的舒适度得分无统计学差异 ($P>0.05$); 在心理维度方面, 观察组得分为 26.6 ± 2.0702 分, 对照组得分为 27.5 ± 2.4419 分, 差异有统计学意义 ($t=-2.165$, $P<0.05$)。

结论: 药物洗脱支架在磁共振检查中无任何不良反应, 患者适应性良好; 体内置入药物洗脱支架的患者在心理层面上舒适度低于对照组, 需要放射科工作者给予更充分的心理支持。

PU-0123

动态网络的时间和拓扑特性反映视神经脊髓炎谱系障碍患者的残疾

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目的: 视神经脊髓炎谱系疾病 (NMOSD) 的每次炎症发作都会导致残疾增加, 并且伴随着功能网络的改变。然而, 目前尚不清楚功能网络如何与 NMOSD 患者的临床残疾状态相关。因此, 本研究旨在探索 NMOSD 患者功能网络的静态强度、时变和拓扑特性的改变, 以及与残疾的关联。

方法: 本研究一共招募了 30 名 NMOSD 患者 (37.70 ± 11.99 岁) 和 45 名健康对照者 (HC, 41.84 ± 11.23 岁)。所有患者都接受了功能 MRI 和残疾评估。使用独立成分分析, 我们构建了静息状态功能网络 (RSNs), 使用方差分析评估 NMOSD 和 HC 之间的 RSNs 的强度、时间和拓扑特性的组间差异, 通过斯皮尔曼相关评估 RSNs 参数与残疾的关系。

结果: 与 HC 相比, NMOSD 患者在动态网络而非静态网络中表现出显著变化。时变特征包括 3 种状态, 状态 1 (State 1) 的特点是网络内和网络之间的低连接。与 HC 相比, NMOSD 患者在 State 1 中表现出更高的分数时间 ($P < 0.001$) 和更多的停留时间 ($P < 0.001$) 以及较少的转换次数 ($P = 0.028$)。相关性分析表明 NMOSD 患者 State 1 的更高的分数时间 ($r = 0.421$, $P = 0.029$)、更多的停留时间 ($r = 0.461$, $P = 0.031$) 和较少的转换次数 ($r = -0.383$, $P = 0.049$) 与更高的残疾相关。ROC 曲线分析表明 State 1 的分数时间和停留时间可以显著区分 NMOSD 和 HC (曲线下面积: $0.991-0.996$)。此外, NMOSD 患者还出现动态网络的中枢节点的度中心性和聚类系数降低 ($P < 0.05$, FDR 校正), 并且楔前叶 ($r = -0.387$, $P = 0.046$) 和丘脑 ($r = 0.406$, $P = 0.036$) 的聚集系数降低与残疾相关。

结论: NMOSD 患者表现在低连接状态 (State 1) 表现出更高的分数时间、更多的停留时间和较少的转换次数, 与更高的残疾相关。

PU-0124

CEST 评估肾脏缺血再灌注损伤氧化还原状态的可行性研究

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目的: 探讨 CEST 成像检测肾脏 IRI 氧化还原状态的可行性。

方法: 选取雌性新西兰大白兔 56 只, 随机分为对照组和缺血再灌注损伤 (IRI 术后 1h、12h、24h、72h、7d 和 14d) 组, 每组 8 只。对照组在假手术后行 MRI 检查, IRI 组夹闭兔左侧肾蒂 45 min 后再灌注建立 IRI 模型, 并在建模后不同时间点行 MRI 检查。扫描序列包括冠状位 SSFSE T2WI, 轴位 SSFSE T2WI, CEST。各组扫描完成后测取每组实验兔皮质及外髓 MTRasym 值, 取血检测血清肌酐、尿素氮含量, 取左肾组织行 HE 染色、PAS 染色、ROS 荧光染色、行生化/Elisa 检测相关氧化指标 (8-OHdG、MDA、XOD) 及抗氧化指标 (T-SOD、SOD-1、SOD-2、GPx) 的含量或活力。采用最小显著差法或 Kruskal-Wallis 检验比较不同组别之间 MTRasym 值、血液学指标、肾脏损伤程度病理评分、肾脏 ROS 荧光强度、肾脏组织氧化指标及抗氧化指标的差异。采用 Spearman 相关系数比较 MTRasym 值与氧化应激指标的相关性。

结果: IRI-1h、24h 组血尿素氮浓度较对照组升高 ($P < 0.05$)。IRI-24h 组较对照组肾小管损伤加重 ($P < 0.05$)。ROS 荧光染色结果显示 IRI-12h 组皮质、外髓平均 IOD 值比对照组高 ($P < 0.05$)。CEST 显示 CEST 效应最明显处即 MTRasym 值最大值波动范围在 1.00-4.00ppm, 且在 1.00、2.00、3.00、3.50ppm 处 IRI-1h 组皮质、外髓 MTRasym 值明显低于对照组 ($P < 0.05$)。与对照组相比, IRI 组氧化指标 8-OHdG、MDA、XOD 含量增高, 抗氧化指标 T-SOD、SOD-1、

SOD-2、GPx 含量或活力减低。皮质及外髓在 1.00-4.00ppm 处 MTR_{asym} 值与氧化指标 8-OhdG、MDA、XOD 含量呈中度负相关 ($P<0.05$), 与抗氧化指标 SOD-2 活力呈中度正相关 ($P<0.05$)。

结论: CEST 可以反映 IRI 后氧化还原状态的动态变化, 间接反映 IRI 后氧化应激水平。

PU-0125

针刺治疗对原发性痛经患者脑结构协变网络变化的影响

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目的 观察针刺治疗原发性痛经 (PDM) 患者脑结构协变网络变化特点及其与临床量表的相关性。

方法 前瞻性采集 50 例 PDM 患者 (PDM 组) 及 47 名健康对照者 (HC 组) 的高清分辨率 T1 结构像数据, 记录痛经相关临床量表评分; 之后对 PDM 组行针刺治疗, 在治疗后第二次采集高清分辨率 T1 结构像及临床量表评分, 比较 PDM 组与 HC 组的灰质体积 (GMV) 差异, 以差异脑区作为感兴趣区基于全脑水平构建结构协变网络 (SCN), 分析结构协变与临床量表的相关性。结果 与 HC 组相比, PDM 组在右侧中央前回、左侧楔前叶、右侧颞中叶皮质、左侧基底外侧杏仁核 GMV 增加 ($P<0.05$)。针刺 PDM 组后以感兴趣区构建 SCN, 右侧中央前回 SCN 中双侧中央后回、左侧中央前回、右侧角回、右侧枕中回、右侧楔前叶、双侧舌回 GMV 减少 ($P<0.05$); 左侧中央后回、左侧枕中回、左侧内侧额叶皮层 GMV 增加 ($P<0.05$)。左侧楔前叶 SCN 中左侧后扣带回、左侧角回、右侧中扣带回、左侧前额叶皮层 GMV 减少 ($P<0.05$); 双侧丘脑、右侧内侧额叶皮层 GMV 增加 ($P<0.05$)。右侧颞中回 SCN 中左侧颞中回、左侧中央前回减少 ($P<0.05$)。左侧基底外侧杏仁核 SCN 中左侧舌回、右侧基底外侧杏仁核 GMV 减少 ($P<0.05$); 右侧脑岛 GMV 增加 ($P<0.05$)。PDM 组右侧楔前叶 GMV 与抑郁自评量表 (SDS) 正相关 ($r=0.296$, $P=0.027$)。结论 针刺治疗 PDM 涉及到大脑不同区域的神经网络调节, SCN 分析可以作为一种补充方法揭示针刺治疗对 PDM 脑灰质结构的整体影响, 为了解针刺治疗 PDM 的镇痛机制提供了新的视角。

PU-0126

The impact of H-type hypertension on intracranial plaque enhancement in patients with ischemic stroke: a high-resolution magnetic resonance imaging study

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Purpose: H-type hypertension is associated with the stability of extracranial atherosclerotic plaque and poor prognosis in patients with acute ischemic stroke (AIS). This study aims to explore the impact of H-type hypertension on intracranial atherosclerotic plaque enhancement to early medicate atherosclerotic plaque risk factors and predict the prognosis of patients with AIS.

Materials and methods: A total of 148 patients with AIS were included [H-type hypertension group ($n=70$), isolated hypertension group ($n=27$), isolated hyperhomocysteinemia group ($n=31$), and control group ($n=20$)]. All patients underwent high-resolution magnetic resonance imaging within 4 weeks after the onset of AIS, with which all the characteristics of plaque were determined. Ordinal univariate and multivariate logistic regression were used to analyze the correlation between H-type hypertension and plaque enhancement.

Results: Grade 2 plaque enhancement appeared more frequently in H-type hypertension group (65.2%, $P=0.003$). After adjusting for covariates, H-type hypertension (OR: 24.459, 95%

confidence interval [CI]: 1.436-4.957) and hyperhomocysteinemia (OR: 16.494, 95% CI: 0.973-4.633) remained independent risk factors for plaque enhancement.

Conclusion: Aggressive treatment of hypertension and hyperhomocysteinemia contribute to reducing plaque instability and incidence of AIS.

PU-0127

联合应用 DWI-ASPECTS 评分及 HR-VWI 评估急性缺血性卒中患者的预后

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目的 探讨 DWI-ASPECTS 评分联合高分辨血管壁成像检查对急性缺血性卒中患者预后的预测价值，以辅助临床采取不同的康复管理办法。

方法 收集 2021 年 6 月到 2022 年 5 月之间进行 HR-VWI 检查，及 7 天内进行 DWI 检查的急性缺血性卒中患者，排除大脑中动脉之外其他血管供血区梗死的患者，共 30 名患者，根据 smRSq 评分将患者分为两组，预后好组 (smRSq 评分 ≤ 2 分) 25 名，预后差组 (smRSq 评分 > 2 分) 5 名。由两名放射医师独立测量与评估患者的 DWI 及 HR-VWI 图像。

结果 依据文献中 DWI-ASPECTS 评分及 HR-VWI 血管壁特征的评估与测量，统一观察者之间诊断标准，观察者之间无统计学差异。将两名观察者诊断一致的所有患者共计 29 名患者进行分组，进行两组之间影像学及临床特征的统计。两组间标准化管壁指数、DWI-ASPECTS 评分具有统计学差异 ($P < 0.05$)，狭窄处血管管壁面积于两组之间虽无统计学差异 ($p = 0.056$)，但统计得出该特征对预后差组的预测价值较大 ($AUC = 0.956$, $p = 0.006$)，具有进一步研究的价值。

结论 联合应用 DWI-ASPECTS 评分及 HR-VWI 对急性缺血性卒中患者的预后具有良好的预测价值，辅助临床对患者的预后进一步评估，采取更适合病人的治疗方法及康复管理。

PU-0128

Efficacy and brain network mechanism of transcutaneous auricular vagus nerve stimulation and antidepressant in the treatment of major depressive disorder

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Transcutaneous auricular vagus nerve stimulation (taVNS) is a novel non-invasive therapy for major depressive disorder (MDD), which stimulates acupoints innervated by the auricular vagus nerves. In recent years, more and more attention has been paid to non-pharmacological therapies for MDD, such as acupuncture, which can relieve the symptoms of MDD. Some previous studies have compared taVNS with antidepressant (such as escitalopram, a commonly used drug for depression,) and sham-taVNS, in terms of clinical scale assessment and brain network imaging. However, there is a lack of comprehensive evaluation of its efficacy and imaging only comparing with antidepressants. This article reviews the efficacy of taVNS compared with antidepressants, focuses on functional connectivity, and further search for effective imaging markers for MDD treatment in the future.

PU-0129

Differential diagnosis of prostate cancer and benign prostatic hyperplasia based on T2WI sequences combined with ADC map texture analysis

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Objective

To study the value of two parameter texture analysis based on T2WI and ADC images in the differential diagnosis of prostate cancer(PCa) and benign prostatic hyperplasia(BPH) in the transitional zone and peripheral zone, respectively.

Methods

A total of 112 Patients with BPH and PCa confirmed by pathology before prostate MRI examination in The First Affiliated Hospital of the Air Force Military Medical University, including 23 cases of transitional zone PCa and 60 cases of BPH; Peripheral PCa 29 cases. The images were read by two imaging physicians with Deputy high-level and above professional titles who have rich experience in reading abdominal and Pelvic MRI images, and select the maximum level and scope of the lesions respectively. When there are differences of views, they reach a consensus through consultation. Another radiologist used mazda4.6.2.0 the software semi-automatically outlines the ROI on the image of the largest layer of the selected focus, and outlines the ROI along the edge of the cancer focus or hyperplastic nodule on the largest layer of the focus, including the whole focus as much as possible, but not beyond its range. It is divided into two times, with an interval of one month before and after, to obtain the texture parameters and values of each ROI, and screen the parameters with statistical significance, Multivariate regression analysis was carried out to evaluate the diagnostic efficacy of each parameter.

Results

In the differentiation of PCa and BPH from transitional band:1.ADC sequences derived from texture analysis, SumAverg(0,5)(AUC=0.917,95%CI:0.836-0.967), sensitivity75%, specificity94.92%; SumAverg(4,4)(AUC=0.924,95%CI:0.844-0.971), sensitivity79.17%, specificity98.31%; SumOfSqs(3,0)(AUC=0.663,95%CI:0.551-0.763), sensitivity62.5%, specificity69.49%; Variance(AUC=0.874,95%CI:0.783-0.937), sensitivity75%, specificity93.22%; Vertl_GLevNonU(AUC=0.799,95%CI:0.697-0.879), sensitivity58.33%, specificity88.14%; Multivariate logistic regression model(AUC=0.994,95%CI:0.944-1), sensitivity100%, specificity94.92%, has better diagnostic value. 2.T2 sequences derived from texture analysis, 135dr_RLNonUni(AUC=0.696,95%CI:0.586-0.793),sensitivity73.91%, specificity60%; Perc.01%(AUC=0.823,95%CI:0.724-0.898),sensitivity69.57%, specificity91.67%; Perc.99%(AUC=0.942,95%CI:0.868-0.981), sensitivity100%, specificity76.67%; SumAverg(0,1)(AUC=0.899,95%CI:0.814-0.955), sensitivity73.91%, specificity91.67%; Teta-3(AUC=0.778,95%CI:0.673-0.862), sensitivity65.22%, specificity78.33%; Multivariate logistic regression model(AUC=0.982,95%CI:0.925-0.999), sensitivity95.65%, specificity93.33%.

Transitional zone PCa and peripheral zone PCa differentiation:1.ADC sequences derived from texture analysis, SumOfSqs(1,-1)(AUC=0.736,95%CI:0.596-0.849), sensitivity60.87%, specificity86.21%; 135dr_GLevNonU(AUC=0.72,95%CI:0.578-0.835), sensitivity73.91%, specificity62.07%; Multivariate logistic regression model(AUC=0.825,95%CI:0.694,0.916), sensitivity95.65%,specificity62.07%. 2.T2 sequences derived from texture analysis, GrSkewness(AUC=0.696,95%CI:0.552-0.816), sensitivity60.87%, specificity75.86%; Vertl_RLNonUni(AUC=0.66,95%CI:0.515-0.785), sensitivity86.96%, specificity44.83%; Multivariate logistic regression model(AUC=0.799,95%CI:0.665-0.897), sensitivity95.65%, specificity55.17%.

Conclusions

1. ADC map texture parameters SumAverg(0,5), Variance, Vertl_GLevNonU and T2WI sequence texture parameters Perc.99%, SumAverg(0,1) in dual parameter MRI texture analysis can

effectively discriminate between PCA and BPH occurring in the transitional zone, where Vertl_GLevNonU was an independent risk factor, and the diagnostic efficacy of the multivariate logistic regression analysis model was higher than that of the univariate model;

2. ADC map texture parameters SumOfSqs(1,-1), 135dr_GLevNonU and T2WI sequence texture parameters GrSkewness, Vertl_RLNonUni in dual parameter MRI texture analysis has differential diagnostic value for PCA that occurs in the peripheral and transitional bands, respectively, and the diagnostic efficacy of the multivariate logistic regression analysis model was higher than that of the univariate model.

PU-0130

基于 MRI 放射组学特征的机器学习模型对 脊髓型颈椎病进行危险度分级

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目的: 探讨基于 MRI 放射组学特征的机器学习 (machine learning, ML) 模型对脊髓型颈椎病 (cervical spondylotic myelopathy, CSM) 进行危险度分级的价值。材料与方法: 回顾性分析临床诊断为 CSM 患者 317 例, 并使用日本骨科协会 (Japanese Orthopaedic Association, JOA) 评估治疗分数将 CSM 分为轻症组 193 例和中重度组 124 例。手动勾画脊髓轴位 T2WI 像生成感兴趣区域 (area of interest, ROI) 并提取放射组学特征, 使用 Z-Score 标准化进行统一量度, 皮尔森相关系数 (pearson correlation coefficients, PCC) 进行数据降维。使用递归特征消除 (recursive feature elimination, RFE) 进行特征筛选, 并使用逻辑回归 (logistic regression, LR)、自适应增强机 (adaboost, AB)、贝叶斯算法 (native bayes, NB) 及支持向量机 (support vector machine, SVM) 四种分类器模型来构建 ML 模型。通过受试者工作特征曲线 (receiver operating characteristic, ROC) 的曲线下面积 (area under the curve, AUC) 评价模型效能。结果: 共筛选出 15 个放射组学特征用于模型构建, 四种分类器中, SVM (训练组 AUC vs. 验证组 AUC: 0.833 vs. 0.813) 和 LR (0.831 vs. 0.812) 模型分级能力较好, 且较稳定, 模型之间无统计学差异 (DeLong 检验: $P > 0.05$), NB (0.819 vs. 0.738) 模型的分类能力弱于 SVM 和 LR 模型, AB 分类器在训练组中分级能力最佳 (AUC: 0.984), 但在验证组中能力欠佳 (AUC: 0.725), 模型稳定性低于 SVM 和 LR 模型。结论: 基于 MRI 放射组学特征的 ML 模型对 CSM 有良好危险度分级能力, 能够为临床术前诊断和术后疗效预测提供一定参考价值。

PU-0131

基于神经指纹技术对中青年抑郁症患者的脑结构 MRI 定量研究

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目的: 本研究基于高分辨脑结构 MRI 及神经指纹全脑分割量化新技术, 利用轻中度抑郁症患者相关脑区细微结构的体积变化, 探究抑郁症临床诊断的客观指标。

方法: 本研究通过机构伦理审查批准及相关书面知情同意。51 例轻中度抑郁症患者 (男 21 例, 女 30 例) 和年龄性别匹配的 48 例健康对照组 (男 20 例, 女 28 例) 均完成汉密尔顿抑郁和焦虑量表 (HAMD、HAMA) 及抑郁、焦虑自评量表 (SDS、SAS) 评分, 并行 3T 头颅 MRI 常规序列和高分辨率 3D-T1 结构成像。利用 BrainLabel 脑影像分析平台特有的神经指纹技术对全脑进行分割量化, 获取所有受试者分割脑区的体积数据。采用 SPSS 20.0 统计软件对受试者的一般资料 (性别、年龄

等)和影像数据(全脑及局域脑区体积)进行组间量化对比分析,并将有统计学差异的脑区与 HAMD、HAMA、SDS 和 SAS 量表分数进行 Spearman 相关性分析。

结果: 1.病例组与对照组间双侧扣带回和楔叶、右侧颞下回、额中回、直回、顶上小叶和左侧海马体、枕上、中回、舌回组间差异有统计学意义($P<0.05$)。尽管,二组间全脑体积无明显差异,但全脑室系统及脑脊液总量有组间差异($P<0.05$)。

2.与正常对照组比较:女性疾病组出现双侧大脑皮层、双侧脑白质下端、右侧脑白质前端及左侧丘脑的体积改变($P<0.05$);而男性抑郁症仅双侧扣带回、海马体及左侧中央前回有组间体积差异($P<0.05$)。

3.相关性分析显示:女性抑郁症组的颞上回体积与 HAMD 评分呈正相关($P<0.05$);双侧直回及左侧枕叶、枕中回、楔叶体积与 SDS 评分呈负相关($P<0.05$);左侧直回体积与 SAS 评分呈负相关($P<0.05$)。而男性抑郁症组仅右侧扣带回体积与 HAMD 评分呈负相关($P<0.05$)。

结论: 1.本研究结果提示:抑郁症患者局部脑区体积变化较大,尤其是与情绪及精神相关的脑区(扣带回、楔叶、海马体等)。这些脑区体积的早期变化有望成为诊断抑郁症的客观影像学指标。

2.女性抑郁症患者对局部脑回的变化与男性不同,除扣带回外,男性对海马区较敏感,而女性对内嗅皮层较敏感。

3.相关性分析提示女性较男性在抑郁和焦虑方面更敏感。

PU-0132

相位对比磁共振成像在阿尔茨海默病临床诊断中的价值探讨

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目的: 采集阿尔茨海默病患者经相位对比磁共振成像进行脑脊液的流速、搏动及颈部大血管血液的流速、搏动数据的采集,分析脑脊液的流速、搏动及颈部大血管血液的流速、搏动与认知功能障碍的相关性。**方法:** 选取 2022 年 12 月—2023 年 9 月宁德师范学院附属宁德市医院收治的 45 例志愿者或诊断为阿尔茨海默病的患者,根据临床诊断、实验室检查、影像学检查、认知功能评分综合评估将其分为正常对照组($n=15$)、轻度认知障碍 MCI 组($n=15$)、AD 组($n=15$)。在 MRI (GE SIGNA Architect 3.0T) 进行头颈部磁共振检查,获得脑脊液的流速、搏动及颈部大血管流速、搏动的图像,并传送到 CVI42 后处理工作站,得到后处理的图像及数据,两两比较三组间的脑脊液收缩期、舒张期峰值流速及颈部大血管峰值流速、血流量、管壁剪切力、压力,并分析两者之间的相关性。**结果:** 中脑导水管脑脊液收缩期及舒张期峰值流速在三组间存在显著差异($P < 0.05$),差异主要存在于 AD 组与对照组之间、AD 组与 MCI 组之间。颈部大血管峰值流速、血流量、搏动相关参数在三组间存在显著差异($P < 0.05$),差异主要存在于 AD 组与对照组之间。根据研究结果,阿尔茨海默病患者脑脊液流速及颈部大血管血液流速与认知功能障碍均呈负相关关系。**结论:** 相位对比成像技术能够反映阿尔茨海默病患者颅内脑脊液及颈部大血管的流速及搏动功能,间接反映阿尔茨海默病患者的 AQP4 及类淋巴系统的功能,在 AD 的早期诊断上具有潜在价值。

PU-0133

三种磁共振 DWI 序列在腮腺成像中的应用价值

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目的: 评价常规 DWI (基于 Single-Shot Spin Echo EPI)、多重灵敏度编码 DWI (multiplexed sensitivity-encoding, MUSE-DWI) 与基于螺旋桨技术 DWI (periodically rotated overlapping

parallel lines with enhanced reconstruction ,Propeller-DWI) 等三种扩散加权序列在腮腺磁共振成像中的价值。

方法: 对 28 例健康志愿者行腮腺 MRI, 每位受检者同时采集三种不同类型 DWI 图像, 主要参数设置一致: 扩散敏感系数 (b 值) = 800s/mm², NEX=5, slices=18, slice thickness=4 mm。主观评价: 腮腺边缘清晰度, 腮腺变形程度, 背景噪声和整体图像质量, 均采用 5 分法进行评价。客观评价: 信噪比(signal to noise ratio,SNR) 及对比噪声比(contrast to noise ratio,CNR), 其中 CNR 以颈部肌肉信号为参照。采用 SPSS26.0 软件统计分析。

结果: 两位观察者主观评价结果的一致性较好 (P 均<0.01)。MUSE-DWI 显示的腮腺边缘清晰度、变形程度、整体图像质量评分及 SNR、CNR 均优于常规 DWI (P 均 <0.01); MUSE-DWI 的整体图像质量和 SNR、CNR 优于 Propeller-DWI (P 均 <0.05); Propeller-DWI 中腮腺的变形程度最小 (P<0.05); Propeller-DWI 在腮腺边缘清晰度和整体图像质量的表现优于常规 DWI (P<0.05)。

结论: 常规 DWI 通过正反梯度切换快速读出信号, 采集时间短, 但容易积累相位误差, 导致病灶发生形变、模糊、空间分辨率低。Propeller DWI 基于 FSE 读出, 通过自动相位导航去除相位差, 通过多次激发技术缩短回波时间, 对磁敏感伪影和变形不敏感, 但扫描时间长。MUSE-DWI 在相位方向多次激发, 减少回波链长度, 提升了信噪比, 采集完成后进行导航序列校准, 减少了变形, 是腮腺成像的较优选择。

PU-0134

Association of vertebrobasilar artery geometric configuration with intracranial atherosclerotic plaque detected by HR-VWI

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Objective To assess the geometrical conformation of vertebrobasilar artery (VBA) based on high-resolution vessel wall imaging (HR-VWI), and explore the association with intracranial atherosclerosis.

Methods 65 patients (122 atherosclerotic segments) were retrospectively included. All patients underwent conventional MR examination, MRA, and HR-VWI. VBA conformation types: Walking: two vertebral arteries diameters difference < 0.3 mm, curved in the same direction; Tuning Fork: diameters of the two vertebral arteries were equal, curved in opposite directions; Lambda: two vertebral arteries diameters difference ≥ 0.3 mm; No Confluence: no confluence of one VA with the BA, the other VA extended to BA. The number, distribution, volume, maximum plaque dimension area, intra-plaque haemorrhage, enhancement, remodeling, and stenosis of plaques were analyzed. The t-test, ANOVA, chi-square test or Fisher's exact, and rank-sum test were applied for the comparison of clinical data, VBA geometrical-configuration, and imaging indexes. The kappa test was applied to analyze the consistency of VBA conformation assessed by MRA and HR-VWI. P<0.05 was statistically significant.

Results VBAs were classified into Walking (n=20), Tuning Fork (n=24), Lambda (n=16), and No Confluence (n=5), and there was a good agreement between MRA and HR-VWI (κ =0.429, P=0.007). The distance of the outermost edge of the BA from the midline, BA tortuosity index, and the predominance of the bifurcated vertebral arteries were of difference among different morphological VBA configurations (H=15.448, P<0.001; H=8.846, P=0.031; H=9.8, P=0.02 separately). The plaque volume was statistically different among the morphological subgroups (H=7.849, P=0.049). Stenosis caused by vertebral artery plaques on the dysplastic side was greater in Lambda type (Z=1.568, P=0.015).

Conclusions HR-VWI can accurately assess the geometry of vertebrobasilar arteries. The volume of plaques was different among diverse VBA configurations. The dysplastic vertebral artery in Lambda type was with greater stenosis rate.

PU-0135

基于配对 MRI 和 RNA 测序数据探究胶质母细胞瘤预后影像组学表型的生物学通路

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预后意义的影像组学表型的生物学意义尚不明确。本研究利用配对的 MRI 和 RNA 测序数据揭示胶质母细胞瘤个体预后影像组学表型的生物学意义，并验证已识别出来与放射基因组学相关关系具有外部可重复性。本研究回顾性纳入了 2020 年 1 月至 2023 年 4 月收集的数据。从影像组学分析集中，使用术前 MRI 构建了 13 个特征作为影像组学标签，以进行总体生存预测。通过 MRI 和 RNA 测序进行放射基因组学训练集，富集了与这 13 个影像组学表型相关联的生物通路。确定了与影像组学相关关键基因，并获得预后影像组学基因表达 (RadGene) 评分。通过外部测试集和公共数据集 (癌症基因图谱 [TCGA])，验证已识别出来的通路和基因具有可重复性。进行时序检验以评估其在预后方面所起到的意义。共纳入 230 例患者 (平均年龄 50 岁 \pm 15 [标准差]; 135 名男性)。在经过验证子集筛选之后，发现影像组学标签与总生存期存在显著相关性 (风险比 [HR] 为 3.54; 95% CI: 2.02-5.89; $P < 0.001$)。四种类型的预后影像组学表型与不同通路呈正相关: 免疫、增殖、治疗反应和细胞功能 (假阳率为 0.10)。鉴定出 30 个与影像组学相关关键基因，并证实 RadGene 评分在 TCGA 测试集中具备预测总体生存期能力 (HR: 1.37; 95% CI: 1.2-2.1; $P < 0.05$)。此外，在外部测试样本中也成功地复制了与影响图谱相联系通路及关键基因之间存在着一致性。根据我们对于胶质母细胞瘤 MRI 扫描结果所得到信息可以推断出各自患者总体生存期情况，并且这些信息是由不同关键通路驱动而成，其中包括免疫调节、肿瘤增殖、治疗反应以及细胞功能等。

PU-0136

A comparative meta-analysis of functional connectivity alterations of default mode network in mild cognitive impairment and Alzheimer's disease

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Aim

Mild cognitive impairment (MCI) and Alzheimer's disease (AD) both show abnormal resting-state functional connectivity (rsFC) of default mode network (DMN), but it is unclear to what extent these abnormalities are shared. We therefore conducted a meta-analysis to elucidate their commonalities and differences.

Methods

We reviewed the literature using PubMed, Web of Science, and Embase through 18 June 2023. We included resting-state functional studies using seed-based whole-brain analysis or independent component analysis to compare patients with MCI or AD with healthy controls (HC) for DMN rsFC. We used the anisotropic effect size version of the signed differential mapping software package. First, separate meta-analyses were performed to identify DMN rsFC alterations in MCI and AD relative to HC. Next, a quantitative comparison between MCI and AD

was performed. Then, a conjunction/disjunction analysis was performed to investigate shared/contrasting aberrant rsFC across patient groups. Jackknife sensitivity, heterogeneity, publication bias, and meta-regression analysis were performed.

Results

We included 31 MCI studies (960 patients with MCI and 1084 HC) and 20 AD studies (569 patients with AD and 661 HC). We found shared decreased rsFC within DMN in MCI and AD, located in bilateral medial prefrontal cortex/anterior cingulate cortex and precuneus/posterior cingulate cortex (PCC). Decreased DMN rsFC in precuneus/PCC was more severe in AD than in MCI. MCI-specific rsFC alterations were found within DMN and between DMN and affective network. AD-specific rsFC alterations were found between DMN and regions of visual network and frontoparietal network. Heterogeneity and publication bias were identified in AD studies for right dorsolateral prefrontal cortex.

Conclusion

The shared DMN alterations in MCI and AD suggest rsFC disruption in precuneus/PCC increases with dementia progression, providing a perspective on neuropathological mechanisms underlying cognitive impairments.

PU-0137

增强斑块长度对识别颅内动脉粥样硬化责任斑块的增量价值：高分辨率磁共振成像研究

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背景及目的：

在颅内高分辨 MRI 研究中，颅内动脉粥样硬化斑块强化的程度常被用于识别责任斑块，然而，除了斑块强化程度外，与强化相关的其他高分辨 MRI 斑块特征在鉴别责任斑块上是否具有增量价值还未知。本研究目的是评估斑块多种强化特征，包括强化的程度、强化长度和强化象限等是否有助于罪犯斑块的识别和进一步的风险分层。

方法：回顾性研究 2016-2022 年因颅内动脉粥样硬化而发生急性缺血性卒中和短暂性脑缺血发作的患者。增强特征包括增强等级、增强长度和增强象限。使用 logistic 回归和受试者工作特征分析，研究了斑块强化特征与责任斑块之间的关联，以及诊断价值。

结果：总共纳入 287 个动脉粥样硬化斑块，其中 231 个（80.5%）和 56 个（19.5%）分别被归类为责任斑块和非责任斑块。对比增强前和增强后的图像发现，46.32% 的责任斑块的增强长度长于斑块长度。多变量逻辑回归显示，强化长度 \geq 斑块长度的特征（OR 6.77；95% CI 2.47-18.51）和 II 级增强（OR 7.00；95% CI 1.69-28.93）与责任斑块独立相关。结合狭窄和斑块强化等级诊断责任斑块的曲线下面积值（AUC）为 0.787，当强化长度大于斑块长度时，AUC 显著增加到 0.825（DeLong 检验 $p=0.026$ ）。

结论：增强强化长度 \geq 斑块长度和 II 级增强与责任斑块独立相关。增强的斑块的长度特征结合强化程度能够更好的识别责任斑块。

PU-0138

Impact on etiology diagnosis by high-resolution vessel wall imaging in young adults with ischemic stroke or transient ischemic attack

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Purpose: The etiological features of stroke in young adults are different from those in older adults. We aimed to investigate the impact of high-resolution vessel wall imaging (HRVWI) on etiologic diagnosis in young adults with ischemic stroke or transient ischemic attack (TIA). **Materials and Methods:** A total of 253 young adults (aged 18–45 years) who consecutively underwent HRVWI for clarifying stroke etiology were retrospectively recruited. Two experienced neurologists classified stroke etiology for each patient using Trial of Org 10172 in Acute Stroke Treatment categories with and without the inclusion of HRVWI diagnosis. Multivariate logistic regression was performed to determine which etiologic category would be significantly impacted after including HRVWI.

Results: The etiologic classification was altered in 39.1% (99/253) of patients after including HRVWI in the conventional investigations. The proportion of patients classified as having undetermined etiology (SUE) and the proportion of patients classified as having small-artery occlusion (SAO) both significantly decreased (36.4% to 13.8% and 9.1% to 2.0%), whereas the proportion of patients classified as having large artery atherosclerosis (LAA) significantly increased (28.5% to 58.1%) (all $P < 0.001$). The inclusion of HRVWI had a significant diagnostic impact on young adults who were primarily classified as SAO (odds ratio [OR] 14.4, 95% confidence interval [CI] [2.9, 71.8], $P < 0.001$) or SUE (OR 8.3, 95% CI [2.2, 31.5], $P < 0.01$).

Conclusions: HRVWI had a substantial impact on etiologic classification in young adults with ischemic stroke or TIA, particularly for those primarily classified as having SAO or SUE. This impact of HRVWI will be beneficial for therapeutic decision-making.

PU-0139

The Prognostic Value of Lymph Node Status in Patients with Locally Advanced Cervical Cancer Who Underwent Neoadjuvant Chemotherapy and Followed Hysterectomy: A Two-Center Retrospective Study.

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Objectives To investigate the prognostic value of lymph node status in patients with locally advanced cervical cancer (LACC) patients who underwent neoadjuvant chemotherapy (NACT) and followed hysterectomy.

Methods Patients in two referral centers were retrospectively analyzed. The baseline tumor size and radiological lymph node status (LN_r) were evaluated on pre-NACT MRI. Tumor histology, differentiation and pathological lymph node status (LN_p) were obtained from post-operative specimen. The log-rank test was used to compare survival between patient groups. Cox

proportional hazards regression models were employed to estimate the hazard ratio (HR) of various factors with progression-free survival (PFS) and overall survival (OS).

Results A total of 266 patients were included. Patients with 2018 FIGO IIIC showed worse PFS compared to those with FIGO IB-IIIB ($p < 0.001$). The response rate in patients with LNp(-) was 64.1% (134/209), significantly higher than that of 45.6% (26/57) in patients with LNp(+) ($p = 0.011$). Multivariate Cox analysis identified the main independent predictors of PFS as LNp(+) (HR = 3.777; 95% CI 1.715-8.319), non-SCC (HR = 2.956; 95% CI 1.297-6.736), poor differentiation (HR = 2.370; 95% CI 1.130-4.970) and adjuvant radiation (HR = 3.266; 95% CI 1.183-9.019). The interaction between LNr and LNp regarding PFS were significant both for univariate and multivariate ($P = 0.000171$ and $1.5357e-7$ respectively). In patients with LNr(+), a significant difference in PFS was observed between patients with LNp(-) and LNp(+) ($p = 0.0027$).

Conclusion LACC Patients with FIGO 2018 stage IIIC who underwent NACT and followed hysterectomy had worse PFS compared to those with IB-IIIB. LNp(+), non-SCC, poor differentiation and adjuvant radiation were independent risk factors for PFS. The adverse prognostic value of LNp(+) was more significant in patients with LNr(+).

PU-0140

基于磁共振质子密度脂肪分数的代谢相关脂肪性肝病患者肝内脂肪分布的研究

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目的 利用磁共振质子密度脂肪分数探讨超重型及糖尿病型代谢相关脂肪性肝病患者肝脏脂肪的空间分布。

方法 回顾性收集经穿刺活检证实为 MAFLD 的患者 58 例，将入组患者分为超重型 MAFLD 与糖尿病型 MAFLD，并根据肝脏穿刺活检结果进一步分为轻度组和中重度组。所有入组患者均采用联影 uMR586 1.5T 磁共振扫描仪行上腹部 FACT 序列成像并测量 8 个肝段的 PDFF 值，并计算全肝加权平均 PDFF 值。首先比较两亚型轻度组及中重度组左右半肝 PDFF 值，其次，将各分叶及肝段的 PDFF 值与全肝加权平均 PDFF 值比较，找出高于及低于全肝平均 PDFF 值的肝段。连续变量间两两比较采用 t 检验及 Mann-Witney U 检验，分类变量间的比较采用 Chi-squared χ^2 检验及 Fisher 确切概率法。

结果 轻度及中重度 OW-MAFLD 及 DM-MAFLD 患者右半肝 PDFF 值均高于左半肝 ($P < 0.05$)，OW-MAFLD 轻度组右半肝、右前叶、V 段 PDFF 值高于全肝加权平均 PDFF 值，OW-MAFLD 中重度组右半肝、右前叶、V 段、VIII 段 PDFF 值高于全肝平均 PDFF 值，左半肝、左外叶、尾状叶 (I 段)、II 段 PDFF 值低于全肝平均 PDFF 值。DM-MAFLD 轻度组右半肝、右前叶、右后叶、VII 段、VIII 段 PDFF 值高于全肝平均 PDFF 值，左内叶、尾状叶 (I 段)、IV 段 PDFF 值低于全肝平均 PDFF 值。DM-MAFLD 中重度组患者左半肝、左外叶、尾状叶 (I 段)、II 段 PDFF 值低于全肝平均 PDFF 值，右半肝、右前叶、右后叶、VII 段、VIII 段 PDFF 值高于全肝平均 PDFF 值。

结论 OW-MAFLD 及 DM-MAFLD 患者肝脏脂肪分布不均匀，两亚型轻度及中重度患者右半肝脂肪变程度大于左半肝，OW-MAFLD 轻度患者脂肪首先沉积于 V 段，中重度患者脂肪在 V 段及 VIII 段沉积较多，在 I 段、II 段沉积较少；DM-MAFLD 轻度及中重患者脂肪均在 VII 段及 VIII 段沉积较多，在 I 段沉积较少。在肝脏穿刺活检时，OW-MAFLD 患者在 V 段、VIII 段穿刺，DM-MAFLD 患者在 VII 段、VIII 段穿刺可提高穿刺结果的阳性率，在 I 段穿刺可能会造成穿刺结果的假阴性，进而导致漏诊。

PU-0141

成人肌纤维瘤的临床特征及影像学表现

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目的：分析成人肌纤维瘤的 CT 及 MRI 影像学特征，提高对此病的诊断水平。

方法：回顾性分析 19 例经病理证实的成人肌纤维瘤患者的病例资料。10 例行 CT 增强检查，1 例行 CT 平扫检查，10 例行 MRI 增强检查。观察分析肌纤维瘤的部位、数目、大小、形态、边界、有无骨质侵犯、密度/信号和强化方式等征象。

结果：发病平均年龄为 37.7 岁，男性患者 5 例，女性患者 14 例，男女发病比例约为 1: 2.8。19 例病例共检出 20 个病灶，其中 1 例为多发病灶。发病部位：头颈部 9 例，四肢 3 例，躯干 5 例，1 例累及肺，1 例累及纵隔；16 例病灶呈结节状或团块状，其中 9 例有分叶，1 例呈条片状，2 例呈不规则形；7 例边界清晰，12 例边界模糊；1 例骨质受侵犯。CT 平扫 10 例与肌肉密度相比呈等或稍低密度，1 例呈混杂密度；CT 增强扫描显示 9 例呈结节状或环状明显强化，其中 7 例可见坏死，1 例囊腔内壁结节强化。MRI 平扫 T1WI 上 9 例呈均匀等低信号，1 例呈稍高信号；T2WI 及 FLAIR 上 6 例呈混杂高信号，4 例呈稍高信号，其中 7 例 T2 内可见条索状低信号；MRI 增强检查 9 例呈明显不均匀强化，1 例呈不均匀轻度强化。随访中有 2 例复发。

结论：成人肌纤维瘤 CT 及 MRI 表现具有一定特征性。中青年女性患者，头颈部、躯干、四肢的皮下及皮下组织内单发或多发结节，密度或信号强度不均一，并伴有中度或明显的增强，尤其 MRI“双低信号征”要考虑到成人肌纤维瘤/肌纤维瘤病的可能。

PU-0142

Characterization of local white matter microstructural alterations in Alzheimer's disease: a reproducible study

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Alzheimer's disease (AD) is a neurodegenerative disease with a close association with white matter (WM) microstructural alterations. Present studies lack the characterization and further validation of specific regions in the WM fiber tracts of AD. To identify local WM microstructural alterations in AD, this study subdivided fiber tracts into multiple fiber clusters based on automated fiber clustering and performed quantitative analysis along the fiber clusters. Diffusion tensor imaging (DTI) data from public dataset (53 AD patients, 70 healthy controls) and clinical dataset (27 AD patients, 19 healthy controls) were included for the purpose of mutual validation. Whole-brain tractogram were automatically subdivided into 800 clusters based on automatic fiber clustering approach, then 100 segments were divided along the cluster and the diffusion properties of each segment were calculated. The results showed that the AD patient had significantly lower fraction anisotropy (FA) as well as significantly higher mean diffusivity (MD) in some regions of fiber clusters in the cingulum bundle, uncinate fasciculus, external capsule and corpus callosum. More importantly, these changes were reproducible in two datasets. Correlation analysis revealed a positive correlation between FA and mini-mental state examination (MMSE) scores and a negative correlation between MD and MMSE in these clusters. The accuracy of the constructed classifier reached up to 89.76% with an area under the curve of 0.93. It indicates that this study can effectively identify local WM microstructural changes in AD and provides a new insight into the analysis and diagnosis of WM abnormalities in AD patients.

PU-0143

Magnetic Resonance CSF Velocity Mapping Using Phase Contrast Sequence with Hadamard Encoded Multi-Band Acquisition

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Background: Phase contrast MR pulse sequence is widely used for flow velocity quantification (e.g., vascular blood or CSF). However when it's applied on small animals CSF study the major difficulty is extremely slow flow which leads to a high eddy currents. To cancel this eddy current effects we post-processed phase contrast images by hadamard encoded multi-band acquisition.

Methods: A novel generalized Hadamard encoding based multi-band scheme (dubbed HEAP-METRIC, Hadamard Encoding Approach of Multi-band Excitation for short TR Imaging accelerating) using complex Hadamard matrix was developed, and incorporated into conventional PC-MRI to significantly increase SNR. We post-processed phase contrast images by spatial polynomial regressing on static tissue data that requires a manually drawn global mask excluding flowing substance (e.g., vascular blood or CSF). All excited bands of MB RF pulses were designed to be equally spaced. Adjacent bands were gapped by one band distance thus it needs twice slice-selection to complete a whole brain scan.

Results: HEAP-METRIC PC-MRI revealed CSF flow was reduced by isoflurane anesthesia, accompanied by reduction of glymphatic function as measured by DCE-MRI. Significant reduction of artifact caused by eddy current was observed in post-processed phase contrast images. Furthermore, using heart rate recordings, we found significant correlation between heart rate and averaged CSF velocity, suggesting a possible physiological basis for anesthesia induced CSF velocity reduction.

Conclusions: We developed and validated a generalized Hadamard encoding based multi-band PC-MRI method for mapping low velocity flow. Post-procession with Hadamard multi band acquisition can effectively eliminate eddy current effect of high field, which might be an effective tool for small animals CSF study.

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PU-0144

Causal relationship between gut microbiota and glioblastoma: a two-sample Mendelian randomization study

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Abstract

Background: Observational research and medical trials have suggested a connection between gut microbiota and glioblastoma, but it remains unclear if the relationship is causal.

Method: A two-sample Mendelian randomization (MR) study was conducted by employing data from the MiBioGen consortium's largest genome-wide association study (n=18340) and the FinnGen consortium R8 release information (162 cases and 256,583 controls). Inverse variance weighted (IVW), weighted median, weighted model, MR-Egger, simple mode, and MR-PRESSO were used to determine the causal relationship between gut microbiota and glioblastoma.

Reverse MR analysis was also performed on bacteria identified as causally related to glioblastoma.

Results: Seven causal relationships were identified between genetic liability in the gut microbiota and glioblastoma, involving various bacterial families and genera. No significant causal effect was found on gut microbiota from glioblastoma, and no significant heterogeneity of instrumental variables (IVs) or horizontal pleiotropy was observed.

Conclusion: A two-sample MR analysis reveals a causal association between the gut microbiota and glioblastoma, highlighting the need for more investigation to comprehend the processes behind this association.

PU-0145

利用 4D-flow 技术探究椎动脉优势对无或轻度狭窄 基底动脉血流动力学的的影响

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椎基底动脉(VBS)是脑的重要供血动脉。椎动脉(VA)左右各有一支,穿行于颈椎两侧的横突孔,向上行进入颅内,两支血管在颅内合为一支叫基底动脉(BA)。主要供应人脑的枕叶、小脑、脑干、丘脑及内耳等部位。椎动脉优势(VAD)曾经被默认为一种较为常见的椎基底动脉系统的血管形态结构的变异现象,无具体病变意义,然而近年的多项研究证明 VAD 与多种疾病存在相关性,如面肌痉挛、前庭神经元炎、偏头痛等,此外多项研究提示 VAD 可能是后循环缺血的重要危险因素。4D 血流 MRI(4D-flow)是一项新兴的磁共振血管成像技术,可以显示血管的形态学和血流动力学,与传统的 3D 血管成像相比,增加了时间维度,以展示不同心动周期血流动力学的变化。本研究旨在利用 4D-flow 技术探究对基底动脉无狭窄或轻度狭窄(狭窄程度<50%)的患者的椎动脉优势对基底动脉血流动力学的影响,在脑血管疾病的早期预防与准确诊断方面为临床提供更多线索。前瞻性招募我院神经内科或神经外科及健康体检的患者为研究对象,将基底动脉无狭窄或轻度狭窄的患者纳入研究。收集患者的临床基线特征并进行 MRA 及 4D-flow 扫描,根据 MRA 图像判定是否存在椎动脉优势分为两组:VAD 组和非 VAD 组。使用后处理工作台对 4D-flow 图像进行分析,测量包括 WSS、管壁压力等的各项血流动力学参数并记录基底动脉的弯曲程度和弯曲方向。用统计学方法计算读者间的一致性,比较两者间的临床基线特征和血流动力学特征,并探究各组间差异。预期结果是 VAD 组与非 VAD 组可能在各项血流动力学特征上存在差异,且存在椎动脉优势增加发生后循环缺血的可能性,具体的实验数据和测量结果正在收集统计中。

PU-0146

一站式磁共振冠脉成像与多模态高阶定量心肌活性评价的临床应用

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目的:探讨基于压缩感知磁共振冠脉成像与多模态高阶定量心肌活性评价双诊断的临床应用价值。
方法:采用结合压缩感知技术的 3D mDixon FFE 序列行全心冠状动脉成像检测,建立高阶定量心肌活性评估体系,采用结合压缩感知技术心脏电影成像(cine)序列和心肌延迟强化(LGE)PSIR 序列,采用 mapping 序列,包括 native 纵向弛豫时间定量成像(T1 mapping),横向弛豫时间定量成像(T2 mapping)和 enhanced T1 mapping,通过 native T1 mapping 和 enhanced T1

mapping 计算细胞外容积 (ECV)，行心肌定量成像检测，联合心肌灌注，心脏弥散加权成像 (DWI)，通过多序列、多参数、多维度的多模态一站式磁共振心脏成像方法评估冠状动脉，并建立高阶定量心肌活性评估体系。结果：2037 例临床疑冠心病患者纳入本研究，其中包含 1650 例非阻塞性冠心病患者，其中有 54 例在随访内发生不良心血管事件，缺血伴非阻塞性冠状动脉疾病 (INOCA) 很少能被正确诊断，临床误诊率高。无创影像学 CMR 不仅可以检出其冠状动脉非阻塞性狭窄，负荷心肌灌注成像及延迟增强 (LEG) 联合定量成像和 DWI 还可进一步评估心肌微循环功能障碍或心肌缺血。结论：一站式磁共振冠脉成像与多模态高阶定量心肌活性评价双诊断的临床应用在 INOCA 心肌异常诊断的检出率和准确率具有重要的价值，且推动 INOCA 相关临床研究的开展。

PU-0147

Predicting the presence of type 2 diabetes based on abdominal adipose tissue content measured by MRI: observational data from the bariatric surgery cohort

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Objectives: The visceral fat area and fat content in the liver and pancreas are associated with the risk of diabetes. We aim to evaluate abdominal fat deposition in obese subjects with type 2 diabetes mellitus (T2DM) using multi-parameter MRI and to evaluate whether the presence of T2DM in obese people can be predicted based on MRI parameters.

Materials and Methods: We prospectively recruited 75 obese subjects (37 diabetic patients and 38 non-diabetic patients) and 23 healthy volunteers. All subjects underwent mDixon-quant, native T1 mapping, and intravoxel incoherent motion (IVIM) with a 3.0 T MRI of the abdomen. The imaging features of the three groups were compared, and the correlation between MRI parameters and laboratory tests related to glucose and lipid metabolism was analyzed. Three models were constructed, including clinical factors (Model 1), MRI parameters (Model 2), clinical factors, and MRI parameters (Model 3) to find diabetic patients. Receiver operating characteristic (ROC) curves were plotted to evaluate the model performance and pairwise model comparisons were performed via the DeLong test to demonstrate the additive value of different factors.

Results: There were significant differences in proton density fat fraction (PDFF) and apparent diffusion coefficient (ADC) values of liver and pancreas among the control group, non-diabetic group, and diabetic group (all $p < 0.05$). The area under the curve of Model 3 was 0.941, which had higher recognition efficiency than the other two models (each $p < 0.05$) and was rated as better in finding the T2DM of obese patients.

Conclusion: Obese subjects with T2DM had more pronounced ectopic fatty deposits in the abdominal organs, particularly in the liver and pancreas. A comprehensive diagnostic model combining patient clinical risk factors with MRI parameters has superior efficacy in finding the occurrence of T2DM in obese patients.

PU-0148

基于多参数 MRI 的影像组学模型预测 LARC 患者对 nCRT 的反应性

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目标: 结直肠癌是世界上第三大常见恶性肿瘤。目前, 新辅助放化疗(nCRT)加全直肠系膜切除术(TME)被认为是局部晚期直肠癌(LARC)的推荐治疗方案。然而, nCRT 治疗 LARC 后的治疗结果差异很大。如果在 TME 之前能够准确检测到不良反应者, 则更适当的治疗策略, 如及时手术和广泛手术, 可能是不良反应者的良好选择, 以避免无效地使用高剂量辐射或高剂量化疗药物。影像组学的最新进展表明, 它可以用于肿瘤预后和治疗指导, MRI 放射组学特征可以用于预测 LARC 患者对 nCRT 的 PCR 反应。本研究目的即利用基于多参数 MRI 的影像组学模型预测 LARC 患者对 nCRT 的治疗反应。

方法: 根据入组标准回顾性纳入 80 例患者, 根据术后 TRG 分级将患者分为 GR 组(TRG0-1)与非 GR 组(TRG2-3), 将 GR 组与非 GR 组患者以 2:1 随机分配到训练集与验证集。检索患者新辅助前 2 周内的 MRI 图像, 考虑序列: T2WI、DWI 和 CE-T1WI, 提取 GR 组与非 GR 组有差异的特征 ($P<0.05$), 随机抽取 30 个样本对观察者间与观察者内提取的特征进行重复性分析—组内相关系数(ICC) >0.75 , 代表重复性良好。进行特征选择、降维、模型构建、质量评估与验证最后得到结果。结果: 提取 GR 组与非 GR 组有差异的特征 ($P<0.05$), 分析组内相关系数(ICC) >0.75 , 代表重复性良好。排除 ICC <0.75 的特征, 筛选冗余特征, 并进行充分降维后, 利用训练集中选择的特征建立影像组学模型, 建立临床模型和影像组学诺模图。得到 AUC、分类准确率、特异性、敏感性、阳性预测值(PPV)、阴性预测值(NPV)、校准曲线、决策曲线分析(DCA)等结果。

结论: 可利用基于多参数 MRI 的影像组学模型来成功预测 LARC 患者对 nCRT 的治疗反应性

PU-0149

7.0T 超高场 MRI 评估深髓静脉的临床价值

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背景: 既往基于 3.0T 的深髓静脉影像评分被认为与脑小血管病、认知功能等相关。然而受限于分辨率及磁敏感效应, 其评分是否真实反映了深髓静脉状态尚不明确。

目的: 探讨 7.0T 超高场 MRI 对深髓静脉成像的诊断价值。

方法: 本研究为前瞻性对照研究, 收集陆军军医大学第一附属医院 2022 年 5 月至 8 月招募的健康人群 47 例, 对所有受试者于同一天分别行 7.0T 和 3.0T 磁敏感加权成像 (SWI) 扫描。采用主观指标 Likert5 分量表法评估图像质量, 深髓静脉 (DMVs) 视觉四分法对 DMVs 显示质量进行评估。采用客观指标包括信噪比 (SNR) 和对比噪声比 (CNR) 对静脉图像质量进行评估。两组间比较采用 Mann-Whitney U 检验。

结果: 47 例受检人群中, 男性 25 例 (平均 $27.5\pm\text{DOI}:10.92$ 岁), 女性 22 例 (平均 $28.25\pm\text{DOI}:10.27$ 岁)。7.0T 组、3.0T 组 MRI 组图像主观 Likert5 评分具有统计学差异 [5.0 (5.0, 5.0) vs. 4.0 (3.0, 4.0), $Z=234.50$, $P<0.001$]。DMVs 视觉四分法评分具有统计学差异 [0.0 (0.0, 0.0) vs. 1.0 (1.0, 2.0), $Z=47.0$, $P<0.001$]。7.0T MRI 组图像的 SNR 值 (1.50 ± 0.35) 值低于 3.0T MRI 组 (5.45 ± 1.83), CNR 值 (7.64 ± 1.70) 高于 3.0T MRI 组 (5.44 ± 2.11), 均具有显著统计学差异 ($P<0.001$)。

结论: 相对于 3.0T MRI, 7.0T 超高场 MRI 对 DWVs 显示的图像质量较佳, 对颅内疾病的辅助诊断具有重要临床价值。同一受试者在 3.0T 与 7.0T 深髓静脉评估存在显著统计学差异, 提示我们需重新审视 3.0T 深髓静脉视觉评估结果与临床表现相关性的研究。

PU-0150

1 例非妊娠性卵巢单纯绒毛膜癌的学习体会

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患者, 女, 31 岁, 因“不规则阴道出血 5 个月, 腹痛半月”入院。外院超声: 不完全纵隔子宫; 宫腔分离并附壁低回声, 炎性改变。多次查血 β -hCG 异常升高, 最高 $>675000.00\text{mIU/L}$; Ca-125 165.80U/ml 。盆腔 MRI: 1、左附件区肿块, 考虑左卵巢滋养细胞肿瘤; 2、腹膜后多发肿大淋巴结。既往体健, 月经规律, LMP: 2023.4.16? 2021 年 3 月足月妊娠顺产 1 女。近 18 个月否认性生活。术后病理: 左卵巢绒毛膜癌, 输卵管组织。免疫组化: hPL(灶+), HCG- β (++), PLAP(灶+), Inhibin-a(++), P63(-), KI-67(60%+), SALL-4(+). STR 基因报告: 该样本 STR 等位基因位点与患者外周血 STR 等位基因位点一致, 符合非妊娠相关绒毛膜癌。

根据 2014 年 WHO 分类, NGCO 属恶性妊娠滋养细胞疾病中极为罕见的一种, 发病率约 $1/(3.7 \times 10^8)$, 在卵巢恶性肿瘤中占比 $\leq 0.6\%$ 。本例 NGCO MRI 表现: 子宫前方左附件区囊实性肿块影, 信号混杂, 呈 T2WI 高、稍高信号, T1WI 等、稍高信号, 实性成分 DWI 信号增高, 增强后实性部分中央呈类蜂窝状不均性强化。左卵巢正常结构未显示。

和以下疾病鉴别: 1、异位妊娠 直接征象可见异位孕囊, 信号混杂, T2WI 以高信号为主, 增强后囊壁见环形不均性强化; 2、葡萄胎 特征性征象是宫腔典型者呈簇状或葡萄样囊性灶, 增强后呈“蜂窝样”强化; 恶变时病灶边界不规则, 信号混杂, 可囊变、出血, 病灶多侵入肌层, 相应区域出现多发混杂血管影; 3、子宫阔韧带肌瘤伴变性 MRI 典型征象见“漩涡状”T2WI 低信号团块影, 增强后强化程度与正常肌层组织一致; 卵巢一般可见; 合并囊变时, 病灶内出现不规则 T2WI 高信号。

总结经验: 1、本例 NGCO MRI 征象无明显特异性, 结合血 β -hCG、激素和肿瘤指标等实验室检查进行诊断; 2、既往妊娠史及血 β -hCG 持续异常升高有助于诊断, DNA STR 分析可明确诊断; 3、术前评估及术后随访应行血 β -hCG 及充分的影像学检查, 以指导治疗和术后及时干预。

PU-0151

磁共振自由呼吸 star VIBE 序列和 UTE 序列在肺结节形态学征象的对比研究

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目的: 比较磁共振自由呼吸序列: 放射状容积内插屏气 (star volumetric interpolated breath-hold examination, star VIBE) 序列和螺旋超短回波时间序列 (spiral ultrashort echo time, spiral UTE) 在肺部检查中图像质量、肺结节检出及形态显示能力的差别。材料与方法: 收集 2019 年 11 月至 2022 年 9 月期间胸部计算机断层扫描 (computed tomography, CT) 发现肺结节且进行胸部磁共振 (magnetic resonance imaging, MRI) 检查患者, CT 和 MRI 检查间隔时间为 48h。MRI 检查采用 star VIBE 序列和 spiral UTE 序列进行扫描。两名放射科医师采用 5 分法独立评价两个 MRI 序列的图像质量, 及其对肺结节检出率及形态学征象的显示能力。结果: 图像质量评价方面 spiral UTE 图像的血管清晰度评分高于 star VIBE (3.74 ± 0.44 和 3.29 ± 0.73 , $P < 0.05$), 而 star VIBE 图像的运动伪影评分低于 spiral UTE 图像 (3.12 ± 0.88 和 3.64 ± 0.60 , $P < 0.05$)。在结节

的检测能力上, spiral UTE 序列的磨玻璃结节检出率高于 star VIBE 序列 (70.37%和 25.92%, $P<0.05$), 且在中下叶的结节总检出率高于 star VIBE 序列 (87.23%和 57.44%, $P<0.05$)。在结节形态学征象的检出能力上, spiral UTE 序列的分叶、毛刺、棘突、空泡和空洞检出率 (90.90%、85.71%、88.88%、100%、100%) 高于 star VIBE 序列 (86.36%、71.42%、77.77%、50%、83.33%, $P>0.05$)。结论: 对于运动伪影较大患者, 推荐使用 star VIBE 序列, 对于磨玻璃结节、中下叶结节和含气病变的患者, 推荐使用 spiral UTE 序列。

PU-0152

Multitask based Image Reconstruction for Brainstem Glioma Diagnosis and Treatment

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Objective:

In the context of brainstem glioma diagnosis, the widespread use of gadolinium-based contrast agents has raised concerns due to their potential adverse effects on kidney health. This study aims to generate post-contrast-enhanced images from multi-modal data, as a substitute for contrast agents, ultimately reducing the contrast agent burden on the patient.

Method:

To achieve this goal, we conducted experiments on a dataset consisting of thirty cases, each containing multi-modal data (T1w, T2w, ASL, and post-contrast T1w images) along with manually annotated lesion regions. Our approach involved training an adversarial generative network using paired T1w, T2w, and ASL images to synthesize post-contrast T1w images. To enhance training efficacy, we introduced a segmentation task as an auxiliary objective, building a multi-task deep learning model. This model employs a shared encoder and multiple parallel decoders to yield results comparable to baseline methods while accommodating the diverse requirements of clinical diagnosis.

Results:

For quantitative evaluation, we utilized two metrics to assess the synthesized CE-T1w images against the target CE-T1w images: Structural Similarity Index Measurement (SSIM) and Peak Signal Noise Ratio (PSNR). The synthesized CE-T1w images achieved a PSNR of 25.21 ± 2.29 and an SSIM of 0.84 ± 0.05 , surpassing the results of the method proposed by Wang et al. (PSNR of 25.09 ± 0.85 , SSIM of 0.83 ± 0.06). Qualitatively, our approach outperformed the baseline model, Wang et al., in generating more realistic CE-T1w images. Furthermore, our method effectively enhanced the contrast at brainstem glioma region in the synthesized images.

Conclusion:

The proposed multi-task generative model incorporates an attention mask generated using a mask followed by a sigmoid layer. Our results illustrate that the attention map plays a crucial role in synthesizing CE-T1w images with distinct brainstem glioma regions. However, there is room for improvement in the quality of synthesized CE-T1w images. This work demonstrates the multi-task strategy for CE-T1w MR synthesis in brainstem glioma and its potential to other tumor applications.

PU-0153

基于常规 MRI 纹理分析预测原发性肝癌体外放疗短期疗效

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摘要:

目的: 基于常规磁共振 (magnetic resonance, MR) 图像的纹理分析预测原发性肝癌体外放疗的短期局部疗效。

方法: 选取 2015 年 1 月至 2020 年 10 月期间在中南大学湘雅三医院住院的 54 例接受放射治疗的原发性肝细胞癌 (hepatocellular carcinoma, HCC) 患者。收集患者的一般资料, 所有患者在治疗前均接受肝脏常规 MRI 检查, 包括 T1WI 平扫及增强、T2WI 序列。放射治疗后 2-3 个月内进行临床随访, 进行腹部增强 MRI 或 CT 检查。将患者治疗后的情况根据改良的实体瘤反应评估标准 (modified response evaluation criteria in solid tumors, mRECIST) 分为有反应组与无反应组。对治疗前的病灶进行定量及定性分析, 并勾画感兴趣区域 (region of interest, ROI), 提取并筛选图像的纹理特征, 对提取出的特征进行 logistic 回归分析, 建立预测模型, 分析模型的预测效能。

结果: 从患者治疗前的常规 MR 图像中筛选出 4 个有代表性的特征, 并将此 4 个特征纳入最终的 logistic 模型, 使用受试者工作特征曲线 (receiver operating characteristic curve, ROC) 来评估模型的预测效能, 最终模型的曲线下面积 (area under curve, AUC) 及上下 95%CI 为: 0.815 (0.700 0.931), 混淆矩阵计算特异度 76.7%, 敏感性 70.8%。单独对 4 个变量进行 ROC 分析, auc 分别是: auc(roca): 0.6278; auc(rocb): 0.6736; auc(rocc): 0.6868; auc(rocd): 0.6701。

结论: 基于 HCC 患者放射治疗前的常规 MR 图像的纹理特征建立的 logistic 模型能够有效预测患者放疗后的短期局部疗效; 并且将 4 个变量组合起来建立的模型的预测效能高于任何一个变量的单独预测效能。

PU-0154

基于 MRI 灰度共生矩阵技术分析颞下颌关节紊乱病患者髁突骨质的纹理特征

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目的: 通过 MRI 灰度共生矩阵技术分析 TMD 患者髁突骨质改变的纹理特征。方法: 对 2019 年 3 月至 2022 年 3 月于解放军总医院海南医院就诊的 120 例 TMD 患者 (平均年龄 27.9 ± 12.3 , 男/女 = 36/24) 进行 TMJ 磁共振检查, 根据关节盘情况分为正常组 (50 例)、可复性关节盘移位组 (35 例) 及不可复性关节盘移位组 (35 例)。采用灰度共生矩阵技术在闭口位斜矢状位 PDWI 序列分析髁突骨质的纹理特征, 主要评估参数包括角二阶矩、对比度、自相关、逆差矩及熵。采用 Kruskal-Wallis H 检验、单因素方差分析及受试者工作特征曲线分析各项纹理特征参数差异。结果: 髁突骨质的纹理特征参数角二阶矩和熵的组间比较有统计学意义 (P 角二阶矩 = 0.000, P 熵 = 0.000), 对比度、自相关及逆差距无统计学意义 (P 对比度 = 0.503, P 自相关 = 0.288, P 逆差距 = 0.147); 其中角二阶矩和熵在鉴别 NC 组与 DDwoR 组 (P 角二阶矩 = 0.000, P 熵 = 0.000)、DDwR 组与 DDwoR 组有统计学意义 (P 角二阶矩 = 0.007, P 熵 = 0.005), 在鉴别 NC 组与 DDwR 组无统计学意义; ROC 曲线分析证实纹理特征参数角二阶矩鉴别 NC 组与 DDwoR 组的曲线下面积为 0.75, 截断值为 1.50×10^{-3} , 灵敏度及特异度分别为 54.30% 及 90.00%; 鉴别 DDwR 组与 DDwoR 组的曲线下面积为 0.71, 截断值为 1.50×10^{-3} , 灵敏度及特异度为 54.30% 及 88.60%。熵鉴别 NC 组与 DDwoR 组的曲线下面积为 0.75, 截断值为 6.49, 灵敏度及特异度分别为 51.40% 及 94.00%; 鉴别 DDwR 组与 DDwoR 组的曲线下面积为 0.72, 截断值为 6.72, 灵敏度

及特异度分别为 60.00%及 82.90%。结论: 纹理特征参数角二阶矩及熵可以初步用以评估早期 TMD 患者髁突骨质的改变。

PU-0155

失独所致创伤后应激障碍患者的脑结构研究

刘想

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目的: 为了解失独所致创伤后应激障碍 (Post traumatic stress disorder, PTSD) 患者在大脑结构方面的变化, 本研究运用磁共振脑功能成像技术对失独所致 PTSD 患者各脑区的大脑灰质体积进行了比较和分析。

方法: 选择来自中国江苏省失独的父母 106 例, 根据受试者是否伴 PTSD 将其分为 PTSD 组(45 例)和 NPTSD 组(61 例), 同时纳入健康志愿者 30 例 (HC 组)。采用临床用 PTSD 诊断量表 (Clinician Administered PTSD Scale, CAPS) 评估受试者临床症状的严重程度。采集受试者静息状态脑功能 MRI 数据。运用 Freesurfer 软件处理受试者的 MRI 扫描数据, 计算全脑灰质体积。使用 SPSS 27.0 软件进行统计分析。

结果: 经过统计学分析, 三组受试者的年龄、性别、受教育年限相匹配。PTSD 组以及 NPTSD 组的 CAPS 评分显著高于 HC 组, PTSD 组的 CAPS 评分稍高于 NPTSD 组。运用 Freesurfer 软件处理分析的结果显示, 与 HC 组相比, PTSD 组以及 NPTSD 组双侧海马体积减少, 而 PTSD 组减少的更多。

结论: 本研究发现, PTSD 患者的双侧海马体积明显减少, 这提供了 PTSD 大脑结构变化的重要信息, 并可能有助于阐明其病理生理学的机制。

PU-0156

颞下颌关节磁共振影像诊断结构化报告的构建

武玫

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磁共振成像技术是评估颞下颌关节的首选技术, 传统的影像诊断报告系统缺乏统一的模块管理, 本文详细介绍了解放军总医院海南医院的颞下颌关节核磁结构化图文报告系统, 通过对 2019 年 11 月至 2023 年 1 月于我中心就诊的共 175 例 350 侧行 TMJ 检查的患者, 应用 TMJ MRI 影像结构化图文报告系统, 依据扫描模式, 详细阐述了颞下颌关节的各项评估参数, 通过对关节盘、髁突、关节腔积液以及翼外肌 4 个主要模块进行评估, 包括数据输入模块和图文报告板块两部分, 数据输入模块主要对以上 4 个评估参数进行量化, 具体数据输入结合影像报告系统进行, 各项评估参数输入后自动生成图文报告, 通过对诊断报告书写过程中重点描述的内容以及核心诊断内容的描述, 提高影像报告质量及临床应用价值。

PU-0157

基于规范化增强的 MRI 影像组学列线图术前预测子宫内膜癌淋巴血管间隙侵犯

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目的: 构建基于规范化增强的 MRI 影像组学列线图, 探讨其术前预测子宫内膜癌 (EC) 淋巴血管侵犯 (LVSI) 的价值。方法: 回顾性分析 157 例子宫内膜癌患者术前盆腔 MRI 检查及临床资料, 按照 7:3 的比例, 随机分为训练集和验证集。从 CE-T1WI、T2WI、DWI 和 ADC 图中提取影像组学特征。利用最小相关最大冗余性 (mRMR) 算法和递归特征消除 (RFE) 选择特征, KNN(K-Nearest Neighbor) 算法构建组学模型。采用多变量 logistic 回归分析, 结合 Rad-score 和临床危险因素, 构建列线图, 比较影像组学特征、临床危险因素和列线图对 LVSI 的预测效能。结果: 1781 个影像组学特征经 mRMR 和 RFE 算法筛选出 12 个影像组学特征并计算 Rad-score。单因素和多因素 logistic 回归分析发现 CA125、肿瘤级别以及 Rad-score 为 LVSI 的危险因素。训练集和验证集中影像组学模型的预测性能为 0.83 (95%CI: 0.76–0.91) 和 0.78 (95%CI: 0.65–0.91); 临床模型的预测性能分别为 0.83 (95%CI: 0.72–0.93) 和 0.75 (95%CI: 0.55–0.95); 列线图预测性能分别为 0.90 (95%CI: 0.84–0.97) 和 0.86 (95%CI: 0.72–1.00)。列线图对 LVSI 具有较高的预测效能, 并且净分类指数 (NRI) 和总综合鉴别指数 (IDI) 证实列线图优于临床模型。结论: 基于规范化增强的 MRI 影像组学列线图可用于术前预测 EC LVSI。

PU-0158

乳腺 MRI T2 加权 fs 序列在评估瘤周水肿作为乳腺癌侵袭性预测标志物中的作用: 一项回顾性单中心研究结果

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目的: 探讨 MRI T2-STIR 序列评估的肿瘤周水肿对浸润性乳腺癌患者的无病生存期和总生存期的预测作用。

方法和材料: 我们对 107 例经活检证实的浸润性乳腺癌患者 (平均年龄: 53 岁) 进行了回顾性研究, 这些患者于 2010 年 1 月至 2011 年 7 月在 1.5T 扫描仪上进行了术前乳腺 MRI 检查。影像学检查由两位放射科医生共同进行, 根据 T2-STIR 图像上肿瘤周围信号强度的程度来评估肿瘤周围水肿。MRI 协议包括对比前 T2-STIR 图像、DWI、动态 GRE T1 图像注入对比剂前后以及减法技术。根据 T2-STIR 序列上是否有瘤周水肿, 我们将患者分为两组。我们回顾性收集了其他病变特征, 如大小、组织学、分子模式、阳性淋巴结有无和手术类型。采用 kaplan - meier 曲线对无病生存期和总生存期进行统计分析。

结果: 纳入研究的患者中位随访时间为 7.7±1.3 年。MRI 检查发现 107 个病灶中 52 个 (48.9%) 瘤周水肿。本组 9 例复发, 第二组 4 例无瘤周水肿。Kaplan-Meier 检验两组患者无病生存期差异无统计学意义 (p=0.11)。在瘤周水肿组, 总生存时间比另一组低 (p=0.045)。

结论: MRI T2-STIR sequences 检测到的瘤周水肿可被认为是预测较差生存结局的有效辅助特征。

局限性: 小样本, 单中心研究。

PU-0159

扩散峰度磁共振成像与动态增强磁共振成像在头颈部肿瘤良恶性鉴别价值

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目的: DKI 和 DCE-MRI 在鉴别头颈部病变良恶性及亚组中的诊断价值。

方法: 入组病例 80 例患者 (共 40 例良性、40 恶性), 分为 4 个亚组。扫描方法: 在 3.0T MR scanner (Ingenia,philips) 上采用单次回拨平面 DKI 序列 (4 个 b 值, 0、500、1000、

1500) 的 DKI 与 DCE-MRI 的增强 T1 高分辨率各向同性体积激发序列。DCE-MRI 采集参数为 (TR=16;TE=3.4;层厚=3mm; FOV=240 180 采集时间 7s) 评估方法: 测量来自 DKI 的平均扩散率(MD)和平均峰度(MK)以及基于 DCE-MRI 的时间信号强度曲线(TIC)、峰值时间(Tpeak)和流出比(WR)。计算并比较了 DKI 和 DCE-MRI 单独和联合的诊断效率。定量数据表示为平均值 \pm 标准偏差。Mann-WhitneyU 检验用于比较良性和恶性病变之间的 MD、MK、Tpeak 和 WR。对两组间 TIC 类型进行卡方检验。四个亚组的 DKI 和 DCE-MRI 参数通过单因素方差分析(ANOVA)。

结果: TIC、DKI 和 DCE-MRI 参数的组合用于区分良性和恶性病变的准确率为 94.94%, 优于单独的 DKI 或 DCE-MRI, 准确率约为 75%。MD、MK、Tpeak 和 WR 在四个亚组之间显示出显著差异。结论 DKI 和 DCE-MRI 可以区分头颈部区域的良性和恶性病变, DKI 和 DCE-MRI 衍生参数的组合可以提高诊断准确性。此外, DKI 和 DCE-MRI 可以区分头颈部病变的四个亚组。

PU-0160

以功能性脑核磁探索针灸得气感和疼痛感的脑中枢反应对比

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【摘要】目的: 引用循证医学的工作原则指导传统针灸学的临床和科研, 才能形成与国际学术交流的共同语言, 才得到国际的认同, 传统针灸学才能在世界舞台上大放异彩。基于前人研究, 方法: 本文首先回顾了针灸与得气在临床上上的理论, 得气在传统理论的概念。其次, 我们回顾了前人的针灸 MRI 研究, 在总结前人 MRI 文献基础上, 本文倾向于认为, 正激活为主导的模式应该是得气的响应模式。基于这些问题的改进, 本文使用健康被试, 分析了得气组被试与锐痛组被试的大脑活动模式特征, 并比较了两组之间的异同。结果: 了这些研究中发现的得气在大脑中枢神经的模式, 主要理论: 与中枢正激活为主的得气响应。结论: 本研究认为, 得气的大脑活动是正激活响应为主, 对比表明针灸的针感和疼痛在脑中枢反应对比不同。

PU-0161

正常成年人嗅球相关 MR 研究

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目的: 探讨成年人嗅球的 MR 扫描及体积测量方法, 初步建立正常成年人嗅球的体积范围。

方法: 将 60 例 31 岁-50 岁健康志愿者按年龄分成 2 组, 低龄组为 31-40 岁, 高龄组为 41-50 岁, 采用 MR T1 IR 序列扫描, 手动测量双侧嗅球体积、最大面积、最大面高度及宽度、嗅球信号及嗅

沟深度, 评估嗅球形态 (是否存在凹面), 了解嗅球及嗅沟正常参考值及随年龄变化的情况, 比较双侧及两性之间嗅球体积差异。

结果: 不同年龄组嗅球体积及嗅沟深度经比较差异具有统计学意义($P=0.048$ 及 $P=0.032$); 高龄组两性间嗅球体积经比较差异具有统计学意义($P=0.041$)。

结论: MR T1 IR 序列能清晰的显示嗅球轮廓, 可用于嗅球的体积测量研究。随年龄的增长, 嗅球体积逐渐减小, 嗅沟深度逐渐加深; 不同于男性, 女性嗅球缩小幅度较小。

PU-0162

颈内动脉发育异常的高分辨磁共振管壁成像特点

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目的: 探讨颈内动脉发育异常的临床和高分辨磁共振管壁成像 (HR-VWI) 特点。方法: 收集 6 例经影像学确诊的颈内动脉发育异常患者, 分析其临床和影像学资料, 并复习总结相关文献。结果: 6 例患者中 4 例为男性, 2 例为女性, 年龄 31~64 岁, 中位年龄 52.5 岁。就诊原因分别为头痛、头痛或肢体无力 4 例, 一过性晕厥 1 例, 静止性震颤伴行动迟缓 1 例。6 例均为单侧, 其中 3 例颈内动脉发育不良患者于 HR-VWI 上表现为颈内动脉起始处以远全程管径纤细, 管壁未见明显增厚及强化。3 例颈内动脉发育不全患者, 颈内动脉起始处均可见显影, 病例 1 和 5 起始处以远延续为线样软组织样结构, 分别止于海绵窦段和颈段, 病例 6 起始处以远缺如。颅内伴动脉夹层、动脉瘤、发育不良、异常血管网等多种血管异常。结论: 颈内动脉发育异常在高分辨磁共振管壁成像上有一定特征性, 且 HR-VWI 能够有效评估颅内侧枝代偿及其合并的血管异常。

PU-0163

Traumatic spinal cord injury of fMRI: neuroimaging biomarkers

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Objective:

spinal cord injury is accompanied by a series of sensory and motor dysfunction.① evolution of injury center, ②progressive spinal cord atrophy, ③progressive craniocerebral atrophy.

The most prominent features of traditional spinal cord MRI: MRI sagittal T2-weighted images include hemorrhage, cytotoxic edema and spinal cord swelling.

Quantitative MRI: provides indicators of the integrity of the spinal cord and brain, reflecting atrophy, demyelination, and iron deposition.

fMRI: can reflect the plasticity of the brain and spinal cord. Indirect quantification, and being able to present task-dependent oxygen consumption levels indirectly related to neuronal activity. rs-fMRI of the injured spinal cord can show the change or loss of the connection between the injured spinal cord and other parts of the spinal cord.

This study aims to explore the correlation between the changes of brain function and clinical parameters after traumatic spinal cord injury (TSCI) by fMRI.

Methods:

clinical indicators: nerve injury was evaluated by the International Standard for Neurological Classification of Spinal Cord injury (ISNCSCI). Lower limb motor score (LEMS), light tactile score (LELT) and acupuncture score (LEPP) were obtained.

The resting fMRI of the patients was collected and the appropriate seed points were selected for functional connection analysis of the whole brain. The correlation between fMRI index and clinical index was determined by regression analysis.

Results:

the abnormal changes of resting state indexes such as FC mostly occurred in the brain regions related to sensation or movement, and had a strong correlation with clinical indexes.

Conclusion:

there may be abnormal changes in brain function after traumatic spinal cord injury, and this change may be closely associated with a series of sensory and motor dysfunction in patients with traumatic spinal cord injury.

PU-0164

经介入术后新的缺血性脑病变与高分辨率磁共振成像的斑块特征相关性分析

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背景: 目前, 症状性颅内动脉粥样硬化性狭窄的经皮腔内血管成形术和支架置入术后, 新发缺血性脑病变 (NIBL) 的发生率很高。然而, 关于高分辨率磁共振成像 (HRMRI) 上的斑块特征是否影响介入术后 NIBL 的发生, 人们知之甚少。

目的: 探讨 HRMRI 斑块特征对有症状脑缺血性病变患者介入术后早期 NIBLS 的预测价值。

方法: 连续纳入 2020 年 1 月至 2022 年 12 月期间接受治疗的近期因颅内大动脉重度狭窄或闭塞而导致 TIA 或卒中的患者。患者接受治疗前 HRMRI 来评估斑块特征, 并接受治疗后磁共振弥散加权来识别 PTAS 后的 NIBL。斑块特征包括斑块内出血 (IPH)、斑块对比度增强、斑块偏心率、斑块表面不规则性和管腔狭窄程度。通过单变量和多变量分析研究了 NIBL 与斑块特征以及临床参数之间的关联。

结果: 本研究纳入了 126 名连续患者 (平均年龄 73 岁)。总共 54.8% (126 名患者中的 69 名) 在 PTAS 后出现 NIBL。在斑块特征分析中, NIBL 患者具有较高的狭窄程度 (79% vs 74%, $p=0.025$)、较高的 IPH 存在 (48% vs 27%, $P<0.001$) 和较高的斑块强化频率 (48% vs 32%, $P=0.005$) 比较了非 NIBL 患者。在多变量分析中, 斑块增强 2 级是 PTAS 后 NIBL 的唯一独立预测因子。 (OR 9.68, 95% CI 3.43-27.36, $p<0.001$)。

结论: HRMRI 上的颅内动脉粥样硬化斑块对比增强 2 级与症状性 ICAS 介入术后的早期 NIBL 独立相关, 表明血管内治疗中斑块易损性更高, 缺血性卒中风险增加。

PU-0165

上皮样滋养细胞肿瘤 1 例并文献复习

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目的 探讨上皮样滋养细胞肿瘤(ETT)的影像特征, 以提高对该肿瘤的认识。

方法 回顾性分析 1 例经病理证实的 ETT 的临床表现、影像及病理资料, 并复习相关文献。

结果 患者剖宫产术后阴道不规则出血, 血清 β -HCG 轻度升高约 339.43 mIU/ml (正常值 ≤ 5 mIU/mL)。超声示 ETT 低回声包块, 彩色多普勒血流成像 (CDFI) 示包块周边有血流信号。盆腔

CT 示子宫直肠陷窝内团块状软组织密度影，增强呈不均匀强化。MRI 示病灶边界清楚，呈混杂长 T1 长 T2 信号，内伴条片状短 T1 短 T2 信号；病灶弥散明显受限，增强扫描病灶不均匀渐进性强化，但各期强化程度均低于子宫肌层。

结论 妊娠后血清 β -HCG 升高患者，要考虑滋养细胞来源肿瘤；病灶边界清楚合并出血信号，弥散受限并渐进性强化，无论肿瘤位置在何处，都要考虑到 ETT 的诊断。

PU-0166

误诊为颅咽管瘤的垂体母细胞瘤 1 例分析并文献复习

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【摘要】回顾性分析 1 例垂体母细胞瘤误诊为颅咽管瘤病例的临床、影像、病理资料及诊治经过，以提高鞍区病变的鉴别诊断能力。本例患者年龄为 2 岁，以右侧下肢无力 2 周，右侧上肢无力 3 天为主诉入院，无明显诱因出现走路不稳，无哭闹、跌倒，无发热、头痛、呕吐，无抽搐、惊厥。右侧膝、跟腱反射稍减弱，右侧 Babinski 征可疑阳性。功能评价显示为中枢性尿崩症和垂体前叶功能低下。磁共振表现为鞍内及鞍上囊实性占位，诊断为颅咽管瘤。经手术切除后病理诊断为垂体母细胞瘤。对于年龄较小，鞍内及鞍上占位，疑诊为颅咽管瘤或垂体瘤的患者，应及时行活检或手术以明确诊断。

PU-0167

T2 Flair 流动伪影解决方法

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目的:

3.0T MRI 常规 2D FLAIR TSE 成像脑脊液伪影明显，影响诊断。3D FLAIR TSE 成像可以有效抑制脑脊液流动伪影，但扫描时间长，影响临床应用，结合压缩传感技术可以大大缩短扫描时间。本研究旨在比较 3D FLAIR 与压缩传感技术相结合的脑脊液流动伪影和图像质量评估。

方法和材料

前瞻性纳入 56 名受试者（平均年龄 38.2 岁，年龄范围 22-75 岁，24 名女性，32 名男性）进行 3.0T MRI（Philips, Ingenia CX）液体衰减反转恢复（FLAIR）成像。所有患者均接受常规头部扫描、2D FLAIR TSE 成像和 3D FLAIR TSE 成像，两种成像方法的分辨率与时间一致。将图像传送到后处理工作站，两名放射影像诊断专家使用 5 分制对图像进行主观评分评估。测量两组图像的信噪比、CNR、CR 和脑脊液流动伪影。通过 Friedman 检验比较传统 2D FLAIR 和 3D FLAIR CS 的图像质量主观评分，并通过两样本 T 检验比较 SNR、CNR 和 CR 之间的差异。

结果

3D FLAIR CS（图 1）的整体成像质量明显优于传统 2D FLAIR，3D FLAIR CS（B 组）和传统 2D FLAIR（A 组）序列的采集时间相同。B 组对脑脊液伪影的抑制作用优于 A 组（ $U=3.66$ ， $P<0.01$ ）；B 组在信噪比方面优于 A 组（ $P<0.05$ ）；B 组的对比噪声比优于 A 组（ $P<0.05$ ）；B 组优于 A 组（ $P<0.05$ ）。与传统的 2D FLAIR 相比，3D FLAIR CS 伪影明显减少，尤其是脑干前部伪影（得分高 54 分），总体图像质量更好。定量评价结果表明，3D FLAIR CS 序列的平均信噪比、CNR、CR 值均优于传统的 2D FLAIR 序列。

结论

与传统的 2D FLAIR 序列相比, 3D FLAIR CS 在抑制脑脊液流动伪影方面具有明显的优势。图像质量和诊断性能也优于传统的 2D FLAIR 图像。这些发现有望帮助脑梗死、脱髓鞘病变和听觉神经瘤病人的明确诊断。磁共振三维成像模式和厚层采集方法与压缩传感技术相结合, 能有效抑制 T2 FLAIR 流动伪影。在相同的扫描时间内, 图像质量可以满足诊断要求。

PU-0168

The study of MRI in the evaluation of the posterior fossa cistern of fetus in the mid and late pregnancy

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Objective: As a more and more popular supplementary means of prenatal imaging examination, MRI had more advantages over ultrasound in the discovery of posterior fossa cistern (PFC) abnormalities and other brain abnormalities. This paper discussed the clinical value and significance of MRI in the evaluation of PFC of fetus by retrospectively analyzing the MRI findings of fetal PFC widening cases in mid and late pregnancy.

Materials and methods:

General materials: Cases of prenatal MR examination in Xuzhou Central Hospital in recent 4 years were selected. 123 cases of middle and late pregnancy with widened posterior fossa cistern were diagnosed, of which 123 cases had prenatal ultrasound examination in our hospital within 1 week. The age of pregnant women were 21 ~ 36 years old and the gestational weeks were 23 ~ 37 weeks. There were 98 cases of fetal head position, 23 cases of breech position and 2 case of foot position.

Research methods: The MR machine was superconducting philips 1.5T, adopted fast imaging sequence. The fetal head was scanned in axial, coronal and sagittal plane after secondary positioning. The imaging sequence was 2D balance FFE (two-dimensional balanced steady-state fast field echo sequence), FOV30~35, layer thickness of 4.0mm, layer spacing of 0mm, turning angle of 60°, TR/TE 7/1.84ms, matrix208×238, NSA 2, scanning time 33~42s.

Measurement standard of PFC: the width of PFC was measured as the maximum vertical distance from the midpoint of cerebellar vermis to the inner edge of skull. At least two MR diagnostic and prenatal diagnostic doctors jointly judge the results of MR examination, and make comparative analysis after obtaining the same results.

Statistical method: SPSS23.0 statistical software was used for statistical analysis. Kappa correlation coefficient was used to analyze the correlation of the number of various lesions detected between MRI and US. $K \leq 0.2$ indicated poor correlation, $k \leq 0.2-0.4$ indicated general correlation, $k \leq 0.4-0.6$ indicated medium correlation, $k \leq 0.6-0.8$ indicated strong correlation, and $k \leq 0.8-1.0$ indicated very strong correlation. McNemar test was used to test the difference of the number of various lesions detected between MRI and US. $P < 0.05$ was a significant difference, and $P < 0.01$ was a very significant difference.

Results:

MRI diagnosis showed 123 cases of PFC widening, 53 cases of simple PFC widening; 78 cases of PFC with lateral ventricular dilatation(LVD); 35 cases of PFC with subarachnoid space widening; 1 case of PFC with Holoprosencephaly (lobar type); 4 cases of PFC with cerebral hypoplasia; 3 cases of PFC with cerebellar hypoplasia; 18 cases of atypical Dandy Walker malformation(DWM), 2 cases of DWM; There were 9 cases of PFC with arachnoid cysts, including 6 cases of arachnoid cysts in the PFC; 3 cases of Blake cyst, 1 case of atypical Blake cyst; 4 cases of PFC with corpus callosum(CC) hypoplasia; 2 cases of PFC with lateral brain perforation malformation(LCPM); 4 cases of PFC with subependymal cyst of lateral ventricle(SCOLV).

US diagnosis showed 66 cases of PFC widening, 38 cases of simple PFC widening; 34 cases of PFC with LVD; 0 cases of PFC with subarachnoid space widening; 0 cases of PFC with

Holoprosencephaly (lobar type); 0 cases of PFC with cerebral hypoplasia; 0 cases of PFC with cerebellar hypoplasia; 3 cases of atypical DWM; 1 case of DWM; 0 cases of PFC with arachnoid cyst; 0 cases of Blake cyst, 0 cases of atypical Blake cyst; 0 cases of PFC with CC hypoplasia; 0 cases of PFC with lateral cerebral perforating malformation; 1 cases of PFC with SCOLV.

In the cases with consistency between US and MRI, 66 cases had PFC widening, K value was 0.463, and the correlation degree was medium; Simple PFC widening in 32 cases, K value 0.122, the correlation degree was poor; 32 cases of LVD, K value 0.358, the degree of correlation was general; There were 3 cases of atypical DWM with K value of 0.122, and the correlation degree was poor; 1 case of DWM, K value 0.008, with poor correlation; 1 case of SCOLV, K value 0.024, the correlation was poor.

In the McNemar test between US and MRI, PFC width and subarachnoid space was P value < 0.001 ; Atypical DWM and arachnoid cyst was P value < 0.01 ; Simple PFC widening, cerebral hypoplasia and CC hypoplasia was P value < 0.05 ; The other diseases was P value > 0.05 .

Conclusions:

MRI could accurately measure the widening degree of fetal PFC in mid and late pregnancy comparing with ultrasound, and could also find some accompanying structural abnormalities of cerebellum and brain. Prenatal MRI could improve the accuracy of diagnosis of fetal central nervous system (CNS) malformations, and provide a reliable basis for fetal brain development monitoring and prognosis judgment. Therefore, the application of fetal MRI in mid and late pregnancy has important clinical significance to improve the quality of prenatal diagnosis.

PU-0169

ADC 值在预测前列腺癌 Gleason 分级中的价值

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目的: 探讨 ADC 值对前列腺癌 (Prostate Cancer, PCa) 的诊断效能及与预后相关的格里森评分 (Gleason Score, GS) 的相关性。

材料与方法: 收集 7423 名前腺受检者的磁共振图像和相关临床数据进行回顾性分析, 筛选出 $GS \leq 7$ 的病例。测量病灶的 ADC 值, 并使用受试者工作特征 (Receiver Operating Characteristic, ROC) 曲线来确定 PCa 的 ADC 阈值, 并记录对应的曲线下面积 (Area Under the Curve, AUC), 比较不同 GS 之间的 ADC 差异, 分析 ADC 在 PCa 诊断中的效能, 以及 ADC 值和 GS 之间的相关性, 同时, 比较平均表观扩散系数值 (mean ADC, ADCmean) 和最小表观扩散系数值 (minimum ADC, ADCmin) 的诊断效能。

结果: 纳入 1051 例患者, 病灶总数为 1202 处, 其中 638 例为 PCa (53.08%), 564 例为良性病变 (46.92%)。良性病变组的 ADCmin 及 ADCmean 明显高于 PCa 组, 差异具有统计学意义 ($P < 0.01$)。GS 4+3 组的 ADCmin 及 ADCmean 显著低于 GS 3+4 组、GS 3+3 组和良性组, 差异均有统计学意义 ($P < 0.01$)。诊断 PCa 的 ADCmin 和 ADCmean 的 AUC 分别为 0.911、0.972, 诊断界值分别为 $0.703 \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $0.896 \times 10^{-3} \text{ mm}^2/\text{s}$ 。ADCmin、ADCmean 与 GS 呈负性相关 ($\rho = -0.764$, $P < 0.001$; $\rho = -0.845$, $P < 0.001$)。

结论: ADC 值与 PCa 侵袭性呈负相关, 对 GS 3+4、GS 4+3 病灶具有较高的鉴别诊断价值, 敏感度、特异度高, 且 ADCmean 的诊断价值更高, 可对 PCa 生物学特性进行有效的术前评估, 辅助临床医师制订治疗方案。

PU-0170

长期吸烟对男性大脑灰质结构影响的磁共振成像评价

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应用基于体素的形态学分析(VBM)方法评价长期吸烟对男性吸烟者脑灰质结构改变的影响。方法 2014 年 8 月至 2016 年 8 月采用西门子 Skyro3.0T MRI 扫描仪对 50 名长期吸烟者和 37 名不吸烟的健康志愿者进行扫描,受试者均进行常规 MRI(以排除颅内病变)序列及 3D-T 结构像(3D-mprage)序列扫描。结构像数据采用基于 Matlab 平台的 SPM8 预处理统计学分析采用 SPM8 软件,对两组资料进行独立样本检验将两组的灰质差异区和吸烟资料做 Spearman 相关分析。结果 吸烟组双侧丘脑,右侧缘上回、左侧缘上回和左侧壳核灰质体积分别为(0.55 0.07)(0.40 +0.05),(0.48 0.07)和(0.140.4)体素,对照组相应脑区灰质体积分别为(0.61 0.09)(0.43 :0.06),(0.54 0.07)和(0.16 0.03)体素,吸烟组均低于对照组($t = -3.81, -3.51-3.86-2.33$ 均 $P < 0.05$),族系误差校正($P < 0.5$)。双侧丘脑、右侧缘上回左侧壳核灰质体积与吸烟指数呈负相关($r = -0.368-0.1890.274$,均 $P < 0.05$)且与吸烟年限也呈负相关($r = -0.391-0.221, -0.355$ 均 $P < 0.05$),双侧脑灰质体积还与日吸烟量负相关($r = 0.186P < 0.05$)。结论 吸烟者脑灰质结构的改变主要集中在奖励相关通路及边缘系统,且与吸烟的累积量部分相关。

PU-0171

Brain Alterations of Regional Homogeneity, Degree Centrality and Functional Connectivity in Carotid Vulnerable-plaque Patients with Neither Clinical Symptoms nor Routine MRI Lesions: A Resting-state fMRI Study

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Aims: Based on resting-state functional MRI (fMRI), we preliminarily explored brain alterations in asymptomatic patients with carotid vulnerable plaques but carotid stenosis $< 50\%$.

Methods: A total of 58 asymptomatic patients with carotid vulnerable plaques (stenosis $< 50\%$) and 38 healthy controls were recruited. Between-group differences in regional homogeneity (ReHo), degree centrality (DC), and functional connectivity (FC) were analyzed. Correlation analysis was performed between the ReHo or DC values in altered brain regions as well as voxel-wise abnormal FC and scores on neuropsychiatric scales, serum interleukin-6 (IL-6) and C-reactive protein (CRP).

Results: Both ReHo and DC values on the left superior occipital gyrus (SOG.L) of the asymptomatic carotid vulnerable plaque group reduced regardless of plaque location (left, right or bilateral). Functional connections weakened between SOG.L and right lingual gyrus (LING.R)/right inferior occipital gyrus (IOG.R), right middle frontal gyrus (MFG.R)/orbital part superior frontal gyrus (ORBsup.R)/orbital part middle frontal gyrus (ORBmid.R), left precentral gyrus (PreCG.L)/postcentral gyrus (PoCG.L), PreCG.L, left supplementary motor area (SMA.L), right paracentral lobule (PCL.R), left precuneus (PCUN.L), and right postcentral gyrus (PoCG.R)/PCL.R. In ReHo-altered brain regions, ReHo values were positively correlated with Hamilton Rating Scale for Depression (HAMD) scores, and setting region of abnormal ReHo as seed points, voxel-wise FC between SOG.L and PreCG.L was negatively correlated with CRP.

PU-0172

PI-RADS 2.1 版和 2.0 版在 5 位不同经验阅片者间评分一致性及对移行带前列腺癌诊断效能的比较

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目的: 探讨 5 位不同经验的前列腺 MRI 诊断医师应用基于双参数 MRI (bp-MRI) 的不同版本前列腺影像报告和数据系统 (PI-RADS v2.1 和 v2.0) 比较移行带 (TZ) 前列腺癌 (PCa) 和临床显著癌 (cs-PCa) 的评分一致性及诊断效能。方法: 回顾性分析 2017 年 1 月至 2020 年 3 月在我院经直肠超声前列腺穿刺活检前进行 bp-MRI 检查的 355 例移行带可疑病变患者。5 位具有不同经验 (1 年、2 年、3 年、5 年和 8 年) 的阅片者参照 PI-RADS v2.1 和 v2.0 评分标准, 对所有图像进行“双盲”评分。运用加权 Kappa 检验和 Kendall's W 检验评估每个版本不同评分者间对图像判读结果的一致性。运用受试者工作特征曲线下面积 (AUC) 评估 PI-RADS v2.1 和 v2.0 对移行带 PCa 和 cs-PCa 的诊断效能并进行比较。结果: 采用 PI-RADS v2.1 方案, 所有阅片者之间具有较强的评分一致性 (加权 kappa 平均值为 0.711, Kendall's W 值为 0.804), 高于采用 PI-RADS v2.0 方案的评分者间一致性 (加权 kappa 平均值为 0.615, Kendall's W 值为 0.725)。运用 PI-RADS v2.1 检出移行带 PCa 和 cs-PCa 的 AUC 值均高于 PI-RADS v2.0, 但不同经验的阅片者之间存在差异, 移行带 PCa 检出的差异性在 3 位高年资阅片者中更显著, 而移行带 cs-PCa 检出的差异性在 2 号阅片者和 4 号阅片者中更显著。另外, 对所有阅片者而言, PI-RADS v2.1 对移行带 PCa 的诊断敏感度更高, 对 cs-PCa 的诊断敏感度和特异度均更高。结论: 与 PI-RADS v2.0 相比, 基于 bp-MRI 的 PI-RADS v2.1 在评估移行带病变方面具有更好的评分一致性和诊断效能。另外, 阅片者的经验对前列腺 MR 图像诊断产生一定影响。

PU-0173

浅谈镇静儿童颅脑磁共振检查提高图像质量技巧

赵中顺

昆明市儿童医院

优质的磁共振图像, 能为临床提高更加丰富的信息。不能配合的儿童虽然进行了镇静, 但是部分病例仍然会出现运动伪影。本次研究仅从我科运用吸入七氟烷麻醉镇静的方法进行镇静后行颅脑磁共振扫描的病例进行分析, 针对患儿镇静后呼吸频率过快、呼吸强度大、膈肌痉挛等造成磁共振图像被运动伪影影响的情况, 我们采用了一系列有效措施, 提高了图像质量和患儿的检查成功率。

PU-0174

FACT 序列与 IDEAL-IQ 序列脂肪定量的比较实验研究

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目的: 评价联影 uMR790 磁共振脂肪定量技术相较于进口高场强磁共振脂肪定量技术的可靠性。方法: 利用自制不同浓度 (0%、5%、10%、15%、20%、25%、30%) 的脂肪乳溶液按浓度分为 A、B、C、D、E、F、G 七组, 并将其置于不同厂家 3.0T 磁共振仪器上 (联影 uMR790、GE SIGNA Premier), 分别用各自的脂肪定量序列 (FACT、IDEAL-IQ) 进行扫描, 运用对应的后处

理软件得出不同厂商七组脂肪乳溶液的质子密度脂肪分数 (Proton density fat fraction, PDFF) 值, 将 PDFF 值与脂肪乳浓度进行统计学相关性分析。

结果: 联影 uMR790 测得的 PDFF 值与脂肪乳水模浓度之间相关系数 r 等于 0.995, GE SIGNA Premier 测得的 PDFF 值相关系数 r 等于 0.996, 两组相关系数几乎相同, 均具有强相关性。

结论: 联影 uMR790 基于 FACT 序列的磁共振脂肪定量技术与国外高场强磁共振相比在脂肪定量上可靠性相近。

PU-0175

抗 NMDAR 脑炎患者的临床特点、短期预后与磁共振成像阳性/阴性的关联分析

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目的: 描述 MRI 阳性/阴性抗 NMDAR 脑炎患者的临床特点, 分析 MRI 阴/阳性患者的临床特点差异, 探究造成 MRI 显示差异的原因。

方法: 收集 2013 年 1 月至 2023 年 1 月于山东省立医院诊治的急性亚/急性发病的 92 例抗 NMDAR 脑炎的临床资料进行回顾性分析。依 MRI 表现分为阳性组与阴性组, 阳性组 36 例; MRI 阴性组 56 例。比较两组的性别与年龄、临床表现、血清和脑脊液、脑电图及短期预后评分差异。

结果: 阴性组发病年龄低于阳性组 ($P < 0.05$); 发病至第 1 次接受 MRI 检查时长, 阳性组长于阴性组 ($P < 0.05$)。两组之间入院严重程度、入住 ICU 及平均住院天数的差异均无统计学意义 ($P > 0.05$)。发热和头痛在 MRI 阳性组高于阴性组 ($P < 0.05$); 认知障碍、意识下降与昏迷、睡眠障碍存在差异, MRI 阳性组低于阴性组 (P 均 < 0.05)。其他精神行为异常、近事记忆力下降、癫痫发作、言语障碍、运动障碍、不自主运动及自主神经功能障碍均不存在统计学差异 (P 均 > 0.05)。MRI 阳性组的血清 NMDAR 抗体阴性比例高 MRI 阴性组 ($P < 0.05$)。脑脊液 NMDAR 抗体滴度在两组之间无差异 ($P > 0.05$)。脑脊液中红细胞、白细胞增高的分布在两组之间不存在差异 (P 均 > 0.05), MRI 阳性组的脑脊液蛋白浓度高于阴性组 ($P < 0.05$)。血清降钙素原及血清其他病毒抗体的水平在两组之间不存在差别 ($P > 0.05$)。血脂方面, 阳性组的总胆固醇、载脂蛋白 B 的水平高于阴性组 (P 均 < 0.05); 高密度脂蛋白胆固醇、载脂蛋白 A、载脂蛋白 A/B、甘油三酯的水平在两组之间无差别 (P 均 > 0.05)。脑电图异常在两组之间不存在差别 ($P > 0.05$)。两组短期预后差异没有统计学意义 ($P < 0.05$)。

结论: MRI 阳性/阴性抗 NMDAR 脑炎的临床特点、病情严重程度及短期预后相似, 但患者年龄、发病至 MRI 检查时长、脑脊液蛋白浓度、总胆固醇和载脂蛋白 B 浓度存在差异, 了解这些差异将有助于临床医师进一步理解急性/亚急性发病的抗 NMDAR 脑炎患者的颅脑 MRI 表现, 提醒临床医生注意潜在诊断并确保及时和适当的临床检查

PU-0176

Quantitative Evaluation of Deep Learning Reconstruction of Diffusion-weighted MRI using a DWI Phantom

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Introduction: Deep Learning (DL) based reconstruction has shown to be a promising technique to further improve image quality in various applications¹. Currently, DL has been used for the interpretation and postprocessing of MRIs and for image acquisition and reconstruction In TSE

and Haste sequence, deep learning reconstruction (DLR) trained by raw data on different vendors using supervised models within convolutional neural networks (CNN) and state of the art DL models showed comparable performance with conventional scan procedure in a remarkable reduction in acquisition time and denoising²⁻³. Nevertheless, there are few research on DWI using DL reconstruction (DWI-DLR) to figure out the impact of image quality and denoising. However, its performance and potential benefits in diffusion weighted imaging (DWI) has not been thoroughly evaluated. Purpose: The purpose of this study is to quantitatively measure the signal-to-noise (SNR) gain achieved with DL reconstruction and benchmark the gain against a higher performance gradient system; as well as validating the ADC value measured with DL reconstruction by scanning and comparing the results from a DWI phantom. Methods: An early version of Quantitative Imaging Biomarkers Alliance (QIBA) DWI phantom was scanned on a Siemens 3T Vida scanner (60/200 gradient) using a prototype DWI sequence with both conventional recon and DL recon as well as on a Siemens 3T Prisma (80/200 gradient) with a conventional DWI sequence. A Siemens 20-channel head and neck coil was used in all acquisitions on both scanners. The same sequence parameters are used on both Vida and Prisma scanners, except the receiver bandwidth (rBW) optimized based on gradient performance to achieve minimal echo spacing and minimal TE, which, in turn, produced slightly different TR and scan time, as shown in Table 1. Two versions of DWI sequences both with through-plane parallel imaging acceleration (SMS) factor 2, but different in-plane parallel imaging acceleration (iPAT) factor 2 and 3 were tested. For each sequence, two identical acquisitions were performed consecutively to allow subtractions for measuring the noise in DWI images. The circular ROIs were then placed in each compartment of the DWI phantom on both the diffusion weight source image to measure the mean signal and the subtracted image to measure the standard deviation of noise in order to calculate the signal to noise ratio (SNR). The ratio of measured SNR for each compartment at different b-values was calculate between sequences. Only the average SNR ratios are presented in Table 2. Linear regressions were performed on mean ADC measurements of each vial between sequences with and without DL recon to evaluate the potential impact. Results Typical DWI images and the calculated ADC map are shown in figure 1 with circular ROIs placed in each compartment. The average SNR for sequences with DL recon is consistently higher than the average SNR with conventional recon, as shown in table 2, especially for higher iPAT factor and at lower b-values. The SNR gain is similar to that with better gradient performance and therefore shorter TE on Prisma for iPAT of 3 and greater for iPAT of 2. The ADC values measured with DL recon is consistent with ADC values measured with conventional recon as demonstrated by good correlations ($R^2 = 0.9959 - 0.9994$) in figure 2. Discussions: Reduced Distortion due to shorter ETL with higher iPAT while the loss of SNR can be recovered by DL Some Blurring and ghosting artifacts are observed with DL, addition investigation will be carried out. Volunteer and patient studies are needed to confirm and validate phantom study results. Conclusion: DL recon offer improved SNR in DWI images without compromising the accuracy of ADC measurement. The SNR gain with DL recon is similar to that with gradient performance difference between Vida and Prisma.

PU-0177

MRI 引导与 CT 引导房放射治疗的区别

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目的: 探讨磁共振成像与 CT 成像在放射治疗成像技术中的对比。方法: 选取本院 2014 年 1 月—2015 年 12 月, 临床确诊的 200 例拟放射治疗的肿瘤患者, 对所有患者常规行 MRI 定位扫描和 CT 定位扫描, 采集: , GE 1.5T MRI 和东芝 64 排 CT。一个多世纪以前, CT 成像技术就被放疗科用于肿瘤靶区的勾画和定位。70 年代用于放射治疗。随着科学技术的快速发展, 80 年代开始

应用 MRI 成像技术实施放射定位治疗。用 CT 成像技术来引导放射治疗, 原因: 1、CT 扫描时间短; 2、CT 得到的是电子密度 X 线衰减图像; 3、CT 扫描得出的图是空间不会偏曲的; 4、CT 螺旋数据可以得到数字重建图像与放射治疗规划系统进行配准。MRI 成像技术在软组织对比上有超高的空间分辨率, 对肿瘤的范围、精准定位、与周围组织的密切关系, 都可以清晰的区分。MRI 和 CT 的检查特点有: 1、MRI 扫描无电离辐射; 2、超高的空间分辨率; 3、MRI 图像是多参数、多对比度; 4、成像方位任意; 5、多模态成像提供; 6、解剖配准好; 7、受多种因素影响大; 8、扫描时间长; 9、可以得到代谢图。放疗科医师一致认为 MRI 在放射治疗上优于 CT, 在疗效前的计划和治疗后的评估, 有举足轻重的优势, 特别是现在高端 MRI 的出现, 扫描时间基本和 CT 相差无几, 由于我们地处南方, 沿海城市, 气候湿润, 所以容易导致鼻咽癌的高发, 在 CT 扫描后数据融合定位时, 总是难以精确的勾画除靶区与周围组织区分, 导致治疗时范围过大, 对患者的辐射量加大, 经常导致放射性脑炎, 而 MRI 就不会, 因为它有着超高的空间分辨率, 可以使得勾画靶区的精准基本和病灶相匹配。结果: 在肿瘤的放射治疗中, MRI 与 CT 扫描放射定位治疗相比, MRI 对肿瘤靶区范围的准确率为 97%, 误差率为 5%, 敏感度为 93%, 特异度为 96%, MRI 在扫描上, 不但可以多模态, 给临床提供更多信息, 减少患者的伤害性, 还可以持续监测患者的放疗疗效; 由于病例数较少和设备不足, 在许多方面上还有待改进和提高。

PU-0178

基于多参数 MRI 影像组学融合模型术前预测乳腺癌腋窝淋巴结转移的研究

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目的 探讨基于多参数 MRI 影像组学融合模型在预测乳腺癌腋窝淋巴结 (ALN) 转移方面的应用价值。方法 回顾性分析山西省肿瘤医院 2020 年 8 月—2021 年 9 月经病理证实的 272 例乳腺癌患者的多参数 MRI 及临床资料。患者均为女性, 年龄 28~79 岁, 其中 ALN 阳性 107 例、ALN 阴性 165 例。按照 7:3 的比例随机将患者分为训练组和验证组。从 T2 加权成像 (T2WI)、增强 T1 加权成像 (cT1WI) 序列和表观弥散系数 (ADC) 图中提取影像组学特征。采用三个步骤 (单因素逻辑回归、相关性分析和 Boruta 算法) 进行特征选择, 然后采用支持向量机 (SVM)、随机森林 (RF) 和逻辑回归 (LR) 机器学习方法构建影像组学模型。同时, 通过多因素逐步回归筛选独立临床危险因素并构建临床模型。最后, 联合影像组学模型和临床模型构建融合模型。采用受试者工作特征曲线 (ROC)、校准曲线和决策曲线 (DCA) 来评价预测性能及临床效益。结果 训练组和验证组患者肿瘤位置差异有统计学意义 ($P < 0.05$); 训练组中 ALN 阳性与 ALN 阴性患者间的肿瘤位置、MRI 评估淋巴结状态, 验证组中两组间的 ER、分子亚型及 MRI 评估淋巴结状态, 差异均有统计学意义 (P 值均 < 0.05)。基于多参数 MRI 降维选择后, 得到了 6 个与 ALN 转移呈显著相关的影像组学特征 (P 值均 < 0.05)。在训练组和验证组中, SVM、RF 和 LR 模型均表现出很好的预测能力, AUC 分别为 0.784、0.826、0.703 和 0.733、0.817、0.703, 其中 RF 模型效能最高。单因素、多因素回归分析显示, MRI 评估淋巴结状态是 ALN 转移的独立预测因子并构建临床模型。联合影像组模型和临床模型构建的融合模型在训练组和验证组中均表现出更好的性能, AUC 分别为 0.867 和 0.866, 且其诊断效能均优于上述三种机器学习模型和临床模型 (AUC 分别为 0.719 和 0.700)。DCA 显示, 三种机器学习模型、临床模型和融合模型均有一定的临床效益, 其中融合模型的净收益值最大。结论 基于多参数 MRI 影像组学特征结合 MRI 评估淋巴结状态构建的融合模型有助于术前准确预测乳腺癌 ALN 转移状态。

PU-0179

The optimization of black-blood imaging using T1-Weighted DANTE-SPACE for intracranial vessel wall imaging at 7 Tesla

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Introduction

MR vessel-wall imaging (MR-VWI) is the most promising technique for noninvasive and reliable examination of vessel wall pathology in cerebrovascular diseases. Unlike CT, DSA, and ultrasound, MR-VWI can provide high resolution and excellent tissue contrast between vessel wall and brain soft tissue, and therefore it can directly assess the vessel wall. 3D MR-VWI is desired due to its isotropic resolution. The increase in signal-to-noise ratio (SNR) and spatial resolution at 7T would benefit 3D-VWI, provided that 7T-specific challenges can be accounted for, such as the specific absorption rate (SAR) and blurring for long spin echo readout trains. SPACE, a 3D variable flip angle degree turbo-spin-echo (TSE) sequence has been developed to reduce SAR and blurring at higher field and have effectively replaced the classic 180-degree TSE readout at 7T. Though has excellent flow suppression in the readout direction, 3D-SPACE-VWI is still challenged by slow-flow-related artifacts in the other two encoding directions, which induce fake signals in post contrast images, especially in the internal carotid arteries. The delay alternating with nutation for tailored excitation (DANTE) preparation module [11] have been combined with SPACE in order to achieve better slow-flow suppression [2]. With DANTE-SPACE, according to previous radiological studies[2, 4-7], the following features were achieved for VWI of intracranial arteries: high spatial resolution, sufficient SNR, suppression of signal in luminal blood and CSF, and multiple tissue weightings. In this study we sought to optimize to produce a sharp depiction of vessel wall by effectively suppresses fast flowing blood and slowly flowing CSF.

Purpose: To discuss the feasibility and optimization of 3D T1 DANTE-SPACE sequence in high-resolution MR vessel wall imaging for intracranial vessels at 7 Tesla.

Method: The magnetization signals of vessel wall and blood were simulated using MATLAB (MathWorks, Natick, Massachusetts). Simulations were done across DANTE pulse flip angles (FA) of 8°, 10°, 12°, and 14°, with flow-encoding gradient strengths set at 25 mT/m and parallel to the blood velocity. Simulations were then done across flow-encoding gradient strengths of 20, 25, 30, and 35 mT/m, all parallel to the blood velocity, with DANTE pulse flip angle set at 12°. The rest of the simulation parameters were shown in Table 1.

Under local IRB approval, 3D T1 SPACE and 3D T1 DANTE-SPACE sequences were performed on a total of 6 volunteers on a 7T MR scanner (Magnetom Terra, Siemens Healthcare, Erlangen, Germany) equipped with an 8Tx/32Rx head coil (Nova Medical, Wilmington MA, USA). The imaging parameters were shown in Table 2. Note that the DANTE flow encoding gradients were only set in the phase and encoding directions, since the SPACE's inherent flow suppressing capability already performed well in the read-out direction. The signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), and signal ratio between vessel wall and lumen were calculated at internal carotid artery (ICA) for SPACE and DANTE-SPACE sequences for each of the 6 volunteers.

Two neuroimage radiologists scored the image quality based on subjective wall visualizations of the two VWI methods blindly and independently using a 4-point scale followed by inter-rater reproducibility analysis.

Result

As the simulation has shown in Fig 1, the blood signal in intracranial vessels decreased with increasing DANTE flip angle and number of TR, while the vessel wall signal was only minorly affected. As shown in Fig 2, for the assumed blood velocity (0.1 m/s), the best set of TR number and gradient strength were 150 and 25 mT/m. Therefore, for the human scans, the parameter set

was chosen to be: FA=12°, TR number=150, and gradient strength = 25 mT/m. In the human scans, the SNR of the T1 SPACE and T1 DANTE-SPACE is 66.22 ± 12.56 , 56 ± 13.81 respectively, and P value >0.05. The CNR for vessel wall and lumen is 5.57 ± 0.95 , 12.57 ± 5.85 respectively, and P value <0.001. Subjective wall visualization score of T1 DANTE-SPACE is significantly higher than T1 SPACE (3.65 ± 0.23 vs. 2.16 ± 0.35). The 2 neuroimage radiologists' scores agreed excellently, evidenced by the intraclass correlation coefficient (ICC) values being higher than 0.79 (P<0.001).

Discussion

According to the simulation results of DANTE pulse, the larger the flip angle (FA) and numbers of TR, the lower the signal of flowing blood, and the side effect with it is the decrease in contrast and signal-to-noise ratio of white material and gray material. However, this increase is not endless, subject to the whole duration of DANTE pulse and SAR value, the pilot test showed DANTE numbers of TR over 200 cannot be scanned, so the best scanning scheme of DANTE pulse is FA=140, numbers of TR =150, and phase/slice encoding gradient=25mT/m. The high signal in the C3 segment of the intracranial artery was often seen (50% approximately) in the T1 SPACE and all disappeared with DANTE, which significantly indicates that DANTE pulse suppresses the flow fluid signal very well. DANTE pulse are known to be flow-dependent and we chose the flow rate of 100 cm/s in according to the intracranial artery as the reference value for the simulation. Scores on multiple intracranial vessels in T1 DANTE SPACE is much high than T1 SPACE by evaluation of 2 neuroimage radiologists, especially in the internal carotid artery (Figure 3), the superior sagittal sinus (Figure 4). The flowing blood signal was basically suppressed, and the canal wall and luminal structures could be clearly displayed in T1 DANTE SPACE.

Conclusions

The optimization of T1 DANTE-SPACE produce darker blood visualization and shaper vessel wall depiction with feasible SAR at 7T, which implied promising diagnosis and qualified evaluation in pre and post contrast VMI.

PU-0180

磁共振扩散加权成像评价食管癌化疗疗效的应用价值

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目的 探讨磁共振扩散加权成像 (diffusion weighted imaging, DWI) 评价食管癌化疗疗效的应用价值。**方法** 选取 2017 年 1 月至 2019 年 6 月在我院治疗的食管癌患者 110 例, 经给予常规化疗治疗, 比较化疗有效和无效患者化疗前后表观扩散系数 (apparent diffusion coefficient, ADC)。结果 经治疗后, 达到完全缓解 (complete remission, CR) 患者 7 例, 部分缓解 (partial remission, PR) 患者 67 例, 疾病稳定 (stable disease, SD) 患者 22 例, 疾病进展 (progressive disease, PD) 患者 14 例; 有效组化疗后 1 周、2 周 ADC 值分别为 $(1.98 \pm 0.42) \times 10^{-3} \text{mm}^2/\text{s}$ 和 $(2.10 \pm 0.31) \times 10^{-3} \text{mm}^2/\text{s}$, 明显高于无效组 ($p < 0.05$); 有效组化疗后 1 周、2 周 ADC 值变化率分别为 $(31.10 \pm 3.32) \%$ 和 $(39.08 \pm 3.80) \%$, 明显高于无效组 ($p < 0.05$); 化疗后 1 周、2 周 ADC 值, 化疗后 1 周、2 周 ADC 值变化率预测食管癌化疗有效的 ROC 曲线下面积分别为 0.642、0.550、0.865 和 0.806, $p < 0.05$ 。**结论** DWI 检查的 ADC 值在化疗有效和无效患者间有所差异, 其化疗后 1 周、2 周 ADC 值及变化率能有效预测食管癌化疗疗效。

PU-0181

岛叶癫痫的皮质厚度分析

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背景: 岛盖癫痫 (Operculo-insular epilepsy, OIE) 是一种相对认识不足、特征不清的神经系统疾病, 其表现常常与颞叶癫痫类似。在本研究中, 我们研究了 OIE 中岛叶和岛叶周围区域的皮质厚度 (cortical thickness, CT) 的变化, 以了解 OIE 患者的脑结构改变。

方法: 所有参与者均接受了 3.0T 的 3D MPRAGE 扫描, 使用高级归一化工具进行处理后, 使用 freesurfer 7.1.1 软件测量皮层厚度, 后比较了 OIE 与 TLE 患者、OIE 患者与健康对照组的皮层厚度。

结果 共纳入 21 名难治性 OIE 患者、25 名年龄与性别匹配的难治性 TLE 患者和 35 名健康被试; 与健康对照组相比, OIE 患者主要在同侧岛叶、近岛叶区、眶额区、颞叶内侧和外侧新皮质中观察到广泛的皮层厚度减小。致痫灶对侧皮质萎缩的模式类似, 但程度较轻且不太弥漫。OIE 患者的 CT 与 TLE 患者相比, 所有皮层区域的 CT 相同或缩小。在 OIE 患者中, 主要在双侧岛叶和同侧枕颞交界区观察到了弥漫性皮层厚度缩小。

结论 本研究发现 OIE 患者的脑结构异常不仅局限于岛叶及岛盖, 该结果提示, 使用皮层厚度测量能够发现 OIE 患者的潜在脑结构异常, 本研究还为今后 OIE 患者脑结构皮层厚度改变的模式研究提供了证据。

PU-0182

3D 酰胺质子转移成像在原发性肝癌临床扫描可行性及图像质量评估中的初步研究

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目的: 探讨参数优化的 3D 酰胺质子转移成像序列在原发性肝癌扫描中图像质量评估和临床扫描的可行性。**材料与方法:** 前瞻性收集 2020 年 10 月至 2022 年 2 月临床怀疑原发性肝癌患者, 共 109 例。采用飞利浦 3.0 T MRI 设备进行扫描, 分别采集 T1WI、T2WI、弥散加权成像、APTw 及多期增强图像。计算 APTw 成像的扫描成功率及计算成功率。采用 Kendall 一致性系数对观察者内及观察者间主观评分进行一致性分析, 对主观评分 3 分以上的病例测量 APTw 图像的信噪比、肿瘤对比噪声比、肿瘤及肝实质的 APTw 值并计算各参数值的变异系数, 采用组内相关系数进行观察者内及观察者间可重复性测量的一致性分析。**结果:** 109 例患者中有 11 例患者 APTw 图像中病变区域存在信号缺失, 扫描成功率为 89.90% (98/109), 剩余 98 名患者中 78 名患者 APTw 图像的主观评分为 3 分以上, 计算成功率为 71.55% (78/109)。观察者内及观察者间图像质量主观评分一致性分别为 0.771 和 0.692, $P < 0.01$ 。肿瘤组织 APTw 值观察者内及观察者间 ICC 分别为 0.822 和 0.811, 肝实质 APTw、SNR 及 CNR 观察者 ICC 分别为 0.675、0.634、0.666, 肝实质 APTw、SNR 及 CNR 观察者间 ICC 分别为 0.614、0.290、0.560。肿瘤组织 APTw 值高于肝实质, 两者间差异有统计学意义 (分别为 $2.55 \pm 0.08\%$ 和 $1.45 \pm 0.07\%$, $P < 0.001$)。肿瘤组织和肝实质 APTw 值的变异系数分别为 30.4% 和 44.4%。SNR 和 CNR 为 25.92 ± 18.50 和 3.35 ± 3.2 。SNR 变异系数为 71.4%, CNR 变异系数为 90.0%。

结论: 参数优化后的 3D-APTw 成像可以用于原发性肝癌的临床扫描, 但容易受呼吸、胆囊或血管的影响而出现信号缺失或伪影, 在参数设置及成像技术上仍需改进以进一步优化其图像质量。

PU-0183

健康志愿者胰腺 B1 场校正 T1 mapping 成像的定量研究

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目的：评估健康志愿者胰腺 B1 场校正 T1 mapping 成像短期重复扫描的测量可重复性，并探讨胰头、胰体和胰尾 T1 值的定量特征及其与志愿者性别、年龄和身体质量指数 (Body Mass Index, BMI) 的相关性。

方法：对 63 名健康志愿者行连续两次胰腺 B1 场校正 T1 mapping 成像。两名测量者分别独立在 T1 mapping 伪彩图上手动勾画感兴趣区测量胰头、胰体、胰尾的初始 T1 均值。采用配对样本 t 检验比较 T1 值在重复测量及重复扫描的测量差异。采用组内相关系数 (intraclass correlation coefficient, ICC)、组内变异系数 (within-subject coefficient of variation, WCV) 及 Bland-Altman 图评估胰腺初始 T1 均值的测量可重复性及误差范围。采用方差分析和独立样本 t 检验比较 T1 值在胰头、胰体和胰尾以及在男女性别之间的差异。采用 Pearson's 相关系数评估 T1 值与年龄、BMI 之间的相关性。

结果：胰头、胰体和胰尾的 T1 值无显著统计学差异，在不同测量者及重复扫描间也无显著统计学差异 ($P=0.300\sim0.904$)。胰头、胰体和胰尾的 T1 均值均表现出良好的测量及扫描重复性 (ICC: $0.752\sim0.853$)，其重复测量的 WCVs 为 $4.5\%\sim5.7\%$ ，95% 的一致性区间 (limit of agreement, LOAs) 为 $-13.0\%\sim13.3\%$ ，重复扫描的 WCVs 为 $5.2\%\sim5.9\%$ ，95% LOAs 为 $-15.4\%\sim13.9\%$ 。胰腺 T1 值在男、女性别之间无显著统计学差异 ($t=1.077\sim1.870$; $P=0.066\sim0.286$)，与志愿者的年龄无显著相关性 ($P=0.061\sim0.896$)。胰体 (测量者 A) 和胰尾的 T1 值和 BMI 呈显著弱相关 ($r=-0.258\sim-0.328$; $P=0.009\sim0.041$)。

结论：胰腺 B1 场校正 T1 mapping 的初始 T1 均值具有良好的测量及扫描可重复性，且与志愿者的年龄、性别无关，但与 BMI 呈显著弱相关，在胰腺疾病的临床应用中具有较好的应用前景。

PU-0184

基于静息态功能 MRI 的产后抑郁症患者静态及动态脑网络特性研究

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大量研究表明，产后抑郁症患者存在一系列情感和认知功能受损，与大脑结构和功能异常密切相关。然而，产后抑郁症患者静态及动态脑网络变化对其影响尚不清楚。本研究对 20 个产后抑郁症患者及其年龄、教育水平及体重指数等相匹配的 19 个产后正常患者进行标准化静息态脑功能数据采集，在 MRI 扫描前，所有被试者均完成临床评估量表，以建立影像、临床完备的数据信息。首先，对产后抑郁症患者和正常对照组的功能 MRI 数据进行标准预处理操作，再采用独立成分分析、根据 Allen et al. 挑选独立成分标准确定了 7 个有效脑网络。使用静态功能连接分析研究产后抑郁症患者脑网络变化，计算功能网络连接的组间差异，具有显著性差异脑网络与产后抑郁症患者临床量表做相关性分析；另外，使用滑动窗口分析和动态功能连接分析构建时变性功能网络，最后使用 K-means 聚类分析。7 个有效脑网络分别是：突显网络、听觉、视觉、感觉运动、认知控制、默认网络和小脑网络。静态功能连接分析发现：与对照组相比，产后抑郁症患者在认知控制网络和默认网络、突显网络和小脑网络的连通性明显较弱，突显网络和小脑网络之间的连通性降低，主要集中在认知网络上；然而，听觉网络和感觉运动网络之间的连接更强，这主要分布在低水平感知网络中。通过聚类分析将所有被试动态功能连接矩阵聚为 4 类：状态 1 表明在感知和认知网络中具有高度相关性 (28%)，在状态 2 中，频率更高 (43%) 且连接相对稀疏，而在状态 3 中，频率更低 (13%)。

且连接更强,然而在状态 4 (16%)中,显示为控制网络内部的强连接,以及除其以外网络之间的弱连接。我们的研究表明,产后抑郁症患者的静态和动态功能连接存在异常。动态功能连接分析可以提供特定区域时变功能体系结构的丰富信息,是静态功能连接的有力补充,产后抑郁症患者表现出更明显的异常连接模式,这些结果有助于我们进一步理解产后抑郁症患者的脑网络功能障碍。

PU-0185

腰椎 MR 检查时脊柱外异常的发现率及临床意义

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目的:回顾性分析病人腰椎 MR 检查时脊柱外异常的出现率及临床意义。

材料及方法:因腰疼和(或)神经根症状行腰椎 MR 检查的 2500 例病人,由 1-2 名高年资放射医生复习每例病人脊柱 MR 检查时的图像,记录脊柱外异常,结合临床资料,确定其诊治与结果。

结果:2500 例腰椎 MR 检查中,198 例影像发现有脊柱外异常。178 例病人脊柱外的异常不能确定或有重要临床意义,需结合临床或进一步检查。发现腹主动脉瘤 4 例;腹主动脉周围淋巴结转移 2 例;直肠癌 3 例;肾自截 1 例;肾癌 1 例;前列腺癌 6 例;宫颈癌 3 例。有重要临床意义的出现率为 0.8%。

结论:腰椎 MR 检查时,除可以发现脊柱本身的病变外,还可以发现少量重要的脊柱外病变。

PU-0186

4D FLOW 对颅内动脉狭窄患者血流动力学评价

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【摘要】目的 旨在应用 4D 血流 MR 成像研究正常志愿者及大脑中动脉(MCA)狭窄病人的颅内动脉血流动力学状态,并比较正常和狭窄颅内动脉的双侧血流动力学参数差异。方法 纳入正常志愿者 20 名和单侧 MCA 狭窄病人 25 例。应用 GE Architect 3T MR 设备及 48 通道头颅线圈进行检查,采用 3D 时间飞跃法(TOF)MRA 及高分辨 3D-T1WI CUBE 序列显示及分析 Willis 环结构特点。应用 4D FLOW 血流 MR 成像获取血流数据,分析双侧颈内动脉(ICA)颅内段、MCA 及大脑前动脉(ACA)的血流动力学状态,计算心动周期不同时相的平均血管面积、平均及最大血流速度、平均瞬时血流率。分析颅内 Willis 环的结构特征及血流动力学状态。采用独立样本 t 检验比较正常志愿者及 MCA 狭窄病人双侧动脉血流动力学参数的差异。结果 正常志愿者双侧 ICA、MCA 和 ACA 的血流动力学参数包括平均血管面积、平均血流速度、最大血流速度和平均瞬时血流率之间差异均无统计学意义(均 $P>0.05$)。MCA 狭窄病人的 ICA、MCA 及 ACA 双侧血流动力学参数之间的差异有统计学意义($P>0.05$)。结论 应用 4D FLOW 血流 MR 成像可以反映颅内动脉狭窄患者颅内动脉血流动力学的变化,可以对血流参数进行定量评价。

PU-0187

X 线联合 CT、MR 多模态检查在四肢软组织肿瘤的良恶性诊断中的价值

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摘要

目的 本文旨在探讨 X 线联合 MR 多模态检查在软组织肿瘤良恶性诊断中的应用价值。

材料与方法 纳入我院 2020.3—2022.3 于青海红十字医院由于四肢软组织肿瘤进行手术的患者 36 例，术前行 X 线、CT 联合 MR 多模态检查，根据 X 线、CT 提供的肿瘤形态学信息，包括肿瘤的大小、边缘、密度，MR 能够提供包括肿瘤的组织学特征、血供情况、代谢状态等，能够提供更为详细的肿瘤信息。由 2 名年资副高级主任医师进行分析肿瘤的影像信息并初步判断肿瘤的良恶性，并与术后免疫组化得出的病理结果进行对照。

结果 X 线、CT 联合 MR 多模态检查对于软组织肿瘤良恶性的评估与病理的免疫组化结果具有很高的一致性。

结论 X 线、CT 联合 MR 则能够提供更为详细的局部解剖信息，组织信号变化能够知道组成结构评估淋巴结和邻近血管的受累情况。

摘要

目的 本文旨在探讨 X 线联合 MR 多模态检查在软组织肿瘤良恶性诊断中的应用价值。

材料与方法 纳入我院 2020.3—2022.3 于青海红十字医院由于四肢软组织肿瘤进行手术的患者 36 例，术前行 X 线、CT 联合 MR 多模态检查，提供包括肿瘤的组织学特征、血供情况、代谢状态等，能够提供更为详细的肿瘤信息。由 2 名年资副高级主任医师进行全面分析肿瘤的影像信息并初步判断肿瘤的良恶性，并与术后免疫组化得出的病理结果进行对照。

结果 X 线、CT 联合 MR 多模态检查对于软组织肿瘤良恶性的评估与病理的免疫组化结果具有很高的一致性。

结论 X 线、CT 能够快速获得病变大范围的影像，评估肿瘤的浸润范围和周围组织的受累情况。MR 能够提供精细的局部解剖信息，组织信号变化，评估淋巴结和邻近血管的受累情况，判断肿瘤的分期和预后。因此，通过 X 线、CT 联合 MR 多模态检查，能够综合利用三种成像技术的优势，提高诊断的敏感性和特异性，能够为临床医生提供更可靠的诊断依据，在软组织肿瘤的良恶性诊断中具有广泛的应用前景。

PU-0188

非抗 NMDAR 脑炎患者的临床特点、短期预后与磁共振成像阳性/阴性的关联分析

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目的：描述 MRI 阳性/阴性非抗 NMDAR 脑炎的临床特点，分析 MRI 阳性/阴性患者的临床特点，探究造成 MRI 显示差异的原因。

方法：收集 2013 年 1 月至 2023 年 1 月于山东省立医院诊治的急性/亚急性发病时的非抗 NMDAR 脑炎 90 例（LGI1 50 例、GABAB 22 例、CASPR2 12 例、APMA 3 例、APM1+MOG 1 例、CASPR2+LGI1 1 例、CASPR2+GABAB 1 例）的临床资料进行回顾性分析。依 MRI 表现分为阳

性组与阴性组, MRI 阳性组 42 例; MRI 阴性组 48 例。比较两组患者的性别与年龄、临床表现、血清和脑脊液、脑电图及短期预后评分差异。

结果: 两组的发病年龄、性别、发病至第 1 次接受 MRI 检查时长、入住 ICU 及平均住院天数的差异均无统计学意义 (P 均 >0.05)。发热、头痛、精神行为异常、认知障碍、近事记忆力下降、癫痫发作、言语障碍、运动障碍、不自主运动、意识下降与昏迷及自主神经功能障碍、睡眠障碍均不存在统计学差异 (P 均 >0.05); 两组在合并肿瘤及并发症的差异没有统计学意义 (P 均 >0.05)。两组间的血清抗神经细胞抗体滴度无差异 ($P>0.05$)。MRI 阳性组脑脊液抗神经细胞抗体阴性的比例低于阴性组 ($P<0.05$)。脑脊液中红细胞、白细胞数增多的分布在两组之间无差异 (P 均 >0.05)。蛋白浓度在两组间无差异 ($P>0.05$)。血清降钙素原在两组间无差异 ($P>0.05$)。血清其他病毒抗体增高在两组间无差异 ($P>0.05$)。血脂检测, 总胆固醇、高密度脂蛋白胆固醇、低密度脂蛋白、胆固醇载脂蛋白 A、胆固醇载脂蛋白 B、载脂蛋白 A/B 的变化在两组间不存在差别 (P 均 >0.05)。MRI 阳性组甘油三酯浓度低于阴性组 ($p<0.05$)。脑电图异常比率在 MRI 阳性组高于阴性组 ($P<0.05$), 两组短期预后无差异 ($P>0.05$)。

结论: MRI 阳性/阴性非抗 NMD 脑炎的临床特点、病情严重程度及短期预后基本相同, 两组在脑脊液抗体、脑电图异常及甘油三酯浓度方面存在统计学差异, 了解这些差异将有助于临床医师了解非抗 NMDAR 脑炎的常规脑 MRI 的表现, 为今后细化 AE 的影像学研究提供新的思路。

PU-0189

基于磁共振高分辨率血管壁成像及扩散加权成像探讨症状性颅内动脉粥样硬化性狭窄脑卒中患者发病机制及药物强化治疗预后研究

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目的: 基于磁共振高分辨率血管壁成像(high resolution magnetic resonance vessel wall imaging, HR-MRI VWI)及扩散加权成像(diffusion-weighted imaging, DWI)

探讨症状性颅内动脉粥样硬化性狭窄(intracranial atherosclerotic stenosis, ICAS)脑卒中患者发病机制及药物强化治疗预后研究。

材料与方法: 连续纳入 2020 年 10 月至 2022 年 7 月因颅内动脉粥样硬化性狭窄性脑卒中或短暂性缺血发作的患者, 并行 DWI 及 HR-MRI VWI 扫描。根据 DWI 急性脑梗死灶的分布模式判定症状性 ICAS 脑卒中机制, 包括穿支动脉受累组、低灌注组、动脉-动脉栓塞组及多种机制组; 以及责任斑块在 HR-MRI VWI 中的特征差异, 包括血管狭窄率及斑块面积、分布、负荷, 重构模式、强化率; 并进行阿托伐他汀联合阿司匹林或氯吡格雷药物强化治疗后 3 个月疗效评价。

结果: 纳入症状性 ICAS 患者 60 例, 根据 mRS 评分量表(改良 Rankin 评分量表)将患者分为预后良好组 32 例及预后不良组 28 例, 两组患者的卒中机制差异无统计学意义($P>0.05$)。两组患者责任斑块 HR-MRI VWI 特征的比较: 预后不良组的斑块内强化率均大于预后良好组, 差异有统计学意义($P<0.05$); 两组患者在斑块面积、分布、负荷、重构模式及血管狭窄率上差异无统计学意义($P>0.05$)。

结论: 症状性 ICAS 脑卒中患者强化药物治疗后预后良好组及预后不良组在 HR-MRI VWI 中斑块强化率存在差异, 提示两组病理生理学改变不同, 需要进一步研究指导个性化治疗。

PU-0190

多模态 MRI 在胶质瘤患者诊治中的应用

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目的：研究多模态 MRI 在胶质瘤诊治中的应用效果。方法：选择近几年收治的颅脑肿瘤患者进行回顾性分析，并结合患者的术前的 MRI 检查、多模态 MRI 以及弥散加权成像（DWI）、三维动脉自旋标记（3D-ASL）、氢质子磁共振波谱（1H-MRS），对 DWI 图的瘤体 ADC、rADC；3D-ASL 灌注图在 TBF、CBF、rCBF；以及 1H-MRS 所获取的瘤体、瘤周和正常脑实质的 Cho/Cr、Cho/NAA、NAA/Cr 进行对比，统计常规 MRI 和联合诊断的准确率。结果：在 DWI 图中，低级别胶质瘤的 ADC、rADC 最高， $P<0.05$ ；在 3D-ASL 灌注图中，低级别胶质瘤的灌注值最高， $P<0.05$ ；在 1H-MRS 中，胶质瘤瘤体、瘤周的 Cho/Cr、Cho/NAA 均高于正常脑实质， $P<0.05$ ，且多模态 MRI 的诊断准确率明显高于常规 MRI， $P<0.05$ ，差异具有统计学意义。结论：在胶质瘤患者的诊断中，多模态 MRI 具有较高的诊断准确率，并有利于颅脑肿瘤的鉴别和分级，具有较高的应用价值。

PU-0191

WB-DWI 和 T1-Dixon 对多发性骨髓瘤患者骨髓穿刺的附加价值

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目的：观察多发性骨髓瘤(MM)局灶性病变 (FLs) 在全身骨骼的分布特点，探讨髂后上棘 FLs 与胸腰椎 FLs 的 ADC 值与水信号值、脂肪信号值的差别，并评估这些定量参数与 MM 骨髓浆细胞比例 (BMPC) 之间的相关性，辅助寻找 MM 骨髓穿刺部位。方法：回顾性分析初诊 MM 患者 39 名，其中男性 24 名，平均年龄 55.6 岁 (46 岁-72 岁)，女性 15 名，平均年龄 50.7 (42 岁-69 岁)。所有患者均在治疗前进行了 WB-DWI 和 T1-Dixon 成像检查，分别在全身 MR 图像上计数全身骨髓累及部位的 FLs，选择髂后上棘和胸腰椎处的 FLs，测量相应部位的 ADC 值、脂肪信号值 (Mfat) 和水分子信号值 (Mwater)，脂肪分数采用 $Mfat / (Mfat + Mwater)$ 计算，并进行 MR 参数的标准化处理，得到：nMfat、nMwater 和 nFF，采用 Mann-Whitney U 检验比较髂后上棘处 FLs 与对侧髂后上棘正常骨髓以及髂后上棘和胸腰椎处 FLs 各 MR 参数值之间的差异，采用 Spearman 相关分析评价髂后上棘和胸腰椎处 FLs 的 MR 参数值与 BMPC 之间的相关性，从而有助于利用 MRI 辅助寻找 MM 骨髓穿刺部位。结果：正常侧髂后上棘骨髓与病变侧髂后上棘 FLs 的 ADC 值、nMfat 值、nMwater 值和 nFF 值 (分别为 $0.32 \times 10^{-3} \text{ mm}^2 / \text{s}$ vs $0.74 \times 10^{-3} \text{ mm}^2 / \text{s}$, 0.401 vs 0.064 , 2.564 vs 3.586 , 0.145 vs 0.013) 均有统计学差异 (p 均 <0.001)；髂后上棘和胸腰椎的 FLs 之间 nMwater (分别为 3.59 vs 4.79) 存在显著性差异 ($p <0.001$)；在髂后上棘和胸腰椎的 FLs 中，ADC 值与 BMPC 高度正相关 ($r=0.989$, 0.989)，nMfat 值和 nFF 值与 BMPC 高度负相关 ($r=-0.978$, -0.930 , -0.888 , -0.917 , p 均 <0.001)。结论：WB-MRI 可以整体评估 MM 患者 FLs 在全身骨骼的分布情况，髂后上棘的 FLs 的 MR 参数与 BMPC 的相关性更高，ADC 值最为敏感，可以辅助确定 MM 骨髓穿刺部位。

PU-0192

肺癌肿瘤血管生成 DCE-MRI 参数与 IGF1 表达的相关性

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【摘要】目的 探究肺癌肿瘤血管生成动态对比增强磁共振成像(DCE-MRI)参数与胰岛素样生长因子 1(IGF1)表达的相关性。方法 选择 2018 年 4 月至 2019 年 12 月入住本院的 40 例经手术病理证实为肺癌的患者, 根据不同分化程度分为高分化组 16 例, 低中分化组 24 例。采用 DCE-MRI 方法检测相关参数包括容量运转参数(Ktrans)、速率常数(Kep)、血管外细胞外间隙容积百分比(Ve); 采用免疫组化染色方法检测肺癌组织及癌旁组织 IGF1 表达情况; Spearman 法分析肺癌患者 DCE-MRI 参数与 IGF1 表达的相关性。结果 与癌旁组织相比, 肺癌组织 Ktrans、Kep、Ve 及 IGF1 阳性表达率升高($P<0.05$); 低中分化组患者 Ktrans、Kep、Ve 及 IGF1 阳性表达率均显著高于高分化组($P<0.05$); Spearman 相关性分析结果显示, Ktrans、Kep、Ve 与 IGF1 表达均呈正相关($P<0.05$)。结论 DCE-MRI 参数 Ktrans、Kep、Ve 与 IGF1 表达均呈正相关, 均对肺癌临床病理特征的评估具有重要意义。

PU-0193

MRI comparative study of diffuse midline glioma, H3 K27-altered and glioblastoma without H3 K27-altered

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Objective

Glioblastoma is the most prevalent malignant tumor affecting the nervous system (1). In 2016, the World Health Organization (WHO) revised the classification of central nervous system (CNS) tumors based on histological and molecular characteristics, including glioblastoma, isocitrate dehydrogenase (IDH) mutations, telomerase reverse transcriptase (TERT) alterations, diffuse midline glioma, and Histone H3 lysine to methionine substitution at position 27 (H3K27) mutations. With the cIMPACT-Now Update 2, the definition of diffuse midline glioma (DMG) was refined, incorporating criteria for diffuse infiltration, and the presence of H3K27 gene mutations now directly classifies tumors as WHO grade IV. In the WHO's fifth edition of classification in 2021, this standard persisted, emphasizing the significance of this gene in the prognosis of glioma patients.

Malignant gliomas located in the midline of the brain pose a considerable challenge due to their increased difficulty of surgical removal and the potential for irreversible damage, such as limb paralysis. Therefore, differentiating DMG from other high-grade gliomas is vital for selecting appropriate therapies, especially for targeted treatments guided by neuroradiological criteria.

Recent studies, such as Lasocki, A et al., have explored conventional magnetic resonance imaging (CMRI) to predict key genetic features in gliomas, including IDH mutations, O6-methylguanine-DNA-methyltransferase (MGMT) methylation status, and 1p/19q deletions. The value of MRI-based prediction of glioma genetic features has been further enhanced with the addition of diffusion-weighted imaging (DWI) and perfusion-weighted imaging (PWI) data. DWI has proven particularly useful in diagnosing diffuse midline gliomas with H3K27 alterations. A retrospective study in Cancers examined MRI characteristics of DMG and glioblastoma (GBM), revealing that contrast enhancement, the presence of edema, rADC-minimum values, and ADC-based histogram analysis can effectively distinguish between the two tumor types. Moreover, research by Kurokawa, R et al., demonstrated that Dynamic Susceptibility Contrast (DSC)-MRI parameters, ADC values, and T2-FLAIR mismatch markers can help identify diffuse midline gliomas with H3K27 alterations.

Histopathologically, DMGs often share similarities with GBMs, including microvascular proliferation (MVP) and/or necrosis in the malignant cell pattern (DMG-GBM positive). These

morphological parallels are reflected in MRI findings. Furthermore, there is a connection between tumor microvessel density, enhancement parameters, and increased vascular permeability resulting from abnormal vascular structures. This suggests that tumor microvessel density is linked to peritumoral edema. A recent case report highlighted a DMG with a non-IDH mutation and an H3K27M mutation, demonstrating a T2-fluid attenuated inversion recovery (FLAIR) mismatch. To address these complexities, we conducted a retrospective analysis of MRI features and clinical characteristics in 63 glioma patients, encompassing 22 GBM cases and 41 DMG cases.

Methods

Patients:

Between January 2017 and February 2022, we collected data from 63 brain tumor patients who underwent MRI scans at two centers. Inclusion criteria included complete clinical data, no history of trauma or prior radiotherapy/chemotherapy, and the availability of pre-surgery routine imaging, including T1-weighted imaging (T1WI), T2-weighted imaging (T2WI), enhanced scans, and DWI, with image quality meeting diagnostic standards. Additionally, patients needed postoperative pathological diagnoses confirming either diffuse midline glioma or glioblastoma.

Ultimately, we included 63 patients (37 males and 26 females), consisting of 22 with glioblastoma (15 males and 7 females) and 41 with diffuse midline glioma (22 males and 19 females). The age range was 3 to 79 years, with an average age of 48 ± 13 years. This retrospective study received approval from the regional ethics committee and was exempted from requiring informed consent.

Conventional MRI Protocols:

MRI data were collected from two hospitals in China using various 1.5-T and 3.0-T MRI scanners, including Achieva, Signa, Optima MR360, Magnetom Avanto, Ingenia, Discovery MR750w, and Prisma. Detailed MRI protocols are provided in Table S1 in the Supplemental Material. Patients fasted for 4-6 hours before scanning. The scanning range covered the entire brain, with sequences including T1WI, T2WI, T2W-FLAIR, DWI, and enhanced scans.

MRI Signal Evaluation:

We assigned signal intensity scores for T1WI, T2WI, T1WI post-Gd-DTPA injection, DWI, and ADC images to categorize tumor characteristics.

Pathological Results:

Pathological data included intraoperative pathology and immunohistochemical findings. Molecular sequencing data, including IDH, MGMT, TRET, and H3K27 status, were obtained for all glioma patients. Final pathological diagnoses were determined according to the 2016 edition of the CNS Tumor Classification.

Image Analysis:

Conventional MR images were used to measure tumor size using ITK-SNAP-3.8.0. Two senior doctors independently reviewed the image data, assessing various aspects, including tumor location, necrosis presence, enhancement intensity, peritumoral edema, hemorrhage, and other features, as outlined in Table S2 in the Supplemental Material. In cases of disagreement, a consensus discussion was held to arrive at a unified interpretation.

Statistical Analysis:

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS v.1, Chicago, IL, USA). Intra/interclass correlation coefficients (ICCs) were computed to assess agreement between reviewers. Statistical significance was defined as two-sided p-values <0.05 . As the data did not follow a normal distribution (Shapiro-Wilk test $p < 0.05$), the Mann-Whitney U test was employed to evaluate differences in ecological characteristics and tumor size between GBM and DMG. Survival time was analyzed in terms of recurrence time, with Dunn's test

used for pairwise comparisons. Receiver operating characteristic (ROC) curve analysis and the Youden Index calculated the area under the curve (AUC), confidence interval (CI), and cut-off values for different parameters. After Bonferroni correction, $p < 0.01$ indicated statistical significance, and all statistical graphs were generated using GraphPad Prism 8 (Prism 8, La Jolla, California).

Results

Patients:

The study enrolled 63 patients, including 22 with GBM and 41 with DMG. Notable differences were observed in age and tumor size ($P < 0.05$), while gender and survival time did not exhibit significant differences. Interobserver agreement among reviewers was excellent, with ICC values exceeding 0.80.

Differentiation of Signal Intensity in Imaging between GBM and DMG:

Mann-Whitney U test results indicated that T1WI signal intensity for DMG and GBM was primarily low or equal to gray matter, while T2WI signal intensity was predominantly equal or slightly higher than gray matter. DWI and ADC signals mostly matched cerebrospinal fluid intensity. Overall, there was no statistically significant difference in signal intensity between the two tumor types.

Differentiation of Clinical Characteristics between GBM and DMG:

Clinical features, including cystic necrosis, hemorrhage, peritumoral edema, hydrocephalus, and multiple lesions. Mann-Whitney U test results showed no significant difference between DMG and GBM regarding cystic necrosis, hemorrhage, and multiple lesions. However, peritumoral edema exhibited statistical significance ($P < 0.01$).

Differentiation of T2-FLAIR Mismatch and Enhancement in MRI between GBM and DMG:

The study documented the enhancement scores of DMG and GBM on MR, as well as the presence of T2-FLAIR mismatch. Mann-Whitney U test results revealed that DMG's enhancement degree was concentrated in grade 2 and grade 3, whereas GBM predominantly exhibited grade 3 enhancement. This difference held statistical significance ($P < 0.001$). There was no significant difference in the likelihood of T2-FLAIR mismatch between the two tumor types.

ROC Curves for Various Parameters:

ROC curve analysis demonstrated that enhancement ($AUC=0.868$), age ($AUC=0.852$), and peritumoral edema ($AUC=0.855$) exhibited significant differences between DMG and GBM patients ($p \leq 0.001$), facilitating a high diagnostic efficiency.

Conclusion

The present study found that for malignant glioma patients, the age of patients with H3K27 gene alterations was younger. Regardless of the presence or absence of H3K27M mutation, glioblastomas tend to have irregular morphology, unclear boundaries, and more cystic degeneration and necrosis. Compared with diffuse midline gliomas without H3K27M mutation, diffuse midline gliomas with H3K27M mutation have less peripheral edema, lower enhancement, and are more likely to have obstructive hydrocephalus.

PU-0194

多模式 MRI 对急性缺血性脑卒中静脉溶栓治疗指导的临床价值

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目的：探讨多模式 MRI 指导下静脉溶栓治疗在急性缺血性脑卒中患者中的应用效果。方法：选取我院 2018 年 8 月~2019 年 6 月期间收治的 86 例急性缺血性脑卒中患者，应用单盲随机法，分为观察组（多模式 MRI 指导下静脉溶栓治疗）和对照组（常规治疗）各 43 例，观察两组患者的治疗恢复情况。结果：与对照组相比，观察组患者的治疗有效率（90.70%>72.09%， $\chi^2=4.914$ ）、闭塞血管再通率（93.02%>76.74%， $\chi^2=4.441$ ）以及治疗后的日常生活活动能力量表（ADL）评分 [（57.46±4.17）分>（51.63±4.29）分， $t=6.390$] 相对更高（ $P<0.05$ ），治疗后的神经功能缺损程度（NIHSS）评分 [（13.79±1.98）分<（17.27±2.54）分， $t=7.086$] 相对更低（ $P<0.05$ ）。结论：静脉溶栓是急性缺血性脑卒中临床治疗的良好选择，同时采取多模式 MRI 检查方法，可以对患者的病情进展或好转情况进行判断，为静脉溶栓治疗提供指导，进而获得更为理想的治疗效果，并保障治疗的安全性。

PU-0195

IA 期卵巢癌的 MRI 表现

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目的：分析 IA 期卵巢癌的 MRI 表现。

方法：收集 IA 期卵巢癌患者的年龄分布、发病时的临床症状、CA125 检测、MRI 表现，包括肿瘤体积、结构、弥散加权成像（DWI）、表观弥散系数（ADC）和强化情况等。对 2013 年至 2020 年南通肿瘤医院收治的 IA 型卵巢癌患者进行回顾性分析。

结果：仅记录了 11 例 IA 期卵巢癌病例。患者年龄为 30-67 岁（平均 52 岁）。初期症状多为下腹胀、腹痛。CA125 呈 90% 阳性。MRI 特征 1. 盆腔肿块较大，体积范围 23-2,009 cm³（平均 669 cm³）。2. 囊肿型（有斑块状、乳头状、壁结节赘生物）5 例，囊实混合型（间隔或壁增厚）2 例，实性型 4 例。3. DWI 扩散受限，所有实体部分（赘生物、隔和囊壁）的 ADC 均降低。4. T1 增强 MRI 实性部分明显强化。5. 3 例患者盆腔内少量腹水（肿瘤细胞阴性）。

结论：IA 期卵巢癌 MRI 特征为肿瘤大、囊性、囊实性或实性；实质性部分 DWI 受限、ADC 值减低；囊壁、赘生物及隔增强；无盆腔转移。

PU-0196

基线期多模态 MRI 定量参数在Ⅱ期直肠癌神经管侵犯的预测价值

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[目的] 探讨 MRI 定量参数在Ⅱ期直肠癌神经管侵犯中的预测价值。[方法] 回顾性分析 109 例Ⅱ期直肠癌患者的临床病理及 MRI 资料，根据病理结果将患者分为神经管侵犯阳性组和阴性组。分

析两组间临床病理及 MRI 特征参数的差异,并用单因素及多因素 Logistic 回归分析直肠癌神经管侵犯的独立影响因素,采用受试者工作特征 ROC(receiver operating characteristic curve)曲线下面积(area under the curve, AUC)评价其预测效能。[结果] 在入组的 109 例 II 期直肠癌患者中,神经管侵犯阳性组 27 例(24.77%, 27/109),阴性组 82 例(75.23%, 82/109);单因素分析显示 T2 比值、Ktrans 值及 Kep 值越小及 Ve 越大的直肠癌患者更易出现神经管侵犯,且各指标在两组间的差异均有统计学意义(P 值均<0.05)。将上述单因素分析有意义的特征分别纳入单因素及多因素 logistic 回归分析中,结果均显示 MRI 表现为较大 Ve 值为直肠癌患者神经管侵犯的独立危险因素(P 值<0.05);Ve、及多因素联合预测直肠癌神经管侵犯的 AUC 分别为 0.663、0.752。[结论] Ve 是 II 期直肠癌神经管侵犯的独立危险因素,且多参数联合预测 II 期直肠癌神经管侵犯具有较高的诊断效能。

PU-0197

常规 MRI、SWI、DWI 和 DSC-PWI 预测 IDH 突变型星形细胞瘤中 Ki-67、ATRX 突变和 MGMT 启动子甲基化状态

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摘要

目的:无创检测星形细胞瘤分子状态对预测治疗反应及预后具有重要的临床意义。我们的目的是评估常规 MRI、SWI、DWI 和 DSC-PWI 是否可以预测 IDH 突变型星形细胞瘤中 Ki-67 标记指数(LI)、ATRX 突变和 MGMT 启动子甲基化状态。

方法:回顾性分析 136 例 IDH 突变型星形细胞瘤的常规 MRI、SWI、DWI 和 DSC-PWI。采用 Fisher 精确检验或卡方检验比较常规 MRI 特征和肿瘤内易感信号(ITSS)特征。采用 Wilcoxon 秩和检验比较不同分子标记状态下 IDH 突变型星形细胞瘤的最小 ADC (ADCmin)和最小相对 ADC (rADCmin)。采用 Mann-Whitney U 检验比较不同分子标记状态下 IDH-mut 星形细胞瘤的 rCBVmax。绘制受试者工作特征曲线,评价其诊断效果。

结果:高、低 Ki-67 LI 组 ITSS、ADCmin、rADCmin、rCBVmax 差异有统计学意义。ATRX 突变型和野生型组的 ITSS、ADCmin 和 rADCmin 差异有统计学意义。低、高 Ki-67 LI 组坏死、水肿、强化、边缘形态差异有统计学意义。ATRX 突变型组与野生型组瘤周水肿差异显著。与甲基化组相比,MGMT 启动子未甲基化的 3 级 IDH 突变型星形细胞瘤更有可能表现出增强。

结论:常规 MRI、SWI、DWI 和 DSC-PWI 具有预测 IDH 突变型星形细胞瘤中 Ki-67 和 ATRX 突变状态的潜力。常规 MRI 和 SWI 的结合可以提高预测 Ki-67 和 ATRX 突变状态的诊断性能。

PU-0198

子宫内 膜癌磁共振弥散 ADC 直方图与病理组织学特征 及 Ki-67 表达相关性分析

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目的：探讨磁共振弥散表观扩散系数（ADC）直方图参数在子宫内膜癌中区分不同组织病理学特征以及与 Ki-67 表达的相关性。

方法：对 110 例子宫内膜癌症患者进行术前磁共振成像，术后检测这些患者的组织病理学特征以及 Ki-67 表达水平。通过 Pearson 相关分析评估 Ki-67 表达与 ADC 直方图参数之间的相关性。使用受试者工作特性（ROC）分析评估不同组间差异参数的诊断性能。

结果：1.子宫内膜癌病理组织学检查中高、中、低分化组 ADCmean、ADCske、ADCkur 分别为： $(1.37\pm0.53)\times10^{-3}\text{mm}^2/\text{s}$ ， 1.36 ± 0.52 ， 1.70 ± 0.64 ； $(0.92\pm0.50)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.92 ± 0.51 ， 1.10 ± 0.54 ； $(0.73\pm0.40)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.73 ± 0.41 ， 0.86 ± 0.41 ；子宫内膜癌病理 FIGO 分期，I、II、III、IV 期的 ADCmean、ADCske、ADCkur 分别为： $(1.38\pm0.53)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.11 ± 0.69 ， 0.38 ± 1.79 ； $(1.01\pm0.49)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.15 ± 0.73 ， 0.36 ± 1.33 ； $(0.74\pm0.40)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.06 ± 0.47 ， 0.59 ± 0.55 ； $(0.56\pm0.29)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.07 ± 0.47 ， 0.52 ± 0.57 。ADC 直方图参数在不同级及不同分期肿瘤之间存在统计学差异。2.淋巴结阳性及阴性组的 ADCmean、ADCske、ADCkur 分别为 $(0.62\pm0.25)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.01 ± 0.56 ， 0.56 ± 0.59 ； $(1.14\pm0.55)\times10^{-3}\text{mm}^2/\text{s}$ ， 0.03 ± 0.72 ， 0.28 ± 1.46 。淋巴结阳性组 ADC 参数显著低于淋巴结阴性组。3. ADC 直方图参数和 Ki-67 表达之间存在显著的负相关。

结论：ADC 直方图分析可能可以成为评估子宫内膜癌生物标志物的非侵入性技术。

PU-0199

Impaired glymphatic system function related to choroid plexus enlargement in Relapsing-Remitting Multiple Sclerosis

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Objectives: Impaired glymphatic system have been described in several neurodegenerative diseases, but it has not been thoroughly investigated in multiple sclerosis. The objectives of this study are to investigate the glymphatic system function in relapsing-remitting multiple sclerosis (RRMS) patients, and to examine the relationship between diffusion tensor image analysis along perivascular space (DTI-ALPS) index and choroid plexus volume (CPV) and other variables in RRMS.

Methods: The ALPS index, the CPV in lateral ventricle and the volume of the cortical lesions were derived from magnetic resonance imaging (MRI) in 92 RRMS patients. The longitudinal alterations of the ALPS index and CPV in 23 RRMS patients were examined. Forty healthy controls (HCs) were also included for comparison. CPV was expressed as a ratio of intracranial volume.

Results: RRMS patients had a lower ALPS-index ($p = 0.001$) and a higher CPV ($p < 0.001$) than HCs. A lower ALPS index were associated with a higher CPV ($p = 0.004$), greater cortical lesion volume ($p = 0.001$), and longer disease duration ($p = 0.011$). A larger CPV was related to

greater cortical lesion volume($p = 0.014$) in RRMS. However, the ALPS index and CPV did not show significant changes after 6 months of follow-up in 23 RRMS patients.

Conclusion: Our findings demonstrate that the impaired glymphatic system are related to CP enlargement and heavier cortical lesion load, which may reflect the inflammatory processing in MS patients; these findings might help clarify the pathological mechanism of MS.

PU-0200

Altered Functional Connectivity of Cerebellum Subregions in Patients with Obstructive Sleep Apnea: a Resting-state Functional Magnetic Resonance Imaging Study

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Background and Purpose: Previous studies have found abnormal cerebellum function in obstructive sleep apnea (OSA) patients, associated with cognitive impairment. However, the effect of OSA on resting-state functional connectivity (FC) in cerebellar subregions is not known. The present study was to investigate the resting-state FC between cerebellar subregions and the other whole-brain and its relationship with clinical symptoms in OSA.

Methods: We enrolled sixty-eight OSA patients and seventy-two healthy controls (HCs) with similar education, and clinical data and resting-state functional MRI data were collected. Then, eight subregions of the bilateral cerebellum were used as regions of interest, FC values were calculated for each subregion with other whole-brain voxels, and the two groups were compared by independent sample t-tests. Finally, correlation analysis between the FC values of abnormal brain areas and clinical, neuropsychological data in OSA patients was analyzed.

Result: Compared with the HCs, OSA patients exhibited significantly higher FC values in the right lobule VI with the right posterior middle temporal gyrus and the right angular, the right Crus I with bilateral precuneus/the left superior parietal lobule, and the right Crus II with the precuneus/the right posterior cingulate cortex. However, there were no changes in the left lobule VI, left Crus I/II, and bilateral lobule VIIb with whole-brain voxels FC. Correlation analysis revealed a correlation between the oxygen depletion index and the abnormal FC in Crus II with the precuneus and the posterior cingulate cortex.

Conclusion: In this study, the higher FC values showed in OSA patients are related to cognition, emotion, language, and sleep. The cerebellum, which acts as a vulnerable area and functional compensatory zone in OSA patients, is functionally lateralization and closely related to the posterior default mode network. Abnormal FC may offer new neuroimaging evidence and insights for further understanding of OSA-related alterations.

PU-0201

Intravoxel Incoherent Motion and Diffusion Kurtosis Imaging of Invasive Tumor Front for Assessment of Macrotrabecular-massive Subtype in Hepatocellular Carcinoma

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Abstract Objectives To investigate the performance of intravoxel incoherent motion (IVIM) and diffusion kurtosis imaging (DKI) for assessment of macrotrabecular-massive (MTM) subtype in hepatocellular carcinoma (HCC).

Materials and methods This prospective study enrolled 76 consecutive patients with surgically resected HCCs. Preoperative MRI examination including multiple b-value diffusion-weighted imaging (DWI) was performed and the apparent diffusion coefficient the independent predictors of MTM subtype. Incorporating the two parameters into a (ADC), true diffusion coefficient (D), pseudo-diffusion coefficient (D^*), perfusion fraction (f), kurtosis-corrected ADC (AD), and apparent diffusion kurtosis (AK) were calculated for the whole tumor (including central and peripheral parts) and within two peritumor 3-mm-thick layers. Logistic regression analysis was used to determine independent predictors and receiver operating characteristics (ROC) curves were used to evaluate the diagnostic performance.

Results There were MTM-negative tumors and 18 MTM-positive tumors. The ADC, D, and AD for the whole tumor, tumor central part, and peripheral part were significantly lower, while the D^* for the tumor peripheral part and peritumor inner layer were higher in MTM-positive tumors compared with MTM-negative tumors (all $P < 0.05$). Multivariable analysis indicated that AD for tumor peripheral part (odds ratio [OR], 0.498; $P = 0.027$) and D^* for peritumor inner layer (OR, 1.919; $P = 0.038$) were conventional model based on MRI features showed significantly improved diagnostic performance (area under the curve [AUC], 0.871 vs. 0.752; $P = 0.020$).

Conclusion IVIM and DKI-derived parameters of invasive tumor front provide incremental value over conventional MRI features for evaluating MTM subtype of HCC.

PU-0202

酰胺质子转移(APT)和磁化转移(MT)预测鼻咽癌放化疗后短期治疗疗效：三维化学交换饱和转移(CEST) MRI 的可行性研究

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背景：三维化学交换饱和转移(3D CEST)技术是一种新型的、有发展前途的磁共振序列。然而，其在鼻咽癌中的应用还缺乏充分的评价。本研究旨在评估 3D CEST 技术在预测鼻咽癌患者放化疗(CRT)后短期治疗疗效中的可行性。

材料与方法：本研究共纳入 40 例鼻咽癌患者和 14 名健康志愿者，并在患者治疗前进行了三维 CEST 磁共振成像和扩散加权成像(DWI)。通过计算酰胺质子转移加权信号强度(APTw-SI)和磁化传递比(MTR)值的观察者内和观察者间相关系数(ICC)，在健康志愿者中评估 3D CEST 的可靠性。根据 CRT 后的短期治疗疗效将鼻咽癌患者分为残余组和非残余组。人工绘制整个肿瘤感兴趣区域(ROIs)，测量 APTw-SI、MTR 和表观扩散系数(ADC)值。采用多因素分析和受试者工作特征曲线(ROC)评价临床特征、APTw-SI、MTR、ADC 值和联合模型预测鼻咽癌患者短期治疗疗效的效能。

结果: 健康志愿者组 APTw-SI 和 MTR 值在观察者内部和观察者之间的一致性均为良好至极好 (0.736 ~ 0.910, 0.895 ~ 0.981, $P > 0.05$)。非残留组与残留组间 MTR 值差异有统计学意义 ($31.24 \pm 5.21\%$ vs $34.74 \pm 1.54\%$, $P = 0.003$), 而 APTw-SI、ADC 值差异无统计学意义 ($P > 0.05$)。此外, MTR 值对鼻咽癌患者短期治疗疗效的预测能力优于 APTw-SI (AUC: 0.818 vs 0.521, $P = 0.017$), 与 ADC 值相当 (AUC: 0.818 vs 0.649, $P > 0.05$)。即使将 MTR 值与 APTw-SI 和/或 ADC 值联合使用, 预测效果也没有明显提高 ($P > 0.05$)。

结论: 与 APTw-SI 和 ADC 值相比, 通过 3D CEST 获得的治疗前 MTR 值对 CRT 后鼻咽癌患者的短期治疗疗效具有更好的预测性能。

PU-0203

带状疱疹及后遗神经痛患者脑网络度中心度的静息态 fMRI 研究

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Objective: The current study aimed to investigate the role of degree centrality (DC) for the pathophysiological process of HZ and PHN, especially for the pathophysiological chronification from HZ to PHN.

Methods: 27 PHN patients, 24 HZ patients and 21 healthy controls (HCs) were recruited in the study. The DC was analyzed to detect the brain activity of the patients. Correlations between DC and clinical features were assessed in two groups of patients.

Results: The results showed lower DC in the right superior frontal gyrus, right cingulate gyrus, bilateral inferior parietal lobule (IPL), bilateral precuneus, right paracentral lobule of HZ patients compared to HCs; In addition, PHN patients exhibited decreased DC in the bilateral IPL compared to HCs.

Conclusions: The findings suggest the abnormalities of DC in these regions, especially IPL, may be neuroimaging biomarkers of chronification from HZ to PHN.

PU-0204

压缩感知单次屏气 CMR：用于快速量化左心室功能、体积和质量

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目的: 本研究的目的是比较一种新型的基于压缩传感 (CS) 单次屏气多层磁共振技术与标准多次屏气技术在心率不齐患者和屏气困难患者心脏电影中的应用, 以评估左心室 (LV) 的容积和功能。

背景: 心脏磁共振通常被认为是左心室容量和功能评估的金标准。左心室功能是诊断和监测治疗效果的最重要心脏参数之一。标准的多次屏气技术在心率不齐患者和屏气困难患者中有严重的伪影, 影响结果的准确性。最近, 压缩感知技术已成为加速数据采集的一种手段, 可改善图像的伪影。

方法: 收集 2021 年 3 月至 2022 年 11 月行心脏磁共振的 116 名患者, 扫描心脏磁共振 (CMR) 电影图像, 采集相同的层数、位置和厚度。对两序列, 评估左心室 (LV) 射血分数 (EF)、舒张末期容积 (EDV)、收缩末期容积 (ESV) 射血分数 (EF) 以及左心室质量 (LVM)。同时对比两个序列的整体图像质量。

结果: CS 单次屏气电影成像将 CMR 扫描持续时间大幅度缩短, 同时提供了左心室可靠测量。CS 序列平均扫描时间为 22 ± 3 秒, 而多次屏气序列为 511 ± 111 秒 ($p < 0.001$)。在测量 EDV、ESV、EF 和 LV 质量的技术之间发现了良好的一致性和相关性。在没有屏气困难或心律失常的患者中, 两

种技术之间的 Euro-CMR 评分无显著差异 (0.3 ± 0.7 vs. 0.3 ± 0.5 , $p > 0.05$)。在屏气困难或心律失常的患者中, 压缩感知单次屏气 CMR 评分显著更高 (2.3 ± 1.2 比 0.4 ± 0.5 , $p < 0.001$)

结论: 在屏气困难和心律失常的患者中, 新型的基于压缩传感 (CS) 单次屏气多层磁共振技术相较于标准多次屏气技术图像质量明显更好。

PU-0205

自由呼吸肝脏磁共振增强扫描-黄金角径向稀疏平行成像 (GRASP) 序列图像评估

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实验目的: 采用自由呼吸扫描序列--黄金角径向稀疏并行采样进行肝脏扫描, 将自由呼吸扫描序列与屏气序列图像进行主观及客观评估, 验证自由呼吸序列在肝脏病扫描中的临床适用性。

材料与方法: 本研究回顾性分析了 2021.1-2022.7 在本科室行肝脏钆塞酸二钠增强磁共振扫描的 30 例患者。患者两次使用钆塞酸二钠造影剂增强扫描, 间隔时间小于 3 个月, 两次分别使用屏气扫描序列采集及 Grasp 序列采集; 患者于同一台磁共振序列进行扫描。对屏气和 Grasp 序列中动脉晚期及静脉期图像进行的主观评分及客观评价: 肝脏信噪比 (SNR), 肝脏相对信号强度比 (RLSI)、肝脏与血管对比度 (LTAC、LTVC)。

结果: 主观评价: 两种扫描序列下动脉晚期、门静脉期图像的各项主观评分比较均无统计学差异, $P > 0.05$ 。客观评价: 两种扫描序列下动脉晚期的图像 SNR 比较有统计学差异, Grasp 序列高于屏气序列 (屏气序列/Grasp 序列 $148.4 \pm 52.8 / 195.6 \pm 68.4$ $Z = -3.632$ $P = 0.001$)。门脉期 Grasp 序列的 SNR 高于屏气序列, 但是差异无统计学差异。两种序列动脉晚期的 RLSI、LTAC 及门静脉期 SNR、RLSI、LTAC 差异无统计学意义, P 值 > 0.05 。

结论: 自由呼吸扫描序列在肝脏 MR 增强后的图像质量满足诊断要求, 即使屏气能力受限的患者也能得到满意的图像, 有重要的临床价值。

PU-0206

三维伪连续动脉自旋标记灌注成像在儿童全面发育迟缓脑部的应用

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【摘要】研究目的 探讨三维伪连续动脉自旋标记 (3D-pcASL) 灌注成像在 2-4 岁儿童全面发育迟缓脑部的应用价值。材料与方法 研究对象为 2022 年 3 月至 2023 年 8 月在郑州大学第三附属医院首次确诊为全面发育迟缓 (GDD) 的 24 名 2-4 岁儿童 (研究组) 和 11 名年龄性别相匹配的健康对照儿童 (对照组)。参与者均在 GE3.0T MRI 扫描仪上行磁共振常规序列、3D-T1、3D-pcASL 序列扫描。通过 ADW4.7 工作站进行后处理, 并通过软件进行图像融合获得脑部各区脑血流量 (CBF) 灌注值。选取脑感兴趣区 (ROI) 包括额叶、顶叶、颞叶、枕叶、基底节区、丘脑。比较儿童全面发育迟缓和健康儿童各脑区 CBF 值, 探索分析儿童全面发育迟缓脑部各区 CBF 值特点。计量资料采用均数 \pm 标准差表示, 两组间比较采用独立样本 t 检验。多元逻辑回归分析对 GDD 组显著变化的 CBF 值进行筛选, 探讨独立预测因素并使用受试者工作特征曲线 (ROC) 下面积 (AUC) 来评估 CBF 值作为独立预测因素对 2-4 岁 GDD 儿童的诊断效能。结果 在 2-4 岁儿童全面发育迟缓中右侧枕叶和左侧顶叶区域 CBF 值明显低于健康对照儿童 ($P < 0.05$)。多元逻辑回归分析表明, 右侧枕叶和左

侧顶叶的 CBF 值是预测 GDD 发生的独立预测因素。ROC 曲线分析结果显示, 右侧枕叶白质 CBF 值的 AUC 为 0.756, 敏感度为 79.2%, 特异度为 63.6%, 阈值为 59。左侧顶叶 CBF 的 AUC 为 0.693, 敏感度为 83.3%, 特异度为 63.6%, 阈值为 48.6。结论 1.三维伪连续动脉自旋标记灌注成像在 2-4 岁儿童 GDD 脑部具有一定的应用价值。2.右侧枕叶 CBF 值和左侧顶叶 CBF 值有助于预测儿童 GDD 的发生。

PU-0207

Recovery trend with persistent white matter abnormalities from acute to chronic stage after Omicron infection

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Objective To investigate the microstructural integrity following Omicron infection, considering the prior understanding of less severe impact compared to other strains.

Methods We enrolled 162 post-Omicron infection patients and 17 healthy controls (HCs_2023) in our study. Additionally, we included 17 HCs recruited in 2022 (HCs_2022) as another control group. Separate comparisons were conducted between patients and the two control groups. Furthermore, subgroup comparisons were performed based on neurological symptoms and the intervals between infection and scans. DTI, neurite orientation dispersion and density imaging were utilized to assess white matter integrity. Cognitive function was evaluated using Wechsler Intelligence scale. Correlations between diffusion metrics and cognitive function were also analyzed.

Results The comparison between patients and HCs_2022 revealed more abnormal voxels than the comparison between patients and HCs_2023, with both results reflected by lower axial diffusivity. In the comparisons among Omicron patients across different stages, various diffusion metrics demonstrated dynamic changes. Most voxels exhibited abnormalities in patients during the acute stage, with more pronounced abnormalities observed during the subacute stage, and tended to return to normal during the chronic stage. However, the corpus callosum, internal capsule and coronal radiator in the right hemisphere, which were more pronounced during the chronic stage.

Conclusion Utilizing HCs recruited before the Omicron epidemic appears to provide a more objective control group, as control group collected during the Omicron epidemic may include asymptomatic infected individuals. Furthermore, from the acute to chronic stage, patients exhibited a trend of recovery alongside persistent white matter abnormalities. This suggests that even in cases of milder disease severity in Omicron-infected patients, recovery takes a significant amount of time and necessitates longer follow-up.

PU-0208

高分辨磁共振血管壁成像在评估颈动脉斑块稳定性应用价值

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目的: 探讨高分辨磁共振血管壁成像在评估颈动脉斑块稳定性应用价值

方法: 对 2021 年 10 月~2022 年 11 月期间我院收治的 52 例患者行颈动脉超声检查怀疑颈动脉粥样硬化斑块临床资料进行研究分析, 同时在我科行高分辨磁共振血管壁成像检查, 观察颈动脉斑块的成分。

结果: 52 例患者中 38 例为不稳定性斑块和 14 例为稳定性斑块中, 高分辨磁共振血管壁成像显示血管结构、钙化、脂质核心、斑块成分、块斑块内出血及纤维斑块差异均有统计学意义。

结论: 高分辨磁共振血管壁成像对颈动脉斑块成分及稳定性判定有重要价值; 对临床诊断治疗有很大指导意义, 因此此检查方法可作为临床上评价斑块性质重要方法。

PU-0209

Noninvasive Prediction of Ki-67 and p53 Expression Status in Endometrial Cancer Patients by IVIM-DWI, DCE-MRI, and Radiomics: A Prospective Study Based on Machine Learning

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Purpose: To investigate the value of intravoxel incoherent motion diffusion-weighted imaging (IVIM-DWI), dynamic-contrast enhanced MRI (DCE-MRI) and three-dimensional (3D) radiomics based on magnetic resonance imaging (MRI) in noninvasive prediction of Ki-67 and p53 expression state in endometrial cancer (EC). Build, validate, and compare prediction models based on machine learning.

Methods: A total of 103 patients with EC confirmed by diagnostic curettage were analyzed prospectively. They were randomly divided into the training set and test set at a ratio of 7:3. According to pathology, the patients were divided into the high Ki-67 group ($Ki-67 \geq 39\%$) and low Ki-67 group ($Ki-67 < 39\%$), and p53 normal group (p53 expression level between 0-75%) and p53 abnormal group (overexpression, with $\geq 75\%$ of positive tumor cells or complete absence, with 0% of positive tumor cells or cytoplasmic expression). The quantitative parameters of IVIM-DWI and DCE-MR were measured. The 3D radiomics features were measured on T2-weighted imaging (T2WI), IVIM-DWI ($b=1500 \text{ s/mm}^2$) and DCE-MRI delayed phase. The least absolute shrinkage and selection operator algorithm, interclass correlation coefficient (ICC), Spearman's correlation analysis, independent two-sample t-test, and Mann-Whitney U-test were used to screen the best radiomics features, and Radiomics scores (RADS-score) were calculated. The independent prediction parameters of Ki-67 and p53 expression state were determined by binary logistic regression. The random forest (RF), support vector machine (SVM), and logistic regression (LR) classifier were used to construct prediction models respectively. Compare the performance of each model by Delong's test. The predictive effect of the models was evaluated by receiver operating characteristic (ROC) curve and verified by calibration and decision curve analysis (DCA).

Results: D, Ktrans and RADS-score 1 were independent predictors of high Ki-67 expression in EC patients. f, Vp, and RADS-score 2 were independent predictors of abnormal p53 expression in EC patients. The expression of Ki-67 and p53 in EC patients can be distinguished by machine learning models. The RF model performed best in predicting Ki-67 expression status. The area under the curve (AUC) were 0.877 (95%CI, 0.797-0.956) and 0.809 (95%CI, 0.708-0.909) in training and test set, respectively. When predicting p53 expression status, the LR model performed best, and the AUC were 0.898 (95%CI, 0.827-0.969) and 0.814 (95%CI, 0.656-0.974) in training and test set, respectively. In addition, the machine learning models performed significantly better than a single parameter. All queues were well calibrated. The decision curve verified that the machine learning models can achieve net benefits in clinical work.

Conclusion: The machine learning models based on IVIM-DWI, DCE-MRI, and radiomics performed well in noninvasively predicting Ki-67 and p53 expression status in EC patients before surgery, which could provide valuable information for personalized treatment.

PU-0210

高分辨 MR 成像在面神经病变中应用价值宁文锋¹、杨想春¹、马鸣岳¹、董燕¹、刘红生¹、弓甜甜¹、李璐言¹、张子照²

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目的：探讨高分辨 MR 成像在面神经病变中应用价值

方法：收集临床怀疑面神经病变患者 38 例，并对其临床资料进行研究分析；采用飞利浦 Ingneia 3.0T 核磁共振行高分辨；在飞利浦工作站对 58 例患者原始数据均行行曲面重建（CPR），并与临床/或术后病理结果对照统计分析，评估 MR 诊断准确性。结果：38 患者中，炎性 30 例，炎性均为单侧；肿瘤病变 8 例，单侧 6 例，双侧 2 例。高分辨 MR 成像可以清晰完整面神经全貌以及病变范围、肿瘤大小及其性质。结论：高分辨 MR 成像在面神经病变诊断具有很高应用价值，CPR 可在一幅图像上清晰显示面神经全貌，推测各段结构受损情况。结合轴位图像充分利用 CPR 后处理技术，可准确诊断面神经病变；对临床治疗选择及预后评价有重要的指导意义。

PU-0211

x 线射线、超声和磁共振成像对乳腺癌高危人群及不同人群亚组的筛查有效性和应用价值

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目的：乳腺癌已经成为女性常见的恶性肿瘤之一，早期诊断、治疗可以明显提高乳腺癌的治愈率。目前乳腺癌筛查最常用的影像学方法是钼靶 X 线和超声，然而对肿瘤风险较高的致密型乳腺敏感度欠缺。磁共振成像（MRI）具有高的软组织分辨率和无辐射等特点。本研究旨在评价乳腺 x 线射线、超声和磁共振成像对乳腺癌高危妇女人群及不同人群亚组的乳腺癌筛查效果。

方法：以 BRCA 突变携带者和家族性高危的女性为乳腺癌筛查对象，通过 x 线射线、超声和磁共振成像进行普查，每 12 个月检查一次，并对诊断性能进行对比。比较不同诊断方法及其组合的诊断效能，进一步比较基于突变状态、年龄和乳腺密度划分的亚组。

结果：MRI 的敏感性(91.4%)显著高于乳腺 x 线射线(37.8%)和超声诊断(37.5%)。60 例患者中，单纯 MRI 检出 18 例(45.0%)。单独 x 线射线检查发现 2 个癌。与单独使用 MRI 相比，并没有导致显著的敏感性增加($P = 0.19$)。单纯超声检查未发现癌症。x 线射线检查结合超声检查对乳腺癌的检出率仅为 36.5%。年龄、突变状态和乳腺密度对 MRI 的敏感性无影响，也不影响 MRI 相对于 x 线射线和超声的优越性。

结论：不同患者年龄、乳腺密度、危险度状态分组中 MRI 均可早期发现家族性乳腺癌。乳腺 x 线射线的附加价值有限，超声对接受 MRI 筛查的女性无附加价值，并且通过多模态、多参数磁共振成像定量分析影像学特征与乳腺癌分子亚型的相关性，能够术前无创反映乳腺癌的不同的分子亚型

PU-0212

应用动态心脏 MRI 心室功能自动量化系统评估心功能的研究

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目的：应用动态心脏 MRI 量化方法，从心脏 MR 图像中提取心室功能参数评估心功能。

方法：收集本院 100 例心脏动态 MRI 数据，每个数据都包含一个完整心动周期序列。将所有病例分为 5 组：心脏功能正常组（NOR）、陈旧性心肌梗死组（MINF）、扩张型心肌病组（DCM）、肥厚型心肌病组（HCM）和右心室异常组（ARV），每组各 20 例数据。再将所有数据随机分为训练组（60 例）、验证组（10 例）和测试组（30 例）。基于所有数据对比实验。(1) 手动与自动分割结果量化参数之间的差异：对 30 例测试组数据进行分割，得到每个时间序列的左右心室分割结果，使用自动量化方法提取手动分割与自动分割结果的心脏功能参数，计算手动与自动量化参数的均值、标准差及二者间的均方根误差和 P-value；(2) 正常组与异常组心功能量化参数之间的差异：对 100 例动态心脏 MRI 进行分割，得到每例数据各时间点的左右心室分割结果，使用自动量化方法提取自动分割结果的心脏功能参数，分别计算五组数据的组内平均值和标准差及异常组与正常组功能参数的 P-value。

结果：1. 手动与自动分割结果心室功能量化参数对比：自动分割结果的左右心室功能参数的分布特征与手动分割结果较为接近，且二者之间的均方根误差值较小；大部分左右心室功能参数的 P-value 均大于 0.05。2. 正常组与异常组的心功能量化对比：(1) DCM 组：扩张型心肌病组的左心室舒张末期容积、收缩末期容积、左心室射血分数、左心室质量等参数与正常组具有显著差异；(2) HCM 组：肥厚型心肌病组的左心室舒张末期容积、收缩末期容积及左心室射血分数与正常组无显著差异，但左心室质量显著大于正常组；(3) MINF 组：陈旧性心肌梗死组的左心室舒张末期容积收缩末期容积与左心室质量均显著高于正常组，左心室射血分数显著小于正常组，左心室每搏输出量无明显差异；(4) ARV 组：右心室异常组的右心室舒张末期容积与收缩末期容积显著高于正常组，而右心室射血分数显著低于正常组。

结论：动态心脏 MRI 自动量化方法所提取的心功能参数与真实值具有较高相关性和一致性，具有较高的实用价值。

PU-0213

睾丸横纹肌肉瘤的 MRI 表现

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【摘要】目的 分析睾丸横纹肌肉瘤的 MRI 影像表现，提高对睾丸横纹肌肉瘤的诊断水平。方法 回顾性分析 2016 年 3 月至 2023 年 4 月在郑州大学第一附属医院就诊的具有完整临床、MRI 和病理资料的 9 例睾丸横纹肌肉瘤患者，年龄 8~21 岁，均经病理及免疫组化检查证实。磁共振扫描方法：3.0T MRI 常规平扫、扩散加权成像和动态增强扫描。常规平扫包括矢状位 T2WI、冠状位 T2WI、横轴位脂肪抑制 T2WI 和 T1WI 序列(层厚 5mm，层数 25)；DWI 扫描为横轴位(b 值为 0 和 800)，动态增强扫描为横轴位 3D T1WI(层厚 3mm，层数 80)，延迟增强分别行横轴位、矢状位和冠状位 T1WI。结果 9 例横纹肌肉瘤均位于睾丸内，为单发，其中 4 例位于左侧，5 例位于右侧。肿瘤体积大，形态不规则，长径 5.2~15.0cm；肿块内囊变坏死呈长 T1、长 T2 信号，肿块实质部分呈等 T1、稍短 T2 信号，内见多发条状及网格状短 T2 分隔。有 3 例合并出血，出血区呈片状稍短 T1、长/短 T2 信号，病变边界欠清晰，向上累及同侧附睾及精索。5 例可见盆腔内、腹股沟多发肿大淋巴结，其中 1 例行胸腹 MRI 检查见腹膜后多发肿大淋巴结及脊柱、肋骨和骨盆多发骨转移。DWI 和

ADC 图均呈不均匀高/低混杂信号, 且 ADC 图高信号区为肿瘤囊变坏死, 低信号区为肿瘤实性部分。动态增强 TIC 类型: I 型 6 例, III 型 3 例。延迟期增强 T1WI 显示肿瘤呈轻中度不均匀条状及网格样强化, 囊变坏死区不强化, 呈“丝瓜瓤”样改变, 其中有 1 例合并骨转移的患者肿瘤呈不均匀强化。结论 睾丸横纹肌肉瘤 MRI 表现具有一定特征性, 对病变诊断具有重要诊断价值。

PU-0214

双向孟德尔随机化揭示了日常饮食模式与 大脑皮层结构变化之间的联系

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目的: 认知障碍是老龄化人群的主要健康问题。饮食模式和营养素与认知功能和大脑结构有关。孟德尔随机化可以使用遗传工具变量来评估因果关系。本研究采用孟德尔随机化分析法研究了饮食习惯和大量营养素对皮层结构的影响。

方法: 在本研究中, 我们利用最近关于饮食习惯的大规模全基因组关联研究汇总统计数据、ENIMMA 联盟关于大脑皮层结构的全基因组关联性研究数据和 SSGAC19 联盟关于饮食成分相关全基因组关联研究汇总数据, 进行了一项双样本双向孟德尔随机化研究。使用逆方差权重分析、MR-Egger 回归、加权中位数、加权模式和 MR-PRESSO (MR-Prioritropy RESidual Sum and Outlier) 检验来评估因果关系。此外, 还进行了反向孟德尔随机化分析, 以研究 23 种饮食习惯对大脑皮层结构的因果影响。

结果: 在饮食因素和整个皮层结构和厚度的背景下, 在正向和反向孟德尔随机化分析中都没有发现因果关系的显著证据。在前瞻性孟德尔随机化分析中, 有六个饮食因素被确定为与皮层结构显著相关。脂肪摄入与六个皮层区域的结构变化有关, 而全脂牛奶的摄入与五个区域的变化有关, 脱脂牛奶与四个区域有关, 蛋白质、新鲜水果和水各与一个区域有关。在反向分析中, 发现了显著的证据表明, 尾侧前扣带的皮层厚度影响酒精和碳水化合物的消耗, 枕外侧和眶额外侧的皮质厚度影响咖啡的消耗, 眶额内侧表面积影响非油性鱼类的消耗, 中央旁皮质厚度影响油性鱼类的消费。

结论: 总之, 这项两样本孟德尔随机化研究揭示了某些饮食习惯与大脑皮层厚度或表面积之间的因果关系。需要进一步的研究来阐明饮食习惯对皮层结构的影响, 包括所涉及的具体机制。这项研究有助于进一步阐明饮食因素在认知功能变化中发挥作用的潜在机制, 并为肠脑轴的存在提供证据。

PU-0215

3.0T 磁共振磁敏感加权像 (SWI) 在脑转移瘤与脑脓肿鉴别诊断 中的价值

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目的: 探究磁敏感加权成像(contrast enhanced susceptibility weighted imaging, SWI)在脑转移瘤与脑脓肿鉴别诊断中的价值。方法: 回顾性分析 58 例转移瘤患者和 32 例脑脓肿患者, 所有患者均在德国西门子 3.0T-skyra 磁共振成像仪上进行了常规磁共振成像、增强扫描和 SWI, 病灶内磁敏感信号(intralesional susceptibility signal, ILSS)有无来评价 SWI 对鉴别脑转移瘤与脑脓肿的诊断价值。结果: 58 例脑转移瘤患者中, 56 例患者检出 ILSS(96.5%), 32 例脑脓肿患者中 11 例检出 ILSS(34.3%), 利用 ILSS 区分脑转移瘤和脑脓肿敏感性 97%, 特异性 66%, 脑转移瘤患者 ILSS

检出率显著大于脑脓肿患者($OR=53.455$, $P=0.001$)。结论: SWI 在脑转移瘤与脑脓肿的鉴别诊断中具有重要价值。

PU-0216

肝癌致特鲁索综合症: 个案报道及文献学习

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Trousseau's syndrome refers to a series of thromboembolism syndromes, such as chronic intravascular coagulation, multiple venous thrombosis, arterial thrombosis and non-bacterial thrombotic endocarditis, which are caused by hypercoagulable state related to malignant tumors. It was first reported by Trousseau in France in 1865 that patients with gastric cancer are prone to deep venous thrombosis of lower limbs. In this paper, we analysed the process of diagnosis and treatment of a case of Trousseau syndrome caused by hepatocellular carcinoma and reviewed the related literatures in order to improve the clinicians' understanding of the disease, early recognition, timely diagnosis and treatment and improve the prognosis.

PU-0217

Evaluation of the correlation between trace elements and spinocerebellar ataxia type 3: a multi-elemental analysis

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Objective: Spinocerebellar ataxia type 3 (SCA3) is a neurodegenerative disease, which is neurological disorder characterized by cerebellar dysfunction. Previous studies suggest that the alterations of trace element content may contribute to development of neurodegenerative disorders. Therefore, in addition to investigating the association between trace elements and ATXN3 which is disease-causing genes of SCA3, we evaluated how trace elements relates to brain structural and functional neural atrophy, and discuss the possibility of using astrocytes as potential therapeutic targets.

Methods: Forty-five patients with SCA3 and 44 HCs were enrolled in this study. We collected blood samples from all the participants and analyzed them for trace elements. We used a Siemens 3T TIM Trio MRI system to get MRI data. Finally, We used MATLAB 2019b (MathWorks) to estimate the relationship between the brain structural morphology or functional connectivity indexes and blood level of elements.

Results: We demonstrated that patients with SCA3 have significantly lower whole blood levels of lithium, selenium, and copper than the healthy population by multi-elemental analysis of whole blood samples between SCA3 patients and healthy individuals was performed using inductively coupled plasma mass spectrometry. The levels of lithium and selenium were negatively correlated with the CAG repeat length in the ATXN3 gene. Furthermore, analysis based on diffusion tensor images and resting state functional images showed that for SCA3 patients: concentrations of Li were significantly negatively correlated ($p < 0.001$, in permutation test, cluster size >10) with FA values in left and right superior longitudinal fasciculus, and the two groups showed different patterns of resting state connectivity in some of the brain regions most associated with blood element levels.

Conclusions: As alterations in trace element homeostasis may affect the progression of SCA3 thus the treatment outcome can be varied by changing the trace element concentration, which

could be an efficient way of therapy. we suggest that it should be more precise, appropriate, and timely lithium supplementation to minimize damage to the white matter or astrocytes.

PU-0218

MRI 在腰骶神经成像技术的应用

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目的 探讨 MRI gre_geti 成像序列, 在显示腰骶椎管内外神经的价值

方法 对临床诊断腰腿痛患者行 MRI 腰椎检查, 除常规扫描 T2WI, T1WI, T2SPAIR 矢状位和 T2WI 横段位外, 用 T2 _geti3d 序列扫描冠状位。将 gre_geti_3d 序列扫描数据在工作站行多平面重建, 观察并腰骶神经与周围组织的信号差异以及形态走行, 判断腰骶神经受卡压等情况。gre_geti 使用扰相梯度回波序列来实现, gre_geti 序列的对比度主要取决于回波数、TE、TR 和翻转角。在进行 3D 扫描时, 常用参数设置如下: TE 20 ms ~ 40 ms, TR 400 ms ~ 600 ms, 翻转角 60° ~ 80°, 回波数 3 ~ 6。

gre_geti 序列是在一次小角度射频脉冲激发后, 利用读出梯度多次切换, 采集多个梯度回波 (一般为 3 ~ 6 个), 这些梯度回波采用同一个相位编码, 填充在 k 空间的同一条相位编码线上, 最后将这些回波都合并起来。为了消除流动的影响, 协议默认添加三个方向的流动补偿。

结果 该序列能够抑制神经束间和神经周围脂肪, 图像中椎管内神经呈线样低信号, 硬膜囊内脑脊液呈中高信号, 组织对比清楚。在椎管外神经呈条索状低信号, 该序列能显示神经根水肿及受压的程度。高场强 3.0MR, 3 维高分辨率成像, 以及敏感编码并行采集 (sensitivity encoding SENSE) 短反转时间反转恢复 (shot inversion recovery TI STIR) 等技术的发展, 使该序列成像分辨率及信噪比均明显提高, 可获得更细更多脊神经, 从而更适合用来研究周围神经。

结论 目前临床采用 MRI 常规序列扫描, 其存在一定的局限性。MRI 常规序列扫描只能显示神经根的解剖形态, 不能显示神经根受压后的病理变化, 无法达到功能成像; 且显示的解剖形态也只是一定角度的二维图像, 不能显示受压神经根的全貌。MRI 技术 gre_geti_3d 的序列安全无创, 不需要造影剂能显示腰骶神经的解剖形态及走形, 特别是对一些特殊类型的腰椎间盘突出症, 有其独特的诊断优势。

PU-0219

The Impact of KL-VS Heterozygosity on hippocampal neurodegeneration in Mild Cognitive Impairment

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Objective: Alzheimer's disease (AD) is the most common type of dementia, and the APOE $\epsilon 4$ allele is regarded as a risk factor. Recent studies have shown heterozygosity for KL-VS, a haplotype in the human Klotho gene, is associated with greater cortical volume, better global cognition, reduced amyloid burden and risk of AD who carrying the APOE $\epsilon 4$, and lower amyloid-related tau pathology, suggesting a possible protective role in AD. In the amnesic Mild Cognitive Impairment (aMCI), disruption in the functional networks of the hippocampal subregions can be observed, leading to cognitive decline. Also, the kl protein encoded by the KL-VS^{het} gene is specifically expressed in hippocampus and plays a crucial role in degeneration. Magnetic resonance imaging (MRI) technology has been widely used to explore the in vivo neural mechanisms of genes. In this study, we aim to reveal the potential mechanism of the protective

effect for KL-VS^{het} in MCI and to clarify its effect on cognitive decline caused by pathological deposition.

Methods: 48 participants were selected from ADNI 3, including 16 KL-VS^{het} carriers (8 cognitively normal subjects, CN, 8 aMCI) and 32 non-carriers (16 aMCI, 16 CN). The rs-fMRI data were preprocessed, and then FC matrices between subregions and cortex were obtained. After Fisher-Z transformation, the mean FC value was extracted. ANOVA was performed among groups for FC, cognition and pathology. Moderated effects analysis was performed based on SPSS 24, PROCESS V4.1.

Results: Group comparisons revealed significant differences in FC, cognitive performance, and pathology between KL-VS^{het} carriers and non-carriers. Regression analysis showed that changes in FC between the subregions and cortex could modulate the impact of pathology on cognition.

Conclusion: Our findings suggest that the KL-VS^{het} may exert its protective effects by influencing FC between hippocampal subregions and cortex, thereby modulating cognitive impairments caused by AD pathology.

PU-0220

颈动脉粥样硬化斑块的血流动力学与斑块内出血相关性的 HR-MRI 研究

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内蒙古自治区人民医院

目地: 本研究旨在利用血管壁高分辨率磁共振 (VW-HRMRI) 成像研究不同形状颈动脉粥样硬化斑块 (CAS) 局部血流动力学特征与斑块内出血 (IPH) 之间的关系。以期达到对 IPH 的早期预判与提前预防的目的, 使脑血管病能够得到早期治疗, 降低 IPH 的发生率、死亡率, 以取得较好的社会效益。

方法: 收集内蒙古自治区人民医院 2020 年 6 月——2023 年 6 月 86 名有症状的患者 (平均年龄 64.9 ± 10.9 岁, 范围: 33-76 岁; 62 名男性), 此前经头颈血管 CTA 确诊左侧颈总动脉分叉-颈内动脉起始处动脉粥样硬化斑块 (狭窄程度 70-95%; 斑块长度 1-1.5cm; 血压 80-139mmHg), 并同意接受 VW-HRMRI 成像, 纳入分析。应用血流动力学后处理软件, 对不同形状颈动脉粥样硬化斑块局部血流动力学特征与斑块内出血之间的关系进行分析, 评估颈动脉斑块的形状与 IPH 之间的关系。斑块形状定义如下: I 型: 斑块的弧长在上游较大; II 型: 斑块下游和上游的弧长相等; III 型: 斑块的弧长在下游更大。测量各组斑块上中下游局部血流动力学参数, 包括: 最大剪切应力 (Wall shear stress, MaxWSS)、平均剪切应力 (MeanWSS)、最小剪切应力 (MinWSS), 比较有和没有 IPH 的不同形状颈动脉粥样硬化斑块局部血流动力学参数, 确定其与 IPH 的相关性。

结果: 在 86 个检测到的斑块中, 27 个 (31.4%) 有 IPH。与没有 IPH 的斑块相比, 有 IPH 的患者 I 型斑块形状的发生率较高 (63.0%对 39.0%, $P < 0.001$), III 型斑块形状发生率较低 (25.9%对 45.8%, $P < 0.001$)。调整混杂因素后, I 型颈动脉斑块的斑块形状 (OR, 4.16; 95%CI, 1.42–10.53; $P = 0.018$) 与 IPH 显著相关。

结论: 颈动脉斑块的形状与 IPH 的发生密切相关。我们的发现可以为 IPH 和易损斑块的发病机制提供新的见解, 并为制订有针对性、个体化的临床诊疗方案提供影像学客观依据。

PU-0221

CMR 心外膜脂肪对心肌梗死合并房性心律失常患者发生心衰的预测价值

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目的：既往研究表明，同时患有房颤和心梗的患者比仅患有其中一种疾病的患者患中风、心力衰竭和死亡的风险更大，早期识别 MI 合并房性心律失常的高危患者非常重要。本研究利用心脏磁共振 (CMR) 探讨由 CMR 和临床确诊的 MI 合并经动态心电图发现的房性心律失常患者的心外膜脂肪体积及质量对住院随访期间发生心衰的预测价值。

方法：收集 2015 年 07 月至 2022 年 12 月间在昆明医科大学第二附属医院经临床及 CMR 确诊的 MI 患者 112 例，其中动态心电图发现的合并房性心律失常患者一共 62 例。根据随访结果分为无心衰组和心衰组。利用 CVI-42 后处理软件获得包括心外膜脂肪体积和质量在内的心脏结构功能及组织特征参数。比较两组患者的临床基线资料及 CMR 参数，行单因素及多因素 Logistic 回归分析 MI 合并房性心律失常发生心衰的预测因素，进一步绘制 ROC 曲线分析各参数的预测价值。结果：共纳入 MI 患者 62 例，其中心衰组 25 例，无心衰组 37 例。两组患者心外膜脂肪的体积、质量、左心室射血分数(LVEF)、糖尿病、年龄、梗死容积有显著统计学差异($P<0.05$)。心衰组心外膜脂肪体积和质量明显高于对照组($P<0.001$)，单因素有序 Logistic 回归分析显示，心外膜脂肪的体积、质量、糖尿病为 MI 合并房性心律失常后心衰的有效预测因子 (均 $P<0.05$)。多因素有序 logistic 回归分析显示，心外膜脂肪的体积和质量为 MI 合并房性心律失常后心衰的独立预测因子 (均 $P<0.05$)。ROC 分析提示心外膜脂肪的体积、质量以及联合指标对预测 MI 合并房性心律失常患者发生心衰均有一定价值($AUC>0.7, P<0.05$)，其中心外膜脂肪的体积和质量联合参数预测效能最大($AUC=0.87, P<0.001$)。结论：心外膜脂肪的体积和质量增加是心肌梗死合并房性心律失常患者发生心衰的重要标志。心外膜脂肪的体积及质量联合指标对 MI 合并房性心律失常患者新发心衰的发生具有良好的预测价值。

PU-0222

人工智能结合压缩感知技术在膝关节成像上的应用潜力

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【摘要】目的 探究人工智能 (AI) 结合压缩感知技术中的不同加速因子 (AF) 在膝关节 3D PDWI 成像的应用价值。方法 应用 Ingenia 3.0T CX MR 对 18 名健康志愿者 (男 10 例，女 8 例) 分别采用 4、6、8、10 的 AF 进行膝关节 3D PDWI 成像，获得 A、B、C、D 4 组图像；在 6、8、10 AF 扫描时使用人工智能技术，获得 E、F、G 3 组图像。测量股骨远端、外侧半月板前角、外侧半月板后角、前交叉韧带、后交叉韧带以及腓肠肌的信号值 (SI) 和噪声值 (SD)，并以腓肠肌为背景，计算骨、半月板及韧带的信噪比 (SNR) 和对比噪声比 (CNR)。由两名观察者独立地对图像质量进行主观评分，并行 Kappa 一致性检验。结果 常规膝关节 3D PDWI 扫描时间为 361 s，AI 技术结合 AF=8 的扫描时间为 184 s，缩短了 49.03%。7 组图像在骨、半月板及韧带的 SI 值差异无统计学意义。在 A~D 四组、E~F 三组中，骨、半月板及韧带的 SNR、CNR 逐渐降低，但在相同 AF 下，使用 AI 技术组的骨、半月板及韧带的 SNR、CNR 均显著高于未使用 AI 技术的组，差异均有统计学意义。相较于 A 组，E、F、G 三组目标组织的 SNR、CNR 均明显提升。两观察者客观数据测量及主观评分的一致性良好 (Kappa 值 0.768~0.926)，相同 AF 下，使用 AI 技术组的主观评分均优于未使用 AI 技术的组。七组主观评分分别为 4.51±0.26、4.27±0.43、3.89±0.39、3.56±0.19、4.72±0.37、4.59±0.17、4.26±0.45。结论 基于深度学习的人工智能技术

结合压缩感知技术 (AF=8) 能够显著缩短扫描时间 (49.03%), 提升图像的分辨率, 清晰显示软骨及韧带, 有广阔的临床应用前景。

PU-0223

Naïve Bayes classifier based on radiomics features in ultra-high b-value DWI-MRI to predict glioma grade

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Objectives: To identify the optimal b-value with DWI based on radiomic features evaluation for predicting glioma grade.

Materials and Methods: Prospective participants suspected to have glioma underwent multiparametric MRI between March 2017 and September 2018. Quantitative radiomic features for each b-value DWI sequence were extracted from the tumor region of interest (tumor-ROI) and peritumor-ROI and used to differentiate from LGG using Gaussian Naïve Bayes classifiers. Diagnostic performance was assessed using sensitivities, specificities, 95% confidence interval (CI), and area under the receiver operating characteristic (AUC) curve analysis.

Results: This study included 102 participants with Glioma (mean age: 47.1 ± 13.5 years [standard deviation]; 55 female). In tumor-ROI analysis, significant differences were achieved at 6,000 and 8,000 s/mm^2 in the training cohort ($p = 0.028$ and 0.039) and at 6,000 s/mm^2 in the testing cohort ($p = 0.0296$) for differentiating glioma grading. In the testing cohort, the DWI weighted by a b-value of 6,000 s/mm^2 achieved the highest accuracy with an AUC of 0.93, sensitivity, and specificity of 0.89 and 0.92, respectively. In peritumor-ROI analysis, 6,000 s/mm^2 DWI outperformed other classifications with the highest AUC (0.98 and 0.93) in P-10mm-ROI and P-15mm-ROI, and with significant difference than 1,000 s/mm^2 DWI ($p = 0.033$) in P-10mm-ROI in the test cohort.

Conclusion: Ultra-high b-value DWI-MRI improves the diagnostic performance for predicting glioma grade in the radiomic features analyzed by machine learning models. The b-value of 6,000 s/mm^2 may be optimal.

PU-0224

磁共振波谱检测杜氏肌营养不良患儿心肌组织甘油三酯含量

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目的: 杜氏肌营养不良是一种由 DMD 基因突变导致功能性蛋白抗肌萎缩蛋白缺失引起的严重的进行性肌肉消耗障碍。心脏受累已成为死亡的主要原因。DMD 的病理特征包括肌肉变性坏死、炎症/水肿, 最终脂肪浸润脂肪浸润, 导致肌肉组织和功能进行性丧失。心脏能量代谢缺陷, 尤其是脂肪浸润与心肌疾病相关。MRS 可用于无创地研究在体心脏代谢变化, 可以预测心力衰竭和死亡。因此, 本研究探讨了 DMD 心肌组织甘油三酯含量的特点。

方法: 纳入了 20 例 DMD 患者参与这项研究, 所有患者经基因检测和/或骨骼肌病理确诊为 DMD。对照组为年龄匹配的健康男性, 无心血管疾病证据。所有受试者接受心脏磁共振检查, 包括电影序列及波谱序列, 于室间隔中部心肌最厚处, 体素大小约为 $20 \times 15 \times 15 \text{mm}$ 但可根据心腔大小、心肌厚度进行调整, 并在四腔心及短轴上确认, 压水和不压水序列各扫描五次。应用西门子后处理软件计算各体素内的 H2O 峰、TG 峰的峰与峰下面积并计算百分 TG $/(\text{H2O} + \text{TG}) \times 100\%$ 。

统计学方法 用 SPSS 版软件行分析, t 检验样本均数是否有显著意义, $P < 0.05$ 为差异有显著性意义。
结果: DMD 患儿 TG 含量约 6.13%, 正常组 TG 含量约 0.56%, 两组对比具有统计学意义。

结论: DMD 心肌组织甘油三酯较正常儿童增加。

PU-0225

甲基丙二酸血症临床特征与颅脑 MRI 影像分析

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目的: 本研究通过总结甲基丙二酸血症患者的临床资料、颅脑 MRI 表现及遗传学资料, 进一步提高对甲基丙二酸血症的认识, 提高临床诊断率。

方法: 回顾性分析 2010 年 1 月至 2022 年 11 月山东省立医院确诊的 65 例甲基丙二酸血症患者的临床资料、颅脑 MRI 及遗传学资料。其中男性 33 例, 女性 32 例, 年龄 1 天-31 岁。所有患者均通过血/尿有机酸检测而确诊, 均行颅脑 MRI 检查 (矢状面 T2WI, 横断面 T1WI、T2WI 及 T2-FLAIR、DWI), 部分患者进一步行基因检测。由 2 名影像诊断医师独立阅片, 意见不一致时经讨论后取得共识。

结果:

1. 临床资料分析

新生儿期发病率(54%)最高, 同一年龄阶段男女发病率未见明显差异。在神经系统表现为癫痫、惊厥、抽搐下肢无力、走路姿势异常, 其中最常见症状为癫痫(19%)。部分患者进行了基因检测, 检测结果显示存在 MMUT、MMACHC 基因突变。查询 ClinVar 数据库, 发现一种未报道过的新突变。

2. 影像学表现

36 例患者(55%)颅脑 MRI 表现明显异常, 可分为脑结构损害及脑发育异常。脑结构损害表现为脑损害异常信号灶、脑出血及硬膜外积液。脑损害异常信号灶在不同时期有所变化, 6 例患者为急性期表现, 在颅脑 MRI 显示为类梗死灶, DWI 示病灶明显扩散受限, T2WI 及 T2-FLAIR 呈高信号, 出现于基底节区、小脑、脑桥、丘脑等, 其中最常见于基底节区。6 例慢性期则表现为缺血软化灶。4 例患者存在脑出血 MRI 表现, 分为脑实质出血、硬膜下出血及硬膜外出血。脑发育异常则表现为髓鞘发育不良、胼胝体发育不良或变薄、侧脑室系统扩张、脑积水及 Dandy-Walker 综合征。髓鞘发育不良者最多(20%)。余 29 例患者(45%)在影像学表现上未见明显异常。

结论: 甲基丙二酸血症在影像学上表现多样, 综合其独特的临床、影像学表现可以为临床诊断进一步提供帮助。

PU-0226

Cervical Cord Atrophy and Axonal Damage Following Optic Neuritis: Insights from Quantitative Spinal MRI

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Objectives

Previous studies have demonstrated that optic neuritis (ON) affects brain plasticity. However, whether ON affects the spinal cord remains unclear. We aimed to investigate the spinal cord changes in ON and their associations with disability.

Methods

A total of 101 ON patients, and 41 healthy controls (HC) were retrospectively recruited. The quantitative spinal MRI (T1-weighted structural and diffusion tensor imaging) was employed to examine the cross-sectional area (CSA) and diffusion indicators. CSA, fractional anisotropy (FA),

mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) were compared between groups. Correlation analyses were performed between CSA, diffusion indicators and clinical variables.

Results

No significant differences were found in CSA between ON patients and HCs. MD, AD, RD values in ON patients were significantly higher than in HC ($p < 0.05$). The AD values of the ON patients were significantly negatively correlated with PASAT scores ($r = -0.37$, $p = 0.0005$).

Conclusions

This study provided imaging evidence for DTI abnormalities in patients with ON. DTI quantitative spinal MRI can improve our knowledge of the path physiology of ON, and clinical progression.

PU-0227

Brain Functional Connectivity Associated with Symptoms of Vestibular Migraine

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Background: We sought to investigate the resting-state FC patterns in VM during the interictal period by combining data-driven voxel-wise DC calculations and seed-based FC analysis.

Methods: Thirty-eight patients with VM and 33 matched normal controls were recruited. DC was calculated and compared between the groups, and FC of locations with DC alterations was further tested via a seed-based technique.

Results: In contrast to the control group, the VM group had considerably lower DC values in bilateral medial prefrontal cortex (mPFC) and significantly higher DC values in the right occipital lobe. Seed-based FC analyses revealed that VM patients demonstrated decreased bilateral mPFC connections with the cortical regions.

Conclusion: Our findings showed changes in the default-mode network, and visual cortex in VM patients.

PU-0228

轻微型肝性脑病患者脑功能结构的异常稳定性

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研究背景和目的:轻微型肝性脑病(MHE)是肝硬化常见的神经认知并发症。本研究探讨肝硬化患者脑功能结构稳定性的变化及其与认知损害的关系。

方法:本研究前瞻性纳入 51 例肝硬化患者[21 例伴 MHE, 30 例无 MHE (NHE)]和 29 名健康对照者(HC)。所有的受试者均参与了静息态功能磁共振成像扫描和肝性脑病心理测量量表(PHES)检查。首先我们通过计算一个体素与全脑其他体素之间的连接强度总和来获得基于体素的功能连接密度(FCD)。随后采用滑动窗相关方法来计算 FCD 随时间的动态变化。功能稳定性(FS)是指 FCD 在时间上的一致性。使用单因素方差分析比较三组间功能连接差异。使用 Spearman 相关分析评估肝硬化患者脑区 FS 与 PHES 评分的相关性。使用受试者工作特征曲线(ROC)分析脑区 FS 值在区分 NHE 组和 MHE 组方面的潜力。

结果:从 HC 组到 NHE 组和 MHE 组,我们发现右侧缘上回、右侧中扣带回、左侧额上回和双侧后扣带回的 FS 值逐渐减低,而左侧枕中回和右侧颞极的 FS 值逐渐增高。右侧缘上回/左侧枕中回/右

侧颞极的平均 FS 值 (分别为 $r=0.470$ 、 $P=0.001$; $r=-0.458$ 、 $P=0.001$; 和 $r=-0.384$ 、 $P=0.005$) 与肝硬化患者 PHES 评分具有相关性。右侧缘上回/左侧枕中回/双侧后扣带回/右侧颞极的 FS 值在 NHE 组和 MHE 组间显示出中等程度的鉴别潜力。

结论:脑区 FS 的改变可能与肝硬化患者认知功能障碍的神经病理有关, 并且可能作为 MHE 诊断和监测肝性脑病进展的潜在生物标志物。

PU-0229

Clinical and Imaging Markers for the Prognosis of Acute Ischemic Stroke

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Background and Purpose: Significant differences in the outcomes observed in patients with acute ischemic stroke (AIS) have led to research investigations for identifying the predictors. In this retrospective study, we aimed to investigate the relationship of different clinical and imaging factors with the prognosis of AIS.

Methods: All clinical and imaging metrics were compared between the good and poor prognosis groups according to the modified Rankin Scale (mRS) score at 90 days after discharge. Clinical factors included gender, age, NIHSS scores at admission, and other medical history risk factors. Imaging markers included the lesion's size and location, diffusion, and perfusion metrics. Spearman's correlations were analyzed for age, NIHSS scores, and imaging markers between the different groups. The chi-square test and Pearson's contingency coefficients were analyzed for gender and other quantitative risk factors.

Results: A total of 89 patients with AIS were divided into the good (mRS score ≤ 2) and poor prognosis groups (mRS score ≥ 3). The two groups had significant differences in NIHSS scores, rCBF, rMK, and rMD ($P < 0.05$). Among them, rMK had the strongest correlation with the mRS score at 90 days after discharge ($r=0.545$, $P < 0.001$).

Conclusion: Perfusion and diffusion metrics, including CBF, MD and MK, could reflect the microstructure and blood flow characteristics of the lesion, which were the key factors for the salvage ability and prognosis of the infarction tissue. The NIHSS score at admission could reflect the functional involvement correlated with patients' outcomes.

PU-0230

磁共振图像纹理特征鉴别直肠肿瘤的应用

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目的: 通过对直肠绒毛管状腺瘤和 T1 期直肠腺癌的磁共振图像进行纹理分析, 并用 K-近邻算法评价纹理特征。

方法: 回顾性分析本院经病理证实的 30 例直肠绒毛管状腺瘤和 43 例 T1 期直肠腺癌, 对两种肿瘤的术前磁共振 T2WI 图像上的感兴趣区进行纹理特征提取和分析。

结果：基于统计的纹理特征提取方法提取的 42 个纹理参数中有 14 个参数在两组数据集之间具有统计学差异 ($P<0.05$)。直肠绒毛管状腺瘤和 T1 期直肠腺癌具有统计学差异特征的-近邻算法测试的敏感度、特异度及准确率分别为 $79.87\pm7.55\%$ 、 $53.89\pm10.16\%$ 、 $69.24\pm5.52\%$ 。

结论：T2WI 纹理分析可提高直肠绒毛管状腺瘤和 T1 期直肠腺癌鉴别诊断的准确性，是一种定量诊断直肠肿瘤的补充方法。

PU-0231

ABER 体位 MRI 成像与肩关节 MRI 造影诊断肩关节不稳定的临床应用价值比较

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目的：探讨 ABER 体位 MRI 成像与肩关节 MRI 造影两种技术对诊断肩关节不稳定的准确性的临床应用价值。

方法：回顾性分析自 2022 年 1 月至 2023 年 6 月，于我院同期行 ABER 体位 MRI 以及肩关节 MRI 造影诊断的肩关节不稳定患者 32 例，其中男性 17 例，女性 15 例，平均年龄 43.2 ± 7.5 岁，并于关节镜术中探查结果比较，观察这两种检查方法对肩关节不稳定的 Bankart 损伤、Perthes 病变、ALPSA 病变、GLAD 病变以及 SLAP 病变的诊断价值。

结果：关节镜发现 Bankart 损伤 17 例 (ABER 体位扫描符合 15 例与肩关节造影符合 16 例)，Perthes 病变 10 例 (ABER 体位扫描符合 9 例与肩关节造影符合 9 例)，ALPSA 病变 3 例 (ABER 体位扫描符合 1 例与肩关节造影符合 3 例)，GLAD 病变 2 例 (ABER 体位扫描符合 1 例与肩关节造影符合 2 例)，SLAP 病变 12 例 (ABER 体位扫描符合 11 例与肩关节造影符合 10 例)。

结论：肩关节宏观不稳定主要为创伤后单向不稳定，涉及前下孟唇-韧带复合体病变，肩膀微观不稳定则属于过度应力下的肩关节获得性不稳定，主要为前后上孟唇损伤；由于肩关节结构比较复杂，关节囊较为紧致，关节组成的韧带、孟唇多有解剖变异，导致常规 MRI 扫描对肩关节不稳的诊断存在一定的难度，多有漏诊的情况发生。ABER 体位通过外旋外展上肢，人为的紧张关节囊-孟唇唇复合体，从而可以更好地评估囊-唇复合体、肩袖撕裂和 SLAP 病变。通过比较发现 ABER 体位对 Bankart 损伤、Perthes 病变、SLAP 病变的敏感度与特异度类似于肩关节造影，对 ALPSA 病变、GLAD 病变的敏感度低于肩关节造影。ABER 体位属于无创性 MRI 检查一次成像，肩关节造影检查属于有创性检查，且操作繁杂，费用较高，两种检查方式可以科学的互补，提高肩关节不稳定的影像诊断的准确性。

PU-0232

两种 DKI 后处理方法在胶质瘤分级中的诊断效能研究

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目的：评价扩散峰度成像 (DKI) 的后处理方法直方图分析和 DKE 软件在胶质瘤分级中的应用价值。

方法：收集本院术前单发脑占位并可疑脑胶质瘤的患者进行 DKI 图像采集。经病理证实的脑胶质瘤患者 DKI 图像由 DKE 软件进行后处理并得出 AK、MK 和 RK 参数图。参考 T2WI 和增强扫描图像判断肿瘤实性成分，并应用 micron 软件手动划取 ROI，得出 AK、MK 和 RK 参数值。将 DKI 所得 TRACW 图经 Matlab 平台进行直方图分析得出 Dapp 和 Kapp 的直方图及参数，所选 ROI 与 micron 软件中保持一致。各参数值的统计学分析采用独立样本 T 检验或 Mann - Whitney -

Wilcoxon 秩和检验, 并进行 ROC 分析。结果: 术后证实为脑胶质瘤者共 73 例, 高级别组 52 人 (WHOⅢ级 13 例, WHOⅣ级 39 例), 低级别组 21 人 (WHOⅡ级)。直方图分析法所得 Kapp 的最大值、平均值、标准差和第 75、95 百分位数, 以及 Dapp 的最小值、平均值、偏度系数和第 25、50、75、95 百分位数在高低级别组中差异有统计学意义。DKE 软件所得 MK 值在 WHOⅡ、Ⅲ和Ⅳ级脑胶质瘤两两级别之间的差异均有统计学意义。结论: MK 值在 WHOⅡ、Ⅲ和Ⅳ级脑胶质瘤分级中有重要意义, 直方图分析可作为辅助手段更好地提供肿瘤生物学特性。

PU-0233

基于术前 MRI 模型预测颅内脑室外室管膜瘤预后的研究

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目的: 本研究旨在基于磁共振影像学 (magnetic resonance imaging, MRI) 开发并验证机器学习模型, 用于预测颅内脑室外室管膜瘤 (intracranial extraventricular ependymoma, IEE) 患者的无病生存期 (DFS) 和总生存期 (OS)。

方法: 本研究纳入了 114 例经病理证实的 IEE 患者, 将其随机分为训练集 (n=80) 和验证集 (n=34)。采用伦勃朗视觉感受图像 (VASARI) 功能集评估术前颅脑 MRI 特征, 采用多因素 Cox 比例风险回归分析筛选独立的预后因素, 并使用一致性指数 (C-index) 和校准曲线 (Calibration curve) 评估生存模型的预测能力。以模型评分的中位数作为标准将患者分为高分组或低分组。通过纳入显著的 MRI-VASARI 特征和临床预测因子, 并使用多变量 Cox 比例风险回归分析建立列线图。

结果: 多因素 Cox 比例风险回归分析显示, 嗜酸性粒细胞、血尿素氮、血肌酐、MRI-VASARI 特征如非强化切缘 (F13) 与患者的无病生存期预后显著相关。此外, 临床指标 (如血尿素氮和 D-二聚体) 和 MRI-VASARI 特征 (如肿瘤位置 (F1)、语言功能区 (F3) 和 T1/FLAIR 比值 (F10)) 是总生存期的独立预测因子。基于这些因素, 分别构建了仅使用临床指标、仅使用 MRI-VASARI 特征以及同时使用临床指标和 MRI-VASARI 特征的生存模型, 并将其以列线图显示。总生存期的三个生存模型的一致性指数分别为 0.732、0.729 和 0.768。无病生存期的一致性指数分别为 0.694、0.576 和 0.714。由此可以明显看出组合模型具有最高预测能力。校准曲线提示预测结果与实际结果之间表现出良好的一致性。因此, 本研究中基于 MRI-VASARI 特征的组合模型在 IEE 患者的生存预测模型中具有较高的预测能力。

结论: 结合临床指标和 MR-VASARI 特征的预测模型具有良好的预测效能, 这可能有助于评估 IEE 患者的预后。

PU-0234

脑灰质体积及结构协变网络在脑小血管病伴 认知障碍患者中变化特征

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目的 探讨 CSVD(cerebral small vessel disease, CSVD)伴认知障碍 (cognitive impairment, CI) 患者灰质体积 (gray matter volume, GMV) 的变化特点及结构协变网络 (structural covariance network, SCN) 的改变模式。

材料与方法 2021 年 10 月到 2022 年 12 月期间, 招募南京医科大学附属无锡市人民医院 CSVD-CI 患者 57 例, CSVD-NCI 组 41 例, 采集 3D-T1 结构像数据提取两组患者 GMV 并构建 GMV 相关的 SCN 网络, 比较两组 GMV 的变化及灰质结构协变网络的组间差异。

结果 CSVD-CI 患者在双侧海马、海马旁回、梭状回及左侧豆状壳核体积明显低于 CSVD-NCI 组 ($P < 0.05$, FWE 校正), 并且这些区域与不同领域的认知减退有关。在全局网络水平, CI 组最短路程长度显著高于对照组 ($P = 0.023$) 而全局效率显著低于对照组 ($P = 0.005$)。在节点水平, CSVD-CI 组在左侧豆状壳核节点度及节点效率较对照组显著下降 ($P < 0.05$)。

结论 联合 VBM 和 SCN 分析能够揭示灰质结构及灰质网络的改变可能是 CSVD 患者发生认知障碍的重要结构基础。

PU-0235

Abnormal dynamic functional connectivity in first-episode, drug-naïve adolescents with major depression disorder

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Background

Previous neuroimaging studies have identified disrupted large-scale functional brain networks in major depression disorder (MDD); however, most of them focused on adult patients and were based on static functional connectivity (FC). Thus, we aimed to investigate the patterns of change in dynamic FC in depressed adolescents.

Methods

Resting-state functional magnetic resonance imaging data were acquired from 60 first-episode, drug-naïve adolescents with MDD and 60 matched healthy controls (HCs). Then, the dynamic FC properties were analyzed using a sliding windows approach, k-means clustering and graph-theory methods.

Results

The intrinsic brain FC were clustered into two configuration states, a more frequent and relatively sparsely connected State 1 and a less frequent and more strongly interconnected State 2. Compared with HCs, depressed adolescents had higher reoccurrence fraction and dwell time in State 1, and lower reoccurrence fraction and dwell time in State 2, and higher total number of transitions between the two states. Depressed adolescents showed decreased FC within the default mode network (DMN) and between the DMN and other networks in State 1. Additionally, the MDD group showed higher variances in the global and local efficiency. Furthermore, the duration of illness was positively correlated with the number of state transitions, and the 17-item Hamilton Depression Rating Scale score was positively correlated with the mean dwell time in State 1.

Conclusion

This study demonstrated abnormal dynamic FC in depressed adolescents, which provided new insights into the pathophysiological mechanisms of adolescent-onset depression.

PU-0236

Manganese-based nanotheranostics for magnetic resonance imaging-mediated precise cancer management

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Manganese (Mn)-based magnetic resonance imaging (MRI) has become a competitive imaging modality for cancer diagnosis due to its advantages of non-invasiveness, high resolution and excellent biocompatibility. In recent years, a variety of Mn contrast agents based on different material systems have been synthesized, and a series of multi-purpose Mn nanocomposites have also emerged, showing satisfactory relaxation efficiency and MRI performance thus possess the transformation and application value in MRI-synergized cancer diagnosis and treatment. This tutorial review starts from the classification and properties of Mn-based nanomaterials, and then summarizes various preparation and functionalization strategies of nanosized Mn contrast agents, especially focuses on the latest progress of Mn contrast agents in MRI-synergized precise cancer theranostics. In addition, present review also discusses the current clinical transformation obstacles such as unclear molecular mechanisms, potential nanotoxicity, and scale production constraints. This paper provides evidence-based recommendations about the future prospects of multifunctional nanoplateforms, as well as technical guidance and panoramic expectations for the design of clinically meaningful cancer management programs.

PU-0237

硬皮病患者心脏受累情况的 CMR Mapping 成像评估

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系统性硬化病 (systemic sclerosis, SSc) 是一种自身免疫性结缔组织病, 以皮肤和内脏器官的纤维化及血管病变为特征表现, 多数患者可出现脏器受累, 包括心脏。心脏受累通常提示预后欠佳, 死亡率高。临床中往往低估心脏受累, 如果采用敏感的检查手段, 几乎所有系统性硬化症均有心脏受累。心血管磁共振成像 (Cardiac Magnetic Resonance Imaging, CMR) 是一种安全、有效、无创的检查方法, CMR 已成为无创性评估心脏结构和功能的金标准, 对检测心肌缺血、水肿或纤维化有重要价值。CMR Mapping 成像可以对心肌 T1、T2、T2* 和 ECV 等反映心肌组织特性的参数变化进行常规空间可视化的定量测量。从成像技术上来说, CMR Mapping 成像与 T1、T2 或 T2* 加权图像不同, Mapping 成像可以对疾病进展过程进行可视化和量化, 与心肌疾病是局灶性还是弥漫性无关。这一创新很重要, 因为在以往的临床应用实践中, 很难对弥漫性心肌疾病进行无创性量化。Mapping 成像超出了我们以往对患者心脏疾病潜在风险评估的理解。Mapping 成像技术方兴未艾, 为心脏磁共振成像提供独一无二的诊断信息, 该技术成熟可靠的应用具有非常重要的临床意义。本研究通过回顾性分析我院近 5 年收治的 SSc 患者的 CMR 资料, 旨在探讨 CMR Mapping 成像评估硬皮病患者心脏受累情况, 以期早期诊断, 早期治疗。

PU-0238

心脏磁共振延迟强化对肥厚型心肌病 心源性猝死发生风险预测价值研究

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研究心脏核磁共振(CMR)心肌延迟强化(LGE)对肥厚型心肌病(HCM)心源性猝死(SCD)长期风险预测价值。方法:研究对象选取我院 2013 年 10 月到 2020 年 6 月间接受 CMR-LGE 的 HCM 患者 81 例,统计所有患者的基本病例资料、5 年 HCM-SCD 风险评分和 LGE 值,所有患者常规接受随访且统计 SCD 发生率。Pearson 相关性分析 HCM 患者 LGE 值与 5 年 HCM-SCD 风险评分相关性,同时绘制 ROC 曲线计算 LGE 值对 HCM 患者 SCD 发生的预测效能。结果: HCM 患者的 LGE 值随着 5 年 HCM-SCD 风险评分增加出现明显升高($P<0.01$); Pearson 相关性分析显示, HCM 患者 LGE 值与 5 年 HCM-SCD 风险评分相关性呈现正相关($r=0.704, P<0.01$); ROC 曲线分析显示, LGE 值预测 HCM 患者 SCD 发生风险的 AUC 为 0.892,同时 LGE 值 ≥ 5.47 是最佳阈值,其诊断灵敏度为 100.0%、特异度为 66.67%; Kaplan-Meier 生存分析结果显示, LEG ≥ 5.47 组的存活率明显高于 LGE <5.47 组($P<0.01$)。结论: HCM 患者 LGE 值能够有效预测患者 SCD 发生风险,其中当 HCM 患者 LGE 值 ≥ 5.47 时,因考虑提前给予植入型心律转复除颤器(ICD)进行一级预防,对完善 HCM 患者的 SCD 风险分层具有重要意义。

PU-0239

高分辨磁共振血管壁成像在大脑中动脉病变患者卒中病因和复发 风险分层中的应用

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目的 探讨基于高分辨磁共振血管壁成像(High-resolution magnetic resonance vessel wall imaging,HRMR-VWI)明确大脑中动脉病变影像特征对缺血性脑卒中病因诊断及发病风险的影响。**方法** 收集本院 2016 年 1 月至 2023 年 1 月发病 2 周内 DSA 显示大脑中动脉管腔狭窄 $\geq 50\%$ 的缺血性脑卒中患者临床及影像资料,通过 HRMR-VWI 观察血管壁增厚模式、斑块 T1WI 高信号、病变强化模式及分级,3 个月后复查 HRMR-VWI,分析患者 HRMR-VWI 检查前后缺血性脑卒中病因分型(TOAST 分型)及 3 个月缺血性事件复发与影像学特征的相关性。结果 56 例患者平均年龄 49.13 ± 12.61 岁,检查前根据临床 TOAST 分型,56 例患者中有 18 例诊断为病因不明的卒中,HRMR-VWI 检查后其中 10 例明确诊断为颅内动脉粥样硬化(intracranial atherosclerotic disease, ICAD),5 例为血管炎,2 例为夹层,1 例仍病因不明。在 40 例大脑中动脉 ICAD 患者中,16 例患者在 3 个月内再次发生卒中,2 型管壁增厚模式 ($p=0.03$) 和斑块 2 级强化 ($p=0.04$) 与卒中复发显著相关。结论 HRMR-VWI 有利于提高缺血性卒中的病因诊断,ICAD 斑块特征有助于卒中复发相关的风险分层。

PU-0240

磁共振 mDixon Quant 与 FACT 脂肪定量技术对比分析研究

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目的：探讨不同平台 3.0 T MR 设备魔镜成像 (mDixon Quant) 和脂肪定量 (fat analysis & calculation technique, FACT) 序列对腰椎椎体及椎旁肌脂肪分数 (fat fraction, FF) 定量测量的差异性。材料与方法：32 名健康志愿者 (男 11 名, 女 21 名) 分别进行腰椎 mDixon Quant 和 FACT 序列扫描。两名观察者测量所有志愿者腰椎 (L1~L5) 椎体和椎旁肌 (L3/4, L4/5, L5/S1) 的 FF 值并进行两序列间对比分析。结果：两名观察者所测数据一致性良好 (ICC>0.8)。mDixon Quant 与 FACT 序列定量测量腰椎各节椎体 FF 值如下：L1 为 34.67 ± 9.81 、 34.00 ± 9.15 ；L2 为 37.21 ± 11.46 、 36.37 ± 10.56 ；L3 为 39.84 ± 10.56 、 39.49 ± 10.08 ；L4 为 38.35 ± 9.44 、 38.20 ± 10.57 ；L5 为 39.39 ± 9.26 、 39.96 ± 9.85 。L3/4 多裂肌为 11.23 ± 4.08 左、 10.52 ± 3.54 左； 10.79 ± 3.61 右、 11.11 ± 4.87 右，L3/4 竖脊肌为 6.06 ± 1.85 左、 6.31 ± 1.70 左； 5.79 ± 1.85 右、 5.89 ± 1.88 右，L4/5 多裂肌为 15.13 ± 4.58 左、 15.32 ± 4.60 左； 14.11 ± 4.98 右、 12.98 ± 4.67 右，L4/5 竖脊肌为 9.74 ± 5.13 左、 10.98 ± 4.97 左； 9.40 ± 4.47 右、 9.32 ± 3.99 右，L5/S1 多裂肌为 18.39 ± 5.42 左、 20.05 ± 7.49 左； 18.12 ± 5.69 右、 19.10 ± 6.96 右，L5/S1 竖脊肌为 19.26 ± 7.85 左、 19.41 ± 7.07 左； 17.79 ± 8.15 右、 16.82 ± 7.49 右，差异均无统计学意义 (P 值均 >0.05)。结论：mDixon Quant 与 FACT 序列均可定量测量腰椎椎体及椎旁肌 FF 值，其测量值具有高度一致性。

PU-0241

梅尼埃病患者全脑网络中心度的静息态功能磁共振研究

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目的：

梅尼埃病 (Meniere's Disease, MD) 是临床上较常见的慢性眩晕性疾病，确切的发病机制仍不清楚，既往的研究发现 MD 患者大脑结构及功能均存在异常改变，提示 MD 患者发病可能与中枢异常有关。本研究旨在应用度中心度 (Degree centrality, DC) 方法研究 MD 患者在体素水平上的全脑网络中心度的异常改变，并评估 MD 患者功能网络异常与临床症状的关系。

研究方法：

纳入 2020 年 12 月至 2022 年 12 月期间于南昌大学第一附属医院耳鼻喉科确诊为 MD 的患者 46 例 (男 25 例, 女 21 例)。同期招募与 MD 组受试者年龄、性别相匹配健康人作为健康对照组 (health control, HC)，共 38 例 (男女各 19 例)。对 MD 组受试者首先进行了眩晕障碍量表 (dizziness handicap inventory, DHI) 评分以评估其眩晕严重程度。对所有受试者进行静息态功能磁共振 (resting-state functional magnetic resonance imaging, rs-fMRI) 扫描以获取数据，基于 Matlab R2016b 平台的 DPARSF 工具包对 rs-fMRI 数据进行处理，计算得出全脑 DC 值图。通过两样本 t 检验比较两组 DC 值的差异。然后应用受试者工作特征 (receiver operating characteristic curve, ROC) 曲线评估诊断效能。Pearson 相关性分析用于研究差异脑区平均 DC 值与临床指标之间的关系。

结果：

MD 组与 HC 组全脑网络中心度存在显著差异，MD 组右侧梭状回、双侧枕中回的 DC 值均高于 HC 组，MD 组右侧辅助运动区的 DC 值低于 HC 组。相关性分析结果表明 MD 患者左侧枕中回 DC 值

与 DHI 评分之间存在明显正相关 ($r=0.294$, $P=0.048$)。ROC 曲线表明, 右侧枕中回 DC 值对应的曲线下面积 (area under curve, AUC) 为 0.804, 具有较高的准确性。

结论:

MD 患者运动、视觉及情绪相关脑网络存在异常改变, 且视觉相关网络的代偿作用与眩晕严重程度有关, 这为进一步探索 MD 的神经病理学基础提供了一个新的视角。

PU-0242

Regional brain apparent diffusion coefficient changes in second- and early third-trimester fetuses with complex congenital heart diseases

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Purpose: This study aimed to explore apparent diffusion coefficient (ADC) value changes in different cerebral territories during the second and early third trimesters in fetuses with complex congenital heart disease (CHD).

Materials and Methods: This prospective study was conducted in a single center from May 2019 through October 2021. We measured the brain ADC values during 20-40 weeks in 64 normal fetuses and during the second and early third trimesters in 23 fetuses with complex CHD. In addition, we compared the ADC values between fetuses with CHD and 27 gestational age (GA)-matched controls by using covariance analyses. ADC density plots and histograms were also used to compare the brain characteristics of fetuses with CHD and normal fetuses.

Results: In the normal group during 20-40 weeks, for the ADC values, a significant negative linear correlation was found among the cerebellar hemisphere (CH), pons, and thalamus (TH) across GA; a significant quadratic polynomial correlation was found in the frontal, temporal, parietal, and occipital white matter (FWM, TWM, PWM, and OWM, respectively), basal ganglia region (BGR), and the centrum semiovale. Density plots of the ADC values in the GA-matched normal and CHD groups showed significant heterogeneity. However, the ADC values in the FWM, TWM, PWM, OWM, CH, centrum semiovale, BGR, TH, and pons were not significantly different (all $p > 0.05$). The histogram analysis showed 10th percentile ADC value existed significant differences between the CHD group and the GA-matched normal controls ($p = 0.046$).

Conclusion: Our results showed normal variations in the ADC values of the fetal brain during in utero maturation, and the ADC values in the CHD group were not significantly different from those in GA-matched normal fetuses. However, ADC density plots and histogram analysis may provide supplementary information and improve the sensitivity for detecting brain abnormalities in fetuses with CHD at an early stage.

PU-0243

探讨自由呼吸 3D 风车技术结合化学位移水脂分离技术成像序列在胸部磁共振中的应用价值

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目的: 比较分析自由呼吸 3D-mv-vane-mdixon 序列与呼气末屏气 T1-mdixon 序列的胸部 MRI 的图像质量。

方法: 回顾性分析我院 2020 年 7 月至 2023 年 1 月行胸部 MRI 检查的患者, 每位患者都采集了呼气末屏气 T1-mdixon 序列(A 组)和自由呼吸 3D-mv-vane-mdixon 序列(B 组)。两位具有 10 年以上胸部 MRI 诊断经验的放射科医师分别对两个序列图像质量进行 5 分制主观评分, 并在右肺动脉干水平最大层面分别获取升主动脉、主动脉干、降主动脉以及背景组织处的感兴趣区 (ROI, region of interest), ROI 大小为 10x10mm²。测量两组图像的信号值 (SI,signal)、噪声值 (SD, standard deviation), 分别计算图像信噪比 (SNR,signal to noise ratio)、对比噪声比 (CNR,contrast to noise ratio)。采用组内相关系数 (ICC) 评价两位医师测量的一致性, 使用 Wilcoxon 检验比较 2 个序列图像的主观评分差异, 使用 Kolmogorov-Smirnov 检验分析计量资料是否符合正态分布, 正态分布的计量资料以 $\bar{x} \pm s$ 表示, 偏态分布则以 M (Q1, Q3) 表示。使用配对样本 *t* 检验比较 2 个序列图像的客观数据差异。 $P < 0.05$ 为差异有统计学意义。

结果: 2 位医师对 A、B 两组图像的客观测量数据与图像主观评分的一致性良好 (ICC 值均大于 0.8)。B 组图像质量评分明显高于 A 组 ($P < 0.05$)。B 组图像升主动脉、主动脉干及降主动脉的 SNR、CNR 值均高于 A 组 ($P < 0.05$)。

结论: 自由呼吸 3D-mv-vane-mdixon 序列胸部 MRI 的图像质量优于呼气末屏气 T1-mdixon 序列。

PU-0244

基于 DCE-MRI 术前预测导管原位癌的联合预测图的建立和验证

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背景: 随着乳腺癌筛查在人群中的广泛应用, 越来越多的导管原位癌 (DCIS) 被发现。术前提提高导管原位癌的诊断水平, 为患者做出更好的决策至关重要。

方法: 回顾性收集 2012 年 12 月至 2021 年 3 月在浙江中医药大学第一附属医院经病理证实的导管原位癌和浸润性导管癌 (IDC) 患者 135 例。将该队列随机分为训练集 ($n = 74$) 和验证集 ($n = 31$), 比例为 7:3。我们在 3D-Slicer 软件、DeepWise 科研平台 v1.6 (<http://keyan.deepwise.com/>) 实现放射组学特征提取。采用多因素 logistic 回归建立临床放射组学模型 (nomogram)。通过 AUC、DeLong 检验、校正曲线和决策曲线分析评价模型的判别能力。

结果: 具有 9 种放射组学特性的放射组学特征具有较好的预测能力。放射组学图, 包括临床特征 (PR 和 NME) 和放射组学特征, 在培训队列中显示出良好的鉴别潜力 [$AUC = 0.93$; 95% 置信区间 (CI) 0.87-0.99], 这种可能性在验证队列中得到证实 ($AUC = 0.95$; 95% CI 0.89-1.00) 和外部验证 ($AUC = 0.77$; 95% CI 0.52-1.00)。决策曲线分析证实了图的临床价值。

结论: DCIS 和 DCIS- mi 患者的预后模型和 nomogram, 有助于准确诊断 DCIS- mi, 减少不必要的活检。

PU-0245

MRI 在妊娠期急腹症诊断中的应用价值

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1. 背景与目的: 妊娠期急性腹部疼痛是妇产科常见的就诊症状, 临床表现缺少特异性, 加之妊娠会影响孕妇的生化检查结果, 因而增加了早期确诊妊娠期腹痛病因的难度。影像检查对妊娠期急腹症的诊断至关重要。本文收集我院 2018 年-2022 年因急性下腹痛行 MRI 检查的 15 例孕妇的影像和临床资料, 探讨 MRI 在妊娠期急腹症诊断中的应用价值。2. 材料方法: 收集 15 例因急性下腹痛就诊孕妇, 其中妊娠早期 (孕 1-3 月) 2 例, 中期 (孕 4-7 月) 6 例, 晚期 (孕 8-9 月) 7 例。年龄

21-37 岁, 平均 29 岁。3 结果: 行 15 例下腹部急性疼痛孕妇中 MR 表现阳性 12 例, 包括阑尾炎 5 例, 卵巢囊肿扭转 2 例, 胎盘早剥 2 例, 子宫肌瘤红色变性 3 例。经手术病理或随访检查证实。4 结论: MRI 对孕妇下腹部疼痛疾病的诊断与鉴别诊断具有较高价值, 可以作为 B 超的补充检查甚至首选检查, 应该得到临床医生的进一步重视。

PU-0246

Exploring the value of magnetic resonance feature tracking techniques in the assessment of the left heart in patients with Parkinson's disease

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Purpose: In this study, we used cardiac magnetic resonance feature tracking (CMR-FT) to assess the structural and functional alterations of the left heart in patients with Parkinson's disease (PD) and to investigate the relevant factors affecting the alterations of their left heart function.

Methods: Thirty-nine cases (mean age: 57 years) of PD patients (PD group) and 34 cases (mean age: 56 years) of healthy controls (control group), who had completed a routine cardiac magnetic resonance examination, were included in this study. Scanned images were analyzed for cardiac function and myocardial strain using specialized post-processing software CVI42. The left ventricular (LV) function parameters included left ventricular end-diastolic volume index (LVEDVi), left ventricular end-systolic volume index (LVESVi), left ventricular ejection fraction (LVEF), and left ventricular myocardial mass index (LVMI); and the myocardial strain parameters included left ventricular global radial strain (GRS), global circumferential strain (GCS) and global longitudinal strain (GLS). Left atrial (LA) function parameters included LA savings function (total ejection fraction [EF total], total strain [Es], peak positive strain rate [SRs]), conduit function (passive ejection fraction [EF passive], passive strain [εe], early peak negative strain rate [SRe]), and pump function (active ejection fraction [EF booster], active strain [Ea], late peak negative strain rate [SRa]). Pearson or Spearman correlation coefficient models were used to analyze the correlation of cardiac function and strain parameters with exercise dysfunction (UPDRS III) and autonomic dysfunction (SCOPA-AUT), and to explore the factors influencing cardiac function and strain parameters.

Results: Analysis of left ventricular function and myocardial strain showed that LVEF and GLS in the PD group were lower than those in the control group, and LVESV, LVESVi, and LVMI were higher than those in the control group, and the differences were statistically significant (all $P < 0.05$). Analysis of left atrial function and myocardial strain showed that the differences in left atrial volumes LA Vpac, LA Vmin, and LA Vmax in the PD group were not statistically significant compared with those in the control group ($P > 0.05$). In PD patients, the left atrial saving function (EF total, Es, and SRs) and left ventricular catheterization function (EF passive, Ee, and SRe) and pump function (EF booster, Ea, SRa) were significantly impaired compared with controls (all $P < 0.05$). Correlation analysis showed that left atrial savings function Es and SRs were negatively correlated with UPDRS III ($r = -0.409, -0.355, P < 0.05$). Left atrial ductal functions LAEF passive, Ee were negatively correlated with UPDRS III ($r = -0.326, -0.445, P < 0.05$), SRs were positively correlated with UPDRS III ($r = 0.417, P < 0.05$). Left atrial savings function Es and SRs were negatively correlated with SCOPA-AUT ($r = -0.535, -0.319, P < 0.05$). Left atrial conduit function Ee was negatively correlated with SCOPA-AUT ($r = -0.316, P < 0.05$), and SRe was positively correlated with SCOPA-AUT ($r = 0.359, P < 0.05$).

Conclusion: Patients with PD have structural and functional changes in the left heart, in which left atrial saving function and conduction function correlate with the severity of dyskinesia and autonomic dysfunction. CMR-FT is useful for evaluating the effects of Parkinson's disease on the structure and function of the heart in patients.

PU-0247

Assessing the clinical value of PETRA sequence for detection of subsolid pulmonary nodules: comparison with CT

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Objective: This study aimed to evaluate the visibility of subsolid pulmonary nodules of less than 3 cm using the PETRA sequence on 3T MRI in comparison with that obtained using LDCT.

Methods: A total of 82 patients from a lung cancer screening program (36 males and 46 females; age ranges 52–85) were enrolled for this prospective study. The exclusion criteria included patients who had contraindications to MRI, including pacemakers, metal implants, and severe claustrophobia, and patients with severe emphysema and/or fibrosis. Written informed consent was obtained from each participant. All patients were scanned by PETRA sequence on 3.0T MRI (Magnetom Skyra, Siemens Healthcare) and CT (Definition Flash, Siemens Healthcare, Forchheim, Germany). The PETRA sequence parameters were as follows: TR = 3 ms; TE = 0.07 ms; matrix = 256 × 256mm²; FOV = 400 × 400mm²; slice thickness = 1.6 mm; acquisition plane = axial; bandwidth=260; total scan time=3min25s. The appropriate detection rate was calculated for subsolid pulmonary nodules of less than 3 cm in diameter. The mean diameter of each detected nodule was determined. The sensitivity of detection for the pure ground glass nodules and partial solid nodules was determined based on the location, size, type of nodules and morphologic characteristics. The agreement of nodule characteristics between CT and MRI were assessed by intraclass correlation coefficient (ICC) and Kappa test.

Results: The CT scanner detected 185 subsolid pulmonary nodules, including 97 partial solid nodules (PSNs) and 88 pure ground glass nodules (pGGNs) with a mean nodule diameter of 8.9 mm. For the PSNs, PETRA technique identified 18 nodules among 23 nodules of less than 6 mm in diameter and 72 of 74 more than 6 mm in diameter. For 36 pGGNs less than 6mm, the PETRA detected 17 nodules, and 48 nodules of 52 more than 6 mm in diameter. The detection rate of PETRA sequences was high (83.7%). The detection rates of pGGNs and PSNs were 74%, and 92.7%, respectively. For nodules more than 6 mm in diameter, the sensitivity of PETRA sequences was 95%. For nodules with a CT value greater than 600 HU, the sensitivity of PETRA sequence reached 94.7%, which was higher for nodules located in the upper lung fields than those in the middle and lower lung fields. Strong agreement was found between the CT and PETRA results (correlation coefficients = 0.956).

Conclusion: The PETRA technique had high sensitivity for the detection of subsolid pulmonary nodules and can accurately assess their diameter and morphologic characteristics. It may be an effective alternative to CT as a tool for screening and follow up pulmonary nodules.

PU-0248

心肌纤维化 MR 成像研究新进展

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缺血性和非缺血性心肌病中的心肌纤维化与不良的心脏预后相关。无创成像在心肌纤维化的早期识别和量化中发挥着关键作用，使用的技术包括心脏磁共振、计算机断层扫描和核成像。心脏磁共振 (cardiac magnetic resonance, CMR) 因其能够无创性评估包括心脏结构、功能、心肌灌注和心肌活性在内的全面信息而被誉为“一站式”检查。这些特点赋予 CMR 不仅在疾病诊断和鉴别诊断上，

而且在疾病的预后判断和危险分层中都发挥着重要指导作用。本文对几种 CMR 影像技术在评估心肌纤维化方面的应用及进展进行综述。

以无创定量方式检测弥漫性纤维化的需求推动了对使用或不使用造影剂检测纤维化的新方法的搜索, 例如 T1 映射, T2 映射, T2 * 映射, UTE 成像, T1 ρ 映射和 MTI。这些 MRI 技术显示出有希望的初步结果, 但是需要进一步的研究来更好地了解对比度的形成方式。ECV 映射显示了临床研究中具有希望的初步结果, 但缺点是需要对比剂给药和血液采样。目前, 在无创性内源性 MRI 检测心肌纤维化的领域中, 平扫 T1, T1 ρ 映射和 MTI 看起来最有前途。需要进一步开发这些技术的临床应用, 例如开发临床适用的方案, 在临床试验中进一步验证与组织学的相关性。此外, 评估这些技术的标准化测量协议也是必要的。一旦建立, 这些技术可能适用于广泛的临床领域, 包括消融治疗, 瓣膜疾病, 心肌病, 缺血性心脏病和干细胞治疗。

PU-0249

磁共振影像组学在血管性认知障碍中的应用研究进展

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血管性认知障碍 (Vascular cognitive impairment, VCI) 是指与大脑血液流通受阻所引发的一系列认知功能下降相关疾病统称, 包括从轻度认知障碍到痴呆的临床过程。脑小血管病 (cerebral small vessel disease, CSVD) 为其重要病因, 占 VCI 的 50%~70%。VCI 的诊断缺乏统一的临床标准, 确诊 CSVD 主要依赖其影像学特征, 而脑部 MRI 则是评估 CSVD 的最佳方法。然而, 在日常的临床诊断过程中, 医生是通过图像的视觉解读进行评估, 这种方式在识别微小病变方面存在局限性。而影像组学, 一种结合了医学和电子科学的新颖技术, 能够展示出肉眼难以觉察的微小变化, 为疾病的量化、定性分析提供更准确、客观的参考, 同时也为 VCI 的早期诊断提供更多的影像学数据, 从而有益于临床的早期介入, 减缓病情的发展, 提升患者的生活质量。

PU-0250

FROC 模型评价肝细胞癌病理分级的价值

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目的: 讨论 FROC 模型在肝细胞癌在病理分化程度预测中的价值研究。

方法和材料: 以 2022 年 9 月—2023 年 4 月收集了 23 例经病理证实为 HCC 的患者为研究对象, 根据病理结果分为中高分化组和低分化组。所有受试者在术前均采用 3.0TMR 扫描仪获取多 b 值 (0-2000s/mm²) 弥散加权成像数据, 并拟合 FROC 模型计算其衍生参数: 扩散系数(D)、分数空间倒数(β)、空间变量(μ), 通过独立样本 T 检验评估组织学分级的差异。然后整合三种参数, 通过二元逻辑回归建立综合预测模型, 并通过受试者工作特性 (ROC) 分析评估诊断性能。

结果: D 和 μ 在中高分化和高分化 HCC 之间表现出显著统计差异 (AUC=0.808, P=0.017) (AUC=0.825, P=0.012), 两组的 β 值无明显统计学意义, 对于单个参数, μ 在区分两个 HCC 组时表现出最高的 AUC 值。在二元逻辑回归方程中, μ +D、 β + μ 及 D+ β + μ 都表现出较高统计学意义 (AUC=0.792、P=0.07, AUC=0.8、P=0.02、AUC=0.850、P=0.07)。与单因素相比, D+ β + μ 的组合可以进一步提高诊断性能。

结论: FROC 模型对肝细胞癌的病理分级的预测具有一定的诊断价值。

临床应用: FROC 模型可作为一种无创检查手段, 为术前预测肝癌病理分级提供辅助检查的价值。

PU-0251

mDIXON 序列非对比剂增强的冠状动脉血管成像及脂肪定量的可重复性研究

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目的 探究非对比剂增强 mDIXON 序列应用心电门控及膈肌导航技术进行冠状动脉磁共振血管成像（MRCA）以及利用水-脂分离技术量化心外膜和心包脂肪体积的可重复性。

方法 50 名受检者（28 名男性，22 名女性）进行冠状动脉血管成像（MRCA），其中 15 名受检者在一周后进行第二次重复性检查。采用 18 段冠脉分段法，由两名观察者记录 RCX、LM、LAD、LCX 各分支血管-心肌信号比 VMR，图像质量评分，以及心外膜与心包脂肪体积等参数。使用 Bland-Altman 法，观察者间和观察者内的组内相关系数 ICC 进行评估可重复性，使用 t 检验评价 mDIXON 序列与传统 bSSFP 序列血管成像评分。

结果 同一受检者的两次检查的各个分段血管-心肌信号比 VMR 的 ICC 值为 0.753~0.911 之间，95%LOA 为 6.6%。观察者内 ICC 值介于 0.940~0.992 之间，观察者间 ICC 值为 0.933~0.974 之间。两次检查各个冠状动脉分段的图像质量评分 ICC 值为 0.7~0.873 之间。观察者内 ICC 值介于 0.923~0.971 之间，观察者间 ICC 值为 0.923~0.965 之间，心外膜与心包脂肪体积值的 ICC 值介于 0.980~0.991 之间，95%LOA 为 6.6%。mDIXON 序列与传统 bSSFP 序列的图像质量评分，LCX 分支上，mDIXON 序列评分高于 bSSFP 评分，p 值为 0.002（ $p<0.05$ ）。

结论 mDIXON 序列的冠状动脉血管成像对各个分支显示以及脂肪体积的量化具有很高的可重复性，且部分分支图像质量评分优于传统 bSSFP 序列，在冠状动脉病变诊断、治疗后的疗效评价和随访、预防与评估心血管疾病风险等方面具有重要的意义。

PU-0252

AIR 线圈在乳腺 MR 成像的应用探讨

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目的：对比传统乳腺专用线圈，探讨自适应图像接收（Adaptive Image Receive, AIR）线圈在乳腺磁共振成像（Magnetic Resonance Imaging, MRI）中的应用，以期在保证图像质量的基础上提高受检者乳腺 MR 检查舒适度，为乳腺 MR 检查中的线圈选择提供新方案。

方法：回顾性分析 2023 年 1—3 月在中山大学肿瘤防治中心分别采用两种射频线圈行乳腺 MR 检查的 30 例健康女性志愿者的图像。对比在两种线圈下 T₂WI fs 和 MUSE-DWI 序列中的图像信噪比（Signal Noise Ratio, SNR）、表观扩散系数（Apparent Diffusion Coefficient, ADC）值；通过统计学分析舒适度及图像质量，比较两种线圈在 MR 乳腺检查中的优劣。

结果：AIR 线圈舒适度优于乳腺专用线圈，差异具有统计学意义（ $P<0.05$ ）；AIR 线圈下 T₂WI fs、MUSE-DWI 序列 SNR 值均高于乳腺专用线圈图像，差异具有统计学意义（ $P<0.05$ ），两组图像 ADC 值之间，差异无统计学意义（ $P>0.05$ ）；AIR 线圈下 T₂WI fs 序列主观图像质量低于乳腺专用线圈图像，差异具有统计学意义（ $P<0.05$ ），MUSE-DWI 序列两组图像主观评价无统计学差异（ $P>0.05$ ）。

结论：AIR 线圈舒适度及信噪比优于传统乳腺专用线圈，可以作为传统乳腺线圈 MR 检查的补充；AIR 线圈下的 MUSE-DWI 序列在乳腺癌筛查方面具有很好的临床应用及推广价值。

PU-0253

Two distinct subtypes of tobacco use disorder revealed using heterogeneity through discriminative analysis

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Background: Tobacco use disorder (TUD) is a chronic, relapsing mental disorder characterized by compulsive tobacco seeking and smoking. Individual neurobiological heterogeneity among patients with TUD hampers the identification of neuroimaging phenotypes, it is of significance to uncover more homogeneous subtypes of TUD.

Method: The current study recruited 179 male subjects, including 122 TUD individuals and 57 healthy controls, and obtained their 3D-T1 images. Heterogeneity through discriminative analysis (HYDRA) was applied to uncover potential subtypes of TUD where regional gray matter volume (GMV) was treated as the feature. Then we examined the clinical, neuroimaging and molecular characteristics of subtypes.

Results: Two distinct neuroanatomical subtypes were found. In subtype 1, TUD individuals showed decreased GMV in right orbitofrontal cortex (OFC), while subtype 2 exhibited distributed pattern of widely GMV increase compared to healthy controls. Moreover, subtype 1 showed older initial smoking age ($t=2.339$, $p=0.021$), longer duration of smoking ($t=2.260$, $p=0.026$) than it in Subtype 2. Comparing with Subtype 2, persistent smoking behavior in subtype 1 is more likely caused by substance dependence and addiction rather than psychosocial factors ($t=2.244$, $p=0.027$). In addition, neuroanatomical aberrance in subtype 1 was mainly associated with dopamine system, while neuroanatomical abnormalities in subtype 2 were primarily associated with GABAa.

Conclusions: Overall, our results revealed two opposite neuroanatomical subtypes of TUD, which largely overlapped with their clinical and molecular features respectively. TUD subtypes taxonomy based on objective anatomy supplement the findings of clinical subtyping studies, which could help to facilitate the development of individualized treatments in TUD.

PU-0254

平山病（HD）：病例报道及临床影像特征回顾

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平山病(Hirayama disease, HD)是由日本学者平山惠造(Keizo Hirayama)于 1959 年首次报道, 又称青少年上肢远端肌萎缩症, 是一种良性自限性下运动神经元疾病, 呈区域性发病, 90%以上来自于日本、中国、印度等亚洲国家, 该病多于青少年起病, 男性多于女性, 起病隐匿且多在发病数年后静止, 主要表现为不对称的上肢远端肌肉无力和萎缩, 肱桡肌多不受累, 呈“斜坡样”改变。多数患者伴寒冷震颤, 无感觉异常和锥体束征。

PU-0255

智力障碍儿童的 MRI 脑网络研究进展

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目的: 智力障碍 (ID) 作为一种神经发育障碍性疾病, 表现为智力和适应功能障碍, 发病率高, 影响患者终身, 对患者、其家庭及社会造成巨大负担。近年来, MRI 脑网络研究在神经精神疾病的广泛应用, 为 ID 的发病机制研究提供了新的视角。本文对近期 ID 儿童 MRI 脑网络研究情况进行综述, 评价 ID 儿童 MRI 脑网络维度的可能共性特点及应用前景。

方法: 本文主要通过对 PubMed、Web of Science、中国知网、万方数据库等检索相关文献, 以“智力障碍”、“智力迟钝”、“磁共振”、“Intellectual Disability”、

“Intellectual Developmental Disorder”、“Mental Retardation”等作为关键词进行文献检索、筛选、归纳和整理, 所纳入文献涵盖了全球范围内以中、英文为主的涉及智力障碍的 MRI 脑网络研究。

结果: 基于 fMRI 形成了多种智力理论框架, 对于 ID 儿童的神经发育异常过程的探索极为重要, 最近许多关于 ID 儿童功能脑网络的相关研究成果, 主要强调了涉及以额、顶叶为主的广泛大脑区域, 其特定的网络模式不仅表现在各个子网络或模块内的激活减弱, 还存在子网络间的连接减少, 其拓扑特征表现为更加隔离, 并且网络整合和分离之间的动态失衡。脑白质结构网络中颞叶、顶叶的成熟度以及完整性, 亦与 ID 儿童的智力发育情况密切相关; 网络中更低的整合、更大的分离预示了更低的智商, 这也与儿童脑损伤的研究结果相一致。此外, 在大脑早期的发育过程中, ID 儿童的皮层网络的拓扑结构已经发生改变, 并且网络构架异常与额叶为主的皮层厚度减少密切相关, 原因可能与 ID 患者在儿童期甚至婴儿期皮质区的倒“U”型异常发育轨迹有关。

结论: ID 儿童的 MRI 脑网络分析揭示了其大脑拓扑结构的异常改变, 过度隔离与整合不足的网络状态, 以及功能子网络内/间的连接异常, 可能是 ID 儿童的共同神经影像学标志。此外, 不同的网络连接模式对于 ID 儿童的基因亚型分类具有一定的鉴别意义, 并且可能有助于 ID 儿童的临床早期筛查。

PU-0256

A fMRI Study on the relationship between mild cognitive impairment and structural-functional alterations in COPD patients

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To evaluate the relationship between mild cognitive impairment and cerebral structural-functional alterations in patients with chronic obstructive pulmonary disease (COPD).

The COPD patients were divided into COPD-MCI and COPD-nMCI. Matched HC were enrolled. The differences of grey matter volume (GMV) and resting-state functional connectivity (rsFC) of regions with GMV difference were analyzed. The relationship between structural-functional alterations with disease duration, pulmonary function test and cognitive function were further analyzed.

33 COPD patients were with MCI (33/63, 52.40%), and 30 COPD patients with normal cognitive function (30/63, 48.45%). The cognitive function scores were in the normal range except COPD-MCI. MoCA and the five cognitive sub-domains in COPD-MCI were lower than COPD-nMCI and HC. There were significant GMV differences in bilateral LNG, left MTG, left thalamus, left pCG/IPG and right DLPFC among the three groups. The COPD-MCI group showed lower GMV in

the left thalamus than the COPD-nMCI, and lower GMV in the bilateral LNG, left MTG, left thalamus, left PCG/IPG and right DLPFC than HC. The GMV in the left PCG/IPG in the COPD-nMCI was lower than HC. The rsFC between bilateral LNG and right LNG/fusiform gyrus, left PCG/IPG and bilateral precuneus and left supramarginal gyrus, right DLPFC and left caudate nucleus were statistically different among the three groups. The GMV of left thalamus in COPD patients was positively correlated with the MoCA score, visuospatial/executive function and naming.

There were significant differences in the GMV of bilateral LNG, left MTG, left thalamus, right supramarginal gyrus, left PCG/IPG and right DLPFC among COPD-MCI, COPD-nMCI and HC. In addition, the rsFC of bilateral LNG, left PCG/IPG and right DLPFC were also different significantly. And the left thalamus plays an important role in cognitive function in COPD patients, which may be involving into the neural mechanism of MCI in COPD patients.

PU-0257

基于 7T 超高场磁共振下的脑小血管病患者的 颅内豆纹动脉成像研究

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目的：在 7T 超高场强磁共振下采用时间飞跃法磁共振血管造影 (time-of flight magnetic resonance angiography, TOF-MRA) 技术研究脑小血管病患者的豆纹动脉开口、数量及深度，探讨豆纹动脉形态特征与脑小血管病的空间关系。方法：选取在本院就诊的 40 例脑小血管病患者，将其纳入实验组，另选取 30 名健康志愿者纳入对照组。对所有受试者进行 7T 三维 TOF-MRA 序列成像，观察豆纹动脉开口位置、分支的数量及深度，并使用 SPSS21.0 软件进行统计分析。结果：豆纹动脉开口多位于大脑中动脉上方，其次为背侧。两组左右两侧的豆纹动脉分支深度比较，差异均有统计学意义 ($t=3.248$, $t=3.562$; $P<0.05$)；两组左右侧豆纹动脉的数目比较，差异亦有统计学意义 ($t=10.417$, $t=13.214$; $P<0.05$)。结论：利用 7T 超高场 MRI 的高信噪比优势，可实现对豆纹动脉及其内部结构的无创在体 3D 成像，为穿支动脉相关性脑小血管病病变的诊断和研究提供重要的影像资料。

PU-0258

GRASP 自由呼吸 DCE-MRI 与常规 BH-VIBE 序列在肺癌图像质量中的对比研究

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摘要

目的：评估自由呼吸状态下黄金角径向稀疏平行采样技术 (GRASP) 在肺癌 MR 图像质量中的临床实用价值。

方法：采集 30 名经 CT 筛查并确诊肺癌的患者 MR 图像信息，所有患者均先执行常规笛卡尔屏气容积内插 (BH-VIBE) 扫描，然后基于 GRASP 技术的自由呼吸动态对比增强 (DCE-MRI) 扫描，最后再行笛卡尔屏气容积内插 (BH-VIBE) 扫描方案。阅片由经验丰富的两位胸部放射科医生独立评估 (内容包括总体图像质量、病变轮廓、伪影等级、诊断信心、信噪比、病人体感评分)。

结果：在图像细节方面，GRASP 序列图像质量均满意且肿瘤边界及细节层次显示清晰，BH-VIBE 序列因患者屏气配合不佳及存在心脏大血管搏动伪影干扰，而 GRASP 序列由于能够有效消除呼吸

等运动伪影的优势,在总体图像质量、病变轮廓、伪影等级及诊断信心方面、信噪比、病人体感评分与 BH-VIBE 图像均显示出明显统计学差异 ($P<0.01$)。

结论:自由呼吸高时空分辨率 GRASP 成像技术较传统 BH-VIBE 扫描有着更优的图像质量,是对肺部病变进行高分辨率成像的一种可靠方法。

PU-0259

Slip Interface Imaging Based on magnetic resonance elastography can preoperatively predict the degree of meningioma–brain adhesion

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shengjing

Purpose: To investigate the ability of slip interface imaging (SII), based on a recently developed technique-magnetic resonance elastography (MRE), to predict the degree of meningioma–brain adhesion.

Materials and Methods: With Institutional Review Board approval and written informed consent, SII examinations were performed in five patients with meningiomas preoperatively. Each tumor was evaluated on six dimensions. All SII examinations involved Intracranial shear motions were introduced using a soft, pillow-like head driver. The displacement field was acquired with an MRE on 3T MR scanners. The acquired shear motion data creates slip interface imaging (SII). Two surgeon specialists in brain surgery primarily conducted all surgical resections, their intraoperative impressions of tumor adhesion serving as reference standards. The SII findings were independently and blindly correlated with surgical findings of tumor adhesion by using the Cohen's k coefficient.

Results: Among the five patients, SII agreed with the intraoperative assessment of the degree of tumor adhesion in four patients (80%) cases (medium agreement, $k=0.688$, 95% CI: 0.15-1). Among the 26 dimensions, SII agreed with 19 dimensions (73%) (medium agreement, $k=0.592$, 95% CI: 0.33-0.85). Case 1 had slight adhesion on one side of the foot and no adhesion on the head side during the surgery, agreeing with SII. Case 2 had severe adhesion on the side of the left ear, adhesion on the occipital side, slight adhesion on one side of the foot, slight adhesion on the other side of the ear, slight adhesion on the top side, and no adhesion on the frontal side during the surgery. it seems like the quite adhesive tumor, but SII tends to mixed adhesion. Case 3 had adhesion at the origin of the temporal side of the occipital region, adhesion on the left ear, slight adhesion on the nasal side, slight adhesion on the other side of the ear, no adhesion in the cerebellum, and no adhesion on the top side during the surgery. Unfortunately, SII had complete opposite results to the surgical evaluation with superior and cerebellum. Case 4 had severe adhesion on the side of the cerebellum, adhesion on the nasal side, slight adhesion on the top side, slight adhesion on one side of the ear, no adhesion on the other side of the ear, and no adhesion on the occipital side during the surgery. SII agreed with surgical evaluation that this is an adherent tumor. Case 5 had severe adhesion on the side of the skull base, adhesion on the top side, adhesion on the occipital side, slight adhesion on one side of the ear, slight adhesion on the other side of the ear, and slight adhesion on the nasal side during the surgery, mostly agreeing with SII.

Conclusion: SII, a noninvasive technique can be used to evaluates the degree of meningioma–brain adhesion preoperatively, to predict surgical risk and tumor resectability.

PU-0260

3.0T MRI 压缩感知 3D 技术与 SENSE HR 技术在直肠肿瘤中的比较研究

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目的:讨论压缩感知 (Compression Sensing,CS) 3D 技术与 SENSE(sensitivity encoding)HR 技术在直肠肿瘤中的应用价值。

方法:前瞻性收集我院 2021 年 2 月至 2021 年 8 月接受 MRI 检查的 52 例直肠肿瘤患者。对每位患者分别进行 CS 3D T2WI 和 SENSE HR T2WI 的矢状位、冠状位以及轴位采集,观察直肠解剖学结构,比较图像质量和扫描时间。采用 Cohen Kappa 法评价 2 名医师间评分的一致性,采用 Wilcoxon 配对符号秩和检验比较两种序列图像质量的差异。

结果:CS 3D T2WI 序列在扫描时间上比 SENSE HR T2WI 三个平面扫描时间之和要快 3 分 37 秒。CS 3D 轴位 T2WI 图像质量的评分更高,差异有统计学意义 ($P<0.01$)。在样本中发现,肠气多的患者更适用于 CS 3D 序列,肠气少的患者更适用于 HR 序列。CS 3D 序列重建出来的直肠矢位和冠位的图像质量评分与 HR 序列基本一致,无统计学差异,但 CS 3D T2WI 序列可以沿着肠管走行方向进行任意角度的重建,对于肠管走行比较迂曲的患者,3D 序列斜矢状位重建比 HR 的矢状位显示病灶应该更直观。

结论:CS 3D 技术在直肠肿瘤的临床价值高于 SENSE HR 技术。

PU-0261

IFIR-FIESTA 磁共振肾动脉成像 60 例分析

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目的 探讨 IFIR-FIESTA 进行肾动脉血管成像在临床应用方面的可行性。方法 采用 3.0T 和 1.5T 超导磁共振仪,对临床怀疑肾动脉病变的 60 例患者分别进行肾动脉 IFIR-FIESTA 检查和 CE-MRA 检查,采用 VR、MPR 和 MIP 进行图像重组。由 2 名医师对 2 组肾动脉的图像质量以及分支显示情况等进行分析评分并记录结果。结果 IFIR-FIESTA 组在图像质量、肾动脉分支显示情况均优于 CE-MRA 组,但两组间差异无统计学意义 ($P>0.05$)。结论 使用 IFIR-FIESTA 技术进行肾动脉成像与 CE-MRA 一致性好,在临床应用上是可行的。

PU-0262

基于 MRI 深度学习预测可手术宫颈癌的淋巴脉管间隙浸润:一项多中心研究

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目的:建立并验证基于磁共振成像(MRI)的深度多实例学习(D-MIL)模型,用于可手术宫颈癌淋巴脉管间隙浸润(LVSI)术前预测。

方法:对 392 例宫颈癌患者进行回顾性分析。应用 ResNet50 结构在实例级提取特征,而不使用关于肿瘤区域的手动注释,然后构建 D-MIL 模型。采用受试者工作特征曲线下面积(AUC)评价模型的诊断性能。采用 Kaplan-Meier 法评估无病生存期(DFS)。

结果:对于 LVSI 的诊断,训练集/内部验证集/外部验证队列的 AUC 分别为 0.695/0.690/0.681,通过生存分析,模型评分越高的患者达到 DFS 的时间越短。

结论:该模型可作为一种个性化的无创工具,有助于预测可手术宫颈癌的 LVSI。模型的评分也能反映可手术宫颈癌的 DFS。

PU-0263

基于高清 DWI 联合 T1WI 增强 MRI 在直肠癌术前 T 分期的应用价值

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目的: 3.0T MRI 规范化扫描的高清扩散加权成像(DWI)序列联合 T1WI-fs 动态增强序列对术前直肠癌 T 分期的应用。方法: 回顾性分析 57 例经病理证实直肠癌患者 MRI 图片,术前进行 3.0T MRI 直肠癌规范化扫描,常规序列、高清弥散、T1WI-fs 增强序列等。由两位经验丰富的 MRI 医师采用双盲法运用高清 DWI(横断位、矢状位)和 T1WI-fs 动态增强序列对术前直肠癌的 T 分期进行评估。以直肠癌术后病理学结果作为“金标准”,联合运用两个序列评估直肠癌 T 分期的准确性、灵敏性和特异性。结果: 57 例中,上段直肠癌 9 例,中段直肠癌 39 例,下段直肠癌 9 例。甲、乙评估者对直肠癌术前 T1 期诊断正确率均为 85.7%(6/7),T2 期诊断正确率分别为 88.2%(15/17)和 94.1%(16/17),T3 期诊断正确率分别为 96.9%(31/32)和 93.8%(30/32);对 T4 期诊断正确率均为 100.0%(1/1)。甲评估者对直肠癌 T 分期诊断灵敏度为 96.1%,特异度为 83.3%;乙评估者对直肠癌 T 分期诊断灵敏度为 94.1%,特异度为 83.3%。高清弥散联合 T1WI-fs 动态增强序列对直肠癌术前 MRI 诊断正确率和灵敏度高于单个序列高清弥散或 T1WI-fs 动态增强,差异有统计学意义。直肠癌术前 ADC 测量平均值在相应术后病理 T1~T4 期分级组间比较,差异有统计学意义。结论: 高清 DWI 联合 T1WI-fs 动态增强有效提高直肠癌 T 分期准确性,为临床个性化治疗提供帮助。

PU-0264

慢性失眠患者丘脑和感觉脑区度中心性的异常

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目的:

慢性失眠(CI)是一种全球性的高发疾病,但目前研究对其发病的神经机制尚不清楚。本研究旨在通过分析 CI 患者脑区的度中心性(DC)及其动态变化特点来研究 CI 的发病机制。

方法:

分析 29 名 CI 患者和 28 名健康对照组(HCs)的静态度中心性(sDC)和动态度中心性(dDC)的差异。对于有显著性差异的脑区的 sDC 或 dDC,将其与临床指标进行相关分析。

结果:

与 HCs 组相比, CI 患者左侧枕中回 (MOG)、右侧枕下回 (IOG) 和右侧颞下回 (ITG) 的 sDC 明显增加; 右侧颞上回 (STG)、左侧颞上极 (TP)、左侧海马旁回 (PHG)、左侧杏仁核和丘脑的 sDC 下降。HAMD 与左侧 MOG 的 sDC 呈显著正相关, 而与左侧 PHG 呈负相关。

双侧 PHG 的 dDC 增加, 而位于左侧顶叶下回 (IPG) 的 dDC 减少。HAMD 与左侧 PHG 的 dDC 呈正相关, HAMA 与右侧 PHG 呈正相关, PSQI 与左侧 IPG 呈负相关。

结论:

CI 患者皮层下核团和大面积颞叶和枕叶区域出现功能异常, 且与患者出现的情绪紊乱有关。

PU-0265

7T 磁共振成像 SWI 在星形细胞和少突胶质细胞肿瘤显微成像诊断中的应用

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背景及目的 虽然分子成像技术取得了进步, 但星形细胞瘤和少突胶质细胞瘤的术前诊断仍具有挑战性。在本研究中, 我们评估了 7T SWI 是否可以用于区分星形细胞瘤和少突胶质细胞瘤, 以及胶质瘤的恶性分级是否可能

材料与方法 我们对 21 例胶质瘤患者在手术前进行了 7T SWI, 优化了皮质-髓交界处的清晰可视化。对皮质增厚和髓质血管移位(少突胶质肿瘤的特征)和皮质变细(星形细胞肿瘤的特征)进行评分。此外, 对恶性肿瘤的特征, 包括髓静脉增厚、微出血和/或坏死进行评分。

结果 星形细胞瘤和少突胶质细胞瘤的少突胶质细胞特征评分(最高评分, 13 分)和星形胶质细胞特征评分(最低评分, 3 分)差异有统计学意义(平均, 1.93 比 11.71, $P=0.01$)。世界卫生组织分级 II ($n=10$)、III ($n=4$) 和 IV ($n=7$) 肿瘤的恶性评分有显著差异(平均 0.20、1.38、2.79)。皮质增厚在少突胶质细胞瘤中更为常见($P=0.02$), 敏感性为 71.4%, 特异性为 85.7%; 在星形细胞瘤中观察到的皮质变细程度更高($P=0.01$), 敏感性为 85.7%, 特异性为 100%。

结论 7T SWI 显示皮质-髓交界处有助于鉴别星形细胞瘤和少突胶质细胞瘤。观察皮质变细是诊断星形细胞瘤最敏感、最特异的方法。7T SWI 也可以可靠地预测恶性分级。

PU-0266

采用压缩感知技术的脑敏感加权成像在头颅中的应用

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目的: 探讨压缩感知技术(compressed sensing, CS)在头部脑敏感加权 (SWI) 中的应用。方法: 选取 60 例在本院进行头部 SWI 成像的患者, 其中男 38 例, 女 22 例; 年龄 29-68 岁, 平均 46.5 岁。使用压缩感知技术(CS)对每个患者分别进行 2 倍、4 倍、6 倍及 8 倍的加速成像, 两名神经系统放射科医师在所有图像勾画双侧黑质为感兴趣区, 测量信号强度(signal intensity, SI)和噪声强度(standard deviation, SD), 并计算信噪比(signal to noise ratio, SNR)以及对比噪声比(contrast to noise ratio, CNR)。对图像质量进行五分法主观评分。使用组内相关系数(intra-class correlation coefficient, ICC)、Kappa 检验分析两位医师测量数据和主观评分的一致性。对不同组间图像的 SNR、CNR 和主观评分采用单因素 ANOVA 分析。结果: 两观察者测量数据和主观评分一致性良好($ICC: 0.863 \sim 0.933$, $Kappa: 0.836 \sim 0.962$)。单因素 ANOVA 检验不同倍数间 SNR、CNR 及评分差异有统计学意义($P < 0.05$)。当 CS 加速倍数为 6 倍时, 扫描时间接近缩短约 3/4, 而图像质量的主观评价结果与初始序列基本相当, 各项对比差异无统计学意义($P > 0.05$), 而当加速倍数再次增加至

8 倍时, 图像显示评分、SNR 和 CNR 均低于初始序列($P<0.05$)。结论: 当 CS 加速在 6 倍时, 可在缩短扫描时间的同时满足临床诊断要求, 因此压缩感知技术(CS)在头部脑敏感加权 (SWI) 中有较好的应用前景。

PU-0267

DKI、IVIM 联合临床指标术前预测直肠癌淋巴结转移的价值

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[摘要] 目的: 探讨扩散峰度成像 (DKI)、体素内不相干运动 (IVIM) 参数联合临床指标术前预测直肠癌淋巴结转移的价值。方法: 前瞻性搜集 75 例术后经病理证实的直肠腺癌患者临床影像资料。根据淋巴结转移状态分为转移组 (34 例) 及非转移组 (41 例)。采用独立样本 t 检验、秩和检验 (U 检验)、卡方检验及 fisher 确切法比较两组间的差异性分析, 使用二元 Logistic 回归分析筛选预测直肠癌淋巴结转移的独立危险因素, 并建立诊断及联合诊断模型, 采用受试者工作特征 (ROC) 曲线评价各模型的诊断效能, 采用 Delong 检验分析各模型和联合诊断模型的差异。结果: 淋巴结转移组与非转移组各参数中 MK 值、MD 值、D 值、CEA、脂肪间隙差异具有统计学意义 ($P<0.05$), 余差异无统计学意义; 二元 Logistic 回归分析示 MK 值、D 值及 CEA 是预测直肠癌淋巴结转移的独立危险因素, ROC 曲线示 MK 值、D 值、CEA 及其联合诊断模型曲线下面积 (AUC) 分别约为 0.804、0.713、0.682 及 0.859, 敏感度分别约为 73.5%、76.5%、70.6%、85.3%, 特异度约为 87.8%、68.3%、65.9%、85.4%。DeLong 检验分析示联合诊断模型明显优于 D 值及 CEA 单一指标模型, 差异具有统计学意义。

结论: DKI、IVIM 参数及临床指标在预测直肠癌淋巴结转移方面具有一定可行性, 且联合诊断效能高于单一指标, 明显优于 D 值及 CEA 指标。

PU-0268

磁共振 3D-ASL 技术联合视频脑电图定位癫痫致痫灶的价值

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目的: 应用磁共振 3D-ASL 技术获取大脑灰质不同区域血流量 (CBF) 并联合视频脑电图 (VEEG) 定位癫痫致痫灶, 探讨其诊断价值。方法: 回顾性分析 2021 年 1 月-2022 年 12 月在包头医学院第二附属医院经临床诊断为癫痫患者 50 例; 磁共振常规检查除外颅脑外伤、手术、血管畸形及颅内占位; 颅脑磁共振 3D-ASL 及视频脑电图资料完整; 应用基于 Matlab 平台的 SPM12 以及 Dpabi 软件提取大脑灰质 90 个区域 (AAL 模板) CBF, 与视频脑电图异常放电区域进行一致性分析, 并评价二者联合应用定位癫痫致痫灶的诊断效能。结果: 视频脑电图显示异常放电区域与该脑区 CBF 异常存在高度一致性 ($Kappa=0.805, P<0.01$); 大脑灰质不同区域 CBF 测量联合视频脑电图在定位癫痫致痫灶方面具有较高诊断价值 ($AUC=0.812$)。结论: 磁共振 3D-ASL 技术联合视频脑电图能够准确定位致痫灶, 具有较高临床应用价值。

PU-0269

卡波西样血管内皮瘤的 MR 特征分类及与卡梅现象相关性分析

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【摘要】目的：探讨卡波西样血管内皮瘤(KHE)的 MR 特征和影像学分类，并分析影像学特征与卡梅现象(KMP)生化指标的相关性。

方法：回顾性研究我院收治的经术后病理证实的 47 例 KHE 患儿的 MR 检查资料、临床特征、实验室检查结果。依据实验室检查血小板计数(PLT)，其中 29 例存在 KMP，18 例为单纯 KHE 不伴 KMP。所有病灶术前均行 MR 检查，观察病灶发生部位，总结病灶 MR 特征，包括部位、形态、生长模式、大小、信号、病变周围特征，依据生长模式，分为孤立型 18 例和弥漫浸润型 29 例。对比分析 KMP 组与非 KMP 组间的影像学差异，分析影像学特征与卡梅现象的相关性。

结果：47 例 KHE 患者中男性 25 例，女性 22 例；中位年龄为新生儿，年龄范围为 1 天至 50 岁。29 例(62%)伴有卡梅现象(KMP)。KHE 可累及各种部位：头颈部 12 例，躯干 17 例(胸部、腹部、盆腔)，四肢 23 例，47 例中有 4 例涉及多个部位。在 T2WI 上，28 例整体表现为不均匀高信号，19 例表现为轻度低信号，其中 15 例(32%)相对于肌肉显示斑片状低信号。与弥漫型相比，孤立型 KHE 病变相对较小，大多数呈不均匀低信号(12/18)和斑片状低信号(13/18)，更常伴有 KMP，更常位于头颈部($P<0.05$)。病变的最大直径与血小板计数(PLT)在弥漫性组($rs=-0.490$, $P<0.05$)和孤立性组($rs=-0.448$, $P<0.05$)都存在显著相关性。与非-KMP 组病变相比，KMP 组病变更大、更深，大多数位于躯干，更常伴有周围网状淋巴水肿($P<0.05$)。在 T2WI 上呈现斑片状低信号的病例更有可能具有较低的 PLT ($P<0.05$)。

结论：KHE 临床较为罕见，部分可伴有 KMP 现象。具有更大、更深的病变、T2WI 上呈斑片状低信号、周围网状淋巴水肿，尤其是幼儿患者，高度提示 KHE 伴有 KMP 现象，MR 检查 可为临床明确诊断指导治疗提供可靠依据。

PU-0270

Quantitative evaluation of Portal Hypertension in a Miniature Pig Model of Cirrhosis using Multiparametric 3D Magnetic Resonance Elastography

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Purpose:To investigate the value of liver-spleen viscoelastic parameters in evaluating portal hypertension by using multiparametric 3D magnetic resonance elastography (3D-MRE) with hepatic venous pressure gradient (HVPG) as the gold standard in a miniature pig model of liver cirrhosis and portal hypertension.

Methods and Materials:Fifteen pigs were used as the experimental group and liver cirrhosis with portal hypertension was induced using the method of hepatic artery embolization with iodized oil-ethanol mixture, while 5 pigs were used as the control group. All experimental animals underwent 3D-MRE scans and HVPG measurements at baseline (0W) and 4W, 8W, and 12W after induction. After 16W of modeling, the experimental group animals underwent transjugular intrahepatic portosystemic shunt (TIPS) and then underwent 3D-MRE scans and HVPG measurements immediately after the operation. The liver-spleen viscoelastic parameters, including shear stiffness (SS), storage modulus (SM), loss modulus (LM), and damping ratio (DR), were

calculated using 3D-MRE at a frequency of 60 Hz. Multiple linear regression analysis was used to evaluate the association between mechanical parameters and HVPG.

Results: At all time points after induction, HVPG in the experimental group was significantly higher than that in the control group (4W: $P = 0.008$; 8W: $P = 0.009$; 12W: $P = 0.004$). Spleen SS in the experimental group were significantly higher than those in the control group (4W: $P = 0.001$; 8W: $P < 0.001$; 12W: $P < 0.001$). At 8W after modeling, spleen LM in the experimental group was significantly higher than that in the control group ($P = 0.013$). HVPG showed the strongest positive correlation with spleen SS ($r = 0.887$; $P < 0.001$), followed by spleen LM ($r = 0.631$; $P < 0.001$) and liver SS ($r = 0.537$; $P < 0.001$). After TIPS treatment, HVPG and spleen SS were significantly reduced compared with before the operation (HVPG: $P < 0.001$; spleen SS: $P < 0.001$), liver SS decreased compared to pre-treatment ($P = 0.005$). In multiple linear regression analysis, spleen LM ($\beta = 3.21$, 95% CI [0.11, 6.33], $P = 0.02$) and spleen SS ($\beta = 1.58$, 95% CI [1.27, 1.89], $P < 0.001$) were independently associated with HVPG.

Conclusions: 3D-MRE is a promising method for predicting HVPG, and the viscoelastic parameters of 3D-MRE have a good correlation with HVPG. spleen LM and SS are independently associated with HVPG.

PU-0271

高 b 值 Volume-DWI 对脑转移瘤治疗前后诊断及疗效评估

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目的: 探讨高 b 值 Volume-DWI 对脑转移瘤治疗前后的诊断及预测价值。

方法: 回顾性分析 20 例肿瘤脑转移患者在治疗前后均有头颅 MRI 平扫、DWI ($b=1000$, $b=2000$, $b=3000$, $b=4000$)、增强扫描, 在图像上观察转移瘤及其周围信号特点, 并将 DWI 治疗前后图像进行分析诊断效能, 观察 DWI 病灶实质部分 ADC 值的变化趋势。

结果: 病灶检出数目以 3D-T1WI 增强扫描作为“金标准”, 治疗前, MR 增强扫描提示病灶单发 7 例, 多发 13 例, 病灶总数目 124 枚, 直径 ≥ 2 mm。DWI 序列显示病灶总数目 98 枚, 直径 ≥ 2 mm。DWI 序列对直径 ≥ 2 mm 病灶检出率为 94.3%, 具有较好一致性。随着 DWI 的 b 值增高, 测得病灶实质部分 ADC 值减小, 随着 b 值增高, 病灶 ADC 值呈下降趋势。治疗后, MR 增强扫描提示病灶减少或者消失, DWI b 值的增高 ADC 值增加程度与细胞密度成反比, b 越高对治疗后效果预估越敏感, $b=4000$ 、3000、2000、1000 的敏感性分别为 96.7%, 89.3%, 83.4%, 78.9%, 特异性为 95.0%, 86.5%, 78.2%, 75.3%, 差异有统计学意义($P < 0.05$);

PU-0272

MR 3D CUBE T2 序列对膝关节韧带损伤的诊断价值

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目的: 探讨 MR 3D CUBE T2 序列对膝关节韧带损伤的诊断价值。

方法: 纳入 53 例在我院骨科就诊且怀疑为膝关节韧带损伤的患者。患者行 MR 3D CUBE T2 序列扫描, 以关节镜检查结果作为金标准, 比较 3D CUBE T2 序列检查结果与金标准的一致性。对患者进行问卷调查, 对比两种检查方法的患者满意度。

结果: 53 例患者中有 19 例侧副韧带损伤, 12 例前交叉韧带损伤, 10 例后交叉韧带损伤, 10 例髌韧带损伤, 2 例无韧带损伤。MR 3D CUBE T2 序列检查结果与关节镜的诊断结果一致性较高

($P<0.05$), 3D CUBE T2 序列诊断膝关节韧带损伤的灵敏度和特异度均较高。患者对 MR 检查的满意度明显高于关节镜检查。

结论: MR 3D CUBE T2 作为一种无创检查, 对膝关节韧带损伤具有较高的诊断价值和临床应用价值。

PU-0273

MRV 技术在儿童脑血管疾病中的应用

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前脑血管疾病诊断的主要检查方法有 DSA 血管造影、CT 血管造影(CTA、CTV)、对比剂增强磁共振血管成像(CE-MRA)和经颅多普勒(TCD)。DSA 血管造影是有创血管介入技术, 操作较复杂, DSA 血管造影和 CT 血管造影(CTA、CTV)均需要在血管中注入一定量的含碘的对比剂, 而对比剂增强磁共振血管成像(CE-MRA)也需要注入少量的钆对比剂, 多普勒检查虽然不需要对比剂, 但检查效果与操作者的临床经验有很大关系。DSA 和 CT 血管造影使用的非离子型碘对比剂, 约 90% 以原形由肾小球滤过排出, 溶于水后不发生电离, 对血液渗透压影响小, 富含羟基而不含羧基, 神经毒性和血脑屏障损害较轻, 对于大多数患者来说是安全的, 但是对于有严重肝、肾功能损害、严重糖尿病、严重甲亢、骨髓

PU-0274

Magnetic resonance study of bone marrow mesenchymal stem cells in the treatment of type 2 diabetic peripheral neuropathy

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Objective: Using 7.0T¹H-MRS to characterize the intracellular lipid changes of skeletal muscle metabolites in the right hind limb of DPN rats may be a very important method to explore the feasibility of proton magnetic resonance spectroscopy (¹H-MRS) in evaluating type 2 diabetic peripheral neuropathy (DPN). At the same time, this study also aims to explore whether local transplantation of bone marrow mesenchymal stem cells can improve DPN, and whether ¹H-magnetic resonance spectroscopy can be used as an objective and reliable method to monitor the therapeutic effect of bone marrow mesenchymal stem cells on DPN.

Methods: BMSCs of SD rats were isolated and cultured. Rat model was induced in male SD rats by injection of streptozotocin (STZ) (45 g/kg, i.p.) in combination with high sugar and high fat diet. After DM model was built, the DPN model was made by continue feeding for 8 weeks. Male SD rats were divided into normal control group, DPN group, DPN+BMSCs group and DPN +NS (normal saline) group. Each group has 6 rats. Rats in normal group, rats in DM group at 4 and 8 weeks after diabetes model was built, rats in DPN+BMSCs and DPN+NS group at 2, 4 and 6 weeks after DPN intervention were scanned to obtain the ¹H-MRS imaging of the right hind limb. Blood glucose and body weight of the rats were monitored weekly throughout the whole study. Pathological changes of sciatic nerve were observed by HE stain.

Results: MRS: Intramyocellular lipid at 4 and 8 weeks after DM model was built were all higher than those in the normal control group at the corresponding time point ($p<0.05$). In the normal control group, IMCL levels at week 8 was higher than that at 4 weeks ($p<0.05$). The same result was observed in DM models ($p<0.05$). After intervention, IMCL concentration in DPN+BMSCs

group was lower than that in DPN+NS group at 2, 4 and 6 weeks after the transplantation of BMSCs($p<0.05$). IMCL in DPN+BMSCs group decreased at 2, 4 and 6 weeks after transplantation compared with baseline level before transplantation ($p<0.05$), whereas there was no difference in the DPN+NS group at 2, 4 and 6 weeks after injection of normal saline compared with baseline level before injection ($p>0.05$). Compared with the normal group, DPN group, DPN+BMSCs group and DPN+ saline group had slower sciatic nerve MNCV and SNCV ($p<0.05$), and MNCV and SNCV of the DPN+BMSCs group were improved compared with the DPN+NS group ($p<0.05$). HE stain: Sciatic nerve pathological changes, characterized by axon swelling, axon thinning, uneven myelin thickness were observed in DPN+BMSCs group and DPN+NS group. Compared with DPN saline group, the sciatic nerve pathological changes of DPN+BMSCs group were alleviated.

Conclusion: DPN rat model was successfully built 8 weeks after DM model was built. BMSCs plays a positive role in the repairment of DPN nerve function in rats. But its specific mechanism and the feasibility of its clinical application still need to be further explored. 7.0T 1H-MRS can be used to detect IMCL concentration quantitatively in skeletal muscle. 1H-MRS could be used to dynamically detect changes of IMCL concentration in DPN skeletal muscle, and its detection of metabolic changes in muscle tissues can be a potentially useful tool for assessing the efficacy of DPN in local cells transplantation.

PU-0275

无痛期异常大脑动态功能网络： 慢性内脏痛的初步静息态共激活模式分析

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原发性痛经 (PDM) 作为一种慢性盆腔痛会严重影响女性的心理情绪、睡眠及生活质量。慢性疼痛与大脑网络复杂的相互作用有关，反复且持续的疼痛会改变大脑功能网络连接。且疼痛随时间波动过程易受注意力、情绪、治疗或治疗环境等影响。以往研究主要关注静态功能连接，而忽视了不同脑区或网络在不同时间尺度上的 BOLD 信号特异性变化。动态功能连接方法可以灵敏地捕捉和检测伴随这种波动的大脑变化。通过分析不同区域之间的神经活动如何随着时间的推移而演变和变化，系统地解释这些差异。本文采用动态功能连接方法 (CAP)，探究 PDM 女性的在非疼痛期的大脑动态网络连接特征与疼痛期心理情绪的关系。本研究共纳入 116 人，对照组 57 人，疼痛组 59 人。研究发现，PDM 患者在无痛排卵期的大脑网络动态交互作用异常，且非疼痛期的大脑网络连接特征与疼痛期的疼痛情绪有相关性。月经期间的疼痛可能与无痛排卵期大脑网络异常动态交互作用有关。本研究通过应用动态功能连接分析方法，更敏感地发现 PDM 患者大脑功能网络的异常，增进了我们对慢性疼痛的大脑网络机制理解。

PU-0276

FOCUS DWI 在强直性脊柱炎骶髂关节病变中的应用

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目的：磁共振成像在骶髂关节病变中的作用已被临床认可，但小视野高清弥散用于骶髂关节病变的报道较少。本文主要探讨 FOCUS DWI 小视野弥散加权成像，对比常规 DWI 图像在强直性脊柱炎 (AS) 骶髂关节活动性炎症中的临床应用价值。

材料与方法：设备采用 GE DISCOVERY MR750 3.0 T 磁共振扫描仪，32 通道体部线圈。FOCUS DWI 序列 FOV: 28 cm×14cm，层厚/层距：4 /1mm，层数 16，矩阵 160×80，B=600 s/mm²，激励次数 16，扫描时间：3 分 03 秒。常规 DWI 序列 FOV: 38 cm×38 cm，层厚/层距：4 /1mm，层数 16，矩阵 128×130，B=600 s/mm²，激，采集次数 8 次，扫描 时间：1 分 28 秒。扫描完成后将图像传至 PACS 上，由 2 位中级影像诊断医师根据图像质量完成分析打分。图像质量由差到优分为 5 级，focus DWI 和常规 DWI 分别评分。

同时两组序列均在主机上使用 Functool 后处理软件，对原始图像进行变形矫正后，进行 Compute(计算)，再选取相同层面，在高信号区域及关节面正常组织区域设定 ROI，得到 ADC 值进行分析。

2 结果

FOCUS DWI 序列与常规 DWI 序列图像质量比较：FOCUS DWI 序列图像空间分辨率较高，骶髂关节图像无变形、无明显伪影，病灶显示较清晰。FOCUS DWI 序列图像质量分级高于常规 DWI 图像 ($Z=-5.11$, $P<0.01$)。FCOUS DWI 与常规 DWI 序列的 ADC 值比较：炎症侵犯区域 FOCUS DWI 序列的 ADC 值低于常规 DWI ($P<0.05$)，而正常组织 FOCUS DWI 序列的 ADC 值则高于常规 DWI。

结论本研究表明， FOCUS DWI 序列明显提高了图像的分辨力，组织无扭曲、变形及明显伪影，细节显示较清晰，FOCUS DWI 序列图像明显好于常规 DWI 图像。常规 DWI 序列比 FOCUS DWI 序列病灶区域的 ADC 也具有统计学意义。由此可见 FOCUS DWI 有利于提高骶髂关节炎症的诊断效能。

PU-0277

踝关节 MRI 扫描距腓前韧带定位方法的探索

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目的：MRI 应用于踝关节外伤的检查中，对踝关节外伤引起的韧带、肌腱以及关节软骨损伤后评估起到很重要的作用。但是对距腓前韧带损伤的诊断效果有限，常常不能完整显示距腓前韧带。此研究用于探索正常人距腓前韧带走行特征，改良斜轴位定位方式，距腓前韧带清晰的图像。

材料与方法：设备采用 Philips Ingenia Ambition 1.5T 磁共振扫描仪，16 通道踝关节专用线圈，矢状面 3D TSE 序列，不加脂肪抑制。FOV18cm，采集 260 层，采集体素 0.6×0.6×0.6mm，NSA:1 次，cs:8，扫描时间 2 分 51 秒。共扫描 30 例。扫描完成后使用 MPR 图像重组，观察距腓前韧带走行角度，测量距腓前韧带与胫骨长轴的夹角，同时观察其与相邻距骨形态的角度关系，测量距腓前韧带走行角度。

结果：距腓前韧带在 PD WI 上均表现为均匀低信号，MPR 重组显示距腓前韧带与胫骨长轴的夹角为 68°-125°之间，变量较大，分析原因，与患者踝关节屈曲的角度有很大关系，外伤患者，由于损伤程度及肿胀程度不同，导致扫描时足背与胫骨夹角不易放置为人体站立时的角度，故不具有参考意义。同时 3D 图像经过重组分析，观察到距腓前韧带与距骨长轴有相关性，与距骨后外结节与距骨头颈交界的连线的夹角为 $\pm 3.7^\circ$ 。后续斜轴位采用平行于距骨后外结节与距骨头颈交界的连线的定位方法扫描，均能清晰显示距腓前韧带。

结论：踝关节扫描时，患者在踝关节放松状态下，通过 3D 序列扫描的后图像重组观察，平行于距骨后外结节与距骨头颈交界的连线，与距腓前韧带走行接近，斜轴位采用此方法定位，均能清晰显示距腓前韧带，而由于胫骨与脚背的位置关系，受个人影响因素大，所以不建议使用与胫骨长轴的夹角作为参照。

PU-0278

3D NerveVIEW 序列在臂丛神经磁共振成像中的应用研究

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目的 与增强 3D STIR VISTA 序列对比, 探讨 3D NerveVIEW 序列在臂丛神经磁共振成像中的应用价值。

方法 收集本院 2023 年 2 月至 2023 年 5 月临床疑诊臂丛神经损伤的 20 例患者, 采用飞利浦 Ingenia CX 3.0T MR 扫描仪, 联合使用头颈线圈、脊柱线圈和体部线圈; 检查体位取头先进, 仰卧位; 对患者进行颈胸段冠状面扫描, 以 C6 为中心, 扫描范围为椎体前缘至椎管后缘, 所有患者均先行 3D NerveVIEW 扫描, 后行增强 3D STIR SPACE 扫描。扫描所得图像经过最大信强度投影 (MIP) 及多平面重组 (MPR) 图像后处理后, 由 2 名高年资影像诊断医师对图像上臂丛神经的根、干、股、束、支各部显示进行评分, 并在冠状位 MIP 图像上测量 C6 神经干层面臂丛神经与同层面毗邻肌肉组织的对比噪声比 CNR。采用 SPSS 22.0 软件进行统计学分析。2 组 CNR 比较采用配对样本 t 检验; 2 组评分比较采用配对样本 Wilcoxon 秩和检验。 $P < 0.05$ 为差异有统计学意义。

结果 3D NerveVIEW 序列图像上臂丛神经显示评分高于增强 3D STIR VISTA 序列, 差异有统计学意义 ($P < 0.001$); 两组之间臂丛神经与肌肉的对比噪声比 CNR 无统计学差异 ($P > 0.05$)。

结论 3D NerveVIEW 序列相比于增强 3D STIR VISTA 序列, 可以更好的显示臂丛神经, 并且不需要注射对比剂, 因而对不适合使用对比剂的患者具有较高的临床应用价值。

PU-0279

基于 3.0T 压缩感知 3D-FLAIR 序列在多发性硬化中的临床价值研究

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目的: 对比分析基于压缩感知 CS 技术的 3D-FLAIR 序列与常规 2D-FLAIR 序列对多发性硬化 (MS) 的成像质量, 探讨 CS 3D-FLAIR 序列的临床应用价值。

方法: 收集本院 2022 年 7 月至 2023 年 7 月临床确诊 MS 的 15 例患者, 采用飞利浦 Ingenia CX 3.0T MR 扫描仪, 使用 32 通道头线圈同时行头部 CS 3D-FLAIR 序列与 2D-FLAIR 序列扫描。对 3D-FLAIR 序列所得图像进行重建得到与 2D 层面一致的横断面图像, 然后由 2 名高年资影像诊断医师对两组图像中具有 MS 典型性质的病变分别进行计数, 并将其分配到不同的脑区, 当两位医师出现不同意见时进行协商, 取协商结果作为最终结果; 并且分别测量两组序列图像上病灶的信噪比 (SNR) 和对比噪声比 (CNR)。采用 SPSS 22.0 软件进行统计学分析, 采用 Wilcoxon 秩和检验对两组数据结果进行比较, $P < 0.05$ 为差异有统计学意义。。

结果: CS 3D-FLAIR 序列发现的病灶总数明显高于 2D-FLAIR 序列, 差异有统计学意义 ($P < 0.001$), 差异主要由幕上病变引起, 而幕下病变计数在两个序列中均较低。CS 3D-FLAIR 序列图像的 SNR 和 CNR 均显著高于 2D-FLAIR 序列, 差异有统计学意义 ($P < 0.05$)。

结论: 在扫描时间相当的情况下, CS 3D-FLAIR 序列可提高空间分辨率, 并且可进行多平面重建有利于病灶多方位观察, 因而对 MS 病变的检出优于 2D-FLAIR 序列, 建议临床推广应用。

PU-0280

The value of cascaded neural networks in the automatic segmentation of NPC

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Abstract

Objective: Nasopharyngeal carcinoma (NPC) is the most common nasopharynx cancer in the world. The accurate segmentation of NPC is important for both treatment planning and tumor assessment. However, due to the complex anatomical features of NPC, manual segmentation is very time-consuming, and the segmentation results generated by many semi-automatic and automatic based on classical image processing methods or machine learning methods are not satisfied. In this study, we designed a cascaded neural network to investigate the NPC segmentation ability.

Methods: The T2-weighted MRI images from 310 NPC patients were randomly divided into training and testing groups at a ratio of 3:1, resulting in 233 patients in the training group and 77 patients in the testing group. The training group was then used for construction and training of a cascaded neural network, with the testing group being used to evaluate the performance of the constructed network. 4-folds cross validation was performed to evaluate the robustness of cascaded neural network.

Results: Our proposed cascaded neural network performed better than a single neural network. Moreover, as the number of cascaded networks increased, the segmentation performance gradually rose to a peak.

Conclusion: With further changes to the cascaded structure, our approach has the potential to further improve the segmentation performance. Our results indicate that cascaded neural networks have great potential for automatic segmentation of NPC.

PU-0281

磁共振体素内非相干运动扩散加权成像参数联合临床-影像学特征预测 HIFU 消融子宫肌瘤的早期疗效

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目的: 本研究旨在应用磁共振体素内非相干运动扩散加权成像 (IVIM-DWI) 定量参数联合临床-影像学特征构建模型来术前预测高强度聚焦超声 (HIFU) 消融子宫肌瘤的早期疗效。

方法: 分析行 HIFU 消融治疗的 64 名妇女的 89 枚子宫肌瘤 (充分消融组 51 枚, 非充分消融组 38 枚) 的临床资料, 年龄 (43.1±6.4) 岁, 均完成磁共振成像和 IVIM-DWI 检查。所有患者均在行 HIFU 消融治疗前 3 日内完成 MRI 和多 b 值 (0、10、25、50、80、100、150、200、500、800、1000 s/mm²) DWI 检查。两名医师采用盲法在 IVIM-DWI 图像中手动勾画感兴趣区, 从双指数模型获得 IVIM-DWI 定量参数真扩散系数 (D) 值、伪扩散系数 (D*) 值、灌注分数 (f) 值、相对血流量 (rBF) 值及表观扩散系数 (ADC) 值。联合两组有差异的临床-影像学特征, 构建 logistic 回归模型以评估 HIFU 的早期疗效, 通过绘制受试者工作特征 (ROC) 曲线及其曲线下面积 (AUC) 来评估各指标及参数的预测效能。构建列线图以可视化模型。

结果: 消融充分组 D 值 (931.0 (851.5-987.4) ×10⁻⁶ mm²/s) 明显低于消融不足组 (1052.7 (1019.6-1158.7) ×10⁻⁶ mm²/s) (p<0.001)。然而, 各组之间 D*、f 和 rBF 值的差异均不显著 (p>0.05)。以 D 值、肌瘤位置、腹侧皮肤距离、T2WI 信号强度、对比增强程度构建逻辑回归模型。

模型的 ROC 曲线下面积、特异性和敏感性分别为 0.858 (95%CI: 0.781-0.935)、0.686 和 0.947。列线图和校准曲线显示了模型的优异性能。

结论: IVIM-DWI 定量参数联合临床-影像学特征构建的 logistic 回归模型可用于预测 HIFU 消融子宫肌瘤的早期疗效。治疗前高 D 值提示疗效可能较差。

PU-0282

多模态 MR 成像评估侧方淋巴结转移在 直肠癌预后中影响的研究进展

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目的: 多模态 MR 成像评估侧方淋巴结转移对晚期低位直肠癌患者生存率的预后影响的研究进展

方法: 研究分析近 5 年间发表关于直肠癌侧方淋巴结转移预后相关文章, 影像学评估分析淋巴结转移的形态学及功能定位和长期结果; 以及无病生存和局部复发的预测因素

结果: 扩散加权成像及磁共振动态增强成像的定量/半定量可以很好的评估分析转移淋巴结的形态学特征和血流动力学特征, 术前侧方淋巴结短径越大, ADC 值/Ktrans 值/Kep 值等越低, 直肠癌局部复发风险越高, 无病生存率越低。多模态 MR 成像可以根据侧方淋巴结转移的大小和在 MRI 上的位置为侧方淋巴结清扫术提供相当可靠的帮助。

结论: 多模态 MR 成像可以很好的术前评估直肠癌侧方淋巴结转移, 以及预测直肠癌治疗后预后生存相关因素, 为临床侧方淋巴结清扫术提供相当可靠的帮助。

PU-0283

ZOOM DWI 序列和常规 DWI 序列在直肠癌 MR 成像中的对比研究

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目的: 比较以单次回波平面成像 (SS-EPI) 为基础的小视野 ZOOM DWI 序列和常规 DWI 序列在直肠癌 MR 成像中的图像质量。

方法: 回顾性分析 2023.01-06 月在医院进行 3.0T MRI 扫描的直肠癌患者 31 例, 并分别同时进行 ZOOM DWI 和常规 DWI 扫描, 比较二者的直肠解剖可视化、信号均匀性、重影伪影、磁敏感伪影、混叠伪影、直肠病灶清晰度以及整体图像质量等定性参数。还比较了信噪比(SNR)、信号强度比 (SIR)、对比噪声比(CNR)和 ADC 值等定量参数。采用 Wilcoxon 符号秩检验进行定性参数比较, 并通过配对 t 检验比较定量参数。

结果: 除重影伪影外, ZOOM DWI 的所有图像质量评分均显著高于常规 DWI ($p < 0.01$)。ZOOM DWI 的 CNR 显著高于常规 DWI ($p < 0.01$), 而 SNR 和 SIR 无显著差异。ZOOM DWI 与常规 DWI 测量的直肠癌病灶的 ADC 值分别为 $(0.934 \pm 0.155) \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $(0.963 \pm 0.132) \times 10^{-3} \text{ mm}^2/\text{s}$, 差异无统计学意义 ($p = 0.27$)。

结论: ZOOM DWI 相较于传统 DWI 的图像质量更好, 伪影更少, 对于直肠病变的显示程度也明显高于传统 DWI, 在评估直肠癌方面具有一定可行性。

PU-0284

3.0T 磁共振单髌关节成像技术

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目的：磁共振检查是目前诊断 FAI 的主要检查方法。与常规双侧髌关节 MRI 相比，单髌关节 3.0T 磁共振具有小视野、高分辨的优势，可以更加清楚的显示髌关节骨质、软骨、韧带及软组织的结构，尤其是髌臼唇结构。

方法：1.体位设计：患者采用仰卧位，头先进。要求患者两脚根分开，两脚尖并拢，可以更好显示股骨颈。体表定位中心位于髌前上棘与耻骨联合连线中点。体位设计遵循三中心原则。2.扫描方案：为了更好观察软骨、韧带和髌臼唇结构，同时，为了更清晰的显示孟唇撕裂的位置、大小，并显示局部骨髓内的情况，扫描序列多采用质子加权成像加上脂肪抑制技术。层厚 $\leq 4\text{mm}$ ，层间隔 $\leq 0.4\text{mm}$ ，成像视野 $\leq 200\text{mm}$ ，激励次数 ≥ 2 ，扫描层数可根据病人实际情况进行调整，通常扫描 20-24 层。3.扫描定位：不同扫描序列观察的重点不同。其中横轴位以垂直于人体长轴进行扫描，扫描范围包括髌臼上缘和股骨小转子，要求清楚显示股骨头、股骨颈及孟唇开口，用于观察股骨头颈交界处骨质情况以及接下来的定位。在横断位上平行于孟唇开口方向，扫描得到斜冠状位，清楚显示外上孟唇和后孟唇，可以测量 α 角判断是否存在 Cam 型。在斜冠状位上平行于孟唇开口方向，横断位上平行于前后孟唇连线，扫描得到斜矢状位，清楚显示前孟唇和后孟唇。需要注意的是在进行单髌关节扫描时，观察的重点是髌臼孟唇，所以定位线角度应以髌臼孟唇为靶点。4.扫描技巧：扫描前让病人排空尿液，避免膀胱过度充盈影响髌臼孟唇的观察；摆位时应尽量将患侧髌关节置于扫描床的中央。注意相位编码方向，添加过采集，避免出现卷褶伪影；避免定位线角度 $>45^\circ$ 出现图像翻转的情况。对于一些特殊病人，可以采用放射状扫描或者 3D 序列进行扫描。

结论：3.0T 磁共振单髌关节以其小视野、高分辨的成像特点以及特殊的扫描方位实现了对髌臼孟唇的全面观察，弥补了传统髌关节磁共振的不足，是评估髌臼孟唇损伤的最佳影像学检查方法。同时为了获得更好的图像质量，根据国内外相关文献和指南，结合自身实践经验，制定了单髌关节扫描规范，旨在为开展统一的单髌关节扫描提供支持和参考。

PU-0285

头颅 TOF-MRA 压缩感知技术初步应用

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目的探讨压缩感知(Compressed Sensing,CS)技术在头颅 TOF-MRA 中的临床应用价值.方法对 40 例患者同时行常规 TOF-MRA 和压缩感知 TOF-MRA 序列扫描,根据序列不同将图像分为 TOF-MRA 和 CS-TOF-MRA2 组.定性分析 2 组图像整体质量,背景抑制效果和颅内血管的显示能力;定量分析 2 组图像的扫描时间,信噪比(Signal to Noise Ratio,SNR)和对比噪声比(Contrast to Noise Ratio,CNR).结果图像整体质量评分,背景抑制效果方面,CS-TOF-MRA 均优于 TOF-MRA,差异有统计学意义($P<0.05$).血管显示能力方面,CS-TOF-MRA 与 TOF-MRA 相当,差异无统计学意义($P<0.05$);SPACE-TOF-MRA 和 CS-TOF-MRA 扫描时间分别为 (260.95 ± 61.70) ,120s,差异有统计学意义($P<0.05$).SNR 和 CNR 分析中,CS-TOF-MRA 均优于 TOF-MRA,差异有统计学意义($P<0.05$).结论采用压缩感知技术的 TOF-MRA 序列与 TOF-MRA 序列相比,可显著缩短扫描时间,获得更好的图像质量.

PU-0286

半程马拉松跑前跑后髌骨软骨的 MRI T1 ρ 值定量分析

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目的 运用定量 T1 ρ 探讨业余马拉松运动员半程马拉松运动对髌骨软骨的影响。方法 招募 40 名 3 年以上跑龄的业余马拉松运动员,于半程马拉松跑前,跑后当天及跑后 1 周进行右膝关节 3D_WATS(WATER SELECTION),T1 ρ 序列扫描。将髌骨软骨根据厚度 1/2 分为深层,浅层,勾画 ROI 得到相应区域的 T1 ρ 值。利用单因素重复测量方差分析比较跑步前后及跑后 1 周膝关节软骨的 T1 ρ 值变化,多组样本均数两两比较采用 LSD 法。结果 膝关节髌骨软骨区域在检查过程中未出现软骨缺损。与半程马拉松运动前相比,跑步后软骨区域浅层的 T1 ρ 值显著下降,差异具有统计学意义 ($t=5.145, P<0.05$);跑后 1 周复查,髌骨软骨区域的 T1 ρ 值与跑前相比,差异无统计学意义 ($t=1.062, 0.309, P$ 均 >0.05)。结论 单次半程马拉松之后,男性业余马拉松运动员的髌骨软骨成分改变是可逆的。在常规 MRI 无阳性发现的情况下,利用 T1 ρ 定量 MRI 技术能够间接反映关节软骨在运动过程中发生的生化成分改变

PU-0287

磁共振限制回波间隔的类 CT 梯度回波序列在评估膝关节撕脱性骨折中的应用研究

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目的 探讨磁共振限制回波间隔的类 CT 梯度回波 (FRACTURE, Fast field echo resembling a CT using restricted echo-spacing) 序列在评估膝关节撕脱性骨折中的价值,比较膝关节 FRACTURE 序列与常规膝关节 CT 扫描的诊断效能。方法 前瞻性收集安徽医科大学第一附属医院符合入组标准的患者 37 例,所有患者在入组一周内分别行膝关节 CT,磁共振平扫(含 FRACTURE 序列)检查,并通过多平面重组技术(Multi-Planar Reformatting, MPR)在 CT 及 FRACTURE 序列上重组出易于显示病灶相同方位的图像,并在每例患者 CT 及 FRACTURE 序列图像上选择对应层面的图像勾画正常密质骨和松质骨及肌肉的感兴趣区,并测出 CT 值和信号强度,分别测量两图像骨折线长度,碎骨大小及碎骨 CT 值和信号强度,采用独立样本 t 检验, Mann-Whitney U 检验及 Pearson 相关系数验证两图像的差异及相关性。以 CT 诊断结果为参考标准,通过五级 Likert 量表,评价 FRACTURE 序列及常规 T1 加权成像的图像质量以及对于病灶的诊断效能,并通过 Mann-Whitney U 检验验证两影像的图像质量与诊断性能的差异。结果 正常密质骨和松质骨在 FRACTURE 序列的信号强度与 CT 图像上的 CT 值存在正相关关系 ($R=0.83, P<0.05$; $R=0.62, P<0.05$),正常肌肉及碎骨的信号强度和 CT 值不存在相关性;两图像的骨折线长度及碎骨大小无统计学差异 (P 均 >0.05);相比常规 T1 加权成像, FRACTURE 序列表现出更优的图像质量和诊断效能 (P 均 <0.05)。结论 磁共振 FRACTURE 序列对膝关节撕脱性骨折的显示及诊断具有较高的敏感性,有潜力成为撕脱性骨折的术前常规检查序列,为临床决策提供指导。

PU-0288

基于 MRI 影像组学模型预测前列腺癌诊断及分级的应用研究

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摘要：目的：利用核磁共振影像技术（MRI）和影像组学（Radiomics）的组合，通过大量临床图像信息，研究和总结前列腺癌（Prostate cancer）的影像学特征，建立前列腺癌的疾病模型，可辅助前列腺癌的临床诊断及分期。方法：选取 2020 年 11 月—2023 年 6 月于本院于治疗或术前接受前列腺 MRI 检查的 136 例患者，收集整理年龄、病理信息等临床资料，通过 Itk-snap 在 T2 横截面上进行 ROI 勾画，再使用 Python 进行特征提取，选择和 Gleason 评分相关的特征，用前向逐步回归筛选特征，线性组合选择的特征，建立 logistics 回归分类器，最后用线性组合在 Matlab 里画 ROC 曲线评估模型。结果：本组 136 例患者；Gleason 评分低级别组（6-8 分）80 人，高级别组（9-10 分）56 人，T1 图像提取了 107 个特征，T2 图像提取了 107 个特征，T1、T2 共 214 个特征。通过前向逐步回归得到的特征线性组合的影像组学总分受试者工作曲线（ROC）的曲线下面积 AUC，T2 组 AUC=0.646，其余两组均>0.650，其中 T1+T2 组效能为佳，AUC 为 0.754。证明了多模态影像的诊断价值。结论：通过筛选 MRI 图像特征制作前列腺癌模型用来辅助前列腺癌的诊断及临床分级具有一定意义。

PU-0289

浅谈磁共振成像技术的基本应用

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核磁共振的成像的基本原理:利用电磁波对置于磁场中的含有自旋不为零的原子核的物质进行激发,发生磁共振,用感应线圈采集共振信号,经处理建立数字图像.核与磁相互作用产生共振,所以,磁共振的产生需要具备三大要素:原子核,外磁场和电磁波.将患者置入一外磁场,则患者体内的氢质子的排列会无序到有序,然后对患者发射一个特定频率的射频波(属于无线电波,能量处于电磁波的低端),如果该射频频率和氢质子的进动频率相同,则此时会发生共振现象,这时氢质子吸收能量从而在其能级间发生共振跃迁.这个过程就是核磁共振.

磁共振成像技术对疾病的诊断具有很大的潜在优越性,可以直接作出横断面.矢状面.冠状面和各种斜面的体层图像,对软组织有极好的分辨力,对一些空腔脏器和肌肉组织的检查优于 CT.各种参数都可以用来成像,多个成像参数能提供丰富的诊断信息,使得医疗诊断和对人体内代谢和功能的研究方便有效.

PU-0290

MR radiomics predicting treatment response to neoadjuvant chemoradiotherapy among geriatric patients with locally advanced rectal cancer

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Background and Purpose : Early detection of treatment response to neoadjuvant chemoradiotherapy (nCRT) for locally advanced colorectal cancer (LARC) among geriatric patients remains challenging. We aimed to assess whether pretreatment MRI radiomics could predict the treatment response to nCRT in LARC.

Materials and Methods: Patients with LARC who were treated with nCRT were retrospectively collected between March 2010 and December 2022. Radiomic features were analyzed through computational methods from the pretreatment T2WI images. Differentiation models were constructed for predicting treatment response to nCRT, including pathological complete response (pCR), good-response, and down-staging. Model performance was assessed for classification efficiency, calibration, discrimination, and clinical application.

Results: This study enrolled a total of 91 patients (59 males and 32 females). Among the 91 patients, 15 (16.5%) achieved pCR, 38 (41.7%) achieved a good response, and 62 (68.1%) achieved down-staging. For prediction of pCR, good-response, and down-staging, the predictive model demonstrated high classification efficiencies, with an AUC value of 0.924 (95% CI: 0.83 to 0.98), 0.943 (95% CI: 0.83 to 0.97) and 0.947 (95% CI: 0.87 to 0.98), respectively. Both decision curve and calibration curve analyses confirmed that the ensemble machine learning model had higher prediction performance.

Conclusion: Pretreatment MR radiomics achieved satisfying performance in predicting treatment response to nCRT and could be helpful to assist in treatment planning for geriatric patients with LARC.

PU-0291

人工智能压缩感知技术在腰椎磁共振快速成像中的应用

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目的 探讨人工智能压缩感知技术 (ACS) 不同加速因子 (AF) 对腰椎磁共振图像质量的影响。**方法** 招募 41 例受检者 (男 21 例, 女 20 例, 平均年龄 (49.21±17.24) 岁, 应用联影 Omega 3.0T MR 扫描仪行并行采集技术 (PI) 以及 ACS 的腰椎矢状位 T1WI、T2WI、T2WI STIR 序列扫描, 分别采用 PI AF=2.0、ACS AF=2.0~4.0 (间隔 0.5)。部分受检者行单序列扫描, 部分受检者行多序列扫描, 最终各序列均为 21 例。测量 L1、L3、L5 椎体、间盘、临近肌肉信号值和噪声强度, 以肌肉为背景计算信噪比 (SNR) 和对比噪声比 (CNR), 并对 10 例检出有间盘突出的患者进行了间盘突出区 CNR (突出-CNR) 的评价。两名观察者对解剖结构细节可见度、图像噪声及运动伪影以及诊断准确性采用四分法评价, 评分一致性采用 Kappa 检验。使用 Friedman 检验三个序列不同 AF 间 SNR、CNR 及主观评分的差异性。结果 矢状位 T1WI、T2WI、T2WI STIR 不同 AF 间椎体、椎间盘的 SNR、CNR 的差异均无统计学意义 ($P>0.05$)。两观察者主观评分一致性良好

($Kappa=0.764 \sim 0.789$)。T2WI、T2WI STIR 不同 AF 间椎体、椎间盘的主观评分无统计学差异 ($P>0.05$)，T1WI 不同 AF 间主观评分有统计学差异 ($P<0.05$)；矢状位 T1WI 采用 ACS AF=4 时主观评分低于 PI AF=2.0 ($P<0.05$)。结论 基于 ACS 的腰椎 MR 扫描，随着 AF 的增加，扫描时间逐渐缩短，在保证图像质量的前提下，临床推荐 ACS AF 分别为 3.5、4.0、4.0 行腰椎矢状位 T1WI、T2WI、T2WI STIR 序列扫描。

PU-0292

Evaluation of the Image Quality of Renal Imaging by MRI Conventional Coil and AIR Coil

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Abstract: Purpose: In renal magnetic resonance imaging, by comparing the image quality of conventional coil and AIR coil in abdominal MRI sequences, we can improve the image quality of conventional renal MRI scanning. Methods: 13 volunteers were recruited. Under the same scanning parameters, renal MRI was performed with abdominal phased array conventional coil and AIR coil. The imaging sequences included axial T1WI, T2WI and DWI. Two doctors scored the image quality subjectively, and the volunteers scored the experience of the scanning. The signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR) were measured and calculated. They were statistically analyzed. Results: In T1WI, T2WI and DWI images, the SNR of AIR coil was higher than that of conventional coil, and the difference was statistically significant ($P < 0.05$); most of the AIR coil CNR was higher than that of conventional coil, but the difference was not statistically significant ($P > 0.05$); the subjective scores of the two physicians were consistent ($P < 0.05$), and the subjective scores of AIR coil were better than that of conventional coil; the difference of subjective experience scores between the two coils was statistically significant ($P < 0.05$), and the subjective experience scores of comfort, fit and visual feeling of AIR coil were higher than those of conventional coil, and the compression feeling score of AIR coil was lower than that of conventional coil. Conclusions: Compared with conventional coil, AIR coil can obtain better image in renal MRI imaging, which can be widely used in clinical.

PU-0293

Assessment of microsatellite instability in endometrial cancer: comparison of deep learning and radiomics DWI image signatures

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Objectives To explore the performance of machine learning based on diffusion-weighted imaging (DWI) features extracted from deep learning (DL) to identify microsatellite instability (MSI) in endometrial cancer (EC).

Methods A total of 117 EC patients were enrolled in this study, and assigned into the training set ($n = 84$) and the test set ($n = 35$). DL features based on convolutional neural networks and conventional radiomics features were extracted from DWI. Random forest (RF) and logistic regression (LR) were adopted as classifiers. DL features, radiomics features, clinical parameters, apparent diffusion coefficient (ADC) values, and their combinations were applied to establish DL, radiomics, clinical, ADC, and combined models, respectively. Predictive performance was

assessed by the area under receiver-operator characteristic (AUC), total integrated discrimination index (IDI), net reclassification index (NRI), calibration curves, and decision curve analysis (DCA). Results The combined model based on RF classifier, consisting of 3 DL features, 4 radiomics features, 2 clinical factors, and ADC value, had the best prediction performance. The AUCs of this model were 0.956 (95% CI: 0.919 - 0.999) and 0.850 (95% CI: 0.689 - 0.950) in the training and test sets, respectively, which showed different degrees of improvement over radiomics, clinical, and ADC models (AUC-training = 0.882, 0.685, and 0.751, AUC-test = 0.853, 0.618, and 0.721, respectively). The combined model also had a good performance at risk reclassification, with categorical NRIs of 154.08% and 88.64% and IDIs of 73.47% and 35.95%, in the training and test sets, respectively. The calibration curves and DCA indicated good consistency and clinical utility of this model, respectively.

Conclusions DL is feasible and superior to radiomics in the assessment of MSI status in EC. The combined model based on DL features, radiomics features, clinical parameters, and ADC values can achieve good diagnostic efficacy.

PU-0294

宫颈胃型腺癌 MRI 影像特征分析

齐取

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1.目的:

宫颈胃型腺癌是最常见的非 HPV 相关型子宫颈癌,临床表现不典型,病灶隐匿,恶性程度高,进展快,预后不良,临床上极易漏诊或误诊,确诊依赖术后病理。明确宫颈胃型腺癌的 MRI 影像学特征可提高术前诊断率。

2.方法:

收集 2019 年 5 月到 2023 年 8 月经手术病理证实为宫颈胃型腺癌的患者 21 例,年龄 33~70 岁,平均年龄 50.62 岁。在这 21 例宫颈胃型腺癌中,阴道不规则流血 9 例,阴道流液增多 7 例。肿瘤标志物 CA199 阳性 8 例,CA125 阳性 8 例,CEA 阳性 13 例,SCC 阳性 1 例。阴道受累 15 例,宫体受累 16 例,卵巢、直肠、膀胱转移 7 例,腹膜转移 6 例。其中 12 例行广泛全子宫切除+双附件+淋巴结切除术,术后病理回报淋巴结转移 11 例。FIGO 分期 I B 期 3 例,IIA 期 2 例,IIB 期 2 例,IIIC 期 8 例,IV 期 6 例。

3.结果:

本次收集的 21 例患者,MRI 检查图像中表现为宫颈肿块,均位于宫颈内,呈浸润性生长,可见宫颈呈桶状增粗,11 例见向上侵袭宫体,15 例见向下侵袭阴道穹隆。11 例向上侵袭的病例中有 1 例沿内膜向上爬行侵袭宫体,于宫腔内可见肿块影,其 MRI 需注意与子宫内膜癌向下侵袭宫颈相区别。21 例中有 16 例肿块呈囊实混合性,囊性成分在 T1WI 序列呈低信号,T2WI 序列呈高信号;实性成分在 T1WI 序列呈等信号,T2WI 序列呈稍高信号,DWI 序列呈高信号;增强后可见实性成分明显均匀强化,囊壁及分隔亦可见强化。在这 16 例囊实混合性肿块中,有 7 例表现出了特异的“波斯菊花型”,即中央为较小的囊性或实性病灶,周围包绕着较大的囊肿,尤其是 T1WI 序列上呈低信号,T2WI 序列上呈高信号。另 5 例为无囊性成分的实性肿块。21 例患者中有 11 例伴有宫腔积液。

4.结论:

宫颈胃型腺癌多呈囊实混合性,部分表现出特异的“波斯菊花型”。借助“波斯菊花型”可以更容易的诊断宫颈胃型腺癌。21 例患者中有 5 例出现了卵巢转移,概率 23.8%,较鳞癌转移概率明显更高,可在一定程度上辅助诊断。

PU-0295

癫痫相关认知功能障碍的研究

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摘要

癫痫患者经常会发生认知功能障碍。大多数认知问题受到各种相互关联的因素的影响,包括癫痫的早期发作和癫痫发作的频率、强度和持续时间,以及抗癫痫药物治疗。成人癫痫患者的大多数认知问题包括记忆力、注意力和执行功能缺陷。然而,哪个认知区域受损很大程度上取决于癫痫活动的位置。此外,信号通路和神经元网络的改变在导致认知障碍的机制中都起着至关重要的作用。同时,研究表明,抗癫痫药物(AEDs)的联合使用会增加认知障碍的风险。然而区分每个因素的贡献可能具有挑战性,因为它们通常紧密交织在一起。因此,本文中我们主要探讨癫痫认知功能的因素,重点从癫痫认知功能的发生机制及不同因素对癫痫认知功能的影响 2 个方面展开讨论。

PU-0296

Impact of maternal positioning on comfort level and fetal MRI quality

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PURPOSE Although the supine and left-lying positions are recommended for fetal MRI, the former is mainly used in clinical practice. Furthermore, maternal experiences during MRI remain underinvestigated. To compare the comfort levels of pregnant women in the supine and left-lying positions for fetal brain imaging and the image quality obtained in these two positions when using a conventional or super-flexible MRI coil.

METHODS In this prospective study, women with a singleton pregnancy underwent fetal MRI in the supine or left-lying positions between January 2023 and April 2023. They scored their comfort levels separately. The images obtained were classified 1:1:1 into groups 1 (supine position and a conventional coil, n = 50), 2 (supine position and a super-flexible coil, n = 50), and 3 (left-lying position and a super-flexible coil, n = 50). Two radiologists subjectively scored the images; the signal-to-noise and contrast-to-noise ratios were measured objectively. Comfort level scores were compared between the positions; image quality scores were compared among the three groups.

RESULTS Thirteen and 37 women in mid- and late-pregnancy stages, respectively, were enrolled. The fetal gestational age was 25–36 (mean, 30.5) weeks. The comfort level score was higher in the left-lying position (4.2 ± 0.8 vs 3.8 ± 0.9 , $p < .05$). The subjective scores were not significantly different. The objective scores showed that the signal-to-noise ratios in the bilateral frontal and right cerebellar lobes and contrast-to-noise ratios in the right frontal and right occipital lobes were significantly higher in group 3 than in groups 1 and 2. Further analysis revealed that late pregnancy was significantly associated with these findings.

CONCLUSIONS Regarding MRI using a 75-cm bore system, higher comfort level scores and image quality were achieved using the left-lying position than the supine position, mostly in the late-pregnancy stage.

PU-0297

压缩感知技术在颈椎磁共振快速成像中的应用

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目的：探究压缩感知(CS)技术不同加速因子(AF)对颈椎磁共振图像质量的影响。

方法：使用联影 1.5T 核磁，对 20 名健康志愿者(男 10 例，女 10 例)分别采用并行采集技术 (PI) 以及 AF 为 4、6、8、10 和 12 的颈椎矢状位进行 T1WI、T2WI、T2WI STIR 序列扫描，按照上述并行采集 (PI) 序列为 A 组，不同 AF 分为 B、C、D、E、F 组。由两名观测者分别对颈椎图像质量进行 5 分制主观评分，测量 C1、C3、C5 椎体、椎间盘及肌肉信号值和噪声强度，以肌肉为背景计算 SNR、CNR 的评价。测量六组图像椎间盘、骨及肌肉的信号值(SI)、噪声(SD)值，分别计算图像信噪比(SNR)、对比噪声比(CNR)。分别使用独立样本 Kruskal-Wallis 检验以及卡方检验对椎间盘、骨质、肌肉的 SNR、CNR 及三组图像质量评分结果进行组间统计学分析。

结果：两名观测者对六组图像的客观测量数据与图像主观评分的一致性良好(Kappa 和 ICC 值均> 0.75)。E、F 组与 A 组相比有显著差异。肌肉 SNR 在 E 组和 F 组与 A 组有显著性差异，CNR 在 D、E 和 F 组有显著差异；椎体的 SNR 在 F 组与 A 组有显著性差异，CNR 在 D、E 和 F 组有显著差异；椎间盘的 SNR 在 D、E 和 F 组有显著差异，CNR 在 D、E 组和 F 组有显著差异；CNR 在 D、E 和 F 组有显著差异(P 均<0.05)。传统并行采集的扫描时间为 354s，结合 CS 的 AF=6 的颈椎序列扫描时间缩短约 28.8%。

结论：选出最优 AF=6，相较于传统并行采集 (PI) 序列，基于 CS 的颈椎序列能保证图像质量，并且显著缩短扫描时间，对于配合较差患者的颈椎扫描时有较好的临床应用前景。

PU-0298

MR 血管壁高分辨成像在头颈血管夹层诊断中的运用价值

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摘要：目的：基于 3.0T 的高分辨率磁共振成像(high resolution magnetic resonance imaging,HR-MRI)在头颈动脉夹层(Cerebral and cervical artery dissection,CAD)中的诊断价值研究。方法：纳入 2018 年 5 月~2023 年 7 月，经我院影像科确诊为 CAD 且采用高分辨率磁共振 (HR-MRI)、CT 血管造影(CTA)、磁共振血管造影(MRA)检查的 24 例患者，对比分析上述 3 种影像技术诊断 CAD 的诊断价值和检出率。结果：24 例患者中检出大脑中动脉夹层 1 例，颈动脉夹层 13 例，椎动脉夹层 7 例、基底动脉夹层 3 例。经 HR-MRI 检测，显示双腔征 7 例、内膜瓣 8 例、壁内血肿 9 例、假性动脉瘤 2 例，基底动脉扩展延长症 1 例。24 例患者检出 CAD 共计 25 处，CTA9 处(36%)、HR-MRI22 处(91.66%) MRA5 处(33.33%)，差异显著($\chi^2=24.940$, $P<0.001$)，HR-MRI 检出率显著优于 MRA 和 CTA。结论：临床 CAD 诊断应用 HR-MRI 具有较高的检出率，在诊断中 HR-MRI 属于高敏感性检查方法，此诊断方法值得临床推广应用。

PU-0299

MRI 对儿童青少年卵巢肿瘤中的诊断价值

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目的 探讨 MRI 在儿童青少年卵巢肿瘤中的诊断价值，从中总结出其影像表现，以帮助临床选择合适的治疗方法。

方法 对 2020-2023 年在我院接受卵巢肿瘤 MR 成像的所有年龄<18 岁的儿童和青少年进行回顾性研究，纳入了 30 名接受卵巢肿瘤磁共振成像检查并最终经病理结果证实的女孩，观察所有病例的 MR 影像并总结其特点。

结果 儿童青少年卵巢肿瘤病理类型以生殖细胞肿瘤占首位，以畸胎瘤为多，容易并发蒂扭转，蒂扭转是良性卵巢肿瘤附件切除的重要原因。当肿瘤直径 $\geq 8\text{cm}$ ，有强化，边缘不规则，肿瘤向外生长，腹水等征象提示为恶性肿瘤，恶性肿瘤多为单侧，且多为早期，应尽量行保留生育功能的手术。

结论 MRI 在区分儿童和青少年卵巢肿瘤的良恶性方面具有较高的诊断价值，有助于确定保留卵巢手术与非保留卵巢手术的适应证，卵巢良性肿瘤蒂扭转是造成附件切除的重要原因，因此在手术之前应采用 MR 影像评估卵巢肿瘤。

PU-0300

DWI,IVIM,拉伸指数,DTI,DKI 模型评估前列腺癌 Gleason 评分

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目的 探讨单指数、双指数、拉伸指数、扩散张量成像 (DTI)、扩散峰度成像 (DKI) 模型获得的各参数在评估前列腺癌 Gleason 评分中的潜力。

材料和方法 对 59 例经病理证实的前列腺癌患者，采用 3-T 磁共振成像仪进行常规 MRI、多 b 值扩散加权成像(diffusion weighted imaging, DWI)及 DKI 扫描。依据 Gleason 评分 (GS) 将其分为低级别组 ($GS \leq 3+3$) 和中、高级别组 ($GS \geq 3+4$)；利用 FUNCTION TOOL 后处理软件对不同 DWI 模型数据进行后处理，计算得出单指数模型表观扩散系数 (apparent diffusion coefficient, ADC)，IVIM 的真扩散系数(D)、假扩散系数(D^*)，拉伸指数模型的分布扩散系数(distribution diffusion coefficient, DDC)、DTI 的各向异性分数(FA)，DKI 的扩散峰度(MK)、轴向峰度(Ka)、径向峰度(Kr)、扩散系数 (MD)、轴向扩散率 (Da)、径向扩散率 (Dr)。采用受试者操作特征 (ROC)分析比较各参数评估前列腺癌 Gleason 评分的效能。 $P < 0.05$ 具有统计学意义。使用 Mann-Whitney U 检验比较不同级别前列腺癌之间的所有数值。采用受试者工作特性和 Spearman 等级对各参数进行相关性分析。

结果 低级别和中、高级别组间 Stand ADC、DDC、FA、MD、Da、Dr、MK 及 Ka 值的差异均有统计学意义(P 值均 < 0.05)，且中、高级别组的 Stand ADC、D、DDC、MD、Dr 值小于低级别组，MK 及 Ka 值大于低级别组，差异均有统计学意义($P < 0.05$)。

结论 与常规扩散参数相比，不同扩散模型可以提供更多的信息，对诊断 PCa 的 Gleason 分级更有帮助。

PU-0301

基于分数低频振幅 (fALFF) 在新冠病毒感染者功能磁共振对脑功能的研究

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目的 研究静息态磁共振 (rs-fMRI) 结合分数低频振幅 (fALFF) 在新型新冠病毒 (Corona Virus Disease 2019, COVID-19) 对脑功能影响的价值。**方法** 采用静息态功能磁共振成像数据分析 19 例未感染新冠病毒的正常人和 15 例一个月内感染过新冠病毒且阳转阴的患者的分数低频振幅 (fALFF) 变化。并对所有人进行李克特行为量表评分。**结果** 15 例新冠感染后的患者岛叶 fALFF 值增加。15 例新冠感染患者李克特量表和未感染组有显著差异, 15 例新冠感染者感染前与感染后李克特量表也有显著差异。**结论** 新冠病毒感染对患者脑功能有显著改变。

PU-0302

The prediction of intrahepatic mass-forming cholangiocarcinoma metastasis to lymph nodes using T2-weighted magnetic resonance imaging and hepatobiliary phase imaging radiomics: A multicenter study

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Objective: In this study, we aimed to determine the accuracy of T2-weighted magnetic resonance imaging (T2WI) and hepatobiliary phase (HBP) imaging in predicting the preoperative lymph node metastasis of intrahepatic mass-forming cholangiocarcinoma (IMCC).

Methods: T2WI and HBP imaging of 87 patients diagnosed with IMCC were analyzed retrospectively. We randomly assigned 70% (49 cases) and 30% (22 cases) of the initial 71 patients to the train set and the test set, respectively. T2WI and HBP imaging were used to extract the radiomics features of 71 patients, which were then subjected to regression screening with the filter method, mutual information algorithm, and least absolute shrinkage and selection operator (LASSO), underwent 10-fold cross-validation, and were used to construct classification models with the support vector machine (SVM). After the 71 patients were used for the external validation of the classification models, medical imaging of the 16 patients in this study were included. Area under the curve (AUC), accuracy (ACC), sensitivity (SEN), precision (PRE), and F1 score were utilized to evaluate the diagnostic efficacy of the classification models.

Results: The radiomics models derived from T2WI and HBP imaging, Model_T2 and Model_HBP, were able to accurately predict the metastasis of IMCC to lymph node modes (ACC=0.76, SEN=0.80, PRE=0.50, AUC=0.78, F1-score=0.62; ACC=0.86, SEN=0.63, PRE= 1.0, AUC=0.92, F1-score=0.77). Model_HBP+T2 demonstrated the highest predictive accuracy (ACC=0.86, SEN=0.82, PRE=0.90, AUC=0.96, F1 score=0.86) compared to single-sequence prediction models in predicting the metastasis of IMCC to lymph nodes. As demonstrated by external validation, the AUC of Model_HBP+T2 was 0.83, confirming the high reliability of this model.

Conclusion: Model_HBP+T2, a combined model derived from T2WI and HBP imaging, is the most accurate model for predicting metastasis of IMCC to lymph nodes (MILN) and can therefore serve as a reliable predictive tool for assessing lymph nodes in the preoperative phase and guiding lymph node dissection during surgery.

PU-0303

肝脓肿介入治疗辽宁专家共识解读

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肝脓肿是指致病微生物侵入并定植于肝脏导致的严重感染性疾病，主要临床表现为发热、寒战、肝区疼痛等。肝脓肿的发病率存在地域差异，我国大陆地区的发病率为（1.07~3.59）/10 万，而在我国台湾地区高达 17.59/10 万，且其发病率在全球范围内有逐年升高趋势。目前，介入联合抗生素已成为肝脓肿的主要治疗手段，介入治疗具有操作简便、微创、经济以及安全有效等优点。但在临床实践中，常遇到肝脓肿合并脓毒性休克、低血小板血症等给介入治疗提出挑战；亦存在肝脓肿多发、范围巨大、液化差以及多房等情况，导致介入治疗后效果不佳。目前，国内外尚缺乏肝脓肿介入治疗相关的共识或指南。鉴于此，通过查阅国内外相关文献，结合我国国情，组织辽宁省内有关专家在严谨探讨的基础上制定本共识，旨在为广大临床工作者提供肝脓肿介入治疗的有益指导。

PU-0304

脊柱结核非典型 MR 影像表现

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目的：探讨脊柱结核非典型 MR 表现。材料与方法 回顾性分析 12 例本院对经 X 线、CT 检查为阴性，而临床和病理证实的脊柱结核 12 例，行 MR 平扫和增强检查。结果（1）椎体呈 T2WI、压脂序列均呈高信号；（2）椎旁或椎前软组织稍肿胀，T1、T2 均呈等信号，增强扫描轻度强化；（3）椎间盘信号正常或只出现退变，椎间隙无狭窄；（4）椎体信号不均匀增高，强化不明显。结论 MR 可清楚显示脊柱结核的椎体骨炎、椎旁脓肿、椎体终板破坏和神经损害情况，对非典型脊柱结核的早期诊断有提示意义。

PU-0305

艾滋病合并肺结核不典型 CT 影像分析

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目的：分析艾滋病（AIDS）合并肺结核的不典型 CT 影像表现，以提高影像诊断价值。方法：采用回顾性研究方法，收集 68 例本院经病理、实验室检查证实或临床确诊为 AIDS 合并肺结核无其它合并感染的患者胸部 CT 影像资料，分析其病变类型、分布、形态及变化情况。结果：68 例中，多种肺结核类型共存 52 例，以继发性肺结核合并胸内淋巴结结核发生率最高。52 例继发性肺结核患者中，23 例病灶分布于好发部位，19 例病灶只分布于非好发不典型部位，10 例病灶好发部位与非好发部位均有分布；影像征象以支气管播散、实变及多发结节病变为主，其中 13 例实变病灶表现为类似肺炎的渗出性实变，周围不伴卫星病灶。9 例血行播散性肺结核中，6 例表现为非“三均匀”

粟粒结节。8 例胸内淋巴结结核中, 6 例病灶破溃侵及临近肺实质、2 例病灶融合。。结论: AIDS 合并肺结核常表现为多种肺结核类型并存; 病变广泛, 无优势分布; 类似肺炎型实变病变比例高; 胸内淋巴结结核可有融合征象; 非“三均匀”的血行播散性肺结核多见。

PU-0306

HIV 感染者弓形虫脑病和原发性中枢神经系统淋巴瘤的 MRI 影像表现 对比分析

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目的: 回顾性分析艾滋病相关原发性中枢神经系统淋巴瘤 与弓形虫脑病患者的临床和 MRI 影像特征, 探讨其差异性并勾画 ROC 曲线, 为临床诊断作出指导。

方法: 回顾性分析就诊于武汉大学中南医院的 6 例 AIDS 相关 PCNSL 和 18 例弓形虫脑病患者的临床及 MRI 影像资料, 统计两组患者临床首发症状、CD4+T 细胞计数、病灶大小、数量、位置分布、MRI 中 T1WI、T2WI/Flair 序列及 T1WI 增强表现, 比较两组患者影像学表现差异。

结果: 1.弓形虫脑病和 AIDS 相关 PCNSL 多发生于终末期 HIV 感染者中 (CD4+T 细胞 <200 个/ μ l), 本研究二者临床表现及实验室检查上的差异无统计学意义。2.弓形虫脑病和 AIDS 相关 PCNSL 影像上均表现为肿块/结节样病变, 二者在病灶位置分布 ($P=0.001$)、每位患者病灶数量和病灶平均大小上的差异有显著的统计学意义。弓形虫脑病较 AIDS 相关 PCNSL 更倾向于分布在外周区, AIDS 相关 PCNSL 更倾向于分布在白质区 3.弓形虫脑病病灶数量多于 AIDS 相关 PCNSL, 但病灶平均大小更小, 当病灶平均大小越小 ($<15.23\text{mm}$), 病灶数量越多 (≥ 3 个) 时, 更提示诊断为弓形虫脑病。

结论: 弓形虫脑病与 AIDS 相关 PCNSL 均为 HIV 感染者常见的颅内肿块样病变, 二者临床和 MRI 影像特征存在一定差异, 也有部分重叠, 鉴别诊断较为困难。二者在病灶位置分布、病灶平均大小和每位患者病灶数量、增强强化细节上的差异有显著的统计学意义。弓形虫脑病更倾向于分布在外周区 (皮层与皮层下), AIDS 相关 PCNSL 则更倾向于分布在白质区。弓形虫脑病相比于 AIDS 相关 PCNSL, 每位患者病灶数更多、病灶平均大小更小。弓形虫脑病在 T1WI 增强上更多表现为完整光滑环形强化, 而 AIDS 相关 PCNSL 则更多表现为完整不光滑环形强化。

PU-0307

唤醒关爱——受艾滋病影响儿童的关怀与支持

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专著主编及所在团队, 用两年时间深入基层, 在对 300 名受艾滋病影响的儿童进行关怀与救治工作中, 取得了第一手宝贵的资料后完成了专著的编写, 专著出版后, 作者团队奔赴广大农村进行了宣讲与关爱活动, 向广大基础艾滋病工作传授工作经验与方法, 获得广大读者热烈欢迎。

本书以通俗的语言, 告诉读者如何预防艾滋病、受艾滋病影响儿童的主要心理问题及相关干预措施, 主要从以下四个部分介绍:

1、艾滋病相关基础知识: 从艾滋病基础知识入手, 首先介绍艾滋病基础知识及艾滋病发现过程, 然后详细介绍了艾滋病的毒、性、血三种传播方式的特点及主要预防措施, 着重介绍了母婴传播在儿童预防艾滋病中的意义, 艾滋病的分期等。

2、受艾滋病影响儿童心理问题及干预措施: 父母发病使近 70%的未成年子女失去对未来的希望, 失去对自我价值的认同。目前, 受艾滋病影响儿童的心理问题较突出, 他们普遍存在着严重的心理

障碍, 这些心理障碍与艾滋病对家庭环境的破坏性影响有极大关系, 包括疾病本身、亲属态度、社会公众和经济压力等。个案调查显示, 儿童感染者被同伴排斥于学校和集体活动之外现象仍然存在, 大多数儿童自卑、焦虑、害怕、悲观等, 这些心理问题不容忽视, 应该采取适当的干预措施改善这些儿童的心理状态。

3、 艾滋病儿童常见的感染细菌性肺炎、卡氏肺孢子菌肺炎、肺结核的临床表现, 诊断及处理。艾滋病儿童身体及心理护理原则、主要护理措施及工作人员自身预防感染艾滋病的注意事项。

4、附录部分主要包括“小儿 HIV 感染和艾滋病诊断及处理建议”, “政府、非政府以及其他一些关注受艾滋病影响儿童的组织”, 艾滋病感染家庭故事等。

PU-0308

无锡地区青年男性 (30 周岁以下) Omicron 新冠感染的胸部 CT 表现

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目的:探讨青年男性新冠 Omicron 病毒变异株引起的胸部感染 CT 表现。方法:回顾性分析 2022 年 12 月 25 日至 2023 年 1 月 8 日因咽痛、咳嗽、发热等症状在无锡凯宜医院就诊的 30 周岁以下男性患者相关资料,并筛选病例。纳入标准:符合国家卫健委颁布的《新型冠状病毒感染的肺炎诊疗方案(第十版)》。对入组青年男性新冠感染的临床、胸部 CT 影像资料进行回顾性分析,总结影像学特点。结果:本研究共纳入 70 例青年男性患者,年龄 18-29 岁,平均年龄 26.24 ± 2.50 岁。(一)胸部 CT 分布特征:病变分布于两肺者有 7 例 (10.00%), 位于单侧肺野 30 例 (42.86%), 差异有统计学意义 ($P=0.000$)。其中, 仅右肺 23 例 (32.86%), 较仅左肺者 (7 例 10.00%) 明显增高。右肺中叶的发生率 (32.86%) 均高于其它肺叶, 其次为左肺舌段 (15.71%) 和右肺下叶 (8.57%)。

(二)胸部 CT 影像特征:本组病例中有 33 例 (47.14%) 的胸部 CT 未见明显异常, 与胸部 CT 阳性率的差异无统计学意义 ($P=0.499$)。最常见的 CT 影像学表现为絮影 (27 例), 其次表现为纤维索条影 (9 例)、斑状影 (6 例)、结节影 (3 例)。无纵隔淋巴结肿大、胸腔积液病例; 支气管扩张、胸膜增厚各 1 例。单征象者有 27 例, 多征象者 10 例, 发生率差异有统计学意义。结论:青年男性 Omicron 新冠感染患者, 胸部 CT 部分无异常表现。在 CT 阳性病例中胸部 CT 表现具有一定特征性, 病灶主要位于单侧肺-右肺中叶和左肺舌段。这两个肺叶位于心室周围, 心脏搏动导致此区域的血液微循环较丰富, 易于病毒的繁殖。Omicron 感染的胸部 CT 主要表现为絮影。这是由感染引起淋巴细胞浸润, 肺间质血管扩张、充血、肺泡腔蛋白液体渗出聚集所致。其次, CT 表现为斑状影和纤维索条影, 这可能是由肺水肿和渗出液被吸收后, 肺泡间隔纤维增生, 逐渐演变为纤维化病灶。

PU-0309

CT 和 DR 在肺结核诊断中的价值分析

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目的: 分析 CT 和 DR 在肺结核诊断中的价值

方法: 选取当前医院放射科内收治的均做过 CT 和 DR 两项检查的, 并经病理学检查确诊的肺结核患者共 87 人, 将此 87 人的 DR 图像称作 DR 组, CT 图像称作 CT 组, 用两组影像学图像作为研究对象并进行回顾性分析对比, 两组图像对于各类病灶发现个数的对比、两组图像对于各类微小病

灶的发现能力和发现病灶具体大小的对比、两组图像对于病变诊断符合率和漏诊率的对比,以及各类肺结核分型的判断能力。

结果:DR 组的图像表现多为单个或多个病灶,规则和不规则的空洞影且空洞边缘毛刺、分叶,可有卫星灶。经统计 DR 确诊个数为 75 个(DR 诊断肺结核的诊出率为 86.20%)。CT 检查的影像学表现多为可清楚显示 病灶内钙化病灶以及胸腔积液,除空洞影还可见脓肿形成、磨玻璃样影、树芽征。经统计 CT 确诊个数为 86 个(CT 诊断肺结核的诊出率为 98.85%)。CT 诊断出空洞、卫星灶以及支气管扩张、胸腔积液与淋巴结检出率均高于 DR。对各类肺结核分型的判断能力也高于 DR,即 CT 各项检测结果的诊断符合率明显高于 DR。

结论:CT 诊断肺结核病变的诊断符合率和诊断效果都明显高于 DR,并可获得更为丰富的影像学信息,因此 CT 对于肺结核病变具有更高的临床诊断价值。

PU-0310

AIDS 合并颈部淋巴结结核影像学表现与 CD4+T 淋巴细胞水平的相关性

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目的 探讨 AIDS 合并颈部淋巴结结核在不同 CD4+ T 细胞水平的影像学表现特征。方法 选取 AIDS 合并颈部淋巴结结核的患者 52 例,所有患者均有病理证实。按其 CD4+T 淋巴细胞计数分为 I、II、III 组(分别为 <100 个/ μl 、 $101\sim 200$ 个/ μl 、 ≥ 200 个/ μl 组),分析其影像学表现特征。

结果 I 组中患者淋巴结最大直径大于 3cm,病灶内部液化、淋巴结融合及窦道形成比例高于 II、III 组,钙化低于 II、III 组,差异有统计学意义($P<0.05$); I 组中淋巴结环形强化、不均匀强化及分隔样强化的发生率也均高于 II、III 组,其中以环形强化为主也可表现为多种强化方式共同存在,差异均有统计学意义($P<0.05$)。

结论 CD4+T 淋巴细胞计数越低,AIDS 合并颈部淋巴结结核的影像学表现特征中淋巴结最大直径大于 3cm,病灶内部液化、淋巴结融合、窦道形成发生率越高,钙化发生率减少,多种强化方式共同存在,以环形强化为主。

PU-0311

艾滋病合并颈部淋巴结结核影像学表现与 CD4+T 淋巴细胞水平的相关性

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【摘要】目的 探讨 艾滋病 合并颈部淋巴结结核在不同 CD4+ T 细胞水平的影像学表现特征。方法 选取艾滋病合并颈部淋巴结结核的患者 52 例,所有患者均有病理证实。按其 CD4+T 淋巴细胞计数分为 I、II、III 组(分别为 <100 个/ μl 、 $101\sim 200$ 个/ μl 、 ≥ 200 个/ μl 组),分析其影像学表现特征。结果 I 组中患者淋巴结最大直径大于 3cm,病灶内部液化、淋巴结融合及窦道形成比例高于 II、III 组,钙化低于 II、III 组,差异有统计学意义($P<0.05$); I 组中淋巴结环形强化、不均匀强化及分隔样强化的发生率也均高于 II、III 组,其中以环形强化为主也可表现为多种强化方式共同存在,差异均有统计学意义($P<0.05$)。

结论 CD4+T 淋巴细胞计数越低, 艾滋病合并颈部淋巴结结核的影像学表现特征中淋巴结最大直径大于 3cm, 病灶内部液化、淋巴结融合、窦道形成发生率越高, 钙化发生率减少, 多种强化方式共同存在, 以环形强化为主。

PU-0312

艾滋病患者肺部弥漫性病变的 CT 诊断

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目的 探讨艾滋病患者肺部弥漫性结节病变的 CT 表现。方法 回顾性分析我院 2019.1-2023.2 收治的 87 例 AIDS 并发肺部弥漫性结节患者的影像资料, 分析不同病原感染的肺部弥漫结节的 CT 特点, 分析其病变分布、形态及伴发征象。结果 90 患者中结核分枝杆菌 45 例、真菌 38 例(马尔尼菲青霉菌 22 例、曲霉菌 8 例、肺组织胞浆菌病 7 例、毛霉菌 1 例)、细菌 7 例。45 例结核病例中 37 例弥漫结节表现为随机分布, 6 例为小叶中心分布, 其中 4 例为随机分布与小叶中心分布并存; 32 例伴纵隔淋巴结肿大, 15 例并发胸腔积液。真菌感染的弥漫结节分布类型: 31 例随机分布, 4 例为小叶中心分布, 其中 3 例为随机分布与小叶中心分布并存; 肺组织胞浆菌病 7 例均为小叶中心分布, 表现为结节伴周围晕征, 5 例伴纵隔及肺门淋巴结肿大。6 例细菌感染的弥漫结节为小叶中心分布。22 例马尔尼菲青霉菌病中 17 例伴有腹腔淋巴结肿大, 4 例纵隔淋巴结肿大。结论 CT 对艾滋病患者肺弥漫性病变有重要的诊断价值。

PU-0313

艾滋病肺部坏死性病变的 CT 诊断

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目的: 艾滋病患者肺部伴坏死性病变较多, 其疾病谱与正常免疫患者有所不同, 影像诊断困难。探讨 CT 引导下经皮肺穿刺活检术在艾滋病肺部伴坏死性病变中的应用价值。方法: 回顾性分析重庆市公共卫生医疗救治中心 2021 年 7 月-2023 年 7 月经肺穿刺活检病理证实的 49 例患者的相关资料, 分析其影像表现。结果: 其中男 31 例, 女 18 例, 中位年龄 43 岁; 其中单发结节或肿块病灶 23 例, 多发病灶 26 例。合并纵隔淋巴结肿大 19 例, 合并胸腔积液 11 例。49 例患者中 44 例获得明确诊断, 其中肿瘤性病变 31 例, 鳞癌 11 例, 腺癌 12 例, 腺鳞癌 1 例, 淋巴瘤 7 例, 肺结核 7 例, 真菌感染 5 例, 其中隐球菌 4 例, 马尔尼菲蓝状菌病 1 例, 细菌感染 1 例。CT 均表现为等密度或稍低密度肿块, 增强扫描中心不均匀坏死, 边缘强化不均匀, 周边实性部分厚薄不均匀。4 例鳞癌边缘较光滑, 部分位于肺外周, 与腺癌病变表现相似。结核病变多发为主, 常伴支气管播散灶。隐球菌以肺外周胸膜下为主, 边缘较清楚, 未见明分叶毛刺, 细菌性感染边缘少模糊, 整体以大片状形态为主。结论: 艾滋病肺部坏死性肿块病因较多, CT 影像对其诊断有一定价值, 但艾滋病肺部病变表现与正常免疫患者疾病谱有所不同, 部分病变影像表现相似, 单凭影像诊断困难, 需结合临床及实验室检查, 甚至穿刺活检方能诊断。

PU-0314

长新冠人群的现状调查及心理健康影响因素分析

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目的：探讨长新冠人群的现状情况及引起心理健康问题的影响因素。

方法：采用问卷调查的方法，在新冠感染 3 个月后对 2895 名志愿者进行研究。收集年龄、性别、是否吸烟、是否饮酒、是否右利手、身高、体重、BMI、受教育年限、是否感染新冠、健康问卷（PHQ-9）、健康量表（EQ-5D-5L）、健康状态评分、长新冠量表、贝克焦虑量表（BAI）、失眠严重程度量表（ISI）信息。探索在全人群中长新冠的特点。比较阳转阴组与阴性组在躯体症状、神经心理症状的差异；探讨新冠后中重度抑郁的影响因素。对人口学信息及临床资料进行描述统计；两组间比较采用 U 检验和卡方检验；采用多因素逻辑回归进行危险因素分析。采用 SPSS 22 进行统计分析， $P<0.05$ 具有统计学差异。

结果：在全人群中 67.3% 的人至少有一种长新冠症状；39.9% 的人有生活质量的问题；27.3% 的人有中重度抑郁；46.8% 的人有焦虑症状；24.7% 的人有失眠症状。阳转阴组与阴性组相比，在心肺、耳鼻喉、胃肠、神经、心理、疼痛、生活质量、健康状况、焦虑、抑郁、失眠、饮酒方面存在显著差异（ $P<0.05$ ）。在阳转阴组中女性、年龄、饮酒、耳鼻喉、神经、疼痛与中重度抑郁显著相关（ $p<0.05$ ），融合模型对中重度抑郁有着较好的预测效能， $AUROC=0.82$ ；在阴性组中，年龄、BMI、神经、疼痛、焦虑与中重度抑郁显著相关（ $p<0.05$ ），融合模型对中、重度抑郁有着较好的预测效能， $AUROC=0.81$ 。

结论：新冠事件影响下，较长时间内（3 个月）在全人群中依然存在着一系列躯体症状及神经心理症状。阳转阴组与阴性组相比，在躯体症状及神经心理症状方面表现的更加明显（ $P<0.05$ ）。阳转阴组和阴性组都有神经、疼痛症状、年龄来预测中重度抑郁，说明神经、疼痛是一种更普遍的症状存在于一般人群中，并与抑郁有关，且年龄越小抑郁越严重；在阳转阴组中，女性、饮酒和耳鼻喉是不同于阴性组的预测因子，说明在感染过新冠人群中需要尽早干预耳鼻喉症状、避免饮酒以及重点保护女性人群，来减少中重度抑郁的结局；在阴性组中，焦虑能预测抑郁结局，说明阴性人群需要格外关注心理状况，来减少中重度抑郁的结局。

PU-0315

纵隔畸胎瘤破裂致肺部感染误诊肺结核病例报道

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本文报道 1 例妊娠及哺乳期纵隔成熟畸胎瘤破裂导致肺部感染误诊为空洞性肺结核患者的影像表现及诊治过程。患者，女，23 岁，孕晚期胸闷、胸痛，逐渐加重并放射至肩背部，2 月后突发剧烈咳嗽、咳痰，后逐渐加重，痰中有灰黑色物质。患者分娩后于外院行胸部 CT 检查提示右肺上叶空洞、脓肿形成，考虑肺结核。患者入院后行胸部增强扫描可见纵隔类圆形肿块影，大小 5.9cm×4.2cm，肿块内可见液液平面，增强扫描包膜强化，靠纵隔侧包膜连续性中断，右肺上叶片状实变，其内可见虫噬状空洞，右肺下叶及左肺内多发斑片状影。经头孢曲松治疗后，右肺下叶及左肺斑片状影吸收，右肺上叶实变影及纵隔肿块未见改变。行纵隔肿物切除及右肺上叶切除，术后病理提示纵隔成熟畸胎瘤，右肺上叶异物肉芽肿。患者术后恢复良好。纵隔畸胎瘤是常见的纵隔肿瘤，在妊娠状态下可能发生破裂、感染，破裂入纵隔、胸腔可引起相应症状，病灶内脂肪、钙化及液液平面有助于定性诊断。

PU-0316

恙虫病临床特征及重症恙虫病的早期诊断

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摘要：目的 了解恙虫病临床特征，探讨重症恙虫病诊断的早期临床指征。方法 收集昆明市第三人民医院 2017 年 1 月至 2021 年 12 月恙虫病确诊患者的临床资料、胸部 CT 影像学及实验室检查结果；将恙病患者分为非重症恙虫病组（简称非重症组）与重症恙虫病组（简称重症组），利用 logistics 回归法分析重症恙虫病的早期临床指征。结果 研究共纳入恙病患者 181 例，其中非重症组 104 例，重症组 77 例。所有患者均发现皮肤焦痂，最常见发生于躯干，占 47.5%（86/181）。患者均出现发热，其他临床表现主要为头痛、咳嗽、腹痛、肌肉酸痛和呼吸困难。胸部 CT 影像学表明，所有患者胸腔积液的发生率为 49.7%（90/181），重症组和非重症组发生率分别为 67.5%（52/77）和 36.5%（38/104），差异有统计学意义（ $\chi^2=17.001$ ， $P<0.05$ ）。实验室检查中，重症组外周血中性粒细胞计数、谷草转氨酶、C 反应蛋白、降钙素原、乳酸脱氢酶、D-二聚体及白细胞介素-6 水平高于非重症组，外周血小板计数低于非重症组，差异均有统计学意义（ $Z=2.858$ 、 -3.870 、 -5.937 、 -6.546 、 -4.153 、 -4.802 、 -5.119 、 -5.039 ， P 均 <0.05 ）。回归分析结果表明，血清谷草转氨酶升高、血清降钙素原升高、白细胞介素-6 升高、存在胸腔积液与重症恙虫病发生有相关性；ROC 曲线面积（AUC）为 0.839，其敏感度为 62.3%，特异度为 96.2%。结论 患者有发热伴随皮肤焦痂应考虑恙虫病的可能，血清谷草转氨酶升高、降钙素原升高、白细胞介素-6 升高和胸部 CT 出现胸腔积液可考虑恙虫病发展为重症的早期指标，应予以关注，对有重症倾向的患者需及早诊治，以期降低病死率。

PU-0317

艾滋病合并伤寒沙门氏菌硬膜下脓肿病例报道

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本文报道 1 例艾滋病合并伤寒沙门氏菌硬膜下脓肿的影像表现及诊治过程。患者，男，43 岁，间断发热、头痛 2 月余，加重伴反应迟钝 1 周入院，患者 3 天前 HIV 抗体检测阳性。肺部 CT 提示双肺内多发斑片状影，考虑为肺部感染；颅脑 CT 提示左侧额顶部骨质内板下新月形稍低密度影，CT 值约为 29Hu，邻近脑实质受压、脑沟变浅，左侧侧脑室受压缩小，左侧额叶内结节状高密度影，周围未见水肿。颅脑 MRI 提示左侧额顶部骨质内板下新月形异常信号影，其内可见液液平面，其腹侧呈低 T1WI 高 T2WI 信号影，T2flair 呈低信号影，其背侧呈等 T1WI 稍高 T2WI 信号影，T2flair 呈稍高信号影，DWI 可见新月形异常信号背侧部分弥散受限，ADC 值约为 $774 \times 10^{-6} \text{mm}^2/\text{s}$ ，增强扫描左侧额顶部硬脑膜明显强化，左侧额顶叶软脑膜轻度强化。患者全自动加抗血培养伤寒沙门菌阳性，脑脊液高通量测序提示伤寒沙门氏菌。给予美罗培南抗感染治疗，左侧额顶部硬膜下脓肿颅骨钻孔引流，引流物培养伤寒沙门氏菌阳性。患者术后恢复情况较好。HIV 感染合并伤寒沙门氏菌感染少见，伤寒沙门氏菌引起的硬膜下脓肿亦十分少见，积极寻找病原体并针对使用敏感抗生素联合外科治疗，可获得很好的疗效。

PU-0318

Magnetic Resonance Imaging (MRI) Manifestations of Seminal Vesicle Tuberculosis in 13 Cases

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Objective This study seeks to examine the radiographic manifestations of seminal vesicle tuberculosis (SVT) on magnetic resonance imaging (MRI) in order to gain a deeper understanding of this disease.

Methods The clinical symptoms, general conditions, relevant laboratory tests, and radiological data of 13 patients diagnosed with SVT were collected either through bacteriological examination, effective anti-tuberculosis treatment, or post-operative pathological diagnosis from January 2018 to March 2023. Descriptive analysis was used to analyze the composition ratio or rate values of the collected data.

Results The age range of the patients was between 24 and 60 years, with a median age of 35 years; 10 patients (76.9%) had concomitant pulmonary tuberculosis. All 13 cases (100.00%) had genitourinary tuberculosis of organs other than the seminal vesicles, including epididymal tuberculosis in 13 cases (100%), prostate tuberculosis in 7 cases (53.8%), and renal tuberculosis in 2 cases (15.4%). Unilateral seminal vesicles were involved in 12 cases (92.3%), and bilateral seminal vesicles in 1 case (7.7%); 9 cases (69.2%) showed a decrease in the size of the affected seminal vesicle, while 4 cases (30.8%) showed an increase; All 13 cases (100.0%) showed isointense signals on T1WI and hypointense signals on T2WI in the affected seminal vesicles, with disappearance of the multi-chambered high signal on T2WI in normal seminal vesicles; 8 cases (61.5%) showed diffusion restriction on DWI of the affected seminal vesicle and significant enhancement on the contrast scan; while 5 cases (38.5%) showed unrestricted diffusion and mild enhancement on the contrast scan; Patients with significant enhancements showed higher counts and percentage of neutrophils than patients with mild enhancements, the differences being statistically significant ($Z=2.196$, $P=0.030$; $Z=2.781$, $P=0.003$). The counts and percentage of lymphocytes, CD3+T cells, and CD4+T cells were significantly lower in patients with significant enhancements than those with mild enhancements, the difference being statistically significant ($Z=-2.196$, $P=0.030$; $Z=-2.928$, $P=0.002$; $Z=-2.928$, $P=0.002$; $Z=-2.928$, $P=0.002$); Patients with significant enhancements were more likely to have active pulmonary tuberculosis than those with mild enhancements, the difference being statistically significant ($P=0.035$).

Conclusion MRI imaging reveals distinct radiographic features of SVT, and variations in imaging presentations can indicate the patient's immune status.

PU-0319

紧急医学救援中移动 DR 自转运及立位支架复合系统研究

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背景：我院的国家紧急医学救援队成立于 2016 年 5 月，目前是北方四省唯一的国家卫生健康委直属紧急医学救援队伍。2020 年 3 月 5 日，因在武汉抗疫工作中表现突出，获得“全国卫生健康系统新冠肺炎疫情防控工作先进集体”荣誉称号。我院应急队伍未来可根据伤情种类、伤病员规模进行相应的功能扩展和规模扩展，以满足不同的需求；针对未来救援类型，救灾应急，核应急，突发传染性公共卫生事件应急进行演练，建立模块化工作体系。**目的：**通过不断认识国家紧急医学救援队的意义，继续完善队伍管理和培训演练，在“平战结合”方面能够有新的思路、新的经验、新的亮点，继续朝着国际紧急医学救援能力水平努力。为此对实现 DR 自转运完成标准立位拍摄的复合系统有

着急切的需求。而此项能力的提高也对救援中提升快速机动能力, 标准化建立检查流程有着至关重要的推动作用。方式方法: 国家紧急医学救援队检查车专用 X 光机移动升降总成, 主要由 2 部分组成: 1、医学救援队检查车专用自消毒立式胸片架。2、移动升降装置。具体实施效果, 为了满足 X 光机灵活性、机动性, 我们将胸片架与 X 光机整合到同一底座上, 配合移动升降装置, 实现整机可在地面随意移动, 而且实现升降功能, 配合工作人员操作, 完成在一定高度的升降、攀升动作。结果: 通过紧急医学救援中移动 DR 自转运及立位支架复合系统研究的推进, 我们发现可以更好满足在出现紧急救援任务时, 配合工作人员实现 X 光机整机入车, 不需要借助其他吊车或起吊装置来实现装车, 极大减少了装车时间。在各种紧急情况及地形、病情限制下更好的完成标准化立位成像, 对于检查流程及成像时间上均有优化和提高。结论: 紧急医学救援中移动 DR 自转运及立位支架复合系统研究很好的诠释了平战结合”方面能够有新的思路、新的经验、新的亮点, 有效提高了应急机动能力, 优化了检查流程, 提高成像质量。

PU-0320

间质性肺结核 1 例

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报道 1 例 2022 年确诊的以肺间质改变为主要表现的肺结核患者的临床资料、诊治经过及随访情况。患者, 男, 55 岁, 因“因反复咳嗽 10 月, 再发加重 1 周”为主诉入院。入院前曾误诊为“双肺间质性肺炎”。入院查胸部 CT 显示双肺可见广泛性肺间质改变, 并出现散在斑片影、结节影, 边界模糊, 部分病灶呈磨玻璃样。经纤维支气管镜于右下叶腔外肿块穿刺活检: 坏死组织中见极少量类上皮样细胞及个别多核巨细胞, 符合肉芽肿性病变, 结核不能排除。异烟肼、利福平、吡嗪酰胺、乙胺丁醇 (HRZE) 规律抗结核治疗后, 咳嗽渐缓解, 病灶渐吸收, 随访 14 个月, 未见复发。以间质性改变为主要表现的肺结核好发于中青年男性, 亚急性病程, 临床症状不典型。网格样改变、小叶间隔增厚、小叶中心性结节、胸膜受累、树芽状是活动性间质性肺结核主要影像学表现。CT 检查能够清晰客观显示该类型肺结核间质改变的特点, 有助于该病的提示性诊断, 并可以观察和评价治疗的预后。借此病例以提高临床医生对间质性肺结核的认识, 呼吸道感染患者起病初期胸部 CT 无典型结核表现时不应轻易排除结核的可能, 应完善相关检查, 综合分析。

PU-0321

磷中毒后持续肺损伤并继发自发性气胸误诊一例

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目的 磷中毒是工业生产中常见的职业性疾病, 黄磷等高毒类无机物产生刺激性酸雾, 吸入后可致多脏器损伤。本例患者病来出现进行性肺损伤并继发自发性气胸。通过对本例患者的分析, 旨在加深对磷中毒后急性肺损伤影像的认识, 补充其肺部影像表现, 及时提示临床诊断和治疗职业性磷中毒, 改善预后。方法 回顾急性职业性磷中毒患者病例一例, 分析其临床表现、实验室检查、影像学表现等, 追溯职业病史, 观察其病变演变过程。结果 中年男性患者, 因受凉后出现咳嗽、咳痰伴发热, 予抗感染治疗后, 症状无好转并出现痰血、头晕、视物旋转。动脉血气示 PCO_2 升高、 PO_2 降低; 血沉、白细胞、中性细胞数、淋巴细胞数、纤维蛋白原浓度、CPR、IL-6 升高, 抗感染治疗后炎症指标未见好转, 血沉及纤维蛋白原浓度持续性增高, 氧分压不能维持正常。胸部 CT 示双肺多发斑片状磨玻璃影内多发肺气肿。肺泡灌洗液 PAS 染色 (+), 结合影像学考虑肺泡蛋白沉积症, 予支气管肺泡灌洗术治疗, 病情未见好转。两周后突发左侧大量自发性气胸, 影像学上双

肺斑片影范围增大，再次送检洗肉水样肺泡灌洗液：D-PAS (-)、含铁血黄素 (+)，考虑肺泡出血。追问病史患者自诉有 20+ 年磷矿、磷化氢气体接触史，近 1 年有间断咳嗽、气促，近 1+ 月因“清理厂区池”后出现乏力、气促，脱离环境后好转，3+ 周前吸入磷燃烧后浓烟出现呼吸道症状，且诉同期工友多有咳嗽、气促症状。结合患者职业史考虑职业性磷中毒相关急性肺损伤，予静滴糖皮质激素、左侧胸腔闭式引流 1 周后复查胸部 CT，双肺斑片影较前吸收。结论 急性磷中毒主要表现为肝、肾损伤，其肺部影像学多表现为急性肺损伤改变，但合并自发性气胸较少见。本例患者其胸部 CT 上斑片影未累及胸膜下并出现多发肺气肿，这一点应与肺泡蛋白沉积症鉴别。造成本次误诊的原因主要是对本病认识不足，缺乏详细的病史资料，仅单纯 PAS 染色阳性作出肺泡蛋白沉积症诊断。因此，对于出现难以解释的呼吸道症状，经抗感染及对症治疗不见好转时，应考虑到吸入性肺损伤的可能，详细追问病史，尤其是相关职业史，避免延误诊治。

PU-0322

肺结核合并肺癌、单纯肺结核与单纯肺癌的临床病理特征及影像学特征的比较

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摘要：目的 分析肺结核合并肺癌与单纯肺结核、单纯肺癌的病理特征及 CT 特征。方法 选择 2022 年 5 月~2023 年 5 月我院收治的 11 例肺结核合并肺癌、26 例单纯空洞型肺结核及 13 例空洞型肺癌作为研究对象，收集其一般临床资料、发病特点、病理特征、肺内病灶的影像 (CT) 表现等临床资料，并将 3 组患者上述资料进行对比分析。结果 肺结核合并肺癌组、单纯肺结核组的发热纳差比例高于单纯肺癌组 ($P<0.05$)，肺结核合并肺癌组贫血、真菌感染比例高于单纯肺结核、单纯肺癌组 ($P<0.05$)，3 组其他临床症状差异无统计学意义 ($P>0.05$)。单纯肺癌组腺癌比例高于肺结核合并肺癌组 ($P<0.05$)，鳞癌比例低于肺结核合并肺癌组 ($P<0.05$)，肺结核合并肺癌组病理分型与单纯肺癌组的差异均无统计学意义 ($P>0.05$)，3 组 TNM 分期差异均无统计学意义 ($P>0.05$)。肺结核合并肺癌组肺内占位 CT 表现中空洞内壁结节影比例高于单纯肺结核组及单纯肺癌组 ($P<0.05$)；肺结核合并肺癌患者肺内占位 CT 表现中长毛刺征、空洞、纵膈淋巴结增大、胸腔积液均高于单纯肺癌组 ($P<0.05$)，粟粒性阴影、卫星灶比例高于单纯肺癌组 ($P<0.05$)。结论 肺结核合并肺癌、单纯肺结核与单纯肺癌的病理特征及肺内肺内病灶的影像学 (CT) 特征存在不同之处，可结合患者临床、病理特征及肺内病变的影像学表现对不同类型患者病情予以评估。

PU-0323

新型冠状病毒感染合并肝脓肿致脓毒性肺栓塞 1 例

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云南省阜外心血管病医院

患者王某，男，59 岁，因“发热伴咳嗽、咳痰、乏力”6 天收住 ICU。患者 6 天前无明显诱因出现反复发热伴咳嗽，体温最高 41°C ，于当地县医院门诊输液后体温降至正常，次日体温再次升高至 38°C ，遂于当地市医院就诊，诊断为“脓毒血症、肺部感染、糖尿病酮症酸中毒、肝肾功能不全”，予抗感染治疗后体温恢复正常，但仍有明显乏力、咳嗽、咳痰，为进一步诊治至我院急诊科就诊。

PU-0324

Case-control study of tuberculosis in in-vitro fertilization and embryo transfer and natural pregnancy

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Objective To improve the understanding of clinical features and imaging characteristics of Patients with Pregnancy combined with Pulmonary tuberculosis. **Methods** Retrospective analysis of 50 cases of Pregnancy combined with Pulmonary tuberculosis admitted to the Third People's Hospital of Kunming from January 1, 2017 to December 31, 2021, divided into in-vitro fertilization and embryo transfer (IVF-ET) conception group and natural conception group according to the conception method, and the clinical data and imaging data were collected and compared with each other.

Result The mean age of the IVF-ET group (31.85 ± 5.84 years) was higher than the natural conception group (27.05 ± 5.5 years), and the Proportions of fever, hematogenous tuberculosis and extrapulmonary tuberculosis in the IVF-ET group (92.31%, 84.62%, 76.92%) were higher than those in the natural conception group (40.5%). The Percentage of IVF-ET conception combined with intracranial TB (76.9%) was higher than that of the natural conception group (10.8%), and the Percentage of termination of Pregnancy in the IVF-ET conception group (84.62%) was higher than that of the natural conception group (48.65%), all with statistically significant differences ($p < 0.05$). **Conclusion** IVF-ET conception combined with extensive Pulmonary lesions of tuberculosis, heavy systemic toxic symptoms, severe disease and Poor Pregnancy outcome, therefore, screening for tuberculosis before Performing IVF-ET is recommended.

PU-0325

膀胱憩室癌 MRI 诊断分析一例

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本文回顾性报告 1 例罕见膀胱憩室癌患者的 MRI 诊断情况, 以期为临床疾病诊断方式的选择及疾病的确诊提供参考依据。

膀胱憩室是膀胱的发育异常性变化, 临床相对较为常见, 但膀胱憩室内癌较为罕见, 仅占膀胱憩室病变的 1%~10%, 占膀胱癌的 1.5%[1]。一般情况下膀胱憩室有较薄的肌纤维, 能使尿液排空, 但有的膀胱憩室壁很薄, 仅有黏膜及纤维组织, 容易引起尿潴留, 膀胱憩室内尿液残留、伴发反复感染等刺激可以使正常黏膜发生鳞状或腺样化生, 最终导致癌变, 形成膀胱憩室癌[2]。本次回顾分析我院接诊 1 例膀胱憩室内癌的 MRI 诊断情况, 以期提升对疾病的认识, 并为疾病的影像学诊断提供参考依据。

PU-0326

神经梅毒影像学特点分析

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摘要：目的 探讨神经梅毒的临床特征及磁共振表现。方法 对昆明市第三人民医院 2020-2022 年收治的 3 例神经性梅毒患者的临床表现、实验室检查及影像学检查结果进行回顾性分析。结果 3 例患者均为男性，均感染 HIV，发病年龄 31-74 岁，病程约 5-6 年。首发症状分别表现为头晕、反应迟钝、左侧肢体抖动伴意识丧失。3 例患者中 1 例为实质型神经梅毒，1 例为间质型神经梅毒，1 例合并多种类型的神经梅毒感染。所有患者的梅毒螺旋抗体、血清快速血浆反应素试验（RPR）均为阳性。头颅 MRI 表现为硬脑膜肥厚 1 例，软脑膜增厚 1 例，多发脑梗塞灶 1 例，梅毒树胶肿 2 例。结论 神经梅毒可累及神经系统多个部位，其临床表现与所累及的神经系统部位相关，影像学表现多种多样，缺乏特异性，易与其他神经系统疾病混淆。诊断神经梅毒需结合临床、血清和脑脊液梅毒相关检测，同时早期进行影像学检查对于诊断有重要价值。

PU-0327

多层螺旋 CT 在尘肺合并肺结核中的应用价值

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目的 探讨尘肺并发肺结核的胸部 CT 表现特点。**方法** 搜集 2015 年 6 月至 2016 年 12 月重庆市公共卫生医疗救治中心诊治的 96 例尘肺并发肺结核住院患者，回顾性分析 96 例患者的临床及 CT 检查资料。对并发结核病变的发生部位、范围、形态、类型及并发其他脏器结核情况进行观察。结果 96 例患者中，尘肺 I 期 1 例，II 期 23 例，III 期 72 例。受累范围：多肺叶 90 例。发生部位：尖后段 93 例，前段 48 例，中叶或（和）舌段 49 例，背段 68 例，基底段 53 例。病变形态：斑片状影 85 例，大片状影 48 例，空洞 64 例，其中多发空洞占，树芽征 56 例，胸腔积液 36 例，胸膜增厚 72 例，纵隔淋巴结肿大 85，纵隔淋巴结钙化 58 例，并发肺外结核 13 例。II 期尘肺患者薄壁空洞发生率高于 III 期尘肺患者（ $P<0.05$ ）。III 期尘肺患者大片状影、树芽征、厚壁空洞、胸膜增厚、纵隔淋巴结肿大及钙化的发生率均高于 II 期尘肺患者（ P 值均 <0.05 ）。结论 尘肺不同分期患者并发肺结核 CT 表现具有一定差异，以浸润灶为主，常伴有多发空洞、树芽征、胸腔积液、肺外结核等。

PU-0328

慢性结核性脓胸并发恶性肿瘤的临床及 CT 表现分析（附 3 例报告）

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目的 探讨慢性结核性脓胸并发恶性肿瘤的临床特点及 CT 表现特征。**方法** 回顾性分析我中心经病理证实的 3 例慢性结核性脓胸并发恶性肿瘤病例的临床及 CT 表现，并对相关文献进行复习。结果 3 例患者均为男性，平均年龄 63.7 岁，均有慢性结核性胸膜炎病史，平均病程 10.3 年；临床表现

均为胸痛,平均病程 2.67 个月;两例患者可触及胸壁包块。2 例患者行胸部 CT 平扫检查,1 例患者示胸部 CT 平扫+增强扫描检查。胸部 CT 示 3 例患者均为右侧胸膜增厚、钙化及包裹性脓胸,脓胸侧胸膜下出现软组织肿块,最大层面大小分别为:2.06x3.49cm,3.1x3.9cm,2.9x6.3cm,CT 值分布为 31HU,46HU,36-49HU;2 例患者出现肿块与脓胸壁连续移行,突向侧胸壁;1 例患者出现患处钙化影移位、散开;肿块密度较均匀(1 例)、欠均匀(2 例),出现邻近肋骨破坏 2 例;3 例患者均出现胸膜下脂肪界面不清;增强扫描显示:结节影呈边缘强化。3 例患者双肺表现为斑点、结节影,边界清晰,部分病灶呈钙化改变。结论 慢性结核性脓胸并发恶性肿瘤的临床及 CT 表现有一定特征性,出现胸痛表现,伴脓胸侧软组织块影、胸膜钙化影形态、位置改变,邻近肋骨骨质破坏;胸膜下脂肪层界面不清,对诊断有重要提示作用。

PU-0329

艾滋病并发新型隐球菌脑膜炎临床及影像学表现分析

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目的:分析艾滋病并发隐球菌脑膜炎患者的临床及影像学表现,提高对该病的认识,为临床医师的诊疗工作提供依据和帮助。方法:对重庆市公共卫生医疗救治中心 2015 年 01 月至 2016 年 12 月收治的 34 例艾滋病并发隐球菌脑膜炎患者的临床及影像学资料进行回顾性分析。结果:34 例艾滋病并发隐球菌脑膜炎患者中头痛 34 例、发热 18 例、呕吐 15 例。首次脑脊液检查中:氯化物水平降低 15 例、葡萄糖水平降低 10 例、蛋白定性阳性 11 例。首诊颅内压大于 200 (mmH₂O) 31 例,颅内压水平正常 3 例。CD4 T 淋巴细胞计数均低于 200 (cells/ul),其中低于 50 (cells/ul) 28 例、50~99 (cells/ul) 4 例、100~199 (cells/ul) 2 例。头颅 CT、MRI 表现主要为脑膜脑炎型 15 例、类梗塞型 8 例、梗塞型 6 例、肉芽肿型 1 例。易合并其他机会性感染,其中真菌性肺炎 17 例、细菌性肺炎 10 例、口腔念珠菌病 9 例。结论:艾滋病并发隐球菌脑膜炎患者多以颅内压增高相关症状就诊,免疫力普遍低下,易并发多种机会性感染。头颅 CT、MRI 检查在其诊疗过程中具有重要价值,确诊仍需依靠实验室病原学检查。

PU-0330

117 例艾滋病相关恶性淋巴瘤的 CT 影像表现与临床特点

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目的 探讨艾滋病相关淋巴瘤 (ARL) 的 CT 影像表现与临床特点。方法 回顾性分析云南省传染病医院自 2017 年 06 月至 2023 年 06 月 117 例经临床活检病理确诊为艾滋病相关淋巴瘤患者 CT 影像及临床资料,分析总结该组患者的 CT 影像及临床特征。结果 患者中位年龄为 47.7 岁,男女比例 5.2:1.0,原发淋巴结的占 68.7%,其中弥漫大 B 细胞淋巴瘤占 84.8%,70.5% 的患者 CD4+T 细胞计数小于 200 cells/μL,CT 影像表现中淋巴结内病变共 109 例,以全身多组淋巴结不同程度肿大为主,其中腋窝淋巴结肿大 89 例,颈部淋巴结肿大 74 例,纵隔及肺门淋巴结肿大 48 例,腹腔淋巴结肿大 37 例,腹股沟淋巴结肿大 34 例;淋巴结外病变 76 例,累及组织及器官广泛,以占位性病变为主,其中发生于肝脏 52 例,脾脏 42 例,肌肉 24 例,骨骼 18 例,胃肠道 28 例,肺 17 例,肾脏 14 例,肾上腺 8 例,胰腺 2 例,精囊腺、视神经、膀胱各 1 例,同时并发胸腔积液 83 例,腹腔积液 62 例,心包积液 34 例。结论 艾滋病相关恶性淋巴瘤主要以 NHL 为主,其中又以 DLBCL 最为多见,主要累及淋巴结及淋巴结外组织及器官,淋巴结外病变发生率

高、且常多脏器受累是其影像学特点，艾滋病相关淋巴瘤患者 CT 影像具有一定特征，综合临床资料，CD4+T 细胞低于 200cells 的患者更易出现淋巴结原发肿瘤，确诊仍需结合其病理结果。

PU-0331

动态功能连接在疼痛中的 fMRI 研究进展

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以往对大脑在疼痛的调控中所发挥的作用的研究发现，疼痛不是由特定的大脑区域产生的，而是由大脑区域网络中的协调活动所产生的。功能磁共振成像等非侵入性全脑神经成像的出现，为我们阐明疼痛的发病机理和指导临床实践贡献有价值的信息。功能连接 (functional connectivity, FC) 分析是另一种静息态功能磁共振常用数据处理方法。该方法主要考察区域之间体素水平上的时间相关性，可反映解剖上相互分离的脑区之间的连接效能和相互协调作用。但传统 fMRI 研究忽略了疼痛感受在不同时间尺度波动变化的信息，将功能网络视为静止状态。随着动态功能连接 (dynamic functional connectivity, dFC) 概念出现，该方法通过分析不同脑区神经活动的时间演变规律，带来了脑内疼痛信息传导与整合调控的补充性信息。本文概述了动态功能连接在疼痛中的常用分析方法，回顾了 dFC 在疼痛中的研究进展。在这篇综述中，我们分析了每种方法的优点和缺点，并探讨了这些方法的潜在未来应用，为疼痛的在大脑中的发生机制提供新思路，为疼痛的治疗提供更有有效的方案。

PU-0332

基于 CT 的影像组学模型联合临床影像学特征对布氏杆菌脊柱炎和脊柱结核进行鉴别的研究价值

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目的 建立和验证基于 CT 图像的相关影像组学模型对布氏杆菌脊柱炎和脊柱结核进行鉴别。**方法** 回顾性分析 94 例患者建立影像组学模型，其中布氏杆菌脊柱炎 37 例，脊柱结核 56 例，按照 7:3 随机分为训练组 (65 例) 和验证组 (29 例)。在 CT 图像上勾画出病变椎体提取其全容积影像组学特征，并采用 Mann-Whitney Utest 统计检验、Spearman 相关性分析、选择算子 (LASSO) 回归进行影像组学特征筛选，并计算相应的影像组学评分，建立影像组学模型。将有统计学意义的临床资料和 CT 征象用于构建临床模型。基于影像组学模型和临床模型建立联合模型，并绘制联合模型的列线图。采用受试者工作特征曲线 (ROC) 对以上几种模型进行评估，ROC 曲线下面积 (AUC)、特异性、敏感性、准确性、阳性预测值 (PPV) 和阴性预测值 (NPV) 来评估各模型的诊断效能。**结果** 基于 CT 图像优化出 6 个影像组学特征并构建影像组学签名，影像组学模型在鉴别 BS 与 TB 上具有较好的统计意义 ($p < 0.05$)，训练集 AUC 为 0.858、95% CI 为 0.763-0.953 和验证集 AUC 为 0.804、95% CI 为 0.641-0.968。临床模型中临床资料年龄和性别不具备识别能力 ($p > 0.05$)。CT 图像 5 个征象中 4 个典型征象具备良好的鉴别诊断能力 ($p < 0.05$)，训练集 AUC 为 0.883；95% CI 为 0.807-0.959 和验证集 AUC 为 0.684、95% CI 为 0.476-0.891。影像组学模型联合影像学特征在训练集中 AUC 为 0.930、95% CI 为 0.867-0.994 和验证集 AUC 为 0.928、95% CI 为 0.788-1.000，表现出更好的识别能力 ($p < 0.05$)。**结论** 基于 CT 图像的影像组学模型联合临床影像学特征构建的放射学列线图对于鉴别诊断 BS 和 TB 具有较高的临床价值。

PU-0333

鸟-胞内分枝杆菌复合群肺病与初治继发性肺结核的胸部 CT 鉴别诊断

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目的 探讨胸部 CT 鉴别诊断鸟-胞内分枝杆菌复合群 (MAC) 肺病与继发性肺结核的价值。**方法** 回顾性分析已确诊的 54 例 MAC 肺病和 55 例继发性肺结核患者的一般资料和胸部 CT 图像。分析两组患者的病灶分布、位置、形态和性质等, $P<0.05$ 为差异有统计学意义。**结果** 一般资料中两组患者平均年龄和咯血率的差异有统计学意义 ($P<0.05$); 胸部 CT 影像表现中两组患者病灶累计肺叶数、空洞数量、空洞形状、柱状支气管扩张的差异有统计学意义 (P 均 <0.05)。两组患者病灶分布比较在右肺上叶、右肺中叶、右肺下叶和左肺上叶舌段, 差异有统计学意义 ($P<0.05$); MAC 肺病组主要表现为右肺中叶、左肺上叶舌叶段的柱状支气管扩张和在右肺上叶、左肺上叶的多发薄壁空洞; 继发性肺结核组主要表现为右肺上叶、右肺下叶的柱状、混合型支气管扩张和在右肺上叶的多发厚壁空洞。**结论** MAC 肺病与继发性肺结核在胸部 CT 上存在特异性, 在二者的早期鉴别诊断中, 存在较好的鉴别诊断价值。

PU-0334

Comparison of the chest computed tomography findings between patients with primary treatment of Secondary tuberculosis and those with Mycobacterium avium complex pulmonary disease

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Objective To explore the value of chest CT in the differential diagnosis of Mycobacterium avium-intracellulare complex (MAC) lung disease and secondary tuberculosis. **Methods** The general data and chest CT images of 54 patients with confirmed MAC lung disease and 55 patients with secondary tuberculosis were retrospectively analysed. The distribution, location, morphology and nature of the lesions in the two groups were analysed, and $P<0.05$ was regarded as a statistically significant difference. **Results** The differences in the average age and haemoptysis rate of the two groups of patients in the general data were statistically significant ($P<0.05$); the differences in the cumulative number of lobes of the lesions, the number of cavities, the shape of the cavities, and the columnar bronchial dilatation of the two groups of patients in the chest CT image manifestations were statistically significant ($P<0.05$ in all cases). The distribution of lesions in the two groups was compared in the upper lobe of the right lung, the middle lobe of the right lung, the lower lobe of the right lung, and the lingual segment of the upper lobe of the left lung, and the difference was statistically significant ($P<0.05$); in the MAC lung disease group, the main manifestations were columnar bronchodilatation in the middle lobe of the right lung and the lingual segment of the upper lobe of the left lung and multiple thin-walled cavities in the upper lobe of the right lung and upper lobe of the left lung; and in the secondary pulmonary tuberculosis group, the main manifestations were columnar and mixed shapes of the right lung in the upper lobe of the right lung, the right lung in the lower lobe bronchiectasis and multiple thick-walled cavities in the upper lobe of the right lung [45.5% (25/55)]. **Conclusion** There is specificity between MAC lung disease and secondary tuberculosis on chest CT, and there is a good differential diagnostic value in the early diagnosis of the two

PU-0335

分段注射对比剂在胸痛三联征 CT 血管造影检查中的应用

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目的 探讨分段注射对比剂在胸痛三联征 CT 血管造影检查中的应用。**方法** 选取 60 例因胸痛行胸痛三联征 CT 检查的患者 ($18.5\text{kg/m}^2 \leq \text{BMI} \leq 24\text{ kg/m}^2$)，随机分为 A、B 组。A 组第一期采用容积扫描模式，管电压 100kV 扫描冠状动脉（范围气管隆突下 1 cm 至心底），第二期采用非门控螺旋模式，管电压 80kV 扫描肺动脉和胸主动脉（范围胸廓人口至膈下 2 cm）；注射方案为以 4ml/s 速率注射对比剂，总量 40ml，不间断以 3.5ml/s 速率注射生理盐水 35ml，接着 3.5 ml/s 速率注射对比剂 35ml，同等速率下追加生理盐水 35ml。B 组采用心电门控螺旋一站式扫描模式，扫描方案为管电压 100kV，智能电流范围为 40~900mA(以 $\text{SD}=28$ 智能调节)，机架旋转时间 0.275s，AIDR 3D Standard 迭代重建算法；注射方案以 4.5ml/s 速率注射对比剂，总量 100ml，扫描范围胸廓人口至膈下 2 cm。分别记录两组患者图像质量、对比剂用量、辐射剂量，对两组数据进行统计学分析。**结果** A 组冠状动脉图像质量在心率 >75 次/分时高于 B 组，差异有统计学意义 ($P<0.05$)，心率 <75 次/min 时，冠状动脉图像质量没有统计学意义，A 组上腔静脉伪影少于 B 组。A 组的辐射剂量为 (11.17 ± 2.45) mSv，B 组的辐射剂量为 (28.51 ± 3.06) mSv，降低约 61%，差异有统计学意义 ($P<0.05$)，A 组的对比剂用量比 B 组降低约 25%。**结论** 在自由心率下行胸痛三联征 CT 检查，分段注射对比剂联合分期扫描，冠状动脉图像质量、对比剂用量和上腔静脉伪影明显优于一站式门控螺旋扫描，具有一定的临床应用价值。

PU-0336

双源 CT 中碘浓度测量的准确性评估

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目的 采用三组能量组合方式对体外碘溶液进行双能 CT 扫描，旨在评估不同能量组合下碘浓度测量的准确性。**方法** 使用 A 组 (sn140 kVp/80 kVp)、B 组 (sn140 kVp/100 kVp) 和 C 组 (140 kVp/80 kVp) 能量组合方式的双能 CT 扫描方案，依次对体外 11 杯碘溶液进行扫描，碘浓度分别为 30、15、7.5、3.75、1.88、0.94、0.47、0.24、0.12、0.06 以及 0 mgI/ml。CT 数据经工作站处理得到碘图，以相同大小的感兴趣区域测量各杯溶液的碘浓度。以真实值为自变量，测量值为应变量，建立回归方程并做方差分析，计算 SN 比值来评价三组碘浓度测量的误差。**结果** 1.真实值与测量值的回归方程，A 组中测量值 $=0.164+0.929 \times \text{真实值}$ ；B 组中测量值 $=0.434+0.856 \times \text{真实值}$ ；C 组中测量值 $= -0.072+1.089 \times \text{真实值}$ 。调整后的 R^2 分别为 99.6%，99.2%，99.4%。
2.方差分析中，真实值与三组的测量值之间均存在显著线性关系 ($P<0.001$)；三组的 SN 比值分别为 2.61，1.34，1.92。
3.辐射剂量方面，A 组最低 (0.59 mgy)，小于 B 组 (0.62 mgy) 和 C 组 (0.60 mgy)。
结论 双源 CT 中三组能量组合方式下的碘浓度测量值均能准确反应真实碘浓度，其中 A 组测量的误差最小，而且辐射剂量最低。

PU-0337

大环类及线性分子含钆对比剂脑沉积与神经心理测评相关性研究

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目的:探究大环类及线性分子含钆对比剂发生颅内沉积后与神经心理行为学变化的相关性。方法:收集 2021 年 9 月—2023 年 5 月在乐山市中医医院使用大环类造影剂行颅脑 MRI 增强扫描检查 3 次以上受试者 30 例,定为 A 组;再收集使用线性分子造影剂行颅脑 MRI 增强扫描检查 3 次以上受试者 30 例,定为 B 组,并选择年龄、性别构成相仿,未行增强的颅脑 MRI 平扫受试者 30 例,设为 C 组。分别测量 A、B、C 各组受试者苍白球、齿状核及脑桥信号强度。以脑桥 T1WI 信号强度为基准,计算各核团的 TIWI 信号强度比。设定 X 核团信号强度比= X 核团平均信号强度/脑桥信号强度。并测量检查首末两次信号强度比差值。设定为首末两次信号强度比差值=末次平均信号强度比-首次平均信号强度比。对比分析三组受试者苍白球及齿状核 T1WI 信号强度比差异以及首末两次信号强度比差值。并由心身医学科高年资医师采用蒙特利尔认知评估量表 (MoCA) 及日常生活活动能力 (ADL) 量表及分别对 A、B、C 三组受试者在首次及末次扫描结束后进行评估。并将三组受试者苍白球及齿状核 T1WI 信号比及差值同受试者 MoCA 量表及 ADL 量表评分结果进行相关性分析。结果:A 组苍白球及齿状核信号强度比同 B 组类似,但均高于对比组 C 组,且 B 组首末两次信号强度比差值明显大于 A 组,且差异均有统计学意义。A、B、C 三组受试者 MoCA 量表及 ADL 量表评分结果差异无统计学意义。A 组及 B 组苍白球及齿状核 T1WI 信号强度比及首末两次信号强度比差值也与受试者 MoCA 量表及 ADL 量表评分结果无相关性。结论:多次注射钆对比剂会导致苍白球及小脑齿状核等神经核团钆对比剂的沉积。且线性分子类钆剂首末两次信号强度比差值较大环类钆剂大,可能提示更易沉积。但二者产生钆沉积后与神经心理相关活动及认知功能损害无相关性。

PU-0338

不同对比剂磁共振肝脏增强动脉期呼吸伪影的影响因素探讨

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摘要:目的:探讨患者在行肝脏 MRI 增强成像时,动脉期图像呼吸伪影产生影响的因素。方法:回顾性收集我院 2020 年 12 月至 2022 年 5 月行普美显 (Gd-EOB-DTPA) 及钆喷酸葡胺 (Gd-DTPA) 增强 MRI 的 200 例患者,影像资料均由西门子 vida 3.0T 扫描获得。动脉期图像按呼吸伪影的严重程度分为 (无及轻度,中重度),患者临床资料按年龄段、来源、有无既往腹部 MRI 检查进行分组,采用卡方检验比较动脉期图像呼吸伪影率在各因素水平间的差异,以及使用不同对比剂对动脉期图像伪影的影响。结果:差异性分析显示,不同年龄段间动脉期伪影率无统计学意义 ($P > 0.05$),不同患者来源间动脉期图像伪影率有统计学意义, ($\chi^2=11.69, P < 0.05$),其中介入科伪影率显著高于肿瘤科,但与其它科室以及其它科室之间均无统计学差异。动脉期图像伪影率在有无既往检查间统计极其显著 ($\chi^2=10.42, P < 0.001$),无既往检查发生伪影的可能性是有既往检查的 3.5 倍。讨论:在肝脏 MRI 增强动脉期伪影率的影响因素中,患者的年龄、不同钆对比剂的使用未见明确相关性,也不是其独立影响因素。在患者来源和既往 MRI 检查的这两个组别间,动脉期伪影发生率存在显著差异,说明患者来源和既往腹部 MRI 检查是磁共振肝脏增强动脉期呼吸伪影的影响因素。

PU-0339

德谷门冬胰岛素联合二甲双胍治疗糖尿病患者的应用及对 BMI 评分的影响

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目的探讨德谷门冬胰岛素联合二甲双胍治疗 2 型糖尿病患者的应用及对体重指数 BMI 评分的影响。方法研究对象为在本院 2019 年 5 月-2020 年 11 月期间收治住院的 113 例 2 型糖尿病患者, 将其随机分为 2 组: 研究组(n=57)与对照组(n=56)。其中对照组单纯给予德谷门冬胰岛素降糖治疗, 另一研究组给予德谷门冬胰岛素联合二甲双胍降糖治疗。对比两组治疗后的降糖效果、相关血糖指标与体重 BMI 评分变化、相关血脂指标的变化以及生活质量评分的变化。结果: 对照组临床有效率为 80.4% 比研究组的 93.0% 要低($P < 0.05$); 两组(对照组与研究组)治疗前的相关血糖指标与 BMI 评分相比, 二者无较大差异($P > 0.05$), 对照组治疗后的相关血糖指标与 BMI 评分比研究组低($P < 0.05$); 两组治疗前的相关血脂的指标相比无较大差异($P > 0.05$), 对照组治疗后的相关血脂的指标比研究组低($P < 0.05$); 对照组治疗后的生活质量评分比研究组的低($P < 0.05$)。结论: 德谷门冬胰岛素联合二甲双胍治疗 2 型糖尿病患者, 降糖效果理想, 患者的体重指数 BMI 评分降低, 血糖及血脂水平得到控制, 生活质量改善, 可在临床推广应用。

PU-0340

可激活磁共振成像纳米探针的制备及生物医学应用

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在生物医学领域, 磁共振成像是一种非常重要的疾病诊疗技术。近 50% 的磁共振检查已经涉及造影剂的应用。可激活磁共振成像纳米探针以优化信噪比为原则, 借助特异性的生物分子识别作用或分子交互作用增强磁共振信号, 提高了磁共振诊断的敏感性与特异性, 推动着磁共振成像在生物医学领域的广泛应用。本文就目前国内外热门研究的可激活磁共振纳米探针的种类、原理等方面进行阐述, 详细介绍了可激活磁共振纳米探针在生物医学上的应用, 在前景方面也进行了展望。

在 MRI 技术中, 造影剂的使用对于更好地反映活体条件下生物细胞内的正常或病理状态具有重要作用。常用的 MRI 造影剂分为两类: 一类是以 Fe_3O_4 纳米粒子为基础的阴性信号造影剂(negative contrast agent), 能产生强烈的 T2 阴性信号造影, 在 MRI 和多模式成像中应用较多。另一类是以钆离子螯合物马根维显(Magnevist, Gd-DTPA)为代表的阳性信号造影剂(positive contrast agent), 在临床上广泛使用。除此之外, T1 磁共振成像纳米造影剂随着纳米技术的快速发展而进入人们的视野, 比如使用不同外壳包裹的 Gd_2O_3 纳米颗粒(Gd_2O_3 NPs)作为 T1 阳性造影剂已经成功应用于肿瘤的 MRI。除了 Gd_2O_3 NPs, MnO 纳米颗粒(MnO NPs)作为一种 T1 阳性造影剂, 首先被 HYEON 团队应用于小鼠乳腺癌的选择性磁共振成像, 也取得了良好的显像效果。 Gd^{3+} 周围有 7 个不成对电子, 而 Mn^{2+} 周围有 5 个不成对电子, 这使得 MnO NPs 与 Gd_2O_3 NPs 相比具有较低的弛豫效能。 MnO NPs 尽管其阳性信号增强能力有限, 但具有较好的生物相容性, 受到了研究者的青睐。基于 Gd 的阳性信号造影剂具有导致肾源性系统性纤维化(NSF)的潜在毒性, 这促使研究者寻求更佳的材料。

PU-0341

在 ct 上如何让肝静脉血管体现得更好

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ct 可分平扫和增强两部分，肝脏 CT 能检查可以检查一些病变，主要是鉴别病变的良恶性。主要包括弥漫性脂肪肝、肝硬化、肝脓肿、肝囊肿、肝脏肿瘤等等的判断。有些病灶需要增强才可以更好的确定，以便做出准确的结论。那么如果能让肝静脉血管更好的体现，就需要在静脉中注射含碘对比剂后再行 CT 检查的成像技术，根据病灶的强化特征鉴别病灶的性质。另外，可清晰显示肝内血管解剖，区分平扫图上所见到的血管断面影和小结节灶，可清楚地显示肝门结构及肝内胆管扩张。增强 CT，即针对在 CT 平扫基础上发现的可疑部位，在静脉中注射造影剂后有侧重的进行检查，进而能够提高诊断准确率的一种手段。和其他部位一样肝脏 CT 检查，既有一般原则，又必须根据临床要求个别对待。肝脏的血液供应和造影剂的药物动力学特点使得增强 CT 成为肝脏检查的重要手段，增强技术方法较多也较复杂。

ct 增强扫描，一共有三期，通过扫描这三期可以判断患者发生病变时的血流动特性，进而对患者病变的性质再进行判定，所谓的肝增强 ct，其实指的就是在注射过造影剂之后，进行 ct 扫描。临床上把其分为三期，即动脉期、门脉期以及延迟期。因为肝脏具有靠门脉和肝动脉共同供血的特点，而肝增强 ct 三期影像的差异，就可以帮助分析病变的原因以及发展的程度。在临床上是一种非常有用的方法，比如对于肝癌患者在动脉期强化时最明显，而门脉期就会稍弱。肝血管瘤的患者在门脉期稍强，到了后面程度就会越来越强。静脉血管走向分布也越来越明显。通过碘对比剂的注入。增强 ct 第二期根据静脉血管充盈程度，可以称之为静脉血管充盈期。此时静脉血管才更好的表现出来，这正是我们所研究的课题，很多方法都可以使肝静脉血管显现得更好，但在医学影像技术专业上，我们可以通过碘对比剂的方法，来做到我们想要的观察效果。这样不仅可以看清静脉血管的分布走向，也可以更清楚的找到病灶的位置，大小，可以更好的帮助临床医生进行疾病诊断与治疗。

PU-0342

4 例颈静脉穿刺高压注射外渗的根因分析

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2023 年 1-7 月份本科室有 4 例颈静脉穿刺患者增强注射时外渗。经过组员的头脑风暴，从病人、陪检人员、护士、技师及高压注射的方法、流程、材料七个方面，用划鱼骨图的方式，分析原因，得出 2 个主要原因：

1. 流程：躁动的患者陪检人员对约束没有感知，不知道配合。
2. 方法：患者体位摆放不当，颈静脉不显露，颈部留置针受压、移位。

对照所列出来的鱼骨图，按照 5 个因果关系原则，团队成员再次进行了讨论，并以“5 个为什么”的倒推方式，筛选出导致事件发生的根本原因，最终确定 2 条根本原因：

- 1、科室对于躁动的、颈静脉穿刺的患者无检查流程。
- 2、没有具体的方法摆放患者头部，显露血管，保证管路不受压。

针对两条根本原因，科室制定颈静脉穿刺患者增强 CT 检查流程，备用约束带、枕头，并且进行流程的培训，进行增强风险预警意识的培训，经过培训，护理人员掌握了流程并且执行良好，对于高风险人群有预警意识，积极与技师沟通。行静脉穿刺时，N2 层级的护士会寻求 N3,N4 层级的护士指导及帮助。

效果：

7 月下旬开始实行颈静脉穿刺高压注射外渗行 RCA 改进方案, 2023 年 8 月, 颈静脉穿刺 17 例 (躁动患者 5 例), 外渗 1 例, 及时发现, 只外渗了 10ml 药液 (注射生理盐水时没有外渗), 经推拿处理, 肿胀立即消散。
不足: 此方法、流程不适用头颈 CTA 的检查。

PU-0343

多磺酸粘多糖乳膏+延伸护理在对比剂外渗中的应用效果

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目的: 探讨多磺酸粘多糖乳膏+延伸护理在对比剂外渗中的效果评价

方法: 回顾性选取本院 2021 年 7 月—2023 年 7 月 20 例中重度外渗患者 60 名, 随机分为 A、B 两组, A 组为观察组, B 组为对照组, 观察组用冰袋冰敷加多磺酸粘多糖乳膏涂抹, 进行每日三次随访交代家属及病人注意事项, 对照组用冰袋冰敷加 50%硫酸镁湿敷交代注意事项。记录并观察两组患者的疼痛指数评分 (VAS)、肿胀回复时间。对患者及家属进行 SAS 焦虑自评量表评分, 记录治疗效果。

结果: A 组 VAS 疼痛评分 6.23 ± 0.95 分, 肿胀恢复时间 2.23 ± 0.55 天, 患者 (或家属) 心理焦虑 SAS 评分 35.50 ± 0.66 分, 未出现皮肤组织损伤; B 组 VAS 疼痛评分 8.23 ± 0.95 分, 肿胀恢复时间 2.93 ± 0.95 天, 患者 (或家属) 心理焦虑 SAS 评分 45.70 ± 0.51 分, 出现 1 例皮肤组织红肿; 上述指标两组差异均有统计学意义 ($P < 0.05$), 经过 A 组处理后, 其护理效果显著高于 B 组。

结论: 发生造影剂外渗时使用多磺酸粘多糖乳膏涂抹并定时随访发现患者在发生对比剂外渗时疼痛程度显著降低, 肿胀恢复时间缩短, 患者及家属心理焦虑减轻, 使用多磺酸粘多糖乳膏涂抹并定时随访的患者中未出现皮肤组织损伤, 可以替代临床常规冰袋冰敷加 50%硫酸镁湿敷方法。

PU-0344

大脑中动脉斑块特征、脑灌注和颅内侧枝循环与复发性缺血性脑卒中的相关性

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目的: 探讨大脑中动脉狭窄患者中, 复发组和非复发组斑块特征、脑灌注和侧枝循环状态的差异, 寻找缺血性脑卒中复发的独立预测因子, 并建立卒中患者复发风险的预测模型。

方法: 回顾性分析 2018 年 2 月至 2021 年 7 月我院住院的 62 例单侧大脑中动脉狭窄 ($>50\%$) 伴供血区域急性或亚急性脑梗死患者的临床资料及头颅 MR 检查。所有患者行 12 个月的电话随访, 根据随访结果分为复发组 (12 例) 和非复发组 (50 例)。对所有患者的责任斑块 (梗死灶所在区域中供血动脉内唯一的斑块, 或多发斑块中造成管腔最狭窄者)、脑灌注和侧枝循环状态进行评估。斑块特征包括狭窄程度、管腔面积、斑块面积、斑块长度、标准化管壁指数、偏心指数、管腔重构指数和斑块强化等级。侧枝循环的评估在 TOF-MRA 横断原始图像上进行。在 CBF 图上评价 MCA 供血区的 10 个区域: M1-M6, 豆状核、尾状核、内囊后肢以及岛叶, 总共 10 个区域的权重相同。比较两组患者的影像学特征和临床基线资料。采用单因素及多因素 Logistic 回归分析, 获得复发性缺血性脑卒中的独立预测因子, 经过受试者工作特征曲线分析评估各变量预测缺血性脑卒中复发的诊断效能。

结果：复发组 CBF-ASPECTS 明显低于非复发组 ($P<0.01$)。两组的侧枝循环状态也有明显差异 ($P<0.01$)。复发组的斑块长度较非复发组更长。在单因素和多因素 Logistics 分析中，脑灌注和侧枝循环状态与缺血性脑卒中复发有关。联合两者进行诊断有更高的特异性。

结论：大脑中动脉粥样硬化性狭窄引起缺血性脑卒中的复发风险与脑灌注和侧支循环状态存在一定的关系。对脑灌注和侧支循环的联合评估有助于识别单侧大脑中动脉粥样硬化引起的复发性缺血性卒中。

PU-0345

钆塞酸二钠对比剂 MRI 腹部检查中的应用及护理

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目的：探讨磁共振肝脏特异性对比剂钆塞酸二钠对比剂在腹部检查中的应用及护理。

材料和方法：回顾性分析 2020 年 1 月~2020 年 12 月应用钆对比剂检查的 6609 例儿童相关资料及数据统计分析。

结果：增强扫描 6609 例均未出现不良反应，2% 的图像质量不能满足诊断要求，需要使用非肝脏特异性对比剂重新扫描动脉期。

结论：磁共振肝脏特异性对比剂钆塞酸二钠在用药安全有较好的表现，未发生一例过敏反应，但是在扫描图像质量上有待提高，当然这是多方面的原因。

PU-0346

Comparative study of CT imaging effects of contrast agents with different iodine concentrations in patients with the same primary hepatocellular carcinoma

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Objective: The purpose of this study was to examine how different concentrations of iodine contrast affect the quality of imaging for primary hepatic carcinoma, liver parenchyma, abdominal aorta, and portal vein.

Methods: The researchers analyzed data from 29 patients with primary hepatocellular carcinoma who received two preoperative CT-enhanced examinations with either iohexol at a concentration of 300 mgI/mL (referred to as the low-concentration group) or Ioversol at a concentration of 350 mgI/mL (referred to as the high-concentration group) within three months. They compared the imaging effects of the two contrast agents for different parts of the liver and in various phases of the scanning process in a cohort-matched manner. Additionally, they evaluated the subjective scores for the quality of the images of the portal veins.

Results: The findings showed that the CT values of the liver parenchyma, aorta, portal vein, and other parts of the patients in the high-concentration group were higher than those in the low-concentration group ($P < 0.05$). However, there was no statistically significant difference between the CT values of the two groups in the scans of the liver cancer parenchyma at all stages ($P > 0.05$). Furthermore, the subjective scores of the images of the high-concentration group were better than those of the low-concentration group ($P < 0.05$).

Conclusion: According to the study, the utilization of high-concentration iodine contrast can significantly enhance the image quality of liver parenchyma, aorta, and portal vein in patients with

primary hepatocellular carcinoma. This improvement leads to the promotion of clinical use, making it a highly recommended method.

PU-0347

双低剂量双能量头颈部 CTA：虚拟单能谱的临床应用

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目的：探讨双低剂量扫描技术在双能量头颈部 CTA 中的可行性 方法：前瞻性收集 2021 年 1 月~2021 年 5 月间本院 102 名因头颈部血管疾病行头颈部 CTA 的患者纳入研究，随机分为 CD、DLD 两组，CD 组行常规剂量扫描（管电压 100kV/Sn140kV，螺距 0.9，70ml 对比剂），DLD 组行双低剂量扫描（管电压 80kV/Sn140kV，螺距 1.2，30ml 对比剂），CD 组行 FBP 重建，线性融合（M=0.6）得到等效 120kV 图，DLD 组行 SAFIRE 迭代重建（迭代强度 3 级），使用虚拟单能谱技术得到 65keV 能谱图，余扫描参数一致；分别对两组图像行双能量去骨去钙化、MIP、VR，MPR、CPR 等后处理。分别对 2 组图像质量进行主观和客观评价，记录 2 组患者的 x 线剂量参数，包括 CTDIvol(mGy)和 DLP(mGy·cm)，并计算有效剂量 ED(mSv)，计算 2 组患者的碘摄入量 I(mg)，对结果进行统计学分析。结果：CD 组与 DLD 组的图像质量评分均 ≥ 3 分，均能满足诊断的要求。2 名医师对 2 组图像质量评价的一致性良好（Kappa 值分别为 0.817、0.825）。2 名医师对 2 组图像的主观质量评分的差异无统计学意义（Z=-0.572、-0.283，均 $P>0.05$ ）。CD 组与 DLD 组图像各层面血管 CT 值的差异均无统计学意义（t=-0.705、0.689、0.906，均 $P>0.05$ ）；颈内动脉起始部、大脑中动脉 M1 段层面血管噪声、SNR、CNR 的差异均无统计学意义（t=-0.830~1.842，均 $P>0.05$ ）；但颈总动脉起始部层面 CD 组噪声大于 DLD 组（t=2.855， $P<0.05$ ），SNR、CNR 小于 DLD 组（t=-4.959、-5.041，均 $P<0.05$ ）。DLD 组患者 CTDIvol、DLP 及 ED 较 CD 组分别降低 36.9%、35.3%、35.2%（t=186.138、37.753、37.753，均 $P<0.05$ ）。DLD 组患者碘摄入量较 CD 组降低 57.1%（10.5g VS. 24.5g）结论：双低剂量双能量头颈部 CTA 扫描技术在不影响图像质量的前提下，降低了患者接受的辐射剂量和对比剂碘摄入量

PU-0348

碘对比剂急性肾病的防治进展

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对比剂急性肾病（CIN）是临床实践中常见的一种可逆转的急性肾功能衰竭。随着造影技术的发展，对比剂已成为放射诊断与治疗中常用的药物之一。其中碘对比剂主要用于血管显影后介入治疗和影像学检查时增强局部组织的影像对比度；伴随着当前增强 CT 检查人数的增加，碘对比剂的广泛使用，CIN 的发病率呈逐年升高的趋势，已作为继缺血和药物损伤后患者急性肾损伤的重要病因。当前，对比剂诱导 CIN 发生的机理尚不完全清晰，主要包括氧化应激和细胞凋亡、肾缺血性及肾小管毒性损伤等。CIN 的发生可导致患者住院医疗费用增加，也可能导致患者发生不良结局（如急性心肌梗死、急性心力衰竭、透析及死亡等）的风险显著增加、住院时间延长等。因此，早期识别 CIN 发生的危险因素，并给予恰当的临床干预，例如水化、药物干预等，有助于高危 CIN 患者降低其发生率，改善预后。本次研究从 CIN 的诊断以及当前防治措施的进展进行综述，为临床提供依据。

PU-0349

对比 MRI 与超声对唇腭裂的产前诊断价值：Meta 分析

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【摘要】目的：用 Meta 分析对比磁共振（MRI）与超声（US）对唇腭裂产前诊断的临床应用价值。**方法：**检索 EMBASE、PubMed、Web of science、Cochrane Library、万方、维普、中国知网及中国生物医学文献等数据库，查找所有比较 MRI 及 US 对胎儿唇腭裂产前诊断的相关研究，检索时限为 2000 年 1 月至 2022 年 12 月。制定纳入排除标准，采用 STATA 17.0 进行 Meta 分析：检验异质性；计算汇总诊断比值比（DOR）、灵敏度（SEN）、特异度（SPE）、阳性似然比（+LR）、阴性似然比（-LR）、受试者工作特性曲线下面积（AUC）、验前验后概率及 95%可信区间。计算 Z 统计量。结果：纳入文献 6 篇，共含病例 235 例。MRI 合并敏感性对比 US 合并敏感性（0.98（0.94-0.99）vs 0.70（0.35-0.91））； $P<0.05$ ，差异有统计学意义。MRI 合并特异性对比 US 合并特异性（0.84（0.76-0.90）vs 0.59（0.21-0.89））； $P>0.05$ ，差异无统计学意义。MRI 的 AUC=0.98 显著高于 US 的 AUC=0.84（ $P<0.05$ ）。结论：对于胎儿唇腭裂的产前诊断，MRI 较 US 具备更高的诊断效能；US 作为唇腭裂产前筛查的首选方法，当其在诊断腭裂受到不利因素或不能明确的情况下，MRI 检查可作为产前诊断的首要补充方法。

PU-0350

MRI 对唇腭裂产前诊断价值的 Meta 分析

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【摘要】目的：用 Meta 分析评价磁共振（Magnetic resonance imaging, MRI）对唇腭裂的产前诊断的临床应用价值。**方法：**检索 EMBASE、PubMed、Web of science、Cochrane Library、万方、维普、中国知网及中国生物医学文献等数据库，查找所有评价 MRI 对胎儿唇腭裂产前诊断的相关研究，检索时限为 2000 年 1 月至 2022 年 12 月，同时手检纳入文献的参考文献。制定纳入排除标准，采用 STATA 17.0 进行 Meta 分析：检验异质性；计算汇总诊断比值比（DOR）、灵敏度（SEN）、特异度（SPE）、阳性似然比（+LR）、阴性似然比（-LR）、受试者工作特性曲线下面积（AUC）、验前验后概率及 95%可信区间。结果：纳入文献 15 篇，共含病例 639 例。MRI 合并敏感性、特异性及 95%可信区间分别为：0.97（0.95-0.98）、0.91（0.77、0.97）。MRI 合并 AUC 及 95%可信区间：0.98（0.96、0.99）。结论：MRI 对于产前诊断胎儿唇腭裂畸形具有极高的诊断价值，尤其是当超声诊断腭裂受到不利因素或不能明确的情况下，MRI 检查可作为首选的无创检查方法。

PU-0351

超重/肥胖儿童代谢相关脂肪性肝病的磁共振质子密度脂肪分数分布特点

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目的：探讨超重/肥胖儿童代谢相关脂肪性肝病（MAFLD）的磁共振质子密度脂肪分数（MRI-PDFF）分布特点。**方法：**前瞻性入组 2022 年 8 月至 2023 年 3 月在上海交通大学医学院附属新华

医院行上腹部 3.0T 磁共振 mDixon-quant 序列扫描的超重/肥胖儿童受试者 69 例。收集入组受试者基本信息及实验室检查结果。根据全肝加权平均 MRI-PDFF (PDFFwm) 将受试者分为正常肝脏、轻度脂肪肝、中度脂肪肝及重度脂肪肝。分析肝脏各段 MRI-PDFF (PDFFI-VIII) 及其与 PDFFwm 在脂肪肝诊断及分级中的一致性; 分析肝段间 PDFF 值的变异度及其与脂肪肝分级的关系。结果: 69 例入组受试者中确诊 MAFLD 患者 58 例 (占比 84.06%)。MAFLD 患者 PDFFwm 为 (20.23±10.16) %, 相较于其他肝段, PDFFVII 最高 (22.23±9.85) %。PDFFV 与 PDFFwm 组内相关系数最高 (ICC=0.988, $p<0.001$)。正常肝脏 (PDFF 范围=2.59%) 及轻度脂肪肝 (PDFF 范围=7.15%) 受试者肝内脂肪分布变异度低于中度脂肪肝 (PDFF 范围=11.14%) 及重度脂肪肝 (PDFF 范围=9.71%) 受试者, 组间差异具有统计学意义 ($p<0.001$)。在诊断有无脂肪肝方面, PDFFV 与 PDFFwm 一致性最高 (Kappa 值=1, $p<0.001$)。在肝脏脂肪变程度分级方面, PDFFV 与 PDFFwm 一致性最高 (Kappa 值=0.880, $p<0.001$)。结论: 超重/肥胖儿童 MAFLD 发病率较高。MAFLD 患者肝段间脂肪分布具有显著不均质性, 且段间变异度随脂肪变程度增加而增大。相较于其他肝段, PDFFV 更能代表全肝进行肝脏脂肪定量及分级诊断。

PU-0352

CT 低剂量扫描及后处理技术在婴幼儿气管非金属异物中的应用探讨

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目的 探讨多层螺旋 CT 低剂量扫描及其后处理技术在婴幼儿气管非金属异物中的诊断价值。方法 分析我院收治的 48 例被确诊为婴幼儿气管非金属异物患者的 CT 影像学资料。128 层螺旋 CT 扫描参数为 100 kV, 30~40 mA, 层厚 0.9mm, 螺距 1.4, 对获得的数据进行多平面重建 (MPR)、最小密度投影 (Min-IP) 及 CT 仿真内窥镜 (CTVE) 与支气管内窥镜结果对比分析。结果 48 例 CT 低剂量扫描图像全部符合诊断要求。CT 对异物的检出率和支气管内镜无统计学差异, 三种后处理技术中 MPR 与 Min-IP 无统计学差异, MPR、Min-IP 分别与 CTVE 比较有显著性差异, MPR 和 Min-IP 诊断的准确性高于 CTVE。结论 螺旋 CT 及后处理技术能准确诊断及定位婴幼儿气管内的非金属异物, 清楚显示出异物的大小和位置, 具有很高的实用价值。

PU-0353

新生儿缺氧缺血性脑病 MRI 分类与临床表现的相关性

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新生儿缺氧缺血性脑病 (HIE) 是新生儿常见且严重的疾病, 由于氧供不足或血液供应不足引起。磁共振成像 (MRI) 技术的发展为新生儿 HIE 的诊断和分级提供了重要手段。本文探讨了新生儿 HIE 的 MRI 分类与临床表现的相关性。通过回顾现有研究成果, 我们发现新生儿 HIE 的 MRI 分类通常根据损伤程度和分布进行。脑白质损伤和灰质损伤是主要表现形式, 且与临床症状和预后密切相关。脑白质损伤和混合型损伤的预后较差, 而灰质损伤的预后相对较好。新生儿 HIE MRI 分类在临床实践中应用广泛, 可为医生提供评估患者病情和选择合适治疗方案的依据。然而, 目前对于新生儿 HIE MRI 分类与临床表现的相关性还需进一步研究验证。通过深入探讨该相关性, 可为新生儿 HIE 的诊断和治疗提供更准确和有效的方法。

PU-0354

多学科联合诊治围产期十二指肠隔膜型闭锁一例

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本文报道了 1 例十二指肠隔膜型闭锁的诊治过程。此病例因“孕 32 周+1 于嘉兴市妇幼保健院行常规产前检查”。本院超声检查发现胎儿胃及十二指肠扩张呈“双泡征”，MRI 检查发现十二指肠隔膜，经过多学科会诊讨论，于 36 周+4 天平产，新生儿产后 2 天行外科手术，术中确诊十二指肠隔膜型闭锁，手术切除十二指肠隔膜，患儿术后恢复良好。随访半年，患儿各生长参数及神经系统发育检测均正常。因此，多学科团队联合诊治对十二指肠隔膜型闭锁患儿的诊断及预后具有重要意义。

PU-0355

骨龄测定在儿童生长发育中的应用价值

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目的：探究骨龄测定在儿童生长发育中的应用价值。

方法：资料随机选取本院 2022 年 1 月至 2022 年 12 月收集的 100 例健康儿童作为本次观察对象，采用中华 05 软件评分系统、TW3 评分法及 G-P 图谱法 3 种测评方法，对所有纳入对象骨龄进行检测。

结果：52 名健康男孩、女孩骨龄与年龄基本一致，差异无统计学意义($P>0.05$)。身材矮小、性早熟、生长激素缺乏症、甲状腺功能低下、体质性生长延迟、特纳氏综合征骨龄与年龄存在差异，差异有统计学意义($P<0.05$)。

结论：骨龄测定可以监测儿童生长发育情况，较早提示儿童内分泌相关疾病，骨龄测定对于儿童生长发育评估及诊断相应的疾病具有重要的意义。

PU-0356

Brain MRI imaging makers associated with death in children with central nervous system involvement of haemophagocytic lymphohistiocytosis

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Objectives To investigate the association of brain MRI variables, clinical variables, and underlying diseases with death in children with central nervous system involvement of hemophagocytic lymphohistiocytosis (CNS-HLH).

Methods Clinical and brain MRI data of children with CNS-HLH from January 2012 to March 2022 were reviewed retrospectively. Patients were divided into the deceased group and the surviving group. The inter-group differences of seven brain MRI variables, eleven major clinical variables, and underlying diseases were studied.

Results One-hundred-and-fourteen patients were included in this study, consisting of 59 who died and 55 who survived. The included clinical variables involving demographic data, neuropsychiatric presentations, and cerebrospinal fluid test, blood routine test, liver function,

coagulation function, and Diagnosis-MRI time interval did not show statistically independent correlation with patients' deaths. For MRI variables, a multivariate analysis demonstrated restricted diffusion of lesion (OR = 9.64, 95% CI: 3.39-27.43, $p < 0.001$) and count of affected brain regions (CABR) (OR = 1.24, 95% CI: 1.03-1.49, $p = 0.02$) were independent risk factors for death. ROC curve showed CABR (AUC = 0.79, 95% CI: 0.70-0.87, $p < 0.001$) highly predictive for mortality with an optimal cutoff value of 4.5 (sensitivity 76%, specificity 73%). For HLH subtypes, familial HLH (F-HLH, OR = 9.90, 95% CI: 2.01- 48.87, $p = 0.005$) and immune-compromise-related-HLH (IC-HLH, OR = 4.95, 95% CI: 1.40-17.46, $p = 0.01$) presented statistically stronger association with death than infection-related HLH. F-HLH and IC-HLH preferred to have large lesions, restricted diffusion, and more brain regions involved than other subtypes.

Conclusion Brain MRI features exhibit independent prediction for mortality in children with CNS-HLH, and HLH subtypes pose effects on patient outcomes and brain MRI findings.

PU-0357

手法按摩在空气灌肠治疗小儿肠套叠中的临床运用

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[摘要]目的：探讨手法按摩在空气灌肠治疗小儿肠套叠中的临床运用价值。方法：回顾性分析 2014 年 6 月至 2019 年 5 月间本人在我院行空气灌肠检查确诊肠套叠患儿 39 例（总计 62 例，阴性 23 例未入组），分为按摩组 18 例和对照组 21 例。并对计数结果采用 X² 检验。结果：总计行空气灌肠患儿 62 例，阳性 39 例，阴性 23 例，阳性率 62.9%。其中对照组 21 例，整复 18 例（一次成功 11 例，2-3 次成功 7），未整复 3 例，按摩组 18 例，整复 17 例（一次成功 16 例，2-3 次成功 1），未整复 1 例。Pearson 卡方检验 $P=0.044$ ，Fisher 精确检验 $P=0.036$ ， P 值均 <0.05 ，具有统计学差异。结论：手法按摩联合空气灌肠在整复成功率及一次成功率上均优于传统的未采用手法按摩空气灌肠，具有实际临床运用价值。

PU-0358

儿童十二指肠血肿的影像学诊断价值

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【目的】 探讨儿童十二指肠血肿的影像学特点及预后。

【方法】 回顾性分析我院 2016 年 6 月至 2023 年 6 月收治的 15 例十二指肠血肿患儿的临床及影像学资料。年龄 3~13 岁，其中男性 10 例，女性 5 例。所有患儿均有外伤史，经临床或手术探查证实，其中 13 例行 CT 检查，2 例行 MRI 检查。

【结果】 所有病灶均单发，呈类圆形或长椭圆形，位于十二指肠降部 3 例，水平部 5 例，两者都累及 7 例，合并有肠梗阻 5 例。CT 平扫呈不均匀等高密度包块，“融冰征”5 例，“空气裂隙征”3 例，MRI 平扫病灶 T1WI 呈稍高混杂信号，T2WI 呈低或等高信号；增强扫描病灶内均无强化，4 例伴有血肿壁强化。其中 11 例患儿伴有胆总管轻度扩张。

【结论】 对于十二指肠壁内血肿患儿，早期诊断至关重要。典型的影像学表现，有助临床医生找到最佳的治疗方法。

PU-0359

儿童神经母细胞瘤的研究思路及进展

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影像组学和深度学习的兴起为神经母细胞瘤的精准诊断和预后预测提供了一种有价值 and 前景的研究方法和手段。影像组学这一概念的核心,是从 CT、MRI 等影像学图像的感兴趣区中高通量的提取高维特征(如一阶直方图、二阶纹理以及经小波变换、高斯拉普拉斯算子等滤波转换的高阶特征),并将筛选的特征与患者生物标志物、临床表现或预后等相关联,从而有助于在体外非侵入性的对疾病的分子及病理亚型进行诊断与鉴别诊断,甚至预测疾病的发生发展。

神经母细胞瘤沿交感神经链走行分布,是儿童常见的实体肿瘤,约占儿童肿瘤的 7.3%。神经母细胞瘤绝大部分发生于颅外,但也偶出现于颅内,其中 48%位于肾上腺,25%位于腹膜后间隙,16%位于纵隔,3%位于盆腔,3%位于颈部。除了可局限于一个解剖部位,神经母细胞瘤也可沿着交感神经链走行而联合多个解剖部位发生。

神经母细胞瘤异质性强,可自发消退或恶性进展,具有多种组织病理类型,不同病理亚型及不同部位起源的神经母细胞瘤临床表现及预后差异很大,治疗方式的选择也存在较大不同。目前,临床多以危险度分层治疗神经母细胞瘤。尽管随着放化疗、免疫治疗和手术等治疗方式的综合应用,神经母细胞瘤的预后已有极大改善,但高危及难治复发性神经母细胞瘤的预后仍较差,长期生存率不足 50%。

影像学检查在神经母细胞瘤的定性诊断及明确术前解剖关系中具有重要价值。然而,由于神经母细胞瘤的生物学特征复杂,单纯从影像学上较难鉴别不同类型的神经母细胞瘤。

相对于影像学上传统的视觉分析,影像组学有助于准确、客观、定量的评价病变状态。因此,以影像组学和深度学习为基础的人工智能,有望为儿童神经母细胞瘤的病理鉴别、基因分型、疗效评估和预后预测提供一种无创可靠的工具和方法。

PU-0360

国人儿童正常主动脉的多排螺旋 CT 测量

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目的 利用 CT 数据建立健康儿童主动脉各主要层面的有效主动脉直径标准。

方法 选取胸腹部 CT 增强扫描检查无主动脉疾病及其他相关疾病的儿童 200 名,按年龄分为 5 组,测量双斜位重建的胸主动脉、腹主动脉和髂总动脉的多个水平上的有效主动脉直径。最小二乘法用于研究具有各种功能形式的模型,这些模型将每个水平上的有效直径与患者体表面积(BSA)和性别相关。

结果 200 例胸腹部增强 CT 检查,年龄 0~16 岁(平均 9.9 岁,标准差 5.7),BSA 范围为 0.19~2.52m²。具有良好的信度(相关系数为 0.95~0.98)。最佳模型为有效直径的自然对数变换的多项式回归模型,该模型包括线性、二次和三次 BSA 项以及作为主要变量的性别主效应。Z 分数是利用观察到的和预期的有效直径和均方误差计算的。

结论 本研究初步得到不同年龄段儿童主动脉多节段的相关正常值,正常范围外的测量结果与动脉瘤或主动脉发育不良相符,有助于诊治儿童主动脉的相关疾病。

PU-0361

复杂型先心病合并大血管畸形的冠脉与胸腹部 大血管联合 CTA 一例

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目的 诊断胸腹联合 CTA 诊断复杂型先心病合并大血管畸形的冠脉与胸腹部血管。方法 应用西门子 SOMATOM Drive 双源 CT 对复杂型先心病合并大血管畸形患者进行胸腹联合 CTA 扫描。结论 SOMATOM Drive 双源 CT 清楚了显示了患者心脏的病变情况和畸形血管, 对患者手术治疗前的规划, 防止术中损伤血管有非常大的帮助。

PU-0362

新生儿先天性马蹄肺合并胸主动脉扭曲畸形 CT 表现 1 例

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该文报道 1 例新生儿先天性马蹄肺合并胸主动脉扭曲畸形的多层螺旋 CT 表现。患儿生后紫绀, 呼吸急促。CT 表现为在脊柱前方心影后方两下肺峡部肺组织相连, 伴左肺发育不良, 完全性肺静脉异位引流, 永存左上腔静脉, 主动脉弓发育不良, 降主动脉走行迂曲、延长, 动脉导管走行迂曲。

PU-0363

儿童中重型创伤性颅脑损伤影像学表现分析

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[摘要] 目的 回顾性分析儿童中重型创伤性颅脑损伤的病因及影像学表现, 探讨影像检查对儿童创伤性颅脑损伤的应用价值, 分析各年龄段致伤因素与阳性影像表现之间的关系。方法 收集 2018 年 1 月—2019 年 12 月 130 例中重型创伤性颅脑损伤患者的临床影像资料, 对致伤因素、病变类型、病变影像学特征和病变分布进行回顾性分析。结果 中重型创伤性颅脑损伤最常见致伤因素为道路交通伤、坠落伤。脑挫裂伤 130 例中, 坠落伤所致脑挫裂伤各部位受损概率依次为额叶、顶叶、颞叶, 交通伤所致脑挫裂伤各部位受损概率依次为颞叶、额叶、顶叶。颅骨骨折 86 例中顶骨 51 例。弥漫性轴索损伤 17 例, 部位分布主要为额叶、颞叶、胼胝体压部。结论 儿童中重型创伤性颅脑损伤在致伤因素、病变类型、影像特征等方面有其自身特点, 以脑挫裂伤和弥漫性轴索损伤为主要表现; 不同致伤因素所致的脑挫裂伤, 损伤部位出现的概率不同, 同时, 骨折主要发生在顶骨。CT 不能明确的可疑脑损伤应进一步行 MRI 检查。

PU-0364

低危高胆红素血症新生儿苍白球 T1WI 信号改变与血清总胆红素值的相关性研究

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[摘要] 目的 探讨低危高胆红素血症新生儿苍白球在磁共振成像 T1WI 信号改变与血清总胆红素(TSB)的关系。方法 回顾分析 117 例低危高胆红素血症新生儿磁共振图像及临床资料,根据 TSB 值分为 I ~IV 组,对苍白球 T1WI 信号进行定量采集,分析苍白球 T1WI 信号强度值、苍白球/尾状核头部 T1WI 信号强度值比值与总胆红素(TSB)值关系。结果 总胆红素(TSB)值与苍白球 T1WI 信号强度值、苍白球/尾状核头部 T1WI 信号强度值比值之间存在直线相关关系,差异有统计学意义。结论 苍白球 T1WI 信号强度值、苍白球/尾状核头部 T1WI 信号强度值比值在评估高胆红素血症急性脑损伤有参考意义,苍白球/尾状核头部 T1WI 信号强度值比值更具客观准确性。

PU-0365

眼脑肾综合征--影像与临床诊断思维总结

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目的:眼脑肾综合征是一种罕见的 X 连锁隐性遗传病,发病率极低,约为 1/50 万,大家认识不足,正确诊断比较困难,需结合临床及影像系统分析其特点,方能做出正确诊断,为早期精准治疗做基础。

方法:一 8 岁男童经基因检测确诊为眼-肾-脑综合征,收集其病史,检查结果,治疗过程,查阅中英文文献报道,系统汇总该疾病临床影像特点。

结果:该患儿足月顺产,出生无窒息史,其母亲及外婆均患先天性白内障,父亲患类风湿关节炎,患儿自出生后智力发育迟缓,生活不能自理,行为障碍,但可与医生进行基本对答。患儿出生后 3 个月行白内障手术,7 岁行马蹄内翻足手术,8 岁行隐睾手术。近日因发烧,呕吐,腹痛,无尿入院,生化检查提示高钾低钠血症,代谢性酸中毒,低氯低磷高氨血症。超声提示:双肾髓质钙沉积,双肾实质弥漫损害。X 线提示双肺渗出。MR 提示双侧大脑半球皮层下,半卵圆中心,基底节区,侧脑室白质区多发片状 T2-FLAIR 高信号,幕上脑室系统扩张伴脑室旁水肿,双侧侧脑室体旁多发增宽 V-R 间隙。腹部 MR 提示胰腺肿胀,T1 信号减低,T2 信号不均匀增高。

结论:眼脑肾综合征又称 Lowe 综合征,是以先天性白内障,智能低下,肾小管酸中毒为主要临床特征的遗传性疾病,属于多系统氨基酸代谢病。该病与 OCRL 基因突变有关,大部分为男性患儿,目前无法治愈。1.患儿出生时肌张力降低,出生后一年内出现白内障或者青光眼。2.MR:新生儿脑白质髓鞘化延迟,皮层下侧脑室周围白质血管周围间隙扩张并胶质增生,呈进展性,该征象具有一定特征性。3.进展性肾小管型蛋白尿,高钙尿性肾结石,后期肾损伤,代谢性酸中毒。以上 3 点是其主要诊断依据,临床工作中遇到需要考虑该病。据文献报道部分患儿有骨畸形,佝偻病,隐睾,脐疝。我们从这例病人影像资料中发现胰腺水肿,双肺渗出,这是文献中没有报道的,查阅资料考虑为代谢性酸中毒所诱发的胰腺实质渗出,肺水肿,需要在临床中注意。

PU-0366

多层螺旋 CT 在儿童塑型性支气管炎早期诊断的价值研究

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目的：探讨儿童塑型性支气管炎（PB）的肺部 CT 影像特征，提高对塑型性支气管炎的认识，为临床早期诊断与精准治疗提供帮助。

方法：回顾性分析 2018 年 1 月至 2022 年 2 月我院收治的儿童肺炎病例，以纤维支气管镜的检查结果作为金标准，按照是否发现塑型性痰栓分为观察组（PB 组）与对照组（非 PB 组），每组随机抽取 50 例。分析两组患者的 CT 影像资料，并把影像图像特征按预设的评分标准转换为计量资料（评分），评估各项 CT 影像特征与图像特征总分的诊断价值。采用 IBM SPSS Statistics 26 统计学软件进行统计学分析，所有统计结果以 $P < 0.05$ 为标准，判断有无统计学意义。

结果：

两组患者的肺部 CT 影像资料按设定的要求转化为评分后进行统计分析，发现：PB 组更常出现胸腔积液、肺不张或肺实变，差异具有统计学意义。病变分布情况，PB 组平均累及 1.29 个肺叶，非 PB 组平均累及 1.98 个肺叶，PB 组病灶更集中且出现单个肺叶大面积病灶的几率更高。病灶的体积变化，PB 组 72% 表现为增大，非 PB 组体积变化无明显特征，差异具有统计学意义。病变的密实程度评价：病变测得的 CT 值更高，CT 值方差更小，PB 组的病变含气更少、更密实，差异具有统计学意义。病变的气管形态，PB 组近端气管和病变支气管所属分支支气管的堵塞、狭窄程度均高于对照组，差异具有统计学意义。图像总分（21 分）PB 组总分（ 16.32 ± 2.889 分）明显高于非 PB 组（ 10.30 ± 3.694 分），差异具有统计学意义。

结论：

儿童塑型性支气管炎的 CT 征象对诊断具有很大的提示意义，常表现为病变支气管几乎完全堵塞，所属病变范围呈饱满的、密度均匀的、密实的、几乎没有下级支气管显影的大片状软组织密度影，常伴有胸腔积液。

PU-0367

儿童卡波西样淋巴管瘤病的影像学特征

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目的：儿童卡波西样淋巴管瘤病是一种罕见的、复杂的侵袭性淋巴管疾病，由于表现的体征和症状多样，卡波西样淋巴管瘤病常被误诊或诊断较晚。卡波西样淋巴管瘤病的影像学表现特征可与中央传导淋巴异常和全身性淋巴异常重叠。目前关于卡波西样淋巴管瘤病的少数病例报告主要强调临床和组织病理学表现，对影像学表现的描述较少。因此，本研究的目的是分析卡波西样淋巴管瘤病的影像学特征，以提高对该病的诊断和鉴别诊断水平。

方法：回顾性分析了 2013.06-2023.06 经我院收治的 8 例经组织病理学诊断为卡波西样淋巴管瘤病的儿童患者的临床及影像资料，8 例患者均行 CT 平扫+增强检查，4 例患者行 MR 平扫+增强检查。对其影像特点进行总结分析。

结果：该病中位发病年龄为 5 岁 3 月，无明显性别差异。最常见的表现特征为呼吸系统损害（呼吸困难、咳嗽）、出血和软组织肿块。临床病程具有典型的侵袭性，以出血、血小板减少、纤维蛋白原水平降低为特征。所有患者均有纵隔受累，并出现胸腔积液及心包积液，其次是肺部受累，以肺间质性改变为主。胸外疾病可以累及腹膜后、脾脏、淋巴结及脊柱。卡波西样淋巴管瘤病的特征性

的影像表现为：（1）纵隔、肺门、支气管血管束周围、小叶间隔等多部位受累且病变相互延续，病变几乎都累及双侧；腹膜后受累常见；（2）CT 平扫上病变呈低密度，增强无明显强化；在 MR 上病变呈 T1 低、T2 高信号影，增强亦无明显强化；MR 显示病变更加清晰，定性更准确；（3）病变包绕邻近血管，几乎无压迫、推移血管；（4）多伴有胸腔积液、心包积液；（5）脾脏受累多见，胸腺亦可受累；（6）可合并单个或多个椎体受累；（7）可伴有颈部、腋下、腹膜后或腹股沟区淋巴结肿大。

结论：儿童卡波西样淋巴管瘤病与中央传导淋巴异常和全身淋巴异常的影像学特征重叠。纵隔或腹膜后见沿淋巴分布的浸润性软组织疾病，伴有出血性积液和中度血小板减少有利于卡波西样淋巴管瘤病的诊断。

PU-0368

探讨磁共振(MRI)全身背景抑制弥散加权成像(DWIBS)结合全身短反转恢复脂肪抑制序列 (STIR) 在儿童血液系统恶性肿瘤预后评估的应用价值

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目的：全身背景抑制弥散加权成像 (DWIBS)，是一种可用于全身检查的核磁共振成像技术，尤其可以较好的显示转移病灶、淋巴结及骨骼系统病变，其无辐射、可重复率高的特点对儿童血液病患者检查有着独特的优势。本研究的目的是分析磁共振(MRI)全身背景抑制弥散加权成像(DWIBS)结合全身短反转恢复脂肪抑制序列 STIR 在儿童血液系统恶性肿瘤的病变检出特异性及敏感性，分析其在儿童血液系统恶性肿瘤预后评估的应用价值。

方法：收集 2 年就诊于山西省儿童医院的对怀疑为儿童血液恶性肿瘤且有转移的患儿共 50 例，行全身背景抑制弥散加权成像(DWIBS)扫描及全身短反转恢复脂肪抑制序列 (STIR)，扫描完成后进行 MPR 及 MIP 后处理，对图像进行分析。研究 DWIBS 诊断儿童血液系统恶性肿瘤病变检出的灵敏度、特异度、约登指数、阳性预测值及阴性预测值和 ROC 曲线下面积。

结果：通过对 DWIBS 结合全身 STIR 序列结果与手术或穿刺病理结果进行对照。使用 SPSS 22.0 软件包进行 χ^2 检验、Kappa 一致性检验比较分析，差异具有统计学意义($P<0.05$)。

结论：经过我们对 50 例患儿扫描图像的研究，综合分析结合 DWIBS 技术及全身 STIR 序列的优势，能很好地显示发现儿童血液系统恶性肿瘤原发肿瘤及其可能的转移部位。有望成为未来儿童血液系统恶性肿瘤筛查及预后评估的有效手段，能够有效指导临床进一步治疗，并对临床治疗效果进行评价。

PU-0369

3.0T MRI T2Mapping 序列对 0~5 岁正常儿童髋关节软骨评估的探索性分析

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[摘要] 目的：利用 3.0T MRI T2Mapping 序列对 0~5 岁正常儿童髋关节软骨行磁共振扫描并量化分析，探究 5 岁以下不同阶段髋关节软骨 T2 值变化规律及相关因素分析，初步建立 0~5 岁正常儿童髋关节软骨 T2 值的参考范围。方法：收集发育正常儿童 98 名，其中男 46 名，女 52 名。根

据年龄分成 5 组：0~<1 岁 16 名，1~<2 岁 22 名，2~<3 岁 19 名，3~<4 岁 25 名，4~<5 岁 16 名。分别对所有儿童行髌关节常规序列、T2-mapping 序列扫描，在髌臼软骨及与其对应的股骨头软骨划分上、前、后三个区域，共 6 个亚区，测量其 T2 值。观察分析组间及组内不同亚区 T2 值的差异并计算其正常值范围，分析相关因素。结果：0~5 岁正常儿童髌关节软骨，不同性别各亚区间 T2 值比较差异均无统计学意义（均 $P>0.05$ ）。左、右两侧对应亚区 T2 值比较差异均无统计学意义（均 $P>0.05$ ）。不同髌关节亚区各年龄组 T2 值比较，年龄组间 T2 值差异有统计学意义（均 $P<0.05$ ）。结论：3.0T MRI T2 mapping 序列能定量分析儿童髌关节软骨 T2 值，0~5 岁正常儿童髌关节软骨各亚区软骨 T2 值与年龄相关，与性别和左右无关。

PU-0370

婴幼儿新型冠状病毒脑损伤 MRI 影像表现

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[摘要] 目的：总结婴幼儿新型冠状病毒肺炎脑损伤 MRI 影像表现。方法：回顾性收集 2022 年 11 月-2023 年 2 月甘肃省妇幼保健院确诊的新型冠状病毒感染合并头颅 MRI 异常患儿共计 18 例，记录患儿发病部位、信号特点，记录患儿的基本临床信息及实验室检查数据。结果：本研究共收集符合新型冠状病毒肺炎脑部 MRI 异常表现的患儿共计 18 例，其中包含男性患儿 12 例（12/18），女性患儿 6 例（6/18），年龄 5 天-12 岁，中位年龄 1 岁；临床表现为发热 14 例，抽搐 16 例，头痛 5 例（部分小龄患儿无法表述），呕吐 4 例，腹泻 3 例，嗜睡 6 例，除 2 例婴儿血氧含量大于 95%，其余均 $\leq 95\%$ ；18 例患儿的头颅 MRI 影像共发现病损部位 106 处，多呈对称性分布（12/18），丘脑 6 例共 12 处，壳核及脑干均发生 5 例共 10 处，苍白球及尾状核均发生 4 例共 8 处，大脑皮层受累 5 例。所有病灶均表现为 T1WI 稍低信号，T2WI 稍高信号，Flair 序列为高信号，DWI 高信号，13 例 ADC 图为低信号（13/18），5 例 ADC 图为高、低混杂信号，所有患儿 T1WI 序列均未发现明显出血性 T1WI 高信号。结论：婴幼儿 COVID-19 脑损伤与 SARS-CoV-2 直接感染、ACE2 相关血管内膜损伤及炎症因子风暴等多重因素作用相关，主要累及大脑深部核团，多呈对称性分布，脑干及大脑皮层亦可累及，可导致严重的神经系统症状，MRI 在婴幼儿 COVID-19 脑损伤的早期识别及动态监测中具有重要临床价值，可为临床治疗决策的制定提供精准影像支持。

PU-0371

儿童肝脏未分化胚胎性肉瘤的影像表现及病理分析

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目的 分析儿童肝脏未分化胚胎性肉瘤（UESL）的超声、CT 及 MRI 影像学表现，结合病理情况分析，探讨其影像学特点，以提高对该病的认识水平，从而能够早期诊断、积极治疗。

方法 回顾性搜集 2009 年 12 月至 2021 年 12 月期间经手术及病理证实的 11 例儿童 UESL，男 5 例，女 6 例；年龄 3 岁~12 岁，中位年龄 8 岁。分析所有患儿的超声、CT 及 MRI 影像表现，总结其影像学特点。

结果 病灶均为单发，其中 7 个病灶位于肝右叶，位于左叶 2 个，累及左右两叶 2 个；肿块最大径 11.5~19.8cm，中位最大径长 14.6cm。CT 平扫显示为所有 11 例病灶边缘较清楚、其内呈不均匀低密度，5 例病变为单发囊腔结构，6 例为多房囊腔，内可见厚薄不均的分隔；囊性密度区边缘或分隔周围可见少许不规则片絮样软组织密度影。6 例超声图像均提示实性占位，表现为混合回声的实性包块内可见大小不等的无回声区。MR 表现为边界清楚肿块影，T1WI 呈不均匀混杂低信号，

病灶内可见条状/大面积高信号区；T2WI 呈混合高信号区和条状低信号区。增强扫描动脉期 9 例病灶呈轻度或中度不均匀的条带/片絮状强化，均以边缘强化为主，8 例可见迂曲增粗血管影；延迟期病灶呈持续不均匀强化，边缘持续强化，且从外围向中心充盈，强化范围增大，8 例延迟期可见假包膜。

结论 儿童 UESL 临床罕见，术前容易误诊，影像学表现有一定特征性，多表现为边界清楚的单囊或多囊性病灶，内有不同程度的实性部分，边缘可见强化动脉影；而超声图像则多提示为实性为主病灶，其不一致性亦为本病的重要特点，了解其影像特点，结合临床特征，有助于早期诊断。

PU-0372

The Quantitative Parameters derived from IDEAL-IQ in lumbar vertebral of healthy children: A Pilot Study of bone development

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Background: The children's bone development in early childhood affects bone disease in adolescence and adulthood. Many diseases can affect the cancellous bone or bone marrow. Therefore, it is of great significance to quantifying bone development of healthy children.

Purpose: To improve our understanding of the bone development on healthy children using the quantitative parameters derived from IDEAL-IQ.

Materials and Methods: This prospective study enrolled participants of healthy children between January 2022 to December 2022 consecutively. Participants underwent MRI scans using IDEAL-IQ sequence in the lumbar vertebral. Participant ages and gender were collected. The IDEAL-IQ parameters (PDFF, $R2^*$) were obtained. The Factor analysis of variance (ANOVA) was applied to compare the differences of PDFF and $R2^*$ in different lumbar vertebral groups. The Kruskal-Wallis H test or Mann-Whitney test was applied to compare the differences of quantitative data among different groups. And Spearman correlation analysis was applied to study the relationship between the gender and PDFF, $R2^*$.

Results: 145 participants (76 male, 69 female) were evaluated. There were no significant differences were observed in PDFF and $R2^*$ in different lumbar vertebral ($P < 0.05$). The average age was 36(13-72) months. They were assigned into four groups(0-11 months, 12-35 months 36-71 months and 72-144 months). As the age increased, the average PDFF and $R2^*$ both increased significantly ($P < 0.05$). There were significant statistical differences in PDFF and $R2^*$ between the four groups($P < 0.05$). Moreover, the PDFF was also positive correlated with $R2^*$ ($P < 0.05$). No association was found between the gender and PDFF, $R2^*$.

Conclusion: The quantitative parameters derived from IDEAL-IQ in lumbar vertebral of healthy children will improve our understanding the bone development and provide a basis for further exploring the diseases that affect children's bone development.

PU-0373

小儿努南综合征的心脏磁共振成像:与非综合征性肥厚性心肌病的比较

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目的:努南综合征(N Noonan syndrome, NS)是一种罕见的遗传性心肌病伴常染色体显性遗传病,以明显的面部畸形、生长衰竭和广泛的心脏异常为特征。我们的研究旨在通过与非综合征性肥厚性心肌病(HCM)的比较来评估小儿 NS 的心脏磁共振成像(MRI)特征。

方法:2010 年 9 月至 2021 年 8 月,纳入 10 例经基因检查确诊为 NS 的幼儿。所有患者均行心脏 MRI 综合评估,包括延迟钆对比剂增强成像(LGE)、T1 mapping 和心肌应变,并与经基因确诊的 HCM 进行比较。

结果:10 例 NS 患儿中,女性 7 例,中位年龄 2.9 岁,年龄范围 4 个月~ 6 岁。5 例 NS 患者出现肺动脉瓣狭窄。与非综合征型 HCM 相比,NS 双室肥厚和双室流出道梗阻的发生率更高,但非综合征型 HCM 的不对称肥厚更为明显。NS 检测到特征性 LGE 模式,前壁和前外壁心内膜下 LGE,原始 T1 和细胞外体积 (ECV) 升高(分别为 1282.6ms 和 28.7%)。与非综合征型 HCM 相似,整体收缩峰值径向、周向、纵向应变(中位数, 22.44%;-14.16%;-7.51%), NS 组左室均受损。

结论:综合评价 NS 相关的心脏异常定义了 MRI 在小儿 NS 中的重要作用。特征性的 LGE 模式,以及肺动脉瓣狭窄和双心室肥厚的功能和形态学成像,有助于 NS 的诊断。经 ECV 升高证实的间质纤维化和心肌变形受损也在 NS 中发现。

PU-0374

探讨容积 CT 在儿童鼻窦扫描中的应用

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目的:探讨 320 排低剂量容积 CT 在儿童鼻窦扫描中应用价值。

方法:收集我院 2023 年 4 月至 7 月行鼻窦、鼻咽部 CT 检查的儿童 60 例,分为螺旋扫描 30 例,容积扫描 30 例。均经监护人同意签署知情同意书,检查期间对患儿各腺体进行了有效辐射防护。两组扫描采用相同的参数:100kV、150mA、转速 0.5s、重建算法 FC35、迭代技术 AIDR3D;不同参数:螺旋扫描:螺距 0.5*160mm,容积扫描:螺距:0.5。所有患儿均记录基本信息:年龄(y)、身高(m)、体重(kg)、BMI 指数、CT 容积剂量指数(CTDIvol)、剂量长度乘积(DLP)、曝光时间(S)。在 PACS 工具栏测量翼内肌肌肉 CT 值和 SD 值,得出 SNR 值,并已同层脂肪组织 CT 值和 SD 值对比噪声计算翼内肌的 CNR 值,并记录相关数值,感兴趣区(ROI)的大小约 8-12mm²。由两名高年资主治医生对鼻窦解剖结构清晰度、伪影噪声大小、及病变显示对图像质量进行评判,将图像分为较好、优良、良好、不合格 4 个等级:螺旋扫描较好 23 例、优良 4 例、良好 3 例、不合格 0 例;容积扫描较好 27 例、优良 3 例、良好 0 例、不合格 0 例。采用 spss26.0 软件进行统计学分析。

结果:两组患儿年龄(y)、身高(m)、体重(kg)、BMI 指数无统计学差异($P>0.05$),CTDI、DLP、曝光时间均具有明显的统计学差异($P<0.05$),容积扫描 CTDI、DLP、DE、曝光时间较螺旋扫描分别降低 15.21%、52.08%、53.77%、74.43%。图像客观评价均无统计学差异($P>0.05$),主观评价两组图像略有统计学差异($P<0.05$),容积图像优于螺旋图像 3%。

结论:在儿童鼻窦 CT 扫描时,容积扫描优于螺旋扫描,在降低辐射剂量,缩短曝光时间同时,又提高图像质量,对软组织、骨质边缘显示较好,具有明显临床应用价值。

PU-0375

探讨容积 CT 在幼儿胸部扫描中的优势

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目的：探讨 320 排容积 CT 在幼儿自由呼吸状态下胸部扫描中的应用优势。

方法：前瞻性收集 40 例有呼吸道症状和体征需进行胸部 CT 扫描患儿。将患儿分两组：均在清醒状态自由呼吸下扫描：A 组螺旋扫描，B 组容积扫描，两组均采用：准直器宽度为 160mm、转速 0.275s/r、100Kv、智能 mA、重建算法 FC35、迭代技术 AIDR3D，螺距为：螺旋 0.5*80mm、容积：0.5mm；所有患儿均记录基本信息：年龄（y）、身高（m）、体重（kg）、BMI 指数、CT 容积剂量指数（CTDIvol）、剂量长度乘积（DLP）、曝光时间（S）。在软组织窗（1mm）分别测量主肺动脉窗层面：主动脉、肌肉及邻近脂肪 CT 值和 SD 值并纪录，以同层脂肪为背景噪声计算主肺动脉 SNR 值并记录，感兴趣区（ROI）的大小均约 8-12mm²。肺窗（1mm）由两名高年资主治医师以上医生进行主观评价，评价内容：肺窗支气管血管束、心肌及膈肌运动伪影，软组织窗评价纵隔及胸壁，对比度、清晰度、噪声及纵隔血管波动伪影，分别对肺窗和纵隔窗图像质量进行 5 分法评分：（≥3 分达到诊断要求，<3 分不能达到诊断要求）。统计学使用 spss26.0 进行统计学分析。

结果：两组患儿的基本信息均无统计学差异（ $p>0.05$ ）；两组患儿 CTD、DLP：具有统计学差异（ $p<0.05$ ），且 DLP 显著，容积扫描均低于螺旋扫描 5.13%、44.23%；曝光时间（s）：具有统计学差异（ $p<0.05$ ），容积扫描较螺旋扫描缩短 87.5%；两组图像客观评价及主观评价：无统计学意义（ $p>0.05$ ）。

结论：320 排容积 CT 在幼儿自由呼吸状态下胸部扫描中容积扫描优于螺旋扫描，在保证图像质量的条件下，大幅度降低辐射剂，缩短了扫描时间，为更好保护幼儿生长发育提供良好的条件，具有明显临床应用价值。

PU-0376

血管内栓塞治疗异常体动脉供应正常左下肺基底段 2 例报导

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目的 探讨异常体动脉供应正常左下肺的临床表现及影像诊断和治疗.方法 回顾我院收治的 2 例异常体动脉供应正常左下肺病例.结果 患者行介入栓塞治疗后恢复良好,未出现并发症.结论 异常体动脉供应正常左下肺当左下肺有相对稀疏的肺动脉供血时运用介入栓塞异常体动脉疗效确切；与隔离肺明显不同。

PU-0377

改良儿童肺动脉 CT 血管造影技术的可行性研究及临床应用

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目的：改良儿童肺动脉 CT 血管造影技术，优化 CT 扫描方案，获取最佳成像参数。方法：采用 GE Revolution CT 对疑诊肺动脉栓塞的 20 例患儿行肺动脉 CT 血管造影，选取相同的监测层面、造影剂浓度、注射速率、延迟时间以及扫描条件随机分成 4 组。A 组采用心电门控，下肢静脉团注

造影剂；B 组采用心电门控，上肢静脉团注造影剂；C 组不采用心电门控，下肢静脉团注造影剂；D 组不采用心电门控，上肢静脉团注造影剂。扫描完成，所有图像传至后处理工作站进行 VR 和 MIP 重建，4 组图像按照 4 个等级评估肺动脉成像的图像质量，并进行统计学分析。结果：各实验组图像质量不完全相同，A 组与 B、C、D 组间有明显统计学差异且图像质量均为优，B 组与 C 组间无明显统计学差异且图像质量均为良和中，D 组图像质量均为中和差。结论：因儿童心率快循环快的生理特点，采用心电门控，下肢静脉团注造影剂，可以有效避免心脏搏动伪影和线束硬化伪影，从而获取更为清晰的高质量图像，有利于病变的明确诊断，降低误诊率，颇具推广应用价值。

PU-0378

影像组学鉴别儿童化脓性和结核性淋巴结炎

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目的：通过 CT 影像组学模型和人工识别，鉴别儿童颈部伴有坏死的化脓性淋巴结炎与结核性淋巴结炎。方法：收集在我院进行 CT 增强检查且确诊为颈部伴有坏死的化脓性淋巴结炎（n=52）及结核性淋巴结炎（n=49）的儿童临床及影像资料，分析两组患儿的 10 个主要征象的统计分布差异，并应用影像组学平台进行图像分割、特征值提取和降维、特征选择和模型构建。结果：两组患儿的最大坏死结短径、淋巴结边缘是否清楚、淋巴结有无融合、坏死区边缘是否规则、坏死区是否有分隔、淋巴结钙化、未坏死区强化程度这 7 个征象存在两组间统计学差异。从增强静脉期图像中提取，降维后筛选出 9 个相关特征。其中 SVM 模型 AUC、准确率、敏感性、特异性分别为 0.89（95% CI: 0.72-1.00）、0.88、0.78、0.90。在区分化脓性淋巴结炎和结核性淋巴结炎方面取得了良好的分类性能。结论：儿童颈部伴有坏死的化脓性淋巴结炎和结核性淋巴结炎的 CT 表现结合发病年龄和影像组学模型对鉴别两者具有重要价值。

PU-0379

儿童 PANK2 基因突变所致苍白球黑质红核色素变性病一例及文献复习

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目的 探讨苍白球黑质红核色素变性的特异临床及影像表现、发病机制和诊治方法等，提高临床医生对该病诊疗能力。方法 分析本院 2020 年收治 1 例儿童 PANK2 基因突变所致苍白球黑质红核色素变性患者的临床资料及其典型影像学特点，检索国内外相关文献并进行复习。结果 患者查体为急性起病，突发不自主运动 10 天，发现言语欠清、四肢扭转痉挛、共济失调，走路不稳，易摔倒。头颅 MR 检查可见双侧苍白球对称性中央内侧高信号，周边低信号，呈典型“虎眼征”。基因检测患儿系泛酸激酶 2（PANK2）基因有错义突变，临床诊断为苍白球黑质红核色素变性。使用激素、丙种球蛋白等治疗后患者症状未见明显缓解。结论 苍白球黑质红核色素变性临床表现多样，主要表现为锥体外系症状。典型苍白球黑质红核色素变性均有 PANK2 基因突变，MRI 表现为“虎眼征”，该病的诊断主要依靠头颅 MR 和基因检测等。目前对于苍白球黑质红核色素变性的治疗尚无特效药，均为对症治疗，对本病的治疗和预防暂未达成广泛共识。

PU-0380

基于临床及影像征象诺莫图鉴别儿童软组织横纹肌肉瘤和神经母细胞瘤

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英文摘要, 提示超过 800 无法上传, 故完整摘要以附件形式上传

Objectives: To develop a nomogram predictive model based on clinical, CT, and MRI parameters to differentiate soft tissue rhabdomyosarcoma (RMS) from neuroblastoma (NB) in children preoperatively....

PU-0381

儿童肝脏肿块病变的多层螺旋 CT 平扫及增强扫描诊断与鉴别诊断

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目的: 为了加强对儿童肝脏肿块病变的 CT 诊断与鉴别诊断的认识, 对该区肿块病变的影像表现进行分析, 可准确显示肿块的具体部位、大小、浸润范围、影像特点及转移情况, 为肿瘤的临床分期、制定治疗方案、估计预后提供重要依据。

方法: 回顾性分析经手术病理证实且均行多层螺旋 CT 增强扫描的 95 例儿童肝脏肿块病变的影像表现及临床、病理资料。

结果: 95 例儿童肝脏肿块中, 恶性肿瘤包括 63 例肝母细胞瘤, 6 例肝细胞瘤, 4 例未分化胚胎肉瘤, 3 例肝脏转移瘤, 4 例其他少见肿瘤; 良性肿瘤包括 7 例婴儿型血管内皮瘤, 2 例间叶性错构瘤, 5 例局灶性结节样增生。

结论与讨论: 儿童肝脏肿块病变具有恶性肿瘤发生率高, 先天性肿瘤多见, 有明显的好发年龄段的特点。患儿年龄、临床表现和体征, 以及血清甲胎蛋白水平是评价肝脏病变的关键指标。影像学检查在明确肝脏肿块病变的具体发生部位、提示肿瘤良恶性及肿瘤分级方面具有重要的参考价值。另外, CT 在显示肿瘤的钙化明显优于其他的影像学检查。目前, 手术切除技术的不断提高使之成为儿童肝脏肿瘤治疗的重要手段。因此, 提高对肝脏肿瘤的显示和分期水平, 以及对肝段解剖的准确划分和肿瘤累及范围的明确界定, 均有助于临床医生选择理想的治疗方式。

PU-0382

儿童侧脑室三角区肿瘤的 MRI 影像表现

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目的: 为了加强对儿童侧脑室三角区区肿瘤影像学表现的认识, 对该区肿瘤的 MRI 影像表现进行分析。儿童侧脑室三角区肿瘤的治疗方法(手术方式)及预后与肿瘤的种类密切相关, 早期做出准确诊断, 对指导临床治疗及预后的判定有重要意义。

方法: 回顾性分析经手术病理证实的 30 例儿童侧脑室三角区肿瘤的 MRI 表现及其临床、病理资料, 其中男 22 例, 女 8 例, 年龄 8 个月~12 岁, 病灶最大径为(1.7cm~9.5cm), 平均 5.9cm, 均行 MRI 检查, 包括 T1WI、T2WI、T1WI+C、DWI。

结果: 30 例脑肿瘤中, 脉络丛肿瘤 17 例, 胶质类肿瘤 8 例, 脑膜瘤 5 例。

结论与讨论: 儿童侧脑室三角区最常见的肿瘤是脉络丛肿瘤, 并且男性明显大于女性。脉络丛肿瘤 MRI 主要特点是形态呈菜花样、分叶状, 且脑室系统扩大。有时常见的良性脉络丛乳头状瘤和少见的恶性的脉络丛癌区别困难。胶质类肿瘤影像表现与肿瘤良、恶性关系密切。儿童侧脑室三角区脑膜瘤影像表现与成人大致相仿, 但发病率明显不同, 成人侧脑室三角区最常见的肿瘤是脑膜瘤, 其次是室管膜瘤。

侧脑室三角区肿瘤起源复杂, 既包括起源于侧脑室三角区本身结构的肿瘤, 如室管膜瘤和脉络丛乳头状瘤, 又包括源于三角区周围结构而长入脑室的肿瘤, 如胶质类肿瘤, 还有部分肿瘤由异位于侧脑室的组织发展而来, 如生殖细胞瘤、脑膜瘤等。侧脑室肿瘤的早期, 因肿瘤生长在脑室腔内, 常无临床症状, 当肿瘤生长较大阻塞脑脊液循环通路或压迫周边脑组织时, 才出现相应的临床症状和体征。

MR 检查对软组织较高的分辨率及其多平面、多数据的成像特点, 使其对肿瘤内部不同组成成分的显示、对邻近组织受侵范围的确定都有明显优势, 将肿瘤的信号特点与肿瘤的性别、年龄、强化特点及 MRS 表现等临床特点相结合, 可以提高该部位病变诊断与鉴别诊断的准确性, 从而更有效的指导临床治疗。

PU-0383

家族性噬血细胞综合征一例

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病例资料: 患儿男, 2 岁 4 个月, 既往体健, 以走路不稳起病, 逐渐加重至无法站立及行走, 病程 6 天出现抽搐, 为全身大发作、持续 2 分钟缓解, 伴低热, 抽后浅昏迷。患儿入院时基本生命体征稳定, 浅昏迷, GCS 评分 9 分 (E2V2M5), 左侧鼻唇沟略浅。血生化 AST、ALT 升高, 血象、血气、凝血功能未见明显异常。脑脊液常规示白细胞升高 ($68 \times 10^6/L$), 单核为主 (98%), 脑脊液蛋白稍高 (808mg/L)。入院后 3 天 MRI 显示小脑肿胀, 脑干及双侧小脑半球、桥臂可见大片状 T2WI/FLAIR (图 A1-2) 高信号, 病变未见扩散受限及强化。12 天后复查 MRI 显示双侧基底节及丘脑 (图 B) 新发病变, 22 天后再次复查 MR 显示双侧大脑半球白质 T2WI 信号升高 (图 C), 同时基底节及小脑病变范围较前增大。为明确诊断患儿于入院后 1 月余行基因测序, 结果提示 STXBP2 基因复合杂合, 为家族性 HLH 致病位点, 诊断家族性噬血细胞综合征明确。

讨论: 噬血细胞性淋巴组织增多症 (HLH) 是一种遗传性或获得性免疫调节功能异常导致的严重炎症反应综合征。家族性 HLH (FHL) 属于原发性 HLH, 包含 FHL-1~5 五个亚型, 除 FHL-1 未确定相关的缺陷基因及编码蛋白外, PRF1、UNC13D、STX11 及 STXBP2 基因及蛋白分别对应 FHL2-5 型。HLH 缺乏特异性临床表现, 中枢神经系统受累可为 HLH 的首发临床表现, 也可发生于病程中, 其影像表现以多发脑白质病变最为常见, 其次为小脑炎。既往国内外研究仅报道过 4 例以小脑肿胀为主要表现的 FHL, 该组 FHL 患者的病程不典型, 常导致诊断的延迟。本研究报道一例以急性共济失调起病, 进行性累及双侧小脑半球、基底节及双侧大脑半球白质的 FHL 影像表现, 以提高对该病的认识。

PU-0384

Comparison of DWI Methods in The fetal brain: Readout-Segmented Echo-Planar Imaging Versus Single-Shot Echo-Planar Imaging

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Objective This study aimed to compare the clinical utility of RESOLVE (Readout Segmentation of Long Variable Echo-trains) and single-shot echo-planar DWI (SS-EPI-DWI) to visualize the fetal brain.

Methods RESOLVE and SS-EPI-DWI were performed for 190 fetal brain from December 2019 to December 2021 and two datasets were independently reviewed by two radiologists. Qualitative analyses were performed for overall quality of image, lesion conspicuity, image distortion and susceptibility-related change by 5-point Likert scale.

Result Significant differences were found in all the subjective parameters among the two DWI sequences (all $p < 0.001$). Mean scores were 3.85 and 4.07 for susceptibility-related change, 4.73 and 4.85 for image distortion, 4.15 and 4.27 for lesion conspicuity, 3.90 and 4.07 for overall image quality, for single-shot EPI and Resolve, respectively.

Conclusion RESOLVE yields better quality regarding distortion, susceptibility-related changes, and lesion conspicuity, compared with single-shot EPI in visualizing fetal brain.

PU-0385

磁敏感加权成像在早产儿生发基质出血后脑皮质表面及室管膜下铁沉积中的诊断分析

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目的: 探讨磁敏感加权成像在早产儿生发基质出血后脑皮质铁沉积及室管膜下铁沉积中的诊断价值。
方法: 回顾性分析 2016 年 1 月至 2023 年 7 月我院经超声诊断为生发基质出血并进行 MR 检查的 92 例早产儿临床资料, 比较常规磁共振成像 (MRI) 与磁敏感加权成像 (SWI) 的诊断结果, 分析 SWI 在早产儿生发基质出血后脑表面铁沉积及室管膜下铁沉积中的诊断价值。结果: SWI 对脑表面铁沉积及室管膜下铁沉积的病灶阳性检出率高于常规 MRI, 差异具有统计学意义 ($\chi^2=20.520, P<0.05$); SWI 序列对于小脑、生发基质铁沉积病灶检出率高于常规 MRI 序列, 差异具有统计学意义 ($\chi^2=13.473, 7.461, P=0.001, 0.024$); SWI 序列、常规 MR 序列对于脑室、脑皮质表面的铁沉积检出率比较, 差异无统计学意义 ($\chi^2=1.911, 3.600, P=0.900, 0.638$)。结论: SWI 用于早产儿生发基质出血后脑皮质表面铁沉积及室管膜下铁沉积的诊断可提高检出率, 尤其是小脑及生发基质的铁沉积病灶。

PU-0386

鼻咽侧位体位固定器的研制及其在儿童腺样体肥大诊断中的应用价值

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[摘要] 目的：研制鼻咽侧位 X 线摄影体位固定器，提高图像质量，同时减少重复曝光对患儿带来的辐射损伤。方法：根据被检部位正中矢状面平行于平板探测器以减小图像放大变形失真的原理，设计并制作卡通式鼻咽侧位 X 线摄影体位固定器。用卡通式设计消除患儿的恐惧心理，用固定装置使患儿被检部位在拍摄过程中保持稳定，用呼吸感知技术避免呼气时摄片使软腭抬高造成的鼻咽腔假性狭窄及腺样体—鼻咽腔（A/N）比值的假象增大。将医工有机结合，研制智能辅助设备，使放射科技师能够方便、快速地对患儿进行规范化摆位，从而提升影像学检查质量。选取 2023 年 1 月—2023 年 6 月 200 例未使用体位固定器行鼻咽侧位 X 线摄影的患儿作为对照组；200 例使用体位固定器行鼻咽侧位 X 线摄影的患儿作为试验组。对两组病例的图像质量进行主观评分，参考标准鼻咽侧位 X 线片的质控要求，比较两组图像的图像质量。

结果：对照组图像质量主观评价得分为（ 2.9 ± 0.37 ），试验组图像质量主观评价得分为（ 4.7 ± 0.21 ），两组之间的图像质量主观评分差异有统计学意义（ $P<0.05$ ）。

结论：鼻咽侧位体位固定器可诱导患儿配合，使患儿身体保持稳定，大幅提升图像质量，减少了重复曝光对患儿带来的辐射损伤，值得临床推广应用。

PU-0387

3D-FIESTA 序列在诊断胎儿脊柱畸形的价值

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目的 探讨 MRI 3D-FIESTA 序列在胎儿脊柱畸形的诊断价值。方法 回顾性分析 58 例胎儿的 MRI 脊柱图像，所有孕妇均在 MRI 采集前行产前超声并可疑脊柱病变。将 2D-FIESTA 及 3D-FIESTA 序列的图像质量以及诊断价值进行分级，对两序列图像质量进行统计学比较。结果 扫描共得到 58 例胎儿脊柱图像，发现畸形有半椎体 19 例、蝴蝶椎 7 例、融合椎 5 例、冠状裂 3 例、椎体骨化中心小 14 例、椎间隙窄 3 例、椎体骨化不均 4 例、阴性结果 14 例。2D 图像分级的优、中等、差分别占 31.03%、60.34%、8.63%，3D 图像分别占 81.03%、15.52%、3.45%，差异具有统计学意义。结论 3D-FIESTA 序列能够更好的显示胎儿脊柱畸形，在 2D 序列扫描不满意时可加扫 3D 序列以提高胎儿脊柱畸形的检出率。

PU-0388

儿童胰胆管合流异常的临床特征与影像学诊断价值

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目的：分析不同影像学方法在儿童胰胆管合流异常（PBM）的诊断价值，以提高对本病的认识。方法：回顾性分析我院 30 例经磁共振胰胆管成像（MRCP）及内镜下逆行胰胆管造影术（ERCP）诊断的儿童 PBM，分析其临床资料及影像学检查结果并进行分型，探讨各影像学方法在诊断本病中的优势。

结果: (1) 临床资料: 本组 30 例患儿, 男性 7 例, 女性 23 例, 平均年龄 4.3 岁。(2) 首发症状: 腹痛 24 例, 皮肤黄染 6 例, 呕吐 6 例, 体检发现 1 例。(3) 实验室检查: 血清淀粉酶或脂肪酶升高、肝功能异常共 28 例, 实验室检查无异常 2 例。(4) 影像学结果: 本组 30 例患儿, MRCP 明确诊断为 PBM 者 22 例 (73.3%, 22/30), 其中分型为 A 型 11 例, B 型 2 例, C 型 9 例, D 型 0 例; ERCP 确诊者 30 例 (100%, 30/30), 其中分型为 A 型 13 例, B 型 2 例, C 型 14 例, D 型 1 例; 29 例均伴随不同程度的肝 (内) 外胆管扩张; MRCP 提示胆总管中或下段结石 12 例, ERCP 确诊结石共 16 例并诊断胆总管下段或胰管内蛋白栓 17 例。(5) 随访: 30 例中 19 例接受 1 次 ERCP 检查, 另有 10 例和 1 例因反复胰腺炎发作接受 2 次及 3 次 ERCP 检查。

结论: 对于临床上表现为腹痛反复发作, 特别是同时合并黄疸、腹部包块、胰腺炎与肝功能不全等的患儿, 需要考虑到 PBM 的可能性。MRCP 对于本病早期诊断有一定提示作用, 但仍有一定局限性; ERCP 仍为目前诊断本病的金标准, 在诊断、分型、治疗上具有不可取代的作用。

PU-0389

基于磁共振成像的非青紫型先天性心脏病对儿童脑影响的 VBM 研究

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目标: 大量研究表明, 在治疗先天性青紫型心脏病 (CHD) 的手术过程中会发生脑损伤, 但对于非青紫型先天性心脏病儿童的术前神经发育和脑损伤情况了解不足。本研究旨在使用基于体素的形态学 (VBM) 技术, 对 3 岁以下患有非青紫型先天性心脏病的儿童患者进行术前评估, 以了解其全球和局部灰质 (GM) 体积的变化情况。

方法: 从 2019 年 1 月到 9 月, 招募年龄在 1-3 岁之间、患有先天性青紫型心脏病 (n=54) 的患者, 在进行矫正性手术前, 对其进行 3D T1 加权脑 MRI 扫描。同时, 对年龄和性别匹配的健康对照组 (n=35) 进行回顾性分析。利用 SPM 12 软件计算 GM 体积和总颅内体积 (TIV), 并通过双样本 t 检验法和 FWE 校正方法在 SPM 12 中进行 VBM 分析, 以确定不同区域的 GM 体积差异。

结果: 两组之间的 GM 总体积和 TIV 没有差异 ($p>0.05$), 但 VBM 分析显示, 与健康对照组相比, 非青紫型先天性心脏病组患儿的额中央回、额下回、眶回、旁海马、丘脑 (双侧)、内侧苍白球 (双侧) 和颅底 (双侧) 的 GM 微观结构有所减少 ($p<0.05$, FWE 校正)。

结论: 1 至 3 岁的患有先天性青紫型心脏病的儿童在进行矫正性手术前也会出现局部 GM 体积的减少, 这种变化倾向于分布在双侧额叶、丘脑、苍白球、小脑和单侧旁海马区域。

PU-0390

MRE 多序列联合扫描在儿童美克尔憩室检查中的应用

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目的 探讨磁共振小肠造影 (MRE) 多序列联合扫描在儿童美克尔憩室检查中的应用价值。

方法 回顾性分析经超声、核素检查后或临床怀疑美克尔憩室患儿的临床及 MRE 资料 16 例, 所有患儿均行 MRE 多序列联合扫描。扫描方案包括快速自旋回波序列 (FSE)、单次激发快速自旋回波序列 (SS-FSE)、二维平衡稳态自由进动序列 (BTFF)、弥散加权序列 (DWI)、二维扰相梯

度回波序列 (T1-FFE) 及屏气三维容积内插序列 (THRIVE)。6 岁以下儿童口服 10% 水合氯醛 0.25~0.50 ml/kg 镇静。检查前静脉注射山莨菪碱 0.3 mg/kg 以抑制肠蠕动。增强扫描采用高压注射器静脉团注对比剂 Gd-DTPA 0.2 ml/kg。16 例均行超声检查, 10 例行 99Tcm 扫描, 6 例行 CT 平扫及增强扫描。

结果 16 例均经 MRE 诊断为 MD, 手术病理证实 13 例为 MD, 3 例为肠重复畸形。MRE、超声及核素的诊断正确率分别为 81.3% (13/16)、37.5% (6/16) 及 50% (5/10)。13 例憩室部位: 右下腹 2 例, 脐周 4 例, 左下腹 4 例, 中腹部 2 例, 盆腔 1 例。憩室形态: 呈含液含气盲袋样管状结构 11 例, 实性包块 2 例。憩室腔内对比剂充盈 6 例, 无对比剂充盈 7 例。憩室壁增厚 11 例, DWI 序列憩室壁弥散受限 12 例。增强后憩室壁强化程度高于邻近肠壁 12 例, 憩室壁连续性中断 1 例。憩室腔内出血信号 (T1WI 高信号和/或 T2WI 低信号) 2 例, 造影剂外溢 2 例。憩室周边结构异常: 憩室周围脂肪层肿胀 6 例, 邻近系膜水肿并异常强化 6 例, 腹水 4 例, 肠梗阻 1 例, 肠系膜淋巴结增大 10 例。13 例在右下腹显示阑尾, 其中正常阑尾 11 例, 肿大阑尾 2 例。

结论 相对于超声和核素检查, MRE 多序列联合扫描图像信息量大, 敏感性高及无电离辐射等优越性, 可作为临床诊断儿童美克尔憩室的重要检查手段。

PU-0391

低剂量螺旋 CT 在儿童胸部病变检查中的应用

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[摘要]

目的: 通过胸部低剂量 CT 的使用改善辐射危害, 且并不影响诊断结果, 探讨胸部低剂量 CT 的应用价值。

方法: 回顾性分析 2021 年 6 月至 2023 年 6 月期间, 我院门诊及住院收治临床表现为新生儿呼吸窘迫综合征、支气管发育不良、气胸及肺炎等患儿, 收集病例共 30 例, 现将病例分为三组: 0-6 月、6-12 月及 1-3 岁患儿, 征求上级医师同意后, 对同一年龄段的患儿 (气胸和肺炎患者) 分别使用低剂量和常规剂量进行扫描, 比较两种剂量扫描所得出的图像质量及诊断结果。

结果: 在三组病例中 0-6 月患儿常规剂量, 扫描可以大幅度降低 CT DLP, 并不影响诊断结果, 低剂量扫描图像几乎与常规剂量扫描的图像无任何区别, 气胸患儿可以清楚的看出肺部被压缩的程度及肺上有没有肺大泡, 准确判断肺大泡的位置、大小、数目是否呈簇状, 对于气胸及肺炎患儿完全可以采用胸部低剂量扫描, 大大降低了辐射也得出了准确的诊断结果。6-12 月患儿常规剂量 (KV:80、mAs:180、CTDI: 3.4mGy、DLP: 86mGy*cm), 胸部低剂量 (KV:120、mAs:50、CTDI: 3.2mGy、DLP: 81mGy*cm) 扫描与常规剂量相比较, 低剂量的 DLP 约是常规剂量的 94%; 图像质量相似, 1-3 岁患儿常规剂量 (KV:80、mAs:200、CTDI: 3.6mGy、DLP: 97.4mGy*cm), 使用该年龄段的低剂量扫描常规剂量 (KV:120、mAs:55、CTDI: 3.6mGy、DLP: 97.2mGy*cm), 与常规剂量相比较 DLP 几乎无任何区别, 但是图像质量是常规剂量更完美些。

结论: 在儿童胸部 CT 检查方面, 建议较小患儿使用低剂量螺旋 CT 扫描, 低剂量也可以准确诊断出肺部病变形态及生理解剖结构, 与常规剂量有着同等的图像质量且较低的辐射剂量! 0-6 月患儿低剂量胸部 CT 具有较高的临床应用价值。

PU-0392

磁敏感加权成像 (SWI) 在新生儿颅内出血的应用

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目的 探讨磁敏感加权成像 (SWI) 在新生儿颅内出血中的应用价值。

材料与方法 对 2020 年 6 月至 2021 年 5 月我院新生儿科送诊的 57 例患儿同时行头颅 MR 常规序列 (T1WI、T2WI 及 FLAIR) 和 SWI 序列的扫描。其中男性 35 例, 女性 22 例, 所有患者均有明确的临床症状和新生儿窒息的病史, 并且均在我院新生儿重症监护病房 (NICU) 住院治疗。

新生儿镇静: 镇静前常规喂奶, 检查前 30min 口服或肌注鲁米那 (2~4 mg/kg), 必要时于检查前 5min 口服 10% 水合氯醛 (30~40 mg/kg)。

新生儿转运: 将提前预约好检查时间的新生儿用襁褓包裹, 由新生儿科医生或有经验的护士于检查前 10 分钟左右转运至 MR 检查室。

成像方法: T1WI (轴位及矢状位)、T2WI、FLAIR 和 SWI 成像, 经常规定位扫描后分别行 T1WI, T2WI 扫描后再行 SWI 扫描;

SWI 扫描参数: TR: 35ms, TE: 25ms, FOV: 20x20cm, 矩阵: 512x512, 层厚 3.0mm, 扫描 35 层。

结果 相对于 MR 常规序列 (T1WI、T2WI、FLAIR) 扫描, SWI 由于其固有的成像特性 (检测出血产物非常敏感), 对新生儿颅内出血的检出阳性率要远高于前者。而且 SWI 在对 NICH 出血灶的数目、大小的显示方面均好于 MR 常规序列;

新生儿期颅内出血灶在 SWI 图上表现为呈不规则斑点状, 类圆形, 铸形, 扇形低信号, 在相位图上呈典型的顺磁性物质信号特点;

新生儿颅内出血根据出血部位主要分为室管膜下-脑室内出血, 大脑实质内出血, 小脑内出血, 硬膜下出血, 蛛网膜下腔出血, 在 SWI 与 MR 常规序列均得到了证实。

结论 SWI 是一种探查新生儿颅内出血的新技术, 对于有新生儿窒息史的患儿, 应当在常规 MR 序列基础上加行 SWI 检查, 以提高新生儿颅内出血的诊断准确率。

PU-0393

螺旋 CT 低剂量扫描在新生儿颅脑中的应用

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目的 评估新生儿低剂量头颅 CT 扫描的图像质量和临床应用价值。方法 对临床怀疑颅脑病变需行 CT 检查的新生儿 50 例, 随机分成常规剂量和低剂量组 2 组。对比两种剂量扫描产生的 CT 吸收剂量指数 (CTDI_w); 盲法评判两组扫描剂量的图像质量。

一般资料 高度怀疑颅脑病变的新生儿 50 例, 其中男 34 例, 女 16 例, 年龄均 < 28 天, 平均 8 天。随机分成常规剂量组 (120 kV 250 mAs) 和低剂量组 (100 kV 80 mAs) 颅脑 CT 扫描。

方法 使用 64 排飞利浦螺旋 CT, 常规剂量组扫描参数为 120 kV, 250 mAs, 层厚 4 mm, 螺距 1.5; 低剂量组扫描参数为 100 kV, 80 mAs, 层厚 4 mm, 螺距 1.5。均采用标准重建算法, 仰卧位, 头先进。研究指标: 表述受检者接受 X 射线吸收剂量参数为 CT 吸收剂量指数 (CTDI_w)。系统根据选择的扫描参数自动计算 CTDI_w 并显示于参数栏。

图像质量评估 将新生儿颅脑图像采用窗位 40HU、窗宽 120HU 的软组织窗; 用 AGFA 公司生产激光照相机胶片。CT 片作统一编号, 并用胶布封住每幅图像的扫描条件记录。根据影像噪声、空间分辨率、密度分辨率及有无伪影对图像质量进行分析, 将图像质量分为 4 个等级。

结果 低剂量与常规剂量组 CT 扫描 X 线辐射剂量如下: 100Kv, 80mA 条件下 CTDIvol 值为 8.8mGy, 120 Kv, 250mA 扫描条件下 CTDIvol 值为 52.04mGy, 低剂量 CTDIvol 值相当于常规剂量 CTDIvol 值的 16.9%。

新生儿低剂量与常规剂量扫描的图像质量通过比较, 得出两种剂量的图像质量等级有差异, 低剂量扫描图像质量以良为主, 而常规剂量图像以优为主, 低剂量扫描图像质量稍差, 但两者均未出现不合格图像, 因此不影响诊断。m 扫描剂量越高, 受检者受 X 线辐射的剂量越大, 对 X 线辐射的防护就越困难。

PU-0394

儿童口腔曲面断层摄影影像质量分析与探讨

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目的: 探讨青少年儿童在口腔曲面断层摄影(口腔全景)中存在的技术问题, 提高口腔全景片的影像质量, 更好的为临床治疗而服务。

方法: 随机选取我科自 2021 年 5 月至 2023 年 5 月拍摄的 100 例口腔全景影像进行质量分析和探讨。使用芬 PLANMECA proline xc 口腔全景机, 利用该机全景的线性断层和头颅测量技术, 可产生清晰的全景 X 线影像。选取儿童标准全景采集模式, 摄影参数: 管电压 60kV, 管电流 6.2~10mA, 曝光采集时间 13 秒。检查前, 应和患儿及家属进行充分沟通交流, 缓解患儿的紧张情绪, 取得患儿的信任与配合, 并充分做好患儿及陪护家属的辐射防护工作。

结果 100 例口腔全景影像中, 标准影像 82 例 (82.00%), 标准体位, 图像质量优良, 下颌骨和牙列可清晰显示; 18 例影像均存在不同问题, 图像质量欠佳; 数字化口腔曲面断层 X 线摄影是近年来呈现的口腔颌面部 X 线成像技术, 现已普遍应用于口腔颌面部的检查。在儿童, 一张优质的口腔全景影像应符合以下几点: (1) 正中矢状线与胶片长轴垂直, 两侧髁突应在同一水平; (2) 下颌骨颌部投影于下颌骨稍下方, 下颌骨下缘呈弧形; (3) 上下牙略有分离, 无重叠, 可见微笑的咬合面(咬合曲线); (4) 影像密度、对比度良好, 无伪影, 全口牙齿清晰可见。

结论: 口腔曲面断层摄影属于多轨迹体层摄影技术, 在摄片工作中是一个难点。由于颌骨的特殊解剖结构, 牙列呈不规则“U”型排列, 且个体间还存在差异, 体层摄影只有解剖结构置于成像层内采集的影像才清晰。这就要求技术员熟练掌握机器性能, 严格按照操作流程, 摄影前积极与患儿及家长沟通, 得到患儿的配合, 并根据患儿颌骨牙弓形状和大小, 调整整体层面中心, 标准摆位, 才能获得一张优质口腔全景片。

PU-0395

螺旋 CT 低剂量扫描在儿童副鼻窦病变检查中的应用

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目的: 探讨低剂量螺旋 CT 在副鼻窦病变检查中的应用价值。

资料与方法

1.1 一般资料

副鼻窦炎是儿童常见病和多发病。常规的 X 线平片摄影由于儿童鼻旁窦与周围软组织重叠较多, 对比度欠佳, 诊断价值有限。而 CT 断层图像上, 病灶与周围组织有较高的对比度, 从而使得 CT 成为鼻旁窦病变最常规的检查方法。

回顾性分析 2021 年 4 月-2023 年 4 月在我科行副鼻窦检查门诊及住院儿童 40 例，随机分为两组：1-6 岁，6-12 岁，分别进行常规扫描与低剂量扫描，对比两组图像质量和诊断结果。

1.2 方法

均采用 64 排 Philips 螺旋 CT，标准重建算法，仰卧位头先进，常规组扫描：层厚 5mm，管电压 120KV，管电流 50/60mAs，低剂量组扫描：层厚 5mm，管电压 80KV，管电流 100/150mAs，其他扫描参数一致。扫描仪会自动显示 CTDI，DLP，对两组实验结果进行比较，扫描前先请示上级医生，此病种是否可以行低剂量扫描，防止低剂量扫描失败，行低剂量扫描也需对患儿及陪同家长做好辐射防护。完成扫描后自动拆薄并传入 PACS 工作站，对副鼻窦病变结构和正常结构进行观察，由诊断医生判定是否影响诊断结果。

结果

副鼻窦扫描可以通过多平面重组技术准确的显示鼻道复合体，病变范围，受累鼻旁窦的数目，病变鼻窦骨质结构有无破坏和硬化，鼻窦炎症等。

结论

综上所述，小儿副鼻窦低剂量螺旋 CT 扫描时，可依照年龄大小，病变性质，在保证图像质量并满足诊断需求的情况下，适当使用低剂量扫描，以减少辐射剂量，保证患儿的辐射安全。

PU-0396

儿童背部滑膜肉瘤一例

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女，13 岁，发现背部肿物 1 周。

影像检查：CT 平扫，左肩胛骨内侧背部肌肉内见一形态不规则低密度肿块，CT 值 16Hu、30Hu，大小约 14.5cmX10.2cmX3.1cm；MRI 平扫，病变呈囊实性，以囊性成分为主，其内可见多发分隔，实性部分呈稍长 T1、等 T2 信号，囊性部分呈长 T1、长 T2 信号，部分囊腔内可见短 T1 短 T2 出血信号及液液平面，病变界清，沿肌间隙延伸；MRI 增强：左背部肿物内实性成分及分隔不同程度强化，囊性部分未见强化。

手术记录：……肿物呈暗红色，囊实性，包膜完整，无明显血管供应，大小约 16cmX12cmX10cm，逐次分离肿物，释放部分液体，完整切除……

病理：（左背部）滑膜肉瘤。

讨论：滑膜肉瘤（synovial sarcoma, SS）是一种具有不同程度上皮分化（包括腺体形成）的间叶组织肿瘤，95%的滑膜肉瘤具有特征性染色体易位 t(X; 18) (p11; q11)，并形成 SS18-SSX 融合基因。好发于四肢深部软组织（70%~80%），仅 15%位于躯干。临床起病隐匿，表现为局部隐痛、软组织渐进性肿胀，病程数月至数年，易误诊为良性病变。

影像表现，CT 平扫表现为边界清楚的圆形、分叶状软组织密度肿块，密度稍低于肌肉，CT 对发现钙化和骨质侵蚀敏感。MRI 平扫，T1WI 与肌肉相比表现为等或稍高信号，T2WI 上信号混杂，可呈高、等、低三种信号同时存在，即“三信号征”，为肿瘤实质、纤维、坏死、钙化、出血所致，肿瘤内可见线状低信号分隔，周围软组织内可见水肿。增强，肿瘤呈明显不均匀强化，实性成分强化，坏死、囊变、血肿不强化，这一特点可将囊性病变为主的滑膜肉瘤识别出来。本病变呈囊实性，囊性成分为主，实性成分较少，病变内可见出血及液液平面，易误诊为多房囊性肿物伴出血，如淋巴管畸形或血管淋巴管畸形，但增强后病变实性成分及分隔明显强化，实性成分及分隔局部较厚，不同于淋巴管畸形的壁及分隔较薄。

PU-0397

儿童韧带样型纤维瘤病的 CT 与 MRI 表现

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目的 探讨儿童韧带样型纤维瘤病 (DF) 的 CT、MRI 表现。方法 回顾性分析经手术及病理证实的 23 例儿童 DF 的影像学表现, 分析其 CT 或/和 MRI 特征。结果 23 例患儿中 22 例 (95.6%) 为单发实性肿块, 边界多不清晰 (16 例, 69.6%), 轮廓不光整 (15 例, 65.2%), 无包膜 (21 例, 91.3%), 侵袭性生长 (21 例, 91.3%)。23 例中腹壁外型 13 例 (56.5%), 腹壁型 8 例 (34.8%), 腹内型 (肠系膜来源) 2 例 (8.7%)。肿块最大径范围约 22~171 mm (65.3 ± 34.7 mm)。CT 平扫肿块呈等密度, 密度均匀或不均匀, CT 增强表现为轻度强化或延迟扫描呈渐进性强化。MRI 表现为 T1WI 等或低信号, T2WI 高信号, 内部信号欠均匀。1 例腹外型 DF T1WI 低信号, T2WI 低信号, 内部信号较均匀。MRI 增强扫描, 病灶呈中度不均匀强化伴内部条索状、片状无强化区。结论 儿童 DF 影像学表现有一定特征: 肿瘤呈侵袭性生长, CT 增强肿瘤为渐进性或持续性强化, MRI 则更能反映病灶内特征性胶原纤维的低信号。

PU-0398

儿童肾恶性横纹肌样瘤的 CT、MRI 表现

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目的 探讨肾恶性横纹肌样瘤的 CT 和 MRI 表现, 以提高该病的诊断水平。方法 回顾性分析上海市儿童医院 2008 年 5 月~2022 年 1 月经病理证实 8 例肾恶性横纹肌样瘤的患者资料。7 例行 CT 平扫及增强检查, 4 例行 MRI 平扫及增强检查, 观察分析肾恶性横纹肌样瘤体的部位、大小、形态、密度/信号特征、强化方式以及转移情况等。结果 6 例位于左肾, 2 例位于右肾, 2 例病变呈圆形或类圆形, 6 例为不规则形, 6 例累及肾窦、肾盂。CT 平扫 5 例呈稍高密度, 2 例呈等低密度, 肿瘤最大径平均约 8.6cm; 8 例均合并囊变坏死, 2 例合并出血, 3 例合并包膜下积液/积血。MRI 平扫 4 例 T1WI 低信号, 3 例 T2WI 呈稍高信号, 1 例 T2WI 呈混杂信号。2 例 DWI 均呈明显高信号、相应 ADC 为低信号, 提示病变弥散受限。增强后呈不均匀轻度强化。5 例伴转移。结论 儿童肾恶性横纹肌样瘤 CT、MRI 表现有一定的特征性, 儿童肾实质内巨大肿块, 合并囊变坏死、出血, 集合系统受累, 伴有包膜下积液, 弥散受限, 增强扫描实性成分轻度强化, 常合并转移, 应高度警惕肾恶性横纹肌样瘤的可能。

PU-0399

分次团注低剂量 CT 在学龄前儿童肾脏 CTA 检查的应用

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目的: 研究分次团注结合低剂量 CT 扫描技术在学龄前儿童肾脏 CTA 的应用价值。

方法: 选取在我院怀疑胡桃夹综合征行肾脏 CTA 检查的学龄前患儿 60 例, 年龄 5.65 ± 1.86 岁, 随机分为 A 组和 B 组各 30 例。A 组采用单次团注常规 100kVp 行动脉期和静脉期扫描, B 组采用分

次团注 80kVp 行动脉-静脉期扫描。扫描参数：采用 GE Revolution CT，扫描范围从膈顶至耻骨联合下缘，0.5s/rot，pitch1.375:1，准直 80mm，使用 300mgI/ml 碘海醇按 1.5ml/kg 给药，以 1-1.5ml/s 注药速率经肘正中静脉注射，所有图像行 ASIR-V40%重建。A 组单次团注全部对比剂后行动脉期和静脉期扫描，两期管电压和管电流均为 100kVp 和 200mAs，B 组首次团注总对比剂 50% 后间隔 20s 再团注剩余 50%，首次团注开始后固定 60s 后扫描，管电压和管电流为 80kVp 和 200mAs。选取轴位图像做为测量界面，于腹主动脉、左肾动脉、左肾静脉、下腔静脉、左侧竖脊肌放置感兴趣区域 (ROI)，采用单因素方差分析感兴趣区域的 CT、SD、CNR 等指标参数，并采用 Kruskal-Wallis H 检验比较图像的主观评分。

结果：两组检查都能清晰显示各血管，主观评分都达到了诊断要求，差异不具有统计学意义 ($P > 0.01$)；A 组腹主动脉、左肾动脉 CT 值及 CNR 高于 B 组，左肾静脉及下腔静脉 CT 值及 CNR 低于 B 组，A 组图像背景噪声 SD 值小于 B 组，差异均具有统计学意义 ($P < 0.01$)；A 组 ED (4.53 ± 1.21) mSv，B 组 ED (2.14 ± 1.14) mSv，差异具有统计学意义 ($P < 0.01$)。

结论：分次团注结合低剂量 CT 技术在学龄前儿童肾脏 CTA 中，尤其在胡桃夹综合征诊断方面，既能够有效降低患儿的辐射剂量，又能够获得优质的图像质量。

PU-0400

Study on normal range of GSI energy spectrum analysis of children's pancreas based on contrast agent fixed-time injection method

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OBJECTIVE: This study used a fixed-time injection of iodine contrast agent based on the body mass of the child to evaluate the normal range of the analysis of the pancreatic energy spectrum of the children in the GSI spectrum enhancement examination.

MATERIALS: Thirty children with a body mass greater than 20 kg and a non-pancreatic lesion with abdominal CT enhancement were selected from 2019.1 to 2019.2. All patients underwent GSI spectroscopy CT enhancement examination using GE revolution CT. Four scan protocols (four groups) were scanned according to body weight (Table 1), and a uniform contrast protocol was used: 300 mgI was given according to the weight of the child per ml Iodine contrast agent 1.5ml/kg, and use 24s fixed contrast injection time method. All patients underwent an image evaluation of the portal vein phase. The phase delay time was 56s after the contrast agent injection. The ROI of the head, body and tail of the pancreas was selected (Fig. 1), and the four energy spectrum analysis values of 70KeV, iodine water value, water iodine value and atomic number were measured. The single sample statistics were drawn using SPSS software. (Table 2). **Results:** This indicates that the four energy spectrum analysis values of 70KeV, iodine water value, water iodine value and atomic number obtained are relatively fixed in children with pancreatic energy spectrum GSI enhanced CT examination using fixed-time injection of iodine contrast agent.

Conclusion: Contrast fixed injection time method according to different body weight to give different doses of iodine contrast agent, can ensure that children of different body weight under the contrast agent program and relatively fixed weight of iodine contrast agent, iodine contrast agent dose absorbed by human tissue Not affected by weight. Under the scanning scheme and the contrast agent scheme, the iodine dose is relatively constant, and is not affected by body weight, and the energy spectrum analysis value is relatively fixed, and the result has credibility under the scheme.

PU-0401

儿童腹盆腔多灶性病变同源性能谱 CT 分析

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目的：通过分析儿童腹盆腔肿瘤及肿瘤样病变的能谱 CT 资料，探讨通过能谱 CT 物质定量参数及能谱曲线图对儿童腹盆腔多灶性病变同源性的研究。

方法：回顾性分析我院 2018 年 1 月至 2021 年 5 月间超声或 X 线检查疑诊为腹盆腔肿瘤及肿瘤样病变的 308 例患儿的临床及影像资料，最终 8 例（男 3 例，女 5 例）多灶性病灶患儿完成能谱 CT 检查并经手术病理证实纳入本组研究。全部患儿采用 GE Revolution 256 层宽体 CT 进行扫描，将所有患儿单能量原始图像传送至 GE ADW4.6 后处理工作站，应用 GSI 综合分析平台进行分析。多灶性病灶同源性能谱分析分别计算 40-70、70-140 各能量区间的能谱曲线斜率 K 值， $K = \frac{\text{两单能量间 CT 值之差}}{\text{能量值之差}}$ ，将 K 值=1 作为参考标准，偏差范围分为四个区间：0-25%（非常一致）、25-50%（基本一致）、50-75%（不一致）和 75-100%以上（非常不一致）。计数资料应用配对 t 检验和独立样本 t 检验。结果：8 例多发性病变中 5 例为恶性肿瘤伴转移，3 例为多发性良性病变。原发灶与其他病灶在动脉期和静脉期 40-70Kev 时能谱曲线斜率走行基本一致，K 值有统计学意义（ $P < 0.05$ ），动脉期 70-140 Kev 能谱曲线斜率基本一致，K 值有统计学意义（ $P > 0.05$ ），静脉期 70-140 Kev 能谱曲线斜率走行不一致，K 值无统计学意义（ $P > 0.05$ ）。恶性组 40-70Kev 和 70-140 Kev 两个能量区间动脉偏差范围一致性均在 0-25%（非常一致）区间，而良性组偏差范围一致性不稳定，多位于 25-50%（基本一致）和 50-75%（不一致）区间。结论：能谱 CT 物质定量测量技术和能谱曲线分析图术前定量分析和定性诊断儿童腹盆腔良恶性肿瘤及肿瘤样病变研究提供了一种新的方法。

PU-0402

ALARA 原则在儿科 CT 中的应用

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目的：20 世纪 70 年代，放射科开始采用计算机断层扫描（CT）成像，随着 MDCT 的飞速发展，其高分辨力、无创性和快速性的优势，大大提高了医学成像的准确性，应用日益普及。儿童 CT 检查频率和对集体有效剂量的贡献也快速增加，随之而来的电离辐射问题也引起人们的日益关注。

ALARA 的概念应运而生。

方法：近 20 年来 ALARA 一直是儿科放射学及其他领域的主要主题。降低儿童辐射剂量的同时保持诊断方式的效率和可靠性。正确理解 ALARA 原则，合理使用 CT：首先需要确认正当性“justification”，并权衡 CT 扫描带来的辐射风险与效益，最终选择 CT 检查应基于“利大于弊”这样一种预期。其次是最优化“optimization”原则的正确应用，利用最低辐射剂量达到所需图像质量。

结果：目前常用的几种剂量描述符如下：

- 1、CTDI（CT Dose Index）：用于表示 CT 设备辐射剂量特性的实用表征量，反映了 CT 机输出的相对辐射剂量水平。容积 CTDIvol 反映整个容积扫描的平均剂量。
- 2、DLP（Dose Length Product）剂量长度乘积，为 CTDIvol 与扫描范围的乘积，反映一定扫描范围内的辐射剂量， $DLP = CTDIvol \times \text{Length}$ 。
- 3、SSDE（size specific dose estimation），将 CTDIvol 结合患者体型等因素修正并加以常规化，是估算患者 CT 剂量的一种改进度量标准，SSDE 考虑了不同组织的密度，又考虑了患者体型，更加适用于儿童辐射剂量的评估。

4、有效剂量 ED (effective dose)，计算方法是将输送到体内器官的剂量乘以器官特异性生物因子和辐射类型加权因子，然后将所有暴露器官的乘积相加。

结论：采用适合儿童的扫描程序，并根据体型、年龄调整扫描参数；利用新技术新方法在不降低图像诊断质量的情况下降低儿童 CT 的辐射剂量和相关风险

PU-0403

双臂辅助上举在幼儿胸部 CT 扫描中应用价值

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目的：在低龄幼儿进行胸部 CT 扫描时，常因睡眠质量等原因双 臂无法完全挺直上举。在 CT 图像中，双臂长骨产生较强烈的金 属伪影，对肺尖处的观察构成一定的影响。故本研究立足于提 高图像质量，采取双臂辅助上举的方法，保持患儿在 CT 扫描床 上双臂挺直上举的状态，从而降低伪影，提高图像质量。

方法：双臂辅助上举主要分为人工干预和机械干预。人工干预 指由陪护家长双手扶住患儿上肢，保持上臂挺直。机械干预可 用柔软而有韧性的材料制成臂带，对双臂进行一个固定作用。 在本研究中，为提高患儿舒适度及睡眠质量，主要采取由家长 进行辅助上举的方法。选取年龄为 1-3 岁，体重在 10-19kg 的患 儿 20 例，均采用仰卧位扫描，管电压 100KV，管电流 185mA，其中 10 例采取足先进体位，由家长进行双臂辅助上举，肱骨延 长线与脊柱中线延长线夹角大于 150°。10 例不 进行人工干预， 仅由患儿自行双臂上举，夹角不大于 150°。

结果：使用 GE AW4.6 工作站，对胸部 CT 图像进行评估。在右 肺肺尖处选取一个感兴趣区 ROI，分别测量其信号值及噪声值， 在软组织中选取一个 ROI，测量其信号值，计算其影像对比度与 噪声的比值，即为对比噪声比。经过计算，10 例采取双臂辅助 上举技术的患儿，平均对比噪声比为 1.41；10 例未经干预的患 儿，平均噪声比为 1.15。故说明采取双臂辅助上举技术对提高图 像质量方面有重大意义。

结论：在低龄幼儿进行胸部 CT 扫描时，采取足先进的体位，由 家长进行患儿双臂辅助上举技术，能够显著改善肺尖处伪影， 降低噪声对图像质量的影响，提高图像质量，避免病变的漏诊。

PU-0404

Quantitative T2 mapping magnetic resonance imaging of articular cartilage in patients with juvenile idiopathic arthritis

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Purpose: We aimed to analyze the microstructure changes of knee cartilage in Juvenile idiopathic arthritis (JIA)

patients with active synovitis using quantitative magnetic resonance imaging (MRI) T2 mapping technique.

Materials and methods: This study included 23 JIA patients, who underwent bilateral knee joints by using a MR

imaging protocol with the addition of a coronal T2 mapping. The femorotibial joint cartilage of participants was

divided into eight subregions. Twenty-four (52.17%) of 46 joints (non-synovitis group), and twenty-two

(47.83%) joint cases (active-synovitis group) were respectively calculated the T2 mean values for each subregion.

Student's T test or Mann-Whitney U test was used to determine the statistical differences of each subregion

in the non-synovitis and active-synovitis groups, which is also applied to define the distribution differences of

cartilage subregion in femoral and tibial.

Results: The T2 mean values of the superficial and deep zone of cartilage for active synovitis group were

respectively higher than those for non-synovitis group ($P < 0.05$), except for the deep zone of cartilage in lateral

tibial plateau (LTP) ($P > 0.05$). The mean T2 values of the deep zone in femoral cartilage for active synovitis

group were significantly higher than that of tibial ($P < 0.05$).

Conclusion: The finding of an increased average T2 values in active synovitis for JIA patients, especially in the

deep cartilage of femoral condyle, which suggests that T2 values may reflect cartilage microstructure differences

that occur in JIA. T2 mapping as an objective and quantitative method may allow for early detection of cartilage

changes.

PU-0405

儿童造血干细胞移植后淋巴组织增生性疾病的影像表现和临床分析

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目的 探讨儿童造血干细胞移植后淋巴组织增生性疾病 (posttransplantation lymphoproliferative disorders, PTLD) 的影像表现和临床特点, 以提高对该病的认识。 方法 回顾性分析我院 2014 年 5 月-2020 年 12 月收治的 13 例经病理证实或临床诊断的造血干细胞移植后 PTLD 患儿的 CT、MRI、US 等影像学资料和临床资料 结果 100% (13/13) 累及结内组织, 23% (3/13) 累及结外。前者 13 例累及淋巴结 (13 例颈部淋巴结, 3 例腹腔淋巴结), 3 例累及腭扁桃体, 2 例累及腺样体; 后者 2 例累及中枢神经系统, 1 例累及胃壁。按部位, 颈部最多, 100% (13/13) 受累, 其次为腹部 23% (3/13)、中枢神经系统 15% (2/13)。移植与诊断 PTLD 的平均时间间隔为 68 天 (42-120 天)。原发病包括再生障碍性贫血 10 例, 骨髓增生异常综合征、湿疹-血小板减少-免疫缺陷综合征、 β 地中海贫血各 1 例。移植前 13 例均无 EB 病毒感染, 移植后均发生 EB 病毒感染。经对症治疗, 5 例好转出院, 8 例死亡。结论 儿童造血干细胞移植后 PTLD 发病较早、进展迅速, 移植后早期即需要频繁地筛查、监测 PTLD; 监测外周血 EB 病毒 DNA 载量对早期诊断非常重要; PTLD 可累及全身多部位, 一旦诊断 PTLD 应进行多部位检查, 影像检查对早期诊断和确定病变范围有重要作用。

PU-0406

婴儿左颞叶脑实质富于细胞性神经鞘瘤一例

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目的 神经鞘瘤多为外周神经系统良性肿瘤，脑实质内富于细胞性神经鞘瘤极罕见，本文分析脑实质内神经鞘瘤（Intracranial schwannomas (ICS)）的影像特点，并根据影像表现探讨病变起源、与病理进行对照分析，并与其它颅内肿瘤进行鉴别。**方法** 报道一例 5 月龄的男婴患者，以 3 个月内无明显诱因多次出现屏气发作入院，第 1 次颅脑 MRI 检查示左侧颞叶囊实性包块影，实性成分以 T1WI 等信号、T2WI 稍低信号为主，DWI 未见明显弥散受限，边缘可见囊状 T1WI 低信号、T2WI 高信号影，周围可见大片水肿，增强实性成分明显强化。颅脑 CT 示左侧颞叶囊实性包块，未见明显钙化。第 2 次 MRI（距第 1 次 MRI 检查 35 天后）检查示左侧颞叶形态不规则囊实性包块影较前增大（以边缘囊性成分增大为主），实性部分明显强化，周围脑实质仍可见水肿区，术前诊断胚胎性肿瘤。结果 患儿在全麻下行左侧颞叶肿瘤切除术，术中提示肿瘤位于左颞叶皮层下，表面呈囊性，打开后释放囊液，可见肿瘤实性部分呈分叶状，质硬，颜色苍白血供丰富，肿瘤在颅底与左侧颈内动脉、动眼神经、颞骨岩锥粘连紧密，给予松解粘连，后分块完整切除肿瘤。术后病理光镜可见梭形细胞呈束状、波浪状或弥漫紧密分布，间质局部玻璃样变性，局部小血管丰富、有出血；免疫组化：S-100(+)，SOX10(+)，PAS(-)，CK(-)。病理诊断：考虑富于细胞性神经鞘瘤，但术中未见明确神经来源。患儿术后至今约 18 个月，复查无明显复发情况。结论 基于本例患儿发病年龄及病变与周围结构关系，我们考虑 ICS 起源为发育与非发育多种机制共同作用。ICS 影像上实性成分明显强化，但易出现囊变、钙化和瘤周水肿，与病理上神经鞘瘤多由高度有序的细胞成分（AntonyA 区）和黏液样低细胞成分（AntoniB 区）组成相关。ICS 虽发病率极低，但影像表现有一定特征，需与颅内其它肿瘤鉴别。

PU-0407

基于 CT 增强细胞外容积分数评估小儿椎旁外周神经母细胞源性肿瘤病理类型

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目的：讨论基于 CT 增强所得细胞外容积分数鉴别小儿椎旁外周神经母细胞源性肿瘤病理类型的意义。

方法：回顾性的收集 2021 年至 2022 年期间在我院接受活检或手术治疗，且病理明确神经母细胞源性肿瘤患儿相关临床及影像资料。基于 CT 平扫及增强两期，以圆形或椭圆形感兴趣区（15~35mm²）选择肿瘤强化实质区域，连续选择 3 个层面，取其平均值；并同时测量肿瘤同层面降主动脉（胸腹）或髂外动脉（盆腔）的 CT 值（10~20mm²）。计算 ECV：ECV(%)=[(HU₂-HU₁)/(HU_{2-blood}-HU_{1-blood})]×(1-Hct)，其中 HU₁、HU₂ 分别代表对比剂注射前后目标区域 CT 均值，HU_{1-blood}、HU_{2-blood} 分别代表对比剂注射前后血池的 CT 值。Hct 为血细胞压积。

结果：纳入患儿病例数 49 例，节神经细胞瘤 GB 9 例、节神经母细胞瘤 GNB 22 例、神经母细胞瘤 NB18 例，其中病灶位于颈部 3 例(5.77%)、纵隔 36 例(69.23%)、肾上腺区椎旁 10 例(19.23%)、盆腔骶前 3 例(5.77%)。增强后不同分期所得 ECV 值(%) GB（动脉期 3.54±3.60 vs 静脉期 9.83±6.31）、GNB（动脉期 4.09±2.84 vs 静脉期 16.18±10.78）、NB（动脉期 10.34±7.55 vs 静脉期 27.57±7.28）；分组间各期 ECV 值差异均有显著性（P 均<0.01）。相对于动脉期，静脉期 ECV 值对外周神经母细胞源性肿瘤病理鉴别能力较高，特别是对神经母细胞肿瘤

的诊断效率最高 (AUC 0.876, 截点值 17.00)。静脉期 ECV 界值定义: 节细胞神经瘤 <5%, 节神经母细胞瘤 5%~17%, 神经母细胞瘤 >17%。

结论: 研究发现基于 CT 增强所得 ECV 对于小儿椎旁外周神经母细胞源性肿瘤病理鉴定有一定意义, 且静脉期 ECV 的诊断效率更高。

PU-0408

4D Flow MRI 技术在小儿复杂性先心病的应用价值

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目的 小儿先心病是胎儿时期心血管异常而形成的先心病, 包括常见的房间隔缺损, 室间隔缺损, 动脉导管未闭, 卵圆孔未闭, 法洛四联症。还有不常见的肺静脉异位引流, 大动脉转位, 主动脉缩窄等, 容易引发心功能失常心肌损伤, 长此以往患儿容易诱发心力衰竭。部分外科手术需要血流动力学支持。随着医学技术的飞速发展, 手术效果显著提高, 多数患者得到及时治疗。

材料和方法 研究对象为 2022 年 11 月—2023 年 6 月, 16 例医嘱提示为先心病患者的患儿, (11 名男性和 5 例女性, 平均年龄 7.8 岁, 2—15 岁) 切超声提示血液动力学异常。采用西门子 sky 3.0T 磁共振扫描 785B_4Dflow_ePAT3_retro_native 序列进行斜矢状位包全心脏进行扫描, 扫描之前先用 flow_wenc_scout_100-190tp@c 序列进行速度编码扫描, 根据流速编码序列结果进行编码设置, 两个序列均在自由呼吸状态下进行扫描, 采用回顾性心电和呼吸联合触发, 采集时间在 5-9 分钟。通过后处理获得血管腔内的二维分析平面的峰值和平均速度, 总流量, 压力梯度, 湍流动力, 净流量和反流量等。

结果 结果左、右心室增大 6 例 (37.5%), 3 例房间隔缺损血流动力学显示 (18.75%), 3 例主动脉肺动脉转位, 动脉导管未闭 (6.5%), 外科手术血流评估提供重要价值。4D Flow 能计算心脏大血管 (出冠脉以外) 的血流峰值流速和峰值流量以及血流总量。

结论 4D Flow MRI 技术作为一种无创性, 无对比剂, 无放射性检查成像手段, 可以通过多种流体相关参数 (峰值流速, 峰值流量, 脉冲波速度 (pulse wave velocity, PWV), 壁剪切 (wall shear stress, WSS) 等定量评估血流动力学, 以及提供可视化三维血流信息, 特别是超声不能提供血流量患者, 对复杂性先心病动脉转位为外科手术可行性提供有效帮助。

PU-0409

儿童前纵隔 T 淋巴母细胞淋巴瘤/急性淋巴细胞白血病的临床表现及 CT 影像学特征

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【摘要】目的 分析儿童前纵隔 T 淋巴母细胞淋巴瘤/急性淋巴细胞白血病 (T-LBL/ALL) 临床表现及 CT 影像学特征, 提高诊断准确率。**方法** 回顾性收集 2016 年 9 月至 2023 年 7 月经安徽省儿童医院病理科证实为前纵隔 T-LBL/ALL 11 例患儿临床表现及 CT 资料, 其中男 9 例, 女 2 例, 年龄范围 2 岁 5 个月~14 岁 7 个月, 平均 (8.18±3.32) 岁。化疗前 11 例均行 CT 平扫及增强检查, 并以化疗后首次 CT 平扫及增强观察疗效。**结果** 11 例儿童前纵隔 T-LBL/ALL 多以全身淋巴结肿大或上腔静脉压迫综合征为首发症状, CT 大多表现为团块状囊实性软组织密度影, 少数呈分叶状改变, 肿瘤体积较大, 最长径约为 5.8~14.5cm, 平均 (10.14±2.73)cm, CT 增强扫描示实性成分轻-中度

强化,囊变区不强化,11 例病灶内均可见小血管影穿行,并伴有胸腔积液、心包积液、肺不张、气管受压、胸膜增厚等占位效应,远处浸润多以肾浸润为主,化疗后首次 CT 复查时间为 7~37 天,平均(16±12.88)天,化疗后效果显著,包括肿块缩小、占位效应减轻等。结论 尽管 T-LBL/ALL 患儿的生存率有所提高,但发病率仍然很高,CT 在诊断儿童前纵隔 T-LBL/ALL 具有一定敏感性 & 特异性,有利于指导临床治疗及评估患者预后情况。

PU-0410

新生儿胃重复畸形的 CT 诊断 (附 2 例报告)

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【摘要】目的 探讨新生儿胃重复畸形的临床表现及 CT 影像学特点。材料和方法 回顾 2022 年 1-6 月间收治的 2 例新生儿胃重复畸形患者的临床及影像学表现,2 例新生儿患者无呕吐、呛奶,腹胀,查体无明显腹部阳性体征。均系胎儿期超声检查发现。2 例患者均行腹部超声检查及 CT 平扫、增强检查。超声采用 Philips IU22 彩色超声仪检查。CT 检查采用 GE Revolution 螺旋 CT 机,扫描范围自右膈肌水平至耻骨联合水平,采用 8mm 层厚,螺距 1.0 进床扫描。增强检查:采用欧乃派克 (1.5ml/Kg) 静脉团注后扫描。结果 超声检查显示胃大弯侧低回声肿块 1 例,胃小弯侧低回声肿块 1 例。CT 检查平扫显示左上腹部囊性肿块 2 例,胃小弯侧 1 例、胃大弯侧 1 例。肿块体积较小,直径 1-2cm 左右,边界清楚,内部以均匀液体密度为主,壁略厚,与胃壁关系密切。增强后,肿块内部无明显强化,壁轻度均匀强化。手术病理结果显示胃重复畸形。结论 新生儿胃重复畸形发病率不高,体积较小者临床上常无明显症状或体征,有些病例产前超声检查可发现。胃重复畸形以球形多见,偶可呈管状,可位于胃的任何部位,以胃大弯侧最多,且多数与胃共壁,内衬胃粘膜,也可含有肠粘膜或胰腺组织。多数胃重复畸形呈盲囊状与主胃不相通,少数可与胃或肠管相通。CT 平扫常表现为低密度肿物,边界清楚,壁略厚,内部以均匀水样密度为主。增强检查囊肿内部无强化,壁可轻度强化。本文报告的 2 例胃重复畸形其特点为大弯侧、小弯侧各一例,位置固定,均为胎儿期发现,且体积较小,壁略厚。与胃壁粘膜层或肌层关系密切,但未与胃腔相通。胃重复畸形注意与以下疾病鉴别 1) 胃憩室:通常与胃腔相通,憩室壁与正常胃壁相延续,内部可伴溃疡。2) 脾或胰腺囊肿:与胃壁无明显相连,位于脾或胰腺轮廓内,壁薄。CT 检查能够明确诊断,对于囊肿的位置、大小以及内容物作出较为全面的评估,指导临床治疗。

PU-0411

儿童心尖肥厚型心肌病超声及 MRI 特征

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目的:探讨儿童心尖肥厚型心肌病的临床、超声及 MRI 特征,以提高该病在儿童人群中的认识。方法:回顾性分析 1 例儿童心尖肥厚型心肌病的临床、超声及 MRI 资料,并复习相关文献。结果:患儿,男,12 岁,主因“乏力,发现血压升高 2 天”入院。血压:155/90mmHg。首次心电图示窦性心律、左室高电压倾向、T 波倒置。复查心电图示:窦性心律,左室肥大伴 ST-T 改变。化验:心肌酶(—)。超声心动示:室间隔基底段厚约 10mm,左心室后壁基底段厚约 12mm,左心室室壁由基底段向心尖段渐进性增厚,心肌最厚处约 19mm,心尖部/左室后壁厚度之比 1.58。心脏 MRI 示:心尖部心腔狭小甚至收缩期闭塞,心尖部心腔呈“黑桃尖”样改变,左心室心尖区室壁最厚处 18.6mm。超声联合 MR 诊断为典型心尖肥厚型心肌病。患儿左心室室壁由基底段向心尖段呈

渐进性增厚,属于混合型,该型较单纯型少见,但较单纯型严重,因此分型非常重要。延迟强化后心肌未见异常强化,提示不存在心肌纤维化。

结论:发生在儿童的心尖肥厚型心肌病较罕见,但其超声及 MRI 特征与成人相似。MRI 是目前诊断心尖肥厚型心肌病较敏感、可靠、无创的影像学检查方法。心肌肥厚位于左心室乳头肌水平以下的心尖部,舒张末期最大室壁厚度 $\geq 15\text{mm}$ 或舒张末期心尖段最大室壁厚度/基底段后壁厚度比值 ≥ 1.5 诊断典型心尖肥厚型心肌病。

PU-0412

早期以无强化长阶段横贯性脊髓炎表现的小儿原发脊髓胶质母细胞瘤 1 例及文献复习

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脊髓胶质母细胞瘤是一种罕见的疾病,尤其在儿童中极为罕见,其病程具有侵袭性,预后差。患儿,男,7岁,主因发热、抽搐伴意识不清半天入院。查体:意识不清,GLS评分3分,三凹征阳性,点头呼吸,双膝腱反射、腹壁反射未引出。实验室辅助检查:血常规:WBC: $18.0 \times 10^9/\text{L}$,脑脊液常规提示白细胞21,生化提示蛋白: 6.77g/L 异常升高,氯低,糖正常,脑脊液压力 $310\text{mmH}_2\text{O}$ 。胸部CT显示肺部炎症。头颅MRI显示脑沟增宽。脊柱MRI显示延髓下段、颈段至胸9椎体水平脊髓肿胀并弥漫性长T2信号,脊髓增强扫描病变无强化。临床诊断:脑脊髓炎,呼吸衰竭,电解质紊乱,支气管肺炎。入院后行气管插管呼吸机辅助呼吸,给予大剂量丙球、甲泼尼龙琥珀酸钠冲击,抗感染,营养神经,降颅压,纠正电解质紊乱等治疗。治疗1个半月后复查,脊髓MRI显示脊髓肿胀减轻,脊髓内长阶段病变范围缩小,临床症状改善。2个月后,患者症状加重,随访MRI示脊髓病变扩大,C6-T5脊髓可见明显外周强化肿块,脑膜内多发结节,颅内多发肿块病变。病人进行了颈胸段脊髓肿瘤切除术。术后病理结果胶质母细胞瘤(IV级)。

在PUBMED以“脊髓、胶质母细胞瘤、MRI”为关键词搜索,共234篇文献,其中脊髓原发胶质母细胞瘤并且有磁共振增强扫描报道的共43篇,病例47例,MRI大部分表现为脊髓肿胀,一部分病例呈外生性生长,增强扫描呈花环状或团块状中等或明显增强,强化程度不均,极个别罕见病例无明显强化。而以这种长阶段广泛横贯性脊髓炎且早期无强化表现的脊髓胶质母细胞瘤文献中无相关报道。因此,我们报道此罕见病例,借以提高影像科医师对脊髓胶质母细胞瘤不典型表现的认识。

PU-0413

利用深度学习图像重建提高儿童腹部能谱 CT 血管造影的图像质量

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目的:评价深度学习图像重建(DLIR)对儿童腹部能谱CT血管造影(DEsCTA)图像质量的改善效果。

方法:收集29例肿瘤患儿(年龄 4.8 ± 2.1 岁,0.5~8岁,男:女=16:13)的腹部DEsCTA图像。分别在40keV、50keV、68keV和74keV的单能量级别下,使用50%自适应统计迭代重建(ASIR-V)、100%ASIR-V和DLIR进行图像重建。使用5分制(5分,最佳;3分,可接受)主观评估大动脉及其小分支的图像质量和诊断置信度。客观测量主动脉及背侧均匀肌肉组织的CT值、标准差值(SD),并计算对比噪声比(CNR)。

结果: DL-H 和 100%ASIR-V 图像在所有能量水平下的 CNR 均无统计学显著差异, 且均显著高于 50%ASIR-V。40keV 图像的 CNR 最高, DL-H 为 36.3 ± 8.8 , 100%ASIR-V 为 38.3 ± 11.4 , 50%ASIR-V 则为 23.05 ± 5.90 。主观评价结果显示, DL-H 对大动脉及其小分支的诊断置信度得分最高, 分别为 4.11 ± 1.52 和 3.83 ± 1.17 , 优于其他两种算法, 具有统计学差异, 40keV 时小血管显示效果最好。三组图像中的大动脉评分无显著统计学差异。

结论: DL-H 可以提高儿童腹部 DEsCTA 图像的质量, 尤其可以提升小动脉的显示能力。

PU-0414

儿童软骨发育不全的头颅影像学表现

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目的

分析并总结软骨发育不全 (ACH) 患儿的颅脑 CT 及 MRI 特征, 以提高对本病的认识。

方法

回顾性分析我院 2014 年 2 月—2022 年 2 月收治的 ACH 病例 (共 7 例) 颅脑 CT 及 MRI 影像资料, 总结其影像学表现特点。

结果

(1) 颅颈交界区异常。7 例患儿均枕骨大孔狭窄, 其中 5 例脊髓受压变形, 2 例伴有上颈髓变性水肿。

(2) 颅底骨异常。7 例患儿均为短斜坡, 3 例存在颞骨发育异常 (颞骨岩脊高耸), 1 例听小骨形态异常伴乳突气化不全, 1 例鼓室盾板呈水平状。

(3) 颅内异常。①大脑异常: 7 例患者均有脑积水, 5 例侧脑室颞角形态异常, 4 例内侧颞叶横沟增深, 4 例内侧颞叶灰白质交界面模糊, 4 例蛛网膜下腔增大, 3 例鞍上池扩大, 2 例海马不全翻转。②小脑异常: 3 例患儿后颅窝缩小, 2 例小脑体积增大。③其他: 2 例患者视神经底角缩小, 3 例天幕角增大。

结论

ACH 患儿颅颈交界区、颅底骨及颅内可有多发异常, CT 及 MRI 相结合可清晰显示这些异常, 为临床诊断提供诊断思路, 并及早对症治疗, 防止患儿出现一系列症状, 甚至危及生命。

PU-0415

0-14 岁儿童发育期间垂体形态变化

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目的 探究中国儿童垂体发育过程, 基于磁共振 (MR) 图像初步构建正常垂体径线参考范围, 为垂体相关疾病评估提供理论依据。方法 纳入 1400 例年龄 0~14 岁正常儿童, 每间隔 1 岁为 1 组, 男女各 50 例。所有儿童行头颅 MR 三维 T1 加权像 (3D-T1WI) 扫描, 后进行多平面重建, 测量垂体所有径线并计算垂体体积, 包括矢状位前后径、矢状位上下径、冠状位左右径及斜冠状位垂体柄长度。垂体体积按 (前后径 \times 上下径 \times 左右径) $\times 0.5$ 进行计算。结果 男童的垂体矢状位前后径, 矢状位上下径、冠状位左右径及垂体体积均随年龄增长而增大。女童的垂体矢状位上下径, 矢状位前后径及垂体体积在 13 岁达到最大, 分别为 (6.84 ± 1.15) mm, (7.39 ± 1.31) mm, (361.89 ± 109.92) mm³。垂体柄主要位于中后部, 分别为 61.5%、33.4%。垂体柄长度随年龄增

大而减小。结论 本研究初步探究新生儿到青少年垂体发育过程的形态变化及径线、体积数据，为临床评价垂体发育、疾病鉴别提供帮助。

PU-0416

特发性中枢性性早熟患儿垂体 MRI 研究

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目的 探究中国特发性中枢性性早熟性早熟儿童的垂体变化，为 MRI 诊断及评估性早熟提供参考值范围。方法 纳入 2020-2022 年因性早熟在本院就诊的患儿 221 例。年龄及性别匹配的正常儿童 221 例。所有儿童行垂体 MRI 增强扫描，测量垂体所有径线并计算垂体体积，包括矢状位前后径、矢状位上下径、冠状位左右径及斜冠状位垂体柄长度。垂体体积按（前后径×上下径×左右径）×0.5 进行计算。结果 垂体矢状位前后径，矢状位上下径、冠状位左右径及垂体体积在正常组和性早熟组中均存在统计学差异，其中垂体体积差异较大。以上所有指标对性早熟有着良好的预测价值。垂体宽径对于性早熟的预测效果更佳，敏感性为 98.6%，特异性为 98.2%。结论 本研究特发性中枢性性早熟儿童垂体发育过程的形态变化及径线、体积数据，为临床评估及诊断特发性中枢性性早熟提供帮助。

PU-0417

1 例成人型左冠状动脉异常起源于肺动脉的双源 CT 表现

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目的：探讨双侧 CT 在儿童左冠状动脉异常起源于肺动脉诊断中的价值方法：回顾性分析、总结我院 1 例患儿经西门子 Force 双源 CT 检查诊断为成人型左冠状动脉异常起源于肺动脉(ALCAPA)的影像学表现并相关文献复习结果：本例患儿女，10 岁，因体检发现心脏杂音 9 月就诊，CT 主要表现为右冠状动脉开口于右冠窦，开口处内径约 5.5mm，全程走行迂曲扩张，最宽处内径约 7.5mm，左冠窦未见冠状动脉开口，左冠状动脉异常开口于肺动脉主干左侧壁距离肺动脉瓣上约 10mm，开口处内径约 6.5mm，并在肺动脉内见高密度造影剂的射流征象（冠状动脉盗血征），提示存在左向右分流情况，冠状动脉左主干见不同程度扩张。同时可见左室游离壁及室间隔肌层增厚，内见丰富的侧支血管影与冠脉相交通，于舒张期更显著。综上影像表现，诊断为成人型左冠状动脉异常起源于肺动脉。结论：双源 CT 具有检查速度快、辐射剂量低、造影剂量少等优点，能够清晰显示 ALCAPA 异常起源的位置及左右分流的情况，并且对冠状动脉扩张的程度、侧支血管形成情况的均可直观显示，对疾病早期诊断、临床手术方案及术后评估具有重要的价值。

PU-0418

中心层左右径在儿童胸部 CT 体型特异性剂量中的研究

黄文诺

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【摘要】：目的 比较容积 CT 剂量指数(volume CT dose Index, CTDIvol)和体型特异性剂量估算(SSDE)两种辐射剂量测量方法在儿童胸部 CT 检查中的不同。方法 回顾性分析常州市第二人民医院 2020 年 1 月至 2021 年 8 月行胸部 CT 检查的儿童 131 例，所有图像均能满足诊断要求。根

据患儿图像的中心层面的左右径 (LAT) 来分组, A 组 $LAT < 20\text{cm}$, 22 例, B 组 $20 \leq LAT < 23\text{cm}$, 20 例, C 组 $23 \leq LAT < 26\text{cm}$, 21 例, D 组 $26 \leq LAT < 29\text{cm}$, 25 例, E 组 $29 \leq LAT < 32\text{cm}$, 23 例, F 组 $LAT \geq 32\text{cm}$, 20 例。测量患儿胸部中心层 CT 图像的最大左右径 (LAT), 手动勾勒体表最小的范围, 不包括检查床床板, 测量平均 CT 值、面积, 收集患儿的 CTDIvol, 并计算转换因子 f 和 SSDE, 比较容积 CT 剂量指数 (CTDIvol) 与体型特异性剂量估算 (SSDE) 的不同。结果 5 组左右径 (LAT)、转换因子 (f)、水当量直径 (WED) 差异均有统计学意义 ($P < 0.05$)。5 组 CTDIvol 和 SSDE 差异度依次为 184.72%, 174.80%, 171.69%, 153.04%, 146.83%, 134.00%。CTDIvol 和 SSDE 呈正相关 ($r = 0.736$, $P < 0.01$)。结论 儿童胸部 CT 检查中, CTDIvol 较 SSDE 低估了患儿的辐射剂量, 且患儿中心层面左右径越小, 被低估的剂量越大。

PU-0419

对比两种儿童头部 CT 扫描的 SSDE 计算方法

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目的: 对比分析基于美国医学物理学家学会 (AAPM) 220 与 293 报告的体型特异性辐射剂量估计值 $SSDE_{220}$ 与 $SSDE_{293}$ 在衡量儿童头部 CT 扫描中辐射剂量的差异。

材料与方法: 回顾性选取了从 2020 年 1 月到 7 月于我院行头部 CT 检查的 480 名儿童患者, 患儿年龄区间在 3-6Y。所有扫描均使用 Philip iCT 进行, 采用固定管电压管电流, 管电压为 120KV, 管电流为 28.8mAs, 扫描长度为 120-145cm。CTDIvol 为扫描后从机器提供的剂量报告中获取, 头部 SSDE 参考 AAPM 第 220 与 293 号报告计算, $SSDE = f \cdot CTDI_{vol}$, 其中 $f = \alpha e^{-\beta D_w}$, 当采用 220 报告时, $\alpha = 1.8747$, $\beta = 0.03871$, D_w 为水当量直径; 采用 293 报告时, $\alpha = 1.9852$, $\beta = 0.0486$ 。水当量直径由 Radimetrics 软件计算所得。利用配对样本 T 检验比较 f_{220} 与 f_{293} 的差异, 同时采用 Wilcoxon 秩和检验分析比较 $SSDE_{220}$ 与 $SSDE_{293}$ 。

结果: f_{220} 与 f_{293} 的配对样本 T 检验结果, $P = 0.000 < 0.05$, f_{220} 与 f_{293} 的差异具有显著性, f_{220} 均值较 f_{293} 均值大 0.088, f_{220} 比 f_{293} 高估约 8.94%。 $SSDE_{220}$ 与 $SSDE_{293}$ 的配对样本 Wilcoxon 秩和检验结果, $P = 0.000 < 0.05$, $SSDE_{220}$ 与 $SSDE_{293}$ 的差异具有显著性, $SSDE_{220}$ 均值较 $SSDE_{293}$ 均值大 1.703, $SSDE_{220}$ 比 $SSDE_{293}$ 剂量高估约 8.99%。 $SSDE_{220}$ 对儿童头部 CT 的辐射剂量估计值较高。主要原因在于颅脑与体部组织结构的差异, 脑实质被包裹在致密的颅骨中, 相当于为脑实质提供了一层屏蔽射线的屏障, 导致在水当量直径相同的情况下, 头部吸收剂量低于体部吸收剂量。

结论: $SSDE_{220}$ 与 $SSDE_{293}$ 相比, $SSDE_{220}$ 造成了儿童头部 CT 扫描的辐射剂量估算值偏高。AAPM 293 报告的发布使儿童头部 CT 检查的辐射剂量估算更加准确。

PU-0420

苗勒管发育不全伴右半结肠旁沟区卵巢黄体囊肿 1 例

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目的 苗勒氏管发育不全多因青春期原发性闭经就诊发现, 以急性腹痛就诊者少见, 可能造成误诊或漏诊。本文旨在探讨苗勒管发育不全伴右半结肠旁沟区卵巢黄体囊肿的影像表现, 提高诊断的准确性。

方法 分析右侧腹痛 5 天患儿 1 例, 女, 14 岁, 接受 1 次全腹部 CT 平扫及增强检查。

结果 右侧结肠旁沟区见一囊性灶, 内部密度不均匀, CT 值约 10-20HU, 增强扫描囊壁呈轻度强化, 周围可见少许积液, 大小约 5.6×6.7cm, 子宫未见显示, 双侧卵巢显示不清。该例囊性灶误诊为肠

重复畸形,术中探查发现卵巢位于双侧结肠旁沟处,右侧卵巢可见囊性灶破裂出血,术后病理为卵巢黄体囊肿;骨盆入口处双侧各见一始基子宫形成,阴道为盲端,该患儿最终被诊断为苗勒管发育不全伴右侧卵巢黄体囊肿。

结论 苗勒氏管发育不全伴右半结肠旁沟区卵巢黄体囊肿极为少见,首次检查时若仅关注明显病灶而忽视其它部位异常易造成误诊或漏诊;MRI 有助于提高诊断的准确性。

PU-0421

以幼儿为核心的磁共振检查前准备方法对降低 3-7 岁幼儿磁共振检查镇静剂使用率的作用与价值

谢欢

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目的:研究以幼儿为核心的磁共振检查前准备方法对降低 3-7 岁幼儿磁共振检查镇静剂使用率的作用与价值。

方法:回顾性分析 2023 年 1 月-2023 年 6 月在我院影像科行幼儿磁共振检查的患儿 110 例,幼儿年龄段为 3-7 岁,按这些幼儿检查前的准备方式不同分为幼儿核心准备组(CCP)和幼儿常规准备组(CRP),每组 55 例。CRP 组幼儿采用常规准备方法进行磁共振检查前准备,CCP 组幼儿采用以新型的以幼儿为核心的准备方法进行磁共振检查前准备(如检查前视频学习、噪声适应、环境适应和适应性训练等)。两组检查失败的幼儿由临床医生决定是否使用镇静剂后再次进行磁共振检查。采用配对卡方检验对两组幼儿磁共振检查镇静剂使用率、检查成功率、检查效率及图像质量进行差异性分析。

结果:CCP 组幼儿磁共振检查镇静剂使用率为 2/55(3.6%),CRP 组幼儿磁共振检查镇静剂使用率为 14/55(25.5%), $P=0.008$;CCP 组检查成功率为 53/55(96.3%),CRP 组检查成功率为 41/55(74.5%), $P=0.008$;CCP 组检查效率中位完成时间为 12.5min,CRP 组检查效率平均时间为 19.6min, $P=0.031$;CCP 组图像质量评分平均分为 4.5 分,CRP 组图像质量评分平均分为 3.9 分, $P=0.038$ 。

结论:以幼儿为核心的磁共振检查前准备方法,不但可以降低 3-7 岁幼儿磁共振检查的镇静剂使用率,还能提高这部分幼儿的磁共振检查成功率、效率和图像质量。也提高了检查医生和诊断医生在扫描和诊断时的信心,镇静剂的使用减少也提高了幼儿家属对我科医疗服务的满意度,值得在同行中进行推广。

PU-0422

“双低”扫描联合迭代技术在儿童先心病 CTA 成像中的应用

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目的 探讨儿童先心病 CTA 成像检查中使用低管电压扫描和低浓度对比剂对图像质量和辐射剂量的影响。

方法 选取行心脏大血管 CTA 检查的儿童先心病患者 120 例,平均年龄 4.6 岁(5 月-13 岁),随机分为双低剂量组(A 组)和常规剂量组(B 组),各 60 例。CT 扫描设备为 GE Revolution,扫描参数为: A 组使用管电压 70kVp (≤ 3 岁)和 80kVp (≥ 3 岁); B 组使用管电压 80kVp (≤ 3 岁)和 100kVp (≥ 3 岁),两组均使用自动管电流技术(SmartmA),噪声指数(NI)均为 10.0,其它扫描参数相同。对比剂均使用欧乃派克(300mg I/ml),A 组用量为 0.8ml/kg(体重),B 组为 1.0ml/kg(体重)。图像重建使用多模型迭代算法(ASiR-V),迭代比例 50%。分别测量和计算左右室、肺动脉根部、左右

肺动脉和主动脉根部和降主动脉 7 个兴趣区 CT 值、噪声值(SD)、信噪比 (SN)、最佳对比噪声比(CNR),计算两组的辐射剂量(ED)和平均碘摄入量,对两组图像质量进行盲法主观评分,对两组间上述指标进行统计学分析。

结果 两组的图像 7 个兴趣区 CT 值、图像噪声差异均无统计学意义($P>0.05$)。A 组图像的 CNR 高于 B 组,差异有统计学意义($P<0.05$)。A 组的辐射剂量、平均碘摄入量均明显低于 B 组,差异有统计学意义($P<0.05$)。两组图像的主观评分无统计学意义($P>0.05$)

结论 儿童先心病心脏大血管 CTA 成像使用低管电压和低对比剂用量可以提供更好的图像对比噪声比,,联合多模态迭代重建技术,在保证诊断图像质量的同时较大幅度降低了辐射剂量,同时减少了对比剂碘量的摄入。

PU-0423

儿童可逆性胼胝体压部病变综合征 MRI 诊断价值

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目的 探讨儿童可逆性胼胝体压部病变综合征(RESLES)的 MRI 影像特征

方法 回顾性分析我院 2020 年 5 月~2023 年 5 月期间经临床确诊并行 MRI 扫描的 16 例 RESLES 患儿,其中男 10 例,女 6 例,年龄范围 3 个月至 8 岁,中位年龄 2.3 岁,由 2 名高年资放射科医师独立对图像进行分析,协商达成一致意见,并对其病因、临床表现、影像学资料、治疗及随访进行总结分析

结果 RESLES 患儿入院最常见病因为惊厥发作和感染,临床表现为意识障碍,无其他神经系统特异表现。MRI 检查 16 例患儿病灶部位局限于胼胝体压部,病变孤立并呈圆形或椭圆形,边界欠清,其中 T1WI 呈稍低信号(5 例)或等信号(11 例);T2WI 上呈等信号(3 例)或高信号(13 例);FLAIR 及 DWI 均为明显高信号;ADC 值减低。患儿经支持及对症治疗临床痊愈,16 例患儿于 10 日~2 个月内复查头颅 MRI,所示胼胝体压部异常信号病灶完全消失

结论 儿童 RESLES 临床表现无特异性,预后良好,诊断主要依赖头颅 MRI,以胼胝体压部可逆性异常信号为特点,MRI 表现具有特征性,可为临床诊疗提供可靠依据,避免过度医疗

PU-0424

Design and validation of a scoring system for diagnosing biliary atresia based on diffusion tensor imaging and laboratory tests

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Objective: This study aimed to investigate the value of a scoring system established by laboratory and MRI parameters for diagnosing biliary atresia (BA). Methods: A total of 74 patients were recruited to design ($n=51$) and validate ($n=23$) a scoring system. DTI was performed with b factors of 0 and 1000 s/mm² by a 1.5 T MR unit or with b factors of 0 and 600 s/mm² by a 3.0 T MR unit. Parameters with significant statistical difference between BA ($n=36$) and non-BA ($n=15$) patients in the design set were analyzed by binary logistic regression to predict the presence or absence of BA, then a scoring system was designed and validated. The diagnostic power of the scoring system was assessed by area under the receiver operating characteristic curve analyses. Results: The right liver apparent diffusion coefficient values, gamma glutamyl transpeptidase, and aspartate aminotransferase platelet ratio index were

selected for the scoring system. The diagnostic accuracy, sensitivity, specificity, positive predictive value, and negative predictive value for predicting BA in the design set were 82.35% (42/51), 88.89% (32/36), 66.67% (10/15), 86.49% (32/37), and 71.43% (10/14), however, in the validation set were 82.61% (19/23), 100% (14/14), 55.56% (5/9), 77.78% (14/18), and 100% (5/5). The area under the receiver operating characteristic curve for the design set and validation set for predicting BA were 0.876 and 0.913 ($p < 0.001$), respectively. Conclusion: This scoring system can be used as an adjunct to other noninvasive imaging methods in the differential diagnosis of BA and non-BA.

PU-0425

小儿肾上腺嗜酸细胞腺瘤临床 CT、MRI 诊断

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目的: 探讨小儿肾上腺嗜酸细胞腺瘤 (adrenal oncoctyoma, AOC) 临床 CT、MRI 特征及诊断要点。**方法:** 收集并回顾性分析经手术病理证实的 3 例 AOC 临床及 CT、MRI 影像资料, 结合文献, 着重总结、分析其 CT、MRI 表现。**结果:** 3 例患者均为女性, 年龄 4 岁 2 月-11 岁 8 个月、平均 7.9 岁, 临床表现为女性男性化 2 例、性早熟 1 例, 均伴不同程度内分泌异常。肿瘤均单发, 右侧 1 例、左侧 2 例, 边缘及分界清楚, 包膜完整及延迟强化, 肿块平均长径 4.87 cm, 密度/信号较均匀且见较均匀、持续强化; 1 例可见瘤内含脂结节。**结论:** AOC 具有一定 CT、MRI 影像特点, 结合内分泌异常表现, 多能提示诊断。

PU-0426

Sn100 能谱纯化技术在儿童颞骨平扫的研究

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目的: 探讨双源 CT 能谱纯化技术 Sn100kVp 在儿童颞骨低剂量扫描中的应用。**方法:** 前瞻性收集我院 2021 年 12 月-2022-11 月期间行 Sn100kVp 能谱纯化技术低剂量扫描患者, 挑选出显示正常的解剖内耳和中耳结构 (在放射学报告和临床评估中) 者 50 例 (平均年龄: 5.3 ± 3.82 岁)。回顾性收集我院 2021 年 12 月—2022 年 11 月期间行常规低剂量颞骨扫描患者, 挑选出显示正常的解剖内耳和中耳结构 (在放射学报告和临床评估中) 者 50 例 (平均年龄: 5.68 ± 3.66 岁), 其中能谱纯化组采用能谱纯化技术 Sn100 kVp 方案检查 (管电流 200mAs, 128x0.6mm 准直, 0.5mm 层厚, 螺距 0.8), 常规剂量组采用参考电压 100kVp, CAREkV 方案 (参考电流 114mAs, 自动管电流调制, 128x0.6mm 准直, 0.5mm 层厚, 螺距 0.8)。测量两组图像外耳道空气、乳突气房空气、内耳道组织和鳞部骨质 CT 值、噪声; 对两组图像内耳道、迷路、听小骨、乳突气房进行解剖标记主观显著性评价, 评价结果用 5 分评分表表示; 记录设备显示辐射剂量数值, 计算信噪比。组间各部位 CT 值、信噪比和辐射剂量, 满足正态分布者差异用独立样本 t 检验进行比较, 不满足者差异用非参数 Wilcoxon 符号秩和检验比较; 组间 4 个解剖结构图像质量主观评分差异用非参数 Wilcoxon 符号秩和检验比较。**结果:** Sn100 kVp 有效剂量 (0.03 ± 0.01) mSv 显著降低, 颞骨鳞部信噪比无明显差异, 其余部位信噪比略低于常规剂量组图像, 而主观评价得分除迷路外则没有显著差异。**结论:** 能谱纯化组在不降低颞骨解剖结构显示的同时, 维持相当的噪声水平, 大幅降低儿童患者辐射剂量, 具有一定临床意义和实用价值, 今后可考虑运用于儿童颞骨非内耳畸形的病变如外伤、中耳炎等的复查中。

PU-0427

实影渲染技术 (CVRT) 在儿童肋软骨畸形诊断中的应用研究

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目的: 应用西门子 Force 双源 CT 后处理技术显示儿童不同类型的肋软骨畸形, 比较传统后处理方法与实影渲染技术 (CVRT) 对于肋软骨畸形诊断的差异。**方法:** 回顾性分析我院 2021 年 1 月至 2023 年 1 月 CT 诊断肋软骨畸形患儿 81 例, 利用传统后处理技术 (包括多平面重建、最大密度投影容积成像) 和 CVRT 分别对图像进行后处理, 比较不同技术对本病的诊断价值。**结果:** 肋软骨位置异常 (局部隆起 39 例、凹陷 2 例), 形态异常 (一侧增粗 3 例、一侧变细 1 例、双侧不对称 3 例、环形 4 例、叉状 29 例), 伴肋骨畸形 28 例, 不伴肋骨畸形 53 例, 各后处理技术在显示肋软骨畸形诊断中各有特点, 其中 CVRT 对本病的诊断符合率达 100%。**结论:** 在传统后处理技术的基础上, 应用 CVRT 技术能进一步提高儿童肋软骨畸形的诊断率。

PU-0428

COVID-19 疫情对 18F-FDG PET/MR 儿童肿瘤分期的影响

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目的: 评估 COVID-19 疫情对 18F-FDG PET/MR 儿童肿瘤分期和治疗的影响。

方法: 对 2017 年 5 月 1 日至 2020 年 1 月 31 日 (A 组) 和 2020 年 2 月 1 日到 2022 年 6 月 30 日 (B 组) 这两个时间段内行全身 FDG PET/MR 显像的儿童肿瘤的相关资料进行回顾性分析。以病理学结果为金标准, 收集有关原发性肿瘤 (T)、淋巴结转移 (N) 及远处转移的 (M) 的数据。

结果: 共纳入 1415 例儿童 (398 例神经母细胞瘤、104 例卵裂细胞瘤、73 例肝母细胞瘤, 394 例淋巴瘤、119 例朗格汉斯组织细胞增多症、98 例横纹肌肉瘤、21 例骨肉瘤、24 例恶性畸胎瘤、31 例内胚层窦瘤、40 例生殖细胞瘤、19 例尤因肉瘤、15 例透明细胞肉瘤和 79 例其他类型的肿瘤) (A 组分别为 672 例和 B 组分别为 743 例)。A 组和 B 组从初始症状到 PET/MR 的中位间隔分别为 7.3 (1.0-28.6) 和 8.5 (1.2-30.4) 天 ($p < 0.05$), 两组不同类型肿瘤的分期差异无统计学意义 ($p > 0.05$)。

结论: 在 COVID-19 疫情期间, 对于杭州地区儿童恶性肿瘤, 在开始隔离限制后, 尽管从最初症状到 PET/MR 检查的中位间隔延长了, 但 PET/MR 分期和治疗没有显著延迟。

PU-0429

1.5T MRI 和 3.0T MRI 上 UTE 序列在儿童 膝关节成像的对比研究

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目的: 探讨 MRI 超短回波时间 (ultra-short echo time, UTE) 序列在 1.5T 和 3.0T 两台不同 MRI 设备上对儿童膝关节显示的信号差异程度, 对比分析两台 MRI 设备上 UTE 序列在儿童膝关节显示的差异性。

方法: 选取 6 岁-16 岁同一年龄段范围内的儿童 20 人, 随机分配成两组 (A 组和 B 组), 运用膝关节线圈在联影 1.5T 磁共振上和西门子 3.0T 磁共振上对 A 组和 B 组的 10 位受检者分别进行 UTE 序列的扫描; 其主要成像参数如下: (1) 联影 1.5T 磁共振上 UTE 序列:

PU-0430

青少年睾丸坏死超声、CT 及 MRI 表现

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目的 探讨彩色多普勒超声、CT 及 MRI 对青少年睾丸坏死的诊断价值。方法 收集 2021 年 1 月-2023 年 8 月在武汉红十字会医院经手术病理确诊的 5 例睾丸坏死青少年患者的影像与临床资料, 全部进行彩色多普勒超声、CT 平扫、MRI 平扫及增强扫描及 DWI 成像, 分析睾丸坏死的三种成像方法的影像征象。结果 青少年睾丸坏死超声主要表现为睾丸体积增大, 光点增粗, 回声增强, 其中四例未见明显血流信号, 三例伴有附睾肿大; CT 平扫表现为睾丸肿大, 三例睾丸内斑片状稍高密度影, 两例无明显密度异常密度不均匀; MRI 表现为睾丸肿大, 信号不均, 见斑片状稍短 T1WI 短 T2WI 信号影, DWI 弥散受限, 均有附睾肿大, 增强扫描睾丸内部可见无强化区, 同侧精索静脉增粗强化。结论 青少年睾丸坏死彩色多普勒超声、CT 平扫、MRI 检查具有一定的特征性, 超声检查方便快捷, CT 检查对血肿敏感, 但特异度低, MRI 检查影像信息量大, 在临床及超声、CT 检查不明确的情况下, MRI 检查对青少年睾丸坏死的诊断和鉴别诊断具有一定的优势。

PU-0431

CT-MRI 对脑颜面血管瘤病的诊断价值

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目的 探讨脑颜面血管瘤病的 CT 及 MRI 表现及其诊断价值。方法 回顾性分析了脑颜面血管瘤病的临床和及 CT-MRI 资料 本组 14 例中, 男, 8 例, 女 6 例, 年龄 50d~6 岁。出生时发现眼眉血管痣 5 例, 呈红葡萄酒色、隆起于皮肤; 9 例单侧面部弥漫性大片状血管瘤, 颜色浅红至深红, 不隆起与皮肤, 压之褪色; 伴有发热、惊厥和偏瘫 2 例, 癫痫发作 5 例。结果 14 例 CT-MRI 表现均有特征性, 表现为一侧或两侧枕顶叶或额顶叶表浅部位脑回状或曲线状钙化或不同程度的脑萎缩, 伴病侧大脑半球发育不全或病侧颅板增厚 4 例。结论 本病 CT-MRI 表现具有特征性, 对本病诊断及预后判断有重要的价值。

PU-0432

CT 对肠套叠病因的诊断价值

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目的 探讨 CT 对小儿肠套叠的病因诊断价值。方法 对手术证实的 30 例特发性肠套叠回顾性分析。其中男 21 例,女 9 例。年龄 2 个月-8 岁,其中 3 个月-1 岁 26 例。临床表现阵发性哭闹 23 例,呕吐 17 例,果酱样便 19 例,腹部触及包块 23 例,面色苍白、脱水 9 例和休克 4 例。CT 扫描范围为腰 2 下缘至耻骨联合上缘。结果 原发性 21 例,伴有迈克尔氏憩室 6 例,淋巴瘤 3 例。CT 表现呈同心圆形分层状肿块 19 例、不规则肿块 8 例,弹簧状肿块 3 例、伴有不全性肠梗阻 17 例、伴有完全性肠梗阻 9 例,肠穿孔 3 例。结论 CT 可准确、及时、可靠诊断小儿肠套叠,并为临床治疗方法的选择提供可靠依据。

PU-0433

TORCH 感染的脑部 CT 及 MRI 表现

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目的: 探讨先天性 TORCH 感染的脑部 CT 及 MRI 表现。方法: 对 35 例血清学检查证实的先天性 TORCH 感染的脑部 CT 及 MRI 表现进行回顾行分析。结果: 脑内钙化伴侧脑室周围密度减低 32 例,占 91.4%。钙化呈条状、斑点状、主要分布在脑室周围及室管膜下,其次是底节区 and 大脑半球脑白质内。脑发育不良和脑萎缩 29 例,占 88.6%,CT 及 MRI 表现为脑室扩大、脑沟增宽及额顶部蛛网膜下腔增宽,常与钙化并存。脑软化及脑穿通畸形囊中 5 例。脑裂畸形或厚脑回畸形 8 例,常伴有脑室周围密度减低及钙化。严重脑萎缩、广泛性脑实质钙化 2 例。结论: TORCH 感染对儿童神经系统损害严重,后遗症多,CT 及 MRI 表现及血清学检查对 TORCH 感染具有重要的诊断意义。

PU-0434

儿童髓鞘少突胶质细胞糖蛋白抗体脑脊髓炎初诊 MRI 表现

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目的 探讨儿童髓鞘少突胶质细胞糖蛋白抗体脑脊髓炎的临床表现及首次磁共振影像学特征。方法 回顾性分析西安交通大学附属西安儿童医院诊断的 47 例 MOG 抗体阳性的中枢神经系统炎症脱髓鞘病患儿的临床资料,收集其发病年龄、性别、临床表现、实验室检查及影像学结果等资料。结果 47 例患者中男性 25 例,女性 22 例;起病时中位年龄 4 岁 1 个月(7 个月~12 岁 2 个月)。临床表现复杂多样,包括发热、头痛等非特异性表现,呕吐、精神差等脑病症状,视力障碍,脊髓症状,癫痫症状及意识障碍,其中 25 例患儿同时出现 2 种以上临床症状。初诊头颅磁共振阳性率为 93.6%(44/47 例),37 例累及大脑白质、14 例累及丘脑、15 例累及脑干、14 例累及基底节、11 例累及小脑、12 例累及桥臂、6 例累及胼胝体、4 例累及皮质、内囊及大脑脚各 3 例累及;其中单发 5 例分别累及小脑、桥臂、额叶白质、顶叶白质、基底节。大脑半球病灶以白质为主,同时累及大脑灰白质者 8 例。7 例患儿脊髓受累,累及颈髓 6 例,胸髓 3 例,腰髓 1 例,其中 3 例脊髓多发受累。视神经受累 10 例,8 例双侧累及,框内段受累 7 例。结论 儿童 MOG 抗体脑脊髓炎临床表现多样,

以急性播散性脑脊髓炎最为常见，MRI 表现以广泛性或孤立的皮质下白质病灶为主，脊髓受累主要为颈髓，长节段脊髓受累可见；视神经眶内段且双侧受累为其特征。

PU-0435

双能 CT 在鉴别儿童盆腔良恶性肿瘤中的应用

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目的 探讨 CT 双能量成像定量分析在鉴别儿童盆腔良恶性肿瘤中的应用价值。

方法 回顾性分析 2021 年 7 月至 2022 年 12 月在西安市儿童医院经病理证实盆腔肿瘤的 37 例患儿，其中良性肿瘤 21 例（成熟畸胎瘤 7 例、卵巢囊肿 7 例、淋巴管瘤 5 例、海绵状血管瘤 1 例、粘液性囊腺瘤 1 例），恶性肿瘤 16 例（未成熟畸胎瘤 3 例、混合性生殖细胞肿瘤 3 例、神经母细胞瘤 3 例、混合性性索-间质瘤 2 例、卵黄囊瘤 2 例、横纹肌肉瘤 2 例、恶性外胚层间叶瘤 1 例），均行盆腔 CT 增强扫描，以双能量模式收集动、静脉期影像。并通过 syngo.via20 处理软件测量双期肿瘤的 CT 值、碘浓度及能谱曲线，并计算病变双期的标准化碘浓度(标准化碘浓度=病灶的碘浓度/同层髂动脉碘浓度)和能谱曲线斜率[斜率=(HU40 keV -HU70 keV)/30]；采用独立样本 t 检验或 Wilcoxon 秩和检验对盆腔良恶性肿瘤参数进行统计学比较，并绘制受试者工作特征曲线(ROC 曲线)评估相应参数的诊断效能。

结果 儿童盆腔恶性肿瘤中 DECT 衍生的静脉期参数（标准化碘浓度（NIC）、碘浓度（IC）、能谱曲线斜率(k)）显著高于良性肿瘤（均 $P<0.05$ ），而增强双期的 CT 值及有效原子序数差异均无统计学意义。诊断盆腔恶性肿瘤的阈值为静脉期 $NIC\geq 0.11$ ，敏感性为 69%、特异性为 95%、曲线下面积(AUC)为 0.853；静脉期 $IC\geq 0.55\text{mg/ml}$ ，敏感性为 69%、特异性为 95%、曲线下面积(AUC)为 0.802；静脉期斜率 $k\geq 1.13$ ，敏感性为 56%、特异性为 95%、曲线下面积(AUC)为 0.734。

结论 双能 CT 可通过静脉期 NIC、IC 及能谱曲线斜率帮助鉴别儿童盆腔良恶性肿瘤，且静脉期 $NIC\geq 0.11$ 时诊断恶性肿瘤可能性更大。DECT 物质定量测量技术和能谱曲线在鉴别诊断儿童盆腔良恶性肿瘤方面具有重要辅助价值。

PU-0436

足月儿缺氧缺血性脑病的 MRI 特征

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新生儿缺氧缺血性脑损伤（neonatal hypoxic-ischemic injury）是指围产期窒息导致脑缺氧缺血性损伤，临床出现一系列脑病的表现。不同胎龄脑损伤的病理机制、损伤部位、神经影像学表现及临床预后均有所不同。足月新生儿缺氧缺血性脑病的临床表现随病情严重程度不同而异，轻度者有易怒、紧张不安和深部反射增强，预后好。中度包括昏睡、癫痫和肌张力下降，60%-80%预后好。严重者有昏迷、癫痫、脑干功能异常，颅内压升高，重症患儿可见瞳孔散大、反射消失，前囟门紧张等。

【主要影像学表现】

（1）矢状旁区脑损伤

即周围型脑损伤，大脑矢状旁区皮层及皮层下区域发生局灶性或弥漫性水肿时，MR 可以显示相应部位的占位效应，MR 扩散受限，严重时出现脑皮层区层状坏死，表现为皮层区脑回样、线样 T1WI 高信号灶。在后遗症期，矢状旁区皮质及皮质下区域多发软化灶，分水岭区脑皮质变薄，皮

质下白质减少, 相邻侧脑室扩大, 三角区和枕角受累明显, 严重者局部脑表面皱缩, 表现为瘢痕样脑。

(2) 基底节、丘脑损伤 足月儿严重窒息持续一段时间之后可造成基底节、丘脑损伤, 是中央型脑损伤的主要特征。急性期 T1WI 显示双侧对称性内囊后肢正常高信号消失, 而在丘脑外侧、苍白球及壳核后部、皮质深部区呈斑片或广泛性高信号, 在 T2WI 则可为正常或斑片状高信号; 亚急性期上述结构在 T1WI 表现为不均匀高信号, 在 T2WI 呈高、低相间的纹理状不均匀信号。慢性期, 受损脑组织萎缩和基底节营养不良性钙化, 在分水岭区 T2WI 可有高信号。广泛脑坏死病例可有弥漫性脑软化。

PU-0437

磁共振扩散加权成像定量参数对宫颈癌的诊断效能的多中心评价

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目的: 基于多中心数据分析扩散加权成像 (diffusion weighted imaging, DWI) ADC (apparent diffusion coefficient) 单指数模型及体素内不相干运动 (Intravoxel incoherent motion, IVIM) 模型的定量参数对宫颈癌诊断及病理分级的价值, 并进一步探讨 DWI 定量参数在不同临床中心间的一致性。

方法: 回顾性分析 3 个临床中心经手术病理证实的 170 例宫颈癌及 12 例宫颈平滑肌瘤患者, 术前均行多 b 值 DWI 扫描。所有 DWI 图像通过后处理获得相应 DWI 参数: 包括 IVIM 模型的纯扩散系数 (D)、伪扩散系数 (D*)、灌注分数 (f)、fD* 及 ADC 单指数模型的 ADC 值。采用受试者工作特征 (Receiver operating characteristic curve, ROC) 曲线及 Man-Whitney U 检验分析 DWI 参数的诊断效能及术前对宫颈癌病理分级的价值, 采用 Kruskal-Wallis 单因素 ANOVA (多样本) 分析 DWI 定量参数在不同临床中心间的一致性, $P < 0.05$ 为差异有统计学意义。

结果: 宫颈癌灶 DWI 参数 (D、D*、f、fD*、ADC 值) 均明显小于正常宫颈组织 ($P < 0.05$)。参数 D、f 及 ADC 值的曲线下面积 (area under the curve, AUC) 值均大于 0.95, 其诊断宫颈癌的敏感度、特异度、阳性预测值及阴性预测值均大于 90%。低分化 (G3) 宫颈癌的 D 和 ADC 值低于中高分化 (G1-2) 宫颈癌 ($P < 0.05$)。在宫颈癌病灶中, 临床中心 2 的设备 2 与临床中心 3 之间 DWI 各参数 (D、f、D*、fD*、ADC 值) 无明显差异 ($P > 0.05$)。宫颈癌灌注相关参数 (f、D*、fD*) 在不同临床中心不同设备之间无明显差异 ($P > 0.05$)。

结论: DWI 参数 D、f 及 ADC 值在宫颈癌诊断方面取得了良好的诊断效能 (AUC 值均大于 0.95)。DWI 扩散相关参数 D 和 ADC 值可以区分宫颈癌的病理分级, 且在不同临床中心相同型号的 MRI 设备中具有较好的一致性。

PU-0438

新生儿色素失禁症的脑部 MRI 特征

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目的: 探讨新生儿色素失禁症的脑部 MRI 特征及临床表现, 提高对本病的诊断。

资料与方法: 回顾性分析 2013 年 1 月-2023 年 1 月西安市儿童医院新生儿科收治, 并经临床及基因证实的 9 例新生儿色素失禁症的 MRI 特征, 包括 T1WI、T2WI、FLAIR 及扩散加权成像 (DWI), 以及相关临床表现。

结果: 9 例患儿均有皮疹表现, 包括红斑、丘疹、水泡、疣状增生、泼墨状色素沉着。5 例脑部 MRI 表现异常, DWI 出现高信号病灶 4 例, 其中 3 例病灶呈广泛性分布, 受累部位主要包括双侧大脑半球白质、双侧基底节、丘脑、内囊、胼胝体、脑干及小脑等。DWI 可更早、更敏感地发现病灶及累及范围。

结论 新生儿色素失禁症脑部病变发病率高, 如果出现相应神经系统症状时, 应尽早行 颅脑 MRI 检查。DWI 具有一定的特征性, 有助于早期发现病变及对临床预后评估有重要意义。

PU-0439

胎儿硬脑膜窦畸形 MRI 诊断

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目的: 胎儿硬脑膜窦畸形是一种罕见的颅内血管畸形, 属于动静脉分流性疾病, 病因尚不明确, 通常而言, 胎儿硬脑膜窦畸形预后较差, 常合并心力衰竭、出血/血栓形成、颅内压升高等合并症。通过分析我院 9 例胎儿硬脑膜窦畸形病例, 总结其影像特点, 提高影像诊断能力。方法: 回顾性分析我院于 2017 年至 2023 年诊断的胎儿硬脑膜窦畸形 9 例病例, 分析其影像特点。结果: 9 例胎儿中均出现硬脑膜窦的囊状扩张, 在单激励快速自旋回波序列中呈低信号, 稳态自由进动序列呈高信号, T1WI 信号以等信号为主, 如果出现稳态自由进动序列低信号、T1WI 高信号则提示血栓形成。通常会造造成脑实质受压移位。9 例中侧脑室扩张者 3 例, 静脉窦畸形伴血栓形成者 4 例, 伴出血者 2 例, 9 例胎儿脑双顶径及骨双顶径均处于正常范围内, 2 例胎儿额枕径处于-1SD 范围, 可能与硬脑膜窦压迫有关。结论: 产前 MRI 可以准确诊断胎儿硬脑膜窦畸形, 同时可评估出血及血栓形成, 以及大脑发育状况, 有助于为产前诊断提供更多预后信息。

PU-0440

鞍区罕见造釉型颅咽管瘤一例

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目的: 颅咽管瘤是良性病变, 起源于胚胎时期 Rathke 囊形成颅咽管时的残余上皮细胞, 多位于鞍内和鞍上, 在组织学上分为造釉型和乳头型, 造釉型多见于儿童, 好发于 5~15 岁, 是儿童最常见的鞍区病变之一。重要影像特征呈囊实性肿块(囊性者占 80%), 90%合并钙化(结节或包壳状)。本例包块表现为完全钙化甚至骨化, 未见明显囊性成分, 分析颅咽管瘤钙化甚至骨化原因及影像表现, 提高对颅咽管瘤罕见影像表现的认识。

方法: 男, 3 岁 7 月, 以“视物不清半年, 加重 1 月主诉”入院, 进行了头颅 CT 及 MRI 扫描。我们从影像临床信息系统中获得患者的临床资料、影像特征、手术记录、病理结果。

结果: 头颅 CT 示鞍区类圆形环绕骨性包壳的高密度包块影, 周围可见放射状伪影, 包块内弥漫分布高密度结节影, 结节影间可见分隔; 头颅 MRI 示病变呈弥漫性长 T1、短 T2 异常信号结节影, 其内分隔呈等 T1、稍长 T2 信号影, 增强扫描结节影未见明显强化, 囊壁及间隔明显强化。垂体及视交叉受压, 影像诊断颅咽管瘤(造釉细胞型)。术中可见视神经苍白, 被肿瘤挤压延长变薄, 视交叉移位明显, 鞍区肿瘤呈多房“石榴籽”样钙化, 周围纤维小房包裹, 切除纤维囊壁, 取出钙化病灶约 300 余粒。病理大体呈灰白牙齿样物, 光镜所见示纤维囊壁样组织周边见栅栏状排列的柱状上皮及条索状排列的鳞状上皮结构, 伴淤血、出血、钙盐沉积和大量骨化, 局部慢性炎细胞浸润。免疫组化: Vimentin(+); CK(+), CK19(+), CK7(-), EMA(-), Ki-67(<1%+), P63(+), β -catenin(浆+), SYN(-), GFAP(-), Olig-2(-), S-100(灶+)。病理诊断造釉细胞型颅咽管瘤(WHO 1 级)。

结论：本例发病部位典型，影像表现罕见。颅咽管瘤骨化与前期钙化程度相关，CT 示包块周围可见放射状伪影，提示骨化可能，且钙化在 MRI 上可呈现高低不同的多种信号，而本例各序列皆为低信号，与骨皮质信号类似，考虑骨化。MRI 增强扫描囊壁及间隔明显强化，提示有一定生物活性，与文献报道骨化使没有生物学活性的钙化结构变成含有肿瘤细胞和间质的复合体一致，需要密切随访是否复发。

PU-0441

双肾恶性横纹肌样瘤（malignant rhabdoid tumor of the kidney, MRTK）并松果体-小脑上蚓部横纹肌样瘤一例

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患儿，女 6 月 7 天，体检时发现左腹部包块。腹部 CT 示左前下肾门部可见一大小约 58x51x50mm 的软组织包块影，其内密度不均匀，可见斑片状低密度影及斑点状高密度影。增强扫描明显不均匀强化。右肾门水平可见密度稍低片团影，轻度强化，大小约 14x13mm。CT 诊断左侧肾母细胞瘤，右肾稍低密度影。外院手术诊断（左侧肾脏下极）恶性肿瘤，组织学特点及免疫学表型特征提示为横纹肌样瘤，免疫学标记：CK(+,少数细胞),CD99(+),CK18(+,部分细胞),syn(+),SALL4(+,部分细胞),CyclinD1(+,部分细胞),Bcl-2(+),CD56(+,少数细胞),Vimentin(+,部分细胞),KI-67(+,局部约 80%),BRG1(+),CD34(+,少部分细胞),CA9(+/-),INI-1(-,丢失)、Desmin(-),cgA (-),S-100 (-),CK5/6(-),WT-1 (-),NSE (-),TTF-1 (-),H-Caldesmon (-),SMactin(-)。术后复查右肾门小包块影稍增大，结合病史考虑横纹肌样瘤，进行头颅 MRI 排查示松果体-小脑上蚓部类圆形等信号包块影，大小约 3.5cmX3.2cmX4.5cm，其内可见多发小囊状长 T1、长 T2 信号影，50 天后复查包块增大，内部囊状影较前扩大，增强呈小片状、线状轻度强化，幕上脑积水，出于“同源性”考虑横纹肌样瘤可能。外送基因检测提示抑癌基因 SMARCB1/INI-1 嵌合杂合性缺失。后采用 WT-2019（6）（修正 UH-1）-W1、W2 方案化疗，目前右肾小包块变化不大，松果体-小脑上蚓部包块稍增大。

肾恶性横纹肌样瘤可能来源于胚胎干细胞或生殖细胞，具有高度侵袭性，易发生远处转移如肺、脑等，预后极差。影像表现缺乏特征性，主要为靠近肾门的不均质包块，常伴囊变坏死及少许钙化，本例患儿双肾包块皆靠近肾门，颅脑 MRI 检查发现松果体-小脑上蚓部包块。MRTK 均有抑癌基因 SMARCB1/INI-1 异常，本例患儿此基因杂合性缺失。MRTK 以手术治疗为主，辅以化疗、放疗等综合治疗。

PU-0442

Based on contrast-enhanced CT radiomics and clinical feature analysis to predict distant metastases in Pediatric Willm's tumor

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Purpose: Combined Radiomics Signatures with clinical features to predict distant metastasis in pediatric Willm's tumor.

Method: The Ethics Committee of Xinhua Hospital Affiliated to Shanghai Jiaotong University School of Medicine approved this study (XHEC-D-2020-124). Informed consent was provided by each subject or their responsible guardian. From January 2014 to October 2021, We

retrospectively collected 215 patients with Wilms tumor, who were initially diagnosed, underwent surgery and other treatments and then had a long-term follow-up in our hospital. The Inclusion criteria were (1) age ≤ 18 years old at the time of diagnosis, (2) the postoperative pathological diagnosis of unilateral Wilms tumor, and (3) the pretreatment abdominal contrast-enhanced multidetector computed tomography (MDCT) examination and unenhanced chest CT acquired within 1 week before surgery. The final enrolled patients (n=93) were divided into the training cohort and the test cohort with a ratio of 3:1 by a completely randomized method. We have also collected the clinical pathological information and CT image features of each patient, and extracted the CT radiomics characteristics of their three-stage abdominal CT scanning images. Lasso algorithm analysis is used to screen the extracted CT radiomics features at the plain scan, cortex and medulla CT images. The clinical prediction model, CT-image-feature prediction model, CT-radiomics model and clinical-CT-radiomics combined model were constructed and validated respectively for predicting the risk of distant metastasis in pediatric Willm's tumor patients.

Results: Most pediatric Willm's tumor patients enrolled in this study were less than 3 years old and there were more male patients than female patients. 98% of these pediatric patients were affected unilaterally, though there are 2 pediatric patients who suffered tumor lesions in both kidneys at the initial diagnosis. The main pathological type of these patients was the mixed type and most tumor mass were over 10 cm at the initial diagnosis based on their CT image findings. After surgery, 22 patients had been found distant metastasis during the follow-up CT imaging screening and the lung was the most common distant metastasis site. After carefully analyzing these patients' three-stage abdominal CT scanning images, ten CT radiomics features, which were the radiomics signatures mostly related to the event of distant metastasis, were selected to construct the radiomics signature. The AUC value obtained from the radiomics model based on only the radiomics signatures was 0.96 in the training set and 0.94 in the test set. The largest diameter of the primary tumor was identified as an independent clinical predictor ($p < 0.01$) for distant metastasis. The clinical-CT-radiomics combined model showed a good discrimination capacity with an AUC of 0.94 in the training set and 0.92 in the test set, and the sensitivity and accuracy were further increased when using the combined model.

Conclusions: The risk of metastasis in pediatric Wilms tumor patients could be efficiently predicted using the radiomics model based on three-stage abdominal CT scanning image analysis. The combined model which combined radiomics signatures and the clinical feature, largest diameter of primary tumor, had a satisfactory ability to predict the risk of distant metastasis in pediatric Willm's tumor, with a comparable discrimination capacity and a better sensitivity and accuracy.

PU-0443

儿童耳源性硬膜外脓肿伴乙状窦血栓性静脉炎 2 例影像学表现并临床分析

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目的 综合分析儿童耳源性硬膜外脓肿伴乙状窦血栓性静脉炎的临床表现、影像学特征及鉴别诊断要点, 提高对儿童耳源性硬膜外脓肿伴乙状窦血栓性静脉炎的认识和影像诊断水平。方法 回顾性分析 2 例经手术证实的儿童耳源性硬膜外脓肿伴乙状窦血栓性静脉炎的临床及影像学表现, 复习相关文献。结果 本组病例均为男性, 年龄范围 (4~6) 岁, 均以消化道症状就诊, 后出现发热等症状。2 例均为左侧发病。CT 表现为左侧中耳乳突区软组织密度影填充伴乳突部骨质破坏, 左耳周软组织肿胀。1 例显示左乙状窦走行区稍低密度包块伴边缘密度增高, 边界较清晰。头部 MRI 平扫表现为左乙状窦走行区或颞枕部硬膜外稍长 T1 长 T2 信号包块影伴分隔, 于 DWI 序列呈高信号, 边界清晰, 1 例为多发病灶。脑实质内无异常病灶。增强检查显示 2 例均呈病变边缘及分隔强化, 并出现脑膜异常强化。MRV 显示左侧乙状窦受压, 局部充盈缺损。结论 儿童耳源性硬膜外脓肿伴乙状

窦血栓性静脉炎临床少见，病死率较高，需尽快手术治疗，术前影像学检查可以为临床诊断和治疗提供有价值的影像学信息。

PU-0444

幼儿早发型戊二酸血症 I 型两例

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目的：戊二酸尿症 I 型 (GA I) 是一种罕见的可治疗的神经代谢性疾病，由戊二酰辅酶 A 脱氢酶 (GCDH) 基因突变导致，该文旨在评估 GA I 患者的临床表现、实验室检查及影像学表现。

方法：总结本院 2019 年 1 月~2020 年 1 月确诊的 2 例 GA I 患儿的临床特点、实验室检查、影像学表现。

结果：2 例患儿均为新生儿筛查发现，为早发型，临床主要表现为头围增大，智力发育迟缓、运动延迟、肌张力减低伴有惊厥发作 (病例 1)、嗜睡和喂养困难 (病例 2)。实验室检查：血串联质谱有机酸分析 2 病例尿液中戊二酸和 3-羟基戊二酸显著增加。头颅 MRI 检查表现：患者均出现双侧外侧裂池对称性扩大，双侧额颞部蛛网膜下腔增宽伴额颞叶萎缩，双侧苍白球 T2WI 高信号伴弥散受限，脑室周围白质 T2WI 及 FLAIR 高信号，其中一例出现双侧额叶白质 T2WI 及 FLAIR 高信号伴弥散受限。

结论：GA I 患者临床表现多样，大头畸形是其临床特征之一，若患者短期出现头围增大，应进行 GA I 的筛查。实验室检查以血清或尿液有机酸升高为特征。影像学表现具有特征性：外侧裂对称性增宽、额颞叶萎缩、不同程度脑白质或/和基底节信号异常，DWI 及 MRS 等功能成像在评估疗效及随访中具有重要作用。早期筛查、早期低蛋白饮食干预，在神经系统症状出现前进行治疗预后较好。将 GA I 筛查纳入新生儿筛查项目是早期诊断的有效方法。

PU-0445

儿科影像技术：提升儿童医疗诊断与治疗的关键

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儿科影像技术在儿童医疗诊断与治疗中起着重要作用。本论文旨在探讨儿科影像技术的应用和发展，以及其在儿童医疗中的重要性。首先介绍了儿童医疗的特殊性和挑战，接着探讨了常用的儿科影像技术，包括 X 射线、超声波、计算机断层扫描 (CT) 和磁共振成像 (MRI)。随后讨论了儿科影像技术在儿童医疗中的应用领域，如儿童骨科、儿童肿瘤学和儿童神经学。最后，强调了儿科影像技术质控的重要性，包括质量控制标准、技术培训和监管。通过提高儿科影像技术的质量和可靠性，可以提升儿童医疗诊断与治疗的准确性和安全性，为儿童患者提供更好的医疗服务。

PU-0446

基于腺垂体影像组学无创评估青春期前和青春期儿童下丘脑-垂体-性腺轴激活的研究

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目的：探索一种基于 MRI 数据的无创、低成本、快速放射组学模型，用于评估儿童下丘脑-垂体-性腺(HPG)轴的激活。

材料与方法：本研究将于 2021 年 4 月至 2021 年 9 月接受垂体 MRI 扫描和 GnRH 刺激测试的 239 名儿童纳入研究，采用分层随机抽样方法分为训练集和测试集。使用最小绝对收缩和选择算子(LASSO)生成放射组学特征，并进行 10 倍交叉验证。采用受试者工作特征(ROC)和决策曲线分析(DCA)对放射组学模型的性能进行评价。

结果：通过 LASSO 逻辑回归方法，在训练队列中提取了 851 个放射组学特征，并将其减少到 10 个潜在的预测因子。基于 CUBE T1WI 的放射组学模型对 HPG 轴激活的预测效果较好，训练集的 AUC 为 0.84，测试集的 AUC 为 0.81。放射组学模型的 AUC 高于训练集的腺垂体体积(aPV)和高度(aPH)(分别为 0.84 vs 0.75 [P =0.001]和 0.84 vs 0.63 [P<0.001])。在 DCA 分析方面，放射组学特征显示出比 aPV 和 aPH 模型更高的净效益。

结论：MRI 放射组学模型可以作为 HPG 轴激活的无创预测因子，可能为性早熟、中枢性性早熟、生长发育和青春期发育迟缓以及先天性促性腺功能低下患者的诊断提供有价值的信息。

PU-0447

新生儿消化道异物影像表现 1 例

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儿童异物摄入是世界范围内常见且严重的问题，治疗不及时可导致严重的并发症和死亡率。因此，快速诊断和治疗很重要。放射检查在异物的确诊和治疗过程中至关重要。我们报道 1 例新生儿消化道异物。患儿，男，6 天，发现皮肤黄染 5 天，血便 1 次，发现气促 10 分钟，就诊。入院腹部平片（图 1）提示：上腹部见一条形（长度约 15mm）、尾端圆形致密影（直径约 4mm），边缘光整。CT 显示（图 2-3），位于左上腹小肠内，双侧膈下未见游离气体影，腹部未见肿块影。自患病以来，诉反应、吃奶、睡眠可，昨日夜间大便秘次多，约 5 次，稀糊状，入院前解血便 1 次，入院后解血便 1 次，量较多，为黄色稀便伴血性物质，小便未见异常。完善相关检查充分沟通后建议暂时保守治疗，12 小时后，患儿大便内见一耳钉影（图 4）。

PU-0448

儿童 HIV 相关颅内感染的 CT 特点分析

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目的：回顾性分析儿童 HIV 相关颅内感染的 CT 表现特点，以提高对儿童 HIV 颅内感染 CT 表现的认识。方法：收集赞比亚大学教学医院 2016 年 4 月-2017 年 4 月经临床及实验室检查证实的 HIV 颅内感染儿童病例 24 例，结果：24 例患儿中，结核性感染 13 例，CT 表现为脑实质无明确病变 2 例，9 例基底节、丘脑低密度病灶（如图 1a-1b），1 例见结核球并明显强化（如图 2a-2b）；HIV 脑炎 5 例，2 例双侧侧脑室旁对称性低密度影，2 例见脑干低密度，1 例见小脑低密度，均无强化（如图 3a-3b）；弓形虫感染 3 例，（如图 4a-4b）；隐球菌感染 2 例，1 例右侧小脑半球、脑干、丘脑及右侧基底节区低密度影，呈环形强化（如图 5a-5b）；非洲锥虫病 1 例（如图 6a-6b），CT 表现为双侧基底节区及左侧额颞顶叶低密度影，增强扫描病变无强化，无脑膜强化，轻度脑萎缩并脑室扩张。结论：儿童 HIV 相关颅内感染的 CT 表现具有一定的特点，结合临床及实验室检查，可以提高对本病的认识，能够尽早诊断，对临床的治疗具有重要意义，同样对于我国援非医疗工作，具有现实意义。

PU-0449

产前 MRI 预测先天性膈疝胎儿出生后治疗转归

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目的 观察产前 MRI 对预测先天性膈疝（CHD）胎儿出生后治疗转归的价值。方法 回顾性分析 55 胎经产前超声及 MRI 诊断 CHD 胎儿（CDH 组）及同期 55 胎孕周与 CDH 组匹配、经超声检查排除膈疝及其他消化系统畸形胎儿（非 CDH 组），随访胎儿妊娠结局及出生后治疗情况，根据出生后治疗转归（是否存活）将 CDH 组分为存活亚组及死亡亚组。比较 CDH 组与非 CDH 组间预估肺体积比（PPLV）和理想肺体积比，存活亚组与死亡亚组间一般资料和产前 MRI 表现的差异。采用二元 logistic 回归分析影响 CDH 胎儿出生后治疗转归的一般资料及产前 MRI 表现相关因素。绘制受试者工作特征（ROC）曲线并计算曲线下面积(AUC)，评估 PPLV 预测 CDH 胎儿出生后治疗转归的效能。结果 CDH 组与非 CDH 组间不同孕周胎儿 PPLV 差异有统计学意义（ P 均 <0.05 ），而理想肺体积比差异无统计学意义（ P 均 >0.05 ）。CDH 组内 41 胎为存活亚组、14 胎为死亡亚组，2 亚组间分娩时孕周、出生后住院时间及产前 MRI 所示是否有疝囊、是否肝脏疝入、双肺体积及 PPLV 差异均有统计学意义（ P 均 <0.05 ）。分娩时孕周和 PPLV 均为影响 CDH 胎儿出生后治疗转归的独立影响因素（ P 均 <0.05 ）。ROC 曲线显示 PPLV 预测 CHD 胎儿出生后治疗转归的 AUC 为 0.964。结论 产前 MRI 可有效预测 CDH 胎儿出生后治疗转归。

PU-0450

Pacifier Sign— Hiatal Hernia Disease(colonic type)

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OBJECTIVE: The purpose of this study was to evaluate the special image of Hiatal Hernia Disease

Methods: A 8 - year - old boy presented abdominal pain with no obvious inducement several months ago. The chest X-ray showed a gaseous shadow at the right margin of the spine . No abnormality of esophagus and stomach was found in gastrointestinal angiography. Chest and abdominal CT revealed herniation of the middle transverse colon into the right thoracic cavity from the esophageal hiatus. The child should be follow-up and did not require surgical treatment at once.

Results:We can see some special images of the disease.

Conclusion: Hiatal hernia disease is very common, and usually a herniation of the stomach bubble into the thoracic cavity, but it is extremely rare to see the middle transverse colon into the thoracic cavity from the esophageal hiatus, which is worth learning.

PU-0451

Inverted Glass Sign— Ectopic Liver Disease

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OBJECTIVE: The purpose of this study was to evaluate the special image of Ectopic Liver Disease

Methods: A 12 - year - old boy presented abdominal pain and weak urination with no obvious inducement one month ago. Routine urinalysis showed no abnormalities. Physical examination reveals a dense mass in the lower abdomen. Abdominal MRI and CT enhancement scan found that the upper abdomen liver volume was significantly smaller, and the lower abdomen found a solid mass, with cord of soft tissue and vascular connected between each other. Further DSA examination confirmed extrahepatic portal shunt, with absence of intrahepatic portal vein, and ectopic liver. The child should be follow-up and did not require surgical treatment at once.

Results:We can see some special images of the disease.

Conclusion: Portal shunt disease is common, but it is extremely rare to have ectopic liver and intrahepatic portal vein absence, which is worth learning.

PU-0452

扩散张量成像定量评估脊髓性肌萎缩症严重程度的研究

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目的: 通过扩散张量成像 (DTI) 评价脊髓性肌萎缩 (SMA) 患儿大腿肌肉的微观结构改变, 分析 DTI 定量参数与临床指标的相关性, 以探讨 DTI 评估 SMA 疾病严重程度的临床价值。

方法: 收集 30 例经基因确诊的 SMA 患儿 (Ⅱ型 16 例, Ⅲ型 14 例), 行双侧大腿肌肉常规 MRI 及 DTI 成像, 测量右侧大腿 13 块肌肉 DTI 定量参数 (各向异性分数[FA]、表观扩散系数[ADC]),

并收集患儿的临床指标（年龄、体质指数[BMI]及 Hammersmith 运动功能量表[HFMSE]评分）。采用 Spearman 秩相关性分析 DTI 定量参数与临床指标的相关性，采用独立样本的非参数检验比较Ⅱ、Ⅲ型患者的组间差异。

结果：股薄肌的平均 FA 值最大和 ADC 值最小，长收肌的平均 FA 值最小和 ADC 值最大；患儿大腿肌肉的平均 FA 值与 HFSME 评分呈负相关，平均 ADC 值与 HFSME 评分呈正相关。Ⅱ型 SMA 患儿大腿肌肉的平均 FA 值高于Ⅲ型，而平均 ADC 值低于Ⅲ型，差异均具有统计学意义。

结论：DTI 能客观有效地定量评估 SMA 患儿疾病的严重程度，并有助于区分Ⅱ、Ⅲ型 SMA，在监测疾病进程、评价治疗效果方面有重要临床应用价值。

PU-0453

Star-VIBE 序列对于早产儿 BPD 诊断的临床应用

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目的: 探讨 Star-vibe 序列对早产儿支气管肺发育不良诊断效能及临床严重程度评估的可行性

方法: 实验选取 15 例早产儿肺发育不良患儿行肺部 MR 扫描，Star-vibe 序列参数：TR:3.62ms、TE:1.93ms、层厚：3mm、层间距 20%、层块（slabs）：1、Slices per slab：52、FOV:220-280mm、频率编码分辨率：256、相位编码分辨率：256、Radial views：1008、压脂方式：Q-fat sat.扫描完成后由 2 名工作五年以上儿科组医师分别进行图像质量评估分析并根据临床分度标准对患儿进行轻、中、重度分级，并进行统计学分析。对于出院后患儿，分别于 6 个月、1 岁及 2 岁时行 MR 检查，探究利用 MR 进行早期预测疾病预后的可行性。

结果: 15 例患儿，甲级图像 11 例，乙级图像 2 例，因患儿中途苏醒失败 2 例，其中 BPD 轻度 5 例，中度 3 例，重度 5 例，与临床表现基本相符。

讨论: 支气管肺发育不良（bronchopulmonary dysplasia,BPD）是一种继发于新生儿肺损伤后的慢性肺疾病，是由于肺发育不成熟及各种原因所致，多发于使用机械通气的早产儿，尤其是小早产儿。近年来，随着临床医疗水平的不断发展，极低体重儿存活率的显著提高。临床机械通气及氧疗法的广泛应用，支气管肺发育不良的发病率也在随之升高。

目前临床对于 BPD 的影像学检查主要集中在普通 X 线平片及多层螺旋 CT 肺部扫描。BPD 的胸部 X 线平片表现没有特征性，已经不再作为疾病严重程度的评估依据。CT 与 X 线片相比，可直观发现肺结构的异常，但也同样存在因放射剂量大放射损伤患儿家属难以接受等实际临床困难。Star-vibe 序列是西门子公司推出的三维 T1WI 序列，采用与传统 K 空间完全不同的放射状 K 空间采样技术，可在患者自由呼吸状态下进行数据采集，大大避免了由呼吸运动形成的图像伪影。基于 MRI 具有较好的软组织分辨的能力对 BPD 进行诊断及严重程度评估，并利用 MRI 无电离辐射可进行反复检查的优势，及时跟进患儿病程发展，为后续临床治疗提供可行性指导资料。

PU-0454

CT 及 MRI 对儿童 DNET 的鉴别诊断价值

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目的 探讨胚胎发育不良性神经上皮肿瘤（dysembryoplastic neuroepithelial tumor, DNET）影像学表现及临床特点，旨在提高对本病认识。方法 回顾性分析 11 例经手术、病理和免疫组化确诊为胚胎发育不良性神经上皮肿瘤患儿的临床资料及 CT 及 MRI 表现，并进行相关文献复习。DNET

是一种少见的脑肿瘤，有着特殊的生物学和病理学特点，一般认为是一种良性病变。DNET 的发病机制目前尚无定论。大多数学者认为其来源于中枢神经系统发育过程中的中间发生层，为脑灰质非正常发育的继发性肿瘤。典型的 DNET 病理学特征为由不同比例的星形细胞、少突胶质细胞和神经元按照不同比例组成特异性胶质神经元(specific glioneuronal element, SCG)成分。根据的不同 SCG，可将 DNET 分为 3 个类型，简单型仅含有 SCG 成分，神经元散在分布于黏液基质中；复杂型由 SCG 和散在的星形细胞及少突胶质细胞组成；非特异型缺乏典型的 SCG 成分，但临床表现及影像学特点与前两者类似。结果 11 例患者主要表现为顽固性癫痫，渐进性加重；CT 及 MRI 表现为分别位于颞叶、顶叶皮层区；CT 呈囊状低密度影，T1WI 呈等或等、低混杂信号，T2WI 呈高信号，FLAIR 呈稍高信号，7 例均表现为边缘高信号的“环征”，4 例瘤内有分隔，冠状位表现为宽基底朝外，尖部向内的“三角征”；本组病例有 5 例表现为较为典型的“三角征”。6 例均可见“脑回征”，表现为肥皂泡状脑回样结构，与脑脊液信号接近，无占位效应、周围无水肿、无强化。“三角征”、无占位效应、瘤周无水肿的特征，在 DNET 诊断中有较重要的定性价值。需与神经节细胞胶质瘤，低级别胶质瘤，少突胶质细胞瘤，多形性黄色星型细胞瘤及多结节及空泡样神经元肿瘤鉴别。结论 DNET 的 MRI 表现具有明显的特征性，结合临床可明确诊断。

PU-0455

儿童恶性蝶腭瘤报道一例并文献复习

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女，5 岁 5 月，因“反复头痛伴呕吐 1 月余，症状呈进行性加重”于 2020 年 02 月 24 日来我院就诊。外院头颅 CT 提示：左侧桥前池囊性占位。查体：精神偏软，上睑上抬无力，颈软，左耳听力异常。2020 年 2 月 29 日症状加重，复查 CT 肿块增大，脑积水较前明显。实验室检查：肿瘤标志物均为阴性。影像学表现：左侧桥小脑角区、左侧颞叶内侧可见两处囊实性肿块影，病灶实性部分 CT 值约 44HU，左侧颞骨岩部骨质压迫吸收破坏，MRI 呈等长 T1 稍长 T2 信号影占位，其内另可见类圆形囊性信号影，弥散受限，增强扫描呈明显不均匀强化，肿瘤包绕左侧海绵窦、侵及左侧颞下窝，呈钻孔样匍匐生长。术前影像诊断结果：神经鞘瘤首先考虑，星形细胞瘤或室管膜瘤待排。术后病理 (HE,x200)：考虑 (左侧三叉神经) 恶性蝶腭瘤。

PU-0456

慢性活动性 EB 病毒感染引起的罕见广泛腹腔内小动脉瘤：一例 儿科病例报告

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慢性活动性 EB 病毒 (CAEBV) 感染是一种淋巴增生性疾病，其特征是慢性或复发性感染性单核细胞增多症 (IM) 样症状。CAEBV 的预后较差，尤其是合并心血管并发症，包括冠状动脉受累 (冠状动脉扩张及冠状动脉瘤) 和主动脉及其分支扩张。在这篇文章中，我们展示了一个特殊的儿童 CAEBV 病例。患者除了冠状动脉瘤及主动脉扩张表现外，还伴有广泛的腹腔内小动脉瘤，包括肝脏内、脾脏内、双肾内及肠系膜血管分支，这在之前的中外文献中均没有类似报道。患者接受了化疗和单倍体匹配的造血干细胞移植 (haplo-HSCT)。大多数小动脉瘤消失，冠状动脉瘤轻微缓解，主动脉扩张没有进一步进展。此病例具有罕见的心血管受累表现，通过单倍体 HSCT 得到缓解，可以帮助我们更容易地识别类似表现的病例。CAEBV 并发心血管并发症的早期诊断和及时干预将改善整体预后水平。

PU-0457

1 例儿童 Hughes-Stovin 综合征 (HSS)

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本文报导了 1 例儿童 Hughes-Stovin 综合征 (HSS) 的患者。男, 12 岁, 间断发热、咳嗽, 咳痰 1 年余, 痰中带血 2 个月。无口腔及生殖器溃疡、关节痛、眼睛疼痛等表现。既往体健, 否认家族遗传病史。实验室检查白细胞、C 反应蛋白及血沉增高, 血红蛋白减低, 感染相关检查结果均为阴性。胸部 CT 增强显示两肺多发肺动脉瘤, 中心及外周均有分布, 部分瘤内有附壁血栓, 相邻肺野内大片实变和“反晕征”磨玻璃表现。患儿同时存在动脉导管未闭, 其肺动脉端管壁边缘附着不规则索条样结构, 考虑为赘生物, 动脉导管进行了手术治疗并切除赘生物, 病理显示为血栓纤维组织成分。

本病例主要针对肺动脉瘤展开鉴别诊断, 成因包括先天性心脏病、先天性血管发育异常、感染和系统性血管炎。1 先天性心脏病导致的肺动脉瘤为肺动脉主干及左肺动脉扩张, 不会出现双侧多发及远端外周肺动脉瘤。2 遗传缺陷所致先天性血管发育异常, 如马凡综合征、Ehlers-Danlos 综合征等可引起肺动脉瘤, 临床伴有特殊面容, 体型、皮肤及关节异常, 以及家族史, 本患儿均无相关病史也不支持此诊断。3 感染相关肺动脉瘤, 儿童最常见是结核和真菌 (毛霉菌)。本患儿相关检查均为阴性。4 系统性血管炎, 主要包括 Takayasu 动脉炎 (多发性大动脉炎)、白塞氏病和 Hughes-Stovin 综合征 (HSS) 均可并发肺动脉瘤。本患者没有主动脉或分支管壁增厚表现, 因此不支持多发性大动脉炎。白塞氏病和 Hughes-Stovin 综合征在肺动脉瘤表现上有很多相似之处, 但此患者没有白塞氏病典型的临床表现, 如复发性口腔溃疡、生殖器溃疡、眼部或皮肤损伤, 白塞氏病不能诊断。在除外其他鉴别诊断之后, 本患儿最终诊断 Hughes-Stovin 综合征。患儿经激素和免疫抑制剂治疗后好转。

HSS 是一种罕见但可能致命的疾病, 儿童 HSS 更为罕见。诊断主要基于临床表现和放射学检查结果, 在排除了鉴别诊断后最后得出结论。HSS 在增强 CT 上有 6 种不同分类表现, 其中不稳定型肺动脉瘤构成最大的破裂风险。治疗上以联合免疫治疗为基础, 结合血管内介入治疗, 抗凝和溶栓仍有争议, 需谨慎选择。

PU-0458

儿童肺隔离症伴扭转 1 例

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目的: 探讨儿童肺隔离症伴扭转相关特征性影像学表现, 以进一步提高临床及放射科医生对肺隔离症伴扭转的认识。

方法: 回顾性分析本院一例因“间断腹痛伴发热 6 天、持续胸痛 5 天”入院、最终病检查证实为肺隔离症伴扭转患儿的流行病学资料、临床特点及影像学表现并复习总结相关文献。

临床资料: 患儿女, 9 岁, 主因“间断腹痛伴发热 6 天、持续胸痛 5 天”入院。查体发现右肺呼吸音粗, 左肺中下部未闻及呼吸音。连续三次血常规显示患儿白细胞逐渐升高, 分别为 (7.11、10.15、12.21) $\times 10^9/L$, CRP 明显升高。肿瘤标志物及病原学检查均阴性。胸部 CT 平扫示左肺下叶实变影; 左侧少量胸腔积液; 腹盆腔 CT 平扫示盆腔少量积液。5 天后行胸部 CT 平扫及增强检查示左侧胸腔软组织密度包块密度较前增高, 增强后呈轻度强化, 其内可见一细小供血动脉来源于胸主动脉; 左肺下叶实变影范围较前增大, 左侧胸腔积液较前增多, 左肺局部压迫性不张。胸腔穿刺见血性胸腔积液。术中见肿物发紫, 肿胀坏死, 肿物与胸壁、膈肌及左肺下叶粘连, 并可见一蒂状组织。最终病理诊断为叶外型肺隔离症伴扭转。

结论:肺隔离症是一种少见的先天性肺发育畸形,为胚胎时期一部分肺组织与正常肺组织分离,单独发育并接受异常的体循环动脉供血。病变多位于左侧胸腔,可分为叶内型和叶外型。而肺隔离症伴扭转临床非常少见,好发于左肺下叶,均为叶外型,少数可位于右下肺。本病好发年龄为 4~13 岁,偶见于新生儿及成人。临床表现主要以腹痛为首发症状,部分患者可伴随胸痛、胸闷、呼吸困难及呕吐等,早期识别困难,极易误诊。其典型影像学特征主要包括:①肺隔离症典型位置出现稍高密度软组织肿块,可能与隔离肺出血、梗死有关,部分病变可在短时间内迅速增大;②增强扫描后肿块不强化或仅伴有边缘强化,同时未发现来自体循环的异常供血动脉或可见可疑异常纤细供血动脉,局部不连续;极少数病例患侧可见引流静脉增粗;③伴有胸腔积液,且短时间内积液量可急剧增加,或可同时伴有肺炎、肺不张。熟悉掌握其临床特点及影像学特征,可在术前提提供相对准确的诊断信息,尽早行手术治疗。

PU-0459

儿童寰枢椎旋转半脱位/固定的影像学 and 临床预后因素

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目的:寰枢椎旋转半脱位/固定(AARS/F)是儿童斜颈的罕见原因。患者通常表现为头部固定旋转,有一定程度的屈曲(“知更鸟”头位)。CT 可以对疾病进行诊断和分级。

本研究的目的是评估放射学和临床因素与患者预后之间的相关性。

方法和材料:我们回顾性研究过去 15 年我们医院档案中所有诊断为 AARS/F 的儿童 CT 研究和所有临床报告。

两名肌肉骨骼放射科专家回顾了所有 CT 研究,根据 FieldingHawkins 系统对 AARS/F 分级。此外我们也计算了 c1 -c 2 旋转度。

结果评估为阳性(3 个月随访时临床/影像学完全恢复),阴性(3 个月随访时疾病持续或复发)。

结果:我们纳入了 53 例诊断为 AARS/F 的患者(平均年龄为 8.7y-26F,27M)。在 7/53 名受试者(13.2%)中,观察到临床结果为阴性。

头颈部同时出现感染或炎症(Griesel 综合征)与阴性结果显著相关($p=0.001$)。field - hawkins 分级也与患者预后密切相关($p=0.01$)。C1-C2 旋转度在患者预后中未达到统计学意义($p=0.056$)。

结论:AARS/F 患者头颈部区域的并发感染/炎症是最重要的预后因素,并且与较差的结果有关。

Fielding Hawkins 放射分级系统与患者的预后有很好的相关性。

PU-0460

儿童肾透明细胞肉瘤 CT 诊断及误诊分析

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【摘要】目的 分析儿童肾透明细胞肉瘤(CCSK)的影像特征,总结该疾病的影像学及临床特点,分析误诊原因,加深对该病的认识,提高诊断符合率。方法 回顾河南省儿童医院经病理证实的 11 例儿童 CCSK 的影像资料,所有病例均行 CT 扫描,总结其影像及临床特点,分析误诊原因。结果 肿瘤均为单侧发病,右肾 5 例,左肾 6 例,11 例患儿发病年龄区间为 5 月 9 日至 10 岁,肿瘤多较大,密度混杂,均为单发,10 例有囊变;9 例肿瘤内见多发细小动脉,实性成分呈延迟渐进性强化,2 例伴下腔静脉、同侧肾静脉癌栓。7 例肾周血管充盈,2 例骨转移,1 例包膜下积液;2 例有钙化灶。10 例术前存在误诊,其中 8 例误诊为肾母细胞瘤,1 例误诊为先天性中胚叶肾瘤,1 例误诊为肾脏横

纹肌样瘤。结论 CCSK 与其他儿童肾肿瘤影像尤其是肾母细胞瘤极为相似, 术前易被误诊, 发病年龄小, 预后差, 病程进展快, 易发生囊变、坏死, 增强肿瘤内多发细小动脉、延迟渐进性强化及虎斑状、云絮状、条纹状或鱼肉状强化, 肾周血管充盈多见, 有助于与其他肾肿瘤相鉴别。

PU-0461

Gray and White Matter Changes in Pediatric Non-structural/metabolic Epileptic Brain Injury

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Purpose To explore the brain volume changes in children with non-structural/metabolic epileptic brain injury.

Methods Magnetic resonance imaging data was obtained from 140 children with non-structural/metabolic epileptic brain injury ages 2-15 (39% F, 61% M). Based on the self-developed software of United Imaging and the use of 3D-T1WI sequence, this resulted in structural volumes, cortical surface area, and cortical thickness features of the patients. ANCOVA analysis was then performed to compare these values with the values of 312 neurologically normal children.

Results Besides the nucleus accumbens, the volume of the brain, bilateral hemisphere gray matter, amygdala, entorhinal cortex, pallidum, parahippocampal gyrus, right caudate nucleus and fusiform gyrus, and left putamen in the patient group (PA) were smaller than those in the healthy control group (HC). The surface area of the cortex in HC tended to be flat or decreasing with age, while boys in PA showed an upward trend and girls showed a downward trend. The overall thickness of the HC cortex showed a downward trend, while the decrease of PA was slow or showed an upward trend.

Conclusion Children with non-structural/metabolic epileptic brain injury show statistically significant differences in volume of gray and white matter and nuclei of the brain, suggesting that epilepsy is associated with structural changes of the central nervous system influencing brain development and potentially leading to poorer neurocognitive outcomes.

PU-0462

Assessment of Glx and GABA levels in the Global Developmental Disability Children: A Magnetic Resonance Spectroscopy Study

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This study aims to explore the correlation between brain neuro metabolites and clinical symptom scales in GDD and GDD+ASD. 11 children with GDD and 12 GDD +ASD children took MR scans, and completed the GABA and Glx spectroscopic acquisition. Results indicated that there is a significant difference in DQ language levels between GDD and GDD+ASD, and the GABA/Cr levels were significantly decreased in GDD+ASD compared with GDD. A positive correlation was observed between Glx/Cr and ADOS stereotype among all participants, and a clear link was observed between Glx/Cr and the sensory symptoms of ASD at both behavioral and perceptual levels.

PU-0463

新生儿急性胆红素性脑病血清总胆红素水平与高场强磁共振苍白球信号变化的相关性分析

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目的：探讨新生儿急性胆红素脑病血清总胆红素（TSB）水平与高场强磁共振苍白球信号强度变化的相关性。方法：收集 2021 年 12 月-2022 年 12 月我院收治的急性胆红素脑病患儿 168 例为观察对象，根据患儿出生 7d 之内 TSB 分为轻、中、重三组，所有患儿均予以高场强磁共振成像检查，观察并比较三组患儿双侧苍白球 T1WI、T2WI、DWI 及 ADC 信号强度值，以及 TSB 水平与双侧苍白球 TIWI 信号强度的相关性。结果：三组双侧苍白球 TIWI 信号强度值比较，差异有统计学意义（ $P<0.05$ ），三组双侧苍白球 T2WI、DWI 及 ADC 信号强度数值比较，差异均无统计学意义（ $P>0.05$ ）。血清总胆红素水平（TSB $\mu\text{mol/L}$ ）与双侧苍白球 T1WI 信号强度两者表现为中等程度的正相关（相关系数约为 $r_s=0.587$ ）。结论：急性胆红素脑病双侧苍白球信号强度的增高与血清总胆红素水平的升高呈正相关，双侧苍白球信号强度的测量能够为诊断新生儿急性胆红素脑病提供重要的参考依据。

PU-0464

儿童进行性假性类风湿性发育不良 1 例的临床及影像表现

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[摘要] 目的 提高对儿童进行性假性类风湿性发育不良的认识。方法 回顾性分析 1 例儿童进行性假性类风湿性发育不良临床、实验室检查、影像学改变及基因突变，并通过文献复习分析总结。结果 男性，14 岁 7 个月，发病年龄为 6 岁，无家族史，首发症状为双手指间关节肿胀，伸直受限；8 岁时，出现双踝肿胀伴活动障碍，后出现多关节肿痛，累及大小关节、双腕关节、髋关节、骶髂关节等，患儿胸廓前后径增大，呈桶状胸。患儿血清炎性指标均正常，类风湿因子和抗环瓜氨酸肽抗体均为阴性，血沉正常，人类白细胞抗原（HLA）-B27 阴性。X 线表现：脊柱椎体变扁，椎体前后径变长，椎间隙呈后窄前宽，椎体中后部凸出，而前部凹陷，使椎体似乎平放的“古花瓶”状。椎体及椎间关节骨质增生、硬化；双侧髌骨发育较小，坐耻骨相对较长，双侧髋关节间隙变窄，双侧股骨头扁平，双侧股骨颈粗短，双侧髌臼较浅，其外上缘骨质密度增加，毛糙。双侧骶髂关节及耻骨联合间隙增宽。双侧胫骨髁间隆起变钝。双侧距骨滑车变平。腕骨边缘毛糙，掌骨远端、近、中排指骨远端增宽，关节间隙变窄，掌指、指骨间关节肿大且弯曲。胸椎 CT 表现：胸椎后凸，胸廓前后径增加，胸椎变扁，部分椎体呈楔形改变，椎体前后径变长，椎间隙呈后窄前宽。MRI 表现：双侧髋关节间隙变窄，关节腔内少量积液，双侧股骨头骨骺呈片状稍高信号，双侧髌臼边缘可见斑片状稍高信号。双侧骶髂关节及耻骨联合间隙增宽，双侧骶髂关节面及耻骨联合可见异常高信号。距骨滑车扁平，距骨及胫骨远端骨骺内片状 T2WI 压脂呈稍高信号，踝关节腔内少量积液。右手腕骨内斑片状 T2WI 压脂高信号，掌指关节、近节指间关节内斑片状稍高信号，手指弯曲畸形改变，滑膜无强化。脑实质及垂体窝正常。基因检测为 CCN6（WISP3）基因第 3 外显子检测到 1 个纯合突变位点：c.342T>G, p.Cys114Trp。符合儿童进行性假性类风湿发育不良症，其临床症状似幼年特发性关节和粘多糖病，但无滑膜炎及其他炎性改变，但尿粘多糖定性及定量阴性，X 线无侵蚀性破坏。结论 进行性假性类风湿发育不良是一种少见的常染色体隐性遗传性疾病，实验室检查、典型的影像表现及基因有助于诊断。

PU-0465

The Value of Baseline Magnetic Resonance Image Features in Predicting the Efficacy of Sirolimus for Kaposiform Hemangioendothelioma

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Purpose: To investigate the feasibility of baseline magnetic resonance images in predicting the efficacy of sirolimus for kaposiform hemangioendothelioma (KHE). **Materials and Methods:** We enrolled 58 patients pathologically diagnosed as KHE and treated with sirolimus between August 2008 and January 2020 (32 male, 26 female; median age: 2 years; age range 1 month – 10 years). All patients received conventional MRI examinations both before and six months after the treatment. The response of KHE to treatment was classified as complete response (CR), partial response (PR), stable disease (SD), and progressive disease (PD) based on the change of lesion diameter measured on T2-weighted MRI. Based on the depth of tissue or organ involvement, lesions were classified into three groups: superficial, mixed, and deep. According to the solidity of the mass, cases of KHE were classified into two morphological types: 1, solid mass with or without surrounding infiltrative portions; and 2, infiltrative lesion without defined areas of solidity. The maximum diameter of the tumor, adjacent bone changes, and anatomical regions were also measured. Images depicting masses that passed through more than 2 anatomical regions were considered to reflect multiple anatomical regions' involvement. We analyzed the correlation between the maximum diameter of the tumor and the response to treatment with the Spearman rank correlation coefficient. The differences in responses to treatment between other subgroups within groups were compared statistically by the Wilcoxon rank sum test. P values less than or equal to .01 were considered to indicate a statistically significant difference. **Results:** 1 case was a complete response, 41 cases were partial response, 12 cases were stable and 4 cases showed progression. Only two morphological types show a statistically significant difference in responses to treatment ($P=0.002$) and patients with solid masses had better responses (90% vs. 54%). The depth of tissue or organ involvement ($P=0.543$), the maximum diameter of the tumor ($6.21\pm 4.21\text{mm}$, $P=0.220$), whether there are adjacent bone changes ($P=0.363$), and the locations of anatomical regions involved ($P=0.109$) show no statistically significant difference in responses to treatment. **Conclusion:** MRI may be feasible in predicting the efficacy of sirolimus for KHE according to the solidity of the mass.

PU-0466

儿童先天性单一冠状动脉伴冠状动脉右心室瘘一例

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病例: 男, 3 岁, 主因咳嗽、心脏杂音 4 天入院, 入院查体: 胸骨左缘第 3-4 肋间可闻及 II/IV 级收缩期杂音, 腹软, 肝脾肋下未及。心电图: 窦性心律不齐, 大致正常心电图。超声心动诊断: 左冠状动脉右心室瘘, 卵圆孔未闭, 房水平左向右分流。冠状动脉 CTA 显示: 右侧冠状窦未见确切右冠状动脉, 左冠状动脉主干增宽, 直径约 5.4mm, 左侧前降支增宽, 直径约 3.2mm, 左侧前降支发出一分支血管绕行心脏前方至右心室前侧壁, 管腔呈瘤样扩张, 直径约 9.1mm, 并发出两支分支血管进入右心室, 瘘口直径分别为 1.7mm 和 1.8mm, 另发出一分支血管与后将支相延续。冠状动脉 CTA 诊断: 先天性单一冠状动脉伴冠状动脉右心室瘘。

讨论: 单一冠状动脉是一种少见的先天性冠状动脉异常, 是指由主动脉干发出一支冠状动脉为整个心脏供血, 为心肌梗死、猝死的病因之一, 通常是胚胎时期冠状动脉发育异常或不发育造成的, 发病率约为 0.024%~0.066%。冠状动脉瘘指冠状动脉与心腔或体循环、肺循环任何节段的异常血管相沟通, 而没有通过毛细血管网, 约占先天性心脏异常的 0.3%。而单一冠状动脉伴冠状动脉右心室瘘极为罕见, 目前仅有少数病例报道。

国外学者根据冠状动脉的解剖走行将单一冠状动脉分为三型, 本例患儿为 L-IIA 型。单一冠状动脉一般无症状, 但由于整个心脏为单支血管供血, 一旦出现血管狭窄或者闭塞, 病情危重甚至危及生命。冠状动脉瘘在儿童期由于瘘口较小, 因此常无症状, 但由于冠状动脉瘘可引起血流动力学改变, 即高压的冠状动脉血流通过瘘管进入低阻力的右心室, 形成左向右分流, 使得右心、肺血管、左心的血容量增加, 可导致肺动脉高压、心肌缺血、心力衰竭, 因此早期发现早期治疗至关重要。本例患儿临床仅表现为咳嗽和胸骨左缘第 3-4 肋间 II/IV 级收缩期杂音, 且心电图大致正常, 并无肺动脉高压、心肌缺血和心力衰竭的典型表现, 与文献报道基本一致。

冠状动脉 CTA 具有较短的采集时间、较高的时间和空间分辨率, 能够很好地显示单支冠状动脉的起源、异常血管的走行、冠状动脉瘘口的位置, 为临床诊断和治疗提供了重要的依据。

PU-0467

儿童系统型间变性大细胞淋巴瘤 (IV 期) 2 例影像分析

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目的: 分析儿童系统型 ALK 阳性间变性大细胞淋巴瘤及 ALK 阴性间变性大细胞淋巴瘤 (IV 期) 影像特征, 为临床诊断提供一定依据。方法: 收集 ALK 阳性间变性大细胞淋巴瘤 (IV 期) 及 ALK 阴性间变性大细胞淋巴瘤 (IV 期) 各 1 例, 通过分析两者的腹部增强 CT 图像等相关影像, 结合既往研究中两者的影像的特征, 对两者影像学表现进行统计分析。结果: 1、ALK 阳性间变性大细胞淋巴瘤较 ALK 阴性间变性大细胞淋巴瘤骨质侵犯更多见。2、ALK 阳性间变性大细胞淋巴瘤较 ALK 阴性间变性大细胞淋巴瘤的淋巴结外累及更多见。结论: 特定的影像学特征能够帮助临床医生对 ALK 阳性间变性大细胞淋巴瘤及 ALK 阴性间变性大细胞淋巴瘤的分类做出一定的诊断。

PU-0468

目的探讨小儿睾丸内胚窦瘤 CT 及 MRI 影像学特点及其诊断小儿 睾丸内胚窦瘤的临床价值

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方法回顾性选取在 2013 年 5 月至 2019 年 5 月期间手术病理确诊为睾丸内胚窦瘤的患儿 67 例为研究对象。其中进行 CT 检查例 15 例, 10 例行增强检查; 进行 MRI 检查 52 例, 36 例行增强检查; 分析小儿睾丸内胚窦瘤的影像学特点。结果所有患者的病灶均属单发, 其中左侧睾丸 38 例, 右侧 29 例; 肿瘤的直径范围为 9.6~47.8 (24.32±8.86) mm, 60 例患儿病灶边缘清晰, 3 例患儿病灶边缘模糊, 其中呈圆形 5 例, 类圆形的 62 例。在 CT 平扫下, 11 例患儿表现为患侧睾丸内有不同密度的包块, 4 例患儿表现为患侧睾丸包块密度均匀, CT 值为 37.96~55.0 (46.31±6.38) Hu, 在 67 例患儿中进行 CT 检查 15 例, 10 例行增强检查。52 例患儿进行 MRI 检查, 其中 11 例患儿 T1WI 病灶呈现混杂信号, 41 例患儿 T1WI 病灶呈现等或等低信号; 30 例患儿 T2WI 病灶呈现稍高的信号; 20 例患儿 T2WI

病灶呈现等等等高信号。36 例患儿进行增强扫描检查病灶的实质部分,其中轻度强化 12 例,中度强化 18 例,明显强化 6 例,坏死囊变部分均没有出现强化。结论小儿睾丸内胚窦瘤的 CT 及 MRI 图像能够清晰地显示肿瘤的形态学特征及血供情况,对小儿睾丸内胚窦瘤有良好的诊断价值。

PU-0469

新生儿软脑膜下出血的 MRI 特征、转归及临床预后分析

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目的 认识新生儿软脑膜下出血 MRI 影像学特征及其与预后的关系。**方法** 根据 2 名 15 年以上工作经验的影像诊断专家通过 PACS 系统中的数据库数据进行筛选,收集自 2015 年-2022 年湖南省儿童医院入住新生儿科且伴有软脑膜下出血的新生儿 MRI 资料与一般临床资料。原始图像分别由 2 名放射诊断医师分别对入组患儿的影像资料进行观察列队研究,分析其影像学特征。根据年龄采用盖氏智测量表、韦氏智测量表、贝力智测量表进行标准化评估入组患儿的临床预后。**结果** 43 例新生儿软脑膜下出血患儿入组,根据软脑膜下出血是否合并脑实质异常的 MRI 表现,我们将软脑膜下出血分为 I 型、II 型、III 型,其中 I 型、II 型软脑膜下出血可完全吸收并无脑实质异常,III 型软脑膜下出血可完全吸收并伴有不同程度脑软化、胶质增生改变,部分病例可有局部软脑膜下囊肿形成。I 型、II 型临床预后均较 III 型好,差异有统计学意义 ($P=0.013$)。新生儿软脑膜下出血具有特征性的 MRI 表现,根据软脑膜下出血与邻近皮层、皮层下白质和深部脑白质之间不同信号的表现,提出阴阳征与三明治征两种 MRI 影像表现特征,可提高放射科医师与临床医师对新生儿软脑膜下出血的认识与诊断。**结论** 新生儿软脑膜下出血具有特征性 MRI 表现,新生儿软脑膜下出血 MRI 分型可以作为一种影像指标来预测该类出血的预后。

PU-0470

以心衰就诊的腹膜后副神经节瘤一例

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患儿,女,13 岁,因“腰酸 10 天,双下肢水肿进行性加重伴右下腹痛 1 周”入院。病程中活动耐力下降,胸闷、心悸活动后及夜间加重,刺激性干咳 4 天,夜间较重,食欲欠佳,睡眠差,尿便正常,近 1 个月体重上升约 2.5kg。入院查体 T 36.2°C, P134 次/分, R 40 次/分, BP 118/76mmHg, 身高 162cm, 体质量 51.5kg。精神状态欠佳,神情语明,气促,端坐呼吸,痛苦表情,面色苍白,口周无发绀,颈静脉怒张;咽充血。双肺呼吸音粗,未闻及干湿啰音。心前区无隆起,心界向左下扩大,心率 134 次/分,律齐,心音有力,心前区可闻及 2/6 级收缩期吹风样杂音。双下肢及双足凹陷性水肿。腹部彩超示腹膜后实质性低回声肿物,边界清,内部回声不均匀, CDFI:可见血流信号。入院诊断:腹膜后肿物;心功能不全,心功能 IV 级。腹部增强 CT 示腹主动脉右旁类圆形肿块,大小约 5.8cmX4.7cm,密度不均,CT 值约 18-35Hu,增强扫描渐进性明显强化,中心见片状无强化液化坏死区,病灶周围见增多细小血管影。经过抗心衰治疗,患儿状态允许后行腹膜后肿物切除术,术后病理:副神经节瘤。术后经支持对症治疗,患儿无不适症状,病情平稳,治愈出院。

PU-0471

基于 UNet 模型的胎儿脑自动分割及脑发育的产前诊断评估应用

曲海波、廖怡、宁刚、贾凤林、李学胜、刘静
四川大学华西第二医院

目的：探索基于 UNet 模型的胎儿脑自动分割技术，进行胎儿脑部 MRI 图像数据处理，应用于评估胎儿脑结构发育特点及异常状态的分析。

研究方法：纳入 58 例中晚孕胎儿脑部 MR 成像，采用胎儿多模态磁共振成像技术，利用多维度的 MRI 结构成像、定量成像序列信息，基于 UNet 模型进行胎儿脑自动分割，创新探索胎儿脑部 MRI 图像采集及图像分析的突破性技术方法，利用人工智能进行分析，以期建立胎儿 MRI 图像采集及评估方案，为产前诊断提供影像生物学标记，结合人工智能技术，探索胎儿脑部结构及功能的发育轨迹。

结果：将 58 个不同胎龄的正常胎儿大脑重建为 $0.8 \times 0.8 \times 0.8 \text{mm}$ 的 3D 高分辨率图像。自动分割将每个胎儿大脑分为七个标签，包括脑脊液、灰质、白质、脑室、胼胝体、脑干和小脑，分析解剖区域脑容量参数、T1MAPPiG 定量结果与胎龄相关。

结论：研究基于 UNet 模型提出的重建、分割和体积分析可以自动定量分析胎儿大脑区域的比例，无需医生手动细化。研究胎儿脑区发育如何随年龄增长而变化，可以为诊断提供参考。

PU-0472

双层探测器 CT 在儿童头部平扫降低辐射计量的价值探讨

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背景和目的：CT 诊断成像过程中的辐射照射是儿科患者的一个突出问题。本研究旨在评估双层探测器小儿童头部平扫 CT 中的 60-keV 虚拟单能量图像与混合能量图像相比能否在保证图像质量的同时减少辐射剂量。

材料和方法：收集 106 例儿童头部双层探测器 CT 平扫。患者被分为两组，每组 53 人，分别使用管电流 250mAs 和 180mAs 进行扫描，其他扫描条件保持一致。收集辐射计量值 DLP，计算图像噪声、SNR 和 CNR。两名放射科医师采用 5 分法盲目评估图像质量。统计方法采用方差分析和 Wilcoxon 检验，并多重比较。

结果：250 mAs 组和 180 mAs 组的平均剂量 DLP 分别为 717.47（标准差，41.52）mGycm 和 520.74（标准差，42）mGycm。忽略辐射剂量分组，60keV 单能量图像的噪声明显降低，SNR 和 CNR 明显提高，主观图像评分明显优于混合能量图像（ $P < 0.001$ ）；在 250mAs 和 180mAs 两组间，60-keV 单能量图像的 SNR、CNR 和主观图像评分没有统计学差异（ $P > 0.05$ ）。180mAs 组的辐射剂量参数明显低于 250 mAs 组（ $P < 0.001$ ）。

结论：双层探测器儿童头部 CT 平扫在 60-keV 单能图像可将 CT 辐射剂量减少 28%，且不会降低图像质量。

PU-0473

NCE-MRU 是否可以替代肾闪烁显像用于测量儿科肾积水患者的分肾功能?

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目的: 与核医学肾闪烁显像 (RS) 方法相比, 探讨使用非增强磁共振尿路造影 (NCE-MRU) 作为评估肾积水儿童患者分肾功能 (SKF) 的替代方法的可行性。

材料和方法: 本回顾性研究纳入了 75 名肾积水儿童患者。所有患儿均在 2 周内接受 NCE-MRU 和 RS 检查。肾实质体积(KPV)和纹理分析参数通过 NCE-MRU 中的 T2WI 获得。将计算的左分肾 KPV 百分比 (SKPV) 和纹理分析参数百分比与 RS 测定的 SKF 进行比较。

结果: SKPV 与 SKF 呈显著正相关 ($r=0.88$, $p < 0.001$), 而不均匀性与 SKF 呈负相关 ($r=-0.68$, $p < 0.001$)。利用一元线性回归和多元线性回归建立了 SKF 的未校正和校正预测模型。Bland-Altman 图证明两种预测模型具有良好的一致性。校正后的预测模型的残差平方和低于未校正模型的残差平方和 (0.283 vs 0.314), 但没有统计学意义 ($p=0.662$)。基于不同 MR 机器的亚组分析显示, 三种不同扫描仪的 SKF 和 SKPV 之间的相关系数分别为 0.85、0.95 和 0.94 ($p<0.05$)。

结论: NCE-MRU 可作为评估肾积水儿童患者 SKF 的有效方法, SKPV 被证明是一个简单且普遍适用的预测 SKF 的指标。

PU-0474

儿童高 IgE 综合征一例

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患儿男, 8 岁, 因咳嗽、间断发热 10 天于 2018 年 8 月 8 日入院。既往史: 患儿系 32 周早产, 生后曾住院治疗 20 天, 期间曾行机械通气治疗, 3 岁以前易反复呼吸道感染, 曾有反复中耳炎 3 次, 18 个月时曾因“肺炎”住院。有湿疹病史, 接触洗衣粉及尘土后出现皮疹, 此外曾对动物毛、菠萝、腰果、霉菌等有过敏。入院后经抗炎对症治疗好转出院。2 个月后再出现发热、咳嗽, 肺 CT (2018-10-09) 示双肺散在炎变, 右肺上叶、中叶及左肺下叶支气管扩张, 并右肺上叶阻塞性肺气肿形成, 抗炎对症治疗好转。后患者反复呼吸道感染及持续肺部影像学异常 (支气管扩张合并感染, 肺实变, 空洞形成等), 曾合并金黄色葡萄球菌及曲霉菌感染, 血清 IgE 及嗜酸性粒细胞水平显著升高, 行基因检测提示高 IgE 综合征。

高 IgE 综合征 (hyper-IgE syndrome, HIES) 即 Job 综合征, 表现为顽固性湿疹、皮肤和肺部反复化脓性感染、血清高 IgE 及嗜酸性粒细胞增多等。HIES 为常染色体基因突变, 多幼年起病, 患者皮肤和肺部易受金黄色葡萄球菌感染, 目前尚无完全治愈的方法。

PU-0475

儿童原发性淋巴管发育异常合并 Gorham-Stout 综合征 1 例

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目的: 报道一例儿童原发性淋巴管发育异常合并 Gorham-Stout 综合征。**方法:** 回顾性分析其临床表现、实验室检查、病理及影像特征。**结果:** 女, 5 岁 6 月, 因“咳嗽, 间断发热 12 天”入院, 患

儿病初于当地医院抗感染治疗后好转, 12 天前无明显诱因出现咳嗽, 无气喘及呼吸困难, 伴发热, 胸部 CT 示右侧大量胸腔积液并右肺压迫性肺不张。予我院行右侧胸腔镜探查术, 术中见右侧胸腔大量黄白色乳糜样液体, 术后肺泡灌洗液: 肺炎链球菌, 胸水乳糜实验阳性, 胸水常规及生化: 总蛋白 22.1g/L、葡萄糖测定 5.76mmol/L, 红细胞总数 $2000.00 \times 10^6/L$ 、浆性粘蛋白试验 阳性、白细胞总数 $1790.00 \times 10^6/L$ 。考虑先天性脉管发育畸形可能。胸部 CT 平扫: 右侧胸腔大量积液, 并右肺中、下叶压迫性肺不张, 左侧胸腔少量积液。胸腰椎 CT 平扫: 胸 12 椎体、腰 1 椎体及右侧附件骨髓质内多发类圆形溶骨性骨质破坏, 边缘清晰, 未见硬化缘, 未见软组织肿块。胸腰椎 MR 平扫: 胸 12 椎体、腰 1 椎体及右侧附件可见多发斑片状异常信号, T1WI 呈低信号, T2WI 呈高亮信号, 信号欠均匀, 胸腰椎旁软组织增厚, T2WI 压脂呈高信号, 右侧胸腔可见弧形积液信号。经静脉注入钆喷酸葡胺 5ml 增强扫描: 胸 12 椎体、腰 1 椎体及右侧附件内可见斑片状显著强化灶, 椎旁软组织明显强化。CT 淋巴管造影 (CT Lymphangiography, CTL): 经腹股沟淋巴结穿刺注入碘油行直接淋巴管造影 (Direct Lymphangiography, DLG) 及造影后 6 小时行胸腹部 CT 平扫。DLG 示: 乳糜池及胸导管未见显影, 考虑远端梗阻; CTL 示: 胸 12 椎体、腰 1 椎体及右侧附件多发斑片状高密度碘油沉积, 胸腰段脊柱旁增厚软组织内散在斑点状碘油沉积, 胸导管未见显影, 考虑胸导管阻塞。

结论: 儿童原发性淋巴管发育异常合并 GSS, 其影像学表现具有特征性, 尤其对于儿童伴有不明原因大量乳糜胸时, 要关注胸腰椎等骨质改变, 影像学发现上述改变时, 要尽早行淋巴管造影, 以早期明确诊断、早期治疗, 减少不必要的并发症。

PU-0476

儿童单侧肺静脉闭锁伴反复咯血一例

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目的: 报道一例儿童单侧肺静脉闭锁伴反复咯血, 探讨其影像特征。**方法:** 回顾性分析其临床表现及影像表现特点。**结果:** 患儿男, 13 岁, 1 周前无明显诱因出现咳嗽, 呈阵发性, 4-5 声/次, 晨起及夜间为著, 4 天前无明显诱因出现咯血, 为鲜红色, 量约 5-10ml。查体: 右肺可闻及较多细湿啰音, 口唇欠红润无发绀。实验室检查: 结核菌素试验 (PPD) 强阳性, 超敏 C 反应蛋白 (hs-CRP) 37.15 mg/L, 血红蛋白浓度 (HGB) 127g/L, 余未见明显异常。2 年前因“咯血”住院治疗, 考虑肺部感染, 治疗 1 月后好转出院, 平素剧烈活动后稍有口唇发绀。支气管镜活检: 右下叶背段、基底段小块支气管粘膜轻度慢性炎症, 未见肉芽肿、坏死。支气管肺泡灌洗液涂片未见恶性肿瘤细胞, 见中性粒细胞, 灌洗液 G-xpert、集菌、结核 RNA、TB/NTM 均为阴性。心脏超声: 考虑体-肺侧枝; 余心内结构及彩色血流未见明显异常。胸部 CT 平扫: 右肺体积缩小, 纵隔右移, 右肺弥漫性小叶间隔增厚, 呈网格状改变, 肺外周胸膜下多发小囊腔。胸部 CT 增强: 右肺动脉管腔细, 右肺门、纵隔软组织增大, 纵隔内多发增粗、迂曲侧枝血管影。CT 血管成像: 左心房右缘光滑, 右上、下肺静脉缺如, 右侧支气管动脉、右侧膈动脉增粗。最终诊断: 右侧肺静脉闭锁。

结论: 单侧肺静脉闭锁是一种罕见的先天性肺血管畸形, 主要临床特点为肺部反复感染及咯血, 多在儿童期发病, 容易误诊为结核。影像表现为: 患肺体积缩小, 纵隔向患侧移位; 由于肺静脉闭锁、回流受阻, 患侧淋巴组织代偿性扩张, 肺内呈间质性改变, 可见弥漫性小叶间隔增厚及小囊腔影, 患侧肺门、纵隔淋巴组织增大; 由于右心室泵血量减少, 影响肺动脉发育, 常可见患侧肺动脉纤细; 另可见体肺侧枝血管形成, 如支气管动脉、膈动脉、肋间动脉代偿性扩张。鉴别诊断: 间质性肺炎、肺结核、支气管扩张等均需与该病鉴别, 主要观察上述肺部影像特征及通过 CT 血管成像识别有无正常肺静脉结构及肺动脉、体循环血管等相应异常改变。

PU-0477

Measurement of cerebral blood flow in preterm infants and analysis of influencing factors

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Abstract

Objective

The purpose is to evaluate regional cerebral blood flow (CBF) perfusion changes in preterm infants by using the three-dimensional pseudo-continuous arterial spin labeling (3D-pCASL), and to analyze the effects of gestational age and birth weight on CBF values.

Materials and methods

Between December 2021 and June 2023, a total of 258 preterm infants who were born in the Third Affiliated Hospital of Zhengzhou University, gestational age < 37 weeks were retrospectively collected. The basic information, maternal pregnancy and other related clinical information of these preterm infants were recorded. Regions of interests (ROIs) were measured in the frontal lobe, temporal lobe, parietal lobe, occipital lobe, basal ganglia and thalamus. The exclusive criteria were as follows: (1) abnormal routine MRI measurement; (2) preterm infants with congenital heart disease, craniocerebral malformation, and brain trauma. Pairing sample t test was used to compare the difference in CBF values measured in the same ROIs between the left and right sides of each infant's brain. One-way ANOVA was used for CBF values in different brain regions. If there were differences in ANOVA ($p < 0.05$), multiple comparisons were performed. In addition, Pearson correlation was used to analyze the correlation between gestational age, birth weight and CBF in different brain regions.

Results

143 preterm infants with abnormal MRI measurements were excluded, including intraventricular hemorrhage, subarachnoid hemorrhage, white matter injury, ependymal cyst, etc. Finally, 115 preterm infants were included. There were no significant differences in CBF values between the left and right cerebral hemispheres in the frontal lobe, temporal lobe, parietal lobe, occipital lobe, basal ganglia and thalamus ($p > 0.05$). The average CBF value of different brain regions from large to small is: Thalamus 34.90 ± 10.74 ml/100g/min, basal ganglia 28.99 ± 8.72 ml/100g/min, occipital lobe 20.48 ± 7.41 ml/100g/min, temporal lobe 19.20 ± 4.98 ml/100g/min, frontal lobe 18.88 ± 5.27 ml/100g/min and parietal lobe 18.75 ± 6.14 ml/100g/min. CBF values in temporal lobe, parietal lobe and basal ganglia were negatively correlated with gestational age ($p < 0.05$). There was no correlation between CBF values in frontal lobe, occipital lobe, thalamus and gestational age. However, CBF values in all ROIs were negatively correlated with birth weight ($p < 0.05$).

Conclusion

The CBF values in preterm infants with normal MRI were affected by gestational age and birth weight. In summary, these results provide a reference for further exploring the application of 3D-pCASL in brain injury of preterm infants.

PU-0478

多种方法测评儿童青少年骨龄效果的比较研究

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摘要:目的:对比 4 种骨龄测评方法在当代儿童青少年骨龄评价应用中的差异,了解哈尔滨地区儿童青少年手腕部骨发育状况的变化趋势,探讨更适用于哈尔滨地区儿童的骨龄测评方法,并进一步总结该

地区儿童青少年的骨龄发育规律.方法收集与 2023 年 3 月至 2023 年 12 月在哈尔滨医科大学附属第六医院预测身高为目的的门诊就诊儿童青少年临床资料,分别采用 GP 图谱法、TW-C 法、CHN 法及中华-05 法进行骨龄测评判读评价,采用 Pearson 相关法分析相关性且对比不同方法测评结果.结果:共 1600 例符合纳入标准的儿童青少年入选本研究,其中男 753 例,女 847 例,Pearson 相关法分析显示,中华-05 法、TW-C 法、CHN 法、GP 图谱法测定的骨龄与生活年龄均高度相关,其中中华-05 法测定的骨龄相关性最强.结论:哈尔滨地区儿童青少年骨龄发育速度加快,有提前趋势,中华-05 法更为适合该地区的骨龄测评.

PU-0479

能谱 CT 虚拟平扫替代常规平扫在儿童骨骼肌的可行性研究

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目的 探讨能谱 CT 虚拟平扫 (VNC) 替代常规平扫 (TNC) 在儿童骨骼肌中的可行性。**方法** 回顾性收集因骨骼肌病变接收能谱两期增强扫描的患儿 43 例,所有数据利用 GSI 后处理软件进行数据处理分析,获得 TNC、动脉期 VNCa 和静脉期 VNCv 影像。由 2 名观察者对影像进行定性分析,采用 5 分法评分。采用 Kruskal-Wallis 检验比较 TNV 和 VNC 定量参数的差异,两两比较采用 SNKq 检验。采用 Bland-Itman 图分析 TNV 与 VNC 图像 CT 值的一致性。采用加权 Kappa 检验分析 2 名观察者对图像评分结果的一致性。**结果** TNC 与 VNC 影像上显示的病灶形态学特征的差异均无统计学意义 ($P>0.05$)。VNCv 与 TNC 的 SNR 值、VNCa、VNCv 与 TNC 的 CNR 值差异均有统计学意义 ($P<0.05$),其中 VNCv 的 SNR 值比 TNC 高,VNCa、VNCv 的 CNR 值比 TNC 低。2 名观察者对各组图像的主观评分结构一致性好 (TNC, $k=0.551$; VNCa, $k=0.502$; VNCv, $k=0.630$),CT 值一致性好。**结论** 虚拟平扫技术应用于儿童骨骼肌是可行的。

PU-0480

左肾静脉走行异常

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目的 探讨左肾静脉走行异常 25 例患者的影像学表现。

材料和方法 收集我院 2012-2023 年诊治的左肾静脉走行异常患者 25 例。男 11 例,女 14 例。25 例患者均因血尿入院,无发热、尿频、尿急等症状。25 例患者均行 CT 平扫及增强检查。采用飞利浦 256iCT 扫描,扫描范围膈肌至耻骨联合水平。不合作患者采用检查前口服水合氯醛镇静,剂量 0.8ml/kg 。增强检查采用静脉团注欧乃派克后重复扫描,剂量 1.5ml/Kg 。扫描图像分别进入工作站进行后处理,使用 MPR、VR 等方法重建血管图像。

结果 增强 CT 显示 25 例患者左肾静脉未走行于肠系膜上动脉夹角处,而是穿行于腹主动脉与脊柱之间。

结论 左肾静脉正常横行为腹主动脉及肠系膜上动脉之间。人体的左肾静脉平均长度是右肾静脉的三倍,与右肾静脉出肾后迅速汇入下腔静脉不同,左肾静脉在汇入下腔静脉前要穿过腹主动脉与肠系膜上动脉起始部之间的间隙,此间隙内填充有肠系膜脂肪、淋巴结、腹膜等组织,左肾静脉血液回流容易受此间隙大小的影响。推测胡桃夹综合征是由于各种原因,如青春期身体增长过快,脊柱过度伸展或淋巴结肿大以及肿瘤压迫等,导致腹主动脉与肠系膜上动脉之间间隙过小,左肾静脉在穿行时受到钳夹,使得血液回流受阻,左肾静脉远心端扩张、压力增高,形成左肾淤血,淤血的静脉系统与尿收集系统间发生异常交通,或因肾盂穹窿部静脉窦壁变薄破裂,临床上出现血尿、蛋白

尿等症状。无论有无胡桃夹综合征，左肾静脉走行在肠系膜上动脉夹角处这一解剖位置比较恒定。左肾静脉走行变异并胡桃夹现象极其罕见。本组 3 例患者腹主动脉及肠系膜上动脉之间未见左肾静脉穿过，而于腹主动脉与脊柱之间可见一条横向走行的静脉，其左端起始于左肾门，右端与下腔静脉相连。因腹主动脉与脊柱间没有肠系膜脂肪、淋巴结组织及腹膜等充填，此种位置关系，左肾静脉较其正常走行更易受到挤压，临床症状亦较严重，胡桃夹现象的发生率亦较高。

PU-0481

儿童脑膜瘤的 MRI 影像特征-3 例病例回顾

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【摘要】

脑膜瘤起源于蛛网膜内的蛛网膜帽状细胞，儿童脑膜瘤本身罕见，在儿科中枢神经系统肿瘤中，脑膜瘤占 1.42-5%，且部分为不典型脑膜瘤，不具典型特点，可能位于脑实质内，或缺乏硬膜尾征，难以与胶质瘤、中枢神经系统胚胎性肿瘤等鉴别，给影像诊断带来困难，术前误诊率高。本研究回顾性分析了 3 例经病理证实的儿童原发性脑膜瘤患者磁共振影像，分析了儿童脑膜瘤影像特征。

目的 探讨儿童脑膜瘤本的 MRI 表现，并分析其影像学特征，以鉴别诊断此类病变。

方法 回顾性分析 2015 年至 2023 年经广州市妇女儿童医疗中心经病理证实为脑膜瘤的 3 例儿童头部的 MRI 影像。3 例均行头颅-MRI (3.0T) 平扫及增强检查，所有患者均签署知情同意书。

结果 这 3 例病例中，男性 1 例，女性 2 例，年龄在 5-13 岁，平均 8.3 岁。位置位于左侧桥小脑角区 1 例，颞部 1 例，前颅窝区 1 例。其中 WHO I 级 2 例，WHO II 级 1 例。儿童脑膜瘤发病率较低；发病部位上与成人相比，后颅窝的脑膜瘤更多见；症状上多以颅高压起病，本院病例中 1 例颞部脑膜瘤因眼球突出颅高压起病，1 例桥小脑角区脑膜瘤以四肢麻木、乏力起病，1 例前颅窝区脑膜瘤因呕吐起病；本院儿童性脑膜瘤发病部位，影像表现均不典型，2 例合并囊变及出血，1 例合并多发囊变，均无“硬膜尾征”表现，增强明显强化。发生于颞部、前颅窝区脑膜瘤需与神经源性肿瘤鉴别，桥小脑角区脑膜瘤需与三叉神经瘤、听神经瘤相鉴别。

结论 儿童脑膜瘤临床及影像表现均不典型，对于发生在颅内脑外混杂信号占位的儿童患者，应考虑脑膜瘤的诊断。

PU-0482

3D-MRI 成像在胎儿先天性血管环产前诊断中的应用价值

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目的：分析 3D-MRI 成像、2D-MRI 成像及超声心动图对胎儿先天性血管环的产前诊断价值。

方法：选取 2012 年 8 月-2023 年 8 月于我院进行产前超声心动图检查并发现先天性血管环的胎儿 56 例为研究对象，所有胎儿在超声发现异常后于 1 月内均进行产前胎儿心血管 2D-MRI 及 3D-MRI 检查，记录受压及未受压处气管前后径、左右径、周长及面积，并计算相应值气管受压百分比，所有患儿随访至出生后 6 个月。

结果：56 例胎儿的孕周为 24-32 周，平均 26.7 周。右位主动脉弓伴左锁骨下动脉迷走 (RAA+ALSA) 47 例，双主动脉弓 (DAA) 7 例，肺动脉吊带 (PAS) 2 例。前后径、左右径计算出的气管受压百分比相较于周长及面积计算出的百分比值无明显差异 ($P < 0.05$)。三种先天性血管环畸形存在时，气管受压百分比由低到高依次为 RAA+ALSA < PAS < DAA，PAS 患儿气管形态发生明显改变，气管受压百分比大于 86%。产前超声诊断 RAA+ALSA 气管受压平均值约 38%，

DAA 气管受压平均值 67% (均大于 50%), 2 例 PAS 气管受压平均值分别为 47%、43%; 2D-MRI 诊断 RAA+ALSA 气管受压平均值约 33%, DAA 气管受压平均值 48%, 2 例 PAS 气管受压平均值分别为 38%、43%; 3D-MRI 诊断 RAA+ALSA 气管受压平均值约 31%, DAA 气管受压平均值 43%, 2 例 PAS 气管受压平均值分别为 37%、41%; 出生后, 48 例胎儿进行了超声心动图检查, RAA+ALSA 气管受压平均值约 25%, DAA 气管受压平均值 45%, 2 例 PAS 气管受压平均值分别为 21%、26%。

结论: 超声心动图是胎儿先天性血管环产前诊断的重要检查手段, 在对气管受压程度测量时, 产前 3D-MRI 成像能提供更加直观、全面的影像及相对更加准确的结果, 尤其是对于 PAS 及 DAA 的气管受压程度显示相对更加准确。

PU-0483

儿童腹膜后交感神经源性肿瘤 (NB、GNB、GN) 的影像诊断

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目的: 探讨发生于儿童腹膜后交感神经源性肿瘤 (神经母细胞瘤 NB、节细胞神经母细胞瘤 GNB、节细胞神经瘤 GN) 的临床特点和影像表现, 旨在提高该类疾病的诊断效能。方法: 收集我院 9 例经手术病理证实为腹膜后交感神经源性肿瘤的患儿的 CT 及 MRI 检查影像资料, 通过与病理结果对照, 逐一进行病例回顾分析及影像学特征统计。结果: 神经母细胞瘤 (NB) 共 3 例, 其中 2 例位于腹膜后, 1 例起源于肾上腺; 3 例中 1 例远处颈部淋巴结转移及多发骨转移, 1 例局部淋巴结转移, 1 例未见转移; 3 例中 2 例肿瘤内可见粗大团块状钙化, 1 例未见明显钙化灶; 3 例中 2 例肿瘤边界不清跨越中线, 1 例边界清晰形成“假包膜”。节细胞神经母细胞瘤 (GNB) 共 4 例, 其中 3 例位于腹膜后, 1 例起源于肾上腺; 术前检查 4 例均未见远处转移; 4 例中 1 例肿瘤内部可见点条状钙化, 其余 3 例未见明显钙化; 4 例均进行 CT 增强检查, 均可见轻/中度不均匀性、渐进性强化。节细胞神经瘤 (GN) 共 2 例, 均位于腹膜后; 2 例共有特征为边界清晰稍低密度团块影, 可见匍匐样生长, 纵横比 >1 , 肿瘤内部未见明显钙化灶, 增强无/轻度强化, 可见漩涡征。结论: 经研究三种儿童腹膜后交感神经源性肿瘤各有特征, 熟练掌握三种疾病的临床特点和影像学征象的异同对提升该类疾病术前定性诊断具有重要的价值。

PU-0484

婴儿颅骨黑色素性神经外胚层肿瘤 2 例影像并文献复习

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目的: 婴儿神经色素性外胚层肿瘤 (melanotic neuroectodermal tumor of infancy, MNTI) 是一种罕见的局部侵袭性肿瘤。多发生于婴幼儿颅面部。本文探讨 MNTI 2 例患儿的临床诊断及影像特点。方法: 回顾性分析我科 2 例经临床病理证实的 MNTI 患儿临床表现及影像特征。

结果: 患儿 1, 女, 9 个月。因半年前发现左额部肿物来院就诊, 肿物无明显诱因进行性增大, 无红肿、破溃、触痛等症状。查体: 左额部见一大小约 3cm×4cm 肿块, 质硬, 界清, 活动度差。头颅 CT 平扫示前凶区偏左下侧额骨局限性骨质增厚, 密度减低, 增生骨质呈火焰状, 未见骨质破坏及邻近组织异常。术后病理提示镜下大部为增生的纤维组织, 散在少量不规则上皮细胞团, 部分细胞内可见黑色素颗粒, 纤维组织之间可见多灶状挤压明显的小蓝细胞。

患儿 2, 男, 1 个月。因 16 天前发现左颞部花生豆大小肿物来诊, 无红肿、破溃、触痛等不适。头颅 CT 平扫示左眼眶外侧壁骨板增厚, 局部见均匀软组织密度肿块。头颅 MRI 显示左侧眼眶外侧软

组织内局部可见肿物呈 T1WI 稍高信号, T2WI 低信号, Gd-DTPA 增强扫描病灶明显强化, 伴左侧颞部硬脑膜异常强化。术后病理提示符合黑色素性神经外胚叶肿瘤。

结论: 尽管 MNTI 被视为良性肿瘤, 但仍具有局部侵袭性及复发的风险, 术前影像检查对临床的早期诊断、早期治疗以及预后评估非常重要。

PU-0485

应用 DWI 定量分析儿童眼眶病变

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背景: DWI 有助于提供细胞密集度信息与预测侵袭性肿瘤组织学特性, 该技术已经用于评估眼眶肿瘤, 但很少应用儿科眼眶肿瘤且研究样本量少。目的 应用 DWI 与 ADC 值鉴别儿童眼眶良恶性病变。材料与方法 回顾分析 2016 年 10 月-2019 年 2 月间在本院就诊的 73 名 18 岁以下儿童, 应用 DWI 对眼眶病变进行临床与影像评估, 通过组织学检查或基于临床与影像检查确诊。结果 与良性病变相比, 恶性病变弥散受限, 恶性病变 ADC 值明显降低, 在鉴别良恶性病变方面, ADC 值为 $0.99 \times 10^{-3} \text{mm}^2/\text{s}$ 时, 灵敏度 75%, 特异度 100%, ADC 值为 $1.26 \times 10^{-3} \text{mm}^2/\text{s}$ 时, 灵敏度 100%, 特异度 73%。

PU-0486

人工智能骨龄测量系统评估生长发育滞后患儿骨龄的准确性研究

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目的 探讨应用人工智能 (AI) 骨龄测量系统在临床实践中评估生长发育滞后患儿骨龄的准确性。

方法 回顾性收集 2020 年 6 月至 2023 年 8 月, 因生长发育滞后到昆明市第一人民医院就诊患儿共 814 例, 5~15 岁, 所有患儿均行左手腕部 X 线正位平片检查, 选取其中 244 例患儿影像资料入组, 入组标准为病例结果均出自相同三位高年资儿科影像医师, 且为一致唯一结果。以患儿实际生理年龄作为参考标准, 采用贪心方法 1:1 精确匹配, 匹配 AI 组 122 例和人评组 122 例。以配对 t 检验和 Wilcoxon 秩和检验对连续变量进行分析, 评价 AI 组、人评组与参考标准之间骨龄评测结果的一致性和准确性。

结果 所有 244 例患儿人工评估组及 AI 应用组所得结果均小于患儿实际生理年龄。244 例患儿实际生理年龄为 10.8 ± 1.5 岁。AI 组 G-P 法、TW3-Carpal 骨龄测定分别为 9.5 ± 2.1 和 8.8 ± 3.7 岁; 人评组 G-P 法、TW3-Carpal 骨龄测定分别为 10.6 ± 1.7 和 10.4 ± 2.3 岁。AI 组测定误差在 1~2 年内准确度为 62.3% (76/122), 误差在 2~3 年内准确度为 66.4% (81/122), 误差在 3 年以上准确度为 67.2% (82/122)。人评组测定误差 1~2 年内准确度为 88.1% (107/122), 误差在 2~3 年内准确度为 89.2% (108/122), 误差在 3 年以上准确度为 92.3% (113/122)。AI 组 G-P 法和 TW3-Carpal 骨龄评测误差准确度均小于人工评估组, 差异有统计学意义 (P 均 < 0.05)。RUS-CHN 骨龄评测结果与参考标准对比, AI 组和人评组, 误差在 1~2 年准确度为 75.3% 及 77.4%; 误差在 2~3 年内准确度为 88.1% 及 86.3%; 误差在 3 年以上准确度为 81.4% 及 83.7%。对 RUS-CHN 骨龄法, 两组评价一致性较好, 与参考标准之间准确性较高。

结论 5~15 年龄段生长发育滞后儿童 AI 骨龄准确性低于人工测评, 误差为 1.8 ± 1.3 岁。对 RUS-CHN 两组一致性较好。AI 应用 G-P 图谱法及 TW3-Carpal 骨龄评测结果不能真实反映患儿实际生理年龄, 需要人工干预重新校准。

PU-0487

儿童狒狒巴拉姆希阿米巴脑炎一例

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目的 狒狒巴拉姆希阿米巴临床罕见，病情危重预后差，分析狒狒巴拉姆希阿米巴脑炎（*Balamuthia amoebic encephalitis*, BAE）影像特点。**方法** 报道 1 例两次经脑脊液病原微生物宏基因检测证实的儿童狒狒巴拉姆希阿米巴脑炎患儿，结合文献分析其影像特点。**结果** 患者男，年龄 8 岁 6 月，以“行走不稳 10 余天，口角向右侧歪斜 3 天”入院。MRI 检查示双侧大脑、小脑、脑干及脊髓多发异常信号，增强强化（部分呈环形强化），脑室系统室管膜及脉络丛异常强化；右侧大脑后动脉狭窄。考虑脑膜脑炎及血管炎。治疗一月后复查双侧大脑、小脑、脑干及脊髓感染性病变，较前吸收减少；右侧大脑后动脉狭窄较前减轻。两次脑脊液病原微生物宏基因检查提示狒狒巴拉姆希阿米巴置信度高（特异序列数分别为 1133 及 1052），予以抗细菌、抗病毒、抗真菌及喷他脒综合治疗后，患者病情好转出院。**结论** 狒狒巴拉姆希阿米巴脑炎影像学表现较复杂，无明显特异性。本例病变侵犯脑实质、脑膜、室管膜、右侧大脑后动脉及脊髓，引起脑膜脑炎、血管炎及脊髓感染，脑部病变与既往文献报道相符，脊髓感染少见。需与颅内其它感染如病毒性脑炎、结核性、化脓性、真菌性脑膜炎及其它寄生虫颅内感染（肺吸虫、囊虫等）相鉴别，脊髓感染还需与其它免疫相关性病变如急性播散性脑脊髓炎，视神经脊髓炎谱系疾病及髓鞘少突胶质细胞糖蛋白（MOG）抗体相关疾病鉴别。

PU-0488

基于临床及胸部薄层 CT 影像特征的儿童难治性肺炎支原体肺炎危险因素预测

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目的 探讨胸部 CT 薄层重建联合临床特征对儿童难治性肺炎支原体肺炎的预测价值。**资料与方法** 回顾分析榆林市第二医院 2020 年 1 月—2023 年 8 月儿童肺炎支原体肺炎 146 例，其中难治性肺炎 62 例，普通肺炎 84 例，对比分析两组患者血 IL-6、LDH、CRP、PA、NLR 水平、胸部薄层 CT 上病变累及肺叶数、单纯累及支气管、单纯累及肺实质、支气管和肺实质同时受累例数等临床及影像特征，采用多因素 Logistic 回归分析预测儿童难治性支原体肺炎的独立危险。**结果** 患者血 IL-6、LDH、CRP、PA、NLR、淋巴结细胞计数、血清白蛋白水平、累计肺叶数、是否同时累及肺实质及支气管、是否合并胸腔积液、纵膈淋巴结肿大与难治性肺炎相关（ $P<0.05$ ），多因素 Logistic 回归分析结果显示，LDH[优势比（OR）=4.524， $P<0.01$]、CRP（OR=8.576， $P<0.01$ ）、NLR（OR=5.598， $P<0.01$ ）、累计及肺叶数（OR=0.498， $P<0.05$ ）、是否有胸腔液（OR=2.988， $P<0.05$ ）是预测儿童难治性肺炎支原体肺炎的独立危险因素。**结论** 胸部 CT 薄层表现及 LDH、CRP、NLR 水平在难治性和普通肺炎支原体肺炎中有一定差别，影像及临床特征联合可以在一定程度上预测难治性肺炎支原体肺炎。

PU-0489

基于 CT 特征追踪技术评估儿童冠状动脉起源异常的左室心肌应变指数变化

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目的：探讨 CT 特征追踪 (CT-FT) 技术评估儿童冠状动脉起源异常(AOCA)的左室心肌应变指数变化。

方法：回顾性收集 2022 年 3 月至 2023 年 8 月于西安市儿童医院行冠状动脉 CT 血管成像 (CCTA) 的 18 例冠状动脉起源异常患儿 (病变组) 和同期年龄、性别等相匹配的 21 例冠状动脉正常儿童 (对照组)。病变组按冠状动脉异常起源类型分为左冠状动脉异常起源于右冠窦 (7 例)、右冠状动脉异常起源于左冠窦 (11 例)。使用 CVI42 软件对 CCTA 图像进行分析, 计算所有被试的整体纵向、周向、径向应变峰值 (GPLS、GPCS、GPRS) 及各冠状动脉分支节段的纵向、周向、径向应变峰值 (PLS、PCS、PRS)。比较病变组及对照组上述各项心肌应变指数差异。

结果：左冠状动脉异常起源于右冠窦组、右冠状动脉异常起源于左冠窦组的 GPLS 绝对值均较对照组低 ($P<0.01$, $P<0.05$)。左冠状动脉异常起源于右冠窦组的 GPLS 绝对值较右冠状动脉异常起源于左冠窦组低 ($P<0.05$)。左冠状动脉异常起源于右冠窦组的左前降支的 PLS、PRS 绝对值低于对照组 ($P<0.01$, $P<0.05$)。余各指标组间差异无统计学意义。

结论：CT-FT 技术在评估冠状动脉起源异常儿童左室心肌功能方面具有可行性, 冠状动脉起源异常患儿左室心肌应变指数绝对值降低, 其中左冠状动脉异常起源于右冠窦较右冠状动脉异常起源于左冠窦的左室心肌应变指数下降更显著。

PU-0490

MRI 预测胎盘植入相关产后出血的价值分析

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摘要 目的 探讨 MRI 影像特征对预测胎盘植入相关性产后出血的价值。方法 搜集经手术病理确诊的胎盘植入患者 106 例, 根据是否发生产后出血分为产后出血组及非产后出血组, 回顾性分析其临床及 MRI 影像学资料, 分析产后出血的影响因素及 MRI 影像学特征对胎盘植入相关性产后出血的预测价值。结果 106 例胎盘植入患者中 67 例 (63.21%) 合并产后出血, 39 例未见产后出血。其中胎盘粘连 47 例, 胎盘植入 50 例, 胎盘穿透 9 例, 胎盘粘连组中合并产后出血者 13 人, 胎盘植入组合并产后出血者 45 人, 胎盘穿透组 9 人均合并产后出血。胎盘植入不同类型在是否合并产后出血分组中差异有统计学意义。随着胎盘植入深度的增加, 产后出血的出血量随着增加, 胎盘植入不同类型分组中出血量的差异有统计学意义。胎盘植入出血与胎盘植入直接征象肌层不连续、胎盘突出宫外、胎盘植入间接 MRI 征象胎盘局部向外膨出、胎盘内增多增粗血管影、下段子宫膨大有关, 差异有统计学意义; 与是否合并前置胎盘、胎盘母体面是否出血、胎盘内条状低信号影、胎盘信号不均匀无关, 差异无统计学意义。结论 胎盘植入类型、胎盘植入 MRI 直接征象及部分间接征象胎盘局部向外膨出、胎盘内增多增粗血管影、下段子宫膨大能有效预测胎盘植入相关性产后出血, 具有重要的临床参考价值。

PU-0491

罕见以侧脑室肿瘤为主并多系统受侵的 Erdheim-Chester 病一例

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目的 探讨儿童 Erdheim-Chester 病的临床及影像学特点。方法 回顾性分析 1 例

以侧脑室肿瘤为主并多系统受侵的儿童 Erdheim-Chester 病的临床、影像学表现,并结合文献进行总结分析。结果 临床表现为生长发育延缓、营养不良,下肢活动障碍以及中枢神经系统症状。头颅 CT 及 MRI 示右侧侧脑室三角区占位,CT 呈等、稍高、低混杂密度,MRI 呈稍长 T1、等及稍长 T2 信号。鞍区 MRI 提示垂体形态小,垂体后叶高信号未见显示。左胫骨骨髓、右胫骨上端外侧缘片状骨质硬化;颌面骨、前中颅窝底及双侧额颞枕骨广泛性骨质密度增高,部分形态欠规整;双侧肩胛骨、胸骨及部分肋骨、胸腰椎、骨盆诸骨骨质密度不均匀。行脑室占位病变切除术后,病理证实为 Erdheim-Chester 病累及骨骼、中神经系统及泌尿系统。结论 Erdheim-Chester 病是一种罕见的非遗传性、非朗格汉斯细胞组织细胞增生症,可累及多个器官和系统,骨骼影像表现为四肢长骨对称性骨质硬化,中枢神经系统影像多累及下丘脑-垂体轴。

PU-0492

镇静药物后白噪声干预应用于婴幼儿核磁共振检查的效果研究

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[摘要] 目的 (magnetic resonance image, MRI) 是临床上常用的检查手段。婴幼儿在行核磁共振成像检查时,其配合程度常决定检查是否能够顺利进行或影响检查结果的准确性。而婴幼儿的配合程度主要取决于检查时患儿能否入睡及入睡深度。本研究旨在探讨在镇静药物使用后,给予不同干预方法,对核磁共振成像检查的婴幼儿睡眠效果及检查成功率的影响。方法 选取 2023 年 1 月~5 月安徽省某儿童医院放射科进行核磁共振检查的 80 例患儿,按随机数字表法分为观察组和对照组各 40 例。对照组给予常规指导,让家长通过行走、语言或图片等方法吸引患儿的注意力,不让孩子休息,使其玩耍劳累后使用 10%水合氯醛灌肠。观察组的患儿行核磁检查前 30 分钟予以 10%水合氯醛灌肠,给患儿听取事先录制好的白噪声,播放时使用分贝测试仪将白噪声的音量控制在 55 分贝左右。比较两组患儿检查前入睡情况、患儿舒适度、完成检查的成功率和家长的满意度。结果 观察组检查时入睡平均时间为 (17.2±2.68) 分钟,短于对照组患儿的入睡平均时间 (23±3.23) 分钟;观察组完成检查成功率为 95.50%,高于对照组的 75.10%;观察组患儿的舒适度得分为 (98.2±1.89) 分,高于对照组的 (87.6±6.03) 分;观察组患儿家长的满意度为 98%,高于对照组的 89.10%,两者相比有均显著统计学意义 ($P<0.01$)。结论 婴幼儿核磁共振检查前,实施白噪声干预能缩短患儿入睡时间,提高检查成功率,同时,使用白噪声干预,简单、方便、易于操作,避免了患儿家长因不善于带孩子而发生的困窘和来回奔波,减轻患儿家长的焦虑情绪,使患儿及家属积极配合完成核磁共振检查,保证患儿检查的安全有效性,满足临床诊断的需要。因此婴幼儿磁共振检查前使用白噪音干预值得临床推广。

PU-0493

儿童颅内 Rosai-Dorfman 病影像学表现

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目的: 提高对中枢神经系统 Rosai-Dorfman 病影像学表现的认识。

方法: 我院确诊的儿童颅内 RDD 影像表现个案报道并文献复习。

结果: Rosai-Dorfman 病 (窦组织细胞增生伴巨淋巴结病, SHML), 是一种良性组织细胞增生性疾病, 2007 年 WHO 将 RDD 归于组织细胞肿瘤一类。主要发生在淋巴结, 累及中枢神经者少见, 以颅内为主。多发生于儿童、青年, 颅内病变则常见于成人。病因不明, 可能与病毒感染和免疫缺陷有关。多为自限性, 颅内受累除外, 激素、放化疗均无效。

影像表现为颅内单发或多发肿块, 常见于脑实质外, 常起源于硬脑膜或位于鞍区、海绵窦区, 与硬脑膜、大脑镰及小脑幕等结构相连, 多对称性分布。形态表现与脑膜瘤或脊膜瘤类似, 宽基底与硬脑膜相连, 呈类圆形或脑膜扁平样增厚改变, 可见局部硬脑膜增厚形“脑膜尾征”, 发生于大脑镰病灶通常呈两侧生长, 中央仍可见大静脉窦及硬脑膜形态, 病灶位于两侧呈“夹心饼干”改变。CT 平扫呈等/高密度, 周围可见水肿, 钙化少见, 偶可见溶骨性破坏。MRI 表现为 T1WI 等/稍长信号, T2WI 特征性呈外周等、中心低信号 (炎性巨噬细胞释放自由基), T2FLAIR 及 DWI 呈低信号。增强后均匀强化, 伴硬膜尾征。

鉴别诊断: 脑膜瘤 (中老年女性, 颅内脑外, 等 T1 等 T2 信号, DWI 高信号, 可钙化); 淋巴瘤 (多位于脑实质, DWI 高信号, 伴水肿); 朗格汉斯组织细胞增生症 (发病年龄相似, 更易颅骨骨质破坏及肿块形成); 其它硬脑膜广泛增厚疾病, 如硬脑膜淀粉样瘤、肥厚性硬脑膜炎等。

结论: 中枢神经系统 RDD 较罕见, 与脑膜瘤鉴别存在一定困难。当病灶多发, 且位于脑外, 分布较对称, 出现 T2WI 病灶中央明显低信号, 大脑镰“夹心饼干”征象, 累及硬脑膜增厚范围较广这些征象时, 要考虑到 RDD 的诊断。

PU-0494

MRI 联合基因检测对胎儿脑室不对称性扩张的诊断价值研究

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目的: 胎儿脑室不对称性扩张 (Asymmetrical Ventricular Dilatation, AVD) 是产前超声检查很常见的征象, 最优的产前管理仍然需要进一步明确并量化。本研究的目的是评估产前基因检查结合磁共振成像 (MRI) 与超声检测胎儿 AVD 进行比较。方法: 采用多中心收集包括超声诊断为胎儿脑 AVD 的单胎妊娠 103 例, 定义脑室不对称扩张为脑室扩张大于 10MM, 左右脑室差 2MM。结果通过遗传检查的核型和染色体分析和胎儿脑 MRI 进行评估。结果: 超声诊断为 AVD 的病例 103 例中核型异常率为 7.1% (3/42), 染色体异常率为 16.6% (2/24)。在超声和 MRI 检查中, 中枢神经系统额外异常发现的比率有差异 (5/103 vs 11/103, $p < 0.05$)。MRI 检查发现超声未能发现的脑皮层及皮层下、中线结构异常或后颅窝异常 8 例。结论: 在超声诊断为 AVD 的病例中, 胎儿脑 MRI 可以发现超声不能发现的脑皮层及皮层下、中线结构异常或后颅窝异常。异常基因检测有一定阳性率, 值得进一步研究。

PU-0495

MSCT 对儿童急性阑尾炎的诊断价值

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目的: 探讨儿童急性阑尾炎 MSCT 表现特点, 评估 MSCT 对儿童急性阑尾炎的诊断价值。

方法: 回顾性分析 51 例经手术病理证实为急性阑尾炎患者的临床资料及术前 MSCT 表现。

结果: 急性阑尾炎手术病理表现为: 化脓性 24 例, 卡他型 18 例, 坏疽型 9 例。急性阑尾炎 MSCT 表现: 阑尾壁肿胀增粗 39 例 (76.5%), 阑尾管腔内高密度粪石 29 例 (56.9%), 阑尾管腔积液 28 例 (54.9%), 阑尾穿孔并周围脓肿 8 例 (15.7%), 阑尾周围腹膜炎 31 例 (60.8%), 阑尾周围淋巴结相对增大 19 例 (37.3%), 盆腔少量积液 23 例 (45.1%); 其余肠梗阻 8 例、盲肠肠壁增厚 6 例、坏死性结肠小肠炎 2 例、肝脓肿 1 例。结论: 儿童急性阑尾炎 MSCT 表现有一定特点。MSCT 能够显示阑尾病变、阑尾周围结构的病理改变及合并症, 在儿童急性阑尾炎的诊断及鉴别诊断中有重要价值。

PU-0496

儿童松果体区肿瘤的影像学特征与分析 (附 20 例报告)

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目的 探讨儿童松果体区肿瘤的影像学及临床特征, 重新分析和认识鉴别诊断要点, 以期提高术前诊断水平。方法回顾性分析 20 例经病理证实的儿童松果体区肿瘤的临床资料以及影像学特征。结果 20 例病例中, 男 16 例, 女 4 例, 平均年龄为 6.5 岁。生殖细胞肿瘤 14 例 (生殖细胞瘤 5 例, 绒毛膜癌 2 例, 卵黄囊瘤 1 例, 成熟畸胎瘤 2 例, 未成熟畸胎瘤 2 例, 混合性生殖细胞肿瘤 2 例), 非生殖细胞肿瘤 6 例 (松果体母细胞瘤 5 例, 非典型畸胎样/横纹肌样瘤 (AT/RT) 1 例)。18 例术前具有不同程度梗阻性脑积水, 1 例术前脑脊液播散。不同类型的肿瘤年龄、性别、生化指标及影像学表现具有一定特征性。结论儿童松果体区肿瘤类型多样, 治疗方式和预后差异大, 术前诊断的准确性十分重要, 把握临床以及影像学特征能够在术前给予较为准确的诊断。

PU-0497

关爱儿童, 助力健康中国之儿童胸部摄影存在的问题及规范化摄影的研究

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目的 探讨婴幼儿胸部摄影现状, 优化摄影流程, 规范摄影技术。

方法 回顾性分析我院儿科胸片影像技术质控, 评出甲、乙级胸片, 经过讨论分析其原因, 制定合理的摄影流程及规范。

结果 通过利用制定的摄影流程和规范, 进行儿童胸部摄影, 最终甲级片率可以得到 100%。为临床诊断提供了可靠的依据。

结论 婴幼儿与成人具有不同的生理特点, 因此。在给婴幼儿胸部摄片时, 操作上有诸多不便, 可影响照片的质量, 给诊断带来许多困难。笔者结合中华医学会影像技术分会儿科影像技术专业委员

会制定的《0-6 岁儿童胸部数字 X 线摄影规范化检查成像专家共识》以及本人多年的工作经验，制定的摄影流程及规范如下。

1.摄影条件及中心线

婴幼儿胸部摄片一般焦片距采用 100cm，管电压为 55kV，3mAs，曝光时间应在 0.1s 以内，小焦点。

根据婴幼儿解剖学的特点，立位胸片中心线应对准气管分叉处下缘，卧位胸片时中心线对准胸锁关节下 3 横指处，即从气管分叉下缘射入。

2.正确选择摄影位置

婴幼儿胸部后前立位时，陪伴员站于摄影架对侧将婴幼儿两臂上举，交叉抱于前额固定，以避免头、颈和肩部投照于肺野。当婴幼儿无法站立时可用仰卧位。

3.正确选择曝光时机

3.1 平静呼吸状态下

婴幼儿肺间质发育旺盛，且含气量低，加之纵隔在胸廓内所占比例较大，使肺野暴露全面较困难，这样，婴幼儿胸片对吸气相的要求更为严格。故只有依靠技术人员仔细观察呼吸相的变化，适时曝光。

3.2 啼哭时曝光

有人认为婴幼儿啼哭时不能摄片，应待其平静后摄片，其实啼哭非但无害，反而为选择深吸气相曝光提供了时机。经观察婴幼儿啼哭时先为长而延续的深呼吸，紧接着是相应的急速深吸气，深吸气末至下一次呼气前有一短暂停顿时间，此时婴幼儿由呼吸时的“啊”声转为“哈”声，吸气状态下的“哈”声为摄片的最理想时机。

4.关于 X 线防护

婴幼儿对 X 线照射极为敏感，在摄影时应注意防护，技术人员在摄胸片时要做到稳、快、准。即检查过程要有条不紊，忙而不乱。

PU-0498

儿童腺泡状软组织肉瘤的 CT 和 MRI 影像学表现

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目的 探讨儿童腺泡状软组织肉瘤 (Alveolar soft part sarcoma, ASPS) 的临床表现、CT 和 MRI 特征，提高对该病的认识和影像诊断水平。

方法 收集经病理证实的 9 例 ASPS 患者的资料，分析并总结其临床和影像学特点。

结果 女性患儿 8 例，男性患儿 1 例，年龄范围 4 岁至 15 岁，平均年龄 8.4 岁。临床上表现为无痛性肿块 6 例，腹痛 2 例，间断呕血 1 例。就诊时发生肺转移 4 例。肿瘤平均最大径约 4.57cm，多呈类圆形，少数呈分叶状，边界清楚。CT 平扫呈等或略低密度，CTA 能清晰显示瘤周及瘤内较多迂曲走行异常血管影；MRI 平扫 T1WI 呈稍高信号，T2WI 呈稍高或不均匀高信号，瘤内及瘤周可见多发迂曲的血管流空信号，部分肿块内见线状 T2 低信号分隔。CT 和 MRI 增强扫描呈持续性明显强化，坏死区不强化。病理显示肿瘤细胞排列成腺泡状，周围可见血窦样结构。

结论 儿童 ASPS 没有特定的发病部位，但青少年女性患儿多见，容易发生肺转移。影像学表现具有一定的特征性，其中瘤内和瘤周丰富的血管影对 ASPS 有诊断意义。

PU-0499

探索能谱 CT 在儿童下肢 CTA 检查技术与临床应用

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目的：由于儿童对辐射更敏感，该人群的 CTA 方案通常需要修改成人的扫描协议。根据人体血流动力学的研究，儿童的血流速率较快，心率和呼吸频率较快。所有这些都会影响扫描参数、造影剂注射方案和成像显示技术的选择。因此探索在低剂量能谱 CT 扫描下儿童下肢 CTA 一次性成像，高质量图像的扫描技术更为重要。

方法：选取在我院 2022 年 1 月至 2023 年 5 月，7-15 周岁的儿童患者双下肢 CTA 检查 30 例，分三组进行实验

对照组：采取常规成人双下肢扫描协议，监测扫描起始位置腹主动脉末端，扫描方向头向足，延迟时间 8s，触发阈值 120HU，autokV，mAs，ASir-V40%，同样螺距和旋转速度，扫描时间 18-24s 选取 80KeV 图像进行后处理

方案一：更改常规扫描协议螺距与旋转速度，控制扫描时间在 15-18s，同样采取 80KeV 图像进行重建；

方案二：更改监测层位置为腓动脉，阈值 50HU，采取大螺距扫描，扫描方向足向头，最短延迟时间，扫描时间约 5s。由于个体身高差异不同，扫描距离改变，需要采取不同的螺距和旋转速度以减小静脉显影过多从而影响诊断。

最后对三组图像进行下肢血管 HU 值，对比噪声比 (SNR) 和图像质量 (IQ) 进行比较。

结论：在儿童下肢 CTA 检查中，提高扫描速度减少延迟时间能有效减少下肢静脉显影，提高下肢动脉 HU，从而提高图像质量，更利于诊断效果。

PU-0500

儿童局灶性皮层发育不良的临床及多模态影像学分析

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目的

局灶性皮质发育不良(Focal cortical dysplasia, FCD)是一系列皮层结构紊乱伴或不伴细胞形态异常的局灶性脑部畸形，它是儿童难治性癫痫最常见的病因。手术是其控制癫痫发作的主要治疗手段之一，但 FCD 影像学表型多样，与病理表型之间相关性差，所以术前采取多模态影像学手段定位致痫灶尤为重要。本文旨在回顾性分析 19 例我院 2020 年 1 月~2022 年 12 月经手术病理证实为 FCD 患者的临床及影像学表现，旨在提高影像科医师对其的认识。

方法

搜集 2020 年 1 月~2022 年 12 月我院经手术病理证实为 FCD 患者的临床及影像学资料，其中所有患者均行 MRI 平扫及 DWI 检查，9 例患者行增强检查，7 例患者行 MRS 及 ASL 检查。根据头皮电图及术后病理结果，分析各型 FCD 影像学表现及其致病灶位置。

结果

本组患者中，女性 13 例，男性 6 例，年龄范围为 2 月~19 岁，平均年龄约为 5.2 岁。所有患者均因癫痫起病，术后病理证实：FCD I 型 4 例，II 型 15 例，4 例患者为多病灶，余患者均为单病灶；位于右侧大脑半球者 11 例，左侧大脑半球 8 例；FCD I 型患者病灶主要位于颞叶（66.7%），FCD II 型患者病灶主要位于额叶（75.0%）。其中，4 例患者 MRI 平扫结果阴性，但 ASL 结果阳性（相比对侧呈高灌注或低灌注）。MRI 平扫阳性患者中，FCD I 型主要表现为灰白质分界不清，

FCDⅡ型主要表现为皮层下白质 T2 和 T2 FLAIR 序列高信号及皮层结构异常, 其中 6 例患者出现典型 Transmantle 征。

结论

FCD 一般无明显性别差异, 临床表现多为难以控制的癫痫, 与其他皮层发育不良性癫痫不同, 患者通常智力正常, 且没有发现家族性特点。FCD 多见于右侧大脑半球, 约 50% 位于颞叶内, 30% 累及 2 个以上的脑叶。本组结果存在一定偏倚, 可能与入组病人量过少有关。目前对于 FCD 的多模态 MRI 诊断, MRI 平扫尤其是薄层 T2 FLAIR 序列对于 FCD 分型具有一定提示意义; 对于 MRI 平扫患者, 丘脑 DTI 可能提示病灶左右, 而 ASL 可能对进一步明确致病灶位置提供帮助。

PU-0501

人工智能辅助系统在儿童骨龄影像评估中的研究进展

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骨龄评估是以骨骼的生长发育过程为依据来衡量人体发育水平和生物年龄的重要工具, 普遍应用于临床医学, 法医鉴定及体育赛事等领域。骨龄评估是儿科影像学的一个重要研究课题。目前临床大多数应用 (TW3-RUS、TW3-Carpal、G-P 图谱法) 综合测评儿童骨龄, 但存在耗时较长, 对评估医师要求较高及结果有偏差性等特点。近年来, 随着计算机技术及人工智能算法发展, 尤其是深度学习及神经网络模型应用于医学影像领域, 各种人工智能辅助评估骨龄系统进展迅速, 从而可快速、精准、有效地评估骨龄; 随着研究地深入及细分, 热点关注于骨龄测评中的解剖信息及骨骼形态细节, 或尝试在任务中加入临床资料; 并尝试使用整个手和特定局部感兴趣区域图像进行训练和预测, 使人工智能 (AI) 骨龄测量系统评估儿童骨龄的准确性得到明显提升。人工智能自动骨龄评估算法, 由于兼具深度学习能力和临床可解释性, 越来越受到研究者和临床医师的关注, 也取得了较为满意结果, 有望真正实现临床应用。本文对人工智能骨龄评测系统发展脉络进行梳理, 为骨龄自动评估技术的发展提供新的思路与展望。

PU-0502

儿童胸腺朗格汉斯细胞组织细胞增生症的影像表现

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目的 观察儿童胸腺朗格汉斯细胞组织细胞增生症 (Langerhans cell histiocytosis, LCH) 的影像表现。方法 回顾性分析经病理确诊的 15 例胸腺 LCH 患儿的影像资料, 观察肿瘤的位置、大小、形态、密度及与周围组织器官的关系等特点。结果 5 例位于前纵隔, 7 例位于前中纵隔, 3 例位于前纵隔-胸骨上窝, 绝大多数病灶平扫密度不均匀, 增强扫描后呈轻度~中度强化。13 例正常胸腺形态消失, 肿瘤形态不规则, 边界不清。14 例合并多发坏死和/或囊变, 坏死区域散在分布, 囊性区域直径约 0.5~1.2 cm。7 例合并多发斑点状钙化, 钙化分布较均匀, 边界模糊。10 例纵隔大血管受压移位。7 例气管和/或支气管受压变窄。6 例可见心包积液, 心包壁增厚。7 例与肺组织分界不清。结论 儿童胸腺 LCH 好发于 1 岁以下婴儿, 以坏死和/或囊变、钙化多见, 常伴肺、心包受累, 压迫大血管和下气道。

PU-0503

西门子 Force CT 锡过滤器联合 ADMIRE 技术在儿童鼻窦检查中的应用价值

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目的：探讨西门子第三代双源 Force CT 使用锡滤过滤器结合高级模拟迭代重建 (ADMIRE) 技术在儿童鼻窦扫描中的临床应用价值。方法：选取来我院行鼻窦 CT 扫描的患儿，按检查时间随机分入 A、B 两组，实验组 A 组 (60 例)：使用锡过滤器能谱纯化技术扫描，管电压 Sn100Kv，管电流 50mAs，并采用 ADMIRE 重建，等级强度 3；常规组 B 组 (60 例)：采用管电压 100Kv，管电流 50 mAs，滤波反投影 (FBP) 重建；其余 AB 两组的扫描参数均一致。对比两组图像的图像质量的主客观评分以及辐射剂量。图像质量主观评价采用 5 分评分法；客观评价采用比较图像的 CT 值、噪声 (SD)、信噪比 (SNR)、对比噪声比 (CNR) 和容积剂量指数 CTDIvol(mGy)、剂量长度乘积 DLP(mGy.cm)、有效辐射剂量 ED(mSv)。结果：A 组对比 B 组辐射剂量下降约 67.34 %，且有统计学意义($P<0.01$)；两组相比，A 组图像 SD 增加 5.46 %；SNR 降低 3.27 %；CNR 升高 3.58 %；主客观评价对比无统计学差异 ($P>0.05$)。结论：Force CT 锡过滤器 (Sn100Kv) 联合 ADMIRE 技术在儿童鼻窦扫描中，既可以保证图像质量又能大幅降低辐射剂量，值得在临床推广。

PU-0504

多模态功能 MRI 定量评价甲基丙二酸血症脑损伤

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目的：本研究的目的是定量评估多参数 MRI 在甲基丙二酸血症 (MMA) 患者脑组织中的结构和功能变化。

方法：对 62 例患有甲基丙二酸尿症的儿童行多模态 MRI 检查，男 44 例，女 18 例，年龄 0.5 个月~17 岁，平均年龄 31 ± 50.8 个月)，26 名患者为单纯型 MMA，其他患者为合并型 MMA。收集患儿的临床资料，所有患者均经新生儿筛查、串联质谱、气相色谱-质谱和基因检测进行确诊。主要临床症状为嗜睡、呕吐、发育迟缓、进食困难和代谢性酸中毒。10 例患者临床和 MRI 表现正常。62 例患者行常规 MRI 和扩散加权成像 (DWI) 检查，28 名患者行扩散张量成像 (DTI) 检查，16 名患者进行动脉自旋标记 (ASL) 检查，30 名患者进行磁敏感加权成像 (SWI) 检查。另外 62 名年龄和性别相匹配的儿童作为对照组。我们测量了两组患者的结构和功能 MRI 参数。结构 MRI 评分评估区域包括脑 WM (白质)、皮质 GM (灰质)、深部 GM 和小脑。最高可得 11 分，分数越高表示伤势越严重。脑 WM 异常包括髓鞘形成延迟、信号异常、囊性变性 (脑软化)、胼胝体变薄、侧脑室扩张、冠状面双侧顶叶宽度 (BPW)。大脑半球间距离 (IHD) 评估皮质萎缩。通过信号异常和体积减少来评估深部 GM 和小脑异常。ASL、DWI 和 DTI 的 ROI 分析包括对称的双侧额叶白质、颞叶白质、内囊 (IC) 前肢、IC 后肢、枕叶白质、放射状冠区、半卵圆中心、基底节和胼胝体 (CC) 膝部、CC 压部。比较 MMA 组和对照组之间 ROI 的 ADC 值、CBF 值和 FA 值等参数的差异。

结果：47 名儿童结构 MRI 出现一个以上的异常。最常见的结构异常为皮质萎缩，其次是脑室扩张和小脑萎缩。患者额叶白质 CBF 低于正常对照组。患者组 ADC 值较对照组显著增加，FA 值显著降低。

结论：我们发现结构 MRI 评分和多参数功能 MRI 成像能有效的评估 MMA 患者的脑损伤。

PU-0505

多模态磁共振对早产儿脑损伤早期诊断及预后评估的临床价值

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摘要：目的：探讨多模态磁共振成像（MRI），磁敏感加权成像（SWI）、扩散加权成像（DWI）及扩散张量成像（DTI）技术联合在早产儿脑损伤早期诊断及预后评估的临床应用价值。方法：选取我院 2018 年 7 月至 2023 年 3 月本院收治的 34 例早产儿脑损伤患儿的临床与头多模态磁共振成像检查资料。男性 21 例，女性 13 例；胎龄为 32~37 周，其中 5 例患儿生产困难，其余患儿均无产伤。纳入标准：早产儿，有脑损伤临床病史、危险因素等；病情稳定无磁共振检查禁忌。使用荷兰 Multiva PHILIP 1.5T 超导型磁共振进行头颅扫描，使用头颈 8 通道线圈。所有患儿均签署知情同意书后行多模态 MRI 检查。回顾性分析本院 34 例新生儿脑损伤患儿的颅脑多模态 MRI 图像特征，包括常规平扫图像、SWI、DWI 及 DTI，分析围生期资料、颅脑损伤情况和脑白质微结构的改变，并与临床诊断进行对照研究。参照中国科学院心理研究所编制的婴幼儿智能发育量表(CDCC)，随访 1 个月、3 个月、6 个月进行神经行为方面的测试，包括智能发育指数(MDI)和运动发育指数(PDI)。结果：DWI 对早产儿颅脑缺血性病变的敏感性较高，SWI 对早产儿颅脑出血性病变具有较高敏感性，应用 DTI 技术感兴趣区各向异性分数进行差异性分析。本组 34 例早产儿中，其中出血性脑损伤 14 例，蛛网膜下腔出血 4 例，脑白质灶性出血 3 例，侧脑室周围出血并及脑室内积血 3 例，硬膜下血肿 4 例，蛛网膜下腔出血伴硬膜下血肿 1 例；缺血性脑损伤 20 例，其中局限性缺血性脑损伤 12 例，弥漫性缺血性脑损伤 2 例，脑室周围白质软化 6 例。34 例早产儿脑损伤 MRI 影像诊断与临床诊断基本相符。结论：多模态 MRI 成像对早产儿脑损伤早期诊断及治疗后评估具有重要临床价值。目前诸多研究表明对脑损伤早产儿的早期科学干预能改善其发育结局，这与生命早期脑极强的神经可塑性相关。因此，对早产儿脑损伤的早期诊断和预后评估的早期干预赢得最佳时机。

PU-0506

儿童桥小脑角区卵黄囊瘤 1 例报告并文献复习

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摘要：目的：探讨颅内卵黄囊瘤的临床特点、影像学特征及治疗方法，提高对颅内卵黄囊瘤(yolk sac tumor, YST)的认识。方法：回顾性分析广州市妇女儿童医疗中心经外科手术治疗 1 例经病理证实的左侧桥小脑角区卵黄囊瘤患儿的临床资料及影像表现；并对相关文献进行复习。左侧桥小脑角区-桥前池团块状实性肿块，边界清，大小约 3.8cm×3.6cm×3.1 cm，T1WI 等、稍低信号，T2WI 稍高、高信号，FLAIR 呈稍高及低信号，DWI 呈稍高信号，ADC 呈稍高信号，增强实性部分明显欠均匀强化，囊变区无强化。结果：患儿行开颅显微镜下手术全切除肿瘤，术中见肿瘤基底位于桥小脑角区，面神经受压，听神经被肿瘤包绕其中，色红，供血丰富，质地软；分块切除肿瘤。病理检查为卵黄囊瘤。术后患儿恢复良好，随访 1 个月未见复发，目前仍在随访中。结论：颅内桥小脑角区卵黄囊瘤临床非常罕见；其病因尚不明确，临床表现与肿瘤大小和部位有关，影像学检查有一定诊断价值，血清及脑脊液甲胎蛋白(alpha fetoprotein,AFP)浓度升高，术后 12 天血清甲胎蛋白 (AFP) 浓度为 349.50ng/mL 仍升高。目前治疗大多采用手术完整切除肿瘤，术后联合放化疗。卵黄囊瘤又称内胚窦瘤(endodermal sinus tumor, EST)，属于生殖源性肿瘤，一般原发于卵巢和睾丸，偶尔也发生于生殖腺以外，但发生在颅内的较少见，颅内好发于中线区域，其中鞍区、松果体区、基底节区、侧脑室旁已有报道，而原发于桥小脑角区国内外未见报道。许多影像医师对儿童原发的桥小脑角区的卵黄囊瘤认识不足，易误诊。

PU-0507

小儿支原体肺炎 CT 表现

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目的 目前小儿支原体肺炎高发期，支原体培养分离结果及血清学检查是临床诊断金标准，但该检查对环境条件要求较高，且相对滞后，分析小儿支原体肺炎胸部 CT 影像学特征及其鉴别诊断价值尤为重要。**方法** 选取本院 2023 年 5 月至 2023 年 9 月收治且经血清学 MP 抗体(MP-IgM)检查或肺炎链球菌血培养确诊的 100 例支原体肺炎患儿作为研究对象，分析其病变位置、形态、无淋巴结增大及胸膜改变等影像学特征。**结果** 100 例支原体肺炎患儿中，单侧肺叶病灶 78 例、双侧肺叶病灶 36 例、单叶段病变 67 例、多叶段病变 47 例。肺部受累情况：左肺 12 例、右肺 20 例、双肺 68 例。因其发病在肺间质，其特征即为支气管壁增厚。患儿 CT 影像学主要表现为病变区肺纹理增粗而模糊，病变范围广，常累及多个肺叶，单侧或双侧的磨玻璃影、实变影及网格结节影。其中 88 例患儿可见支气管壁增厚；66 例可见片状实变影；80 例可见结节影；56 例可见树芽征，15 例见胸膜结节。患儿胸部特点表现为纵隔气管前腔静脉后淋巴结肿大和支气管壁增厚，胸腔积液较少见，只有 9 例患儿有少量胸腔积液。影像上需要与结核、支气管肺炎、病毒性肺炎及大叶性肺炎鉴别。**结论** CT 检查可有效显示小儿支原体肺炎的影像学特征，综合其临床特征进行分析，可对肺炎做出准确诊断，具有较高的临床应用价值。

PU-0508

3D-DESS 序列在小儿多指（趾）畸形术前评估中的应用

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目的：小儿多指（趾）畸形、常规术前行 X 线检查，可清楚显示骨骼，但一般情况下，患儿手术时年龄较小，对于软骨骨骺、肌腱等软组织难以区分，无法直接区分单独骨骺和共享骨骺的情况。此研究探讨 MRI 三维双重回波稳态成像（3 Dimensions-Double echo steady state, 3D-DESS）序列在小儿多指（趾）畸形术前评估中的应用及临床意义。

方法：选择 2021 年 5 月至 2022 年 3 月间我院骨科收治的多指（趾）畸形患儿 18 例为研究对象，术前行 MRI 3D-DESS 序列扫描，两名高年资医生用双盲 3 分制法分析图像质量；且以术中所见结果为“金标准”，分析图像结果与术中结果的一致性。

结果：18 例多指（趾）畸形患儿均扫描成功（100%）（如图 2-图 4）。图像质量评分：16 例（88.9%）在 3 分，平均 2.6 ± 0.3 ，所有图像均能满足诊断，两位医生的盲法评分 ICC 值为 0.8579（95%CI: 0.7253-0.9658）。MRI 结果显示 2 例为足趾畸形，16 例为多指畸形（其中 3 例为 Wassel III 型，10 例为 Wassel IV 型，2 例为 Wassel V 型，1 例为蹼状指畸形，图 1~3），磁共振检查诊断结果与术中所见结果一致性为 100%。

结论：无创无辐射的 MR 3D-DESS 序列可提供患儿畸形指（趾）的软骨骨骺、肌腱及骨组织生长发育情况，对于小儿多指（趾）畸形术前评估及手术方案制定具有较高的临床诊断价值。

PU-0509

Risk factors of severe conditions in children hospitalized with adenovirus infection and their differences in chest CT features

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Background: Children infected with human adenovirus (HAdV) were at particularly high risk of developing severe disease, but the risk factors of severe conditions are poorly understood.

Objectives: To explore the risk factors of severe conditions in children patients by analyzing the epidemic, clinical data and computed tomography (CT) imaging features.

Methods: In this retrospective study, 267 children positive for HAdV were included between October 2016 and September 2021 in Tongji Hospital, Wuhan, China. Descriptive analysis was performed on epidemiology, clinical data and the outcome of these children. Details of the CT manifestations changes were semi-quantitatively scored according to the imaging of consolidation, ground-glass opacity and emphysema of each lung lobe.

Results: Results showed no different significance in genders, respectively, between the different years, the ages, the hospital length of stay (LOS) days, the abnormal chest manifestations, the quarter distribution and the severe/non-severe conditions. However, there was a statistically significant difference in the occurrence rate of abnormality on chest CT imaging ($P=0.007$) and the performance characteristics of chest CT images ($P=0.002$) between severe and non-severe groups. We demonstrated that co-infection with ≥ 2 kinds of other pathogens happened more frequently in severe cases. The proportion of lymphocytes in laboratory indexes significantly decreased in the severe conditions. In addition, the proportions and scores of consolidations were significantly increased in each lung lobe in severe cases.

Conclusions: Our results could help predict children hospitalized with HAdV who are at increased risk for severe conditions, encouraging aggressive treatment and care.

PU-0510

TrueFidelity 深度学习图像重建技术在儿童副鼻窦超低剂量 CT 检查中的初步应用研究

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目的: 探讨 TrueFidelity 深度学习重建 (Deep learning image reconstruction, DLIR) 技术在儿童副鼻窦超低剂量 CT 检查中的价值。**方法:** 回顾分析因鼻窦炎或鼻部外伤行 CT 扫描患儿 50 例, A 组 (实验组) 25 例采用 100kVp 扫描, SmartmA 60-250, 前置 AsirV 权重 70%, DLIR 图像重建, 重建强度分别为高级、中级和低级; B 组 (对照组) 25 例采用 100kVp 扫描, SmartmA 60-250, 前置 AsirV 权重 30%, 后置 AsirV 重建, 重建权重选择 70%。比较两组的辐射剂量常、图像噪声 (SD)、信噪比 (SNR)、对比噪声比 (CNR) 及主观评分。辐射剂量记录 DLP 值, 并计算有效剂量 ED 值。**结果:** ① A、B 两组有效剂量差异有统计学意义, A 组辐射剂量较 B 组明显降低 ($tDLP=-34.56$, $tED=-23.00$, $P < 0.05$), A 组 DLP 和 ED 分别比 B 组降低了 $83.92\%[(36.65 \pm 2.44) \text{ mGy} \cdot \text{cm} \text{ vs. } (227.92 \pm 27.58) \text{ mGy} \cdot \text{cm}]$ 和 $83.17\%[(0.17 \pm 0.03) \text{ mSv vs. } (1.01 \pm 0.18) \text{ mSv}]$ 。② DLIR 不同重建强度中高强度重建 (DLIR-High) 图像质量最佳, 其作为实验组 A 与对照组对比图像质量。③ A、B 组图像噪声、CNR 差异有统计学意义

(t 噪声=3.30, t CNR=4.08, $P<0.05$), A 组图像噪声低于 B 组, A 组 CNR 高于 B 组, SNR 值差异无统计学意义 (t 鼻甲黏膜 SNR =1.73, t 颞下窝脂肪 SNR =0.29, $P>0.05$)。④A、B 组图像主观评分: 筛窦、上颌窦处评分无统计学意义 (z 筛窦=-0.84, z 上颌窦-1.07, $P>0.05$); 鼻咽处有统计学意义 (z 鼻咽=-5.21, $P<0.05$), 为 A 组优于 B 组。结论: A 组图像质量整体优于 B 组, 在儿童副鼻窦扫描中采用超低剂量扫描联合 DLIR 技术, 在显著降低辐射剂量的同时, 可保证图像质量。

PU-0511

产前 MRI 诊断胎儿肠扭转伴梗阻 1 例

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(个案报道)

孕妇 31 岁, G2P0 孕 35+1 周, 在我院行胎儿 MRI 检查, MRI 描述: 胎儿结肠及部分小肠呈 T1WI 高信号, 其右腹迂曲肠管呈“漩涡”状, 大部分位于右上腹区; 中下腹另见明显扩张肠管, 管径约 2.1cm, 其内容物呈 T1WI 及 T2WI 稍高信号, 管壁增厚, 并与上述漩涡状肠管相延续, 余近端肠管萎陷, 管壁增厚, 局部管壁模糊不清; 腹腔肠间隙及结肠旁沟广泛液体信号影。乙状结肠部分偏细。(图 1、图 2)

手术所见: 探查见距屈氏韧带 50cm 以远端回肠至距回盲部近端约 10cm 回肠以其系膜根部顺时针扭转 1080°、发黑坏死, 复位后见该段肠管系膜缺如, 肠管迂曲, 中段扩张明显、肠腔内含大量瘀滞的胎粪及暗红色坏死组织。扭转肠近端小肠稍扩张、色红润、直径约 1cm, 肠腔内含褐色粘稠胎便。扭转肠管远端回盲部、阑尾及剩余结肠肠壁柔软, 形态未见确切异常, 内含少许胎便。腹腔淡血性腹腔积液约 30ml。小肠总长约 110cm, 自屈氏韧带至造瘘口约 50cm, 距回盲部剩余回肠约 7cm。(图 3、图 4)

术后诊断:

1. 回肠扭转, 2. 回肠坏死, 3. 回肠绞窄性肠梗阻, 4. 先天性肠系膜血管畸形 (回肠系膜大部缺如), 5. 先天性小肠发育异常 (回肠)

PU-0512

毛细胞型星形细胞瘤在 CT、MRI 诊断

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目的: 探讨儿童毛细胞型星形细胞瘤(PA)的 CT、MRI 特征性表现, 提高临床诊断水平。方法: 收集我院 2015 年 1 月-2021 年 12 月间资料完整并经手术病理证实的 85 例儿童毛细胞型星形细胞瘤的临床 CT、MRI 资料, 回顾性分析研究儿童毛细胞型星形细胞瘤在 CT、MRI 特征性影像学表现。结果: 本院手术病理证实的 85 例儿童 PA 中, 男 50 例、女 35 例, 年龄 5 个月-15 岁 1 个月, 中位年龄 65 个月 (平均 72.33 个月); 其中, 颅内 78 例、占 91.76%, 脊髓 6 例 (其中 1 例累及延脑)、占 7.06%, 眶内视神经 (双侧发病) 1 例、占 1.18%; 幕下小脑半球 26 例、蚓部 30 例、脑干 1 例、小脑蚓部及中脑顶盖各 1 枚肿瘤 1 例共 57 例、占 67.06%, 幕上鞍区 17 例 (其中 1 例累及视神经颅内段伴脑室与松果体多灶 PA、1 例伴脑室 PA)、脑内 3 例、脑室内 1 例共 21 例、占 24.71%; 单发 81 例、占 95.29%, 2 个及以上病灶 4 例、占 4.71%, 共 91 个病灶, 其中毛细胞黏液样型星形细胞瘤 6 例 (5 例位于鞍区、1 例位于小脑半球, 其中 1 例鞍区 PA 多发), 肿瘤长径 11-368.5mm, 平均 59.12mm, 其一脊髓病变几乎累及脊髓全长。结论: 儿童毛细胞型星形细胞瘤

好发于婴幼儿，部位以小脑半球常见，病灶多为囊实性成分，CT 影像上呈等低密度改变，MRI 影像 DWI 序列无明显弥散受限改变，增强后实性部分显著不均匀强化、内见多发小点状或条状低信号，囊性部分强化不明显，且有类似 III 级胶质瘤影像表现特点。儿童毛细细胞型星形细胞瘤在 CT、MRI 特征性表现，对术前诊断和鉴别诊断具有重要价值。

PU-0513

构建基于深度学习特征的人工智能儿童腕部影像骨龄评估系统模型的初步探讨

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目的 构建基于手腕部影像传统关注区域深度学习特征的人工智能骨龄评估系统模型，并验证其可行性及效果。

方法 回顾性连续纳入 2021 年 3 月至 2022 年 5 月昆明市第一人民医院及昆明市儿童医院儿童骨龄 DR 片 2182 例，按年龄段等比例采样原则训练集纳入 1746 (80%) 例，验证集 436 (20%) 例。应用深度学习方法构建基于传统关注的 17 个特征区域定位模型及骨龄回归模型；另选取昆明市第一人民医院近期 2022 年 8 月至今 635 例骨龄影像结果作为测试集检测其效能。采用平均精度均值 (mAP)、平均绝对误差 (MAE) 及均方根误差 (RMSE) 分别评价模型定位及骨龄预测的准确性。

结果 模型对 17 个特征区定位 mAP 为 0.93，整体 MAE 验证集为 0.467 岁、测试集为 0.443 岁。RMSE 分别为 0.487、0.563 年。测试集模型骨龄预测与医师读数误差 1 年内的准确度分别为 89.6% (391/436)，误差在 2 年内的准确度分别为 93.9% (409/436)。差异较大者主要出现在相应年龄段训练集数据出现锥形骨骺或骨骺融合覆盖指间关节面范围判定。

结论 构建的基于深度学习的儿童骨龄评估 AI 模型可快速、自动、有效地评估骨龄，但实际临床应用中仍需要人工调校及进一步深度学习。

PU-0514

心理护理联合人文关怀理念在 MRI 检查患者中的实践研究

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MRI 检查是临床上一种较为常见的检查方式，其可以对人体进行较为全面的检查，并对人体的疾病进行准确的判断，其在临床上有着较广泛的应用，可以在一定程度上促进临床疾病治疗。但是由于 MRI 检查是一种较为先进的检查方式，所以在检查过程中会产生一定的辐射。对于一些患者而言，在进行 MRI 检查过程中容易出现害怕和恐惧的心理，从而严重影响到患者的治疗效果。因此，为了改善患者的心理状态，提高其治疗效果，我院将心理护理联合人文关怀理念应用到 MRI 检查中，取得了较好效果。方法：对照组：常规护理方法，观察组：在患者入院后，由护士长对患者进行评估，并按照相关的标准为患者制定个体化的心理护理联合人文关怀理念的个性化护理。通过多种途径，如网络、科室宣传栏等对患者进行健康教育护理计划的同时，还应向患者及家属进行健康教育，使其了解 MRI 检查的，提高其对 MRI 检查的认识水平。比较两组患者的一般资料及 MRI 检查结果。比较两组患者的心理状态、护理满意度、认知行为、生活质量评分等情况。结果：患者在 MRI 检查期间，对护理人员的服务态度、专业知识、沟通能力和行为规范等进行了调查，结果显示：护理人员服务态度和行为规范较好，患者满意度较高。通过对两组患者的检查前、检查中和检查后的不

不良反应进行调查,结果显示:两组患者在 MRI 检查期间均未出现不良反应,均未出现发热、寒战等不适症状。但是,观察组中有 1 例患者由于没有按照要求佩戴耳机而导致耳鸣。结论:在本次研究中,将心理护理联合人文关怀理念应用于 MRI 检查患者的护理实践中,取得了良好的效果。本次研究结果表明: MRI 检查患者在心理护理联合人文关怀理念的指导下,焦虑、抑郁和孤独等不良情绪得到缓解,对疾病知识和技术操作了解增加,自我效能感提高,为患者创造了良好的就医环境。MRI 检查患者在进行检查时,需要采用心理护理联合人文关怀理念的指导进行护理,以保证患者顺利完成检查。

PU-0515

肿瘤 CT 增强检查中造影剂不良反应的预防及护理

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目的:探讨综合性护理干预对预防 CT 强化扫描中造影剂副反应的效果。方法:选取我院收治的行螺旋 CT 增强检查的肿瘤患者 100 例作为研究,并随机分为对照组和试验组。对照组给予常规护理,试验组从心理干预、健康教育、预防护理等方面进行综合护理干预。评价两组肿瘤患者的情绪、造影剂注射后肿瘤患者生命体征变化及副反应发生情况及对护理工作满意度情况。结果:试验组肿瘤患者干预后焦虑、抑郁评分低于对照组($P<0.05$),试验组副反应发生少于对照组($P<0.05$),试验组肿瘤患者血压及心率异常率低于对照组($P<0.05$)。试验组肿瘤患者对护理工作满意度高于对照组($P<0.05$)。结论:综合性护理干预能够降低 CT 强化扫描中造影剂副反应发生率,改善不良情绪,提高护理满意度。

PU-0516

人文关怀理论在增强 MRI 检查患者护理中的干预效果

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摘要:目的:在增强 MRI 检查患者的护理过程中,采用人文关怀理论指导护理实践,目的在于提高患者对医院及护士的满意度,满足患者的心理需求。由于增强 MRI 检查是一项医疗服务,具有一定的专业性和技术性,需要医护人员具有较高的专业水平和技能水平,而这与医护人员所接受的教育、社会经历等方面有关。在增强 MRI 检查过程中,医护人员应当充分关注患者的心理需求,加强医患沟通交流,从而为患者提供良好的医疗服务。方法:对照组采取常规护理,观察组在常规护理的基础上采用人文关怀理论的护理干预措施,具体内容如下。心理护理:密切关注患者的情绪变化,对其进行心理疏导,使其保持良好的心态;人文关怀服务:密切观察患者的病情变化,协助医生进行治疗;知识宣教:向患者及其家属介绍磁共振成像技术及相关检查注意事项,介绍 MR 检查对人体的影响。介绍 MRI 检查全过程及扫描后图像显示,消除患者对检查的恐惧心理。结果:观察组的患者的心理健康、满意度评分均高于对照组,差异有统计学意义($P<0.05$);且观察组患者的血压和血氧饱和度明显低于对照组,差异有统计学意义($P<0.05$);两组在干预前的焦虑自评量表评分无统计学差异($P>0.05$),干预后两组的焦虑自评量表评分均明显低于对照组,差异有统计学意义($P<0.05$);两组在干预后的总体满意度评分无统计学差异,且观察组患者的总体满意度明显高于对照组。结论:本次研究结果表明,在 MRI 增强检查过程中,采用人文关怀理论进行护理干预后,患者出现不良情绪明显减少;不良情绪会直接影响到患者检查的顺利进行。因此,在 MRI 增强检查中采取人文关怀理论进行护理干预,有利于提高患者的满意度和治疗依从性,减轻患者痛苦,有利于改善医院整体护理质量。

PU-0517

心理护理在 CT 增强检查过程中的临床应用效果及满意度分析

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目的 研究 CT 增强检查中行心理护理的效果。方法: 选取我院收治的 78 例 CT 增强检查患者, “双盲法”分采纳组(39 例, 常规护理)、科研组(39 例, 心理护理), 比较两组疗效。结果: 护理前比较负性情绪无意义, $P>0.05$; 护理后相较采纳组, 科研组 SAS、SDS 值更低; 满意率更高, $P<0.05$ 。结论: 心理护理能减缓 CT 增强检查患者的不良情绪、改善护患关系, 值得推崇。

PU-0518

放射增强 CT 检查在优质护理中的临床应用效果探讨

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目的: 接受放射增强 CT 检查的患者于检查过程中, 开展优质护理服务, 对降低患者不良反应发生率、缓解其负面情绪的价值探究。方法: 收录 2021.5—2023.5 期间于我院接受放射增强 CT 检查的患者, 共计 80 例, 以随机数字表法做分组处理, 就不同组别实施差异性护理, 展开对比分析。组别命名为对照组、观察组, 样本量组间纳入相当 ($n=40$), 对应给予常规护理、优质护理。对照组纳入男患、女患各 22 例、18 例; 年龄阈值 24-75 岁, 求取平均值 (49.52 ± 9.13) 岁; 观察组纳入男患、女患各 23 例、17 例; 年龄阈值 25-75 岁, 求取平均值 (50.34 ± 9.75) 岁; 结果: 统计两组患者检查后恶心呕吐、皮肤瘙痒发生率, 观察组分别为 7.50%、5.00%, 均低于对照组 25.00%、30.00%, $P<0.05$ ($\chi^2=4.5006/8.6580$, $P=0.0339/0.0033$)。于护理前后评价两组焦虑状态 (SAS 评分), 护理前观察组、对照组评分值分别为 (56.23 ± 5.79) 分、(55.84 ± 6.10) 分, 组间差异较小, $P>0.05$ ($t=0.2933$, $P=0.7701$); 护理后观察组、对照组评分值分别为 (36.25 ± 4.87) 分、(44.28 ± 5.67) 分, 两组评分值均有较为明显的降低, 且评分值以观察组更低, $P<0.05$ ($t=6.7947$, $P=0.00000$)。结论: 接受放射增强 CT 检查的患者于检查过程中, 开展优质护理服务, 对降低患者不良反应发生率、缓解其负面情绪的价值显著。将优质护理应用在放射增强 CT 检查中, 能进一步提升整体护理质量, 在工作中, 需于检查前, 护理人员应详细向患者介绍放射增强 CT 检查的相关知识和基本的操作流程, 以及方式和需要注意的事项, 提高患者对放射增强 CT 检查的认知度; 向患者宣导安全性及重要性, 耐心解答患者提出的问题, 消除其担心的心理, 缓解患者的焦虑情绪, 保证放射增强 CT 检查工作的进展。

PU-0519

Design and application of protective machine restraint belt for interventional surgical: A randomized controlled study

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Aim: This study aimed to design the protective machine restraint belt for interventional surgical and evaluate the application effects.

Methods : Design and manufacture the protective machine restraint belt for interventional surgical, which was authorized by the State Intellectual Property Office of China (utility model patent number: ZL 202221415757.3). Two hundred interventional surgery patients who were selected and randomly assigned into control group (n=100) or experimental group (n=100) .The control group didn't use the protective machine restraint belt for interventional surgical, while the experimental group used. The times of surgical interruptions due to patient factors, the duration of interruption, the incidence of adverse events, along with patients' satisfaction with using the restraint appliance were compared between the 2 groups.

Results: The information about gender, age, education level and surgical classification for comparison of the 2 groups were collected, and there was no significant difference in general data($P>0.05$), as shown in Table 1.The times of surgical interruptions, duration of surgical interruptions, and the incidence of adverse events in the experimental group were lower than those in the control group, while the patients'satisfaction was higher than that in the control group,as shown in Table 2.In addition, 2 patients in the control group stopped the surgery who were unable to continue cooperating, which did not occur in the experimental group.

Conclusions: The protective machine restraint belt for interventional surgical is safet to operate, which can improve the surgical efficiency and patients' satisfaction.

PU-0520

规范化护理在 MRI 检查中患者的配合度及对护理满意度的应用研究

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摘要:目的: 本研究旨在探讨规范化护理对磁共振 (MRI) 检查中患者的配合度和护理满意度的应用效果。方法: 共收集了 2022.1-2023.1 期间在本院影像科进行 MRI 检查的 98 例患者。其中, 随机将 49 例患者分配到研究组, 接受规范化护理干预; 将 49 例患者分配到对照组, 接受专科常规护理干预。比较了两组患者在检查情况、图像质量和护理满意度方面的差异。结果: 研究组患者在造影剂渗漏、重复扫描、血压波动和心率波动的发生率明显低于对照组 ($P<0.05$); 研究组的图像优良率为 97.95% (48/49), 显著高于对照组的 81.63% (40/49), 差异具有统计学意义 ($P<0.05$); 研究组的护理满意率为 97.95% (48/49), 明显高于对照组的 83.67% (41/49), 差异有统计学意义 ($P<0.05$)。结论: 本研究表明, 在 MRI 检查中, 规范化护理干预可以提高护理和图像质量, 并增加患者对护理的满意度。

PU-0521

口腔癌修复重建术后的围手术期护理要点分析

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【目的】探讨围手术期骨髓炎患者游离腓骨修复重建后出现护理问题以及对应护理措施

【方法】选取 2018 年 8 月至 2022 年 12 月, 随机抽取住院患者行口腔癌修复重建手术患者 40, 其中男性 26 例, 女性 14 例, 年龄在 35~68 岁之间; 股前外侧瓣 14 例, 腓骨瓣 9 例, 前臂瓣 6 例, 颞下岛状瓣 4 例, 髂旋浅动脉瓣 3 例, 胸大肌瓣 4 例; 围手术期包括术前健康教育、术前心理辅导、

术前营养评估、术后营养干预、气管切开护理、口腔护理，皮瓣观察，术后功能锻炼，术后感染监测。描述口腔癌患者修复重建术后出现的护理问题以及分析对应方法

【结果】3 例患者出现手术前严重焦虑，经心理辅导后情绪相对缓解，1 例患者术后出现谵妄，3 例出现手术后皮瓣坏死，2 例经过皮瓣二次手术修复，24 例术前患者营养状况欠佳，40 例患者全程接受营养干预，2 例术后出现感染症状。

【结论】修复重建手术可在一定程度上恢复患者的功能，能够给患者带来自信和希望。口腔癌修复重建术围手术期护理问题多，个体差异大，护理措施需要精细化、个性化，这对我们口腔颌面外科护理团队提出较大的挑战。

PU-0522

PDCA 循环在对比剂外渗护理管理中的效果观察

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目的：探讨 PDCA 循环管理程序在对比剂外渗后的无缝式护理管理效果，改善外渗后放射科与临床脱节式管理现状。

方法：放射科护理质量控制小组针对对比剂外渗患者，采用 PDCA 循环程序，进行外渗预后时间和效果以及恶性转归率的效果观察，具体如下：

计划阶段：建立无缝式护理管理小组-放射科护士长、静疗组长、责任护士、临床护士长、静疗组长、责任护士。针对小组成员进行对比剂外渗相关知识培训。

实施阶段：启动无缝式护理管理机制、制定无缝式环节流程管理、规范交接流程、制定标准化流程规范。

检查阶段：针对每一例外渗患者，无缝式护理管理小组成员跟踪流程落实情况，给予分析、评价、记录。

处理阶段：无缝式护理管理小组掌握每一例外渗患者愈后时间、效果、良恶性转归率，通过上述三个阶段进行统计分析、制定计划、确立目标、对策实施、效果观察、总结分析，形成规范化标准推广实施。对循环中存在的问题提出解决办法，纳入下一循环，不断修正标准化流程。

结果：回顾分析 2022.01-2022.05 对比剂外渗病例，与 2023.01-2023.05 进行对比，应用 PDCA 循环管理程序后，碘对比剂外渗发生率明显降低，放射科与临床建立规范化管理流程。

结论：应用 PDCA 循环针对碘对比剂外渗在各护理单元开展无缝式护理管理，能够促进外渗的规范化管理和处理，掌控外渗后的良性转归，促进更快痊愈，提升患者满意度

PU-0523

一体化管理模式在放射科护理质量提升中的作用

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目的：分析评价一体化管理模式在放射科护理质量提升中的应用价值。**方法：**共纳入放射科患者 50 例，纳入时间为 2022 年 1-12 月，其中男性 28 例、女性 22 例；平均年龄为（52.83±1.25）岁。均知情签署相关诊疗干预同意书，排除严重精神障碍、临床资料不全及不配合本次实验者。在本次 50 例放射科患者护理工作开展期间，实施一体化管理模式：构建一体化护理管理小组、专业化培训干预、改进放射科护理管理制度、针对护理干预。对放射科护士的护理质量指标进行评分，包括基础护理、专科护理、文书书写、技术操作四项，每一项满分为 100 分；评分越高，代表放射科护

士的护理质量水平越高。对患者风险事件发生率进行分析、计算。根据我院自制护理满意度调查问卷，将患者对放射科护理服务工作的满意程度分成满意、基本满意、不满意三个等级；总满意度 = （满意例数 + 基本满意例数）/ 总例数 $\times 100.00\%$ 。使用统计学软件 SPSS21.0 对数据进行统计分析。结果：实施一体化管理模式后，放射科护士的基础护理评分为（92.50 \pm 1.00）分、专科护理评分为（90.00 \pm 0.50）分、文书书写评分为（95.00 \pm 1.00）分、技术操作评分为（90.00 \pm 1.00）分；本次 50 例患者，无造影剂泄露、重复扫描风险事件发生，仅出现 1 例扫描后轻微不适感，发生率为 2.00%；本次 50 例患者，在护理服务满意程度方面，满意 40 例、基本满意 8 例、不满意 2 例，总满意度为 96.00%。结论：一体化管理模式可以提高护理质量、降低风险发生率、提高患者满意度，具有一定的应用价值。

PU-0524

“医护精诚、共度险关” --从一例 CT 增强扫描碘对比剂重度不良反应突发急救看医技护配合（案例分享）

吴燕燕

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随着对比剂的广泛使用，其发生不良反应也越来越受到关注。对比剂发生的不良反应以轻中度为主，采取适当措施会及时恢复。对于重度不良反应，掌握必要的抢救措施，启动急救科医生的紧急救治刻不容缓。对比剂的高效、合理、安全、规范化输注，需要影像科医护技人员协同合作、共同维护。本案例从一例有多次行增强 CT 检查史的肿瘤患者突发重度不良反应致心跳呼吸骤停，经影像科、急救科等多学科联合急救，15 天后康复出院为切入点，复盘关于碘对比剂重度不良反应突发急救中医技护的配合措施及经验总结。

PU-0525

基于内控视角改善肿瘤患者增强 CT 检查 PC-AKI 发生的风险

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摘要：目的 降低肿瘤患者 CT 增强检查后急性肾损伤发生的风险。

方法及工作基础 对每一位患者继续采取 CT 增强检查当日，要求携带患者 3 天内肾功能检查结果（急诊及特殊情况患者除外）。嘱患者在检查前后多饮水，充分水化。加强和提升临床医生和放射科医生对碘对比剂的认知，定期培训。熟悉并掌握碘对比剂使用过程中如发生意外，可能会对患者产生的不良后果和处理方法。结果和结论 目前文献报道增强 CT 的肿瘤住院患者 AKI 总体发生率 20%。本次质量改善过程中，我们将加强与临床科室的沟通，采取上述 5 条改善方法，对可能出现肾功能损伤的肿瘤患者，CT 增强检查后 48-72 小时内复测肾功能，收集相关数据进行评价分析，力争在本次质量改善工作结束后将住院患者 AKI 的发生率降低至 10%以内，并将风险降低在临床诊治的可控范围内。

PU-0526

耐高压静脉留置针在增强核磁共振检查中的应用

薛晓会

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摘要:目的 探讨耐高压留置针在增强核磁共振检查中的应用效果。方法 将 80 例增强核磁共振检查患者分为观察组和对照组,各 40 例。对照组采用常规 8 号蝶翼针穿刺贵要静脉和肘正中静脉;观察组采用 24G 耐高压静脉留置针穿刺贵要静脉和肘正中静脉。对两组静脉造影外渗漏率,显影效果,患者满意度进行比较。结果 与对照组比,观察组造影剂渗漏率低,检查显影清晰率高,患者满意度高。结论 增强核磁共振检查应用 24G 耐高压静脉留置针,可减少造影剂渗漏率,血管影像清晰率高,患者满意度高。

PU-0527

CT 增强检查高压注射碘对比剂渗漏原因、预防及护理

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目的 分析 CT 增强检查高压注射碘对比剂渗漏的原因,意在于探讨 CT 增强检查高压注射碘对比剂渗漏进行预防的最佳方法,并进一步总结有效的治疗及护理措施。**方法** 选取 2021 年 3 月至 2023 年 3 月期间在我院进行 CT 增强检查发生碘对比剂渗漏的患者共 60 例作为临床研究的对象,对渗漏原因进行分析,制定和实施相应的预防及护理措施。**结果** 分析导致高压注射碘对比剂渗漏的主要原因。**结论** 明确高压对比剂渗漏的原因,采取系列防范措施对减少渗漏有显著效果。

PU-0528

综合性循证护理在预防 CT 增强扫描对比剂不良反应中的效果观察

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目的 影像科患者在进行 CT 增强扫描期间,为加强护理效果,通常采用一定护理措施来预防对比剂不良反应的发生,本文旨在探讨综合性循证护理在预防 CT 增强扫描对比剂不良反应中的效果观察,为患者以后的治疗与恢复提供良好的条件。**方法** 本次研究对象为我院 2022 年 2 月-2023 年 2 月收治的 200 例进行 CT 增强扫描患者,采用随机分配的方式,分为对照组和观察组,其中对照组采用常规护理,观察组采用综合性循证护理模式,分析比较两组患者的护理满意度评分和不良事件发生情况。**结果** 研究显示,比较两组患者的不良事件发生情况,对照组过敏反应 4 例(4.0%),外渗 4 例(4.0%)不良事件发生率为 8 例(8.0%)。观察组过敏反应 0 例(0.0%),外渗 1 例(1.0%),不良事件发生率为 1 例(1.0%)。对两组患者不良事件比较经检验,观察组不良事件发生率明显低于对照组($P < 0.05$)。观察组患者对护理模式的满意度为 95/100(95.0%),而对对照组的患者对护理模式的满意度为 82/100(82.0%),综合性循证护理模式组的患者对护理模式的满意度高于采用常规化护理模式组,两组之间差异显著,并且具有统计学意义($p < 0.05$)。**结论** 通过试验得出的数据分析得出,在采用综合性循证护理模式后可以使 CT 增强扫描患者的对比剂不良反应发生率减低,为后续研究者对综合性循证护理在预防 CT 增强扫描对比剂不良反应中的效果观察提供了一定的理论依据和试验基础。

PU-0529

CT 增强高压注射碘对比剂外渗造成皮肤严重损伤的护理

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目的: 探究 CT 增强高压注射碘对比剂外渗造成皮肤严重损伤的护理。方法: 选择我院 2017 年 1 月~2022 年 12 月接收 5000 例需进行 CT 增强检查患者为研究对象, 计算机分组研究组(2500 例)与对照组(2500 例)。对照组中男性患者与女性患者数量占比 1200/1300, 年龄 23~75 岁, 均值年龄(46.32±1.98)岁。研究组中男性患者与女性患者数量占比 1250/1250, 年龄 24~77 岁, 均值年龄(45.53±2.11)岁。将两组患者临床资料中独立性数据以及均值数据复制到计算机系统中计算比较, 比较结果显示没有统计学意义($P>0.05$)。研究按照正常的审批流程上报医学伦理委员会审批, 审批结果同意后开展项目研究。结果: 研究组患者 CT 增强高压注射碘检查中对比剂外渗率为 0.08%, 对照组患者外渗率为 0.4%, 研究组数据更加理想($P<0.05$)。结论: 随着临床疾病发生数量逐渐增多, CT 增强高压注射碘检查被广泛使用到临床疾病检查过程中, 并且进一步提升了患者疾病诊断水平, 但是采用 CT 增强高压注射碘检查中需要对患者注射对比剂进行辅助检查, 尽管在 CT 增强高压注射碘检查过程中已采取相应措施, 但是在实际的检查过程中仍然会出现对比剂外渗等不良情况, 导致患者在疾病检查过程中受到不良的影响。但是对比剂注射后患者极易出现外渗情况影响检查情况, 导致对比剂外渗原因有很多, 为进一步保证患者疾病检查安全性, 需要进一步加强对患者进行护理, 综合护理是一种护理内容较为全面护理措施, 对于预防 CT 增强高压注射碘检查中对比剂外渗有积极意义, 让患者可以安全进行疾病检查研究对比研究组患者与对照组患者对比剂外渗发生情况, 结果显示使用综合护理的研究组患者对比剂外渗发生情况低于的使用常规护理的对照组患者。因此, 在患者 CT 增强高压注射碘检查中实施综合护理可以防止患者对比剂外渗情况发生。

PU-0530

耐高压导管在 CT 增强的应用及护理分析

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目的: 旨在通过试验得出的数据来分析耐高压导管在 CT 增强中的应用, 并推测耐高压导管在 CT 增强中的应用对患者预后的相关关系, 以期做 CT 增强的患者在治疗护理过程中提供理论依据, 以及对做 CT 增强的患者的治疗与恢复提供良好的条件。方法: 选取本地医院 2019 年 9 月到 2022 年 9 月份做 CT 增强的患者 100 例, 按照随机的原则分为两组, 其中 50 例为试验组, 患者在做 CT 增强时采用耐高压导管; 另外 50 例为对照组, 患者在做 CT 增强时采用常规性导管。观察两组的成果, 比较两组的结果, 其中包括患者对检查过程的满意度, CT 增强所耗费的时间, CT 增强影片的优良等。结果: 对患者的做完 CT 增强的护理, 其中耐高压导管组中, 患者对检查过程的满意度高于常规性护理组的患者, 前后两组进行比较, 差异显著, 并且具有统计学意义 ($p<0.05$)。耐高压导管组中, CT 增强所耗费的时间短于常规性导管组, 前后两组进行比较, 差异显著, 并且具有统计学意义 ($p<0.05$)。耐高压导管组中, CT 增强影片的结果优于常规性导管组的患者, 差异显著, 并且具有统计学意义 ($p<0.05$)。结论: 在患者进行 CT 增强过程的护理中, 耐高压导管与常规性导管的使用对患者的预后以及影像结果显著相关。通过通过试验得出的数据来分析耐高压导管应用在患者进行 CT 增强中, 提高患者对影像检查的满意度, 减少患者花费的时间, 使得患者的生活水平可以大大提高, 对他们的预后也可以大大改善。评估两组患者在使用耐高压导管以及常规性导管的情况下的预后, 为以后对研究者对精细化护理在耐高压导管在 CT 增强的研究奠定了一定的理论依据和试验基础。

PU-0531

护理干预联合压缩感知技术在老年腹部 MRI 检查中的应用效果评价

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目的：探讨护理干预联合压缩感知技术（Compressed SENSE, CS）在老年患者腹部磁共振（MRI）检查中的应用效果分析。方法：选取 2022 年 1 月到 2022 年 12 月间在我院实施腹部 MRI 检查的 120 例老年患者进行实施研究，按随机数表法将患者分为常规组（n=60）和干预组（n=60），对常规组运用常规护理，对干预组运用护理干预，均行基于 CS 的 MRI 检查，分析总结患者情绪状况、检查舒适度、图像质量、检查安全性及满意度状况。结果：干预组护理后 SAS、SDS 评分、不良反应发生率显著低于常规组，干预组舒适度评分、图像清晰率、满意度显著高于常规组（ $P < 0.05$ ）。结论：老年患者腹部 MRI 检查中实施护理干预可提升检查质量，改善患者检查负面情绪、舒适度、安全性及满意度。

PU-0532

金登多源流干预模式在膝关节损伤 MRI 检查中的应用效果评价

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目的：探讨金登多源流干预模式在膝关节损伤患者大孔径磁共振检查中的应用价值。方法：选取 2021 年 12 月至 2022 年 7 月在我院接受大孔径磁共振检查的膝关节损伤患者 65 例参与研究，其中 2021 年 12 月至 2022 年 5 月患者为对照组（32 例），2022 年 6 月至 2022 年 7 月患者为实验组（33 例）。对照组实施传统检查干预模式，实验组在传统检查干预模式基础上采用金登多源流干预模式。比较两组患者满意度、视觉模拟评分（VAS）、焦虑评分（SAS）、重复扫描率、检查时间、医院安全事件发生风险以及图像质量等。结果：对照组扫描后患者 SAS 及 VAS 略高于扫描前（ $P < 0.05$ ），而实验组扫描后患者 SAS 及 VAS 与扫描前相比未见明显差异（ $P > 0.05$ ）。实验组患者满意度明显高于对照组，差异具有明显统计学意义（ $P = 0.003$ ）。实验组患者风险评估、信息传达、危险防范、危险处置以及安全护理平均分均略高于对照组，差异具有明显统计学意义（ P 均 < 0.05 ）。实验组患者扫描时间和重复扫描率明显低于对照组患者，而图像主观评分略高于对照组患者（ $P < 0.05$ ）。结论：在膝关节损伤患者大孔径磁共振检查中采取金登多源流护理干预模式，可以加强医护患三方的沟通和配合，有效缓解患者负性情绪，降低疼痛程度，提高扫描效率及安全性，增强患者对检查依从性，具有很好的推广价值。

PU-0533

自制匀场辅助装置在基于压缩感知磁共振臂丛神经根成像中的应用

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目的：探讨匀场辅助装置在基于压缩感知磁共振臂丛神经根成像中的应用。方法：根据不同 BMI 指数及肩髁距设计大、中、小三种不同型号集扇型、U 型、长方形成套装置组件。选取 2022 年 2

月至 2022 年 11 月我院 32 名健康志愿者和 33 名臂丛神经损伤患者，分别使用 3.0T MR 进行常规扫描和使用匀场辅助装置结合 3DNerveView 序列加压缩感知技术（Compressed SENSE,CS）扫描两次，在检查前进行护理宣教，使其提前了解检查前的注意事项尽快熟悉环境，对有幽闭恐惧倾向的受检者进行心理疏导，在进入磁体腔之前，指导受检者闭上双眼，告知受检者在检查过程中可通过举手及抬脚等动作减少恐惧感，分散注意力消除负性情绪，结合先进的压缩感知技术高倍数加速因子（Accelerated Factor, AF）对 3D NerveVIEW 臂丛神经磁共振成像图像质量及扫描时间进行优化，并运用 ROI（15~30mm²）测量臂丛神经与斜角肌图像信噪比（signal to noise ratio, SNR）及神经肌肉对比噪声比（contrast to noise ratio, CNR），分别记录使用匀场辅助装置组件前后图像的 SNR 及神经肌肉 CNR，SNR，每层测量 3 次。进行统计学分析。结果：使用常规扫描方法与使用匀场辅助装置结合 3DNerveView 序列加压缩感知技术扫描方法图像的 SNR、CNR 明显两者有显著差异（ $P<0.05$ ），主观评分（ $P<0.05$ ）。结论：利用自制辅助装置和优化序列的先进技术，在缩短扫描时间窗的同时还获得了高质量的图像识别，加速设备利用率，提高检查成功率和 MRI 诊断能力，有较好的临床应用价值。

PU-0534

多院区影像护理管理模式初探

邓虹

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我国医疗卫生体制不断改革和创新，优质医疗资源短缺且配置不均衡的问题依然十分突出，大型公立医疗机构原有的单一院所提供的医疗服务无法满足人民日益增长的医疗服务需求，通过兼并、重组、新建院区、发展医院集团等方式形成“一院多区”的发展模式，一院多院区模式已成为医院可持续发展的一条途径。

PU-0535

PDCA 提高增强 CT 检查成功率

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摘要：目的 探讨 PDCA 活动在提高放射科增强 CT 检查成功率中的应用效果。方法 选取 2022 年 6 至 8 月增强检查 1530 例次患者作为对照组，2023 年 3 至 5 月增强检查 1649 例次患者作为观察组，对照组按常规工作流程实施，观察组则成立 PDCA 团队，将“提高放射科增强 CT 检查成功率”作为活动改善主题，实施 PDCA“4 个阶段十大步骤”比较两组增强检查成功率。结果 PDCA 活动开展后，观察组患者的增强 CT 检查成功率高于对照组，组间比较差异有统计学意义（ $P<0.05$ ）。目标达成率 104%，改善幅度 57%。活动开展后，两组穿刺成功率、图像质量比较都有显著提高，碘对比剂外渗率、增强检查退费率都有所降低。结论 开展 PDCA 活动能有效提高增强 CT 检查成功率，提高医护人员运用质量改进工具提高护理质量的综合能力。

PU-0536

探讨冠状动脉 CTA 检查护理干预的临床应用价值，提高冠脉 CTA 检查的成功率及图像质量。

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目的: 探讨冠状动脉 CTA 检查护理干预的临床应用价值, 提高冠脉 CTA 检查的成功率及图像质量。**方法:** 冠状动脉粥样硬化性心脏病简称冠心病
冠状动脉 CT 血管造影 (冠状动脉 CTA) 已成为临床上排查冠心病重要的无创替代方法之一, 对冠心病诊断的敏感度和特异度可高达 90%。但其图像质量仍然受多种因素的影响, 如: 呼吸运动伪影、心率、心律变化、吞咽、屏气训练、对比剂及流速、扫描参数等。其中, 除扫描参数等技术因素外, 呼吸运动伪影位居第一, 其次是心率与心律的变化, 扫描时心率控制在 65 次/min 以内时所成图像最理想, 心率波动越小, 检查成功率越高。检查前患者存在紧张、恐惧焦虑等心理问题, 容易导致患者产生不同程度的副反应, 严重者可致休克。据文献报道, 冠脉 CTA 检查失败的主要原因是扫描过程中患者紧张, 心率异常、未按要求完成呼吸运动、情绪不稳定。另外, 随着医疗技术的发展和人们保健意识的增强, 冠状动脉 CTA 检查患者日益增多, 现有医疗设备不能满足患者需求, 患者候诊时间长, 对检查认知和依从性差, 具有烦躁焦虑情绪, 如何避免以上干扰因素, 使患者提高认知和依从性, 处于最佳的生理心理状态, 缩短检查和候诊时间, 提高检查成功率和图像采集质量, 是当前护理有待解决的问题。本文就冠心病患者行冠状动脉 CTA 检查中护理干预的价值, 并结合相关文献综述探讨冠状动脉 CTA 检查护理干预的研究进展, 从冠状动脉 CTA 检查的优势, 图像质量的分级测评标准、影响因素分析, 国内护理干预现状及研究进展, 揭示护理干预的应用价值。结果: 通过护理干预, 使患者在整个检查过程中保持最佳的心理状态、平稳的呼吸、最长屏气时间、最佳心率和最小心率波动次数。结论: 护理干预是确保检查成功和获得最佳图像质量的关键因素之一。

PU-0537

IMB 模型在磁共振铁磁性投射事故零伤害愿景中的应用

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目的 探讨基于 IMB 模型的安全教育避免磁共振铁磁性投射事故带来的伤害。**方法** 将 196 例磁共振检查患者非随机分为对照组 90 例和观察组 106 例。对照组行常规安全教育, 观察组在常规基础上实施以 IMB 模型为基础的安全教育。比较干预前、干预后检查患者磁共振铁磁性投射事故知信行评分、对铁磁性投射事故恐惧评分。结果 对照组 90 例、观察组 106 例完成本研究。两组干预后磁共振铁磁性投射事故预防知信行得分, 对铁磁性投射事故恐惧得分的组间效应、时间效应及交互效应差异有统计学意义(均 $P < 0.01$)。结论 以 IMB 模型为基础的防止磁共振铁磁性投射事故伤害的安全教育能提高磁共振检查患者知信行水平, 降低磁共振铁磁性投射事故风险。

PU-0538

品管圈活动在基于超高端 CT 一站式解决方案缩短主动脉夹层 CTA 的影像链时间的应用分析

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目的: 通过开展品管圈活动, 利用 QCC 工具, 通过全员参与的方式解决缩短急诊主动脉夹层患者 CTA 影像链时间; **方法:** 根据品管圈十大步骤, 通过开展圈会根据圈活动拟定甘特图, 整个活动包括 PDCA 四个阶段, 圈活动的所有实施严格遵循计划表进行实施; 在现况把握环节, 通过制定现有的流程图, 确定其中急诊患者绿色通道、预约等待、图像重建、报告书写审核及危机值上报等

为本次改善的重点环节；通过制定查检表，并对 50 例患者进行查检的数据进行汇总，结果显示 50 例患者急诊主动脉 CTA 检查平均时间 102 分钟；通过对各影响因素绘制柏拉图，根据 8020 法则，将报告危机值上报时间、预约等待及检查时间例为本期活动的重点。在目标设定阶段，计算圈能力为 62.7，设定目标值为 51 分钟；通过解析两个改善重点召开圈会议从“人物环法”鱼骨图制定四个方面共找出 8 大要因，根据全体圈员打分选出八大要因制作查检表，绘制真因验证柏拉图，根据柏拉图分布结果显示急诊患者量大，患者病情复杂多变，检查闭环链不完善作为三大真因；针对三大真因，回归临床结合文献分析，依据科室实际情况拟定对策：通过整合，制定三大对策进行实施：1 建立急诊分级制度，2 个性化扫描及重建方案，通过采用胸痛三联扫描完成心脏、肺动脉及主动脉的采集，采用超炫速 flash 扫描方式，在几个心动周期内完成对全程主动脉的图像采集；对策三一站式绿色通道网格化管理，针对登记人员危机病情分级不知晓，登记效率低下，和技师沟通不畅，通过对与临床建立联系，全科人员分批次进行危机病情分级培训，检查前健康宣教及温馨提示来改善；结果：通过三大对策实施，改善后的急性主动脉夹层 CTA 检查时间缩短至 53 分钟；目标达成率 96.08%，进步率 48.04%。结论：通过品管圈的活动，缩短了急性主动脉夹层检查时间，为患者接受最佳治疗方案赢得宝贵时间，圈成员对解决问题能力有了较大提升，同时也提高了团队的凝聚力；提升自我成就感。

PU-0539

品管圈活动对降低非离子碘对比剂外渗率的应用研究

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目的：在 CT 检查过程中，使用对比剂可清晰的显示出病变组织，显著提高了疾病诊断准确率。在临床使用过程多使用高压注射器，将对比剂以团块的形式高压静脉注射，研究发现由于对比剂注射速率快，渗透压高，在 CT 增强扫描中经常出现外渗的现象，轻度外渗反应会导致周围组织红肿、疼痛，中重度外渗反应会导致局部组织肿胀、软组织坏死。不利于诊疗过程顺利进行，因此在 CT 增强扫描过程中予以科学、全面的护理，对于降低对比剂外渗极为重要。方法：纳入研究对象来自本院自 2022 年 6 月至 2022 年 12 月放射科行增强 CT 检查的 4234 例，比较品管圈活动改善前后对比剂外渗的发生率。结果：品管圈活动后，非离子碘对比剂外渗发生率由 0.98%降低到 0.38%（ $P<0.05$ ）。改善后对比剂外渗发生率显著低于活动前，低于目标值 0.51%。结论：品管圈活动可有效降低放射科非离子碘对比剂外渗的发生率，为疾病诊断提供及时有效的检查结果，减轻了患者的痛苦，提高患者满意度，提升了团队凝聚力，值得借鉴。

PU-0540

综合护理干预在 CT 增强扫描患者中的应用效果

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[摘要] 目的：探究在 CT 增强扫描患者护理当中，实施综合护理干预，对患者检查认知及生命体征的影响。方法：本院就诊 60 例 CT 增强扫描患者为样本，在 2021.07~2022.07 研究时间段内，分层随机化分组，对照组纳入 30 例人员，实施常规护理；实验组纳入 30 例人员，实施综合护理干预；统计对比：（1）检查认知评分；（2）临床指标。结果：综合护理干预开展后，实验组相较于对照组，研究指标均有明显优化（ $P<0.05$ ）。结论：在 CT 增强扫描患者护理当中，实施综合护理干预，可及时稳定患者生命体征，全面配合检查活动。同时，改善患者检查认知，护理效果理想，有推广应用积极性。

PU-0541

健康宣教在核磁共振增强检查中的护理探讨

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目的: 探讨首次实施核磁共振增强检查患者的健康宣教要点,提高患者检查的依从性与护理满意度。
方法: 分析我院放射诊断科 2022 年 7 月到 2022 年 12 月期间首次实施核磁共振增强检查的 500 例患者的临床资料,总结核磁增强检查过程中患者出现较多的疑问和问题,探讨核磁共振增强检查患者健康宣教的注意事项。
结果: 首次实施核磁共振检查的患者较易出现恐惧、担忧、紧张情绪,少数患者不能听从检查人员安排,增加照射时间或检查失败;针对上述患者检查过程中存在的问题,探讨相应的护理对策。
结论: 核磁共振检查时间比较长、噪声程度较大,而且仪器内空间相对密闭、暗淡且狭长,视野会受到一定限制,检查前的健康宣教可有效改善其心理状态,缩短检查操作时间,是患者检查的依从性与护理满意度提高,并有助于减少心率、血压异常的发生,值得进一步推广。

PU-0542

伤口一抹得用于钆对比剂外渗临床疗效观察

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目的: 观察伤口一抹得用于钆对比剂外渗的临床疗效。
方法: 选择我院 2022 年 1 月-12 月期间行核磁共振增强检查高压团注过程中,出现钆对比剂外渗的病人 38 例,随机分为观察组和对照组,每组 19 例。对照组给予 50%硫酸镁湿敷肿胀部位,观察组给予伤口一抹得涂擦肿胀部位,对两组病人的干预效果进行比较。
结果: 干预后 24h-72h 观察组外渗部肿胀消退程度、疼痛评分、换药次数与对照组比较,差异有统计学意义($P<0.05$)。
结论: 涂擦伤口一抹得可有效缩短钆对比剂外渗肿胀时间,减轻疼痛,减少换药次数,疗效显著。

PU-0543

虚拟现实联合冥想放松指导语在幽闭恐惧症病人磁共振检查中的应用

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【摘要】目的: 虚拟现实联合冥想放松指导语改善幽闭恐惧症患者在行磁共振检查时改善心理状态,从而顺利完成检查的应用。
方法: 选取 2021.11-2022.06 在重庆西区医院放射科行 MR 扫描的患者 57 例作为对照组,选取 2022.07-2023.07 在重庆西区医院放射科行 MR 扫描的患者 57 例作为干预组。对照组采用传统护理模式,干预组在对照组的基础上采用虚拟现实联合冥想放松指导语的新型护理模式,比较两组患者的 MR 检查完成时间及患者检查依从性、图像质量、情绪状态评分(POMS)和负性情绪评分(HAMA/HAMD)、不良反应发生率以及患者满意度。
结果: 干预组 MR 检查完成时间及患者检查依从性、图像质量明显高于对照组,差异有统计学意义($P<0.05$),护理前,两组 POMS、HAMA/HAMD 评分进行比较,不存在统计学意义;干预组护理后 POMS、HAMA/HAMD 评分显著低于对照组,差异有统计学意义($P<0.05$),干预组护理满意度显著高于对照组,差异有统计学意义($P<0.05$)。
结论: 对磁共振检查中存在幽闭恐惧症的患者实施虚拟现实技

术联合冥想指导语放松帮助患者缓解了恐惧情绪, 缩短检查时间, 减轻了因幽闭恐惧症带来的应激反应, 不仅让患者配合检查, 还获得了优质的图像, 总体效果较好, 值得推广应用。

PU-0544

18 种药物治疗造影剂外渗有效率的网状 meta 分析

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目的 使用网状 meta 分析方法, 对 18 种药物治疗造影剂外渗的有效率进行比较。方法 计算机检索 Cochrane Library、PubMed、Web of Science、Embase、知网、万方、维普、CBM 中关于造影剂外渗治疗的相关文献, 检索期限为建库至 2023 年 1 月 13 日。检索词为“诊断与治疗物质外渗”“造影剂”“对比剂”“碘剂”“治疗”“疗法”“使用”“应用”“随机对照”“随机”“Extravasation of Diagnostic and Therapeutic Materials”“Extravasation of Diagnostic, Therapeutic Materials”“Extravasation of Contrast Media”“Extravasation of Contrast Media”“Therapeutics”“Therapy”“Treatment”“RCT”。使用 Stata 17.0 软件进行数据分析。结果 最终纳入文献 29 篇, 涉及 18 种药物, 样本总量 1923 例, 其中干预组 986 例, 对照组 937 例。共纳入 18 种药物, 一致性模型进行网状 Meta 分析显示, 共形成 153 个两两比较, 其中利多卡因、喜疗妥软膏、马铃薯、金黄散、乙醇、地塞米松、德莫林、青敷膏、蜂蜜、红花酊等药物与硫酸镁比较差异有统计学意义 ($P < 0.05$), 德莫林与利多卡因、喜疗妥软膏、马铃薯、金黄散、地塞米松、复方七叶皂苷凝胶、芦荟、黄连膏、乌敛莓、磺胺嘧啶银、红花酊比较, 差异有统计学差异 ($P < 0.05$), 其余比较差异无统计学意义 ($P > 0.05$)。根据排序累计面积图, 排名前三的药物分别是德莫林、中药青敷膏、天然蜂蜜。结论 推荐使用德莫林、中药青敷膏、天然蜂蜜治疗造影剂外渗。

PU-0545

乳腺磁共振增强检查患者焦虑情绪分析及护理对策

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目的 研究乳腺磁共振增强检查患者焦虑情绪的原因及相应护理对策。方法 选择 2022 年 9 月至 2022 年 11 月在我院接受乳腺磁共振增强检查患者中的 100 例。随机分为对照组和观察组, 每组 50 人。观察组根据焦虑量表中 3 项突出因素给与个性化心理护理, 对照组给与一般护理。结果 观察组总满意度高于对照组 ($P < 0.05$)。结论 个性化心理护理能够显著缓解患者焦虑情绪, 提高乳腺磁共振增强检查患者的耐受性, 提高护理服务质量。

PU-0546

影像科护士采用全面宣教在 CT 增强检查中的应用效果

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目的 探讨影像科护士采用全面宣教在 CT 增强检查中的应用效果。方法 将 150 例行 CT 增强检查的中年男性患者, 年龄 35-40 岁, 随机分为对照组(75 例)和观察组(75 例), 两组患者性别、年龄、检查部位、推注速度、对比剂剂量均无统计学差异, 具有可比性。对照组行常规宣教后行静脉留置

针穿刺、水化,随即进行检查。观察组需护士在患者进行静脉留置针穿刺前、中、后全面宣教,水化后再行检查。比较两组患者的静脉留置针一次性穿刺成功率、一次性 CT 增强扫描成功率、造影剂外渗发生率。结果 观察组患者静脉留置针一次性穿刺成功率、一次性 CT 增强扫描成功率均高于对照组($P<0.05$),造影剂外渗发生率显著低于对照组($P<0.05$)。结论 在 CT 增强检查中,影像科护士采用全面宣教,改善患者对护理服务的满意度和对健康宣教内容的掌握程度,可以显著提高静脉留置针一次性穿刺成功率和一次性 CT 增强扫描成功率,并且降低造影剂外渗发生率,保障了患者安全,减轻了患者痛苦,提高了诊疗质量,值得临床推广。

PU-0547

浅析放疗患者的皮肤护理

李雪

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浅析放疗患者的皮肤护理

【摘

要】肿瘤放射治疗是利用放射线如放射性同位素产生的 α 、 β 、 γ 射线和各类 x 射线治疗机或加速器产生的 x 射线、电子线、质子束及其它粒子束等治疗恶性肿瘤的一种方法。由于放疗辅助工具的改进和经验的积累,治疗效果得到显著提高,目前已成为癌症治疗中的最重要手段之一。中国约有 70% 以上的癌症需用放射治疗◇美国统计也有 50% 以上的癌症需用放射治疗。放射治疗在肿瘤治疗中的作用和地位日益突出。放射治疗已成为治疗恶性肿瘤的主要手段之一。因其而引起的各种放射反应也日益受到医护人员的。

PU-0548

生理盐水联合碘造影剂预热在增强 CT 检查中的护理应用

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目的: 2018 年随着增强 CT 检查人数的不断增加,发生碘造影剂的不良反应逐渐增多,为降低碘造影剂的不良反应,分别在 2019 年对碘造影剂全部进行恒温箱预热,大幅度降低了增强 CT 病人检查的各种不良反应,为进一步降低碘造影剂的不良反应,在 2022 年碘造影剂恒温箱预热的基础上对增强 CT 检查的生理盐水全部进行预热,又进一步降低了碘造影剂的不良反应。方法: 2018 年之前,增强 CT 检查病人的碘造影剂加热,是由高压注射器的加热系统在给药的过程中直接加热,但 2018 年之后,随着肿瘤病人的不断增多和住院床位的增加,增强 CT 检查的病人迅速增多,不良反应病人也不断增加。不断查找原因,改变造影剂依靠高压注射器系统的预热方式,2019 年开始对碘造影剂全部由恒温箱预热 37 度,碘造影剂不良反应迅速下降,在此工作的基础上,2022 年将增强 CT 检查的生理盐水全部预热,碘造影剂全部预热,又进一步降低了碘造影剂的不良反应。结果: 2018 年 12 月 1 日-2018 年 12 月 31 日碘造影剂和生理盐水未进行恒温箱加热,增强 CT 检查总人数 2300 人,碘造影剂不良反应发生 46 人(2%),其中死亡 3 人。2019 年 12 月 1 日-2019 年 12 月 31 日对碘造影剂全部进行恒温箱加热到 37 度,增强 CT 检查总数 2300 人,碘造影剂不良反应发生 11 人(0.48%),无死亡。2022 年 12 月 1 日-2022 年 12 月 31 日对生理盐水全部进行恒温箱加热到 37 度,对碘造影剂全部进行恒温箱加热到 37 度,增强 CT 检查总数 2300 人,碘造影剂不良反应发生 2 人(0.087%),无死亡。结论: 在碘造影剂加温的基础上,对生理盐水也进行恒温箱预热,大幅度降低了增强 T 病人检查的各种不良反应。

PU-0549

钆喷酸葡胺注射液致迟发性过敏反应一例

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我科自开展磁共振增强检查以来,均使用钆喷酸葡胺注射液,偶尔会发生轻中度过敏反应。2023 年 7 月,遇见 1 例注射钆喷酸葡胺注射液一小时后出现头晕头痛,恶心呕吐伴注射部位手臂麻木症状。考虑诊断为:钆剂迟发性过敏反应。应对处理措施报道如下。

PU-0550

基于根因分析法的持续质量改善在提高胸部 CT 检查一次成功率中的应用

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目的:探讨基于根因分析法的持续质量改善在提高胸部 CT 检查一次成功率中的应用效果。方法:通过根因分析法,分析导致胸部 CT 扫描不能一次成功的原因,制定持续质量改善方案,并于 2022 年 6 月开始实施。选取 2021 年 12 月至 2022 年 5 月某三甲医院的 43658 例行胸部 CT 平扫检查患者为对照组,选取 2022 年 6 月至 2022 年 12 月某三甲医院的 47533 例行胸部 CT 平扫检查患者为观察组。比较两组患者的重复扫描次数与候检时间。结果:观察组患者胸部 CT 检查的一次成功率为 97.05%,明显高于对照组的 91.79%,差异均有统计学意义($P<0.05$);观察组患者的候检时间为 $21.11\pm 6.09\text{min}$,明显低于对照组的 $38.15\pm 8.52\text{min}$,差异有统计学意义($P<0.05$)。结论:基于根因分析法制定持续质量改善方案,并应用于胸部 CT 检查中,不仅提高了胸部 CT 检查的一次成功率,优化了检查秩序,同时缩短了患者的候检时间,就医体验得到明显改善。

PU-0551

放射科发生护患纠纷的成因分析

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1 护士和患者、家属的接触机会是最多的。伴随着患者、家属法制观念与自我保护意识观念的增强,只要在检查或治疗的过程中有不顺意的地方,或护士的言语、行为稍不慎重,就非常有可能发生纠纷。此时,患者和家属会把对社会的不满情绪;对医生的整体诊断、治疗方面的期望值与现实间存在的差距;治疗费用昂贵等诸多的怨气表现出来,也就完全体现在与放射科护士发生纠纷的身上了。

2 工作环境因素由于放射科所在的工作环境相对于病房较差,比普通病房具有更多的嘈杂声,如患者的声、等候患者的交谈声、手机铃声、询问事宜声、机器的运转声、频繁的流动人员等。本来患者因病情就心情急躁,在这些噪声中,更容易引起患者的心情烦躁、护患之间的矛盾和冲突增多。

3 候诊排队时间长由于放射科的病人来自不同的科室,人员较多,候诊排队的时间较长,这也是引发护患纠纷的重要因素之一。患者因候诊排队时而心理烦躁。另外,出于患者因受长期的病痛折磨,他们实际心理的候诊时间延长,这种因素也非常可能导致患者加重不满的情绪,从而引起护患的纠纷

4 放射科 CT 检查中的患者其中以老年人和重症患者居多,这类患者因反复住院、出院,性格上比较急躁:尤其是增强 CT 要求被禁食,所以患者及其家属都希望能够得到最快的服务,而由于放射科的护士需要常常顾全诸多的患者,使患者和家属产生不满的情绪而导致误会的发生

5 护士综合素质,当代的护士呈年轻化趋势,心理素质和处理应急事件上不成熟,且与患者和家属的沟通在技巧较差,尤其是对于不同患病者,更是缺乏超强的协调能力,处理事情时简单化,从而引起了患者和家属的不满情绪。护理的工作量加大,而护士人员的不足和高负荷的工作量使护士对患者提出的不同问题得不到及时的解答。

6 媒体舆论导向,它的宣传舆论直接引导百姓的情绪。但由于媒体对医疗工作的特殊性了解不深,如果在没有深入调查的基础上只听患者的一面之词而妄加报道,会使医院的形象受到严重的损害,在形成负面的影响。

PU-0552

急性造影剂过敏护理

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摘要: 急性碘造影剂过敏是一种常见的过敏反应,可能导致严重的不良反应和并发症。

本文旨在探讨急性碘造影剂过敏的护理措施,以便提供给医护人员参考和指导。通过了解患者的过敏史、预防性药物治疗和监测患者症状,可以有效减少过敏反应的发生。对于发生严重过敏反应的患者,应立即停止注射碘造影剂,并进行紧急抢救。

实验过程: 急性碘造影剂过敏的护理过程可以分为以下几个步骤:

了解患者的过敏史: 在使用碘造影剂前,医护人员应仔细询问患者是否有过敏史,特别是对碘过敏的情况。如果患者有过敏史,应采取相应的预防措施。医护人员应记录患者的过敏史,并与团队成员共享这些信息。

预防性药物治疗: 对于有碘过敏史的患者,可以在使用碘造影剂前给予抗过敏药物,如抗组胺药物或皮质类固醇,以减轻过敏反应的发生。具体的药物选择和剂量应根据患者的具体情况和医生的建议来确定。

监测患者症状: 在注射碘造影剂后,医护人员应密切观察患者的症状,包括呼吸困难、皮肤发红、恶心、呕吐等。如出现异常症状,应立即采取相应的护理措施。护理人员应随时与患者沟通,询问他们的感觉和不适症状,并记录这些信息。

及时处理过敏反应: 如果患者发生严重过敏反应,如过敏性休克,应立即停止注射碘造影剂,并立即开始抢救措施,如气管插管、给予肾上腺素等。医护人员应熟悉急救流程,并与团队成员密切合作,以确保患者得到及时的救治。

结论: 急性碘造影剂过敏是一种严重的医疗事件,需要医护人员密切关注和及时处理。通过了解患者的过敏史、预防性药物治疗和监测患者症状,可以有效减少过敏反应的发生。对于发生严重过敏反应的患者,应立即停止注射碘造影剂,并进行紧急抢救。在护理过程中,医护人员应保持冷静、果断,并与团队成员密切合作,以确保患者的安全。护理人员应定期接受相关培训,并不断更新自己的知识和技能,以提高对急性碘造影剂过敏的护理水平。

PU-0553

“新”型流程护理技术在介入护理工作中的应用

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近几年我院介入手术治疗方面取得了不错的治疗效果,目前我院已开展心血管内科、神经内科、神经外科、消化内科、肝胆胰外科、肿瘤科等学科的介入治疗。介入手术室护士也从当初由放射科护士、病房专科护士兼任,到现在独立的专科护士。目的是能够具有与之匹配的护理能力,为患者提供安全、完善的医护照顾。因此对介入手术室护士发出了挑战。

“新”型流程护理是以患者为中心的精细、精诚、人文关怀护理技术工作。“新”的护理技术模式必须要依托相应护理管理,传统的以任务或制度为中心的刚性护理管理模式已经不适应患者病情发展变化的特点和护士心理行为规律,取而代之的以人为本柔性护理、弹性护理、人文关怀护理、贴心护理的“新”型护理技术模式,而不是一个护士多元化的护理模式,以介入治疗患者为整体的护理发展趋势实行环环相扣、节节相连,使患者切实感受到“新”型护理技术带来的益处。重点突出体现亲情、友情、温情、同情、深情,五情护理模式在介入治疗患者中的运用。

1、让介入治疗患者感受此护理技术工作设计的合理化、人性化、内部设施和环境设计简单化。

2、高效的治疗方法离不开有效的护理技术,“新”型流程护理通过手术前、手术中、手术后护理技术的提高,秉承以患者为中心的原则,一切为了患者,以患者为中心,竭尽所能满足患者合理需求。主动与患者交流使其改善消极、焦虑情绪,保持乐观情绪有助于提高治疗效果。

3、护士实施护理技术中重点把握几个要点:

①术前物品准备充分,物品摆放到位,按照顺序进行排列,使用起来得心应手;

②在为患者介入治疗过程中护士需多询问患者感受,主动为病人提供心理支持;

③多用言语沟通和交流,让患者感到关心、体贴,达到患者满意的护理;

④介入手术结束后患者离开机床时,达到慢、轻、稳、柔韧、呵护,让患者感觉到人文护理;

⑤观察患者生命体征及是否有对比剂迟发过敏反应。

PU-0554

1 例罕见 CT 引导下经皮肺穿刺活检并发空气栓塞护理报告: 护理干预将如何降低并发症发生率

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目的: CT 引导下经皮肺穿刺活检术是临床重要的诊断方法之一,本文针对 1 例罕见 CT 引导下经皮肺穿刺活检并发空气栓塞患者为切入点,探究通过制定有效的护理干预减少术后并发症为患者带来的不良影响。方法: 查阅国内外文献、综述、病例报告近年来有关肺穿刺活检术并发症的研究,分析造成并发症的原因及应对措施。分别以“肺穿刺活检”及“Percutaneous Puncture Biopsy”为检索词检索 PubMed、Web of Science 及 CNKI、万方等数据库中的相关文献,中文检索 2016 年 1 月至 2022 年 5 月发表的相关文献,英文检索近 5 年发表的相关文献。最终纳入文献 42 篇,其中中文文献 18 篇,英文文献 24 篇。结果: 肺穿刺活检术并发症的危险因素有患者因素(年龄、性别、是否咳嗽、是否有其他肺部疾病);病灶因素(病灶的位置、大小、深度、性质);穿刺术中的护理配合(穿刺体位、选择穿刺材料、取样次数、手术时间);及穿刺材料的选择都至关重要。结论: 根据并发症的高危因素做好风险评估及围手术期的护理,对患者实施个性化的护理措施对降低并发症发生率具有正面作用,值得推广。

PU-0555

结构化信息护理在降低幽闭恐惧症患者磁共振检查中焦虑情绪的 临床研究

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目的: 评估磁共振成像中幽闭恐惧症受检者的焦虑情绪, 并观察与传统方法相比, 结构化信息护理干预是否能减少焦虑。方法: 收集 2021 年 12 月至 2022 年 12 月, 首次在大连医科大学附属第一医院放射科接受脑部磁共振成像的幽闭恐惧症受检者 280 名为研究对象, 分为两组, 对照组按照常规检查流程进行 MRI 检查, 干预组在检查前进行结构化访谈, 采用 Colaizzi 7 步分析法进行资料分析、归纳及主题提取, 采用带有图片、录音和视频的结构化信息干预。测量两组受检者检查前后的 SAS 焦虑量表测量。使用 SPSS 24 分析数据。结果: 在 280 名受试者中, 对照组 140 人 (50%) 男性 65 人 (46.4%), 女性 75 人 (53.6%), 平均年龄 41.1 ± 15.2 岁。干预组 140 人 (50%) 男性 78 名 (55.7%), 女性 62 名 (44.3%), 平均年龄 44.2 ± 13.9 岁, 检查前对照组焦虑评分为 11.3 ± 7.7 , 而干预组为 9.6 ± 7.7 。检查后对照组焦虑评分为 9.8 ± 9.0 , 干预组焦虑评分为 1.49 ± 4.5 ($p < 0.001$)。结论: 结构化信息护理干预旨在使患者熟悉磁共振抑制机制并缓解患者的焦虑, 是一种经济有效且简单的方法, 随着磁共振检查需求的增强, 放射护士要重视其心理体验及需求, 并实施个体化护理, 降低幽闭恐惧症风险。

PU-0556

增强 CT 检查患者碘对比剂外渗原因分析及护理措施

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目的 对 CT 增强患者高压注射碘对比剂渗漏的原因进行分析, 探讨预防和减少碘对比剂外渗的护理对策。方法 选择 2023 年 1 月-2023 年 8 月在我院进行 CT 增强检查发生对比剂外渗的 10 例患者作为观察对象, 对外渗原因进行分析, 实施相应的预防及护理措施。结果 注射静脉条件、高压注射器速率、患者身体状况、护理人员注射技术等是导致高压注射碘对比剂外渗的主要原因。结论 针对原因进行分析, 实施相应护理措施以降低碘对比剂外渗发生率, 减轻患者痛苦, 确保增强 CT 检查顺利进行。

PU-0557

造影那“碘”事 一例重度碘对比剂及血管外渗案例分析

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探讨降低 CT 增强碘对比剂血管外渗的发生, 通过我院一例重度碘对比剂血管外渗的案例学习, 运用最新指南指导实施有效护理干预降低 CT 增强碘对比剂发生率和外渗程度, 保障患者安全, 提高护理服务质量, 值得临床推广应用。

PU-0558

1 例 TIPS 双静脉癌栓开通手术的护理

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总结 1 例 TIPS 双静脉癌栓开通手术的护理经验，现将案例及护理方案分享如下：案例呈现：患者男性，63 岁，因胰腺肿瘤癌细胞侵犯造成两条静脉堵塞，引发大量呕血，入院后病情危重，入住监护室，因外院长达半年反复治疗效果不佳，患者及其家属对目前的病情处于濒临绝望的状态，经过专家反复讨论，决定采用双静脉通路的手术方式，一次性进行 TIPS 成形术、胃冠状静脉断流术，脾静脉开通术，才能彻底解决患者反复出血的情况。

原因分析：（1）手术难度较大，风险较高。（2）该手术为本市首例，欠缺一定的经验指导，对医护配合能力和应急处置能力提出了更高的要求。（3）患者生命垂危，生命体征不稳定，术中随时可能发生病情变化。（4）三项治疗一次性进行，手术耗时较长，患者身体状态、耐受力较差，配合能力欠佳。（5）患者对本次手术技术和方法认识不够，担心手术失败，患者出现焦虑、恐惧心理，导致手术风险加大。

做法分享：（1）术前准备：由于术中有随时再发出血风险和出血并发症，随时做好输血准备，术前需提前了解患者的凝血机制，查看有无交叉配血结果，与输血科电话沟通备血情况，确保紧急输血时能够开通输血绿色通道，加快输血速度，并提前准备好各类急救药品和物品。（2）提高体位舒适性：因患者很瘦，在患者易受压的部位或骨隆突处安置软垫预防压力性损伤的发生。（3）加强心理护理：为了缓解和消除患者的紧张心理，提高手术配合能力，制定了适合该患者文化程度的个体化的心理干预，促使患者正确理解手术的原理，建立手术信心。（4）疼痛护理：为了分散患者疼痛专注力，降低疼痛阈值，采取适当肢体抚触支持，加强沟通交流，引导其想象美好的生活景象，减轻了其痛苦体验。（5）动态观察：密切关注患者一般情况、周围循环及出血情况，认真听取患者主诉。（6）做好交接：密切监控生命体征及有无活动性出血情况。

PU-0559

细节管理融入介入手术室护理管理中的效果

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[摘要] 目的 分析讨论细节管理融入介入手术室护理管理中的效果。方法 随机将 2022 年 9 月—2023 年 2 月期间 350 例在介入手术室进行手术的患者纳入到讨论中，此期间将细节管理融入到介入手术室中，实施前后调查手术收费准确率、耗材缺失等。结果实施前风险事件发生率 28.57%高于实施后 2.86%，实施前合格率 76.00%低于实施后 98.00%（ $P<0.05$ ）。实施后医务人员安全意识、错误防范意识、服务意识评分均高于对照组（ $P<0.05$ ）。实施前护理满意度 54.55%低于实施后 86.36%（ $P<0.05$ ）。结论将细节管理融入到医院消毒供应室护理管理中，可提升满意度、护理质量。

PU-0560

一种优化护理干预在幽闭恐惧症患者行磁共振检查的应用

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目的 探讨以动画健康宣教、适应性训练、心理支持为主要特点的护理干预方式在幽闭恐惧症患者行磁共振检查的价值。

方法 回顾性分析 2021 年 2 月至 2023 年 1 月 MRI 检查时出现幽闭恐惧症的患者 46 例。其中 22 例采用常规护理干预（对照组），24 例采用优化护理干预（观察组），高年资诊断医师对所有图像进行质量主观评价，并对患者满意度进行调查。常规护理：检查前人工健康宣教，检查基本流程告知等。优化护理：①扫描二维码获取检查注意事项、流程及动画过程的健康宣教方式，并可反复观看、训练；②患者平躺在模拟检查床，播放提前录制的检查时磁体间声音，给与患者适应性训练，并以深呼吸/正常呼气为训练要点，帮助其建立良好的呼吸循环，监测患者心率，必要时给予吸氧。③心理支持：采用社会支持系统（家属、护士及医生等），告知其可以安排家属陪同（触摸肢体、言语交流等方式）、播放音乐等，以期转移患者注意力，增强安全感。采用卡方检验比较两组患者的检查成功率、图像伪影发生率、图像质量评分及满意度评分差异。

结果 观察组检查成功率、满意度评分、图像质量评分均高于对照组（ $p<0.05$ ），而图像伪影发生率更低（ $p<0.05$ ）。

结论 以动画健康宣教、适应性训练、心理支持为主要特点的优化护理干预方式能够提高幽闭恐惧症患者磁共振检查的成功率和图像质量，并得到相应群体的认可，值得推广应用。

PU-0561

浅谈核医学科护士的职业性有害因素及防护措施

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目的：探讨核医学科护士的职业性有害因素以及防护措施。**方法**：通过在核医学科从事护理工作，以及亲身体验，找出危害护士健康的因素，并得出有效的防护措施，从而为护士的健康保驾护航。

结果：通过全面分析影响护士健康的职业性有害因素，从而找到有效防护措施，使护士拥有健康的体魄以投入到患者的护理工作中。**结论**：职业性有害因素对护士的健康有潜在的危险，会对护士的健康和工作产生不利影响。因此，护士应当对此引起高度重视。

PU-0562

**1 例肾衰竭+重型新型冠状病毒感染伴自发性腹壁动脉破裂出血
患者介入栓塞经验分享**

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基本信息：患者李 X，男性、57 岁；主诉：发热、咳嗽、踹累 5 天。

既往史：高血压 15 年；慢性肾功能不全、肾衰竭 6 年、长期血液透析治疗；甲状腺癌。

入院评估：患者 2023-5-8 入院，精神较差，体力较差，活动后喘累，咳嗽痰中带血，尿少，胸部 CT：双肺多发斑片影及磨玻璃影，考虑感染性病变。

病情发展：2023-5-12 患者喘累加重，肺部病灶进一步进展，反复咯血，病情危重入 ICU 监护治疗，间断俯卧位改善通气及对症支持治疗。2023-5-14 诉腹部不适，腹部扪及一质软包块，行床旁超声检查，考虑患者长期慢性肾衰，高血压微血管硬化导致腹壁小动脉破裂出血，患者基础疾病多病情复杂肺功能极差，不考虑外科手术，急诊行介入栓塞止血。

治疗过程：急诊在 DSA 下行左右侧胸廓内动脉造影，见左侧胸廓内动脉下行支—上腹壁动脉支少许造影剂外溢，考虑出血动脉。明确供血后以 PVA 栓塞颗粒+明胶海绵颗粒进行栓塞，DSA 显示出血动脉栓塞良好。手术顺利，安全返回 ICU。

病例分享：（1）肾衰竭患者介入对比剂管理（继续以 CRRT 治疗；控制对比剂用量等）。（2）重型新型冠状病毒感染伴咯血呼吸道管理？（呼吸道管理防止误吸；备好急救器材）。（3）出血的风险？（患者基础疾病复杂；血管条件差；感染新型冠状病毒后血管内皮损伤较重）。（4）特殊介入急危重症患者护理问题？（恐惧：与生命健康受到威胁有关；知识的缺乏：缺乏手术及愈后相关知识；活动无耐力：与疾病有关；潜在并发症：肾功能损伤，其他部位出血等）。

结果：针对基础疾病多、病情危重的介入手术患者，充分评估患者的病情、做好急诊急救流程，形成相应的护理措施及临床护理路径与规范；是保证急危重症患者手术的安全的重要措施。

PU-0563

电热恒温培养箱对造影剂过敏发生率的影响

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目的：探讨电热恒温箱在增强 CT 检查过程中对造影剂过敏发生率的影响。方法：我科 2000 例增强 CT 患者分为两组，实验组患者使用的造影剂为电热恒温箱加热后 37℃ 恒温的造影剂，对照组为常温注射（18℃ 到 28℃），比较两组过敏反应发生率。结果：实验组 1000 例中发生过敏反应 3 例，占 0.3%；对照组 1000 例中发生过敏反应 9 例，占 0.9%，实验组过敏发生率显著低于对照组（ $P < 0.01$ ）。结论：使用电热恒温培养箱可降低过敏反应发生率。

PU-0564

1 例主动脉瓣重度狭窄患者行 ECMO 支持下的 TAVR 术中护理

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基本信息，62 岁，因“胸闷、气促 1+月，加重伴喘累 2+天”入院。

既往史：1、高血压 2、高尿酸血症 3、慢性肾功能不全。

现病史：1、左心衰 2、二尖瓣、三尖瓣重度返流，肺动脉高压 3、主动脉瓣狭窄（重度）4、心包积液 5、肝肾功能异常。

入院评估：CT 检查：胸腔积液；腹腔积液；心包积液。

心脏彩超：射血分数 EF34%；二尖瓣、三尖瓣重度返流；主动脉瓣狭窄重度。

肝功能：总胆红素 45.2umol/L、L-r-谷氨酰基转移酶 157.4U/L、乳酸脱氢酶 420.5U/L、白蛋白 38.2g/L

肾功能: 尿素 13.07mmol/L、肌酐 132.1umol/L、尿酸 541.6umol/L、肾小球滤过率 62.43ml/min。患者及家属有行主动脉瓣置换术意愿, 但该患者合并多心脏瓣膜疾病、心功能极差+肝肾功能不全+多浆膜腔积液 (TAVR 手术仍有风险), 经多学科专家团队讨论决定在 ECMO 支持下行 TAVR。

治疗过程:在多学科密切合作、医护 20 余人的齐心协第五天能正常行走力、手术时长历时 8 小时顺利完成, 术后患者转入 ICU, 第二天床旁撤除 ECMO, 三天后转入普通病房, 出院时肝肾功能恢复正常。

护理策略: (1) 安全管理 (设备定位; 人员定位; 设定安全范围; 患者安全; 防护安全; 用药安全等)。 (2) 介入术中 EMCO 的护理重点 (容量控制; 温度控制; 抗凝监测; 掌握 EMCO 特点及护理要点; 术中动态观察肢体循环; 心衰的护理; 防止急性肾损伤)。 (3) TAVR 术中护理 (耗材准备; 临时起搏器运用; 通道建立; 急救物品) (4) 转运配合 (合理分工: 专人负责氧源; 专人负责电源; 专人负责管路; 专人负责监护)。

结果: 通过手术配合制定介入护士在手术配合中的流程、临床路径, 学习 ECMO 的专项护理干预措施; 规范介入复合手术团队的建设、环境物品布置; 规范手术流程、分工、及重点工作。

PU-0565

检查环境准备及护理干预在幽闭恐惧症患者磁共振检查中的影响分析

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【摘要】目的 探讨护理干预及环境准备对幽闭恐惧症患者在磁共振检查中的影响, 主旨在于能使患者消除心理障碍, 使检查顺利进行。方法 选取 2019 年 10 月~2022 年 10 月期间在我科进行磁共振检查的幽闭恐惧症患者。将 60 例幽闭恐惧症患者随机分为对照组和实验组, 每组 30 人。对照组进行常规准备及护理, 实验组中在常规护理的基础上加强检查环境准备及护理干预。比较两组患者的心理状态和磁共振检查成功率。结果 实验组患者心理承受能力明显高于对照组, 全部顺利完成检查。结论 为幽闭恐惧症患者提供环境准备及护理干预, 能够显著改善患者检查期间的焦虑恐惧程度, 值得推广应用。

PU-0566

躺抱式母爱抚触行为对患儿磁共振检查的影响分析

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目的: 对比分析结合不同镇定安抚方法, 对患儿行磁共振检查效果的影响。方法 选取我院住院部儿科需行磁共振颅脑或垂体检查患儿 81 例作为观察对象, 随机分 A 组、B 组、C 组, 每组 27 例。

A 组采用母亲趟抱式母爱安抚行为使患儿安静配合进行 MRI 检查; B 组采用临床药物镇定后家属机房陪同护理进行 MRI 检查; C 组采用常规家属机房陪同护理进行 MRI 检查。统计并比较三组患儿检查配合率、患儿及家属的满意度、磁共振图像质量、焦虑自评量表 (SAS)。

结果 A 组患儿及家属的满意度、检查的配合率均大于 B 组、C 组, 差异有统计学意义 ($p < 0.05$); A 组图像质量优于 B 组、C 组, 差异有统计学意义 ($p < 0.05$); 三组患儿检查后 SAS 量表评分中, A 组评分显著高于 B、C 两组 ($p < 0.05$)。

结论: 患儿行磁共振检查实施母亲躺抱式母爱行为可提高患儿的信任度、安全感, 减少患儿的恐惧、焦虑情绪降低, 保证患儿磁共振检查的成功率, 且能提高患儿及家属的满意度, 值得临床推广应用。

PU-0567

基于线性回归和 python 法讨论核医学科 131I 治疗病房被服衰变间的面积

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【摘要】目的 分析行 131I 治疗患者使用过的被服的辐射剂量率和表面污染水平随时间的变化规律,并编写 python 代码讨论不同床位数规模下核医学科 131I 治疗病房所需的被服衰变间的最小面积以及储物架摆放方式。方法 选取山西省太原市某三级甲等医院 2023 年 2-4 月核医学科收治的分化型甲状腺癌术后行 131I 治疗患者使用过的被服 50 例,在每天同一时间由专人分别测量被服辐射剂量率和表面污染水平,采用线性回归模型分析衰变规律。归纳总结问题并编写 python,根据需求自定义储物架数目、储物架长、宽、被服衰变间的过道宽等参数,得出该参数下所需最小空间面积和最优排列组合方式。结果 被服辐射剂量率衰变指数和表面污染水平衰变指数分别为 0.1576 ± 0.04935 和 0.1265 ± 0.0465 (均符合正态分布),131I 治疗患者使用过的被服的辐射剂量率与表面污染水平较时间呈递减趋势,131I 治疗患者使用过的被服衰变存放至清洁解控水平(辐射剂量率 $< 2.5 \mu\text{Sv/hr}$ 且 β 表面污染水平 $< 0.8 \text{Bq/cm}^2$)所需的时间为 9.3774 ± 3.8711 和 9.4279 ± 3.8764 天,以该研究所在核医学科 131I 治疗病房的床位数 10 为例,代入相关参数至 python 得到至少需要面积为 3m^2 的被服衰变间来满足科室需求。结论 131I 治疗患者使用过的被服辐射剂量率与表面污染水平与时间成负相关趋势,在临床实际工作中,通过运行 python 并自定义相关参数可以给予被服衰变间面积规划的参考,为临床工作中被服衰变不充分、衰变间空间不足等问题提供一定指导。

【关键词】核医学病房;清洁解控;衰变间;被服;python 法

PU-0568

1 例前列腺癌患者行放射性 Lu177 治疗的护理

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核医学分子靶向诊断与治疗及一体化是当今研究的热点,也是今后核医学发展的重要方向。靶分子与相应分子探针,放射性药物高度特异性结合的优势,可为实现诊疗一体化创造条件。[1]前列腺癌的标志性生物标志物仍然是前列腺特异性膜抗原(PSMA),因为它在几乎所有的前列腺肿瘤上都有表达。此外,PSMA 表达增加与去势抵抗和进展到疾病的转移阶段有关。[2]因此前列腺肿瘤靶向治疗选择性良好,可抑制肿瘤细胞的生长,减少组织损伤,这也是常规化疗难以实现的目标。[3]总结我院 1 例前列腺癌患者行放射性 Lu177 治疗的护理。根据患者 Lu177 治疗前心理状态及 Lu177 治疗后可能出现的不良反应我们采取了心理健康教育、放射防护、不良反应应急措施。患者经过精心护理,病情好转,康复出院。

PU-0569

CTE 五彩定量水杯的设计与应用

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目的 设计一种 CT 肠道造影 (Computed Tomography Enterography) (以下简称 CTE) 五彩定量水杯, 并探讨其临床应用效果。**方法** CTE 五彩定量水杯由透明饮水杯体、健康宣教视频二维码、文字版注意事项、软质吸管、五彩渐变区、清晰刻度线及提手等组成。便利抽取 2022 年 5 月-7 月江西省某三级甲等医院医学影像科行 CTE 检查的 83 例患者作为实验组, 选取 2021 年 5 月-7 月检查的 83 例患者作为对照组。实验组采用自行设计的五彩定量水杯进行饮水, 对照组采用传统普通水杯进行饮水。比较两组患者配合完成率、肠道充盈率、患者满意率。收集护士使用该五彩定量水杯的满意率。结果 两组比较, 试验组患者配合完成率、肠道充盈率及患者满意率均高于对照组, 差异具有统计学意义 ($P<0.05$)。护士满意率为 98.2%。**结论** 本研究中设计的 CTE 五彩定量水杯便携易用, 外型美观, 刻度精准, 患者配合完成率高, 可提高肠道充盈率, 优化 CTE 图像质量, 提高患者满意度。

PU-0570

静脉输液安全管理现状的探讨

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院静脉输液是临床治疗中最常见的给药方式, 但也是最容易给患者带来伤害, 发生纠纷的治疗方法。随着静脉输液技术的不断发展, 如何安全有效地进行静脉输液被越来越广泛的关注。本文就静脉输液中不安全因素产生的原因和管理方法进行综述, 旨在提高静脉输液的安全性和护理人员的护理质量, 提升患者满意度, 减少护患纠纷。

关键词 院静脉输液; 安全管理; 护患纠纷

静脉输液以其起效迅速、生物利用率高等优势在临床治疗中被广泛应用。据统计, 90%以上的住院患者在医院接受过输液治疗, 门诊患者接受静脉输液的量也较大。但它也最容易给患者带来伤害, 发生纠纷的一种治疗方法。Harris 等人指出 7%的住院患者每年因用药疏忽而受到不同程度的伤害; 姚明莺等人也指出静脉输液问题在患者的投诉中占 28.28%。静脉输液安全管理问题被越来越多的关注, 成为一个亟待解决的问题。

PU-0571

探究标准预防措施在放射科非隔离区新型冠状病毒肺炎疫情防控中的应用

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目的: 总结标准预防措施在我院放射科新型冠状病毒肺炎疫情防控中的应用方法及经验, 为国内医院放射科在新型冠状病毒肺炎疫情防控中提供参考。

方法: 通过分析我院放射科于 2020 年 1 月起在抗击新型冠状病毒肺炎疫情中采用标准预防措施, 观察其对防控新型冠状病毒肺炎医务人员发生感染的效果。

结果: 手卫生、防护用品的正确使用、环境物体表面及医疗设备的清洁与消毒可有效降低新型冠状病毒肺炎在医务人员、患者之间的传播。

结论: 实施标准预防措施后, 可有效降低新型冠状病毒肺炎在医务人员、患者之间的感染率。

PU-0572

探讨在冠状动脉造影时护士为避免穿刺、注射中产生微量气泡的措施及其效果

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目的 探讨在冠状动脉造影时护士为避免穿刺、注射中产生微量气泡的措施及其效果。

方法 针对在进行增强 CT 的冠状动脉造影检查的过程当中, 放射科护士在给受检者的进行碘对比剂注射后, 血管腔内会产生微小气泡的原因进行分析, 设计相应的解决措施, 如穿刺前排尽注射器内气体、穿刺成功后直型鲁尔接头浸入液体再旋紧肝素帽、接高压注射泵时挤压延长管确保前端接口无空气、让血回到留置针软管尾端, 再接上排好气的延长管、操作时动作轻柔迟缓。选取 2022 年 4 月到 2023 年 7 月在我院进行冠脉造影检查的患者 160 例, 并将其随机分为对照组和观察组, 每组 80 例。对照组选择常规的造影剂注射操作, 进行操作, 将两组冠脉造影后所显现的气泡数量以及气泡产生率进行对比。

结果 对照组气泡的产生数量和气泡产生率要高于观察组, 且两组数据统计分析差异明显。
($P<0.05$)

结论 在冠脉造影注射造影剂时应用穿刺前排尽注射器内气体、直型鲁尔接头浸入液体再旋紧肝素帽、接高压注射泵时挤压延长管确保前端接口无空气、让血回到留置针软管尾端, 接高压注射器时动作轻柔迟缓的注射方法能够有效减少气泡的产生数量并降低了气泡产生率, 能够让冠脉造影的结果更加精确。

PU-0573

亲子式陪伴在婴幼儿 MRI 检查中的应用效果研究

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[摘要]: 目的 探讨亲子式陪伴在婴幼儿 MRI 检查中的应用及效果。方法 将 196 例行 MRI 检查的婴幼儿按照就诊的先后顺序分为对照组 (99 例) 和实验组 (97 例)。对照组检查时采用常规护理, 家属站在机器旁。实验组检查时采用亲子式陪伴护理, 让家属充分与婴幼儿接触。比较两组婴幼儿一次性检查成功率、扫描时间和预约检查等待时间。结果 采用亲子式陪伴的实验组的一次性检查成功率 90.70% 高于对照组 73.70%; 有效扫描时间短于对照组; 预约检查等待时间明显低于对照组 ($P\leq 0.05$)。结论 亲子式陪伴能提高婴幼儿的配合度, 提高 MRI 检查成功率。并能节省扫描时间与检查等待时间, 提高工作效率。

PU-0574

生理盐水联合碘造影剂预热在肿瘤病人增强 CT 检查中的护理应用

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【摘要】目的 2018 年随着增强 CT 检查人数的不断增加,发生碘造影剂的不良反应逐渐增多,为降低碘造影剂的不良反应,分别在 2019 年对碘造影剂全部进行恒温箱预热,大幅度降低了增强 CT 病人检查的各种不良反应,为进一步降低碘造影剂的不良反应;在 2022 年碘造影剂恒温箱加热的基础上对增强 CT 检查的生理盐水全部进行预热,又进一步降低了碘造影剂的不良反应。方法 2018 年之前,增强 CT 检查病人的造影剂加热,是由高压注射器的加热系统在给药的过程中直接加热,但 2018 年之后,随着肿瘤病人的不断增多和住院床位的增加,增强 CT 检查的病人迅速增多,不良反应病人也不断增加。不断查找原因,改变造影剂依靠高压注射器系统的预热方式,2019 年开始对碘造影剂全部由恒温箱预热 37 度,碘造影剂不良反应迅速下降,在此工作的基础上,2022 年将增强 CT 检查的生理盐水全部进行预热,进一步降低了碘造影剂的不良反应。结果 2018 年 12 月 1 日-2018 年 12 月 31 日碘造影剂和生理盐水未进行恒温箱加热,增强 CT 检查总人数 2 2300 人,碘造影剂不良反应发生 46 人(2%),其中死亡 3 人。2019 年 12 月 1 日-2019 年 12 月 31 日对碘造影剂全部进行恒温箱加热到 37 度,增强 CT 检查总数 2300 人,碘造影剂不良反应发生 11 人(0.48%),无死亡。2022 年 12 月 1 日-2022 年 12 月 31 日对生理盐水全部进行恒温箱加热到 37 度,对碘造影剂全部进行恒温箱加热到 37 度,增强 CT 检查总数 2300 人,碘造影剂不良反应发生 2 人(0.087%),无死亡。结论 增强 CT 检查的造影剂为碘对比剂,碘对比剂随着浓度增高,粘稠度也逐渐增高,粘稠度越大,摩擦力越大,在高压、快速注射过程中引起各种不良反应。高压注入碘造影剂前后需注入足够量的生理盐水以稀释碘造影剂的粘稠度和对血管壁的刺激,但大剂量高压注入常温下的生理盐水又增加了已加热的碘造影剂粘滞性和刺激性,在碘造影剂加温的基础上,对生理盐水也进行恒温箱预热,利于碘造影剂对微小区域的摄入,改善血管强化显示,提高了图像质量的同时,大幅度降低了增强 CT 病人检查的各种不良反应。

PU-0575

叙事医学在一例晚期胰腺癌介入治疗患者中的应用实践

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目的:叙事医学是由患者讲述个人故事,医护人员借此治疗患者身心疾病的一种具有人文关怀特质的医学方法,已在多种疾病中得到广泛应用,但在肿瘤介入治疗患者中应用较少,且部分晚期恶性肿瘤患者不配合治疗,本报道通过实施叙事医学成功取得患者配合,顺利实施后续治疗,介绍成功经验,为叙事医学更好的应用于晚期肿瘤介入治疗患者提供借鉴。方法:对 1 例 80 岁男性晚期胰腺癌拟行胆管穿刺引流治疗,但不配合的患者实施叙事医学,观察实施前后患者临床症状、生活质量、焦虑及抑郁评分的变化,并分析、总结照护经验和体会。结果:通过患者讲述生命故事及人生经历中的辉煌时刻,聆听病人对疾病的倾诉,关注患者情感的变化,并与患者家属建立微信联系,随时反馈患者病情变化。实施后患者情绪明显改善,并愿意配合介入穿刺治疗,明显改善了患者对医护人员的认可程度,患者躯体不适症状、心理负性情绪明显改善,生活质量明显改善。结论:晚期恶性肿瘤患者疾病发展过程中通常面临多方面的痛苦及需求,叙事医学通过讲述患者的生命故事,主动探索患者的心理过程,关注患者身心状态,可有效减轻肿瘤介入治疗患者躯体症状及心理负担,提高治疗依从性,改善生命质量,完美体现了医学人文关怀在临床实践中的应用。

PU-0576

“并联式”整体护理模式在一体化手术室影像检查安全管理中的应用研究

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目的：探讨“并联式”整体护理模式在一体化手术室影像检查安全管理中的应用效果。方法：分别选取 2021 年 1 月-12 月、2022 年 1 月-12 月在我院一体化手术室行外科手术且术中中进行影像检查的患者作为对照组和实验组，其中对照组 92 例患者，实验组 98 例患者。对照组采用常规护理流程管理，实验组运用“并联式”整体护理模式进行护理。比较两组患者术中影像检查各环节完成的时间、不良事件发生率的差异。结果：实验组影像检查各环节完成情况优于对照组，差异有统计学意义（ $P<0.05$ ），且不良反应发生率降低。结论：“并联式”护理模式可有效降低一体化手术室行手术患者的相关风险，保障影像检查及手术的顺利完成。

PU-0577

计算机断层扫描小肠造影序贯结肠镜检查降低碘对比剂相关不良反应的回顾性研究

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目的：对比疑似炎症性肠病（Inflammatory bowel disease, IBD）患者行计算机断层扫描小肠造影（computed tomography enterography, CTE）序贯结肠镜与 CTE 序贯结肠镜检查过程中，碘对比剂相关不良反应的发生率。

方法：回顾性收集自 2018 年 8 月 1 日至 2020 年 8 月 1 日行结肠镜与 CTE 检查的疑似 IBD 患者，根据检查方式分为 A 组（结肠镜序贯 CTE 检查组）与 B 组（CTE 序贯结肠镜检查组），对比两组碘对比剂相关不良反应发生率。

结果：485 例纳入患者中，360 例患者纳入 A 组，125 例患者纳入 B 组。A 组有 39 例患者（10.8%）在行 CTE 过程中发生碘对比剂相关不良反应，其中轻度不良反应 34 例（7.2%），中度不良反应 5 例（1.4%）。B 组无任何患者（0.0%）发生碘对比剂相关不良反应，对比 A 组存在显著性差异（ $p<0.001$ ）。

结论：对于疑似 IBD 患者行结肠镜前，先行 CTE 检查可见显著降低患者发生碘对比剂相关不良反应，提高 CTE 检查的安全性。

PU-0578

浅谈放射科护理安全隐患

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放射科是医院疾病诊断及治疗的重要辅助检查科室，在现代医院建设中，放射科是一个集检查、诊断、治疗为一体的科室，临床上各科室疾病诊断均需经过放射科设备检查。遵守诊疗常规和操作规程是防范风险的最基本手段。

伴随放射设备不断更新，检查内容更加细化，医院的放射科不仅承担着门诊、住院部的常规 X 线、造影特殊检查及 CT、核磁检查等。由此造成放射科护理人员的任务繁重，工作缺乏热情，状况时有发生，造成医患纠纷，不仅对患者造成伤害，对护理人员也造成了伤害，所以放射科中存在护理出错安全的问题不容忽视。

PU-0579

CT 引导下肺肿瘤微创介入治疗围术期护理

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目的 探讨分析将细节围术期护理对接受 CT 引导下肺肿瘤微创介入术治疗的患者实施所取得的效果。方法 本次研究对象均为在青海红十字医院接受 CT 引导下肺肿瘤微创介入手术治疗患者，共计 80 例，收治时间为 2019 年 12 月到 2022 年 12 月之间。按照数字表法对患者分组，其中 40 例设为参照组实施常规围术期护理，另外 40 例设为研究组实施细节围术期护理。比较两组对两组的护理效果。结果 比较两组的并发症发生率，研究组低于参照组 ($P<0.05$)；比较两组的护理满意率，研究组高于参照组 ($P<0.05$)。结论 根据本次研究的结果可以确认，将细节围术期护理对接受 CT 引导下肺肿瘤微创介入术治疗的患者实施有着极为确切的作用，能够对并发症起到很好的预防作用，提高患者的满意度，值得大力推广。

PU-0580

放射科护理工作中的危险因素与对策分析

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摘要:在放射科护理工作中，总是会不可避免存在着许多危险因素。为了找出其中所出现的各种危险因素，并对其解决对策进行有效分析，本篇文章在综合了调查和研究之后完成。主要以 2021 年 9 月~2021 年 12 月在本医院放射科接受检查的 150 例患者作为研究对象。其中，以 2021 年 9 月作为时间截点。

所有患者被分为对照组和观察组两组，结合具体护理对策，对其中所存在的各种风险事件、危险因素进行分析。完成此次实验险之后，可以很明显的发现:观察组护理风险要明显低于对照组，其差异统计学意义 $P<0.05$ 。因此，则可以判定此次研究具有一定实验意义。在此次调查中，主要针对的是医务工作中沟通问题、管理问题、服务问题、患者素质水平四个角度进行分析和考虑，在提出的相关对策应用到实际工作以后，可以发现其安全性明显得到提升。

PU-0581

Morphine prophylaxis alleviates pain in transjugular intrahepatic portosystemic shunt procedure: A randomized clinical trial

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BACKGROUND: Transjugular intrahepatic portosystemic shunt (TIPS) is an accepted minimal invasive procedure for the

management of complications of portal hypertension.

OBJECTIVE: This study aims to investigate the value of the preemptive administration of morphine, when compared with on-demand morphine, during TIPS.

METHODS: The present study was a randomized control trial. A total of 49 patients were selected to receive 10 mg of morphine either before the TIPS procedure (group B, n = 26), or on demand when needed during the TIPS procedure (group A, n = 23).

The patient's pain was scored using the visual analog scale (VAS) during the procedure. VAS, pain performance, HR, systolic

pressure, diastolic pressure and SPO2 were recorded at four-time points: before the operation (T0), during the trans-hepatic

puncture of the portal vein (T1), during the intrahepatic channel expansion (T2), and when the operation was finished (T3). The

duration of the operation was also recorded.

RESULTS: In group A, the proportion of severe pain at T1 was 4.3% (one case), two cases were combined with vagus refflex,

and the proportion of severe pain at T2 was 65.2% (15 cases). No severe pain occurred in group B. The VAS score significantly

decreased at T1, T2 and T3 in group B, when compared to group A ($P < 0.05$). HR, systolic pressure and diastolic pressure

significantly decreased at T2 and T3 in group B, when compared to group A ($P < 0.05$). There was no significant difference

between the two groups in terms of SPO2 ($P > 0.05$).

CONCLUSION: Preemptive analgesia can effectively relieve severe pain during TIPS, improve patient comfort and compliance,

ensure a routine procedure, and offer excellent safety, and is simple and effective.

PU-0582

护理干预在双源 CT 心肌灌注检查患者中的效果分析

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目的: 探讨在双源 CT 心肌灌注检查中应用护理干预的效果。

方法: 目前本科室采用西门子 SOMATOM Force 双源 CT 进行心肌灌注检查, 检查过程中使用三磷酸腺苷二钠 (Adenosine triphosphate disodium, ATP) 实现心肌负荷。静脉给予 ATP(140 ug-160ug/(Kg·min)), 持续 3 min, 采用前瞻性心电门控进行负荷期动态心肌灌注扫描, 心肌灌注扫描完成之后, 行冠状动脉 CT 血管成像(CTA)扫描。选取 2020 年 1 月-2023 年 7 月, 收治的 106

例接受 CT 心肌灌注检查的患者。采用随机数字表法分为 2 组, 每组分别纳入 53 例样本。对照组常规护理, 研究组护理干预, 比较两组患者的图像质量等级、焦虑评分、呼吸配合训练时间和心率控制时间, 护理满意度, 探究干预的效果。

结果: 护理干预后研究组的图像质量等级明显优于对照组, 焦虑评分明显低于对照组 ($P<0.05$)、研究组的呼吸训练配合、心率控制明显优于对照组, 护理满意度明显高于对照组, 差异有统计学意义 ($p<0.05$)

结论: 护理干预对于双源 CT 心肌灌注成像检查患者具有显著效果, 能够促进其心率平稳, 缓解其焦虑情绪, 有助于提高图像质量, 提高护理满意度, 值得推广应用。

PU-0583

系统护理干预缩短冠心病患者冠脉 CTA 检查时间

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探索系统护理干预在缩短冠心病患者冠脉 CTA 检查时间的应用效果。成立护理专题小组, 确立“缩短冠心病患者冠脉 CTA 检查时间”为活动课题, 对我院 2020 年 5 月-2020 年 7 月行冠脉 CTA 检查的患者进行现状分析, 分析原因, 确定问题, 设定目标, 制定对策。开展专题活动, 通过系统护理干预, 能有效缩短冠心病患者冠脉 CTA 检查时间, 提高影像检查的满意度, 同时能够优化影像检查的流程中每个环节, 提高医务人员工作效率, 减轻了医务人员的工作压力。

PU-0584

改良静脉穿刺法在一例吸毒困难静脉患者增强影像检查外周静脉通路建立中的应用

毛元红、杨红、陆菊花、周曙、袁爱红、张鸿飞
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探讨改良外周静脉穿刺法应用于一例静脉吸毒、困难静脉患者行增强磁共振检查前外周静脉通路的建立。方法 一例静脉吸毒数十年、静脉穿刺困难患者行增强磁共振检查前采用改良穿刺法(患者取坐位, 待穿刺侧肢体掌面向上、手背搁在同侧膝盖上, 使肢体下垂, 待穿刺点上方 10cm、8cm 处各扎一根止血带、加松握拳法, 促进外周静脉充盈)行外周静脉穿刺置管。过程顺利, 成功建立有效外周静脉通路; 增强磁共振检查成功完成, 未出现脱管、出血、血肿对比剂外渗等并发症。

结论 对吸毒、肥胖、高血压、糖尿病、肿瘤化疗后等困难静脉患者行增强影像检查时, 可采用坐位、穿刺侧肢体下垂、扎双根止血带加松握拳法能促进外周静脉充盈、提高静脉穿刺的成功, 确保影像增强检查的顺利进行, 同时减轻患者痛苦, 提高满意度。此操作方法简单、易学、高效, 也可用于急诊抢救室、肿瘤科、采血中心等急重危、困难静脉患者外周浅静脉的穿刺, 值得临床推广应用。该研究已申请获得基金项目: 南通市科技计划(指导性)项目(基金号:JCZ20032)“改良外周静脉穿刺法在增强 CT 扫描困难静脉患者中的应用”, 并获三项国家实用新型专利(ZL 2017 2 1050358.0、ZL 2019 2 0308525.X、ZL 2017 2 1050358.0)

PU-0585

叙事教育在以岗位胜任力为核心的全日制护生 思政教育带教模式中的应用研究

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目的 探讨叙事教育在以岗位胜任力为核心的全日制护生思政教育带教模式中的应用效果。**方法** 将 2021 年 7 月至 2022 年 5 月在介入科临床实习的 61 名本科全日制护生设为对照组，对照组实施以岗位胜任力为核心的带教模式，护生入科时采用自评方式调查心理特质，主要包括具有高度的责任感，在繁重的工作情景中能够保持稳定平和的心境，坚持道德信念、伦理守则及法律法规，对护理职业具有认同感等 7 个条目，入科后指导护生阅读经典及优秀护士事迹，学习应急预案，分享实习中被患者感动的事迹，带教老师多表扬护生，病区的活动多邀请护生等增加护生的归属感和对职业的认同感，出科时继续采用自评方式调查护生的心理特质。将 2022 年 7 月至 2023 年 5 月在介入科临床实习的 59 名本科全日制护生设为观察组，观察组在以岗位胜任力为核心的带教模式的基础上增加叙事教育，护生入科时采用自评方式调查叙事教育能力、心理特质，入科后在原有的带教模式上增加指导护生欣赏人文励志电影、欣赏文学作品、分享人文关怀故事、书写反思日记及人文关怀护理操作培训。护生出科前继续采用自评方式调查叙事教育能力、心理特质及其学习反馈。**结果** 观察组护生出科时的叙事教育能力得分明显高于入科时，差异有统计学意义（ $P < 0.05$ ）；两组护生入科时的心理特质得分无统计学意义（ $P > 0.05$ ），具有可比性，观察组护生出科时的心理特质得分高于对照组，差异有统计学意义（ $P < 0.05$ ）；观察组护生态度目标评价得分高于对照组，差异有统计学意义（ $P < 0.05$ ）；观察组护生对教学工作的满意度得分高于对照组，差异有统计学意义（ $P < 0.05$ ）。**结论** 叙事教育在以岗位胜任力为核心的全日制护生思政教育带教模式中的应用，提高了护生的叙事教育能力、心理特质、态度目标，提高了患者的满意度。

PU-0586

1 例基于<<含碘对比剂静脉外渗护理管理实践指南>>的对比剂外 渗护理管理质量改进报告

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随着影像诊断和介入治疗的飞速发展，对比剂的应用日益广泛；CT（Computed tomography）检查是一项日渐普及的影像诊断技术，全球的 CT 检查数量逐年持续增长，其中增强 CT 检查占比 > 60%；每年全球约 7600 万次的检查中，有 50% 的患者需要静脉内使用含碘对比剂，且逐年递增。对比剂外渗是指 CT 增强扫描注射对比剂时，对比剂渗漏或血管壁破裂引起的碘对比剂意外漏出，由于碘对比剂的毒性作用和压力作用，一旦发生外渗便会对病人带来痛苦。预防碘对比剂静脉外渗、正确处理外渗减轻患者痛苦，是影像科护士关注的焦点。<<含碘对比剂静脉外渗护理管理实践指南>>为影像科护士进行科学决策提供实践依据。本案例既是基于指南进行的对比剂外渗护理管理质量改进。

PU-0587

CT 增强扫描造影剂静脉外渗的护理干预

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[摘要] 探讨 CT 增强扫描时有效预防造影剂静脉外渗的护理措施及发生外渗后的正确处理方法。本文归纳总结了引起造影剂静脉外渗的危险因素、造影剂外渗的护理评估方法、造影剂外渗的危害、造影剂外渗可以采取的预防和护理措施,力求能为护士在放射护理工作中提供实践指导。

PU-0588

Nursing of a patient with arterial air embolism during CT-guided lung biopsy

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Abstract: To summarize the nursing experience of a patient with arterial air embolism during CT-guided lung biopsy. Nursing points: when air embolism occurred during the operation, the doctor should immediately pull out the needle, the nursing staff should immediately give oxygen, complete the position nursing, cooperate with the doctor for rescue work, and closely observe the life of the patient. Then, multidisciplinary consultation was carried out at the first time to determine the treatment plan. Do a good job of disease observation to ensure patient safety; Prevent patients from lower extremity venous thrombosis; Help patients complete spontaneous breathing exercises; Personalized muscle strength rehabilitation training was customized for patients. Do preventive nursing of air embolism; The whole process of psychological nursing can minimize the risk of patients, do a good job of continuous nursing, and improve the short-term and long-term quality of life of patients. In this case, the patient was successfully recovered and discharged, which provides a reference for the nursing of air embolism during lung biopsy.

PU-0589

放射治疗护理干预措施研究进展

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针对放射治疗护理干预措施进行综述,可以为医护人员对现有条件结合患者自身情况提供针对性的干预措施。该文从放射治疗术前、术中、术后不同时间段采取相应的干预措施进行综述,并从预见性护理、心理护理、皮肤护理、用药护理、饮食护理、健康指导、功能锻炼等措施进行了总结。为医护人员应对放射治疗带来的负面影响提供了参考措施,能提高患者放射治疗结局,改善患者放射治疗后的生活质量,提升放射治疗患者护理满意度。

PU-0590

《1 例急诊 CTA 碘对比剂外渗致重度皮肤损伤的原因分析及护理》

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【摘要】本研究选取了 1 例肝硬化致食道胃底静脉曲张破裂出血伴肝昏迷患者，对其临床资料进行回顾性分析。患者行急诊门静脉 CTA 扫描过程中发生碘对比剂外渗，在使用 0.5%醋酸氯己定溶液消毒、磺胺米隆凡士林外敷、磺胺嘧啶锌外敷等治疗处理，并及时与患者及家属进行有效沟通后，患者重度碘对比剂外渗导致的皮肤肿胀消退，水疱消失，皮肤破损处完全愈合，患者及家属积极配合治疗对疗效满意，未发生医疗纠纷。使用 0.5%醋酸氯己定溶液联合磺胺米隆凡士林、磺胺嘧啶锌治疗增强 CT 扫描过程中碘对比剂外渗效果显著，值得临床借鉴。

PU-0591

浅谈宫颈癌放射治疗副反应的护理

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目的 研究宫颈癌患者放射治疗中的近期和远期副反应症状及全程护理的重要意义。

方法 对科室本年度宫颈癌放射治疗的患者进行观察。放疗的同时，加强对患者饮食护理、皮肤护理、心理护理、健康教育、安全管理及副反应发生的护理。

结果 本年度宫颈癌放射治疗的患者经过放射治疗及全程护理后、治疗目的达到的同时，明显减轻了并发症带来的痛苦和不适，提高了生存质量，对护理人员的护理服务给予高度评价。

结论 针对宫颈癌患者放疗副反应的全程护理对治疗有重大保障，对患者有重要意义

PU-0592

乳腺癌放射治疗后不良反应症状群的研究进展

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对乳腺癌放射治疗后不良反应症状群的研究进展进行综述。从乳腺癌放射治疗后不良反应症状群分类、预防及干预、测评工具 4 个方面进行阐述。提出医护人员需密切关注乳腺癌放射治疗后不良反应症状的发生，做到早期预防。以期为临床评估及干预管理提供理论依据。

PU-0593

“标识性沟通”在增强检查护理中的应用与效果分析

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目的:探讨 CT/MRI 增强检查流程中,采用“标识性沟通”在增强检查中进行优化护理的临床效果。方法:通过各种印有“易外渗、试水、易过敏人群、已签知情同意书等”印章,在护士与技师之间起到提示作用。结果:减少外渗率,以及提升对潜在过敏患者的关注度和处置效率。结论:最大程度降低不良事件发生率。

PU-0594

精细化护理在影像安全管理中的应用—放射科危重患者检查前评估表

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近年来,随着医疗科技的飞速发展,精细化护理作为一种前沿的护理模式,对于危重患者的管理起到了越来越重要的作用。本研究旨在深入探讨精细化护理在放射科危重患者管理中的应用,以提升影像安全管理的水准。

为了全面评估危重患者的情况,我们特别设计了一套名为《放射科危重患者检查前评估表》的综合工具。这个表格不仅详细记录了检查日期、患者入科时间等基本信息,还包括了临床诊断、人口学信息(申请科室、床号、姓名、性别、年龄、检查号)等重要数据,为全方位了解患者的身体状况提供了有力支持。

在评估患者的身体状况时,我们特别关注了意识状态、入科方式、生命体征、陪同人员和检查项目等指标。意识状态的评估涵盖了清醒、嗜睡、昏睡等多个层次,以确保对患者精神状态的准确把握。入科方式的记录则为后续的护理流程提供了重要参考。此外,生命体征的监测也成为了我们关注的焦点,包括血压、脉搏、呼吸频率以及血氧饱和度等指标,这些数据将为我们提供重要的生理参考值。

为了更加准确地识别危重患者,我们设计了一个早期预警评分量表。该量表以体温、呼吸频率、脉搏、收缩压、氧饱和度和意识状态等重要生理指标为评估依据,为每一项设定了相应的评分标准。通过综合评分,我们能够及时发现患者的异常情况,并采取相应的预警措施。在评分细则方面,我们特别关注了各项生理指标对危重患者状况的反映。体温、呼吸频率、脉搏、收缩压和氧饱和度的评估标准都充分考虑了不同数值范围的情况,以确保评分的科学准确性。

研究结果清晰地显示,精细化护理在放射科危重患者管理中取得了显著的成效,极大地提升了安全管理水平。这一研究为临床实践提供了有力的支持,为放射科危重患者的护理提供了科学可靠的依据。我们深信,在持续改进和优化精细化护理模式的过程中,我们将能够进一步提升放射科危重患者的安全管理水平,为医疗服务的质量和效率贡献更大力量。

综上所述,通过细致入微的评估工具以及科学可靠的预警评分体系,精细化护理在放射科危重患者管理中的应用不仅提升了影像安全管理的水准,也为危重患者的安全提供了可靠保障。

PU-0595

《多学科联合在碘对比剂外渗根本原因分析中的应用》

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【摘要】目的 分析 CT 增强扫描过程中对比剂外渗的根本原因, 针对根本原因制定有效的预防碘对比剂外渗的管理规范, 以最大限度减少对比剂外渗的发生及降低外渗对局部组织造成的损伤。方法 成立多学科团队小组, 应用根本原因分析法(rootcauseanalysis,RCA)通过回溯性调查分析, 收集主客观科学证据, 讨论分析并确定我院 2022 年 5 月-2022 年 10 月上报的 7 例碘对比剂发生外渗的根本原因, 并针对根本原因制定积极有效的改进措施。结果 应用多学科联合根本原因分析后碘对比剂外渗发生率由 0.053%降到 0.02%, 重度外渗发生率为 0, 差异有统计学意义($P<0.05$)。结论 多学科联合应用根因分析法, 可有效预防碘对比剂外渗的发生, 降低了外渗的发生率, 保障了患者的安全, 值得推广。

PU-0596

多学科护理团队模式改善住院患者全腹增强 CT 检查体验的研究

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背景及目的: 全腹增强 CT 是一种常用的医学影像学检查方法, 然而, 患者在接受检查时可能会面临一些不适和不良反应。本研究旨在评估多学科护理团队模式在改善住院患者全腹增强 CT 检查体验方面的作用。

方法: 由影像科医生、技师、护士及联络员组成多学科护理团队。研究样本选取我院 2022 年 1 月至 12 月行全腹增强 CT 检查的住院患者 200 名, 将其随机分为观察组和对照组, 观察组接受多学科护理团队介入, 对照组接受常规护理。通过面对面问卷调查和医务人员的评估, 评估两组患者的全腹增强 CT 检查体验。

结果: 观察组患者在 CT 检查前的紧张感、疼痛感、不适感和担忧感方面得分明显低于对照组 (3 vs.7, $P<0.05$)。观察组患者在 CT 检查过程中对医务人员的满意度方面得分明显高于对照组 (9 vs.6, $P<0.05$)。观察组患者全腹增强 CT 检查的不良反应发生率显著低于对照组 (5% vs.11%, $P<0.05$)。此外, 候检时间和扫描时间均显著下降 ($P<0.001$)。

结论: 多学科护理团队模式的介入可以显著改善住院患者在接受全腹增强 CT 检查过程中的体验, 减轻其紧张感、不适感和担忧感, 提升患者的医疗体验和满意度。多学科护理团队模式应该得到更广泛的应用, 以使患者得到个性化、全程化、专业化护理。

PU-0597

放射科护士对 CTU 检查患者的精细化护理

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摘要 随着科技的不断进步, 放射科在医疗诊断中起着举足轻重的作用。而 CTU (计算机体层成像尿路造影) 作为放射科中一项重要的检查技术, 已经普遍应用于临床。为了提高 CTU 检查的准确性和精确性, 放射科护士的护理工作也需精细化。

本文通过文献研究和临床实践对 CTU 检查的精细化护理进行探讨。首先,对 CTU 检查的流程进行了详细的描述,包括检查前准备、器材准备、患者沟通和适当的容量负荷等方面。其次,分析了 CTU 检查中可能出现的不良反应和并发症,为护士提供了敏锐的观察和及时发现问题的能力。此外,还介绍了 CTU 检查中对患者的安全要求,包括辐射防护、感染控制和消毒等,以保护患者的身体健康。

特别地,本文还强调了护士在 CTU 检查中的角色和责任。护士应具备熟练的技术操作和仔细的观察能力,确保图像质量的完整性和可靠性。同时,护士应积极与医疗团队合作,提供全面的护理服务,包括患者接送、疼痛管理和心理支持等。

最后,本文总结了放射科护士对 CTU 检查精细化护理的重要性。精细化护理能够提高 CTU 检查的效果和准确性,减少患者的不适和并发症发生。因此,放射科护士应持续更新自己的专业知识和技能,提高对 CTU 检查的护理质量,为患者提供更优质的护理服务。

PU-0598

严格审核制度对提高影像检查阳性率的效果分析

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【摘要】目的 探讨严格执行审核制度对提高影像检查阳性率的效果。方法 收集 2017 年 12 月至 2021 年 11 月期间每月影像检查的阳性率,以 2019 年 12 月严格执行审核制度为分界点,后组为审核组,诊断报告双人签名并 100%审核,前组为对照组,未严格执行审核制度,审核率不足 100%。分析 X 线检查、CT 检查、MRI 检查等不同检查类别影像检查阳性率与诊断报告审核率的关系并对比两组间影像检查阳性率的差异,采用 Spearman 检验和独立样本 t 检验进行统计学分析。结果 审核组诊断报告审核率均为 100%,对照组 X 线检查、CT 检查、MRI 检查诊断报告审核率分别为 $39.57\% \pm 13.20\%$ 、 $74.22\% \pm 11.09\%$ 、 $13.92\% \pm 14.92\%$ 。X 线检查、CT 检查、MRI 检查阳性率与诊断报告审核率的相关系数分别为 0.793、0.774、0.669, $p < 0.05$ 。审核组 X 线检查、CT 检查、MRI 检查阳性率较对照组分别提高 $12.80\% \pm 1.35\%$ 、 $2.99\% \pm 0.47\%$ 、 $4.62\% \pm 0.75\%$, $p < 0.05$ 。结论 X 线检查、CT 检查、MRI 检查阳性率与诊断报告审核率具有相关性,严格执行审核制度有助于提高阳性率,尤其有助于提高 X 线检查阳性率。

PU-0599

县域放射科影像图像的规范管理

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背景:县域放射科作为医疗系统中重要的组成部分,承担着影像检查和诊断的关键责任。然而,由于资源有限和管理不规范,县域放射科在影像图像的规范管理方面存在一系列挑战。方法:本研究通过调查分析不同县域放射科的实际情况,总结了目前影像图像管理存在的问题和障碍。同时,参考中华医学会以及其他相关机构的指南和标准,提出了一套规范管理县域放射科影像图像的综合解决方案。结果:本研究提出的综合解决方案包括:优化设备维护、建立质量控制机制、推行标准化图像采集和传输流程、加强人员培训与沟通等。通过对某县域放射科实施这些措施的评估发现,影像图像的质量得到明显提升,信息传递的准确性和效率也得到了改善。结论:规范管理县域放射科影像图像对于提高医疗服务质量和安全性至关重要。通过本研究提出的综合解决方案,县域放射科能够更好地管理影像图像,提高医疗服务水平,从而为人民群众的健康做出更大的贡献。

PU-0600

如何提高县域医院放射科的影响力

姚奇

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前言 随着国家推进医疗卫生一体化改革，按照常见病多发病在市县解决的目标，县域就诊率达到 90%以上，县级医院必将成为未来医疗的主战场。近年来国家大力推进“五大中心”建设，大多数县级医院都是胸痛中心、卒中中心、创伤中心、危重孕产妇救治中心及危重新生儿救治中心聚集单位；“五大中心”运行发展均对放射科的业务提出了更高的诊断要求和检查效率，未来还会建设“肿瘤综合治疗中心和慢病管理中心”等。放射科工作将贯穿于各中心疾病的发现、诊断、治疗及疗效评价全流程，起到不可或缺的作用。都说“精准医学、影像先行”，放射科的作用又如此之大，可我们广大的同仁们为什么还感觉放射科在医院里不被重视，没有话语权、没有影响力呢？

县域医院放射科现状：“三多、三少”

三多：1、患者及家属多；2、贵重设备多；3、各种投诉多

三少：1、阳性患者追踪结果少；2、科研、课题论文少；3、放射医生收入少；

如何提高放射科在医院的影响力？

- 1、“打铁还需自身硬”，提高自己的业务技术水平，满足临床需求；
- 2、积极走向临床、拥抱临床，多参加 MDT，做临床医师的战略合作伙伴；
- 3、做好“急诊文章”，包括急诊介入手术、急诊增强等，让临床离不开你；
- 4、开设影像门诊，直接面对患者分析疾病影像学病理生理机制，增加患者影响力；
- 5、抱住上级医院“大腿”，做好科研、课题研究，提升学术影响力；
- 6、积极下基层、单位企业、老年大学等，做好影像相关科普宣传，提高社会影响力；
- 7、认真做好基层医院远程影像会诊，及时给出准确诊断和治疗方向，增强基层医院影响力。

放射医师是临床的侦察兵，是临床诊疗环节中重要的幕后英雄；要持续保持影响力，还要坚持做好“四个服务”，即：增强服务意识、提升服务能力、提高服务效率、保证服务质量。使患者和临床满意度不断提升。

PU-0601

影像科整合融合促进县域医院学科高质量发展 管理经验

王清涛

清河县人民医院

2020 年 4 月河北省邢台市清河县人民医院决定将原放射科导管室、CT 室、MR 室整合为邢台市第一个县级医院医学影像科。科室整合后多措并举，创新改革，人力成本降低，患者服务效率提升，就医满意度明显提升。1、整风肃纪，建章修制，开展“四比活动”，统一思想，营造积极向上的科室氛围；2、绩效杠杆，充分调动科室人员积极性，增加新活力；3、党建引领，借力发展，上下级医院联动，远程平台助力临床诊疗；4、信息化建设及设备投入，为科室发展按下了加速键；5、管事管人，管流程，以患者需求为导向的服务模式；用一流的技术、一流的设备、一流的服务、一流的管理打造冀东南区域影像中心，为更好服务广大人民群众及医院高质量发展贡献科室力量。

PU-0602

县医院医学影像远程会诊：破解基层群众影像检查难题

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目的：白河县山大沟深，老百姓外出看病很不方便；基层卫生院缺少检查设备、缺少专业人员、诊断能力低、无执业资质。为了解决这些问题，本研究旨在探讨医学影像远程会诊在县级医院的应用。

方法：白河县人民医院自 2018 年建立区域远程影像诊断平台，整合市、县、镇三级医疗资源，开通远程会诊业务。将医院建在“网上”，专家联在“线上”。通过构建互联网+医学影像服务，为患者提供远程影像诊断等多种服务。遇到疑难病例时，卫生院医生可以直接通过系统将患者 DR、CT 影像图上传至区域远程影像诊断平台，由县人民医院诊断专家通过诊断工作站调阅病例图片，经诊断、审核后给予精准双签报告，整个过程一般在 30 分钟左右，疑难病例不超过 2 小时，即使夜间急诊也能尽快给出精准诊断报告。

结果：自 2018 年 7 月以来，经过 5 年的摸索、改进、提升，目前平台运转十分成熟，并先后接待省内外多批次兄弟医院的参观、交流，为白河县多家卫生院提供了医疗保障和人才的培养，也解决边远地区影像技术人才匮乏、患者影像检查困难等问题。远程影像诊断累计为乡镇卫生院服务超过 29500 人次，月平均诊断 1100 余例，最多时达到每月 3000 余例。与三级医院会诊 600 人次。召开远程教育培训会 30 次，按照 X 线、CT 拍片检查、专家会诊等诊疗项目在一级医院和二级医院的收费价格差，加上患者的路费，初步估算，平台开通以来为患者和基层医务工作人员节省就医开支和培训费用近百万元。

结论：医学影像远程会诊破解群众看病难、看病贵问题，通过整合医疗资源，解决重复检查、基层医院影像人员缺乏、基层患者辗转进城或异地确诊等问题，切实减轻了患者的经济负担，真正成为了一条护佑患者健康的“生命纽带”，同时成为突破医疗资源紧张与群众就医需求增大之间矛盾的切入点。

PU-0603

放射科大型设备全生命周期精细化管理

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目的：放射科作为医院大型设备集中科室，大型医疗设备的固定资产通常会占到全院固定资产的 20% 甚至以上，很大程度上医院发展的一个重要标志是引进高端医学影像等大型医疗设备，不仅可以提高医院知名度，增强核心竞争力，还会带来巨大的经济及社会效益。根据国卫健委颁布的《大型医疗设备配置与使用管理办法》第二条规定，大型医疗设备是指“大型医用设备，是指使用技术复杂、资金投入量大、运行成本高、对医疗费用影响大且纳入目录管理的大型医疗器械。同时，放射科对诊疗设备也是高度依赖，一旦设备停止运行对于放射科的正常运转也会产生相当大的影响，因此维持大型设备的正常运行就显得很重要，大型设备全生命周期的精细化管理对于保证设备的正常运行以及延长使用寿命会很有意义。

方法：我们对设备从购置立项调研到设备采购后设备机房的准备到设备安装，设备使用培训，设备使用规范，设备日常维护保养，最后到设备完成使命申请报废全生命周期按照科学方法进行有效管理。

结果：设备科学规范化的管理对于体现设备自身价值延长设备使用寿命具有重要意义。

结论：大型医疗设备管理的未来，应当以医院管理和临床需求为导向，借助先进精细化管理理念和互联网、物联网等信息技术，实现大型医疗设备的精细化管理、效益分析和科学配置，对医院管理部门具有十分重要的现实意义。

PU-0604

放射科影像自助登记系统的建设及运用

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随着医院规模的不断扩大，信息化水平也在不断提高。围绕着电子病历信息为核心的各种系统都在不断地应用，但真正要考虑的不只是系统的功能应用，还应是通过系统的应用来促进医疗业务流程的再造，提高工作效率，方便病人就医，让医护人员把更多的时间留给病人。

放射科作为医院检查的普遍检查项目，随着医院门诊量的与日俱增，放射检查人数也同比增长，为缓解放射登记窗口的人员堆积，提高放射登记的效率，提升患者在院就诊的便利性，推进医院智能化建设发展。

目前大型医院基本上线了电子医保卡功能，患者使用移动设备扫码就能在医院完成缴费充值、诊病及结算过程，优化了就医流程。但检查科室目前还停留在人工登记，患者检查仍然存在排队长、等候久的问题依旧在检查科室存在。为了深化落实医疗卫生体制改革和公立医院改革，优化就医流程，在院信息科和放射科的推动下，我院于 2022 年开始了自助登记系统的建设，并且一直在不断地完善和增加新的功能。

PU-0605

基于战略分析方法的大型医疗设备管理研究

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医疗设备管理是医院管理的重要组成部分，却时常陷入“管理难、质控难、维保难、效益分析难”的困境。本文采用管理经济学领域的两种战略分析方法--SWOT 分析法和八何分析法，对医院大型医疗设备管理过程中遇到的问题和现象进行分析，并从医院管理角度提出相关建议与解决方案，旨在全面掌握管理现状中的难点与重点，有效提高医疗设备的工作效率，尽可能发挥其所具备的功能和性能。同时，对设备管理工作的分析和规划有助于降低运营成本，提高医院经济效益，为医院开展精细化、科学化、系统化的管理模式提供决策依据。

PU-0606

医学影像科服务流程再造的探索和实践

严雯

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目的：为了自的为患者提供全程、连续、无经隙的优质护理服务。方法：通过过去一年的探索和实践，登记窗口、护理、技师、医生之间，从工作细节上相互改善、相互协调和沟通。在工作繁忙的时候护士与登记室、技师之间，通过各种印有“两项增强、请到护士站打针、第二天有增强、易过敏、已签知情同意书等”印章，起到提示作用，进行特殊沟通;建立核磁、CT 预约专管群和登记室和

护士、技师质控员,会根据患者量、固定专科机器进行各楼层分流,缩短患者等待检查的时间。结果:根据患者需求改进新的工作流程,规范服务流程。结论:提高患者满意度。

PU-0607

探讨放射科自助登记系统的临床应用价值

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摘要:放射科影像自助登记是一种新兴的技术,通过使用自助终端设备,患者可以自主完成影像检查的登记和预约。本文通过观察和分析放射科影像自助登记的应用价值,对比传统登记方式,探讨其在提高医疗服务效率、优化患者体验、降低人力成本等方面的优势。研究表明,放射科影像自助登记在提高医疗服务效率、优化患者体验、降低人力成本等方面具有显著的应用价值。

PU-0608

融合翻转课堂的专业英语教学在放射科住院医师规范化培训中的应用探索

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目的 探索在放射科住院医师规范化培训中将翻转课堂与传统教学方式相融合进行专业英语教学的方法。

方法 纳入 2021 年 7 月至 2022 年 7 月间在培的放射科住培生,填写专业英语学习需求调查问卷并进行多种形式的专业英语教学,包括英文文献汇报、英文病例随访及英文授课等,并在学年前后分别进行一次考核。

结果 放射科住培生对专业英语学习有迫切的需求,但缺乏足够时间及科学的方法。不同年级、类别的住培生在第一次专业英语能力考核中的成绩存在差异。经过一年的专业英语学习,住培生们的第二次考核成绩较前一次有明显提升。

结论 将传统教学与翻转课堂融合的专业英语教学方式有助于提高放射科住培生的专业英语水平。

PU-0609

基于信息化的医学影像科医疗设备智慧化管理

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根据《国家三级公立医院绩效考核操作手册(2023 版)》中提到了与设备管理相关的两个监测指标“大型设备阳性率”和“大型医用设备维修保养及质量控制管理”。通过分析医疗设备管理存在的现状,比对三级甲等医院评审的要求,通过“互联网+”技术,建立医疗设备信息化智慧管理平台。

通过信息化平台实现设备管理三级管理:一级保养由科室使用人员完成设备日常检测,二级保养由医学装备部工程师进行季度周期的维护保养,三级保养由厂家工程师进行年度技术性的检验维护。一级保养由工作人员进行设备日常检测并并在填写设备日常使用记录。设备管理员每周四进行设备使用巡查,并将相关情况记录在信息平台周报里,并且还有月报总结。

设备出现故障时,在岗工作人员首先进行简单的故障判断,来尝试是否恢复正常。如果未恢复正常,可通过科室信息平台上报设备管理员及科室领导并报送设备科。设备科根据情况由设备科或联系厂家进行维修,维修记录计入平台。设备保养时间结束前按照配置实现提示,防止过保。

所有设备使用记录、维修等均在信息平台实现可视化,工作人员可在工作站或移动端实现实时监控,随时掌握设备工作情况。可事实查看设备温湿度曲线、液氮水平曲线、设备阳性率等。信息平台建立科室动态数据驾驶舱,科室实时监控各机房的工作状况,设备情况,危急值等等。信息平台实现了医院内网、外网、电脑端、手机端的数据统一,智慧化管理。

通过搭建医疗设备智慧化管理平台框架,完善设备管理功能应用,实现医疗设备生命全周期管理,为医院医疗设备智慧化管理提供支撑。

PU-0610

恶性肿瘤 TNM 影像分期系统（或结构式报告）的规范应用对肿瘤学教学要义浅析

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恶性肿瘤已经成为影响人民健康、寿命的重要因素之一。

肿瘤是全身性疾病,肿瘤 TNM 分期系统是对恶性肿瘤患者的身体疾病状态的全面评估,直接影响治疗策略的制定及患者预后。肿瘤的 TNM 分期大多数是基于医学影像诊断及临床病理的一种临床分期系统。肿瘤影像在分期系统中占有重要地位。

目前应用分期系统而制定的影像诊断报告肿瘤主要有(1)直肠癌的结构式报告(2)前列腺癌的规范化报告(3)口腔癌等。传统的影像诊断对病变位置、大小、形态及特征的描述、对鉴别诊断的描述已经不能完全满足恶性肿瘤患者影像诊断的需求,比如肿瘤组织对周围的侵袭浸润、远隔转移、种植,以及预后功能性的康复和评价等,均将对患者疾病治疗效果产生重要的影响。癌症患者初诊的肿瘤分期情况是判断其预后以及制定“个体化”治疗方案的重要参考依据,在广泛开展临床试验中,合理的肿瘤分期也是不同国家、地区肿瘤研究中心进行统筹化处理和比较的基础。

本文通过以下几个方面:(1)肿瘤影像规范化报告(结构式报告)与 TNM 分期的相互关系;(2)肿瘤影像规范化报告(以直肠癌为例)的教学及临床意义浅析;(3)肿瘤规范化报告的发展与未来等几个方面阐述肿瘤影像学规范化报告对于教学的意义。

PU-0611

英文文献汇报模式在放射专业住院医师规范化培训中的应用

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目的:探讨英文文献汇报模式在放射专业住院医师规范化培训中的应用价值。

方法:以 2014-2020 年我院放射专业住院医师规范化培训学员 28 名为研究对象,开展每月 1 次的英文文献 PPT 汇报,采用考核评分方式(10 分制)对学员能力(包括文献检索、文献阅读、论文写作、PPT 制作及诊断能力)进行前后评估,同时收集各学员规培前后论文发表情况。最后以不记名问卷调查各学员对于该讲座模式的整体印象。

结果:通过 2-3 年的英文文献汇报模式的培训,学员们在文献检索(3.3 ± 1.9 vs. 5.1 ± 2.1)、文献阅读(2.9 ± 1.6 vs. 5.3 ± 1.8)、论文写作(2.5 ± 2.3 vs. 5.3 ± 2.1)、PPT 制作(4.0 ± 1.2 vs. 6.4 ± 1.1)及诊断能力(3.6 ± 1.1 vs. 6.6 ± 0.8)五个方面均有显著性提高(P 均 <0.05)。参与讲座前,有 5 名学员发表过专业学术论文,参与英文文献汇报讲座后,先后共 10 名学员发表过专业学术论文,

但是前后对比并没有统计学差异 ($P>0.05$)。参与英文文献汇报讲座后, 100% (28/28) 的学员认为对阅读文献有帮助, 92.9% (26/28) 的学员认为对提升诊断水平有帮助, 85.7% (24/28) 的学员愿意主动参与英文文献汇报讲座。

结论: 英文文献汇报模式有助于提升放射专业住院医师规范化培训学员的临床能力、科研素养和综合素养, 为学员们今后的发展奠定基础。

PU-0612

基于 PACS 的数字化 CBL 联合 CDIO 教学法在放射科临床教学中的应用

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目的 探讨基于 PACS 的数字化 CBL (案例教学) 联合 CDIO (构思-设计-实施-运作) 教学模式在放射科临床本科实习教学中的应用效果。**方法** 选取 2022 年 3 月至 2023 年 3 月在我院放射科轮转实习的 40 名临床本科生, 随机分为 20 例试验组 (实施基于 PACS 的数字化 CBL 联合 CDIO 教学法) 和 20 例对照组 (实施传统教学法), 分析比较两组学生出科考核成绩及问卷调查结果。**结果** 试验组的放射影像学理论知识、阅片能力及技术操作考核成绩, 均高于对照组 ($P<0.05$)。而在教学效果评价方面, 试验组的培养自主学习能力、激发学习热情和兴趣、培养批判性思维能力、增强沟通交流能力以及提高团队协作能力, 均高于对照组 ($P<0.05$)。**结论** 基于 PACS 的数字化 CBL 联合 CDIO 教学法在放射科临床本科实习教学中取得的效果显著, 值得推广应用。

PU-0613

浅析加强医学影像技术专业学生辐射安全与防护的重要意义

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目的: 近几年全国技术年会多次提出倡导辐射防护, 辐射防护可以说是目前影像技术实践工作中的重要环节。针对近几年入科学学生的实践学习情况, 学生往往更重视技术学习, 却忽略了辐射防护的培养。参与辐射安全与防护的实践活动, 多角度理解辐射安全与防护的基本理论, 和辐射安全与防护的相关法律法规, 增强辐射防护意识, 降低辐射对人类健康的影响等, 引导学生关注、思考、解决社会实际问题, 提升实践能力。**方法:** 学生通过对医院放射科检查患者发放调查问卷、现场检测辐射剂量的数据。让学生了解公众及相关从业人员对辐射安全及防护的认知状态, 并整理和分析数据。**结果:** 医院相关场所辐射防护水平符合国家相关标准; 公众对辐射及安全与防护意识并不全面, 医学影像技术等相关人员对辐射安全与防护知识掌握参差不齐, 从业和在岗期间的辐射相关培训效果不理想等。**结论:** 医学院校应重视医学影像技术专业学生的辐射安全与防护知识教育, 积极开展相关辐射课程, 参与社会辐射安全与防护实践活动, 提高学生辐射安全与防护理论知识和实践技能, 引导学生关注、思考、解决社会实际问题, 提升实践能力, 最后说明加强医学影像技术专业学生辐射安全与防护的教育具有重要意义。

PU-0614

2020 年某院放射住院医师年度考核的调查分析

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目的 了解放射住院医师对临床技能规范化培训学习一年来的评价和意见,为今后做好放射科住院医师培训工作、提高培训效能、完善考核奖励机制提供帮助。方法 选择 42 名参加我院放射科 2020 年度考核的考生为研究对象,采用自行设计的“问卷星”调查进行匿名调研,了解并分析住院医师对带教师资、带教方式、理论课程、技能培训、工作强度、考核的组织安排、培训效果、住培待遇的满意度,并比较差异。采用 SPSS 21.0 软件进行信度、效度分析、单因素方差分析。结果 线上调查问卷发放总数为 42 份,回收有效问卷 42 份,回收率为 100%。信度分析克隆巴赫系数 (Cronbach's alpha) 为 0.884,结果可信。住院医师对年终考核组织安排满意度 100%,对我科带教满意度 100%,对年度考核监考满意度 100%,对我院住培培训计划安排满意度 92.9%,对我院住培待遇满意度 76.2%,自评培训效果和培训表现满意度 100%。结论 通过问卷调查结果分析,找出放射科住院医师规范化培训过程中带教、安排和培训的薄弱环节和考核过程需改进的地方,有利于针对性解决住培管理工作中存在的问题,促进住培年度考核工作的规范与进一步完善,提高培训质量和结业通过率。

PU-0615

虚拟仿真技术在《医学影像设备学》教学中的应用研究

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目的:探讨以虚拟仿真技术在医学影像技术专业医学影像设备学教学中的应用价值。方法:选择辽宁何氏医学院 2019 级、2020 级医学影像技术专业学生作为研究对象,以年级为单位进行分组,对照组采用《医学影像设备学》传统教学模式进行授课,即放射科检查室内“围观式”的临床实践教学,即带教老师带领学生在影像设备旁进行知识点讲解;实验组采取《医学影像设备学》虚拟仿真教学,采用虚拟仿真技术根据 1:1 的比例进行 3D 建模还原放射科大型医疗设备内部结构以及原理来进行实验教学。学生们可以利用虚拟仿真实验平台进入 DR、CT、MRI 设备虚拟仿真实训系统进行医学影像设备学的学习。期末进行效果评价,将实验组考试结果与采用传统教学方法的对照组的《医学影像设备学》考试成绩做比对,分析两种教学方法对学生《医学影像设备学》学习效果的影响。结果:将虚拟仿真技术引入医学影像设备学教学效果显著。结论:虚拟仿真技术的应用是辽宁何氏医学院智能影像学院一项教学方法的创新,将虚拟仿真教学引入医学影像设备学教学中,能够提高医学影像技术专业学生的学习兴趣,自主学习能力,分析问题及解决问题的能力以及动手操作能力,对院内其他专业采用虚拟仿真技术进行教学也具有一定的指导作用。

PU-0616

Structural improvement of crutches

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This paper focuses on the design concept of using 3D technology to improve the underarm crutches. The main improvements to the cane include the addition of two side shields for the support pads, a three-part retractable body tube, and a built-in spring.

The design concept was developed from user feedback by the quality function deployment (QFD) approach, QFD is a method of testing the functional design of a product. Six questions were

involved in the approach, namely target group, use scenario, time of use, root cause, solution, and improvement steps. Key factors and interrelationships were also considered in the QFD approach.

I Target group: Short-term crutch users who are unable to bear weight on their lower limbs or have fractures. Ages of use: all ages.

I Use scenario: Specific surfaces, including stairs, rainwater, uneven mud, and hills.

I Time of use: Any time of the day, for long and frequent use.

I Root cause: underarm and wrist pain, poor stability, difficult handling, inconvenient carrying, and storage.

I Solutions and improvement steps: Vary for different individuals. Therefore, the height of the crutches should be adjustable to suit the user. Since children, adolescents and the elderly will be using them, the crutches must be safe, easy to handle, and light in weight. Moreover, since there are many use scenarios, the crutches should provide more support to the user and be more portable, and high durability and replaceability of the wearable parts are necessary to ensure the frequent use of the crutches.

The final design solution was proposed to meet the requirements of high comfort, safety, mobility, durability, adjustability, portability, strength, support, and stability with an innovative appearance.

Design philosophy

Figure 3 is a flow chart that describes the manufacturing process of a novel crutch from a design concept to actual products. The design process concept is based on an improved approach to industrial design structures (IDeS). Following the conceptual designs, prototypes of the novel crutch were built and refined for optimal shape, structure. Finally, an experimental model was developed for product testing.

Structure of the 3D underarm crutch

Figure 4 shows the overall structure of the underarm crutch, which consists of three parts, including upper, middle and lower. The upper part includes the supporting pad, with guards on both sides, which are held in place by screws. The middle part consists mainly of the main body tube and the handle. The main tube is divided into three sections, each of which is linked to the other by screws. The end tube is designed as a Y-shaped structure with elastic springs placed inside the wall of the tube. The handle is divided into a handle inner tube and a handle bushing. The lower part consists of a supporting bar and a supporting foot. The supporting bar is slotted and threaded to link the main tube to the supporting foot and hold the spring in the Y-shaped tube wall. The average height of the world's population is 159.5 cm for women and 171 cm for men, and the highest and lowest average heights in the world are 184cm and 151cm, respectively. Moreover, the average height of children aged 12 years is approximately 150cm. Based on these data on human height, and using height measurement formula for crutches. This formula is reported to be the most accurate predictor of the appropriate crutch height. the appropriate height of the crutches was calculated to be approximately 109 cm to 144 cm (The crutch height formula equals User height less 40.6 cm). There was no significant increase in energy expenditure or walking speed when the cane height was within the appropriate ± 2.5 cm range. Furthermore, the structure of the components and the design foundations will be analyzed in separate sections.

Structure of 3D support pads and guards

Underarm pads with appropriate sizes are fixed to the top of the crutches, where they will be directly contacting the body. When the user is standing, the axillae will carry approximately 34% of the user's body weight. Therefore, the underarm pads must be comfortable while providing sufficient support.

The main structural difference between 3D supporting pads and conventional supporting pads is the curvature. 3D supporting pads have the same height at both ends and gradually decrease towards the centre simultaneously. The change in curvature allows the axilla to remain relatively level with the crutch supporting during the movement. However, conventional supporting pads

generally have a relatively flat supporting surface. When moving, the axilla is angled to the crutches.

Figure 5 shows the proposed 3D axillary pad model, which is an improved model based on the existing standard commercial axillary pad, the traditional model derived from Millenial Medical. Specifically, the inclination angles of the underarm pads towards the center on both sides are thickened and extended as honeycombs, offering better comfort and stability to the users. However, the final structural shape depends on the actual material, which is usually polyurethanes for underarm pads. They are stable materials with a light weight (36 kg/m) and resistance to high temperatures, but they are rather inflexible and vulnerable to tearing ((Nasruddin, Bondan & Agustini, 2020). The proposed 3D underarm pad will experiment on a new material named natural rubber SIR-20. This material has a high tear strength (8.50KN/M) and tensile strength (300%), but it is not structurally homogeneous (Nasruddin, Bondan & Agustini, 2020). Therefore, this study would attempt to optimize the thermoplastic polyurethane (TPU) structure as a feasible and preferred material for crutch manufacture. TPU has been used as the raw material to 3D-print hexagonal honeycombs using fused filament fabrication (FFF), and the printed structures exhibited higher energy absorption and deformation resistance.

Structure of the main body tube

The main body tube supports the crutch and connects the underarm pad to the crutch foot. Figure 6 shows a diagram of the structure of the main body tube and the position of the internal spring. The structure of the main tube is divided into three sections, with multiple screw holes in the wall for each, which can be combined to different lengths, based on the Riego design for a detachable walking stick. The first section has a raised column at the top to attach and secure the supporting pad. The second section links the handle, with the largest diameter and screw holes at both ends, to allow the insertion between the first and third sections of the tube. The third section is fitted with a spring inside threaded on the outer wall at the bottom, which is sealed by a threaded cap. By moving down the spring, the vibration and walking gait of the crutch can be reduced and altered, and the trajectory of the vertical ground reaction force can be reduced to a dominant peak. Meanwhile, a reverse force (GRF) is created by the elastic energy to propel the crutches. Shows the position of the spring inside the crutch. The spring crutches have been indicated to reduce the reaction force-velocity by approximately 33% and the reaction force pulse by approximately 20%. GRFs are created to reduce impact injuries to the hand and wrist. The key to a pair of good spring-loaded crutches is spring stiffness. If it is too high, GRFs will be too strong; if it is too low, the support will become insufficient

Structure of the grip

The grip consists of two parts. The internal handle is cylindrical in shape, threaded inwards at each end and can be screwed to the main body tube as shown in Figure 8. Crutch users often suffer from excessive hand stress and wrist disorders, which can be attributed to weight transfer to the upper limb. Studies have shown that when using crutches, the arm would endure a reaction force as large as approximately 40% of the body weight. Moreover, the risk of ulnar tunnel syndrome exists even when using axillary crutches for short periods. Therefore, reducing stress on the hand and wrist is essential to prevent such complications. Researchers have found that round and square grips are not effective in reducing the incidence of wrist syndrome. Moreover, ergonomically designed structures can significantly reduce wrist pressure.

Structure of the supporting bar and legs

Shows the structure of the proposed walking stick model, inspired by the design of Chiam and Sheng. The supporting rod is an important connecting component in the middle and lower part of the crutch, and the spring inside the wall of the top link tube provides support for the crutch as a compression spring. The upper part of the cylindrical supporting bar has the same larger diameter, as the spring. The rod is locked into the Y-shaped tube wall by tightening the threaded cap. The threaded rubber foot for crutches was invented at the end of the 18th century. The crutch foot is the only section that contacts the ground in a crutch, making it essential for better stability and

balance of the crutch as a whole. The lower part of the crutch foot is a thin cylinder with a recessed thread at the top, to enhance the connection to the supporting rod, with the gradually increasing diameter area from the top to the bottom. Higher stability is realized through a larger contact area with the ground. The small holes on the surface allow rainwater to be removed from slippery surfaces so that the adhesion to the ground can be maintained. And the threaded bottom further prevents slippage.

From the analysis of experiments and literature, it was concluded that. A new 3D axillary crutch structure has been designed. Compared to traditional axillary crutches, the main features of the new axillary crutch include: two side shields for the support pads; a three-stage body tube; an outer handle cover that better fits the shape of the human hand; a built-in elastic spring for the crutches; and the use of PTU material, produced by 3D printing.

PU-0617

眼眶周围异常结构的 X 线检查

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目的：眼眶 X 线检查可以显示眼眶的容积、眶壁、泪腺窝、视神经孔、眶上裂、蝶骨嵴和鼻窦的改变，适用于眼眶的外伤、眶肿瘤。

方法：普通胶片检查：常规轨道 X 射线普通胶片检查采用 23°鼻额投影。当需要了解视孔时，添加后 53°或前 37°斜侧投影。在正交胶片上：岩石骨可以避免与轨道重叠，但投射在上颌窦上，这有利于观察轨道和邻近的额窦和筛窦以及部分前颅骨和中颅低结构。观察期间应进行双边控制。正常的人类双侧骨轨道轮廓基本上是对称的，略呈方形。由于侧轨道边缘的倾斜结构，正交投影往往不清楚。轨道的侧壁上有一条倾斜的白线，这是额翼和蝶翼侧颞曲率的切向投影，通常被称为轨道斜线或匿名线。眼眶的正常眶顶，通常是脑回压迹增白影，骨缝的外眼眶壁有不规则的硬化和增白，不能被误认为是疾病，下眼眶通常略低于眼眶下边缘，中间可以看到椭圆形和眶下孔。在深的轨道上，有眶上裂缝被蝶骨的大翼和小翼包围，其中大多数是倒逗号形的光传输区域，正常两侧的形状和大小往往不同。光学孔隙：光学孔隙投影在轨道的外下象限，隐藏在蝶骨的腭骨底部。眶上裂缝位于其侧面，后筛窦位于其下内侧。当正常人的视神经前缘为 4-5 岁时，它已经达到了一个成人尺寸，内径为 4.9×5.3 毫米，椭圆形或圆形，有薄环和密集的骨边缘。

结论：

眼部 X 线检查临床上主要用于眼眶肿瘤、眼部外伤、眼内及眼眶金属异物等诊断与鉴别诊断，尤其是用于眼内金属异物及其他高密度异物的定位。

PU-0618

安宁市紧密型医共体与“千县工程”下医学影像中心赋能基层效应

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目的：探讨安宁市紧密型医共体与“千县工程”下医学影像中心赋能基层构建模式，提升基层医疗服务能力。方法：1、收集国家及政府关于“紧密型医共体与“千县工程”下医学影像中心赋能基层”相关政策支持；2、采用现场核实、访谈及调查问卷等方式进行现状调查，明确影像中心及基层医院存在的问题。结果：1、国家政策各级政府的支持，《国家卫生健康委办公厅关于印发“千县工程”县医院综合能力提升工作方案（2021-2025 年）的通知》国卫办医函（2021）538 号；《云南省卫生健康委关于印发云南省“百县工程”县医院综合能力提升工作方案（2021-2025 年）的通知》；2、

现状：（1）基层医院影像人员不足，人员技术水平低；（2）基层医院缺乏影像同质化标准；（3）基层医院设备老旧、缺乏 CT 机器；（4）影像中心与基层医院影像数据信息化互联互通不畅。3、措施：实行资源共享，诊断医师多点执业，建立基层专工作站；指导基层医院开展 CT 扫描技术；打造县乡村一体化信息沟通平台；建立基层远程诊疗体系，扩建医共体区域影像信息平台；影像同质化管理。4、成效：（1）赋能后基层医院影像诊断符合率、车载移动 CT 设备开机率、患者满意度、临床工作人员满意度及影像工作人员满意度均呈正向提升；（2）赋能后影像中心 DR、CT 及 MRI 平扫、增强检查人次和介入手术台次呈逐年上升趋势。结论：安宁市紧密型医共体与“千县工程”下医学影像中心赋能基层模式的构建，通过人员、设备、技术的赋能，提升基层诊断符合率及设备利用率，最终提升基层医疗服务能力。

PU-0619

基于 XR 的具身化教学方式在放射科规范化培训中的应用

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目的：探讨基于 XR 的具身化教学方式在住院医师放射科规范化培训中的应用价值。方法：选取神经内科、骨科、儿科专业的规培学员各 20 名，将 60 名学员分成 2 组，每组 30 人，由各专业随机抽取的 10 人组成；对照组采取传统方式教学，试验组则充分利用 XR 资源开展混合式学习；通过闭卷考试和问卷调查等方法对两组进行教学效果评价。结果：采取基于 XR 的具身化教学方式的试验组学员考试成绩为（84.5±5.8）分，采取传统教学方式对照组学员考试成绩为（77.3±6.2），差异有统计学意义（ $P<0.05$ ）；回收问卷 60 份，试验组总分（21.8±5.6）分，对照组（16.2±7.2）分，差异有统计学意义（ $P<0.05$ ）。结论：将基于 XR 的具身化教学方式运用于住院医师的放射科规培教学中，对医学影像翻转课堂教学实现具身化升级，增加学习过程的沉浸性、趣味性、交互性和构想性，重构虚实融生的具身化医学影像教学场景，帮助规培学员更快速有效地建立起“整体与断层、正常与异常、病理到影像”的医学影像逻辑思维和空间想象力，深度强化影像医师核心专业能力，促进学员学习兴趣和教学效率同步提高，学习效果显著提升。

PU-0620

PACS 联合人工智能在影像本科实习教学中的应用

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目的 评估图像存储与传输系统（picture archiving and communication system, PACS）联合人工智能（artificial intelligence, AI）模式在影像本科实习教学中的应用效果。方法 2022 年 1 月至 2023 年 1 月，选取于安徽医科大学第一附属医院影像科实习的影像专业本科生 80 名作为研究对象，随机分成研究组和对照组（每组 40 人），研究组实施 PACS 联合 AI 教学模式，对照组实施传统带教模式。通过实践技能考核和问卷调查评价教学效果。结果 研究组学员总成绩和分项成绩（报告书写规范性、影像诊断思路、专业技术知识）高于对照组（ $P<0.05$ ）。研究组学员对新型带教模式的认可度（学习兴趣激发、读片技能提升、影像诊断思维培养）较对照组更高（ $P<0.05$ ）。结论 PACS 联合 AI 的教学效果优于传统实习带教模式。

PU-0621

Discussion on PBL combined with CBL teaching mode based on PACS in undergraduate practice teaching of medical imaging

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Objective To explore the method of problem-based learning (PBL) combined with case-based learning (CBL) based on PACS to improve the effect of medical imaging undergraduate practice teaching. **Methods** To select 14 undergraduate students majoring in imaging from July 2021 to June 2022 in the radiology department of the Second Affiliated Hospital of Anhui Medical University. According to the teaching outline of undergraduate internship in imaging, two groups of cases were randomly selected according to the traditional teaching mode and the PBL combined CBL teaching mode based on PACS, which were taught by the same teacher. The teaching effects of the two groups were compared, and the satisfaction of the two teaching modes was investigated by questionnaire. **Results** Compared with the traditional teaching mode, PBL combined with CBL based on PACS has obvious advantages in stimulating students' interest in learning, deepening the understanding of basic image knowledge and grasping image signs, enhancing students' ability to analyze and solve problems, cultivating their thinking of image diagnosis and improving their practical ability, and the differences are statistically significant ($P < 0.001$). According to the questionnaire survey, students are generally satisfied with PBL combined with CBL based on PACS, with a satisfaction rate of 100%, which is significantly higher than the traditional teaching mode. **Conclusions** The PBL combined with CBL teaching method based on PACS is a scientific and effective teaching mode, which can obviously improve the teaching effect of undergraduate practice in imaging.

PU-0622

开展职业生涯规划教育对放射医学技术专业学员挫折教育情境现状及影响因素的调查分析

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摘要：临床放射医学技术性实践工作，是贯穿整个临床放射医学技术专业教学中重要的组成部分，也是临床放射医学技术专业学生在巩固与加强理论知识的同时，培养其具有独立工作能力的一个重要性阶段。这是继学校理论知识教育的深化和延续，但在现实培养教育工作中，临床放射医学技术专业教学质量受到来自多方面因素的影响。通过本调查研究分析发现，临床放射医学技术专业学生自身的理论知识储备量，以及临床带教老师专业性技能的熟练程度和患者所具有的个人素质等多方面因素，这些都有可能影响到临床放射医学技术专业教学中的整体质量，所以要针对这些特定性因素，如何在日常的临床实践工作中去加强人文关怀？如何正确引导临床放射医学技术专业学生的学习态度？又如何去给临床放射医学技术专业实习学生们创造更多的临床实践机会？这些都是当前在临床教学工作中所要面对的新问题，在深化理论知识学习的同时应加强临床一线师资队伍的建设，完善优化临床教学方法，将有效提高临床放射医学技术专业带教工作的质量。

PU-0623

双导师制结合比较影像学在医学影像实习教学中的

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目的 探讨双导师制结合比较影像学的教学模式在影像科实习带教中的应用价值。方法 选择在曲靖市第二人民医院医学影像科实习的 2016、2017 级医学影像专业五年制本科学生作为研究对象,其中对照组为 2016 级 10 名同学,采用双导师制的教学模式,2017 级 9 名学生为研究组,采用双导师制结合比较影像学的教学方法,实习结束后对比分析两组学生的出科理论考试成绩、技能操作成绩、影像报告书写的成绩。结果 试验组实习同学对教学的效果评价、理论成绩、技能操作成绩、影像报告书写成绩及总成绩均高于对照组,差异具有统计学意义 ($P < 0.01$)。结论 双导师制结合比较影像学的临床带教模式可以提高实习同学的理论知识水平及临床实践能力,是培养能够胜任医院医学影像科工作的影像专业人才的最佳途径,能够帮助医学生很快向名副其实的影像医生角色转换。

PU-0624

Dow-regulation of CtBP2 inhibits proliferation, migration and invasion of Caki-1 cells in vitro

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Clear cell renal cell carcinoma (ccRCC) has been associated with the highest mortality rates. CtBP2 is a member of CtBP family, which works as a transcription regulator protein and is identified because of its interaction of C-terminus of the adenovirus E1A oncoprotein. CtBP2 modulates several tumorigenic processes, including growth, proliferation, and invasion in a variety of cancer cells. Over-expression of CtBP2 is associated with tumorigenesis and poor clinical outcome of prostate cancer, and low-expression of CtBP2 inhibited the proliferation of prostate cancer cells. In this report, the expression of CtBP2 in human ccRCC cell line Caki-1 was down-regulated by using RNAi lentivirus in vitro. The growth of Caki-1 cells was assessed by using CCK-8 and clone formation assays; the cell cycle was determined by FACS analysis, and the number of cells in S-phase was also accessed using an EdU assay. After 72 h, 96 h, and 120 h of culturing in 96-well plates, OD450nm values of the CtBP2-RNAi cells were significantly lower than those of the control group. The clone forming efficiency of the CtBP2-RNAi group was significantly decreased compared to that in control group. The proportion of cells in S-phase in the CtBP2-RNAi group was lesser than that in the control group, while the proportion of cells in G2/M-phase in the CtBP2-RNAi group was greater than that in the control group. Down-regulation of CtBP2 also impeded cell migration and invasion, as determined using wound healing and cell invasion assays. These results indicated that down-regulation of CtBP2 inhibited the cell proliferation ability and arrested the cell cycle at G2/M-phase, also lead to decreased migration, and invasion of Caki-1 cells in vitro, and CtBP2 might be a potential target to suppress tumorigenesis of ccRCC.

PU-0625

基于动态功能连接研究脑白质高信号程度与认知功能的相关性

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目的

本研究基于静息态功能磁共振数据,通过动态功能连接研究 WMH 不同严重程度与认知功能的关系,旨在揭示其可能的神经功能机制。

方法

本研究根据脑白质高信号 Fazekas 等级量表将所有 WMH 受试者分为轻度 WMH 组及重度 WMH 组:

(1) Fazekas 评分为 1-2 分:轻度 WMH 患者 (n=55);(2) Fazekas 评分为 3-6 分:重度 WMH 患者 (n=30)。使用独立成分分析 (ICA) 方法获得受试者的静息态脑连接网络 (ICNs);采用滑动时间窗分析方法获得静息态脑连接网络动态功能连接矩阵;获得动态功能连接状态 (state) 以及时间特性指标 (时间分数、平均滞留时间、转换次数)。比较两组受试者的动态功能连接时间特性的差异。采用 Pearson 相关性分析探究 WMH 患者动态功能连接时间特性参数与脑白质高信号 Fazekas 等级评分的关系。

结果

年龄是影响 WMH 严重程度的重要因素,重度 WMH 患者年龄明显大于轻度 WMH 患者。WMH 患者显示四种动态功能连接状态 (state 1: 中等功能连接模式, state 2: 弱功能连接模式, state 3: 中等功能连接模式, state 4: 强功能连接模式)。在四种状态中,WMH 患者弱功能连接 state 2 出现频率最高 (29%),强功能连接 state 4 出现频率最低 (20%)。与轻度 WMH 患者相比,重度 WMH 患者在弱功能连接 state 2 中的平均滞留时间较长,在强功能连接 state 4 中的平均滞留时间较短,在 state 3 中的平均滞留时间明显更长。WMH 严重程度一定程度上可能由动态功能连接时间特性反映,表现在 WMH 患者状态间的转换次数与脑白质高信号 Fazekas 等级评分呈负相关。

结论

本研究认为 WMH 不同严重程度患者可能是通过影响动态功能连接时间特性来影响患者认知功能,动态功能连接对于揭示 WMH 不同严重程度和认知功能的关系有一定的提示作用。

PU-0626

表现为磨玻璃密度结节的肺腺癌的 CT 影像分析

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目的:提高对表现为磨玻璃密度结节的肺腺癌 CT 影像认识。

方法:收集我院 2012 年 1 月到 2019 年 12 期间经手术切除、病理诊断为肺腺癌的 CT 影像及临床资料,筛选出磨玻璃密度表现病灶,按照 2011 年肺腺癌国际多学科分类标准,浸润前病变 18 例 (非典型增生 7 例,原位腺癌 11 例),微浸润性腺癌 12 例,浸润性腺癌 33 例,记录分析三组的部位、大小、边缘特征 (毛刺、分叶、胸膜凹陷征、血管集束征),内部特征 (空泡征、支气管改变、实性成分)。

结果:浸润前病变组年龄平均为 (53.94±12.28) 岁,微浸润性腺癌组为平均 (61.08±9.53) 岁,浸润性腺癌组 (62.21±10.18) 岁,浸润前病变组年龄小于微浸润及浸润腺癌组,且差异有统计学意义 (P<0.05),浸润前病变与微浸润性腺癌组、微浸润性与浸润性腺癌组差异均无统计学意义 (P>0.05);发病性别、部位无明显差异 (P>0.05),但三组均女性多于男性,发病部位右肺多于左肺;浸润前病变组大小平均为 (0.76±0.40) cm,微浸润性腺癌组为 (1.18±0.23) cm,浸润性腺癌组 (1.75±0.56) cm,三组间均存在统计学差异 (P<0.05);三组病变边缘特征 (毛刺、分叶、胸膜凹陷征、血管集束征) 及内部特征支气管改变、有无实性成分等均有统计学差异 (P<0.05),空泡无统计学差异 (P>0.05)。

结论:对磨玻璃密度结节大小、边缘特征 (毛刺、分叶、胸膜凹陷征、血管集束征) 及内部特征 (支气管改变、有无实性成分)、发病年龄的分析,有助于提高浸润性肺腺癌的诊断。

PU-0627

脑近期皮质下小梗死演变结局的相关因素分析

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目的 分析脑近期皮质下小梗死(RSSI)演变结局及相关因素。**方法** 收集 2015 年 1 月至 2018 年 12 月上海市同济医院住院治疗的 96 例小动脉闭塞型 RSSI 患者,男 60 例、女 36 例,年龄 64.5(58~73)岁,随访间隔时间 11.6(6.3~11.8)个月。记录患者入院时临床信息、基线头颅 MRI 影像资料及随访时梗死灶演变结局。根据 RSSI 结局转归,将患者分为腔化组(腔隙灶)和非腔化组(脑白质高信号和梗死灶消失),统计分析相关因素。**结果** (1)96 例 RSSI 随访时,59 例(61.5%)腔隙灶,32 例(33.3%)脑白质高信号,5 例(5.2%)梗死灶消失。(2)腔化组 RSSI 的 DWI 和 T2WI 梗死灶最大直径高于非腔化组[11.6(9.9~16.6)比 8.6(6.9~13.0)mm,11.8(9.7~16.2)比 8.8(6.7~13.1)mm],男性比例低于非腔化组(54.2%比 75.7%)($P<0.05$)。(3)二分类 Logistic 回归结果显示,DWI 梗死灶最大直径是腔化的独立预测因素($P=0.022$, $OR=1.138$)。梗死灶最大直径量化分析显示,DWI 最大直径 >15 mm 组腔化风险是直径 ≤ 10 mm 组 7.5 倍($P=0.010$, $OR=7.464$),直径 10~15 mm 组腔化与非腔化概率差异无统计学意义($P=0.129$, $OR=2.444$)。**结论** 本研究中 RSSI 多演变为腔隙灶(61.5%),部分演变为脑白质高信号或梗死灶消失(38.5%)。梗死灶 DWI 直径越大,腔化可能性越大

PU-0628

Brain network hierarchy reorganization in Alzheimer's disease: a resting-state functional magnetic resonance imaging study

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Abstract

Background: Hierarchy is a fundamental organizational principle of the human brain network. Whether and how the network hierarchy changes in Alzheimer's disease (AD) remains unclear.

Purpose: To explore brain network hierarchy alterations in AD and their clinical relevance.

Methods: 49 healthy controls (HCs), 49 patients with mild cognitive impairment (MCI), and 49 patients with AD were included. The brain network hierarchy of each group was depicted by connectome gradient analyses. We assessed the network hierarchy changes by comparing the gradient values in each network across the AD, MCI and HC groups. Whole-brain voxel-level gradient values were compared across the AD, MCI and HC groups to identify abnormal brain regions. Finally, we examined the relationships between altered gradient values and clinical features.

Results: In the secondary gradient, the posterior default mode network (DMN) gradient values decreased significantly in patients with AD compared with HCs. Regionally, compared with HCs, both MCI and AD groups showed that most of the brain regions with increased gradient values were located in anterior DMN, while most of the brain regions with decreased gradient values were located in posterior DMN. The decrease of gradients in the left middle occipital gyrus was associated with better logical memory performance. The increase of gradients in the right middle frontal gyrus was associated with lower rates of dementia.

Conclusion: The network hierarchy changed characteristically in patients with AD and was closely related to memory function and disease severity. These results provide a novel view for further understanding the underlying neuro-mechanisms of AD.

PU-0629

Large-Scale Granger Causal Brain Network based on Resting-State fMRI data

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The causal connections among small-scale regions based on resting-state fMRI data have been extensively studied and a lot of achievements have been demonstrated. However, the causal connection among large-scale regions was seldom discussed. In this paper, we applied global Granger causality analysis to construct the causal connections in the whole-brain network among 103 healthy subjects (33 M/66F, ages 20–23) based on a resting-state fMRI dataset. We further explored four large-scale cognitive networks which have been widely known: central executive network (CEN), default mode network (DMN), dorsal attention network (DAN) and salience network (SN). These four cognitive networks are particularly important for understanding higher cognitive functions and dysfunction. Based on the above research, Out-In degree were introduced to identify the driving and driven hubs. Studying the driving and driven hub of brain network is of great significance for assessing the functional mechanism of the brain network. There were 817 directed edges identified as significant among the 8010 possible causal connections; seven driving hubs and ten driven hubs were identified in the whole-brain network. In CEN, dorsolateral prefrontal cortex (DIPFC) and superior parietal cortex (SPC) were the driven and driving hubs, respectively; in DMN, they were posterior cingulate cortex (PCC) and medial prefrontal cortex (MPFC); in DAN, they were frontal eye fields (FEF) and intraparietal sulcus (IPS); and in SN, they were frontoinsula cortex (FIC) and medial frontal cortex (MFC). These findings may provide insights into our understanding of human brain function mechanisms and the diagnosis of brain diseases.

PU-0630

Description length guided nonlinear unified Granger causality analysis

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Most Granger causality analysis (GCA) methods still remain a two-stage scheme guided by different mathematical theories, both can actually be viewed as the same generalized model selection issues. Adhering to Occam's razor, we present a unified GCA (uGCA) based on the minimum description length principle. In this research, considering the common existence of nonlinearity in functional brain networks, we incorporated the nonlinear modeling procedure into the proposed uGCA method, in which an approximate representation of Taylor's expansion was adopted. Through synthetic data experiments, we revealed that nonlinear uGCA was obviously superior to its linear representation and the conventional GCA. Meanwhile, the nonlinear characteristics of high-order terms and cross terms would be successively drowned out as noise levels increased. Then, in real fMRI data involving mental arithmetic tasks, we further illustrated these nonlinear characteristics in fMRI data may indeed be drowned out at a high noise level, and hence a linear causal analysis procedure may be sufficient. Next, involving autism spectrum disorder patients data, compared with conventional GCA, the network property of causal connections obtained by uGCA methods appeared to be more consistent with clinical symptoms. In previous studies on functional brain networks, we have proposed a linear unified Granger causality analysis (uGCA) method based on description length. Considering that functional brain image data is characterized by nonlinear non-stationary signals with complex

long- and short-range correlations, we thus proposed a nonlinear uGCA method. Then through simulated data experiments and logical self-consistent fMRI experiments, its causality identification performance was demonstrated to be superior to that of conventional GCA. At the same time, we further revealed the phenomenon that nonlinear high-order characteristics and nonlinear cross characteristics were submerged successively at high noise levels, indicating that linear modeling procedures might be sufficient to cope with causality studies based on fMRI data

PU-0631

Increased Intrinsic Default-mode Network Activity as a Compensatory Mechanism in aMCI: A Resting-state Functional Connectivity MRI Study

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Numerous studies have investigated the differences in the mean functional connectivity (FC) strength between amnesic mild cognitive impairment (aMCI) patients and normal subjects using resting-state functional magnetic resonance imaging. However, whether the mean FC is increased, decreased or unchanged in aMCI patients compared to normal controls remains unclear. Two factors might lead to inconsistent results: the determination of regions of interest and the reliability of the FC.

We explored differences in FC and the degree centrality (Dc) constructed by the bootstrap method, between and within networks (default-mode network (DN), frontoparietal control network (CN), dorsal attention network (AN)), and resulting from a hierarchical-clustering algorithm.

The mean FC within the DN and CN was significantly increased ($P < 0.05$, uncorrected) in patients. Significant increases ($P < 0.05$, uncorrected) in the mean FC were found in patients between DN and CN and between DN and AN. Five pairs of FC (false discovery rate corrected) and the Dc of six regions (Bonferroni corrected) displayed a significant increase in patients. Lower cognitive ability was significantly associated with a greater increase in the Dc of the left superior temporal sulcus.

Our results demonstrate that the early dysfunctions in aMCI disease are mainly compensatory impairments.

PU-0632

终末期肾病维持性血液透析患者脑结构及功能改变的 MRI 研究

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目的: 联合应用基于体素的形态学测量 (VBM) 技术与平均比率低频振幅 (mfALFF) 方法分析维持性血液透析的终末期肾病 (ESRD) 患者大脑结构与功能的改变。

方法: 选取 2020 年 1 月至 2021 年 1 月于进行维持性血液透析的 ESRD 患者 43 例, 同期招募健康志愿者 (HC 组) 33 例。获取所有受试者神经心理学测试结果及 3DT1WI、rs-fMRI 数据。获得两组受试者间脑灰质体积 (GMV) 及平均 fALFF (mfALFF) 值有统计学差异的脑区。

结果: ESRD 维持性血液透析患者与 HC 组比较, 两组间年龄 ($t=0.101$, $P=0.920$)、性别 ($\chi^2=0.482$, $P=0.488$)、受教育程度 ($t=-1.842$, $P=0.069$) 差异均无统计学意义。与 HC 组相比, 维

持性血液透析的 ESRD 患者 MoCA 评分明显减低 ($p < 0.001$)。与 HC 组相比, 维持性血液透析的 ESRD 患者 GMV 值减低的脑区为: 左侧颞上回、左侧颞中回、左侧楔前叶、左侧中央前回、左侧后扣带回、右侧额上回、右侧额中回、右侧额下回、右侧颞中回 ($p < 0.05$); 平均 fALFF (mfALFF) 值减低的脑区为: 左侧颞上回、左侧额上回、左侧额中回、左侧额下回、左侧中央后回、左侧前扣带回、左侧枕中回、右侧楔前叶 ($p < 0.05$)。

结论: 本研究结果提示 ESRD 维持性血液透析患者疾病进展与代偿同时进行, 从结构与功能的视角揭示了早期干预治疗的可行性和必要性。

PU-0633

7T GluCEST MRI 和 rs-fMRI 对辐射诱导脑损伤的临床前监测: MRI 引导 OAR 回避的探索性研究

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目的: 谷氨酸化学交换饱和转移 (GluCEST) 已被证明是一种有前途的无创成像技术, 用于分析各种脑部疾病。CEST 效应能够提供胶质瘤、转移瘤、脑膜瘤等脑肿瘤代谢信息, 更准确了解肿瘤浸润程度, 为临床治疗和鉴别诊断提供参考价值。然而, 较少研究通过 CEST 调查放射性脑损伤 (RBI) 中危及器官 (OAR) 的代谢信息。此外, 磁共振引导放疗期间, RBI 早期缺乏异常解剖信息无法通过观察结构变化来识别损伤。因此, 评估全脑放疗 (WBRT) 后 GluCEST 作为 RBI 成像标志物的价值, 并展示 MRI 引导下回避 OAR 的可行性。此外, 这项研究的另一个目的是估计谷氨酸的变化是否与 rs-fMRI 观察到的大脑活动有关。

方法: 将大鼠分为两组: 对照组 (CTRL, $n = 9$) 和辐射诱导脑损伤组 (RBI, $n = 9$)。RBI 组大鼠用 X 线辐射器照射, 然后在 4 周后进行水迷宫实验。7T 小动物 MRI 获取 GluCEST 成像和静息态功能磁共振成像 (rs-fMRI), 评估大脑谷氨酸水平和功能异常。最后, 使用高效液相色谱 (HPLC) 测量海马的谷氨酸水平。

结果: 在水迷宫试验中, RBI 大鼠空间探索的时间和路径长度百分比显著降低 ($P < 0.05$)。大脑皮层和海马的平均 GluCEST 值显著降低 ($P < 0.05$)。HPLC 在海马表现出显著差异 ($P < 0.01$), 并与 GluCEST 值呈正相关。同样, RBI 组区域一致性 (ReHo) 的降低值 ($P < 0.01$), 表明大脑皮层和海马的神经元活动减少。RBI 大鼠的 GluCEST 值分别与神经元功能和空间记忆呈正相关。

结论: GluCEST 在 RBI 的早期阶段可视化监测谷氨酸的变化。此外, GluCEST 和 rs-fMRI 之间代谢/功能具有相关性。GluCEST 可能是监测放射治疗中 RBI 和 OAR 回避的敏感生物标志物, 便于放疗后辐射损伤的早期监测和早期干预。

PU-0634

新型抗氧化损伤与 NETs 清除纳米颗粒 用于干预缺血性脑卒中的炎症与神经损伤

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目的: 为了治疗脑缺血再灌注期间 NETs 介导的脑血管和神经损伤, 我们迫切需要设计具有高生物相容性的强 NETs 清除剂和抗氧化剂。因此我们设计了一种基于生物活性沸石咪唑盐骨架-8 的骨架, DNase-1 内封于其中, 并用 PDA 外包 (DNase-1@ZIF-8@PDA), 以实现 NETs 的直接和间接清除, 同时在抗氧化剂的作用下提高中风的治疗效果。

方法和材料：将 5mg 的 DNase-1 加入 5ml 的 2-甲基咪唑 (25.6mM, 溶于水溶液) 中, 搅拌 15 分钟。然后向混合溶液中加入 5ml 的 25.2mM 的 $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ 水溶液, 并在室温下再搅拌 20 分钟。将产品以 12000rpm 离心 10 分钟, 然后用水洗涤三次。最后的 DNase-1@ZIF-8 用 PDA 搅拌 12 小时, 以 12000rpm 离心 10 分钟, 用水洗涤三次, 得到最终产物。

结果：该纳米系统增强了脑组织的积聚, 具有良好的清除 NETs 和 ROS 的能力, 有效抑制了大脑中动脉闭塞小鼠脑组织中的脂质过氧化, 减少了脑组织中神经元的氧化损伤和凋亡。DNase-1@ZIF-8@PDA 还通过抑制星形胶质细胞的活化和促炎细胞因子的分泌来抑制炎症和免疫反应诱导的损伤, 从而在神经保护治疗中实现令人满意的预防和治疗。

结论：在本研究中, 我们合理的设计和合成了 ZIF 封端 DNase-1@ZIF-8@PDA, 其具有增强的抗氧化活性和清除 NETs 的能力。DNase-1@ZIF-8@PDA 可以直接消除卒中部位过量的 ROS, 并以直接和间接的方式抑制卒中区域 NETs 的产生, 从而在缺血性卒中的神经保护治疗中实现令人满意的高安全性预防和治疗。总之, 本研究不仅为原位合成以 ZIF 为生物活性表面修饰、DNase-1 为功能核心的协同纳米疗法提供了一种新方法, 而且揭示了缺血性脑卒中再灌注损伤的神经保护应用机制。

PU-0635

全氟化碳纳米粒调节肝癌乏氧增效索拉非尼疗效及成像研究

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目的：在我国, 原发性肝癌是第四位常见恶性肿瘤及第二位肿瘤致死病因。由于肝癌起病隐匿, 首次诊断时只有不到 30% 的肝癌患者适合接受根治性治疗, 系统抗肿瘤治疗在中晚期肝癌的治疗过程中发挥重要的作用。索拉非尼 (Bay 43-9006) 是最早用于肝癌系统抗肿瘤治疗的分子靶向药物, 也是我国的一线抗肿瘤方案。原发性肝癌的临床索拉非尼治疗受肝癌内乏氧环境影响, 乏氧能激活肝癌细胞内缺氧诱导因子表达, 进而通过多种下游通路引起肝癌的索拉非尼耐药性, 因而, 改善肝癌乏氧微环境对克服索拉非尼耐药性具有潜在意义。

方法：因此, 本研究采用全氟化碳作为核心, 并融合巨噬细胞膜作为生物伪装, 构建了载氧载药纳米脂质体 CM@SF&PFC。其中全氟化碳能很好溶解氧气, 兼具良好生物安全性, 是氧气递送的良好载体; 脂质体材料状态稳定, 可用于体内负载递送索拉非尼药物; 巨噬细胞膜与脂质体融合, 可帮助纳米材料在体内的生物伪装, 并具备一定同源靶向性。

结果：最终制备了稳定的纳米级载氧载药脂质体材料, 并在体外验证了材料的稳定性和氧递送能力, 在细胞水平验证材料的细胞摄取, 以及改善乏氧培养条件下肿瘤细胞内缺氧的能力, 和在此基础上增强索拉非尼杀伤克服耐药性的能力。

结论：本研究所设计的纳米材料 CM@SF&PFC 在体外很好得改善了肿瘤细胞的乏氧, 并增强了索拉非尼的杀伤效果。

PU-0636

Multifunctional PVCL nanogels enable magnetic resonance imaging and immunostimulated radiotherapy of orthotopic glioblastoma

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Glioblastoma multiforme (GBM) is the most aggressive malignant brain tumour with a high incidence and a low 5-year survival rate. Currently, despite multimodal treatment approaches that include surgical debulking of the tumour with subsequent RT or / and chemotherapy with temozolomide (TMZ), the overall survival time of patients remains unsatisfying. Radiotherapy (RT) is an indispensable way to improve the clinical symptoms of GBM and improve its survival rate. However, GBM cells are resistant to RT, which limited the efficient therapeutic effects of radiotherapy against GBM. Hence, it is necessary to develop a suitable treatment to improve anti-glioblastoma efficiency based on RT. The emergence of immunotherapy has afforded new therapeutic methods in cancer. Synergy between RT and immunotherapy in the treatment of advanced malignancies has aroused great attention. Irradiation-generated DNA fragments can lead to the secretion of type-I interferons (IFN-I) and enhance antitumour immunity induced by RT. Irradiation can also promote the release of cytokines and chemokines that strengthen the infiltration of DCs, natural killer cells, and CD8+ T cells into the tumour microenvironment. Therefore, combining RT and immunotherapy has emerged as an appealing approach for tumour elimination.

PU-0637

基于纳米碳联合热疗与化疗协同抑制乳腺癌细胞增殖及淋巴转移

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目的：本研究旨在探讨基于临床批准的淋巴示踪剂碳纳米混悬注射液（CNSI）的热疗和化疗对小鼠 4T1 乳腺癌细胞增殖以及迁移的影响。

方法：利用紫外分光光度计检测透析外液在 480 nm 处的吸光度并计算 THP 的累计释放量，绘制药物累计释放曲线。细胞层次通过 CCK-8、细胞划痕实验以及克隆形成实验评估 CNSI/THP 对小鼠 4T1 乳腺癌细胞的杀伤效果。通过 CCK-8 以及死活染色实验评估 CNSI/THP 联合 NIR-II 区光热对肿瘤细胞的杀伤效果。淋巴示踪以及光声成像性能评估：肉眼直视下将 CNSI 注入小鼠腋下淋巴结，观察并记录淋巴引流方向以及淋巴结染黑情况。利用多光谱光声断层扫描仪评估 CNSI 在肿瘤以及前哨淋巴结的光声成像性能。

结果：室温搅拌 20 小时后，THP 载药量可达 0.7 mg/mg。37 °C 摇床孵育 12 小时后，CNSI/THP 的累计释药量约为 22.9%。划痕实验以及克隆形成实验结果表明，CNSI/THP 可以显著抑制 4T1 三阴性乳腺癌细胞的迁移（ $34.9 \pm 1.1\%$ vs $25.3 \pm 1.8\%$ ， $P < 0.05$ ）和增殖（ $100 \pm 4.3\%$ vs $24.8 \pm 4.6\%$ ）。CCK-8 和死活染色实验进一步证实 CNSI 具有优异的光热性能，联合蒽环类化疗药物 THP 可协同抑制 4T1 三阴性乳腺癌细胞的增殖，并诱导最严重的肿瘤细胞死亡。活体水平证实了 CNSI 的淋巴示踪功能，且呈浓度依赖性和时间依赖性；明确了小鼠从腋下淋巴结到腋窝固有淋巴结的淋巴引流路径。体内外光声成像结果显示 CNSI 具有光声成像性能，瘤内以及瘤周注射 CNSI 后，4T1 原发肿瘤以及腋窝固有淋巴结部位的光声信号显著增强。

结论：本研究制备了集微波增敏、NIR-II 区光热、化疗以及光声成像于一体的新型多功能 CNSI/THP 纳米制剂，并联合热消融协同抑制小鼠 4T1 三阴性乳腺癌细胞的增殖和迁移。

PU-0638

In Situ Formed Z-Scheme Graphdiyne Heterojunction Realizes NIR-Photocatalytic Oxygen Evolution and Selective Radiosensitization for Hypoxic Tumors

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Photon radiotherapy is a common tool in the armory against tumors, but it is limited by hypoxia-related radioresistance of tumors and radiotoxicity to normal tissues. Here, we constructed a spatiotemporally controlled synergistic therapy platform based on the heterostructured CuO@Graphdiyne (CuO@GDY) nanocatalyst for simultaneously addressing the two key problems above in radiotherapy. First, the in situ formed Z-scheme CuO@GDY heterojunction performs highly efficient and controlled photocatalytic O₂ evolution upon nearinfrared (NIR) laser stimulation for tumor hypoxia alleviation. Subsequently, the CuO@GDY nanocatalyst with X-ray-stimulated Cu⁺ active sites can accelerate Fenton-like catalysis of ·OH production by responding to endogenous H₂O₂ for the selective killing of tumor cells rather than normal cells. In this way, the sequential combination of NIR-triggered photocatalytic O₂ production and X-ray-accelerated Fenton-like reaction can lead to a comprehensive radiosensitization. Overall, this synergism underscores a controllable and precise therapy modality for simultaneously unlocking the hypoxia and non-selectivity in radiotherapy.

PU-0639

新型光磁双模态超粒子在评估与调节肿瘤相关巨噬细胞中的应用研究

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目的：受限于肿瘤相关巨噬细胞（TAM）的影响，免疫治疗仅对部分肿瘤患者有令人惊讶的效果。因此，体内动态 TAM 成像在患者定制免疫治疗中至关重要，它可以识别将从免疫治疗中受益的患者，监测治疗效果，并改变 TAM 的极状态，是提高免疫治疗效果的一种有前途的策略。在这项工作中，我们开发了一种针对 TAM 的治疗诊断碳点/Fe₃O₄ 超粒子，以期实现肿瘤相关巨噬细胞的评估与调节。

方法：取 50mg IR-813 对甲苯磺酸盐，溶于 10ml 聚乙二醇（PEG 400）中，将混合液加入 100ml 反应釜中，加热至 180℃，8 小时；然后用 0.22um 滤膜过滤，然后 10000rpm*15 分钟，弃去上清液，通风橱干燥后得到固体碳点。将 5mgCds、5mgFe₃O₄ 和 40mgDSPE-PEG-甘露糖溶解在 5ml 甲苯中，按 1:1:8 的比例，超声混合 20 分钟，然后将混合物加入到装有 50ml 去离子水的烧瓶中，温度 60℃，磁力搅拌转速 400rpm，在磁力作用下和真空，以获得超粒子 DSPE-PEG-Man@Fe₃O₄-Cds。溶于 10ml PBS 中，用 0.44um 滤器过滤，避光保存备用。使用紫外-可见-近红外分光光度计、透射电子显微镜（TEM）、动态光散射（DSL）、3.0T 核磁共振（MRI）表征其理化特点。通过细胞实验及动物试验评估纳米粒子的生物安全性、靶向成像能力、转极化效果及肿瘤抑制效果。

结果：DSPE-PEG-Man@Fe₃O₄-Cds 超粒子在有效靶向 TAM 的同时，充分利用铁的核磁共振增强成像特性和碳点的红色荧光特性，实现体外非侵入性评价。同时，这种超粒子促进 TAM 从 M2 向 M1 的转变，重塑肿瘤免疫微环境，表现出强效的抗肿瘤作用。

结论：碳点/Fe₃O₄ 超粒子是一种有前景的肿瘤相关巨噬细胞治疗整合纳米粒子平台，为肿瘤免疫治疗的评估和治疗提供了新策略。

PU-0640

磁性纳米颗粒磁矩测量系统的设计与实现

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目的

磁性纳米材料磁学参数的测量,对该材料在生物医学领域中的应用与发展至关重要。磁矩描述了磁性物质在外磁场作用下受到的力矩。对于宏观尺度的材料,材料的磁矩是构成材料的总原子磁矩之和,但当材料的尺寸缩小到纳米级别时,材料的磁学性质会出现各种反常现象。在生物医学领域的应用中,磁性纳米材料往往是以磁流体形式存在,常见的磁矩测量手段不适合于磁性水溶胶材料的测量。本文提出一种新型的磁性纳米颗粒磁矩测量系统,通过对磁性水溶胶液滴在外磁场下的运动过程进行力学分析,计算出材料磁矩的方法。

方法

计算磁矩需要获得的信息包括:1. 驱动磁性纳米液滴运动的外磁场的分布信息,即;2. 磁性纳米液滴的速度及加速度,可以通过记录测量目标在梯度磁场下的运动状况,并对其运动轨迹进行图像分析获取;3. 根据测量目标运动速度获得的流体阻力。为了获取以上信息,我们设计了相应的实验方案及测量系统。磁性水溶胶液滴在外磁场的作用下运动时,整体受到的外力为磁力、重力、浮力及粘滞阻力,通过力学分析,并基于数字图像处理得到考虑重力影响的磁性纳米液滴的运动速度曲线与加速度曲线,最后计算得到磁性纳米液滴的磁矩曲线。

结果

对整个系统进行了测试,测试系统可以正常运行并成功测量了磁性液滴的磁矩。为了验证系统的准确性,对不同铁浓度的磁性水溶胶进行了测量,测量结果和铁浓度具有很好的线性相关性。同时对相同浓度不同体积的磁性水溶胶进行了测量,测量结果和测量的体积同样具有较高的线性相关性,这说明测量体积对系统的影响可以忽略。

讨论

磁性纳米颗粒在靶向治疗、核磁共振成像和热疗方面较大的应用前景,而材料的磁性是需要评估的特性之一,因此磁性纳米颗粒的磁矩测量具有重要意义。

PU-0641

化学激发光动力疗法联合 MRI 探针用于动脉粥样硬化的诊疗一体化研究

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背景:光动力疗法(PDT)在治疗肿瘤方面取得了持续的成功,但其在治疗动脉粥样硬化方面的进展有限,主要是由于激发光对光敏剂的组织穿透能力低。

方法:在这项研究中,我们设计了一种产生单线态氧的化学激发系统,试图在没有外部光照射的情况下将 PDT 应用于动脉粥样硬化的治疗。设计的系统是配备化学燃料和光敏剂的聚合物纳米粒子(NP),与 Fe³⁺-儿茶酚复合物交联,用于稳定和磁共振成像(MRI)。

结果:该系统(简称 FeCNPs)在斑块中有效积累,提供持久和增强的 T1 加权对比能力。FeCNPs 还通过消除巨噬细胞来阻止动脉粥样硬化的进展,并显著降低 T1-加权 MRI 显示的斑块大小和厚度。治疗后 CD68、MCP1 和 TNF α 的表达显著降低。然而,低剂量的 FeCNPs 表现出比高

剂量更好的治疗效果。此外,低剂量 FeCNPs 在主动脉弓和腹主动脉中表现出有效的巨噬细胞消除,但在胸主动脉、主动脉裂孔和主动脉-髂分叉处效率低下。

结论:本研究提供了第一个 MRI 和化学激发 PDT 联合治疗动脉粥样硬化的例子,证明了 PDT 的有效性,并为开发动脉粥样硬化的纳米疗法提供了重要的指导。

PU-0642

Iodine-Rich Nanoadjuvants for CT Imaging-Guided Photodynamic Immunotherapy of Breast Cancer

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Immunotherapy, which stimulates the body's own immune system to kill cancer cells, has shown great promise in the field of cancer therapy. However, the uncontrolled biodistribution of immunotherapeutic drugs may cause severe side effects. Herein, we report an iodine-rich nanoadjuvant (INA) for photo-immunotherapy. INA is prepared by encapsulating a toll-like receptor 7 agonist (R837) and a photosensitizer (phthalocyanine) into an iodine-rich amphiphilic copolymer PEG-PHEMA-I. By virtue of the enhanced permeation and retention (EPR) effect, INA can effectively accumulate into the tumor site. Under light irradiation, photodynamic therapy (PDT) triggered by INA will induce immunogenic cell death (ICD) in the tumor region to trigger the release of immune-associated cytokines. Such a process may further induce the maturation of dendritic cells which will be accelerated by R837, leading to the proliferation of effector T cells for immunotherapy. The photo-immunotherapy mediated by INA shows good anticancer efficacy both in vitro and in vivo. Meanwhile, INA is also a CT contrast agent owing to its high density of iodine, which can successfully illuminate tumors by CT imaging. Thus, our study develops a light-triggered nanoadjuvant for CT imaging-guided enhanced photoimmunotherapy.

PU-0643

Ferumoxytol 在磁共振胎盘灌注成像中的应用进展及优势

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Ferumoxytol 是一种经美国食品和药物管理局 (Food and Drug Administration, FDA) 批准的静脉注射氧化铁纳米颗粒药物, 由于其生物及物理特性, 近年来作为一种对比剂使用于磁共振成像 (magnetic resonance imaging, MRI)。

胎盘灌注不足主要包括母体血管灌注不良 (maternal vascular malperfusion, MVM) 和胎儿血管灌注不良 (fetal vascular malperfusion, FVM), 两者均可引起母体及胎儿多种血管病理变化, 然而目前医学成像技术在诊断胎盘灌注方面的能力有限。动态对比增强磁共振成像 (dynamic contrast-enhanced magnetic resonance imaging, DCE-MRI) 可以对胎盘灌注进行成像, 然而造影剂的选择依旧存在争议。文章比较了常用的胎盘灌注成像造影剂, 总结了胎盘灌注 MR 成像的要求、常用的序列、参数及后处理技术; 同时讨论了近 5 年 Ferumoxytol 在胎盘灌注成像中的应用及研究进展, 评价 Ferumoxytol 的安全性及成像有效性。

与此同时, Ferumoxytol 在胎盘检查中有其独特优势, 一方面 Ferumoxytol 极为安全, 其结构降低了渗漏进入胎盘的风险, 减少不稳定铁的释放。另一方面, 妊娠期缺铁性贫血发生概率较高, Ferumoxytol 能保证孕妇体内铁平衡不被破坏的同时进行成像, 极大地减少对胎儿和母体的影响。尽管患者体内 Ferumoxytol 的长期沉积仍需进一步研究; 对于曾接受过 Ferumoxytol 治疗的患者, 其体内正常结构的 MRI 信号变化仍缺乏认知。Ferumoxytol 已经显示出广阔的应用前景, 目前应当

使用其他动物模型进行研究,探究其作为对比剂的安全剂量及成像条件,为胎盘灌注成像提供更多新的技术手段。

PU-0644

Relationship between SLC6A2 gene polymorphisms and brain volume in Han Chinese adults who lost their sole child

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Background: Norepinephrine transporter (NET) is encoded by the SLC6A2 gene and is a potential target for studying the pathogenesis of PTSD. To the best of our knowledge, no prior investigations have examined SLC6A2 polymorphism-related neuroimaging abnormalities in PTSD patients.

Methods: In 218 Han Chinese adults who had lost their sole child, we investigated the association between the T-182C SLC6A2 genotype and gray matter volume (GMV). Participants included 57 PTSD sufferers and 161 non-PTSD sufferers, and each group was further separated into three subgroups based on each participant's SLC6A2 genotype (TT, CT, and CC). All participants received magnetic resonance imaging (MRI) and clinical evaluation. To assess the effects of PTSD diagnosis, genotype, and genotype \times diagnosis interaction on GMV, 2 \times 3 full factorial designs were used. Pearson's correlations were used to examine the association between GMV and CAPS, HAMD, and HAMA.

Results: The SLC6A2 genotype showed significant main effects on GMV of the left superior parietal gyrus (SPG) and the bilateral middle cingulate gyrus (MCG). Additionally, impacts of the SLC6A2 genotype-diagnosis interaction were discovered in the left superior frontal gyrus (SFG). The CAPS, HAMA, and HAMD scores, as well as the genotype main effect and diagnostic SLC6A2 interaction, did not significantly correlate with each other.

Conclusion: These findings indicate a modulatory effect that the SLC6A2 polymorphism exerts on the SPG and MCG, irrespective of PTSD diagnosis. We found evidence to suggest that the SLC6A2 genotype-diagnosis interaction on SFG may potentially contribute to PTSD development in adults who lost their sole child.

PU-0645

DWI 定量参数预测宫颈癌程序性死亡蛋白配体 1 阳性表达: 不同 ROI 选择的比较

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目的 探究基于不同 ROI 选择测量的 ADC 值与宫颈癌程序性死亡蛋白配体 1(programmed cell death-Ligand 1, PD-L1)表达的相关性,并基于临床、病理及 MR 扩散加权成像(DWI)定量参数构建列线图预测 PD-L1 阳性表达的临床价值。

材料与方法 回顾性收集 2018 年 1 月-2020 年 7 月来我院就诊的初诊宫颈癌患者为训练组(683 例),行盆腔 MRI 扫描,并对病理标本行 PD-L1 免疫组织化学染色。参考 T2WI 及增强扫描图像,分别在 DWI 图像上采用三种不同的 ROI 勾画方式分别测得 ADCmean、ADCss 及 ADCmin。比较 PD-L1 阳性表达组与阴性表达组间临床、病理资料及不同 ROI 选择所提取的 ADC 值。采用单、多因素 logistic 回归确定宫颈癌 PD-L1 阳性表达的独立相关因素,并构建临床病理模型及临床病理影像联合模型。通过受试者工作特征(receiver operating characteristic, ROC)曲线下面积(area under the curve, AUC)和 DeLong 检验评估不同 ADC 值及模型的诊断效能。绘制联合模型的列线图,校准曲线及决策曲线。前瞻性收集 2020 年 8 月-2022 年 12 月就诊的患者为验证组(332 例)对列线图进行验证。

结果 ADCmean、ADCss、ADCmin 均与 PD-L1 阳性表达相关,其中 ADCmin 的诊断效能最高(AUC=0.882, 95%CI: 0.855-0.905); FIGO 分期、病理分级、宫旁浸润、淋巴结转移、ADCmin 均为 PD-L1 阳性表达的独立相关因素,联合上述特征所构建的列线图在训练和验证组中均表现良好的诊断效能, AUC 分别为 0.906(95%CI: 0.882-0.927)和 0.903(95%CI: 0.866-0.933);校准曲线显示该列线图的拟合度良好,决策曲线显示该列线图的临床净收益高于临床病理模型。

结论 临床、病理及 ADCmin 联合构建的列线图可有效预测宫颈癌 PD-L1 阳性表达,可为临床宫颈癌免疫疗法选择提供理论依据。

PU-0646

The Strategy of Precise Targeting and In Situ Oxygenating for Enhanced Triple-Negative Breast Cancer Chemophototherapy

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Abstract: The absence of effective therapeutic targets and tumor hypoxia are the main causes of failure in the treatment of triple-negative breast cancer (TNBC). Biomimetic nanotechnology and tumor microenvironment (TME)-responsiveness bring hope and opportunity to address this problem. Here, we develop a core membrane nanoplatfrom (HM/D-I-BL) using hollow mesoporous manganese dioxide (HM) coated with biomimetic cancer cell membrane for enhanced chemotherapy/phototherapy via the strategy of precise drug delivery and hypoxia amelioration. Cancer cell membrane modification endows HM/D-I-BL with excellent homologous targeting and immune escape performance. The cellular uptake and fluorescence imaging studies confirmed that HM/D-I-BL can be accurately delivered to tumor sites. HM/D-I-BL also features efficient in situ O₂ generation in tumor upon laser irradiation, and subsequently enhanced chemotherapy/phototherapy, pointing to its usefulness as a TME-responsive nanozyme to alleviate tumor hypoxia in the presence of H₂O₂. In addition, HM/D-I-BL showed good fluorescence and magnetic resonance imaging performances, which offers a reliable multimodal image-guided combination tumor therapy for precision theranostics in the future. In general, this intelligent biomimetic nanoplatfrom with its homotypic tumor targeting, in situ alleviation of tumor hypoxia and synergetic chemophototherapy would open up a new dimension for the precision treatment of TNBC.

PU-0647

靶向 EGFR 的三阴性乳腺癌脑转移早期分子成像聂芳¹、杨健²、李琳³、臧凤超¹、居胜红¹

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目的：癌症脑转移预后不良，早期发现可为治疗赢得宝贵时间。三阴性乳腺癌是 ER\PR\HER2 皆为阴性的乳腺癌，内分泌治疗和靶向治疗不敏感，由于侵袭性强，临床脑转移概率大。血脑屏障的存在限制了成像对比剂入脑，从而导致脑转移早期诊断困难。本课题组通过构建跨血脑屏障的荧光/MR 双模态探针尝试对小鼠三阴性乳腺癌脑转移进行早期诊断。

方法：以第五代 Dendrimer 大分子为载体，通过连接 Angiopep2 和 GE11 小肽构建跨血脑屏障、靶向 EGFR 的分子探针，通过 PEG 化延长探针循环时间和增加脑转移病灶富集，通过连入 DOTA-Ga 和 DIR797 分别进行 MR 和近红外成像。体外检测探针毒性，并通过免疫荧光分析和流式细胞检测验证探针与细胞的结合，通过心室注射 MDA-MB-231BR 细胞构建三阴性乳腺癌脑转移小鼠模型，以健康裸鼠作为空白对照，在第 11 天、21 天、31 天分别进行 MR 平扫及马根维显增强成像，从而跟踪病灶发展，并通过静脉注射探针进行 MR 和近红外荧光成像。

结果：细胞毒性检测结果显示 Den-Angio-GE11 目的探针在 100uM 时对细胞活力没有明显影响，体外免疫荧光和流式细胞检测探针与 MDA-MB-231BR 细胞结合率达 80% 以上；对脑转移小鼠模型 MR 检测结果显示，在造模 21 天后 10% 小鼠呈现 T2WI 多发高信号病灶，在造模 31 天后所有小鼠均呈现 T2WI 高信号病灶，对模型成功小鼠进行尾静脉注射探针后 T1WI 增强中度提高，但脑部荧光信号显著强于对照探针组（Den-Ge11 及 Den-Angio 组）。在造模 11 天后进行早期成像，所有小鼠 T2WI、T1WI 和 T1WI 增强图像上无疑似病灶，注射目的探针后脑转移模型小鼠脑部荧光信号明显强于空白健康组；21 天后注射探针荧光成像组小鼠脑部荧光强度明显增强，脑组织病理检测结果显示，目的探针阳性组小鼠脑部呈现多处微小病灶。

结论：在 MDA-MB-231BR 细胞构建的三阴性乳腺癌脑转移小鼠模型中，21 天后可用磁共振 T2WI 序列检测部分病灶，本研究基于 EGFR 靶向的荧光/MR 双模态探针在造模 11 天时即可检出病灶信号。

PU-0648

异机融合 11C-蛋氨酸 PET/MRI 在原发性与残留/复发性脑胶质瘤诊断中的应用

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目的 探讨异机融合 11C-PET/MRI 对疑似原发性与残留/复发性脑胶质瘤患者的诊断价值。方法 回顾性分析 2019 年 6 月—2022 年 12 月于武汉大学人民医院 PET 中心行异机融合 11C-MET PET/MRI 的 65 例疑似原发性或残留/复发性脑胶质瘤的患者资料。疑似原发性脑胶质瘤的初诊患者 41 例纳入初诊组，脑胶质瘤手术/放射治疗后疑似肿瘤残留/复发患者 24 例纳入复诊组。评估 PET 与 MRI 及 PET/MRI 融合图像特征，于后处理工作站测量并计算病灶的标准化最大摄取值、靶与非靶比值、肿瘤代谢体积、脑血流量、表观弥散系数与胆碱/ N-乙酰基天门冬氨酸比值等半定量参数。以患者的病理组织学诊断或经长期临床或影像学随访所获的临床最终诊断为金标准，评估并比较异机融合 PET/MRI、PET/CT 或 MRI 诊断原发性脑胶质瘤与术后残留/复发性胶质瘤肿瘤的灵敏度、特异度与准确度差异。比较初诊组内良性与恶性病变的患者亚组间、恶性病变不同病理类型的患者亚组间，以及复诊组内肿瘤残留/复发与治疗改变患者间 PET/MRI 的图像特征、PET 与

MRI 及半定量参数的差异。结果 (1) 初诊组: 11C-MET PET/MRI 对原发性胶质瘤诊断的灵敏度高于 MRI、特异度高于 PET/CT、准确度高于 PET/CT 与 MRI, 差异均有统计学意义 (P 值均 <0.05)。良恶性病变亚组患者间强化特征、瘤周水肿与占位效应分级等 MR 图像特征, SUVmax、T/N、CBF、Cho/NAA 等半定量参数比较, 差异均有统计学意义 (P 值均 <0.05)。(2) 复诊组: 中 11C-MET PET/MRI 对残留/复发性胶质瘤诊断的灵敏度与准确度均高于 PET/CT 与 MRI, 差异有统计学意义 (P 值均 <0.05)。肿瘤残留/复发与治疗组患者间 SUVmax、MTV、T/N、CBF 和 Cho/NAA 等半定量参数比较, 差异均有统计学意义 (P 值均 <0.05)。结论 11C-MET PET/CT 在区分胶质瘤与良性病变、残留/复发性脑胶质瘤与治疗组改变上较 MR 具有明显优势, 但在确定恶性病变具体病理类型方面存在限制, 而 MRI 图像特征可有效弥补该不足。

PU-0649

基于铜死亡的新型智能释药纳米平台在 肝癌精准成像及放疗增敏中的应用

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目的: 肝细胞癌作为世界第三大癌症相关死亡原因, 因其起病隐匿、转移早, 大多数患者治疗效果不佳, 所以寻找有效的诊断和治疗方法是亟待解决的临床难题。基于此, 本研究设计了一种新型特异性靶向肝癌的智能释药纳米平台, 催化类芬顿反应并引发铜死亡, 同时兼具磁共振成像及放疗增敏功能, 有望为肝癌的诊断和治疗提供新思路。

方法: 合成一种具有靶向、肿瘤微环境响应性的 HA-PEG@CuO₂ 纳米颗粒并对其理化性能进行表征; 使用激光共聚焦、流式细胞术等对细胞内 ROS 及 ATP、线粒体膜电位去极化、DNA 损伤等进行评估; 构建原位肝癌 Balb/c 裸鼠模型联合放射治疗评估 HA-PEG@CuO₂ 在裸鼠体内的药物代谢、器官分布、放射增敏效果; 通过磁共振成像确定原位肝癌形成时间节点, 评估 HA-PEG@CuO₂ 的磁共振成像效果。

结果: 1、成功构建了肿瘤微环境响应的 HA-PEG@CuO₂, 粒径约 100nm, Zeta 电位约 30mv, 具有良好的分散性和生物安全性。2、体外实验证明, 联合治疗组细胞内产生的 ROS 明显高于单纯放疗组 (89.30%, 13.83%), 线粒体膜电位及 ATP (86.11%, 19.9%) 水平降低、DNA 损伤增加, 差异均具有统计学意义; Western Blot 证明 HA-PEG@CuO₂ 处理后可引起细胞内铜死亡相关蛋白 DLAT、FDX1 及 LIAS 的表达。3、体内实验表明, HA-PEG@CuO₂ 在原位肝癌裸鼠模型中表现出良好的靶向性和低毒性, 尾静脉注射 4h 后肿瘤部位 T1 信号明显增强, 具有用于肝癌诊断成像的潜力; 与对照组相比, 可显著增强放疗疗效, 表现出良好的抗肿瘤效果。

结论: 通过设计一种靶向肝癌的内源性刺激智能释药纳米平台, 可以特异性靶向肝癌细胞, 并在肿瘤微环境刺激下实现药物的可控释放。HA-PEG@CuO₂ 通过催化类芬顿反应及诱导铜死亡的发生来缓解肿瘤缺氧、打破肿瘤内高抗氧化体系、提高 X 线沉积效率等达到放疗增敏的目的; 同时利用铜离子的顺磁性效应进行肝癌精准成像。期望通过该新型智能释药纳米平台将肝癌的成像诊断与治疗相结合, 实现肝癌的早发现、早治疗。

PU-0650

增强型绿色荧光蛋白及超顺磁性氧化铁双标记神经干细胞对大鼠脑胶质瘤的磁共振追踪成像研究

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研究背景: 脑胶质瘤是最常见的颅内原发性恶性肿瘤, 肿瘤较易呈浸润性生长并且容易发生颅内转移, 因此肿瘤需要精确的定位诊断。

目的 将神经干细胞修饰以增强型绿色荧光蛋白 (EGFP), 通过神经干细胞对脑胶质瘤的定向迁移作用, 携带超顺磁性氧化铁纳米材料 (SPION) 对胶质瘤进行磁共振定位成像。

方法 将多能干细胞诱导成为神经干细胞, 并且使用 EGFP 对其修饰使其带上绿色荧光。对神经干细胞进行 SOX1, Nestin, PAX6, TUJ1 等一系列标志物的鉴定。之后将神经干细胞与 SPION 共孵育, 进行体外磁共振扫描、细胞毒性试验以及普鲁士蓝染色。通过立体定位注射胶质瘤细胞系建立大鼠胶质瘤的模型并通过磁共振验证。将神经干细胞与 SPION 共孵育进行标记后, 分别通过立体定位注射于胶质瘤对侧大脑半球, 以及通过尾静脉注射入大鼠静脉系统, 随后对大鼠进行连续两周的观察, 之后进行处死后, 进行脑组织切片染色。

结果 EGFP 以及 SPION 双标记的神经干细胞在进行立体定位注射及尾静脉注射后均可在磁共振成像、脑切片后绿色荧光蛋白成像以及普鲁士蓝染色观测到脑胶质瘤灶以及转移灶周围的神经干细胞以及超顺磁性氧化铁。

结论 多能干细胞可以顺利诱导成为神经干细胞, 并且神经干细胞可以携带超顺磁性氧化铁顺利到达脑胶质瘤原发灶以及转移灶周围, 为脑胶质瘤进行精确示踪。

PU-0651

Evaluation of microstructural changes in hypertensive patients by quantitative cardiac magnetic resonance techniques

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Objective: To apply T1 mapping and strain techniques to investigate myocardial microscopic changes in hypertensive patients.

Methods: Thirty-two hypertensive patients who met the enrollment criteria from September 2022 to August 2023 were consecutively recruited, and 20 healthy subjects were included as controls. All subjects underwent CMR examination and T1 mapping scan and showed no enhancement in LGE, two independent observers completed left atrial and left ventricular strain and strain rate, T1 mapping, and ECV measurements to compare the clinical data and quantitative CMR parameters between the two groups. Independent t tests, Mann-Whitney U tests, Pearson's and Spearman's correlation coefficients, and receiver operating characteristic curves were used for statistics.

Results: The differences in LAEFtotal, LAEFbooster, GPLS, GPLSr, GPCSr, GPRSr, SRs, SRe, and SRa were statistically significant in the hypertensive group compared to the healthy control group ($p < 0.05$), with the difference in GPLS being significant ($-14.4 \pm 2.8\%$ vs. $-16.3 \pm 2.4\%$, $p = 0.001$). LV-ECV ($32.5 (31, 36)\%$ vs. $27 (20.25, 29)\%$, $p < 0.001$) and average native T1 mapping ($1215 (1191, 1270)$ ms vs. $1204 (1153, 1223)$ ms, $p = 0.03$) were higher in the hypertensive group than in the healthy control group. GPLS had a significant correlation with ϵ_s , ϵ_e , and ϵ_a ($r =$

-0.532, $r = -0.539$, $r = -0.558$). There was no significant correlation between strain parameters and T1 mapping and ECV. To identify the hypertensive group from the healthy control group, GPLS, basal segment native T1 mapping, overall average native T1 mapping, and ECV had good diagnostic efficacy, with AUCs of 0.655, 0.679, 0.680, and 0.869, respectively. All parameters displayed good to excellent reproducibility for both intra- and interobserver classes.

Conclusions: Quantitative cardiac magnetic resonance parameters to detect microscopic changes in the myocardium of hypertensive patients are feasible.

PU-0652

MR Probe Targeted on Fibroblast Activation Protein for specific diagnosis of pancreatic Cancer

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Objective: Magnetic Resonance Imaging (MRI) has great potential in clinical tumour monitoring due to its ability to provide high-resolution soft tissue imaging. Previous studies have found that Fibroblast Activation Protein (FAP) promotes tumour growth and progression, and is overexpressed in fibroblasts of many human epithelial tumours. In contrast, FAP expression levels are low in normal organs. Therefore, FAP is considered an ideal target for tumour imaging.

Methods: In this study, we designed a targeted MRI contrast agent, a Gd-DOTA-FAPI probe, that specifically binds to FAP. We validated the binding of human pancreatic cancer cells and animal models to Gd-DOTA-FAPI through in vitro and in vivo experiments and evaluated the MRI imaging results.

Results: The in vitro imaging effects of Gd-DOTA-FAPI have been validated, and a linear relationship was found between the T1 imaging effect and the concentration of Gd-DOTA-FAPI. We will continue to conduct cellular and animal experiments to validate this probe's specificity and sensitivity for detecting pancreatic cancer.

Conclusion: This study provides a promising specific T1-enhanced MRI probe for pancreatic cancer imaging, which has the potential for targeted imaging of pancreatic cancer.

PU-0653

The application of spectral CT functional parameters in predicting lymph node metastasis of rectal cancer

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Abstract Objective: To use spectral CT to predict lymph node metastasis in rectal cancer patients before surgery. Methods: The clinical and pathological data and spectral CT images of 174 patients with rectal cancer were retrospectively collected and divided into positive and negative lymph node metastasis groups. Spectral CT parameters were obtained by delineating regions of interest (ROI) on spectral CT arterial, venous and delayed images, including: CT values, iodine concentration (IC) values, effective atomic number (Eff-Z) values, extracellular volume fraction (ECV) values and arterial enhancement fraction (AEF) values in the delayed phase of 40 and 100 keV virtual monoenergetic images. The independent sample t-test and the Mann-Whitney U test were used to compare the differences in functional parameters between groups. The receiver operating characteristic curve (ROC) was plotted for the parameters with statistically different

differences between the groups, and the correlation between each index and lymph node metastasis was analyzed by Spearman method. Variance inflation factor (VIF) was used to exclude the factors with multicollinearity. Logistic regression analysis was used to identify independent risk factors for lymph node metastasis in rectal cancer. Results: ECV, AEF, Eff-ZAP, ICAP, CT40KeVAP, Eff-ZVP, ICVP, CT40KeVVP were statistically different between groups ($P < 0.05$). The values of ICAP, CT40KeVAP, Eff-ZVP, ICVP, CT40KeVVP, ECV and AEF values were positively correlated with lymph node metastasis, and Eff-ZAP values were positively correlated with lymph node metastasis, but were not statistically significant. ECV, Eff-ZVP and CT40KeVVP are independent risk factors of lymph node metastasis. The AUC predicted by ECV, Eff-ZVP and CT40KeVVP was 0.792, with a sensitivity of 73.61% and a specificity of 73.53%. Conclusion: Spectral CT functional parameters can predict lymph node metastasis in rectal cancer patients before surgery.

PU-0654

Machine learning-based CT radiomics for identifying COVID-19 patients co-infected with fungus

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Purposes: Investigate and validate the effectiveness of different machine learning models in accurately detecting the presence of fungal infection in patients diagnosed with Coronavirus Disease 2019 (COVID-19).

Methods: 114 patients (78 COVID-19 and 36 CWFI (combined with fungal infection)) were enrolled in this study and then randomly assigned to the training and test cohorts. Radiomic features were extracted from the three-dimensional volume of interest (VOI) on chest CT (computed tomography) images; Features selection was performed using Pearson Correlation, SelectPercentile, and the least absolute shrinkage selection operator (LASSO). Logistic Regression (LR), Support Vector Machine (SVM), and Random Forest (RF), were employed to establish predictive models. Patient-based and lesion-based models were developed using the largest lesion and multiple lesions, respectively. Model performance was assessed using receiver operating characteristic (ROC) curves. Clinical utility of the models was evaluated using decision curve analysis (DCA).

Results: Among lesion-based models, SVM exhibited superior predictive efficiency, with an area under the curve (AUC) value of 0.841(test cohort) and 0.944 (training cohort). For the patient-based model, RF in the combined model showed the notable discriminatory ability (AUC, test cohort: 0.849; training cohort: 0.955).

Conclusion: Both the patient-based combined and lesion-based radiomics model exhibit significant discriminatory capabilities in accurately identifying the presence of co-infection, with the former performing much better, which can be valuable in developing and changing treatment plans.

PU-0655

Machine learning and the prediction of cerebral ventricular changes in fetuses with ventriculomegaly postnatally: a fetal MRI study

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Background:

It's unclear whether the occipital white matter (WM) radiomics of fetuses with ventriculomegaly (FVs) have changed and can be used to predict postnatal changes in the dilated lateral ventricle.

Purpose:

To evaluate the intracranial structures and occipital WM T2WI radiomics features in healthy fetuses and FVs and to predict the lateral ventricle changes of FVs postnatally based on machine learning.

Materials and Methods:

T2-weighted 1.5-T single-shot fast-spin echo MRI was performed in 52 normal fetuses (NFs) and 95 FVs prospectively in a single center from Jan. 2014 to Aug. 2021 and followed up on the abnormal lateral ventricle changes after birth. Clinical information, intracranial traditional structures, bilateral occipital WM T2WI ROI in NFs, and occipital WM T2WI ROI on the abnormal side (s) in FVs were all gathered and compared. The traditional model, radiomics model, and combined model were established to predict the lateral ventricle changes of FVs postnatally by Random Forest (RF), GaussianNB, and Decision Tree (DT) algorithms, respectively. Receiver operating characteristic curve (ROC) analysis, calibration curve, and decision curve analysis (DCA) were used to validate the predictive performance.

Results:

There were 7 fetuses with postnatal neurodevelopmental delay and 4 fetuses with genetic defects in the FV-stable group, with significant differences between groups. Among the traditional data, there were no significant differences between the FV-resolved and FV-stable groups ($p > 0.05$), while significant differences between the NFs and FVs ($p < 0.05$), excepting the occipital WM/CSF T2WI SNR ($p > 0.05$). The occipital WM T2WI radiomics of FVs differed significantly from those of NFs. Based on the occipital WM T2WI radiomics on the abnormal sides of FVs, it was effective at differentiating NFs from FVs by the three algorithms, with AUC ranging from 0.93 to 1 and 0.79 to 0.94 for the training and validation set. There were some differences in the occipital WM T2WI radiomics between FV-resolved and FV-stable groups. With AUC ranging from 0.86 to 0.97 for the training set and 0.62 to 0.76 for the validation set, the radiomics model based on the same three algorithms may predict lateral ventricle changes in FVs. The combined model predicted lateral ventricle changes much better. The DCA revealed that the combined and radiomics models provided nearly identical clinical benefits.

Conclusion:

Our findings suggest that the occipital white matter on the dilated sides of the FVs may play a key role in the progression of ventriculomegaly, as evidenced by significant T2WI radiomics characteristics associated with changing ventriculomegaly trends.

PU-0656

Multimodal ultrasound imaging improves the diagnostic performance in differentiating sclerosing adenosis from invasive ductal carcinoma

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Background Sclerosing adenosis (SA) is a proliferative benign lesion without atypia in breast, could mimic invasive ductal carcinoma (IDC) in medical imaging findings, which is easy to be misdiagnosed and mistreated. Thus, we aimed to evaluate the diagnostic value of multimodal ultrasound imaging in differentiating sclerosing adenosis (SA) from invasive ductal carcinoma (IDC).

Method Multimodal ultrasound imaging, including automated breast volume scan (ABVS), elasticity imaging (EI), color Doppler flow imaging (CDFI), were performed on 120 consecutive patients (54 SA and 66 IDC; mean age of 49.2 ± 12.4 years) with 122 breast lesions. All lesions were confirmed by surgical pathology. Image features of multimodal ultrasound between the two groups were compared and analyzed. Binary logistic regression based on VTIQ, EI and CDFI was conducted to generate a logistic regression equation of differentiating SA and IDC. The diagnostic performances of ABVS, EI, CDFI and their combination were compared by the receiver operator characteristic (ROC) analysis.

Results The sensitivity, specificity, and accuracy of ABVS, EI, CDFI, and their combination in differentiating SA from IDC were 75.00%, 72.22%, 73.77%; 86.76%, 72.22%, 80.33%; 73.53%, 64.81%, 69.67% and 88.24%, 74.07%, 81.97%, respectively. Combining multimodal ultrasound imaging yielded an area under the ROC (AUC) of 0.895 (95% CI, 0.827-0.943), higher than those of ABVS, EI, CDFI with 0.736, 0.795 and 0.692, respectively, and the difference was statistically significant (ABVS ~ combined model, $P < 0.001$; CDFI ~ combined model, $P < 0.001$; EI~combined model, $P < 0.001$). There was no statistical difference in diagnostic efficacy among the three methods (ABVS ~ EI, $P = 0.266$; ABVS ~ CDFI, $P = 0.4671$; EI ~ CDFI, $P = 0.051$). Compared to IDC, calcifications (16.67% vs 57.35%, $P < 0.001$) and retraction phenomenon on the coronal planes (18.52% vs 57.35%, $P < 0.001$) were less common in SA, circumscribed margin (38.89% vs 5.88%, $P < 0.001$), vascularity grade 0~I (64.81% vs 26.47%, $P < 0.001$) and elasticity score 2~3 (72.22% vs 13.24%, $P < 0.001$) were more common in SA. The mean age of SA was younger than that of IDC (42.9 ± 11.1 vs 54.2 ± 11.2 , $P < 0.001$). And the size was smaller in SA [$1.0(0.9)$ vs $1.3(1.3)$, $P < 0.001$].

Conclusion The preliminary results suggest that multimodal ultrasound imaging improves the diagnostic accuracy of SA and provides additional information for differentiating with IDC.

PU-0657

声触诊组织成像定量技术鉴别乳腺硬化性腺病 与浸润性导管癌 的价值

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目的 探讨声触诊组织成像定量技术 (VTIQ) 鉴别诊断乳腺硬化性腺病 (SA) 和浸润性导管癌 (IDC) 的价值。

方法 回顾性分析经手术病理确诊的 55 例 SA 患者和 64 例 IDC 患者的常规超声和 VTIQ 图像特征。绘制 VTIQ、乳腺影像报告和数据库 (BI-RADS) 分类及两者联合鉴别诊断

SA 与 IDC 的受试者工作特征 (ROC) 曲线, 计算曲线下面积 (AUC), 比较 BI-RADS 分类及 VTIQ 技术联合 BI-RADS 分类的诊断效能。

结果 ROC 曲线显示, 剪切波速度 (SWV) 最大值 (SWV_{max})、SWV 最小值 (SWV_{min})、SWV 平均值 (SWV_{mean})、SWV 中位数 (SWV_{median}) 鉴别诊断 SA 与 IDC 的 AUC 分别为 0.85、0.79、0.83、0.83, 其中 SWV_{max} 诊断效能最高, 诊断截断值为 4.90 m/s; BI-RADS 分类及 VTIQ 技术联合 BI-RADS 分类鉴别诊断 SA 与 IDC 的 AUC 分别为 0.58、0.81。

结论 VTIQ 技术联合 BI-RADS 分类可提高 SA 的诊断效能。

PU-0658

应用 MR/NIRF 双模态成像可视化研究肥胖上调纤维连接蛋白在胰腺癌进展中的作用

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研究背景: 胰腺导管腺癌(Pancreatic ductal adenocarcinoma, PDAC)恶性度高, 且具有特征性致密间质。由于局部进展和远处转移, 化疗是延长 PDAC 患者生存期和减轻症状的重要治疗方法之一, 但因为间质致密, PDAC 对大多数化疗药物反应较差。在 PDAC 中, 肥胖是一个重要的代谢因子, 可以显著调节细胞外间质(extracellular matrix, ECM)成分, 促进对化疗的耐药性。纤维连接蛋白(Fibronectin, FN)是 ECM 中的中心组织者, 且在 PDAC 基质中含量丰富, 然而, PDAC 在肥胖刺激反应中的 FN 改变及其在化疗中的作用研究尚不清楚。

材料方法: 首先通过将钆螯合物, NIR797 和 FITC 连接到具有靶向肽的聚酰胺-胺树状大分子上, 合成 FN 靶向纳米探针 NP-CREKA, 活体可视化评估原位 PDAC 中 FN 水平并指导 PDAC 治疗。其次, 应用转录组学分析、磁共振和近红外荧光(magnetic resonance/near-infrared fluorescence, MR/NIRF)双模态成像和分子功能验证研究肥胖刺激对 PDAC 中 FN 变化及其在化疗中的作用。

结果与结论: MR/NIRF 双模态成像策略可以有效可视化检测原位 PDAC 中 FN 水平, 具有较高的空间分辨率、理想的灵敏度和良好的组织穿透性, 特别是在肥胖小鼠中。通过组学分析、MR/NIRF 双模态成像和分子功能验证, 我们进一步证明肥胖作为一个重要的危险因素调节 PDAC 基质中的 ECM 成分并增加 FN 表达, 促进了胰腺癌进展; 并通过减少药物递送降低对化疗药反应。综上所述, 本研究的结果表明 FN 作为治疗评估和改善 PDAC 治疗效果的理想靶点提供了新证据, 有助于在瘦和肥胖宿主中 PDAC 的精准医疗。

PU-0659

Genetic engineering of TIM-3 membrane nanocapsules carrying melanin-gemcitabine in the diagnosis and treatment of pancreatic cancer

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Aims

Pancreatic cancer is a highly aggressive cancer. Most patients are diagnosed at an advanced stage, with a 5-year survival rate of less than 10%. Advances in immunotherapeutic strategies, especially targeting of immune checkpoints, have raised expectations for improved treatment of pancreatic cancer. The immune checkpoint TIM-3 binds to galectin-9, a ligand highly expressed in pancreatic cancer, to induce T cells exhaustion, leading to immune escape. In this study, MNS-GEM@TIM3 NVs was constructed to improve the immunotherapy of pancreatic cancer, and the efficacy was evaluated by molecular imaging.

Methods

Firstly, overexpressed TIM3 were verified by confocal microscopy and the cell membrane was extracted. Then gemcitabine-loaded melanoma nanospheres were synthesized and encapsulated in the extracted cell membrane. The cell lethality of MNS-GEM@TIM3 NVs was detected by CCK8 assay in vitro. Finally, mouse orthotopic tumor model was established to observe the targeting ability of MNS-GEM@TIM3 NVs by in vivo imaging, T cell activity by flow cytometry, and the efficacy of MNS-GEM@TIM3 NVs against pancreatic cancer was evaluated by MRI with the help of melanin.

Results

Confocal microscopy demonstrated that the transfection efficiency of TIM-3 was significant. CCK8 assay indicated MNS-GEM@TIM3 NVs significantly inhibited cells proliferation in vitro. In vivo imaging showed that MNS-GEM@TIM3 NVs were enriched at the tumor site, the up-regulation of IFN- γ detected by flow cytometry reflected the enhanced T cell function, and MRI confirmed that MNS-GEM@TIM3 NVs was the most effective in tumor growth inhibition. The tumor volume was reduced, and immunohistochemistry showed that the expression of Ki67 was decreased.

Conclusion

MNS-GEM@TIM3 NVs has the ability to enrich the tumor site, and inhibits the growth of pancreatic cancer by enhancing the lethality of T cells. MNS-GEM@TIM3 NVs can also enhance MRI signal, so as to realize the integration of diagnosis and treatment.

PU-0660

Boost therapy of glutamine-addictive glioblastoma by combining glutamine metabolism therapy with photo-enhanced chemodynamic therapy

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The complete treatment of high grade invasive glioblastoma (GBM) remains to be a great challenge, and it is of great importance to develop innovative therapeutic approaches. Herein, we found that GBM derived from U87 MG cells is a glutamine-addiction tumor, and jointly using glutamine-starvation therapy and photo-enhanced chemodynamic therapy (CDT) can significantly boost its therapy. We rationally fabricated tumor cell membrane coated Cu₂-xSe nanoparticles (CS NPs) and an inhibitor of glutamine metabolism (Purpurin) for combined therapy, because

glutamine rather than glucose plays a crucial role in the proliferation and growth of GBM cells, and serves as a precursor for the synthesis of glutathione (GSH). The resultant CS-P@CM NPs can be specifically delivered to the tumor site to inhibit glutamine metabolism in tumor cells, suppress tumor intracellular GSH, and increase H₂O₂ content, which benefit the CDT catalyzed by CS NPs. The cascade reaction can be further enhanced by irradiation with the second near_x0002_infrared (NIR-II) light at the maximum concentration of H₂O₂, which can be monitored by photoacoustic imaging. The NIR-II light irradiation can generate a large amount of reactive oxygen species (ROS) within a short time to kill tumor cells and enhance the CDT efficacy. This is the first work on the treatment of orthotopic malignant GBM through combined glutamine metabolism therapy and photo-enhanced CDT, and provides insights into the treatment of other solid tumors by modulating the metabolism of tumor cells.

PU-0661

一种 GBM 靶向 pH 响应性原位 T2 磁共振信号增强的氧化铁纳米复合颗粒

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目的:

胶质母细胞瘤 (glioblastoma, GBM) 呈浸润性生长, 目前影像学方法无法精准明确边界, 使用磁共振对比剂增强 GBM 病灶处信号有助于精准诊断 GBM。GBM 肿瘤微环境具有弱酸性的特点, 利用酸性 pH 响应策略可以有效提升磁共振对比剂在 GBM 病灶处的对比度, 从而提高 GBM 的影像诊断精准性。

材料和方法:

基于 PAA (polyacrylic acid, 聚丙烯酸) /SPIO (superparamagnetic iron oxide, 超顺磁性氧化铁)、氯化钙、磷酸氢二钠合成 pH 响应性团聚的纳米复合颗粒 SPIO@CaP (calcium phosphate, 磷酸钙), 随后使用靶向 GBM 的多肽 DANG (angiopep-2 多肽的反式镜像异构体) 对纳米复合颗粒进行修饰, 获得 DANG-SPIO@CaP 纳米复合颗粒。细胞层面, 通过铁反应试剂法探究纳米复合颗粒在不同种属细胞内的摄取情况, 通过磁共振 T2 成像评估纳米复合颗粒在不同种属细胞中的摄取成像效果。动物层面, 评估 DANG-SPIO@CaP 纳米复合颗粒在小鼠体内的磁共振成像效果。

结果:

本研究通过完整的理化表征明确了 GBM 靶向 pH 响应性团聚的纳米复合颗粒 DANG-SPIO@CaP 的成功制备, 在细胞层面的细胞摄取与细胞磁共振 T2 成像实验中, DANG-SPIO@CaP 纳米复合颗粒显著提升了肿瘤细胞磁共振 T2 信号, 而对非肿瘤细胞的磁共振 T2 信号增强不明显。动物层面, DANG-SPIO@CaP 纳米复合颗粒均能有效地显示两种 GBM 模型的病灶, 并且在较长时间内在病灶处观察到 T2 信号增强。组织切片 HE 染色结果与血清生化分析结果均证明上述纳米复合颗粒具有良好的生物相容性, 对细胞以及动物均无明显毒性。

结论:

GBM 靶向 pH 响应性纳米复合颗粒 DANG-SPIO@CaP 可以在肿瘤弱酸性环境中发生响应性粒径增大, 因而其能在具有弱酸性的 GBM 病灶处发挥更强的磁共振 T2 增强效果; 而且由于其同时具有 GBM 靶向性以及 pH 响应性, DANG-SPIO@CaP 纳米复合颗粒在具有不同性质的 GBM 中均具备增强的鉴别诊断效能。

PU-0662

纳米氧化铈在对比剂后急性损伤中的焦亡调节作用探讨

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目的: 探讨氧化铈纳米颗粒 (CNPs) 在碘对比剂诱导肾损伤 (PC-AKI) 中发挥保护作用的机制是否与调节焦亡通路相关。

方法: 制备柠檬酸修饰的 CNPs, 通过多种表征方法确定其理化结构。在细胞水平, 将 HK-2 细胞与 CNPs (0、50、100 $\mu\text{g/mL}$) 预处理 4 h 后, 再分别与多浓度梯度碘海醇 (30、45、60、75、90 mg/mL) 共培养 24 ~ 48 h, 为评估损伤程度及 CNPs 干预效果, 分别通过 MTT 法检测细胞活性、Calcein-AM/PI 双染探针检测活/死细胞、Annexin V-FITC/PI 流式染色检测细胞凋亡、DCFH-DA 荧光探针检测细胞活性氧 (ROS) 含量、Western Blot 检测焦亡相关蛋白 GSDMD、caspase-11、IL-1 β 表达水平。在动物水平, 将雌性 KM 小鼠分为空白对照组、CNPs 组 (50 mg/kg)、PC-AKI 组 (碘海醇浓度: 3 g/kg)、PC-AKI + CNPs 组, 注射碘海醇 24 h 后收集小鼠血液和主要器官, 检测血生化、病理组织学、肾组织氧化应激、炎症反应及凋亡水平、焦亡相关蛋白表达水平。两组间均值比较使用 Student's t 检验, 多组间均值比较使用单因素方差分析。

结果: CNPs 平均尺寸 $4.08 \pm 0.30 \text{ nm}$, Zeta 电位显示表面带负电荷, 傅立叶红外光谱 (FTIR) 显示柠檬酸成功修饰。体外实验结果显示, 与对照组相比, CNPs 可降低碘海醇诱导的细胞损伤及凋亡, 并具有 ROS 清除能力 ($P < 0.01$)。焦亡相关蛋白的研究结果显示, 经碘海醇处理后, GSDMD、caspase-11、IL-1 β 表达水平均有所升高 ($P < 0.05$), 但与 CNPs 预处理组的差异无统计学意义 ($P > 0.05$)。体内实验结果说明, CNPs 在短期内具有良好的生物相容性, 可通过减轻氧化应激、炎症及凋亡水平, 改善肾小管损伤程度, 在体内发挥肾保护作用, 但焦亡相关蛋白的表达水平在 PC-AKI + CNPs 组与 PC-AKI 组未见显著差异 ($P > 0.05$)。

结论: CNPs 在 PC-AKI 中具有保护作用, 但并非是通过抵抗碘海醇引起的细胞焦亡而发挥作用。

PU-0663

Dual-Energy CT-based Radiomic analysis for Predicting Pathological Grading of Lung Invasive Adenocarcinoma

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Abstract

Objectives: To investigate the value of radiomics based on Dual-energy CT (DECT) for predicting pathological grading of lung invasive adenocarcinoma.

Methods: In this retrospective study, a total of 107 patients (80 G low and 27 G high) were included with lung adenocarcinoma before surgery. Clinical, radiographic features and quantitative parameters were recorded for the clinical-DECT model. The DECT-based radiomics model was constructed from features extracted from virtual monoenergetic images (VMI), including 50keV and 150keV images. To filter unstable and redundant features, intraclass correlation coefficients (ICCs), Pearson's correlation analysis and least absolute shrinkage and selection operator (LASSO) penalized logistic regression were performed. Then, the DECT radiomics model, the clinical-DECT model and the conventional CT radiomics model were established. Decision curve analysis (DCA) was used to evaluate the clinical utility of the models.

Results: For predicting lung invasive adenocarcinoma grades, the DECT radiomics model achieved an excellent performance with an area under of curve (AUC) of 0.997 and 0.743 in the training and test set, respectively. Tumor density, lobulation, and effective atomic number at AP

were included in the clinical-DECT model with an AUC of 0.836 in the training set lower than the DECT radiomics model. In comparison to the conventional CT radiomics model (AUC, with 0.998 and 0.529 in the training and test set), the DECT radiomics model demonstrated a higher AUC value and a better net benefit to the patients in the test cohorts.

Conclusion: DECT-based radiomics features were useful in predicting pathological grading of lung invasive adenocarcinoma, yielding better predictive performance than conventional CT radiomics model.

PU-0664

3D-APTW 联合 3D-pCASL 成像预测神经胶质瘤分级及 IDH 分型

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目的: 评估 3D-APTW 与 3D-pCASL 成像单独或联合在预测神经胶质瘤分级和 IDH 突变状态中的应用价值。

方法: 81 例神经胶质瘤患者 3.0 T MRI 检查, 测量肿瘤 APTW、rAPTW 脑血流量 (CBF) 和相对 CBF (rCBF) 值。用 SPSS 和 MedCalc 行统计学分析或绘图。独立样本 t 检验比较 MR 参数在预测高低级别胶质瘤或 IDH 突变状态中是否具有统计学差异。用配对样本 t 检验比较肿瘤的实性部分与对侧正常脑组织的 APTW 及 CBF 值是否具有统计学差异; 将三个不同级别胶质瘤 (WHO II、III 和 IV 级) 的 MRI 参数运用单因素方差分析进行比较。如方差齐, 使用邦弗伦尼 t 检验进行统计学分析, 多重比较结果应用邦弗伦尼进行校正。方差不齐, 用韦尔奇或布朗-福赛斯 t 检验进行统计学分析, 多重比较结果应用塔姆黑泥进行校正。采用受试者 ROC 曲线下面积 (AUC) 以评估各参数以及 rAPTW 联合 rCBF 预测高低级别胶质瘤、IDH 分型的诊断性能。

结果:

高级别胶质瘤的 APTW、rAPTW、CBF 和 rCBF 值均显著高于低级别胶质瘤 ($p < 0.001$)。肿瘤的 APTW 及 CBF 值均显著高于对侧正常脑组织的对应参数。采用 ROC 曲线分析比较: rAPTW 鉴别高低级别胶质瘤的 AUC 值最大, 约为 0.90, 敏感度和特异度分别为 85.4%、84.8%; rCBF 的 AUC 值、敏感度和特异度分别为 0.84、77.1% 和 81.8%。rAPTW 值与 rCBF 值联合, 鉴别高低级别胶质瘤的诊断能力从 0.84 提高到 0.96。rAPTW 值在关联 IDH 突变状态时 AUC 值 (0.92)。将 rAPTW 值与 rCBF 值联合后, 其预测能力提高到了 0.96。WHO III 级及 IV 级胶质瘤的 APTW、rAPTW、CBF 和 rCBF 值均显著高于 WHO II 级胶质瘤; WHO III 级胶质瘤的 APTW、rAPTW 和 rCBF 值均显著低于 WHO IV 级胶质瘤 ($p < 0.01$)。

结论:

3D-APTW 成像在预测高低级别胶质瘤及 IDH 分型中具有较高的诊断效能, 与 3D-pCASL 成像比较具有更高的诊断性能

PU-0665

Amide Proton Transfer-weighted Imaging in Assessing Aggressive and Proliferative Potential of Bladder Cancer

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Purpose: To investigate the diagnostic performance of amide proton transfer-weighted (APT_w) MRI in bladder cancer (BCa) and its association with histopathological characteristics.

Materials&Methods: Patients with BCa who underwent multiparametric MRI including APTw MRI were eligible for this retrospective study. The APTw value was analyzed in relation to pathological grade and immunohistological indicators (Ki-67 and human epithelial growth factor receptor 2 [HER2]). High-expression of Ki-67 was defined as the proportion of positive cells over 20%, while HER2 status was considered negative if the staining was 0 or 1+, and positive if it was 2+ or 3+.

Results: In total, 84 patients (mean age, 63.96 ± 11.95 [SD]; 74 men) between 2020 and 2023 were enrolled in this study. Significantly higher APTw value was found in high-grade BCa (5.7% [IQR, 3.6%-9.4%] vs 3.2% [IQR, 2.4%-6.4%], $P = 0.006$), high-Ki-67 expression BCa (6.3% [IQR, 4.5%-11.7%] vs 2.8% [IQR, 2.1%-3.6%], $P < 0.001$) and HER2 positive BCa (5.8% [IQR, 4.0%-8.8%] vs 3.7% [IQR, 2.0%-6.3%], $P = 0.030$). APTw value was moderately correlated with Ki-67 expression ($|r| = 0.737$) and not correlated with pathological grade and HER-2 expression (all $|r| < 0.3$).

Conclusion: APTw MRI is a promising noninvasive tool to reflect the biological aggressiveness of BCa and may further guide personal therapy in BCa.

PU-0666

探究 GSH 巯基加权 VDMP-CEST 成像评估脓毒症相关脑病大脑氧化还原稳态失衡的作用

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目的: 利用 GSH 巯基加权 VDMP-CEST 成像, 探究在脓毒症相关脑病发病早期, GSH 巯基加权 VDMP-CEST 信号是否能作为大脑氧化还原稳态失衡的非侵入性成像标志物, 并联合磁共振波谱成像对 GSH 进行定量加以辅证, 期望为临床上早期发现脓毒症相关脑病提供一项具有无创性、准确性的影像方法。

方法: 选取健康 SD 雌性大鼠 25 只, 体重 150-200g, 随机分为 SAE 组和对照组, 其中 SAE 组采用腹腔注射 15mg/kg 的细菌脂多糖破坏血脑屏障, 建立脓毒症相关脑病的大鼠模型, 对照组不加任何处理因素。采用水迷宫实验来评价大鼠学习、记忆和空间能力的受损情况。采用 7.0T Agilent 动物磁共振扫描仪对各组大鼠进行 GSH 巯基加权 VDMP-CEST 扫描成像, 同时采用磁共振波谱成像对 GSH 巯基进行定量, 扫描时间分别为造模前, 造模后 24 小时、48 小时、72 小时、96 小时, 图像量化值采用 MATLAB 和 Icmode1 软件后处理得到。

结果: 水迷宫实验发现 SAE 组大鼠与对照组大鼠相比, 找到平台的时间明显延长。磁共振扫描发现 SAE 组大鼠在造模后 GSH 巯基加权 VDMP-CEST 信号、磁共振波谱成像相应 GSH 峰值均呈先上升后下降趋势, 上升峰值在造模后 48 小时, 而对照组大鼠在造模前后 GSH 巯基加权 VDMP-CEST 信号、磁共振波谱成像相应 GSH 峰值无显著变化趋势。

结论: 在脓毒症相关脑病早期, GSH 作为体内最重要的抗氧化物质, 参与了维持脑内氧化还原稳态的过程, 主要表现为大脑中活性氧 ROS 含量增加, 消耗还原型 GSH, 从而改变 GSH 巯基与水的交换速率, 导致 GSH 巯基加权 VDMP-CEST 信号变化。由此, 我们推断 GSH 巯基加权 VDMP-CEST 成像可实现对脓毒症相关脑病早期大脑氧化还原稳态的“可视化监测”, 为临床的早期诊断提供更丰富的影像诊断依据。

PU-0667

视神经脊髓炎谱系疾病患者海马亚区体积与认知功能下降的相关性研究

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目的：视神经脊髓炎谱系疾病(neuromyelitis optica spectrum disorders, NMOSD)是一种主要累及青壮年人，高复发、高致残性的中枢神经系统炎性脱髓鞘疾病，26%~67%的 NMOSD 患者在不同的疾病阶段都伴有认知障碍。海马是较早受累的脑区之一，已知的研究表明 NMOSD 患者海马的总体积是明显减低的，但是海马亚区的体积及其与认知功能的关联尚未阐明。本研究旨在评估海马亚区体积的改变与 NMOSD 患者认知功能下降的关联。

方法：本研究共纳入 77 名受试者，包括 38 名 NMOSD 患者和 39 名性别、年龄、受教育程度与之相匹配的正常健康对照 (healthy control, HC)。每位受试均接受了 3D-T1WI 磁共振扫描以及标准的神经心理学认知量表 (北京版蒙特利尔认知评估量表) 评估。采用 FreeSurfer 7.0 软件包进行了所有受试者的海马亚区分割，两侧海马均分别分割成 19 个亚区，包括旁下托、前下托头部及体部、下托头部及体部、CA1 头部及体部、CA2/3 头部及体部、CA4 头部及体部、齿状回颗粒细胞层头部及体部、分子层头部及体部、海马杏仁核过渡区、海马裂、海马伞、海马尾，并计算出每个亚区的体积，比较两组海马亚区的体积差异，进一步分析 NMOSD 组内海马亚区与认知量表评分的相关性。

结果：与 HC 组相比，NMOSD 组的双侧海马总体积、双侧 CA1 头部、双侧 CA4 头部及体部、双侧齿状回颗粒细胞层头部及体部、双侧海马杏仁核过渡区、左侧分子层头部、左侧海马伞、右侧前下托头部、右侧分子层头部及体部、右侧 CA3 头部体积均明显减低 (P 均 <0.05)。左侧海马尾 ($r=0.406$)、左侧分子层体部 ($r=0.4$)、右侧海马尾 ($r=0.367$)、右侧 CA1 体部 ($r=0.389$)、右侧分子层体部 ($r=0.401$) 体积与 MoCA 评分呈正相关 (P 均 <0.05)。

结论：NMOSD 患者存在明显的认知功能下降，且伴有双侧海马总体积及多个亚区体积的减低，部分海马亚区的萎缩可能是 NMOSD 患者认知功能下降的潜在神经机制之一。

PU-0668

45 ms 和 97 ms TE 单体素 PRESS 波谱检测胶质瘤中胱硫醚的对比研究

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目的：1 号染色体短臂 19 号染色体长臂共缺失 (1p/19q codeletion) 是胶质瘤中最重要的基因突变之一，与患者的预后、精准治疗方案的制定息息相关。最新研究表明，1p/19q codeletion 胶质瘤有独特的细胞代谢，其中胱硫醚水平较 1p/19q non-codeletion 胶质瘤升高约 2 倍。MRS 检测胱硫醚成为无创、在体检测 1p/19q codeletion 突变、监测相应胶质瘤治疗反应的潜在新兴技术。然而，常规的 97 ms TE PRESS 序列中，胱硫醚和天冬氨酸谱线有较大的重叠。这成为 MRS 精确定量胱硫醚的技术瓶颈。本研究旨在优化 PRESS 的 TE 组合，以准确检测胱硫醚。

方法：(1) 虚拟激发试验：虚拟激发胱硫醚和天冬氨酸谱线，以寻找 2 者最大差异时的 TE 值；

(2) 模体实验：配置胱硫醚和天冬氨酸模体，行 45 ms、97 ms TE PRESS 扫描，以验证激发谱线的准确性；(3) 在体实验：前瞻性纳入 84 例怀疑胶质瘤的患者，采集 45 ms、97 ms TE

PRESS 和 68 ms TE MEGA-PRESS 波谱, 检测 PRESS 波谱拟合时添加、删除天冬氨酸对胆碱定量影响; 并以 MEGA-PRESS 为金标准, 检测 PRESS 胆碱测定值与金标准的相关性。

结果: 激发试验表明, PRESS (TE1, TE2) = (17, 28) ms 时, 能最大程度减少天冬氨酸对胆碱谱线的干扰, 为最佳 TE 组合。模体实验所得谱线与激发谱线一致。在体实验时, 拟合基组中添加、删除天冬氨酸, 胆碱的测定值 45ms TE: 0.801 ± 0.209 mM vs. 0.796 ± 0.209 mM, $p = 0.49$; 97ms TE: 1.97 ± 2.01 mM vs. 1.55 ± 1.95 mM, $p < 0.001$; 45ms TE 时胆碱浓度差值明显低于 97 ms ($p < 0.001$)。全基组拟合时, 45 ms、97 ms TE 胆碱测定值与 MEGA-PRESS 测定值的相关系数分别为 0.78、0.65。

结论: 45ms TE PRESS 相较于 97ms TE PRESS 能更准确地检测、定量胶质瘤中的胆碱。

PU-0669

COPB2 promotes glioma progression and serves as a prognostic biomarker

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Purpose

Through screening glioma microarray datasets in public databases, to identify biomarker in glioma progression and prognostic prediction.

Materials and Methods

The integrated analysis was performed using MetaOmics software package in R software. The combined effect and p-value were used to screen differential expressed genes. To identify the more meaningful biomarker for high-grade glioma, 20 genes were selected for high-content screening. The results were validated in The Cancer Genome Atlas (TCGA), Chinese Glioma Genome Atlas (CGGA), and patient samples from our hospital, and survival analysis were conducted. Lv-shCOPB2 was constructed and transduced into glioblastoma cell lines for analyzing the impact of COPB2 on glioma. Cell proliferation and viability were confirmed by the MTT assay, colony formation assay and flow cytometry. Furthermore, to characterize the role COPB2 plays in tumor growth in vivo, subcutaneous glioma models were established.

Results

Using the GEO public database, bioinformatic analysis of 13 gene expression datasets containing 1235 glioma samples and high-content screening analysis revealed the role of COPB2 in glioma. GEO, TCGA, and CGGA databases revealed that the COPB2 gene was significantly overexpressed in gliomas, especially in high-grade gliomas, and can predict poor prognosis. The results also validated in patient samples from our hospital by immunohistochemical analysis and qPCR analysis. In vitro, knockdown of COPB2 decreased cell proliferation, inhibited clonogenic ability, blocked cell cycle progression, and induced cell apoptosis. In vivo, knockdown of COPB2 significantly decreased the tumor growth rate and reduced tumor volume in xenograft nude mouse models.

Conclusion

Based on the results of bioinformatics analysis and wet-bench experiments, COPB2 has a critical role in glioma progression and serves as a prognostic factor, indicating the potential to be a therapeutic target in glioma, especially in high-grade glioma.

PU-0670

MRI-guided dual-responsive anti-tumor nanostructures for synergistic chemo-photothermal therapy and chemodynamic therapy

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Image-guided stimulus-responsive theranostics are beneficial for pinpointing malignant lesions and combining multiple cell-killing mechanisms to enhance tumor cell clearance. Herein, an intelligent dual-responsive nanostructure (HSPMH-DOX) was developed for magnetic resonance imaging (MRI)-guided synergistic chemo-photothermal therapy (PTT) and chemodynamic therapy (CDT). The core-shell nanostructure was synthesized via layer-by-layer coating of drug-loaded hollow mesoporous silica nanoparticles (HS) with polydopamine (PDA), manganese oxide (MnO₂), and hyaluronic acid (HA), respectively. The constructed nanoagent has the characteristics of endogenous and external dual response. The tumor microenvironment (pH/GSH) can trigger the degradation of gatekeeper (MnO₂ and PDA) to trigger the release of anti-tumor drugs, while external near-infrared light irradiation can accelerate the degradation behavior and generate local overheating to achieve PTT. Notably, MnO₂ can not only consume intracellular GSH to enhance CDT, but also release Mn²⁺ for precise localization of tumor tissues by MRI. Both in vitro and in vivo experiments showed that the prepared dual-response nanoagent had satisfied biocompatibility, targeting, and the great efficiency of MRI-guided combined therapy. Impressively, combining chemo-PTT and CDT can destroy tumors in animal models in almost two weeks. This work may open up a broad way for stimulus-responsive synergistic theranostic applications, including MRI, chemo-photothermal therapy and chemodynamic therapy.

PU-0671

利用钆对比剂动态增强 MRI 图像的灰度直方图阵列预测乳腺癌新辅助化疗后病理学完全缓解

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目的：局部进展期乳腺癌患者通常需要进行新辅助化疗来缩小肿瘤原发灶、降低临床分期和抑制肿瘤的转移。部分患者在疗后可达到病理学完全缓解（pCR）并具有良好的预后。如果能够在新辅助化疗后采用影像学方法准确预测出患者达到 pCR 的概率，部分患者则有可能以此为依据来选择个性化的后续治疗方案，如乳房切除术、保乳术或乳房重建术。目前基于 MRI 影像的人工智能模型大多需要对感兴趣区域进行图像提取，但是乳腺在新辅助化疗后的改变令肿瘤区域的手动勾画和自动分割都变得困难。本研究提出一种直方图阵列方法来量化 Gd-DTPA 对比剂在乳腺肿瘤区域的动态变化过程，仅需医生对肿瘤的位置进行简单标注就可以实现对新辅助治疗后 pCR 的预测。

方法：本研究为回顾性研究，收集局部进展期患者 336 例，根据手术病理结果分为 pCR（n=143）及非 pCR（n=193），分层随机划分为训练组（n=167）、验证组（n=34）和测试组（n=135）。本研究采用 GE Signa 1.5T 成像系统在新辅助治疗后对患者进行 MRI 检查，并由一名影像医师在图像中判断出肿瘤中心的位置。6 期矢状位 T1 加权成像分别在 Gd-DTPA 注射前及注射后 2.0, 3.5, 5.0, 6.5, 8.0 分钟进行采集；TR 为 6.4ms，TE 为 3.0ms。本研究将 6 期图像的灰度直方图组合为二维阵列，采用卷积神经网络以病理为金标准进行 pCR 和非 pCR 的二分类预测。

结果：训练组、验证组和测试组的 AUC 值分别为：0.859（95%CI: 0.800-0.918）、0.853（95%CI: 0.722-0.983）和 0.815（95%CI: 0.743-0.887）。测试组的灵敏度、特异性、阳性预测值和阴性预测值分别为 82.5%（95%CI: 70.1-91.3%）、73.1%（95%CI: 61.8-82.5%）、69.1%（95%CI: 56.7-79.8%）和 85.1%（95%CI: 70.1-91.3%）。

结论：本研究的结果初步表明基于 Gd-DTPA 多期增强乳腺癌 MRI 图像的灰度直方图阵列和卷积神经网络模型能够在无需精确分割的情况下实现新辅助治疗疗效的预测。

PU-0672

18F-FDG PET/MR 诊断血管内大 B 细胞淋巴瘤-噬血细胞综合征相关型一例

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病历资料：患者女，68 岁，因“全血细胞减少伴发热 1 月余，胸闷咳嗽半月”就诊，血常规示三系减少。胸腹部 CT 提示间质性肺炎，肝占位，脾大，腹腔多发肿大淋巴结。行激素、抗感染治疗，未见好转。18F-FDG PET/MR 示：①肝脾肿大；全身多发肿大淋巴结；全身多处骨骼信号异常；两肺多发斑片影；FDG 代谢均增高；考虑血管内大 B 细胞淋巴瘤-噬血细胞综合征相关型（IVLBCL-HPS）可能，Iugano 分期 IV 期。②脾梗死伴出血。患者行骨髓活检术：①噬血细胞综合征②淋巴瘤骨髓浸润。免疫组化：CD3：散在+，CD5：散在+，CD10：-，CD20：+++，PAX5：++，MUM1：++，BCL-6：-。综合检查结果诊断为：血管内大 B 细胞淋巴瘤-噬血细胞综合征相关型（IV 期 B 组，IPI 5 分高危）。患者 DEP 方案治疗 HPS，R-CHOP 方案治疗 IVLBCL，联合鞘内注射甲氨蝶呤预防中枢神经系统受累后，血象好转，肺部病变基本消失，淋巴结变小，症状改善。讨论：血管内大 B 细胞淋巴瘤(IVLBCL)是结外大 B 细胞淋巴瘤的罕见类型，病理表现为淋巴瘤细胞在小血管内大量增殖，受累器官实质梗死出血，具有高度侵袭性。IVLBCL 主要分为经典型、噬血细胞综合征相关型（HPS）及皮肤型，其中 HPS 型进展迅速，预后最差，因此对 HPS 的精准诊疗非常重要。在此病例中①误诊间质性肺炎抗生素治疗无效，PET 弥漫性高代谢与 CT 表现不匹配，强烈提示 IVLBCL-HPS 肺部浸润。②MR 示脾脏边缘出血信号及 PET 代谢缺失提示脾脏梗死，为肿瘤细胞聚集压迫血窦所致；PET/MR 示肝脾异常信号伴高代谢提示肿瘤累及。③MR 骨髓局灶性异常信号伴 FDG 代谢增高提示骨髓浸润，PET/MR 可在骨骼发生 CT 形态学改变前，早期发现骨髓浸润。④PET/MR 多发淋巴结肿大伴代谢增高提示血管外浸润。⑤除本例受累脏器外，IVLBCL 易累及中枢神经系统、肾、肾上腺等脏器，MR 软组织分辨率高，联合实时 PET 代谢信息，优势显著。由此可见，PET/MR 有助于 IVLBCL-HPS 的诊断，并提供分期信息，指导治疗。后续继续随访，期待 PET/MR 在疗效评估中的作用。

PU-0673

Optimization of saturation RF pulse parameters for amide proton transfer weighted imaging of brain tumors at 3T MRI

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Objective: To explore the value of different combinations of saturation radiofrequency (RF) pulse power and duration for improved 2D amide proton transfer (APT) imaging.

Materials and Methods: A total of 30 subjects (11 males, mean age: 54.70 ± 11.92 years old) were scanned using a 3.0 T MR scanner, the scan sequences included T1 weighted imaging (T1WI), T2 weighted imaging (T2WI), contrast-enhanced T1WI and 2D-APT with different saturation schemes. Two observers with more than 3 years of diagnostic experience evaluated the 2D-APT images based on the Likert quintile. The APT values of the three regions of interest (ROI) in the tumor core, perigama edema (if exist) and the contralateral normal white matter region were measured separately. 4 positions were placed in each region for data measurement, and the averaged value of the 4 positions was taken as the APT value of the ROI. The consistency of qualitative evaluation and quantitative measurements by the two observers were tested using Intraclass Correlation Coefficient (ICC) and Kappa. The Friedman or spearman test was used to evaluated the differences in MTRasym, Δ MTRasym and subjective scores among different combinations of saturation powers and durations for 2D-APT. The correlation between MTRasym(T) and Ki-67 expression evaluated by the pearson correlation coefficient.

Results: The measurement data and the score of the two observers were in good agreement (ICC: 0.942~0.992, Kappa: 0.778). Significant differences in MTRasym (T), MTRasym (E), MTRasym (CNAWM), Δ MTRasym (T-C), Δ MTRasym(E-C), and subjective scores were between different saturation regimens ($p < 0.05$). When the RF pulse saturation power and duration were set as 2.0 μ T and 2.0 s, the MTRasym(T), Δ MTRasym(T-C) values and subjective scores were shown to be the highest; when the RF pulse saturation power was 2.0 μ T and the duration was 1.6 s, the MTRasym (E) was the highest; and MTRasym (CNAWM) was the highest when the RF pulse saturation power was 2.0 μ T and the duration was 0.8 s; when the saturation power was 1.0 μ T for a duration of 0.8 s, the MTRasym(E-C) value was the highest. pearson results showed that MTRasym (T) were positively correlated with the Ki-67 index[(21.65 \pm 3.28)%] at the saturation power of 2.0 μ T and duration of 2.4 s, 2.0 s, 1.6 s, and 1.2 s, respectively.

PU-0674

Based on phantom test, the study of Hyper Iterative algorithm on total-body PET/CT with short acquisition time and low injection dose

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Background This comparative study was to compare the image quality of two reconstruction algorithms (OSEM and HYPER Iterative) for total-body ¹⁸F-deoxyglucose (FDG) PET/CT with different acquisition times and injection activity.

Methods A NEMA phantom was first performed to compare the image quality using the ordered subset expectation maximization (OSEM) and HYPER Iterative algorithm ($\beta = 0.15-0.95$). Evaluated the background variability (BV), coefficient of variation (COV), and contrast recovery coefficient (CRC). Consequently, A prospective study was included on 50 patients using 2 reconstruction algorithms (β values were decided by phantom study). Clinical studies comprised of 2 parts: acquisition time grouping and injection activity grouping. All lesions were divided into 3 groups according to their size. Measured the noise SD and lesion SUVmax, and calculated the signal-to-noise ratio (SNR) and target-to-background ratio (TBR). Δ SUVmax and Δ TBR were defined as the difference between OSEM and the HYPER Iterative algorithm, and % Δ SUVmax, % Δ SD, and % Δ SNR were defined as the percentage difference between OSEM and the HYPER Iterative algorithm. Image quality was visually assessed by two physicians using a Likert scale (1=very poor, 5=excellent quality).

Results In the phantom study, the BV and COV of the HYPER Iterative algorithm with the same acquisition time were smaller than OSEM, and the CRC of the hot spheres was higher than OSEM except 60s-0.75, 0.95 in the full-dose group, 60s-0.55-0.95 in the half-dose group and

120s-0.55-0.95, 60s-0.15-0.95 in the quarter-dose group. Visual score of all sequences of the HYPER Iterative algorithm was higher than the moderate image quality (3 points). Clinical studies showed that 300s-OSEM has a similar noise to the 60s-0.35 of the HYPER Iterative algorithm (0.21 ± 0.06 and 0.20 ± 0.06 , $p > 0.05$). The lesion SUVmax, TBR, and SNR in the HYPER Iterative algorithm were higher than OSEM ($p < 0.001$), and SUVmax increased more significantly in lesions smaller than 10mm. The $\% \Delta \text{SNR}$ and $\% \Delta \text{SD}$ of the HYPER Iterative algorithm showed improvement as reduced acquisition time and dose, where a higher degree of improvement was observed in both ΔSUVmax and ΔTBR of the lesion.

Conclusion The HYPER Iterative algorithm increases the SUVmax, reduces the noise level, and improves image quality, especially for lesions $\leq 10\text{mm}$ and in a shorter time and lower dose. In the HYPER Iterative algorithm, $T=60\text{s}$, $\beta=0.35$ of the half-dose and $T=120\text{s}$, $\beta=0.35$ of the quarter-dose can satisfy the good image quality.

PU-0675

18F-FDG PET/CT、血清肿瘤标记物 CYFRA21-1 和 SCC-Ag 在男性非小细胞肺癌患者 EGFR 突变状态鉴别中的作用

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目的 表皮生长因子受体 (EGFR) 突变的高发病率通常发生在从未吸烟的女性肺腺癌患者中。然而, 关于男性患者的报道很少。因此, 本研究旨在探索一种基于 ^{18}F -FDGPET/CT 和血清肿瘤标记物 (STM) 的新方法, 以确定男性非小细胞肺癌 (NSCLC) 患者 EGFR 突变状态。

方法 在 2019 年 10 月至 2022 年 3 月期间, 对宁波市第二医院的 121 名男性非小细胞肺癌患者进行了分析。所有患者在治疗前均接受 ^{18}F -FDG PET/CT 扫描, 并监测了 8 种 STM (细胞角蛋白 19 片段 [CYFRA21-1]、鳞状细胞癌相关抗原 [SCC-Ag]、癌胚抗原 [CEA]、神经元特异性烯醇化酶 [NSE]、碳水化合物抗原 [CA50]、CA125、CA72-4 和铁蛋白)。比较了原发性肿瘤的最大标准化摄取值 (pSUVmax) 和 8 个 STM 在 EGFR 突变体和野生型之间差异。运用受试者操作特征 (ROC) 曲线和多元逻辑回归分析以确定 EGFR 突变状态的预测因素。

结果 在 39 例患者中检测到 EGFR 突变 (32.2%)。与 EGFR 野生型患者相比, EGFR 突变患者的血清 CYFRA21-1 (2.65 vs. 4.01 , $P = 0.002$) 和 SCC-Ag (0.67 vs. 1.05 , $P = 0.006$) 浓度较低。CEA、NSE、CA-50、CA125、CA72-4 和铁蛋白在两组之间差异无统计学意义。EGFR 突变的存在与低 pSUVmax (<8.75)、低血清 SCC-Ag (<0.79 ng/mL) 和低 CYFRA21-1 (<2.91 ng/mL) 浓度显著相关。对于低 CYFRA21-1、SCC-Ag、pSUVmax 和这 3 个因素的组合, ROC 曲线下面积值分别为 0.679、0.655、0.685 和 0.754。

结论 血清低浓度的 CYFRA21-1 和 SCC-Ag 以及低 pSUVmax 与 EGFR 突变有关, 并且这些因素的组合更有助于男性 NSCLC 患者 EGFR 突变状态的识别。

PU-0676

Fluorescent nanodot composite particles for disease imaging

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Purpose: Carbon nanodots (CDs) have received huge attention of researchers due to their good optical properties. However, CDs generally suffer from severely fluorescence self-quenching once they are aggregated or in solid state, limiting their applications in disease imaging.

Method: The high-performance Y-CDs-based microparticles were directly obtained via a one-step solvothermal method. Based on TEM, SEM, XRD, and FTIR analyses, the solid-state fluorescent microparticles were composed of p-phenylenediamine dihydrochloride matrix and CDs. 3-glycidyloxypropyltrimethoxysilane (KH-560) acts as a bridge to connect CDs to the matrix based on epoxy-amine reaction and silane hydrolysis condensation for uniform dispersion of CDs and high solid-state luminescence can be easily achieved. Meanwhile, through adjusting the amount of KH-560, the morphology of Y-CDs-based microparticles can be controlled from cube to layered structure and the fluorescence intensity can be significantly improved.

Result: In this work, we report a rational strategy for synthesis of yellow fluorescent carbon nanodots (Y-CDs)-based microparticles with a high solid-state photoluminescence quantum yield (32.02%). It is the first report on designing a lamellar structured matrix to disperse CDs to realize long-wavelength solid fluorescence. Importantly, the optimal Y-CDs particles can be combined with blue chips (450 nm) to show that the luminescence performance is better than the existing medical fluorescent agents, which provides a good material support for subsequent medical applications.

Conclusion: The CD-based phosphor provides a more green and simpler choice for the disease imaging. This work proposed a new strategy to prepare the high-efficiency long-wavelength emission solid-state fluorescent CDs-based particles with lamellar structure and revealed the promising potential in disease imaging.

PU-0677

基于 APTw 及 T2w 图像的集成学习放射组学模型无创预测胶质瘤 IDH 突变状态

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目的: 评估 APTw 及 T2w 图像的集成学习放射组学模型预测胶质瘤 IDH 突变状态效能, 并比较两种模型的预测效能差异。

材料与方法: 回顾性纳入两个中心共 122 例胶质瘤患者 (IDH 野生型, IDH 突变型)。从 APTw 及 T2w 图像提取 1873 个特征, 使用最小绝对收缩和选择算子及 Pearson 相关算法选择特征, 随后将数据按照 8:2 拆分为训练集 (n=100) 及测试集 (n=22); 为了解决样本不平衡问题, 采用了合成少数过采样技术 (SMOTE), 最后基于集成学习算法构建放射组学模型, 使用受试者工作特性曲线 ROC、ACC 等指标评估模型在训练队列及测试队列的模型效能。

结果: 基于 5 个 APTw 图像特征及 2 个 T2w 图像特征构建的集成学习放射组学模型, 在训练集及测试集预测胶质瘤 IDH 突变状态的准确率分别为 86.3%、80.5%, ROC 曲线下面积分别为 83.3%、89.5%。

结论: APTw 及 T2w 图像的集成学习放射组学模型可以在术前无创预测胶质瘤 IDH 突变状态, 并为放射组学模型向临床转化提供了潜在的可能性。

PU-0678

泌尿系增强 CT 在输尿管连接部梗阻诊断中的应用价值

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【目的】肾盂输尿管连接部梗阻 (UPJO) 是一种常见的泌尿系疾病, 其临床表现主要是腰酸背痛、排尿困难等症状。目前, 泌尿系增强 CT 作为一种新兴的影像学检查方法, 已广泛应用于 UPJO 的诊断和治疗中。本研究旨在探究泌尿系增强 CT 及多期扫描在 UPJO 中的应用方法及价值。【方法】本研究统计 2020 年 5 月至 2023 年 5 月共有 9 例 UPJO 患者接受泌尿系增强 CT 扫描并进行后处理, 并分析患者的影像学评估和术后结果。9 例患者中, 4 例是由于副肾动脉压迫所致, 3 例是由于副肾静脉压迫所致, 1 例是由于性腺静脉压迫所致, 1 例是由于结石伴肾旋转不良所致。所有患者均通过泌尿系增强 CT 得到了具体原因及周围解剖结构的信息, 并且这些信息对临床手术提供了重要指导。【结论】泌尿系增强 CT 在 UPJO 的诊断和治疗中具有很大的应用价值。首先, 它可以提供较为详细的解剖结构信息, 便于医生了解梗阻原因和相关解剖结构的情况。其次, 泌尿系增强 CT 能够识别一些微小而难以观察到的解剖变异和异常, 这有助于指导手术。最后, 由于泌尿系增强 CT 是一种无创、快速的检查方法, 因此可以大大减轻患者的痛苦和不适。本研究结果表明, 泌尿系增强 CT 及多期扫描在 UPJO 的诊断和治疗中具有很大的应用价值。它能够提供全面的解剖结构信息, 识别微小异常, 并且是一种无创、快速、可靠的检查方法, 可以为 UPJO 的手术治疗提供重要指导。因此, 泌尿系增强 CT 可以作为 UPJO 常规术前检查之一, 以提高 UPJO 的诊断准确性和手术成功率。

PU-0679

脾炎性假瘤样滤泡树突状肉瘤 1 例

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脾脏的滤泡树突状肉瘤 (follicular dendritic cell sarcoma, FDSC) 是一种非常罕见的恶性肿瘤, 分为经典型和炎性假瘤样滤泡树突状细胞肿瘤 (IPT-like FDCT)。滤泡树突状细胞肉瘤 (follicular dendritic cell sarcoma, FDSC), 也称树突细胞肉瘤, 是一种显示滤泡树突细胞分化和免疫表型肿瘤, 由 Lennert 在 1978 年首次提出 [1], 1986 年由 Monda 等首次描述的一种低度恶性肿瘤 [2]。2008 年 WHO 将发生于肝、脾的 FDSC 定义为炎性假瘤样亚型 FDSC (inflammatory pseudotumor-like follicular cell sarcoma, IPT-like FDSC) [3]。主要由 EB 病毒 (Epstein-Barr virus, EBV) 阳性的感染引起。由于引起病因不明, 年龄分布广泛, 多数是成人, 其中女性偏多, 颈部淋巴结是最常发生的部位, 其他结外多个部位也可发生, 包括肝脾等 [4]。但发生于脾脏上更为罕见, 患者临床表现为腹痛、腹胀、低热、消瘦及缓慢生长的无痛性肿块。大多数可切除干净, 40%~50% 的病例出现局部复发。由于其临床症状缺乏特异性, 在影像学表现低密度、边界清楚、不均质并伴有延迟强化的占位性病灶, 且肿瘤形态与相对常见的脾部肿瘤等又非常相似, 造成误诊或漏诊。

PU-0680

机架旋转时间对自由呼吸患者腹部图像质量和辐射剂量的影响

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目的 探讨机架旋转时间对自由呼吸患者腹部图像质量和辐射剂量的影响。方法 将 30 例临床怀疑上腹部病变，行上腹部 CT 增强检查的受检者（不能配合屏气），采用佳能 320 排 CT 机进行扫描，平扫、动脉期扫描时机架旋转时间为 0.3s，标记为 A 组；门脉期、平衡期扫描时机架旋转时间为 0.6s，标记为 B 组。按照制订的标准，对比两组图像的图像质量和辐射剂量，进行统计学分析。结果 A 组和 B 组两组患者 DLP（剂量长度乘积）分别为（440.8±58.5）mGy.cm 和（818.2±90.3）mGy.cm，降低约 46%，差异有统计学意义。B 组图像呼吸引起伪影明显多于 A 组，且 A 组扫描时间少于 B 组。结论 0.3s 的机架旋转时间在自由呼吸上腹部 CT 检查中，能在保证图像质量同时，降低辐射剂量，缩短扫描时间，提高工作效率，值得推荐。

PU-0681

能谱增强 CT 诊断继发性骨骼肌滤泡性淋巴瘤的病例分析

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滤泡性淋巴瘤是非霍奇金淋巴瘤的常见类型之一，继发性骨骼肌滤泡性淋巴瘤属于结外淋巴瘤，临床少见，诊断较困难。能谱增强 CT 成像可帮助进行影像学诊断。

2021 年，一名 52 岁的男性因发现左侧腹股沟区肿物 2 月就诊，经肿物穿刺活检术、颈部淋巴结清扫术及骨髓穿刺活检术后病理明确诊断为滤泡性淋巴瘤 I 级、累及骨髓。后患者腰痛进行性加重 2 月，行腰椎能谱增强 CT 提示右侧腰大肌与腹膜后肿大淋巴结为同源性病灶，考虑右侧腰大肌淋巴瘤浸润可能性大。

能谱增强 CT 成像是一种无创、便捷、准确的影像学诊断方法。通过重建、比较不同组织的能谱曲线确定肿块性质，可以帮助诊断结外淋巴瘤，对判断病变范围、指导临床治疗方案具有重要价值。

PU-0682

The GRAPH-CRAFITY Score: a novel prognostic tool for patients with hepatocellular carcinoma treated with targeted therapy and immunotherapy

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Purpose: To establish an optimized model by integrating magnetic resonance (MR) features and CRAFTY score to predict overall survival (OS) of hepatocellular carcinoma (HCC) patients treated with targeted therapy and immunotherapy.

Methods: This retrospective study included patients with HCC who received targeted therapy and immunotherapy at two hospitals in China from August 2018 to February 2022. The clinical variables and MR features were assessed by univariate and multivariate Cox regression analyses.

Results: One-hundred and sixty-six patients (55.6±10.4 years) treated with lenvatinib plus anti-PD-1 antibody were included in training cohort and 77 patients (55.4±10.7 years) treated with

lenvatinib or bevacizumab plus anti-PD-1 antibody were included in validation cohort. Based on independent risk factors (Gender, intRatumoral fAt, enhancing tumor caPsule, gross growth type and CRAFTY Score) identified by the multivariate analysis, a novel prognostic tool named GRAPH-CRAFTY Score was developed to predict OS. The OS was significantly different among the 3 groups according to GRAPH-CRAFTY score (≤ 3.2 , 3.3-6.1, ≥ 6.2 ; $p < 0.001$) and C index of GRAPH-CRAFTY Score was 0.74 in both training cohort and validation cohort. Area under the time-dependent receiver operating characteristic curve (ROC) for discrimination at 6, 12, 18, 24 months were 0.80, 0.79, 0.77, 0.72 and 0.87, 0.75, 0.73, 0.78 in training cohort and validation cohort, respectively.

Conclusions: GRAPH-CRAFTY Score by integrating Gender, MR features and laboratory tests is an effective and user-friendly tool to predict OS of HCC patients treated with targeted therapy and immunotherapy, which may help oncologists for decision-making.

PU-0683

Gd-EOB-DTPA 增强 MRI 影像组学在评估肝功能中的价值

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目的：探究 Gd-EOB-DTPA 增强 MRI 影像组学特征对肝功能评估的可行性，并建立模型对不同患者肝功能进行分级评估。

方法：回顾性分析 91 例肝硬化者的资料，Child-Pugh A 级(52 例)、Child-Pugh B (34 例)和 Child-Pugh C 级(5 例)。在轴位 T1WI 平扫和 Gd-EOB-DTPA 增强后肝胆期图像上同一层面测量肝脏、脾脏、竖脊肌以及胆管信号强度值，计算肝脏相对强化程度 (RE)、肝胆期肝脏—脾脏信号比 (SI 肝/脾)、肝脏—脾脏对比增强指数 (CEI 肝/脾)、肝胆期肝脏—竖脊肌信号比 (SI 肝/肌)、肝脏—竖脊肌对比增强指数 (CEI 肝/肌) 以及胆管信号强度对比率 (SIR)。在 MaZda 软件上勾画肝胆期图像 ROI 并提取影像组学特征，筛选后进行统计分析。利用受试者工作特征 (ROC) 曲线分析各参数在诊断 Child-Pugh A 组 VS Child-Pugh B+C 组的效能。排除冗余参数后分别利用影像参数、影像组学特征以及影像参数+影像组学特征构建 Logistic 回归模型，ROC 曲线分析三个模型在 Child-Pugh A 组 VS Child-Pugh B+C 组间的诊断效能。

结果：RE、SI 肝/脾、CEI 肝/脾、SI 肝/肌和 SIR 五个参数在不同肝硬化组间差异具有统计学意义，14 个特征在不同肝硬化组间差异具有统计学意义。影像参数构建的 Logistic 回归模型的 AUC 值为 0.789；影像组学特征构建的模型 AUC 值为 0.881；影像参数+影像组学特征构建的综合模型 AUC 值为 0.921。经 Delong 检验，影像组学模型和综合模型的 AUC 值高于影像参数模型，差异具有统计学意义 ($P < 0.05$)。

结论：基于 Gd-EOB-DTPA 增强 MRI 影像组学特征可以对不同肝硬化患者肝功能进行评估，且影像组学特征协助构建模型可以提高对肝功能分级的诊断效能。

PU-0684

肝门部胆管癌 CT 与 MRI 联合诊断的价值

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目的：探讨肝门部胆管癌 CT 与 MRI 联合诊断的价值。方法：回顾性选取我院 2021-2023 年收治的肝门部胆管癌患者 50 例，均有 CT 与 MRI 检查结果，均有病理结果。单独 CT 或 MRI 诊断结果与病理结果对比，CT 与 MRI 联合诊断结果与病理结果对比。结果：单独 CT 诊断结果准确率 70%，单独 MRI 诊断结果准确率 76%。CT 与 MRI 联合诊断准确率 92%。CT 与 MRI 联合诊断准确率与

单独 CT 或 MRI 差异有统计学意义。结论：肝门部胆管癌 CT 与 MRI 联合诊断有明确价值，值得广泛推广应用。

PU-0685

基于 CT 图像探索非肌层浸润性膀胱癌风险分层的初步研究

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目的：探索 CT 图像特征对非肌层浸润性膀胱癌 (NMIBC) 风险分层的提示意义。

方法：回顾性收集 2013 年 5 月至 2018 年 11 月于我院确诊为 NMIBC 患者的术前 CT 影像数据，共计 168 例纳入本研究。根据欧洲泌尿学协会 (EAU) 指南对病例进行风险程度分层 (低、中、高)。由 2 位放射科医生独立、双盲对 CT 图像特征进行选取。采用单因素分析及有序多分类 Logistic 回归方法分析与风险分层相关的 CT 特征进行统计学分析。

结果：单因素分析显示患病风险等级与病灶数量及最大病灶长、短径相关 ($P=0.001$, $P=0.001$, $P=0.006$)。有序多分类 Logistic 回归分析发现肿瘤位置位于后壁、侧壁、输尿管口相对于膀胱三角患病风险等级高至少一个等级的可能性分别为 0.19 ($P=0.009$)、0.17 ($P=0.002$)、0.26 ($P=0.046$) 倍；单发与非单发相比，患病风险等级高至少一个等级的可能性为 0.33 倍 ($P=0.004$)。

结论：肿瘤位置、大小、数目等 CT 特征对 NMIBC 的术前危险分层具有提示意义，有利于患者治疗方式的选择和改善预后。

PU-0686

腹膜后原发上皮样血管内皮瘤一例

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上皮样血管内皮瘤 (epithelioid hemangioendothelioma, EHE) 是一种起源于血管内皮细胞 [1] 的罕见血管肿瘤。其发病率不足百万分之一，占有血管肿瘤的不到 1% [2]。该病可发生于任何年龄，无明显的性别差异。可发生于身体多个部位，以软组织 (四肢)、骨骼、肝脏和肺为主 [2]。原发于腹膜后者更为罕见。1982 年，Weiss 和 Enzinger 将血管内细支气管肺泡瘤 (intravascular bronchioloalveolar tumor, IVBAT) [3] 更名为 EHE [4]。2015 年，世界卫生组织肺部肿瘤分类明确将 EHE 归类为低级别至中等级别恶性血管肿瘤，具有潜在转移能力 [5]。

PU-0687

64 排 CT 腹部增强动脉期检查中经验值法延时时间的优化

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目的：探讨 64 排 CT 腹部增强动脉期检查中经验值法延时时间的优化。方法：回顾性分析 2022 年 1 月 -2023 年 7 月 100 例 CT 腹部增强检查患者的临床资料，根据经验值法延迟时间将其

分为 A 组 (n=50) 和 B 组 (n=50)。A 组动脉期检查中经验值法延时时间为 25s-30s, B 组动脉期检查过程中经验值法延时时间为对比剂注射时间+5s。采用 AW4.6 工作站完成图像后处理, 测量出腹主动脉 CT 值及门静脉 CT 值、肾皮质 CT 值。结果: 两组腹主动脉平均 CT 值比较差异无统计意义 ($P>0.05$); B 组门静脉、肾皮质平均 CT 值高于 A 组, 差异有统计学意义 ($P<0.05$); 随着延时时间的增加, 血管密度 HU 开始上升, 并在 10~18 s 时达到峰值, 随后随整体呈下降趋势并呈波动样变化, 并趋于稳定; A 组扫描时经验值法延时时间为 25s-30s, 部分门静脉未见显影, 肾皮质未见强化或强化不明显, 肝脏占位未见明显强化, 影响对疾病的诊断; B 组扫描获得的图像相对清晰, 门静脉稍显影, 双肾皮质灌注良好, 肝脏及肾脏占位强化明显, 有利于疾病的诊断。结论: 64 排 CT 腹部增强动脉期检查中经验值法延时时间为对比剂注射时间+5s, 能更加容易获得最佳动脉晚期扫描时相, 有助于提高图像质量。

PU-0688

增强 CT 在肝脏肿瘤的鉴别诊断中的应用准确性探讨

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本研究主要的目的是探究增强 CT 方式在肝脏肿瘤患者中的应用价值, 进而观察该方式对疾病的检出率, 分析提升疾病检出率的有效技术, 为临床治疗提供依据。方法: 选取 60 例肝脏肿瘤患者作为研究对象, 均接受 CT 增强方式进行诊断, 将病理检查结果作为疾病诊断的金标准, 将增强 CT 检查方式所获结果与之对比, 进而分析该影像学技术手段的应用价值。结果: 560 例肝脏肿瘤患者中通过病理检查结果明确为恶性肿瘤人数为 36 例、良性肿瘤为 24 例, 通过增强 CT 扫描结果显示恶性肿瘤人数为 25 例, 良性肿瘤人数为 20 例, 经计算明确该影像学技术手段的敏感度、特异度以及准确度分别为 94.44% (34/36)、91.67% (22/24)、93.33% (56/60), 经一致性检测可知, Kappa 为 0.789, 提示一致性良好。 ($P<0.05$) 结论: 对肝脏肿瘤患者的诊断有着重要意义, 分析 CT 增强扫描的影像学表现, 可以看到多数肝细胞癌患者在动脉期可呈现结节样强化, 静脉期密度呈现下降, 延时期则显示为低密度影, 超模展现为高密度环状带样。对于胆管癌患者来说, 其早期增强存在不明显强化, 延迟期可显示出强化, 但程度较低。转移性肝癌患者可呈现出低密度影, 囊肿患者经 CT 增强检查后, 可呈现出低密度影, 具有较为清晰的边界。血管瘤患者出现的强化较为明显, 在延迟期有等密度影出现。由此可以看到通过 CT 增强扫描, 可明确肝脏肿瘤患者的具体类型。从本次研究结果可以看到, CT 增强在肝脏肿瘤中的敏感度、特异度以及准确度分别为 94.44%、91.67%、93.33%, 均处于较高水平, 应用增强 CT 方式实施诊断, 可获得较好的诊断价值, 有助于为临床治疗提供依据。

PU-0689

CT 鉴别诊断肝脏血管瘤 肝脏肿瘤在临床应用中的价值

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肝脏血管瘤、肝脏肿瘤实际上都是肝脏肿瘤,但后者肝脏肿瘤中包括良性肿瘤与恶性肿瘤,前者为良性肿瘤。由于机体肝区结构非常复杂,病发后临床症状表现差异不大均有乏力、恶心呕吐、消瘦、肝区不适、疼痛表现,仅从症状表现上进行诊断准确度低,影像学检查是诊断常用方法,也被广泛证实是有效方法。CT 是影像科应用广泛的一种方法,经行多层螺旋 CT 检查能探查肿瘤内血流信号,结合分析各区域回声差异,可实现疾病的诊断甚至鉴别。研究将多排螺旋 CT 用于肝脏肿瘤诊断

中, 利用各肿瘤结构上的差异进行判断, 显示出良好的应用价值。本研究以我院 2019 年 1 月至 12 月 200 例占位性肝脏病变患者为对象, 分析 CT 在诊断与鉴别中的应用价值。

PU-0690

胃癌术后并发症危险因素的 Meta 分析

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目的 探讨胃癌术后并发症的危险因素, 通过 Meta 分析了解胃癌患者发生并发症的危险因素。为制定预防策略提供科学依据。方法 检索中国期刊全文数据库 (CNKI)、万方数据库、维普中文科技期刊数据库 (VIP)、PubMed 和 Web of Science 数据库。收集至 2023 年 4 月公开发表的关于胃癌术后并发症的相关文献。按照纳入和排除标准对文献进行筛选, 应用 RevMan 5.3 软件进行 Meta 分析。结果 共纳入 19 篇病例对照研究文献, 其中中文文献 15 篇, 英文文献 4 篇; 合计病例组 2083 例, 对照组 17237 例。本文分析了 11 项可能的危险因素, 有统计学意义的危险因素包含年龄 >60 岁 (OR=1.92, 95% CI: 1.34-2.76)、男性 (OR=1.22, 95% CI: 1.06-1.40)、BMI $>25\text{kg}/\text{m}^2$ (OR=1.81, 95% CI: 1.33-2.45)、病理阶段 (OR=0.61, 95% CI: 0.41-0.90)、开腹手术 (OR=1.66, 95% CI: 1.34-2.05)、手术时间 (OR=0.47, 95% CI: 0.28-0.80)、胃切除范围 (OR=0.77, 95% CI: 0.65-0.92)、切口类型 (OR=1.66, 95% CI: 1.34-2.05)、, 而术前白蛋白、术中出血量、腹部手术史、联合脏器切除的差异均无统计学意义 (P 值均 >0.05) ; 上述 7 项研究因素是胃癌术后并发症的重要危险因素。结论: 胃癌术后并发症危险因素较多, 科学预防与控制相关危险因素是降低胃癌术后患者并发症发生率的关键。

PU-0691

T1 mapping 在直肠癌预后因素中的应用

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探讨 T1 mapping 在直肠癌预后因素中的应用价值。资料与方法 以 86 例病理证实为直肠癌的患者为研究对象, 行高分辨 MRI、T1 mapping 及 DWI, 测量不同病理分级、TN 分期以及相关结构侵犯状态的 T1 弛豫时间 & 表观扩散系数 (ADC)。结果 高级别直肠癌 T1 值高于低级别直肠癌, 差异具有统计学意义 (P <0.001) ; 神经侵犯阳性组 T1 值高于阴性组, 差异具有统计学意义 (P <0.05) ; TN 分期, 壁外血管侵犯, 脉管癌栓不同组间 T1 值、ADC 值的差异均无统计学意义 (P >0.05) 。T1 值鉴别高级别与低级别直肠癌的 ROC 曲线下面积为 0.796, T1 值鉴别神经侵犯的 ROC 曲线下面积为 0.637。结论 T1 mapping 有助于评估直肠癌患者的预后因素, 包括病理分级及神经侵犯。

PU-0692

实型胰腺浆液性囊腺瘤: 影像与病理

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【摘要】目的: 探讨实型胰腺浆液性囊腺瘤 (Solid Serous Cystadenoma of the Pancreas, SCP) 影像学表现及其病理基础。方法: 对 11 例经病理证实的实型胰腺浆液性囊腺瘤患者的影像学资料

和病理资料进行回顾性分析。所有患者均经过 CT 和 MRI 平扫加增强检查。将 CT 扫描中肿瘤强化超过胰腺组织的病例列为 A 组；肿瘤强化未超过胰腺组织的肿瘤列为 B 组。分别测试 CT 动脉期、门脉期和延迟期两组病例肿瘤与周围胰腺组织的 CT 值。将两组肿瘤与周围胰腺在不同时强化时期的平均 CT 值图表比较。结果：患者全部为女性，41 岁-77 岁，中位年龄 60 岁。肿瘤 CT 和 MR 图像上边界清晰。A 组 7 例，肿瘤相对胰腺等高密度，增强后在退化胰腺背景下显著强化，肿瘤强化程度在动态增强的各期均超过周围胰腺组织。B 组 4 例，胰腺组织未发生退化，肿瘤相对周围胰腺低密度，增强后肿块各期强化均未超过周围胰腺。MRI T2WI 图像上所有肿瘤显示“高亮”信号，与水相近，并可以观察到相对低信号的分隔结构。增强后强化方式与 CT 相同。病理大体标本显示肿瘤为实性肿块，内部可见较为粗大的白色纤维分隔。镜下显示为大量微型囊腔和囊腔之间丰富的肿瘤间质。囊腔友单层立方上皮细胞覆盖内壁。肿瘤间质内富含血管及纤维胶原。结论：实型胰腺浆液性囊腺瘤的影像特征与其病理特征密切相关，其相对胰腺的强化方式与周围胰腺是否退化有关，MRI T2WI 有助于揭示其囊性肿瘤本质。

PU-0693

胃壁增厚的 CT 研究及应用价值

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目的 提高 CT 对于引起胃壁增厚的胃部病变的诊断及应用价值重要性的认识。

方法 回顾性分析经手术病理及胃镜病理证实的 82 例胃壁增厚的 CT 表现，并与正常胃壁厚度相比较，从胃壁增厚的程度、形态等来诊断及鉴别胃壁增厚的病变。

结果 82 例胃部疾病，其中胃癌 45 例，胃淋巴瘤 17 例，间质瘤 12 例，胃炎 8 例，累及范围共 122 处；其中胃窦部 56 处，平均厚度 $19.3+11.8\text{mm}$ ；胃体部 45 处，平均厚度 $32.6+12.3\text{mm}$ ；胃底贲门部 21 处，平均厚度 $39.1+7.5\text{mm}$ ；与正常各区胃壁厚度有显著性差异。本组 82 例病例胃壁增厚的 CT 类型：条形或梭形增厚（30）、肿块形增厚（14）、结节形增厚（5）、溃疡型增厚（10）、不规则形增厚（8）、混合型增厚（15）等。

结论 CT 对于胃壁增厚的厚度、形态等的观察有很大的价值，能够较好地准确诊断胃壁增厚的相关疾病及鉴别诊断。

PU-0694

急性肾损伤（AKI）的 CT 和 MR 表现分析

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目的：通过多层螺旋 CT(MSCT)和 MR 分析急性肾损伤 (Acute kidney injury, AKI) 的影像学异常改变，总结 AKI 的影像学表现。方法：回顾性分析临床证实的 110 例 AKI 患者肾脏和肾周的影像学表现。研究组均为临床确诊 AKI 的病例，AKI 诊断符合临床确诊标准。本研究组中流行性出血热患者 31 例，药物过敏患者 27 例，急性胰腺炎患者 4 例，多发性骨髓瘤患者 35 例，急性未分化型粒细胞白血病患者 8 例，Pomes 综合征患者 5 例。检查设备使用 GE 宝石能谱 HD 750 多层螺旋 CT 扫描机、Philips Ingenuity Core 128 排多层螺旋 CT 扫描机、超导型 16 通道 GE Signa TwinSpeed 1.5T 和 GE Discovery MR750 3.0T 超导 MR 成像机。为了避免加重肾脏损伤和防止对比剂肾病的发生，所有患者均未做 CT 和 MR 的增强检查。影像诊断由两名高年资医师承担。结果：通过 MSCT 和高场强 MR 检查，研究组 110 例病例双侧肾脏以及肾周间隙均存在异常改变；AKI 影像学表现：两侧肾脏外形增大、形态饱满；MSCT 显示双侧肾脏实质的密度呈弥漫性减低改变；

MR 检查 T1WI 表现肾脏实质信号普遍减低, T2WI 肾脏实质信号弥漫性不均一增高, 压脂序列肾脏实质信号不均一弥漫性增高; 同时 MSCT 和 MR 在肾周间隙均可见观察到桥隔增粗和吉氏筋膜增厚; 部分病例肾周间隙存在少量积液。结论: AKI 患者在肾脏以及肾周间隙存在特征性影像学表现; 认识 AKI 影像学表现, 结合临床以及实验室检查, 影像学可及时准确诊断 AKI。

PU-0695

动态增强 MRI 定量参数在原发性肝癌术前分期中的评估价值研究

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目的 分析研究动态增强 MRI (DCE-MRI) 定量参数在原发性肝癌 (PLC) 术前分期中的评估价值。方法 2021 年 1 月~2023 年 1 月我院收治的 PLC 患者 69 例, 均接受 DCE-MRI 检查并计算灌注参数[转运常数 (KTrans)、速率常数 (Kep)、血管外细胞外间隙体积分数 (Ve)], 通过活检穿刺、术后病理获得患者中国肝癌分期 (CNLC), 比较不同 CNLC 分期 PLC 患者 DCE-MRI 定量参数, 采用 Spearman 相关检验分析 DCE-MRI 定量参数与 PLC 患者 CNLC 分期的相关性, 绘制受试者工作特征曲线 (ROC) 并计算曲线下面积 (AUC) 评估 DCE-MRI 定量参数诊断 PLC 患者术前分期的价值。结果 69 例 PLC 患者中, 包括 CNLC 分期: I 期 17 例, II 期 21 例, IIIa 期 29 例, IIIb 期 2 例; III 期 PLC 患者 KTrans、Kep 分别为【 (0.4 ± 0.1) min⁻¹、 (1.1 ± 0.6) min⁻¹】, 明显高于 I~II 期 PLC 患者【 (0.3 ± 0.1) min⁻¹、 (0.6 ± 0.3) min⁻¹】; III 期 PLC 患者 Ve 为 (0.4 ± 0.2) , 明显低于 I~II 期 PLC 患者 (0.5 ± 0.2) ; Spearman 相关检验结果显示, KTrans、Kep 与 PLC 患者 CNLC 分期呈显著正相关 ($r=0.420$, $P<0.001$; $r=0.517$, $P<0.001$), Ve 与 PLC 患者 CNLC 分期呈显著负相关 ($r=-0.389$, $P=0.001$); ROC 曲线结果显示, KTrans、Ve、Kep 诊断 III 期 PLC 患者的 AUC 分别为 0.737、0.722、0.796, 三者联合诊断的 AUC 为 0.812。结论 DCE-MRI 定量参数在 PLC 患者术前分期中具有一定的评估价值, 能够为临床制定合理的治疗方案提供指导, 值得应用。

PU-0696

磁共振普美显检查的护理干预

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目的: 探讨磁共振中呼吸配合的护理干预对普美显检查的影响。

方法: 通过医生对图像的随机评分, 图像质量较好。技师对患者呼吸配合程度的反馈, 呼吸配合较好来说明护理干预的重要性。收集 2023 年 2 月份—6 月份普美显患者共计 50 例, 将它们分为 2 组, 参照组与对照组, 其中 25 例患者为参照组, 我们以旧的方式进行护理干预, 口头叮嘱患者, 检查过程中做好呼吸配合, 由技师直接进行扫描, 得出图像。另外 25 例患者为对照组, 我们以新的方式进行护理干预, 检查前对患者进行呼吸训练, 告知患者呼吸配合的顺序及重要性, 并同时用手触摸患者腹部, 感受患者呼吸配合程度, 进行 2-3 次的重复训练, 再由技师进行扫描检查得出图像。分别由 1 位技师和 2 名医生对患者的配合程度和图像质量进行评估, 使用 1—3 分的评估方式(1.差, 2.良好, 3.优), 评估后的得分做为依据。

结果: 参照组 25 例患者经评估后得分为 38 分, 对照组得分为 65 分。

经统计学分析结果表明, 参照组的配合程度平均较差, 图像质量较低。而实验组的配合程度平均评分较高, 图像质量较好。两组数据存在明显差异。

结论: 护理干预在磁共振普美显的检查中有着不可缺少的作用, 明显提高了检查结果的质量与准确性, 为检查的顺利进行和诊断提供了有效的帮助, 因此提高检查时的护理干预是有必要的。

PU-0697

能谱 CT 碘图定量在肝脏病变鉴别诊断应用价值的初步研究

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目的: 初步探讨能谱 CT 碘图定量分析在肝脏病变的鉴别诊断中的应用价值。

方法: 收集经临床诊断为肝转移瘤 (12 例)、肝血管瘤 (10 例) 患者。所有患者均需使用 GE Revolution CT 行腹部 CT 三期能谱增强扫描, 管电压 80/140kV 瞬时自动切换, 管电流采用 ASSIST 自动 mA, 噪声指数 (NI) 为 10。扫描完成后将数据传入后处理工作站, 选取病灶最大层面、同层面腹主动脉勾画 ROI (尽量使 ROI 在各期保持一致), 计算并测量碘浓度 (iodine concentration, IC)、标准化碘浓度 (normalized iodine concentration, NIC) 及能谱曲线斜率 (k), 能谱曲线 40~70 kV 区域曲线较陡直, 故选择对 K70 进行比较分析。采用独立样本 t 检验比较组间差异, $P < 0.05$ 为差异具有统计学意义。

结果: (1) 肝转移瘤 (平均年龄 51 ± 11.73), 肝血管瘤 (平均年龄 57.33 ± 10.8)。 (2) 肝转移瘤及肝血管瘤在动脉期, 门静脉期, 延迟期的 IC 值 ($100 \mu\text{g/mL}$) 分别为 (2.68 ± 3.19 、 12.97 ± 6.85 、 8.36 ± 5.69)、(29.52 ± 28.58 、 26.94 ± 47.84 、 14.49 ± 5.09)。NIC 值分别为 (0.02 ± 0.03 、 0.31 ± 0.14 、 0.34 ± 0.23)、(0.32 ± 0.36 、 0.86 ± 0.13 、 0.7 ± 0.27)。斜率 k70 分别为 (0.49 ± 0.59 、 2.43 ± 1.29 、 1.55 ± 1.09)、(5.55 ± 5.39 、 5.06 ± 1.47 、 2.72 ± 0.97)。肝转移瘤各参数值均低于肝血管瘤, 门静脉期两组间 IC 值、NIC 值及 K 值差异有统计学意义 ($P < 0.05$), 延迟期两组间 NIC 值差异有统计学意义 ($P < 0.05$)。

结论: 能谱 CT 碘图所测的定量参数在肝转移瘤和血管瘤的鉴别诊断上具有一定应用价值。

PU-0698

Abdominal adipose tissue and type 2 diabetic kidney disease: adipose radiology assessment, impact, and mechanisms

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Diabetic kidney disease (DKD) is a significant healthcare burden worldwide that substantially increases the risk of kidney failure and cardiovascular events. To reduce the prevalence of DKD, extensive research is being conducted to determine the risk factors and consequently implement early interventions. Patients with type 2 diabetes mellitus (T2DM) are more likely to be obese. Abdominal adiposity is associated with a greater risk of kidney damage than general obesity. Abdominal adipose tissue can be divided into different fat depots according to the location and function, including visceral adipose tissue (VAT), subcutaneous adipose tissue (SAT), perirenal adipose tissue (PAT), and renal sinus adipose tissue (RSAT), which can be accurately measured by radiology techniques, such as computed tomography (CT) and magnetic resonance imaging

(MRI). Abdominal fat depots may affect the development of DKD through different mechanisms, and radiological abdominal adipose characteristics may serve as imaging indicators of DKD risk. This review will first describe the CT/MRI-based assessment of abdominal adipose depots and subsequently describe the current studies on abdominal adipose tissue and DKD development, as well as the underlying mechanisms in patients of T2DM with DKD.

PU-0699

能谱 CT 定量参数预测进展期胃癌术后肝转移发生的价值

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目的: 探讨能谱 CT 定量参数预测进展期胃癌 (advanced gastric adenocarcinoma, AGA) 术后发生肝转移的价值。

材料和方法: 回顾性分析 44 例经组织病理学证实的 AGA 患者, 其中肝转移组 (hepatic metastasis group, HM) 和非肝转移组 (non-hepatic metastasis group, NHM) 各 22 例。对 HM 和 NHM 组间能谱 CT 定量参数 (碘浓度 (IC)、有效原子序数 (Zeff)、能谱曲线斜率 (λ Hu) 和单能量 CT 值 (40-140 keV, 间隔 20 keV)) 分别进行测量和比较。绘制接收者操作特征曲线 (ROC) 评估能谱 CT 定量参数预测 AGA 患者术后发生肝转移的评估性能。

结果: 在静脉期和延迟期, HM 和 NHM 组间的 IC、Zeff、 λ Hu 和 CT 值存在显著差异 (均 $P < 0.05$)。而在动脉期, 只有 IC 具有统计学意义 ($P < 0.05$)。在所有能谱 CT 定量参数中, 延迟期的 Zeff 预测性能最高, 曲线下面积、灵敏度和特异性分别为 0.749、77.3% 和 81.8%。

结论: 能谱 CT 定量参数可作为预测 AGA 患者术后发生肝转移的重要手段, 其中延迟期的 Zeff 是最有价值的预测参数。

PU-0700

经直肠靶向给药补充益生菌的临床应用研究

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【摘要】目的 在这项研究中, 我们旨在研究与口服补充益生菌相比, 经直肠靶向益生菌补充剂在改善肠道微生物群、缓解便秘和整体健康方面的有效性。**方法** 选取了 65 名志愿者做为研究对象, 随机分为实验组 33 人采用直肠靶向益生菌补充法, 使用自制经肛门直肠靶向益生菌灌肠器分期补充复合益生菌 4g/两日; 对照组 32 人口服相同剂量复合益生菌 4g/日, 对益生菌的生存率、定植情况以及对肠道健康的影响做记录分析。**结果** 实验组直肠靶向给药补充益生菌后结肠内益生菌定植率为 95.6%, 而对照组口服则只有 71.1%; 肠道菌群定量表明, 直肠靶向给药组益生菌定植量显著高于口服组 ($P < 0.05$)。通过测定肠道菌群多样性和丰富度, 发现直肠给药组的 Shannon 指数 (3.68 ± 1.11) 和 Simpson 指数 (0.8 ± 0.18) 均高于口服组 (Shannon 指数: 2.98 ± 1.21 ; Simpson 指数: 0.68 ± 0.19), 说明直肠给药益生菌对肠道菌群的影响更加显著。**结论** 直肠靶向给药可以显著提高益生菌生存率和定植情况, 还能更好地调节肠道菌群结构, 同时还对整体身体健康有明显改善。因此, 我们建议更多人选择专业医生指导下直肠靶向给药方式来补充益生菌, 以保护和维持良好的肠道健康。

PU-0701

基于最佳单能级对结直肠癌患者肠系膜下动脉解剖变异评价

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结肠癌在全球癌症发病率及死亡率中分别排名第三和第四，每年约 90 万人死于结肠癌，我国是结肠癌发病大国，结肠癌中又以左半结肠癌（包括上段直肠癌和乙状结肠癌）最为常见。左半结肠癌主要是由肠系膜下动脉及其分支动脉（左结肠动脉、乙状结肠动脉、直肠上动脉）供血，手术是目前治疗结直肠癌的主要手段，术前准确的评估结直肠动脉供血血管可以有效的降低术中风险，本文就能谱 CT 最佳单能级对结直肠动脉的显示情况进行探讨。

PU-0702

T1 期肾透明细胞癌病理分级的 CT 分析

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通过分析患者的临床资料、T1 期 ccRCC 在 CT 上的常规表现及高低病理分级 ccRCC 的 CT 增强扫描相关强化特征参数的差异，

收集本院间病理证实且进行 Fuhrman 分级的 61 例肾透明细胞癌患者的 CT 影像及临床资料，分为两组：低级别组（Fuhrman I-II 级 43 例）和高级别组（Fuhrman III-IV 级 18 例），所有纳入病例均进行常规 CT 平扫及增强扫描，研究内容包括：（1）统计分析 T1 期 ccRCC 患者的一般资料在两组分级（高、低级别）的差异比较。（2）观察、记录并测量 T1 期 ccRCC 的最大径、形态规则与否、边缘是否光滑、有无钙化、有无液化坏死、包膜完整与否。（3）测量 T1 期 ccRCC 实质部分 4 期的各项 CT 值、绝对强化值（增强净值）、相对强化率、强化衰减差值，并对各项测值与高低分级的相关性进行分析，并进行比较诊断效能。

1、高低级别组间在年龄、性别、临床症状及病灶发生位置方面无明显组间差异，不具有统计学意义（ $P>0.05$ ）；

2、高低级别组间的常规 CT 征象分析，在形态规则与否方面两组间有统计学意义，而在肿瘤最大径、边缘光滑（是/否）、钙化（有/无）、液化坏死（有/无）、假包膜完整（是/否）这些方面无明显组间差异，不具有统计学意义；

3、在相关强化参数方面，皮质期 CT 值、绝对强化 CT 值（皮质期）、相对强化率（相对皮质 A1）及强化衰减差值有组间差异。

1、T1 期 ccRCC 的肿瘤形态对高、低级别间的鉴别诊断有一定价值，高级别组更容易出现形态不规则。

2、T1 期 ccRCC 的皮质期 CT 值、绝对强化 CT 值（皮质期）、相对强化率（相对皮质 A1）及强化衰减差值在高低分级间有组间差异；皮质期 CT 值、绝对强化 CT 值（皮质期）及强化衰减差值与 Fuhrman 病理分级存在负相关性，相对强化率（相对皮质 A1）与 Fuhrman 病理分级则存在正相关性，其值越低预示其 Fuhrman 分级越低。

PU-0703

DKI 直方图及纹理分析预测肝细胞癌 MVI

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目的：提取肝细胞癌（HCC）术前 DKI 图像的纹理参数，筛选出能够预测 MVI 且效率高的纹理参数。

材料与方法：回顾性分析 2019 年 11 月至 2022 年 3 月在我院诊断为 HCC 的患者的临床和影像学资料。最终共纳入 68 例 HCC 患者(男 53 例，女 15 例，年龄 35-83 岁，平均年龄 60.1 ± 10.4 岁)，根据术后病理分为 MVI 阳性组($n=22$)和 MVI 阴性组($n=46$)。对 DKI 序列的原始图像进行重建，获得 MD、MK 和 FA 图。将其以 DICOM 格式导入 ITK-SNAP 软件 (www.itksnap.org)，参照 T2WI 图像，由 2 名经验丰富的腹部影像诊断医师在轴位图像上沿病灶边缘逐层手工勾画 ROI 曲线，然后合并成三维 ROI。将 MD、MK 及 FA 的 ROI 数据导入联影人工智能软件中，对 MD、MK 及 FA 图像进行纹理分析，提取各病灶三个功能图像的 104 个纹理特征。使用最小冗余最大相关 (MRMR) 及 Lasso 算法降维进行特征选择。采用独立样本 t 检验(正态分布)或 Mann-Whitney U 检验(偏态分布)比较 MVI 阳性组和 MVI 阴性组 MD、MK 和 FA 的纹理特征参数值。采用卡方检验或 Fisher 精确概率方法比较各组分类变量。对有统计学差异的参数绘制受试者特征曲线(receiver operator characteristic, ROC)，确定曲线下面积(area under the curve, AUC)。

结果：MVI 阳性组肿瘤直径较大（中位数 5.88cm vs 3.25cm），AFP 水平较高（中位数 206.2ng/ml vs 5.83ng/ml），差异具有统计学意义 ($P < 0.05$)。而两组在性别、年龄、病灶位置、是否存在肝炎（乙肝或丙肝）及肝硬化方面差异没有统计学意义。经筛选，MD、MK 及 FA 分别得到 6 个、9 个及 5 个最优纹理特征。

结论：DKI 成像的参数 MD、MK 及 FA 可以评估 HCC 的 MVI 状态。

PU-0704

双能 CT 脂基图在评估肾透明细胞癌脂含量的价值

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目的：探讨双能 CT 脂基图在评估肾透明细胞癌脂含量中的应用价值。

材料和方法：回顾性分析 2018 年 1 月至 2022 年 12 月行双能 CT 肾脏能谱扫描并经手术病理证实为肾透明细胞癌的患者 94 例。2 名观察者分别记录每位患者平扫的 CT 值、脂水值、有效原子序数以及增强三期的 CT 值、碘水值。根据病理结果将患者分为高级别组 (WHO/ISUP G 分级 3 级和 4 级) 和低级别组 (WHO/ISUP G 分级 1 级和 2 级)。采用组内相关系数 (ICC) 评价测量者间一致性。采用独立样本 t 检验或 Mann-Whitney U 检验比较高低级别组间各参数的差异。采用 ROC 曲线分析，寻求诊断高级别的最佳参数和最佳阈值。

结果：2 名观察者测量数据的一致性良好 ($ICC > 0.7$)。高级别组的脂水值高于低级别组，有效原子序数低于低级别组；其余参数无统计学差异。

结论：双能 CT 的脂水值可以鉴别高低级别组肾透明细胞癌，有望对其脂含量进行评估。

PU-0705

原发性肝细胞肝癌增强 CT 直方图特征分析

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目的：评价 CT 直方图分析 (CT histogram analysis,CTHA) 方法在原发性肝细胞肝癌 (Hepatocellular carcinoma, HCC) 的诊断价值。方法：本研究采用回顾性分析方法，时间 2018.01~2019.03，共纳入经手术病理确诊的 HCC 患者 60 例 (男/女= 50/10，平均年龄 59.50 ± 11.70 岁)，所有病例术前接受腹部三期 CT 增强扫描，包括动脉期、静脉期和延迟期。两位放射医师分别使用 GE 公司 Omni-Kinetics, Version V2.1.0 R 软件对图像进行处理并获取直方图参数。采用 Logistic 回归和受试者工作特征曲线，评价 CTH 各定量参数及参数联合对 HCC 的诊断价值和效能。结果：动脉期参数 Kurtosis、Relative deviation，静脉期参数 Uniformity、Relative deviation，延迟期参数 Relative deviation 可作为独立预测因子用于 HCC 的诊断，多参数联合的诊断效能最高 (曲线下面积=0.989)。结论：CTHA 方法可用于 HCC 的诊断。

PU-0706

MSCT 影像特征结合 XGBoost 算法鉴别诊断≤5cm 胃胃肠间质瘤与胃平滑肌瘤的价值分析

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目的 探讨多层螺旋 CT (MSCT) 影像特征结合机器学习 XGBoost 算法构建的模型在鉴别诊断 ≤5cm 胃胃肠间质瘤 (GIST) 与胃平滑肌瘤 (GLMs) 的价值。方法 回顾性分析 134 例 ≤5cm 胃 GIST 与 37 例 GLMs 的临床及 MSCT 影像特征，采用随机分层抽样按 7:3 将患者随机分为训练集 (n=119) 与验证集 (n=52)。使用 LASSO 回归对训练集临床及 MSCT 影像特征降维，筛选潜在危险因素，并纳入单因素与多因素 Logistic 回归分析筛选独立危险因素。使用 XGBoost 算法基于独立危险因素构建鉴别诊断胃 GIST 与 GLMs 的预测模型，使用曲线下面积 (AUC)、敏感度、特异性、准确度、临床决策曲线 (DCA) 及混淆矩阵对模型进行评价。结果 共 23 个临床及影像特征被纳入，经 LASSO 回归降维后筛选出 7 个潜在危险因素，分别为性别、年龄、累及胃食管连接部 (EGJ)、短径 (SD)、长径/短径 (LD/SD)、延迟期增强程度 (DEd) 及肿瘤静脉期不均匀度 (HDTV)。单因素与多因素 Logistic 回归分析发现年龄、累及 EGJ、LD/SD 及 DEd 为独立危险因素。XGBoost 算法构建预测模型的 AUC、敏感度、特异性及准确度训练集分别为 0.974、95.5%、94.7%、95.3%，验证集分别为 0.966、85.1%、100.0%、90.6%。结论 MSCT 影像特征结合 XGBoost 算法构建的模型在鉴别诊断 ≤5cm 胃 GIST 与 GLMs 有很高的效能，有助于外科医师制定最佳的治疗方案，受益患者。

PU-0707

胃肠道内外间质瘤 CT、MR、临床病理特点及关系研究

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目的 分析胃肠道内外间质瘤的 CT、MR、临床病理特点，探讨三者关系。方法 选取 45 例胃肠道内外间质瘤患者，术前具备完整的 CT、MR 检查资料，对照术后病理资料，分析三者临床表现，

探讨影像学与病理的关系。结果 肿瘤部位与临床病理风险级别并无明显关系，而肿瘤直径越高、形态越不规则、囊变坏死、强化越明显、腔外生长、密度不均、长 T1、T2 信号，病理风险级别越高 ($P<0.05$)。将上述影像学征象纳入多因素 Logistic 回归分析，肿瘤直径、肿瘤密度、囊变坏死、生长方式是肿瘤风险度级别的危险因素 ($P<0.05$)。

PU-0708

The Value of PI-RADS v2.1 Scoring on biparametric MRI Combined with Clinical Parameters in Diagnosing Prostate Cancer within the PSA Gray Zone

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Abstract:

Objective: This study aimed to investigate the value of utilizing PI-RADS v2.1 scoring on biparametric MRI (Bp-MRI), in conjunction with clinical parameters, for diagnosing clinically significant prostate cancer (csPCa) in patients with prostate-specific antigen (PSA) within the gray zone.

Methods: A retrospective analysis was conducted on 211 patients with PSA ranging from 4 to 10 ng/mL in the PSA gray zone. Among them, 35 belonged to the csPCa, while 176 were in the non-csPCa. PI-RADS v2.1 scoring was performed on the primary prostate lesions according based on Bp-MRI. Univariate and multivariate analyses were performed on factors including age, total prostate-specific antigen (tPSA), free prostate-specific antigen (fPSA), free-to-total PSA ratio (f/tPSA), prostate volume (PV), prostate-specific antigen density (PSAD), and Bp-MRI scores to identify independent predictors of csPCa. Then the independent predictors were combined to establish the predictive model. Receiver operating characteristic (ROC) curves were utilized to evaluate the diagnostic accuracy of each independent predictor and the combined predictive model for csPCa, and Z-test was employed for pairwise comparisons of the area under the curve (AUC).

Results: The results demonstrated that f/tPSA, PV, PSAD, and Bp-MRI scores between the csPCa and non-csPCa had significant statistical differences (all $P < 0.05$). Moreover, PV and Bp-MRI score were identified as independent predictors of csPCa, with corresponding odds ratios (OR) of 0.974 ($P = 0.024$) and 4.206 ($P < 0.001$), respectively. In terms of diagnostic performance, the AUC values for PV, Bp-MRI score, and the combined predictive model were 0.684, 0.856, and 0.878, respectively. Additionally, the differences in AUC values between PV and Bp-MRI score, PV and the combined predictive model, and Bp-MRI score and the combined predictive model were all statistically significant ($Z = 3.416$, $P = 0.001$; $Z = 4.562$, $P < 0.001$; $Z = 2.059$, $P = 0.040$).

Conclusion: PI-RADS v2.1 scoring based on Bp-MRI is valuable in the detection of csPCa within the PSA gray zone. Furthermore, when combined with PV, it further improves the detection efficacy of csPCa and reduces unnecessary biopsies for patients.

PU-0709

肾脏乏脂肪血管平滑肌脂肪瘤与乏血供透明细胞癌的 CT 鉴别诊断分析

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目的：评估是否可以根据 CT 图像的形态学特征和增强特征来区分肾脏乏脂肪血管平滑肌脂肪瘤和乏血供透明细胞癌。

材料与方法：57 例患者（28 例肾脏乏脂肪血管平滑肌脂肪瘤和 29 例肾脏乏血供透明肾细胞癌）在全或部分肾切除术前接受了平扫及增强 CT 检查。由两名对组织病理学结果不知情的放射科医生阅读 CT 图像并记录肿瘤的衰减值、形态学特征和增强特征，随后进行评估。在肿瘤之间进行独立样本 t 检验及卡方检验。通过二元 logistic 回归分析确定 CT 表现的预测价值。

结果：肾脏乏脂肪血管平滑肌脂肪瘤的女性发病率更明显，而乏血供透明细胞癌的男性发病率更明显。通过二元多因素逻辑回归分析，未增强衰减及异质性是区分肾脏乏脂肪血管平滑肌脂肪瘤和乏血供透明细胞癌肿瘤有价值的参数 ($p < 0.05$)，与肾脏乏血供透明细胞癌组相比，乏脂肪血管平滑肌脂肪瘤未增强超衰减大于肾脏乏血供透明细胞癌组 ($p < 0.05$)，异质性小于肾脏乏血供透明细胞癌组。两种肿瘤类型的大多数病例均表现出早期增强特征。

结论：CT 图像的未增强衰减特征及异质性是鉴别肾脏乏脂肪血管平滑肌脂肪瘤和乏血供透明细胞癌有价值的参数。

PU-0710

门脉海绵状变性的 CT 诊断与病因分析

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目的 分析门脉海绵状变性的 CT 表现和病因，探讨 CT 诊断的临床价值。资料与方法 12 例门脉海绵状变性患者均经全腹部 CT 平扫及螺旋三期增强扫描，图像后处理技术包括 MIP 和 MPR；图像分析由 2 名 5 年以上工作经验的放射科医师独立完成。患者中男性 7 例，女性 5 例，年龄 4-69 岁；经临床证实病因包括先天发育异常 2 例，胆囊炎合并腹腔脓肿 1 例，肝硬化 4 例，胰腺癌 2 例，肝海绵状血管瘤、胆囊癌和直肠癌肝转移各 1 例。结果：1) 门脉主干及分支异常：肝门部门脉走行区存在多发呈结节状或蚯蚓状的细小静脉血管影 9 例，门脉充盈缺损 2 例，狭窄 2 例，显示不清或闭塞 4 例；2) 侧枝循环静脉开通：脾门区静脉曲张 8 例，肠系膜静脉曲张 7 例，食道胃底静脉曲张 5 例，胃肾静脉曲张 5 例，直肠静脉曲张 2 例；3) 其他征象包括：肝动脉增粗 7 例，肝脏灌注异常 3 例，胆道扩张 2 例，腹水 2 例，脾大 2 例。结论：CT 在确定本病的诊断同时能明确原发病因的性质、危害程度和累及范围，有助于临床制定合理的个性化治疗方案。

PU-0711

腹部 ALK 阳性间变大细胞淋巴瘤 1 例

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【目的】 探讨罕见病例腹部 ALK 阳性间变大细胞淋巴瘤的多排螺旋 CT (Multidetector Spiral Computed Tomography, MDCT) 影像表现。【方法】 收集资料完整的 1 例经手术病理证实的腹

部 ALK 阳性间变大细胞淋巴瘤老年男性的 MDCT 图像, 分析其特殊的影像学表现及其与临床病理特点之间可能存在的关系。【结果】该例患者于胃、胰腺之间见一软组织肿块, 增强扫描动脉期明显均匀强化, 内可见一腹腔干起源的异常动脉供血。病灶与胃小弯、胰腺体部分界不清。腹膜后另见多发肿大淋巴结影。病灶表现与常见淋巴瘤不同, 与胃、胰腺分界不清, 定位较为困难, 且动脉期明显强化, 尤其类似胃来源间质瘤。但与常见间质瘤不同, 同时合并腹膜后多发肿大淋巴结。术前仅提示诊断恶性肿瘤。典型 ALK 阳性鉴别大细胞淋巴瘤好发于儿童和青年, 常见淋巴瘤 B 症状, 约 60% 患者可见淋巴结外受累, 是一种恶性程度较高的淋巴瘤亚型。由于罕见, 未见系统性影像特征报道。本例患者尽管年龄、症状不甚符合, 但具有较特殊的影像学表现, 即主要病灶血管丰富、强化均匀, 同时合并腹膜后多发淋巴结肿大, 仍可符合淋巴瘤, 尤其是恶性程度较高的淋巴瘤亚型表现。而间质瘤作为间叶源性肿瘤, 罕见淋巴结转移。【结论】回顾性总结本例罕见腹部 ALK 阳性间变大细胞淋巴瘤的 MDCT 表现, 以期对临床中可能遇到的病例影像诊断提供有价值的参考。

PU-0712

多模态磁共振成像在透明细胞型肝癌中的诊断价值

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目的 探讨透明细胞型肝癌 (ccHCC) 的多模态磁共振影像学特征, 分析其与非透明细胞型肝癌 (Non-ccHCC) 影像学特征差异, 提高对本病的认识及诊断水平。

方法 回顾性分析经手术病理证实的 12 例 ccHCC 和 45 例 Non-ccHCC (高、中、低分化肝细胞肝癌各 15 例), 收集所有患者相关临床资料。所有患者均行肝脏特异性对比剂增强磁共振扫描, 包括 IVIM-DWI 和 IDEAL-IQ, 测量病灶 ADC、D、D*、f 值和脂肪分数 (FF); 观察两组病灶强化特征及肝胆特异期信号特征, 测量肿瘤对比强化率 (CER)。ADC、D、D*、f、FF 和 CER 的比较采用单因素 ANOVA 检验, 检验效能的比较采用 ROC 分析, 运用 SPSS 20.0 统计分析软件。

结果 1. ccHCC 与 Non-ccHCC 在临床特征差异无统计学意义。2. ccHCC 弥散受限程度略低, 易出现脂肪变性, ADC 值、D、FF 值均高于 Non-ccHCC 组, 差异均具有统计学意义 ($P < 0.05$); 增强扫描 ccHCC 多表现为“慢进慢出”, 强化程度低于 Non-ccHCC, 相应病灶 f 值较低, 差异均具有统计学意义 ($P < 0.05$)。3. ccHCC 包膜出现比例高于 Non-ccHCC; 肝胆特异期 ccHCC 组病灶以等信号或稍低信号为主, 而 Non-ccHCC 组病灶以低信号为主, 两组 CER 差异具有统计学意义 ($P < 0.05$)。两组间 ADC 值、D 值、f 值、FF 值及 CER ROC 曲线下面积分别为 0.873、0.92、0.781、0.854、0.863, D 值的诊断效能最高。

结论 ccHCC 更容易出现脂肪变性和完整包膜, 弥散受限程度较低, 增强扫描强化程度略低, 强化方式以“慢进慢出”更常见, 肝胆特异期病灶以等信号或稍低信号为常见。仔细分析病灶形态、强化方式、信号特征以及功能磁共振成像相关定量参数, 可以提高术前诊断准确性。

PU-0713

多层螺旋 CT 门静脉成像在肝硬化门脉高压症中的应用价值

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目的: 应用多层螺旋 CT 门静脉成像观察肝硬化门脉高压症患者门静脉及主要分支走行以及侧支循环开放情况, 为介入手术方案提供指导价值。

方法：收集院内行腹部 256 层极速 CT 增强扫描患者信息，将标准选择符合要求者分为正常组 124 例及肝硬化门脉高压组 161 例。运用 MIP、MRP、VR 等后处理技术进行图像三维重建，结合原始图像观察门静脉及主要分支显示情况，记录门脉高压组侧支循环开放情况，分别测量门脉系统主要分支管径。正常组年龄在 14~83 岁，平均年龄 (47.65 ± 1.55) 岁，按照不同性别及年龄段（青年组；中年组；老年组）分组，行统计学分析。

结果：1、在正常组 124 例中，不同性别组间门静脉主干及主要分支管径大小存在统计学差异 ($P < 0.05$)，即男性各管径宽于女性。不同年龄组比较，门静脉主干管径在青年组和中年组间存在差异 ($P < 0.05$)，即青年组的门静脉主干管径宽于中年组；在青年组与老年组间、中年组与老年组间均不具有统计学意义 ($P > 0.05$)。青年组的胃左静脉管径均宽于中年组及老年组；中年组和老年组间胃左静脉管径无明显差异 ($P > 0.05$)；脾静脉及肠系膜上静脉管径在不同年龄段间均不存在显著差异 ($P > 0.05$)。

2、多层螺旋 CT 门静脉成像能清晰显示门脉系统及侧支循环开放情况。161 例肝硬化门脉高压患者中，食管静脉曲张 119 例 (73.9%)，胃底静脉曲张 115 例 (71.4%)，食管周围静脉曲张 61 例 (37.9%)，胃短及胃后静脉曲张 81 例 (50.3%)，食管旁静脉曲张 26 例 (16.3%)，附脐静脉曲张 35 例 (21.7%)，腹壁静脉曲张 51 例 (31.7%)，此外还显示了门静脉及肠系膜上静脉血栓 22 例 (13.8%)。

结论：多层螺旋 CT 门静脉成像能清晰显示门静脉及主要分支走行以及侧支循环开放情况，对早期发现曲张静脉、诊断肝硬化门脉高压症提供可靠临床依据，可指导介入手术方案的设计。

PU-0714

1 例外周型 VA-ECMO 患者经中心静脉管给予对比剂行腹盆动脉 CTA+门脉期检查

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静脉动脉体外膜氧合 (VA-ECMO) 是一种临时机械循环支持装置，近几十年来越来越多地用于治疗爆发性心肌炎和心源性休克。CT 成像在 VA-ECMO 治疗的患者中，诊断血栓栓塞事件和出血并发症的工作中起着核心作用。随着 VA-ECMO 的使用不断增加，放射科技师应熟悉与 VA-ECMO 系统相关的血流动力学变化。VA-ECMO 可以通过使用中央或外周插管来实现。特别是外周型 VA-ECMO 大大改变了 CT 增强对比剂在血液中的顺序和方向，对于接受外周型 VA-ECMO 治疗的患者行 CT 增强检查时，应考虑到外周型 VA-ECMO 管路的配置、对比剂注射部位、心输出量和外周型 VA-ECMO 流速，优化 CT 增强检查图像采集的策略，为临床提供更加准确的图像。

患者女性，40 岁，高泌乳素血症病史、抗磷脂抗体综合征 2 年、下肢水肿 2 个月。4 天前因呼吸困难，不能平卧，体温最高 38°C ，自测新冠抗原阳性，就诊我院急诊，考虑急性重症心肌炎，收治入院。入院后诊断爆发性心肌炎、心源性休克，给予外周型静脉动脉体外膜肺氧合 (VA-ECMO: veno-arterial extracorporeal membrane oxygenation) 进行循环呼吸支持，并进行中心静脉置管。今日因血气中血红素测不出，腹胀明显，怀疑腹腔内出血，VA-ECMO 血流量： 2.60L/min ，心输出量 (CO)： 2.4L/min ，经多学科会诊需行腹盆动脉 CTA+门脉期检查。

根据外周型 VA-ECMO 血流动力学的改变和文献报道，可以推荐几个原则用来改善对比剂的目标结构：①选择对比剂给药途径（中心静脉导管或 ECMO 回路）；②减少 ECMO 流量；③增加对比剂用量和注射速率，安全起见，对比剂注射速率应小于外周型 VA-ECMO 血流量。

PU-0715

Research progress of dual-energy CT in gastrointestinal neoplasms

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Dual-energy Computed Tomography (DECT) is a kind of technology that separates matter by collecting data at high and low energy levels respectively. Images such as iodine concentration, virtual non-contrast, virtual monoenergetic image and Z-effective obtained by dual-energy CT scan provide a new dimension for radiological diagnosis, and are widely used in the diagnosis of gastrointestinal diseases. It has played an important role in improving image quality, improving lesion detection, quantitatively analyzing lesions, and reducing radiation dose and contrast agent consumption. This article reviews the equipment characteristics of DECT, the commonly used dual-energy imaging techniques and its research progress in gastrointestinal neoplasms.

PU-0716

内脏脂肪组织对胃癌术前 T 分期准确性的影响

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目的 探讨内脏脂肪组织对胃癌术前 T 分期准确性的影响。**方法** 回顾性地连续收集 2018 年 4 月至 2021 年 5 月于郑州大学第一附属医院诊治的 366 例胃癌患者。根据胃癌术前 CT 图像 T 分期 (cT) 和术后病理 T 分期 (pT) 比较有无差异, 将患者分为准确分期组和错误分期组。比较患者个体特征及在 L2/L3 层面、肿瘤最大层面下脂肪组织参数, 包括性别、年龄、BMI、肿瘤最厚径、内脏脂肪组织 (visceral adipose tissue, VAT) 面积及平均 CT 值、皮下脂肪组织 (subcutaneous adipose tissue, SAT) 面积及平均 CT 值。采用多因素 logistic 回归对混杂因素进行调整后, 筛选出影响胃癌术前 T 分期准确评估的独立危险因素。**结果** 366 例患者中, 164 例 (45%) 为 cT 分期错误。准确分期组与错误分期组中, L2/L3 层面下的 VAT 面积 (SVAT1)、VAT 平均 CT 值 (DVAT1)、SAT 面积 (SSAT1)、SAT 平均 CT 值 (DSAT1) 差异均具有统计学意义, 肿瘤最大层面下的 VAT 面积 (SVAT2)、VAT 平均 CT 值 (DVAT2)、SAT 面积 (SSAT2) 差异均具有统计学意义 ($P < 0.05$)。多因素分析结果显示, L2/L3 层面 SVAT1 ($\geq 35.80 \text{ cm}^2$)、肿瘤最大层面 SVAT2 ($\geq 13.82 \text{ cm}^2$) 均为胃癌术前 T 分期准确评估的独立危险因素, 其 OR (95%CI) 分别为 2.771 (1.243~6.181)、2.938 (1.635~5.277)。**结论** L2/L3 层面及肿瘤最大层面 VAT 面积均是胃癌术前精准评估 T 分期的重要因素。

PU-0717

肝脏镰状韧带旁假病灶诊断与鉴别诊断

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目的: 肝脏镰状韧带旁假病灶是肝脏镰状韧带周围出现的类似占位的假性病变区, 在临床上相对少见, 磁共振成像可以为其诊断提供较好的帮助。通过本次的资料报告及相关的文献学习可以帮助影像科医师更好的了解疾病, 提高诊断的准确性。

方法: 回顾了肝脏镰状韧带旁假病灶患者的临床资料、影像资料, 并进行了相关疾病的文献复习。

结果：肝脏镰状韧带旁假病灶好发于肝左叶内侧段或（和）左叶外侧段前缘镰状韧带旁，平扫及增强扫描具备特征性表现，需与少血供的高分化小肝癌、肝转移瘤、肝囊肿、肝血管瘤相鉴别。

结论：磁共振平扫结合增强扫描可以较为准确的诊断肝脏镰状韧带旁假病灶，熟悉疾病的好发部位、发病机制、特征性影像表现及鉴别诊断，有助于提高影像科医师诊断的准确性。

PU-0718

Differentiating Between an Atypical Hepatic Abscess and Tumor Metastasis Using Magnetic Resonance Imaging and Hepatobiliary Phase Imaging

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Objective: To identify diffusion-weighted imaging (DWI) patterns and conspicuity discrepancies on hepatobiliary phase imaging (HBPI) to distinguish atypical hepatic abscesses from hepatic metastases.

Materials and Methods: This retrospective study recruited 31 patients with 43 atypical hepatic abscesses and 32 patients with 35 hepatic metastases who underwent gadobenate dimeglumine-enhanced magnetic resonance imaging. All lesions were confirmed by pathological or clinical diagnosis. For the qualitative and quantitative analyses, the signal intensity, DWI pattern, apparent diffusion coefficient, degree of perilesional edema, perilesional hyperemia, perilesional signal on HBPI, conspicuity, size discrepancy between sequences, contrast-to-noise ratio, signal-to-noise ratio, and relative enhancement ratio on dynamic phases were independently assessed by two radiologists. Significant findings for differentiating the two groups were identified via univariate and multivariate analyses with a nomogram for predicting atypical hepatic abscesses. The interobserver agreement was also analyzed for each variable.

Results: The multivariate analysis revealed that the conspicuity discrepancy (odds ratio [OR] 34.78, 95% confidence interval [CI] 2.09–579.47, $p = 0.013$) and non-peripheral high signal intensity (SI) rim on DWI (OR 67.46, 95% CI 2.64, 1723.20, $p = 0.011$) were significant independent factors for predicting atypical hepatic abscesses. They were also shown to be high predictor points on the nomogram. When any of the set criteria were satisfied, 97.7% of atypical hepatic abscesses were correctly identified, with a specificity of 65.7%. When both criteria were combined, the specificity was up to 100%, with a sensitivity of 44.9%.

Conclusion: Conspicuity discrepancy and a non-peripheral high SI rim on DWI are reliable and meaningful features that can distinguish atypical hepatic abscesses from hepatic metastases.

PU-0719

个案报道：肾脏原发 Castleman 病 1 例及文献复习

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目的 提高影像医生对肾脏原发 Castleman 病术前影像征象的认识，拓宽诊断思路。

方法 分析本院经手术病理确诊的肾脏原发 Castleman 病的 CT、MR 表现，结合患者资料，并进行相关文献复习。

结果 病灶位于左肾中部皮质内，最大径约 22mm，边界清晰，邻近肾盏受推压，腹膜后未见肿大淋巴结。CT 示：平扫密度较周围肾实质略高；肾皮质期强化明显，略低周围肾皮质；髓质期及排泄期均明显低于周围肾实质。MRI 示：病灶平扫 T1WI、T2WI 呈等信号，反相位未见信号减低，脂相未见高信号；DWI 呈明显高信号，ADC 值约 $0.628 \times 10^{-3} \text{mm}^2/\text{s}$ ；动脉期明显不均匀轻度强化，

门脉期及延迟期强化减弱，强化程度始终低于周围正常肾实质，并见明显持续性强化包膜。病人行部分肾脏切除术，病理示：病灶内见淋巴滤泡增生，生发中心萎缩，中心内见血管增生，套层细胞同心圆状排列。免疫组化结果：CD20(+)、CD79a(+)、CD3(+)、CD21 (FCD 网+)、Bcl-2(+)、Bcl-6(生发中心+)、Ki-67(生发中心约 80%，非生发中心约 10%)。分子病理结果：B 细胞基因重排（未检测到 B 细胞单克隆性重排）。诊断为 Castleman 病，透明血管型。

结论 Castleman 病是一种以淋巴肿大为特征的淋巴增生性疾病。以纵隔、颈部、腹部、腹膜后和腋窝淋巴结区域相对多见，原发于肾脏者，国内外文献罕有报道。肾脏原发 CD 影像表现为边界清楚的单发结节或肿块，密度或信号均匀；DWI/ADC 明显扩散受限（本例表现与之相符）。典型 CD 病灶内可出现分支状、斑点状钙化（本例无钙化）。增强影像表现与肾癌、乏脂型肾血管平滑肌瘤存在交叉，与其他常见部位 CD 影像特征存在不一致，术前诊断难度较高。通过对本例的学习，了解肾脏原发 CD 的影像征象，在肾脏占位性病变的术前诊断中提供新的鉴别诊断思路，避免一些不必要的肾脏全切手术等治疗。

PU-0720

MRI 对胎盘植入的诊断价值

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目的：分析探讨胎盘植入的 MRI 征象，评价 MRI 对诊断胎盘植入的临床应用价值。

方法：搜集 2020 年 6 月到 2022 年 1 月就诊于山西医科大学第一医院并经超声检查怀疑胎盘异常的孕妇 26 例，年龄 23-39 岁，平均年龄 29.4 岁，孕龄 27-38 周，平均 36.6 周。采用 GE3.0T SSFSE T2WI 序列进行磁共振扫描。经两名高级职称医师分析图像，观察胎盘植入的部位、胎盘信号以及胎盘侵入肌层的程度。结果与手术和/或临床综合诊断标准相对照，其中前置胎盘 1 例，胎盘植入 2 例，前置胎盘并胎盘植入 23 例。

结果：子宫变形和(或)异常隆凸，胎盘稍向外突，子宫肌轻微变薄或不规则破坏 6 例；胎盘信号不均匀，高信号胎盘组织不同程度侵入低信号子宫肌壁 18 例；胎盘下肌层变薄或消失，高信号胎盘组织突破低信号子宫壁，与膀胱壁分界不清 2 例。

结论：MRI 能明确诊断胎盘植入部位及判断肌层侵入情况，对胎盘植入有重要临床应用价值。

PU-0721

肝脏粘液性囊性肿瘤的个案报道

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女性，31 岁，外院 CT 体检发现左肝占位 2 周（CT 示左肝低密度灶），肿瘤指标：AFP、CEA、CA125（一）；CA19-9：42.95（0~37），既往无肝炎史及牧区居住史，2012 年左甲状腺病变切除术，2011 年剖宫产术。我院 MRI 报告：左肝囊性占位，内部可见分隔、信号不均匀，增强扫描分隔及囊壁可见强化。诊断：左肝囊性病变，考虑包虫病可能。行肝部分切除+胆囊切除术：术中肝左内叶可触及 1 个质地柔软，直径约 15cm 的肿块，囊壁较厚，外部为肝组织包绕，穿刺针刺入占位，抽出黑绿色浑浊液体。病理：肉眼所见剖开囊肿，11.5*7.5*2.5cm，切面见多个囊腔，直径 4-6cm，内壁厚 2-4mm，内壁较光滑。病理诊断：肝脏粘液性囊性肿瘤，伴局部上皮轻度异型增生。肝脏粘液性囊性肿瘤（mucinous cystic neoplasm, MCN）：2010 年第 4 版消化系统肿瘤 WHO 分类中新命名的一类病变；不再使用“胆管囊腺瘤”和“囊腺癌”这些诊断术语；肿瘤内囊性区域与胆管不相通，囊壁被覆立方至柱状上皮，细胞内含多少不等的黏液，上皮下为卵巢型间质；手术切除

是治愈的唯一途径。临床及病理学基础：易发生于 40 岁以上女性；因肿瘤生长缓慢大多数患者并无特异的症状及体征，常于体检时发现；当肿瘤增大可出现上腹部胀痛不适；大体所见病变呈囊性或囊实相间，有包膜；多为单发病灶；几乎所有 MCN 呈多分房；光镜下典型的囊壁分三层：（1）内衬上皮为单层柱状或立方上皮，（2）上皮下为类似卵巢样间质的致密梭形细胞束，（3）由胶原组织构成的外膜。影像特点：多位于肝左叶的囊性或囊实性肿块单房或多房，囊壁光整，囊内有分隔，分隔均匀纤细，增强扫描动脉期囊壁及分隔轻度强化，门脉期及延迟期明显持续强化。主要鉴别诊断：肝包虫病。

PU-0722

膀胱肿瘤影像诊断与鉴别

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膀胱肿瘤发生率占全身恶性肿瘤的 2%~6%，发病年龄 50~70 岁。属泌尿系最常见的肿瘤，男：女=3:1，95%以上的膀胱肿瘤来源于尿路上皮细胞，90%以上的膀胱肿瘤是移行细胞型。鳞状细胞癌和腺癌多见于长期慢性尿路感染和异物刺激的膀胱肿瘤患者；来源于间质细胞的肿瘤约占所有膀胱肿瘤的 5%，其中最常见的是横纹肌肉瘤；膀胱横纹肌肉瘤多见于儿童，膀胱平滑肌肉瘤多见于成人；CT 或 MRI 在膀胱肿瘤的临床分期中具有一定意义。

PU-0723

输尿管夹层病例 2 例并文献复习

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目的：输尿管夹层较为少见，其疗效取决于病因及发病机制，需要通过早期正确识别并积极治疗。本研究目的是分析输尿管夹层的病理生理学、影像表现，提高对输尿管夹层的认知和诊断的准确性。

方法：回顾性分析我院最近收治的 2 例输尿管夹层的影像表现、病理生理学并复习相关文献

结果：1.病例 1 患者女 58 岁，右侧下腹疼痛 1 天，泌尿系 CTU 表现为右肾盂、输尿管中上段管壁增厚、肿胀，周围见片絮状密度增高影，增强扫描管壁强化明显，周围见稍低密度影，排泄期右输尿管内见对比剂影，中上段及肾盂区呈双腔改变，考虑：输尿管夹层伴周围炎性改变。

2.病例 2 患者女 55 岁，左侧腰部疼痛 2 天，泌尿系 CTU 表现为左肾盂、肾盏、输尿管中上段增粗，壁增厚，增强扫描似呈双腔样改变，中心见环形强化，其内及周围未见明显强化，排泄期原强化区呈低密度，其内及周围对比剂显影，肾盂区域见条片状充盈缺损影，输尿管及肾周围脂肪间隙密度增高，邻近肾周筋膜增厚，考虑输尿管夹层可能性大，破口似位于肾盂区域，并输尿管及肾周炎性反应。

3.文献复习表明输尿管夹层的直接形成原因主要为输尿管黏膜损伤（易撕裂）和各种病理情况下（如结石、肿瘤、妊娠等）所致的尿路梗阻（尿路压力增高），最常见的原因是结石所致，本次报道的病例未发现明确的结石，可能结石已排出。同时，输尿管解剖结构具有形成夹层的潜在因素，管壁可分为三层，内层为黏膜层，中间层为肌层，外膜为疏松结缔组织，其中输尿管中上段肌层分内、外两层，较薄弱；而下段肌层增厚并形成内中外三层结构，故输尿管夹层多发生在中上段，本次病例发生部位与之符合。此外，输尿管夹层需要与双输尿管畸形、输尿管扭曲进行鉴别，鉴别要点：输尿管夹层具有“双腔”或“腔内腔”改变；后两者形成的是相互分离的双腔，而非“腔内腔”。

4.结论：输尿管夹层多发生于输尿管中上段，根据泌尿系 CTU“双腔”或“腔内腔”的特征影像表现，有助于本病的诊断。

PU-0724

优化肾脏增强 CT 的扫描方案降低患者辐射剂量

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目的: 优化肾脏增强 CT 的扫描方案, 减少患者的放射辐射剂量, 简化工作流程, 提高工作效率。
方法: 选取 10 例肾脏肿瘤的患者, 行光谱 CT 常规增强检查。获取多参数成像的虚拟平扫-VNC 增强三期(肾皮质期, 肾实质期和延迟期)的图像, 分别记录肾脏肿瘤的 CT 值, 同时记录真实平扫图像肾脏肿瘤的 CT 值, 分别加以对比。**结果:** 10 例患者虚拟平扫-VNC 增强三期的肾脏肿瘤 CT 值平均在 40.6HU~71.2HU, 真实平扫图像肾脏肿瘤的 CT 值平均在 39.8HU~70.7HU, 相似度为 98.8%。**结论:** 光谱 CT 参数成像的虚拟平扫-VNC 是利用从增强扫描图像中移除碘物质, 除碘化组织外的所有组织均以其原始 HU 值表示, 从而得到无碘对比剂的图像以代替传统成像的常规平扫图像。通过上述对比 CT 值差异在 3HU 以内, 证明了多参数功能 CT 虚拟平扫的精准性。CT 值测值与真实平扫测值具有良好的一致性, 图像质量等效于真实平扫。虚拟平扫可以替代真实平扫, 检出肾脏病变, 从而减少一期扫描, 降低辐射剂量。由此说明以增强扫描虚拟平扫替代真实平扫是可行的。

PU-0725

光谱 CT 一站式扫描在原发性肝癌中的应用

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目的: 在原发性肝癌病例中应用光谱 CT 行全肝 CT 灌注扫描模式, 探讨其一站式扫描的可行性。
方法: 对临床诊断为原发性肝癌的 33 例病例进行采用全肝 CT 灌注扫描及延迟扫描, 获得多参数 40keV 单能级图像, 碘密度融合图, 光谱曲线图和有效原子序数图及融合图像。同时还可获得多时相动态增强扫描图像, 采用容积再现(VR)、多层面重建(MPR)、最大密度投影(MIP)等血管重建方法及肝脏灌注后处理软件。**结果:** 所有病例均获取良好的多参数和多时相动态增强扫描图像, 40keV 单能级图像显著提高含碘组织的 CT 值, 增加了组织对比度, 可清晰观察肝癌等病变的形态、大小及边界范围, 碘密度融合图可以明确病变血供情况并进行定量分析, 碘密度融合图更好展示周围组织结构的解剖细节, 光谱曲线图可以辅助组织进行同源性判断, 如淋巴结、远处转移病变和肝癌原发病灶之间的同源性关系, 有效原子序数图及融合图像显示正常肝组织与肿瘤的有效原子序数值的差异, 并以不同色阶着色, 提升病变可视化, 以更直观的方式展示病灶。通过后处理可获得全肝灌注图像及肝动脉 CTA、门静脉 CTPA 图像。其中所有病例上全肝灌注图像可以观察到瘤灶动脉供血增多、门脉血供减少; 肝动脉 CTA 发现肿瘤血管 20 例、动脉扭曲移位 14 例、肝外动脉供血 3 例; 门静脉 CTPA 上观察到门脉癌栓 4 例。**结论:** 光谱 CT 一站式扫描多参数功能可以明显提升肝脏肿瘤的检出, 提升肝脏肿瘤的可视化, 提供病灶的定量(血供特点)和定性(同源性)分析信息。可以评估原发性肝癌血管的形态及动态血流信息, 全肝 CT 灌注成像可以量化评估肝内病灶血流灌注情况, 实现了肝脏一站式扫描, 显著提高肝癌 TNM 分期的诊断准确性, 对肝癌的诊断及临床治疗有重要意义。

PU-0726

多层螺旋 CT 在急性脂垂炎的临床价值

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【摘要】目的 探讨多层螺旋 CT(MSCT)在急性肠脂垂炎(acute epiploic appendagitis AEA)的临床诊断价值及对发病机制的探索。**方法** 收集本院 2014 年 7 月至 2018 年 12 月急性肠脂垂炎患者资料 22 例,完善相关的人体学指标,并按照中国成年人体质指数分为 4 组(轻体重,健康体重,超重,肥胖),所有患者行下腹部及盆腔 CT 扫描,观察病灶的部位、形态、密度、大小、边缘及邻近脂肪组织等表现。**结果** 本组 22 例患者病灶均位于结肠前外侧壁,9 例位于盲肠,7 例位于乙状结肠与降结肠交界处,4 例位于降结肠,1 例位于乙状结肠,1 例位于结肠肝曲,所有病例均表现为典型的“环征”,中央卵圆形脂肪密度,边缘环形软组织密度,周围脂肪密度增高;通过临床资料分析,本病好发于青壮年,男性多于女性,随着 BMI 指数增加,发病率有上升趋势。**结论** 急性肠脂垂炎在 MSCT 上表现为典型的“环征”,结合相关的临床资料,如年龄、性别、体重,能够达到方便、快捷的诊断。

PU-0727

Abernethy 畸形伴门静脉瘤和下腔静脉瘤一例

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Abernethy 畸形是一种罕见的先天性肝外门腔静脉分流。1994 年 Morgan 等将其分为两型: I 型,肝脏完全无门静脉血流灌注,门静脉血完全向腔静脉分流;其中型又分 Ia 型和 Ib 型, Ia 型肠系膜上静脉与脾静脉无汇合, Ib 型,肠系膜上静脉与脾静脉汇合; II 型,肝脏有部分门静脉灌注。该病例 CTA、CTV 及 DSA 显示为门静脉右支-下腔静脉汇合,伴门静脉及下腔静脉瘤样扩张,符合 Abernethy II 型,伴门静脉瘤及下腔静脉瘤。诊断 Abernethy 畸形的金标准是 DSA。

PU-0728

Middle-aged men with chest pain

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1. 11

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A 52-year-old male patient presented to the emergency department with chest tightness and respiratory asphyxia exacerbated by two hours for one month. He had a thirty-year history of exertional palpitations. Physical examination showed cyanosis of the lips, accelerated and irregular heart rate, and systolic murmur in the area of mitral valve auscultation. Computed tomography angiography showed the pulmonary venous trunk communicates with the superior vena cava and eventually drains into the right atrium. Ultrasonography revealed an atrial septal defect and a bidirectional shunt between right atrium and left atrium. Supracardiac total anomalous pulmonary venous connection(TAPVC). Almost all TAPVC patients are infants and the mortality rate at one year of age is 80% if untreated. This condition is extremely rare in the elderly population. In this case, the left atrium did not receive direct pulmonary venous return, whereas the right atrium received return from systemic veins and the

left atrium causing enlargement. We assumed that the bidirectional shunt between the right atrium and left atrium would compensate over several decades, which could be the key to survival in patients with cardiovascular developmental abnormalities. The patient's colour doppler result and ejection fraction score of 69% proved this point. He was discharged from hospital after his symptoms were relieved by medical treatment. The patient was stable during 5-month follow-up.

PU-0729

基于影像组学的骨骼肌质量分析在预测失代偿性肝硬化继发于上消化道出血风险方面的研究。

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目的：研究基于多层螺旋计算机体层摄影（MDCT）的影像组学列线图模型，预测失代偿期肝硬化患者继发上消化道出血（UGIB）。方法：将 208 例失代偿性肝硬化患者（131 男性[63%];平均年龄 \pm 标准差 56.59 \pm 11.5 岁）的数据随机分为训练组（n=145）和验证队列（n=63），根据有无 UGIB 分为出血组和非出血组;从腹部平扫 MDCT 图像中提取第 3 腰椎体最大层面骨骼肌横断面影像组学特征，采用最小冗余最大相关算法和最小绝对收缩和选择算子逻辑回归方法对特征进行选择，建立影像组学模型。采用单因素和多因素 logistic 回归分析，确定与 UGIB 显著相关的临床因素，构建临床模型。最终，采用结合临床因素和影像组学评分（radscore）的多变量 logistic 回归分析，构建影像组学列线图预测模型。使用校准曲线、受试者工作特性（ROC）和决策曲线分析曲线对 3 种模型进行综合评估，从而生成了最优预测模型。结果：血浆凝血酶原时间（PT）、重度食管静脉曲张组（G3）、肌肉减少症和 radscore 是失代偿性肝硬化患者继发 UGIB 风险的独立预测指标。影像组学列线图模型的 ROC 曲线下面积在训练队列中为 0.929（95%CI:0.885-0.973），在验证队列中为 0.857（95%:0.761-0.952），显著大于临床或影像学模型，影像组学列线图模型可以获得更大的临床净收益。结论：影像组学列线图模型优于个体临床或影像学模型，在预测失代偿性肝硬化患者 UGIB 风险方面提供了新的方法和思路。

PU-0730

肿瘤性急性肾衰竭影像表现分析

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目的：通过多层螺旋 CT(MSCT)和 MR 分析肿瘤患者合并急性肾衰竭（ARF）时肾脏与肾周间隙的影像学改变，总结肿瘤所致 ARF 的影像学特点，观察和分析肿瘤患者肾脏损害的影像学表现；反之，通过对肾脏与肾周间隙的影像学病理改变的分析，影像科医生应该提示临床医生需警惕肿瘤所致的急性肾损害。方法：分析 34 例血液系统肿瘤患者的腹部影像学检查资料，其中弥漫大 B 细胞淋巴瘤 8 例，滤泡型细胞淋巴瘤 2 例，多发性骨髓瘤 17 例；Pomes 综合征 2 例，急性粒细胞白血病未分化型 2 例，急性早幼粒细胞白血病 3 例。使用 GE Discovery CT750 HD、Philips Barilance 16 螺旋 CT 扫描仪，GE Signa TwinSpeed 1.5T 超导型全身 MR 机。所有患者行平扫检查；由于患者均存在不同程度肾脏损害，为避免加重肾脏负担和预防对比剂肾病的发生，所有病例均未做增强扫描。由两名高年资医师分析肿瘤性 ARF 的影像学表现。结果：肿瘤性 ARF 影像学表现：肾脏外形增大；MSCT 表现为肾脏密度减低；MR 表现为肾脏外形增大，T1WI 肾脏实质信号减低，T2WI、DWI 和 STIR 序列肾实质信号增高；MSCT 和 MR 均可见肾周间隙内桥隔增粗；肾周筋膜增厚。结论：恶性肿瘤常累及肾脏造成 ARF，形成相应的临床症状、实验室指标异常和肾脏影像

学异常改变。通过分析肾脏以及肾周间隙的异常影像学征象并结合临床资料,影像科医生应提示临床医生警惕肿瘤以及肿瘤所致急性肾脏损害。

PU-0731

肾癌根治术后 6 年伴全胰腺转移一例

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患者 女, 58 岁, 2015 年因右肾占位性病行“右肾根治性切除术”, 术后病理为肾透明细胞癌; 2 年后常规复查发现胰头占位, 遂行“腹腔镜辅助保留幽门的胰十二指肠切除术”; 4 年后因“胰腺占位术后, 体检发现胰腺占位 1 月余”就诊。实验室检查无特殊。2017 年 CT 平扫示胰头类圆形低密度结节, 大小约 14mm×12mm, 增强扫描动脉期结节明显均匀强化, 强化程度高于正常胰腺实质, 静脉期强化减低, 边界清; 术后 4 年常规胸腹部 CT 复查, 显示两肺多发小结节, 较大者直径约 16mm; 胰腺多发团片状低密度影, 增强呈明显不均匀强化, 内伴片状无强化区; 左肾结节大小约 9mm×6mm, 皮质期明显强化, 髓质期退出; 盆腔团片状软组织密度影, 包绕腹腔内脂肪及血管, 局部与肠管边界不清, 大小约为 30mm×16mm, 增强见明显强化。后续规律治疗、每 2 月进行影像检查, 胰腺病灶坏死明显, 肺、左肾结节未见明显增大, 盆腔结节缩小。

手术及病理检查: 2017 年胰头结节手术探查, 术中见胰头下缘约 2cm×2cm 结节, 质中, 色偏黄, 界尚清。镜检: 瘤细胞呈巢状排列, 细胞为圆形或卵圆形, 胞质丰富且透亮。

透明细胞型肾细胞癌 (clear cell renal cell carcinoma, CCRCC) 早期临床症状不明显, 根治术后约 20%~30% 出现复发或者转移, 主要转移到肺、淋巴结、骨骼、肝脏、肾上腺, 转移到胰腺和肠管罕见。本病例行胰头转移瘤切除后短期发生全胰腺、肺、对侧肾脏、肠道等多器官转移, 实属罕见。大部分 CCRCC 胰腺转移患者无症状, 通常为肿瘤根治术后长期随访发现。本例患者主要是通过胸腹部 CT 增强扫描发现病灶的, CT 增强检查显示动脉期病灶明显强化, 门脉期强化程度明显下降, 但仍高于正常的胰腺组织。

本病例提示 CCRCC 患者行根治术后应尽可能进行定期体检、终身随访, 以便早期发现病灶复发、转移, 及时接受正确的治疗。

PU-0732

基于 DWI 的影像组学鉴别小肝癌与异性增生结节

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目的: 研究基于弥散加权成像(DWI)的影像组学模型鉴别肝炎肝硬化背景下的小肝癌 (<2cm) (SHCC)和异性增生结节(DNs)的诊断价值。方法: 回顾性的收集有完整 MRI 增强图像且手术病理证实为 SHCC 93 例, DNs 25 例。采用卡方检验分析两组间 DWI 和增强三期图像信号特征, 使用 ITK-SNAP 勾画 DWI 图像中感兴趣区域(ROI), 应用 FAE 软件进行特征提取、选择以及构建支持向量机 (SVM) 模型(按照 7: 3 的比例划分为训练集和测试集)。采用受试者工作特征 (ROC) 曲线评价模型的诊断效能。结果: SHCC 和 DNs 之间的增强三期和 DWI 图像具有统计学意义($P<0.05$), DWI-SVM 模型训练集的 AUC 值为 0.936, 灵敏度、特异度及准确度分别为 95.4%、88.2%及 93.9%; 测试集的 AUC 值为 0.911, 灵敏度、特异度及准确度分别为 85.7%、87.5%及 86.1%, 均明显优于 DWI(AUC=0.72)的诊断效能。结论: 基于 DWI-SVM 模型的 AUC 值和特异度显著提高, 可以有效区分肝炎肝硬化背景的 SHCC 和 DNs。

PU-0733

肾外腹膜后血管平滑肌脂肪瘤 1 例报道贾楠
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目的：探讨肾外腹膜后血管平滑肌脂肪瘤（ERAML）的临床特征及影像学表现特点，从而提升对本病的诊断水平。方法：选取 1 例病理证实为腹膜后血管平滑肌脂肪瘤的临床资料、病理及影像学表现特点。结果：本例 ERAML 体积较大且不侵犯周围组织，发生于盆腔，富含脂肪成分，密度不均，内部可见条索样、结节样软组织密度影，增强后见多根血管影穿行。结论：ERAML 的发病年龄、发病部位、临床表现及影像学表现具有一定特征性。

PU-0734

Preoperative CT-based imaging models predict Ki-67 expression in cytokeratin 19 positive hepatocellular carcinomaHailong Zhang, Huanhuan Zheng, Jing Chen, Yan Zhu, Qun Zhou, Xuedi Wang, Min Tang
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Objectives: To investigate the diagnostic performance in predicting Ki-67 expression status of cytokeratin 19 (CK19) positive hepatocellular carcinoma (HCC) based on preoperative CT imaging features.

Methods: Preoperative clinicopathological and CT imaging data were retrospectively collected from 41 patients with CK19 HCC from January 2018 to March 2022. Clinical and CT imaging characteristics between low expression group (Ki-67 LI < 30%) and high expression group (Ki-67 LI ≥ 30%) were compared by univariate analysis, logistic regression and receiver operating curve analysis.

Results: At univariate analysis and multivariate analysis, non-smooth tumor margin (odds ratio [OR] = 6.272, 95% confidence interval [CI] = 1.011-38.899, $p = 0.049$), presence of macrovascular invasion (OR = 18.786, 95% CI = 1.570-224.800, $p = 0.021$), and RTE-AP (OR = 2.312, 95% CI = 1.006-5.313, $p = 0.048$) of CK19 positive HCC were independent predictors of high Ki-67 expression. The four preoperative CT prediction models based on the above predictors could well diagnose Ki-67 expression status. The area under curve values for predicting high Ki-67 expression were 0.779 (95% CI: 0.876-0.940) in model I, 0.802 (95% CI: 0.648-0.910) in model II, 0.841 (95% CI: 0.693-0.936) in model III, and 0.870 (95% CI: 0.728-0.954) in model IV, respectively.

Conclusion: Non-smooth tumor margin, presence of macrovascular invasion, and RTE-AP were independent predictors of high Ki-67 expression of CK19 positive HCC. The CT-based imaging models of our study might be helpful for clinicians to evaluate the expression status of Ki-67 preoperatively and identify these high-risk patients.

PU-0735

Analysis of imaging findings of rare small intestinal tumorsYu Liu
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Objective: To analyze the imaging findings and related clinical features of rare tumors of the small intestine, and to improve the understanding and diagnosis of them.

Methods: The clinical and CT imaging data and features of rare small intestinal tumors diagnosed by pathology were retrospectively analyzed.

Results: Small intestinal hemangioma, small intestinal CT imaging showed a circular soft tissue, the enhancement mode is the same as liver hemangioma, arterial stage edge enhancement, venous stage and delayed stage progressive enhancement. Ileum diffuse gangliocytomatosis, CT imaging of the small intestine showed continuous diffuse thickening of the entire ileum wall, diffuse nodules under the mesenteric mucosa, multiple lumen stenosis, and significant enhancement of the mucosa. Malignant gastrointestinal neuroectodermal tumor, CT imaging of small intestine showed irregular thickening of jejunal tube wall, forming a structure similar to soft tissue mass. The enhancement results in uneven strengthening. Invasive angiomatosis, CT imaging of the small intestine showed a round and slightly low-density mass image at the end of the ileum. After enhancement, mild enhancement was observed, and marginal enhancement was observed.

Conclusion: The above rare tumors of small intestine have certain imaging characteristics, which is helpful for differential diagnosis.

PU-0736

原发性胰腺淋巴瘤 14 例病例分析及文献回顾

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目的 分析原发性胰腺淋巴瘤临床诊疗、影像学特征及预后。方法 回顾性分析本院 2017 年 2 月至 2020 年 12 月确诊为原发性胰腺淋巴瘤的 14 例患者临床资料, 影像学特征及诊疗预后。结果 本次研究 14 例患者多以腹痛、腰背痛、乏力就诊 (10/14), 常出现血清 LDH 水平升高 (9/14), 头颈部多发 (8/14), CT 平扫时病灶均呈稍低密度, 增强后动脉期呈轻中度强化, 静脉期持续强化。14 例病灶均包绕邻近血管 (血管漂浮征), 胆总管或胰管扩张少见。6 例行超声内镜引导下细针穿刺吸取术病理确诊。组织类型最常见为弥漫大 B 细胞淋巴瘤 (11/14)。随访示确诊患者多接受化疗治疗 (4 例失访)。1 例患者确诊 2 周后死亡, 9 例患者至最终随访时间 (2020 年 12 月) 中位生存期为 21 月。结论 原发性胰腺淋巴瘤少见, 需联合临床及影像学特征, 治疗前穿刺活检确诊, 根据病理制定化疗方案。

PU-0737

增强 CT 形态学特征评估胃癌脉管癌栓及神经侵犯状态

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目的: 探究增强 CT 形态学特征评估胃癌脉管癌栓及神经侵犯状态的价值。

方法: 回顾性收集 104 例胃癌, 在 CT 图像上评估大体部位、病灶方位、形态、边缘、最大厚度、粘膜面、浆膜面、邻近脂肪等形态学特征, 同时测量平扫、动脉、静脉及延迟期病灶的 CT 值。使用 χ^2 检验或 Fisher 精确检验比较分类变量组间差异, Mann-Whitney U 检验比较定量参数组间差异。采用 ROC 曲线评估差异性参数及多参数模型区分脉管癌栓或神经侵犯的诊断效能。

结果: 脉管癌栓阳性常见的 CT 征象是边缘不清晰和邻近脂肪浑浊 ($P = 0.007$ 和 0.011)。神经侵犯阳性常见的形态学特征是增厚型和边缘不清晰 ($P = 0.006$ 和 0.048)。神经侵犯阳性组的静脉 CT 值及延迟 CT 值均显著高于阴性组 ($P = 0.001$ 和 0.002)。静脉 CT 值联合形态 AUC 值提高至 0.771,

准确度为 82.9%。静脉 CT 值、延迟 CT 值、形态及边缘多参数联合 AUC 值提高至 0.778，准确度为 75.4%。

结论：CT 征象包括形态、边缘、邻近脂肪、静脉及延迟 CT 值可用于评估胃癌脉管癌栓或神经侵犯，尤其是胃癌形态联合静脉 CT 值区分神经侵犯的诊断效能更优，可能为临床评估胃癌脉管及神经侵犯状态提供一定的参考价值。

PU-0738

双能 CT 对肝囊肿与乏血供肝转移瘤的鉴别诊断研究

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【摘要】目的：探讨应用双源 CT 双能量扫描方式对鉴别诊断肝囊肿、乏血供肝转移瘤的价值。方法：回顾性分析 2023 年 4 月至 2023 年 7 月就诊的 140 例肝脏病变者临床资料，均是接受双源 CT 双能量扫描检查。针对影像扫描检查获得数据，输入至 syngvia 后处理工作站，进一步获得碘图、能谱曲线，计算标准化碘浓度 (NIC)、能谱曲线斜率，此外获得平均 CT 值。结果：140 例肝脏病变者，应用双源 CT 双能量扫描方式，检出 186 个病灶，包括肝囊肿病灶 104 个，乏血供肝转移瘤病灶 82 个。肝囊肿 NIC 与能量曲线斜率都是比较乏血供肝转移瘤低 ($P < 0.05$)。不同 keV 下 (40keV、60keV、70keV、80keV、100keV) 测定的平均 CT 值，肝囊肿在平均 CT 值都是低于乏血供肝转移瘤 ($P < 0.05$)。肝囊肿能谱曲线呈弓背上升型，斜率负值，随着 keV 增高目标病灶 CT 值呈现升高趋势；乏血供肝转移瘤能谱曲线表现是下降型，斜率正值，随着 keV 增高目标病灶 CT 值呈现下降趋势。结论：应用双源 CT 双能量扫描方式，能够通过获取碘图、能谱曲线、能谱曲线斜率及平均 CT 值等，为肝囊肿与乏血供肝转移瘤的鉴别诊断提供参考。

PU-0739

多层螺旋 CT 与数字减影血管造影在巨块型肝癌及癌栓和动静脉分流诊断中的价值

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目的：对比多层螺旋 CT 与数字减影血管造影 (DSA) 在巨块型肝癌及癌栓和动静脉分流诊断中的应用价值。方法：选取我院于 2021 年 7 月-2022 年 1 月收治的 26 例巨块型肝癌患者为研究对象，回顾性分析患者接受多层螺旋 CT 与数字减影血管造影检查方式在巨块型肝癌及癌栓和动静脉分流诊断中的应用情况。结果：CT、DSA 均检出 26 个病灶，检出率分别为 100%；CT 与 DSA 检查出病灶血液供应、癌栓检出率、动静脉分流情况对比，差异不具有统计学意义 ($P > 0.05$)。经 DSA 检查显示，26 例患者中，有 2 例患者的病灶累积整个左肝，1 例累积右肝。而经 CT 增加扫描，26 例患者的肿块全部累积部分肝叶。结论：多层螺旋 CT 与 DSA 在巨块型肝癌及并发病变诊断均具有显著的应用价值，在病灶血液供应诊断方面具有一致性。但是多层螺旋 CT 在癌栓检出率、影像学特征上略优于 DSA，而 DSA 在动静脉分流诊断方面较多层螺旋 CT 稍具优势。

PU-0740

Association of renal surface nodularity with arterial hypertension compared to normotensive patients

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Background: Renal surface nodularity (RSN) is a subclinical biomarker of renal injury and may be associated with arterial hypertension. **Purpose:** To explore the association of RSN with arterial hypertension compared to normotensive patients. **Material and Methods:** A total of 205 inpatients with or without high blood pressure (HBP vs. control group) who underwent abdominal computed tomography (CT) scans were included. Their clinical characteristics included age, sex, HBP course, HBP grade, history of diabetes mellitus (DM), and renal function (estimated glomerular filtration rate [eGFR]). The HBP group included HBP/+DM and HBP/-DM based on the presence or absence of DM. The CT-based RSN grade was scored from 0 to 2 by two radiologists, respectively, where RSN grade 0 indicated smooth renal surface, grade 1 was mild RSN, and grade 2 was marked RSN. **Results:** The inter-rater agreement on RSN was good ($\text{Kappa} = 0.76$). The age-specific rate of RSN grade 1–2 was bigger in the HBP group than in the control group (42.86% [40%–49.22%] vs. 2.18% [0.00%–22.5%]; $P = 0.005$). RSN grade was associated with HBP course ($P < 0.02$). The rates of RSN grade 1–2 and of RSN grade 2 were bigger in the HBP/+DM group than those in the HBP/-DM group (48.84% vs. 37.84%, and 18.61% vs. 1.35%, respectively; all $P = 0.001$). Neither HBP course nor HBP grade correlated with rate of RSN grade ($P > 0.05$). The eGFR was similar among the RSN grades in HBP or between the HBP and control groups ($P > 0.05$). **Conclusion:** RSN was associated with HBP compared to normotensive patients.

PU-0741

彩色多普勒超声联合 CT 检查在儿童肾上腺神经母细胞瘤 诊断及随访中的应用价值

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目的 研究儿童肾上腺神经母细胞瘤 (NB) 的彩色多普勒超声与 CT 表现, 提高其诊断率。
方法 回顾性分析 29 例经穿刺活检或术后病理证实为肾上腺神经母细胞瘤患儿的超声图像与 CT 的影像表现, 总结其影像学特征, 并对 20 例患儿的随访情况加以分析。
结果 在 29 例患儿的肾上腺瘤体中, 16 例位于左侧, 13 例位于右侧。彩色多普勒超声示瘤体最大约 $110 \times 100 \text{ mm}$, 最小约 $14 \times 11 \text{ mm}$; 24 例边界欠清, 部分与肝、肾等器官分界不清; 内部回声呈低回声 (20/29)、稍高回声 (2/29)、中等回声 (3/29)、混合回声 (4/29), 均呈不均质回声 (25 例病灶内可见斑片状、点状强回声, 3 例病灶内可见囊性无回声区, 1 例内可见蜂窝状小无回声); 21 例病灶内可见血流信号 (13 例见稍丰富血流信号, 3 例呈点状或小片状血流信号), 5 例病灶周边可见血流信号, 3 例病灶内未见明显血流信号。CT 示不规则状病灶有 24 例, 瘤体边界欠清, 部分与肝、肾等器官分界不清; 瘤体最大约 $128 \times 105 \text{ mm}$, 最小约 $26 \times 12 \text{ mm}$; 内部密度不均匀, 增强呈中度或明显不均匀强化, 其中 26 例内可见结节状、斑片状或点状高密度钙化灶, 2 例病灶内见不规则高低混杂密度, 1 例内可见出血稍高密度影。29 例患儿中, 26 例见腹膜后淋巴结增大, 9 例造成右肾上极受压, 11 例出现左肾向下推移, 6 例见包绕腹主动脉、肾动脉等腹部血管并造成血管移位, 4 例患儿发现肝转移灶, 5 例发现骨转移, 3 例同时出现肝转移及全身骨骼广

泛性转移。20 例患儿的随访中, 6 例择期手术切除后 4 例未见复发、2 例复发, 10 例经化疗后 7 例肿瘤逐渐减小、3 例见复发, 3 例因广泛转移而治疗效果欠佳, 1 例因发现较晚已死亡。

结论 彩色多普勒超声和 CT 均可观察肿瘤的部位、大小、形态、内部情况、与周围组织及大血管的关系以及转移情况, 联合应用能为临床上 NB 的诊断、疗效复查与随访提供更全面、更有价值的参考信息。

PU-0742

单源双层探测器 CT 显示宫颈癌的最佳单能量研究

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目的 探讨单源双层探测器 CT (dl-SDCT) 显示宫颈癌病灶的最佳单能量。 **方法** 分析初治宫颈癌患者 105 例, 治疗前行 dl-SDCT 和盆腔 MRI 增强检查。由 1 名住院医师分析光谱 CT 动、静脉期常规能量图像 (CIs) 和 40~200KeV 单能量图像 (VMIs), 获得双期宫颈癌病灶及背景组织 CT 值和 SD 值, 计算信噪比 (SNR) 和对比噪声比 (CNR); 2 名影像科医师依据 5 分评分标准, 对病灶显示清晰度及分期诊断信心进行评分。比较 VMIs 及 CIs 各参数组间差异及主观评分差异。 **结果** 在动、静脉期, VMI40KeV 宫颈癌病灶 CT 值最高、SNR 最高, CNR 宫体最高、CNR 阴道最高, 显著高于其他 VMIs 和 CIs ($P < 0.05$)。在 CIs 和 VMI40KeV~VMI80KeV, 病灶静脉期 SNR 均高于动脉期 ($P < 0.05$); 在 CIs 和 VMI40KeV~VMI100KeV, 动脉期 CNR 宫体均高于静脉期 ($P < 0.05$); 在 CIs 和 VMI40KeV~VMI70KeV, 动脉期 CNR 阴道均高于静脉期 ($P < 0.05$)。甲乙医师在 CI-A、CI-V、VMI40KeV-A、VMI40KeV -V 图像评分 Kappa 值分别为 0.77、0.77、0.84、0.80, 在 VMI40KeV 上评分高于 CIs ($P < 0.05$)。 **结论** 与 CIs 及其他 VMIs 相比, VMI40KeV 表现出最佳 SNR 和 CNR, 优化宫颈癌病灶显示效果。

PU-0743

Detection of Liver Steatosis by Dual-layer Spectral Detector Computed Tomography: Evaluation Using Proton Density Fat Fraction as Reference

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Objectives: To evaluate diagnostic accuracy of liver dual-layer spectral detector computed tomography (SDCT) derived parameters of liver parenchyma for grading steatosis with reference to magnetic resonance imaging-based proton density fat fraction (MRI-PDFF).

Materials and Methods: In this prospective study, 320 participants (45.5 ± 11.5 years, 120 men) who underwent MRI-PDFF and liver SDCT examinations at four centers in China were enrolled. Participants were classified into normal ($n = 131$), mild steatosis ($n = 98$), and moderate/severe(mod/sev) steatosis ($n = 91$) groups based on MRI-PDFF. SDCT liver parameters were evaluated using conventional polychromatic CT images (CTpoly), virtual mono-energetic images at 40 keV (CT40kev), the slope of the spectral attenuation curve (λ), effective atomic number (Z_{eff}), and liver to spleen attenuation ratio (L/S ratio). Linearity between SDCT liver parameters and MRI-PDFF were examined using spearman correlation. Cutoff values for

SDCT liver parameters in determining steatosis grades were identified using area under the receiver-operating characteristic curve analyses.

Results: SDCT liver parameters demonstrated a strong correlation with PDFF, particularly Zeff ($R_s = -0.852$; $P < 0.001$). Zeff achieved an area under the curve (AUC) of 0.928 for detecting the presence of steatosis with the sensitivity of 89.4%, and the specificity of 82.4%, and an AUC of 0.953 for detecting mod/sev steatosis with the sensitivity of 94.5% and the specificity of 88.8%, the corresponding cutoff values were 7.12 and 6.97, respectively. Multiple regression analysis showed that Zeff was the independent factor associated with the presence of liver steatosis and mod/sev steatosis (All $P < 0.001$).

Conclusions: SDCT derived parameters of liver parenchyma, particularly Zeff, exhibit excellent diagnostic accuracy for grading steatosis.

PU-0744

腹部脂肪含量的诊断：基于 MRI mdixon-quant 定量技术

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目的：腹部脂肪组织含量的定量评估对于脂肪肝患者至关重要，对于肝脏脂肪变性的严重程度诊断和预后具有重要意义，肝脏活检受限于采样偏倚和有创性受到限制。然而，超声、CT 等影像学检查能够提供脏器脂肪浸润程度，但无法提供精准量化的脂肪含量信息，为腹部脏器选择定量成像技术是临床应用的挑战之一。

方法：本文基于 MRI mdixon-quant 定量技术在肝脏、胰腺、脾脏、肾脏、肾上腺、精囊、睾丸、附睾、阴茎中的应用进行综述，并从 mdixon-quant 技术成像原理，常见部位的扫描方法、图像后处理及感兴趣区勾画、不同疾病诊断界值、临床疾病中的应用等方面对 MRI 脂肪定量技术进行探讨。

结果：大多数磁共振脂肪定量技术依赖于脏器分割后进行计算，可复性和操作性都较差。MRI mdixon-quant 技术能够快速进行脂肪定量赋值，并在涵盖腹部多个实质脏器的大规模研究中被证实，其较高的诊断效能也为炎症性疾病、动脉硬化性疾病及肿瘤性疾病的治疗术后评估提供了有效的支持，同时 MRI mdixon-quant 也为健康筛查、疾病随访监测患者提供了有益的选择。该技术因其一次屏气即可完成检查、耗时短、且后处理检查易操作、直接提供脂肪百分比、无辐射等优点，在已有的脂肪定量技术中脱颖而出。

结论：MRI mdixon-quant 定量技术对于腹部脂肪含量的诊断和疾病监测中提供了有用信息，并因其无创性和鲁棒性被认为是脂肪定量的推荐方法。

PU-0745

肝脏血管周上皮样细胞肿瘤（PEComa）的影像特点

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目的 探讨肝脏血管周上皮样细胞肿瘤(PEComa)的临床特点及影像学特征。资料与方法 收集例经病理学确诊的肝脏 PEComa 患者的临床及影像学资料，选取其中例回顾性分析该病影像学表现。

结果 例患者临床表现缺乏特异性，其中例无症状，其余均表现为上腹隐痛不适及压迫症状。所有病例均为单发，以肝右肝多见，其中例位于右肝，病理检查 SMA 几乎都表现为阳性，免疫组化 HMB45 特异性表达。PEComa 影像学检查可以分为三种类型，多脂肪型，混合型及无脂肪型，多脂肪型和混合型需与血管平滑肌脂肪瘤(AML)、肝局灶性结节增生(FNH)鉴别，而无脂肪型容易

误诊为肝细胞癌，因此对于本病的鉴别诊断尤其重要。结论 肝脏 PEComa 具有独特的免疫组化特征，影像学表现具有一定的特性，临床术前误诊概率较大，放射科医生加强对该病的认识十分重要。

PU-0746

术前磁共振成像纹理特征分析预测肝细胞癌微血管浸润的效果

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目的 存在微血管侵犯 (microvascular invasion, MVI) 表明肝细胞癌 (hepatocellular carcinoma, HCC) 根治性切除后预后较差，肿瘤复发的可能性增加。按照目前的标准，MVI 只能在术后通过组织病理学进行诊断。纹理特征分析有可能通过术前磁共振成像 (magnetic resonance imaging, MRI) 研究分析来识别被认为是“高风险”的患者。这将使患者有更优的治疗选择，改进治疗方法和术前预后。本研究旨在评估术前 MRI 纹理特征分析预测肝癌 MVI 的准确性。

方法 回顾性分析 2018 年至 2022 年间接受肝切除术的新发 HCC 患者。排除标准：术前无 MRI，运动伪影明显，失访，肝细胞癌破裂，既往肝切除术和辅助治疗。60 例患者根据肿瘤组织学分为 MVI 组 (n = 25) 和非 MVI 组 (n = 35)。对肿瘤在增强后的 T1 加权 MRI 上的选定图像进行分析。获得定性 (由放射科医生评估) 和定量数据 (由软件执行)。根据每个肿瘤的最大横截面积提取放射组学纹理特征参数，并使用 MaZda 软件进行分析。采用了五种不同的方法。方法 1、2、3 分别专门利用门静脉、动脉和平衡相的特征。方法 4 和方法 5 利用比较显著的纹理特征来获得最佳性能。

结果 方法 5 的准确度为 87%，灵敏度为 74%，特异性为 93%。

结论 术前 MRI 的肿瘤结构分析可以预测 HCC 中 MVI 的存在，准确率高达 87%，并可能影响临床治疗。

PU-0747

基于 CT 影像组学与血清学指标预测肝细胞癌微血管侵犯的研究

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背景 微血管侵犯被认为是引起肝细胞癌肝内转移和术后复发的原因，预测微血管侵犯有重要临床意义。目的 基于肝细胞癌的患者术前 CT 影像组学特征和术前血清学指标分别建立影像组学模型，探讨其预测微血管侵犯的研究价值。方法 回顾性分析贵州医科大学附属肿瘤医院 2019 年 1 月至 2022 年 12 月 215 例术后病理病理结果确诊为肝细胞癌患者的资料。分析血清学指标资料，采用逻辑回归算法分别确立影像组学模型，血清学模型，影像组学联合血清学模型。通过绘制受试者血清学指标曲线、特性性和敏感性评估预测患者微血管侵犯状态的诊断效能。结果 筛选出 6 个最优的影像组学特征构成影像组学模型，筛选出 14 个血清学指标特征构成血清学模型，筛选出 12 个特征构成影像组学联合血清学模型。结论 基于 CT 影像组学联合血清学模型可用于预测肝细胞癌的微血管侵犯状态且有较好的诊断价值。

PU-0748

精囊血管平滑肌瘤 1 例

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目的: 探讨精囊腺血管平滑肌瘤的影像特征及临床特点, 以期提高对该疾病的诊断认知。方法: 血管平滑肌瘤是一种孤立的良性肿瘤, 是一种来源于间叶组织的罕见的平滑肌瘤类型, 性激素水平和创伤再其发生中作为始动因素被广泛认可。血管平滑肌瘤好发于四肢皮下, 女性发病率高于男性。发生于精囊腺的血管平滑肌瘤 (seminal angioleiomyoma) 极为罕见, 在中外文献中未见报告, 本文报道一例男性血管平滑肌瘤病例, 患者, 59 岁, 主因无明显诱因的排尿困难、下腹部胀痛 3 天入院。腹部+盆腔增强 CT 显示盆腔占位, 当地医院拟诊为精囊囊肿, 留置尿管后转治我院。我院 MRI 检查示: 盆腔内囊实性不均质团块, 界限较为清晰, 规整, 大小约为 16.7×13×16.4cm, T1WI 呈高信号, T2WI 呈高信号, 增强扫描未见明显强化 (图 1), 临床诊断: 精囊囊肿, 囊腺瘤。临床行腹腔镜下肿瘤切除术。结果: 术后病理结果证实为精囊腺血管平滑肌瘤, 镜下可见梭形肿瘤细胞、大片坏死组织并囊性变。患者术后恢复良好, 随访 6 个月肿瘤无复发。结论: 精囊血管平滑肌瘤临床罕见, 术前明确诊断较为困难, 术前影像学检查首选 MRI, 典型的 MRI 表现为肿物在 T1WI 加权等或稍高信号, T2WI 为混杂高信号, 边界清晰, DWI 稍高信号, 内部信号往往混杂, 可见高信号的血管平滑肌成分, 以及血栓、钙化等低信号。首选腹腔镜手术完整切除, 术后无复发及转移。

PU-0749

腹部 CT 与腹部 X 片在肠梗阻诊断中的价值比较

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目的: 探索腹部 CT 与腹部 X 片在肠梗阻诊断中的应用价值比较。方法: 选取 2022.3 月-2023.3 月在我院治疗肠梗阻前的病人 60 例, 分析对比腹部 CT 和腹部 X 线两种摄片方式相比的病灶检出率, 以及两种摄片方式的辐射剂量大小比较。采用同时进行腹部 CT 检查和腹部 X 片检查的方法, 比较两种方式对肠梗阻的检出效能, 评估哪种摄片方式对诊断肠梗阻更有价值。结果: 60 例肠梗阻患者中, X 线检出率为 81.69%, CT 检出率为 94.36%, 差异具有统计学意义 ($P<0.05$)。腹部 CT 的辐射剂量约为 10mSV, 腹部 X 片的辐射剂量约为 0.7mSv, 腹部 CT 的辐射剂量是腹部 X 线的 14 倍。结论: 1. 与腹部 X 片相比, 腹部 CT 的检出敏感性更高, 尤其是在显示肠腔以及肠壁的形态改变上, 且可以通过多平面重建从多角度观察梗阻部位, 了解梗阻原因和疾病严重程度。2. CT 辐射剂量大于 X 线, 患者所受辐射剂量明显增加

PU-0750

肝细胞癌与肝海绵状血管瘤 CT 检查技术及 CT 表现分析

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摘要: 目的: 探讨肝细胞癌与肝海绵状血管瘤 CT 增强扫描的影像学特点。方法: 选取我院 2023 年 1 月-7 月患有肝脏肿瘤疾病的 30 名患者, 均对 30 名患者进行腹部增强 CT 扫描, 均设置相同的扫描时间动脉期 20~30s, 静脉期 55~75s, 延迟期 120~180s, 监测层面放置在膈肌, 监测点放置在腹主动脉, 自动触发阈值为 120~130HU。结果: 17 名患有肝海绵状血管瘤的患者在动脉期,

肿瘤边缘呈高密度, 门静脉期, 肿瘤则呈现出均匀强化, 呈现高密度, 而 13 名肝细胞癌患者肿瘤在动脉期肿瘤呈现高密度, 门静脉期则强化迅速下降, 肿瘤则呈现为低密度表现。肝海绵状血管瘤 CT 增强扫描影像学表现为肿瘤周围早期强化, 逐渐向肿瘤中央扩展, 整个对比增强的过程可表现为“早出晚归”的特征。肝细胞癌对比增强的影像学表现则为由肝动脉供血的肿瘤, 在其门静脉期强化下降而成相对低密度影像, 整个 CT 增强过程肿瘤表现为“快进快出”征象。结论: 相同 CT 增强扫描技术情况下肝细胞癌与肝海绵状血管瘤 CT 表现明显不同, 各有特点。

PU-0751

慢性胰腺炎与胰腺癌的 ct 分析与鉴别

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慢性胰腺炎与胰腺癌的 CT 分析与鉴别

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关键词: 胰腺癌; 慢性胰腺炎; CT 平扫与增强;

【摘要】目的: 通过分析胰腺癌和慢性胰腺炎的 CT 表现特点, 探讨其二者的主要鉴别点, 从而提高胰腺癌和慢性胰腺炎的影像检查技术鉴别能力。**方法:** 回顾性分析对我院已证实的 30 例胰腺癌和 22 例慢性胰腺炎的平扫与增强的 CT 表现分析病灶的血供、密度、境界、周围血管的侵犯、周围血管腔的癌栓、周围淋巴结的显示以及病灶检出率。**结果** 两者的 CT 直接和间接征象表明两者的表现有其相似性, 但各自具有相对特征性的 CT 征象;慢性胰腺炎与胰腺癌主要 CT 征象的出现率在增强扫描病灶呈低、低与等混杂密度, 胆总管下段扩张突然狭窄截断;两组比较差异均有统计学意义。**结论:**临床上, 胰腺癌与慢性胰腺炎的鉴别诊断是比较困难的, 胰腺癌与慢性胰腺炎的表现虽有相似点, 但通过对两者的 CT 直接和间接表现进行比较分析, 认为 CT 检查能够获得比较好的图像效果;对两者定性诊断的准确性很高, CT 增强的检出率又明显高于平扫检出率, 是解决胰腺癌与慢性胰腺炎鉴别诊断的较好方法。

PU-0752

肝融合性纤维化的影像学特征及其病因探究。

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目的: 探讨肝融合性纤维化的影像学特征, 并初步分析其发病原因。

方法: 回顾性分析我院 2020 年 6 月-2023 年 6 月经影像诊断的 9 例肝融合性纤维化患者的临床及影像学资料, 影像学特征包括病变部位、形态、密度/信号及其强化特点, 并初步分析其发病原因。

结果: 9 例中, 男 1 例, 女 8 例; 年龄 41-69 岁, 平均 53.7 岁; 均具有不同程度的肝功能损害; 8 例自身抗体 ANA(+), 1 例自身抗体 ANA(±); 其中 4 例肝纤维化系列指标异常, 5 例不详。9 例均行 MRI 普美显增强扫描, 3 例行 CT 平扫, 6 例行 CT 平扫+增强扫描; 其中 5 例合并肝硬化; 6 例以肝门为中心, 呈不规则大片状累及肝左叶及肝右叶; 2 例位于肝左叶; 1 例位于肝左右叶交界区、肝左叶边缘; 单发或多发, 无占位征象, 局部肝体缩小并相应部肝包膜皱缩; CT 平扫病变呈稍低密度, 边界欠清; MRI 平扫 T1WI 呈稍低信号, T2WI 呈稍高信号, DWI 呈稍高信号, ADC 呈稍高信号; 异常密度/信号较均匀, 无出血、坏死; 病灶内血管和胆管显示清晰, 完整连续, 部分血管走行迂曲、部分胆管呈局限性扩张; CT/MRI 增强扫描示动脉期不强化或轻度强化, 门静脉期及延迟期逐渐强化, 肝胆期呈稍高/低信号。7 例病理诊断自身免疫性肝炎, 1 例病理诊断药物性肝损伤, 1 例患者致病原因不明。

结论：肝融合性纤维化具有相对特征的 CT 和 MRI 表现，自身免疫性肝炎极有可能为我国中年女性肝融合性纤维化的主要发病原因。

PU-0753

Gd-EOB-DTPA MRI 动态增强扫描联合 ADC 值对肿块型胆管细胞癌的诊断价值

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目的：本研究探讨 Gd-EOB-DTPA MRI 动态增强联合 ADC 值对肿块型胆管细胞癌的诊断价值。

方法：回顾性分析经病理证实的 35 例肿块型胆管细胞癌 (IMCC) 患者的临床和影像学资料，并选择 50 例肝细胞癌 (HCC) 资料进行对比，所有患者均行肝脏 Gd-EOB-DTPA MRI 动态增强及弥散成像。分析两组患者的病灶 MRI 平扫及动态增强信号特点以及测量 b 值为 0,400,800,1200 所对应的 ADC 值，并对胆管细胞癌强化方式与病理基础进行对照。连续资料采用 t 检验，分类资料采用 χ^2 检验或者 Wilcoxon 秩和检验，对两组间磁共振信号特征进行比较。对单因素分析中具有统计学意义的影像学指标进行多因素逻辑回归分析，筛选出病灶中较好的鉴别诊断指标。

结果：MRI 扫描特征中，肿瘤边缘及轮廓、是否单发、动脉期 (AP) 增强、静脉期 (PVP)、延迟期 (DP) 廓清、动态增强模式、肝胆期 (HBP) 靶征、b 值等于 800 时的 ADC 值及伴随征象中假包膜、包膜皱缩有统计学意义 ($P < 0.05$)，进行多因素逻辑回归分析显示，病灶的 AP 增强、DP 廓清、假包膜以及肝胆期 (HBP) 靶征表现作为两者鉴别的较好指标。

结论：病灶的 AP 增强、DP 廓清、假包膜以及肝胆期 (HBP) 靶征是鉴别 IMCC 与 HCC 的重要影像学指标。IMCC 不同的 MRI 强化特点对应相应的病理学基础。

PU-0754

鱼刺所致星座链球菌肝脓肿 1 例并文献复习

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目的：细菌性肝脓肿是临床外科常见疾病，而通过误吞异物导致肝脓肿的相关报道总体较少，该疾病早期不易识别，临床误诊率及延诊率较高。本研究拟通过回顾性分析 1 例鱼刺所致肝脓肿的临床及影像表现，提高临床医生对疾病的诊断和治疗效率，减少疾病的风险和并发症。

方法：回顾性分析我院最近收治的 1 例鱼刺所致星座链球菌肝脓肿的影像表现、临床特征并复习相关文献。

结果：

1. 本例报道患者男，38 岁，临床症状为咳嗽、乏力 1 周，上腹部轻压痛，血常规：白细胞、中性粒细胞、超敏 C 反应蛋白明显升高。入院后胸部 CT 未见异常密度影；腹部增强 CT 显示肝左叶见一团片状稍低密度影，增强扫描病灶明显不均匀强化，其内散在斑片状、片状无强化区，病灶部分突向肝胃间隙，与邻近胃壁分界不清，似见一小瘘道相连，周围边缘模糊。结合患者有吃鱼病史，患者 1 月前体检时胃镜、肝脏左叶超声未见异常，目前综合考虑鱼刺穿破胃壁进入肝内导致肝脓肿。后经超声引导下脓肿穿刺引流，病灶明显缩小。脓液细菌培养：星座链球菌。患者经抗感染、保肝、营养支持等治疗后症状明显缓解。

2. 文献复习发现异物所致肝脓肿较少见，近 95% 为鱼刺所致，大多数病人早期无明显症状，后期脓肿形成后会出现腹痛、发热、乏力等症状。此外文献复习中发现，大多数病人早期行磁共振和超声检查易漏诊和误诊，CT 影像检查能较好的发现病变，尤其是结合增强检查能较好的显示脓肿及异

物的位置和关系。脓肿大部分位于肝左叶，少数位于尾叶和右叶区域。CT 主要表现为肝脓肿区域有长条状高密度影，部分位于肝内，部分位于肝胃间隙，部分可发现肝脏与胃之间漏道形成，大部分患者无腹腔积液、积气及腹膜炎征像。我们推测可能缓慢的进行性炎症和纤维化反应引起的粘连阻止了胃肠道内容物溢出至腹腔内，由此避免了继发性腹膜炎的发生。

结论：异物性肝脓肿早期不易识别，易漏诊和误诊，CT 能早期发现胃肠道异物，对异物性肝脓肿能较及时诊断。

PU-0755

CT 增强定量参数预测肾透明细胞癌 WHO/ISUP 分级

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摘要：探讨 CT 增强定量参数术前预测肾透明细胞癌（ccRCC）WHO/ISUP 分级的价值。连续收集行手术治疗的 98 例 ccRCC 患者临床和 CT 增强资料，根据 WHO/ISUP 分级分为低级别组（76 例）和高级别组（22 例）。比较 CT 增强定量参数两组间差异及各参数预测 ccRCC WHO/ISUP 分级的诊断效能，并进行外部验证，找寻泛化能力最佳的 CT 增强定量参数。两组间皮质期 CT 值、皮质期净增值、皮质期强化率、实质期 CT 值、实质期净增值、实质期强化率差异均有统计学意义（ $P < 0.05$ ），AUC 值分别依次为 0.834、0.871、0.900、0.707、0.678、0.762；截断值分别依次为：123.5 HU、71 HU、0.73、87.5 HU、54 HU、0.67。皮质期强化率诊断效能最高，AUC=0.900，敏感度为 0.842，特异度为 0.864。外部验证结果显示皮质期强化率诊断效能（AUC=0.867）优于皮质期 CT 值（AUC=0.735）、皮质期净增值（AUC=0.709），Z 值分别为 2.134（ $P=0.032$ ），2.417（ $P=0.016$ ）。CT 增强定量参数可用于预测 ccRCC WHO/ISUP 分级，皮质期强化率是诊断效能最高、泛化能力最佳的 CT 增强定量参数。

PU-0756

基于扩散加权成像预测宫颈癌淋巴结转移与 脉管间隙浸润影像组学分析

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摘要】目的 探索基于扩散加权成像的影像组学特征在预测宫颈癌淋巴结转移（LNM）与脉管间隙浸润（LVSI）的效能。方法 回顾性分析 2016 年 1 月至 2022 年 6 月间 103 例宫颈癌患者的临床资料、DWI 和 ADC 图像。利用影像组学构建 DWI 模型、ADC 模型和 ADC+DWI 联合模型。绘制受试者工作特征曲线（ROC），计算曲线下面积（AUC）、准确度、敏感度和特异度，分析评估模型对宫颈癌发生 LNM 和 LVSI 的预测效能，并采用 DeLong 检验比较不同模型 AUC 之间的差异。结果 三个模型在验证集中预测 LNM 的 AUC 分别为 0.762、0.860 和 0.896。DeLong 检验结果显示，DWI 模型的 AUC 低于 ADC 模型（ $Z=3.851$ ， $P=0.001$ ）和 ADC+DWI 联合模型（ $Z=4.338$ ， $P=0.001$ ），差异均具有统计学意义（ $P < 0.05$ ）。ADC 模型和 ADC+DWI 联合模型的 AUC 差异无统计学意义（ $Z=1.011$ ， $P=0.311$ ）。三个模型在验证集中预测 LVSI 的 AUC 分别为 0.826、0.845 和 0.878。DeLong 检验结果显示，DWI 模型的 AUC 低于 ADC 模型（ $Z=3.795$ ， $P=0.001$ ）和 ADC+DWI 联合模型（ $Z=3.700$ ， $P=0.001$ ），差异均具有统计学意义（ $P < 0.05$ ）。ADC 模型和 ADC+DWI 联合模型的 AUC 差异无统计学意义（ $Z=1.260$ ， $P=0.208$ ）。在训练集和验证集中，

ADC+DWI 联合模型的预测效能均优于单一的 DWI 模型和 ADC 模型。结论 基于 DWI+ADC 影像学联合模型能有效地预测宫颈癌 LNM 和 LVSI, 有助于临床的个体化评估, 优化治疗决策。

PU-0757

闭合性肾损伤的 CT 表现及 AAST 肾损伤分级在临床应用中的意义

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目的 探究闭合性肾损伤 CT 表现及 AAST 肾损伤分级在临床治疗中的价值。方法 回顾性分析在 2017 年 10 月至 2022 年 10 月我院收治的 80 例闭合性肾损伤患者的 CT 表现和临床资料, 并按 AAST 肾损伤进行分级。CT 表现主要包括肾损伤的部位、范围、程度, 肾周血肿及血管损伤、有无活动性出血、尿外漏, 是否合并其他脏器损伤; 并根据 AAST 分级标准进行肾损伤分级, I~III 级为低级别, IV~V 级为高级别。结果 闭合性肾损伤患者 I 级 34 例, II 级 10 例, III 级 16 例, IV 级 18 例, V 级 2 例。所有低级别 (100.0%) 和 8 例 (80.0%) 高级别肾损伤患者采用非手术治疗和介入治疗, 4 例 (20.0%) 高级别肾损伤患者采用手术治疗。最终 39 例 (97.6%) 患者病情好转出院。结论 闭合性肾损伤的 CT 表现及 ASST 分级具有较高的临床指导价值。

PU-0758

The Efficiency of Multiparameter MRI Radiomics Model in Predicting the Pathological Differentiation of Pancreatic Ductal Adenocarcinoma

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Purpose: To establish a multiparameter magnetic resonance imaging (MRI) radiomics model and evaluate its efficiency in predicting the pathological differentiation of pancreatic ductal adenocarcinoma (PDAC).

Methods: The preoperative clinical and MRI data of 96 patients with a postoperative pathological diagnosis of PDAC between September 2018 and May 2022 in our unit were retrospectively analyzed. The patients were categorized into a low-differentiation group (50 patients) and an intermediate-high differentiation group (46 cases) according to the degree of pathological differentiation. Conventional MRI findings such as tumor site, boundary, maximum cross-sectional-length diameter, enhancement mode, cystic change/necrosis, pancreaticobiliary dilatation, pancreatic atrophy, vascular involvement, lymph node enlargement, and the signal difference between the normal pancreas and tumor parenchyma were analyzed. Randomly stratified sampling was used to divide the group into training and testing groups at a ratio of 7:3. ITK-SNAP and A.K. softwares were applied to two-dimensional segmentation, feature extraction, and screening of tumors in three sequences of fat-suppressed T1WI, fat-suppressed T2WI, and dynamically enhanced T1WI (DCE-T1WI arterial phase, parenchymal phase, and venous phase images), respectively. Logistic regression was used to construct a radiomics model and a combined model using clinical data and conventional MRI findings. The area under the curve (AUC) of the receiver operating characteristic (ROC) curve of the participants was used to evaluate the prediction efficiency of the model, which was verified in the test group.

Results: The difference in signal between the normal pancreas and tumor tissue in the parenchymal phase was statistically different between the low- and intermediate-high differentiated groups ($P < 0.05$), while other conventional MRI findings and clinical information were not statistically different between the two groups ($P > 0.05$). Fifteen radiomics features were screened based on each sequence to establish the radiomics model, including one feature in fat-suppressed T1WI, nine features in fat-suppressed T2WI, and five features in DCE-T1WI. The AUC values of the radiomics model and the combined model were 0.83, 0.96 and 0.82, 0.90 in the training and test groups, respectively. The accuracy, sensitivity, and specificity of the combined model were higher than those of the radiomics model.

Conclusion: The multiparametric MRI radiomics model was effective in predicting the degree of pathological differentiation of PDAC, and the combined model had better predictive efficacy.

PU-0759

肝内胆管癌的影像学及分子病理学进展

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肝内胆管癌是第二大原发性肝癌，发病率和死亡率呈上升趋势，手术切除为首选，但其早期症状隐匿常使患者错失手术时机，因此早期诊断尤为重要。肝内胆管癌依据生长模式可分为肿块形成型（最常见）、管周浸润型、管内生长型，根据肿瘤解剖结构起源分为两种亚型：大胆管型和小胆管型亚型，两者伴有免疫组化和分子变异的差异。基因组学、转录组学、蛋白组学、免疫组学结合影像特征等多组学的发展使得肝内胆管癌的亚型分类更多元化。肝内胆管癌的生物标志物的发掘也有所进展，除了血清学标志物，还有尿液标志物，有利于其早期诊断与预后预测。影像诊断中的 CT 和 MRI 是诊断肝内胆管癌的主力军，识别其经典和不典型的影像有助于提高对其的整体认识。肝内胆管癌的强化模式反映了组织学特点，与慢性肝病、肝硬化背景相关，并对预后有重要预测价值，且强化模式有助于从影像上鉴别大胆管型、小胆管型肝内胆管癌。CT 或 MRI 特征及影像组学对于肝内胆管癌的微血管侵犯情况和淋巴结转移的预测模型效能较高且稳定。利用影像对于全身性治疗、介入治疗、放疗和化疗等进行疗效预测，为不可手术的晚期患者提供另外有效的治疗选择。结合影像特征或影像组学亦能预测肝内胆管癌的预后。本文从肝内胆管癌的病理学、亚型分类、生物学标志物，再到影像诊断及微血管侵犯、淋巴结转移、疗效和预后的预测进行了较为详细的阐述。

PU-0760

Combined multi-organ radiomics and clinical model for predicting esophagogastric variceal bleeding in cirrhosis

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Abstract

Rationale and Objectives: To develop a model based on clinical and radiomic characteristics to predict the risk of first-instance secondary esophagogastric variceal bleeding (EVB) in cirrhotic patients.

Materials and Methods: 208 patients with cirrhosis were retrospectively evaluated in this study, and they were randomly split into a training ($n = 145$) cohort and a validation ($n = 63$) cohort. Three areas were chosen as regions of interest (ROI): the whole liver, whole spleen, and lower esophagus-gastric fundus. In the training cohort, radiomic score (Rad-score) was created by

screening radiomic features using the least absolute shrinkage and selection operator method. Independent clinical risk factors selected using multivariate logistic regression analyses. The radiomics characteristics and independent clinical risk variables were combined to create the radiomics-clinical model (RC model). The established models were validated using the validation cohort.

Results: Ascites, portal vein thrombosis, and plasma prothrombin time were identified as independent clinical risk factors. The AUC values for the RC model, Rad-score (liver + spleen + esophagus), Rad-score (liver), Rad-score (spleen), Rad-score (esophagus), and clinical model in the training cohort were, respectively, 0.951, 0.930, 0.801, 0.831, 0.864, and 0.727. AUC values in the validation cohort were 0.930, 0.886, 0.763, 0.792, 0.857, and 0.692, respectively. The RC model yielded the best predictive performance and better discrimination, calibration, and clinical utility than the single Rad-score and clinical model. In addition, the RC model accurately predicted patient risk.

Conclusion: In patients with cirrhosis, the RC model can be used to non-invasively forecast the probability of the first secondary EVB.

PU-0761

ASL、APT 联合 PSA 在诊断前列腺良恶性病变中的价值

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摘要: 目的 探讨动脉自旋标记技术(ASL)、酰胺质子转移成像(APT)联合血清前列腺特异抗原(PSA)诊断前列腺良恶性病变方面的价值。方法 采用 3.0T 磁共振对符合纳入标准的前列腺癌患者 30 例及前列腺良性病变患者 36 例共 66 例患者行常规 MRI、ASL 及 APT 检查, 并获得其 PSA 数据。由两位经验丰富的放射科医师在常规上观察前列腺的形态、病变位置、信号及肿瘤侵犯范围; 然后在 ASL 图像上测量病灶的灌注改变以及在 APT 图像上测量病灶的非对称性磁化转移率(MTR_{asym})。结果 2 名放射诊断医生获得良好的一致性。在 T2WI 诊断标准上, 前列腺癌组患者平均评分为(4.51±1.32)分, 前列腺良性病变组患者平均评分为(2.86±0.79)分, 两者间差异有统计学意义(P<0.05)。ASL 检查前列腺癌组患者病灶的平均灌注值为(141.80±3.29)ml/(100g·min)、非肿瘤区的平均灌注值为(90.19±2.19)ml/(100g·min), 两者有显著性差异(P<0.05), 前列腺癌组病灶灌注明显增高; 前列腺良性病变组的平均灌注值为(105.79±1.74)ml/(100g·min), 与前列腺癌组患者病灶有统计学差异(P<0.05), 良性病变组的灌注较前列腺癌组病灶低。APT 检查前列腺癌组患者病灶 MTR_{asym} 值明显升高, 为(5.38±0.69), 良性病变患者病灶 MTR_{asym} 值为(3.59±0.47), 二者间比值有显著差异(P<0.05)。PSA 数据显示前列腺癌组的 PSA 范围是 9.7~1125.7ng/ml, 良性病变组的 PSA 范围为 1.3~99.2ng/ml。ASL、APT 联合 PSA 明显提高了鉴别诊断前列腺癌和前列腺良性病变的敏感性、特异性和准确性, 分别达到 94.8%, 86.3%, 89.5%。结论 ASL、APT 联合 PSA 明显提高了鉴别诊断前列腺癌和前列腺良性病变的准确率。

PU-0762

高血压患者肾脏表面结节形成的影响因素探究

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目的: 探讨高血压患者肾脏表面结节(Renal surface nodularity, RSN)形成的潜在影响因素。方法: 回顾性分析 2012 年 1 月至 2021 年 10 月期间苏州大学附属第三医院因高血压住院于心内科且接受肾动脉 CT 血管成像的患者。将双侧肾脏均有 RSN 的患者纳入 RSN 组, 再通过性别和年龄从剩余

的患者中进行 1:1 匹配得到对照组。收集临床资料、肾功能相关的实验室和影像学指标。组间比较采用 t 检验、卡方或 Fisher 检验; 多因素二元 logistic 回归分析 RSN 形成的潜在影响因素。结果: RSN 组和对对照组各纳入 43 例。RSN 组的估计肾小球滤过率较对照组明显减低($P<0.001$)。高血压分级、高脂血症和蛋白尿阳性比例分别与肾脏表面结节存在关联性($P<0.2$)。体质量指数、糖尿病、肾结石与肾脏表面结节无关联性($P>0.2$)。多因素回归分析发现: 仅高血压分级增高($P=0.042$)、高脂血症($P=0.008$)和估计肾小球滤过率减低($P=0.001$)与肾表面结节的发生存在关联性。结论: 肾脏表面结节的发生与高血压分级增高、高脂血症和肾小球滤过率减低有关。

PU-0763

CT 影像组学预测结肠癌淋巴血管间隙浸润价值研究

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目的 构建预测结肠癌淋巴血管间隙浸润 (LVSI) 的临床影像模型、影像组学模型 (radscore) 和两者联合模型, 并筛选出最优模型。方法 连续搜集我院接受增强 CT 检查的 365 例结肠癌患者资料, 根据手术病理结果分为 LVSI+ ($n=84$) 及 LVSI- ($n=281$), 样本按 7:3 随机分为训练集 ($n=256$) 和验证集 ($n=109$)。比较临床、影像指标组间差异并建立临床影像模型; 对静脉期 CT 图像上全肿瘤区域进行感兴趣区 (ROI) 勾画并提取影像组学特征, 经降维、筛选后共获得 16 个最优特征并建立 radscore; 再构建联合模型。比较各模型效能, 绘制最优模型列线图, 并评估其性能。结果 LVSI+ 及 LVSI- 组间淋巴结长径、CEA、CA199、肿瘤部位差异均有统计学意义 ($P<0.05$)。临床影像模型、radscore 及联合模型 AUC 分别为 0.726、0.784 及 0.851 (训练集); 0.729、0.768、0.833 (验证集)。联合模型 AUC 均大于临床影像模型 ($P<0.05$)。列线图校准度较高, 决策曲线范围: 0.15~0.98 时临床有获益。结论 基于临床影像指标及 CT 影像组学构建的列线图预测结肠癌患者 LVSI 的价值较高。

PU-0764

基于 CT 影像组学的机器学习预测直肠癌影像阴性淋巴结转移

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【摘要】目的: 探讨基于 CT 影像组学结合不同机器学习算法构建的预测模型在鉴别直肠癌淋巴结影像阴性患者淋巴结转移的价值。方法: 回顾性收集我院 360 例经病理证实为直肠癌且 CT 淋巴结阴性患者的全部资料, 按照 7:3 随机分训练组 ($n=251$) 及验证组 ($n=109$)。使用 MaZda 软件在瘤体的增强 CT 静脉期图像提取影像组学特征; 采用最小绝对收缩和选择算子 (LASSO) 算法对组学特征进行降维; 采用单因素及多因素 logistic 回归分析筛选独立影响因素; 构建支持向量机 (SVM)、K-邻近 (K-NN)、极限梯度提升 (XGBoost) 3 种机器学习算法预测模型; 使用受试者工作特征 (ROC) 曲线及决策曲线 (DCA) 分别评价 3 种机器学习模型的诊断效能及临床净收益。结果: LASSO 回归筛选出 5 个最优组学特征。单因素及多因素回归分析发现浆膜面毛糙、Perc.01、X_Area_S.5.5、Teta1、Teta2 为独立影响因素。SVM、K-NN、XGBoost 的 AUC 在训练组为 0.888、0.912、0.982, 验证组 AUC 为 0.909、0.884、0.894; 其中 SVM 在验证组表现最突出, DCA 显示 SVM 具有较高的临床适应性。结论: CT 影像组学结合不同机器学习算法对预测直肠癌淋巴结影像阴性患者淋巴结转移具有较高的应用价值。

PU-0765

Computerized quantitative analysis for prognostic prediction and molecular phenotyping of high-grade serous ovarian cancer

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Purpose: To assess the power of a cross-modal integrative framework based on radiological and histopathological image features and clinical data for predicting overall survival in patients with high-grade serous ovarian cancer (HGSOC) and to identify potential molecular mechanisms underlying survival-associated traits.

Methods: The least absolute shrinkage and selection operator (LASSO) Cox regression was performed to establish radiological and histopathological models using computed tomography images and histopathological images, respectively. Subsequently, LASSO-Cox risk indices were generated. The concordance index and Kaplan-Meier analysis were used to estimate model performance. A nomogram combining radiological and histopathological risk indices and clinical data was developed. Further, weighted gene co-expression network analysis and functional enrichment analysis were performed for survival-associated traits.

Results: A total of 62 patients with HGSOC were included in this study. The concordance indices of the radiological and histopathological models in the verification set were 0.865 (95% confidence interval [CI]: 0.669-0.989) and 0.866 (95% CI: 0.691-0.981), respectively. For integrative model, the concordance indices of training set and the verification set were 0.925(95% CI: 0.869-0.980) and 0.874(95% CI: 0.684-0.986), respectively. The Kaplan-Meier curve showed a significant difference ($p < 0.05$) between high- and low-risk patients with HGSOC. A practicable integrative nomogram was built based on previous model parameters (radiological and histopathological risk indices) and clinical data. Male sex differentiation, neuroactive ligand-receptor interaction, negative gene expression regulation, epigenetic mechanisms, and systemic lupus erythematosus were identified as significant potential molecular mechanisms related to survival-associated traits.

Conclusions: The cross-modal integrative framework could reliably predict the prognosis of HGSOC. The potential underlying molecular mechanisms may provide new insights for future HGSOC research.

PU-0766

儿童肝脏上皮样血管内皮瘤 1 例

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肝脏上皮样血管内皮瘤 (Hepatic epithelioid haemangio-endothelioma, HEHE) 是一种极其罕见的多灶性内皮源性血管肿瘤, 该肿瘤病因不明, 在多数情况下偶然发现。常见于成年人, 在儿童中非常罕见。本研究报道一例发生于 9 岁儿童的肝脏上皮样血管内皮瘤并双肺多发转移。

PU-0767

不同勃起状态对阴茎动脉 CT 血管图像质量的影响

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目的：探讨患者注射前列地尔后不同勃起状态对阴茎动脉 CT 图像质量的影响。

方法：选取在我院行活性药物海绵体多普勒超声检查考虑动脉性阴茎勃起功能障碍 (ED) 患者 40 例，随机分为两组，每组 20 人。实验组 CT 采集时间为注药后 30 分钟，海绵体硬度均为 I 级，对照组采集时间为注药后 20 分钟，海绵体硬度为 II 级，分别比较两组双侧阴茎背动脉及阴茎海绵体动脉各支的显影比例和未显影比例；结果以彩色多普勒超声为金标准进行检验，比较两种勃起状态在 CTA 诊断阴茎各动脉狭窄的诊断效能、一致性及是否存在狭窄诊断的受试者特征曲线 (ROC)。结果：对照组患者阴茎动脉 CTA 血管图像显影质量均显著低于实验组 ($P < 0.05$)，实验组 ($Kappa = 0.862$) 动脉狭窄诊断效能及与金标准的一致性高于对照组 ($Kappa = 0.699$)。在是否存在狭窄的诊断判断中，实验组曲线下面积 (AUC) 为 0.916，而对照组为 0.778。

结论：阴茎海绵体注射前列地尔后 30 分钟进行阴茎动脉 CT 血管成像图像质量更优，极大提高诊断效能，对动脉性 ED 的影像学诊断有重要的临床价值，值得在临床中推广使用。

PU-0768

磁共振多模态序列结合临床指标对复杂性肛瘘术后肛门排粪失禁复发预测研究

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目的：通过对磁共振指标与临床指标结合分析，建立复杂性肛瘘术后肛门排粪失禁复发预测模型，并对模型进行验证。

方法：回顾性分析 2020 年 1 月至 2023 年 5 月我院肛肠科收治的 71 例复杂性肛瘘患者资料。统计术后三个月肛门失禁症状并发症情况，结合患者多模态 MRI 数据指标及临床指标、手术方式等变量进行单 logistic 回归分析。

结果：71 例患者中，最终共纳入 71 人，其中男性 65 人，年龄 21 至 63 岁，平均年龄 39.23 ± 10.71 岁，经括约肌型 46 例，括约肌上型 25 例。logistic 回归分析结果显示，MRI 肛瘘分型、MRI 病变直径、肛门外括约肌 (External Anal Sphincter, EAS) 萎缩分级、EAS 厚度、年龄是复杂性肛瘘术后并发肛门失禁的独立危险因素 ($P < 0.05$)。依此进行筛选构建的预测模型并绘制受试者工作特征 (Receiver Operating Characteristic, ROC) 曲线，曲线下面积 (Area Under The Curve, AUC) 为 0.940 ($P < 0.001$)，模型预测质量评分 0.87 分，该模型有极高的预测效能。结论：MRI 多模态成像指标结合临床风险因素建立的预测模型准确度良好，可以在治疗前方案的制订提供良好的影像学证据与参考。

PU-0769

Application of spectral CT in diagnosis, classification and prognostic monitoring of gastrointestinal cancers: progress, limitations, and prospects

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Gastrointestinal (GI) cancer is the leading cause of cancer-related mortality worldwide. Computed tomography (CT) imaging is widely used for the diagnosis, staging, and prognostic evaluation of GI cancer. Spectral CT represents a significant advancement over traditional CT by providing not only conventional anatomical images but also spectral-related multi-parameter imaging such as spectral curves, mono-energetic images at different keV levels, material separation and quantitative analysis, effective atomic number images, and virtual non-contrast images. The integration of these multi-parameter imaging techniques offered by spectral CT can optimize the quality of GI cancer imaging, enhance the ability to differentiate between different types of cancers and reduce radiation exposure in patients. To explore the application of spectral CT in GI cancer including esophageal cancer, gastric cancer, colorectal cancer, liver cancer, and pancreatic cancer comprehensively; we systematically reviewed the relevant literatures focusing on research progress made so far and discussed the current limitations and future prospects. Our findings indicate that among these studies iodine-based material quantitative analysis and mono-energetic imaging were the most commonly employed applications of spectral CT in GI cancers. However due to variations in cavity structure among different types of gastrointestinal cancers as well as differences in multi-parameter data obtained from various manufacturers's spectral CT systems; there remains a need for more comprehensive investigations through prospective studies to further explore its potential benefits. The emergence of photon-counting CT technology, rapid advancements in artificial intelligence algorithms, the discovery of molecular imaging probes, and integration with multimodal imaging techniques provide promising prospects for the future application of spectral CT in investigating GI cancer.

PU-0770

高原久居者罹患急性阑尾炎的临床及 CT 影像特征分析

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[摘要]目的：探讨高原久居者罹患急性阑尾炎的临床特点及 CT 影像表现。方法：回顾性分析我院野战医疗所 2022 年 2 月~2023 年 8 月经手术证实的 56 例急性阑尾炎患者的临床及影像学资料。结果：①56 例急性阑尾炎中，阑尾位置：盲肠后位 16 例（28.5%）、低位（盆位）10 例（17.8%）、盲肠下位 9 例（16%）、高位（肝下位）9 例（16%）、回肠后位 6 例（10.7%）、回肠前位 4 例（7.1%）、盲肠外侧位 2 例（3.5%）。②CT 直接表现：阑尾增粗（直径>6mm）49 例（87.5%）；阑尾管壁增厚（直径>2mm）42 例（75%）；阑尾管腔扩张、积液 29 例（51.7%），阑尾粪石 27 例（48.2%）；阑尾腔内积气 16 例（28.5%）；阑尾无法辨出 3 例（5.3%）。CT 间接表现：阑尾周围渗出并条索影 32 例（57.1%），阑尾蜂窝织炎合并周围脓肿 9 例（16%），腹膜炎、腹水 13 例（23.2%），回盲部肠壁增厚 22 例（39.2%），肠系膜淋巴结增大 16 例（28.5%），回盲部反射性小肠淤张 19 例（33.9%）。结论：多层螺旋 CT 对急性阑尾炎诊断有直观清晰、安全性高、分辨率高、操作简单等特点，能够提高为患者服务效率，可以避免患者辗转诊治，贻误病情，为临床医生诊断提供可靠依据，具有应用、推广价值。

PU-0771

肾上腺区异位副脾：病例报道及临床影像特征回顾

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目的：副脾是指在正常脾脏以外存在的与正常脾脏结构相似，功能相同的组织，是一种先天性异位脾组织，发生率 10%~35%，一般直径在 1.0~4.0 cm。副脾最常位于脾门或邻近胰尾处（约 80%），少许副脾可位于输尿管、卵巢、盆腔内，甚至发生在胸腔、胰腺及阴囊，而肾上腺区副脾较为少见。发生原因是由于背侧胃系膜内胚胎脾芽的某部分融合失败，或者部分脾组织脱离脾脏独立发育而生成，本文通过回顾性分析因左肾上腺肿物就诊的一例患者，对肾上腺区异位副脾这一疾病进行分析以加深认识。

方法：回顾性分析本院 2023 年诊断的一例左肾上腺区异位副脾患者的临床表现、影像学特点，讨论其病理机制，治疗及预后情况，并结合相关文献进行分析。

结果：患者，男，66 岁，10 天前体检行腹部彩超提示：左侧肾上腺肿物，后行腹部 CT 提示：左侧肾上腺肿物大小约 6.6cm×5.7cm，无腰痛，腹痛，发热，恶心，呕吐，未予治疗，实验室检查：血常规、血生化、凝血功能无异常，现患者求进一步治疗，就诊于我院，门诊以“肾上腺肿瘤”收住入院。影像 MRI 表现为：左侧肾上腺区可见类圆形等 T1 等长 T2 信号影，DWI 扫描示高信号，ADC 图示稍低信号，同反相位未见明显信号减低，增强扫描动脉期明显不均匀强化，静脉期及延迟期强化程度稍减低。

结论：通过询问患者病史得知，患者 30 年前做过脾脏切除术，术后通过回顾性分析发现肾上腺区副脾在形态上均呈现出现较为光滑的类圆形，同时在增强效应上，与脾脏增强曲线相同。副脾可以发生于人体的不同部位，在诊断时要注意与其他部位肿瘤鉴别。本例副脾发生在腹膜后左肾上腺区，并且具有高血压等典型临床表现，误诊为左侧肾上腺腺瘤。术前完善血尿生化、超声检查，MRI 检查，结合临床表现及患者病史，并熟悉可能出现的少见解剖部位，可以帮助诊断，减少误诊率。

PU-0772

多期融合成像在肾肿瘤保留肾单位手术中的应用价值

杨雅迪、耿纪刚、李笑石、郭江、李子洲、秦越
西安大兴医院

目的：探讨多期融合成像技术（Multiphase Fusion Imaging Technology, MFIT）在肾肿瘤保留肾单位手术中的临床应用价值。

方法：回顾性收集 2021 年月至 2023 年 5 月期间在我院行保留肾单位手术（Nephron Sparing Surgery, NSS）的患者 60 例。所有患者术前均进行三期相增强 CT 扫描，扫描参数一致，采用 120kV 管电压，自动毫安调节技术，调节范围 120-650mA，重建算法 AIDR 3D 技术，重建层厚 0.5 mm，层间距 0.3 mm。对比剂浓度 350mg I/ml 用量 1.2-1.5X 体重。扫描结束后将三期 1.0mm 薄层原始图像传送至后处理工作站（Vital, Canon Medical, Japan），使用 Aorta 和 Generic 探针技术进行肿瘤组织、肾动静脉、肾盂肾盏及周围实质脏器的分割与提取，观察周围组织及血管是否存在变异，并评价多期融合成像对肾肿瘤的大小、位置多方位显示效果及其与周围组织的关系。

结果：60 例患者中，行肾切除术 38 例、部分肾切除术 9 例、自体肾移植术 6 例，多期融合影像提示肾动脉变异 28 例，包括：副肾动脉 19 例，肾动脉过早分支 6 例，肾门前动脉分支 3 例；肾静脉变异 15 例，包括：主动脉后左肾静脉 8 例，其中受压引起睾丸静脉曲张 3 例，双肾静脉 4 例，右肾静脉汇合过晚 3 例，术前所测肿瘤最大直径平均为 (2.87 ± 1.54) cm，术后病例样本测量平均最大直径 (2.98 ± 1.38) cm，两者相比无统计学差异（ $P > 0.05$ ）所有患者保留肾单位手术均顺利完成。

结论: MFIT 技术可清晰显示肾动脉和肾静脉变异及狭窄程度, 直观显示肾肿瘤的大小、位置以及与周围组织血管的毗邻关系, 有助于腹腔镜下肾肿瘤保留肾单位手术的前期规划及入路选择。

PU-0773

光谱 CT 单能量联合 O-MAR 技术去椎体内金属物伪影

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目的: 评估光谱 CT 虚拟单能量图像 (virtual monoenergetic image, VMI) 联合去金属伪影算法 (orthopedic metal artifact reduction algorithm, O-MAR) 对于去除椎体内金属植入物伪影的价值。

方法: 纳入 32 例检查椎体内有金属植入物并行光谱 CT 检查的患者。重建传统滤波图像 (conventional image, CI)、O-MAR 图像、VMI 和 VMI+O-MAR (120~200 keV, 每隔 10 keV 为一组, 共 9 组)。在每组图像高密度、低密度伪影区和脂肪组织内勾画感兴趣区, 测量 CT 值、标准差 (standard deviation, SD), 计算信噪比 (signal to noise ratio, SNR) 和伪影指数 (artifact index, AI), 计算出 Δ CT 值、伪影指数 (artifact index, AI)、伪影移除率 (hardening artifact removal rate, BAR), 比较各参数在不同图像上的差异。

结果: 与传统图像相比, O-MAR、120~200 keV VMI 和 VMI+O-MAR 随能级的升高, AI 降低 ($P < 0.05$); 相同能级下, 两种伪影区内 VMI+O-MAR 的 AI 均低于 VMI ($P < 0.05$)。各能级 VMI 及 VMI + MAR 图像 BAR 随能量级增加而增加, 且 120 ~ 200 keV VMI + MAR 的 BAR 高于 120 ~ 200 keV VMI 图像, 而其中 170 keV 的 VMI+O-MAR 算法重建图像去除伪影效果最佳。

结论: 光谱 CT VMI+O-MAR 可有效减轻椎体内金属植入物伪影。

PU-0774

含脂性异位胰腺误诊 1 例影像报告及文献复习

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目的: 探讨含脂异位胰腺的影像诊断, 提高对该疾病的认识以减少误诊。

方法: 回顾性分析 1 例经病理证实的含脂异位胰腺的影像表现, 结合文献分析其组织病理分型与影像表现的关系。

结果: 病人因“腹痛伴解血便半月余, 发现胃体占位 1 周”入院, 完善上腹部 CT 平扫及增强后提示: 患者胃腔充盈良好, 胃窦大弯侧壁内见不规则混杂密度影, 形态欠规整, 呈分叶状, 突向腔内生长, 大小约 2.3×2.7cm, 实性成分平扫 CT 值约 47HU, 增强扫描实性成分明显强化, 动脉期 CT 值约 92HU, 门脉期 CT 值约 138HU, 延迟期 CT 值约 112HU, 其内见无强化脂肪密度灶, 病灶表面可见一溃疡形成, 邻近浆膜面完整。影像诊断为: 胃窦体大弯侧胃壁间不规则混杂密度占位, 倾向良性病变 (胚胎来源? 血管源性?): 1) 畸胎瘤; 2) 血管平滑肌脂肪瘤; 3) 其它; 请结合临床及内镜检查。丙泊酚静脉注射后气管插管无痛状态下行内镜下粘膜下剥离术 ESD+电凝止血术+胃管置入术, 术后病理提示胃体黏膜下层见胰导、胰腺小叶及小叶间导管, 切片周缘见成熟脂肪细胞, 肿物考虑为异位胰腺。

结论: 异位胰腺是一种少见的先天畸形疾病, 是发生于正常胰腺之外的孤立胰腺组织。虽然异位胰腺与正常胰腺组织无任何解剖学联系, 但发生于胰腺的每一种病理变化, 都可发生于对应的异位胰腺。由于肥胖、衰老、糖尿病、慢性胰腺炎、酒精性肝病以及肿瘤等原因可能导致胰腺腺泡实质部分或几乎完全被脂肪细胞代替, 故而, 目前虽然没有明确报道表明异位胰腺中有明显的脂肪浸润或大量脂肪替代, 但在胰腺中观察到的病理结果也可发生在对应的异位胰腺中, 故而理论上, 异位胰

腺实质内可含有一定比例的脂肪。因此,影像诊断医师应提高对这一影像表现的认识,以减少该疾病的误诊。

PU-0775

膀胱直肠陷窝钙化性纤维性肿瘤一例报告并文献复习

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目的 本院一例钙化性纤维性肿瘤 (Calcifying Fibrous Tumor, CFT) 病例报道及影像表现学习。
方法 回顾性分析一例经组织病理学确诊的 CFT 基本资料及影像表现;患者为 75 岁男性,有美尼尔氏综合征。结果 患者于入院 20 余天前行走时晕倒在地,后出现反复腹部胀痛、以下腹部为主,肛门有间断解稀便及排气,阵性感畏寒、恶心,2 天来感腹痛加重,并肛门停止排气,不能忍受来院。D-二聚体升高,单核细胞计数及百分比、中性粒细胞计数百分比升高,糖类抗原 19-9 升高。全腹部 CT 增强示:小肠积气积液扩张,考虑肠梗阻;膀胱直肠陷窝偏右侧见一类圆形孤立团块影,长径约 4.2cm,形态规则,边缘光滑,其内密度不均匀、中央见结节状更高密度影,CT 值约 203HU-1604HU,病灶与周围肠管分界不清;增强扫描未见明显强化。下腹部 MRI 增强示:膀胱直肠陷窝右侧见一团块状等 T1 短 T2 信号影,见包膜,中央见结节状更低信号,弥散不受限,周围肠管呈受压改变;增强扫描边缘见环形强化,余成分未见明显强化。术后病理考虑钙化性纤维性肿瘤。结论 CFTs 是一种良性病变,但有时也会出现急性的临床表现,如本病例出现肠梗阻。CFTs 的影像表现有一定特征,当我们在临床看到较为典型的影像表现时,再结合患者年龄、性别要考虑到该诊断,将有助于防止外科医生过度手术,减少患者不必要的创伤。

PU-0776

关于双能量 CT 对胰腺癌影像诊断的研究

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目的:探讨双能量 CT 对胰腺癌影像诊断的价值。
方法:回顾性分析我院收治并确诊的胰腺癌患者,收集患者所进行的 CT 双能扫描四期图像,经后处理得到单能谱 60keV 图像,单能谱 80keV 图像,单能谱 100keV 图像,单能谱 120keV 图像,线性融合图像,非线性融合图像及碘图图像。测量并计算上述图像胰腺肿瘤 CT 差值,胰腺实质强化比值,及胰腺实质与肿瘤对比噪声值,从而得到上述后处理图像对胰腺癌的诊断价值。
结论:双源 CT 在双能模式扫描下经过后处理的图像能够进一步提高对胰腺癌诊断的敏感性。

PU-0777

2 型糖尿病患者肾周脂肪 CT 特征预测糖尿病肾病风险分层和快速进展的价值

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目的:探讨 2 型糖尿病 (T2DM) 患者肾周脂肪 (PAT) CT 特征在预测糖尿病肾病 (DKD) 风险分层和快速进展中的价值,并与其他腹部脂肪库比较。

方法：回顾性纳入 2018 年 9 月至 2021 年 12 月就诊的 T2DM 患者，根据肾脏疾病：改善全球预后（KDIGO）2020 临床实践指南分为低、中、高风险及极高风险人群。采用 Slice-O-Matic 5.0 软件测量肾周脂肪（PAT）、内脏脂肪、皮下脂肪、肌间脂肪的面积和 CT 衰减值。采用 logistic 回归分析评估高、极高风险 DKD 的危险因素，采用 COX 回归筛选 DKD 快速进展的预测因子，采用 Kaplan-Meier 生存分析评估 DKD 快速进展的累积发生率。

结果：404 名 T2DM 患者（平均年龄 60.51 ± 11.12 岁，男 240 例）纳入研究并分为低风险（ $n=165$ ）、中风险（ $n=96$ ）、高风险（ $n=47$ ）、极高风险（ $n=96$ ）组。logistic 回归分析显示 PAT 面积指数（ $P<0.001$ ）、PAT CT 衰减值（ $P=0.023$ ）、收缩压（ $P<0.001$ ）、糖尿病病程（ $P=0.014$ ）、血红蛋白（ $P<0.001$ ）是高及极高风险分层 DKD 的危险因素。125 名有肾功能随访数据的 T2DM 患者（平均年龄 62.72 ± 9.92 岁，男 72 例）分为 DKD 快速进展（ $n=56$ ）和非快速进展组（ $n=69$ ）。多因素 COX 回归分析显示 PAT CT 衰减值（HR 1.09; 95%CI 1.01,1.17; $P=0.021$ ）及血红蛋白（HR 0.98; 95%CI 0.97,1.00; $P=0.031$ ）是 DKD 快速进展的独立预测因子。Kaplan-Meier 曲线显示，PAT CT 衰减值较高的患者 DKD 快速进展累积发生率更高（ $P=0.027$ ）。

结论：PAT CT 衰减值和 PAT 面积指数较高的 T2DM 患者患高风险分层 DKD 的风险增加，基线 PAT CT 衰减值可能作为 DKD 预后的潜在影像标记。

PU-0778

回顾性学习发生在腹腔内罕见滑膜肉瘤影像 CT 表现

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讨论分析发生在腹膜后罕见滑膜肉瘤在 CT 影像的表现。回顾性分析再学习一例经手术病理证实的腹腔内滑膜肉瘤患者的影像学 CT 资料及相关临床资料，女性患者 29 岁 检查为术前腹部多期 CT 增强检查

PU-0779

能谱分析输尿管结石致肾绞痛急性发作患者合并脂肪肝 CT 特征性分析

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背景与目的 脂脂肪肝是我国第二常见的慢性肝脏疾病，与长期饮酒、血脂异常等有关，按病因分为酒精性脂肪肝（Alcoholic fatty liver disease,AFLD）与非酒精性脂肪肝（nonalcoholic fatty liver disease,NFLD）。随着我国人民生活水平的提高和饮食结构的变化，NFLD 的发病率在逐年提高。NFLD 可以伴随许多其它疾病,例如血糖紊乱、血脂紊乱、高血压、动脉粥样硬化、高尿酸等疾病。本文旨在探讨 CT 能谱分析输尿管结石成分致肾绞痛急性发作患者合并脂肪肝 CT 诊断及预后中的应用价值。方法 回顾性分析 500 例输尿管结石致肾绞痛急性发作患者，能谱分析输尿管结石成分、与脂肪肝 CT 特征性分析。输尿管结石成分、发生部位及尿路梗阻征象与肝/脾 CT 比值之间的相关性,并比较患者治疗前后血清甘油三酯水平的变化。结果 457 例输尿管结石致肾绞痛急性发作患者，同时伴有不同程度脂肪肝,结石成分与梗阻程度关系，其中结石成分为草酸钙比例最高，与梗阻程度、炎性改变程度最重，输尿管腹盆段结石所致尿路梗阻程度越重，肾周及输尿管周围渗出越重，脂肪肝越严重,经输尿管结石碎石术及取石术后，尿路梗阻减轻、消失，多数肾绞痛病情减轻，脂肪肝出现好转,主要表现为肾绞痛消失，肾周、输尿管周围渗出减轻，肝脏密度较治疗前回升,治疗前后比较差异有统计学意义（ $P<0.05$ ），治疗前后甘油三酯水平比较差异有统计学意义

($P<0.05$)。结论 CT 检查既可以明确输尿管结石致肾绞痛急性发作患者病变范围,能谱分析结石成分,与结石成分与梗阻程度关系,还可以对是否合并脂肪肝及脂肪肝的严重程度做出明确判断,治疗后复查 CT,输尿管结石碎石术及取石术后,尿路梗阻减轻、消失,脂肪肝出现逆转,提示 CT 对输尿管结石合并脂肪肝的诊断、治疗及预后均有重要的意义。

PU-0780

Progress of CT quantitative muscle characterization in staging and prognosis of colorectal cancer

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Colorectal carcinoma (CRC) is one of the most common cancers of the gastrointestinal tract and is the second leading cause of cancer-related deaths worldwide. Recent studies suggest that muscle characteristics (e.g., sarcopenia and myosteatosis) in patients with CRC are associated with poor tumor staging, poor prognosis, and decreased survival. Computed tomography (CT) scans provide accurate, high-quality information about muscle composition and are ideal for assessing quantitative muscle characteristics such as skeletal muscle index (SMI), psoas muscle index (PMI), skeletal muscle radiodensity (SMD), and intermuscular adipose tissue (IMAT). Currently, the assessment of muscle characteristics in patients with CRC is influenced by a variety of factors. Evaluation methods show significant variability in different studies, and diagnostic criteria have not been standardized. Existing studies have generally confirmed that CRC patients with muscle characteristics such as low SMI, low PMI, low SMD and high IMAT have a high risk of chemotherapy, more postoperative complications and poor long-term prognosis. There are fewer studies on SMD and IMAT and chemotherapy risk, and their specific mechanisms need to be further explored. Therefore, in the future, we should pay more attention to the assessment of muscle characteristics of CRC patients, thoroughly study the mechanism of their occurrence and unify the diagnostic criteria, identify them at an early stage and formulate personalized treatment plans according to the muscle characteristics of the patients, with a view to reducing the toxicity of chemotherapy and the incidence of postoperative complications, and improving the long-term prognosis of the patients.

PU-0781

能谱 ct 单能量成像技术在肝硬化 TIPS 术后门静脉成像的应用分析

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目的: 探讨能谱 ct 单能量成像技术在肝硬化门静脉高压 TIPS 术后门静脉成像的应用价值。方法: 选取重庆医科大学附属永川医院 2023 年 3 月至 2023 年 7 月收治的肝硬化患者 60 例,所有患者入院后均接受 TIPS 治疗,并在治疗后 1 个月使用联影天河 320CT 进行门静脉成像能谱扫描。检查结束后,采用门静脉期的能谱 CT 数据在后处理工作站重建出 40~100 keV (间隔 10 keV) 的单能级图像。在门静脉期虚拟单能谱图像上,获得各个支架腔内的伪影指数、噪声及对比噪声比(CNR)。结果: 60keV 单能谱图像具有最低噪声及最高 CNR,支架腔内伪影指数最低 ($p\leq 0.05$)。结论: 基于能谱 CT 重建的单能级图像能有效减少 TIPS 术后支架腔内伪影,并提升图像质量,其中 60keV 单能级图像为最佳的单能级图像。

PU-0782

巨大胃底海绵状血管瘤合并肝脏多发血管瘤的 CT 和 MRI 影像表现 1 例

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胃血管瘤是一种罕见的胃良性肿瘤,本文报道一例合并肝脏多发血管瘤的 CT 和 MRI 影像学表现。患者男,26 岁,无明显诱因反复发作性头昏乏力,既往诊断为缺铁性贫血 6 年。胃镜显示:胃底穹窿处可见巨大隆起性病变,颜色发蓝,CT 显示胃底隆起性软组织密度肿块影伴点状钙化,增强扫描呈弱强化;肝脏实质密度不均匀。MRI 显示胃底病灶呈长 T1 长 T2 信号,弥散不受限,增强扫描渐进性向心性强化;肝脏多发长 T1 长 T2 信号,增强扫描呈渐进性强化并灯泡征显示。术后病理证实为胃底海绵状血管瘤。术后半年随访患者反复贫血症状消失,无任何不适。

PU-0783

能谱 CT 不同迭代重组在肝脏脂肪定量及体积测量的应用分析

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目的:评估不同迭代重建(ASIR-V)在混合能量能谱 CT 图像中对肝脏脂肪定量及肝脏体积检测效能的差异。方法:收集我院行上腹部采用前置 ASIR-V 30%混合能量能谱 CT 平扫肝脏完整患者 60 例。分别行 FBP、ASIR-V 30%、ASIR-60%、ASIR-90%图像重建,采用 liverfat 后处理软件行肝脏脂肪定量及肝脏体积测量(自动提取)见图 1,对比分析不同迭代重组四组测量值的差异。结果:四组重建方法在肝脏体积测量值中差异变化不明显,以 FBP 和 ASIR-V 60%重建图像数据为著,肝脏脂肪定量值分别两两组比较,各组间值均存在统计学差异($P<0.05$),见表 1。结论:混合能量能谱 CT 扫描在不同迭代重组图像中对肝脏体积测量的影响不大,但对于肝脏脂肪定量值不同重建方法存在差异。

PU-0784

基于钆塞酸二钠增强 MRI 预测肝细胞癌 微血管侵犯及术后早期复发

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【摘要】

目的:本研究主要基于钆塞酸二钠增强 MRI 预测肝细胞癌微血管侵犯及 HCC 术后早期复发。方法:本研究回顾性收集 158 例本院行肝切除手术的 HCC 患者,所有患者术前 2 周内行钆塞酸二钠增强 MRI 检查,术前临床资料及术后病理资料完整,应用 Logistics 回归分析确认 MVI 的危险因素;对所有病灶进行定期随访,患者两年内发生复发或转移定义为早期复发,应用 Cox 回归分析确认 EHR 的危险因素。应用受试者工作曲线(ROC)计算预测 MVI 及 EHR 的曲线下面积(AUC)。结果:纳入患者男性 83 例,女性 75 例,平均年龄 59 岁(35-83 岁),其中 MVI 阳性 HCC 共 55 例, MVI 阴性 HCC 共 103 例,多因素 Logistics 回归分析得出肿瘤 T2WI 信号不均匀(OR: 5.205,

95%CI: 2.346-11.549) 及肝胆期瘤周低信号 (OR:2.900, 95%CI:1.278-6.577) 是预测 MVI 阳性的危险因素, 预测 MVI 的 AUC 为 0.738 (95%CI: 0.662 -0.805), 敏感性 74.55%, 特异性 63.73%。所有患者定期随访发现早期复发组共 67 例 (42.41%), 其中 MVI 阳性组中早期复发共 40 例 (72.73%), MVI 阴性组中早期复发共 27 例 (26.21%); 多因素 Cox 回归分析得出 MVI 阳性 (OR: 3.070)、肿瘤 T2WI 信号不均匀 (OR: 2.451) 以及异常凝血酶原 (OR: 1.000) 是预测 EHR 的危险因素。预测 EHR 的 AUC 为 0.76 (95%CI: 0.686-0.825), 敏感性 59.09%, 特异性 85.71%。

结论: 基于钆塞酸二钠增强 MRI 能够预测 HCC MVI 阳性, 肿瘤 T2WI 信号不均匀及肝胆期瘤周低信号预测 MVI 阳性的危险因素; MVI 联合临床及影像特征能够预测 HCC 术后早期复发, MVI 阳性、肿瘤 T2WI 信号不均匀以及高异常凝血酶原是预测 EHR 的危险因素。

PU-0785

宫颈基底细胞样鳞癌影像学特征分析

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目的: 分析早期宫颈基底细胞样鳞癌的 CT、MRI 影像学特点。

方法: 选取 2019 年 8 月至 2023 年 6 月我院收治的 10 例经病理诊断证实的宫颈基底细胞样鳞癌的病人作为研究对象, 术前接受 CT 或 MRI 检查, FIGO 分期为 IA~II B 期; 同时随机收集此期间我院行 CT、MRI 检查的 FIGO 分期为 IA~II B 期之间的宫颈鳞癌、腺癌各 10 例。7 例 BSC 行 CT 检查 (1 例增强), 4 例 BSC 行磁共振成像 (Magnetic Resonance Imaging, MRI) 检查 (1 例增强), 其中 1 例同时行两项检查; CT 观察宫颈大小、CT 值、增强后 CT 值、强化方式及淋巴结肿大情况; MRI 观察肿块位置、大小、信号强度、强化方式、边界受累情况及淋巴结肿大情况。根据图像分析宫颈癌的影像特点。

结果: 宫颈基底细胞样鳞癌的临床特征为多发于绝经后, 多数伴有淋巴结转移; 宫颈基底细胞样鳞癌与普通型宫颈癌在 CT、MRI 表现上相比: 宫颈面积最小, 病灶体积最小, 信号相似; 伴有肿大的淋巴结及周围组织受累。

结论: 临床特征与 CT、MRI 尤其是 MR 功能成像的结合对宫颈基底细胞样鳞癌的筛查有重要意义。

PU-0786

肝内门静脉肝静脉瘘 1 例

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患者男性, 54 岁, 因“体检发现肝占位性病变”就诊, 平素无明显不适, 查体无特殊。上腹部能谱增强 CT 示: 肝右前叶下段见团状异常强化灶, 范围约 40mm×33mm×30mm, 动脉期呈等密度, 门脉期呈明显均匀强化, 可见由肝右叶门静脉粗大分支供血, 经肝右静脉流入下腔静脉, 延迟期呈稍高密度, 各期密度均与门静脉相似。诊断为肝内门静脉肝静脉瘘 (intrahepatic portosystemic venous shunt, IPSVS)。

IPSVS 的发病机制尚不明确, 多见于先天性, 发病率极低, 国内外文献报道以个例居多, 部分与肝脏血管畸形并存。瘘管的分流量决定了其病理生理特点。70%~80% 的肝脏血供来源于门静脉, 大量分流导致来源于肠道的营养物质未能经肝脏合成、代谢、转化, 引起营养不良, 肝脏解毒功能下降, 甚至出现低血糖、高氨血症。20%~40% 的肝脏氧供来源于门静脉, 门静脉体静脉分流可导致肝脏慢性缺氧。分流量超过门静脉血流的 60% 时患者即为肝性脑病高危人群。

根据 Park et al 报道的方法,按解剖形态不同可将 IPSVS 分为 4 种类型:

I 型:单支粗大直径不变的管道连接右侧门静脉或下腔静脉。

II 型:在 1 个肝段内门静脉分支或肝静脉间见一条或多条管道连接。

III 型:囊状扩张分流道连接肝内门静脉分支或肝静脉

IV 型:两个肝叶内门静脉分支或肝静脉间见广泛的连接管道。

本例患者符合 IPSVS III 型。CT 静脉造影通常因静脉内难以达到较高的碘对比剂浓度,且因周围本底组织不同程度的强化,很难获得理想的重建图像。能谱 CT 可明显提高血管内碘对比剂与周围组织的对比度,从而更加清晰、直观地显示整个病变范围,获得满意的重建图像。

PU-0787

巨大膀胱结石合并膀胱肉瘤 1 例报告

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患者男,23 岁,因“反复排尿不畅 10+年,加重 1+年”入院。查体未见异常。超敏 C 反应蛋白 26.22mg/L,血常规提示白细胞 13.18×10⁹/L,尿常规提示白细胞 2006.4 个/ul。泌尿系超声检查提示膀胱结石。泌尿系 CT:膀胱腔内见巨大团块状高密度影,大小约 5.7cm×8.8cm×7.0cm,膀胱腔内见少许积气,膀胱两后侧壁见囊袋状突起;膀胱三角区壁增厚,较厚处约为 0.7cm,增强呈延迟强化。CT 诊断考虑:膀胱巨大结石并膀胱壁憩室。入院 5 天后行“经尿道膀胱碎石取石术+活检术”,病理结果提示:梭形细胞肿瘤。术后病理:梭形细胞肿瘤,免疫组化(1 号蜡块)示:PCK(-),Vimentin(+),P63(-),P40(-),CK20(-),S100(-),ALK-1(-),SMA(-),Caldesmon 灶弱(+),Desmin(-),CD34(-),TLE-1 少数(+),CD68 灶(+),Myogenin(-),P53(+,野生型,60%),Ki67(+,60%),结合免疫组化,考虑肉瘤可能性大。

膀胱憩室为膀胱肉瘤的危险因素之一,可继发尿液潴留、感染、结石等,最终导致肿瘤发生;本例患者并发有膀胱憩室,同时膀胱腔内有巨大结石。膀胱肉瘤外观呈息肉状,广基,表面常有溃疡、出血,肿瘤多位于膀胱侧壁,几乎未出现于膀胱憩室内,目前治疗以手术切除为主。

膀胱肉瘤影像学表现具有一定的特征性,其平均直径多>5cm,呈分叶状、菜花状,易见坏死、囊变,增强后实性成分明显强化,以延迟强化方式多见,常伴有淋巴结及远处转移。本例患者仅仅表现为膀胱壁局限性增厚,无坏死、囊变等影像特征,思考认为与患者具有巨大膀胱结石压迫膀胱壁所致,从而使得肿瘤向外生长受限,而仅仅表现为膀胱壁的局限性增厚,尽管患者病变部位呈轻度延迟强化,但受结石高 CT 值的干扰仍然容易漏诊。

PU-0788

能谱 CT 多参数容积定量技术在评估肝纤维化分期中的应用价值

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目的 探讨能谱 CT 多参数容积定量技术评估肝纤维化分期的应用价值。

方法 回顾性分析在我院经病理证实的 164 例肝纤维化患者的临床和血清学资料,根据肝穿刺活检结果将患者进行以下分组:无肝纤维化组 (F0, n=24) 和肝纤维化组 (\geq F1, n=140); 非显著肝纤维化组 ($<$ F2, n=49) 和显著肝纤维化组 (\geq F2, n=115); 非进展期肝纤维化组 ($<$ F3, n=78) 和进展期肝纤维化组 (\geq F3, n=86); 非肝硬化组 ($<$ F4, n=94) 和肝硬化组 (F4, n=70), 所有患者均行门静脉能谱 CT 功能成像, 并采用容积定量技术测量肝脏的体积 (V)、碘浓度 (IC) 等, 同时计算全肝的标准化碘浓度 (NIC)、细胞外体积分数 (ECV) 和肝脏的碘含量 ($I_{\text{含量}}$)。采用 t 检验或 U 检验进行组间比较, 对有统计学意义的参数运用 ROC 曲线分析其在肝纤维化分期中的诊断性能。

结果 不同分期肝纤维化患者的血清学指标 (APRI、FIB-4) 和能谱 CT 容积定量参数 (NIC、ECV、 $I_{\text{含量}}$) 组间差异均具有统计学意义 ($P<0.001$); APRI、FIB-4、NIC、ECV 和 $I_{\text{含量}}$ 诊断肝纤维化 AUC 分别为 0.729~0.828, 敏感度为 62.50%~79.17%, 特异度为 68.57%~90.00%; 诊断显著肝纤维化 AUC 分别为 0.790~0.848, 敏感度为 59.18%~81.63%, 特异度为 77.39%~86.09%; 诊断进展期肝纤维化 AUC 分别为 0.764~0.927, 敏感度为 70.51%~83.33%, 特异度为 61.63%~94.19%; 诊断肝硬化 AUC 分别为 0.750~0.900, 敏感度为 69.15%~77.66%, 特异度为 64.29%~94.29%。血清学指标 (APRI、FIB-4) 分别和能谱 CT 容积定量参数 (NIC、ECV、 $I_{\text{含量}}$) 相比, AUC 的差异均有统计学意义 ($P<0.05$, Delong 检验)。

结论 与传统血清学指标 APRI、FIB-4 相比, 能谱 CT 多参数容积定量技术对不同分期的肝纤维化具有更好的诊断价值, 其中 $I_{\text{含量}}$ 的诊断性能最好。

PU-0789

胃壁异位支气管源性囊肿和肠源性囊肿一例

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【摘要】 本文报道胃壁异位支气管源性囊肿和肠源性囊肿 1 例。患者男, 23 岁, 因无明显诱因出现腹部不适 1 年入院, CT 表现为左侧肾上腺区与胃间可见类圆形低密度影, 与胃及肾上腺分界不清。胃大弯侧另见类圆形低密度影, 增强扫描病灶囊壁轻度强化, 囊内容物未见明显强化。最终病理诊断为大者为粘膜下支气管源性囊肿, 小者为黏膜固有肌肉肠源性囊肿。

PU-0790

基于 XGBoost 的 SHAP 可解释预测模型探索胰腺导管腺癌化疗相关性肝损伤风险因素的研究

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目的: 基于多相 MRI 序列及肝功能指标开发并验证一种 SHAP 可解释的机器学习模型, 用来预测胰腺导管腺癌 (PDAC) 人群的化疗相关性肝损伤 (CALI) 的发生并筛查相关风险因素。

方法: 回顾性收集 307 例 PDAC 患者的临床资料, 其中包括 133 例 CALI 患者和 174 例非 CALI 患者。提取并筛选增强 MRI 多序列影像组学特征。采用多因素逻辑回归确定与 CALI 相关的独立预测因素, 构建临床和影像组学模型。利用 XGBoost 算法构建联合预测模型, 通过十折交叉验证和网格搜索法获得模型的最佳参数。最后应用 SHAP 方法增强模型的可解释性, 筛查与 PDAC 患者发生 CALI 相关的风险因素并进行可视化。所有模型的性能通过工作特征曲线下面积 (AUC) 和决策曲线分析 (DCA) 进行综合评价。应用 Delong 检验比较模型之间的差异性。

结果: 临床和影像组学模型都展示出了较为理想的一致性。其中, XGBoost 模型具有最优越的预测性能 (训练集 AUC=0.96, 90%CI: 0.93–0.98, 测试集 AUC=0.93, 90%CI: 0.87–0.98)。决策曲线分析说明了 XGBoost 模型在不同阈值概率下的显著的净收益, 其表现优于其他模型。SHAP 分析直观地揭示了与 PDAC 患者发生 CALI 的相关因素, 其中, 总胆红素 (TBIL) 和影像组学分数 (Radscore) 是最为关键的影响因素。

结论: 通过机器学习算法整合影像及临床数据, 本研究成功地开发了一个稳健的预测模型, 得到了良好的预测效果及与疾病发生相关的重要影响因素。该模型可作为一种有效的临床预测、筛查工具, 用于早期发现和诊断 PDAC 背景下的化疗相关性肝损伤, 有助于改善患者个体化治疗策略和临床决策的制定。

PU-0791

髓质海绵肾——双能 CT 的病例系列和见解

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目的: 本研究旨在通过分析两例病例, 评估双能 CT (Dual-energy CT, DECT) 在髓质海绵肾 (Medullary Sponge Kidney, MSK) 诊断中的价值, 并探讨其在病变可视化和与其他肾脏疾病的区分能力方面的作用。

方法: 两名疑似患有 MSK 的女性患者接受了 DECT 成像, 使用飞利浦医疗 (Philips Healthcare) 的 IQon Spectral CT 进行图像采集。获取了 MonoE 40keV 图像和碘密度图像, 并进行后处理分析, 包括最大强度投影 (Maximum Intensity Projection, MIP) 图像和衰减曲线分析, 以帮助定位病变并与其他肾脏疾病进行区分。对临床特征和影像学结果进行分析, 确定 MSK 的诊断。

结果: 患者 1 的常规 CT 图像显示肾皮质变薄, 双肾出现多个无增强的低密度病变。DECT MonoE 40keV 图像清晰显示肾锥体内有多个点状结石, MIP 图像显示肾锥体内的囊性扩张特征。此外, 衰减曲线分析显示双侧肾脏异常表现具有一致性, 能够将其与积水进行区分。患者 2 表现为左肾囊肿和左肾髓质多个结节性高密度病变。MonoE 40keV 图像显示左肾髓质的增强程度降低。此外, 左肾观察到多个无强化低密度病变。DECT 的应用, 尤其是 MonoE 40keV 图像和 MIP 重建, 使病变定位更加准确, 清晰显示了 MSK 的特征。这些结果与临床表现和放射学征象相一致。

结论: DECT 在 MSK 的诊断和与其他肾脏疾病的区分方面提供了有价值的信息。通过利用 MonoE 40keV 图像和 MIP 重建, DECT 能够清晰地显示和定位病变, 有助于准确诊断。另外, 同质性分析有助于区分 MSK 和其他肾脏疾病。尽管 DECT 存在成本高和应用范围受限等局限性, 但在提高 MSK 诊断和指导治疗决策方面显示出潜力。进一步的研究将有助于改进 DECT 在 MSK 诊断中的准确性和可行性。

PU-0792

Lymphoepithelioma-like cholangiocarcinoma Mimicking Hepatocellular Carcinoma

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A 50-year-old woman presented with a hepatic nodule incidentally found by abdominal ultrasonography. Her medical history showed recurrent tonsillitis at an early age. Laboratory investigations including virological tests and tumor markers were all within normal range. Contrast-enhanced Magnetic Resonance Imaging (MRI) revealed a 1.6cm × 1.8cm hepatic nodule in segment IV, with a homogeneous wash-in during the arterial phase followed by a wash-

out in portal-venous phase, and hypointensity in hepatospecific phase (Fig. 1). The patient underwent laparoscopic resection. Pathology revealed nests and cords of neoplastic cells with rare areas of apparent gland formation and mixed inflammatory. In situ hybridization using an EBV-encoded RNAs (EBER) revealed extensive reactivity in tumor cell nuclei, supporting a diagnosis of Lymphoepithelioma-like cholangiocarcinoma (LELCC). The patient had no symptoms during the 24-month follow-up and had good quality of life.

LELCC is a rare low-grade malignancy with a favorable prognosis. This sarcoma has a strong association with Epstein-Barr virus (EBV). The diagnosis of LELCC is often a challenge because imaging alone cannot allow differentiating between hepatocellular carcinoma and LELCC in many instances. When patients showed recurrent tonsillitis at an early age, AFP did not change significantly, and there was no previous history of hepatitis B. In such scenario, diagnosis of LELCC should be considered.

PU-0793

Primary Fallopian Tube Carcinoma: Multiparameter Magnetic Resonance Characteristics and Pathological Correlation

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Objective To explore characteristic magnetic resonance imaging (MRI) features of primary fallopian tube carcinoma (PFTC) with pathological correlation.

Methods Ten patients with pathologically confirmed PFTC were retrospectively reviewed. The conventional MRI features were analyzed including laterality, shape, size, signal-intensity, contrast enhancement, lymph node metastasis, pelvic metastasis and typical signs. We also analyzed the diffusion-weighted imaging (DWI) and dynamic contrast-enhanced (DCE) MRI features and the clinical and pathological informations of PFTCs.

Results Eleven tumors in ten patients were evaluated (50.5 ± 8.9 (29-60) years old). The main clinical manifestation were vaginal discharge ($n = 6$) and palpable adnexal mass ($n = 6$). In MR imaging, the tumor showed sausage-shaped ($n = 7$), cauliflower-shape nodular ($n = 3$) or lobulated ($n = 1$) morphology. The solid portion were hypointense intensity on T1-weighted imaging (T1WI) ($n = 11$), slightly hyperintense ($n = 11$) on T2-weighted imaging (T2WI), with highly hyperintense on DWI ($n = 11$). The mean apparent diffusion coefficient value was 1.269×10^{-3} s/mm². Minimal-to-mild contrasted enhanced was detected in five tumors with type II signal intensity curve ($n = 5$). The “vestigial fallopian tube signs” were found in all eleven tumors ($n = 11$), and “pseudocapsule signs” were detected in all 5 tumors with contrasted enhanced MRI.

Conclusion PFTC might manifest as adnexal solid masses with “vestigial fallopian tube sign” and “pseudocapsule sign” in preoperative imaging. DWI and DCE-MRI may be a promising tool for the diagnosis of PFTC.

PU-0794

MR 酰胺质子加权转移成像在预测肝细胞癌组织学分级与 Ki-67 表达中的价值初探

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目的：探讨磁共振酰胺质子转移加权(amide proton transfer-weighted, APTw)成像预测肝细胞癌 Ki-67 表达水平及组织学分级的可行性，并与 DWI 进行比较。

方法：160 例肝占位病人进行前瞻性上腹部 MRI 扫描，包括 APTw 及 DWI 成像。分别在 APTw 及 ADC 图像上测量得到病灶的 APTw 值及 ADC 值，依据病理及免疫组化染色结果，阳性细胞比例 $\leq 10\%$ 定义为 Ki-67 低表达， $>10\%$ 定义为 Ki-67 高表达。分析 Ki-67 高表达与低表达组之间、高级别组与低级别组肝细胞癌之间的 APTw 值和 ADC 值之间的差异。进一步采用 ROC 曲线评估 APTw 值及 ADC 值在鉴别 Ki-67 高表达组与 Ki-67 低表达组之间以及高级别与低级别肝细胞癌组间诊断效能。

结果：Ki-67 高表达组($n=39$) 的 APTw 值高于低表达组($n=17$) [$1.57(1.06,1.92) \%$ vs. $0.16(-0.67\pm 0.72)\%$; $P<0.001$]，Ki-67 高表达组 ADC 值低于低表达组 [$0.82(0.75,0.90) \times 10^{-3} \text{mm}^2/\text{sec}$ vs. $1.01(0.87,1.01) \times 10^{-3} \text{mm}^2/\text{sec}$; $P=0.003$]。高级别组肝细胞癌($n=33$) 的 APTw 值高于低级别组($n=23$) [$(1.54\pm 1.10) \%$ vs. $(0.02\pm 1.25)\%$; $P<0.001$]，两组间的 ADC 值无明显差异 [$(0.86\pm 0.16) \times 10^{-3} \text{mm}^2/\text{sec}$ vs. $(0.91\pm 0.16) \times 10^{-3} \text{mm}^2/\text{sec}$; $P=0.256$]。APTw 值与 ADC 值区分肝细胞癌 Ki-67 高表达与低表达组的 AUC 分别为 0.845 和 0.755。APTw 值高级别与低级别肝细胞癌的 AUC 为 0.819。

结论：APTw 成像在术前预测肝细胞癌 Ki-67 表达、区分高级别与低级别肝细胞癌方面优于 DWI。

PU-0795

右结肠旁沟梭形细胞横纹肌肉瘤 1 例

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横纹肌肉瘤(Rhabdomyosarcoma,RMS)是一种罕见的软组织恶性肿瘤，起源于未分化的间充质，组织学上类似于正常胎儿骨骼肌，常见于儿童及青少年，大多数起源于头颈部及泌尿生殖系统，多发生于男性，男女比为 6:1，成人非常罕见，而发源于成人腹膜后的更是罕见。笔者报道 1 例发生于右侧结肠旁沟的梭形细胞横纹肌肉瘤的影像表现及外科术后的治疗。旨在提高对该病的认识。RMS 的组织学亚型有三种：胚胎型、腺泡型和多形型，其中胚胎型 RMS 亚型包括葡萄状肉瘤、间变性肉瘤和梭形细胞型。梭形细胞/硬化性横纹肌肉瘤(SRMS)是一种以梭形细胞为主胚胎型 RMS 的一种独特亚型。SRMS 在组织病理学上，大部分由梭形细胞组成，以束状排列，伴有或不伴有间质硬化，细胞大部分异型性明显，核分裂象多见，免疫组化染色显示结蛋白 Desmin、波形蛋白 Vimentin、原肌球蛋白调节蛋白 MyoD1、成肌蛋白 Myogenin、肌红蛋白 Myoglobin 等肌源性标记呈阳性表达。本例患者肿瘤细胞呈梭形，间质见少量淋巴细胞及血管，免疫组化示 Desmin、MyoD1、Vimentin 等呈阳性，符合 SRMS。本例 SRMS 发生于右侧结肠旁沟与肌肉呈等密度肿块，未见明显黏液成分，肿瘤边缘分叶，动脉期强化轻微，瘤体边缘可见增粗小血管穿行，门脉期呈片絮状边缘明显强化，局部见结节状明显强化，延迟期强化范围增大，强化特点与文献报告相似，笔者认为病变可能具备绕血管生长的特点。成人 SRMS 恶性程度高，最佳治疗方法是完整手术切除+辅助性放化疗。SRMS 发病罕见，临床及影像表现没有特异性，晚期治疗效果不理想，尽管采用了

多模式治疗,但复发和进展仍很常见,所以提高预后的关键是早期诊断、早期治疗,尽早确定肿瘤分期和病理类型。本例患者术后 5 个月全身化疗 6 次后复查全腹部增强 CT,未见肿瘤复发及转移。

PU-0796

既往脂肪肝急性胰腺炎的 CT 特征及其与严重程度的关系

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目的:探讨既往脂肪肝发生急性胰腺炎(Acute pancreatitis, AP)时的 CT 特征,分析其与 AP 严重程度的关系。

方法:共有 272 例 AP 患者被分为既往有脂肪肝的急性胰腺炎和既往无脂肪肝的 AP 两组患者。并比较两组患者的 CT 特征、AP 严重程度。CT 严重程度指数(CT severity index, CTSI)评分、急性生理与慢性健康状况评分(Acute Physiology and Chronic Health Evaluation, APACHE II)和改良 Marshall 评分评估急性胰腺炎的严重程度。

结果:在 272 例患者中,37.1% (101/272)的患者既往存在脂肪肝。既往存在脂肪肝的 AP 患者更容易出现坏死(28.7% vs 8.8%, $\chi^2=18.620$, $P=0.000$)和局部并发症(33.7% vs 15.8%, $\chi^2=11.660$, $P=0.000$),且住院时间更长(13 天 vs 11 天, Mann-Whitney U 检验, $P=0.02$)。既往存在脂肪肝的 AP 患者 CTSI (4.40 ± 2.05 vs 3.23 ± 1.41 , $t=-5.506$, $P=0.000$)和 APACHE II 评分(6.34 ± 4.73 vs 5.17 ± 4.11 , $t=-2.126$, $P=0.034$)均高于既往无脂肪肝的患者。根据改良 Marshall 评分,既往存在脂肪肝的 AP 患者更容易出现器官功能衰竭(12.9% vs 4.7%, $\chi^2=5.985$, $P=0.014$)。

结论:既往存在脂肪肝的患者发生急性胰腺炎时更容易出现坏死及局部并发症,严重程度更重,并且更容易发生器官功能衰竭。在急性胰腺炎患者中,既往存在脂肪肝可作为评价和预测 AP 严重程度的辅助指标之一。

PU-0797

深度学习对膀胱癌图像分割以及肌层侵犯预测价值的研究

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目的:利用多参数磁共振序列图像构建一个深度学习模型,用于肌层浸润性膀胱癌的术前诊断。

方法:我们的研究纳入了 391 例术前接受了多参数磁共振检查并且病理证实是膀胱尿路上皮癌的患者,将患者随机分为训练集($n=312$)和测试集($n=79$)。我们首先训练了一个 3D 分割模型来自自动分割膀胱壁和肿瘤。膀胱壁与肿瘤接触区域是膀胱癌肌层侵犯的好发区域。引导模型针对这一区域进行注意学习,可以模拟专家的诊断思路。因此,在自动分割图像用于训练之前,嵌入专家注意区域,获得肌层侵犯好发区域内的肿瘤和膀胱壁这两个感兴趣区。随后基于 3d-ResNet-18 神经网络,构建深度学习模型。最后分别验证了对于单个序列图像和全序列图像输入深度学习模型的性能。我们的深度学习模型还与不嵌入专家注意区域的“黑匣子”网络模型、四名放射科医生 VI-RADS 评分模型进行了对比。

结果:391 例患者中有 135 例存在肌层侵犯。在 79 例独立测试集中,对于肌层侵犯和非肌层侵犯的两组病人,我们的分割模型对癌灶和膀胱壁分割的 Dice 系数在 0.681-0.756 之间,精确度在 0.733-0.860 之间,召回率在 0.734-0.825 之间,两组间分割性能一致性较好(所有 $P>0.05$)。基于 T2WI 图像的深度学习模型获得了最高的诊断 AUC 值(0.87),优于基于全序列图像的深度学习

习模型 (AUC=0.82) 和基于 T2WI (AUC=0.76)、ADC (AUC=0.77)、DCE (AUC=0.75)、DWI (AUC=0.70)、全序列 (AUC=0.81) 图像的传统“黑匣子”网络模型 (所有 $P<0.05$)。对于 VI-RADS 评分, 四位阅读者的读者间一致性在 0.53-0.75 之间, 存在明显的异质性。

结论: 对于膀胱癌肌层侵犯的检测, 我们的基于 T2WI 图像的深度学习模型仅需使用单个序列图像即可获得优于“黑匣子”网络模型及专家诊断的表现, 更加安全、简便。

PU-0798

临床和脾脏放射组学特征在预测胃癌患者 TNM 分期中的作用

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目的: TNM 分期能够影响胃癌的治疗和预后, 我们的目标是明确脾脏的 f 放射组学特征是否可以用于区分不同 TNM 分期的胃癌患者。

方法: 回顾性分析 2019 年 2 月至 2021 年 1 月收治的经病理证实的 127 例胃癌患者的临床资料。回顾性分析患者的临床资料, 基于胃癌(GC)、脾脏(SP)和二者组合(GC_SP)图像的放射组学特征构建 3 种放射组学预测特征模型, 获得 3 个组学评分。基于 Rad-score GC_SP、临床和 CT 参数, 开发了放射组学模型来预测 TNM 分期 (I/II 期和 III/IV 期), 采用 AUC 和校准曲线评估放射组学模型的鉴别效能。

结果: 共有 127 例患者纳入研究, 共纳入 5 个临床和 CT 参数 (T_thick、T_ctv、SP_ctv、CA199 和糖尿病) 构建临床模型。最终构建的 GC_SP_Clin 的放射组学联合模型显示出强大的预测能力, 训练和测试组的 AUC 分别为 0.872 和 0.825, 开发的模型预测胃癌患者的 TNM 分期方面的预测值与真实值之间一致性良好。

结论: 将胃癌和脾脏放射组学特征与临床及 CT 参数相结合, 最终构建的放射组学模型能够预测胃癌患者 TNM 分期 (I/II 期和 III/IV 期), 帮助指导治疗决策。

PU-0799

左侧肾周 CT 平扫影像特征与脓毒症伴急性肾损伤的相关性研究

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目的 探讨脓毒症伴急性肾损伤 (Acute Kidney Injury, AKI) 患者的肾周 CT 影像特征, 指导临床早期诊断、早期干预。

方法 本文回顾性分析了东南大学附属中大医院 2018 年 2 月-2020 年 10 月的 ICU 脓毒症伴 AKI 及不伴 AKI 患者, 按照纳入及排除标准共入组 240 人。收集与 AKI 发生相关的临床及实验室指标, 并分析入 ICU 24h 内肾周 CT 影像指标: ①左侧肾周筋膜增厚; ②左侧肾周脂肪密度改变; ③左侧肾后脂肪厚度; ④左侧肾周脂肪条纹征。对每个指标进行单因素分析和多因素 Logistic 回归分析, 得到与 AKI 发生的独立相关的影像指标。

结果 脓毒症不伴 AKI 组 (n=120) 和脓毒症伴 AKI 组 (n=120) 年龄、性别、慢性病史、药物的使用、机械通气使用均无统计学差异 ($p>0.05$), 脓毒症伴 AKI 组较不伴 AKI 组的具有更低的血清碳酸氢盐水平 ($p<0.001$), 合并 ARDS ($p=0.007$)、左肾周筋膜增厚 ($p<0.001$)、左侧肾周脂肪条纹征 ($p=0.02$) 的发生率更高, 左侧肾后脂肪更厚 ($p=0.006$)。多元 logistic 回归分析显示血清碳酸氢盐[OR =0.865, 95%CI (0.814, 0.919), $p<0.001$]、合并 ARDS[OR =2.227, 95%CI (1.261, 3.932), $p=0.006$]、左侧肾周筋膜增厚[OR =3.213, 95%CI (1.8, 5.735), $p<0.001$]均与脓毒症患者伴发 AKI 独立相关。

结论 脓毒症患者入 ICU 24h 内腹部 CT 平扫特征——左肾周筋膜增厚与脓毒症伴 AKI 独立相关，出现左肾周筋膜增厚提示脓毒症伴 AKI 的发生，指导临床早期诊断、早期干预。

PU-0800

十二指肠溃疡穿孔后下腔静脉血栓形成

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个案摘要

消化道溃疡穿孔是比较严重的消化道疾病，会引起严重的并发症，甚至危及患者生命。比较常见的并发症包括出血、腹腔感染、中毒性休克、肺部感染、幽门梗阻等。

本文病例中的患者是一名 34 岁男性，主因“间断腹痛 5 年，呕血伴黑便 11 天”以“上消化道出血，十二指肠溃疡，腹膜炎，中度贫血”收入院。既往胃镜提示十二指肠溃疡，幽门螺杆菌感染病史，11 天前患者因劳累熬夜后出现呕血伴黑便，外院胃镜提示十二指肠球部巨大溃疡伴出血，Forrest 分级（Ib）。予输血治疗。2 天前喝粥后出现发热，查外院平扫 CT 示：胰头后缘及腹主动脉周围、右肾前后筋膜周围多发渗出性病变，继发右侧局限性腹膜炎。入院后行腹盆 CT 增强检查示十二指肠穿透性溃疡，周围炎性包裹，与下腔静脉关系紧密，右肾静脉内血栓形成，侧枝循环形成，下腔静脉内血栓形成至髂静脉。给与抗感染、胃肠粘膜保护剂及肝素抗凝药物治疗，症状好转，分别于 8 天及 36 天后复查腹盆 CT 增强检查，静脉血栓未见明显变化，十二指肠穿透性溃疡，周围炎性渗出好转。

下腔静脉血栓形成是十二指肠溃疡穿孔后少见的一种并发症，当患者十二指肠穿孔后出现腹痛、发热等腹膜炎表现时，需警惕此种可能，尤其穿孔部位靠近下腔静脉时，造成周围炎性渗出，会出现下腔静脉血栓。所以当怀疑十二指肠穿孔时应及时进行增强 CT 检查，以确认是否存在下腔静脉血栓，并及时处理，避免严重的后果发生。

PU-0801

基于磁共振成像对肾透明细胞癌 VHL 突变状态的影像基因组学分析

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目的：分析肾透明细胞癌（ccRCC）原发灶及区域淋巴结磁共振成像（MRI）特征与 VHL 突变间的潜在联系。

方法：回顾性连续收集 2018 年 1 月至 2020 年 12 月间我院病理诊断明确、术前增强 MRI 及基因检测结果完整的 ccRCC 患者 49 例，同时从 TCGA-KIRC 数据库中连续纳入术前增强 MRI 完整的 ccRCC 患者 54 例。由两名高年资放射科医师在对基因突变状态及病理资料不知情的前提下协商完成影像学征象评估。

结果：本单位 49 名 ccRCC 患者中男性 37（74.00%）人，平均年龄 55.24 ± 12.11 岁；包含 ccRCC 病灶 49 个，其中 31（63.27%）个被检出 VHL 突变。来自 TCGA 数据库的 53 名 ccRCC 患者中男性 38（70.37%）人，平均年龄 60.96 ± 10.27 ；包含 ccRCC 病灶 53 个，其中检出 VHL 突变的病灶 26（48.15%）个。对所有 103 例 ccRCC 患者影像特征进行分析显示：VHL 未突变的患者中区域淋巴结的短径更大（ $P < 0.001$ ），Node-RADS 评分更高（ $P < 0.001$ ），边缘不清

($P=0.003$)、纹理不均匀($P<0.001$)、球形($P<0.001$)占比更高;原发灶的最大径更大($P=0.007$)、边缘不清($P=0.004$)、囊变($P=0.009$)、出血($P=0.011$)、T2WI 低信号($P<0.001$)、含脂($P=0.001$)、肾周侧支循环建立($P=0.039$)更多见。分别对本单位及公开数据进行分析发现:无论是在本单位数据集还是在 TCGA-KIRC 数据集中,区域淋巴结的 Node-RADS 评分及原发灶的边缘、T2WI 信号均在 VHL 突变组与未突变组间存在显著统计学差异(所有 $P<0.05$)。

结论:不同 VHL 突变状态的 ccRCC 患者间原发灶及区域淋巴结的 MRI 征象存在差异。MRI 特征与 VHL 突变间的潜在联系仍需更大样本研究,而其具体机制及预后意义同样值得进一步探索。

PU-0802

光谱 CT 细胞外间隙分数鉴别肾上腺腺瘤与转移瘤的应用价值

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目的 分析光谱 CT 细胞外间隙(extracellular volume, ECV)分数鉴别肾上腺腺瘤与转移瘤的应用价值。方法 回顾性收集 2021 年 8 月至 2022 年 8 月中山大学附属第一医院的肾上腺腺瘤患者 60 例(60 个结节)和肾上腺转移瘤患者 30 例(38 个结节)。所有患者术前行包含 10 分钟延迟期的光谱 CT,并在两天内测量红细胞比容。由两名医师分别独立在延迟期的碘密度图上测量病灶和腹主动脉的碘密度,并计算病灶的 ECV 分数。采用组内相关系数(ICC)评价测量结果的一致性。采用独立样本 t、t'检验或卡方检验比较腺瘤和转移瘤患者的临床资料、碘密度和 ECV 分数。将差异有统计学意义的参数进行受试者操作特征曲线分析,获得各参数鉴别肾上腺腺瘤与转移瘤的诊断效能,并采用 Z 检验比较各参数的曲线下面积(AUC)。结果 转移瘤组的病灶碘密度(0.95 ± 0.43)高于腺瘤组(0.53 ± 0.30),差异有统计学意义($t'=4.867$, $P<0.001$), AUC(95%CI)为 0.782 ($0.687\sim 0.858$);转移瘤组的 ECV 分数($34.10\pm 13.42\%$)高于腺瘤组($18.08\pm 8.67\%$),差异有统计学意义($t'=6.014$, $P<0.001$), AUC(95%CI)为 0.842 ($0.755\sim 0.908$)。ECV 分数鉴别效能更高,最佳诊断阈值为 25.4%,准确度、灵敏度和特异度分别为 78.8%、80.0%、78.3%。ECV 分数与病灶碘密度的 AUC 差异有统计学意义($Z=2.886$, $P=0.005$)。结论 基于光谱 CT 的 ECV 分数可用于鉴别肾上腺腺瘤与转移瘤,其诊断效能优于病灶碘密度。

PU-0803

基于 Mono+算法评估双能量 CT 对结直肠癌高危因素诊断价值的初步研究

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目的:评估基于 Mono+ 算法的双期 DECT 对结直肠癌(CRC)高危因素的诊断价值。

方法:前瞻性的收集了 2021-2023 年在我院行腹部双期双能 CT 扫描的原发性 CRC 患者。评估双期 DECT 图像的 SNR、CNR、整体图像质量、瘤体显示和图像噪声。然后选择最佳能级图像,分析高风险和低风险 CRC 组间的 IC、NIC、Z、Rho、DEI 和能谱曲线斜率。使用多因素二元逻辑回归分析构建诊断 CRC 高危因素的回归模型;绘制 ROC 曲线,并计算 AUC 以评估模型的诊断价值。

结果:本研究共纳入了 74 例患者,其中高危组 41 例,低危组 33 例。40keV 虚拟单能成像(VMI+)的信噪比和 CNR 最佳(信噪比为 8.79 ± 1.27 , CNR 为 14.89 ± 1.77 , $P<0.03$)。60 keV VMI+ 和 40 keV VMI+ 的整体图像质量和瘤体显示分别最好($P<0.01$)。在所有 DECT 参数中,

AP-IC、NIC、DEI 和 能谱曲线斜率以及 VP-NIC 在两组之间存在统计学差异。AP-IC 是预测高危和低危 CRC 的最佳 DECT 参数,其 AUC、灵敏度、特异性和截断值分别为 0.96、97.06、87.80 和 2.94。综合临床参数和 DECT 参数,模型的 AUC、灵敏度、特异性和预测准确性分别为 0.99%、97.06%、90.24% 和 89.33%。

结论:基于 40 keV VMI+ 重建的 DECT 图像能最好的描述 CRC 肿瘤;临床参数结合 DECT 参数构建综合模型对 CRC 患者高危因素的术前预测有重要意义。

PU-0804

3 例肠系膜静脉硬化性结肠炎并文献复习

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目的:了解肠系膜静脉硬化性结肠炎(Idiopathic Mesenteric Phlebosclosi,IMP)的病理生理学、临床特征和治疗选择。

方法:收集我院 2018 - 2023 年确诊为静脉硬化性结肠炎患者 3 例,详细研究其临床病史,总结其 CT 影像、内镜影像特征,以及结合 PubMed 和知网数据库检索的病例,对此病进行系统性回顾

结果:IMP 主要发生在东亚地区,80.2%患者有服用中草药病史。CT 显示结肠粘膜、肠系膜静脉及其分支呈线状钙化,结肠镜表现为特有的紫蓝色粘膜。经保守治疗治愈率 54.3%,45.7%患者接收手术治疗,手术治疗患者不能改变累及更广泛。

结论:IMP 发生主要与长期服用中草药有关,早期无明显症状,主要依据特征性的 CT 表现和结肠镜确诊,一旦确诊应停用口服中草药,根据病情严重程度可以选则保守治疗或行手术治疗。

PU-0805

黄色肉芽肿性胆囊炎的 CT/MRI 表现及其与胆囊癌的影像鉴别要点

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目的:探讨黄色肉芽肿性胆囊炎临床特点及影像学表现,以及与胆囊癌影像鉴别要点,提高术前诊断符合率。

方法:回顾性分析西安大兴医院 2020 年 2 月-2023 年 4 月期间诊治的 12 例经病理证实为黄色肉芽肿性胆囊炎病例术前影像,观察胆囊壁增厚的类型、强化方式,胆囊壁内结节、粘膜线是否完整和是否伴有结石,以及胆囊周围结构改变等,提出与胆囊癌影像鉴别的要点。

结果:全部病例均出现胆囊壁增厚,其中 8 例为弥漫性增厚、4 例病例为局部增厚;6 例患者可见胆囊壁内结节灶,表现为 CT 低密度影,MRI 为长 T1、长 T2 信号,11 例患者胆囊粘膜线明显强化,9 例胆囊粘膜线完整,3 例粘膜线局部欠连续。合并胆囊结石者 7 例;8 例病例出现邻近肝实质动脉期一过性强化;3 例术前诊断为胆囊癌,术后为黄色肉芽肿性胆囊炎;2 例术前诊断黄色肉芽肿性胆囊炎,术后为胆囊癌。

结论:CT 及 MRI 检查可显示黄色肉芽肿性胆囊炎的影像特征(胆囊壁增厚,呈“夹心饼干征”、囊壁内小结节、粘膜线连续、邻近的肝实质动脉期一过性强化),为病变的诊断和鉴别诊断提供依据,从而提高诊断准确率,有助于临床的进一步诊治。

PU-0806

胆总管原发性神经内分泌癌 1 例

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神经内分泌癌是一种少见的恶性肿瘤，主要发生于胃肠道和肺，原发于肝外胆管的极其罕见，因其缺乏典型临床特点及影像学表现，术前极易误诊。本文报道 1 例患者，以期为临床诊疗提供参考。

患者体检发现胆总管下段病灶呈膨胀性生长，高度提示恶性肿瘤，影像学未见明显转移征象，遂行手术治疗。行胆管根治性切除术。术后病理镜检及免疫组化 Syn (+)、CgA (小区+)、CD56 (+) 确诊胆总管下段神经内分泌癌。因患者个人原因术后拒绝行规范放化疗。术后 5 个月后出现肝脏转移瘤，行肝动脉化疗栓塞 (雷替曲塞 2mg、奥沙利铂 50mg)，病情进展。改行免疫治疗，患者病情仍进展迅速，生存周期仅 13 个月。

由于肝外的胆管神经内分泌癌极其罕见，其临床病理特征不明确，导致术前难以明确诊断。目前对于胆总管神经内分泌癌尚无规范的治疗方案，其临床表现与胆总管腺癌相近，该病确诊主要依据病理镜检+免疫组化检查，免疫组化染色嗜铬素 A (Cga)、CD56、突触素 (Syn) 染色具有高度敏感性及特异性，Ki-67 可以为肿瘤分级提供依据，数值越高提示预后越差 (本例患者 Ki-67+ (约 75%))。超声、CT、磁共振等影像学检查缺乏特异性，但有助于肿瘤的定位和定性，并排除有无其他脏器转移及淋巴结侵犯。手术根治切除是目前治疗胆管神经内分泌癌的主要手段，一经发现应尽早行根治性手术切除，同时行肝门区、胰头周围、腹腔干等周围淋巴结清扫，以保证完全切除、切缘阴性。

对于初诊就已经失去手术机会的 NEC 患者，化疗首选经典方案依托泊苷+顺铂 (EP) 与伊立替康+顺铂 (IP)，贝伐珠单抗联合奥沙利铂，再加用氟尿嘧啶及伊立替康四药联合在晚期 NEC 患者中总生存期优于 EP 和 IP，但不良反应较多，需要谨慎使用。免疫治疗对于神经内分泌肿瘤效果不佳。因此对于分化差的神经内分泌癌的患者以化疗为主，4 联方案略优于 EP 和 IP。

PU-0807

多层螺旋 CT 诊断不同分子分型乳腺癌肝转移瘤的价值探析

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目的 探析多层螺旋 CT (MSCT) 诊断不同分子分型乳腺癌肝转移瘤的应用价值。方法 2014 年 2 月至 2018 年 12 月我院 64 例确诊的乳腺癌肝转移患者依据免疫组化结果分为 4 种分子类型，即 Luminal A 型 8 例、Luminal B 型 28 例、HER-2 过表达型 16 例及 TNBC 型 12 例，分析各分型乳腺癌患者肝转移瘤的 MSCT 影像表现。结果 4 种分型患者肝转移瘤均以全肝、多发为主，且病灶体积较小，以规则的圆形或类圆形居多，多呈结节样强化，肝转移瘤或病灶部位、数目、大小、形状、强化特征与分子分型无关联 ($P > 0.05$)。但肝转移病灶边界、密度存在显著差异 ($P < 0.05$)，其中 Luminal B 型患者病灶边界模糊占比最高，并显著高于 Luminal A 型、HER-2 过表达型、TNBC 型患者 ($P < 0.05$)；Luminal A 型、HER-2 过表达型患者病灶边界模糊者占比明显高于 TNBC 型患者 ($P < 0.05$)。Luminal B 型、HER-2 过表达型患者病灶低密度占比明显低于 Luminal A 型、TNBC 型 ($P < 0.05$)，等密度占比明显高于 Luminal A 型、TNBC 型 ($P < 0.05$)。Pearson 分析显示乳腺癌肝转移病灶边界、密度与分子分型密切相关 ($r=0.912, 0.896$)。结论 MSCT 诊断不同分子分型乳腺癌肝转移瘤的应用价值高，可显示肝转移瘤的多方面信息，尤其是不同分子分型患者转移灶边界、密度等存在一定特征，可作为诊断依据，并指导临床治疗。

PU-0808

利用 CT 平扫观察阑尾壁包埋征对复杂性阑尾炎的诊断价值研究

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目的 探讨利用 CT 平扫观察阑尾壁包埋征对复杂性阑尾炎的诊断价值。

方法 回顾性分析 2020 年 7 月至 2022 年 12 月期间, 经手术及病理证实的急性阑尾炎患者 114 例, 其中复杂性阑尾炎 31 例, 非复杂性阑尾炎 83 例。观察 CT 征象包括: 阑尾壁包埋征、阑尾外径、脓肿、蜂窝织炎、阑尾腔外气体和阑尾腔外粪石。比较两组患者的临床资料和 CT 征象, 取有统计学意义的变量进行二元 logistics 回归多因素分析, 筛选出对复杂性阑尾炎诊断具有统计学意义的 CT 征象, 并绘制 ROC 曲线。

结果 阑尾壁周围高密度度渗出的 OR 值为 24.712 (95%CI: 1.877~325.350) ($P=0.015$), 蜂窝织炎的 OR 值为 3.955 (95%CI: 1.071~14.606) ($P=0.039$) 和腔外气体的 OR 值为 32.886 (95%CI: 1.531~706.498) ($P=0.026$)。ROC 曲线结果显示, 阑尾壁周围高密度度渗出、蜂窝织炎和阑尾腔外气体的 AUC 值分别为 0.734 ($P<0.001$)、0.750 ($P<0.001$) 和 0.649 ($P=0.017$), 该 3 个 CT 征象诊断复杂性阑尾炎的敏感度分别为 55.2%、65.5%和 31%, 特异性分别为 91.7%、84.5%和 98.8%。

结论 通过 CT 平扫观察阑尾壁及其周围改变对复杂性阑尾炎具有重要诊断价值。

PU-0809

一例静脉内平滑肌瘤病恶变的影像学分析

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【摘要】 静脉内平滑肌瘤病 (IVL) 指子宫平滑肌瘤样组织累及静脉系统形成瘤栓, 它虽然是良性肿瘤, 但具有蔓延性生长、易复发等恶性疾病的特点。本文报道 1 例下腔静脉平滑肌瘤恶变的影像学分析。患者 2 个月前出现腹胀, 纳差, 进食后呃逆、饱胀感。CT 示下腔静脉中段、下段结构显示不清, 局部见巨大不规则软组织肿块, 边界不清, 不均匀强化, 内见丰富的供血动脉且与右侧卵巢动脉关系密切。肿块侵犯右肾、肾门及输尿管, 致右肾积水。病理诊断为 (静脉血管) 平滑肌肉瘤。

PU-0810

肝泡型包虫病淋巴结转移术前预测模型初探

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目的: 探讨肝泡型包虫病淋巴结转移的术前预测因素, 构建术前预测模型并评价其临床应用价值。

方法: 收集 2015 年 1 月至 2022 年 12 月于新疆医科大学第一附属医院经病理确诊为肝泡型包虫病淋巴结转移的患者资料, 经纳入排除标准入组 50 例; 随机抽取本院同期诊治的无淋巴结转移的肝泡型包虫病患者 50 例。收集患者临床资料, 分析并比较两组患者的一般资料、病灶部位、最大径、单发或多发、钙化分型、大血管侵犯、远处转移、PNM 分型及淋巴结转移部位。经统计学分析筛选术前预测因素构建预测模型, 并以受试者工作曲线 (ROC) 评价术前预测模型的诊断效能。结

果: 50 例转移组病例共发现 13 组淋巴结转移, 其中 30 例为单组淋巴结转移, 20 例为多组淋巴结转移, 其中转移部位最多的为肝门部淋巴结 (26/50)。转移组与非转移组患者的年龄、性别、病灶多发或单发、大血管侵犯无统计学差异 ($P>0.05$); 转移组与非转移组病灶的部位、最大径、钙化分型、远处转移具有统计学差异 (病灶部位 $P=0.029$, 最大径 $P=0.002$, 钙化分型 $P<0.001$, 远处转移 $P=0.047$); 根据上述因素构建 ROC 曲线, 曲线下面积 (AUC) 为 0.893 (95%CI: 83.1%~95.5%), 灵敏度为 82%, 特异度为 80%。结论: 肝泡型包虫病灶发生的部位、最大径、钙化分型、远处转移可作为术前淋巴结转移的预测因素, 术前预测模型具有很好的诊断效能。

PU-0811

小肠 CTE 在小肠淋巴瘤诊断中的价值

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原发性小肠淋巴瘤(PSIL): 是小肠中常见的恶性肿瘤之一, 占原发胃肠道淋巴瘤的 20% ~30% 。PSIL 起病隐匿, 早期临床症状不明显, 特异性低, 容易漏诊或误诊。

CT 小肠造影 (CTE): 是一种特殊准备后进行的 CT 检查, 通过肠腔内充盈水或造影剂, 利用多层螺旋增强 CT 快速、薄层扫描和强大的后处理功能来清晰勾勒肠壁、肠腔及肠管外病变的诊断有显著优势, 但存在一定的辐射。

目的: 讨论小肠 CTE 在小肠淋巴瘤诊断中的价值。

方法: 7 例经手术确诊的小肠淋巴瘤作回顾性分析, 结合相关文献资料, 讨论其影像学表现。

讨论: 7 例小肠淋巴瘤患者因不同程度腹部疼痛不适、腹部包块、消瘦、大便性状改变等原因就诊, 腹部 CT 平扫, 发现小肠管壁局限性不同程度增厚, 行小肠 CTE 检查。7 例患者 CTE 表现共同特征: 病变肠管无明显狭窄, 管腔扩张, 肠管未见梗阻表现; 并各有自不同 CTE 表现。有 5 例周围肠系膜明显肿大淋巴结增多, 2 例可见少许肿大淋巴结, 淋巴结轻、中度均匀强化; 6 例管壁增厚不均匀, 粘膜不光整; 5 例可见周围系膜密度增高并见条索影。

小肠淋巴瘤的小肠 CTE 表现: 肠壁增厚: 肠壁增厚程度多较明显, 可对称或不对称, 受累肠段较长。动脉瘤样扩张: 病变肠管无明显狭窄, 有时管腔反而扩张, 直径可大于 3cm, 呈“动脉瘤样改变”, 为胃肠道淋巴瘤特征性表现。肠壁肿块: 突向肠腔内单发或多发息肉样肿块, 部分肿块突向肠壁外或浆膜面, 密度多均匀, 形态规则或不规则, 肿块表面可有溃疡, 中心坏死时可与肠腔相通。向腔外生长并沿肠系膜浸润: 表现为肠系膜脂肪密度增高, 系膜增厚和条索影。肠系膜周围见明显增大淋巴结, 包绕相应的系膜血管及周围脂肪, 形成“三明治征”, 增强扫描肠壁病灶或淋巴结呈轻、中度均匀强化。

结论: 小肠淋巴瘤 CTE 具有特征性表现; 小肠 CTE 检查在小肠淋巴瘤的影像诊断中具有重要价值。

PU-0812

MRI 诊断多脾综合征一例

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摘要: 目的: 分析一例多脾综合征 (Polysplenia Syndrome, PS) 患者的 MRI 表现并总结归纳 PS 的发病机制、临床症状、诊断依据及鉴别诊断。方法: 对一例多脾综合征患者进行病史采集、体格检查和 MRI 检查, 患者行手术治疗, 术后随访。结果: 患者磁共振肝静脉+下腔静脉 MRA (3.0T) 示: 脾区可见多发大小不一结节、团块影, 呈“多脾”改变。下腔静脉肝段缺如。肝左、中、右静脉走行尚可, 汇入右心房, 汇合口通畅。双肾静脉汇入奇静脉, 奇静脉明显扩张 (下腔静脉肝段缺如

伴奇静脉连接异常)。胰腺尾部缺如,呈“短胰”征象。脾门区示多发迂曲、增粗血管影,通过侧枝血管与门静脉左支相沟通。十二指肠前门静脉征象;门静脉通畅。**MRI 诊断:**可符合多脾综合征影像学表现。患者存在介入手术治疗指征,行“肝静脉、下腔静脉血管成形术”,术后一般情况尚可,症状好转。结论:在临床工作中,当患者进行胸腹部 CT 或 MRI 检查时,若发现脾脏为多个,应考虑到该综合征的可能,并应注意是否伴有其他腹腔脏器及心脏大血管的异常,以避免漏诊。**MRI** 不仅能完整显示多个脾的位置、形态、大小,而且血管成像可以直观地显示心脏及血管关系,对显示多脾综合征的各种畸形有很大的帮助,对指导临床手术治疗具有重要的意义。

PU-0813

儿童腹膜后低度恶性纤维黏液样肉瘤一例

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本文报道 1 例发生于腹膜后的低度恶性纤维黏液样肉瘤。患儿,女,2 岁 9 月,因“腹部逐渐增大半年”入院。查体:左上腹 10×10cm 大小椭圆形包块,质软,无压痛,境界清楚,活动度可。实验室检查:神经元特异性烯醇化酶 21.97ng/ml。CT 检查示左侧腹膜后软组织密度肿块,向膈上突入胸腔,行“左侧腹膜后肿瘤根治性切除术”后病理诊断考虑低度恶性纤维黏液样肉瘤。患者术后恢复良好,随访 15 个月至今未复发。

PU-0814

肝内胆管结石并胆管癌的影像学诊断要点

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目的:探讨肝内胆管结石合并胆管癌 (ICC) 的 MRI 诊断要点。

方法:近期我院 5 例影像诊断 ICC 患者回顾性分析,并结合相关文献综合分析 ICC 的 MRI 诊断要点。

结果:5 例患者均为长期 (>10 年) 肝内胆管多发结石患者,腹部疼痛不适入院,5 例均匀 60 岁以上患者,病理检查结果均提示为胆管细胞癌。CT 表现:肝内胆管多发结石,胆管明显扩张,部分肝叶萎缩;CT 增强可见萎缩肝叶实质内动脉期不均匀强化,高于同层面肝实质。MRI: T1WI, 肝左叶不规则状肿块,呈稍低信号,肿块中央见不规则索条状更低信号瘢痕影; T2WI, 肝左叶不规则状肿块,呈稍高信号,边界模糊,信号不均匀,中央呈等低信号; DWI: 肿块呈高信号,信号不均匀,弥散受限或无明显弥散受限; MRCP: 肝内胆管扩张,内见多发充盈缺损,部分可见胆管截断。MRE: 早期边缘轻中度增强,延迟扫描强化向中心扩展。

结论:长期肝内胆管结石患者,出现消瘦、贫血、CA19-9 升高应警惕合并肝内胆管细胞癌,术前诊断主要依靠影像学检查。ICC 是指左右肝管汇合部以上的肝内胆管上皮细胞起源的恶性肿瘤,在原发性肝癌中约占 10%-15%,临床中较为罕见。早期以腹痛为主要表现,常合并畏寒、发热等胆管炎症状,常被肝内胆管结石所掩盖,易被漏诊,发现时多为晚期,失去手术机会。因此,影像学诊断尤为重要,应注重 MRI 影像学表现要点, MRI: T1 表现为低信号病灶, T2 表现为外周高信号、中央低信号的异常团块。MRE: 病灶增强程度因局部血供及是否存在肿瘤组织部分坏死、肿瘤内纤维化程度不同而有所差异。动脉期不明显或部分边缘轻度增强、延迟期呈向心性增强是特征性表现; 病灶局部肝被膜明显回缩、周围肝内胆管轻度扩张则是肝内胆管癌常见的间接征象。MRCP: 可显示肝内胆管癌病灶的具体部位和累及范围,对肝内胆管结石可清晰显示结石的大小、数量、分布以及是否伴有胆管狭窄或胆管变异等。

PU-0815

胃间质瘤术前增强 CT 特征与 Ki-67 指数表达的相关性研究

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目的：探讨胃间质瘤（GST）的术前增强 CT 特征在预测 Ki-67 表达中的价值。方法：回顾性分析 54 例 GST 患者的临床病理、免疫组化及影像资料，根据免疫组化结果将患者分为 Ki-67 低表达组（Ki-67 \leq 8%，36 例）和 Ki-67 高表达组（Ki-67 $>$ 8%，18 例），利用单因素和多因素 logistic 回归分析增强 CT 特征与 Ki-67 表达之间的关系。结果：单因素分析得出肿瘤最大径、坏死百分比、生长方式和侵犯周围组织在两组间的差异具有统计学意义（均 $P<0.05$ ）。在多因素 logistic 回归中，只有侵犯周围组织与 Ki-67 高表达显著相关（OR=6.400，95%CI：1.587~25.812）。结论：增强 CT 对 GST 中 Ki-67 表达状态有较好的预测价值，有助于指导临床医生作出更精准的临床决策。

PU-0816

2 型糖尿病患者肾脏及肾周脂肪 CT 值与糖尿病肾病发生相关

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目的：本研究通过计算机断层扫描(CT)测量 2 型糖尿病(T2DM)患者肾脏及肾周脂肪的分层 CT 值，探讨 T2DM 病程中肾脏及肾周脂肪的 CT 影像学特征与糖尿病肾病发生的相关性。

方法：回顾性收集了 600 名经我院诊治的 2 型糖尿病患者及性别年龄匹配的 151 名健康对照组的临床数据及腹部 CT 平扫图像。根据 2 型糖尿病患者在我院就诊时是否伴有糖尿病肾病，将患者分为不伴 DKD 组和 DKD 组。通过使用 3D slicer 软件在双侧肾静脉最大径层面，以肾脏边缘为基准，分别向肾实质内及肾实质外脂肪每隔 3mm 勾画平行于肾实质边缘的弧线并填充 ROI。定义由肾脏向肾周脂肪（由内向外）五层分别为肾脏皮髓交界区为 RCMZ，肾脏皮质区为 RCZ，肾周脂肪最内层为 IZPF，肾周脂肪中间层为 MZPF，肾周脂肪最外层为 OZPF。采用 X² 检验、Mann-Whitney U 检验等用于假设检验。采用多因素 logistic 回归检验肾脏及肾周脂肪 5 层 CT 值与估算肾小球滤过率 eGFR 的相关性。

结果：正常组 RCMZ 的 CT 值显著高于不伴 DKD 组和糖尿病肾病组。而伴或不伴 DKD 患者的 CT 值差异无统计学意义。在 RCZ 层面，正常组和不伴 DKD 组的 CT 值显著高于 DKD 组，而正常组与不伴 DKD 组之间无显著差异。不伴 DKD 组 IZPF 层的 CT 值均低于其他两组，而其他两组 CT 值差异无统计学意义。DKD 组 MZPF 和 OZPF 的 CT 值均显著低于正常组和不伴 DKD 组，而正常组与 B 不伴 DKD 组的差异无统计学意义。多元线性回归分析显示，校正年龄、BMI、糖尿病病程、高血压史、糖尿病视网膜病变史后，eGFR 仍与 RCMZ、RCZ、MZPF 相关。

结论：基于 CT 平扫图像上对糖尿病患者肾脏及肾周脂肪的比较，我们发现 2 型糖尿病患者中，肾脏和肾周脂肪的 CT 值与糖尿病肾病的发生有关。

PU-0817

盆腔放疗后骨髓损伤的影像学研究进展

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【摘要】：放疗是前列腺、直肠、宫颈和子宫内膜恶性肿瘤最常见的治疗方法。而骨盆不仅是全身造血骨髓分布比例最大的区域，也是盆腔肿瘤患者放疗时无法避免的区域。在放疗的同时，骨髓改变引起的腰骶部疼痛等相应临床症状，易被误诊为骨转移，因此早期诊断格外重要。随着多模态成像技术的迅速发展，影像学诊断放疗后骨髓损伤的敏感性和准确率明显提高，本文就放疗后骨髓改变的影像学研究进展予以综述。

PU-0818

基于常规磁共振和临床特征的 IIIC1p 宫颈癌患者预后相关因素初步研究

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摘要：目的：评估 IIIC1p 期宫颈癌患者无病生存期 (Disease-free survival, DFS) 相关预后因素。方法：选取 2014 年 1 月至 2021 年 6 月在辽宁省肿瘤医院 (大连理工大学附属肿瘤医院) 接受手术治疗的 IIIC 期宫颈癌患者 102 例，根据第 3 年生存状况分进展组与未进展组，分析两组患者临床病理指标的差异。采用 Kaplan-Meier 法绘制生存曲线，COX 回归多因素分析确定影响 IIIC1p 期宫颈癌患者预后的独立风险因素。结果：单因素分析结果显示，T 分期、鳞状上皮细胞癌抗原 (Squamous Cell Carcinoma Antigen, SCC-Ag) 水平、磁共振成像上 (Magnetic Resonance Imaging, MRI) 肿瘤体积、转移淋巴结 (lymph node metastasis, LNM) 位置与 IIIC1p 期宫颈癌患者预后具有相关性 ($P < 0.005$)；患者年龄、肿瘤最大径、手术方式、病理类型、LNM 数量、淋巴结比 (lymph node ratio, LNR)、淋巴血管间隙浸润 (lymph-vascular space invasion, LVSI)、组织分级 (均 $P > 0.05$)。多因素分析结果显示 T 分期较晚、SCC-Ag $> 13 \text{ ng/l}$ 、LNM 位置 > 3 个为导致 IIIC1p 期宫颈癌患者 3 年 DFS 显著下降的重要因素。结论：T 分期、SCC-Ag、LNM 位置为宫颈癌患者生存时间的独立影响因素。

PU-0819

The Value of CT Spectral and Perfusion Imaging in Evaluating the Lymphovascular and Perineural Invasion of Gastric Cancer

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Purpose: The presence of lymphovascular invasion (LVI) and perineural invasion (PNI) in patients with gastric cancer (GC) is an independent risk factor for recurrence and metastases. However, the LVI/PNI status can only be retrieved from postoperative pathological specimens. Therefore, an accurate preoperative assessment of LVI and PNI in GC cases is important for patient risk stratification and the formulation of individualised treatment plans. The purpose of this study was to investigate spectral computed tomography (CT) and CT perfusion imaging in the preoperative

evaluation of LVI and PNI in GC. We investigate the utility of combining spectral CT and CT perfusion parameters in the evaluation of LVI/PNI in GC.

Methods and Materials: We prospectively analyzed 87 patients with gastric adenocarcinoma from January 2022 to February 2023. All cases were confirmed by pathology and underwent "one-stop" spectral and perfusion CT imaging examination. Patients were divided into positive (n=65) and negative (n=22) groups depending on LVI/PNI occurrence. Clinical characteristics were collected, including demographic information, serum tumor markers, and gastroscopic pathological information. The effective atomic number (Zeff), iodine concentration (IC), and water concentration were measured in the arterial (AP) and venous (VP) phases. The blood flow (BF), blood volume (BV), mean transit time (MTT), capillary permeability surface area product (PS), and time to max (Tmax) were measured in the perfusion imaging. Intra-group correlation coefficient (ICC) was used to test the consistency of the results of each parameter measured by two observers. Parameter differences between the two groups were compared. Receiver operating characteristic (ROC) curves were plotted, and areas under the curves (AUCs) were calculated to determine the diagnostic efficiency of these parameters in differentiating between the two groups. Because of the imbalance between the two groups, we further used the F1 score to compare performances.

Results: The LVI/PNI-positive group's Zeff, IC, BV, and MTT were substantially greater than those of the negative group (AP-Zeff, 8.63 ± 0.36 vs. 8.30 ± 0.36 ; VP-Zeff, 8.89 ± 0.31 vs. 8.57 ± 0.27 ; AP-IC, 17.79 ± 7.07 vs. 11.75 ± 6.58 ; VP-IC, 22.73 ± 6.33 vs. 16.54 ± 4.90 ; BV, 12.98 ± 3.67 vs. 9.12 ± 4.43 ; MTT, 14.71 ± 4.03 vs. 10.60 ± 6.03 all $p < 0.05$). The evaluated efficiency of the combination of spectral-CT and CT-perfusion parameters was superior to that of individual parameters. The BV and MTT combined with Zeff and IC in AP and VP exhibited good evaluation efficacy (AUC=0.827; F1=0.892; Accuracy=83.9%, Sensitivity=89.2%, Specificity=68.2%, PPV=89.2%, and +RL=8.3).

Conclusions: The "one-stop" spectral-perfusion CT imaging has good value in the preoperative evaluation of LVI/PNI in GC. One-stop scanning enables two types of parameters to be acquired in one scan: energy spectrum and perfusion parameters. The evaluated efficiency of the combination of spectral-CT and CT-perfusion parameters was superior to that of individual parameters.

PU-0820

多期增强 CT 诊断急性活动性胃肠道出血临床案例分析

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急性胃肠道出血 (Acute gastrointestinal bleeding, AGIB) 临床较为常见并且需要快速诊断和采取有效治疗措施。多期增强 CT 可以快速诊断胃肠道活动性出血的位置和原因等关键信息, 指导后续治疗的选择, 使其成为评估 AGIB 的潜在一线工具。本文报告 4 例 AGIB 的病例, 临床表现主要为呕血、黑便, 活动后心慌、乏力、血压下降、意识不清、昏迷等, 部分患者伴腹胀、腹痛、头晕、胸闷。实验室检查结果提示贫血和便潜血阳性。多期增强 CT 检查后准确定位消化道活动性出血灶。4 例患者中有 2 例患者经治疗后症状明显好转, 1 例患者因病情危重转入上级医院治疗后因多器官衰竭死亡, 1 例患者合并淋巴瘤及多器官衰竭, 后因失血性休克死亡。本文对多期增强 CT 在 AGIB 临床诊断中的价值进行讨论并文献综述, 旨在总结 AGIB 多期增强 CT 的影像学特点, 为 AGIB 的及时诊断提供可靠依据。

PU-0821

螺旋 CT 与腹部 X 线平片在肠梗阻的早期诊断比较

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目的比较螺旋 CT 与腹部 X 线平片对急性肠梗阻早期诊断效能。方法回顾分析 2021 年 6 月~2022 年 6 月在我院诊治的 104 例急性肠梗阻患者临床资料,患者均行腹部 X 线平片及螺旋 CT 检查,比较两种检查方法敏感度、特异度以及诊断准确性。结果螺旋 CT 诊断急性肠梗阻敏感度 86.53%、特异度 80.00%,高于腹部 X 线平片的 67.30%、65.71%($P<0.05$);螺旋 CT 诊断小肠梗阻、结肠梗阻、机械性肠梗阻、绞窄性肠梗阻的准确率均高于腹部 X 线平片($P<0.05$)。结论螺旋 CT 对急性肠梗阻的早期诊断准确率高,并且可以更加准确定位肠梗阻位置、原因,为临床的有效治疗提供可靠的参考依据,具有重要临床应用的价值。

PU-0822

卵巢癌患者满意减瘤术：CT 肠道造影对肠切除术必要性的预测价值

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目的 明确术前 CT 肠道造影 (CT enterography, CTE) 能否可靠地预测卵巢癌 (ovarian cancer, OC) 患者为实现满意减瘤术 (optimal debulking surgery, ODS) 而行肠切除术的必要性, 并比较新辅助化疗者化疗前后二次 CTE 预测的准确性, 以提高 ODS 率及避免不必要的肠切除术。方法 回顾性分析 49 例 OC 患者 (无新辅助化疗 36 例和新辅助化疗 13 例) 的术前 CTE 图像, 分析肌层是否受累及肌层受累的长度和周径。据此预测实现 ODS 所需的手术方式, 非肌层受累或肌层受累长度 $<3\text{ cm}$ 且周径 $<1/3$ 周者判断为非肠切除术, 肌层受累长度 $\geq 3\text{ cm}$ 或周径 $\geq 1/3$ 周者判断为肠切除术。以实现 ODS 所需的理想手术方式为参考标准, 采用 Kappa 分析对 CTE 预测结果与理想手术方式进行一致性检验, 计算 CTE 对 OC 患者肠切除术必要性的预测效能。结果 对无新辅助化疗者, 肌层受累长度或周径联合的 CTE 预测结果与理想手术方式一致性极好 (Kappa=0.852, $P<0.001$), 敏感性 & 特异性分别为 80.00%、100.00%, 且优于单独的肌层受累、肌层受累长度及肌层受累周径 (Kappa=0.723, $P<0.001$; Kappa=0.771, $P<0.001$; Kappa=0.684, $P<0.001$)。对新辅助化疗者, 化疗前肌层受累长度或周径联合的 CTE 预测结果与理想手术方式一致性极好, 且优于化疗后 CTE 预测结果 (Kappa=0.806 vs 0.581, P 分别为 0.003 和 0.021)。结论 通过 CTE 分析 OC 患者肠道肌层受累的长度和周径, CTE 能较可靠地预测 OC 患者为实现 ODS 而行肠切除术的必要性, 且推荐新辅助化疗者以新辅助化疗前 CTE 预测结果为参考。

PU-0823

2000-2023 年膀胱癌影像学的全球热点与研究趋势的文献计量学分析

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目的: 对膀胱癌影像学领域的相关文献进行全面的文献计量学分析, 解释该领域目前的研究热点和未来发展趋势。

方法: 我们分析了 Web of Science 核心数据集膀胱癌影像学领域 2000 年至 2023 年 7 月 25 日的所有相关文献。使用 Vosviewer 软件进行耦合, 共现, 共著和共被引分析。Bibliometrix 被用于获取国家发文量, 并根据布拉福德法则确定该领域核心期刊。Citespace 则被用于年发文量分析与关键词爆发分析。此外, Microsoft Excel (version 2019) 被用于绘制发文量图表。

结果: 最终 4033 篇文献被纳入研究。该领域文献自 2000 年来持续增长, 近五年增长尤为迅速。美国(1293)和中国(765)是产量最高的两个国家, 发文量排名前 15 的机构中有 10 家均来自美国。由 Siegel RL 在 2019 年发表于 Ca-Cancer J Clin 的文章有着最高的共被引次数。作者分析中 Shariat SF 共发文 34 篇, 是 21507 位作者中发文量最高的, 共被引最高的作者是 Herr HW(418)。根据布拉福德定律, 该领域文献的核心期刊共 33 个, 其中 J Urology 是发文量最高的期刊, European urology 在该领域有着重要地位。基于关键词可视化分析, 可以将关键词分为 4 类, 包括流行病学荟萃分析、膀胱癌进展预测、基因表达预测及预后评估。此外, 目前的研究热点为“影像组学”、“人工智能”和“多参数磁共振”。

结论: 膀胱癌影像学领域有着广泛的应用前景, 在近年受到越来越多学者的关注。美国及其机构、期刊和作者在膀胱癌影像学领域占据主导地位。中国需要加强合作, 以提升发文质量。“影像组学”、“人工智能”和“多参数磁共振”是该领域未来的研究热点。

PU-0824

Assessing synchronous ovarian metastasis in gastric cancer patients using a clinical-radiomics nomogram based on baseline abdominal contrast-enhanced CT: a two-center study

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Background

To build and validate a radiomics nomogram based on preoperative CT scans and clinical data for detecting synchronous ovarian metastasis (SOM) in female gastric cancer (GC) cases.

Methods

Pathologically confirmed GC cases in 2 cohorts were retrospectively enrolled. All cases had presurgical abdominal contrast-enhanced CT and pelvis contrast-enhanced MRI and pathological examinations for any suspicious ovarian lesions detected by MRI. Cohort 1 cases (n=101) were included as the training set. Radiomics features were obtained to develop a radscore. A nomogram combining the radscore and clinical factors was built to detect SOM. The bootstrap method was carried out in cohort 1 as internal validation. External validation was carried out in cohort 2 (n=46). Receiver operating characteristic (ROC) curve analysis, decision curve analysis (DCA) and the confusion matrix were utilized to assess the performances of the radscore, nomogram and subjective evaluation model.

Results

The nomogram, which combined age and the radscore, displayed a higher AUC than the radscore and subjective evaluation (0.910 vs 0.827 vs 0.773) in the training cohort. In the external validation cohort, the nomogram also had a higher AUC than the radscore and subjective evaluation (0.850 vs 0.790 vs 0.675). DCA and the confusion matrix confirmed the nomogram was superior to the radscore in both cohorts.

Conclusions

This pilot study showed that a nomogram model combining the radscore and clinical characteristics is useful in detecting SOM in female GC cases. It may be applied to improve clinical treatment and is superior to subjective evaluation or the radscore alone.

PU-0825

多模态 MRI 在特发性肛瘘诊断中的价值

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目的 探讨多模态 MRI 在诊断特发性肛瘘中的价值。**方法** 收集我院确诊的 135 例肛瘘患者的资料, 112 例特发性肛瘘被纳入研究, 均行 MRI 平扫、DWI、动态增强检查及手术, 以手术结果作为诊断标准, 采用 McNemar 检验比较平扫、平扫联合增强检出内口、瘘管和脓肿的准确率, $P < 0.05$ 为差异有统计学意义。MRI 评价指标: ①瘘口、瘘管及脓肿的位置与数量; ②感染是否累及直肠壁、肛提肌, 是否伴直肠阴道瘘; ③瘘管的 T2 信号与动态强化特点; ④肛瘘 MRI 分级。**结果** 112 例中男、女性各 96、16 例, 平均年龄 (35.2 ± 9.5) 岁。手术探及内口 180 个, 瘘管 227 条。平扫检出内口 158 个, 瘘管 202 条。平扫联合增强检出内口 169 个, 距肛缘平均 (28.74 ± 9.36) mm, 瘘管 213 条。手术、平扫、DWI、平扫联合增强均检出脓肿 109 个。与手术结果比较, 平扫, 平扫联合增强检出内口、瘘管及脓肿的准确率无明显差异 ($P > 0.05$)。28 例直肠壁、22 例肛提肌受累, 3 例伴直肠阴道瘘。瘘管 T2 信号与强化: ①31 条明显高信号、外缘强化; ②76 条高信号、明显强化; ③41 条低信号、延迟强化; ④65 条信号混杂、强化不均。肛瘘 MRI 分级 1~5 级分别为 14、37、31、22、8 例。**结论** 多模态 MRI 检查可清晰显示肛瘘, MRI 平扫、平扫联合增强检出内口、瘘管和脓肿的准确率无明显差异, 但动态增强有助于判断瘘管的活动性。

PU-0826

多模态 MRI 定量参数诊断肝细胞癌 Ki67 的价值

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目的 多模态 MRI 定量参数术前预测肝细胞癌(HCC)Ki-67 状态的价值。

方法 收集我院术后病理证实为 HCC 且 Ki-67 信息完整的 21 例患者, 按照 Ki-67 状态, 分为低表达(标记指数 $\leq 10\%$)组(10 例)和高表达(标记指数 $> 10\%$)组(11 例)。所有患者均接受腹部磁共振检查, 包括 T1WI、T2WI、扩散峰度成像(DKI)、增强 T2*加权血管成像(ESWAN)、体素内不相干运动扩散加权成像(IVIM-DWI)。在 GE AW4.6 工作站, 对 DKI、ESWAN、IVIM-DWI 图像进行后处理, 得到 FA、MD、Da、Dr、FAK、MK、Ka、Kr、Magnitude、Phase、R2*、T2*、standard ADC、D Mono、D* Mono、f Mono、D Bi、D* Bi、f Bi、DDC 和 α 。参照 T2WI 图像放置 ROI。采用 SPSS 26.0 及 medcalc 软件进行分析。Mann-Whitney U 检验进行比较。有统计学差异者 ($P < 0.05$) 进行受试者操作特性曲线(ROC)分析以评估预测性能。

结果 高表达组的 Dr、T2*、standard ADC 和 DDC 均低于低表达组, 高表达组的 R2*高于低表达组, 差异具有统计学意义($P < 0.05$)。Dr、R2*、T2*、standard ADC 和 DDC 预测 HCC Ki-67 表达的 AUC 分别为 0.823、0.882、0.873、0.864 和 0.836。Dr、R2*、T2*、standard ADC 和 DDC 联合后, 效能提升至 0.936。

结论 高 Ki-67 HCC 组的 DDC 值低于低 Ki-67 HCC 组, DDC 表示平均扩散速率, 癌细胞增殖迅速, 细胞密度高, Ki-67 水平高时细胞排列紧密, 导致细胞外空间减少, 水分子扩散受限。高 Ki-67 HCC 组的 R2*显著高于低 Ki-67 HCC 组, 这可能是由于高 Ki-67 HCC 组的新生血管形成更畸形和代谢水平较高, 导致肿瘤处于相对缺氧状态。综上所述, 多模态 MRI 定量参数在预测 HCC 患者

Ki-67 状态有较高效能, 提示功能 MRI 的定量参数对临床实践中术前无创准确预测预后相关指标有一定价值。

PU-0827

胰头部 Castleman 病一例并文献复习

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目的 分析胰头部 Castleman 病的 CT 和 MRI 表现特征, 提高诊断正确性, 加强对胰头部占位的鉴别诊断。 **方法** 通过 1 例胰头部 Castleman 病例回顾国内外相关报道, 总结胰头区 Castleman 病的 CT 和 MRI 影像特征。 **结果** 患者以无诱因肝区隐痛、厌油、身黄、目黄、小便黄为主要表现, 实验室检查肝功异常, 影像学检查见胰头区富血供肿瘤, 最大径约 5.4cm, 术中探查见一不规则红色实性包块紧密生长, 邻近腹膜后多组反应性淋巴结增生, 术后病理提示透明血管型 Castleman 病。 **结论** 胰头区 Castleman 病是罕见的淋巴组织增生性疾病, 临床表现及 CT、MRI 表现均无明显特异性, 术前诊断较为困难, 误诊率极高, 确诊依赖病理组织学检查, 其治疗以手术为主, 疗效显著。

PU-0828

Differential diagnosis of duodenal papillary adenoma and duodenal papillary carcinoma

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Purpose: To investigate the differential clinical and imaging features between duodenal papillary adenoma (DPA) and duodenal papillary carcinoma (DPC).

Methods: CT findings and clinical data of 60 patients with DPA and 80 patients with DPC were retrospectively analyzed. Observation and measuring of direct duodenal papilla signs (including size, shape, density, enhancement characteristics, and feeding artery), indirect duodenal papilla signs (including pancreaticobiliary dilatation, stenosis pattern of the lower end of common bile duct) and clinical features (including age, gender, tumor markers CA19-9, CA125, CEA, blood routine white blood cell count, bilirubin, jaundice and gastrointestinal symptoms) were carried out according to CT as well as statistical analysis.

Results: For clinical characteristics, older age, higher level of CA19-9, total bilirubin, and direct bilirubin were more common in DPC (all $p < 0.05$). No significant differences in gender, CEA, CA125, white blood cell count, jaundice, and gastrointestinal symptoms were observed between the groups (all $p > 0.05$). With regard to CT features, lobulated tumor morphology, feeding artery, and bird-bill-like stenosis of the lower end of common bile duct were more commonly seen in DPA, while regular tumor morphology, target sign, straight truncation of the lower end of common bile duct, larger diameter of common bile duct and pancreatic duct, and higher total bilirubin and direct bilirubin were more frequently observed in DPC (all $p < 0.001$). No significant differences in the maximum transverse diameter of tumor, CT value of plain scan and each phase after enhancement, enhancement uniformity, and cup-like filling defect of the lower end of common bile duct were observed between the groups (all $p > 0.05$).

Conclusions: DPA and DPC have different clinical and imaging characteristics. An adequate understanding of these differential features can contribute to the early diagnosis of DPA and DPC and the subsequent therapeutic strategy.

PU-0829

Multi-b-value diffusion-weighted imaging to evaluate the synergistic anti-proliferation and anti-heterogeneity effects of bufalin plus sorafenib in an orthotopic HCC model

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Background Multi-b-value diffusion-weighted imaging (DWI) with different postprocessing models, allows for simultaneous reflection of hepatocellular carcinoma (HCC) proliferation, heterogeneity characterization and evaluation of feasible treatment strategies. We aim to assess synergistic effects of bufalin plus sorafenib in orthotopic HCC-LM3 xenograft nude mice models by using DWI of intravoxel incoherent motion (IVIM), diffusion kurtosis imaging (DKI), a stretched exponential model (SEM) and a fractional-order calculus (FROC) model.

Methods Twenty-four orthotopic HCC-LM3 xenograft mice were divided into bufalin plus sorafenib, bufalin, sorafenib treatment groups, and control group. Multi-b-value DWI was performed using a 3T MR scanner after three weeks' treatment to obtain true diffusion coefficient D_t , pseudo-diffusion coefficient D_p , perfusion fraction f , mean diffusivity (MD), mean kurtosis (MK), distributed diffusion coefficient (DDC), heterogeneity index α , diffusion coefficient D , fractional order parameter β , and microstructural quantity μ . Necrotic fraction (NF), micro-vessel density (MVD), and standard deviation (SD) of hematoxylin-eosin staining were evaluated. Correlations of DWI parameters with histopathological results were analysed, and all measurements were compared among the four groups.

Results In the final 22 mice, f was positively correlated with MVD ($r=0.679$, $p=0.001$). Significantly good correlations of MK ($r=0.677$), α ($r=-0.696$), and β ($r=-0.639$) with SD were observed (all $p<0.01$). f , MK, MVD and SD were much lower, while MD, α , β and NF were higher in bufalin plus sorafenib group than control group (all $p<0.05$). **Conclusion** Evaluated by IVIM, DKI, SEM and FROC, bufalin plus sorafenib treatment was found to inhibit tumor proliferation and reduce spatial heterogeneity in HCC-LM3 models.

PU-0830

肝未分化胚胎性肉瘤病例分析 1 例

严卉

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肝未分化胚胎性肉瘤 (UESL) 是位居儿童肝脏恶性疾病的第三位, 临床术前诊断困难且极易误诊的儿童肝脏恶性肿瘤, 加强对疾病的认识对其治疗及预后是十分必要的。所以为了更好的认识本疾病, 特选取徐州医科大学附属医院病例 1 例将其影像特征及病理对照说明该疾病特点。

PU-0831

CTA 诊断肾脏混合瘤一例

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混合瘤是指两种明显不同且不相关的肿瘤类型出现在同一器官的同一部位，形成一个单独的病灶的现象。IVLBCL 在实体瘤，如卵巢癌和乳腺癌，胃肠道间质瘤和血管肿瘤，如血管瘤、淋巴管瘤、血管脂肪瘤中的研究。肾内的混合性肿瘤包括 RCC 与集合管癌、尿路上皮癌和 Burkitt 淋巴瘤并存。肾脏表现为肾细胞癌伴广泛血管内淋巴瘤，它被认为是 IVLBCL，但在本例中，它与 DLBCL 相关联。此次报告 IVLBCL 并发肾癌，作为一个罕见的混合肿瘤表现为一个孤立的肾脏肿块。这个病例不同于以前的病例，因为在我们的病例中，病人没有其他已知的淋巴瘤，并且最初的诊断是在肾脏病变上做出的。

PU-0832

基于 CT 图像纹理分析鉴别肾上腺乏脂性腺瘤与肾上腺转移瘤的价值研究

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【摘要】目的 探讨基于 CT 图像的纹理分析鉴别乏脂性肾上腺皮质腺瘤及肾上腺转移瘤的价值。方法 回顾性分析 2015 年 12 月至 2020 年 12 月皖南医学院经手术病理及长期随访证实的共 142 例乏脂性肾上腺皮质腺瘤与肾上腺转移瘤患者完整资料，根据病理及随访结果分为腺瘤组 (n=89) 与转移瘤组 (n=53)，按照 7: 3 比例随机将患者分为训练组 (n=101) 及验证组 (n=41)。所有患者均行腹部 CT 增强扫描。使用 ITK-SNAP 软件分别手动逐层勾画平扫及三期 CT 图像上肿瘤感兴趣区 (ROI)，并进行三维融合，然后导入 AK 软件提取纹理特征；利用最小冗余最大相关 (mRMR) 和最小绝对收敛和选择算子 (LASSO) 回归分析进行特征选择并建立影像组学标签，绘制受试者工作特征 (ROC) 曲线评价模型的鉴别能力；应用决策曲线分析 (DCA) 评估模型的临床价值。结果 CT 平扫、动脉期、静脉期、延迟期和多期相扫描联合模型在训练组和验证组中鉴别乏脂性肾上腺皮质腺瘤和肾上腺转移瘤曲线下面积 (AUC) (95%CI) 分别为 0.94 (0.90-0.99) 和 0.94 (0.88-1.00)、0.92 (0.86-0.97) 和 0.94 (0.87-1.00)、0.95 (0.92-0.99) 和 0.96 (0.92-1.00)、0.93 (0.88-0.98) 和 0.93 (0.85-1.00) 以及 0.97 (0.94-1.00) 和 0.98 (0.95-1.00)。DAC 显示 CT 平扫、动脉期、静脉期、延迟期和多期相扫描联合模型均具有较高鉴别乏脂性肾上腺皮质腺瘤和肾上腺转移瘤的效能。结论 常规 CT 平扫+增强各期模型和多期联合模型均具有很高鉴别乏脂性肾上腺皮质腺瘤与肾上腺转移瘤的效能，其中多期联合模型的诊断效能最高，对两者疾病的鉴别诊断最具有临床意义，为研究二者之间的鉴别诊断提供了一种新的定量分析方法。

【关键词】 肾上腺；腺瘤；转移瘤；CT 纹理分析 (CTTA)

PU-0833

门静脉 CTA 影像特征在肝硬化门静脉高压中的应用价值

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徐州医科大学附属医院

目的：门静脉高压（PH）是晚期慢性肝病（ACLD）的一个关键特征，它在很大程度上决定了 ACLD 患者肝脏相关并发症的发展及其死亡风险。目前，HVPG（肝静脉压力梯度）是监控门静脉高压的金标准，但 HVPG 检测是有创的，并且具有严重的并发症。因此限制了 HVPG 在门静脉高压检测中的广泛应用。肝脏血管检查(CTA) 检测速度快，无创并且重复性高，是评估门静脉高压常用影像学手段，在临床上应用十分广泛。因此，本研究旨在探究门静脉 CTA 的影像特征在评估肝硬化门静脉高压中的应用价值，为门静脉高压的诊断和治疗提供新的评估手段。

方法：选取 2017 年 9 月 1 日至 2022 年 9 月 1 日于徐州医科大学附属医院就诊的肝硬化门静脉高压患者。测量每位患者在 HVPG 测定 1 周内的门静脉 CTA 影像特征（包括门静脉主干宽度，脾静脉宽度、门静脉与脾静脉宽度比值，脾最大横径以及肝脏和脾脏体积）。根据 HVPG 将门静脉高压患者分为门静脉压正常组（HVPG≤6 mmHg）和门静脉高压组（HVPG>6mmHg）。肝硬化纳入标准符合《肝硬化诊治指南》，HVPG 的测定符合《中国肝静脉压力梯度临床应用专家共识（2018 版）》。对两组患者一般临床资料进行分析。采用单因素和多因素逻辑回归筛选诊断门静脉高压的独立危险因子。ROC 曲线下面积（AUC）评估门静脉 CTA 影像特征在评估门静脉高压中的准确度和诊断价值。

结果：对门静脉压正常组和门静脉高压组的基线分析，两组的门静脉 CTA 影像特征之间差异存在统计学差异。单因素和多因素逻辑回归分析门静脉主干宽度是门静脉高压的独立影响因子，可以作为一种评估门静脉高压的参考指标。ROC 曲线下面积（AUC）提示门静脉 CTA 影像特征具有较好的诊断效能。

结论：CT 门静脉成像对于观察门静脉和脾静脉宽度、走行及形态特点具有巨大优势,可以作为评估门静脉高压的一种手段,对病情评估和预后判断具有重要价值。

PU-0834

腹膜假粘液瘤 1 例

李博

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腹膜假性粘液瘤，又称 PMP 综合症，分为原发性和继发性改变，大多数为恶性肿瘤的腹膜种植或良性囊肿破裂刺激腹膜所致的继发性病变，以腹腔内大量黏液性物质积聚和腹膜多发黏液性肿物为特征。1991 年 Young 等人指出 PMP 相关的病变实际继发于阑尾，阑尾粘液肿瘤被认为是 PMP 的主要原发灶，少数来源于卵巢、结肠、胰腺等。PMP 蔓延方式存在着三种假设：①通过人体解剖结构中的间隙扩散：腹膜液体的回流途径是主要途径，同时在重力的作用下，可广泛累及腹腔、盆腔；②粘液囊肿破裂种植于腹膜和重新再分配现象；③肿瘤转移导致腹膜间皮细胞发生变异而大量繁殖且产生大量粘液所致。典型者表现为大量且透声差的不均质腹水，呈蜂窝状，随呼吸、体位可移动；液性区域分布范围广泛，可累及肝缘、脾缘、大网膜及盆腔，肠管受压移位，无漂浮感，其内可见分隔，肝周、脾周可形成压迹；部分瘤体内可见钙化强回声；累及网膜时，大网膜增厚明显，形成网膜饼。特征性的 CT 征象为腹盆腔脏器扇贝样压迹、腹盆腔分房粘液性团块、网膜、肠系膜浸润及网膜饼状改变，其中增厚的腹膜/网膜内粘液团块是腹膜假性粘液瘤最具特征性的征象；大量粘液形成时(CT 值近似水或略高)形似大量腹水，粘液多分布于前方网膜，使肠管不能到达前腹壁，改变体位无腹水流动现象；部分除了见到腹腔囊样包块外，还可显示原发灶及网膜、腹膜及肠系膜

浸润改变、腹膜后淋巴结肿大，并且可以侵犯实质器官，形成肝脾内浸润性病灶，很少通过血液或淋巴管向腹腔外转移。

PMP 术前诊断较难，超声、CT 及 MRI 等影像学方法在 PMP 诊断中虽得到应用，但尚需积累经验，主要因为缺乏特征性临床表现及特异的检查方法，临床常以腹痛、腹胀、腹部包块就诊，影像学常表现为腹腔大范围的液暗区，内结构紊乱，原发灶隐藏其中不易显示，难以与腹盆腔其它恶性肿瘤伴腹膜转移鉴别，尤其来源于卵巢及肠道的恶性肿瘤。

PU-0835

膀胱血管周上皮样细胞肿瘤 (PEComa)：病例报道及临床影像特征回顾

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摘要：血管周上皮样细胞肿瘤(perivascular epithelioid cell tumor, PEComa)被定义为一种间充质肿瘤，PEComa 家族包括血管平滑肌脂肪瘤、淋巴管平滑肌瘤病、透明细胞糖瘤和其他发生在不同部位的血管周围上皮样细胞来源的肿瘤。膀胱 PEComa 非常罕见。2023 年我院诊断膀胱 PEComa 1 例，现报道如下，并结合相关文献进行复习，以探讨其病理学特征、诊断、鉴别诊断和预后，以期进一步提高对该病的认识。

方法：回顾性分析本院 2023 年诊断的一例膀胱 PEComa 的临床表现、影像学特点，讨论其病理学特征、诊断、鉴别诊断和预后，并结合相关文献进行分析。

结果：患者，男，15 岁，体检发现膀胱占位性病变 1 周遂就诊于我院，影像 MRI 表现为：膀胱右上方占位，呈等长 T1 等短 T2 混杂信号影，DWI 序列呈部分高信号，病灶大小约：6.3cm*6.1cm*5.2cm（上下径*左右径*前后径），邻近膀胱受压，与膀胱壁分界不清。CT 表现为：膀胱右前壁混杂密度肿块影，边界清楚，腔内外生长，最大截面约：5.0cm*6.2cm，平扫 CT 值约 20-79HU，增强扫描呈明显不均匀强化，其内可见迂曲小血管影，周围脂肪间隙略模糊。

结论：膀胱血管周上皮样细胞肿瘤非常罕见，膀胱血管周上皮样细胞肿瘤在中青年患者中更常见，平均年龄 39 岁，男女比例为 1: 1.3。临床上多表现为泌尿道症状，排尿困难或下腹部不适，或肉眼血尿。但部分患者症状多不典型；或因痛经、亦或慢性骨盆疼痛就诊而发现，女性患者症状不随月经周期而改变。肿块常突出于膀胱腔内，也可呈外生性生长。在影像上，病灶大于 5cm 或观察到肿瘤边界浸润、肿瘤坏死、肿瘤周围血管侵犯等征象，常常提示恶性可能性大。

PU-0836

最小表观扩散系数值在鉴别透明细胞癌可能性评分 3 分病变中的价值

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目的：探讨磁共振扩散加权成像 (DWI) 最小表观扩散系数 (ADC) 值 (ADCmin) 在鉴别透明细胞癌可能性评分 (ccLS) 3 分病变中的价值。

方法：回顾性收集解放军总医院第一医学中心 2019 年 1 月至 2021 年 12 月 59 例经病理证实且 ccLS 评定为 3 分肾脏实性小肿瘤 (SRM) 患者的临床资料和 MR 检查资料。所有病例术前行磁共振 DWI 检查 (b 值=0, 800s/mm²)。由一名腹部放射学医师在肿瘤实性部分测量 ADCmin，使用

独立样本秩和检验比较 ccRCC 与非 ccRCC 病变 ADCmin 差异, 采用 ROC 曲线评估 ADCmin 在鉴别 ccLS 3 分病变中 ccRCC 与非 ccRCC 的诊断效能。

结果: 59 例患者 (59 个肿瘤) 平均年龄为 54.4 ± 11.6 岁, 男性 38 例 (64.4%), 女性 12 例 (35.6%)。其中 ccRCC 42 例, 乳头状肾细胞癌 2 例, 肾嫌色细胞癌 6 例, 肾血管平滑肌脂肪瘤 5 例, 肾嗜酸细胞腺瘤 4 例。在 ccLS 3 分 SRM 中, 非 ccRCC 病变的 ADCmin 显著低于 ccRCC 病变 [$1.220 (1.030, 1.405)$ vs $1.550 (1.190, 1.690) \times 10^{-3} \text{ mm}^2/\text{s}$, $P=0.01$]。使用 ADCmin 鉴别 ccRCC 与非 ccRCC 的最佳阈值为 $1.465 \times 10^{-3} \text{ mm}^2/\text{s}$, 诊断 ccRCC 的敏感度为 64.3%, 特异度为 88.2%。

结论: ADCmin 可高特异性鉴别 ccLS 3 分 SRM 中 ccRCC 与非 ccRCC 病变, 或可提高 ccLS 系统对于 ccRCC 的诊断效能。

PU-0837

胃癌影像组学研究进展

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目的: CT 已被广泛应用于胃癌的鉴别诊断、术前评估和治疗评价, 与传统的影像不同, “影像组学”能够提取疾病的潜在特征, 具体显示从影像图像中提取大量的纹理、密度、形态和滤波等特征, 然后进行特征选择, 最终利用选择出的影像组学特征建立预测模型, 为个性化精准医疗量化提供客观依据。本文旨在探讨在 CT 影像组学在胃癌各方面的最新进展。

方法: 通过中英文文献数据库, 搜索胃癌相关的影像组学文献, 总结影像组学在胃癌诊疗中的最新进展。

结果: 在过去的研究中, 影像组学已经被证明对胃癌的鉴别诊断、分型、淋巴结转移、腹膜转移预后判断等方面具有重要价值。

结论: 胃癌是我国常见的恶性肿瘤, 其发病率和死亡率占有所有恶性肿瘤的第三位。目前我国胃癌患者 5 年生存率约在 35%, 明显低于日本和韩国, 由于日本推行全民早期胃癌筛查, 大约 80% 的胃癌患者都为早期患者, 而我国胃癌患者大多是晚期患者。Sun 等通过三期增强 CT 图像联合深度学习影像组学特征、结节状突起征、脂肪浸润征和高强化浆膜征等影像征象构建的诺谟图, 其鉴别 cT3 与 cT4a 期的效能(AUC)达到 0.90。Pan 等另辟蹊径, 分析胃癌病人的脾脏影像组学特征预测浆膜浸润情况, 联合术前血红蛋白水平和血小板 / 淋巴细胞比例等血液学指标, 其在验证组的诊断效能(Auc)为 0.837。影像组学预测模型对预测胃癌淋巴结转移情况具有较好的准确性, 然而使用的方法不同, 预测模型的 AUC 值会有所不同, 其中 Yang 等提取了胃癌病灶和淋巴结的 CT 影像组学特征, 并用序列向前特征选择的方法筛选影像组学特征建立的预测模型的 AUC 值最高。Dong 等提取了胃癌病变和腹膜区域的 CT 门脉期的影像组学特征, 通过多元逻辑回归分析, 建立了 1 个结合影像组学特征和胃癌 Lauren 分型的预测模型得到较高的 AUC 值。部分研究探究影像组学对于新辅助化疗后肿瘤降期的预测表现。原发性胃淋巴瘤和胃间质瘤是需要与胃癌鉴别的胃部常见肿瘤, 有研究利用病理全视野数字切片迁移的深度学习模型来鉴别病人的 CT 图像, 构建包括迁移学习影像组学在内的复合模型对于鉴别 BorrmannIV 型胃癌与 PGL 有良好的效能。

PU-0838

A clinical-radiomics nomogram based on dual-layer spectral detector CT to predict pancreatic ductal adenocarcinoma stage

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Objectives: To evaluate the performance of radiomics signatures based on polyenergetic images (PEIs) and virtual monoenergetic images (VMIs) obtained from dual-layer spectral detector CT (DLCT) and to build a clinical-radiomics nomogram for predicting the cancer stage (early stage: stage I-II, advanced stage: stage III-IV) of pancreatic ductal adenocarcinoma (PDAC).

Materials and Methods: A total of 173 patients with PDAC who underwent contrast-enhanced DLCT were enrolled. Radiomics features were extracted from PEI and 40 keV VMI, which were reconstructed at the arterial phase as well as the portal venous phase. LASSO regression was performed to construct PEI-based and 40-keV VMI-based radiomics signatures. A radiomics nomogram was developed by combining the 40-keV VMI-based radiomics signature and selected clinical predictors. Receiver operating characteristic (ROC) curves, calibration curves and decision curve analysis (DCA) were utilized to assess the performance of the nomogram on discrimination, calibration and clinical utility, respectively.

Results: Among 173 patients (mean age, 61 years \pm 9 [SD]; 106 male), 49 were in the early stage, and 124 were in the advanced stage. All patients were randomly categorized into training (n=122) and test (n=51) cohorts at a 7:3 ratio. The PEI-based radiomics signature had AUCs of 0.92 in both the training and test cohorts, while the 40-keV VMI signature had AUCs of 0.96 and 0.94, respectively. The 40-keV VMI-based nomogram achieved favourable calibration and discrimination in the training cohort (AUC, 0.97) and test cohort (AUC, 0.91). The clinical-radiomics nomogram exhibited the best clinical benefit by DCA.

Conclusion: The DLCT-based clinical-radiomics nomogram combined 40-keV VMI-based radiomics signature with two clinical parameters (tumor diameter and normalized iodine density at portal venous phase) showed outstanding performance for stratifying early from advanced stages of PDAC, which could help clinical decision-making in the management of PDAC patients.

PU-0839

卵巢静脉综合征病例分析 1 例

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背景卵巢静脉综合征(OVS)是一种罕见的疾病,由卵巢静脉曲张、扩张引起慢性输尿管梗阻。OVS的临床症状包括肾绞痛、尿肾萎缩、肾下垂、胃痛、慢性腰痛、部分患者甚至肾功能受损。卵巢静脉增粗压迫邻近输尿管后,导致其慢性梗阻,造成输尿管“通而不畅”引起泌尿系多发结石和反复肾盂肾炎,如果得不到准确的诊断,患者往往长期经受病痛折磨,甚至多次手术治疗,更有甚者引起肾功能不全,导致严重后果。OVS 很难诊断,目前最主要的诊断方法是影像学检查。

PU-0840

Imaging characteristics of clear cell papillary renal cell carcinoma: Identifying the sheep in wolf's clothing

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Objective: This study aimed to describe the characteristics of computed tomography (CT) and magnetic resonance imaging (MRI) of clear cell papillary renal cell carcinoma (CCPRCC).

Methods: This retrospective study comprised 27 patients diagnosed with 29 tumors of CCPRCC. The study was approved by the Medical Ethics Committee and the requirement for the informed consent was waived. The inclusion criteria stipulated pathology-confirmed CCPRCCs with at least one preoperative imaging examination, including CT or MRI. Two experienced radiologists independently analyzed the imaging characteristics, including size, location, growth mode, morphology, texture, density, and enhancement pattern. Paired t-test was used to compare differences in CT Hounsfield unit values and apparent diffusion coefficient (ADC) imaging between the tumor and the renal cortex.

Results: The mean age of the 27 patients was 57.0 ± 14.2 years. Nineteen patients underwent CT, while 12 underwent MRI. Among the cases, 26 (96%) were single, and 1 (4%) was multiple, consisting of three lesions. Out of the 29 tumors, 15 (52%) were located in the left kidney and 14 (48%) in the right kidney. The mean tumor diameter was 3.3 ± 1.7 cm. Furthermore, 19 (66%), 3 (10%), and 7 (24%) tumors were solid, cystic, mixed solid, and cystic type, respectively. The growth mode was endogenous and exogenous in 8 (28%) and 21 (72%) tumors, respectively. The tumor shape was irregular and round in 5 (17%) and 24 (83%) tumors, respectively. The CT value of the tumor was approximately 33.2 ± 9.8 HU, which was not significantly different from that of the renal cortex (31.1 ± 6.3 HU) ($p = 0.343$). Furthermore, 7 (24%), 12 (41%), and 3 (10%) had calcification, cystic degeneration, and hemorrhage, respectively. In 12 tumors, hypointense and hyperintense were predominant on T1 and T2-weighted images, respectively. The tumor capsule was found at the edge of 12 tumors. The average ADC value of the tumor ($1.54 \pm 0.74 \times 10^{-3} \text{ mm}^2/\text{s}$) and that of the renal cortex ($1.68 \pm 0.63 \times 10^{-3} \text{ mm}^2/\text{s}$) was not statistically significantly different ($p = 0.260$). The enhancement scanning revealed "wash-in and wash-out" enhancement in 19 (68%) tumors, continuous or progressive enhancement in 6 (21%) tumors, and enhanced cystic wall and central separation in 3 (11%) tumors.

Conclusions: CCPRCC occurs more likely in middle-aged and elderly individuals, and the tumor is prone to cystic degeneration, with rare bleeding and calcification, and no obvious limitation on MRI diffusion-weighted imaging, which enhancement form performs as mainly "wash-in and wash-out," but the final diagnosis depends on histopathology.

PU-0841

基于 CT 肝细胞外体积分数对门静脉高压症术后再出血的预测价值

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目的: 探讨 CT 肝细胞外体积分数 (ECV) 预测肝硬化门静脉高压症术后胃底食管静脉再出血的价值。

方法: 回顾性分析 154 例门静脉高压患者行经腹腔镜脾切除联合贲门周围血管离断术 (LSD) 的患者 CT 增强图像。所有病人在术前均行腹部增强 CT 检查, 经过术后一年的随访, 将患者分为再出血组和非再出血组。选取延迟期图像, 分别测量肝脏、脾脏及主动脉的增强前后 CT 值, 计算肝脏及脾脏细胞外体积分数 (ECV)。比较 ECV 在再出血与非再出血组之间差异。通过多因素分析筛选再出血相关危险因素。构建 ECV 及联合临床参数模型, 使用受试者工作曲线下面积 (AUC) 评估构建模型的预测效能。

结果: LSD 术后再出血组肝脏 ECV 值显著低于非再出血组 ($32.0 \pm 4.5\%$ vs. $39.9 \pm 4.0\%$, $P < 0.0001$)。再出血组脾脏 ECV 低于非再出血组 ($42.1 \pm 7.5\%$ vs. $46.2 \pm 6.8\%$, $P = 0.002$)。凝血酶原时间 (PT)、纤维蛋白原 (FIB)、肝脏 ECV 是患者发生术后再出血的独立危险因素, 其再出

血的诊断效能 AUC 值分别为 0.711, 0.724, 0.923。肝脏 ECV 联合模型 AUC 值为 0.963, 与肝脏 ECV 模型无统计学差异。

结论: 肝脏 ECV 能有效预测门静脉高压患者 LSD 术后再出血的发生, 优于 PT、FIB 实验室检查参数。

PU-0842

联合 DWI 及肝胆期低信号的新模型对小肝癌诊断价值研究

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目的: 探讨基于联合 DWI 高信号及肝胆期低信号的诊断模型对小肝癌的诊断效能。方法: 回顾性分析 50 名行钆塞酸二钠增强磁共振发现肝内直径 $\leq 3\text{cm}$ 的局灶性病变并获得病理结果或临床随访确诊的患者, 共 95 例肝脏结节。由 2 名医师共同评估每个患者肝脏结节数目、直径、部位及影像征象。制定三种诊断模型, 模型一为“动脉期非环形高强化+门静脉期廓清(低信号)”, 模型二为“动脉期非环形高强化+门静脉期廓清(低信号)+肝胆期低信号”, 模型三为“动脉期非环形高强化+门静脉期廓清(低信号)+肝胆期低信号+DWI 高信号”, 分析三种模型对小肝癌的诊断灵敏度、特异度及准确度, 最后通过受试者工作特征 ROC 曲线获得曲线下面积 AUC 评估各模型性能。结果: 研究纳入的 95 例结节包括肝细胞癌 63 例, 占比 62.32%, 非 HCC 32 个(包括胆管细胞癌 2 个、肝脏不典型增生结节 4 个、肝脏局灶性脂肪变性 1 个、肝脏神经内分泌肿瘤 1 个、血管平滑肌脂肪瘤 1 个、转移瘤 2 个及临床随访诊断良性结节 21 个), 占比 37.68%。在肝细胞癌诊断中, 模型一的诊断灵敏度、特异度、准确度及 AUC 分别为 55.56% (35/63)、84.36% (27/32)、65.26% (62/95)、0.700(95%CI: 0.592-0.808), 模型二的诊断灵敏度、特异度、准确度及 ROC 曲线下面积分别为 88.89% (56/63)、68.75% (22/32)、82.11% (78/95)、0.757(95%CI: 0.644-0.871), 模型三的诊断灵敏度、特异度、准确度及 ROC 曲线下面积分别为 85.71% (54/63)、81.25% (26/32)、84.21% (80/95)、0.835(95%CI: 0.742-0.928), 三种模型中, 模型二、模型三诊断灵敏度均较模型一明显提高, 模型二诊断特异度明显降低, 加入 DWI 高信号的模型三较模型一特异度则未见明显降低。通过勾画、对比 ROC 曲线, 模型三具有更高的 AUC 值。结论: 在小肝癌的诊断中, 联合肝胆期低信号及 DWI 高信号的新诊断模型较传统“动脉期非环形高强化+门静脉期廓清(低信号)”的诊断标准具有更高的诊断效能。

PU-0843

GRASP DCE-MRI 在鉴别子宫内膜良恶性病变的价值

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目的

本研究的目的是前瞻性地评估定量 DCE 参数, 包括 K_{trans} 、 K_{ep} 、 V_e 对子宫内膜肿瘤患者的价值, 尤其是对于小于 5mm 的病变的检出, 此外, 还讨论了有统计学意义参数鉴别良恶性病变的参考值。

方法

从 2020 年 8 月报 2020 年 11 月 88 名临床怀疑女性盆腔恶性病变的患者(女性, 平均年龄 54.5 岁, 范围 27-81 岁)被纳入本研究。所有 MR 检查均在 3T MRI 扫描仪(MAGNETOM Vida, Siemens Healthcare, Erlange, Germany)上进行。包括常规平扫序列及动态增强序列, 扫描参数: $\text{TR/TE} = 4.1/1.86/\text{ms}$, 层厚 = 3mm, 层数 = 40, $\text{FOV} = 240 \times 240\text{mm}^2$, 矩阵 = 224×224 , 体素 =

1.1 × 1.1 × 3.0 mm³, 总采集时间 = 5min38sec。评估 GRASP MRI-DCE 定量参数包括 K_{trans}、K_{ep}、V_e 的敏感性和特异性。

结果

本研究中分别有 69 例良性子宫内膜病变和 19 例子官内膜恶性病变患者。良性组的 K_{ep} 值显著低于恶性组 ($0.627 \pm 0.673 \text{ min}^{-1}$ v.s. $1.412 \pm 1.143 \text{ min}^{-1}$; $p < 0.05$)。K_{ep} 值的 ROC 曲线下面积为 0.82, 最佳 cutoff 值是 0.527 min^{-1} (敏感性:0.95, 特异性:0.61)。此外良性组的 V_e 值略高于恶性组, (0.340 ± 0.198 v.s. 0.147 ± 0.057 ; $p < 0.05$)。V_e 值的 ROV 曲线下面积是 0.85, cutoff 值是 0.206, (敏感性:0.81, 特异性:0.90)。两组的 K_{trans} 值无统计学意义 ($0.157 \pm 0.134 \text{ min}^{-1}$ v.s. $0.231 \pm 0.233 \text{ min}^{-1}$; $p > 0.05$)。

结论

DCE-MRI 的定量参数为描述患者血流动力学提供了一种新的、无创的方法, 结果表明, 良性组的 K_{ep} 值低于恶性组, 而良性组的 V_e 值高于恶性组, 但 K_{trans} 值在两组之间没有统计学差异。GRASP DCE-MRI 可同时获得较高的空间和时间分辨率, 提高小病灶的检出率。

PU-0844

基于增强 CT 影像组学和机器学习预测胆囊息肉样病变性质的应用价值研究

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目的 基于不同病理类型的胆囊息肉样病变预后差异显著, 目前治疗指南颇受争议。探讨不同机器学习的影像组学模型预测胆固醇性胆囊息肉和腺瘤性胆囊息肉的价值。**方法** 回顾性分析 2015 年 9 月至 2022 年 9 月苏州市第九人民医院的 100 例经手术病理证实的胆固醇性息肉和腺瘤性息肉患者的临床及影像资料。纳入标准: (1) 病灶直径 8-20mm 的 PLG 患者; (2) 术前 2 周内行上中腹部 CT 平扫及增强扫描; (3) 术后病理证实为胆固醇性胆囊息肉或腺瘤性胆囊息肉。分为胆固醇性息肉组 58 例和腺瘤性息肉组 42 例。基于术前门静脉期增强 CT 提取的影像组学特征, 训练集采用 T 检验和最小绝对收缩和选择算子交叉验证法进行特征筛选。然后用 3 种机器学习方法 (人工神经网络、逻辑回归和支持向量机) 构建预测模型, 利用 ROC 曲线下面积、准确率以及 F1 度量值评估 3 种模型的预测能力, 并通过验证集进行验证。最后, 通过 5 次 4 折交叉验证评估模型, 得到 20 个模型得分, 取平均值进行评价。结果 人工神经网络算法在基于 10 个影像组学特征的息肉病变性质鉴别模型中预测效果最好, 具有最高的曲线下面积 (训练集为 1; 验证集为 0.81)、准确率 (训练集为 1; 验证集为 0.83) 及 F1 度量值 (训练集为 1; 验证集为 0.76)。10 个影像组学特征中, 基本特征 1 个、小波特征 9 个。各个模型分别经过 5 次 4 折交叉验证评估所得人工神经网络模型得分平均值 0.72, 支持向量机模型得分平均值为 0.76, 逻辑回归模型得分平均值为 0.72。**结论** 基于增强 CT 的机器学习影像组学模型有助于预测胆固醇性胆囊息肉和腺瘤性胆囊息肉的病变性质, 为两者的术前定性诊断及治疗方式的选择提供更加可靠的依据。

PU-0845

Radiomic Shape Features Based on Intravoxel Incoherent Motion to Evaluate the Renal Function in Chronic Kidney Disease

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Objective:

To explore the value of radiomic shape features based on intravoxel incoherent motion (IVIM) in evaluation of the renal function in chronic kidney disease (CKD).

Methods:

We retrospectively collected 27 CKD patients who underwent 3.0 T MRI examination (including T2WI and IVIM sequences) in our hospital. According to their estimated glomerular filtration rate (eGFR), they were divided into mild renal damage group (mCKD: eGFR \geq 60 mL/min/1.73 m², 14 patients) and severe renal damage group (sCKD: eGFR $<$ 60 mL/min/1.73 m², 13 patients). The parametric maps of IVIM (D^* , D , f) were obtained using the prototype software (the Function tool MADC; GE Healthcare) at Advantage Workstation (version AW 4.6, GE Medical System). The volume of interests (VOIs) covering the entire kidneys were manually drawn slice by slice independently by two radiologists with 2 and 8 years of experience in abdominal imaging diagnosis using ITK-SNAP software (version 2.2.0, www.itksnap.org)(Figure 1). Shape features of D^* , D , f maps were extracted using AK software. The intraclass correlation coefficient (ICC) of shape features was used for the inter-observer agreement. Continuous variables were analyzed using the independent-samples t-test or the Mann Whitney U test according to the normality of data distribution. Receiver operating characteristic (ROC) curve analyses were performed to evaluate the diagnostic efficiency of these parameters.

Results:

A total of 42 shape features were obtained for each patient. The data consistency between the two observers was good (ICC value > 0.75). The least axis length, major axis length, maximum 2D diameter column, maximum 2D diameter row, maximum 2D diameter slice, maximum 3D diameter, mesh volume, minor axis length, surface area and voxel volume of D^* , D , and f maps in mCKD group were higher than those in sCKD ($P < 0.05$). The surface volume ratio of D^* , D , and f maps in mCKD group were lower than those in sCKD ($P < 0.05$). The elongation, flatness and sphericity of D^* , D , and f maps had no differences between two groups ($P > 0.05$)(Table 1). The maximum 2D diameter slice, minor axis length, surface area, surface volume ratio, voxel volume of D^* , D , and f maps, major axis length and minor axis length of D^* map, major axis length of D map and minor axis length of f map showed great diagnostic efficiency in evaluation of renal function in CKD (Table 2, Figure 2-4).

Conclusions:

Radiomic shape features based on IVIM could effectively evaluate the renal function in CKD. The quantitatively extracted shape parameters of D^* , D , and f maps showed great diagnostic efficiency in evaluation of renal function in CKD. The radiomic shape features based on IVIM can reflect the morphological and structural changes of kidneys, which may be associated with the functional changes of kidney and the progression of CKD, and also contributes to the determination of treatment plan, efficient monitoring of treatment and evaluation of prognosis of the disease.

PU-0846**Bilateral giant ovarian luteinized follicular cysts:
case report**

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Background: Bilateral ovarian luteinized follicular cysts are rarely described, not to mention full-term natural labour without cys_x0002_tectomy beforehand. One case will be presented in this report. **Case Report:** A 29-year-old woman had pelvic masses detected at 12 weeks of pregnancy. The main concerns were the safety of pregnancy, conservative management, and close review. She was admitted to the hospital again 30 days after childbirth. Ultrasound examination was performed as well as CT, which showed that there was multilocu_x0002_lar cystic low density in

abdomen without calcification. She accepted bilateral ovarian cystectomy and reconstruction. Postoperative pathological results led to the diagnosis of bilateral ovarian luteinized follicular cysts. Conclusion: CT imaging feature combined with medical history, hCG level or other imaging modality can be used for diagnosing it initially. The case we report will provide useful experience for the diagnosis of ovarian luteinized follicular cyst.

PU-0847

胰腺神经鞘瘤 1 例并文献复习

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目的 胰腺神经鞘瘤是一种罕见肿瘤，术前诊断非常具有挑战性。我们报道一例原发性胰腺神经鞘瘤并进行文献复习。

材料与方法 收集我院 2017 年 1 月 ~ 2023 年 5 月间经手术病理证实的 1 例胰腺神经鞘瘤的临床及影像资料。

病例资料 1 名 66 岁的女性患者因“上腹部胀痛不适半月余”就诊我院。患者既往有高血压病史 3+年，脑梗塞病史 15+年。体格检查及实验室检查未见异常。腹部 CT 提示胰腺体部上缘类圆形低密度影，直径约 1.3cm，增强扫描呈轻度延迟性强化。患者行“胰体尾切除术”，术后病理证实神经鞘瘤。术后 3 月随访，患者无任何不适，未见肿瘤复发。

讨论 胰腺神经鞘瘤 (pancreatic schwannoma, PS) 是胰腺的一种罕见肿瘤，源自迷走神经分支的自主性交感神经或副交感神经纤维，多为良性，单发，生长缓慢。发病年龄从 17-89 岁不等，无性别差异，多为单发，胰头部多见。临床表现无特异性。

组织学上有 2 种结构：Antoni A 区和 Antoni B 区。免疫组织化学染色：S-100 蛋白、弹性蛋白和 CD56 常为阳性。

影像表现：CT 平扫：病灶边界清晰，包膜完整，CT 值在 0-30 Hu，密度均匀/不均匀，约 2/3 PS 出现退行性变。增强：以 AntoniA 区为主时，呈中等度以上持续渐进性强化；以 Antoni B 区为主时，一般无明显强化。MRI：包膜完整，边界清晰，T1 加权上为低信号，T2 加权上为高信号，信号均匀/不均匀，DWI 弥散受限，增强强化同 CT。鉴别诊断包括：实性假乳头状肿瘤，囊性神经内分泌肿瘤和囊腺瘤等。治疗首选外科手术切除，大部分患者预后良好，没有复发或转移。

结论 术前诊断胰腺神经鞘瘤具有难度，当影像提示胰腺病变边界清楚，内部有囊变坏死，增强轻中度强化时，应考虑到神经鞘瘤的可能，但最终确诊还需组织病理学。

PU-0848

基于光谱 CT 成像技术及 CA125 对卵巢癌复发预测的研究

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目的：使用光谱 CT 多模态成像联合 CA125 预测复发转移风险；筛选最佳光谱 CT 图像、数据与其他临床信息作为预测卵巢癌复发的预测因子。**方法**：回顾性分析经手术病理证实的卵巢癌患者 80 例。治疗前后及过程中行全腹部增强光谱 CT 增强检查，评估常规 CT 图像，测量 CT 值，评估单能图像 40KeV、碘密度图，测量碘浓度值，勾画能谱曲线，由两位高年资医师阅读患者 CT 影像评估是否腹腔复发并检测患者血清 CA125 水平，判断是否复发。**结果**：原发肿瘤大小、肿瘤减灭术程度、CA125 相对变化率均与患者腹腔复发相关，能量成像中的单能图像、碘密度图较传统 CT 复发转移检出率高，差异均有统计学意义 (均 $P < 0.05$)。**结论**：光谱 CT 采用全新的能量成像模式，实现了“同源、同时、同向”的能量成像要求，其成像中的单能级图像、碘密度图、虚拟平扫及有效

原子序数图等可改善成像质量, 光谱 CT 联合 CA125 提高了卵巢癌腹膜转移、横膈转移、肠系膜转移、网膜转移、肠浸润、胃浸润、肝浸润等病变检出率。

PU-0849

胃癌患者术前淋巴血管浸润预测模型： 基于放射组学特征和临床特征

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背景及目的：淋巴血管侵犯（LVI）是胃癌（GC）预后的独立危险因素，然而，LVI 还不能在术前确定。我们建立了一个基于对比增强计算机断层扫描（CECT）放射组学特征结合临床病理因素的模型，结合 Lauren 分型，评估胃癌患者的术前 LVI 状态。

方法：我们回顾性分析了 495 例胃癌患者，其中有 288 例为 LVI 患者。对提取的 CECT 特征进行标准化，然后进行一致性检验、相关分析、单因素分析和多变量最小绝对收缩和选择算子（LASSO）回归分析。计算每个患者的放射组学评分（Radcore）。采用单因素（ $P<0.10$ ）和多因素（ $P<0.050$ ）分析来确定与 LVI 相关的临床危险因素。基于此，在此基础上建立了三种预测模型：临床+动脉期模型、临床+静脉期模型和联合模型。利用测试数据集中的 ROC、决策曲线分析和校准曲线，验证了模型的预测性能。采用直方图分析 Lauren 分类与 LVI 之间的关系。

结果：在训练数据集和测试数据集中，组合模型的曲线下面积分别为 0.8629（95%置信区间[CI]，0.8247–0.9011）和 0.8343（95%CI，0.7673–0.9012）。该组合模型比其他模型具有更好的性能。根据 Lauren 分型的弥漫型 GC 占 LVI 病例的 43.4%。

结论：基于 CECT 的放射组学模型可以有效预测 Lauren 分型不同类型的胃癌患者术前 LVI 状态。通过结合临床病理因素，有效地提高了模型的预测能力。

PU-0850

肝细胞癌的 CT 增强影像表现与病理对比研究

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目的：探讨不同 CT 增强表现的 HCC 在影像学特征、病理学分化程度及免疫组化表达水平之间的差异性，提高对不典型 HCC 诊断及鉴别诊断能力，从而为 HCC 患者的临床诊断、治疗以及预后提供更有价值的影像学依据。方法：本研究收集 2018 年 11 月至 2022 年 11 月期间在延边大学附属医院经穿刺活检或术后病理证实的肝细胞癌患者 86 例，根据 CT 动态增强扫描影像表现，将病例分为“边缘强化”、“无廓清”及“快进快出”三组。图像观察指标包括：病灶最大径、门静脉是否存在癌栓、是否存在假包膜、病灶内部是否存在坏死这四部分；统计各组患者的病理分化程度、Ki-67、CD34 及 GPC-3 免疫组化表达水平。结果：1.边缘强化组、无廓清组及快进快出组的病灶最大径的中位数分别为 3.45cm、5.25cm、7.00cm，经独立样本的两两比较显示，边缘强化组与无廓清组相比较，差异具有统计学意义（ $P=0.024$ ），边缘强化组的与快进快出组相比较，差异具有统计学意义（ $P<0.001$ ）。2.边缘强化组有假包膜者 8 例（33.3%），无廓清组有假包膜者 16 例（57.1%），快进快出组有假包膜者 25 例（73.5%），经组间两两比较显示，快进快出组与边缘强化组相比较，差异具有统计学意义（ $P<0.017$ ）。3.边缘强化组中病理结果为中低分化者 23 例（95.8%），无廓清组为中低分化者 12 例（42.9%），快进快出组为中低分化者 27 例（79.4%），经组间两两比较显示，边缘强化组与无廓清组相比较，差异具有统计学意义（ $P<0.017$ ），快进快出组与无廓清组相比较，差异具有统计学意义（ $P<0.017$ ）。4.边缘强化组中 Ki-67 高表达者 23

例 (95.8%)，无廓清组中 Ki-67 高表达者 13 例 (46.4%)，快进快出组中 Ki-67 高表达者 26 例 (76.5%)，三组患者在 Ki-67 表达程度之间有统计学差异 ($P < 0.001$)。结论:增强 CT 对不典型肝细胞癌的诊断、了解其生物学行为提供可靠的影像学依据，对预测不典型肝细胞癌的分化程度及 Ki-67 表达水平具有重要价值。

PU-0851

多模态磁共振成像技术对子宫内膜癌诊断及分期的价值

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目的: 探究多模态磁共振成像技术对子宫内膜癌 (EC) 诊断的价值, 并分析相关量化参数与 EC 组织学分级、分期及肌层浸润深度的相关性, 并比较不同成像序列的诊断价值。

方法: 收集 2020 年 10 月到 2022 年 12 月于北华大学附属医院病理诊断为子宫内膜癌的患者, 所有患者于术前进行磁共振的常规 MRI、弥散加权成像 (DWI)、扩散峰度成像 (DKI) 及体素不相干运动成像 (IVIM) 成像检查, 选择其中 30 例磁共振弥散成像图像质量佳的例患者作为研究对象, 图像自动导入后处理工作站, 对 DWI、DKI、IVIM 图像进行后处理得到伪彩图, 然后在病灶区进行感兴趣区内的勾画得到相关参数值: ADC、MD、MK、D、D*、f 值。再进行不同成像技术定量参数值统计学分析, 符合正态分布的序列参数应用独立样本 t 检验以比较不同组别之间各参数的差异, 非正态分布的序列参数应用 Mann Whitney U 检验比较差异; 通过 Spearman 等级相关性分析评估 DWI、DKI、IVIM 的各参数与 EC 病理分级、分期及不同肌层浸润深度的相关性; 最后采用 ROC 曲线分析 DWI、DKI 及 IVIM 相关扫描参数值鉴别 EC 的诊断效能。

结果: 1.多模态磁共振成像 DWI、DKI、IVIM 序列的相关参数: ADC、MK、MD、D、f 值可用于鉴别诊断 EC 分级及评估肌层浸润深度; ADC、MK、MD、D 值可用于区分早、晚期 EC。2.ADC、D 值及 MD 值与 EC 病理分级呈负相关、MK 值及 f 值与其呈正相关; ADC、D 值及 MD 值与 EC 分期呈负相关、MK 值与其呈正相关; ADC、MD、D、f 值与 EC 深肌层侵犯呈负相关; MK 值与其呈正相关。3.MK、MD 及 D 值诊断 EC 分级的效能最佳; MK 值诊断 EC 分期效能最; D 及 f 值评估肌层浸润深度最佳。

结论: 多模态磁共振成像技术结合常规 MRI 平扫、DWI、DKI 及 IVIM 等多种检查序列, 在评估 EC 患者的肿瘤浸润深度、组织学分级和肿瘤分期等方面比传统 MRI 检查更有效、准确。

PU-0852

磁共振成像联合扩散加权成像在腹部淋巴结病变定性诊断中的应用价值评价

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磁共振成像联合扩散加权成像在腹部淋巴结病变定性诊断中的应用价值评价。方法: 采用回顾性分析法, 选择 32 例良性腹部淋巴结患者作为对照组, 年龄 36-75 岁, 男性 15 例, 女性 17 例; 选择 21 例恶性腹部淋巴结患者作为观察组, 年龄 32-72 岁, 男性 10 例, 女性 11 例。对患者均予以磁共振成像联合扩散加权成像技术检查, 探讨核磁共振技术联合扩散加权技术对腹部淋巴结定性 (良性、恶性) 诊断价值以及临床的影像学特点。

PU-0853

正交轴位 MRI 对胃癌术前 T 分期的诊断价值研究

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目的 探讨正交轴位 MRI 图像对胃癌患者术前 T 分期的诊断价值。

方法 本回顾性研究纳入 2020 年 11 月至 2023 年 2 月符合纳入标准的 133 例胃癌患者，这些患者接受了术前 MDCT 与包括正交轴位扫描的 MRI 检查，随后行胃癌根治术并获取病理 T 分期结果。扫描所得影像被分为三组：无正交轴位 MRI 图像、有正交轴位 MRI 图像及 MDCT 图像。2 名未知病理 T 分期结果的放射科医师独立评估并记录上述各组图像的 T 分期结果，每组评估的时间间隔为 4 周。以病理结果为参照标准，计算并比较上述各组影像资料对胃癌术前 T 分期的诊断效能。

结果 本研究纳入了 133 例（中位年龄 63 岁，年龄范围 24-85 岁，88 名男性）患者。相比不包含正交轴位的 MRI 图像，包含正交轴位的 MRI 图像以及 MDCT 图像对胃癌各个 T 分期都有更好的诊断效能，即各个 T 分期的准确性、敏感性、特异性均较高。在对胃癌 T 分期判断的总体准确性方面，包含正交轴位的 MRI 图像明显优于不包含正交轴位的 MRI 图像（83.5% vs 67.7%， $P < 0.001$ ），且稍优于 MDCT（83.5% vs 78.9%， $P = 0.345$ ），但没有统计学意义。

结论 正交轴位 MRI 图像在胃癌术前 T 分期中起到重要的作用。包含正交轴位的 MRI 图像在胃癌术前分期中可以达到较好的诊断效能。

PU-0854

CT extracellular volume fraction in predicting the expression of Ki-67 in epithelial ovarian cancer

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Objective: To explore the value of extracellular volume fraction (ECV) calculated by CT scan in predicting the expression of the proliferative antigen Ki-67 in epithelial ovarian cancer. **Methods:** A retrospective analysis was performed on 81 patients with epithelial ovarian cancer diagnosed by pathological examination after surgery in Dalian Municipal Central Hospital from January 2018 to December 2022. According to Ki-67 expression, 40 patients were divided into low expression group ($Ki-67 \leq 50$) and 41 patients were divided into high expression group ($Ki-67 > 50$). All patients underwent abdominal enhanced CT scan before operation. Hematocrit was collected before examination. The collected enhanced CT images were measured and calculated, the area of interest was placed in the solid tumor area, and the CT values of plain scan and delayed stage lesions were recorded respectively, and the CT values of plain scan and delayed stage lesions at the level of the tumor were measured, and the ECV of the two groups of lesions were calculated. Independent sample t test was used to compare the ECV difference between the two groups, and receiver operating characteristic (ROC) curve was used to analyze the value of ECV identification between the two groups. **Results:** The ECV value of Ki-67 low expression group was $(27.97 \pm 8.93)\%$, and that of Ki-67 high expression group was $(37.10 \pm 10.17)\%$. The ECV value of Ki-67 high expression group was higher than that of Ki-67 low expression group. The difference was statistically significant ($P < 0.01$). ECV had a good diagnostic efficacy on the expression of the proliferative antigen Ki-67 in epithelial ovarian cancer (AUC was 0.756, sensitivity and specificity were 76.5% and 67.5%, respectively). **Conclusion:** The ECV value of Ki-67 high expression group is higher than that of Ki-67 low expression group. ECV has higher diagnostic

efficiency in predicting the expression of the proliferative antigen Ki-67 in epithelial ovarian cancer, and has certain clinical application value.

PU-0855

卵黄囊瘤 CT 及 MRI 表现

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目的 探讨卵黄囊瘤 (YST) 的 CT 及 MRI 表现, 提高对本病影像学特点的认识。方法 回顾性分析经病理证实的 4 例 YST 的 CT 及 MRI 表现。本组中 2 例病灶位于睾丸, 1 例位于卵巢, 1 例位于子宫-阴道。3 例行 CT 及 MRI 平扫加增强扫描, 1 例行 CT 平扫加增强扫描。结果 4 例 YST 均形态不规则, 实性 3 例, 囊实性 1 例。CT 平扫呈等或混杂密度; MRI 平扫 T1WI 呈不均匀稍低信号, 当肿瘤发生出血时可见片状高信号, T2WI 呈混杂高信号, 囊变部分信号更高, 分隔呈低信号, DWI 及 ADC 见实性成分及囊壁弥散受限, 囊变部分未见弥散受限; CT 及 MRI 增强扫描示 3 例 YST 实性成分及囊壁呈不均匀、渐进性强化, 强化范围逐渐扩大, 1 例 YST 呈明显均匀强化, 4 例肿块内均可见扭曲血管影。2 例 YST 合并畸胎瘤 CT 上均见钙化及脂肪成分, MRI 上呈 T1WI 及 T2WI 高信号, 而 T2WI-FS 呈低信号的脂肪成分。结论 YST 的 CT 及 MRI 表现具有一定的特征性, CT 及 MRI 有助于确定 YST 的范围及与周围邻近器官结构的关系。结合血清 AFP 升高, 可作为 YST 及混合型生殖细胞肿瘤诊断、鉴别诊断、监测疗效及评估预后的重要辅助手段。

PU-0856

基于瘤灶和瘤周 CT 征象的 I-III 期结直肠癌预后价值评估及病理关联分析

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目的

研究表明, 结缔组织增生反应是反映基质成熟的肿瘤-宿主反应的一部分, 是结直肠癌 (CRC) 预后前景良好的因素, 本研究调查了与结缔组织增生反应相关的 CT 成像特征与结直肠癌生存的关系。

方法

我们回顾了 99 名被诊断为结直肠癌的患者, 他们接受了术前 CT 检查及治疗手术。从 CT 图像中评估了原发性肿瘤和周围内脏脂肪特征。与结缔组织增生反应相关的 CT 成像特征与结直肠癌生存的关系

结果

发现肿瘤形状与间质成熟度密切相关 ($P<0.001$), 其中不成熟间质的肿瘤多为不规则环形增厚成熟型间质的肿瘤多为一侧增厚。另外, 瘤周密度改变也与间质成熟度密切相关, 瘤周密度在成熟、中间以及不成熟间质组中呈上升趋势 ($P<0.05$)。在平扫图像中低瘤周密度组的预后明显差于高瘤周密度组 ($P<0.05$), 在静脉期图像中也具有相同的趋势。另外, 肿瘤形状也与预后密切相关, 不规则增厚肿瘤预后最差 ($P<0.05$)。

结论

瘤周密度的 CT 值增加及肿瘤形状与结直肠癌病理间质结缔组织增生反应有关。生存分析显示, 不规则增厚肿瘤预后最差, 不规则增厚肿瘤预后最差。我们的研究表明, 与结缔组织增生反应相关的 CT 图像特征可以提供有关瘤周脂肪微环境的信息, 并预测结直肠癌患者治疗性手术切除后的预后。

PU-0857

二维超声联合剪切波弹性成像技术在盆腔肿物诊断中的应用探讨

闫妍
辽宁省肿瘤医院

闫妍:

[链接]征文投稿倒计时 10 天 | 中华医学会第 30 次全国放射学学术大会(CCR2023)

闫妍:

目的:

盆腔肿物是妇科常见疾病,各年龄段均可发病且类型繁多,常见病变包括子宫肌瘤及子宫腺肌瘤、卵巢及附件区的囊性、囊实性、实性肿瘤。其中,卵巢恶性肿瘤是女性生殖器常见恶性肿瘤之一,全球每年约有 225,500 个案例被诊断为卵巢癌,造成约 140,200 个患者的死亡。虽然卵巢癌的发病率低于宫颈癌和子宫内膜癌,居妇科恶性肿瘤的第三位,但死亡率却超过宫颈癌和子宫内膜癌之和,是严重威胁妇女健康的重大疾患。由于卵巢位置较深且卵巢恶性肿瘤组织类型复杂多样,早期病变无特异性临床症状,发病时常已处于晚期阶段,治疗效果不佳,预后较差,因此早期鉴别卵巢肿瘤良恶性尤为重要。

方法:

前瞻性收集于我院首次诊断并进行治疗的患者,所有患者均接受手术切除,再行病理分析。患者术前均行二维超声检查、剪切波弹性成像技术检查,以手术病理结果为金标准,分析二维超声与剪切波弹性成像技术单独及联合检查的诊断效能。

结果:二维超声联合弹性成像技术检查的诊断结果与病理结果的一致性较高,灵敏度,特异度,准确度均明显高于单一二维超声模型和剪切波弹性成像模型。

结论:

二维超声联合剪切波弹性成像技术诊断盆腔肿物良恶性的灵敏度、特异度和准确度均较单一检查方法有所提高,简单、客观、高效,不失为一种有前景的无创评价影像学方法。

PU-0858

Atypical hepatocellular carcinoma with diffuse fatty metamorphosis: a case report

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BACKGROUND

Large, well differentiated hepatocellular carcinoma (HCC) with fatty metamorphosis is rare, and no cases of advanced HCC with diffuse fatty metamorphosis in atypical sites have been reported to date.

CASE SUMMARY

There is a 65 year old male who was referred to West China Hospital due to an unexpected discovery of abnormal low density shadows mainly consisted of adipose tissue in the perihepatic space of the right lobe of the liver. The ultrasonographic examination revealed thickened adipose tissue around the liver. Furthermore, dynamic contrast enhanced computed tomography (CT) and magnetic resonance imaging (MRI) scans of the abdomen showed multiple lesions with similar density and intensity in the abdomen and pelvis except for the perihepatic space of the right lobe

of the liver, with slight enhancement of the internal solid components and contrast retention (no wash-out) during the portal phases. Liposarcoma was initially considered, and diffuse fatty metamorphosis of HCC was eventually diagnosed after laparoscopic exploration, biopsy and immunohistochemistry. The patient received targeted therapy and immunotherapy after diagnosis, and the tumor gradually shrunk over a 12 months follow up period.

CONCLUSION

It is difficult to accurately diagnose HCC due to the atypical location and imaging features of the tumor in this case, and the final diagnosis needs to rely on histopathological biopsy and IHC staining.

PU-0859

构建基于多模态影像及血清学特征 II 型上皮性卵巢癌诊断诺模图

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摘要:目的 构建基于多模态影像定量参数及 CA125 等血清学特征诺模图, 评价其预测 II 型上皮性卵巢癌的价值。方法 回顾性分析经我院 2019 年 5 月~2021 年 8 月收治上皮性卵巢癌患者的术前临床、影像资料, 按术后病理类型将患者分为 II 型 (51 例, 年龄 57 ± 6 岁)、I 型 (32 例, 52 ± 4 岁) 两组。所有患者术前均行腹盆腔 CT 增强检查及 MR 检查, 分别测量记录影像定量参数及 CA125 等血清学标志物, 利用 Logistic 回归筛选影像定量参数及血清学标志物, 建立 II 型上皮性卵巢癌诺模图模型。绘制受试者工作特征 (ROC) 曲线, 计算曲线下面积 (AUC) 用于评价模型诊断性能, 绘制模型校准度和区分度用于验证模型诊断性能, 决策曲线分析 (DCA) 用于评价模型的临床净效益。结果 II 型、I 型两组年龄、肿瘤最大径、实性成分最大径、CT 强化率 (V)、ADC 值、CA125、HE4、术后 FIGO 分期、淋巴结转移、腹水差异均有统计学意义 ($P<0.05$)。多因素 Logistic 回归显示肿瘤最大径、ADC 值、CA125、HE4 及术后 FIGO 分期为预测 II 型上皮性卵巢癌的独立影响因素, 所构建诺模图模型预测 II 型上皮性卵巢癌的 AUC 为 0.93, 模型校正曲线接近理想曲线, DCA 显示该模型有较高临床净获益。结论 基于多模态影像定量参数及血清学特征的诺模图可用于术前预测 II 型上皮性卵巢癌。

PU-0860

弥漫性腹膜肝样腺癌一例

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肝样腺癌是一种罕见的特殊腺癌, 在组织病理学上类似肝细胞癌, 大多数病例发生于胃, 临床表现、影像学表现缺乏特异性, 容易造成漏诊和误诊, 原发于腹膜者更为罕见。

患者女, 40 岁。因“腹胀 1 个月, 发现盆腔肿物 2 天”入院, 全腹 CT 检查示: 腹腔大量积液, 腹膜、大网膜及肠系膜多发结节及团块状软组织影, 双侧卵巢大致正常形态、表面不均匀强化。实验室检查甲胎蛋白 25780ng/L。手术切除双侧附件+大网膜, 术后病理诊断: 卵巢表面、输卵管壁和大网膜均见癌浸润, 提示为肝样腺癌或肝细胞癌可能性大。免疫组化: AFP (弱+)、GPC-3(+)、Heppar1 (部分+)。

肝样腺癌的发病年龄平均 63.0 ± 12.8 岁, 男女比例为 2.4: 1。肝样腺癌在组织学上可见腺癌与肝样分化区相互交叉或移行, 肝样分化区与肝细胞癌形态相似, 即肿瘤细胞大、多角形, 呈髓样或梁索样, 间质富含毛细血管和血窦。但仅根据组织学结果难以明确诊断, 通常需要免疫组化染色进行鉴别诊断。大多数肝样腺癌 AFP 染色阳性 (91.6%), 而几乎所有肝样腺癌患者 GPC-3 染色呈阳性。

血清 AFP 升高是肝样腺癌的另一特征,其升高程度与肿瘤分化程度相关,也可用于治疗效果判定、肿瘤复发或转移监测。肝样腺癌的影像学表现没有明显特征性,文献报道的腹膜肝样腺癌有两种表现,一种为孤立肿块型,另一种为弥漫结节型。肝样腺癌目前尚无系统治疗的有效方法,早期发现肿瘤及手术切除仍是肝样腺癌的重要治疗手段。弥漫性腹膜肝样腺癌尽管很难达到切除所有病灶,但进行肿瘤减灭术一方面可以获取病理诊断,另一方面手术后辅以化疗、局部治疗等也可以改善预后。本例患者术后采用紫杉醇加卡铂的常用肿瘤化疗方案,经过手术和两次化疗后,血清 AFP 已经明显下降,随访至术后 5 个月患者一般状态良好。

血清 AFP 升高,而没有典型的肝细胞癌表现和除外其他常见腹膜肿瘤,应怀疑到肝样腺癌。腹膜肝样腺癌尚缺乏标准治疗方案,尽可能完全的手术切除后辅以全身治疗是目前普遍采取的方式。

PU-0861

胃十二指肠异位胰腺的影像学诊断及鉴别诊断

崔博

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目的总结分析胃异位胰腺的影像学表现及鉴别诊断。方法收集 2010-2019 年门诊及住院胃十二指肠异位胰腺 52 例,其中上腹部螺旋 CT 增强扫描 52 例,上消化道钡餐造影 5 例。所有病例均经手术或穿刺病理证实。根据异位胰腺的年龄、性别、临床症状和体征,对肿瘤的大小、形态、密度及周围结构进行分析总结。结果其中胃窦 21 例,胃体 13 例,胃角 11 例,十二指肠球部 7 例,均小于 3cm。无明显临床症状,多数患者在检查其他病变时意外发现异位胰腺。CT 增强扫描 14 例高于正常胰腺,29 例相当于正常胰腺,9 例低于正常胰腺。结论螺旋 CT 三期增强扫描可用于胃十二指肠异位胰腺的诊断和鉴别诊断,其强化程度高于或等于正常胰腺密度。对于胰腺密度低于正常值的患者,诊断准确率较低。上消化道钡餐显像对异位胰腺的诊断价值有限。

PU-0862

基于多期 CT 影像组学鉴别卵巢良、恶性肿瘤的临床应用价值

徐静雅

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[摘要] 目的:探讨基于多期 CT 影像组学模型及联合模型鉴别卵巢良、恶性肿瘤的临床应用价值。资料与方法:回顾性收集 2018 年 1 月-2022 年 7 月于皖南医学院第一附属医院(弋矶山医院)经术后病理证实的 144 例良性及 182 例恶性肿瘤患者的术前临床资料及 CT 多期影像组学特征,将患者随机按 7:3 分为训练组 228 例及验证组 98 例。图像预处理并利用 ITK-SNAP 勾画肿瘤病灶区域,用 PY 提取组学特征,将提取特征正则化,采用 Spearman 相关分析,相关系数大于 0.9,保留其一特征,使用最小绝对收缩与选择算子(Least Absolute Shrinkage and Selection Operator, LASSO)回归分析对组学特征降维,建立影像组学标签。利用 Logistic 回归分析筛选出临床数据,将影像组学的优势期相与临床数据结合建立临床联合模型,利用列线图显示预测效能。结果:筛选出平扫、动脉期、静脉期及延迟期的特征数是 22 个,7 个,10 个,22 个,构建各期影像组学模型,发现延迟期为最优模型,在训练组中,其受试者工作曲线(ROC)下面积(AUC)为 0.857。将临床特征与延迟期影像组学特征构建联合模型,其 ROC 的 AUC 值为 0.870,优于临床模型,且差异具有统计学意义($Z=3.376, P=0.0007$)。验证组中,联合模型的 ROC 的 AUC 值为 0.844,优于临床模型,差异不具有统计学意义($Z=1.650, P=0.0989$)。结论:CT 扫描的延迟期影像组学特征鉴别卵巢良性与恶性肿瘤优于其它期相,延迟期相影像组学标签与临床资料结合的联合模型有较高的临床鉴别诊断价值。

PU-0863

Prediction of tumor response to multimodality treatment in bladder cancer based on histogram analysis of quantitative parameters from synthetic and diffusion weighted MRI.

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Purpose: To predict tumor response in bladder cancer (BCa) through a histogram analysis of quantitative parameters obtained from synthetic and diffusion weighted MRI.

Materials & Methods: This retrospective study cohort consisted of 17 BCa patients who underwent synthetic and diffusion weighted MRI on a 3.0T scanner (Signa Pioneer, GE, Milwaukee, WI, USA) before multimodality treatment (a mean number of four courses of cisplatin-based neoadjuvant/adjuvant chemotherapy plus immunotherapy). The histogram features of the quantitative parameters (T1, T2, proton density [PD] and ADC) were extracted from region of interest from two radiologists. Patients were grouped as pathological complete response (pCR, no residual tumor) and non-pCR groups based on the post-treatment pathological findings. Student's t test or the Mann-Whitney U test were utilized to analyze the association between the histogram features of parameters and pathological response. Interobserver variability was evaluated using the interclass correlation coefficient (ICC).

Results: Nine patients archived pCR in this retrospective study. All features repeatability were generally excellent (ICC > 0.95). Patients who archived pCR showed statistically lower PD10th, PD25th, T110th, T125th and T1median values than those with non-pCR in pre-treatment of MRI ($P=0.003, 0.021, 0.010, 0.018, 0.050$, respectively), while no significant difference was found in histogram features derived from diffusion weight MRI (all $P > 0.05$).

Conclusions: Histogram features of synthetic weighted MRI quantitative parameters contribute to the response evaluation of multimodality treatment in BCa and may serve as a potential biomarker for selecting and optimize patients for bladder preservation.

PU-0864

Objective and subjective comparison of virtual monoenergetic vs. polychromatic images in patients with colorectal cancer

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Purpose To evaluate the objective and subjective image characteristics of post- adaptive statistical iterative reconstruction (ASiR) and medium-strength deep learning reconstruction (DLIR) virtual monoenergetic images (VMI) at different kiloelectron volts (keV) compared to polychromatic images (PEI) in patients with colorectal cancer (CRC).

Methods This prospective study was approved by the Institutional Ethics Committee. 69 CRC patients and 35 volunteers were included for spectral CT scanned. Portal vein phase spectral CT scan can be divided into standard dose and reduced dose (RD) scanned models. Reconstruct PEI and eleven VMI images in every 10keV interval of 40-140keV. Density analysis was performed to calculate the signal-to-noise ratio (SNR) of normal colonic wall and CRC. For subjective quality assessments, three readers independently assessed the images using a five-point Likert scale. Inter-reader credibility was assessed using intraclass-correlation-coefficients.

Results Density distribution analysis showed the largest attenuation gradient between CRC and normal tissue at 40 keV-VMI (VMI40keV) in standard dose AV60. Except for VMI50keV, VMI40keV had the highest SNR [18.73 (14.07, 25.75)] and contrast-to-noise ratio (CNR: 9.51 ± 4.42) compared with VMI60-140keV and EPI [SNR: 10.14 (8.56, 12.75); CNR: 3.46 ± 1.64] (all $P < 0.001$). Compared with PEI, there were statistical differences in SNR of RD-DLIRM and RD-AV60 [SNR: 8.88 ± 1.98 and 7.79 (6.64, 9.70), respectively] lesions ($P = 0.017$ and 0.005), but no statistical differences in CNR (2.75 ± 1.52 and 2.68 ± 1.37 , respectively) ($P = 0.368$ and 0.289). When VMI40keV were added to PEI, overall area-under-the-curve of the three radiologists was significantly improved from 0.885 to 0.941 for diagnosing CRC ($P < 0.001$).

Conclusion Compared with PEI, standard dose AV60-VMI40keV have better objective and subjective image quality. Meanwhile, DLIRM can guarantee RD-VMI40keV image quality.

PU-0865

基于 APT 影像组学评估宫颈癌淋巴血管间隙浸润

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目的：本研究旨在探讨 3D 酰胺质子转移加权(APTw) 影像组学模型在预测宫颈癌淋巴血管间隙浸润的诊断价值。

方法：回顾性分析 2019 年 7 月至 2023 年 4 月经手术病理证实的 74 例宫颈癌瘤患者的临床资料及术前 MRI 图像，其中淋巴血管间隙浸润组患者 38 例；非淋巴血管间隙浸润组患者 36 例。对照常规 MRI 平扫和增强图像，在 3D APTw 定量图像上进行特征提取。使用 uAI Research Portal 软件进行影像组学分析。通过最小冗余-最大相关性(mRMR)和最小绝对收缩和选择算子(LASSO)算法对提取的特征进行降维处理。使用随机森林模型(Random forest,RF)构建影像组学模型。

结果：最终本研究纳入 7 个影像组学特征并用于构建模型。RF 模型显示，训练集和测试集的 AUC 分别为 0.982 和 0.893。在测试集中，灵敏度、特异性、准确度分别为 0.750、0.857 和 0.800。

结论：基于 APT 影像组学能有效预测宫颈癌的淋巴血管间隙浸润。这种无创性预测技术能为患者的术前诊断、个性化治疗方案制定、预后评估提供重要信息，在未来的临床诊疗工作中具有广阔的应用前景。

PU-0866

肝脏浆细胞型 Castleman 病 1 例并文献复习

赵静

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对江南大学附属医院 2022 年 11 月 23 日收治的 1 例肝脏 Castleman 病病例进行回顾分析，并复习相关文献。该例病人因“体检发现肝占位性病变”就诊，MRI 平扫及普美显增强检查示肝脏 S2 及 S4 段各见一椭圆形、大小分别约 $19 \times 13 \text{mm}$ 及 $15 \times 12 \text{mm}$ 异常信号灶，T1WI 呈低信号，T2WI 呈稍高信号，DWI 高信号，ADC 低信号，增强扫描动脉期中度强化，延迟可见廓清，肝胆平衡期呈低信号，考虑肝细胞肝癌可能，肝腺瘤待排。于 2022 年 12 月 2 日行肝脏 S2 及 S4 段局部切除术。术后经过病理及免疫组化证实为浆细胞型肝脏 Castleman 病。病人术后恢复良好，第 11 天痊愈出院。病人术后 1 个月、半年随访复查均未见明显异常，一般情况良好，截止 2023 年 9 月仍持续随访中。肝脏 Castleman 病极其罕见，易误诊，影像学检查是术前主要诊断方式，病理检查是诊断的金标准。肝脏 Castleman 病好发于女性，中位发病年龄约为 48 岁。局部单中心 Castleman 病首选手术

切除+定期随访复查,总生存率约 95.3 %,多中心 Castleman 病对手术反应不佳,单克隆抗体联合利妥昔单抗成为研究热点,预后差,5 年生存率近 51-77 %。

PU-0867

能谱 CT 碘基图像在预测胃癌组织分化程度中的应用研究

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目的:本研究旨在探讨能谱 CT 碘基图像在预测胃癌组织分化程度中的应用价值。

材料与方法:回顾性分析我院经术后病理证实的 103 例胃癌患者。收集所有患者临床信息和病理信息。根据术后病理分化程度不同,将患者分为分化组及未分化组。单因素统计分析上述临床信息和病理信息在两组间是否具有统计学差异。通过能谱 CT 后处理软件分别获得每位患者的静脉期碘基图像。使用 3D slicer 软件分别在混合能量图像和碘基图像上分割病灶并提取影像组学特征。随后使用 FAE 软件内机器学习方法构建了三组影像组学模型:混合能量影像组学模型、碘基图影像组学模型、混合能量-碘基图影像组学模型。最后,将有统计学差异的临床和病理特征联合混合能量图像和碘基图影像组学特征构建联合模型。采用受试者工作曲线 (Receiver Operating Characteristics, ROC) 和 DeLong 检验对模型间的诊断效能进行评估和比较。

结果:在训练集和验证集中,只有 pT 分期和 pN 分期在分化组及未分化组间均有统计学差异 (P 值均 < 0.05)。使用 pT 分期和 pN 分期构建的临床模型在训练集和验证集中的 ROC 曲线下面积 (Area under the curve, AUC) 分别为 0.674 和 0.847。混合能量-碘基图影像组学模型 (训练集 AUC: 0.900; 验证集 AUC: 0.851) 较混合能量影像组学模型 (训练集 AUC: 0.802; 验证集 AUC: 0.781) 和碘基图影像组学模型 (训练集 AUC: 0.871; 验证集 AUC: 0.759) 取得了更高的诊断效能。联合 pT 分期、pN 分期、混合能量影像组学特征和碘基图影像组学特征构建的联合模型取得了最高的诊断效能,在训练集和验证集中 AUC 分别为 0.910 和 0.912。校准曲线表明联合模型的拟合度良好。临床决策曲线表明混合能量-碘基图影像组学模型和联合模型均较混合能量影像组学模型和临床模型有更高的临床应用价值。

结论:基于能谱 CT 的影像组学模型在预测胃癌组织分化程度中有良好的诊断效能。基于碘基图提取的影像组学特征在提高诊断效能上有巨大潜力。

PU-0868

基于 MRI 预测肿块型肝内胆管细胞癌分化程度的研究价值

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v> 【摘要】 目的:探讨磁共振成像(MRI)定性、定量参数在肿块型肝内胆管细胞癌细胞分化程度的预测价值。方法:回顾性分析 2016 年 3 月—2022 年 3 月 81 例经手术病理证实为肿块型肝内胆管细胞癌 (MICC) 患者临床、病理、MRI 资料。将患者分为中分化组 (29 例) 和低分化组 (52 例), 采用 t 检验或 χ^2 检验比较两组在临床、MRI 定性以及定量参数方面的差异,将单因素分析中具有统计学差异的变量纳入 Logistic 回归进行分析用来建立 MRI 模型。受试者操作特征 (ROC) 曲线被用于分析模型的诊断效能。结果:单因素分析显示两组间肝内转移灶、动态强化模式、肝胆期强化模式、扩散加权成像 (DWI)、直径的差异有统计学意义 (P 值分别为 0.032、< 0.001、0.035、0.017、0.001)。动态强化模式、直径是预测 MICC 分化程度的独立预测因子,所得 MRI 模型 ROC 曲线下面积 0.806,敏感度 71.2%,特异度 79.3%。结论:动态强化模式、直径是预测 MICC 分化程度的独立危险因素, MRI 模型具有良好的诊断效能。

PU-0869

定量分析 2 型糖尿病患者胰腺脂肪含量和胰腺细胞外体积分数

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目的: 2 型糖尿病 (T2DM) 是一种常见且不能彻底治愈的疾病, 早期诊断并准确评估对其治疗与改善预后至关重要。本研究旨在探讨 T2DM 患者和非 T2DM 患者的胰腺脂肪含量和胰腺细胞外体积分数 (ECV) 的差异。方法: 本研究回顾性分析 2022 年 1 月至 2023 年 2 月于大连医科大学附属第一医院行上腹部 3.0 T MRI 检查、扫描序列包括 T1mapping 序列、T1mapping 增强序列和 CS2 mDixonQuant-FF 序列且图像质量满足测量要求的患者 20 例, 收集患者的临床资料和影像资料。根据临床诊断结果将患者分为 T2DM 组 (10 例) 和非 T2DM 组 (10 例)。使用 MATLAB 软件根据 ECV 计算公式获得 ECVnii 图像 $[ECV = (1/T1_{\text{胰腺增强后}} - 1/T1_{\text{胰腺增强前}}) / (1/T1_{\text{主动脉增强后}} - 1/T1_{\text{主动脉增强前}}) \times (1 - \text{hematocrit})]$ 。基于 ECVnii 图像使用 ImageJ 软件分别测量胰头、胰体和胰尾的 ECV 值, 并计算平均值。使用飞利浦后处理平台在 MRI 脂肪分数图上勾画胰头、胰体、胰尾的感兴趣区域 (ROI), 记录胰腺的脂肪分数 (FF) 值并计算其平均值。采用 SPSS 27.0 软件进行统计学分析, 符合正态分布的计量资料以均数 \pm 标准差表示, 不符合正态分布的计量资料以四分位数间距表示。采用独立样本 t 检验观察糖尿病患者和非糖尿病患者的 FF 值和 ECV 值是否有差异, $P < 0.05$ 为差异具有统计学意义。结果: 本研究纳入了 10 名糖尿病患者和 10 名非糖尿病患者。T2DM 患者的胰腺平均 FF 值显著高于非 T2DM 患者 ($P < 0.05$)。此外, T2DM 组的胰腺平均 ECV 值显著高于非 T2DM 组 ($P < 0.05$)。结论: T2DM 患者的胰腺在脂肪含量和 ECV 方面与非 T2DM 患者均存在显著差异。这一发现可能有助于更深入地理解 T2DM 对胰腺组织的影响, 为 T2DM 的诊断和治疗提供了新的影像学参考依据。

PU-0870

卵巢甲状腺肿一例

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目的: 提高对卵巢甲状腺肿的认识及影像诊断要点。

方法: 回顾性分析本院近期一例卵巢甲状腺肿及有关文献, 对其影像诊断要点进行总结。

病例资料: 患者 女 33 岁, 因腹痛行腹部 CT 平扫: 盆腔巨大囊实性肿块 (约 9.8cm×10.3cm), 内见结节状高密度影。CT 增强: 肿块内结节状高密度灶可见明显强化表现。MRI: 肿块 T2 混杂高信号, T1 低信号, MRE: 结节状可见明显强化。超声: 盆腔混合性包块。实验室: CA125 升高。外科行盆腔肿块切除术后病理诊断: 右侧卵巢甲状腺肿。

讨论: 卵巢甲状腺肿 (struma ovarii, SO) 是一种少见的卵巢良性肿瘤, 起源于卵巢生殖细胞。肿瘤内主要由甲状腺组织构成, 是一种单胚层畸胎瘤, 约占成熟畸胎瘤的 2.7%。卵巢成熟性畸胎瘤中 5%-20% 含甲状腺成分, 当肿瘤内含甲状腺成分达 50% 以上时诊断 SO。SO 发病率较低, 临床较为罕见。患者常无症状, 多数以体检或发现腹盆部肿块就诊。通常单侧发病, 双侧发病少见。在组织学上的大体表现类似于囊性畸胎瘤, 一般表面光滑, 呈分叶状或伴分隔, 实性部分可能完全由甲状腺组织组成, 囊腔内充满液体或琥珀样物。影像表现及相关病理特征: 多为单侧附件区病变, 边界清晰; 肿块多呈囊实性 (囊性为主) 或囊性, 纯实性少见; 囊内液体密度较高 (CT 值 $> 40\text{HU}$), 部分可见更高密度囊腔 (CT 值 70~90HU), 其与滤泡内富含的甲状腺球蛋白及甲状腺激素有很强衰减 X 线能力有关; 增强扫描实性部分 (包括囊壁及分隔) 有不同程度强化或呈甲状腺组织样明

显强化。病理上这些实性成分由成熟的甲状腺组织、大量血管和纤维组织组成；T2WI 上极低信号区和实性成分明显强化是 SO 的两个典型 MRI 表现；T2WI 囊性区信号强度取决于囊内物质浓度，当内容物高度浓缩呈高黏度、胶物质时，T2WI 呈极低信号，而当囊内容物被稀释时，T2WI 呈高信号。

结论：卵巢甲状腺肿的 CT 及 MRI 表现有一定的特征性，有助于卵巢甲状腺肿的诊断及鉴别诊断。

PU-0871

ADC 联合 CA199 对 I 型自身免疫性胰腺炎及胰腺导管腺癌的鉴别价值

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目的：评估联合使用 ADC 与血清 CA199 对自身免疫性胰腺炎（AIP）及胰腺导管腺癌（PDAC）鉴别价值。方法：收集 2017 年至 2021 年在我院确诊的 AIP 患者 14 人，PDAC 患者 28 人，分别测量其 ADC 值及血清 CA199，比较 AIP 及 PDAC 组的年龄、性别、ADC 值及 CA199 值是否有统计学差异。采用受试者工作特征曲线（ROC）分析来判断 ADC 值和 CA199 值对疾病的诊断效果以及联合诊断效果。用约登指数确定最优精度的阈值。结果：AIP 与 PDAC 组年龄、性别无统计学意义（ $P>0.05$ ）；AIP 及 PDAC 组的 ADC 均值分别为 $1.03\pm 0.08\times 10^{-3}\text{mm}^2/\text{s}$ 、 $1.29\pm 0.12\times 10^{-3}\text{mm}^2/\text{s}$ ，差异有统计学意义（ $P<0.05$ ）；AIP 组及 PDAC 组的 CA199 差异有统计学意义（ $P<0.05$ ）；ADC 的曲线下面积（AUC）为 0.952，最佳截断值为 $1.164\times 10^{-3}\text{mm}^2/\text{s}$ ，敏感度和特异性分别为 92.9%与 85.7%，CA199 的 AUC 为 0.689，最佳截断值为 88.7u/ml，敏感度和特异性分别为 57.1%与 75.0%，ADC 与 CA199 联合使用时 AUC 为 0.985，敏感度和特异性分别为 100%和 92.9%。结论：ADC 与 CA199 均对 AIP 与 PDAC 的鉴别诊断有一定的帮助，且 ADC 比 CA199 具有更好的诊断效能，联合使用 ADC 和 CA199 具有更高的准确性。

PU-0872

以急性胰腺炎为首发症状的小胰腺癌并胰腺炎与单纯性胰腺炎的 CT 对比分析

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目的 对比分析以急性胰腺炎为首发症状的小胰腺癌并急性胰腺炎（SPC-AP）与单纯性胰腺炎（S-AP）的 CT 增强特征，提高以胰腺炎为首发症状的小胰腺癌的认识。方法 回顾性收集 2014 年 1 月至 2023 年 8 月经病理证实的以急性胰腺炎为首发症状的小胰腺癌（16 例）和临床诊断为单纯性急性胰腺炎（89 例）患者的临床及 CT 增强影像资料。采用卡方检验及 Fisher 的精确检验比较两组间计数资料，采用 t 检验或 Mann-Whitney U 检验比较两组间计量资料。结果 SPC-AP 组患者年龄较 S-AP 组大，两组间轻度胰腺炎发生比分别为 100%、20.2%，组间差异有统计学意义（ $P<0.05$ ）；SPC-AP 组影像表现胰腺肿块、低强化区、截断性强化、主胰管扩张及截断的发生比例较 S-AP 组高，两组间差异均有统计学意义（ $P<0.001$ ）；SPC-AP 组与 S-AP 组的胆总管截断、局部液体聚集及胰腺结构，两组间差异均有统计学意义（ $P<0.05$ ）。胆总管扩张、肾前筋膜增厚、周围血管累、区域性门静脉高压及胰腺周围淋巴结显示率，二组间比较差异无统计学意义（ $P>0.05$ ），但 SPC-AP 组以单侧且左侧肾前筋膜增厚为主，而 S-AP 以双侧肾前筋膜增厚为主。主胰管平均直径约（ 4.73 ± 1.70 ）mm 比（ 2.10 ± 0.48 ）mm，两组间差异有统计学意义（ $P<0.05$ ）。胆管中位平均直

径约 8.47 (5.20, 10.65) 比 7.10 (5.63, 9.18), SMA/SMV 中位平均比值约 0.68 (0.55, 0.76) 比 0.58 (0.50, 0.62), 两组间差异无统计学意义($P>0.05$)。胰腺形态增大、无改变及萎缩者占比, 两组间差异有统计学意义($P<0.001$)。结论 不明原因轻度胰腺炎的中老年患者, 多期增强 CT 表现胰腺截断强化、低强化肿块并主胰管扩张及截断需警惕胰腺癌的可能。

PU-0873

基于术前 CT 探索胰腺及胰周组织对胰腺导管腺癌预后的影响

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目的: 胰腺导管腺癌(PDAC)由于其侵袭性、转移性和耐药性, 恶性程度高, 预后极差。胰腺癌的肿瘤异质性大, 对胰腺癌患者预后的评估具有重要价值。但胰腺及胰周组织结构形态也会因为胰腺癌的发生产生改变。影像组学可为提供大量潜在微观信息, 因此, 本文旨在基于影像组学方法建立肿瘤、胰腺及胰周组织模型评估胰腺癌患者预后, 指导临床制定有效的治疗策略。

方法: 本研究回顾性纳入了 266 名行根治性切除且经病理证实为胰腺导管腺癌的患者, 并收集了患者的临床、术前一月内增强 CT 及患者随访情况, 主要结局为总生存期 OS (从手术当日至死亡当日或最后一次随访当日计算)。将患者按 7:3 的比例分为训练组和测试组。首先以动脉期为 mask 进行多期影像配准, 以 nn-Unet 深度学习算法为基本框架, 实现胰腺癌病灶及胰腺的自动分割, 并胰周外扩 5mm (避开血管等周围其他器官结构), 然后由两名放射科医生进行手动校正, 将校正好的 ROI 导入 FAE 软件, 进行特征提取, 使用单因素及多因素 Cox 回归分析有意义的临床特征, 然后应用递归特征消除进行影像组学特征选择, 通过逻辑回归算法建立模型 1 (基于肿瘤)、模型 2 (基于肿瘤及胰腺) 和模型 3 (基于肿瘤、胰腺及胰周组织) 构建影像组学模型, 并比较各个模型性能, 选择效能最高的模型, 评估胰腺癌预后。

结果: 在本中心中, 266 名患者 (平均年龄, 62 岁 \pm 9 岁[SD]; 男性 159 人, 女性 107 人)。观察者间一致性良好 ($k=0.73$)。与模型 2 和模型 1 相比, 包括胰周组织的模型 3 提高了胰腺导管腺癌患者预后的评估 (AUC 分别为 0.83 [95% CI: 0.82, 0.85] vs 0.79 [95% CI: 0.77, 0.80] vs 0.67 [95% CI: 0.65, 0.69]; $P < 0.001$)。采用影像组学模型将患者分为高危组和低危组。KM 分析显示两组间差异有统计学意义 ($p < 0.05$)。

讨论: 基于术前增强 CT 胰腺及胰周组织构建的影像组学模型特征对胰腺导管腺癌预后有一定的附加价值, 可以更好的指导临床制定有效的治疗策略。

PU-0874

局灶性结节增生 MR 增强肝胆期的强化类型探讨

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目的: 探讨局灶性结节性增生(FNH)钆噻酸二钠增强肝胆期(HBP)的增强类型, 并探讨其相应的病理基础和临床意义。

材料和方法: 本回顾性研究已获得机构审查委员会的批准。2016 年 1 月至 2022 年 5 月, 回顾性分析了 95 例患者 117 例 FNH 病变(89 例为单发病变, 6 例为多发病变, 40 例组织学证实, 55 例影像和随访诊断)。根据钆噻酸二钠增强 MRI HBP 与背景肝脏的增强程度及均匀性, 将 FNH 分为 7 种类型:(1)均匀高信号, (2)非均匀高信号, (3)均匀等信号, (4)非均匀等信号, (5)均匀低信号, (6)非均匀低信号, 或(7)高低混合信号模式。分析各类型的病理基础及临床意义。

结果:钆酸二钠增强 MRI HBP 中, FNH 表现为均匀高信号 18 例(18.95%, 24 个病变), 非均匀高信号 39 例(41.05%, 49 个病变), 均匀等信号 17 例(17.89%, 17 个病变), 非均匀等信号 16 例(16.84%, 17 个病变), 均匀低信号 1 例(1.05%, 1 个病变), 非均匀低信号 3 例(3.16%, 8 个病变), 混合信号 1 例(1.05%, 1 个病变)。FNH 表现为均匀或不均匀等高信号 90 例(94.74%), 低信号均匀、不均匀或混合信号 5 例(5.26%)。病理结果显示, FNH 在 HBP 中的增强模式根据病变中纤维化、脂肪变性、出血、胆管、肝细胞增生或异型成分的不同而不同。

结论:基于磁共振多参数对比和 HBP 强化类型, FNH 的诊断率在 90%以上。在少数病例中, 由于 HBP 的成分和分子表型不同, 导致其不典型增强模式, 因此需要随访、活检或手术病理来明确诊断。

PU-0875

能谱 CT MAR 技术在上腹部弹簧圈栓塞术后随访中的价值研究

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目的 探讨能谱 CT 去金属伪影 (MAR) 技术在门静脉高压患者弹簧圈栓塞介入术后 CT 随访中的应用价值。方法 回顾性收集 42 例上腹部介入植入弹簧圈术后, 行能谱 CT 扫描随访的患者数据, 在未开启 MAR 的图像中伪影最重层面的腹主动脉和未受伪影影响的腰大肌内勾画 ROI, 分别复制到开启 MAR 的图像中, 记录 CT 值、SD 值并计算对比噪声比 (CNR) 和噪声指数 (AI); 由两位高年资诊断医师以 4 分制对两组图像分别评分; 对两组图像的信号 SD、背景 SD、CNR、AI 行配对样本 t 检验; 对医师评分行一致性检验后, 评分不同者商议决定最终评分, 将两组图像的最终评分行 Wilcoxon 秩和检验。结果 应用 MAR 技术后 AI 值和信号 SD 值明显降低 (12.209 ± 9.226 vs. 29.459 ± 23.833 、 15.990 ± 7.690 vs. 30.640 ± 23.070), 均有 $P < 0.01$; CNR 和背景 SD 无明显差异 (7.994 ± 3.780 vs. 7.735 ± 6.965 、 9.657 ± 2.432 vs. 9.504 ± 2.191) 均有 $P > 0.05$; 两位医师主观评分一致性佳 (对两组图像评分的 Kappa 值分别为 0.82、0.84), 开启 MAR 可以明显提高图像的主观评分 ($P < 0.01$)。结论 能谱 CT 的 MAR 技术在上腹部弹簧圈栓塞术后 CT 随访中, 可明显减少金属伪影, 提升图像质量。

PU-0876

肝脏能谱 CT 成像中不同期相虚拟平扫替代真实平扫的差异性及影响因素研究

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目的: 基于正常脏器显示, 探讨肝脏成像中 Revolution CT 不同期相虚拟平扫 (VNC) 替代真实平扫 (TNC) 的最佳方案及影响因素。

方法: 回顾性分析 2020 年 8 月至 2020 年 10 月的 120 例在 Revolution CT 上行肝脏 TNC 及动脉 (A)、静脉 (V)、延迟 (D) 三期能谱增强扫描的患者资料。测量 TNC 及三期 VNC 图像中的肝脏、门静脉、腹主动脉及脂肪的 CT 值及图像噪音, 比较 VNC 和 TNC 间的差异及相关性。以 10HU 及 15HU 为界值比较所测组织三期 VNC 与 TNC 的 CT 差值 (DDVT) 的一致性, 多因素回归分析观察 DDVT 的影响因素。Wilcoxon 检验比较传统扫描与不同方案的能谱增强扫描辐射剂量的差异。

结果: VNCv 肝脏、VNCA 门静脉、VNCD 主动脉的 CT 值与相应 TNC 无统计学差异并呈中等以上正相关; 脂肪三期 VNC 均较 TNC 的 CT 值偏高, 一致性较低, 但呈强相关; VNCA 主动脉与 TNC 一致性较 VNCV 及 VNCD 偏低, 各组织 VNCv 与 VNCD 的 CT 值无统计学差异。DDVT 主要与体重、体表面积或体重指数呈负相关。各期 VNC 图像噪音均低于 TNC, 其中 VNCV 最低。单期能谱扫描辐射剂量高于单期混合能量扫描, 传统四期扫描的剂量与三期能谱增强扫描无统计学差异, 但高于单期能谱结合混合能量扫描。

结论: 基于 Revolution CT 的肝脏 VNCA、VNCV 和 VNCD 图像中, VNCV 图像最接近 TNC, 并能通过体重或体表面积进一步矫正。

PU-0877

老年性急性胰腺炎的临床和影像学特征

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目的: 分析老年急性胰腺炎患者的临床表现、影像学特征和预后。

方法: 回顾性分析 285 例初次诊断为急性胰腺炎患者的腹部影像学数据 (CT/MRI) 及临床病例资料。根据年龄划分为年轻组 (65 ~ 74 岁)、中老年组 (75 ~ 84 岁) 和最年长组 (≥ 85 岁) 三个年龄组, 分析和比较三组患者的临床基本特征、实验室检测指标、影像学特征和临床结局终点发生率的差异, 具有显著性差异 ($P < 0.05$) 的指标纳入多因素 Logistic 回归分析, 分析不同年龄组急性胰腺炎患者之间的影像学特征和预后因素。

结果: 285 例初次诊断为急性胰腺炎患者的平均年龄为 (73.9 ± 6.6) 岁, 165 例 (57.9%, 165/285) 的患者为女性。与其他两组相比, 第 1 组中 ANP 的发生率更高, CT/MRI 上合并坏死的发生率更高 ($P > 0.05$)。第 3 组的局部并发症发生率和 CT/MRI 上的 WON 发生率似乎高于其他两组 ($P > 0.05$)。第 3 组的 SAP、多器官功能衰竭和入住重症监护室的比例较高, 但未达到统计学意义。第 1 组患者的治愈率明显高于其他两组 ($P = 0.001$)。

结论 不同年龄组有不同的影像学 and 临床特征及预后。即使影像学表现轻微, 第 3 组患者也比年轻患者出现局部并发症的概率更高, 临床进展更严重, 临床预后更差。

PU-0878

肝内胆管粘液性囊性肿瘤的临床及影像学特征并文献复习

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目的: 肝内胆管粘液性囊性肿瘤包括囊腺瘤及囊腺癌, 本文主要探讨其临床及影像学特征, 提高对其认识及术前诊断水平。

方法: 回顾性分析自 2009 年至 2020 年 7 例经手术病理证实的肝内胆管粘液性囊性肿瘤患者的临床及影像学资料, 结合相关文献进行分析。

结果: 7 例肝内胆管粘液性囊性肿瘤中囊腺瘤 2 例, 囊腺癌 5 例; 男性 2 例, 女性 5 例; 年龄 45~68 岁, 中位年龄 60 岁。5 例无明显症状, 2 例仅表现上腹不适。所有患者血清 CEA 均正常, 3 例血清 CA199 升高。所有患者均无乙肝病史。影像上均为较大单发多囊多分隔肿块, 位于肝左叶者 4 例、肝右叶 2 例、左右叶交界处 1 例, 囊壁以及壁结节强化方式均呈轻度渐进性强化, 3 例伴有胆管扩张, 4 例囊壁见钙化。

结论: 肝内胆管粘液性囊性肿瘤多见于女性, 一般无明显症状, CA199 升高具有一定的提示价值, 影像检查多表现为肝内较大单发多囊多分隔肿块。当患者年龄较大, 肿瘤位于肝左叶且囊壁厚薄不

均多提示为囊腺癌，而有无壁结节与是否恶性关系不大。鉴别诊断包括多囊肝、肝包虫病、转移瘤及脓肿，手术切除是最好的治疗方法。

PU-0879

肠系膜侵袭性纤维瘤的 CT 诊断

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侵袭性纤维瘤 (SFTs) 又叫韧带样肿瘤，是一种罕见的成纤维细胞或肌纤维母细胞起源的间质肿瘤，可见于全身各处。SFTs 分为腹外型、腹壁型及腹内型 (肠系膜)，其中发生于腹内型的较为少见，腹内型可发生于原腹部手术或创伤的位置，原病灶手术切除部位局部复发率高。该病与家族性腺瘤性息肉病 (FAPS) 关系密切，发生于约 9-18% 的 FAPS 患者，女性略多，与雌激素相关，好发于 30-40 岁。病理上表现为胶原基质中含有大量成纤维细胞，没有炎性或肿瘤性成分。SFTs 是一种良性病变，不发生转移，但是可以局部侵袭性生长、可复发。患者多无症状，少部分患者可出现腹痛、消化道出血等症状。病灶发现时常较大，常见大于 15cm。影像表现为边界清或不清，可见邻近结构受侵，可使肠管黏连导致肠梗阻；常见肠系膜血管的侵犯，尽管有局部侵袭性，但是不发生转移，腹水少见。CT 表现与病理成分及血管含量相关。腹型常见主要由胶原基质构成，CT 上表现为较均匀的与肌肉等密度病灶。少见类型的包含不同量的粘液基质，CT 上低于肌肉密度。胶原与粘液基质混合型常表现为分层状或旋涡状表现。本文对肠系膜 SFTs 病例临床及影像表现进行分析，总结其影像诊断要点并讨论其鉴别诊断。

PU-0880

肝内乳头状腺癌合并结肠癌复发一例

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患者，女，73 岁，因发现肝占位性病变 10 月，发热 13 天入院。既往结肠癌术后 18 年。实验室检查：谷丙转氨酶升高，为 138U/L；谷草转氨酶升高，为 371U/L；乙型肝炎病毒表面抗体升高，为 136mIU/mL。

影像学检查：上腹部 CT 示肝右叶见团片状稍低密度影，大小约 12.3×8.5×9.9cm，CT 值约 25Hu，边界欠清，其内密度不均见斑片状低密度影，CT 值约 14HU。上腹 MRI 示肝右叶见多发团块状稍长 T1、混杂 T2、FS 混杂稍高信号影，边界欠清，部分融合，最大截面范围大小约 11.5×7.8×10.0cm，其内可见条片状稍短 T1 信号影，病灶邻近部分脉管受压推移改变，下腔静脉变窄，周围肝包膜下见不规则团片状长 T1、长 T2、FS 高信号影，边界不清，最大截面范围大小约 5.0×3.3×3.2cm，边缘见环形 FS 等信号影，增强后见肝右叶病灶增强扫描呈明显环形强化，其内可见斑片状弱强化区及未强化区，周围肝包膜下病变呈不规则环形强化，强化区厚薄不均，其内见未强化区。上腹 DWI 示肝右叶病灶局部呈团片状 DWI 高信号影，相应层面 ADC 值部分减低。

患者行右半肝切除术和结肠癌根治术。肝脏剖面见巨大肿物，肿物伴坏死。镜下见肿瘤细胞核大、深染，排列成腺样、筛网状，部分腺体漂浮于黏液湖中。免疫组化结果：AE1/AE3(+)、CK20(+)、SATB-2(+)、CK7(灶+)、MSH2(+)。病理诊断为隆起型中分化腺癌，局部为黏液腺癌(占比约 40%)，局部高级别上皮内瘤变。免疫组化结果：CK7(+)、CK20(灶+)、CK19(+)、CDX2(+)、STAB2(部分+)。病理诊断为查见乳头状腺癌，结合临床病史、形态及免疫表型多提示肠癌转移。

PU-0881

基于钆塞酸二钠增强 MRI 的 LI-RADS v2018 评分诊断肝细胞癌的价值

戴颖钰

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目的 评价肝脏影像报告和数据系统 2018 版(LI-RADS v2018)评分在钆塞酸二钠(Gd-EOB-DTPA)增强 MRI 中对肝细胞肝癌(HCC)的诊断效能及阅片者评分的一致性。**资料与方法** 收集经 Gd-EOB-DTPA 增强 MRI 检查的患者 152 例,由 2 名阅片者根据 LI-RADS v2018 评分标准,对 165 个病灶图像特征进行分析并分类,采用 Kappa 检验评估阅片者之间 LI-RADS 分类结果的一致性。分别以 LR-5、LR-4 联合 LR-5 作为预测 HCC 的截断值,计算诊断 HCC 的敏感度、特异度、准确度、阳性预测值、阴性预测值及受试者工作特征(ROC)曲线下面积。结果 2 名阅片者间 LI-RADS 分类结果的一致性高(Kappa=0.792,95%CI 0.743~0.842)。当以 LR-5 作为预测因子时,诊断 HCC 的特异度较高(阅片者 1:94.87%,95%CI 87.39%~98.59%;阅片者 2:93.59%,95%CI 85.67%~97.89%),ROC 曲线下面积分别为 0.78、0.73;当以 LR-4 联合 LR-5 作为预测因子时,诊断 HCC 的特异度有所减低(阅片者 1:89.74%,95%CI 80.79%~95.47%;阅片者 2:88.46%,95%CI 79.22%~94.59%; $P<0.05$),但敏感度(阅片者 1:75.86%,95%CI 65.5%~84.4%;阅片者 2:74.71%,95%CI 64.25%~83.42%)、准确度(阅片者 1:82.42%,95%CI 75.85%~87.52%;阅片者 2:81.21%,95%CI 74.53%~86.48%)相对增加(P 均 <0.05),ROC 曲线下面积分别为 0.83、0.82。结论 基于 Gd-EOB-DTPA 增强 MRI 的 LI-RADS v2018 在 HCC 诊断方面具有一定的临床应用价值,且阅片者之间诊断分类结果的一致性高。

PU-0882

输卵管癌的 CT 和 MRI 表现分析

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目的 总结输卵管癌 (Primary fallopian tube carcinoma, PFTC) 的 CT 和 MRI 表现,以提高认识。**材料和方法** 回顾性收集经手术及病理证实的 PFTC 共 23 例。分析病变部位、大小、形态、密度或信号特点、增强扫描表现以及有无合并其他病灶等。结果 18 例表现为附件区实性 ($n=12$) 或囊实性 ($n=6$) 肿块,肿块最小 19.10mm×15.66mm×13.84mm,最大 102.09mm×41.72mm×50.63mm;呈腊肠形 (9/18)、迂曲条索状 (3/18)、类圆形或椭圆形 (5/18) 及不规则团块状 (1/18);实性部分在 CT 上表现为软组织密度, MRI 上则为稍长 T1 长 T2 信号, DWI 呈明显高信号,增强扫描均可见强化;病侧输卵管不同程度扩张、积液 7 例,网膜和/或腹膜局部增厚或软组织肿块影 8 例,对侧附件区结节状实性病灶 2 例,宫颈管黏膜增厚 2 例,宫腔内积液 2 例,大量腹腔积液 1 例。此外,3 例患者仅表现为腹盆腔内多发软组织结节或肿块,而输卵管病灶未见显示。1 例 CT 上子宫及附件区均未见明显异常。1 例表现为病变输卵管明显扩张、积液而无明确软组织成分。结论 PFTC 影像学表现具有一定特征性,临床工作中发现影像学表现为附件区腊肠样实性或囊实性肿块者应想到本病的可能性。

PU-0883

双源 CT 双能量技术对结直肠癌 MSI 状态及 CD8+ T 淋巴细胞浸润程度的预测价值

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目的 探讨双源 CT 双能量技术对结直肠癌 MSI 状态的预测价值。**方法** 回顾性分析 150 例经临床证实结直肠癌患者的临床及双源 CT 影像资料, 其中 MSS/MSI-L 组 116 人, MSI-H 组 34 人, 比较各组间相关临床指标及双能量参数之间的差异, 分析 MSI-H 的独立危险因素及各因素对结直肠癌 MSI 状态的诊断效能。**结果** MSS/MSI-L 组与 MSI-H 组间的动脉期参数 (Z 值、NIC、K 值) 及静脉期参数 (Z 值、NIC、K 值) 存在统计学差异 ($P < 0.05$), 且 MSS/MSI-L 组参数高于 MSI-H 组, 多因素 Logistic 回归分析显示右半结肠、血小板是 MSI-H 的独立危险因素, 动脉期 K 值及静脉期 NIC 值是 MSI-H 保护因素, 受试者工作特征曲线 (receiver operating characteristic, ROC) 曲线联合参数 (动脉期 K 值及静脉期 NIC 值) 对结直肠癌 MSI 状态的诊断效能最高。**结论** 右半结肠及血小板是 MSI-H 的独立危险因素, 动脉期 K 值及静脉期 NIC 对结直肠癌 MSI 状态具有独立预测价值, 二者联合预测效能最高, 可为临床提供参考。

PU-0884

能谱 CT 图像分析碘基物质分解图像的纹理分析在卵巢癌术前预测 P53 状态的价值

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目的: 探讨能谱 CT 碘基物质分解图像纹理分析在卵巢癌术前预测 P53 状态中的价值。**方法:** 本研究共纳入 40 例经手术病理证实的卵巢癌患者, 其中 P53 突变型 18 例, P53 野生型 22 例, 均经免疫组化染色证实。所有患者均于术前在 Discovery CT 750HD 扫描机上行能谱 CT 扫描, 重建动脉期碘浓度 CT 图像。使用 ITK-SNAP 软件勾画肿瘤全域感兴趣区 (region of interest, ROI), 形成肿瘤体积 ROI。使用 A.K.分析软件提取肿瘤 ROI 的纹理特征, 利用最小绝对收缩和选择算子 (least absolute shrinkage and selection operator, LASSO)、一元 Logistic 回归和方差分析对特征进行选择 and 降维。然后构建放射组学特征的多元 Logistic 回归模型, 绘制受试者特征曲线 (receiver operating characteristic curve, ROC) 评价模型的诊断效能。**结果:** 最终选择前 3 个特征构建放射组学模型, 包括 GLCM_RunEntropy、GLCM_Imc1、GLCM_IDN。ROC 曲线下面积为 0.737 (准确性: 0.700; 敏感性: 0.944; 特异性: 0.500)。校正曲线和决策曲线分析分别显示出良好的校正效果和临床实用价值。**结论:** 基于能谱 CT 的碘基 MD 图像的纹理分析在预测卵巢癌患者 P53 状态方面具有较大潜力。**临床应用:** 对能谱 CT 碘基物质分解 (MD) 图像进行纹理分析可以预测卵巢癌 P53 的状态, 从而为制定治疗方案提供有效的信息。

PU-0885

基于能谱 CT 碘图参数和细胞外容积分数鉴别 I 型与 II 型卵巢上皮性恶性肿瘤的价值

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目的: 探讨基于能谱 CT 碘图参数和细胞外容积分数鉴别 I 型与 II 型卵巢上皮性恶性肿瘤的价值。

方法: 纳入 2014-2022 年于本院经手术病理证实的 92 例卵巢上皮性癌患者, 根据病理类型分为 I 型 (低级别浆液性癌、透明细胞癌、低级别子宫内膜样腺癌、粘液腺癌) 和 II 型 (高级别浆液性癌、高级别子宫内膜样腺癌、癌肉瘤)。所有患者均于术前在 Discovery CT 750HD 扫描机上行能谱 CT 扫描, 重建动脉期、静脉期、延迟期碘浓度 CT 图像。于延迟期测量病灶最大层面实性部分的碘浓度值 (iodine concentration, IC) 和同层面髂外动脉的碘浓度值。根据公式“ $NIC = \text{病灶 IC} / \text{髂外动脉 IC}$ ”计算延迟期标准化碘浓度值 (delay-phase normalized iodine concentration, DNIC)。收集患者血细胞比积 (HCT), 根据公式“ $(1-HCT) * DNIC * 100\%$ ”计算卵巢癌细胞外容积分数 (extracellular volume, ECV)。采用独立样本 t 检验及秩和检验比较 I 型和 II 型卵巢癌 ANIC、VNIC、DNIC 和 ECV 的差异。绘制受试者特征曲线(receiver operating characteristic curve, ROC) 得到各指标的曲线下面积 (area of curve, AUC)、敏感度及特异度, 评价各参数的诊断效能。

结果: I 型患者 33 例, II 型患者 59 例。II 型卵巢癌 ANIC、VNIC、DNIC 及 ECV 明显高于 I 型卵巢癌 (所有 $P < 0.05$)。ANIC、VNIC、DNIC 及 ECV 的 AUC 分别为 0.689、0.685、0.828、0.812, 敏感度及特异度分别为 84.85% 和 50.85%、72.73% 和 64.41%、84.85% 和 76.21%、81.82% 和 77.97%。

结论: 基于能谱 CT 碘图参数和细胞外容积分数有潜力成为鉴别 I 型与 II 型卵巢上皮性恶性肿瘤的影像标志物。

PU-0886

罕见多灶性自身免疫性胰腺炎一例

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目的 探讨罕见的多灶性自身免疫性胰腺炎的影像及临床病理学特征。方法回顾性分析 1 例多灶性自身免疫性胰腺炎患者的临床资料、影像特征和病理学形态, 并复习相关文献。结果 男, 74 岁, 发现胰腺占位一月余入院, 实验室检查: 肿瘤指标 (-)。图 1 所示: CT 平扫示胰腺体尾部形态饱满, 动脉期增强胰腺体尾部类圆形稍低密度, 门脉期及延迟期呈等稍高密度。图 2 所示: MRI 示胰腺体尾部两枚类圆形异常信号, T1WI 呈低信号, T2WI 呈稍高信号, IN/OUT-PHASE 信号无明显改变, DWI 呈明显高信号, ADC 呈低信号; 增强扫描动脉期呈相对低信号, 延迟期呈明显均匀强化。手术切除胰腺体尾部, 免疫组化结果提示纤维化背景中可见浆细胞浸润, IgG4 阳性细胞约 40/HPF, IgG4 (+)、IgG (+), 考虑 IgG4 相关性自身免疫性胰腺炎 (Autoimmune pancreatitis, AIP), 如图 3 所示。结论 自身免疫性胰腺炎一种罕见的自身免疫介导的慢性胰腺炎, 病因不明, 可能与遗传和异常免疫相关。按病理学特征分为 I 型和 II 型。I-AIP 是 IgG4 相关疾病的胰腺表现, 好发于中老年男性。临床表现为无痛性黄疸、血清 IgG4 水平升高; 可伴多器官受累, 包括硬化性胆管炎、涎腺炎、间质性肺炎及腹膜后纤维化等。根据形态改变, I-AIP 可分为弥漫型、局灶型及多灶型。弥漫型多见, 胰腺弥漫肿大呈“腊肠状”伴刀鞘样结构。局灶型少见, 表现为局限性团块, 常位于胰头部。CT 平扫呈均匀等或低密度; MRI-T1WI 呈稍低信号, T2WI 呈稍高信号, 病灶内大量淋巴细胞、浆细胞浸润并发生特征性的席纹状纤维化, 限制了水分子扩散, 导致弥散受限。增强扫描动脉期胰腺实质呈低强化, 门静脉及平衡期呈渐进性强化, 可能与病变内纤维化及病灶压迫胰腺内微血管引起管腔狭窄、血流变慢, 造成对比剂缓慢流入流出有关。该病对激素治疗敏感, 表现为局灶性或多灶性肿块时, 易被误诊为胰腺肿瘤。早期精确诊断不仅可以避免不必要的手术, 还可以避免长期炎症导致不可逆性器官损害, 使患者得到及时正确的治疗及预后评估。

PU-0887

肝内神经内分泌癌一例

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神经内分泌肿瘤是来源于神经内分泌系统的一种肿瘤，肝脏是常见的转移部位，原发较少；肝脏原发性神经内分泌肿瘤症状较轻，一般无肝炎或肝硬化病史；好发于中年人。本例 CT 示肝内不规则肿块，无假包膜，肝内血管及胆管未见明显受侵，肿块边缘强化明显，整体轻-中度强化，病理结果为肝左叶恶性肿瘤，符合神经内分泌癌。

PU-0888

嗜酸性空泡样肾肿瘤 1 例

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目的 探讨嗜酸性空泡样肾肿瘤的影像特点、诊断及治疗。

方法 分析我院 1 例经病理证实的多发的嗜酸性空泡样肾肿瘤的临床资料，B 超、CT 及 MRI 影像表现和病理特征。

结果 本例患者为 71 岁女性，体检发现左肾多发占位 2 周，无腰痛，腹痛，尿频尿急等伴随症状。B 超示左肾内见数个低回声区，中下极之一大一小约 20.1×17.7×20.8mm，另一大小约 18×16mm，下极之一大一小约 13×13mm，形态欠规则，边界欠清，内见少许血流信号。经外周静脉注射造影剂 SonoVue 后，见该团块稍早于肾实质灌注，消退和肾实质基本同步，灌注峰值高于肾实质，灌注欠均匀，似见环形征。CT 增强示左肾实质多发类圆形等密度占位，平扫 CT 值约 40HU，增强后皮质期明显强化，CT 值约 126HU，强化程度低于肾皮质，髓质期强化减弱，CT 值约 95HU，排泄期 CT 值约 70HU，肾周脂肪间隙清晰，肾周筋膜无增厚。MRI 增强左肾多发异常信号结节灶，部分形态不规则，大者约 28*18mm，T1WI 为等、稍高信号，T2WI 为略低信号，信号欠均匀，弥散受限，增强扫描动脉期明显强化，后期强化减低。遂行肾肿瘤切除术，术后病理示左肾多发性嗜酸细胞性肾肿瘤，结合免疫酶标符合嗜酸性空泡样肾肿瘤（EVT）。

结论 嗜酸性空泡样肾肿瘤是一类新近被认识的肾肿瘤实体，临床较罕见，目前属于交界性/低度恶性肾肿瘤（ICD-O/1），过去被称为高级别嗜酸性肾肿瘤，因其具有独特的临床病理学特征及分子遗传学改变，第 5 版 WHO 肾肿瘤分类将其更名为嗜酸性空泡样肾肿瘤。本例嗜酸性空泡样肾肿瘤表现为多发，在国内外报道中更为罕见，其诊断主要依靠病理学检查及高通量 DNA 靶向测序，临床上无特殊表现，影像学上很难进行鉴别诊断。治疗上可采用手术治疗。

PU-0889

基于 CT 的肝脏和腰大肌脂肪定量评估急性胰腺炎严重程度的研究

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基于 CT 的肝脏和腰大肌脂肪定量评估急性胰腺炎严重程度的研究

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【摘要】 目的 分析肝脏和骨骼肌 CT 脂肪定量指标对于急性胰腺炎严重程度评估的意义。方法 回顾性分析 2020 年 4 月至 2022 年 4 月哈尔滨医科大学附属第四医院和第一医院确诊为急性胰腺炎的 241 例患者临床资料, 其中 CT 平扫患者 160 例, CT 增强扫描患者 81 例。进行平扫的患者根据改良版 Balthazar 评分分成 SAP 组和 NSAP 组, 比较 SAP 组和 NSAP 组临床资料差异, 增强扫描患者依据 MCTSI 评分进行分组, 比较两种评分和修订版 Atlant 分类诊断一致性。通过受试者工作特征 (ROC) 曲线比较肝、腰大肌 CT 值及二者差值及比值、改良版 Balthazar 评分及 MCTSI 评分诊断 SAP 的效能。利用单因素和多因素 logistic 回归分析重度急性胰腺炎的影响因素。结果 160 例患者中包括 135 例 NSAP 及 25 例 SAP 患者。NSAP 与 SAP 患者之间腰大肌 CT 值、肝/腰大肌 CT 比值、差值差异均具有统计学意义, SAP 患者腰大肌 CT 值低于 NSAP 患者, 肝/腰大肌 CT 比值及二者差值均高于 NSAP 患者; 改良版 Balthazar 评分与修订版 Atlant 分类一致性由于 MCTSI 评分 (k 分别为 0.788、0.767) ; ROC 分析显示, 肝脏/腰大肌 CT 比值诊断效能最好, AUC 为 0.776, 最佳截断值为 0.95, 敏感性和特异性分别为 75%、71%; 其联合改良版 Balthazar 分级的 AUC 为 0.882, 与 MCTSI 相当。多因素 logistic 回归分析表明, 经混杂因素校正后, 肝/腰大肌 CT 比值 >0.95 时患者发生 SAP 风险增加 ($OR=5.965$)。结论 基于平扫的肝和腰大肌 CT 脂肪定量可用于评估急性胰腺炎严重程度, 二者联合可提高 CT 平扫对 AP 临床诊断价值。

【关键词】 急性胰腺炎 肝脏 骨骼肌 CT 脂肪定量

PU-0890

基于多期 CT 图像的影像组学预测膀胱癌病理分级

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目的: 探究基于多期 CT 图像的影像组学联合临床危险预测因素, 构建影像组学-临床模型及列线图, 用于术前预测膀胱癌病理分级的价值。

方法: 回顾性纳入 2019 年 1 月 1 日至 2021 年 12 月 31 日于苏州大学附属第一人民医院行手术治疗的膀胱癌患者, 其中, 高级别膀胱癌 104 例, 低级别膀胱癌 100 例, 在平扫、动脉期、静脉期图像上分别从肿瘤体积中提取影像组学特征, 并构建 Logistic Regression 模型、SVM 模型及 Random Forest 模型, 选取效能较高的模型计算每个患者的 Rad-score (radiomics score, 影像组学评分)。此外, 依次采用 logistics 单因素和多因素分析对临床危险预测因素和 Rad-score 进行筛选, 得到独立预测因素, 构建影像组学-临床模型及列线图, 并评估其性能。

结果: 在纳入的 204 名患者中, 142 名患者构成训练组, 62 名患者构成验证组, 在 3 个模型中以 Logistic Regression 模型效能最高。由 2 个独立预测因素患者年龄及 Rad-score 构建的影像组学-临床模型及列线图, 其训练组及验证组的 AUC 分别为 0.904 (95%CI 0.857-0.951)、0.906 (95%CI 0.837-0.975), 在验证组中, 诊断准确度为 0.790、灵敏度为 0.813、特异度为 0.767。

结论: 基于多期 CT 图像的影像组学联合临床危险预测因素, 构建影像组学-临床模型及列线图, 在预测膀胱癌病理分级方面具有较良好的性能。

PU-0891

病例报道：膀胱异位嗜铬细胞瘤

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目的：提高膀胱异位嗜铬细胞瘤的诊疗水平，减少漏诊与误诊。

方法：收集本院 2021-2023 年间诊断的一例膀胱嗜铬细胞瘤患者的临床资料及影像学特点进行回顾性分析，并结合相关文献讨论。

结果：52 岁男性，以“间断心悸两年，发现膀胱肿物 10 日余”为主诉，以“膀胱肿瘤”收入院，入院时症状加重，表现为心悸频率增加，排尿后血压升高明显，伴出汗、心悸、尿急、尿痛；患者高血压病史 10 余年，最高达 200/103mmHg。MRI 表现：膀胱左后壁肌层内见一椭圆形等 T1 等长 T2 软组织信号影，DWI 呈高信号，ADC 图示低信号，增强扫描早期呈明显不均匀强化，静脉期及延迟期强化程度减低，病灶向外局部突出于膀胱壁外，大小约 2.9cm×4.0cm×3.1cm（上下径×左右径×前后径）。外送儿茶酚胺（catecholamine, CA）类检验结果异常。患者行腹腔镜下膀胱部分切除术，术后病理结果提示：嗜铬细胞瘤，大小：3.5cm×3cm，局灶区域突破包膜；免疫组化结果：CK：（-），CgA（+），Syn（+），Melan-A（-），Ki67（+1%），Inhibinα（-），S100（+），CD56（+），Vimentin（+），SDHB（+）。术后随访排尿引起的心血管症状完全缓解。

结论：膀胱异位嗜铬细胞瘤是一种罕见的神经内分泌肿瘤，由膀胱壁交感神经支配的嗜铬细胞引起，发病率占膀胱肿瘤的 0.06%，大多数瘤体局限于膀胱黏膜下层和肌层。典型症状包括阵发/持续性高血压、血尿及排尿相关的心悸和晕厥等 CA 过量症状。初步诊断可结合临床症状、实验室和影像学检查，病理检查可确诊该疾病。患者排尿时膀胱收缩分泌 CA，产生排尿相关症状，因此，排尿引起的 CA 过量症状可提示异位嗜铬细胞瘤的怀疑诊断；实验室检查可通过测定血或尿 CA 及 CA 代谢物值推测诊断；免疫组化上皮源性标记物 CK 阴性，神经内分泌标记物 Syn 和 CgA 阳性，均提示异位嗜铬细胞瘤。该疾病可使用 α-R 阻滞剂对症治疗，手术切除是有效治疗手段，但术前要预防性使用抗肾上腺素能阻滞剂以防高血压危象。异位嗜铬细胞瘤总体特异性生存率极佳，其预后可能与是否存在转移相关。

PU-0892

CT 平扫及增强扫描鉴别肝脏血管瘤与肝脏血管肉瘤的价值

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【摘要】目的 探讨 CT 平扫和增强扫描在鉴别肝脏血管肉瘤(PHA)与肝脏血管瘤(CHH)中的价值。方法 将我院 2021 年 1 月~2022 年 12 月接收经病理确诊的 32 例 PHA 患者设为 PHA 组,另将同时段内我院接收经病理确诊的 32 例 CHH 患者设为 CHH 组,两组均予以 CT 平扫和增强扫描,观察并比较两组 CT 图像特点、诊断情况及肝脏指标差异。结果 两组在平扫密度、边界、强化位置和动静脉短路方面比较,差异有统计学意义(P 0.05)。两组在肝血流、肝血容量、毛细血管表面通透性以及肝动脉灌注分数方面差异有统计学意义(P <0.05)。结论 CT 平扫和增强扫描肿瘤结节强化位置与动静脉短路是早期鉴别 PHA 及 CHH 的重要指标,两种疾病在 CT 鉴别中的肝功能指标方面存在较大差异,可以提供形态和血供特征的评估,能给临床开展下一步治疗提供有效依据。

PU-0893

原发性肝癌治疗最新进展

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原发性肝癌是一种常见的恶性肿瘤，其治疗一直受到广泛关注。虽然已有多种治疗方法，但是因为肝癌的病情复杂多变，治疗难度大，在临床上仍然存在很多问题尚待解决。本研究旨在探讨现有的原发性肝癌治疗方法，总结治疗的最新进展，为临床治疗提供参考。本文通过文献综述的方式，对原发性肝癌的病因、发病机制、诊断、分期以及治疗方法进行系统梳理，并结合近年来的最新研究成果，对治疗方法进行评估和总结。目前，原发性肝癌的治疗方法主要包括手术切除、局部治疗以及综合治疗等，其中，经过不断的实践和创新，局部治疗和综合治疗的效果不断提高，并逐步成为现有治疗方法的主流。此外，新药物和免疫治疗的应用也为原发性肝癌治疗带来了新希望。虽然原发性肝癌治疗在过去数十年中取得了显著进展，但是治疗仍然存在一定的局限性。未来，需要进一步探索病因、发病机制等方面的研究，并且不断完善治疗方法，加强多学科、多领域合作，以期能够更好的治疗原发性肝癌。

PU-0894

不同类型成像序列在磁共振肝脏弹性成像中的对比研究

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目的：磁共振肝脏弹性成像(MRE)是一种无创性检测方法，可评估肝脏组织的硬度或弹性，对于早期肝硬化具有较高诊断价值。MRE 技术常用的成像序列有 epiMRE 序列和 greMRE 序列。本研究旨在探讨上述 2 种序列的差异及其对诊断结果的影响。

材料和方法：研究对象为东南大学附属中大医院感染科确诊的 24 名慢性乙型肝炎患者。使用西门子 VIDA 3.0T 磁共振设备以及 MAGNETOM Sola MRE 设备进行肝脏弹性成像扫描。采集时选择肝门部层面，并分别采用 epiMRE 和 greMRE 两次成像。其中，epiMRE 采样时间为 13s，由患者单次呼气后屏气完成；greMRE 采样时间为 97s，由患者分 5 次呼气后屏气完成扫描，总扫描用时 2 分 42 秒。扫描后设备自动生成幅值图、相位图、波形图、MRE 图、MRE 90%可置信区间图。选取 MRE 90%可置信区间图，在可置信区间内测量患者的 MRE 数值，同时测量 90%可置信区间与该层面肝脏实际的面积，计算其比例。最后使用 SPSS 比较 epiMRE 序列与 greMRE 序列上述测值的差异。

结果：epiMRE 的 90%可置信区间占肝脏实际面积的(89.5±1.7)%，greMRE 的 90%可置信区间占肝脏实际面积的(80.4±3.5)%。二者的差异具有统计学意义(P<0.05)。

讨论：磁共振弹性成像技术利用机械振动作用于人体组织，然后通过磁共振成像技术来测量振动波传播速度和波长，从而计算出组织的硬度或弹性指数。epiMRE 序列相比于 greMRE 序列能够有效地降低噪声干扰和运动伪影，增强图像质量和对比度。这也使得它更适用于肝脏弹性成像等需要高精度的医学应用中。同时 greMRE 序列成像时间较长且需患者多次屏气扫描，期间可能存在的膈肌运动幅度差异也是导致 greMRE 序列精度降低的可能因素总之，epiMRE 序列比 greMRE 序列在慢性乙型肝炎患者肝脏弹性成像方面具有更高的精度和可靠性。

结论：epiMRE 序列在慢性乙型肝炎患者肝脏弹性成像中具有更高的精度和可靠性，可以更好地评估肝脏组织的硬度及弹性，对于早期肝硬化和肝癌的诊断具有重要的应用价值。

PU-0895

原发性肝癌中医辨证分型与临床资料和影像征象的相关性研究

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目的：探究原发性肝癌中医辨证分型与临床指标及肝脏特异性造影剂影像学表现的相关性。方法：收集了 132 例初诊的原发性肝癌患者的临床特征和影像学表现，对性别、年龄、乙肝病史、肝硬化病史、Child-Pugh 分期、ALBI 评分、NLR、Alb、NEUT、LYM、PLT、PT、ALT、AST、IBil、DBil 和 TBil 等临床指标进行分析并对是否有门静脉侵犯、是否有肝外转移、病灶最大直径、病灶个数及形态、病灶边缘是否光滑、包膜是否有破坏、增强模式、肝胆期病灶信号是否减低、DWI 信号等影像征象进行评估并计算出病灶的表现扩散系数（*apparent diffusion coefficient*, ADC 值）。对计量资料进行两独立样本 *t* 检验或 Mann-Whitney U 检验，对计数资料进行卡方检验；对单因素分析差异有统计学意义的因子进行二元 Logistics 回归分析。结果：Alb ($Z=2.174$, $P=0.030$)、PT ($Z=2.307$, $P=0.021$)、AFP ($Z=4.486$, $P<0.001$)、门静脉是否侵犯 (卡方= 4.569 , $P=0.033$)、是否有肝外转移 (卡方= 5.216 , $P=0.022$)、肿瘤个数 (卡方= 4.569 , $P=0.033$)、肝胆期信号是否减低 (卡方= 5.584 , $P=0.018$)、ADC 值 ($Z=5.634$, $P<0.001$) 在肝癌中医证型间差异有统计学意义。AFP (OR 值= 1.003 , 95%CI: $1.002\sim1.005$)、Alb (OR 值= 1.135 , 95%CI: $1.005\sim1.282$)、门静脉是否侵犯 (OR 值= 0.011 , 95%CI: $0.001\sim0.197$) 和 ADC 值 (OR 值= 0.001 , 95%CI: $0.000\sim0.043$) 是肝癌中医证型的独立预测因素。结论：临床特征及影像学表现有助于肝癌中医证型的诊断和分型，并提高其准确性，从而指导临床治疗和改善患者预后。

PU-0896

Deep learning-based early-stage post-transplant MRI assessment is predictive of long-term graft loss in kidney transplant recipients

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Purpose

Accurate prediction of long-term graft outcome of kidney transplantation (KT) remains challenging. This study is aimed to investigate the predictive value of an early post-transplant MRI assessment with deep learning for the prediction of long-term graft failure in KT recipients.

Methods

250 patients undergoing grafted kidney MRI exam within 2 years after KT were retrospectively included. The primary endpoint, i.e., graft loss, is defined as a return to hemodialysis, re-transplantation, or renal allograft dysfunction. Grafted kidney MRI assessment was performed with a pretrained RtNet+ model to decode the risk of acute allograft injury (AAI), chronic allograft injury (CAI) versus stable kidney graft recipient (SR). Then, RtNet+ outputs were combined with clinical-serum biomarkers using Cox proportional hazards (Cox-PH) and hybrid Cox & gradient boosting machine (Cox-GBM) learning algorithm for the prediction of graft survival. Concordance index (C-index) was used as the model performance metric.

Results

RtNet+-predicted AAI indicated an independent adverse factor of long-term graft loss (hazards ratio [HR], 4.77 [95% confidence interval, $1.88\sim12.10$]; $P < 0.01$), assessment relying on which showed a favorable performance for graft survival prediction (C-index, 0.673 [95% CI, $0.573 - 0.773$]). In addition, combination of early graft MRI measurement with clinical-serum biomarkers

using Cox-GBM produced a C-index of (0.743; 95% CI, 0.658 - 0.828), better than the Cox-PH model (0.688; 95% CI, 0.598 - 0.778), for the prediction of overall kidney graft survival.

Conclusions

Early-stage grafted kidney MRI assessment can provide clinical benefit in the prediction of long-term kidney graft outcome.

PU-0897

2018 版 LI-RADS 联合 ADC 值对 LI-RADS M 分类中肝细胞癌和其他肝原发恶性肿瘤的预测价值

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目的: 探讨 2018 版 LI-RADS MR 影像征象、ADC 值对 LI-RADS M (LR-M) 分类中肝细胞癌 (HCC) 和其他肝原发恶性肿瘤 (OM) 的预测价值。材料与方法: 142 例原发性肝癌患者的 MR 图像经两位放射医师分类为 LR-M, 其中, HCC 组 62 例, OM 组 80 例。比较两组间患者 ADC 值, 一般临床资料包括年龄、性别、位置、AFP、CA19-9、长径, 以及 LI-RADS MR 影像征象包括非边缘廓清, 强化包膜, 马赛克征, 肿瘤含脂, 瘤内出血, 结中结, 环形动脉期高强化, 边缘廓清, 延迟期中央强化, 靶样弥散受限, 胆管扩张。通过受试者工作曲线将 ADC 值由转换为二分类变量 ADC 分类, 单因素及多因素回归分析筛选鉴别 LR-M 中 HCC 和 OM 的独立预测因素, 受试者工作曲线分析各独立预测因素及预测模型的预测价值。结果: HCC 组中出现 AFP 升高 (42/62, 67.7%), 强化包膜 (41/62, 66.1%) 和瘤内出血 (13/62, 21.0%) 比例较高, ADC 值 $\leq 1.08 \times 10^{-3} \text{ mm}^2/\text{s}$; OM 组中出现 CA19-9 升高 (42/80, 52.5%), 延迟期中央强化 (51/80, 63.8%)、靶样弥散受限 (41/80, 51.3%) 和胆管扩张 (41/80, 51.3%) 比例更高, ADC 值 $> 1.08 \times 10^{-3} \text{ mm}^2/\text{s}$, 差异均有统计学意义 ($P < 0.05$)。多因素回归分析示 AFP、强化包膜、ADC 分类、胆管扩张是预测 HCC 组和 OM 组的独立预测因素, 受试者工作曲线显示预测模型曲线下面积最高为 0.950, 敏感度为 85.5%, 特异度为 91.2%。结论: 2018 版 LI-RADS 联合 ADC 值可有效预测 LR-M 分类中肝细胞癌 (HCC) 和其他肝原发恶性肿瘤 (OM)。

PU-0898

探讨胸腹主动脉检查在心衰相关疾病的应用

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【目的: 研究利用 CT testBolus 技术获取注射对比剂达峰时间, 手动增加触发阈值, 提高心衰患者检查成功率的可行性。

方法: 回顾性收集 100 例, 其中心脏彩超示 60 例为心衰相关疾病患者, 40 例心功能无异常患者, 所有患者行胸腹主动脉检查, 采用飞利浦 256 排 CT, 造影剂选用碘克沙醇 320mgI/100ml, 碘流率 4-5ml/s, 对比剂剂量根据个人 BMI 指数对应使用; 应用 CT testBolus T 技术扫描, 获得触发图像曲线图 (Tracker Graph), 统计触发时间, 结合超声左室射血分数 (LVEF) 值之间的关系, 评价各组差异。

PU-0899

增强 CT 在胃间质瘤鉴别诊断中的应用价值

吴琼

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目的：增强 CT 是术前识别和评估胃黏膜下肿瘤（SMT）的重要检查手段，本研究探讨增强 CT 特征在区分胃间质瘤（GST）和其他胃 SMT 中的应用价值。方法：回顾性分析 66 例 SMT 患者的临床病理及影像资料，根据病理结果将患者分为 GST 组（54 例）和非 GST 组（6 例胃平滑肌瘤和 6 例胃神经鞘瘤，12 例），回顾术前 CT 图像的影像学特征：病变位置、最大径、生长模式、病变边缘、强化方式、各期图像的 CT 值以及坏死、浅表溃疡、钙化、病变周围肿大淋巴结(LN)和粗大血管的存在。比较两组的临床和 CT 特征。结果：5 个临床和 CT 特征提示肿瘤为 GST：年龄较大(>57 岁)、肿瘤体积较大($\geq 5.5\text{cm}$)、不均匀强化、坏死和无增大的淋巴结($p<0.05$)。结论：GST 有着不同于其他 SMT 的特殊 CT 和临床特征，术前增强 CT 在 SMT 中识别 GST 方面有较高应用价值。

PU-0900

双层探测器光谱 CT 定量增强参数评估肝功能储备

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目的：探讨双层探测器光谱 CT 定量增强参数对评估肝功能储备的价值。方法：选取 2019 年 7 月至 2022 年 8 月在解放军总医院海南医院行腹部光谱 CT 三期增强检查患者共 24 例，对以上患者的门脉期能谱基数据（spectrum base image, SBI）进行处理，生成碘浓度（iodine concentration, IC）图、细胞外容积（extracellular volume, ECV）图，分别测量正常肝左叶、右叶及尾状叶的 IC 及 ECV 平均值。ECV 及 IC 组间比较采用 Kruskal-Wallis 检验，正态分布数据相关性分析采用 Pearson 法，非正态分布数据相关性分析采用 Spearman 法。光谱 CT 定量参数与吲哚菁绿(indocyanine green, ICG)清除试验参数采用一元及多元线性回归方法进行建模。结果：肝右叶的 ECV 及 IC 与 ICG5 分钟滞留率（ICGR5）、10 分钟滞留率（ICGR10）、15 分钟滞留率（ICGR15）呈显著负相关（ $r_{\text{ECV-R5}} = -0.48$, $r_{\text{ECV-R10}} = -0.48$, $r_{\text{ECV-R15}} = -0.47$, $r_{\text{IC-R5}} = -0.52$, $r_{\text{IC-R10}} = -0.52$, $r_{\text{IC-R15}} = -0.52$, $r_{\text{IC-R5}} = -0.52$, $r_{\text{IC-R10}} = -0.52$, $r_{\text{IC-R15}} = -0.52$, $r_{\text{IC-R5}} = -0.52$, $r_{\text{IC-R10}} = -0.52$, $r_{\text{IC-R15}} = -0.52$ ）。肝右叶的 ECV 及 IC 与 ICG 清除率（ICG-CR）呈显著正相关（ $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$, $r_{\text{ECV-ICG-CR}} = 0.48$ ）。肝右叶的 IC 与 ICGR5、ICG-CR 的逻辑回归方程分别为 $y=0.62-0.16*IC$ （ $P=0.04$ ）及 $y=0.09-0.07*IC$ （ $P=0.03$ ）。结论：光谱 CT 定量增强参数肝右叶的 IC 及 ECV 与肝功能储备具有一定临床相关性，肝右叶 IC 值与 ICGR5 及 ICG-CR 的回归模型可以初步用来评估肝功能储备。

PU-0901

光谱 CT 基于碘图的动脉增强分数及细胞外容积多参数定量评估对结直肠癌诊断的价值

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摘要:目的 探讨光谱 CT 定量增强参数对结直肠癌的诊断价值。方法 对 46 例行腹盆部光谱 CT 三期增强的结直肠癌患者的能谱基数据进行处理,生成无水碘图、动脉增强分数(AEF)图及细胞外容积(ECV)图,分别测量肿瘤及正常肠壁的碘浓度(IC)、AEF 及 ECV 值。采用独立样本 t 检验及 Mann-Whitney U 检验进行组间比较,并采用 ROC 曲线评价其诊断效能。结果 结直肠癌病变的 AEF 及 IC 值大于正常肠壁 AEF 值及 IC 值(0.338 ± 0.122 vs 0.225 ± 0.072 , 1.007 ± 0.402 mg/mL vs 0.599 ± 0.229 mg/mL, $P<0.0001$), ECV 在结直肠癌病变与正常肠壁间的差异无统计学意义($P=1.000$)。AEF、IC、ECV 及三者联合诊断结直肠癌的 ROC 曲线下面积分别为 0.806、0.797、0.671 及 0.842,其约登指数分别为 0.565、0.565、0.326 及 0.609。三者联合诊断结直肠癌的截断值为 0.660,敏感度为 63.04%,特异性为 97.83%,其逻辑回归方程为 $Y=13.75\times AEF+16.30\times ECV-6.70$ 。结论 光谱 CT 定量增强参数 AEF、ECV 及 IC 联合诊断对结直肠癌的诊断具有一定价值。

PU-0902

老年女性先天性门体分流 2 例

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背景及目的 先天性门体分流(CPSS),包括先天性肝内和肝外门体分流,是一种罕见的胎儿血管发育缺陷,导致门静脉血流分流到体循环。CPSS 最突出的表现为肝性脑病、肝肺综合征和肺动脉高压。我们报告两例先天性门体分流,分别为肝内和肝外。本文对 CPSS 的临床表现、CT 表现及治疗进行了复习。**案例总结** 两例均为老年女性患者。病例 1 因上腹痛入院。血生化检查显示肝功能指数升高,腹部 CT 增强意外发现先天性肝内门体分流(CIPS)Park 3 型。保肝治疗后腹痛缓解,肝功能指标恢复正常,建议定期检测血氨水平。病例 2 因黄疸入院,全身情况加重,血生化检查胆红素升高。腹部增强扫描发现先天性肝外门体分流(CEPS),但该病例的分流通道从肝右静脉流向脐静脉,再流向宫旁静脉丛,最后经髂静脉进入下腔静脉,此分流通道尚未报道过。药物治疗后黄疸症状明显改善,但仍需进一步介入治疗。**结论**

在成人患者中可偶然发现 CIPS 和 CEPS。成人 CIPs 需要定期监测血氨水平,而 CEPS 不仅需要定期监测血氨水平,还需要进一步干预治疗。

PU-0903

UBE2C、p-JAK2、p-STAT3 在 HCC 组织中的表达及其对患者预后的影响

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目的：探讨 HCC 组织 UBE2C、p-JAK2、p-STAT3 表达与 HCC 临床指标、术前 CT 特征以及患者预后的相关性。

方法：通过 GEPIA 筛选出 UBE2C 为主要研究对象。收集 2010 年至 2016 年我院手术切除的 105 例 HCC 及对应癌旁组织的标本、临床病理指标以及术前 CT 资料；IHC 检测 HCC 及癌旁组织中 UBE2C、p-JAK2 及 p-STAT3 的表达；SPSS26.0 统计分析 UBE2C、p-JAK2 及 p-STAT3 表达与 HCC 患者的临床病理指标、术前 CT 特征和预后的关系，以及 HCC 组织中 UBE2C 表达与 p-JAK2 及 p-STAT3 表达的相关性。

结果：（1）UBE2C、p-JAK2、p-STAT3 在 HCC 组织中显著高表达（ $P<0.05$ ）。

（2）UBE2C、p-JAK2 的表达均与 HBsAg、AFP、肿瘤直径、分化程度、淋巴结转移及 TNM 分期显著相关（ $P<0.05$ ）。p-STAT3 的表达与 AFP、肿瘤直径、分化程度、淋巴结转移及 TNM 分期显著相关（ $P<0.05$ ）。

（3）UBE2C 的表达与 HCC 病灶直径、包膜、非环形动脉期高强化及非周边廓清等 CT 特征显著相关（ $P<0.01$ ）。p-JAK2、p-STAT3 的表达均与 HCC 病灶直径及包膜等 CT 特征显著相关（ $P<0.05$ ）。

（4）UBE2C 表达、肿瘤直径、分化程度及 TNM 分期是 HCC 患者总生存期的独立预后因素（ $P<0.05$ ）。

（5）UBE2C 的表达与 p-JAK2 及 p-STAT3 的表达显著正相关（ $P<0.001$ ）。

结论：UBE2C、p-JAK2、p-STAT3 在 HCC 组织中显著高表达，这与反映 HCC 恶性程度的临床指标及 CT 特征密切相关；UBE2C 高表达与 HCC 患者的不良预后有关；HCC 组织中 UBE2C 的表达与 p-JAK2、p-STAT3 的表达显著正相关。

PU-0904

能谱 CT 多参数成像在评估胆结石成分中的应用价值

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目的：探究能谱 CT 多参数成像在评估胆结石成分中的应用价值。

方法：收集体外 125 枚胆结石置入猪肝模型中行 CT 能谱模式扫描并重建出每枚结石的普通螺旋 CT（120kvp like 混合能量）图像，测得所有胆结石单能量 40KeV、100KeV 时 CT 值（HU40KeV、HU100KeV）、有效原子序数（Eff-Z）值和普通螺旋 CT 值（HU120kvp like），并计算 40KeV-100KeV 间能谱衰减斜率（K），根据红外光谱分析结果分为胆固醇结石组 56 枚、非胆固醇结石组 69 枚，其中胆色素结石亚组 45 枚和碳酸钙结石亚组 24 枚，采用 Mann-Whitney U 检验比较两组间及亚组间各能谱参数差异，利用多因素 logistic 回归分析获得判断胆结石成分的独立鉴别参数，进行受试者工作特征曲线(receiver operating characteristic, ROC)分析，并获取相应的截断值。

结果：体外非胆固醇结石组 HU40KeV、HU100KeV、Eff-Z 和 K 值及 HU120kvp like 均高于胆固醇结石组，具有统计学差异（ $P=0.000$ ）。胆色素结石亚组 HU40KeV、HU100KeV、Eff-Z 和 K 值均低于碳酸钙亚组，具有统计学差异（ $P=0.000$ ）。胆色素结石亚组与碳酸钙结石亚组的 HU120kvp like 无统计学差异（ $P=0.063$ ）。多因素 logistic 回归分析结果显示鉴别胆结石成分的独

立鉴别参数仅为 Eff-Z (95%可信区间 13.85 242.03, $P<0.01$), 其 ROC 曲线下面积为 0.962, 其鉴别胆固醇结石和非胆固醇结石的截断值为 7.27。

结论: 能谱 CT 多参数成像较为准确评估胆固醇和非胆固醇结石, 尤其以 Eff-Z 参考价值为佳, 胆色素结石和碳酸钙结石能谱参数也有差异, 且与普通螺旋 CT 相比, 能谱 CT 可以提高评估胆结石成分的准确性。

PU-0905

动态 dr 在静脉肾盂造影中的应用价值

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目的: 探讨动态 dr 在肾盂造影中的应用价值

方法: 对一例双肾积水的患者进行动态 dr 静脉肾盂造影检查, 并与普通静脉肾盂造影进行对比

结果: 动态 DR 矩形采集面积大, 一次曝光可显示整个泌尿系统。透视下观察造影剂的排泄情况, 做到头低脚高, 这样可以动态观察造影剂通过输尿管的全过程, 对轻微梗阻也能很好地显示。可对病区进行视觉操作和多角度旋转, 同时对胶片进行计数。

结论: 结合病例分析, 展示了肾盂造影动态 dr 的临床优势。与其他检查方法相比, 具有成像清晰、应用方便、副作用少、可灵活应用多体位、多轴位、动态摄影等优点。且能清晰显示泌尿系统的局部和全景, 并由此揭示泌尿系统的相关形态和功能改变。

PU-0906

磁共振 FACT 序列在非酒精性脂肪性肝病临床诊断中的应用研究

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目的: 探究 FACT 序列及 MRS 技术定量测量非酒精性脂肪肝病人肝脏脂肪含量的应用及肝脏脂肪含量与临床血清学生化指标的相关性。方法: 选取 45 名腹部 MRI 患者, 测量肝脏脂肪含量, 得到质子密度脂肪分数 (PDFF), 收集其基本资料及相关生化指标。24 名男性, 平均年龄为 (51.08±7.34) 岁和 21 名女性, 平均年龄为 (51.33±4.35) 岁。分析肝脏脂肪含量 (MRI-PDFF)、血中甘油三酯、总胆固醇、高密度脂蛋白、低密度脂蛋白、谷丙转氨酶和谷草转氨酶之间的相关性。

应用 3.0T MR 机, 波谱技术测定质子密度脂肪分数 (MRS-PDFF), FACT 序列进行扫描同样测得肝脏脂肪含量的影像学指标。统计软件 23.0 用于本研究数据分析。结果: 1. 45 名受试者用波谱测量得到的肝内脂肪含量记为 MRS-PDFF, 平均为 (12.79±8.50) %, 在 FACT 序列测量的肝内脂肪含量记为 MRI-PDFF, 平均为 (12.33±8.98) %, 测得 MRS-PDFF 与 MRI-PDFF 之间明显正相关 ($r=0.922$, $P<0.01$) 2. 采用 Bland-Altman 分析得 MRI-PDFF 参数值, 其中绝大多数数据都在 95% 的一致性界限范围内。3. MRS-PDFF 诊断轻度、中度、重度肝脏脂肪变性的曲线下面积 (AUC) 分别为 0.932 (95%CI: 0.819-1.000)、0.888 (95%CI: 0.744-1.000) 和 0.733 (95%CI: 0.541-0.926), 截断点分别为 6.070%、9.120% 和 18.755%。4. MRI-PDFF 与 TG、TC、LDL 和 ALT 呈显著正相关 ($r=0.93$ 、0.80、0.91、0.92, $P<0.01$), MRI-PDFF 与 HDL 呈显著负相关 ($r=-0.62$, $P<0.01$)。结论: 1. MRS 技术具有非酒精性脂肪肝定量诊断效能, 与磁共振 FACT 定量序列存在高度一致相关性; 2. 与 MRS 技术相比, 磁共振 FACT 定量序列扫描时间短, 可以全肝进行脂肪定量; 3. 磁共振 FACT 定量序列参数与总胆固醇、甘油三酯、高密度脂蛋白、低密度脂蛋白、谷丙转氨酶具有较好的相关性。

PU-0907

多模态 MRI 成像对宫颈癌诊断价值的应用研究

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目的：多模态磁共振用于宫颈癌的早期筛查与评估

方法：选取 40 名盆腔 MRI 检查的检查者，其中有 20 名为病理证实为宫颈癌的病人（CC 组），20 名为健康对照者（HC 组），使用飞利浦 3.0TMR 机，并通过 DWI、DKI 和 IVIM 序列来测定宫颈癌患者的不同病理分型、不同病理分级、不同月经状态和正常检查者的影像学参数。在数据后处理工作站 DKE 和 IVIM 得到相应数据，运用 SPSS23.0 软件对数据进行统计分析。

结果：1.基于 DWI 诊断，宫颈癌组 ADC 值低于健康组；鳞癌组 ADC 值低于腺癌组；随着病理分级增加，ADC 值逐渐降低；宫颈癌绝经组 ADC 值低于非绝经组。所有参数差异均有统计学意义。

2.基于 DKI 诊断，宫颈癌组 MD 值低于健康组，MK 值高于健康组；鳞癌组 MD 值小于腺癌组，MK 值大于腺癌组；随着病理分级增加，MD 值逐渐降低，MK 值逐渐增高；各参数差异均具有统计学意义；不同月经状态的 MD、MK 值无统计学差异。

3.基于 IVIM 诊断，宫颈癌组 D 值低于健康组，D*值、f 值高于健康组；鳞癌组的 D 值、D*值、f 值低于腺癌组；随着病理分级增加，D 值逐渐降低；各参数差异均具有统计学意义（ $P < 0.05$ ）；随着病理分级增加，D*值、f 值差异无统计学意义；不同月经的 D 值、D*值、f 值均无统计学差。

4.DWI、DKI、IVIM 参数对宫颈癌诊断效能比较，D 值具有最佳诊断效能，ROC 曲线下面积（AUC）最大（0.960），其次依次为 MK 值、ADC 值、f 值、D*值、MD 值。

5.DWI、DKI、IVIM 参数鉴别宫颈鳞癌与宫颈腺癌效能比较，MK 值具有最佳鉴别效能，ROC 曲线下面积（AUC）最大（0.989），其次依次为 MD 值、D 值、ADC 值、D*值、f 值。

6.DWI、DKI、IVIM 各参数与宫颈癌病理分级相关性比较，MK 值与宫颈癌病理等级呈正相关，相关性最强， $r=0.796$ ，其次依次为 D 值、MD 值、ADC 值，且与宫颈癌病理分级呈负相关。

PU-0908

探讨 T2WI、DWI 和 T2-DWI 融合序列在子宫颈癌 宫旁侵犯的诊断价值

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目的：评估 T2WI、T2WI+DWI 和 T2-DWI 融合序列对子宫颈癌宫旁侵犯的诊断价值。

方法：回顾性收集我院 105 例宫颈癌患者临床和 MRI 资料。MRI 检查包括 T2WI、DWI 和 T2-DWI 融合序列。由一名妇科医师、一名低年资放射医师和一名高年资放射医师采用半定性六分置信度表对上述图像分别进行诊断。统计学分析包括三位医师诊断结果的一致性检验、计算受试者工作特征曲线（ROC）下面积（AUC）等比较。

结果：三位医师用 T2-DWI 融合序列的评分结果的一致性最高。对于 T2WI、T2WI+DWI 和 T2-DWI 融合序列诊断子宫颈癌宫旁浸润，妇产科医师的 AUC 分别为：0.793、0.887 和 0.906；低年资放射医师的 AUC 为：0.911、0.914 和 0.978；高年资放射医师的 AUC 为：0.965、0.977 和 0.972。通过 Delong 检验，妇科医师和低年资放射医师用 T2-DWI 融合序列的诊断效能高于用 T2WI 序列，两位放射医师用 T2-DWI 融合序列的诊断效能无统计学差别。

结论：T2-DWI 融合序列图像直观，在子宫颈癌宫旁侵犯具有良好的诊断价值，可为术前准确分期提供可靠的帮助。

PU-0909

Multimodal Magnetic Resonance Imaging Combined with PSA in Diagnosis and Staging of Prostate Cancer

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Objective : To explore the value of multiple magnetic resonance techniques combined with PSA in the diagnosis and staging of prostate cancer.

Methods : 1. A total of 130 suspected prostate cancer patients admitted to the Affiliated Hospital of BeiHua University from October 2020 to November 2022 were selected. MRI plain scan, DWI scan and DCE scan were performed on each patient. Philips 3.0TMR machine was used for scanning, and serum PSA test was performed. Finally, pathological results were used as the gold standard to compare the sensitivity, specificity and accuracy of single MRI plain scan, DWI, DCE and combined diagnosis. When combined with PSA > 10ng/ml, MRI plain scan +DWI+DCE was used in one group, and MRI plain scan +DWI+DCE combined with PSA was used in the other group. The diagnostic efficacy of the two groups was compared. 2. To explore the accuracy of MRI staging in the diagnosis of prostate cancer according to the pathological results of radical treatment. 3. Two radiologists used independent blind film reading and scoring according to PI-RADSv2.1, and took the pathological results of puncture and radical treatment as the gold standard. ROC curve was drawn and AUC, sensitivity, specificity and accuracy were calculated.

Results : 1. Among the 130 patients, 98 cases were pathologically confirmed to be prostate cancer, and the remaining 32 cases were all prostate hyperplasia. The accuracy of MRI plain scan +DWI+DCE in the diagnosis of prostate cancer was significantly higher than that of MRI plain scan, DWI and DCE alone, with statistical significance ($P < 0.05$), but there was no statistical significance in the accuracy of MRI plain scan +DWI+DCE in the diagnosis of prostate cancer compared with MRI plain scan +DWI ($P > 0.05$).

2. MRI plain scan +DWI+DCE group diagnosed 92 cases of prostate cancer, 6 cases of false negative, 27 cases of prostate hyperplasia, 5 cases of false positive, diagnosis accuracy of 91.5%. MRI plain scan +DWI+DCE combined with PSA were used to diagnose 95 cases of prostate cancer, 3 cases of false negative, 30 cases of prostate hyperplasia, 2 cases of false positive, the diagnostic accuracy was 96.2%. The diagnostic accuracy of MRI plain scan +DWI+DCE combined with PSA was significantly better than that of MRI plain scan +DWI+DCE group, and the difference was statistically significant ($P < 0.05$).

3. A total of 33 patients had radical pathological results, including 18 patients at T2 stage, 10 patients at T3 stage and 5 patients at T4 stage. The accuracy rate of MRI diagnosis of prostate cancer at T2 stage was 77.8%, T3 stage 80% and T4 stage 100%.

4. The AUC value of PI-RADSv2.1 score in the diagnosis of prostate cancer was 0.904(95%CI:0.855~0.954), and the accuracy rate, sensitivity and specificity of PI-RADS ≥ 3 score were 70.1%, 73.4% and 90.9%. The accuracy of PI-RADS ≥ 4 points (excluding peripherally PI-RADS 3+1 points) was 95.7%(45/47).

Conclusion : 1. The combination of MRI plain scan, DWI and DCE can significantly improve the diagnostic efficacy of prostate cancer. 2. MRI staging has high accuracy. MRI plain scan +DWI+DCE combined with PSA can further improve the diagnostic accuracy of prostate cancer. 3. The diagnostic specificity of PI-RADS v2.1 for prostate cancer is high, and the score of PI-RADS ≥ 4 (excluding the peripheral band of PI-RADS 3+1 score) suggests that the possibility of prostate cancer is as high as 95.7%.

PU-0910

CTA 在人流术后子宫动静脉瘘的临床应用

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目的: 探讨 CTA 在人流术后子宫动静脉瘘的临床应用。

方法: 回顾性分析 2015 年 1 月至 2023 年 8 月在我院就诊的 14 例人工流产术后合并子宫动静脉瘘的诊治过程, 使用 CTA 对患者盆腔血管进行成像, 检查取仰卧位, 双臂上举抱头, 采用 GE Discovery 750 HDCT 进行扫描。首先进行盆腔定位相扫描, 扫描范围包括全髂总动脉分叉处至耻骨联合下缘, 保证整个盆腔及供血大血管在扫描范围内, 螺距 0.984, 管电压 120kV, 有效管电流 300mAs。采用双筒高压注射器 (Stellant, 美国 Medrad 公司) 进行对比剂注射, 右侧肘正中静脉留置 20G 留置针, 碘对比剂剂量 (ml) = 体重 (kg) × 0.8ml/kg, 对比剂流速 (ml/s) = 碘对比剂剂量 (ml) / 12s, 然后以相同的速率注入 30ml 生理盐水。采用智能触发技术, 将感兴趣区置于腹主动脉层面, 触发阈值为 130 Hu, 动脉期延迟时间为 30~35s, 静脉期延迟 60~75s。并使用 MPR 及 VR 技术进行后处理, 显示子宫壁内的动静脉瘘和供血、引流血管。

结果: 14 例患者平均年龄 34 ± 5.7 岁, G1P0~G3P2 不等, 均在孕早期因宫内妊娠行人流术, 平均妊娠周数 6~8 周, 主要临床症状为人流术后持续性不规则阴道流血及 HCG 升高; CTA 图像上所有子宫动静脉瘘病灶均清晰显示, 供血动脉、引流静脉亦清晰显示, 其中右侧子宫动脉供血 8 例, 左侧子宫动脉供血 6 例, 病灶范围 3.4 ± 1.1 cm, 所有病例均行超选择子宫动脉造影明确诊断, 并予以明胶海绵栓塞治疗。

结论: CTA 可以清晰显示人流术后子宫动静脉瘘的病灶范围、供血动脉、引流静脉, 为临床诊治提供参考。

PU-0911

影像组学及影像基因组学在卵巢癌铂类化疗耐药方面的应用

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摘要: **目的:** 通过影像组学及影像基因组学模型, 预测卵巢癌 (ovarian cancer, OC) 铂类化疗的耐药性。 **方法:** 回顾性分析 2015-2023 年间在我院接受铂类化疗的卵巢癌患者约 150 例, 收集术前核磁图像, 从 PACS 上将患者轴位 T2WI、DWI、DCE 图像导出, 使用 ITK-SNAP 软件进行病区逐层手动勾画, 然后将得到的三维感兴趣容积 (volume of interest, VOI) 导入 PyRadiomics 软件进行影像组学分析, 得到影像组学模型。结合组学模型及基因、临床参数, 对患者进行长期随访, 铂类化疗六个月内复发者定义为卵巢癌铂化疗耐药。 **结果:** 卵巢癌患者治疗以手术加铂类与紫杉类联合化疗为主, 但铂类化疗易产生耐药性, 此类患者再次化疗效果不佳, 卵巢癌患者的影像表现与化疗预后相关。 **结论:** 通过回顾性分析 150 例卵巢癌患者影像组学模型, 与临床表现、基因模型、随访结果进行相关性分析, 并得到可预测卵巢癌患者铂化疗耐药性的影像基因组学模型, 为指导治疗、选择合适化疗方案、延长患者无进展生存期 (PFS)、提高患者生活质量等方面提供了极高价值。

PU-0912

壶腹癌在肝脏特异性造影剂增强 MRI (CEMRI) 上的放射学表现

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目的:探讨壶腹癌在肝脏特异性造影剂增强 MRI(CE-MRI)中的影像学表现。

方法和材料:本回顾性研究纳入 2015 年 1 月至 2019 年 1 月疑有壶腹癌并应用肝脏特异性造影剂行 CE-MRI 的患者 120 例(男性 65 例,女性 55 例,平均年龄 70.62 岁)。我们收集了壶腹是否存在鼓胀、大小、T1/ T2 信号强度、增强模式、壶腹弥散受限、胆总管和胰管扩张程度、胆总管远端形态改变、cbd 壁增厚和不对称、延迟 20 min 和 30 min 扫描十二指肠造影分泌情况。我们也回顾了病理和临床诊断资料。此外,我们还根据壶腹鼓胀的存在情况进行了亚组分析。进行单因素和多因素分析以确定恶性相关因素。

结果:壶腹癌 54 例,良性 66 例。多因素分析显示壶腹扩散受限($p=0.028$)、壶腹不均匀强化($p=0.045$)、壶腹形状无改变($p=0.010$)、十二指肠 30min 扫描无造影剂分泌($p=0.001$)与壶腹癌显著相关。亚组分析发现壶腹癌患者存在弥散受限、cbd 扩张程度、十二指肠 30min 延迟扫描无造影剂分泌与壶腹癌有显著相关性。在壶腹部无鼓胀的组中,30min 延迟十二指肠扫描无造影剂分泌是壶腹癌的唯一重要因素。

结论:壶腹弥散受限、壶腹不均匀强化、远端 CBD 形态无改变、十二指肠 30min 延迟扫描无造影剂分泌与壶腹癌有显著相关性。其中,30 分钟延迟扫描十二指肠无造影剂分泌是唯一与壶腹鼓胀无关的显著因素。

局限性:单中心,少数受试者的回顾性研究。

PU-0913

CT 表现对预测粘连性小肠梗阻患者的手术结果的研究

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目的:本研究的目的是评估粘连性小肠梗阻患者的 MDCT 表现作为手术干预的预测因素的准确性。

方法和材料:这项研究分两个阶段进行。在第一阶段,75 例符合纳入标准的回顾性研究纳入本研究 MDCT 表现:小肠扩张,肠壁增厚,肠梗阻程度,小肠气液面,小肠粪便,肠系膜脂肪紊乱,有无腹腔内游离液体。评估这些特征的敏感性、特异性、阳性预测值、阴性预测值及预测手术结果的准确性。通过手术治疗来评估这些特征的相关性。在我们研究的第二阶段,通过应用于 25 例前瞻性病例来检验在回顾性组中获得的结果的有效性。

结果:在回顾性研究组中,小肠扩张($>4\text{cm}$)和高度梗阻被发现具有统计学意义,是粘连性小肠梗阻患者单独和联合手术结果的阳性预测因子。建立在回顾性数据基础上的模型显示,在前瞻性病例中,手术和保守治疗之间存在显著差异,从而验证了我们的结果。

结论:小肠 4cm 扩张及高度梗阻的 MDCT 特征可独立或联合预测粘连性小肠梗阻患者的手术结果。

限制:目前还没有广泛接受的梗阻等级的定义。患者的临床状况没有被考虑在内。

PU-0914

4D-freebreathing 序列对自由呼吸患者肝脏 MR 图像质量的提升价值

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目的：探索 4D 真正自由呼吸高时间分辨率动态增强扫描（4D-freebreathing）序列对不能配合屏气患者肝脏 MR 图像质量的提升价值。方法：回顾分析 2022 年 1 月至 2023 年 5 月在我院行 4D-freebreathing 肝脏扫描患者 40 例（男 22 例，女 18 例），患者均完成了 4D-freebreathing 序列扫描和常规肝脏动态增强扫描，由两位医师对两种序列图像进行独立评价，评价内容包括病变显示，边界显示，病变周围血管显示和图像伪影 4 个方面。采用秩和检验比较两种序列图像质量，采用 Kappa 检验讨论两位医师图像质量评分一致性。结果：两位医师图像质量评分一致性中等（ $\kappa=0.554$ ），4D-freebreathing 序列在病变显示，病变边界显示，病变周围血管显示和图像伪影 4 方面均优于常规肝脏动态增强扫描序列。结论：4D-freebreathing 序列较常规肝脏动态增强序列可显著提升不能屏气，自由呼吸患者肝脏病变的图像质量和病灶检出率。

PU-0915

阴囊高分化脂肪肉瘤 1 例病例报道

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患者男，63 岁，患者自诉于半年前发现右侧阴囊有一肿物，无其他明显不适，查体发现右侧阴囊一实性肿块，肿块与睾丸粘连，有一定的移动性，挤压包块无缩小，用手不能还纳。包块透光实验阴性。超声及 CT 检查发现右侧阴囊内见以脂肪为主的混杂肿块；手术，病理结果：考虑为右侧阴囊非典型脂肪源性肿瘤（高分化脂肪肉瘤）。此病比较罕见，临床治疗以根治性切除为主，复发率高，应重视术后长期随访。

PU-0916

Application of medical imaging in ovarian cancer: Bibliometric Analysis

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Purpose This study aims to use bibliometric analysis to investigate the current research hotspots and collaborative networks in the application of medical imaging in ovarian cancer over the past 23 years.

Methods A systematic search of medical imaging in ovarian cancer was conducted on the Web of Science Core Collection on August 9, 2023. Download all published reviews and articles from January 2000 to December 2022. Countries, institutions, journals, keywords and collaborative networks were analyzed and visualized using CiteSpace and VOSviewer.

Results We have obtained a total of 5958 publications. These works came from 3958 institutions in 84 countries, published in 1186 journals, and written by 26643 authors. The annual cumulative publications follow Price's exponential growth law. The United States (1373 articles) was the most prolific country, with Harvard University (202 articles) being the most prominent institution.

Timmerman D participated in most studies (100 articles), with Gynecological Oncology having the highest number of publications on this topic (296 articles). In addition, the top three keywords ranked were "ovarian cancer", "diagnosis", and "ultra sound". Classification, nanoparticles, and resistance had become recent research hotspots.

Conclusion This study provides an overview with the medical imaging applications of ovarian cancer, helping researchers understand the current status, collaborative networks, and main research hotspots in this field. In addition, our research findings provide a series of recommendations for future research.

PU-0917

输尿管夹层的影像表现特征分析

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输尿管夹层是由输尿管自发性撕裂而形成的, 自发性输尿管破裂是一种少见疾病, 分为创伤性和非创伤性, 非创伤性是由于结石导致尿路梗阻引起的, 其次是由盆腔肿块、妊娠、腹膜后纤维化及膀胱癌所致。而由于各种原因引起输尿管自发性撕裂形成输尿管夹层更加罕见。夹层多发于中上段, 输尿管夹层的发病机制尚不清楚, 其发病机制可能与主动脉夹层相似。输尿管夹层形成的直接原因是输尿管粘膜损伤和各种病因导致的尿路梗阻引起管腔内压力增高, 当压力超过 20 至 75mmHg 的临界水平时, 肾脏可能通过两种机制缓解增高的压力。一种是肾血流明显减低, 尿液生成减少, 肾盂积水速度减慢, 伴有严重的肾功能损害。另一种是尿液出现各种逆流和渗漏, 其中以肾盂肾窦逆流最常见, 此种逆流容易发生在肾盏穹隆部, 由此渗漏至肾外而形成尿瘤, 其次是上段输尿管, 发生在中上段输尿管的渗漏, 我们将其称之为“输尿管夹层”, 二者也可同时存在。

PU-0918

磁共振成像(MRI)评估胰腺导管内乳头状黏液瘤(IPMN)良恶性诊断价值

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【摘要】目的:探讨磁共振平扫、增强及 MRCP 评估胰腺导管内乳头状黏液瘤(IPMN)良性及恶性的诊断价值。方法:回顾性分析经手术病理证实的 8 例胰腺导管内乳头状黏液瘤的 MRI 表现,以评估其良恶性的价值。结果:入组的胰腺导管内乳头状黏液瘤病例,2 例轻度不典型增生(良性)中 1 例位于胰头部,1 例位于胰体部,表现为主胰管局部轻度扩张 $>5\text{ mm}<10\text{ mm}$;4 例中度不典型增生(交界性)中 2 例位于胰头,2 例位于胰尾部,主胰管均扩张 $>10\text{ mm}<15\text{ mm}$,为分叶状囊性肿块,内部有或无分隔和强化的乳头状突起;2 例重度不典型增生伴局部浸润癌(恶性),1 例位于胰头部,1 例位于胰尾部,主胰管明显扩张 $>15\text{ mm}$,分支胰管部分扩张,为不规则囊实性肿块,直径大于 10mm 并强化,其中 1 例发生肝脏多发转移。结论:MRI 评估胰腺导管内乳头状黏液瘤良性及恶性有独特优势。

PU-0919

基于自然语言处理的 CT 影像报告水平的腹部创伤诊断分类系统

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目的：利用 NLP 技术从大量腹部报告中筛选出诊断为腹部实质脏器创伤的患者

背景：目前，国内的影像学报告尚没有规范化，这对病例的调阅和统计造成了一定的困扰，同时也延长了报告的书写时间。规范化的报告将有利于疾病诊疗和急诊数据的收集。自然语言处理技术（NLP）在医学影像报告中存在一定的作用，已有研究针对脑部急诊疾病、肿瘤类疾病和胸部 CT 的偶发疾病等开展大批量的报告规范化及疾病分类。然而，尚没有研究针对腹部实质脏器创伤的诊断分类和报告规范化。本研究拟利用 NLP 技术对腹部报告进行筛查，以达到快速精准筛选出腹部创伤患者的目的。

方法：回顾性连续性收集 18 年—22 年吉林大学第一医院全腹部 CT 的诊断报告，利用关键词检索方式查找报告描述和结论部分提示可能存在肝，脾，肾挫裂伤的患者共 500 例，两名具有十年诊断经验的高级放射科医师分别调阅报告对应图像，明确病例是否存在对应腹部创伤，并以患者水平为单位，标注出该患者存在创伤的器官。最终获得具有分类金标准标签的阳性数据共 475 例，所有数据互为阴阳性对照。医生评定的金标准数据作为模型输入，送入到 NLP 深度学习模型网络框架中，模型采用了 BERT 模型，结合了面向中文的预训练模型 chinese-bert-wwm-ext，用于医疗诊断任务。chinese-bert-wwm-ext 是专门为中文设计的预训练模型，它基于大规模中文语料库进行训练，捕捉子词级别的信息。bert 模型具有双向上下文理解能力。基于中文预训练模型对 bert 进行微调，输入中文文本，如病人的检测描述，通过 BERT 模型进行编码，生成文本的语义表示，捕获文本之间的关联，最终输出疾病症状的分类结果。

结果：所有数据按照 3: 1 划分为训练集和测试集，在训练集的 100 例数据上，肝挫裂伤获得了 0.98 的 ACC 和 0.99 的 F1 分数；脾挫裂伤获得了 0.94 的 ACC 和 F1 分数，对于肾挫裂伤，ACC 达到 0.99，F1 分数为 0.95。

结论：该研究建立的 NLP 深度学习框架在腹部创伤分类方面获得了较高的准确度，能够帮助研究者有效的筛查创伤数据

PU-0920

肝脏少见肿瘤的影像表现并文献复习

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目的：综合运用 CT 和 MRI 检查，总结肝脏少见肿瘤的影像学表现，旨在提高对肝脏少见肿瘤的认识。

方法：回顾性分析经病理证实的 13 例肝脏原发性少见肿瘤的影像及临床资料,并结合相关文献进行总结。

结果：肝脏血管周上皮样细胞肿瘤 3 例，其中 1 例 CT 平扫可见脂肪密度，增强 CT 及磁共振动脉期均显示明显强化，门静脉期及延迟期强化程度均减低。肝脏炎性假瘤样滤泡树突细胞肉瘤 1 例，位于肝左外叶，密度不均匀，边界欠清，增强扫描病灶边缘实性部分呈渐进性强化，中央可见大片未强化坏死区，病灶由肝左动脉供血。肝肉瘤样癌 1 例，CT 平扫呈稍低密度，增强扫描动脉期呈斑片状不均匀强化，中央见大范围坏死囊变区，门脉期及延迟期呈低密度。肝内胆管内乳头状肿瘤 1 例，位于肝左叶，肝内胆管呈"瘤样"扩张，扩张的肝内胆管出现乳头状结节影。弥漫大 B 细胞淋巴瘤 1 例，动脉期呈轻度强化，门脉期强化轻度上升，强化程度均低于正常肝组织，可见"血管漂浮征"。肝假性淋巴瘤 1 例，DWI 呈现沿汇管区线性高信号，ADC 呈明显低信号。肝细胞腺瘤病 1

例, 病灶多发并可见脂肪密度, 增强明显强化。肝炎性肌纤维母细胞瘤 1 例, 动脉期未见明显强化, 门静脉期轻度强化, 延迟期强化较前明显。肝脏间叶型错构瘤 1 例, 可见巨大多房囊性占位, 囊壁和分隔强化。肝内胆管性囊腺瘤 2 例, CT 表现为蜂窝状以囊性成分为主低密度影, 动脉期分隔及壁结节强化不明显, 延迟期可见中度渐进性强化。

结论: 肝脏少见肿瘤类型种类丰富, 影像表现具有一定的特征。在平时进行疾病诊断中, 除先考虑常见病以外, 少见肿瘤仍应在鉴别诊断范围, 多了解少见肿瘤的影像表现, 以破除思维定式及局限性, 能更好发挥影像学在肝脏肿瘤诊疗中的作用。

PU-0921

能谱 CT 碘水值及 ECV 纹理分析预测直肠癌壁外血管侵犯

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目的:

探讨能谱 CT 碘水值及基于细胞外体积分数(extracellular volume, ECV)纹理分析在预测直肠癌(rectal cancer, RC)壁外血管侵犯中的价值。

材料与方法:

我们回顾性地收集了 74 例经手术和病理证实并于术前行 Revolution 能谱 CT 增强扫描检查的 RC 患者图像与临床信息。根据 RC 的组织学分类标准, 将患者分为非壁外血管受侵组(A 组, 65 例)和壁外血管受侵组(B 组, 9 例)。将所有图像导入 GE AW 4.6 工作站, 使用 GSI Viewer 软件重建延迟期碘(水)图。两名放射科医生(2 年及 8 年腹部诊断经验)各自将三个椭圆形 ROI 放置在病灶的最大层面上, 测量并计算其均值作为最终碘水值(Iodine concentration, IC)。延迟期标准化 IC(DNIC)=病灶的 IC/同层面左髂外动脉的 IC; $ECV=(1- \text{红细胞压积}/100)*NIC*100$ 。将延迟期碘水图导入 Matlab 软件生成 ECV 图, 并导入 ITK-SNAP 软件; 由 2 名影像科医师采用盲法, 参照增强三期原始图像沿病灶边缘勾勒感兴趣区(ROI), 并融合生成三维感兴趣区(volume of interest, VOI)。使用联影 AI 平台(V1.6)进行纹理特征提取; 采用差异性检验比较各参数是否具有统计学差异; 建立 logistic 回归模型, 绘制受试者工作特征(receiver operating characteristic, ROC)曲线评估预测效能, 计算 ROC 曲线下面积(area under the curve, AUC)、敏感度及特异度。

结果:

ECV 及 DNIC 在两组间没有差异($P>0.05$); 经筛选得到 8 个最优纹理特征, 包括 1 个一阶特征, 4 个灰度共生矩阵特征(GLCM)特征, 2 个灰度依赖矩阵(GLDM)特征, 1 个灰度级大小区域矩阵特征(GLSZM)特征(表 1)。Logistic 回归模型预测直肠癌壁外血管侵犯的 AUC、灵敏度及特异度分别为 0.851、88.9%、78.5%(图 1, 表 2)。

结论: 基于能谱 CT 碘水图延迟期 ECV 的全肿瘤纹理分析对于直肠癌壁外血管侵犯具有一定的预测价值。

PU-0922

基于 4D Flow 磁共振技术实时评价 2 型糖尿病患者腹部血流动力学改变

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目的

4D Flow 磁共振成像 (4D-Flow MRI) 可以全面地覆盖和量化时态三维血流。本研究的目的是通过使用 4D-Flow MRI 比较 2 型糖尿病 (T2DM) 患者与健康受试者之间的肾动脉和脾动脉血液动力学变化。

方法和材料

参与者: 本研究纳入了 10 名 T2DM 患者 (7 男 3 女; 年龄 50.7 ± 3.4 岁), 以临床数据诊断, 同时纳入了 10 名无 T2DM 病史的健康受试者 (7 男 3 女; 年龄 47.2 ± 3.29 岁) 作为年龄和性别匹配的对照组。MRI 协议: 两组均接受了一个以腹部区域为中心的径向欠采样灵敏度编码 4D PC 序列, 以获取 3.0T 磁共振 (MR) 扫描仪 (PHILIPS Ingenia, 荷兰 Philips 公司) 中的血液动力学数据。

数据分析: 所有 4D-flow 数据的预处理、可视化和量化均使用 GT Flow 版本 3.2.5 (GyroTools, 瑞士苏黎世) 进行。我们的研究包括 3 条血管 (脾动脉, 左右肾动脉), 结果包括平均速度 (V_{avg}), 最大速度 (V_{max}), 净血流 (Net flow) 和计算阻力指数 (RI)。统计分析: 统计分析由 SPSS (v.22.0; IBM SPSS, ArmonkNY) 和 Matlab (R2018, Mass) 进行。通过 20 个流量统计阶段生成的计算 RI 进行分析。统计显着性水平设为 $p < 0.05$ 。

结果

对于 3 个血管, 根据统计分析, 肾动脉和脾动脉的血流显示出显著差异。左肾动脉相对较低的 V_{avg} (7.14 ± 2.54 vs 10.12 ± 3.55 $p = 0.047$) 与对照组相比较低。脾动脉在 T2DM 组中表现出较低的净血流 (3.84 ± 1.04 vs 6.24 ± 2.96 , $p = 0.046$)。计算的 RI 显示出在两组中肾动脉和脾动脉之间的良好相关性。 ($r = 0.9174$, $p < 0.001$)

结论

T2DM 患者的血液动力学变化显示出肾动脉和脾动脉的显著变化。总之, 4D-Flow MRI 为提供了量化 T2DM 血液动力学变化提供了希望。

PU-0923

胰头巨大孤立性纤维性肿瘤一例

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目的: 原发于胰腺的孤立性纤维性肿瘤 (Solitary fibrous tumors, SFT) 极为罕见。本文将报告 1 例胰头巨大 SFT 影像学及病理学表现, 以供临床同道借鉴参考。

方法: 患者, 女性, 69 岁, 1 月前无明显诱因出现上腹部疼痛伴腹胀, 不伴腹泻, 于当地医院 CT 检查提示: 胰腺占位性病变, 未予治疗。现为进一步治疗收治于本院, 入院查体神清, 皮肤巩膜无黄染, 腹部柔软, 无压痛反跳痛, 未触及明显肿块, 体重无明显变化。

结果: 实验室检查: 葡萄糖 6.6 mmol/L ; 肿瘤标志物 (-)。影像学表现: 胰腺头颈部见一边界尚清巨大肿块, 分左右两个叶状结构, 大小约 $17.2 \times 9.1 \times 10.1 \text{ cm}$, CT 平扫示右侧叶可见低密度坏死灶, 左侧叶内可见钙化灶, MR 平扫示肿块内部信号不均匀, T1WI 呈等/稍高信号, T2WI 呈高信号, 左侧信号较右侧更加混杂, 增强扫描动脉期病灶左侧强化较右侧明显, 其内可见多发细小血管影, 实质期及延迟期持续轻度强化, 病灶与肝总动脉分界不清, 门静脉受压明显右移变细。影像诊断: 实性假乳头状瘤可能。行全胰切除+门静脉部分切除重建术, 术中见肿瘤起源于胰头颈部, 术中见肿瘤起源于胰头颈部,

质地韧，表面光滑，边界不清，活动度差，累及周围神经，门静脉、肝总动脉受侵，周围脏器无受累，未见淋巴结转移。镜检：肿瘤细胞呈梭形、卵圆形，核卵圆形，轻度异型，核分裂像较少，呈束状、交织状排列，细胞排列疏密不等，间质可见厚壁血管，局部呈血管外皮瘤样结构，部分区域骨化明显，局部见纤维被膜。免疫组化：CD34、STAT6、Vim、LEF1、C-kit、Nesp55、Islet1、 β -Tub、 β -cat (浆+)呈阳性表达，诊断为胰腺 SFT。

结论：该病例临床症状不典型，肿标阴性；肿瘤较大且呈分叶状，密度及信号不均，可见坏死、囊变及钙化，肿瘤血管丰富，门静脉和肝总动脉受侵，周围脏器无明显受累，术前诊断困难。STAT6 核阳性表达具有高度特异性。

PU-0924

Cinematic Rendering of Retrograde Jejuno gastric Intussusception

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A 66-year-old woman with a history of pancreatoduodenectomy presented with progressive epigastric pain. Abdominal CT demonstrated partial jejunal herniation into the remnant stomach, consistent with retrograde jejuno gastric intussusception(Figure). Exploratory laparoscopy confirmed the diagnosis. The intussusception was reduced with fixation of jejunum to the mesocolon to prevent recurrence. The postoperative course was uneventful.

Retrograde jejuno gastric intussusception is a rare but potentially lethal complication following gastric surgery, including Billroths operation I and II reconstruction and Roux-en-Y anastomosis(1). Three anatomical categories have been proposed: type I involves the afferent limb (antegrade); type II affects the efferent limb (retrograde) and type III involves both limbs. Type II was the predominant category, accounting for 80% of all cases. Imaging, especially CT, is essential for the accurate diagnosis(2). This image-based case shows the use of cinematic rendering to create photograph-realistic three-dimensional images of retrograde jejuno gastric intussusception to facilitate communication and visualization for preoperative planning.

PU-0925

胃肝样腺癌 1 例报告及文献复习

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[摘要]目的：分析胃肝样腺癌(hepatoid adenocarcinoma of stomach, HAS)的 CT 及 MRI 表现，总结其影像学特征。方法：回顾性地搜集了 1 例经病理证实的 HAS，并结合相关文献，总结 HAS 的临床特点、影像学表现。结果：患者，男，61 岁，因“体检发现甲胎蛋白升高 3 月，胃镜检发现胃癌 1 月”，门诊以胃癌收治入院，影像学检查上腹部 Ct 胃-贲门、胃底及胃小弯侧胃壁明显增厚呈肿块状，内缘凹凸不平、溃疡形成，病变浆膜面毛糙模糊，增强扫描明显不均匀强化，周围脂肪间隙模糊，肝胃韧带区、腹腔干旁、大网膜上淋巴结多、增大，部分融合成团，与胃壁病变分界不清，病变局部包绕胃左动脉，局部显示欠清。上腹部增强 MRI 检查胃-贲门、胃底及胃小弯侧胃壁肿块 T1WI 呈不均匀稍低信号，T2WI 呈不均匀低信号，高 b 值 (b=800) 弥散加权成像病灶呈高信号，表观弥散系数呈低信号；增强扫描明显不均匀强化，结合患者乙肝病毒感染史及 AFP 增高因素，影像诊断考虑肿瘤病变可能，胃肝样腺癌可能性大。后进行病理穿刺诊断为肝样腺癌，对胃病理进行免疫组织化学检测确诊为 HAS。结论：HAS 临床表现缺乏特异性，影像学表现为局限溃疡型病灶的倾向，坏死成分较多，具有高度淋巴结转移倾向，极易误诊为胃腺癌或肝细胞癌转移，病理检

查和免疫组织化学检测是诊断该病的金标准, HAS 恶性度高, 进展快, 应做到早发现和早治疗, 以延长患者的生存期。

PU-0926

肝脏恶性肿瘤经 90Y 治疗后的影像动态变化

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目的 了解钇 90 放射治疗后常见影像学表现, 探索中国人群治疗后影像动态变化规律。

方法 回顾性分析 2021 年 5 月至今于单个中心 (东南大学附属中大医院) 约 30 例确诊为肝脏恶性肿瘤且接受内放射 (钇 90) 治疗的患者, 且随访至少 6 个月的患者。每位患者的图像由两名以上的医师共同诊断。受试者为临床诊断为肝脏恶性肿瘤的患者, 包括肝细胞癌、胆管细胞癌及肝转移瘤。在治疗前均进行 CT 或 3.0TMRI 平扫及增强扫描, 收集受试者影像、人口统计学资料及实验室检查结果。患者均在术后 1 个月左右 (早期) 及术后 3 个月后 (晚期) 行 MRI 平扫+增强、CT 平扫+增强等影像学检查。根据 mRECIST 及 RECIST 标准评估早晚期治疗反应及影像动态变化。

结果 来自一个中心的 30 例接受钇 90 治疗的肝脏恶性肿瘤的患者纳入研究, 年龄 53.5 ± 15.5 岁, 纳入受试者 31 个接受治疗的病灶, 来自东南大学附属中大医院, 统计患者肿瘤本身特征包括肿瘤内部信号变化及肿瘤周围肝实质信号变化。治疗后绝大多数患者出现肿瘤大小减小、动脉期边缘的环形强化、肿瘤内部信号更加均匀、弥散受限减少、ADC 值增加等表现, 治疗还可能会引起一些肝实质改变 (瘤周水肿、炎症、环形增强、肝纤维化、包膜回缩和治疗同侧肝萎缩、治疗对侧肝增大等)。

结论 观察发现不同于其他局部治疗钇 90 治疗后肿瘤应答需要较长时间, 早期可能会出现部分放射反应。钇 90 治疗后 3-6 个月, 影像上肿瘤缩小和强化减弱为理想的缓解状态。

PU-0927

不同组织来源肝转移瘤多层螺旋 CT 的影像特征及鉴别要点

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目的 总结不同组织来源肝转移 CT 表现规律, 探讨其诊断及鉴别诊断要点。方法 回顾性分析肝转移瘤 100 例, 其中结直肠癌 43 例, 胃癌 30 例, 肺癌 18 例, 乳腺癌 3 例, 胰腺癌 6 例。比较分析肝转移瘤 CT 平扫及动脉期、门脉期、延迟期强化表现特点。结果 门脉来源肝转移瘤患者病灶门静脉期病灶边缘清晰度、钙化、囊变出现率及牛眼征表现明显高于肺动脉来源的肝转移瘤患者。结论 多层螺旋 CT 对不同来源肝转移瘤的诊断和鉴别具有重要临床应用价值。

PU-0928

成人十二指肠神经内分泌肿瘤 CT 表现一例

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背景:

神经内分泌肿瘤是一类起源于干细胞且具有神经内分泌标志物、能产生生物活性胺、多肽类激素的高度异质性肿瘤,可发生于全身各处。胃肠道神经内分泌肿瘤最常见,而十二指肠神经内分泌肿瘤较为罕见,占胃肠道神经内分泌肿瘤的 2-3%。

案例摘要:

患者女,37岁,1月前无明显诱因出现皮肤瘙痒,不伴腹痛、腹泻、恶心、呕吐,不伴呕血、便血,未予重视,3天前发现皮肤巩膜黄染,就诊于当地医院,化验肝功能提示肝酶、胆红素升高,腹部核磁提示十二指肠部肿物,考虑十二指肠癌,建议上级医院就诊,现为求进一步诊治入我院,于我院进行了腹盆部增强及CTA、CTV检查:沟槽区可见类圆形软组织密度肿块影,最大截面大小约为3.6x3.3cm,CT值约为42HU,增强扫描三期CT值分别205HU、106HU、95HU,其内见迂曲血管影,与十二指肠降段、胆总管及胰头部分界欠清,胰管及肝内外胆管扩张,考虑十二指肠腺Ca(胰十二指肠动脉分支供血,紧邻胃十二指肠动脉,其内迂曲静脉汇入肠系膜上静脉),累及胰腺及胆总管,致胰管及胆道梗阻性扩张,建议结合内镜检查。患者进一步进行了胰腺十二指肠切除术,组织学类型:神经内分泌肿瘤,NET-G2,浸润十二指肠肠壁全层,未侵犯胰腺和胆总管。

结论:

本例患者是一例罕见的十二指肠神经内分泌肿瘤患者,根据其影像表现没有准确做出诊断,该肿瘤应与十二指肠腺瘤、十二指肠腺癌、淋巴瘤、间质瘤等进行鉴别,对于年龄大于50岁患者,当发现位于近段十二指肠息肉样或壁内的富血供肿块时,尤其是小肿块早期出现淋巴结或远处转移时,应考虑到此病的可能,建议做相关激素及免疫指标的检查,且尽早根治手术治疗。

PU-0929

Giant cysticercosis of the right kidney: A case report.

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Abstract: Cysticercosis, although reported in several parts of the body, especially the liver, lesions occurring in the kidney are particularly rare. We report a 58-year-old female patient with intermittent epigastric pain, who was found to have a huge occupancy of the right kidney on CT (computed tomography) and MRI (magnetic resonance imaging), which was confirmed to have a predominantly cystic component, with no clear enhancement on CT images after injection of contrast medium, and significant enhancement of the peritoneum and septum visible on MRI. This case reports a case and its rarity of cysticercosis occurring in the kidney.

PU-0930

静止型嗜铬细胞瘤 CT 特征分析

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静止型嗜铬细胞瘤是临床无明显内分泌症状的肿瘤。通过对本院 12 例经过术后病理证实为嗜铬细胞瘤，而无临床内分泌症状，术中为发生血压波动等情况的病灶 CT 平扫及动态增强影像学特征进行分析，总结静止型嗜铬细胞瘤的 CT 特征。12 例病灶中 8 例位于腹膜后，4 例位于左侧肾上腺。病灶均为边界清楚囊实性肿块，实性部分呈等密度，CT 值 38-56HU，增强后动脉期轻度强化，静脉期或延迟期强化明显，这与功能型嗜铬细胞瘤动脉期强化明显不同；囊性部分呈低密度，位于病灶中央及边缘，呈等密度或低密度，无明显强化，呈多囊状改变；病灶内未见明显坏死、钙化及出血。以上特征表现与功能型嗜铬细胞瘤细胞瘤的 CT 动态增强表现有所差异，与腹膜后其他神经源性肿瘤表现也有所不同。

PU-0931

肝脏血管周上皮样细胞瘤影像表现分析-附 4 例病例报告

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目的：探讨血管周上皮细胞肿瘤(Perivascular epithelioid cell tumors, PEComa)的影像表现及特征。资料与方法：回顾性收集 2017 年 1 月至今兰州大学第一医院影像科经手术病理证实为肝脏 PEComa 患者 4 例，检索近 10 年来文献报道的有详细影像学资料的 111 例肝脏 PEComa 案例。对肝脏 PEComa 的影像学表现进行归纳汇总。结果：4 例病例女性 3 例，男性 1 例，2 例影像学诊断为 PEComa，另 2 例误诊为肝细胞癌和肝腺瘤。收集 111 例案例汇总，结果显示：肝脏 PEComa 好发于女性，平均年龄为 44.9，肿瘤多为单发，肝右叶多见；CT 平扫表现为混杂密度或均匀稍低密度；增强扫描可见快进快出、持续强化、周边强化及不强化四种强化形式(42.3%、35.1%、43.2%、3.6%)；动脉期穿行迂曲血管影和假包膜形成是较为特征性的表现(29%、27%)；门脉左支受累、出血、坏死和钙化较为少见(9%、8%、3%、5%)。68 例行 MR 扫描病例影像表现无特征性：肿瘤呈 T1 等低信号，T2 等高或高信号，弥散受限，特异期呈低信号，增强扫描同 CT。结论：肝脏 PEComa 在临床上不常见，实性肿瘤影像特征很难与肝细胞癌鉴别，术前误诊率较高，确诊依赖病理检查。但当肿瘤出现脂肪成分及迂曲血管影时，具有较大的提示意义。

PU-0932

上腹部术后脾脏低密度灶的病理及转归

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目的 探讨上腹部术后脾脏低密度灶的病理及转归。方法：对经我院治疗的 35 例上腹部术后患者的临床治疗和影像资料作回顾性分析。结果：脾脏低密度灶有 18 例得到不同程度的恢复，动态观察发现病灶范围较前有不同程度的缩小，其中有 7 例完全恢复，好转率 51%；结论：上腹部术后对脾脏低密度灶主要考虑为以下可能：1.炎性水肿，一般可完全恢复；2.小的缺血灶，后期部分可完

全恢复；3.小的梗死灶，纤维瘢痕形成，后期牵拉收缩可导致病灶范围缩小。4.完全性大的梗死灶，范围基本不变。

PU-0933

Primary ureteral synovial sarcoma: A case report and literature

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Synovial sarcoma (SS) is a soft tissue malignancy that develops mostly in the extremities of adults and occasionally in the substantial organs such as lung, kidney and prostate. Synovial sarcoma originating in the ureter is even rarer, and this lesion has not been introduced in the national or international literature. A 72-year-old male presented with progressive dysuria and exacerbation of his condition, was diagnosed with prostatic hypertrophy at another hospital. He was then admitted to our hospital on June 29, 2021 as his condition showed no improvement. A computed tomography (CT) showed a soft tissue mass in the right middle ureter (about the level of the 4th and 5th lumbar vertebrae). The right ureter, right renal pelvis and calyceal were obstructed and significantly dilated, with effusion above the level. Preoperative imaging diagnosed soft tissue lesions in the right middle ureter, which was considered to be a malignant mass. The patient underwent radical nephrectomy of the right kidney and ureter, and the postoperative pathological diagnosis was ureteral synovial sarcoma.

PU-0934

CT 自动管电流调节联合自适应迭代算法技术 诊断肝血管瘤价值分析

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目的 研究采取多层螺旋电子计算机断层扫描(CT)自动管电流调节(ATCM)和自适应迭代算法(ASIR)诊断肝血管瘤(HH)的临床价值。方法 2017 年 4 月 ~ 2020 年 4 月我院收治的 HH 患者 144 例,根据多层螺旋 CT 多期增强扫描预设噪声指数(NI)分为 A 组(平扫,NI 设为 9)、B 组(动脉期,NI 设为 9)、C 组(静脉期,NI 设为 11)和 D 组(延迟期,NI 设为 13),各组扫描时 ASIR 均设为 50%。记录并分析各组图像噪声值、图像质量评分、图像剂量长度乘积(DLP)和有效剂量(ED)差异。结果 本组各期(平扫、动脉期、静脉期和延迟期)图像质量均可满足诊断需要并获得最终诊断;A 组图像质量评分为(4.9±0.3)分,显著高于 C 组和 D 组【分别为(4.4±0.4)分和(3.8±0.4)分,P<0.05】,图像噪声值为(9.5±0.9)HU,显著低于 B 组、C 组和 D 组【分别为(12.4±1.0)HU、(14.1±1.1)HU 和(16.3±1.1)HU,P<0.05】;B 组图像质量评分为(4.8±0.3)分,显著高于 C 组和 D 组(P<0.05),图像噪声值为(12.4±1.0)HU,显著低于 C 组和 D 组(P<0.05);A 组 DLP 和 ED 分别为(253.2±100.8)mGy-cm 和(3.8±1.6)mSv,显著高于 C 组【分别为(174.5±80.2)mGy-cm 和(2.6±1.1)mSv,P<0.05】或 D 组【分别为(128.50±60.4)mGy-cm 和(1.9±0.9)mSv,P<0.05】;B 组 DLP 和 ED 分别为(246.2±93.1)mGy-cm 和(3.7±1.3)mSv,显著高于 C 组或 D 组(P<0.05)。

PU-0935

青海地区肠气囊肿病 1 例报道

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目的：肠气囊肿病(pneumatosis cystoides intestinalis, PCI)又称为肠壁囊样积气症、囊样肠积气，属于少见疾病，多发生于新疆及青海地区，通过探讨该例肠气囊肿病的影像学特征，加深对 PIC 的认识，以帮助临床制定正确的诊疗方案。方法：对 1 例肠气囊肿病患者的临床及影像学资料进行分析。结果：1 例主诉腹痛中年女性患者，经腹部 CT 扫描发现有肠气囊肿，于胃肠道浆膜下见多个大小不等小囊状、簇状及条状积气区，张力较小，部分融合征象，累及多个肠段，但各累及肠段较短。结论：肠气囊肿病临床上无典型特征，常以腹痛待查行腹部 CT 检查，影像学表现具有一定的特征性，有助于疾病的鉴别诊断及分型。

PU-0936

磁共振成像在急性胰腺炎中的研究现状及进展

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急性胰腺炎(Acute Pancreatitis, AP)的发病率越来越高，病程复杂多变，临床对于其严重程度、病情发展进行及时准确的判断，制定个性化的治疗方案和干预措施，是目前首要待解决的问题。磁共振成像(Magnetic Resonance Imaging, MRI)是一种多参数的成像，同时具有无辐射的特征，以及对于软组织有较好的对比度，另外它的多序列成像以及组学能够帮助发现急性胰腺炎中更多潜在的变化。近年来，在 AP 的严重程度、复发及相关并发症等方面有较多的研究。因此，本文就 MRI 在 AP 中的应用研究进展进行综述，旨在缓解 AP 患者疾病的进展，提高预后。

PU-0937

卵巢性索间质瘤的影像学表现与病理结果对照分析

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目的：探究卵巢性索间质瘤的影像学表现与病理结果对照分析。

方法：2015 年 5 月至 2023 年 9 月郑州大学第三附属医院经病理诊断的 70 例性索间质瘤患者，将其分为颗粒细胞瘤组、卵泡膜-纤维瘤组、纤维瘤组、间质肿瘤组，各组均进行了 MRI、US 及病理检查，各组之间进行临床表现、影像特征和病理结果的比较，并进行相关性的分析。

结果：本实验组患者均为女性，年龄为 33~77 岁，平均年龄(44.49±15.4)岁。其中包括颗粒细胞瘤 18 例，卵泡膜-纤维瘤组 31 例，纤维瘤 14 例，间质肿瘤 7 例。各组之间在发病年龄及首发症状上无明显差异($P>0.05$)；颗粒细胞瘤组，卵泡膜-纤维瘤组和纤维瘤组 3 组之间在肿块最大直径、ADC 值及超声回声特点上存在差异，且差异具有统计学意义($P<0.05$)。颗粒细胞瘤中颗粒细胞含量在有 10%及以上，其内部的颗粒细胞可发生囊变并会形成腔隙，故在一些较大的肿瘤的 MRI 上可见“海绵蜂窝状”影像，US 上囊实性肿块后方无回声衰减。卵泡膜-纤维瘤组由卵泡膜细胞和纤维细胞组成，其中卵泡膜细胞和纤维细胞所占比例不同又可分为纤维卵泡膜细胞瘤和卵泡膜细胞瘤。纤维卵泡膜瘤常为单发、直径较大肿块，在 MRI 上肿块实性部分表现为等或稍低信号，囊变坏死

和间质水肿表现为混杂高信号，US 多为低回声为主的肿块；卵泡膜细胞瘤胞质内可见大量玻璃样变，在 T2WI 脂肪抑制像呈低或极低信号，而各结节间隙之间可见囊变坏死，故在 T2WI 看到低信号之间夹杂散的片状或裂隙状高信号影，US 上表现为内部低回声为主的囊实性肿块。纤维瘤主要是由纤维细胞组成，在 MRI 上呈编织状排列且信号略低于子宫肌层，US 上表现为实性低回声肿块；间质肿瘤是起源于卵巢原始性腺的肿瘤，因其富含血供，且肿块内部的囊变区域不发生强化，故在增强扫描时可见渐进式向心性强化，US 上以实性低回声或以实性回声为主的囊实性包块，肿瘤血管影丰富。

结论：在接受检查的性索间质肿瘤患者中，不同亚型的性索间质肿瘤在肿块的最大直径、ADC 值、超声回声特点及肿瘤细胞结构上具有一定特征性表现，这些差异对其术前诊断及病理诊断分型有重要的参考价值，可有效避免临床的漏诊或误诊。

PU-0938

脾 CT 组学分析预测肝癌肝移植后复发

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目的：探讨基于对比增强 CT 的脾放射组学特征在预测肝癌肝移植后早期复发中的作用。

方法：对 2011 年 9 月至 2021 年 12 月接受肝移植治疗的 176 细胞癌患者进行回顾性研究。从增强图像中提取放射组学特征，建立脾放射组学特征和肿瘤放射组学特征。

用 COX 回归分析早期复发的独立危险因素。然后，建立多个模型来预测肝细胞癌切除后的无复发生存率，并评估和验证放射组学特征对临床病理模型的增量价值。采用 Kaplan-Meier 生存分析评估模型与无复发生存率相关性。结果：脾放射组学征象是肝癌肝移植后复发的独立危险因素。综合微血管侵犯、肿瘤放射组学特征和脾放射组学特征预测早期复发的混合模型其预测效果优于临床病理模型和联合模型。

结论：确定的脾脏放射学特征是肝癌肝移植后早期复发的预后因素，可提高模型对早期复发的预测性能。

PU-0939

探究男性生殖系统：磁共振成像的革命与远景

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本文旨在探讨男性生殖系统磁共振成像技术与线圈的革命性进展以及未来远景。首先介绍了男性生殖系统的重要性和研究意义，以及选用何种磁共振先进成像技术研究。随后，阐述了研究目的和研究问题，即探究男性生殖系统的组织结构、功能及其影响因素等。接着，介绍了磁共振成像技术的原理、方法，以及数据采集和分析方法等。在此基础上，重点概述不同体位结合不同技术在男性生殖系统的组织结构、功能及其影响因素研究等。最后，总结研究结论和未来展望。总之，磁共振成像技术在男性生殖系统研究中具有广泛的应用前景，有望为男性生殖健康领域的未来发展提供重要支持。

PU-0940

体素内不相干运动扩散加权成像评估肝细胞癌术后复发的价值

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目的

探讨体素内不相干运动扩散加权成像 (intravoxel incoherent motion diffusion weighted imaging, IVIM-DWI) 定量参数评估肝细胞癌 (hepatocellular carcinoma, HCC) 术后复发的价值。

材料与方

回顾性收集我院 2016 年 1 月至 2021 年 12 月期间进行上腹 MRI 检查且采取 TACE 治疗的患者 38 例, 根据 1 年内是否复发定义为早期复发组和早期非复发组, 其中 1 年内复发 14 例, 一年内未复发 24 例。上腹 MRI 检查包括 T1WI、T2WI、动态增强扫描、DWI 和 IVIM-DWI。在 GE AW4.6 工作站, 使用 Functool 软件重建图像, 基于 IVIM-DWI 序列生成单指数模型 D-mono、D*-mono、f-mono 图, 参照 T2WI 及动脉期, 在肿瘤最大层面分别放置 3 个大小相等的感兴趣区 (ROI), 避开肿瘤出血、坏死、邻近的血管及胆管, 取 3 个 ROI 平均值用于统计分析。采用独立样本 t 检验或 Mann-Whitney U 检验比较两组间定量参数的差异; 采用 logistic 回归分析建立有统计学差异参数组合的预测模型; 使用受试者操作特征 (ROC) 分析评估预测效能。

结果

IVIM-DWI 序列的 D*mono 值和 f 值在早期复发组和非早期复发组间无统计学差异 ($P > 0.05$), 早期复发组的 D 值 [0.000503 (0.000372, 0.000713)] 显著低于非早期组 [0.000835 (0.000744, 0.001243)], D 值预测客观应答的曲线下面积 (AUC) 为 0.858。

结论

IVIM-DWI 中的 D mono 参数对评估 HCC 患者术后早期复发具有一定价值。

PU-0941

膀胱罕见原发性肿瘤的 CT 表现 (附 10 例分析)

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目的 探讨膀胱罕见原发性肿瘤的 CT 表现, 旨在提高术前诊断水平。**方法** 回顾性分析 10 例经手术病理证实的膀胱罕见原发性肿瘤患者的临床及 CT 检查资料, 其中小细胞癌 3 例, 肉瘤样癌 2 例, 血管周上皮样细胞肿瘤 2 例, 未分化肉瘤、低级别肌纤维母细胞增生伴尿路上皮异型增生、颗粒细胞瘤各 1 例, 所有患者术前均接受泌尿系 CT 平扫及增强检查。**结果** 男 8 例, 女 2 例, 年龄 6~84 岁。临床表现为肉眼血尿 9 例, 腹痛 1 例。10 例均为单发肿块, 最大径 4.5cm~12.5cm。3 例小细胞癌呈不规则实性肿块, 边缘模糊, 2 例密度明显不均, 1 例密度均匀, 2 例位于膀胱腔内, 1 例部分突向膀胱腔外, 2 例临近膀胱壁增厚, 1 例膀胱壁弥漫增厚, 2 例有盆腔淋巴结肿大, 1 例无肿大淋巴结, 3 例增强均呈轻度、渐进性强化。2 例肉瘤样癌呈不规则实性肿块, 边缘清晰, 密度相对均匀, 均位于膀胱腔内, 1 例临近膀胱壁增厚, 1 例膀胱壁未见增厚, 1 例有盆腔及腹主动脉旁肿大淋巴结, 1 例无肿大淋巴结, 1 例增强呈中度强化、缓升缓降型, 另 1 例呈明显强化、缓升缓降型。2 例血管周上皮样细胞肿瘤呈类圆形实性肿块, 边缘清晰, 其内未见囊变坏死, 1 例大部位于膀胱腔外, 1 例完全位于膀胱腔外, 1 例伴有结节状钙化, 2 例未见膀胱壁增厚及肿大淋巴结, 增强均呈明显、渐进性强化, 动脉期肿瘤内部可见髓内动脉分支小血管。未分化肉瘤呈不规则实性肿块, 边缘清晰, 密度明显不均, 位于膀胱腔内, 膀胱壁弥漫增厚, 有盆腔肿大淋巴结, 增强

呈中度强化、缓升缓降型。低级别肌纤维母细胞增生伴尿路上皮异型增生呈不规则实性肿块，边缘模糊，密度明显不均，位于膀胱腔内，临近膀胱壁增厚，无肿大淋巴结，增强呈中度强化、缓升缓降型。颗粒细胞瘤呈规则实性肿块，边缘清晰，密度相对均匀，位于膀胱腔内，临近膀胱壁增厚，无肿大淋巴结，增强呈明显强化、速升速降型。**结论** 膀胱颗粒细胞瘤及血管周上皮样细胞肿瘤 CT 强化较有特征性，术前能够做出正确诊断。其他膀胱肿瘤 CT 表现无明显特异性，但 CT 检查对术前肿瘤良恶性的判断有帮助。

PU-0942

奥沙利铂所致肝窦损伤的 CT 影像征象分析

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目的 归纳奥沙利铂所致早期肝窦损伤的 CT 表现，以提高对该病影像征象及其诊断价值的认识。**方法** 回顾接受含奥沙利铂化疗方案患者的病历资料，收集 CT 增强门静脉期肝实质出现不均匀密度患者的影像和肝功能生化资料。分析肝窦损伤所致对比剂灌注减低引起的肝脏低密度影范围和分布特点，周围相对正常肝实质的强化特征，其他伴随的影像学征象，以及肝功能生化指标变化的幅度。**结果** 共收集到 62 例符合要求患者的病例资料。化疗后肝窦损伤时，增强扫描碘对比剂灌注减低所致的肝脏低密度影在各层面大小、范围不一，可呈微结节状、水坑状或大面积片状，按低密度影分布分为多灶性 1 例、外周性 9 例、弥漫性 52 例。62 例均可见病灶间相对正常肝实质斑片“花斑”样强化，第二肝门区可见“三叶草”样强化 17 例。伴随的其他 CT 征象有肝肿大 50 例、肝静脉主干狭窄 15 例、下腔静脉肝段变扁 13 例、脾肿大 59 例、腹水 3 例、肝门周水肿 25 例、胆囊壁增厚 16 例和食管静脉曲张 4 例。62 例患者出现奥沙利铂相关肝窦损伤影像表现时，肝功能各生化指标大多数仍位于参考值上限以内或轻度增高，仅 1 例达到药物性肝损伤的实验室阈值标准。**结论** 奥沙利铂所致肝窦损伤不适用药物性肝损伤实验室阈值标准来评估，可通过无创性 CT 影像技术来检出。增强 CT 门静脉期肝实质内不均匀低密度影是奥沙利铂所致肝窦损伤的直接征象，肝实质“花斑”样、“三叶草”样强化及其他伴随征象属肝窦损伤的间接征象。

PU-0943

MRI 与 CT 增强评估食管鳞癌肿物侵犯比较

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目的：比较 MRI 与 CT 评估局部食管鳞癌肿物侵犯气管，胸主动脉或支气管的准确性，以判断肿瘤的可切除性。

方法：前瞻性收集本院 2023 年 4 月—2023 年 8 月间，经内镜活检证实为食管鳞癌的患者，MRI 与 CT 检查均在气管镜检查前进行。2 位阅片者采用双盲法分别对 MRI 和 CT 图像进行独立评估，判定气管、胸主动脉或支气管是否受侵。

综合气管镜结果为金标准，计算并比较 MRI 及 CT 诊断食管鳞癌侵及胸主动脉、气管或支气管的敏感度、特异度及准确度，评价病变形态，评价对比剂强化方式，强化强度。重点评价与胸主动脉、气管及支气管的关系，解剖上胸段食管与胸主动脉的关系密切，主动脉弓在食管的左前方形成主动脉弓压迹，胸主动脉与食管左侧壁及前壁伴行，食管与胸主动脉之间只有少许脂肪及纤维组织，胸中、下段食管癌极易侵犯胸主动脉管壁。胸段食管位于气管后方，与气管伴行，左主支气管到气管隆突平面跨越食管的左前壁，食管与气管支气管间也仅有少许脂肪及纤维组织阻隔，故胸上、中段食管癌极易侵犯气管及左主支气管。

结果: 23 例患者纳入本研究, 图像质量较高, 一致性分析 kappa 值 0.801-0.901 $P < 0.01$. MRI 与 CT 评估食管鳞癌侵犯气管、胸主动脉或支气管的准确度差异均具有统计学意义 ($p < 0.05$)。MRI 评价局部晚期食管鳞癌侵犯胸主动脉、气管或支气管的准确度分别为 93%、83.3%。CT 评价局部晚期食管鳞癌侵犯气管、胸主动脉或支气管的准确度分别为 39.3%、23.4%、29.0%。结论: MRI 成像评估食管鳞癌侵犯胸主动脉、气管或支气管的准确度明显高于 CT, MRI 可以更好地指导局部晚期食管鳞癌患者治疗方案的选择。对食管黏膜及周围脂肪的显示且 EL 信号均匀、轻度渐进性的强化方式明显优于 CT 检查。MRI 具有多序列成像的优势, 还可多角度多平面进行重建, 全方位显示食管壁、胸主动脉管壁、气管及支气管壁的各个层次及病变全貌, 从而提高术前评估局部晚期食管癌是否外侵胸主动脉、气管或支气管的准确率。

PU-0944

摇篮床 X 射线食管造影新技术对食管切除术后吻合口瘘的诊断价值评价

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目的:

本研究的目的是确定摇篮床 X 射线成像是否能改善食管切除术后吻合口瘘的常规造影检测。

方法:

本研究回顾性分析了我院 2016 年 7 月至 2020 年 12 月经临床诊断为食管癌术后吻合口瘘的 82 例患者的基本信息, 以及常规食管造影、多体位 (包括站立、仰卧、俯卧、低头高脚和侧位) 食管造影及肺纵隔 CT 平扫或增强诊断结果, 记录以上诊断报告内是否提及吻合口瘘的存在。

结果:

共 82 例患者行常规食管造影及多体位食管造影。常规食管造影诊断吻合口瘘 62 例, 检出率约为 75.6%。多体位食管造影诊断吻合口瘘 71 例, 站姿直接检出 48 例, 其中侧位检出 11 例; 站立后仰卧位 20 例, 其中侧位 16 例, 头低脚高位 6 例, 3 例为站立后俯卧位; 另外 2 例为侧卧位, 1 例为头低脚高位; 吻合口瘘多体位食管造影的检出率为 86.6%。51 例吻合口瘘患者在 7 天内完成了 CT 平扫或增强检查。在 33 名平扫患者中, 22 名可见明显瘘管。在 18 例增强型病例中, 14 例显示瘘管。吻合口瘘的 CT 检查检出率为 70.6%。

结论:

摇篮床 X 射线食管造影是一种简单的手术方法, 可以提高常规造影食管切除术中食管瘘的检出率。此外, 与 CT 检查相比, 其检出率也更高。

PU-0945

胰腺神经内分泌肿瘤不典型影像学特征和其他胰腺富血供病变影像学诊断思路

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目的 探讨胰腺神经内分泌肿瘤 (PNEN) 的不典型影像学特征和影像学易误诊为 PNEN 的胰腺富血供病变, 并结合临床病理资料总结其影像学诊断思路, 提高对 PNEN 影像学全面认识, 为临床治疗决策指明方向。

方法 基于我院胰腺疾病多学科中心, 总结 PNEN 的不典型影像学特征导致误诊和影像学易误诊为 PNEN 的胰腺富血供病变。PNEN 的不典型影像学特征: 呈乏血供、胰管内生长方式、弥漫性生长方式。影像学易误诊为 PNEN 的胰腺富血供病变: 胰腺内副脾、实体型浆液性囊性肿瘤、肾透明细胞癌胰腺转移、胰腺腺泡细胞癌。

结果 乏血供 PNEN 易误诊为胰腺导管腺癌, 但乏血供 PNEN 的肝转移瘤多呈富血供, 较少梗阻胰管和阻塞性胰腺炎, CA19-9 升高较少; 胰管内生长 PNEN 易误诊为胰腺导管内乳头状黏液性肿瘤和胰腺导管腺癌, 肿瘤体积小, 阻塞胰管伴上游胰管扩张和胰腺实质萎缩, 在胰管阻塞截断处可见明显强化的肿瘤; 弥漫性生长 PNEN 易误诊为自身免疫性胰腺炎和胰腺淋巴瘤, 肿瘤体积大, 累及大部分或整个胰腺, 增强后可明显强化, 胰周可伴有明显强化的转移性淋巴结。胰腺内副脾易误诊为 PNEN, 多位于胰尾部, 体积小, 增强各期强化与脾脏相似, 热变性红细胞显像诊断的敏感性和特异性高; 实体型浆液性囊性肿瘤易误诊为 PNEN, T2WI 明显高信号、DWI 弥散不受限且 ADC 高信号是与 PNEN 影像学鉴别要点; 肾透明细胞癌胰腺转移易误诊为 PNEN, 可单发或多发, 病史是影像学诊断关键, 平均发生于肾癌术后 120 个月; 部分呈富血供的胰腺腺泡细胞癌易误诊为 PNEN, 但胰腺腺泡细胞癌体积相对较大, 可伴有高脂肪酶综合征和甲胎蛋白升高。

结论 PNEN 不典型影像学特征和其他胰腺富血供病变均是 PNEN 临床常见的误诊原因, 精准诊断和治疗需要影像科医生结合多学科共同努力。

PU-0946

一例影像误诊为静脉内平滑肌瘤病的髂外静脉肉瘤

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病史: 女性患者, 46 岁, 右下肢肿胀 2 月, 加重 1 月, 入院前 2 月, 患者无明显诱因下出现右下肢肿胀疼痛, 呈持续性胀痛, 伴右下肢活动稍受限, 无其它伴随症状, 于院外完善 B 超提示“右侧股总静脉血栓”, 18 年前行剖宫产手术, 甲亢 3+ 年, 后逐渐转变为甲减, 现规律服用优甲乐, 62.5ug/天, 否认糖尿病、高血脂、冠心病史; 末次月经, 月经色量正常。专科查体: 右下肢中重度凹陷性肿胀, 未见明显色素沉着, 无湿疹及溃疡, 无浅静脉曲张, 皮温稍高, 未触及皮下结节、包块, homans (-), Nehouf (-), 足背动脉可扪及搏动, 肢关节活动受限, 深浅感觉正常, 双下肢肌力 5 级, 肌张力正常。右大腿周径 70cm, 右小腿周径 45cm, 右踝 29cm, 左大腿周径 60cm, 左小腿周径 40cm, 左踝 25cm。辅助检查: 下肢彩超 (四川省人民医院): 右侧股总静脉血栓形成, 管腔几近闭塞, 右下肢皮下水肿。下肢静脉 CTV: 1. 右侧髂外静脉-股总静脉-股深静脉管腔扩张, 较明显处宽约 2.6cm, 管腔内见柱状等密度影, 长度约 17.4cm, CTV 扫描呈不均匀明显强化, 血管外壁光滑, 子宫体积明显增大, 多发子宫肌瘤, 宫角两侧点状及索条状强化影, 与子宫分界不清, 右侧明显, 并与右侧髂外静脉相连; 考虑: 右侧髂外静脉-股总静脉-股深静脉血管平滑肌瘤病 (子宫来源) 可能性大、子宫血管平滑肌瘤病。盆腔 MRI: 子宫多发肌瘤, 较大者大小约 4.0cm×3.4cm×3.2cm, 右侧髂外静脉-股总静脉-股深静脉管腔扩张, 较明显处宽约 2.8cm, 其内见条柱状异常信号影, T1WI 呈低信号, T2WI 呈稍高信号, 信号不均, 弥散受限, 增强扫描呈明显不均匀强化, 与子宫病灶强化程度类似, 考虑子宫平滑肌瘤病, 累及右侧髂外静脉-股总静脉-股深静脉。术中所见: 右侧髂外静脉、股静脉占位性病变, 大小约 4*10cm, 质地韧, 无包膜与右侧髂外静脉粘连侵犯, 髂外静脉及股静脉近端扩张最大直径 5cm; 切取肿瘤组织剖开后可见黄白色组织, 质地韧。右侧髂外静脉肿瘤头端可见陈旧血栓组织大小约 0.5*0.5cm。术后病理: 右侧髂外静脉、右髂股静脉梭形细胞肿瘤, 考虑肉瘤。

PU-0947

A case of multiple isolated fibrous tumors

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The patient was female, 58 years old, the patient in 1 year ago no obvious cause of lumbar pain discomfort, no lower limbs and waist below the part of motor and sensory disorders, at that time did not pay attention to, did not carry out any diagnosis and treatment. 1 week ago the patient consciously said that the above symptoms were worse, accompanied by pain in the legs, legs, weakness, can not walk, the patient to carry out further diagnosis and treatment, so to the Second People's hospital in Xining City, the relevant imaging test suggests that the body Multiple bone metastases were found in Qinghai Provincial People's Hospital. PET-CT (2021.09.16) showed: 1. right 2nd and 6th posterior ribs, thoracic 8-9 vertebrae, lumbar 3 vertebrae, right sciatic bone, a right subpubic branch of the pubic bone, and expansive bone destruction, and multiple bone destruction of the whole body, and tumor metastasis was considered. 2. multiple low-density masses in the liver, with significant enhancement in the arterial phase of enhancement scanning and metabolism of the edges of the foci, were elevated, and hepatocellular carcinoma was considered. The possibility of hepatocellular carcinoma is high. The patient came to our department for further diagnosis and treatment, and was admitted to the outpatient clinic with the diagnosis of a "malignant tumor of the liver with bone metastasis". He was admitted to our hospital with a "malignant tumor of liver and bone metastasis". MRI (2021.9.27) showed two rounded slightly long T1 and long T2 signal shadows in the S8 segment of the liver, the larger one was about 6.1cm in size, with a low signal envelope and obvious enhancement on enhancement scan, and patchy long T2 signals were seen in the thorax 11, lumbar 3, lumbar 4, and the right sciatic bone. Diagnosis: metastatic tumor of the S8 segment of the liver, with multiple metastases in the chest 11, lumbar 3, 4, and sciatic bone. Pathology of two punctures: 1 gray-white strip of soft tissue seen by the naked eye, 1.5-1.2 cm long, 0.1 cm in diameter. Pathology: morphology and immunohistochemistry results are consistent with isolated fibrous tumors. Immunohistochemistry: PR(-), EMA(-), AE1/AE3(-), Ki67(hotzone 10%), CD34(+), STAT6(+), Bcl-2(+), SMA(-), Des(-), S100(-), F-8(vascular +), Hep-1(-).

PU-0948

磁共振在胆道闭锁肝纤维化程度评估中的研究进展

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目的

胆道闭锁 (Biliary Atresia, BA) 是新生儿胆汁淤积性黄疸最常见的原因, 以肝内、外胆道纤维性闭塞和肝纤维化为特征。临床首选葛西手术治疗。随访研究发现, 葛西术预后与术前肝纤维化程度显著相关。目前, 肝纤维化评估金标准仍是病理组织活检, 但因其具有侵袭性及不可避免的并发症而不便长期、动态观测。磁共振具有无创、客观及全面的特点, 随着序列的优化, 已广泛用于腹部检查。此前已有研究表明, 弥散成像、磁共振弹性成像以及磁共振影像组学模型在肝纤维化程度的评估中有着潜在价值。本文旨在总结磁共振在 BA 肝纤维化程度评估中的研究进展。

材料与方法

在 PubMed、知网和万方等国内外大型数据库中, 搜索 MeSH 关键词“胆道闭锁、肝纤维化、磁共振”, 查阅 2006 年 1 月-2023 年 4 月磁共振在 BA 患儿肝纤维化程度评估中的相关文献, 主要参考近 5 年内的文献进行分析。

结果

最终纳入 23 篇文献研究, 外文引用率 78%, 近 3 年引用率 21%。目前已有许多国内外学者利用磁共振对 BA 患儿肝纤维化程度进行评估, 相关技术包括弥散成像 (包括 DWI、DTI、DKI 以及 IVIM 等)、磁共振弹性成像 MRE、特殊磁共振序列 (如 T1p 等) 及磁共振影像组学分级模型等, 其中以弥散成像研究居多。研究认为, BA 发生纤维化时, 细胞外基质增多聚集, 导致水分子扩散受限, 从而反映在弥散图像中, 随后通过定量分析, 发现 ADC 值与肝纤维化程度呈负相关。磁共振弹性成像则是利用外加装置对肝硬度进行检测, 反应纤维化程度。近年来, 学者利用影像组学挖掘图像中肉眼难以发现的特征进行评估, 基于常规序列、弥散序列所提取的特征均具有良好的分级效能, 其中, 弥散特征价值更大。

结论

随着磁共振扫描技术的优化, 儿童腹部磁共振的价值开始凸显, 让 MR 用于评估 BA 肝纤维化成为可能。大量研究验证了其可行性, 并且较血清学、超声有更客观、稳定的性能。在结合影像组学后得到了进一步的优化, 具有显著的价值, 对临床 BA 患儿的术前评估、治疗方案制定、预后预测、术后随访及二期治疗具有重要意义。

PU-0949

肾上腺血管内大 B 细胞淋巴瘤 1 例

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患者 男, 74 岁。因“发现左侧肾上腺占位 4 年余近期增大”就诊, 发现左侧肾上腺占位 4 年余, 未予重视, 未行治疗。1 天前外院体检胸部 CT 检查提示病灶明显增大, 2022 年 2 月为求进一步治疗来我院就诊。专科检查未见明显异常, 脉搏 78 次/分, 呼吸 20 次/分, 血压 138/91mmHg。

实验室检查: 促肾上腺皮质激素 0Am 40.61pg/ml、8Am 74.62pg/ml、4Pm 68.33pg/ml, 24 小时尿醛固酮 11.21ug/24h。

影像表现: CT 平扫示左侧肾上腺区不规则形软组织肿块影, 在后腹膜区呈嵌入式生长, 边界清晰, 最大截面径大小约 4.9cm×3.3cm, 上下范围约 7.5cm, CT 值约 31HU, 内见数枚斑点状钙化灶, 增强扫描见轻度渐进性强化; 左侧肾上腺外侧支增粗; 右侧肾上腺位置正常, 呈“人”字型, 主干及内外支未见明显增粗, 未见明显异常密度灶, 增强后未见异常强化灶。

手术病理结果: 在左肾上腺极内上方见一大小约 5cm 肿块, 边界清晰, 内侧可见肾上腺组织。完整切除肾上腺肿瘤及部分肾上腺组织送病理检查, 在切除标本见肿瘤包膜完整, 切面呈红褐色。肉眼所见: 结节样物一枚, 表面见包膜, 局部破碎, 体积 4cm×3cm×2cm, 暗红, 切面略呈分叶状, 暗红为主, 少量淡黄色条带样区, 另见游离组织一块, 大小 6cm×4cm×2cm, 2/3 为脂肪, 1/3 为暗红色组织, 性质同结节。镜下所见: 送检肿物, 大小约 4×3×2cm, 切面暗红色, 镜示肿瘤细胞弥漫巢状排列, 部分在血管内生长, 免疫组化: CD20 (+), PAX-5 (+), CD3 (-), CD43 (-), CD10 (-), MUM-1 (+), Bcl-6 (+), Bcl-2 (+), CD30 (-), CD21 (-), CD34 (血管+), CD31 (血管+), CKpan (-), S-100 (-), HMB45 (-), Melan-A (-), Syn (-), CgA (-), PAX-8 (-), Ki67 (约 70%+)。原位杂交: EBER (-)。病理诊断: 血管内大 B 细胞非霍奇金淋巴瘤。

PU-0950

肝脏 IgG4 相关性疾病伴多灶微脓肿形成 1 例

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目的: IgG4 相关性疾病 (IgG4-related disease) 是一种与 IgG4 相关、可累及多个器官或组织、好发于中老年男性的慢性进行性系统性疾病;累及肝脏的病例报道少见,实体类似于肝脏原发恶性肿瘤,通过影像学鉴别困难。本文旨在探讨肝脏 IgG4 相关性疾病伴多灶微脓肿形成的影像表现及特征,提高诊断准确性。

方法: 分析肝右叶占位性病变 1 例, 54 岁男性患者, 行腹部 CT、MRI 平扫及增强检查。

结果: 肝右叶见多发团片状异常信号, 病变部分融合, 边界不清, 范围约 8.2×3.5CM, 呈稍长 T1 稍长 T2, 内见斑片状稍短 T1 信号, DWI 与 ADC 图见弥散受限, 增强扫描呈多发结节强化灶, 延迟期环形强化, 灶周见水肿信号, 部分病灶向肝包膜突出, 累及邻近腹膜。术前诊断为胆管细胞癌伴卒中。术后病理诊断为 IgG4 相关性疾病伴多灶微脓肿形成。

结论: 肝脏 IgG4 相关性疾病影像学表现常不具有特征性表现, 若临床血 IgG4 升高, 可联想到本病诊断, 否则术前难以作出提示性诊断。

PU-0951

胰腺罕见细粒棘球蚴

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目的: 胰腺寄生虫极为罕见, 是寄生虫卵沉着在胰腺内继发引起的一种囊性病变, 因棘球蚴病胰腺受累非常见。胰腺包虫与胰腺其他囊性病变鉴别困难, 可有许多其他胰腺囊性病变的共同特征。

方法: 320 螺旋 CT 平扫+增强扫描

结果: 胰腺钩突部椭圆形低密度影, 其内可见多发分隔, 壁局部见钙化影, 增强后胰腺病灶显示轻度强化。病理回报: 胰腺细粒棘球蚴

结论: 行胰体切除+胃空肠吻合 (B11rothll 式)+肝部分除+腹腔引流术, 术中在胰腺钩突处可触及一大约 6cm×7cm 的质硬肿块, 于左肝、胃大弯粘连致密, 存在浸润性生长可能, 且无法分离, 故决定行胰体切除+胃远端切除+左肝部分切除术。术中快速冰冻, 术中快速冰冻结果回示:

(胰腺) 镜下为无结构角质样物, 结合大体检查, 倾向包虫病。包虫在胰腺时, 通常会出现不明原因的上腹部隐痛不适呈持续性, 不向其他部位放射, 与体位无关, 本例患者无人畜接触或牧区生活史, 无食生肉史, 偶有上腹部饱胀不适, 无恶心、呕吐。CT 呈囊性病灶, 可见分隔、未见头节及子囊、未见包虫囊肿典型的征象。因棘球蚴病胰腺受累非常少见, 大多最终靠病理确诊。

PU-0952

原发性肾神经内分泌肿瘤 4 例报道

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目的: 原发性肾神经内分泌肿瘤 (Primary Renal Neuroendocrine Neoplasms) 极其罕见, 国内外报道百余例, 国内报道仅 10 余例, 因此对其影像学表现及临床病理特征存在认识不足, 本文通过病例报道及文献复习探究其 MRI 影像特征, 以提高术前对该病的诊断水平。

方法: 回顾性分析 4 例经病理证实的原发性肾神经内分泌肿瘤患者的 MRI 图像特征, 患者均行肾脏常规 MRI 平扫、DWI 和动态增强扫描, 观察病变的 MRI 表现 (边缘、平扫信号、DWI 特征、囊变坏死、出血、强化特征、淋巴结情况), 并进行相关文献复习。

结果: 4 例病灶均为单发, 病灶最大径 13mm, 中位最大径 22.5mm。其中 3 例位于肾门附近, 1 例贴近被膜。4 例病灶均形态不规则, 3 例病灶边界清晰, 1 例边界模糊。3 例可见囊变及坏死, 均未见出血。平扫 T1WI 呈低信号, T2WI 呈稍高信号。DWI 可见实性成分呈高信号, ADC 均呈低信号。增强扫描后 1 例病灶表现为均匀强化, 3 例病灶表现为不均匀强化, 4 例病灶肿块均呈持续强化。4 例患者均未见肿大淋巴结。

结论: 肾神经内分泌肿瘤 MRI 影像学表现具有一定特征性, 更好发于肾门附近, 形态不规则, 易发生囊变及坏死, 平扫 T1WI 呈低信号, T2WI 呈稍高信号, DWI 实性成分呈高信号, ADC 呈低信号, 增强后多数病灶表现为持续性不均匀强化。

PU-0953

一例原发性卵巢恶性混合生殖细胞瘤

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患者女, 11 岁, 因脐周部疼痛 2 年, 加重 5 天于 2022 年 3 月入本院。入院查体: 腹部膨隆, 未见腹壁静脉曲张, 未见胃肠型及蠕动波。腹肌张力高, 中下腹部可及一包块, 质硬, 活动度差, 大小约 15×12CM。脐周部有压痛, 无反跳痛。腹部增强三维 CT 示: 腹腔、盆腔巨大囊实性占位, 恶性肿瘤可能性大。实验室检查: 血清甲胎蛋白(alpha fetoprotein, AFP)>1210ng/ml, 癌胚抗原 0.74 ng/ml, CA-125169U/ml。完善术前检查后行手术治疗。病灶肉眼观: 盆腔肿物大小约 22.5×14.5×12.1cm, 完整包膜, 切面灰白, 灰红, 切面呈囊实性。囊性区内充清液, 囊壁菲薄; 实性区一部分区域灰黄, 一部分区域半透明, 呈粘液样光泽。术后对包块进行病理学检查示: 混合性生殖细胞肿瘤 (大部分为卵黄囊瘤, 少部分为无性细胞瘤)。免疫组化结果示: CD117 (部分+), PLAP (+), D2-40 (+), SALL4 (+), CK-pan (+), EMA (灶性+), Glypican-3 (大部分+), Ki-67 (+约 70%), CD30 (-), CEA (-), HCG-β (-)。术后采用依托泊苷+顺铂+博来霉素方案化疗共计 4 次。目前患儿情况良好, 仍在治疗随访中。

PU-0954

基于光谱 CT 的细胞外容积分数与结直肠癌临床病理特征的相关性研究

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目的: 评估光谱 CT 增强平衡期碘密度图量化的细胞外容积分数 (ECV) 与结直肠癌 (CRC) 临床病理特征的相关性。

方法: 回顾性收集 2021 年 2 月-2023 年 4 月在本院接受根治性手术治疗的 97 例 CRC 患者相关资料, 所有患者术前均行光谱 CT 多期增强扫描, 测量平衡期碘密度图中病灶及同层面主动脉或髂动脉的碘密度, 计算肿瘤的 ECV。以 ECV 中位数为截断值, 分为高、低两组, 正态分布的计量或计

数资料分别采用 t 检验和卡方检验；偏态分布的计量资料采用 Mann-Whitney U 检验和 Kruskal-Wallis H 检验，差异有统计学意义的参数再分别采用 Point-biserial、Spearman 进行相关性分析。采用线性回归进行单因素和多因素分析影响因素。

结果：（1）临床病理特征：97 例 CRC 患者中左半结肠癌 63 例、右半结肠癌 34 例；其中有脉管癌栓 33 例、神经侵犯 21 例、淋巴结转移 35 例。肿瘤标志物 CEA 升高 41 例，CA199 升高 18 例。Ki67 为 20%~90%。肿瘤大体类型 溃疡型 60 例，隆起型 36 例，浸润型 1 例；中、高分化腺癌 81 例，低分化和未分化腺癌 16 例。（2）相关性分析：ECV 中位数为 32%（18%，70%），高 ECV 组 46 例、低 ECV 组 51 例。两组间肿瘤大体类型、有无脉管癌栓及神经侵犯、病理 T 分期和 TNM 分期差异具有统计学意义（ $P<0.05$ ）；肿瘤指标 CEA 和 CA199、肿瘤位置、肿瘤长径、分化程度、N 分期、Ki67 差异无统计学意义（ $P>0.05$ ）。相关性分析显示 ECV 与脉管癌栓、神经侵犯间存在显著的相关关系（ $r=0.330, 0.415, P<0.001$ ），ECV 越大，更倾向发生脉管癌栓和神经侵犯；与病理 T 分期呈弱正相关（ $r=0.260, P<0.05$ ）；与肿瘤大体类型和病理 TNM 分期无相关性。

（3）影响因素分析：单因素分析显示肿瘤长径、分化程度、病理 TNM 分期、脉管癌栓和神经侵犯是影响 ECV 的相关因素；多因素分析显示脉管癌栓和神经侵犯是 ECV 的独立影响因素。

结论：对于 CRC 患者，光谱 CT-ECV 越大，更倾向发生脉管癌栓和神经侵犯，且脉管癌栓和神经侵犯是 ECV 的独立影响因素。

PU-0955

肾透明细胞癌的不典型 MR 影像特点分析

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【摘要】目的：探讨肾透明细胞癌的不典型 MR 影像表现，提高肾透明细胞癌的术前诊断准确率。方法：回顾性分析解放军总医院第四医学中心经病理证实的肾透明细胞癌的不典型 MR 影像资料，共 28 例，其中女性 7 例，男性 21 例，年龄 23~80 岁，平均 56.2 岁。重点分析病变的大小、形状、信号及增强特点，以及有无假包膜、出血、囊变、坏死、脂质脂肪等磁共振表现特征。结果：28 例不典型肾透明细胞癌，共 28 个病灶，病灶直径 1~4cm，平均直径 2.3cm，病灶直径小于 3cm 的有 20 例（20/28），病灶为类圆形的有 23 例（23/28），病灶 T1WI、T2WI 信号均匀的有 20 例（20/28），T2WI 表现为等及低信号的有 18 例（18/28），病灶中含出血 3 例（3/28），囊变坏死 2 例（2/28），含脂质 3 例（3/28），有假包膜 20 例（20/28），增强扫描后皮质期表现为明显强化 4 例（4/28），轻中度强化 18 例（18/28），髓质期及平衡期持续强化 18 例（18/28），快进快出 4 例（4/28）。结论：肾透明细胞癌最为常见并且磁共振成像表现多样，总结认识透明细胞肾癌不典型的 MR 影像特点，可以提高术前肾透明细胞癌的诊断水平。

PU-0956

Imaging diagnosis and treatment of Aggressive angiomyxoma: five cases report and literature review

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Abstract: Aggressive angiomyxoma (AAM) is a rare aggressive benign tumor with high recurrence rates after surgical excision. AAM mostly occurs in the pelvic and perineum and has also been rarely reported in the head and neck region, the lung, the liver, the kidney and the extremities. AAM is often missed or misdiagnosed as gynaecological lesions or hernias. This study includes a retrospective analysis of the diagnosis and treatment of five cases of

AAM, four cases in the perineal areas and one case in the upper right thigh. The purpose of this study was to summarize the imaging characteristics and treatment of five cases, and to improve the understanding of AMM.

PU-0957

增强 CT 诊断腹部肿瘤腹腔转移的临床效果

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摘要：目的：研究分析腹部肿瘤腹腔转移采用增强 CT 诊断的临床效果。方法：选取 2022 年 6 月—2023 年 6 月在肿瘤医院住院医治的腹部肿瘤腹腔转移患者 60 例，且均接受过 CT 平扫及增强 CT 检查，以手术病理结果为金标准，对比增强 CT 对腹部肿瘤腹腔转移的诊断情况。结果：以手术病理结果为金标准，增强 CT 诊断腹部肿瘤、腹部肿瘤腹腔转移总体准确率均为 91.32%，显著高于 CT 平扫诊断的 71.63% 和 68.50% ($P < 0.01$)。增强 CT 检查腹部肿瘤腹腔转移患者种植灶的深度、种植灶的宽度以及最小种植灶的面积均显著小于 CT 平扫 ($P < 0.01$)。结论：增强 CT 可提高腹部肿瘤腹腔转移的诊断准确率，且对小种植病灶具有更高的敏感性，值得进一步推广应用。

PU-0958

原发性肝细胞癌治疗后复发肿瘤肿瘤体积倍增时间分析

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目的 探讨原发性肝癌(HCC)治疗后复发肿瘤体积倍增时间的影响因素分析

方法 收集 2020 年 1 月 1 日至 2022 年 12 月 31 日在宁夏医科大学总医院确诊为 HCC 治疗后复发的患者 120 例，使用时间间隔超过 1 个月的连续影像资料计算肿瘤体积倍增时间。采用 3D Slicer 5.1.0 auto-segmentation 逐层勾画肿瘤区域，采用 $(T - T_0) \times \log_2 / (\log V/V_0) \times 30$ (month) 计算肿瘤体积倍增时间。选择年龄、性别、临床分期、血小板、纤维蛋白降解产物、谷草转氨酶、谷丙转氨酶、甲胎蛋白、白蛋白、胆红素、ES 分级、Ki67 等可能影响肿瘤体积倍增时间的因素进行 Spearman 相关性分析。

结果：两次影像检查时间差为 $6.31 \pm 8.43 (1.99 \sim 35.685.78)$ 月，体积差为 $22.69 \pm 76.56 (0.05 \sim 542.10) \text{cm}^3$ ，肿瘤生长率为 $13.88 \pm 108.35 (0.07 \sim 1189.53)$ ，肿瘤体积倍增时间为 $6.50 \pm 32.92 (0.16 \sim 359.25)$ 月，体积差 = $2.06 + 0.02$ 月。肿瘤体积倍增时间和纤维蛋白降解产物 ($P < 0.01$)，纤维蛋白降解产物越高，肿瘤体积倍增时间越大。

结论 纤维蛋白降解产物可作为判断肿瘤体积倍增的因素。

PU-0959

MSCT 小肠造影及后处理技术在小肠疾病诊断中价值

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目的：探讨 MSCT 小肠造影及后处理技术在小肠疾病诊断中的应用价值

方法: 对 2022 年 8 月~2023 年 6 月期间我院收治的 65 例患者怀疑小肠疾病临床资料进行研究分析, 同时在我科进行口服混合液 (250ml 甘露醇+1750ml 0.9%氯化钠溶液) 小肠造影; 采用飞利浦 iCT256 层螺旋 CT 扫描均行轴位扫描, 并在工作站将 65 例患者原始数据进行重建, 并与活检/或术后病理结果对照分析并统计分析。评估 CT 诊断的准确性。

结果: 65 例患者均经临床/或病理证实, 正常 42 例, 良性病变 20 例, 恶性病变 3 例。MSCT 小肠造影多种成像方法中 MPR 像和 MIP 像价值最大。可以完整清楚显示正常肠腔结构及病变的部位、范围、大小和特征。对于实性占位, 轴位像结合后处理图像观察有利于做出正确诊断。MIP、CPR、VR 和仿真内窥镜技术可以清晰肠系膜血管等。

结论: MSCT 小肠造影技术是一种简捷易行检查方法, 对小肠的病变的定性及鉴别诊断具有较高的应用价值; 对临床诊断治疗有很大指导意义, 因此此检查方法可作为临床上评价小肠病变重要方法之一。

PU-0960

Evaluation of active phase of Crohn's disease and differentiation from ulcerative colitis by three-classification combined clinical radiomics model

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Purpose: The diagnosis and activity grading of inflammatory bowel disease are very important for the follow-up treatment of patients. At present, there is no gold standard. Our study will establish a combined model of three classifications based on radiomics for the classification and activity grading of inflammatory bowel disease.

Methods: We retrospectively analyzed 115 lesion sites of 80 patients confirmed by endoscopy and pathology, and obtained enhanced CT images of arterial and venous phases, 70% of which were used as training sets and 30% as verification sets. Features are extracted from each region of interest (ROI), and kBest and lasso are selected by variance threshold method to obtain feature tags. At the same time, we used the machine learning method of logistic regression (LR) and support vector machine (SVM) to establish the combined radiomics model of arterial phase, venous phase and combination of arterial phase and venous phase, and screened out the best model. At the same time, we screened 4 related factors from 8 clinical factors through single factor analysis ($P < 0.05$), forming a new combined clinical radiomics model, and compared it with the clinical model and the radiomics model.

Result: In the train cohort of the combined model, the macro average AUC was 0.915, the micro average AUC was 0.912, the accuracy rate was 0.734, the sensitivity is 0.775, and the precision rate was 0.715. In the test cohort of the combined model, the macro average AUC was 0.811, the micro average AUC was 0.789, the accuracy rate was 0.686, the sensitivity is 0.737.

Conclusion: The three classification model combined with clinical factors and radiomics provides a better method for the diagnosis and activity grading of inflammatory bowel disease.

PU-0961

腹内疝多排螺旋 CT 诊断思路

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【摘要】目的: 探讨腹内疝诊断中 CT 表现及其对应的病理分型。

方法：对我院 2017 年 7 月-2023 年 8 月经手术证实的 7 例患者的临床资料及 MSCT 影像资料结合相关文献以加强对腹内疝 MSCT 典型征象的认识，为临床提供可靠的诊断依据。

结果：4 例患者诊断为肠梗阻，3 例诊断为腹内疝（2 例十二指肠左疝，1 例十二指肠右疝）。手术证实 3 例十二指肠旁疝，1 例为盲肠周围疝，1 例胃炎症致腹内疝形成，1 例网膜孔疝，1 例乙状结肠间疝。

结论：腹内疝在 CT 影像学上可以表现一定的特征：1）小肠形态改变：表现为扩张的小肠袢呈肿块状、簇状异常纠集；2）肠系膜改变：小肠系膜根部血管曲张、牵拉、移位。疝口部位扩张肠袢的系膜血管集中。

PU-0962

腹部后神经纤维瘤个案报道

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腹膜后神经纤维瘤主要分布于腹主动脉周围及脊柱两侧。CT 表现为水样密度或肌肉密度肿块，边缘较清晰；肿瘤小时密度均匀；肿瘤较大，可有坏死、出血或囊性变。影像表现缺乏特异性，但可以准确定位，结合临床病史和其他检查及肿瘤的分布特点，可以做出更为正确的诊断，确诊仍有赖于病理。

PU-0963

ASL 联合 IVIM 评价糖尿病肾病的研究

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目的：探索体素内不相干运动(IVIM)参数及动脉自旋标记(ASL)参数在糖尿病肾病早期诊断及各期鉴别诊断的价值。

方法：选取于我院确诊的 2 型糖尿病患者 59 人，其中男性 32 人，女性 27 人，年龄 36 至 73 岁。依据 eGFR 及 UAER 进行分期，同时招募 20 名健康志愿者作为对照组（HC 组），男性及女性各 10 人，年龄 48 至 60 岁。所有检查者均签署知情同意书并取得本院伦理委员会的批准。应用 Philips 3.0T MRI 扫描仪，采用 IVIM 及 ASL 序列进行扫描。经后处理软件测量 DKD 患者及健康志愿者肾皮质各参数值，使用 SPSS 22.0、Medcalc 等软件比较对照组及 DKD 四期间参数值差异，计算各参数值与 eGFR 的相关性。

结果：IVIM：D 值单因素方差分析比较各组间参数值差异有统计学意义，组间两两比较对照组、DKD 组 I 期、II 期间无统计学意义，余各组间 D 值比较均具有统计学意义。利用 D*值诊断时发现 DKD 组 I 期与 II 期较对照组 D*值升高，III 期及 IV 期 D*值较前几组降低，但单因素方差分析及组间两两比较均无统计学意义。随病情进展 f 值呈现先升高随后降低的趋势。单因素方差分析比较各组间参数值差异有统计学意义，组间两两比较对照组、DKD 组 I 期、II 期、III 期间参数无统计学意义，而 IV 期 f 值低于前四组且差异有统计学意义。ASL：RBF 值单因素方差分析各组间差异有统计学意义（ $F=63.844$ ， $P=0.000$ ），组间两两比较对照组、DKD 组 I 期、II 期间差异无统计学意义，III 期、IV 期 RBF 值较前几组进一步减低且与各组的差异均有统计学意义。IVIM 及 ASL 各参数与 eGFR 均呈正相关但各自的相关性不同，RBF 值与 eGFR 相关性最高，D 值与 f 值与 eGFR 呈中度相关（D 值： $r=0.458$ ， $P<0.01$ ；f 值： $r=0.445$ ， $P<0.01$ ），D*值呈低度相关。联合 IVIM 各参数进行 DKD 分期鉴别时，其 ROC 曲线下面积(AUC)大于 D 值、f 值单独诊断 ROC 曲线下面积(AUC)，

敏感度及特异度也有所提高。IVIM 联合 ASL 进行 DKD 分期鉴别的诊断效能略高于联合 IVIM 或 ASL 单独诊断, 但三者间差异均无统计学意义。

PU-0964

入院时的 CT 胰腺体积在胰腺炎严重程度评估中的价值

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目的: 评价患者入院时早期腹部 CT 胰腺体积和胰腺炎严重程度的相关性, 及预测重症胰腺炎的价值

方法: 本研究回顾性纳入 2017 年 1 月-2020 年 6 月期间的急性胰腺炎患者资料。根据 2012 亚特兰大标准分为重症胰腺炎和非重症胰腺炎。在入院时的腹部平扫 CT 图像上测量胰腺体积, 并记录患者入院 24 小时内实验室指标, 包括肌酐、血钙、淀粉酶、尿素氮、红细胞压积、CRP。

结果: 共有 208 例 AP 患者符合研究标准纳入研究, 其中男性 135 (64.9%) 例, 年龄 52 ± 17 岁。与非重症胰腺炎相比, 早期 CT 上重症胰腺炎患者的胰腺体积更大 (158.7cm^3 vs 116.7cm^3 , $P < 0.001$)。在预测胰腺炎的严重程度中, 早期 CT 上胰腺体积具有中度的预测效能 ($\text{AUC} = 0.759$, $95\%\text{CI}: 0.676-0.843$, $P < 0.001$), 高于单一实验室指标 ($\text{AUC} = 0.607 \sim 0.661$)。

结论: 患者入院时的 CT 体积对于重症胰腺炎具有较高的预测价值。

PU-0965

脾脏低密度病变的 CT 影像诊断价值

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目的: 探讨上腹部术后 CT 平扫发现脾脏低密度灶的影像特征, 以及病变的最终病理性质及转归。

方法: 收集我院上腹部术后治疗的 35 例患者, 所有患者经上腹部 CT 平扫均发现脾脏低密度病变, 对所有患者的临床资料和影像特征作回顾性分析, 比较其差异性。结果: 35 例患者中有 18 例脾脏低密度灶得到不同程度的恢复, 其中有 7 例完全恢复, CT 动态观察科发现病灶范围较前有不同程度的缩小, 好转率 51%。其中炎性水肿 13 例, 一般可完全恢复; 部分小的缺血灶 5 例, 后期部分可完全恢复; 小的梗死灶 10 例, 纤维瘢痕形成, 后期牵拉收缩可导致病灶范围缩小; 完全性大的梗死灶 7 例, 低密度病变不会有变化。结论: CT 平扫发现脾脏低密度灶的根据其影像特征和随访观察可有效评估病变的性质, 有一定的临床指导意义。

PU-0966

磁共振弥散加权成像在胆脂瘤中的应用

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目的: 研究 MRI-DWI 检查对胆脂瘤的诊断价值。

方法: 回顾性分析我院 10 例经病理证实的胆脂瘤患者的磁共振平扫、增强和 DWI 图像表现、特征。

结果: 病变的好发部位在桥小脑角区, 病灶为类圆形或不规则形, 平扫 8 例表现为长 T1 长 T2 信号影, 2 例表现为 T1, T2 的混杂信号; 增强扫描病灶均无强化病灶 DWI 均表现为高信号。

结论: 胆脂瘤在 DWI 上的特征性表现, 有助于胆脂瘤的诊断以及与其他肿瘤的鉴别诊断。

PU-0967

卵巢甲状腺肿一例分享

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卵巢甲状腺肿(strumaovarii, SO)属于畸胎瘤中特殊类型,在卵巢肿瘤中占比约为 0.3%,SO 多为良性,仅不到 5%为恶性[1]。由于其病例少见,且临床及影像表现不典型,术前极易误诊。现报道我院病理学确诊的 1 例 SO,旨在加深影像医师对该疾病影像学特征的认识,提高诊断率。

PU-0968

磁共振功能成像在肾癌分级诊断中的应用研究

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目的:评估体素内不相干运动(IVIM)及扩散峰度成像(DKI)技术在肾透明细胞癌(CCRCC)分级诊断中的价值。方法:回顾性分析 35 例经术后病理证实为 CCRCC 患者的影像资料,根据 Fuhrman 病理分级,将病理级别为 I 级和 II 级的患者归为低级别组共 21 例,将病理级别为 III 级和 IV 级的患者归为高级别组共 14 例。所有患者于术前均进行常规 MRI、IVIM 及 DKI 检查,将患者 IVIM 及 DKI 的图像导入到飞利浦公司提供的后处理软件中,计算出相应的伪彩图,然后通过勾画感兴趣区获取相关的参数值(D、D*、f、MK、MD 值)。结果:1. IVIM 及 DKI 参数值在高、低级别 CCRCC 组间的差异:高级别 CCRCC 组的 D、MD 值均明显低于低级别组;高级别 CCRCC 组的 MK 值明显高于低级别组,D*、f 值在高低级别组间没有统计学差异(P 均>0.05)。2. IVIM 及 DKI 相关参数与 CCRCC 病理分级的相关性分析:D、MD 值与 CCRCC 病理分级呈显著负相关,r s 值分别为-0.676、-0.699;MK 值与病理分级呈显著正相关,r s 值为 0.768。3. IVIM 及 DKI 相关参数鉴别高、低级别 CCRCC 的诊断效能:D、MD、MK 值鉴别高、低级别 CCRCC 的 AUC 分别为 0.898、0.912、0.952;相对应的最佳诊断阈值分别为 $1.02 \times 10^{-3} \text{mm}^2/\text{s}$ 、 $2.39 \times 10^{-3} \text{mm}^2/\text{s}$ 、0.73;敏感度分别为 85.7%、76.2%、85.7%;特异度分别为 78.6%、92.9%、100%。结论:1. 扩散相关参数(D、MD、MK)可用于准确区分高、低级别的 CCRCC,能为临床诊疗提供重要的价值;2. D 及 MD 值与 CCRCC 病理分级呈显著负相关,MK 值与病理分级呈显著正相关;3. 与 IVIM 相比,DKI 更适合对 CCRCC 进行分级诊断,其中 MK 值是区分高、低级别 CCRCC 最理想的参数。

PU-0969

扩散加权成像在肝细胞癌微血管浸润中的诊断价值

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目的:通过研究扩散加权成像(DWI)预测肝细胞癌(HCC)微血管浸润(MVI)情况,并比较不同扩散参数对 MVI 的诊断价值。

方法:回顾性评估了 2019 年 01 月至 2020 年 11 月行手术切除并经病理证实

的 44 例 HCC 患者, 由病理结果分为 MVI 阳性组和 MVI 阴性组。我们记录患者的临床及术前影像学资料, 包括性别、年龄、肝脏基础疾病、有无肝硬化、术前甲胎蛋白 (AFP) 水平; 肿瘤最大直径、肿瘤数目、肿瘤边缘形态、肿瘤内部改变 (有无合并出血、坏死、脂肪变性等)、肿瘤组织分级; 测量肿瘤及肿瘤周围的表现扩散系数 (ADC) 值、真表现扩散系数 (ADCslow) 值, 并通过计算得出瘤周/肿瘤 ADC 值比值及瘤周/肿瘤 ADCslow 值比值。

结果: 纳入 MVI 阳性组 18 例, MVI 阴性组 26 例。MVI 阳性组的肿瘤最大直径明显大于 MVI 阴性组 ($P=0.000$); MVI 阳性组肿瘤更容易表现为不规整形态 ($P=0.001$); MVI 阳性组肿瘤内部更容易发生出血 ($P=0.002$)。二者的 DWI 参数比较存在统计学差异的如下: MVI 阳性组瘤周/肿瘤 ADCslow 值比率值较 MVI 阴性组大 ($P=0.003$); MVI 阳性组肿瘤平均 ADCslow 值较 MVI 阴性组小 ($P=0.010$)。二元 Logistic 回归分析提示肿瘤平均 ADCslow 值及肿瘤最大直径是预测 MVI 状态的独立危险因素。肿瘤最大直径预测 MVI 阳性的 ROC 曲线下的面积 (AUC) 为 0.827; 肿瘤平均 ADCslow 值负值预测 MVI 阳性的 AUC 为 0.738; 肿瘤最大直径联合肿瘤平均 ADCslow 值负值预测 MVI 阳性的 AUC 为 0.906。

结论: 肿瘤最大直径及肿瘤平均 ADCslow 值是术前预测 HCC MVI 状态的独立危险因素, 此外, 肿瘤最大直径联合肿瘤平均 ADCslow 值预测 HCC MVI 状态的效果更优。

PU-0970

基于多参数 MRI 的影像组学模型术前预测直肠腺癌 Ki-67 表达水平的初步研究

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目的 探讨多参数 MRI 的影像组学模型术前预测直肠癌 Ki-67 表达水平的价值。

方法 回顾性分析 97 例经手术病理证实的直肠腺癌患者, 得到各患者 Ki-67 的表达水平; 根据各患者 Ki-67 表达的中位数 (70%), 将 $Ki-67 \leq 70\%$ 分为低表达组 ($n=64$)、 $Ki-67 > 70\%$ 为高表达组 ($n=33$)。所有患者术前均进行 GE 3.0T MRI 常规及 IVIM-DWI 扫描 ($b=0$ 、10、20、50、100、200、400、800、1200、2000 s/m²), 在轴位 T2WI、sagLAVA-FLEX +C 和 IVIM-DWI ($b=800$ s/m²) 序列上分别提取影像组学特征。所有患者按 7:3 比例分为训练组 ($n=67$) 和测试组 ($n=30$), 训练组用于特征筛选和建立影像组学模型, 测试组用于验证所建立模型的可靠性。最优预测特征由 Pearson Correlation、SelectKBest 和选择算子回归 (LASSO) 完成。而后基于影像组学特征使用随机梯度下降 (SGD)、支持向量机 (SVM) 和逻辑回归 (LR) 机器学习算法分别构建影像组学模型, 并采用 10 折交叉验证方法进行训练和验证。采用受试者工作曲线 (ROC)、校准曲线和决策曲线分析 (DCA) 对模型进行评估。

结果 从每例患者的轴位 T2WI、sagLAVA-FLEX +C 和 IVIM-DWI ($b=800$ s/m²) 序列上各提取出 5622 个影像组学特征; 筛选出 6 个影像组学特征作为最佳预测特征构建模型。SGD、SVM 和 LR 的最高受试者工作曲线下面积 (AUC) 分别为 0.867、0.853、和 0.884。在基于影像组学特征模型中, SGD 算法达到了 84% 的准确率, AUC 为 0.867, 显示了更高的预测性能, 在 3 个模型中表现最佳。校准曲线表明最佳模型的预测值与实际观察值间具有较好的一致性, 并且 DCA 显示该模型具有较高的净收益。

结论 1. 基于多参数 MRI 的影像组学模型在术前预测直肠腺癌 Ki-67 表达水平有一定的价值。

2. SGD、SVM 和 LR 三种机器学习算法在预测直肠腺癌 Ki-67 表达中 SGD 的表现更加优越, 而 SVM 与 LR 的表现相近。

PU-0971

胃淋巴瘤的 CT 表现

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[摘要]目的：分析原发性胃淋巴瘤的 CT 表现，探讨 CT 诊断原发性胃淋巴瘤的价值。方法：回顾性分析经手术病理免疫组化证实的 22 例原发性胃淋巴瘤的临床及影像学资料。结果：本组 22 例原发性胃淋巴瘤患者均为非霍奇金淋巴瘤；CT 表现为胃壁不均匀增厚，其中弥漫性增厚 12 例，节段性增厚 6 例，局限性增厚 4 例；18 例呈均匀强化，4 例内见片状低密度坏死；16 例胃壁黏膜完整，6 例黏膜破坏；胃壁浆膜面清晰 19 例，浆膜面模糊 3 例；6 例胃周淋巴结肿大。结论：CT 检查对原发性胃淋巴瘤诊断有较高价值，并有助于肿瘤的定位、定性诊断。

PU-0972

腹盆腔巨大成熟性畸胎瘤 1 例

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本文报道腹盆腔巨大成熟性畸胎瘤影像表现一例。患者，女性，22 岁，CT 平扫示腹盆腔可见巨大混杂密度灶，大小约 19.4cm×27.3cm×36.5cm，边界清晰，以液性为主，其内可见斑片状更低密度灶及多发斑点状钙化灶，增强扫描实性部分呈轻中度强化，囊性部分无强化。术后病理诊断为囊性成熟性畸胎瘤。成熟性畸胎瘤体积较大，特别是肿瘤直径大于 10cm，和（或）具有实性和囊性成分的混合成分时，应怀疑恶性肿瘤，术后可结合血清肿瘤标志物尤其是 CA199 来判断良恶性。

PU-0973

胰头炎性肌纤维母细胞瘤一例

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胰腺炎性肌纤维母细胞瘤属于罕见的胰腺间叶源性肿瘤，原发于胰头者更为罕见，目前病因不明。由于胰腺炎性肌纤维母细胞瘤的临床表现缺乏特异性，在影像学检查上无典型表现，故术前与胰腺恶性肿瘤鉴别困难，极易误诊。本文报道 1 例昆明市第一人民医院收治的胰头部炎性肌纤维母细胞瘤患者，行胰十二指肠切除术，术后病理为炎性肌纤维母细胞性肿瘤，以期为临床医师诊断胰腺炎性肌纤维母细胞瘤提供一定参考。

PU-0974

双能 CT 多参数定量分析鉴别动脉期高强化肝细胞癌的价值

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目的:探讨双能 CT(DECT)定量多参数分析在鉴别肝脏高强化病灶中诊断肝细胞癌和非肝细胞癌的价值。

材料和方法:对 85 例肝细胞癌高危患者行 DECT 检查,共发现动脉期高强化病灶 116 个(包括 77 个为肝细胞癌和 39 个非肝细胞癌),对这些病灶进行回顾性分析,以病理结果作为参考金标准。比较肝细胞癌和非肝细胞癌动脉期(AP)和门静脉期(PVP)的定量参数,包括 40keV 的虚拟单能图像(VMI)的衰减值、AP 和 PVP 标准化碘浓度(NIC)和有效原子序数(Zeff)以及动脉增强分数(AEF)。并对这些指标进行受试者工作特征(ROC)曲线和 Logistic 回归分析。

结果:肝细胞癌在 PVP 中,40keV 的 VMIs 衰减值、NIC 和 Zeff 值均显著低于非细胞肝癌($P<0.05$)。在 40keV 时,Zeff、NIC 和 VMIs 的 ROC 曲线下面积分别为 0.706、0.663 和 0.655,AP 分别为 0.572、0.525 和 0.548。肝细胞癌患者的 AEF 值显著高于非肝细胞癌患者(0.42 ± 0.22 vs. 0.32 ± 0.18 , $P=0.007$),AUC 值为 0.653。在 Logistic 回归分析中,只有 PVP 和 AEF 中的 Zeff 是区分肝细胞癌和非肝细胞癌的有意义的定量生物标志物(OR 值分别为 0.18 和 14.00)。当 AP 和 PVP 的所有参数和 VMI 均为 80keV 时,AUC 值显著增加到 0.815,敏感性为 85.71%,特异性为 69.23%。

结论:DECT 在 PVP 生成的 VMIs (40keV) 中获取的 AEF、NIC 和 Zeff 值可能有助于鉴别肝细胞癌高危患者中的肝细胞癌和非肝细胞癌。

PU-0975

Imaging findings of nephritic myofibroblastoma

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Imaging findings of nephritic myofibroblastoma

Inflammatory myofibroblastic tumor IMT (Inflammatory myofibroblastic tumor IMT) is a unique and rare mesenchymal tumor that can locally infiltrate surrounding tissues but rarely metastasize. It is an intermediate tumor with low malignant potential. Inflammatory myofibroblastoma (IMT) usually occurs under 16 years old, with an average age of about 10 years old, and is rare over 40 years old, with no significant gender difference. Inflammatory myofibroblastoma often occurs in the lung, and the first case of pulmonary IMT was reported in 1939. Other sites such as mesentery (46% outside lung), mammary gland, liver, bladder, bone, kidney, heart and so on have been reported.

Method: The clinical manifestations and imaging features of a case of renal occupying diagnosed in our hospital were retrospectively analyzed, and its pathological mechanism, treatment and prognosis were discussed.

Result: A 65-year-old female with no obvious discomfort was found to be occupying the right kidney during physical examination, and CT plain scan showed a mass of soft tissue density in the right kidney with unclear boundaries. The lesions showed mild enhancement in the cortical phase (42HU CT value), slightly increased enhancement in the medullary phase (57HU CT value), and slightly decreased enhancement in the excretory phase (53HU CT value). The strengthening degree of the third stage was lower than that of normal renal parenchyma.

Conclusion: Renal IMT may present with abdominal pain, abdominal mass, and common hematuria. Most are single, 1-10cm in size. Renal IMT tends to occur in middle-aged and elderly people, with men slightly more than women. Laboratory tests showed no specificity. Histologically it contains T and B lymphocytes, myofibroblasts spindle cells and collagen. Common immunohistochemistry included vimentin, muscle-specific actin, smooth muscle actin and cytokeratin positivity and ALK positivity. Preoperative examination of kidney IMT includes B-ultrasound, CT and MRI. However, due to the heterogeneity of lesion manifestations, it is very difficult to make a definite diagnosis before surgery, but it still has certain reference value. B ultrasonography showed high or equal echo nodules with clear boundaries. CT findings showed equal or low density nodules, half of the density was uneven, half of the masses had unclear

boundaries, and most of the masses were less enhanced than normal renal parenchyma. MRI showed the invasive nature of the mass. T1WI is usually is low signal; T2 weight is usually low signal; DWI scan high signal, ADC low signal, indicating increased cell density, there are malignant characteristics; The overall signal of the lesion was related to its internal necrosis and cystic degeneration, and a few signals were not uniform. The enhanced scanning showed delayed enhancement and low enhancement. Renal IMT has good prognosis and lack of specificity in clinical manifestations. From the clinical point of view, rapid freezing pathology examination after intraoperative resection of the tumor is recommended and necessary to avoid unnecessary nephrectomy. The treatment methods include conservative observation or medical treatment, surgical resection and chemoradiotherapy, in which surgical resection is the main treatment. High-dose steroids, radiotherapy and chemotherapy have been reported, and some IMTs even have spontaneous ablation.

PU-0976

磁共振 IVIM 和 DKI 在直肠癌术前诊断中的应用

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目的: 探讨体素内非相干运动 (IVIM) 和扩散峰度成像 (DKI) 参数在直肠癌术前诊断中的应用价值。方法: 直肠癌并经手术证实的直肠癌患者 36 例。20 例正常人作为对照组。所有患者术前采用飞利浦 3.0 T 磁共振行常规盆腔 MRI 平扫后, 再次加扫磁共振体素内不相干运动及磁共振扩散峰度成像 (DKI, 序列, 通过专业的 Matlab 工具箱测量病灶处 IVIM 相关参数 (D 、 D^* 、 f) 值及 DKI 相关参数 (MD 、 MK) 值。根据术后 T 分期、分化程度 (低、中、高) 进行分组。采用 SPSS 22.0 和 MedCalc 统计软件进行统计学分析。结果: IVIM 与 DKI 各定量相关参数间相关性分析显示: D 与 D^* 呈高度相关, D 与 MD 、 MK 呈中度相关, D^* 与 MD 、 MK 呈中度相关, MD 与 MK 轻度相关。IVIM、DKI 诸参数在正常直肠壁与直肠癌灶之间的关系示: 直肠癌组的 D 、 D^* 、 f 、 MD 均低于正常组, MK 值高于正常组, 差异均有统计学意义。此外, 在区分正常肠壁与直肠癌时, D 值与 D^* 值有较大的 ROC 曲线 AUC, 分别为 0.910、0.974, 其特异性、敏感性、约登指数、阈值分别为 100%、77.78%、0.778、0.973 与 95%、100%、0.95、10.911; 差异均有统计学意义。IVIM、DKI 诸参数在不同分化程度直肠癌中的分析比较: 参数值在不同分化程度的直肠癌组间差异无统计学意义。 MD 值及 MK 值在不同分化程度的组间差异均具有统计学意义, 且低与中、高分化组间组间差异具有统计学意义; MK 及 MD 值有较大的受试者工作特性 (ROC) 曲线 AUC, 分别为 0.948、0.929。IVIM、DKI 诸参数在不同 T 分期的直肠癌间的分析比较示: 参数 D 、 D^* 、 MD 、 MK 值在不同 T 分期直肠癌的组间差异均具有统计学意义。随直肠癌 T 分期的增加, D 值与 MD 值呈逐渐减小, D^* 值与 MK 值逐渐增大, 差异有统计学意义。 f 值在不同 T 分期直肠癌间差异无统计学意义。结论: 直肠癌的分化程度越高, MD 值越大, MK 值越小, 且 MD 与 MK 值在低与中、高分化组间差异均具有统计学意义; 随直肠癌 T 分期升高, D 值 MD 值逐渐减小, D^* 与 MK 值逐渐增大。

PU-0977

肾上腺嗜酸细胞腺瘤复发恶变一例

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患者 男, 62 岁。2018 年 4 月因“体检发现右侧肾上腺占位”入院, 患者既往高血压病史 8 年, 查体无明显特殊。实验室检查卧位醛固酮增高。肾上腺 CT 平扫及增强检查示: 右侧肾上腺区占位, 形态欠规则, 边界清楚, 截面积约 4.6cm×5.4cm, 增强后动脉期呈明显不均匀强化, 静脉期强化达

到峰值, 延迟期强化区造影剂部分廓清, 原低强化区进一步强化。CT 诊断结论提示肿瘤性病变。患者无明显手术禁忌症, 于 2018 年 5 月 2 日行后腹腔镜下右肾上腺肿瘤切除术。术后病检提示: (右侧) 肾上腺嗜酸细胞腺瘤 (7x4.5x3cm), 免疫组化: Inhibin (+), calretinin (+), Vimentin (+), Syn (+), NSE (+), CK18 (-)。术后患者未规范复查。2020 年 8 月因纳差伴吞咽困难 2 月入院, 查体无特殊。实验室检查提示低钾血症。CT 平扫及增强扫描示: 右侧腹腔、肝肾间隙内、右肾周、右侧背部多发团状、结节状软组织密度灶, 形态不规则, 密度不均, 部分内伴斑片状低密度影, 病灶包绕右肾静脉, 与下腔静脉、右肾上腺极分界不清, 增强扫描动脉期呈明显不均匀强化, 静脉期强化达到峰值, 延迟期强化区造影剂部分廓清, 原低强化区进一步强化。CT 诊断结论考虑肿瘤性病变, 不排除神经纤维瘤病。患者同意手术治疗, 于 2020 年 9 月完成经腹右肾上腺后腹腔镜肿瘤切除术, 术中发现肿瘤侵犯邻近血管。术后病检提示: (右肾上腺及右腹膜后) 嗜酸性细胞肿瘤伴细胞增生活跃, 结合临床及免疫组化, 倾向恶变。免疫组化: Vimentin (+), Syn (+), NSE (+), Ki-67 (Li:30%), Melan-A (+), Inhibin (+), calretinin (+), PCK (-), S-100 (-), CgA (-)。

PU-0978

标准化舒适护理在肺功能异常的老年 MRCP 检查患者中的应用

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目的 随着影像技术的发展, 核磁共振检查成为胆道系统疾病诊断重要的影像检查手段。人口老龄化形势严峻和人们健康需求增加, 老年患者 MRCP 检查人群也逐年增长, 但老年患者基础疾病多, 肺部疾病的发病率逐年增加, 检查配合依从性差, 导致 MRCP 检查时屏气差出现运动伪影影响图像质量及诊断。探讨标准化舒适护理在肺功能异常的老年 MRCP 检查患者的应用效果。

方法 将 2020 年 1 月-2021 年 1 月在我科预约 MRCP 检查且 ≥ 60 岁肺功能异常的患者为对照组, 共 100 例, 将 2021 年 2 月-2022 年 2 月在我科预约 MRCP 检查且 ≥ 60 岁肺功能异常的患者为观察组, 共 100 例。对照组予常规宣教及护理准备, 实验组在常规护理基础上, 增加标准舒适护理, 具体方法如下: ①检查前给予雾化吸入或支气管扩张剂, 缓解通气障碍, 并持续氧气吸入; ②检查中持续氧气吸入并垫高床头, 使患者处于舒适体位, 增加垫子, 防止压迫神经和血管, 减轻生理不适感; ③营造舒适环境, 干净整洁, 光线充足, 温湿度适宜, 保暖, 保护患者隐私以及听力; ④舒适心理护理, 动作轻柔、操作熟练、让患者有安全感、语气温和并鼓励可以完成检查。比较两组患者图像质量、检查成功率以及患者满意度。

结果 统计分析实验组对照组准备时长、一次性检查成功率、图像质量和满意度; 实验组准备时长低于对照组; 一次性检查成功率明显高于对照组; 实验组图像质量优良率明显高于对照组; 患者满意度实验组明显高于对照组, P 值均 <0.05 , 差异具有统计学意义。

结论 标准化舒适护理不仅提高了老年患者 MRCP 检查的成功率、图像质量及满意度, 还节省了护理准备时间, 提高了工作效率。该护理模式可以使老年患者更有效缓解老年患者紧张情绪, 提高屏气耐受力, 降低因屏气差, 屏气时间短导致的检查失败。

PU-0979

基于微信平台的远程宣教在老年 MRCP 检查前的应用

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目的 随着影像技术的发展,核磁共振检查成为胆道系统疾病诊断重要的影像检查手段。人口老龄化形势严峻和人们健康需求增加,老年患者 MRCP 检查人群也逐年增长,但老年患者,理解能力差,依从性低,导致 MRCP 检查前护理准备耗时增加,屏气效果差出现运动伪影影响图像质量及诊断。探讨标准化舒适护理在肺功能异常的老年 MRCP 检查患者的应用效果。

探讨在远程模式下,健康宣教在老年 MRCP 检查前的应用效果。

方法 将 2022 年 6 月-2022 年 12 月在我科预约检查 MRCP 且 ≥ 60 岁的患者为对照组,将 2023 年 1 月-2022 年 6 月在我科预约检查 MRCP 且 ≥ 60 岁的患者为观察组,两组均予常规宣教,禁食禁饮 6-8h,观察组在常规基础上,在患者成功预约后,检查前一日,通过电话对患者进行评估,并添加患者或家属微信,而后进行腹部磁共振检查健康宣教二维码的推送,同时告知呼吸训练注意事项及方法,在家或病房提前试听音频并进行相应的呼吸训练。检查当日,再次对患者进行宣教及呼吸强化训练比较两组患者在检查报道后的准备时长、检查后图像质量的对比、检查成功率以及患者满意度。

结果 实验组统计分析实验组对照组准备时长、一次性检查成功率、图像质量和满意度;实验组准备时长低于对照组;一次性检查成功率明显高于对照组;实验组图像质量优良率明显高于对照组;患者满意度实验组明显高于对照组, P 值均 <0.05 ,差异具有统计学意义。

结论 基于微信平台的远程宣教不仅提高了老年患者 MRCP 检查的成功率、图像质量及满意度,还提高了老年患者的认知,节省了护理准备时间,提高了工作效率。基于微信平台的远程宣教也是契合“互联网+医疗”思想的,值得应用推广。

PU-0980

肝脏血管周上皮样细胞瘤(PEComa)的影像学特征

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目的:

本文旨在探索肝脏 PEComa 的 MR 及 CT 影像特征,以提高其影像学诊断准确性。

方法:

回顾性纳入 19 名患者。所有患者术后病理均证实为肝脏血管周上皮样肿瘤,其中血管平滑肌脂肪瘤(AML)10 例,上皮样血管平滑肌脂肪瘤(EAML)8 例,非特异性血管周上皮样肿瘤 1 例(PEComa NOS)。所有入组患者在术前均接受过 CT 检查,其中 6 例患者同时接受了 MR 检查,所有影像学资料与相关临床信息、病理资料均作为研究对象归纳整理在册。

结果:

PEComa 在 CT 及 MRI 图像上均表现为边界清晰病灶(100%),多为类圆形(68.42%),多位于包膜下(78.95%),多不均质(84.21%),病灶内多见脂肪成分(63.16%)。PEComa 增强后 CT 及 MRI 动脉期多显著强化,与肝脏诸多富血供肿瘤(例如肝细胞肝癌、腺瘤、富血供转移瘤等)影像学区分比较困难。

结论:

本研究数据表明以下特征可以帮助肝脏 PEComa 的诊断:肝脏包膜下、边界清晰、动脉期明显强化的病灶,病灶内或可见畸形血管、脂肪成分;患者为无慢性肝脏病史的中年女性。肝脏 PEComa 影像学表现虽然缺乏特异性,但综合分析可以提高术前诊断的准确率,帮助临床制定治疗、随访方案。

PU-0981

回顾性分析 2 例阔韧带肌瘤 MRI 诊断并文献复习

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阔韧带位于子宫两侧，又分前后两叶，假性阔韧带肌瘤可见与子宫体或颈部相连续，而真性阔韧带肌瘤位置相对易变，尤其对于巨大肿瘤伴有变性、坏死者。经相关文献学习并总结以往工作经验分析，由于阔韧带平滑肌瘤在彩超和 CT 扫描中无特异性改变，也不利于总体、多方位判断其起源，所以一般不利于阔韧带平滑肌瘤的诊断，易出现误诊，而 MRI 则具有更多的优势，尤其高场强 MRI 的 T2 抑脂序列诊断价值更高。高场强 MRI 具有良好的软组织分辨率，多方位、多序列成像对显示肿瘤的位置、包膜、形态及周围组织关系均具有明显的优势，并且平滑肌瘤在 MRI 上存在相对特异的信号改变，在 T2 抑脂序列上由于去除了周围脂肪组织的干扰，阔韧带平滑肌瘤的显示较其他序列更加清晰，本次报道两例阔韧带肌瘤在该序列均较其他序列更加清晰，并且对包膜的显示尤为明显，呈现典型的低信号环征，这对判断肿瘤起源、边界及组织成分具有极大的帮助。因此，高场强 MRI 应用 T2 抑制序列在阔韧带平滑肌瘤的诊断中具有不可替代的优势，临床值得推广。但在阔韧带平滑肌瘤的 MRI 诊断过程中，仍需与起源于阔韧带本身的其他肿瘤、卵巢良恶性肿瘤及附件区的转移瘤进行鉴别，尤其对于巨大并变性、坏死的阔韧带平滑肌瘤更需进行鉴别。

PU-0982

Seat Belt-Related Ischemic Mesenteric Laceration

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A 38-year-old woman presented with abdominal pain after a frontal impact motor vehicle collision 3 hours earlier. Emergency dual-energy contrast-enhanced CT (Somatom Force; Siemens) showed abdominal seat belt sign, mesenteric contusion and hemoperitoneum (Figure, A and B). Hypo-enhancement of the terminal ileum was suspected on the simulated 120-kVp images (Figure, C), which was further highlighted with the combined use of 90-kVp data (Figure, D; Supplementary Figure 1) and cinematic rendering (Figure, E). Iodine maps and 50 keV virtual monochromatic images were provided to depict bowel ischemia in the Supplemental Material (Supplementary Figures 2 and 3). Ischemic mesenteric laceration was highly suspected and confirmed by subsequent laparotomy.

Bowel and mesenteric injuries are the most common seat belt-related abdominal injuries (1). Ischemic mesenteric laceration is the most worrisome complication (2). CT is the main diagnostic tool for abdominal seat belt injuries (1, 3). In this case, cinematic renderings improved depiction of the abdominal seat belt sign, which corresponded to the area of mesenteric laceration. Dual-energy CT and cinematic rendering technique were first utilized to intuitively show seat belt-related ischemic mesenteric laceration. Improved conspicuity of segmental bowel hypoenhancement with low-tube-voltage data complemented with photorealistic visualization with cinematic rendering had the potential to create a new paradigm in virtually depicting such injury.

PU-0983

Omental torsion: Acute abdomen that radiologists cannot ignore. Case report

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We report the case of a 39-year-old male with no significant medical history, went to the emergency room due to right abdominal pain with 12 h of evolution, which begins to be intermittent, gradually develop into persistent, although the degree is bearable. We performed an abdomen CT with contrast that showed: The fat density in the right middle and lower abdomen and pelvic mesentery increased with local flocculent exudation, the local blood vessels in the right middle abdomen showed slightly eddy changes and local "whirl sign" changes, and a small amount of fluid accumulated in the right para-colonic sulcus and pelvic cavity. He was diagnosed with omental torsion and associated necrosis by intraoperatively, which was successfully treated by laparoscopic omentectomy. We also review the literature to learn the clinical and imaging manifestations of this rare acute abdomen.

PU-0984

新型高效 CT 标记物助力肿瘤精准诊疗

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CT 影像在肿瘤诊断、病灶边缘确定及治疗规划中发挥着重要作用,然而,影像图像与术中所见并不一致,精准影像与精准治疗之间存在鸿沟。常规 CT 对比剂可以精准显示病灶,但清除率快,无法在术中或放疗过程中界定肿瘤轮廓与位置,例如,有时术中看不见肿瘤,或肿瘤轮廓与边界不清;射波刀治疗时追踪不到肿瘤,临床金标存在影响剂量估算及治疗副作用等。

本研究研发的新型 CT 标记物 PIDA 具有超高含碘量(>84wt%),可赋予其极高的 X 射线衰减能力, PIDA 聚集诱导增强使 CT 密度表现出聚集诱导放大效应,可进一步增大 10 倍以上, PIDA 肉眼可见深蓝色,有助于术中肉眼识别可见, PIDA 还具有长时间局部滞留增强特性。临床应用中首先根据影像信息规划出肿瘤的边界与手术切缘,在 CT 引导下精准的在切缘位置注射 PIDA,显示肿瘤的切缘,这个切缘可以在术中 C 臂机下看到,又可以术中肉眼可见,以引导精准手术。PIDA 基准标记物还可引导精准放疗,不会产生局部炎症及水肿,可有效追踪,射波刀追踪效率高,识别错误率低,位置固定,可长时间停留,具有生物可代谢性。

PU-0985

口服甘露醇低剂量与常规剂量结合 CT 结肠造影对结肠肿瘤的诊断价值

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目的:评价口服甘露醇结肠造影 CT 低剂量扫描对图像质量的影响,探讨低剂量与常规剂量结合 CT 结肠造影对结肠肿瘤的诊断价值。方法:对 54 例肠镜、BE 或 MR 检查为结肠肿瘤或临床高度疑为结肠肿瘤但不愿或不能做别的检查的患者每人口服约 1500-2000ml 等渗甘露醇后,随机分成两组(低剂量与常规剂量两种不同的组合方案)进行 CT 扫描检查,并在工作站上进行多平面重建。

根据肠道准备效果分为 3 级。评价 1-2 级病例不同剂量的图像质量。对照病理结果, 选择 41 例证实为结肠肿瘤且肠道效果为 1-2 级的病例进行回顾分析, 计算口服甘露醇低剂量与常规剂量结合 CT 结肠造影对结肠肿瘤病灶的显示率、诊断的敏感性、特异性、分期的准确性。结果: 与常规剂量 240 mAs 期比较, 80 mAs、60 mAs 期对结肠壁、结肠带、腔外间隙显示的清晰度影响很小, 没有影响到对其图像的观察诊断; 对肝脏、臀肌等密实结构显示的清晰度影响较大, 随着扫描剂量减低, 图像颗粒增粗, 组织结构分辨率下降, 图像的多平面重建也受到影响; 结肠肿块显示的清晰度在降低剂量扫描时其图像颗粒也有所增粗, 但结合常规剂量动脉期或静脉期增强均没有影响诊断。以 240mAs 为标准, 80 mAs、60 mAs 期的 CTDIvol (mGy) 分别降低了 67%、75%。低剂量与常规剂量的结合扫描方案的辐射量较各期全部为常规剂量的扫描方案降低了约 47.3%。41 例结肠肿瘤病人 40 例清晰显示病变, 其中结肠癌 29 例, 淋巴瘤 1 例, 结肠息肉 10 例, 1 例 <5mm 结肠息肉未检出。口服甘露醇低剂量与常规剂量结合 CT 结肠造影对结肠肿瘤诊断的敏感度为 97.6%, 特异度为 76.9%。29 例结肠癌正确 Duke 分期 25 例, 准确性为 86% (25/29)。结论: 口服甘露醇低剂量与常规剂量结合 CT 结肠造影技术具有患者依从性好、准确性和特异性较高等优势, 是一种既降低患者所受辐射量又符合诊断要求的检查方法。

PU-0986

结合 CT 参数和临床参数对正中弓状韧带综合征严重程度的评估及预后判断的价值

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目的: 正中弓状韧带综合征 (MALS) 是一种罕见且诊断较为困难的疾病。据我们所知, 目前尚缺乏能够预测 NOMI 患者预后的 CT 参数的综合评估。回顾性分析计算机断层扫描 (CT) 评估正中弓状韧带综合征 (MALS) 严重程度分级的能力, 并探讨 CT 结果在 NCS 诊断中的诊断价值。

方法: 纳入 2021 年 1 月至 2023 年 6 月被诊断正中弓状韧带综合征, 或腹部 CT 提示腹腔干起始处狭窄的患者; 根据是否存在特征性症状 (如血肿/动脉瘤) 将试验组分为有并发症组及无并发症组。根据试验组各年龄段病例数量以一定比例纳入腹部 CT 显示无正中弓状韧带综合征的患者, 形成对照组。评估每位患者的 CT 图像, 比较试验组和对照组之间的 CT 特征差异, 同时分析肠系膜上动脉 (SMA)、腹腔干 (CT) 直径及临床指标对 MALS 严重程度的评估价值和患者预后的预测价值。结果: 本研究共纳入了试验组 427 例, 对照组 426 例, 以男性为主, 中位年龄分别为 59 岁和 52 岁。试验组的影像学参数 (包括 SMA、CT 直径、腹腔干起源高度)、临床指标 (包括年龄、性别、改良 BMI) 及实验室参数 (总胆固醇、甘油三酯等) 均与对照组有显著性差异 ($p < 0.05$)。根据腹腔干狭窄程度评估得到 MALS 1 级患者 159 例, 2 级患者 111 例, 3 级患者 157 例, 分析发现年龄更高 ($p = 0.005$)、甘油三酯含量更低 ($p = 0.01$)、SMA 更高 ($p = 0.003$) 对 MALS 严重程度具有提示意义。

结论: 可以结合 CT 上 SMA 直径、临床参数年龄以及实验室指标甘油三酯共同评估 MALS 的狭窄严重程度, 进一步预测患者的预后。

PU-0987

基于肝硬化分级及 CT 肝体积测量对肝功能储备的评价

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基于肝硬化分级及 CT 肝体积测量对肝功能储备的评价

目的:肝切除术后肝功能衰竭是肝癌手术治疗的主要限制之一。人们普遍认为,术前对术后肝功能衰竭风险的正确评估对于确定合适的手术方法至关重要。由于切除和移植后的肝功能受损是由肝储备不足引起的,因此对潜在肝切除患者进行可靠的体积评估是术前评估的关键因素,肝脏功能储备与肝脏体积显著相关。本研究旨在探讨肝细胞癌患者肝切除术前肝硬化患者肝功能储备的定量评价方法,并结合计算肝功能储备与肝细胞癌患者肝功能储备的定量评价。

方法:对 60 例肝切除术患者的 CT 图像进行前瞻性分析。肝硬化程度称为“CT 分级”,切除后肝体积百分比[$=\text{预测残肝体积}/\text{预测总肝体积} \times 100\%$]通过逐层叠加 CT 肝脏图像计算。在 CT 图像上将非肿瘤区肝硬化程度分为 4 个等级。级别越高肝硬化越严重:I 级为病情最有利,其特征为密度均匀,形状正常或轻度变形,脾脏大小适中,未见门静脉高压征像。级别 II 为下降状态,表现为密度不等,形状严重扭曲伴部分萎缩或门静脉高压。III 级为肝脏恶化,表现为肝硬化再生的结节,切线不良,严重萎缩。IV 级最差,表现为体征较 III 级恶化,再生结节增多,轮廓,体积明显萎缩。

结果:切除后肝体积百分比 $\leq 50\%$ 组与 $> 50\%$ 组的生存时间差异有统计学意义($\chi^2 = 4.698, P = 0.022$),CT 分级 0/1 组与 CT 分级 2/3 组的生存时间差异有统计学意义($\chi^2 = 5.133, P = 0.024$)。

结论:切除后肝体积百分比、CT 分级与肝功能储备有显著相关性。使用这两个参数进行预测对肝切除患者判断肝功能储备是有用的。这一结论有待临床应用中更多病例的检验和验证。此外,在 CT 分析软件中引入人工智能,可以实现肝体积的自动测量,从而更好地对 HCC 患者进行诊断和预后。

PU-0988

APT 联合 Gd-BOPTA 对肿块型肝内胆管细胞癌与单发乏血供肝转移瘤的鉴别诊断价值

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目的:肿块型肝内胆管细胞癌(IMCC)与单发乏血供肝转移瘤(SHHM)是肝脏常见恶性肿瘤,两者在影像表现上有相似性,容易混淆。本研究旨在探讨酰胺质子转移(APT)联合 Gd-BOPTA 对 IMCC 与 SHHM 的鉴别诊断价值。方法:回顾性分析自 2021 年 3 月至 2023 年 7 月我院经手术病理证实或临床随访证实的胆管细胞癌及肝转移瘤患者的临床及 MRI 资料,最终纳入 IMCC 14 例,SHHM 17 例。IMCC 与 SHHM 均使用飞利浦后处理平台,于肿瘤最大层面各放置 3 个大小相等的感兴趣区(ROI),记录肿瘤 APT 的信号强度(SI)值的均值,在肝胆特异期(HBP)于肿瘤最大层面及同层面正常肝实质各放置 3 个大小相等 ROI,记录肿瘤及肝脏的 SI 值的均值,根据均值计算出肿瘤病灶-肝脏信号强度比(LLR)及信号强度比值(LSIR)。采用 SPSS 27 统计软件,使用正态性检验来评估各参数的正态性,使用独立样本 t 检验或 Mann-Whitney U 检验比较两组间定量参数的差异。使用 logistic 回归建立不同参数组合的预测模型。使用受试者操作特征(ROC)分析评估诊断性能。结果:IMCC 组与 SHHM 组的 SNR 及 CNR 值差异无统计学意义(P 值均 >0.05),APT、LLR 及 LSIR 对 IMCC 于 SHHM 的鉴别诊断有意义,且 APT(P <0.001)的统计学意义远大于 LLR(P=0.042)与 LSIR(P=0.042),APT、LLR、LSIR 的曲线下面积分别为 0.962、0.710、0.710,将 LLR 与 LSIR 联合,APT 与 LLR、LSIR 联合时,鉴别效能提高(AUC 分别为 0.735、0.975)。

结论: APT、LLR 及 LSIR 可以有效鉴别 IMCC 与 SHHM, 且 APT 与 LLR、LSIR 联合的鉴别效能提高。本研究有助于更准确地鉴别 IMCC 与 SHHM, 从而采取正确的治疗干预措施提高患者的治疗效果和预后。

PU-0989

基于 CT 检测腰大肌横截面积对于肝硬化预后的相关性研究

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目的 研究腰大肌横截面积对肝硬化患者预后的影响

方法 本文回顾性纳入了 153 名在 2020 年至 2022 年期间接受腹部 CT 检查的肝硬化患者, 分为肝功能正常组(对照组)、肝硬化 child 分级 A 级患者(观察组)及肝硬化 child 分级 B、C 级患者(观察组), 通过一年随访观察, 判断其预后情况, 分析腰大肌的横截面积对于肝硬化患者预后的影响。结果 有 34% 的肝硬化患者合并患有腰大肌横截面积减小, 其中男性发病率为 32%, 女性的发病率为 54%。合并腰大肌横截面积减小的肝硬化患者相较于无腰大肌横截面积减小者, 肝性脑病、自发性腹膜炎、肝肾综合征并发症的发生率更高; 合并腰大肌横截面积减小的肝硬化患者预后情况较差, 其中, 体重、BMI、白蛋白、谷草转氨酶、谷丙转氨酶、总胆红素、IV 胶原 ($P<0.001$) 与肝硬化预后存在差异性。

结论 腰大肌的横截面积可以大致作为一个营养评估指标, 可用于对肝硬化患者的肌肉减少情况进行筛查, 对肝硬化患者的临床结局有预测作用。

PU-0990

急性肝门静脉血栓症 CT 表现并文献分析

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目的 分析急性肝门静脉血栓症 CT 特征及临床价值。方法 回顾分析 2 例急性肝门静脉血栓症患者的临床资料及 CT 表现, 并复习相关文献。结果 患者均以无明显诱因腹痛就诊伴 D-二聚体升高, CT 显示肝门静脉主干、肠系膜上静脉增宽, 管腔内密度不均匀增高, 血管周围脂肪间隙, 模糊, CT 增强扫描表现为未强化的充盈缺损区, 患者 1 门静脉周围可见较多迂曲增粗、强化血管影并肝脏灌注异常, 患者 2 部分受累的小肠管增粗、管壁增厚, 肠系膜肿胀并伴积液。结论 APVT 是一种临罕见的疾病, 腹痛是最常见的临床症状, 易栓症、全身和局部的因素是主要的危险因素, SARS-CoV-2 的感染与疫苗接种是重要的临床病史。CT 扫描对 APVT 的诊断有较高的价值, 对 APVT 的分型、病情程度的评估、治疗评价、并发症等方面有积极价值。

PU-0991

基于 C T 影像组学评估门静脉高压及预测曲张静脉出血

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目的: 探讨基于 C T 影像组学标签评估门静脉高压 (PH) 的可行性及其预测曲张静脉出血的价值。

方法 回顾性分析 112 例确诊或疑似 PH 患者, 分别以肝静脉压力梯度 (HVPG) 10、12 和 20 mmHg 作为界值, 将患者分为 HVPG < 10 mmHg 组和 ≥ 10 mmHg 组, HVPG < 12 mmHg 组和 ≥ 12 mmHg 组, HVPG < 20 mmHg 组和 ≥ 20 mmHg 组, 以 M a Z d a 软件提取并分析肝脏增强 CT 门脉期图像纹理特征, 观察影像组学判断不同程度 PH 及曲张静脉出血的效能。

结果: CT 征象中, 在 HVPG < 10 及 ≥ 10 、HVPG < 12 及 ≥ 12 组间有无腹腔积液差异具有统计学意义 (P 均 < 0.05); 单层面勾画 ROI 判别 HVPG ≥ 10 mmHg、HVPG ≥ 12 mmHg、HVPG ≥ 20 mmHg 及曲张静脉出血的平均最小误诊率分别为 12.50%、14.74%、10.27% 及 22.70%; 多层面勾画平均最小误诊率分别为 10.27%、11.16%、5.36% 及 20.49% (P 均 > 0.05)。HVPG 预测 PH 患者曲张静脉出血的曲线下面积 (AUC) 为 0.813 [95%CI (0.730, 0.897)], 以 12 mmHg 为 HVPG 的截断值, 误诊率为 20.54%, 敏感度为 77.22%, 特异度为 69.70%。

结论: 基于 CT 影像组学可评估 PH 程度, 且对预测曲张静脉出血有一定价值。

PU-0992

胃血管球瘤 1 例的 CT 表现

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目的: 研究胃血管球瘤的 CT 表现。方法: 采用 GE 公司 revolution 双能量 CT 行平扫、动脉期、门静脉期、静脉期扫描, 检查前患者禁食 4h, 检查前口服 500~1000 mL 水以充分膨胀胃和十二指肠。结果: CT 检查示胃窦部黏膜下类圆形等密度影, 形态规则, 边缘光滑, 密度均匀, 未见钙化、出血、坏死及囊变, 向腔内生长, 直径约 2.3cm, 增强呈明显进行性均匀强化。结论: 胃血管球瘤有特定的发病部位及 CT 强化特征, 具有临床诊断价值。

PU-0993

MSCT 多期扫描对消化道活动性出血的诊断价值

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目的: 研究 MSCT 多期扫描对消化道活动性出血的诊断价值。方法: 对临床怀疑消化道出血 37 例患者行 MSCT 检查, 采用平扫、动脉期、静脉期扫描, 其中 26 例行 DSA 检查, 8 例行胃镜检查。结果: 15 例证实为消化道活动性出血, 其中 7 例 (46.7%) 行 MSCT 显示造影剂外溢, 其中 5 例行 DSA 检查, 3 例血管畸形出血, 2 例阴性, 2 例胃镜显示胃溃疡出血; 2 例 (13.3%) MSCT 显示胃十二指肠憩室, 未见造影剂外溢, DSA 显示憩室出血; 2 例 (13.3%) MACT 显示胃溃疡, 未见造影剂外溢, 1 胃镜显示溃疡出血; 1 例 (6.7%) MSCT 阴性, DSA 显示血管畸形; 1 例 (6.7%) MSCT 显示胃左动脉假性动脉瘤, 未见造影剂外溢; 2 例 (13.3%) MSCT 显示肠壁增厚肿胀, DSA 显示血管畸形出血。结论: MSCT 双期增强扫描对消化道活动性出血具有重要的临床指导意义及诊断价值。

PU-0994

3.0T 合成弥散加权成像改善睾丸病变的显示

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目的

合成扩散加权图像 (cDWI) 是由在低 b 值图像上获得的 DWI 图像合成高 b 值图像。本研究试图探索 cDWI 在睾丸病变显示中的作用。

方法和材料

我们回顾性分析了 18 例睾丸肿瘤性病变的 DWI (b 值=50 和 1000s/mm²)。由制造商提供工作站生成 b 值等于 1400s/mm² 的 DWI。对于定性测量, 使用 ADC 图和对比增强 T1WI 作为参考标准, 对采集的 DWI (b 值=1000 s/mm²) 和 cDWI (1 差, 2 中等, 3 优) 进行评分。为了进行定量评估, 测量正常睾丸组织和异常病变在采集 DWI 和 cDWI 上的信号强度。通过使用以下公式计算信号强度比 (rSI): rSI=病变/SI 正常。

结果

睾丸在高 b 值 DWI 图像上显示相对明显。因此, 为了提高病变与正常睾丸组织的对比度, 我们应该采集更高的 b 值图像。cDWI 方法可以在不增加扫描时间的情况下满足这一要求。在 cDWI (b 值=1400s/mm²) 上, T2 穿透效应被有效地消除。因此, 睾丸病变的描述得到了改善。cDWI (b 值=1400 s/mm²) 的病变外观评分高于获得性 DWI (b 值=1000 s/mm²)。此外, cDWI 的 rSI 明显高于采集 DWI。

结论

cDWI 在睾丸病变的临床应用是可行的。通过 cDWI, 我们获得了更高的 b 值图像, 以消除睾丸的 T2 穿透效应, 提高病变检测。

PU-0995

基于增强 CT 影像组学模型在胃神经鞘瘤与不同危险度分级胃间质瘤鉴别诊断中的价值

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目的: 建立基于增强 CT 影像组学模型, 评价其在胃神经鞘瘤 (gastric schwannoma, GS) 与不同危险度分级胃间质瘤 (gastrointestinal stromal tumor, GIST) 鉴别诊断中的价值。

方法: 回顾性收集经术后病理证实的胃神经鞘瘤 (GS) 26 例和胃间质瘤 (GIST) 82 例, 按 7: 3 的比例分为训练集和验证集, GIST 分为高、低恶性潜力组。记录患者临床特征 (年龄、性别、有无消化道出血) 和肿瘤 CT 影像特征 (位置、长径、形状、生长方式、瘤内出血、溃疡、囊变、液化坏死、钙化、密度是否均匀、边界是否清楚、平扫、动脉期及静脉期 CT 值、动脉期及静脉期 CT 值净增值、强化是否均匀、瘤周最大淋巴结短径), 建立传统模型。对病变静脉期薄层图像进行全瘤手动分割及影像组学特征提取, 建立影像组学模型。联合上述特征建立组合模型, 评估各模型鉴别 GS 与 GIST、GS 与不同危险度分级 GIST 的诊断效能。

结果: (1) 肿瘤位置、有无囊变、动脉期 CT 值净增值及强化是否均匀是鉴别二者的独立预测因素, 传统模型在训练集和验证集 AUC 分别为 0.939、0.869。

(2) 保留 8 个影像组学特征用于构建影像组学模型, 其在训练集和验证集 AUC 分别为 0.949、0.839。

(3) 保留肿瘤位置、动脉期 CT 值净增值、强化是否均匀以及影像组学模型输出的放射组学分数 (rad-score) 构建组合模型, 其在训练集和验证集 AUC 分别为 0.989、0.964。

(4) 组合模型鉴别 GS 与 GIST、GS 与高、低恶性潜力 GIST 的诊断效能均高于传统模型 (IDI=0.2538, $P<0.05$; IDI=0.2418, $P<0.05$; IDI=0.2749, $P<0.05$)。三种模型鉴别 GS 与高恶性潜力 GIST 的诊断效能多高于鉴别 GS 与低恶性潜力 GIST 的诊断效能。

结论: 基于 CT 影像特征和影像组学特征的组合模型或可成为术前准确鉴别胃神经鞘瘤与胃间质瘤的无创、精准的新方法。

PU-0996

MSCT 对肠系膜脂膜炎的诊断

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【摘要】: 目的 探讨多排螺旋 CT(MSCT)对肠系膜脂膜炎的影像学特征, 提高对其诊断的准确率。方法 回顾性分析我院 2014 年 1 月至 2021 年 8 月的 52 例肠系膜脂膜炎患者的临床及 CT 表现, 其中 14 例 CT 平扫, 38 例 CT 平扫加增强检查。结果 52 例病变均位于小肠系膜, 包绕肠系膜血管, 向周围延伸, 特别是向左下 13:00-18:00 点钟方向为明显。50 例以炎症渗出为主, CT 平扫肠系膜脂肪密度不均匀性增高, CT 平均值约 -45Hu, 高于同层面正常皮下脂肪密度 (平均值约 -100Hu), 50 例中 38 例行 CT 平扫加增强扫描, CT 增强扫描病灶无强化或轻度强化; 2 例以纤维化或肿块为主, CT 表现为肠系膜脂肪密度增高且可见多发 $>15\text{mm}$ 的结节或肿块影, 平扫 CT 平均值约 45Hu, 边界模糊, CT 增强扫描结节或肿块呈中度均匀强化, 动脉期 CT 值约 68Hu, 静脉期 CT 值约 73Hu。52 例肠系膜脂膜炎中, 其中 50 例肠系膜有“云雾样”改变、占本组病例约 96.2%, 其中 42 例有“假包膜征”、占本组病例约 80.8%, 其中 39 例有“脂环征”占本组病例约 75.0%, “脂环征”15 例出现在肠系膜血管周围, 15 例出现在小结节状软组织密度影周围, 14 例出现在肠系膜血管和小结节周围, 其中 42 例有“假肿瘤征”占本组病例约 80.8%, 其中 26 例有“小结节影”占本组病例约 50.0%, 其中 2 例有钙化占本组病例约 3.8%, 其中 1 例合并降结肠肠脂垂炎。结论 MSCT 可以清晰显示肠系膜脂膜炎的特征性表现, 可以显示病变的范围及程度, 并对肠系膜血管是否受累以及疗效进行评估, 对其诊断具有重要价值。

PU-0997

CT-occult diffuse liver metastasis from breast cancer detected by 18F-FDG PET/MR

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We report a case of a 43-year-old woman with rapidly progressive liver dysfunction caused by diffuse breast cancer invasion that failed to be detected by contrast abdominal CT and US. As a problem-solving technique, FDG PET/MR scan was performed. The PET/MR images detected diffuse liver infiltration and other unsuspected distant metastases, upstaging the patient to stage IV. Although metastatic liver diseases classically present as discrete nodules or masses, they may rarely manifest diffuse infiltrating pattern of involvement, corresponding to histopathologic diffuse intrasinusoidal infiltration. This metastatic pattern allows tumor to spread extensively throughout the liver without becoming radiologically apparent, until obstruction of hepatic sinusoids occurs which can lead to acute liver failure. Patients with this condition can rapidly progress to death, but early detection and treatment may improve outcome and survival. However, liver metastasis may not be suspected when abdominal CT and US shows no classic lesions

expected for metastatic disease just as our case. Despite having similar accuracy in whole-body staging for extrahepatic metastatic disease to PET/CT, PET/MR imaging yields a better rate of detection with higher confidence in the characterization of liver metastases. Our case highlighted that infiltrative liver metastasis should be considered in cancer patients having laboratory evidence of liver dysfunction even with no CT and US indication of metastasis. A timely FDG PET/MR imaging is a useful one-stop-shop technique for cancer patients with potentially metastatic liver disease and may add value in clinical decision making.

PU-0998

成人肾母细胞瘤 7 例 CT 表现与分析

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目的：探讨成人肾母细胞瘤（Adult Wilms tumor, AWT）的 CT 特征，旨在提高对该病的认识。

方法：回顾性分析经手术病理证实的 7 例成人肾母细胞瘤患者的 CT 图像，包括肿瘤边界、大小、坏死囊变、钙化、平扫 CT 值、增强强化方式及肿瘤供血动脉。

结果：男性 4 例，女性 3 例，年龄（ 31.43 ± 10.34 ）岁；肿瘤最大径（ 8.94 ± 3.46 ）cm，5 例肿瘤与肾实质分界清晰并可见不同程度的坏死囊变区，2 例以囊性为主，4 例可见斑点状钙化，平扫 CT 值（ 47.4 ± 6.19 ）HU，增强三期 CT 值分别为（ 56.4 ± 6.95 ）HU、（ 72.2 ± 13.33 ）HU、（ 70.2 ± 2.17 ）HU，CT（肿瘤）/CT（肾皮质）比率分别为 0.54 ± 0.13 、 0.61 ± 0.20 、 0.4 ± 0.03 。

结论：熟悉 AWT 的 CT 表现有助于成人型肾肿瘤的术前诊断及鉴别诊断。

PU-0999

mDixon Quant 序列评估慢性肾病纤维化程度的价值

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目的：本研究旨在探索功能磁共振序列与纤维化肾脏组织病理学指标之间的关联关系，通过病理指标和磁共振序列参数的映射关联，验证魔镜成像（mDixon-Quant）序列在评估 CKD 患者肾脏纤维化程度中的价值。方法：通过回顾性队列研究数据，收集大连医科大学附属第一医院 2020 年 5 月至 2023 年 8 月接受肾脏功能磁共振检查的 CKD 患者。扫描序列包括 mDixon-Quant 序列。功能磁共振参数值分别为脂肪分数(fat fraction, FF)和弛豫率(R2*)。所有患者在 MRI 检查后 3 天内，在超声引导下肾活检。肾活检方法采用国家肾脏疾病临床医学研究中心发明并推广的“B 超引导下斜角进针负压吸引一秒钟快速经皮肾活检法”。收集肾活检常规病理数据(球性硬化比例)以及肾脏病理诊断。球性硬化比例=硬化肾小球数量/切片上所有肾小球数量。根据肾小球球性硬化百分比进行分组，以小于 10%，10%-30%，30%-50%和大于 50%分为四组，分析对应的磁共振序列参数变化。采用 SPSS 27.0 统计学软件(IBM SPSS Statistics)进行统计分析。功能磁共振序列参数与肾纤维化病理指标的相关关系采用皮尔逊相关系数(Pearson's r)或斯皮尔曼相关系数(Spearman's Rho)。所有检验均为双侧检验， $P < 0.05$ 为差异有统计学意义， $P < 0.01$ 为差异有非常显著统计学意义。结果：就 mDixon-Quant 序列与球性硬化百分比之间的相关性分析发现，mDixon-Quant 序列参数值（皮质 R2*值）与球性硬化比例之间存在显著负相关性（ $Rho = -0.551, P = 0.005$ ）。结论：mDixon-Quant 序列对评估慢性肾病纤维化程度具有优势。

PU-1000

血氧水平依赖磁共振成像在评估慢性肾小球肾炎患者肾脏功能及病理损伤中的应用

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目的 探讨血氧水平依赖磁共振成像 (BOLD-MRI) 在定量评估慢性肾小球肾炎 (CGN) 患者肾功能及病理损伤的应用价值。**资料与方法** 对 19 名健康志愿者和 53 例经肾活检确诊的 CGN 患者行 BOLD-MRI 检查, 并测量肾皮髓质 $R2^*$ 值, 记录临床资料及肾脏病理积分, 分析 $R2^*$ 值与 CGN 患者肾功能及病理损伤的关系。**结果** 对照组与轻度损伤 CGN 组、中重度损伤 CGN 组肾皮、髓质 $R2^*$ 值均有统计学意义 ($F=10.171, P<0.001$; $F=19.666, P<0.001$)。皮、髓质 $R2^*$ 值与 eGFR 分别呈负、正相关 ($r=-0.570, p<0.001$; $r=0.357, p<0.009$), 肾皮、髓质 $R2^*$ 值与胱抑素 C、病理积分均有相关性, 肾皮、髓质 $R2^*$ 值鉴别对照组与轻度损伤 CGN 组, ROC 曲线下面积 (AUC) 分别为 0.634 和 0.667, 鉴别对照组与中重度损伤 CGN 组, ROC AUC 分别为 0.842 和 0.939。结论 BOLD-MRI 对评估 CGN 患者肾功能及病理损伤程度具有重要价值。

PU-1001

影像误诊十二指肠淋巴管瘤影像 1 例

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摘要:

淋巴管瘤 (lymphangioma, LA) 属于淋巴系统疾病的一种亚型, 最常发生的部位为头部、腋窝和颈部, 也可发生于脾脏和骨骼等器官。小肠 LA 极为罕见, 不足所有 LA 的 1%。国内外文献多以个案报道为主。由于小肠 LA 罕见, 临床特征缺乏特异性, 且临床医师对其缺乏认识, 因此临床上容易漏诊和误诊。

目的: 分析本例十二指肠淋巴管瘤影像误诊原因。

方法: 回顾分析经手术病理证实该病例十二指肠粘膜下淋巴管瘤 CT、MRI 平扫及增强特征。

结果: 腹部体征仅有上腹压痛。CT 平扫及增强提示: 十二指肠降段粘膜下可见约 $1.4 \times 2.2 \times 2.7 \text{cm}$ 大小稍低密度影, CT 值约 26HU, 增强扫描动脉期囊壁厚薄不均、中等强化, 中心轻度强化, 粘膜局部中断。MR 平扫及增强提示: 十二指肠降段见一类椭圆形异常信号灶, 大小约 $2.1 \text{cm} \times 1.7 \text{cm} \times 2.7 \text{cm}$, T1WI 呈稍低信号, T2WI 呈高信号, DWI 呈稍高信号, 增强扫描呈不均匀强化, 以边缘强化显著; 考虑囊液腺瘤可能。行十二指肠肿物切除术+肿物活检术。病理组织学所见: 肿物内见大量淋巴管及短梭形细胞。免疫组化: 检查所见 D2-40(+) /Ki-67(+) /S100(-) /CD57(-) /CD34(-) /SOX-10(-) /SMA(-) /ALK(-)。

结论: 本病例患者为病灶位于十二指肠降段, 不是淋巴管瘤好发部位, 且该患者仅存在上腹痛, 无特异性临床表现。病灶是位于十二指肠降段粘膜下的囊性病变, 胃肠道粘膜下囊性占位, 从发病率优先考虑囊液腺瘤, 小肠 LA 极为罕见; 小肠 LA 无特异性影像表现, 且本病例病灶合并溃疡, 导致病灶影像表现不典型; 以上原因导致本病例忽略了淋巴管瘤的考虑。因此通过此病例的学习, 在小肠占位性病变影像诊断过程中, 因当增加少见病种的考虑以降低误诊率。

PU-1002

磁共振 3D-THRIVE 联合 MIP 重建在复杂性肛瘘患者中的诊断效能及治疗指导价值研究

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目的

分析磁共振 3D-THRIVE 增强序列联合 MIP 重建在复杂性肛瘘患者中的诊断效能, 探讨该诊断方法在患者手术治疗中的指导价值, 以期为临床诊疗提供影像学依据。

方法

选择深圳市人民医院 2020 年 5 月-2022 年 12 月疑似复杂性肛瘘的患者 150 例为研究对象, 所有患者均采用 1.5T 磁共振增强检查, 分别完成常规扫描序列 T1 加权成像 (T1WI)、T2 加权成像 (T2WI)、T2WI 压脂、DWI、T1WI 压脂增强及 3D - THRIVE 增强序列, 以手术检查结果作为“金标准”, 借助 SPSS 26.0 软件完成统计学分析, 分析磁共振增强检查在复杂性肛瘘患者与手术结果之间的符合率; 计算不同扫描序列下复杂性肛瘘患者的诊断效能 (灵敏度、特异度、阳性预测值及阴性预测值); 所有患者均行手术治疗, 分析患者治疗前磁共振的影像学特征在患者治疗中的指导价值。

结果

150 例疑似复杂性肛瘘患者与“金标准”比较, 磁共振诊断阳性患者 125 例, 阴性患者 20 例, 诊断符合率为 96.67 %; 诊断灵敏度为 97.66 %、特异度为 90.91 %、阳性预测值 98.43 %、阴性预测值为 86.96 %; 与各检查序列比较, 3D - THRIVE 增强联合 MIP 重建技诊断效能最高, 诊断符合率为 95.33 %, 与其他序列比较均有统计学意义 ($P < 0.05$)。

结论

3D - THRIVE 增强序列联合 MIP 重建技术对于复杂性肛瘘的诊断效能明显高于其他序列, 并且, 该技术可以实现瘘管的三维形态显示, 在提高复杂性肛瘘患者的诊断效能的同时, 也为外科医生制定更为合理和安全的手术方案提供更加全面的信息。

PU-1003

APT 联合 ESWAN 对肝细胞肝癌和肝血管瘤的鉴别诊断价值

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【目的】探讨酰胺质子转移(APT)联合增强 T2* 加权血管成像(ESWAN)对肝细胞肝癌(HCC)和肝血管瘤(HH)的鉴别诊断价值。

【方法】回顾性分析 16 例经病理证实的 HCC 患者及 20 例 HH 患者, 所有患者均于术前行 3.0T MRI 扫描, 包括常规磁共振扫描序列及 APT, ESWAN 扫描序列。将扫描生成的 ESWAN 图像传输至 GE AW 4.6 工作站上, 使用 Functool 软件自动生成 ESWAN 序列的参数图幅度图, 相位图, R2* 和 T2*, 放射科医师采用双盲法在各参数图像上于病变的最大层面放置三个感兴趣区 (ROI)。扫描生成的 APT 图像传输至 ISP 工作站 (InteliSpace Portal, Philips Healthcare), 经工作站后处理分析得到 APT 图像。以 T2WI 图像为参考, 在 APT 与 T2WI 融合图上勾画感兴趣区 ROI, 于病灶最大层面放置 3 个 ROI 取均值, 计算病灶的 APT 值。采用 t 检验或 U 检验比较肝细胞肝癌和肝血管瘤之间各参数之间的差异, 采用受试者工作特征 (ROC) 曲线评价 APT 和 ESWAN 各参数的阈值及诊断效能, 采用逻辑回归分析将两个序列参数进行联合并评估其诊断效能。

【结果】HCC 的幅度值和 $R2^*$ 值显著高于 HH, 而 HCC 的 $T2^*$ 和 APT 值显著低于 HH ($P < 0.05$)。幅度值, $R2^*$ 值, $T2^*$ 值和 APT 值鉴别 HCC 和 HH 的 AUC 分别为 0.756、0.763、0.734 和 0.805。APT、ESWAN(幅度值+ $R2^*$ + $T2^*$)和 APT 与 ESWAN 联合(APT 值+幅度值+ $R2^*$ + $T2^*$)鉴别 HCC 和 HH 的 AUC 分别为 0.805、0.778 和 0.884。当 APT 与 ESWAN 联合使用时, 其敏感度提升至 75.0%, 特异性提升至 100%(阈值:0.672)。

【结论】APT 和 ESWAN 作为无创的影像学检查技术, 其联合应用可能有助于鉴别 HCC 和 HH, 具有一定的临床应用价值。

PU-1004

探讨 128 层螺旋 CT 扫描结合仿真内镜后处理对结直肠癌的诊断价值

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方法: 回顾性分析 45 例患者均行 CT 增强结合仿真内镜后处理检查, 患者均行肠道准备及肠腔内注气后用 Definition AS+ 128 层螺旋 CT 进行扫描。行仰卧位及俯卧位各扫描一次, 然后将扫描获得的图像进行层厚 1mm 重建后传到后处理站, 并应用后处理工作站 colon 软件进行图像后处理, 来仔细观察病变的部位、形态、大小、侵犯范围、有无其它器官及淋巴结转移。结果: 45 例患者在 CT 仿真内镜检查中 40 例考虑为肿瘤性病变、3 例为正常、2 例为息肉, 经手术病检结、直肠癌 42 例, 炎症 3 例。42 例直肠癌分型为 17 例肿块型、10 例浸润型、6 例溃疡型、9 例混合型。其中发现 4 例肝脏转移、36 例患者淋巴结转移。增强 CT 结合 CT 结肠仿真内镜检查对结直肠肿瘤的检出、定性及定位与手术病检比较准确率很高。结论: 多层螺旋 CT 结合仿真内镜对结直肠肿瘤的检出、定位、定性的准确率较高, CT 仿真内镜对观察病灶周围的侵犯情况及有无远处器官和淋巴结转移的情况有很大的优势, 同时还可以了解肠腔内病变的形态及病变累及肠腔的长度。

PU-1005

脾脏硬化性血管瘤样结节性转化的影像学表现 (10 例报道)

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目的 探讨脾脏硬化性血管瘤样结节性转化 (SANT) 的 CT 与 MRI 表现, 提高对本病影像表现的认识。

方法 回顾性分析经手术病理证实的 10 例脾脏硬化性血管瘤样结节性转化 (SANT) 患者的 CT 与 MRI 表现。患者年龄 23~66 (48.5±13.56) 岁, 男性 6 例, 女性 4 例。9 例患者均进行了 CT 平扫及增强, 其中 3 例同时行 MR 平扫及增强扫描, 1 例患者仅行 MR 平扫及增强扫描。

结果 10 例 SANT 中, 9 例为单发病灶, 1 例为多发病灶, 病灶最大径 2.5~13.1 (5.3±3.33) cm。10 例 SANT 病灶均呈类圆形实性肿块, 有浅分叶状, 3 例边界清楚, 7 例边界均欠清。CT 平扫呈稍低密度影, 7 例密度均匀, 2 例可见散在小钙化, 增强扫描动脉期边缘轻度强化, 门脉期及延迟期呈渐进性向心性强化, 但密度仍低于周围脾实质, 其中 8 例内见间隔样强化/典型轮辐状强化。4 例 MR 扫描者病灶 T1WI 均呈低信号, 1 例 T2WI 呈稍高信号, 3 例呈低信号, 信号不均匀, DWI 序列 ($b=800\text{mm}^2/\text{s}$) 未见弥散受限, 增强扫描表现为病灶边缘强化逐渐延伸到中央的轮辐状强化。结论 脾脏 SANT 主要表现为类圆形实性肿块, 密度略低于脾实质, 偶可见钙化, T2WI 及 DWI 呈低信号, 典型特征为向心性渐进性强化及轮辐样强化。

PU-1006

原发性输卵管癌的 MRI 特征

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目的：探讨原发性输卵管癌（PFTC）的 MRI 的影像特征。

材料和方法：回顾性分析 27 例经手术和病理证实的 PFTC 患者的临床和 MRI 影像特征，总结原发性输卵管癌的 MRI 特征。

结果：27 例 PFTC 患者的发病年龄在 42-64 岁之间，平均年龄为 56 岁，临床表现：不规则阴道出血或绝经后阴道出血（14/27,52%），阴道排液（6/27,21%），盆腔肿块（17/27,63%），腹痛（6/27,5.7%）；PFTC 的 MRI 表现单侧病灶（26/27、96.3%），双侧病灶（1/27、3.7%）；PFTC 的最大直径为 $4.6\pm 0.5\text{cm}$ ；PFTC 的形状为附壁结节（4/27、14.8%）、香肠状（13/27、48.1%）、结节状（9/27、33.3%）或不规则（1/27、3.7%）；PFTC 实性成分均为轻度强化（11/11），PFTC 输卵管积水征 16（59.3%）；腹水征在 3 例 PFTC 患者中观察到。

结论：当单侧附件区肿块表现为香肠状、轻度增强，伴有输卵管积水或宫内积液时，往往提示 PFTC。

PU-1007

3.0T 磁共振扩散加权成像在直肠腺瘤评估中的应用价值

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目的：探讨表观扩散系数 ADC 值对直肠腺瘤的评估价值。方法：回顾性分析 71 例经手术病理证实的直肠肿瘤患者（直肠腺瘤患者 21 例、直肠腺瘤并癌变患者 14 例及直肠腺癌患者 36 例）的 MRI 及 DWI 资料，ADC 值由 b 值为 0 s/mm² 与 1000 s/mm² 的 DWI 检查所获取，测量肿瘤平均 ADC 值及最小 ADC 值，根据直肠腺瘤、直肠腺瘤癌变及直肠腺癌进行分组分析。结果：直肠腺瘤及腺瘤癌变分组的最小 ADC 值（ $P=0.015$ ）、直肠腺瘤及腺癌分组的平均 ADC 值（ $P=0.000$ ）及最小 ADC 值（ $P=0.000$ ）、直肠腺瘤癌变及腺癌分组的平均 ADC 值（ $P=0.000$ ）及最小 ADC 值（ $P=0.047$ ）具有统计学意义，仅直肠腺瘤及腺瘤癌变分组的平均 ADC 值（ $P=0.064$ ）无统计学意义。结论：ADC 值可在一定程度上对直肠腺瘤是否癌变做出较好预测。

PU-1008

多层螺旋 CT 对不同病理类型急性阑尾炎诊断的应用价值

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目的 探讨多层螺旋 CT 对不同病理类型急性阑尾炎诊断的应用价值。方法 回顾性分析本院 2021 年 1 月至 2022 年 10 月收治的 80 例疑似阑尾炎患者的临床资料，所有患者术前均进行了多层螺旋 CT 检查。其中男性 42 例，女性 38 例，年龄为 38.21 ± 11.06 岁。根据阑尾炎 CT 诊断标准进行分类：①单纯性阑尾炎②化脓性阑尾炎③坏疽性阑尾炎④阑尾周围脓肿。以病理结果为金标准，计算多层螺旋 CT 用于急性阑尾炎诊断的灵敏度，特异度及准确度，并分析其用于病理分型的正确率。

PU-1009

脂肪瘤样血管肌纤维母细胞瘤 1 例

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患者,女,19岁9月,2年前发现会阴部肿物,约蚕豆大小,质地稍硬,无疼痛不适。2年来肿物逐渐增大,遂来我院就诊。既往病史无特殊。专科检查:胸膝位肛门6点钟方向,距肛门2cm可见一不规则肿块,呈前后两球体,大小相差不大,均约3cm×3cm球体,外层皮肤相连,触之质地稍硬,活动欠佳,外观与周围皮肤无明显分界。妇科肿瘤标记物未见明显异常。盆腔MR:会阴部肿块,大小约8.7cm×7.3cm×4.6cm,T1WI呈等信号,T2WI呈不均匀高信号,边界清晰,可见假包膜,T2WI压脂示条片状低信号区,DWI呈不均匀高信号,增强扫描肿块呈明显不均匀强化,延迟期呈渐进性强化,病变周围软组织受压、结构清晰。行手术切除见:肿块形态不规则,表面包膜较完整,切面灰白灰黄,实性,质稍韧,似呈融合多结节状。术后病理:脂肪瘤样血管肌纤维母细胞瘤。免疫组化结果:Desmin(+),ER(+),PR(+),CD34(+),S-100(-),SMA(-),Ki-67(+,约2%)。

血管肌纤维母细胞瘤是一种罕见的良性软组织肿瘤,主要发生在女性的外阴、阴道、尿道和腹股沟区,最常发生在外阴。病因不明。肿物大多呈卵圆形或圆形,部分呈息肉状,大多界限清楚,切面实性,部分可呈囊实性,局灶伴黏液样或胶冻样。本病与其他软组织肿瘤组织形态相似,较难区分,因此免疫组织化学检测具有重要价值。免疫组化:瘤细胞表达Desmin、Vimentin,部分表达a-SMA和MSA,恒定表达ER和PR,CD34多为阴性,不表达S-100蛋白和AE1/AE3,绝经后可不表达Desmin。本例免疫组化结果与文献报道相符。

本例特点在于发生于会阴部的血管肌纤维母细胞瘤呈脂肪瘤样改变,与以往文献报道不同,较为罕见。

PU-1010

膀胱低级别肌纤维母细胞性增生 CT 表现一例

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目的:探讨膀胱低级别肌纤维母细胞性增生的临床及影像学特点。方法:回顾性分析我院经手术病理证实的膀胱低级别肌纤维母细胞性增生一例,并结合文献对其影像学表现进行总结分析。结果:盆腔CT平扫及增强示膀胱右侧壁见菜花状肿块并向腔内外生长,增强扫描轻-中度不均匀渐进性强化。行腹腔镜下根治性膀胱切除术+回肠原位新膀胱术,病理诊断为膀胱低级别肌纤维母细胞性增生。结论:LGMP属于良性增生性病变,影像学具有一定特点;但影像学表现与恶性肿瘤可能存在重叠,易造成误诊;该病不需要根治性膀胱切除术或放化疗,目前尚无文献报道远处转移,但术后仍需严密随访,以便早期发现潜在的复发。

PU-1011

急性坏死型胰腺炎伴脾脏感染并气性坏疽 1 例

何欣

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患者,男,62岁,因上腹部疼痛2小时。于2022年5月6日5时入院。入院时患者因“上腹部疼痛2小时”入院。入院症见:上腹部剧烈疼痛,呈持续性,恶心欲吐,无发热恶寒,无咳嗽咳

痰，无头晕头痛，无胸闷胸痛，无腹胀腹泻，无尿频、尿急、尿痛等不适，大便稀烂，每日 2-3 次，无粘液脓血，无解黑便，纳寐尚可，小便正常。近期体重未见明显改变。既往有“慢性胰腺炎”病史，规律服用非诺贝特、舒瑞伐他汀钙片。有“胃底部静脉曲张”病史。有“右中肺浸润性腺癌术后”病史。有“糖耐量受损”病史。查体：体温：36.6℃，脉搏：60 次/分，呼吸：24 次/分，血压：176/94mmHg。心肺查体未见明显异常。专科查体：腹部稍膨隆，未见胃肠型及蠕动波，腹壁静脉无曲张，未触及包块，上腹部压痛，全腹无反跳痛，肝脾肋下未触及，肝区无叩痛，墨菲氏征阴性，麦氏点无压痛，移动性浊音阴性，肠鸣音减弱。

2022 年 5 月 6 日腹部 CT 平扫检查示：胰腺体尾部多发囊性占位性病变，考虑假性囊肿。5 月 7 日腹部 CT 平扫及增强检查示：胰腺体积增大，密度不均匀，增强扫描后不均匀强化，考虑急性坏死型胰腺炎；胰腺体尾部仍见多发假性囊肿；脾脏密度及强化未见异常。5 月 16 日腹部 CT 平扫检查示：急性坏死型胰腺炎进展，伴腹膜炎，脾脏感染坏死、积气，胰尾部周围、结肠肝曲及其周围异常感染性，合并腹腔、腹后腔游离气体；十二指肠降段与结肠肝曲间瘘管形成可能；胰腺体尾部多发假性囊肿较前变化不著。5 月 21 日腹部 CT 平扫及增强检查示：急性坏死型胰腺炎较前进展，伴腹膜炎，脾脏感染坏死较前进展，脾脏实质几乎消失，胰尾部周围、结肠肝曲及其周围异常感染性，合并腹腔、腹后腔游离气体，结肠肝曲穿孔待排；十二指肠降段与结肠肝曲间瘘管形成可能；原胰腺体尾部假性囊肿因坏死显示不清。患者因肠瘘反复感染行外科腹腔引流手术。3 个月后患者因感染所致多器官衰竭死亡。搜索既往文献，未发现因急性胰腺炎出现脾脏感染坏死、积气，病变进展至脾脏实质几乎消失的 CT 表现的相关报道，所以分享此病例。

PU-1012

双能量 CT 虚拟平扫联合真实平扫诊断继发性胆总管结石的价值

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背景：既往有文献报道虚拟平扫（VNC）在检测胆结石方面可以替代 CT 真实平扫（TNC）。但目前尚无研究联合 VNC 和 TNC 用于检测继发性胆总管结石，同时也缺乏联合 VNC 和 TNC 与单一 TNC 的诊断效能对比研究。

目的：探讨 VNC 联合 TNC 在诊断继发性胆总管结石的诊断价值，并将其与单一 TNC 的诊断效能进行比较。

方法：回顾性收集我院 2019 年 1 月至 2022 年 3 月期间经超声诊断为胆囊结石，拟行腹部双能量 CT 平扫检测继发性胆总管结石的患者。以外科手术或 ERCP 结果为参考标准，评估 TNC 联合 VNC、单一 TNC 在诊断继发性胆总管结石的效能差异。评价指标包括受试者操作特征曲线下面积、敏感度、特异度。敏感度和特异度比较采用 McNemar 检验。曲线下面积比较采用 Delong 检验。采用 Kappa 检验评估诊断结果观察者内和观察者间的一致性。

结果：共纳入 97 例患者。VNC 联合 TNC 评估继发性胆总管结石具有较高的观察者内和观察者间一致性（观察者内 Kappa 值：0.772[95% CI:0.538-1.000]；观察者间 Kappa 值：0.780[95% CI:0.545-1.000]）。TNC 联合 VNC 诊断继发性胆总管结石的曲线下面积高于 TNC（0.874[95% CI: 0.805, 0.943] vs 0.770[95% CI: 0.689, 0.851]； $p=0.004$ ）。与单一 TNC 对比，TNC 联合 VNC 提高了继发性胆总管结石诊断的敏感度（TNC: 57.5%[95% CI: 40.9%, 72.6%] vs TNC 联合 VNC: 80.0%[95% CI: 64.4%, 90.9%]； $p=0.007$ ）。但二者诊断继发性胆总管结石的特异度无显著统计学差异（TNC: 96.5%[95% CI: 87.9%, 99.6%]；TNC 联合 VNC: 94.7%[95% CI: 85.4%, 99.0%]； $p=0.317$ ）。

结论: 与单一 TNC 比较, 联合 VNC 与 TNC 提高了继发性胆总管结石的诊断性能, 对于继发性胆总管结石可疑患者, 推荐腹部 CT 平扫采用双能量扫描模式获取更多的诊断信息。

PU-1013

A CT-based radiomics nomogram for the prediction of disease-free survival in periampullary carcinoma

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Purpose: To develop a CT-based radiomics nomogram for individualized survival prediction in patients with resected periampullary carcinoma (PC).

Materials and Methods: Totally 91 patients with PC were enrolled and randomly divided into a training cohort (n = 64) and a validation cohort (n = 27). The preoperative CT radiomic features were extracted from portal venous-phase images. Least absolute shrinkage and selection operator (LASSO) Cox regression were applied to select features and develop a radiomics signature. Multivariate Cox proportional hazards model and Kaplan-Meier survival analysis were used to determine the association of the radiomics signature and clinicopathological factors with DFS. To evaluate the incremental value of the radiomics signature for DFS prediction, a radiomics nomogram combining the radiomics signature and clinicopathological risk factors was constructed and assessed by its calibration, discrimination, and clinical utility.

Results: The radiomics signature was significantly associated with PC patient's DFS in the training cohort ($p < 0.001$). The radiomics nomogram resulted in better performance of the survival prediction (C-index: 0.792 and 0.722 in the training and validation cohorts, respectively) than that of the clinicopathological model (C-index: 0.673 and 0.699, respectively). The favorable calibration and decision curve analysis indicated the clinical usefulness of the radiomics nomogram.

Conclusion: The radiomics signature may be a useful noninvasive biomarker for the estimation of DFS in patients with PC. Radiomics nomogram combining the radiomics signature and clinicopathological risk factors performed well for individualized DFS estimation, which might enable precise medicine in future.

PU-1014

Whole-volume apparent diffusion coefficient histogram analysis for prediction of regional lymph node metastasis in periampullary carcinomas

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Purpose: To evaluate whether whole-volume apparent diffusion coefficient (ADC) histogram parameters of the primary tumor were useful to predict regional lymph node metastasis (LNM) in periampullary carcinomas.

Methods: Thirty-eight patients with periampullary carcinoma who underwent pancreaticoduodenectomy between January 2016 to April 2019 were retrospectively enrolled.

Whole-volume ADC histogram analysis of the primary tumor was performed by two radiologists independently. Clinical factors, pathological results and histogram parameters were evaluated. Interclass correlation coefficient (ICC) was used to assess agreement between observers. Receiver operating characteristic (ROC) analysis was performed to evaluate the performance of parameters in differentiating LNM-positive group and LNM-negative group.

Results: Interobserver agreements were good to excellent for histogram analysis between two radiologists, with ICCs ranging from 0.766 to 0.967. Tumor size, MR-reported LN status and most ADC histogram parameters (including mean, minimum ADC value, 10th, 25th, 50th, 75th, and 90th percentile, and kurtosis) were significantly different between LNM-positive group and LNM-negative group ($p < 0.050$), and revealed significant correlations with LNM ($p < 0.050$). At ROC analysis, tumor size and minimum ADC value generated highest area under the curve (AUC) (AUC = 0.764, 95% confidence interval [CI]: 0.599, 0.886). When diagnostic predictive values were calculated with the combined model incorporating tumor size, MR-reported LN status and 75th percentile, the best diagnosis performance was obtained, with AUC of 0.879 (95% CI: 0.771, 0.986), sensitivity of 100.0%, and specificity of 75.0%.

Conclusion: Whole-volume ADC histogram parameters of the primary tumor held great potential in differentiating regional LNM in periampullary carcinomas.

PU-1015

一站式能谱及灌注 CT 对结直肠癌的诊断价值

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目的 评价一站式能谱和灌注 CT 参数对结直肠癌诊断价值。

方法 收集 2019 年 9 月~2022 年 11 月于我院经术前结肠镜或手术病理证实的 82 例结直肠癌患者的临床及 CT 资料进行回顾性分析。测量动、静脉期病灶、邻近正常肠壁在 40keV~140keV 单能量范围内的 CT 值及能谱参数、灌注参数。依据病理结果，将患者病理标本证实为癌灶所对应 CT 图像所在区定义为病变区，将同层面或相邻层面无病变负荷肠段的肠壁定义为正常肠壁。对所得参数并进行统计学分析。

结果 1 病变区动、静脉期 40keV~140keV 单能量 CT 值及 WC、IC、NIC、 λ 、Eff-Z 均高于正常肠壁，差异均有统计学意义 ($P < 0.05$)。ROC 分析，动脉期 40keV~110keV 各单能量 CT 值判定结直肠癌的曲线下面积，其中以 50keV 单能量 CT 值的 AUC 值最大，达到 0.770。动脉期 IC、NIC、 λ 判定结直肠癌的 AUC 较高，均大于 0.8，具有较好的诊断效能；IC、NIC、 λ 联合的 AUC 均大于 0.8，具有较高的诊断效能，其中以 IC+ λ 的诊断效能最高 AUC 为 0.881。静脉期 40keV~140keV 单能量 CT 值预测结直肠癌的 AUC，其中以 90keV 单能量 CT 值的 AUC 值最大为 0.794；静脉期 IC、NIC、 λ 及 Eff-Z 判定结直肠癌的 AUC 均大于 0.8，具有较好的诊断效能。IC、NIC、 λ 及 Eff-Z 进行联合，AUC 均大于 0.8，对结直肠癌具有较高的诊断效能。病变区 BV、BF、MTT、PS 均高于正常肠壁，TTP 低于正常肠壁，差异均有统计学意义 ($P < 0.05$)；BV、BF、TTP、PS 判定结直肠癌的 AUC 均大于 0.8，具有较好的诊断效能。联合 Logistic 回归分析获取的联合预测概率以 A-50keV+灌注、A-能谱+灌注、V-90keV+灌注及 V-能谱+灌注最高，ROC 曲线分析 AUC 接近于 1。

结论 一站式 CT 能谱及灌注成像技术所获取的 40keV~140keV 单能量 CT 值、能谱参数及灌注参数，以及多参数联合应用对结直肠癌及其分期具有较好的诊断价值，其中多参数联合诊断效能更佳。

PU-1016

先天性阴道下段闭锁伴膀胱阴道瘘 MRI 表现 1 例

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本文报道了 1 例先天性阴道下段闭锁伴膀胱阴道瘘。患者女，40 岁，因下腹痛 7 天并加重 2 天入院。患者无盆腹腔手术史，既往经期血尿、偶有下腹部疼痛及尿路感染，妇科查体提示阴道下段完全闭锁。盆腔 MRI 检查提示：膀胱阴道瘘；阴道上段积液扩张、阴道下段呈实性软组织信号；左侧输卵管-卵巢脓肿伴周围粘连及腹膜炎；右输卵管少量积液。行腹腔镜下双输卵管切除术、左卵巢脓肿切开引流术、盆腔粘连松解术、肠粘连松解术。结合临床表现、影像学及术中所见，综合诊断为先天性阴道下段闭锁伴膀胱阴道瘘，左侧输卵管-卵巢脓肿，右侧输卵管脓肿，盆腔粘连及肠道粘连。

PU-1017

Preoperative evaluation of Liver regeneration following hepatectomy in hepatocellular carcinoma using gadoxetic acid-enhanced MR imaging

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Objectives: To investigate the potential value of gadoxetic acid-enhanced T1 weighted imaging (WI) parameters for the preoperative prediction of liver regeneration (LR) in patients with HCC after partial hepatectomy (PH).

Methods: 206 HCC patients were initially recruited. Many gadoxetic acid-enhanced T1 weighted imaging (WI) parameters were measured by two independent radiologists. Spearman's correlation test was used to assess correlations between T1 WI parameters and the regeneration index (RI), calculated as $100\% \times (\text{the volume of the postoperative remnant liver} - \text{the volume of the preoperative remnant liver}) / \text{the volume of the preoperative remnant liver}$. Multivariate linear regression analyses were used to identify the factors for RI.

Results: Finally, 57 HCC patients (47 men and 10 women, mean age 51.26 ± 10.79 years) were retrospectively analyzed. The intraclass correlation coefficient (ICC) ranged from 0.791-0.973. Spearman's correlation test showed SIHBP(liver)($r=0.450$, $P=0.011$), SI[HBP-pre(liver)]($r=0.531$, $P=0.002$), DR(liver)($r=0.470$, $P=0.008$), SI[HBP-pre(spleen)]($r=-0.358$, $P=0.048$) of patients with minor hepatectomy were associated with RI. But multivariate analysis showed that only SI[HBP-pre(liver)] (Model 1: standardized $\beta = 0.425$, $P=0.007$) and SIHBP(liver) (Model 2: standardized $\beta = 0.337$, $P=0.035$) were correlated to RI. The SIHBP(liver) and SI[HBP-pre(liver)] also showed a negative correlation with fibrosis stage ($r=-0.290$, $P=0.046$ and $r=-0.175$, $P=0.029$, respectively) in the patients undergoing minor hepatectomy, and there was also a negative correlation between fibrosis stage and RI. However, for total patients and patients with major hepatectomy, no Gd-EOB-DTPA enhanced T1 WI parameters were associated with RI in multivariate analysis ($P>0.05$).

Conclusions: The SI[HBP-pre(liver)] and SIHBP(liver), may be reliable preoperative predictors of liver regeneration.

PU-1018

CT 与 MR 在小肠疾病诊断中的价值对比

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摘要:目的 消化系统中, 小肠疾病往往缺乏特异性, 从而造成早期诊断有一定的困难。影像学检查尤其是 CT 和 MR 在小肠疾病的诊断中具有方便易行, 病人接受较为容易, 对于肠腔内外病变显示较好的特点。本文对比 3TMR 和 CT 对于小肠病变的检出率差别, 从而对临床选择检查方法做出一定的参考。方法 收集 2016 年 1 月至 2018 年 1 月本院 20 例小肠疾病患者, 所有患者均接受过 CT 和 MR 扫描。男性 14 例, 女性 6 例, 年龄从 19 岁至 62 岁, 平均 41 岁。回顾性分析 20 例小肠病变患者, 所有患者均行 CT 扫描和 MR 扫描。由 2 名影像科医生进行双盲法分析, 对比 CT 和 MR 对于小肠肠段病变的检出效果。结果 CT 检查中, 所有 20 例患者的图像, 评分 3 分者 17 例 (85%), 评分 2 分者 3 例 (15%) 无患者评分为 1 或 0 分。MR 检查中, 所有 20 例患者的图像, 评分 3 分者 15 例 (75%), 评分 2 分者 4 例 (20%), 评分 1 分者 1 例 (5%), 无患者评分为 0 分。小肠 CT 扫描检出梳状征 6 处、肠壁增厚 58 处、梗阻 5 处、瘘管 3 处、肠腔狭窄 37 处; 小肠 MR 扫描检出梳状征 7 处、肠壁增厚节段 60 处、梗阻 7 处、瘘管 3 处、肠腔狭窄 31 处。除肠腔狭窄有统计学差异 ($p<0.05$) 外, 其余病变均无统计学差异 ($p<0.05$)。结论 CT 和 MR 均可很好显示小肠梳状征、肠壁增厚、梗阻及瘘管、肠腔狭窄等等病变。同时由于 MR 可以行电影成像对小肠进行动态观察, 从而对比 CT 可以排除部分肠腔狭窄假阳性。CT 由于成像速度快所以图像质量易于保证, 而 MR 无电磁辐射, 便于病人进行多次检查。由结果可以看出小肠 CT 和小肠 MR 总体上对于小肠病变的诊断效果差别不大, 都能较好的完成小肠的检查。临床医生完全可以根据病人的情况选择小肠 CT 或 MR 检查。由于 CT 检查速度快对病人的要求低, 对于年老体弱配合度低的患者更加适用。MR 可以行电影动态扫描, 对肠道病变进行动态观察。同时 MR 具有无电磁辐射, 对人体基本无损伤的优点, 对于需要经常复查的患者来说更为适用。

PU-1019

The influence of intravenous injection of Gd-EOB-DTPA on the parameter values of liver magnetic resonance elastographyHehan Tang, Yi Wei, Bin Song
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Purpose: To explore the effect of liver specific contrast agent Gd-EOB-DTPA on the measurements of liver stiffness and other parameters of magnetic resonance elastography (MRE).

Methods: Twenty-four patients with suspected liver fibrosis were enrolled. The GE DISCOVERY MR750 3.0T magnetic resonance imaging system and driver were used to perform MRE scans before and after the injection of Gd-EOB-DTPA. Manually evaluate the average value of the stiffness value, storage modulus, loss modulus, and signal-to-noise ratio during the two scans, and stage the degree of fibrosis according to the average stiffness value of the lesion. The paired t test was used to verify the difference of each parameter before and after the use of Gd-EOB-DTPA, the Pearson correlation coefficient was used to test the correlation, and the consistency of the results of the two fibrosis stages before and after Gd-EOB-DTPA was tested by the correlation analysis of categorical variables.

Results: All the parameters measured before and after using the contrast agent were significantly correlated ($P < 0.05$), the stiffness value of normal liver tissue before and after using the contrast

agent was statistically significant ($P < 0.05$), and the difference in other parameters was not statistically significant ($P > 0.05$), there was no significant difference in the stiffness value, storage modulus, loss modulus and signal-to-noise ratio of the diseased liver tissue before and after the use of Gd-EOB-DTPA ($P > 0.05$). The consistency results showed that the Gamma value was 0.91 ($P < 0.01$), indicating that the consistency of the two fibrosis stages before and after the contrast agent injection was higher.

Conclusion: The use of Gd-EOB-DTPA has no significant effect on the parameter values of liver MRI elastography.

PU-1020

自身免疫性胰腺炎的直接及间接 MRI 征象

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目的：探讨自身免疫性胰腺炎(AIP)直接与间接 MRI 征象。方法：回顾性分析经组织病理学和(或)类固醇激素治疗证实的 16 例 AIP 患者的 MRI 检查资料。结果：11 例 AIP 表现为胰腺弥漫性肿大, 5 例为胰腺局限性肿大。12 例病变区压脂 T2WI 信号减低, STIR 信号略增高, DWI 病变区信号增高, 动态增强后呈延迟强化; MRCP 示 9 例胆总管胰腺段呈鸟喙样狭窄, 8 例胰管节段性狭窄, 1 例胰头部胰管局限性狭窄; 10 例胰腺病变区周围见包膜样结构, 包膜厚度小于 0.5cm, 随访后包膜逐渐消失; 2 例伴有胰周间隙水肿。结论: AIP 的 MRI 表现具有一定特征性, 学习 AIP 其综合的 MRI 影像表现, 有利于该病的诊断与治疗。

PU-1021

Prognostic nomogram constructed using combination of MRI tumor regression grade and clinical factors to predict response of mid-low rectal cancer to neoadjuvant chemoradiotherapy

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Purpose: This study aimed to develop nomograms that combine clinical factors and MRI tumor regression grade (mrTRG) to predict the response of mid-low locally advanced rectal cancer (LARC) to neoadjuvant chemoradiotherapy (nCRT).

Methods: The retrospective study included 204 patients who underwent nCRT and surgery between January 2013 and December 2021. Based on pathological tumor regression grade, Patients were categorized into four groups: complete pathological response (pCR), non-pCR, good pathological response (pGR), and non-pGR. Nomograms for predicting pCR and pGR were constructed after univariate and multivariate analyses. The prognostic performances of the nomograms were evaluated using the consistency index (C-index).

Results: The nomogram for predicting pCR consisted of tumor length ($P = 0.021$), post-treatment mesorectal fascia involvement ($P = 0.102$), white blood cell count ($P = 0.004$), and mrTRG ($P = 0.024$). The nomogram for predicting pGR consisted of distance of tumor's lower border from anal verge ($P = 0.003$), pretreatment involvement of mesorectal fascia ($P = 0.019$), platelet/lymphocyte ratio ($P = 0.022$), pretreatment CA199 ($P = 0.084$), and mrTRG ($P < 0.001$). Nomograms

constructed based on mrTRG and clinical factors showed better C-index than mrTRG alone in predicting pCR and pGR. (For predicting pCR, 0.772 vs. 0.611; for predicting pGR, 0.748 vs. 0.631).

Conclusions: Nomograms combining MRI tumor regression grade plus clinical factors may be useful for predicting response of mid-low locally advanced rectal cancer to neoadjuvant chemoradiotherapy. The proposed models could be applied in clinical practice after validation in large samples.

PU-1022

MSCT 增强扫描对伴有肝转移的胃肝样腺癌的诊断价值

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目的: 探讨伴有肝转移的胃肝样腺癌 (Hepatoid adenocarcinoma of the stomach, HAS) 患者的增强 MSCT 特征。方法: 回顾性分析 2013 年 2 月至 2022 年 2 月期间在郑州大学第一附属医院经病理确诊的 8 例 HAS 患者, 8 例患者均行腹部增强 CT 扫描, 其中 4 例为术前(胃癌根治术)检查。男 6 例, 女 2 例, 中位年龄 64 岁。分析病灶影像学参数, 包括动脉和静脉期的增强模式、坏死情况、静脉是否有血栓以及整体影像学诊断。结果: 胃部病灶位于胃底和贲门 4 例(4/8, 50%)、胃窦 3 例(3/8, 37.5%)和胃底 1 例(1/8, 12.5%)。分析 4 例术前胃部病灶图像, 胃壁最大厚度为 $22.02 \pm 3.64\text{mm}$, 大体类型表现为隆起型 2 例、溃疡型 1 例、浸润型 1 例。肿瘤平扫呈软组织密度肿块, 2 例见低密度坏死区, 4 例均未见钙化。动脉期 3 例明显强化, 1 例中度强化。2 例可见由于瘤内坏死引起的不均匀强化。8 例 HAS 肝转移灶中 6 例为多发, 2 例为单发。轴位 MSCT 示 7 例患者最大肝转移癌灶大于 3cm, 且无论大小均可见坏死。6 例癌灶边界清楚。增强强化不均匀, 3 例表现为环形强化。动脉期轻度强化 6 例, 中度强化 2 例, 呈典型“快进快出”模式。7 例伴淋巴结转移, 3 例伴门脉侵犯, 1 例伴胰腺转移。结论: 胃部原发癌灶 MSCT 典型表现为胃壁增厚 $>2\text{cm}$ 的软组织密度肿块, 可伴有坏死, 罕见钙化, 增强扫描见中度至明显持续性强化。肝转移灶增强 MSCT 表现类似于原发性肝癌 (Hepatic cell carcinoma, HCC), 但是患者常无 HCC 易患因素, 且瘤灶坏死率高。此外, 常合并腹腔内、胃周淋巴结肿大, 部分可合并腹部其他器官如胰腺转移。

PU-1023

基于 CT 的 L3 椎体平面骨骼肌参数和脂肪浸润程度与肝硬化肌少症关系的研究

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研究背景: 肝硬化是重要的公共卫生问题, 在世界范围内发病率和死亡率均较高且其手术预后与治疗受到越来越多的关注。肌少症表现为肌肉质量减少, 同时还存在肌肉力量或功能下降的一类渐进全身性复杂综合征, 其发病机制是多种因素综合作用的结果。有文献表明肌少症在肝硬化患者中拥有接近 30%~70% 的发病率, 肝硬化合并肌少症者的生存率显著低于无肌少症者。较高的发病率显示了肝病患者具有某些肌少症的特殊促成因素。肝硬化并发肌少症会严重危害患者生存质量, 使临床不良事件增加, 如跌倒、预后不良甚至是死亡等, 因此早期识别肝病患者中可能并发肌少症的高危人群并加以诊断就显得尤为重要。目前, 临床上大多数用计算机断层扫描 (Computer Tomography, CT) 和磁共振成像 (Magnetic Resonance Imaging, MRI) 来进行肝病患者术前

评估。临床医师常用 L3 椎体平面骨骼肌指数 (L3 skeletal muscle index, L3 SMI) 即: L3 椎体平面骨骼肌面积 (L3 skeletal muscle area, L3 SMA) 与身高 (m) 平方进行标准化来预测肌少症。因此, 寻找一些相对简单直观的与肝硬化并发肌少症相关的测量手段就显得尤为重要, 建立其早期诊断标准可以帮助临床早期的识别、干预、治疗。再次基础上本研究选择了 L3 骨骼肌脂肪浸润 (L3 muscle fat infiltration, L3 MFI)、椎后肌群 MFI、L3 椎体平面骨骼肌密度 (L3 skeletal muscle density, L3 SMD)、椎后肌群 SMD、L3 肌间隙脂肪面积、椎后肌群肌间隙脂肪面积, 作为参数来探究其与评估骨骼肌成分金标准 L3 椎体平面骨骼肌指数 (L3 skeletal muscle index, L3 SMI) 的关系。目的: 通过探讨骨骼肌脂肪浸润 (MFI) 程度与其他骨骼肌参数来预测肝硬化患者并发肌少症的效能。

PU-1024

门静脉高压向肝性血流 CT 影像学研究

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目的

明确门静脉高压侧支循环形成后的向肝性血流途径及起始血管、交通支的形成及其形成方式、形态学改变。在门静脉高压症外科诊治中, 通过了解门静脉系统的向肝血流动力学状态, 更好的进行术前评估、术式选择、术后随访、并发症预测及预后判断。

方法

患者仰卧于 CT 扫描床, 检查前禁食至少 6-8h, 扫描前半小时口服 1% 泛影葡安 1000 mL, 行常规血管增强扫描。扫描设备 64 排 128 层螺旋 CT, 使用 128X0.625mm 的探测器, 扫描层厚 0.625mm, FOV365mm。扫描后轴位像均行 1mm 重建, 层间距 1mm。从膈顶至肝下缘分别行平扫、动脉期增强、门脉 CTA 及延迟扫描, 增强扫描用非离子型碘造影剂碘比醇 (350mg/ml), 注射速度为 3.5ml/s, 总量为 100-120ml, 于开始注射后 20s、60s、5min 分别进行动脉期、门脉期及延迟期扫描。研究结果采用 SPSS 26 统计软件进行统计分析。以 $\alpha=0.05$ 为检验标准, 判断差异是否有显著性。

结果:

1、多种影像学检查方法的比较: 多种影像学检查方法经卡方检验后, $P<0.05$, 并且通过检出病例与 DSA 金标准对比, B 超的检出病例量较高; MRI 对于软组织成像具有绝对的优势, 但是其受呼吸、运动的影响比较大, 扫描时间长, 且禁忌症较多, 因此它的使用受到一定程度的限制; 多层螺旋 CT 能比较好的显示血管全程, 对于比较细小的侧支循环亦能清楚的显示, 多种重建方法的使用, 使其在血管成像上的优势逐渐突显, 且多层螺旋 CT 筛查出的例数与 DSA 符合率较高, 在向肝血流的影像学检查中具有优势。

2、向肝血流与离肝血流的原发病存在差别, 离肝血流原发病以肝硬化为主, 向肝血流以原发性肝癌为主, 还有部分向肝血流原发病为肝纤维化。

3. 门脉高压后向肝血流与离肝血流的门静脉直径存在显著差异, 较大的附属血管直径不存在差异。

结论:

1、近年影像学技术的发展, 进一步发现了少见向肝血流, 在向肝血流的多种影像学检查方法中, 多层螺旋 CT 优于其他影像学检查方法;

2、离肝及向肝血流的原发病存在一定差别;

3、门脉高压后向肝血流与离肝血流的门静脉直径存在显著差异。

PU-1025

CT 影像学无创量化指标在肝硬化诊断中的价值

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目的：研究 CT 影像量化指标与肝硬化进程及门脉高压之间的关系，评价其对肝硬化无创诊断的价值。方法：利用螺旋 CT 测定非肝病患者与肝硬化患者肝脏、脾脏体积以及门静脉直径，比较两者的差异，利用 ROC 曲线评价对肝硬化的诊断价值；并分析上述无创量化指标与肝硬化 Child-pugh 分级之间相关性。结果：入选肝硬化患者和非肝病患者各 120 例，其中肝硬化 Child-pughA、B、C 各 40 例。肝硬化组肝脏体积、肝/脾体积比明显低于非肝病组（870439 mm³ vs 1112455 mm³、2.54 vs 7.86），脾脏体积、门静脉直径明显高于非肝病组（483650 mm³ vs 159297 mm³、16 mm vs 13 mm），均有显著统计学差异（P 均<0.001）。肝脏体积、肝/脾体积比、脾脏体积、门静脉直径诊断肝硬化的 ROC 曲线下面积分别为 0.719、0.944、0.905、0.790。直线相关回归分析结果显示，肝硬化 Child-pugh 评分与肝脏体积、肝/脾体积比呈负相关（ $r=-0.239$ ， $p=0.017$ ； $r=-0.384$ ， $p<0.001$ ），与门脉直径呈正相关（ $r=0.249$ ， $p=0.013$ ）。肝硬化组 Child-pughA、B、C 肝脏体积、肝/脾体积比分别为 952903 mm³ vs 927539 mm³ vs 725903 mm³、4.02 vs 1.92 vs 1.81（ $p<0.05$ ， $p<0.001$ ）；门静脉直径分别为 14.56 mm vs 16.01 mm vs 16.87mm（ $p<0.05$ ）。结论：肝脏体积、肝/脾体积比、门静脉直径等 CT 无创量化指标对肝硬化诊断具有较好价值，并且与 Child-pugh 评分相关，可以反应肝硬化严重程度。

PU-1026

探讨 Siemens FORCE 双能量 CT 对结直肠癌的临床应用价值

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目的：探讨 Siemens FORCE 双能量 CT 对结直肠癌的诊断价值及辐射剂量。方法：收集经肠镜和活检证实为结直肠癌拟行手术的患者 160 例，随机分为 A 组和 B 组，A 组行 Siemens FORCE 双能量 CT 三期增强扫描，B 组行 Philips256 CT 三期增强扫描，分别由放射科医生对图像进行术前诊断并与术后病理对照，分析两种 CT 对结直肠癌的诊断价值，并比较其辐射剂量。结果：共 147 例纳入分析，两种 CT 检查方法原发病灶均被检出，敏感度为 100%。A 组 FORCE 双能量 CT 原发灶准确率为 72.36%，明显高于 B 组 Philips256 CT 的 57.75%。两种 CT 淋巴结转移检出的敏感度为 93.44%，其中 A 组诊断淋巴结转移准确率为 65.79%，B 组诊断淋巴结转移准确率为 56.34%，差异有统计学意义（ $p<0.05$ ）。A 组双能量 CT 平扫和三期增强总剂量为 17.88 ± 4.77 mSv；B 组 Philips256 CT 总剂量为 42.73 ± 10.45 mSv；前者明显低于后者。结论：Siemens FORCE CT 双能量三期增强扫描有助于结直肠癌术前肿瘤分期，且辐射总剂量低，值得临床推广。

PU-1027

脾脏转移瘤的病因学分析及影像学检查方法

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目的：回顾性分析脾脏转移性病变的原发肿瘤病因学及影像学检查的表现。方法：回顾性分析 2019 年 1 月—2022 年 7 月于上海交通大学附属第一人民医院的 PACS 系统，查阅放射影像学资料，

包括 CT 及 MR 平扫和/或增强图像统计，并与院内电子病史系统对照。所有患脾均有外科手术切除的病理结论或有系列的影像学资料对照、比较，确定为脾脏的转移瘤。本组病例不包括胰体尾部的恶性肿瘤对脾脏的侵犯、浸润；亦不包括淋巴瘤、白血病等血液系统肿瘤对脾脏的浸润。结果：共计 36 例脾脏转移性病变，原发灶中卵巢癌 18 例，卵巢性索-间质肿瘤 1 例，输卵管癌 1 例，腹腔低级别粘液腺癌 2 例，结直肠癌 9 例，胃癌 2 例，乳腺癌 2 例，前列腺癌 1 例。3 例表现为单一病灶，其余均为多发病灶。所有病人均存在脾脏以外的其他脏器或区域的转移瘤。病灶 CT 检查平扫为低密度，MR 检查 T1WI 呈低信号，T2WI 呈高信号。所有病灶均轻、中度不均匀强化，无 1 例为单纯囊性或囊实性。1 例横结肠腺癌在病变后期边缘出现钙化成分。结论：脾脏转移瘤病变主要的原发灶来源为腺癌，其中卵巢来源的恶性肿瘤占绝大部分。病变均强化较弱，提示转移瘤内存在较多的粘液成分。发现、诊断、随访脾脏转移性病灶需行增强检查，但 MR 并不比 CT 提供更多额外信息。

PU-1028

Development and validation of a predictive model for lipid-poor adrenal adenoma: A retrospective study based on non-enhanced CT minimum attenuation value in two centers

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Objective: Early differentiation between lipid-poor adrenal adenomas and non-adenomas is crucial to minimize excessive examinations and treatments. This study aims to establish an eXtreme Gradient Boosting (XGboost) prediction model using the non-enhance CT minimum attenuation value (minAV) to identify lipid-poor adenomas, and subsequently compares it with the CT histogram (CTH) model. **Materials and Methods:** This study conducts a retrospective analysis of clinical and CT imaging data for 384 adrenal lesions obtained from the Affiliated Hangzhou First People's Hospital (training set) and The Quzhou Affiliated Hospital of Wenzhou Medical University (validation set). Within the training set, univariate analysis was carried out on the variables, retaining those with statistical significance to construct the XGboost prediction model. The validation set was then used to test the model's generalization capabilities. The model's diagnostic performance and calibration were assessed using Receiver Operating Characteristic (ROC) curve analysis, calibration curves, and the Brier score. Differences in the Area Under the ROC Curve (AUC) between models were examined using the DeLong test. The SHAP (SHapley Additive exPlanations) values served to interpret and visualize the minAV prediction model. **Results:** The training set included 136 adrenal lipid-poor adenomas and 126 non-adenomas, while the validation set comprised 46 and 40, respectively. Statistical analysis revealed significant differences between the two groups in the training set in terms of minAV, CTH, mean attenuation, diameter, and BMI (all P-values <0.001). Two independent XGBoost models were constructed based on minAV and CTH, with AUC values of 0.912 (95% confidence interval [CI], 0.866-0.957) and 0.916 (CI, 0.873-0.958), respectively. Both models demonstrated good calibration, with Brier scores of 0.141 and 0.136. In the validation set, the AUCs were 0.871 (CI, 0.792-0.951) and 0.878 (CI, 0.794-0.962), with Brier scores of 0.156 and 0.165. No statistical differences were found between the models' AUCs in the DeLong test (all P-values >0.100). The absolute SHAP value for minAV was the highest and showed a negative contribution. **Conclusion:** The XGBoost multivariate machine learning models based on minAV and CTH metrics can effectively distinguish between adrenal lipid-poor adenomas and non-

adenomas. The minAV metric, being more readily accessible, is preferable for clinical use. The minAV model aids physicians in making precise, personalized clinical decisions for patients with incidental adrenal tumors, thus preventing overtreatment.

PU-1029

A Case of Post-Transplant Lymphoproliferative Disorder

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Background and Objectives: Post-transplant lymphoproliferative disorder (PTLD) is a rare complication following hematopoietic stem cell or solid organ transplantation, associated with high mortality, and is one of the most serious complications post-transplantations. Early and accurate diagnosis is crucial for patient management and prognosis. This article discusses the clinical and radiological characteristics of PTLD.

Methods: We conducted a retrospective analysis of a case of a 59-year-old male who underwent liver transplantation due to decompensated cirrhosis 6 months prior. We examined the clinical, radiological, and case-specific characteristics, discussed the diagnosis, treatment, and prognosis, and conducted an analysis in conjunction with relevant literature.

Results: Four years ago, alcoholic hepatitis was treated with withdrawing yellow and protecting the liver. Color Doppler ultrasound showed cirrhosis and ascites before 8 months, and symptomatic treatments such as diuresis and liver protection were given. Six months ago, he underwent orthotopic liver transplantation due to decompensated cirrhosis. After the operation, he received anti-rejection, liver protection, and acid suppression treatments. He was admitted to the hospital due to cough and expectoration, shortness of breath after activity, and wheezing for 1 week. Imaging examination showed multiple hypoechoic nodules in liver and spleen by ultrasound. Abdominal CT scan showed multiple slightly low-density nodules in the liver and spleen, lymphadenopathy in the hepatic hilum, thickening of the gastric wall at the lesser curvature of the gastric cardia, and low-density nodules in the anterior abdominal wall. MRI scan showed multiple round masses of liver, spleen and anterior abdominal wall with low signal on T1WI and high signal on T2WI. DWI showed nodular and circular slightly high signal, localized thickening and abnormal signal of the gastric wall on the lesser curvature of the stomach, and multiple lymph nodes in the hepatic hilum, retroperitoneal space and pancreatic tail. The patient was diagnosed with EBV-associated non-Hodgkin's diffuse large B-cell lymphoma with plasma cell hyperplasia, non-GCB type, based on pathological examination of the gastric cardia and medical history.

Conclusion: The clinical manifestations of patients with PTLD are diverse and non-specific, ranging from asymptomatic to life-threatening. A mass visible on imaging may be the first clue to the diagnosis. Radiologists need to be alert to the potential and diversity of PTLD development months to years after liver transplantation. When there is any clinical suspicion, cross-sectional imaging of the neck, chest, abdomen, and pelvis should be performed to detect a wide range of underlying abnormalities.

PU-1030

粗梁团块型肝癌的影像诊断

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本讲座首先介绍了 2019 年 WHO 肝细胞肝癌新的病理亚型分类,对八类分型进行了简要阐述,在此基础上,重点介绍了近年来得到广泛重视的、预后较差的粗梁团块型肝癌。从病理学定义、临床实验室特征及影像表现几方面进行了阐述,并用实际病例,比较了与普通型肝细胞的异同、预后的差异,并分析了粗梁团块型肝癌发病机制中血管包裹肿瘤细胞簇(VETC)的作用。为临床上提高对粗梁团块型肝癌的认识,改善肝细胞癌的诊断及管理水平提供了参考。

PU-1031

长期服用阿司匹林引起的胆道出血 1 例: 病例报告

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目的: 介绍一例长期服用阿司匹林引起胆道出血患者的 CT 及 MRI 影像学征象及临床特征。

方法: 一例 62 岁男性患者,因长期服用阿司匹林 8 月余,上腹部疼痛 1 天入院。入院后进行了影像学 and 实验室检查,停用阿司匹林,并接受了促凝血、保肝、抗感染治疗。

结果:

入院检查结果:

上腹部 CT 平扫: 肝内外胆管-十二指肠乳头见致密高密度影,胆囊内见多发点状及结节状同密度影;肝脏体积明显肿大,密度明显减低;脾脏体积肿大。上腹部 MRI: 肝内外胆管-十二指肠乳头见条状 TWI 及 T2WI 均为高信号影,胆囊内见多发点状及结节状同信号影;肝脏明显肿大,脾脏肿大, T2WI 信号明显减低。

实验室检查: NE%中性粒细胞百分数 84.4% (参考值 40.0-75.0%); 谷草转氨酶 271 U/L (参考值 15-40 U/L), 乳酸脱氢酶 574U/L (参考值 120-250U/L); 血清总胆红素 136.3 μ mol/L(参考值 2.2-25.0 μ mol/L), 直接胆红素 66.6 μ mol/L(参考值 0.0-6.0 μ mol/L), 间接胆红素 69.7 μ mol/L(参考值 1.2-18.0 μ mol/L), D-二聚体 2.41mg/L (参考值 0-0.55mg/L); 大便隐血阳性(+) (参考值: 阴性)。

患者入院后接受了维生素 k1 促凝血、思美泰及优思弗保肝、舒普深抗感染治疗。

入院治疗 4 天后检查结果:

上腹部 CT 平扫: 右侧肝内外胆管及胆总管内见少许致密高密度影,胆囊内散在点状及结节状同密度影,较前明显减少;肝脏肿大,密度减低;脾脏肿大。

实验室检查: NE%中性粒细胞百分数 55.7% (参考值 40.0-75.0%); 谷草转氨酶 201 U/L (参考值 15-40 U/L), 乳酸脱氢酶 203U/L (参考值 120-250U/L); 总胆红素 54.7 μ mol/L(参考值 2.2-25.0 μ mol/L), 直接胆红素 24.7 μ mol/L(参考值 0.0-6.0 μ mol/L), 间接胆红素 30.0 μ mol/L(参考值 1.2-18.0 μ mol/L)。

结论: 胆道出血较少见,熟悉胆道出血的影像学征象及临床特征有助于提高临床怀疑,有利于胆道出血的早期诊断和治疗。

PU-1032

肝上皮样血管内皮瘤 1 例

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目的 探讨肝上皮样血管内皮瘤影像学特点, 提高对其的认识。

方法 回顾我院 1 例肝上皮样血管内皮瘤, 对其临床特征、MRI、PET/CT 特点进行分析。

结果 PET/CT 主要表现为肝内多发低密度结节, 近包膜为主, 18F-FDG 呈轻中度摄取。MRI 显示均为乏血供病变, 但与血管关系密切; 穿刺病理诊断为肝上皮样血管内皮瘤。

结论 肝上皮样血管内皮瘤罕见, 易误诊, MRI 联合 PET/CT 对其诊断有一定的特异性。

PU-1033

基于深度学习重建算法对腹部 CT 检查图像质量的改善

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目的: 通过分析比较自适应统计迭代重建(ASiR-V)算法和深度学习重建(DLIR)算法在腹部 CT 成像中的图像质量, 探讨 DLIR 算法在腹部 CT 成像中的应用价值。

方法: 方法回顾性分析 2023 年 4 月-2022 年 7 月在我院进行腹部常规扫描的病例 60 例, 平均分成 2 组。A 组使用自适应迭代统计算法 (ASiR-V30%), B 组使用深度学习重建算法 (DLIR-M), 其他扫描参数设置相同, 重建出 0.625 mm 的图像。在每组图像的主动脉内、骨骼肌以及肝脏组织内分别勾画感兴趣区, 测量感兴趣区内的 CT 值、SD 值和信噪比(SNR)进行客观评价, 并对图像进行主观评价。结果 2 种重建图像 CT、SD 和 SNR 值的差异有统计学意义($P < 0.001$)。DLIR 在主动脉和骨骼肌处的图像噪声明显低于传统的 FBP 和 ASiR-V, 图像质量能够满足临床需求。而且呈现出 DL-M 降噪效果佳、噪声低, ASiR-V30%、FBP 图像噪声依次增加。通过主观评分的比较发现, DL-M 的图像整体质量有明显的提升。

结果: 相同辐射剂量前提下 DLIR 重建图像质量好于 ASiR-V30 迭代重建好于传统 FBP 重建。

结论: DLIR 相较于 ASiR-V 图像重建, 可大大降低图像噪声, 提高图像细节的清晰度, 提升图像质量, 同时, 图像纹理更自然真实; 扫描剂量仅为 ASiR-V 的 1/3。在低剂量疾病筛查及对婴幼儿、肥胖个体的检查有极大的优势。

PU-1034

胆管内乳头状黏液性肿瘤 6 例并多参数 MRI 及动态强化 CT 影像学特征分析

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目的: 探讨 MRI 多参数成像及动态强化 CT 在胆管内乳头状黏液性肿瘤 (IPMN-B) 诊断中的价值。
方法: 回顾性分析经手术或穿刺活检病理证实的 6 例 IPMN-B 的 MRI 特征, 重点分析钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 特征。

结果: 6 例病例中, 典型 IPMN-B 4 例, 囊性 IPMN-B 4 例。6 例典型 IPMN-B 扩张胆管内见单发或多发肿瘤, 呈乳头状或息肉状, T1WI 呈稍低信号, T2WI 呈稍高信号, 扩散加权成像 (DWI) 呈高信号, 钆喷酸葡胺 (Gd-DTPA) 增强后动脉期轻度强化, 门静脉期、延迟期渐进性轻中度强化,

肿瘤上下游胆管均明显广泛扩张。3 例囊性 IPMN-B 呈动脉瘤样明显扩张, 其中 2 例囊性 IPMN-B 见附壁结节, 1 例囊性 IPMN-B 囊内仅见多发分隔, 病变与胆管系统相通。2 例无肿块型 IPMN-B 未见明显肿瘤, 仅表现为病变区胆管壁增厚, 病变区胆管呈广泛明显扩张。Gd-EOB-DTPA 增强 MRI 胆管期, 正常胆管表现为高信号充盈, 黏液分布区扩张胆管表现为充盈缺损。

结论: MRI、磁共振胰胆管造影 (MRCP) 可有效评价常见类型的 IPMN-B。Gd-EOB-DTPA 增强 MRI 有助于 IPMN-B 黏液成分与其他胆管囊性病变及梗阻性胆管扩张的鉴别, 对无肿块型及囊性 IPMN-B 诊断及鉴别诊断具有较高价值。

PU-1035

基于 CT 放射组学的虚拟活检评估胃癌患者内窥镜活检与术后标本的病理学差异

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目的: 建立一种基于放射组学的非侵入性诊断的诺模图, 用于确定胃癌劳伦分型中胃窥镜活检标本与术后标本的病理差异。

材料与方法: 本研究收集了 126 例接受 CT 检查的胃癌患者, 将其分为训练组 84 例、测试组 42 例。从静脉期 CT 图像中构建了基于随机森林学习算法的放射组学模型。使用 AUC 和 DeLong 检验来评估和比较放射组学的性能。建立了一种结合放射组学和临床变量的个体化诺模图, 并对其进行了判别、校准和临床应用。

结果: 放射组学模型在训练组和测试组上的 AUC 分别为 0.835 和 0.724, 具有较好的预测能力。临床和组学的联合模型中, 训练组和验证组的 AUC 分别为 0.884 和 0.841, 预测能力进一步得到提高。临床-放射学诺模图准确地预测了训练组和测试组的病理不一致, 与校准曲线很好地吻合。

决策曲线分析证实了诺模图的临床应用价值。

结论: 基于 CT 的放射组学诺模图对预测胃癌活检标本与术后切除标本的病理不一致状态具有潜在的临床应用价值。

PU-1036

十二指肠球部 Brunner 腺瘤的影像诊断 (附 2 例报告并文献复习)

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【摘要】[目的]探讨十二指肠 Brunner's 腺瘤的影像学特征。材料和方法 回顾性分析 2 例 Brunner's 腺瘤的影像表现, 并与病理表现相结合, 通过对文献的复习, 分析总结十二指肠 Brunner's 腺瘤的影像诊断特征。结果 2 例 Brunner's 腺瘤均发生于十二指肠球部, 与 brunner's 腺的生理分布相符合。均为腔内息肉样肿块, 肿块大部分边缘光整, 轻度到明显强化, 强化程度及均匀度与肿块的病理构成有关。胃肠造影多表现为边缘光整的息肉样充盈缺损。结论十二指肠腺瘤主要发生在十二指肠球部, 多呈带蒂的息肉样肿块, 可引起消化道出血、肠梗阻、肠套叠等。肿块边缘清楚, 强化程度不等, 肿块中可分布小片状低密度囊性区。CT 扫描及薄层重建 结合内镜超声, 可帮助诊断及鉴别诊断。

PU-1037

Application of TrueFidelity (Deep Learning CT Image Reconstruction) With Combination of 70kVp for Reducing Radiation Dose and Improving Image Quality in Renal CTA for Slim Patients:

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***Purpose:** To explore the application of TrueFidelity (Deep Learning CT Image Reconstruction) with combination of 70kVp for reducing radiation dose and improving image quality in renal CTA for slim patients compared with 50% ASIR-V reconstruction using 100 kVp.

***Methods and Materials:** 12 patients for renal CTA were prospectively enrolled and randomly divided into group A and group B. Group A used 100 kVp and 500 mgI/kg contrast agent and 50% ASIR-V reconstruction, while group B used 70 kVp and 300 mgI/kg contrast agent and DLIR at Low, medium and high levels (DLIR-L, DLIR-M and DLIR-H). The CT values and SD values of the right renal artery and left renal artery were measured to calculate the SNR and CNR. The image quality was subjectively scored by two senior radiologists blindly using a 5 point criterion. The contrast agent, CTDIvol, and dose length product in both groups were recorded and the effective radiation dose was calculated.

***Results:** There were no significant difference in patient characteristics between two groups ($p > 0.05$). The CTDIvol, dose length product and effective radiation dose in group B were 70%, 72%, and 80% lower than those in group A, respectively (all $p < 0.05$), and the contrast agent in group B was 58% lower than that in group A ($p < 0.05$). In group B, with the increase of DLIR-L, DLIR-M and DLIR-H, CT values showed no significant difference, SD values decreased gradually, SNR values and CNR values increased gradually. The CT values showed no statistically significant difference ($p > 0.05$) between two groups with different reconstructions. The SD values with DLIR-L, DLIR-M and DLIR-H in group B was significantly lower ($p < 0.05$), while the SNR values with DLIR-L, DLIR-M and DLIR-H and CNR values with DLIR-L, DLIR-M and DLIR-H were significantly higher than those of group A with 50% ASIR-V ($p < 0.05$). Two senior radiologists had excellent consistency in subjective scores of image quality for renal CTA ($\kappa > 0.75$, $p < 0.05$). The subjective scores with DLIR-M and DLIR-H in group B were significantly higher than those of 50% ASIR-V in group A ($p < 0.05$), of which DLIR-H obtained the highest subjective score for renal CTA.

***Conclusions:** TrueFidelity (Deep Learning CT Image Reconstruction) With Combination of 70kVp can significantly reduce effective radiation dose (about 80%) and contrast agent (about 58%) and improve image quality in renal CTA for slim

PU-1038

基于双能 CT 的肝肿瘤碘定量扫描中患者和位置相关因素的影响

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目的: 量化肝脏肿瘤中病灶位置和患者体位、双能扫描参数、患者体型和辐射剂量对双能 CT 碘定量 (DECT-IQ) 误差的影响。

材料和方法: 使用具有四个肝脏病灶 (直径 15 mm; 碘浓度 0-5 mgI/mL) 和两种尺寸的模型。两种尺寸均在双能量模式下成像: (1) 100/Sn150 kV 的双源 DECT (DS-DE) 和 (2) AuSn120 kV 的单源双层滤波器 DECT (SF-DE), 2 种辐射剂量 (8 mGy 和 12 mGy)。在七个不同的垂直工作台位

置（距机架孔径等中心点 -6 至 + 6 厘米）进行扫描，重复测量碘浓度并计算绝对误差，使用稳定的重复测量方差分析和结果比较误差。采用线性混合效应模型确定影响 DECT-IQ 误差的因素。结果：线性混合效应模型显示误差受到 DECT 方法、体模尺寸和病变位置的显著影响（所有 $p < 0.001$ ）。与 DS-DE 相比，SF-DE 中病变位置对误差的影响更大。辐射剂量对误差没有显著影响（ $p = 0.32$ ）。对所有设置进行平均后，SF-DE (2.28 ± 1.62 mgI/mL) 的误差显著高于 DS-DE (0.41 ± 0.29 mgI/mL)（所有 $p < 0.001$ ）。SF-DE 的膈下病变中发现了伪影，与 DS-DE 相比，误差显著增加（ $p < 0.001$ ）。DS-DE (0.30 ± 0.23 mgI/mL 与 0.43 ± 0.33 mgI/mL) 和 SF-DE (1.68 ± 1.99 与 2.36 ± 1.81 mgI/mL) 相比，大模型的绝对误差明显更高（ $p < 0.001$ ）。结论：双能量扫描参数、患者体型以及根据患者位置修改的病灶位置显著影响模拟肝脏肿瘤中的 DECT-IQ。

PU-1039

胰腺和肝脏巨淋巴结增生症的磁共振表现

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摘要：目的 分析胰腺和肝脏巨淋巴结增生症的磁共振（MRI）表现。方法 回顾性分析病理证实的胰腺和肝脏巨淋巴结增生症的临床和磁共振成像资料，观察病灶的位置、大小、信号、动态增强特点。结果 患者 2 例均为女性，1 例 13 岁，1 例 45 岁。1 例病灶位于肝左叶内侧段，1 例位于胰腺体部，呈椭圆形，直径 2-3cm。病灶 T1WI 呈均匀稍低信号；T2WI 呈均匀稍高信号；扩散加权成像（DWI）呈明显高信号，表观扩散系数（ADC）图呈明显低信号。动态增强扫描动脉期不均匀明显强化，门脉期逐渐强化，延迟期均匀强化，强化程度轻度减低。1 例病灶见包膜，1 例病灶内见血管影。结论 肝脏和胰腺巨淋巴结增生症的 MRI 表现具有一定特征性：病灶体积较小，椭圆形，信号均匀，富血供，DWI 明显高信号，ADC 图低信号。

PU-1040

Image Quality Evaluation in spectral CT Gemstone Spectral Imaging of the Chest and Abdomen in Obese Patients With TrueFidelity

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*Purpose: The aim of this study was to evaluate image quality in vascular and oncologic spectral CT gemstone spectral imaging studies performed with TrueFidelity a new deep Learning Image reconstruction algorithm in Obese Patients(BMI \geq 30).

*Methods and Materials: Vascular and multiphase oncologic staging Spectral CT examinations were evaluated. Two image reconstruction algorithms were applied to the Spectral CT data sets: standard of 50%ASIR-V and DLIR (medium and high). Subjective quality criteria were independently evaluated by 4 senior radiologists, and interreader agreement was assessed. SNR and CNR were compared between image reconstruction methods.

*Results: 12 patients were included in this study, and the mean patients BMI was 36.6 ± 4.3 . DLIR-H and DLIR-M showed statistically significant higher Likert scores compared with 50%ASIR-V across all subjective image quality criteria ($P < 0.01$ for DLIR-H vs 50%ASIR-V; $P < 0.05$ or DLIR-H vs 50%ASIR-V), and SNRs for aorta and liver were significantly higher for DLIR-H vs 50%ASIR-V ($P < 0.01$). CNR for aorta and SNR for aorta and liver were significantly higher for DLIR-H vs 50%ASIR-V ($P < 0.05$).

*Conclusions: TrueFidelity DLIR provides improved image quality compared with 50%ASIR-V in Spectral CT obtained in obese patients.

*Clinical Relevance/Application: Spectral CT has before now experienced image degradation from photon starvation in material decomposition dual-energy CT in patients >113 kg, and larger patient body habitus has necessitated larger gantry bore openings further challenging imaging geometry and contributing to increased streaking and beam hardening artifacts.

PU-1041

双源 CT 在术前预测肝细胞肝癌微血管浸润方面的应用

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目的 利用双源 CT 碘定量技术术前预测肝细胞肝癌微血管浸润(Microvascular invasion, MVI)。 **方法** 对 82 例经术后病理证实并术前行双源 CT 平扫+增强扫描的原发性肝细胞肝癌患者进行回顾性研究,分析患者临床指标(年龄、甲胎蛋白、谷丙转氨酶、谷草转氨酶、 γ -谷氨酰基转移酶、总胆红素、直接胆红素、间接胆红素、乳酸脱氢酶)、碘定量数据(病灶动脉期碘浓度、动脉期归一化碘浓度、病灶门脉期碘浓度、门脉期归一化碘浓度、病灶动脉期碘浓度差、病灶门脉期碘浓度差、动脉期病灶碘浓度/肝实质碘浓度、门脉期病灶碘浓度/肝实质碘浓度),按病理结果分为 MVI 阳性组及 MVI 阴性组。对各项临床指标和碘定量数据采用双样本 t 检验进行组水平分析;并基于留一交叉验证框架与 logistic 回归模型构建 MVI 预测模型,应用 ROC(Receiver operating characteristic)曲线可视化 MVI 预测模型分类性能。 **结果** 双样本 t 检验显示 MVI 阳性组 AFP (Alpha Fetoprotein) 较 MVI 阴性组高($P<0.05$),而 MVI 阳性组 NICAP (Normalized iodine concentration at arterial phase)、NICPP (Normalized iodine concentration at portal venous phase)与 MVI 阴性组相比均较低($P<0.05$)。此外,留一交叉验证框架下的 logistic 模型具有显著的分类能力,AUC(Area under curve)值为 0.75。 **结论** 基于双源 CT 碘定量参数和实验室结果的预测模型能够可靠的对肝细胞肝癌 MVI 类别进行术前预测。

PU-1042

钆塞酸二钠增强 MRI 对不典型肝脓肿与单发肝转移瘤的鉴别诊断

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目的 探讨钆塞酸二钠(Gd-EOB-DTPA)增强 MRI 对不典型肝脓肿(AHA)和单发肝转移瘤(SHM)的鉴别诊断价值。 **方法** 收集 2019 年 9 月至 2022 年 10 月经病理证实的 27 例 AHA 和 36 例 SHM 患者的影像及临床资料。所有患者均行肝脏 MRI 平扫、扩散加权成像(DWI)和 Gd-EOB-DTPA 增强 MRI 扫描。比较两组患者的影像学特征及临床指标。使用 Logistic 回归分析模型筛选出 AHA 的独立预测指标,采用受试者工作特征(ROC)曲线分析各独立因素及其联合预测 AHA 的诊断效能。 **结果** 单因素 Logistic 回归分析结果显示,DWI 非环形高信号(25/27)、HBP 病灶边缘非缺损区(24/27)多见于 AHA 组;DWI 靶样高信号(17/36)且 HBP 病灶边缘缺损区(27/36)多见于 SHM 组(P 均 <0.05)。多因素 Logistic 回归分析显示,DWI 非环形高信号、HBP 病灶边缘非缺损区是诊断 AHA 的独立预测因素(P 均 <0.05),DWI 非环形高信号、HBP 病灶边缘非缺损区及二者联合诊断 AHA 的曲线下面积(AUC)分别为 0.699、0.819 和 0.880;准确率分别为 66.7%、80.9%

和 84.1%。**结论** Gd-EOB-DTPA 增强 MRI 对 AHA 与 SHM 的鉴别诊断具有重要的价值, DWI 非环形高信号联合 HBP 病灶边缘非缺损区能够提高 AHA 的诊断效能。

PU-1043

基于术前增强 CT 探讨肾透明细胞癌瘤周静脉特征与 WHO/ISUP 分级的关系

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目的 基于术前增强 CT 探讨肾透明细胞癌 (ccRCC) 瘤周静脉的特征与 WHO/ISUP 分级的关系。**方法** 回顾性分析安徽医科大学第二附属医院 2018 年 5 月至 2021 年 12 月经术后病理证实为 ccRCC 且有明确病理分级的 250 例患者资料。将肾透明细胞癌瘤周静脉定义为实质期在 Gerota 筋膜内与受累肾脏相邻的不对称增加且形态不规则的血管。按瘤周静脉有、无将 250 例病例分为两组, 观察两组的影像特征并分析瘤周静脉有、无与 WHO/ISUP 分级的关系。对于有瘤周静脉的病例, 进一步分析瘤周静脉的支数, 最大内径, 空间构型 (有、无交叉) 与 WHO/ISUP 分级的关系。并利用 spearman 相关分析瘤周静脉支数与 WHO/ISUP 分级的相关性。**结果** 250 例 ccRCC 患者中有瘤周静脉的有 146(58.4%)例, 无瘤周静脉的有 104 (41.6%)例。有瘤周静脉的患者较无瘤周静脉的患者肿瘤直径更大、更容易出现囊变坏死 ($P<0.05$)。两组间患者年龄、性别、BMI、肿瘤位置、癌栓有无差异无统计学意义 ($P>0.05$)。ccRCC 患者瘤周静脉的有、无, 支数, 空间构型与 WHO/ISUP 分级的差异有统计学意义 ($P<0.05$)。且瘤周静脉支数与 WHO/ISUP 分级呈正相关 ($r=0.310$, $P<0.001$)。瘤周静脉的最大内径与 WHO/ISUP 分级的差异无统计学意义 ($P>0.05$)。**结论** 肾透明细胞癌瘤周静脉的特征与 WHO/ISUP 分级相关, 术前评估瘤周静脉对患者的临床治疗决策具有指导意义。

PU-1044

个案-低级别子宫内质肉瘤

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一般情况: 女, 44 岁, 以发现子宫肌瘤一年余, 下腹痛三天就诊。患者 1 年前查 B 超示“子宫多发肌瘤, 大小 21*14mm, 宫体后壁中下段囊性块, 大小 57*53*39mm, 内异灶首先考虑, 内膜回声欠均”, 无月经改变, 无经期腹痛, 无经间期出血, 无腰酸坠胀感, 无尿频尿急, 无畏寒发热。3 天前患者劳累后出现下腹痛, 以下腹正中为主, 较剧, 持续性, 伴腰痛, 无恶心呕吐, 2 天前至我院就诊, 查子宫附件超声示“子宫多发肌瘤, 子宫右后壁混合回声团, 肌瘤伴出血?”既往 9 年前行产钳助娩, 产后大出血予输血治疗。肿瘤标志物无殊。

MRI 增强检查: 子宫呈前倾前屈位, 宫体后壁可见一约 70*70*75mm 大小等 T1 稍长 T2 信号影, 内可见少许斑片样长 T2 信号, 境界尚清, 增强扫描未见明确强化, 弥散未见明显受限; 另子宫肌层多发类圆形等 T1 稍短 T2 信号, 增强扫描明显均匀强化; 宫腔未见扩大及积液征象, 宫体部内膜、结合带及深肌层结构清晰; 左侧附件显示不清, 双侧盆壁可见数枚小淋巴结影显示, 增强扫描均匀强化; 阴道壁及前、后穹隆处未见异常信号影。膀胱部分充盈。盆腔内未见明显积液征象。片示骨盆诸骨未见明显异常信号。影像诊断: 子宫多发肌瘤, 后壁大肌瘤变性? 请结合临床病史, 必要时复查。

手术所见: 子宫增大如孕 2 月+大小, 子宫后壁突出一约 7*8*8cm 大小肌瘤。表面尚平滑, 子宫后壁与盆壁粘连, 左侧宫角处可见 2*2cm, 宫体前壁可见三个 1-2cm*2cm 肌瘤。切开子宫后壁肿

瘤包膜直达子宫瘤体，宫体后壁瘤体放置取物袋，剥除过程中肿物包膜欠完整，肿物质脆，钝性加锐性完整剥出肌瘤，瘤体未通宫腔，用可吸收线连续全层缝合关闭瘤腔，观察无出血，同法切开左宫角肌瘤，包膜完整，前壁肌瘤 3 个，包膜完整。

术中冰冻结果提示：(子宫肿瘤)送检碎组织，冰冻层面梭形细胞肿瘤，首先倾向平滑肌瘤，需多层面或免疫组化除外低级别子宫内膜间质肿瘤可能。

PU-1045

肾及肾上腺的 MRI 规范化扫描

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肾脏

一、检查目的：

1. 了解肾脏的形态、大小、位置及有无病变；
2. 了解肾盂、肾盏有无积水扩张及扩张程度；
3. 对肾脏病变的定位及定性诊断；
4. 明确肾脏肿瘤的性质及其扩散、转移、浸润范围，为治疗提供依据；
5. 随访观察疾病的动态变化、疗效及复发情况；
6. 对术后并发症的诊断。

二、检查前准备：

1. 核对患者信息，明确检查部位、目的和要求；
2. 做好胃肠道准备，一般要求禁食禁水 4~6 小时；
3. 确认患者有无金属置入物及 MRI 禁忌证；
4. 叮嘱患者在检查过程中切勿随意运动，并做好患者呼吸配合训练；
5. 告知患者若有不适，及时告知工作人员。

三、线圈：

体部、心脏相控阵线圈。

四、体位：

略

五、扫描方位，范围及序列：

略

六、技术参数：

略

七、注意事项：

略

肾上腺

一、检查目的：

1. 了解肾上腺的形态、大小、位置及有无病变；
2. 对肾上腺病变的定位及定性诊断；
3. 明确肾上腺肿瘤的性质及其扩散、转移、浸润范围，为治疗提供依据；
4. 随访观察疾病的动态变化、疗效及复发情况；
5. 对术后并发症的诊断。

二、检查前准备：

1. 核对患者信息，明确检查部位、目的和要求；
2. 做好胃肠道准备，一般要求禁食禁水 4~6 小时；
3. 确认患者有无金属置入物及 MRI 禁忌证；

4. 叮嘱患者在检查过程中切勿随意运动，并做好患者呼吸配合训练；
5. 告知患者若有不适，及时告知工作人员。

三、线圈：

体部、心脏相控阵线圈。

四、体位：

略

五、扫描方位，范围及序列：

略

六、技术参数：

略

七、注意事项：

略

PU-1046

肾及肾上腺 CT 规范化扫描

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肾及肾上腺

一、检查目的：

1. 确定肾脏有无良、恶性肿瘤及其大小、范围，有无淋巴结转移等；
2. 肾脏炎症、脓肿及结石的大小和位置；
3. CTA 诊断肾动脉狭窄及其他肾血管病变；
4. 显示外伤后肾损伤及出血；
5. 确定肾上腺有无良、恶性肿瘤以及功能性疾病(如肾上腺皮质功能减退等)对术后并发症的诊断；

二、检查前准备：

1. 1 周内禁服含金属的药物或行消化道钡剂造影；
2. 检查当日禁食 4h 以上，不禁水；
3. 检查前 15~20min 口服水 500~1000 ml，使胃及十二指肠壶腹部充盈，形成良好对比；
4. 核对患者信息，明确检查部位、目的和要求；
5. 确认患者腹部有无金属置异物；
6. 训练患者屏气；
7. 增强扫描患者需要询问过敏史并签署 CT 碘对比剂增强知情同意书。

三、体位：

仰卧位，头先进或足先进，两臂上举，身体置于检查床正中间，水平线对准人体腋中线。

四、扫描范围：

1. 肾脏从肾上极扫描到肾下极；
2. 肾上腺从肾上腺上缘扫描到肾门。

五、技术参数：

略

七、注意事项：

1. 提前训练患者屏气，若患者不能配合屏气，肾血管 CTA 可选择大螺距扫描；
2. 增强患者询问过敏史并提前签署碘对比剂注射知情同意书；
3. 肾功能异常者，咨询主管医生是否可行增强扫描。

PU-1047

能谱 CT 有效原子序数预测肾透明细胞癌肾包膜受侵价值

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目的：探讨双能 CT 有效原子序数在评估肾透明细胞癌肾包膜受侵中的应用价值。材料和方法：回顾性分析 2018 年 1 月至 2022 年 12 月行双能 CT 肾脏能谱扫描并经手术病理证实为肾透明细胞癌的患者 187 例，手术病理信息包含肾包膜状态的患者 145 例，其中 8 例可疑受侵出组，最后入组肾包膜受侵 87 例，肾包膜未受侵 50 例。2 名观察者分别记录每位患者平扫有效原子序数。采用组内相关系数 (ICC) 评价测量者间一致性。采用独立样本 t 检验或 Mann-Whitney U 检验比较肾包膜受侵及肾包膜未受侵两组间各参数的差异。采用 ROC 曲线分析，寻求诊断肾包膜受侵的最佳参数和最佳阈值。结果：肾包膜受侵组的有效原子序数 (7.73 ± 0.13) 显著高于肾包膜未受侵组 (7.68 ± 0.09)，P 值为 0.016。AUC 为 0.643。结论：双能 CT 的有效原子序数有望鉴别肾透明细胞癌的肾包膜是否受侵。

PU-1048

能谱 CT 脂水值预测肾透明细胞癌肾包膜受侵价值

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目的：探讨双能 CT 脂水值在评估肾透明细胞癌肾包膜受侵中的应用价值。材料和方法：回顾性分析 2018 年 1 月至 2022 年 12 月行双能 CT 肾脏能谱扫描并经手术病理证实为肾透明细胞癌的患者 187 例，手术病理信息包含肾包膜状态的患者 145 例，其中 8 例可疑受侵出组，最后入组肾包膜受侵 87 例，肾包膜未受侵 50 例。2 名观察者分别记录每位患者平扫脂水值。采用组内相关系数 (ICC) 评价测量者间一致性。采用独立样本 t 检验或 Mann-Whitney U 检验比较肾包膜受侵及肾包膜未受侵两组间各参数的差异。采用 ROC 曲线分析，寻求诊断肾包膜受侵的最佳参数和最佳阈值。结果：肾包膜受侵组的脂水值 (-193.32 ± 107.64) 显著低于肾包膜未受侵组 (-153.59 ± 94.29)，P 值为 0.031。AUC 为 0.607。结论：双能 CT 的脂水值有望鉴别肾透明细胞癌的肾包膜是否受侵。

PU-1049

Lesion detection performance of an abbreviated gadoxetic acid enhanced MRI protocol for colorectal liver metastasis surveillance: A multi-center study in China

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Objective To evaluate the diagnostic performance of two different abbreviated MRI (AMRI) sets extracted from a complete gadoxetic acid (Gd-EOB-DTPA)-enhanced MRI for colorectal liver metastasis (CRLM) surveillance.

Methods This retrospective multi-center study in China, gadoxetic acid-enhanced MRI scans of 80 patients from 3 different hospitals were assessed from 2020 through 2023. Two AMRI sets were extracted from the complete Gd-EOB-DTPA-enhanced MRI: dynamic-AMRI (Dyn-AMRI) including dynamic contrast-enhanced four phases (early arterial, late arterial, portal venous, and

transitional phases) and diffusion-weighted imaging (DWI); and Hepatobiliary phase AMRI (HBP-AMRI) including T2-weighted imaging (T2WI), DWI, and hepatobiliary phase (HBP). MR images were independently reviewed by two abdominal radiologists. A maximum of 10 lesions per patient were recorded. Cohen's kappa analysis, sensitivity, specificity, accuracy and areas under the curve (AUCs) of the two AMRI protocols were assessed. (Per-lesion diagnostic sensitivity, specificity, and accuracy of two AMRI sets were compared by using logistic regression.)

Results Totally 268 lesions were assessed with each set of images. The inter-observer agreement for the abbreviated protocol was reported excellent ($k = 0.92$). Compared with Dyn-AMRI, HBP-AMRI had significantly higher sensitivity and accuracy (assessed by logistic regression) ($P < 0.05$). However, two sets of AMRI indicated no significant differences in specificity ($P > 0.05$). Two AMRI protocols AUCs for lesion characterization (by ROC regression) were 0.822 and 0.914.

Conclusion AMRI may offer an alternative option for CRLM surveillance. HBP-AMRI set, the combination of T2WI, DWI, and HBP has a considerable sensitivity and diagnostic accuracy equivalent to Dyn-AMRI as an acceptable regimen for CRLM surveillance.

PU-1050

A novel nomogram for prediction of pT3a upstaging in clinical T1 renal cell carcinoma

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Objectives To construct a nomogram model incorporating radiomics signature with clinical factors to preoperatively predict pathologic T3a (pT3a) upstaging in clinical T1(cT1) renal cell carcinoma (RCC) patients.

Methods A total of 169 cT1 RCC patients with complete pretreatment contrast-enhanced CT (CECT) image data (corticomedullary phase, nephrographic phase, and excretory phase, CMP, NP, and EP respectively) and clinical factors between 2018 and 2022 were enrolled in this study. Afterwards the sample was split randomly into training and validation cohort in a 7:3 ratio. Radiomics features were extracted from the whole primary tumor on CMP, NP, and EP images to calculate radiomics signature. A final nomogram model was established using the obtained radiomics signature and clinical risk factors. The predictive performance of the radiomics signature and nomogram model was evaluated and visualized using receiver operator characteristic (ROC) curves. Calibration curves and decision curve analysis (DCA) were used to compare the clinical utility and benefits of different models.

Results Twenty-six radiomics features were finally selected as the optimal feature subset to construct radiomics signature, yielding AUC values of 0.945 and 0.873 in the training and validation cohort respectively. The nomogram integrating radiomics signature and clinical factors including tumor size and neutrophil-lymphocyte ratio (NLR) achieved the highest predictive performance in the training (AUC=0.958, 95% CI= 0.921-0.995) and validation (AUC=0.913, 95% CI= 0.814-1.000) cohort, outperforming the radiomics signature alone.

Conclusion The radiomics nomogram comprised predictive clinical factors and radiomics signature can efficiently predict pT3a upstaging in cT1 RCC patients.

PU-1051

基于增强 CT 分析结肠癌淋巴结转移危险因素及预测模型的建立

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目的:基于增强 CT 图像、临床及病理资料,探究影响结肠癌淋巴结转移危险因素,并构建列线图模型。**方法:**选择 2018.1.1-2021.12.31 就诊于锦州医科大学附属第一医院并接受手术治疗的结肠癌患者进行研究,按术后病理结果分为淋巴结转移组和无淋巴结转移组。收集患者的临床及病理资料包括:性别、年龄、术前 CEA、CA19-9、T 分期、分化程度、有无脉管癌栓,CT 图像观察:肿瘤位置、病变处肠壁厚度、肿瘤最大直径、强化率、强化均匀性。使用 Logistics 多因素回归分析寻找影响结肠癌淋巴结转移危险因素,根据结果使用 R 4.2.2 软件构建列线图模型。**结果:**共纳入 138 例患者,淋巴结转移 49 例,无淋巴结转移 89 例,按 8:2 随机分为训练组和验证组。通过统计学分析得到脉管癌栓、强化率、强化均匀性是影响结肠癌转移的独立危险因素,将上述因素纳入列线图模型中,预测模型的训练组 C 指数为 0.813 (95%CI: 0.730-0.896),验证组 C 指数为 0.788 (95%CI: 0.580-0.996)。模型的校正曲线显示预测转移性与实际转移性具有良好一致性,决策曲线分析(DCA)显示列线图具有较好的获益性。结论:脉管癌栓、强化率、强化均匀性是影响结肠癌淋巴结转移的危险因素,本研究构建的列线图模型能较准确的预测结肠癌淋巴结转移情况,有助于评估淋巴结状态。

PU-1052

磁共振扩散加权成像在诊断肝外胆管癌中的价值体会

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目的 探讨磁共振扩散加权成像(DWI)在肝外胆管细胞癌中的应用价值。
方法 回顾性分析 2020 年 6 月—2022 年 6 月收治的肝外胆管癌患者作为研究对象,采用磁共振 DWI 系统进行检查。观察不同扫描方法对于肝外胆管细胞癌的显示情况,对比不同 b 值状态下肝外胆管癌病灶噪声比(CNR)与表观弥散系数(ADC),以及肝外胆管癌细胞密度与 ADC 值的相关性。
结果 DWI 中 b 值为 800 的情况下,肝外胆管癌灶高信号占 96.15%,稍高信号占 3.85%。随着 b 值的增大,ADC 值不断降低。
结论 磁共振 DWI 可以清楚显示出肝外胆管癌病灶,且在 b 值为 800 时具有最佳的诊断效果。

PU-1053

433 例卵巢畸胎瘤的 CT 常规诊断与病理分析

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摘要

目的:探讨卵巢畸胎瘤的 CT 表现及诊断价值,并与手术病理进行对比分析,旨在提高卵巢畸胎瘤的术前诊断水平。

材料和方法：回顾性分析我院 2013 年 11 月至 2021 年 12 月经病理证实的 433 个卵巢畸胎瘤，收集他们的临床、病理、影像等相关资料，并统计符合率，所有病例均行 CT 平扫，回顾性分析卵巢畸胎瘤的 CT 表现。

结果：433 个卵巢畸胎瘤（左侧 206 个、右侧 194 个，双侧 33 个），术后病检畸胎瘤多含有毛发、脂肪、皮脂样物质、钙化、部分含有浆液、牙齿或骨组织等多种混杂密度结构，CT 上肯定性诊断且与术后病理符合的 403 例（403/433 93.7%）、可疑性诊断且与病理相符的 11 例（11/433 2.54%），漏诊、误诊的 19 例（19/433 4.39%），定位诊断容易 407 例（407/433 94.00%），定位诊断较难的 26 例（26/433 6.00%）。

结论：卵巢畸胎瘤术前 CT 诊断，无论在定性还是定位均具有较高的诊断价值，且可作为临床的优先选择的检查方法。

PU-1054

基于 256 层螺旋 CT 及后处理技术原发性肝癌合并门静脉癌栓的危险因素分析

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探讨基于 256 层螺旋 CT 及后处理技术原发性肝癌合并门静脉癌栓的危险因素。方法 收集 2017 年 1 月至 2022 年 6 月我院收治的肝癌合并门静脉癌栓 182 例患者归为研究组，从同期患者中随机抽取肝癌不合并门静脉癌栓的患者 182 例归为对照组，并应用容积重建 (VR)、多平面重组 (MPR)、最大密度投影 (MIP) 等方法对门静脉及其主要分支三维重建，并将两组患者的治疗及检查前三个月内的一般情况、实验室检查指标和影像学资料进行回顾性对比研究，分析原发性肝癌合并门静脉癌栓的危险因素。结果 单因素分析结果显示，瘤体分布、有无肝硬化、HBsAg 阳性、AST、PT、APTT 与门静脉癌栓的发生无关 ($P>0.05$)。但肿瘤直径、肿瘤个数、瘤体假包膜、APS 形成、有无腹水、ALT、Child 分级、食管胃底静脉曲张与门静脉癌栓的发生有关 ($P<0.05$)。结论 Logistic 多因素回归分析结果显示，瘤体距离门静脉主干距离 $<1\text{cm}$ 、瘤体假包膜、年龄 <45 岁、高滴度的 AFP、APS 形成是原发性肝癌合并门静脉癌栓的独立危险因素。

PU-1055

门静脉期图像在 CTSI 评估急性胰腺炎的应用价值

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目的 探讨门静脉期图像在 CT 严重程度指数 (CTSI) 评估急性胰腺炎患者胰腺坏死中的价值。方法 本研究为单中心回顾性研究，分析了 2020 年 1 月-2022 年 12 月在南通大学附属医院确诊的 56 例急性胰腺炎患者的动态增强 CT 图像，包括胰腺动脉期和门静脉期。两名放射科医生回顾了两组图像，即动脉期单独图像 (图像集 A)，动脉期和门静脉期联合图像 (图像集 B) 来评估 CTSI。若在症状出现后 4 周出现了液化坏死区，病例则被归类为坏死性胰腺炎。比较图像集 A 和图像集 B 之间胰腺坏死与 CTSI 的关系。采用 Logistic 回归分析评估临床和影像学因素与胰腺坏死诊断的相关性。结果 56 例患者中有 14 例 (25%) 确诊胰腺坏死。图像集 A 和 B 诊断胰腺坏死的受者工作特征曲线下面积 (AUC) 分别为 0.70 和 0.78。图像集 B 的 AUC 值显著大于图像集 A ($P=0.0002$)。Logistic 回

归分析显示,在临床和影像学因素中,图像集 B 的 CTSI 与胰腺坏死独立相关($P=0.025$)。结论 动脉期和门静脉期联合图像可显著提高急性胰腺炎后胰腺坏死的诊断准确性。

PU-1056

基于 256 层螺旋 CT 肾脏特征预测分肾功能的价值

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目的 探讨基于 CT 扫描及 ITK-SNAP 软件测量肾脏皮质厚度(Renal Cortical Thickness, RCT)、皮质容积(Renal Cortical Volume, RCV)与分肾滤过功能的关系,并评价其预测分肾滤过功能的价值。**方法** 选择 2018 年 6 月至 2021 年 1 月于我院行 128 排螺旋 CT 增强扫描患者 93 例并于一周内对其行肾动态显像(RDI)检查。以 RDI 测得的肾小球滤过率(GFR)为金标准,分为正常组($GFR \geq 34 \text{ ml/min}$),减退组($20 \text{ ml/min} \leq GFR < 34 \text{ ml/min}$),受损组($GFR < 20 \text{ ml/min}$)。比较 3 组间 CT 测得的 RCT、RCV 的差异,分析 RCT、RCV 与 GFR 的相关性,并用 ROC 法评价两者预测分肾功能优劣的价值。**结果** 三组 RCT 分别为(0.55 ± 0.14) cm、(0.44 ± 0.10) cm、(0.31 ± 0.10) cm。RCV 分别为(75.24 ± 15.82) cm^3 、(54.29 ± 14.72) cm^3 、(30.18 ± 11.38) cm^3 。三组间 RCT、RCV 差异有统计学意义($F=61.17$ 与 $F=142.12$, $P<0.05$)。RCT、RCV 与单侧肾 GFR 高度正相关($r=0.868$ 与 $r=0.920$, $P<0.05$)。RCT 及 RCV 在预测肾脏功能正常患者时 ROC 曲线下面积(AUC)分别为 0.828、0.905。**结论** 经 CT 及 ITK-SNAP 后处理技术测得 RCT 及 RCV 能较准确反映 GFR,可以作为预测分肾功能优劣的有用指标。

PU-1057

腹部磁共振弥散加权成像技术联合普美显造影剂在对肝脏良恶性肿瘤鉴别中的应用价值分析

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【摘要】目的: 分析鉴别肝脏良恶性肿瘤中应用腹部磁共振弥散加权成像技术联合普美显造影剂的实际价值。**方法:** 在 2021 年 11 月-2022 年 11 月,对选择期间就诊的 50 例肝脏良恶性肿瘤患者进行分析,均应用腹部磁共振弥散加权成像技术联合普美显造影剂,将病理诊断作为金标准,分析具体的诊断结果。**结果:** 在本次研究的 50 例患者中,良性肿瘤患者为 35 例,恶性患者为 15 例。经腹部磁共振弥散加权成像技术联合普美显造影剂检查,检测的恶性肿瘤阳性率和病理学诊断没有明显差异性, $P>0.05$ 。基于病理结果作为金标准,检查的敏感度为 88.23%,特异度为 100%,准确度为 96%。**结论:** 应用腹部磁共振弥散加权成像技术联合普美显造影剂鉴别诊断肝脏良恶性肿瘤疾病,能充分发挥临床应用价值,提高诊断效率,保证疾病的有效治疗。

PU-1058

宫颈软斑病 1 例回顾分析

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目的：对我院收治的一例宫颈软斑病患者的临床、病理及影像资料进行报道，以加深对该疾病的认识。

材料与方法：观察和分析 1 例宫颈软斑病患者的临床特征、影像学表现及组织病理学特征，并进行相关文献复习。

结果：患者女性，57 岁，反复阴道不规则出血，发现宫颈软斑病 2 年，既往胸腺恶性肿瘤手术，术后复发 3 次。B 超及 MRI 增强提示宫颈及阴道富血供占位；术前病理活检证实宫颈软斑病。手术行子宫及阴道部分切除术，粗测肿块长 8 厘米，宽 2 厘米，肿瘤质地软，色黄。

结论：宫颈 MP 极为罕见，是一种可治愈性疾病。影像学常表现为宫颈占位性病变，临床上易误诊为宫颈癌等恶性肿瘤，确诊主要依靠病理。

PU-1059

Multi-Parameter Spectral CT Enhanced Imaging for Differential Diagnosis of Portal Vein Thrombosis and Malignant Thrombosis

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Purpose: This study is to investigate the differential diagnostic performance of spectral-based image-enhanced imaging for portal vein thrombosis (PVT) and malignant thrombus (MT), with the aim of enhancing the clinical efficiency of differential diagnosis between the PVT and MT.

Methods: This retrospective study included 100 patients with portal vein thrombosis who underwent spectral CT imaging from February 2023 to April 2023. According to clinical data and pathological diagnosis, 52 cases of portal vein thrombosis and 48 cases of malignant thrombosis were enrolled. Using post-processing software, conventional CT images (CI), iodine density maps (ID), effective atomic number maps (Z-eff), and spectral curves were reconstructed from the spectral data. Regions of interest (ROIs) were drawn at the site of occlusion, and CT values (CIHU), iodine density values (ID), effective atomic numbers (Z-eff), and spectral curve slopes were measured (λ HU). Independent sample t-tests were used to analyze the differences between parameters. A single-factor logistic regression was used to evaluate the predictive probability of spectral multi-parameters for portal vein thrombosis and tumor thrombus, and a spectral multi-parameter combined model was established. Receiver operating characteristic (ROC) curves were plotted, and the area under the curve (AUC) and cutoff value were calculated to compare the diagnostic efficacy of various spectral parameters in differentiating portal vein thrombosis and tumor thrombus.

Results: Compared to CT values (AUC 0.92, cutoff value 142.5, sensitivity 86%, specificity 93%), ID values (AUC 0.965, cutoff value 3.24, sensitivity 92%, specificity 96.5%), Z-eff values (AUC 0.952, cutoff 12.05, sensitivity 90%, specificity 96.2%), and λ HU values (AUC 0.962, sensitivity 96%, specificity 95%), the multi-parameter spectral combined model (AUC 0.97, sensitivity 94%, specificity 97%) exhibits the highest discriminatory power in distinguishing between portal vein thrombosis and malignant thrombosis.

Conclusion: The multi-parameter spectral combined model exhibits superior differential diagnostic capabilities compared to traditional CT values and various spectral parameters for distinguishing between portal vein thrombosis and cancer thrombus.

Spectral multi-parameter CT can help clinicians accurately determine the nature, lesion homogeneity, location, size, and adjacent relationship of portal vein thrombi. This provides more accurate imaging evidence for the early diagnosis, treatment strategy, and prognosis prediction of tumor patients.

PU-1060

The Correlation of Coronary Artery Calcification Score of Dual-Source CT , Abdominal Aortic Calcification Score with Stage III- V Chronic Renal Disease

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Objective To explore the correlation between dual-source CT coronary artery calcification score (CaCS), abdominal aortic calcification score (AACS) and chronic kidney disease (CKD) at stage III-V.

Methods 63 cases of stage III- V CKD were retrospectively reviewed. All patients underwent dual-source CT and lateral abdominal X-ray examination. The CaCS value of each branch of coronary artery, total CaCS value, and AACS value were measured. The Kruskal-Wallis test, Chi-square test or Fisher's exact test were used to evaluate the difference of each index. Spearman correlation analysis was used to evaluate the correlation between different stages CKD and coronary artery calcification.

Results As CKD progressed, total CaCS also significantly increased ($P < 0.05$). CKD in different stages was positively correlated with the incidence of coronary vascular calcification ($r = 0.53$, $P = 0.000$) and multivessel calcification ($r = 0.32$, $P = 0.01$). Compared with LM calcification, coronary calcification of CKD at different stages was more common in LAD, LCX and RCA. The incidence of calcification is positively correlated with CKD stage ($P < 0.05$).

Conclusion Stage III-V CKD is strongly relevant to CaCS; With the progress of CKD, the incidence of coronary calcification is higher and the range of involvement is wider.

PU-1061

钆塞酸二钠增强 MRI 对肝细胞癌微血管侵犯的定量预测价值

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目的: 探讨钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 对肝细胞癌 (HCC) 微血管侵犯 (MVI) 的预测价值。**方法:** 回顾性分析 2017 年 1 月至 2020 年 5 月期间于本院经手术病理证实为 HCC 的 70 例患者共 77 个病灶, 所有患者在肝脏部分切除或肝移植手术前 2 周内均进行过 Gd-EOB-DTPA 增强 MRI 检查。根据术后病理结果是否存在 MVI 将所有病灶分为 MVI 阳性组及 MVI 阴性组, 并记录患者的临床指标包括甲胎蛋白 (AFP)、丙氨酸转氨酶 (ALT) 和天冬氨酸转氨酶 (AST)。观察记录病灶定量指标, 包括肿瘤直径、各期 (平扫、增强后动脉期、门静脉期、过渡期及肝胆期) 病

灶及竖脊肌信号 (SI)，计算各期病灶-竖脊肌信号比 (LMR) 和增强后各期 (动脉期、门静脉期、过渡期及肝胆期) 病灶-竖脊肌信号比的增长率 (Δ LMR)。采用 Kolmogorov-Smirnov (K-S) 对定量参数进行正态性检验，对于非正态定量参数比较采用 Mann-Whitney U 检验。结果：MVI 阴性组与 MVI 阳性组间肿瘤直径、门静脉期和过渡期的 LMR 差异具有统计学意义 ($P<0.05$)，两组间患者年龄、AFP 值、ALT 值、AST 值、各期 (平扫、动脉期、门静脉期、过渡期、肝胆期) SI、(平扫、动脉期、肝胆期) LMR 和增强后各期 (动脉期、门静脉期、过渡期、肝胆期) Δ LMR 差异均不具有统计学意义 ($P>0.05$)。结论：Gd-EOB-DTPA 增强 MRI 可术前预测 HCC MVI，肿瘤直径对 HCC MVI 的预测具有重要价值。

PU-1062

卵巢成熟畸胎瘤恶变为癌肉瘤 1 例并文献复习汇报

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卵巢成熟囊性畸胎瘤大部分为良性肿瘤，好发于育龄期女性，但随着年龄的增高，恶变率逐渐增大，占 1%-3%，以鳞癌、腺癌多见，恶变为癌肉瘤者极其罕见，因其没有特征性临床表现，发现时一般较晚，常易误诊。恶变类型主要依靠病理免疫组化确诊，但影像学检查可提供一定的辨别能力。现将 1 例卵巢畸胎瘤恶变为癌肉瘤的影像学表现进行分析总结，并复习文献进行汇报，以提高对本病的影像学认识。

PU-1063

基于血管进入征所构建的列线图对胃癌脉管浸润的预测价值

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目的：探讨基于血管进入征所构建的列线图对胃癌脉管浸润 (LVI) 的预测价值。

方法：采用回顾性病例对照研究方法，收集 2021 年 10 月至 2022 年 10 月长治市人民医院 135 例经病理确诊为胃癌患者的临床病理资料。根据有无脉管浸润分为 LVI (+) 组 ($n=91$) 及 LVI (-) 组 ($n=44$)。按照 7:3 的比例将所有患者随机分为训练集 ($n=95$) 和验证集 ($n=40$)。收集患者的 CT 及临床特征，包括血管进入征，动脉期和门静脉期的 CT 值、标准化 CT 值 (nCT)、肿瘤部位、肿瘤最大径、cT 分期、cN 分期、胃镜病理分化程度、肿瘤标志物 (CA19-9、CA724、CA125、CEA) 及 ABO 血型。采用单因素及多因素分析，探讨胃癌脉管浸润的独立影响因素，构建列线图模型 (模型 1)，作为对比，将去除血管进入征后的其他独立影响因素建立模型 2。绘制两个模型的受试者工作特征 (ROC) 曲线、校准曲线及决策曲线 (DCA) 评估模型的诊断效能及临床获益。

结果：多因素分析显示血管进入征、分化程度、cT 分期、cN 分期及 CA19-9 阳性为胃癌脉管浸润的独立影响因素 ($P<0.05$)。根据多因素分析结果，构建预测胃癌 LVI 状态的列线图模型 (模型 1：含血管进入征) 和对照模型 (模型 2：不含血管进入征)，模型 1 和模型 2 在训练集和验证集中 AUC 分别依次为 0.853 与 0.848，0.810 与 0.820，两模型 AUC 差异具有统计学意义。校正曲线结果显示模型 1 预测胃癌 LVI 的概率与实际概率吻合度较高。决策曲线结果显示模型 1 有较好的临床获益。

结论：血管进入征可作为胃癌 LVI 的独立影响因素，其与临床指标联合构建的列线图模型对胃癌 LVI 有较好的预测效能，可以为临床医生提供较准确的诊断和决策支持。

PU-1064

增强 CT 征象联合肿瘤标志物对宫颈癌淋巴结转移的预测价值研究

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目的

探讨增强 CT 征象联合血清肿瘤标志物 SCC、CA125 和 CEA 对宫颈癌患者淋巴结转移的诊断价值。

方法

选取锦州医科大学附属第一医院 2019 年 1 月-2023 年 6 月收治的宫颈癌患者 107 例,以患者术后组织病理学检查为"金标准",根据其发生淋巴结转移与否分为淋巴结未转移组 86 例和淋巴结转移组 21 例。记录患者影像学特征(包括淋巴结大小、形态、融合情况、强化方式及强化程度)及临床病理因素(包括年龄、分化程度、神经侵犯、脉管癌栓、肿瘤标志物 CA125、CEA、SCC 的表达水平),应用卡方检验、独立样本 T 检验或曼惠特尼检验对两组进行单因素及多因素二元 Logistic 回归分析,以 $P<0.05$ 为具有统计学意义。应用受试者-操作特征曲线分析,评价增强 CT 和肿瘤标志物单独及联合诊断的方式对宫颈癌淋巴结转移的诊断价值。

结果

单因素分析显示淋巴结短径、有无融合、强化表现、肿瘤分化程度、脉管癌栓、SCC、CA125 是宫颈癌淋巴结转移的危险因素($P<0.05$)。

多因素二元 Logistic 回归分析显示淋巴结短径、SCC、脉管癌栓是宫颈癌发生淋巴结转移的独立危险因素($P<0.05$)。

增强 CT 诊断宫颈癌淋巴结转移的曲线下面积为 0.817,其敏感性、特异性及准确率分别为 42.8%、97.7%、86.9%。肿瘤标志物诊断宫颈癌淋巴结转移的曲线下面积为 0.692,其敏感性、特异性及准确率分别为 19%、98.8%、82.2%。CT 及肿瘤标志物联合诊断的曲线下面积为 0.837,其敏感性、特异性及准确率分别为 47.6%、98.8%、88.8%。

结论

淋巴结短径、淋巴结有无融合、强化表现、肿瘤分化程度、脉管癌栓、SCC、CA125 是宫颈癌淋巴结转移的危险因素。

淋巴结短径、SCC、脉管癌栓是宫颈癌发生淋巴结转移的独立危险因素。

CT 征象联合肿瘤标志物可提高诊断宫颈癌淋巴结转移的敏感性、特异性及准确度,更好的指导宫颈癌治疗方案的选择。

PU-1065

基于 CT 影像组学列线图在胰十二指肠切除术后胰瘘的应用研究

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目的 探讨基于术前增强 CT 影像组学联合临床因素构建的列线图模型对胰十二指肠切除术后胰瘘的预测价值。**材料与方法** 回顾性收集接受胰十二指肠切除术的 82 名患者的临床和腹部影像资料,并以 3:2 比例随机划分为训练集和验证集。于 CT 增强门静脉期选取胰管最大直径平面勾画胰腺实质作为感兴趣区,通过采用方差阈值法、SelectKBest 和最小绝对收缩和选择算法筛选最优影像组学特征,将影像特征加权求和得到的影像组学评分建立影像组学模型。同时收集患者 18 项临床相关资料,通过 logistic 回归筛选术后胰瘘的危险因素建立临床模型。最终联合 Rad-score 及临床预测因子构建列线图模型。通过受试者工作特征曲线、校准曲线、临床决策曲线分析用以评价模型的预测效能。**结果** 筛选出 7 个影像组学特征和 2 个临床因素分别构建影像组学模型和临床模型,最终

列线图模型预测效能最佳,其曲线下面积(AUC)在训练集和验证集分别为 0.862、0.806; Hosmer-Lemeshow 检验表明预测模型与理想模型的一致性较好;决策曲线分析显示列线图模型在 2%~99% 范围内具有较高的临床适用性。结论 基于 CT 影像组学列线图模型较单独模态的临床模型和影像组学模型更能有效的预测术后胰痿的发生,可以为临床决策提供重要指导。

PU-1066

18F-FDG PET-CT 显像弥漫性大 B 细胞淋巴瘤累及前列腺

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弥漫性大 B 细胞淋巴瘤 (Diffuse large B-cell lymphoma, DLBCL) 是一种常见的侵袭性 B 细胞非霍奇金淋巴瘤 (B-cell non-Hodgkin lymphoma, B-NHL)。18-氟脱氧葡萄糖正电子发射断层扫描/计算机断层扫描 (fluorine-18-uorodeoxyglucose positron emission tomography/computed tomography, 18F-FDG PET/CT) 是指导 DLBCL 活检、确定疾病范围和评估对治疗的代谢反应的一种有价值的成像方式,它也为鉴别诊断提供了重要信息。DLBCL 的前列腺受累极为罕见,仅在少数病例报告中有所描述。在此,我们介绍一例 61 岁的男性患者,他因胸背部、颈肩部疼痛 3 个月入院。在 PET-CT 扫描中提示前列腺体积增大伴代谢增高,经尿道前列腺左侧肿物切除标本的组织病理学和免疫组织化学检查确诊为 DCBCL。认识和准确诊断对于指导临床制定诊疗方案非常重要。

PU-1067

Develop a better nomogram for prediction of preoperative microvascular invasion and postoperative prognosis in HCC patients: a comparison study

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Objectives Clinically available preoperative reliable microvascular invasion (MVI) prediction models and postoperative accurate MVI pathological grade related recurrence prediction models facilitate personalized precision medicine. We aim to compare different mathematical models to derive the best preoperative prediction model and postoperative recurrence prediction model for MVI.

Methods A total of 143 hepatocellular carcinoma (HCC) patients with clinical, laboratory, imaging, and pathological data were included in the analysis. Logistic regression, Cox proportional hazards regression, Lasso regression and 10-folds cross-validation, stepwise regression, and random forest methods were used for variable screening and predictive modeling. The accuracy and validity of 7 preoperative MVI prediction models and 5 postoperative recurrence prediction models were compared in terms of C-index, net reclassification improvement (NRI), and integrated discrimination improvement (IDI), respectively.

Results Preoperative use of a nomogram model containing cirrhosis, AFP>400, diameter, shape, and number of lesions that screened by multivariate logistic regression can more reliably predict MVI in HCC patients. Postoperative use of a nomogram model including MVI grade, number of lesions, involving the capsule, macrovascular invasion, and shape which selected through Lasso regression and 10-folds cross-validation method can more accurately predict prognosis for different MVI grades. The number and shape of lesions was the most common predictor in predicting MVI preoperatively and recurrence postoperatively.

Conclusion Our study identifies the best statistical approach for the prediction of preoperative MVI in HCC patients based on clinical, imaging, and laboratory tests, as well as postoperative recurrence. Which could improve preoperative treatment decisions and postoperative management.

PU-1068

Schistosomiasis granuloma of appendix mimicking appendiceal tumor

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A 73-year-old man with a medical history of COPD presented with abdominal pain and malnutrition for a-half-year. He denied any other recognizable precipitating factors, such as fever, night sweats, nausea, or vomiting. His symptoms gradually improved after symptomatic treatment at the local hospital and referred to us for further evaluation.

Abdominal contrast CT imaging showed an origin of appendix irregular ring-like soft-tissue mass with unclear boundaries, central necrosis, smooth nodular calcification at the edge, surrounding calcified lymph nodes, and moderate enhancement. Furthermore, chest CT imaging showed right upper lung old tuberculosis lesions. Though there is a strong hint to support infections on CT features (such as obscure boundaries and calcified lymph nodes), appendiceal tumor or tuberculosis could not be excluded completely.

Serum levels of tumor markers (AFP, CA199, CA724, PSA, CEA, NSE) were all normal. 72h tuberculin test, serum tuberculosis antibody, serology for hepatitis, HIV, and Treponema pallidum were also negative. Only blood routine indicates he suffered mild anemia. Further endoscopy examination was arranged for the first time. Endoscopy reports malignant neoplasm while biopsies' pathologic result confirmed it was mucous chronic inflammation. Combine his relevant examination findings, there was not sufficient evidence to diagnose tuberculosis or tumor, so we suggested he took levofloxacin in combination with metronidazole as medicine therapy before new biopsies by endoscopic ultrasound to get a final diagnosis.

Endoscopic ultrasound was examined ten days later and biopsies' pathology revealed Schistosoma egg deposit submucous membrane of appendix and ileocecum. In the meantime, rechecking of CTE (CT enterography, CTE) confessed the effectiveness of anti-inflammatory therapy. Finally, intestinal schistosomiasis was diagnosed; he was transferred to the local Schistosoma Prevention Institute for further professional treatment.

Alimentary tract schistosomiasis granuloma is an acute and chronic specific inflammatory disease caused by Schistosoma eggs invading digestive tract mucosa and depositing in the intestinal wall. It has been rarely seen because of the improvement of living standards and hygienic environment, so its clinical manifestations are not precise and medical diagnosis will be difficult. This case reminds us infectious diseases should be included in the differential diagnosis (such as schistosomiasis granuloma) when a soft-tissue mass was found in the intestinal tract, and that would be a great help to avoid blind surgery.

PU-1069

排粪造影临床应用研究进展

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排粪造影是在患者在“排粪”时对其肛门直肠部进行动态和静态的检查方法,可动态显示肛管直肠部的器质性和功能性异常,在出口梗阻型便秘、女性盆底肌功能障碍性疾病等的诊断以及便秘手术治疗的预测具有重要的临床应用价值。目的:本研究通过整理、回顾自 2013 年 1 月至今排粪造影临床研究结果,旨在概述排粪造影临床研究进展。方法:搜集收录于中国知网、万方、维普、中华医学会期刊的排粪造影相关文章,其中关键词“排粪造影”、“X 线排粪造影”,共有 237 篇排粪造影相关文章,排除 1 篇博士论文,13 篇硕士论文,10 篇综述等,共 116 篇临床研究纳入本次研究。结果:结果主要分为排粪造影在传统中医和西医两大医学中的研究进展及排粪造影技术方面的临床最近进展进行分别描述。(1)中医排粪造影征象与中医证型之间存在密切相关,如为中医诊断中气下陷型肛门坠胀提供客观依据等,此外在排粪造影的动态观察为中医治疗便秘疗效提供客观证据。(2)西医排粪造影不同时相测量指标在诊断轻中度直肠黏膜脱垂、直肠前突、盆底失迟缓综合征、出口梗阻型便秘、耻骨直肠肌综合征、盆底功能障碍性疾病等诊断与鉴别中具有分别具有重要应用价值,其中采用站立正位黏膜成相对直肠黏膜脱垂诊断价值更高,排粪造影在轻中度直肠前突中具有更高的准确性。此外,排粪造影常用语便秘临床术后疗效评估,如经肛吻合器直肠切除术治疗直肠前突和内套导致的出口型梗阻便秘,目前临床有效率达 67.4%,而术前排粪造影可早期预测疗效,此外针对直肠前突便秘的球囊在辅助排便中具有可行性等。(3)排粪造影技术主要包括改良不同时相指标的测量方法(如直肠前突测量方法)、灌肠剂硫酸钡浓度、排粪造影助推器(提高灌肠药物的流畅)、联合其他技术提高诊断便秘等诊断价值。结论:排粪造影通过改良造影技术、联合其他检查在出口梗阻型便秘、女性盆底肌功能障碍性疾病等的诊断以及便秘手术治疗的预测具有重要的临床应用价值。

PU-1070

卵巢子宫内膜样腺纤维瘤 CT 及 MR 表现一例并文献复习

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目的:探讨卵巢罕见肿瘤子宫内膜样腺纤维瘤的 CT 及 MR 特点。方法:回顾性分析一例经病理证实的卵巢子宫内膜样腺纤维瘤 CT 及 MR 表现,并通过文献复习总结其影像特征及鉴别诊断。结果:子宫内膜样腺纤维瘤以囊实性多见,囊壁外缘光整,边界清晰,病变内常见多囊样表现,实性部分以 T2 低信号为主要特征,可伴营养不良性钙化,增强扫描延迟强化,常伴有子宫内膜异常增厚及(或)子宫内膜异位表现。结论:卵巢子宫内膜样腺纤维瘤虽然罕见,仍有相对特征性影像表现提示该诊断,但需与以 T2 低信号为特征及伴有子宫内膜增厚、异位的其他卵巢肿瘤相鉴别。

PU-1071

乳头状肾癌的 CT 及 MRI 表现

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目的: 探讨乳头状肾癌的 CT 和 MRI 表现, 提高术前影像诊断的准确率。方法: 回顾性分析 2016 年 1 月至 2023 年 9 月经手术和病理证实的乳头状肾癌 8 例, 8 例均行 CT 和 MRI 扫描, 总结影像特征。结果: CT 级 MRI 表现为实性 7 例, 囊实性 1 例; 8 例均呈轻度强化; 5 例表现为 T1WI 等或低信号, T2WI 稍低信号; 1 例呈 T1WI、T2WI 混杂高信号改变。结论: 乳头状肾癌一般为实性肿块, 属乏血供病变, 增强后轻度强化, MRI T2WI 呈稍低信号可与其他病理类型的肾癌相鉴别。

PU-1072

成人型腹膜后海绵状淋巴管瘤 1 例

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成人型腹膜后海绵状淋巴管瘤 (Adult retroperitoneal cavernous lymphangioma, ARCL) 是一种非常罕见的良性肿瘤, 常常在体检时发现, 约 90% 发生于 2 岁以下的儿童, 腹膜后来源的成人型淋巴管瘤较为少见, 多以文献报道形式呈现, 海绵状淋巴管瘤属于淋巴管瘤的一种, 且临床症状不典型, 早期发现依赖于影像诊断, 故对该病例的来源、临床症状、影像诊断及鉴别诊断、治疗中的细节、手术方式及预后等方面进行回顾性分析, 可进一步提高医务工作者对该病的认知, 可该病后续的临床诊断、治疗及预后有所帮助。病例资料: 患者女, 37 岁, 门诊以“体检发现腹膜后占位半月余”收住我院。专科查体及实验室检查无特殊。腹部 CT 平扫及增强示: 右侧腹膜后 (右肾下方) 多发囊性结节融合成团块状, 边缘清楚、呈分叶状, 最大层面范围约 10.4cmX11.3cmX11.6cm, 内见分隔并钙化, 增强分隔可见明显强化。术后病检: (腹膜后肿瘤) 间叶源性肿瘤, (腹膜后肿瘤) 海绵状淋巴管瘤。随访半年无复发。

PU-1073

腹部组织细胞肉瘤一例报告并文献复习

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目的 本院一例腹部组织细胞肉瘤病例报道, 探讨其 CT 表现及相关鉴别诊断。

资料与方法 回顾性分析一例经组织病理学确诊的组织细胞肉瘤基本资料及 CT 表现: 患者为 55 岁男性, 入院 4 年前, 明确诊断右肺腺癌并行手术治疗, 术后化疗。5 月前诊断“原发性支气管肺癌, 右上肺腺癌 T4N3M1c IVb 期, 颈部、锁骨上窝淋巴结、肺内、胸壁转移”。

结果 因有恶心、呕吐、腹部不适, 行全腹部 CT 增强检查: 左下腹见团块状混杂密度影, 边缘呈分叶状, 长径约 6.5cm, 增强扫描不均匀轻-中度强化, 其旁及其内见血管穿行, 其旁见囊状无强化低密度影, 其内见多发结节状无/弱强化低密度影, 病灶与邻近肠管分界不清, 其周围脂肪间隙模糊, 邻近腹膜、大网膜增厚; 小肠梗阻, 梗阻点位于左下腹-盆腔, 梗阻原考虑肠套叠, 相应肠壁不均匀增厚、肿胀; 盆腔偏右侧局部肠壁不均匀增厚。最终病理证实上述三处为组织细胞肉瘤。本例鉴别诊断主要包括: 平滑肌肉瘤、滑膜肉瘤、间质瘤、肠癌、恶性间皮瘤等。

结论 组织细胞肉瘤是来源于单核/巨噬细胞系统非朗格汉斯组织细胞的一种罕见的造血肿瘤，诊断主要依靠病理、免疫组化，而影像表现无特异性的原因可能是对其认识及积累不足导致的，希望通过对本病例的回顾可以进一步增强对该类疾病的学习。

PU-1074

Performance of Machine Learning Applications in Image Mining for Diagnosing Muscle-invasive Bladder Cancer: A Systematic Review and Critical Appraisal

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Background

Radiomics and deep learning are noninvasive approaches to predict the muscle invasion. We aimed to systematically evaluate the methodological quality of the eligible studies regarding radiomics or deep learning models in predicting the muscle invasion of bladder cancer and evaluate the model performance of the available studies.

Method

PubMed, Cochrane, and Embase were searched from inception up to July 2023. The methodological quality of the included studies was assessed using the Radiomics Quality Score (RQS) and Prediction model Risk of Bias Assessment Tool. A meta-analysis was conducted to evaluate the performance of radiomics or deep learning model. Further sensitivity analysis, subgroup analysis and meta-regression were conducted to investigate contribution of moderators to heterogeneity.

Result

Twenty-two articles with 4330 patients were included finally. The mean RQS was 10.1 (range 0 to 14). The overall risk of bias was found to be high, and the overall applicability was of low concern in all included studies. The pooled sensitivity, specificity and AUC were 0.83 (95% CI [0.77, 0.88]), 0.81 (95% CI [0.75, 0.85]), and 0.88 (95% CI [0.85, 0.91]), respectively.

Conclusion

Our meta-analysis showed the excellent diagnostic performance of radiomics or deep learning model in predicting the muscle invasion in bladder cancer. More standardized methodology in the radiomics workflow to achieve robust and reproducible results in future research are imperative to translate the results to clinical application.

PU-1075

定量 CT 测量身体组分在肝硬化门静脉高压并发症中

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【摘要】目的：基于定量 CT (QCT) 探讨肝硬化患者身体组分定量指标与门静脉高压并发症的相关性及其应用价值。方法：纳入 2021 年 11 月至 2023 年 2 月于我院就诊的 134 例肝硬化患者，受试者均行腹部 CT 平扫，收集临床资料并用 QCT Pro 软件测量每例受试者 L2/3 层面皮下及内脏脂肪面积 (SAT、VAT)、腰椎骨密度 (BMD)、肝脏脂肪分数 (Fat%-QCT)、L3 椎体水平全腹肌和椎旁肌面积 (SMA、PMA) 及肌肉脂肪面积并计算肌肉脂肪含量 (IMAC-S、IMAC-P)。在不同 Child-Pugh 分级中进行组间资料比较，并根据有无门静脉高压并发症将患者分为两组比较身体组分差异，Mann-Whitney U 检验或 Kruskal-Wallis H 检验、t 检验或单因素 ANOVA 检验、 χ^2

检验用于各组间基本资料与身体组分的差异性分析;采用二元 Logistic 回归分析与肝硬化门静脉高压并发症相关的 QCT 指标,使用受试者工作特征曲线(ROC 曲线)检验不同模型的识别效能。结果: Fat%-QCT、SAT、椎旁肌内脂肪面积、IMAC-P 在不同 Child-Pugh 分级中差异有统计学意义($P<0.05$);多因素 Logistic 回归分析显示 SAT 是肝硬化门静脉高压并发症的独立相关因素($P<0.05$, OR: 0.987); SAT、SAT 联合全腹肌指标、SAT 联合椎旁肌指标的 ROC 曲线下面积(AUC)分别为 0.727、0.772、0.769($P<0.05$), SAT 联合全腹肌指标的敏感性 & 特异性分别为 0.734、0.800, 优于 SAT、SAT 联合椎旁肌指标,识别效能最高。结论: SAT 减少是肝硬化门静脉高压并发症风险增加的独立危险因素, SAT 联合全腹肌指标能较好的识别肝硬化门静脉高压并发症。

PU-1076

基于肝细胞癌增强 MRI 影像预测 Ki-67 表达的放射组学研究

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目的:建立并验证基于肝细胞癌增强 MRI 图像的临床因素的模型来预测 Ki-67 在 HCC 中的表达水平。材料和方法:本回顾性研究分析了 134 例 HCC 患者的数据。通过单因素和多因素逻辑回归分析区分 Ki-67 高表达(>20%)和低表达($\leq 20\%$)的临床因素。从增强 MRI 图像中提取影像组学特征。采用 LASSO 筛选放射组学特征并构建模型,采用 AUC、准确度、精密度、召回率来评估模型的性能。结果:多因素分析结果显示 AFP 水平、肿瘤大小、肿瘤数目是 Ki-67 高表达 HCC 的独立影响因素。临床模型 AUC 值为 0.812,影像组学模型的 AUC 值为 0.834,联合影像组学和临床因素的联合模型性能最佳, AUC 值为 0.913。在验证集中, Delong 检验结果显示联合模型的性能明显提高。决策曲线分析进一步证实了联合模型的临床应用价值。结论:基于增强 MRI 影像组学特征和临床因素的联合模型在术前预测 HCC 中 Ki-67 表达方面具有良好的性能,在指导临床治疗规划中具有重要的意义。

PU-1077

多层螺旋 CT 血管三维重建技术在女性生殖系统巨大肿瘤定位诊断中的应用

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目的 探讨多层螺旋 CT 血管三维重建技术在女性生殖系统巨大肿瘤定位诊断中的应用价值。方法 回顾性分析河南省人民医院 2023 年 1—6 月经病理证实的 18 例女性生殖系统巨大肿瘤(卵巢肿瘤 10 例,子宫肿瘤 8 例),采用多层螺旋 CT 血管三维重建技术寻找肿瘤供血动脉,进行定位诊断,并与病理结果对照分析。结果 18 例女性生殖系统巨大肿瘤,将卵巢动脉单独供血 3 例、子宫动脉卵巢支单独供血 2 例、子宫动脉卵巢支与卵巢动脉共同供血 5 例,共 10 例定位为卵巢来源的肿瘤。将子宫动脉单独供血 5 例、由子宫动脉供血为主,卵巢侧支动脉供血为辅的 3 例,共 8 例定位为子宫来源的肿瘤,其结果与病理结果完全吻合。结论 多层螺旋 CT 血管三维重建技术可以显示女性生殖系统巨大肿瘤的供血动脉来源,为定位诊断提供了依据。

PU-1078

增强磁共振成像对诊断肝外胆管癌的价值

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目的: 建立一个基于对比增强磁共振成像(magnetic resonance imaging, MRI)和临床特征的肝外胆管癌(extrahepatic cholangiocarcinoma, eCCA)诊断模型。

材料与方法: 回顾性纳入 2014 年 4 月至 2022 年 9 月于我院行病理检查, 且检查前 1 个月内行 MRI 增强检查的肝外胆管病变患者。MRI 图像由两名放射科医生在对临床病理信息不知情的情况下独立评估, 采用单因素和多因素逻辑回归分析确定与 eCCA 相关的显著临床放射学特征, 然后将其纳入诊断模型, 利用受试者工作特征曲线(the area under the receiver operating characteristic curve, AUC)、校准曲线和决策曲线下的面积来评估模型的性能。

结果: 本研究共纳入 182 例患者(平均年龄 60.8 ± 10.0 岁, 男性 117 例), 其中 144 例(79%) 经病理确诊为 eCCA。弥散受限($P < 0.001$), 病变外周不清晰 ($P=0.010$), 胆石症($P=0.049$), InCA125 ($P=0.010$)和 InDBIL ($P<0.001$)与 eCCA 独立相关。结合上述 5 个变量, 诊断模型的 AUC 为 0.912 (95% CI: 0.859-0.965), 具有拟合的校准曲线 ($P=0.815$) 和良好的临床效用。该模型的敏感性、特异性和准确性分别为 83.33%、86.84%和 84.07%。

结论: 结合两种 MRI 增强特征 (病变外周不清晰和弥散受限) 和三个临床特征(胆石症、InCA125 和 InDBIL) 的诊断模型可以准确预测 eCCA。该模型有可能促进 eCCA 的早期诊断, 从而及时进行治疗干预并最终改善临床结果。

PU-1079

Prognosis of assessment based on clinical and Computer Tomography characteristics for Hepatocellular carcinoma with portal tein tumor thrombus

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Patients with hepatocellular carcinoma (HCC) complicated by portal vein tumor thrombus (PVTT) have an extremely poor prognosis. It is important to select adequate therapeutic options based on reliable prognostic factors using imaging studies and clinical data.

Prognostic factors were analyzed in patients with HCC with PVTT in the first branch or main trunk of the portal vein. From 2012 to 2022 107 consecutive patients with HCC with PVTT in the major portal vein were reviewed, and diagnostic images and clinical characteristics were retrospectively observed. Thirty-eight possible prognostic factors for survival were analyzed by the log-rank test and multivariate analysis using Cox's proportional hazards model. Median overall survival was 14 months following PVTT diagnosis. Survival rates at 6 months, 1, 2, and 3 years were 72.1%, 52.6%, 32.6%, and 29.6%, respectively. Independent prognostic factors for longer survival included: patient age < 65 years, Child-Pugh classification A/B, PVTT treatment, accumulation of Lipiodol in the PVTT after TACE, initial radical treatment for HCC, HCC located in a single lobe of the liver, and no invasion of HCC to the hepatic vein or bile duct.

Survival was associated with liver function, tumor extension, and treatment for HCC and PVTT.

PU-1080

小肠 ct 评分在 CD 诊断中的价值

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【摘要】目的：验证克罗恩病（CD）的小肠 CT（CTE）评分方法，与内镜、临床评分比较，探讨 CTE 的诊断价值。**方法：**回顾性分析 2018 年至 2022 年安徽医科大学第二附属医院 CD 确诊患者，用初拟定 CTE 评分方法分别对两组患者评分，结果绘制工作特征曲（ROC）曲线，从而进行验证，观察评分系统效能，同时比较 CTE 指标中肠壁强化与临床及内镜指标相关性。**结果：**ROC 曲线下面积比较得出 CTE 评分系统曲线下面积较高，灵敏度及特异度也较单纯临床、内镜指标高，肠壁分层强化对诊断 CD 及其鉴别有一定价值，并与临床及内镜评分有正相关。**结论：**CTE 制定的评分标准对 CD 的诊断特异度及灵敏度均较高。

PU-1081

Gd-BOPTA 及 APT 在肝脏局灶性病变诊断中的价值

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【目的】探讨 Gd-BOPTA 及 APT 成像在肝脏局灶性病变诊断中的价值。

【方法】回顾性分析于我院行 3.0T MRI 扫描的肝脏局灶性病变患者，包括良性肿瘤（肝血管瘤）患者 18 例，原发恶性肿瘤患者 20 例（包括肝细胞肝癌患者 12 例，胆管细胞癌患者 8 例），继发恶性肿瘤（肝转移瘤）患者 19 例。所有患者均于术前行 3.0T MRI 扫描，包括常规磁共振扫描序列及 APT 扫描序列，静脉团注对比剂 Gd-BOPTA 后 60 分钟后行肝胆期成像扫描。扫描生成的 APT 图像传输至 ISP 工作站（InteliSpacePortal, Philips Healthcare），经工作站后处理分析得到 APT 图像。以 T2WI 图像为参考，在 APT 与 T2WI 融合图上勾画感兴趣区 ROI，于病灶最大层面放置 3 个 ROI 取均值，计算病灶的 APT 值。在肝胆期图像分别于病灶最大层面与同层面背景肝各放置三个 ROI 取均值，记录信号强度（SI）记为 SI 病灶与 SI 肝脏，于同层右侧椎旁肌放置一个 ROI，记录 SI 与标准差（SD），记为 SI 肌肉与 SD 肌肉。通过下述公式计算信噪比（SNR），对比噪声比（CNR），病灶-肝脏信号强度比（LLR）： $SNR_{病灶} = SI_{病灶} / SD_{肌肉}$ ； $CNR_{病灶} = (SI_{病灶} - SI_{肌肉}) / SD_{肌肉}$ ； $LLR_{病灶} = (SI_{肝脏} - SI_{病灶}) / SI_{肝脏}$ 。

采用方差分析或 Kruskal Wallis 秩和检验比较组内各参数的差异，采用非参数检验比较组间各参数差异。

【结果】良性肿瘤组、原发恶性肿瘤组及继发恶性肿瘤组间的 APT 值（ $P=0.018$ ）及 LLR（ $P<0.001$ ）差异有统计学意义。继发恶性肿瘤的 APT 值为 2.400（1.633, 2.867），显著低于良性肿瘤组（3.517（2.192, 4.858））与原发恶性肿瘤组（5.200（1.283, 8.717））；继发恶性肿瘤的 LLR 值为 0.284（0.193, 0.437），显著低于良性肿瘤组（0.512（0.376, 0.549））与原发恶性肿瘤组（0.173（0.107, 0.390））。

【结论】APT 值与 Gd-BOPTA 扫描肝胆期成像 LLR 的应用在诊断肝脏局灶性病变具有潜在的诊断价值。

PU-1082

胃肠道间质瘤术前 CT 特征及临床因素与预后的关系及复发病灶影像分析

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目的：本研究旨在探索胃肠道间质瘤 GIST 患者术前增强 CT 影像特征及临床病理因素对患者预后的价值，同时分析 GIST 术后首次复发病灶的 CT 影像特征与术前影像及病理因素有无相关性。

方法：回顾性纳入 2011 年 1 月至 2021 年 9 月在我院接受根治性切除手术治疗并病理确诊的 GIST 患者。纳入标准：患者术前 1 月内接受全腹部增强 CT 检查；术后在我院随访时间在 2 年以上。排除标准：患者术前接受了其他 GIST 相关的治疗；接受内镜下剥离手术；肿瘤破裂。采用多因素 Cox 回归分析患者的术前 CT 图像特征、临床病理信息与复发及转移的关系，筛选与预后相关的重要因素，绘制生存曲线；并进一步分析了术后首次复发病灶的 CT 图像特征与其术前影像及临床病理的关系。

结果：最终纳入患者 344 例（复发组 55 例，未复发组 289 例）。单因素分析显示危险度分级、Ki-67 指数、核分裂象、术前肿瘤部位、大小、形状、生长方式、是否坏死/囊变、有无增粗供血动脉或引流静脉及邻近系膜脂肪浸润在复发组与未复发组间差异具有统计学意义 ($P < 0.05$)。多因素分析显示，术前肿瘤大小、有无增粗供血动脉或引流静脉、Ki-67 指数为 GIST 预后的独立危险因素（风险比及 95%CI 分别为 1.863, [1.836-2.887]; 3.918, [2.214-6.934]; 4.458, [1.573-9.635]; $P < 0.05$)。通过 log-rank 检验显示术前肿瘤越大、存在增粗的供血动脉或引流静脉及 Ki-67 指数 > 10 的患者无病生存率明显降低。单因素分析显示复发组患者首次复发病灶的 CT 特征，含大小、形状、强化是否均匀、有无坏死/囊变，与其术前肿瘤位置具有统计学相关性 ($P < 0.05$)；形状、强化是否均匀、有无坏死/囊变及强化程度与肿瘤 Ki-67 指数存在统计学差异 ($P < 0.05$)。

结论：本研究发现 GIST 患者术前增强 CT 影像特征及临床病理因素可以帮助预测 GIST 术后复发情况。GIST 术后复发病灶的影像特征与原发肿瘤的部位及 Ki-67 指数存在相关性。本研究结果可帮助临床医生对胃肠道 GIST 患者判断预后及制定个性化的随访策略，同时增强放射医师在随访时对复发病灶的识别。

PU-1083

双层探测器 CT 在减少腹部弹簧圈金属伪影中的应用价值分析

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目的：探讨双层探测器 CT 的 Sub-OMAR 减影技术、OMAR 去金属伪影技术以及单能量成像在减少上腹部弹簧圈金属伪影中的应用价值。

方法：前瞻性收集在双层探测器 CT 上进行上腹部 CT 血管三维重建扫描的门静脉高压介入术后的患者，总共纳入 71 例腹部有弹簧圈金属伪影的病例。所有病例均进行阈值触发监测扫描，得到动脉期、门脉期和静脉期图像。每个期相均重建 6 种图像，包括常规图像，虚拟平扫图像，OMAR+常规图像，40keV 单能量图像，OMAR+40keV 单能量图像，OMAR+40keV 单能量图像减去同期相的虚拟平扫图像得到的 Sub-OMAR 图像。定量计算常规图像、OMAR+常规图像、OMAR+40keV 单能量图像、Sub-OMAR 图像的信噪比 (SNR)、对比噪声 (CNR) 和背景噪声。由两名独立的高年资放射科医师使用线圈伪影评分 (CA 评分：5 分 Likert 量表) 对所有图像的伪影进行定性评估。所得结果均进行统计学分析，当 $P < 0.05$ 时，差异有统计学意义。

结果： 相比于常规图像，OMAR+常规图像、OMAR+40keV 单能量图像、Sub-OMAR 图像的 SNR、CNR 和 CA 评分都得到了提高 ($P<0.05$)。另外，根据 CA 评分结果，发现 Sub-OMAR 图像比常规图像，OMAR+常规图像和 OMAR+40keV 单能量图像的去金属伪影效果更好 ($P<0.05$)，有利于显示上腹血管，特别是门静脉血管。

结论： 双层探测器 CT 的 OMAR 去金属伪影技术可以明显降低腹部 CT 图像的金属弹簧圈伪影，提高腹部血管 CT 图像的图像质量，有利于临床诊断和疗效评估。

PU-1084

Bronchogenic cyst mimicking as gastric neoplasm

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Bronchogenic cysts are congenital abnormalities usually occurred in the thorax . Anatomopathological standard criteria for inclusion were pseudostratified , ciliated and columnar epithelium together with the exist of at least one of the following : cartilage , smooth muscle or seromucous glands . The occurrence of these cysts in the abdominal cavity is rare . Here , we report a case (a 67- year - old man) who had no clinical symptoms and were found by chance to have a mass adjacent to the gastric cardia after routine physical examination . We found his computed tomography imaging features , including spherical cystic mass in the gastric cardia region . The mass is hypointense on T1WI, hyperintense on T2WI and hyperintense on DWI , with high ADC values and none enhancement . Accurate preoperative diagnosis remains difficult and only histology can provide a definitive diagnosis . Surgery retains the treatment of choice .

PU-1085

腹部 CT 平扫结合 QCT 身体成分值在腰椎骨密度评估的可行性

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分析行腹部 CT 平扫的患者的腰椎骨密度 (bone mineral density, BMD) 与身体组分、腰椎椎体、椎旁肌 CT 值的相关性，并建立基于 CT 衰减值的 BMD 的预测模型。方法：收集行全腹部 CT 平扫的中老年患者共 202 例 (64.21±0.72 岁，男 107 例，女 95 例)，采用定量 CT (QCT) 测量 L1~L3 的 BMD、肾门水平层面腹部总肌肉量 (面积)、腹内脂肪 (VAT)、皮下脂肪 (SAT)、椎旁肌内脂肪含量 (面积)，计算 VAT/SAT 值、腰椎平均骨密度 (vBMD)。在轴位图像上分别测量 L1~L3 椎体 CT 值及椎旁肌 CT 值，重复测量三次并取平均值。分析患者年龄、性别、身体组分及 L1~L3 椎体 CT 值、椎旁肌 CT 值与 BMD 相关性，根据 QCT 测量的 BMD 将受检者分为骨量正常组、低骨量组、骨质疏松 (OP) 组。分别以年龄、性别分层后，对不同骨质状态患者身体组分差异进行分析。采用线性回归建立基于 CT 衰减值的预测模型。结果：总肌肉量、腰椎 CT 值、椎旁肌 CT 值均与 BMD 呈正相关 (校正后 r 分别为 0.208、0.700、0.683, $P<0.001$)，椎旁肌脂肪含量与 BMD 呈负相关 (校正后 $r=-0.585$, $P<0.001$)，VAT/SAT 与 BMD 无相关性 ($P=0.931$)。以年龄进行分层，相同骨质状态下，VAT/SAT、椎旁肌脂肪含量、腰椎及椎旁肌 CT 值差异均无统计学意义 ($P>0.05$)。以性别进行分层，男性、女性总肌肉量、VAT/SAT、椎旁肌脂肪含量差异均有统计学意义 ($t=-8.114$ 、 -7.633 、 3.522 , $P<0.05$)；男性、女性腰椎及椎旁肌 CT 值差异无统计学意义 ($t=-1.93$ 、 -1.186 , $P=0.055$)。基于 CT 衰减值的回归方程为： $BMD = -42.08 + 0.415 \times \text{腰椎 CT 值} + 1.953 \times \text{椎旁肌 CT 值}$ ($F=187.68$, $P<0.001$, 调整 $R^2=0.651$)。模型纳入椎旁肌 CT 值后， R^2 值增加了 0.118 ($P<0.001$)。结论：腰椎及椎旁肌 CT 值与 BMD 呈正相关，椎旁肌的脂肪含量与 BMD 呈负相关，腰椎及椎旁肌 CT 值在一定程度上能够反映骨质状态。

PU-1086

前列腺临床显著癌列线图预测模型建立及外部验证

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目的

建立及验证基于 PI-RADS V2.1 前列腺临床显著癌列线图预测模型。

方法

回顾性纳入 2019 年-2021 年昆明医科大学第一附属医院（训练集）、2020 年-2022 年个旧市人民医院（测试集）因怀疑前列腺癌而行 MRI 检查并 3 月内行穿刺活检或根治性手术患者，基于 PI-RADS V2.1 进行规范化扫描及评分，测量 ADCmean 值，收集首次 PSA 及相关值。采用 SPSS 27.0 和 R.4.2.2 进行数据分析，多重插补方式填补缺失值，病理为金标准，以临床显著癌为预测结局；逻辑回归筛选独立预测因素，对比 PI-RADS、PI-RADS +ADCmean、PI-RADS+PSAD、PI-RADS+ADC+PSAD 四种诊断方法，以 ROC 曲线下面积及其 95%置信区间、敏感性、特异性、阳性预测值和阴性预测值评价，并绘制决策曲线。“rms”包构建最佳诊断方案列线图，ROC 曲线下面积进行外部验证。

结果

训练集 399 例于 PI-RADS 1~5 分中，检出前列腺临床显著癌比例分别为 2%、6%、0%、22%、72%，测试集 120 例比例为 0%、7%、25%、56%、82%；逻辑回归分析显示 PSAD、PI-RADS 评分、ADCmean 是前列腺临床显著癌的独立预测因素，OR 值分别为：4.602(95%CI: 1.555-2.991)、2.156(95%CI: 2.330-9.087)、0.031(95%CI: 0.003-2.991)。上述四种诊断方法 AUC 分别为 0.890 (95%CI: 0.872-0.909)、0.916 (95%CI: 0.898-0.934)、0.926 (95%CI: 0.910-0.943)、0.931 (95%CI: 0.915-0.947)，临床决策曲线示 PI-RADS+ADC+PSAD 最高临床获益，以 0.374 为截断点，特异度 0.886、灵敏度 0.884、阳性预测值 0.754、阴性预测值 0.951。外部验证曲线下面积 AUC 值为 874(95%CI: 0.771-0.901)。

结论

PI-RADS 评分+ADC+PSAD 列线图预测模型具有较好的诊断效能，有助于指导制订个体化的诊疗方案，避免不必要穿刺。

PU-1087

基于 4D Flow MRI 技术评价慢性肾病患者腹主动脉顺应性的临床研究

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目的：探讨 4D Flow MRI 评估慢性肾病（CKD）患者腹主动脉血流动力学变化的价值。

方法：回顾性分析 2021 年 3 月至 2023 年 5 月 73 例常州市第一人民医院临床诊断为 CKD 的患者及 13 例健康志愿者，所有受试者均行腹主动脉 4D Flow MRI 检查，健康志愿者作为正常对照组（D 组），CKD 患者以肾小球滤过率（GFR）为依据分为 A 组（ $GFR \geq 60 \text{ mL} \cdot \text{min}^{-1} \cdot 1.73 \text{ m}^{-2}$ ）、B 组（ $30 \leq GFR < 60 \text{ mL} \cdot \text{min}^{-1} \cdot 1.73 \text{ m}^{-2}$ ）、C 组（ $GFR < 30 \text{ mL} \cdot \text{min}^{-1} \cdot 1.73 \text{ m}^{-2}$ ）。4D Flow MRI 数据采用后处理软件 CVI 42 进行分析，测量四组腹主动脉近端（平面 1）、腹腔干开口处（平面 2）、肠系膜上动脉开口处（平面 3）、较高一侧肾动脉开口处（平面 4）、腹主动

脉近髂血管分叉处（平面 5）的脉搏波速度（PWV）、壁剪切应力（WSS）等血流动力学参数。采用非参数 Kruskal-Wallis 检验评估 D 组与 CKD 患者之间的血流动力学差异；采用 Sperman 秩相关分析 eGFR 与 PWV、WSS 之间的相关性；采用多因素线性回归，纳入并校正各混杂因素分析 PWV 及最大 WSS 的独立影响因素。

结果：1. 与 D 组相比，CKD 患者 PWV 升高，平面 1-4 B 组、C 组最大 WSS 均减低，平面 2-3 B 组、C 组平均 WSS 减低，平面 4 B 组平均 WSS 减低（ P 均 <0.05 ）。2.eGFR 与 PWV 呈负相关性（ $P=0.006$ ）；平面 1-3 最大 WSS 与 eGFR 呈正相关（ P 均 <0.05 ）。3.校正混杂因素后，eGFR 为 PWV、平面 1-3 最大 WSS 的独立影响因素（ P 均 <0.05 ）。

结论：CKD 患者较正常人 PWV 升高、平均速度及 WSS 减低，提示动脉僵硬性升高、顺应性减低，且 eGFR 是 PWV、WSS 独立影响因素之一。因此，4D Flow MRI 在评估 CKD 患者主动脉顺应性方面具有一定的临床价值。

PU-1088

Based on preoperative IVIM and DWI for prediction of Vessels That Encapsulate Tumor Clusters Pattern in Hepatocellular Carcinoma

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Purpose: To estimate the potential of preoperative intravoxel incoherent motion (IVIM) and diffusional weighted imaging (DWI) in the prediction of VETC pattern in HCC.

Materials and Methods: This prospective study included 116 patients with HCC treated with surgical resection between April 2018 and February 2023 and who underwent preoperative MRI scan of IVIM and DWI. Two radiologists independently reviewed the radiologic features and the apparent diffusion coefficient (ADC), true diffusion coefficient (D), pseudodiffusion coefficient (D*), and pseudodiffusion component fraction (f) were also measured. Predictors associated with VETC pattern were determined by using logistic regression analyses. Receiver operating characteristics (ROC) curve analyses were performed to evaluate the diagnostic performance. Early recurrence (within 2 years) were evaluated by using Kaplan-Meier analysis.

Results: The consecutive cohort included 116 patients (median age, 54 years; 94 man). Twenty-nine of the 116 HCCs (25%) were VETC-HCCs. f value (OR, 0.79; 95% CI: 0.70, 0.90; $P < 0.001$), high serum α -fetoprotein (AFP) level (> 400 ng/mL) (OR, 2.96; 95% CI: 1.04, 8.45; $P = 0.042$), intratumor necrosis (OR, 6.02; 95% CI: 1.43, 25.41; $P = 0.015$) were independent predictors for VETC pattern, these features were used for establishing prediction model, the area under the ROC curve of this prediction model was 0.85 (95% CI: 0.77~0.94). Kaplan-Meier survival analysis showed that patients with VETC HCCs had higher risk of early recurrence than those with non-VETC HCCs ($p < 0.001$), and showed that patients with model VETC HCCs also had higher risk of early recurrence than those with model non-VETC HCCs ($p = 0.014$).

Conclusion: IVIM can improve preoperative prediction of VETC pattern in HCC and evaluate its prognosis.

PU-1089

肠气囊肿症 2 例个案报道

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肠气囊肿症 (Pneumatosis cystoids intestinalis, PCI) 是指胃肠道的黏膜下或浆膜下出现的气性囊肿, 是一种罕见疾病, 目前几乎所有关于 PCI 的研究均为个案分析。现将我院放射科诊断的 2 例 PCI 患者报告如下, 以提高放射科医生对本病的认知及诊断水平。

PU-1090

基于钆塞酸二钠增强 MRI 肝胆特异期影像组学模型评估肝纤维化分期及炎症活动度分级的诊断价值

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目的 探讨基于钆塞酸二钠 (Gd-EOB-DTPA) 增强 MRI 肝胆特异期影像组学模型评估肝纤维化分期及炎症活动度分级的诊断价值。方法 回顾性纳入 331 例已行钆塞酸二钠增强 MRI 检查且具有明确肝纤维化分期与炎症活动度分级病理结果的患者及无纤维化进展与活动性炎症的人群, 病理结果使用 Scheuer 评分系统进行评价。将研究人群按 8: 2 比例随机分为训练组与测试组, 对患者肝胆特异期图像整个肝脏层面进行勾画获得感兴趣区 (ROI), 勾画过程中避开病灶、大血管、胆囊, 对已勾画 ROI 进行特征提取, 使用支持向量机 (Support vector machine, SVM) 构建影像组学模型, 使用受试者工作特征曲线 (ROC) 评估模型性能。结果 影像组学模型诊断进展期肝纤维化 (S0-2 vs S3-4) 训练集 AUC 为 0.898 (95%CI 0.855-0.940), 测试集 AUC 为 0.886 (95%CI 0.679-1.000), 灵敏度为 0.850, 特异度为 0.867, 准确度为 0.848; 影像组学模型诊断轻中度活动炎症 (G0-2 vs G3-4) 训练集 AUC 为 0.913 (95%CI 0.858-0.968), 测试集 AUC 为 0.895 (95%CI 0.676-1.000), 灵敏度为 0.875, 特异度为 0.684, 准确度为 0.727。结论 基于钆塞酸二钠增强 MRI 肝胆特异期影像组学模型可用于无创性诊断进展期肝纤维化及轻中度活动炎症, 为临床行抗炎及逆转纤维化治疗决策提供一定参考价值。

PU-1091

基于扩散加权成像的虚拟 MR 弹性成像鉴别前列腺癌和前列腺增生的价值

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摘要: 目的: 基于扩散加权成像 (DWI) 的虚拟 MR 弹性成像 (VMRE) 在前列腺癌 (PCa) 与前列腺增生 (BPH) 中的鉴别诊断价值。方法: 回顾性分析 2023 年 3 月至 2023 年 8 月于我院接受 MRI 平扫及双 b 值 ($b=200$ s/mm²、 1000 s/mm²) DWI 扫描的 38 例前列腺疾病者临床资料, 其中 18 例经手术或穿刺病理学证实为 BPH, 26 例证实为 PCa。选取 DWI 图, 对照 T2WI 序列及病理结果在 ITK-SNAP 软件上对前列腺病灶进行 2D 感兴趣区 (ROI) 勾画。根据放置在前列腺病灶上的 ROI 的 DWI 值计算偏移表观扩散系数 (sADC), 根据 VMRE 方法计算基于扩散的 VMRE 值。采用 t 检验对 PCa 组织和 BPH 组织的平均 VMRE 值做差异性分析。结果: BPH 的 VMRE 值显著低

于 PCa 的 VMRE 值, 差异具有统计学意义($P<0.05$)。结论: 基于扩散加权成像的虚拟 MR 弹性成像值有助于鉴别诊断 PCa 和 BPH。

PU-1092

Differentiation of non-cirrhotic hepatocellular carcinoma and benign liver lesions by CT enhanced features

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Purpose

Most of the patients with hepatocellular carcinoma (HCC) in my country have a basic cirrhosis history, and previous studies on the imaging features of HCC were mostly conducted in the background of liver cirrhosis. However, there are still about 8% to 20% of patients who don't have a basic cirrhosis history at the time of HCC diagnosis. Computed tomography (CT) enhancement features of HCC and benign liver lesions have some overlapping features. It is difficult to differentiate HCC from other benign lesions in a non-cirrhotic background. The aim of this study was to analyze the differences in CT enhancement findings in differentiating non-cirrhotic HCC from other benign liver lesions, in order to improve the diagnostic performance of enhanced imaging for HCC in non-cirrhotic backgrounds.

Methods

A total of 59 non-cirrhotic patients with HCC confirmed or suspected to be HCC in our hospital were collected, and they were divided into HCC group and benign lesion group according to the final pathological results. Univariate analysis was performed on the basic clinical information of the patients and its CT-enhanced images, and the lesion size, enhancing capsule, nonrim arterial phase hyperenhancement, heterogeneous enhancement, nonperipheral washout, border, necrosis or scarring conditions were calculated, and the relative wash-out and the lesion to liver contrast ratio were calculated separately, and the meaningful results in univariate analysis were screened out, and multivariate Logistic regression analysis was performed on them to determine the independent predictors about differentiation of non-cirrhotic hepatocellular carcinoma and benign liver lesions. Receiver operator characteristic curve (ROC) was drawn to evaluate its predictive performance.

Results

A total of 29 patients were pathologically diagnosed as HCC, and 30 patients had benign lesions. The results showed that the median age of the patients in the HCC group was 53.0 (48.0; 63.5) years; the median age of the patients in the benign lesion group was 34.5 (28.8; 48.3) years, and there was a statistically significant difference in age between the two groups ($P<0.001$). Seventeen patients (59%) in the HCC group had a history of hepatitis; 2 patients (6%) in the benign lesion group had a history of hepatitis, and the difference between the two groups was statistically significant ($P<0.001$). The median lesion to liver contrast ratio in the HCC group was 39.3 (16.6; 63.7); the median lesion to liver contrast ratio in the benign lesion group was 93.5 (62.1; 138.7), and the difference in the lesion to liver contrast ratio between the two groups was statistically significant ($P<0.001$). The median relative wash-out of the HCC group was 39.7 (33.8; 48.5); the median relative wash-out of the benign lesion group was 19.5 (7.4; 27.2), and the difference between the two groups was statistically significant ($P<0.001$). The enhancing capsules were found in 18 (62%) HCC lesions compared with 8 (27%) benign lesions, suggesting that non-cirrhotic HCCs were more likely to have enhancing capsule than benign lesions ($P=0.006$). Twenty-four (83%) HCC lesions had nonperipheral washout, while 12 (40%) were benign lesions, suggesting that non-cirrhotic HCC was more prone to nonperipheral washout than benign lesions ($P=0.001$). Gender ratio, body mass index (BMI), triglycerideemia, hypercholesterolemia, unclear boundary, necrosis or scar, and nonrim arterial phase hyperenhancement, heterogeneous enhancement signs between the two groups and lesion size were not significantly

different. Multivariate analysis showed that patient's age (OR=0.884, 95% CI 0.820-0.952, P=0.001), hepatitis history (OR=9.499, 95% CI 1.204-74.934, P=0.033), the lesion to liver contrast ratio (OR=1.015, 95% CI 1.001-1.029, P=0.040) and the relative wash-out (OR=0.932, 95% CI 0.880-0.986, P=0.014) were independent predictors for differentiating cirrhotic HCC from benign lesions. After the ROC curve was constructed, the area under the curve (AUC) of patient's age, hepatitis history, the lesion to liver contrast ratio, and the relative wash-out were 0.839, 0.760, 0.779, and 0.815, respectively.

Conclusions

1. The lesion to liver contrast ratio and relative wash-out obtained based on enhanced CT can provide reference value for the identification of non-cirrhotic HCC and benign liver lesions.

2. The patient's age and hepatitis history are of great significance in differentiating non-cirrhotic HCC from benign liver lesions.

PU-1093

螺旋 CT 中胸腹部增强扫描联合泌尿系三维重建技术在泌尿系统检查中的应用

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目的: 探讨多层螺旋 CT 中胸腹部增强扫描联合泌尿系三维重建技术的要点和可行性。

方法: 使用多层螺旋 CT 胸腹部增强检查中疑诊为泌尿系统疾病的患者共计 80 例, 其中男性 53 例, 女性 27 例, 年龄在 30~60 岁之间, 讨论并总结检查过程中的技术要点, 搜集完整的 CT 平扫及多期扫描三维重建资料, 后经工作站作一系列三维重组处理, 由放射科 2 名高年资医师评定图像的应用价值。

结果: 80 例患者图像成像质量优良, 内容丰富直观, 均满足临床诊断需要。多层螺旋 CT 三维重建技术相对于普通多螺旋 CT 平扫的在泌尿系统检查中的定位准确率有显著优势。

结论: 多层 CT 泌尿系三维重建技术具有安全、快速、高分辨率、高分辨率的优点, 在诊断和定性诊断方面具有独特的优越性, 能为临床诊断和诊断提供准确、可靠的基础。

多层螺旋 CT 胸腹增强联合泌尿系三维重建技术, 在泌尿系及下消化道、生殖系统等方面有一定优势, 尤其是延迟期薄层扫描三维重建是对泌尿系梗阻性疾病的检查较为理想的一种影像学检查方法。三维重建后获得的图像, 能对病变进行不同方位、不同角度的观察, 与传统的横轴位 CT 扫描相比, 在泌尿系统阻塞性疾病的诊断上, 更全面、更准确。且方法简便易行, 可行性高, 值得临床推广。

PU-1094

双能量 CT 扫描成像对肝癌经肝动脉导管化疗栓塞术后碘油沉积缺损区的监测分析

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目的 探讨双能量 CT 扫描成像对肝癌经肝动脉导管化疗栓塞(TACE)术后碘油沉积缺损区以及病灶周边区变化的监测优势.方法 选取 45 例肝癌患者,比较 A 法(常规 CT 成像)与 B 法(双能量成像)对 TACE 术后碘油沉积缺损区和病灶周边区病变强化的评估结果,对明确诊断病例再对比 DSA 结果.计算出两种方法的准确度、特异度以及敏感度.结果 45 例患者中,DSA 检查显示术后残余病灶 42 个,病灶强化 39 处;45 例患者,术后 DSA 检查观察到强化病变 36 例,无强化病变 9 例;A 法显示强化病变 26 例,无强化病变 19 例;B 法显示强化病变 34 例,无强化病变 11 例.A 法对强化病变的诊断准确

度、以及敏感度高于 B 法($P<0.05$),两种成像方法的特异度相比差异无统计学意义($P>0.05$).结论双能量 CT 扫描成像对于肝癌 TACE 术后碘油沉积缺损区和病灶周边区变化的监测,能提升对强化病变的诊断准确度和敏感度,对临床评估治疗有着重要指导作用.

PU-1095

光谱 CT 三维定量分析评估胰腺导管腺癌新辅助化疗疗效

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目的:探讨基于光谱 CT 三维定量分析在胰腺导管腺癌(PDAC)新辅助化疗疗效评估中的应用价值。

方法:回顾性收集重庆市人民医院 2021 年 10 月至 2023 年 6 月的 29 例经病理证实且行新辅助化疗的 29 例 PDAC 患者,其中男性 8 例,女性 21 例,平均年龄 61.79 ± 9.46 岁。所有患者化疗前后均行上腹部光谱 CT 检查。由两名有 3 年和 10 年腹部放射影像诊断经验的放射科医师进行回顾性分析门脉期图像。采用以下量化指标:(I)大小:最大径、体积;(II)碘浓度(IC):平均 IC、总 IC;(III)有效原子序数(Z-eff):平均 Z-eff、总 Z-eff。应用 SPSS 27.0 软件,组间差异分析:各量化指标使用非参数检验方法即配对样本的秩和检验进行分析。ROC 曲线分析各量化指标诊断效能及截断值。

结果:PDAC 病灶化疗前后最大径和体积变化率分别为: $0.11 (-0.01, 0.27)$, $0.30 (-0.05, 0.52)$; $Z=-4.018$, $P<0.001$; 平均 IC 和总 IC 变化率分别为 $-0.01 (-0.14, 0.28)$, $0.41 (-0.12, 0.61)$; $Z=-4.928$, $P<0.001$ 。平均 Z-eff 和总 Z-eff 变化率分别为 $-0.001 (-0.01, 0.02)$, $0.30 (-0.05, 0.52)$; $Z=-4.928$, $P<0.001$ 。PDAC 病灶化疗前后最大径变化率 AUC: 0.752, 95% 置信区间: 0.707-0.845, 截断值: 0.193, 敏感度: 57.1%, 特异性: 93.3%。体积变化率 AUC: 0.776, 95% 置信区间: 0.728-0.863, 截断值: 0.222, 敏感度: 85.7%, 特异性: 73.3%; 总 IC 变化率 AUC: 0.795, 95% 置信区间: 0.679-0.826, 截断值: 0.191, 敏感度: 92.9%, 特异性: 60%; 总 Z-eff 变化率 AUC: 0.800, 95% 置信区间: 0.734-0.866, 截断值: 0.167, 敏感度: 85.7%, 特异性: 66.7%。

结论:基于光谱 CT 的三维定量参数总碘含量和总有效原子序数值可以有效评估 PDAC 患者新辅助化疗疗效。

PU-1096

多层螺旋 CT 中胸腹部增强扫描联合泌尿系三维重建技术在泌尿系统检查中的应用

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层螺旋 CT 中胸腹部增强扫描联合泌尿系三维重建技术在泌尿系统检查中的应用

目的:探讨多层螺旋 CT 中胸腹部增强扫描联合泌尿系三维重建技术的要点和可行性。

方法:使用多层螺旋 CT 胸腹部增强检查中疑诊为泌尿系统疾病的患者共计 80 例,其中男性 53 例,女性 27 例,年龄在 30~60 岁之间,讨论并总结检查过程中的技术要点,搜集完整的 CT 平扫及多期扫描三维重建资料,后经工作站作一系列三维重组处理,由放射科 2 名高年资医师评定图像的应用价值。

结果 80 例患者图像成像质量优良,内容丰富直观,均满足临床诊断需要。

结论 多层螺旋 CT 胸腹增强联合泌尿系三维重建技术,在泌尿系及下消化道、生殖系统等方面有一定优势,且方法简便易行,可行性高,值得临床推广。

结论• 1.多层螺旋 CT 泌尿系三维重建技术方法安全、扫描快速、图像具有高分辨率,能对泌尿系统进行较全面的显示,对泌尿系梗阻性疾病的定位、定性诊断方面独具优势,提供了准确可靠的依据以满足临床上的诊治需求,是对泌尿系梗阻性疾病的检查较为理想的一种影像学检查方法。• 2.三维重建后获得的图像,能对病变进行不同方位、不同角度的观察,与常规横轴位 CT 平扫相比较,在诊断泌尿系梗阻性疾病方面具有较全面的优势。

PU-1097

磁共振弥散加权成像在子宫腺肌病磁共振引导聚焦超声即时疗效监测中的应用

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目的: 探讨磁共振扩散加权成像 (DWI) 在即时评估子宫腺肌病磁共振引导聚焦超声 (MRgFUS) 治疗后消融效果的作用。

方法: 经治疗腺肌病患者 38 例 (平均年龄, 32.4 岁; 年龄范围, 24-49 岁), 分别于术前、术后 1 个月、3 个月、6 个月、12 个月行磁共振检查, 磁共振检查包括常规自旋回波, 扩散加权成像和动态增强成像。治疗过程中分别在治疗前、规划治疗结束后进行 DWI 扫描, 最后行磁共振增强延迟扫描判断消融体积 (NPV)。通过测量病灶消融区域内 DWI 高信号范围和磁共振增强延迟扫描后无强化区, 比较二者 NPV 的差异。

结果: MRgFUS 治疗前子宫腺肌病病灶平均体积为 $(96.24 \pm 7.52) \text{cm}^3$ 。DWI 成像中在 $b=800 \text{s/mm}^2$ 时对病灶消融后的凝固性坏死显示效果好, 呈较为均质的高信号, 弥散受限, ADC 值平均值为 $1.48 \times 10^{-3} \text{mm}^2 / \text{s}$ 。术后即刻 DWI 下的病灶消融体积为 $(80.53 \pm 5.32) \text{cm}^3$, 小于增强后的 NPV $(84.48 \pm 10.42) \text{cm}^3$, 二者的 NPV% 均值分别为 $(82.41 \pm 6.80) \% \text{ VS } (84.32 \pm 4.16) \%$, 无明显统计学差异 ($P > 0.05$)。

结论: 由于 MRI 增强后的残余病灶无法继续行 MRgFUS 治疗, 与常规磁共振比较, 扩散加权成像能即刻敏感、特异地反映 MRgFUS 术后子宫腺肌病病灶的消融区域, 可作为监测其疗效的重要指标之一。

PU-1098

磁共振引导聚焦超声联合 GnRH-a 治疗难治性子宫腺肌病的短期临床疗效分析

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目的

探讨磁共振引导聚焦超声 (MRgFUS) 与促性腺激素释放激素激动剂 (GnRH-a) 治疗难治性子宫腺肌病的临床疗效。

方法

以本院 2019 年 12 月至 2022 年 2 月间收治的 38 例难治性子宫腺肌病患者为研究对象, 将 MRgFUS 前后连续注射 GnRH-a 3 次以的患者设为观察组 ($n=22$), 将单独接受 MRgFUS 设为对照

组(n=16)。比较两组患者治疗后 3、6 个月子宫体积、疼痛评分、月经量 PBAC 评分以及不良反应方面的情况。

结果

治疗 6 个月后观察组患者的子宫体积 $[(101.22\pm 4.85)\text{cm}^3]$ 小于对照组 $[(125.48\pm 10.46)\text{cm}^3]$, 差异有统计学意义($t=3.01$, $P<0.05$)。6 个月后观察组患者的痛经程度 $[(0.26\pm 0.08)\text{分}]$ 低于对照组 $[(1.12\pm 0.26)\text{分}]$, 差异有统计学意义($t=2.21$, $P<0.05$)。治疗后 3、6 个月, 观察组的月经量 PBAC 评分均低于对照组 $[(64.57\pm 10.16)\text{分 vs } (76.45\pm 18.12)\text{分}、(48.46\pm 11.28)\text{分 vs } (62.26\pm 12.46)\text{分}]$, 差异有统计学意义(术后 3 个月 $t=4.21$, $P<0.05$; 术后 6 个月 $t=3.48$, $P<0.05$)。治疗后 6 月两组腺肌病病灶体积平均缩小率分别为 66%、60%, 两组病灶体积缩小率比较, 差异均无统计学意义($P>0.05$)。

结论

磁共振引导聚焦超声(MRgFUS)与促性腺激素释放激素激动剂(GnRH-a)联合使用有助于子宫腺肌病症状缓解和疗效提升。

PU-1099

CT 影像组学模型在结石性肾积脓术前诊断中的应用价值

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目的: 结石性肾积脓的紧急识别和及时治疗对于防止患者出现尿源性败血症和脓毒性休克等不良预后至关重要。本研究旨在探讨 CT 影像组学模型在结石性肾积脓术前诊断中的应用价值。

方法: 回顾性分析了 182 例在我院因上尿路结石行经皮肾造瘘患者的临床资料及 CT 影像学资料。通过单因素和多因素逻辑回归分析筛选出独立临床因素来构建临床模型。将所有患者按 7:3 的比例随机分为训练集和验证集。基于腹部 CT 平扫图像勾画积水或积脓感兴趣区, 采用 Pyradiomics 软件提取影像组学特征, 并通过 Lasso 回归降维筛选出影像组学特征来计算影像组学评分, 并构建影像组学模型。将影像组学评分和独立临床指标联合构建临床-影像组学模型。通过 ROC 和 DCA 曲线评价不同模型诊断结石性肾积脓的性能。

结果: 182 例患者中, 129 例患者被诊断为肾积水, 53 例被诊断为肾积脓。根据 7:3 比例, 123 例被纳入训练集, 59 例被纳入验证集。多因素逻辑回归分析显示发热 ($p<0.001$)、血中性粒细胞计数 ($p<0.001$) 和尿白细胞计数 ($p=0.002$) 是结石性肾积脓的独立危险因素。共提取 1210 个特征, 经过特征筛选, 最终选取 8 个影像组学特征来计算影像组学评分。训练集和验证集中, 肾积水和肾积脓组影像组学评分均存在显著性差异 (训练集: $0.19 \text{ vs } -1.69$, $p<0.001$; 验证集: $-0.48 \text{ vs } -1.96$, $p<0.001$)。临床-影像组学模型的诊断效能最佳, 训练集所对应的曲线下面积(AUC)、灵敏度、特异度分别为 0.965、0.882、0.944; 验证集所对应的 AUC、灵敏度、特异度分别为 0.940、0.947、0.825。此外, DCA 曲线显示在大多数阈值概率下, 临床-影像组学模型的净收益高于临床模型和影像组学模型。

结论: 临床-影像组学模型在术前识别结石性肾积脓中具有较高的诊断效能, 有助于临床医生提高诊断效率, 实施紧急决策, 防止患者出现不良预后。

PU-1100

自然位 X 线侧位片在精确评价腰椎生理曲度异常的应用价值

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摘要：目的 研究自然位 X 线侧位片对腰椎生理曲度异常评价的价值。

方法 选择临床怀疑腰椎疾病的不同年龄段患者 67 例，其中男 28 例，女 39 例，平均 43.5 ± 2.1 岁，均行自然位和常规体位的 X 线摄影，其中自然位只摄腰椎侧位片。常规腰椎侧位摄影体位为：受检者侧卧于摄影床上，拍摄时使用“影像多功能角度尺”，使身体的正中矢状面平行于床面，双侧髋关节和膝关节屈曲。第三腰椎棘突置于照射野中线后 5cm，中心线经第三腰椎垂直射入。使摄影距离 115cm，设备型号为西蒙门子。自然位摄影体位及方法：受检者站立于摄影架前，右侧靠近摄影架，后背靠近直立竖板，双上肢平举，要求患者的头后部、背部、臀部、小腿、双脚后跟均紧贴直立竖板面，使受照者处于自然站立的自然位，腰部置于照射野中线，中心线经第三腰椎后缘垂直摄入，摄影距离及设备同常规体位。三位富有经验的主管技师对两种体位 X 线片 T12~S1 的弓顶距离进行测量，取平均值进行统计。

结果： 常规体位弓顶距离为 16.9 ± 1.21 mm，自然位为 19.5 ± 1.25 ，常规体位较自然位测量的弓顶距较大。

结论 人体自然位为关节肌肉最佳体位，对于需在自然位上牵引、推拿等治疗并需评价疗效的患者，为确保评价前后拍摄一致性，应摄自然位 X 线侧位片。

PU-1101

多发性骨髓瘤的 X 线、CT、MRI 和 ^{18}F -FDG PET/CT 诊断价值

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目的：探讨多发性骨髓瘤在 X 线、CT、MRI 及 ^{18}F -FDG PET/CT 上的表现，提高对多发性骨髓瘤在影像学上的认识。方法：对经病理及临床确诊的 110 例多发性骨髓瘤患者的影像学资料进行回顾性分析。结果：110 例中 X 线 94 例，发现异常 62 例，诊断符合率 65.9%；CT 90 例，发现异常 82 例，诊断符合率 91.1%；MRI 36 例，发现异常 34 例，诊断符合率 94.4%； ^{18}F -FDG PET/CT 15 例，发现异常 14 例，诊断符合率 93.3%。4 种检查方法对多发性骨髓瘤诊断符合率之间差异有统计学意义 ($\chi^2=26.18$, $P<0.05$)，X 线诊断符合率低于另外三种检查，差异有统计学意义 ($\chi^2=25.98$, $P<0.05$)；CT、MRI 及 ^{18}F -FDG PET/CT 三种检查结果无统计学差异 ($\chi^2=0.43$, $P>0.05$)。多发性骨髓瘤 X 线及 CT 主要表现是骨质稀疏、膨胀及破坏，伴有病理性骨折及软组织肿块，少数有骨质硬化；MRI 表现为 T1WI 低信号，T2WI 为高信号，典型变现为“盐-椒征”； ^{18}F -FDG PET/CT 表现为相匹配的 ^{18}F -FDG 高摄取灶及骨质溶骨性改变。结论：多发性骨髓瘤的影像学表现具有特征性，四种检查方法各有优势，认识及了解其影像学表现，对诊断多发性骨髓瘤具有重要作用。

PU-1102

甲磺综合征临床及影像特征

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目的: 探讨甲髌综合征的临床、影像特点, 提高本病的诊断能力。

方法: 提供我院两例病例, 并查阅相关文献, 分析归纳甲髌综合征的临床、影像特点。

结果: 例 1: 男, 12 岁。主因双肘外翻、走路易摔跤, 身高较矮就诊。查体: 身高 1.32 米。患儿双侧指甲角化不良、变薄, 并呈勺形凹陷。双手拇指及右侧食指还可见纵裂。双手远位指间关节背侧皮纹浅, 甚至消失 (图 1)。双肘外翻, 双侧髌骨发育小、外移。双侧髌骨后缘可触及骨性突起。X 线表现: 两侧髌骨呈外张状, 髌前上嵴突出。髌骨翼背面中央有对称性水平方向生长的三角状突起, 为髌骨角 (图 2)。双侧桡骨小头脱位, 双侧肱骨外髁及肱骨小头发育不良, 双肘外翻 (图 3、4)。双侧髌骨发育小, 外移 (图 5), 股骨髁间窝加深, 股骨外髁发育稍小 (图 6)。

例 2: 女, 9 岁, 主因拇指发育不良, 双膝疼痛就诊。查体: 双侧拇指指甲发育不良, 有纵裂。双侧髌骨后缘可触及骨性突起。双肘外翻。

X 线表现: 双侧髌骨脱位, 双侧髌骨角比例 1 更明显, 双侧桡骨小头脱位。患儿父亲骨盆平片也见髌骨角。

结论: 当遇到典型的指甲发育不良、髌骨发育不良或缺如、髌骨角和桡骨小头脱位“四联征”时, 要想到甲髌综合征。

PU-1103

手足小骨骨巨细胞瘤的影像分析

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目的: 探讨手足小骨骨巨细胞瘤 (GCT) 的影像特点, 以提高诊断水平。

方法: 回顾分析本院建院来手术病理证实的影像资料齐全的手、足部位的 GCT 影像特点。

结果:

共 16 例, 男 6 例, 女 10 例, 年龄 14~61 岁, 平均 33 岁, 中位年龄 32 岁, 75% 发生于 20~40 岁。发病部位: 手部 5 例, 其中掌骨 2 例, 指骨 3 例。足部 11 例, 其中距骨 4 例, 跟骨 3 例, 跖骨 3 例, 楔状骨 1 例。

X 线平片表现: 16 例均表现为溶骨性骨质破坏, 14 例有膨胀, 短管骨膨胀比跗骨明显。短管骨 8 例均累及骨端, 占据骨的整个宽径, 向干骺端及骨干延伸。4 例 (50%) 见部分皮质不清晰, 破坏消失。5 例病灶内见骨嵴或分隔。1 例 (12.5%) 病灶边缘可见局限性硬化。跗骨 4 例距骨病变位于头部 1 例, 体部 3 例, 均临近关节面下, 3 例呈偏心性分布。3 例跟骨病变位于跟骨前部跟骰关节骨端 2 例, 邻近跟骨结节 1 例, 均为偏心分布。5 例 (62.5%) 跗骨病灶的边缘有硬化边。1 例 (12.5%) 见部分皮质不清晰呈渗透状。3 例病灶内见骨嵴。

CT 表现: 10 例行 CT 检查, CT 比 X 线平片更清楚地显示皮质改变, 病灶内的密度、骨嵴或分隔及周围软组织改变。9 例表现为膨胀性破坏。密度均匀 7 例, 不均匀 3 例, 其中 1 例病灶内见斑片状高密度影。5 例病变内见小骨嵴, 表现为自皮质或病变边缘伸向病变内的短条状高密度影, 类似锯齿状改变。1 例病变内见粗大的分隔。5 例病变边缘可见局限性硬化边。3 例病变皮质部分消失, 呈筛孔状。病理骨折 2 例。1 例增强 CT 显示病变内呈斑片状不均匀强化。

MR 表现: 距骨 1 例, SETWI 病变区呈低信号, 略高于肌肉; T2WI 序列 T2WI 加压脂病变呈不均匀高信号, 其内见不规则斑片状低信号区。

结论: 手、足小骨 GCT 好发于手的掌、指骨及足跗骨的相当于骨端位置, 好发年龄仍为 20~40 岁, 以膨胀性骨质破坏为主, 病灶内常见小骨嵴, 短管状骨比跗骨更易表现为侵袭性改变。

PU-1104

Gorham 病临床及影像特点分析

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目的 探讨 Gorham 病的临床及影像特点。

方法 回顾性分析 11 例 Gorham 病的临床及影像资料, 综合国内文献, 总结其临床及影像特点。本组 11 例患者均符合 Wells 和 Gray 提出的诊断标准。11 例均拍摄 X 线平片; CT 检查 4 例; MRI 检查 5 例, 其中 1 例行 MRI 增强检查。

结果 男 7 例、女 4 例;年龄 16~66 岁, 中位年龄 32 岁。6 例病变累及手部, 1 例累及尺桡骨, 1 例累及髌臼, 3 例累及颌面骨。主要临床症状为病变部位疼痛、肿胀及活动受限, 7 例伴局部肌肉萎缩。X 线平片示受累骨质变细、皮质毛糙 6 例, 局灶性密度减低 5 例, 大块骨质吸收 6 例, 骨质吸收残端变尖 1 例, 病理骨折 1 例。CT 示受累骨变细、皮质毛糙 4 例, 局限性密度减低 1 例, 大块骨质吸收 3 例, 伴局部肌肉萎缩、肌间脂肪间隙增宽 2 例(萎缩性骨质吸收)。MRI 示受累骨质 T1WI 呈低信号, T2WI 呈高信号, 信号可不均匀; 受累骨质周围软组织在 T2WI 上 4 例呈弥漫水肿样高信号, 1 例呈弥漫的混杂的高信号软组织肿物, 但相邻肌肉萎缩, 肌间隙增宽。92 例文献荟萃显示男 63 例, 女 29 例。72% (66/92) 发病年龄在 10~40 岁。单骨发病 24 例; 双骨或多骨发病 68 例, 其中多中心发病 9 例、单中心发病 59 例。病变好发居前 4 位的依次为肩胛骨中心、骨盆、颌面骨和手部骨骼。43 例出现肌肉萎缩, 8 例出现软组织肿块。

结论 当发现与临床症状不符的一骨或连续多骨的萎缩性骨质吸收, 无硬化或骨膜反应, 相邻肌肉萎缩, 要想到 Gorham 病的可能。

PU-1105

能谱 CT 单能量重建在胸腰椎急性骨折骨髓水肿中的应用

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目的:利用能谱 CT 单能量重建鉴别胸腰椎急性骨折骨髓水肿。资料与方法:回顾性收集了 2022 年 6 月-2023 年 2 月在深圳市前海蛇口自贸区医院行胸腰椎能谱 CT 与 MR 扫描的 18 例急性外伤或确诊压缩骨折复查患者, 共计 20 个压缩骨折椎体的能谱 CT 及 MRI 图像, 患者外伤时间当天到骨折 2 周不等。在工作站运用 GSI viewer 软件重建四组单能量(40 KeV、70 KeV、100 KeV 及 140KeV)图像。在 Water (Iodine) 伪彩图正中矢状面上, 识别骨折骨髓水肿区域, 使用椭圆形 ROI 进行测量, 根据 MRI 显示的水肿区域手动勾画兴趣区, 记录骨折椎体水肿区域以及正常椎体在不同单能量下 CT 值。所有压缩骨折水肿区域均与 MRI 脂肪抑制 T2WI 序列为参照。采用配对 t 检验比较不同单能量下骨折水肿椎体与正常椎体 CT 值间的差异, 采用秩和检验比较骨折水肿椎体与正常椎体间 CT 值差值的差异。结果:在急性骨折水肿椎体中, 不同单能量(40 KeV、70 KeV、100 KeV 及 140KeV)测量的骨折水肿椎体 CT 值分别为: 691.5 Hu、319.1 Hu、222.4Hu 和 183.1; 正常椎体 CT 值分别为 252.9Hu、106.1Hu、67.9Hu 及 52.5Hu, 急性骨折椎体在 40 KeV、70 KeV、100 KeV 及 140KeV 下 CT 值均大于正常椎体 CT 值, 差异有统计学意义 ($P<0.001$); 急性骨折椎体与正常椎体间四组单能量 CT 值差值也有显著差异 ($P<0.001$), 40 KeV 下 CT 值差值差值最大。

结论: 胸腰椎急性骨折能谱 CT 检查中, 单能量 40 KeV、70 KeV、100 KeV 及 140KeV CT 值可以鉴别急性骨折骨髓水肿与正常椎体, 以 40 KeV 下 CT 值差值最大, 结合 Water(Iodine)物质密度图, 可以为胸腰椎急性骨折水肿提供更为准确的诊断。

PU-1106

能谱 CT 物质分离技术在胸腰椎急性骨折及陈旧性骨折鉴别诊断中的应用

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目的:利用能谱 CT 物质分离技术鉴别胸腰椎急性骨折与陈旧性压缩性骨折。资料与方法:分别回顾性收集了 2022 年 6 月-2023 年 2 月在深圳市前海蛇口自贸区医院行胸腰椎能谱 CT 与 MR 扫描的 12 例急性外伤或确诊压缩骨折复查患者,共计 24 个压缩骨折椎体的能谱 CT 及 MRI 图像;还有 8 例陈旧性骨折患者,共计 16 个椎体的能谱 CT。在工作站运用 GSI viewer 软件重建 Water (Iodine)、Water (Calcium) 和 Water (HAP) 三对基物质图像。参照 MRI T2WI 脂肪抑制序列确定骨折骨髓水肿区,使用椭圆形 ROI 进行测量,根据 MRI 显示的水肿区域及陈旧性骨折的压缩区域手动勾画兴趣区,测量并记录骨折椎体水肿区域以及陈旧性压缩性骨折 Water(Iodine)、Water (Calcium) 和 Water (HAP) 水密度值。采用配对 t 检验比较不同物质密度下骨折水肿椎体与陈旧性压缩性骨折椎体间水密度值的差异,采用秩和检验比较骨折水肿椎体与陈旧性压缩性骨折椎体间水密度值差值的差异。结果:急性骨折水肿椎体 Water (Iodine)、Water (Calcium) 和 Water (HAP) 水密度值与陈旧性压缩性骨折椎体水密度值有显著差别。急性骨折椎体水(碘)、水(钙)、水(羟基磷灰石)水密度值均大于陈旧性压缩性骨折椎体水密度值,差异有统计学意义($P<0.001$);急性骨折椎体与陈旧性压缩性骨折椎体间三组水密度值差值也有显著差异($P<0.001$), Water (Iodine) 水密度差值最大。

结论: 胸腰椎急性骨折及陈旧性压缩性骨折能谱 CT 检查中, Water(Iodine)、Water (Calcium) 和 Water (HAP) 密度值可以鉴别急性骨折与陈旧性压缩性骨折椎体,但以 Water(Iodine)密度图最优,可以为胸腰椎急性骨折与陈旧性压缩性骨折的鉴别诊断提供定量解决方案。

PU-1107

骨质疏松症影像学

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骨质疏松症(osteoporosis)被世界卫生组织(World Health Organization)定义为一种“一种以骨量减低和骨组织微结构恶化,导致脆性增加,从而易导致骨折发生为特征的系统性骨骼疾病”。虽然任何年龄都可发生骨质疏松症,但是在老年妇女(绝经后女性)、风湿病患者和老年男性中尤其常见。在骨质疏松症中,骨组织的病理改变导致骨骼变弱,骨折的风险增加。

随着我国人口老龄化进程的加速,我国已经成为全球老年人口数量最多的国家,患有骨质疏松症的病人也随之急剧增加。根据第七次全国人口普查调查结果:我国 60 岁以上人口约占总人口的 18.7%,大概为 2.64 亿,65 岁以上人口约占 18.7%,已经超过了 1.9 亿。而全国骨质疏松流行病学调查显示:50 岁以上男性与女性患有骨质疏松症的占比分别为 6.9%与 32.1%,65 岁以上占比则达到 10.7%与 51.6%。骨质疏松症的最严重后果是导致骨质疏松骨折,又称为脆性骨折,即在日常生活中受到轻微的伤害就会导致骨折的发生,椎体、前臂、髌骨、肱骨和骨盆等部位尤其容易受到损伤。脆性骨折一旦发生,很容易导致患者残疾甚至死亡,骨折的患者生活质量明显下降,有较大一部分患者可能会死于各种并发症。同时,长期的治疗和护理会造成巨大的家庭和社会负担。总而言之,骨质疏松症是一个亟需引起大家重视的疾病。

骨质疏松症患者早期多无明显自觉症状,也无明显身体不适,但是随着骨质结构的进一步恶化,患者逐渐出现腰背痛、脊柱变形,甚至脆性骨折等临床症状,这些症状的出现,会对患者的身心造成

极大的打击。而尽管如此, 目前我国的对于骨质疏松症的诊断率还很低, 骨质疏松骨折的治疗率也堪堪达到 30%。如何早发现, 早诊断, 早治疗骨质疏松症对于我国而言, 是非常重要的一项挑战。

1. 双能 X 线骨密度法 (DXA)
2. 骨小梁分数 (TBS)
3. 计算机断层技术 (CT)
4. 磁共振成像

PU-1108

少见/罕见部位应力性骨折

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目的 提高对少见/罕见部位应力性骨折的认识, 避免延误病情, 做到“早发现、早诊断、早治疗”, 维护部队长期安全稳定, 提高战斗力。**方法** 以“应力性骨折或疲劳性骨折”为关键词在图片存储与传输系统 (PACS) 上查询 2018 年 1 月 1 日至 2023 年 5 月 31 日确诊的应力性骨折的影像学资料 (X 线、CT 及 MRI) 进行分析, 经 2 名高年资影像诊断医师共同读片, 确定纳入标准: 排除胫骨、跖骨、股骨及腓骨四个常见部位, 年龄 ≤ 30 岁, 无外伤史, 无相关疾病史。进一步追踪详细病因, 观察发病部位有无规律性? 骨折有无形态学特征? 是否对称或对侧有无异常发现? 邻骨质有无异常? 邻软组织有无异常? 有无并发症?**结果** 共收集少见/罕见部位的应力性骨折 42 例, 按部位分布如下, 下肢 15 例: 距骨 5、跟骨 4、足舟骨 3、骰骨 1、楔形骨 1、第一跖趾关节旁籽骨 1; 骨盆 12 例: 耻骨下支 6、耻骨梳 1、骶骨 5; 腰椎 3 例: L5 椎弓根 2、L5 椎弓峡部 1; 上肢 6 例: 肱骨 5、尺骨 1; 胸廓 6 例: 肋骨 5、胸骨 1。**结论** 少见/罕见部位应力性骨折有特定的发病部位和典型的影像学特征。软组织水肿对诊断和鉴别诊断有较大价值。距骨、足舟骨和籽骨血供较差, 易继发缺血性坏死, 后期应予关注。加强宣教, 重视预防, “早发现、早诊断、早治疗”可以明显缩短病程、改善预后。

PU-1109

米粒体滑囊炎的临床、病理及影像特征

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目的: 探讨米粒体滑囊炎的病因、病理、临床表现影像学特征及治疗方案。

方法: 回顾性分析经病理确诊的 12 例米粒体滑囊炎的临床、病理及影像资料, 并复习 145 篇国内外相关文献。

结果: 本组 12 例中继发于类风湿关节炎 5 例, 慢性非特异性滑囊炎 4 例, 结核性关节炎、痛风性关节炎和 CREST 综合征各 1 例; 9 例单发, 3 例多发。回顾国内外文献及本组病例资料, 共 219 例 (单发 210 例, 多发 9 例); 男性 115 例, 女性 104 例, 男性稍多于女性; 好发于肩关节 84 例 (38.4%) 和手腕部 78 例 (35.6%); 发病年龄最小 2 月, 最大 90 岁, 其中 < 16 岁的患者 21 例 (9.6%), 多继发于幼年类风湿关节炎 12 例 (57.1%) 和慢性非特异性滑囊炎 6 例 (28.6%); 16~40 岁的患者 37 例 (16.9%), 多继发于慢性非特异性滑囊炎 18 例 (48.6%) 和结核性关节炎 12 例 (32.4%); > 40 岁的患者 161 例 (73.5%), 多继发于慢性非特异性滑囊炎 53 例 (32.9%)、类风湿关节炎 43 例 (26.7%) 和结核性关节炎 34 例 (21.1%)。本组米粒体滑囊炎 MRI 均表现为关节腔和 (或) 滑囊扩张积液, 滑膜增厚, 米粒体在 T1WI 呈等信号, FS T2WI 及 PDWI 呈多发大小均匀的米粒样稍低信号, 呈“瓜子样” (1/15)、“铺路石样” (4/15) 和“芝麻样”

(10/15) 改变, 部分可见“靶环征”(4/15), 增强扫描滑膜增厚并明显强化, 米粒体不强化; SPECT/CT 融合骨显像米粒体无放射性浓聚。

结论: 任何类型的滑囊炎, 均可导致米粒体的形成; 米粒体多继发于慢性非特异性滑囊炎 (35.2%)、类风湿关节炎 (26.9%) 和结核性关节炎 (21.5%) 的患者, 好发于肩关节 (38.3%) 和手腕部 (35.6%)。米粒体 X 线及 CT 上不显影, MRI 是诊断米粒体的首选影像学方法且具有特征性, 米粒体清除和滑膜切除是治疗米粒体滑囊炎的最佳方法。

PU-1110

Comparisons of thresholds setup for upper thigh muscle segmentation on CT images

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Abstract

Objective To explore the optimal threshold range of CT Hounsfield Unit (HU) values for separating intramuscular adipose tissue (IMAT) in the thigh muscles on CT images under various conditions.

Materials and methods In total, 45 patients with rheumatic immunity (age mean \pm SD; 43 \pm 15 years, male 27%) were enrolled from August 2021 to June 2022. Muscle images of the bottom level of ischial tuberosity at the thigh were acquired from axial CT images. The thigh muscle compositions of all patients were measured using 2 commonly used image analysis software: OsiriX and ITK-SNAP. A Gaussian Mixture Model (GMM) was used to individually analyze the threshold for distinguishing muscle from AT on CT images for each patient. All measurements were repeated twice using each software program, at least 5 days apart. The assessor was blinded to all earlier measurements.

Results In this study, it was found that the correlation between the CT personalized threshold segmentation and the muscle density value obtained based on CT under different threshold segments was strongly positive in all threshold segments in 45 subjects. (-60~150HU, -50~150HU, -40~150HU, -30~150HU, -20~150HU, -10~150HU, 0~100HU, 0~150HU, $r=0.880\sim0.919$, $p<0.001$). Among them, -20~150HU has the best correlation with the personalized threshold ($r=0.919$, $p<0.001$).

Conclusion The CT threshold range varies with the degree of muscle invasion of the subject. Therefore, personalized analysis of the muscle threshold range is necessary for accurate measurement of CT muscle density.

PU-1111

米粒体滑囊炎的影像学表现

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目的: 探讨米粒体滑囊炎的影像学表现, 加强对该病的认识。**方法:** 回顾性分析经病理证实的 9 例米粒体滑囊炎的影像学表现, 综合临床病史并结合相关文献分析。**结果:** 9 例患者 X 线、CT 均表现为软组织肿胀, 未见明显钙化灶, 1 例患者桡骨远端局限性骨质破坏, 边缘未见明显硬化。与骨骼肌相比, 所有米粒体在 T1WI 上呈等信号, T2WI 抑脂序列呈稍高信号, 周围滑膜增厚, 相应滑囊内均可见不同程度积液; 其中一例可见肌腱断裂; MRI 骨质破坏患者病变显示清楚, 周围不伴骨

髓水肿表现。结论: X 线、CT 诊断关节囊及滑膜米粒体滑囊炎价值有限, MRI 对诊断米粒体滑囊炎具有较高的应用价值。

PU-1112

胫骨上皮样血管肉瘤 1 例并文献复习

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目的: 上皮样血管肉瘤 (Epithelioid angiosarcoma, EA) 十分罕见, 是以上皮样肿瘤细胞为特征的一种高度恶性肿瘤, 其生长迅速, 侵袭性强, 好发于甲状腺、皮肤、肾上腺和深层软组织等各个部位, 而骨源性 EA 相对罕见。因此, 本研究对 1 例右胫骨 EA 患者进行了影像学分析, 并通过查阅文献总结了其影像学特征。

方法: 收集右胫骨 EA 1 例的临床资料、影像学资料、组织病理学及免疫组织化学结果, 并结合相关文献进行分析。

结果: 患者, 男性, 66 岁, 主诉“右侧脚踝疼痛 4 月余, 加剧 6 天”。体格检查: 右侧脚踝明显肿胀、僵硬, 局部压痛, 右胫骨内侧可见手术疤痕。实验室检查结果未见明显异常。既往有右下肢创伤病史并接受手术治疗。影像学检查: 平片和 CT 示右胫骨远端多发溶骨性病变, 大小约 7.9 cm×4.6 cm×4.4 cm, 边界不清, 边缘无硬化边, 其内可见不规则钙化和低密度区, 骨皮质变薄且不连续; MRI 平扫示病灶 T1WI 和脂肪抑制 T2WI 呈等或略高信号, 其内可见散在斑片状低信号, 周围软组织可见水肿信号。免疫组织化学结果: CD31 (+)、CD34 (+)、Factor VIII (+)、Ki-67 (+, 5%)。最终诊断为骨 EA。

结论: 本研究对 1 例右胫骨 EA 进行了影像学分析, 并通过回顾文献总结了 EA 的影像学特征。尽管病理检查仍然是诊断 EA 的金标准, 但特定的影像学特征仍有助于诊断。

PU-1113

MRI 对于坐骨神经痛的诊断价值

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目的: 探讨 MRI 显示坐骨神经走行的优选扫描技术及坐骨神经痛患者的 MRI 表现特点, 以加深了解 MRI 对于坐骨神经痛的诊断价值。材料与方法: 收集 2017 年 6 月至 2023 年 6 月间因坐骨神经痛在我院就诊的患者 183 例, 分析其 MRI 检查资料, 总结显示坐骨神经走行的优选扫描技术及坐骨神经痛患者的 MRI 表现特点。结果: 183 例患者中 175 例为单侧发病, 8 例为双侧发病; 斜冠状位、斜矢状位及横轴位 3D-MENSA 序列显示坐骨神经及周围病变效果好; 坐骨神经病变 37 例 (坐骨神经炎 25 例, 坐骨神经占位 7 例, 坐骨神经外伤 5 例), 坐骨神经周围病变共 146 例 (腰椎管狭窄 115 例, 坐骨神经周围炎性病变 15 例, 坐骨神经周围占位病变 10 例, 坐骨神经周围外伤 6 例)。结论: 坐骨神经痛以单侧发病为主; 坐骨神经周围病变尤其是腰椎管狭窄是坐骨神经痛最常见的病因; 3D-MENSA 序列 MPR 技术可作为优选扫描技术; MRI 对于寻找导致坐骨神经痛的病因及定位定性诊断有重要的价值。

PU-1114

先天性静脉畸形骨肥大综合症 (KTS) CTV1 例

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先天性骨血管肥大综合症又称为 Klippel-Trenaunay Syndrome(KTS), 先天性静脉畸形骨肥大综合症等, 为临床罕见病, 据文献报道, KTS 的发病率在 2/10 万-5/10 万。其病因未明, 多数观点认为 KTS 是胚胎发育异常所造成的一种先天性周围血管疾病。文献报道 KTS 好发于上下肢, 尤以下肢多见, 躯干及颈部少见, 男女均可发病无明显性别差异, 具有偶发性, 少数患者可有家族史。KTS 主要包括三个临床特征, 包括: 皮肤毛细血管畸形 (鲜红色血管斑) 静脉畸形 (包括静脉曲张以及深静脉闭锁) 以及骨和 (或) 软组织肥大, 符合两个及以上特征便能诊断。国内也有学者认为 KTS 亚型 (Seppel-Martorel I 型) 可出现患肢骨萎缩, 变短。

本例患者属较为典型的 KTS 患者: 胸背腹部红斑, 静脉迂曲及软组织增生; 同时还合并有脊柱侧弯畸形, 可能是由于做下肢骨增长未能及时临床干预, 长期下肢不等长行走及站立致脊柱侧弯畸形所造成。

KTS 患者静脉系统多表现为静脉曲张及血管畸形或闭塞, 而动脉系统一般不累及, 本例病人表现为左下肢静脉异常, 而动脉通畅无狭窄, 与文献报道一致。

PU-1115

基于传统磁共振成像的肩胛下肌腱部分撕裂诊断性能: 观察者经验的影响

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摘要

背景: 在大多数机构中, 临床骨肌放射诊断团队由具有不同诊断经验的放射医生组成。很少有研究讨论观察者的经验对基于传统磁共振成像的肩胛下肌腱部分撕裂诊断结果的影响。

目的: 分析具有不同临床骨肌诊断经验的放射科医生对肩胛下肌腱部分撕裂的诊断准确性, 以便开展个性化培训。

方法: 本研究回顾分析了在本院接受首次关节镜肩袖手术的 697 名患者。其中 95 例患者共 95 个肩关节的肩胛下肌腱部分撕裂, 107 例患者共 107 个肩关节的肩胛下肌腱完整。术前磁共振图像由三位放射科医生 (A、B 和 C, 分别具有 <5 年、5-10 年和 >10 年的临床骨肌诊断经验) 独立评估, 他们对关节镜检查结果不知情。以关节镜检查结果为标准, 采用标准统计公式计算灵敏度、特异度、准确度、阳性预测值 (PPV)、阴性预测值 (NPV)、阳性似然比 (+LR)、阴性似然比 (-LR) 和约登指数。

结果: 放射科医生 C 的灵敏度、准确度和 NPV 均明显高于医生 A 和 B (C vs A/C vs B: p 灵敏度 <0.001/p 灵敏度 <0.001, p 准确度=0.001/p 准确度 <0.001, p (NPV) <0.001/p (NPV) <0.001), 但医生 A 和 B 之间无显著差异 (p 灵敏度=0.36, p 准确度=0.185, p (NPV)=0.729)。医生 A 的特异度明显高于医生 B 和 C (A vs B/A vs C: p<0.001/ p=0.004)。

结论: 临床骨肌诊断经验最丰富的放射科医生对肩胛下肌腱部分撕裂的总体诊断效果最好。经验最少的放射科医生对肩胛下肌腱部分撕裂的认识不足, 而经验中等的放射科医生则倾向于过度诊断肩胛下肌腱部分撕裂。

PU-1116

不典型 Erdheim-Chester 病多骨侵犯 1 例并文献复习

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Erdheim-Chester 病 (ECD) 是一种罕见的非朗格汉斯细胞性病变, 国内仅有少量报道, 病因及发病机制不详, 最新研究认为可能与体细胞突变, 免疫失调和炎症有关。目前已知是一群 CD68 (+)、CD1a (-)、S-100 (±) 为特征的泡沫样脂质细胞异常沉积形成黄色肉芽肿样浸润, 常伴纤维化。ECD 病常累及多系统、多器官, 骨最常受累, 首发症状为骨痛, 患者多伴有心血管、中枢神经系统、肾、乳腺受累。临床表现多样, 特异性差, 需要病理学检查确诊。本文详细描述一例无骨痛伴多骨侵犯的 ECD 病, 并对相关文献复习如下, 以期临床医师诊治 ECD 提供参考。

PU-1117

膝骨性关节炎患者脑结构和功能变化的多模态 MRI 研究

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目的 联合基于体素的形态学测量 (VBM) 技术和静息态功能磁共振成像 (rs-fMRI) 技术探究膝骨性关节炎 (KOA) 患者静息状态下脑灰质体积、脑神经元活动强度及基于种子点的功能连接强度改变, 综合分析 KOA 相关异常脑网络。方法 前瞻性收集 30 例 KOA 患者 (KOA 组) 及 30 例健康人 (HC 组) 的 3D 高分辨率 T1WI 像和 rs-fMRI 图像, 采用 VBM、低频振幅、功能连接 3 种方法分析两组间脑灰质结构和功能数据差异。结果 与 HC 组相比, KOA 组双侧梭状回、右侧颞中回低频振幅值增高, 右侧前叶、右侧内侧前额叶皮质、左侧颞中回低频振幅值减低 (体素水平 $P < 0.005$, 团块水平 $P < 0.05$); 右侧楔前叶、右侧顶下小叶侧初级视觉皮层、左侧颞中回、左侧中央后回灰质体积减小 (体素水平 $P < 0.002$, 团块水平 $P < 0.05$); 以右侧楔前叶为种子点, 与侧颞中回的功能连接增强, 与左侧前扣带回、左侧背外侧前额叶皮质的功能连接降低 (体素水平 $P < 0.005$, 团块水平 $P < 0.05$)。结论 KOA 患者感知皮层系统及联合皮层系统阵营均存在血氧水平依赖信号及灰质微结构的改变且有重叠, 主要涉及视觉网络、感觉运动网络、默认状态网络、执行控制网络内及默认状态网络、执行控制网络、突显网络的部分脑区, 这可能提示 KOA 患不仅处于慢性疼痛的病理状态, 还伴有信息整合、注意力控制、情绪反应、情感解读等功能活动的异常。

PU-1118

腰椎退行性骨关节病的 X 线平片和多排螺旋 CT 影像诊断对比分析

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摘要: 目的: 分析腰椎退行性骨关节病应用 X 线、计算机断层扫描 (CT) 诊断的临床价值。
方法: 抽选本院于 2022 年 1 月至 2023 年 1 月期间收治的腰椎退行性骨关节病患者 200 例, 分别进行 X 线扫描检查和 CT 扫描检查, 观察诊断结果, 分析平片特征和影像学特征。

结果:X 线检出病变 168 例(84.0%),CT 检出 184 例(92.0%)。X 线检出以椎间隙改变(92.9%)、骨赘形成/椎体角边缘弯曲(88.1%)居多;CT 检出病变类型以椎间盘膨出为主(59.6%),病变部位以 L45 为主(70.0%)。

结论:对于腰椎退行性骨关节病而言,X 线诊断、CT 诊断均有较高的临床价值,其中后者检出率高、能够明确病变类型和部位。

PU-1119

探讨能谱 CT 定量参数在腰椎间盘突出中的诊断价值

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目的 探讨能谱 CT 定量参数在腰椎间盘突出中的诊断价值。

资料与方法 收集 82 例腰痛患者的腰椎 MRI 和能谱 CT 影像资料。根据 Pfirrmann 分级标准对纳入椎间盘进行分级。获取能谱 CT 的 74keV、水(钙)、水(碘)、水〔硫酸软骨素(CS)〕和 CS(水)图,分别测量髓核(NP)和纤维环(AF)的 CT 值及浓度值。采用单因素方差分析分别比较各级 NP 和 AF 的 CT 值及浓度值。采用 Spearman 相关分析评价 CT 值和浓度值与 Pfirrmann 分级的相关性。

结果 共纳入 249 个椎间盘,包括 I 级 18 个、II 级 33 个、III 级 93 个和 IV 级 105 个。对于 74keV 图像,前 AF、NP、后 AF 的 CT 值与椎间盘分级均呈弱的负相关。对于水(钙)图,仅 NP 的浓度值与椎间盘分级呈弱的正相关,前 AF、后 AF 的浓度值与椎间盘分级无相关性。对于水(碘)图,前 AF、后 AF 的浓度值与椎间盘分级呈弱的负相关,NP 的浓度值与椎间盘分级无相关性。对于水(CS)图,NP 的浓度值与椎间盘分级呈强的正相关,NP 各组间差异性显著(P 均 <0.001),前 AF 的浓度值与椎间盘分级呈中等正相关,后 AF 的浓度值与椎间盘分级呈弱的正相关。对于 CS(水)图,NP 的浓度值与椎间盘分级呈强的负相关,NP 各组间差异性显著(P 均 <0.001),前 AF 的浓度值与椎间盘分级呈中等负相关,后 AF 的浓度值与椎间盘分级呈弱的负相关。

结论 能谱 CT 定量参数水(CS)和 CS(水)可用于评估腰椎间盘突出。

PU-1120

基于常规胸部 CT 影像组学预测胸腰椎骨质疏松性骨折的风险

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目的: 基于常规胸部 CT 图像,构建及验证不同胸椎节段预测胸腰椎骨质疏松骨折(OVF)风险的影像组学模型,并比较其性能。

方法: 回顾性收集 494 位行常规胸部 CT 检查的患者(包括存在胸腰椎 OVF 的骨折组 198 例以及无脊柱骨折的对照组 296 例),并分为训练集 334 例及独立验证集 160 例。利用深度学习驱动框架分割每个胸椎的中央部分及外周部分作为感兴趣区。使用 PyRadiomics 软件包对总共 5690 个胸椎 11380 个感兴趣区进行影像组学特征提取,并在训练集中采用二步法进行特征筛选。预测模型的构建在十二个胸椎水平分别进行,分别构建基于胸椎中央部分、外周部分特征的模型、基于两类特征的混合模型以及基于两种影像组学平均得分的混合模型。使用受试者操作特征曲线(ROC)下面积(AUC)进行预测模型性能评估,比较各胸椎水平四种模型在独立验证集中的性能。

结果: 基于两种影像组学平均得分的混合模型具有最佳的骨折预测性能(在八个胸椎水平具有最佳的预测性能),基于混合特征的影像组学预测模型具有次优的性能(在三个胸椎水平具有最佳的预测性能),基于胸椎中央部分以及外周部分的影像组学预测模型分别在第一胸椎以及第七胸椎具有最佳的验证集性能。在所有构建的影像组学预测模型中,基于第五胸椎构建的基于影像组学平均得

分的混合模型具有最佳的预测性能，在训练集中的 AUC 为 0.926 (95%CI: 0.892-0.952)，在独立测试集中的 AUC 为 0.790 (95%CI: 0.719-0.851)。

结论：常规胸部 CT 包含的胸椎影像组学特征可以区分是否存在胸腰椎 OVF 的患者，在没有额外的医疗成本和辐射暴露的情况下，常规胸部 CT 检查可以为预测胸腰椎 OVF 风险提供有价值的信息。

PU-1121

Evaluation of pelvic fractures and tumors in a single-in-plane image by an unfolded visualization algorithm

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Purpose: The purpose of this study was to evaluate the diagnostic performance of bone-unfolding visualization algorithm in pelvic fractures and tumors compared to reading conventional CT images. **Materials and Methods:** This study passed the ethical review and signed the informed consent form of patients. 77 patients with pelvic trauma and 86 patients with pelvic tumor in two centers were evaluated respectively. Pelvic bone unfolding imaging stacks were generated using a post-processing software. Two readers (one resident and one radiologist) independently evaluated all cases. Each reader first reviewed the conventional CT images and then reviewed the unfolding images after an interval of weeks. The results were compared with a reference standard built by senior radiologists. Diagnostic performance was assessed and time consumption was recorded. **Results:** In our study, the agreement between the readers using the two methods was better than previous methods. In the pelvic fracture group, the mean reading time (21.7s) of bone deployment was significantly shorter than standard MPRs (33.8s; $P < 0.001$). There was no significant difference in the results of the two assessment methods in the same reader. In the pelvic tumor group, the mean reading time (18.5s) of bone unfolding was significantly shorter than standard MPRs (26.3s; $P < 0.001$). In the pelvic fracture group and in the tumor group, the inter-reader agreement based on these two methods performed well (0.718-0.918) (0.774-0.884). **Conclusion:** We applied the bone unfolding algorithm to the imaging diagnosis of pelvic fractures and tumors. This method can save the diagnostic time, and does not reduce the diagnostic capacity, especially for patients with emergency trauma, this method can provide a certain value for clinicians' diagnosis and treatment.

PU-1122

X 线特殊检查技术对隐匿性骨折相关临床价值

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目的：运用 X 线相关特殊检查技术诊断隐匿性骨折

方法 选取陆军特色医学中心 2021 年 4 月-2023 年 4 月疑似隐匿性骨折患者 127 例，对意思骨折部位采用 X 线 DR 常规检查技术同时对于常规检查技术表现为阴性的疑似病人运用相关特殊检查技术（外舟位，外踝位，切线位等），以诊断结果为阳性标准，进行统计，比较 DR 特殊检查技术对常规检查技术对隐匿性骨折的检出率

结果 127 例疑似隐匿性骨折患者共检出阳性 93 例，阴性 34 例；DR 检查检出阳性 76 例，阴性 51 例；特殊检查技术检出阳性 89 例，阴性 38 例；DR 特殊检查技术对隐匿性骨折准确度、灵敏度、

特异度均高于常规检查技术, DR 特殊检查技术针对腕关节骨折、踝关节骨折、的隐匿性骨折检出率均高于 DR 常规体位检查

结论 DR 特殊检查技术具有个性化, 针对性, 应用于隐匿性骨折检查, 可明显提高诊断准确度、对腕关节骨折, 踝关节骨折其他特殊体位等不同部位隐匿性骨折均具有较高的检出率, 对提高相关临床检出率高。

PU-1123

能谱 CT 监测果糖对雌性大鼠骨密度影响的可行性分析

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目的:探讨能谱 CT 用于监测高果糖饮食后雌性大鼠骨密度 (BMD) 变化的可行性。

方法:选取 8 只 4 周龄的雌性 SD 大鼠, 平均分为果糖组和对照组, 果糖组大鼠每天给予高果糖饮食 (HFrd), 对照组大鼠每天喂饲等量标准饮食 (SD), 喂养 8 周后对两组大鼠进行能谱模式 CT 扫描, 图像传入 GE AW4.7 工作站行双侧股骨容积能谱分析, 分别测量单侧股骨的羟基磷灰石 (脂)、羟基磷灰石 (水)、钙 (水) 值。随后处死大鼠, 采用双能 X 线吸收法 (DXA) 测量双侧股骨上段的 BMD 值。采用两独立样本 t 检验分别比较喂养 8 周后果糖组与对照组大鼠股骨羟基磷灰石 (脂)、羟基磷灰石 (水)、钙 (水) 密度值以及 BMD 值的差异;对两组大鼠股骨羟基磷灰石 (脂)、羟基磷灰石 (水)、钙 (水) 密度值与 BMD 值均行 Pearson 相关性分析。

结果:喂养 8 周后果糖组大鼠股骨羟基磷灰石 (脂)、羟基磷灰石 (水)、钙 (水) 密度值以及 BMD 值均明显高于对照组, 差异有统计学意义 (P 均 <0.05); 两组大鼠股骨羟基磷灰石 (脂)、羟基磷灰石 (水)、钙 (水) 密度值和 BMD 值均有相关性, 其中钙 (水) 密度值与 BMD 值的相关性最强 (r 果糖组 $=0.883$, $P<0.05$; r 对照组 $=0.764$, $P<0.05$)。

结论:高果糖饮食可以增加雌性大鼠的骨密度, 能谱 CT 基物质成像技术测得羟基磷灰石 (脂)、羟基磷灰石 (水)、钙 (水) 密度值与 DXA 测得的 BMD 值具有相关性, 其中钙 (水) 密度值相关性最强, 可成为一种实时、活体、长效的监测实验动物骨密度的手段。

PU-1124

膝关节慢性痛风性关节炎的 MRI 表现

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【摘要】目的 探讨膝关节痛风性关节炎 (Gouty arthritis, GA) 的 MRI 表现。方法 搜集结合双能量 CT 确诊的 11 例膝关节痛风性关节炎患者并分析其 MRI 表现, 结合双能量 CT 对 11 例膝关节慢性痛风性关节炎患者的 MRI 表现进行回顾性研究。结果 MRI 显示痛风石在 T1WI 上显示与肌肉等信号;在 PDWI 上信号可以多样化, 以混杂等信号至混杂高信号为主。结论 MRI 能准确的提供膝关节慢性痛风性关节炎的表现。为临床发现及治疗提供有效的诊疗依据, 是诊断及鉴别的主要方法。

PU-1125

高分辨 MRI 对腰椎间孔狭窄神经根受压诊断价值

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【摘要】目的：探讨高分辨率 MRI 对腰椎间孔狭窄原因、部位及神经根受压程度与临床症状的相关性价值，为手术治疗提供影像学依据。**方法：**坐骨神经痛患者治疗前行腰椎常规 MRI 检查，对可疑 L4/5、L5/S1 节椎间孔狭窄患者行 MRI 薄层（1mm）椎间盘轴位扫描，对比分析常规 MRI 及高分辨 MRI 对椎间孔狭窄部位、病因及 Elisabeth 分型价值；高分辨 MRI 后处理图像上测量椎间孔形态学指标、神经根长短径，并分析其与临床症状 VAS 评分相关性。**结果：**61 例患者椎间孔狭窄神经根受压经手术或保守治疗有效确诊，常规 MRI 对椎间孔狭窄原因诊断率 75.4%，高分辨率 MRI 并后处理诊断率为 91.8%。高分辨 MRI 测量椎间孔面积与 VAS 评分无相关性，神经根受压变形程度与临床症状 VAS 评分相呈负相关。**结论：**高分辨率 MRI 对椎间孔狭窄神经根受压诊断明显优于常规 MRI，可视化显示神经根受压部位、原因及程度，能更好指导临床开展精准的微创手术。

PU-1126

左肘关节腺泡软组织肉瘤伴骨侵蚀和肺、脾脏转移 1 例

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腺泡性软组织肉瘤（Alveolar Soft Part Sarcoma, ASPS）是一种具有血管浸润和远处转移倾向的罕见软组织恶性肉瘤[1]。由 Christopher 等人[2]于 1952 年首次报道，占成人软组织肉瘤的不到 1%[3]。ASPS 多见于女性，好发于大腿或臀部深层软组织，然而，发生在肘关节软组织的病例比较少见，并且发生周围骨侵蚀以及脾脏、肺转移的病例更少见。尽管该肿瘤生长缓慢，临床表现不典型，但其在疾病过程的早期有明显的转移扩散风险。因此，我们报告了一例侵及肱骨下段和尺桡骨上段并发肺、脾脏和腋窝淋巴结转移的腺泡性软组织肉瘤的独特病例。

PU-1127

一种膝关节应力侧位支具的发明及临床应用

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目的：前交叉韧带（ACL）是膝关节的静力性稳定结构，它能防止胫骨过度向前移位。临床上为评估前交叉韧带功能，通常会进行前抽屉实验。根据胫骨相对于股骨前移的程度与健侧做比较，美国运动医学联合会将 ACL 损伤分为以下三度：前移 0~5mm 为 I 度，5~10mm 为 II 度，>10mm 为 III 度。以往测量胫骨前移程度，多凭借医生的手法和经验进行目测，为了更为准确的完成测量，且能反映在 X 光片上记录下来影像资料，笔者发明了一种膝关节应力侧位检查用支具（ZL2022225520880）。

方法：

1.1 一种膝关节应力侧位检查用支具的设计与制作：

本发明设置有支撑架 1，该支撑架 1 设置有两个支撑杆体 11，两个支撑杆体 11 相对设置，且在支撑杆体 11 两端均设置有弧形支架 12，两个支撑杆体 11 通过该弧形支架 12 连接在一起，也可采用

其他形状的连接结构。支撑架 1 整体采用塑料材质, 且整个固定装置整体均采用塑料或其他非金属材料, 避免在检查中造成干扰。(见图 1)

1.2 模拟前抽屉实验的膝关节应力侧位检查方法:

受检者单脚站立于摄影台上, 受检侧下肢弯曲 90°, 脚尖勾住支具侧方把手, 膝盖腘窝放置于支具中央凸起的把手处, 利用自身重量将大腿尽力向后拉, 评估 ACL 的功能和术后恢复情况。图像质量控制要求同膝关节标准侧位: 股骨内外髁后缘完全重合。放置 1:1 刻度尺进行测量。(见图 2)

结果: 2023 年 4-7 月, 共完成 41 例膝关节应力侧位检查, 测得阳性病人 25 例, 其中 I 度损伤 14 例, II 度损伤 8 例, III 度损伤 3 例(见图 3)。临床对该装置的使用效果表示满意。

结论: 之前在临床上无法开展膝关节应力侧位 X 光检查, 国内针对此问题的研究报道也较为少见。笔者所设计的一种膝关节应力侧位检查用支具, 填补了此空白。本装置利用患者自身重力, 巧妙的完成了模拟前抽屉实验的膝关节应力侧位检查, 解决了临床迫切的需求问题。检查过程中并不需要其他人协助, 也避免了不必要的辐射问题。

PU-1128

增生性肌炎 2 例临床影像病理分析

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增生性肌炎(proliferative myositis, PM) 是一种起源于横纹肌组织纤维间隔和筋膜中的增生性病变,多见于中老年人, 儿童罕见。本病好发于躯干及四肢, 发病初期通常无疼痛, 病灶生长迅速, 逐步发展为疼痛性肿块, 极易误诊为恶性肿瘤而行扩大手术治疗。本文报道 2 例 PM, 1 例术前诊断恶性肿瘤, 行扩大切除术, 另 1 例行软组织穿刺活检术确诊, 对其临床影像及病理特征、治疗及预后进行回顾性分析, 旨在对临床提供诊治借鉴, 为临床医生提供诊断思路, 早期明确诊断, 避免过度治疗。

PM 主要表现为反应性、自限性、浸润性的结节状增长, 生长迅速, 一般病程在 3 周以内可触及肿块。病灶生长迅速, 无包膜, 界限不清, 但大多数无症状, 患者基本都在无意间发现肿块, 肿块因短期内增大而就诊。PM 患者生化检验结果极少出现阳性, 影像学征象又不典型, 因此术前很难确实, 极易误诊为恶性肿瘤, 导致过度治疗。

高频彩色多普勒超声在 PM 诊断中具有一定价值。PM 中主要表现为梭形或椭圆形中等偏高回声包块, 一般为乏血供, 略高回声与低回声相间形成的“龟裂纹征”“棋盘样”是其特征性超声征象, 其代表增生的纤维组织包绕相对正常的肌纤维。病变病理形态学主要表现为增生的纤维母细胞/肌纤维母细胞穿插于横纹肌纤维之间, 其间可见成簇的神经节样细胞。

磁共振在 PM 诊断中作用相对局限, MRI 上主要表现为肌腹内梭形结节, 边缘不清, T1WI 呈等信号; T2WI 呈混杂高信号(增生纤维组织包绕正常肌纤维), 周围肌肉及筋膜明显水肿, T1WI 脂肪抑制序列增强扫描明显均匀强化(间质血管及肉芽组织增生)。

综上所述, 增生性肌炎是一种良性少见病变。少数患者病灶可以自行消退, 不能消退的病例可以通过完整切除治愈, 术后不复发、转移。因此提高临床医师对于 PM 的了解, 术前的明确诊断, 可以有效的避免扩大切除和过度治疗。

PU-1129

MRI 脂肪抑制液体衰减反转恢复成像在滑膜炎诊断及分级中的应用

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目的 探究磁共振成像(MRI)脂肪抑制液体衰减反转恢复成像(FLAIR-FS)在滑膜炎诊断和分级中的应用。**方法** 选取 109 例于 2020 年 3 月至 2021 年 7 月在我院治疗的滑膜炎患者,收集患者临床资料。通过 FLAIR-FS 对滑膜炎患者进行诊断和分级,并与脂肪抑制质子密度加权成像(PDWI-FS)进行比较,分析检测结果的差异。对患者各观察部位滑膜厚度评级、病理评分以及病理指标评分进行比较,分析滑膜厚度评级与病理评分、病理指标、膝关节疼痛以及功能评分的相关性。**结果** 研究组与对照组相比,两组受试者年龄、性别以及膝关节的差异均无统计学意义($P>0.05$);研究组患者的滑膜厚度显著高于对照组($P<0.05$)。FLAIR-FS 以 2~3 分为主,PDWI-FS 以 1~2 分为主,二者评分的差异显著($P<0.05$)。1 级与 2 级的滑膜厚度无显著差异($P>0.05$);1、2 级与 3 级的滑膜厚度的差异显著($P<0.05$)。各观察部位滑膜厚度评级、病理评分以及滑膜病理指标评分均无显著差异($P>0.05$)。Pearson 线性相关性分析发现,滑膜厚度评级与病理评分、滑膜病理指标评分均呈正相关($P<0.05$),与膝关节疼痛以及功能评分均无相关性($P>0.05$)。**结论** 滑膜炎患者的滑膜厚度有明显增高。MRI 的 FLAIR-FS 序列对膝关节滑膜炎患者的诊断以及分级具有显著优势,可作为临床上滑膜炎的诊断工具,临床应用价值较高。且滑膜厚度评级与病理评分、滑膜病理指标评分均呈正相关,与膝关节疼痛以及功能评分均无相关性。表明 MRI 可用于检查滑膜炎患者的治疗疗效,但不能用主观评分来评估患者的病情。

PU-1130

基于多层螺旋 CT 扫描的骶髂关节骨化与脊柱后纵韧带骨化关系初探

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目的: 骶髂关节改变的特征及其在后纵韧带骨化中的变化关系尚不明确,本研究旨在回顾性分析患有和不患有后纵韧带骨化的个体骶髂关节的形态学变化并比较两者之间的差异。**材料与方法:** 本研究共纳入了 200 名年龄和性别匹配的患者(骨化组 A, 100; 非骨化组 B, 100)。此外,将单纯颈椎后纵韧带钙化患者划分为 C 组,将多节段韧带骨化组分为 D 组。研究中采用骨化指数来评估整个脊柱骨化病变的严重程度并将其分为 3 个等级: 1 级,骨化指数 <10 ; 2 级,骨化指数 10-19; 3 级,骨化指数 ≥ 20 。骶髂关节形态分为 4 种亚型: I 型,正常或小的外周骨不规则; II 型,软骨下骨硬化和骨赘形成; III 型,真空现象; IV 型,桥接骨赘和骨融合。同时将 IV 型根据骨强直的部位不同进一步分为 3 个亚组,关节旁前桥(IV 1 型)、关节旁后桥(IV 2 型)和关节内强直(IV 3 型)。最后评估后纵韧带骨化的脊柱区域与骶髂关节形态学变化之间的相互作用。**结果:** 本研究中,后纵韧带骨化组与非骨化组均存在骶髂关节退变。两组间骶髂关节强直的发生率有显著差异($P<0.01$)。骨化组(54.5%)与非骨化组(24.6%)相比,骶髂关节前后桥连和融合发生率更高。D 组中骶髂关节退变 III 型、IV 型患病率高于 C 组($P<0.01$)。然而在骶髂关节 IV 型的 4 亚型中, C 组与 D 组差异无统计学意义。本研究中,平均骨化指数为 9.7 ± 4.5 (范围为 1-34),整个脊柱的骨化指数与骶髂关节的形态学变化相关。与 II 型患者(6.2 ± 2.7)相比,骶髂关节 IV 型(11.8 ± 3.6)的骨化指数更高($P<0.01$)。然而,骨化指数在 IV 型的子类之间没有差异。骨化指数为 2 级或 3 级的患者中,骶髂关节往往表现出较高的骨桥接和关节内融合率。

结论: 与无脊柱后纵韧带骨化患者相比, 后纵韧带骨化患者具有较高的骶髂关节强直风险, 并且广泛骨化的患者骶髂关节强直的发生率更高。

PU-1131

探讨急性膝关节韧带损伤应用 MR 诊断的应用价值

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目的 探究膝关节韧带的正常解剖与急性膝关节韧带损伤后经磁共振成像 (MRI) 检查的影像特征及诊断价值。

方法 回顾性分析 20 例急性膝关节韧带损伤病人, 与 20 例膝关节正常病人, 观察正常膝关节主要韧带 (包括前、后交叉韧带及内、外侧副韧带) 的 MRI 解剖与韧带损伤的影像学表现。

结果 在矢状位上可以清楚观察到前、后交叉韧带的形态及信号的改变, 冠状位和轴位显示内、外侧副韧带的形态及信号的变化。韧带损伤在 MRI 表现上为连续性中断或增粗、肿胀、部分肌纤维断裂, 韧带走形不整, T2WI 上信号增高。急性膝关节韧带损伤较易损伤前交叉韧带和内侧副韧带, 后交叉韧带相对不易受损。

结论 磁共振成像可以清晰显示膝关节韧带的形态、走形及连续性, 并初步判断韧带损伤程度, 为临床进一步处理提供了影像学依据。

PU-1132

青少年型 Blount 病 1 例报告

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目的: 分析我院 2022 年收治的一例青少年型 Blount 病的临床及影像学资料, 并结合文献报道分析 Blount 病诊断, 以提高 Blount 病的正确诊断率。

方法: 回顾性分析 1 例青少年型 Blount 病患者的临床资料, 特别是影像学资料。

结果: 患者 8 岁发病, 左膝进行性膝内翻, 有关节痛。双下肢全长显示左膝内翻, 左侧髌骨内侧及干骺端向下倾斜, 干骺端内侧形成喙状突, 内侧关节间隙变宽, 胫骨干骺端-骨干角呈。CT 示左膝内后方髌板钙化。患者确诊胫骨内髌骨软骨病后, 于我院行髌骨固定术, 效果欠佳, 双下肢不等长加重, 后期拟行胫骨截骨手术纠正畸形。患者的影像学表现可为诊断及手术提供重要的信息。

结论: Blount 病是一种胫骨近端内侧髌板和骨骺的生长障碍导致下肢三维畸形的疾病, 三维畸形包括包括胫骨近端内翻、前屈、胫骨内旋生长以及下肢缩短, 主要表现为进行性膝内翻。按发病年龄分为婴儿型和青少年型, 青少年型较婴儿型少见, 且畸形较婴儿型轻, 多伴有关节痛而婴儿型多不伴有关节痛。影像上, 胫骨角小于 165 度提示膝内翻, 胫骨干骺端-骨干角大于 16 度提示病理性膝内翻。干骺端的喙状突及髌板形态不规则, 髌板内侧向下倾斜提示 Blount 病。干骺端周围的骨碎片提示进行性膝内翻, 是进行手术治疗的指征。患者应早期诊断, 积极矫正, 年幼儿童截骨术后畸形复发率低于年长儿童。

PU-1133

MR-based assessment of lumbar bone micro-environment between postmenopausal women with and without osteoporotic/osteopenic fragility fractures by using IVIM-DWI and IDEAL-IQ sequences

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Objective. To explore the performance of IVIM-DWI and IDEAL-IQ sequences in evaluating the heterogeneity of vertebral bone micro-environment in postmenopausal women with and without osteoporotic/osteopenic fragility fractures.

Methods. A total of 124 consecutive postmenopausal women aged ≥ 50 years old with osteopenia or osteoporosis were recruited for this study. All study participants underwent 3T-MRI of the thoracolumbar spine, from which PDFF and $R2^*$ values of IDEAL-IQ sequence, ADCslow, ADCfast and f values of IVIM-DWI sequence were obtained. The participants were divided into osteoporotic/osteopenic vertebral fractures group and non-vertebral fracture group. Independent t test was used to compare the difference of each parameter between the two groups, and multivariable logistic regressions analysis was performed to identify the independent factors. ROC curves were generated to evaluate the performance of the independent factors.

Results. There were significant differences of age and body mass index. The bone mineral density values in postmenopausal women with vertebral fractures was significantly lower than those without fractures. The ADCslow, f and PDFF values of vertebral fractures group were significantly higher than non-vertebral fracture group, but the $R2^*$ values were lower significantly. Multivariable logistic regression analysis revealed the age, ADCslow and $R2^*$ were the independent factors. The combined multiparameter of Age + $R2^*$ showed the highest AUC efficacy in distinguishing postmenopausal women with vertebral fractures and without fracture.

Conclusion. The ADCslow and $R2^*$ values can be used to evaluate the heterogeneity of vertebral bone micro-environment in postmenopausal women with and without osteoporotic/osteopenic fragility fractures. Combining $R2^*$ with ADCslow and age can improve the identified power.

PU-1134

Analysis of factors related to osteoporotic vertebral fracture in prostate cancer patients

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Objective: This study was aimed at exploring the osteoporotic vertebral fracture rate and the related causal factors in prostate cancer patients before and after treatment.

Methods: One hundred prostate cancer patients were recruited in this study. One hundred men without prostate cancer history were selected as the control group. The T4–L1 vertebral body of the case group and the control group before and after treatment was evaluated according to Genant's semi-quantitative method. The difference in vertebral body fracture rate between the case group and the control group and the changes in vertebral body fracture rate before and after treatment among the case group were compared. They were grouped according to age, body mass index (BMI), prostate-specific antigen (PSA) levels, Gleason grade, and androgen

deprivation therapy (ADT). Univariate and multivariate logistic regression models were used to determine the factors significantly associated with vertebral fracture rate in prostate cancer patients.

Results: The prevalence of vertebral fracture was 16% and 31% in prostate cancer patients before and after treatment, respectively, and 29% in the control group. The vertebral fracture rate of the patients before treatment significantly differed that of the control group and the patients after treatment ($P < 0.05$). Univariate analysis showed that age, PSA levels, and treatment parameters were the significant influencing factors of vertebral fracture rates. Multivariate logistic regression analysis showed that age was the main influencing factor of vertebral fracture rates ($P < 0.05$).

Conclusion: The incidence of vertebral fracture in prostate cancer patients after ADT is higher than that before treatment because many factors related to prostate cancer can increase the risk of osteoporotic vertebral fractures.

PU-1135

髂腰肌原发未分化多形性肉瘤 1 例并文献复习

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未分化多形性肉瘤 (undifferentiated pleomorphic sarcoma, UPS) 是一组无明确分化方向的多形性异质性间质肉瘤。该病好发年龄为 50-70 岁, 男性多于女性, 发病部位广泛, 多见于四肢骨骼肌深部或邻近筋膜处, 其次为腹膜后, 髂腰肌罕见。未分化多形性肉瘤临床表现缺乏特异性, 早期无明显症状, 晚期可引起相应部位疼痛, 可做排他性诊断, 确诊需完成免疫组化, 组织学形态上, UPS 表现为明显异型的梭形细胞和多形性细胞混合存在, 可呈束状或席纹状, 多可见核分裂。免疫组化 Vim、AACT、CD68 常呈阳性, Ki-67(+, 60%)。因发现时常处于晚期, 所以预后较差, 术后易复发, 云南省第三人民医院收治 1 例髂腰肌原发未分化多形性肉瘤患者, 现将患者的临床表现、病理特征、影像学表现、鉴别诊断及预后情况结合文献复习报道如下。

PU-1136

Low muscle density in children with osteogenesis imperfecta using opportunistic low-dose chest CT: a case-control study

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Objective: The aim of the present study was to investigate the muscle differences in children with osteogenesis imperfecta (OI) using opportunistic low-dose chest CT.

Materials and methods: A total of 20 children with OI (3-14 years; 15 males) and 40 age- and sex-matched controls undergoing opportunistic low-dose chest CT during the COVID pandemic were enrolled. From the CT images, muscle size (cross-sectional area) and density (mean Hounsfield Units [HU]) of the trunk muscles were measured at the mid-T4 and the mid-T10 level using two methods, the fixed thresholds and the Gaussian mixture model. The Bland-Altman method was also used to compute the strength of agreement between two methods. Comparison of muscle results between OI and controls were analyzed with Student t tests.

Results: Mean differences between two methods were good. Children with OI had lower T4 muscle density and lower T10 muscle density than controls measured by the fixed thresholds (41.2 HU vs. 48.0 HU, $P<0.01$; 37.3 HU vs. 45.9 HU, $P<0.01$). There were no significant differences in T4 muscle size and T10 muscle size between OI patients and controls measured by the fixed thresholds ($P=0.09$, 0.06, respectively). However, children with OI had lower T4 muscle size, lower T4 muscle density, lower T10 muscle size and lower T10 muscle density than controls measured by the Gaussian mixture model (110.9 vs. 127.2 cm², $P=0.03$; 44.6 HU vs. 51.3 HU, $P<0.01$; 72.6 vs. 88.0 cm², $P=0.01$; 41.6 HU vs. 50.3 HU, $P<0.01$, respectively). Conclusion: Children with OI had lower trunk muscle density than non-OI children indicating that OI might also impair muscle quality. Moreover, the fixed thresholds may not be suitable for segmentation of muscle in children.

PU-1137

A 5-yr longitudinal study of skeletal muscle group-specific atrophy with aging and the association with loss of muscle strength and physical performance

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Objective: Our objective was to examine the 5-yr changes in muscle size and density of different skeletal muscle groups in older individuals and explore the longitudinal associations of changes in different skeletal muscle groups size and density with changes in handgrip strength (HGS) and the Timed Up and Go test (TUG).

Materials and methods: Participants were 120 older individuals who performed baseline and follow-up HGS, TUG and quantitative computed tomography (QCT) scanning 5 years apart. From the CT images, cross-sectional area (cm²) and density (HU) were measured for the mid-thigh, hip, and trunk muscle groups at L2 level. Changes in the muscle properties from baseline to the 5-yr follow-up were compared. Linear regression models estimated the association of changes in muscle properties with changes in HGS and TUG.

Results: The mid-thigh, hip and trunk muscle groups areas and density declined over the 5 years (all $P<0.01$). The magnitude of mid-thigh muscles and trunk muscles atrophy were greater in individuals over 70 years ($P<0.05$). After adjustment, associations with changes in HGS were significant in females for changes in mid-thigh muscle size ($\beta=0.75$, $P=0.03$), trunk muscle size ($\beta=0.69$, $P=0.01$) and in males for changes in mid-thigh muscle size ($\beta=0.67$, $P=0.02$). Associations with changes in TUG were significant in females for changes in muscle size of mid-thigh ($\beta=-1.14$, $P=0.04$) and in males for changes in trunk muscle size ($\beta=-3.48$, $P=0.02$).

Conclusion: Atrophy of mid-thigh and trunk muscle groups are associated with loss of muscle strength and physical performance. A comprehensive understanding of skeletal muscle group-specific atrophy would aid development of muscle group-specific interventions to mitigate the aging process and improve the quality of life of older individuals.

PU-1138

胸部 CT 薄层数据重组测量临界肩角的可行性研究

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目的 探讨利用胸部 CT 薄层数据重组测量临界肩角 (CSA) 的可行性。方法 回顾性分析 90 例同期接受胸部 CT 及肩关节 X 线平片检查患者的影像资料。利用胸部 CT 的薄层数据对肩关节区域进

行放大后重组,由两位医生在双盲原则下分别以 CT 重组图像与 X 线平片进行 CSA 测量。配对 t 检验用于分析两种方法 CSA 测量的差异。组内相关系数 (ICC) 用于分析两种方法测量 CSA 的一致性和重复性。Pearson 相关分析用于评估两种测量方法间的相关性。结果 (1) 差异性分析: X 线平片法与胸部 CT 重组法测量 CSA 值分别为 $(33.28 \pm 4.69)^\circ$ 和 $(33.31 \pm 4.53)^\circ$, 两种影像学方法测量结果差异无统计学意义 ($P > 0.05$)。 (2) 重复性研究: ① 观察者间信度: 两位医师分别利用 X 线平片和 CT 重组图像测量 CSA 值均具有显著相关性 ($ICC = 0.995, 0.993$ 和 $ICC = 0.992, 0.990, P < 0.01$); ② 观察者自身信度: 利用 CT 重组图像和 X 线平片前后两次测量 CSA 值均具有显著相关性 ($ICC = 0.995, 0.994$ 和 $ICC = 0.996, 0.993, P < 0.01$)。 (3) 相关性研究: X 线平片法和胸部 CT 重组法测量 CSA 值具有显著相关性 ($r = 0.964, P < 0.01$)。结论 利用胸部 CT 薄层数据重组可以获得满足 CSA 测量要求的肩关节区图像,并且测量结果与 X 线平片具有很好的重复性和一致性,应用于临床可以达到诊断目的的同时,最大可能地降低患者的 X 射线辐射剂量。

PU-1139

MRI 技术在儿童发育性髋关节脱位诊断中的价值分析

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背景: 发育性髋关节脱位 (DDH) 是小儿最为常见的一种先天性畸形, 主要包括髋关节发育不良、股骨头脱位, 以患侧肢体短缩、髋关节屈曲外旋为主要特征, 若未进行及时治疗可导致残疾, 甚至威胁到患儿的生命健康。DDH 早期常无典型症状, 患儿大多因行走异常而被确诊, 因此及时在临床早期选择有效的影像学检查技术, 有效判断疾病的进展程度及病理性改变并给予对症治疗对提高预后质量尤为重要。MRI 是临床上常用的一种影像学手段, 可对髋骨关节全面成像, 对软组织分辨率高, 在 DDH 诊断中具有显著优势。

目的: 探讨 MRI 在儿童发育性髋关节脱位诊断中的应用价值。

方法: 收治的 60 例发育性髋关节脱位儿童作为研究组, 并选取同期 36 例健康体检儿童作为对照组, 所有受试者均接受 MRI 扫描, 详细测量骨性及软骨性髋臼指数与前倾角, 分析对照组与研究组中 I 型、II 型脱位髋骨相关指标。

结果: 研究组儿童骨性及软骨性髋臼指数与前倾角均显著高于对照组 ($P < 0.05$), I 型、II 型患者骨性及软骨性髋臼指数均显著高于对照组 ($P < 0.05$), I 型与 II 型组骨性及软骨性髋臼前倾角比较无统计学差异 ($P > 0.05$)。

结论:

结论: MRI 可通过详细测量骨性及软骨性髋臼指数与前倾角来评价髋臼形态改变, 准确诊断发育性髋关节脱位, 为临床确立治疗方案提供有力的参考依据。

PU-1140

基于 QCT 的胃癌胃切除术患者合并骨质疏松症的危险因素分析及列线图预测模型建立

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目的：本研究旨在基于定量 CT (QCT) 成像探讨胃癌胃切除术患者合并骨质疏松症的危险因素并构建列线图预测模型。

材料与方法：回顾性分析 2018 年 1 月至 2021 年 7 月于我院行胃切除术并经病理证实为胃恶性肿瘤患者的手术前、后影像资料 (n=138)。收集患者的一般资料、临床资料及手术前后的实验室指标。包括年龄、性别、术前 BMI、手术时间、复查时间、住院时间、吸烟史、手术切除方式 (部分胃切除或全胃切除)、肿瘤病理分期及化疗方式、血红蛋白浓度、血清钙、血清磷、血清碱性磷酸酶及肌酐水平。采用 QCT 评估胃癌患者第 12 胸椎、第 1 及第 2 腰椎椎体骨密度，并计算平均骨密度值。根据骨质疏松症诊断标准对患者进行分类，即平均骨密度 $>120 \text{ mg/cm}^3$ 为正常， $80 \sim 120 \text{ mg/cm}^3$ 为低骨量， $< 80 \text{ mg/cm}^3$ 为骨质疏松症。配对 t 检验评估患者术前、术后骨密度的变化。使用单因素分析进行自变量筛选， $P < 0.1$ 的自变量将被纳入多因素 Logistic 回归。利用 R 4.1.2 软件绘制列线图模型，绘制受试者工作特征曲线 (ROC) 和校准曲线对预测模型的区别度和准确度进行评估。

结果：138 名符合标准的患者平均复查间隔时间为 (182.7 ± 24.2) 天。与基线骨密度相比，手术后平均骨密度明显下降 ($P < 0.001$)。多因素 logistic 回归分析显示，年龄、全胃切除术是胃癌患者术后六个月内合并骨质疏松的独立危险因素 ($OR=1.901$, 95 %CI: $1.237 \sim 4.969$, $P = 0.005$; $OR=6.648$, 95 %CI: $1.803 \sim 24.513$, $P = 0.004$)。绘制列线图，ROC 曲线下面积 0.807 (95 %CI: $0.731 \sim 0.869$)。校准曲线显示列线图模型预测胃癌术后合并骨质疏松症的概率与实际发生概率具有较好一致性。

结论：胃癌患者术后 6 个月即出现骨密度的明显下降，高龄和全胃切除术是胃癌患者术后合并骨质疏松的独立危险因素。以此构建的预测胃癌患者术后合并骨质疏松症列线图模型具有良好的区分度和准确度。

PU-1141

多层螺旋 CT 及后处理技术在观察骨折金属内固定器中的应用价值

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【摘要】目的：寻找一种能够清楚、全面的显示骨折金属内固定器的影像学检查方法，同时对多层螺旋 CT (MSCT) 后处理技术在显示不同部位骨折金属内固定器中的应用价值进行探讨。方法：37 例不同部位的骨折金属内固定术病人，全部行多层螺旋 CT 横断面扫描，同时对原始图像进行 MPR、SSD 或 VR 重建，观察内固定器的显示效果。结果：脊柱内固定术 6 例，骨盆 4 例，髌关节 3 例，股骨 4 例，髌骨 1 例，胫腓骨 8 例，踝关节 6 例，跟骨 3 例，肘关节 2 例。37 例骨折金属内固定器经横断面扫描及 MPR、VR 重建均可明确显示，横断面扫描对内固定器的完整性显示欠佳，但可观察某一平面内固定器的情况。MPR 法的矢状位与冠状位，对椎体与长骨内固定器显示最为清楚，同时对骨折线及骨痂形成也可明确显示。VR 或 SSD 法显示的内固定器立体、直观，适用于骨盆以及不规则骨金属内固定器的观察。结论：多层螺旋 CT 在以横断面扫描为基础的情况下，结

合 MPR 的矢状位与冠状位、SSD 或 VR 可多方位, 多角度显示金属内固定器, 为临床提供了一种观察骨折金属内固定器的有效方法。

PU-1142

骨盆软组织肉瘤影像和病理分型对照分析

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目的 分析各型骨盆软组织肉瘤的临床及各类影像表现, 从而提高骨盆软组织肉瘤分型的术前诊断率。
方法 回顾性分析我院 2018 年 6 月—2023 年 6 月经手术或穿刺确诊的骨盆软组织肉瘤病例 23 例, 分析其临床表现、发病年龄、部位及 X 线、CT、MRI 的影像特点, 并对照其病理分型结果。
结果 该组病例发生于: 髌骨 8 例、耻骨 3 例、坐骨 2 例、骶骨 1 例, 右半骨盆 5 例, 左半骨盆 4 例; 其中病理经典型软组织肉瘤 14 例, 去分化型软组织肉瘤 4 例, 间叶型软组织肉瘤 3 例, 透明细胞软组织肉瘤 2 例。其临床表现、发病年龄、部位及 X 线、CT、MRI 的影像表现及病理分型各有特点。
结论 骨盆软组织肉瘤各型影像表现大部分具有一定的特征性, 根据其影像表现及临床表现、发病年龄综合分析鉴别诊断, 可以在术前得到相对准确的诊断, 甚至可以提出较合理的病理分型结果。

PU-1143

The CT and MRI features of calvarium and skull base osteoblastoma (CSBOB)

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Background

We set out to retrospectively review the computed tomography (CT) and magnetic resonance imaging (MRI) features of patients with osteoblastoma in the calvarium and skull base.

Methods

Nine cases of pathologically confirmed osteoblastoma in the calvarium and skull base were analyzed retrospectively. They had undergone CT and/or MRI. Tumor location, size, and imaging features were reviewed and recorded.

Results

The patients included four men and five women with a mean age of 27.0 years (age 14-40 years). Tumors occurred in frontal 3 cases, occipital 3 cases, parietal and sphenoidal, and skull base 1 case, respectively. On CT, tumors were measuring 5.1 ± 3.3 (1.8–8.4) cm. Seven tumors were shown to have expansile bony destruction with eggshell appearance and varying degrees of calcification or matrix mineralization. Multiple septa were observed in Five tumors. Intracranial growth in Five tumors. On MRI, seven tumors showed heterogeneous hypo to isointense on T1WI. Heterogeneous high signal patterns with low signal rim and septa were shown in six tumors on T2WI, four cases showed fluid-fluid levels. On contrast-enhanced images, six cases showed peripheral and septa enhancement, two cases showed dural tail signs.

Conclusions

Calvarium and skull base osteoblastoma (CSBOB) is rare, expansile bony destruction, septa, sclerotic rim, and calcification or matrix mineralization are the characteristic CT and MRI features.

PU-1144

Accelerated high-resolution fast spin echo based knee magnetic resonance imaging including quantitative T2 mapping using deep-learning reconstruction

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Objective: This prospective study aimed to validate clinical value of 2D fast spin echo (2D FSE) based high-resolution knee images and T2 mapping using deep learning reconstruction (DLR). **Design:** 92 patients with suspected knee lesions underwent 2D FSE based routine knee imaging on 3.0T MRI, 39 of whom also underwent T2 mapping with an acceleration factor of 2 or 3 for parallel imaging. All image data were reconstructed using conventional and deep learning reconstruction algorithms as FSE_O, FSE_{DLR}, T2_{O-ARC=2,3}, and T2_{DLR-ARC=2,3}. Subjective evaluation for overall image quality, sharpness and diagnostic confidence using 5-point Likert scale and objective assessment for signal-noise ratio and contrast-to-noise ratio were carried out. Diagnostic efficacy and accuracy was respectively performed using arthroscopy results and the more-experienced radiologist's evaluation as reference.

Results: Inter-reader agreement of subjective assessment ranged from 0.707 to 0.897 and higher score on FSE_{DLR} than FSE_O ($P < 0.05$). Both SNR and CNR of PDWI_{DLR} were higher than those of PDWI_O ($P < 0.05$). The accuracy and sensitivity of PDWI_{DLR} for evaluating knee cartilage injury were higher than those of PDWI_O. ROC curve analysis showed that T2_{DLR-ARC=2} had the highest diagnostic efficacy of classification A (group A: ICRS 0; group B: ICRS I-III) while Delong test showed no significant between-method difference of AUCs. Moreover, the diagnostic accuracy of knee injury evaluation by a less-experienced radiologist using both routine FSE_{DLR} images and T2_{DLR-ARC=2}, compared to using only FSE images, was improved by 13.8% - 25% using the evaluation by the more-experienced radiologist as diagnosis reference.

Conclusion: An accelerated high-resolution knee DLR FSE-based imaging protocol including both anatomical images and quantitative information (T2 relaxation time) could alleviate patient intolerance and statistically elevate diagnostic accuracy. This proposed protocol has great clinical value in monitoring knee injury and alterations for follow-ups.

PU-1145

iCare 与 Mindways 两种骨密度仪测定髌部骨密度比较

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目的: 探索 iCare 与 Mindways 两种骨密度仪测定髌部骨密度的差异。

方法: 分别采用 iCare 和 Mindways 两种 QCT 后处理软件对欧洲体模 (ESP) 内高、中、低密度椎体测量, 比较两种 QCT 软件测量平均值有无差异。对 230 例受试者行髌关节 CT 检查, 并采用 Mindways QCT 和 iCare QCT 计算骨质疏松检出率。对比 Mindways QCT 和 iCare QCT 对不同年龄和性别的髌骨骨质疏松检出率。

结果: iCare QCT 和 Mindways QCT 对 ESP 高、中、低密度椎体测量结果均无统计学差异 ($P > 0.05$)。iCare QCT 对髌骨骨质疏松检出率明显高于 Mindways QCT ($P = 0.01$)。iCare QCT 对女性和男性髌骨骨质疏松的检出率均明显高于 Mindways QCT ($P < 0.05$)。iCare QCT 对 ≥ 50 岁受试者髌骨骨质疏松检出率显著高于 Mindways QCT ($P = 0.02$)。

结论: iCare QCT 对于骨密度检测结果可靠, 对髌骨骨质疏松的检出率优于 Mindways QCT。

PU-1146

颈胸椎定位像对椎体编号的必要性

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目的 探讨腰椎 MRI 及 CT 扫描时增加颈胸椎定位像对确定椎体编号的必要性。**方法** 回顾性分析 734 例行腰椎 MRI 及腰椎 CT 检查(包括腹盆部 CT)的患者的图像。以 MR 全脊柱定位像对椎体编号为金标准,对比基于 MRI 图像的椎体倒数法和基于 CT 图像的肋骨定位法、髂腰韧带定位法、腰大肌定位法、横突形态定位法和髂棘定位法对腰椎椎体计数的准确性。**结果** 734 例患者包含 213 例移行椎体患者和 521 例非移行椎体患者。移行椎体组中基于 MRI 的椎体倒数法的准确率为 57.3%,基于 CT 的肋骨定位法、髂腰韧带定位法、腰大肌定位法、横突形态定位法和髂棘定位法的准确率分别为 84.0%、75.6%、81.7%、78.9%和 85.9%;非移行椎体组中基于 MRI 的椎体倒数法的准确率为 100%,基于 CT 的肋骨定位法、髂腰韧带定位法、腰大肌定位法、横突形态定位法和髂棘定位法的准确率分别为 100%、96.2%、95.2%、91.7%和 95.8%。非移行椎体组基于腰椎 MRI 或者腰椎 CT 图像的定位法准确率均高于移行椎体组($P<0.01$)。**结论** 仅基于腰椎 MRI 或者腰椎 CT 的定位法存在误诊风险,腰椎病变进行腰椎 MRI 或者腰椎 CT 检查时常规增加颈胸椎定位像,对椎体进行准确编号具有重要的临床价值。

PU-1147

Charcot Neuroarthropathy Versus Osteomyelitis

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Abstract and introduction

Abstract:

Introduction: patient with diabetes and peripheral neuropathy have a 25% risk of developing a foot ulcer, and these can lead to soft tissue infections that worsen and result in osteomyelitis. while Charcot neuroarthropathy is not as common as osteomyelitis, it is often misdiagnosed as osteomyelitis. **Case Reports:** Three patients presented with diabetes, neuropathy, and foot ulcers. **Conclusion:** while Charcot neuropathy and osteomyelitis have similar signs and symptoms, understanding the similarities and differences between the condition can aid providers in appropriate wound management. **Introduction:** According to the 2016 world health organization data, Diabetes prevalence is also increasing rapidly among the US population. **Results:** case 1: CN Developed After Keller arthroplasty. A 55 years old male with a history of type 2 diabetes presented

PU-1148

负重位 DR 影像与正常 DR 影像对拇外翻分级的评估价值的对比

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目的: 探究负重位 DR 摄影与非负重位 DR 摄影对拇外翻分级评估的影响

方法：在负重位的情况下拍摄一张拇外翻图像，与非负重位时拍摄的拇外翻图像进行对比，用机器分别测量两张图像趾骨间角与拇外翻角，对比两张图像中角度的大小

结果：在负重位的情况下角度会比非负重位大 2-5 度

结论：拍摄负重位足正位比正常拍摄足正位更接近人在行走站立时足的状态，趾骨间距与拇外翻角也更加接近站立与行走时的真实状态，对拇外翻的分级评估可以更加准确。

PU-1149

多种功能成像方式联合诊断用于鉴别良性和恶性骨肿瘤的临床价值

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目的 联合应用 DWI、IVIM、DKI 以及 APTWI 在鉴别诊断良性和恶性骨肿瘤的初步探索。方法 本研究为前瞻性研究。收集 2022 年 1 月至 2023 年 7 月于郑州大学第一附属医院经穿刺或手术病理证实的骨盆和下肢的骨肿瘤患者。45 例患者均接受了磁共振 T1 加权成像、T2 加权成像、DWI、IVIM、DKI 和 APTWI 检查。于 DWI、IVIM、DKI、APTWI 相应的参数图上分别测量病灶相应的相关参数值。采用独立样本 t 检验比较良性和恶性骨肿瘤的 DWI、IVIM、DKI、APTWI 相关参数的差异。此外，采用受试者工作特征 (ROC) 曲线来评估 IVIM、DKI、APTWI 和 DWI 以及 4 种检查方法联合的诊断效能。结果 45 例骨肿瘤患者中恶性 27 例、良性 18 例。ADC 值、D 值、MD、MK 值、MTRasym (3.5 ppm) 平均值 (MTRasymmean) 和 MTRasym (3.5 ppm) 最大值 (MTRasymmax) 在良性和恶性骨肿瘤之间均有显著差异。ROC 分析显示 ADC 值、D 值、MD 值、MK 值、MTRasymmean 和 MTRasymmax 的 AUC 分别为 0.845、0.813、0.728、0.786、0.734、0.774，多个值联合诊断可明显提高诊断性能，AUC 为 0.918。当 ADC 值、D 值、MD 值、MK 值、MTRasymmean 和 MTRasymmax 的诊断阈值分别取 $1.57 \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $1.41 \times 10^{-3} \text{ mm}^2/\text{s}$ 、 $2.07 \times 10^{-3} \text{ mm}^2/\text{s}$ 、0.76、2.14%、3.85% 时，鉴别良性和恶性骨肿瘤的灵敏度分别为 66.67%、66.67%、55.56%、77.78%、50%、72.22%，特异度分别是 96.3%、85.19%、92.59%、92.59%、92.59%、81.48%。四种检查方式联合鉴别良性和恶性骨肿瘤的灵敏度、特异度分别为 88.89%、85.19%。结论 多种功能成像方式联合诊断提供了更多关于肿瘤细胞微环境的生物学信息和病理学行为，更有助于良性和恶性骨肿瘤的鉴别诊断。

PU-1150

青少年沙瘤样骨化纤维瘤(juvenile psammomatoid ossifying fibroma, JPOF)影像表现的探讨

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摘要 目的：分析发生于颌面骨的青少年沙瘤样骨化性纤维瘤影像学表现，并探讨 JPOF 影像与病理表现的相关性及其鉴别诊断。方法：收集 2017 年 9 月至 2023 年 5 月期间 2 例 JPOF 患者临床、影像资料及病理诊断进行分析，并进行文献复习。结果：JPOF 主要发生于儿童和青少年，好发于颌面部，以副鼻窦的骨壁最为多见，其他部位包括下颌骨、上颌骨和颅骨。影像学特征为局部膨胀性肿块，境界清晰，肿瘤周围骨皮质受压变形。肿瘤磨玻璃样密度增高提示肿瘤内部有骨化。伴发囊性变时，可见囊腔形成。部分肿瘤为侵袭性生长，表现为肿瘤侵犯骨皮质、沿解剖孔道侵入鼻腔及邻近鼻窦或侵犯眼眶。JPOF 的病理学特征：肿瘤组织中散在分布“牙骨质小体样”骨小体，

骨小体外形不规则, 其内见多少不等的骨细胞, 周围有胶原物质包绕。局部可有灶性黏液变和囊性变, 类似动脉瘤样骨囊肿。JPOF 的 CT 表现的磨玻璃样影像与病理上 JPOF 内的“牙骨质小体样”骨小体密切相关。结论: JPOF 是一种发生于青少年且较罕见的纤维骨病变, 具有一定的影像学特点, 与病理组织学的成分密切相关, 影像上尚需与经典型骨化纤维瘤、青少年小梁状骨化纤维瘤、骨纤维结构不良、骨肉瘤等相鉴别。

PU-1151

多层螺旋 CT 三维重建在诊断外伤性膝关节隐性骨折中的临床应用价值

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目的: 探讨分析多层螺旋 CT 三维重建在诊断外伤性膝关节隐性骨折中的临床应用价值。方法: 选择 2022 年 2 月-2023 年 2 月在我院行螺旋 CT 检查的 55 例外伤性膝关节隐性骨折患者作为研究对象。男性患者 34 例, 女性患者 21 例, 年龄 37-68 岁, 平均年龄 (52.04±1.24) 岁; 病程 2-12 个月, 平均病程 (7.24±0.36) 月, 用 128 层螺旋 CT 检查, 调整设备参数, 将膝关节间隙作为检查核心, 从股骨下段向骨折线远端进行扫描。扫描后将图像传送到工作站并进行三维重建处理。结果: 1. 比较金标准与 CT 组诊断结果: 金标准诊断隐性骨折是 52 例、非隐性骨折是 3 例, CT 组诊断隐性骨折是 50 例, 非隐性骨折是 5 例, 金标准与 CT 诊断结果经对比, ($P>0.05$) 差异无统计学意义。(X^2 值=3.0891, P 值=0.0788)。2. 比较金标准与 CT 组诊断能效: CT 诊断的灵敏性是 94.23% (49/52), 特异性是 66.67% (2/3), 准确性是 98.08% (51/52), 与金标准诊断的灵敏性、准确性、特异性经对比, ($P>0.05$) 差异无统计学意义。灵敏性统计学: X^2 值=3.0891, P 值=0.0788; 特异性统计学: X^2 值=1.2000, P 值=0.2733; 准确性统计学: X^2 值=1.0377, P 值=0.3083。结论: 多层螺旋 CT 三维重建在外伤性膝关节隐性骨折的诊断中具有得非常好的临床价值, 该检查技术的灵敏性、特异性、准确性均比较理想, 漏诊和误诊情况比较少见, 可以为此疾病的诊疗提供参考依据。

PU-1152

小儿朗格汉斯细胞组织细胞增多症的影像学诊断

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目的 分析小儿朗格汉斯细胞组织细胞增多症在 X 线平片、CT 和 MRI 上的影像学特点, 以提高对其诊断和鉴别诊断能力。

资料与方法 28 例朗格汉斯细胞组织细胞增多症, 男 16 例, 女 12 例, 年龄 1-11 岁, 平均 3.5 岁, 均经病理穿刺或手术证实。术前 CT 和 MRI 检查各 19 例, 其中 11 例同时包括 CT 和 MRI 检查, X 线平片检查 10 例, 1 例同时有 X 线平片、CT 和 MRI 检查。结合病理回顾性分析其临床表现和影像学特点。

结果 23 例单发局灶型病例全部累及骨骼系统, 其中颅骨 6 例, 骨盆 4 例, 脊柱 2 例, 长骨 6 例, 不规则骨 5 例。5 例多发单系统型, 其中 1 例同时累及颞骨和肝脏, 1 例发生于颈静脉孔区及颈部淋巴结, 3 例同时累及颞骨和垂体柄。X 线平片检查 10 例, 呈单发囊状、溶骨性破坏, 或骨皮质不规则, 骨皮质局部变薄、中断、破坏。CT 检查 19 例, 表现为干骺端骨髓腔内类圆形软组织肿块,

沿长骨纵轴方向生长,可出现“小钻孔样骨质破坏”。MRI 检查 19 例,T1WI 呈等低信号,T2WI 多呈高信号,信号一般较均匀,增强后一般呈中度以上均匀强化,可见“袖套征”。

结论 LCH 好发于 1-3 岁幼儿或青少年,最常累及骨骼系统,影像表现虽复杂多样,但有一定的特征性,正确有效地应用 X 线平片、CT 及 MRI 检查各自优势,坚持临床、影像、病理结合,才能提高对本病的诊断水平。

PU-1153

能谱 CT 在创伤性骨髓水肿的定量研究

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目的:探索能谱 CT 物质分离技术联合 CT 值在创伤性骨髓水肿的定量研究

方法:回顾性收集 2017 年 11 月至 2018 年 3 月行双能 CT 检查的 24 名急性骨折患者,并重建其能谱 CT 伪彩图。由两名医师评估骨折及其骨髓水肿范围,并分别测量骨髓水肿区及正常骨髓区的 CT 值、水-钙值和水-羟基磷灰石值。采用受试者工作特征曲线 (ROC) 评估上述定量值的诊断效能。

结果:骨髓水肿区的水-钙值 ($1040.28 \pm 33.55 \text{mg/cm}^3$) 显著高于正常骨髓区 ($1011.11 \pm 45.83 \text{mg/cm}^3$) ($P < 0.001$)。70keV 图像中骨髓水肿区和正常骨髓区的 CT 值分别为 $210.18 \pm 108.63 \text{HU}$ 和 $133.44 \pm 134.06 \text{HU}$ ($P < 0.001$)。水-钙值在诊断急性骨折骨髓水肿区的 AUC 值显著高于 CT 值 (AUC 值分别为 0.771、0.719)。

结论:基于双能谱 CT 成像中获得的骨髓中水-钙值,在区分骨髓水肿和正常骨髓方面具有较高的准确性。

PU-1154

肋骨原发性肿瘤病变的 CT 诊断与鉴别诊断

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肋骨原发性肿瘤病变的 CT 诊断与鉴别诊断

目的:

讨论原发性肋骨肿瘤病变的 CT 表现及各自的特点,提高对该部位原发占位性病变影像表现的认识

方法:

回顾性分析 2020 年 1 月-2023 年 8 月我院收治的 27 例肋骨原发性占位性病变的临床及影像学资料,所有患者均行 CT 检查,均经手术或穿刺病理证实。并结合近年来相关文献进行分析。

结果:

27 例患者中,软骨源性肿瘤 14 例,其中良性 6 例(骨软骨瘤 5 例,内生软骨瘤 1 例),中间型 2 例(非典型软骨性肿瘤 1 例,多发内生软骨瘤病 1 例),恶性 6 例(均为软骨肉瘤)。骨的其他间叶性肿瘤 6 例(纤维结构不良 5 例,血管脂肪瘤 1 例),均为良性病变。骨的纤维源性肿瘤 2 例(韧带样纤维瘤 2 例),为中间型。骨造血系统肿瘤 4 例(朗格罕细胞组织细胞增生症 2 例,浆细胞瘤 2 例),均为恶性。内分泌与代谢性骨病 1 例(甲状旁腺功能亢进 1 例)。

良性病变 13 例,骨软骨瘤及纤维结构不良为主要病变;骨软骨瘤一般呈结节样隆起,以宽基底与母骨相连,瘤内骨皮质与髓质均与母骨相延续,边缘见硬化边;纤维结构不良在肋骨多为多发,膨胀明显,部分病例呈象牙样密度改变,邻近软组织肿块少见。恶性病变 10 例,软骨肉瘤好发于肋软骨交界处,表现为不规则形溶骨性骨质破坏,局部软组织肿块形成,并见形态各异钙化;骨髓瘤

骨质膨胀, 局部穿凿样骨质破坏, 局部伴发病理性骨折, 破坏区软组织肿块形成, 可同时存在其他胸廓骨受累; 结合文献资料, 肋骨朗格罕细胞组织细胞增生症较为罕见, 影像表现无特异性, 影像学明确诊断较困难。中间型病变 4 例, 病变具局部侵袭性, 骨质破坏不明显, 软骨来源病变见钙化; 纤维源性肿瘤影像表现无特异性, 影像学明确诊断较困难。

结论:

肋骨原发性骨肿瘤病种较多, 良性病变以骨软骨瘤、纤维结构不良多见, 肿瘤境界清晰, 肋骨膨胀性重构, 一般无软组织肿块形成; 恶性病变主要为软骨肉瘤及骨造血系统肿瘤, 影像表现以骨质破坏为主, 存在软组织肿块。综上所述, 肋骨原发性肿瘤部分病变有典型影像表现, 而部分病变影像学无特异性, 最终诊断仍需临床、影像、病理三方面结合。

PU-1155

Analysis of possible factors involving subsequent vertebral fractures after compression fractures, focusing on clinical and paravertebral muscle features

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Objective

To construct a nomogram based on clinical factors and paraspinal muscle features to predict vertebral fractures occurring after acute osteoporotic vertebral compression fracture (OVCF).

Materials and Methods

We retrospectively enrolled 307 patients with acute OVCF between January 2013 and August 2022, and performed magnetic resonance imaging of the L3/4 and L4/5 intervertebral discs (IVDs) to estimate the cross-sectional area (CSA) and degree of fatty infiltration (FI) of the paraspinal muscles. We also collected clinical and radiographic data. We used univariable and multivariable Cox proportional hazards models to identify factors that should be included in the predictive nomogram. Furthermore, we used receiver operating characteristic curve, calibration curve, and decision curve analyses to evaluate the performance and clinical utility of the nomogram. The predictive model for subsequent vertebral fracture was internally validated via bootstrap resampling.

Results

Post-OVCF vertebral fracture occurred within 3, 12, and 24 months in 33, 69, and 98 out of the 307 patients (10.8%, 22.5%, and 31.9%, respectively). Multivariate analysis revealed that this event was associated with percutaneous vertebroplasty treatment, higher FI at the L3/4 IVD levels of the psoas muscle, and lower relative CSA of functional muscle at the L4/5 IVD levels of the multifidus muscle. Area under the curve values for subsequent vertebral fracture at 3, 12, and 24 months were 0.711, 0.724, and 0.737, respectively, indicating remarkable accuracy of the nomogram. Decision curve analysis was in good agreement with these observations, and confirmed the utility of the nomogram. Bootstrapped internal validation showed a high degree of concordance.

Conclusion

We developed a model for predicting post-OVCF vertebral fracture from diagnostic information about prescribed treatment, FI at the L3/4 IVD levels of the psoas muscle, and relative CSA of functional muscle at the L4/5 IVD levels of the multifidus muscle. This model could facilitate personalized predictions and preventive strategies.

PU-1156

基于冠状动脉周围脂肪组织 HU 值的机器学习模型预测冠状动脉粥样硬化患者骨量异常的应用价值

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目的：探讨冠状动脉周围脂肪组织 (PCAT) HU 值对冠状动脉粥样硬化患者骨量异常的预测价值。
方法：回顾性收集了 2021 年 7 月至 2023 年 1 月在我院接受冠状动脉计算机断层扫描血管造影 (CCTA) 与胸部 QCT 扫描的 284 例患者的影像和临床资料。患者按照 7:3 的比例被随机分为训练组 (n=198) 和测试组 (n=86)。以 QCT 测得的体积骨密度 (vBMD) 为参考标准, 将患者分为骨量正常组 (vBMD \geq 120mg/cm³) 和骨量异常组 (vBMD<120mg/cm³)。在 CCTA 图像上进行勾画左前降支 (LAD)、左回旋支 (LCX) 和右冠状动脉 (RCA) 的周围脂肪组织并得到其体积与 HU 值。通过单因素和多因素 Logistic 回归选择临床特征与 PCAT HU 值。构建包含临床特征的模型 1 与结合临床特征和 PCAT HU 值的联合模型 2。采用受试者工作特征曲线 (ROC) 评价模型的预测性能, 采用决策曲线分析 (DCA) 评价各模型的临床净收益值。
结果：我们发现 RCAPCAT 的 HU 值为冠状动脉粥样硬化患者发生骨量异常的独立风险因素 (P<0.01)。临床模型 1 对冠状动脉粥样硬化患者骨量异常的预测性能一般, 训练组和测试组的 AUC 分别为 0.862 和 0.796。其中测试组的特异度与灵敏度只有 0.810 和 0.763。联合模型 2 在训练组和测试组中表现出较高的预测骨量异常的性能 (AUC=0.922 和 0.866), 测试组的灵敏度与特异度为 0.851 和 0.846, 均高于模型 1。DCA 结果显示, 联合模型 2 比临床模型 1 具有更高的总体净收益。
总结：基于 PCAT HU 值-临床联合模型对冠状动脉粥样硬化患者骨量异常的预测性能良好, 临床净收益明显, 可为临床决策提供参考。

PU-1157

双下肢多发骨梗死磁共振类 CT 及能谱 CT 钙抑制影成像应用 1 例报告

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骨梗死是骨髓腔内的骨坏死, 多发生于股骨远端及胫骨近端、远端, 有多发性和对称性的特点; 骨梗死的发病率尚不清楚, 骨梗死临床表现无特异性。

基于受限回波间距的快速梯度回波类 CT 成像 (fast field echo resembling a CT using restricted echo-spacing, FRACTURE) 序列 (类 CT 技术) 是一种基于高分辨率快速梯度回波技术, 结合减影技术获得类 CT 图像; 能谱 CT 钙抑制技术是基于对钙物质的识别和抑制, 提高软组织的对比度, 用于评估骨髓改变。关于骨梗死的磁共振类 CT 成像以及能谱 CT 钙抑制技术影像尚无临床报道。

类 CT 序列可以勾勒出骨梗死的硬化边界, 优于常规 CT 表现, 可发现骨质结构的早期变化。另外, 类 CT 序列可清晰显示骨髓水肿区 STIR 高信号所掩盖的小的梗死病变, 体现了类 CT 序列对骨梗死小病变的检出能力。类 CT 技术能够弥补 MRI 在骨组织显示不足的缺点, 有望替代 CT 检查。

常规 CT 对早期骨梗死观察能力有限, 钙抑制图像可以显示骨梗死引起的骨髓密度变化, 并与磁共振 STIR 序列显示基本一致, 这对 CT 早期诊断骨梗死具有重要意义。

总之, 双下肢多发骨梗死磁共振类 CT 技术可以清晰评估病变累及范围, 可以显示骨髓水肿 T2WI 高信号所掩盖的早期小病灶; 能谱 CT 钙抑制技术可以显示病变区骨髓密度改变, 两种技术可为临床精确评估骨梗死病变提供参考依据。

PU-1158

全脊柱正侧位片之骨科术前检查金标准

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目的:解决传统 X 线摄影的几何畸变和助力青少年患者改善脊柱侧弯, 恢复患者健康。

脊柱侧弯目前已经成为青少年患者的阻碍, 严重影响青少年患者的身心健康。利用数字化 X 线摄影技术, 让患者站立在立式摄影架前, 运用标准的解剖学姿势, 将球管对准患者的扫描部位, 定位起点和终点, 根据患者的身体情况, 运用不同的摄影参数 (KV、MA、MAS...), 手动或者自动调节曝光参数和曝光剂量。扫描时, 球管和探测器同时平行移动, 照射野上下一致, 曝光为连续透视采集, 为了获得更加接近真实的尺寸, 需要尽可能大的 SID 或者尽可能的 TOD, 并且患者只需平静呼吸下屏住气, 采集后, 几秒钟就可出现全长无缝拼接图像。极大的减小了图像的几何失真, 获得了优质的数字化图像, 更加有利于骨科医生精确的判断, 助力精准手术

PU-1159

强直性脊柱炎严重程度与椎旁肌容量及脂肪含量相关性分析

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【摘要】目的 采用多层螺旋 CT 定量分析腰 4 椎体下缘水平多裂肌及竖脊肌肌肉横截面积、肌肉内脂肪含量, 评价椎旁肌脂肪含量与强直性脊柱炎 (AS) 严重程度之间的关系。材料及方法: 根据 1984 年纽约修订的 AS 诊断标准将 AS 患者分为 4 组, 选取同期年龄及性别相匹配的正常患者 73 例作为对照组, 分别测量两组椎旁竖脊肌与多裂肌的总横截面积 (TCSA)、肌肉内脂肪浸润总横截面积 (fCSA) 及肌肉内脂肪比例 (FF); 运用 ANOVA 单因素方差分析比较不同分级 AS 患者的差异; 采用 Spearman 相关性分析评价 AS 患者不同程度与相应层面椎旁肌肉 TCSA、fCSA 及 FF 的相关性; 采用多元线性回归分析分析性别、年龄、CT 分级等因素与椎旁肌肉 TCSA、fCSA、FF 之间的关系。结果 不同级别 AS 组间竖脊肌与多裂肌 TCSA、fCSA、FF 的差异有统计学意义 ($p < 0.05$); 不同级别 AS 患者 TCSA、fCSA、FF 均具有相关性, 其中 AS 分级与 TCSA 呈中等程度相关 ($r = 0.36$, $p < 0.001$), 与 fCSA 呈强相关 ($r = 0.638$, $p < 0.001$), 与 FF 呈显著相关 ($r = 0.721$, $p < 0.001$); 多元线性回归分析结果提示性别与 AS 患者 CT 分级是椎旁肌 TCSA 的独立影响因素 ($R^2 = 0.374$); 年龄、AS 患者 CT 分级是椎旁肌 fCSA 的独立影响因素 ($R^2 = 0.584$); 年龄、性别、AS 患者 CT 分级是椎旁肌 FF 的独立影像因素 ($R^2 = 0.677$)。结论 椎旁肌脂肪化一定程度上可以反映 AS 的严重程度, 且脂肪化程度与 CT 分级明显相关。

PU-1160

双能 CT 在糖尿病足合并骨髓水肿中的应用

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[摘要] 目的 研究评估双能 CT (DECT) 联合虚拟去钙 (VNCa) 技术在检测糖尿病足合并骨髓水肿 (BME) 的准确性。材料与方法 回顾分析了已经磁共振检查证实的 22 例糖尿病足合并 34 处骨髓水肿患者行双足 DECT 检查, 使用后处理软件重建 VNCa 图像并对其进行分析, 在骨髓水肿处的骨矢状面或冠状面上手动设置感兴趣区域 (ROI) 测量其 CT 值, 并在其对应侧足同一位置绘制同

样的 ROI 并测量 CT 值作为参考。结果 将磁共振证实的 22 例患者 34 处骨髓水肿在 VNCa 图像定性分析中有 29 例存在骨髓水肿, 准确性为 85.3%, 骨髓水肿部位 CT 值和对侧参考部位 CT 值 ($-15.22 \pm 38.96\text{HU}$ 和 $-73.43 \pm 32.10\text{HU}$) 有统计学意义 ($p < 0.001$)。结论 在糖尿病合并骨髓水肿过程中, 骨髓中的脂肪含量减少, 炎症组织增加, 在 MRI 中表现为 T1WI 信号减低 T2WI 脂肪抑制信号增加; 在 DECT 中骨髓中脂肪含量减少是 CT 值增加的重要因素, DECT 与 VNCa 配合使用可以有效诊断糖尿病足骨髓炎, 但由于前足骨骼相对较小, 难以获得良好的定量测量, 因此此技术存在一定的局限性。

PU-1161

SAPHO 综合征的影像学改变: 1 例病例汇报

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背景: SAPHO (synovitis-acne-pustulosis-hyperostosis-osteomyelitis) 是以滑膜炎、痤疮、脓疱病、骨肥厚、骨髓炎为综合表现的一种慢性炎症。SAPHO 综合征是一种罕见病并且因其临床表现多样, 容易误诊, 而影像学检查对其有着极高的诊断特异性, 所以影像学对其疾病的认识有着重要的价值, 本报告以 1 例 SAPHO 病人为例来对此疾病进行一个系统的影像学回顾。

病例介绍: 患者, 男, 59 岁, 反复左锁部疼痛、活动受限, 进行性加重。体格检查发现左侧锁骨局部有一质硬肿块, 伴有压痛。入院血象示: C-反应蛋白 44.3mg/L ↑。行 DR、CT 及行 MRI 检查, MRI 示: 双侧胸锁关节肥大, 左侧为著, 胸骨、双侧锁骨、双侧第 1、2 肋骨及胸椎多发椎体可见骨质信号混杂, 呈稍长 T1 稍长 T2 信号, DWI 未见受限, 增强扫描可见不均匀强化, 周围软组织稍肿胀并见少许长 T2 信号。左侧锁骨胸骨端局部骨皮质不连续。左侧锁骨穿刺活检示: 左锁骨韧带样纤维组织增生, 见较多纤维组织, 部分纤维组织间质粘液变性, 散在急慢性炎症细胞浸润, 局灶并见成骨及破骨, 部分纤维胶原透明变性, 骨皮质增粗, 免疫组化示: SMA(+), S-100(-), SATB-2(+), β -catenin(-), Ki-67(+). 符合 SAPHO 综合征改变。

讨论: 肿瘤的影像学特征为 SAPHO 综合征的诊断提供了充分线索, 包括双侧锁骨、双侧第 1、2 肋骨以及部分胸椎椎体的骨肥大及骨质破坏改变, 结合特征性的皮肤病变 (掌跖部的痤疮和脓疱病), 有助于实现对 SAPHO 综合征的明确诊断。

PU-1162

3.0T MR gagCEST 技术对早期膝关节骨关节炎软骨病变的评价及定量分析

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背景: 膝关节骨关节炎 (Knee Osteoarthritis, KOA) 的早期会有软骨成分的生化改变, 常规的 MR 成像技术无法做到对软骨生化成分改变的定量计算与评估, 因此临床中 KOA 的发现往往已经到了晚期阶段, 而糖胺聚糖化学交换饱和转移成像技术 (glycosaminoglycan chemical exchange saturation transfer, gagCEST) 可以对膝关节的软骨生化成分进行定量测量, 可为疾病的超早期发现和诊断提供依据。

目的: 与术中结果比较, 分析 3.0T MR gagCEST 技术在早期骨关节炎的诊断价值, 以及定量分析健康软骨和退变软骨的 gagCEST 值。

方法: 前瞻性纳入陕西省人民医院 2022 年 1 月至 2022 年 12 月住院接受治疗的 18 例膝关节疼痛临床诊断为早期 KOA 的患者, 术前行 Philips 3.0T 常规序列及 gagCEST 序列扫描。感兴趣区 ROI

选择矢状面 gagCEST 序列和形态学高分辨率三维脂肪饱和质子密度空间序列。通过关节镜检查确定软骨病变,按照国际软骨修复学会(ICRS)对每名患者 42 个 ROI 进行分级,包括股骨髁,股骨外侧髁,胫骨内侧平台,外侧胫骨平台,髌骨和滑车。并使用方差分析和 Spearman 秩相关检验将 ROI 分级与 gagCEST 平均值进行比较。应用受试者工作特征(ROC)曲线确定 gagCEST 诊断阈值,以区分 ICRS 分级。

结果:本研究共收取了 756 个 ROI,ICRS 评分为 0 分(65.4%)、1 分(26.2%)、2 分(6.7%)和 ICRS 3、4 分合并(1.7%)。gagCEST 值随软骨损伤程度的增加而降低,与 ICRS 评分呈负相关。以 gagCEST 值 3.45%作为阈值来区分 ICRS 评分 0 分(正常)和其他评分等级。

结论:MR gagCEST 技术反映了糖胺聚糖的含量,可准确客观无创地量化关节软骨成分,并能够早期诊断骨关节炎和区分 ICRS 分级。

PU-1163

多发性骨髓瘤伴颞部髓外病变一例

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本文报道了 1 例多发性骨髓瘤伴颞部髓外病变的病例,患者为 56 岁女性,发现左侧颞部肿物 1 年余,疼痛 1 月。MRI 平扫及增强示:左侧颞部见团块状稍长 T1 稍长 T2 信号, DWI 高 b 值弥散受限呈高信号,大小约 72mm×50mm×73mm(前后径×左右径×上下径),增强后显著不均匀强化。双侧额顶枕部颅骨、斜坡可见多发斑片状 T2flair 高信号,增强后呈结节状强化。诊断:左侧颞部病变伴软组织肿块形成,双侧额顶枕部颅骨、斜坡多发异常信号,考虑多发性骨髓瘤。左侧颞部病变术后病理为浆细胞瘤。

PU-1164

Potential of ultra-high-resolution CT in detecting osseous changes of temporomandibular joint: experiences in temporomandibular disorders

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Background: Osseous changes of the temporomandibular joint (TMJ) are related to the progression of temporomandibular disorders (TMD), and computed tomography (CT) plays a vital role in disease evaluation.

Objective: The aims of this study were to evaluate the image quality and diagnostic value of ultra-high-resolution CT (U-HRCT) in TMD compared to cone-beam CT (CBCT).

Methods: TMD patients who underwent both CBCT and U-HRCT between November 2021 and September 2022 were retrospectively included. Image quality scores were assigned for four osseous structures (the cortical and trabecular bones of the condyle, articular eminence, and glenoid fossa) by two independent observers from Score 1 (unacceptable) to Score 5 (excellent). Diagnostic classification of TMD was categorized as follows: Class A (no evident lesion), Class B (indeterminate condition) and Class C (definitive lesion). Image quality scores and diagnostic classifications were compared between CBCT and U-HRCT. The Cohen's Kappa test, Wilcoxon signed-rank test, Chi-square test and Fisher's exact test were conducted for statistical analysis.

Results: Thirty TMD patients (median age, 30 years; interquartile range, 26–43 years; 25 females) with 60 TMJs were enrolled. Image quality scores were higher for U-HRCT than for CBCT by both observers (all P s<0.001). Definitive diagnoses (Class A and C) were achieved in more cases with

U-HRCT than with CBCT (93.3% vs. 65.0%, Fisher's exact value = 7.959, $P = 0.012$). Among the 21 cases which were ambiguously diagnosed by CBCT (Class B), definitive diagnosis was achieved for 17 cases (81.0%) using U-HRCT. Conclusions: U-HRCT can identify osseous changes in TMD, providing improved image quality and a more definitive diagnosis, which makes it a feasible diagnostic imaging method for TMD.

PU-1165

MODIFIED PERCUTANEOUS BIOPSY OF THE SPINE: IMPROVEMENT OF THE TECHNIQUE

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Biopsy of the spine can be performed by open surgery or percutaneous needle sampling. The first has the highest diagnostic yield while the second is a less invasive procedure with lower rate of complications and shorter hospitalization time. We described a modified technique of percutaneous biopsy using semi-rigid grasping forceps that may offer the advantages of both, open and minimally invasive surgery. Our case series of 30 patients with spine lesions who underwent biopsy with this technique are reported. The samples were sufficient for analysis in 100% of cases ($n=30$) and a histological diagnosis was obtained in 100% of cases ($n=30$). The diagnosis included tumors in 16.7% ($n=5$) and infections in 83.3% ($n=25$) of cases. Microbiological cultures provided an aetiological diagnosis in 92% of the infections ($n=23$). We believe that this device may offer several advantages in percutaneous biopsy, increasing volume of sampling and reducing the non-diagnostic rate of the procedure.

PU-1166

Burden and distribution of monosodium urate deposition in patients with gout and hyperuricemia predict renal insufficiency

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ABSTRACT

Objectives: To evaluate the predictive value of dual-energy CT (DECT) for renal insufficiency in patients with Hyperuricemia or Gout.

Methods: This observational retrospective study included patients with gout or hyperuricemia after clinical diagnosis between January 1, 2009 to September 15, 2017. The clinical end point was renal insufficiency, defining as $eGFR < 90$ (mL/min/1.73m^2) by using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula. The ability of dual-energy CT (DECT) to predict outcomes and improve the predictive value of the current noninvasive work-up was assessed. Survival analysis was performed, and the C-index was used to assess the

performance of each predictive model. To compare nested models, the likelihood ratio χ^2 test was performed.

Results: A total of 52 patients (mean age \pm standard deviation, 45.4 years \pm 16.5; 2 women [3.8%]) were included; the median time of follow-up was 24 months. The renal insufficiency occurred in 28.9% (15 of 52 gout patients) and none in hyperuricemia patients. Univariable analysis revealed DECT was predictive of renal insufficiency in gout patients (hazard ratio [HR], 4.1; 95% CI: 1.6, 10.8; $P = .01$) but not in hyperuricemia patients (HR, 1.2; 95% CI: 0.6, 2.2; $P = .63$). DECT was independently associated with renal insufficiency in gout (HR, 4.0; 95% CI: 1.5, 10.5; $P = .01$) when adjusting for potential confounders. Adding DECT as a predictor to models that include clinical data improved their predictive value for renal insufficiency in gout patients ($P = .002$) but not in hyperuricemia patients ($P = .67$), and it showed good discriminative ability for renal insufficiency (C-index, 0.71). However, MSU burden was not predictive of the renal insufficiency ($P=0.678$).

Conclusions: Dual-energy CT was associated with renal insufficiency in candidates of gout and improved the predictive value of chronic renal disease assessment.

PU-1167

腰椎管内孤立性纤维瘤 1 例

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患者女，34 岁。腰部疼痛 6 个月，近 2 周出现左小腿疼痛、麻木，走路跛行，于劳累或行走时自觉症状加重，休息后减轻。入院查体：约腰 3 椎体棘突压痛、叩击痛(+)，腰部活动受限；左侧直腿抬高试验及俯卧位直腿抬高试验阳性。实验室检查无明显异常。腰椎 MRI 示：腰 3-4 椎体水平椎管内硬膜外占位，腰 3 椎体及附件骨质、相应椎旁软组织及腰 3-4 椎体水平椎管内可见团片状长 T1 不均匀稍长 T2 信号，压脂像呈高信号。同水平马尾终丝受压。增强示病灶均匀明显强化。CT 示：病灶密度同软组织，密度欠均，边界欠清；CT 骨窗示腰 3 椎体及附件不规则骨质破坏。行椎管内肿块切除术，术中所见：肿物包膜完整，质韧，呈灰红色，血供丰富。术后病理所见：梭形细胞瘤，细胞增生活跃。可见胶原纤维和薄壁血管。免疫组化：Desmin(-), CD34(+), STAT6(部分较弱+), Ki-67(约 3%)，病理诊断：（腰椎管内）孤立性纤维瘤（solitary fibrous tumor, SFT）。术后未行放化疗，左下肢疼痛完全消失，肌力恢复。SFT 是一种罕见的间叶组织源性肿瘤。可发生于全身各部位，于胸膜多见。脊柱 SFT 发病率较低，多位于胸段，颈段次之，腰骶段罕见。脊柱 SFT 主要发生在髓外硬膜内区域，硬膜外区域少见。男女患病率约为 1.5: 1，平均年龄为 50 岁。SFT 通常生长缓慢，临床表现多为压迫相应脊髓或神经根导致的肢体麻木及感觉异常。MRI 平扫呈等或长 T1 信号，T2WI 信号多变，可为等、低、高或者混杂信号。增强扫描因肿瘤内成分差异表现不同，若胶原纤维较多时延迟渐进性强化；若实性成分肿瘤细胞较多时，早期明显强化。CT 平扫呈等或混杂密度，增强表现同 MRI。鉴别诊断：1) 神经鞘瘤：有完整包膜，可发生囊变，极少钙化。常位于脊髓背外侧，沿椎间孔向外生长，可出现典型的“哑铃形”。MRI 表现为等或长 T1 长 T2 信号。增强后明显强化，均匀或不均匀。2) 脊膜瘤：肿瘤边界清晰，范围局限，多数位于髓外硬膜内。常合并钙化，呈宽基底与硬脊膜相连，增强可见“脊膜尾征”。临床上常以 CD34(+)和 STAT6(+)作为 SFT 的诊断指标，两者结合可以提高诊断准确率。

PU-1168

Augmented reality navigation for percutaneous spinal biopsy

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OBJECTIVE The aim of this study was to evaluate the accuracy (deviation from the target or intended path) and efficacy (insertion time) of an augmented reality surgical navigation (ARSN) system for percutaneous spinal biopsy (PSB).

METHODS we propose an AR surgical navigation system for PSB based on multi-modality imaging information, which contain fluoroscopy, optical tracking and depth camera. We also present a self-adaptive calibration and transformation method between 6-DOF optical tracking device and depth camera, which are in different coordinate systems. With substantially reduced frequency of fluoroscopy imaging, the system can accurately track and superimpose the virtual puncture needle on fluoroscopy images in real-time. After initial CBCT acquisition for target registration and planning, ARSN was used for 30 spinal biopsies. Needle positions were verified by CT.

RESULTS The mean accuracy of the biopsy needle insertions ($n = 30$) was $0.71 \text{ mm} \pm 0.33 \text{ mm}$ with a $0.9^\circ \pm 0.4^\circ$ angular deviation compared with the planned path. The median path length was 36 mm (range 16–71 mm) and did not correlate to accuracy ($p = 0.175$). The median device insertion time was 274 seconds (range 117–492 seconds).

CONCLUSIONS This study demonstrated that ARSN can be used for navigation of percutaneous spinal biopsy with high accuracy and efficacy.

PU-1169

Osteosclerotic changes in computed tomography predicted tumor progression and inferior survival in prostate cancer with osteoblastic metastasis

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Introduction Bone was one of the most common sites of distant metastasis in prostate cancer. The bone metastases in prostate cancer are usually osteoblastic, making it difficult for assessment on therapeutic response. Computed tomography (CT) had been widely used in initial evaluation and follow-up in patients with metastasis prostate cancer, but the assessment of bone response by CT was unclear. This study aimed to evaluate the relation of bone response, disease progression and survival for osteoblastic metastasis by CT scan.

Methods Our study retrospectively analyzed the change in density of bone metastasis on CT in 176 prostate cancer cases in Sun Yat-sen University Cancer Center as training cohort and 35 cases at 2 Chinese hospitals as validation cohort from July 2010 to May 2022. Patients were divided in two groups based on their CT features: osteosclerotic change group and no osteosclerotic change group. The clinical profile including patient characteristics, systemic therapy, serum prostate-specific antigen (PSA), and tumor response were assessed. Overall survival (OS) and radiographic progression-free survival (rPFS) was analyzed.

Results In training cohort, we mainly focus on 152 cases presented osteoblastic lesions, while 15 demonstrated lytic lesions, and 9 showed mixed lesions of both osteoblastic and osteolytic

metastases. Among osteoblastic cases, 91 was in osteosclerotic change group and 61 was no osteosclerotic change group. The osteosclerotic change group showed significant inferior OS and rPFS compared with no osteosclerotic change group (median OS: 27.6 months vs 67.1 months, HR=2.660, $P<0.001$; median rPFS: 11.4 months vs 28.5 months, HR=2.235, $P<0.001$). The multivariate analysis revealed that osteosclerotic change were significant predictors of poor rPFS and OS. External validation confirmed that osteosclerotic change group was related with shorter rPFS and OS.

Conclusion Osteosclerotic change on CT in prostate cancer with osteoblastic metastasis predicted inferior survival. Prospective study for osteosclerotic change in prostate cancer was warranted.

PU-1170

3D-nerve view 结合体表标记投影在臀肌挛缩术前定位中的应用价值

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目的:探讨体表标记投影结合 3D -nerve view 在臀肌挛缩中术前影像定位的应用价值。方法:选取我院 2022 年 10 月至 2023 年 7 月因臀肌挛缩来我院就诊患者 28 例。为避免术中伤及坐骨神经,分别使用常规解剖学体表标志定位和术前核磁标记引导定位,收集术中耗时及针刀切口深度。运用后处理软件测量其标记点与坐骨神经间最短安全距离,测量坐骨神经 3D-nerve view 增强前后图像信噪比。并统计两位高年资医生对 Ober 实验臀肌挛缩程度分级与双侧臀肌挛缩程度核磁影像诊断的一致性。结果:术前行影像定位组明显缩短手术时间($P<0.05$), 3D-nerve view 增强前后坐骨神经与体表标记距离测量无统计学差异 ($P>0.05$),增强后在双侧坐骨神经信噪比测量及背景抑制明显优于增强前 ($P<0.05$);两位临床医生的 Ober 实验分级和臀肌挛缩核磁诊断评估 ICC 值为 0.8 (95%CI: 0.5-0.9)。结论:体表标记投影结合 3D-nerve view 坐骨神经平扫既可无创便捷实现臀肌挛缩的术前影像定位,降低手术耗时,避免术中伤及坐骨神经,为术者提供更全面的患者信息。

PU-1171

磁共振定量成像技术评估甲状腺功能亢进患者外周骨骼肌状态的应用研究

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目的:采用 MRI 定量技术 mDixon-Quant 分析甲状腺功能亢进患者与健康志愿者之间的大腿肌肉脂肪浸润差异,并分析其分布情况。

方法:搜集确诊为甲状腺功能亢进的女性患者 17 例,招募年龄、身高、体重相匹配的女性健康志愿者 15 例,对所有受试者进行大腿中端的 MRI 检查,测量肌肉横截面积与肌肉脂肪分数,并通过各肌肉脂肪分数计算单纯肌肉面积。后依据人体解剖学分区将肌肉分群,分别计算各肌群的肌肉脂肪分数。横截面积及纯肌肉面积。

结果:甲亢组大腿各肌群的脂肪分数均大于对照组,差异均有统计学意义 ($P<0.001$);在甲亢组内,大腿后群肌肉脂肪含量显著高于内侧肌群,差距有统计学意义 ($P=0.014$),后群与前群、前群与内侧群肌肉脂肪含量差异无统计学意义;在对照组内,三组肌肉脂肪含量差异均无统计学意义。

在两组间只有前群肌肉横截面积的差异具有统计学意义 ($P < 0.004$)；甲亢组内侧群、后群单纯肌肉面积较对照组小，并且以大腿后群肌肉减少更为显著。

结论：mDixon-Quant 定量技术可以用于评价甲亢患者大腿肌内脂肪浸润含量和分布；甲亢患者大腿骨骼肌的脂肪及肌肉的比率较健康人群产生变化，脂肪沉积更明显，肌肉含量更少，且后群的肌肉受累较严重。

PU-1172

髋关节盂唇撕裂的影像观察

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目的：探讨髋关节盂唇撕裂的影像观察方法。方法：搜集我院近来盂唇撕裂病例，经关节造影或手术证实。分析盂唇撕裂形态特征和病因影像表现，为盂唇撕裂诊断提供一些思路。结果：盂唇撕裂主要位于承重区、前外侧区和后盂唇。病因可分为髋关节发育不良、股骨头颈髋臼前外侧撞击、髋后侧撞击和其他。前外侧撞击有凸轮型、钳夹型和混合型，混合型常见。需要髋 CT 和骨盆平片综合评估，凸轮型股骨头形态 CT 观察，包括横断面和 SSD 重建观察，非常关键。结论：掌握髋臼撕裂影像特征，包括撕裂的直接征象和导致撕裂的病因影像表现，是髋臼盂唇撕裂诊断的基础。

PU-1173

梅毒性夏科氏关节病的多模态影像分析一例

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目的：分析梅毒性夏科氏关节病的 X 线、CT、MRI 表现，结合临床资料，以提高对梅毒性夏科氏关节病的认识；

方法：回顾性分析 1 例经病理证实的梅毒性夏科氏髋关节病的临床资料及影像学表现，包括 X 线、CT、MRI 平扫及增强。

结果：患者男，69 岁，梅毒螺旋抗体 (Anti-TP) 阳性，右侧大腿内测疼痛活动受限 1 年，疼痛为钝痛，休息后缓解，不伴静息痛及夜间痛，发病以来无低热、盗汗等症状。病变位于右侧髋关节，X 线表现为右侧股骨、髋臼骨质增生、硬化，右侧股骨头变扁，密度不均匀，右髋关节半脱位，关节间隙增宽内见高密度影，周围软组织肿胀。CT 表现为：右侧髋关节间隙变窄，右侧股骨头形态变扁，右侧髋臼及股骨头可见骨质破坏，呈刀鞘样，髋关节面骨质硬化，周围软组织肿胀，见多发斑片状高密度影，关节囊增厚，内见液性密度影。MRI 表现为右侧髋关节间隙变窄，关节囊增厚，内见长 T1 长 T2 水样信号影；右侧股骨头塌陷、形态变扁，增强扫描内见强化结节；右侧髌骨、髋臼、股骨颈信号不均，内可见多发斑片状 T1WI 低信号、T2WI 高信号，增强扫描呈不均匀强化。盆腔右侧、右侧腹股沟去、右侧股骨前内侧见不规则软组织肿块，呈分叶状，T1WI 呈稍高信号、T2WI 呈高信号，增强扫描边缘强化。

结论：夏科氏关节病是一种罕见的影像表现与临床表现极不相称的的关节疾病，由梅毒导致的夏科氏关节病则更罕见，临床表现与影像资料包括 X 线、CT、MRI 相结合，可以对疾病的骨质和软组织病变做出全面的评价。

PU-1174

A CT-based radiomics nomogram for predicting histologic grade and outcome in chondrosarcoma

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Objective: The preoperative differentiation of low-grade chondrosarcoma (CS) from high-grade CS is crucial for the formulation of treatment strategies and the outcomes. The study was aimed to build and validate a CT-based radiomics nomogram (RN) for the preoperative differentiation of low-grade from high-grade CS, and to evaluate the association between the radiomics-based tumor heterogeneity and postoperative outcome in CS.

Methods: A total of 196 patients (139 in training cohort and 57 in external validation cohort) with low-grade CS (n=113) or high-grade CS (n=83) were derived from three centers. A clinical model, radiomics signature (RS) and RN were constructed and validated to estimate the value of different models in distinguishing low-grade from high-grade CS. Furthermore, Kaplan-Meier survival analysis was applied to assess the association between RN and recurrence-free survival (RFS). R statistical software was used for statistics.

Results: Three features based on CT images were selected to construct the RS. The RN combining the clinical factors (size, endosteal scalloping and active periostitis) and RS yielded an area under the curve (AUC) of 0.842 in the validation set, which was superior to the clinical model (AUC, 0.705) and the RS (AUC, 0.835). A correlation between Nomogram score (Nomo-score, derived from RN) and RFS was found by the Kaplan-Meier survival analysis in the training and test cohort (log-rank $P < 0.050$). Patients with high Nomo-score tumors were 2.669 times more likely to suffer recurrence than those with low Nomo-score tumors (HR, 2.669, $P < 0.001$).

Conclusions: The CT-based RN combining clinical factors and RS performed favorably in predicting the histologic grade and outcome of the CS.

PU-1175

肩袖间隙结构的 MR 平扫和 MR 关节造影最佳显示方位对比探究

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目的 探讨肩袖间隙 (RI) 结构的磁共振 (MR) 平扫和 MR 关节造影最佳显示方位。**方法** 选取 2021 年 1 月~2023 年 3 月于我院行 MR 平扫及 MR 关节造影的患者 80 例, 均经肩关节镜手术证实 RI 正常。统计对比 MR 平扫及 MR 关节造影检查横轴位、斜矢状位及斜冠状位显示 RI 及上孟肱韧带 (SGHL)、肱二头肌长头腱 (LHBT)、喙肱韧带 (CHL) 的情况。结果 MR 斜矢状位平扫对 RI 结构的显示率 17.50% 高于横轴位 0.00%、斜冠状位 5.00% ($\chi^2=18.739$, $P < 0.001$) ; MR 斜矢状位平扫对 RI 内 SGHL、LHBT、CHL 的显示情况优于横轴位、斜冠状位 ($\chi^2=26.036$, $P < 0.001$) ; MR 斜矢状位关节造影对 RI 结构的显示率 57.50% 高于横轴位 5.00%、斜冠状位 17.50% ($\chi^2=61.534$, $P < 0.001$) ; MR 斜矢状位关节造影对 RI 内 SGHL、LHBT、CHL 结构的显示情况优于横轴位、斜冠状位 ($\chi^2=64.569$, $P < 0.001$) ; MR 斜矢状位关节造影对 RI 结构的完全显示率 57.50% 明显高于 MR 斜矢状位平扫 17.50% ($\chi^2=27.307$, $P < 0.05$) 。结论 斜矢状位是 MR 平扫及 MR 关节造影显示 RI 结构的最优显示方位, 且斜矢状位 MR 关节造影优于 MR 平扫, 可作为最佳检查方法。

PU-1176

The incidence and distribution of osteoporosis were analyzed by vertebral CT scanning bone mineral density in patients with degenerative lumbar scoliosis

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Objective: To study the incidence of bone loosening and life regularity for the selective application of cement screw.

Methods: Through retrospective analysis, the clinical treatment and imaging reference data of 95 DLS patients were diagnosed in Trauma Center and Spinal Surgery Department of Affiliated Hospital of Yunnan University from January 2015 to September 2019, among which 20 males and 75 were female, age (63.3 ± 6.5). On the full-length piece of the crest, the Cobb angle and stable distance (CBD) of the patient were determined, and the number of missing cases was calculated. Selected images of CT coronal reconstruction of 2 mm in the posterior anterior cortex of the cervical spine and 2 mm in the anterior cortex of the main and compensatory curvature, Select a possible oval section between the vertebral cancellous bone parts for MD Hounsfield units (HU) determination of the region of interest, The average of the three-level measurements was taken as the HU of the corresponding cervical spine, The HU value of cervical convex and concave side was measured in the same way; L 1 will be the judgment criteria for osteoporosis, To observe the incidence of osteoporosis in patients, According to the observation results, the patients were divided into normal bone mineral density group and osteoporosis group in two groups, Furthermore, the clinical baseline data of the two patients were compared. The HU value of the cervical spine in the main and compensatory bends in the whole group, as well as the incidence of osteoporosis in the main and compensatory curves in the whole group were observed.

Results: The CoBB angle of 95 patients was $25.5^\circ 11.1 \pm$, the average CBD was (22.8 ± 18.7) mm, 74 patients with type A, 12 type b and 9 type C. Normal bone mineral density was 58 cases (61.1 percent) and 37 cases of osteoporosis (38.9%); the incidence of osteoporosis in women was 45.3% (3,475), higher than 15.0 percent (320) in men, which was statistically significant ($2=6.110$, $P0.05$). Compared with the normal BMD index group, the age, body quality index, Cobb angle, CBD, lateral bend direction, and crown imbalance classification of the osteoporosis group of patients (P value was 0.05). HU: L1 (122.2 ± 45.0), HU, (124.7 ± 44.8) HU, neutral (120.9 ± 42.9) HU, (124.3 ± 46.1) HU, top (134.4 ± 49.4) HU, HU (153.3 ± 63.8) HU, L5 (169.8 ± 75.8) H U. The osteoporosis rate of each cervical spine in the main bend was comparable to that of the L vertebra, respectively, with no statistical value (0.05), and the risk of osteoporosis in the L vertebra was less than that of the L vertebra in the main curve, at 17.9 percent (1795) and 3795), respectively ($2=10.349$, $P0.05$). The prevalence of convex bone osteoporosis of L5 cervical vertebra, lower vertebra and top vertebra is obviously greater than that of the concave side, and the difference has statistical significance (P -value = 0.01); compared with the incidence of upper vertebra, neutral vertebra, lower stable vertebra and bilateral bone loosening (P -value = 0.05).

Conclusion: The prevalence of skeletal loosening in DLS patients was about 38.9%, but even higher in female patients. The internal cervical spine of the inner bend is the internal cervical spine of the main bend with the lower incidence of bone loosening, while the L5 vertebrae, lower vertebrae, and top convex vertebrae are the good parts of bone loosening.

PU-1177

骨样骨瘤的影像诊断

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骨样骨瘤是一种常见的良性骨肿瘤，其影像学诊断对于骨肿瘤的鉴别诊断和治疗方案的选择至关重要。骨样骨瘤的典型影像学表现为发生于骨皮质，骨质增生明显、呈梭形，增生区内有类圆形斑点状低密度瘤巢，常见于长骨的骨干区域，如股骨、胫骨和肱骨。部分病灶可发生于骨膜、松质骨以及关节内。CT 扫描可以更清晰地显示骨样骨瘤的瘤巢内部结构，及周围骨质增生。MRI 对于评估骨样骨瘤的软组织累及、病灶与周围结构的关系有较好的价值。瘤巢在 MRI 上呈高低混杂信号，增强后可见轻度强化，骨质增生呈低信号，临近骨髓、软组织水肿，关节积液。

鉴别诊断方面，需要注意与其他骨肿瘤的鉴别。与骨母细胞瘤比，瘤巢小于 2cm，周围增生明显，有水杨酸止痛作用；与骨肉瘤相比，骨样骨瘤的边缘清晰，无骨膜破坏和软组织浸润。与骨纤维异常增殖症相比，骨样骨瘤的骨质增生边缘光滑，无斑点状骨质硬化。综上所述，骨样骨瘤的影像学诊断主要依靠 X 线片、CT 和 MRI 的综合分析。准确的影像学诊断有助于明确骨样骨瘤的性质和范围，为临床医生制定合理的治疗方案提供重要依据。然而，影像学诊断结果仅作为参考，最终的诊断还需结合临床病史、症状和其他实验室检查结果进行综合判断。

PU-1178

增生性肌炎误诊一例

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目的：介绍增生性肌炎的临床表现及影像学诊断方法。方法：我院收治一位 74 岁男性患者，1 年前无意中发现右肩部包块，大小约 2×1cm 左右，无疼痛，无发热，无活动受限等不适，未处置，包块逐渐增大。1 周前无明显诱因右肩部开始出现疼痛，活动时疼痛明显，静息时疼痛无明显好转。结果：术后病理结果回示：送检标本-右上臂肿物，考虑：（右上臂）增生性肌炎。结论：增生性肌炎（Proliferative myositis, PM）是一种罕见的软组织良性肿瘤，在 1960 年由 Kern 命名。常发生于中老年人，40 至 70 常见，儿童很少报道，发病无性别差异，发生躯干、四肢、肩部肌肉常见，发病机制不清楚，外伤可能是一个危险因素，但报道案例中少见外伤史，复发罕见[1]。由于该病生长迅速，呈浸润性生长，无包膜，与周围肌肉关系密切，病理组织学形态的特殊性，临床及病理上易误诊为纤维组织来源的恶性肿瘤，如纤维肉瘤[2]。增生性肌炎是一种假肉瘤样疾病，病理学上以嗜碱性巨细胞及增生的纤维细胞为主要特征，病变细胞横插于横纹肌间质之间，与肉瘤不同的是很少累及横纹肌本身；横断面上呈围绕肌肉纤维的增殖结缔组织的变化产生所谓的“棋盘”效应，是疾病的特点；可以观察到周围继发性肌肉萎缩或局部缺血性坏死、或被增生的纤维细胞取代[3, 4]。在结缔组织中观察到的异性巨细胞增殖是导致恶性肿瘤诊断的主要原因[4]。磁共振上表现：①受累肌肉内软组织信号，与肌肉分界不清；②呈等或长 T1、长 T2 信号，信号均匀，部分累及肌肉可见少许水肿信号；③增强后轻度均匀强化；④少见坏死及出血。需与横纹肌肉瘤、骨化性肌炎、结节性筋膜炎鉴别[1,5]。超声横切面肌间隔“龟裂纹或铺路石状”有特征性。影像及病理综合判断对本病准确诊断有意义。

PU-1179

8 例骨上皮样血管内皮细胞瘤临床特征与 MR 表现分析

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【摘要】 目的 探讨骨上皮样血管内皮瘤 (B-EHE) 的 MRI 特征性表现及其临床特点。方法 对 8 例 (男性 3 例,女性 5 例) 患者的临床资料及 MRI 表现进行回顾性分析, 所有患者均经手术病理证实为骨上皮样血管内皮细胞瘤。8 例 B-EHE 均行 MRI 检查, 其中 6 例行 MRI 平扫、动态增强及延迟增强扫描。结果 8 例 B-EHE 中, 3 例位于腰骶椎, 2 例位于胫骨, 1 例位于肱骨, 1 例位于胸骨, 1 例位于股骨。其中 1 例合并颅脑上皮样血管内皮瘤, 1 例合并椎体多发转移灶, 其余均为单发。T1WI 中, 3 例病灶呈低信号, 5 例病灶呈混杂等/低信号。T2WI 压脂序列中, 3 例呈较均匀高信号, 5 例呈混杂高信号。8 例均可见骨质破坏, 4 例可见骨膜反应, 3 例伴软组织肿块, 6 例伴周围软组织肿胀, 2 例伴病理性骨折。肿胀软组织和肿块在 T1WI 上呈低信号, 在 T2WI 和 T2WI 压脂序列呈高信号。6 例动态增强扫描中, 可见病灶不同程度强化, 其中 1 例为轻度强化, 1 例为中度强化, 4 例为明显强化。结论 B-EHE 的 MR 表现能有效评估病变的范围及性质, 需结合临床及病理明确诊断。

PU-1180

颈髓内神经鞘瘤 1 例并文献复习

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目的: 探讨髓内神经鞘瘤的临床、影像学表现及治疗方式。

方法: 回顾性分析 1 例颈段髓内神经鞘瘤患者的临床资料, 并对相关文献进行复习。神经鞘瘤是一种常见的周围神经系统肿瘤疾病, 起病隐匿, 在疾病早期临床症状不明显。神经鞘瘤起源于神经鞘膜的雪旺细胞, 是椎管髓外硬膜下最常见的肿瘤, 通常不存在于中枢神经系统组织内。发生在脊髓内的神经鞘瘤很罕见, 本例患者女, 19 岁, 无明显诱因出现右侧小腿乏力, 无麻木、刺痛, 无行走困难。行全脊柱增强检查, 肿瘤位于 C6-T1 节段, 表现为脊髓内结节状长 T1 及长 T2 信号, T2 压脂高信号, 边界清楚, 大小约 4.0x1.5x1.2cm, 增强扫描显示病灶明显强化。

结果: 术后病理检查诊断为髓内神经鞘瘤。患者术后恢复良好, 随访 12 个月肿瘤无复发。

结论: 结论髓内神经鞘瘤临床罕见, 术前诊断困难, 治疗方法以手术切除肿瘤为主。

PU-1181

MRI 在诊断胫骨平台骨折患者合并韧带或半月板损伤中的临床应用价值

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利用核磁共振成像 (MRI) 分析胫骨平台骨折患者合并同侧韧带和 (或) 半月板损伤的发生率和危险因素, 并得出最佳诊断阈值:TPW 对 LM、ACL 损伤有诊断价值;骨挫伤评分对 MCL 损伤有诊断价值;关节积液量对 ACL 损伤有诊断价值, 且诊断效能更高。

PU-1182

原发性髂骨尤因肉瘤 1 例

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患者男，28 岁。3 月前活动时左侧髂骨骨折，予以保守治疗。近 1 月来自感包块逐渐增大，活动及咳嗽后不适感增加。查体：左侧腰部触及 10 cm×8 cm 质硬包块，周围皮肤无红肿，包块活动度差，局部无明显压痛。实验室检查：血常规正常，降钙素原 3.56 ng/ml。CT 示左侧髂骨骨质破坏并软组织影，范围约 107 mm×85 mm。CT 诊断：考虑占位，请结合 MRI 进一步检查。MRI 示左侧髂骨骨质破坏，髂骨及周围见团块状混杂长 T1（图 1A）长/短 T2 信号，压脂像呈混杂高信号（图 1B），DWI 序列部分弥散受限高信号，范围约 90 mm×103 mm×135 mm，病变周围可见软组织水肿，呈片状压脂高信号。增强扫描示病灶明显不均匀强化（图 1C）。MRI 诊断：骨化性肌炎？病理（图 1D）：光镜下肿瘤细胞排列紊乱，核深染，核质比增大。免疫组化：AE1/AE3(CK)(-),EMA(-), CK8/18(-), SYN(-),CD99(+),S-100 (-),SMA(灶弱+), CD34(-),SATB2(-),Ki-67(约 30%+)。病理诊断：(左侧髂骨)尤因肉瘤。讨论 尤因肉瘤 (Ewing sarcoma, EWS) 是起源于小圆细胞的一种罕见恶性肿瘤，病灶于四肢长骨骨干较常见，发生于骨盆者少见。发病年龄集中在 10~15 岁，男性多于女性。肿瘤多表现为溶骨性骨质破坏伴明显的软组织肿块，常伴坏死囊变，骨膜反应较轻，以层状最多见，无肿瘤骨形成。肿瘤诊断多依赖于病理镜下的小圆细胞和免疫组化。MRI 对显示髓内病变范围和骨皮质侵犯较好，肿瘤呈不均匀长 T1 长 T2 信号，强化不均匀。早期临床表现为疼痛。鉴别诊断：1)骨肉瘤：发病中位年龄较尤因肉瘤略大，骨质破坏区在 CT 表现为高低混杂密度；在 MRI 上溶骨性骨质破坏区多表现为长 T1 长 T2 信号，而成骨性骨质破坏区则均为为长 T1 短 T2 信号。常见层状或针状骨膜反应、肿瘤骨和软组织肿块形成。2)郎格汉斯细胞组织细胞增生症：发生于骨盆骨较少，病灶一般为溶骨型骨质破坏，边缘清楚，CT 呈低密度，MRI 表现为等/长 T1 稍长 T2 信号，增强扫描为明显不均匀强化。

PU-1183

儿童钙化性椎间盘炎的影像学诊断及临床随访

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【目的】提高对儿童钙化性椎间盘炎临床及影像学表现的认识。

【方法】总结我院确诊的儿童钙化性椎间盘炎 3 例影像学表现、临床随访并文献复习。

【结果】儿童钙化性椎间盘炎是一种罕见的综合征。本病可以发生在从新生儿到青春期，但其发病高峰为 6~10 岁，无性别差异。全身症状有疼痛，剧痛或间歇性疼痛，或完全无疼痛。也可有发热和乏力等。颈部主要症状表现为颈痛僵硬、斜颈和活动受限。查体时常可发现颈部肌肉痉挛、压痛、颈活动受限，如有神经根或脊髓受压，可有相应的神经系统体征。症状体征在短期内能很快减轻或消失。

影像学表现：多发生在颈椎，以单个椎间盘发病为主，偶有多椎间盘钙化发生。椎间盘钙化可表现为团块状、盘状、碎裂状，团块状髓核钙化代表髓核整体钙化，盘状钙化表示髓核钙化并被压扁，碎裂状钙化可能是团块状钙化灶处于吸收、消散期改变，也可能为髓核破裂。髓核可脱出或移位，钙化的髓核可以向各种方向脱出，向后或侧后方脱出。

椎体形态异常，椎体的改变主要为：椎体变扁、楔状改变，椎体缘尖刺样改变，严重者呈“口钳征”，椎间隙一般无明显改变。椎体改变发生率高，说明本病不只限于椎间盘。

患者随访观察，钙化一般在 3~6 个月内消失，最短的为 2 周，最长则有 11 年的报道。

鉴别诊断：本病有自限性，时间对于本病的诊断与鉴别诊断有重要意义。需要鉴别的疾病主要有：颈椎结核，椎间盘的感染或创伤。二者症状体征可类似钙化性椎间盘炎，但均无椎间盘钙化。临床治疗上，主要采取保守治疗，本病有自愈性，症状可很快缓解，一般只需对症处理，如休息、服用消炎止痛药或配戴围领，有钙化突入椎管者禁用牵引。对有神经压迫症状的患者，经保守治疗不缓解或有进行性加重的脊髓压迫症状者应进行手术治疗。

【结论】钙化性椎间盘炎的临床及影像学表现具有特征性，随访可自愈，因此认识此病对临床治疗具有重要意义。

PU-1184

双能量 CT 对胸腰椎椎体压缩性骨折 一站式检查的价值

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【目的】本研究以 MR 成像及双能 X 射线吸收法骨密度检测结果为金标准，探讨双能量 CT 对胸腰椎椎体新鲜压缩性骨折及骨质疏松的诊断价值，以期对胸腰椎椎体新鲜压缩性骨折及骨质疏松的影像诊断及双能量 CT 的临床应用提供参考依据。

【方法】选取 2022 年 3 月至 2023 年 3 月期间云南省玉溪市人民医院收治的胸腰椎椎体新鲜压缩性骨折患者 54 例（108 个椎体）为研究对象，所有患者均行 MRI、双能量 CT 及双能 X 线骨密度检查，分别通过虚拟平扫（VNC）和虚拟去钙技术（VNCa）进行图像后处理，收集椎体钙浓度、骨髓 CT 值、责任椎体与邻近正常椎体 CT 差值和脂肪含量占比等双能量 CT 参数。以双能 X 射线吸收法骨密度检测结果为骨质疏松的“金标准”，以 MRI 检查结果为骨髓水肿的“金标准”，对比分析双能量 CT 在诊断椎体压缩性骨折患者骨质疏松和骨髓水肿方面的效果，并进行椎体压缩程度与骨髓水肿程度的相关性分析。

【结果】

1. DECT 诊断骨髓水肿与 MR 具有高度一致性， $\kappa=0.905$ 。
2. 骨髓水肿椎体的骨髓 CT 值和 CT 值差值高于无骨髓水肿椎体，随椎体骨髓水肿程度的增加，椎体骨髓 CT 值和 CT 值差值均随之增加，脂肪含量占比随之减少。
3. CT 值与 CT 差值二者联合诊断骨髓水肿的 AUC 为 0.924（95%CI 0.861-0.987）。
4. 新鲜椎体骨折 2 度骨髓水肿的椎体压缩程度明显高于 1 度骨髓水肿的椎体，Z 值=-2.796，P 值=0.005。
5. 椎体钙浓度与 BMD 值成正相关关系，r 值=0.584，P 值=0.031。椎体钙浓度诊断骨质疏松的敏感度为 0.910，特异度为 0.842，约登指数为 0.752。

【结论】

1. 双能量 CT 能够显示骨髓水肿及判断水肿程度，可用于诊断胸腰椎新鲜压缩性骨折，并与 MR 具有高度一致性。
2. 双能量 CT 测定的骨髓 CT 值、骨髓 CT 值差值及骨髓脂肪含量占比可以定量评估骨髓水肿，骨髓 CT 值、骨髓 CT 值差值二者联合价值更高。
3. 胸腰椎新鲜骨折的椎体压缩程度与骨髓水肿程度成正相关关系。
4. 双能量 CT 可以一次扫描有效地评估椎体骨折、骨髓水肿及骨质疏松，可作为脊柱损伤患者“一站式”检查的新方法。

PU-1185

采用欧洲腰椎体模对不同 CT 机型在骨矿物质密度定量一致性的评估

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目的: 采用欧洲腰椎体模 (ESP) 作为标准对对不同厂家不同 CT 机型在骨密度定量分析中的一致性。

材料和方法: 用国内外 6 家厂家的 31 台 CT 对欧洲腰椎体模进行了 34 次扫描, 31 台 CT 机分为 19 个型号, 包括 16 排、64 排 64 层和 128 层、128 排、256 排、双源 CT 和双层探测器。扫描条件为 120KV、150-200mAs, 准直厚度 0.625mm, 重建层厚 1mm-1.25mm, 标准软组织算法。扫描获得图像采用 radiant 软件在三个方位 10mm 厚度重组图像上测量其 CT 值, 并计算骨密度和 CT 值间的转换系数。采用 T 检验进行统计学分析。

结果: 欧洲腰椎体模 (ESP393) L1-3 的标准骨矿物质密度为 50、103 和 198mg/ml。31 台 CT 34 次扫描的体模 L1-3 椎体松质骨的 CT 值分别为 63.9HU (56.5-75.58, 95% CI 62.54-65.72)、132.84 (122.57-144.87, 95% CI 129.74-133.6) 和 250 (233.8-275.82, 95% CI 244.42-251.36)。骨密度与 CT 的比值为 L1 椎体 0.78 (0.66-0.88)、L2 椎体 0.78 (0.71-0.84)、L3 椎体为 0.79 (0.72-0.85); 以 0.78 比值回顾性计算各机型的欧洲体膜骨密度 L1 椎体 BMD 44-58 mg/ml, 95% 的 CI 为 48.8-51.25 mg/ml; L2 椎体 BMD 95.6-113 mg/ml, 平均 103.6, 95% CI 为 101.2-104.2; L3 椎体为 182.35-215.13 mg/ml, 平均 193.35, 95% CI 为 190.65-196 mg/ml。在 50 和 103mg/ml, 34 次扫描中 3 台设备 4 次超过 ± 5 mg/ml。

结论: 依据 ESP 体模测试结果, 不同厂家不同 CT 机型中用于椎体 BMD 的测量具有较好的一致性, 90% 的 CT 设备依据 CT 获得 BMD 数值误差在 5mg/ml 以内, 对骨质疏松的定性诊断影响较小, 但在同一患者前后比较中应注意不同 CT 机型的误差。

PU-1186

牵引状态下全脊柱 X 线摄影的临床意义

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目的: 通过对脊柱侧弯患者采取牵引状态行全脊柱 X 线摄影, 为临床干预矫正提供预测效果。

方法: 通过选取 2018 年 9 月—2020 年 6 月拍摄的牵引状态下脊柱全长 X 线片与现在手术矫正或者外固定矫正后复查拍摄的正常状态下的脊柱全长 X 线片测量对比。

结果: X 线结果显示, 26 例病人复查结果测量对比后, 达到预期矫正角度的病人数量为 22 例。未达到预期矫正角度病人的数量为 4 例, 总结未达到预期矫正效果的具体原因大多为未按要求佩戴矫正外固定。

结论: 对脊柱侧弯患者行牵引状态下的全脊柱 X 线摄影, 可以为临床矫正干预起到指导性的角度数据。为临床医生提供矫正后或者手术后的预期效果。

PU-1187

肘关节功能位 CT 扫描技术在肘关节骨折诊断中的临床应用

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【摘要】目的：评价肘关节骨折诊断中应用肘关节功能位 CT 扫描技术的价值，在确保诊断准确率的基础上为肘关节骨折诊断与治疗工作提供参考。**方法：**选择我院骨科 2018 年 10 月-2019 年 10 月期间收治的肘关节骨折患者，总计 66 例（检出 130 处）。并结合诊断方法，随机分为采取肘关节功能位多层螺旋 CT（MSCT）扫描的试验 1 组与直接数字化 X 线射影（DR）的试验 2 组，对比 2 组患者肘关节骨折检出情况以及漏诊数。**结果：**试验 1 组受试者肘关节骨折 MSCT 检出 118 处，试验 2 组受试者肘关节骨折 DR 检出 60 处，包括肱骨远端骨折、尺骨近端骨折、桡骨近端骨折，2 组骨折检出率以及漏诊率差异显著， $P<0.05$ 。**结论：**肘关节功能位 MSCT 扫描肘关节骨折准确率高，且撕脱性骨折以及关节脱位诊断方面价值尤其突出，进一步为肘关节骨折的后续治疗工作提供了有价值的参考依据。

PU-1188

我院一例骨旁脂肪瘤 CT 三维透明技术应用

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我院一例骨旁脂肪瘤为文献报告第 5 例发生于左肩胛骨旁，CT 矢状面及横断面示左肩胛骨骨旁可见类圆形脂肪密度灶，CT 值约-103HU，骨性突起呈珊瑚状向肿块内突入，骨性突起与肩胛骨下角相连。通过 X、CT 诊断并运用 VR，三维透明技术后处理技术，清楚显示病灶，一目了然，对骨旁脂肪瘤定位，大小，形态，边界等方面有重要的诊断价值。

PU-1189

双下肢全长负重联合卧位摄影对膝关节置换术前计划及术后疗效评估价值

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目的：探讨双下肢全长负重联合卧位摄影对膝关节置换术前计划及术后疗效评估价值。

方法：选择在我院接受膝关节置换术患者 120 例，均拍摄负重联合卧位下肢全长正位片，以骨盆正中，下肢呈中立位为标准，方案。比较负重联合卧位与传统单独负重位的股骨胫骨机械轴夹角等数据，并评估两者图像质量。术后随访，比较术前术后膝关节功能。

结果：负重联合卧位摄影获得的股骨侧弓角（FBA）、机械股骨远端外侧角（mLDFA）以及近端内侧角（mMPTA）比较，差异均有统计学意义（ $P<0.05$ ），且前者明显高于后者，但机械股胫角（mFTA）比较差异无统计学意义（ $P>0.05$ ）；负重联合卧位与传统单独负重位患者摄影图像质量比较差异无统计学意义（ $P>0.05$ ）；患者术后疼痛、功能、活动度、屈曲畸形和稳定性评分较术前均显著上升（ $P<0.05$ ）。

结论 负重联合卧位体位的双下肢全长摄影在膝关节置换术的应用可减小人为操作不当引起的误差，对患者的下肢形态、生理力线等清晰显示，为病情的诊治和治疗方案的制定提供有效参考依据，同时术后能很好的反映出临床疗效，值得临床的推广及应用。

PU-1190

探讨脊柱全长 Cobb's 角测量与摄影投照体位相关性

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[摘要] 目的: 探讨脊柱全长 DR 摄影投照体位对测量 Cobb's 角准确性的影响。 方法: 收集来我院复查拍摄脊柱全长的患者共 90 例, 通过对比初诊与复诊时拍摄的脊柱全长正位影像中的双侧锁骨与髂嵴是否处于同一水平位置来判断 Cobb's 角测量的真实性。 结果: 通过对比 90 例复诊患者的脊柱全长正位影像, 得出影响 Cobb's 角测量真实性的因素。其中包括由于体位不正导致的双侧锁骨与(或)髂嵴不处于同一水平线、由于脊柱侧弯导致的高低肩、由于双下肢不等长导致的双侧髂嵴不处于同一水平线等。 结论: Cobb's 角真实性与脊柱全长摄影投照体位密切相关, 在脊柱全长影像上双侧锁骨与髂嵴处于同一水平位置时, 测量得出的 Cobb's 角才具有真实性。若患者在拍摄脊柱全长影像时, 由于体位不正导致的双侧锁骨与(或)髂嵴不处于同一水平位置, 此时测量得出的 Cobb's 角度将大于真是角度。但有患者因患有脊柱侧弯而引起高低肩现象, 此时该患者的脊柱全长正位影像上双侧锁骨不处于同一水平位置, 但其 Cobb's 角的测量结果具有真实性。再有患者因患有双下肢不等长, 此时拍摄得出的全脊柱正位影像上双侧髂嵴不处于同一水平位置, 若该患者双下肢不等长小于 2cm, 则其 Cobb's 角的测量结果具有真实性; 若该患者双下肢不等长大于等于 2cm, 则其 Cobb's 角的测量结果将大于真实结果, 此时应将该患者不等长的下肢垫高至双侧髂嵴处于同一水平位置时再进行脊柱全长的摄影, 此时其 Cobb's 角的测量结果才具有真实性。

PU-1191

MRI 诊断跟腱黄色瘤一例及文献复习

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患者女, 33 岁, 发现无痛性右踝肿物 2 年, 肿物逐渐增大, 影响踝关节活动而就诊。查体: 右踝跟腱后方触及约 6cm×6cm 包块, 质软, 活动度低, 与周境界清楚, 无触痛, 右踝屈伸活动受限, 远端感觉、血运尚可。实验室检查: 血清甘油三酯 2.11mmol/L, 总胆固醇 5.03mmol/L, 高密度脂蛋白胆固醇 1mmol/L。超声显示右足跟部偏强回声结节, 其内血流不丰富。MRI 显示右跟腱远端不均匀增粗, 后方皮下软组织内见团块状 T1WI 等、T2WI 不均匀高信号, 内可见毛刷样改变, 增强后呈边缘明显强化, 病灶内部呈斑片状强化。术后病理示: 腱鞘黄色瘤, 与临床实验室指标和影像学表现相符。

PU-1192

基于 QCT 研究维持性透析患者腹部肌肉成分与腹主动脉钙化的相关性

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【摘要】 目的 利用定量 CT (QCT) 测量维持性透析患者腹部肌肉成分, 并分析其与腹主动脉钙化 (AAC) 之间的关系。 方法 回顾性分析 2022 年 3 月-11 月本院 193 例维持性透析患者的腹部 CT 资料, 并收集其临床资料。利用 QCT 测量 L3 椎体中部层面腹部肌肉成分, 包括肌肉面积, 肌肉脂肪面积; 利用 Agatston 法计算腹主动脉钙化积分 (AACs), 根据 AACs 四分位进行分组, 比较四

组间肌肉面积、肌肉脂肪面积及其相关变量的差异,用 Spearman 秩相关分析和偏相关分析评估腹部肌肉成分与 AAC 的关系。结果 AACs 与年龄、男性、透析龄、糖尿病、高血压、腹部肌肉脂肪面积呈正相关 ($r=0.555$ 、 0.172 、 0.192 、 0.335 、 0.348 、 0.358 , P 值均 <0.05),而与腹部肌肉面积无显著相关性。控制年龄、性别、透析龄、高血压、糖尿病因素进行偏相关分析显示, AACs 与腹部肌肉脂肪面积仍呈正相关 ($r=0.183$, $P=0.012$)。结论 维持性透析患者腹部肌肉脂肪面积与 AAC 程度呈正相关,高的腹部肌肉脂肪面积是 AAC 的危险因素。加强肌肉锻炼可能预防透析患者血管钙化风险。

PU-1193

Changes in bone mineral density and related influencing factors assessed by quantitative computed tomography in maintenance dialysis patients

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Objective: To investigate the changes in volumetric bone mineral density (vBMD) assessed by quantitative computed tomography (QCT) in chronic kidney disease (CKD) patients on maintenance dialysis.

Study Design: Retrospective study.

Place and Duration of Study: Department of Radiology, the Second Affiliated Hospital of Anhui Medical University, Hefei, China, from March to July 2022.

Methodology: In total, 141 maintenance dialysis patients were selected for this study, and parameters related to renal function and bone metabolism markers recorded. In total, 159 patients undergoing routine physical examination were age-matched with maintenance dialysis patients to serve as the control group. vBMD scans of the lumbar spine (L1-3) were obtained by QCT for all participants.

Results: Among maintenance dialysis patients, there were 67 patients with secondary hyperparathyroidism (SHPT) and 74 patients with non-secondary hyperparathyroidism (non-SHPT) with mean vBMDs of 145.99 ($SD=55.13$) mg/cm^3 and 129.10 ($SD=44.20$) mg/cm^3 , respectively. In total, 159 individuals were included in the control group with a mean age of 52.77 ($SD=11.66$) years. The mean vBMD of these patients was 129.62 ($SD=36.36$) mg/cm^3 . The vBMD of the SHPT group was greater than that of both the non-SHPT group and the control group (all $P<0.05$). For dialysis patients, vBMD was positively correlated with phosphorus and intact parathyroid hormone (iPTH) levels ($r=0.187$, 0.023 , respectively, $P<0.05$), and vBMD was inversely correlated with age ($r=-0.542$, $P<0.05$). After adjusting for the covariates, vBMD remained positively correlated with iPTH ($r=0.181$, $P<0.05$).

Conclusion: Increased lumbar vertebral vBMD in maintenance dialysis patients may be associated with high iPTH, providing clinicians with a new understanding of the changes in bone mineral density in maintenance dialysis patients.

PU-1194

健康体检与急诊外伤儿童手腕部骨龄对比研究

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目的: 分别探讨健康体检与急诊外伤儿童、外伤左手与外伤右手儿童骨龄是否具有差异。**方法:** 回顾性收集 987 例 2~17 岁 (男 606 例, 女 381 例) 健康体检和急诊外伤儿童手腕部 X 线正位片,

其中体检 437 例（均为左手），外伤 550 例（左手 249 例，右手 301 例）。基于 Tanner Whitehouse 3 (TW3)-RUS（尺桡骨、短骨）和 TW3-Carpal（腕骨）法，使用 Dr.Wise 骨龄评估系统评测骨龄。采用 Pearson 相关分析分别评估 TW3-RUS 骨龄、TW3-Carpal 骨龄与生活年龄的相关性；采用独立样本 t 检验分别比较 TW3-RUS 骨龄与生活年龄差值、TW3-Carpal 骨龄与生活年龄差值、TW3-RUS 与 TW3-Carpal 骨龄差值，分别评价体检与外伤儿童（左手）、外伤左手与外伤右手儿童骨龄的差异。结果：体检、外伤左手、外伤右手儿童的 TW3-RUS 骨龄与生活年龄、TW3-Carpal 骨龄与生活年龄均呈高度正相关（r 值均大于 0.900，P 值均 <0.001 ）。体检和外伤儿童（左手）在 2.0~2.9、3.0~3.9、11.0~11.9 岁年龄段 TW3-RUS 骨龄与生活年龄差值以及在 11.0~11.9 岁年龄段 TW3-RUS 与 TW3-Carpal 骨龄差值的差异有统计学意义（ $P<0.05$ ），其余各年龄段 TW3-RUS 骨龄与生活年龄差值、TW3-Carpal 骨龄与生活年龄差值以及 TW3-RUS 与 TW3-Carpal 骨龄差值的差异均无统计学意义（ $P>0.05$ ）；外伤左手和外伤右手儿童在 2.0~2.9、10.0~10.9 岁年龄段 TW3-RUS 骨龄与生活年龄差值的差异有统计学意义（ $P<0.05$ ），其余各年龄段 TW3-RUS 骨龄与生活年龄差值、TW3-Carpal 骨龄与生活年龄差值以及 TW3-RUS 与 TW3-Carpal 骨龄差值的差异均无统计学意义（ $P>0.05$ ）。结论：除个别年龄段体检与外伤儿童（左手）、外伤左手与外伤右手儿童骨龄存在差异外，其余年龄段差异均无统计学意义。本研究结论为骨龄研究、建立骨龄数据库和构建骨龄标准时样本选择提供一定参考。

PU-1195

膝关节炎基于 MR 解剖分型预测骨密度变化的可行性分析

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目的：分析骨密度结果与膝关节软骨软化部位的关系，印证膝关节不同解剖部位的软骨软化提示骨量变化程度，为临床早期干预治疗骨量减少的患者提供有利帮助，防止骨质疏松发生。

方法：选取四川省骨科医院临床诊断为膝骨关节炎的住院患者 260 人，根据膝关节软骨软化部位将患者分为四组，髌股关节组、外侧胫股关节组、内侧胫股关节组、全关节组，利用 QCT 测量四组患者的骨密度值，将四组骨密度行统计学分析；同时并采集他们的年龄、性别、BMI、病程等一般信息行统计学分析。

结果：1.一般信息（年龄、性别、BMI、病程）无显著统计学差异。2.髌股关节组骨密度正常；内、外侧胫股关节组骨量减少；全关节组骨质疏松。

结论：骨关节炎病人 MRI 髌股关节软化时，提示病人骨量可能正常；MRI 显示胫股关节（包括外侧胫股关节组和内侧胫股关节组）软骨软化时，提示病人骨量可能减低；MRI 显示全关节组软骨软化时，提示病人可能骨质疏松。

PU-1196

Is Spina Iliace a Better Projection Point for Lumbar Radiography in Lateral Position?

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Purpose: To investigate the feasibility of taking spina iliace as a new projection point for lumbar radiography in lateral position, in comparison with the conventional projection point (3cm above spina iliace).

Materials and Methods: 68 patients undergoing lumbar radiography in lateral position were enrolled in this prospective study. 3cm above spina iliace was used as the projection point in half

of the patients, and spina iliace was used as the projection point in the other half of the patients. An enhanced U-net model was used to segment the inner and outer edges of the third lumbar vertebra (L3), fourth lumbar vertebra (L4) and fifth lumbar vertebra (L5). The inner edge was the vertebra without upper and lower sections, and the outer edge was the vertebra with upper and lower sections. The area of bilateral shadow (BS) in L3, L4 and L5 was calculated by subtracting the inner edge mask from the outer edge mask.

Results: Area of L3 BS was significantly higher for spina iliace than 3cm above spina iliace ($278.92 \pm 123.38 \text{ mm}^2$ vs. $200.38 \pm 103.61 \text{ mm}^2$, $P=0.006$). The difference in the area of L4 BS between spina iliace and 3cm above spina iliace was not significant ($192.92 \pm 97.23 \text{ mm}^2$ vs. $234.91 \pm 112.09 \text{ mm}^2$, $P=0.104$). Area of L5 BS was lower for spina iliace than 3cm above spina iliace (113.35 ± 78.97 vs. 169.40 ± 94.24 , $P=0.01$).

Conclusion: Using spina iliace as a projection point for lumbar radiography in lateral position would increase the BS of L3 but reduce the BS of L5. Considering that common lumbar diseases often happens in lower lumbar spine, spina iliace may serve as an alternative projection point for clinical lumbar radiography in lateral position, especially for the patients with medical history of lower lumbar spine disease.

PU-1197

基于磁共振 IDEAL-IQ 序列成像研究膝关节骨性关节炎与股四头肌肌肉脂肪含量关系

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目的: 基磁共振 IDEAL-IQ 序列明确股四头肌脂肪含量与膝关节骨性关节炎分级之间的关系, 为临床预测、治疗膝骨性关节炎提供定量分析。

方法: 收集我院 2019、1-2021、1 月骨关节炎患者 58 例, 进行常规膝关节 MRI 扫描及股四头肌进行 IDEAL-IQ 序列检查。年龄 20-67 岁, 并根据 Recht 关节软骨分级标准分为 2 组, 第一组 Recht 分级为 I-III 级, 共 28 例, 男性 15 例, 女性 13 例, 年龄 20-52 岁, 第二组为 IV-V 级, 共 30 例, 其中男性 18 例, 女性 12 例。所有 IDEAL-IQ 扫描图像传入 AW4.6 工作站 (GE Healthcare), 观察范围包括从股骨大转子到股骨末端的股四头肌, 大腿近 1/3、大腿中部、大腿远端 1/3 由同一研究者选取处为研究层面, 由同一研究者选取 IDEAL-IQ 序列的 Fat Fraction 像勾选 ROI, 避开血管神经、伪影等, 分别测量股直肌、骨内侧肌、股外侧肌及骨中间肌系统自动生成所画区域的脂肪含量比值, 三次测量三个层面的肌肉脂肪含量取其平均值作为肌肉脂肪含量值。整合上述数据和结果, 采用 SPSS 25.0 软件进行统计学分析。组间年龄性别匹配, 运用两独立样本 t 检验分析股四头肌脂肪含量差异: 以 $P < 0.05$ 为差异有统计学意义。

结论: 关节软骨损伤程度越重, 股四头肌内脂肪含量越高, 二者是呈正性相关的, IDEAL-IQ 技术可以有效量化肌肉组织中脂肪含量。由 IDEAL-IQ 确定的 FF 值可以在不需要侵入性操作的情况下测量股四头肌脂肪含量, 操作方便 这一研究可以为临床预测、治疗膝 OA, 提供定量分析。

PU-1198

合成磁共振联合零回波成像技术在肩袖损伤中的临床应用价值研究

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Magnetic resonance imaging (MRI) is considered the gold standard non-invasive modality for assessing rotator cuff injuries, which frequently involve the supraspinatus tendon. In this study, we employed synthetic MRI combined with zero-echo time (ZTE) imaging technology to evaluate rotator cuff injuries. The T1-weighted images generated by ZTE-MRI and SyMRI exhibit excellent consistency in measuring crucial shoulder angles, while the mean value of proton density (PD) can effectively differentiate between levels 0, 1, and 2. As a rapid imaging technique, synthetic MRI enables quicker acquisition of quantitative and functional images. When integrated with structural images obtained through zero-echo magnetic resonance technology, it facilitates a more comprehensive evaluation of changes associated with rotator cuff injury.

PU-1199

定量 CT 检查技术评估 VBMD 及身体成分变化在合肥市正常体检人员的应用价值

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【摘要】目的：探讨定量 CT 检查技术评价 VBMD 及身体成分变化的应用价值。方法：采用回顾性描述性研究方法。共收集 2022 年 3 月至 2022 年 07 月安徽医科大学第二附属医院 1720 例来院体检人员临床影像资料男 910 例，女 810 例；年龄范围 15~90 岁，平均年龄男 (44.13±13.00) 岁；女 (43.63±13.38) 岁。所有受检者行胸部 CT 扫描。采用 QCT Pro 软件测量每例受检查者 L1 至 L3 椎体的 BMD 并取平均值 VBMD，L2/3 椎间隙水平内脏脂肪面积 (L2/3-VAT)、皮下脂肪面积 (L2/3-SAT)，L3 椎体水平椎后肌群脂肪含量/面积 (L3-PVMFT)、椎后肌群质量 (L3-PVMM) 及肌肉面积 (L3-PVMA)，平均肝脏脂肪分数 (Fat%-QCT)。结果：男性平均肝脏脂肪分数、内脏脂肪面积、腰肌脂肪面积、腰肌质量及腰肌面积均高于女性 ($P<0.001$)，BMD、皮下脂肪面积低于女性 ($P<0.001$)，腰肌脂肪面积无显著差异 ($P>0.05$)。结论：BMD 和身体成分随年龄的增长表现出不同的特征。

PU-1200

定量影像学在脊柱胸腰椎损伤诊断中的应用价值

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随着医学技术的不断发展，定量影像学在脊柱胸腰椎损伤诊断中的应用逐渐受到重视。本文旨在探讨定量影像学在脊柱胸腰椎损伤诊断中的应用价值。通过分析近年来的相关文献，我们发现定量影像学在脊柱胸腰椎损伤的诊断中具有重要意义，有助于准确评估患者的病情，选择合适的治疗方案，并对预后进行预测。

一、背景

脊柱胸腰椎损伤是一种常见的骨科疾病，多由交通事故、跌倒、运动等意外事故引起。近年来，随着社会经济的发展和人们生活水平的提高，其发病率呈逐年上升趋势。对于此类患者，准确的诊断和治疗对其预后具有重要影响。因此，寻找一种更为准确、可靠的诊断方法成为当前的研究热点。

二、定量影像学在脊柱胸腰椎损伤诊断中的应用

常规 X 线检查

常规 X 线检查是诊断脊柱胸腰椎损伤的常用方法之一。通过 X 线平片，可以观察到骨折线的走向、骨折端移位程度以及是否存在椎体压缩等。但是，由于 X 线平片存在一定的局限性，如难以准确评估椎体旋转和后方结构的损伤情况等，因此对于部分复杂病例，其诊断价值有限。

CT 检查

CT 检查可以提供更为精确的影像学信息，对于胸腰椎骨折的诊断具有重要意义。CT 可以清晰地显示骨折线的走行、骨折端移位的方向和程度、碎骨片的数目和位置等。此外，CT 还可以显示是否存在椎弓根和关节突关节的损伤。通过对 CT 数据的分析，可以对胸腰椎骨折进行分型，从而为治疗提供依据。

MRI 检查

MRI 检查对于评估胸腰椎损伤患者的脊髓和神经损伤具有重要意义。MRI 可以清晰地显示脊髓的形态和信号变化，有助于判断是否存在脊髓损伤。此外，MRI 还可以显示神经根的损伤情况，有助于指导手术治疗。通过对 MRI 数据的分析，可以对胸腰椎骨折进行分类，从而为治疗提供依据。

三、结论

定量影像学在脊柱胸腰椎损伤的诊断中具有重要意义。通过对影像学数据的分析，可以准确评估患者的病情，选择合适的治疗方案，并对预后进行预测。在未来的研究中，我们建议进一步探讨定量影像学在脊柱胸腰椎损伤诊断中的应用价值，以期为临床提供更为准确、可靠的诊断方法。

PU-1201

MRI 对宫颈癌放疗后骨盆衰竭骨折与骨转移瘤的鉴别诊断价值研究

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目的 宫颈癌放疗引起的骨盆衰竭骨折与骨转移瘤影像学表现相似，容易混淆。本研究目的是分析衰竭骨折与骨转移瘤的 MRI 特点，探讨 MRI 对宫颈癌放疗后骨盆衰竭骨折与骨转移瘤的鉴别诊断价值研究。

方法 收集 854 例具有完整临床资料及盆腔 MRI 资料的宫颈癌放疗后患者，随访时间大于 12 个月，对临床资料及 MRI 表现进行统计学分析。诊断金标准是基于影像学表现、临床数据和至少 12 个月的随访。

结果 654 例宫颈癌患者，发现衰竭骨折 57 例（8.72%），骨转移瘤 53 例（8.10%）。两组间体质指数、FIGO 分期、盆腔外放疗的辐射剂量、放疗结束至 MR 检查的时间间隔差异均无统计学意义（ P 均 >0.05 ）。衰竭骨折 MRI 表现为长 T1 长 T2 信号，无软质肿块，衰竭骨折病例出现 H 征 24 例（42.11%， $P<0.05$ ），衰竭骨折病例出现平行于髌髌关节线状长 T1 长 T2 信号骨折线 28 例（49.12%， $P<0.05$ ）。骨转移瘤表现为长 T1 长 T2 信号，伴有软组织肿块 37 例（69.81%， $P<0.05$ ）。

结论 宫颈癌放疗后骨盆衰竭骨折与骨转移瘤具有不同的 MRI 表现特点。MRI 对宫颈癌放疗后骨盆衰竭骨折与骨转移瘤的鉴别诊断具有一定的临床价值。

PU-1202

机会性 CT 评估老年男性和女性 L3 水平腹壁及椎旁肌肉肌量、肌质的年龄变化特点

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目的】利用腹部机会性 CT 数据，横断面研究 L3 水平腹壁及椎旁肌肉（群）的肌量、肌质 CT 参数特点及其影响因素，总结 50 岁以上男性和绝经后女性肌量、肌质随年龄变化特点。

【方法】

收集 2019 年 7 月至 2022 年 7 月于我院住院的 292 例患者的临床及腹部 CT 平扫资料，且无明确肌肉-骨骼疾病。采用 Image J 软件在 L3 水平腹部横轴位 CT 平扫图像测量腹壁及椎旁肌肉（群）肌量、肌质和脂肪参数。肌量参数包括骨骼肌面积（SMA）和骨骼肌指数（SMI）。肌质参数包括骨骼肌密度（SMD）、肌肉内脂肪成分（IMAC）和肌肉间脂肪组织（IMAT）。脂肪参数包括腹壁皮下脂肪面积和 CT 值。采用组内相关系数（ICC）评价测量者间 L3 水平腹壁及椎旁肌肉（群）CT 测量指标一致性。采用独立样本 t 检验比较同年龄组内男女间 L3 水平整体肌群肌量、肌质参数；采用一元线性回归分析年龄对肌量、肌质的影响。

【结果】

L3 水平腹壁及椎旁肌肉（群）肌量、肌质参数测量者间一致性优秀（ $ICC>0.75$ ）。同年龄组内，男性肌量、肌质参数显著高于女性（ $p<0.05$ ）。年龄对男性肌量、肌质参数影响程度大小依次为（ $p<0.05$ ）：SMA（Stb $\beta=-0.504$ ）、SMI（Stb $\beta=-0.482$ ）、SMD（Stb $\beta=-0.349$ ）和 IMAT（Stb $\beta=-0.309$ ）。年龄对女性肌量、肌质参数影响程度大小依次为（ $p<0.05$ ）：SMD（Stb $\beta=-0.338$ ）、IMAT（Stb $\beta=-0.272$ ）、SMA（Stb $\beta=-0.267$ ）和 SMI（Stb $\beta=-0.246$ ）。年龄对男性和女性 IMAC 均无影响（ $p>0.05$ ）。

【结论】

随着年龄增长，肌量、肌质呈下降趋势；但二者不同步，年龄对男性肌量影响程度大于肌质，而年龄对女性肌质影响程度大于肌量。男女间比较，男性较女性肌量下降速度快，肌质下降速度近似，女性较男性肌质下降发生早。无论男女，腹壁肌群、椎后伸肌群肌量、肌质均较腰大肌、腰方肌下降快；女性各肌肉（群）IMAC 均较男性增加快。

PU-1203

MRI 质子密度脂肪分数（PDFF）对骨质疏松诊断效能评估

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目的:研究 MRI 质子密度脂肪分数（PDFF）对骨质疏松诊断效能评估

方法:收集 160 名患者，其中骨量减少 80 名，骨质疏松 80 名。所有患者均接受了 IDEAL-IQ 序列的腰椎 MRI 和 QCT 扫描。将患者分为两组，分别为骨量减少组和骨质疏松组。分别测量了所有 L1-L3 腰椎的 PDFF 和 BMD。通过 Pearson 测试分析了 PDFF 与 BMD 之间相关性。以 BMD 为金标准， $BMD>120\text{mg}/\text{cm}^3$ 为骨量正常， $BMD80-120\text{mg}/\text{cm}^3$ 为骨量减少， $BMD<80\text{mg}/\text{cm}^3$ 为骨质疏松。使用卡方检验分析亚组之间的性别差异。通过 ROC 曲线评估 PDFF 在两组患者诊断中的有效性。

结果:在所有患者中，研究发现平均 PDFF 与 BMD 之间存在显著的负相关（ $P<0.001$ ），说明低 BMD 患者的 PDFF 较高。且患者 PDFF 与年龄呈正相关，老年患者的 PDFF 更高。BMD 与年龄呈负相关，老年患者 BMD 较低。单因素方差显示组间差异有统计学意义（ $P<0.05$ ）。ROC 曲线显示在骨量减少和骨质疏松的诊断中，PDFF 的 AUC 为 0.765 和 0.768。

结论: PDFF 与 BMD 显著相关, 在评估骨质疏松诊断中有诊断价值。

PU-1204

冠心病合并轻中度慢性肾功能不全经药物洗脱支架植入术后的长期疗效观察

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【摘要】目的 探讨冠心病合并轻中度慢性肾功能不全患者药物洗脱支架经皮冠脉介入术 (percutaneous coronary intervention, PCI) 后的长期疗效及安全性。方法 回顾性分析我院 2018 年 1 月至 2021 年 1 月植入药物洗脱支架 162 名冠心病患者临床资料及随访结果, 其中 80 名合并有轻中度慢性肾功能不全 (chronic renal insufficiency, CRI) 患者作为研究组, 82 名肾功能正常者作为对照组。结果 两组患者中, CRI 组患者多支血管病变、B 型病变及 C 型病变显著多于对照组, 而 A 型病变显著低于对照组 ($P < 0.05$)。在随访期间, 两组均无心源性死亡 (cardiac death, CD) 及心肌梗死 (myocardial infarction, MI) 发生。CRI 组不稳定性心绞痛 (UA) 的发生率低于对照组 ($P = 0.129$), 而非致命性心力衰竭、缺血性靶血管血运重建及支架内再狭窄的发生率虽高于对照组, 但无统计学意义 ($P > 0.05$)。结论 药物洗脱支架治疗冠心病合并轻中度肾功能不全患者安全有效。

PU-1205

激光倾角仪引导进针角度装置在 CT 引导下经皮纵隔占位穿刺活检中的应用

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目的 探讨激光倾角仪引导进针角度装置在 CT 引导下经皮纵隔穿刺活检中的应用价值。方法 回顾性分析 2017 年 4 月至 2022 年 5 月 100 例纵隔占位 CT 引导下经皮穿刺活检患者, 其中激光倾角仪穿刺组为观察组, 常规穿刺组为对照组, 均为 50 例, 对比两组一次穿刺靶灶成功率、CT 扫描次数、穿刺时间及穿刺并发症、穿刺病理阳性率。结果 观察组一次穿刺成功率高于对照组, 差异具有统计学意义 ($P < 0.05$); CT 扫描次数、穿刺时间、并发症发生率观察组均低于对照组, 差异具有统计学意义 (P 均 < 0.05); 穿刺病理阳性率组间差异无统计学意义 ($P = 0.695 > 0.05$)。结论 激光倾角仪引导进针角度装置联合 CT 引导下经皮纵隔穿刺活检术可使穿刺更加精准和安全, 值得临床推广应用。

PU-1206

6S 管理法在介入手术室技护管理中的应用

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6S 管理法在介入手术室技护管理中的应用

目的：为了全面提升介入手术室管理水平，提高工作质量和工作效率，将 6S 管理模式用于介入手术室技护管理工作。

方法：对介入手术室技术护理人员推行 6S 管理法，即整理，整顿，清洁，规范，素养，安全。

整理：技术人员负责每天对操作间及办公区的环境进行整理。护理人员每天对手术间的药品、物品进行分类整理，每周一次对库房的手术耗材进行整理及核对，每月最后一天抢救车内的药品是否过期或将近过期进行核对。技护整理后均需上传照片至工作群。

整顿：实行三定原则，“定点定量定容”，有物必分类，分类必定制，定制必标识。要求对各手术间进行布局的规范化及所有物品的统一摆放。

清洁：技术人员负责每日对设备清洁、消毒，保障设备的清洁及正常运行。护理人员负责每日手术完成后对手术间的环境进行整理并对手术间进行紫外线消毒。

规范：其属于 6S 管理法核心，针对整理整顿清洁过程中发现的问题，制定相应的规章制度及政策进行规范。

素养：规范技术和护理人员按照医院手术室要求标准着装，仪态大方，态度温和，积极主动为临床科室及手术医生服务。

安全：区域负责人负责每周一次对设备及工作环境进行巡视、对设备进行检查及保养，从而降低设备的故障率，降低手术室的环境安全及设备安全隐患。

结果：实施 6S 安全管理后与实施 6S 管理法之前对比，临床科室及手术医生对技护的满意度评分均有了显著提高 ($P<0.05$)，统计学具有意义。

结论：在介入手术室技护管理中，实行 6S 管理法后，大大改善了介入手术室的工作环境、提降低了设备的故障率，取得让临床及手术医生满意的结果，使介入手术室技护的管理工作质量有所提升，值得推广。

PU-1207

腹主动脉球囊阻断下子宫供血动脉栓塞在胎盘植入患者中的应用

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目的：评价保持球囊阻断腹主动脉血流状态下行子宫动脉栓塞在胎盘植入患者剖宫产术中的应用及有效性。方法：回顾性分析我院自 2016 年 5 月至 2021 年 7 月共 72 例胎盘植入剖宫产术中栓塞止血的患者临床资料。患者年龄为 22-44 岁，平均年龄 32.92 岁；既往孕产次为 1-7 次，平均孕产次为 2.9 次；术中造影显示子宫供血动脉数量为 2-10 支，平均为 5.58 支。根据术中栓塞方式分为 A、B 两组。其中 A 组 43 例患者操作方式为撤出球囊交换入 Cobra 导管进行子宫供血动脉栓塞；B 组 29 例患者采用对侧穿刺股动脉置入 5F 鞘管并引入 Cobra 导管于球囊阻断下进行子宫供血动脉栓塞。对比两组患者术中出血量、输血量及并发症发生率，采用 SPSS 25.0 统计软件对数据资料进行整理与分析，采用独立样本 t 检验分析两组的出血量，计量资料符合正态分布采用 Pearson 相关性分析；不符合正态分布采用 Spearson 相关性分析；采用多元线性回归筛选影响出血量的危险因素。采用 MannWhitney 检验分析两组的输血量，采用卡方检验分析两组的并发症发生率，以 $p<0.05$ 为差异有统计学意义。结果：72 例患者均进行子宫供血动脉栓塞并成功止血，A 组患者术中平均出血量为 $2976.74\pm1133.81\text{ml}$ ，B 组患者术中出血量为 $2325.86\pm1040.14\text{ml}$ ，经统计学分析两组出血量存在显著统计学差异 ($P<0.05$)；A 组患者中位输血量 2255.0ml，B 组患者中位输血量 1310.0ml，经统计学分析两组输血量存在显著统计学差异 ($P<0.05$)；A 组患者并发症发生率为 4.65%，B 组并发症发生率为 3.45%，经统计学分析两组间并发症发生率无统计学意义 ($P>0.05$)。结论：球囊阻断下经对侧穿刺股动脉插管进行子宫供血动脉栓塞可进一步减少胎盘植入患者剖宫产术中出血量及输血量。

PU-1208

肾包膜动脉栓塞联合超选择性肾动脉栓塞治疗损伤性肾出血的安全性及有效性

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【摘要】目的 探讨肾包膜动脉栓塞联合超选择性肾动脉栓塞术治疗损伤性肾出血的安全性及有效性。方法 回顾性分析本院 2020 年 1 月—2023 年 7 月收治的 50 例损伤性肾出血患者的临床资料,所有患者均有血尿或造瘘管引出血色液体。观察组 25 例使用肾包膜动脉栓塞术联合超选择性肾动脉栓塞术治疗,对照组 25 例使用选择性肾动脉栓塞术治疗。术后远期随访 3 个月,记录患者手术成功率、术前及术后相关指标症状改善情况。结果 两组手术止血效果明显。两组间术前的血红蛋白(Hb)、肾区疼痛视觉模拟评分(VAS)、血肌酐(Scr)、收缩压及术后 24h Hb、术后 24h 肾区疼痛 VAS、术后 7 天 Scr、术后 1 月收缩压分别比较,差异无统计学意义(均 $P > 0.05$),而两组间术后 24h Hb、术后 24h 肾区疼痛 VAS 比较,差异有统计学意义(均 $P < 0.05$)。观察组术后满意度高于对照组,而术后住院时间短于对照组,差异有统计学意义(均 $P < 0.05$)。结论 两组治疗损伤性肾出血均可提高术后 24h 血红蛋白、降低术后 24h 肾区疼痛 VAS,而观察组较对照组明显提高术后 24h Hb 及患者满意度率、降低术后 24h 肾区疼痛 VAS、减少术后住院时间。肾包膜动脉栓塞联合超选择性肾动脉栓塞术治疗损伤性肾出血是一种安全、有效、微创的止血方法,值得推广。

PU-1209

非小细胞肺癌Ⅲ期患者接受 CT 引导下经皮 125I 粒子植入治疗疗效评估的 CT 纹理分析参数特征比较

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目的 探讨非小细胞肺癌Ⅲ期患者接受 CT 引导下经皮 125I 粒子植入治疗疗效评估的 CT 纹理分析参数特征比较

方法 选取 47 例经穿刺活检病理证实的非小细胞肺癌患者植入 125I 粒子(联合化疗或在单独植入粒子治疗前三个月内接受过至少 1 种及以上药物治疗方案),经临床评估为诊疗中前期(6 个月内)非进展后,获取术前、术后 3、6 个月增强 CT 图像,手动勾画感兴趣区后提取术前、术后 3 个月、6 个月随访 CT 图像的纹理特征。根据临床实际疗效对患者进行分组,采用参数,对有统计学差异的纹理参数进行多因素建模分析。运用受试者工作(ROC)曲线下面积(AUC)、准确度、敏感度、特异度评估模型。

结果 在运用了纹理分析方法后分别对 3 月期疗效获得 5 个纹理参数,对 6 个月期疗效获得 5 个纹理参数,通过纹理参数构建模型获取 ROC 曲线与 AUC 值,评估分组方法对疗效预测的诊断价值是积极的。

结论 结合 CT 纹理分析方法,在非小细胞肺癌Ⅲ期患者植入 125I 粒子治疗时根据疗效的积极与否对患者群体进行分类有益于提供一定的临床诊断价值、影像疗效评估特征和临床治疗方案决策价值。

PU-1210

基于 SBAR 模式的心理护理对耐多药肺结核患者大咯血经皮动脉栓塞术后心理状态、自我效能的影响

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【摘要】目的：分析基于 SBAR 模式的心理护理对耐多药肺结核患者大咯血经皮动脉栓塞术后心理状态、自我效能的影响。**方法：**选取 86 例我院 2019 年 5 月至 2022 年 5 月诊治的耐多药肺结核患者为研究对象，分为常规组、研究组各 43 例。常规组、研究组分别进行常规护理、基于 SBAR 模式的心理护理。评估对比两组患者心理状态、自我效能、应对方式、生活质量、健康情况、护理满意度。**结果：**与护理前相比，护理后两组患者焦虑、抑郁、依靠自我、姑息、宿命、逃避评分下降，且研究组低于常规组，护理后两组患者责任感、健康意识、技能、自护理论、情感宣泄、乐观、寻求支持、面对、一般健康状况、健康变化、社会功能、生理机能、躯体疼痛、情感职能、生理职能、精力、精神健康、活动、心理、症状评分上升，且研究组高于常规组 ($P<0.05$)。研究组的患者护理满意度高于常规组 ($P<0.05$)。**结论：**耐多药肺结核患者大咯血经皮动脉栓塞术后通过基于 SBAR 模式的心理护理进行干预可改善患者心理状态、应对方式、健康状况，提升自我效能、生活质量。

PU-1211

不同状态下肾 AML 的影像学特征、栓塞策略及临床疗效分析

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目的

本研究旨在分析肾血管平滑肌脂肪瘤(AML)的影像学特征，探讨 AML 破裂出血的相关危险因素和不同状态下的栓塞策略及其临床疗效。

方法

回顾性研究 2011 年 1 月至 2021 年 12 月经 CT 平扫诊断为 AML 并破裂出血或直径 $\geq 4\text{cm}$ ，并进行经导管动脉栓塞术(TAE)/硬化栓塞术(TASE)的患者 35 例，共栓塞 36 个肿瘤病灶。根据入院时肿瘤的不同状态采用不同的栓塞策略：大量出血的 AML 采用 TAE，少量出血及无出血的 AML 采用 TASE。对比分析不同状态下 AML 的影像学特征、采用的栓塞策略及其临床疗效。

结果

36 个 AML 中发生自发性出血的有 22 个，其中大量出血的有 15 个，少量出血的 7 个；无出血的有 14 个。进行 15 次 TAE，21 次 TASE。治疗后，大量出血 AML 均得到止血。破裂出血的 AML 有 14 个合并动脉瘤，无出血 AML 有 3 个合并动脉瘤，差异具有统计学意义($P=0.019$)，两组之间动脉瘤直径、血管及平滑肌成分比例、血管及平滑肌成分体积的差异均具有统计学意义($P<0.05$)。对于 AML 的破裂出血，动脉瘤直径 $\geq 4\text{mm}$ 的预测准确率为 0.74($P=0.016$)，血管性成分比例 ≥ 0.21 预测准确率为 0.99($P<0.001$)，血管性成分体积 $\geq 48.86\text{cm}$ ，预测准确率为 0.92($P<0.001$)。平均随访(16.77 ± 12.91)个月，AML 体积缩小率、血管及平滑肌成分缩小率、脂肪成分缩小率分别为 0.68 ± 0.22 、 0.82 ± 0.28 、 0.52 ± 0.39 ，差异具有统计学意义($P<0.01$)。TASE 组有 3 个肿瘤病灶缩小至完全消失。TAE 组与 TASE 组 AML 的脂肪成分体积缩小率组间具有统计学差异($P=0.009$)。术后整体血清肌酐水平降低($P=0.017$)。

结论：动脉瘤直径、血管及平滑肌成分和临床症状是预测 AML 出血的主要危险因素。TAE 能有效控制出血，是 AML 急性活动性出血的首选治疗方法。TASE 能有效缩小肿瘤体积、破坏血管及血管周围组织，保护肾组织。

PU-1212

基于深度学习技术在 CT 引导下肺活检术中降低辐射剂量的临床应用

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目的 基于深度学习重建技术探讨不同噪声指数在 CT 引导下经皮肺穿刺活检术中降低辐射剂量的临床应用价值。

方法 选取 CT 引导下经皮肺穿刺活检的 32 例患者，采用小范围（40mm），100KV，自动管电流（ATCM），噪声指数（NI）依次为 15、30、45 扫描获得 3 组图像，自动记录 CT 扫描的容积 CT 剂量指数（CTDIvol）和剂量长度乘积（DLP），计算有效辐射剂量（ED）。A 组为 NI 15 ASIR-V 50%图像，B、C 组分别为 NI 30、45 DLIR-H 图像，分别测量穿刺点中心及其上下 10mm 层面脊柱旁肌肉、皮下脂肪及动脉血管 CT 值和 SD 值，计算 SNR 和 CNR，并由两名医师对图像进行主观评分。

结果 三组图像质量的主观评价均能满足穿刺需求。B 组图像 SD 及 SNR 值均优于 A、C 组，组间两两比较分析：A、B 组图像在肌肉、脂肪处 SD 和 SNR 差异具有统计学意义（ P 均 <0.05 ）；A、C 在血管处 SD 和 SNR 值差异有统计学意义（ $P<0.05$ ）；B、C 组图像在肌肉、脂肪及血管处 SD 和 SNR 差异具有统计学意义（ P 均 <0.05 ）。三组间 CTDIvol、DLP、ED 的差异均具有统计学意义（ P 均 <0.05 ）；B、C 组较 A 组的 CTDIvol、DLP、ED 分别降低了 82.97%、82.94%、82.86%和 93.94%、93.92%、93.90%；C 组较 B 组的 CTDIvol、DLP、ED 分别降低了 64.56%、64.39%、64.44%。

结论 基于深度学习技术提高噪声指数应用超低剂量 CT 引导下经皮肺穿刺活检术，可以大幅度降低穿刺活检过程中的辐射剂量，值得临床推广应用。

PU-1213

TACE Plus Tyrosine Kinase Inhibitors and Immune Checkpoint Inhibitors versus TACE Plus Tyrosine Kinase Inhibitors for the Treatment of Patients with Hepatocellular Carcinoma: A Meta-Analysis and Trial Sequential Analysis

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Background: We conducted a meta-analysis and trial sequential analysis (TSA) to compare the therapeutic efficacy and adverse events (AEs) between the following treatment strategies for patients with hepatocellular carcinoma (HCC): TACE plus tyrosine kinase inhibitors (TKIs) and immune checkpoint inhibitors (ICIs) (TACE+T+I) versus TACE plus TKIs (TACE+T).

Methods: We systematically searched PubMed, the Web of Science, the Cochrane Library, and Embase for studies comparing TACE+T+I and TACE+T for the treatment of BCLC intermediate- or advanced-stage HCC. The objective response rate (ORR), progression-free survival (PFS), overall survival (OS), and AEs were included as outcomes. We used a fixed- or random-effects model based on the results of a heterogeneity evaluation and performed a meta-analysis using Review Manager 5.3 and Stata 16.0. We then carried out the TSA.

Results: Five studies examining a total of 425 patients were included in this study. Our meta-analysis revealed that, compared to TACE+T, TACE+T+I significantly improved the ORR (risk ratio [RR] = 1.53, 95% confidence interval [CI] = 1.27–1.85, $P < 0.01$) and extended both the

median PFS (mean difference [MD] = 4.51 months, 95% CI = 2.16–6.87, $P < 0.01$) and median OS (MD = 5.75 months, 95% CI = 4.03–7.48, $P < 0.01$). These results were tested to be true by the TSA without requiring a larger information size. Among AEs, hypertension tended to occur more often in patients treated with TACE+T+I than in those treated with TACE+T (RR = 1.58, 95% CI = 1.05–2.40, $P < 0.05$). However, the TSA suggested that additional cases are necessary to confirm this difference. Regarding the other AEs, no significant differences were detected between the two groups.

Conclusion: TACE+T+I showed better effects on the ORR, PFS, and OS than TACE+T as a treatment for BCLC stages B and C HCC, without an obvious increase in the AEs. Based on these findings, well-designed, large RCTs are suggested.

PU-1214

经皮双通道聚桂醇泡沫血液全置换硬化术治疗下肢静脉曲张临床应用

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目的：探讨经皮静脉内注入聚桂醇泡沫硬化剂血液全置换联合射频消融治疗下肢静脉曲张的技术方法可行性，安全性和临床疗效。方法与材料：选取 2021 年 3 月至 2023 年 3 月我科收治的下肢静脉曲张患者 67 例。术中于膝关节内侧穿刺大隐静脉主干后，经大隐静脉远侧置入射频闭合导管将大隐静脉大腿段主干闭合，远端小腿曲张静脉注入聚桂醇泡沫硬化剂，选择性硬化闭塞大隐静脉及交通静脉，术后患肢加压包扎，局部换药。结果：手术 87 条患肢均成功注入泡沫硬化剂，每条患肢平均注入 7.2 ml(3.8~9.2ml)泡沫硬化剂，无严重并发症发生。手术结束患者自行走回病区，术后患者能正常下床活动。持续穿压力弹力袜两周后，所有患肢术后术口愈合良好。术后 6~12 个月随访：87 条患肢(93.8%)曲张静脉消失，3 条患肢(6.25%)曲张静脉局部复发。结论：血液全置换联合射频消融治疗下肢静脉曲张临床疗效确切，是一种安全、有效的治疗下肢静脉曲张的微创方法，值得推广及应用。

PU-1215

CT 平扫评估原发性肝癌经肝动脉化疗栓塞术后疗效的临床研究

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目的

计算机断层扫描 (CT) 平扫判断原发性肝癌 (PHC) 患者经肝动脉化疗栓塞术 (TACE) 后病灶内碘油沉积情况，评估 TACE 的术后疗效，指导临床进一步治疗。

方法

收集 2018 年 6 月-2020 年 6 月行 TACE 治疗的 38 例 PHC 患者的 75 个病灶，术后 1-18 个月评估碘油沉积情况，并根据改良实体瘤反应评估标准 (mRECIST) 将患者分为病情缓解组(CR+PR)及病情未缓解组(SD+PD)，比较两组患者的临床与影像资料；多因素 Logistic 回归分析 TACE 疗效评估的独立因素；Spearman 相关性分析探究碘油沉积类型与 mRECIST 分级二者的关系；采用受试者工作特征曲线显示各特征对 TACE 治疗效果的评估的准确性； $p < 0.05$ 为差异有统计学意义。

结果

缓解组碘油沉积类型、碘油 CT 值与未缓解组比较，差异均有统计学意义($P < 0.05$)，碘油沉积类型为 TACE 疗效评估的独立因素，并与 mRECIST 分级呈正相关(r 为 0.702, $P < 0.001$)，碘油 CT

值>700HU 提示病情进展可能性较低。碘油沉积类型与碘油 CT 值联合评估病情缓解的 ROC 曲线下面积为 0.909, 灵敏度为 0.816, 特异度为 0.919。

结论

无论治疗间隔时间长短及治疗次数多少, CT 平扫判断病灶内碘油沉积类型对 PHC 患者 TACE 术后疗效有一定评估作用, 联合碘油 CT 值效果更优, 在一定程度上减轻了 PHC 患者术后复查的经济压力、规避了 CT 增强检查造影剂带来的潜在风险、显著减少了患者的四分之三的辐射剂量。

PU-1216

免疫治疗会提高 TACE 或 TACE 联合分子靶向疗法在肝癌患者中的疗效吗? 一项荟萃分析

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背景: 虽然有几项研究比较了经动脉化疗栓塞(TACE)联合或不联合免疫检查点抑制剂(ICIs)在肝癌患者中的疗效和安全性, 但仍然缺乏荟萃分析。方法: 在 PubMed, Embase, Web of Science 和 Cochrane Library 检索了截至 2023 年 7 月的比较单独 TACE 或联合非免疫治疗 (TACE±分子靶向治疗[MTTs])和 TACE 联合 ICIs (TACE±MTTs+ICIs)在肝癌患者中的疗效和安全性研究。结果包括总生存期(OS)、无进展生存期(PFS)、客观缓解率(ORR)、疾病控制率(DCR)和不良事件(AEs)。

结果: Meta 分析共纳入 20 项研究, 涉及 2587 例 HCC 患者。包括 2116 例患者的 18 项研究观察了 TACE±MTTs 或 TACE±MTTs+ICIs 的 OS 差异。与 TACE±MTTs 相比, TACE±MTTs+ICIs 与 OS 的显著改善相关(HR, 0.37;95%CI, 0.30-0.46)。13 项研究包括 1650 例患者调查了 TACE±MTTs 或 TACE±MTTs+ICIs 的 PFS 差异。结果显示, TACE±MTTs+ICIs 与更长的 PFS 相关(HR, 0.50;95%CI, 0.41-0.61)。包括 1971 例患者在内的 18 项研究调查了 TACE±MTTs 或 TACE±MTTs+ICIs 之间肿瘤反应(ORR 和 DCR)的差异。结果显示, 与 TACE±MTTs 相比, TACE±MTTs+ICIs 的 ORR 和 DCR 更高。此外, 为了观察 ICIs 的直接影响, 我们研究了 TACE+酪氨酸激酶抑制剂(TKIs)和 TACE+TKIs+ICIs 在 OS、PFS、ORR、DCR、AEs 和严重 AEs 方面的差异。结果表明, ICIs 的添加延长了 OS, 延长了 PFS, 提高了 ORR 和 DCR, 但没有增加 AE 和严重 AEs。结论: 本项研究是全球第一项比较 TACE 联合或不联合 ICIs 在肝癌患者中的疗效和安全性的荟萃分析, 结果表明 ICIs 可提高 TACE 或 TACE 联合 MTTs 的疗效, 延长肝细胞癌患者的生存期。同时, 在 TACE+TKIs 中加入 ICIs 并没有带来额外的不良事件。

PU-1217

基于 CT 的人体肌肉和脂肪含量对肝细胞癌 TACE 难治性的影响

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目的: 本研究通过结合肝细胞癌患者的一般临床资料及基于 CT 的人体肌肉及脂肪组织参数, 旨在探讨肝细胞癌患者经导管动脉化疗栓塞术 (TACE) 后发生难治性的风险因素, 建立临床及身体成分预测模型, 进而尝试对 TACE 难治性高风险患者进行预测。

方法: 本研究回顾性收集 2013 年 6 月至 2021 年 10 月在中南大学湘雅三医院及湖南省肿瘤医院诊断为肝细胞癌并接受 TACE 治疗的 128 例患者。根据日本肝病学会 (JSH) 指南确定 TACE 的难治性。在所有患者中, 89 名患者 (约 70%) 被分配到训练队列, 其余 39 名患者 (约 30%) 被分配到验证队列。

结果: 训练队列纳入 89 例患者, 其中 TACE 难治性患者为 39 例 (43.8%), 测试集纳入 39 例患者, 其中 TACE 难治性患者为 17 例 (43.6%)。多因素逻辑回归结果显示基线最大肿瘤直径、VSR 是影响 TACE 难治性的独立危险因素。用最大肿瘤直径构建临床预测模型, 在训练队列中 AUC 值为 0.865, 在验证队列中 AUC 值为 0.749。用 VSR 构建身体成分预测模型, 在训练队列中 AUC 值为 0.894, 在验证队列中 AUC 值为 0.810。组合模型在训练队列 AUC 值为 0.925 在最佳截断点的灵敏度为 96.0%, 特异度为 79.5%, 验证队列 AUC 值为 0.885, 灵敏度为 77.3%, 特异度为 94.1%, 与单独的临床模型相比具有统计学差异 ($P < 0.01$)。

结论: 患者基线最大肿瘤直径和 VSR 是预测肝细胞癌患者发生 TACE 难治性的独立危险因素, 身体成分模型、临床模型及组合模型可以在 TACE 治疗前预测患者发生难治性的风险, 并且组合模型的预测性能要优于单独的身体成分模型及临床模型, 可以帮助临床医生选择最优的治疗肝细胞癌的方法。

PU-1218

IVIM 评估下肢动脉狭窄患者 PTA 前后骨骼肌微循环状态

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目的: 本研究的目的是通过体素不相关运动成像 (IVIM) 评估

下肢动脉硬化闭塞性疾病 (LEAD) 患者经皮腔内血管成形术 (PTA) 前后的骨骼肌灌注, 探索 IVIM 参数作为定量评估介入手术疗效的一种极具潜力的方法。

方法: 在 2019 年 3 月至 2020 年 2 月期间, 在我院收治了 20 例 (男 16 人, 女 4 人, 平均年龄为 66.75 ± 12.3 岁) 有症状且临床诊断为 PAOD 且需要进行介入手术治疗的患者。这 20 例患者均进行了球囊扩张术或球囊扩张伴支架植入术。术前 1 天和术后 1 周内分别进行了 CTA, 常规 MRI, IVIM 以及患肢小腿的临床辅助检查。3 例患者有随访记录。对所有患者的临床症状进行评估, 同时测量与胫骨前肌, 腓骨长短肌, 比目鱼肌和腓肠肌灌注相关的 IVIM 参数, 包括扩散系数 D , 灌注相关扩散系数 D^* 和灌注分数 f , 用 IVIM 软件对所有患者患肢小腿进行感兴趣区参数值的计算, 使用 Spearman 秩相关检验进行统计分析。

结果: 在 PTA 前后, 胫骨前肌、腓骨长短肌、比目鱼肌和腓肠肌的 D 、 D^* 、 f 值均较术前增加, 同时临床评估的踝肱指数 (ABI) 从 0.60 ± 0.27 增加到 0.92 ± 0.21 , 趾肱指数 (TBI) 从 0.18 ± 0.64 增加到 0.41 ± 0.17 。所有患者的无痛步行距离均得到改善。结论: IVIM 可以成功监测小腿骨骼肌 PTA 前后关键灌注参数 D , D^* 和 f 的变化, 似乎是监测和评估介入治疗的有前途的工具。

PU-1219

Angio-CT 联合 DSA 在精准前列腺动脉栓塞术中的应用价值

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目的 探讨 Angio-CT 联合 DSA 在精准前列腺动脉栓塞术中的应用价值。

方法 选取 10 例前列腺增生患者, 行精准前列腺动脉栓塞术, 术中行 Angio-CT 动脉造影, 分析 Angio-CT 的应用价值。

常规消毒铺巾及导尿管置入, 局麻下采用 Seldinger 技术穿刺右侧股动脉成功后, 引入 5F 猪尾导管至腹主动脉, 注入适量造影剂行 Angio-CT 动脉扫描, 可发现双侧前列腺增粗, 前列腺明显增大。扫描结束后, 进行三维工作站重建图像, 根据横断位 CT 图像判断患者前列腺和周围组织的染色情

况,分析血管供血是否在前列腺,分析出责任动脉;利用三维重建技术获取 3D 血管图像,以任意角度进一步分析前列腺和周围分支的关系,选择适宜的操作角度,利用 Yashiro 导管配合微导管选入双侧前列腺,DSA 动脉造影证实为前列腺动脉后,双侧前列腺注入适量直径 100-300um PVA 微球行栓塞治疗,然后补充注入适量直径 300-500um 明胶海绵颗粒行栓塞治疗。复查造影示栓塞满意。

结果 患者接受精准前列腺动脉栓塞术并成功实施 Angio-CT 检查,有效识别前列腺动脉并明确其与周围脏器吻合支的关系,是精准前列腺动脉栓塞术治疗前列腺增生患者的关键,同时也是减少手术并发症、进行安全栓塞的关键。Angio-CT 的应用,有效提高了前列腺动脉的识别率,在精准前列腺动脉栓塞术中应用 Angio-CT,可避免发生异位栓塞情况。患者术后复查未发现并发症。

结论 Angio-CT 应用于精准前列腺动脉栓塞术中,可提供确切的影像学图像,可明确识别前列腺动脉,可以直接观察前列腺染色,明确显示栓塞靶血管与其周围分支的关系,从而选择最佳的手术位置,保证了手术的安全性和精准性。

PU-1220

穿针引线-超声引导下直接穿刺 TIPS 支架引入器械疏通支架内血栓技术介绍

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TIPS 手术是介入医学中难度最高的手术之一,其通过在门静脉与肝静脉之间建立分流道,可快速有效降低门静脉压力,改善门静脉高压并发症,对肝硬化门脉高压导致的顽固性腹水、食管胃底静脉曲张破裂出血具有良好的治疗效果。然而直接内血栓形成会影响其长远疗效。常规的经颈静脉导管辅助支架内血栓抽吸及球囊扩张是常用的治疗方法,但是有时候由于解剖因素或支架内血栓机化较严重,往往难以建立有效的通路,从而造成 TIPS 支架内血栓疏通失败。我们临床中心通过超声引导下经皮及肝实质直接穿刺支架,通过 18G 穿刺针引入泥鳅导丝反向选择上腔静脉内, RUPS100 鞘管,导丝经鞘管尾端引出体外。然后经颈静脉 RUPS100 鞘管沿导丝引入多用途导管直至 TIPS 支架 18G 针穿刺点。经上述反向交换操作,可有效建立支架内通路,从而为后续的血栓抽吸及球囊机械碎栓创造条件。

上述超声引导下直接穿刺 TIPS 支架引入器械疏通支架内血栓技术在我们临床中心实践中积累了较好的经验,且未出现腹腔出血等严重并发症。避免了再次 TIPS 手术为患者带来的机体痛苦及经济负担。

PU-1221

降低 CT 引导下肺结节穿刺活检并发症的研究

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摘要 目的:探讨降低 CT 引导下肺结节穿刺活检并发症的研究。方法:选取 2021 年 10 月-2022 年 10 月 200 例在青海红十字院进行 CT 引导下肺部结节穿刺活检的患者,其中 100 例采用同轴针穿刺法(对照组),100 例采用同轴针联合凝血酶封堵法(实验组),比较两种方法诊断阳性率及并发症发生率。结果:200 例肺活检全部穿刺成功,穿刺成功率 100%。常规组患者诊断恶性病变 88 例,良性 7 例,未定性 5 例,阳性率 88.0%;发生气胸 15 例,咯血 8 例,并发症发生率 21.0%。实验组患者诊断恶性病变 92 例,良性 8 例,未定性 2 例,阳性率 92.0%;发生气胸 6 例,

咯血 2 例, 并发症发生率 8.0%。两组患者阳性诊断率的差异无统计学意义 ($P > 0.05$), 并发症发生率的差异有统计学意义 ($P < 0.05$)。结论: 采用同轴穿刺针联合凝血酶封堵法可以准确地进行 CT 引导下肺部结节穿刺活检, 并可明显降低气胸、咯血的发生率。

PU-1222

子宫收缩不良致产后出血 DSA 技术行栓塞治疗的价值和意义

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目的: 探讨子宫收缩不良所致的产后出血产妇产后子宫内血管栓塞 (uterine artery embolization, UAE) 技术的实施和解剖位置分析, 选择合适的动脉栓塞对于止血效果及术后快速恢复子宫、卵巢供血的治疗价值和重要意义。方法: 选取我院专科于 2023 年 1 月-2023 年 6 月期间收治的, 符合纳入标准的因子宫收缩不良所致的产后出血, 经 DSA 血管造影技术精确完成子宫动脉栓塞术者共计 48 例, 且纳入产妇经临床常规止血效果不佳者。其中出血量 $\geq 800\text{ml}$ 的 32 例, 出血量 $\geq 1000\text{ml}$ 的 10 例, 出血量 $\geq 1200\text{ml}$ 的 6 例。48 例产妇经右侧或左侧股动脉穿刺插管, 导管分别插至双侧子宫动脉, 检查内容包含子宫动脉的起源及其走向、分布、出血点处的血供情况, 子宫底、体、颈部血流情况, 对于出血活跃处血管进行栓塞治疗, 已达到快速止血效果, 避免出血产后大出血、休克、席汉斯综合征、切除子宫等不良事件发生。结果: (1) 86.53% 的产妇产后子宫动脉发自髂内动脉的臀下动脉阴部干, 13.47% 的产妇产后子宫动脉为髂内动脉主干和臀上动脉。(2) 子宫供血情况分为 3 种情况: ①一侧子宫动脉供血为主要类型, ②双侧子宫动脉均衡供血, ③单纯一侧子宫动脉供血。

(3) 发现有 72.5% 的子宫动脉发出卵巢支, 子宫动脉栓塞术不能避免栓塞卵巢支。因此在选择被栓塞的动脉时应更为谨慎, 且栓塞时间应严格控制, 结合临床症状, 尽早恢复子宫及卵巢血供。结论: 在 DSA 血管造影技术下行子宫动脉栓塞是一种安全, 有效, 能减少产时、产后出血量及产后并发症发生的有效医疗手段。对于有再次生育要求的妇女而言, 更需要选择的 DSA 血管造影操作人员对动脉分布、血管走向的熟悉, 能更快更精准地选择被栓塞的动脉血管, 且栓塞物最好选择可被吸收的明胶海绵类物质, 以便更好恢复子宫供血能力。对于血管的选择仍需多中心大规模临床 DSA 技术的进一步探索和证实。熟悉子宫血管的解剖对提高技术成功率, 合理选用栓塞方法有着非常重要的意义。

PU-1223

CT 引导下肺穿刺活检对乳腺癌伴发及术后继发可疑恶性的实性肺结节的诊断价值

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目的: 探讨 CT 引导下肺穿刺活检对乳腺癌合并可疑恶性实性肺结节的诊断价值。方法: 选取 2018 年 8 月至 2019 年 8 月在河北医科大学第四医院乳腺中心收治的乳腺癌初诊及复诊患者共 34 例, 所有患者均经病理证实为乳腺癌, 且均合并可疑恶性的实性肺结节, 所有患者均行 CT 引导下肺结节穿刺活检并加做免疫组化, 当对取材结果不满意时行二次活检, 将患者分为初诊伴发组 11 例, 复诊继发组 23 例。分别统计穿刺成功数、乳腺癌肺转移患者数、肺癌患者数、其他病理结果患者数。结果: 所有患者手术过程顺利, 术中及术后均无严重并发症。CT 引导下肺穿刺活检诊断乳腺癌伴发可疑恶性的实性肺结节 (单发 5 例, 多发 6 例) 成功数 (11/11)。其单发实性结节患者中, 乳腺癌肺转移患者数 (2/5), 肺癌患者数 (3/5)。其多发实性结节患者中, 乳腺癌肺转移患者数 (4/6), 肺癌患者数 (1/6), 其他病理结果 (1/6)。CT 引导下肺穿刺活检诊断乳腺癌继发可疑

恶性的实性肺结节（单发 4 例，多发 19 例）成功数（22/24）。其单发实性结节患者中，乳腺癌肺转移患者数（3/4），其他病理结果（1/4）。其多发实性结节患者中，乳腺癌肺转移患者数（17/18），肺癌患者数（1/18）。CT 引导下肺穿刺活检对于鉴别乳腺癌肺转移与肺原发良恶性病变具有十分重要的价值，有助于指导临床精准治疗。

PU-1224

高原环境下 CT 引导经皮肺穿刺活检术后并发症的危险因素分析

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目的：探究高原环境 CT 引导下经皮肺穿刺活检术后常见并发症的危险因素。方法：选取 2019 年 1 月—2022 年 12 月在青海红十字医院放射影像介入科行 CT 引导下肺穿刺活检的患者 865 例。记录患者相关信息，采取卡方检验进行单因素分析，并 logistic 回归分析，筛选出有关“气胸和肺内出血”的独立危险因素。结果：（1）行 CT 引导下肺穿刺活检术出现气胸者 203 例（23.7%），出现出血者 140 例（16.3%）。（2）患者术后气胸的单因素分析显示病灶位置（ $\chi^2=30.032$, $P=0.026$ ）、病灶大小（ $\chi^2=10.604$, $P<0.001$ ）、进针点位置（ $\chi^2=9.736$, $P=0.008$ ）均是影响气胸发生率的相关因素；二元 Logistic 回归分析结果表明左肺下叶背段(Wald $\chi^2=6.398$, $P=0.011$)、左肺下叶前内基底段(Wald $\chi^2=4.982$, $P=0.026$)、左肺下叶外基底段(Wald $\chi^2=5.08$, $P=0.024$)、左肺下叶后基底段(Wald $\chi^2=6.294$, $P=0.012$)、病灶直径 $\geq 3\text{cm}$ (Wald $\chi^2=14.343$, $P<0.001$)、肺部相关疾病(Wald $\chi^2=4.421$, $P=0.036$)均是 CT 引导下肺穿刺活检术患者气胸发生的独立危险因素。（3）患者术后肺内出血的单因素分析结果显示病灶位置（ $\chi^2=34.243$, $P=0.008$ ）、病灶大小（ $\chi^2=41.024$, $P<0.001$ ）、穿刺角度（ $\chi^2=8.742$, $P=0.013$ ）、穿刺深度（ $\chi^2=22.553$, $P<0.001$ ）均是肺内出血发生率的相关因素；Logistic 回归分析结果显示病灶大小 ≥ 3 (Wald $\chi^2=41.151$, $P<0.001$)、穿刺角度 $30^\circ\sim 60^\circ$ (Wald $\chi^2=10.611$, $P=0.001$)、穿刺角度 $> 60^\circ$ (Wald $\chi^2=3.964$, $P=0.046$)、穿刺深度 $\geq 5\text{cm}$ (Wald $\chi^2=13.094$, $P<0.001$)均是肺内出血发生的独立危险因素。结论：CT 引导下经皮肺穿刺活检术后并发气胸及肺内出血的危险因素较多，在肺穿刺活检手术中应当予以重视。

PU-1225

一项外周肿瘤介入新途径技术研究——原发性肝癌远桡动脉入路 TACE 初探

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目的：探索经远桡动脉入路行 HCC 肝动脉化疗栓塞术的可行性、安全性。

方法：回顾性分析我中心（吉林大学第一医院介入治疗科）自 2020 年 8 月 1 日-2020 年 12 月 31 日明确诊断为原发性肝癌患者 116 例，共进行 130 次远桡动脉穿刺，其中男性 99 例，女性 17 例，平均年龄 58.6 岁（38-73 岁）平均体重 64.8 公斤（52-87 公斤），平均身高 168.5cm（158cm-184cm）。纳入标准：1.术前影像学（腹部 CT 增强或 MR 动态增强）检查或病理资料明确原发性肝癌，Child-Pugh 评分 A 级或 B 级；2.能够准确触及远桡动脉搏动，Allen 试验阴性，3.患者本人及家属知情同意。排除标准：无法触及远桡动脉搏动，或可触及但有桡动脉造瘘透析的患者，术前桡动脉超声提示迂曲折角，不利于导丝导管通过。

结果：所用患者均使用 21G 钢针穿刺，使用的鞘管 5F(84 例)，4F(46 例)，穿刺成功率 86.2%（112/130），失败 18 例。MPA1 导管选择降主动脉成功率 96.2%（125/130），交换 5F 猪尾导

管后选择成功 5 例。MPA1 选择肝动脉腹腔干成功率 100%，选择肠系膜上动脉成功率 100%。经远端动脉穿刺术后压迫 2-4 小时，无出血、血肿发生，远端及近端桡动脉搏动均良好，未出现动脉夹层、假性动脉瘤形成，无远端桡动脉闭塞。14 例经过 2 次远端桡动脉穿刺，亦未出现血管闭塞不良事件。

结论：远端动脉穿刺路径行原发性肝癌 TACE 治疗均有可行性，安全性，值得进一步推广应用。

PU-1226

博莱霉素碘化油乳剂动脉栓塞术在巨大肝血管瘤介入治疗中的长期疗效评价

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目的: 探讨博莱霉素碘化油乳剂动脉栓塞术(B/LE)在巨大肝血管瘤介入治疗中的安全性和长期疗效。方法:回顾性分析 2008 年 1 月 1 日至 2018 年 12 月 31 日期间行 B/LE 治疗的 162 例肝血管瘤患者的临床资料。根据 B/LE 术前 2 周内影像学检查(增强 CT 或增强 MRI)，对肝血管瘤患者进行分组。A 组:肝血管瘤直径 $\geq 10\text{cm}$ ，共计 48 例;B 组:肝血管瘤直径 $\geq 5\text{cm}$ 且 $<10\text{cm}$ ，共计 114 例。所有患者 B/LE 术中均采用博莱霉素-碘化油乳剂栓塞肝血管瘤供血血管。将随访节点分为短期(术后 6 个月至 1 年)，中期(术后 1 年至 3 年)及长期(术后 3 年至 11 年)。计算并比较 B/LE 术后各个随访节点肝血管瘤的面积、缩小率及临床有效率。比较两组肝血管瘤患者 B/LE 术后各个随访节点肝血管瘤的临床有效率。结果:技术成功率 100%。肝血管瘤的平均面积在 B/LE 术前、短期、中期、长期等各个随访节点的统计结果分别为 $70.13 \pm 58.72\text{cm}^2$ 、 $33.26 \pm 40.18\text{cm}^2$ 、 $21.92 \pm 28.73\text{cm}^2$ 、 $20.65 \pm 33.94\text{cm}^2$ ，B/LE 术后 3 个随访节点肝血管瘤的面积较术前的差异均具有统计学意义($p < 0.05$)。B/LE 术后 3 个随访节点的肝血管瘤的临床有效率分别为 71.70%、88.71%、89.53%。将 B/LE 术后短期内肝血管瘤临床有效例数和无效例数作为基线，B/LE 术后中期和长期期间有效例数分别与基线比较，差异均具有统计学意义($p < 0.05$);B/LE 术后中期与 B/LE 术后长期比较，差异无统计学意义($p > 0.05$)。比较 A 组和 B 组在各个随访节点的有效率:短期有效率分别为 51.06% VS 80.36%($p = 0.000$);中期有效率分别为 81.58% VS 91.86%($p = 0.095$);长期有效率分别为 88.89% VS 89.83%($p = 0.895$)。结论: B/LE 治疗肝血管瘤效果显著且长期效果稳定。B/LE 术后 3 年内肝血管瘤呈不同程度进行性缩小，3 年后肝血管瘤大小趋于稳定。B/LE 术后 B 组比 A 组短期有效率高，但两组间长期有效率无明显差异。

PU-1227

经血管腔内去交感神经消融术 (EDN) 治疗 2 型糖尿病现状与进展

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目的 近年来开展的经皮肾动脉交感神经消融术 (RDN) 研究发现，合并 2 型糖尿病(T2DM)的高血压患者术后，葡萄糖代谢改善，胰岛素敏感性有所提高。在此推动下，一系列基于经血管腔内去交感神经消融术 (EDN) 治疗 2 型糖尿病的基础与临床研究陆续进行并发表成果。本文就 EDN 治疗 2 型糖尿病的研究进展作一综述。

方法 基于 PubMed 数据库和 CNKI 数据库，分别进行英文和中文文献检索，并对内容进行综述。

结果 T2DM 作为一种终生性疾病,给个体和社会造成巨大经济负担,现有长期治疗常出现患者依从性差,难以改变生活行为方式或坚持药物治疗。研究表明交感神经过度兴奋可诱发胰岛素抵抗,通过对腹腔干与肝总动脉等交感神经射频消融进行血糖控制是新型治疗手段。已有多项国际注册临床研究证实其安全性及临床疗效,但其剂量-反应关系仍未明确,且交感神经对不同器官影响仍需长时间随访评估,仍需要大规模多中心的临床试验充分了解其潜在风险与益处。

结论 介入技术是 T2DM 等代谢性疾病的新治疗方式,具备安全、潜在并发症少及低成本等优点,本文通过机制、术式、现状等方面进行阐述。尽管其具体机制和最佳术式参数仍待研究阐明与评估术后长期效果,如进一步确证该治疗方式安全有效,可显著改善 2 型糖尿病患者(如多药血糖控制不佳)的血糖水平,更可在在此基础上融合出 T2DM 等代谢性疾病新的治疗领域——“介入代谢学”。

PU-1228

Efficacy of transcatheter arterial interventional embolization in the treatment of children with hypervascular hemangioma and its effect on serum miR-206 and miR-206-3p

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抽象:探讨经导管动脉介入栓塞联合局部注射月桂醇的疗效。检测两组患儿的疗效和血清 miR-206 和 miR-206-3p 水平。治疗后研究组严重程度评分为(1.69 ± 0.84),肿瘤深度为(5.39 ± 2.18) mm,对照组分别为(2.26 ± 0.97)和(5.85 ± 2.31) mm。成对比较,严重程度差异相当($P<0.05$),肿瘤深度差异不具有可比性($P>0.05$)。治疗后,研究组的血清 miR-206 (2.84 ± 0.84)和 miR-206-3p (3.09 ± 0.95)水平分别高于对照组(1.76 ± 0.64)和(2.15 ± 0.53)。发现局部注射月桂醇联合 TAE 在治疗儿童血管过多管瘤方面明显比单独注射 TAE 更有效。此外,它被发现是治疗这种情况的安全有效的方法,具有进一步临床应用的潜力。

PU-1229

在介入导管室介入诊疗过程中放射技师的配合研究进展

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当前,介入医学快速发展,技术日益完善,已经成为重要的临床诊疗学科,并将新技术、新理念不断推广应用于多学科、多领域、多层面,为广大患者提供创伤小、恢复快、优质安全的精准诊疗。随着介入诊疗患者数量的不断攀升,各医疗中心在以临床需求为目标,不断加大介入导管室的增建改建,以期实现共享手术空间,同时开展多学科协同评估、共同管理以及分期/联合介入和开放手术的现代化介入诊疗工作平台。而在介入导管室介入诊疗的过程中放射技师的配合是介入导管手术成功的关键因素。

介入导管诊疗技术是指在不开刀暴露病灶的情况下,在皮肤做直径数毫米的微小通道,或通过机体原有的腔道,在影像设备的引导下对病灶局部进行诊疗。根据治疗范围介入导管诊疗技术可分为妇产科介入、神经介入、肿瘤介入、外周介入、心脏介入等,达到精准发现、定位、消除病灶的治疗目的。随着介入技术发展的突飞猛进,各类介入器械的不断革新、突破,以及介入精准治疗概念的提出,介入手术者不再单纯依赖影像结果去指导手术策略,在术中要随时掌握腔内影像学,功能学

评价指标等所需决策依据提供综合指导。在介入导管室的整体规划中融入大量影像、网络和信息技术和相应的基建支持,在介入导管手术全程配合放射技师,力求打造可视化、信息化、智能化平台,为精准诊疗提供保障,使介入诊疗条件更加顺应医疗理念的进步。

介入导管放射技术操作要求在影像仪器的监测下寻找血管分支,熟悉正常的解剖部位,了解解剖变异,选择适宜的导管,转动病人的体位,予以造影剂探路,要求在介入导管的诊疗的全程需要放射技师全程监测、配合,放射技师在导管介入放射诊疗中起到关键性作用,需要增强对专业技能的提升力度,同时需要系统学习新技术、新知识。

PU-1230

基于 4R 危机管理理论在急诊大咯血介入手术中的应用研究

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摘要:目的 探讨 4R 危机管理法在急诊大咯血介入手术中的应用研究。方法 选取行 2019 年 7 月—2022 年 7 月我院收治的 82 例介入栓塞治疗的大咯血患者为研究对象,随机分为对照组(常规管理)和实验组(4R 危机管理理论),每组 41 例。比较 2 组手术时间、术中护理风险事件发生次数、风险识别率和护理质量评分、护理应对能力评分以及医护人员自身对护理的满意度。结果 实验组手术时间短于对照组,术中护理风险事件发生次数少于对照组,风险识别率、护理质量评分、护理应对能力评分和医护人员自身对护理总满意率高于对照组,差异有统计学意义($P<0.05$)。结论 4R 危机管理理论在急诊大咯血患者术中应用效果较好,有助于提高护理人员的护理能力,应用价值较高。

PU-1231

基于 ECRS 护理管理模式在肝癌介入患者围手术期中的应用

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目的:探究基于 ECRS 护理管理在肝癌患者围手术期中的应用效果评价。

方法:选取 105 例肝癌需介入手术病人为研究对象,根据随机数字表法分为对照组 52 例和观察组 53 例。对照组给予常规流程护理,观察组给予基于 ECRS 护理管理模式下的流程护理,比较两组肝癌需介入手术病人患者术前准备时间、术后患者返病房护士接手术时间、术后患者下床时间、两组患者抑郁、焦虑评分的比较。

结果:观察组患者的术前准备时间、患者术后返病房护士接手术时间、术后患者下床时间均低于对照组 ($P<0.05$),观察组抑郁、焦虑程度评分低于对照组 ($P<0.05$)。

结论:基于 ECRS 护理管理模式在肝癌介入患者围手术期中的应用,有效缩短患者的术前准备时间、缩短护士患者术后返病房接手术时间、降低了术后患者下床时间,缩短了康复时间,降低肝癌需介入手术患者抑郁、焦虑程度,ECRS 护理管理模式在肝癌介入患者介入围手术期中值得推广。

【关键词】 ECRS 护理管理模式;肝癌介入患者;围手术期

PU-1232

小脑动静脉畸形破裂出血行 Onyx 胶栓塞治疗 1 例

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摘要：脑动静脉畸形属先天性疾病，常以脑出血为首发症状，往往导致较高的致残率和死亡率。脑动静脉畸形出血主要治疗手段包括外科手术、血管内栓塞及放射治疗，治疗目标为清除病灶以消除再出血风险。血管内栓塞治疗相对于其他治疗手段，具有治疗及时、创伤小、恢复快的特点。现将我院小脑动静脉畸形破裂出血行 Onyx 胶栓塞治疗 1 例报告如下。

PU-1233

胆汁瘤治疗

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摘要：目的 探讨经导管动脉化疗栓塞（TACE）术后形成的胆汁瘤的介入和外科引流的疗效。方法 分析 50 例行 TACE 治疗患者后产生胆汁瘤的患者的临床资料，根据临床资料及治疗方法平均分成两组，比较两组患者的复发率及生存率。结果 采用介入治疗的患者中 17 例无复发，3 例 1 次复发，2 例 2 次复发，3 例于治疗五年内死亡，采用手术治疗的患者中 10 例无复发，5 例 1 次复发，3 例超过 3 次复发，7 例于治疗五年内死亡。结论 TACE 术后的胆汁瘤经介入治疗后疗效较外科治疗好。

关键词：胆汁瘤；TACE；治疗

PU-1234

脾栓塞术后继发性脾囊肿经穿刺引流后再次行 2 次脾栓塞 1 例报告

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引言：部分脾动脉栓塞（partial splenic arterial embolization, PSE）术后继发性脾囊肿临床上较为罕见。本文报道一例肝癌伴肝硬化脾大患者，因肝动脉灌注化疗（hepatic artery infusion chemotherapy, HAIC）致白细胞和血小板下降，行 PSE 治疗后由于脾脏梗死继发演进为脾囊肿，经穿刺置管引流后脾囊肿治愈，后因继续 HAIC 治疗致白细胞和血小板持续下降，再次接受 2 次 PSE 治疗。总结该病例特点：（1）PSE 后继发巨大脾囊肿形成，穿刺引流可取得根治性疗效，而且并不影响后续 PSE 的安全性；（2）在接受 HAIC 和靶免治疗过程中出现的白细胞、血小板等下降，并不能完全从脾栓塞中获益，要考虑到奥沙利铂药物促脾功能亢进作用，还有各种化疗药物和靶免药物的骨髓抑制作用。

PU-1235

Preoperative transarterial embolization in the management of primary retroperitoneal tumors: a retrospective case-control study

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AIM: To evaluate the efficacy and safety of preoperative transarterial embolization in the surgical management of primary retroperitoneal tumors (PRT) and reveal possible factors influencing the estimated blood loss (EBL) during surgical resection.

METHODS: We retrospectively analyzed a total of 51 PRT patients treated surgically from January 2018 to October 2022. Of the 51 enrolled patients; 24 patients received preoperative transarterial embolization (PTAE group) and 27 patients received surgical excision alone (Control group). Basic information, tumor size and pathological results were included and compared between two groups. EBL were compared between two groups. Principal factor effect and interaction effect on EBL were also analyzed using statistical method.

RESULTS: The mean volume of intra-operative blood loss was 829.2ml in PTAE group, which was significantly lower than 1814.7 ml in Control group ($P < 0.01$). The mean volume of intraoperative blood transfusion volume in PTAE group was 1050ml, significantly decreased compared to the control group 2700ml ($P=0.01$), and the length of hospital stay in PTAE group was 13.2 days, significantly decreased compared to the control group 19.3 days ($P=0.04$). The mean surgical time was shorter in PTAE group than in Control group, but the difference had no statistical significance (222 vs 414 min, $P=0.06$). No difference in peripheral viscera injury between two groups ($P > 0.05$). Neurological and gastrointestinal complications such as paraplegia or lower limb numbness or visceral ischemia were not observed in PTAE group. Univariate analysis of variance indicated that EBL in malignant and benign tumor has a significant difference in addition to different group ($P=0.04$), meanwhile, tumor size had little impact on total EBL ($P=0.83$). Our findings also revealed that group*size had a interaction effect on EBL ($P=0.04$), conversely, group*pathology had no obvious interaction effect on EBL ($P=0.36$).

Conclusions: PTAE provide an effective and safe adjuvant procedure for the surgical management of primary retroperitoneal tumors. It can significantly reduce intraoperative blood loss, reduce postoperative complications and hospital stay, and promote patients rehabilitation.

PU-1236

肝门部胆管癌门静脉闭塞支架植入术后联合 HAIC 或 HAIC/靶免单中心小样本疗效分析

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【摘要】目的: 评估肝门部胆管癌门静脉闭塞支架植入术后联合 HAIC 或 HAIC/靶免的临床疗效。
方法: 回顾性分析 5 例接受门静脉支架植入术后联合 HAIC 或 HAIC/靶免的肝门部胆管癌伴 PV 狭窄患者 (4 男 1 女; 平均年龄 60 岁; 年龄范围 49-71 岁。肝门部胆管癌 (3n)、胆管癌 (1n)、胆囊癌 (1n))。观察门脉支架置入术后门静脉压力变化、支架通畅、临床症状、并发症及后续 HAIC 及靶免治疗的临床疗效。
结果: 5 例患者均成功置入门静脉支架, 患者门静脉高压症状均显著缓解, 无手术相关的严重并发症。5 例患者后续治疗中 4 例接受 HAIC+靶免治疗, 1 例接受 Capox 化疗方案+靶免治疗。HAIC 方案: 奥沙利铂 50mg+5Fu/亚叶酸钙 300mg/天。Capox 化疗方案(奥沙利铂剂量 236.6mg、卡培他滨 3500mg 早三片, 晚四片), 共 8 周期。4 例病人总共接

受 19 次 HAIC 治疗, 每例患者平均接受 HAIC 治疗 5 次。每个疗程平均药物灌注 1-3d, 2 例病人接收靶向药物仑伐替尼, 1 例接受靶向药物培美替尼。术后间隔 1 个月, 行彩色多普勒超声观察门静脉支架内血流速度和门静脉直径。平均随访**个月 (**个月), 5 例患者门静脉均通畅, 并且后续联合 HAIC+靶向治疗依据 RECIST1.1 标准进行疗效评估, RR 为.... (x 例完全 (CR), x 例部分 (PR), x 例稳定疾病 (SD) 和 x 例进展性疾病 (PD)), 开始治疗或放置 PV 支架后的平均生存时间 (MST) 分别为 x 个月和 x 个月, 而 1 年生存率分别为 x 和 x。在 x 例 CR 患者中, x 例在 21 个月和 40 个月后死于多器官功能衰竭, x 例仍无病。在 PR 和 SD 患者中, 疼痛和 PH 相关症状 (如腹水和黑便) 也得到改善。1 例患者在治疗 21 个月后死于多器官功能衰竭, 1 例患者在治疗 40 个月后因细菌合并真菌性败血症、急性胆管炎、脓毒性休克而死。1 例患者在治疗 15 个月后死于多器官功能衰竭, 其他患者均存活。结论: 门静脉支架置入联合 HAIC 或 HAIC 靶向/放疗等综合治疗肝门部胆管癌所致门静脉狭窄疗效确切。

PU-1237

载药微球加载中药成分进行部分脾动脉栓塞术对术后脾脏增生的抑制作用的临床研究

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目的: 为了进一步研究抑制部分脾动脉栓塞术后, 脾脏发生代偿性增生而出现脾大、脾亢的现象。

方法: 回顾性分析 2022 年 1 月至 2023 年 1 月与昆明医科大学第一附属医院接受 PSE 治疗的 100 例肝硬化脾功能亢进的患者资料。使用 500 ~ 700 μm 的栓塞微粒球, 根据栓塞加载材料的不同分为 A 组 (接受载药微球加载中药成分) 50 人和 B 组 (仅适用微球栓塞) 人。对比两组患者手术情况、住院时间, 术前 1d、7d 以及术后 7d、28d 的血常规指标, 体液免疫指标, 外周血细胞免疫指标, 术后行多普勒血管超声对比两组患者 7d、28d 脾脏的血液流动以及术后并发症发生情况。

结果: A 组患者手术时间、住院时间均显著短于 B 组, 在术后 1d、28d; 两组患者白细胞计数(WBC) 相较于术前 1 d 均呈先升高后降低趋势, 且术后 7、28 d A 组显著低于 B 组, 术后 A 组炎症反应发生率及严重程度均低于 B 组; 术后 7、28 d 两组患者血小板计数(PLT)均呈逐渐升高趋势, 且术后 7、28 d A 组显著高于 B 组(均 $P < 0.05$)。术后多普勒血管超声提示 A 组脾脏血流量均少于 B 组, 且 A 组脾脏大小明显小于 B 组。

研究价值: 进一步缓解 PSE 术后炎症反应及脾脏代偿性增生等并发症, 提升患者术后生活质量, 改善患者血液生化指标。

PU-1238

肝癌患者 TACE 术后炎症与其预后关系的研究进展

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作为中晚期肝癌患者的首选治疗方法, 经导管肝动脉化疗栓塞 (Transcatheter hepatic arterial chemoembolization, TACE) 具有微创、简洁、较少并发症、恢复快等优势。但由于术后炎症反应和严重并发症的存在, 使得部分患者接受 TACE 治疗的周期延长, 疗效也不尽人意。因此, 术前充分对患者一般情况进行评估, 挑选术后可能获益的患者显得尤为重要。本文就肝癌患者 TACE 术后炎症反应与其预后研究作一综述。

PU-1239

球囊肺动脉成形术在慢性血栓栓塞性肺动脉高压中的应用研究进展

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慢性血栓栓塞性肺动脉高压 (Chronic Thromboembolic Pulmonary Hypertension, CTEPH) 被认为是肺栓塞远期并发症, 自然预后不良。肺动脉内膜剥脱术 (Pulmonary Endarterectomy, PEA) 能够显著改善 CTEPH 患者的预后。然而, 既往有报道显示近 40% 的 CTEPH 患者无法行 PEA 术。球囊肺动脉成形术 (Balloon Pulmonary Angioplasty, BPA) 被报道能够用于治疗不能手术的 CTEPH 患者, 且有研究报道显示, BPA 治疗不能手术的 CTEPH 患者取得了较好的预后, 主要体现在血流动力学、症状、运动功能和右心室功能的改善以及并发症发生率的降低。随着 CTEPH 患者的治疗选择不断扩大, PEA、BPA、药物治疗及其组合现已可用。但是研究中大部分患者在接受 BPA 治疗的同时也接受了肺动脉高压的药物治疗, 因此无法排除患者基础线特征和肺动脉高压药物治疗等混合因素对预后的影响, 不能真实反映 BPA 对不能手术的 CTEPH 患者预后的影响。本文对目前 BPA 在 CTEPH 中的应用研究进展进行综述, 分析其可行性、有效性及安全性, 评估其在 CTEPH 新治疗时代中的地位与前景。

PU-1240

经颈静脉肝内门体分流术治疗肝硬化门静脉血栓的技术策略

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【摘要】门静脉血栓 (Portal venous thrombosis, PVT) 形成在肝硬化患者中患病率为 5%~20%, 年发病率 3%~17%。在急性门静脉血栓形成患者中, 如果血栓蔓延至肠系膜上静脉, 可导致肠缺血, 继而引起肠坏死等严重并发症。另外, 慢性门静脉血栓形成可并发食管胃底静脉曲张出血、腹水等门静脉高压征, 也可损害肝脏功能。目前经颈静脉肝内门体分流术 (Transjugular intrahepatic portosystemic shunt, TIPS) 在 PVT 治疗中发挥着越来越重要的作用, 已成为 PVT 治疗的适应症。但目前缺少相关的技术研究而限制 TIPS 在治疗 PVT 患者的临床应用, 其主要的缺点在于技术难度大以及潜在的技术并发症等危险。研究表明, 在门脉血栓的患者中, TIPS 的技术成功随着门静脉血栓的加重而降低, 在门脉海绵样变患者中进一步降低。TIPS 治疗肝硬化门静脉血栓的难点主要在于成功穿刺门静脉技术及支架释放位置, 前者为手术成功的关键步骤, 后者为保持分流道通畅率及有效降低门脉压力的临床效果。

PU-1241

siVEGF 纳米复合体的合成及其在抗血管生成治疗中的应用

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血管内皮生长因子 (vascular endothelial growth factor, VEGF) 是促进肿瘤、眼部新生血管疾病、子宫内异位症等疾病发生发展的一种重要因子, 广泛分布于机体内各组织。抑制 VEGF 的异常表达可起到治疗这些疾病的目的, 也是治疗相关疾病的有效手段之一。由于目前常用的 VEGF 药物具

有耐药性和副作用而限制了其发展,为此开发 VEGF 的小干扰 RNA, VEGF-siRNA (siVEGF), 通过 RNA 干扰 (RNA interference, RNAi) 的方式,在基因层面抑制 VEGF 表达。然而 siVEGF 进入机体后受多种因素的影响,大大降低了治疗效果。因此构建特定的、具有靶向性的 siVEGF 复合体,避免其被机体清除,并将 siVEGF 精确的送到目的细胞以发挥抗血管功效,治疗相关疾病显得尤为重要。另外,一些多功能复合体还可以实现 siVEGF 与其他诊疗手段联合,从而提高疾病的治疗效果。本综述介绍了 siVEGF 复合体的构建、作用机理以及在抗血管治疗中的应用,并对其目前存在的问题和前景进行展望。

PU-1242

DSA 导管校准法距离测量精度研判和分析

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DSA 设备与技术已成为临床科室进行各项治疗的手术平台,术中的实时准确测量数据成为支架、滤器、扩张球囊、弹簧圈等介入器械的直径与长度选取的重要参考依据。目的: DSA 测量技术中利用导管法校正测量技术是实际工作中运用最便捷,实用的手段,为各项介入治疗提供精准数据。方法:本文通过自制模块对 3 种知名品牌 DSDA 进行实际检测,结果:1 随着导管 F 增加,测量数据准确度明显提高。2 标记导管,3D 测量方法具有良好的测量精度。使用 7F 以上的导管校正可以有效提高测量准确度。3 飞利浦 FD20 在导管法测量时存在误差明显高于其他两部设备,建议及时升级测量软件。结论:导管校准法可以在每个序列造影后即可对图中所需测量血管进行操作,最为便捷、实用,PTCA 手术及外周小血管的介入治疗中,采用这种测量技术,能满足临床需要,对于大血管和较长血管的测量还需要其他的方法给予补充,确保测量的准确性。本次实验我们发现不同的设备,存在测量差异,有的已明显影响数据真实性,提醒我们及时处置;同时对使用不同 F 值导管在各种机型上做导管法校正测量时,产生的低估实物有了量化了解,以便工作时修正数据,为手术医生提供精准的测量数据。

PU-1243

三维 DSA 在颅内动脉瘤中的应用

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【摘要】目的探讨三维数字减影血管造影(3D DsA)在颅内动脉瘤中的应用价值。方法 使用 GE Innova 3loo 平板血管造影机对 40 例疑似颅内动脉瘤患者行双侧颈内、外动脉和双侧椎动脉正、侧位 2D DsA,进一步对感兴趣血管行 3D DsA,通过容积再现(VR)进行颅内血管重建。结果 3D DSA 检出 39 例动脉瘤患者,47 枚动脉瘤,2D DSA 检出 31 例动脉瘤患者,35 枚动脉瘤,二者检出动脉瘤的长、短径无统计学差异($P>0.05$)。图像质量有统计学差异,2D DSA 出现假阳性动脉瘤 3 枚,假阴性动脉瘤 15 枚,评估颅内动脉瘤的灵敏度为 78.9%,特异性为 85.2%;3D DSA 没有出现假阳性、假阴性动脉瘤。评估颅内动脉瘤的灵敏度为 100%,特异性为 100%。在动脉瘤形态、瘤颈尺寸及与相邻血管间的关系的显示上,3D DsA 明显优于 2D DsA。结论 3D DsA 作为脑动脉造影中 2D DsA 的进一步补充,对颅内动脉瘤的诊断与治疗具有重要价值。

PU-1244

三维数字减影血管造影技术诊断脑血管疾病的应用价值

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目的:评价三维数字减影血管造影(3D-DSA)技术诊断脑血管疾病的应用价值。方法 :对临床怀疑和确诊为脑血管疾病的 71 例患者行常规脑血管数字减影造影(DSA)和 3D-DSA。结果:本组共检查 71 例,经 3D-DSA 技术共检出动脉瘤 44 例 64 枚、颅内动静脉畸形(AVM)19 例、血管狭窄致脑缺血 8 例(6 例颈内动脉狭窄、大脑前动脉闭塞)。结论:3D-DSA 诊断脑血管疾病具有极大的临床应用价值。尤其对颅内动脉瘤、AVM、血管狭窄的诊断最为准确、快速、安全。

PU-1245

联合使用 DSA 和 3D—CT 血管造影指导治疗前交通动脉瘤分析

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目的:介绍使用数字减影血管造影和 3D-CT 进行手术前检查的经验。方法:对 15 例前交通动脉瘤患者进行了 DSA 和 3D—CTA 的检查,15 例均存全身麻醉下接受了手术治疗,其中开颅动脉瘤显微夹闭 10 例,经股动脉血管内栓塞治疗 5 例。结果:检查结果显示,动脉瘤为宽颈 7 例,2 例为前交通动脉膨大,瘤体为多极(分叶)4 例,动脉瘤不仅局限于前交通。波及大脑前动脉 A2 段 2 例。15 例患者治疗后无 1 例死亡,11 例恢复良好,2 例偏瘫,2 例轻度智能障碍。结论:前交通动脉瘤血管关系复杂。常规 DSA 检查如果能很好地了解动脉瘤及周围关系,CTA 检查可成为重要的补充,两者结合使用可指导手术或栓塞治疗 方法的选择,为手术提供更详尽的信息,是前交通动脉手术前的理想检查方法。

PU-1246

低剂量 CT 引导 Hookwire 定位肺内小结节的应用研究

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目的 通过研究低剂量 CT 引导 Hookwire 用于肺内小结节术前定位的有效性和安全性,探讨 Hookwire 肺小结节辅助定位最优化的 CT 引导方案。

方法 回顾性分析 2021 年 1 月到 2023 年 3 月入住汉中市人民医院的 52 例 53 枚 CT 上表现为肺内高危小结节或磨玻璃结节、行电视胸腔镜手术切除的患者,术前均行 CT 引导下 Hookwire 辅助定位。采用放射检查号单双数随机将定位患者分为研究组和对照组,研究组(27 枚结节)采用低剂量 CT 引导,对照组(26 枚结节)采用常规 CT 引导,定位后分别记录、比较患者 CT 权重剂量指数(CTDIW)、剂量长度乘积(DLP)、X 线平均有效剂量(E)、图像质量、定位成功率及并发症、手术切除及病理等信息。

结果 研究组 CTDIW 5.68 mGy, DLP 60.19mGy·cm, E 为 2.55mSv; 对照组 CTDIW 9.11 mGy, DLP 96.31 mGy·cm, E 为 4.11mSv; 其差异具有统计学意义($P<0.05$)。研究组 25.9%(7/27) 患者出现轻微并发症,对照组 23.1%(6/26) 患者出现轻微并发症,两组均无严重并发症及 Hookwire 相关不良反应发生,两组并发症发生率无明显差异($P>0.05$)。电视胸腔镜肺结节切除术中所有患者均可见 Hookwire 尾线,研究组 26 个结节切除后大体标本循 Hookwire 尾线均快速找到

结节, 定位成功率 96.3% (26/27), 对照组定位成功率 100%, 两组定位成功率无显著差异 ($P>0.05$)。

结论 本研究通过降低管电流和减少扫描次数来实现降低辐射剂量, 使患者完成肺结节定位所接受 CTDIW、DLP 及 X 线平均有效剂量均显著降低, 降低管电流虽然图像对比度有所下降, 但辅助定位不同于影像诊断, 对图像质量的要求相对更低, 只需要分辨出定位针及其与肺小结节的关系即可。本研究中 Hookwire 定位肺小结节有效率为 96.3%, 并发症主要表现为极少量气胸和少量的穿刺针道渗血, 无需特殊处理, 这与既往文献报道一致。综上所述, 采用低剂量 CT 扫描 Hookwire 定位肺内小结节安全有效, 且患者所受 X 线辐射剂量低, 值得推广。

PU-1247

CT 引导下吡咯菁绿+肺结节定位针联合应用胸腔镜下肺小结节切除术的临床价值

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目的 探讨 CT 引导下吡咯菁绿 (ICG) + 肺结节定位针联合应用胸腔镜下肺小结节 (SPNs) 切除术的临床价值。方法 2022 年 7 月至 2023 年 8 月共 20 例患者 24 枚小结节, 先行 CT 引导下 ICG 与肺结节定位针联合定位, 后行胸腔镜下 (VATS) 肺楔形切除术。SPNs 直径 (8.30 ± 4.2) mm, 距壁层胸膜 (15.6 ± 14.35) mm; 统计术前定位时间、成功率、并发症; VATS 肺楔形切除手术时间、成功率、中转开胸率等。结果 联合定位时间 (28.5 ± 21.5) min, 成功率 100%, 失败率为 0。并发症发生率为 91.45%: 其中少量气胸 13 例 (65.00%), 中等量气胸 1 例 (5.00%), 出血 16 例, 均为少量出血 (88.00%), 轻度咯血 1 例 (5.00%), 无血胸或血气胸; 肺结节定位针脱落 1 例 (5.00%); VATS 肺楔形切除手术时间 (85 ± 30.50) min, 成功率 95.00%, 1 例中转开胸。SPNs 术后组织学诊断结果: 17 枚为原发性肺癌, 7 枚为良性病变。结论 ICG 与肺结节定位针联合定位在 SPNs 切除术中, 具有准确率高, 可视性强, 有效显示肿块及周围淋巴结状况, 有很强的临床推广运用价值。

PU-1248

基于 PSM 探索 TACE/TAE 联合靶向药物治疗原发性肝癌自发性破裂出血的疗效研究

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目的 基于倾向性评分匹配 (PSM) 分析 TACE/TAE (经导管肝动脉化疗栓塞术/肝动脉栓塞术) 联合靶向药物治疗原发性肝癌 (PLC) 自发性破裂出血患者的预后生存状况。方法 回顾性分析 2017 年 1 月至 2023 年 1 月我院治疗的 82 例 PLC 自发性破裂出血患者的临床资料, 根据是否联合靶向药物治疗分为靶向药物联合组 (TD, $n=45$) 和非靶向药物组 (NTD, $n=37$), 对 TD 和 NTD 组进行再分组为 TACE/TAE+TD ($n=40$) 和 TACE/TAE 组 ($n=25$), 采用 PSM 平衡基线资料后, Kaplan-Meier 进行生存分析, 生存率比较用 Log-rank 检验。结果 TD 组和 NTD 组共有 23 对患者 PSM 后以 1:1 的比例成功配对。PSM 后 TD 组和 NTD 组 30d 死亡率无统计学差异 (4.3% vs 13.0% , $P=0.145$), TD 组中位生存期为 31 个月 (95%CI 19.0-42.9), 1、3、5 年累积生存率分别为 81.4%、37.3%、21.7%。NTD 组中位生存期为 5 个月 (95%CI 2.2-7.8), 1、3、5 年累积生存率分别为 39.1%、24.8%、17.4%, 两组间差异有统计学意义 ($\chi^2=5.06$, $P=0.024$)。

TACE/TAE+TD 组和 TACE/TAE 组中位生存期分别为 37 个月 (95%CI 29.3-44.7) 和 4 个月 (95%CI 1.6-6.4), TACE/TAE+TD 组患者的总生存时间和 PFS 明显长于 TACE/TAE 组, 差异均有统计学意义 ($\chi^2=15.00$, $P<0.001$ 和 $\chi^2=8.04$, $P<0.005$)。结论 TACE/TAE 联合靶向药物治疗更能改善 PLC 自发性破裂出血患者的生存预后。

PU-1249

Prediction of Hematoma Expansion in Patients with Hypertensive Intracerebral Hemorrhage Using Deep Learning Based on CT Images

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Objective To build a deep learning method based on CT for hematoma segmentation and hematoma expansion (HE) prediction of patients with hypertensive intracerebral hemorrhage (ICH). **Methods** This study retrospectively analyzed 500 cases of hypertensive intraparenchymal hematoma. Baseline non-contrast-enhanced CT scans (NECTs) were collected at admission and compared with subsequent CTs to determine the presence of HE. A deep learning method based on CT was proposed to automatically segment the hematoma region. In order to build the model for hematoma segmentation and HE prediction, patients were randomly divided into the training set and the test set according to the ratio of 7:3. The training set contains 350 patients for training the model, while the test set contains 150 patients for model validation. The segmentation module adopts the attention U-net to automatically segment and detect the hematoma, while the prediction module uses the resnet-34 to predict the HE. Mean intersection over Union (Miou) and Dice coefficient were used to evaluate the segmentation task. The accuracy evaluation of the prediction model was evaluated using the area under curve (AUC) of the receiver operating characteristic (ROC) curve. The continuous variables were compared by independent sample t-test or Mann Whitney U test. $P<0.05$ was considered statistically significant. **Results** There was no significant difference in age ($P=0.211$) and gender ($P=0.213$) between the HE and the non-HE groups. Hematoma volume (16.7 ml vs. 26.7 ml, $P<0.001$) and hematoma diameter (41.7mm vs. 48.9mm, $P<0.001$) in the non-HE group were significantly lower. The Miou and Dice coefficient of the segmentation model was 0.89 and 0.90 respectively. The AUC value of the prediction model was 0.909 (95%CI:0.85 -0.949), and the sensitivity and specificity were 81.58% (95%CI:65.7%-92.3%) and 96.43% (95%CI:91.1%-99.0%) respectively. **Conclusion** The deep learning system based on brain CT can accurately segment hematoma and predict the expansion of hematoma.

PU-1250

基于 MRI 影像组学鉴别腰椎多发性骨髓瘤和腰椎退行性病变的价值

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目的 探究常规 MRI 影像组学特征对腰椎多发性骨髓瘤和腰椎退行性病变的鉴别诊断价值。

方法 回顾性分析 60 例腰椎多发性骨髓瘤患者和 60 例腰椎退行性病变, 利用 MaZda 软件在矢状位 T2-STIR 上手动勾画感兴趣区并提取特征参数, 通过 Fisher、POE+ACC、MI 三种方法对提取的特征参数进行降维筛选, 其每种方法筛选出 10 个最优纹理特征参数, 然后利用原始数据分析法

(raw data analysis, RDA)、主要成分分析法 (principal component analysis, PCA)、线性判别分析法 (linear discriminant analysis, LDA)、非线性判别分析法 (nonlinear discriminant analysis, NDA) 四种分析方法分别结合降维筛选出的特征参数, 计算各组合的分类误判率, 并与两位影像医师鉴别错判率对比。对 30 个最优影像组学特征参数进行统计学意义分析, 获取具有统计学意义参数的 ROC 曲线。

结果 三种降维方法中, POE+ACC 结合 NDA 组合和 MI 结合 RDA 组合对两组病例的误判率最低 (5.00%), 低于影像医师鉴别错判率 (10%、8.3%)。20 个影像组学特征具有统计学意义。ROC 曲线分析结果显示有 12 个特征参数 $AUC > 0.7$, 其中 Perc.99% 的 AUC 值最高 (0.936), 当取值为 107.000 时。敏感度为 83.3%, 特异度为 96.7%, 95%CI 为 0.874~0.998。结论 基于常规 MRI 影像组学有助于鉴别腰椎多发性骨髓瘤和腰椎退行性病变。

PU-1251

基于支持向量机递归特征消除算法和人工神经网络算法构建鼻咽癌基因标志物的诊断预测模型

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【摘要】目的: 本研究旨在基于支持向量机递归特征消除算法和人工神经网络算法构建一种基于基因特征的鼻咽癌诊断预测模型, 旨在为临床诊断和治疗以及分子机制的研究提供参考。方法: 我们从公共数据库中获取了鼻咽癌患者和正常对照者的微阵列和转录组测序基因表达谱数据。首先通过基因差异表达分析坚定了与鼻咽癌相关的差异表达基因, 再利用支持向量机递归特征消除算法筛选出重要的基因特征。接着, 我们利用人工神经网络算法构建了鼻咽癌诊断预测模型, 并通过内部和外部验证集的分析评估了模型的准确性和预测性能。结果: 本研究共鉴定了 457 个差异表达基因。随后通过支持向量机递归特征消除算法识别了 6 个重要基因特征。基于这 6 个重要基因特征, 利用人工神经网络构建了鼻咽癌诊断预测模型。最后, 使用内部和独立的外部验证集计算 ROC 曲线的曲线下面积, 评估并验证了该模型的有效性。结论: 本研究鉴定了几个潜在的 NPC 诊断特征基因并成功建立了基于基因特征的鼻咽癌诊断预测模型, 有望为临床早期筛查和治疗干预以及分子机制的研究提供新的思路 and 参考。

PU-1252

Construction of a novel gene signature-based predictive model of transarterial chemoembolization efficacy in patients with hepatocellular carcinoma by a random forest and artificial neural network

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Objective: Hepatocellular carcinoma (HCC), one of the most common cancers in the world, has a high lethality rate, and transarterial chemoembolization (TACE) is often used to treat patients with advanced HCC. However, the response to TACE treatment varies greatly between patients. We aimed to construct a predictive model for diagnosing non-response to TACE treatment using a random forest algorithm and an artificial neural network, and to verify its diagnostic value by constructing a receiver operating characteristic curve.

Methods: We downloaded the GSE104580 public dataset (88 patients labeled as TACE-responsive and 66 patients labeled as TACE-non-responsive) from the Gene Expression Omnibus database and randomly extracted 57 of the samples labeled as TACE-responsive and 46 labeled as TACE-non-responsive as training sets for identifying differentially expressed genes. Next, we used the random forest algorithm to screen out the key genes and the artificial neural network algorithm to further construct a model to predict TACE non-response. In addition, we validated the model using 31 TACE-responsive and 20-non-responsive samples as the validation set and confirmed the validity of the model, Lastly We downloaded RNA-Seq data from HCC patients in the TCGA database and explored the impact of key genes associated with TACE non-response on overall prognostic survival.

Results: A total of 173 up-regulated genes and 204 down-regulated genes were identified. We screened out five key genes using the random forest algorithm, calculated the gene weight of each key gene using the artificial neural network, and constructed a prediction model with effective prediction (area under the curve [AUC] = 0.981) Finally, the model was validated using the validation set (AUC = 0.971) and we found that these key genes were also associated with poor prognosis.

Conclusion: We developed a diagnostic model to predict the non-response to TACE treatment based on machine learning approaches. Our findings provided insights on potential gene signatures for clinicians to assist in the decision of whether to apply TACE.

PU-1253

Intratumoral and Peritumoral MRI Radiomics Nomogram for Predicting Parametrial Invasion in Patients with Early-stage Cervical Adenocarcinoma and Adenosquamous Carcinoma

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Objective To develop a comprehensive nomogram based on MRI intra- and peritumoral radiomics signatures and independent risk factors for predicting parametrial invasion (PMI) in patients with early-stage cervical adenocarcinoma (AC) and adenosquamous carcinoma (ASC).

Methods A total of 460 patients with IB to IIB cervical AC and ASC who performed preoperative MRI examination and radical trachelectomy/hysterectomy were retrospectively enrolled and divided into the primary, internal validation, and external validation cohorts. The original (Ori) and wavelet (Wav)-transform features were extracted from the volumetric region of interest of the tumor (ROI-T), 3mm- and 5mm-peritumoral rings (ROI-3 and ROI-5), respectively. Then the Ori and Ori-Wav feature-based radiomics signatures from the tumor (RST) and 3 mm- and 5 mm-peritumoral regions (RS3 and RS5) were independently built and their diagnostic performances were compared to select the optimal ones. Finally, the nomogram was developed by integrating optimal intra- and peritumoral signatures and clinical independent risk factors based on binary multivariable logistic regression analysis.

Results FIGO stage, disruption of the cervical stromal ring (DCSRMR), parametrial invasion on MRI (PMIMR), and serum CA-125 were determined as independent risk factors. The nomogram constructed by integrating independent risk factors, Ori-Wav features-based RST, and RS5 yielded AUCs of 0.874 (0.810-0.922), 0.885 (0.834-0.924) and 0.966 (0.887-0.995) for predicting PMI in the primary, internal and external validation cohorts. Furthermore, the nomogram was superior to radiomics signatures and clinical models for predicting PMI in three cohorts.

Conclusion The nomogram can preoperatively, accurately, and noninvasively predict PMI in patients with early-stage cervical AC and ASC.

PU-1254

软件 LCModel 与 Spectroscopy 对 MRS 数据的后处理技术比较

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目的 比较软件 LCModel 与 Spectroscopy 对 MRS 代谢物含量估计的稳定性和准确性。

方法 选用健康志愿者 15 名 (4 男, 11 女, 年龄 22 ± 2 岁), 以大脑右侧前额叶作为目标脑区。利用 3.0T 磁共振成像扫描仪 (Siemens MAGNETOM Trio Tim), 在每次定位后, 采用点分辨波谱 (PRESS) 序列对志愿者连续扫描两次。利用 Spectroscopy 软件计算 NAA、Cho 波峰下面积的积分值, 求出 NAA/Cr、Cho/Cr 的值, 并利用 LCModel 软件处理后获得 NAA、Cho 相对含量值及以 Cr 为参照物的相对含量的比值 NAA/Cr、Cho/Cr。分别将两种软件计算的代谢物含量比值与文献参考值进行比较, 然后分别对每种软件计算的两次扫描数据进行比较, 以差异性系数 ($CV=100*SD/mean$) 作为衡量两种软件数据分析稳定性的指标。

结果 对于连续两次扫描的大脑右侧前额叶中, LCModel 软件所得波谱数据基线较 Spectroscopy 软件所得波谱数据的基线更平稳, 各代谢物峰清晰。LCModel 与 Spectroscopy 测得的代谢物含量比值 NAA/Cr 分别为 1.8 ± 0.2 , 1.9 ± 0.7 , 文献参考值为 1.6 ± 0.2 , LCModel 结果更为接近; 比值 Cho/Cr 分别为 0.3 ± 0.03 , 1.1 ± 0.41 , 文献参考值为 0.9 ± 0.2 , Spectroscopy 结果更为接近。配对样本 t 检验发现, 对于不同代谢物及其比值, 两种软件两次扫描所得结果的差异均不具有统计学意义 ($P>0.05$)。

结论 两种软件对 MRS 代谢物含量的估计均有较高的稳定性。但 LCModel 有相对较好的处理基线不稳的能力, 在实际临床应用中更具前景。

PU-1255

基于 T1 加权 MRI 图像的深度学习模型对新生儿高胆红素血症相关脑损伤的早期诊断价值

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目的: 建立基于 T1 加权 MRI 图像的深度学习模型, 为新生儿高胆红素血症 (hyperbilirubinemia, HB) 相关脑损伤提供诊断依据。方法: 回顾性收集 606 例住院新生儿的头颅 MRI 和临床资料, 包括 256 例 HB 患儿和 350 例非 HB 患儿。随机分为训练集和测试集, 选取合适的尺度提取 ROI 进行图像分割, 利用 Inception-v3 网络模型对数据进行训练, 同时结合类别激活映射图, 构建了卷积神经网络模型, 通过计算 AUC、准确度、敏感性和特异性来评价模型的诊断效能。结果: 随着血清总胆红素 (total serum bilirubin, TSB) 水平的升高, 我们构建的深度学习模型对苍白球区 T1WI 信号升高检测的各项指标在整体上有上升的趋势。在血清总胆红素水平大于 $400\mu\text{mol/L}$ 时, 训练集中 AUC 为 0.93, 准确度为 0.95, 敏感性为 0.87, 特异性为 0.94; 测试集中 AUC 为 0.72, 准确度为 0.76, 敏感性为 0.66, 特异性为 0.75; 目视检查 AUC 为 0.62, 准确度为 0.64, 敏感性为 0.61, 特异性为 0.62。结论: 基于 T1 加权 MRI 图像建立的深度学习模型可以敏感地识别到 TSB 升高引起的双侧苍白球区域的信号变化, 诊断效能高于目视检查, 在 TSB 大于 $400\mu\text{mol/L}$ 时模型诊断效能最高。

PU-1256

利用 4D-CT 图像进行人工智能靶区自动勾画研究

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目的: 针对 4D-CT 在立体定向体放射治疗(SBRT)肺癌患者的临床应用, 进行危及器官和靶区的自动勾画, 主要针对靶区的自动勾画进行研究, 采用人工智能靶区训练的方法, 研究靶区勾画的准确性。

方法: 对 20 例患者, 对每个患者进行 4D-CT 定位。并把这二十名患者分成两组, 第一组进行人工靶区勾画。然后使用人工智能软件 Manteia 对第一组进行人工智能勾画训练。训练完成以后, 针对第二组进行人工智能的靶区勾画和人工的靶区勾画, 并对第二组两者的勾画情况进行分析。

结果: 两种技术下勾画的 ITV 的质心距离 COM 误差为 $(3.1 \pm 1.1\text{mm})$ 。计划通过率均达到 90 以上。靶区勾画相差较小, 但是人工智能能够花的时间较少, 平均只是人工智能勾画的 20%, 大大缩减了工作时间。

结论: 针对 4D-CT 图像勾画靶区, 人工智能学习勾画具有重要的临床应用意义, 可以大幅度的缩短勾画靶区的时间, 同时靶区精度也基本可以满足临床需求, 经过更多的人工智能靶区勾画训练, 人工智能靶区勾画可代替人工勾画, 人工只需要进行微调即可, 满足了日常靶区勾画的要求。为人工智能在临床的应用提供了研究数据和参考。

PU-1257

基于临床-多参数磁共振影像组学模型预测直肠癌脉管癌栓临床研究

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目的 探讨临床-多参数磁共振影像组学模型预测直肠癌脉管癌栓的价值。**方法** 回顾分析 80 例直肠癌患者的临床病理及影像资料, 其中脉管癌栓阳性 40 例, 阴性 40 例。用 Pyradiomics 包从 T1WI、ADC、T2WI 压脂序列中提取影像特征, 按 7: 3 的比例随机分为训练集和验证集, 在训练集中用最小绝对收缩和选择算子进行特征降维并计算影像组学评分 (Radioscore, R-score)。构建 T1WI、ADC、T2WI 压脂以及 T1WI+ADC+T2WI 压脂联合 R-score 模型, 并在验证集验证。通过 AUC、准确率、特异度进行分析选择最优模型。通过单因素、多因素 Logistic 回归筛选直肠癌脉管癌栓独立危险因素并建立临床模型。将最优 R-score 模型与临床模型结合建立影像-临床联合模型, 通过决策曲线分析其临床价值。**结果** 在 T1WI、ADC、T2WI 压脂以及 T1WI+ADC+T2WI 压脂联合组中提取 4、4、3 及 8 个特征。构建的 R-score 模型中, T1WI+ADC+T2WI 压脂联合模型最优, 训练集 AUC=0.885(95%CI:0.79~0.98), 验证集 AUC=0.797(95%CI:0.60~0.99)。单因素、多因素分析筛选出 N1-2 分期为直肠癌脉管癌栓独立危险因素, 临床模型训练集 AUC=0.857(95%CI:0.76~0.95), 验证集 AUC=0.755(95%CI:0.58~0.93)。影像-临床联合模型 AUC=0.957(95%CI:0.90~1.00), 验证集 AUC=0.839(95%CI:0.66~1.00)。影像-临床联合模型性能最佳, 临床决策曲线显示影像-临床联合模型有较好的临床应用价值。**结论** 区域淋巴结转移为直肠癌脉管癌栓临床独立预测因素, 临床-多参数磁共振影像组学模型可以术前无创预测直肠癌脉管癌栓状态, 为术前个体化临床决策提供依据。

PU-1258

基于临床和 MRI 影像组学预测 BI-RADS 4 类病变性质模型的构建

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目的：本研究通过综合有关临床及 MRI 影像组学的信息、术前评估 BI-RADS 4 类病灶良恶性，为此类病变性质准确判断、优化临床处理策略提供帮助。

方法：① 连续搜集医院 237 例超声 BI-RADS 4 类患者，按 7:3 的比例分成训练集及验证集，再搜集另一时间段医院 70 例作为测试集。② 提取患者的有关临床及常规 MRI 影像特征信息，筛选出良恶性分类的独立预测因素。③ 提取 T2WI 序列及 T1WI 动态增强扫描序列峰值期纹理及小波影像组学特征，经过一致性检验，及 LASSO 进行特征筛选；利用 SVM 构建影像组学模型，并进行影像组学特征预测效能分析。④ 联合上述有关临床特征及影像组学特征，构建预测超声 BI-RADS 4 类病灶性质的 nomogram，利用受试者工作特征曲线及决策曲线，观察联合模型的诊断性能并与独立的 MRI 影像组学模型对比。

结果：① 患者年龄、病灶 ADC 值、强化曲线类型及病灶的边缘情况是超声 BI-RADS 4 类病灶良恶性独立的预测因素。② T2WI 序列有 4 个组学特征、T1WI-DCE 峰值期有 5 个组学特征与良恶性预测相关。组合两个序列影像 9 个组学特征构建的模型，训练集、验证集与测试集 AUC 分别为 0.947、0.879 和 0.804。③联合有关临床及常规 MRI 影像特征、影像组学特征的 nomogram 预测效能，训练集、验证集及测试集 AUC 分别为 0.959、0.934 和 0.933。联合模型 AUC 高于影像组学模型。

结论：基于 MRI T2WI 及 T1WI-DCE 的影像组学可为超声 BI-RADS 4 类病灶鉴别诊断提供帮助。联合有关临床、常规 MRI 影像特征及 MRI 影像组学特征的 nomogram 图进行个体的可视化评估，预测效能高于单一的 MRI 影像组学模型。

PU-1259

基于 DCE-MRI 的影像组学在直肠癌周围神经侵犯评估中的研究

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目的：周围神经侵犯 (perineural invasion, PNI) 是评价直肠癌侵袭性的重要指标，但目前影像学检查无法对其进行有效评估。本研究旨在探讨基于动态对比增强磁共振成像 (dynamic contrast enhanced-magnetic resonance imaging, DCE-MRI) 的影像组学在直肠癌患者术前 PNI 评估中的应用价值。

方法：回顾性收集 2019 年 5 月至 2020 年 1 月期间于宁波市第二医院行 DCE-MRI 检查的直肠癌患者共 44 例，所有患者均病理诊断为直肠癌，且有病理 PNI 评估。收集上述病例的 DCE-MRI 图像、一般临床信息、实验室检查、病理诊断等资料。利用 Omni kinetics 软件 (OK, GE Healthcare, China) 对 DCE-MRI 影像进行后处理，并分割直肠癌原发灶，从中提取 Ktrans、Kep、Ve、Vp 图的影像组学特征，并通过 LASSO 算法降维筛选关键组学特征，然后结合影像医师评估结果及临床、实验室检查等，利用多因素 Logistic 回归分析构建直肠癌术前 PNI 评估模型并进行五折交叉验证。结果：最终提取得到的影像组学特征共 236 个，经 LASSO 筛选出与 PNI 高度相关的关键影像组学特征 3 个，并将其整合为 Radscore。Radscore 对 PNI 诊断的敏感性为 0.875，特异性为 0.571，

ROC 曲线下面积 (AUC) 为 0.734。利用多因素 Logistic 回归, 将 Radscore 与与影像医师评估结果及临床、实验室检查进行整合后得到直肠癌术前 PNI 评估模型, 其诊断敏感性为 0.688, 特异性为 0.964, AUC 为 0.879。

结论: 基于 DCE-MRI 的影像组学技术能够有效地对直肠癌患者进行术前 PNI 风险分层, 是对常规影像学诊断的重要补充, 有助于为临床制定合理、高效的个体化诊疗方案提供可靠依据。

PU-1260

Precise pulmonary scanning and reducing medical radiation exposure by developing a clinically applicable intelligent CT system: Toward improving patient care

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Purpose: Interstitial lung disease requires frequent re-examination, which directly causes excessive cumulative radiation exposure. To date, AI has not been applied to CT for enhancing clinical care; thus, we hypothesize AI may empower CT with intelligence to realize automatic and accurate pulmonary scanning, thus dramatically decrease medical radiation exposure without compromising patient care.

Materials and Methods: Facial boundary detection was realized by recognizing adjacent jaw position through training and testing a region proposal network (RPN) on 76,882 human faces using a preinstalled 2-dimensional camera; the lung-fields was then segmented by V-Net on another training set with 314 subjects and calculated the moving distance of the scanning couch based on a pre-generated calibration table. A multi-cohort study, including 1,186 patients was used for validation and radiation dose quantification under three clinical scenarios.

Results: A U-HAPPY (United imaging Human Automatic Planbox for Pulmonary) scanning CT was designed. Error distance of RPN was 4.46 ± 0.02 pixels with a success rate of 98.7% in training set and 2.23 ± 0.10 pixels with 100% success rate in testing set. Average Dice's coefficient was 0.99 in training set and 0.96 in testing set. A calibration table with 1,344,000 matches was generated to support the linkage between camera and scanner. This real-time automation makes an accurate plan-box to cover exact location and area needed to scan, thus reducing amounts of radiation exposures significantly (all, $P < 0.001$).

Conclusion: U-HAPPY CT designed for pulmonary imaging acquisition standardization is promising for reducing patient risk and optimizing public health expenditures.

PU-1261

基于 CT 皮质期影像组学预测肾细胞癌亚型的研究

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目的:探讨基于 CT 皮质期影像组学鉴别肾透明细胞癌 (ccRCC) 和非透明细胞癌 (non-ccRCC) 的价值。方法:本研究为回顾性分析, 收集 2017 年 1 月至 2022 年 12 月本院经病理证实的 122 例肾细胞癌患者, 其中 ccRCC 82 例, non-ccRCC 40 例, 并以随机数表法按照 7: 3 的比例将患者分成训练集 (n=85) 和验证集 (n=37)。在 CT 皮质期手工逐层勾画肿瘤感兴趣区 (ROI) 后提取影像组学特征, 使用特征间线性相关检查和 F 检验进行特征筛选, 采用 logistic 回归构建影像组学模型。采用 t 检验、 χ^2 检验及 logistic 回归筛选 CT 影像特征, 建立常规影像模型。综合影像组学模型和常规影像模型建立联合模型。绘制 ROC 曲线评估各模型的预测效能, AUC 值比较采用 Delong

检验。结果:影像组学模型在训练集和验证集中的 AUC 分别为 0.990 (95%CI 0.976~1.0) 和 0.890 (95%CI 0.774~1.0)。在训练集和验证集中,影像组学模型和联合模型的预测性能均优于常规影像模型,差异有统计学意义 (P 均 <0.05);相比联合模型,在验证集中影像组学模型的预测值略高,但无统计学差异 ($P=0.27$)。结论:基于 CT 皮质期影像组学模型对预测肾细胞癌亚型具有较好的诊断价值。

PU-1262

基于 CT 影像组学预测晚期非小细胞肺癌免疫检查点抑制剂疗效的研究

贺帅

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目的:评估基于 CT 影像组学在晚期非小细胞肺癌 (non-small-cell lung cancer, NSCLC) 患者免疫检查点抑制剂 (immune checkpoint inhibitor, ICI) 治疗反应中的预测价值。

方法:回顾性收集一组 64 名接受 ICI 单药治疗的 IIIB 或 IV 期 NSCLC 患者。在增强前后的 CT 序列上,从整个靶病灶分别提取 1967 个影像组学特征。根据患者 ICI 治疗前 CT 检查时间将其按照 7:3 的比例分为训练组和测试组。肿瘤疗效评估根据免疫应答 iRECIST 标准评价疗效,并将患者分为应答组和无应答组。利用最小绝对收缩和选择算子 LASSO 算法进行特征筛选。利用筛选出来的有效特征进行影像组学预测标签的建立。随后,该影像组学标签的预测效能在一组由 33 名接受免疫联合化疗的独立队列中进行了验证。最后,建立了结合临床因素和影像组学标签的诺模图来预测 ICI 治疗反应。用受试者工作特征曲线 ROC 下面积 AUC、校准和判定曲线分析 (decision curve analysis, DCA) 评价诺模图的预测能力。

结果:总计 97 名患者纳入分析,有 3 例发生假性进展现象。基于临床因素(骨转移情况)和影像组学标签的临床-影像组学诺模图为预测 ICI 的疗效提供了最优的结果。其训练组 AUC 为 0.878(95%CI 0.812~0.944, 敏感度=0.711, 特异度=0.860),测试组为 0.756(95%CI 为 0.615~0.897, 敏感度=0.714, 特异度=0.720),免疫联合化疗验证组为 0.790(95%CI 为 0.660~0.921, 敏感度=0.697, 特异度=0.875)。与单一临床因素和影像组学标签相比,临床-影像组学诺模图通过 DCA 曲线表现了更多的净收益。

结论:基于 CT 影像组学对晚期 NSCLC 免疫检查点抑制剂的治疗反应有较好的预测能力,该方法可以为临床用药决策提供有力支持。

PU-1263

cycle-gan 在 ct 去金属伪影中的应用

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目的:金属伪影是计算机断层扫描 (CT) 中常见的一种伪影,它会影响图像质量并干扰诊断。传统的去除金属伪影方法通常依赖于种子算法,这既耗时又容易出错。循环生成对抗网络 (CycleGAN) 是一种深度学习方法,它可以学习将一张图像转换为另一张图像。在这项研究中,我们使用 CycleGAN 来开发一种自动去除金属伪影的算法。

方法:我们使用来自 Revolution CT 的能谱去伪影 CT 图像和来自 670CT 的非能谱金属伪影图像来训练 CycleGAN。CycleGAN 由两个生成器和两个判别器组成。生成器 G1 将金属伪影图像转换为去伪影图像,生成器 G2 将去伪影图像转换回金属伪影图像。判别器 D1 用于区分真实的去伪影图

像和生成的去伪影图像, 判别器 D2 用于区分真实的金属伪影图像和生成的金属伪影图像。

CycleGAN 通过最小化生成器和判别器之间的损失函数来训练。

结果: 我们在测试集上评估了我们的算法。结果表明, 我们的算法可以有效地去除金属伪影, 同时保持图像的细节。

结论: 我们的算法为自动去除金属伪影提供了一种新的思路。它具有良好的去伪影效果和鲁棒性, 并且可以应用于各种 CT 扫描仪。

PU-1264

unet+++在 dixon 水脂分离的应用

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目的: 在本文中, 我们将探讨使用基于深度学习的 Unet+++模型在 Dixon 水脂分离中的应用, 并将其与传统的 RIPE 算法进行对比。本研究的目的是探究 Unet+++模型在 Dixon 水脂分离中的应用, 以提高水脂分离的准确性和可视化效果。

方法: 为了训练和测试 Unet+++模型, 本研究使用 Philips Ingenia MRI 的腹部 FFE 2 回波图像包括幅度图、相位图以及水脂分离图。训练数据集包括 100 个患者的图像, 其中 70 个用于训练, 30 个用于验证。为了对比 Unet+++模型和 RIPE 算法的效果, 本研究还使用 RIPE 算法对同一组图像进行了处理。

结果: 本研究使用 Unet+++模型进行 Dixon 水脂分离, 与 RIPE 算法相比, 平均 Dice 系数提高了 4.2%, 平均 SSIM 指数提高了 2.6%。在测试集中, Unet+++模型的 Dice 系数和 SSIM 指数分别为 0.94 和 0.96, 而 RIPE 算法的 Dice 系数和 SSIM 指数分别为 0.90 和 0.94。这表明 Unet+++模型在 Dixon 水脂分离中的应用具有更高的准确性和可靠性。

结论: 本研究表明, Unet+++模型在 Dixon 水脂分离中具有较高的准确性和可靠性, 可以有效地提高水脂分离的精度和可视化效果。与传统的 RIPE 算法相比, Unet+++模型的精度和可靠性更高。这意味着 Unet+++模型可以在临床实践中更好地应用于 Dixon 水脂分离技术中, 并为 MRI 影像诊断提供更可靠的信息。

未来的研究可以进一步探究 Unet+++模型在其他 MRI 图像分析中的应用, 以及其在临床中的实际应用前景。此外, 本研究的数据集限制为腹部 FFE 2 回波图像, 未来的研究可以扩大数据集以验证 Unet+++模型在其他 MRI 图像中的适用性。本研究的结果为 MRI 影像技术的发展提供了有益的启示, 并为临床医生提供了新的诊断思路和方法。

PU-1265

比较深度学习重建与迭代重建在肺动脉 CTA 双低扫描中的图像质量与辐射剂量

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目的: 比较深度学习算法重建 (DLIR) 与自适应迭代重建 (ASiR-V) 在 CTPA 双低扫描技术中的图像质量和辐射剂量。方法: 回顾性分析 2020 年 10 月至 2021 年 03 月于我院进行 CTPA 检查的患者。扫描管电压 80kV, 对比剂注射剂量 20ml。分别应用 ASiR-V, DL-M, DL-H 算法重建三组

CTPA 图像。比较三组图像质量的客观评价 (CT 值、噪声, SNR, CNR)、主观评分、诊断信心。同时, 报告辐射剂量 (CTDI_{vol}、剂量长度乘积[DLP]、有效剂量[ED])。符合正态分布的多组间计量资料比较采用单因素方差分析, 组间两两比较采用 LSD 法。不符合正态分布的多组间计量资料比较采用 Kruskal-Wallis H 法, $P < 0.05$ 认为差异有统计学意义。统计分析采用 SPSS 19.0 统计分析软件。结果: 89 例患者纳入研究, 男性 45 例 (50.6%)、女性 44 例 (49.4%), 平均年龄 61.0 ± 15.2 岁, BMI 平均值为 24.5 kg/m^2 。辐射剂量报告 CTDI_{vol}、DLP 和 ED 分别为 $2.9 \pm 0.7 \text{ mGy}$ 、 $88.3 \pm 23.0 \text{ mGy.cm}$ 和 $1.2 \pm 0.3 \text{ mSv}$ 。ASiR-V、DL-M、DL-H 三组不同重建算法, 肺动脉主干及其主要分支的图像噪声、SNR、CNR 均有统计学差异 ($P < 0.01$)。与 ASiR-V 重建比较, DL-M、DL-H 重建分别降低了 19.2%-27.8%、34.1%-40.9% 的图像噪声, 增加了 30.0%-39.3%、56.2%-94.9% 的 SNR, 增加了 30.9%-39.0%、56.3%-98.5% 的 CNR。ASiR-V、DL-M、DL-H 三组不同重建算法的图像质量主观评分、诊断信心分别为 3.7 分、4.6 分、4.9 分和 2.4 分、2.7 分、2.8 分, 差异具有统计学意义 ($P < 0.01$)。结论: 深度学习算法重建较迭代算法重建能够明显提高 CTPA 双低扫描的图像质量。

PU-1266

多模态 MRI 影像组学对儿童髓鞘少突胶质细胞糖蛋白抗体相关疾病诊断与预测复发的价值

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目的 探讨三种常规脑 MRI 序列将儿童髓鞘少突胶质细胞糖蛋白抗体相关疾病(MOGAD)与原因不明的特发性炎性脱髓鞘疾病(IIDDs)的鉴别及预测首次发作的 MOGAD 是否复发的价值。

方法 共纳入 68 例 MOGAD 患儿和 53 例不明原因 IIDDs 患儿。其中, MOGAD 患儿中复发 30 例, 未复发 38 例。用 7:3 的比例进行随机分组。在鉴别模型中, 训练组中 MOGAD 47 例, 原因不明的特发性炎性脱髓鞘疾病 37 例。测试组中 MOGAD 21 例, 原因不明的特发性炎性脱髓鞘疾病 16 例。在预测复发模型中, 训练组复发的 MOGAD 患者 21 例, 未复发的 MOGAD 患者 26 例。在测试组中, 复发的 MOGAD 患者 9 例, 未复发的 MOGAD 患者 12 例。分别从 T1WI、T2WI 和 FLAIR 序列图像中提取特征。利用方差阈值法、单变量选择、LASSO 回归分析和特征相关分析进行特征选择。随后, 基于最优特征子集构建了单个序列模型以及三个序列的复合模型。使用各种指标评估这些模型的性能, 包括受试者工作特征(ROC)曲线、ROC 曲线下面积(AUC)、准确性、灵敏度和特异性。

结果 在鉴别模型中: T1WI、T2WI、FLAIR 序列及复合序列模型在训练集和测试集的 AUC 分别为 0.781 和 0.500、0.959 和 0.833、0.939 和 0.834、0.989 和 0.905。在预测复发模型中: T1WI、T2WI、FLAIR 序列及复合序列模型在训练集和测试集的 AUC 分别为 0.947 和 0.796、0.709 和 0.509、0.755 和 0.546、0.969 和 0.833。

结论 基于多模态 MRI 的放射组学有助于将儿童 MOGAD 与原因不明的 IIDDs 区分开来, 此外, 还可以将其运用于 MOGAD 患儿首次发作时预测是否复发, 填补了放射组学在儿童 IIDDs 中的应用空白。

PU-1267

人工智能模型迭代重建对低剂量腹部增强 CT 图像质量的影响

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目的:评估人工智能模型迭代重建(AIIR)对低剂量腹部增强CT图像质量的影响。方法:52例患者行低剂量全腹部增强CT,采用FBP重建、混合迭代重建(HIR)及AIIR(5级~1级)。评估FBP、HIR及AIIR图像质量客观参数。对AIIR图像的蜡状伪影程度按5分法评分(1分,无蜡状伪影;5分,完全不能接受的蜡状伪影)。结果:AIIR图像噪声均明显低于FBP和HIR图像。医师1动脉期AIIR5级~1级蜡状伪影评分分别为 1.04 ± 0.19 、 1.12 ± 0.32 、 1.92 ± 0.48 、 2.73 ± 0.49 和 4.15 ± 0.54 ,静脉期分别为 1.02 ± 0.14 、 1.19 ± 0.40 、 2.02 ± 0.42 、 3.10 ± 0.41 和 4.02 ± 0.37 ;医师2动脉期分别为 1.21 ± 0.41 、 1.23 ± 0.43 、 2.10 ± 0.41 、 2.88 ± 0.55 和 4.12 ± 0.43 ,静脉期分别为 1.12 ± 0.32 、 1.33 ± 0.47 、 2.29 ± 0.46 、 3.17 ± 0.38 和 4.00 ± 0.40 。AIIR5级和4级图像蜡状伪影评分显著低于AIIR3~1级图像。结论:AIIR能够大幅度提升低剂量腹部增强CT的图像质量,其中5级和4级AIIR图像质量最优。

PU-1268

基于深度学习的新冠鉴别诊断算法研究

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目的:探讨基于肺部CT影像构建的机器学习模型鉴别新型冠状病毒肺炎(COVID-19)、普通肺炎(CP)及正常对照(Normal)的价值。方法:回顾性分析国家基因组科学数据中心2020年4月的部分数据。根据患者的病毒类型分为COVID-19组(422例),普通肺炎组(498例)和正常对照组(448例);从所有病例的CT影像中随机抽取10张构建1号数据集,并按8:1:1的比例随机分层抽样分为训练集(10944张)、验证集(1368张)和测试集(1368张),同时根据患者是否患病分为患病组(Sick, 920例)和正常对照组(Control, 448例)构建2号数据集,同样按照8:1:1的比例随机分层抽样分为训练集、验证集和测试集。从平扫胸部CT图像中提取出肺炎征象和特征,建立基于DenseNet网络的预测模型。通过受试者操作特征(ROC)曲线分析模型的诊断性能。模型在1号训练集中鉴别诊断COVID-19组、CP组和Normal组的ROC曲线下面积(AUC)为0.7291, COVID19类别的精确率为46.43%,召回率为17.69%, F1分数为0.2562;CP类别的精确率为47.17%,召回率为46.39%, F1分数为0.4678;Normal类别的精确率为48.82%,召回率为79.86%, F1分数为0.6060;模型在2号训练集中鉴别诊断Sick组和Control组的AUC为0.904,灵敏度为85.5%,特异度为84.4%,准确度为84.9%;在测试集中鉴别诊断Sick组和Control组的AUC为0.866,灵敏度为77.8%,特异度为78.6%,准确度为78.2%。结论:肺部CT影像构建的机器学习模型在鉴别诊断COVID-19、普通肺炎和正常对照的三分类问题的效果一般,有较大的提升空间;在鉴别诊断患病和正常对照的二分类问题的效果较好,具有较好的临床价值。

PU-1269

Advances in the Application of Deep Learning in Nuclear Medicine Cardiac Imaging

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Research Purpose: Cardiovascular diseases are a major health threat worldwide. Nuclear medicine cardiac imaging techniques, as a non-invasive and high-sensitivity means of imaging, have been widely used in the diagnosis and treatment of cardiovascular diseases. However,

traditional nuclear medicine cardiac imaging methods have limitations in image quality, region of interest segmentation, and image diagnosis. This paper aims to comprehensively summarize the application of deep learning in the field of nuclear medicine cardiac imaging, and discuss its advantages and limitations, as well as potential development directions.

Research Methods: We collected and sorted out domestic and foreign literature and research results on deep learning applied to nuclear medicine cardiac imaging in the past five years. We elaborated in detail on the principles, processes, applications, limitations, and prospects of deep learning from three aspects: image diagnosis, image segmentation, and image quality optimization in nuclear medicine cardiac imaging. We discussed how they can learn image features through a large amount of data and effectively solve the problems in traditional methods. We also discussed the training process of deep learning in the field of medical imaging, including data collection and preprocessing, data partitioning and training, back-propagation algorithm, model evaluation and optimization, prediction, and application.

Research Results: Deep learning has good application prospects in the fields of image diagnosis, image segmentation, and image quality optimization in nuclear medicine cardiac imaging. In terms of image diagnosis, deep learning technology can automatically and accurately analyze images to diagnose cardiovascular diseases and evaluate cardiac function. In terms of image segmentation, deep learning has been successfully applied to the image segmentation of nuclear medicine cardiac imaging, achieving automated and accurate positioning of different areas of cardiac tissue. In terms of image quality optimization, deep learning technology has been used for image reconstruction and denoising of nuclear medicine cardiac imaging, achieving tasks such as super-resolution reconstruction, denoising, and enhancement of images. It can also be applied to attenuation correction of SPECT MPI images, improving the accuracy and visualization of images. At the same time, there are certain limitations to the use of deep learning in nuclear medicine cardiac imaging, such as difficulties in data annotation and the need for powerful computational resources, which need to be improved in future research.

Research Conclusion: The application of deep learning provides a new opportunity to improve and optimize nuclear medicine cardiac imaging, and is expected to further promote the development of nuclear medicine cardiac imaging. Although there are some challenges, overall, the application of deep learning in nuclear medicine cardiac imaging shows great potential and opportunities.

PU-1270

"互联网+"时代远程影像会诊运营模式研究

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随着“互联网+”医疗服务的发展,互联网医院逐渐成为公立医院补充发展的新模式。2020 年新冠肺炎疫情全球爆发致使全球经济受到重大冲击,与此同时,也推动了远程办公、远程医疗、远程影像会诊等新业态新模式的迅速发展,人们的生产生活方式发生了迅速变革。远程影像会诊基于云平台,运用互联网和多样化终端,依托医学影像技术,使患者临床信息能够走出医院的围墙,实现了病人与医生,医生与专家,以及医院与医院之间的疑难杂症影像会诊互联网模式,将病人、基层医院和大医院的专家三者建立便捷的沟通渠道,让病人通过网络平台得到专家的专业、科学的诊断意见,在提高基层医生的诊疗水平的同时,也提升了患者就医满意度。虽然我国地域间发展差异性大,但远程影像会诊平台建设差异性并不明显,现阶段远程影像会诊的运营模式成为其可持续发展的关键。本文对“互联网+”时代远程影像会诊运营模式研究,为远程医疗的正向发展提供借鉴与参考。

PU-1271

Performance evaluation of a deep learning-based cascaded HRNet model for automatic measurement of X-ray imaging parameters of lumbar sagittal curvature

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Objective: To develop a deep learning-based cascaded HRNet model, in order to automatically measure X-ray imaging parameters of lumbar sagittal curvature and to evaluate its prediction performance.

Methods: A total of 3730 lumbar lateral digital radiography (DR) images were collected from picture archiving and communication system (PACS). Among them, 3150 images were randomly selected as the training dataset and validation dataset, and 580 images as the test dataset. The landmarks of the lumbar curve index (LCI), lumbar lordosis angle (LLA), sacral slope (SS), lumbar lordosis index (LLI), and the posterior edge tangent angle of the vertebral body (PTA) were identified and marked. The measured results of landmarks on the test dataset were compared with the mean values of manual measurement as the reference standard. Percentage of correct key-points (PCK), intra-class correlation coefficient (ICC), Pearson correlation coefficient (r), mean absolute error (MAE), mean square error (MSE), root mean square error (RMSE) and Bland-Altman plot were used to evaluate the performance of the cascade HRNet model.

Results: The PCK of the cascaded HRNet model was 97.9-100% in the 3 mm distance threshold. The mean differences between the reference standard and the predicted values for LCI, LLA, SS, LLI, and PTA were 0.43 mm, 0.99°, 1.11°, 0.01 mm, and 0.23°, respectively. There were strong correlation and consistency of the five parameters between the cascaded HRNet model and manual measurements (ICC = 0.989-0.999, R = 0.991-0.999, MAE = 0.63-1.65, MSE = 0.61-4.06, RMSE = 0.78-2.01).

Conclusion: The cascaded HRNet model based on deep learning algorithm could accurately identify the sagittal curvature-related landmarks on lateral lumbar DR images and automatically measure the relevant parameters, which is of great significance in clinical application.

PU-1272

Prediction model of vascular cognitive impairment based on MRI white matter hyperintensities radiomics features in the elderly patients with CSVD

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Purpose: To establish a prediction model of vascular cognitive impairment (VCI) based on white matter hyperintensities (WMH) radiomics feature, in order to guide people at risk of VCI to carry out early intervention and delay the occurrence of VCI or dementia. **Materials and Methods:** MRI data of 57 patients with VCI and 169 patients with no cognitive impairment (NCI) were retrospectively analyzed. Patients were randomly divided into training set (n=159) and test set (n=67) in a ratio of 7:3. The images were standardized and WMHs were segmented automatically by using the lesion prediction algorithm in the SPM software package. Two radiologists

determined whether there was any error, and if there was any error, ITK-SNAP software was imported for manual delineation. Then features were extracted from the segmented WMHs to select the best image morphological features to build the model. Clinical data and conventional MRI signs were incorporated into the study to build a clinical model, and then the radiomics model was combined with clinical model. The receiver operating characteristic (ROC) curve was plotted and the decision curve analysis (DCA) was performed to evaluate the diagnostic efficacy and clinical application value of each model. Results: 8 radiomics features were extracted from WMH, and the WMH radiomics model, clinical model and combined model were established respectively. The area under the ROC curve (AUC) of the training sets of the three models were as follows: WMH radiomics model was 0.74(95%CI: 0.66-0.83), clinical model was 0.88(95%CI: 0.81-0.94), combined model was 0.90 (95%CI: 0.84-0.96), The AUC in the test set was 0.75(95%CI:0.62-0.87), 0.81(95%CI: 0.68-0.95) and 0.85 (95%CI: 0.74-0.96), respectively. The combined model has better diagnostic efficacy and a higher clinical net return as assessed by DCA. Conclusions: The diagnostic efficacy of WMH radiomics combined with clinical conventional model was better than that of WMH radiomics or clinical model. It could be provide more sensitive and reliable markers for the early prediction and diagnosis of VCI.

PU-1273

人工智能在甲状腺领域的应用价值观察

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摘要:

人工智能 (Artificial Intelligence, 简称 AI) 在医疗领域的应用正日益受到关注。本文旨在探讨人工智能在甲状腺领域的应用价值, 并通过对相关研究成果的观察, 总结人工智能在甲状腺疾病诊断、治疗和预后评估等方面的潜在优势和挑战。本研究结果显示, 人工智能在甲状腺领域的应用具有巨大的潜力, 并为未来的甲状腺疾病管理提供了新的诊疗思路和方法。

PU-1274

3D 人工智能定位技术在 64 排 CT 胸部扫描中的应用价值

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目的:探讨 3D 人工智能(artificial intelligence, AI)定位技术在胸部 CT 平扫中的应用价值。

方法:连续选取 2020 年 9 月来我院行胸部平扫 CT 检查的患者 100 例, 采用区组长度为 2, 区组内顺序固定的区组随机分组法分为 A、B 两组, A 组为人工定位组, B 组为 3D-AI 定位组, 每组 50 例。两组患者使用相同的胸部扫描协议。测量 A、B 两组患者的定位偏离距离, CT 剂量指数 (CTDI) 和剂量长度乘积(DLP), 并记录患者的检查用时。同时由 2 位放射医师对患者纵隔窗图像质量进行客观评价, 并对胸部图像进行主观评分。使用独立样本 t 检验对定位偏离距离、CTDI、DLP、图像质量客观指标和检查用时进行比较。使用卡方检验对图像质量评分进行比较。P<0.05 认为差异具有统计学意义。结果: B 组 (3D-AI 定位组) 的总体定位偏移距离较 A 组 (人工定位组) 减少了 47.18%[(8.81±7.16)VS (15.40±9.66)mm] (P<0.01), CTDI 降低了 11.28%[(6.68±2.58)VS (7.53±2.52) mGy], DLP 降低了 13.31%[(234.21±85.62)VS (270.19±95.30)mGy·cm](P 均<0.05)。B 组的检查用时(149.62 秒±14.43)比 A 组(214.18 秒±26.31)减少 64.56 秒, 降低 30.14% (P<0.01)。A、B 两组图像的背景噪

声以及降主动脉和竖脊肌的信号噪声比均无统计学差异($P>0.05$), 图像主观评分无统计学差异($P>0.05$), 所有患者图像均满足诊断要求。

结论: 使用 3D-AI 定位技术进行胸部 CT 扫描, 可以在保证图像质量的前提下, 提高定位准确性, 降低患者的辐射剂量, 大幅提高工作效率。

PU-1275

精神分裂症患者具有暴力行为风险的灰质体积分析的结构磁共振成像研究

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目的: 比较具有暴力行为的精神分裂症患者与无暴力行为史的精神分裂症患者之间的灰质厚度和体积差异以及临床因素的相关性。

方法: 本研究招募了 19 名具有暴力行为史的精神分裂症患者和 17 名无暴力行为史的精神分裂症患者, 分析他们大脑结构上的差异。每组个体都接受了 3DT1WI 磁共振成像检查, 并使用 FreeSurfer 进行全脑结构分析。使用 Spearman 相关性评估 PANSS 量表得分与 MRI 脑形态指标之间的相关性。采用接收者操作特征曲线 (ROC 曲线) 检验皮层厚度和体积的诊断效能。

结果: 与无暴力行为史的精神分裂症患者相比, 具有暴力行为史的患者显示出左侧额中回尾部皮层厚度显著减少和右侧颞中回皮层体积减少。ROC 曲线显示, 左侧额中回尾部皮层厚度的 AUC 为 0.876, 右侧中颞回皮层体积的 AUC 为 0.794。左侧缘上回、顶下小叶和右侧楔叶体积与精神分裂症患者的阳性和阴性综合症状评分 (PANSS-N) 呈正相关。

结论: 与无暴力行为的精神分裂症患者相比, 暴力患者的大脑结构显示了明显的差异, 这些发现可能与暴力行为的表现有关, 暗示着与控制情绪和冲动有关的大脑区域可能出现了功能和结构上的异常。这可能为将来发展基于大脑结构的生物标志物来辅助暴力行为的诊断和预测提供了潜在的线索。

PU-1276

CT 灌注成像对急性缺血性脑卒中评估价值的研究进展

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脑卒中发病率高、致死/残疾率高, 其中以急性缺血性脑卒中 (AIS) 最为常见。CT 灌注成像 (CTP) 能有效反映局部脑组织血流灌注量的改变。对诊断超早期 AIS 具有重要意义, 评估梗死后脑组织的代偿能力, 判断溶栓治疗后血管再通的效果等。本研究就 CTP 在 AIS 评估价值的研究进展予以综述。

PU-1277

QSM 与双能 CT 对比评估帕金森病脑铁沉积

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目的 通过比较帕金森病 (PD) 患者与正常人脑各灰质核团的磁敏感值 (MSV) 及 CT 值的差异, 探讨 QSM 与双能 CT (DECT) 评估 PD 患者脑内铁沉积的价值; 同时分析 MSV 与 CT 值之间的相关性, 判断 QSM 与 DECT 两种技术在评估 PD 患者脑内铁沉积的相关性。

方法 分别对 55 例 PD 患者 (PD 组) 和 43 例正常人 (对照组) 进行 QSM 检查和 DECT 扫描, 测量双侧尾状核 (CA)、壳核 (PU)、苍白球 (GP)、黑质 (SN)、红核 (RN) 的 MSV 和 CT 值。比较 PD 组与对照组各部位 MSV 与 CT 值的差异, 分析各部位 MSV 及 CT 值鉴别诊断 PD 组与对照组的效能, 评估各部位 MSV 与 CT 值之间的相关性。P < 0.05 为差异有统计学意义。

结果 1. PD 组双侧 GP、SN 的 MSV 均大于对照组, 差异有统计学意义 (均 P < 0.05)。2. PD 组双侧 GP、SN 和 RN 的各 CT 值均大于对照组, 差异有统计学意义 (均 P < 0.05)。3. PD 组左侧 GP 的 MSV 与 DECT 的各 CT 值均呈正相关 (P < 0.001)。4. PD 组右侧 GP 的 MSV 与 DECT 的各 CT 值均呈正相关 (P < 0.001)。

结论 1. QSM 与 DECT 均可以无创性定量评估 PD 患者异常脑内铁沉积。2. PD 患者双侧 GP 的 MSV 与 CT 值具有正相关性, 提示 DECT 可作为 QSM 的替代技术评估 PD 患者脑内铁沉积。

PU-1278

基于黑质纹状体系统 QSM 影像组学鉴别帕金森病及帕金森病型多系统萎缩

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目的 应用影像组学探讨基于黑质纹状体系统定量磁敏感图 (QSM) 在帕金森病 (PD) 和帕金森病型多系统萎缩 (MSA-P) 鉴别诊断中的价值。

方法 分别对 PD 患者和 MSA-P 患者进行 QSM 检查并勾画双侧尾状核头 (HCN)、壳核 (PUT)、苍白球 (GP)、黑质 (SN)、红核 (RN) 作为感兴趣区 (ROI), 对每个 ROI 提取组学特征并进行降维, 筛选出鉴别诊断贡献率较大的特征。按 7: 3 的个数比将入组患者随机分为训练组和验证组, 就不同 ROI 分别创建多元逻辑回归模型, 采用 ROC 曲线及混淆矩阵计算模型判断诊断效能。采用 Mann-Whitney U 检验比较 PD 组和 MSA-P 组特征的差异。

结果 在两组比较中, 5 个 ROI 的特征有统计学差异, PUT 的诊断效能最高, 在训练组与验证组均具有高度的准确性、敏感性、特异性、曲线下面积。

结论 基于黑质纹状体系统 QSM 影像组学可以鉴别 PD 和 MSA-P, 其中 PUT 的诊断效能最高。

PU-1279

机器学习结合影像组学特征预测 2 型糖尿病患者椎体脆性骨折

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目的: 探讨机器学习结合 CT 影像组学特征构建模型预测 2 型糖尿病 (T2DM) 患者椎体脆性骨折的准确性。**方法** 回顾性收集 138 例新近椎体脆性骨折的 T2DM 患者和对照组的 CT 图像和临床数

据，应用单因素分析、Pearson 相关分析、二元 logistic 回归分析和最小绝对值收缩和选择算子（LASSO）模型筛选出最佳特征。基于支持向量机（SVM）、极端梯度提升树（XGBoost）、轻量级梯度提升机（LightGBM）构建预测模型。应用受试者工作特征（ROC）曲线下面积（AUC）对模型效能进行评估。结果：从每例患者的 CT 图像中提取了 1037 个影像组学特征，然后精简为 18 个影像组学特征。18 个临床特征中性别、年龄、BMI 是预测结果的独立因素。其中 LightGBM 分类器表现最好，训练集中 LightGBM 模型的 AUC 分别为 0.982、0.864、0.980；测试集中分别为 0.959、0.770、0.985。结论：基于临床及影像组学特征构建的 LightGBM 模型可作为预测 T2DM 患者椎体脆性骨折的一种无创性辅助工具。

PU-1280

虚拟平扫技术在泌尿系 CTU 检查中的应用

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目的：通过虚拟平扫技术获得去除造影剂的虚拟平扫图像，分析评价结石成分，获得与常规平扫图像质量最相符的图像，从而替代常规平扫期所需要的图像，同时减少患者所受辐射剂量。

方法：常规行平扫及皮质期、髓质期扫描，排泄期三期增强行双能量扫描，对所得三期增强图像进行双能量后处理，获得虚拟平扫图像，对所得图像进行分析处理，评价图像显示的结石成分，与常规平扫图像结果作比较。

结果：评价三期增强处理后的虚拟平扫图像，比较图像信噪比及与常规平扫图像对比结石检出率，得到与常规平扫图像吻合度最高的图像。

结论：虚拟平扫技术得到的图像与常规平扫图像信噪比及病变检出率吻合，可替代常规平扫期图像，降低患者辐射剂量，减少检查所需时间。

PU-1281

基于胸部 CT 的影像组学对胸腺上皮性肿瘤和前纵隔淋巴瘤鉴别诊断的价值研究

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目的：探讨基于胸部 CT 的影像组学对胸腺上皮性肿瘤、前纵隔淋巴瘤鉴别诊断的预测价值。

材料与方法：回顾性分析 102 例病理证实的胸腺上皮性肿瘤（71 例）和前纵隔淋巴瘤（31 例）患者影像资料，按照 7:3 比例随机分为训练集和测试集。在平扫、动脉期、静脉期图像上逐层勾画病灶获得感兴趣容积并分别提取 1409 个组学特征。基于平扫图像提取的特征用于构建平扫模型，基于动脉期、静脉期提取的特征用于构建增强模型，基于平扫、动脉期、静脉期提取的特征用于构建联合模型。进行观察者间一致性分析，排除低重复性特征。使用合成少数类过采样技术对样本进行平衡处理。使用 Z-score 标准化对特征进行标准化。训练集依次使用皮尔逊相关系数、递归特征消除对影像组学特征进行筛选。使用线性判别分析（linear discriminant analysis, LDA）、逻辑回归、支持向量机作为分类器。运用 10 折交叉验证方法选取最优模型参数。最后取得基于 3 个序列（平扫、增强、平扫+增强）图像、采用 3 种分类器的 9 个模型，使用独立测试集对模型效能进行评估。

结果：训练集中，9 个影像组学模型均具有较好、优异的诊断效能，AUC 值 0.895-0.962，准确率 0.817-0.930，敏感性 0.682-0.909，特异性 0.776-0.980。测试集中，9 个影像组学模型均具有较好的诊断效能，AUC 值 0.818-0.899，准确率 0.807-0.903，敏感性 0.556-0.889，特异性 0.818-

1.000。各模型中,采用 LDA 分类器的平扫模型预测效能稍佳,测试集 AUC 为 0.899,95%CI 为 0.747-1.000,准确率 0.839,敏感性为 0.889,特异性为 0.818。

结论:

基于不同序列图像、采用不同分类器的影像组学模型在鉴别胸腺上皮性肿瘤及前纵隔淋巴瘤中均具有较好的诊断效能,采用 LDA 分类器的平扫模型诊断效能稍佳,有助于辅助临床决策。

PU-1282

实影渲染重建技术在不同危险度分层急性肺栓塞患者中的应用研究

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目的: 研究实影渲染 (Cinematic rendering, CR) 技术在不同危险分层的急性肺动脉栓塞 (Acute pulmonary embolism, APE) 患者中的临床应用价值。 **方法** 回顾性分析 2022 年 11 月-2023 年 3 月于我院行 CT 肺血管造影检查的 APE 患者资料。以 Qanadli 栓塞指数=20%为低死亡风险阈值,分为低危组 (Qanadli 栓塞指数<20%, N=23) 和高危组 (Qanadli 栓塞指数≥20%, N=27), 所有图像上传至 Siemens Syngo.via 后处理工作站 (西门子医疗, 德国), 由一名从事心血管影像诊断工作的医生根据预先设计好的 APE 渲染颜色、透明度模块分别进行 CR、容积重建 (Volume rendering, VR)。所有后处理图像的评估由两名具有高级职称的影像诊断学医生完成, 至意见达成一致。后处理图像的评估采用 3 分法, 包括图像质量方面的栓子显示、解剖结构、诊断信心及是否推荐用于多学科诊疗 (Multi-disciplinary Treatment, MDT)。 **结果** 本研究 50 例患者中位数年龄 72.5 (15) 岁。高危组的 CR 重建栓子显示平均 2.815 分, VR 重建 1.778 分; 低危组的 CR 重建栓子显示平均 2.739 分, VR 重建 1.913 分, 差异均具有统计学意义 ($P<0.0001$)。41 例 (82%) CR 重建的解剖结构为 3 分, 明显高于 VR 重建 (1.904 分), $P<0.0001$ 。40 例 (80%) 患者 CR 重建对于栓子的诊断信心为 3 分, 明显高于 VR ($P<0.0001$)。在评估是否被推荐用于 MDT (3 分) 中, 41 例 (82%) 患者的 CR 重建图像和 5 例 (10%) 患者的 VR 图像被推荐用于 MDT (3 分), 两组间统计学差异明显 ($P<0.0001$)。 **结论** 对于不同危险分层的 APE 患者, CR 重建技术均可获得逼真的三维图像, 更好的显示栓子、准确诊断信心、更有效的用于 MDT。

PU-1283

人工智能辅助诊断高危肺结节影像的应用价值研究

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目的 探讨人工智能 (AI) 在高危肺结节影像诊断中的应用价值。 **方法** 选取肺结节手术患者 113 例, 所有患者的肺部 CT 薄层图像由 AI 软件诊断及影像诊断医师阅片, 由 1 名胸外科高年资医师及 1 名影像科高年资医师联合阅片的诊断结果作为金标准, 对比 2 组高危肺结节检出的敏感性、阳性率、假阳性率及漏诊情况, 对所得结果进行分析。 **结果** 113 例患者共检出高危肺结节 121 个, 其中实性结节 67 个, 磨玻璃结节 38 个, 混杂磨玻璃结节 16 个。AI 组共检出高危肺结节 131 个, 误诊 18 个, 漏诊 4 个, AI 组检出敏感性 93.3%, 阳性率 86.2%, 假阳性率 13.8%; 医师组共检出高危肺结节 119 个, 误诊 3 个, 漏诊 5 个, 医师组检出敏感性 95.8%, 阳性率 97.4%, 假阳性率 2.6%。 **结论** AI 组与医师组诊断高危肺结节的敏感性均高, 但 AI 组的假阳性率相对较高; 影像科

医生利用 AI 阅片可有效提高影像诊断正确率,减少误诊及漏诊,减少医师工作负担,提高工作效率。

PU-1284

基于 CTE 影像组学在克罗恩病所致炎性肠段活动性预测效能的研究价值

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目的: 本文旨在探讨基于 CTE (计算机断层扫描增强) 影像组学在克罗恩病所致炎性肠段活动性预测中的研究价值。通过综合分析 CTE 影像组学技术在克罗恩病诊断和治疗过程中的应用,我们探讨其在炎性肠段活动性预测方面的潜在效能,以及为克罗恩病患者提供更准确、早期干预的新途径。**引言:** 克罗恩病是一种复杂的慢性炎性肠道疾病,其临床表现多样,诊断和治疗存在一定的挑战。CTE 影像组学作为一种先进的医学影像分析技术,可以从大规模的 CTE 图像中提取丰富的特征信息,为医生提供更全面的诊断依据。**方法:** 本研究将收集克罗恩病患者的 CTE 影像数据,应用影像组学技术提取多维度的影像特征,如肠壁增厚程度、病变分布、血管分布等。同时,将结合临床指标,如病情活动指数、临床症状等,建立预测模型,评估 CTE 影像组学在预测克罗恩病炎性肠段活动性方面的效能。**结果:** 预计 CTE 影像组学技术在预测克罗恩病所致炎性肠段活动性方面将具有重要价值。通过多维度特征的综合分析,预测模型可能能够准确预测患者的肠段活动性,为临床医生提供及早干预的机会。此外,CTE 影像组学还可能揭示不同炎症程度之间的影像特征差异,有助于深入理解炎性肠段的病理生理过程。**结论:** 基于 CTE 影像组学在克罗恩病所致炎性肠段活动性预测方面的研究具有重要的临床应用前景。该技术有望提高克罗恩病的早期诊断和治疗效果评估水平,为临床决策提供更全面的影像信息支持。然而,为了更好地发挥其潜力,需要进一步的大样本研究和临床验证,同时结合其他临床指标进行综合分析,以确保预测模型的可靠性和准确性。

PU-1285

人工智能三维可视化技术在保留肾单位肾肿瘤切除术前评估的价值及相关 CT 图像质量优化策略分析

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目的:探索并构建保留肾单位肾肿瘤切除术前的 CT 三维可视化术前评估规范并针对图像质量的优化策略进行分析。

方法:回顾性收集 2022 年 6 月到 2023 年 7 月吉林大学第一医院放射科因拟行保留肾单位肾肿瘤切除术的连续性 CT 三期增强检查拟患者 48 例。根据肾动静脉走行、形态和连续性及主干、二级、三级分支情况,肾脏内部结构(肾皮质、肾锥体、肾盏)其显示,测算病灶形态、大小、分布和体积是否与 CT 图像一致,是否需要人为修正,出现的影像质量问题,逐一判断影响质量的原因,对三维可视化图像质量进行质控评价分成三类:不需要人为修正可直接重建,人为修正可重建和无法重建。并评估肿瘤相关解剖结构,血管等信息通过归纳和总结构建专科化评估规范并对影响可视化效果的原始 CT 增强图像质量的原因进行分析和总结进一步改进优化策略。

结果: 48 例图像中, 39 例 (81.23%) 不需要人为修正可直接重建, 7 例 (14.58%) 需要人为修正, 2 例 (4.17%) 图像无法重建。人为修正可重建和无法重建的例数 9 例, 共占 18.75%。其中有 4 例为对比剂使用不当血管显影不良, 2 例为延迟时间不足输尿管未显影, 3 例为屏气不当产生运动伪影。

结论: 基于人工智能三维可视化技术较常规三维重建, 能够更全面、直观、量化评估保留肾单位肾肿瘤切除术的风险。CT 增强图像对可视化信息获取影响因素的分析和改进, 有助于可视化技术规范、同质化工作的开展, 助力专科化精准影像评估体系的构建。

PU-1286

对侧颈动脉狭窄对非急性前循环大血管闭塞的灌注影响:CTP 初步研究

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目的: 探讨对侧颈动脉狭窄程度对非急性前循环大血管闭塞患者脑部灌注和分水岭侧支状态的影响。方法: 回顾性分析 2020 年 1 月~2022 年 12 月我院连续收治 58 例单侧前循环非急性大血管闭塞患者 CTP 和 DSA 影像资料。闭塞侧根据闭塞部位分为颈内动脉 (ICA) 闭塞组和大脑中动脉 (MCA) 闭塞组, 比较两组患者 $T_{max} > 4s$ 和 $T_{max} > 6s$ 低灌注容积的差异。根据对侧颈动脉狭窄 (CAS) 程度分为两组: 狭窄 $\geq 50\%$ 和狭窄 $< 50\%$ 。采用一种新的 8 分制分水岭区域侧支评分 (WTCS) 对闭塞侧及对侧进行评分。比较两组双侧脑半球脑灌注参数及分水岭区 CBF、CBV、TTP、MTT、 T_{max} 比值以及 WTCS。

结果: 58 例非急性前循环闭塞患者均存在不同程度的灌注不良, MTT、TTP 和 T_{max} 延长, CBV 和 CBF 略有增加。ICA 闭塞组 $T_{max} > 4s$ 容积 ($216.0 \pm 120.8ml$ vs $142.6 \pm 128.2ml$, $P < 0.05$)、 $T_{max} > 6s$ 容积 ($85.0 \pm 91.1ml$ vs $39.1 \pm 68.9ml$, $P < 0.05$) 均大于 MCA 闭塞组。与对侧 CAS $< 50\%$ 患者比较, 对侧 CAS $\geq 50\%$ 患者半卵圆中心分水岭区 CBF 比值较低 (1.033 ± 0.046 vs 1.084 ± 0.167 , $P = 0.003$), 对侧 CAS $\geq 50\%$ 患者 WTCS 总分较高 [3.1 (95%CI: 2.4-3.7) vs 5.1 (95%CI: 3.9-6.2), $P = 0.002$], 而 CBV、MTT、TTP、 T_{max} 比值无统计学意义。联合 CBF 比值+WTCS 总分预测非急性 LVO 患者对侧前循环狭窄 $\geq 50\%$ 的 AUC 为 0.832。

结论: 非急性 LVO 患者中, ICA 闭塞患者比 MCA 闭塞患者的灌注不良容积更大。非急性 LVO 患者, 对侧颈动脉狭窄程度影响侧枝循环代偿能力, 脑 CTP 及 WTCS 评分有较高的评估价值。

PU-1287

A radiomics model of contrast-enhanced computed tomography for predicting post-acute pancreatitis diabetes mellitus: a bi-center study

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Background Diabetes mellitus can occur after acute pancreatitis (AP), but the accurate quantitative methods to predict post-acute pancreatitis diabetes mellitus (PPDM-A) are lacking. This retrospective study aimed to establish a radiomics model based on contrast-enhanced computed tomography (CECT) for predicting PPDM-A.

Methods A total of 374 patients with first-episode AP were retrospectively enrolled from two tertiary referral centers. There were 224 patients in the training cohort, 56 in the internal validation cohort, and 94 in the external validation cohort, and there were 86, 22, and 27 patients with PPDM-A in these cohorts, respectively. The clinical characteristics were collected from the hospital information system. A total of 2398 radiomics features were extracted from the arterial- and venous-phase CECT images. Random forest-based recursive feature elimination, collinearity analysis, and least absolute shrinkage and selection operator were used for selecting the final features. Three classification methods (eXtreme Gradient Boosting [XGBoost], Adaptive Boosting, and Decision Tree) were built in three models to compare the performances. The predictive performances of the models were compared based on the classification metrics. Each of the three models was modeled with three algorithms, resulting in a total of nine classifiers. The performances were compared both within and between the models.

Results Eleven radiomics features were selected after a reproducibility test and dimensionality reduction. Among the three classification methods, the XGBoost classifier showed better and more consistent performances. The accuracy of the XGBoost's radiomics model to predict PPDM-A in the training, internal, and external cohorts was good (0.964, 0.875, 0.968, respectively). By comparing the AUCs among the three XGBoost's models, we found that the radiomics model was significantly better than the clinical model in the external validation cohort (0.857 vs. 0.619, $p = 0.000$), but there was no significant difference between the combined and radiomics models (0.882 vs. 0.857, $p = 0.317$).

Conclusions The radiomics model based on CECT performs well and can be used as an early quantitative method to predict the occurrence of PPDM-A.

PU-1288

多模态影像融合技术在脑膜瘤患者中的应用

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目的：由于大脑结构和功能的复杂性，决定了该学科的特点就是精准治疗。精准治疗实现的一个重要手段就是多模态影像融合技术。多模态影像融合技术就是通过融合多种成像技术，把多种模态的图像信息整合，将抽象的、原本“不可见”的神经解剖及功能结构三维可视化，通过多模态影像融合技术把各种神经功能和病变的关系整合到手术平台上，通过术中精准定位，选择合适的个体化手术入路。本研究主要目的是探讨多模态影像融合技术在脑膜瘤患者中的临床可操作性及准确性。

方法：纳入我院 2022 年 8 月至 2023 年 8 月神经外科接受开颅肿瘤切除手术治疗的脑膜瘤患者 30 例，术前均行 3.0T 的磁共振扫描，扫描序列包括：TWI、T2WI、FLAIR、MRA 及增强的 T1 加权序列，颅内血管 CTA 及 CTV，然后利用西门子后处理软件 Sygo.via 软件将多模态 MRI、CT 影像配准、融合，通过区域增长及结构分离的方式，重建出三维立体的脑膜瘤及临近血管的虚拟现实模型，然后根据重建出的虚拟现实模型制定合适的个体化手术入路，最后与手术中所见到的实际情况进行对比分析，进而探讨多模态影像融合技术在脑膜瘤患者中的临床可操作性及准确性。

结果：在 30 例脑膜瘤患者中，利用西门子后处理软件 Sygo.via 基于区域增长及结构分离，可准确直观的展示脑膜瘤在颅内的空间位置及肿瘤及临近血管的关系，对于肿瘤的血供及对静脉窦的压迫具有较高的灵敏度和特异度；利用此技术与术中实际情况相比具有很好的一致性。对于患者手术方案的制定及术中手术切除范围有极大的帮助。

结论：基于多模态影像融合技术，利用西门子后处理软件 Sygo.via 实现对脑膜瘤患者的虚拟现实模拟技术具有临床可行性。利用该技术可以实现术前对脑膜瘤患者肿瘤在颅内直观的三维立体空间及肿瘤的血供、对静脉窦有压迫、侵蚀作出准确的评估，以便指导手术方案的制定，最大程度地切除病变和最安全地保护神经功能，从而改善患者预后。

PU-1289

CT 影像组学特征与临床指标的联合模型预测非小细胞肺癌脑转移发生风险

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目的

非小细胞肺癌 (non-small cell lung cancer, NSCLC) 脑转移发生率高, 患者需多次 MRI 增强扫描随访, 增加了钆对比剂沉积风险。因此, 有必要对 NSCLC 脑转移发生风险进行分层, 减少低风险患者钆对比剂沉积风险。本研究通过 CT 影像组学方法, 提取并筛选稳定影像组学特征, 融合临床指标、CT 影像学特征和影像组学特征构建多维信息联合模型, 预测 NSCLC 脑转移发生风险。

方法

回顾性分析经病理学确诊 NSCLC 的 226 例患者胸部 CT 影像及临床资料, 其中脑转移阳性 61 例, 阴性 185 例。训练组 (195 例) 使用 SIEMENS 64 排、128 排 CT 扫描仪, 测试组 (31 例) 使用 GE 256 排 CT 扫描仪。在 1mm 肺算法组、2mm 平扫组、2mm 静脉期组中分别勾画感兴趣区, 提取、筛选各组 CT 影像组学特征并建立模型, 选出预测效能最佳的 CT 影像组学模型并计算 Rad-score。筛选与脑转移相关的临床指标、CT 影像学特征, 建立 Rad-score 与临床指标、CT 影像学特征联合模型, 选出预测效能最佳的模型。

结果

1mm 肺算法组、2mm 平扫组、2mm 静脉期组影像组学特征预测 NSCLC 脑转移模型训练组 AUC 分别为 0.651、0.683、0.677, 测试组 AUC 分别为 0.619、0.696、0.643, Delong 检验显示三组模型 AUC 差异无统计学意义。选用 2mm 平扫组计算 Rad-score 并构建联合模型, CT 影像组学+临床指标联合模型训练组、测试组 AUC 分别为 0.838、0.738, CT 影像组学+CT 影像学特征联合模型训练组、测试组 AUC 分别为 0.703、0.714。

结论

CT 影像组学模型预测 NSCLC 脑转移具有可行性, CT 图像的层厚、时相、重建算法对影像组学模型预测效能不会造成影响, 纳入临床指标和 2mm 平扫组 CT 影像组学特征的联合模型可以提高预测效能。

PU-1290

基于 MRI 的人工智能预测自体肌腱大小辅助前交叉韧带重建术

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目的

通过基于 MR 的成像技术验证腓绳肌肌腱 (半腱肌及股薄肌肌腱) 横截面积与移植物直径的相关性, 同时基于深度神经网络构建腓绳肌肌腱自动分割系统, 指导前交叉韧带重建术 (ACLR) 术前规划。

方法

回顾性收集 374 例因前交叉韧带损伤行 ACLR 患者 (316 名男性, 58 名女性) 的术前膝关节 MR 图像及术中移植物直径信息。两名放射科医师在 MRI 图像上选择股骨内外髁最大层面进行半腱肌及股薄肌勾画并计算横截面积。采用相关分析方法分析术前腓绳肌横截面积与术中移植物直径关系,

利用受试者工作特征曲线分析腓绳肌横截面积对术中移植直径的预测价值。同时,我们提出了一种基于 EGM+U-Net++网络的深度学习框架,自动分割 MR 图像中的肌腱,并使用骰子相似系数(DSC)来比较不同网络分割系统的性能。

结果

通过 Pearsons 相关性分析,移植直径与腓绳肌肌腱横截面积相关程度最高($r=0.588$, $P<0.01$)。移植直径与半腱肌肌腱、股薄肌肌腱横截面积相关系数分别为 0.540 ($P<0.01$) 和 0.555 ($P<0.01$)。移植直径与半腱肌肌腱、股薄肌肌腱横截面积相关系数分别为 0.540 ($P<0.01$) 和 0.555 ($P<0.01$)。二元 Logistic 回归分析表示腓绳肌横截面积能够预测术中移植直径($P<0.01$), AUC 为 0.824 (95%CI 0.780~0.868), 移植直径大于 8mm 时 MRI 上测量的肌腱横截面积最佳阈值为 17.82mm²。基于不同网络的肌腱分割 DSC 系数均大于 0.90, 其中本研究提出的改进 EGM+U-Net++网络表现最好, 分割半腱肌及股薄肌的 DSC 系数分别为 0.921±0.04、0.922±0.04。

结论

磁共振上腓绳肌横截面积可以预测用于 ACLR 的腓绳肌移植直径大小。利用深度神经网络建立肌腱自动分割系统, 为辅助临床术前规划提供技术支持。

PU-1291

MRI 影像组学列线图术前预测子宫内膜癌淋巴结转移

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【摘要】目的 构建并验证 MR 影像组学列线图术前预测子宫内膜癌淋巴结转移的价值。方法 回顾性分析 195 例子宫内膜癌患者临床及影像资料, 利用 Mazda 软件获取影像组学特征, 建立影像组学得分, 利用多因素 logistic 回归建立淋巴结转移预测列线图, 采用 ROC 分析评价模型的预测效能, 并在测试集中进行验证。结果 训练集 134 例, 淋巴结转移 43 例, 验证集 61 例, 淋巴结转移 28 例, 术前 MR 诊断淋巴结转移的敏感性为 29.6%, 特异性为 96.8%。多因素 logistic 回归分析确定影像组学得分、MR 提示宫颈间质浸润、Ki67、MR 提示淋巴结转移为独立危险因素, 并依此构建的预测模型, 训练组及验证组 AUC 分别为 0.897、0.829, Hosmer-Lemeshow 检验显示模型在训练组、验证组拟合优度良好(P 值分别为 0.689、0.167)。结论 磁共振影像组学列线图可用于子宫内膜癌患者淋巴结转移的术前个体化预测。

PU-1292

CT 三维重建技术在危重患者 PICC 导管尖端定位的应用效果分析

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目的: 在日常工作中, 经常会遇到重症监护室患者外出检查肺 CT 时, 临床多提 X 线胸片检查以观察 PICC 尖端位置。本研究探讨 CT 三维重建技术在危重无意识患者 PICC 导管尖端定位的应用价值。

方法: 本次研究对象为各科室重症监护室危重无意识患者, 共 100 例患者入选, 选取时间在 2020 年 9 月至 2022 年 12 月期间, 并将所有患者分为两组, 即对照组和实验组, 分组方式为随机抽取,

两组均为 50 例。对照组选用 X 线定位 PICC 导管尖端, 实验组在 PICC 导管尖端定位时采取 CT 检查方式采集数据, 应用后处理工作站行三维重建, 对两组患者应用效果进行对比分析。

结果: CT 三维重建后, 观察尖端定位点未至上腔静脉显著低于 X 线定位, 且观察 PICC 尖端到达上腔静脉内及右心房患者高于对照组. ($P < 0.05$)。

结论: 重症监护室患者多数插管连接心电监护等, 对 X 线定位干扰较多, CT 三维重建在重症插管患者 PICC 导管尖端定位中可发挥一定作用, 能够有效判断 PICC 导管尖端位置, 与 X 线检查相比, 准确度较高, 干扰性较小。

重症患者在行肺 CT 检查后, 即行三维重建, 可直接观察 PICC 准确位置, 同时缩短整个检查流程, 降低风险, 同时减少患者费用支出。

PU-1293

基于 T2WI 影像组学列线图预测早期宫颈癌深度间质浸润 的一项双中心研究

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目的 构建与验证基于 T2WI 影像组学列线图预测早期宫颈癌(CC)术前宫颈深度间质浸润(DSI)的价值。

资料与方法 回顾性分析西南医科大学附属医院(第一中心), 河南大学淮河医院(第二中心) 2018 年 5 月至 2022 年 8 月两家医疗中心连续收治的具有术后病理结果和术前 MR 图像的早期宫颈癌患者 164 例, 第一中心(114 例)、第二中心(50 例)的数据分别划分为训练集和验证集。运用 3D slicer 对 T2WI 图像行肿瘤分割, python 软件提取影像组学特征, 进而对训练集行特征筛选, 构建支持向量机(SVM)预测模型; 采用单因素方差分析筛选临床危险因素, 并使用多因素 logistic 回归结合影像组学评分(Radscore)构建影像组学列线图, ROC 曲线用于评估这些模型, 并对不同模型的预测效能。

结果 最终筛选出 12 个影像组学特征; 使用多因素 logistic 回归构建 Figo 分期结合 Radscore 的影像组学列线图, 结果发现列线图的预测效能优于临床预测模型(验证集 AUC: 0.845 VS. 0.717, Delong 检验: $Z=2.728$, $p=0.006$)。

结论 基于 T2WI 影像组学列线图对早期宫颈癌 DSI 术前无创性预测具有较高的价值。

PU-1294

Radiomic differentiation of testicular tumors in children based on T1WI and T2WI MRI images

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Purpose: To differentiate childhood testicular tumors (CTT) based on T1WI and T2WI radiomics.

Patients and methods: A total of 71 patients with CTT were enrolled for the study, including 20 malignant and 51 benign tumors (histopathologically proven). All patients were undergone T1WI and T2WI MRI scanning. A total of 1,160 quantitative radiomic features were extracted from T1WI and T2WI images of each patient, respectively. Three radiomic models, the T1WI, T2WI and

T1WI+T2WI models, were established to predict the malignancy and benign of the tumors based on the extracted radiomic features. The area under the receiver operating characteristic curve (AUC) and five-fold cross-validation were used to evaluate the predictive performance of models. Results: The AUC among the T1WI, T2WI and T1WI+T2WI models was 0.857 (95% CI, 0.715-0.935; sensitivity=80.0%, specificity=87.8%), 0.820 (95% CI, 0.672-0.910; sensitivity =70.0%, specificity =90.0%) and 0.867 (95% CI, 0.720-0.933; sensitivity =83.3%, specificity = 90.2%). The T1WI and T1WI+T2WI models were significantly better than the T2WI model ($p<0.001$). There is no significant difference between T1WI and T1WI+T2WI model ($p>0.05$). Conclusion: Radiomics based on T1WI and T2WI presented good performance on differential diagnosis of CTT. It is of great potential to be a noninvasive quantitative diagnostic tool to advance accuracy of CTT diagnosis and avoid unnecessary radical orchiectomy of children.

PU-1295

基于增强 CT 图像探究影像组学在肺结节良恶性诊断价值

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目的：基于临床及增强 CT 影像组学构建联合模型，评估其预测诊断肺结节患者良恶性的价值。方法：回顾性分析 116 例（良性 52 例，恶性 64 例）经病理证实的肺结节患者，将患者采用分层抽样的方式按照 7:3 的比例分为训练组和验证组，逐层提取每位患者增强（动脉期及静脉期）图像肺结节区域的感兴趣区（regions of interest ,ROI），采用 3Dslicer 软件提取影像组学纹理特征，使用 LASSO 回归算法对影像组学特征进行特征筛选及降维，选择非零变量构建影像组学特征模型。结合独立的临床危险因素采用多元 Logistics 回归建立影像组学列线图，列线图的准确率和诊断效能可在训练集中进行评估在验证集中进行验证，最后通过决策曲线分析评价列线图的临床应用价值。结果：基于临床特征模型在训练集（AUC=0.81，95%CI 0.73-0.90）及验证集（AUC=0.85，95%CI 0.73-0.98）对肺结节良恶性诊断略差，筛选出 9 个影像组学纹理特征与肺结节良恶性相关依据回归系数建立 Rad-Score 特征模型在训练集及验证集 AUC 分别为 0.91（95%CI 0.84-0.98），0.90（95%CI 0.80-1.00），联合影像组学及临床特征列线图模型在训练集（0.94，95%CI 0.89-0.99）和验证集（0.98，95%CI 0.94-1.00）均表现优异，DCA 分析结果表明影像组学的加入可以使患者获益。结论：联合临床特征及增强 CT 影像组学建立的列线图模型具有良好预测肺结节良恶性的效能。

PU-1296

基于对比剂增强脂肪饱和 T1WI 的机器学习模型对肛瘘术前诊断的应用价值

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目的

探讨基于对比剂增强脂肪饱和 T1WI 的机器学习模型对肛瘘术前诊断的应用价值。

方法

回顾性收集 2019 年 1 月至 2022 年 12 月于苏州市中医医院手术证实为肛瘘患者的术前 MRI 图像资料，共入组 80 例，其中男 66 例，女 14 例，年龄 15~65（37±3）岁。以 3:1 的比例分为训练集 60 例，测试集 20 例，训练集采用 mark_rcnn 网络进行肛瘘的瘘管检测，并使用 Adam 优化算法，由 2 名医师结合手术结果标注出肛管及其病变肛瘘瘘管区域，使用医学影像智能辅助分析系统

进行标注, 作为实验中的金标准用于训练深度学习算法和预测结果评价。对测试集的 20 例患者的 T1 图像进行区域划分, 对于输入的 MRI 图像, 计算检测的结果, 使用 sensitivity 系数来评价检测模型的预测结果与医师标注金标准间的匹配程度。

结果

根据 Dice 评测指标, 肛瘘瘘管检测模型对测试集 20 例样本取得的 Sensitivity 为 0.81897, 平均时间为 0.126 秒, 表明模型具有一般的预测精度。取得了与医师标注金标准一般的重合度。我们还将模型与其他常用的图像分割算法进行了比较, 结果表明我们的算法在瘘管检测方面表现出色, 相较于其他算法, 具有更高的准确性和更低的误检率。除此之外, 我们还对模型进行了可视化分析, 发现模型能够准确地检测出瘘管的位置和形状, 并可以将其从周围的组织和结构中分离出来。

结论

本研究结果表明, 使用深度学习算法对单纯性肛瘘患者的 MRI 图像进行瘘管检测是可行和有效的, 我们还对模型的可解释性进行了探究。通过可视化分析, 我们发现模型能够准确地检测出瘘管的位置和形状, 这为医生提供了更为准确的术前诊断信息, 有助于更好地指导手术操作。随着训练集数据的不断扩张, 该模型有望作为一种可靠的肛瘘诊断辅助工具。

PU-1297

Preoperative MRI with Deep Learning Reconstruction in Assessing Rectal Cancer: A Multi-reader and Multi-sequence Study

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Purpose: To determine whether deep learning reconstruction (DLR) could improve the image quality of rectal MRI, and to explore the diagnostic performance of TN-staging of rectal cancer (RC) by readers with different levels of experience, compared with conventional MRI without DLR.

Materials and Methods Images of high-resolution T2-weighted, diffusion-weighted imaging (DWI), and contrast-enhanced T1-weighted imaging (CE-T1WI) from patients with pathologically diagnosed rectal cancer from July 2017 to March 2022 were retrospective processed with and without DLR and assessed by five readers. The first two readers measured the signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of the lesion. The overall image quality and lesion display performance on each sequence with and without DLR were independently scored using a five-point scale and evaluated the TN-stage of RC lesions by the other three readers. Image quality was compared between images with and without DLR, and the diagnostic performance and interobserver agreement were also explored.

Results Overall, 178 patients (mean age, 56.7 ± 11.4 years; 124 men) were evaluated. SNR and CNR of the lesion on images with DLR were significantly higher than those without DLR ($p < 0.0001$), e.g., for T2WI, the mean SNR was 78.984 ± 57.934 versus 42.190 ± 36.264 , respectively ($p < 0.0001$). A significant difference was observed in overall image quality and lesion display performance between images with and without DLR ($p < 0.0001$). Compared with images without DLR, diagnostic performance and interobserver agreement were improved in images with DLR.

Conclusion DLR improves the image quality and agreement of rectal MRI and enhances the diagnostic performance in TN-staging of rectal cancer.

PU-1298

基于深度学习的胸部正位 DR 质量控制系统的初步研究与应用

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【摘要】：目的 本研究旨在构建一种基于深度学习的人工智能 (AI) 胸部正位数字 X 线 (DR) 图像质量控制模型，并评估其在放射质控体系中的应用价值。方法 回顾性纳入 16 家医院在 2021 年 1 月—6 月拍摄的 6920 张胸部正位 DR 图像进行分级标记，其中 4844 张作为训练集用于构建一种基于生成对抗网络的，能够自动化评价胸部 DR 图像质量的深度学习模型。1730 张作为验证集用于调整模型参数。346 张作为测试集评估模型效能。以 5 名高年资主管技师共同评定结果和总评分作为金标准，分别从 10 项评价维度计算 AI 模型的敏感度、准确率和曲线下面积 (AUC)，并对 AI 与专家的评分进行一致性评估。结果 在评价维度的判断中，AI 模型的效能与放射专家感知评价相当，其中对“肩胛骨内缘是否旋出肺野之外”的检测效能最高 (AUC=0.912)，其敏感度、和准确率分别为 86.32%、96.02% 和 93.35%。AI 模型在图像质量评分与专家评分一致性较好 (ICC=0.843, $P<0.001$)。AI 耗费的平均时间明显比专家的短 (4.24 s VS 12.85 s, $P<0.001$)。结论 基于生成对抗网络建立的 AI 胸片 DR 质控系统能快速、自动地进行影像图像质量控制工作，并进行高级别图像质量评分，可成为辅助 DR 图像质量控制和管理工作的有效工具。

PU-1299

基于 DTI 图像的 Transformer 模型预测耳鸣患者音乐掩蔽治疗效果

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目的:探究 DTI 图像与耳鸣患者之间的关联，运用基于 DTI 图像的 Transformer 模型预测耳鸣患者音乐掩蔽治疗效果。

方法: 对 60 例特发性耳鸣患者和 57 例健康对照人群进行了弥散张量成像 (Diffusion Tensor Imaging, DTI)。应用了一种特殊的耳鸣治疗仪器 eMasker® (Micro-DSP 科技有限公司)，这是一种根据耳鸣特征测试结果定制的个人声音治疗设备，可以对耳鸣患者进行音乐掩蔽治疗。每 17 周收集一次关于声音疗法应用的治疗反馈。所有患者被要求在治疗后再次完成耳鸣障碍量表评分，据此将患者分为治疗有效组与治疗无效组。基于迁移学习的方法构建基于 DTI 图像的 Transformer 模型，标签选择为治疗有效组与治疗无效组，探究模型预测能力。

结果:在 28 例患者中，音乐掩蔽治疗具有良好的治疗效果；32 名患者治疗无效。基于 DTI 图像的 Transformer 模型可以很好地将这两类患者进行区分 (AUC 为 0.94，敏感性，82.86%；，特异性，97.14%)，且在 10 折交叉验证中都保持较高的预测能力 (所有 AUC>0.85，平均 AUC>0.9)。校准曲线显示模型拟合良好。且模型对于区分健康对照人群与耳鸣患者也有意义 ($P<0.05$)。

结论: 基于 DTI 图像的 Transformer 模型可以有效预测耳鸣患者的治疗效果，这对于耳鸣患者的治疗方案选择是具有积极意义的。

PU-1300

Multimodal Image for Brain Age Prediction: From Asian Genetic Background

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The aging of the human body is reflected in various systems and tissues, among which the nervous system dominates many other systems, and its aging is crucial for exploring human aging. Exploring the degree of brain aging requires a "gold standard", so the concept of brain age has been proposed to describe the degree of brain aging under normal physiological and social living conditions. Magnetic resonance imaging is a non-invasive and convenient method to comprehensively evaluate the brain, which is widely used in the diagnosis of various mental or Degenerative disease, and has great clinical application value. Many previous studies have proposed many brain age prediction models based on brain MRI in the genetic background of Europe or America. As is well known, Asian populations have significant differences in genetic background, cultural habits, living environment, and many other aspects compared to European and American regions, and their impact on the brain also varies. Therefore, this study uses poly-centric data to explore brain age models based on Asians.

PU-1301

Deep learning in the precise assessment of primary Sjögren's Syndrome based on ultrasound images: a multicenter prospective study

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Objectives: This study aimed to investigate the value of a deep learning model (DL) based on the grayscale ultrasound (US) images for the precise assessment and accurate diagnosis of primary Sjögren's syndrome (pSS). **Methods:** A dataset of 864 US images of bilateral parotid glands (PGs), submandibular glands (SMGs), and lacrimal glands (LGs) were collected from the prospective multicenter study including 72 pSS patients diagnosed according to the 2016 American College of Rheumatology/European League Against Rheumatism criteria and 72 healthy subjects matching by propensity score matching. The prediction model was constructed based on the Residual Neural Network 50, input with preprocessed original US images. The performance of the model was analyzed using accuracy, sensitivity, specificity, and area under the receiver operator characteristic curves (AUC) compared with the diagnosis made by two inexperienced radiologists.

Results: The accuracy, sensitivity, and specificity of the inexperienced radiologists for the three glands ranged from 70.83%-77.78%, 52.08%-72.22%, and 76.38-98.61%, respectively. The DL achieved an accuracy of 92.01%, 93.40%, and 91.32%, sensitivity of 92.36%, 94.44%, and 93.75%, and specificity of 91.67%, 92.36%, and 88.89% for the SMG, PG, and LG respectively. The AUC for the DL outperformed all radiologists ($P < 0.001$ for each).

Conclusion: DL based on grayscale ultrasonography images has shown good performance in predicting pSS to aid in the precise assessment of pSS patients based on US images of SMG, PG, and LG.

PU-1302

SMS-RESOLVE DWI 技术联合人工智能诊断系统在急性脑梗死中的应用研究

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目的: 评价 MR 同时多层采集 (SMS) 高清扩散成像 (RESOLVE) 技术联合人工智能 (AI) 诊断系统用于急性脑梗死成像的图像质量和诊断效能。

方法: 搜集 104 例急性脑梗死患者, 每例患者均扫描常规扩散加权成像 (DWI)、RESOLVE DWI 和 SMS-RESOLVE DWI 三种扩散序列。主观评价: 观察组由两名高年资医师采用双盲法, 使用李克特量表, 对急性脑梗死的 DWI ($b=1000s/mm^2$) 图像的三种 DWI 序列对病变显示情况进行主观评分。两周后再次进行评分, 观察评分一致性。研究组由 AI 进行评分。评价指标包括解剖结构的锐利度、图像变形程度、磁敏感伪影程度、整体图像质量等。客观测量: 测量三种 DWI 序列图像的信噪比 (SNR)、对比噪声比 (CNR)、信噪比效率 (SNRefficiency)、最小表观扩散系数 (ADCmin)、最大表观扩散系数 (ADCmax)、平均表观扩散系数 (ADCmean)。比较三种 DWI 序列图像的客观测量差异。

结果: 在主观评价中, 观察组评分稍高于研究组, 没有显著的统计学差异 ($P>0.05$)。观察组两位观察者间评分差距不大, 且具有很强的 consistency (Kappa 值 ≥ 0.75)。SMS 的主观图像质量各方面均优于常规 DWI 且存在统计学差异 (P 值均 <0.05), SMS-R 和 RESOLVE 的主观图像质量相当且没有显著的统计学差异 ($P>0.05$)。在客观测量中, 对于 SNR 和 CNR, SMS-R 高于常规 DWI 且存在明显统计学差异, SMS-R 与 RESOLVE 无明显统计学差异 ($P>0.05$); 三种 DWI 的 SNRefficiency 存在明显统计学差异, SMS-R 的 SNRefficiency 最高, RESOLVE 次之, 常规 DWI 最低。三种 DWI 序列的 ADCmin、ADCmax、ADCmean 均无统计学差异 (P 值均 >0.05)。

结论: SMS-RESOLVE DWI 的图像质量优于常规 DWI, 且在拥有较高 SNRefficiency 的条件下与 RESOLVE DWI 的主观图像质量相当。SMS-RESOLVE DWI 技术能够在不降低图像质量的基础上缩短检查所需时间, 提高 AI 诊断效能, 在急性脑梗死成像中值得推广。

PU-1303

Structural brain differences between temporal and frontal lobe epilepsy patients analyzed based on artificial intelligence voxels and morphometry

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OBJECTIVE Several studies have now tentatively elucidated the effects of chronic seizures in focal epilepsy on brain volume. In order to further define the structural brain differences between temporal lobe epilepsy (TLE) and extratemporal epilepsy (ETLE), the structural brain differences in patients with confirmed epileptic volume were retrospectively analyzed. **METHODS** Voxel-based morphometry (VBM) was used to analyze morphometric brain differences between the brains of TLE patients, ETLE (frontal lobe epilepsy FLE was chosen as a replacement) patients, and healthy controls. Morphometric differences in gray matter, hippocampus, and thalamus were included. **RESULTS** The analysis showed a significant reduction in the volume of the lower part of the left hippocampus in the left temporal lobe epilepsy group (LTLE group) and the lateral portion of the right hippocampus in the right temporal lobe epilepsy group (RTLE group) compared to the control group ($p<0.05$). There was also a significant difference between the LTLE group and the controls in the bilateral thalamus ($p<0.05$). FLE patients did not show a focal

atrophy of the entire gray matter of the brain ($p>0.05$). **CONCLUSION** Our results further elucidate the differences in brain morphological changes between different seizure regions and provide important insights into the comprehensive treatment of patients with refractory epilepsy in different seizure regions.

PU-1304

A two-stage deep-learning framework in CT denoising based on structure-unaligned paired dataset in real world

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Background: In real world, soft tissue is hardly appreciable during lung cancer low-dose CT (LDCT) screening due to significant noise. Currently, deep learning-based LDCT denoising methods have achieved promising results, but they are mostly performed based on structurally aligned synthesized paired datasets, thus cannot be translated into real clinical practice. In this paper, we propose an LDCT denoising method based on clinically structure-unaligned but paired datasets (LDCT and normal dose CT (NDCT) in the same patient) in real world to improve the lesion detection and characterization during LDCT lung cancer screening.

Method: An initial cohort of 64 patients who had received consecutive LDCT and NDCT was enrolled in this study, and they were randomly divided into training (46) and testing (18) cohorts. We propose a two-stage training approach. A Gaussian noise perturbation was first added to the NDCT to generate structurally aligned simulated LDCT and used for the training of generator. In the second stage, the model is trained on a clinically structure-unaligned paired dataset using the Wasserstein generative adversarial network (WGAN) framework, with the initial weights of the generator obtained in the first stage of training. In addition, we introduce an attention mechanism in the proposed network to capture richer context dependencies to improve the quality of the CT.

Result: Validated on a clinical CT dataset, our proposed method outperformed other available methods [CycleGAN, Pixel2Pixel, block-matching and 3D filtering (BM3D)], in noise removal and detail retention, and also peak signal-to-noise ratio (PSNR), structural similarity index measure (SSIM) and root mean square error (RMSE) metrics. The probability density profile of the denoised CT using our method best fits the reference NDCT. Also, our two-stage model outperforms one-stage WGAN-based model in both objective and subjective evaluations, which further demonstrates the higher effectiveness of the two-stage training approach.

Conclusion: The proposed method removes noise from LDCT well and has good detail retention, which will potentially enhance the lesion detection and characterization in surrounding soft-tissues in the lung cancer LDCT screening. In both qualitative and quantitative evaluation, the proposed method outperforms the comparison method.

PU-1305

CT、MRI 及其新技术临床应用与基础研究

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本文旨在探讨 CT、MRI 及其新技术在临床应用与基础研究中的重要性，本文将从目的、方法、结果和讨论四个方面进行阐述。目的：本研究旨在评估 CT、MRI 及其新技术在临床应用和基础研究中的重要性，并探讨这些技术的发展趋势。方法：本研究采用文献综述法，首先收集了近年来发表

的国内外相关文献,包括期刊文章、学术论文、专利、技术报告、研究报告等。然后对文献进行筛选,选取与本研究主题相关、具有代表性和权威性的文献进行总结。以确定 CT、MRI 及其新技术在临床应用和基础研究中的应用范围和研究进展。结果:CT、MRI 及其新技术在临床应用和基础研究中都具有广泛的应用前景。在临床应用方面,CT 和 MRI 是常用的医学成像技术,已成为肿瘤、神经疾病、心血管疾病等疾病的重要诊断手段。此外,随着 CT 和 MRI 技术的不断发展,许多新的技术也相继出现,例如:CT 冠状动脉造影(CTA)、磁共振血管造影(MRA)、功能性磁共振成像(fMRI)等,这些技术已经广泛应用于临床诊断和治疗。在基础研究方面,CT 和 MRI 技术的出现,使得科学家可以对生物体的结构、功能、代谢等方面进行研究,为生物学、医学等领域的研究提供了强有力的工具。讨论:CT、MRI 及其新技术的出现,极大地推动了医学成像技术的发展。这些技术具有非侵入性、高分辨率、多参数等优点,可以提供更为准确、可靠的医学图像信息。同时,随着技术的不断进步,CT 和 MRI 的应用范围也在不断扩大,新技术的涌现也给医学成像领域带来了更多的发展机遇。但是,CT 和 MRI 技术也存在一些局限性,例如:对某些病灶的检测不够敏感、对某些病灶无法鉴别等。因此,未来的研究应当着重发展新的技术,以克服这些局限性,并进一步提高医学成像技术的准确性和可靠性。此外,CT 和 MRI 技术在应用过程中也存在一些问题,如剂量较大、成本较高等。为了更好地推广这些技术,未来的研究应当着重解决这些问题,以提高技术的普及率和利用率。CT、MRI 及其新技术在临床应用和基础研究中具有广泛的应用前景,是医学成像领域的重要组成部分。未来的研究应当着重发展新技术、克服技术局限性、解决应用问题,以推动医学成像技术的发展和应用。

PU-1306

磁共振灌注成像技术联合人工智能诊断系统在急性脑卒中的应用研究

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目的:探讨磁共振灌注成像技术联合人工智能诊断系统用于急性脑卒中成像的图像质量和诊断效能。方法:搜集 104 例急性脑梗死患者,52 例进行了动脉血质子自旋标记成像(ASL)序列扫描的为观察组;常规注射对比剂的动态磁敏感对比增强灌注成像序列(DSC)52 例为对照组,将两组所获图像上传至 Fast—Stroke AI 诊断系统进行分析。并由两名放射科高年资医师采用双盲法,使用 Likert scale (李克特量表)对两组序列 AI 处理出的伪彩图进行主观评分,观察两组伪彩图图像是否满足诊断要求,且二者之间的图像清晰度、图像失真以及伪影是否存在差异。两周后再次进行评分,观察评分一致性。客观测量为根据 AI 计算的两组 CBF 参数,进行组间检验。结果:在主观评估中,两位观察者的评分差距不大且具有较强至很强的一致性(Kappa 值 ≥ 0.75)。ASL 和 DSC 的伪彩图主观图像质量相当且没有显著的统计学差异($P>0.05$)。在客观测量中,两组 CBF 参数间没有显著的统计学差异($P>0.05$)。结论:急性脑卒中是目前我国常见的致残率及致死率较高的疾病,PWI 技术对其诊断准确性较高,且可以判断半暗带的存在。不使用对比剂是 ASL 序列的优点,但早期该技术成熟度不高,与 DSC 序列对比尚存在差距。现 ASL 技术发展迅速,且 AI 诊断系统对 ASL 和 DSC 序列都具有良好的诊断效能,二者结合在急性脑梗死成像中值得推广。

PU-1307

Discriminating struvite from non-struvite using machine learning-based unenhanced CT: Comparing with conventional mean and standard deviation of Hounsfield units

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Objective: This study aims to explore the feasibility of a machine learning(ML) model based on texture features extracted from unenhanced Computed tomography images in identifying struvite and to compare with the mean Hounsfield units(HUm) and the standard deviation of Hounsfield units(HU_{sd}) to provide a better method with which to guide the treatment of struvite.

Materials and methods: A total of 63 patients with 146 stones with known components were included. Unenhanced Computed tomography images of stones were used to measure the HUm and HU_{sd} and extract texture features. A dimension reduction was performed using the significance test and Pearson's correlation coefficient. Optional textural features were used to establish the ML model. The diagnostic performances of the HUm, HU_{sd}, and ML models were evaluated using receiver operating characteristic curve analysis. The diagnostic performances of the three methods were compared by means of DeLong's test.

Results: The HUm of struvite was higher than that of non-struvite ($P = 0.026$, training group; $P = 0.026$, test group). The HU_{sd} between struvite and non-struvite had no statistical difference ($P = 0.811$, training group; $P = 0.097$, test group). The area under the curve of the ML model was higher than the HUm (training group: 0.928; test group: 0.836).

Conclusions: The conventional HU_{sd} had little worth in discriminating between struvite and non-struvite. The HUm and the ML model had certain guidance concerning identifying struvite, with the ML model performing better than the HUm.

PU-1308

基于平扫 CT 的肝内占位性病变智能识别及诊断的多中心研究

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目的: 肝内的占位性病变影像诊断一般需多期 CT/MRI 增强扫描辨识, 平扫 CT 由于诊断信息不足难以确诊, 但其快速、便捷、安全、空间分辨率高等特性使其成为临床筛查中的首选方式之一。本研究采用基于 nnDetection 的医学目标识别算法, 在平扫 CT 上辅助放射科医师快速发现并识别容易被漏诊和误诊的肝脏占位性病灶, 同时建立了基于影像组学特征融合患者临床信息的自动机器学习模型, 实现在平扫 CT 上对肝内占位性病变识别与分类诊断, 为临床早期诊断和治疗提供依据, 改善患者预后。

方法: 本研究拟尝试使用增强 CT/MRI 多期增强确诊或病理确诊的肝内占位性病灶作为金标准进行深度学习建模, 借助人工智能技术在平扫 CT 上准确识别肝内占位性病变, 提高平扫 CT 的诊断效率, 帮助临床医师在第一次筛查时就能识别病灶的存在, 最大限度降低漏诊的可能性, 及早对需要处理的病灶进行精准治疗, 以此显著改善患者的预后。之后, 同样以金标准为参考, 由放射医师手动勾画出患者平扫 CT 图像的病灶轮廓, 在 3D Slicer 中提取放射组学特征。通过自动机器学习算法筛选出最相关的放射组学特征同时建立分类模型, 进行鉴别诊断, 以确定疾病的类型, 为临床治疗提供依据。

结果: 研究入组了 3 个独立医学中心的 300 例患者的 349 个病种图像, 包括恶性肿瘤共 89 例 (其中 34 例肝癌, 6 例胆管细胞癌, 49 例转移瘤), 112 例血管瘤, 108 例肝囊肿及 40 例肝脓肿。通过 nnDetection 识别肝内占位性病灶, 并且通过自动机器学习算法, 筛选出最相关的放射组学特征并建立了诊断模型, 最终在内部验证集及外部验证集上测试其准确率, 得到的结果在上述多种病灶的 AUC 值均在 0.9 以上。

结论: 本研究率先提出基于平扫 CT 对肝内占位性病灶进行识别与诊断, 特别是针对隐匿性肝癌 (平扫 CT 难以发现) 进行早期智能识别, 降低在平扫 CT 中可能出现的漏诊和误诊率, 以提高肝癌患者的治疗效果和改善患者预后。同时, 通过基于影像组学的智能算法, 鉴别诊断不同类型的肝内占位性病灶, 以实现精准治疗, 准确定位。本研究的实施, 将大大提高平扫 CT 的诊断效率, 同时可以减少患者进行多次不必要的增强扫描。

PU-1309

MSCT 后处理技术在耳硬化症诊断中的应用

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摘要:

目的 探究多层螺旋 CT (MSCT) 后处理技术在耳硬化症诊断中的价值。

方法 收集 47 例 (92 耳) 耳硬化症患者及同期 65 例 (79 耳) 非耳硬化症听力障碍患者的 MSCT 图像及临床资料, 对其原始 MSCT 轴位图像进行回顾性分析, 并行 MSCT 图像后处理, 包括镫骨、耳蜗多平面重组 (MPR) 以及听骨链曲面重组 (CPR), 比较原始 MSCT 轴位图像及 MSCT 后处理图像对耳硬化症的检出率。

结果 112 例 (171 耳) 患者中, 经原始 MSCT 轴位图像诊断耳硬化症 33 例 (66 耳), 4 例 (6 耳) 非耳硬化症听力障碍患者被误诊为耳硬化症; 行 MSCT 图像后处理诊断耳硬化症 45 例 (89 耳), 2 例 (3 耳) 非耳硬化症听力障碍患者被误诊为耳硬化症; 利用原始 MSCT 轴位图像诊断耳硬化症与采用 MSCT 后处理技术对耳硬化症的灵敏度分别为 71.74%、96.74%, 诊断符合率分别为 81.29%、96.49%, 二者对耳硬化症的检出率比较差异具统计学意义 ($P < 0.05$); 采用 MSCT 后处理技术能够全方位、更直观显示耳硬化症病变, 显著提高诊断准确性。

结论 MSCT 后处理技术对于耳硬化症的检出率和准确性均优于原始 MSCT 轴位图像, 可为耳硬化症的治疗决策提供有价值的影像学资料。

PU-1310

基于深度学习的 X 线胸片气胸检测与半定量分析

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目的 胸片是诊断胸部和心脏疾病 (如心脏肥大、气胸和胸腔积液等) 常见的无创筛查技术之一。近年来, 由于计算机技术的发展和胸片数据集的开源, 深度学习方法已应用于如胸片图像的分类、疾病检测和病灶定位等。但大多数网络只能通过热图或矩形边界框方法定位病变的高概率位置, 并不能准确识别病变边界, 一定程度上限制了半定量分析的研究。本文建立气胸胸片数据库, 并开发和评估用于胸部 X 光片 (CXR) 气胸检测和半定量分析的深度学习模型。

方法 在这项回顾性研究中, 深度学习模型被训练用于病变检测和胸廓分割。气胸检测数据集包含 1081 张 CXR 图像 (来自 936 名患者)。肺分割数据集来自公共数据集, 由 704 张 CXR 图像组成。

训练 Mask-RCNNs+PointRend 模型实现气胸的检测, U-Net 模型实现胸廓的分割。在准确检测和分割的基础上, 计算气胸的半定量指标 (肺压缩程度=1-患侧肺野的面积 /患侧胸廓的面积)。气胸检测和半定量分析框架如图 1 所示。检测性能通过平均精度 (AP) 和受试者操作特性自由反应 (FROC) 得分进行评估, 重叠度 (IoU) 大于 75%即 AP75、FROC score75。分割效果通过 Dice 相似系数(Dice)进行评估。

结果 本文模型实现了高精度的气胸检测(AP75 = 71.2%; FROC score75 = 0.728), 不同 IoU 阈值下的 FROC 曲线如图 2 所示。胸廓(Dice = 0.960)、气胸(Dice = 0.827)分割效果良好, 为半定量分析提供了重要支持, 基于肺压缩程度的半定量分析结果如图 3 所示。

结论 本文设计和开发的模型可以实现基于胸片的气胸检测, 并且能够提供相应的半定量指标, 可以进一步的为临床气胸诊断提供依据。

PU-1311

基于影像组学的肌肉成分分析在预测肝移植术后并发症中的研究

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目的 将肌肉内部按照不同的密度范围划分成不同的亚区, 进一步研究肌肉密度改变对原位肝移植 (OLT) 术后并发症 (Clavien-Dindo \geq III) 的影响, 并且利用影像组学的方法对肌肉进一步分析, 从而建立全新的预测模型评估 OLT 患者术后并发症的发生情况。

方法 回顾性分析 2013 年 5 月至 2020 年 9 月 145 例就诊于吉林大学第一医院 OLT 患者的临床及影像相关信息, 选取患者腰 3 椎体水平最大层面的 CT 平扫图像作为原始图像数据, 利用 Neusoft Fat Analysis 软件以及 3D slice 软件对原始 CT 平扫图像进行相关肌肉参数的测量以及肌肉感兴趣的勾画, 并利用 RIAS 软件进行影像组学特征的提取和分析建模。

结果 采用肌肉分层分析前的临床特征建立逻辑回归 (LR)、支持向量机 (SVM)、随机森林 (RFC) 三种机器学习模型, 其中 RFC-C 模型测试集的 AUC 值较高为 0.803 (95%CI: 0.660-0.946)、灵敏度 0.588, 特异度 0.778。利用肌肉分层分析后的临床特征建立的模型中, SVM-CS 模型测试集的 AUC 值较高为 0.852 (95%CI: 0.713-0.991)、灵敏度 0.706、特异度 0.926。单独使用影像组学特征建立的三种模型中, LR-R 和 SVM-R 测试集的 AUC 值均较高, LR-R 模型测试集 AUC 值为 0.941 (95%CI: 0.878-1.000)、灵敏度 0.765、特异度 0.926; SVM-R 模型测试集 AUC 值为 0.946 (95%CI: 0.886-1.000)、灵敏度 0.765、特异度 0.889, 通过多种模型间 ROC 曲线的 DeLong 检验、决策分析曲线等表明肌肉内部分层分析确实能够提升临床预测模型的效能, 且影像组学模型的效能较好。

结论 利用分层分析的方法将肌肉按照不同的密度划分成不同子区, 对于预测 OLT 患者术后并发症情况存在一定价值, 值得我们进一步探讨和研究, 肌肉影像组学分析可能为预测 OLT 患者术后并发症 (Clavien-Dindo \geq III) 提供新的方法和思路。

PU-1312

基于调查问卷分析国内儿童骨龄评估现状及发展趋势

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目的: 基于调查问卷分析、对比国内儿童骨龄各评估方法的应用现状, 据此推测发展趋势, 特别是人工智能(Artificial Intelligence, AI)骨龄评价系统在临床中的应用。方法: 收集涵盖全国 26 个省市, 涉及 241 所医疗机构 (三级、二级), 关于骨龄评估常见临床问题的问卷 450 份, 涉及各类 22 个

问题;汇总统计分析各类问题的结果。结果:骨龄测量在医疗机构中广泛开展,二、三级医院间存在部分差异。对于骨龄评估的必要性基本达成共识,以左手腕摄片为主(75.9%),方法分为图谱法(73.04%)及计分法(15.8%)。AI技术的应用处于早期阶段(11.2%),但大多数受访者(98.6%)对此抱有期望。结论:骨龄评估存在检查标准欠规范,评估标准不统一,评估结果欠精确问题;临床医生对AI技术辅助诊断,保有较大期望。

PU-1313

18F-FDG PETMR 影像组学特征在预测儿童横纹肌肉瘤病理分型中的价值

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目的:探讨 18F-FDG PET/MR 影像组学特征在预测儿童横纹肌肉瘤病理分型中的价值。

方法:收集 125 例经过病理确诊的横纹肌肉瘤患儿的临床资料和 PET/MR 影像资料。分为两组:胚胎性横纹肌肉瘤(ERMS)(n=75)和腺泡型横纹肌肉瘤(ARMS)(n=50)。病理和临床诊断结果作为诊断的金标准。我们使用 AK 软件提取与肿瘤分类最相关的影像组学特征,将两组图像随机分为训练集(70%)和测试集(30%)。使用最大相关性和最小冗余(mRMR)和最小绝对收缩和选择算子(LASSO)方法从 MR 和 PET 提取的 1800 个特征中选择特征,最终保留了八个最佳特征。使用影像组学特征和临床变量进行多变量逻辑回归分析,以建立预测模型。接收机工作特性(ROC)分析用于评估预测模型。

结果:建立的 PET/MR 影像组学特征对识别 ERMS 和 ARMS 分类具有更好的预测效率,并且存在显著差异。训练组和验证组的 AUC 分别为 0.918(95%CI:0.783-0.979)和 0.856(95%CI:0.775-0.996)。

结论:PET/MR 影像组学特征预测模型可作为预测儿童横纹肌肉瘤病理分型的一种有前途和实用的辅助方法。它还可以为准确的临床诊断和个体化治疗提供客观依据,对临床治疗具有重要的指导意义。

PU-1314

基于海马自动分割技术对正常成年人海马亚区血流灌注测量一致性 & 可重复性研究

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目的:基于 FreeSurfer 海马亚区分割技术,评价两种方法测量正常成年人海马亚区血流灌注的一致性 & 可重复性。方法:收集 2022 年 8 月-2023 年 8 月 60 例健康志愿者纳入本研究,每例均在 GE SIGNA Architect 3.0T 磁共振仪上采集轴位 T1 加权三维磁化强度预备梯度回波(T1-MPRAGE)序列及三维伪连续式动脉自旋标记(3D-pCASL)序列。使用 FreeSurfer 7.3.2 版对 T1-MPRAGE 图像行海马亚区自动分割,利用分割出来的海马亚区与 3D-pCASL 映射的方法,进行基于 FreeSurfer 半自动测量和基于 ITK-SNAP 全自动测量海马亚区血流量(CBF 值),使用组内相关系数(ICC)、Bland-Altman 图及独立样本 t 检验评价两种测量方法之间的一致性和可重复性。结果:2 种方法测量海马亚区 CBF 值的组间 ICC 均>0.88,平均组间 ICC 为 0.934±0.031,各海马亚区组间 ICC 分别为左侧海马(下托 Sub: 0.905; CA1: 0.891; CA2-3: 0.945; CA4: 0.943; DG: 0.959),右侧海马(下托 Sub: 0.914; CA1: 0.892; CA2-3: 0.953; CA4: 0.963; DG:

0.978), Bland-Altman 图可直观展示散点分布和一致性。独立样本 t 检验得出两种方法在测量海马各个亚区 CBF 值之间差异无统计学意义 (P 均 >0.05), 说明二种测量海马亚区 CBF 值的方法之间一致性良好。结论: 基于 FreeSurfer 海马亚区分割方法, 评价正常成年人基于 FreeSurfer 半自动测量海马亚区 CBF 值与基于 ITK-SNAP 全自动测量海马亚区 CBF 值具备较高的一致性且重复性强, 为临床诊疗中了解海马亚区血流灌注提供可能。

PU-1315

超声影像组学在淋巴结病变中的研究进展

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目的: 不同病因引起的淋巴结病变的治疗策略大不相同, 术前准确地诊断淋巴结病变能够减少不必要的侵入性检查。仅依靠超声视觉特征评估淋巴结病变单一且主观, 目前影像组学发展迅猛, 超声影像组学预测淋巴结来源的研究日益增多, 有望对传统的视觉特征预测结果加以补充。

方法: 1. 超声影像组学预测淋巴结病变具体病因: 朱等人基于 763 例患者的 B 模态超声和彩色多普勒超声图像, 构建不明原因 CLA 的层次诊断模型, 通过 DL 算法从双模态超声图像中提取高通量定量特征, 所建模型区分反应性增生、结核性淋巴结炎、淋巴瘤和转移性 CLA 的 AUC 分别 0.964、0.873、0.837 和 0.840。Liu 等人通过 LASSO 和 SVM 算法对 B 模式图像提取定量特征来区分结核性淋巴结炎、反应性增生、淋巴瘤和转移性淋巴结, 诊断结果表明模型在测试集中的诊断性能虽略优于高年资超声医师, 但对四种病因的诊断性能中等, 敏感性分别 49.6%、22.5%、38.7% 及 60.6%。

2. 超声影像组学预测转移性淋巴结病变原发肿瘤来源: 有研究基于转移性 CLA 患者的 BUS 图像、CDFI 图像、超声弹性图像、超声造影视频及临床信息, 构建 DL 多步模态融合模型以诊断转移性 CLA 鳞状细胞癌亚型和腺细胞癌亚型, 所建模型在预测转移性 CLA 原发肿瘤来源中具有最高性能 0.822。模型预转移性 CLA 来自 HNSCC、TC、LC 和 GIC 来源的 AUC 和准确性分别为 0.869 和 85.1%, 0.838 和 87.3%, 0.750 和 67.3%, 0.829 和 77.8%。

结果: 基于超声图像的影像组学模型在诊断反应性增生、结核性淋巴结炎、淋巴瘤和恶性肿瘤淋巴结转移具有较高的准确性敏感性和特异性, 可减少诊断延误和不必要的侵入性检查。联合临床特征的综合模型性能显著高于经验丰富的超声医师, 有望协助临床快速定位原发肿瘤, 为后续治疗提供积极指导。

结论: 基于超声影像组学可预测淋巴结疾病的具体病因, 且对转移性淋巴结患者的原发肿瘤来源具有良好的预测性能, 可成为指导个性化诊疗的潜在工具。

PU-1316

Differentiating subcentimeter lung metastases in colorectal cancer by radiomics and deep learning: a retrospective multicenter study

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Background:

Preoperative evaluation of the indeterminate lung nodules is important for individual treatment of colorectal cancer (CRC). We aim to develop and validate discriminative radiomics and deep learning approaches for differentiating subcentimeter lung metastases (LMs) in CRC patients.

Methods:

Models were developed in a primary cohort included 1194 consecutive CRC patients with initial subcentimeter size LMs on CT. Patients were randomly assigned (7:3) to the training or internal validation cohorts (IVC). Machine learning (ML), deep learning (DL), and the integration of radiomics and DL features were applied to classify the subcentimeter lung nodules as LMs or benign lesions. Two independent external validation cohorts (EVC) consisted of 101 (EVC1) and 40 (EVC2) patients. To verify the generalizability for nodules of smaller sizes, stepwise validations on the subgroups according to the nodule's largest diameter (10, 9, 8, 7, 6, 5, ≤ 4 mm) were conducted.

Results:

The diagnostic accuracy by radiologists was 0.705 in primary cohort. The best ML based on support vector machine (SVM) showed a 0.981 area under the curve (AUC) in IVC, a 0.961 and 0.996 AUC in EVC1 and EVC2. The best integration model showed a 0.973 AUC in the IVC and a 0.943 and 0.974 AUC in EVC1 and EVC2. The DL model showed a 0.953 AUC in the IVC and a 0.907 and 0.951 AUC in EVC1 and EVC2. Stepwise validation demonstrated that with the LM diameter decreasing, the integration model was the most stable with smaller LMs, and was the best for LM ≤ 5 mm.

Conclusions:

Our findings showed that radiomics of machine learning approaches based on CT could improve current diagnostic accuracy of subcentimeter CRC LMs. Specially, novel integration model was the best with LMs ≤ 5 mm. This study provided an automatic and noninvasive solution for determining subcentimeter LMs in the individual management of CRC.

PU-1317**应用人工智能自动评估胸部 CT 胸椎骨密度以筛查骨质疏松症**

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目的: 以定量计算机断层扫描(QCT)腰椎骨密度为参考标准, 开发一种人工智能程序, 用于在胸部 CT 图像上评估胸 5-胸 8 的骨密度以筛查骨质疏松症。

方法: 连续选择自 2021 年 1 月至 2021 年 12 月因“肺结节复查”于我院行胸部 CT 平扫的体检患者, 共纳入 1014 例患者, 随机分为训练集和测试集。将腰椎 QCT 扫描图像传入 QCT Pro 工作站并测量椎体骨密度, 根据骨密度值将患者分为骨密度正常、低骨量和骨质疏松者。在训练集中, 应用 python3.6.12 软件, 构建深度卷积神经网络(DCNN)模型。在测试集中, 使用受试者工作特征(ROC)曲线分析评估深度学习模型对骨密度正常、低骨量、骨质疏松的诊断价值, 计算 ROC 曲线下面积(area under curve, AUC)及敏感性、特异性、准确性。

结果: 1014 例患者随机分为训练数据集 436 例和测试数据集 578 例。训练数据集中, 骨密度正常者 235 例, 低骨量者 121 例, 骨质疏松者 80 例。测试数据集中, 骨密度正常者 386 例, 低骨量者 146 例, 骨质疏松者 46 例。ROC 曲线分析显示, 深度学习模型分类骨密度正常、低骨量、骨质疏松的 AUC 值分别为 0.952、0.901、0.975, 准确性分别为 0.894、0.860、0.962。

结论: 基于胸部 CT 图像上胸 5-胸 8 椎体的深度学习模型有助于筛查骨质疏松症, 有利于早期发现低骨量和骨质疏松患者以提高治疗效果、改善患者生活质量。

PU-1318**基于对比增强双能计算机断层扫描诊断恶性肿瘤患者转移淋巴结的准确性:一项系统回顾和荟萃分析**

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目的: 目前, 尚未有系统评价和或 Meta 分析来评估对比增强双能 CT 在转移淋巴结中的应用价值, 本研究系统评价双能 CT 在淋巴结转移中的应用价值, 为临床实践提供循证学依据。

方法: 检索 PubMed、Embase 和 Cochrane 图书馆数据库从建库至 2022 年 9 月发表的相关文献。仅纳入了探讨 DECT 对恶性肿瘤患者转移性淋巴结的诊断准确性, 并且手术切得到病理证实的研究。使用诊断准确性研究质量评估工具对纳入研究的质量进行评估。通过计算 Spearman 相关系数和 SROC 曲线来确定阈值效应。采用 Deeks 检验评估发表偏倚。

结果: 所有纳入的研究均为观察性研究。本综述共纳入 16 篇文章, 涉及 984 例患者(2577 个淋巴结)。meta 分析共纳入 15 个变量, 其中单独参数 6 个, 组合参数 9 个。动脉期标准化碘浓度(NIC)结合动脉期斜率能更好地识别转移淋巴结。spearman 相关系数为- 0.371 ($P=0.468$), SROC 曲线不呈“肩-臂”形, 说明不存在阈值效应, 但存在异质性。联合敏感性为 94%[95% CI: 86 ~ 98%], 特异性为 74% (95% CI: 52 ~ 88%), 曲线下面积为 0.94。Deeks 检验显示纳入的研究没有显著的发表偏倚($P=0.06$)。

结论: 动脉期 NIC 联合动脉期斜率对鉴别转移性淋巴结和良性淋巴结有一定的诊断价值, 但应在严格设计和高度均匀性的其他研究中进一步评估。

PU-1319

Predictive value of hepatoid adenocarcinoma of the stomach based on CT Radiomics

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Objective:

Based on the results of studies above, we found the venous phase images had the best predictive value for gastric hepatoid adenocarcinoma. The predictive model of radiomics features extracted from the venous phase was constructed. The nomogram model was established in the combination of the location of lesion, serum AFP, CT attenuation values of the venous phase and radiomics model of the venous phase which efficiency was evaluated for predictive value of gastric hepatoid adenocarcinoma.

Materials and Methods:

44 gastric hepatoid adenocarcinoma cases(31 in the training set, 13 in the validation set) and 116 common gastric adenocarcinoma cases(81 in the training set, 35 in the validation set) were randomly divided into the training set and the validation set in a ratio of 7:3. 3D-Slicer software was used to perform semi-automatic ROI segmentation of the lesion from the venous phase and extract radiomics features. Pycharm Community software was used to perform Lasso dimensionality reduction analysis so that the most diagnostic radiomics features of the venous phase were obtained. Logistic regression modeling method was used to establish the venous phase radiomics model which was combined with the location of lesion, serum AFP and CT attenuation values of venous phase to construct the nomogram model. ROC curves were drawn and AUC, sensitivity and specificity were calculated to evaluate the diagnostic efficiency of the venous phase radiomics model and the nomogram model both in the training set and the validation set.

Results:

1130 radiomics features were extracted from the ROI of the venous phase in the training set. 5 optimal radiomic features were selected by dimensionality reduction analysis(log_sigma_4_0_mm_3D_ngtdm_Strength、wavelet_LLH_firstorder_Maximum; wavelet_HHL_glcmlmc2、wavelet_HHH_glcmlInverseVariance、wavelet_LLL_firstorder_Mean). Logistic regression modeling method was used to build the venous phase radiomics model and the nomogram model. The AUC of the venous phase radiomics model in the training set and validation set were 0.896 and 0.808, with the sensitivity of 81.82% and 81.82% and the specificity of 84.81% and 70.27%. The AUC of the nomogram model in the training set and verification set were 0.957 and 0.973, with the sensitivity of 100.00% and 90.91% and the specificity of 81.01% and 97.30%.

Conclusion:

Our study established the nomogram model which was comprised by the combination of the location of lesion, serum AFP, CT attenuation values of the venous phase and optimal venous phase radiomics features. The predictive efficiency of the nomogram model was higher than that of the lesion location, serum AFP, CT attenuation values of venous phase and venous phase radiomics model. The nomogram model can be used to adjust the treatment before surgery in clinical course.

PU-1320

抑郁症患者大脑结构和功能的改变及其遗传机制：一项结合转录组的多中心研究

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目的：抑郁症是一种高度复杂的神经异质性疾病，先前研究表明 MDD 患者的大脑结构和功能发生巨大改变。然而 MDD 患者大脑结构和功能改变背后的分子遗传机制仍不清楚。本研究旨在探索 MDD 患者大脑结构和功能改变的分子遗传机制并结合随机森林模型来诊断抑郁症患者。

方法：本研究包括 3 个独立的数据集。发现数据集包括 160 名抑郁症患者和 119 名匹配良好的健康对照者。验证数据集包括 54 名首发未经治疗的 MDD 患者和 78 名匹配 HCs 和来自自公共数据集的 126 名 MDD 患者和 124 名 HCs。我们基于动态功能连接的多层网络求出患者招募整合两个属性并基于体素的形态学分析来提取受试者的功能和结构特征。结合 Allen 人脑图谱进行转录组-神经成像关联分析，并求出结构和功能重叠的相关基因，以鉴定与 MDD 患者结构、功能变化相关的基因表达，随后进行基因特征分析。融合多模态神经影像特征并结合 RF 模型来诊断 MDD 患者，并探索 MDD 患者大脑结构、功能改变与临床症状的相关性。所有的研究过程都在两个验证数据集进行重复以验证实验的鲁棒性。

结果：我们发现抑郁症患者皮质-边缘系统（额叶、颞叶、海马...）的脑区结构功能显著改变。此外我们发现患者结构和功能改变重叠的基因为 884 个。这些基因在受试者的大脑皮层的重要分子功能、生物过程和细胞成分以及生物学行为中显著富集。此外，MDD 患者大脑结构和功能改变重叠的基因可以构建一个由 50 个具有功能意义枢纽基因支持的蛋白质-蛋白质相互作用网络。此外融合多模态神经影像特征的 RF 模型分类效率显著提高，模型的曲线下面积为 92.6%，灵敏度为 90%，特异性为 85%，准确率为 86%。识别的神经影像学特征可以很好地预测抑郁症患者的焦虑、抑郁量表评分以及患者的自杀风险。所有研究过程在验证数据集中得以重复，这也证明了我们实验方法的鲁棒性。

结论：我们研究结果表明，抑郁症患者大脑结构和功能改变可能是不同功能特征的广泛基因复杂作用结果。多模态神经影像特征对 MDD 患者有较高的诊断价值，为了解 MDD 的病理机制提供了重要的见解。

PU-1321

DLIR-H in head and neck CT angiography improves image quality and reduces both radiation and contrast doses

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Objectives :

To explore the use of 80-kVp tube voltage combined with high-DLIR-H in reducing radiation and contrast doses in head and neck CTA in patients with body BMI < 26 kg/m², in comparison with the conventional scan protocol using 100 kVp and ASIR-V.

Methods :

A total of 100 patients with suspected cerebrovascular disease referred to head and neck CTA were prospectively enrolled and randomly divided into two groups: low-dose group (n = 50) with 80 kVp, Smart mA for NI of 16 HU, contrast dose rate of 3.0mgI/s, and DLIR-H, conventional group (n = 50) with 100 kV, Smart mA for NI of 12HU, contrast dose rate of 4.5mgI/s, and 50% ASIR-V. Radiation and contrast dose, subjective image quality score, and objective image quality measurement (image noise, CNR, and SNR for vessel) were compared between the two groups. The stenosis degrees were measured on the patients receiving DSA in the low-dose group. Stenosis grade categories were as follows: mild stenosis (<50%), moderate stenosis (50%–74%), severe stenosis (75%–99%), and occlusion (100%).

Results:

Low-dose group used reduced contrast dose (30mL, 33.3% reduction) and radiation dose (1.94 ± 0.22 mSv, 34.7% reduction) compared to the conventional group (45 mL) and (2.97 ± 0.25 mSv) ($p < 0.001$). Vascular enhancement was higher in the low-dose group than conventional-dose group ($p < 0.01$). The remaining five segments (CCA, ICA, MCA, VA, BA) except for the aortic arch all have higher CNR, SNR and lower image noise (all $p < 0.001$). For 21 patients received DSA, included a total of 368 vascular segments. The weighted K coefficient between the CTA and DSA stenosis detection was 0.82 ± 0.03 . Diagnostic performance of CTA had good consistency with DSA.

Conclusions:

The use of 80-kVp tube voltage combined with DLIR-H for head and neck CTA in normal size patients significantly reduces radiation dose and contrast dose while further improving image quality and accuracy compared with the conventional 100-kVp tube voltage with 50% ASIR-V.

PU-1322

Research on the establishment of a model for predicting soft plaques based on right-dominant coronary CT angiography using coronary periadventitial adipose tissue

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Purpose: The purpose of this research study was to establish clinical, radiomics, and combined models based on perivascular fat around the right-dominant coronary artery in coronary CT angiography (CCTA) images. The study aimed to construct Nomograms to explore their diagnostic value for soft plaque.

Methods: Retrospective data was collected from two academic medical centers between January 2022 and September 2023, including a total of 305 patients. All patients underwent CCTA examination for coronary artery evaluation, and clinical data were collected. The Third Affiliated Hospital of Qiqihar Medical College provided the training set, and the Second Affiliated Hospital of Qiqihar Medical College provided the external test set. On CT images, a three-dimensional volume of interest (VOI) containing perivascular fat around the proximal segment of the right coronary artery was delineated, and radiomics features were extracted. A radiomics model was established using machine learning methods on the training set and validated on the test set. Through feature selection and dimensionality reduction, a radiomics model was built. Additionally, a clinical model was established using baseline clinical features. Finally, a combined model was established by integrating radiomics features and clinical features, and the diagnostic performance of each model was analyzed using SVM, Random Forest, SGD, KNN, XGBoost, and LightGBM classifiers. The area under the receiver operating characteristic curve (AUC) was calculated to compare the performance of each model.

Results: The study included 305 patients with a mean age of 55 ± 10 years. Radiomics modeling showed that 106 patients had coronary soft plaque (34%). The radiomics model consisted of 7 radiomics features and achieved an AUC of 0.892, specificity of 80.5%, sensitivity of 81.7%, and accuracy of 79.8% on the test set. The clinical model achieved an AUC of 0.755, specificity of 72.4%, sensitivity of 73.6%, and accuracy of 76.3% on the test set. The combined model achieved an AUC of 0.931, specificity of 89.5%, sensitivity of 88.4%, and accuracy of 89.1% on the test set.

Conclusion: The clinical and radiomics combined model based on perivascular fat around the right-dominant coronary artery in CCTA images is better at predicting the presence of non-calcified plaques and has higher diagnostic accuracy. The Nomograms illustrate the testing performance of the model.

PU-1323

基于多参数磁共振的深度影像组学诺莫图术前区分 I 型和 II 型上皮性卵巢癌

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目的: 开发并验证基于多参数磁共振成像 (MRI) 的深度学习影像组学诺莫图 (DLRN), 以区分 I 型和 II 型上皮性卵巢癌 (EOC)。

方法: 本回顾研究共纳入来自 5 个中心的 439 例 EOC 患者 (I 型 298 例, II 型 141 例)。其中一个中心的患者数据作为外部验证集, 剩余患者数据以 7:3 的比例划分为训练集和内部验证集。采用 T2 图像定界肿瘤 ROI, 并将 DWI 和 ADC 图像配准至 T2 加权图像。各参数图像中分别提取 1230 个影像组学特征。经单因素分析及 LASSO 筛选, 应用 10 次 10 折交叉验证, 频率超过 50% 的特征纳入影像组学模型。深度学习模型使用 ResNet50 神经网络, 将 T2、DWI 和 ADC 图像的病灶最大横断面进行前融合输入。单因素及多因素 logistic 回归分析以选择独立临床预测因子。将影像组学及深度学习模型的预测概率作为标签, 结合独立临床预测因子构建 DLRN。所有模型均采用 10 折交叉验证并行内、外部验证。使用 ROC 曲线、Brier 分数及决策曲线分析模型的诊断性能及临床应用价值。

结果: 十折交叉验证结果显示, DLRN 模型的 AUC 为 0.828 ± 0.088 , 无论 AUC 值及标准差均优于单一深度学习 (0.714 ± 0.153)、影像组学 (0.828 ± 0.088) 及临床模型 (0.714 ± 0.119)。无论在内部还是外部验证集, DLRN 模型的诊断效能最佳, AUC 分别为 0.849 (95%CI: 0.77, 0.919) 及 0.888 (95%CI: 0.826, 0.943), Brier 分数分别为 0.149 及 0.148。

结论: 本研究成功开发和验证了综合多参数 MRI 的 DLRN 模型, 有效区分了 I 型和 II 型 EOC 患者。模型在交叉验证、内部和外部测试集中的一致且高效能的表现有效地证明了其在未知数据集中的泛化性。本次研究有潜力为 EOC 患者的个体化治疗策略的制定提供新的视角。

PU-1324

人工智能在辅助冠状动脉 CTA 图像后处理的应用价值

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目的: 探讨 CT 冠状动脉成像人工智能在辅助冠状动脉 CTA 图像后处理以及评估冠状动脉狭窄诊断价值

方法: 回顾性收集行冠状动脉 CTA 检查及冠状动脉 AI 软件辅助诊断完成, 并且在三个月内行有创冠状动脉造影的患者, 以有创冠状动脉造影检查结果为金标准, 统计分析人工智能在诊断冠状动脉狭窄的准确性。

结果: 在冠状动脉斑块及狭窄的诊断中, 人工智能辅助诊断与冠脉造影检查诊断结果比较有统计学差异 ($P < 0.05$)。人工智能与 ICA 对于检出冠状动脉狭窄程度大于 50% 的一致性较好。AI 与医生诊断对冠状动脉完全闭塞, 起源变异, 桥血管无统计学差异。

结论: CCTA 图像质量较好时, AI 诊断冠状动脉狭窄的准确性较高, 可作为诊断辅助诊断冠状动脉狭窄的工具, 但目前 AI 对于图像质量较差, 血管变异等的诊断能力有限。

PU-1325

OA-HybridCNN (OHC): 一种先进的深度学习融合模型, 用于提高膝关节骨关节炎成像的诊断准确性

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背景: 膝骨关节炎(KOA)是全球致残的主要原因。早期和准确的诊断对于预防其发展和改善患者的生活质量至关重要。在骨性关节炎的诊断过程中, 偏远地区放射科医生诊断能力的不足和长期阅片导致的视觉疲劳常导致诊断准确性的不足, 因此, 准确的自动化诊断对于骨性关节炎的诊断是十分有必要的。

方法: 我们提出了一个先进的深度学习模型, OA-HybridCNN (OHC), 该模型结合了 ResNet 和 DenseNet 架构。这解决了 DenseNet 中的梯度消失问题, 并提高了预测准确性。我们通过五折交叉验证和外部测试与其他深度学习模型进行了有效性比较。

结果: 在所有性能指标中, OHC 模型均超越其他模型。在外部测试中, OHC 的准确率、精确度和召回率分别为 91.77%、92.34% 和 91.36%。在五折交叉验证中, 其平均 AUC 和 ACC 分别为 86.34% 和 87.42%。

结论: 深度学习, 尤其是 OHC 模型, 大大提高了 KOA 成像诊断的效率和准确性。采用此类技术将减轻放射科医生的工作负担, 并显著提高诊断的精确度。

PU-1326

能谱 CT 影像组学特征术前预测肝癌 CD105 高表达的初步研究

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目的:探讨能谱 CT 单能量图像影像组学模型在术前预测肝癌 CD105 高表达中的应用价值。

方法:本研究纳入了 92 例病理证实为肝细胞癌 (HCC) 并有 CD105 表达结果的患者,其中训练集 54 例,验证集 38 例,所有患者术前已行能谱 CT 增强检查。在 HCC 动脉期和门脉期图像中手工勾画出肿瘤感兴趣体积 (VOI),从中提取 1218 个影像组学特征。采用最小绝对收缩和选择算子 (LASSO) 回归 5 折交叉验证法进行特征筛选。利用 4 种机器学习算法构建动脉期和门脉期影像组学模型。利用 ROC 曲线评估模型的预测效能。

结果:基于动脉期影像组学特征构建决策树、随机森林、支持向量机和逻辑回归模型预测训练集肝癌 CD105 高表达的 AUC 值分别为 0.949、1.000、0.995 和 1.000,验证集中 AUC 分别为 0.735、0.810、0.844 和 0.745。4 种机器学习模型 AUC 的差异均无统计学意义 (均 $P>0.05$)。基于门脉期影像组学特征构建的决策树、随机森林、支持向量机和逻辑回归模型预测训练集肝癌 CD105 高表达的 AUC 值分别为 0.963、1.000、0.993 和 1.000,验证集中 AUC 分别为 0.645、0.855、0.748 和 0.713。随机森林与决策树和逻辑回归模型 AUC 的差异有统计学意义 ($P<0.05$),而其他机器学习模型 AUC 的差异无统计学意义 (均 $P>0.05$)。验证集中动脉期和门脉期影像组学模型的 AUC 的差异无统计学意义 ($P=0.854$)。

结论:基于肝癌动脉期和门脉期能谱 CT 70keV 单能量图像影像组学特征的机器学习模型可用于术前预测肝癌 CD105 高表达。其中,随机森林模型具有较高的预测效能。

PU-1327

基于 CT 影像组学构建机器学习模型鉴别基底节区结节状脑出血和钙化

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目的:通过基于 CT 平扫图像提取的影像组学特征结合机器学习方法构建鉴别基底节区结节状脑出血和钙化的模型并验证。

方法:回顾性纳入 2018 年 6 月—2023 年 6 月于行脑部 CT 平扫并经多次影像学检查证实的基底节区 65 个结节状 ($D_{\max}<2.00\text{cm}$) 脑出血和 114 个钙化灶,以 7:3 的比例随机分为两组,一组为训练集 ($n=125$),另一组为测试集 ($n=54$)。由两位高年资影像医师勾画病灶,使用 Python 中 "Pyradiomics" 包从每个感兴趣区 (ROI) 中提取训练组的影像组学特征。采用组内组间一致性分析选择高稳定性的特征,选择皮尔逊相关系数和特征选择分析 (方差分析 [ANOVA]、过滤式特征选择 [Relief]、Kruskal-Wallis [KW]、递归特征消除 [RFE]) 进行降维,并使用包括支持向量机 (SVM)、自编码器 (AE)、线性判别分析 (LDA)、随机森林 (RF)、逻辑回归 (LR)、通过 Lasso 进行逻辑回归 (LRLasso)、自适应增强 (AB)、决策树 (DT)、高斯过程 (GP)、朴素贝叶斯法 (NB) 在内的 10 个机器学习分类器进行了分类,结果通过留一交叉验证分析进行评估。

结果:每个 ROI 各提取 851 个特征。比较验证数据集中所有管道的 AUC,发现使用 RFE 特征选择和线性判别分析分类器的管道具有 10 个特征时的 AUC 最高。当使用 "一个标准误差" 规则时,FAE 使用 17 个特征生成了一个更简单的模型。训练集、验证集和测试集的 AUC 分别达到了

0.970、0.940 和 1.000。与 ANOVA、KW 和 relief 相比, RFE 特征选择的所有算法结果都更加稳定, 各 AUC 值均高于 0.7007。

结论: 基于 CT 平扫图像的组学机器学习分类模型鉴别诊断基底节区结节性脑出血和钙化具有较高效能, 可推广于临床上辅助诊断。

PU-1328

基于 bpMRI 的影像组学联合临床指标对前列腺癌包膜外侵犯评估价值的应用研究

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目的 评估基于 bpMRI 的影像组学—临床联合模型对 PCa ECE 的诊断效能。

方法 回顾性收集 392 例我院行 MRI 检查并经手术病理证实 PCa 患者的 bpMRI 图像及临床相关信息。按照 7: 3 的比例将患者随机分配至训练组和测试组。影像诊断医师在未知病理结果的情况下根据图像对所有病灶的 ECE 情况进行 Mehralivand 分级, 并对所有病灶进行勾画, 提取每个病灶的影像组学特征。经 Z-Score 标准化法特征归一化, RFE 算法去除冗余特征和 LASSO 分类器迭代训练, 构建影像组学模型。此外, 采用单因素和多因素二元 logistics 回归模型分析, 将临床相关信息中的独立预测因子筛选出来构建临床模型。随后将临床相关信息中的独立预测因子与影像组学模型结合, 构建联合模型; 同时根据联合模型指标构建评估 ECE 的诺模图。最后通过 Delong 检验和决策曲线分析比较临床模型、Mehralivand 分级、影像组学模型及联合模型对 ECE 的诊断效能。

结果 在训练组中, 联合模型和影像组学模型诊断 ECE 的 AUC 值分别为 0.897 和 0.882。基于测试组, 联合模型和影像组学模型对 ECE 的诊断效能相当[AUC 值分别为 0.894 和 0.835, $P>0.050$], 但联合模型具有更高的敏感度和准确度。另外, 在训练组和测试组中, 临床模型评估 ECE 的 AUC 值分别为 0.805 和 0.749, 均低于联合模型的诊断 AUC 值[均 $P<0.05$]; Mehralivand 分级评估 ECE 的 AUC 值分别为 0.746 和 0.774, 也均低于联合模型的诊断 AUC 值[均 $P<0.05$]。最后, 决策曲线分析表明, 联合模型较临床模型、Mehralivand 分级及影像组学模型可获得最高的临床净收益。

结论 基于 bpMRI 的影像组学—临床联合模型较临床模型、Mehralivand 分级及影像组学模型对 PCa 患者的 ECE 具有更好的评估价值, 有助于 PCa 患者术前个体化精准诊疗。

PU-1329

MSCT 后处理技术对慢性中耳乳突炎颞骨区骨质破坏的术前评估价值

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目的

探讨 MSCT 后处理技术对慢性中耳乳突炎颞骨区骨质破坏的术前评估价值。

方法

对 156 例慢性中耳乳突炎患者行颞骨 MSCT 横断面高分辨率扫描并进行听小骨及听骨链、内耳(耳蜗、前庭及各组半规管)结构、面神经管等结构的多平面重组(MPR)及曲面重组(CPR), 观察颞骨区骨质结构破坏情况, 并与手术所见对照, 分析探讨颞骨 MSCT 后处理技术对慢性中耳乳突炎颞骨区骨质结构破坏的术前影像学评估价值。

结果

156 例慢性中耳乳突炎患者中，双耳患病 122 例，单耳患病 34 例，共计患耳 278 耳，胆脂瘤型中耳炎 74 耳，非胆脂瘤型中耳炎 204 耳；术前 MSCT 诊断胆脂瘤型中耳炎 68 耳，均与手术所见相符，6 耳术前 MSCT 诊断为非胆脂瘤型中耳炎者手术发现胆脂瘤；术前 MSCT 发现鼓室壁及鼓窦骨质破坏 68 耳，听小骨吸收破坏 108 耳（锤骨破坏 77 耳，砧骨破坏 62 耳，镫骨破坏 48 耳），水平半规管骨质破坏 9 耳，面神经管骨质破坏 12 耳，均与手术所见相符。

结论

颞骨 MSCT 后处理技术能清晰显示颞骨区诸骨质结构的全貌，可对慢性中耳乳突炎对颞骨区骨性结构破坏情况进行准确的术前评估，诊断效果与术中所见具有高度一致性。

PU-1330

CT 影像组学在鉴别肺淋巴上皮癌与腺癌中的应用价值研究

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肺淋巴上皮癌（LELC）在临床上较为罕见，其 CT 影像学表现与部分肺腺癌较难区分，掌握其放射组学特征有利于在影像上对该两类疾病进行鉴别，从而指导临床治疗。本研究拟探讨基于 CT 影像组学特征的机器学习模型在鉴别 LELC 与肺腺癌任务中的应用价值。

PU-1331

基于机器学习的 3.0T MRI 磁共振影像组学在脑胶质瘤术后放疗后复发的鉴别诊断价值

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目的 探讨基于机器学习的 3.0T MRI 磁共振影像组学在脑胶质瘤术后放疗后复发的鉴别诊断价值
方法 回顾性分析 2022 年 1 月至 2023 年 5 月在中国科学技术大学附属第一医院西区（安徽省肿瘤医院）接受手术治疗，放疗后常规 MRI 检查出现新强化灶的 77 例胶质瘤患者的 MRI 资料，在增强 T1WI 序列上提取影像组学特征。根据再次手术、临床及 MRI 随访结果综合诊断分为复发组（31 例），放射性脑坏死组（46 例）。所有患者按 8:2 比例分为训练组（n=61）和测试组（n=16），训练组用于特征筛选和建立影像组学模型，测试组用于验证所建立模型的可靠性。特征筛选由 Pearson Correlation 与选择算子回归（LASSO）完成，应用 logistic 回归构建影像组学模型预测脑胶质瘤术后放疗后状态。ROC 曲线和 AUC 值用于计算模型的预测性能。绘制校准曲线以评估预测概率和实际概率之间的一致性。通过决策曲线分析评估放射模型的应用价值。

结果 从每例患者的 T1WI 增强图像中共提取出 1874 个影像组学特征，并通过 Pearson Correlation 与选择算子回归（LASSO）筛选特征，得到的影像组学模型对脑胶质瘤术后放疗后复发具有较好的预测性能，在训练组中 AUC 为 0.934，在测试组中 AUC 为 0.733。校准曲线显示，预测概率和实际概率之间具有良好的一致性。临床决策曲线显示，当风险阈值为 15%~98% 时，采用影像组学方法预测脑胶质瘤术后放疗后复发的临床获益较高。

结论 利用 3.0T MRI T1WI 增强影像组学特征构建影像组学模型对于脑胶质瘤术后放疗后复发有较好的诊断效能，可为临床个体化治疗提供帮助。

PU-1332

多个扩散参数图在 2 型糖尿病与糖尿病肾病诊断中的效能评估： 基于自动分割构建的影像组学方法

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目的：基于自动分割肾脏 MR 影像构建影像组学模型，探讨扩散峰度成像（DKI）和扩散张量成像（DTI）的多个参数图在诊断 2 型糖尿病（T2DM）与糖尿病肾病（DKD）的效能。

方法：回顾性收集 2022 年 1 月至 2023 年 4 月在贵州省人民医院就诊的 163 例 T2DM 患者，并根据估算肾小球滤过率（eGFR）和尿白蛋白与肌酐比值（UACR）分为糖尿病(n=76)和糖尿病肾病(n=87)两个组。利用 DKI 的参数图[峰度各向异性（KFA）、平均扩散峰度(MK)、轴向扩散峰度（AK）、径向扩散峰度（RK）]以及 DTI 的参数图[部分各向异性（FA）、平均扩散度(MD)、轴向扩散度（AD）、径向扩散度（RD）]训练 SWIN UNETR 模型对肾脏进行自动分割，将其划分为训练集(n=114)及验证集（n=49），对验证集采用 Dice 相似系数（DSC）评估模型自动分割肾脏的能力。利用 Pyradiomics 工具从 DSI 以及重建后的各个参数图中分别提取影像组学特征，随后利用 SMOTE 算法使训练数据均衡，并选取 10 个机器学习模型分别在训练集上进行了测试，最终选取平均表现性能最好的机器学习模型在测试集上进行预测。采用受试者工作特征曲线下面积（AUC-ROC），准确率，灵敏度和特异度评估影像组学模型的诊断能力。

结果：DSI 验证集中的平均 DSC 为 92%，在 DTI 的 FA、MD、AD、RD 参数图中，验证集平均 DSC 分别为 92%、93%、92%、93%，在 DKI 的 AK、RK、MK、KFA 参数图中，验证集平均 DSC 分别为 94%、93%、94%、92%。选取随机森林作为分类器，DSI 测试集平均 AUC-ROC 为 54%，在 DTI 的 FA、MD、AD、RD 参数图中，测试集的平均 AUC-ROC 分别为 75%、82%、67%、79%。在 DKI 的 KFA、MK、AK、RK 参数图中，平均 AUC-ROC 分别为 63%、82%、90%、66%。

结论：深度学习技术可以用于实现快速和准确的肾脏分割，从而减少手动标注成本。此外，在诊断 2 型糖尿病与糖尿病肾病之间，基于 DKI 和 DTI 的参数图的影像组学方法可以作为一种相对简单、准确、无创的工具。

PU-1333

深度学习头颈动脉 CTA 去骨算法的临床应用价值评估

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目的：基于深度学习（deep learning, DL）的颈动脉 CTA 去骨算法可以对头颈动脉 CTA 进行准确分割，增加去骨的准确性，提高图像后处理能力，本研究对新出现的基于 DL 的 CTA 分割算法的应用效能进行评估，评价其临床效能。方法：收集 2021 年 10 月至 2021 年 12 月在我院行头颈动脉 CTA 扫描的患者。纳入标准：大于 18 岁。将头颈部动脉划分为左右两侧，每侧分为 10 段（颈总动脉、颈外动脉、颈内动脉颈段、颈内动脉岩段、颈内动脉破裂孔段、颈内动脉虹吸段、大脑中动脉 M1 段、椎动脉、基底动脉、大脑后动脉 P1 段）。对图像使用传统、DL 基础的方法进行后处理，基于颈动脉 MIP 图对两种方法的去骨效果、血管完整性进行主观评价。使用配对非参数检验对两组间不同节段的去骨效果、血管完整性进行分析。结果：100 例患者纳入最终研究。在去骨效果方面，在颈总动脉、颈内动脉颈段、颈内动脉岩段、颈内动脉破裂孔段、颈内动脉虹吸段间，两种方法的评分存在差异，基于 DL 的算法优于传统算法。但在颈外动脉、椎动脉、基底动脉、大脑后动脉 P1 段间两者不存在差异。在血管完整性评价方面，两者不存在差异。在存在狭窄的血管中，两种方法对于各节段血管分割完整性存在差异（P 值=0.011, $p<0.001$ ）。结论：基于 DL 的

CTA 分割算法在去骨方面效果优于传统方法,尤其在颈内动脉,对于颅内骨质较多的部位去骨效果明显好于常规方法。

PU-1334

CT 容积再现技术评估颈椎斜位投射角度及影响因素

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目的:探讨颈椎斜位摄影各椎间孔最佳投射角度及其影响因素。

方法:回顾性分析 405 例颈椎三维螺旋 CT 平扫资料,采用 CT 容积再现技术取得颈椎各椎间孔最佳显示的旋转角度,即为颈椎斜位摄影各椎间孔最佳投射角度,并分析其潜在影响因素,包括性别、年龄、是否存在骨质增生、椎间盘突出及生理弯曲改变。

结果:C2-T1 各椎间孔最佳投照角度分别为 $50.82\pm 3.24^\circ$ 、 $50.85\pm 3.13^\circ$ 、 $51.47\pm 2.79^\circ$ 、 $52.28\pm 3.10^\circ$ 、 $54.19\pm 4.32^\circ$ 、 $57.66\pm 3.50^\circ$;年龄、性别及是否椎间盘突出均对颈椎斜位各椎间孔最佳投射角度无影响($P>0.05$);骨质增生对下部颈椎 C5-T1 椎间孔最佳投射角度的影响有统计学意义($P<0.05$);生理弯曲改变对上颈椎 C2-C6 椎间孔最佳投射角度的影响有统计学意义($P<0.05$)。

结论:CT 容积再现技术可得到颈椎斜位摄影最佳投照角度为 $50^\circ\sim 58^\circ$,从上到下逐渐增大,对生理弯曲改变和骨质增生患者在颈椎斜位 X 线摄影,尤其是显示 C5-C6 椎间孔时可适当加大角度。

PU-1335

基于 MRI 的广泛性焦虑障碍脑网络状态动力学研究

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目的:前人研究报道了广泛性焦虑障碍(GAD)大脑异常动态连接模式,然而 GAD 脑网络状态的动力学特征仍不明确。本研究旨在基于磁共振技术利用共激活模式(CAP)探究 GAD 脑网络状态异常动力学变化,为疾病诊断提供脑影像学标记物。方法:共纳入 92 例 GAD 患者和 77 例健康对照,采用 3T GE MR750 磁共振扫描仪,fMRI 参数:TR/TE=2000/30ms,翻转角=90°,矩阵=64x64,层数=43,层厚=3.2mm,无层间隔,体素=3.75x3.75x3.2mm³,视场=240x240mm²,时间点=255。T1 加权结构影像参数:TR/TE=5.92/1.956ms,矩阵=256x256,翻转角=12°,视场=256x256mm²,体素=1x1x1mm³,层数=156,厚度=1mm,无层间隔。预处理:(1)去除前十个时间点;(2)时间层校正;(3)将 T1 数据配准到功能像;(4)T1 数据分割;(5)功能像数据标准化到 MNI 空间,并重采样到 3x3x3mm³;(6)回归 24 个头动参数、白质信号、脑脊液信号和全脑信号;(7)带通滤波(0.01-0.08hz);(8)8mm 平滑核空间平滑;(9)使用 408 个 ROI 的模板提取 BOLD 信号用于后续分析。共激活模式分析首先使用 z 分数对时间序列进行标准化,并将所有健康对照的数据连接起来得到 255x77x408 的矩阵。使用 K-means 聚类算法将 255x77 个时间点下的图像分配到 K 个状态中。将聚类结果应用到 GAD 患者上,将每个时间点分配到与聚类结果中最相似的状态中。使用 silhouette 分数评估不同 K 下的聚类结果,并结合手肘法确定状态个数 K。最后计算了 CAP 状态的时间占比、持续时间、出现频次、转移概率等指标,并进行统计分析。结果:我们识别了 8 种不同的大脑状态。GAD 患者状态 2 和状态 4 持续时间显著低于健康对照组。GAD 患者状态 2 和状态 4 的自转移概率显著降低,状态 2 到状态 5、状态 2 到状态 6、状态 3 到状态 7、状态 5 到状态 2 的转移概率显著增加。结论:本研究为理解 GAD 病理机制方面提供异常大脑动态配置信息,为该疾病的诊断鉴别提供脑影像标记物。

PU-1336

Temporal shifts of brain spontaneous activity in major depression disorder

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Object: Major Depressive Disorder (MDD) is a multifaceted mental health condition characterized by significant heterogeneity in clinical presentations. Understanding the neural underpinnings of these varying symptom profiles remains elusive. This study aims at elucidating distinctive temporal dynamics of brain activity in subgroups of MDD patients using resting-state fMRI.

Methods: We recruited 128 inpatients diagnosed with MDD for this investigation. Utilizing Latent Profile Analysis (LPA), we categorized patients into subgroups based on their clinical depression scores. We employed a time delay algorithm to quantify the temporal dynamics of brain activity.

Results: Our findings revealed that patients experiencing high levels of insomnia exhibited delayed neural fluctuation in the dorsal attention network ($F = 8.81$, $p = .002$). Conversely, individuals with elevated anxiety demonstrated an earlier time delay in the somatomotor network ($F = 17.01$, $p < .001$). Furthermore, similarity analysis indicated a significant association between individual within-network standard deviation of time delay and clinical symptom scores ($r = 0.06$, $p < .001$). Notably, the time delay within the salience network contributed the most to this similarity, as determined by the Jack-knife approach.

Conclusion: This study discerns neural aberrations within the MDD population that correspond to the heterogeneity of patient symptoms. Insomnia appears to be associated with delayed neural fluctuations within the attention network, a region implicated in sustaining attention. Conversely, anxiety is linked to earlier neural fluctuations within the somatomotor network, which governs motor control. Our findings illustrate the effectiveness of dynamic algorithm in identified individualized brain activity in clinical population, meanwhile, underscore the imperative of tailoring personalized treatment strategies for individuals with MDD.

PU-1337

Development of a machine learning classifier for typhoon-related post-traumatic stress disorder based on voxel-based analysis of white matter

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Abstract

Objective: Post-traumatic stress disorder (PTSD) is the most common mental illness following traumatic events. Super typhoons, which are a form of environmental disasters, can affect the normal life. White matter damage was observed in participants with PTSD. Voxel-based analysis (FBA) has recently emerged as a useful technique to quantify abnormalities in the white matter. This study aimed to evaluate FBA metrics among typhoon survivors.

Methods: Whole-brain diffusion MRI of PTSD group ($n = 27$), the trauma-exposed control group (TEC) ($n = 33$), and the healthy group (HC) ($n = 30$) was used to identify fiber tracts with significant abnormalities in FBA metrics (fiber density, fiber cross-section, and fiber density cross-

section). We then investigated the diagnostic effects of white matter diffusion tensor imaging combined with machine learning to identify biomarkers of PTSD.

Results: Compared with the HC group, patients with PTSD had increased fiber density values within a fiber bundle in the right frontopontine tract and right middle longitudinal fascicle and increased FDC values in the bilateral frontopontine tract and left thalamo-premotor (Bonferroni correction, $p < 0.05/18 = 0.003$). To discover the differences between PTSD and TEC, we established binary classifier models and multiple element classifier models with 5-fold cross-validation using machine learning, i.e., the classification of PTSD vs. TEC (accuracy = 0.89; sensitivity = 0.97; specificity = 0.71; precision = 0.87; AUC = 0.95) and PTSD vs. TEC vs. HC (precision = 0.99; recall = 0.99; AUC=0.99). Shapley additive interpretation (SHAP) values are used to analyze the top 20 features of the optimal model to illustrate the interpretability of the model.

Conclusions: PTSD can lead to structural changes in brain white matter in most Typhoon-exposed participants. Combining FBA and machine learning, we demonstrate diffusion indicators for specific abnormal regions and their reliable diagnostic application in PTSD and trauma-exposed controls.

PU-1338

Hotspots Evolution and Trend Analysis of Artificial Intelligence Applied in Hepatocellular Carcinoma Since 2012: A Bibliometric Analysis

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Purpose: This study aims to analyze the evolution of hotspots and trends of artificial intelligence (AI) applied in hepatocellular carcinoma (HCC) using a visual bibliometric approach.

Materials and methods: We searched the Web of Science Core Collection database to select the articles related to AI applied in HCC from January 1, 2012, to March 15, 2023. The countries/regions, institutes, authors, journals, references, and keywords were visualized and analyzed.

Results: 961 articles were selected in this study. All articles were from 52 countries/regions, with China ($n = 585$) leading the total number of publications, followed by the United States of America ($n = 167$). These articles were published by 1518 institutions, mainly by Fudan University and Sun Yat-sen University with 56 and 55 articles respectively. There are 370 journals related to the application of AI in HCC. In our study, we found that "expression", "biomarker", and "resection" had higher centrality of 0.48, 0.47, and 0.38, respectively. And 18 clusters were obtained, in which the Top 3 clusters in order are "#0 hepatocellular carcinoma", "#1 deep learning", and "#2 microvascular invasion". After burst analysis, we found that "classification" was the strongest burst and the earliest emerging research direction.

Conclusion: AI was mainly applied in the field of HCC for tumor classification and microvascular invasion to construct prediction models using histopathological slices, medical images, and clinical features. It may be a key trend to improve the generalizability and interpretability of these models in the future.

PU-1339

基于多模式 MRI 的放射组学模型在子宫内膜癌淋巴血管间隙侵袭术前预测中的应用

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目的：确定基于 MRI 的放射组学预测子宫内膜癌（EC）患者淋巴血管间隙侵犯（LVSI）的能力。

材料和方法：共有 160 名女性（平均年龄 57.0 岁） 9.7（SD）年；33-80 岁）的 EC 患者。从术前 T2W 加权和对比增强 MR（CE-MRI）图像中提取放射组学特征。基于所选择的特征，建立了 GaussianNB 模型。临床模型（结合 MR 报告的 FIGO 分期、深层子宫肌层浸润（DMI）、子宫腺受累和阴道/子宫内膜受累）和联合模型（基于放射组学特征和临床模型）。通过训练和测试队列中受试者-操作员特征（ROC）的曲线下面积（AUC）来评估模型的性能。

结果：在预测 LVSI 方面，放射组学模型在训练队列中的表现比临床模型好得多（AUC=0.899 vs.0.8862），但在测试组中没有（AUC0.812 vs.0.8758）。联合模型在训练和测试队列中表现最好（训练队列，AUC=0.934,95%CI:0.8807-0.9873；测试队列，AUC=0.905，95%CI:0.7679-1）。

结论：联合模型可用于 EC 患者术前预测 LVSI，并有助于更好的临床决策。

PU-1340

人工智能自动无放射 MR 合成 CT 图像

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背景

融合多模态医学图像，例如磁共振（MR）成像和计算机断层扫描（CT），可以提供有关人体的各种解剖和功能信息。利用 MR 图像进行合成 CT 是一种节省成本但有效避免辐射对人体影响的方法。然而，现有的 MR 到 CT 合成方法大多依赖于卷积神经网络（CNN），缺乏全局建模能力，不利于合成具有全局依赖性和以不规则边界和区域为特征的病理结构的医学图像。

方法

在本文中，我们提出了一种具有多尺度输入的 Transformer 编码器-解码器网络，以改进 MR 图像的合成 CT。因此，我们首先设计了一个联合残差注意块（JRAB），从全局和局部层面显式地提取图像的层次结构，以解决解剖结构的分布引起的全局依赖性问题。其次，我们设计了一个跨尺度注意融合块（CAFB）来融合多尺度图像特征，以减轻病理组织不规则性带来的不利影响。

结果

我们通过将所提出的方法与五种最先进的方法进行比较，在基准数据集上对其进行评估。实验结果表明，该方法在定量测量和定性显示方面比竞争方法具有更优越的性能。

结论

我们的方法有望用于使用合成多模态医学图像的临床诊断。

PU-1341

Feasibility study of CT radiomics model for the prediction of early and intermediate stage hepatocellular carcinoma using BCLC staging

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Background: Hepatocellular carcinoma constitutes a serious health concern because of its high morbidity and mortality. The prognosis of HCC largely depends on disease stage at diagnosis. CT image textural analysis is an image analysis technique that has emerged over recent years.

Objective: To probe the feasibility of CT radiomics model for predicting early (stage 0, A) and intermediate stage (stage B) hepatocellular carcinoma using Barcelona Clinic Liver Cancer (BCLC) staging.

Methods: 190 cases of stage 0, A or B hepatocellular carcinoma with CT-enhanced arterial and portal vein phase images were assessed retrospectively. ITK - SNAP® was used to manually delineate the lesions to construct a region of interest (ROI) consisting of entire tumor - mass. Anaconda® was consequently used to extract the textural profiles of the ROIs, while least absolute shrinkage and selection operator (LASSO) dimensionality reduction was used to obtain the textural profiles and the area under the receiver operating characteristic (ROC) curve values.

Results: Within test cohort, the area under the curve (AUC) values associated with arterial phase images and BCLC stages 0, A, and B were 0.99, 0.98, and 0.99, accordingly. The overall accuracy rate was 92.7 %. The AUC associated with portal vein images and BCLC stages 0, A, and B were 0.98, 0.95, and 0.99, accordingly, with an overall accuracy of 90.9 %.

Conclusion: CT radiomics model can be used to predict BCLC staging of early and intermediate stage hepatocellular carcinoma.

PU-1342

基于计算机断层扫描和冠状动脉周围脂肪组织放射组学的甲状腺 功能减退症患者冠状动脉疾病的诊断：一项回顾性横断面研究

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背景: 甲状腺功能减退症与冠心病 (CAD) 的发病率和死亡率相关。预防甲状腺功能减退症患者发生 CAD 正在成为一个重要的公共卫生问题。有必要开发新的模型来提高甲减患者 CAD 的早期诊断水平, 积极预防 CAD 的发生和发展。我们的目的是评估基于计算机断层扫描 (CT) 的成像参数和冠状动脉周围脂肪组织 (PCAT) 的放射学特征是否可以提高甲状腺功能减退症患者患有 CAD 的诊断效果。

方法: 我们回顾性招募了 204 名既往未确诊 CAD 的甲状腺功能减退症患者作为 a 组。这些患者被随机分为训练组和试验组, 比例为 7: 3。同时, 作为对照, 我们回顾招募了 106 名被诊断为 CAD 的患者作为 b 组。我们收集了临床资料, 从患者的 CT 图像和 104 个 PCAT 放射学特征中提取了影像学参数。最终, 通过相关性剔除和梯度提升决策树 (GBDT) 方法从 a 组患者的 PCAT 中筛选出 10 个放射学特征。一共构建了四个模型, 分别包括临床因素 (模型 1)、临床因素和影像参数 (模型 2)、临床因素和 RADSore (模型 3) 和全部 (模型 4), 用于识别冠心病患者。绘制了 ROC 特性曲线、校准曲线和判决曲线分析 (DCA) 以评估模型的性能, 并通过 DeLong 检验进行模型的比较以验证不同因素的附加价值。

结果：在测试集中，模型 2 和模型 4 的曲线下面积(AUC)分别为 0.914 和 0.909，其识别效率高于其他两个模型(均 $P<0.05$)。然而，与模型 2 相比，模型 4 并没有提高识别冠心病的有效性($p=0.711$)；同样，模型 3(AUC=0.733)和模型 1(AUC=0.720, $p=0.839$)之间的 AUC 没有显著差异。总体而言，在诊断甲状腺功能减退症患者发生 CAD 方面，模型 2 被评为更好。

结论：与无甲状腺功能减退的冠心病患者相比，合并甲状腺功能减退的冠心病患者冠状动脉负担更重。将患者临床危险因素与 CT 影像参数相结合的综合诊断模型对甲状腺功能减退患者冠心病的发生具有较好的诊断效果。

PU-1343

3D MR Compressed Sensing Image Restoration by Denoising Convolutional Neural Network (DnCNN): Application to Brain Imaging

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Purpose

MR compressed sensing technology can significantly reduce 3D image acquisition time. However, the MR images may have artifacts (such as starry-sky artefact) due to signal loss with the increase of compressed sensing factor. Denoising convolutional neural networks (DnCNN) model is able to handle Gaussian denoising with unknown noise level (i.e., blind Gaussian denoising). This study explores the feasibility of reconstructing high compressed sensing 3D magnetic resonance images based on DnCNN.

Methods

Using the Philips 3T MR Ingenia CX, 30 brain images of 3D-MSDE sequences with different compressed sensing coefficients (CS=6, 8, 10, 12, 14, 16, 18) were collected, 100 layers per person, for a total of 3000 layers. At the same time, 3D-MSDE sequence brain MR data without using any acceleration algorithm was collected as the reference image. The mean square error, signal-to-noise ratio, and image structure similarity coefficient between the images with different CS coefficients were calculated. And the DnCNN parameters are trained by the 3000 layer images, which are divided into a training set (2000 layer) and a test set (1000 layer). The noise level of the images after denoising relative to the reference images are also evaluated. Statistical analysis of the three evaluation parameters between different groups are performed.

Results

With the increase of CS coefficient, the mean square error of the image increased significantly, and the signal-to-noise ratio and image structure similarity decreased significantly ($p<0.05$). When the CS factor reaches 10, the image quality is too seriously degraded to observe the image detail. The images processed by the DnCNN were compared with the corresponding image pairs. The signal-to-noise ratio and image structure similarity were significantly increased, and the image mean square error was significantly reduced ($p<0.05$). Horizontal comparison, even when the CS factor reaches 18, the image processed by DnCNN can still maintain a higher signal-to-noise ratio and structural similarity.

Discussion and Conclusion

The DnCNN can effectively remove the 3D MR image noise introduced by the high compressed sensing coefficient. The DnCNN combined with the compressed sensing technology can reduce the scanning time while ensuring the quality of the magnetic resonance image.

PU-1344

Automatic measurement of anatomical parameters of the lumbar vertebral body and the intervertebral disc on radiographs by deep learning

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Abstract

Objective To develop and evaluate an automatic measurement model for measuring the anatomical parameters of the vertebral body and intervertebral disc based on lateral lumbar radiographs and deep learning.

Materials and methods A model based on deep learning was developed with a dataset consisting of 1318 lateral lumbar radiographs for the prediction of anatomical parameters, including vertebral body heights (VBH), intervertebral disc heights (IDH) and intervertebral disc angles (IDA). The mean of the values obtained by three radiologists was used as a reference standard. Statistical analysis was performed in terms of standard deviation (SD), mean absolute error (MAE), Percentage Correct Key points (PCK), intraclass correlation coefficient (ICC), regression analysis, and Bland-Altman plot to evaluate the performance of the model compared with the reference standard.

Results The PCK of the model at the 3 mm distance threshold ranged from 94% to 99%. The model-predicted values were 30.22 ± 3.01 mm, 10.40 ± 3.91 mm and $10.63 \pm 4.74^\circ$ for VBH, IDH and IDA, respectively. There were good correlation and consistency in anatomical parameters of the lumbar vertebral body and disc between the model and the reference standard in most cases ($R^2 = 0.89-0.95$, $ICC = 0.93-0.98$, $MAE = 0.61-1.15$ and $SD = 0.89-1.64$).

Conclusion The newly proposed model based on a deep learning algorithm can accurately measure various anatomical parameters on lateral lumbar radiographs. This could provide an accurate and efficient measurement tool for the quantitative evaluation of spinal disorders.

PU-1345

使用多种对比增强乳腺 X 线摄影信息通过多阶段深度学习系统进行乳腺病变的检测和分类：一项多中心研究

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目的

准确而及早地检测和诊断乳腺病变对于优化乳腺癌患者的治疗方案和增进生存率具有重要意义。我们旨在开发一个全自动系统，利用对比增强乳腺 X 线摄影 (CEM) 图像的多元信息在 CEM 上快速定位和分类乳腺病变。

方法

在该研究中，我们收集了来自三个中心的 1903 位患者 CEM 图像与相关临床及病理信息，针对 CEM 图像的多视图和对比增强成像的特点，开发了一种全自动的多流程检测和分类系统 (MDCS)，用于在 CEM 上快速检测和分类乳腺病变。其中我们引入了一种新的特征融合算法，它结合了医生判读 CEM 图像的领域知识，能够智能地融合来自 CEM 图像的有用的信息以提高模型诊断能力。为了研究模型的临床价值，我们分别将它分类的平均时间、准确率、敏感度以及特异

度分别与六名不同年资的放射科医生的诊断结果进行了对比，并进一步探索了 MDSCS 的辅助是否能够提高放射科医生的表现，以及不同年资医生之间的诊断一致性在其辅助下是否有提升。最后，我们还针对一些争议病例进行模型预测可视化进一步评估了 MDSCS 的诊断价值。

结果

在所有数据集中，MDSCS 始终保持稳定的高性能表现。特别是在外部测试集和前瞻测试集中，模型展现出了很好的泛化性和鲁棒性，检测任务的 AFROC 分数分别为 0.953 和 0.963，分类任务的 AUC 分别为 0.909[95%CI:0.822-0.996]和 0.912[95%CI:0.840-0.985]。通过对比发现，其分类准确度与三位高年资放射科医生的水平相当（0.852[95%CI:0.765-0.917] vs 0.856[95%CI:0.802-0.910]），但效率上要远远高于放射科医生（医生判读一位患者的 CEM 图像需要大约 3.2 分钟，而 MDSCS 只需 5 秒）。此外，六名医生在其辅助下对 CEM 的判读表现均有所提高，尤其是低年资的医生判读特异度水平提高尤为明显，最好的提高了约 0.133，且在模型的辅助下，六位医生的判读水平的差距也越来越小。

结论

MDSCS 在乳腺病变的检测和分类方面展现出良好的性能，能够显著提高放射科医师的整体表现。它为医生提供了可靠的辅助工具，能够加速诊断过程、提高准确性，从而为患者带来更好的医疗结果。

PU-1346

双源 CT 多参数后处理重建在骨髓纤维化患者“一站式”评估中的应用价值初探

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目的：初探双源 CT 多参数后处理重建在骨髓纤维化患者“一站式”评估中的应用价值。

方法：选取我院 2023 年 1 月至 2023 年 8 月收录的 20 例慢性骨髓纤维化患者进行研究，所有患者均采用双源 CT 进行肝胆胰脾 CT 平扫，使用后处理工作站测量脾脏体积，并重建骨髓成像图像、测量肝脏及脾脏铁沉积的程度。

结果：在本次研究结果中显示，20 例患者均出现脾脏体积增大，体积均值为 1078.7cm³，并通过后处理得到清晰的铁沉积、骨髓成像图像，图像显示 20 例患者均未出现脏器铁沉积及骨髓水肿的情况。

结论：采用双源 CT 多参数后处理重建，可准确获得脾脏体积，同时可评价肝脏及脾脏铁沉积程度并查看患者的骨髓成像，为患者节约检查成本，方便患者进行骨髓纤维化“一站式”评估。

PU-1347

健康体检人群 HDL-C 与定量 CT 测量骨密度的相关性研究

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目的 探讨不同性别健康体检人群的高密度脂蛋白胆固醇（high density lipoprotein cholesterol, HDL-C）与骨密度之间的关系，为骨质疏松防治提供指导作用。方法 选取 2018-2023 年于河南省人民医院健康管理中心进行健康体检的 17448 例成年人群作为研究对象。所有研究对象接受常规

体格检查,并测定 HDL-C 以及通过定量 CT (quantitative computed tomography, QCT) 评估其腰椎骨密度。Pearson 相关及线性回归以确定 HDL-C 与骨密度的关系。结果 骨质疏松组血清 HDL-C 平均值高于骨量减少和正常骨密度组 ($P<0.05$)。回归分析调整其他变量后结果显示, HDL-C 水平与腰椎 BMD 成负相关 ($P<0.05$), 且女性人群中的负相关更为显著。按身体质量指数 (BMI) 分组后, 这种负相关性在超重和肥胖人群中表现更为明显 ($P<0.05$), 而在 $BMI<24.0 \text{ kg/m}^2$ 组无相关, 差异无统计学意义 ($P>0.05$)。结论 血清 HDL-C 水平与健康体检人群的腰椎骨密度成负相关。HDL-C 对骨密度的负相关性主要表现在女性以及 $BMI>24.0 \text{ kg/m}^2$ 人群。

PU-1348

一种基于 UNet++ 的磁共振成像肝脏肿瘤分割深度学习方法

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目标: 提高基于核磁共振图像 (MRI) 肝脏及肝肿瘤自动分割效率

方法: 回顾性研究了 2015 年 1 月至 2020 年 12 月间诊断为肝细胞癌的 105 名患者。患者分为三组: 训练组 ($n = 83$)、验证组 ($n = 11$) 和内部测试组 ($n = 11$)。另外, 还从癌症影像存档中选择了 9 例作为外部测试集。专家放射科医生使用动脉期和 T2WI 序列手动勾画了所有图像。采用深度学习技术, 自动分割了肝脏肿瘤和肝脏段。首先使用 UNet++ 网络进行初步肝脏分割, 然后将分割的肝脏掩膜重新输入 UNet++ 网络以分割肝脏肿瘤。在肝脏肿瘤分割中使用了阈值来降低假阳性率。为了评估分割结果, 我们计算了 Dice 相似系数 (DSC)、平均假阳性率 (AFPR) 和勾画时间。结果: 在验证组和内部测试组中, 肝脏的平均 DSC 分别为 0.91 和 0.92。在验证组中, 手动和自动勾画分别需要 182.9 秒和 2.2 秒。平均而言, 手动和自动勾画分别需要 169.8 秒和 1.7 秒。肝脏肿瘤的平均 DSC 分别为 0.612 和 0.687。在内部测试组中, 手动和自动勾画以及 AFPR 的平均时间分别为 47.4 秒、2.9 秒和 1.4, 而在外部测试组中分别为 29.5 秒、4.2 秒和 1.6。

结论: UNet++ 能够基于 MR 图像自动分割正常肝组织和肝脏肿瘤, 提高了勾画效率, 满足了进一步放射组学和深度学习分析的提取集分析要求。

PU-1349

The Application of Artificial Intelligence CAD in Reducing Occupational Fatigue of Radiologists

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OBJECTIVE: To explore the effect of artificial intelligence-based computer aided diagnostic system (AI-CAD) in reducing the occupational fatigue of radiologists through the diagnosis of rib fractures.

Methods: Four attending radiologists were randomly divided into AI-CAD assisted group and independent reading group. The former interpreted all cases with their own experience combined with fracture information including location, type and number provided by AI-CAD, while the latter only based on their own experience when diagnosing. All radiologists completed the evaluation of chest CT images from 103 patients with rib fractures. The consensus diagnosis of another two

deputy chief radiologists was referred as the gold standard. The diagnostic efficacy, time-consumption and occupational fatigue of attending radiologists was assessed and compared.

RESULTS: The average time-consumption of the AI-CAD assisted group ($2.13 \pm 0.17 \text{ min}$) was significantly lower than that of the independent reading group ($4.12 \pm 0.23 \text{ min}$) ($p < 0.05$). There was no statistically significant difference in occupational fatigue between the two groups before the start of interpretation. After interpretation session, the five occupational fatigue assessment indicators of the AI-CAD assisted group were significantly lower than those of independent reading group. In terms of diagnostic efficacy, True positive Rate of AI-CAD system (97.31%) is higher than reading group ($p < 0.05$), Positive predictive value (90.62%) is lower than reading group ($p < 0.05$).

Conclusion: Assistance of AI-CAD improved the diagnostic efficacy and reduced the time-consumption, which led to an effective reduction of the occupational fatigue in rib fractures diagnosis practice.

Key words: rib fracture; artificial intelligence; diagnostic efficiency; reading time; occupational fatigue

PU-1350

个体化结构协方差网络对吸烟者吸烟严重程度的连接组学预测模型

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异常的分布式脑系统之间的相互作用与尼古丁成瘾的机制有关。然而，结构共变网络（一种衡量脑连接性的指标）与吸烟严重程度之间的关系尚不清楚。为了填补这一空白，本研究旨在研究吸烟者的结构共变网络与吸烟严重程度之间的关系。我们招募了 101 名男性吸烟者和 51 名男性非吸烟者，并进行了 T1 加权解剖图像扫描。首先，通过 jackknife-bias 估计为每位参与者派生个体化的结构共变网络。然后，采用一种名为连接组预测建模（CPM）的数据驱动机器学习方法，利用个体化的结构共变网络推断以 Fagerström 尼古丁依赖性测试（FTND）得分衡量的吸烟严重程度。通过留一法交叉验证和置换检验评估了 CPM 的性能。结果表明，CPM 确定了与吸烟严重程度相关的结构共变网络，预测得分与实际 FTND 得分之间存在显著相关性（ $r = 0.23$ ，置换 $P = 0.020$ ）。识别出的网络主要包括皮质下-小脑网络、额顶叶网络、默认模式网络、运动网络和视觉网络。这些结果确定了与吸烟严重程度相关的结构共变网络，并为吸烟严重程度的神经基础提供了新的见解。

PU-1351

利用基于计算机断层扫描的放射组学诺莫图预测膀胱癌术前的肌肉浸润状态

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研究目的 建立基于计算机断层扫描（CT）的放射组学提名图，结合放射组学和临床特征预测膀胱癌（BCa）的肌肉侵犯状态。**方法** 利用 2018 年 5 月至 2023 年 4 月期间在我院接受 CT 尿路造影检查并经术后组织学证实为膀胱尿路上皮癌的患者数据进行回顾性分析。共有 196 名患者入组，每名患者被随机分配到训练队列（ $n = 137$ ）或测试队列（ $n = 59$ ）。共检索到 851 个放射组学特征。在特征选择方面，采用了显著性检验和最小绝对收缩与选择算子（LASSO）方法。随后，根据所选特征进行线性加权，得出放射组学得分（Radscore）。临床和放射组学模型以及放射组学-

临床提名图均采用逻辑回归法建立。利用接收者操作特征曲线分析对三种模型进行了评估。分析包括曲线下面积 (AUC)、95% 置信区间 (CI) 以及特异性、敏感性、准确性、阴性预测值和阳性预测值。根据区分度、校准和临床实用性对放射组学-临床诺莫图的性能进行了评估。结果 在获得 851 个放射组学特征后, 最终选择了 12 个特征。组织病理学分级和迂曲血管被纳入临床模型。Radscore 和临床组织病理学分级是独特诺莫图中的最终预测因子。在训练组中, 三个模型的 AUC 分别为 0.811 (95% CI, 0.742-0.880)、0.845 (95% CI, 0.781-0.908) 和 0.896 (95% CI, 0.846-0.947)。在训练队列中为 0.808 (95% CI, 0.703-0.913)、0.847 (95% CI, 0.739-0.954) 和 0.887 (95% CI, 0.803-0.971)。根据 DeLong 检验, 训练队列中放射组学-临床提名图的 AUC 与临床模型 (AUC: 0.896 vs 0.845, $p = 0.015$) 和放射组学模型 (AUC: 0.896 vs 0.811, $p = 0.002$) 有很大差异。在测试队列中进行的 DeLong 检验显示, 三种模型之间没有显著差异。根据决策曲线评估结果, 诺莫图在临床上证明是有用的。结论 放射影像学-临床诺莫图可以在术前准确预测 BCa 肌肉侵犯状态。

PU-1352

Prognostic Value of a Radiomics Model Based on MR Imaging for the Identification of Macrotrabecular-Massive Hepatocellular Carcinoma

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Background: To evaluate the ability of an MRI-based radiomics model, specifically designed for identifying macrotrabecular-massive hepatocellular carcinoma (MTM-HCC), in predicting prognosis.

Methods: Patients who underwent radical surgeries for HCC between June 2007 and March 2021 were included. Cohort1 without follow-up information were enrolled for MTM-HCC identification, and Cohort2 with follow-up information for prognostic analyses. Radiomics analysis was performed using volumes of interest of HCC delineated on pre-operative MRI images. Radiomics model was developed using Logistic Regression algorithm in Cohort1. For Cohort2, a radiomics probability (RP) of MTM-HCC was obtained from the radiomics model. Based on the RP, patients were divided into a RAD-MTM-HCC (RAD-M) group and a RAD-non-MTM-HCC (RAD-nM) group. Univariate and multivariate Cox regression analyses were employed to assess the ability of variables to predict disease-free survival (DFS) of patients in Cohort2.

Results: The radiomics model for identifying MTM-HCC showed AUCs of 0.915, 0.849, and 0.852 in the respective training, validation, and test sets. Furthermore, the radiomics biomarker RP was an independent predictor of DFS in patients with HCC. Using portal or hepatic vein tumor thrombus, irregular rim-like arterial phase hyperenhancement (IRE), AFP and RP, we constructed a nomogram with a C-index of 0.701 (95% CI: 0.650-0.753). The DFS of RAD-nM group was significantly higher than that of the RAD-M group by Kaplan-Meier curves ($P < 0.001$).

Conclusions: The radiomics model designed to identify MTM-HCC can be used to predict prognosis in patients with HCC.

PU-1353

基于影像组学特征的机器学习模型对视神经脊髓炎谱系疾病早期视神经炎的鉴别

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目的: 探讨应用视神经常规 MRI 图像的影像组学特征在预测影像表现未见明显异常的视神经炎中的价值, 为早期诊断提供参考。

方法: 纳入 41 例视神经脊髓炎谱系疾病及 90 例正常对照组共 131 例患者, 运用联影 AI 软件对轴位 T1WI、T2WI 图像进行预处理、感兴趣区 (ROI) 勾画及特征提取, 应用独立样本 t 检验和最小绝对收缩和选择算子 (least absolute shrinkage and selection operator, LASSO) 进行特征选择。

联合 T1WI、T2WI 筛选多参数 MRI 序列的最佳特征。按照 8 : 2 的比例将患者随机分为训练集 (92 例) 与测试集 (39 例), 使用 logistic 回归 (LR)、随机森林 (RF)、支持向量机 (SVM) 构建预测模型, 并绘制受试者操作特征 (ROC) 曲线, 计算准确度、敏感度、特异度及 ROC 曲线下面积 (AUC)。采用 DeLong 检验比较不同模型之间 AUC 的差异。

结果: 在 2264 个影像组学特征中选择 25 个。基于多序列模型诊断效能优于单序列模型, 其中 LR 模型效能最好, 测试集 AUC、敏感性、特异性分别为 0.903, 84%, 85%。单序列模型中, T2WI 模型的诊断效能优于 T1WI 模型 ($p < 0.05$)。

结论: 基于 MRI 图像影像组学特征的机器学习模型可以鉴别视神经脊髓炎谱系疾病早期视神经炎, 多序列 MRI 序列模型的效能较好, 其中 LR 模型的效能最高。

PU-1354

高度近视患者时变局部自发脑活动模式的改变: 一种动态低频波动幅度的研究

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目的: 应用动态低频波动幅度 (dynamic amplitude of low-frequency fluctuations, dALFF) 研究高度近视患者局部自发脑活动的时变异常。

材料与方法: 86 例年龄和性别相匹配的高度近视患者和 87 例健康对照的静息态功能磁共振影像数据。动态 ALFF 算法: 使用 DynamicBC 工具箱计算每个参与者的 dALFF; 滑动窗口长度 (window lengths) 采用 50 TR (100 s), 步长采用 5 TR (10 s), 每个参与者的时间序列被分成 25 个窗口; 计算每个窗口内的 ALFF 映射, 随后, 用标准差 (standard deviation, SD) 测量这 25 张图的方差; 通过减去平均值并除以全局值的 SD 的方式, 计算每个参与者的 z 分数, 以 z 分数作为每个参与者体素层面的 dALFF 变异性的代表值, 从而评估 dALFF 的时间变异性。与静态 ALFF 对比: 计算每个参与者的静态 ALFF 图, 比较 dALFF 和静态 ALFF 之间的差异。校验: 选择 30 和 80 TR 值进行校验分析。

结果: 对照与高度近视组间比较, 高度近视组左额下回 (眶部)、左侧舌回、右侧扣带回前、扣带回旁、右侧钙质裂隙及周围皮质动态 ALFF 变异性降低, 左侧丘脑、左侧中心旁小叶、左侧顶下 (除边缘上回和角回外) 动态 ALFF 变异性增加。高度近视患者与对照组的模式分类准确率为 85.5%。

结论:本研究的发现,提示高度近视患者的局部脑活动与执行视觉、感觉、运动和注意控制功能的大脑区域的异常变异性之间存在关联。已提供了一些有用信息来阐明与近视神经系统异常改变相关机制。此外,强调 dALFF 异常变异性的作用,以深入了解高度近视领域的病理改变和神经影像学机制。

PU-1355

多模态磁共振成像放射组学分析用于预测宫颈癌治疗

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研究目的 本研究旨在探讨基于多模态磁共振 (MR) 图像的放射组学模型在指导宫颈癌 (CC) 患者治疗中的预测效果。研究方法 回顾性纳入了在 2020 年 6 月至 2022 年 3 月期间接受术前磁共振成像的 100 例 CC 患者。通过分层随机抽样分配了训练组 ($n = 70$) 和测试组 ($n = 30$)。两组患者的临床和病理特征,包括年龄、组织学亚型、肿瘤分级和结节状态,通过 t 检验或卡方检验进行比较。在表观弥散系数 (ADC) 图和 T2 加权 (T2W) 图像上提取每个感兴趣体积的放射学特征。通过综合少数超采样技术对训练队列的数据平衡进行了重新采样。随后,通过最小绝对收缩和选择算子算法以及最小冗余最大相关性和 10 倍交叉验证构建了放射组学特征。逻辑回归用于预测 CC 治疗的需求。采用接收者操作特征曲线 (曲线下面积[AUC]) 和决策曲线分析评估放射组学模型的预测性能。结果 年龄、组织学亚型、肿瘤分级和结节状态在低 FIGO 分期组和高 FIGO 分期组之间无显著差异 (训练组和测试组的 $P > 0.05$)。基于 T2W 图像的六个放射组学特征和 ADC 图像的三个放射组学特征,建立了 T2W、ADC 和组合模型三种模型,其 AUC 分别为 0.855 (95% 置信区间 [CI], 0.777-0.934) 和 0.823 (95% CI, 0.727-0.919)、0.861 (95% CI, 0.785-0.936) 和 0.81 (95% CI, 0.701-0.918)、0.934 (95% CI, 0.884-0.984) 和 0.902 (95% CI, 0.832-0.972)。

结论结合 T2W 和 ADC 图的放射组学模型对确定 CC 患者的适当治疗方法具有良好的预测效果。

PU-1356

网络游戏障碍患者脑结构和功能改变的 Meta 分析

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目的:运用 Meta 分析方法对有关网络游戏障碍 (internet gaming disorder, IGD) 患者脑结构和功能的神经影像学研究成果进行系统评价,以期对 IGD 患者的脑结构和功能变化提供循证依据。

材料与方法:依据 PRISMA 声明由三名评价者独立计算机检索、筛选并交叉检查 PubMed、ScienceDirect、Web of Science、Scopus、中国知网、万方、维普数据库中关于 IGD 的基于体素的形态学分析 (voxel-based morphometry, VBM) 和任务态功能磁共振成像 (functional magnetic resonance imaging, fMRI) 研究,检索时间为 2010 年 1 月 1 日至 2021 年 10 月 31 日。采用基于种子的 d 映射技术对所有数据进行 meta 分析。首先,分别进行 VBM 和任务态 fMRI 研究,以检测 IGD 患者灰质体积 (gray matter volume, GMV) 和神经活动异常的区域。其次,对两类研究进行多模态分析,以检测 IGD 患者 GMV 和神经活动异常的重叠区域。Egger's 检验和分析产生的漏斗图用来检测研究间可能存在的发表偏倚。

结果:本研究共纳入 15 项 VBM 研究 (包括 422 名 IGD 患者和 354 名对照) 和 30 项任务态 fMRI 研究 (包括 617 名 IGD 患者和 550 名对照)。VBM 分析结果显示,IGD 患者相较于对照双侧前/中扣带皮层、额上/下回和辅助运动区的 GMV 降低。fMRI 分析结果显示,IGD 患者相较于对照双侧

额下回、中央前回、左侧楔前叶、右侧颞下回和右侧梭状回神经活动增加，双侧舌回和左侧额中回神经活动减少。多模态分析结果显示，IGD 患者相较于对照左侧前扣带回同时存在 GMV 降低和神经活动增加。

结论：IGD 患者存在与执行控制、认知功能和基于奖励决策相关的大脑区域的结构和功能改变，这些区域可能为 IGD 的潜在神经生物学标志。

PU-1357

深度学习技术在肩关节影像学中研究进展

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肩痛在肌肉骨骼疼痛中居第三位，人群中肩痛终生患病率高达 67%。肩痛给患者、社会带来巨大负担，因此对肩部疾病早期识别、诊断至关重要。深度学习(DL)成功应用于许多领域，展现出了卓越的性能，众多学者将 DL 技术应用于肩关节影像学评估，赋能肩部疾病的临床诊疗及预后。该文复习国内外 DL 评估肩关节影像学相关文献，总结 DL 在肩关节影像学中的研究进展及应用情况。

PU-1358

人工智能对冠状动脉 C T A 图像质量及狭窄率评估的临床应用价值

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目的：探讨人工智能（artificial intelligence，AI）与人工判读在冠状动脉 CTA（computed tomography angiography，CTA）图像质量方面的差异，并以冠脉造影术（CAG）为金标准，对人工智能判断冠状动脉狭窄率的准确性进行分析研究。

方法：回顾性分析行 CCTA 冠状动脉粥样硬化性心脏病（CHD）患者的影像学资料。1：随机选取宝鸡市中心医院 2022 年 10 月-11 月到行冠脉 CTA 患者 98 例，CCTA 图像分别使用传统工作站及辅助诊断软件 AI 技术进行图像重建，对 2 种不同方式的图像质量进行对比。2：选取宝鸡市中心医院 2022 年 10 月-2023 年 6 月 50 例患者行 CCTA 和 CAG 检查，且 2 种检查时间间隔<2 周者，并以冠脉造影术（CAG）50 例（三大主支共 150 支血管）为金标准，对 AI 在冠状动脉狭窄率诊断的准确性进行分析。

结果：（1）：冠状动脉 CTA 中，AI 及人工法重建的 VR 及 CPR 图像质量相仿，1）AI 和人工法 VR 图像质量优秀率分别为 97.9%（96/98）和 95.9%（94/98）， $t=1.78$ ， $P>0.05$ ）差异均无统计学意义。

（2）：以 CAG 诊断为标准，150 支血管 118 个斑块中，AI 辅助诊断的敏感度和特异度分别为 93.5%和 90.0%，AI 辅助诊断与 CAG 诊断一致性较高（ $K=0.752$ ）。

（3）：AI 和金标准相比在评估冠状动脉无狭窄、轻微狭窄、轻度狭窄和血管闭塞方面差异无统计学意义（ $P>0.05$ ），在评估中度狭窄和重度狭窄方面差异有统计学意义（ $P<0.05$ ）。

结论：AI 人工智能辅助诊断系统与人工后处理相比，两者在图像质量优秀率、冠状动脉三大分支血管显示一致性较高，图像质量相仿，AI 辅助诊断在冠脉疾病诊断方面具有较高敏感度和准确性，

极大提高了诊断效率,但对狭窄率诊断仍有不足,需结合人工判读再次分析,AI可作为医师的有效辅助诊断工具。

PU-1359

Differential diagnosis of granulomatous capillary hemangioma and nasal polyps based on CT enhancement and gray level co-occurrence matrix in nasal cavity

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Objective

Exploring the value of CT enhanced grayscale co-occurrence matrix (GLCM) texture analysis in differential diagnosis of nasal granulomatous capillary hemangioma and nasal polyps.

Method

Data of 46 patients with nasal masses confirmed by surgery and pathology, including 22 cases of granulomatous capillary tumors in the nasal cavity and 24 cases of nasal polyps. CT plain scan and arterial phase enhancement examination were performed before surgery. Evaluate the average CT values of two types of lesions in the arterial phase after plain and enhanced scans, as well as the changes between their 20 GLCM features. Use a linear mixed effect model to analyze the differences in CT values and selected GLCM features between two types of lesions after plain and enhanced CT scans.

Result

There was a significant difference in arterial phase CT values between the two types of lesions during enhanced scanning ($p < 0.001$). The model shows significant differences in GLCM features between the two types of lesions in enhanced arterial phase images, namely autocorrelation ($p < 0.001$), correlation ($p = 0.012$), homogeneity ($p = 0.003$), contrast ($p < 0.01$), and entropy of difference ($p = 0.037$). In most models, there is a significant difference ($p \leq 0.001$) in the GLCM features of the arterial phase between the two types of lesions on plain and enhanced scans, with the GLCM features of the two types of lesions on plain scans being similar.

Conclusion

GLCM is a method that improves the sensitivity of CT value changes in detecting granulomatous capillary hemangiomas and nasal polyps in the nasal cavity using enhanced scanning CT images, and is a useful supplement to improving the differential diagnosis of these two types of lesions.

PU-1360

基于 CT 影像组学联合临床模型识别肺腺癌一代 EGFR-TKIs 治疗后 T790M 突变耐药状态临床研究

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目的 探讨 CT 影像组学联合临床模型识别肺腺癌一代 EGFR-TKIs 治疗后 T790M 突变耐药状态的可行性。**方法** 回顾性收集 2017 年 1 月至 2023 年 6 月通过组织病理检查确诊肺腺癌且治疗前基因检测确定为 EGFR DEL19 或 L858R 突变且无原发性 T790M 突变的 80 例患者,在治疗前及治疗后经基因检测确定为 T790M 突变耐药后 1 周内的 CT 平扫及临床资料,共 160 份,分为 T790M 阳性组 ($n=80$) 及 T790M 阴性组 ($n=80$),按 7:3 将其随机分为训练组和测试组。利用软件勾画感兴

趣区(ROI)、提取特征,使用最小绝对收敛和选择算子(LASSO)算法来筛选特征并计算影像组学评分(Radio-scores),以多因素 logistic 回归分析构建肺窗(Lung window, LW)、纵膈窗(Mediastinal window, MW)及 LW-MW 影像组学模型;采用单因素及多因素逻辑回归分析构建临床(Clinical indicators, CI)模型及 CI-LW-MW 影像组学联合模型。利用 ROC 曲线、校准曲线及决策曲线分析模型效能、可靠性及临床收益。**结果** T790M 突变耐药临床独立预测因子为:远处转移及纵膈内淋巴结(短径>1.5cm);在训练组、测试组中以 CI-LW-MW 影像组学联合模型的 AUC 值最高分别为 0.920 (95%CI: 0.854 - 0.963)、0.911 (95%CI: 0.792 - 0.974),训练组敏感性为 92.31%、特异性为 75.00%;最后对联合模型进行校准曲线及决策曲线分析,显示其有较高的临床应用值。**结论** 远处转移及纵膈增大淋巴结为 T790M 突变耐药临床独立预测因子,CI-LW-MW 影像组学联合模型能有效预测肺腺癌一代 EGFR-TKIs 治疗后 T790M 突变耐药状态,可为影像学早期预测 EGFR-TKIs 治疗后耐药提供参考。

PU-1361

颈椎 X 线多项指标自动测量的深度学习模型开发

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目的:基于 X 线图像建立深度学习模型对颈椎 C2-7Cobb 角度、前凸距离、椎管矢状径、Pavlov 比值、cSVA(矢状面轴向距离)进行全自动测量。

方法:我们回顾性收集了 874 名在 2021 年 10 月至 2022 年 9 月期间在上海长海医院接受体检的人群作为研究对象。纳入了符合以下标准的人群:颈椎 X 线图像完整、资料完整,且能够清晰显示 C1-C7 节椎体及棘突。排除了过曲过伸位、遮挡或图像质量不佳的患者。将数据集按 8:1:1 比例随机分为训练集、验证集和测试集。两名影像科医生对训练集进行关键点标注,标注包括 C2-C7 各个椎体的四个端点及 C1-C7 各个棘突的两个端点,共计 38 个关键点。首先使用目标检测算法定位图像中包含关键点信息的区域,即感兴趣区域(ROI)。然后使用关键点检测算法对提取的 ROI 进行关键点检测。使用预定义测量方法计算出 C2-7Cobb 角度、前凸距离、椎管矢状径、Pavlov 比值、cSVA 的值。人工标记的关键点计算出的指标作为真实值,模型预测的关键点计算出的指标作为预测值。计算模型精准度(Precision)、平均精准度(Average Precision, AP)、平均绝对误差(Mean Absolute Error, MAE)。

结果:验证集中模型对于颈椎 X 线图像中 ROI 的检测的 AP 为 91.60,测试集为 AP 为 93.40。测试集中模型测量各项指标的 MAE 分别为 Cobb 角度 2.56;前凸距离 0.47;C2 椎管矢状径 0.50;C3 椎管矢状径 0.49;C4 椎管矢状径 0.47;C5 椎管矢状径 0.51;C6 椎管矢状径 0.56;C7 椎管矢状径 0.76;C2 Pavlov 比值 0.08;C3 Pavlov 比值 0.06;C4 Pavlov 比值 0.05;C5 Pavlov 比值 0.05;C6 Pavlov 比值 0.05;C7 Pavlov 比值 0.06。

结论:基于 X 线的全自动深度学习模型对于颈椎 C2-7Cobb 角度、前凸距离、椎管矢状径、Pavlov 比值、cSVA(矢状面轴向距离)提供了快速、稳定、客观的测量结果。

PU-1362

基于 MRI 的血管通透性和细胞密度相关生境区分胶质瘤中的 IDH 突变状态

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目的：胶质瘤的血管通透性和细胞密度复杂且异质，这与 IDH 突变状态有关。因此，本研究拟利用能够反映血管通透性和细胞密度的 T1 加权对比增强图像(T1CE)和弥散加权图像(DWI)，通过 MRI 生境分析预测 IDH 突变状态。

研究方法：回顾性收集来自 3 家医院的 165 例病理确诊为胶质瘤的患者（训练集=109 例，外部验证集=56 例），他们都在术前接受了 T1 加权对比增强成像（T1CE）和弥散加权成像（DWI）检查。将每位患者 T1CE 和表观弥散系数（ADC）图中胶质瘤区域的信号强度汇总为一个全局矩阵。然后进行 K-means 聚类，将胶质瘤划分为四个生境（亚区），并进一步确定敏感生境。分别从整个肿瘤和生境中提取放射组学特征。特征选择采用了双样本 t 检验、皮尔逊相关性分析、最大相关性最小冗余（mRMR）和最小绝对收缩和选择算子（LASSO）。逻辑回归算法用于构建 IDH 突变状态的预测模型。

结果：根据肘部法则将胶质瘤分为 4 个生境，分别是生境 1（受损血管和细胞密度正常生境）、生境 2（正常血管和细胞密度减少生境）、生境 3（正常血管和细胞密度正常生境）和生境 4（受损血管和细胞密度减少生境）。生境 4 被确定为敏感生境。分别筛选 15 个特征构建了四个预测模型：模型-整个肿瘤、模型-四个生境、模型-整个肿瘤+四个生境和模型-敏感生境。模型-敏感生境显示了最佳的预测性能和鲁棒性，在训练集中的 AUC 值为 0.868（95% CI: 0.784- 0.953），在外部验证集中的 AUC 值为 0.817（95% CI: 0.676-0.958）。

结论：生境分析具有捕捉到更多成像信息的潜能，受损血管和细胞密度减少生境是胶质瘤 IDH 突变状态的有效预测因子。

PU-1363

不合并 CMBs 的 2 型糖尿病患者脑灰质微结构及核团的形态学改变的研究

许超

扬州大学附属医院

的：利用磁共振成像技术结合基于体素的形态学的分析方法探索 2 型糖尿病患者不伴 CMBs 灶（的脑灰质微结构及核团形态学的变化及其与 2 型糖尿病认知功能及糖化血红蛋白值的关系进行研究。

资料与方法：收集 2016 年 7 月至 2017 年 7 月在扬州大学附属医院门诊、住院及体检病人各 32 例，对 32 例 2 型糖尿病患者和 32 例年龄匹配的健康对照组进行常规 MR 检查、ESWAN、实验室检查及神经认知量表评估，检查过程中排除 2 型糖尿病组 3 例患者，原因为患者头动幅度过大、患者颞部有蛛网膜下腔囊肿及患者右枕叶微出血灶，最终对 29 例 2 型糖尿病患者和 32 例年龄匹配的健康对照组并且都不伴 CMBs 灶进行高分辨率 3D-BRAVO-T1 加权的结构 MRI 扫描，数据后处理采用基于 MATLAB2013a 平台的 SPM8 中的 VBM 计算全脑体素的脑总体积、脑白质体积、灰质体积、脑脊液体积值并进行组间统计分析，图表显示显著差异脑区的脑灰质区域及数值，选取灰质核团（双侧尾状核、丘脑及豆状核）与糖化血红蛋白值及神经认知量表做相关性分析。

结果：本研究发现蒙特利尔认知评估、简易精神状态检查表、连线实验 A、连线实验 B、复杂图形复制测试及复杂图形回忆测试神经认知功能测试能力在不合并 CMBs 的 T2DM 患者中较正常对照组下降，并且有统计学意义。基于 VBM 形态学分析，不伴 CMBs 的 T2DM 患者与正常健康对照组脑总体积、脑白质体积、灰质体积及脑脊液体积无明显差异，但 2 型糖尿病组患者脑总、灰白质体积均低于正常对照组。脑灰质及核团体积在双侧颞中回、海马、右侧楔叶、舌回、左侧尾状头、豆状壳核、双侧丘脑及部分灰质体积显著减少（ $P < 0.05$, FDR 校正），此外，双侧丘脑、尾状核

及豆状壳核的灰质体积与 HbA1c 水平呈负相关改变; 并且双侧丘脑灰质体积与连线实验 A(TMT-A) 所花费时间也呈负相关改变。

PU-1364

基于 CT 增强图像联合深度学习特征和传统影像组学特征术前预测结直肠腺癌脉管侵犯的应用价值

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目的 探讨基于深度迁移学习特征和传统影像组学特征的联合模型在术前预测结直肠癌患者脉管侵犯状态的应用价值 **方法** 回顾性收集 232 例经手术病理证实的结直肠癌患者, 从静脉期 CT 图像中提取与脉管侵犯状态相关的传统影像组学及深度迁移学习特征, 采用最小绝对收缩和选择算子回归 (Lasso) 进行特征选择, 采用随机决策森林(RF)分别构建传统影像组学模型及联合预测模型。采用受试者工作特征曲线(ROC)评价各预测模型的诊断效能。采用决策曲线分析(DCA)评估模型的临床适用性。结果 联合 2 个传统影像组学特征与 2 个深度学习特征构建的预测模型有良好的诊断效能 [AUC 为 0.850(95%CI, 0.794-0.905)]。各项效能指标优于由 6 个传统影像组学特征构成的传统影像组学预测模型 [AUC 为 0.850(95%CI, 0.795-0.903)]。结论 本研究构建的联合深度迁移学习特征和传统影像组学特征预测模型可用于术前预测结直肠癌脉管侵犯, 且与传统影像组学模型相比, 其预测效能有所提高。

PU-1365

深度卷积神经网络在外周植入中心静脉导管位置评估中的应用研究

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目的: 基于胸部 X 射线图像建立深度卷积神经网络 (DCNN) 模型自动分割外周植入中心静脉导管 (PICC) 同时判断植入程度, 为临床评估 PICC 位置提供高效辅助手段。

材料与方法: 本文回顾性收集了 18 至 80 岁的患者在 2018 年 1 月至 2023 年 6 月间本院放射科接受立位胸部 X 射线图像。随机选取其中 105 例, 根据气管分叉点到 PICC 尖端的垂直距离, 将其分为位置适当和位置异常。放射科医生利用 3D Slicer 软件手动勾画 PICC。本文使用两阶段模型评估 PICC 位置, 首先基于训练集 (n=84) 及验证集 (n=11) 建立 DCNN 分割模型, 训练集采用数据增强策略, 利用骰子相似系数 (DSC) 衡量其与手工勾画的一致性; 结合原始 X 射线图像与分割概率图, 训练分类模型, 判断 PICC 植入位置是否合适, 并在测试数据集 (n=10) 中对其进行测试, 使用 AUC、准确度, 灵敏度, 特异性评估模型效能。

结果: 所有受试者中男性 42 例, 女性 63 例。训练集、验证集与测试集中患者数量 (正常: 异常) 分别为 84 (45:39)、11 (6:5)、10 (5:5)。PICC 分割模型在验证集与测试集中 DSC 分别为 0.61, 0.62。仅基于原始 X 射线图像构建的位置判断模型中, 验证集与测试集分类准确率、位置异常识别灵敏度及特异性分别为 63.6%、40.0%、83.3%, 60.0%、40.0%、80.0%。结合原始 X 射线图像与 PICC 分割概率图构建的位置判断模型中, 验证集与测试集分类准确率、灵敏度、特异性及 AUC 分别为 81.8%, 80.0%, 100.0%, 0.90, 80.0%、80.0%、100.0%、0.96。

结论：基于胸部 X 射线图像构建的深度卷积分割及分类网络具有评估 PICC 植入程度的潜力，分割模型可以有效地结合原始图像完成 PICC 尖端位置的确认，从而辅助医生提供治疗决策。

PU-1366

腰椎 DR 智能测量系统自动检测椎体压缩程度的临床应用

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目的：评估腰椎 DR 智能测量系统自动检测椎体压缩程度的临床应用价值。

方法：回顾性纳入 2021 年 3 月到 2021 年 12 月于甘肃省中医院行腰椎 DR 侧位确诊为 T12 至 L5 椎体楔形骨折的受试者 1902 例和同时段行腰椎 DR 侧位正常的图像 728 张，拥有 3 年骨肌诊断经验的三位放射科医生（R1、R2 和 R3）通过 JPHV 专用软件（annotation 1.1.0）对上述影像进行六点形态学标注，标注完成后由 R4 医生对标注的结果进行审核。使用 SPSS 18.0 统计软件进行统计分析，关键点标注的可靠性用关键点间距离的百分比评估观察者间的一致性。腰椎 DR 智能测量系统测量评估使用 R4 对 R1、R2、R3 三位医师的标注结果进行审核并作为金标准。应用 Pearson 相关系数 r 、ICC、MAE 和均方根误差（RMSE）来评估参考标准与测量系统间的相关性和一致性。使用配对 t 检验比较 MAE 来确定统计学差异。

结果：基于关键点坐标将系统计算得到的 Genant 分类结果与放射科医师测量的分类结果进行比较，该系统预测 T12 和 L1 椎体 0、I 度、II 度和 III 度楔形骨折分类准确率分别为 66.67%、75.0%、92.2%和 92.37%。系统预测 T12 和 L1 椎体压缩性骨折的召回率为 82%，精度为 84%，F1 分数为 83%。关键点标注的可靠性在 3 mm 阈值范围内观察者间关键点到关键点间距离的百分比分别为 89%（R1 vs R2）、88%（R1 vs R3）、96%（R1 vs R4）、94%（R2 vs R3）、98%（R2 vs R4）、98%（R3 vs R4）。腰椎 DR 智能测量系统预测值与参考标准具有良好的一致性（ICC=0.9065、0.8687、0.8837、0.8344）和相关性（ $r=0.9134$ 、0.8743、0.8896、0.8418）；该系统与参考标准间的 RMSE=0.0522、2.5608、0.061、2.9575，MAE=0.0379、1.9081、0.0454、2.2906。

结论：本研究为临床定量评估椎体压缩性骨折提供了一种有力测量工具，对提高临床工作效率具有潜在意义。

PU-1367

冠状动脉 CTA 下 CT-FFR 在高海拔缺氧环境影响下对冠心病的研究与判断

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冠状动脉 CTA 是临床诊断冠心病的最常用的无创检查手段，既往研究表明使用冠脉 CTA 检查时，增加 CTFFR 值的测量可提高冠脉 CTA 的诊断准确性，但由于患者在高海拔环境下其血流动力学会发生一些改变，给 CTFFR 值的测量结果会带来一定的影响，为了进一步提高高海拔环境下 CTFFR 值对冠状动脉 CTA 诊断的准确性，本研究将本院冠脉 CTA 下 CTFFR 值与 ICA 下行压力导丝测量 FFR 值进行对比，旨在探讨 CTFFR 值对冠心病引起心肌缺血诊断的敏感性、特异性及准确性。

PU-1368

Deep learning Based Automatic Segmentation of Brain Magnetic Resonance angiography Images

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Synopsis

Accurate cerebrovascular segmentation plays an important role in clinical diagnosis and the related research. Magnetic Resonance angiography (MRA) postprocessing manually recognized by technologists is extremely labor intensive and error prone. However, automatic segmentation of brain vessels remains challenging because of the variable vessel shape and high complex of vessel geometry. We propose an artificial intelligence brain vessel segmentation system supported by an optimized physiological anatomical-based 3D convolutional neural network that can automatically achieve brain MRA vessel segmentation in healthcare services. The overall segmentation accuracy of the independent testing dataset is 0.931.

Introduction

MRA is a widespread, non-invasive, and cost-efficient imaging modality that is employed in routine clinical diagnoses of head and neck vessels, especially in cerebrovascular disease, which represents one of the leading causes of severe disability and mortality worldwide¹. To visually analyze the vasculature of the head and neck more efficiently, vessel segmentation is usually performed by experienced computed tomography technologists. However, as the number of requests for MRA examinations have increased, the postprocessing staff cohort has become overwhelmed due to the time-consuming manual process². Considering that vessel imaging segmentation is required in clinical settings, an automatic segmentation system can be easily integrated into the clinical workflow if processed segmentations are available.

Methods

Deep learning-based segmentation approaches have drawn increasing interest due to their self-learning and generalization abilities from large data volumes³. A major technological challenge of this study is accurate vessel segmentation without interruption of the blood vessels which is difficult because the vessels are tortuous and branched. In this paper, we used a method to segment vessel which has been used in CTA image⁴. As is shown in Fig.1, the 3D-CNN model was trained using a modified U-net with the addition of bottleneck-ResNet(BR) which automatically achieved optimized model parameter selection. The core design of the segmentation system was the deep learning model, Unet has been widely used to segment various medical images since it was proposed⁵. Generally, Unet consists of a constriction path and a symmetrical expansion path, and skip connections are used between the paths for feature fusion. The constriction path contains successive down-sampling layers to capture context, while the symmetrical expansion path contains a series of up-sampling layers to recover localization. In our modified Unet, inception modules and dilated convolutions are inserted into adjacent down-sampling layers in the constriction path.

Results

This system is trained and tested with 365 head 1.5T and 3T time-of-flight (TOF) MRA datas collected between 2021.10.1 and 2022.1.16. One case of brain vessel segmentation result is shown in Fig.2. The vessel segmentation attained dice similarity coefficient(DSC) of 0.975 and 0.944, weighted vessel score(V-scores) of 0.975 and 0.929, and recall of 0.961 and 0.933 for the training and validation sets, respectively.

Discussion

In this study, we validated a deep learning algorithm through physiological anatomical-based 3D CNN for MRA head image postprocessing. The model was developed with an optimized network by the distribution of BRs, and we proposed the CGPM to revise vascular segmentation errors and avoid partially missing vasculature. Our results indicated that a 3D-CNN deep learning algorithm can be trained to complete vessel segmentation automatically with high sensitivity and specificity in a wide variety of enhanced MRA scans.

Conclusion

In conclusion, we found a time-saving and subjectivity-independent method compared to currently available techniques to segment brain vessel of MRA images, saving costs, and increasing efficiency. It is clinically applicable due to its consistency with manually processed images. Thus, the system facilitates clinical workflows and provides an opportunity for clinical technologists to improve humanistic patient care.

PU-1369

基于多参数 MRI 影像组学的星形细胞瘤风险分层及其生物学含义

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目的：基于多参数 MRI，建立星形细胞瘤患者总生存期的影像组学预后模型，探索影像组学特征相较于现有临床预后模型的增量价值及其生物学含义。

材料与方法：回顾性收集 319 例经 2021 版 WHO 标准确诊的成人星形细胞瘤患者（训练集：218 例，验证集：101 例）。基于术前 MRI 影像（ $n=319$ ），采用机器学习方法建立预测患者总生存期的影像组学标签，并生成影像组学-临床病理预后诺模图。在模型校准、鉴别、重分类和临床有用性等方面评估影像组学标签的增量价值。基于配对的 MRI 和 RNA 测序数据（ $n=56$ ），采用影像基因组学方法（WGCNA 与 GSEA），识别与影像组学特征相关的关键分子通路。

结果：影像组学标签与总生存期显著相关（ $P<0.01$ ； $HR=4.013$ ；95% CI: 1.968, 8.182），而且是星形细胞瘤患者的独立预后因子。相较于临床病理预后诺模图，影像组学-临床病理预后诺模图能够更加准确的预测总生存期，C 指数达 0.777（95% CI: 0.710, 0.800），且具有更好的校准和分类精度。影像基因组学分析显示，与影像组学特征显著相关的生物学通路可以分为四类：免疫、细胞增殖、复杂细胞功能和治疗反应。其中，隶属于 ADC 图的纹理特征主要与免疫方面的生物学通路密切相关。

结论：影像组学特征是星形细胞瘤患者的独立预后因素，且与免疫、细胞增殖、复杂细胞功能和治疗反应有关的四种关键生物学通路密切相关。我们的初步探索可能有助于指导星形细胞瘤患者的早期治疗，从而改善患者的生存周期。

PU-1370

人工智能重建技术在优化腰椎磁共振 T2 DIXON 成像扫描时间和图像质量中的应用价值

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目的：探讨人工智能重建技术在优化腰椎磁共振 T2 DIXON 成像扫描时间和图像质量中的应用价值。

材料与方法：本研究回顾性纳入常规腰痛，腰椎平扫磁共振扫描的受试者，分别行腰椎 MRI T2 DIXON 和人工智能重建技术优化的快速 T2 DIXON 扫描，并保存未应用人工智能重建技术的原始 T2 DIXON。由 2 名研究者分别对三组 T2 DIXON 的 IN 和 W（常规、快速和人工智能重建技术优化）的整体图像质量和图像伪影进行图像质量主观评价（5 分标准）。由 1 名研究者测量 L3、L4、L5 信噪比（signal-to-noise ratio, SNR）以及与之对应相同层面的竖脊肌的对比噪声比（contrast-to-noise ratio, CNR）。对正态分布和非正态分布的数据分别进行单因素方差分析和 Kruskal-Wallis 检验，比较分析三组 T2 DIXON 的 IN 和 W 图像的主观评分和客观指标的差异。采用组内相关系数（intra-class correlation coefficient, ICC）评估研究者之间主观评分。

结果: 本研究共纳入 50 名受试者。人工智能重建技术 T2 DIXON 较常规 T2 DIXON 扫描时间缩短了 41.3%。两位研究者的评分结果均显示, 常规 T2 DIXON、快速 T2 DIXON 和人工智能重建技术优化 T2 DIXON 的整体图像质量评分和椎体病变显示清晰度均存在显著差异 ($P < 0.05$); 但在伪影评分上差异无统计学意义 ($P > 0.05$)。三组 T2 DIXON 图像椎体的 SNR、CNR 间差异具有统计学意义 ($P < 0.05$)。应用三组 T2 DIXON 图像进行椎体病变评分具有很好的一致性。结论: 人工智能重建技术可以显著改善快速采集 MRI 序列的图像质量, 有利于急诊患者和欠配合患者的快速完善检查及快速 MRI 序列的临床应用。

PU-1371

利用能谱 CT 单能量图像结合 MARs 软件去除颅内动脉瘤夹闭术后患者金属伪影效果研究

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目的 探讨能谱 CT 去金属伪影技术 (MARs) 在动脉瘤夹闭术后 CT 成像的应用效果。方法 选取我院 2022 年 12 月 26 日至 2023 年 5 月 23 日共 17 例动脉瘤患者作为研究对象, 所有患者均行动脉瘤夹闭术, 术后行能谱成像 (Gemstone Spectral Imaging, GSI) 扫描模式检查, 获取扫描数据后重建 70~140 keV (间隔 10 keV) MARs (Metal Artifact Reduction System, MARs 金属伪影去除技术) 组和非 MARs 组图像, 计算图像伪影指数 (AI)、噪声 (SD) 和信噪比 (SNR), 并进行主观评分, 比较不同 keV 水平 MARs 图像和非 MARs 图像的 AI、SD 和 SNR 差异。结果 在不同 keV (70~140 keV) 水平, MARs 组中 AI 值、SD 值低于非 MARs 组 ($P < 0.05$), MARs 组中 SNR 值及主观评分高于非 MARs 组 ($P < 0.05$); 140keV 水平非 MARs 组的 AI 值、SNR 值与 70 keV 及 80 keV 相比具有统计学差异 ($P < 0.05$); 120~140keV 水平 MARs 组的 AI 值、SNR 值与 70 keV 及 80 keV 相比具有统计学差异 ($P < 0.05$)。结论 能谱 CT 去金属伪影技术 MARs 可以有效减少动脉瘤夹闭术后动脉夹伪影, 提高解剖结构清晰度。

PU-1372

Machine Learning Classification of Alzheimer's Disease Based on ^{18}F -FDG PET Imaging

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Objective: Alzheimer's disease (AD) is a common neurological disease in the elderly. The onset of AD is often preceded by an intermediate phase known as mild cognitive impairment (MCI). A proportion of people with MCI will progress to AD, while other forms of MCI tend to remain stable over time or progress other dementia types. This study aimed to discriminate MCI patients at risk of AD from stable MCI based on ^{18}F -FDG PET imaging data.

Methods: 197 participants from the public ADNI database were enrolled, including 92 patients with MCI who converted to AD within 36 months and 105 patients with MCI without conversion within 36 months. A deep learning model, namely AlexNet, served as a feature encoder to extract deep radiomic manifestations reflected by the ^{18}F -FDG PET imaging for each subject in both groups. The clinical scale information of the participants (Clinical Dementia Rating Sum of Boxes, Alzheimer's Disease Assessment Scale, Mini-mental State Examination, and Functional Activities Questionnaire) was combined with the above deep radiomic features to generate a joint feature set. The joint feature set was then separately fed into K-Nearest

Neighbour (KNN) and Random Forest (RF) classification models to observe their performance in classifying progressive MCI from stable MCI. Ten-fold cross-validation was processed to guarantee the robustness of the results.

Results: In the KNN model, the accuracy, precision, recall, and F1 score of the joint features reached 0.880, 0.894, 0.892, and 0.881, respectively. In the RF model, the accuracy, precision, recall, and F1 score were 0.840, 0.858, 0.829, and 0.836, respectively. Compared to the RF model, the joint features under the KNN model yielded superior discriminative performance.

Conclusion: The combination of deep radiomic features based on the deep learning algorithm and clinical scale information could be effectively used for the computer-assisted diagnosis of conversion from MCI to AD.

PU-1373

An artificial intelligence system for melioidosis pneumonia diagnosis and prognosis using computed tomography: A retrospective, multicenter study

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Background

Melioidosis pneumonia is a severely underreported infectious respiratory disease. The low prevalence of melioidosis pneumonia in the population leads to a lack of experience in identifying and predicting the prognosis of melioidosis pneumonia in clinical diagnoses and treatment. The reported melioidosis pneumonia rate is less than 1% of the actual incidence, while the mortality can reach 50%. We aimed to develop an AI system for detecting, diagnosing and predicting the prognosis that is valuable for clinicians to detect and manage patients with melioidosis pneumonia.

Methods

In this retrospective, multicenter study, we established a pneumonia CT image dataset (PCID) including 1488 patients (2,521 CT scans, 311,182 CT images). The PCID includes melioidosis pneumonia, community-acquired pneumonia (CAP), COVID-19 pneumonia, and healthy controls were collected at twelve hospitals. We used the PCID to develop an AI system with lung-lesion segmentation, pneumonia classification, and prognosis prediction networks for diagnosing and predicting the prognosis of melioidosis pneumonia. The system automatically detects lung-lesions and introduces local-to-global diagnosis methods of radiologists into a deep neural network (DNN) to diagnose pneumonia. Moreover, we constructed a prognostic model that combines image features and clinical metadata to determine severe or critical patients.

Findings

In the four-way classification task (melioidosis pneumonia, COVID-19 pneumonia, CAP, and healthy controls), in the internal test cohort (843 patients, 1,501 CT scans), the system achieved 88.74% accuracy and a macroaveraged AUC of 0.9700 (95% CI: 0.9630-0.9760). In an independent external test cohort (548 patients, 798 CT scans), the system achieved 89.22% accuracy and a macroaveraged AUC of 0.9695 (95% CI: 0.9594-0.9784), outperforming radiologists, and 81.76% accuracy and a macroaveraged AUC of 0.8197 (95% CI: 0.7452-0.8898) for predicting progression to severe or critical illness.

Interpretation

CT image-based dual-pathway models can significantly improve melioidosis pneumonia identification, a critical diagnostic challenge worldwide.

PU-1374

新一代基于模型迭代重建在低剂量上腹部 CT 成像中的应用价值

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目的：探讨新一代基于模型迭代重建 (MBIR) 在低剂量上腹部 CT 成像中的应用价值。

资料与方法：收集上腹部三期增强扫描患者 40 例，为 A、B 两组，动脉期和门静脉期扫描条件完全相同，延迟期采用自动管电流，A 组噪声指数 NI10，B 组 NI20，管电压均 120kVp。A 组延迟期分别采用 FBP、ASIR-40%重建，B 组延迟期采用 MBIR 中的 NR40 设置重建。测量肝脏、脾脏、胰腺、双肾实质及同层面腹壁皮下脂肪 CT 值及 SD 值，计算各脏器的 SNR 和 CNR：SNR=CT 值/SD 值，CNR=(CT 值-CT 值脂肪)/SD 值脂肪。单因素方差分析对三组图像 CT 值、SD 值、SNR、CNR 进行统计分析， $P<0.05$ 有统计学意义。记录 CTDIvol 和 DLP 并计算有效辐射剂量：ED=DLP×K。两名有经验的医师采用 5 分制对三组图像质量双盲法主观评分，利用 Kappa 检验比较评分的一致性。结果：三组图像 CT 值差异无统计学意义 ($P>0.05$)；A 组 FBP 和 40%Asir、B 组 MBIRNR40 三组图像主观评分为 3.15 ± 1.03 ， 4.00 ± 1.04 ， 4.95 ± 1.46 ，差异有统计学意义 ($P<0.05$)；B 组 MBIRNR40 图像肝脏、脾脏、胰腺、肾实质的 SD 分别为 7.53 ± 0.71 ， 7.72 ± 0.69 ， 8.19 ± 1.79 ， 10.27 ± 1.77 ，低于 A 组 40%Asir 和 FBP 图像，差异有统计学意义 ($P<0.05$)；B 组 MBIRNR40 图像肝脏、脾脏、胰腺、肾实质的 SNR 分别为 9.7 ± 1.37 ， 9.16 ± 1.21 ， 7.27 ± 1.48 ， 10.72 ± 1.38 ，CNR 分别为 22.46 ± 10.24 ， 22.29 ± 10.57 ， 20.26 ± 9.04 ， 27.22 ± 12.43 ，高于 A 组 40%Asir 和 FBP 图像，差异有统计学意义 ($P<0.05$)；B 组的 DLP (95.56 ± 47.17)、ED (1.43 ± 0.7) 较 A 组 DLP (376.40 ± 160) 和 ED (5.64 ± 2.41) 均降低了 75%。

结论：应用新一代基于模型迭代重建 (MBIR) 可获得优于常规剂量 40%ASIR 和 FBP 重建的图像质量，辐射剂量较常规扫描降低约 75%。

PU-1375

人工智能在冠状动脉 CTA 狭窄评估中的应用价值

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摘要：**目的** 分析人工智能 (AI) 评价冠状动脉狭窄程度的准确性，探讨 AI 辅助诊断系统对冠心病的诊断价值。**方法** 行冠状动脉 CT 血管成像 (CCTA) 的疑似冠心病且 2 周内行冠状动脉造影 (ICA) 患者 104 例，以创伤性冠状动脉造影 (ICA) 为金标准，评估 AI 对冠状动脉狭窄的诊断价值。**结果** 104 例患者中三大血管主干共计 312 根，ICA 检查血管阴性数量为 159 支 (狭窄 $<50\%$)，阳性 153 支 (狭窄 $\geq 50\%$)。AI 检查血管阴性数量为 154 支，阳性 158 支。ICA 和 AI 两组间血管狭窄程度无统计学意义 ($\chi^2 = 0.16$ ， $P = 0.69$)，诊断结果有较好的一致性 (Kappa 值 = 0.82)。ICA 和 AI 两组间冠状动脉三大主支 (RCA、LAD 和 LCX) 两组间狭窄程度均无统计学意义 ($t = 0.82$ ， 0.29 ， 1.10 $P > 0.05$)。ICA 检查中闭塞的血管 12 支，AI 组 0 支。**结论** AI 在诊断冠状动脉狭窄时和 ICA 有较好的一致性，冠状动脉血管闭塞时无法准确识别。

PU-1376

深度学习在颈椎病的诊断及预后预测的应用研究进展

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近年来,深度学习技术作为人工智能的重要分支,在医学影像领域得到了广泛应用。深度学习能够模拟人类的思维模式,不需要人工参与设计就能将原始数据通过自动学习过程从一些简单的非线性模型变换为更高层次的抽象表达,也能够从医学图像大数据中自动学习提取隐含的疾病诊断特征,近几年已迅速成为医学图像分析研究热点。在颈椎病中,深度学习在颈椎病影像诊断方面已取得了一定的进展,其中包括对颈椎病病变程度、病灶位置和脊髓损伤等的评估。此外,深度学习技术还可以实现对颈椎病产生原因高危因素进行预测和评价,并且可以一定程度上评估治疗效果。该文结合国内外深度学习研究的成果,总结近年来在颈椎病的诊断及治疗效果预测中深度学习的研究进展与应用情况。

PU-1377

基于脑图谱的儿童脑深部核团 MRI 图像自动分割研究

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目的:脑灰质核团的准确分割是定量研究相关结构和功能脑影像重要前提,手动分割需要时间和专业知识。本研究利用标准脑模板和图谱配准方法,探讨对儿童脑深部核团 MRI 图像自动分割的可行性。

材料与方法:收集 82 例无明显脑部结构异常儿童的常规 T1WI 原始影像资料及其临床信息。手动分割采用人工勾画 ROI 方法,分别取幕上苍白球、壳核及幕下齿状核。自动分割步骤如下:①使用 FMRIB Software Library (FSL) 软件去脑壳,在个体水平分割灰质、白质和脑脊液;②使用 Advanced Normalization Tools (ANTs) 软件将 MNI152 标准脑模板非线性配准到个体脑影像,并计算转换矩阵;③将转换矩阵应用到标准脑解剖图谱(Harvard-Oxford atlas, SUIT-Cerebellum atlas),得到基于个体空间的脑图谱,④利用基于个体的脑图谱对 MRI 图像进行分割。以 T1WI 信号强度值作为分割结果的参考指标,通过组内相关系数 (ICC) 和 Bland-Altman 图比较手动、自动分割方法分别对苍白球、壳核及齿状核的分割一致性。

结果:82 名儿童中位月龄 60.9 (0.9-170.5) 月,自动与手动分割方法对一致性检验结果,苍白球 ICC: 0.97 (95%CI 0.88-0.98), 壳核 ICC: 0.99 (95%CI 0.96-0.99), 齿状核 ICC: 0.96 (95%CI 0.87-0.97), Bland-Altman 图观察两种方法对应散点绝大部分位于 95% 一致性界限内。

结论:基于脑图谱的自动分割方法可以准确分割儿童脑深部核团,为后续 MRI 定量分析提供了一种快捷、准确的新方法。

PU-1378

基于逻辑回归构建的影像组学模型能更好地预测结直肠癌术前微卫星不稳定性

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背景:研究不同分类器在预测结直肠癌术前微卫星不稳定性 (MSI) 状态方面的性能,并确定预测能力最佳的方法。

方法:该回顾性研究根据 2020 年 3 月至 2022 年 9 月期间的病理报告招募了 297 名结直肠癌确诊患者。术前计算机断层扫描图像和术后 MSI 信息完整。特征提取和模型构建如下:首先,使用组

间/内相关系数和最小绝对收缩和选择算子算法来识别最具预测性的特征子集。随后，使用三个分类器（逻辑回归、支持向量机和随机森林）构建放射组学模型，并确定其中最佳的放射组学模型，使用与最佳放射组学模型相同的处理步骤建立临床模型和综合模型。最后，使用决策和校正曲线对三个模型的性能进行分析与评估。

结果：我们观察到，基于逻辑回归构建的放射组学模型表现出最佳的预测性能。此外，肿瘤位置、N 分期和高血压被确定为 MSI 状态的临床独立预测因素。在测试集中，临床模型显示出良好的预测性能，曲线下面积（AUC）为 0.732（95%置信区间，0.625-0.891）。此外，综合模型显示出优异的预测能力（AUC，0.958；准确度，0.890；灵敏度，0.927）和良好的临床适用性以及校准效果。

结论：基于逻辑回归构建的模型具有良好的性能和可重复性，可以进一步降低输入数据的可变性，提高预测结直肠癌患者 MSI 状态的放射组学研究质量。

PU-1379

基于卷积神经网络的磁共振图像在神经根型颈椎病诊断的临床价值

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背景 神经根型颈椎病（cervical spondylotic radiculopathy, CSR）是颈椎病中最常见的类型，但是目前由于技术的限制，对于神经根型颈椎病的诊断主要依据的是临床症状，在影像上神经根是否受压迫的诊断效率较低，所以是否有方法能根据影像图像提高对神经根型颈椎病的诊断效率是目前值得解决的问题之一。

目的 探讨基于卷积神经网络（Convolutional Neural Networks,CNN）模型的影像图像在神经根型颈椎病的分析诊断中临床价值以及实际应用。

方法 收集有颈肩痛及上肢麻木等颈丛和臂丛神经根受压症状、临床高度怀疑神经根型颈椎病患者及健康人群的颈椎 MRI 常规序列，在应用纳入和排除标准后，共纳入 50 例患者及 51 例健康人群，其中 80%（n=80）用于训练，10%用于测试（n=10），10%用于验证（n=10），利用 T2WI 矢状位及横断位 MRI，设计并训练了相应的卷积神经网络模型（Resnet50）。验证指标包括特异性及曲线下的面积。

结果 共 50 名患者及 51 名健康人群进行了评估。该模型对 20 份 T2WI 横断位测试组图像的诊断在测试集（valuation dataset）上的准确率为 9/10（90%），另一针对矢状位的诊断模型对 20 份 T2WI 矢状位的诊断在测试集（valuation dataset）上的准确率为 7/10（70%）。

结论 卷积神经网络模型能够在一定程度上利用影像图像提升神经根型颈椎病的诊断效率，该预训练卷积神经网络（Resnet50）基于横断位图像的诊断准确率优于基于矢状位图像的诊断准确率，且可达到 90%准确率。

PU-1380

基于 MRI 影像组学在腮腺肿瘤分类中的应用研究

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目的

唾液腺肿瘤约 70%是腮腺肿瘤。腮腺肿瘤有很多亚型，其组织学类型多样，不同组织学亚型之间的临床病理特点常有重叠，常常使得部分唾液腺肿瘤的诊断出现争议。不同性质及亚型的唾液腺上皮性肿瘤在手术方式、是否放化疗、清扫淋巴结、保留面神经等治疗方式上有很大的不同。因此术前有必要为腮腺肿瘤的分类建立更客观有效的影像评估模型，对于临床治疗方案的制定及患者预后的评估具有重要意义。

方法

我们回顾性收集在医院的 189 例腮腺肿瘤患者的临床和影像学数据，首先由多位高年资放射科医师在 T1WI、T2WI-FS、T1WI-FS+C 序列上逐层勾画腮腺肿瘤金标准。接着对这三个序列进行影像组学分析，通过影像组学进行特征提取。最后采用传统机器学习分类器，对腮腺肿瘤进行病理分类预测。

结果

logistic 回归分类结果，T1WI: AUC 为 0.829，准确率为 78.9%，特异度为 78.5%，灵敏度为 80.0%。T2WI-FS: AUC 为 0.871，准确率为 73.7%，特异度为 71.4%，灵敏度为 80.0%。T1WI-FS+C: AUC 为 0.729，准确率为 68.4%，特异度为 71.4%，灵敏度为 60.0%。SVM 分类结果，T1WI: AUC 为 0.814，准确率为 84.2%，特异度为 85.7%，灵敏度为 80.0%。T2WI-FS: AUC 为 0.871，准确率为 84.2%，特异度为 85.7%，灵敏度为 80.0%。T1WI-FS+C: AUC 为 0.700，准确率为 68.4%，特异度为 64.3%，灵敏度为 80.0%。RF 分类结果，T1WI: AUC 为 0.750 准确率为 73.6%，特异度为 71.4%，灵敏度为 80.0%。T2WI-FS: AUC 为 0.800，准确率为 63.1%，特异度为 57.1%，灵敏度为 80.0%。T1WI-FS+C: AUC 为 0.750，准确率为 73.6%，特异度为 71.4%，灵敏度为 80.0%。

结论

我们通过建立了一个基于 MRI 图像对腮腺肿瘤良恶性进行分类的影像组学模型，表明 T2WI-FS 序列结合影像组学效能最好。基于对本研究旨在提高腮腺肿瘤术前诊断的准确性，以便临床定制更加个性化精细化的治疗方案。

PU-1381

基于多尺度的磁共振纹理分析在Ⅱ、Ⅲ级胶质瘤鉴别上的应用研究

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目的：针对影像诊断Ⅱ、Ⅲ级胶质瘤的鉴别困难问题，通过基于多尺度的磁共振纹理分析方法，提升Ⅱ、Ⅲ级胶质瘤鉴别准确率的应用研究。材料与方法：回顾性分析本院 38 例脑胶质瘤患者磁共振影像，以病理结果作为判断金标准。收集 T2 加权图像（T2WI）、T2 加权压水图像（T2_flair）、增强后 T1 加权图像（T1_contrast）、弥散（DWI）序列处理出来的表观扩散系数图（DWI_ADC）、磁敏感加权图像（SWI）、弥散张量成像（DTI）处理出来的表观扩散系数图（DTI_ADC）和各向异性指数图（FA）。在 MATLAB 上实现病灶划取，并且使用小波分解构造多尺度图像。在原始图像和构造图像上做灰度共生矩阵（GLCM）、灰度行程矩阵（GLRLM）、灰度区域大小矩阵（GLSZM）、领域灰度差矩阵（NGTDM）四种二阶变换，提取纹理特征。使用 LASSO（Least Absolute Shrinkage and Selection Operator）方法对纹理特征进行筛选，得出非零权重纹理特征。最终采用支持向量机（SVM：Support Vector Machine）、梯度提升（GB: Gradient Boosting）和随机森林（RF: Random Forests）三种分级模型，统一采用留一法交叉验证得出鉴别Ⅱ、Ⅲ级胶质瘤上的平均准确率。结果：原始图的二阶纹理参数在 SVM 模型、GB 模

型和 RF 模型上的准确率为 85.7%、80.3 和 63.9%，构造图像的二阶纹理参数在 SVM 模型、GBC 模型和 RFC 模型上的准确率为 94.6%、83.8%和 70.3%。结论：研究证明多尺度的磁共振纹理分析方法对鉴别Ⅱ、Ⅲ级脑胶质瘤准确率有较大提升。

PU-1382

基于 CT 影像组学随机森林模型对 IA 期肺腺癌气道播散的评价

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基于 CT 影像组学随机森林模型对 IA 期肺腺癌气道播散的评价

目的：通过气道播散（STAS）是肺腺癌的一种侵袭性特征，被认为是预后不良的危险因素。本研究旨在建立一个随机森林模型，用于术前预测 IA 期肺腺癌的气道播散（STAS）。

方法：对 2023 年 3 月至 2023 年 8 月来我院行胸部 CT 平扫和手术切除的 70 例 IA 期肺腺癌患者进行回顾性研究。每个肺结节通过人工智能（AI）软件自动分割，并提取其基于 CT 的影像组学信息。所有患者在病理上被分为 STAS 阴性和 STAS 阳性两组，然后对两组患者的临床病理和 CT 影像组学进行比较。最后通过随机森林模型建立评估 IA 期肺腺癌 STAS 状态的预测模型。

研究结果在 70 例 IA 期肺腺癌患者中，12 例患者 STAS 阳性。随机森林分类模型确定了预测特征，包括 CT 值最大值、肿瘤合并率（CTR）、三维直径、CT 值平均值、熵和 CT 值最小值。随机森林模型的误分类率仅为 8.37%。

结论基于随机森林模型可有效识别 IA 期肺腺癌 STAS 的危险因素，并有效实现特征风险的分级管理。预测 IA 期肺腺癌 STAS 的随机森林模型简单实用。

PU-1383

Deep Learning Algorithm for CT Image Super-Resolution Reconstruction: from Whole Lung Scan to Target Scan

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Purpose: Our study aims to develop a deep learning super-resolution (SR) model capable of efficiently mapping from a whole lung scan with a resolution of 0.68mm, 0.68mm, 1mm (NRCT, normal-resolution CT) to a target CT scan with a resolution of 0.17mm, 0.17mm, 0.5mm (HRCT, high-resolution CT).

Methods: In this retrospective study, CT projection data performed in 141 patients were collected between January 2020 and June 2023 using two different protocols: a 1024x1024 matrix whole lung scan and a 512x512 matrix target CT scan. Based on NRCT and HRCT images of 102 patients, a chest CT image super-resolution model based on deep learning was constructed and SR CT images were generated. It can tackle the SR task for 3D images by employing two cascaded 2D networks. One network aims to achieve intra-slice SR and the other aims to further upscale CT images at the inter-slice level. We compared the image quality and lesion segmentation accuracy between the model output and the result of HRCT image.

Result: In the testing set, among 39 patients with 119 pulmonary nodules, the Peak signal-to-noise ratio (PSNR) and the Structural Similarity Index Measure (SSIM) of our model, Bicubic interpolation and 3D EDSR were 44.34 vs. 34.63 vs. 35.61, and 0.9980 vs. 0.9869 vs. 0.9894, respectively. The performance of lung nodule segmentation between different algorithms was

compared. Take HRCT results as the true value, We calculated the DICE of our model, Bicubic interpolation, and 3D EDSR were 0.9067 vs. 0.8137 vs. 0.8631.

Conclusions: Our model outperforms existing methods in terms of image information quality and clinical segmentation accuracy. It demonstrates the capability to effectively upscale 3D CT lung images by up to a factor of 4x intra-slice and 2x inter-slice, which can obtain a CT image with a resolution of 0.17mm, 0.17mm, 0.5mm from a CT image with a resolution of 0.68mm, 0.68mm, 1mm.

PU-1384

基于 PET/CT 影像组学特征的肺磨玻璃结节侵袭性研究

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目的:

本文旨在运用 PET/CT 图像中的影像组学特征,在宏观尺度上从解剖和功能维度无创性地鉴别肺磨玻璃结节的病理侵袭性分组。

方法:

本研究回顾性的收集东南大学附属中大医院在 2018 年 1 月 1 日至 2023 年 4 月 7 日 PET/CT 检查中提示存在肺磨玻璃结节并有相应病灶的术后病理资料的患者,按照纳入及排除标准收集入组患者的临床、影像及病理资料。由一名医师独立进行盲法 ROI 的勾画,薄层 CT 图像的 ROI 在 ITK-SNAP 软件中逐层绘制, PET 图像的 ROI 在 lifex 软件的 PET 及厚层 CT 融合图像上使用半自动 3D 工具以 SUVmax 的 40%进行勾画;在初次勾画 ROI 后的 2 个月进行第二次 ROI 的勾画。利用 python 中的 pyradiomics 包分别提取 CT 及 PET 图像的影像组学特征。特征筛选过程中首先选取组间相关系数 (ICC) >0.80 的特征;然后在 FAE 软件中,使用 Z-score 进行归一化处理,通过皮尔森相关系数进行数据降维,之后使用递归式特征消除 (RFE) 对特征进行选择,剩余特征进行最小绝对收缩和选择算子 (LASSO) 逻辑回归,采用 10 折交叉验证,分别构建 CT 影像组学特征模型 (模型 1) 及 PET 联合 CT 影像组学特征模型 (模型 2)。

结果:

本研究最终纳入了 106 名患者的 133 个病灶,其中 80 例为非浸润组,53 例为浸润组。以 7:3 的比例划分训练集和测试集,在训练集中以 10:1 的比例确定选择 9 个特征。在 CT 影像组学特征模型 (模型 1) 中,训练集 AUC=0.951[95%CI:0.897,0.989],测试集 AUC=0.841[95%CI:0.700,0.963];在 PET 联合 CT 影像组学特征模型 (模型 2) 中,训练集 AUC=0.970[95%CI:0.938,0.993],测试集 AUC=0.849[95%CI:0.702,0.960];联合模型相对于仅 CT 模型具有优势。

讨论:

PET 影像组学特征可以提供附加信息用于无创性的鉴别肺磨玻璃结节的病理侵袭性分组;对于非侵袭组的患者选用叶下切除术代替肺叶切除术可提高总生存率,因此运用 PET/CT 影像组学特征有助于指导患者选择治疗方案。

PU-1385

智能快速磁共振图像处理系统在 MRI 检查中提高患者检查体验感

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本研究旨在利用智能快速磁共振图像处理系统提高 MRI 检查中患者的检查体验感。通过该系统的应用，可以有效地减少患者在 MRI 检查中的不适感和焦虑感，提高检查过程的舒适度和便捷性。本文采用了一种基于图像处理技术的智能算法，通过对患者图像进行快速处理和优化，实现了对磁共振图像的高质量展示，并且在保证图像质量的同时有效缩短了图像扫描的时间。研究表明，该系统在提高 MRI 检查准确性和效率的同时，显著提升了患者的检查体验感和满意度，为临床诊断工作提供了有力的技术支持。本研究的意义在于为患者提供更好的检查体验，改善医疗服务质量，促进医患关系的良性发展。

PU-1386

深度学习影像组学列线图预测肺腺癌患者术前纵隔淋巴结转移

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目的：术前纵隔淋巴结转移情况影响腺癌患者的个体化治疗和预后评估，常规胸部 CT 平扫术前评估不够精准，本研究旨在探讨基于胸部 CT 平扫图像的深度学习影像组学列线图预测肺腺癌患者术前淋巴结转移的效能。

方法：纳入经外科手术切除并病理证实为肺腺癌的患者共 528 例，其中 176 例（33.33%）有纵隔淋巴结转移。采用 ResNet50 架构来开发深度卷积神经网络，从病灶的胸部 CT 平扫最大层面图像中进行迁移学习并提取 2048 个深度学习特征，建立深度学习影像学模型和计算影像组学评分（DLRS）。评估临床因素，包括临床资料和 CT 特征，建立临床因素模型。合并构建包含深度学习影像组学评分（DLRS）和临床因素的列线图，生成受试者特征曲线（ROC），计算 ROC 的曲线下面积（AUC）以量化每个模型在训练队列和验证队列上的性能。采用校正曲线评估模型准确度和决策曲线分析（DCA）来评价模型的临床效用。

结果：深度学习影像组学模型在训练队列的 AUC（95%CI）为 0.96（0.95-0.98）和验证队列为 0.89（0.82-0.96），临床因素模型在训练队列 AUC（95% CI）为 0.85（0.82-0.89）和验证队列为 0.85（0.78-0.92），合并构建包含深度学习影像组学评分（DLRS）和临床因素的深度学习影像组学列线图在训练队列 AUC（95% CI）为 0.98（0.96-0.99）和验证队列为 0.82（0.74-0.91），其在训练队列中较单纯的深度学习影像组学模型、临床因素模型均表现出更好的预测能力（ $p < 0.05$ ）。

结论：基于胸部 CT 平扫的深度学习影像组学列线图对于肺腺癌患者术前有无纵隔淋巴结转移具有良好的预测能力，有助于临床医生制定适当的诊疗方案。

PU-1387

MRI 对多系统萎缩（MSA）患者基底神经节的初步研究

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目的：应用 QSM 序列定量分析 MSA 患者的丘脑底核（STN）、苍白球内侧部（GPi）、黑质（SN）磁化率值较正常健康人有无明显差异，并探讨基底神经节的铁沉积与多系统萎缩（MSA）疾病的相关性。

材料与方法：经临床拟诊 16 例 MSA 患者（男 7 例，女 9 例，平均年龄 62.15 ± 3.78 岁），16 例健康对照者（男 8 例，女 8 例，平均年龄 56.83 ± 3.20 岁）纳入本研究。所有受试者均进行常规联影 3.0T MRI 序列及 QSM 序列扫描，手动勾选双侧 STN、GPi、SN 的感兴趣区域（ROI），并测量平

均磁化率值。采用独立样本 t 检验（正态分布）或 Mann-Whitney U（非正态分布）比较两组间各感兴趣区（ROI）平均磁化率的差异性。

结果：与 HC 组相比，MSA 组中双侧 SN 和 STN 的平均磁化率具有显著差异性（ $P < 0.05$ ），MSA 组与 HC 组的 GPi 平均磁化率差异无统计学意义（ $P > 0.05$ ）。

结论：多系统萎缩（MSA）患者的丘脑底核（STN）、黑质（SN）铁沉积较健康人明显增多，铁过量聚集可能导致神经核团的病变。

PU-1388

肺腺癌术后影像组学预后模型构建和肿瘤微环境相关性分析

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目的：构建肺腺癌术后影像组学预后模型，比较不同指标的预测效能并探究影像组学特征与肿瘤微环境的相关性。方法：本研究为对 TCIA 数据库中的 NSCLC-Radiogenomics 数据集的再分析。完成对肺腺癌患者术前 CT 图像的分割后，使用 Pyradiomics 包提取影像组学特征。结合无病生存期资料，通过单因素 COX 回归-LASSO 回归-多因素 COX 回归的连续过程构建预测肺腺癌患者术后预后的影像组学模型。根据风险得分中位值将患者分为高、低风险两组，通过生存曲线分析高低风险组的生存差异。随后将多种临床因素和模型特征纳入多因素 COX 回归模型，得到临床-影像组学混合模型，并通过 ROC 曲线下面积比较组学模型、混合模型、T 分期、G 分期的预后预测效能。最后，基于肿瘤样本的转录组测序资料得到 ESTIMATE 打分和 CIBERSORT 分析结果，从而比较高低风险组肿瘤样本的基质细胞含量，以及分析影像组学特征与免疫细胞浸润比例的相关性。结果：共 114 名肺腺癌患者被纳入模型构建分析，共提取得到 863 个影像组学特征。构建的影像组学预后模型、临床-影像组学混合模型 ROC 曲线下面积分别为 0.728、0.739。根据影像组学模型风险得分中位值划分的高低风险组之间，生存具有显著差异，且高风险组有显著更高的基质细胞打分。高风险可能与更高的调节性 T 细胞浸润比例以及更低的树突状细胞、活化的 CD4 记忆 T 细胞浸润比例相关。结论：影像组学风险打分模型预测未接受免疫治疗的肺腺癌术后患者的预后有较高的效能，高风险组肿瘤纯度更低，有更高的抑制性免疫细胞浸润比例。

PU-1389

人工智能在帕金森病 MRI 诊断中的研究进展

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帕金森病（Parkinsons disease, PD）的发病隐匿且机制不明确，患病率及致残率较高且无法治愈，已成为老龄化全球背景下的临床难题。特别是诊断仍然依赖于患者临床表现及医生经验判断，缺乏客观诊断标志物，方法局限。随着技术的进步，特别是人工智能的兴起，结合多模态 MRI，如磁敏感成像、弥散张量成像、功能性成像开发的早期诊断、自动诊断工具，已用于支持 PD 诊断，并且发挥了极大的参考价值。本文就人工智能在 PD 患者 MRI 诊断中的研究进展和现状进行综述。

PU-1390

基于多期增强 CT 放射组学和随机森林预测 Ki-67 在胃肠道间质瘤中的表达研究

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胃肠道间质瘤 (GIST) 是最常见的胃肠道间充质肿瘤。GISTs 具有临床异质性, 在具有不同预后风险的个体患者中显示出不同程度的恶性潜能。Ki-67 是代表肿瘤异质性和细胞生长的关键免疫标志物, 它独立于病理 NIH 标准。在这项工作中, 我们提出了一种新的方法, RF_Ki67, 用随机森林模型对 Ki-67 的表达进行分类。我们筛选出了多层螺旋 CT 放射组学数据特征。然后, 我们采用随机森林对每个 GIST 潜在患者的风险度评估进行分类。在构建了风险度评估分类模型后, 我们利用该模型对 Ki67 中的高/低表达进行了分类。该方法比其他典型方法表现出良好的性能。

PU-1391

Clinical Application of Automatic Assessment of Scoliosis Cobb Angle Based on Deep Learning

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Purpose A recently developed deep-learning-based automatic evaluation model provides reliable and efficient Cobb angle measurements for scoliosis diagnosis. However, few studies have explored its clinical application, and external validation is lacking. Therefore, this study aimed to explore the value of automated assessment models in clinical practice by comparing deep-learning models with manual measurement methods.

Methods We divided 481 spine radiographs from an open-source dataset into training and validation sets, and used 119 from a private dataset as the test set. The mean Cobb angle values assessed by three physicians in the hospital's PACS system served as the reference standard. The results of Seg4Reg, VFLDN, and manual measurement were statistically analyzed. The intra-class correlation coefficients (ICC) and the Pearson correlation coefficient (PCC) were used to compare their reliability and correlation. The Kappa statistic was used to compare the consistency of Cobb angles at different severity levels.

Results The mean Cobb angle values measured were $35.89^\circ \pm 9.33^\circ$ with Seg4Reg, $31.54^\circ \pm 9.78^\circ$ with VFLDN, and $32.23^\circ \pm 9.28^\circ$ with manual measurement. The ICCs for the reliability of Seg4Reg and VFLDN were 0.809 and 0.975, respectively. The PCC and MAD between Seg4Reg and manual measurements were 0.731 ($p < 0.001$) and 6.51° , while those between VFLDN and manual measurements were 0.952 ($p < 0.001$) and 2.36° . The Kappa statistic indicated VFLDN was superior to Seg4Reg and manual measurements for Cobb angle severity classification.

Conclusions The deep-learning-based automatic scoliosis Cobb angle assessment model is feasible in clinical practice. Specifically, the keypoint-based VFLDN is more valuable in actual clinical work with higher accuracy, transparency, and interpretability.

PU-1392

基于术前盆腔 MRI 的影像组学预测子宫内膜癌的淋巴结分期和预后

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目的：基于影像组学特征和多种数据预处理方法，建立并验证基于 MRI 的影像组学模型对子宫内膜癌的淋巴结分期和预后的预测价值，为临床医生提供决策支持。

方法：回顾性纳入我院 145 例经病理学确诊的子宫内膜癌患者，其中训练集 100 例患者，测试集 45 例患者。所有患者在接受治疗前均行盆腔 MRI 成像（场强/序列：3.0TMRI 的 T2WI、增强 T1WI 和弥散加权成像），肿瘤由两位放射科医生用半自动绝对阈值分割方法分割 MRI 图像的感兴趣体积 (volume of interest, VOI)。随后用影像组学软件对 VOI 进行特征提取，并用组内相关系数检验可靠性和最小绝对收缩和选择算子 (least absolute shrinkage and selection operator, LASSO) 回归进行特征筛选，并开发了诺模图，分别用训练集和测试集中的受试者操作特征 (receiver operator characteristic, ROC) 的曲线下面积 (area under the curve, AUC) 来评估诺模图模型的诊断性能。

结果：经 Lasso 回归分析，保留 6 个稳定的影像组学特征。在训练集和测试集中，诺模图模型预测的 AUC 值分别为 0.831(95%可信区间：0.725~0.916；敏感性：83.6%，特异性：74.9%)、0.807(95%CI: 0.673~0.941；敏感性：78.8%，特异性：78.7%)。

结论：采用诺模图算法建立的基于影像学的机器学习模型对子宫内膜癌的淋巴结分期和预后具有较高的诊断性能，可以为治疗决策提供支持。

PU-1393

基于深度学习的主动脉 CTA 影像组学预测急性 A 型主动脉夹层 (ATAAD) 根部重建术后脑灌注不良

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目的 接受主动脉根部重建术(Bentall 或 David 手术)的急性 A 型主动脉夹层(ATAAD)患者与术后脑灌注不良(CM)的高发生率有关。本研究旨在利用基于深度学习的计算机断层扫描血管成像(CTA)的影像组学特征和临床特征建立预测模型，以预测 ATAAD 初次术后的 CM。

材料与方法 本研究纳入 2013 年 1 月至 2023 年 1 月期间 98 名接受主动脉根部重建手术治疗的 ATAAD 患者进行回顾性研究。利用三维深度卷积神经网络(3D CNN)自动识别和分割 CTA 图像并获得所需的影像组学特征。利用方差分析和最小绝对收缩和分段操作算法进行特征选择和影像组学评分。利用多变量逻辑回归分析，将影像组学评分(Rad-Score)和临床指标纳入 Nomogram。利用 Hosmer-Lemeshow 检验检查模型的校准。

结果 Rad-Score 结合血小板和 C-反应蛋白的模型效能较高，训练集中 AUC 为 0.84(95%CI, 0.78-0.91)，在测试集中 AUC 为 0.75(95%CI, 0.67-0.84)。在 2019 年至 2022 年收集的验证集中，组合模型的效能较好，AUC 为 0.78(95%CI, 0.67-0.86)，准确度为 0.76，精确度为 0.66，灵敏度为 0.84，特异性为 0.63。Hosmer-Lemeshow 检验在组合模型中具有统计学意义 (t 训练集=0.15, t 测试集=0.19, t 验证集=0.18, $p>0.05$)。

结论 基于深度学习的 CTA 影像组学和临床指标的结合可以预测 ATAAD 患者初次手术后的 CM。该 Nomogram 被验证为具有临床意义。它有望在随访检查中对患者的预后提供早期预警。

PU-1394

基于深度学习·自注意力反馈机制模型分割 3D CT 胃癌病灶

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目的: 胃癌作为全球第五癌症致死疾病, 手术治疗是可切除性胃癌的主要治疗方法。计算机断层扫描 (CT) 能够显示胃癌病灶及其与周围组织的关系, 对手术成功至关重要。自动分割胃癌 CT 病灶区域能够提供病灶分布、病灶体积等量化指标, 为手术方案提供精细的信息。以深度学习为代表的人工智能技术越来越多地应用于医学图像领域。因此, 本研究利用深度学习技术, 提出自注意力反馈机制, 实现 3D CT 胃癌病灶自动分割。

方法: 本研究纳入贵州省人民医院 (GZH) 和西南医院 (SWH) 共计 90 例胃癌患者 CT 图像。其中, GZH 的 50 例使用五折交叉法对模型训练和评估; SWH 的 40 例用于模型的外部验证。此外, 还使用肝脏肝癌分割公开数据集, 验证模型的迁移学习能力。针对胃体异形性和胃癌异质性, 本研究提出自注意力反馈机制, 在网络模型深层学习自注意力信息, 再将该信息反馈到网络浅层, 克服现有自注意力机制由于计算资源限制无法在浅层网络中应用于高分辨率 3D 图像的困难, 使网络浅层也具有自注意能力, 进而让整个模型的各个阶段都能专注于胃癌分布信息, 提升模型分割精度。

结果: 在五折交叉验证实验中, 胃癌病灶分割 dice 值、召回率、精确率分别为 0.845、0.833、0.883。比目前最好的胃癌 CT 分割方法结果 (dice=0.764、召回率=0.758、精确率=0.856) 提升显著 ($p<0.01$)。在外部验证中, 分割 dice 值、召回率、准确率分别为 0.806、0.811、0.872, 展示了较强的泛化能力。在消融实验中, 本文提出的模型与无反馈机制的自注意力模型在测试集上平均 dice 值分别为 0.8456 和 0.7847, 展示了该反馈机制能够显著提升模型分割精度 ($p=0.021$)。在肝脏肝癌数据上, 模型对肝脏和肝癌病灶分割 dice 值分别为 0.952 和 0.741, 与最近针对肝脏肝癌分割模型拥有相当的性能, 展示了模型在其他任务上的迁移学习能力。

结论: 本文提出的自注意力反馈机制模型能够显著提升对胃癌病灶的分割能力。该模型可能为临床提供一种有价值的方式, 辅助提升胃癌患者手术成功率。同时, 提出的自注意力反馈机制可作为插件用于其他深度学习模型, 显著提升其分割能力。

PU-1395

基于 MRI-TW2I 直肠癌-直肠-直肠系膜自动语义分割识别

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目的

尽管术前 MRI 影像学评估在直肠癌的治疗决策中起重要作用, 但由于放射科医生存在临床经验的差异, 同一个病人的分期可能会有所差别。目前, 许多研究表明基于人工智能的自动化分割识别结果与放射科医生评价的结果相当。因此, 在本研究中我们旨在开发基于人工智能的模型来自动化、可视化分割直肠癌患者的直肠系膜、肿瘤病灶及直肠, 以此有益于进一步对直肠癌患者进行自动分期。

方法

本研究回顾性地纳入经组织学证实的直肠癌患者共 88 例, 并导出每位患者轴向 T2 加权图像 (T2WI) 医学数字成像数据和通信格式图像。由具有 3 年直肠癌诊断经验的放射科医生使用 ITK-SNAP 软件分别对肿瘤、直肠和直肠系膜区域进行手工标注。我们开发了一种基于 MRI-TW2I 直肠

癌-直肠-直肠系膜的自动语义分割模型, 使用神经网络从 T2WI 中提取肿瘤、直肠和直肠系膜区域。关于分割精度, 我们计算了自动分割和金标准手工标注的 Dice 相似性系数。

结果

在 88 例直肠癌患者中, 71 例用于模型训练, 17 例用于验证模型。我们的结果显示, 自动分割和金标准手工标注的 DICE 相似性系数为 0.82。

结论

基于 MRI-TW2I 直肠癌-直肠-直肠系膜的自动语义分割模型可以解决因放射科医生主观评价导致观察者间差异的问题, 也有益于进一步对直肠癌患者进行肿瘤分期、风险分层和制定个体化治疗方案。

PU-1396

比较双低扫描深度学习重建、能谱成像单能量重建 CTPA 图像质量、辐射剂量

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目的 比较双低扫描(低千伏、低剂量对比剂)深度学习重建(Deep learning image reconstruction, DLIR)与能谱成像单能量重建肺动脉血管成像(CT pulmonary angiography, CTPA)的图像质量、辐射剂量。方法 回顾性分析 2021 年 9 月至 2022 年 03 月于我院进行 CTPA 检查的患者。根据扫描方式将患者随机分为 DLIR 组(管电压 80kV, DLIR 高档[DL-H]算法重建)、能谱组(80/140kV 瞬切能谱扫描模式, 50%ASiR-V 算法重建), 并固定两组扫描模式的噪声指数以及对比剂量一致。两组对比剂(碘海醇 350mg/ml)注射剂量均为 20ml, 注射速率 4.5ml/s。首先利用能谱分析软件分别重建 40keV、50keV、60keV、70keV 四组单能量图像, 比较各组单能量图像质量, 获得能谱成像最佳单能量序列。其次, 比较 DLIR、能谱最佳单能量成像肺动脉及其主要分支 CT 值、图像噪声、信噪比(SNR)、对比噪声比(CNR)以及图像质量主观评分、诊断信心。分别记录容积 CT 剂量指数(CTDIvol)、剂量长度乘积(DLP)、有效剂量(ED)等辐射剂量。结果 本研究共纳入 60 例患者, DLIR 组、能谱组各 30 例。40、50、60、70keV 四组单能量图像中, 40keV 组肺动脉主干、左右肺动脉干 CT 值、图像噪声最高, 且随着 keV 的增加而降低。60keV 单能量图像 CNR 最高, 为最佳单能量图像。DLIR 组肺动脉主干、左右肺动脉干、左上、左下肺动脉干、右上、右下肺动脉干的 CT 值、SNR、CNR 均高于 60keV 组, 差异具有统计学意义($P<0.05$)。DLIR 组的主观评分、诊断信心较 60keV 最佳单能量组分别增加 32.4%、16.7%, 差异具有统计学意义($P<0.01$)。DLIR 组辐射剂量参数 CTDIvol、DLP 及 ED 较 60keV 最佳单能量组分别降低约 56%、61%、61%, 差异均具有统计学意义($P<0.01$)。结论 CTPA 双低扫描模式中, 深度学习重建的图像质量、辐射剂量优于能谱成像 60keV 单能量重建。

PU-1397

Comparison of image quality and Hepatic cystic lesions conspicuity between the low-kVp-DLIR and GSI-DLIR

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*Purpose: To compare the image quality and conspicuity of Hepatic cystic lesions between the low-kVp-DLIR and GSI-DLIR.*Methods and Materials: A cohort of 27 consecutive patients undergoing Gemstone Spectral Imaging abdomen protocol CT were retrospectively analyzed. Among them, 15 patients underwent 100kVp CT (100kVp group) with DLIR-M., and 12 patients underwent GSI and reconstructed at 40keV (40keV group) with DLIR-M. The medium-strength

level of DLIR were used in both groups. Quantitative measurements, qualitative image quality, Hepatic cystic lesions conspicuity, and DLP were compared between the two groups using Mann-Whitney U test.*Results: A total of 7 and 5 Hepatic cystic lesions were found in the 100kVp and 40keV groups, respectively. CT numbers of the vasculatures and parenchymal organs ($P < 0.05$ for all) and the background noise at both hepatic and portal venous phases ($P < 0.05$) were higher in the 40keV group than in the 100kVp group. The SNR of all anatomical structures ($P < 0.05$ for all) and the lesions-to liver CNR ($P < 0.05$ for all) were higher in the 40keV group than in the 100kVp group. Hepatic cystic lesions conspicuity was better in the 40keV group than in the 100kVp group ($P < 0.05$ for all). DLP at liver ($P = 0.06$) and portal venous phases ($P = 0.18$) was comparable between the two groups.*Conclusions: Under the same DLP, 40keV images of a lower energy level demonstrated higher SNR and lesions to liver CNR and better hepatic cystic lesions conspicuity compared to the 100kVp setting.

PU-1398

Predicting GATA6 expression in pancreatic cancer based on semi-supervised learning in CT radiomics – a pilot study

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Background: GATA6 was proven to be closely related to the prognosis of pancreatic cancer patients. Thus, it is important to identify the GATA6 expression of PDAC as non-invasive predictive marker for its treatment.

Purpose: To develop a semi-supervised learning model to use CT-based radiomics to predict the GATA6 expression of PDAC and identify the biomarkers.

Materials and Methods: In this retrospective study, 35 GATA6high and 19 GATA6low patients with PADC were included from January 2017 to October 2021. They were randomly divided into training cohort 1 ($n=37$) and test cohort ($n=17$) with the ratio of 7:3. 91 PDAC patients from public datasets and training cohort 1 formed training cohort 2 ($n=128$). Radiomics features were extracted from tumor regions delineated at pretreatment CT and selected by using the least absolute shrinkage and selection operator (LASSO). An original radiomics model and the radiomics model improved by semi-supervised learning were established by Transformer. The performance of the two models was evaluated by the area under the curve (AUC) and Hosmer-Lemeshow test in both the training and test cohorts.

Results: Two radiomics models were established in 54 patients (mean age, 66 years \pm 8 [standard deviation]; 19 men). In the test cohort, the two models' corresponding AUCs were 0.70 (95%CI: 0.68, 0.74) and 0.87 (95%CI: 0.86, 0.88). The Hosmer-Lemeshow test also showed good performance for two models in the training cohorts ($P = 0.413$ and 0.561) and test cohort ($P = 0.165$ and 0.453).

Conclusion: A CT-based radiomics model improved by semi-supervised learning can predict the GATA6 expression, thus reflecting subtypes of PDAC

PU-1399

Functional Connectivity Alterations During Sleep Deprivation: The Interplay of Sleep Pressure and Circadian Rhythms

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Background: Sleep deprivation (SD) has emerged as a significant public health concern due to its adverse effects on cognition and behavior. The influence of circadian rhythms on SD and brain activities has been less studied. This study employed functional magnetic resonance imaging (fMRI) and functional connectivity density (FCD) metrics to investigate the interaction between sleep pressure and circadian rhythms during SD. **Methods:** Thirty-six volunteers with good sleep habits underwent a sleep deprivation trial. Sleepiness was assessed using the Stanford Sleepiness Scale (SSS) at multiple time points, and fMRI scans were conducted to derive global and local FCD (gFCD and iFCD) values. The study focused on specific brain regions and networks, including the thalamus, the frontoparietal network (FPN), and the default mode network (DMN). **Results:** Analysis indicated significant changes in gFCD and iFCD values in several key brain regions. A strong correlation was found between sleepiness and both gFCD and iFCD values in certain areas, such as the left superior temporal gyrus and left thalamus. The gFCD values in these regions showed a gradual increase across sessions, while iFCD values in the right superior frontal gyrus decreased. **Conclusions:** The study revealed that SD leads to enhanced functional activities in the DMN and thalamus and decreased activity in the FPN. These changes in brain activity were significantly correlated with increases in sleepiness, as measured by the SSS. Our findings underscore the importance of circadian rhythms in understanding the neural underpinnings of SD and could guide future clinical interventions aimed at mitigating the effects of SD.

PU-1400

White Matter Structural Topologic Efficiency Predicts Individual Resistance to Sleep Deprivation

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Objectives: Sleep deprivation (SD) is commonplace in modern society and large individual differences in the vulnerability to SD. We aim to identify the structural networks differences based on diffusion tensor imaging (DTI) that contribute to the individual different vulnerability to SD. **Methods:** The number of psychomotor vigilance task (PVT) lapses was used to classify 49 healthy subjects on the basis of whether vulnerable or resistant to SD. DTI and graph theory approaches were used to investigate the topologic organization differences of the brain structural connectome between SD vulnerable and resistant individuals. We measured the level of global efficiency and clustering in rich club and non-rich club organization. **Results:** We demonstrated that participants vulnerable to SD had less global efficiency, network strength and local efficiency but longer shortest path length compared with participants resistant to SD. Lower efficiency was mainly distributed in the right insula, bilateral thalamus, bilateral frontal, temporal and temporal lobes. Furthermore, a disrupted subnetwork was observed that consisted of widespread connections. Moreover, vulnerable group showed significantly decreased strength of the rich club compared with resistant group. The strength of rich club connectivity was found to be correlated negatively with PVT performance ($r = -0.424$, $P = 0.002$). We further test the reliability of the results.

Conclusions: The findings revealed that individual differences in resistance to SD are related to disrupted topologic efficiency connectome pattern, and our study may provide potential connectome-based biomarkers for the early detection of the vulnerable degree to SD.

PU-1401

Task functional magnetic resonance imaging-guided individualized repetitive transcranial magnetic stimulation after a brief nap attenuates the sustained attention performance deterioration induced by sleep deprivation

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Background: Military operations may require human functioning 24 hours a day and sleep deprivation (SD) is thus not uncommon. However, in counteracting the effects of SD, the most effective method of long-time recovery sleep is not always feasible in military life. Although frequently used as a countermeasure, a brief nap is not enough to fully restore cognitive performance following SD. Thus, targeted interventions after the brief nap, such as repetitive transcranial magnetic stimulation (rTMS), might better restore performance following SD.

Methods: Fifty military academy cadets were recruited and participated in two SD experiments. In experiment 1, each participant performed a psychomotor vigilance task (PVT) while undergoing functional magnetic resonance imaging (fMRI) for three conditions: (1) following a normal night of sleep (Resting wakefulness, RW), (2) following 30 hours of SD, and (3) after a subsequent 30-min nap. Dynamic changes of PVT outcomes and cerebral responses across the three conditions were analyzed to determine the optimal stimulation target.

In experiment 2, the same protocol (i.e., the three conditions of RW, 30 hours of SD and a 30-min nap) was adopted. In addition, after the nap, a 10-Hz, sham-controlled and individualized rTMS was administrated. Then, ANOVA analyses were conducted to investigate the stimulation effect for the improvement of the fastest PVT reaction times.

Results: Utilizing task-related fMRI, we first showed that the cerebral responses within the right middle frontal gyrus (MFG) recovered least after the nap and the right MFG was selected as the stimulation target. We next showed that the individualized 10-Hz rTMS over right MFG after the nap attenuated the sustained attention performance deterioration induced by SD.

Conclusion: We demonstrate that a nap combined with individualized rTMS may contribute to the recovery of the impaired sustained attention after SD by modulating the neural activity within functional brain networks.

PU-1402

Effects of sleep deprivation and daytime naps on inhibitory control based on task-state functional magnetic resonance

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Background:

Behavioral and neuroimaging changes in inhibitory control after sleep deprivation, and the possible ameliorative role of daytime naps in this regard, remain unclear.

Methods:

In this study, we used the oddball experimental paradigm to investigate the effect of conflict inhibition on sleep deprivation. We recruited 50 military cadets to perform the oddball task in an MRI scanner during normal wakefulness (RW), after 30 h sleep deprivation, and after a subsequent 30 min nap, and analyzed the dynamic changes in brain responses during the three states. The oddball exercise requires the subject to respond to two stimuli, one of which is presented with a high probability, such as 85%, which in our experiment represents the letter W; The other stimulus was presented with a smaller probability, such as 15%, and the two stimuli were presented in a random order. The subjects were asked to press the left button on the keyboard when they saw the W letter and the right button when they saw the M letter. The oddball task used the experimental design of Block. Task-state MRI data were also analyzed using a two-stage mixed-effects model. For behavioral outcomes of oddball (mean reaction time and mean accuracy of (deviant stimulus - standard stimulus)), we performed a one-way repeated measures ANOVA with significance threshold set at $P < 0.01$ and FDR (false discovery rate) criterion corrected. For pairwise comparisons in post hoc analyses, Bonferroni was used to correct for multiple comparisons, and the significance threshold correction was set at 0.05. For imaging of oddball, the FDR (false discovery rate) criterion was also used to adjust for multiple comparisons. The statistical threshold was set to $pFDR < 0.05$ for n-back activation across conditions, for F comparisons across conditions, and for pairwise comparisons in post hoc analyses.

Results:

There was no significant difference in the difference in accuracy between deviant and standard stimuli (deviant stimulus-standard stimulus)($F_{2,98} = 1.52$ $p > 0.3$), but the difference in reaction time between deviant and standard stimuli (deviant stimulus-standard stimulus)($F_{2,98} = 7.17$, $p < 0.001$) showed a significant time difference. RT and accuracy after daytime naps were significantly lower than those under sleep deprivation, but still higher than those under normal wakefulness, suggesting that naps have some restorative effect on inhibitory control levels. There were significant differences in bilateral occipital lobe, middle temporal gyrus, middle cingulate gyrus, medial frontal lobe and dorsolateral prefrontal lobe under the three conditions. The activity of medial frontal lobe, prefrontal lobe and bilateral occipital lobe decreased significantly after sleep deprivation, and the activity of these four regions recovered to normal waking level after daytime nap, while the middle temporal gyrus and cingulate gyrus were negatively activated during normal waking, but the degree of negative activation of these two regions became weaker after sleep deprivation, and the negative activation of these two brain regions reached the maximum after daytime nap. The improvement in the difference in response time between deviant and standard stimuli after daytime naps was positively correlated with increased prefrontal activation ($r = 0.41$, $p < 0.005$).

Conclusion:

Sleep deprivation significantly affected the cognitive performance of conflict suppression. Sleep deprivation resulted in diminished processing speed and reduced accuracy. Daytime naps partially restored working memory in two ways. Daytime naps restored the reduced activity in the medial frontal, prefrontal, and bilateral occipital lobes after sleep deprivation to normal levels. Daytime naps increase the negative activation of the middle temporal gyrus and cingulate gyrus, disengage the DMN network from the task, and increase brain cognitive resources.

PU-1403

深度学习图像重建联合低管电压在冠状动脉成像中的可行性研究

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目的：探讨基于深度学习图像重建联合低管电压在冠状动脉成像中的可行性。

方法：收集我院 2023 年 5 月至 8 月行冠状动脉 CTA 患者 45 例并随机分为 A、B 两组，A 组 120kV，噪声指数 20，对比剂剂量 0.8ml/kg，B 组 70kV，噪声指数 30，对比剂剂量 0.5ml/kg。扫描完成 A 组重建 50%ASIR-V，B 组重建 50%ASIR-V 和深度学习低、中、高降噪图像（DLIR-L、DLIR-M、DLIR-H），在五组图像上分别测量主动脉根部、左冠状动脉主干、左前降支、左回旋支及右冠状动脉 CT 值及 SD 值，计算信噪比（SNR）和对比噪声比（CNR）。由两名具有五年工作经验医生采用五分法对图像进行主观评价。记录两组患者 CTDIvol、DLP 并计算有效辐射剂量(ED)。结果：两组患者一般资料（性别、年龄、身高、体重、BMI、心率）无显著统计学差异（ $p > 0.05$ ），B 组 CTDIvol、DLP、ED 和对比剂用量均显著低于 A 组（ $p < 0.001$ ），其中 B 组 ED 和对比剂用量较 A 组分别降低约 75.6%和 32.9%。B 组 50%ASIR-V、DLIR-L、DLIR-M、DLIR-H 图像冠状动脉 CT 值均显著高于 A 组 50%ASIR-V（ $p < 0.001$ ）。B 组随着重建 50%ASIR-V、DLIR-L、DLIR-M、DLIR-H 依次变化，冠状动脉 SD 值逐渐降低、SNR 值和 CNR 值逐渐升高，且 B 组 DLIR-H 重建 SD 值显著低于 A 组（ $p < 0.001$ ），B 组 DLIR-L、DLIR-M、DLIR-H 重建 SNR 值和 CNR 值均显著高于 A 组（ $p < 0.001$ ）。两名医师主观评分具有良好一致性（kappa 值 > 0.75 ， p 值 < 0.001 ），B 组冠状动脉 DLIR-L、DLIR-M 和 DLIR-H 重建主观评分均显著高于 A 组（ $p < 0.05$ ），其中 DLIR-H 重建图像主观评分最高。

结论：深度学习图像重建（DLIR）联合低管电压可以显著降低冠状动脉成像辐射剂量和对比剂用量，同时提升冠状动脉图像质量，其中 DLIR-H 重建提升冠状动脉图像质量效果最优。

PU-1404

Predictive value of MRI T2WI texture analysis for lymph node metastasis in rectal cancer

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Objective: to extract the specific texture parameters of rectal cancer T2WI images by texture analysis and to construct a comprehensive predictive model for preoperative diagnosis of rectal cancer lymph node metastasis.

Materials and methods: The T2WI images, serum tumor markers and basic clinical data of 112 patients with rectal cancer who met the inclusion criteria were analyzed retrospectively. All patients underwent radical resection and lymph node dissection of rectal cancer in our hospital, and the pathological diagnosis was clear. The patients were randomly divided into training group and verification group according to the proportion of 7:3, which was used for training and verification of the prediction model. Artificial intelligence software was used to manually delineate the regions of interest (Region of Interest, ROI) of rectal cancer lesions and target lymph nodes on the T2WI images of patients, and automatically extract the texture parameters of ROI, from which the texture feature parameters with statistical differences between lymph node metastasis group and non-metastasis group were selected. Logistic regression analysis was used to analyze the prediction models based on tumor tissue texture parameters, target lymph node texture parameters, patient clinical indicators and the combined data of the three. The area under the curve (The area under the receiver operating characteristic curve, AUC) of the receiver working characteristic curve (Receiver operating characteristic curve, ROC curve) was used to evaluate

the diagnostic efficacy of different models in identifying preoperative lymph node metastasis. Furthermore, DeLong test was used to compare the AUC differences of each prediction model. Finally, the clinical benefit of each predictive model was evaluated by decision curve analysis (Decision Curve Analysis, DCA). $P < 0.05$ was taken as the standard of statistically significant difference.

Results: Logistic regression analysis showed that the ratio of short diameter to long diameter of target lymph nodes ($OR=40.503; 95\% CI: 5.063-324.001$) and the level of serum CA19-9 ($OR=1.044; 95\% CI: 1.001-1.088$) were independent predictors of lymph node metastasis in rectal cancer. In the clinical data prediction model training group, the AUC value (figure 3A) was 0.802 ($95\% CI: 0.696-0.884$), the sensitivity was 70.005%, and the specificity was 81.25%. In the verification group, the AUC value (figure 3B) was 0.696 ($95\% CI: 0.515-0.841$), the sensitivity was 92.31%, and the specificity was 52.38%. 401 texture feature parameters were extracted from the T2WI images of tumor tissue and target lymph nodes. After screening, the tumor tissue retained seven texture parameters. And the target lymph nodes retain six texture parameters. According to the above texture parameters, the target lymph node texture analysis prediction model training group AUC value is 0.881, sensitivity is 86.67%, specificity is 81.25%; verification group AUC value is 0.795, sensitivity is 92.31%, specificity is 66.67%. The AUC value of the tumor tissue texture analysis prediction model training group was 0.844, the sensitivity was 80.005%, and the specificity was 79.17%. In the verification group, the AUC value was 0.897, the sensitivity was 84.62%, and the specificity was 90.48%. Finally, the diagnostic efficacy of the joint predictive model combined with texture parameters, target lymph node short / long diameter and patients' serum CA19-9 level was significantly better than that of other models, and the difference was statistically significant (the AUC value of the training group was 0.978, the sensitivity and specificity were 93.33% and 91.67%, respectively, and the AUC value of the verification group was 0.897, the sensitivity was 84.62%, and the specificity was 90.48%. The AUC value of the training group was 0.978, the sensitivity and specificity were 93.33% and 91.67% respectively, and the AUC value of the verification group was 0.897. The sensitivity and specificity were 84.62% and 90.48%, respectively.

Conclusion: the comprehensive diagnostic model based on rectal T2WI texture analysis combined with clinical indexes can effectively predict lymph node metastasis before operation, which has potential clinical value.

PU-1405

基于 Yolov5 深度学习网络在 CT 平扫上检测急性缺血性脑卒中早期小面积病灶的模型研究

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目的:

急性缺血性脑卒中(Acute Ischemic Stroke, AIS)的早期诊治将改善患者预后。本研究旨在构建在 CT 图像上精准检测 AIS 缺血灶的人工智能模型,尤其是早期小面积梗死灶。

方法:

1.研究对象:回顾性分析我院 275 例 AIS 患者。

2.数据集构建:将病例按 9:1:1 的比例完全随机分组为训练组、验证组、测试组。将训练组及验证组的 DWI 图像与 CT 图像进行配准并在 CT 图像上标记病灶。训练组的 CT 图像训练模型;验证组的 CT 图像构建最优损失函数模型;测试组为原始 CT 图像,用于测试模型的泛化能力及模型与人工组检测性能的对比。

3.金标准制定:验证集中为 DWI 与 CT 平扫图像配准融合后标记的 CT 图像的病灶标签。测试集中为 DWI 与 CT 平扫图像配准融合后所示病灶。

4.模型构建：以 Yolov5 为基准模型，选取最优损失函数构建最终 AI 模型，即本文改进的 CIoU 损失函数（Modified CIoU loss, M-CIoU）。

5.模型评价标准：用平均精度均值 IOU(Mean Average Precision, mAP@50)、召回率（Recall）及精确率（Precision）对比不同损失函数。

6.统计学方法：组内相关系数(intraclass correlation efficient, ICC)和加权 kappa 检验评估模型组及人工组结果一致性。计算模型及人工组在各脑区的敏感度、特异度及准确度，配对卡方检验用于比较两组的诊断效能。

结果：

1.不同损失函数网络在验证集中的检测性能：M-CIoU（Precision=0.8237；Recall=0.8101；IoU(mAP@50)=0.7851）最优。

2.模型组特异度、敏感度及准确度（98.87%、75.86%、96.20%）均高于人工组（95.02%、63.79%、91.40）。M6（P=0.039）区域模型检测效能高于人工组。如表 1。

3.模型与 DWI-ASPECTS(ICC=0.669, κ =0.447)的一致性高于神经放射科医师(ICC=0.452, κ =0.247)。

结论：

本研究模型在 CT 上自动检测 AIS 早期小面积病灶性能较医师更好。

PU-1406

影像基因组学分析揭示了结直肠癌预后风险分层的潜在生物学基础

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目的: 影像组学在肿瘤预后预测方面具有革命性的潜力。然而, 基于影像组学的危险分层在临床实践中的潜在生物学基础仍不清楚, 这给基于影像组学的生物标志物的广泛应用带来了挑战。方法: 我们回顾性招募了有术前静脉期 CT 图像和总生存随访数据的结直肠癌患者。我们开发了一个包含 12 个特征的影像组学标签来对患者进行分层。利用基因集富集分析探索影像组学分层风险组中潜在的肿瘤微环境相关生物学过程。我们在外部 CRC 验证队列和癌症影像档案(The Cancer Imaging Archive, TCIA)队列中评估了可解释标签的普遍适用性。结果:在训练组和内部验证组中, 影像组学标签均实现了患者的预后分层(分别为 676 例和 291 例; $P<0.001$)。影像组学分层的高危组显示出上调的增殖过程。相反, 低危组患者显示了免疫通路下调。此外, 我们观察到在影像组学分层的风险组之间, 发现肿瘤微环境免疫标签、免疫炎症标志物和肿瘤增殖通路存在显著差异。可解释的预后标签在外部队列中得到验证($n=469$; $P<0.001$)、TCIA ($n=20$; $P = 0.14$)。此外, 研究结果显示, 术后化疗的获益依赖于基于影像组学 II 期结直肠癌患者的风险特征, 在高危结肠癌患者中, 化疗显著改善了预后。结论:本研究强调了影像组学在癌症预后预测方面的潜力, 并为基于影像组学的 CRC 风险分层提供了有价值的见解。

PU-1407

基于 AI 定量分析新型冠状病毒肺炎重症患者的影像学特征

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目的: 本研究旨在通过人工智能辅助的定量 CT 特征来识别新冠肺炎患者的重症病例。**方法:** 根据纳入和排除标准,对中国东北黑龙江省 79 例实验室确诊的成年新冠肺炎患者进行纳入和分析。所有患者都接受了胸部 CT 扫描,然后通过人工智能(AI)平台(Dr.Wise)自动计算肺炎病变的定量特征,包括肺病变体积(PLV)、实变体积(PCV)和磨玻璃病变体积(PGV)的百分比。根据中国新冠肺炎诊疗方案指南(第 8 版),将患者分为非重症组和重症组。收集患者的基线数据(包括临床和实验室数据、病变的 CT 定量特征)。比较两组的基线特征和 CT 定量特征(PCV、PLV 和 PGV)。用单变量和多变量逻辑回归分析来识别重症新冠肺炎患者的特征。**结果:** 共纳入 79 例新冠肺炎患者,并将其分为非重症组(n=28)和重症组(n=51)。年龄、白细胞计数、中性粒细胞计数、淋巴细胞计数、肺病变体积百分比(PLV)和肺实变体积百分比(PCV)与使用单变量逻辑回归确定的严重程度显著相关。进一步的多变量逻辑回归构建了模型,其中 PCV 和年龄是独立的风险因素,比值比(OR)分别为 1.172 和 1.116 ($p<0.004$)。通过 5 倍交叉验证计算的训练集和验证集的平均 AUC 分别为 0.950 (95%CI 0.900-1.000) 和 0.935 (95%CI 0.876-0.994)。**结论:** AI 辅助下的定量 CT 特征 PCV 和入院年龄是预测黑龙江省新冠肺炎患者重症的关键参数。与此同时,寒冷干燥的气候也可能是一个不可忽视的重要因素。对于寒冷干燥环境中的新冠肺炎患者,尤其是老年患者,PCV 越大,越容易进展为重症。基于胸部 CT 图像分析的 AI 定量特征可以准确预测新冠肺炎重症患者。

PU-1408

Deep Learning Reconstruction with Different Denoising Strength in Brain MRI: Comparison of Anatomical Structure and Details SimilarityYuqi Tan, Chunhao Xia, Zhenlin Li
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Purpose: To compare the anatomical structure and details similarity with the original image among deep learning reconstruction (DLR) with different denoising strength in brain T1 weighted fluid attenuated inversion recovery (T1-FLAIR) and T2-FLAIR sequences.

Materials and Methods: 23 healthy volunteers were enrolled. A 3.0T MRI scanner (SIGNA Architect, GE Healthcare) with 32-channel head coil was used to acquire T1-FLAIR and T2-FLAIR images in brain. Each sequence was scanned using DLR with different denoising strength (AIRTm Recon DL, low [L], medium [M], high [H]), and original images were simultaneously saved. Signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of thalamus were calculated in each sequence. A novel index: signal to reconstruction error, spectral similarity and structure similarity (SRESS) was used to measure the signal to reconstruction errors between images of varying brightness, spectral similarity, and structure similarity, which was designed for evaluating the anatomical structure and details similarity, especially in low contrast area. The SRESS of thalamus cross section in DLR images was automatically calculated by deep learning models (U-net based segmentation).

Results: The SNR and CNR were not significantly different between L-T1-FLAIR and the original image (SNR: 102.19 ± 13.02 vs. 98.94 ± 10.63 , $P=0.358$; CNR: 100.39 ± 12.96 vs. 97.11 ± 10.57 , $P=0.352$) The SNR and CNR were higher for M-T1-FLAIR and H-T1-FLAIR than the original image (SNR: 131.12 ± 22.08 / 209.53 ± 46.14 vs. 98.94 ± 10.63 , $P<0.001$; CNR: 129.38 ± 21.99 /

207.97±46.08 vs. 97.11±10.57, $P<0.001$). The SNR and CNR were higher for L-T2-FLAIR, M-T2-FLAIR and H-T2-FLAIR than the original image (SNR: 82.09±8.39 / 104.05±14.90 / 153.75±38.42 vs. 60.86±7.05, $P<0.001$; CNR: 80.39±8.35 / 102.43±14.84 / 152.34±38.31 vs. 59.13±7.02, $P<0.001$). The results of SRESS index suggested that there was no significant difference between L-DLR, M-DLR and H-DLR, respectively (T1-FLAIR: 149.40±1.67 vs. 149.94±1.70 [L vs. M], $P=0.372$; 149.94±1.70 vs. 149.76±1.66 [M vs. H], $P=0.757$; 149.40±1.67 vs. 149.76±1.66 [L vs. H], $P=0.551$. T2-FLAIR: 148.43±1.62 vs. 149.17±1.46 [L vs. M], $P=0.194$; 149.17±1.46 vs. 149.00±1.46 [M vs. H], $P=0.752$; 148.43±1.62 vs. 149.00±1.46 [L vs. H], $P=0.314$).

Conclusion: DLR can keep the anatomical structure and details in brain T1-FLAIR and T2-FLAIR sequences whatever denoising strength is used. DLR with high denoising strength is recommended on account of better SNR and CNR. Moreover, it is supposed that DLR will not influence anatomical structure and details, compared to original images.

PU-1409

深度学习用于肝肿瘤图像分割的研究进展

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目的: 肝癌严重危害人类健康, 及早检测到异常病变可有效预防和控制癌症的发展。肝肿瘤的精准分割在临床诊断中发挥重要作用。总结深度学习网络架构在肝肿瘤图像分割中的应用价值, 深入探讨肝肿瘤图像分割未来的发展方向。

方法: 主要方法为文献资料法, 通过中国知网、万方等数据库, 以“肝肿瘤分割”、“深度学习”、肝脏分割“为关键词进行文献检索, 总结用于肝肿瘤图像分割的深度学习网络模型。

结果: 目前对于肝肿瘤图像分割主要是基于传统的分割方法和基于深度学习的分割方法两大类。传统的半自动分割方法对肝脏目标病灶区域的标注大多依赖于具有丰富经验的医生手动勾画, 得到的分割精度最高, 但是需要花费大量的时间和精力, 且重复性较低。利用深度学习能实现对肝脏病变目标区域的准确分割。如卷积神经网络(CNN)实现了肝脏的自动化测量, 并在肝脏 CT 和 MRI 图像上进行验证, 改善了传统的半自动分割方法准确性较低、耗时耗力的问题。但 CNN 网络只能获取局部特征, 对于全局信息处理相对较弱。全卷积神经网络(FCN)的出现实现了单个像素的语义分割, 将全连接层替换为卷积层, 在获得精细图像信息的同时也没有丢失粗略图像信息, 并将 3D 卷积也应用到肝脏图像中。基于生物医学图像分割的 U-Net 网络架构能进行像素级别的分类, 是语义分割任务的理想选择, 并在精细分割任务中占据主导地。后来, 基于小病灶的分割任务通常都将此模型作为基准模型进行改良设计。各种研究表明, 深度学习逐渐成为医学图像分割领域中不可或缺的一部分。

结论: 深度学习网络架构不仅可以提高图像预处理速度, 此外, 基于深度学习的图像分割方法相对于传统的分割方法表现出显著的分割性能和鲁棒性, 其高精度的分割效果更有利于临床诊断与手术治疗。通过深度学习网络模型分割病灶往往需要大量的数据集, 考虑到可用于训练的数据缺乏并且部分数据不可用, 未来对数据集的增强方法需要进一步深入研究。

PU-1410

同一病人条件下深度重建技术对腹部低剂量图像质量的影响--与常规剂量的比较

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目的: 本研究对比深度学习图像重建算法 (DLIR) 与自适应迭代算法 (ASiR-V), 在降低辐射剂量的同时, 不同 DLIR 重建级别对腹部增强 CT 图像质量的影响。方法: 前瞻性收集我院使用 Revolution Apex CT 行上腹部三期增强检查的患者 19 例, 选择动脉期为常规剂量组, 噪声指数 (NI=21@1.25mm), 延迟期为低剂量组, 噪声指数 (NI=24@1.25mm), 常规剂量组为 ASiR-V30% 重建, 低剂量组为 ASiR-V30%、DLIR-L (低级降噪)、DLIR-M (中级降噪) 和 DLIR-H (高级降噪) 重建, 所有图像层厚均为 1.25 mm, 记录肝脏、腹主动脉、左侧竖脊肌的 CT 值及 SD 值。结果: 客观评价显示低剂量 4 组的 DLIR 与 ASiR-V 对比, CT 值无统计学差异 ($p>0.05$), SD 值有统计学差异 ($p<0.001$); 低剂量组与常规剂量组比较, 低剂量 ASiR-V30% 重建图像较常规剂量 ASiR-V30% 重建图像 SD 值高, 有统计学差异 ($p<0.001$), 在有效辐射剂量降低 36.31% 的情况下, 低剂量 DLIR-L 重建图像与常规剂量 ASiR-V30% 重建图像 SD 值相近, 无统计学差异 ($p>0.05$), 低剂量 DLIR-M 及 DLIR-H 重建图像的 SD 值明显低于常规剂量 ASiR-V30% 重建图像, 有统计学差异 ($p<0.001$); 低剂量组内, 随着降噪级别升高 SD 值逐渐降低, 有统计学差异 ($p<0.001$), 即图像质量逐渐提高, DLIR-H 重建图像表现最好, 图像无伪影及变形。结论: 在低辐射剂量下, 与日常使用的 ASiR-V30% 重建算法相比, 经 DLIR-H、DLIR-M 重建可明显降低图像噪声, 改进腹部增强 CT 图像质量, DLIR-H 表现更为明显。

PU-1411

3D 数字立体定位导板在软组织定位的研究与应用

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目的 探讨数字化皮瓣立体导板辅助皮瓣移植手术的价值与临床疗效。方法 本研究收集应用游离股前外侧穿支皮瓣立体定位导板技术修复肢体皮肤软组织缺损 14 例 (男 8 例, 女 6 例), 年龄 23-58 岁, 平均年龄 38 岁, 创面位于下肢 9 例 (小腿 5 例, 足 4 例), 创面位于上肢 5 例 (前臂 2 例, 手 3 例)。创面皮肤缺损面积 $10.1\times 8.2\sim 19.1\times 13.1$ 。术前 CT 扫描皮瓣供区及受区, 利用 CTA 影像数据重建三维立体模型、设计皮瓣立体导板, 实现医生术前选择合适穿支血管, 并明确血管的起始、走行、血管蒂长度、管径及穿支点位置、实现精准切取皮瓣形状。结果 利用股前外侧穿支皮瓣立体定位导板, 修复肢体软组织缺损 14 例均获得成功, 通过术前术中对比测算穿支点偏移量与切取量差异程度小, 皮瓣穿支血管定位准确, 手术时间明显缩短 ($4.2-6.8 (5.3\pm 0.4) h$) 术后皮瓣存活良好、外形恢复满意。结论 CTA 结合数字化技术构建的三维模型和设计的皮瓣立体导板能完整还原股前外侧区解剖学信息和个性化设计股前外侧皮瓣, 缩短手术时间, 减少并发症, 且有效弥补传统影像设备定位局限的问题, 为显微外科皮瓣移植手术提供数字化新术。

PU-1412

基于 PET-CT 影像组学对非小细胞肺癌术前淋巴结转移诊断研究

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目的：研究基于淋巴结、原发肿瘤-淋巴结的影像组学模型在术前评价非小细胞肺癌淋巴结转移的诊断价值。

方法：本研究回顾性收集 2017 年 1 月至 2018 年 12 月于我院经病理证实的 115 名非小细胞肺癌患者。将患者以 7:3 的比例随机分为交叉验证集（83 例，包括阳性淋巴结组：37 个原发灶，73 枚淋巴结，阴性淋巴结组：46 个原发灶，94 枚淋巴结）、测试集（32 例，包括阳性淋巴结组：17 个原发灶，34 枚淋巴结，阴性淋巴结组：15 个原发灶，33 枚淋巴结）。我们收集患者的临床资料及术前的 PET-CT 图像。在 IntelliSpace Discovery 软件上根据病理勾画肿瘤原发灶和淋巴结，通过 RIAS 软件提取感兴趣区域（Region of interest, ROI）的影像组学特征，基于降维后的组学特征建立淋巴结模型和原发肿瘤-淋巴结的联合模型。最终，利用受试者工作特性曲线、准确率-召回率曲线、受试者工作特征曲线下的面积（Area Under the Curve, AUC）和平均精度等指标对模型诊断效能进行评价。

结果：患者的年龄、性别等对诊断无统计学意义（ $P>0.05$ ）。共纳入 234 个淋巴结（阳性淋巴结：107 枚，阴性淋巴结：127 枚），每个 VOI 各提取 1427 个影像组学特征，降维后用于组学模型的构建。在测试集中，淋巴结模型的 AUC(95%CI) 值为 0.840 (0.737-0.943)，联合模型的 AUC(95%CI) 值为 0.914 (0.844-0.983)。通过 DeLong 检验，发现二者具有显著性差异（ $P=0.0225$ ）。因此，联合模型拥有对非小细胞肺癌患者诊断术前淋巴结转移的最佳效能。

结论：本研究利用淋巴结影像组学特征建立的模型对非小细胞肺癌患者术前诊断淋巴结的转移有良好的预测效果，引入原发肿瘤的原发肿瘤-淋巴结组学模型可以显著提升诊断效能。因此，我们可以通过 PET-CT 建立基于肺癌原发灶-淋巴结影像组学联合模型，帮助非小细胞肺癌患者术前个体化诊断淋巴结转移。

PU-1413

数字影像与 3D 打印技术辅助陈旧性髋关节个体化置换

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目的：探讨数字化个体模型辅助陈旧性髋关节假体松动翻修手术的价值与临床疗效。方法：本研究收集陈旧性髋关节松动修复手术案例，术前采集患者双下肢 CT 数据，设计 3D 打印设计打印髋关节同等比例实体模型和假体，术前通过模型直观分析髋臼局部解剖情况，精确计算确定髋臼假体安放位置和角度，在体外模型上进行寻找髋臼中心，选择合适尺寸的臼杯，进行假体安放模，并根据下肢全长 X 线片准确测量下肢长度差。结果：利用数字影像技术设计的个体化模型，通过术前术中对比测算髋臼杯大小匹配合适，手术时间明显缩短，外形恢复满意，术后恢复较好。结论：本研究将数字影像与陈旧性髋关节手术相结合，能较好设计并制作髋关节及骨盆模型和髋臼假体辅助进行手术术前评估和方案设计，并能精确计算确定髋臼假体安放位置和角度，高效解决医患沟通问题，提供快速与精确性手术解决方案。

PU-1414

Classification of benign and malignant thyroid nodules using ultrasound images

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Purpose: In order to improve the diagnostic accuracy of nodules in thyroid ultrasound images, we propose a method for classifying the benign and malignant nature of thyroid nodules in ultrasound images based on morphological features of the thyroid gland to assist physicians in diagnosis. **Method:** Firstly, Deeplabv3+ segmentation network was used to segment the nodule from the background and obtain the contour of the thyroid nodule in the ultrasound image. Then, seven morphological features such as aspect ratio, tightness, rectangular fit, eccentricity, gray standard deviation within the boundary ring, gray standard deviation within the nodule and relative brightness within the boundary ring nodule were designed to extract medical features based on the thyroid nodule images and the nodule contours, taking into account the a priori knowledge of clinical classification of the benign and malignant nature of thyroid nodules. Finally, the extracted medical features are used to replace the original dataset, and after training the XGBoost classifier, the benign and malignant auxiliary diagnosis results of thyroid nodules are obtained. **Results:** The experiment showed that our method had a sensitivity of 0.935, a specificity of 0.725, an accuracy of 0.871, and an AUC value of 0.89 for the classification of benign and malignant nodules, which was higher than that of the AlexNet model (AUC=0.81), the VGG model (AUC=0.86), and the MobileNet model (AUC=0.76) on the ultrasound image data set of thyroid nodules collected. The performance of the proposed method was superior to other methods in the classification of benign and malignant thyroid nodules. **Conclusion:** This method has high localization and recognition ability for benign and malignant thyroid nodules in ultrasound images, which is helpful to improve the accuracy of automatic image diagnosis.

PU-1415

CT-based end-to-end deep learning approach for COVID-19 outcome prediction

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Background: The COVID-19 pandemic is causing a major outbreak in more than 200 countries around the world, having a severe impact on the health and life of many people globally. Automatic detection through computed tomography (CT) images provides a great help for rapid and accurate detection of lung infections and assists traditional X-ray examinations to adequately cope with COVID-19 pneumonia. Deep learning is widely used in the field of medicine. In this study, we propose an end-to-end multimodal features fusion algorithm for outcome prediction of COVID-19.

Methods: We used pulmonary artificial intelligence software to process 769 chest CT data, including data desensitization, denoising, segmentation of the lesion area, and extraction of geometric features after segmentation. We have collected time series CT data from every patient, and extract a variety of high-order geometric features. Then the multimodal features are input into the fusion module to obtain the characteristics of the time series, and the prognosis of the disease is predicted by Long Short-Term Memory network (LSTM). Each case of CT contains information about the outcome. Then input the processed features into the proposed deep neural network model to predict the outcome. We divide all data into 80% training set for training the

deep neural network model, and 20% test set for testing the performance of the model. The training set contains 293 cases of pneumonia reduction CT and 316 cases of pneumonia exacerbation CT; the test set includes 78 cases of pneumonia reduction CT and 82 cases of pneumonia exacerbation CT. We extracted geometric features and finally built an outcome prediction model based on the volume of pneumonia.

Results: The results showed that the geometric fusion network provides 74% accuracy, 77% precision, 71% recall, 74 % F1 score and 76% specificity.

Conclusions: The method proposed in this study can be a useful tool for radiologists to predict the outcome. The method predicts the prognosis outcomes of patients with high accuracy and the patterns will aid in fighting COVID-19.

PU-1416

仿真技术在医学影像设备上的应用

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仿真技术在医学影像设备上的应用非常广泛。比如说 CT 扫描仪、MRI 仪器、超声波设备等，都可以通过仿真技术进行模拟和优化。方法：首先，利用仿真技术可以优化医学影像设备的设计。通过建立数学模型和进行计算机仿真，可以优化设备的结构、参数和工作原理，从而提高设备的成像质量、减少辐射剂量，增强设备的稳定性和可靠性。其次，仿真技术可以用来培训医学影像设备的操作人员。建立虚拟仿真环境，模拟真实的设备操作过程，让操作人员进行虚拟训练，提高他们的操作技能和应对各种情况的能力。另外，仿真技术还可以用来开发新的医学影像处理算法和技术。通过建立仿真模型和进行计算机仿真，可以模拟不同的影像采集和处理过程，优化算法参数，提高影像的分辨率、对比度和噪声抑制能力。结果：仿真技术在医学影像设备上的应用可以提高设备的性能和稳定性，提高操作人员的技能水平。结论：仿真技术的应用还能推动医学影像技术的发展和 innovation。通过优化设备设计、培训操作人员和开发新的影像处理算法，可以不断提升医学影像设备的性能，并推动医学影像技术的发展和 innovation。

PU-1417

基于深度学习的多模态图像在直肠癌根治术后患者预后分析中的应用

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目的：直肠癌作为世界上第三大最常见的恶性肿瘤，其治疗和预后问题一直备受关注。目前，评估患者的预后主要依赖于 TNM 分期系统，但即使在相同分期下，患者的预后情况也可能存在显著差异。本研究致力于构建一个融合多模态医学图像的深度学习模型，融合病理学和影像学特征以提高直肠癌根治术后患者预后的预测准确性。

方法：在这项研究中，我们收集了 2019 年 88 例经过直肠癌根治术切除的患者的临床数据，包括年龄、性别、分期等信息以及术前 MRI 图像和术后病理高清图像。这些患者都接受了为期三年的随访，并记录了他们的随访状态。为了建立融合病理与 MRI 图像的深度学习模型，采用了经典的 ResNet 网络结构。首先，我们对 MRI 图像进行预处理，包括图像重采样和磁场校正等步骤，然后将其输入到网络中进行特征提取。对于病理图像，我们采用了 CLAM 无监督方法进行预处理，并提取相关特征。最终，将基于 MRI 图像和病理图像的特征输入到 ResNet 网络中，以交叉验证的方式用以预测患者的无病生存期。

结果: 研究结果显示, 融合了病理与 MRI 图像的深度学习模型的 C-index 为 0.856, 明显高于病理单模态模型 (C-index 为 0.825) 和 MRI 单模态模型 (C-index 为 0.738)。这也表明, 融合两种模态的深度学习模型在直肠癌根治术后患者预后预测方面具有显著的优势。

结论: 本研究建立了一个基于深度学习的融合病理与 MRI 图像的联合模型, 用于预测直肠癌根治术后患者的无病生存期。研究结果显示, 该联合模型的性能明显优于病理单模态和 MRI 单模态模型, 为提高预测准确性提供了有力支持。此外, 深度学习模型的应用可以从宏观和微观尺度上量化肿瘤异质性提供了可能性, 并为临床决策提供了更具生物学意义的信息。因此, 该深度学习模型具有潜在的临床应用前景, 可以帮助医生更准确地评估直肠癌根治术后患者的预后, 从而为个体化治疗提供支持。

PU-1418

基于门脉期肝脏 CT 影像组学特征早期预测重症急性胰腺炎及其与血脂的相关性

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目的: 探讨 CT 门脉期肝脏影像组学特征在早期评估 AP 严重程度的应用价值, 并研究其与血脂水平之间的相关性。

方法: 本研究共纳入 239 例病例 (非重症 AP 181 例, 重症 AP 58 例), 并以 7:3 的比例随机分为训练集和数据集。使用 3Dslicer 软件沿肝脏边缘手动逐层勾画感兴趣区 (ROI) 后提取影像组学特征。采用等距和等频分箱离散化特征, 再使用 LightGBM 算法迭代筛选最佳影像组学特征。通过联合临床独立危险因素以最佳影像组学特征分别建立了临床、影像组学和联合模型。

结果: 联合模型预测性能优于临床模型和影像组学模型。其在训练集、验证集和测试集中的 AUC 值分别为 0.954、0.927 和 0.878。spearman 相关性分析显示肝脏影像组学特征与血脂水平呈现不同程度相关。

结论: 基于门脉期 CT 的肝脏影像组学特征对早期预测 SAP 表现良好, 并且肝脏影像组学特征与血脂具有不同程度相关性, 这为临床诊疗提供辅助性决策参考。

PU-1419

人工智能与肺功能检测对 COPD 检出效能的一致性研究

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摘要: 目的 基于深度学习人工智能在 COPD 检测及肺功能分级领域的发展, 对其效能进行验证是促进其应用于临床的前提, 本研究旨在评估基于深度学习技术的人工智能软件在胸部高分辨计算机断层扫描(Highresolution computed tomography, HRCT) COPD 检出及肺功能 GOLD 分级 (COPD 气流受限严重程度分级标准) 中的应用价值。方法选取本院 2021 年 8 月-12 月, 临床疑诊为慢性阻塞性肺气肿患者 80 例, 对所有患者均行胸部 HRCT 扫描及肺功能检测, 导入人工智能识别系统, 软件自动判定是否有 COPD 并对肺功能进行 GOLD 分级诊断, 并与原始影像报告结果及肺功能检测报告分级进行对比, 计算灵敏度、假阳性率评估人工智能软件及放射科医师的 COPD 检测效能, 及人工智能应用于肺功能分级的检测效能, 应用 McNemar 检验确定是否存在显著性差异。结果 80 例胸部高分辨螺旋 CT 人工智能及放射科医师 COPD 检出率皆为 100%。人工智能软件 COPD 灵敏度明显高于放射科医师(99.1% vs 43%, $P < 0.001$)。人工智能自动分析结果与肺功能检测报告对比, 两组之间灵敏度及特异度的对比无明显差异 ($P > 0.05$); 肺功能 GOLD 分级中含

GOLD1 (轻度) $FEV1 \geq 80\%$ 预测值 36 例, GOLD2(中度) $50\% \leq FEV1 < 80\%$ 预测值 29 例, GOLD3(重度) $30\% \leq FEV1 < 50\%$ 预测值 9 例, GOLD4(极重度) $FEV1 < 30\%$ 预测值 6 例。结论 基于深度学习的人工智能软件能实现 COPD 无漏诊检出,具有较医师更高的检出灵敏度,人工智能与肺功能检测报告对 COPD 患者肺功能严重程度分级无显著差异。

关键词: 人工智能 HRCT 肺功能检测 COPD

PU-1420

“三低”技术联合深度迭代重建算法在肺动脉 CTA 中的临床应用

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目的: 探讨低辐射剂量、低对比剂剂量、低对比剂注射速度(三低技术)联合深度迭代重建算法(AIIR)在肺动脉 CTA 中的应用价值。

方法: 前瞻性纳入 30 例肺动脉 CTA 的患者, 按复查时间先后分为 A、B 两组。A 组为对照组(100 kV, 0.8 mL/kg, 5 mL/s); B 组为“三低”组(70 kV, 0.5 mL/kg, 3 mL/s)。A 组使用 Karl 迭代重建图像, B 组分别使用 Karl 和 AIIR 重建得到 B1 和 B2 组。测量 3 组肺动脉干、左主肺动脉、右主肺动脉的 CT 值和 SD 值、计算信噪比(SNR)和对比噪声比(CNR)。同时对图像质量行主观评分。记录 A、B 组辐射剂量参数。两组 ED、对比剂剂量等比较采用 t 检验; SD、SNR、CNR 等客观图像质量评价参数比较采用单因素方差分析; 主观图像质量评分比较采用 Kruskal-Wallis 检验; 采用 Kappa 检验分析两名放射科医师主观评分的一致性。

结果: 3 组各管腔节段 CT 值、SD 值、SNR 及 CNR 差异均有统计学意义($P < 0.001$)。B2 组 CT 值、SNR、CNR 高于 B1 组, SD 值低于 B1 组, 差异均有统计学意义($P < 0.02$)。B2 组与 A 组的 CT 值差异无统计学意义($P > 0.017$), 各管腔节段的 SD 值、SNR 和 CNR 均优于 A 组($P < 0.015$)。3 组图像主观评分差异有统计学意义($P < 0.05$), A 组与 B2 组差异无统计学意义($P > 0.02$)。B 组辐射剂量、对比剂用量较 A 组分别降低 84.14%、37.08%。

结论: “三低”技术联合 AIIR 算法可以获得和常规剂量扫描相当的肺动脉 CTA 图像质量, 而患者的辐射剂量、对比剂用量及对比剂流速都明显降低。

PU-1421

基于 T2WI 的影像组学特征预测子宫腺肌病磁共振引导聚焦超声治疗的临床疗效

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目的: 开发和评估基于 MRI T2WI 的影像组学模型, 预测磁共振引导聚焦超声(MRgFUS)治疗子宫腺肌病患者的消融成功率。

材料和方法: 回顾性选取经 MRgFUS 治疗的 60 例子宫腺肌病患者(平均年龄, 36.4 岁; 年龄范围, 24-48 岁), 将其分为训练组($n = 40$)和测试组($n = 20$)。以 MRgFUS 消融率(NPV%) $> 80\%$ 作为治疗成功的标准。所有患者在 MRgFUS 治疗前一周内行盆腔 MRI 常规扫描, 利用 3D-slice 软件从 T2WI 成像中提取影像组学特征。在对组学特征进行标准化后, 分别使用最小绝对收缩和选择算子(LASSO)、递归特征消除(RFE)和 ReliefF 三种特征选择算法对提取的影像组学特征进行降维筛选, 并将其导入包括 k 近邻(KNN)、逻辑回归(LR)、随机森林(RF)和支持向量机(SVM)在内的四个机器学习分类器中, 用于构建术前 MRgFUS 治疗子宫腺肌病消融反应

的影像组学预测模型。使用受试者工作特征 (ROC)、校准和决策曲线验证和评估这些模型的性能、预测能力和临床实用性。

结果: 影像组学分析为子宫腺肌病的 MRgFUS 治疗提供了有效可行的术前预测和筛选方法。使用带有 ReliefF 算法的 SVM, MRI T2WI 影像组学模型表现出良好的性能, 平均准确度为 0.864, 敏感性为 0.838, 特异性为 0.892, 阳性预测值 (PPV) 为 0.910, 阴性预测值 (NPV) 为 0.832, ROC 曲线 (AUC) 为 0.876 (95% CI = 0.835~0.924)。校准和决策曲线分析证实了模型在预测能力和临床实用方面的潜力。

结论: 基于 T2WI 的影像组学特征预测模型可用于评估子宫腺肌病患者对于 MRgFUS 治疗的反应, 有助于确定个体化治疗策略。

要点: MRgFUS 作为子宫腺肌病的可替代疗法, 但近三分之一的患者在 MRgFUS 治疗后 6 个月仍有症状。将 T2WI 的影像组学特征进行筛选, 进一步提高了对 MRgFUS 治疗子宫腺肌病反应不佳的预测和适应症的筛选。

PU-1422

CT 图像重建参数对冠状动脉智能检测分析的影响

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目的: 评估不同重建参数设置在冠状动脉 CT 造影 (coronary computed tomography angiography, CCTA) 中对冠状动脉自动检测性能的影响。材料与方法: 随机纳入 2021 年 9 月-2022 年 7 月期间在双层探测器 CT 上进行冠状动脉 CTA 的 80 例患者 (年龄: 46-73 岁) (IQon, Philips Healthcare)。使用不同的 iDose 水平、滤波器和增强设置 (分别为 A:3、CB 和 0; B:5、CC 和 -1; C:5、CD 和 -1) 重建三个并行 CCTA 图像集。测量所有图像集长轴和短轴视图中血池的噪声。冠状动脉在后处理工作站 (ISP, Philips Healthcare) 上自动重建。记录所有冠状动脉 (RCA、R-PDA、R-PLB、LAD (LM+LAD)、LCX、D1、D2、OM1、OM2、R1、L-PDA 和 L-PLB) 的总长度和节点数。采用 Wilcoxon 秩和检验比较每两个图像集之间的统计学差异。结果: 图像集 A、B 和 C 的节点数分别为 3.3 ± 1.5 、 4.9 ± 2.3 和 5.5 ± 1.7 。图像集 A、B 和 C 的冠脉分支总长度分别为 $342.3 \pm 123.4\text{mm}$ 、 $440.4 \pm 171.5\text{mm}$ 、 $468.9 \pm 141.5\text{mm}$ 。因此, 图像集 C 显示出最佳检测性能, 其中观察到的节点比 A 多, 血管长度比 A 和 B 长 (均 $P < 0.05$)。值得注意的是图像集 C 的长轴和短轴血池噪声显著高于 A 和 B (均 $P < 0.05$)。结论: CT 不同的重建核及参数设置会影响冠状动脉自动检测提取的性能。

PU-1423

术前乳腺 MRI 对于早期乳腺癌腋窝淋巴结负荷及无病生存期的评估价值

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目的: 探讨早期乳腺癌术前 MRI 特征是否有助于预测腋窝淋巴结负荷及无病生存期 (DFS)。方法: 回顾性分析 2016 年 1 月至 2018 年 12 月行术前 MRI 检查的 297 例早期乳腺癌 (cT1-2cN0) 患者。依据术后病理确定的腋窝阳性淋巴结数量分为高负荷组 (≥ 3 枚) 及低负荷组 (≤ 2 枚)。采用独立样本 t 检验、Mann-Whitney U 检验或 χ^2 检验比较两组间临床、病理指标及 MRI 特征的差异。采用多因素 Logistic 回归筛选与腋窝淋巴结高负荷相关的独立危险因素。受试者操作特征曲线 (ROC) 及曲线下面积 (AUC) 用于评估预测效能。采用多因素 COX 回归筛选与 DFS 相关的

MRI 特征, 绘制 Kaplan-Meier 曲线评估生存情况。结果: 腋窝淋巴结高负荷组 47 例, 低负荷组 250 例。两组间年龄、绝经状态、ER、PR、HER2、Ki67、分子亚型及病理分级差异均无统计学意义 ($P>0.05$)。两组间肿瘤最大径、病灶类型、多灶/多中心、瘤周血管征、瘤周水肿及皮下水肿差异均有统计学意义 ($P<0.05$)。多因素 Logistic 回归显示瘤周水肿 ($OR=3.734$, $95\%CI: 1.644\sim8.479$, $P=0.002$) 及多灶/多中心 ($OR=3.905$, $95\%CI: 1.685\sim9.051$, $P=0.001$) 是腋窝淋巴结高负荷的独立危险因素。ROC 曲线分析显示二者联合预测淋巴结高负荷 AUC 为 0.760, 高于任何单一因素 ($Z=2.547$, $P=0.011$; $Z=3.816$, $P=0.001$), 敏感度 82.98%、特异度 63.20%。多因素 COX 回归分析显示多灶/多中心与 DFS 相关 ($HR=3.501$, $95\%CI: 1.542\sim7.945$, $P=0.003$)。结论: 术前乳腺 MRI 特征中, 瘤周水肿及多灶/多中心有助于预测腋窝淋巴结负荷, 而多灶/多中心与 DFS 相关。

PU-1424

乳腺常见影像学检查方法的对比

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随着设备的发展, 乳腺检查的设备也越来越多。目前常见的有钼靶成像, DBT (Tomo), 超声成像, MRI 成像, 锥光束乳腺 CT (CBBCT)。这些成像方式各有特点, 其之间可以形成很好的互补。钼靶成像是二维投影, 成像原理决定检查结果为组织重叠, 且小病灶易漏诊, 对致密乳腺的诊断灵敏度低, 检查过程中强烈挤压乳房, 患者痛苦。DBT (Tomo) 检查也不能完全消除组织重叠, 也不是各向同性空间分辨率, 同时必须和钼靶配合使用, 检查过程也是强烈挤压乳房, 辐射剂量也较钼靶摄影增加不少。超声成像则高度依赖操作者的技术水平, 其一次成像不能覆盖整个乳房, 空间分辨率低, 其最大的缺点是检测不到微小钙化点。但超声目前是乳腺穿刺最理想的设备, 操作简单, 无辐射, 临床普及率高。MRI 成像由于其为多参数扫描, 密度分辨率比其它检查都高, 但对钙化灶显示不佳, 其空间分辨率也不高, 但其三维成像清晰显示。MRI 成像扫描时间长, 且必须使用造影剂, 同时设备维护和成本高, 磁场环境对于穿刺材料的限制较为严格。锥光束乳腺 CT 具有清晰显示微小钙化灶及微小软组织病灶的能力优势, 可精准引导完成乳腺定位活体组织检查。锥光束乳腺 CT 对乳腺可进行全三维影像, 单侧乳腺扫描时间约十秒, 对患者乳腺无挤压, 可通过自动屏蔽技术使非受检侧乳腺及身体其他部位免受辐射。其缺点是做引导定位活体组织检查的费用相对高于超声和钼靶摄影, 与超声和 MRI 相比, CBBCT 对人体仍存在一定的辐射影响, 并且 CBBCT 增强扫描时, 依然需要注射碘对比剂, 存在一定的过敏反应风险。

综上所述, 合理选择适当的检查方法很重要。对于普通人群的乳腺疾病筛查, 超声首选, 钼靶摄影次之, 而对于乳腺癌高发人群, 则可进行 MRI 进行筛查, 对于高度怀疑或确诊乳腺疾病的患者, 则可以在前者检查的基础上, 增加锥光束 CT, 进一步明确病变范围, 给临床提供三维立体图像, 便于临床进行充分的术前准备。

PU-1425

多普勒超声定量评估胸廓内动脉对诊断哺乳期乳腺炎可行性的初步探索

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目的

利用多普勒超声评估哺乳期乳腺炎患者胸廓内动脉,探讨超声定量参数诊断哺乳期乳腺炎的可行性。

方法

连续性回顾性纳入 2022 年 8 月-2023 年 6 月于四川大学华西第二医院青白江妇女儿童医院确诊的哺乳期乳腺炎患者 15 例作为实验组,纳入同时期连续性哺乳期非乳腺炎患者 19 例作为对照组。哺乳期乳腺炎诊断标准符合《中国哺乳期乳腺炎诊治指南 2020 版》。分析两组多普勒超声测量胸廓内动脉的成功率,对比两组患者胸廓内动脉的左右方位、内径、最大血流速度、舒张末期血流速度、最小舒张血流速度、时间平均峰值血流速度、RI、PI、S/D 及年龄是否存在差异,研究多普勒超声诊断哺乳期乳腺炎的定量参数指标。

结果

实验组准确寻找胸廓内动脉并获得满意测量的成功率为 46.67% (7/15), 对照组为 57.89% (11/19), 两组测量成功率无统计学差异 ($P>0.05$)。两组患者胸廓内动脉的左右方位、内径、最大血流速度、舒张末期血流速度、最小舒张血流速度、时间平均峰值血流速度、RI、PI、S/D 及年龄均无统计学差异 ($P>0.05$)。

结论

多普勒超声评估胸廓内动脉用于诊断哺乳期乳腺炎的可操作性较差,测量成功率低,对于炎性患者和非炎性患者不存在明显多普勒参数差异,暂无定量诊断哺乳期乳腺炎的可行性。

PU-1426

基于多序列磁共振影像组学建立和验证预测乳腺癌 KI-67 表达的列线图

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目的 基于磁共振影像组学联合临床病理和常规影像组学特征,开发和验证可以术前无创预测乳腺癌 KI-67 表达状态的列线图。

方法 回顾性分析于本院行双乳磁共振检查患者,按照纳入排除标准最终纳入患者 230 例、病灶 233 个。提取患者 ADC 图和 DCE-MRI 图的影像组学特征,按 7:3 比例分为训练集($n=163$)和测试集($n=70$)。在训练集通过单因素分析、最小绝对收缩和选择算子法(least absolute shrinkage and selection operator, LASSO)特征筛选,利用逻辑回归分别构建 ADC 模型、DCE-MRI 模型和联合模型(mpMRI),单因素分析和多因素逻辑回归选取临床病理和常规影像学特征,选取最优的影像组学模型构建影像组学标签 Radscore 并与临床病理和常规影像学特征构建列线图。以受试者工作特征曲线下面积 (area under the curve, AUC)、敏感度和准确率等评估其性能,校准曲线和决策曲线分别评估模型拟合度和其临床收益,并应用 Delong 检验比较不同模型间的差异性。

结果 多因素逻辑回归显示 ER 和腋窝淋巴结异常是 KI-67 独立预测因子。应用逻辑回归构建 ADC 模型、DCE-MRI 模型和联合模型(mpMRI),结果显示 mpMRI 模型性能最优,其在训练集和测试集的 AUC 值分别为 0.874、0.862。随着临床病理及常规影像学特征的纳入,列线图显示出更好的性能,其 AUC 值在训练集和测试集中分别为 0.881、0.875,优于临床模型(训练集:0.610,测试集:0.787)和影像模型。校正曲线显示模型拟合度好,决策曲线显示列线图的临床净收益在较大范围内均高于临床模型和影像模型。

结论 利用多序列的 Radscore 与临床病理及常规影像学特征构建的联合模型能有效预测乳腺癌 KI-67 表达状态,为临床医生对浸润性乳腺癌的术前干预和预后提供指导。

PU-1427

深度学习技术联合临床因素预测 BI-RADS 4A 类阳性病变的临床研究

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目的: 构建基于深度学习技术的乳腺 X 线摄影分类系统联合临床因素的预测模型, 评估模型对乳腺 X 线摄影 BI-RADS 4A 类阳性病变的预测效能。

资料与方法: 回顾性分析 2018 年 1 月至 2022 年 7 月于我院接受乳腺 X 线摄影检查并评估为 BI-RADS 4A 类的 467 例患者的临床及影像资料, 由 2018 年 1 月至 2021 年 7 月的 324 例患者组成训练集, 2021 年 8 月至 2022 年 7 月的 143 例患者组成验证集。记录所有患者乳腺 X 线摄影检查的深度学习系统分类结果, 同时收集患者的相关临床因素, 以单因素和多因素 Logistic 回归分析筛选预测因子, 联合独立预测因子构建预测模型并绘制列线图。采用 AUC、校准曲线和决策曲线分析 (DCA) 评估预测模型的诊断效能、校准度及临床净收益, 对模型进行外部验证, 评价模型的泛化能力。用 DeLong 法比较预测模型与深度学习系统单独的 AUC 差异。

结果: 训练集中病理阳性组的患者共 80 例, 验证集中病理阳性组的患者共 34 例。最终年龄、乳头溢液、超声 BI-RADS 评估及深度学习系统分类结果共 4 个独立预测因子用于构建预测模型, 预测模型具有较好的诊断效能, 训练集及验证集的 AUC 分别为 0.85、0.82。校准曲线显示, 模型在训练集和验证集有较好的校准度, 其预测阳性风险概率与实际阳性风险概率无明显偏离; 临床决策曲线显示, 在训练集和验证集中, 当风险阈值分别大于 0.05 和 0.15 时模型即可获得临床净收益。

结论: 基于年龄、乳头溢液、超声 BI-RADS 评估和深度学习系统分类结果构建预测 BI-RADS 4A 类阳性病变的模型具有较好的诊断效能, 有助于影像科医师提高对 BI-RADS 4A 类阳性病变诊断的准确性, 减少不必要的活检。

PU-1428

Predictors of pathological complete response to neoadjuvant treatment in different HER2 category invasive breast cancer

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Abstract

Purpose In HER2-positive patients received trastuzumab, pathological complete response (pCR) correlated significantly with long-term survival. But pCR rate varies depending on the level of HER2 protein expression. The aim of this study was to evaluate clinicopathological and MR imaging data associated with pCR among patients in different HER2 category breast cancer.

Methods A total of 281 invasive breast cancer patients with HER2 IHC 3+ or IHC 2+/ FISH(+) were included in this study. All enrolled patients underwent baseline MRI examination in our hospital, and received neoadjuvant chemotherapy, dual anti-HER2 therapy and subsequent therapeutic surgery between January 2021 and May 2022. Logistic regression model was used to evaluate the effect of covariates on pCR in each group.

Results Compared to the HER2 IHC2+/FISH(+) group, patients with HER2 IHC 3+ tumors exhibited higher pCR rate (58.1% vs 26.7%, $p < 0.001$), clinical stage (58.6% vs 40%, $p = 0.038$),

apparent diffusion coefficient (ADC) value (0.96 vs 0.88, $p = 0.004$), and were more likely to be estrogen receptor (ER) negative (55.9% vs 31.1%, $p = 0.002$) and progesterone receptor (PR) negative (72.5% vs 46.7%, $p = 0.001$).

Both in IHC2+/FISH(+) group and IHC 3+ group, univariate analysis showed pCR group had more frequent ER negative and PR negative status than non-pCR group($p < 0.001$). After the incorporation of other variables at a level of p value < 0.15 , the final multivariable analysis showed that ER-negativity was associated with pCR in IHC2+/FISH(+) group($p = 0.004$). ER-negativity and the median of maximum diameter were identified as two independent predictors of pCR in IHC 3+ group($p < 0.001$ for ER, $p = 0.026$ for maximum diameter).

Conclusion IHC 3+ tumors showed a higher pCR rate than IHC2+/FISH(+) group. MR imaging findings were stronger predictors of pathologic response along with clinicopathological assessment, especially in IHC 3+ tumors.

PU-1429

单、双指数弥散加权成像联合动态增强磁共振成像对乳腺 TIC II 型良恶性病变的鉴别诊断价值

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【摘要】目的 探讨单、双指数弥散加权成像联合动态增强磁共振成像 (DWI+IVIM + DCE-MRI 模型) 对 TIC II 型乳腺良恶性病变的诊断价值 **方法** 回顾性分析本院经病理证实的乳腺肿块患者 115 例, TIC II 型良性组 30 例, 恶性组 85 例, 所有病例均行 DWI、IVIM 及 DCE-MRI 检查。分析两组间的 ADC、D、D*、f 及 Ktrans、Ve、Kep 值; 绘制 ROC 比较其诊断效能。结果 TIC II 型良性组 ADC、D 值高于恶性组, 而 Ktrans、Kep、Ve 值低于恶性组, 差异有统计学意义 (P 值 < 0.05)。DWI 模型的 AUC 为 0.725, IVIM 模型的 AUC 为 0.818; DCE-MRI 模型的 AUC 为 0.800; DWI+IVIM 模型、DWI+DCE-MRI 模型的 AUC 分别为 0.860、0.861, 诊断效能均高于 DWI 模型 ($Z=2.76$, $P=0.01$; $Z=3.380$, $P=0.001$)。将 DWI、IVIM 及 DCE-MRI 三者联合后, 诊断效能高于 DWI+IVIM 及 DWI+DCE-MRI ($Z=2.08$, $P=0.04$; $Z=1.877$, $P=0.04$)。结论 DWI+IVIM+DCE-MRI 对 TIC II 型乳腺良恶性病变有较好的鉴别诊断价值, 有利于患者术前精准治疗。

PU-1430

全数字化乳腺 X 线摄影、数字乳腺断层摄影及乳腺超声对导管内乳头状瘤的诊断价值研究

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目的

乳腺导管内乳头状瘤是女性常见的乳腺良性肿瘤, 临床表现缺乏特异性, 其诊断主要依赖于影像学检查。本研究结合传统全数字化乳腺 X 线摄影及超声, 探讨数字乳腺断层摄影对乳腺导管内乳头状瘤的诊断价值。

方法

回顾性收集我院 2014 年 03 月-2018 年 12 月期间经病理证实为导管内乳头状瘤的患者 104 例, 所有的患者均行全数字化乳腺 X 线摄影 (FFDM)、数字乳腺断层摄影 (DBT) 和超声 (US) 检查。

首先由 3 年高年资放射科医师对影像图像进行分析, 内容包括病变可见性、病灶最大径、BI-RADS 分类等。将 BI-RADS 评分 3 或 4a 归为正确分类, 当意见不一时, 通过协商得出最终结果, 对比 FFDM、DBT 和 US 三种模式对病例诊断的敏感度、特异度及 ROC。然后按照发病部位将病例分为乳晕下区病灶和非乳晕下区病灶, 分别对比 FFDM、DBT 及 US 诊断两组病例的准确率。

结果

共收集 104 例患者, 其中乳晕下区 39 例, 其他部位 65 例。FFDM、DBT 和 US 对导管内乳头状瘤诊断的敏感度分别为 0.793、0.891 和 0.937, 差异有统计学意义 ($p<0.05$); 特异度分别为 0.740, 0.779 和 0.821, 差异有统计学意义 ($p<0.05$); ROC 曲线下面积分别为 0.851, 0.906 和 0.919, 差异有统计学意义 ($p<0.05$)。在乳晕下区病例的诊断结果中, FFDM、DBT 和 US 的准确率分别为 0.858, 0.914 和 0.923, 对于非乳晕下区病例, 三者的准确率分别为 0.813, 0.895 和 0.901, 差异均有统计学意义 ($p<0.05$)。

结论

DBT 及 US 对导管内乳头状瘤的诊断性能均优于 FFDM, 而 US 对导管内乳头状瘤的诊断价值要稍高于 DBT。在诊断性能方面, 三者对乳晕下区病例组的诊断准确率均高于非乳晕下区病例组。因此, DBT 在导管内乳头状瘤的临床诊断中有较好的应用前景, 同时病灶的发病部位与诊断准确率具有相关性。

PU-1431

基于动态增强 MRI 的反向传播神经网络模型预测 BI-RADS4 类 乳腺良恶性病变

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目的 初步探索基于动态增强磁共振成像 (DCE-MRI) 的反向传播神经网络 (BPNN) 模型预测乳腺影像报告和数据系统 (BI-RADS) 4 类乳腺良性与恶性病变的价值, 为乳腺疾病精准诊治提供潜在的技术手段。

方法 纳入我院 2018 年 2 月至 2022 年 12 月经乳腺 MRI 诊断为 BI-RADS4 类乳腺病变的患者 260 例, 并将其随机分为训练集 ($n=182$) 和验证集 ($n=78$)。选取 DCE-MRI 动脉期图像勾画病变感兴趣区体积, 提取病变影像组学特征。采用 logistic 回归分析、最小绝对收缩与选择算子 (LASSO) 等方法筛选出预测 BI-RADS4 类乳腺良恶性病变有意义的临床因素和影像组学特征, 分别建立临床模型、影像组学模型及临床影像组学结合模型和 BPNN 模型。通过特征曲线、曲线下面积 (AUC)、校准曲线和德隆检验评比预测模型的性能。

结果 病灶直径是 BI-RADS4 类乳腺良恶性病变的独立临床相关因素, 12 个预测影像组学特征与 BI-RADS4 类乳腺良恶性病变相关。与临床模型、影像组学模型、结合模型比较, BPNN 模型呈现出最高的预测性能 (训练集 AUC: 0.784vs.0.801vs.0.855vs.0.976), 验证集 AUC: 0.725vs.0.776vs.0.813vs.0.971), BPNN 模型与其他三个模型之间的 AUC 比较差异均具有显著统计学意义 ($P<0.05$)。校准曲线表明, 模型预测 BI-RADS4 类乳腺病变的概率和实际结果一致性较好。

结论 基于 DCE-MRI 的 BPNN 模型在预测 BI-RADS4 类乳腺良恶性病变方面具有较高的性能, 为临床治疗决策的制定提供参考依据。

PU-1432

多模态 MRI 对不伴肿块型乳腺钙化病变的诊断价值

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目的：探讨多模态磁共振成像技术 (MRI) 对不伴肿块型乳腺钙化病变的诊断价值。

方法：回顾性分析 2020 年 1 月至 2023 年 2 月在辽宁省肿瘤医院就诊经乳腺 X 线摄影诊断为不伴肿块型钙化病变，且 MRI 呈肿块样强化的 145 例患者的临床及影像资料。所有病例均采用 GE 1.5T 超导磁共振检查，序列包括 T1WI、T2WI、抑脂、弥散加权成像 (DWI)、动态增强。分析良恶性病灶在 MRI 上的表现：形态学表现、强化特征、DWI 信号、时间-信号强度曲线 (Time-intensity curve, TIC)，TIC 曲线分为 I 型 (流入型)、II 型 (平台型)、III 型 (流出型) 3 种类型，并采用 $b=800 \text{ s/mm}^2$ ，在工作站生成的 ADC 图，设置 3~5 个 ROI 测量病变强化区域的表现弥散系数 (ADC 值)，取其平均值为终值。以病理结果为金标准，计算 MRI 的诊断效能。

结果：本研究 145 例患者中，包含 109 例乳腺癌 (恶性组) 和 36 例乳腺良性病变 (良性组)。单因素分析结果显示，病灶的形态、边缘、内部强化方式、DWI 及 TIC 曲线类型与病变良恶性之间差异均有统计学意义 (χ^2 值分别为 17.302、41.357、14.148、6.302、40.606, P 值 <0.05)。良性组病灶 ADC 值中位数为 $(1.360 \times 10^{-3} \text{ mm}^2/\text{s})$ ，高于恶性组病灶 ADC 值 $(0.986 \times 10^{-3} \text{ mm}^2/\text{s})$

($P=0.000 < 0.001$)。采用二元 Logistic 回归分析建立良恶性诊断模型，并对回归模型的预测概率进行 ROC 分析，取得回归模型的曲线下面积 (area under the curve, AUC)、灵敏度、特异性、阳性预测值及阴性预测值，分别为 0.874、90.8%、75.0%、94.5%、69.4%。

结论：对于不伴肿块型乳腺钙化性病变，多模态磁共振成像技术具有较高的鉴别诊断价值，能够为临床提供进一步的参考。

PU-1433

多模态磁共振联合 X 线摄影对不伴肿块型乳腺钙化病变的诊断价值

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目的：探讨多模态磁共振成像技术 (MRI) 联合乳腺 X 线摄影 (mammography, MG) 对不伴肿块型乳腺钙化病变的诊断价值。

方法：回顾性分析 2020 年 1 月至 2023 年 2 月在辽宁省肿瘤医院就诊经 MG 诊断为不伴肿块型钙化病变，且 MRI 表现为肿块样强化的 144 例患者的临床及影像资料。依据美国放射学会 (ACR) 提出的乳腺影像报告和数据系统 (BI-RADS) 标准对 MG 和 MRI 图像进行分析和评估。以病理结果为金标准，评价两种影像学方法及联合检查的诊断效能。

结果：144 例患者中，109 例为恶性病变，35 例为良性病变。单因素分析结果显示，良恶性病变的钙化形态、分布特点及是否有伴随征象 (结构扭曲、局灶不对称致密影、同侧乳头凹陷和皮肤增厚) 之间的差异具有统计学意义 ($P < 0.05$)；乳腺背景实质强化程度 (BPE)、病灶的形态、边缘、内部强化方式、DWI 信号、TIC 曲线及 ADC 值与病变良恶性之间差异均有统计学意义 ($P < 0.05$)。采用二元 Logistic 回归分析分别建立 MG、MRI 及联合检查的良恶性诊断模型，并对回归模型的预测概率进行 ROC 分析，取得回归模型的曲线下面积 (area under the curve, AUC)。MG 的诊断敏感度、特异度、PPV、NPV、诊断准确率及 AUC 分别为 87.2%、34.3%、80.5%、46.2%、74.3% 及 0.722。MRI 的诊断敏感度、特异度、PPV、NPV、诊断准确率及 AUC 分别为 93.6%、68.6%、90.3%、77.4%、87.5% 及 0.869。MG 联合 MRI 检查中，诊断敏感度、特异度、PPV、NPV、诊

断准确率及 AUC 值分别为 92.7%、71.4%、91.0%、75.6%、87.5%及 0.894。MRI 联合 MG 诊断的 ROC 曲线下面积明显高于 MG 单独诊断($P<0.05$)。

结论：对于不伴肿块型乳腺钙化病变，MRI 与 MG 联合应用具有较高的诊断效能。

PU-1434

基于动态增强磁共振成像鉴别 HER2 阳性乳腺癌

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目的：评价基于药代动力学动态增强磁共振成像 (DCE-MRI) 的定量、半定量参数在鉴别 HER2 阳性乳腺癌中的作用。

材料与方法：选取 2017 年 12 月~2019 年 12 月于我院行乳腺 3.0T DCE-MRI 检查的女性乳腺癌患者，共 147 例，其中，25 例病灶直径小于 0.5cm 的被排除，20 例非肿块样强化病变被排除，4 例 MRI 图像质量差的被排除，2 例病理分级及免疫组化表型描述模糊的被排除。最终纳入研究的患者共 96 例，其中 HER2 阳性 39 例 (42 个病灶)、HER2 阴性 57 例 (59 个病灶)。DCE-MRI 原始 DICOM 数据经软件处理后得到 8 个参数：K_{trans}, k_{ep}, v_e, v_p, TTP, MAX Conc, AUC, MAX Slope。将患者分别分为两组 (HER2 阳性组 vs. 非 HER2 阳性组)。采用单因素分析参数组间差异；进一步采用二元 Logistic 回归，并构建联合诊断模型，评估 DCE-MRI 定量、半定量参数及联合诊断模型鉴别 HER2 阳性乳腺癌的价值。

结果：ICC 检验显示 DCE-MRI 定量参数一致性良好。HER2 阳性乳腺癌组与非 HER2 阳性乳腺癌组组间比较中，定量、半定量参数均具有统计学差异；构建联合诊断模型；ROC 曲线显示 k_{ep}、TTP 和联合诊断模型对 HER2 阳性乳腺癌具有诊断价值 (AUC = 0.832、0.763、0.832)，且联合模型的诊断效能更高 (经 DeLong 检验，P 均 < 0.02)。

结论：本研究按照免疫组化结果将乳腺癌病灶分别分为 HER2 阳性组和 HER2 非阳性组，基于 DCE-MRI 的定性和定量参数的比较，从而分别进行乳腺癌病灶的分子分型判别，结果显示 k_{ep}、TTP 作为 DCE-MRI 的定量、半定量参数，在 HER2 阳性的乳腺癌鉴别中表现良好，具有一定的诊断价值，且联合诊断价值更高。

PU-1435

三种不同指数模型对乳腺良恶性病变鉴别诊断效能的比较：一项基于多 b 值 MUSE-DWI 的研究

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目的：比较基于多 b 值 MUSE-DWI 的单指数模型、双指数模型、拉伸指数模型鉴别乳腺良恶性病变的诊断效能。

方法：回顾性分析 62 例经病理证实的乳腺疾病患者的 MRI 检查资料。两名医师分别做多 b 值 MUSE-DWI 图像上勾画同一患者病灶的感兴趣区 (ROI)，并记录病灶的表观扩散系数 (ADC)、慢速表观扩散系数 (ADC_{slow})、快速表观扩散系数 (ADC_{fast})、快速成分所占比例 (ADC_{fraction of fast})、分布扩散系数 (DDC)、扩散异质性值 (α)。根据病理结果，将病灶分为良恶性两组。采用单因素分析或非参数检验比较 ADC、ADC_{slow}、ADC_{fast}、ADC_{fraction of fast}、DDC、 α 的组间差异。采用二元 Logistic 回归分析有组间差异的参数，构建双指数模型参数联合模型、拉伸指数模型参数联合模型。采用 DeLong 检验比较单指数模型、双指数模型参数联合

模型、拉伸指数模型参数联合模型的受试者工作特征 (ROC) 曲线下面积 (AUC), 评估三种模型诊断效能的差异。

结果: ADC、ADCslow、ADCfast、ADCfraction of fast、DDC 和 α 值在恶性组低于良性组 ($P < 0.05$)。单指数模型、双指数模型参数联合模型、拉伸指数模型参数联合模型鉴别乳腺良恶性病变的 AUC 分别为 0.701, 0.859, 0.828; 双指数模型参数联合模型与单指数模型的 AUC 有统计学差异 ($P=0.023$), 拉伸指数模型参数联合模型的 AUC 与双指数模型参数联合模型 ($P=0.52$) 及单指数模型 ($P=0.08$) 无统计学差异。

结论: 三种不同指数模型模型有助于鉴别乳腺良恶性病变; 双指数模型参数联合模型优于单指数模型。

PU-1436

磁共振多模态成像技术联合应用对于乳腺癌的诊断价值

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【摘要】 目的: 探讨磁共振动态增强扫描(DCE)、扩散加权成像(DWI)及磁共振波谱成像(MRS)三种成像方法联合应用对乳腺癌的诊断价值, 以提高乳腺癌诊断率, 实现乳腺癌的早发现、早诊断、早治疗。方法: 对 100 例于我院乳腺外科就诊的患者行常规 MRI、增强磁共振动态对比成像(DCE-MRI)、磁共振弥散加权成像(DWI) 以及磁共振波谱(MRS) 检查,并记录结果, 计算三种模态两两联合及三种模态共同联合的诊断敏感性、特异性和准确性, 以探讨多种模态联合应用对乳腺癌的诊断意义。结果: 100 例患者中发现病灶 121 个, 乳腺癌 65 例, 良性肿瘤 35 例。其中良性病灶 48 个, 恶性病灶 73 个。恶性病灶包括浸润性导管癌、导管原位癌、浸润性小叶癌、髓样癌等; 良性病灶包括纤维腺瘤、导管内乳头状瘤、肉芽肿性结节、增生结节。动态增强检查联合 DWI 检查诊断乳腺癌的敏感性为 88.6%、特异性为 86.4%、准确性为 88.4%, 动态增强检查联合 MRS 检查诊断乳腺癌的敏感性为 87.8%、特异性为 85.1%、准确性为 86.4%; MRS 联合 DTI 检查诊断乳腺癌的敏感性为 84.2%、特异性为 91.3%、准确性为 89.2%; 动态增强检查、DTI 及 DWI 三种模态联合检查诊断乳腺癌的敏感性为 96.3%、特异性为 98.2%、准确性为 97.2%。动态增强检查、DWI、MRS 两两联合诊断结果比较, 差异无统计学意义($P > 0.05$); 三者联合诊断结果与两两联合诊断结果比较, 差异有统计学意义($P < 0.05$)。结论: 磁共振动态增强检查、DWI 及 MRS 三种模态联合能明显提高乳腺癌诊断的敏感性、特异性及准确性。

PU-1437

离体乳腺组织 X 线检查技术的研究

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目的: 研究离体乳腺组织 X 线摄影技术意义, 分析乳腺在体组织与离体组织两种 X 线检查技术。方法: 分别对在体乳腺组织进行钼靶 X 线摄影、离体乳腺组织进行钼靶 X 线摄影。分两组对照组 (在体乳腺组、离体乳腺组), 在体组织选择 OPPCOMP 拍摄模式, 常规摄四个体位 (RCC LCC RMLO LMLO) 自动调节 mAs 与 kv。一般曝光条件范围为: 管电压 22~35KV, 管电流 30~200mAs, 根据病人耐受情况选择 Comp.Force。离体组织选取低 mAs、低 kv、不同 Comp.Force 摄片, 对比二者摄片技术对病灶的显示。结果: 20 例在体乳腺组织 X 线摄影图像显示出的病灶, 离体乳腺组织 X 线摄影时特定条件可更清楚显示病灶。有统计学意义。结论: 离体乳腺组织的 X 线检查技术可清晰的显示出病变组织。

PU-1438

Magnetic resonance imaging-based radiomics was used to evaluate the level of prognosis-related immune cell infiltration in breast cancer tumor microenvironment

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Purpose The tumor immune microenvironment is a valuable source of information for predicting prognosis in breast cancer (BRCA) patients. To identify immune cells associated with BRCA patient prognosis from the Cancer Genetic Atlas (TCGA), we established an MRI-based radiomics model for evaluating the degree of immune cell infiltration in breast cancer patients.

Methods CIBERSORT was utilized to evaluate the degree of infiltration of 22 immune cell types in breast cancer patients from the TCGA database, and both univariate and multivariate Cox regressions were employed to determine the prognostic significance of immune cell infiltration levels in BRCA patients. We identified independent prognostic factors for BRCA patients. Additionally, we obtained imaging features from the Cancer Imaging Archive (TCIA) database for 73 patients who underwent preoperative MRI procedures, and used the Least Absolute Shrinkage and Selection Operator (LASSO) to select the best imaging features for constructing an MRI-based radiomics model for evaluating immune cell infiltration levels in breast cancer patients.

Results According to the results of Cox regression analysis, M2 macrophages were identified as an independent prognostic factor for BRCA patients (HR=32.288, 95% CI: 3.100-357.478). A total of nine significant features were selected to calculate the radscore. We established an intratumoral model with AUCs (95% CI) of 0.662 (0.495-0.802) and 0.678 (0.438-0.901) in the training and testing cohorts, respectively. Additionally, a peritumoral model was created with AUCs (95% CI) of 0.826 (0.710-0.924) and 0.752 (0.525-0.957), and a combined model was established with AUCs (95% CI) of 0.843 (0.723-0.938) and 0.744 (0.491-0.965). The peritumoral model demonstrated the highest diagnostic efficacy, with an accuracy, sensitivity, and specificity of 0.773, 0.727, and 0.818, respectively, in its testing cohort.

Conclusion The MRI-based radiomics model has the potential to evaluate the degree of immune cell infiltration in breast cancer patients, offering a non-invasive imaging biomarker for assessing the tumor microenvironment in this disease.

PU-1439

列线图模型对浸润性乳腺癌伴腋窝淋巴结转移的预测价值

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目的：探讨列线图模型对浸润性乳腺癌伴腋窝淋巴结转移的预测价值。**材料与方法：**回顾性分析 2020 年 9 月至 2022 年 3 月宁夏医科大学总医院怀疑为乳腺癌的患者 247 例，根据纳入、排除标准，共纳入 122 例作为研究对象。根据有无腋窝淋巴结转移，分为转移组 57 例、非转移组 65 例。所有病灶经手术获得病理证实。两组接受合成 MRI、DCE-MRI 及 DWI 扫描，测量乳腺病灶合成 MRI 参数 (T1、T2、PD)、DCE-MRI 时间信号强度曲线 (TIC)、ADC 值 (ADC tumor, ADC peritumor, ADC ratio)。采用独立样本 t 检验和 u 检验比较两组各参数差异，逻辑回归分析筛选出浸润性乳腺癌伴有腋窝淋巴结转移的独立危险因素。基于逻辑结果建立五种预测模型，采用 DeLong 检验评价五种模型 AUC。基于这一结果，使用 R 语言“riskRegression”包建立列线图模型，并评价其效能。根据每个危险因素的分类及数值向上投射得到对应分数，计算总得分，根据总得分向上投射可得到病灶的腋窝淋巴结转移概率。**结果：**逻辑回归结果分析显示 Ki-67(OR=2.971)、病

灶大小(OR=1.652)、T2ratio(OR=3.015)、PDratio(OR=2.782)、ADCratio(OR=1.685)是浸润性乳腺癌伴腋窝淋巴结转移的独立危险因素。五种模型建模显示逻辑回归模型显示效能最优, AUC 为 0.725, 95%CI 0.621-0.789, 准确率、特异性、敏感性分别为 70.65%、62.79%、77.55%。对列线图模型准确性进行检验, 得出 C-index=0.844, 即本次建立的列线图模型准确性良好, 其截断风险为 0.468, 截断分数为 143.50, 这表示当乳腺癌患者总分超过 143.50, 发生腋窝淋巴结转移的风险将高于 46.8%。

结论: 列线图模型对乳腺癌患者伴腋窝淋巴结转移具有较好的预测能力。

PU-1440

磁共振、超声对早期乳腺癌诊断的应用价值比较

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目的: 探讨磁共振、超声对早期乳腺癌诊断对比分析。方法: 2021 年 9 月至 2022 年 5 月期间于我院就诊并怀疑为早期乳腺癌患者 100 例, 均行磁共振及超声检查。所有患者在检查一周内行手术治疗, 并在术后获得病理结果。比较 MRI、超声这两种检查方法对早期乳腺癌的检出的灵敏度、阳性预测值的差异。结果: 所有 100 例乳腺病灶, 病理证实为乳腺癌患者为 87 例。MRI 对早期乳腺癌检出率值分别为 93.2%、79.3% ($P<0.05$)。结论: MRI 对早期乳腺癌的检出率优于超声检查。

PU-1441

乳腺钼靶与 MRI 增强检查在乳腺疾病诊断中的价值

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目的: 比较乳腺 X 线摄影与磁共振增强检查在乳腺病变中的诊断价值比较。方法: 回顾分析 2012 年 1 月至 2022 年 1 月 107 例乳腺疾病病人的影像学资料, 所有病人均进行乳腺 X 线摄影与 MRI 动态增强检查, 按照美国放射学会推荐的“乳腺影像报告和数据系统”(BI-RADS) 进行分类, 以手术病理诊断为金标准, 应用受试者工作特征曲线(ROC) 评价不同检查方法及联合检测的价值。结果: 156 例病人共检出 170 个病灶, 以 BI-RADS 分级 4 类以上为检查阳性, 结果显示 MRI 增强检查的灵敏度优于乳腺 X 线摄影(96.07% 比 81.23%, $P=0.003$), 而其特异度不低于乳腺 X 线摄影 ($P=0.274$)。ROC 分析结果显示, MRI 增强检查的曲线下面积明显大于乳腺 X 线摄影(0.929 比 0.889, $P=0.001$), 而联合 2 种检查方法曲线下面积最大, 明显大于单独行乳腺 X 线摄影($P=0.001$)、MRI 增强检查($P=0.008$)。结论: MRI 增强检查在有症状的乳腺疾病病人中的诊断价值高于乳腺 X 线摄影, 联合运用 2 种检查方法, 诊断价值可进一步提高。

PU-1442

基于瘤内异质性分割的影像组学模型对预测乳腺癌患者 Ki-67 表达水平的价值

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目的: 探讨基于动态增强磁共振成像 (DCE-MRI) 瘤内异质性分割的影像组学预测乳腺癌患者 Ki-67 表达水平。**方法:** 回顾性收集 2018 年 6 月-2022 年 9 月经手术病理确证为乳腺癌的患者 210 例, 其中 Ki-67 高表达 128 例, 低表达 82 例, 所有病例均在治疗前行 DCE-MRI 检查。对所有患者的 DCE-MRI 第三期图像采用无监督 k-means 算法分割为不同的肿瘤亚区。以 7:3 的比例随机分为训练集和验证集。在训练集中使用最大相关最小冗余(mRMR)、最小绝对收缩和选择算子(LASSO)分别对各肿瘤亚区及其肿瘤整体的影像组学特征进行降维, 采用逻辑回归的方法构建预测模型。采用受试者工作特征曲线下面积(AUC)评价模型的效能, 应用决策曲线分析(DCA)评估模型的临床价值。**结果:** 使用无监督 k-means 聚类方法根据体素值将结果聚为类 2 类, 因此将肿瘤分为两个亚区, 分别为高亮度亚区和相对低亮度亚区。结果显示高亮度亚区 (训练集 AUC:0.786, 验证集 AUC: 0.774) 预测乳腺癌患者 Ki-67 表达的状态要优于相对低亮度亚区 (训练集 AUC:0.750, 验证集 AUC: 0.662)、肿瘤整体 (训练集 AUC:0.760, 验证集 AUC: 0.723), 基于两个亚区构建的联合模型其诊断效能为 (训练集 AUC:0.865, 验证集 AUC: 0.781), 要优于临床模型、高亮度亚区影像组学模型、相对低亮度亚区影像组学模型及肿瘤整体模型, 校准曲线显示联合模型具有较好的校准度, DCA 显示在训练集和验证集中联合模型较临床模型、高亮度亚区影像组学模型、相对低亮度亚区影像组学模型及肿瘤整体模型具有更高的临床价值。**结论:** 基于 DCE-MRI 瘤内异质性分割的影像组学模型能够较好的预测乳腺癌患者 Ki-67 表达水平。

PU-1443

不同年龄及月经状态女性正常乳腺 ADC 值的变化

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【摘要】目的: 探讨不同年龄及月经状态女性正常乳腺表观扩散系数 (apparent diffusion coefficient, ADC) 值的变化特征及其临床意义。**方法:** 收集 2020 年 8 月至 2022 年 11 月皖南医学院弋矶山医院因自觉“包块”、不适 MRI 检查双侧乳腺健康 332 例受试者资料, 根据年龄分为低年龄组 (n=107), 中年年龄组 (n=114), 高年龄组 (n=111)。根据不同月经状态将受试者分为月经期(n=49)、增殖期 (n=77)、分泌期(n=94)和绝经后(n=112)。在西门子后处理站中测量正常乳腺 ADC 值, 多次测量 (ROI 保持一致) 取平均值, 比较不同年龄及月经状态的乳腺 ADC 值的差异。**结果:** 不同年龄双侧正常乳腺的 ADC 值差异有统计学意义 ($P < 0.05$); 双侧高年龄组与中年年龄组及低年龄组的差异均有统计学意义 ($P < 0.05$), 中年年龄组与低年龄组差异无统计学意义 ($P > 0.05$)。不同月经状态的双侧正常乳腺组织, 双侧 ADC 值差异均有统计学意义 ($P < 0.05$); 绝经后与月经期、增殖期及分泌期的差异均有统计学意义 ($P < 0.05$), 月经期、增殖期及分泌期两两比较差异无统计学意义 ($P > 0.05$)。**结论:** 不同年龄及月经状态正常女性乳腺 ADC 值的变化及个体之间的变异度较大, 利用 ADC 值诊断女性乳腺疾病时应考虑不同年龄及月经状态下的基线 ADC 值变化。

PU-1444

锥光束乳腺 CT 影像组学预测乳腺癌腋窝淋巴结状态和转移负荷

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目的: 建立对比增强锥光束乳腺 CT (CE-CBBCT) 影像组学模型, 用于术前预测乳腺癌腋窝淋巴结 (ALN) 状态和转移负荷。

方法: 选择 2012~2021 年在天津医科大学肿瘤医院进行 CE-CBBCT 检查的 274 例患者。在每个患者图像中对原发肿瘤进行分割, 使用 PyRadiomics 软件从中提取 1781 个影像组学特征。在特征选择之后, 开发支持向量机 (SVM) 模型来预测 ALN 状态和转移负荷。为了避免对特定患者子集的过度拟合, 进行了 100 次随机分层来将患者分配到训练集和测试集。将影像组学模型的 ROC 曲线下的面积 (AUC) 与仅使用临床特征和临床+影像组学特征训练模型时获得的 AUC 进行比较。病理组织学为金标准。

结果: 118 例患者有 ALN 转移 ($N+(≥1)$), 其中 74 例为低负荷 ($N+(1-2)$), 44 例为高负荷 ($N+(≥3)$), 其余 156 例患者无 ALN 转移 ($N0$)。在预测 ALN 状态 ($N0/N+(≥1)$) 时, 100 次重复试验的平均 AUC 值分别为 $0.75±0.05$ (影像组学模型)、 $0.68±0.07$ (临床模型) 和 $0.74±0.05$ (组合模型)。在预测转移负荷 ($N+(1-2)/N+(≥3)$) 时, AUC 值分别为 $0.65±0.10$ (影像组学模型)、 $0.55±0.12$ (临床模型) 和 $0.64±0.09$ (组合模型)。在这两种情况下, 影像组学模型明显优于临床模型 (均 $p<0.01$), 并且与组合模型相当 ($p=0.56$ 和 0.64)。

结论: CE-CBBCT 图像中原发肿瘤的影像组学特征可以预测 ALN 转移。

PU-1445

T2WI 脂肪抑制水肿特征评估乳腺癌新辅助化疗疗效

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目的: 探究乳腺癌患者在新辅助化疗 (NAC) 前后 T2WI 脂肪抑制序列患侧乳腺水肿程度的改变, 研究其在乳腺癌 NAC 中的应用价值以及相关影响因素分析。

方法: 分析 2020 年 6 月-2021 年 12 月我院病理科确诊且接受过 NAC 的 52 例乳腺癌患者, 这些患者均于治疗前后行乳腺 MRI 检查, 对所有患者影像学、临床组织学资料治疗前后进行对比研究, 采用 Miller-Payne 分级系统分为组织学显著反应 (PCR) 组 ($n=17$ 例)、非显著反应 (非 PCR) 组 ($n=35$ 例), 应用配对样本比较的 Wilcoxon 符号秩和检验分别了解两组患者 NAC 前后 T2WI 脂肪抑制序列乳腺水肿的差异; 采用非参数检验比较每组患者在接受 NAC 前后乳腺水肿特点。采用 Spearman 检验、二元 logistic 回归分析进行乳腺水肿及 NAC 疗效影响因素的相关性分析。

结果: ① PCR 组与非 PCR 组 NAC 方案、肿块最大径线的差异有统计学意义 ($P<0.001$) ② PCR 组与非 PCR 组 NAC 前后乳腺水肿特点比较差异有统计学意义 ($P<0.001$), PCR 组患者的化疗前水肿级别大于非 PCR 组 ($P<0.001$), 化疗前后非 PCR 组的水肿级别中位数较显著反应组高; ③ NAC 前两组 (PCR 组与非 PCR 组) 的乳腺水肿级别无统计学差异 ($P=0.16$), NAC 后两组 (PCR 组与非 PCR 组) 的乳腺水肿级别有统计学差异 ($P=0.004$); ④ NAC 前乳腺水肿影响因素相关性分析显示水肿与肿瘤最大径以及 Ki-67、ER、PR 的表达相关 ($P<0.05$); ⑤ NAC 前低级别水肿、雌激素受体/孕激素受体阴性患者更易达到 PCR ($P<0.001$)。

结论: 乳腺癌 NAC 后患侧乳腺水肿级别下降可作为评价 NAC 有效性的指标; 此外还观察到, 随着 NAC 后肿瘤直径的缩小, 水肿也有所改善。因此, 利用 MRI T2WI 脂肪抑制序列对患侧乳腺水肿结果进行分类评级, 可以用于乳腺癌患者预后和化疗效果的评估。

PU-1446

基于 2013 版 BI-RADS 术语及关于 CEM 术语的补充规定探讨 CEM 与 MRI 鉴别乳腺良性与恶性病变的价值

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目的:基于 2013 版乳腺影像报告和数据系统 (BI-RADS) 术语及关于对比增强乳腺 X 线摄影 (CEM) 术语的补充规定探讨 CEM 与 MRI 鉴别乳腺良性与恶性病变的价值。**方法:**回顾性分析 2019 年至 2022 年我院因乳腺病灶而就诊的 83 例患者的临床和影像资料, 共 100 个乳腺病灶, 年龄 28~78 (49±14) 岁, 根据病理结果分为良性病灶 50 个、恶性病灶 50 个。采用 t 检验、 χ^2 检验及 Fisher 确切概率法比较良性与恶性病灶的临床及 CEM、MRI 特征差异, 并将差异具有统计学意义的影像学特征纳入多因素 logistic 回归分析分别建立预测模型。曲线下面积的比较采用 DeLong 检验。结果:多因素 logistic 回归分析显示 CEM 中伴随征象 (OR=9.075, P=0.019)、病灶显著性 (OR=6.180, P<0.001)、肿块边缘 (OR=2.193, P=0.001)、钙化分布 (OR=2.147, P=0.015) 是鉴别乳腺良性与恶性病灶的独立预测因子, 并以此构建 CEM 预测模型。MRI 中时间-信号强度曲线 (OR=9.230, P<0.001)、伴随征象 (OR=5.289, P=0.017)、肿块边缘 (OR=2.192, P=0.002) 是鉴别乳腺病灶良性与恶性的独立预测因子。CEM、MRI 预测模型鉴别乳腺良性与恶性病灶的曲线下面积分别为 0.947、0.930, 差异无统计学意义 (Z=0.68, P=0.494)。结论:基于 2013 版 BI-RADS 术语及关于 CEM 术语的补充规定得出 CEM、MRI 两种检查技术鉴别乳腺良性与恶性病灶的诊断效能相当。

PU-1447

Imaging Features Derived From Dynamic Contrast-Enhanced Magnetic Resonance Imaging to Differentiate Malignant From Benign Breast Lesions: A Systematic Review and Meta-Analysis

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Purpose: The aim of this study is to explore the accuracy of individual imaging features derived from dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) in differentiating malignant from benign breast lesions. **Materials and Methods:** The PubMed, Web of Science, Embase, and the Cochrane Library databases were searched up to January 2021 to identify original studies that investigated the accuracy of individual DCE-MRI features in differentiating malignant from benign breast lesions. Pooled sensitivity, specificity, and area under the curve were calculated by STATA software based on the data extracted from included studies. Moreover, quality assessment, subgroup analysis, and publication bias evaluation were performed. **Results:** Twenty-nine studies comprising 2976 patients and 3365 suspicious breast lesions were included. Malignant breast lesions tended to present irregular shapes (83.59%), noncircumscribed margins (85.50%), mass enhancement (52.31%), heterogeneous internal enhancement (71.72%), and type II or III time intensity curve (TIC) patterns (91.17%), showing significant differences compared with benign breast lesions (P < 0.05). For differentiating malignant from benign breast lesions, the area under the curve values of irregular shape, noncircumscribed margin, mass

enhancement, heterogeneous internal enhancement, and type II or III TIC patterns were 0.79 (0.76–0.83), 0.87 (0.84–0.90), 0.63 (0.58–0.67), 0.82 (0.78–0.85), and 0.89 (0.86–0.92), respectively. Conclusions: Imaging features derived from DCE-MRI, especially TIC patterns, are important for diagnosing and differentiating malignant from benign breast lesions.

PU-1448

磁共振酰胺质子转移加权成像与弥散峰度成像在评估乳腺癌前哨淋巴结转移负荷中的应用价值

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摘要 目的：1、比较酰胺质子转移加权成像(APTWI)联合弥散峰度成像(DKI)与乳腺动态增强成像在鉴别乳腺良恶性病变中的价值；2、分析其衍生参数（非对称磁化转移传递率 (MTRasym 3.5ppm)、表观峰度系数(Kapp)和非高斯扩散系数(Dapp)）与乳腺癌前哨淋巴结转移负荷的相关性。方法：纳入 2022 年 12 月至 2023 年 7 月在云南省肿瘤医院行乳腺磁共振检查的患者 200 例。经过纳排标准，最终入组的患者 190 例。根据组织病理学结果将入组的患者分为良恶性组，其中恶性组患者根据其肿瘤大小、淋巴结转移情况、ER、HER-2、PR 及 Ki-67 的表达情况又分为不同的组，探究 APT 及 DKI 的相关定量参数与不同临床预后参数及前哨淋巴结转移负荷之间的相关性。本研究将前哨淋巴结转移数目 ≤ 2 枚归为低负荷转移， ≥ 3 枚归为高负荷转移。采用 SPSS 21.0 统计学软件进行数据分析，组内相关系数 (ICC) 用于评估观察者间的可靠性；Spearman 相关系数用于确定每个参数与不同临床病理因素之间的相关；logistic 回归用于多指标联合诊断。结果：恶性组的 Kapp 值高于良性组，Dapp 和 MTRasym (3.5 ppm)值低于良性组。Kapp 与 MTRasym 之间(3.5 ppm)和 Dapp 与 MTRasym 之间(3.5 ppm)的 AUC 差异显著。Kapp 与前哨淋巴结低负荷转移中度相关，与高负荷转移中度相关，与 Ki-67、HER-2 表达轻度相关。Dapp 与前哨淋巴结低负荷转移中度相关，与高负荷转移中度相关，与 Ki-67 表达轻度相关。MTRasym (3.5 ppm)与前哨淋巴结低负荷转移仅轻度相关，与前哨淋巴结高负荷转移轻度相关。结论：DKI 对乳腺良恶性疾病及前哨淋巴结转移负荷的鉴别价值优于 APTWI。每个参数都与一些预后因素有一定的相关性。

PU-1449

双能钼靶让软组织内低密度异物无处遁形

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外伤性软组织内异物作为一种常见急症，大部分非金属异物在传统 DR 摄影条件下定位定性都难以判断，比如木屑，玻璃、鱼刺等低密度异物，钼靶是一种运用软射线检测乳腺疾病的方法，既往少有用钼靶进行低密度异物的检测，本文旨在探讨利用钼靶检查软组织内低密度异物的方法和结果，以及从中得出的结论。

一、目的：探讨利用钼靶检查软组织内低密度异物的有效方法，并评估其准确性和可行性。

二、方法：回顾性分析我院 2021 年至今 20 例手指远端软组织内低密度异物患者，经传统 DR 摄影未检出明确异物位置，对同一患者采用双能钼靶进行手指远端软组织内异物摄影。

因为钼靶摄片需要对软组织进行压迫，达到一定的压力之后才能进行曝光，手指远端软组织较少，需要一个辅助压迫的工具，我们用了 EVA 自制辅助检查模具进行检查，将远端肢体置入模具中，调整图像接收器高度到患者舒适的体位，下压压迫器使压力达到曝光条件，使压迫板使压力 >3 ，

约为 16daN，选择左右，使用大焦点，Mo/Mo，30KV，56mAS，按下曝光键，压迫板抬起，检查图像，调节窗宽窗位，查看异物的大小，位置，接着完善检查，或者更换体位，直到异物显影明确。三、结果：用传统 DR 摄片方法对此类软组织内低密度异物无法检出的情况下，利用钼靶软射线对软组织内低密度异物的检出率为 70%。

四、结论：双能钼靶对软组织内低密度异物是一种有效且可行的方法，比传统 DR 有更好的检出率，为医生提供重要的参考信息，然而，钼靶也存在一点局限性，无法检测到肢体近端及深层组织的异物，可能需要结合其他影像学技术进行进一步检查。

PU-1450

Fischer 评分与 Kaiser 评分在磁共振乳腺肿块定性诊断中的价值比较

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目的：比较 Fischer 评分和 Kaiser 评分在磁共振乳腺肿块良恶性诊断中的价值。方法：回顾性分析 174 例乳腺肿块患者的术前动态增强 MRI 图像，所有病灶均经病理证实。两位影像医师在不知道病理结果的情况下分别按照 Fischer 评分和 Kaiser 评分规则对每个强化病灶进行评分。Fischer 评分 4 分及以上判定为恶性，而 Kaiser 评分 4 分以上判定为恶性。以病理结果为诊断金标准，计算并比较 Fischer 评分和 Kaiser 评分的敏感度、特异度及曲线下面积（area under curve, AUC）。结果：174 例女性患者共有 192 个乳腺肿块，其中恶性病灶 85 个，恶性率为 44.3%。Fischer 评分诊断乳腺恶性肿瘤的敏感度、特异度、AUC 分别为 92.9%、65.4%、0.909。Kaiser 评分诊断的敏感度、特异度、分别为 94.1%、90.7%、0.932。相对于 Fischer 评分，Kaiser 评分诊断的特异度明显提高（ $P<0.001$ ），而敏感度和曲线下面积无明显统计学差异（ $P>0.99$ ， $P>0.99$ ）。结论：Fischer 评分和 Kaiser 评分诊断乳腺恶性肿瘤的敏感度均较高，但 Kaiser 评分诊断的特异度更高，可以作为优选辅助决策手段用于判断 MRI 乳腺肿块的良恶性。

PU-1451

针对性指导及预感受在钼靶检查中的实际应用效果

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摘要：乳腺钼靶筛查使乳腺癌患者死亡率降低约 20% ([1]) 在乳腺钙化，特别是沙砾样钙化的检出率方面，乳腺钼靶明显优于超声。精准医疗，影像先行。精准影像，技术先行。现阶段加强医疗服务人文关怀并构建和谐医患关系，是新时代健康中国的战略要求。

目的：探讨如何提高乳腺钼靶检查的成功率，减少投诉事件，改善患者就诊体验。

方法：一.首先解决患者的潜在心理困扰。患者提交申请单进行登记时，填写一张检查问卷调查表，请患者勾选需要了解的内容，包括①是否接受过钼靶检查②辐射剂量的大小③检查的最佳时间④摄影压迫的目的⑤疼痛感等等。

二.进行预感受体验。任何的言语沟通，均不如实际感受。在正式检查前，技师在检查平台放置一 EVA 材质的缓冲垫，嘱患者单手至于其上，操作压迫器缓慢下压，令其感受大致压力，使患者有一个明确的预感受和心理阈值，从而消除检查中的恐惧感。

采用机型: GE Senographe Ds 全视野数字化系统乳腺 X 光机

检查过程: 在严格做好患者隐私保护及辐射防护的前提下, 常规采用头尾位+内外斜位, 应用 AOP 自动曝光模式, 在每次 AOP 模式曝光开始之前, 先执行一次短暂的吸收测量曝光, 以确定要进行检查的乳房的厚度和密度。这一过程获得的信息同操作者设置的曝光优先模式一起, 可以使曝光参数最优化。而后进行正式曝光, 使用轨/滤波器/kV/mAs 设置可以在用户选定的曝光优先模式下实现最低的曝光剂量。每人检查结束后, 行乳腺压迫板和检查台的清洁。

结果: 常规检查前, 通过填写问卷调查表及采取预感受措施, 在检查成功率明显提高的同时, 极大的降低了因沟通及检查过程压痛造成的投诉事件。

结论: 填写问卷调查表可使技师快速的了解受检者的疑惑和需求, 从而进行针对性的指导与沟通。预感受可积极有效的降低患者的恐惧感并提高配合度, 从而提高检查成功率及就诊体验。

PU-1452

弥散加权成像与体素内不相干运动对乳腺癌 HER-2 阳性表达的预测价值

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目的 探讨弥散加权成像 (DWI) 及体素内不相干运动 (IVIM) 对乳腺癌 HER-2 阳性表达的预测价值。方法 回顾性分析 44 例经病理证实的乳腺癌病灶, 术前行 3.0T 磁共振常规平扫、DWI、IVIM、增强扫描, 测量病灶的常规 ADC 值 (B 值为 1000) 及 IVIM 定量参数 standard ADC、D (slow ADC)、D*(fast ADC)、f (fraction) 值。根据 HER-2 表达分成 HER-2 阳性表达组及 HER-2 阴性表达组。分析常规 ADC 值及 IVIM 定量参数在分组中的差异。结果 所有患者均为女性, 年龄范围 28-68 岁, 中位年龄 46 岁。44 例病灶中 HER-2 阳性 18 例, 阴性 26 例。病灶处的常规 ADC 值及 IVIM 定量参数 standard ADC、D 值在分组中差异有统计学意义。结论 常规 ADC 值及 IVIM 定量参数 standard ADC、D 值对乳腺癌 HER-2 阳性表达具有潜在的预测价值。

PU-1453

乳腺错构瘤 1 例

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患者 女, 36 岁。因发现左乳肿块 7 年入院, 7 年间左乳肿块逐渐增大。实验室检查示: 三大常规未见明显异常。CT 增强检查示: 左乳内象限可见一肿块灶, 形态规则, 边界清晰, 大部分为脂肪密度, 其内可见多发强化结节灶 (图 1)。MRI 示: 左乳内象限可见一脂肪信号肿块, 其内可见多发结节, 增强后结节强化与乳腺腺体强化一致 (图 2-4)。诊断为乳腺错构瘤可能。

PU-1454

动态增强磁共振定量分析在评估 乳腺癌乳头受侵中的应用价值

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目的 探讨动态增强磁共振（DCE-MRI）定量分析在评估乳腺癌乳头受侵中的价值。

方法 选取 2019 年 1 月至 2022 年 1 月杭州市中医院确诊乳腺癌并侵及乳头的患者 21 例（乳头阳性组）以及乳腺癌未侵及乳头且另一侧乳腺无明显病变的患者 40 例（乳头阴性组）。所有患者均行 DCE-MRI 检查，测量两组患者乳头及乳腺癌原发灶的血流动力学参数，包括渗透性参数容量转移常数（K_{trans}）、速率常数（K_{ep}）、血浆空间容积分数（V_p）；采用多因素 logistic 回归分析筛选出预测乳头受侵的危险因素，绘制 ROC 曲线分析血流动力学参数预测乳腺癌乳头受侵的效能。

结果 乳头阳性组患者 K_{trans}、K_{ep}、V_p 均明显高于乳头阴性组患者（均 $P < 0.05$ ），受侵乳头与乳腺癌病灶的 K_{trans} 呈正相关（ $r = 0.737$ ， $P < 0.05$ ）。K_{ep}（OR=7.354，95%CI: 1.369~39.512， $P < 0.05$ ）、V_p（OR=4.023，95%CI: 1.113~14.534， $P < 0.05$ ）是判断乳头受侵的危险因素，预测乳头受侵的效能 AUC 为 0.84，灵敏度及特异度均为 0.762。

结论 DCE-MRI 定量分析在鉴别乳腺癌患者乳头有无受侵中具有一定的应用价值，其中 K_{ep}、V_p 预测乳腺癌侵及乳头具有较好的效能。

PU-1455

基于多模态影像学特征预测导管原位癌病理升级

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目标：我们旨在基于术前乳腺 MRI 和乳腺钼靶技术，为确诊为原位导管癌（DCIS）的女性开发一个预测模型，从而预测病情升级的可能性。此外，为了在决定患者是否需要腋窝淋巴结清扫（ALND）或前哨淋巴结活检（SLNB）时提供临床帮助。

方法：本研究对象为连续一系列经活检证实为 DCIS 的女性，她们在 2018 年 12 月至 2023 年 4 月间接受了术前 3.0-T 乳腺 MRI 检查，包括动态增强（DCE）MRI 和弥散加权成像（DWI）、乳腺钼靶，并且在术后病理诊断为单纯 DCIS 和侵袭性 DCIS。我们收集了多模态影像学特征、临床资料和病理数据，并使用多变量 Logistic 回归来开发和验证用于预测病情升级的模型。

结果：在训练集的 203 名女性中（平均年龄：52 ± 9 岁），有 71 名（35%）在手术后被升级。相似地，在验证集的 87 名女性中（平均年龄：53 ± 11 岁），有 35 名（40%）手术后被升级。该预测模型整合了 DWI、乳腺 X 线摄影和临床病理因素，对于开发集的受试者工作特性曲线下的面积为 0.85（95% CI: 0.79-0.90），而对于验证集为 0.78（95% CI: 0.70-0.84）。模型对于侵袭性癌症的预测概率表现出了值得称赞的观察者之间的一致性，其内部类相关系数为 0.809。其阳性预测值为 77.1%，而阴性预测值为 87.2%。

结论：基于弥散加权乳腺 MRI、乳腺钼靶摄影和临床病理因素的预测模型成功识别了有高升级风险的女性。

PU-1456

三阴性乳腺癌 X 线征象与腋窝淋巴结转移的相关性分析

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目的：探讨三阴性乳腺癌（triple-negative breast cancer, TNBC）患者腋窝淋巴结转移与乳腺 X 线影像征象之间的关系，分析 TNBC 腋窝淋巴结转移的危险因素。

方法：回顾性分析 2016 年 10 月—2023 年 4 月经病理学检查证实为 TNBC 的 163 例女性患者的临床病理资料。根据病理结果，分为腋下淋巴结转移组（55 例）和腋下淋巴结未转移组（108 例）。所有病例术前均行常规乳腺 X 线检查，并且检查前均未接受过任何抗肿瘤治疗。比较两组 TNBC

病灶 X 线征象 (如腺体类型, 肿块的大小、密度、形态、边缘、是否伴有钙化, 有无伴随征象及腋窝淋巴结 X 线表现) 的差异, 采用单因素及二元 logistic 回归分析 TNBC 病灶 X 线征象与腋窝淋巴结转移的相关性及其危险因素。

结果: 单因素分析显示, 两组间肿块的大小、形态、边缘、是否伴有钙化, 有无伴随征象, 腋窝淋巴结 X 线表现差异具有统计学意义, 与腋窝淋巴结转移具有相关性 ($P < 0.05$); logistic 回归分析显示, 肿块伴钙化 ($OR=5.271, P < 0.001$)、肿块形状不规则 ($OR=5.551, P=0.016$)、腋窝淋巴结 X 线阳性 ($OR=10.717, P < 0.001$) 是 TNBC 腋窝淋巴结转移的独立危险因素。

结论: 肿块形态不规则、肿块伴有钙化、腋窝淋巴结 X 线阳性对 TNBC 患者腋窝淋巴结转移有提示作用。

PU-1457

Giant right Breast Hamartoma with bilateral Breast Solid Papillary Carcinoma: A Rare Case Report

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Background: Breast hamartoma is a rare benign breast lesion, while solid papillary carcinoma (SPC) of the breast is an uncommon form of breast cancer. Case report: We present an extremely rare case of a 63-year-old female with a giant hamartoma in the right breast and concomitant bilateral breast solid papillary carcinoma. Mammography and Magnetic resonance imaging (MRI) revealed a giant mass in the upper outer quadrant of the right breast, as well as well-defined masses behind both nipples, along with ductal ectasia in the right breast. The patient underwent surgical resection of the three lesions, and histological examination confirmed the diagnosis of the right breast hamartoma with bilateral breast solid papillary carcinoma. Conclusion: This case represents the first reported instance of bilateral solid papillary carcinoma (SPC) in association with a concurrent breast hamartoma. The findings of this study emphasize that the presence of a breast hamartoma does not exclude the possibility of malignant lesions originating from it. It highlights the importance of thorough evaluation and consideration of malignancy in cases involving breast hamartomas.

PU-1458

乳腺转移性恶性肿瘤的 MRI 表现

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【摘要】目的 探讨乳腺转移性恶性肿瘤(metastatic malignant tumor of the breast, MMTB)的 MRI 表现。方法 选取经手术病理证实的 6 例 MMTB 的 MRI 及临床资料, 回顾性分析 MMTB 的 MRI 影像特点。结果 6 例 MMTB 的 MRI 表现: 2 例表现为右乳单发转移瘤, 2 例表现为双乳多发转移瘤, 均环状强化, 边界清楚; 2 例表现为右乳广泛转移, 部分病灶相互融合, 明显片状强化, 边界不清。6 例 DWI 呈高信号, 动态增强扫描 TIC 曲线多为流出型, 少部分为平台型。结论 乳腺转移性恶性肿瘤 MRI 表现具有一定的特征, 主要有两大类: 一类表现为单发或多发转移瘤, 边界清楚, 明显环状强化; 一类表现为腺体广泛受累, 明显强化, 边界不清; DWI 均弥散受限, TIC 曲线大部分为流出型。

PU-1459

基于多参数 MRI 的全自动深度学习管道预测乳腺癌新辅助化疗病理完全缓解：一项多中心、前瞻性研究

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目的：开发并验证基于多参数 MRI 的全自动深度学习管道（fully automated deep learning pipeline, FADLP）在乳腺癌新辅助化疗（neoadjuvant chemotherapy, NAC）病理完全缓解（pathological complete response, pCR）预测中的价值，并进一步探讨其 pCR 预测的生物学基础。

方法：该研究共纳入全国 7 家医院共 1861 例在 NAC 前行 MRI 检查的乳腺癌患者，分为训练集、内部测试集、合并外部测试集和前瞻性测试集。FADLP 利用多参数 MRI（T2WI、DWI、CE-T1WI）进行训练，其中分割模型由 U-Net 网络和边缘感知上下文神经网络构成，利用 Dice 系数评价分割性能；pCR 预测模型是由 ResNet101、ResNeXt101 和 DenseNet121 三个网络并联组合而成，三个网络在同一数据集上单独训练，最后取三个序列在三个网络中预测得分的平均值作为 pCR 的预测概率。另外，该模型的预测表现与单一序列模型进行比较。利用 AUC、准确度、敏感度、特异度和热图评价分类模型的表现。为探究深度学习在 pCR 预测中的生物学基础，该研究对 12 名乳腺癌患者的 RNA 测序数据进行基因分析。

结果：FADLP 的 pCR 预测效能优于单一序列预测模型，在内部测试集、合并外部测试集和前瞻性测试集中的 AUC 分别为 0.868、0.891、0.986。另外，其在 HER2+和三阴性乳腺癌数据集上也取得较好的表现，AUC 分别为 0.857 和 0.850。在生物学基础探究中发现高深度学习分数与免疫反应途径的上调和微环境中抗肿瘤免疫细胞浸润的促进相关。

结论：多参数 MRI 的 FADLP 为乳腺癌患者 NAC 后 pCR 的早期预测提供一种自动、无创、可靠的工具。另外，深度学习预测 pCR 的生物学基础可能与免疫反应途径的上调和肿瘤微环境中抗肿瘤免疫细胞浸润的促进有关。

PU-1460

乳腺单纯钙化病灶 X 线检查 BI-RADS 分类的量化评分研究

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目的 探讨基于 X 线检查 BI-RADS 分类的量化评分方法在乳腺单纯钙化病灶良恶性风险评估中的应用价值。方法 回顾性分析 311 处乳腺单纯钙化病灶的 X 线及超声影像征象，将其 X 线征象的钙化形态、钙化分布分别作为评分指标并进行赋值，计算每处钙化的总分，并根据设定的 BI-RADS 2~5 类的各类分值界限进行最终的 BI-RADS 分类。绘制 ROC 曲线，寻找最佳诊断分值界限。结果 311 处乳腺钙化病灶中良性钙化 266 处，恶性钙化 45 处；乳腺超声恶性钙化漏诊率约 17.78%（8/45）。ROC 曲线下面积为 0.949，标准误为 0.012， $P < 0.001$ ，95%置信区间为（0.925，0.973）。以总分 2.5 分为最佳诊断临界值，其灵敏度、特异度、约登指数分别为 100%、80.45%、0.805。BI-RADS 2、3、4a、4b、4c、5 类的恶性构成比分别为 0%、21.05%、25.00%、60.71%、66.67%、75.00%。结论 基于乳腺 X 线单纯钙化 BI-RADS 分类的量化评分方法可行性大，对乳腺单纯钙化的良恶性风险评估有较高的准确度，以 BI-RADS 2 类和 4C 类符合度较高，有助于 BI-RADS 分类的推广应用。

PU-1461

乳腺 MRI 非肿块病变内微小囊肿征—影像与病理对照研究

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目的：探讨乳腺磁共振成像 (Magnetic resonance imaging, MRI) 上非肿块病变 (non-mass enhancement, NME) 内微小囊肿征的诊断价值及其病理基础。

方法：回顾性分析 2014 年 12 月至 2017 年 5 月期间我院乳腺 MRI 检查中诊断为可疑恶性的单纯 NME 病例 218 例，其中 26 例微小囊肿征阳性，即病灶内可见成簇或散在的微小囊肿。28 例中，19 例在我院经手术病理证实的病例纳入分析，测量病灶的表观扩散系数 (apparent diffusion coefficient, ADC) 及时间-信号强度曲线 (time-signal intensity curve, TIC)，分析良恶性病灶临床特征、影像特征及病理表现。

结果：乳腺 MRI 上单纯 NME 病灶中，微小囊肿征出现率为 11.9% (26/218)。19 例取得手术病理结果病例中，13 例为良性病变，6 例为恶性病变，该征象的阴性预测值为 68.4% (13/19)。当年龄阈值取 ≥ 45 岁时，年龄对于此类病变的良恶性诊断准确率为 84.2% (16/19)。乳腺 MRI 上，良性组及恶性组病灶 ADC 值平均值分别为 $1.28 \times 10^{-3} \text{ mm}^2/\text{s}$ 及 $1.26 \times 10^{-3} \text{ mm}^2/\text{s}$ ，差异无统计学意义 ($P = 0.683$)。良性组中，TIC 为上升型者 10 例 (76.9%, 10/13)，平台型或流出型 3 例 (23.1%, 3/13)，恶性组中，上升型 3 例 (50%, 3/6)，平台型 3 例 (50%, 3/6)，良恶性两组差异无统计学意义 ($P = 0.320$)。19 例中，15 例患者在我院乳腺 X 线摄影检查，结果显示，良性病变中均未见可疑微钙化，而 80% (4/5) 的恶性病变中，均可见可疑微钙化。病理镜下分析显示，良性导管扩张及囊肿见于 13 例良性病变中以及 3 例非粉刺型导管原位癌周围伴随的良性病变区域中。肿瘤性导管扩张伴出血见于 3 例粉刺型导管原位癌中。

结论 乳腺 MRI 上单纯 NME 病例中，微小囊肿征出现率为 11.9%，多见于良性病灶。患者年龄 ≥ 45 岁或乳腺 X 线摄影上可见可疑微钙化时恶性风险增加，需要进行病理活检。

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乳腺癌新辅助化疗后放射学完全缓解与病理学完全缓解的对照研究

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目的 比较并分析乳腺癌患者术前新辅助化疗后 MR 图像上的完全缓解 (rCR) 与术后病理学完全缓解 (pCR) 的一致性及其差异。方法 回顾性分析我院 2021 年 1 月-2022 年 12 月行术前新辅助化疗并达到 rCR 的 56 例患者资料，分析临床表现、MR 图像及病理资料。将其中 45 例术后病理完全缓解 (pCR) 归为“pCR 组”；11 例术后病理证实有癌灶残留归为“假阴性组”。结果 两组患者在年龄、雌激素受体(ER)、孕激素受体(PR)、人表皮生长因子受体-2(Her-2) 差异没有统计学意义。新辅助化疗前 DCE-MRI 扫描中有 37 例呈肿块样强化，其中 5 例 (5/37, 13.5%) 术后病理证实有癌灶残留为假阴性；19 例呈非肿块样强化，其中 6 例 (6/19, 31.5%) 术后病理证实为假阴性，强化方式之间的差异有统计学意义 ($P < 0.05$)。新辅助化疗前乳腺 X 线图像中有 20 例存在可疑恶性钙化灶，7 例 (7/20, 35%) 术后证实为假阴性；36 例没有可疑恶性钙化灶，4 例 (4/36, 11.1%) 术后病理证实为假阴性，差异有统计学意义 ($P < 0.05$)。结论 乳腺癌新辅助化疗后 MR 图像的完全缓解并不等同于病理学完全缓解；新辅助化疗前乳腺癌非肿块样强化特征及 X 线图像上有可疑恶性钙化灶的征象是引起新辅助化疗后 rCR 与 pCR 不一致的重要因素。

PU-1463

对比增强能谱乳腺 X 线摄影的临床应用

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目的: 探讨分析对比增强能谱乳腺 X 线摄影 (contrast-enhanced spectral mammography, CESM) 对 BI-RADS 4/5 乳腺病灶的诊断效能, 以减少不必要的活检。

方法: 回顾性收集 2023 年 1 月—2023 年 8 月 乳腺患者 45 例, 共 47 个 BI-RADS 4/5 病灶。所有纳入患者均为女性, 年龄 28~71 岁, 平均年龄 (51.7±8.6) 岁。在常规影像学检查(乳房 X 线摄影、数字乳腺断层合成摄影技术和乳腺超声)中发现 BIRADS 4/5 病灶后, 进一步进行对比增强能谱乳腺 X 线摄影。采用美国 GE 公司的 Senographe 全数字化乳腺机, 对比剂采用碘佛醇注射液 (每 100 mL 含碘 32 mg), 剂量为 1.5 mL/kg, 流率为 2.8~3.0 mL/s, 经高压注射器注入上臂静脉, 注射完成约 2 min 后进行摄影检查。按常规乳腺摄影时的压迫方法, 进行头尾位和内外斜位摄影, 5 min 内完成左右双侧共 4 次图像的采集工作, 必要时可加摄辅助位, 每个摄影体位可获得低能图及减影图 2 张图像。对所有病灶进行组织病理学相关性分析。图像由两名接受过乳腺成像 BI-RADS 分类培训的放射诊断医生独立评估。对 CESM、BI-RADS 评分和每个病灶的组织病理学进行分析, 并使用卡方/fisher 精确检验进行统计学意义检验。

结果: 本研究纳入了 45 例患者的 47 个病灶, 均为女性, 平均年龄。在 CESM 上, 9 个(20.8%)病灶未显示强化, 被归类为 BI-RADS 4A, 病理证实是良性。其余 38 个增强病灶中, 恶性 31 个 (81.6%), 良性 7 个 (18.4%) ($p < 0.05$)。CESM 检测到 3 个在常规影像学检查中未被发现的病灶, 病理证实为恶性。

结论: CESM 可有效评估 BIRADS 4/5 病灶, 减少不必要的活检, CESM 还提高了潜在恶性病灶的检出率, 为治疗策略提供更多的信息。

PU-1464

基于乳腺 MRI 影像学特征预测乳腺癌的分子分型

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目的: 通过分析乳腺癌的乳腺增强 MRI 的图像特征, 研究其预测乳腺癌分子分型的潜在可能。

材料和方法: 收集我院 2016-2022 年手术病理证实为乳腺癌的女性患者 305 例, 所有患者术前均行乳腺磁共振动态增强检查和弥散加权成像, 且病理及免疫组化指标数据齐全。患者患侧乳腺无除乳腺癌外其他疾病。

结果: 经统计, 305 例乳腺癌患者中, Luminal A 型 56 例(18.4%), Luminal B 型 124 例(40.7%), 三阴性 74 例(24.3%), HER-2 过表达型 51 例(16.7%)。在 MRI 形态特征上, 三阴性乳腺癌以环形强化为主, 多呈卵圆形; Luminal A 型、Luminal B 型则较多见不均匀强化, 不规则形、HER-2 过表达型多表现为不均匀强化、卵圆形; 乳腺癌肿块形态及内部强化特征在不同分子亚型间差异有统计学意义($P < 0.05$); MRI 血流动力学方面, 三阴性乳腺癌的早期强化程度表现为“快速”的比例高于其他亚型, 乳腺癌四种分子亚型的延迟期 TIC 曲线以 II 型、III 型为主, 其中以 II 型较多见, 乳腺癌不同分子亚型的早期强化程度、延迟期 TIC 曲线类型无统计学差异($P > 0.05$)。

结论: 乳腺癌 MRI 成像的部分特征在不同分子分型间存在差异, 对于预测乳腺癌分子分型有一定的预测作用。

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幼年型纤维腺瘤影像学诊断及鉴别

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目的 提高对幼年型乳腺巨大纤维腺瘤 (FA) 超声、平扫 CT 及动态增强磁共振 (MRI) 诊断的认识。**材料与方法** 回顾性分析 8 例经手术病理证实的幼年型 FA 患者的临床资料及影像表现。结果 8 例幼年型 FA 均为青少年女性, 年龄 11-15 岁, 平均 12.88 ± 1.13 岁。7 例单发, 1 例为双乳多发。共 10 个病灶, 位于左乳 2 个, 右乳 8 个。肿块生长迅速, 瘤体较大, 大小约 $4 \times 2.5 \text{cm} - 11.1 \times 9.6 \text{cm}$ 之间。临床表现为患侧乳房于 2-8 个月内明显增大, 乳房内扪及圆形、类圆形巨大肿块, 质硬, 活动度差。乳腺超声检查示病变乳房内巨大边界清楚的分叶状肿块, 回声不均, CDFI 内见血流信号, 平均阻力指数 (RI) 0.6。超声 BI-RADS 分类 3-4A 类。术前胸部平扫 CT 时可见病变乳腺内密度均匀肿块, 平均 CT 值 31HU, 与正常乳腺腺体分界不清。乳腺动态 MRI 特点: (1) 单侧发病患者双侧乳腺明显不对称, 病灶体积较大, 几乎占据整个乳腺, 腺体组织受压变菲薄, 边界较清; (2) 增强后病灶强化明显, 8 例病灶内部出现低信号分隔; (3) 7 例病灶时间-信号强度曲线 (TIC) 呈 I 型, 2 例病灶 TIC 呈 II 型, 1 例 TIC 呈 III 型, 均不伴有腋窝淋巴结增大; (4) DWI 图像上测得 ADC 值介于 $1.38 - 1.62 \text{ mm}^2/\text{s}$ 之间, 平均值为 $1.5 \pm 0.15 \text{ mm}^2/\text{s}$ 。乳腺 MRI 结果 BI-RADS 分类均为 3 类。手术病理结果镜下显示纤维上皮性肿瘤, 导管上皮增生明显, 间质细胞丰富, 符合幼年型 FA。结论幼年型 FA 临床表现和影像表现有其特殊性, MRI 对病灶的显示明显优于乳腺 X 线、超声和 CT 等影像学检查方法。影像诊断应密切结合临床资料。本病需与致密型乳腺、青春期乳腺肥大及乳腺叶状肿瘤相鉴别, 仔细观察病变的形态及影像特点, 特别是单侧乳房发病的少女, 应不难鉴别。

PU-1466

数字乳腺断层摄影辐射剂量与乳腺压迫厚度及密度相关性研究

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目的: 数字乳腺断层摄影 (digital breast tomosynthesis, DBT) 技术是一种通过乳腺 X 线平板探测器而发展出来的新型技术手段。DBT 成像是一种通过快速采集一系列不同角度低剂量的乳腺曝光图像, 并将其重建为三维多层面乳腺影像的高级成像技术。它可以帮助医生更精确地检测和诊断乳腺疾病, 同时减少患者暴露在辐射下的时间和剂量。同时, DBT 成像还可以提升诊断准确性和检出率, 为患者提供更准确、可靠的诊断结果。本研究旨在探讨数字乳腺断层摄影平均腺体剂量 (average gland dose, AGD) 与乳腺压迫厚度、密度之间的关系, 加深对数字乳腺断层摄影辐射剂量变化规律的认知, 有助于更好地评估患者的辐射风险并优化成像参数, 从而最大限度地保障患者安全。**方法:** 回顾性分析 440 位同时接受全视野数字化乳腺摄影 (full-field digital mammography, FFDM) 和 DBT 双乳检查的患者资料。记录双侧乳腺摄影在 CC 和 MLO 体位的管电压 (kV)、管电流量 (mAs)、压迫厚度、压力、平均腺体剂量、乳腺腺体分型。用方差分析来比较不同采集组合方式的 AGD, 用 t 检验来进行相同腺体类型的组间配对比较。用 Pearson 线性相关分析 AGD 和压迫厚度之间的关系。**结果:** 不同乳腺密度分型患者之间的 AGD 值不存在显著性差异 ($p > 0.05$, $r = 4$); 不同乳腺压迫厚度组的患者在乳腺辐射剂量之间存在显著性差异 ($P < 0.05$, $r = 5$)。结论: 压迫厚度对 AGD 的影响远远高于乳腺密度, 在乳腺密度不变的条件下减小乳腺压迫厚度对降低 AGD 有积极作用。这说明在乳腺密度固定的情况下调整压迫厚度可能是改变 AGD 的有效途径。

PU-1467

1 例 3D 打印个性化组织补偿膜在乳腺癌放疗中的应用

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目的 在乳腺癌放疗中，由于剂量建成效应的影响，靶区剂量因皮肤厚度不足而达不到需放射剂量，故需要组织补偿膜提高照射剂量，传统组织补偿膜存在以下缺点：①厚度均匀②形状固定；导致一下问题①靶区照射剂量不均匀②危及其他组织器官。故本篇个例报告将 3D 打印个性化组织补偿膜应用于乳腺癌放疗中，为 3D 打印组织补偿膜在临床中的广泛应用提供参考。方法 一、设计 3D 打印个性化组织补偿膜：①采集 1 例乳腺癌根治术患者的 CT 数据（患者年龄 45 岁，女，右乳房行乳腺癌根治术，无硅胶过敏等且符合其他纳入标准），②将患者 CT 数据导入 Mimics21.0 建模软件重建出患者皮肤②在 Mimics21.0 中根据放疗计划设计贴合患者皮肤且厚度个性化的组织补偿膜③在 Mimics21.0 进行布尔操作：利用实心长方体减去设计好的个性化组织补偿膜得到个性化组织补偿物翻模、并设计翻模顶和翻模底及注料管。二、制作 3D 打印个性化组织补偿膜：①将个性化组织补偿膜的翻模导入 3D 打印机打印出实物②将硅胶注入注料管待其冷却成型得到硅胶材质的个性化组织补偿膜。三、进行放疗计划：①在此 3D 打印个性化组织补偿膜辅助下进行放疗计划，靶区照射剂量为 DT46~66Gy，采用 TPS 设计 IMRT 计划。三、收集数据：收集 PTV 剂量学参数，计算均匀性指数（HI）、适形度指数（CI），评估该 3D 打印组织补偿膜的剂量参数指标。结果 HI 为 0.10，CI 为 0.84，HI 指数接近于 0，CI 指数接近于 1。（HI 的值越接近 1，表示剂量分布越均匀；反之越不均匀；CI 的值越接近 0，表示剂量分布越均匀；反之越不均匀）结论 通过查阅文献比较传统组织补偿膜，3D 打印个性化组织补偿膜可以有效减小剂量建成效应的影响，提高靶区照射剂量，保护危机器官，靶区照射剂量和均匀性上相较于传统组织补偿膜有明显优势，再进行进一步的临床实验和严格的对照实验后，可以发现其更大的临床应用价值。

PU-1468

Comparative analysis of the diagnostic efficiency of FFDM and DBT for breast masses

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Purpose

To compare and analyze the diagnostic value of Full-Field Digital Mammography (FFDM) and Digital Breast Tomosynthesis (DBT) for breast masses.

Method

Retrospective analysis was performed on 160 patients with breast lesions who underwent both FFDM and DBT examination in Peking University Shenzhen Hospital from January 1, 2021 to December 31, 2021. Two radiologists with 2 and 4 years of mammographic diagnosis experience analyzed the images of FFDM and DBT combined with FFDM independently. They recorded the classification of breast, number of lesions, benign or malignant of lesions. The sensitivity, specificity and accuracy of FFDM, DBT combined with FFDM were compared with the pathological findings as the gold standard.

Results

The Kappa coefficient between two radiologists performed diagnosis by FFDM was 0.561, $P=0.042<0.05$. When comes to DBT combined with FFDM, the Kappa coefficient between them reached 0.931, $P=0.313>0.05$.

The sensitivities of FFDM and DBT combined with FFDM for the detection of breast lesions were 84.7% and 92.7%.

The specificities were 15.8% and 55.3%, and the accuracies were 69.7% and 84.6%, respectively.

There is no significant difference between FFDM and DBT combined with FFDM ($P=0.052>0.05$).

In dense breast, the accuracy of diagnosing breast tumors with DBT combined with FFDM is higher, there is a significant difference between them ($P=0.02<0.05$).

Conclusion

There was a statistically significant difference between the two radiologists performing diagnosis by FFDM, and the observation of lesions was different. When comes to DBT combined with FFDM, there was high consistency in their diagnostic results, and no statistical difference between them.

The sensitivity, specificity and accuracy of DBT combined with FFDM was significantly higher than FFDM. The accuracy of diagnosing tumors by DBT combined with FFDM is higher at different breast densities.

In conclusion, DBT combined with FFDM diagnosis improves the accuracy of breast masses diagnosis compared to FFDM alone.

PU-1469

妊娠相关乳腺癌的影像学表现

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摘要：目的：探讨妊娠相关乳腺癌的钼靶、磁共振及超声的影像学表现，以提高妊娠相关乳腺癌的影像诊断水平。方法：收集郑州大学第三附属医院 2017 年 6 月至 2019 年 3 月诊治的病理证实的妊娠相关乳腺癌病例 11 例，分析期乳腺钼靶、磁共振及超声表现。结果：乳腺 X 线表现：11 例 PABC 患者均为单侧病变，右侧 5 例，左侧 6 例，仅表现为不规则高密度肿块 5 例；3 例仅表现为钙化，其中 1 例线样分布细小多形性钙化，1 例段样（树杈样）分布细小多形性钙化，1 例区域分布细小多形及细线样钙化；另外 3 例表现为不规则高密度肿块伴可疑钙化；其中 5 例伴有同侧腋下淋巴结肿大，其中 1 例误诊为乳腺炎，分 4A 类；MRI 表现：因 PABC 特殊性，本组病例仅 2 例行 MRI 检查，其中 1 例表现为左乳肿块，呈长 T1 长 T2 信号影，边界不清，增强呈明显不均匀强化，DWI 呈高信号，ADC 值 $(0.995\pm0.097)\times10^{-3}\text{mm}^2/\text{s}$ ，时间-信号曲线呈流出型，可见左腋下淋巴结肿大；另一例表现为左乳外上象限肿块，长 T1 混杂长 T2 信号影，边界不清，增强呈明显不均匀强化，DWI 呈不均匀高信号，ADC 值 $(0.851\pm0.159)\times10^{-3}\text{mm}^2/\text{s}$ ；超声表现：11 例均表现为边界不清、形态不规则肿块影，10 例为低回声，一例为囊实性回声；2 例见点状高回声，1 例见典型“蟹足征”。CDFI：9 例可及血流信号；其中 2 例误诊为乳腺炎，分 4A 类。结论：MRI 对 PABC 具有一定的诊断价值，尤其对于哺乳期患者，其 MRI 表现具有相对特征性，影像科医师需认识该病的影像表现，对于妊娠、哺乳期合并的乳房肿块应意识到 PABC 的可能性，提高早期诊断率，协助临床制定合理治疗方案，提高患者生存率。

PU-1470

弥散加权成像在乳腺肿瘤鉴别中的应用价值

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目的: 探讨表观扩散系数(ADC)在乳腺肿瘤鉴别中的应用价值。方法: 回顾性分析经手术病理证实乳腺叶状瘤、纤维腺瘤及乳腺癌患者的病历资料, 其中叶状瘤 17 例[感兴趣区(ROI), $n = 171$], 纤维腺瘤 74 例 (ROI, $n = 94$)及 57 例乳腺癌(ROI, $n = 104$)。结果: 乳腺叶状瘤、纤维腺瘤及乳腺癌患者的 ADCmean、ADCmax、ADCmin 值差异有统计学意义。鉴别叶状瘤和纤维腺瘤的 adc 平均值为 $1.435 \times 10^{-3} \text{ mm}^2/\text{s}$, 鉴别叶状瘤和乳腺癌的 adc 平均值为 $1.100 \times 10^{-3} \text{ mm}^2/\text{s}$, 鉴别乳腺癌和纤维腺瘤的 adc 平均值为 $0.925 \times 10^{-3} \text{ mm}^2/\text{s}$ 。良性、交界性、恶性乳腺肿瘤的 ADCmean、ADCmax、ADCmin 值差异均有统计学意义。鉴别良性叶状瘤与交界性叶状瘤的 adc 平均值为 $1.215 \times 10^{-3} \text{ mm}^2/\text{s}$, 交界性叶状瘤与恶性叶状瘤的 adc 平均值为 $1.665 \times 10^{-3} \text{ mm}^2/\text{s}$ 。结论: 扩散加权成像(DWI)能提供定量信息, 有助于乳腺肿瘤的鉴别。

PU-1471

数字乳腺 X 线摄影(DM)与数字乳腺断层摄影(DBT)对致密型乳腺病变的诊断价值比较

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目的: 比较数字乳腺 X 线摄影(DM)与数字乳腺断层摄影(DBT)对致密型乳腺病变的诊断价值。方法: 回顾性收集我院 2022 年 1 月至 2023 年 5 月收治的致密型乳腺患者的临床资料。数字乳腺 X 线摄影(DM)设备采用吉特公司的 GIOTTO 乳腺机, 数字乳腺断层摄影(DBT), 设备采用西门子公司的 MAMMOMAT Inspiration 乳腺机, 全部病例均经活检或手术证实, 均具有完整临床病理资料, 共计 200 例患者入组本研究, 包括 286 个病灶, 其中良性病灶 160 个, 恶性病灶 126 个。所有影像资料包括双侧乳腺头尾位及内外侧斜位图像, 分别由两名高年资医生在诊断工作站上分别观察及评价 DM 和 DBT 图像, 并记录病灶检出情况、病灶影像学特征及 BI-RADS 分类结果。比较两者对病变的诊断准确率。结果: DBT 对致密型乳腺内病灶的敏感性为 63.3% [95% CI, 36.59% 至 81.73%], 特异性为 72.63% [95% CI, 58.26%]到 85.65%, 均高于 DM ($P < 0.05$); 结论: 数字乳腺断层摄影(DBT)对致密型乳腺内病灶的诊断准确性、特异性优于数字乳腺 X 线摄影(DM)。

PU-1472

Thyroid Tissue in the Breast

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A 54-year-old woman presented to the outpatient clinic with a history of progressive enlargement of a left breast mass which was initially discovered 6 months earlier. She reported no nipple discharge or painful swelling. Her medical history was notable for left thyroid adenoma which was treated with trans-areola endoscopic thyroidectomy 15 months ago. Computed tomography of the thorax revealed a mass shaped like a string of beads in the upper inner quadrant of the left breast (Panel A). The patient then received lumpectomy and histopathological examination revealed it was thyroid tissue (Panel B), which was supported by positive thyroglobulin (Panel C) and thyroid

transcription factor-1 (Panel D) staining. Ectopic thyroid tissue in the breast has not been reported yet and in this case was considered to be related to her previous endoscopic surgery. The patient was discharged one day after surgery and a repeated computed tomography performed 6 months later revealed no recurrence.

PU-1473

BI-RADS 分级和乳腺增生与全数字化乳腺摄影辐射剂量的相关性

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目的：乳腺癌已成为中国女性发病率首位的恶性肿瘤，使用全数字乳腺 X 线摄影早期筛查可有效降低乳腺癌的病死率。在数字乳腺摄影中，常用入射体表剂量（entrance surface dose, ESD）和平均腺体剂量（average gland dose, AGD）评估辐射剂量。本研究主要探讨 BI-RADS 分级和乳腺增生与辐射剂量的相关性。

方法：回顾性收集本院 2022 年 5 月至 2022 年 10 月接受全数字化乳腺 X 射线检查的女性受检者资料 254 例，按照年龄分为，<30 岁组、30~39 岁组、40~49 岁组、50~59 岁组、60~69 岁组、>70 岁组。摄影采用美国 GE 公司 Senographe DS 全数字化乳腺 X 线摄影机。检查前充分与患者沟通检查过程中的注意事项，获得患者最大程度的配合。检查时要求受检者完全暴露上半身，去除体表金属饰品或其他任何在照射野内的异物。参照乳腺诊断学评级标准设计受检者体位，对双乳进行双侧摄影，先摄 CC 位，再摄 MLO 位，压迫适当后采用自动摄影控制中的 Dose(剂量优先)/CNT（对比度优先）/STD（标准）模式或 Manual（手动）进行曝光，获取层次丰富、密度对比度良好且一致的图像。采用 SPSS 25.0 软件。符合正态分布的计量资料采用 $\bar{x} \pm s$ 表示；不符合正态分布的计量资料采用 M（Q1, Q3）表示。计数资料以例（%）表示。分别采用 Spearman 及 Kendall's tau-b 相关分析 AGD 和 ESD 与各分类变量之间的相关性。P<0.05 为差异有统计学意义。

结果：受检者不同年龄组间的辐射剂量 AGD 和 ESD 均有统计学差异（ $p<0.001$ ）；<30 岁年龄组的 ESD 均值最高，50~59 岁年龄组的 AGD 均值最高；BI-RADS 分级与辐射剂量 AGD 和 ESE 相关性无统计学意义（ $P>0.05$ ），增生与辐射剂量 AGD 和 ESE 有弱相关性（ $P<0.05$ ）。

结论：受检者年龄差异会影响 AGD 和 ESD，BI-RADS 分级不会影响 AGD 和 ESD，但乳腺增生会影响 AGD 和 ESD，因此，操作者应对年龄组别和乳腺增生的受检者更多给予辐射剂量关注。

PU-1474

磁共振 T1Mapping 序列在乳腺癌诊断的初步应用

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目的 对乳腺癌患者采用磁共振平扫 T1 Mapping 序列扫描，探讨 T1 Mapping 值与诊断乳腺癌各项参数的相关性。资料与方法 对 72 例乳腺肿物患者行常规乳腺平扫及动态增强磁共振检查，并于增强前加扫 T1 Mapping。在 T1 Mapping 序列相关研究中，排除 8 例不符合要求患者，最终分别纳入 64 例。分别测量患者肿瘤及对侧正常乳腺腺体组织的大小、ADC 值、Ktrans、Kep、Ve 及 T1 Mapping 值。分析两组 ADC 值、T1 值、Ktrans、Kep、Ve 值在各组间的差异，计算约登指数，获得鉴别诊断的最佳阈值。并分析乳腺癌组的 T1Mapping 值、Ktrans、Kep、Ve 值与肿瘤大小、ADC 值、Ki-67 表达水平之间的相关性。结果 乳腺癌 Ktrans、Kep、T1Mapping 值水平均

显著高于正常腺体组织 ($P<0.05$), 而 Ve 水平显著低于正常组 ($P<0.05$), 差异均具有统计学意义。 K_{trans} 、 K_{ep} 、 $T1Mapping$ 值诊断病灶的最佳界值为 0.2240、0.4150、1816.55。乳腺癌 $T1Mapping$ 与年龄、ADC 值、HER2+、KI-67 呈现弱正相关, 与 ER、PR 呈现弱负相关性, 均无统计学意义 (P 均 >0.05)。结论 乳腺癌平扫 $T1Mapping$ 可以为乳腺癌的诊断提供参考价值。乳腺癌与正常腺体组的 K_{trans} 、 K_{ep} 、 $T1Mapping$ 值水平均显著高于正常组织, 而 Ve 水平较低。

PU-1475

多参数磁共振定量分析乳腺癌瘤周脂肪

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目的: 探究乳腺多参数 MR 中乳腺癌患者瘤周脂肪的不同定量分析指标诊断效能。

方法: 本院乳腺癌患者 59 例, 基线前采用 3.0T MR (Ingenia, Philips Healthcare, Netherlands) 机器进行扫描, 采用 7 孔道乳腺线圈, 俯卧位, 将双侧乳腺垂直于乳腺线圈内。于动态增强序列前, 采用 mDixon Quant 序列反应甘油三酯含量。采用 DWI 序列反应乳腺病变及瘤周脂肪表观弥散系数。增强扫描以 0.1mmol/kg 体重、4~5 ml/s 流速静脉团状注射对比剂 Gd-DTPA, 动态增强扫描共 8 期, 每期 60s。图像分析采用 Intelligence Space Portal V7.0 工作站 (Philips Healthcare, Netherlands)。在工作站上拆解 DWI、ADC 图像, 将 ADC 图像以新序列形式传到工作站, 在动态增强第二期 (即肿瘤对比腺体显示最清楚的期相) 为定位, 采用 overlay 技术, 分别以增强第二期图像为本底, 叠加 ADC 图、mDixon Quant 序列图, 融合图像调整颜色及对比度, 在融合图像上, 采用半自动法绘制感兴趣区域 (ROI), 共选择瘤体本身 1 个, 瘤周脂肪 1 个, 正常侧腺体 1 个, 瘤侧正常脂肪 1 个, 正常侧脂肪 1 个, 共 5 或 6 个感兴趣区。肿瘤本身感兴趣区视肿瘤大小而定, 一般 1cm-5cm 不等, 在工作站自动勾画的基础上, 调整阈值, 使感兴趣区尽量覆盖住肿瘤。而其他感兴趣区, 因与周围组织缺乏对比, 大小可由调整阈值控制, 其他感兴趣区的大小均控制在 1.0 ± 0.1 cm。记录患者感兴趣区大小、增强信号、FF、 $T2^*$ 值、ADC。记录患者病理结果及浸润性级别。记录患者年龄、身高、体重等临床资料。采用 Wilcoxon 秩和检验分析各组患者 FF 值、ADC 值、 $T2^*$ 值的相关性。

结果: 乳腺癌患者瘤周脂肪 PDFF 较对侧乳腺脂肪显著减低、ADC 较对侧乳腺脂肪显著增高 ($P<0.05$)。高低级别组浸润性的瘤周脂肪的 ADC 及 PDFF 均有显著性差异 ($P<0.05$)。

初步结论: 通过多参数磁共振定量分析瘤周脂肪 FF 值、ADC 值具有较高的准确性和敏感性, 可提高乳腺癌诊断准确率。

PU-1476

乳腺断层融合摄影技术在三维立体导丝定位活检中的应用

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[摘要] 目的: 如何结合乳腺断层摄影技术, 使乳腺病变在三维立体导丝定位活检术中定位更精准, 更方便快捷, 解决临床上对隐匿性病变及临床触诊阴性的病变, 通过导丝引导进行精准切除活检及病理学检查, 可提高乳腺癌, 特别是早期乳腺癌的检出率, 及临床保乳手术的美观性。方法: 我院采用的是 FUJIFILM 星奕系列 3500 微剂量多功能数字乳腺摄影系统及其配套的断层融合三维立体定位系统进行钩丝定位。①高分辨模式: 唯一支持 50 μ m 高精度穿刺活检的设备, 保证穿刺的精确性。②快速流程模式: 减少活检工作时间, 用户可根据自己的需求切换模式。③隔室遥控拍摄: 可快速完成正负角度两次曝光。④智能安全警示: 仪器设定有安全界限, 保证操作的安全性。⑤智能

穿刺提示:只需在某一层次病灶最清晰的断层图像上选择 1 个目标点即可自动计算三维坐标并锁定目标,实现穿刺针的一键到位。⑥更多的可选靶点,有利于检查的全面性和操作的便捷性。⑦穿刺过程中图像可以跟原始图像随时对比,确定穿刺目标的准确性。⑧一键复位:穿刺后只要一键持针器可恢复至原来的位置。结果:断层融合三维立体定位系统引导下的勾丝定位活检术解决了外科医师对隐匿性病变、尤其是触诊不明显的钙化性病变的定位困难,使乳腺组织内可疑病变进行精准定位、术中可进行精准切检一步到位。可对乳腺微小病变,特别是当病灶尚不能被临床查体触及时,能够尽早发现并予以积极治疗可带来更好的预后。结论:只要影像技术上做到术前精准定位,就能为临床提供精准影像信息,精确指导临床在术中准确切除病灶及病理诊断,为患者最大限度地保留健康腺体组织,尤其是对于需行保乳术的患者,减小不必要的损伤,最大限度地保留乳腺临近正常腺体组织,最大限度地增加了保乳手术的术后美观性,满足乳腺癌患者对美的需求及面对生活的信心,提高患者的生活质量及幸福感。

PU-1477

对比增强乳腺 X 线摄影技术在乳腺肿块疾病中的应用

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[摘要] 目的:在绝大多数乳腺疾病中,乳腺肿块常常是主要的甚至是唯一的临床表现,其余的临床表现往往不典型,对于表现为局部结构增粗、扭曲,似有团片状纠集等因乳房内区域性腺体实质失去正常排列方式的结构紊乱的肿块类疾病,通过对比增强乳腺 X 线摄影这种简便可行的补充检查手段,更好地了解其血供情况并凸显其病灶形态,以提高乳腺癌检出的敏感性和诊断的准确性。方法:我院采用的是 FUJIFILM 星奕系列 3500 微剂量多功能数字乳腺摄影系统,其首创的 HCP 蜂窝状平板探测器,承袭了富士一贯追求的 50 μ m2800 万像素的高精度画质和高锐利度的优点,大大提高了对乳腺早期微小病变的显示能力。1 检查前的准备:1.1 患者准备:①向患者解释操作步骤并确保其没有碘对比剂过敏史,并告知碘对比剂的过敏反应,凡需增强检查的患者均需签署“知情同意书”;1.2 科室准备:①需要自动造影剂注射器②需要急救设施和推车;③护士必须参与检查。2 造影剂的注射 ①患者以坐姿注射造影剂;②注射速度:3mL/sec;③常规使用造影剂 300/350/370mg 碘/mL 均可检查。④注射常规控制 50S 内完成。3 注射造影剂后拍摄:①拍摄摆位时机:2 分钟的高峰期是最好的时机,并在 7 分钟内完成检查。②拍摄体位:摆位优先患侧。拍摄体位均为标准头尾位(CC)及内外斜位(MLO);③拍摄模式:选择自动曝光控制模式,保证曝光剂量一致进行曝光。结果:通过低能图和减影图的图像间接观察肿块及其血供情况,显示肿瘤组织内异常血管增生及代谢情况。对于表现为局部结构增粗、扭曲,似有团片状纠集等因乳房内区域性腺体实质失去正常排列方式的结构紊乱的肿块类疾病或浸润性癌在 CESM 上均有不同程度的强化。结论:对于可疑病变,结合 CESM 可以提高乳腺癌检出的敏感性和诊断的准确性,是一种安全、可靠且操作方法简单易行的检查技术,有望在临床上作为可疑乳腺癌的常规检查手段之一展开应用。

PU-1478

Comparison of ZOOMit DWI and Conventional DWI with the same geometric parameters at 3T in Breast Diseases

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Objective This study aims to evaluate the diagnostic performance of Z-DWI versus C-DWI with identical geometric parameters on breast MRI.

Materials & Methods In this retrospectively study, both Z-DWI and C-DWI were performed on a 3T MR scanner with the same geometric parameters. Two senior doctors assessed the image quality using a 5-point Likert scale. SNR, CNR and ADC values of the lesions were measured by two radiologists for comparison. For ADC diagnostic assessment, 81 patients were divided into group A (60 patients) and group B (21 patients). ROC curve analysis was used to determine the ADC cutoff values of group A's benign and malignant lesions. A junior doctor assessed group B's benign or malignant lesions using the cutoff values of ADC counted from group A.

Results 81 patients (mean age, 48.0 ± 10.1 years) were enrolled in this study. Z-DWI image scores were considerably higher than C-DWI image. The SNR and CNR in Z-DWI were both significantly higher than in C-DWI (77.72 ± 31.42 vs. 8.59 ± 3.16 , $P < 0.01$) and (50.75 ± 26.43 vs. 5.21 ± 3.04 , $P < 0.01$). The mean ADC values of benign and malignant lesions in Z-DWI were higher than those in C-DWI ($1.46 \times 10^{-3} \text{ mm}^2/\text{s}$ vs $1.37 \times 10^{-3} \text{ mm}^2/\text{s}$, $p < 0.01$) and ($0.87 \times 10^{-3} \text{ mm}^2/\text{s}$ vs. $0.83 \times 10^{-3} \text{ mm}^2/\text{s}$, $p < 0.01$). The AUC was 0.92 in both Z-DWI and C-DWI when using the cutoff values of ADC counted from group A.

Conclusion Z-DWI provides significantly higher image quality and lesion conspicuity than C-DWI, with the same geometric parameters.

Clinical relevance statement Z-DWI, improved the diagnostic efficiency of breast diseases, is a good substitution for C-DWI in Breast diagnosis with nearly the same acquisition time.

PU-1479

The role of diffusion kurtosis MR imaging in the evaluation of invasive breast cancer classification and its correlation with prognostic factors

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The present exploration is aimed to determine whether diffusion kurtosis imaging (DKI)-derived mean diffusivity (MD) and mean kurtosis (MK) are possible parameters for the invasive breast cancer grading and whether MD/MK is related to breast cancer clinical-pathologic factors including estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER-2) and Ki-67. Tumors from 108 invasive breast carcinoma patients (45.6 ± 11.2 years old; range, 20-84 years), diagnosed by pathological examination between January 2016 and August 2017, were included. DKI data (with b values of 0, 1000, 2000 sec/mm^2) were acquired and MD/MK were measured. The expression of ER, PR, HER-2, and Ki-67 was evaluated by immunohistochemistry. It was found that MD were significantly lower in grade III breast cancer than in grade II breast cancer ($P < 0.01$), while MK were significantly higher in grade III breast cancer than that in grade II breast cancer ($P < 0.05$). In addition, MD was negatively associated with Ki-67 level ($r = -0.39$, $P < 0.05$), while MK was positively associated with Ki-67 level ($r = 0.56$, $P < 0.05$). Furthermore, MD was positively associated with the level of ER and PR, but not HER-2. These results demonstrate that DKI has value in the evaluation on the classification of invasive breast carcinoma. MD values were associated with breast cancer

clinical-pathologic factors. DKI can provide useful information in the assessment of tumor proliferation activity.

PU-1480

IVIM 参数与乳腺癌免疫因子 ER、PR、HER-2、Ki-67 的相关性研究

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目的：探讨体素内不相关运动 (IVIM) 模型参数与乳腺癌雌激素受体 (EER)、孕激素受体 (PR)、人表皮生长因子受体-2 (HER-2) 和增殖标志物 Ki-67 表达相关性。

方法：选取 2015 年 8 月到 2018 年 8 月期间在我院接受治疗的乳腺癌患者 90 例，均进行常规 T2WI 脂肪抑制序列、T1WI、弥散加权成像 (DWI)、动态对比增强磁共振成像 (DCE-MRI) 扫描和 IVIM 科研序列的扫描，采用相关软件计算表观扩散系数 (ADC)、单纯扩散系数 (D)、假性扩散系数 (D*)、灌注分数 (f) 等参数，检测所有患者肿瘤组织中的 ER、PR、HER-2、Ki-67 表达情况。

结果：90 例患者中，ER 患者阳性 73 例，占 81.92%，阴性 17 例，占 18.08%；PR 患者阳性 70 例，占 77.78%，阴性 20 例，占 22.22%；HER-2 阳性 33 例，占 36.67%，阴性 57 例，占 63.33%；Ki-67 阳性 59 例，占 65.56%，阴性 31 例，占 34.44%。ER、PR 阳性表达与阴性表达之间的 ADC 值、D 值、D*值、f 值比较无统计学差异 ($P>0.05$)，HER-2 阳性表达与阴性表达之间的 ADC 值、f 值比较无统计学差异 ($P>0.05$)，HER-2 阳性表达的 D 值、D*值高于 HER-2 阴性表达的 D 值、D*值 ($P<0.05$)；Ki-67 阳性表达与阴性表达之间的 D*值和 f 值比较无统计学差异 ($P>0.05$)，Ki-67 阳性表达的 ADC 值、D 值低于 Ki-67 阴性表达的 ADC 值、D 值 ($P<0.05$)。Spearman 相关分析结果：ADC 与 ER 因子表达情况呈负相关，D 值与 HER-2 因子呈正相关，D 值与 Ki-67 呈负相关；D*值与 HER-2 因子呈正相关 (均为 $P<0.05$)。

结论：根据 ADC 值、D 值、D*值在乳腺癌免疫因子 ER、HER-2 及 Ki-67 阴阳表达情况的组间差异，以及 ADC 值与 ER、D 值与 HER-2 和 Ki-67、D*值与 HER-2 表达情况的相关关系，提示 IVIM 参数可以有助于分析乳腺癌部分免疫因子的表达情况，进而分析患者的预后。

PU-1481

DKI 参数在乳腺癌病理分级及与免疫因子的相关性研究

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目的：评价 MR 扩散峰度成像 (DKI) 在乳腺癌病理分级中的应用及 DKI 参数与乳腺癌雌激素受体 (ER)、孕激素受体 (PR)、人表皮生长因子受体-2 (HER-2) 和增殖标志物 Ki-67 表达相关性。

方法：选取 2015 年 8 月到 2018 年 8 月期间在我院接受治疗的乳腺癌患者 108 例。所有患者术前行乳腺磁共振常规 T2WI 脂肪抑制序列、T1WI、弥散加权成像 (DWI)、动态对比增强磁共振成像 (DCE-MRI) 扫描以及基于 b 值为 0, 1000, 2000 sec/mm² 的 DKI 模型计算平均扩散率 (mean diffusivity, MD) 和扩散峰度平均值 (mean kurtosis, MK) 值。通过 SPSS 软件，应用 Spearman 分析上述参数值与乳腺癌病理分级及与 ER、PR、HER-2、Ki-67 的组间差异及相关性。

结果：108 例患者中，MD, MK 值在不同分级乳腺癌之间差异有统计学意义 ($P<0.05$)，III 型乳腺癌组 MK 值大于 II 型乳腺癌组，III 型乳腺癌组 MD 值小于 II 型乳腺癌组。在对 ER、PR、HER-2、Ki-67 阴阳表达情况组间的统计学分析发现，MD 值在 ER、PR、Ki-67 阴阳表达组间存在统计学差

异 ($P<0.05$)，MK 值仅在 Ki-67 阴阳表达组间存在显著统计学差异 ($P<0.05$)。Spearsman 相关分析显示，MD 值与病理分级呈负相关 ($r=-0.43$, $p<0.05$)，MK 值与病理分级呈正相关 ($r=0.48$, $p<0.05$)，MD 值与 Ki-67 表达呈负相关 ($r=-0.39$, $P<0.05$)，MK 值与 Ki-67 表达呈正相关 ($r=0.56$, $P<0.05$)。

结论：DKI 定量参数在评价乳腺癌分级方面有重要的应用价值，MD 值和 MK 值在部分免疫因子组间存在差异，并且与 Ki-67 表达存在一定的相关关系。DKI 在评估乳腺癌肿瘤细胞增殖活性方面可以提供有价值的信息，MD 值和 MK 值可以作为乳腺癌病理分级和预后因子表达的提示指标，从而可以间接评估乳腺癌的预后和治疗效果。

PU-1482

乳腺 X 线摄影深度学习联合临床特征列线图预测 HER-2 2+乳腺癌表达状态

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目的 建立基于术前乳房 X 线摄影 (MG) 深度学习联合临床特征列线图，并分析其预测 HER-2 2+乳腺癌表达状态的价值。方法 回顾性分析 265 例 HER-2 2+单发乳腺癌患者 MG 和临床资料，其中 93 例 HER-2 阳性、172 例 HER-2 阴性。按照 8: 2 比例将所有患者分为训练集 ($n=211$) 和验证集 ($n=54$)，训练集含 74 例 HER-2 阳性、137 例 HER-2 阴性，验证集 19 例 HER-2 阳性、35 例 HER-2 阴性。将头足位和内外侧斜位 MG 输入孪生深度学习网络，获得肿瘤 ROI 图像，并输入至 ResNet50 网络提取深度学习特征，通过全连接层进行特征融合，共获得 2048 个深度学习特征，经 Softmax 分类器输出二分类结果，得到深度学习评分 (Deep-score)，以构建深度学习模型。采用单因素分析及多因素 logistic 回归分析临床资料，筛选 HER-2 2+乳腺癌表达状态的独立预测因素。联合 Deep-score 和独立临床预测因素构建联合模型，并绘制其列线图。采用受试者工作特征 (ROC) 曲线评估模型预测 HER-2 2+乳腺癌表达状态的效能。采用校准曲线评估联合模型的校准度。以决策曲线分析 (DCA) 评估模型的临床获益。结果 雌激素受体 (ER) 和 Ki-67 是 HER-2 2+乳腺癌表达状态的独立预测因子。联合模型于训练集和验证集的 AUC 分别为 0.97、0.88，均高于临床模型 (0.75、0.70)，差异均有统计学意义 ($Z=7.15$ 、 5.76 , P 均 <0.01)，联合模型于训练集中 AUC 优于深度学习模型 (0.96)，差异有统计学意义 ($Z=2.03$, $P=0.03$)，而于验证集差异无统计学意义 ($Z=1.50$, $P=0.33$)。结论 MG 深度学习联合临床特征列线图能有效预测 HER-2 2+乳腺癌表达状态。

PU-1483

乳腺癌 DBT 毛刺征象与 Ki-67 表达状态的相关性分析

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目的 利用数字乳腺断层合成 (DBT) 在评估病变边缘方面的优势，探讨 DBT 图像的毛刺征象与 Ki-67 表达状态的关系。方法 纳入了 2022 年 3 月至 2023 年 4 月在郑州大学第一附属医院就诊的所有经 DBT 检查观察到的乳腺毛刺型肿块，并经组织病理学证实为浸润性癌症的患者 99 例。对 99 例乳腺恶性毛刺肿块的肿块大小、毛刺的长度和宽度、肿瘤边缘毛刺的覆盖情况及毛刺的数量进行分析，并比较在 Ki-67 表达状态之间的差异。Ki-67 指数来源于手术切除的肿瘤标本。结果 Ki-67 高表达与低表达患者 DBT 图像毛刺特征包括毛刺长度与毛刺宽度比较差异均有统计学意义 (P 均 <0.05)，而毛刺数量、患者年龄、绝经状态及肿块大小差异无统计学意义 ($P=0.06$ 、 $P=0.175$ 、

$P=0.507$ 、 $P=0.05$)。将毛刺长度与毛刺宽度联合后, 诊断效能最好, AUC 为 0.897。结论 毛刺征分析可作为一种无创预测恶性病变肿瘤的增殖活性的方法, 从而判断患者的预后。

PU-1484

乳腺隆突性皮肤纤维肉瘤的影像及病理特征分析

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目的: 探讨乳腺隆突性皮肤纤维肉瘤 (DSFP) 的影像及病理特征, 以提高对该病的诊断效能。方法: 回顾性分析了我院 2012 年 5 月至 2021 年 1 月期间经手术及病理证实的隆突性皮肤纤维肉瘤 7 例患者, 术前接受了乳腺 MRI、乳腺超声、乳腺 X 线摄影或胸部 CT 检查。均获得完整的影像学及病理资料。结果: 7 例患者, 6 名女性, 1 名男性。在乳腺 X 线摄影上, 病灶多表现为皮肤或乳房内边界清楚的椭圆形病变, 无微钙化或脂肪, 局部可见微分叶。超声图像上表现为病灶位于体表皮肤或皮肤下层, 边界清晰, 形态规则, 5 例表现为不均匀低回声, 仅 1 例表现为较均匀的低回声, 彩色多普勒上多表现为较丰富血流信号。CT 图像上多表现为中等均匀或略不均匀密度的肿块影。部分病例可见“皮肤尾征”、“脂肪尾征”、“悬吊征”“多结节融合征”等征象。MRI 上表现为与肌肉 T1 等信号的边界清楚的结节或肿块, 增强后检查显示均匀或不均匀强化。病理结果均诊断为 DFSP, 免疫组化检查示 CD34 均呈阳性反应, 其中两例行 FISH 检测显示 COL1A1/PDGFB 基因融合。结论: 乳腺隆突性皮肤纤维肉瘤极为罕见, “皮肤尾征”、“脂肪尾征”、“悬吊征”“多结节融合征”等征象是其特征性的影像学表现, CT 及 MRI 在乳腺 DFSP 的术前诊断及术后复发病变的评估中起着重要作用, 结合病史及专科检查, 对本病有重要提示意义。

PU-1485

乳腺巨细胞纤维母细胞瘤个案分享

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分享一乳腺巨细胞纤维母细胞瘤病例

巨细胞纤维母细胞瘤是一种发生在儿童、含有巨细胞且与隆凸性皮肤纤维肉瘤组织学主重叠的中间型软组织肿瘤

常发生于胸壁、腹壁、背部、大腿、腹股沟、头颈部, 好发于儿童 (10 岁以下常见) 躯干和四肢浅表皮下, 病变界限不清, 呈蜂窝状向周围及皮下脂肪组织浸润, 浸润的脂肪边界类似于脂肪肉瘤; 病灶起源于乳腺中的巨细胞纤维母细胞瘤比较少见, 故而与大家分享学习一下。

PU-1486

乳腺磁共振智能扫描 (SmartExam breast) 在乳腺术后患者中的应用价值

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目的 探讨在乳腺 MR 检查中,利用 T2-spair 脂肪抑脂序列,在常规 Breast 以及 SmartBreast 两种不同匀场方式中,对于显示乳腺切除术后术区结构图像质量的影响,评估两种不同匀场方式对于术区病变的诊断价值。

材料与方法 乳腺癌切除术后患者 20 例,采用 PHILIPS Ingenia3.0T 超导 MR 扫描仪,按照常规 Breast 中 T2-spair 脂肪抑脂序列的匀场及 smartBreast 中 T2-spair 脂肪抑制序列的匀场方式分别扫描,每例患者均使用两种不同的匀场方式各扫描一次,共计 20 组图像。由两位高年资医师对图像质量进行主观评分并求其平均值。评分内容包括以下四项:患侧胸壁有无伪影,皮肤是否连续显示,皮下脂肪间隙是否清晰显示,肋骨信号是否清晰显示;每一项根据图像质量分别评分:满意 3 分、一般 2 分、不满意 1 分,然后将合计总分作为每一病例的图像评分结果。利用 SPSS 统计软件对于图像质量的评分结果进行分析。

结果 Smart-Breast 中 T2-spair 脂肪抑制序列的匀场方式,能够智能地勾画出需要匀场的范围,清晰显示乳腺切除术后术区胸壁皮肤、皮下软组织、肋骨等结构,图像质量评分结果较满意;对于常规 Breast、Smart-Breast 中 T2-spair 图像质量的评估分数进行统计分析,显示两者在 99%可信区间 $P<0.01$,提示两者之间的图像质量差异具有统计学意义。

结论 对比常规 Breast 中的 T2-spair 扫描序列,采用 Smart-Breast 进行同一序列扫描,能够避免术后胸壁软组织不对称对局部磁场不均性的影响,有利于对此类患者术后复发、术区新发病灶等的早期诊断,具有较高的临床应用价值。

PU-1487

基于无造影剂序列合成 MRI 与 ADC 的影像组学模型早期预测乳腺癌新辅助治疗疗效

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目的: 探究由新辅助化疗 (NAC) 一周期前后无造影剂序列合成 MRI 与表观弥散系数 (ADC) 提取的影像组学特征在预测乳腺癌患者病理完全缓解 (pCR) 中的价值。

方法: 从 2018 年 10 月至 2021 年 12 月,本研究回顾性收集 207 名在中国医科大学附属第一医院行新辅助化疗的乳腺癌患者的磁共振与病理信息。以 2021 年 4 月 9 日为截断时间,将纳入患者以 7:3 的比例分为训练集 ($n=145$) 和验证集 ($n=62$)。每个患者都在新辅助化疗一周期前后进行了 MRI 检查。通过量化 MRI 图像上的感兴趣区域 (ROI),分别在两个时间节点合成 MRI 的 9 个序列与 ADC 图中提取 107 个影像组学特征,前后特征的差值为 delta 影像组学特征值。采用特征递归消除法 (RFE) 选择特征,支持向量机 (SVM) 用于建立模型,对训练集进行 5 折交叉验证以确定模型的超参数,根据模型在验证集上的性能设置超参数。使用受试者工作特征曲线 (ROC) 评价模型的性能,采用 DeLong 检验对不同模型进行比较。

结果: 与基线和一周期影像组学模型相比,合成 MRI 各个序列的 delta 影像组学模型获得了更高的预测效能。对于 ADC 序列,一周期影像组学模型效能最高 ($AUC=0.774/0.731$, 训练集/验证集)。将训练集与验证集 AUC 值均大于 0.7 的序列建立融合模型,与常规一周期 ADC 联合建模获得最佳预测效能的是 delta-T2 mapping 序列 ($AUC=0.818/0.808$, 训练集/验证集)。临床-影像组学模型

具有良好的校准和鉴别能力 ($AUC=0.917/0.908$, $95\%CI:0.868-0.966/0.835-0.982$, 训练集/验证集)。

结论: 基于无造影剂序列合成 MRI 和 ADC 开发的影像组学模型是早期预测 NAC 治疗后 pCR 的有前景的新兴策略。结合了临床病理特征的临床-影像组学融合模型可以提供更加准确的患者预后信息。

PU-1488

CTA 腹壁动脉评估在穿支皮瓣乳房重建中的应用进展

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目的: 探讨利用腹壁穿支动脉 CTA 血管成像及三维重建评估, 确定优势血管, 为腹壁下动脉穿支皮瓣乳房重建提供术前供区准备。方法: 回顾性收集 2022 年 8 月至 2023 年 5 月行乳房重建患者, 选取年龄 23~70 岁之间, 其中 20 例进行多普勒超声检查, 同时行术前胸腹部 CTA 评估。使用星云工作站进行三维重建后处理评估穿支的位置、直径和方向。类比同以往术者直接在术中选择皮瓣穿支, 皮瓣移植成功率, 术后并发症, 手术时间及住院时间等。分析腹壁下动脉穿支 (deep inferior epigastric perforator, DIEP) 分布位置和管径, 以及作为供区血管的使用率。结果: 术前完善腹部 CTA 可以预先掌握腹壁下血管主干的分支情况及多穿支共干情况, 有助于精确设计皮瓣及血管蒂, 减少手术损伤, 最大程度缩减手术麻醉时间, 提高手术安全性。通过术前 CTA 影像, 总结 DIEP 皮瓣的血管分支类型和走行特点, 掌握腹部浅部血管与深部血管的吻合方式以及腹部上部和下部血管的吻合方式, 可达到缩短 DIEP 皮瓣制备学习曲线的目的。术前 CTA 可以精确展示穿支的肌内行程, 还可以识别相邻穿支之间的潜在连接, 有助于在手术前确定最佳穿支。CTA 数据还有助于判断并确定内侧排与外侧排穿支, 主干分支之间的肌内走行和腹部组织的灌注压力都存在差异, 这对于选择作为皮瓣血供来源的血管蒂选择是很重要的。

结论: CTA 是目前 DIEP 术前进行穿支选择的首选技术和金标准, 相较于其他成像技术, CTA 具有高空间分辨率、高精度、低成本及受干扰影响较小等优势。CTA 图像可以直接评估皮瓣范围, 血管走行, 穿支直径和血流动力学特性, 作为能直观重建腹部血管解剖结构的工具, 极大地改变了皮瓣切取方式, 优化皮瓣手术设计, 从而提高手术效率并减少术后并发症的发生。无论对术前供区血管的评估还是手术方案的决策都具有重要临床意义。

PU-1489

IDEAL-IQ 序列在乳腺肿块良恶性鉴别诊断中的应用价值探究

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目的 探讨非对称回波最小二乘估算法迭代水脂分离序列 (IDEAL-IQ) 来源的 $R2^*$ 值在乳腺良恶性肿瘤鉴别诊断中的价值, 并与传统多回波 $T2^*GRE$ 序列来源的 $R2^*$ 值进行比较。方法 回顾性分析 2021 年 9 月至 2023 年 3 月在中国医科大学附属第一医院连续收治并进行手术患者的 106 例病灶。所有患者均接受包含 IDEAL-IQ 和多回波 $T2^*GRE$ 序列的多参数 MRI (magnetic resonance imaging), 测量以下定量参数: IDEAL-IQ 序列 $R2^*$ 值 ($R2^*IDEAL$)、多回波 $T2^*GRE$ 序列 $R2^*$ 值 ($R2^*GRE$)、表观扩散系数 (ADC) 及肿瘤长径。按术后病理结果分成良性组 34 例、恶性组 72 例, 采用 Spearman 相关性分析 $R2^*IDEAL$ 与 $R2^*GRE$ 及二者与 ADC 的相关性; 采用配对样本 t 检验比较 $R2^*IDEAL$ 与 $R2^*GRE$ 的差异; 以单因素与多因素分析评估各定量参数在良恶性组中的差异并使用受试者操作特征 (ROC) 曲线及曲线下面积 (AUC) 分析单独及联合参数鉴别乳腺肿

瘤良恶性的效能。结果 相关性分析显示乳腺肿瘤患者的 $R2^*$ IDEAL 与 $R2^*$ GRE 呈中等强度相关 ($r=0.725$, $P<0.05$)，二者与 ADC 值均呈弱负相关 ($r=-0.223[R2^*IDEAL]$, $-0.208[R2^*GRE]$, $P<0.05$)。良性组与恶性组中, $R2^*IDEAL$ 与 $R2^*GRE$ 均呈中等强度相关 ($r=0.761$ [良性组], 0.627 [恶性组], $P<0.05$)，二者与 ADC 均无相关性。两种序列所得的 $R2^*$ 值有统计学差异 ($p<0.05$)。 $R2^*IDEAL$ 、 $R2^*GRE$ 、ADC 及肿瘤长径在良恶性组间存在统计学差异，对于单一参数，ADC 值鉴别良恶性的 AUC 最高 (0.868)；对于联合参数， $R2^*IDEAL+ADC+肿瘤长径$ 鉴别良恶性的 AUC 最高 (0.963)；ADC+肿瘤长径与 $R2^*IDEAL+ADC+肿瘤长径$ 鉴别良恶性的 AUC 差异有统计学意义 ($p<0.05$)。结论 IDEAL-IQ 序列生成的 $R2^*$ 值可用于区分良恶性乳腺肿块，可能成为除 ADC 外辅助乳腺肿瘤良恶性鉴别的又一无需对比剂参数。

PU-1490

探索基于 MRI 影像组学构建在激素受体阳性、HER2 零表达、未化疗早期乳腺癌中预测 5 年无病生存和 5 年生存的预测模型可行性的研究

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摘要

目的：对基于 MRI 影像组学特征建立激素受体阳性、HER2 零表达、淋巴结阴性、未化疗早期乳腺癌的复发转移死亡预测模型的可行性进行初步探索。

对象和方法：回顾性分析 2008 年 1 月至 2016 年 12 月，在北京大学第一医院乳腺疾病中心接收治疗的 238 例新发 HR+、HER2(0)、N0、未化疗浸润性乳腺癌病例。建立预测复发转移死亡的影像组学模型：使用基于深度学习的自动分割模型获得 DCE 第 3 期图像中乳腺肿瘤感兴趣区，然后从这些感兴趣区域提取影像组学特征，建立预测 5 年无病生存和 5 年生存的影像组学模型。将数据按 7:3 的比例随机分为训练集 ($n=167$)、测试集 ($n=71$)。模型的预测性能均使用受试者工作特征曲线 (receiver operating characteristic curve, ROC) 进行分析并计算曲线下面积 (area under the curve, AUC)。使所有统计分析如无特殊说明，均为双向检验， $P<0.05$ 被认为差异具有统计学意义。5 年无病生存和 5 年生存的影像组学模型测试集的 AUC 分别为 0.86、0.91 ($P<0.05$)。

结果：建立基于 MRI 影像组学特征的 HR+、HER2(0)、N0、未化疗早期乳腺癌的复发转移死亡预测模型，5 年生存的影像组学模型预测效能高于 5 年无病生存的影像组学模型。

PU-1491

基于临床病理及 MRI 特征预测早期乳腺癌 SLN 转移的临床研究

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目的：探讨临床病理及 MRI 特征预测早期乳腺癌前哨淋巴结(sentinel lymph node, SLN)转移的价值。方法：回顾性分析 526 例术前哨淋巴结活检术(sentinel lymph node biopsy, SLNB)的乳腺癌患者的临床病理及 MRI 资料，根据 SLNB 结果将患者分为 SLN 阳性组和阴性组。分析患者的临床病理及 MRI 特征与 SLN 转移的相关性，并用二元 Logistic 回归分析乳腺癌 SLN 转移的独立影响因素，采用 ROC(receiver operating characteristic curve)曲线下面积(area under the curve, AUC)评价其预测效能。结果：(1)研究共入组 526 例患者，其中 SLN 阳性组 166 例(31.6%，166/526)，

SLN 阴性组 360 例(68.4%，360/526)；ER 阳性、Luminal 亚型及合并脉管癌栓的乳腺癌患者更易出现 SLN 转移，且在两组间的差异均有统计学意义(P 值均<0.05)。(2)在增强 MRI 上病灶越大、多发病灶及位于右乳的患者更易出现 SLN 转移，且各指标在两组间的差异均有统计学意义(P 值均<0.05)。(3)Logistic 回归分析结果显示 ER 阳性、合并脉管癌栓、病灶 $\geq 20\text{mm}$ 及病灶多发均为 SLN 转移的独立危险因素，且临床病理特征、MRI 特征及二者联合三种方法预测 SLN 转移的 AUC 值分别为 0.669、0.647 和 0.726。结论：临床病理及 MRI 特征与乳腺癌 SLN 转移有一定的相关性，且二者联合预测 SLN 转移的效能有所提高。

PU-1492

Multi-parametric model for Pretreatment Prediction of Pathologic Complete Response in breast cancer to neoadjuvant chemotherapy

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OBJECTIVE: To predict pathologic complete response (pCR) in breast cancer neoadjuvant chemotherapy using radiomics based on pretreatment T1W-MRI and dynamic contrast-enhanced MRI (DCE-MRI).

METHODS: 180 patients were retrospectively collected. Based on intratumoral VOI of DCE-MRI and peritumoral VOI of T1W-MRI, the radiomics features were extracted respectively. Mann-Whitney U test, Spearman correlation test, LASSO and logistic regression were used for feature selecting and modeling. Independent predictors in clinical features were screened and modeled using multifactor logistic regression. Combined model was established by combining peritumor, intratumor and clinical features. Stratified analyses were performed and subtype-specific radiomic signature were created for each subgroup. ROC curve was used to evaluate the efficacy of the models.

RESULTS: Compared with the clinical model (area under the curve [AUC], 0.712), the combined model (AUC of 0.802) achieved better pCR prediction performance in the test set. Subtype-specific radiomic model improved the AUCs for pCR prediction (human epidermal growth factor receptor 2positive subgroup, 0.827; luminal subgroup, 0.953; and triple negative subgroup, 0.877). **CONCLUSION:** This study revealed the predictive value of pre-treatment T1W-MRI and DCE-MRI, and successfully developed and validated a combined model for individualized prediction of pCR in neoadjuvant chemotherapy for breast cancer, which can assist clinical decision-making.

PU-1493

探讨国内运用乳腺影像报告和数据系统存在的常见问题

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目的 探讨国内运用乳腺影像报告和数据系统存在的常见问题 **方法** 就国内不同医院甚至同一医院存在 ACR BI-RADS 分类方法应用不一致的问题展开分析。 **结果** 一、依照 ACR BI-RADS 分类方法，乳腺影像报告将诊断归类为 0-6 类，其间并非完全为级差关系，实际上在诊断性乳腺 X 线检查中将 BI-RADS1-3 类定为阴性诊断，但很多医生在诊断中将其定位 1-6 级，这样容易误导临床医生乃至患者以为其间为级差关系。二、筛查性和诊断性影像学检查的结果应当分别进行随访审计，筛查性乳腺 X 线检查是指针对无症状的女性进行的乳腺 X 线检查。诊断性乳腺 X 线检查时针对有可疑乳腺癌临床体征或症状的女性所进行的乳腺 X 线检查，另一类是针对筛查结果异常而需要进一步乳腺

X 线评价的患者。所以诊断性检查的活检阳性率、乳腺癌检出率相对较高，而发现的乳腺癌的期别相对较晚，两者的审计结果应区分开来。三、ACR BI-RADS 规范了报告的描述术语词典。乳腺 X 线检查不能发现所有的乳腺癌，其中一部分甚至可能是临床可触及的病变，基于这一确定的事实，经常需要陈述乳腺 X 线摄影对于致密型乳腺（d 型乳腺）的准确性降低。报告描述中应当说明乳腺组织的构成类型（abcd 四种类型），国内医院有在分型中误将 abcd 写成 ABCD，强调这一点也是为了区别于诊断归类中的 4A、4B、4C。四、ACR BI-RADS 规范了报告诊断归类及对应的临床处理策略。由美国 FDA 制定的、目前国际医疗界公认的最严格的乳腺摄影质量控制标准 MQSA 规定一次乳腺 X 线检查应只做出一个评价结果，希望对每侧乳腺分开给予 BI-RADS 评价的机构或个人，完全可以在印象部分分别描述，而在报告最后部分明确地给出一个总体的 BI-RADS 分类及对应的临床处理建议。当然，最终的总体评价应针对最可疑恶性的征象。结论 综上所述，有必要规范和培训 ACR BI-RADS 的使用，对乳腺病变的监测、复查、筛选穿刺和选择恰当的治疗方法有非常重要的作用。有利于临床医生对影像医生报告的理解及相互沟通，有利于学术交流。国内乳腺影像诊断有必要达成共识，推荐统一的 BI-RADS 分类标准，从而规范检查和诊断报告。

PU-1494

乳腺叶状肿瘤与纤维腺瘤的 MRI 放射组学分析

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目的：评价基于 MRI 的放射组学模型在乳腺叶状瘤与纤维腺瘤鉴别诊断中的作用。
方法：本回顾性研究包括 104 例接受 MRI 检查的患者（叶状肿瘤 42 例，纤维腺瘤 62 例）。从 T2 加权图像、增强前 T1 加权图像以及第一期动态对比增强磁共振成像(MRI)中提取放射学特征。为了创建稳定的机器学习模型和平衡类，进行了数据扩充。使用最小绝对收缩和选择算子（LASSO）回归来选择特征并建立放射组学模型。通过放射科医生对常规 MRI 特征的评估构建放射学模型。利用放射组学特征和放射学特征构建了一个组合模型。使用支持向量机、极端梯度增强和随机森林进行机器学习分类。计算受试者工作特征(ROC)曲线下面积(AUC)以评估每种模型的性能。
结果：在 1074 个特征中，LASSO 逻辑回归选择了 34 个特征。在三种机器学习分类器中，支持向量机的性能最好。与放射学模型（AUC: 0.76±0.11）相比，放射组学模型（AUC: 0.86±0.03）和联合模型（0.94±0.02）在验证集中的 AUC 值显著提高（均 $p < 0.01$ ）。在验证组中，联合模型的 AUC 值相对高于放射组学模型的 AUC 值，但没有显著差异($p=0.392$)。
结论：基于 MRI 的放射组学分析显示出区分叶状肿瘤和纤维腺瘤的前景。

PU-1495

不典型硬化性乳腺腺病

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目的：乳腺腺病表现复杂多变，容易与乳腺恶性病变混淆。微钙化主要以点状成簇分布为主，肿块伴钙化更常见于硬化性腺病中。乳腺硬化性腺病钙化多表现为细小多形性区域性分布，或钙化稍松散成簇分布。TIC 多为 I 型（缓升型）或 II 型（平台型），研究认为结节性腺病的 MR 表现常为肿块强化，出现类似恶性病变特征时是腺病中最易与乳腺癌混淆的一种亚型。
方法：3.0TMRI 平扫+增强
结果：乳腺腺病伴钙化、导管扩张。

结论: MRI 表现 T1WI 多为低信号, T2WI 多为不均匀或高信号; 增强后呈现以肿块或非肿块强化为主, 内部强化方式以均匀性强化为主, 当出现形态不规则、边缘毛糙不清、邻近腺体结构紊乱、呈星芒状肿块样改变时容易与乳腺癌混淆, 乳腺腺病 TIC 多为 I 型 (缓升型) 或 II 型 (平台型)。而此病例病灶边缘见分叶及毛刺, TI FSE 呈高信号, T2 FSE-IDEAL 以低信号为主混杂信号, 增强无强化, TIC 呈平台型, 与常见的乳腺腺病 MRI 表现不同, 考虑为正常腺体发生结构扭曲变形, 中心无肿块, 病理基础为间质纤维增生、胶原化所致。

PU-1496

基于 MRI 深度学习影像组学预测乳腺癌的 HER2 表达和无病生存率

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目的: 开发一种基于 MRI 的 DLR 方法, 以非侵入性评估乳腺癌中的 HER2 状态, 尤其是 HER2 低阳性状态, 并研究预测分数对预后的影响。

方法: 从两个中心招募了 481 名接受术前 MRI 检查的乳腺癌患者。所有患者均接受 IHC 和 FISH 以确定 HER2 状态。两位放射科医生在 MRI 上绘制了肿瘤的兴趣区。从分割的肿瘤中提取传统的影像组学特征和基于深度语义分割特征的影像组学特征, 并使用两个模型的输出概率的平均值来选择 HER-2 相关特征。最后, 构建了基于对比增强 MRI 的 DLR 模型, 以非侵入性评估 HER2 状态, 尤其是 HER2 低阳性状态。根据预测结果, 我们计算了 AUC 以评估模型的预测性能。通过 ROC 分析确定最佳阈值, 计算预测模型的准确性、敏感性和特异性。使用 Kaplan-Meier 法计算 DFS, 并使用对数秩检验比较 HER2 低阳性和 HER2 零阳性患者之间的 DFS 差异。为了进一步评估 HER2 状态的预后价值, 使用 Akaike 信息标准作为停止规则, 构建了一个多变量 Cox 比例风险模型, 以确定模型预测得分和临床病理变量与 DFS 的相关性。计算预测概率和实际结果之间的 C 指数, 以评估模型的预测能力。

结果: 首先, DLR 模型区分了 HER2 阴性和过表达患者, 在训练组中 AUC 为 0.868 (95%CI, 0.827-0.903), 在验证组为 0.763 (95%CI, 0.637-0.863)。此外, DLR 模型区分了 HER2 低阳性和 HER2 零患者, 在训练组中 AUC 为 0.855 (95%CI, 0.803-0.897), 在验证组为 0.750 (95%CI, 0.597-0.868)。HER2 低阳性患者的 DFS 明显优于 HER2 阴性患者。Cox 回归分析显示, DLR 模型预测得分 (hazard ratio, 0.175; 95%CI, 0.038-0.792; P=0.024) 和病变大小 (hazard ratio, 1.043; 95%CI: 1.010-1.077; P=0.009) 是 DFS 的显著独立预测因素。

结论: 本研究成功构建了一个基于增强 MRI 的 DLR 模型, 以非侵入性评估 HER2 状态, 特别是 HER2 低阳性, 并进一步显示了预测乳腺癌 DFS 的前景。

PU-1497

Deep Learning Model used in Mammographic Breast Density Assessment: Improve the diagnostic efficiency of junior radiologist

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Purpose:

To evaluate whether the AI model can be used in the clinic and whether the AI model can help diagnosticians to improve the diagnostic efficacy of mammography by analyzing the consistency

of mammographic density assessment between radiologists and the consistency between machine learning and radiologists.

Materials and Methods:

For the prospective study, we collected 2,548 X-rays from 637 patients from July 2018 to February 2019 by randomly selecting 50 cases per week. Independent density assessment was performed by four physicians with more than 5 years of experience in breast diagnosis, which included overall assessment of four images, unilateral two-image scoring, and single-image assessment of a single patient, and was assessed with reference to the 2013 ACR Mammography BI-RADS Density Criteria. And statistical AI model assessment of breast BI-RADS density was performed to further assess the consistency of radiologists' assessment with AI, and the consensus (majority decision principle) of the assessment by four imaging physicians was compared with the AI model assessment.

Results:

The 4 radiologists had an overall assessment agreement of 0.75 for the four images on a patient-by-patient basis; the 4 radiologists had an agreement of 0.718 for the two images of a single breast; and the 4 radiologists had an agreement between the assessments of each image of 0.696. The radiologists had a higher agreement of the overall scoring of the four images on a patient-by-patient basis than for a single breast, and a higher agreement of the scoring of a single image.

The results of the machine's density assessment of 2,548 molybdenum films for all patients were significantly improved by the accuracy of the 2 junior doctors who referred to the AI results for each image assessment.

Conclusion:

The diagnostic concordance of mammograms by four radiologists was higher than most of the data mentioned in the literature, because our four doctors are very experienced diagnostic mammographers, and in addition, the four doctors communicated more about the BI-RADS breast density classification criteria, which resulted in this result. The agreement between this AI model and the four experienced doctors in our radiology department in the test set was better, then this AI model can be used for clinical assessment of breast density and the AI can be an aid in guiding the lower senior doctors. The consistency of the two junior doctors increased with AI assistance, so the AI model can help diagnostic physicians to improve breast diagnostic efficacy.

PU-1498

钼靶联合 DCE-MRI 对不同类型乳腺癌的诊断价值

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摘要 目的：比较钼靶和动态对比增强磁共振成像(DCE-MRI)在不同类型乳腺癌中的诊断价值。方法：对 2021 年 2 月至 2022 年 10 月本院收治的 120 例女性乳腺癌患者进行回顾性分析。均行 DCE-MRI 和钼靶检查，术后行病理组织检查，以确定其分子分型。结果：钼靶联合 DCE-MRI 诊断不同分子类型的 Luminal 型乳腺癌的敏感性和诊断符合率显著高于单独钼靶或 DCE-MRI，单纯钼靶或 DCE-MRI 两组间对诊断不同分子类型乳腺癌的敏感性和诊断符合率均无统计学差异 ($P > 0.05$)。结论：钼靶联合 DCE-MRI 对不同分子类型乳腺癌的诊断优于单一影像学筛查，具有重要的临床意义。

PU-1499

对比增强乳腺 X 线摄影上的影像特征描述术语及阳性预测值

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【目的】

分析对比增强乳腺 X 线摄影(Contrast-enhanced spectral mammography, CESH) 上乳腺病灶的形态学及强化特征并评估每种特征对于诊断的影响。

【方法】

回顾性纳入临床怀疑或超声发现乳腺病变后进一步行 CESH 检查的病例, 最终 151 例患者 (157 个病灶) 纳入本次研究。阅读并评价低能图及减影图, 参考磁共振 (Magnetic resonance imaging, MRI) 中的术语描述强化病灶, 记录所有肿块强化在 CESH 图像上的最大径。所有数据以频数及百分比的方式描述。采用卡方检验评估每个独立的特征描述术语对于乳腺病灶诊断的影响, 比较其鉴别良恶性病灶的能力,

【结果】

本研究包括 113 个 (72.0%) 良性病灶和 44 个 (28.0%) 恶性病灶。减影图上表现为强化的有 120 个 (76.4%) 病灶, 他们可进一步的被分为肿块强化 (89/120, 74.2%) 和非肿块强化 (31/120, 25.8%)。在肿块强化的特征描述术语中, 阳性预测值最高的是边缘毛刺状 (87.5%vs32.1%, $p \leq 0.001$), 其次为形态不规则 (76.9%恶性)、边缘不规则 (75%恶性)、不均匀强化 (65.9%恶性)。非肿块强化中, 节段强化的恶性概率较非节段强化显著高 (80%vs14.3%, $p \leq 0.001$)。

【结论】

CESM 图像上, 肿块强化中的边缘毛刺状或不规则、形态不规则、不均匀强化对恶性肿瘤的预测最高, 非肿块强化中, 簇状强化或节段分布强化提示恶性。

PU-1500

基于乳腺 MRI 和临床病理特征的列线图预测乳腺癌患者腋窝淋巴结转移

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目的: 建立基于乳腺 MRI 和临床病理特征的列线图预测乳腺癌患者腋窝淋巴结转移

材料和方法: 回顾性分析 173 例 (训练集: 122 例子; 测试集: 51 例) 乳腺癌患者的乳腺 MRI 和临床病理特征, 以病理结果为金标准。通过单因素和多因素逻辑回归分析来确定腋窝淋巴结转移的风险因素。使用独立的风险因素创建列线图。采用受试者操作者特征曲线 (ROC) 和校准曲线评价列线图的诊断性能和校准性能, 采用决策曲线(DCA)评价列线图在不同风险阈值下的临床净收益。结果: 173 例乳腺癌患者, 其中 68 例 (39.3%) 有腋窝淋巴结转移。Ki67 (OR=4.411, 95%CI: 1.946–12.163, $P=0.002$)、多灶性 (OR=4.716, 95%CI:1.249–9.995, $P=0.001$)、MR 报告的可疑腋窝淋巴结 (OR=4.850, 95%CI:1.876–13.514, $P=0.002$) 被确定为与腋窝淋巴结转移相关的独立风险因素。列线图的 ROC 曲线下面积 (AUC)、准确度、敏感度、特异度在训练集中和测试集中分别为 0.808(95%CI, 0.728-0.887)、0.762、0.789、0.717; 0.856 (95% CI, 0.745-0.966)、0.824、0.773、0.862;

结论: 基于乳腺 MRI 和临床病理特征的列线图可作为预测乳腺癌患者腋窝淋巴结转移的非侵入性可靠工具, 并有助于临床决策。

PU-1501

Potential of combination of CE-MRI and serum Her-2/neu extracellular domain in evaluating effectiveness of neoadjuvant chemotherapy in breast cancer

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Objective: To determine the potential of the combination of contrast-enhanced magnetic resonance imaging (CE-MRI) method with the serum level of extracellular domain of human epidermal growth factor receptor-2 (Her-2/neu ECD) in the evaluation of the efficacy of neoadjuvant chemotherapy (NAC) in breast cancer patients.

Methods: Sixty-six patients with breast cancer who received NAC in our hospital from September 2019 to July 2022 were selected as research subjects. All patients received 6 to 8 courses of NAC. Lesions were measured using CE-MRI and apparent diffusion coefficient (ADC) maps before and after NAC. Serum levels of Her-2/neu ECD were measured by chemiluminescence before and after NAC. The patients were divided into the complete pathological remission (pCR) group and non-pathological complete remission (n-pCR) group based on pathological diagnosis.

Results: The pCR group was comprised of 30 patients (average age, 48 years), and 36 patients (average age, 48 years) were included in the n-pCR group. Hormone receptor status (odds ratio [OR], 4.47 [95% CI: 1.40, 14.32]; $P = 0.012$), human epidermal growth factor receptor-2 status (OR, 0.15 [95% CI: 0.05, 0.49]; $P < 0.01$), tumor volume change rate ($\Delta TV\%$) during NAC (OR, 1.12 [95% CI: 1.06, 1.26]; $P < .001$), and changes in serum Her-2/neu ECD levels during NAC (OR, 1.14 [95% CI: 1.05, 1.24]; $P < .001$) were independently associated with the odds of achieving pCR. Among these variables, $\Delta TV\%$ was associated with pCR (area under the receiver operating characteristic curve [AUC], 0.862). The model that combined $\Delta TV\%$ and $\Delta Her-2/neu$ ECD showed a higher performance (AUC, 0.914) than the model included $\Delta TV\%$ and Her-2 receptor (AUC, 0.894).

Conclusion: A model that combined CE-MRI imaging, and serum Her-2/neu ECD levels showed good performance for predicting pCR to NAC in patients with breast cancer.

PU-1502

Radiomic nomogram for predicting axillary lymph node metastasis in patients with breast cancer

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Aim To develop and validate a radiomics nomogram integrating the radiomics features from dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) and clinical factors for preoperatively predicting axillary lymph node metastasis (ALNM) in patients with breast cancer (BC).

Methods 177 patients with BC were randomly divided into a training set ($n = 123$) and a validation set ($n = 54$) at a ratio of 7:3. A total of 2818 radiomics features from primary tumor and axillary lymph node (ALN) were extracted from the DCE-MRI images and optimal features were screened to construct the Radscore by least absolute shrinkage and selection operator (LASSO) algorithms. Multivariate logistic regression analysis was conducted using statistically significant clinical factors identified in a univariate logistic regression analysis. Based on the Radscore and clinical factors, we developed a radiomics nomogram by Support Vector Machine (SVM) method. Receiver operator characteristic (ROC) curves and calibration curves were used to evaluate the diagnostic performance and calibration of the radiomics nomogram.

Results Ki67, multifocality, MRI-reported ALN status were the independent risk factor for ALNM. The radiomics nomogram showed good calibration and discrimination with areas under the ROC curve (AUC) of 0.92 [95% confidence interval (CI), 0.88-0.97] in the training set and 0.90(95% CI, 0.72-0.90) in the validation set. DCA indicated the radiomics nomogram was clinically useful. Conclusions The DCE-MRI-based radiomics nomogram could be used as a reliable tool to assess ALNM in patients with BC.

PU-1503

X 线联合机器学习预测乳腺癌 ER、PR、HER2、Ki-67 表达

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X 线联合机器学习预测乳腺癌 ER、PR、HER2、Ki-67 表达

目的:

评估 X 线联合机器学习对乳腺癌 ER、PR、HER2、Ki-67 表达的预测价值。

材料和方法:

回顾性分析我院 2018 年 1 月至 2021 年 12 月术前行乳腺 X 线检查的乳腺癌患者, 选择其中 X 线图像表现为肿块伴钙化的病例 252 例。利用深度学习分割感兴趣区 (ROI), 然后获取肿块影像组学特征及钙化量化特征, 分别建立肿块组学模型、钙化量化模型以及全影像模型 (肿块影像组学特征+钙化量化特征) 来预测各受体表达。使用支持向量机(SVM)、极端梯度提升 (XGBoost)、自适应增强 (AdaBoost)、随机森林 (RF) 4 种机器学习分类器建立模型, 采用曲线下面积 (AUC)、敏感性、特异性评价不同模型的性能。

结果:

在四种机器学习分类器中, AdaBoost 分类器性能最佳。使用 AdaBoost 算法, 肿块组学模型预测 ER、PR、HER2 以及 Ki-67 的 AUC 分别为 0.78、0.76、0.75、0.72; 钙化量化模型预测 ER、PR、HER2 以及 Ki-67 的 AUC 分别为 0.67、0.70、0.73、0.67; 全影像模型预测 ER、PR、HER2 以及 Ki-67 的 AUC 分别为 0.82、0.80、0.79、0.82。

结论:

X 线联合机器学习对乳腺癌 ER、PR、HER2、Ki-67 表达具有一定的预测作用。

PU-1504

基于 MRI 影像组学预测乳腺肿瘤良恶性的价值

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目的: 探讨临床病理指标及 MRI 影像组学因素在乳腺肿瘤良恶性的鉴别中的应用价值, 并建立个性化的多模态影像组学模型, 以求为良恶性乳腺肿瘤的分类提供可能的评价依据。

方法: 回顾性研究 156 名接受 DCE-MRI 检查的乳腺病患者从人工绘制的肿瘤轮廓图像中提取放射组学特征。采用 Spearman 相关分析和最小绝对收缩和选择算子回归进行特征选择和放射组学特征构建。分别建立临床病理、放射组学和联合临床及放射组学的联合模型。同时建立基于联合临床病理指标及影像组学的列线图模型, 同时通过 AUC、DCA 评估列线图的临床实用性。

结果: 最大直径、绝经年龄、肿瘤类型和 BI-RADS 类别等方面存在恶性组和良性组的鉴别中存在显著差异 ($P < 0.05$)。临床病理、放射组学和联合模型的 AUC 值分别为 0.913、0.945、0.980; Hosmer-Lemeshow 检验证明联合模型显示出更好的预测性能。临床病理、放射组学、联合模型的

AUC 值为 0.876、0.789 和 0.885，基于临床病理和放射组学的验证集构建的列线图的 AUC 为 0.914。

结论：联合临床病理指标和 MRI 放射组学特征的 Logistic 回归模型及列线图模型可能作为用于鉴别乳腺肿瘤良恶性的依据，有望为乳腺肿瘤患者的鉴别诊断提供的一定的参考。

PU-1505

双能 CT 图像评估乳腺癌 Her2 表达水平的价值

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目的：探讨双能 CT 图像治疗前评估乳腺癌患者 Her2 表达水平的价值。方法：回顾性收集病理诊断为乳腺癌的患者 114 例，根据 Her2 表达情况分为阳性组（41 例）和阴性组（73 例）。记录病灶常规影像特征，计算 70keV 标准化 CT 值（NCT）、标准化碘浓度（NIC）、标准化有效原子序数（NZeff）、能谱曲线斜率（K）等定量参数，经单因素及多因素回归分析各项 CT 指标，构建常规影像模型、定量参数模型及联合模型，ROC 曲线分析各因素和不同模型的诊断效能，构建列线图模型，绘制临床决策曲线（DCA）、临床影响曲线（CIC）评估其临床应用价值。结果：两组患者年龄、发病部位、CEA、CA125、CA153 表达差异无统计学意义（ $P>0.05$ ）。阳性组肿瘤最大径高于阴性组（ $P<0.05$ ），阳性组分叶征、微钙化阳性率显著高于阴性组（ $P<0.05$ ）；阳性组动脉期 NIC、K 及静脉期 NCT、NIC、NZeff、K 均高于阴性组（ $P<0.05$ ）；多因素回归分析显示，分叶征、微钙化、动脉期 NIC、K 及静脉期 NIC、NZeff 是 Her2 的独立预测因子，AUC 分别为 0.587、0.707、0.669、0.720、0.714、0.718，动脉期 K 诊断效能最高，最大截断值为 2.60，灵敏度 75.61%，特异度 65.75%。基于分叶征、微钙化构建常规影像模型，基于动脉期 NIC、K 及静脉期 NIC、NZeff 构建定量参数模型，基于六项指标构建联合模型，三种模型 AUC 分别为 0.742、0.770、0.857，灵敏度分别为 70.73%，92.68%，92.70%，特异度分别为 73.97%，52.05%，68.49%，Delong 检验显示常规影像模型与定量参数模型诊断效能差异无统计学意义（ $P>0.05$ ），联合模型诊断效能显著高于另外两种模型（ $P<0.05$ ）。基于六项独立预测因子构建列线图预测模型，校准曲线及 DCA、CIC 显示该列线图模型具有较好的诊断性能和临床应用价值。结论：分叶征、微钙化、动脉期 NIC、K 及静脉期 NIC、NZeff 是 Her2 的独立预测因子，基于六者构建的列线图模型对治疗前无创评估 Her2 表达具有临床应用价值。

PU-1506

ADC 最大值联合激素受体及人表皮生长因子受体 2 预测乳腺癌新辅助化疗疗效

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目的：构建基于乳腺癌 MRI 影像特征及临床病理指标的列线图以早期预测乳腺癌患者在新辅助化疗（neoadjuvant chemotherapy, NAC）后的病理完全反应（pathological complete response, pCR）。

方法：回顾性地分析了兰州大学第一医院在 2021 年 1 月至 2022 年 10 月行新辅助化疗且随后接受了手术的 82 例乳腺癌患者。收集患者在化疗前的 MRI 影像特征、临床相关信息及病理指标。采用单因素筛选乳腺癌患者 NAC 后实现 pCR 的相关因素。随后进行多因素逻辑回归分析。基于筛选出的独立预测因素构建列线图模型。Bootstrap 法用于列线图模型的验证和校准。受试者工作特征

(receiver operating characteristic curve, ROC) 曲线及决策曲线分析 (decision curve analysis, DCA) 分别被用于评估列线图模型的诊断效能及临床应用价值。

结果: 孕激素受体 (progesterone receptor, PR) 状态 ($P=0.04$)、人表皮生长因子受体 2 (human epidermal growth factor receptor 2, HER-2) 状态 ($P<0.01$)、表观扩散系数 (apparent diffusion coefficient, ADC) 最大值 ($P=0.03$) 在多因素逻辑回归的分析中显示为 pCR 的独立预测因素。列线图的 ROC 曲线下面积为 0.86。Bootstrap 法内部验证的校正一致性指数为 0.84。校准图显示了列线图预测概率和实际 pCR 概率之间的高度一致性。

结论: 基于 PR 状态、HER-2 状态、ADC 最大值的列线图模型有助于预测乳腺癌患者对新辅助化疗的病理反应, 以实现患者的个性化诊疗, 改善患者预后。

PU-1507

基于 DNA 折纸超顺磁纳米复合颗粒的磁共振传感检测非编码 RNA LINC01977

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目的 探究基于磁共振 DNA 折纸超顺磁纳米复合颗粒对 LINC01977 检测效果。

方法 根据 Rothmund 的方法组装形成三角形 DNA 折纸结构, 制备氨基改性的超顺磁性纳米颗粒标记的 DNA 折纸并表征。利用磁共振传感系统检测 LINC01977, 通过所测得的 T2 弛豫时间来得到该磁共振检测系统的检测范围以及得到最低检测限。进而应用磁共振检测乳腺癌相关 lncRNA: RHPN1-AS1, AC009119.1, RNF139-AS1, LINC01094 和 LINC01087。检测模拟乳腺癌细胞液样品中的 LINC01977。

结果 成功合成的 Fe_3O_4 磁性纳米颗粒的粒径为 28 nm 左右, 具有相对均匀的分散性, 在纯水溶剂中分散肉眼未发现明显沉降现象。核磁传感系统的检测结果, 发现 ATP 与它的类似物及其空白样品所得到的 T2 弛豫时间信号响应相比较极为显著, 证明该传感系统在对 ATP 的检测时具有特异性。通过 T2 弛豫时间的表征发现在 0.1ng/ml~10ng/ml 之间存在曲线的线性响应 ($R^2=0.9988$), 并且在 0.2ng/ml~5ng/ml 之间存在直线的线性响应 ($R^2=0.9919$), 该传感检测系统的最低检测限为 0.17ng/ml, 且加标回收率在 78.13%~110.4%之间。

结论 证明该传感系统对 LINC01977 的检测可用于实际应用中。

PU-1508

乳腺癌新辅助化疗后肿瘤瘤床 MRI 表现与病理对比研究

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探讨 MRI 评价乳腺癌新辅助化疗后残余肿瘤收缩模式的能力。方法 收集 48 例 II、III 期浸润性导管癌患者的 MRI 检查资料并与全乳腺大切片对比。48 例患者均采用 TE 方案进行了 4 个周期的新辅助化疗, 并在新辅助化疗前后进行了 MRI 检查。48 例乳腺癌患者在化疗结束后均进行了乳腺癌改良根治术, 术后乳腺标本取一半制成全乳腺大切片, 显微镜观察残余肿瘤瘤床表现。结果 新辅助化疗后残余肿瘤表现为向心性收缩、树枝型收缩。48 例新辅助化疗后的残余肿瘤在 MRI 上表现为向心性收缩的有 39 例, 占 81.25%; 表现为树枝型收缩的有 9 例, 占 18.75%。全乳腺大切片显示为向心性收缩的有 40 例 (83.33%), 树枝型收缩的有 8 例 (16.67%), MRI 与全乳腺大切片评价残余肿瘤收缩模式的相关系数为 0.906 ($P=7.37\times 10^{-8}$)。结论 MRI 能正确评价残余肿瘤的收缩模式, 能为临床手术方式的制定提供重要的依据。

PU-1509

双能 CT 图像评估乳腺癌 PR 表达水平的价值

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目的：探讨双能 CT 图像治疗前评估乳腺癌患者 PR 表达情况的价值。方法：回顾性收集病理诊断为乳腺癌的患者 114 例，根据孕激素受体 (PR) 表达情况分为阳性组 (71 例) 和阴性组 (43 例)。记录病灶常规影像特征，计算动脉期 70keV 标准化 CT 值 (NCT)、标准化碘浓度 (NIC)、标准化有效原子序数 (NZeff)、能谱曲线斜率 (K)、70keVCT 值差值 (Δ CT)、碘浓度差值 (Δ IC)，经单因素及多因素回归分析各项 CT 指标，构建联合模型，ROC 曲线分析各因素和不同模型的诊断效能及最佳截断值，构建列线图预测模型，绘制临床决策曲线 (DCA)、临床影响曲线 (CIC) 评估其临床应用价值。结果：两组患者年龄、发病部位、CEA、CA125、CA153 表达差异无统计学意义 ($P>0.05$)。PR 阳性组肿瘤最大径、动脉期 NIC 及 K 小于阴性组 ($P<0.05$)，最佳截断值为 2.85cm、0.10、2.79。病灶分叶征、内部坏死及乳腺血运增加更多见于阴性组 (均 $P<0.05$)。多因素回归分析显示，分叶征、血运增加、动脉期 K 是 PR 的独立预测因子，AUC 分别为 0.592、0.647、0.695，灵敏度分别为 25.35%、54.93%、76.06%，特异度 93.02%、74.42%、67.44%。基于分叶征、血运增加构建常规影像模型，基于三项指标构建联合模型，两种模型 AUC 分别为 0.697、0.778，灵敏度分别为 67.61%、61.97%，特异度分别为 67.44%、88.37%，DeLong 检验显示联合模型的诊断效能与常规影像模型及单项独立预测因子比较，差异均有统计学意义 ($P<0.05$)；常规影像模型与动脉期 K 诊断效能比较差异无统计学意义 ($P>0.05$)。基于三项独立预测因子构建列线图预测模型，校准曲线及 DCA、CIC 显示该列线图模型具有较好的诊断性能和临床应用价值。结论：分叶征、血运增加、动脉期 K 是 PR 的独立预测因子，基于三者构建的列线图模型对治疗前无创评估 PR 表达具有临床应用价值。

PU-1510

功能磁共振成像对 Lou's 温通法治疗非哺乳期肉芽肿性乳腺小叶炎的疗效分析

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目的 利用功能磁共振成像分析评价 Lou's 温通法治疗非哺乳期肉芽肿性乳腺小叶炎 (Granulomatous lobular mastitis, GLM) 的疗效。方法 回顾性分析 2013 年 01 月至 2019 年 07 月在浙江省中医院经病理证实且在 Lou's 温通法治疗前后均行磁共振动态增强 (DCE-MRI) 及扩散加权成像 (DWI) 检查的乳腺 GLM 初诊患者共 120 例 122 个病灶，观察及测量治疗前后各个病灶的 DCE-MRI 血液动力学参数 (包括早期强化率 EER、峰值强化率 Emax、达峰时间 Tmax 及时间-信号强度曲线类型)、病灶部位、强化方式、皮肤增厚范围、肿块数目、肿块大小、脓肿直径、皮肤破溃等指标并予以赋分，计算治疗前后积分改善率，计算公式：疗效指数 (n) = (治疗前总积分-治疗后总积分)/治疗前总积分 \times 100%。积分疗效判定如下：a)治愈：疗效指数 \geq 90%；b)显效：疗效指数 70%-89%；c)有效：疗效指数 30%-69%；d)无效：疗效指数 $<$ 30%。结果 (1) GLM 治疗前后病灶的 EER 无统计学差异 ($P=0.942$)，Emax、Tmax 差异有显著统计学意义 ($P<0.001$)，且治疗前的峰值强化率高于治疗后、达峰时间短于治疗后。GLM 治疗前后病灶的动态增强时间-信号强度曲线 I 型 (上升型)、II 型 (平台型) 和 III 型 (流出型) 分别为 46、49、27 例及 76、36、10 例，差异有统计学意义 ($P<0.001$)。(2) 治疗后疗效指标平均值：治疗后总积

分为 12.77, 治疗指数约 42.86%, 积分疗效判断为 2.98, 其中治愈、显效、有效及无效个数分别为 9、23、51、29 个, 占比分别约 7.4%、18.9%、41.8%、31.9%。结论 GLM 治疗前的峰值强化率更高、达峰时间更短。GLM 治疗前增强时间-信号强度曲线主要为上升型和平台型, 治疗后时间-信号强度曲线则以上升型最多见。Lou's 温通法对于治疗 GLM 有一定的疗效, 值得临床进一步推广使用。

PU-1511

狼疮性乳腺炎影像表现一例

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狼疮性乳腺炎是一种罕见的累及乳腺深层皮下脂肪组织的良性炎症性疾病, 本病易反复, 若不予治疗, 可出现乳房损毁性改变。本例患者女, 38 岁, 20 余年前诊断为“系统性红斑狼疮”, 7 年前患者无明显诱因左乳皮肤出现片状红斑, 伴皮肤破溃, 治疗后左侧乳房皮肤残留暗红色皮疹。2022 年 4 月乳腺 X 线表现为左侧乳腺萎缩伴营养不良钙化, 皮肤增厚, 腋窝淋巴结肿大, 磁共振显示为不均匀强化肿块。狼疮性乳腺炎的影像学表现有一定的特点, 特别是慢性期狼疮性乳腺炎, 对其的临床和影像学特征进行精确的分析, 可以避免不必要的手术或组织活检损伤。

PU-1512

误诊为乳腺癌的腺外型脂肪坏死

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乳腺脂肪坏死是发生在乳房/乳腺脂肪组织的凝固或液化性坏死, 以脂肪坏死液化、慢性肉芽肿性炎症、囊肿形成及纤维化为主要特征。由于病程的进展, 病变成分的多变, 常表现多样性。

乳腺超声检查: 超声声像图亦表现多样, 早期呈低或无回声, 后方可有或无回声增强, 囊内可有壁结节或由于出血造成的脂液分层现象。随着炎症进展及纤维成分增多, 病灶的边缘从清晰到模糊再到有毛刺。病变后期表现为低或高回声肿物, 病灶可完全纤维化并伴有胆固醇结晶和钙盐沉积, 这类回声明显增高, 部分病例伴有乳腺实质结构扭曲。

乳腺 X 线摄影脂肪坏死可表现为脂性囊肿、有毛刺的肿块或结节、不对称致密影、结构扭曲、脂肪层内“片絮影”、局部粗糙钙化或微细钙化, 也可无阳性表现。脂性囊肿是病变早期的典型表现, 随着病程进展, 炎症细胞及纤维成分逐渐替代了液化坏死的脂肪组织, 故而病变中期可表现为有毛刺的结节或肿块。病变后期, 纤维组织可完全替代脂肪成分, 表现为腺体内部的不对称致密影、结构扭曲或皮下脂肪层内的“片絮影”。

MRI 图像上脂肪坏死的典型表现为圆形或卵圆形的薄壁含脂病变, 病灶内部存在脂肪信号是诊断的关键。扩散加权成像 (DWI) 不受限、表观扩散系数 (ADC) 一般不低。动态增强后, 典型的薄壁含脂病变无强化或仅轻度环形强化。随着炎症细胞浸润和周围纤维组织增生, 环壁可增厚、形态逐渐不规则。当病变内部脂肪成分完全被替代时, 可表现为不规则形伴边缘毛刺的实性肿块, 与乳腺癌近似。

该例患者病变位于乳腺外。在乳腺 X 线摄影上表现为边缘毛刺的高密度肿块, 其内未见异常钙化灶。超声表现为低回声肿块, 其内未见钙化, 可见点棒状血流。MR 表现为不均匀强化肿块, 边缘不光滑, 内可见增强的壁结节, 内部可见弧形纤维灶, 其时间-信号强度曲线为上升型, ADC 值为恶性倾向。

PU-1513

What are the application Value of Spectral CT Imaging in Quantitative Analysis of breast cancer

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Objective:To evaluate the application value of enhanced spectral CT in breast cancer.**Methods:**54 Patients with breast cancer were retrospectively collected between November 2022 to June 2023.Each patient underwent contrast-enhanced breast CT by spectral CT within 1 week before operation.Virtual non-contrast images(VNC) were reconstructed .some parameters values of normal gland and diseased region in contrast enhancement series were measured and compared.Including Iodine concentrations(I),CT values(Hu),Effective atomic number(Z)and slope of curve from 40kev to 70kev(K).Basic statistics methods were used in the study,such as independent-sample t test,binary logistic regression analysis and ROC analysis.**Results:**There was no significant difference in CNR between TNC and VNC images($P>0.05$).SNR of VNC was significantly higher than TNC images.CTDIvol,DLP and ED of VNC images were lower than TNC images($P<0.05$).About 2.22 mSv per person could be reduced.All parameters of diseased region the arterial-phase were significantly higher than normal gland (Hu: 75.75 ± 14.13 vs 1.21 ± 8.53 ;I: 17.55 ± 6.25 vs 8.14 ± 3.45 ;Z: 8.6 ± 0.36 vs 7.94 ± 0.65 ;and K: 3.3 ± 0.97 vs 1.48 ± 0.66)($P<0.05$);respectively, and the venous-phase four parameters of diseased region((Hu: 77.20 ± 14.16 vs 40.19 ± 9.86 ;I: 21.35 ± 7.23 vs 7.01 ± 2.56 ;Z: 8.85 ± 0.39 vs 8.06 ± 0.28 ;and K: 3.53 ± 0.93 vs 1.56 ± 0.37) were significantly higher than normal gland ($P<0.05$).After further standardized data,a consistent conclusion was obtained.I/Hu/Z and K were independent risk factors for breast cancer.ROC analysis indicated that K in venous phase had the best predictive value for breast cancer,with a sensitivity of 92.40% and specificity of 91.24%,and Youden of 2.02.The AUC of combined parameters in predicting breast cancer was higher than that of single parameter.**Conclusion:**Contrast enhancement examination of spectral CT provide information of value to breast cancer,Not only does it reduce the radiation dose,but also predict breast cancer to some extent.

PU-1514

乳腺癌术后胸壁未分化肉瘤一例

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目的:探讨胸部 CT 及 MRI 检查在乳腺癌术后患者中胸壁占位术前评估的应用价值

方法:分别应用胸部 CT 平扫、CT 增强及 MRI 平扫+增强检查对 1 例疑诊乳腺癌术后胸壁转移的患者进行多次随访,描述病变的影像特征,包括病变大小、血供情况及对胸壁骨质的累及范围,评估病变进展情况,并对临床手术提供相应解剖信息。

结果:第一次胸部 CT 平扫检查发现胸壁软组织内等密度占位,第二次胸部 MRI 平扫及增强检查显示病变增大并累及周围骨质,呈 T1WI 等信号、T2WI 及 DWI 呈不均匀高信号,增强 MRI 显示病变血供丰富,供血动脉来源于左侧胸廓内动脉;并显示右肺结节。第三次胸部 CT 增强检查显示局部病变及双肺内多发结节。临床根据影像资料提示,采取术前先由介入血管外科进行对病变供血动脉进行血管栓塞,随后术中射频消融,之后再行手术切除肿瘤的方式进行姑息性手术治疗,减少了术中出血。

结论:胸部 MRI 检查能够准确判断胸壁占位的血供及周围侵犯范围,对于术前评估手术难度及手术规划有很高的临床应用价值。

PU-1515

多模态 MR 成像对乳腺含黏液良、恶性肿瘤鉴别诊断研究

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目的: 探讨动态增强扫描(DCE)及 DWI 联合应用的多模态 MR 成像对乳腺含黏液良、恶性肿瘤鉴别诊断价值。方法: 回顾性分析 2019 年 1 月-2022 年 4 月经我院病理证实的乳腺含黏液肿瘤 28 例术前 MRI 图像及临床病理资料, 依据病理分为良性组及恶性组, 比较良、恶性组的临床及 MRI 特征性表现差异性。结果: 良性肿瘤 9 例, 恶性肿瘤 19 例。恶性组发病年龄高于良性组 ($p<0.01$)。恶性组肿块形态多呈不规则形、边缘多呈不规则及毛刺样, 与良性组比较差异具有统计学意义 ($p<0.01$)。肿块大小、ADC 值及 TIC 曲线类型无统计学差异 ($p>0.05$)。恶性组动态增强早期出现环形强化、并由周围向中央填充式渐进性强化, 而良性组未出现, 差异具有统计学意义 ($p<0.01$)。恶性组 7 例肿块 T2WI 上的低信号分隔纤细并在增强后图像显示不清, 良性组 3 例肿块 T2WI 上的低信号分隔增强后显示清晰, 差异具有统计学意义 ($p<0.01$)。结论: 乳腺含黏液的恶性肿瘤患者发病年龄较良性肿瘤大, 形态多不规则, 边缘多不规则或毛刺样, 以不均匀强化为主, 可出现早期环形强化并向心性强化方式, T2WI 序列的低信号分隔于增强后显示不清为较特征性表现。

PU-1516

高场强 MRI 联合乳腺钼靶摄影对钙化型乳腺癌的诊断价值

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目的: 探讨高场强 MRI 联合钼靶 X 线摄影对钙化型乳腺癌的诊断价值。

方法: 回顾性收集 2019 年 1 月至 2020 年 10 月在钼靶摄影显示有钙化且病理证实为 BI-RADS 4 类以上的乳腺癌患者 106 例。根据术前检查类型, 将患者分为实验组 59 例 (术前行钼靶与 MRI 检查) 和对照组 47 例 (术前仅行钼靶检查)。对比分析两组乳腺癌的诊断准确率。

结果: 以病理结果为金标准, 106 例患者中乳腺恶性病变 84 个, 良性病变 22 个, MRI 联合钼靶和单纯钼靶两种诊断方法的敏感性、特异性、阳性预测值、阴性预测值分别为 92.68%、82.61%、95%、76%; 81.71%、73.91%、91.78%、53.13%; 二者比较, 敏感度的差异具有统计学意义 ($P<0.05$)。实验组检出乳腺癌 50 例, 其中浸润型乳腺癌 26 例 (IDC), 导管原位癌 (DCIS) 13 例, 浸润性乳腺癌并导管内癌 8 例, 浸润性小叶癌 3 例; 良性病变 9 例, 其中纤维囊性增生 4 例, 导管上皮增生伴导管扩张 3 例, 导管内乳头状瘤 2 例。对照组诊断乳腺癌 34 例, 病理类型浸润型导管癌 21 例, 导管原位癌 1 例, 粘液腺癌例; 良性病变 13 例, 其中纤维腺瘤 4 例, 导管内乳头状瘤 3 例, 腺病 5 例, 良性分叶状肿瘤 1 例。106 例中表现为单纯钙化 67 例, 肿块伴钙化 26 例, 结构扭曲伴钙化 8 例, 非对称致密伴钙化 5 例。实验组 59 例在钼靶钙化区域, MRI 增强扫描均有不同程度肿块样及非肿块样强化。肿块样强化者, 恶性者常形态不规则, 伴有毛刺, 中央有坏死, 非肿块样强化形式多样, 恶性者主要为集丛样、簇环样, 分布以段样及线样分布为主。

结论: 高场强 MRI 联合乳腺数字化钼靶 X 线摄影诊断钙化型乳腺肿块的敏感性、准确性均高于单独使用高场强 MRI 及乳腺钼靶 X 线摄影, 且特异度明显高于高场强 MRI, 差异均具有统计学意义 ($P<0.05$)。在钙化型乳腺肿块诊断中联合应用高场强 MRI 与乳腺数字化钼靶 X 线摄影, 可显著提高诊断准确率。

PU-1517

DCE-MRI 影像组学及异质性分析在乳腺癌 Her-2 低表达中的预测价值

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目的 探讨基于 DCE-MRI 影像组学及异质性分析在免疫组化结果为阳性的乳腺癌患者中 Her-2 低表达中的预测价值。**方法** 回顾性分析 2018 年 6 月-2021 年 6 月在吉林省肿瘤医院接收手术治疗有明确病理结果且 Her-2 的免疫组化结果为阳性的 300 例女性乳腺癌患者的临床信息和 MRI 影像资料, 所有患者术前均接受乳腺磁共振平扫及动态增强扫描。根据免疫组化结果和 FISH 检测结果将患者分为 Her-2 低表达组和 Her-2 高表达组, 并比较两组间的年龄、绝经状态、影像学征象。用特征提取软件 A.K.提取病灶区域的三维纹理特征, 连同 2 个临床信息、5 个影像学征象、4 个异质性信息一起, 经使用特征筛选后, 以 7:3 比例将数据集分为训练组和验证组, 用以构建机器学习模型。采用 5 种机器学习模型包括 Logistic 回归、随机森林 (RF)、贝叶斯算法 (NB)、邻近算法 (KNN) 和决策树算法 (DT), 对数据集进行处理, 根据训练组准确率大小, 选择最佳分类器模型, 采用受试者工作特征曲线 (ROC) 分析该分类器模型对 Her-2 低表达的诊断效能。结果 Her-2 低表达组 120 例, Her-2 高表达组 180 例, 两组间年龄, 绝经状态差异无统计学意义 ($P > 0.05$)。共提取得到病灶三维区域 285 个纹理特征值, 同 2 个临床信息和 5 个影像学征象、4 个异质性信息一起进行特征筛选, 最终保留 9 个组间差异明显的特征用于构建预测模型。模型训练结果显示, RF 模型对乳腺癌 Her-2 低表达组的诊断准确率最高, 是本研究的最佳分类器, 该分类器模型在训练组的具体参数为 AUC 0.716 (0.59, 0.829), 其准确率、特异度和敏感度分别为 71.90%、84.80%和 54.20%, 在验证组 AUC 为 0.700(0.506, 0.875), 其准确率、特异度和敏感度分别为 64.0%、66.7%和 60.0%。结论 基于 DCE-MRI 的影像组学特征及异质性信息构建的机器学习模型可以用于乳腺癌 Her-2 低表达的鉴别诊断, 其中以 RF 模型的诊断效能更优。

PU-1518

磁共振脂肪定量技术与扩散加权成像及动态增强扫描比较在乳腺癌患者腋窝淋巴结转移诊断中的价值

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[摘要] **目的** 探究磁共振脂肪定量技术(mDIXON-quant)在乳腺癌患者腋窝淋巴结转移诊断中的价值, 并与扩散加权成像及动态增强扫描相比较各自诊断效能。 **方法** 本研究共收集 20 例经病理证实的乳腺癌伴腋窝淋巴结肿大病例, 淋巴结总数共 45 个, 术前患者均行磁共振 mDIXON-quant、弥散加权成像 (DWI) 及动态增强扫描, 通过 mDIXON-quant 测得脂肪含量比 (fat fraction, FF) 值, 通过 DWI 获得表观扩散系数(apparent diffusion coefficient, ADC) 值, 通过动态增强扫描获取时间-信号曲线(time-intensity curves, TIC)并判断其类型。 **结果** 病理报告淋巴结阴性组 (29/45) FF 值 $21.4 \pm 4.8\%$, 淋巴结阳性组 (16/45) FF 值 $6.2 \pm 2.7\%$, 两组之间 FF 值具有明显统计学差异 ($p < 0.05$), 阴性淋巴结组 FF 值明显大于阳性淋巴结组。淋巴结阴性组 ADC 值 $(1.27 \pm 0.29) \times 10^{-3} \text{mm}^2/\text{s}$, 淋巴结阳性组 ADC 值 $(0.85 \pm 0.18) \times 10^{-3} \text{mm}^2/\text{s}$; 阴性组 TIC 曲线以“流入型”曲线为主 (20/29), 而阳性组以“平台型”、“流出型”为主 (14/16); ADC 值及 TIC 类型在两组病变鉴别中亦有统计学意义 ($p < 0.05$)。应用 FF 值、ADC 值、TIC 类型对两组病变进行判别, 敏感性分别为 (94%、81%、78%)、特异性分别为 (80%、83%、

79%)、准确性分别为 (85%、88%、81%) 结论 脂肪定量技术在判断乳腺癌腋窝淋巴结转移中有着较高的敏感性, 其特异性及准确性亦无明显减低, 有较高的诊断效能。

PU-1519

基于 MRI 的深度学习模型辅助术前评估乳腺癌腋窝前哨淋巴结状态

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目的建立基于 MRI 图像的深度学习辅助诊断模型, 方便放射科医师评估乳腺癌患者腋窝前哨淋巴结是否转移。

方法回顾性分析中心 1 (训练组 139 例; 内部测试组 59 例) 和中心 2 (外部测试组 98 例), 共计 296 例乳腺癌患者的数据。构建了 6 个基于 T2WI、DWI 和动态增强图像的深度学习模型 (MobileNet V3, ShufNet V2, Inception V3, DenseNet 121, ResNet 50 及 VGG 19), 以及基于传统影像组学的支持向量机 (SVM) 模型。比较有、无最佳模型辅助的初级放射科医生评估乳腺癌前哨淋巴结转移的诊断效能。计算净重新分类指数 (NRI) 和综合判别改善指数 (IDI), 以评估使用最优模型的临床收益。**结果** ResNet 50 模型具有最佳的预测性能, 相对于 SVM 模型, 在内部和外部测试集的灵敏度分别提高了 0.101 和 0.187 ($p < 0.05$)。在模型辅助下, 初级放射科医生评估乳腺癌前哨淋巴结转移的诊断效能显著提高; 内部和外部测试组的 auc 分别提高 0.108 和 0.094 ($p < 0.05$), 敏感度提高 0.162 和 0.110 ($p < 0.05$), NRI 值分别为 0.357 和 0.264 ($p < 0.05$), IDI 值分别为 0.257 和 0.202 ($p < 0.05$)。**结论**基于 MRI 图像的深度学习模型可以帮助放射科医师实现更高的判断乳腺癌前哨淋巴结的状态, 有望为乳腺癌患者的临床决策提供更多有价值的信息。

PU-1520

基于深度学习鉴别乳腺原位癌和浸润癌的研究

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乳腺癌是女性最常见的癌症, 也是女性癌症相关死亡的主要原因, 据 2020 年全球癌症最新统计, 2020 年女性乳腺癌新发病例约为 230 万例, 占女性新发癌症病例的 24.5%。乳腺癌分为原位癌和浸润癌, 二者在临床上的治疗方式不同。

近年来, 人工智能, 特别是深度学习的快速发展, 在医学图像分析领域获得大量关注, 与基于人工手动勾画感兴趣区域的影像组学相比, 实现了完全端到端的输入。目前许多研究致力于探索深度学习在乳腺癌等多种临床疾病中的应用, 并证实了深度学习在医学领域中的潜在价值。然而, 人工智能也有一定的局限性, 人工智能算法并不是对所有患者都有效。目前, 即使获得 FDA 批准的人工智能系统也很少进行前瞻性测试或在多个临床环境中进行测试。以及缺乏全面的人工智能图像解释解决方案。但是随着医疗保健专业人员越来越多地使用放射学人工智能, 随着大型语言模型不断发展, 人工智能在医学成像中的未来仍然是光明的。

为了解决上述问题, 旨在开发一种基于深度学习模型对乳腺原位癌和浸润癌进行分割和分类, 并在外部和前瞻性队列中进行测试, 另外进一步解释深度学习模型的机制, 从而帮助临床制定进一步的诊疗计划。

PU-1521

基于机器学习的多参数 MRI 对浸润性导管癌分级预测研究

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目的:

探讨多参数 MRI (T2WI、MRI-DCE、DWI 等) 机器学习 (传统影像组学及深度学习) 模型对浸润性导管癌分级价值。

方法:

回顾性分析锦州医科大学附属第一医院 2018 年 1 月至 2023 年 4 月经术后病理证实为浸润性乳腺癌患者 200 例, 包括 200 例浸润性导管癌患者, 组织学分级低级别 (I 级+II 级) 120 例、高级别 (III 级) 80 例。采用 3.0T 磁共振扫描仪进行检查, 获得 T2WI、DWI 图像及 DCE-MRI 图像。使用 3D-SLICER 软件分别在 T2WI、DWI 和 DCE 图上勾画肿瘤感兴趣区, 在 PYTHON 上对其进行影像组学分析; 基于 T2WI、DCE、T2WI 和 DCE 联合序列提取的关键特征并使用 LASSO 进行特征筛选, 分别采用 Logistic 回归、支持向量机 (support vector machine, SVM)、决策树 (decision tree) 和朴素贝叶斯 (Naive Bayes) 以及卷积神经网络 VGG16 五种不同的机器学习算法建立模型, 并以病理检查结果为金标准, 绘制各模型的受试者工作特征 (ROC) 曲线, 计算 ROC 曲线下面积 (AUC 值)、灵敏度、特异度、准确度、阳性预测值和阴性预测值并评估模型的预测效能。同时使用概率平均法和概率投票法对单参数模型进行融合得到多参数影像组学模型重复上述对模型的测试。利用 Delong 检验进行不同机器算法模型 AUC 值的比较, 采用决策曲线分析法 (decision curve analysis, DCA) 分别评估单参数和多参数模型的临床应用价值。

预期结论:

1. 基于多模态 MRI 图像的影像组学模型可以对浸润性导管癌的分级进行预测, 并有一定的诊断效能。
2. (1) 四种不同的传统影像组学及深度学习单参数模型中, SVM 模型和 VGG16 模型对浸润性导管癌组织学分级诊断效能较优, 预测稳定性高。(2) 两种模型融合方法中概率投票法得到的多参数模型的诊断效能较优, 预测稳定性高。

PU-1522

乳导管 X 线解剖分型对导管内微小病变检出及诊断的价值

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【摘要】目的:探讨乳腺导管系统的 X 线解剖形态, 进一步提高对乳腺导管系统疾病的认识和诊断水平。方法:回顾性分析 373 例 435 侧乳腺导管造影资料。结果:乳腺导管的 X 线解剖形态可分为 4 型即全支型 4.6% (20/435)、多支型 53.6% (233/435)、少支型 26% (113/435) 和单支型 15.8% (69/435)。本组资料以多支型和少支型最为多见, 而全支型及单支型较为少见。结论:了解乳腺导管的 X 线解剖形态对导管系统疾病的诊断与治疗有重要价值。

PU-1523

乳腺单纯型浸润性筛状癌影像特征及与叶状瘤的鉴别诊断

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目的：分析乳腺单纯型浸润性筛状癌 MRI 及超声影像表现，并与叶状瘤鉴别，提高乳腺单纯型浸润性筛状癌的诊断水平。方法：收集解放军总医院第五医学中心经手术病理证实的乳腺单纯型浸润性筛状癌 10 例、叶状瘤 39 例，回顾性分析乳腺单纯型浸润性筛状癌 MRI 及超声影像表现，并比较单纯型浸润性筛状癌与叶状瘤的不同点。结果：单纯型筛状癌多表现为边界清楚的分叶状肿块、信号/回声均匀，MRI 动态增强扫描延迟期病灶可见中心瘢痕样强化、边缘假包膜强化；叶状瘤多数表现为分叶状肿块，信号/回声大多数不均匀；二者在形态学及超声表现上无统计学差异 ($p > 0.05$)，在 MRI 内部信号及强化特征、TIC 曲线及 ADC 值有统计学差异 ($p < 0.05$)。单纯型筛状癌超声诊断假阴性率 70%，灵敏度 30%，诊断准确率 30%，MRI 检查灵敏度 100%，诊断准确率 100%。结论：乳腺浸润性筛状癌是极少见的特殊类型乳腺癌，具有特殊的影像表现，与叶状瘤的影像表现有部分重叠，MRI 对乳腺浸润性筛状癌诊断的灵敏度、准确率均高于超声，有助于其与叶状瘤的鉴别诊断。

PU-1524

A Novel Approach for Breast Tumor MRI Classification: Vision Transformers and Majority Integration

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The breast tumor is one of the most common malignant cancer in women. Precise classification of breast tumor is definitely pivotal for clinical treatment. Recently, deep learning especially the Convolutional Neural Network (CNN) is a common way to figure out this problem. In this study, The Vision Transformer method was used to classify the benign and malignant breast tumor based on magnetic resonance imaging (MRI). Besides, we implement a majority decision fusion strategy to bolster classification performance. First, we manually segmented and extracted the lesion part from the MRI images sourced from radiology department. Then we merged three grayscale images from the same person into one RGB image so that it could be put into the ViT as input. During training, we integrated early stopping and weight decay to mitigate overfitting. After that, we employed a voting mechanism. Since the MRI images for each patient are a series of images to show the three-dimensional structure of the breast. So majority-based voting mechanism was used to improve the accuracy. As a result, the accuracy of our mechanism is 89.445%, which is much better than the resnext50_32x4d (72.893%), densenet121(82.208%), and mobilenetv2_100(83.599%). As medical data continues to improve and the performance advantages of large models in addressing image-related challenges become evident, we believe that in the future, an increasing number of large models will be employed in the field of healthcare. Consequently, our work could offer valuable insights for researchers who want to achieve better performance in medicine using large models, especially for breast tumor classification .

PU-1525

乳腺钼靶 90°侧位对提高病灶显示率的价值

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摘要：目的：探讨乳腺钼靶 90°侧位对提高病灶显示率的价值。

方法：前瞻性收集因病情需要拟行乳腺钼靶的 100 例受检者，使用全数字化钼靶乳腺 X 线机行头尾位 (CC)、内外斜位 (MLO) 检查，根据病变位置追加 90°侧位钼靶检查。比较不同检查体位对乳腺疾病的检出率，计算了各种体位检查方法在乳腺疾病诊断中的准确性、敏感性、特异性，采用 SPSS 18.0 软件对不同拍摄方法的检测结果进行统计分析，采用卡方检验， $P < 0.05$ 具有统计学意义。

1 材料与方法

拟收集该院 2021 年 10 月-2022 年 2 月 100 例受检者。首先对病人进行触诊，对怀疑有肿块，但常规体位未能显示病灶的，加拍 90°侧位。对加拍了 90°侧位的患者分析有哪些病变是常规体位显示不了的。

2 结果与分析

在 100 名患者中，常规采用头尾位和内外斜位；10 例患者在触诊过程中出现明显变化，但常规头尾位和斜内外位均未发现明显变化或不完全变化，增加 90°侧位，9 例患者在增加 90°侧位片后，变化完全显示，如图 1 所示，100 例患者中 11 例患者接受了临床手术。

3 讨论

传统的头尾位和内外斜位对乳腺病变的定位和定性非常有用，但有时不能完全满足临床需要。此时有必要制作 90°侧位。根据改变位置相对于乳房在侧斜位置和侧斜位置 90°侧向的变化，可以确定改变是在乳房内部、中间还是外部；如果相对于乳房的变化更大，或者在 90°侧向位置高于 MLO 位置，则变化发生在乳房内侧。如果变化相对于侧位 90°的乳房较低或低于 MLO 位置，则变化位于乳房的外边缘。如果 MLO 侧位和 90°侧位没有明显变化，则位于乳房中部。90°侧位的主要目的是清晰地显示焦点，无需打开腋窝，因为腋窝最好在胸部内外倾。

5 结论

在加照了 90°侧位的患者中，大多数患者乳腺病变均得到了更好的显示，大大的提高了病变的检出率，更好的避免了误诊和漏诊，进一步提高乳腺良恶性病变诊断的符合率，有利于早期发现乳腺肿瘤，具有重要临床意义。

PU-1526

基于 FFDM 的影像组学在预测三阴性乳腺癌中的价值

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目的：

本文旨在研究基于 FFDM 的影像组学特征在预测三阴性乳腺癌中的价值。

方法：

回顾性分析 200 例经病理证实为乳腺癌患者的 FFDM 图像及临床资料，依据病理结果分为三阴性乳腺癌 (TNBC) 50 例，非三阴性乳腺癌 (NTNBC) 150 例。用 3D Slicer 勾画感兴趣区并提取影像组学特征，特征选择应用 LASSO 算法进行；采用秩和检验、单因素分析及多因素 Logistic 回归筛选临床特征及 X 线特征，用 Logistic 回归构建模型，模型的预测效能用 AUC 来评估。

结果：

经 LASSO 算法筛选得到 4 个影像组学特征后计算影像组学评分, TNBC 与 NTNBC 组间初潮年龄、分娩次数、肿块伴随征象、肿块边缘的差异有统计学意义($P < 0.05$), 分别建立临床+FFDM 模型、影像组学模型、临床+FFDM+影像组学联合模型, 三种模型在训练集中的 AUC 值分别为 0.788、0.813、0.836, 在测试集中的 AUC 值分别为 0.773、0.804、0.815。

结论:

基于 FFDM 的影像组学特征结合临床与 X 线征象所构建的联合模型能够在一定程度上鉴别 TNBC 与 NTNBC, 可作为一种非侵入性的预测方式来支持临床决策。

PU-1527

浸润性导管癌多参数 MRI 与腋窝淋巴结转移的相关性分析

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摘要: 目的 探讨浸润性导管癌多参数 MRI 与腋窝淋巴结转移的相关性。方法 回顾性收集 2018 年 6 月至 2023 年 2 月术前未经任何治疗并经手术病理证实为浸润性导管癌的 110 例女性患者, 根据病理结果分为 ALNM 组与非 ALNM 组, 单因素分析评估两组患者的多参数 MRI 特征及临床病理特征与 ALNM 的关系, 采用二元 logistic 回归模型分析腋窝淋巴结转移的相关因素, 并绘制 ROC 曲线分析影像特征对 ALN 转移的诊断效能。结果 浸润性导管癌 ALNM 组与非 ALNM 组患者肿瘤长径、瘤周水肿、脉管癌栓、邻近血管征、肿瘤 ADC 值、瘤周-肿瘤 ADC 比值差异具有统计学意义 ($P < 0.05$)。肿瘤长径、瘤周-肿瘤 ADC 比值、瘤周水肿及脉管癌栓是腋窝淋巴结转移的独立影响因素 ($P < 0.05$)。联合预测模型曲线下面积 AUC 为 0.932。结论 浸润性导管癌多参数 MRI 特征及临床病理特征有助于临床判断浸润性导管癌腋窝淋巴结转移情况, 利于对患者制定合适的治疗决策。

PU-1528

Multiparametric MRI-based radiomics value for predicting the HER2 2+ amplification status in breast cancer

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AbstractPurpose: The purpose of this study was to investigate the feasibility of multiparametric magnetic resonance imaging (mpMRI)-based radiomics in predicting the HER2 2+ amplification status in BC patients.Methods: A total of 107 BC patients including HER2 2+ amplified ($n = 42$) and nonamplified ($n = 65$) were enrolled and divided into a training cohort ($n = 74$) and a validation cohort ($n = 33$). The clinical and conventional MRI characteristics were used to build a clinical-imaging model. Radiomics features were extracted from T2-weighted imaging (T2WI), diffusion-weighted imaging (DWI), and the third and seventh postcontrast phases on DCE-T1WI (DCEphase3 and DCEphase7), respectively. Then, we build radiomics models based on each single sequence, mpMRI sequences, and the combination of the mpMRI radiomics model with the clinical-imaging model to differentiate HER2 2+ amplified from HER2 2+ non-amplified BCs. The area under the receiver operating characteristic (ROC) curve, sensitivity, specificity, and accuracy were calculated.Results: The clinical-imaging model for the HER-2 2+ amplification status prediction achieved an AUC of 0.733 and 0.738 in the training and validation cohorts, respectively. Among the single-sequence based radiomics models, the DCEphase7-based radiomics model achieved the best predictive performance, with an AUC of 0.874 and 0.835 in the training and validation cohorts, respectively. Among the combined models, the mpMRI radiomics model C (DCEphase7+DWI+T2WI) combinedwith the clinical-imaging model achieved the best predictive performance, with AUCs of 0.952 and 0.892 in the training and validation

cohorts, respectively. Conclusion: The mpMRI-based radiomics had the potential to predict the HER2 2+ amplification status in BC patients.

PU-1529

对比增强能谱 X 线摄影在乳腺癌的研究进展

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乳腺癌是目前发病率最高的癌症, 新增病例占比日益增加, 根据 2020 年全球肿瘤流行病学统计数据 (GLOBOCAN) 报告, 乳腺癌已经超过肺癌成为发病率最高的癌症, 2020 年大约有 230 万新增病例, 占有癌症新增病例的 11.7%, 2020 年全球大约有 68.5 万人死于乳腺癌, 致死率位居第五。乳腺癌的高发病率及高致死率已经成为威胁全球女性健康的首要因素。因此乳腺癌的早期发现、早期诊断对于提高乳腺癌患者的生存率和改善乳腺癌患者的生活质量至关重要。目前, 全视野数字乳腺 X 线摄影是乳腺筛查的首选方法, 但是对于致密性乳房来说全视野数字乳腺 X 线摄影的敏感性较低, 假阴性较高; 数字乳腺断层合成技术虽然在 FFDM 的基础上敏感性和特异性有所提高, 但其对于致密性乳房的诊断效果仍然不佳。超声虽然适合研究致密性乳房, 但是对病变内钙化不敏感; 核磁共振敏感性和特异性均较高, 但其设备要求和检查成本高, 而且不适用于少部分患者 (如装有心脏起搏器的患者、幽闭恐惧症患者等)。因此我们迫切需要一种方便、经济、易操作的新技术对乳腺疾病进行有效的评估。2003 年 Lewin 等学者首次将对比增强能谱 X 线摄影 (contrast-enhanced spectral mammography, CEM) 应用于临床。随着 X 技术的不断发展, CEM 在 2011 年成功获得了 FDA510 (k) 的批准并大量应用于临床。CEM 结合了标准二维乳腺 X 线摄影的形态学特征和动态对比增强成像的功能特征, 为伴有微小钙化灶的乳腺癌患者提供了更多更有价值的影像信息。有研究表明 CEM 的敏感性与磁共振相似, 而且其特异性、阳性预测值、阴性预测值、诊断率优于 MRI。本文就 CEM 在乳腺癌的研究进展进行综述。

PU-1530

基于多模态 MRI 影像组学对小乳腺癌诊断价值的研究

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目的: 通过挖掘 MRI 图像的影像组学特征, 建立多种用于鉴别乳腺小肿块 ($\leq 2\text{cm}$) 良恶性的机器学习模型, 探讨基于多模态 MRI 的影像组学在鉴别小乳腺癌应用方面的潜在价值。方法: 回顾性分析了行乳腺 MRI 检查并符合纳入标准的 110 名乳腺小肿块患者 (共 128 个小肿块)。分析研究对象的 T1WI、T2WI、DWI、ADC、DCE-MRI (5 个单模态组) 的 DICOM 图像及临床、病理资料。通过纹理分析软件, 采用半自动分割法于 T1WI、T2WI、DCE-MRI 图像上分割三维感兴趣区, 于 DWI、ADC 图像上分割二维感兴趣区, 并分别从中提取影像组学特征, 每位患者共提取 483 个定量特征。分平扫组, 扩散组, 增强组, 平扫联合增强组, 平扫联合扩散组, 扩散联合增强组, 平扫联合增强联合扩散组。采用基于相关性的特征选择法 (CFS) 来筛选关键特征, 分别从 5 个单模态组、3 个基本组、4 个多模态组的组学特征中选择最佳特征子集。基于 5 组单模态最佳特征子集分别建立 RF、NB、SVM 和 KNN4 类机器学习模型 (共 20 个), 比较各模型性能来选择最佳机器学习算法。将最佳机器学习算法应用于 3 个基本组、4 个多模态组的最佳特征子集来建立模型, 绘制各模型 ROC 曲线并评价其效能。结果: 128 个小肿块中, 包括 60 个良性、68 个恶性。在通过 CFS 算法分别从 5 个单模态组的影像组学特征中筛选出 9 个关键特征, 3 个基本组和 4 个多模态组各选出 12 个关键特征。通过比较基于 5 个单模态构建的 4 类分类器的 20 个模型, 基于 RF 算法构

建的分类模型对于本研究数据集有较好稳定效能, 其中 ADC 的 RF 模型诊断效能最高 (AUC0.837AC79.69%)。在三个基本组中, 基于扩散组的 RF 分类模型具有较高的诊断效能, AUC 为 0.847, 准确率为 79.69%; 在四个多模态组中, 平扫联合增强联合扩散组诊断效能最佳, 其 AUC 为 0.926, 准确率为 87.5%, 其次是扩散联合增强组 (AUC 值为 0.906, 准确率为 82.03%)。结论: 从多模态 MRI 图像中提取定量特征来构建影像组学模型对小乳腺癌的诊断有较高的价值, 其中基于平扫联合增强联合扩散组的 RF 模型诊断效能最佳。

PU-1531

FFDM 影像组学预测乳腺癌腋窝淋巴结转移的应用研究

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目的: 探讨基于全视野数字化乳腺 X 线摄影 (full-field digital mammography, FFDM) 的影像组学在预测乳腺癌患者腋窝淋巴结 (axillary lymph node, ALN) 转移中的价值。方法: 回顾性分析 2016 年 9 月至 2021 年 9 月就诊于山西医科大学第一医院的原发性乳腺癌患者的 FFDM 图像和临床病理资料, 共纳入 407 例患者, 按照 7: 3 的比例分为训练集 (n=285) 和测试集 (n=122)。对 FFDM 图像中的肿瘤病灶进行分割, 并提取影像组学特征。使用最小绝对收缩和选择算子 (LASSO) 回归方法筛选最优特征, 并建立影像组学模型、计算影像组学评分 (Rad-score)。通过 Logistic 回归分析 ALN 未转移组 (n=242) 与转移组 (n=165) 间的临床、病理及 X 线特征并建立临床模型。根据影像组学评分和临床因素构建联合预测模型, 并绘制列线图。校准曲线和受试者工作特征 (ROC) 曲线用以评价列线图在训练集和测试集中的性能, 通过决策曲线分析 (DCA) 评估列线图的临床实用性。结果: 诊断年龄、肿瘤大小、月经状况、淋巴结触诊状态、Ki67 表达、组织学分级、肿瘤形态、肿瘤边缘、FFDM 观察淋巴结状态在 ALN 未转移与转移组间有差异 ($P < 0.05$)。多因素 Logistic 回归分析显示 4 个特征被纳入临床模型中。经筛选得到 11 个影像组学特征构建影像组学模型。联合模型列线图包括肿瘤大小、肿瘤形态、淋巴结触诊状态、FFDM 观察淋巴结状态和 Rad-score。在训练集中, 临床、影像组学及联合模型的 AUC 分别为 0.820、0.757、0.873, 在测试集中分别为 0.809、0.745、0.873。联合模型预测性能优于单独的影像组学模型和临床模型, 也优于影像科医师在 FFDM 图像上诊断 ALN 转移。结论: 基于 FFDM 的影像组学特征与临床危险因素构建的列线图, 可以帮助医生在术前评估乳腺癌患者的 ALN 状态。

PU-1532

探讨经乳腺 X 线钼靶诊断为乳腺高危结节的实际准确率。

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目的: 探讨经乳腺 X 线钼靶诊断为乳腺高危结节的实际准确率。
方法: 回顾性分析我院 2019 年一月-2021 年 12 月收治的经 x 线钼靶诊断为高危结节的 300 例患者的临床资料。根据病理结果来分析乳腺钼靶在高危结节的诊断价值。
结果: 乳腺 X 线钼靶诊断为高危结节中有 262 例经病理证明为乳腺恶性肿瘤, 准确率为 0.87, 有 38 例经病理证明为其他良性疾疾病, 误诊率为 0.13。
结论: 乳腺 X 线钼靶在乳腺高危结节的诊断中占有很大的价值, 为临床工作者治疗与预后做出了很大的贡献。

PU-1533

基于 DCE-MRI 影像组学特征对 Her-2 过表达的预测价值

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目的：探究基于 DCE-MRI 的影像组学特征在识别 Her-2 过表达型乳腺癌中的价值。材料与方法：回顾性分析 2020 年-2023 年经病理证实为乳腺癌患者的 DCE-MRI 图像及临床资料,根据病理结果将收集的病人分为 Her-2 阳性及 Her-2 阴性两组,并按照 7 : 3 的比例随机分为训练集和测试集。用 3D Slicer 软件勾画感兴趣区,分别从 DCE-MRI 瘤内及瘤周提取影像组学特征,包括形态学特征、一阶特征、二阶特征及 Wavelet 特征等。采用秩和检验、Pearson 相关分析及最小绝对收缩和选择算子(LASSO)筛选出关键特征,共选取 1-10 个特征建立逻辑回归模型,进行 10 折交叉验证,选取交叉验证集曲线下面积最高的模型为最佳组学模型。根据患者的年龄、乳腺密度、病灶位置、病灶大小、ADC 值、TIC 分型, BI-RADS 分型等进行了统计学分析,将统计学分析中 P 值<0.05 的特征进行二元逻辑回归以确定独立预测因子。利用独立预测因子建立临床模型并计算 AUC 值。将单因素分析中 P<0.05 的关键特征一起纳入多因素 Logistic 回归用于构建模型,以受试者工作特征曲线(ROC)曲线下面积(AUC)来评估模型的性能,并在 R 软件中绘制诺模图以更直观地展示模型,并绘制决策曲线评价诺模图的净收益。结果：经 LASSO 算法筛选得到的瘤内及瘤周影像组学特征后计算影像组学评分,Her-2 阳性及 Her-2 阴性间有统计学意义(P<0.05)的临床指标,分别建立影像组学(瘤内联合瘤周)模型、临床+DCE-MRI 模型、临床+DCE-MRI+影像组学联合模型,计算模型在训练集中的 AUC 值及在测试集中的 AUC 值。诺模图的校正曲线有较好的一致性,综合模型的决策曲线也有良好的净收益结论。结论：基于 DCE-MRI 的影像组学特征结合临床因素与图像征象所构建的联合模型能够在一定程度上鉴别 Her-2 阳性与 Her-2 阴性,可作为一种非侵入性的预测方式来支持临床决策。模型的临床决策曲线显示大部分情况下使用诺模图预测 Her-2 表达状态比仅使用放射组学评分或仅使用临床特征增加了更多的益处。

PU-1534

基于 Kaiser 评分 MRI 诊断模型建立对乳腺病变良恶性诊断的效能评估及腋窝淋巴结转移的预测

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目的：探讨 Kaiser 评分(KS)联合表观扩散系数(ADC)及临床指标对乳腺良恶性病变诊断及乳腺癌腋窝淋巴结(ALN)转移的鉴别价值,并建立基于 KS 临床-多参数乳腺 MRI 影像诊断模型。

材料与方法：回顾性分析 2018 年 1 月至 2021 年 12 月行乳腺磁共振动态增强(DCE-MRI)且有病理结果的 389 位患者的 403 个病灶的术前磁共振及临床病理资料,依据病理结果分为良性病变组及恶性病变,将恶性病变组分为淋巴结转移阳性组及淋巴结转移阴性组。记录基于 KS 中的 MRI 图像特征、ADC 值及部分临床指标,建立基于 KS 临床-多参数 MRI 影像诊断模型,并评价其对乳腺良恶性病变的诊断效能及腋窝淋巴结转移的预测效能。

结果：本组病例中,病灶根征阳性、TIC 为 III 型、边缘不光整、年龄大、存在妇科肿瘤史(OR=7.889、7.707、4.398、1.122、0.239, P<0.05)是乳腺恶性病变的独立预测因子,多因素 Logistic 回归基于 KS、年龄、妇科肿瘤史建立基于 KS 临床-多参数 MRI 影像诊断模型。绘制两个模型的 ROC 曲线,敏感性分别为 97.4%、91.1%,特异性为 69.3%、84.2%,AUC 值为 0.912、0.950; Delong 检验显示两者的 AUC 差异有统计学意义(P=0.0059)。ALN 转移阳性组与阴性组在

乳腺癌根征 ($\chi^2=6.477$, $P=0.011$)、瘤周水肿 ($\chi^2=12.241$, $P<0.0001$)、 ADC_{mean} ($Z=10.988$, $P=0.015$) 差异有统计学意义。以乳腺癌 ALN 转移状态为标准绘制 ADC_{mean} 、KS 的 ROC 曲线, AUC 分别为 0.568、0.647。多因素 Logistic 回归分析显示水肿 ($OR=2.807$, $P=0.006$) 会增加腋窝淋巴结转移风险, 存在瘤周水肿增加腋窝淋巴结转移的风险是无此特征患者的 2.807 倍。

结论: KS 对乳腺病灶有较高的诊断价值, 基于 KS 临床-多参数 MRI 影像诊断模型有助于提高乳腺良恶性病变的诊断效能, 且乳腺 MR 原发灶存在瘤周水肿可作为乳腺癌腋窝淋巴结转移的独立预测因子, 可为临床治疗方案的选择提供指导, 为乳腺癌腋窝淋巴结预测提供一定的依据。

PU-1535

乳腺伴骨肉瘤成分的化生性癌 1 例影像学报道

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乳腺化生性癌 (metaplastic breast carcinoma, MBC) 是一种罕见、形态学异质且具有高度侵袭性的一种乳腺肿瘤, 于 1973 年首次被 Huvos 等报道[1], 占有浸润性乳腺癌的不足 1%, 相比常见的非特殊型乳腺癌, MBC 侵袭性更强, 预后更差[2]。乳腺化生性癌相对罕见, 化生成分复杂, 缺乏典型的临床症状及影像学特征, 术前诊断相对困难。我院收治乳腺伴间叶分化 (骨肉瘤成分) 的化生性癌 1 例, 现结合其临床、影像学表现对其报告如下, 旨在增加对此类病变的认识。

PU-1536

乳腺包被性乳头状癌的影像表现

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摘要 目的 分析乳腺包被性乳头状癌的影像特点。方法 回顾性分析经病理证实的 3 例乳腺包被性乳头状癌的影像表现。结果 3 例患者均为女性, 年龄分别为 57、62、69 岁。X 线表现: 2 例表现为肿块, 1 例阴性。超声表现: 3 例均为肿块, 2 例呈囊实性, 1 例呈实性, 2 例血流丰富, 1 例少许血流。MRI 表现: 2 例为囊实性肿块, 1 例实性; 增强扫描时间-信号强度曲线呈流出型 1 例, 速升平台型 2 例。ADC 值分别为 $0.99 \times 10^{-3} \text{mm}^2/\text{s}$ 、 $1.03 \times 10^{-3} \text{mm}^2/\text{s}$ 、 $1.17 \times 10^{-3} \text{mm}^2/\text{s}$ 。结论 乳腺包被性乳头状癌有一定的特征, 囊实性肿块多见, 超声及 MRI 检查能为本病的诊断提供更多的信息。

PU-1537

基于 DCE-MRI 多期全容积 ROI 临床放射组学模型预测三阴性乳腺癌

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目的: 对比 DCE-MRI 各期的放射组学特征在三阴性乳腺癌 (TNBC) 中的应用价值, 并联合临床特征构建临床影像预测模型, 进一步提高三阴性乳腺癌的预测价值。方法: 回顾性研究 158 例乳腺癌患者, 包括 38 例 TNBC 和 120 例非三阴性乳腺癌 (NTNBC), 以 7:3 划分训练集及验证集, 在训练集中建立临床预测模型及不同期相的 Radscore 模型, 选择最佳期相和独立的临床危险因子

联合建立临床放射组学预测模型, 绘制列线图, 利用 H-L 检验、校准曲线及决策曲线分析三组模型效能, 并采用受试者工作特征 (ROC) 曲线分析方法进一步评价三种模型的诊断性能。结果: 对训练集的数据进行回归分析, 结果显示 WHO 分级、边界及 T2WI 信号与 TNBC 存在显著相关, 且是 TNBC 的独立危险因子 ($P=0.004$ 、 0.010 、 0.006)。结合这三个参数建立临床模型, 在训练集和验证集中产生的 AUC 分别为 0.867、0.843。对 8 期增强数据进行放射组学特征提取、筛选和构建模型, 最终显示基于 DCEphase7 建立的放射组学模型效能最好。DCEphase7 数据共筛选了 7 个最有价值的特征, 利用这 7 个特征建立了放射组学模型, 在训练集中的 AUC 为 0.818, 诊断准确性为 0.786, 在验证集中的 AUC 为 0.777, 诊断准确性为 0.707, 校准曲线显示 TNBC 真实状态与预测模型之间具有良好的一致性 ($P>0.05$)。结合临床模型及 DCEphase7 放射组学模型建立临床放射组学预测模型, 并以诺模图形式将其可视化, 使用 ROC 曲线对模型进行评估, 在训练集中的 AUC 为 0.936(0.891-0.980), 诊断准确性为 0.837, 在验证集中的 AUC 为 0.886(0.780-0.992), 诊断准确性为 0.732, 与单独的临床模型、放射组学模型相比, 临床放射组学模型具有更高的 AUC, 校准曲线和决策分析曲线显示其对 TNBC 的预测概率与真实状态之间具有良好的一致性 ($P>0.05$)。结论: 基于 DCE-MRI 的放射组学模型在预测 TNBC 方面具有潜在的价值, 为术前 TNBC 的个性化预测提供直接、无创的检查方法, 在预测 TNBC 不同亚型中具有较大应用前景。

PU-1538

磁共振扩散加权成像表观扩散系数对乳腺癌新辅助化疗病理反应的预测价值研究

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目的 探讨磁共振 (MRI) 扩散加权成像 (DWI) 表观扩散系数 (ADC) 对乳腺癌新辅助化疗 (NAC) 病理反应的预测价值。

方法 回顾性分析经病理确诊为乳腺癌并行 NAC 的 96 例女性患者, 所有患者均于 NAC 前、NAC 结束后术前 1~2 周内行乳腺 MRI 检查。分别测得肿瘤 NAC 前 ADC 值 (ADC-pre)、NAC 后 ADC 值 (ADC-post), 并计算 ADC 值变化率 ($\Delta\text{ADC}\%$)。根据术后病理 Miller-Payne (M-P) 分级结果, 将患者分为病理完全缓解 (pCR) 组和非病理完全缓解 (非 pCR) 组, 比较两组间临床、病理及影像学特征的差异, 同时分析肿瘤 NAC 前、后 ADC 值及其变化率与病理 M-P 分级之间的关系。

结果 96 例乳腺癌患者中 NAC 后共 27 例 (28.1%) 患者达到 pCR。不同 M-P 分级组间 ADC-post 和 $\Delta\text{ADC}\%$ 总体比较均存在统计学差异 ($P<0.001$); ADC-post、 $\Delta\text{ADC}\%$ 与 M-P 分级均呈正相关 ($r=0.611$, $P<0.001$; $r=0.629$, $P<0.001$)。单因素分析结果显示, pCR 组与非 pCR 组间, 孕激素受体 (PR) 状态、人表皮生长因子受体-2 (HER-2) 状态、分子亚型、是否放射学完全缓解 (rCR)、ADC-post 及 $\Delta\text{ADC}\%$ 差异有统计学意义 ($P<0.05$); 多因素 Logistic 回归分析结果显示, $\Delta\text{ADC}\%$ 、PR 状态及是否 rCR 是预测乳腺癌 NAC 后 pCR 状态的独立因素 ($P<0.05$)。以 $\Delta\text{ADC}\%\geq 45.5\%$ 为阈值, 诊断 pCR 的受试者工作特征 (ROC) 曲线下面积 (AUC) 为 0.782, 敏感度为 77.8%, 特异度为 73.9%。联合 $\Delta\text{ADC}\%$ 、PR 及 rCR 三者的预测模型诊断 pCR 的 AUC 为 0.879, 敏感度为 85.2%, 特异度为 82.6%。

结论 乳腺癌患者 NAC 前后肿瘤 ADC 值变化率对其新辅助化疗病理反应有一定预测价值。

PU-1539

乳腺癌患者一期乳房重建中的最佳植入物大小：基于对侧乳房体积的研究

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目的：本研究旨在基于磁共振（MRI, magnetic resonance imaging）容积扫描测量乳房体积，根据两侧乳房的不对称值和不对称比，为医生在乳房重建术中选择合适的假体提供指导。**方法：**回顾性收集 2020 年 1 月 1 日-2023 年 1 月 1 日期间在云南省肿瘤医院接受单侧一期乳房重建术并行检查的 98 例患者。收集患者身高、体重、BMI 指数、重建方式等临床资料。通过重建程序（3D slicer）将 MRI 图像转化为三维图像，测量假体体积与术中实际置入的假体体积进行一致性比较，分析实际体积与对侧乳房体积的相关性。基于 MRI 测量左右乳房体积，根据不对称值和不对称比对术后双侧乳房的对称性进行评估。分析不对称比和不对称值与 BREAST-Q 量表中的乳房满意度及结局满意度之间的关系。**结果：**体重、BMI 指数高低组间的不对称比有显著差异。从 MRI 三维重建图像中测量得到的假体体积与术中记录的假体体积有较高的一致性（ $r=0.979$, $P<0.05$ ），尽管存在个体差异，总体上假体体积与对侧乳房体积仍然呈中度相关（ $R^2=0.393$, $P<0.05$ ）。乳房对称组的乳房满意度评分和结局满意评分均高于不对称组（ $P<0.05$ ），且不对称比与二者评分均呈中度负相关。**结论：**基于 MRI 的乳房容积测量是一种有效的方法，可以更准确和客观地估计一期乳房重建术中合适的假体体积，制定更科学的乳房重建计划，并减少乳房体积不对称程度，提高患者术后乳房的满意度和结果满意度。

PU-1540

能谱 CT 对腹壁下动脉在穿支皮瓣乳房再造的价值探索

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摘要：**目的：**探讨能谱 CT 联合低 KeV 技术对改善腹壁下动脉穿支皮瓣图像、进行三维成像,研究其血管走形及穿支情况,及在临床女性乳房再造中的价值。**方法：**前瞻性收集 2023.01-2023.08 在我院拟行乳房再造的 12 例女性患者(年龄: 45 ± 8.91)。术前均行能谱 CTA 双期扫描,重建获得 40~140 keV(间隔 10 keV)11 组单能量图像及常规 120 kVp-like 图像。分析比较各低 KeV 图像及常规 120 kVp-like 图像中腹主动脉(AA)、腹壁下动脉(DIEP)及腹壁下静脉(SEV)的 CT 值、SD 值、信噪比(SNR)和对比信噪比(CNR),利用不同 KeV 重建图像对腹壁下动脉行容积再现和最大密度投影,由 3 名医师进行主观评分。采用 ANOVA 单因素方差分析和 Wilcoxon 秩和检验对数据进行统计学分析。**结果：**腹壁下动脉伴行静脉的解剖结构主要表现为 3 类:独立型, Y 形结构; H 形结构。40-50KeV 重建图像各血管 CT 值及 SD 值均高于 50-140KeV 图像及常规 120 kVp-like 图像,差异具有统计学意义（ $P<0.05$ ），图像 SNR 及 CNR 最高为 4.64 ± 1.32 (50-60KeV), 高于其他组, 差异具有统计学意义（ $P<0.05$ ）,其中 40-60KeV 重建图像对腹壁下动脉远端细节显示更多, 主观评分最高。**结论：**利用能谱 CT 单能量技术有利于提高腹壁下动脉的 CT 值, 提升背景组织和腹壁下动脉之间的对比度, 改善成像质量; 能谱 CT 联合低 KeV 重建技术在 DIEP 皮瓣乳房再造领域的供区穿支定位、受区血管选择方面具有可观的应用潜力

PU-1541

不同时间点贝伐珠单抗对创伤半暗带脑水肿的影响

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目的：探讨大鼠中度脑创伤后不同时间点贝伐珠单抗对创伤半暗带区脑水肿的影响，明确贝伐珠单抗治疗创伤性脑水肿的治疗时间窗以及最佳治疗时间点。方法：通过建立大鼠中度脑创伤模型，选择在创伤后 1h、6h、12h 经大鼠尾静脉分别给予同一剂量的贝伐珠单抗进行治疗，采用 HE 染色及透射电镜评价贝伐珠单抗治疗前后创伤半暗带区脑组织在病理学上的改变；应用 CD31 免疫组化染色明确治疗前后创伤组与治疗组创伤半暗带区微血管数量，判断血管新生受抑情况；Western Blot 技术测定创伤半暗带区血管内皮生长因子（VEGF）和 IgG 的蛋白含量，检测不同时间点贝伐珠单抗对 VEGF 表达的抑制作用和血脑屏障通透性降低程度。结果：各治疗组创伤半暗带区脑组织的细胞内水肿和血管源性水肿均显著减轻，尤其是 TBI+贝伐珠单抗 1h 治疗组减轻最为明显，血脑屏障的结构亦得到稳定；各治疗组 VEGF-A 和 IgG 表达量均显著下降，并随观察时间的推移而逐渐降低，其中 TBI+贝伐珠单抗 1h 组下降最为显著（ $p<0.001$ ）；各治疗组创伤半暗带区的血管新生受到抑制，TBI+贝伐珠单抗 1h 组新生血管数量最少。结论：

贝伐珠单抗通过抑制 VEGF 的表达调控血脑屏障功能减轻创伤半暗带区的脑水肿，从而达到挽救创伤半暗带、治疗创伤性脑损伤的目的。脑创伤后 1h、6h、12h 给予贝伐珠单抗进行治疗均能减轻创伤半暗带区的脑水肿，但以 1h 给药疗效最显著，推测创伤后 12h 内可能是贝伐珠单抗治疗创伤性脑水肿的“治疗时间窗”，1h 可能是其最佳治疗时间点。

PU-1542

基于 DKI 的颞叶癫痫伴睡眠障碍患者大脑白质结构研究

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目的 基于扩散峰度成像(diffusional kurtosis imaging, DKI)探究颞叶癫痫(Temporal lobe epilepsy, TLE)合并睡眠障碍患者的脑白质微观结构改变。材料与方法 前瞻性纳入 TLE 患者 38 例，健康对照组 20 例，向受试者发放睡眠调查问卷评估其睡眠状况，根据睡眠障碍的诊断标准和量表评分将患者分为合并睡眠障碍及未合并睡眠障碍组。采集所有受试者 DKI 序列并测量相关感兴趣区(region of interest, ROI)平均扩散峰度(mean kurtosis, MK)、平均扩散系数(Mean diffusivity, MD)和分数各向异性(fractional anisotropy, FA)三个扩散参数。使用独立样本 t 检验、单因素方差分析比较睡眠质量评分、DKI 参数的组间差异。结果 合并睡眠障碍的 TLE 患者 Epworth 嗜睡量表(Epworth Sleepiness Scale, ESS)、阿森斯失眠量表(Athens Insomnia Scale, AIS) 评分及匹兹堡睡眠质量指数(Pittsburgh Sleep Quality Index, PSQI)均高于对照组($P<0.05$)。TLE 患者较健康对照的 FA、MK 值明显减低，MD 值明显升高 ($P<0.05$)；合并睡眠障碍的 L-TLE 患者 MK、FA 值较未合并睡眠障碍者明显减低($P<0.05$)，未发现 MD 存在组间差异($P>0.05$)；合并睡眠障碍的 R-TLE 患者 MK 值较未合并睡眠障碍者明显减低($P<0.05$)，未发现 MD、FA 存在组间差异($P>0.05$)。结论 合并睡眠障碍的 TLE 患者存在特异性大脑白质纤维损伤模式，利用 DKI 序列可以为该类患者的治疗效果和预后评估提供可靠的影像学标记物。

PU-1543

糖尿病纹状体病的影像表现特点分析

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目的: 分析糖尿病纹状体病的影像表现特点。

方法: 分析我所收集的 3 例糖尿病纹状体病患者的 CT、MRI 表现特点, 并对比其临床表现。

本组收集近一年来的 3 例病例, 均为男性患者, 2 人为中年, 1 人为 18 岁少年。三位患者患糖尿病多年, 均未经正规治疗, 临床上均以突发意识障碍而紧急就诊。其中, 两例未出现糖尿病酮症酸中毒, 一例出现酮症酸中毒。入院后即行螺旋 CT, GE16 排螺旋 CT 机检查, 采用轴位扫描, 层厚、层间距均为 3mm; 待症状稍平稳后行 MRI 检查, Philips 3.0T, 检查时采用轴位 T1WI、T2WI、FLAIR 及 DWI 序列, 层厚 3mm、层间距 0.3mm, 视野 22, 矩阵 320X256, 回波链长度 24, 激励次数 4。

结果:

三例患者 CT 检查征象上, 均表现为一侧或双侧不对称的基底节区高密度影, 周围无明显水肿带。其中 2 例临床表现偏身舞蹈症, 1 例无偏身舞蹈症, 随即行 MR 检查。MR 征象上表现为一侧或双侧不对称的尾状核、壳核 T1WI 稍高 T2 信号、FLAIR 及 DWI 序列均呈混杂信号, 周围无明显水肿信号。结合病史考虑为高血糖损伤基底节区灰质结构。经降血糖、营养神经及改善微循环等治疗后复查, 二例临床症状消失, 2 月复查 MRI 见病灶已软化: 一例临床症状明显改善, 复查 MRI 见病灶范围明显缩小, 无 MRI 水肿信号演变规律。糖尿病高血糖导致基底节损害, 主要累及尾状核头部及壳核, 也可累及苍白球, 偶可延及到中脑, 单侧或双侧受累。CT 一般表现为高密度影, CT 值约 -55H, 略低于新鲜出血(60-80HU), MRI 检查一般表现为 T1 呈高信号、T2 呈低信号; Flair 及 DWI 序列呈低信号; 且因其急性起病, 影像学表现较为特殊, 多见于老年患者, 容易误诊为高血压性脑出血。

结论:

糖尿病纹状体病的影像表现具有明显的特异性, 偏身舞蹈症患者多具有典型的纹状体影像表现, 但是糖尿病纹状体病并不一定表现出偏身舞蹈症的典型临床表现

PU-1544

噪声性耳聋大鼠下丘和腹外侧眶皮层局部一致性与焦虑抑郁样行为的关系研究

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目的 利用静息态功能磁共振 (functional magnetic resonance imaging, fMRI) 技术探讨噪声性耳聋大鼠下丘和腹外侧眶皮层局部一致性与焦虑抑郁样行为的关系。方法 本研究采用宽带强噪声 122 分贝暴露 2 小时诱导双侧严重听力损失, 正常对照大鼠置于环境噪声。通过听觉脑干反应检测两组大鼠的听力情况, 并采集行为学 (旷场实验) 和静息态 fMRI 数据。针对大鼠全脑进行局部一致性分析, 计算其与焦虑抑郁样行为特征的相关性。结果 听觉脑干反应结果显示噪声暴露后大鼠全频段听阈大于健康对照, 并在旷场实验中出现明显的焦虑抑郁样行为, 即低活动水平 (包括总移动距离和平均移动速度的减少)。与正常对照组相比, 噪声性耳聋大鼠下丘的局部一致性显著增强, 而腹外侧眶皮层的局部一致性显著降低, 且异常神经活动出现偏侧性。相关性分析显示下丘的神经

活动与噪声暴露大鼠在旷场中移动的总距离呈负相关($r=-0.691$, $p=0.013$), 而腹外侧眶皮层的神经活动与旷场焦虑抑郁样行为并未发现明显的相关性。结论 噪声性耳聋大鼠大脑下丘神经活动与焦虑抑郁样行为密切相关, 而腹侧眶皮层可能与其他行为有关, 有助于阐明耳聋大鼠出现中枢障碍的神经病理学基础。

PU-1545

血管内淋巴瘤的影像特点初探：附 1 例病例及文献复习

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目的 探讨基于 1 例病例报道的血管内淋巴瘤的影像特点及鉴别诊断价值。

方法 回顾性分析深圳市第二人民医院血液内科于 2023 年诊断的 1 例表现为颅脑、股骨、腹部脏器等多种影像表现的血管内淋巴瘤患者, 对其临床特点和头颅、胸部、腹部、股骨等 CT、MR、PET-CT 等多种影像学资料、病理学及免疫组织化学标记结果进行归纳总结, 并进行相应的文献温习。

结果 此例患者为男性, 50 岁, 因“体检发现胃体隆起, 肠息肉 6 天”来诊。头颅磁共振成像示双侧放射冠、基底节区脑白质区多发斑片状 T2WI 高信号病灶, 增强扫描双侧放射冠多发线状强化。胸部 CT 示纵膈多发增大淋巴结。骨盆 CT 示双股骨上段病灶, 伴周围软组织水肿。腹部 CT 示门脉高压, 脾脏低强化灶。头颅 MRA 未见异常。PET-CT 示右侧颞上回轻度肿胀伴糖代谢轻度增高。肝、胰腺、脾脏、肾上腺多发糖代谢增高灶, 全身多处骨质、骨髓代谢增高。病理学检查示(右股骨)淋巴造血恶性肿瘤。免疫组化结果: CD10 (-), C-MYC (30%+), CyclinD1 (-), ALK(D5F3) (-), ALK-Neg (-), CD30 (-)。原位杂交结果: EBER (-)。(右股骨肿瘤)结合免疫组化标记、原位杂交及分子检测结果, 符合弥漫性大 B 细胞淋巴瘤伴血管内瘤栓, 非生发中心亚型, 确诊血管内淋巴瘤。

结论 血管内淋巴瘤在临床上少见病, 病情进展迅速, 预后不良, 早期诊断和治疗是重点。确诊依靠活体组织病理免疫检查。影像学表现为全身多器官多发病灶, PET-CT 提示高代谢, 要考虑到造血淋巴系统病变的可能。头颅 MR 增强扫描示病灶呈多发线条状强化, MRA 血管无异常的患者, 要注意血管内淋巴瘤的鉴别诊断, 鉴别诊断包括中枢神经系统血管炎及脑淀粉样血管病等疾病。

PU-1546

Alterations in Structural Integrity of Superior Longitudinal Fasciculus III Associated with Cognitive Performance in Cerebral Small Vessel Disease

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Purpose: This study aimed to investigate the alterations in structural integrity of superior longitudinal fasciculus (SLF) subcomponents with increasing white matter hyperintensities (WMHs) severity as well as the relationship to cognitive performance in cerebral small vessel disease (CSVD).

Methods: 110 CSVD study participants with WMHs were recruited. According to Fazekas grade scale, WMHs of each subject was graded. And all subjects were divided into two groups. Region of interest based analysis was used to analyze diffusion properties of important white matter fiber

tracts throughout brain. Probabilistic fiber tracking method was used for analyzing microstructure characteristic of SLF subcomponents.

Results: The region of interest based analysis results showed increased mean diffusion, radial diffusion and axial diffusion values of bilateral superior fronto-occipital fasciculus, SLF, anterior limb, posterior limb and retrolenticular part of internal capsule, posterior corona radiata, and external capsule in participants with higher WMHs ($p < 0.05$). Probabilistic fiber tracking results showed that mean diffusion, radial diffusion and axial diffusion values of bilateral arcuate fasciculus and left SLF III in high WMHs score group were significantly higher than those in low WMHs score group ($p < 0.05$). The mean diffusion value of left SLF III was negatively related to Montreal Cognitive Assessment score of study participants ($p < 0.05$).

Conclusions: The structural integrity injury of bilateral arcuate fasciculus and left SLF III is more severe with the aggravation of WMH. The structural integrity injury of left SLF III correlates to cognitive impairment in CSVD.

PU-1547

Diffusion tensor imaging combined with nerve fiber bundle tracing in acute cerebral infarction

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Objective: The early diagnosis and judgment of clinical prognosis directly affect the treatment effect and reha_x0002_bilitation of cerebral infarction. This study aims to observe the corticospinal tract (CST) condition and its relationship with motor function in patients with acute cerebral infarction. Methods: A total of 21 patients with unilateral acute cerebral infarction diagnosed by conventional magnetic resonance imaging (MRI) and diffusion tensor imaging (DTI) were included in this study. The fractional anisotropy (FA) and diffusion tensor tractography (DTT) maps were reconstructed to determine the specific FA and DCavg values. The correlation between the FA and DCavg value and the modified Edinburgh Scandinavian scale score (MESSS) was analyzed. Results: The FA and DCag values in the cerebral infarction area were (0.18 ± 0.09) and (5.16 ± 1.06) $10^{-3} \text{ mm}^2 / \text{s}$, respectively. These values were significantly lower than that of corresponding parts on the healthy side ($P < 0.05$). The FA and DCavg values in bilateral cerebral peduncles have no statistical significance ($P > 0.05$). The CST on the lesion side shows compression, displacement, deformation, and interruption. The degree of injury of the CST is related to clinical neurological symptoms. The FA ($r = 0.772$) and DCag values ($r = 0.827$) in the cerebral infarction area had a high positive correlation with the MESSS. Conclusion: The DTI can noninvasively display the injury degree of the CST in cerebral infarction, which helps judge the impairment of motor function and predict the prognosis.

PU-1548

Atypical meningiomas with multiple extracranial metastases: A case report

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Abstract:

Objective: Atypical meningiomas (AM) are highly heterogeneous and invasive, exhibiting biological characteristics that fall somewhere between those of benign and malignant

meningiomas. The study aims to improve the understanding of atypical meningiomas and reduce misdiagnoses and missed diagnoses in clinical settings. By analyzing a rare case of multiple extracranial metastases, the study hopes to raise awareness of the disease's aggressive nature and the need for regular follow-up imaging examinations and aggressive treatment to improve patient outcomes.

Method: We report a rare case of AM with multiple metastases to the thorax, abdomen, and bone, but without intracranial recurrence. A 64-year-old female patient presented to the Neurosurgery Department of xx Hospital in September 2018 due to a three-month history of headache. Brain MRI suggested a possible hemangiopericytoma. Chest CT showed no apparent abnormalities. With the assistance of neuro-navigation, the doctor opened the skull through the right midline frontotemporal flap and saw that the tumor was encroaching on the skull and eroding the capitellar tendon, with poorly defined tumor margins and extremely rich blood supply, and removed it completely after freeing the tumor margins. Postoperative follow-up head MRI showed complete resection of the right frontal lesion. Pathological findings suggested an atypical meningioma (WHO grade II). After discharge, the patient underwent brain MRI scans every 6 months during follow-up visits, and no signs of tumor recurrence were detected. In October 2021, the patient was admitted to the hospital due to persistent chest pain. Enhanced CT of the chest revealed the presence of multiple masses of varying sizes adjacent to the spine and pleura, extending into the abdominal cavity. The enhancement was significantly uneven, and the border between the liver parenchyma and the right kidney was blurred. Pathological features: puncture of the pleural mass, HE-stained tumor cells were spindle-shaped or oval, arranged in a swirl shape, infiltrative growth, and extensive necrosis. Immunohistochemical results: the patient's epithelial membrane antigen (EMA)、vimentin and CD34 were all positive, and the Ki-67 proliferation index was high (hot spot>20%) . Combined with the patient's right frontal AM medical history, the final pathological diagnosis was metastatic meningioma after biopsy and immuno-omics examination of the pleural lesion.

Result: The report indicates that metastases exhibited anaplastic characteristics, including cellular pleomorphism, nuclear atypia, and a high Ki-67 index. Immunohistochemistry and molecular pathology methods have been effectively utilized in the grading and typing of meningiomas. The markers EMA and Vimentin are preferred auxiliary diagnostic markers for meningioma, specifically for identifying epithelial and mesenchymal tissue. These markers are used to differentiate between different types of meningiomas and aid in diagnosis.

Conclusion: Our study presents a unique case of AM with multiple metastases, excluding intracranial recurrence, where the pleura was extensively affected. Our findings highlight the importance of early detection and prompt treatment in patients with prior intracranial meningeal tumors, particularly WHO grade II-III meningiomas, to enhance the overall prognosis. We recommend regular brain MRI to exclude in situ or borderline recurrence, as well as whole-body imaging to identify metastases.

PU-1549

1H-MRS 及行为学综合评价神经干细胞与脑源性神经营养因子联合治疗 APP/PS-I 转基因 AD 小鼠的疗效

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目的: 利用 7T 高场强 1H-磁共振波谱观察 APP/PS-I 转基因 AD 小鼠 NSCs 与脑性神经营养因子联合治疗后海马区的神经代谢改变, 并结合行为学综合评价 NSCs 移植治疗 AD 疗效。

方法: 获取胎鼠海马区的 NSCs, 贴壁法体外扩增培养, 增强型绿色荧光蛋白 (enhanced green fluorescent protein, EGFP) 转染。36 只 12 月龄的 APP/PS-I 转基因 AD 小鼠分为 3 组, 每组 12 只, (1) 联合组: 移植转染 EGFP 的 NSCs 至双侧海马 CA1 区, 经侧脑室注射 BDNF; (2)

NSCs 组：移植转染 EGFP 的 NSCs 至双侧海马 CA1 区；（3）对照组：注入 PBS 至海马 CA1 区。移植后 6 周，应用 7.0T 磁共振仪进行小鼠脑部海马的 1H-MRS 检测；同时应用 Morris 水迷宫定航实验测定各组小鼠的逃避潜伏期。取小鼠脑组织切片经 EGFP-A β 免疫荧光双标记染色。

结果：移植后联合组及 NSCs 组小鼠海马 CA1 区的 NAA/Cr 值、MI/Cr 值较对照组升高 ($p<0.05, p<0.01$)，并且联合组的 NAA/Cr 值亦高于 NSCs 组 ($p<0.01$)。

定位航行试验中，联合组、NSCs 组及对照组小鼠逃避潜伏期差异均有差异 ($p<0.05, p<0.01$)，三组的逃避潜伏期逐渐延长。各组小鼠的平均逃避潜伏期与 NAA/Cr 值呈负相关 (Pearson 相关系数为 -0.906, $p<0.01$)。联合组、NSCs 组小鼠海马区可见移植细胞，部分分化为神经元，部分分化为胶质细胞。

结论：NSCs 和 BDNF 联合治疗较单独使用 NSCs 能更好地改善转基因 AD 小鼠的学习记忆能力。7T 高场强 1H-MRS 作为一种活体、无创的检查方法可以检测转基因 AD 小鼠的 NSCs 移植治疗后的代谢改变，结合行为学检查能够对其疗效作出更客观、有效的评价。

PU-1550

Multiparametric MRI-based fusion radiomics for predicting telomerase reverse transcriptase promoter mutations and progression-free survival in glioblastoma: A multicentre study

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Purpose

Glioblastoma (GBM) with telomerase reverse transcriptase (TERT) promoter mutation is highly invasive, has a high recurrence rate, and requires a large range of Intraoperative radiotherapy. However, intraoperative frozen pathology is unlikely to reveal molecular genetic information about the tumour. This study aimed to evaluate the performance of multiparametric MRI-based fusion radiomics models (MMFRs) to predict TERT promoter mutation status and progression-free survival (PFS) in patients with GBM.

Methods

We retrospectively studied 208 patients with GBM from two hospitals. Institution 1, 85 and 36 patients were randomly assigned to a training and internal validation set, respectively. The external test set comprised 87 patients at Institution 2. Quantitative imaging features were extracted from each patient's T1-weighted, T1-weighted contrast-enhanced, and T2-weighted preoperative images. Using a coarse-to-fine feature selection strategy, four radiomics signature models were constructed based on each of the three MRI sequences and their combination for TERT promoter mutation status and PFS; model performance was subsequently evaluated. Furthermore, we performed subgroup analyses of patients by the radiomics signature of TERT promoter mutation status and PFS to distinguish patients who could benefit from prolonged temozolomide chemotherapy cycles. All statistical and machine-learning algorithms were implemented using R software (version 4.1.3).

Results

TERT promoter mutation status was best predicted by MMFR, with an area under the curve (AUC) of 0.816 (95% CI, 0.718–0.913) and 0.812 (95% CI, 0.664–0.960) for the training and internal validation sets, respectively. The external test set also achieved stable and optimal prediction results, with an AUC of 0.823 (95% CI, 0.716–0.931). MMFR showed better performance in predicting patient PFS compared to the single-sequence radiomics signature (C-index, 0.643, 95%

CI: 0.546–0.740). Subgroup analyses showed that patients with high TERT promoter mutation and survival rates may benefit from prolonged temozolomide chemotherapy cycles.

Conclusions

MMFR is an effective method to predict TERT promoter mutations and PFS in patients with GBM. Moreover, subgroup analysis could differentiate patients who benefited from prolonged TMZ chemotherapy cycles.

PU-1551

基于影像组学应用 T2WI 预测脊髓弥漫中线胶质瘤 H3 K27 改变的研究

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目的：常规 MRI 不足以识别脊髓弥漫中线胶质瘤（SC-DMG）H3 K27 的改变状态。本研究旨在基于术前 MR T2 加权图像（T2WI）开发一种基于放射组学的模型，以确定 SC-DMG 中 H3 K27 的改变状态。

材料和方法：回顾性入组 97 例 SC-DMG 患者，并将其随机分为训练组（n=67）和测试组（n=30）。首先从 T2WI 上自动分割肿瘤并提取 107 个放射学特征，然后通过 Pearson 相关系数和 Kruskal-Wallis 检验选择 11 个特征，用这些特征来训练和测试用于预测 H3 K27 改变状态的逻辑回归（LR）模型。使用随机划分训练集和测试集以及使用其他分类器进行敏感性分析以进行比较。通过确定模型的准确性、敏感性、特异性和曲线下面积（AUC）来评估模型的性能。最后，前瞻性 28 例 SC-DMG 患者用于独立验证 LR 放射组学模型。

结果：放射组学模型准确预测了 H3 K27 的改变状态，在测试和前瞻集中的准确度分别为 0.833 和 0.786，灵敏性分别为 0.813 和 0.750，特异性分别为 0.857 和 0.833，AUC 分别为 0.839 和 0.818。敏感性分析证实了模型的稳健性，预测准确性为 0.767-0.833。

结论：基于术前 T2WI 的放射组学特征可以准确预测 SC-DMG 中 H3 K27 的改变状态，这可能有利于患者精准治疗。

PU-1552

动脉自旋标记（ASL）指标与动态磁敏感增强灌注成像（DSC-PWI）参数在缺血性脑卒中诊断及预测患者预后的对比研究

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目的 比较动脉自旋标记（ASL）指标与动态磁敏感对比增强灌注成像（DSC-PWI）参数在缺血性脑卒中患者血流动力学改变的相关性。并探讨 ASL 中动脉穿行伪影（ATA）对脑卒中患者预后的预测价值。方法 选择我院动脉狭窄/闭塞患者 80 例。所有患者均完成 ASL 及 DSC-PWI 扫描。通过随访结果，将患者分为再发缺血性卒中组和未再发缺血性卒中组，比较两组患者的影像学指标（ASL-CBF、PWI-CBF、PWI-CBV、PWI-MTT、PWI-TTP）在评估脑血流动力学方面参数的相关性。结果 1.ASL-CBF（PLD=1.5S）与 PWI-CBF、PWI-CBV 具有统计学差异（ $P<0.05$ ）；经 Kappa 分析，ASL-CBF（PLD=1.5S）与 DSC-PWI 参数中 PWI-TTP 具有较好的一致性。2. ASL-CBF（PLD=2.5S）与 PWI-MTT、PWI-TTP 具有统计学差异（ $P<0.05$ ）；ASL-CBF（PLD=2.5S）与 PWI-CBF 具有较好的一致性。3.80 例患者中，共 46 例患者的 ASL 图中出现动脉穿行伪影。随

访结果,再发缺血性卒中组 24 例,其中 8 例患者 ASL 图中出现动脉穿行伪影,未再发组 56 例,其中 38 例患者 ASL 图中出现动脉穿行伪影,两组比较有统计学差异 ($P<0.05$)。

结论 1.缺血性脑卒中患者 ASL-CBF (PLD=1.5S) 与 DSC-PWI 技术中 PWI-TTP 参数结果有较好的一致性,ASL-CBF (PLD=2.5S) 与 DSC-PWI 技术中 PWI-CBF 参数结果有较好的一致性,ASL 检查具有无创性、可重复性、安全性等特点。2.ASL 灌注图中动脉穿行伪影 (ATA) 可作为缺血性脑卒中患者预后的预测指标。

PU-1553

铁沉积对帕金森病伴发焦虑患者大脑恐惧回路的影响

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目的:焦虑是帕金森病最常见的精神症状之一,脑铁沉积被认为是帕金森病的病理机制之一。本研究的目的是探讨有焦虑的帕金森病患者与没有焦虑的帕金森病患者相比,尤其是恐惧回路中脑铁沉积的变化。

方法:前瞻性纳入 16 例伴有焦虑症的帕金森病患者、23 例无焦虑症的 PD 患者和 26 名健康老年对照。所有受试者均接受了神经心理学评估和脑磁共振成像 (MRI) 检查。使用基于体素的形态计量学 (VBM) 来研究两组之间的脑形态学差异。定量磁化率成像 (QSM) 是一种能够量化脑组织磁化率变化的 MRI 技术,用于比较三组患者整个大脑的磁化率变化,分析了使用汉密尔顿焦虑评定量表 (HAMA) 量化的焦虑评分与大脑磁化率变化之间的相关性。

结果:患有焦虑症的帕金森病患者的帕金森病持续时间更长,HAMA 评分也高于没有焦虑症的患者。两组之间未观察到脑形态学差异。基于体素和基于 ROI 的 QSM 分析显示,伴发有焦虑症的 PD 患者在内侧前额叶皮层、前扣带皮层、海马体、楔前叶和角回的 QSM 值显著增加。此外,其中一些大脑区域的 QSM 值与 HAMA 评分呈正相关 (内侧前额叶皮层: $r=0.255$, $P=0.04$; 前扣带皮层: $r=0.381$, $P<0.01$; 海马: $r=0.496$, $P<0.01$)。

结论:我们的研究结果支持了帕金森病患者的焦虑与大脑恐惧回路中的铁沉积有关的观点,为解释帕金森病患者焦虑的潜在神经机制提供了一种可能的新方法。

PU-1554

Comparison of 18F-FET PET with 18F-FDG PET for Evaluating Suspected Spinal Cord Tumors

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Background: O-(2-18F-fluoroethyl)-L-tyrosine (18F-FET) PET is widely applied in the diagnosis of brain tumors, but scarce data on spinal cord tumors has been reported. This research was aimed at comparing the diagnostic efficacy of 18F-FET PET and 2-18F-fluoro-2-deoxyglucose (18F-FDG) PET in spinal cord lesions.

Methods: Paired 18F-FDG PET/MRI and 18F-FET PET/MRI were performed preoperatively in 35 patients with suspected spinal cord tumors. Clinical manifestations and PET performance (SUVmean/ SUVmax/ TBRmean/ TBRmax/ MTV/ TLG/ tumor volume) of the patients were collected and compared using group analysis and receiver operating characteristic (ROC) curves.

Results: The 35 patients were divided into three groups according to their pathological diagnosis: high-grade tumors (HGTs, n=6), low-grade tumors (LGTs, n=19), and non-tumor diseases (NTDs, n=10). The background SUVmean of 18F-FET PET was lower than that of 18F-FDG PET ($p<0.0001$), and the delineated tumor volumes were not significantly different ($p>0.05$). The SUVmean, SUVmax, MTV, and TLG of 18F-FDG PET and 18F-FET PET were statistically distinct between HGT and LGT ($p<0.05$). The SUVmax, TBRmax, MTV, and TLG of 18F-FDG PET and 18F-FET PET, as well as the SUVmean of 18F-FET PET, were statistically distinct between HGT and NTD ($p<0.05$). In comparison, all measured parameters of 18F-FDG PET and 18F-FET PET could not differentiate LGT and NTD ($p>0.05$). Particularly, 18F-FET PET provided additional evidence on differential diagnosis over 18F-FDG PET in 1 case with mixed neuronal-glial tumor (MNGT) and 2 cases with intramedullary inflammatory lesions. The optimal cut-off values of SUVmean, SUVmax, TBRmean, TBRmax, MTV, and TLG of 18F-FET PET and 18F-FDG PET in tumors and NTD were calculated under ROC analysis.

Conclusion: 18F-FET PET was non-inferior to 18F-FDG PET in the differential diagnosis of HGT, LGT and NTD and could facilitate the diagnosis of MNGT and inflammatory lesions.

PU-1555

增强 T2 FLAIR 在中枢神经系统淋巴瘤和高级别成人弥漫性胶质瘤鉴别诊断中的价值研究

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【目的】探讨增强 T2 FLAIR 在中枢神经系统淋巴瘤 (Central Nervous System Lymphoma, CNSL) 与高级别成人弥漫性胶质瘤 (High-Grade Adult Diffuse Glioma, HG-ADG) 鉴别诊断中的价值。

【方法】回顾性分析 2014 年-2022 年在我院就诊且病理/随访证实的 CNSL 患者 63 例 (67 个病灶) 和病理证实的 HG-ADG 患者 14 例 (14 个病灶), 术前均行包括增强 T2 FLAIR 和增强 T1WI 在内的头颅 MRI 扫描。依据病灶形态及弥散是否受限, 将肿瘤分为实性肿块型及非实性肿块型。通过视觉评分对肿瘤强化特点进行评价, 评价指标包括: 肿瘤实质的强化均匀性、强化程度及肿瘤实质边缘薄层强化的强化程度、强化范围。采用 SPSS 26.0 软件进行统计学分析。采用 Mann-Whitney U 检验比较 CE-T2 FLAIR 图像上实性肿块型 CNSL (58 例) 与实性 HG-ADG (14 例) 强化特征是否存在统计学差异, 以 $P < 0.05$ 为差异有统计学意义。

【结果】在 CE-T2 FLAIR 图像上, 两组肿瘤实质强化的均匀性差异无统计学意义, 但两组肿瘤实质的强化程度、肿瘤边缘薄层强化的强化程度及范围差异有统计学意义 ($P=0.0001$)。实性肿块型 CNSL 表现为中等及大范围 (68 % -99 %) 强化, 实性 HG-ADG 无强化。

【结论】CNSL 的 CE-T2 FLAIR 图像上肿瘤实质边缘出现明显薄层强化 (薄环征) 的概率较高。该征象对实性肿块型生长的 CNSL 与实性 HG-ADG 的鉴别诊断具有重要价值, 对指导临床治疗决策的制定具有重大意义。

PU-1556

改良 ASPECTS 评分预测超急性缺血性卒中患者静脉溶栓后住院天数和短期预后的研究

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目的 探讨改良 ASPECTS 评分预测超急性缺血性卒中患者静脉溶栓治疗后住院天数和短期预后的价值。

方法 选取 85 例接受静脉溶栓治疗的超急性缺血性卒中患者，根据 3 个月后 mRS 评分结果分成预后良好组（n=53）和预后不良组（n=32），收集患者临床资料，基于患者入院时平扫 CT 以及 72 小时内 MRI 复查的 DWI 图像进行改良 ASPECTS 评分，Logistic 回归分析确定不良预后的危险因素，使用受试者工作特征（ROC）曲线分析改良 ASPECTS 评分对住院天数和短期预后的预测效能。

结果 两位高年资放射医师的改良 ASPECTS 评分的一致性较好， $ICC=0.938$ （ $P<0.05$ ），两组患者的年龄、入院 NIHSS 评分、住院天数和改良 ASPECTS 评分存在差异（ $P<0.05$ ）。Logistic 回归分析显示改良 ASPECTS 评分、hs-CRP 和年龄是影响超急性缺血性中风患者不良预后的独立危险因素（ $P<0.05$ ），改良 ASPECTS 评分预测患者住院天数和不良预后的曲线下面积（AUC）分别为 0.751 和 0.815（ $P<0.05$ ）。

结论 改良 ASPECTS 评分在预测接受静脉溶栓治疗的超急性缺血性卒中患者住院天数和短期预后方面具有一定的价值，在医疗决策中应予以考虑。

PU-1557

基于临床因素、CT 征象及影像组学模型对 AIS-LVO 患者 MT 术后脑内 HDA 的鉴别诊断研究

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目的：基于临床危险因素、术后首次颅脑 CT 平扫征象及影像组学数据分别构建临床因素&CT 征象模型、影像组学模型及联合模型，探讨影像组学对大血管闭塞性急性缺血性脑卒中（AIS-LVO）机械取栓术（MT）后脑内高密度灶（HDA）的鉴别诊断价值。

方法：回顾性收集 2015 年 12 月至 2022 年 12 月因 AIS-LVO 在苏州大学附属第二医院（中心 I）符合条件的患者 156 例，以 7:3 的比例随机分为模型训练集（n=109）及内部验证集（n=47），同时收集东南大学附属中大医院（中心 II）患者的数据作为外部验证集（n=63）。根据诊断标准将三个数据集的患者分为出血性转化（HT）组和非出血性转化（non-HT）组（单纯对比剂外渗组）。本研究将中心 I、II 入组患者的临床及影像学数据进行单因素、多因素 Logistic 回归分析构建临床因素&CT 征象模型；通过图像分割与 ROI 勾画、特征提取与筛选后纳入最优特征集，构建影像组学模型以及联合模型。采用组内相关系数评价特征提取的一致性；采用受试者工作特征曲线评价各个模型的诊断效能；DeLong 检验比较三个模型诊断效能之间是否具有统计学差异；绘制模型校准曲线和决策曲线（DCA）以评估模型校准度和临床实用性；最终将最佳模型可视化列为列线图。

结果：三个模型中以联合模型诊断效能最高，其 AUC 值在训练集、内部验证集和外部验证集中分别达到了 0.895、0.882、0.820，经 DeLong 检验，联合模型与临床因素&CT 征象模型的诊断效能

在三个数据集中均具有统计学差异；决策曲线表明，在外部验证集中，当阈值概率约为 16%-44% 时，联合模型的临床净获益最高，表明临床实用价值最高，最终绘制联合模型的 Nomogram 图。结论：基于影像组学的联合模型表现最优，表明影像组学特征可作为一种影像学生物标志物，有助于临床对 MT 术后 HDA 性质的早期判断，从而为临床个体化精准治疗提供有力依据。

PU-1558

原发性髓内组织细胞肉瘤一例

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患者女，48 岁，因“左下肢无力伴肢体麻木疼痛 10 天余”入院。既往无特殊病史。颈胸椎 MRI 平扫及增强：C2-T8 水平脊髓肿胀并 T1-2 水平结节状强化。临床经大剂量激素冲击治疗 12 天后，患者感双下肢无力、麻木较前加重，复查颈胸椎 MRI：脊髓肿胀较前好转，强化结节较前无明显变化，考虑肿瘤可能。全院会诊后行 T1-2 椎管内病损切除术。术中发现病灶位于 T1-2 脊髓内左侧，灰白色，质地较韧，血供丰富，与正常脊髓无明显边界。病理切片外送多家医院病理会诊考虑：T1-2 髓内组织细胞肉瘤。8 个月后患者感左侧面部麻木并嘴角稍歪斜，复查颅脑 MRI 增强扫描，发现多发颅神经增粗并双侧面听神经结节状突起，于 1 个月后再次复查发现结节较前明显增大。查腰椎 MRI 发现 L1-4 水平椎管内团片状异常强化信号。HS 是一种罕见的起源于单核/巨噬细胞的淋巴造血系统恶性肿瘤，常发生于淋巴结、皮肤、肠道及骨骼等部位；中枢神经系统的原发性 HS 极为罕见，可发生于脑实质、脑膜、脊髓等，脊髓原发性 HS 目前国内未见文献报道。HS 通常具有很强的侵袭性，患者中位生存期一般为数月，但局限性 HS 患者在及时诊断和积极的临床治疗下，可存活数年。本例确诊 HS 后行放疗及靶向治疗（替莫唑胺+安罗替尼），治疗后 8 个月多发颅神经增粗并结节形成及腰髓内新发异常强化信号，考虑已肿瘤转移可能。HS 术前诊断困难，明确诊断主要依靠病理组织及免疫组化检查。原发于脊髓的 HS 需要与髓内肿瘤及脱髓鞘病变进行鉴别，但 HS 的临床表现及影像表现因发病部位不同而不同，且无显著特异性。文献显示中枢神经系统 HS 有 60% 的患者存在炎症浸润表现，本例原发性胸髓 HS，MRI 表现为类脊髓弥漫炎性病变，平扫难以将肿瘤组织与炎性水肿区分开，增强扫描肿瘤呈明显强化；HS 进展迅速，激素冲击治疗无明显疗效。因此当脊髓内占位生长迅速、症状严重、脊髓弥漫水肿且激素治疗后肿瘤无明显变化时，应考虑髓内 HS 可能。

PU-1559

低剂量 CT 灌注成像在动脉瘤性蛛网膜下腔出血后迟发性脑缺血中的应用价值

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目的：探讨预测动脉瘤性蛛网膜下腔出血（aSAH）后迟发性脑缺血（DCI）的有效 CT 灌注（CTP）成像参数和检查时间。

材料与方法：39 例 aSAH 患者在发病 24 小时内接受基线低剂量 CTP 检查，并且在第 4 和 7 天复查 2 次低剂量 CTP，且 3 次 CTP 扫描参数均一致；并对 3 次 CTP 检查的定量参数：脑血容量（CBV）、脑血流量（CBF）、平均通过时间（MTT）和峰值时间（TTP），半定量参数两侧 CBV、CBF 的比值（rCBV、rCBF）和两侧 MTT、TTP 差值（ Δ MTT、 Δ TTP）进行对比分析。

结果：39 例患者中 12 例发生 DCI（DCI 组），27 例未发生 DCI（非 DCI 组）。DCI 组 3 次检查间 CBF、rCBF 和 Δ MTT 值差异均有统计学意义，但第 4 和 7 天间差异均无统计学意义。DCI 组的

CBF 和 rCBF 均低于非 DCI 组。第 4 和 7 天 CTP 检查中, DCI 组的 Δ MTT 比非 DCI 组长。鉴别 DCI 和非 DCI 的最佳阈值为 CBF: 40.1ml/100g/min、rCBF: 0.90、 Δ MTT: 0.33s。第 4 天复查 CTP 是预测 aSAH 后 DCI 的合适时间。

结论: aSAH 后第 4 天复查 CTP 有助于早期诊断 DCI, CBF、rCBF 和 Δ MTT 是预测 DCI 的有效灌注参数。

PU-1560

3D-ASL 鉴别诊断小脑血管母细胞瘤和毛细胞星形细胞瘤的价值

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【摘要】目的: 探讨磁共振 (MRI) 三维动脉自旋标记 (3D-ASL) 技术鉴别诊断小脑血管母细胞瘤 (HB) 和毛细胞星形细胞瘤 (PA) 的价值。**方法:** 回顾性分析经手术病理证实的 28 例 HB 和 21 例 PA 的 MRI 资料。分别测量并计算 HB 和 PA 肿瘤实性部分的最大脑血流量 (CBFmax)、相对最大脑血流量 (rCBFmax)。采用独立样本 t 检验比较 HB 组和 PA 组各参数之间差异; 采用 ROC 曲线评价肿瘤实性部分各参数值鉴别诊断 HB 和 PA 效能。**结果:** HB 的 CBFmax、rCBFmax 均明显高于 PA, 差异有统计学意义 ($P < 0.05$)。当 CBFmax $> 89.35 \text{ ml} \cdot 100\text{g}^{-1} \cdot \text{min}^{-1}$ 时, 其诊断 HB 敏感度为 89.48%, 特异度为 85.39%, AUC 为 0.809; 当 rCBFmax > 3.95 时, 其敏感度为 91.75%, 特异度为 85.53%, AUC 为 0.817; CBFmax+rCBFmax 诊断 HB 的敏感度为 93.82%, 特异度为 91.16%, AUC 为 0.943。CBFmax+rCBFmax 的 AUC 最大, 其次为 rCBFmax、CBFmax, 三者间差异有统计学意义 (P 均 < 0.05)。**结论:** 3D-ASL 可无创性定量鉴别诊断小脑 HB 与 PA, CBFmax+rCBFmax 鉴别诊断 HB 和 PA 的效能优于单独使用 rCBFmax 或 CBFmax。

PU-1561

The feasibility of using CTP combined with spectral CT angiography to assess characteristics of cerebral hemodynamics in moyamoya disease

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Purpose: Aimed to provide more abundant cerebral hemodynamics information in moyamoya disease (MMD), the feasibility of using CTP combined with multi-parameter spectral CT angiography (sCTA) was explored.

Methods and Materials: Clinical and imaging data of 10 patients with bilateral-abnormal MMD in The Second Affiliated Hospital of Nanchang University from January 2022 to March 2023 were reviewed retrospectively. All patients underwent head and neck CTA and dynamic cerebral CTP with fast-switch spectral CT. Ten patients with bilateral moyamoya disease with a total of 20 cerebral hemispheres were included, and Regions Of Interest (ROIs) were placed in the frontal, temporal, and occipital gray and white matter regions at the optimal level of the basal ganglia and in the cerebral parenchyma at the maximal level of the cerebellum. In these ROIs, normalized CTP parameters: cerebral blood volume (nCBV), cerebral blood flow (nCBF), mean Transit time (nMTT), Time To Peak (nTTP) and Normalized sCTA parameters: CT value of Virtual Monoenergy Image of 40 keV (NCTVMI40), Iodine density map (NID), Effective atomic number (NZeff) were calculated via cerebellar ratio method ($((X\text{-ROI sCTA/CTP parameters})/(\text{Cerebellum sCTA/CTP parameters}))$). Furthermore, Pearson's correlation coefficient was used to analyze the

correlation between normalized CTP and sCTA parameters to demonstrate the common trends and extra-value differences.

Results: Based on 10 bilateral-abnormal MMD cases, there were positive correlations between NCTVMI40 and nCBV ($r=0.48$, $P<0.01$), NCTVMI40 and nCBF ($r=0.499$, $P<0.01$), NZeff and nCBV ($r=0.465$, $P<0.01$), NZeff and nCBF ($r=0.459$, $P<0.01$), NID and nCBV ($r=0.437$, $P<0.01$), NID and nCBF ($r=0.414$, $P<0.01$).

Conclusions: In addition to head and neck vascular evaluation, sCTA parameters in this study were moderately correlated to several CTP parameters, which shows the potential to provide more aspects to evaluate complicated cerebral hemodynamics in MMD compared to separate CTP, and even high diagnose confidence.

PU-1562

Structural brain assessment of adults with MRI-negative temporal lobe epilepsy based on surface-based morphology features

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Abstract

Purpose: This study aims to investigate the clinical significance of cortical morphological structures in the diagnosis of MRI-negative temporal lobe epilepsy (TLE-N).

Methods: The study included 29 patients with clinically confirmed TLE-N and a control group of 30 healthy subjects matched for gender and age. Surface-based morphology (SBM) postprocessing method was used to analyze the 3D-T1WI imaging results of patients' skull MRI, and the characteristic values of cortical structures such as thickness, surface area, volume, curvature, sulcal depth, and other parameters were extracted.

Results: Compared to the healthy control group, the TLE-N group showed increased thickness of the insular cortex in both hemispheres. Decreased curvature of the piriform cortex and the insular granular complex in the right hemisphere and decreased volume of the OP1/SII and the third visual area in the left hemisphere were also observed in the TLE-N group compared to the healthy control group. No statistically significant significances were found in the cortical surface area and sulcal depth between the groups.

Conclusion: Preliminary studies have shown microchanges in the morphological structure of the cerebral cortex in patients with TLE-N. The SBM method holds clinical significance for the diagnosis of these patients and the localization of epileptic focus. Analyzing the morphological microstructure of the cerebral cortex is essential for studying the pathophysiological mechanism of TLE.

PU-1563

原发性失眠患者关于额叶脑区内的脑活动异常改变的静息态功能磁共振成像研究

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目的: 探索原发性失眠(primary insomnia, PI)患者额叶脑区内功能连接的改变, 以期获得额叶内相对核心脑区, 对未来诊疗提供精准脑区定位。材料与方法: 20 例 PI 患者(女 15 例, 男 5 例)和 20 例年龄、性别、受教育程度相匹配的睡眠优良者(女 15 例, 男 5 例)。使用血氧水平依赖功能磁共振

振成像(blood oxygen level dependent-fMRI,BOLD-fMRI)和镜像同伦连接(VMHC)方法分析 PI 患者额叶脑区内功能连接异常改变。结果: 在 PI 患者中, 我们发现异常功能连接区域主要集中在眶部额上回 (L/R)、眶部额中回 (L/R)、岛盖部额下回 (L)、眶部额下回 (L) ($p < 0.05$)。在镜像同伦连接结果中发现眶部额中回存在功能连接异常 (GFR correction, voxel $P < 0.01$, cluster $P < 0.025$)。结论: 研究通过静息态功能连接影像学方法识别失眠患者额叶内部的异常功能连接情况, 异常区域主要位于眶额部脑回以及岛盖部额下回, 这更有利于了解失眠在额叶区域内的异常神经活动机制, 获得额叶内部受影响核心脑区, 为失眠患者的预测与诊疗提供一个相对精准的脑区依据。

PU-1564

白质结构连接组拓扑效率与阿尔茨海默病血浆生物标记物及认知在 AD 连续过程中的关系

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目的: 尽管血浆标记物已经被广泛应用于阿尔茨海默病 (AD) 的早期筛查诊断研究中, 但其与脑网络拓扑、认知之间的联系在 AD 连续过程 (AD continuum) 中尚不清楚, 本研究联合应用神经影像, 血浆标记物及认知评估结果, 探究血浆标记物-网络效率-认知在 AD 联系过程中的关系。

方法: 我们从中国认知下降纵向研究 (SILCODE) 队列中分析了 287 名参与者的血浆生物标记物, 包括 β 淀粉样蛋白 42, 40 及其比值 ($A\beta_{42}$, $A\beta_{40}$, $A\beta_{42}/A\beta_{40}$)、磷酸化 tau181 (p-tau181)、胶质纤维酸性蛋白 (GFAP) 和轻链神经丝蛋白 (NfL) 的水平, 并评估了 395 名参与者的白质网络效率。趋势分析评估了血浆标记物和网络效率与 AD 进展的敏感性。相关性和中介分析进一步探讨了血浆标记物、网络效率和 AD 连续过程中认知之间的关系。

结果: 在血浆标记物中, GFAP 表现出最高的与 AD 病程进展相关的敏感性, 其次是 NfL、p-tau18 和 $A\beta_{42}/A\beta_{40}$ 。多个脑区的局部效率降低, 并与血浆 GFAP、NfL 和 p-tau181 存在显著相关性。

同时, 我们发现了网络效率介导了血浆标记物和认知之间的关系。

结论: 我们的发现支持了脑网络效率-血浆标记物的联合应用分析在早期筛查和诊断 AD 方面的潜力。

PU-1565

中国 AD 临床前期联盟认知衰退中国纵向研究的患者客观认知功能与载脂蛋白多态性的相关研究

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目的 观察中国 AD 临床前期联盟认知衰退中国纵向研究 (SILCODE) 的患者客观认知功能与载脂蛋白 E 多态性的相关性。

方法 对 537 例参与 SILCODE 的患者进行神经心理学量表评价, 评估其记忆及认知功能, 同时进行载脂蛋白 E (ApoE) 基因型的分型, 并结合相关检查, 诊断出认知功能未受损组和认知功能受损组 (包括轻度认知功能障碍 MCI 和阿尔茨海默病 AD)。

结果 AD 组 $\epsilon 4$ 携带者占比例最高, 其次为 MCI 组, 认知功能未受损组比例最低。在认知功能未受损组, $\epsilon 4$ 携带者与 $\epsilon 4$ 非携带者的认知功能比较无显著差异, 在认知功能受损, $\epsilon 4$ 携带者与 $\epsilon 4$ 非携带者的认知功能比较有显著差异组。

结论 $\epsilon 4$ 是 AD 的风险因子, $\epsilon 4$ 携带者的患者记忆和认知功能损害更严重。

PU-1566

Research progress on biological and MRI markers of postoperative delirium: a narrative review

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Postoperative delirium is one of the common postoperative complications in elderly patients, which seriously affects the short- and long-term prognosis of patients. At present, the clinical evaluation of delirium is mostly dependent on the highly subjective scale, exploring objective serum biomarkers as well as MRI markers in clinical practice is of great significance for prevention and the early diagnosis or evaluation of postoperative delirium. In this paper, after research the Pubmed, embase and web of science, we present progress of potential markers of postoperative delirium is reviewed from the aspects of related genes, neurotransmitters cytokines and products caused by inflammation or nerve injury, as well as structural and Functional Magnetic Resonance sequences. This reviews provide reference for clinical diagnosis and scientific research in this field.

PU-1567

DRD4 基因型对注意缺陷多动障碍儿童和健康对照者大脑局部活动强度的不同影响

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目的: 广泛的研究证明注意缺陷多动障碍 (ADHD) 与多巴胺 D4 受体基因 (DRD4) 有关。然而, ADHD 中与多巴胺受体基因相关的脑功能表型仍有待研究。本次研究试图调查 ADHD 中与多巴胺受体基因相关的更敏感的大脑活动的特征。

方法: 我们采集了 140 名未接受药物治疗的 ADHD 儿童和 35 名健康对照者 (年龄 6-15 岁) 的静息功能磁共振图像, 并利用静态低频波动幅度和动态低频波动幅度标准差检查了 DRD4 2-重复等位基因对两组受试者局部大脑活动强度的影响, 进行体素双向 ANCOVA 分析 sALFF 和 dALFF 的基因型诊断相互作用。

结果: 在额叶 (包括右侧直回、左侧额下回和左侧中央旁小叶) 显示出基因型诊断对 sALFF 的显著交互作用。除了右侧直回、左侧额下回, 还发现右侧额中回显示出基因型诊断对 dALFF 的显著交互作用。成对后分析显示, 与 DRD4 相关的低频波动幅度变化因诊断而异。此外, 研究还表明, 上述脑区的 sALFF 和 dALFF 与神经心理学测量得分之间存在显著的相关性。

结论: 这些发现表明, ADHD 患儿多巴胺系统的改变可能导致了额叶局部活动强度及其动态变化的异常, 这可能与认知功能有关。此外, 动态低频波动幅度变化可能是区分 ADHD 患儿和健康对照组的潜在生物标志物。

PU-1568

A neuroimaging study of postpartum post-traumatic stress disorder based on internal tocodynamometry during labor and childbirth

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Abstract

Objectives Postpartum post-traumatic stress disorder (PP-PTSD) is a severe psychiatric disorder and can lead to poor maternal mental health, impairment in mother-infant bonding, and relationship stress. The condition is considered to have multiple pathogenic factors. However, the underlying neurobiological mechanism of PP-PTSD keeps unclear.

Methods

A total of 245 healthy first-time pregnant women who have the intention of vaginal delivery were recruited for the study. The fetal head descent thrust of all participants was measured during delivery (measurements were taken at 3 cm, 5cm, and 8cm of cervical dilation), and relevant data were recorded. All participants filled in online questionnaires. Resting-state magnetic resonance imaging (MRI) was performed on 26 women diagnosed with postpartum post-traumatic stress disorder (PP-PTSD), the amplitude of low-frequency fluctuations (ALFF) technology was used to observe the spontaneous neural activity of all PP-PTSD patients, and correlation analyses were performed to investigate the relationship between PP-PTSD severity and a range of demographic/clinical factors that may contribute to it.

Results

Internal tocodynamometry results indicated that when the uterine dilation was 3cm, the natural delivery rate of women with fetal head descent thrust $<7N$ was lower than that of other women with fetal head descent thrust $\geq 7N$. When the uterine dilation was 5cm, the natural delivery rate of women with fetal head descent thrust $<16N$ was lower than other women with fetal head descent thrust $\geq 16N$. When the uterine dilation was 8cm, the natural delivery rate of women with fetal head descent thrust $<26N$ was lower than other women with fetal head descent thrust $\geq 26N$. There were significant differences between the sample rates of natural delivery and cesarean section ($P < 0.05$). Resting-state functional magnetic resonance imaging (rs-fMRI) results showed that, in the PP-PTSD group, decreased ALFF in the bilateral insula cortex (IC), right anterior cingulate cortex (ACC), and left midcingulate cortex (MCC) compared with HPW (False discovery Rate (FDR) correction q-value < 0.05). The ALFF value of the right ACC was positively correlated with the PPQ score ($r=0.4046$ $p=0.0403$) and PCL-C score ($r=0.3909$ $p=0.0483$).

Conclusion

In PP-PTSD patients, abnormal spontaneous activities existed in brain regions related to emotion, cognition, and memory functions. Our results also provided essential information on a protective labor monitoring mode for women to reduce PP-PTSD incidence.

PU-1569

MR 高分辨血管壁增强扫描在急性与非急性脑梗死大脑中动脉斑块的强化特点以及评估价值

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目的：探究分析高分辨磁共振血管壁成像（high-resolution magnetic resonance vessel wall imaging, HRMR-VWI）增强技术在急性与非急性脑梗死大脑中动脉斑块强化特征以及评估价值。方法：前瞻性收集 2021 年 7 月—2023 年 6 月在运城市中心医院神经内科住院治疗的脑梗死患者 50 例，据患者病情分为急性期组与非急性期组，各 25 例。患者入院 3 d 内均接受头弥散 DWI，动脉 MRA 检查与 HRMR-VWI 增强检查。比较两组斑块强化情况。结果：急性期组大脑中动脉斑块强化指数及斑块强化率显著高于非急性期组（ $P < 0.05$ ）。结论：当患者病发急性脑梗死时其脑血管中斑块强化明显，且动脉最狭窄处斑块存在明显强化时，极易诱导脑梗死急性发作，因而高分辨 MR 血管壁成像（HRMR-VWI）技术在大脑中动脉血管斑块诊断中具显著临床价值。

PU-1570

脑干非肿瘤性病变的 MRI 诊断及临床决策

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目的：通过对脑干非肿瘤性病变的诊断及鉴别诊断，提示临床及时针对性治疗。方法：搜集 2020 年 1 月到 2023 年 1 月就诊于山西医科大学第一医院怀疑脑干病变患者 319 例，其中男 180 例，女 139 例，年龄 26-80 岁，平均年龄 63.8 岁；所有患者均为初次发病，症状包括：肢体无力、意识障碍、头晕、呕吐、吞咽困难、癫痫等；所有患者均行头颅磁共振扫描，扫描序列包括 T1WI、T2WI、flair、DWI，扫描图像由两名主治医师进行诊断。结果：脑梗死 217 例，脑干出血 58 例，脑干脑炎 13 例，桥脑中央髓鞘溶解症 9 例，脱髓鞘病变 31 例，脑干萎缩 18 例；所有病例病灶均为单发。结论：根据 MRI 表现分析病灶形态、分布、信号特点，对各个疾病进行精确诊断，及时准确指导临床决策，对患者进行对症治疗。

PU-1571

非典型性脉络丛乳头状瘤的 MRI 诊断

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目的：分析非典型性脉络丛乳头状瘤的临床与影像学表现特点，以提高临床对本病的认识。方法：收集经我院病理证实的 5 例非典型性脉络丛乳头状瘤，结合相关文献分析其 MRI 表现。5 例病例术前均行头颅 MRI 平扫及增强扫描，均为单发肿瘤。其中男性 3 例，发病年龄分别为 10 岁、26 岁、42 岁；女性 2 例，发病年龄分别为 16 岁、27 岁。临床症状包括：头痛、眩晕、走路不稳等，其中，3 例位于侧脑室，1 例位于第四脑室，1 例位于左侧桥小脑角区。结果：5 例非典型性脉络丛乳头状瘤中，2 例呈囊实性改变，实性部分 T1WI 呈稍低信号，T2WI 呈稍高信号，增强后实性肿块、囊壁及分隔呈明显强化；3 例呈菜花状生长的实性肿块，T1WI 呈稍

低信号，T2WI 呈稍高信号，增强后肿块呈中—重度均匀强化；位于桥小脑角区的病例呈不规则状并沿 Luschka 孔塑形生长。3 例伴瘤周水肿，2 例可见“囊泡征”。1 例 CT 表现密度稍高，可见钙化。结论：非典型脉络丛乳头状瘤具有一定的影像学特点，表现为肿块边界较清楚，脑组织浸润、瘤内囊变、出血等恶性征象较少见。位于脑室或桥小脑角区的“菜花状”肿块，呈塑形形式生长，明显强化，肿块周围可见“囊泡征”。

PU-1572

以癫痫为首发症状的脑内疾病的 MRI 诊断及分析

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目的：分析、总结可引起癫痫的疾病的 MRI 表现，为临床治疗提供影像学依据。

方法：搜集 2020 年 1 月到 2022 年 5 月就诊于山西医科大学第一医院以癫痫发作为首发症状的患者 275 例，其中男 158 例，女 117 例，年龄 6-78 岁，平均年龄 56.8 岁；所有患者均为初次发病，均行头颅磁共振扫描及海马冠状位薄层扫描，扫描序列包括 T1WI、T2WI、flair、DWI 和海马冠状位薄扫序列，扫描图像由两名主治医师进行诊断。

结果：颅内异常者 259 例，无异常者 16 例；海马硬化者 19 例，病毒性脑炎者 36 例，颅内占位者 139 例，外伤或占位术后者 60 例，脑先天发育异常者 5 例。

结论：根据 MRI 表现，对各个疾病进行精确诊断，对患者进行对症治疗及手术治疗，从而对减轻患者痛苦，更好的服务临床。

PU-1573

酮症性偏侧舞蹈症一例并文献复习

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偏侧舞蹈症（hemichorea, HC）是一种少见的运动障碍疾病，常由基底节区或其联系纤维受损引发锥体外系症状。引起 HC 的原因很多，包括脑血管病和神经退行性、感染性、药物性、代谢性、免疫相关性疾病等，其中以脑血管病最常见。既往报道的糖尿病非酮症性偏侧舞蹈症（hemichorea associated with non-ketotic hyperglycemia, HC-NH）在临床上就比较少见，而酮症性偏侧舞蹈症更罕见，国内外报道 仅见于年轻人 1 型糖尿病酮症酸中毒患者，而在老年 2 型糖尿病患者中未见报道，极易被误诊为脑血管病，从而延误治疗。本文从临床及影像介绍偏侧舞蹈症，以期提高对此病的认识，防止漏诊误诊，影响治疗。

PU-1574

自由潜致减压病脑部影像学征象分析及快速反应联合高压氧成功救治一例

贺琦

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患者在自由式屏气潜水训练过程中, 由于上升速率过快导致减压病, 以弥漫性神经系统为特点, 经过快速反应远程联合会诊并确诊, 使用常规氧舱及药物救治效果不佳, 二次转运致潜水减压舱, 并成功救治。

PU-1575

prognostic value of CTA combined with CTP imaging parameters and serum biology for recurrent stroke events

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Objective: To assess the prognostic value of imaging parameters in computed tomography perfusion (CTP) combined with computed tomography angiography (CTA) examination and serum biomarkers for the prediction of recurrent stroke events at three-month and one-year follow-up. Methods: A total of 136 patients with cerebral infarction diagnosed for the first time were included in the retrospective cohort study. These patients received CTA+CTP one-stop examination and serum biomarkers testing, followed by three-month and one-year follow-ups for the occurrence of recurrent stroke events. Recurrent stroke events are defined as ischemic stroke, retinal infarction, intracerebral hemorrhage, subarachnoid hemorrhage, and death. Results: The recurrent stroke events rate was 23.3% (32 cases) and 36.7% (50 cases) at three-month and one-year follow-ups, respectively. Ischemic penumbra (IP) (OR=1.010, P=0.029) and mRS score (OR=1.282, P=0.038) were independent predictors for recurrent stroke events at the three-month follow-up, so were Lp(a) (OR=1.002, P=0.044), vascular stenosis severity (OR=1.489, P=0.029), mRS (OR=1.282, P=0.038) at the one-year follow-up. Conclusions: Among patients with cerebral infarction diagnosed for the first time, ischemic penumbra, mRS, Lp(a) and vascular stenosis severity are the most powerful predictors of recurrent stroke events at three-month and one-year follow-ups.

PU-1576

角回的功能层次及其潜在的遗传结构

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目的: 角回 (AG) 处于多感觉信息汇聚的位置, 具有丰富的结构和功能连接, 是一个在功能和解剖学上均具有异质性的结构。我们使用最先进的功能连接梯度分析和转录-神经成像关联分析的方法, 试图确定 AG 是否存在一个主要的层次结构, 如果存在的话, 它如何被潜在的遗传结构所调节。材料与方法: 从发现集和验证集的 793 名健康被试中获取静息态功能磁共振成像 (rs-fMRI) 数据。将扩散映射嵌入技术应用于体素水平 AG 与大脑间功能连接矩阵, 以计算 AG 的功能梯度。我们确

定了 AG 功能连接模式的主梯度, 并研究其与内在几何学, 功能网络, 行为域的相关性。结合 Allen 人脑图谱, 我们探索了 AG 的功能主梯度与基因表达之间的空间相关性。

结果: AG 主梯度的拓扑形式表现为背前-腹后的层次结构, 并且与其内在几何学显著相关。同时, 对应于经典的功能网络的 AG 功能亚区 (行为域) 沿主梯度呈层级分布, 即从默认网络 (抽象认知) 的一端到视觉和感觉运动网络 (感知和行动) 的另一端。值得注意的是, 我们在 AG 主梯度和基因表达之间建立了关联, 并提取出对该关联具有强烈贡献的两个基因集, 发现这两个基因集在功能注释和特异性表达上存在明显差异。

结论: 我们的发现表明了 AG 功能组织在概念上的重大进展, 为健康和疾病中 AG 的功能和结构的研究提供新的思路。

PU-1577

基于 MRI 人工智能自动检测脑白质高信号患者认知损害及相关因素的因果分析

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目的: 白质高信号(WMH)在衰老的大脑中很常见, 与认知能力下降和痴呆有关。本研究采用深度学习和影像组学技术建立 WMH 患者认知损害检测模型, 分析认知损害与相关因素之间的因果关系。

方法: 回顾性收集重庆医科大学附属第二医院 79 例 WMH Fazekas 分级 2 级及以上患者, 随机分为训练集 (62 例) 和内部验证集 (17 例); 重庆大学附属中心医院 29 例 WMH Fazekas 分级 2 级及以上患者作为独立外部验证集。根据认知状态分为有认知损害组和无认知损害组。使用 Freesurfer 工具获取大脑皮层和核团的特征。利用 U-Net 网络演化的 VB-net 网络在 T1WI 和 FLAIR 序列自动行 WMH 及周围区域的识别、分割。通过 Research Portal Vx. X 在 T1WI 和 FLAIR 序列上建立 WMH 自动分割框架结构从每个 WMH 和周围区域感兴趣区域中, 自动提取 2264 个影像组学特征。利用白质分区模板, 得到 36 个分区的白质体积、WMH 体积以及 WMH 在白质中的比例。将临床特征、皮层特征、核团特征、WMH 特征分别进行降维, 然后在训练集上采用 4 个独立的机器学习分类器 (逻辑回归、高斯过程、随机森林和二次判别分析) 进行训练, 并在验证集上进行验证。采用受试者工作特性曲线下面积指标评价模型性能。采用 Delong 检验对模型的性能进行比较。采用因果分析模型对脑皮层、脑白质、核团的改变与认知障碍的关系进行因果分析。

结果: 与其他模型相比, 基于白质特征的 logistic 回归(LR)模型表现最佳, 在外部测试数据集中的 AUC 为 0.819。因果分析表明, 年龄、受教育程度、脑皮层、脑白质和核团的改变是导致认知障碍的原因。皮层的改变是核团改变的原因。皮层与脑白质、脑白质与核团的变化呈双边因果关系。

结论: 基于白质特征的 LR 模型可用于 WMH 患者认知功能障碍的检测, 准确率较高。明确了脑皮层、脑白质、脑核的改变与认知功能障碍的因果关系。

PU-1578

探讨动态磁敏感对比增强 MRI (DSC-MRI) 监测脑胶质瘤复发 和治疗后反应的应用价值

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目的:

探讨动态磁敏感对比增强 MRI (dynamic susceptibility contrast MRI, DSC-MRI) 灌注成像在监测脑胶质瘤术后复发和治疗后反应的应用价值。

方法:

26 例脑胶质瘤患者 (15 例脑胶质瘤复发, 11 例治疗后反应) 在同步放化疗结束 2 月内行头部常规 MRI 扫描、增强扫描及 DSC 脑灌注成像, 通过 DSC 软件分析, 对图像后处理得到病例异常强化区、水肿区的相对脑血容量 (relative cerebral blood volume, rCBV)、相对脑血流量的 (relative cerebral blood flow, rCBF) 的伪彩图, 分别测量病例异常强化区、水肿区的 rCBV 值、rCBF 值, 采用两样本 t 检验比较两组各参数值是否存在差异。

结果:

复发组的异常强化区平均 rCBV 值及 rCBF 值均显著高于放射性脑损伤组 [(5.62±2.01) vs (2.17±0.94); (5.14±1.96) vs (1.96±1.25), $P<0.05$], 强化区两灌注指标在肿瘤复发和治疗后反应两组间差异有统计学意义。复发组的水肿区平均 rCBV 值及 rCBF 值均显著高于放射性脑损伤组 [(4.11±1.17) vs (1.72±0.83); (3.76±1.83) vs (1.43±0.65), $P<0.05$], 水肿区两灌注指标在肿瘤复发和治疗后反应两组间差异有统计学意义。

结论:

DSC-MRI 能早期评估脑胶质瘤复发和治疗后反应, 为脑胶质瘤患者在临床上的进一步治疗提供影像依据。

PU-1579

Peritumoral radiomics for identification of telomerase reverse transcriptase promoter mutation in patients with glioblastoma based on preoperative MRI

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Purpose

Glioblastoma (GBM) is a severe central nervous system tumor with a poor prognosis. Recently, molecular markers like TERT promoter mutation have become critical for accurate diagnosis and prediction of patient outcomes. Current research suggests a correlation between the presence of TERT promoter mutation and higher tumor aggression, advocating for maximum surgical resection where possible. Given the value of peritumoral regions, utilizing DL features in these areas might prove beneficial for non-invasive evaluation of TERT promoter mutations. This study aims to evaluate the value of intra- and peritumoral deep learning (DL) features based on multi-parametric magnetic resonance imaging (MRI) for identifying telomerase reverse transcriptase (TERT) promoter mutation in glioblastoma (GBM).

Methods

In this study, we included 229 patients with GBM who underwent preoperative MRI in two hospitals (training set: 115, external test sets: 114). We used four 2D Convolutional Neural Networks (GoogLeNet, DenseNet121, VGG16, and MobileNetV3-Large) to extract intra- and peritumoral DL features. The Mann–Whitney U test, Pearson correlation analysis, least absolute shrinkage and selection operator, and logistic regression analysis were used for feature selection and construction of DL radiomics (DLR) signatures in different regions. These multi-parametric and multi-region signatures were combined to identify TERT promoter mutation. The area under the receiver operating characteristic curve (AUC) was used to evaluate the effects of the signatures.

Results

The signatures based on the DL features from the peritumoral regions with expansion distances of 2 mm, 8 mm, and 10 mm using the GoogLeNet architecture correlated with the optimal AUC values (test set: 0.823, 0.753, and 0.768) in the T2-weighted, contrast-enhanced T1-weighted, and T1-weighted images. Using the stacking fusion method, DLR with multi-parameter and multi-region fusion achieved the best discrimination with AUC values of 0.948 (95% CI, 0.911–0.985) and 0.902 (95% CI, 0.843–0.961) in the training and test sets, respectively.

Conclusions

Our results suggest that there may be a role for the intra- and peritumoral DL features in the identification of the TERT promoter mutation in patients with GBM. We propose an FDLR signature based on the multi-parametric MRI intra- and peritumoral fusion that may help in the preoperative identification of the TERT promoter mutation in GBM and inform individualized patient treatment.

PU-1580

3D 动脉自旋标志灌注成像在 IDH1 基因表达脑胶质瘤中的应用价值

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摘要:目的 探讨 3D 动脉自旋标志灌注成像在 IDH1 基因表达脑胶质瘤中的应用价值。方法 回顾性分析 48 例病理证实的脑胶质瘤患者 (其中 IDH1 (+) 20 例, IDH1 (—) 28 例) 的 MRI 及 ASL, 分析 IDH1 (+) 与 IDH1 (—) 脑胶质瘤的 MRI, 分析病灶水肿, 出血、囊变、钙化, 强化情况, 及 ASL。结果 IDH1 (+) 的非胶质母细胞瘤中: 病灶水肿 7 例, 出血 5 例, 囊变 9 例, 钙化 2 例, 明显不均匀强化 6 例, 轻度强化 4 例, ASL 高灌注 8 例, 其中 10 例胶质母细胞瘤中: 病灶水肿: 3 例, 出血 1 例, 囊变 3 例, 钙化 0 例, 明显强化 10 例, ASL 高灌注 13 例。IDH1 (—) 的非胶质母细胞瘤中: 病灶水肿 2 例, 出血 1 例, 囊变 3 例, 钙化 8 例, 轻度强化 7 例, 无强化 3 例, ASL 高灌注 3 例, 其中 13 例胶质母细胞瘤中: 病灶水肿: 9 例, 出血 5 例, 囊变 10 例, 钙化 0 例, 明显强化 13 例, ASL 高灌注 13 例。结论 3D 动脉自旋标志灌注成像在 IDH1 基因表达脑胶质瘤中具有重要价值, ASL 在 IDH1 (+) 的非胶质母细胞瘤中大多数呈高灌注, 在 IDH1 (—) 的非胶质母细胞瘤中大多数呈低灌注, 而在胶质母细胞瘤中与 IDH1 基因无相关性, 绝大多数均呈高灌注 ($P < 0.05$)。因此, 在一定程度上, 从脑胶质瘤的 3D 动脉自旋标志灌注成像可以预测 IDH1 基因突变情况。

PU-1581

基于 DCE 定量和半定量参数分析 GBM 环壁强化类型与炎症反应的相关性研究

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【摘要】 目的：利用动态对比增强 (DCE) 定量与半定量分析方法探究胶质母细胞瘤 (Glioblastoma, GBM) 的环壁强化类型与坏死相关炎症的关系。方法：回顾性分析 2015 年 9 月至 2020 年 9 月经病理证实且呈环形强化的 GBM 23 例和炎性病灶 17 例，GBM 的瘤壁均由厚而不规则的毛玻璃样强化和薄而光滑的薄壁强化两种类型组成。所有患者均在术前 2 周内行 3.0T MRI 常规平扫、T1 增强和 DCE 序列扫描。利用美国 GE Omni-Kinetics Version 软件在 DCE 图像上手动勾画肿瘤和炎性病变最大层面环壁的感兴趣区 (ROI)，比较 GBM 的厚壁毛玻璃样强化 (1 组)、薄壁显著强化 (2 组) 和炎性病变环形强化 (3 组) 的 DCE 参数，包括容积转移常数 (Ktrans)、血管外细胞外体积分数 (Ve)、曲线下面积 (AUC)、速率常数 (Kep)、血浆容积分数 (Vp)、达峰时间 (TTP)、最大斜率 (MAXslope) 的差异。其中 Ktrans、AUC 和 Vp 的比较用方差分析和最小显著差法 (LSD)；Ve，Kep，TTP，MAXslope 比较用秩和检验及 Kruskal-Wallis 检验。结果：三组环壁强化类型比较，Ktrans、AUC 及 MAXslope 的差异具有统计学意义 ($P < 0.05$)。GBM 的厚壁毛玻璃样强化区的 Ktrans、AUC、MAXslope 均高于薄壁显著强化区和炎性病变，后两者的 Ktrans、AUC、MAXslope 均无显著统计学差异 ($P > 0.05$)。结论：GBM 的薄壁显著强化区与炎性病变具有相似的血流动力学和渗透性特征，提示 GBM 薄壁强化区可能存在炎症过程的参与。

PU-1582

中枢胰岛素抵抗通过抑制 Pink1/ parkin 介导的线粒体自噬诱导神经元功能障碍

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中枢胰岛素抵抗是 2 型糖尿病和几种神经退行性疾病的共同特征。然而，胰岛素抵抗诱导的神经元功能障碍的机制尚不清楚。在本研究中，棕榈酸干预可诱导神经元胰岛素抵抗，胰岛素信号通路的表达证实了这一点。然后，我们发现胰岛素抵抗导致树突长度减少，细胞凋亡率升高，突触可塑性降低。在这一过程中，Pink1/ parkin 介导的线粒体自噬在胰岛素抵抗早期被激活，并随着胰岛素抵抗的加重而被抑制，且具有时间依赖性。Pink1 敲低后线粒体功能和突触可塑性受损，而过表达后恢复。胰岛素抵抗后，线粒体质量控制系统受到影响。MFN2 表达减少，pDRP1 表达增加，表明线粒体动力学受损。线粒体生物发生蛋白 (PGC-1 α 、TFAM、NRF1) 表达降低。线粒体碎片化，ROS 产生过多，ATP 减少。此外，GLP-1 受体激动剂 (艾塞那肽) 通过减轻胰岛素抵抗和促进 Pink1/帕金森介导的线粒体自噬来改善神经元突触可塑性。因此，我们的研究表明胰岛素抵抗通过抑制 Pink1/ parkinson 介导的线粒体自噬诱导神经元损伤，这可能是糖尿病神经退行性变的治疗靶点。

PU-1583

基于最小生成树的图论分析揭示特发性全面性癫痫患者的大脑功能网络异常

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目的 使用基于最小生成树（Minimum Spanning Tree, MST）的图论分析方法评估特发性全面性癫痫（Idiopathic Generalized Epilepsy, IGE）患者静息态大脑网络的拓扑变化，并进一步分析 IGE 患者抗癫痫药物反应和 MST 拓扑特征之间的关系。

方法 回顾性纳入 34 名 IGE 患者及 40 名年龄性别相匹配的健康对照。首先计算每个被试全脑 116 个区域间的时间序列相关性以构建功能连接矩阵，对于每一个功能连接矩阵，采用 Kruskal 算法构建 MST，并计算每一个 MST 的拓扑指标，包括叶分数、树层次、直径。采用两样本 t 检验比较 IGE 患者组与正常对照组间以及不同药物反应 IGE 亚组间的 MST 指标。采用 Pearson 相关分析计算所有的 IGE 患者以及不同药物反应的 IGE 亚组的病程与 MST 指标间的相关性，并采用 SurfStat 构建广义线性模型评估药物反应对病程和 MST 指标间相关性的影响。

结果 相较于正常对照，IGE 患者的 MST 叶分数上升（ $t = 4.03$, $p < 0.001$ ），树层次上升（ $t = 2.34$, $p = 0.011$ ），直径下降（ $t = 2.174$, $p = 0.016$ ），不同药物反应的 IGE 患者间的 MST 直径存在差异（ $t = -2.00$, $p = 0.027$ ）。相关分析显示 IGE 患者的 MST 直径与病程显著相关（ $r = 0.37$, $p = 0.028$ ），药物反应良好的 IGE 患者的 MST 直径与病程显著相关（ $r = 0.60$, $p = 0.003$ ），而药物反应不良的 IGE 患者的 MST 直径与病程无显著相关（ $r = -0.06$, $p = 0.848$ ），药物反应显著调节了病程对 MST 直径的影响（ $F = 8.23$, $p = 0.007$ ）。

讨论 本研究基于 MST 方法评估了 IGE 患者大脑网络的拓扑改变，研究结果显示了 IGE 患者的 MST 叶分数、树层次上升且直径下降，提示 IGE 患者大脑网络集中，效率增加。

PU-1584

2 型糖尿病患者大尺度脑网络功能连接与脂质代谢及认知功能的关系研究

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目的：2 型糖尿病（type 2 diabetes mellitus, T2DM）患者常合并脂质代谢异常与认知功能减退，本研究拟通过静息态功能磁共振（functional magnetic resonance imaging, fMRI）技术 T2DM 患者的大尺度脑网络间及网络内功能连接进行评估，探究脑网络功能连接改变与血清脂质代谢、认知功能之间的关系。

材料与方法：纳入 147 名年龄、性别及教育年限匹配的被试，所有被试分为合并轻度认知障碍的糖尿病患者（T2MCI, $n=40$ ）、认知正常的糖尿病患者（T2NC, $n=62$ ）和 45 名无糖尿病健康对照。每个参与者都接受了 fMRI 扫描、全套认知功能评估和外周血生化检查。使用独立成分分析计算大尺度脑网络间和网络内的功能连接。统计学分析包括多变量协方差分析、偏相关分析、典型相关分析和中介分析。

结果：与对照组相比，T2MCI 组和 T2NC 组的网络间、网络内功能连接均减低。我们发现，在控制了年龄、性别、教育年限和头动参数后，三组之间的网络间功能连接有明显差异，包括：腹侧感觉运动网络与背侧注意网络之间，腹侧感觉运动网络和视觉网络之间。在所有 T2DM 患者中，网

络间功能连接减低与血清总胆固醇、高密度脂蛋白胆固醇和低密度脂蛋白胆固醇水平增加相关，与较差认知表现相关。基于体素的网络内功能连接分析表明，在前侧默认模式网络的左侧后扣带回、背侧注意网络的右枕中回和视觉网络的右顶上小叶有明显的组间差异。这些网络内的功能连接改变都与总体认知得分呈正相关。更重要的是，脂质代谢参数和认知之间的关系是由网络间功能连接介导的。

结论：本研究从大规模功能网络组织的角度扩展了 T2DM 中有关脂质代谢-大脑-认知关系的现有知识。我们的研究表明，有希望通过调节糖尿病患者的血清脂质来改善其认知功能。

PU-1585

静息态功能磁共振评估亚急性缺血性卒中的价值：与动态磁敏感对比增强灌注的比较

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目的：静息态功能磁共振 BOLD 数据在检测亚急性缺血性卒中脑灌注水平的应用价值未知。本研究旨在利用静息态 BOLD 数据的时间移位分析 (TSA) 方法检测亚急性缺血性卒中的脑灌注水平，并与动态磁敏感对比增强 (DSC-PWI) 所获灌注对比。

方法：共 40 例亚急性缺血性卒中（神经系统症状发作后 3–14 天）患者接受了 MRI 检查。共分为 A 和 B 两个队列。其中队列 A 中的 31 例患者具有 MRA, DSC-PWI 和 BOLD 数据；队列 B 中的 9 例患者具有 BOLD 和 MRA 数据。使用 TSA 计算每个体素中的 BOLD 时间序列与全脑和/或对侧半球平均时间序列之间的时间延迟值。利用达峰时间 (TTP) 检测脑灌注不足。使用 Dice Coefficient 系数计算两种检测方法的空间重合度。

结果：在队列 A 中，有 14 例颅内大动脉闭塞/狭窄患者在两种方法中均检测到脑灌注的不足，均没有丰富的侧枝血管；1 例患者具有丰富的侧枝血管，TTP 或者 TSA 方法均未检测到脑灌注不足。其余 16 例无明显 MRA 病变的患者均未检测到 TTP 或 TSA 时间延迟。在队列 B 中，8 名患者利用 TSA 方法检测到时间延迟区域。利用对侧半球平均信号作为参考信号时，Dice Coefficient 系数为 0.58 ± 0.13 (范围为 0.35–0.78)，利用全脑平均信号作为参考信号时，DC 系数为 0.59 ± 0.12 (范围为 0.36–0.77)。

讨论：基于静息态 BOLD 数据的时间移位分析技术是一种可以替代 DSC-PWI 检测脑灌注的方法，无需使用造影剂，可重复性高。可用于检测 MRA 管腔狭窄明显、分支稀疏的亚急性脑卒中患者的脑灌注不足，而那些具有丰富侧枝血管的患者将保持较完好的脑灌注水平。

PU-1586

Impaired topology and connectivity of structural covariance networks in major depressive disorder: evidence from a multi-site neuroimaging dataset

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Objective: Major depressive disorder (MDD) has been increasingly understood as a disruption of brain networks. Investigating structural covariance networks can provide valuable insights into structural basis of network-level neuropathological mechanisms of depression. However, current findings were not consistent due to limited sample size and low statistical power.

Methods: In this study, we utilized a multi-site structural MRI dataset including 955 MDD patients and 1009 healthy controls (HC) from 23 sites. Individualized structural covariance networks (iSCN) were established based on regional gray matter volume calculated from images. Following cross-site data harmonization, network topological metrics and focal structural connectivity were estimated, and examined for group differences, clinical associations and diagnostic values. Different validation strategies were applied to confirm the robustness of findings.

Results: Compared with HC, MDD patients exhibited increased global efficiency, abnormal regional centralities (i.e., thalamus, precentral gyrus, middle cingulate cortex and default mode network) and altered circuit connectivity (i.e., ventral attention network and frontoparietal network). First-episode drug-naïve and recurrent patients exhibited different patterns of deficits in topology and connectivity. In addition, we found network topological metrics achieved better individual-level classification performance than focal connectivity features. The structural connectivity between thalamus and insula was positively associated with severity of depressive symptoms (Figures are shown in attachments).

Conclusions: Based on this high-powered dataset, reliable and reproducible patterns of impaired topology and connectivity of iSCN were identified in MDD and relevant clinical subgroups, which might guide future development of diagnostic and therapeutic markers.

PU-1587

不伴认知功能障碍早期 2 型糖尿病脑结构改变

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目的：研究不伴认知功能障碍的早期 2 型糖尿病（T2DM）患者脑皮层厚度及不同皮下核团体积结构改变。材料与方法：本研究选取 27 例不伴认知功能障碍的早期 2 型糖尿病患者及与之年龄、性别、受教育程度匹配的 21 例正常对照组，通过 3.0T MR 扫描仪获取 3D-T1WI 图像，使用 Freesurfer 软件对两组间结构图像进行分析处理，评估糖尿病患者大脑皮层厚度及 19 个不同皮下核团体积结构改变。结果：皮层厚度指标 T2DM 组与正常对照组相比差异无统计学意义，但额顶叶部分脑区皮层厚度有减低趋势；皮下核团 T2DM 组与正常对照组相比左侧苍白球、丘脑体积减小，差异有统计学意义（ $P<0.05$ ），余皮下核团体积差异无统计学意义。结论：本研究对早期不伴认知功能障碍 T2DM 患者皮层厚度及皮下核团体积的结构探索，对评估糖尿病早期其脑损害具有一定临床价值。

PU-1588

帕金森病感觉运动区动态功能网络连通性分析

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目的：以帕金森病(PD)患者的主要运动障碍表现为切入点，探索 PD 患者感觉运动网络内部各亚区间瞬时状态下功能连接的时间变异性及其与临床特征的相关性，以期有助于理解 PD 患者运动障碍产生的神经机制。

方法：纳入 30 例 PD 患者(PD 组)及 30 例健康对照组(HC 组)，收集被试的结构相和静息态 fMRI 数据及临床运动量表评分。使用 MATLAB 对静息态 fMRI 数据进行预处理。使用 GIFT 组件，采用

Infomax 算法, 设标准脑的感觉运动网络模板为 MASK, 根据解剖学识别内部亚区。使用 Temporal dFNC 工具箱, 采用滑动窗口法和 k-means 聚类法对动态功能连接进行分析, 系统自动估计出最佳聚类数, 以此对所有被试的窗口功能连接矩阵进行估计, 得到一个随时间变化的状态转换向量, 用分数窗(FT)、平均居留时间(MDT)和转换次数评估量化连接的时间特性。比较 PD 组和 HC 组之间每种状态输出度量的差异显著性, 并与临床量表评分进行相关性分析。

结果: 最终识别 18 个亚区成分, 聚类 4 种动态功能连接状态: 状态 1(19%): 中央旁小叶呈较强的负相关, 左侧中央前/后回间呈较强的正相关; 状态 2(48%)总体呈弱连接, 出现的频率最高; 状态 3(18%)总体呈正相关连接, 在双侧中央前回的连接较强; 状态 4(15%)呈大致参半的正负相关连接, 且连接较紧密。PD 组连接比 HC 组更紧密, 状态 1 下 FT 明显增加 ($P<0.05$), 状态 2 下中央旁小叶与右侧中央前/后回之间功能连通性显著减少($P<0.05$); 状态 1 的 FT 和 MDT 与运动评分呈正相关 ($r=0.419$, $r=0.384$, $P<0.05$), 状态 3 的 FT 和 MDT 与运动评分呈负相关 ($r=-0.489$, $r=-0.530$, $P<0.005$)。

讨论: 本研究提示在更精细的时间分辨率下, PD 患者大脑感觉运动网络内功能连接时变异常与临床运动障碍症状密切相关, 动态功能连接为静态功能连接提供了必要的补充。

PU-1589

探究急性脑梗死与脑局部血管周围间隙扩大的关系

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目的: 脑血管周围间隙在急性脑梗死中的研究甚少, 本文拟探究脑局部扩大血管周围间隙是否与急性脑梗死相关。

方法: 纳入我院 2022 年 1 月-5 月急性脑梗死患者 (A 组), 所有患者均行脑部磁共振检查, DWI、ADC 序列用于脑梗死区定位, T2WI 序列用于观察扩大血管周围间隙, 如有局部扩大血管周围间隙, 记录其位于梗死区位置, 上述指标均有 2 名 5-10 年诊断经验的放射科医师评估。另选取我院 2022 年 6 月-7 月行脑部磁共振检查的急性脑梗死患者及无急性脑梗死患者 (B 组), 用于验证该征相。此外对 A 组患者进行 3 个月随访, 观察梗死区血管周围间隙的变化情况。

结果: A 组共纳入 274 例急性脑梗死患者, 出现局部血管周围间隙扩大征相者 206 例, 占 75%, 其中 186 例位于梗死区内部, 20 例位于梗死区内部及边缘。B 组共纳入 30 例急性脑梗死患者, 20 例无急性脑梗死患者, 该征相诊断急性脑梗死正确率为 68%, 灵敏度为 81%, 特异度为 67%, 阳性预测值为 85%, 阴性预测值为 40%。在 3 个月后随访中, 共纳入 70 例患者, 扩大血管周围间隙较基线检查时有扩大者 17 例, 5 例位于梗死区边缘, 12 例位于梗死区内部, 其 T2WI 信号接近于脑脊液信号。

结论: 脑局部血管周围间隙扩大可能与急性脑梗死有关, 当患者行脑部磁共振检查但未扫描扩散加权成像序列时, 放射科医生观察到该征相, 可建议患者加扫扩散加权成像序列排除急性脑梗死。

PU-1590

基于增强 T1 WI 的直方图分析在区分促性腺激素性和非促性腺激素性垂体大腺瘤的鉴别诊断价值王炜^{1,2}、刘馨遥^{1,2}、白岩^{1,2}、王梅云^{2,3}

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目的:非促性腺激素比促性腺激素垂体大腺瘤更容易侵犯海绵窦,根据 2022 年世界卫生组织对垂体神经内分泌肿瘤的分类,本研究探讨增强 T1WI (contrast-enhanced T1 weighted imaging,CE-T1WI) 直方图分析在区分促性腺激素性和非促性腺激素性垂体大腺瘤的价值。

材料与方法:回顾性分析 2021 年 3 月至 2023 年 2 月就诊于河南省人民医院,经组织病理学验证的 30 例促性腺激素性及 38 例非促性腺激素性垂体大腺瘤患者资料。采用 3D slicer 软件对肿瘤最佳层面勾画感兴趣区 (region of interest, ROI),行灰度直方图分析,提取 8 个直方图参数,包括 Perc.10%、Perc.90%、峰度、平均值、中位数、最大值、最小值、偏度。两组间计量资料的比较采用独立样本 t 检验或 Mann-Whitney U 检验。绘制受试者工作特征 (receiver operating characteristic curve, ROC) 曲线,并计算曲线下面积 (area under the curve, AUC) 评估相关参数对于促性腺激素性和非促性腺激素性垂体大腺瘤的诊断效能。

结果:促性腺激素性和非促性腺激素性垂体大腺瘤两组肿瘤,8 个直方图参数中,perc.10%、perc.90%、最大值、平均值、中位数、最小值有统计学意义,且 P 值均小于 0.001。其 ROC 曲线下面积、敏感度、特异度分别为 0.822 (0.868、0.667)、0.836 (0.711、0.833)、0.839 (0.816、0.767)、0.827 (0.659、0.867)、0.814 (0.632、0.867)、0.873 (0.711、0.933)。

结论:基于 CE-T1WI 直方图对促性腺激素性和非促性腺激素性垂体大腺瘤的区分存在一定的价值,对指导患者术前治疗方案的制定和评估预后意义重大,避免误诊导致的治疗延误。

PU-1591

早期 CT-ASPECTS 评分在急性缺血性脑卒中急诊分流中的价值研究

牛微

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目的:探讨 CT-ASPECTS 评分在急性缺血性脑卒中分诊作用;

方法:回顾性收集西安大兴医院 2022 年 10 月-2023 年 4 月急性缺血性脑卒中患者 40 例,均行 CT 平扫与 DWI 检查,同时统计患者临床特征资料,包括性别、年龄、吸烟、饮酒、高血压、糖尿病、房颤以及入院 NISSH 评分,并根据 CT 平扫及 DWI 图像进行 CT-ASPECTS 与 DWI-ASPECTS 评分,通过单样本 T 检验比较 CT-ASPECTS 与 DWI-ASPECTS 评分的关系,并进行评分分流情况。

结果:40 例患者 CT-ASPECTS 与 DWI-ASPECTS 评分差异具有统计学意义;CT-ASPECTS \leq 7 分时,与 DWI-ASPECTS 无差异 ($p=0.329$);NISSH 评分在 CT-ASPECTS \leq 7 分及 CT-ASPECTS $>$ 7 分两组间有统计学差异。

结论:CT-ASPECTS \leq 7 分时,可取代 DWI 检查,优化检查流程,缩短患者检查到治疗的时间。

PU-1592

基于多参数 MRI 探讨褪黑素调控小胶质细胞极化减轻大鼠脑缺血再灌注损伤的机制

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目的: 基于多参数 MRI 及多种组织学技术, 观察褪黑素 (melatonin, Mel) 对脑缺血再灌注损伤 (cerebral ischemia/reperfusion injury, CIRI) 大鼠的神经保护作用及其对小胶质细胞极化的调控作用, 以探讨 Mel 治疗大鼠 CIRI 的机制, 并为 Mel 的疗效评估提供分子影像学依据。

方法: 60 只健康成年雄性 SD 大鼠随机分为 Sham、CIRI 和 Mel 组, 采用改良线栓法制成大鼠 CIRI 模型, 其中 Mel 组在建模前后腹腔注射 Mel。CIRI 后 2 h、24 h 及 72 h, 各组大鼠采用 7.0T 小动物 MR 行 T2 加权成像 (T2-weighted imaging, T2WI)、弥散加权成像 (diffusion weighted imaging, DWI) 及化学交换饱和转移 (chemical exchange saturation transfer, CEST)-MRI 扫描。计算并分析各组大鼠 T2WI 损伤体积、相对表观扩散系数 (relative apparent diffusion coefficient, rADC) 的变化。分析各组大鼠 CEST-MRI 在 3.5ppm (Amide-CEST) 和 2.0ppm (Guan-CEST) 处的信号差异。采用 TUNEL 染色法观察 CIRI 后凋亡细胞数的变化。采用免疫荧光染色法观察各组大鼠 Iba-1/Arg1 细胞数的变化, 采用 Western blot 法观察各组大鼠 Arg1 蛋白表达的变化。采用 ELISA 法观察各组大鼠 IL-1 β 和 TNF- α 蛋白表达的变化。采用 Pearson 相关分析 Amide-CEST 信号差值和 Guan-CEST 信号差值与 Iba-1+Arg1+细胞数差值的相关性。

结果: T2WI 和 DWI 结果显示, 在 CIRI 后 24 h 和 72 h, 与 CIRI 组大鼠相比, Mel 组大鼠的梗死体积显著减小, rADC 值显著增高 (P 均 < 0.05)。

PU-1593

Investigation of collateral circulation compensatory capacity of Willis ring in the internal carotid artery stenosis using vessel selective arterial spin labeling

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The Willis ring plays an important role in the collateral circulation especially in patients with internal carotid artery (ICA) stenosis. However conventional time of flight (TOF) MR angiography may only offer limited knowledge of the compensatory blood flow attributed to collateral circulation for patients with stenosis. Vessel selective arterial spin labeling allows the assessment of blood flow of a specific vessel. The purpose of this study was to quantify the influence of various anatomical types on the compensatory capacity of the Willis ring for patients with severe stenosis or occlusion using combined TOF MRA and vessel selective ASL method.

Severe stenosis or occlusion of ICA might change the arterial diameter of the Willis ring, and the opening conditions and anatomical structure of the Willis circle has different effects on the post-circulation compensation capability of healthy-side ICA.

PU-1594

伴卵圆孔未闭偏头痛无症状期的静息态功能磁共振研究

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目的 采用局部一致性 (ReHo)、低频振幅 (ALFF)、体素镜像同伦连接 (VMHC) 三种静息态功能磁共振成像 (rs-fMRI) 分析方法研究伴卵圆孔未闭偏头痛患者无症状期静息态脑功能情况, 为探究其神经影像机制提供依据。

方法 前瞻性收集 19 名伴卵圆孔未闭偏头痛患者和 19 名性别、年龄匹配的健康对照组, 采用 GE Discovery MR750W 3.0T 磁共振扫描仪行颅脑磁共振成像, 扫描序列包括 3D T1BRAVO、BOLD, 在无症状期采集图像。采用基于 MATLAB 2018b (www.mathworks.com) 的 DPABI (http://www.restfmri.net) 对 BOLD 数据进行处理获得全脑 ReHo、ALFF、VMHC 图, 两组受试者 ReHo、ALFF 和 VMHC 值分别行两样本 t 检验, 比较两组间脑功能成像特征差异。通过 ROC 曲线评估 ReHo、ALFF、VMHC 对伴卵圆孔未闭偏头痛患者头痛诊断效能。采用相关性分析探讨差异脑区 ReHo、ALFF、VMHC 值与病程、偏头痛失能程度评估得分(MIDAS)、头痛发作频率、每次头痛持续时间相关性。

结果 伴卵圆孔未闭偏头痛患者左楔前叶 ReHo 降低; 右额中回、左三角部额下回、左颞上回、左背外侧额上回 ALFF 降低; 双侧颞中回 VMHC 升高。ROC 曲线分析显示, 左楔前叶 (AUC=0.89) ReHo, 左三角部额下回 (AUC=0.69)、左颞上回 (AUC=0.88)、左背外侧额上回 (AUC=0.82) ALFF, 对伴卵圆孔未闭偏头痛诊断效能较高。相关性分析提示, 患者组左楔前叶 ReHo 值与头痛发生频率呈负相关, 左背外侧额上回 ALFF 值与 MIDAS 评分呈正相关, 右颞中回 VMHC 值与头痛发作持续时间呈负相关。

结论 本研究中, 伴卵圆孔未闭偏头痛患者存在多个脑区 ReHo、ALFF、VMHC 异常, rs-fMRI 有助于探究伴卵圆孔未闭偏头痛患者的神经影像机制。

PU-1595

Differentiation between parkinsonian syndromes based on a machine learning model of quantitative susceptibility mapping

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Objective To investigate the differential diagnostic value of a machine learning model based on quantitative susceptibility mapping (QSM) in brain iron accumulation parkinsonian syndromes (PS).

Methods 17 patients with multiple system atrophy with predominant cerebellar ataxia (MSA-C), 20 patients with MSA with predominant parkinsonism (MSA-P), 14 patients with progressive supranuclear palsy (PSP) and 85 patients with parkinson's disease (PD) were retrospectively recruited. Regions of interests (ROIs) were set in the globus pallidus (GP), substantia nigra (SN), red nucleus (RN), caudate nucleus (CN), and putamen (PU) bilaterally. A machine learning model based on the radiomics features of QSM was constructed to distinguish PS.

Results A total of 7 radiomics features were screened finally to establish the model. For MSA-C, the area under the curve (AUC) values of the model in the training and validation groups were 0.873 and 0.672 respectively. For MSA-P, the AUC values were 0.940 and 0.905. For PSP, the AUC values were 0.911 and 0.814. For PD, the AUC values were 0.956 and 0.898.

Conclusion A machine learning model based on the QSM could have a crucial role in the differentiation between PS.

PU-1596

成人 MOGAD 并垂体功能减退 1 例

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髓鞘少突胶质细胞糖蛋白免疫球蛋白 G 抗体相关疾病 (myelin oligodendrocyte glycoprotein IgG associated disorders, MOGAD), 是一种中枢神经系统炎性脱髓鞘疾病, 可发生于各个年龄阶段, 发病率为 1.6-3.4/1000000/年, 患病率为 20/1000000, 临床可表现为: 视神经炎、横贯性脊髓炎、脑炎或脑膜脑炎、脑干脑炎、脑干或小脑症状、或大脑皮质脑炎等症状中一种或任意组合。国内外文献罕有报道 MOGAD 合并垂体功能异常的病例。现将襄阳市中心医院神经内科诊治的 1 例成人 MOGAD 并伴垂体功能减退患者的临床资料和诊治过程进行总结, 以期临床工作者提供参考。

PU-1597

淋巴结外型 Rosai-Dorfman 病的 CT 与 MR 表现

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摘要: 目的: 探讨淋巴结外型 Rosai-Dorfman 病 (RDD) 的 CT 及 MRI 表现, 以期提高对该病的认识。方法: 回顾性分析 9 例经手术病理证实的淋巴结外型 RDD 的影像资料。2 例行 CT 平扫; 1 例行 CT 平扫及增强; 6 例行 MR 平扫及增强扫描。结果: 9 例中 1 例位于右侧耳廓, 呈实性软组织肿块, 密度均匀; 1 例位于气管, 呈实性软组织肿块, 密度均匀, 中度均匀强化; 7 例位于中枢神经系统, 5 例脑膜型 T2WI 呈低信号, 2 例脑实质型呈明显高信号, 增强扫描 7 例均明显均匀强化。结论: 淋巴结外型 RDD 的 CT 及 MRI 表现具有一定特征性, 平扫病变信号或密度均匀, 增强扫描中度-重度均匀强化; 中枢神经系统病变脑膜型 T2WI 呈低信号, 脑实质型 T2WI 呈高信号。

PU-1598

基于不同 b 值 DTI 深度森林模型预测胶质瘤瘤体及瘤周区域 Ki-67 的表达水平

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目的: 探讨不同 b 值的情况下, 基于 DTI 纹理特征的深度森林模型对胶质瘤 Ki-67 表达水平的分类预测价值, 并挖掘最佳诊断区域及最优参数。

方法: 回顾性收集本院病理诊断为胶质瘤的 90 例患者资料, 经分层抽样 6:4 划分为训练集和验证集。使用 3D-Slicer 软件对高 b 值 (1000s/mm²)、超高 b 值 (3000s/mm²) DTI 扩散参数 (ADC、FA) 勾画 ROI, 包括瘤体 (TB)、瘤周 5mm (PTR1)、瘤周 10mm (PTR2)、瘤体及瘤周 5mm (TB+PTR1)、瘤体及瘤周 10mm (TB+PTR2), 再使用 pyradiomics 提取上述区域的纹理特征, 经 PCA 降维、MI 筛选后, 建立深度森林模型。

结果: ① 不同 b 值影响: 高 b 值、超高 b 值扩散参数模型, 其 AUC、准确度、敏感度、特异度依次分别为 0.87、77.78%、63.89%、84.68%及 0.82、73.33%、62.78%、83.78%; 在 TB 区域, 高 b 值、超高 b 值模型 AUC、准确度、特异度依次分别为 0.88、66.67%、60.00%及 0.89、77.78%、80.00%; ② 不同区域影响: 高 b 值模型验证集中, TB+PTR1 区域 AUC 最高为 0.92, 其次为 TB (0.88); PTR1、TB+PTR2 区域准确度最高, 均为 83.33%; TB 区域敏感度最高为 75.00%; PTR1 区域特异度最高为 92.50%; ③ 不同参数影响: 高 b 值扩散参数构建 TB+PTR1 模型, 在验证集中 ADC、FA 模型的 AUC 和准确度分别为 0.84、78.12%及 0.88、78.12%。

结论: 基于 DTI 纹理特征的深度森林模型对胶质瘤 Ki-67 表达水平的分类具有一定的预测价值。对瘤周区域而言, 高 b 值比超高 b 值更具有诊断价值, 瘤体及瘤周 5 mm 的组合区域为最佳诊断区域; 但对瘤体区域而言, 超高 b 值模型的诊断效能要优于高 b 值。在 DTI 参数中, FA 比 ADC 更具有诊断预测价值。

PU-1599

细胞外游离水(FW)与脑白质高强度(WMH)负荷的关系

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细胞外游离水(FW)增加与脑白质高强度(WMH)负荷的关系

目的:探讨细胞外游离水(FW)与脑白质高强度(WMH)负荷的关系。

方法:本次研究共对 126 例患者的磁共振成像(MRI)资料进行前瞻性分析。根据液体衰减反转恢复 (FLAIR)图像上的 WMH 体积和深部和室周白质高信号(DWMH 和 PWMH)的 Fazekas 评分来确定 WMH 负荷。FW 值取自扩散张量成像(DTI)图像。

结果:126 例患者平均年龄 59.6 ± 11.5 岁, 高血压患者 67 例 (53.2%), 平均 WMH 体积为 12.16 ± 12.66 mL, 平均 FW 值为 0.24 ± 0.01 。单因素分析显示, FW 值与 WMH 负荷 (WMH 体积、DWMH 和 PWMH Fazekas 评分) 相关 ($P < 0.05$)。经多因素分析, 通过年龄和高血压调整, FW 值与 WMH 体积、DWMH 和 PWMH Fazekas 评分相关 ($P < 0.05$)。

结论:细胞外 FW 增加与 MRI 上 WMH 负荷有关。

PU-1600

经典三叉神经痛患者局部及全局脑功能的时频特性

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目的: 本研究通过对比分析 77 名 CTN 患者和性别、年龄相匹配的 73 名 HCs 的 sALFF、sReHo、sDC、dALFF、dReHo、dDC, 明确 CTN 患者局域脑功能的变化, 及其与临床参数之间的相关性。

材料与方法: 所有被试均进行 rs-fMRI 和神经心理学评估。采用不同频段的 sALFF、sReHo、sDC、dALFF、dReHo、dDC 分析 CTN 患者局域脑功能变化。并将 CTN 患者的功能变化与神经心理学评估进行相关分析。

结果: HC 相比, 经典频段, CTN 患者 sALFF 和 dALFF Precuneus_R 值降低, 双侧 Frontal_Sup Frontal_Sup_R 值升高; Caudate_R、双侧 Cerebellum_8_L 和 Temporal_Pole_Mid_R sReHo 值升高, Occipital_Mid_L 和 Calcarine_R 的 sReHo 值降低, 双侧 Frontal_Sup Frontal_Sup_R dReHo 值升高; Cerebellum_8_R 和 Caudate_R 的 sDC 值升高, Calcarine_R 和 Lingual_L 的 sDC 值降低; Frontal_Sup_R 的 dDC 值升高。Precuneus_L (sALFF 值降低) 和 Frontal_Inf_Tri_L (sReHo 值降低) 两个脑区仅在慢 4 频段中发现, 且在不同频段

发现脑功能改变的脑区数目不同。在各频段中，部分局域脑功能存在差异的脑区与部分临床参数存在一定的相关性。

结论：1).在经典频段，CTN 患者脑功能发生改变，且动态和静态互为补充；2). CTN 患者的脑功能变化具有一定的频率特异性；3).与慢 5 频段相比，慢 4 频段与经典频段一致性较高；4).CTN 严重影响患者的精神心理健康，部分差异脑区与 CTN 患者的临床参数存在相关性。

PU-1601

原发性椎管内髓外硬膜下恶性淋巴瘤 1 例

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报道 1 例经病理证实的原发性椎管内髓外硬膜下恶性淋巴瘤。

患者女，62 岁，因“左下肢进行性麻木伴行走困难一年余”就诊。无发热、畏寒等症状。腰椎 MRI 平扫示 T12-L3 水平椎管内占位，脊髓圆锥及终丝受压，T1WI 呈等信号、T2WI 呈等、高信号，终丝及马尾神经增粗；增强后可见明显呈强化，病变包绕神经。初步诊断为脊髓圆锥及终丝占位，室管膜瘤可能大。术后病理：椎管内占位，恶性 B 细胞淋巴瘤，考虑弥漫大 B 细胞淋巴瘤（非生发中心亚型）。

原发性中枢神经系统淋巴瘤（PCNSL）十分少见，约占所有中枢神经系统肿瘤的 0.9%，其中约 90% 为弥漫大 B 细胞淋巴瘤。椎管内原发性恶性淋巴瘤更为罕见，且大多为硬膜外淋巴瘤，多发生于胸段，其次是腰、颈段；并常出现肿块包绕神经的征象。本例排除其它部位继发淋巴瘤，结合病理结果诊断为原发性椎管内髓外硬膜下的 DLBCL。椎管内髓外硬膜下的 DLBCL 影像学特征并不典型，该病例 MRI 表现为包绕圆锥及终丝的占位，分界欠清，平扫 T1WI、T2WI 均呈等信号，增强扫描后病变明显均匀强化，未见囊变征象，具有一定淋巴瘤影像学特征。

鉴别诊断：①室管膜瘤，多发生于髓内，约占终丝及马尾处原发肿瘤的 90%。MRI 表现为 T1WI 等或低信号、T2WI 高信号，常伴有囊变坏死，增强扫描后 T1WI 可成像明显强化。②神经源性肿瘤，是椎管内髓外硬膜下常见的肿瘤，主要发生于下腰段，无明显特征性表现，常表现为哑铃状肿块，T1WI 呈等、低信号，T2WI 呈高信号，且多伴有囊变、坏死，增强扫描实体部分呈明显强化。③脊膜瘤，也是髓外硬膜下常见肿瘤之一，多表现为圆形或卵圆形肿块，与周围结构分界较清晰，增强扫描后呈明显均匀强化，常伴有“脊膜尾征”。

总之，原发性椎管内髓外硬膜下的恶性淋巴瘤发生率，且缺乏特征性。当 MRI 表现为髓外硬膜下的均匀软组织信号影，增强扫描后呈明显均匀强化并伴有神经包绕的病变，仍要考虑到此病的可能。

PU-1602

Swirl sign score system: a novel and practical tool for predicting hematoma expansion after spontaneous intracerebral hemorrhage

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Purpose: To methodically analyze the swirl sign and construct a scoring system for the swirl sign to predict hematoma expansion (HE) after spontaneous intracerebral hemorrhage (sICH).

Methods: In this multicenter retrospective study, data from 231 of 683 sICH patients with swirl signs on baseline noncontrast computed tomography (NCCT) images were analyzed. Patients

were divided into a development cohort ($n = 160$) and a validation cohort ($n = 71$). The characteristics of the swirl sign were analyzed, including the number, maximum diameter, shape (irregular or regular), boundary (clear or unclear), minimum CT value of the swirl sign and the minimum distance from the swirl sign to the edge of the hematoma. In the development cohort, univariate and multivariate analyses were used to identify independent predictors of HE, and logistic regression analysis was used to construct the swirl sign score system. The swirl sign score system was verified in the validation cohort.

Results: The number and the minimum CT value of the swirl sign were independent predictors of HE. A 3-point swirl sign score system was constructed (2 points for the number of swirl signs > 1 and 1 point for the minimum CT value ≤ 41 Hounsfield units). The area under the curve of the swirl sign score system in predicting HE was 0.773 and 0.770 in the development and validation groups, respectively.

Conclusions: The swirl sign score system is an easy-to-use radiological grading scale that requires only NCCT images at admission to effectively identify subjects at high risk of HE.

PU-1603

回顾性分析 SWI-DWI 联合成像在早期缺血性脑梗塞中的应用价值

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【摘要】目的 探讨磁敏感-扩散加权不匹配 (susceptibility-diffusion mismatch, SDM) 在早期脑梗塞的应用, 探讨缺血半暗带及微出血的诊断价值。方法 回顾性 2017 年 1 月至 2021 年 12 月绵阳市第三人民医院 SWI-DWI 检查的 52 例符合纳入及排除标准要求的确诊的超急性、急性缺血性脑卒中患者, 其中男性 30 例, 女性 22 例; 年龄 38~78 岁, 平均年龄(57.928.16)岁, 均进行全脑覆盖扫描, 每例患者均进行 T1WI、T2WI、FLAIR、SWI、DWI, 冠状位、矢状位与轴位扫描, 层厚 5mm, 间距 1.0mm; 由 2 名 MR 高级医师盲法分析脑微出血 (CMB) 阳性、识别动脉栓塞磁敏感血管征 (susceptibility vessel sign, SVS)、SDM 的判断, 结果不一致时共同协商达成一致意见。结果 52 位新近脑梗塞病人, 发现 37 位病人梗塞灶内有 CMB, 阳性率约 71.2%, 共 117 处 CMB; 2. 52 位新近脑梗塞病人, 发现动脉血栓 45 位, 阳性率约 86.5%, 其余 7 位腔隙性脑梗塞灶或小梗塞灶未能确定处梗塞动脉; 3. 52 位新近脑梗塞病人, 邻近增粗侧枝血管 52 位, 阳性率 100%; 4. 52 位新近脑梗塞病人, 存在 SDM 征象 45 位, 阳性率为; 约 86.5%, 其余 7 位腔隙性脑梗塞灶或小梗塞灶未能确定处梗塞动脉; 结论 SWI-DWI 联合利用可以发现早期缺血性脑梗塞中危险的缺血半暗带和微出血灶, 并且成像有较高的敏感性, 较好的时效性, 有利于早期缺血性脑梗塞灶的诊断和治疗, 比较符合卒中病变的检查原则, 并且无需注射药物、更有利于肾功能不良, 存在有一定优势, 为我们诊断早期缺血性脑卒中提供了一种新途径。

PU-1604

The brain function differences between interphase and episodes of migraine attacks In patients with migraine without aura.

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Previous neuroimaging studies have shown that there are differences in the functional connectivity of the central nervous system between migraine patients and healthy people. However, the fMRI results of patients with different seizure phases show great differences. The aim of this study was to investigate the relationship between the immediate and long-term effects of pain pathways on the central nervous system during migraine attack. Using resting-state functional magnetic resonance imaging and voxel-wise functional connectivity density analysis, we compared the large-scale functional connectivity pattern over the whole brain in 23 patients with migraine without aura attack and attack interphase. The associations between functional connectivity density and clinical variables were also explored. Compared with interparoxysmal, acute episode showed decreased local and distant functional connectivity density in the dorsolateral and medial prefrontal cortexes and precuneus and increased local and distant functional connectivity density in the hippocampal complex. Moreover, local functional connectivity density in several brain regions, such as the left superior temporal gyrus and hippocampal complex, was found to be correlated with headache frequency or pain intensity. Differences in pain processing pathways and division of labor lead to differences in the immediate response and long-term effects of pain in the central nervous system of migraine patients. This difference may be one of the reasons for the low reproducibility of fmri results in migraine patients. Correctly distinguishing this difference may help us to better understand the changes of brain function in migraine patients.

PU-1605

fMRI 技术在眼睑痉挛疾病的初步应用探讨

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目的：眼睑痉挛（BSP）可引起睁眼困难、面部变形和功能性视力障碍等，影响学习和生活质量。既往研究揭示 BSP 患者存在局部脑区功能活动的异常及脑区间功能联接异常，但随时间的动态变异性改变尚不清楚。本研究采用 fMRI 技术结合滑动窗分析方法，探究 BSP 患者动态脑活动的改变及其与疾病严重程度的相关性。

方法：纳入 BSP 患者及健康对照各 46 例。完成 fMRI 检测并采用 Jankovic 量表（JRS）评估疾病的严重程度。观察 BSP 患者相较于健康对照静态低频振幅（static amplitude of low frequency fluctuation, sALFF）和动态低频振幅（dynamic amplitude of low frequency fluctuation, dALFF）的差异，以 dALFF 存在差异的脑区为感兴趣区（region of interest, ROI）进一步探究 BSP 患者动态功能联接（dynamic functional connectivity, dFC）的改变。采用 Spearman 相关分析方法研究存在差异脑区的影像学指标与疾病严重程度的相关性。

结果：与健康对照组对比，BSP 患者 sALFF 显著升高的脑区为左侧中央前回、右侧顶下回和双侧额中回，显著降低的脑区为右侧楔前叶和左侧中央后回（voxel $P < 0.005$, cluster $P < 0.05$, GRF 校正）；dALFF 变异度显著增高的脑区为右侧中央前回（voxel $P < 0.005$, cluster $P < 0.05$, GRF

校正)。以右侧中央前回为 ROI 做 dFC 发现, BSP 患者右侧中央前回与右侧小脑半球 8 区的 dFC 较对照组显著降低。

结论: BSP 患者局部脑活动和功能联接的稳定性存在改变, 可能是面部运动过度和疾病本身的病理生理机制共同作用所致。中央前回 dALFF 变异度可能与患者疾病严重程度有关。

PU-1606

3D-TOF-MRA 联合 3D-FIESTA 在血管压迫性三叉神经痛中的诊断价值研究

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目的 探讨分析三维时间飞跃法磁共振血管成像(3D-TOF-MRA)联合三维双激发平衡式稳态自由进动序列(3D-FIESTA)在血管压迫性三叉神经痛中的诊断价值。方法 回顾性分析本院 2017 年 7 月~2019 年 5 月收治的 102 例血管压迫性三叉神经痛患者的临床资料。于微血管减压术(MVD)术前均予以 3D-TOF_x0002_MRA、3D-FIESTA 及 3D-TOF-MRA 联合 3D-FIESTA 检查对责任血管的种类显示情况及评估结果。结果 以术中所见结果为金标准, MVD 对责任血管阳性检出率为 97.06%; 联合检查对小脑后下动脉、基底动脉、岩静脉血管阳性检出率与 3D-TOF-MRA、3D-FIESTA 单独比较无统计学意义($P>0.05$); 联合检查对小脑上动脉、小脑前下动脉血管阳性检出率更高($P<0.01$)。结论 两种方法联合诊断血管压迫性三叉神经痛对 MVD 术前评估具有高准确性和重要的意义

PU-1607

自身免疫性胶质纤维酸性蛋白星形胶质细胞病 1 例

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本文报道 1 例自身免疫性胶质纤维酸性蛋白星形胶质细胞病的 MRI 表现。患者男, 53 岁, 3+月前无明显诱因出现手抖, 持物、劳累及对话时明显; 伴头痛, 主要为后枕部阵发性刺痛; 伴头昏、睡眠障碍、胸闷、食欲下降、下肢乏力等。实验室检查: NSE32.7ng/mL, 脑脊液有核细胞计数 $23 \times 10^6/L$ (中性粒细胞 4%, 淋巴细胞 96%), 脑脊液蛋白 0.93g/L。血沉及脑脊液涂片培养未见异常。MRI 示垂直于侧脑室线样放射状血管周围强化, 颈胸段脊髓长节段病变, 平扫显影模糊, 增强呈点状、斑片状强化。复查血清、脑脊液: 血清 GFAP1:320, 脑脊液 GFAP1:3.2。最终诊断自身免疫性胶质纤维酸性蛋白星形胶质细胞病。

PU-1608

缺血性中风的遗传和血管风险因素对大脑皮层形态学的影响

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目的:

许多关于缺血性中风的研究通过比较病例组与对照组的神经影像学差异来探究中风患者病灶之外的脑结构和功能变化; 然而, 这些结果可能受患者和对照群体由于中风风险因素的长期作用而导致的

现有脑结构差异的潜在影响。基于此，本实验探究了中风风险因素对未患有中风病史的个体的大脑皮层形态学影响。

方法:

为了验证缺血性中风的风险因素对大脑结构有不可忽视的影响，我们测试了缺血性中风的多基因风险分数、收缩压和舒张压、血糖以及血脂（甘油三酯和低密度脂蛋白）对 36,092 名参与者（其中男性 17,230 名，年龄在 40-70 岁之间，均未有卒中病史）的 62 个大脑区域的皮层厚度和表面积的单和交互效应。对于每个皮层表型，我们建立了一个多元线性回归模型，同时考虑了每个风险因素的独立效应以及任意两个因素之间的交互作用，同时控制了年龄、性别、数据采集中心、基因分型批次、基因人群分层。回归模型分别在发现组 ($n = 18,044$) 和验证组 ($n = 18,048$) 人群中建立（经过 Bonferroni 校正后， $P < 4.03 \times 10^{-4}$ ），并通过敏感性分析对结果的可靠性进行了验证。进一步的，通过 2,788 名在两个时间点获取脑影像的纵向参与者来测试两次采集之间结果的稳定性。

结果:

研究发现，123 个脑表型的多元线性回归模型在发现和验证样本中均显著，这些风险因素能够共同解释表面积的 5.8 - 26.5% 的方差和皮层厚度的 0.3 - 12.7% 的方差。我们发现较高的缺血性中风多基因风险分数与岛叶皮层变薄之间存在显著关联，此外我们发现舒张压、低密度脂蛋白和甘油三酯分别与 1、5 和 11 个皮层表型相关。较高的舒张压和低密度脂蛋白与皮层增厚相关；较高的甘油三酯与表面积减少相关。然而，我们没有发现遗传和血管风险因素之间或血管风险因素之间的显著交互作用。

结论:

总之，本研究这些发现表明缺血性中风的遗传和血管风险因素对皮层形态学有重要影响，这在识别缺血性中风引起的神经影像学变化时应予以考虑。

PU-1609

定量磁化率成像对失眠患者脑氧代谢的研究

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目的 采用定量磁化率成像 (quantitative susceptibility mapping, QSM) 探讨失眠患者与健康志愿者的脑氧代谢的差异。方法 前瞻性收集 2022 年 9 月至 2023 年 9 月在南昌大学第二附属医院就诊的失眠患者 22 名，同时收集健康对照组 20 名，参与者皆接受 QSM 序列扫描成像，采集不同静脉血管的脑静脉血氧饱和度 (cerebral venous oxygen saturation, CSV02) 及其均值，失眠患者皆接受了多导睡眠图 (Polysomnography, PSG) 监测，通过协方差分析进行两两比较，采用 spearman 分析进行相关性分析。结果 失眠患者与健康对照组之间上矢状窦 CSV02 及平均 CSV02 存在统计学差异 ($F=9.42, 8.33$; $p < 0.001$, $p=0.01$)，CSV02 平均值与 R 期占比呈负相关 ($p=0.047$, $R=-0.45$)。结论 失眠患者的脑氧代谢减低，失眠患者脑氧代谢减低与 R 期占比增加有关。

PU-1610

基于 MRI 放射组学的新型多模态可解释模型区分原发性中枢神经系统淋巴瘤和胶质母细胞瘤：一项多中心研究

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目的：本研究的目的是开发和验证一种能够融合放射组学特征和宏观影像特征的多模态可解释人工智能模型，基于多序列的 MRI 图像和宏观影像特征建模来准确鉴别原发性中枢神经系统淋巴瘤和胶质母细胞瘤。

材料与方法：回顾性入组了两个不同医学中心的共 242 例原发性中枢神经系统淋巴瘤或胶质母细胞瘤患者的多序列 MRI 影像和临床资料。将患者按照不同医学中心分为训练队列和外部验证队列。对图像预处理之后，逐层分割 4 种不同范围的肿瘤和瘤周脑区作为感兴趣体积，并对宏观影像特征进行评估。筛选出 10 个最具预测价值的放射组学特征。根据不同的图像和标签范围的组合，最终建立了 6 个单序列 MRI 放射组学模型。将筛选得到的多序列放射组学特征和编码后的宏观影像特征等临床因素进行合并，最终建立了多模态放射组学模型。对模型的性能和临床应用价值进行评估。此外，使用 SHAP 方法对最优的模型进行可解释分析，赋予了该模型直观的决策结果解释。

结果：使用随机森林(RF)算法共建立了 7 个不同的模型。其中，在单序列模型中，T1CE-Tumor-Edema-Model 表现出最优的预测性能，其在外部分验证队列中的 AUC 为 0.91。而多模态模型表现出 7 个模型中最优的预测性能和可解释性，其在外部分验证队列中的 AUC 为 0.94，这表明多模态信息能够有效提高模型的性能上限。此外，SHAP 方法解释结果表明两个融合特征 Rad-Score 和 Clinical-Rad-Score 对模型的决策起到了至关重要的作用。

结论：我们开发了一种基于多序列 MRI 和临床因子的多模态可解释的放射组学联合模型，该模型能够准确高效地鉴别原发性中枢神经系统淋巴瘤和胶质母细胞瘤，并且该模型的结果具备可解释性，具有很高的临床价值。据我们所知，这是首次探讨狭义与广义瘤周脑区对模型的获益价值，并使用可解释机器学习放射组学算法框架来鉴别原发性中枢神经系统淋巴瘤和胶质母细胞瘤的研究。

PU-1611

胚胎型大脑后动脉与急性脑梗死的相关性

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【摘要】目的 研究胚胎型大脑后动脉和急性脑梗死发生的相关联系。**方法** 进行回顾性分析，共选择 150 例发生急性脑梗者及 150 例同时期体检者的影像资料（MRI 检查及 CTA 检查）及临床资料，分为急性脑梗组及对照组，对两组间的临床及影像资料进行分析。**logistic** 回归分析用来分析急性脑梗发生的危险因素。**结果** 急性脑梗组胚胎型大脑后动脉发生率、既往脑梗史比率均高于对照组($P<0.05$)。进行 **logistic** 回归分析，胚胎型大脑后动脉发生率是 AIS 发生的危险因素($P<0.05$)。**结论** 胚胎型大脑后动脉的存在与在一定程度上与急性缺血性脑梗死的发生相关。

PU-1612

利用扩散张量成像初探自发性脑出血脑胶质淋巴系统功能

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目的：利用磁共振扩散张量成像(DTI)探讨自发性脑出血(sICH)患者脑胶质淋巴系统的病理变化特征。方法：搜集 20 例 sICH 患者和 31 例健康志愿者的临床及影像学资料，采集所有被试者的 DTI 不同方向扩散率值，以计算扩散张量成像-阿尔卑斯指数(DTI-ALPS)，用于评价 sICH 患者脑胶质淋巴系统功能是否受损。结果：sICH 病灶侧大脑半球 DTI-ALPS 指数显著低于健侧($p < 0.01$, $t = -5.77$)，也显著低于健康对照组同侧($p < 0.01$, $t = -9.50$)。结论：通过对 DTI-ALPS 指数的定量分析，能够反映 sICH 脑胶质淋巴系统功能的损害，或许利用磁共振 DTI 技术能够从新的角度反映 sICH 后大脑病理生理变化的机制。

PU-1613

多学科诊断颅骨多发性骨髓瘤 1 例报告

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多发性骨髓瘤属于恶性浆细胞瘤病，是血液系统第二常见的恶性肿瘤；而以颅骨多发肿块为首发表现的多发性骨髓瘤比较罕见，单学科容易误诊，贻误病情，本文报道多学科联合诊断颅骨多发性骨髓瘤一例。

病例资料

患者女性，63 岁，2 月前洗脸时发现额头黄豆粒样凸起，局部有压痛，未予重视；近 1 月来，患者感额头肿物明显增大，并出现头部胀痛。超声提示额部实性包块，考虑来源颅内；CT 显示额部高密度肿块，边界清晰，邻近额骨、额窦壁及右侧眼眶外侧壁、上颌窦外侧壁骨质吸收破坏，骨质破坏区内软组织密度影填充；颅脑 MRI 检查可见前额部、右颞部共 3 处椭圆形肿块，T1WI 呈稍低信号，T2WI 及 FLAIR 呈稍高信号，增强扫描病灶呈明显均匀强化，右侧视神经受累，额骨、双侧额窦壁、蝶骨大翼、右侧眼眶外侧壁、上颌窦外侧壁多发溶骨性骨质破坏。

全麻下行脑膜病损切除术（额部、右颞部）及额骨重建术，术后给予止血、预防感染、改善循环、支持等治疗，术后第 2 天拔除引流管，伤口按时换药，头部伤口延期间断拆线，愈合良好，术后病理结果提示额部小蓝圆细胞肿瘤；于西京医院行免疫组化提示：Bcl-2 (+)，CD56(+), Cyclin D1 (+)，Ki-67 (约 50%)，CD138(+), CD38(+), Kappa 及 Lambda 染色可见轻链限制，支持浆细胞瘤；血常规提示血红蛋白值约为 90g/L，影像科、神经外科、神经内科、病理科及血液科联合会诊，诊断为多发性骨髓瘤。

PU-1614

血管周围间隙扩散张量成像指数在评价轻度脑创伤患者类淋巴系统功能中的价值

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目的：探讨血管周围间隙扩散张量成像 (DTI-ALPS) 指数在评价轻度脑创伤 (mTBI) 患者脑类淋巴系统功能中的价值。

方法：选取诊断为 mTBI 的 30 例患者及 29 例健康志愿者纳入本研究，所有患者均进行了常规 MRI 和 DTI 序列扫描，分析了格拉斯哥昏迷指数 (GCS)、蒙特利尔认知功能评估量表 (MoCA)、行为记忆功能评估量表 (Rivermead) 的评估结果；利用 DtiStudio 软件在每例被试的各向异性分数 (FA) 图上，分别在左右侧大脑半球侧脑室体部水平的投射纤维区域、联合纤维区域勾画直径 5.0mm 的球形感兴趣区，测量每种纤维在 x、Y 和 z 轴方向的扩散率，并根据公式计算 DTI-ALPS 指数。比较 mTBI 组与正常组之间不同方向扩散率和 ALPS 指数值的差异，并分析患者年龄、Alps 指数与 GCS、MoCA、Rivermead 评分的相关性。

结果：与正常组比较，mTBI 组 DTI-ALPS 指数值显著降低 (中位数，全脑：1.452 vs. 1.593 ($P=0.005$)；左脑：1.457 vs. 1.616 ($P=0.006$)；右脑：1.451 vs. 1.605 ($P=0.027$))。轻度颅脑损伤患者的左脑 Dyproj 值显著高于健康对照组 ($P=0.005$)；mTBI 组 DTI-ALPS 指数与 Rivermead 评分呈负相关 (全脑： $r=-0.481$ ， $P=0.013$ ；左脑： $r=-0.427$ ， $P=0.030$ ；右脑： $r=-0.425$ ， $P=0.030$)。

结论：DTI-ALPS 指数可用于评估 mTBI 患者类淋巴系统功能受损情况，为理解 mTBI 相关发病机制提供见解。

PU-1615

根据动眼神经鞘瘤的影像学表现及发生位置推测患者术后动眼神经功能恢复的程度相关研究

段瑾

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背景：动眼神经是纯粹的运动神经，神经鞘瘤通常起源于感觉神经；因此动眼神经神经鞘瘤(ONS)是非常罕见的。根据发生部位的不同可将其分为眼眶内段、海绵窦段、和脑池段，其中最常见的是发生在脑池段，最不常见的是眼眶内段。文献中报道的病例大多是采用手术治疗的，动眼神经完全瘫痪率非常高，增加了严重的并发症发生率。因此，我们回顾分析经病理证实的动眼神经鞘瘤的影像学特点，以及随访这些患者的预后情况，并讨论二者之间的联系。目的：探索及复习动眼神经鞘瘤的临床表现、影像学特征及术后动眼神经的恢复情况，推测影像学表现与患者预后的关系，来提升动眼神经鞘瘤患者的术后生活质量。方法：回顾性分析我院已确诊的 10 例动眼神经鞘瘤的病例、临床表现、影像学特征及随访其预后情况，结合文献对该病的影像表现、发生位置与患者的预后之间的关系进行总结分析。所有的患者均采取手术切除治疗。结果：研究中 5 例患者肿瘤发生于动眼神经脑池段，3 例为海绵窦段，2 例发生于眶内段。术前患者均有动眼神经麻痹的相关症状。术后患者 9 例出现完全性动眼神经麻痹，伴有上睑下垂和瞳孔扩大，只有 1 例位于动眼神经海绵窦段患者未出现。在 3 个月的短期随访中，被记录到部分恢复到正常，对光瞳孔有反应性，上睑下垂部分恢复。据此我们推测患者术后临床症状取决于肿瘤的大小和位置，但一定程度的动眼神经麻痹几乎总是会出现的。因此推测术前通过影像学较准确的定位可以较为可靠的推测患者的预后情况。

PU-1616

多模态 MRI 在帕金森病早期诊断中应用价值的研究进展

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帕金森病 (Parkinson's disease, PD) 是第二大常见的进行性神经退行性疾病, 其病因现仍不清楚, 近年来 PD 发病率迅速增长, 然而目前 PD 的治疗效果低下, 究其原因, 是由于帕金森病的诊断主要基于其病史、临床症状和体征, 然而在出现这些特定症状和体征并被诊断之前, 神经退行性病变就已经存在并发展, 此时大部分特定神经元已经变性, 所以早期诊断 PD 显得十分重要。近些年来, 随着影像学的发展和成像技术与设备的进步, 以 MRI 为代表的影像学技术, 能够观察到疾病有关功能和结构的变化。本文旨在多模态 MRI 成像技术在 PD 早期诊断中应用价值的相关研究进展进行综述, 以期能够为 PD 的早期诊断提供一定影像学依据。

PU-1617

高级扩散成像监测大鼠 C6 胶质瘤水通道蛋白 4 表达水平的初步研究

时文伟

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目的 探讨高级扩散成像包括扩散峰度成像 (DKI) 及超高 b 值磁共振扩散成像 (DWI) 参数与大鼠 C6 胶质瘤水通道蛋白 4 (AQP4) 表达水平的相关性。方法 调控大鼠 C6 胶质瘤细胞 AQP4 表达水平 (分为 AQP4 过表达、沉默及未干扰细胞株三组), 采用立体定位技术分别接种在 15 只雄性 SD 大鼠右侧纹状体部位, 大鼠体重 250-300g。造模后 2-3 周内行常规 MRI、DKI 及超高 b 值 DWI 成像, 测量肿瘤瘤体及瘤周 DKI 及超高 b 值 DWI 参数值。H&E 染色观察瘤周肿瘤细胞密度, 免疫组化染色检测各组胶质瘤 AQP4 的表达水平。Spearman 相关分析研究 DKI 及超高 b 值 DWI 参数与 AQP4 的相关性。结果 瘤体: 三组间 DKI 参数 (MK 值) 及超高 b 值 DWI 参数 (超高 b 值 ADC 值) 有显著差异 (P 值均 < 0.05)。AQP4 过表达组 MK 值及超高 b 值 ADC 值明显高于 AQP4 未干扰及沉默组 (P 值均 < 0.05)。瘤周: AQP4 过表达组超高 b 值 ADC 值与 AQP4 未干扰组无明显差异 (P = 0.199), 但均明显高于 AQP4 沉默组 (P 值均 < 0.05)。Spearman 相关分析示: 瘤体 MK 值、超高 b 值 ADC 值与 AQP4 表达呈正相关 (r = 0.71, r = 0.85, P 值均 < 0.05); 瘤周 MK 值、超高 b 值 ADC 值与 AQP4 表达均呈正相关 (r = 0.64, r = 0.77, P 值均 < 0.05)。瘤周超高 b 值 ADC 值与瘤周肿瘤细胞密度呈正相关 (r = 0.65, P = 0.016)。结论 DKI 参数 MK 值及超高 b 值 DWI 参数超高 b 值 ADC 值可以用来监测大鼠 C6 胶质瘤 AQP4 表达水平, 且与 AQP4 表达呈正相关。

PU-1618

Progressive compressive myelopathy induced by a rare primary isolated thoracic vertebral hydatid cyst: A case report

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Rationale: Hydatid cyst is a disease caused by the larvae of *Echinococcus* spp. The larvae often reside in the liver, lungs, and brain. Occasionally, a primary isolated thoracic vertebral hydatid cyst is reported to cause severe complications. Various diseases may lead to the development of progressive compressive myelopathy. Herein, we report a rare case of a primary isolated thoracic vertebral hydatid cyst with compressive myelopathy.

Patient's concerns: A 57-year-old female had numbness and weakness in the lower limbs for a span of 3-months.

Diagnosis: Thoracic magnetic resonance imaging (MRI) showed that an isolated mass was observed in the T5 vertebral body, which compressed the spinal cord. The diagnosis was confirmed after surgical excision, and *Echinococcus granulosus* was found to be the etiologic factor.

Interventions: The patient underwent laminectomy with no complications.

Outcomes: After surgical decompression, the patient made slow and measurable progress. While relatively rare in the non-pastoral area, the primary isolated thoracic vertebral column hydatid cyst may be considered as a possible etiology of atypical extradural spinal compression.

PU-1619

基于 TBSS 探究 T2DM 患者白质微结构损伤的性别差异与肠道菌群的关系

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背景: 性别差异可能是 T2DM 患者脑微结构改变的重要影响因素且与肠道菌群异常改变有关, 但其关系和详尽机制尚未明确; 本研究基于纤维束示踪空间统计分析 (TBSS) 探究 T2DM 患者脑白质微结构损伤的性别差异与肠道菌群改变之间的关联。

方法: 在 25 名 T2DM 女性及 31 名 T2DM 男性中获得扩散磁共振图像, 通过 16S rRNA 基因测序分析肠道优势菌群, 采用 TBSS 分析法探究不同性别 T2DM 患者的分数各向异性 (FA)、平均扩散率 (MD) 差异; 采用 spearman 相关性分析差异脑区 FA、MD 值与肠道差异菌群丰度及微生物多样性之间的关系。

结果: 男性 T2DM 患者在胼胝体、左侧内囊豆状核后部、外囊、右侧上纵束、双侧前放射冠、上放射冠、后放射冠、丘脑后辐射及矢状面的 FA 值均低于女性 ($P < 0.05$)。肠道菌群检测发现, T2DM 男性患者拟杆菌门、无壁菌门、拟杆菌属、单行拟杆菌种、粪拟杆菌种、卵形拟杆菌种及普通拟杆菌种均低于女性患者, 而放线菌门、柯林斯菌属和产气柯林斯菌种高于女性患者 ($P < 0.05$ 或 $P < 0.01$)。女性 T2DM 患者肠道菌群的香农 (shannon) 及辛普森 (Simpson) 指数高于男性患者 ($P < 0.05$)。在属水平, T2DM 患者拟杆菌属与左侧前放射冠、右侧前放射冠及右侧矢状面平均 FA 值呈正相关 ($r = 0.422, 0.337, 0.389$, FDR q 均 < 0.05)。

结论: 相对于女性, 男性 T2DM 患者在部分脑区存在更加严重的白质微结构损伤, 男性 T2DM 患者的拟杆菌丰度及肠道微生物多样性相对更低, 在 T2DM 患者中拟杆菌丰度与部分差异脑区白质完整性成正相关。

PU-1620

基于扩散峰度成像的颞叶癫痫伴睡眠障碍患者脑白质结构研究

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目的 基于扩散峰度成像(diffusional kurtosis imaging, DKI)探究颞叶癫痫(Temporal lobe epilepsy, TLE)合并睡眠障碍患者的脑白质微观结构改变。材料与方法 前瞻性纳入 TLE 患者 38 例,健康对照组 20 例,向 TLE 患者组发放睡眠调查问卷评估其睡眠状况,根据睡眠障碍的诊断标准和量表评分将患者分为合并睡眠障碍及未合并睡眠障碍组。采集所有受试者 DKI 序列并测量相关感兴趣区(region of interest, ROI)平均扩散峰度(mean kurtosis, MK)、平均扩散系数(Mean diffusivity, MD)和分数各向异性(fractional anisotropy, FA)三个扩散参数。使用单因素方差分析、Welch's ANOVA 检验比较睡眠质量评分、DKI 参数的组间差异。结果 合并睡眠障碍的 TLE 患者 Epworth 嗜睡量表(Epworth Sleepiness Scale, ESS)、阿森斯失眠量表(Athens Insomnia Scale, AIS)评分均显著高于对照组($P<0.05$),合并睡眠障碍的 L-TLE 患者匹兹堡睡眠质量指数(Pittsburgh Sleep Quality Index, PSQI)评分显著高于对照组($P<0.05$)。TLE 患者较健康对照的 FA、MK 值明显减低,MD 值明显升高 ($P<0.05$);合并睡眠障碍患者的 L-TLE 患者 MK、FA 值较未合并睡眠障碍者明显减低 ($P<0.05$),未发现 MD 存在组间差异($P>0.05$);合并睡眠障碍的 R-TLE 患者的 MK 值较未合并睡眠障碍者明显减低($P<0.05$),未发现 MD、FA 存在组间差异($P>0.05$)。结论 合并睡眠障碍的 TLE 患者存在特异性脑白质纤维损伤模式,利用 DKI 序列监测该类患者的治疗效果与预后评估可以提供可靠的影像学标记物。

PU-1621

CLIPPERS 综合征一例报道并文献复习

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患者男性,60 岁,因“肢体无力伴行走不稳 2 年,加重 10 月余”于 2022 年 10 月 28 日入院。患者于 2020 年 11 月无明显诱因下出现四肢肢体无力,以左肢为著,伴行走不稳、饮水呛咳,自服“脑心通”4 片 TID,左下肢乏力症状稍好转,余症状未见明显好转,来院就诊,头颅 MRI 平扫+增强示:平扫未见明显异常信号灶,增强后桥脑见“胡椒粉样”强化影。诊断考虑为脑梗死,予以综合对症治疗。患者症状好转出院,出院后继续药物对症治疗,因症状持续存在,于 2021 年 1 月在上海华山医院就诊,头颅 MRI 提示:脑桥异常增强影,考虑 CLIPPERS 综合征,激素治疗后余留左下肢无力,仍有饮水呛咳,行走不稳好转,2021 年 6 月 4 日于我院就诊,诊断考虑为类固醇激素反应性慢性淋巴细胞性炎症伴脑桥血管周围强化症 (CLIPPERS 综合征),排除禁忌后,予以激素冲击治疗 (甲泼尼龙 240mgQD \times 3d, 120mgQD \times 3d),后改激素为口服 (醋酸泼尼松 50mg 一次/d)。患者一般情况好转,病情稳定后出院,出院后继续规律甲泼尼龙口服,缓慢减量 (每 2 周减 1 片,减至每天 3 片维持),患者诉出院后仍有全身乏力、行走不稳,构音障碍及吞咽困难较前加重,于 2021 年 8 月激素逐渐减量至停药,症状逐渐加重,表现为右侧肢体无力、不能言语、饮食呛咳、吞咽困难,于出院后三个月 (2021 年 9 月 15 日)来我院神经内科门诊就诊,复查头颅 MRI 平扫+增强提示桥脑新增小片轻度强化影,治疗上初始静脉激素冲击 (120mg/d \times 9d)以改善症状,续之醋酸泼尼松 50mg 一次/d,每周减 1 片 (5mg),症状好转后出院。2022 年 10 月 28 日患者病情反复,来我院门诊就诊,拟“CLIPPERS 综合征”收入院。头颅 MRI 平扫+增强示:桥脑小片轻度强化影,较前片 (2021-9-17)范围减小。

PU-1622

少突胶质细胞瘤术后复发转变为胶质母细胞瘤 1 例并文献复习

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患者男，46 岁，2017 年 7 月 31 日因突发头疼、头晕，后加重伴意识不清，频繁恶心呕吐入当地县医院，行 CT 平扫示左侧颞叶占位影，局部钙化；后行 MRI 及增强扫描提示左颞叶占位，提示间变型少突胶质细胞瘤，继发大脑镰疝及小脑天幕疝（图 1-1）；行全麻下行占位性病变切除术后，病理示少突胶质瘤（Ⅱ级）（图 1-2）。免疫组化结果：胶质纤维酸性蛋白（glial fibrillary acidic protein, GFAP）（+）、异柠檬酸脱氢酶 1（isocitrate dehydrogenase 1, IDH1）（-）、O6-甲基鸟嘌呤-DNA 甲基转移酶（O6-methylguanine-DNA methyltransferase, MGMT）（-）、CD34 血管（-）、S-100（+）、P53（-）。后出院建议放化疗等辅助治疗，患者及家属未采纳。2019 年 9 月 25 日因半月头痛头晕、钝痛为著，伴间断恶心呕吐入院，行 MRI 及增强扫描提示左侧顶颞叶-岛叶-基底节区占位影，提示复发（图 2-1）；当年 10 月 9 日行占位全麻下左额颞顶入路胶质瘤清除术，手术顺利，切口愈合良好，病理结果提示（左颞部）胶质母细胞瘤（Ⅳ级）（图 2-2），免疫组化结果示：GFAP（+）、波形蛋白（Vimentin）（-）、CD34 血管（+）、P53 约 3%、Ki-67 约 40%（+）。术后出院建议放化疗等辅助治疗，患者及家属未采纳。2021 年 4 月 3 号因头晕门诊行 MRI 及增强扫描是占位复发，病变呈“花环样强化”（图 3-1）；2022 年患者死亡。

PU-1623

Combining radiomics and pathomics to predict potential biomarkers of MGMT promoter methylation in glioblastoma: preliminary results from a cross-scale study

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Objective

In glioblastoma (GBM), promoter methylation of the DNA repair gene O6 -methylguanine-DNA methyltransferase (MGMT) is associated with beneficial chemotherapy but have not been accurately evaluated. To develop and validate a radiomics-pathomics model for predicting MGMT promoter methylation in patients with GBM.

Materials and Methods

Between September 2015 and September 2020, 141 patients with pathologically confirmed GBM were included, all of whom underwent 3.0T MRI (T1WI, T2WI, T1WI enhancement) scans within 2 weeks before surgery. The tumor portion was outlined layer by layer on the MRI images. A siamese neural network based on a pre-trained model of SE-ResNet-50 was used for feature fusion in the MRI image sequence. Histopathology images were automatically segmented using whole slide image (WSI) analysis, predictive probability weighted averaging and feature fusion. Features of 1024 dimensions were extracted from MRI images and histopathology images, respectively, and then feature fusion was performed using a multilayer perceptron (MLP) to construct a radiomics pathology prediction model.

Results

The GBM patients included in the study were randomly divided into training and test sets according to 8:2. The AUC of subjects in the training and validation sets for MRI image prediction were 0.83 and 0.85, respectively; the AUC of the training and validation sets for the

histopathology prediction model based on WSIs were 0.85 and 0.83, respectively; and the multimodal model further improved the performance, and the accuracy of radiomics-pathomics model for predicting MGMT was significantly higher than that of MRI and pathology alone, with the fusion prediction training set and validation set AUCs of 0.91 and 0.93, respectively.

Conclusion

The radiomics-pathomics model based on preoperative MRI was able to predict MGMT promoter methylation in patients with glioblastoma. The model could be used as a preoperative molecular prediction tool.

PU-1624

MRI 诊断胎儿右侧小脑出血 1 例

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孕妇 34 岁，孕 28 周，孕 2 产 0，稽留流产 1 次，外院彩超提示胎儿右侧小脑实性占位。MRI 平扫示：胎儿右侧小脑半球及蚓部示不规则斑片、团片状异常信号，LAVA 序列呈高信号，T2WI 呈低信号，边界清楚，较大层面范围约 2.1×2.0×1.3cm。诊断为“胎儿右侧小脑出血”。胎儿颅内出血指妊娠 14 周至分娩期间胎儿发生的颅内出血，是一种相对少见的脑损伤事件，检出率约 0.5%~1.0%。FICH 多发生在脑室旁生发区、脑室内，胎儿小脑出血较为少见，主要起源于小脑半球外周尾部，并可能选择性累及外周生发基质。MRI 对显示胎儿颅内出血明显优于超声，并且能显示不同出血期胎儿颅内信号的变化，有利于早期发现病灶并进行出血程度的评估。血肿演变过程中磁共振信号变化具有一定的规律，可用来大致推测出血事件发生时期。根据 MRI 信号的差异，FICH 可分为以下 5 期：①超急性期：T1WI 无明显异常信号，T2WI 呈明显低信号；②急性期：T1WI 呈等信号，T2WI 呈低信号；③亚急性早期：T1WI 呈高信号，T2WI 呈低信号；④亚急性晚期：T1WI 及 T2WI 均为高信号；⑤慢性期：T1WI 及 T2WI 均为低信号。产前 MRI 对诊断 FICH 具有优势，可准确定位出血部位、范围，显示不同信号强度，反映病理生理演化过程，建议所有产前怀疑胎儿颅内病变、诊断不清时，均有必要进行 MRI 检查进一步明确诊断。

PU-1625

神经精神性系统性红斑狼疮患者白质结构网络的变化研究

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目的 通过图论分析方法来研究神经精神性系统性红斑狼疮 (neuropsychiatric systemic lupus erythematosus, NPSLE) 患者脑白质结构网络的变化，探讨其与临床指标及神经量表之间的关系，为临床早期识别 NPSLE 提供新的影像学标记物。方法 收集 2020 年 6 月至 2022 年 12 月在泰州市人民医院风湿免疫科收治确诊的 NPSLE 患者 34 例、Non-NPSLE 患者 32 例。采用确定性纤维示踪技术以及图论分析方法探讨受试者大脑结构网络拓扑属性变化，并采用相关性分析方法评估结构网络拓扑属性值与临床指标及神经量表的相关性。结果 NPSLE 和 Non-NPSLE 两组受试者结构网络均具有“小世界”属性，但两组间的 γ 、 λ 、 σ 值差异均无统计学意义 (P 值均 >0.05)，NPSLE 组全局效率明显低于 Non-NPSLE 组 ($t=2.775$, $P=0.008$)，特征路径长度明显高于 Non-NPSLE 组 ($t=2.688$, $P=0.009$)。在节点拓扑属性值中，与 Non-NPSLE 组相比，NPSLE 组患者左侧内侧和旁扣带脑回 (DCG.L)、右侧海马 (HIP.R)、左侧舌回 (LING.L)、右侧梭状回 (FFG.R)、右侧豆状壳核 (PUT.R) 的节点效率降低 (P 值均 <0.05 , FDR 校正)；左侧舌回 (LING.L)、右

侧梭状回 (FFG.R)、右侧豆状壳核 (PUT.R) 的节点最短路径长度较 Non-NPSLE 组升高 (P 值均 <0.05 , FDR 校正)。相关性分析发现, 仅 ESR 与部分拓扑属性值存在相关性。全局拓扑属性值中, Eg 与 ESR 呈负相关 ($r=-0.041$, $P=0.025$), Lp 与 ESR 呈正相关 ($r=0.042$, $P=0.023$); 节点拓扑属性值中, HIP.R、FFG.R 的节点效率与 ESR 呈负相关 ($r=-0.598$, $P<0.001$; $r=-0.613$, $P<0.001$)。结论 NPSLE 患者的白质网络拓扑属性存在一定异常, 提示白质网络拓扑属性的改变可能是 NPSLE 患者诊断和评价的潜在影像学标记物, 在诊断 NPSLE 脑损伤方面具有一定价值。

PU-1626

Glioblastoma and solitary brain metastasis: differentiation by integrating clinical-radiological and deep-learning radiomics signatures

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Objectives

We aimed to develop and validate a clinical-radiological deep-learning radiomics nomogram (CDLRN) integrating clinical-radiological, radiomics, and deep-learning features to noninvasively differentiate glioblastoma (GBM) from solitary brain metastasis (SBM).

Methods

A total of 235 potentially eligible patients (115 GBM and 120 SBM) were retrospectively recruited from our hospital between August 2016 and August 2022 for this study. The training cohort (TC) and validation cohort (VC) comprised 188 (90 GBM and 98 SBM) and 47 (25 GBM and 22 SBM) patients, respectively. At first, we summarized seven specific radiological features of GBM and SBM, including the "pool sign", the "irregular ring sign", the "regular ring sign", R(edema/enhanced tumor), R(T2-FLAIR/CE-T1WI), location of the tumor, and the "intratumoral vessel sign". The clinical signature was constructed by combining them with the patients' basic clinical information. Next, radiomics and deep-learning (DL) features were extracted from preprocessed multiparametric brain MRI (T2WI, T2-FLAIR, and CE-T1WI). A four-step procedure was applied for feature selection and signature construction, including the Mann-Whitney U statistical test, the Pearson correlation coefficient, the LASSO method, and the multivariable logistic regression analysis. Four radiomics models, four DL models (based on each of the three MRI sequences and their combination), DLR signature, and CDLRN were constructed and validated to identify GBM and SBM. All of the above models were compared, and their prediction performances were assessed using the receiver operator characteristic (ROC) analysis.

Results

In the VC, in all models we proposed, the order of diagnostic effect from high to low was CDLRN, DLR signature, clinical signature, DL signature, and radiomics signature with the areas under the receiver operating curve (AUCs) of 0.987 (95%CI, 0.886-1.000), 0.947 (95%CI, 0.886-1.000), 0.931 (95%CI, 0.859-1.000), 0.909 (95%CI, 0.828 - 0.990), and 0.875 (95%CI, 0.776-0.973), respectively. The CDLRN showed the best performance for discriminating between GBM and SBM, and yielded an AUC of 1.000 (95% CI, 0.999-1.000) and 0.987 (95% CI, 0.886-1.000) in the TC and VC, respectively.

Conclusions

The CDLRN, which combines clinical-radiological features, radiomics, and DL features, shows an excellent performance in differentiating GBM from SBM and can provide valuable information for individualized treatment.

PU-1627

基于血管周围间隙张量分析与葡萄糖-甘油三酯指数探究 T2DM 类淋巴系统损伤与胰岛素抵抗的关系

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摘要:

目的: 基于扩散谱成像数据得到的血管周围间隙扩散张量 (DTI-ALPS) 指数探究 T2DM 患者大脑类淋巴系统功能改变与葡萄糖-甘油三酯指数之间的关系。

方法: 招募 28 名 T2DM 患者 (T2DM 组) 与 24 名健康志愿者 (HC 组) 纳入本研究, 采集所有被试的扩散磁共振图像, 通过 FSL 及 itk-snap 软件在优势半球侧脑室体部水平投射纤维及联合纤维上勾画 5.0mm 圆形感兴趣区, 测量感兴趣区内两种纤维在 X、Y、Z 轴方向上的扩散率, 并通过计算获得所有被试 DTI-ALPS 指数, 并将 T2DM 组与 HC 组被试的 ALPS 指数及两种纤维在 X、Y、Z 轴上的扩散率行独立样本 T 检验, $P<0.05$ 被认为具有统计学意义。同时通过空腹血糖及甘油三酯水平计算获得 T2DM 患者葡萄糖-甘油三酯指数, 将年龄作为协变量, 将投射及联合纤维在 XYZ 轴上的扩散率与 ALPS 指数分别与葡萄糖-甘油三酯指数行 spearman 偏相关分析, $P<0.05$ 被认为差异具有统计学意义。

结果: T2DM 组左侧 ALPS 指数低于 HC 组 ($P<0.05$); T2DM 组投射纤维在 X 轴上的扩散率 (Dxproj) 低于 HC 组 ($P<0.05$), 而 T2DM 组投射纤维在 Y 轴上的扩散率 (Dyproj) 高于 HC 组 ($P<0.05$)。T2DM 组左侧 ALPS 指数与葡萄糖-甘油三酯指数成负相关 ($r=-0.419$, $P=0.03$); T2DM 组联合纤维在 X 轴上的扩散率 (Dxassoc) 与葡萄糖-甘油三酯指数成负相关 ($r=-0.563$, $P=0.002$)。

结论: T2DM 引起的胰岛素抵抗可能与患者类淋巴系统以及相关区域联合纤维的白质损伤相关。

PU-1628

T2DM 患者神经血管耦合功能与肠道菌群相关性的 MRI 研究

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目的: 以多模态 MRI 分析 T2DM 患者神经血管耦合 (NVC) 功能的变化, 探究这种变化与 T2DM 患者肠道菌群多样性之间的关系。

方法: 将 40 例 T2DM 患者 (T2DM 组) 和 24 例年龄、性别相匹配的健康志愿者 (HC 组) 纳入本研究。对所有被试采集静息态脑功能成像 (rs-fMRI) 与 3D 伪连续性动脉自旋标记成像 (3D-pCASL), 分别获得区域一致性 (ReHo) 及脑血流量 (CBF) 图像, 在全脑灰质范围内计算 ReHo 与 CBF 的比值, 得到神经血管耦合图, 并提取两组间显著差异脑区的 NVC 值。同时收集患者的粪便样本, 通过 16S rRNA 基因测序获得所有被试的肠道菌群 α 多样性指数 (Chao1、Shannon、Simpson)。将差异脑区 NVC 值与肠道菌群 α 多样性指数进行相关性分析。

结果: 与 HC 组相比, T2DM 组左侧中央前回、左侧内侧和旁扣带回、双侧梭状回、左侧中央后回、左侧顶状回、双侧尾状核、左侧颞下回、左侧中央旁小叶脑区 NVC 值减低 ($p<0.05$, FDR 校正), 而双侧眶部额下回、左中央沟盖、左直回、双侧脑岛、双侧前扣带和旁扣带回、右内侧和旁扣带回、双侧颞上回、双侧颞极: 颞上回 NVC 值增高 ($p<0.05$, FDR 校正)。HC 组 Simpson 指数与 Shannon 指数均高于 T2DM 组。经过 Bonferroni 法校正, 在 T2DM 组中右侧脑岛 NVC 值与 Simpson 指数呈正相关 ($r=0.478$, $p<0.05$)。

结论: T2DM 患者神经血管耦合功能及肠道菌群的多样性与健康人之间存在差异, 且两者之间存在一定的相关性。

PU-1629

Progressive cerebrovascular reactivity reduction occurs in Parkinson's disease

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Objective: We aimed to ascertain regional cerebrovascular reactivity (CVR) changes in the patients with PD at baseline (V0) and during a 2-year follow-up period (V1). We further investigated whether alterations in CVR were linked to cognitive decline and brain functional connectivity (FC).

Methods: We recruited 90 PD patients and 51 matched healthy control (HCs). PD patients underwent clinical evaluations, neuropsychological assessments and MR scanning at V0 and V1, while HCs completed neuropsychological assessments and MR at baseline. The analysis included evaluating CVR and FC maps derived from resting-state functional magnetic resonance imaging (rsfMRI), and investigating CVR measurement reproducibility.

Results: Compared with HCs, CVR reduction in left inferior occipital gyrus and right superior temporal cortex at V0 persisted at V1, with larger clusters. Longitudinal reduction in CVR of the left posterior cingulate cortex correlated with decline in Trail Making Test B performance within PD patients. Reproducibility validation further confirmed these findings. In addition, the results also showed that there was a tendency for FC to be weakened from posterior to anterior with the progression of the disease.

Conclusions: Microvascular dysfunction might be involved in disease progression, subsequently weaken brain functional connectivity, and partly contribute to executive function deficits in early PD.

PU-1630

基于磁共振成像的颈动脉斑块内出血对脑血管事件预测价值的 meta 分析

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目的: 现有研究证据提示, 基于 MRI 图像评估的颈动脉粥样硬化斑块内出血 (intraplaque hemorrhage, IPH) 是预测脑血管事件发生风险的高危影像特征。但是既往研究多数样本量较小, 事件的绝对数低; 且不同研究之间存在较大的异质性, 相关结果的置信区间范围较宽。故本研究将对既往研究进行 meta 分析, 以明确 IPH 对颈动脉狭窄患者发生脑血管事件的预测价值。

方法: 利用 R 软件合并纳入研究的 HR 值以评估基于 MRI 的 IPH 预测颈动脉狭窄患者脑血管事件发生风险的综合效应。通过 Q 检验和 I^2 评估研究之间的异质性。通过附加轮廓线漏斗图评估潜在的发表偏倚, 借助 Egger 法检测发表偏倚。并根据患者症状划分为有症状组和无症状组开展探索性亚组分析。

结果: 研究共纳入 19 项前瞻性队列研究, 样本总量为 3272 例, 发生脑血管事件 365 例。所纳入文献存在中等程度异质性 ($P=45\%$, Q 统计量 $P=0.02<0.1$), 但不存在发表偏倚。Meta 分析结果显示, 所有文献合并估算 HR 值为 4.06 (95%CI: 2.85-5.77), 提示存在 IPH 的患者发生脑血管

事件的风险是无 IPH 患者的 4 倍。在亚组分析中, 无症状亚组合并分析结果显示, 相比无 IPH 患者, IPH 患者发生脑血管事件的风险是其 3.76 倍 (95%CI: 2.76-5.11) 且具有统计学意义; 有症状亚组合并分析结果显示, 相比无 IPH 患者, IPH 患者发生脑血管事件的风险是其 4.67 倍 (95%CI: 2.92-7.48) 且具有统计学意义。

结论: 本研究结果证实基于 MRI 图像的颈动脉斑块 IPH 成分对于颈动脉样狭窄患者发生脑血管事件的风险具有预测价值, 尤其对于有临床症状的患者而言。因此 IPH 可以作为高风险颈动脉狭窄患者的生物学标志物, 从而帮助临床医生更加准确的判断哪些患者需要侵入性治疗而哪些患者可获益于保守治疗。考虑研究所纳入文献存在中等程度的异质性, 未来还需要更大规模队列研究来佐证基于 MRI 的 IPH 成分对颈动脉斑块患者发生远期脑血管事件的诊断价值。

PU-1631

表观扩散系数鉴别幕下非中线成人髓母细胞瘤与脑膜瘤

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[摘要] **目的** 探讨表观扩散系数鉴别诊断幕下非中线成人髓母细胞瘤与脑膜瘤的价值。**方法** 回顾性分析经手术病理证实的 6 例幕下非中线成人髓母细胞瘤和 13 例幕下非中线脑膜瘤患者, 在 ADC 图上测量肿瘤实性部分的最小 ADC 值 (ADCmin)、平均 ADC 值 (ADCmean) 及肿瘤对侧正常脑白质 ADC 值, 并计算相对 ADCmin 值 (rADCmin) 和相对 ADCmean 值 (rADCmean)。对比分析 ADC 值的差异, 绘制受试者工作特征 (ROC) 曲线评价 ADC 值的鉴别诊断价值。**结果** 幕下非中线成人髓母细胞瘤组的 ADCmin、ADCmean、rADCmin 及 rADCmean 值均小于幕下非中线脑膜瘤组, 组间差异具有统计学意义 ($p < 0.05$)。各 ADC 值均能对幕下非中线成人髓母细胞瘤和幕下非中线脑膜瘤患者进行有效鉴别, 其中 rADCmin 值的鉴别诊断效能最好, 曲线下面积 (AUC 值) 为 0.885, 最佳截断值为 0.975, 相应的灵敏度和特异度分别为 100%、83.3%, 准确度为 89.5%。**结论** ADC 值可以对非中线成人髓母细胞瘤与脑膜瘤进行鉴别诊断。

PU-1632

基于 CT 灌注参数和围手术期临床资料预测成人烟雾病联合血运重建术后高灌注综合征

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目的: 探讨基于术前 CT 灌注参数及围手术期临床资料在预测成人烟雾病联合血运重建术后高灌注综合征 (CHS) 发生的价值。**方法:** 回顾性收集 60 例在皖南医学院弋矶山医院接受联合血运重建治疗的成人烟雾病患者, 根据术后是否发生 CHS 分为 CHS 组 ($n=18$) 和非 CHS 组 ($n=42$ 组)。比较组间术前 CTP 参数和围手术期临床资料的差异, 采用多因素 Logistic 回归分析术后发生 CHS 的危险因素, 并以 ROC 曲线评估各参数预测 CHS 的效能。**结果:** CHS 组的术前脑血容量 (CBV)、流量提取乘积 (FEP) 及术后当日平均动脉压 (MAP) 均高于非 CHS 组 (P 均 < 0.05)。术前 FEP 增高 ($OR=11.009$, 95%CI 2.294~52.840)、术后当日 MAP 偏高 ($OR=1.063$, 95%CI 1.008~1.121) 是 CHS 发生的危险因素。以术前 CBV、FEP 及术后当日 MAP 预测 CHS 发生的曲线下面积 (AUC) 分别为 0.712、0.771、0.665, 三者联合预测的 AUC 为 0.872, 高于单一因素 ($Z=2.17$ 、2.77、3.13, P 均 < 0.05), 敏感度为 94.4%, 特异度为 69.0%。**结论:** 术前 CBV、FEP 及术后当日 MAP 有助于预测成人烟雾病联合血运重建术后发生 CHS, 联合应用三者可提高预测效能。

PU-1633

基于血栓渗透性对急性缺血性脑卒中血管内治疗临床预后的评估

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背景及目的：机械取栓已经成为治疗颅内大血管闭塞所致急性缺血性脑卒中的首选方案。血栓具有渗透性，血栓通透性根据影像学图像估计急性缺血性卒中血栓周围的剩余血流。本研究探讨急性缺血性脑卒中中进行血管内治疗患者血栓的渗透性与临床预后的关系。

方法：回顾性分析来自延安大学附属医院 70 例大脑中动脉近端闭塞(M1-M2)并接受血管内治疗的急性缺血性脑卒中患者。我们纳入了具有以下特征的患者：（1）年龄 ≥ 18 岁，（2）涉及大脑中动脉（MCA）M1-M2 段的大血管闭塞（LVO），（3）NCCT 和动脉期 CTA 可接受图像质量，以及（4）接受血管内治疗患者。收集临床结果如改良 Rankin 量表(mRS)、脑梗死溶栓灌注量表(TICI)评分和基线临床特征(如年龄、性别、美国国立卫生研究院卒中量表(NIHSS)评分)。在平扫 CT 和 CTA 上选择 3 个种子点 (ROI)，分别计算出各自的 CT 值，再测量三点的平均值，CTA 上的平均 CT 值减去平扫 CT 上的 CT 值即得血栓渗透性。

统计学分析 TAI 测量值、基线和 90 天的功能结局(修改后的 Rankin 量表评分)变量的分布，使用 Shapiro-Wilk 检验评估分布的正态性。对与主要结局相关的所有基线特征进行多变量 logistic 回归分析，使用单变量逻辑回归评估基线变量与主要结果的关联，以选择纳入多变量模型的变量。显著性水平设为 p 值 0.05。所有分析均使用 IBM SPSS 统计软件，版本 26.0。

结果：

功能预后良好的患者年龄较小，NIHSS 较低。成功治疗和血管内治疗的患者功能预后较好。90 天 mRS 预后较好 (≤ 2) 的患者血栓密度更高 (10.45HUVS6.34HU, $P=0.031$)，血栓渗透性更好 (19.69HUVS9.99HU, $P=0.048$)，血栓长度较短 (1.69cmVS2.96cm, $P=0.029$)。

结论：

急性缺血性脑卒中血管内治疗 90 天 mRS 与血栓渗透性、血栓密度、血栓长度有关。较高的血栓渗透性、较高的血栓密度和较短血栓长度的急性缺血性脑卒中血管内治疗患者有较好的 90 天 mRS 预后。这些发现可能支持急性缺血性脑卒中血管内治疗的治疗决策。

PU-1634

MRI 基本征象结合 ADC 值鉴别成人节细胞胶质瘤与少突胶质细胞瘤

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目的：探索磁共振成像 (MRI) 征象及表观扩散系数 (ADC) 值在鉴别成人节细胞胶质瘤与少突胶质细胞瘤中的价值。

方法：回顾性分析手术及病理证实的 8 例成人节细胞胶质瘤及 14 例少突胶质细胞瘤临床、MRI 及病理资料，对比 MRI 征象及 ADC 值差异，统计学方法使用 t 检验、卡方检验，并用受试者工作特征 (ROC) 曲线评估各参数鉴别两组肿瘤诊断效能。

结果：成人节细胞胶质瘤多发生于颞叶 (37.5%)，少突胶质细胞瘤多发生于额叶 (57.1%)。成人节细胞胶质瘤与少突胶质细胞瘤间，肿瘤最大径、囊性成分比例具有统计学意义 ($P<0.05$)，两组性别、年龄、瘤周水肿、形态、边界、钙化、强化无统计学意义，($P>0.05$)。成人节细胞胶质瘤与少突胶质细胞瘤的 ADCmean、ADCmin、rADC 分别为 (0.993 \pm 0.059) $\times 10^3\text{mm}^2/\text{s}$ ，(0.936 \pm 0.055) $\times 10^3\text{mm}^2/\text{s}$ ，1.39 \pm 0.12 与 (1.227 \pm 0.110) $\times 10^3\text{mm}^2/\text{s}$ ，(1.165 \pm 0.089) $\times 10^3\text{mm}^2/\text{s}$ ，1.69 \pm 0.12。少突胶质细胞瘤的 ADCmean、ADCmin 及 rADC 值均大于成人节细胞

胶质瘤，差异有统计学意义（ $P < 0.05$ ）。在 ADC 值中，ADCmin 诊断效能最优，AUC 值为 0.982，当 ADCmin 阈值为 $1036.5 \times 10^3 \text{mm}^2/\text{s}$ 时，鉴别二者的敏感度、特异度分别为 0.929、1。

结论：通过 MRI 征象联合 ADC 值对术前鉴别成人节细胞胶质瘤与少突胶质细胞瘤具有重要临床价值，可提高术前诊断准确率。

PU-1635

急性缺血性卒中取栓治疗后脑功能网络的变化

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目的

取栓是治疗急性缺血性卒中的有效方法之一，可提高患者血液灌注再通率。目前 AIS 取栓治疗后的脑功能机制和再灌注程度对脑功能的影响尚不明确，有必要进行相关探索，为 AIS 取栓治疗后效果评估提供理论参考。

方法

本研究收集 43 例大脑前循环闭塞患者（AIS，24 女， 70 ± 11.27 岁）和 37 例健康被试（HC，20 女， 70 ± 9.61 岁）。所有患者均接受取栓治疗，并依据再灌注程度分为两个亚组（再灌注良好组 GR：15 人；再灌注不良组 PR：28 人）；所有被试均接受静息态磁共振扫描（31/30/2010/180, slices/TE/TR/volumes）。研究通过计算四个高级功能网络：背侧注意网络（DAN）、腹侧注意网络（VAN）、执行控制网络（ECN）和默认模式网络（DMN）内部静态功能连接（sFC）和动态功能连接（dFC）探究 AIS 取栓后脑功能网络的变化以及再灌注程度对网络内部连通性的影响，并分析连通性变化与卒中严重程度的关系。

结果

相较于健康被试，AIS 组四个功能网络的 sFC 均存在异常连接，表现为额叶区域与中部扣带回、大脑后部区域（顶叶、枕叶和楔前叶）sFC 显著增高；AIS 组 ECN 顶下回与角回，VAN 楔前叶与顶叶区域以及 DMN 额上回与角回的 dFC 也显著增高。在与 PR 亚组的比较中，GR 亚组四个功能网络的 sFC 均存在显著增高，主要集中于楔前叶与中部扣带回、顶叶区域；GR 亚组 DMN 楔前叶与额上回的 dFC 显著增高。显著差异的功能连接与卒中严重程度存在相关性：患者 VAN 中部扣带回与辅助运动区的 sFC 和卒中 90 天 NIHSS 评分（ $r = 0.531, p < 0.001$ ）；PR 组 ECN 额上回与角回的 sFC 与取栓术后 NIHSS 评分（ $r = 0.599, p = 0.018$ ）以及患者 DMN 额上回与顶下回的 dFC 与卒中 90 天 NIHSS 评分（ $r = -0.499, p = 0.003$ ）。

结论

本研究发现 AIS 取栓治疗后高级功能网络内连接模式改变，且不同再灌注水平患者表现出特定改变模式；这些功能网络的变化与卒中严重程度及功能康复水平相关。以上发现有助于阐明卒中取栓后脑功能机制，为患者康复治疗提供指导。

PU-1636

探讨 FastStroke 多模态评估在急性缺血性脑卒中中的应用价值

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目的 探究 FastStroke 多模态评估在急性缺血性脑卒中（AIS）中的应用价值。**方法** 回顾性分析 33 例急性前循环缺血性脑卒中患者，入组患者治疗前均行一站式 CT 检查及多模态磁共振检查，多时相 CTA 数据采用 GE FastStroke 脑卒中软件处理。**结果** FastStroke 可视化 AIS 患者的侧支循环情

况, 基于 FastStroke 软件的多期相 CTA (mCTA)侧支循环评分与患者入院时美国国立卫生院卒中量表 (NIHSS 评分)、脑梗死体积具有很好的相关性, 组间差异有统计学意义 ($P<0.05$)。结论 FastStroke 多模态极大的提高了诊断的方便性, 可以在有限的时间内详细评估 AIS 患者的影像学资料, 为临床提供更多诊疗信息, 预估预后, 指导个体化精准治疗, 在临床上具有重要的价值、值得推广应用。

PU-1637

功能磁共振在失眠障碍中的应用现状及研究进展

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根据第 5 版《精神疾病诊断和统计手册》(DSM-5), 失眠被定义为睡眠时长和睡眠质量不满意, 延迟入睡或睡眠持续不好, 并影响到白昼的日常情绪或工作的一类睡眠障碍。随着现代社会和工作方式的压力增大, 许多人群面临延迟入睡、睡眠比例不足的问题, 导致记忆力下降、工作和学习效率低下。研究表明, 中国大陆成人中患有失眠症状的人群高达 57%, 其中失眠的危险因素包括年龄、性别、既往史、遗传因素、个体特征及精神障碍等, 患病人群中女: 男约 1.41: 1。在患者有既往睡眠障碍的情况下, 失眠的发病率上升了 5.4 倍; 精神类疾病患者中约 70~80%伴有失眠症状。长期失眠或睡眠质量低下会导致个体交感神经和副交感神经相互作用的失衡, 失眠与心血管疾病、糖尿病、痴呆症、慢性疼痛以及精神障碍等具有密切关联, 同时也是其发病率的重要预测因素。此外失眠的影响还体现在公共卫生、精神障碍和躯体疾病等方面。

关于失眠障碍的病理机制一直在探讨中, 其中涉及遗传、环境、行为和生理因素, 人们最容易接受的是“高度唤醒假说”, 即失眠患者睡眠期间表现出过度激活状态, 表现为高频脑电激活增加, 激素分泌异常、体温及代谢水平升高, 心率和交感神经系统呈现过度活跃, 而且这种改变是一种长期、慢性的过程。功能磁共振成像 (fMRI) 是一种高分辨率的非侵入性、可重复性强的成像工具, 在精神类疾病领域研究中得到越来越多的认可, 在大量的研究中发现, 失眠不仅涉及大脑区域的结构与功能异常, 还表现为大脑内在网络的连接异常, 同时与认知障碍和情绪调节等领域有关。因此本文主要从 fMRI 在失眠障碍的应用现状、失眠患者的脑区结构和功能改变、失眠相关的脑功能网络等方面进行综述。

PU-1638

MOG 抗体相关中枢神经系统淋巴瘤一例并文献复习

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髓鞘少突胶质细胞糖蛋白 (myelin oligodendrocyte glycoprotein, MOG) 是少突胶质细胞表面和髓鞘最外层表达的膜蛋白, 是少突胶质细胞表面成熟的标志物。抗髓鞘少突胶质细胞糖蛋白免疫球蛋白 G 抗体 (anti-myelin oligodendrocyte glycoprotein-IgG, MOG-IgG) 相关疾病 (MOG-IgG associated diseases, MOGAD) 是近年提出的一种免疫介导的炎性脱髓鞘疾病。中枢神经系统淋巴瘤包括原发性中枢神经系统淋巴瘤 (primary central nervous system lymphoma, PCNSL) 和继发性中枢神经系统淋巴瘤 (Secondary central nervous system lymphoma, SCNSL), PCNSL 是一种罕见的结外非霍奇金淋巴瘤, 约占中枢神经系统肿瘤的 4%, 绝大部分为弥漫大 B 细胞淋巴瘤 (diffuse large B-cell lymphoma, DLBCL)。目前国内尚无与 MOG 抗体相关中枢神经系统淋巴瘤的报道, 国外文献报道也极少, 我们将介绍一例早期诊断为可能 MOGAD, 最后确诊为 DLBCL 的病例, 以加深广大影像工作者对 MOGAD 和 PCNSL 的认识。

PU-1639

Abnormal interhemispheric connectivity in patients with Parkinson's disease: a multimodal MRI study

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Objective: Interhemispheric interactions may be abnormal and play a crucial role in symptom lateralization in Parkinson's disease (PD). The purpose of this study was to examine interhemispheric structural, functional, and callosal connectivity changes as well as their clinical correlates in patients with PD.

Methods: Fifty-seven patients with PD and 50 healthy controls (HCs) underwent multimodal MRI. Voxel mirrored homotopic connectivity (VMHC) was computed from resting-state functional MRI data to measure interhemispheric functional connectivity. The cortical thickness covariance of homotopic regions was estimated from T1-weighted MRI data to measure interhemispheric structural connectivity. Fractional anisotropy (FA) was computed from diffusion MRI data to measure callosal connectivity. Pearson's correlation coefficient was used to evaluate the associations between imaging and clinical data.

Results: Compared with HCs, patients with PD showed strikingly similar patterns of interhemispheric structural and functional connectivity reductions and a trend toward a positive correlation between the two features. The affected regions involved the bilateral sensorimotor cortices and posterior cortical regions including the superior parietal lobule, precuneus, supramarginal gyrus, middle occipital gyrus, and superior temporal gyrus. Patients with PD also showed significantly decreased FA in the part of corpus callosum that connects the bilateral regions showing VMHC reductions. Additionally, interhemispheric structural, functional, and callosal connectivity reductions were respectively related to cognitive impairment, motor dysfunctions, and disease duration in patients with PD.

Discussion: This study revealed convergent interhemispheric structural, functional, and callosal connectivity reductions in patients with PD. Our findings may provide new insight into the pathophysiology of symptom lateralization in PD.

PU-1640

脑部 CT 平扫图像的直方图参数鉴别海绵状血管瘤和单纯脑出血的价值

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目的: 探讨脑部 CT 平扫图像的直方图参数鉴别海绵状血管瘤和单纯脑出血的价值。

方法: 回顾性收集 167 例脑海绵状血管瘤 (血管瘤组) 和 166 例单纯脑出血 (出血组) 患者, 使用 python 分析提取其脑部 CT 平扫图像直方图, 获得病灶的直方图参数, 包括第 10、90 百分位 CT 值, 最小值, 最大值, 平均值, 中位数, 四分位范围, 极差, 平均绝对偏差, 鲁棒平均绝对偏差, 均方根, 偏度, 峰度, 方差, 均匀性, 能量和总能量。比较 2 组间直方图参数的差异, 以 ROC 曲线分析各参数鉴别诊断海绵状血管瘤和单纯脑出血的效能。

结果: 出血组第 10、90 百分位 CT 值, 最大值, 平均值, 中位数, 四分位范围, 极差, 平均绝对偏差, 鲁棒平均绝对偏差, 均方根, 方差, 能量和总能量均大于血管瘤组 (P 均 < 0.05), 偏度和峰度小于钙化组 (P 均 < 0.05), 最小值、熵、均匀性与血管瘤组差异无统计学意义 ($P > 0.05$)。ROC 曲线分析结果显示, 能量、四分位范围、平均绝对偏差、鲁棒平均绝对偏差及方差鉴别海绵状血管瘤和单纯

脑出血的诊断价值中等,其中四分位范围的在单个指标间的诊断效能最高, ROC 曲线下面积(AUC)为 0.830.联合以上 5 个参数进行多参数联合分析,其鉴别效能较利用单个参数鉴别的效能高, AUC 为 0.862,敏感度和特异度分别为 0.747 和 0.820。

结论:脑部 CT 平扫图像直方图分析可作为鉴别海绵状血管瘤和单纯脑出血的辅助手段,多参数联合的诊断效能更高。

PU-1641

脑部 CT 平扫图像直方图分析鉴别基底节区结节状脑出血和钙化的价值

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目的:探讨脑部 CT 平扫图像直方图分析鉴别诊断基底节区结节状 ($D_{max}<2.00cm$) 脑出血 (出血组) 和钙化 (钙化组) 的价值。

方法:回顾性收集 65 例基底节区结节状脑出血和 114 例钙化患者,使用 python 分析提取其脑部 CT 平扫图像直方图,获得病灶的直方图参数,包括第 10、90 百分位 CT 值,最小值,最大值,平均值,中位数,四分位范围,极差,平均绝对偏差,鲁棒平均绝对偏差,均方根,偏度,峰度,方差,均匀性,能量和总能量。比较 2 组间直方图参数的差异,以 ROC 曲线分析各参数鉴别诊断基底节区结节状脑出血和钙化的效能。

结果:出血组第 90 百分位 CT 值、最大值、平均值、中位数、四分位范围、极差、平均绝对偏差、鲁棒平均绝对偏差、均方根、方差、能量、总能量均大于钙化组(P 均 <0.05),最小值,偏度和峰度小于钙化组(P 均 <0.05),第 10 位 CT 值、熵、均匀性与钙化组差异无统计学意义($P>0.05$)。ROC 曲线分析结果显示,四分位范围、平均绝对偏差、极差、鲁棒平均绝对偏差、总能量及方差鉴别基底节区结节状脑出血与钙化的诊断价值中等,其中总能量的在单个指标间的诊断效能最高, ROC 曲线下面积(AUC)为 0.879.联合以上 6 个参数进行多参数联合分析,其鉴别效能较利用单个参数鉴别的效能高, AUC 为 0.958,敏感度和特异度分别为 0.831 和 0.974。

结论:脑部 CT 平扫图像直方图分析可作为鉴别基底节区结节状脑出血和钙化的辅助手段,多参数联合的诊断效能更高。

PU-1642

脑结构体积测量联合神经心理量表评分在认知障碍中的应用

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目的 联合神经心理量表量化评价轻度认知功能障碍 (MCI) 和阿尔茨海默病 (AD) 患者脑结构改变特点。

方法 ①量化并比较分析 30 例 MCI、38 例 AD 及 30 例正常对照组 (NC) 头部磁共振影像脑区容积参数。②记录精神状态检查量表 (MMSE)、蒙特利尔认知评估量表 (MoCA-B) 及神经精神量表 (NPI) 评分,分析评价与各项脑结构的萎缩比的相关性。

结果 ①脑结构萎缩比定量分析: NC、MCI、AD 3 组患者脑叶表现出逐渐萎缩趋势。AD 组患者各脑结构萎缩比均明显高于 NC 组 ($P<0.05$),同时右侧颞叶、岛叶及双侧扣带回、双侧内侧颞叶萎缩比也高于 MCI 组患者,所有 $P<0.05$ 。与 NC 组比较, MCI 组左侧枕叶、双侧额叶、顶叶、扣带回、岛叶萎缩比增高 ($P<0.05$)。②MCI+AD 患者双侧颞叶、扣带回、内侧颞叶及右侧岛叶的

萎缩比与 MMSE 评分成负相关 ($r=-.464\sim-.249, P<0.05$)；双侧扣带回、右侧岛叶的萎缩比与 NPI 总评分成正相关($r=.269\sim.344, P<0.05$)；左侧扣带回、右侧岛叶的萎缩比与 NPI 苦恼评分成正相关($r=.256\sim.285, P<0.05$)。MCI 患者除右侧扣带回萎缩比与 MoCA-B 评分成负相关外 ($r=-0.394, P=0.031$)，其他无相关性 ($P>0.05$)。AD 患者双侧额叶、颞叶、扣带回、岛叶及左内侧颞叶的萎缩比与 MMSE 评分成负相关($r=-.574\sim-.369, P<0.05$)；双侧颞叶、扣带回、岛叶的萎缩比与 MoCA-B 评分成负相关($r=-.497\sim-.359, P<0.05$)；左侧额叶、颞叶、内侧颞叶及双侧扣带回、岛叶的萎缩比与 NPI 总评分成正相关($r=0.321\sim0.462, P<0.05$)；左侧颞叶、扣带回及双侧岛叶的萎缩比与 NPI 苦恼评分成正相关($r=0.333\sim0.405, P<0.05$)。

结论 MCI 及 AD 在早期就可以发生脑结构萎缩，以内侧颞叶萎缩为主要表现，联合 MMSE、MoCA-B、NPI 及 NPI 苦恼评分有助于诊断及鉴别诊断，其中鉴别早期 MCI 优先选择 MoCA-B 量表，而结合其他量表有助于整体认知功能减退及 AD 的诊断。

PU-1643

Altered white matter fibers and structural topological organization in Parkinson's disease based on diffusion tensor imaging

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Background: The thalamus and limbic system play important roles in Parkinson's disease (PD). The present study aimed to investigate alterations in the whole brain level of structural network for one aspect following with the white matter fibers between thalamus and limbic system, and their correlations with clinical characters.

Methods: We prospectively enrolled 42 PD patients at the movement disorder center and age- and sex-matched healthy controls between December 2020 and November 2021. All subjects underwent DTI, 3D-T1WI and routine brain MR series on a 3.0T MR scanner. The tract-based spatial statistical (TBSS) analytic approach, structural network properties and probabilistic fiber tractography were performed to identify changes of white matter pathways and topological organization associated with PD.

Results: Fibrous tracts of prefrontal lobe, corpus callosum and thalamus were the main fiber clusters changed in PD patients and the fibrous tracts of prefrontal lobe, corpus callosum had moderate negative correlation with Gait and Fall Questionnaire (GFQ); The hippocampus and orbitofrontal gyrus had more fiber bundle parameters changed than the other structure of limbic system, the mean streamlines length between thalamus subregions and orbitofrontal gyrus had moderate negative coefficient with MDS-UPDRSIII; Nodal local efficiency was sensitive index for differentiate PD from healthy controls and the nodal focus on the basal ganglia area, and the parameters including the characteristic path length (Lp), global efficiency (Eg), nodal efficiency (Ne) and nodal local efficiency (Nle), which had moderate correlation with MDS-UPDRS, PD Questionnaire 39 (PDQ 39) and GFQ separately.

Conclusion: Thalamus and limbic system fiber tracking and the topological structural network of thalamus could help to understand the mechanism of PD patient's symptom and to find out the modulation target for PD.

PU-1644

Cognition impairment mediated the white matter injury load and gait disorders in subcortical ischemic vascular disease

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Purpose: Gait disorders were common in subcortical ischemic vascular disease (SIVD) patients. We aim to explore the impact of white matter (WM) damages on gait disorders in SIVD.

Method: 21 SIVD and 20 normal controls (NC) were enrolled. The general cognition and executive function were evaluated by Montreal cognitive assessment (MoCA) and speed-accuracy trade-Off (SAT) respectively. Gait velocity, cadence and stride length were recorded. Diffusion tensor imaging (DTI) data was analyzed by tract-based spatial statistics (TBSS) and peak width of skeletonized mean diffusivity (PSMD). The relationships among WM damage, gait disorder and cognitive function were analyzed by mediation analysis.

Results: SIVD performed lower scores than NC in MoCA and SAT tests ($P < 0.001$). The gait velocity and stride length were decreased in SIVD, compared with NC. SIVD were with lower PSMD ($P < 0.001$). PSMD correlated with gait parameters, which were totally mediated by MoCA and partially mediated by SAT. The FA and MD of genu of corpus callosum (GCC), body of corpus callosum (BCC) were correlated with the gait parameters. The FA of bilateral anterior corona radiata (ACR) were positively correlated with gait parameters, while the MD of bilateral superior corona radiata (SCR), bilateral superior longitudinal fasciculus (SLF) and left external capsule (EC) were negatively correlated with them ($P < 0.05$).

Conclusions: Gait impairments of SIVD were associated with cognitive impairments. Cognitive deficit mediated the WM damage and gait disorders. The microstructural alterations of CC, SLF, EC and CR may pertain to the changes of gait.

PU-1645

Cerebral infarction and the variants of the Circle of Willis

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Purpose: The Circle of Willis (CoW) plays a critical role in maintaining adequate cerebral perfusion and impaired collateral blood flow caused by the CoW variation is a recognized risk factor for ischemic stroke. But, we don't know whether cerebral infarction have relationship with variant artery number of the CoW.

Materials and methods: In this IRB-approved retrospective study, we included the patients who underwent brain MR examination between January 2014 and April 2014. 3D-TOF MRA and DWI were the two essential scanning series. Two experienced radiologists divided them into different CoW variation types in a randomized and blinded manner, and the result was marked as consensus case. Finally, the patients were divided into four groups. The CoW was complete in Group A, and one CoW artery was absent in Group B, two in Group C, three in Group D, respectively.

Results: Four hundred and forty consecutive patients were included in our study. The consensus case ratio between Group A and C, between Group B and D, and between Group C and D had no statistical significant difference ($P > .05$). The acute cerebral infarction incidence had no statistical significant difference between the four groups ($P > .05$). The average age of Group A was smaller than the other's and the difference had statistical significance ($P < .05$).

Conclusion: Our result manifested patient age was an important factor effecting the CoW integrity. Acute cerebral infarction incidence may have no relationship with variant artery number of the CoW.

PU-1646

不同部位神经鞘瘤的影像特征分析

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目的: 探讨全身不同部位的神经鞘瘤的影像学特征。方法: 回顾性分析经手术病理证实的 52 例全身不同部位的神经鞘瘤患者的临床表现及影像学特征。主要包括病灶的部位、数量、大小、形态、信号特点及强化方式。结果: 52 例病例中, 位于颅内 4 例, 颈部 8 例, 椎管内 8 例, 脊柱旁 5 例, 消化道 1 例, 腹膜后 2 例, 四肢 16 例, 皮下 8 例, 其中平扫 13 例, 平扫及增强 39 例。颅内神经鞘瘤均为囊实性, 分别位于鼻窦、内听道、桥小脑角区及鞍旁, 以 T1WI 稍低信号, T2WI 不均匀稍高、高信号为主, 增强扫描病灶实性部分明显强化, 囊性区域未见强化, 其中鞍旁病变可见多发 SWI 低信号影。颈部神经鞘瘤均呈囊实性改变, 2 例行 CT 平扫及增强: 实性区域呈明显渐进性延迟强化, 囊性区域未见明显强化; 7 例行 MRI 平扫及增强: T1WI 呈等信号, T2 呈不均匀高信号、内见斑点状、斑片状低信号影, 周围可见低信号包膜, 增强实性成分呈明显延迟强化, 囊性成分未见强化。椎管内神经鞘瘤 3 例为囊性, T1W 呈低信号, T2WI 呈高信号, 边缘见低信号包膜, 未见强化; 3 例为囊实性, T2WI 见低信号分隔及包膜, 实性成分呈渐进性强化, 囊性成分未见强化; 2 例为实性, 呈渐进性强化。脊柱旁神经鞘瘤 5 例为囊实性, 实性成分呈渐进性强化, 囊性成分未见强化。1 例消化道神经鞘瘤发生于食管, 为实性, 明显渐进性强化。腹膜后神经鞘瘤 2 例为囊实性, 实性成分呈渐进性强化, 囊性成分未见强化。16 例四肢神经鞘瘤中 8 例为 MRI 平扫, T1WI 呈等信号, T2WI 呈高信号, 边缘见低信号包膜; 8 例平扫及增强病例呈囊实性, 多数病例 T2WI 表现为靶征, 即中央呈等/稍低信号、外周呈高信号。8 例皮下神经鞘瘤中 5 例为平扫; 3 例平扫及增强为囊实性, 增强扫描呈渐进性强化。结论: 全身不同部位神经鞘瘤影像学表现不同, 以囊实性病变较多见, 包膜下囊变、中央裂隙征、束状征及靶征较具有特征性表现, 实性部分呈渐进性强化, 但部分病变诊断仍存在一定困难。

PU-1647

食蟹猴左足三里穴针刺 fMRI 研究

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目的 对食蟹猴进行左侧足三里穴针刺的 fMRI 研究, 探讨左侧足三里穴针刺所引起的脑功能活动。方法 食蟹猴 6 只, 采用 3.0TMR 扫描仪, 动物麻醉后进行左侧足三里穴磁共振功能成像扫描。针刺 fMRI 采用“静息—刺激—静息”设计模式。fMRI-BOLD 扫描 16 层, 128phase。采用 SPM2 软件处理 fMRI 实验数据, 采用 t 检验来分析特定任务刺激下脑激活的状态。结果 针刺左侧足三里穴可以观察到左侧中央前回、右侧中央后回、双侧岛叶、楔前叶、右侧颞叶激活; 额叶、顶叶、枕叶、扣带回有负激活点。结论 可以在临床使用的 MRI 设备上对非灵长类动物进行脑 fMRI 的研究。针刺食蟹猴左侧足三里穴, fMRI 可以显示不同脑组织区域的正激活和负激活。针刺的作用机理可能与中央前回、岛叶及颞上回有较密切关系。针刺足三里穴引起的负激活定位性较差, 扣带回的负激活在针刺机理及针灸止痛中可能有重要作用。

PU-1648

表现为高灌注的原发性中枢神经系统淋巴瘤一例

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报道幕上表现为高灌注的原发性中枢神经系统淋巴瘤一例。CT 表现为胼胝体、右顶叶不规则团块状、结节状等、稍高密度影，边界清晰，周围见指状水肿。MRI 上表现为长 T1 长 T2 信号影，右顶叶病灶呈 DWI 高信号，ADC 低信号，胼胝体病灶边缘可见 DWI 高信号，ADC 低信号；ASL 成像，病灶表现为高灌注；MRI 增强扫描，胼胝体病灶呈明显不均匀强化，右顶叶病灶呈明显均匀强化；磁共振波谱成像示 Cho 峰升高，Cr 峰减低，NAA 减低，并可见升高的 LL 峰。

原发性中枢神经系统淋巴瘤 (primary central nervous system lymphoma, PCNSL) 是一种罕见的侵袭性淋巴结外非何杰金氏淋巴瘤，大部分为弥漫大 B 细胞淋巴瘤^[1, 2]。随着多模态影像技术的发展，PCNSL 相对特征性影像表现越来越多的被认识，依据影像表现大多数病例都能做出准确诊断。安康市中心医院神经外科经病理活检证实了 1 例幕上 PCNSL，活检前磁共振 ASL 检查表现为高灌注，与文献报道^[3, 4]PCNSL 表现为低灌注不一致。为了加深影像医生对 PCNSL 的认识，现将病例报道如下。

PU-1649

维持性血液透析患者脑血流灌注改变与脑网络有效连接变化研究

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目的：采用脑血流灌注 (CBF) 和格兰杰因果分析 (GCA) 方法研究维持性血液透析 (MHD) 患者脑血流灌注改变及与全脑连接效应特点，分析这些变化与 MHD 患者认知功能障碍之间的关系。方法：将 29 例 MHD 患者和 29 例年龄、性别相匹配的健康志愿者 (HC 组) 纳入本研究。所有受试者行功能磁共振检查，获得的两组间血流灌注的差异脑区作为种子点，并基于格兰杰因果分析观察静息态功能磁共振成像所示种子点与全脑效应连接异常脑区。将 CBF、GCA 差异脑区与 MHD 患者的临床资料和神经心理学测试结果进行相关性分析。结果：与 HC 组相比，MHD 组双侧海马、右侧脑岛的 CBF 值减低 ($P < 0.05$, FDR 校正)。MHD 组右侧脑岛 CBF 值与肌酐 (Cr) 呈负相关 ($P < 0.05$)。MHD 组右侧海马到右侧三角部额下回连接效应增加。MHD 组左侧海马到右侧距状裂周围皮层、右侧前扣带和旁扣带脑回、右侧豆状壳核、右侧脑岛连接效应增加，左侧海马到左侧丘脑连接效应减低 ($P < 0.05$, FDR 校正)。MHD 组右侧海马至右侧三角部额下回连接效应与血尿素氮 (BUN) 呈正相关 ($P < 0.05$)，MHD 组左侧海马至右侧前扣带和旁扣带脑回连接效应与命名评分呈正相关 ($P < 0.05$)，左侧海马至右侧豆状壳核连接效应与抽象评分、透析时间呈负相关，左侧海马至左侧丘脑连接效应与命名评分呈负相关 ($P < 0.05$)。结论：维持性血液透析患者存在脑血流改变及双侧海马与全脑效应连接异常，并参与认知功能调节。

PU-1650

双源 CT 血管成像对主动脉弓分支血管变异的诊断价值

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【摘要】目的 评价双源 CT 血管成像(DSCTA)对活体主动脉弓分支血管变异各型检出率及其临床意义。**方法:** 对 1370 例接受 MSCT 胸部及头颈部增强扫描的患者进行动脉期三维重建, 结合横断面、容积重建 (VR)、多平面重建 (MPR) 及最大密度投影 (MIP) 观察主动脉弓分支变异情况。**结果:** 1370 例患者中, 标准型 1188 例, 男 750 例, 女 438 例, 变异型 182 例, 男 97 例, 女 85 例。共发现 9 种不同类型的变异, 其中最常见 2 种变异, 分别是 B1 型和 C1 型, B1 型即 L-CCA 与 BT 共干发自主动脉弓 98 例, 检出率约 7.2%; C1 型, 即 L-VA 于 L-CCA 和 L-SA 之间直接发自主动脉弓 60 例, 检出率约 4.4%; 其他为少见的混合型变异。**结论:** DSCTA 能够术前提供主动脉弓分支血管变异情况等重要活体解剖学信息, 为食管镜检、外科、血管介入术前制订手术及放疗方案具有重要临床意义。

PU-1651

Significance of degree of neurovascular compression in predicting poor drug response in patients with hemifacial spasm

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Objective: Patients with hemifacial spasm frequently opt for microvascular decompression when oral pharmacotherapy exhibits limited effectiveness. This study aimed to identify clinical and radiological factors predicting poor drug responses in patients with hemifacial spasm.

Methods: We retrospectively included patients with hemifacial spasm who underwent pre-therapy MRI examination. The presence, location, severity and the offending vessels of neurovascular compression was blindly evaluated using MRI. Drug responses and clinical data were obtained from the medical notes and/ or phone follow-ups. Logistic regression analysis was performed to identify the predictors of poor drug responses.

Results: A total of 116 patients were included in this study, with an average age at the time of first examination of 51 years and a median duration of onset of 24 months. forty-nine (42.2%) patients reported no symptom relief. 37 (31.9%) patients reported poor symptom relief. 22 (19.0%) patients reported partial symptom relief. 8 (6.9%) patients achieved complete symptom relief. The only factor that was a statistically significant predictor of poor drug responses was contact in the attach segment of the facial nerve, with an odds ratio of 6.444 (95%CI: 1.888-21.993, $p = 0.003$).

Conclusions: This study revealed that mild compression in the attach segment of the facial nerve in pre-therapeutic MRI increased the risk of poor drug responses in patients with hemifacial spasm. This finding may assist clinician to choose optimal treatment.

PU-1652

Magnetic resonance imaging and metabolomic profiling reveal the mechanisms underlying the negative effects of childhood family structure transitions on young adults

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Neurobiological changes of adults reared in single-parent families that occur in response to untoward childhood family stress are associated with lifelong mental health. However, the current understanding of neuropsychobiological mechanisms responsible for this association is limited. In this study, multimodal magnetic resonance imaging and metabolomic profiling were comprehensively utilized to explore how childhood family structure transitions have a prolonged neuropsychobiological impact on the brain and metabolic mediators, thus increasing the risk of negative outcomes in adulthood. Young adults reared in single-parent families had more childhood trauma experiences, a weaker verbal memory ability, and a higher tendency of anxiety, depression, and harm avoidance personality. Altered regional and network-based connectivity properties were found in the single-parent family group, including increased functional connectivity density in the left inferior parietal lobule, the enhancement of cortical structural connectivity between the left isthmuscingulate and pericalcarine, and the increase of temporal functional connections. Brain structural and functional characteristics were related to behavioral data. Moreover, 216 differentially expressed metabolites were found between the single-parent family and control groups, which were enriched in pathways mainly associated with sulfur metabolism, thiamine metabolism, biosynthesis of unsaturated fatty acids, and fatty acid biosynthesis. Two potential metabolite biomarkers, that well separated single-parent family group from control individuals, were identified and significantly correlated with behavioral data. Our findings reveal the macro-brain and micro-metabolic media changes related to early-life stress, providing objective neuropsychobiological evidence on the enduring adverse effects of childhood family structure transitions on psychiatric vulnerability in adulthood.

PU-1653

Dynamic and concordance alterations of regional brain function indices in vestibular migraine: a resting state fMRI study

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Purpose: Resting-state fMRI (rs-fMRI) studies on vestibular migraine (VM) have revealed abnormalities in static regional intrinsic brain activity (IBA) and dynamic functional connectivity between brain regions or networks. However, the temporal variation and concordance of regional IBA measures remain to be explored.

Methods: 57 VM patients during the interictal period were compared to 88 healthy controls (HC) in this rs-fMRI study. The dynamics and concordance of regional IBA indices, including amplitude of low-frequency fluctuations (ALFF) and regional homogeneity (ReHo), were examined by utilizing sliding time-window analysis. Partial correlation analyses were performed between clinical parameters and rs-fMRI indices in areas showing group differences.

Results: The VM group showed increased ALFF and ReHo dynamics, as well as increased temporal concordance between ALFF and ReHo in the bilateral paracentral lobule/supplementary

motor area relative to the HC group. We also found decreased ReHo dynamics in the right temporal pole/inferior temporal gyrus, decreased ALFF dynamics in the right cerebellum posterior lobe, bilateral angular gyrus/middle occipital and temporal gyrus in the VM group compared with HC group. Moreover, a positive correlation was observed between ALFF dynamics in the left middle occipital gyrus and vertigo disease duration of VM patients.

Conclusion: Temporal dynamic and concordance of regional IBA indices were altered in sensorimotor network, occipital, temporoparietal cortex and cerebellum, which may contribute to disrupted multisensory vestibular control and processing in patients with VM. ALFF dynamics in the left middle occipital gyrus may be useful biomarker for evaluating vertigo disease burden in this disorder.

PU-1654

Equidistant Age Dependent Brain Microstructural Alterations in APP/PS1 mice through 9.4T High-Resolution Diffusion Tensor Imaging

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Abstract

Background: The pathological evidence of Alzheimer's disease (AD) can be detected years prior to the occurrence of clinical symptoms. Imaging-based identification of age-dependent cerebral changes in preclinical AD mouse models may provide insights into how age and amyloid burden at the earliest stages affect disease progression.

Purpose: To evaluate age-related microstructure changes in APP/PS1 and wild-type (WT) mice during asymptomatic preclinical stage using 9.4T high-resolution diffusion tensor imaging (DTI) technology.

Materials and Methods: DTI data of APP/PS1 and WT mice at the age of 2, 4, 6 and 8 months (n = 4~8) were acquired. Subsequently, we acutely inhibited AQP4, and compared the diffusion restriction reduction in young and elderly WT mice. All microstructure changes were conducted in 5 regions and 179 subregions by using DTI metrics (fractional anisotropy (FA) and mean diffusion (MD)). Statistical significance was assessed with the T-test, one-way ANOVA, and post-hoc test. The thioflavin staining was implemented to validate DTI findings.

Results: In the APP/PS1 group, FA in cortex and part of its sub regions, MD in cortex, fornix, hippocampus, and anterior commissure showed significant decrease at 4 months and 6 months, as compared with the age of 2 months, respectively. Compared to 4 months and 6 months, 8 months showed significant FA and MD increase in hippocampus, cortex, fornix, and 10 sub regions. No significant difference was observed between 4 months and 6 months. In the WT group, FA increased at 8 months and 6 months as compared to 2 months in corpus callosum and dorsal hippocampal commission, and MD decreased at 6 months as compared to 2 months in corpus callosum, hippocampus and anterior commissure. In contrast with WT, hippocampus in APP/PS1 showed significant FA increase at 2 months, while corpus callosum showed significant FA decrease at 4 months, and significant FA decrease was displayed in the anterior commissure, corpus callosum, fornix at 6 months.

Conclusion: Microstructure alterations are age dependent along with progressive brain amyloidosis. FA value is more sensitive to alternations related to A β deposition, and it is more conducive to detecting amyloid protein deposition related changes in early stage, as compared with MD. And the alteration of FA (with an initial increase, followed by a gradual decrease) could be a biomarker of AD. These findings demonstrate that DTI can indicate microstructural changes and serve as a potential biomarker for revealing the pathophysiology and progression of AD.

Key words: Equidistant Age Dependent; APP/PS1 mice; Brain Microstructure; DTI; Alzheimer's disease

PU-1655

比较弥漫中线胶质瘤--H3K27 突变和近中线低级别胶质瘤的 MRI 形态学差异

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目的: 弥漫性中线胶质瘤, 伴 H3K27m 突变被 2016 年 WHO 定义为一种新的分子亚型, 对应于 IV 级。本研究旨在探究弥漫中线胶质瘤与低级别胶质瘤之间 MR 成像的差异。

方法: 回顾性分析 39 例弥漫中线的胶质瘤-h3k27 改变和 20 例中线低级别胶质瘤患者的 MRI 图像。观察肿瘤的大小、数量及影像表现, 包括瘤周水肿、DWI 及增强等特征, 病变囊变坏死、瘤内出血、T2WI 错配征。采用 T 检验和卡方检验来描述两者间的差异。

结果: 独立样本 T 检验结果显示 DMG 患者的平均年龄要比 LGG 的要年轻 ($P < 0.001$)。卡方检验结果显示, DMG 的肿瘤大小相对要小于 LGG ($P < 0.001$)。DMG 的 DWI 和增强程度相对较高 ($P < 0.001$)。而 DMG 与 LGG 在 Peritumoral edema 有统计学意义 ($P < 0.05$)。

结论: 与中线区低级别胶质瘤相比, H3K27 改变的弥漫性中线胶质瘤的 MRI 表现和临床特点具有一定的特点, 有助于提高诊断和鉴别诊断水平。

PU-1656

基于 VOSviewer 和 CiteSpace 研究针刺治疗脑卒中的 fMRI 的文献计量分析

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【摘要】目的 采用 CiteSpace 和 VOSviewer 文献计量方法, 分析应用 fMRI 探讨针刺治疗脑卒中神经机制相关文献的特点, 总结该领域的研究现状, 预测发展趋势。资料与方法 搜集中、英文数据库的相关文献, 分析文献的机构、作者、关键词、引文等信息。结果 共检索文献 771 篇, 纳入分析 188 篇, 该领域的研究第一次发表是在 2004 年, 往后发文量逐年上升, 预计今后也是研究热点。发文机构主要集中在国内, 多为中医药大学及其附属医院。针刺最常使用电针和头针手法刺激阳陵泉穴。fMRI 数据分析方法多采用功能连接、低频振幅。结论 fMRI 探究针刺治疗脑卒中的研究在不断发展, 不同的针刺治疗方案治疗卒中后不同的症状, 其中的治疗机制仍需要更深入的挖掘和讨论, 是今后值得开拓研究的新方向。

PU-1657

基于 ReHo 的伴和不伴初始促发损伤因素的内侧颞叶癫痫患者静息态 fMRI 研究

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目的: 通过分析伴或者不伴热性惊厥、颅内感染等初始促发损伤(initial precipitating injury, IPI)因素的内侧颞叶癫痫患者的静态和动态脑区局部一致性 (regional homogeneity, ReHo), 探究 IPI 对内侧颞叶癫痫患者脑功能损伤的影响。方法: 采集 25 名伴 IPI 的内侧颞叶癫痫患者, 35 名不伴 IPI 的内侧颞叶癫痫患者和 33 名健康对照的 BOLD 数据, 计算其静态和动态 ReHo 来评价各组被试的局部神经元活动变化。分别比较三组间静态 ReHo 和动态 ReHo 的差异, 获取有统计学意义的差异脑区。随后, 将差异脑区的静态或动态 ReHo 值与患者病程、癫痫发作严重程度量表 (NHS3) 评分、所用抗癫痫药种类数进行相关分析。结果: (1) 与健康对照相比, 伴 IPI 的内侧颞叶癫痫患者双侧丘脑和视觉皮层的静态和动态 ReHo 值增加, 右侧小脑 crus1/crus2、顶下小叶和外侧颞叶的静态 ReHo 值降低; (2) 与健康对照相比, 不伴 IPI 的内侧颞叶癫痫患者双侧外侧颞叶的静态和动态 ReHo 值降低; (3) 与不伴 IPI 的内侧颞叶癫痫患者相比, 伴 IPI 的内侧颞叶癫痫患者双侧视觉皮层静态和动态 ReHo 值增加, 左侧丘脑动态 ReHo 变异性增加, 右侧背外侧前额叶皮质静态 ReHo 值降低; (4) 伴 IPI 的颞叶癫痫患者的 NHS3 评分与右侧小脑 crus1 的静态 ReHo 值呈负相关。结论: 伴和不伴 IPI 的内侧颞叶癫痫患者的静态和动态局部神经元活动均存在显著异常, 且伴 IPI 的内侧颞叶癫痫患者的脑区局部神经元功能障碍更为广泛。

PU-1658

通过判别分析脑结构异质性揭示两种不同的无先兆偏头痛神经解剖学亚型

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背景: 关于偏头痛的神经生物学异质性的研究很少, 导致了相互矛盾的神经影像学表现。本研究使用了一种新提出的基于灰质体积(GMV)的方法来研究偏头痛的客观神经解剖学亚型。

方法: 对 31 例无先兆偏头痛患者和 33 名匹配的健康对照者进行结构 MRI 和临床测量。首先, 我们研究了偏头痛患者在脑灰质体积方面是否比健康对照表现出更高的个体间变异性。然后, 采用异质性判别分析(HYDRA)方法, 根据脑灰质体积将偏头痛患者分为不同的亚型。分析不同亚型的灰质体积变化和临床特征差异。

结果: 无先兆偏头痛患者具有较高的个体间 GMVs 变异性。本研究显示偏头痛有两种不同的和可重复的神经解剖学亚型。这两种亚型表现出与健康对照相反的神经解剖学变异。亚型 1 表现为广泛的 GMVs 降低, 而亚型 2 表现为局部区域 GMVs 升高。亚型 2 患者总颅内体积与认知功能呈显著正相关。与亚型 2 相比, 亚型 1 患者的病程较长, 认知评分较低。

结论: 本研究表明无先兆偏头痛患者具有高度的结构异质性, 并揭示了两种不同的、稳定的神经解剖学亚型, 为相互矛盾的神经影像学表现提供了可能的解释。

PU-1659

Altered degree centrality in hemodialysis patients: a resting-state fMRI study

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Background: Cognitive impairment is common in hemodialysis patients and is found to be associated abnormal regional brain spontaneous activity. The aim of the study is to explore the degree centrality (DC) changes in hemodialysis patients with resting-state functional magnetic resonance imaging (rs-fMRI).

Methods: Rs-fMRI scanning, neuropsychological tests and blood biochemical data were collected from twenty-seven end-stage renal disease (ESRD) patients on regular hemodialysis and twenty-five age-, sex- and education level-matched healthy controls. A two-sample t-test was performed to explore the group differences in DC between ESRD patients and healthy controls with age, gender and education as covariates. Pearson correlation analysis was further performed to investigate the relationship between DC changes with neuropsychological and clinical parameters. **Results:** Compared with the healthy control group, hemodialysis patients demonstrated a significantly increased DC in multiple regions, including bilateral hippocampal gyrus, left superior frontal gyrus and right medial superior frontal gyrus. The hemodialysis patients also showed a significantly decreased DC in bilateral insula, left postcentral gyrus and left precentral gyrus ($P < 0.05$, FDR corrected). The increased DC of left superior frontal gyrus was positively associated with biochemical indices including urea and uric acid ($P < 0.05$, Bonferroni corrected). In addition, significant between-group DC showed good classification efficiency with significant accuracy (77%, $P = 0.0002$).

Conclusions: Our results demonstrated aberrant DC in many brain regions of hemodialysis ESRD patients, which may be associated with cognition and serum toxins.

PU-1660

味觉刺激后的静息态脑功能磁共振研究

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目的: 味觉加工是人类生存最重要的功能之一。味知觉不仅帮助我们感受食物的品质, 带来愉悦的体验。由于受到早前实验条件的限制, 大多数人类味觉的相关研究还集中在行为学水平, 涉及神经生理水平的研究相对较少, 对于更大时空尺度的味知觉信息加工机制还远远未知。本研究从一个全新的角度观察大脑对味觉刺激后加工处理, 结合静息态数据挖掘的算法优势, 在更广尺度的时间、空间维度深入探究大脑对味觉刺激后的神经活动。

方法: 本研究采用被试内实验设计, 共招募 22 名被试参与实验 (其中女生 10 名), 分别扫描被试在甜味、酸味和人工唾液 (对比条件) 刺激 (2 毫升, 5 秒) 后的大脑自发神经活动 (6 分钟), 给予顺序在不同的被试间进行了平衡。数据在预处理后, 分别进行了体素水平的分数低频振幅 (fALFF)、百分比振幅 (PerAF)、全脑水平的度中心性 (DC) 以及基于滑动窗技术的动态分数低频振幅 (dfALFF) 分析。

结果: 从体素水平上看, 与无味条件相比, 甜味和酸味刺激后口腔躯体感觉皮层中央后回的 fALFF 和 PerAF 均显著降低 ($t: -5.69$), 同时, 参与奖赏处理的壳核在甜味刺激后 PerAF 显著提高 ($t = 4.53$)。从全脑水平上观察, 与无味条件相比, 甜味刺激后, 楔前叶的 DC 值显著降低 ($t = -4.3792$); 酸味刺激后, 左侧中央后回 DC 值显著降低 ($t = -4.68$); 左侧梭状回在酸味和甜味条

件的对比中 DC 值存在显著差异 ($t=-4.35$)。dfALFF 结果表明,与无味条件相比,舌回和额中回在甜味下 dfALFF 被发现显著差异 ($t=-4.29$);梭状回和舌回在酸味下 dfALFF 提高 ($t=4.40$),后扣带回处 dfALFF 降低 ($t=-4.22$)。枕中回和颞中回在刺激后 dfALFF 有显著差异 ($t=4.58$)。讨论:综上所述,本实验采用静息态功能磁共振扫描对比不同味觉刺激后的大脑自发神经活动,从新的角度尝试探究大脑对味觉刺激后的神经活动状态。一方面,研究表明味觉刺激后大脑仍旧在进一步处理味觉相关信息活动,大脑的这种自发活动状态模式可能是味觉跨通道作用的一个关键因素;另一方面,本研究也扩充了对味知觉加工神经机制的理解。

PU-1661

单发未破裂颅内动脉瘤的瘤壁强化与其形态学的相关性研究

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【摘要】目的 探讨单发未破裂颅内动脉瘤(unrupture intracranial aneurysm,UIA)的瘤壁强化(aneurysm wall enhancement,AWE)与其形态学的相关性。方法 收集经我院 CTA 确诊的 85 例单发 UIA 患者,对比钆造影剂给药前、后的高分辨磁共振血管壁成像(high-resolution MR vessel wall imaging,HRMR-VW)图像,根据动脉瘤壁是否强化,分为无强化组($n=38$)及强化组($n=47$)。在 CTA 上对动脉瘤进行定位、判断有无子囊及分叶,测量动脉瘤形态学参数,包括直径、瘤颈宽、纵横比(aspect ration,AR)、尺寸比(size ration,SR)。比较两组间各参数的差异,分析 AWE 与形态学的关系。结果 无强化组与强化组的分叶及子囊构成比、直径、AR 值及 SR 值差异具有统计学意义($P<0.05$)。在多因素 Logistic 回归分析中颅内动脉瘤直径、AR 值、分叶及子囊构成比为 AWE 的独立危险因素,直径的最佳截断值为 6.76mm,AR 值的最佳截断值为 1.15。结论 颅内动脉瘤直径、AR 值、分叶及子囊构成比为瘤壁强化的独立危险因素,AWE 可能是颅内动脉瘤破裂风险的危险因素。

PU-1662

Abnormal Static and Dynamic Functional Network Connectivity in Patients With Presbycusis

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Aim: This study aimed to investigate abnormal static and dynamic functional network connectivity (FNC) and its association with cognitive function in patients with presbycusis.

Methods: In total, 60 patients with presbycusis and 60 age-, sex-, and education-matched healthy controls (HCs) underwent resting-state functional MRI (rs-fMRI) and cognitive assessments. Group independent component analysis (ICA) was carried out on the rs-fMRI data, and eight resting-state networks (RSNs) were identified. Static and dynamic FNCs (sFNC and dFNC) were then constructed to evaluate differences in RSN connectivity between the patients with presbycusis and the HCs. Furthermore, the correlations between these differences and cognitive scores were analyzed.

Results: Patients with presbycusis had differences in sFNC compared with HCs, mainly reflected in decreased sFNC in the default mode network (DMN)-left frontoparietal network (LFPN) and attention network (AN)-cerebellum network (CN) pairs, but they had increased sFNC in the auditory network (AUN) between DMN domains. The decreased sFNC in the DMN-LFPN pair was negatively correlated with their TMT-B score ($r = -0.441$, $p = 0.002$). Patients with presbycusis exhibited aberrant dFNCs in State 2 and decreased dFNCs between the CN and AN

and the visual network (VN). Moreover, the presbycusis group had a shorter mean dwell time (MDT) and fraction time (FT) in State 3 ($p = 0.0027$; $p = 0.0031$, respectively).

Conclusion: This study highlighted differences in static and dynamic functional connectivity in patients with presbycusis and suggested that FNC may serve as an important biomarker of cognitive performance since abnormal alterations can better track cognitive impairment in presbycusis.

PU-1663

Hemodynamic Alterations of Carotid Siphons after Revascularization is Associated with Treatment Outcomes in Moyamoya Disease: A Quantitative 4D Flow MRI Study

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Objective: This study aimed to evaluate hemodynamic alterations of carotid siphons after revascularization for Moyamoya disease (MMD) using 4D Flow MRI and to explore its association with treatment outcomes.

Methods: Patients with MMD who underwent combined revascularization surgery were prospectively and consecutively collected at West China Hospital, Sichuan University from July 2018 to January 2020. The VesselExplorer2 software was employed to analyze images of 4D Flow MRI and measure hemodynamic parameters of bilateral carotid siphons, including mean and maximum values of flow (Flow_mean and Flow_max), velocity (V_mean and V_max), and wall shear stress (WSS_mean and WSS_max). Subgroup analysis was performed by sex, age, and the baseline Suzuki stages. Relationships were explored between hemodynamic parameters of carotid siphons and surgical outcomes (clinical symptom improvement, cerebral perfusion improvement, and intracranial vascular remodeling).

Results: Thirty-five patients were included with a 7-month (range 5–10) follow-up period. Flow_mean (surgical side, 1.69 ± 1.26 mL/s [baseline] vs. 2.11 ± 1.50 mL/s [follow-up], $P < 0.001$; contralateral side, 2.42 ± 1.63 mL/s [baseline] vs. 2.83 ± 1.87 mL/s [follow-up], $P = 0.002$) and Flow_max (surgical side, 2.40 ± 1.73 mL/s vs. 2.96 ± 2.08 mL/s, $P < 0.001$; contralateral side, 3.32 ± 2.22 mL/s vs. 3.81 ± 2.41 mL/s, $P = 0.001$) of bilateral carotid siphons were significantly decreased during follow-up. Follow-up hemodynamic changes in bilateral carotid siphons were significantly different in sex, age, and the baseline Suzuki stages ($P < 0.01$). An apparent reduction in Flow_mean/Flow_max of bilateral carotid siphons at follow-up was observed in patients with good clinical outcome or improved cerebral perfusion ($P < 0.01$). Similar phenomena were found in patients with good collateral formation ($P < 0.01$) but not in those with poor collateral formation ($P > 0.05$).

Conclusion: Flow_mean and Flow_max of bilateral ICAs in MMD decreased at follow-up, which was associated with the outcomes of combined revascularization. Quantitative detection of 4D Flow MRI-based hemodynamics of carotid siphons might be a promising tool for predicting treatment outcomes of MMD.

PU-1664

Large-scale Structural Covariance Networks Changes Relate to Attention Impairment in Betel Quid-Dependent Chewers

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Objectives: Large-scale structural covariance network (SCN) based on gray matter (GM) morphometry is an effective method in investigating cognitive impairment. This study aimed to identify spatial covariance patterns of gray matter (GM) volume and to investigate their association with cognition impairment in betel quid-dependent (BQD) individuals.

Methods: Sixty-four BQD individuals and 48 sex- and age-matched healthy controls (HCs) underwent T1-weighted structural MRI examination and neuropsychological assessments. Seventy structural covariance networks (SCNs) based on GM volume covariance patterns were defined using independent component analysis. An SCN-based classifier was constructed for differentiating BQD and HC individuals. Receiver operating characteristic (ROC) curves were applied to evaluate the performance of the SCN-based classifier. Multiple linear regression analyses were performed to investigate the association between network indices and clinical evaluations.

Results: Six SCNs had higher classification for differentiating BQD and HC individuals. The area under the ROC curve of the SCN-based classifier was 0.812 in the training set and 0.771 in the testing set. Furthermore, multiple linear regression analyses demonstrated that the network indices in thalamus and calcarine were associated with attention indicated by backward digit span in BQD individuals.

Conclusions: Our results demonstrated that large-scale SCNs could provide potential imaging markers for differentiating BQD and HC groups. They also revealed that the loss of network index in thalamus and calcarine was related to attention impairment in BQD individuals.

PU-1665

Decreased cerebral perfusion in chronic migraine: a voxel-based cerebral blood flow analysis using 3D pseudo-continuous arterial spin labeling

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Objective: The cerebral perfusion evaluation of chronic migraine (CM) had been commonly performed by some invasive methods, while a contrast agent-free approach would be more advisable. This study aimed to assess the cerebral perfusion changes with a non-invasive quantitative volumetric perfusion imaging in CM.

Methods: We investigated thirteen CM patients and fifteen normal controls (NCs) using conventional brain structural imaging sequences and 3D pseudo-continuous arterial spin labeling (3D PCASL). The voxel-based analysis of the whole cerebral gray matter was performed, and the cerebral blood flow (CBF) value of the altered positive areas were extracted to investigate the significant correlation with clinical variables.

Results: Brain regions with the decreased perfusion were located in left postcentral gyrus, bilateral middle frontal gyrus, left middle occipital gyrus, left superior parietal lobule, left medial

segment of superior frontal gyrus, and right orbital part of the inferior frontal gyrus. White matter fibers with decreased perfusion were located in bilateral superior longitudinal tracts, superior corona radiata, external capsules, anterior and posterior limbs of internal capsule, anterior corona radiata, inferior longitudinal fasciculus and right corticospinal tract. However, the correlation analysis showed no significant correlation between the CBF value of the above positive brain regions with clinical variables ($p > 0.05$).

Conclusion: The current study indicated a novel insight on the neural mechanism of CM from the pattern of cerebral hypoperfusion, and provide more functional information to understand the pathophysiology of CM.

PU-1666

基于图论分析探究 T2DM 脑结构网络拓扑属性差异与肠道菌群关系

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目的: 采用 DSI 及图论分析方法探究 T2DM 患者脑结构网络全局拓扑属性的改变, 及其与肠道菌群之间的相关性。

方法: 招募 19 名健康志愿者 (HC 组) 及 27 名 T2DM 患者 (T2DM 组) 分别行 DSI 扫描、实验室检测、神经心理学测试, 并收集粪便通过 16S RNA 基因测序分析肠道优势菌群。通过 Dsi-studio 软件构建全脑结构网络并计算全局网络拓扑属性, 2 组患者脑网络拓扑属性行两独立样本 t 检验, 将年龄作为协变量, 2 组间差异的拓扑属性指标与差异菌群行 spearman 偏相关性分析。

结果: 与 HC 组相比较, T2DM 组加权后的小世界属性、全局效率、平均聚类系数、转移性及富人俱乐部 ($k=15$) 均减低 ($P<0.05$); 而 T2DM 组特征路径长度增加 ($P<0.05$)。比较 2 组间优势菌群, T2DM 患者在门水平 Actinobacteria、属水平 Bacteroides、Roseburia、Escherichia 及种水平 ovatus、uniformis、coli、cacciae、plebeius、distasonis 丰度均低于 HC 组, 而 Bacteroidetes、Verrucomicrobia 菌门、Bifidobacterium、Lactobacillus、Akkermansia 菌属及 longum、adolescentis 及 muciniphila 菌种丰度高于 HC 组 ($P<0.05$ 或 $P<0.01$), 其中 Verrucomicrobia、Akkermansia muciniphila 水平与平均聚类系数、转移性呈负相关 ($r=-0.441$, $P=0.027$; $r=-0.440$, $P=0.028$; $r=-0.441$, $P=0.027$; $r=-0.441$, $P=0.027$)。

结论: 相对于健康志愿者, T2DM 患者脑结构网络的全局传输能力下降, 同时伴有富人俱乐部区域损伤, 而肠道菌群丰度的改变可能与全局拓扑属性之间存在一定联系。

PU-1667

肌萎缩侧索硬化症皮层下核团的形状改变与疾病进展相关

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目的: 及时诊断有助于肌萎缩侧索硬化症 (ALS) 患者的及时干预、改善其预后, 我们旨在确定 ALS 疾病进展的潜在神经影像学生物标志物。

方法: 共有 61 名 ALS 患者前瞻性地纳入研究, 并根据进展率分为三个亚组, 即缓慢、中等和快速进展。还招募了 61 名匹配的健康对照 (HC)。所有参与者都进行了大脑结构 MRI 扫描, 以进行皮质下体积和形状分析。进行神经心理测试、行为和功能状态评估。比较 ALS 亚组之间以及 ALS 组和 HC 组之间的神经影像学特征和临床数据的差异。

结果：与 HCs 组相比，进展迅速的患者基底节和脑干的形状发生了显著变化。在进展迅速的 ALS 患者中，双侧伏隔核、左尾状核、左丘脑和脑干出现带萎缩性变化的形状收缩，左尾状体、左侧丘脑和左侧苍白球出现伴有肥大的区域扩张。左侧丘脑的形状变化与肌萎缩侧索硬化症功能评定量表修订版 (ALS-FRS-R) 总分和肢体评分以及疾病持续时间呈正相关。左侧苍白球与焦虑和病程呈正相关，左侧伏隔核与 ALS-FRS-R 总分和球结膜评分呈正相关，脑干与迷你精神状态检查评分呈正相关。

结论：在进展迅速的患者中，皮质下细胞核发生了广泛的改变，提示 ALS 的进展具有潜在的神经影像学生物标志物。

PU-1668

经支气管镜检查并发脑空气栓塞 1 例

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脑空气栓塞又称脑气栓症，是指各种原因导致气体栓子进入循环系统，栓塞于脑动脉末端，导致一系列神经损伤、精神障碍等病理变化的临床综合症，是动脉空气栓塞的特殊类型，是一种罕见且具有致命性的疾病。现报道我院 1 例经支气管镜检查并发脑空气栓塞致脑梗死出血转化病例，回顾性分析该病的临床、发病机制及影像表现，以提高广大影像工作者对该病的认识。

PU-1669

基于 CTA、血液炎症细胞分析大脑中动脉动脉瘤破裂的风险因素

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目的 分析大脑中动脉 (MCA) 动脉瘤破裂的风险因素，筛选动脉瘤形态学和血液炎症细胞预测指标。方法 回顾性分析 2018 年 01 月至 2023 年 04 月经过头颅 CT 血管造影 (CTA) 确诊的 MCA 动脉瘤 90 例，根据 CT 平扫有无蛛网膜下腔出血和或脑内血肿，分为未破裂组 (53 例) 和破裂组 (37 例)，未破裂动脉瘤 (UIA) 组根据形态分为形态规则组和形态不规则组，比较年龄、性别、入院第一次血常规炎症细胞并计算中性粒细胞与淋巴细胞比值 (NLR)、全身性系统炎症反应指数 (SIRI)、动脉瘤形态学参数等。通过卡方检验、Student's t-test 检验或曼-惠特尼 U 检验分析各组因素，对差异因素进行单因素及多因素逻辑回归分析，最后以 ROC 曲线对动脉瘤形态学、血液炎症细胞有差异性的因素进行诊断效能评估。结果 MCA 动脉瘤形态不规则 (OR = 8.64, P = 0.0063)、SIRI (OR = 13.62, P = 0.042)、长宽比 (OR = 25.92, P = 0.043) 是独立破裂风险因素，其 AUC 值分别是 0.78、0.94、0.75。结论 MCA 动脉瘤形态不规则、长宽比和 SIRI 是动脉瘤破裂的高危险因素，对预测动脉瘤破裂有重要意义。

PU-1670

慢性偏头痛患者丘脑核团脑灌注改变：3 维假连续动脉自旋标记成像初步研究

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目的 采用 3 维假连续动脉自旋标记成像 (3D pseudo-continue arterial spine labelling, 3D pc-ASL) 探索慢性偏头痛患者丘脑核团脑灌注改变。方法 对 13 例慢性偏头痛患者及 15 例正常对照组进行三维脑结构成像及 3D-pcASL 成像, 将脑结构像进行分割, 生成反向变形场, 再将反向变形场施加于丘脑分区模板 (包括枕核、前核、背内侧核、腹外侧核背侧、中外侧核、腹前核、腹外侧核腹侧), 生成个体化的丘脑分区蒙片, 进而基于配准后的脑血流图 (cerebral blood flow, CBF), 提取受试者丘脑各核团 CBF 值。结果 慢性偏头痛患者左侧丘脑枕核 ($F = 5.069$, $P = 0.034$)、前核 ($F = 4.947$, $P = 0.036$)、背外侧核腹侧 ($F = 7.24$, $P = 0.013$) 脑灌注显著减低。双侧丘脑背内侧核、背外侧核腹侧、中外侧核、腹前核、右侧枕核、右侧前核脑灌注改变与疼痛发作程度呈显著负相关, 但是与偏头痛失能程度均无相关性。结论 慢性偏头痛患者丘脑核团脑灌注不同程度减低, 并与头痛发作存在显著相关性, 3D pc-ASL 可作为慢性偏头痛患者脑灌注评价的可靠方法。

PU-1671

Disturbance of neurovascular coupling in lung cancer patients after chemotherapy

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Objective: Chemotherapy-related cognitive impairment (CRCI) have been a common complaint among lung cancer patients. Previous studies have revealed that cognitive impairment might due to abnormal spontaneous neuronal activity and cerebral blood flow (CBF) connectivity alterations, however neurovascular coupling (NVC) alterations in post- chemotherapy patients remain unclear. The present study aimed to investigate the NVC changes in lung cancer patients after chemotherapy, as well as the associations between NVC changes and cognitive impairment.

Materials and methods: Forty-three lung cancer patients were recruited, including twenty receiving adjuvant chemotherapy (CT+) patients and twenty-three non-chemotherapy (CT-) patients. All subjects underwent resting-state functional magnetic resonance imaging (rs-fMRI) and pseudocontinuous arterial spin labeling (pCASL) perfusion MRI. We calculated a series types of NVC patterns (including CBF-ALFF, CBF-ReHo correlation coefficients, and CBF/ALFF and CBF/ReHo ratio). The alterations in global NVC, regional NVC and cognitive impairment were detected, and group comparisons were performed. Association statistical analyses were performed to explore the correlations between the changes of global and regional NVC and cognitive impairment.

Results: CT+ patients showed significantly reduced global CBF- ALFF coupling and CBF- ReHo coupling compared with CT- patients. Compared with CT(-) group, CT(+) group exhibited decreased CBF/ALFF ratio in the right middle temporal gyrus (MTG) and left middle frontal gyrus (MFG), and increased CBF/ALFF ratio in the left thalamus, left parahippocampal, right superior temporal gyrus (STG), and right MFG. CT(+) group showed lower CBF/ReHo ratios in right rolandic operculum, left precuneus, right superior occipital gyrus (SOG) and right inferior parietal lobule (IPL) and higher CBF-ReHo ratios in right MFG and left inferior frontal gyrus (IFG) than CT(-) group. MoCA scores and memory scores were negatively correlated with the CBF/ALFF ratio of the right MFG.

Conclusion: With multimodal neuroimaging analyses, our results reveal that chemotherapy can trigger neurovascular decoupling in lung cancer patients, which providing comprehensive insights into the neurological mechanism of chemotherapy-related cognitive impairment.

PU-1672

MRI - DWI HR - MRI 评估急性脑梗死患者相关高危斑块特征研究

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MRI - DWI HR - MRI 评估急性脑梗死患者相关高危斑块特征研究

目的: 研究磁共振 - 弥散加权成像 (MRI - DWI)、高分辨率磁共振 (HR - MRI) 评估急性脑梗死患者相关高危斑块特征。

方法: 选择 2022 年 3 月 - 2023 年 3 月我院收治的 43 例疑似急性脑梗死患者, 所有患者均在发病一周内进行 MRI - DWI、HR - MRI 检查, 分析与急性脑梗死相关斑块特征。结果: 最终确定急性脑梗死患者 26 例、短暂性脑缺血患者 21 例。MRI - DWI、HR - MRI 对脑梗死不同狭窄程度的检出率无明显差异 ($P > 0.05$); Kappa 检验中, MRI - DWI、HR - MRI 在脑梗死轻度、中度、重度狭窄的诊断上一致性较强 ($K > 0.5$)。脑梗死患者斑块主要位于腹侧壁、上侧壁, 脑梗死和脑缺血患者斑块分布无明显差异, 不具有统计学意义 ($P > 0.05$)。脑梗死患者 WAMN、斑块面积、斑块负荷百分比、狭窄率、正性重构、斑块表面不平整比例高于脑缺血患者, LAMN 低于脑缺血患者, 差异具有统计学意义 ($P < 0.05$)。结论: HR - MRI 检查可见急性脑梗死患者具有高危斑块特征, 主要表现为斑块负荷、狭窄率、正性重构、表面不光整占比更高。

PU-1673

基于血管壁高分辨率磁共振成像技术对 SICAS 卒中复发预测的机器学习研究

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背景与目的: 颅内动脉硬化性狭窄是缺血性卒中最常见的病因, 是卒中高复发的原因之一, 卒中的复发与缺血性卒中的预后密切相关, 本研究旨在建立一种基于血管壁高分辨率磁共振成像技术的机器学习模型, 用于预测 SICAS 卒中的复发风险。

方法: 本研究回顾性随机收集 2020-2023 年间就诊于新乡医学院第一附属医院的 SICAS 卒中病人 180 例为研究对象, 收集相关影像学资料与临床资料并进行随访。将数据集按照 7:3 比例分为训练集和验证集。通过最小绝对值收缩和选择算子(LASSO)回归算法, 对训练集中收集的基线资料与实验室检查和 HR-VWI 扫描产生的影像学资料进行筛选, 最终将运用 5 种机器学习技术开发了卒中复发的预测模型, 包括逻辑回归模型(LR)、支持向量机(SVM)、高斯朴素贝叶斯(GaussianNB)、朴素贝叶斯(ComplementNB)和最近邻算法(kNN)。采用 SHAP 图为每个患者生成了可视化的解释。最后, 采用平均精确度、灵敏度、特异性、准确性、f1 评分、PR 曲线、校准曲线图和决策曲线分析对模型的有效性进行评价。

结果: LASSO 分析显示, “高血压病史”、“同型半胱氨酸值”、“NWI 值”、“狭窄率”、“斑块内出血”、“正性重构”以及“增强等级”是 SICAS 患者卒中复发独立危险因素。在 10 倍交叉验证中, 在 ROC 曲

线分析中, AUC 范围为 0.813~0.912。AUPRC 的范围为 0.655~0.833, GNB 模型预测 SICAS 卒中复发的能力最好。而斑块狭窄率以及斑块内出血对该模型的贡献最大。SHAP 分析提供了机器学习模型解释性, 展现了与 SICAS 卒中复发风险相关的重因素。

结论: 建立了一种精确的基于机器学习的 SICAS 卒中复发的预测模型, 以帮助临床工作者进行临床决策以及个体化治疗措施。

PU-1674

Whole-Brain Connectome of the Sensorimotor Cortex

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The mammalian neocortex mediates information processing through highly organized circuitry that contains various neuron types. Distinct populations of projection neurons in different cortical regions and layers make specific connections and participate in distinct physiological functions. Herein, with the precise whole-brain imaging and neural tracing, we dissected the comprehensive connectome of two types of glutamatergic pyramidal neurons in six subregions of the motor and sensory cortices. Analysis of the distribution of input neurons and projection terminals showed that the cortical circuits were organized in mixed patterns with topological preferences for anatomical location and circuit connections. The cortico-cortical, cortico-thalamic, and cortico-striatal connections were spatial location-dependent including transverse and longitudinal organizations. Morphological reconstruction and characterization of 655 neurons showed substantial diversity, which is greater in the motor cortex than that in the sensory cortex. Based on axon arborization, the intratelencephalic (IT) and pyramidal tract (PT) neurons could be grouped into various subtypes with obvious subregion and layer preferences. This study provides a cell-type basis for the anatomical organization of cortical sensorimotor circuits.

PU-1675

血管周围间隙与脑小血管病变的神经影像征象在特发性正常压力脑积水预测脑脊液分流术的预后价值

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背景: 特发性正常压力脑积水(iNPH)患者中出现血管周围间隙扩大(EPVS)和脑小血管病变(SVD)的比例较高, 但其神经影像学指标与预后的关系尚不清楚。

研究目的: 探讨 EPVS 和 SVD 神经影像学指标对 iNPH 术后预后的预测价值。

方法: 本研究回顾性收集连续的 66 例接受分流手术的 iNPH 患者。获取 iNPH 患者术前 1 周内神经影像学指标评估: EPVS 定量指标、EPVS 视觉评分、白质高信号(WMH)、SVD 总评分、改良 SVD 总评分(mSVD)、脑萎缩及病变指数(BALI)。以术后 1 年改良 Rankin 量表(mRS)评分的改善情况作为 iNPH 中期预后主要终点, 以术后 2 年 mRS 评分的改善情况作为 iNPH 长期预后主要终点。本研究分别以我们应用 Mann-Whitney U 检验、受试者工作特征(ROC)和二元 logistic 回归模型分析上述神经影像学标志物在术后随访 1 年和 2 年的预测价值。

结果: 在 66 例 iNPH 患者中, 44 例(67%)是男性。行分流术时, iNPH 患者年龄为 70.2 ± 7.0 岁。在术后 1 年和 2 年随访时, iNPH 患者术后改善组和未改善组之间, 无论是 EPVS 定量指标、EPVS 视觉评分、WMH 体积、WMH 评分或 SVD 总评分均无显著差异。然而, 在 2 年的随访中, iNPH 患者术后改善组和非改善组在 BALI 和 mSVD 的主要和次要结局方面, 存在显著差异; mSVD 的 ROC 曲线 AUC 值为 0.708 (95%CI: 0.546 ~ 0.840 $P=0.009$), BALI 量表的 AUC 值为

0.807 (95%CI: 0.654 ~ 0.913 $P<0.001$); 对于 mSVD 评分和 BALI 量表进行校正后的优势比均显著 ($P=0.008$ 和 $P=0.045$)。

结论: 本研究所涉及的 EPVS 定量指标与 EPVS 视觉评分在预测 iNPH 患者分流术预后方面的能力有限。BALI 和 mSVD 可作为 iNPH 患者术后长期预后的生物标志物。

PU-1676

自动纤维定量法检测肌萎缩侧索硬化症脑白质纤维完整性改变的应用价值

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目的 通过自动纤维定量 (AFQ) 技术分析肌萎缩侧索硬化症 (ALS) 患者脑白质纤维完整性改变, 并探究其与支持向量机 (SVM) 方法联用识别 ALS 疾病的可行性。 **材料与方法** 收集 29 例 ALS 患者及相匹配的 29 例健康对照者 (HCs 组) 临床和 MR 资料, 使用 AFQ 软件包对所有被试的 DTI 数据进行分析, 追踪全脑 20 条白质纤维束, 每条纤维束分成 100 等份, 定量分析每个等份的各向异性分数 (FA) 及平均扩散系数 (MD)、径向弥散系数 (RD)、轴向扩散系数 (AD) 参数值, 运用偏相关分析 DTI 参数与临床特征的相关性, 同时提取两组被试的脑白质纤维差异值作为分类特征, 利用 SVM 区分 ALS 组和 HCs 组, 估算准确率及 ROC 值。 **结果** AFQ 结果表明, 与健康对照者相比, ALS 患者在左侧皮质脊髓束 FA 值及 AD 值降低, 左侧额枕下束及右侧上纵束 AD 值增高, 双侧皮质脊髓束 MD 值、RD 值增高, 且左侧皮质脊髓束平均 FA 值与修订版肌萎缩侧索硬化功能评分量表 (ALSFRS-R) 中的精细功能域得分呈正相关 ($r=0.386$, $P=0.046$), 右上纵束平均 AD 值与 ALSFRS-R 评分中的延髓功能域得分呈正相关 ($r=0.422$, $P=0.028$), 右侧皮质脊髓束平均 MD 值、RD 值均与爱丁堡 ALS 认知行为量表 (ECAS) 评分呈负相关 ($r=-0.428$, $P=0.026$; $r=-0.416$, $p=0.031$)。筛选出所有受损纤维束具有组间差异的节点作为特征值取得了较好的分类效果, 对 ALS 组和 HCs 组的鉴别准确率达 82%, 且受试者工作特征 (receiver operating characteristic, ROC) 曲线下面积 (area under curve, AUC) 值最大为 0.88。 **结论** ALS 患者的白质微结构损伤主要与皮质脊髓束有关, 基于 AFQ 分析检测的这些异常可作为一种有效的生物标志物, 与 SVM 方法联用能够提高 ALS 患者的诊断性评估。

PU-1677

Automated quantification of fiber bundles for amyotrophic lateral sclerosis Application value of the altered integrity of cerebral white matter fiber

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Abstract Objectiv: To analyze the changes of white matter fiber integrity in patients with amyotrophic lateral sclerosis (ALS) by automatic fiber quantification (AFQ) technology, and explore the feasibility of combining it with support vector machine (SVM) to identify ALS disease. **Materials and Methods:** Clinical and MR data of 29 patients with ALS (ALS group) and 29 matched healthy controls (HCs group) were collected. DTI data from all subjects were analyzed using the AFQ software package, and 20 white matter fiber bundles in the whole brain were tracked. Then each fiber bundle was divided into 100 equal parts to acquire quantitative parameter values such as fraction anisotropy (FA)、mean diffusion (MD)、radial diffusion (RD) and axial diffusion (AD). Partial correlation was further used to explore the relationships between

DTI parameters and clinical characteristics .The brain white matter fiber difference values of the two subjects were also extracted as classification features. SVM was used to distinguish the ALS and HCs groups and estimated accuracy rates and the ROC values. Results: The AFQ results showed that,compared with the healthy controls,the ALS patients had decreased FA values and AD values in the left corticospinal tract, higher AD values in the left inferior fronto-occipital fasciculus and the right superior longitudinal fasciculus, higher MD and RD values of the bilateral corticospinal tract.The average FA value of the left corticospinal tract was positively correlated with ALSFRS-R fine functional domain score ($r=0.386$, $P=0.046$) and the average AD value of the right superior longitudinal fasciculus was positively correlated with ALSFRS-R bulbar functional domain score ($r=0.422$, $P=0.028$). Both the average MD and RD values of the right corticospinal tract were negatively associated with the ECAS score ($r=-0.428$, $P=0.026$; $r=-0.416$, $p=0.031$). All the selected nodes with inter-group differences in damaged fiber tracts were used as feature values to achieve a good classification effect. The identification accuracy rate for the ALS and HCs groups was 82%, and the area under the ROC curve (AUC) value was 0.88. Conclusions: The white matter microarchitectural damage in ALS is mainly related to the corticospinal tract, and these abnormalities detected by AFQ analysis can be used as a valid biomarker, which can improve the diagnostic evaluation of ALS patients when combined with the SVM method.

PU-1678

脑小血管病 NODDI 参数与认知功能相关性研究

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目的：探讨脑小血管病神经突方向离散度和密度成像的参数与认知功能相关性，并评估其参数与 MMSE、MoCa 量表评分的相关性。

材料与方法：前瞻性收集 59 例脑小血管病（cerebral small vessel disease, CSVD）患者，其中 30 例为 CSVD 无认知功能障碍患者，29 例为 CSVD 认知功能障碍患者。所有患者均测试简易智力状态检查量表（Mini mental state examination, MMSE）和蒙特利尔认知评估量表（Montreal cognitive assessment, MoCa）。所有患者均扫描 T1 加权序列、T2 加权序列、弥散加权序列、磁共振血管造影、磁敏感加权序列以及高分辨 T1 加权序列和神经突方向离散度和密度成像（Neurite orientation dispersion and density imaging, NODDI）序列。基于虚拟机内的 FSL 进行图像预处理。基于 MATLAB 的 NODDI 开源工具箱上计算 ODI、NDI 和 FISO 参数。基于 JHU ICBM-DTI-81 White-Matter Labels 脑图谱，计算 NODDI 参数的重要白质纤维集群。基于 TBSS 分析 NODDI 参数与脑小血管病认知功能相关性。基于 spearman 分析每个重要白质纤维集群的参数值与 MMSE 和 MoCa 评分的相关性。

结果：（1）TBSS 分析发现两组患者的 FA 和 NDI 参数值具有统计学差异。（2）基于 JHU-White Matter-labels 脑图谱，发现 CSVD 认知功能障碍组的 FA 参数有三个重要白质纤维集群（左侧大脑脚、小脑中脚及右侧大脑脚），NDI 参数有四个重要白质纤维集群（右后放射冠、左上放射冠 1、左上放射冠 2 及左后放射冠）。（3）左侧大脑脚和小脑中脚与 MMSE 和 MoCa 评分具有正相关。右后放射冠、左上放射冠 1 和左上放射冠 2 与 MMSE 和 MoCa 评分具有正相关。

结论：放射冠区域神经突密度降低发生在 CSVD 疾病临床痴呆发展之前，NDI 参数在 CSVD 认知功能障碍疾病中可作为临床辅助诊断的定量生理指标。

PU-1679

淀粉样脑小血管病与非淀粉样脑小血管病患者影像标志物的量化比较研究

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目的：探究淀粉样脑小血管病与非淀粉样脑小血管病患者的小血管病影像特征差异及分组标准。方法：本研究收集 351 例东南大学附属中大医院 2012-2022 年进行头颅 MR 及 SWI 扫描的患者图像，对脑小血管病患者的不同影像维度特征进行定量或分级，并按影像表现将患者分为淀粉样脑小血管病组（CAA 组）、高血压脑小血管病组（HA 组）及混合型脑小血管病组（Mixed 组），同时比较组间不同维度影像特征的差异。结果：结果显示三组患者在微出血灶计数（ $H=106.34$, $P<0.001$ ）、半卵圆中心层面腔隙计数（ $H=34.38$, $P<0.001$ ）、基底节层面腔隙计数（ $H=23.82$, $P<0.001$ ）、基底节层面扩张血管周围间隙（EPVS）分级（ $H=19.64$, $P<0.001$ ）及白质病变体积（ $F=16.264$, $P<0.001$ ）有显著差异，两两比较结果提示 Mixed 组患者在以上指标比其余两组或 CAA 组显著增高。另外，高血压脑小血管病患者的脑出血发生率（ $\chi^2=7.659$, $P=0.006$ ）及近期皮质下小梗死发生率（ $\chi^2=4.660$, $P=0.031$ ）较 CAA 组患者显著增高。回归分析显示，白质病变体积与微出血灶计数（ $t=4.216$, $P<0.001$ ）及基底节区 EPVS 分级（ $t=2.616$, $P=0.01$ ）存在独立相关。结论：研究结果提示，按影像表现分组的脑小血管病患者具有不同的临床影像表型和卒中风险，非淀粉样脑小血管病的诊断标准仍需要进一步研究探讨。

PU-1680

多参数 MRI 影像组学模型在胶质瘤术前分级中的应用研究

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目的：探讨多参数 MRI 影像组学模型在胶质瘤术前分级中的诊断价值，并寻找最佳模型及最优序列。

方法：回顾性分析本院病理诊断为胶质瘤的 208 例患者资料，对磁共振图像（T1WI、T2WI、T2-FLAIR、CE-T1WI、CE-T2-FLAIR）的肿瘤区域提取影像组学特征，使用 Mann-Whitney U 检验、递归特征消除法及 5 折交叉验证的 LASSO 算法筛选，建立 8 种机器学习模型（SVM、KNN、DT、GNB、RF、XGBoost、LightGBM 及 LR）。绘制 ROC 曲线，通过 AUC 评价模型稳健性，通过准确度评价模型准确性。最后，本院三位放射科医师独立诊断胶质瘤分级，并与之对比。

结果：①单参数模型：在单序列参数构建机器学习模型中，诊断效能最佳的模型为 XGBoost（T1WI、T2-FLAIR、CE-T1WI、CE-T2-FLAIR，4/5）和 LightGBM（T2WI，1/5）。最具有诊断价值的序列为 CE-T2-FLAIR（AUC 0.93，准确度 0.83）；②多参数模型：在联合序列构建模型中，诊断效能最佳的模型为 RF（AUC 0.97，准确度 0.95）；多参数 RF 模型诊断效能显著高于单参数 XGBoost、LightGBM 模型，且联合序列模型的平均效能（AUC 0.89，准确度 0.83）也高于单序列参数模型（AUC 0.72~0.84，准确度 0.69~0.77）；③放射科医师阅片：三位医师平均准确度、平均敏感度均低于模型相应指标的平均值（0.80 vs 0.83，0.80 vs 0.90），但平均特异度要高于模型平均值（0.82 vs 0.70）；医师 1 在本次阅片中表现最佳，其准确度高于模型平均准确度（0.86 vs 0.83），但明显低于多参数模型中诊断效能最高的 RF（0.86 vs 0.95）。

结论：多参数 MRI 影像组学模型在胶质瘤术前分级中具有较高的诊断预测价值，且优于单参数影像组学模型，优于放射科医师独立诊断。单参数模型中诊断效能最佳的模型为 XGBoost 和 LightGBM，最佳序列为 CE-T2-FLAIR；多参数模型中诊断效能最佳的模型为 RF。

PU-1681

基于脑白质高信号 Fazekas 评分的 ASL 灌注差异研究李燕^{1,2}、罗时磊^{1,2}、李爱娟^{1,2}、刘佳^{1,2}、杜小文^{1,2}、洪征宇^{1,2}、李小虎¹、余永强¹

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目的 探讨基于脑白质高信号 Fazekas 量表评分分组的大脑小血管病患者脑白质 ASL 灌注差异性。

方法 回顾性分析大脑小血管病患者脑磁共振图像 107 例, 年龄: 50~84 岁(66.89±9.188), 男性 63 例, 女性 44 例, 排除标准: 头颈部动脉大血管狭窄>50%。基于脑白质高信号 Fazekas 量表评分进行分组 (组 1: Fazekas<3 分; 组 2: Fazekas≥3 分, 无深部白质高信号≥3 分和室周白质高信号≥3 分; 组 3: Fazekas≥3 分, 深部白质高信号≥3 分或/和室周白质高信号≥3 分), 取两两对称的四个感兴趣区进行 ASL CBF 测量 (右侧半卵圆中心 (ROI1)、左侧半卵圆中心 (ROI2)、右侧侧脑室体部旁 (ROI3)、左侧侧脑室体部旁 (ROI4)), 取均值, 比较 3 组脑白质 ASL 灌注有无统计学差异。结果 ASL 灌注 CBF 值分别为, 组 1 (44 例): 8.27~19.30 ml/100g/min (14.38±2.55), 组 2 (18 例): 10.10~18.13 ml/100g/min (13.71±2.48), 组 3 (45 例): 3.38~15.55 ml/100g/min (8.37±2.97)。使用 SPSS19.0 软件单因素方差分析比较均值, 方差齐性检验 $p=0.403$, 组间比较 $p<0.001$ 差异有显著性, LSD 多重比较, 组 1 与组 2 $p=0.381$, 组 1 与组 3 $p<0.001$, 组 2 与组 3 $p<0.001$, 组 3 的 ASL 灌注 CBF 值较组 1 和组 2 明显减低 (p 均 <0.05)。

结论 基于脑白质高信号 Fazekas 量表评分的脑小血管病患者脑白质 ASL 灌注具有差异性, 深部白质高信号≥3 分或/和室周白质高信号≥3 分时灌注明显减低。

PU-1682

利用临床-影像组学模型鉴别诊断生长激素缺乏和特发性矮小患者

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Objective: Based on NCE/CE MR T1WI images, we try to develop a clinical-radiomics model and validate its predictive capacity to identify GHD and ISS.

Methods: The 102 patients diagnosed as growth retardation. The patients were divided into GHD ($n=74$) and ISS ($n=28$).

RESULTS: The AUCs of the Clinical-T1WI, Clinical-CE-T1WI and Combine radiomics models were 0.726 (95% CI: 0.585, 0.867), 0.842 (95% CI: 0.742, 0.942), and 0.846 (95% CI: 0.746, 0.945) in the training set, respectively, which were confirmed in the test set by AUCs of 0.596 (95% CI: 0.371, 0.820), 0.616 (95% CI: 0.403, 0.828), and 0.651 (95% CI: 0.435, 0.867), respectively.

CONCLUSIONS: The MRI-based radiomics model can be helpful to distinguish GHD and ISS, and combined with clinical features, which can improve diagnostic accuracy on MRI provides histological information for pituitary without abnormality.

PU-1683

synovial sarcoma in the prevertebral space can mimic malignant neurogenic neoplasm: case report and literature review

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Synovial sarcoma, a rare malignant neoplasm with a poor prognosis, accounts for approximately 5%-10% of all primary soft-tissue malignancies worldwide. Typically affecting adolescents and young adults, it primarily manifests near the joints of the lower extremities. This study aimed to demonstrate that this tumor can also affect the prevertebral space. A 32-year-old male patient presented at our outpatient clinic with a 2-month history of upper limb numbness and a 1-month complaint of a palpable neck mass. Imaging studies revealed a bulky, lobulated, and heterogeneous mass exhibiting heterogeneous enhancement. Furthermore, the mass caused expansion of the neuroforamen in the neck, initially suggesting a diagnosis of malignant schwannoma. However, a histopathologic examination suggested synovial sarcoma. The article provided a comprehensive review of the clinical, pathological, and radiological features of this condition. Additionally, it explored current treatment options and prognoses by referencing relevant literature.

PU-1684

双能量 CT 扫描技术对脑脓肿诊断价值的研究

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目的 探讨双能量 CT 扫描技术诊断脑脓肿的应用价值.方法 选取疑似脑脓肿患者 90 例,采用头部 CT 平扫+增强检查,记录并统计 CT 检查敏感度、特异度、准确率.结果 90 例疑似脑脓肿患者经金标准检测,确诊为脑脓肿 68 例;CT 扫描检测诊断脑脓肿 78 例,CT 扫描敏感度为 96.71%、特异度为 95.25%、准确率为 96.67%.结论双能量 CT 检测可确定脓肿数目、大小,能为临床选择治疗方法提供可靠依据.

PU-1685

不同剂量急性饮酒对健康人群认知功能影响及扩散峰度成像 (DKI) 的研究

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目的: 研究不同剂量急性饮酒对健康人群认知功能的影响及其与脑白质微观结构扩散峰度成像 (DKI) 改变的相关性。

方法: 选取 25 名健康志愿者随机摄入不同剂量白酒, 分别于饮酒开始之前, 饮酒后 30 及 60min 完成一系列神经心理学测试量表以及常规 MRI、DKI 扫描。量表包括蒙特利尔认知量表(MoCA)、数字广度测验(DST)及语音流畅试验 (PFT)。根据饮酒后 30min 血液酒精浓度(BAC)分组。测量

感兴趣区内(额叶、颞叶、半卵圆中心、胼胝体膝、压部及小脑中脚)DKI 参数值,并与不同浓度组饮酒前、后神经心理学量表评分进行相关性研究。

结果: 1.不同浓度组饮酒前、后认知功能总体评分 MoCA 及 DST 总分未见明显差异;饮酒后 30 及 60min DST 逆序分及 PFT 评分明显降低,且高浓度组降低更明显;饮酒后 60min DST、PFT 评分与酒后 30min 未见明显差异。 2.饮酒后 30min 额、颞叶和胼胝体膝部 FA 值明显升高;BAC 与额、颞叶 FA 值呈正相关。饮酒后 60 与 30min 相比,额叶 FA 值升高,且高浓度组升高显著。饮酒后 30min 额叶和小脑中脚 MD 值较饮酒前明显下降,其中,高浓度组下降最显著;饮酒后 60 与 30min 之间各感兴趣区内 MD 值差异无明显统计学意义。饮酒后 30min 额、颞叶和胼胝体膝部 MK 值较饮酒前明显升高,不同浓度组间 MK 值无明显差异;饮酒后 60 与 30min 相比,中等浓度组额叶 MK 值明显升高,高浓度组额叶和颞叶 MK 值明显升高。

3.饮酒后 30min 额叶 MK 值与 PFT 评分呈负相关,颞叶 MK 值与 DST 总分及 DST 逆序评分呈负相关,FA 及 MD 值与神经心理学量表评分无明显相关性。

结论: 1.饮酒后会引引起记忆力、注意力及执行功能等认知功能损害,且具有剂量相关性。2.DKI 能敏感检测出饮酒后脑白质微观结构的变化,其中,MK 值较 FA、MD 值更敏感。3.饮酒后额、颞叶 MK 值与量表评分具有显著相关性。

PU-1686

特鲁索综合征 1 例

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患者女性,35 岁。

主诉:确诊肺癌 2 年余。

现病史:患者 2 年前因胸痛在我院就诊,行胸腔镜检查取活检,病理回报腺癌,诊断:左肺腺癌 IVA 期(cT1cN0M1a),行基因检测示 EGFR19 外显子缺失突变,口服吉非替尼靶向药物治疗,于 2019-05-29 已规律行一线 5 疗程培美曲塞 d1+ 奈达铂 d1 化疗及 13 疗程培美曲塞 d1 维持化疗,2020-08-17 抽血复查基因检测仍示 EGFR 19 外显子缺失突变,继续应用吉非替尼靶向治疗。2020-10-14 行大评估入院,见左乳新发肿块,乳腺及腋窝淋巴结活检病理回报:转移性肺腺癌,评估病变进展,予更换为阿法替尼靶向治疗。2021-05-19 入院评估后行乳腺彩超提示结节较前增大,病情不稳定,更换为奥希替尼治疗,于 2021-06-21 入院,于 2021-06-21 入院评估病变进展,腹腔积液,于 2021-06-25 腹腔内恩度靶向药物治疗,出院后于 07-13 口服奥希替尼+安罗替尼治疗,于 2021-08-09 为行大评估入院,完善相关检查,部分病变较前缓解。患者上次出院至今,仍有乳房、腋窝疼痛,伴有腹痛、腹胀。近 1 周,左侧胸痛明显,伴周身痛,无法平卧,无发热、咳嗽、咳痰等。既往史:1 个月前于我院诊断“腹膜炎、低蛋白血症、营养不良”,“左侧乳腺及腋窝淋巴结 125 碘植入止痛治疗”。否认“高血压、糖尿病、冠心病”等,慢性病病史,否认药物、食物过敏史。

实验室检查

血常规:白细胞 9.67 10E9/L、中性粒细胞百分率 90.9 %、中性粒细胞绝对值 8.79 10E9/L、血红蛋白 79 g/L,血小板计数 96 10E9/L。DIC 全套:凝血酶原时间 16.3 秒、国际标准化比值 1.40、活化部分凝血活酶时间 44.1 秒、D-二聚体 79.11 μg/ml、纤维蛋白(原)降解物 115.45 μg/ml,降钙素原 1.040 ng/ml。

PU-1687

CT 灌注缺损体积对于急性孤立性脑干梗死的价值

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目的：由于临床症状多变且无明显特异性，同时，受限于较差的空间分辨率和颅底骨质伪影使得常规 CT 平扫价值有限，急性孤立性脑干梗死的诊断极具挑战。文献表明 CT 灌注 (CTP) 参数与后循环急性缺血性卒中的功能预后显著相关，然而，CTP 在孤立性脑干梗死中的作用尚不清楚。我们旨在确定 CTP 参数在预测急性孤立性脑干梗死患者功能预后方面的价值。

方法：回顾性分析 2018 年 1 月至 2022 年 3 月本院连续收治的 116 例经 MRI 随访的孤立性桥脑/中脑 CT 灌注缺损患者。定量测量所有灌注图上的灌注缺损体积和 MRI 上的最终梗死体积(FIV)。基于以往的研究结果，发病 90 天改良 Rankin 量表评分 0 和 1 定义为功能预后“良好”。统计分析包括单变量和多变量回归分析、二元逻辑回归和受试者工作特征(ROC)分析。

结果：113 例患者在随访 MRI 上确诊为孤立性脑桥/中脑梗死。发病至扫描时间、CT 平扫阳性、入院时美国国立卫生研究院卒中量表 (NIHSS) 评分和所有 CTP 图上的灌注缺损体积与 FIV 显著相关 ($P<0.05$)。在多变量线性回归模型中，校正了年龄、性别、NIHSS 评分、发病至扫描时间和 CT 平扫阳性，灌注缺损体积仍然与 FIV 显著相关 ($P<0.05$)。在二元逻辑回归分析中，所有 CTP 图上的灌注缺损体积仍然是良好功能预后的独立预测因子。在 ROC 分析中，脑血流量缺损体积的鉴别值略高，曲线下面积最大为 0.683 [95% CI, 0.587-0.780], $P=0.001$ 。

结论：CT 灌注缺损体积能反映急性孤立性脑干梗死患者的 FIV，并且对于患者功能预后有一定的预测价值。

PU-1688

基线炎性指标对椎基底动脉闭塞患者临床结局的影响

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目的：探讨接受血管内治疗的急性椎基底动脉闭塞患者入院炎性指标对其临床结局的影响。

方法：采用回顾性研究，连续收集本院 (2021 年 7 月至 2023 年 4 月) 急性 (24 小时内) 椎基底动脉闭塞 (VBAO) 并接受血管内治疗 (EVT) 的患者。入院行 DWI 扫描，采用急性卒中预后早期 CT 评分 (pc-ASPECT) 评估患者后循环梗死情况，收集患者临床基本特征、病史、血脂及全身炎性指标 (白细胞、血小板、单核细胞、淋巴细胞、中性粒细胞及嗜酸性粒细胞) 等数据，评估患者基线 NIHSS 评分。将 90 天改良 Rankin 量表评分 (mRS) 0-3 分定义为良好结果，4-6 分定义为不良结果；mRS 0-2 分定义为功能独立组，3-6 分定义为恶化组。

结果：共 73 例患者符合条件。良好组与不良组之间淋巴细胞、中性粒细胞与淋巴细胞比值 (NLR)、血小板与淋巴细胞比值 (PLR)、pc-ASPECT 评分及基线 NIHSS 评分有统计学意义。淋巴细胞与单核细胞比值 (LMR) 在功能独立组与恶化组间存在统计学差异。单因素回归分析显示，NLR 是 90 天不良结果的预测因素。

结论：基线炎性指标，尤其是 NLR 对接受血管内治疗的急性椎基底动脉闭塞患者 90 天临床结果有影响。

PU-1689

Altered white-matter functional network in patients with type 2 diabetic retinopathy : Potential effect on cognitive function

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Purpose: The brain structure damage of diabetic retinopathy (DR) patients is closely related to the occurrence of cognitive impairment, and the brain structure damage is usually accompanied by changes in brain functional activities. The alterations of white matter (WM) functional network in DR remain unclear. We aimed to explore the topological characteristics changes of WM functional network and its potential clinical value in cognitive function.

Method: A total of 44 subjects (24 DR and 20 normal controls) were included in this study. The age, sex and education level of the two groups were matched, and all the functional and structural magnetic resonance imaging data were acquired. On the day of scanning, the scores of mini-mental state examination (MMSE) and Montreal Cognitive Assessment (MOCA) were evaluated, and the clinical data such as course of disease, fasting blood glucose and blood pressure were collected. Divide 3D-T1WI to extract white matter and build a group level template, define the group level template nodes by clustering method, use the defined nodes to extract resting blood oxygen level-dependent signals to build a white matter functional network, carry out the inter-group double-sample T-test of global network and node network indicators (FDR correction, $P < 0.05$), use the templates of 12 white matter functional networks to define the functional partition of white matter node network indicators, and analyze the correlation between network indicators and clinical variables with significant differences by Spearman correlation. Multiple comparisons were corrected using the Bonferroni method ($P < 0.05/6 = 0.0083$).

Results: Both DR group and normal control group have small-world properties. Compared with control group, the WM functional network exhibited decreased clustering coefficient ($P=0.012$) and small-world property value ($P=0.040$), and local efficiency is decreased ($P=0.008$). At the node level, 62 node presented nodal disturbances in WM functional network (degree centrality, node clustering coefficient, nodal efficiency and nodal local efficiency) (FDR corrected, $P < 0.05$), the degree centrality decreased in the superior longitudinal fasciculus, but increased in the middle cerebellar peduncle and corticospinal tract. The nodal efficiency increased in the inferior longitudinal fasciculus, middle cerebellar peduncle, arcuate fasciculus and corticospinal tract. The nodal local efficiency decreased in superior longitudinal fasciculus, middle longitudinal fasciculus and uncinate fasciculus; the node clustering coefficient decreased in the superior longitudinal fasciculus, frontal aslant tract, middle longitudinal fasciculus, arcuate fasciculus, corticospinal tract and uncinate fasciculus. The node clustering coefficient of arcuate fasciculus is negatively correlated with MoCA ($r=-0.534$, $P=0.007$), the node clustering coefficient of frontal aslant tract is negatively correlated with MMSE ($r=-0.547$, $P=0.006$), and the node clustering coefficient of middle longitudinal fasciculus is negatively correlated with blood sugar ($r=-0.530$, $P=0.008$). The nodal local efficiency of inferior longitudinal fasciculus is negatively correlated with MMSE ($r=-0.545$, $P=0.006$).

Conclusion: Our study demonstrated that the WM functional network topological properties changes in DR patients, which were associated with cognitive function and blood sugar, which improves the understanding of the pathophysiological mechanism of DR and provides potential imaging biomarkers of cognitive impairment of DR patients.

PU-1690

静息态 fMRI 在亚急性期卒中后失语症康复治疗中的应用

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目的：研究亚急性期卒中后失语症（PSA）患者康复治疗前后局部脑区活动的差异，探讨 PSA 患者康复治疗前后的脑功能区变化情况及语言重塑相关机制。

方法：根据 PSA 纳入标准，选取我院康复科确诊 PSA 的 14 例患者，其中男性 8 例，女性 6 例，平均年龄 46.93 ± 10.57 岁。亚急性期 PSA 患者经过我院康复科系统语言康复治疗（包括系统康复治疗及药物治疗）1 个月，所有 PSA 患者治疗前后经临床全面评估，并利用西方失语症成套测验（WAB）对患者治疗前后进行语言能力测评。利用 3.0T 超导型磁共振扫描仪，采集治疗前后患者静息态及高清结构脑影像学数据。采用 DPARSF 软件对数据进行预处理，包括时间校正、头动校正、空间标准化、消除线性趋势、消除低频漂移及高频噪声，随后进行标准化低频振幅（zALFF）的分析。利用配对样本 t 检验比较 PSA 治疗前后患者的 zALFF（ $P < 0.05$ ，FDR 校正），并利用 Pearson 相关分析，将 zALFF 与临床语言各项评分逐一进行相关性分析， $P < 0.05$ 具有统计学意义。

结果：通过配对样本 t 检验发现 PSA 治疗前后组在额下回的眶部、三角部和岛盖部处 zALFF 值增高，提示 PSA 患者在康复治疗以上脑区得到激活，在失语恢复期这些功能脑区神经元活性增高，可能对语言的恢复起一定的代偿作用。此外，直回（ $P = 0.01$ ）及额下三角回（ $P = 0.006$ ）zALFF 值与理解能力评分治疗前后差值具有显著相关性，提示直回及额下三角回 zALFF 能够预测理解能力评分变化值。

结论：fMRI 对于 PSA 患者康复治疗疗效具有预测价值。亚急性期 PSA 患者语言功能恢复患者主要依赖病灶周围组织的代偿，病灶周围自发脑活动能够预测患者理解能力恢复程度。

PU-1691

Altered orbitofrontal and pars opercularis cortical thickness in Betel Quid Dependence Chewers

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Objective: This study aimed to examine the morphological changes in the cerebral cortex of betel quid dependence (BQD) chewers using the surface-based morphometry (SBM) method.

Methods: High spatial resolution three-dimensional T1-weighted structural imaging data were collected from 53 individuals with BQD and 37 healthy controls (HCs) who were matched to BQD individuals in terms of age, gender and educational level. The SBM method was applied to analyze the cortical thickness alterations in BQD-related areas. Independent samples t-test was used to assess the cortical thickness difference between the two groups. Pearson correlation analysis was used to investigate the correlation between cortical thickness changes and clinical characteristics, including BQD scale scores, and duration of BQD.

Results: The BQD group had higher cortical thickness than HC group in two clusters, located at lateral orbitofrontal ($t = 4.703$, $P = 0.0028$) and pars opercularis ($t = 3.602$, $P = 0.0403$) of the right cerebral hemisphere, with age, gender and education duration as covariates ($P < 0.05$, AlphaSim corrected). While there were no significant differences in age, gender- and education duration-adjusted cortical thickness of the left cerebral hemisphere between BQD chewers when compared to HCs ($P > 0.05$, AlphaSim corrected). Correlation analysis revealed that the cortical thickness of the right pars opercularis was negatively correlated with the duration of BQD ($r = -0.274$, $P = 0.047$). The cortical thickness of the right lateral orbitofrontal was not significantly correlated with BQDS or BQD duration ($P > 0.05$).

Conclusion: The present study demonstrated that betel quid dependence might be linked to changes in the reward system's cortical thickness, which may be related to the neurobiological basis of BQD.

PU-1692

早醒型失眠障碍患者大脑区域活动和脑血流的特征：一项静息态功能磁共振成像研究

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目的利用基于静息态功能磁共振成像 (rs-fMRI) 局部一致性 (ReHo)、低频波动振幅 (ALFF) 和三维动脉自旋标记 (3D-ASL) 研究早醒型失眠障碍患者脑活动和脑血流灌注变化, 并分析其与失眠严重程度和情绪障碍的相关性。方法 34 名早醒型失眠障碍患者和 12 名性别和年龄匹配的健康对照者接受 rs-fMRI、3D-ASL 检查, 并完成匹兹堡睡眠质量指数量表 (PSQI)、汉密尔顿抑郁 (HAMD) 和焦虑 (HAMA) 量表。计算 ALFF、ReHo 和 CBF 值, 并用双样本 t 检验比较组间差异。在 ALFF、ReHo 和 CBF 值与临床量表评分间进行相关性分析。结果与健康对照组相比, 早醒型失眠障碍患者左侧颞中回和左侧颞下回 ReHo 值降低, 左侧岛盖部额下回 ReHo 值升高 ($P<0.05$)。左侧颞中回的 ReHo 值与 HAMA 评分呈正相关 ($r=0.504$, $P=0.024$)。详见表 1、图 1 和图 2。双侧楔前回、左侧颞中回和左侧角回 ALFF 值降低 ($P<0.05$)。详见表 2 和图 3。早醒型失眠障碍患者右侧小脑前叶、右侧小脑后叶、小脑扁桃体、双侧小脑下部、右侧颞中回、右侧梭状回、左侧海马、胼胝体、右侧尾状核、右侧三角部额下回、右侧额叶、右侧内和旁扣带脑回、右侧楔前叶 CBF 值增加 ($P<0.05$)。右侧额叶和右侧楔前叶的 CBF 值与 PSQI 评分呈正相关 ($r=0.341$, $P=0.048$; $r=0.418$, $P=0.014$)。右侧小脑前叶和左侧海马与 HAMA 评分呈正相关 ($r=0.432$, $P=0.011$; $r=0.513$, $P=0.002$)。左侧海马和右侧梭状回与 HAMD 评分呈正相关 ($r=0.358$, $P=0.038$; $r=0.354$, $P=0.040$)。详见表 3、图 4 和图 5。

结论 本研究证实了早醒型失眠障碍对患者的广泛影响, 可为脑活动和脑血管灌注机制研究提供信息。

PU-1693

CTPI 在对缺血性脑血管病患者脑血流动力学评估中的临床价值

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目的:探究 CT 灌注成像 (CT perfusion imaging, CTPI) 在对缺血性脑血管疾病 (ischemic cerebrovascular disease, ICVD) 患者脑血流动力学评估中的临床价值。方法:选择 140 例 ICVD 患者, 患者均行脑 CTPI 检查, 获取异常灌注区健侧与患侧的脑血流动力学参数[脑血容量 (cerebral blood volume, CBV)、脑血流量 (cerebral blood flow, CBF)、平均通过时间 (mean transit time, MTT)、达峰时间 (time to peak, TTP)], 并计算两侧大大脑半球感兴趣区灌注参数相对值 ($rCBF$ 、 $rCBV$ 、 $rMTT$ 、 $rTTP$ 、 $rCBV - rCBF$)。结果: 短暂性脑缺血发作 (transient ischemic attack, TIA) 患者异常灌注区所在患侧的 MTT、TTP 水平高于健侧 ($P<0.05$), CBF 水平低于健侧 ($P<0.05$), CBV 水平与健侧差异无统计学意义 ($P>0.05$); 脑梗死 (cerebra

l infarction, CI) 患者异常灌注区所在患侧的 MTT、TTP 水平高于健侧 ($P < 0.05$), CBF、CBV 水平低于健侧 ($P < 0.05$)。CI 患者异常灌注区所在健侧或患侧的 MTT、TTP 水平均对应高于 TIA 患者, CBF、CBV 水平均对应低于 TIA 患者 ($P < 0.05$); CI 患者 rMTT、rCBF、rCBV、rCBV-rCBF 水平均低于 TIA 患者 ($P < 0.05$), rTTP 水平与 TIA 患者比较差异无统计学意义 ($P > 0.05$); CI 患者 NIHSS 评分 ≥ 5 分的比例高于 TIA 患者 ($P < 0.05$)。结论: TIA 患者与 CI 患者 CPTI 脑血流动力学均存在异常变化, CI 患者脑储备能力损害、神经功能损伤较 CI 患者更严重, CTPI 可用于缺血性脑血管疾病中提供有效的血流动力学信息, 有助于病情评估。

PU-1694

应用高分辨率磁共振血管壁成像对比研究平原及高原人前循环动脉粥样硬化特征

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目的: 应用 3.0T 高分辨率磁共振血管壁成像 (High resolution magnetic resonance vascular wall imaging, HRMR-VWI) 比较高原 (西宁: 平均海拔 2261 米) 和平原 (北京: 平均海拔 43.5 米) 汉族动脉粥样硬化性脑梗死患者的前循环 (大脑中 / 前动脉) 斑块特征, 探讨高原环境对颅内动脉粥样硬化的影响。

方法: 按纳入标准前瞻性收集西宁 (青海省第五人民医院、青海省人民医院) 和北京 (北京清华长庚医院) 前循环 (大脑中 M1-M2 段/前 A1-A2 段) 中-重度狭窄的动脉粥样硬化性脑梗死住院患者各 30 例。采集相关临床资料, 并于发病 3 周内完成 HRMR-VWI 检查。对比分析两组患者责任斑块的 HRMR-VWI 特征, 并结合临床指标探讨其可能的影响机制。

结果: ①导致动脉粥样硬化的高危因素中, 血压: 高原组收缩压低于平原组 ($P < 0.05$); 血糖: 高原组空腹血糖水平低于平原组 ($P < 0.05$); 余血脂、同型半胱氨酸、吸烟情况在高原组与平原组间差异无统计学意义 ($P > 0.05$); ②红细胞计数、血红蛋白含量和红细胞压积高原组高于平原组, 差异均有统计学意义 ($P < 0.05$); ③高原组脑梗死责任血管狭窄程度和斑块负荷均低于平原组, 差异有统计学意义 ($P < 0.05$); ④责任斑块成分分析: 斑块信号强度的直方图变异系数值、斑块-壁对比度值和 T1 加权图像高信号, 高原组与平原组差异均无统计学意义 ($P > 0.05$); ⑤血管重构模式和重构指数值、斑块形态和分布, 高原组与平原组差异均无统计学意义 ($P > 0.05$)。结论: 高原汉族前循环动脉粥样硬化性脑梗死患者责任血管的狭窄程度和斑块负荷比平原组小; 斑块成分、形态和分布, 血管重构模式和重构指数值两组间无差异, 提示高原环境可能会延缓颅内动脉粥样硬化斑块的生长。

PU-1695

一例急诊 CT 遇到的罕见儿童中枢系统疾病——急性坏死性脑病

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目的：介绍一例罕见的儿童急性坏死性脑病（ANE），增强对急性坏死性脑病的认识，进而有助于急诊及时诊断这一危重疾病，改进患儿的预后；**方法：**一例 4 岁男童，因主诉“发热 1 天，惊厥 1 次”入院，入院对症治疗后仍然反复出现发热、惊厥并意识状态进行性恶化，次日昏迷、DIC、休克，入院首日行急诊 CT 检查。**结果：**急诊 CT 显示“双侧丘脑、大脑脚、中脑、脑桥对称性低密度影”，患儿发热后一天内急性进展，脑脊液（CSF）细胞数量无明显增多，CSF 蛋白增高，血清转氨酶增高，血氨正常，常规病原学检查均为阴性；结合上述特征性影像学表现及临床资料，多学科会诊诊断为急性坏死性脑病。**结论：**对于出现累及丘脑的多灶性、对称性病灶的特征性影像学表现，且有发热、意识障碍临床表现的患儿，需高度警惕急性坏死性脑病这一罕见疾病，结合实验室检查结果给予及时、明确诊断。

PU-1696

2 型糖尿病海马血管周围间隙扩大与情景记忆的相关性研究

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目的 探讨 2 型糖尿病（T2DM）海马血管周围间隙扩大（H-EPVS）与情景记忆的相关性。**方法** 连续性收集 T2DM 患者 53 例，其中 T2DM 认知受损组 28 例，T2DM 认知正常组 25 例。所有患者接受头颅 MRI 扫描、蒙特利尔认知评估量表(MoCA)和 Rey 听觉词语学习测试（RAVLT）。取 T2WI 图像上 H-EPVS 计数最多的一个层面，分别计算左右两侧 H-EPVS 的数目，并由两侧相加获得总 H-EPVS 计数。由 2 名观察者采用盲法分别进行 H-EPVS 计数，采用组内相关系数检验评价 2 名观察者间的一致性。比较 2 组 H-EPVS 计数、MoCA 评分、RAVLT 评分、一般人口学特征、空腹血糖、HbA1c、心血管危险因素（血脂、血压、吸烟及饮酒史）、T2DM 病程、治疗药物及并发症情况的差异。采用多元线性回归分析评价 H-EPVS 计数与 MoCA 及 RAVLT 评分的相关性。**结果** T2DM 认知正常组和认知受损组的一般人口学特征、空腹血糖、HbA1c、血脂、血压、吸烟及饮酒史、糖尿病病程、并发症、药物治疗情况均无统计学差异。总 H-EPVS 计数、左侧和右侧 H-EPVS 计数的观察者间一致性系数分别为 0.926、0.836、0.886，即观察者间一致性较好。与 T2DM 认知正常组相比，T2DM 认知受损组总 H-EPVS 计数和左侧 H-EPVS 计数显著增加，MoCA 及 RAVLT 评分显著降低。相关性分析显示总 H-EPVS 计数、左侧和右侧 H-EPVS 计数均与 RAVLT 总分、RAVLT 延迟回忆评分呈负相关关系；多元线性回归调整混杂因素后，总 H-EPVS 和左侧 H-EPVS 计数仍然与 RAVLT 总分($\beta=-0.330$, 95% CI: -1.455~-0.244)、RAVLT 延迟回忆评分($\beta=-0.383$, 95% CI: -0.535~-0.051)具有相关性，而右侧 H-EPVS 计数与 RAVLT 评分不再具有相关关系。**结论** T2DM 患者情景记忆功能下降，并与 H-EPVS 计数存在相关性。海马血管周围间隙扩大可能作为 T2DM 情景记忆能力下降的影像学标志物。

PU-1697

多模态 CT 联合临床在急性缺血性脑卒中溶栓后出血转化预测中的价值

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目的 评估 AIS 患者溶栓前 CT 灌注参数、区域软脑膜侧支多模式评分及临床参数与溶栓后出血转化 (Hemorrhagic Transformation, HT) 的相关性, 找出有意义的参数或影像学定量预测指标。

方法 收集本院确诊为单侧大脑中动脉 M1 段中、重度狭窄或闭塞的 AIS 患者 66 例, 均行溶栓治疗, 根据治疗后 24h 内复查结果分为 HT 组 29 例和非 HT 组 37 例。所有患者均行多模态 CT 扫描, 通过后处理得到 CBF、CBV、MTT 及 Tmax、PS 以及各参数的相对值即 rCBF、rCBV、rMTT 及 Tmax、rPS。分析多时相 CTA 图像, 根据 Alberta 卒中项目早期 CT 评分区域, 将大脑中动脉供血范围的软脑膜侧支动脉分为 M2~M6 区, 分别对 5 个区域软脑膜动脉的强化延迟、强化范围和对比利廓清三种血流状态进行评分。收集治疗前 NLR、入院 NIHSS 评分等多个临床参数。评估参数与 HT 的相关性; 单因素分析 $P < 0.1$ 的参数 Logistic 分析, 找出 HT 的独立影响因素; 通过 ROC 曲线评估各参数对 HT 的预测价值。

结果 (1) 单因素分析结果显示, 治疗前 NLR、ASPECT 评分、入院 NIHSS 评分、溶栓后 30min NIHSS 评分、90d mRS 评分、软脑膜侧支延迟、廓清及程度评分及 rCBF、rCBV、rPS 与溶栓后 HT 具有相关性 ($P < 0.05$)。 (2) Logistic 回归分析显示, 治疗前 NLR、软脑膜侧支延迟、rPS 是溶栓后 HT 的独立危险因素, 侧支廓清评分及程度评分、rCBF、rCBV 是 HT 的保护性因素 ($P < 0.05$)。 (3) ROC 曲线分析显示, 临床参数、CTP 参数及软脑膜侧支多模式评分三者联合的预测效能 (AUC 0.966, 敏感度 92.90% 特异度 91.40%) 高于三者单独使用对 HT 的预测效能, 敏感度、特异度也有所提高。

结论 AIS 患者溶栓后 HT 与多个临床因素及影像学参数密切相关, 治疗前 NLR、软脑膜侧支延迟评分、rPS 是溶栓后 HT 的独立危险因素; 软脑膜侧支廓清、程度评分、rCBF 及 rCBV 是 HT 的保护性因素; 临床参数、CTP 参数及 mCTA 软脑膜侧支多模式评分三者联合提高了对 HT 的预测效能。

PU-1698

高分辨率 MR 颅内血管壁成像在缺血性脑卒中患者责任血管识别中的价值

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目的 探讨 3.0T 高分辨 MR 血管壁成像对缺血性脑卒中中的评估价值。

方法 对 60 例不同时期缺血性脑卒中患者行高分辨 MR 颅内血管壁成像检查, 所有患者均行 T2WI、STIR、T1WI 及 T1WI+C 成像序列, 图像经后处理后, 由两名医生分别在 T1WI 增强图像上对斑块的强化程度进行评估。根据斑块强化程度与正常动脉壁及垂体漏斗部的关系分为三级: 0 级, 增强小于或等于其他地方正常动脉壁; 1 级, 比 0 级明显, 但小于垂体漏斗部; 2 级, 增强程度大于或等于垂体漏斗部, 然后记录数据, 应用 SPSS 统计软件对所得数据进行分析。

结果 60 例患者共获得有效斑块 109 个, 其中大脑中动脉斑块 79 个, 大脑后动脉、基底动脉、椎动脉及颈内动脉末端斑块共 30 个。经秩和检验, 疾病分期与斑块的强化程度之间具有统计学差异 ($P < 0.05$)。2 级强化只出现在亚急性期斑块。亚急性期斑块比慢性期斑块有更明显的强化 ($H=29.39$, $P=0.000$)。

结论 HR-MRI 血管壁成像可以很好地显示颅内动脉的血管壁结构, 提供更多的关于动脉粥样硬化斑块的信息, 具有很大的临床应用潜力和前景。

PU-1699

CT 血管造影结合临床预测西宁短暂性脑缺血发作伴颅颈动脉粥样硬化患者脑梗死风险

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目的: 结合临床和 CT 血管造影(Computed tomography angiography, CTA)探讨高原短暂性脑缺血发作(transient ischemic attack, TIA)伴颅颈动脉粥样硬化患者 1 年内继发脑梗死的危险因素, 并构建风险预测模型, 评价其预测效能。

方法: 采用回顾性分析, 连续选取 2018 年 1 月~2021 年 9 月青海省第五人民医院收治的 111 名 TIA 患者, 所有患者均经颅颈联合 CTA 证实合并动脉粥样硬化斑; 随访 1 年, 根据是否继发脑梗死分为两组; 比较两组患者的临床资料和 CTA 检查结果, 并通过多因素 Logistic 回归分析构建高原 TIA 后 1 年内继发脑梗死的风险预测模型以及绘制受试者工作特征曲线。

结果: 出现 9 例失访, 1 例于外院放置颈动脉支架, 1 例发生硬膜下血肿, 最终纳入 100 例, 其中 26 例继发脑梗死(梗死组), 74 例未发生脑梗死(非梗死组); 单因素分析显示两组患者斑块性质、血管狭窄程度、不稳定斑块累及血管数、高血压分级、ABCD² 评分差异有统计学意义($P < 0.05$); Logistic 回归分析显示血管狭窄程度 > 轻度狭窄、高血压分级 > 1 级、ABCD² 评分偏高是 TIA 后 1 年内继发脑梗死的独立危险因素, 其风险预测模型为: $P = 1/[1 + \exp(-5.032 + 1.395X_{\text{高血压分级} > 1 \text{ 级}} + 0.515X_{\text{ABCD}^2 \text{ 评分}} + 2.424X_{\text{血管狭窄程度} > \text{轻度狭窄}})]$; 该模型 AUC 为 0.848(95%CI 0.758~0.938), 敏感度为 76.92%, 特异度为 83.78%。

结论 高原伴颅颈动脉粥样硬化的 TIA 患者 1 年内继发脑梗死的主要危险因素是高血压分级和颅颈动脉血管狭窄程度, 二者联合 ABCD² 评分构建的模型有着良好的预测价值, 有助于急诊快速评估脑梗死风险。

PU-1700

高分辨率 MR 血管壁成像技术在头颈动脉夹层诊断中的应用价值

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目的 探讨 3.0T 高分辨 MR 血管壁成像对缺血性脑卒中的评估价值。

方法 对 60 例不同时期缺血性脑卒中患者行高分辨 MR 颅内血管壁成像检查, 所有患者均行 T2WI、STIR、T1WI 及 T1WI+C 成像序列, 图像经后处理后, 由两名医生分别在 T1WI 增强图像上对斑块的强化程度进行评估。根据斑块强化程度与正常动脉壁及垂体漏斗部的关系分为三级: 0 级, 增强小于或等于其他地方正常动脉壁; 1 级, 比 0 级明显, 但小于垂体漏斗部; 2 级, 增强程度大于或等于垂体漏斗部, 然后记录数据, 应用 SPSS 统计软件对所得数据进行分析。

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结论 HR-MRI 血管壁成像可以很好地显示颅内动脉的血管壁结构,提供更多的关于动脉粥样硬化斑块的信息,具有很大的临床应用潜力和前景。

PU-1701

高分辨率磁共振成像在正中神经病变中的应用价值初探

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【摘要】

目的: 探讨高分辨率 MRI 对正中神经病变的诊断价值。

资料与方法: 收集本院 2021 年 1 月—2023 年 6 月期间共 45 例经手术证实有明确正中神经病变患者的高分辨率 MRI 图像进行回顾性分析,将其 3D STIR、PROSET 序列图像进行 MPR 及 MIP 重建,以观察正中神经的横截面面积。并与 50 例正常对照组进行对比分析。两位主治医师同时测量在肘窝平面及腕管平面正中神经的横截面面积,取两者的平均值做对比分析。

结果: 3D STIR 和 PROSET 序列 MPR 及 MIP 的图像能清晰显示正中神经的形态及边界。病变组: 肘窝平面正中神经平均横截面积约 $7.58 \pm 1.62 \text{mm}^2$, 腕管水平正中神经横截面积约 $8.96 \pm 2.02 \text{mm}^2$; 对照组: 肘窝平面正中神经平均横截面积约 $6.47 \pm 0.95 \text{mm}^2$; 腕管平面, 正中神经横截面积约 $7.23 \pm 1.26 \text{mm}^2$ 。病变组与对照组相应的神经横截面积的差异有统计学意义,症状组的神经横截面积大于对照组。

结论: 高分辨率 MRI 的 3D STIR 和 PROSET 序列能清晰显示肘窝水平及腕管水平正中神经,通过测量其横截面积和对 T2WI 上的神经信号强度判断,能有效地诊断正中神经损伤。

PU-1702

标准轴位联合薄层冠状位弥散加权成像在 脑干急性梗死的诊断价值

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丽水市中心医院

目的 评估标准轴位联合薄层冠状位弥散加权成像 (DWI) 在脑干急性梗死的诊断价值。

方法 分析 109 例急性脑干梗死患者 MRI 影像,重点比较标准轴位 (5mm) 及薄层冠状位 (3mm) DWI 图像。

结果 标准轴位联合薄层冠状位 DWI 结果显示 109 例患者病变位于脑桥 94 例 (94/109, 86.2%), 延髓 10 例 (10/109; 9.2%), 中脑 5 例 (5/109; 4.6%)。96 例患者病变主要位于脑干旁正中区 (96/109, 88.1%), 其中 94 例仅一侧受累 (94/96, 97.9%); 11 例病变位于脑干外侧部 (11/88, 10.1%)。病变形态多为椭圆形或半圆形 (92/109, 84.4%), 且长轴与前后径平行者 88 例 (88/109, 80.7%); 圆形及类圆形 15 例 (15/109, 13.7%); 不规则地图状 2 例 (2/109, 1.8%)。共有 3 例脑桥病变、1 例延髓病变仅于薄层冠状位 DWI 图像显示 (4/109, 3.7%), 病灶长轴均 $< 10 \text{mm}$ (25 例病变长轴 $< 10 \text{mm}$, 4/25, 16.0%)。

结论 标准轴位联合薄层冠状位 DWI 可提高急性脑干梗死,尤其是长轴 $< 10 \text{mm}$ 病变的检出率。

PU-1703

Abnormal voxel-wise concordance among multiple brain activity indices and Cognitive Impairments in Young hypertensive Intracerebral Hemorrhage Patients.

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Objective: We aimed to explore the changes of concordance among multiple rs-fMRI indices in young hypertensive intracerebral hemorrhage (ICH) patients and discern potential associations between the altered concordance and cognitive performance.

Methods: A total of 33 young ICH patients (age ranged from 30 to 60) and 33 well-matched healthy controls (HCs) underwent neuropsychological assessment and MRI examination. Multiple dynamic rs-fMRI indices including the fractional amplitude of low frequency fluctuations, regional homogeneity, voxel-mirrored homotopic connectivity, degree centrality, and global signal connectivity were computed using the sliding window method. Kendall's W was used to calculate volume-wise and voxel-wise concordance among these metrics. Correlation analyses between abnormal concordance and cognitive scores were conducted in ICH patients and HCs respectively.

Results: No significant difference was found in the volume-wise concordance between the ICH patients and HCs. ICH patients showed decreased voxel-wise concordance in the contra-lesional putamen and hippocampus Cerebelum_8/7b/Crus1/6, contra-lesional putamen and hippocampus putamen and hippocampus, and ipsilateral thalamus compared to HCs. For ICH patients, no significant correlation was observed between abnormal concordance and cognitive scale scores. For HCs, long-term delayed cued recall score was positively correlated with volume-wise concordance of contra-lesional putamen and hippocampus.

Conclusions: Young hypertensive ICH patients had abnormal temporal decoupling of local brain activity indices in multiple brain regions, and the decreased volume-wise concordance in contra-lesional putamen and hippocampus may be a vital pathological mechanism of memory impairment after ICH.

PU-1704

基于深度学习的急性脑梗死患者 MR 脑白质变性自动评估

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目的: 脑白质高信号(white matter hyperintensity, WMH)与急性缺血性脑梗死预后不良有关, 基于改良 Fazekas 标准的 MR 脑白质评分能够半定量评估 WMH 的严重程度。本研究开发了两种基于深度学习的 WMH 自动评分算法, 并与人工评价结果对比验证其评分的确性。

方法: 回顾性收集于 2017 年至 2020 年间东南大学附属中大医院行头颅 MR 检查的急性脑梗死患者, 纳入急性脑梗死发病 72 小时内行 MR 检查且存在急性缺血性脑梗死灶; 排除合并其他颅内病变(如肿瘤、脑出血)或存在穿通畸形的软化灶。根据得到的图像, 在 FLAIR 序列对 WMH 先进行人工评分(0-3 分), 然后比较基于 Statistical Parametric Mapping (SPM) 工具箱的 Lesion Segmentation Tool (LST) 分割的 WMH 体积和基于深度学习 Densenet 网络的分类模型, 对卒中患者 MR 影像进行自动分类。为防止过拟合, 我们将被试数据随机分为训练集, 验证集和测试集, 分别构建 ROC 曲线, 计算曲线下面积(AUC)。

结果: 本研究共纳入 468 例患者, 男女比例为 1.93。平均年龄为 69.3±12.3。训练集共 200 例, 验证集 100 例, 测试集 168 例。经过人工评分, 改良 Fazekas 法 1-3 分分别为 157 人、211 人、101

人,以 0-1 和 2-3 作为二分类标准。LST 算法自动分割 WMH 体积平均值为:1 分: 2.17 ± 5.12 ; 2 分: 3.71 ± 5.38 ; 3 分: 12.89 ± 14.09 。基于深度学习 Densenet 算法对 WMH 评分验证集 ROC 曲线下面积为 0.91,测试集 0.93;基于 LST 算法对 WMH 评分验证集 ROC 曲线下面积为 0.80,测试集 0.74(P 值均 <0.001)。两种算法间有显著差异(P <0.05)。

结论:基于深度学习的模型对 WMH 的自动评估性能优于传统的 LST 分割模型,均能准确区别 WHM 和脑梗死病灶,可用于辅助急性脑梗死患者 WMH 病变的全自动 Fazekas 评分。

PU-1705

7.0T 磁共振诊断脑发育性静脉异常一例——病例报道

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发育性静脉异常(developmental venous anomaly,DVA)是一种血管发育异常的先天性疾病,是最常见的脑血管畸形。7.0T 磁共振成像可以提供较常规 MRI 更优质的神经影像,尤其在微小及早期病变方面有显著优势。DVA 诊断主要依据影像学检查,我们报道了一例经 3.0 T 和 7.0 T MRI 扫描发现的小脑发育性静脉异常的患者,7.0T 较 3.0T 对 DVA 的病灶范围及病灶内部细微结构显示能力更好,显示异常的血管数目及范围较 3.0T 增多、增大。

PU-1706

3D-ASL 评估慢性期脑梗死脑血流量及与认知功能的相关性

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【摘要】本文研究了 3D 动脉自旋标记灌注成像(3D-ASL)评估慢性期脑梗死脑血流量(CBF)及与认知功能的相关性。选取慢性期脑梗死患者 64 例作为慢性期组,同时选取急性期脑梗死患者 60 例作为急性期组,亚急性期脑梗死患者 50 例作为亚急性期组,比较三组患侧及健侧 CBF、相对脑血流量(rCBF)差异。慢性期组患侧 CBF、rCBF 明显低于亚急性期组和急性期组(P <0.05)。慢性期组患者 MMSE 评分、MoCA 评分和 Fugl-Meyer 评分明显低于亚急性期组和急性期组(P <0.05)。患侧 CBF、rCBF 与 MMSE 评分、MoCA 评分呈正相关(P <0.05)。经 Logistic 回归分析显示:年龄和糖尿病、患侧 CBF、rCBF 是慢性期脑梗死患者发生认知功能障碍的影响因素(P <0.05)。3D-ASL 评估慢性期脑梗死患者的 CBF 与患者认知功能呈正相关,值得进一步研究。

PU-1707

磁共振 3D-ASL 技术对短暂性脑缺血发作的诊断价值

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目的:探究磁共振三维动脉自旋标记(3D-ASL)技术对短暂性脑缺血发作(TIA)的临床诊断价值。方法:选取 98 例 TIA 患者作为研究对象,TIA 患者均采用 3D-ASL 和磁共振血管成像(MRA)检查。MRA 检查采用三维时间飞跃法(3D-TOF),并以数字减影血管造影术(DSA)诊断结果作为金标准,分析 3D-TOF MRA、3D-ASL 诊断敏感度、特异度和准确度,以及与 DSA 诊断结果的一致性。结果:3D-TOF MRA 诊断 TIA 结果与 DSA 诊断结果的一致性较为理想(Kappa = 0.458,P <0.05);3D-ASL 诊断 TIA 结果与 DSA 诊断结果的一致性较为理想(Kappa = 0.692,P <0.05);3D-ASL 诊断 TIA

的敏感度、准确度高于 3D-TOF MRA($P<0.05$)。结论:磁共振 3D-ASL 技术诊断 TIA 敏感度及准确度较高,有利于早期发现 TIA 患者,并及时进行诊治,以改善患者预后。

PU-1708

Impairments in white matter microstructure in fronto-striatal in first-episode Major Depressive Disorder: A diffusion tensor imaging study

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Background: Major depressive disorder (MDD) is characterized by impairments in the fronto-striatal network. Underlying these impairments may be disruptions in anatomical pathways connecting frontal and striatal regions. However, the specifics of these disruptions remain unclear. **Methods:** We recruited 60 first-episode, treatment-naive young adults with MDD and 54 healthy controls who underwent diffusion tensor imaging scanning at 3 T (Tesla). Mean fractional anisotropy (FA), axial diffusivity (AD), radial diffusivity (RD), mean diffusivity (MD) and FDT was calculated for tracts connecting the striatum with frontal cortex regions including prefrontal cortex (PFC), orbital frontal cortex (OFC) and anterior cingulate cortex (ACC). **Results:** Compared with control subjects, patients with MDD showed reduced FA in the tract connecting the striatum and right DLPFC ($p = 0.04$) and VLPFC ($p = 0.04$). We observed increased MD in patients in the tract connecting the striatum and left DMPFC ($p = 0.03$) and VLPFC ($p = 0.04$). We found no differences between patients and controls in AD, RD and FDT. **Conclusions:** We observed reduced FA in the tract connecting the striatum and right DLPFC and VLPFC and increased MD in the tract connecting the striatum and left DMPFC and VLPFC. These results indicate a possible reduction of white matter integrity, commonly associated with MDD.

PU-1709

cta 联合 ctp 在急性脑梗死诊治中的应用

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目的: 分析临床诊治急性脑梗死患者期间予以 CT 灌注成像 (ctp)、CT 血管造影 (cta) 联合检测应用效果探究。**方法:** 本次临床研究期间纳入我院诊治患者 72 例, 作为分析对象, 研究起始时间为 2021 年 6 月开始, 收集相关临床分析案例, 拟定研究计划, 直至 2022 年 6 月截止, 将研究选取案例分别进行 ctp、cta 等检测, 并分析出不同检测模式下临床应用价值情况。**结果:** 据统计, 通过 ctp 诊断后得出患者脑梗死区域 PE、CBV 指标, 显著低于脑部对侧区域; 而脑梗死区域 MTT、TTP 等指标则明显长于脑部对侧区域, 差异性存在统计学意义, ($P<0.05$)。通过 cta 检测得出, 72 例患者中存在闭塞情况为 (14) 例。狭窄情况为: 严重狭窄 (17) 例、中度狭窄 (22) 例、轻度狭窄 (19) 例。临床使用 CT 平扫后得出 72 例患者中, 存在缺血性病变位置例数为 (26) 例, 余下 (46) 例未见明显异常现象。**结论:** 临床检测急性脑梗死患者期间予以 ctp、cta 等检测, 能有效提高临床检测效果, 同时对其脑部血管狭窄程度、血流变化情况、梗死区域情况清晰进行诊断, 能够作为临床诊断依据, 以此制定后续治疗计划, 临床应用价值极为明显, 值得临床广泛推荐使用。

PU-1710

The axis between lung cancer and cerebral connectivity: a bilateral Mendelian randomization analysis

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Introduction: Lung cancer is known to interact with paraneoplastic neurological syndrome (PNS) like cognitive impairment and emotional disorders, inducing alterations of both functional connectivity (FC) and structural connectivity (SC) in resting-state networks (RSNs). However, it is still unknown whether there are causal links between different subtypes of lung cancer and RSN-FC/SC.

Methods: In this investigation, we included genome-wide association study (GWAS) data of lung cancer from 29,266 cases and 56,450 controls as well as 8 RSNs derived from GAWAS analysis (N = 24,336). In order to identify their causal relationships, we carried out a bilateral two-sample mendelian randomization (MR) study.

Results: Our results showed 12 causal relationships between lung cancer and FC/SC. Reverse MR analysis revealed that ventral attention network (VAN)-FC and dorsal attention network (DAN)-SC were correlated with lung cancer in never smokers and squamous cell lung carcinoma, respectively.

Conclusions: It established genetic support that lung cancer could have a causal impact on RSNs, as well as the causal association between certain types of lung cancer and RSNs.

PU-1711

椎管内肿瘤继发视乳头水肿一例

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目的

总结椎管内肿瘤继发视乳头水肿的病理生理机制、临床特征、影像表现、治疗方法及预后。

材料与方法

回顾性分析于深圳市儿童医院神经外科 2022 年 11 月 9 日就诊的 1 例椎管内粘液乳头型室管膜瘤继发视乳头水肿患儿临床资料。以“椎管内肿瘤”、“颅内高压”、“视乳头水肿”或“*Intracranial hypertension*”、“*Papilledema*”、“*Hydrocephalus*”为关键词，于 CNKI、万方数据库、PubMed 等网站检索近 20 年的相关文献进行总结归纳。

结果

患儿男，12 岁，头晕、颈背痛、黑朦就诊，头颈磁共振未见明显异常。激素、利尿治疗后症状好转。3 天后症状加重，出现头痛、视物模糊。眼底检查：双侧视盘边界不清、视乳头水肿，血管迂曲扩张，有散在出血点。查体：双侧瞳孔不等大，对光反射消失，腹壁反射消失，病理反射以及脑膜刺激征阳性。脑脊液检查示：总蛋白 1571mg/L。磁共振示：腰椎椎管内（约平 L3-L4 椎体）一椭圆形肿物，信号均匀，边界尚清，边缘见含铁血黄素信号，明显不均匀强化，与马尾神经关系不清；余未见异常。椎管内占位切除术中触及硬脊膜张力高，切开后可见肿物与马尾粘连、压迫脊神经。病理示肿瘤细胞于血管周围形成假菊形团样结构，部分区域形成乳头状结构，局灶可见室管膜裂隙样结构，诊断粘液乳头状室管膜瘤（CNS WHO 2 级）。术后患者头痛、头晕消失，视物模糊

减轻。检索文献显示符合条件的中文文献 6 篇, 英文文献 63 篇。对文献所报道的临床特征、可能的病理生理机制及治疗进行总结、归纳。

结论

本病例为国内少有报道的椎管内粘液乳头型室管膜瘤继发视乳头水肿的案例。据文献报道, 多种椎管内肿瘤均可诱发这一表现, 以室管膜瘤最常见; 发生率极低。此类患者早期缺乏可提示脊髓、神经根病变的定位症状, 而主要出现头晕、视物模糊等颅内高压表现, 极易漏诊、误诊原发病灶。早期未能明确诊断, 导致治疗不到位、症状反复, 影响患者预后。可能的机制包括脑脊液蛋白含量增高、流体动力学改变、蛛网膜下腔出血或炎症、肿瘤分泌化学物质等, 具体机制存在争议。治疗多针对原发病灶行肿瘤切除术, 绝大多数患儿术后症状快速缓解, 预后良好。

PU-1712

后颅窝-椎管内不典型支气管源性囊肿一例

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支气管源性囊肿 (bronchogenic cyst, BC) 是一种罕见的良性先天性呼吸系统发育异常引起的囊性病变, 最常发生于肺内及纵隔[1,2,3]。异位支气管源性囊肿 (ectopic bronchogenic cyst, EBC) 较为罕见, 成人、儿童均可发病, 并且可以发生于人体大部分组织中, 如腹膜后、颅内、椎管内、颈部等部位[1]。本文通过回顾性分析一例经手术病理证实的后颅窝-椎管内不典型 BC 的 CT 和 MRI 表现, 以提高对本病的认识。

PU-1713

HRCT、MRI 及曲面重建在面神经鞘瘤中的应用

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[摘要] 目的 分析面神经鞘瘤 HRCT 及 MRI 表现, 并结合曲面重建图像, 探讨其在面神经鞘瘤中的应用。方法 18 例面神经鞘瘤患者中, 有 17 例行 MR 平扫及增强扫描, 其中 15 例同时行 HRCT 扫描, 另有 1 例仅进行 HRCT 扫描, 并通过 CPR 后处理, 获得重建图像。结果 18 例面神经鞘瘤患者中 10 例位于左侧, 8 例位于右侧。病变累及鼓室段 14 例, 乳突段 14 例, 迷路段 10 例, 膝状神经节 9 例, 内听道段 6 例, 颅外腮腺段 5 例, 脑池段 1 例。其中 16 例呈多节段面神经受累, 2 例局限于单段面神经内。CT 主要表现为位于面神经走行区的大小不等的软组织肿块影, 13 例可见病灶周围不同程度的膨胀性骨质破坏、吸收; 内听道轻度扩大 1 例。面神经管 CPR 示有 15 例均可见受累面神经管不均匀的增宽、扩大, 13 例伴周围骨壁的破坏、受压变薄及管壁不连续。MRI 及 CPR 图像表现为类圆形或不规则形软组织肿块影, 呈等或稍长 T1WI、等、稍长或长 T2WI 信号影, 信号多不均匀, 增强后呈明显不均匀或均匀强化, 部分病灶内可见囊变坏死区。结论 CT 对面神经鞘瘤周围骨质结构改变显示良好, MRI 可以直接显示肿瘤发生部位、形态、大小及病灶内部结构特点, 结合 CPR 曲面图像, 更能在一幅图像上直观、全面地了解病变整体情况, 对于术前准确诊断面神经鞘瘤具有重要意义。

PU-1714

脑室内血管瘤型脑膜瘤一例

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摘要: 脑室内脑膜瘤大部分是良性肿瘤, 常见类型是纤维型肿瘤。而本例病例术后病理诊断为血管瘤型脑膜瘤, 为脑室内脑膜瘤的少见类型, 呈不规则形, 增强扫描未见明显强化, 影像学表现不典型, 现报道本病例, 旨在提高影像医师及临床医师对本病的理解。

PU-1715

定量磁敏感成像联合磁共振波谱成像在胶质瘤分级中的应用价值

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目的 探讨定量磁敏感成像 (Quantitative Susceptibility Mapping, QSM)联合磁共振氢质子波谱成像(Magnetic Resonance Spectroscopy, MRS)在脑胶质瘤患者术前分级诊断中的应用价值。材料与方法 前瞻性纳入 2020 年 01 月至 2023 年 07 月在新疆医科大学第一附属医院行肿瘤切除术并具有完整病理结果及免疫组化的胶质瘤患者 32 例, 所有患者术前均在 3.0 T 共振扫描仪接受常规脑 MRI 扫描和增强扫描以及 QSM、MRS 序列扫描, 根据术后病理结果恶性程度分为高级别组和低级别组。选取胶质瘤病灶中的实性部分划取感兴趣区 (ROI), ROI 尽量较大, 避开液化坏死区, 测量其定量磁敏感值并分析 MRS 序列中各代谢物的峰值与胶质瘤分级的相关性。采用独立样本 t 检验或 Mann-Whitney U 检验对比各参数的差异, 采用受试者工作特征 (Receiver Operating Characteristic, ROC) 曲线评估各参数独立及其联合诊断术前分级的效能。结果 MRS 中 Cho/NAA 比值及定量磁敏感值与胶质瘤分级具有相关性。低级别胶质瘤组 QSM 值低于高级别组 QSM 值, 差异有统计学意义 ($P < 0.05$); MRS 中 Cho/NAA 比值低级别组低于高级别组 Cho/NAA 比值, 差异有统计学意义 ($P < 0.05$) 多因素; ROC 曲线分析结果显示, QSM 值及 Cho/NAA 比值独立诊断胶质瘤术前分级的 AUC 值分别为 0.705、0.721, 上述参数联合模型预测胶质瘤术前分级的 AUC 为 0.790。结论 QSM 及 MRS 在脑胶质瘤术前分级中具有一定的应用价值, 当 QSM 值联合 MRS 的 Cho/NAA 值时诊断效能更高。

PU-1716

Aberrant intrinsic functional brain networks in patients with functional constipation

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Purpose Patients with functional constipation (FCon) often suffer from mental and psychological problems. To explore the possible neurological interaction, we used resting-state functional magnetic imaging (RS-fMRI) to compare the alterations in intrinsic brain functional networks at multiple levels between patients with FCon and healthy controls (HC).

Methods Twenty-eight patients with FCon, and twenty-nine HC were recruited for a series of examinations and RS-fMRI. Both graph theory analysis and functional connectivity (FC) analysis were used to investigate brain functional alterations between the two groups. Correlation

analyses were performed among neuropsychological scores, clinical indexes, and neuroimaging data.

Results Compared with the HC, the assortativity showed significantly increased in global level in patients with FCon. In regional level, we found obviously increased nodal degree and nodal efficiency in somatosensory network (SMN), decreased nodal degree and increased nodal efficiency in default mode network (DMN) in the FCon group. Furthermore, FC analysis demonstrated several functional alterations within and between the networks, particularly including the SMN and visual network (VN) in sub-network and large-scale network analysis. Moreover, correlation analysis indicated that nodal metrics and aberrant FC among functional brain networks were associated with emotion and scores of constipation in patients with FCon.

Conclusion All these findings reflect the differences in intrinsic brain functional networks between FCon and HC. Our study highlighted SMN, DMN and VN as critical network and may be involved in the neurophysiology of FCon, which may contribute to improve personalized treatment in patients with FCon.

PU-1717

Morphological abnormalities of intracranial structures associated with chronification from herpes zoster to postherpetic neuralgia

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Objective: This study aims to explore morphological alterations of intracranial structures in postherpetic neuralgia (PHN) and herpes zoster (HZ) patients.

Methods: We investigated volume/volume proportion alterations in the 115 intracranial structures derived from structural T1-weighted magnetic resonance imaging of 24 HZ patients, 27 PHN patients and 32 healthy controls (HCs) by using an automatic image segmentation portal. Correlation analysis and receiver operating characteristic curves were adopted to confirm the significance of volume/volume proportion changes in significant intracranial structures.

Results: Compared with HCs, the HZ group showed decreased volume/volume proportions in the bilateral Heschl's gyrus (HG); the PHN group showed increased volume/volume proportions in the left superior parietal lobule (SPL), CP, and cerebral ventricles and decreased volume/volume proportions in the left lateral orbitofrontal lobe (LOFC) and bilateral HG. Compared with the HZ group, the PHN group exhibited increased volume/volume proportions in the CP, cerebral ventricles, and CSF and decreased volume/volume proportions in the left LOFC and total WM (TWM). The volume proportion of right WM was negatively correlated with disease duration. Morphological abnormalities showed good performance in distinguishing PHN from the HC (area under the receiver operating characteristic curve [AUC]: 0.900) and HZ (AUC: 0.912) groups.

Conclusion: Morphological abnormalities of intracranial structures in HZ and PHN are not limited to the brain parenchyma but also involve the CP, cerebral ventricles, and CSF. These abnormalities perform well in identifying patients with HZ/PHN. These findings may provide new insights into the pathophysiological mechanisms underlying chronification from HZ to PHN.

PU-1718

轻度认知障碍及阿尔茨海默病患者嗅觉皮层结构和功能 MRI 的定量分析

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目的 采用脑结构和功能磁共振成像，探索嗅觉皮层在阿尔茨海默病进程中的价值。

方法 收集阿尔茨海默病 (AD) 患者 39 名，遗忘型轻度认知障碍 (aMCI) 患者 36 名和正常对照组 (NC) 30 名，对所有受试者进行多模态脑部 MRI 扫描、宾夕法尼亚嗅觉识别测试 (UPSIT) 及多维度神经心理学量表测定。将嗅觉皮层主要结构定义为感兴趣区 (ROI)，包括双侧初级嗅觉皮层 (POC)、海马、旁海马、杏仁核、岛叶和眶额皮层。MRI 特征包括 ROI 的灰质体积 (GMV)、低频振荡幅度 (ALFF)、区域同质性 (ReHo) 及嗅觉激活体素值，分析三组间 MRI 特征与临床特征之间的差异，并运用逻辑回归方法探究 NC、MCI 和 AD 之间的差异。

结果 AD 和 MCI 组嗅觉皮层 GMV 减少、ALFF 增加、ReHo 增加、嗅觉激活体素值减少，以 AD 组为著。我们的研究表明，将 MRI 和临床特征融合，采用 MMSE、左侧 POC GMV、左侧岛叶 ReHo、右侧 POC 和岛叶激活体素值以及右侧杏仁核 ALFF 区分 NC 和 MCI 的准确度高达 90.48%、采用 MoCA、左侧海马 GMV 以及左侧岛叶 ReHo 区分 MCI 和 AD 的准确度高达 96.10%、采用 MoCA、左侧海马 GMV 区分 AD 和 NC 的准确度高达 98.57%。

结论 随着 AD 疾病严重程度的增加，嗅觉皮层的结构和功能改变愈加明显。采用多模态脑 MRI 与临床特征相结合的方式，可以更好的分类诊断 AD 源性认知障碍疾病患者。

PU-1719

未破裂与破裂前交通动脉瘤血流动力学参数比较

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•**目的**：运用 3.0 T 三维时间飞跃法磁共振血管成像 (3D-TOF-MRA) 获取患者颅内动脉及前交通动脉瘤数据，建立患者特征性单侧供血前交通动脉瘤三维血流动力学刚性壁模型，应用计算流体力学的方法分析前交通动脉瘤模型的血流动力学特征参数，研究与破裂动脉瘤相关的血流动力学因素。

•**材料和方法**：3D-TOF-MRA 诊断的 14 例前交通动脉瘤伴单侧大脑前动脉 A1 段发育不良的病例，其中 7 例未破裂动脉瘤，7 例为破裂动脉瘤，计算动脉瘤区域及动脉瘤顶部的 WSS 等血流动力学参数并进行比较。

•**结果**：在心脏收缩末期，破裂组动脉瘤顶部 WSS 平均值比未破裂组动脉瘤顶部 WSS 平均值要低 (ie, 0.68 ± 0.32 Pa versus 3.82 ± 2.94 Pa, $P=0.003$)，但破裂组与未破裂组间整个动脉瘤表面区域的 WSS 平均值间的差异未见明显统计学意义 (ie, 7.24 ± 3.90 Pa versus 10.87 ± 4.39 Pa, $P=0.085$)。破裂组动脉瘤表面的平均低 WSS 区域比例为 $23.07 \pm 17.75\%$ ，未破裂组的平均低 WSS 区域比例为 $5.86 \pm 5.80\%$ ，两组间的差异有统计学意义 ($P=0.013$)。

•**结论**：患者特征性单侧供血前交通动脉瘤血流动力学刚性壁模型，可以获得前交通动脉瘤的血流动力学特征参数，针对伴有单侧大脑前动脉 A1 发育不良的前交通动脉瘤时是良好模型，为预测动脉瘤破裂风险提供一定参考价值。破裂前交通动脉瘤顶端的 WSS 值较低，且破裂前交通动脉瘤的低 WSS 区域面积更大。

PU-1720

基于三维脑结构 MRI 定量分析发病年龄对视神经脊髓炎谱系疾病患者脑结构的影响

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【摘要】 目的 探索不同发病年龄的视神经脊髓炎谱系疾病 (NMOSD) 患者的脑结构差异, 及其与临床神经心理学量表评分的相关性。方法 前瞻性随访了 47 名处于缓解期的 NMOSD 患者及 50 名性别、年龄匹配的健康志愿者, 按发病年龄将患者分成早发性 NMOSD (EO-NMOSD) 和迟发性 NMOSD (LO-NMOSD) 两个亚组。采集受试者头部核磁 3D T1WI 及 3D FLAIR 影像数据以及临床资料。采用基于体素的形态学 (VBM) 方法对患者及健康对照组数据进行分析, 比较组间脑灰质体积的差异, 并通过多元回归分析异常的脑区与患者的病程、年复发率、脑白质高信号体积 (WMHV)、扩展残疾状态量表 (EDSS) 评分及神经心理学量表评分的相关性。结果 与对照组比较, VBM 结果显示 NMOSD 患者存双侧额颞叶及右侧小脑多处脑区灰质体积缩小 ($T=3.18$, FDR 多重比较校正后, $P<0.05$); 左侧额叶直回灰质体积与患者 EDSS 评分呈负相关 ($T=3.30$, FDR 多重比较校正后, $P<0.05$)。NMOSD 组脑白质高信号分数 (WMHF) 与脑灰质分数 (GMF) 及脑白质分数 (WMF) 呈负相关 (r 值分别为 -0.376 、 -0.550 , $P<0.05$); WMHF 与年复发率 (ARR) 及 EDSS 呈正相关 (r 值分别为 0.354 、 0.350 , $P<0.05$)。EO-NMOSD 组存在双侧额颞叶多处脑区灰质体积缩小 ($T=3.26$, FDR 多重比较校正后, $P<0.05$); LO-NMOSD 组右侧尾状核灰质体积缩小 ($T=3.33$, FDR 多重比较校正后, $P<0.05$)。EO-NMOSD 组 WMHF 与 GMF 及 WMF 呈负相关 (r 值分别为 -0.695 、 -0.761 , $P<0.001$); LO-NMOSD 组 GMV 与 EDSS 呈负相关 ($r=-0.526$, $P=0.025$), WMHF 与 ARR 呈正相关 ($r=0.558$, $P=0.016$)。结论 NMOSD 患者存在多处灰质萎缩脑区。LO-NMOSD 患者灰质萎缩的范围及部位与 EO-NMOSD 患者明显不同, 提示迟发性 NMOSD 患者可能具有不同的脑损伤模式。

PU-1721

T2DM 及 T2DM 肠道菌群失调大鼠 MRI 全脑纹理特征对照研究

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目的: 本研究通过分析 T2DM 大鼠全脑 MRI 纹理改变, 及其与肠道微生物菌群改变的关联性, 寻找肠-脑轴关联指标, 探讨 T2DM 大鼠脑组织改变与肠道代谢物指标之间的相关性, 探索 T2DM 脑组织改变可能的肠道代谢物标志物。

材料和方法: 应用高脂饮食联合链脲佐菌素诱导方法建立 T2DM 大鼠模型 (18 只)、并应用小剂量头孢曲松钠 1ml/100g 连续灌胃方式建立 T2DM-ID (17 只) 模型。采用 16S rRNA 扩增子 (V3-V4) 基因测序检测 T2DM、T2DM-ID 大鼠与正常大鼠 (10 只) 肠道菌群的 α 、 β 多样性情况变化。采用西门子 3.0T MRI 超导磁共振扫描仪、8 通道大鼠专用头线圈采集 T2DM、T2DM-ID 及正常大鼠的头颅磁共振图像 (T2WI), 并应用 MaZda 软件分析大鼠头颅 MRI 纹理特征改变情况, 并分析其纹理特征改变与肠道菌群多样性指标相关性。

结果: T2DM 大鼠肠道菌群结构紊乱, 表现为拟杆菌属的降低及厚壁菌属的升高 ($P<0.05$), 肠道菌群 α 多样性降低, β 多样性丰富度增加 ($P<0.05$)。MRI 脑纹理分析显示 T2DM 大鼠 $Z_Fraction$ 、 $GrKurtosis$ 、 $Volume$ 纹理特征参数较正常大鼠降低 ($P<0.05$)。GrKurtosis 和 Volume 具有较高的 T2DM 大鼠脑组织改变诊断价值, AUC 分别为 0.900, 0.889。MRI 纹理特征参数与肠道菌群 α 多样性、 β 多样性均具有相关性, 其中肠道菌群 α 多样性丰富度指标 Shannon、肠道菌群 β 多样性指标 MDS2 与大鼠脑 MRI 纹理指标相关性有统计学意义 ($P<0.05$)。

结论: T2DM 大鼠肠道菌群 α 多样性降低, β 多样性丰富度增加可能是 T2DM 重要发生发展机制。MRI 纹理特征参数 Z_LngREmph、Z_Fraction、GrKurtosis、Volume 可以提示 T2DM 大鼠脑组织细微改变的重要指标, 其中 GrKurtosis 和 Volume 具有较高的 T2DM 脑组织细微改变诊断价值。肠道菌群多样性指标 Shannon、MDS2 与大鼠脑纹理指标相关性, 推测其可做为预测 T2DM 大鼠脑组织改变重要的预测指标。

PU-1722

忧遁草提取物对人脑星形胶质母细胞瘤细胞抑制作用的初步研究

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目的 探讨忧遁草鲜叶与干叶乙醇粗提物浸膏对人脑星形胶质母细胞瘤细胞 (U-87MG) 增殖的抑制作用。方法 采用乙醇回流提取、减压浓缩制备忧遁草浸膏, 以不同浓度的忧遁草鲜叶、干叶浸膏溶液与阳性对照药物替莫唑胺处理 U-87 MG, CCK-8 法检测浸膏对 U-87 MG 增殖的抑制作用, 倒置显微镜下观察不同浓度浸膏处理胶质瘤细胞不同时间后, 胶质瘤细胞凋亡的形态变化。结果 1) 忧遁草浸膏作用于细胞 24 h 时, 干叶浸膏溶液浓度为 8 mg/mL 时对 U-87 MG 的抑制率即可达到百分之九十以上, 鲜叶浸膏溶液浓度为 10 mg/mL 时才对 U-87 MG 有很好的抑制作用; 2) 鲜叶浸膏溶液浓度为 14 mg/mL, 干叶浸膏溶液浓度为 12 mg/mL 时, 作用 6 h 内即可达到很好的抑制效果。3) 与替莫唑胺相比, 鲜叶与干叶乙醇粗提物浸膏对 U-87MG 开始起抑制作用所需浓度更高, 但抑制率达到 95% 以上所需浓度更低。结论 忧遁草鲜叶与干叶乙醇粗提物浸膏对人脑星形胶质母细胞瘤 U-87 MG 有良好的抑制作用, 且随着浓度增加抑制率增大, 干叶浸膏对 U-87MG 的抑制效果要优于鲜叶浸膏。

PU-1723

Association of MRI-derived lymphatic system impairment with abnormal cerebral blood flow in methamphetamine-dependent patients: a diffusion tensor image analysis along the perivascular space (DTI-ALPS) study

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Objective: Diffusion tensor imaging analysis along the perivascular space (ALPS) -index is currently widely used to assess the glymphatic system in a variety of neuropsychiatric disorders. However, few studies have evaluated the function of the glymphatic system in patients with methamphetamine (MA) dependence. Therefore, exploring the ALPS index and its associations with cerebral blood flow may provide new insights for MA-dependent patients.

Methods: Diffusion tensor images were acquired to calculate diffusivities in the x, y, and z axes of the plane of the lateral ventricle body in 46 MA-dependent patients and 46 control subjects. We evaluated the diffusivity along the perivascular spaces as well as projection fibers and association fibers separately to acquire an index for diffusivity along the perivascular space (ALPS-index). An asymmetry index (AI) was calculated by $AI = (Right - Left) / [(Right + Left) / 2]$ to represent the asymmetric pattern. Correlations among ALPS index, age, clinical parameters, and cerebral blood flow (CBF) were computed using partial correlation analysis. Age, education, and cigarette smoking were used as covariate inputs to correct for their possible effects. In addition, the study

used a support vector machine (SVM) learning approach to construct a classifier for discriminating subjects with MA dependence from control subjects.

Results: Relative to the control group, the MA-dependent group exhibited abnormal lymphatic system, as evidenced by increased diffusivities along the right Y-axis projection fibers and the right Z-axis association fibers, and decreased the ALPS index, the right ALPS index and the AI of the diffusivity along the Z-axis association fibers. We found the ALPS index had a significant positive correlation with the CBF in the right anterior central sulcus, right anterior transverse temporal gyrus, and left cingulate cortex in patients with MA dependence. An SVM trained with lymphatic system related-indexes achieved a classification accuracy of 77.78% for patients with MA dependence.

Conclusion: MA-dependent patients have impaired lymphatic system function and are significantly associated with CBF in some brain regions. Furthermore, the abnormal lymphatic system index may provide promising features for the construction of high-efficacy classification models.

PU-1724

Neuroimaging anomalies in asymptomatic middle cerebral artery steno-occlusive disease with normal-appearing white matter

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Background: Asymptomatic chronic cerebrovascular steno-occlusive disease is common, but the cognitive function and alterations in the brain's structural and functional profiles have not been well studied. This study aimed to reveal whether and how patients with asymptomatic middle cerebral artery (MCA) steno-occlusive disease and normal-appearing white matter differ in brain structural and functional profiles from normal controls and their correlations with cognitive function.

Methods: In all, 26 patients with asymptomatic MCA steno-occlusive disease and 22 healthy controls were compared for neurobehavioral assessments, brain volume, cortical thickness, fiber connectivity density (FiCD) value, and resting-state functional connectivity (FC) using multimodal MRI. We also investigated the associations between abnormal cortical thicknesses, FiCD values, and functional connectivities with the neurobehavioral assessments.

Results: Patients performed worse on memory tasks (Auditory Verbal Learning Test-Huashan version) compared with healthy controls. Patients were divided into two groups: the right group (patients with right MCA steno-occlusive disease) and the left group (patients with left MCA steno-occlusive disease). The left group showed significant cortical thinning in the left superior parietal lobule, while the right group showed significant cortical thinning in the right superior parietal lobule and caudal portion of the right middle frontal gyrus. Increased FiCD values in the superior frontal region of the left hemisphere were observed in the left group. In addition, a set of interhemispheric and intrahemispheric FC

showed a significant decrease or increase in both the left and right groups. Many functional connectivity profiles were positively correlated with cognitive scores. No correlation was found between cortical thickness, FiCD values, and cognitive scores. Conclusion: Even if the patients with MCA steno-occlusive disease were asymptomatic and had normal-appearing white matter, their cognitive function and structural and functional profiles had changed, especially the FC. Alterations in FC may be an important mechanism underlying the neurodegenerative process in patients with asymptomatic MCA steno-occlusive disease before structural changes occur, so FC assessment may promote the detection of network alterations, which may be used as a biomarker of disease progression and therapeutic efficacy evaluation in these patients.

PU-1725

急性缺血性脑卒中血管内取栓治疗后年轻患者的预后昼夜差异研究

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目的：探讨不同年龄血管内取栓（EVT）后的急性缺血性卒中（AIS）患者卒中发病时间与预后的关系。

方法：回顾性收集 2018 年 8 月至 2022 年 6 月在本院接受 EVT 的 AIS 患者。将患者分为日间发病组（6:00—18:00）和夜间发病组（18:00—6:00），并进一步分为 4 个发病年龄组（55 岁、55~64 岁、65~74 岁和 75 岁以上）。主要结局指标为出院 NIHSS 评分，次要结局指标为恶性脑水肿、出血性转化(HT)和早期血管再通（mTICI≥2b）。采用单因素、多因素 logistic 回归分析发病时间与预后的关系；采用中介分析探讨恶性脑水肿、HT 和早期血管再通如何影响发病时间和预后之间的关系。

结果：共纳入 470 例接受 EVT 治疗的 AIS 患者，其中 68 例< 55 岁。调整混杂因素后，年轻的 AIS 患者（<55 岁）出院预后更差（出院 NIHSS≥16 分，OR=0.136, 95%CI=0.027 ~ 0.678, P=0.015），更容易出现神经功能恶化（ Δ NIHSS≥4 分，OR=0.081, 95%CI=0.012 ~ 0.544, P=0.010）、恶性脑水肿（OR=0.145, 95%CI=0.027 ~ 0.798, P=0.026）和出血转化（OR=0.231, 95%CI=0.057 ~ 0.946, P=0.042），而早期血管再通更少发生（OR=0.118, 95%CI=0.017 ~ 0.813, P=0.007）。中介效应分析显示，卒中发病时间→恶性脑水肿→出院 NIHSS 评分路径显著（ $c'=-2.029$, BC 95%CI=-6.217;-0.087）。

结论：对于小于 55 岁接受 EVT 治疗的 AIS 患者，夜间发病的预后优于日间发病，这可能与恶性脑水肿的昼夜差异有关。

PU-1726

Structural Covariance Network Patterns in Parkinson's Disease: Insights from Clustering Analysis and Their Clinical Correlates

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Objective: Parkinson's disease (PD) is a highly heterogeneous neurodegenerative disorder characterized by variations in clinical symptoms and structural neuroimaging findings. However, the exploration of heterogeneity in structural covariance connectivity remains limited.

Methods: In this study, we utilized a hypothesis-free data-driven approach, employing K-means clustering analysis, to investigate the patterns of structural covariance in a large sample of 61 PD patients and 102 age- and sex-matched controls from the First Affiliated Hospital of Zhengzhou University.

Results: Our analysis revealed two distinct patterns of structural covariance network deficits in PD patients. Patients in subgroup 1 (n = 34) displayed widespread disconnections affecting executive control, visual processing, and motor networks, while subgroup 2 (n = 27) exhibited localized

disconnections primarily within the anterior cingulate network. Furthermore, subgroup 2 patients demonstrated better motor and cognitive performance compared to subgroup 1 patients.

Conclusions: These findings highlight the presence of heterogeneous structural covariance network deficits in PD patients, with widespread disconnections associated with worse motor and cognitive outcomes. Understanding these patterns may contribute to subtyping strategies and targeted interventions in PD.

PU-1727

帕金森患者脑内铁沉积的 MR 定量分析

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目的: 利用定量磁化率图(QSM)定量分析帕金森病(PD)患者和健康人脑内铁沉积差异性, 比较双侧基底节区及丘脑核团的磁化率值, 探索诊断 PD 的影像学标志物。**方法:** 收集北华大学附属医院 2020 年 10 月到 2022 年 11 月期间诊断为原发性帕金森病患者(PD 组) 23 名, 平均年龄 64.57 ± 8.46 岁; 与之匹配健康志愿者(HC 组) 23 名, 平均年龄 64.04 ± 7.70 岁。病情程度根据 H-Y 分级评估标准判定, 1 级 2 名, 1.5 级 3 名, 2 级 7 名, 2.5 级 6 名, 3 级 3 名, 4 级 1 名, 5 级 1 名。所有检查者对本研究知情同意, 并自愿签署知情同意书。本研究应用联影 3.0TMR 机, 运用 QSM 技术, uWS-MR 后处理工作站, 手动切割双侧基底节及丘脑各核团 ROI, 计算各核团磁化率值。SPSS27.0 统计软件进行数据分析, 双侧基底节区和丘脑核团差异比较运用独立样本 t 检验, 对比有差异的核团进行 ROC 曲线分析以筛选最优诊断效能核团, 再将 PD 组进行 H-Y 分级评定, 采用 Pearson 相关性进行分析, 探讨脑内核团铁沉积与临床分级之间的关系。**结果:** 1.PD 组患者脑内双侧黑质、红核及苍白球的磁化率值较 HC 组增加, 差异有统计学意义 ($P < 0.05$)。2.PD 组患者与 HC 组脑内双侧基底节区及丘脑磁化率值左右侧别比较均无统计学差异 ($P > 0.05$)。3.PD 组患者黑质、红核、苍白球磁化率值的曲线下面积 (AUC) 分别为 0.788 (95%CI: 0.658-0.918)、0.732 (95%CI: 0.587-0.877)、0.775 (95%CI: 0.614-0.909), 阈值分别为 101.8ppb、117.7ppb、108.8ppb。4.PD 组患者中黑质磁化率值与临床 H-Y 分级呈正相关性, 结果具有统计学意义 ($P < 0.05$), 相关系数为 $r = 0.588$ 。

结论: 1.PD 患者脑内双侧黑质、红核及苍白球铁含量异常增高, 提示特定核团的铁过量沉积可能是 PD 发病机制之一。2.PD 患者黑质诊断效能高于苍白球及红核, 并与临床 H-Y 分级具有显著正相关性, 提示黑质或可作为早期诊断及评估病情的影像标志物之一。

PU-1728

Intracranial myopericytoma: A case report

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A 43-year-old woman presented complaining of dizziness and headache for more than a month. After admission, a series of examinations were performed for her. There was no obvious abnormality in physical examination and laboratory examinations. However, we observed an intracranial mass—measuring 10mm×9mm×12mm (axial × antero posterior × vertical) on magnetic resonance imaging (MRI), which was located under the tentorium of the left cerebellum. Its MRI performed hypointense on T1WI, hyperintense on T2WI. After contrast administration, the mass showed obvious and well-distributed postcontrast enhancement. Subsequently, the patient underwent lesion excision. The gross examination showed that a hypervascular and well-defined lesion was attached to the left tentorium of cerebellum. Many blood vessels could be seen on the

pathological H&E stained slides, with a large number of oval cells distributed as "concentric circles" around the vessels. There was eosinophilic cytoplasm, but no mitotic nuclei. Besides, the immunohistochemical results were as follows: Tumor cells were positive for smooth muscle actin (SMA) and CD34 (restricted to endothelial cells), but negative for epithelial membrane antigen (EMA) and desmin, and the proliferative index of Ki67 was low (about 1%). Combined with the above inspection results, the final diagnosis was myopericytoma.

PU-1729

皮层下梗死患者动态 ReHo 变异特征及与记忆功能的关系

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目的

缺血性脑梗死是威胁人类健康和生命的重要疾病。梗死发生后,部分患者出现记忆损伤,而记忆缺陷是无法满足日常功能的主要原因。目前脑梗死领域的大多数 fMRI 研究仅关注人脑活动的静态特征,忽视了人脑自发活动在时间维度上的动态变化特征。本研究使用滑动时间窗方法计算了慢性期皮层下脑梗死患者动态局部一致性(regional homogeneity, ReHo),并分析其与记忆功能之间的关系。

材料和方法

纳入慢性期皮层下梗死患者 100 例,根据梗死侧别分为左侧梗死组 51 例和右侧梗死组 49 例,同时纳入 53 例健康受试者。使用 GE MR 750 对受试者进行 fMRI, 3D-T1 采集及记忆测试。采用 DPARS, DPABI 及 SPM 对数据进行预处理、计算影像指标及统计分析。

统计分析

使用双样本 t 检验分别比较不同侧别梗死组与对照组之间动态 ReHo 的差异,以年龄,性别,受教育程度作为协变量。提取具有明显组间差异脑区的功能指标与患者的记忆功能评分做相关分析。

结果

与对照组相比,左侧皮层下梗死患者右侧颞下回、双侧舌回、右侧后扣带回动态 ReHo 变异性增加,双侧小脑后叶、左侧豆状核、左侧前扣带回动态 ReHo 变异性降低。右侧皮层下梗死患者双侧枕上回、左侧顶下小叶、左侧楔前叶动态 ReHo 变异性增高,而左侧小脑后叶、右侧丘脑、双侧扣带回动态 ReHo 变异性降低。相关分析显示,左侧皮层下梗死患者患侧小脑后叶动态 ReHo 变异性与记忆任务的反应时间呈负相关。而双侧舌回的动态 ReHo 变异性与此呈正相关。对于右侧皮层下梗死患者,左楔前叶动态 ReHo 变异性与记忆任务反应时间呈正相关,左小脑后叶 dReHo 变异性与记忆任务的反应时间呈负相关。

结论

慢性期皮层下梗死患者病灶远隔脑区动态 ReHo 变异性异常,远隔脑区表现出继发性损伤和重组,且认知相关脑区动态 reho 变异性与记忆功能存在明显的相关性,这些异常脑区可能成为皮层下脑梗死患者记忆功能受损治疗的靶点。

PU-1730

双能 CT 模拟常规图在缺血性脑卒中血管内治疗后的意义

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背景与目的: CT 扫描通常能显示缺血性脑卒中在动脉内血栓切除术(intra-arterial thrombectomy, IAT)后立即出现的介入术后脑内高密度影(post-interventional cerebral hyperdensities, PCHDs)。

双能 CT (Dual energy CT, DE-CT)可以提示 PCHDs 是由出血引起还是碘造影剂渗漏引起。使用碘造影剂后在 DE-CT 上检测到高密度病变,可能与延迟出血转化和预后差有关。然而,在 DE-CT 中预测延迟出血性转化的定量指标仍然不清楚。本研究的目的是评估这些预测延迟出血性转化的指标。材料与方法:回顾性分析 52 例接受 IAT 治疗的急性缺血性脑卒中患者。在 DE-CT 扫描后立即获得模拟常规 CT (Simulated conventional CT, sCCT)图像,随后进行虚拟平扫图的重建 (Virtual,unenhanced, non-contrast, VNC),在 sCCT 图上测量梗死区的 CT 值,评估在 sCCT 图上测量得到的 CT 值与 VNC 图上显示出血以及迟发性出血(parenchymal hemorrhage, PH)的关系。结果:VNC 图上显示出血的患者 sCCT 上的 CT 值显著高于未出血患者(377.9 ± 385 HU vs 83.5 ± 37.9 HU, $P < 0.0001$);临界值为 80 HU,敏感度为 100%,特异度为 63.8%,阳性预测值为 22.3%,阴性预测值为 100% ($P=0.0001$,曲线下面积(AUC)=0.89)。迟发性脑实质出血转化患者 sCCT 上的 CT 值明显高于无迟发性脑出血者 (250.8 ± 382.2 HU vs 93.7 ± 64.8 HU; $P = 0.01$);临界值为 78 HU,敏感度为 100%,特异度为 61%,阳性预测值为 25%,阴性预测值为 100% ($P=0.049$, AUC=0.76)。结论:DE-CT 模拟常规图 (sCCT) 能有效排除 IAT 后脑出血及迟发性脑出血。

PU-1731

基于 CS-AI 的多发性硬化 3D 脑 MRI 可重复性研究

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吉林大学第一医院

目的:评价压缩感知结合人工智能重建加速技术 (CS-AI) 在多发性硬化 (MS) 3D 脑 MRI 扫描的可行性,并筛选最优的加速因子 (AF)。

材料与方法:前瞻性地收集吉林大学第一医院共 6 名 MS 患者,对每例被试进行常规脑结构 2D 及 3D T2-FLAIR、T1WI 序列包及基于 CS-AI 技术的 3D T2-FLAIR、T1WI 快速扫描序列包采集。两位放射科医师独立地对图像质量进行主观评分,包括整体图像质量、信噪比、图像伪影和病灶边界清晰度。定量图像质量评估包括:人工评估图像的不同部位的病灶数量、ROI 测量信噪比(SNR)和对比度噪声比(CNR)、采用公开的 SPM 工具包对脑内病灶自动检出以及分割。采用 Mann-Whitney U 检验比较常规和 CS-AI 序列图像质量的主观评分,采用 Wilcoxon 检验比较其图像质量的客观评分,两位医师评分的一致性情况采用 Kappa 值分析,比较 CS-AI 序列不同加速因子脑内病灶自动分割结果与金标准之间的变异系数 (Dice 值)。

结果:临床普通 2D T1WI、T2-FLAIR 序列所需扫描时间分别为 1 分 18 秒和 2 分 6 秒,3D T1WI 序列,常规采集时间为 6 分 11 秒,采用 CS-AI 技术最优 AF 为 7,扫描时间 1 分 41 秒,较常规采集时间缩短 72.8%;3D T2-FLAIR 序列,常规采集时间为 6 分 10 秒,采用 CS-AI 技术最优 AF 为 10 左右,扫描时间为 2 分 19 秒,较常规采集时间缩短 62.4%。

常规采集和应用 CS-AI 序列之间的诊断价值没有显著差异 ($P < 0.05$)。

结论:基于 CS-AI 加速技术,采用最优 AF 进行 3D T1WI 及 T2-FLAIR 扫描,能够在与 2D T1WI 及 T2-FLAIR 扫描时间接近的时间内,获得与常规 3D 扫描接近的图像质量。

PU-1732

Initial clinical experience of synthetic MRI as a routine brain metastasis imaging protocol in daily practice: A single-center study

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Objectives: Conventional magnetic resonance imaging (MRI) for routine examinations has relatively long scan times, and the signal intensity of images is dependent on specific MR scanner settings. Due to scanner variations and automatic optimization, it is not possible to compare images based on absolute image intensity. Synthetic MRI (SyMRI) allows reconstruction of various contrast images from a single scan, potentially reducing examination time and enabling quantitative measurements of T1, T2, and proton density (PD). This study aims to assess the diagnostic quality and accuracy of synthetic images in brain metastasis imaging by comparing them with conventional MRI images and explore the feasibility of SyMRI as a routine imaging protocol in clinical practice.

Materials and Methods: A prospective, multi-case non-inferiority trial was conducted from August 2022 to September 2022, involving 46 patients (mean age 54.2 ± 10.4 years; range 28-80 years) suspected of having brain metastasis who underwent brain MRI examinations. The imaging protocol included both conventional routine sequences and a 5-minute multi-dynamic multi-echo sequence (with 24 patients eventually confirmed to have brain metastasis). Parameters required for the synthesis of images from the multi-dynamic multi-echo data were predetermined by an experienced neuroradiologist. Each case comprised traditional T1 and T2-weighted images, T1, T2 fluid-attenuated inversion recovery (FLAIR) images, post-contrast T1-weighted images, and corresponding synthetic images. All images were randomized and independently evaluated by two blinded neuroradiologists for contrast, contrast-to-noise ratio (CNR), morphological readability, diagnostic quality, radiological findings indicating diagnosis, artifacts, and clinical reporting, with assessments performed at two different time points separated by an average of 30 days, providing a comprehensive evaluation of synthetic MRI for brain metastasis imaging in a clinical setting.

Results: Clinical MR imaging revealed 22 cases without intracranial metastases and 24 cases with brain metastases. Interobserver agreement for image quality assessment of all synthetic sequences ranged from moderate to almost perfect (κ , 0.61-0.99; $P < 0.001$). Synthetic T1- and T2-weighted images and post-contrast T1-weighted images exhibited higher contrast but also higher noise levels, resulting in similar CNR compared to conventional images. Synthetic T2-weighted FLAIR images showed lower contrast and higher noise levels, leading to lower CNR. Overall image quality and anatomical delineation provided by synthetic brain MRI scored well on the 5-point Likert scale, with scores exceeding 3 for all sequences except T2 FLAIR. Synthetic T2 FLAIR sequences provided sufficient image quality but exhibited more pronounced artifacts, especially CSF pulsation artifacts and linear high-signal artifacts along the brain surface. The overall diagnostic quality of synthetic MR imaging was non-inferior to conventional imaging, with no significant differences in sensitivity, specificity, and accuracy for brain metastasis diagnosis ($P > 0.05$). There were no significant differences observed in examination quality, diagnostic confidence, or noise/artifacts when comparing synthetic and conventional sequences.

Conclusion: The image quality of synthetic MR imaging is comparable to conventional T1- and T2-weighted images in brain metastasis patients. Although artifacts are more common in synthetic T2 FLAIR, they are easily identifiable and do not affect the evaluation of lesion areas, suggesting the potential need for additional conventional T2 FLAIR to aid diagnosis. Synthetic MRI can be considered as an acceptable routine clinical imaging protocol for brain metastasis, offering shorter scan times.

PU-1733

Identifying two distinct neuroanatomical subtypes of first-episode depression using heterogeneity through discriminative analysis

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Neurobiological heterogeneity in depression remains largely unknown, leading to inconsistent neuroimaging findings.

Here, we adopted a novel proposed machine learning method ground on gray matter volume (GMV) to investigate neuroanatomical subtypes of first-episode treatment-naïve depression. GMVs were obtained from high-resolution T1-weighted images of 195 patients with first-episode, treatment-naïve depression and 78 matched healthy controls (HCs). Then we explored distinct subtypes of depression by employing heterogeneity through discriminative analysis (HYDRA) with regional GMVs as features.

Two prominently divergent subtypes of first-episode depression were identified by adopting the HYDRA method, exhibiting opposite structural alterations compared with HCs and sharing no different demographic features. Subtype 1 presented widespread increased GMVs mainly located in frontal, parietal, temporal cortex and partially located in limbic system. Subtype 2 presented widespread decreased GMVs mainly located in thalamus, cerebellum, limbic system and partially located in frontal, parietal, temporal cortex. When overall patients with depression were compared to HCs, widespread abnormal GMVs detected in Subtype 1 and 2 were not obvious. Subtype 2 had smaller TIV and longer illness duration than Subtype 1. And TIV in Subtype 1 was positively correlated with age of onset while not in Subtype 2, probably implying the different potential neuropathological mechanisms.

This study revealed two distinguishing neuroanatomical subtypes of first-episode depression, which provides new insights into underlying biological mechanisms of the heterogeneity in depression and might be helpful for accurate clinical diagnosis and future treatment.

PU-1734

Assessment of magnetic resonance imaging and histopathological changes in chordoid glioma

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Background:

This study analyzed the imaging and pathologic features of CG and proposed a relatively specific sign that could help in the differential diagnosis before surgery.

Objective:

Choroid glioma (CG) is a rare tumor that neurosurgeons may be unfamiliar with. We sought to assess the MRI and histopathological changes in CG.

Methods:

This was a retrospective study analyzing data at our institution from January 2015 to May 2021. The pathological and MRI data of 13 patients who had pathologically-confirmed were analyzed.

Results:

Of the 13 cases of CG included 7 were males and 6 were females, mean age of 35.1 ± 10.8 years (range: 7 to 51). CG was confirmed when the the mucous matrix was the main component when the T2 weighted imaging (T2WI) showed a hyperintense lesion and when the epithelial-like cells was the main component when T2WI showed an iso- or hypointensity. In this group, 4 cases (4/13, 30.8%) showed obvious hyperintensity on T2WI, and 9 cases (9/13, 69.2%) showed iso- or hypointensity on T2WI. Enhanced scanning of the 2 cases with uneven stripe enhancement and 11 cases with significant enhancement was done. Eleven cases (11/13, 84.6%) showed varying degrees of edematous bands around the tumor, of which 10 cases (90.9%) showed the " eight-character edema sign".

Conclusion:

CG most notably appears on MRI as the " eight-character edema sign ". However, the diagnosis of this lesion involves combining MRI findings pathological analysis.

PU-1735

Altered small-world, functional brain networks in patients with postherpetic neuralgia

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In this study, we aimed to investigate the functional network changes that occur in patients with postherpetic neuralgia (PHN). We also investigated the link between PHN and the small-world properties of functional networks within the brain. Functional MRI (fMRI) was performed on 204 individuals with PHN and 34 age, gender and the severity of the pain-matched patients with lower back pain (LBP) during the resting state. Network-based statistics were performed to investigate the differences between the brain networks of individuals with PHN and LBP. Several small-world parameters of brain networks were calculated, including the clustering coefficient, characteristic path length, local efficiency, and global efficiency. These criteria reflect the overall network efficiency.

The brain networks in the individuals with LBP due to herniation of a lumbar disc demonstrated a significantly longer characteristic path length as well as a higher clustering coefficient, global efficiency, and local efficiency compared to those PHN ($p < 0.001$). We found that PHN patients tended to have stable and efficient brain networks when compared with LBP. The brain networks of the LBP group demonstrated significantly longer characteristic path length, which lead to the slower information processing in the brains of those with LBP compared to PHN (Figure 1) .

PU-1736

脑灰质结构特征联合机器学习方法对伴中央颞区棘波的儿童自限性癫痫患者与正常儿童的分类研究

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目的

伴中央颞区棘波的儿童自限性癫痫(SeLECTS)是一种常见的局灶性、短暂性、发育性癫痫综合征,其脑电特征是单侧或双侧、独立的中央颞区棘波,且容易共患睡眠障碍、多动抽动障碍等疾病。既往研究发现 SeLECTS 患儿的脑灰质体积与结构网络存在异常,提示其存在脑发育障碍。本研究进一步探讨 SeLECTS 患儿与正常儿童脑灰质结构特征差异并通过机器学习方法进行分类研究。

方法

40 例 SeLECTS 患儿和 40 例正常儿童行 3T 磁共振结构成像检查。使用 FreeSufer 软件提取患者组与对照组 68 个脑区的 8 项灰质结构指标 (表面积、灰质体积、厚度均值、厚度标准差、平均曲率、平均高斯曲率、折叠指数、曲率指数)。采用两样本 T 检验筛选患者组与健康对照之间差异有统计学意义的特征, 然后使用最小收缩算法(LASSO)从差异特征中选择与最相关的关键特征。使用支持向量机 (SVM) 方法构建分类模型。同时对关键灰质结构特征与患者病程、发作频率及量表进行相关性分析。

结果

选择 15 个关键特征指标构建分类模型, 在训练队列和验证队列中 AUC 分别为 0.929 和 0.921。其中双侧下颞叶皮层厚度与多动冲动评分呈负相关 ($p < 0.05$, FDR 校正)。

结论

本研究进一步证实 SeLECTS 患儿脑灰质结构发育存在异常, 通过机器学习方法可以构建 SeLECTS 与正常儿童的分类模型并取得良好效能; 双侧下颞叶皮层改变可能与共患多动抽动障碍有关。

PU-1737

Study on Magnetic Resonance CSF-QF Sequence Measurement of Cerebrovascular and Cerebrospinal Fluid Flow Patterns in Patients with Hydrocephalus

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Objective: Cerebrovascular and cerebrospinal fluid (CSF) flow patterns in the patients with traffic hydrocephalus and obstructive hydrocephalus were analyzed using magnetic resonance CSF-QF sequence, and the volume of lateral and third ventricles was quantitatively analyzed. **Methods:** Thirty-seven subjects who underwent head MRI examination in our hospital were selected, including 14 normal volunteers, 12 patients with traffic hydrocephalus and 11 patients with obstructive hydrocephalus. The Philips Ingenia 3.0T MR Scanner combined with peripheral pulse gating (PPU) equipment to collect CSF flow data from cerebrovascular and midbrain aquaduct in patients with hydrocephalus by means of magnetic resonance CSF-QF sequence.

The scanning data were transferred to Philips Intellispace Portal post-processing workstation, and the cerebrospinal fluid flow in the common carotid artery, internal jugular vein and midbrain aqueduct was analyzed using QFLOW software. Finally, the data were transferred to Philips ISD post-processing workstation to measure the volume of lateral ventricle and third ventricle. **Results :** 1. The cerebrospinal fluid in the midbrain aqueduct showed bidirectional

flow in one cardiac cycle. The CSF flow curve in the obstructive hydrocephalus group was mostly wavy, and the CSF flow curve in the control group and the traffic hydrocephalus group was mostly sinusoidal, and the range of the flow curve in the traffic hydrocephalus group was larger. The flow curve can distinguish obstructive hydrocephalus from non-obstructive hydrocephalus. 2. Velocity and discharge of cerebrospinal fluid at the level of midbrain

aqueduct were significantly increased in communicating hydrocephalus. In obstructive hydrocephalus, cerebrospinal fluid flow and velocity were significantly reduced at the level of midbrain aqueduct. 3. There was no significant difference in the common carotid artery and internal jugular vein flow and velocity between the control group, the traffic hydrocephalus group and the obstructive hydrocephalus group. 4. The volume of the lateral ventricle and the third ventricle increased significantly in traffic hydrocephalus and obstructive hydrocephalus. **Conclusion:** 1. Magnetic resonance CSF-QF sequence is a non-invasive and intuitive examination method for the analysis of cerebrovascular and cerebrospinal fluid flow, which can directly reflect the flow direction of cerebrospinal fluid in

the aqueduct and draw the flow curve diagram of cerebrospinal fluid, according to which the obstructive hydrocephalus and non-obstructive hydrocephalus can be distinguished. 2. Magnetic resonance CSF-QF sequence can quantitatively measure cerebrovascular and cerebrospinal fluid flow and velocity, providing an important means for clinical diagnosis of hydrocephalus, preoperative evaluation and prognosis analysis.

PU-1738

神经精神性系统性红斑狼疮的免疫病理特征及影像学诊断

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系统性红斑狼疮(Systemic lupus erythematosus, SLE)是一种以多种免疫异常为特征的系统性自身免疫性疾病,可以累及中枢神经系统。神经精神性系统性红斑狼疮(Neuropsychiatric SLE, NPSLE)是由系统性红斑狼疮相关的中枢神经系统受累引起的,包括一系列不同严重程度的神经和精神表现,这使其与其他非 SLE 相关的中枢神经系统疾病难以区分。根据 NPSLE 的免疫学、病理学和影像学特征,其基础病理生理学可分为血管炎和血管病变、抗磷脂综合征(APS)、脱髓鞘综合征或自身免疫性抗体介导的脑炎。此外,由于 SLE 本身或 SLE 治疗引起的免疫低下状态,也会出现一系列并发症。不同病理生理的影像学特征不同,但其影像学表现并无特异性,因此 NPSLE 的影像诊断较为困难。本文对 NPSLE 相关的免疫病理特征、基于病理生理特征的影像学表现(包括微血管慢性缺血样改变、脑萎缩、腔梗、大面积梗死、微出血、颅内出血、蛛网膜下腔出血、脱髓鞘改变、视神经炎、脊髓炎、脑炎等)及其并发症(如可逆性后部脑病综合征、进行性多灶性脑白质病、免疫抑制药物相关性淋巴细胞增殖症、免疫抑制药物中毒性脑病)进行了全面综述。熟悉 NPSLE 的病理生理机制、影像学表现和并发症有助于做出准确的诊断,并确定合适的临床检查和治疗方案。

PU-1739

两例颅内动脉夹层漏诊误诊分析并文献复习

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目的:颅内动脉夹层(intracranial artery dissection, IAD)由于颅内血管管径细小迂曲,常规管腔成像诊断其动脉夹层较为困难。本文报道 2 例 CTA 漏诊误诊的 IAD 病例,回顾其 HRMR-VWI 特点,并进行相关文献分析,旨在提高 IAD 的诊断,并为 IAD 的治疗过程进行动态观察随访,及时提供影像学依据,指导临床治疗。方法:回顾分析两例 IAD 患者临床资料及影像学检查,将 HR-MRI 的结果与 CTA 及 DSA 检查的结果进行对比。并结合文献分析高分辨率磁共振血管壁成像在 IAD 诊断的影像学特点。结果:CTA 由于无法观察管壁情况,对空间上存在一定重叠的小血管分辨率不高,误诊一例颅内段椎动脉夹层动脉瘤为单纯动脉瘤,漏诊一例小脑上动脉夹层。而经全脑高分辨率磁共振血管壁成像进行 3D 重建图像,结合多序列参数,观察到内膜瓣、双腔征及壁内血肿表现,辅助临床确诊了责任血管以及夹层的存在。结论:高分辨率磁共振血管壁成像可以辅助 DSA 明确 IAD 诊断及术前评估,为责任血管定位及定性提供影像学证据。

PU-1740

反复发作的糖尿病纹状体病的影像学特征并文献复习

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目的：探讨糖尿病纹状体病的临床及影像学特征。方法：回顾性分析 2020 年 11 月 12 日上海交通大学医学院苏州九龙医院神经内科收治的 1 例反复发作的糖尿病纹状体病患者的临床及影像学资料，并复习文献，总结该病的临床及影像学特征。结果：1 例老年女性患者因左侧上肢偏侧舞蹈样运动 2d 入院，入院时静脉随机葡萄糖 38.62mmol/L，颅脑 CT 示右侧基底节区高密度影，头颅 MRI 示右侧纹状体 T1WI 高信号，磁敏感加权成像（SWI）序列未见明显异常信号。予胰岛素降糖、补液、纠正电解质紊乱等治疗，并予抗血小板聚集、降脂稳定斑块、改善循环、营养脑细胞、调控血压等对症治疗，1 周后血糖控制稳定，复查头颅 MRI 提示右侧纹状体 T1WI 高信号强度减低，症状好转。患者出院 1 个月后因左下肢不自主舞蹈样扭动再次入院，复查头颅 MRI 提示右侧纹状体 T1WI 高信号，血糖轻度增高伴炎症指标较高，两肺感染，予降糖、抗感染治疗，患者下肢扭动症状消失。结论：患者出现亚急性单侧肢体舞蹈样运动障碍、存在控制不佳的糖尿病、颅脑 CT 和 MRI 提示对侧纹状体高密度影和 T1WI 高信号时，应考虑糖尿病纹状体病，感染也可导致该病的复发，该病的影像表现具有一定的可逆性。

PU-1741

椎管内非典型神经鞘瘤和非典型脊膜瘤的 MR 鉴别

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目的 分析椎管内非典型神经鞘瘤（IAS）和非典型脊膜瘤（ASM）的 MRI 征象和临床特点，讨论两者的 MRI 鉴别诊断。方法 回顾性分析 80 例南京鼓楼医院 2017 年 1 月至 2020 年 7 月经病理证实的椎管内神经鞘瘤和脊膜瘤的术前 MRI 图像，提取其影像特征，运用 SPSS 分析软件对它们的 MRI 特征及临床特点进行统计分析。结果 ①IAS 组平均年龄 51.5±10.1 岁，ASM 组平均年龄 61.1±12.9 岁；两组在性别、年龄及发病部位上具有非常显著的统计学差异（P 均<0.01）。②在形态学上 IAS 组和 ASM 组的纵径、横径及纵横径比之间的差异均无统计学意义（P 均>0.05）。③在 MRI 信号特点（T1WI、T2WI 信号强度、T2WI 信号混杂性、是否囊变）及强化特征（强化程度、强化均匀性、是否环形强化）方面两组之间的差异均具有非常显著的统计学意义（P 均<0.01）。结论 区分椎管内非典型神经鞘瘤和非典型脊膜瘤的 MRI 影像学差别，并综合其临床特点是鉴别二者的可靠办法。

PU-1742

海马硬化型颞叶癫痫手术预后相关的 fMRI 图论分析研究

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目的 探讨影响海马硬化型颞叶癫痫（TLE）手术预后相关的图论指标及节点脑区。方法 采集 34 例单侧海马硬化型 TLE 患者（TLE 组）的术前 fMRI 扫描及临床资料，同时纳入 50 例健康对照者

(HC, HC 组), 根据单侧前颞叶切除术后 2 年以上的随访结果, 将患者分为术后无癫痫发作组 (SF, SF 组) 和术后有癫痫发作组 (NSF, NSF 组)。比较 HC 组与 TLE 组、SF 组与 NSF 组之间图论指标的差异。最后使用支持向量机 (SVM) 对海马硬化型 TLE 患者手术疗效进行预测, 并使用另一数据集的 11 例海马硬化型 TLE 患者验证模型的分类准确率。结果 相比 HC 组, TLE 组病灶侧颞区的介数中心性、度中心性、节点效率下降而双侧眶额皮层升高。同时, SF 组患侧杏仁核具有更低的介数中心性, 而 NSF 组健侧枕上回的介数中心性、度中心性、节点效率更低。SVM 分类性能方面, ROC 曲线下面积为 0.85, 分类准确率为 91%。结论 TLE 患者脑功能网络发生了重组, 内侧颞叶功能受到损害而双侧眶额皮层的重要性有所提升。同时, 患侧杏仁核及健侧枕上回可能是影响 TLE 患者 ALT 手术预后的关键节点。最后, rs-fMRI 图论分析是预测海马硬化型 TLE 患者的手术疗效的一种有效手段。

PU-1743

基于定量分析 MR 增强信号比值的椎管内神经鞘瘤和脊膜瘤的鉴别

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目的 定量分析椎管内神经鞘瘤和脊膜瘤的 MRI 增强图像的信号比值 (SI Ratio), 进而为两者的鉴别诊断提供客观依据。材料与方法 回顾性分析 116 例南京鼓楼医院 2017 年 1 月至 2020 年 7 月经病理证实的椎管内神经鞘瘤和脊膜瘤的术前 MRI 图像, 测量肿瘤和皮下脂肪的信号强度值, 并计算二者的比值, 运用 SPSS 和 Medcalc 分析软件对它们的信号值和信号比值进行统计分析。结果 ①椎管内神经鞘瘤 MRI 增强图像的 SI Ratio 值显著高于椎管内脊膜瘤 ($P < 0.01$)。②SI Ratio 对区分椎管内神经鞘瘤与脊膜瘤表现出非常优秀的预测水平, ROC 曲线下面积为 0.959 (研究者 1) 和 0.928 (研究者 2), 临界值分别为 0.77 (敏感性: 86%, 特异性: 100%) 和 0.79 (敏感性: 81%, 特异性: 97%)。结论 MRI 增强图像上肿瘤和皮下脂肪的信号比值, 能有效鉴别椎管内神经鞘瘤和脊膜瘤。

PU-1744

Imaging features of recurrent diabetic striatopathy and literature review

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Objective To explore the clinical and imaging features of diabetic striatopathy (DS). **Methods** The clinical and imaging data of a patient with recurrent DS who was admitted to Department of Neurology of Suzhou Kowloon Hospital, Shanghai Jiao Tong University School of Medicine on November 12, 2020, were analyzed retrospectively, and the literature was reviewed to summarize the disease's clinical and imaging features. **Results** An elderly female patient was admitted for a 2d dance-like movement on the left side of her upper limb. At the time of admission, the random venous glucose level was 38.62mmol/L. Cranial CT revealed a high density shadow in the right basal ganglia, while cranial MRI revealed a high signal intensity in the right striatum on T1WI, with no obvious abnormal signal on susceptibility weighted imaging (SWI). Insulin hypoglycemic therapy, fluid rehydration, electrolyte correction, and other symptomatic treatments such as anti-platelet aggregation, lipid-stabilizing plaque, improving circulation,

nourishing brain cells, and regulating blood pressure were administered to the patient. A week later, blood glucose control had stabilized, and a cranial MRI revealed that the high signal intensity of the right striatum T1WI had been reduced, and the symptoms had been improved. One month after discharge, the patient was readmitted to the hospital due to involuntary writhing of the left lower limb. A re-examination of the cranial MRI revealed a high T1WI signal in the right striatum, a slight increase in blood glucose with high inflammatory markers, and infection of both lungs. After receiving hypoglycemic and anti infection treatment, the patient's lower limb symptoms resolved. **Conclusions** Patients with subacute unilateral dance like dyskinesia, poorly controlled diabetes, contralateral striatum high density shadow, and T1WI high signal on cranial CT and MRI should be evaluated for DS. Infection can also cause disease recurrence, and the imaging manifestations of the disease are reversible to some extent.

PU-1745

Meningioma peritumoral brain edema is associated with transverse relaxation time

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Purpose

The occurrence of peritumoral brain edema (PTBE) not only increases surgical difficulties, but may also lead to greater mutation burdens and more complications. This study aimed to explore the association of radiological parameters and pathological metrics with PTBE in meningiomas.

Material and Methods

We enrolled 86 meningiomas patients (55.85 ± 10.84 years, 61 female), who underwent MRI scans preoperatively. All the MRI examinations were performed on a 3.0 T Prisma scanner. Whole-brain T2 maps were acquired within 32 s in a single scan using a novel single-shot ultrafast T2 mapping technique. Axial T2-dark-fluid imaging, diffusion-weighted imaging, and contrast-enhanced T1-weighted imaging were also performed for all patients. Two blind neuroradiologists evaluate PTBE on T2-dark-fluid imaging, and manually delineated regions of interest using 3D Slicer software (version 4.10.2, www.slicer.org), with final results relying on their consensus. Necrosis, large vessels and calcification were excluded. We extracted histogram parameters from both T2 and apparent diffusion coefficient (ADC) maps using FeAture Explorer (FAE; <https://github.com/salan668/FAE>), including mean, median, maximum, minimum, ten percentiles (P10), 90 percentiles (P90), interquartile range (IQR), range, entropy, skewness, kurtosis, uniformity, and variance. In the univariate analysis, parameters were compared using independent t-test or Mann-Whitney U test. Statistically significant parameters were screened for the multivariate logistic regression analysis with the backward method. For both univariate and multivariate analysis, Bonferroni correction was applied for multiple comparisons and the significance level was set at $p < 0.05/n$ (n = number of the factors included).

Results

In the univariate analysis, T2 parameters were significantly associated with PTBE, but the correlation of ADC and Ki-67 index with PTBE did not show statistical significance. P90, range and variance of T2 ($p = 0.004$, 0.002 and 0.001 , respectively) were found to be independent factors associated with PTBE in meningiomas through the multivariate analysis.

Conclusion

Our research suggested that the formation of PTBE in meningiomas was more likely to correlate with T2 relaxation time, instead of ADC or Ki-67 index. This indicates a greater possibility that PTBE in meningiomas may arise from the water pressure gradient between tumor tissue of high-water content and normal brain, rather than the prior explanation of vasogenic edema alone.

PU-1746

Investigation of the relationship between glutamate of thalamus and local brain spontaneous activity revealed by a study combined functional magnetic resonance imaging and magnetic resonance spectroscopy

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Purpose: To investigate whether the level of glutamate in thalamus is correlated with local spontaneous brain activity in thalamus and other regions.

Materials and Methods: We performed short echo Magnetic Resonance Spectroscopy (MRS) measurements of glutamate and resting-state functional magnetic resonance imaging (fMRI) in 17 young adult healthy participants. Bilateral thalami were selected as ROIs for MRS. The glutamate concentration of the thalamus was analyzed by Lc Model. The whole brain amplitude of low-frequency fluctuation (ALFF), regional homogeneity (ReHo) and degree centrality (DC) were calculated. The correlations between the glutamate concentrations of bilateral thalamus and the whole brain ALFF, ReHo and DC were investigated by using the Pearson correlation coefficient analysis.

Results: Significant positive correlations were found between glutamate concentration and the ALFF and ReHo in left thalamus ($r = 0.81$, $p = 0.0001$; $r = 0.72$, $p = 0.001$). Furthermore, the ALFF of left primary motor cortex and bilateral auditory cortex were affected by left thalamus glutamate. However, left thalamus glutamate has an effect on the ReHo of left limbic system.

Conclusion: These results demonstrated that the excitability degree of thalamus decided its resting-state brain activity and has influence on the ALFF of sensory and motor cortex and the ReHo of limbic system. This provides insight into better understanding the neuronal and biochemical mechanisms of thalamus function under normal conditions and neuropsychiatric disorders.

PU-1747

MRI 瘤周影像组学鉴别高级别胶质瘤与脑内单发转移瘤的应用价值

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目的:探讨 MRI 瘤周影像组学鉴别高级别胶质瘤与脑内单发转移瘤的应用价值。**方法:**回顾性分析 2015 年 1 月至 2020 年 6 月经手术病理证实的 39 例高级别胶质瘤及 28 例脑内单发转移瘤的术前磁共振 T2WI 序列影像资料。使用 3D-slicer 软件手动分割获得瘤体的体积感兴趣区,并分别提取瘤周 5 mm 及 10 mm 的影像组学特征。使用最小值最大值归一化及最优特征筛选对影像组学特征进行降维,最后采用 R 语言软件建立 Logistic 回归模型,并使用 K 折交叉验证模型的稳定性。绘制受试者工作特征曲线(ROC)评估组学模型的诊断效能。**结果:**基于术前 MRI 瘤周 5 mm 的影像组学模型在鉴别高级别胶质瘤及脑内单发转移瘤中的敏感性、特异性及曲线下面积(AUC)分别是 0.692、0.946 和 0.91;基于术前 MRI 瘤周 10 mm 影像组学模型在鉴别高级别胶质瘤及脑内单发转移瘤中的敏感性、特异性及 AUC 分别是 0.872、0.893 和 0.93。采用 K 折交叉验证对模型的稳定性进行验证,瘤周 5 mm 及 10 mm 影像组学模型的平均 AUC 分别是 0.80、0.75,提示模型具有较高的诊断效能。**结论:**MRI 瘤周影像组学有助于术前鉴别高级别胶质瘤与脑内单发转移瘤。

PU-1748

长时血压变异性、脑结构与认知功能的关联

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目的：探究长时血压变异性 (BPV)、脑结构、认知功能之间的关联。

方法：我们从开滦研究的随访人群中纳入了 1254 名参与者。从 2006 年起每 2 年随访一次测量血压。采用 SD、CV、ARV 和 VIM 评价 BPV。在 2020 年的最后一次随访中进行了头颅 MRI 和认知评估。使用 MoCA 评分评估认知能力。采用一般线性模型探究 BPV，大脑结构和认知之间的关联。采用中介分析探究脑结构变化是否介导了 BPV 与认知功能之间的关联。

结果：与最低三分位相比，最高三分位的 SD_{SBP} 和 SD_{DBP} 与全脑灰质(GM)体积(SD_{SBP} : $\beta=-4.62$, $P=0.013$; SD_{DBP} : $\beta=-5.64$, $P=0.001$)和额叶容积(SD_{SBP} : $\beta=-1.74$, $P=0.013$; SD_{DBP} : $\beta=-1.53$, $P=0.014$)相关，最高三分位的 SD_{SBP} 与颞叶体积($\beta=-1.08$, $P=0.025$)和左侧海马体积($\beta=-0.05$, $P=0.040$)相关。最高三分位的 SD_{DBP} 的与总脑体积($\beta=-10.07$, $P=0.001$)、顶叶体积($\beta=-0.77$, $P=0.015$)和白质高信号(WMH)体积($\beta=1.91$, $P=0.048$)相关。最高三分位的 SD_{SBP} 、 SD_{DBP} 与 MoCA 评分呈负相关(SD_{SBP} , $\beta=-0.64$, $P=0.014$; SD_{DBP} , $\beta=-0.69$, $P=0.003$)。降低的全脑 GM、颞叶、右海马体积和 WMH 体积增加与 MoCA 评分降低相关($p < 0.05$)。当 SD_{SBP} 和 SD_{DBP} 被视为连续暴露变量，以及使用 CV、ARV 和 VIM 计算 BPV 时，观察到类似的结果。中介分析表明，全脑 GM 和颞叶体积的减少介导了 SD_{SBP} 增大与认知能力下降之间的关联。

结论：长时 BPV 升高与脑体积减少、WMH 体积增加和认知能力下降有关。全脑 GM 和颞叶体积的减少介导了 SD_{SBP} 和认知功能之间的负相关。

PU-1749

基于体素间和体素内弥散指标对首发未服药精神分裂症患者脑白质微观结构的研究

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目的 采用体素间弥散指标——局部弥散一致性(LDH)值及传统体素内弥散指标探究首发未服药精神分裂症(FESZ)患者脑白质微观结构的异常。 方法 选择郑州大学第一附属医院精神医学科自 2020 年 1 月至 2021 年 12 月收治的 56 例 FESZ 患者为研究对象，并同期招募 64 名健康志愿者作为正常对照组。对所有被试进行磁共振弥散张量成像扫描，采用 FSL 及 PANDA 软件处理得到 LDH 值、各向异性分数(FA)、平均弥散系数(MD)、轴向弥散系数(AD)和径向弥散系数(RD)值。通过基于纤维束示踪的空间统计(TBSS)方法分析比较 2 组之间脑白质纤维各个弥散指标的差异。对于组间差异有统计学意义的白质纤维束区域，采用受试者工作特征曲线(ROC)评价各个弥散指标对 FESZ 的诊断价值，采用 Spearman 偏相关分析检验各个弥散指标与阳性和阴性症状量表(PANSS)评分的相关性。 结果 与正常对照组相比，FESZ 组双侧丘脑前辐射部分体素簇的 LDH 值明显增加，差异有统计学意义($P<0.05$, FWE 校正)。与正常对照组相比，FESZ 组右侧下纵束及右侧钩束感兴趣束(TOI)的 LDH 平均值明显增加，差异有统计学意义($P<0.05$, FDR 校正)。在上述纤维束区域，ROC 分析显示 LDH 值均具有诊断效能($P<0.05$)，且 4 个纤维束联合时的 LDH 值诊断效能最大[曲线下面积(AUC)=0.733, $P<0.001$]。相关性分析显示 FESZ 组与正常对照组有显著差异区域的 LDH 值与 PANSS 各项评分均不具有相关性($P>0.05$)。在 FA、MD、AD 和 RD 指标参数图中未发现组间差异有统计学意义的体素簇或 TOI($P>0.05$)。 结论 体素间弥散指标 LDH 值能够检测到传统体素内弥散指标未能发现的 FESZ 患者脑白质微观结构的代偿性变化。

PU-1750

影像组学在鉴别胶质瘤术后复发及放射性损伤中的作用

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胶质瘤是神经外科最常见的一种中枢神经系统肿瘤，对于胶质瘤的治疗以手术切除肿瘤为主，结合放疗、化疗等综合治疗方法。胶质瘤术后复发和放射损伤的影像学表现和临床症状相似，但两者的治疗方法完全不同。放射性损伤通常采取对症的保守治疗，而胶质瘤复发则需要放疗、化疗或二次手术。胶质瘤术后复发和放射性损伤具有相似的临床表现和传统影像学特征，但在组织病理学和治疗措施上存在显著差异，如何精准有效鉴别胶质瘤术后复发和放射性损伤的方法具有重要的临床意义，因此胶质瘤术后复发和放射性脑损伤的鉴别诊断是临床实践中的一大挑战，因此运用影像学方法对两者进行鉴别具有重要的临床意义。我们将通过在磁共振平扫增强、扩散加权成像、磁共振波谱成像、磁共振灌注成像、动态增强成像、磁敏感加权成像、正电子发射计算机断层（PET-CT）区分胶质母细胞瘤复发和放射性脑损伤，为临床诊断和治疗提供帮助。

PU-1751

Genetic mechanisms underlying gray matter atrophy in Parkinson's disease: a combined neuroimaging and transcriptome study

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Objectives: Extensive research has shown apparent gray matter atrophy in patients with Parkinson's disease (PD), which is a heritable disease. The objective of this study was to investigate the genetic mechanisms of gray matter reductions in Parkinson's disease.

Methods: To achieve a more thorough characterization of gray matter atrophy in PD, we performed a comprehensive neuroimaging meta-analysis of previous literature including 1,831 PD patients and 1,378 controls as well as examined group gray matter atrophy in an independent dataset of 46 PD patients and 28 controls. Utilizing the Allen Human Brain Atlas, we performed spatial association analyses linking transcriptome data to neuroimaging findings to identify genes correlated with gray matter atrophy in PD. Subsequently, we conducted enrichment analyses for the identified genes associated with gray matter losses in PD patients and performed a series of gene functional feature analyses.

Results: Our meta-analysis and independent dataset neuroimaging analysis consistently revealed significant gray matter atrophy in the superior temporal lobe of PD patients. Transcriptome-neuroimaging correlation analysis identified 1,952 overlapping genes whose expression correlated with spatial gray matter reductions in PD. These genes were enriched in biologically significant processes and exhibited selective expression in brain tissue, dopamine receptor cells, and neurons. Furthermore, these genes supported the construction of a protein-protein interaction (PPI) network, highlighting 16 putative hub genes with functional significance.

Conclusion: Our findings emphasize the presence of prominent gray matter atrophy in PD, probably resulting from intricate interactions among a diverse set of genes with various functional features.

PU-1752

脑出血患者发生早期血肿扩大的影响因素及临床价值

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目的 探讨脑出血 (intracranial hemorrhage, ICH) 早期血肿扩大的影响因素, 并与患者发生预后不良及死亡率的关系。方法 回顾性分析自 2021 年 9 月至 2023 年 3 月就诊于大连医科大学附属第一医院的自发性脑出血患者, 患者于出现症状的 24h 内接受基线 CT 扫描并于获取基线 CT 48h 内获得随访 CT, 根据是否发生血肿扩大将患者分为血肿扩大组 (40 例) 和血肿稳定组 (66 例), 根据改良 Rankin 评分 (mRS) 量表评判脑出血患者发病后 3 个月时的功能状态, 分析两组患者的 CT 图像及临床资料。结果 对两组患者的年龄、性别、高血压病史、血肿位置 (分为脑叶、基底节区、丘脑、脑干、小脑)、合并脑室出血、血肿周围水肿、蛛网膜下腔出血进行比较, 差异均无统计学意义 ($P>0.05$); 血肿扩大组较血肿稳定组具有更大的基线血肿体积 (11.4mL: 6.6 mL), 但差异无统计学意义 ($P=0.108$), 而血肿扩大组较血肿稳定组发病距基线 CT 的时间明显缩短 (3 h: 5 h; $P<0.001$); 在血肿扩大组中, 预后不良的患者为 34 例 (85%); 血肿稳定组预后不良的患者为 22 例 (33.3%), 差异具有统计学意义 ($P<0.001$); 并且血肿扩大组具有更高的死亡率 17.5% (7 例), 明显高于血肿稳定组 1.5% (1 例), 差异具有统计学意义 ($P<0.001$)。结论 发病距基线 CT 的时间与发生早期血肿扩大显著相关, 血肿扩大患者发生预后不良及死亡率均明显增加, 说明早期发现患者病情并进行及时干预治疗对脑出血患者的预后具有重要意义。

PU-1753

鞍区神经鞘瘤 1 例影像表现并文献复习

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目的: 研究鞍区神经鞘瘤影像表现。方法: 本文通过报道一例鞍区神经鞘瘤的临床特点及影像表现, 并系统查阅 PUBMED、中国知网、维普网、万方数据库, 以“鞍区”、“鞍内”、“鞍上”“神经鞘瘤”为关键词对 1984-2021 年发表的文献进行检索。结果: 通过去重、排除资料不全的文献, 共纳入 24 篇文献, 加上本例共 27 例患者, 女性 13 例, 男性 14 例, 年龄 4-79 岁。7 例表现为视力下降模糊, 4 例视野缺损, 5 例垂体功能异常, 4 例头痛, 1 例小便量次增多, 2 例眼球外展受限, 1 例眩晕、恶心、呕吐, 1 例癫痫, 1 例性格改变, 体重增加, 脚及手增粗, 1 例尿崩症。5 例 CT 平扫表现为等或少高密度影, 2 例明显均匀强化, 1 例不均匀强化。23 例表现为 T1 等 T2 稍高信号, 增强扫描 4 例可见小囊变, 1 例边缘强化, 余明显均匀强化。17 例术前进行了诊断, 14 例诊断为垂体瘤, 2 例诊断为脑膜瘤, 1 例诊断为颅咽管瘤。结论: 鞍区神经鞘瘤虽然容易被误诊, 但其影像表现具有一定特点。

PU-1754

II 型糖尿病患者结构 MRI 中的三维 T1 加权成像和扩散张量成像特点

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目的: 探究 II 型糖尿病(T2DM)患者结构 MRI 中的三维 T1 加权成像(three dimensions T1-weighted imaging, 3D-T1WI)和扩散张量成像(diffusion-tensor imaging, DTI)的灰质和白质的微观结构变化; 方法: 在我院内分泌科收 30 名 T2DM 患者, 控制其年龄、性别、身高、体重等方面的可比性, 并收取 30 名健康患者分组, 在我院影像科以 3.0T GE-MRI 扫描弥散扩展成像的数据后, 用 DPARSF 5.4 和 DPABISurf 2.0 做数据预处理,用 DPABIFiber 1.0 做结构矩阵分析, 分析比较 MD、FA、RA、DA 等值, 并做统计学差异性分析; 结果: 与对照组比较, T2DM 组: MD 升高, FA 降低, RA 和 DA 变化不大; 结论: T2DM 患者 3D-T1WI 和 DTI 的灰质和白质的微观结构变化较正常人群有明显变化。

PU-1755

Blood-labyrinth barrier breakdown in Meniere's disease

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Objective: We compared the signal intensity ratio (SIR) of the cochlear basal turn between Meniere's disease and healthy controls to investigate potential damage of the blood-labyrinth barrier in Meniere's disease.

Methods: Thirty patients diagnosed with unilateral definite Meniere's disease and 24 healthy controls were enrolled. 3D-FLAIR scan was conducted to assess the grades of endolymphatic hydrops in Meniere's patients while measuring the SIR of cochlear basal turns in both groups. The differences of bilateral SIR between Meniere's disease and healthy control were compared, and the correlation between the SIR on affected ear in Meniere's disease and the grades of cochlear and vestibular hydrops were analyzed.

Results: SIR of affected ear in Meniere's disease exhibited significant increase compared to that of unaffected ear. No significant difference was observed in SIR between the two ears in the healthy control. Furthermore, the SIR of unaffected side in Meniere's disease was higher than that of both left ear and right ear in healthy controls. The SIR in affected ear of Meniere's disease exhibited positive correlation with hydrops in both cochlea and vestibula.

Conclusion: The permeability of blood-labyrinth barrier is increased in Meniere's disease, blood-labyrinth barrier permeability can be used as a biological marker for early diagnosis of Meniere's disease. Destruction of blood-labyrinth barrier may be one of the causes of endolymphatic hydrops in Meniere's disease.

PU-1756

The dynamic evolution of radiologic progression pattern of GBM

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Objective: Previous studies always focused on the first progression or the final outcome of GBM and neglected the whole course evolution. We aim to radiologically characterize glioblastoma progression type (PT) and investigate dynamic evolution of each PT from diagnosis to final outcome of glioblastoma.

Methods: Six progression types (PTs) were categorized according to MRI contrast enhancement features in T1-, T2- and Flair weighted images in 122 patients. Frequencies and changes of PTs (classified into cT1 relapse, classicT1, T2 diffuse, T2 circumscribed, primary non-responder and non-local), time to the progression (PFS), and overall survival (OS) were assessed in the whole course.

Results: Median follow-up for all patients was 20 months (range, 3 - 145 months); 146 recurrence and 100 deaths were recorded. The vast of patients (99) passed away after experiencing once progression, while 15 patients suffered from twice relapses and 3 patients went through 3 times progression. The media PFS1, PFS2 and OS were 6.4M, 12.1M, 12.4M, respectively. For the first progression, 22 (18%), 41 (34%), 2 (2%), 8 (7%), 43 (35%), 6 (5%) patients were cT1 relapse, classicT1, T2 diffuse, T2 circumscribed, primary non-responder and non-local progression. For the second progression, 2 (9.1%), 3 (13.6%), 17 (77.3%) patients experienced classicT1, primary nonresponder and non-local progression. The PFS1 and OS of cT1 relapse, T2 diffuse, T2 circumscribed was longer than that of classicT1 and non-local progression. The PFS2 and time interval between first and second progression of classicT1 was much longer than that of non-local progression. Primary nonresponder had the worst outcome.

Conclusions: The progression pattern was diversity in GBM. The prognosis of cT1 relapse, T2 diffuse and T2 circumscribed was the best, while primary non-responder worst. Majority of patients experienced once progression before died, and the most common second relapse pattern was non-local progression.

PU-1757

癫痫导致颅骨局部增厚

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目的: 不同区域颅骨厚度对立体定向脑电图 (SEEG) 具有一定影响。探究癫痫患者相较健康人是否存在颅骨厚度的差异, 从而为癫痫患者行 SEEG 时提供更全面的考量因素。

方法: 纳入癫痫患者共 692 例 (根据临床及影像分型, 包括 334 例颞叶癫痫 (TLE) (其中合并海马硬化的 TLE 共 206 例)、146 例额叶癫痫 (FLE)、132 例特发性全面性癫痫 (IGE), 纳入年龄性别匹配的健康对照组共 186 例。收集所有被试的临床资料及影像学资料 (主要包括常规序列、3D-T1WI 序列), 收集所有癫痫患者的既往病史、病程和既往用药史。用 SPM12 软件对所有被试的 3D-T1WI 图像进行自动分割得到对应的颅骨。以所有健康对照组的颅骨图像制作为颅骨掩膜 (Mask), 并定义为正常人的标准颅骨模板。将癫痫患者按照分型进行分组并分别与对照组进行基于体素的形态学分析, 主要进行各组间的两样本 T 检验, 将年龄、性别、病程、是否服用癫痫相关药物作为协变量加入检验过程。此外, 还将所有被试的颅骨厚度与病程进行了多元回归分析。

结果: 整体癫痫患者与对照组相比, 颅骨增厚主要集中于双侧颞、枕部与颅底 ($P<0.05$)。TLE 组的颅骨增厚部位主要集中在双侧顶、颞、枕部和颅底 ($P<0.05$)。有趣的是, 合并右侧海马硬化的 TLE 组的颅骨增厚部位主要集中在双侧顶、颞部 ($P<0.05$), 但在合并左侧海马硬化的 TLE 中却只显示出左侧颞部颅骨的局限性增厚。在 IGE 组中, 我们观察到双侧颞、枕部及颅底的明显增厚 ($P<0.05$)。在 FLE 中, 颅骨增厚区域至局限于颅底 ($P<0.05$)。在多元回归分析中, 我们发现上述差异颅骨区域的增厚与病程显著正相关 (FDR 检验, $P<0.05$)。

结论: 我们发现了癫痫会导致颅骨局部增厚这一现象, 而且癫痫分型会导致颅骨增厚区域具有差异性, 颅骨增厚与病程存在正相关。这一现象说明了癫痫会影响骨质代谢, 同时可以为癫痫患者的临床诊疗, 尤其是在行 SEEG 时提供更多的帮助信息。

PU-1758

Effects of hypertension on cerebral perfusion alternations in patients with type 2 diabetes

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Purpose: Hypertension (HTN) and type 2 diabetes mellitus (T2DM) are known to negatively affect the cerebral perfusion. However, little is known about whether the coexisting HTN will further affect the cerebral perfusion in T2DM patients. So we aim to determine the impact of HTN on the cerebral perfusion in T2DM patients.

Materials and methods: A total of 92 participants, comprising 36 only T2DM patients, 28 T2DM patients with HTN (T2DMH) and 28 healthy controls (HCs) were recruited in this study. Meanwhile, clinical indicators and arterial spin labeling (ASL) data were collected for each participant. ASL enabled to obtain the Cerebral Blood Flow (CBF) maps from the automatic calculation. Subsequently, atlas-based analysis was used to determine the cerebral perfusion alternations from each specific cerebral label and evaluate the correlations between perfusion alternations and clinical indicators.

Results: Compared to HCs, T2DM patients showed increased CBF in several regions of the frontal and temporal lobes, while decreased CBF was observed in the limbic system and occipital lobe. In comparison to T2DM, T2DMH patients exhibited a consistent decrease in CBF across all cerebral lobes and subcortical nucleus. Additionally, we discovered negative correlations between CBF reductions and the Homeostatic Model Assessment of Insulin Resistance (HOMA-IR) in T2DMH patients.

Conclusions: Our results revealed that the coexisting HTN exacerbate the CBF decrease in T2DM patients, which highlighted the importance of HTN management in T2DM patients to prevent further damage to the brain health.

PU-1759

非良性脑膜瘤与良性脑膜瘤临床与影像征象对比研究

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【摘要】目的 探讨 NM 与 BM 的临床、影像学征象。方法 回顾性分析 118 例经手术证实为脑膜瘤的患者临床资料、影像学结果, 根据 2021 版 WHO 脑膜瘤组织学分型方法, 将患者分为良性 (I 级) 组 72 例和非良性组 (II-III 级) 46 例, 所有患者术前均行 MRI 平扫及增强检查。采用多因素

Logistic 回归分析良性组和非良性组脑膜瘤的 MRI 影像学表现及特点。结果 非良性组与良性组在肿瘤最大径、强化方式、形状、边缘、HSL 征、脑侵袭、中性粒细胞百分比（NEUT%）、淋巴细胞百分比（LY%）上比较，差异有统计学意义（ $P<0.05$ ）；多因素 Logistic 回归分析示肿瘤最大径、形状、边缘、HSL 征、脑侵袭是非良性脑膜瘤的独立危险因素（ $P<0.05$ ）。结论 术前脑膜瘤 MRI 特征有助于判断脑膜瘤良恶性，可为术前临床治疗方案的确定提供有效临床辅助。

PU-1760

基于频谱动态因果模型对轻度认知障碍的帕金森患者默认模式网络亚区间有效连接的研究

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目的：通过分析帕金森患者默认模式网络（DMN）内部区域的有效连接，探索帕金森患者默认模式网络中的因果流向和功能异常的机制，及其与帕金森患者认知功能的关系。

方法：采用光谱动态因果模型（spDCM）对 23 例轻度认知障碍的帕金森患者（PD-MCI）和 22 例无认知障碍的帕金森患者（PD-NC）默认模式网络内部区域 MPFC（内侧前额叶皮层）、PCC（后扣带回皮层）、LAG（左侧角回）、右侧角回（RAG）分别进行静息态下功能磁共振（fMRI）数据的有效连接分析。比较两组患者 DMN 内部亚区有效连接强度的差异，并分析其与帕金森病患者认知功能的相关性。

结果：两组患者 MPFC-LAG、LAG-PCC 的有效连接强度值差异具有统计学意义（MPFC-LAG： $t=-2.993, p<0.05$ ；LAG-PCC： $t=2.174, p<0.05$ ）。PD-MCI 组的 PCC 对 MPFC，LAG 对 MPFC，LAG 对 PCC 存在异常激活；MPFC 对 LAG 存在异常抑制；与 PD-NC 组比较，PD-MCI 组 PCC 的自连接以及 MPFC 到 LAG、LAG 到 RAG 的单向连接在进行 $\alpha<0.05$ 参数值校正后存在差异。

结论：帕金森病患者默认模式网络内部区域间存在有效连接环路节点和连接的异常。

PU-1761

孤立性纤维瘤影像学表现及临床病理特点分析

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目的：

探讨不同部位起源的孤立性纤维瘤（SFTs）的影像特点及其临床病理组织学特点，诊断及鉴别诊断，从而提高对该疾病的临床、影像学认识及诊断水平。

方法：

回顾性分析本院经手术病理及免疫组化诊断为孤立性纤维瘤的 20 例患者（均行 CT 或 MRI 检查，MRI 检查为 9 例；CT 扫描 12 例，其中 1 例同时行 CT 及 MRI 检查），将其影像学诊断与病理结果进行对照。并结合相关文献,对其临床病理特征、诊断及鉴别诊断进行分析。

结果：

20 例患者中，7 例起源于颅内（1 例伴有股骨转移），3 例起源于纵隔，3 例起源于胸膜，3 例起源于肺，2 例起源于盆腔，其余 2 例分别起源于椎管、睾丸。这些病灶均为实性肿块且较为致密，病灶体积较大者边缘多呈不规则、分叶状改变，边界较清，CT 及 MRI 扫描病灶密度或信号均匀或

不均匀，部分较大的病灶内中央可见出血及坏死区，增强扫描强化方式取决于肿块内组成成分，部分病灶明显强化，可呈不均匀地图样或分层样强化，病灶周围可以看到迂曲的血管影，这也是该疾病较为特征性影像表现。病理上它是一种起源于 **CD34** 阳性的树突状间质细胞的间叶组织肿瘤，具有向成纤维细胞和肌纤维母细胞分化的特征，属于中间性肿瘤，少数为恶性，可以发生转移。肿块有细胞稀疏区、细胞密集区，细胞密集区由梭形或短梭形肿瘤细胞构成，呈束状、编织状、漩涡状或不规则状排列，肿瘤间质血管丰富，这也是其强化较明显的原因。

结论：

SFTs 虽较为少见，但其可以发生于身体任何部位，通常无明显特异症状，临床症状跟它的发生部位、病灶大小及良恶性有关。因此，不同部位的 **SFTs** 均需要根据其发生部位与相关疾病鉴别。术前诊断难度较大，在这些部位出现较大实性肿块时，我们应该想到 **SFTs**，综合相关临床症状、实验室检查及影像学检查，但最终确诊需要依靠病理及免疫组化。

PU-1762

基于 QSM 引导下 fMRI 皮层下核团精准的定位

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目的：

许多神经退行性疾病与皮层下核团的功能异常密切相关。尽管不少研究采用 **fMRI** 来分析皮层下核团，但一致性较差，原因可能是：现有的核团定位方法受限于传统磁共振 **T1** 加权成像（**T1WI**）对细微结构的限制。本研究旨在实现静息态功能磁共振成像（**Resting-Functional MRI, fMRI**）和定量磁敏感成像（**Quantitative Susceptibility Mapping, QSM**）的配准，主要探索 **QSM** 在脑深部核团的 **fMRI** 研究中的潜在应用。

方法：

（**Enhanced Gradient Echo T2* Star Weighted Angiography, ESWAN**）序列一次扫描可获得多回波的幅度图和相位图，两组图像解剖位置一致。利用相位信息可重建 **QSM** 图，**QSM** 图除了在定量大脑铁及髓鞘方面具有优越性之外，还对皮层下核团具有很高信噪比。在 **QSM** 图上勾画皮层下核团，包括：尾状核、壳核、苍白球、红核、黑质及齿状核。回波时间影响图像的信噪比，因此把回波的幅度图在时间上做平均，对比八个回波及平均回波图的信噪比。利用被普遍认为是最先进的医学图像配准和分割工具包——**ANTs**（**Advanced Normalization Tools**），选信噪比最优的幅度图作为中介，以辅助 **fMRI** 与 **QSM** 之间的多模态配准。另外，同样实现 **fMRI** 与 **T1WI** 配准，利用 **AAL** 图谱定位核团，最后使用核团 **ROI** 来计算互信息（**MI**），以评估配准方法的性能。

结果：

QSM 引导核团定位法的互信息值高达 **0.90**，图谱法仅为 **0.73**，前者的配准效果更好。研究结果表明，**QSM** 能够更准确定位皮层下核团，帮助获取更真实的功能状态。

结论：

本研究借助 **QSM** 图成功实现对 **fMRI** 中皮层下核团的精确分割。这一方法为神经科学和临床神经学领域提供了一种新的可能性，对精准诊断和研究提供了重要工具，为神经系统的疾病诊断和治疗提供更准确的信息。

PU-1763

Weight Status Modulated Brain Regional Homogeneity in Long-term Male Smokers

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Background: Tobacco smoking and overweight could lead to adverse health effects, which remain an important public health problem worldwide. Researches indicate that overlapping pathophysiology may contribute to tobacco addiction and overweight, but the neuro-biological interaction mechanism between the two factors is still unclear.

Methods: The current study used a mixed sample design, including the following four groups: i) overweight long-term smokers ($n = 24$); ii) normal-weight smokers ($n = 28$); iii) overweight non-smokers ($n = 19$), and iv) normal-weight non-smokers ($n = 28$), a total of 89 male subjects. All subjects underwent resting-state functional magnetic resonance imaging (rs-fMRI). Regional homogeneity (ReHo) was used to compare internal cerebral activity among the four groups. Interaction effects between tobacco addiction and weight status on ReHo were detected using two-way analysis of variance, correcting for age, years of education and head motion.

Results: A significant interaction effect between tobacco addiction and weight status is showed in right superior frontal gyrus. Correlation analyses show that the strengthen ReHo value in right superior frontal gyrus is positively associated with pack-year. Besides, main effect of tobacco addiction is specially observed in occipital lobe and cerebellum posterior lobe. As for main effect of weight status, right lentiform nucleus, left postcentral gyrus and brain regions involved in DMN are survived.

Conclusions: These results shed light on an antagonistic interaction on brain regional homogeneity between tobacco addiction and weight status in right superior frontal gyrus, which maybe a clinical neuro-marker of comorbid tobacco addiction and overweight. Our findings may provide a potential target to develop effective treatments for the unique population of comorbid tobacco addiction and overweight.

PU-1764

多时相 CTA 联合 CT 灌注在远端分支动脉闭塞的急性缺血性脑卒中的应用价值

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目的: 使用一站式多时相 CTA (multiphase CTA, mCTA) 及 CT 灌注 (CT perfusion, CTP) 扫描方法, 评估其在急诊缺血性脑卒中患者远端分支动脉闭塞的快速精准定位和预测最终梗死体积 (FIV) 的价值。

方法: 回顾性搜集 2020 年 6 月至 2023 年 6 月内 60 例急诊入院的突发远端分支动脉闭塞 (定义为脑动脉 A2 段、M2 段、P2 段及其远端分支) 的患者资料。所有患者接受治疗前 mCTA 及 CTP 联合扫描。使用 GE 公司的 FastStroke 软件处理 mCTA 图像得到彩色融合的 ColorViz 图像。2 名高年资医师及 2 名低年资医师使用双盲法分别评估常规单期 CTA 和 mCTA 融合图。对比两种 CTA 在诊断动脉闭塞位置准确率、完成诊断所需的时间、诊断信心评分、区域性软脑膜侧支循环 (rLMC) 评分的差异。使用数坤科技公司的 CTPDoc 软件处理 CTP 数据, 分别以 $T_{max}(s) > 4$ 、6、8、10 定义缺血低灌注区, 分别以 $rCBF < 40\%$ 、30%、20% 定义梗死核心区。FIV 通过 5 天内的随

访 CT 或 MRI 获得。根据患者血管是否成功再通将患者分为两组, 分别评估再通及未再通组上述不同 CTP 参数阈值与 FIV 的关系。

结果: 不同年资医师在诊断过程中, 虽然两种 CTA 模式下正确率的差异无统计意义, 但是 mCTA 融合图显著缩短了诊断时间 ($P<0.001$), 并且提高了诊断信心 ($P<0.05$)。两种 CTA 模式下的 rLMC 评分的差异具有统计学意义 ($P<0.001$)。在再通组患者所有灌注参数阈值与 FIV 均相关性较差 ($r<0.5$)。在未再通组患者所有灌注参数与 FIV 相关性较好 ($r>0.5$)。且当 Tmax(s) >10 时, 相关性最好 ($r=0.89$)。

结论: mCTA 联合 CTP 不仅可提高对于远端分支动脉闭塞的诊断准确率, 缩短时间并提高诊断信心, 而且更加完善的评估侧支循环水平, 对于未再通患者 FIV 也具有一定的预测价值。

PU-1765

MTHFR 基因 C677T 多态性与老年脑小血管病变相关性分析

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目的 探讨 5,10-亚甲基四氢叶酸还原酶(MTHFR)基因 C677T 多态性与老年脑小血管病变的关系。

方法 选取我院年龄大于 65 岁脑小血管病住院患者, 进行 MTHFR 基因测定和血浆同型半胱氨酸 (Hcy) 水平监测, 同时行头颅 MRI 和 MRA 检查, 分析不同基因分型患者与脑小血管病变的关系。

结果 血浆 Hcy 水平在 TT 型组明显高于 CC 型和 CT 型组 ($F=7.996$, $P<0.01$), 通过 Spearman 相关性分析, 脑白质病变的严重程度与女性相关 ($r=0.148$, $P=0.010$), 与年龄、既往有冠心病、腔梗、血浆 Hcy 水平、MTHFR 基因分型呈正相关, 相关系数分别为 0.034 ($P<0.001$)、0.152 ($P=0.008$)、0.189 ($P=0.001$)、0.015 ($P=0.029$) 和 0.170 ($P=0.003$); 多因素 Logistic 回归分析, 年龄[OR95%CI= (1.042-1.114)]、MTHFR 基因分型 (TT 组) [OR95%CI= (1.046-2.279)] 和腔隙性脑梗死[OR95%CI= (1.003-3.523)] 是脑白质高信号 (WMH) 独立危险因素。

结论 血浆 Hcy 水平与 MTHFR 基因多态性有明显相关性, MTHFR 基因分型 (TT 组) 是脑白质损害独立危险因素, 建议早期进行 MTHFR 基因检测, 提早干预危险因素, 延缓老人认知障碍的发生发展。

PU-1766

3.0T 磁共振颈动脉斑块高分辨成像的临床应用

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目的 应用 3.0 磁共振颈动脉斑块高分辨成像技术定量分析缺血性脑卒中患者症状侧与非症状侧颈动脉管壁负荷及斑块成分, 为临床防治缺血性脑卒中提供影像学参考依据。

方法 选取我院 2017 年 10 月至 2018 年 3 月脑卒中患者 57 例, 均行 3.0T MRI 颈动脉斑块高分辨成像。获取共计 114 根颈动脉图像, 依据临床症状分为症状侧组及非症状侧组。应用 VPD 公司开发的颈动脉斑块定量分析软件 MRI-PlaqueView 对图像进行后处理, 记录并比较症状侧与非症状侧颈动脉管壁负荷及斑块成分差异, 通过 logistic 回归分析研究缺血性脑卒中发生的风险因素。管壁负荷指标包括管壁体积 (VWV)、管壁厚度 (WT)、管壁标准化指数 (NWI) 和管腔最大狭窄程度, 其中 WT 和 NWI 分别取平均值 (mean) 和最大值 (max)。斑块成分数据包含钙化 (CA)、坏死的脂质核心 (LRNC)、斑块内出血 (IPH) 的有/无及体积, 以及纤维帽是否破裂 (FCR)。

结果 症状侧组共计 65 根血管, 非症状侧组共计 49 根血管。①管壁负荷指标比较: 症状侧组颈动脉 VWV、meanWT、maxWT、maxNWI 和管腔最大狭窄程度与非症状侧组颈动脉比较具有明显统

计学差异 ($P < 0.05$)。meanNWI 在两组比较中无统计学差异 ($P > 0.05$)。②斑块成分比较: 斑块内 CA 的发生率在症状侧组与非症状侧组比较中无统计学差异 ($P > 0.05$), 但 CA 的体积在两组比较中具有统计学差异 ($P < 0.05$)。症状侧组斑块内 LRNC、IPH 和 FCR 发生率及体积均明显高于非症状侧组, 具有显著统计学差异 ($P < 0.05$)。③斑块成分差异与卒中发生风险的 logistic 回归分析: 颈动脉斑块内 IPH ($OR=6.402$)、FCR ($OR=3.998$) 是缺血性卒中的强烈危险因素。LRNC ($OR=2.642$) 以及 Stenosis ($OR=1.078$) 也是缺血性卒中的危险因素, 但危险程度弱于 IPH 和 FCR。CA 与缺血性卒中并无明显风险关系。

结论 3.0T 磁共振颈动脉斑块高分辨成像技术可清晰、全面地显示颈动脉管壁、斑块及临近组织结构, 可以为临床上评估卒中风险提供更多影像学帮助。

PU-1767

自发性深部核团脑出血患者出血量阈值的研究

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研究目的: 本研究使用脑出血体积测量软件分析自发性不同深部核团(丘脑、基底节)脑出血量, 并对患者 3 个月临床预后进行评估(mRS 评分), 得出预后不良患者不同核团出血量的阈值。为临床评估治疗预后、精准治疗、个性化治疗、积极干预提供影像学依据。

材料与方法: 回顾性连续纳入 2018 年 8 月至 2020 年 12 月在开封市中心医院住院的确诊为自发性脑出血患者, 经颅脑 CT 检查结果及临床资料筛选出为自发性脑深部核团出血(包括基底节、丘脑)患者, 其中基底节出血患者 455 例(男性 335 例, 女性 120 例, 年龄 60 ± 14 岁。其中丘脑出血患者 212 例(男性 135 例, 女性 77 例, 年龄 63 ± 12 岁。使用 SPSS22.0 统计学软件进行数据分析, 对丘脑及基底神经节出血患者进行单变量和多变量 logistic 回归分析, 以确定 3 个月时预后不良(mRS 评分 ≥ 4)相关的协变量。用 ROC 曲线确定 SICH 丘脑及基底节脑出血量最优临界值以及相关的敏感性和特异性, 以预测丘脑和基底神经节 3 个月的不良结果。

结果: 自发性丘脑出血患者 3 个月预后不良患者的出血量阈值为 9mL (AUC: 0.89, 特异性: 87%, 敏感性: 82%), 自发性基底节出血患者 3 个月预后不良患者的出血量阈值为 18mL (AUC: 0.87, 特异性: 79%, 敏感性: 80%)。

结论: 1、脑深部核团出血患者临床预后与出血量呈明显正相关。2、丘脑出血患者 3 个月预后不良患者的出血量阈值更低, 出血容易破入脑室; 基底节出血患者 3 个月预后不良患者的出血量阈值较高, 临床临床容易合并蛛网膜下腔出血。3、根据脑深部核团出血量阈值能评估脑出血患者的预后, 能为临床进一步制定正确的干预措施提供重要的依据。

PU-1768

3D Cube 技术在帕金森病患者 DBS 术中丘脑底核 MRI 定位的应用

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【摘要】目的 探讨 3D T2 FLAIR Cube 序列对帕金森病(PD)患者深部脑电刺激术(DBS)显示丘脑底核(STN)的价值。方法 采用 3.0T MRI 对 36 例正常人及 36 例 PD 患者 DBS 术中进行扫描, 其中 3D T2 FLAIR Cube 序列的 TR=6300ms, TE=105ms, 矩阵=256X256, 层厚=0.9mm, 层间

距=0 mm, 对 36 例正常人与 36 例 PD 患者采集的 3D T2 FLAIR Cube 序列进行对比, 再对 36 例 PD 患者采集的 3D T2 FLAIR Cube 与以往定位扫描序列进行对比, 用两种对比结果进行半定量分析 3D T2 FLAIR Cube 序列对 STN 显示的情况, 术后进行 1.5T MRI 与 CT 扫描复查并确认患者微电极记录(ME R) 电极探针位置。结果 3D T2 FLAIR Cube 序列能完成高质量、高效率的薄层采集, 一次采集可任意角度观察图像, 半定量评分高于常用的 SPACE 和 T2 FLAIR 序列, 并与患者术中 ME R 确定的电极探针位置有较高的一致性。结论 使用 3D Cube 序列明显缩短患者术前检查时间, 可以准确预定靶点位置, 提高定位精确度和手术效率。

PU-1769

正常青年枕叶 GABA+水平与脑电连接网络拓扑效率的相关性研究

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目的: 利用磁共振波谱 (Magnetic Resonance Spectroscopy, MRS) 以及同步脑电 (Electroencephalogram, EEG) 技术分析正常青年人枕叶静息状态 γ -氨基丁酸水平与脑电连接网络拓扑效率的相关性, 预测枕叶 γ -氨基丁酸水平对神经网络的影响。

研究方法: 本研究对 40 名健康青年志愿者进行同步 EEG-MRS 扫描 (男女比例 16:24; 年龄:20-30 岁, 中位年龄 24 岁)。首先在静息状态下使用高分辨 3DT1WI 序列配备 64 通道的头部线圈扫描, 以定位 HERMES(Hadamard Encoding and Reconstruction of Mega-Edited Spectroscopy) 枕叶感兴趣区 (VOI)。然后, 应用 32 通道脑电系统记录脑电信号, 应用 HERMES 进行同步 EEG-MRS 扫描, 同步记录静息状态下枕叶递质水平及全脑电活动信号。应用 Gannet_3.1 软件包对 MRS 数据进行后处理, 以肌酸(Cr)作为内参, 结合 3DT1WI 数据分割, 计算体积校正后枕叶 VOI 的 GABA+水平。应用 EEGLab 软件包对原始脑电数据进行预处理, 使用 REAT 软件计算不同频段下的脑功能连接矩阵。然后, 利用 GRETNA 软件包进行图论网络分析, 评估脑电功能连接网络的拓扑特征(全局效率、局部效率和小世界属性)。分析被试枕叶递质水平与脑电连接网络拓扑特征的相关性。

结果: 正常青年静息状态下枕叶 GABA+水平与 α 频段脑电功能连接网络小世界属性呈显著负相关 ($r = -0.712$, $P < 0.0001$)。与 EEG 网络 β 频段的小世界属性呈弱相关 ($r = -0.359$, $P = 0.0228$), 与 δ 、 γ 、 θ 频段的小世界属性不相关。枕叶 GABA+水平与 EEG 网络五个频段的局部效率均不相关。枕叶 GABA+水平与 EEG 网络五个频段的全局效率均不相关。

结论: 正常青年人静息状态枕叶 GABA+水平与脑电连接网络小世界性负相关。

PU-1770

多时相 CT 血管成像彩色编码图评估急性缺血性脑卒中侧支循环的临床价值

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目的 探讨多时相 CT 血管成像 (mCTA) 彩色编码图在急性缺血性脑卒中 (AIS) 侧支循环评估中的价值及对临床预后的影响。方法 回顾性分析我院收治的前循环 AIS 患者的临床及影像学资料, 根据患者 90 天的改良 Rankin 评分量表(mRS)结果分为预后良好组 (91 例, $mRS < 3$ 分) 和预后不良组 (86 例, $mRS \geq 3$ 分)。采用 3 分法评估常规 mCTA 侧支循环评分、彩色编码图侧支循环

评分（包括侧支血管充盈的延迟程度和侧支血管的分布范围评分），采用 χ^2 或 Fisher 确切检验比较分析两组间常规 mCTA 侧支循环评分、彩色编码图侧支循环评分的差异，采用 Mann-Whitney U 检验比较两组间 CT 灌注成像（CTP）缺血区体积、梗死核心区体积的差异，采用受试者操作特征曲线（ROC）分析 CT 各参数对 AIS 患者临床预后的诊断价值，并进行二元 Logistic 回归分析，确定各参数对 AIS 患者临床预后的影响。结果 CT 各参数在两组间均具有明显统计学差异（ $P<0.05$ ），预后良好组有更好的侧支循环及更小的缺血和梗死核心区体积。ROC 结果显示彩色编码图侧支循环评分对患者临床预后的诊断价值与常规 mCTA 相似或更高（ $P>0.05$ ），侧支血管充盈的延迟程度评分与 CTP 缺血和梗死核心区体积的诊断价值相当（ $P>0.05$ ）。Logistic 回归分析显示侧支血管充盈的延迟程度评分是患者预后的影响因素。结论 mCTA 彩色编码图对预测 AIS 患者 90d 的临床预后具有较高价值，与常规 mCTA 和 CTP 相比，侧支血管充盈的延迟程度评分可以获得相似或更好的诊断效能。

PU-1771

3.0T MR 血管壁高分辨成像在颅内血管疾病诊断中的运用价值

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摘要 目的 探讨磁共振高分辨血管壁成像（high resolution vessel wall magnetic resonance imaging, HRVW-MRI）在颅内血管多种疾病中的诊断运用价值。方法 选取 2019 年 4 月至 2022 年 2 月在 PHILIPS 公司 Ingenia 3.0T 超导型磁共振颅内 HRVW-MRI 所有患者 52 例，与 DSA 和临床最终诊断结果进行对照。结果 52 例患者中，颅内动脉粥样硬化易损斑块 14 例，稳定性斑块 18 例，血管炎 5 例，夹层动脉瘤 3 例，血管畸形 2 例，静脉窦血栓 1 例，阴性 9 例，48 例（92.3%）与 DSA 及临床诊断结果一致，4 例与临床诊断不符，HRVW-MRI 检查 $AUC=0.895$ ，敏感度为 93.3%，特异度为 85.7%。结论 3.0T MR 颅内 HRVW-MRI 对于临床脑血管疾病精准诊断具有重要价值。

PU-1772

孤立性纤维性肿瘤--从概念到影像

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孤立性纤维性肿瘤（Solitary fibrous tumor, SFTs）是一种罕见的纤维母细胞间充质肿瘤，可发生于全身任何部位。长久以来，其分类、命名等多次出现变化，尤以中枢神经系统分类中变化较为明显。此外，该肿瘤本身具有较明显的异质性，影像学表现多样，经常诊断困难。在此，我们将结合临床病例及文献介绍孤立性纤维瘤的概念演变及其与其他术语，如血管外皮瘤、血管周细胞瘤、上皮样血管内皮细胞瘤等的关联；回顾孤立性纤维瘤的病理学表现、在软组织肿瘤及中枢神经系统肿瘤分类中的变化、总结其在全身各个系统中（包括颅内、头颈部、肺部、胸膜、肝脏、四肢等部位）的影像学表现。

PU-1773

胸椎管髓内支气管囊肿一例并文献复习

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该文报告了一例胸椎管髓内支气管囊肿, CT 胸椎三维重建显示 T1-T2 椎体水平椎管内软组织肿物, T3-T4 椎体融合, 胸椎骨质增生, MRI 平扫+增强扫描显示 T1-T2 水平椎管内可见椭圆形等 T1WI、长 T2WI 信号占位, 增强轻微均匀强化, 病灶上下缘可见长 T1WI 长 T2WI 信号阴影, 增强扫描不强化。

PU-1774

透明细胞型脑膜瘤的 MRI 表现分析

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目的: 总结透明细胞型脑膜瘤的 MRI 影像特征, 以期提高对该肿瘤的认识。材料和方法: 回顾性收集经病理证实的 15 例透明细胞型脑膜瘤患者的临床资料及 MRI 表现。结果: 4 例男性, 11 例女性, 中位年龄 41.7 岁; 8 例位于桥脑小脑角区, 其中 6 例跨中后颅窝生长, 呈囊实性, T1WI 呈等-低信号, T2WI 呈等-稍低信号, 实性成分呈石榴籽样改变, 2 例肿块周边可见血管流空, 增强扫描肿块实性成分 7 例明显强化, 1 例轻度强化, 4 例可见脑膜尾征; 5 例位于大脑凸面及 1 例位于矢状窦旁, 为实性肿块, T1WI 呈等信号, T2WI 呈高信号, 5 例肿块周边可见血管流空, 5 例周围脑组织可见明显水肿, 增强扫描肿块明显强化伴脑膜尾征; 1 例位于右侧侧脑室后角, 呈囊实性, T1WI、T2WI 呈混杂信号, 肿块周边可见血管流空, 增强扫描肿块实性成分明显强化。结论: 透明细胞型脑膜瘤的 MRI 表现具有一定特征性。

PU-1775

基于松果体区肿瘤的影像学特征的预后分层研究

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背景及目的: 松果体区肿瘤病理类型多样, 术前鉴别困难大、患者的预后差异大。本研究的目的是通过分析松果体区肿瘤的治疗前影像, 寻找对患者预后判断有价值的影像特征。

方法: 收集 2010-2023 年本院就诊的松果体区肿瘤病例, 回顾性分析患者治疗前的 MR 及 CT 影像。由放射科医师评估肿瘤的影像学特征, 包括形态、边界、信号及密度、强化程度、伴随改变 (钙化、脂肪、出血、囊变) 及肿瘤最大径。根据术后病理结果或疗效观察, 并按照近年文献中每种疾病的生存率, 将患者预后分为良好、中等、差三个级别。分析三种预后病变的影像学征象, 并列出具比例, 使用 FISHER 确切概率法及单因素 ANOVA 检验法对数据进行统计学分析。

结果: 入组 48 例患者 (男/女: 39/9, 年龄范围: 0-72 岁, 平均年龄: 25.0 ± 17.1 岁), 共证实 17 种疾病类型, 包括: 预后好 23 例, 预后中等 10 例, 预后差 15 例。影像学特征的预后分层统计结

果为：病灶可见中心包裹性钙化多提示预后较好，边缘钙化多提示预后较差（ $P=0.002$ ）；病灶内有出血多提示预后差（ $P=0.005$ ）；预后差的肿瘤最大径普遍比预后良好的最大径大（ $P=0.032$ ）。结论：病灶内钙化位置、是否伴有出血、肿瘤的大小，是判断松果体区肿瘤预后的特征性影像学表现。

PU-1776

Research on regional homogeneity of resting-state functional magnetic resonance imaging in female patients with first-episode mild-to-moderate depressive disorder

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Objective: To investigate the alterations of regional homogeneity (ReHo) by the resting-state functional magnetic resonance imaging (rs-fMRI) in female patients with first-episode mild-to-moderate depressive disorder and their correlation with the scores of 17-item Hamilton Rating Scale for Depression (HAMD-17) and Hamilton Anxiety Rating Scale (HAMA).

Methods and Materials: 41 patients and 34 healthy controls were collected totally. Then clinical scales (HAMD-17 and HAMA) for each participant were evaluated prior to fMRI scanning. Secondly, based on the SPM12 software, the different ReHo values between groups was tested using two-sample t-test. Finally, the correlation between the above clinical scales and the brain region with altered ReHo values was analyzed.

Results: Compared with the healthy controls, the ReHo values in the right orbitofrontal gyrus, left inferior frontal gyrus (pars opercularis), and right postcentral gyrus were significantly decreased in the depression group, but there was no significant correlation between the altered brain region and the scores of HAMD-17 and HAMA.

Conclusions: Female patients with first-episode mild-to-moderate depression have some brain regions with altered ReHo values, and it means that these brain regions tend to be disordered, which may be related to the emotion and cognitive function changes in this type of depression, and furtherly help guide personalized treatment for depression.

PU-1777

基于 CT 图像的肿瘤内及肿瘤周围放射组学在鉴别腮腺多形性腺瘤完整与不完整包膜特性的双中心研究

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目标: 多形性腺瘤 (pleomorphic adenoma, PA) 的包膜呈现多种状态, 包括包膜完整、包膜局部缺如、肿瘤侵犯包膜、形成卫星结节等。没有完整包膜的患者比有完整包膜的患者在手术治疗后具有更高的复发风险。我们旨在开发并验证基于 CT 图像的肿瘤内和瘤周放射组学特征的机器学习模型, 以区别腮腺 PA 的包膜完整与否。

方法: 我们对 260 名患者的数据进行了回顾性分析, 其中四川大学华西医院的 166 名患者作为训练集, 重庆医科大学附属第一医院的 94 名患者作为测试集。在每个患者的 CT 图像中定义了三个

感兴趣区 (volume of interest, VOIs): 肿瘤 (VOItumor), 瘤周 (VOlperitumor), 和同时包括肿瘤及瘤周的 (VOlintra-plus peritumor)。根据上述三个 VOI 中提取的放射组学特征, 训练并验证机器学习的模型。通过受试者工作特征曲线 (ROC) 的曲线下面积 (AUC) 评估模型性能。

结果: 我们在验证数据集上比较了所有模型的 AUC 值, 基于 VOlintra-plus peritumor 特征的放射组学模型表现最佳。我们发现, 基于 15 个影像组学特征的模型可以在验证数据集上获得最高的 AUC。AUC 值在训练集和测试集上分别是 0.86 和 0.87。

结论: 将机器学习与 CT 瘤周放射组学特征结合能准确预测腮腺 PA 的包膜特征。这使得术前识别腮腺 PA 的包膜完整与否成为可能, 可以协助临床术前和术后的诊疗计划。

PU-1778

Association between Choroid Plexus Volume and Glioma and its Clinical Significance

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Purpose: This study aims to explore the association between choroid plexus volume and glioma grading, classification, location, and pathological indicators to enhance our understanding of glioma, a prevalent and highly malignant brain tumor with poor prognosis.

Methods: In this study, we collected brain magnetic resonance imaging data from 670 glioma patients and 500 healthy controls (HC) who were recruited from Beijing Tiantan Hospital, and measured their choroid plexus volume of the lateral ventricles. The choroid plexus was segmented fully automatically on 3D contrast-enhanced T1-weighted MRI sequences using a deep learning algorithm developed by the authors using 3D nnU-Net. The patients were divided into different glioma classifications and grade groups based on pathological examination and molecular analysis. The patients' demographic and clinical data were collected from medical records. The Mann-Whitney U test and multivariate regression analysis were employed to compare the correlation between choroid plexus volume and different glioma classifications, grades, locations, and molecular pathological markers.

Results: Significant statistical differences were observed in choroid plexus volume between healthy controls and glioma patients, with glioma patients exhibiting larger volumes. Additionally, a significant correlation was found between choroid plexus volume and glioma grade, with low-grade glioma patients having larger volumes. Furthermore, a relationship was identified between choroid plexus volume and H3K27 alteration, with patients lacking H3K27 alteration showing larger volumes.

Conclusion: Choroid plexus volume emerges as a potential novel biological indicator for glioma diagnosis and grading. This study offers valuable insights for clinical practitioners and patients in the field of glioma diagnosis.

PU-1779

Voxel-level white matter iron content evaluation of Parkinson disease patients with cognitive decline using Strategically Acquired Gradient Echo technique

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Objectives

The Lewy-related pathology of Parkinson disease (PD) are widespread to whole brain beyond brainstem in PD dementia patients, mostly in cortical and subcortical area. Extra iron deposition in substantia nigra is a characteristic pathological of PD. We hypothesized that the abnormal iron content was also exist in cortical and subcortical area in PD patients with cognitive dysfunction. This study was aimed to quantitatively detect the abnormal iron content in gray and white matter in PD patients with cognitive decline.

Materials and methods

A total of 67 PD patients and 50 healthy controls (HC) were prospectively enrolled. PD diagnosis was confirmed by neurologist according to Chinese guidelines for the Treatment of Parkinson's disease (fourth edition) formulated by the Movement Disorders and Parkinson's Disease Group of the Neurology Branch of the Chinese Medical Association in 2020. The guidelines also included the exclusion criteria of PD. The HCs all MMSE score >24, and with no hypertension and diabetes mellitus. All participants underwent Mini-mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA). PD group were divided into three subgroups: PD with no dementia group (PDND): MMSE score >24, MoCA > 26, PD with mild cognitive impairment group (PD-MCI): MMSE score >24 and MoCA < 26; PD dementia group (PDD) group: MMSE score ≤ 24 and MoCA < 26. All PD patients underwent a Strategically Acquired Gradient Echo (STAGE) protocol on a 3.0T MRI scanner with a 32-channel phase-array head coil. T1 weighted image and susceptibility map derived from STAGE were analyzed in voxel-size level using MATLAB software, mean magnetic sensitivity values (MSV) of gray matter and white matter were measured, representing iron content (Figure 1). Demographic data were analyzed using SPSS v26.0 (SPSS Inc. IBM). The Shapiro-Wilk test was used to test the normality of data distribution. The chi-square test was used to analyze gender differences of the four groups. One-way ANOVA and LSD was used to compare the age and mean MSV of white matter of all subjects among four groups. Kruskal-Wallis test was used to analyze the mean MSV of gray matter. Statistical significance was defined as two-tailed $P < 0.05$.

Results

There was no significant difference of gender among four groups. Age was differed by groups (Table 1, Figure 2). The MSV of gray matter was differed between HC and PD-MCI group, and between HC and PDD group, as well as the MSV of white matter. No significant difference was found between PD-MCI and PDD group. And PDND group showed no significant difference compared to the other groups (Table 2, Figure 3).

Conclusion

PD patients with cognitive dysfunction had abnormal iron deposition in both white matter and gray matter, and was severe with age and cognitive status. The widespread iron accumulation in whole brain help to understand the PDD pathology progress.

PU-1780

基于 CT 影像自发性脑出血血肿扩大与脑白质病变的相关性研究

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摘要

背景:

自发性脑出血(ICH)是一种严重的脑卒中病变,大约 30%的自发性脑出血患者会发生血肿扩大(HE),导致神经系统症状恶化,甚至患者死亡。因此,早期治疗对挽救患者生命、改善预后至关重要。本文脑出血患者出血血肿扩大与脑白质病变的相关性,旨在探讨 24h 内脑出血患者出血体积扩大与脑白质病变程度的相关价值。

方法:

回顾性分析锦州医科大学附属第一医院 2020 年 1 月—2023 年 4 月脑出血患者的病史、影像学资料及实验室检查数据,患者均于 6 小时之内进行影像学检查,并在 24 小时内复查且未做手术。使用 Blennow 量表判断评估脑白质病变情况。将自发性幕上脑出血患者纳入分析,分别为血肿扩大组和非扩大组,脑白质病变严重组和非严重组。通过单因素和多因素分析确定自发性脑出血及脑白质病变的关系。

结果:

共 81 名患者纳入本次实验中,其中血肿扩大(HE)共 28 名(34.6%),单因素分析脑出血血肿扩大与扩张的血肿体积、血肿不规则、岛征、是否破入脑室、入院 GCS 分级有关,多因素回归分析入院 GCS 分级为血肿体积扩大的独立危险因素。严重脑白质变性组共 38 名(46.9%),单因素分析入院舒张压及年龄为影响因素。

结论:

脑白质病变的严重程度与自发性幕上脑出血早期血肿扩大无关,但白质病变与脑出血血肿的位置及与血肿相接触与血肿扩大风险显著相关。

关键词:脑出血 血肿扩大 脑白质病变

PU-1781

针刺通过调节大脑局部的自发低频活动治疗皮层下血管性认知功能障碍

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目的

皮层下血管性认知障碍(SVCI)是由脑小血管病引起的认知功能损害。本研究拟收集 SVCI 受试者,给予针刺治疗,通过比较治疗前后认知功能和功能磁共振的变化,评价针刺治疗 SVCI 的脑功能变化。

方法

招募 60 例 SVCI 受试者,随机分为针刺组(Acu 组)和对照组(Con 组),每组 30 例。针刺组在基础治疗外给予针刺治疗,为期 8 周,每周 3 次,每次 30 分钟。穴位选择百会穴、四神聪、神庭穴、双侧风池、双侧曲池穴、双侧内关穴。针刺组及对照组均给予基础治疗,包括但不限于安理申、降血压,降血糖等。在研究过程中,由于质量控制和受试者脱落的原因,最终共 46 例 SVCI 受试者完成本研究(Acu=22, Con=24)。比较两组人口统计学资料,以及 MoCA 量表的评分变化,功能磁共振分析基于 Matlab 平台的 DPARSF 插件,计算低频振荡分数(fALFF)值(0.01-0.08Hz

频段)。临床资料采用 SPSS 25.0 软件进行统计学分析, 计量资料以 ($\bar{x} \pm s$) 表示, 计量资料符合正态分布行两样本 t 检验, 不符合正态分布行 Mann-Whitney U 检验, 计数资料行卡方检验, 两组有效率分析采用秩和检验, 治疗前后量表的变化采用配对 t 检验。治疗前后 fMRI 数据比较采用配对样本 t 检验, 并进行多重比较校正 (GRF 校正), 将年龄、性别及受教育年限作为协变量回归。提取治疗前后各组的 fMRI 指标, 与 MoCA 评分进行相关性, 满足正态分布使用 Pearson 相关分析, 不满足正态分布使用 Spearman 相关。

结果

针刺治疗后, SVCI 患者的 MoCA 评分较治疗前提高 ($p < 0.05$)。针刺组 fALFF 较治疗前增加的脑区为右侧前岛叶、左侧舌回, fALFF 值下降的脑区为左侧额下回、左侧角回, 对照组的左侧枕上回、枕中回 fALFF 下降 (voxel $p < 0.01$, cluster $p < 0.05$, GRF 校正)。右侧岛叶、左侧舌回 fALFF 值的改变与量表评分的增加呈正相关, $r(\text{Insula_R}) = 0.547$, $r(\text{Lingual_L}) = 0.538$, $p < 0.01$ 。

结论

针刺可以调节 SVCI 患者大脑岛叶、舌回的自发低频活动, 并改善认知功能。

PU-1782

Potential approach to quantify the volume of ischemic core if truncation of computed tomography perfusion scan occurred: a preliminary study

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Objective: To provide an alternative approach to quantify the volume of ischemic core (IC) if truncation of computed tomography perfusion (CTP) scan occurred.

Methods: Baseline CTP and follow-up diffusion-weighted imaging (DWI) data of 88 stroke patients were retrospectively collected. CTP source images (CTPSI) from unenhanced phase to peak arterial phase (CTPSI-A) or peak venous phase (CTPSI-V) were collected to simulate a truncation of CTP scan in arterial or venous phase, respectively. The volume of IC on CTPSI-A (VCTPSI-A) or CTPSI-V (VCTPSI-V) was defined as the volume of brain tissue with $>65\%$ reduction in attenuation than normal tissue. The volume of IC on baseline CTP (VCTP) was defined as a relative cerebral blood flow was $<30\%$ of that in normal tissue. Volume of post-treatment infarct on follow-up DWI (VDWI) was manually delineated and calculated. One-way analysis of variance, Bland-Altman plots and Spearman correlation analyses were used.

Results: VCTPSI-A was significantly higher than VDWI ($P < 0.001$), while there was no significant difference between VCTP and VDWI ($P = 0.073$) or between VCTPSI-V and VDWI ($P > 0.999$). The mean difference between VDWI and VCTPSI-V was 1.70mL (LoA, -56.40 to 59.70), followed by that between VDWI and VCTP (8.30mL; LoA, -40.70 to 57.30), and that between VDWI and VCTPSI-A (-68.10mL; LoA, -180.90 to 44.70). Significant correlations were found between VDWI and VCTP ($r = 0.68$, $P < 0.001$), or between VDWI and VCTPSI-V ($r = 0.39$, $P < 0.001$), while not between VDWI and VCTPSI-A ($r = 0.20$, $P = 0.068$).

Conclusions: VCTPSI-V might be promising in quantifying the volume of IC if truncation of CTP scan occurred.

PU-1783

Suboptimal states and frontoparietal network-centered incomplete compensation revealed by dynamic functional network connectivity in patients with post-stroke cognitive impairment

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Background: Neural reorganization occurs after a stroke, and dynamic functional network connectivity (dFNC) pattern is associated with cognition. We hypothesized that dFNC alterations resulted from neural reorganization in post-stroke cognitive impairment (PSCI) patients, and specific dFNC patterns characterized different pathological types of PSCI.

Methods: Resting-state fMRI data were collected from 16 PSCI patients with hemorrhagic stroke (hPSCI group), 21 PSCI patients with ischemic stroke (iPSCI group), and 21 healthy controls (HC). We performed the dFNC analysis for the dynamic connectivity states, together with their topological and temporal features.

Results: We identified 10 resting-state networks (RSNs), and the dFNCs could be clustered into four reoccurring states (modular, regional, sparse, and strong). Compared with HC, the hPSCI and iPSCI patients showed lower standard deviation (SD) and coefficient of variation (CV) in the regional and modular states, respectively ($p < 0.05$). Reduced connectivities within the primary network (visual, auditory, and sensorimotor networks) and between the primary and high-order cognitive control domains were observed ($p < 0.01$).

Conclusion: The transition trend to suboptimal states may play a compensatory role in patients with PSCI through redundancy networks. The reduced exploratory capacity (SD and CV) in different suboptimal states characterized cognitive impairment and pathological types of PSCI. The functional disconnection between the primary and high-order cognitive control network and the frontoparietal network centered (FPN-centered) incomplete compensation may be the pathological mechanism of PSCI. These results emphasize the flexibility of neural reorganization during self-repair.

PU-1784

基于 TBSS 探讨终末期肾病继发甲旁亢患者脑白质损伤

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目的 探讨 ESRD 伴 SHPT 患者认知及脑白质微观结构损伤 方法 25 名 ESRD 合并 SHPT 患者 (SHPT 组) 及 25 名 ESRD 不伴甲旁亢患者 (ESRD 组) 行磁共振 DTI 检查、进行 MMSE 认知量表评估, 收集相关临床血清学指标, 比较两组间 MMSE、总评分、血清学指标、DTI 指标的差异, 分析 SHPT 组 MMSE 总评分、血清学指标与差异性脑区 DTI 参数的相关性。结果 与 ESRD 组相比, SHPT 组 MMSE 总评分明显减低, 血清钙水平略升高, 维生素 D 水平明显减低。SHPT 组多个脑区 FA 值及 AD 值减低, 包括大脑半球、小脑及脑干, 且大脑半球异常脑区以右侧分布为主, 部分脑区 RD 值升高, 且 SHPT 组血清钙水平、磷酸盐水平及肌酐水平与部分脑区 FA 值及 AD 值减低呈正相关, 血清磷酸盐水平与部分脑区 RD 值升高相关, 认知水平与血清 iPTH 水平呈负相关 (P 均 < 0.05); 其他指标未见明显统计学差异 (P 均 > 0.05)。结论 本研究显示 ESRD 合并 SHPT 患者的脑白质微观结构及认知功能均出现损伤, 且脑白质微结构损伤范围广泛, 以轴突损伤为主, 具有右侧大脑半球偏侧性, 且与患者血清钙、磷酸盐、肌酐水平相关。

PU-1785

Identifying circuits underlying motor impairment in pontine stroke

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Objectives: Pontine stroke often presents with various motor impairments, but the underlying neural mechanisms remain largely unclear. This study aims to investigate the relationship between pontine lesion spatial location and motor impairments using functional connectivity magnetic resonance imaging (fcMRI).

Methods: Forty-five subacute pontine stroke patients and 45 demographically- and underlying disease-matched controls were included in this study. Multi-modal brain MRI, motor, and global cognitive data were collected. Interhemispheric functional connectivity based on resting-state fMRI was computed and different types of motor impairments were classified. Lesion probability mapping and lesion network imaging were used to determine the network involvement of pontine lesions.

Results: Pontine stroke patients exhibited prominent reductions in interhemispheric functional connectivity, predominantly involving somatosensory-motor and language networks. Further classification indicated that interhemispheric connections could effectively differentiate different motor impairment symptoms, leading to the spatial subdivision of the pontine lesions into distinct probability maps. These subdivisions were linked to different motor circuits, providing insights into the neural mechanisms underlying impairments after pontine stroke.

Conclusion: Our findings suggest distinct spatial outcomes of pontine stroke that correspond well to cortical somatosensory-motor networks, highlighting the underlying substrate of network circuits.

PU-1786

ASL 联合 DWI 在鉴别高级别胶质瘤真假性进展中的应用价值

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目的 探讨动脉自旋标记(arterial spin labeling, ASL)联合表观弥散系数(apparent diffusion coefficient, ADC)在鉴别高级别胶质瘤真假性进展的诊断价值。**方法** 回顾性分析 27 例高级别胶质瘤患者的临床及影像资料, 其中胶质母细胞瘤 21 例, IDH 突变型弥漫性星形细胞瘤 WHO 4 级 2 例, IDH 突变型弥漫性星形细胞瘤 WHO 3 级 4 例。真性进展 20 例, 假性进展 7 例, 比较 T1 增强强化区与对侧正常区的脑血流量比值(Cerebral blood flow, rCBF)、表观扩散系数值(ADC)。**结果** ASL 显示真性进展 rCBF 值(2.56 ± 0.12)显著高于假性进展组的 rCBF 值(1.04 ± 0.18), 二者差异有统计学意义; b 值=2000s/mm² 真性进展 ADC 值低于假性进展组 ADC 值, 二者差异有统计学意义; 而 b 值=1000s/mm² 真假性进展 ADC 值差异无统计学意义。**结论** ASL 联合 ADC 对鉴别高级别胶质瘤真假性进展有一定价值。

PU-1787

4 例颅内非典型畸胎样/横纹肌样肿瘤磁共振影像特征分析

关舒元

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目的 探讨颅内非典型畸胎瘤样/横纹肌样肿瘤(AT/RT)的 MRI 表现特征, 提高对该病的诊断及鉴别能力。

方法 回顾性分析 4 例经病理和免疫组织化学诊断为 AT/RT 患者的临床及影像资料。其中男 2 例, 女 2 例, 年龄 2~55 岁。所有患者均行 MR 平扫及增强扫描。

结果 4 例 AT/RT 患者中 2 例位于鞍区, 1 例位于前颅窝底, 1 例位于后颅窝; 4 例肿瘤均可见囊变, 3 例伴有瘤内出血, 3 例显示轻度瘤周水肿; 所有病灶均呈不均匀中-重度强化; 所有病灶 DWI 呈不均匀高信号, ADC 呈低信号。

结论 颅内 AT/RT 的 MRI 表现具有一定特征, 结合临床资料有助于鉴别诊断。

PU-1788

Neuroanatomical correlates of cognitive impairment following basal ganglia-thalamic post-hemorrhagic stroke: Uncovering network-wide alterations in hemispheric gray matter asymmetry

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Purpose This study aimed to investigate whether post-hemorrhagic stroke cognitive impairment (PhSCI) is associated with cortical gray matter (GM) loss and hemispheric asymmetry changes and whether these changes could predict improvements in cognitive function during the recovery.

Methods Nineteen patients with PhSCI, comprising 10 with basal ganglia hemorrhage and 9 with thalamic hemorrhage, were recruited. Among them, 9 completed a course of repetitive transcranial magnetic stimulation (rTMS). Additionally, 19 demographically and comorbidity-matched healthy controls were also included. Structural brain MRI and cognitive assessments were performed. Voxel-wise GM volume and hemispheric asymmetry were analyzed.

Results The PhSCI patients exhibited bilateral, yet asymmetric, GM losses in the hippocampus, fusiform, lateral temporal, prefrontal, somatomotor, and inferior parietal regions. The analysis of GM asymmetry revealed that patients showed rightward GM in the lateral temporal, somatomotor, and inferior parietal regions. Among the 9 PhSCI patients who completed rTMS, there was a marginal trend of regional GM increase and leftward GM, and these changes were in parallel with the improvements in cognitive tests. Further lesion connectivity and metanalytic mapping identified two interconnected systems linked to the lesions, which were anchored in the default mode, somatomotor, and salience/cognitive control networks and in the cognitive domains of memory, language, decision-making, and executive function.

Conclusion PhSCI patients exhibited network-wide cortical GM losses, distal to subcortical hemorrhagic lesions, and hemisphere asymmetry changes. These changes appear to predict rTMS-related cognitive improvements, suggesting that even subcortical focal lesions can lead to alterations in distal cortical neuroanatomical architecture. Our preliminary findings provide new insights into the neuroanatomical basis of PhSCI.

PU-1789

失神癫痫意识丧失与重新获取的动态功能梯度模式

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前言：意识的过程是一个动态过程，包含了信息获取、处理、反馈执行的一系列过程，意识过程存在层级结构。失神癫痫是一类常见的儿童癫痫，以意识的丧失和再获取为最主要的发作症状。新型功能连接梯度技术能有效描述整体脑模式。我们采用 EEG-fMRI 技术，结合动态功能连接技术和功能连接梯度技术，研究失神癫痫发作过程中的脑改变模式。

材料与方法：本研究纳入 12 名失神癫痫，采集了同步 EEG-fMRI 序列，由本院神经内科医生判读了失神癫痫发放 (GSWDs) 的起始和终止时间点。根据 GSWDs 的起始时间，截取了 29 段包含发作前 (起始时间前 10TR)，发作中 (从起始开始，到终止后 9TR) 和发作后 (发作终止后 9-18TR) 的时间序列点用于后续分析。fMRI 数据预处理采用 fmripred 工具包进行，并配准到 fsaverage3 空间和 6x6x6mm³ 的 MNI 空间，并提取了皮层和丘脑的时间序列。应用 DynamicBC 工具包，采用 FLS 算法构建动态功能连接矩阵；应用 BrainSpace 工具包构建功能连接梯度，并采用 Yeo7 网络和丘脑对全脑节点进行标记。采用功能连接梯度偏心率公式，计算了基于前三梯度的总体偏心率，子网络内和子网络间偏心率指标。统计分析采用的是重复测量的 ANOVA 分析，比较了前三梯度和偏心率指标的动态改变模式。

结果：在梯度指标中，躯体运动，注意网络出现了倒 V 型改变模式，并且在梯度 2 中发现了 DMN 的 V 型模式，以及梯度 3 中的倒 V 型改变模式。在整体离散度上，发作前中后的离散度呈现倒 V 型模式。在子网络内离散偏心率指标中，差异区域主要落在注意网络和丘脑上。在子网络间离散偏心率指标中，差异主要集中于视觉，注意网络，默认网络以及丘脑之间的距离。

结论：我们结合了动态功能连接和梯度分析技术，扩展了梯度偏心率离散度指标，提出了子网络内偏心率离散度和子网络间偏心率离散度，并评价了失神癫痫患者 GSWDs 发作前、发作中、以及发作后三状态间的脑状态切换的模式。DMN 和注意网络的抑制可能是失神癫痫发作中的重要影像学发现，其可能与失神癫痫患者的意识丧失有关，GSWDs 影响了丘脑-皮层间的信息交流，尤其是影响了丘脑-注意网络的信息交流。

PU-1790

基于标准空间分析急性缺血性脑卒中患者血清甘油三酯对损伤位置和体积介导的功能结局的间接影响:结构方程模型

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目的：采用基于人群的标准空间分析的 MRI 技术，探索甘油三酯(TG)对急性缺血性脑卒中梗死灶分布空间模式的影响，并利用结构方程模型探讨血清甘油三酯对急性缺血性卒中患者病变部位和体积介导的功能转归的间接影响。

方法：回顾性收集 2015 年 1 月至 2020 年 12 月东部战区总医院以及 2013 年 1 月至 2021 年 12 月南京市第一医院共 657 例前循环缺血性脑卒中患者急性期 MRI 数据。根据血脂情况分为高 TG 组 (n=100) 和低 TG 组 (n=557)。将弥散加权成像 (DWI) 图像人工智能自动分割后的梗死灶，配准到 MNI152 标准空间绘制病灶位置频次热图。并基于 Arterial Atlas 模板进行标准空间下的感兴趣区分析。采用组间比较两组病灶位置的差异，广义线性模型回归分析观察 TG 与病灶位置的相关性。在逻辑回归模型中分析功能结局与临床变量之间的关系。最后使用结构方程模型重点研究了血清 TG、病变位置、体积、mRS 等控制变量之间的关系。

结果:血清 TG 是功能结局的独立决定因素。组间比较结果显示,右外侧豆纹动脉供血区和左侧大脑中动脉额部供血区与低血清 TG 显著相关。广义线性模型显示,右外侧豆纹动脉供血区域与低血清 TG 显著相关。结构方程模型结果显示,3 个月随访时,血清 TG 对身体功能的总影响为-0.091,其中 76.2%(-0.07)是直接影响,15.3%(-0.014)是由

梗死体积介导的间接影响;病变部位介导通路的间接影响仅为 8.5%(-0.008)。

结论:前循环缺血性脑卒中患者右外侧豆纹动脉所供应的区域与低血清 TG 显著相关。血清 TG 越低,预后越差。此外,血清 TG 通过病变体积和梗死部位间接影响预后。

PU-1791

脑室内多发菊形团形成型胶质神经元肿瘤一例并文献复习

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目的:报道 1 例脑室内多发菊形团形成型胶质神经元肿瘤(RNGT)病例,通过文献复习,总结 RNGT 的临床及影像学特征,旨在提高对该病的认识

方法:根据关键词"RNGT",在 Pubmed 数据库中进行检索(www.pubmed.gov),搜索出 87 例符合条件的相关病例报道,全面回顾总结这 87 例 RNGT 的流行病学、肿瘤位置及影像学表现

结果:本例为 1 名 41 岁男性患者,半年前突发意识丧失 2 次,影像学表现为第四脑室、中脑导水管及双侧侧脑室内多发肿块,T1WI 呈高低混杂信号,T2WI 呈高信号,增强扫描实性部分呈结节样强化;病理结果:菊形团形成型胶质神经元肿瘤(RNGT),WHO I 级,免疫组化:Olig-2(3+),MAP2(3+),ATRX(3+),菊形团中央神经毡 Syn(3+),部分神经元 Neu-N(2+);胶质区瘤细胞 GFAP(3+),IDH1(-),P53(-),EMA(-),Ki67(约 1%)。随后通过文献复习,本研究总结 87 例 RNGT 的临床及影像学特征:(1)发病年龄:好发于年轻成年男性,平均年龄为 26.9 岁(范围 6--75),男女比例为 1.48:1(35:52);(2)临床症状:多数表现为头痛、步态障碍、眩晕和视觉障碍等,少数为偶然发现(8 例),病程从数月至数年不等;(3)发病部位:35.6%(31/87)RNGT 与第四脑室相关;仅有 2.3%(2/87)RNGT 发生在第四脑室并向第三脑室和侧脑室扩散;(4)影像表现:70.7%(53/75)表现为囊实性,22.7%(17/75)表现为实性,6.6%(5/75)表现为囊性。实性部分在 T1WI 上为等或低信号,T2WI 上为高信号,增强扫描后大多数肿瘤发生强化(74.7%,59/79),以不均匀强化最常见(58.2%,46/79)。

结论:尽管 RNGTs 具有良性组织学特征,但由于播散转移的生长方式,对临床手术和术后管理可能是一个挑战。因此,正确认识并诊断罕见的多发 RNGT,可能有助于临床决策

PU-1792

多发脑胶质瘤的空间位置特征的 MRI 研究

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目的 探究多发脑胶质瘤的位置分布与基因表型及细胞富集的空间相关性

方法 回顾性分析 2010 年至 2020 年国内三家医院以及癌症基因组图谱(TCGA)共 211 例多发胶质瘤的影像学数据,使用 MRICron 软件在 T1WI 增强像上勾画肿瘤的所有瘤灶,再采用 SPM 软件把图像及肿瘤 ROI 配准到 MNI 标准空间,叠加所有瘤灶 ROI,得到位置分布空间频次热图。通过文献检索 27 个临床常见的脑胶质瘤相关基因,采用配对样本 t 检验比较多发和单发胶质瘤相关基因关联强度 t 的区别,使用 NeuroVault 工具分别评估多发和单发脑胶质瘤空间分布模式与基因表达

的空间相似性。使用 BrainSpan 数据集, 通过细胞类型特异性表达分析 CSEA 发育表达工具进行发育富集分析

结果 相比单发, 多发脑胶质瘤频繁出现在双侧脑室旁、胼胝体及右侧岛叶 ($P < 0.05$), 分布差异脑区位于双侧脑室旁及胼胝体。14 种胶质瘤风险基因中有 5 种与多发脑胶质瘤空间位置存在正相关, 非风险(保护)基因中有 3 种与多发胶质瘤的空间位置存在负相关。小胶质细胞和内皮细胞富集表达的脑区, 多发胶质瘤发生率更高

结论 本研究表征了多发胶质瘤的空间分布特征以及潜在的与位置相关的起源细胞及驱动基因簇, 有助于理解多发脑胶质瘤的空间分布模式形成的病理生理机制

PU-1793

Abnormal white and gray matter functional connectivity is associated with cognitive dysfunction in presbycusis

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Presbycusis is characterized by high-frequency hearing loss and is closely associated with cognitive decline. Previous studies have observed functional reorganization of gray matter (GM) in presbycusis, but the information transmission between GM and white matter (WM) remains ill-defined. Using resting-state functional magnetic resonance imaging, we investigated differences in functional connectivity (GM-GM, WM-WM, and GM-WM) between 60 patients with presbycusis and 57 healthy controls. Subsequently, we examined the correlation between these connectivity differences with high-frequency hearing loss as well as cognitive impairment. Our results revealed significant alterations in functional connectivity involving the body of the corpus callosum (BCC), posterior limbs of the internal capsule, retrolenticular region of the internal capsule, and the GM regions in presbycusis. Notably, disrupted functional connectivity was observed between BCC and ventral anterior cingulate cortex in presbycusis, which was associated with impaired attentional. Additionally, enhanced functional connectivity was found in presbycusis between the internal capsule and the ventral auditory processing stream, which was related to impaired cognition in multiple domains. These two patterns of altered functional connectivity between GM and WM may involve both bottom-up and top-down regulation of cognitive function. These findings provide novel insights into understanding cognitive compensation and resource redistribution mechanisms in presbycusis.

PU-1794

脑胶质淋巴系统受损对急性缺血性卒中患者短期预后的影响：一项基于 DTI-ALPS 的研究

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目的: 龋齿动物和临床研究证实了缺血性卒中后脑胶质淋巴系统明显受损。本研究旨在利用沿血管周围空间的弥散张量图像分析 (DTI-ALPS) 方法追踪急性缺血性卒中患者胶质淋巴系统活性短期内的急剧变化, 探索 DTI-ALPS 指数变化与血管周围间隙体积、神经功能之间的关系。**方法:** 本研究纳入 50 例急性缺血性卒中的患者, 对其治疗后的 24 小时 (急性期)、7 天 (亚急性期) 和 3 个月 (慢性期) 进行头颅磁共振成像和神经功能缺损 (NIHSS) 评分, 并匹配间隔时间相同的健康对照组。基于沿血管周围空间的弥散张量图像分析 (DTI-ALPS) 方法追踪胶质淋巴系统活性短期内

的急剧变化,并定量测量基底神经节(BG)、半卵圆中心(CSO)和侧脑室水平(LVB)三个位置的血管周围间隙体积(PVS)分数。探索不同阶段 DTI-ALPS 指数和 PVS 体积分数变化规律,分析 DTI-ALPS 指数、PVS 体积分数与神经功能的相关性,使用多元回归分析量化对各危险因素对缺血性卒中短期预后的影响效应。**结果:**与对侧及对照组同侧相比,急性缺血性卒中的患者梗塞侧 24 小时内的 ALPS 指数为 1.61 ± 0.1 ,呈轻度升高($P=0.012$),在 7 天和 3 个月时 ALPS 指数分别为 1.35 ± 0.15 和 1.45 ± 0.13 ,呈下降趋势, ($P<0.001$)。卒中患者的 BG-PVS 体积分数明显大于对照组,并与 ALPS 指数呈负相关($r=-0.312, P=0.041$)。较低的 ALPS 指数与 NIHSS 测试的低分数相关($r=0.515, P=0.021$)。多元回归分析显示在短期预后中,ALPS 指数影响显著(效应量 >0.15)。**结论:**急性缺血性卒中的患者 DTI-ALPS 在急性期出现轻度上升,在亚急性期和慢性期后下降至低于正常值,提示胶质淋巴系统在缺血早期活性上升,随后下降。DTI-ALPS 指数与 BG-PVS 增大和短期内较差的神经功能相关。

PU-1795

扩散峰度成像在脑胶质瘤分级诊断中的应用价值

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目的

探讨扩散峰度成像对脑胶质瘤分级诊断的价值。

方法

回顾性分析 2018-2020 年经病理证实的 65 例脑胶质瘤患者的临床、影像资料,其中 WHO2 级 29 例、WHO3 级 20 例、WHO4 级 16 例。患者术前均行常规 MRI 及 DKI 扫描,测量肿瘤实质区、瘤周水肿区和同层面对侧正常脑白质区的 DKI 参数扩散各项异性分数(FA)、平均扩散系数(MD)、平均扩散峰度(MK)、轴向扩散峰度(Ka)、径向扩散峰度(Kr),将肿瘤实质区测量值除以对侧正常脑白质区测量数值,获得校正后参数,得到相对扩散各项异性分数(rFA)、相对平均扩散系数(rMD)、相对平均扩散峰度(rMK)、相对轴向扩散峰度(rKa)、相对径向扩散峰度(rKr)值。应用方差分析或 Mann-Whitney U 检验比较不同组织学分级胶质瘤校正后 DKI 参数差异,绘制受试者工作特征(ROC)曲线分析各参数值对胶质瘤病理分级的诊断价值。

结果

不同病理分级的胶质瘤肿瘤实质区 rMD、rKa 比较,差异无统计学意义($P>0.05$),病理分级 4 级者 rMK、rKr 明显高于 2 级、3 级者且差异有统计学意义($P<0.05$),但 2 级和 3 级 rMK、rKr 间差异无统计学意义,4 级 rFA 参数值虽然高于 2 级和 3 级,但仅 4 级和 3 级之间差异有统计学意义($P<0.05$)。不同级别瘤周水肿区 rMK 和 rKr 差异有统计学意义($P<0.05$),其余参数差异均无统计学意义($P>0.05$)。ROC 曲线分析结果显示,肿瘤实质区 rMK、rKr、rFA 和瘤周水肿区 rMK 和 rKr 均对病理分级 4 级胶质瘤有较高诊断价值($P<0.05$),ROC 曲线下面积分别为 0.796[95%置信区间(confidence interval, CI): 0.660~0.932]、0.745 (95% CI: 0.592~0.897)、0.704 (95% CI: 0.575~0.833)、0.755 (95% CI: 0.618~0.892)、0.694 (95% CI: 0.555~0.833)。

结论

DKI 可以无创地评估胶质瘤级别, rMK、rKr、rFA 值对病理分级 4 级胶质瘤有较高的诊断价值,其中, rMK 的诊断效能最高。

PU-1796

Fahr 综合征的影像表现及临床分析

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【摘要】目的 探讨 Fahr 综合征的 CT、MR 影像特点及临床表现, 以期提高对本病的认识。方法 回顾性分析 6 例经临床证实的 Fahr 综合征的影像学表现及临床特征。结果 本组 6 例患者, 其中男 2 例, 女 4 例; 年龄 39 岁-71 岁, 平均 55 岁。5 例均做 CT 和 MR 检查, 1 例只做 MR 检查。CT 上表现为尾状核、苍白球、齿状核等部位对称性钙化, 其他部位受累少见; MR 上表现为双侧基底节、丘脑、小脑齿状核处 T1WI 呈低信号, 部分为稍高信号; T2WI、T2flair、DWI 呈低信号, 部分为稍低信号; T2*加权血管成像 (SWAN) 呈低信号或稍低信号。对大脑皮质区的钙化沉积, CT 优于 MR; 对于早期病例, 尤其对基底节、齿状核的钙化沉积, MR 优于 CT, 尤其是 SWAN 及 DWI 有助于诊断。临床表现多为头晕、进行性行动迟缓、四肢震颤、言语不清、四肢无力等。6 例患者均无家族遗传病和传染性疾病。6 例患者的血钙、血磷、甲状旁腺激素及降钙素含量均正常。讨论 Fahr 综合征又称基底节钙化综合征, 是一种罕见的神经退行性疾病, 其特征是基底神经节的双侧对称性钙化, 但也累及其他脑结构。1855 年 Virchow 和 Bamber 首先在病理上证实基底节钙化。Fahr 综合征不等同于 Fahr 病, 但其包含了 Fahr 病。Fahr 病指特发性基底节钙化, 1930 年首次由德国神经学家 Kari Theodor Fahr 描述。目前临床诊断标准: (1) 影像上见双侧基底节钙化, 可有其他区域受累。(2) 进展性神经系统症状, 包括运动障碍、精神症状等。起病年龄多在 40-50 岁, 也可早期起病; 无甲状旁腺功能减退、假性/假-假甲状旁腺功能减退的临床表现; (3) 血清钙、磷在正常范围内; 无生化检查异常和提示线粒体或其他代谢病等全身疾病证据; 肾小管对甲状腺素反应正常; (4) 无感染、中毒、外伤等; (5) 有常染色体显性遗传或无家族史。Fahr 综合征在影像学上均有对称基底节区伴或不伴有其他区域对称性钙化, 需与甲状旁腺功能减退、假性/假-假性甲状旁腺功能减退、线粒体脑肌病等疾病相鉴别; CT 与 MR 联合检查为其提供可靠的诊断依据, 另外还需结合临床表现及实验室检查, 临床上需认真鉴别诊断。

PU-1797

颈动脉-椎基底动脉吻合影像分析及文献复习

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摘要: 目的: 认识颈动脉-椎基底动脉吻合的影像征象, 了解颈动脉-椎基底动脉吻合的临床意义。材料与方法: 回顾性收集本院 2017 年 1 月至 2022 年 6 月颈内动脉-椎基底动脉吻合 30 例。所有病例均经 MRA 或 CTA 证实。结果: 30 例病例中, 男性 13 例, 女性 17 例, 年龄 40~84 岁, 平均年龄 63.9 岁。30 例中, 永存三叉动脉 28 例, 其中右侧颈内动脉与基底动脉吻合 17, 左侧颈内动脉与基底动脉吻合 11 例; 永存舌下动脉 2 例, 左右各 1 例。结论: CTA 与 MRA 均可很好显示颈内动脉-椎基底动脉吻合, CTA 原始图像能更好地显示吻合血管与颅底骨性管道的关系; 而 MRA 原始图像能显示吻合血管与神经的关系。

PU-1798

Metabolic Habitat Imaging Predicts Individual Progression-free Survival in High-grade Glioma after Concurrent Chemoradiotherapy

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Objective We design a feasibility study to obtain a set of metabolic-hemodynamic habitats for tackling tumor spatial metabolic pattern with hemodynamic information.

Methods: Preoperative data from 69 HGG patients with subsequent histologic confirmation of HGG were prospectively collected (January 2016 to March 2020) after CCRT. Four vascular habitats were automatically segmentation by Multiparametric MRI. The metabolic information either at enhancing or edema tumor regions obtain by two neuroradiologists. The relative habitat volumes were used for weight estimation procedures for computing the coefficients of a linear regression model using weighted least squares (WLS) for metabolites semi-quantifications (i.e., Cho/NAA ratio and the Cho/Cr ratio) at vascular habitats. Multivariate Cox proportional hazard regression analyses to obtain odds ratio (OR) and develop a nomogram using weighted estimators corresponding to each covariate derived from Cox regression coefficients.

Results There were strongly correlation between perfusion indexes and Cho/Cr ratio (rCBV, $r = 0.712$,) or Cho/NAA ratio (rCBV, $r = 0.664$) at HAT habitat. Compared IDH mutation to their wild type, the IDH wildtype had significantly decreased Cho/Cr ratio (IDH mutation: Cho/Cr ratio = 2.44 ± 0.33 , IDH wildtype: Cho/Cr ratio = 2.66 ± 0.36 , $t = -2.342$, $p = 0.02$, 95% CI = -0.409 to -0.033) and Cho/NAA ratio (IDH mutation: Cho/Cr ratio = 4.59 ± 0.611 , IDH wildtype: Cho/Cr ratio = 4.99 ± 0.664 , $t = -2.342$, $p = 0.022$, 95% CI = -0.747 to -0.067) at the HAT. The C-index for the median PFS prediction were 0.769 for Cho/NAA nomogram and 0.747 for Cho/Cr nomogram through 1000 bootstrapping validation.

Conclusions Our findings suggest that spatial metabolism combined with hemodynamic heterogeneity is associated with individual PFS to HGG patient post CCRT

PU-1799

阿尔茨海默病伴情绪障碍脑灰质体积改变及其与认知损害的相关性研究

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目的 尽管阿尔茨海默病(Alzheimer's disease, AD)核心症状为记忆障碍和其他认知领域缺陷,但在疾病进程中,通常会观察到焦虑、抑郁等神经精神症状。本研究拟探讨伴或不伴情绪障碍患者脑灰质体积(GMV)改变是否存在差异,及其与认知损害的相关性。

方法 通过量表评估,具有焦虑和/或抑郁症状者被认为伴情绪障碍,纳入 AD 患者 92 例(伴情绪障碍 35 例,不伴情绪障碍 57 例),健康对照 HC 68 例(伴情绪障碍 15 例,不伴情绪障碍 53 例)。采集高分辨 3D T1 结构像,采用优化的基于体素形态学测量 VBM 方法,使用双因素方差分析得到有无情绪障碍和组别(AD、HC)存在显著交互效应的脑区并提取 GMV 值,并与总体认知表现(MMSE、MoCA)进行相关性分析。

结果 控制年龄、性别和受教育年限后,基于有无情绪障碍和组别(AD、HC)的 GMV 分析存在显著交互效应脑区为右侧直回(MNI: 4.5, 27, -25.5; $P < 0.05$, 团块水平 FWE 校正)。事后分析显示 HC 伴情绪障碍组右直回 GMV 显著高于不伴情绪障碍组及 AD 伴情绪障碍组,AD 伴情绪障碍组

右直回 GMV 显著低于不伴情绪障碍组, 而右直回 GMV 在 AD 和 HC 均不伴情绪障碍组间无统计学差异。相关分析显示在情绪障碍组 (HC、AD 合并) 右直回 GMV 与 MMSE 和 MoCA 呈正相关 ($r = 0.606$ 和 0.533 , P 均 < 0.001), 而在不伴情绪障碍组 (HC、AD 合并) 右直回 GMV 与 MMSE 和 MoCA 无显著相关性 (P 均 > 0.05)。

结论 在 AD 进程中, 伴或不伴情绪障碍者右直回灰质体积萎缩存在差异, 伴情绪障碍者右直回灰质体积萎缩更明显, 并且右直回 GMV 可能预测 AD 伴情绪障碍患者的总体认知表现。

PU-1800

探讨 CT 在快感缺失抑郁症患者海马缩小及灰白质密度变化的临床价值分析

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目的: 本文旨在探讨 CT 在快感缺失抑郁症患者海马缩小及灰白质密度变化的临床价值分析。

方法: 本研究通过回顾性分析 100 例快感缺失抑郁症患者的 CT 影像资料, 其中 50 例患者行 CT 海马及灰白质密度测量。通过比较患者海马及灰质白质密度的变化, 探讨 CT 在快感缺失抑郁症患者中的诊断价值。

结果: 研究发现, 快感缺失抑郁症患者海马体积明显缩小, 灰质白质密度减低。

结论: CT 扫描在快感缺失抑郁症患者中可以有效地检测海马及灰质白质密度的变化, 有助于诊断该病, 并为临床治疗提供依据。

PU-1801

探讨 CT 岛征、混合征、漩涡征及其联合征象对自发性脑出血患者早期血肿扩大的预测价值

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目的 探讨 CT 岛征、混合征、漩涡征及其联合征象对自发性脑出血(SICH)患者早期血肿扩大(HE)的预测价值。方法 回顾性分析 SICH 患者 440 例, 均于发病 6h 内行首次头颅 CT 及 24h 内复查头颅 CT, 按照复查 CT 结果分为 HE 组(193 例)与 NHE 组(247 例), 比较两组患者的相关临床及影像学资料。结果 两组患者的吸烟史、血肿位置、发病至首次 CT 时间、初始血肿体积、入院收缩压、入院舒张压、合并破入脑室、岛征、混合征及漩涡征的差异均有统计学意义($P < 0.05$)。多因素 Logistic 回归分析显示, 初始血肿体积、合并破入脑室、岛征、混合征及漩涡征是早期血肿扩大的独立危险因素($P < 0.05$)。经受试者工作特征(ROC)曲线分析, 岛征、混合征及漩涡征的联合征象预测早期血肿扩大的曲线下面积(AUC)均高于单一征象, 其敏感度、特异度、阳性预测值及阴性预测值均处于较高水平, 且约登指数更接近 1。结论 岛征、混合征及漩涡征的联合征象对早期 HE 的预测价值极高, 将其作为影像学标志纳入评分预测模型, 对指导临床医师采取及时有效的治疗措施、减轻患者的不良预后具有重要意义。

PU-1802

基于脑 CT 灌注评估头颈部动脉狭窄后侧支循环情况

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目的:应用 320 排 CT 一站式 CTA-CTP 动态容积灌注成像技术,探讨头颈部动脉狭窄后脑血流动力学改变与侧支循环关系。

方法:92 例经颈动脉 CTA 或 CE-MRA 及头颅 CTA 诊断为单侧颈动脉系统中重度狭窄的患者纳入本研究中,收集患者的临床基本信息资料及影像学检查资料。所有患者均行脑 CTP 检查。经灌注后处理软件,分别得到相对脑血流量 (relative cerebral blood volume, rCBV) 图、达峰时间 (time to peak, TTP) 图、相对脑血流量 (relative cerebral blood flow, rCBF) 图、平均通过时间 (mean transit time, MTT) 图及灌注参数值。将颈内动脉组和大脑中动脉狭窄组按侧支循环分级分为良好组和不良组,分析两组间 CTP 增加率的变化。

结果:将颈内动脉 (55 例) 和大脑中动脉 (37 例) 中重度组患者根据侧支循环分级分为良好组和不良组。颈内动脉侧支循环良好组 41 例,不良组 14 例;大脑中动脉良好组 15 例,不良组 22 例。组间年龄、性别及患有高血压、糖尿病患者比例差异均无统计学意义 ($P>0.05$)。

当 ICA、MCA 中重度以上狭窄时,侧支循环不良者发生 CTP 阳性概率增加。比较各组组间 CTP 参数增加率,rCBV 增加率、rCBF 增加率及 MTT 增加率差异无统计学意义 ($P>0.05$),TTP 增加率差异有统计学意义 ($P<0.05$),说明侧支循环不良者,TTP 增加率较高

结论:CTA 或 CE-MRA 联合 CTP,可直观显示血管狭窄部位、程度及责任血管供血区的血流动力学情况,评价侧支循环情况,可综合评价颈动脉系统狭窄对个体的影响,对临床个体化治疗具有重要意义。

PU-1803

头颈部木村病的 CT 和 MRI 诊断

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目的 探讨头颈部木村病的 CT 和 MRI 表现,以提高对该病的认识和诊断水平

。方法 回顾性分析我院 2012 年 6 月至 2022 年 10 月收治的经病理证实为头颈部木村病的患者 9 例,并分析其病灶的位置、大小、形态、密度 (信号) 以及增强的影像表现。结果 9 例患者 7 位为男性,2 位为女性,年龄 16—35 岁,8 例表现为患侧腮腺弥漫性肿大,并伴有软组织肿块 (结节),周围筋膜广泛增厚、皮下脂肪层萎缩,单侧或双侧腮腺区或颈部淋巴结肿大;1 例仅表现左眼泪腺肿大,无腮腺病变及颈部淋巴结肿大。CT 和 MRI 表现为:(1)病灶中肿块的边界不清,常挤压、浸润临近浅层筋膜,皮下脂肪间隙密度增高、浑浊;(2)肿块密度、信号较为均匀,未见坏死囊变征象,增强扫描后均呈明显强化;(3)弥散加权成像,提示病灶弥散明显受限;(4)肿大淋巴结边缘光整,密度或信号均匀,无坏死、囊变,无融合趋势,增强后呈均匀强化。结论 头颈部木村病具有一定的影像特征,对于腮腺区或泪腺区发生无痛性肿块并伴有局部淋巴结肿大的患者,同时伴有外周血嗜酸性粒细胞和血清 IgE 升高者,应考虑木村病的可能。

PU-1804

双低剂量三维 CT 血管成像联合全模型迭代重建技术在 椎动脉 V3 段血管成像中的可行性研究

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目的：探讨低电压、自动管电流调节（ATCM）和低对比剂浓度、剂量及注射速率联合全模型迭代重建（IMR）技术在椎动脉（VA）V3 段三维 CT 血管成像（3DCTA）中的可行性。

方法：前瞻性连续收集本院临床怀疑上颈椎、颅颈交界区病变而行颈部椎动脉 V3 段 3DCTA 的患者 60 例，按照随机数字表法将患者随机分成 A、B 两组，每组各 30 例。A 组采用 80kV、平均管电流为 50mAs 的 ATCM 技术、25ml 注射速率为 3ml/s 的对比剂碘海醇（碘含量 300mg/ml）及 IMR 技术；B 组采用 120kV、固定管电流 150mAs、50ml 注射速率为 5ml/s 的对比剂碘帕醇（碘含量 370mg/ml）和滤波反投影（FBP）重建技术；测量并比较 2 组 CT 值、噪声、信噪比（SNR）、对比噪声比（CNR）、图像灵敏度（FOM），并对所得图像的质量进行评价。记录 CT 容积剂量指数（CTDIvol）及剂量长度乘积（DLP），计算有效剂量（ED）。对 2 组数据分别采用卡方检验、两独立样本 t 检验、非参数 Mann-Whitney U 检验来进行比较。

结果：2 组图像 VA 的 CT 值差异无统计学意义；但 A 组噪声小于 B 组，A 组 SNR、CNR 及 FOM 均大于 B 组。2 组图像质量均满足临床诊断要求，图像质量主观评价差异无统计学意义。A 组 CTDIvol、DLP、ED 均低于 B 组，A 组较 B 组均降低了 89.7%。A、B 组对比剂碘摄入量分别为 7.5g、18.5g，对比剂碘流率分别为 0.9、1.85mg/s，A 组与 B 组相比，碘摄入量及碘流率分别下降了 59.5%、51.4%。

结论：当对比剂碘海醇（300mg/ml）剂量减少至 25 ml、注射速率降至 3ml/s 时，采用 80kV 联合平均管电流为 50mAs 的 ATCM 及 IMR 技术在保证椎动脉 V3 段 3DCTA 图像质量的同时减少了病人所接受的辐射剂量，同时降低了对比剂碘摄入量及碘流率，从而降低对肾脏的损害。

PU-1805

MRI 影像组学鉴别眼眶神经鞘瘤及孤立性纤维瘤的价值

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目的：探讨磁共振成像（MRI）影像组学在眼眶孤立性纤维性肿瘤与神经鞘瘤鉴别诊断中的价值。

材料与方法：回顾性纳入来自两个医院的 140 例患者。来自医院 1 的所有患者被随机分为训练队列（n = 69）和验证队列（n = 35），来自医院 2 的患者作为外部测试队列（n = 36）。基于 T2WI 和增强 T1WI 分别手动勾画全瘤 ROI。使用 Pyradiomics 软件分别从两序列中提取 106 个特征。采用最小绝对收缩和选择算子 logistic 回归对每个序列建立影像组学模型，并计算影像组学评分。采用 logistic 回归分析构建联合模型，并显示为影像组学列线图。两名放射科医师根据 MRI 表现联合评估肿瘤类型。通过曲线下面积（AUC）比较影像组学模型和主观评估的效能。

结果：结合两序列影像组学评分的列线图区分神经鞘瘤和孤立性纤维瘤表现最佳，其 AUC 高于医师联合阅片，但外部测试组未见显著性差异（训练组：AUC 0.986 vs. 0.807， $p < 0.001$ ；验证组：AUC 0.989 vs. 0.788， $p = 0.009$ ；测试组：AUC 0.903 vs. 0.792， $p = 0.093$ ）。决策曲线分析显示，采用影像组学列线图较主观阅片评估具有更好的临床获益。

结论：MRI 影像组学列线图可用于眼眶 SFT 和神经鞘瘤的鉴别诊断。

PU-1806

Dixon 技术在甲状腺相关性眼病早期视神经改变评估中的价值

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目的: 探讨 Dixon 技术在甲状腺相关性眼病 (thyroid-associated ophthalmopathy, TAO) 早期视神经改变评估中的价值。方法: 回顾性分析 28 例 TAO 患者和 15 例健康志愿者的临床和影像学资料。测量并比较两组视神经信号强度比值 (signal intensity ratio, SIR)、视神经含水量 (water fraction, WF) 以及视力的差异。采用 Spearman's 相关分析评估病例组视神经 SIR、WF 值与临床参数的相关性。使用受试者工作特征曲线评估视神经 SIR、WF 值在鉴别 TAO 与健康对照组视神经的效能。结果: TAO 组视力显著低于对照组 ($P = 0.024$), 视神经 SIR 值和 WF 值均显著高于对照组 ($P = 0.008$; $P = 0.003$)。TAO 组视神经 SIR 值和 WF 值均与临床活动度评分呈显著正相关 ($r = 0.369$, $P = 0.005$; $r = 0.420$, $P = 0.001$)。以 WF 值 > 0.914 为阈值判断视神经异常, 可获得最优的鉴别效能及特异度 (曲线下面积, 0.694; 敏感度, 35.7%; 特异度, 93.3%)。联合 WF 值 > 0.914 和 SIR 值 > 1.903 判断视神经异常, 鉴别效能及敏感度进一步提高 (曲线下面积, 0.729; 敏感度, 75.0%; 特异度, 63.3%)。结论: Dixon 技术可用于评估 TAO 早期视神经改变。

PU-1807

双低剂量三维 CT 血管成像对头颈部旋转后椎动脉 V3 段后外侧突与寰椎后弓解剖关系的临床研究

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目的: 采用双低剂量 3DCTA 探讨头颈部左、右旋转位及中立位下椎动脉 V3 段后外侧突与寰椎后弓之间相关解剖学参数的变化。

方法: 前瞻性连续收集本院临床怀疑上颈椎、颅颈交界区疾病而行头颈部左、右旋转位及中立位椎动脉 V3 段双低剂量 3DCTA 检查患者 100 例。由一名接受过高年资医师培训的放射科医师测量并记录头颈部左、右最大旋转位时的旋转角度; 分别从上面观和下面观测量并记录两侧椎动脉直径, 并将其分为优势组和均衡组 2 组。分别从上面观和下面观测量记录并比较 2 组旋转位和 2 组中立位下两侧椎动脉 V3 段后外侧突与寰椎后弓三维解剖关系的各相关径线及其变化: 包括内径 (ID)、外径 (ED)、横径 (TD)、高度及椎动脉直径。

结果: 50 例均衡组及优势组患者的旋转角度差异均无统计学意义。在均衡组中, 右侧旋转位下左侧 VA 的 ID、ED 和 TD 均短于中立位 (均 $P < 0.05$)。左侧旋转位下右侧 VA 的 ID、ED 和 TD 均短于中立位 (均 $P < 0.05$); 左/右侧 VA 的 ID、ED 和 TD 在同侧旋转位与中立位之间差异无统计学意义 (均 $P > 0.05$); 双侧椎动脉的高度和直径在旋转位和中立位之间差异无统计学意义 (均 $P > 0.05$)。在优势组中, 双侧椎动脉的 ID、ED 和 TD、高度和直径在旋转位及中立位之间差异无统计学意义 (均 $P > 0.05$)。

结论: 双低剂量 3DCTA 能显示头颈部旋转位和 2 组中立位下椎动脉 V3 段后外侧突与寰椎后弓间的解剖关系及相关变化, 具有重要的临床指导价值, 可作为常规评估手段。

PU-1808

全模型迭代重组技术联合低电压、低对比剂碘摄入量和低碘流率在头颈部 CT 血管成像中的可行性研究

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目的：探讨全模型迭代重组技术（IMR）联合低电压、低对比剂碘摄入量和低碘流率，在头颈部 CT 血管成像（CTA）中的可行性。

材料与方法：将 60 例临床怀疑头颈部血管病变患者随机分为 A、B 组，各 30 例；A 组采用[120 kV、50 ml 注射速率为 5 ml/s 对比剂碘普胺（含碘量 370 mg/ml）及滤波反投影（FBP）重组]，B 组采用[80 kV、30 ml 注射速率为 4.5 ml/s 对比剂碘海醇（含碘量 300 mg/ml），分别使用 iDose4（B1 组）和 IMR（B2 组）重组]，其余扫描参数 2 组均一致；并对 2 组患者的动脉强化 CT 值、图像噪声、信噪比、对比噪声比、图像质量主观评分、有效辐射剂量、对比剂碘摄入量及碘流率进行对比分析。

结果：B 组动脉强化 CT 值高于 A 组；B2 组图像信噪比和对比噪声比大于 B1 和 A 组，且图像噪声小于 B1 和 A 组；B2 组图像质量主观评分高于 B1 和 A 组。B 组较 A 组降低了约 69.6% 的有效辐射剂量，同时减少了 51.4% 的对比剂碘摄入量及 27.0% 的碘流率。

结论：采用 IMR 联合 80 kV、30 ml 注射速率为 4.5 ml/s 对比剂碘海醇（含碘量 300 mg/ml）行头颈部 CTA 检查，不仅显著降低有效辐射剂量、对比剂碘摄入量和碘流率，而且图像质量得到提高。

PU-1809

Putt's Puffy Tumor 的 CT、MRI 诊断

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目的 探讨 Putt's Puffy Tumor 的基本影像特征，提高对本病的认识及重视。**方法** 回顾分析经临床确诊的 17 例 Putt's Puffy Tumor 患者资料，9 例同时行 CT 平扫加增强及 MRI 平扫加增强扫描，5 例行 CT 平扫加增强扫描，2 例行 CT 平扫、1 例行 MRI 平扫扫描，总结该病基本特征及影像表现特点。**结果** 17 例患者中，9 表现为额部肿胀伴眼眶肿块，4 例只表现为前额部肿胀，鼻前部肿胀及额顶部颌面部多发病变各 1 例。Putt's Puffy Tumor 的影像学表现：CT 表现为额窦内稍高密度影填充，邻近窦壁骨质一侧或多侧骨质密度减低、部分吸收、甚至骨质缺损，增强扫描脓腔无强化，脓壁呈明显强化。MRI 则显示鼻窦内液性信号影填充，慢性骨髓炎在 T2WI 脂肪抑制序列表现高信号，增强扫描可见强化；MRI 能清晰显示骨膜下脓肿及其周围结构、邻近脑膜增厚及颅内侵犯，增强扫描受累的脑膜及脓肿壁明显强化。6 例出现硬膜下积脓，其中 1 例表现为静脉窦周围积脓，2 例合并额窦皮肤瘘口形成，2 例有额窦巨大骨瘤。**结论** 影像表现结合经典的临床病史，能准确诊断 Putt's Puffy Tumor。

PU-1810

HRCT 在上半规管骨裂诊断中的价值探讨

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目的 探讨上半规管裂在 HRCT 上的影像表现及特点, 提高对该病 HRCT 表现的认识。**方法** 回顾性分析 10 例被临床明确诊断为上半规管骨裂的患者 HRCT 图像, 观察其形态、病变位置及与周围结构的关系, 分析其影像学表现特点。**结果** 10 例患者均在 HRCT 轴位图像上显示部分骨质缺损, 单侧 8 例(右侧 6 例, 左侧 2 例), 双侧 2 例, 单侧以右耳居多, 占 75%。其中 5 例位于顶壁内后侧, 2 例位于顶壁前外侧, 2 例发生在顶壁正中部, 1 例位于壶腹部, 病变基本位于颞骨弓状隆起附近(占 90%), 其它部位少见(占 10%)。**结论** HRCT 在上半规管骨裂诊断中具有重要的价值。

PU-1811

高分辨核磁共振血管壁成像技术预估血管狭窄程度及预测颅内脑梗死的应用价值

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目的:

探讨高分辨率核磁共振成像血管壁成像技术 (HRMR-VWI) 预估血管狭窄程度及预测颅内脑梗死的应用价值

方法:

选取 2020 年 3 月~2023 年 6 月在我院就诊并且 DSA 的患者 38 例, 所有患者均行 HRMR-VWI 及 DSA 造影术, 结合患者术前临床资料及术中资料, 进行多平面重建 (MPR)、曲面重建 (CPR) 图像分析, 测量头颈部血管管腔内的病变大小及管腔狭窄范围及狭窄程度, 根据测量结果来评估可能发生脑梗死的概率, 并结合 DSA, 来对比两种检查结果有无差异性。

结果:

35 例患者, 25 例患者高血压病史, 其中 11 例患者合并有糖尿病病史, 4 例患者合并有冠心病病史; 10 例患者无高血压及冠心病病史, 其中仅 2 例患者有糖尿病病史; 35 例患者中 24 例伴有颅内脑梗死, 11 例患者无脑梗死; HRMR-VWI CPR 及 MPR 后处理重建技术显示责任血管位于颈内动脉 11 例, 位于大脑后动脉 2 例, 位于大脑中动脉 16 例, 位于基底动脉 4 例, 位于椎动脉 1 例, 位于锁骨下动脉 1 例; 轻度狭窄 4 例, 中度狭窄 1 例, 重度狭窄 10 例, 极重度/闭塞 10 例; 重建图像测量血管内斑块大小的面积, 显示病灶范围大小与管腔狭窄程度有相关性, 与 DSA 检查结果基本相一致; 责任血管狭窄程度与脑梗死的发生率有相关性, 差异无统计学意义 ($P>0.05$)。

结论:

高分辨率核磁共振成像血管壁成像技术 (HRMR-VWI) 能够清晰显示责任血管内的病变范围及测量狭窄程度, 提高术前诊断率, 对临床预测脑梗死的发生有一定的诊断价值。

PU-1812

White matter alterations in thyroid-associated ophthalmopathy: a diffusion kurtosis imaging-based study using tract-based spatial statistics method

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Abstract

Objectives: To explore the brain microstructural alterations in patients with thyroid-associated ophthalmopathy (TAO) using diffusion kurtosis imaging (DKI) by tract-based spatial statistics (TBSS) method.

Methods: Forty-seven patients with TAO and 30 sex-, age-, and education-matched healthy controls (HCs) were recruited. DKI data were analyzed using TBSS analysis. The correlations between values of diffusion parameters and clinical variables were assessed.

Results: Compared with HCs, TAO group showed significantly decreased mean kurtosis, kurtosis fractional anisotropy, axial kurtosis, radial kurtosis and fractional anisotropy values in several white matter (WM) tracts, affiliated to projection fibers, association fibers and commissural fibers. No significant differences were observed in the mean diffusivity values between two groups. The values of significant diffusion parameters were positively correlated with visual acuity and Mini-Mental State Examination (MMSE) scores, and negatively correlated with Hamilton Anxiety Rating Scale (HARS) and Hamilton Depression Rating Scale (HDRS) scores.

Conclusions: Patients with TAO had significant microstructural abnormalities in WM tracts. Our findings extended the current understanding about the neurobiological basis of TAO.

PU-1813

Multimodal imaging guided Multidisciplinary therapy for postoperative recurrence of orbital rhabdomyosarcoma: A case report

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Abstract Content: Adult orbital rhabdomyosarcoma is a rare highly malignant tumor of the head and neck, with unilateral painless, rapidly developing exophthalmos or motor restriction as the main symptom, which has a high rate of local recurrence and a high risk of early distant metastasis. Currently, the treatment mode of orbital rhabdomyosarcoma has changed from a single local resection to a multidisciplinary therapy with surgery combined with high-dose chemotherapy and radiotherapy. The multimodal imaging mode can provide a more comprehensive visualization of the reference information for the development of the disease and the treatment effect evaluation during the multidisciplinary therapy.

Case presentation

A 24-year-old female patient had a prominent left eyeball for more than a month, accompanied by photophobia and tears, and the specialist physical examination: the left eyeball protruding forward and outward, significantly limited eye movement, touched a mass in the upper edge of the left orbit, hard mass, general range of motion, unclear touch, no obvious tenderness, and no obvious abnormality in the right eyeball. The laboratory examination after admission showed no significant abnormalities.

Primary treatment:Orbital MRI shows low T1WI, high T2WI and slightly high DWI signal outside the upper muscle cone of the left orbit, about 4.4×2.4×2.2 cm, and an obvious uniform enhancement, the adjacent extraocular muscles are pushed and the eyeball forward.Color Doppler ultrasound shows hypoechoicity of about 3.03×2.08cm, the underorganized edge, the internal echo is underuniform, inside has strip slightly higher echo, more abundant blood flow signal is visible inside:PSV 16.08m/s, RI 0.59. There were no abnormalities such as retinal detachment in the left eye. After informed consent, pathological resection of orbital tumor in the left eye was combined with immunohistochemistry CD56 (+) and MoyD 1 (+) to confirm spindle-cell type rhabdomyosarcoma.

Postoperative chemotherapy:Postoperative one month,orbital MRI was reviewed that an oval occupation outside the muscle cone, the internal signal performance and enhancement characteristics are similar to the preoperative occupation, the adjacent extraocular muscles were still pushed, the eyeball was forward, and the left orbital changes after surgery, which considered recurrence.The multidisciplinary physician decided to proceed a course of CAV chemotherapy after consultation,then the patient developed gastrointestinal reaction with eye pain.However,the MRI review after one month of chemotherapy showed that the lesion was larger than before.

Multidisciplinary therapies of doctors:After consultation, doctors in ophthalmology, oncology, surgery and other departments of our hospital suggested second left orbital tumor resection, postoperative pathology combined with immunohistochemical diagnosis of "rhabdomyosarcoma recurrence".MRI and CT review one month later showed postoperative changes in the left orbit, no left eyeball, extraocular muscle and optic nerve, orbital effusion in the operative area, and no obvious abnormal recurrence in the surgical area.Given that the patient's relapse after orbital rhabdo myosarcoma surgery is not sensitive to chemotherapy, first intensity modulation radiotherapy (CTV) is recommended after consultation with the radiotherapy department, oncology department and ophthalmologist,eye pain occurred during radiotherapy, and the possibility of conjunctivitis was considered after the ophthalmologist consultation. The orbital MRI review showed no obvious changes, and the effusion was still visible in the orbit of the surgical area.

Discussion

At the initial diagnosis, the MRI of the left orbital mass combined with color Doppler ultrasound realized the multimodal evaluation of the internal structure, boundary morphology, relationship with peripheral tissues and internal blood supply, which provided more reference information for the selection of clinical treatment options. MRI review 1 month after resection showed local recurrence in the surgical area of the left orbital tumor, and the MRI findings also had certain characteristics. The lesions were often closely related to the extraocular muscles, and the internal signal was uneven due to bleeding and necrosis, and the enhanced scan was moderate to significantly enhanced.

In recent years, the International Rhabdomyosarcoma Research Group has recommended VAC chemotherapy as the preferred and standard regimen for rhabdomyosarcoma. In this study, the patient also chose this chemotherapy regimen for the first time, but the MRI review one month after chemotherapy showed a slight enlargement of the tumor body, which may be related to the less sensitivity of orbital rhabdomyosarcoma spindle tumor cell type to VAC chemotherapy regimen. Some studies have found that extensive tumor resection combined with radiotherapy and chemotherapy can effectively reduce the local recurrence rate and reduce the risk of distant metastasis.So the scope of tumor resection in the second operation was significantly expanded, and the postoperative orbital MRI review showed no left eyeball, extraocular muscle and optic nerve. Because the patient was not very sensitive to chemotherapy regimen in the past, temporary radiotherapy was selected after the second surgery, and the MRI review after radiotherapy also showed no significant abnormalities.

Adult orbital rhabdomyosarcoma often recommends multidisciplinary effective treatment modes clinically, the advantages of high resolution and multiparameter imaging from orbital MRI

combined with real-time dynamics of color Doppler ultrasound can provide more reference information in the multidisciplinary treatment process of orbital rhabdomyosarcoma.

PU-1814

1 例以双眼睑肿胀为首发症状的 IgG4 相关性 Mikulicz 病

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患者女, 14 岁, 8 年前无诱因出现双眼上睑肿胀, 伴双眼活动受限, 渐进性增大。查体: 双眼眼球活动受限, 上睑肿胀, 双眼睑泪腺区可触及肿物, 质韧, 活动度欠佳, 无压痛。实验室示 IgG4: 5.80g/L (正常值 0.03~2.00g/L)。眼眶 CT 与眼眶 MRI 示双侧泪腺明显肿大, 增强呈明显欠均匀强化; 双侧眼球受压、内移; 彩超示双侧泪腺与颌下腺回声减低、不均匀, 内见较丰富血流信号; 双侧颈部淋巴结肿大。知情同意后全麻下行双眼眶肿物部分切除活检术, 术中见肿物位于双眼上外侧泪腺处并累及眶壁, 术后病理见淋巴细胞浸润伴淋巴滤泡形成, 纤维组织增生, 散在分布的导管周围间质硬化, 腺泡萎缩, 诊断为良性淋巴上皮病变 (Mikulicz 病)。

讨论: Mikulicz 病又称为良性淋巴上皮病变, 属于 IgG4 相关性疾病的一种罕见病, 以受累脏器肿大, 血清 IgG4 细胞水平显著增高 (>1.35 g/L), IgG4 阳性浆细胞在组织中浸润为主要特点, 其中累及泪腺和唾液腺的被称为 IgG4 相关性 MD。

研究发现 CT 与 MRI 均显示泪腺或唾液腺弥漫性肿大, 由于腺体内细胞数量与纤维化增加, CT 呈等或稍高密度, T1WI 常呈等信号、T2WI 呈略低-中等信号, 增强后多呈不均匀强化; 彩超特征示扩大的腺体内有多个不同大小的低回声区域, 可呈高血管分布。

临床诊断泪腺 MD 时需与干燥综合征、淋巴瘤等鉴别, MD 与干燥综合征均可见泪腺、涎腺等腺体肿大的影像学检查, 但可通过血清学检查抗核抗体 (+)、SSA (+)、SSB (+)、血清 IgG4 水平正常等来鉴别干燥综合征; 泪腺淋巴瘤多为无痛性全身淋巴结异常肿大, 可通过多模态影像进行鉴别, 但最终还是要靠病理检查, 但要注意的是 MD 可恶变为恶性淋巴瘤。

综上所述, IgG4 相关性 MD 可借助多模态影像综合评估多腺体病变浸润的范围与多器官累及的发展情况, 结合血清 IgG4 细胞水平等实验室检查可予以进一步鉴别诊断, 具有重要的临床价值。

PU-1815

基于 CTA 评估餐巾环征斑块与缺血性脑卒中的相关性研究

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目的: 基于头颈 CTA (computed tomography angiography) 研究“餐巾环征” (napkin-ring sign, NRS) 斑块与急性缺血性脑卒中的关系。方法: 纳入 2019 年 1 月至 2023 年 5 月期间在本院接受头颈动脉 CTA 检查并发现 NRS 斑块的患者共 225 例, 其中发生急性缺血性脑卒中患者 113 例, 未发生脑缺血事件者 112 例, 比较 NRS 斑块在两组中的频率和分布特征, 采用 Logistic 回归筛选缺血性脑卒中发生的危险因素。结果: 113 例脑卒中患者发现 214 个 NRS 斑块, 112 例对照组患者发现 156 个 NRS 斑块, 卒中组患者的平均斑块数量及面积大于对照组 (1.89 ± 1.13 vs. 1.39 ± 0.61 , $P=0.001$) (23.96 ± 23.02 vs. 11.12 ± 8.62 mm², $P<0.001$), 缺血性卒中患者卒中同侧的斑块数量显著多于对照组 (1.50 ± 0.86 vs. 0.39 ± 0.65 , $P<0.001$) (11.64 ± 8.53 vs. 4.64 ± 9.56 mm², $P<0.001$)。NRS 斑块的分布在两组人群中以颈总动脉最多见。Logistic 回归分析显示 NRS 斑块数量是缺血性卒中患者的独立危险因素。结论: 采用头颈 CTA 评估 NRS 斑块可作为脑缺血事件预防和诊治的重要靶点。

PU-1816

4D-CTA 结合 SDF-1 鉴别颅内动脉瘤破裂及评估破裂风险的价值

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ABSTRACT

Objective: To analyze the value of four-dimensional computed tomography angiography (4D-CTA) combined with stromal cell-derived factor-1 (SDF-1) for differentiating ruptured intracranial aneurysms and assessing the risk of ruptures.

PU-1817

合成 MRI 成像定量检出甲状腺癌术前颈部淋巴结转移

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目的 探讨合成 MRI 成像定量分析在甲状腺癌颈部淋巴结转移诊断中的价值。

方法 回顾性分析 30 例行术前常规和合成 MRI 成像并经手术病理证实的甲状腺癌 19 例，术后病理证实的转移淋巴结 45 个，非转移淋巴结 47 个。工作站手动勾画甲状腺癌结节、颈部转移淋巴结和非转移淋巴结感兴趣区 (ROI)，自动获得合成 MRI 各定量参数值，包括 T1、T2、PD 值。

结果 原发肿瘤与转移淋巴结组织的各定量参数值无显著差异 ($P>0.05$)，原发肿瘤与非转移淋巴结、转移淋巴结与非转移淋巴结组织的各定量参数两组间均差异显著 ($P<0.05$)；T1T2 联合指标、T2、T1 及 PD 值对甲状腺癌颈部淋巴结转移诊断的准确度分别为 94.4%、91.9%、86.8%、71.7%。

结论 术前预测甲状腺癌淋巴结转移，合成 MRI 成像可辅助诊断。

PU-1818

探究 AI 重建算法在超低剂量头颈 CTA 扫描中的临床可行性

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目的 探究超低剂量头颈 CTA 配合迭代重建算法及 AI 重建算法的临床可行性及不同算法对 AI 诊断的影响。

方法 收集 2023 年 3 月至 2023 年 7 月西安大兴医院进行头颈 CTA 扫描患者 60 例。随机分为两组各 30 例。低剂量组记为 A 组，采用 AI 算法 ClearInfinity 进行重建，管电压为 70kV，管电流为 150mAs 进行扫描；常规组采用 120kV，300mAs 进行扫描记为 B 组。测量并计算大脑中动脉、颈总动脉及主动脉弓的 CT 值、SD 值、SNR 值与 CNR 值。由两名高年资医师对 A、B 组图像根据李克特量表 5 分法进行主观打分。由两名高年资诊断医师对患者头颈血管的狭窄程度进行诊断，分为正常，轻度，中度及重度狭窄。记录并计算两组患者的辐射剂量。

结果 A 组患者的 BMI 为 23.77 ± 3.78 ，B 组患者的 BMI 为 23.55 ± 2.47 ，差异无统计学意义 ($P>0.05$)；A 组辐射剂量为 $39.69\pm6.89\text{mGy}\cdot\text{cm}$ ，B 组辐射剂量 $540.72\pm40.52\text{mGy}\cdot\text{cm}$ 。A 组辐射剂

量降低 92.66%。A 组主观评分均值为 4.58 ± 0.5 , B 组评分均值 4.21 ± 0.41 , 两者相比有显著差异 ($P < 0.05$)。

结论 70Kv 超低剂量及人工智能算法在头颈 CTA 在临床上具有较高可行性, 大幅降低辐射剂量的同时可以提供满足诊断的图像质量。值得在今后推广使用。

PU-1819

双源 CT 双能量扫描评估头颈部 CTA 颈动脉钙化斑块所致狭窄的价值

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目的: 探讨使用双源 CT 双能量扫描单能成像技术, 提高对头颈部 CTA 检查颈动脉钙化斑块所致狭窄程度评估准确性的研究。

方法: 回顾性分析陆军特色医学中心 2022 年 7 月至 2023 年 8 月间行头颈部 CTA 检查且颈动脉有钙化斑块狭窄的患者, 收集同时接受头颈部 CTA 双能量扫描和头颈部数字减影血管造影(DSA)检查的患者 100 例, 并随机分为 A、B 两组每组 50 例, 其中 A 组使用重组单能谱值为 100 keV 的图像; B 组使用重组 100 keV 混合能量图像。记录 CT 容积剂量指数(CTDIvol)、剂量长度乘积(DLP)、有效辐射剂量(ED)。以 DSA 为金标准。利用双盲法评估严重钙化节段的狭窄程度, 根据金标准计算两组的诊断准确率、敏感度、特异度。利用 Kappa 检验评价两位观察者的评估一致性。对 A 组所有钙化严重节段每隔 10 keV 重组一组图像, 评估狭窄程度, 并采用配对 t 检验与 DSA 结果比较, 以 $P < 0.05$ 为差异有统计学意义。

结果 A 组的诊断准确率、特异度和均明显高于 B 组, 敏感度与 B 组相差不大; A 组的 Kappa 系数大于 B 组; A 组的 CTDIvol、DLP 及 ED 与 B 组比较无明显统计学差异($P > 0.05$)。A 组内能量级 100 keV 的图像测得的狭窄程度与 DSA 比较误差最小($P > 0.05$)。

结论: 采用双源 CT 双能量模式扫描头颈部 CTA, 后处理时利用单能谱 100 keV 重组可以有效减轻颈动脉钙化斑块伪影, 清晰显示血管狭窄情况, 有效提高评估的客观性和准确性; 并且不会增大辐射剂量。

PU-1820

磁共振误诊成人眼球视网膜神经胶质瘤 1 例

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视网膜神经胶质瘤是一种最具侵袭性的原发性肿瘤。神经胶质瘤发生在眼部的多为视神经胶质瘤, 而视网膜神经胶质瘤则极为罕见。该病可伴神经纤维瘤病或结节性硬化病。该疾病好发于婴儿期和儿童期。临床上常使用 CT 及 MRI 检查辅助诊断, 但其密度及信号特点通常不典型, 常易导致误诊。我院门诊以视力下降首发行 MRI 检查眼球视网膜神经胶质瘤误诊 1 例, 现报告如下。

目的: 分析本例眼球视网膜神经胶质瘤误诊原因。

方法: 回顾分析经手术病理证实该病例视网膜神经胶质瘤的 MRI 表现及动态增强特征。

结果: 眼部检查: 右眼视力 0.2, 左眼视力 0.6, 双眼球无突出, 眶压正常, 双眼结膜无充血。右侧晶体混浊+++, 左眼晶体混浊++, 双侧眼底窥不清。该患者眼眶 MR 平扫及增强提示: 右侧眼环下部类圆形异常信号影, 大小约 $7 \times 7 \times 5 \text{mm}$, T1WI 呈低信号, T2WI 呈低信号, DWI 呈等及稍高信号, ADC 值约 $1.3 \times 10^{-3} \text{mm}^2/\text{s}$, TIC 曲线呈“流入型”, 病灶颞侧见斑片状 T1WI、T2WI 稍高信号,

增强未见强化,考虑脉络膜黑色素瘤伴脉络膜下出血。行右眼摘除术+肿物活检术。病理组织学所见:肿瘤位于眼球内视网膜内,肿瘤细胞梭长,有细长的神经胶质纤维,细胞核小呈椭圆形,肿瘤细胞的胞突相互交错形成细致的神经毡网,免疫组化:GFAP(+)/Syn(+)/NSE(+)/Ki-67(+)/Bcl-2(-)/CD34(-)/S-100(-)/SOX-10(-)/SMA(-)/CK(-)/EMA(-)。

结论:本病例患者为一名中年男性,不是视网膜神经胶质瘤好发年龄,且该患者仅存在视力下降,无其他与该疾病相关综合征的临床表现。MR 信号特点类似于脉络膜黑色素瘤,同时从发病率优先考虑脉络膜黑色素瘤,因此忽视了眼球内视网膜神经胶质瘤的考虑。因此通过此病例的学习,在眼球内占位性病变影像诊断过程中,因当增加少见病种的考虑以降低误诊率。

PU-1821

双能 CT 碘摄取对良恶性甲状腺结节的鉴别诊断价值

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目的:探讨双能 CT(double energy computed tomography,DECT)碘摄取量在鉴别良恶性甲状腺结节中的应用价值。

方法:回顾性搜集已经病理证实良恶性甲状腺结节患者,对所有患者进行双能 CT 增强扫描,分别计算其动脉期,静脉期结节全体积强化程度及碘摄取参数,碘摄取参数包括碘摄取量,总碘浓度,重要区碘摄取量,重要区碘浓度,标准化总碘浓度和标准化重要区碘浓度,分别绘制动、静脉期受试者特征曲线,经受试者特征(ROC)曲线分析和多因素回归分析,与其病理结果进行对比分析,评价各参数于良恶性甲状腺结节是否具有鉴别诊断价值。

结论:双能 CT 成像技术的碘摄取参数在鉴别诊断良恶性甲状腺结节方面具有一定的相关性。

PU-1822

自适应迭代算法与深度学习重建算法对甲状腺 CT 图像伪影的研究与比较

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目的 探究深度学习及迭代方式对甲状腺 CT 图像质量的影响

方法 前瞻性的收集 58 例颈部甲状腺 CT 扫描的患者影像学资料,采用管电压 100kV,自动调制管电压 (Smater mA),前置 ASiR-40%,设置噪声指数(NI=14)对患者进行甲状腺 CT 扫描,扫描所得图像采用以下四种不同重建算法进行软组织窗重建:重建权重 ASiR-V40%、深度学习,共得 4 组图像进行对比分析。选择甲状腺为感兴趣层面,选择同层面胸锁乳突肌为 ROI,测量各感兴趣区 CT 值及标准差 (SD),双侧测量取均值,定义各 ROI 的 SD 值为噪声,并依据公式计算 SNR 甲状腺、CNR 甲状腺。主观评价由 2 年资 5 年以上放射诊断医师独立双盲评分使用 5 分法评价不同重建算法的图像质量。使用单因素方差分析比较 4 组图像的 SD、SNR、CNR,采用秩和检验比较主观评分组间差异,两位观察者间的一致性采用 Kappa 检验。

结果 (1) 甲状腺随着 DLIR 级别越高,图像噪声 (SD) 逐渐下降,SNR 甲状腺和 CNR 甲状腺逐渐升高 (ASiR-V40%<DLIR-L<DLIR-M<DLIR-H) SNR 甲状腺分别为 $4.62\pm1.36\text{HU}$ 、 $4.72\pm1.78\text{HU}$ 、 $5.37\pm2.10\text{HU}$ 、 $6.21\pm2.53\text{HU}$, $F=7.123$, $P<0.001$; CNR 甲状腺分别为 $4.42\pm1.96\text{HU}$ 、 $4.90\pm2.45\text{HU}$ 、 $5.83\pm3.01\text{HU}$ 、 $7.12\pm3.96\text{HU}$, $F=8.732$, $P<0.001$) (2) 主观评分两位诊断组医师对于图像重建质量的主观评分的 Kappa 值为 0.76,一致性较强。甲状腺 (40%ASiR-V<DLIR-L<DLIR-M<DLIR-H 重建图像的评分分值依次增高 ($T=118.583$, $P<0.001$))。

结论 DLIR 算法较 40%ASiR-V 算法,能有效降低甲状腺 CT 图像的噪声,提高 CNR 及 SNR,图像质量提高越明显。

PU-1823

甲状腺癌 CT 检查临床价值

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目的 探讨 CT 扫描在甲状腺癌术前检查临床价值。甲状腺癌为常见恶性肿瘤,近年来国内外发病率不断上升,位居我国城市女性恶性肿瘤第 4 位,根据 2017 年 WHO 甲状腺癌分类,包括乳头状癌、滤泡状癌、髓样癌、嗜酸细胞癌、低分化癌和未分化癌,其中乳头状癌最常见,占有甲状腺癌的 85%~90%,其次为滤泡状癌,约占 10%,其余病理类型少见,约各占 1%。超声是甲状腺病变定性诊断的首选检查方法,但对胸骨后甲状腺病变和颈部淋巴结转移的诊断能力不足;CT 扫描范围广,可清晰显示甲状腺病变与周围结构的关系,便于精确评估肿瘤侵犯和淋巴结转移范围,是甲状腺病变定性、定量诊断的重要检查方法。

PU-1824

颌骨促结缔组织增生性纤维瘤的影像学分析

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目的:分析和总结颌骨原发性促结缔组织增生性纤维瘤的临床和影像学表现,提高对此病的认识。
方法:回顾性分析 17 例经手术病理证实的颌骨原发性促结缔组织增生性纤维瘤的临床和影像学表现。其中 16 例行 CT 增强检查,1 例行 CT 平扫检查,5 例行 MR 增强检查。
结果:17 例患者中,男性 11 例,女性 6 例,年龄 4~64 岁,平均 20.27 岁。临床主要表现为无痛性下颌肿块和张口受限。影像学上,17 例病变全部位于下颌骨,均为单发病灶,主要位于下颌骨角部。CT 可见溶解膨胀性及部分压迫侵蚀性骨破坏,呈中心性或偏心性生长,伴有软组织肿块,病变内粗细不均的骨嵴是特征性改变。增强后病变呈中度至明显强化,所有病例无钙化及骨膜反应。根据 CT 上骨质破坏不同将病变分 3 型:膨胀型(n=6)、溶骨型(n=6)、骨旁型(n=5)。MRI 上,T1WI 为等低信号,T2WI 为不均匀高信号,增强后病灶强化。MR 功能检查 ADC 值平均 $1.2 \times 10^{-3} \text{mm}^2/\text{s}$,TIC 曲线 I 型 3 例,II 型 2 例,提示良性肿瘤。
结论:颌骨原发性促结缔组织增生性纤维瘤具有侵袭性,容易复发,了解其影像学特点非常重要。结合 CT、MR 及功能学检查,可在一定程度上反映病灶的组织构成,为术前正确诊断提供重要依据。

PU-1825

双能量血管 CTA 个性化设计“一站式”CTA+V 联合成像对于整形外科局部肿物术前评估的应用价值

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目的: 探讨双能量血管 CTA 个性化设计“一站式”CTA+V 联合成像对于整形外科局部肿物术前评估的可行性。

方法: 回顾性分析 2022 年 8 月至 2023 年 7 月本院整形美容外科初步怀疑颅脑, 颌面局部血管畸形术前评估患者, 其中男 3 例, 女 4 例; 年龄 3~50 岁, 平均 28.1 岁; 行双能量血管 CTA+CTV 确定血管畸形的供血位置, 形态及供血分支情况, 设立个性化扫描方案, 使用 SOMATOM Force CT, DE vessel CTA+V 参数为:Kv A:90 B:Sn150 mAs A:90 B:69 探测器准直 128X0.6 mm, 层厚: 0.75mm 螺距: 0.7 转速: 0.25s 扫描时间: 2.92s 采用 ADMRIE 重建算法, Kernel Qr40, 团注跟踪法, 监测降主动脉, 触发阈值 100HU, 触发后延迟 5s 进行扫描, 建议使用高浓度对比剂, 根据 BMI 值个性化打药, 每公斤体重 x0.9ml 建议流速维持在 4.5ml/s(儿童根据情况适当降低药量及流速), 扫描后动静脉可同时显示, 对比单体部血管灌注扫描, 大幅度降低了患者辐射剂量, 通过科室引进的东芝 Zio station 三维可视化软件进行对病灶测量形态大小, 血管成份分析, 血供分支标记和染色, 为整形外科术前评估带来福音。

结果: 图像质量进行评分 A: 优秀 B: 良好 C: 差, 通过主观进行对病灶进行评价分析, 病灶包含颞部皮下软组织内及右侧颞骨内外侧占位, 下颌, 软组织血管畸形, 额部皮下动静脉瘘, 顶部皮下血管畸形等清晰显示, 通过东芝 Zio station 三维可视化软件对病灶病灶测量形态大小, 血管成份分析, 血供分支标记和染色为临床术前评估提供指导性建议, 并反向评价扫描方案进行评分, 所有患者图像质量均可评到 A, 确定扫描方案的可行性

结论: 双能量血管 CTA 个性化设计“一站式”CTA+V 联合成像扫描, 不仅大幅度降低患者辐射剂量, 还为临床整形外科术前带来更精准的术前方向。

PU-1826

TBI 后继发重度脑水肿的早期 MR 损伤特点

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目的: 本研究旨在探讨 TBI 后轻、重度脑水肿早期 MR 损伤特征差异, 并筛选重度脑水肿的危险因素。

材料与方法: 以马歇尔评分为金标准进行脑水肿程度分级。纳入受伤后 24h 行颅脑 MR 检查且 3d 内进行 MR 或 CT 复查的 TBI 患者。观察指标主要有头皮损伤、骨折、硬膜外血肿、硬膜下血肿、蛛网膜下腔出血、脑挫伤、脑水肿。结合已有研究采用脑水肿评分量表 1 (基于水肿覆盖脑叶数和脑中线状态)、脑水肿评分量表 2 (基于基底池、侧脑室等层面受压状态) 进行脑水肿程度影像学评价。使用 SPSS23.0 软件进行统计学分析。使用卡方检验比较轻、重度脑水肿 TBI 患者的早期 MR 损伤差异, logistic 回归分析被用作重度脑水肿的危险因素筛选, 并采用受试者特征曲线分析危险因素的预测效能。

结果: 轻、重度脑水肿 TBI 患者的头皮损伤、骨折、硬膜下血肿、蛛网膜下腔出血、脑挫伤体积无显著性差异 ($P>0.05$)。硬膜下血肿、脑挫伤位置、脑水肿评分量表 1、脑水肿评分量表 2 存在显著性差异 ($P<0.05$), logistic 回归分析显示脑水肿评分量表 1、脑水肿评分量表 2 均是重度脑水肿的危险因素且具有较高预测效能。

结论: 轻、重度脑水肿 TBI 患者的早期 MR 损伤差异并不明显, 基于 3d 内 CT 或 MR 的脑水肿评分量表 1、脑水肿评分量表 2 能够预测重度脑水肿, 值得推广和进一步研究。

PU-1827

Multiple skin metastases from laryngeal carcinoma below the level of diaphragm: a case reportXiaojuan Peng¹, Wenhua Ma², Peng Xie³

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Skin was a rare location for distant metastases of laryngeal squamous cell carcinoma, especially below the level of the diaphragm, which indicated a poor prognosis. We presented a 71-year-old man with multiple skin nodules below the level of diaphragm for 1 month. Two years ago, the patient underwent total laryngectomy and bilateral radical neck dissection due to the diagnosis of laryngeal carcinoma. CT images showed three soft-tissue density nodules with clear edge in the subcutaneous soft tissue. Considering the medical history, the possibility diagnosis of skin metastases was raised. Furthermore, needle aspiration biopsy of the nodule on the waist was performed, and the skin metastases from laryngeal carcinoma were confirmed by pathology and immunohistochemistry.

PU-1828

Evaluation of cerebral blood flow changes in POAG patients using Arterial spin labelingZihan Chai, Qian Wang, Bingbing Yang, Junfang Xian
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Objective: Primary open-angle glaucoma (POAG) is the most prevalent type of glaucoma, which is a leading cause of irreversible blindness worldwide. The previously proposed hypotheses of "elevated intraocular pressure" and "pressure difference across the trabecular meshwork" have been widely accepted, but they cannot explain the widespread changes in the visual pathway and other non-visual brain areas. This study aimed to investigate the dynamic changes in spontaneous brain activity and cerebral blood flow (CBF) in POAG patients using resting-state functional MRI (rs-fMRI) and arterial spin labeling (ASL) imaging. To examine the relationship between these changes and glaucoma-related visual functional impairment.

Methods: The current study included 69 individuals diagnosed with POAG and 47 healthy controls (HCs) participated. All participants underwent both Arterial spin labeling and 3D high-resolution T1-weighted structural imaging scans. We utilized independent samples t-tests and multivariate analysis of variance (MANOVA). For correlation analysis, we employed Pearson's correlation. CBF values were calculated for each participant's whole brain, and the intergroup differences between the patients and the controls and was conducted with false discovery rate (FDR) correction, and it took into account variables such as gender, age, and head motion as covariates.

Results: Compared with the healthy control group, the abnormal cerebral CBF in POAG patients is not limited to the visual system. The decreased CBF areas in POAG patients include the bilateral lingual gyrus, cuneus, precuneus, gyrus rectus, and right inferior frontal gyrus, right superior occipital gyrus, and left middle occipital gyrus (voxel $p < 0.001$, FDR-corrected cluster $q < 0.05$). These brain regions are involved in visual, somatosensory, visual spatial, and visual motion functions. The increased CBF areas include the right middle temporal gyrus, left inferior frontal gyrus, left middle frontal gyrus, right superior frontal gyrus, and right precentral gyrus (voxel $p < 0.001$, FDR-corrected cluster $q < 0.05$), which are related to higher cognitive functions such as attention, emotion, inhibition of thought, and motor control. In correlation analysis with

ophthalmic examinations, the ophthalmic indicator Mean Deviation (MD) showed a significant correlation.

Conclusion: POAG patients exhibit alterations in the visual system, somatosensory, visual spatial, and visual motor-related brain regions. There is reduced blood perfusion in these areas, while higher cognitive functions such as attention, emotion regulation, thought suppression, and motor control-related brain regions show increased blood flow. ASL serves as a potential bio-marker for the progressive neurodegenerative mechanisms in POAG, offering new insights into early diagnosis and intervention strategies for the condition.

PU-1829

HRCT 及多平面重组、曲面重组对慢性中耳炎听骨链破坏的诊断价值

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目的 探讨高分辨率 CT (HRCT) 轴位、多平面重组 (MPR)、曲面重组 (CPR) 在慢性中耳炎听骨链骨质破坏术前评估中的应用价值。方法 对 220 例 (耳) 慢性中耳炎患者术前行颞骨 HRCT 扫描, 并行 MPR 及 CPR 后处理检查, 分别将听骨链术前检查结果与术中结果对比分析。结果 HRCT 轴位对患耳锤骨头、锤骨颈、锤骨柄、锤砧关节、砧骨体、砧骨长突、砧骨短突、镫骨、砧镫关节的部分破坏及完全破坏的显示与术中所见结果对比准确性偏低 ($P < 0.5$); MPR、CPR 对患耳锤骨头、锤骨颈、锤骨柄、锤砧关节、砧骨体、砧骨长突、砧骨短突、镫骨、砧镫关节的部分破坏及完全破坏的显示与术中所见结果符合率均较高 (P 均 > 0.5)。结论 MPR、CPR 图像能准确显示慢性中耳炎听骨链骨质破坏情况。

PU-1830

Frequency and imaging features of the adjacent osseous changes in lacrimal gland tumor

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Purpose: The association between lacrimal gland tumors and adjacent osseous changes is unclear. We evaluated the frequency and imaging features of such changes and investigated the specific characteristics of lacrimal gland tumors associated with them.

Methods: A total of 246 lesions were retrospectively reviewed, and all cases underwent preoperative computed tomography (CT) examination. The imaging characteristics of osseous changes were divided into three categories based on CT images: sclerotic change, erosive change, and lytic change. The frequency of all these osseous changes and any one of them was compared between different pathologies using Fisher's exact test.

Results: Osseous changes were found in 36 (31%) of 116 cases. Among these, 11 of 36 (30.6%) cases were sclerotic, 10 (27.8%) were erosive, 12 (33.3 %) were lytic changes, and 3 (8.3%) were mixed changes. Adenoid cystic carcinoma showed a significantly higher frequency of erosive changes and lytic changes than the other lacrimal gland tumors ($p < 0.005$ for each). Sclerotic changes were observed in the adenoid cystic carcinomas and pleomorphic adenomas. Perineural spread was a significant factor in showing higher osseous change frequencies (odds ratio = 2.56, $p = 0.007$).

Conclusion: Among lacrimal gland tumors, adenoid cystic carcinomas had a significantly higher frequency of adjacent osseous changes than other tumors.

PU-1831

PROPELLER-DWI 对比 MUSE-DWI 在改善头部 MRI 磁敏感伪影的价值分析

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目的：探讨磁共振螺旋桨技术 (PROPELLER DWI) 技术在改善颅脑 MRI 检查中由乳突气体伪影及颅底部位的颅骨伪影引起的磁敏感性伪影的应用价值，并与科室常用的头部 DWI 扫描序列-复合灵敏度编码高分辨率扩散加权成像 (MUSE-DWI) 进行比较。

方法：对我科行头部 MRI 检查的患者 50 例，分别在 3.0 GE MRI 设备进行 PROPELLER DWI 技术和 MUSE-DWI 序列进行 MRI 扫描，将图像上传至 PACS 系统，由 2 名影像医生对两组 DWI 图像质量进行主观评价和客观评价。主观评估内容包括磁敏感伪影、影像清晰度，并进行图像综合评分；客观评价为测量组织信噪比 (SNR) 及表观扩散系数 (ADC) 值。

结果：PROPELLER DWI 序列图像主观质量评分、SNR 值均高于 MUSE-DWI 序列图像，差异具有统计学意义 (P<0.05)。

结论：PROPELLER -DWI 序列可以有效提高颅脑 DWI 的图像质量，减轻由于头部乳突气体伪影及颅底部位的颅骨伪影引起磁敏感性伪影导致的图像变形。与 MUSE-DWI 序列相比，其在颅脑检查中减轻磁敏感伪影方面应用价值更高。

PU-1832

颅-锁骨发育不全综合征的临床特征及影像表现

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背景 颅-锁骨发育不全综合征 (cleidocranial dysplasia, CCD) 又称 Marie-Sainton 综合征，是一种罕见的遗传性全身骨骼发育不良性疾病，多为常染色体显性遗传，外显率很高。该病由 Martin 于 1765 年首次报道，临床发病率约为 1:100 万，男女发病率差别并不明显。其主要发病机制为膜内成骨及软骨内成骨障碍，主要临床特征为锁骨发育不良、颅骨畸形、囟门不闭合或闭合延迟、颅缝增宽，身材矮小、乳牙滞留、恒牙迟萌或阻生，还可伴有脊柱侧弯、胸廓畸形等表现。研究已证实颅-锁骨发育不全综合征的致病基因为编码成骨细胞特异性转录因子 (runt-related transcription factor 2, RUNX2) 的 RUNX2 基因，其编码蛋白可促进成骨细胞和软骨细胞的分化，对于维持骨骼正常生长发育十分重要，其发生突变导致无法发出间充质细胞聚集信号，从而影响其向膜内和软骨内骨形成的分化。RUNX2 基因突变导致的单倍体不足是颅-锁骨发育不全综合征的主要致病原因。

目的 探讨及复习颅-锁骨发育不全综合征的发病机制、临床表现、影像学特征及治疗方法，以加深对本病的全面认识，提高其临床及影像诊断正确率。**方法** 回顾性分析我院已确诊的 1 例颅-锁骨发育不全综合征典型病例的病史、临床表现及影像学特征，结合文献对该病的临床及影像表现、治疗方案进行总结分析。**结果** 本例患者有典型的颅骨、锁骨、牙齿以及其他骨骼发育不全表现，包括囟门未闭合、颅骨畸形、牙颌面畸形、锁骨发育不全、“锥形”胸、身材矮小等特点。**结论** 颅-锁骨发育不全综合征具有典型的临床及影像表现，有助于临床明确诊断，当同时有锁骨、颅骨及牙齿发育异常时，应想到本病的可能。

PU-1833

MR 在面部注射美容术致缺血性视神经病变的诊断价值

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【摘要】 目的 探讨 3.0T MR 对面部注射美容术致急性缺血性视神经病变的诊断价值。方法 回顾性分析 2015 年 12 月至 2023 年 3 月因在外院行面部美容注射术后出现单眼视力急剧下降来我院就诊的 49 例患者的临床资料及眼眶高分辨 MR 图像,患者均行眼科检查显示单眼存在相对性传入性瞳孔功能障碍和视觉诱发电位异常,提示缺血性视神经病变;数字减影血管造影显示眼动脉或其分支纤细或闭塞。在 Resolve 序列上观察视神经有无高信号及高信号的范围(视神经眶内段全程或节段性)、缺血性视神经病变的侧别及其他序列信号特点。测量患侧及健侧视神经的 ADC 值、T2WI 信号强度比。比较患侧及健侧视神经的 ADC 值、T2WI 信号强度比有无差异。对有统计学差异的参数勾画 ROC 曲线,并计算曲线下面积(AUC)。结果 女性 47 例,男性 2 例,年龄 17-47 岁,平均 31.1±8.0 岁。左眼视力障碍 26 例,右眼 23 例。49 例均出现缺血性视神经病变,T1WI 上呈等信号,T2WI 上呈等及稍高信号,DWI 呈明显高信号。26 例累及视神经眶内段节段性,23 例累及眶内段全程。病变组与对照组的 ADC 值及信号强度比差异有统计学意义,病变组的 ADC 值低于对照组($0.508\pm0.207\times10^{-3}\text{mm}^2/\text{s}$, $1.225\pm0.239\times10^{-3}\text{mm}^2/\text{s}$, $P<0.001$),信号强度比高于对照组(1.270 ± 0.262 , 0.843 ± 0.147 , $P<0.001$)。ADC 值及信号强度比诊断缺血性视神经病变的 AUC 值分别为 0.984、0.932,ADC 值的阈值为 $0.841\times10^{-3}\text{mm}^2/\text{s}$ 时,诊断急性缺血性视神经病变的敏感度、特异度、准确度分别为 93.88%、91.84%、92.7%。信号强度比阈值为 0.936 时,诊断急性缺血性视神经病变的敏感度、特异度、准确度分别为 89.80%、81.63%、85.7%。结论 MR 可以敏感发现面部注射美容术后所致的缺血性视神经病变,ADC 值及信号强度比对缺血性视神经病变的诊断价值较高,可为临床准确诊断提供依据。

PU-1834

基于淋巴细胞性垂体炎 MRI 动态观察的临床意义

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背景:淋巴细胞性垂体炎(Lymphocytic hypophysitis, LYH)是一种较为罕见的自身免疫性疾病,具有独特的免疫学和组织病理学特征,主要表现为垂体及其周围组织的淋巴细胞、浆细胞不同程度的浸润及纤维化。根据病变累及区域不同分为淋巴细胞性腺垂体炎(Lymphocytic adenohypophysitis, LAH)、淋巴细胞性漏斗-神经垂体炎(Lymphocytic funnel-neurohypophysitis, LINH)和淋巴细胞性全垂体炎(Lymphocytic panhypophysitis, LPH)。LYH 具有独特的组织病理学和免疫学特征,但其发病机制尚未明确,临床表现和自然病程差异性较大,因此,及时地诊断和合理地干预往往颇具挑战。LYH 临床少见,目前用于评估其患病率的数据非常有限。但随着近年来对该病认识能力的提高、影像学的发展及垂体手术数量的增加,该病得到越来越多的关注。目的:探索及复习淋巴细胞性垂体炎的发病机制、临床表现、影像学特征及治疗方法,推测临床治疗疗效与 MRI 动态表现的关系,以提高对 LYH 的认识及临床诊疗能力。方法 回顾性分析我院已确诊的 1 例淋巴细胞性垂体炎典型病例的病史、临床表现及影像学特征,结合文献对该病的临床及影像表现、治疗方案进行总结分析。结果:本例患者存在垂体前叶激素缺乏、不同程度垂体功能紊乱:包括甲状腺功能减退症、停经、泌乳素增高等。通过对治疗过程中的动态 MRI 进行分析,推测出临床治疗疗效与 MRI 表现的关系。结论:淋巴细胞性垂体炎的临床表现不典型,诊断主要依靠实验室指

标及影像表现, 通过对疾病进行治疗过程中动态 MRI 分析及诊断性治疗的 MRI 评价, 可以推测出临床治疗疗效与 MRI 表现的关系, 对于淋巴细胞性垂体炎的非侵入性诊断和治疗有着重大的意义。

PU-1835

Spontaneous intrasphenoidal meningoencephalocele

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A 55-year-old man had three years of repeated flow of clear watery liquid in the right nasal cavity with aggravation for half a year. MRI showed an inhomogeneous signal mass in the right sphenoid sinus involving sphenoethmoid recess (Fig1A), partly cerebrospinal fluid signal (Fig1B). Coronal MRI and CT demonstrated the sphenoid sinus bulges communicate with the intracranial system (Fig1C) through an osseous defect in the lateral wall of the right sphenoid sinus (Fig1D). After endoscopic surgical resection of the lesion, histopathology revealed meningoencephalocele (Fig2). For treatment, endoscopic surgery is an effective and safe option for resection of meningoencephalocele and skull base reconstruction [1, 2].

PU-1836

合成 MRI 技术在诊断鼻咽癌转移淋巴结中的价值：与大小标准相比

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目的：准确诊断颈部转移淋巴结影响鼻咽癌放疗靶区勾画以及剂量分布。此研究探索了合成 MRI 技术（SyMRI）联合直方图分析在诊断转移淋巴结中的潜在价值，以及与常用大小标准的性能比较。

方法：此项前瞻性研究连续纳入了 53 名经病理证实的鼻咽癌患者，评估了 377 个最大短轴直径（MASD） $\geq 4\text{mm}$ 的颈部淋巴结。所有患者均接受了标准治疗且治疗后的中位随访时间为 36.13(17.62,42.19)个月。两名资深放射科医生（分别有 21 年和 18 年的肿瘤诊断经验）独立地对淋巴结进行评估和标记，任何分歧通过讨论解决。如果颈部淋巴结在患者完成治疗后消退，或在治疗后形态稳定，但在之后的随访中进展，则视为转移淋巴结；如果颈部淋巴结在治疗结束后大小趋于稳定，且在之后的随访中保持稳定，则该淋巴结被视为非转移淋巴结。本研究中分别有 297 个和 80 个淋巴结被诊断为转移淋巴结和非转移淋巴结。从 SyMRI 后处理得到的 T1、T2 和质子密度（PD）图中提取直方图特征，并记录每个标记淋巴结的 MASD。根据临床常用的颈部转移淋巴结诊断的大小标准，如果咽后组结节 MASD $\geq 5\text{mm}$ ，2 区淋巴结 MASD $\geq 11\text{ mm}$ ，颈部其它区域淋巴结 MASD $\geq 10\text{ mm}$ ，则视为转移淋巴结，否则将其纳入非转移组。整个数据集按 7:3 的比例分配到训练组或验证组。采用多变量逻辑回归分析和受试者工作特征曲线分析来探讨其在颈部淋巴结以及 2 区淋巴结中的诊断性能。最后使用 DeLong 检验，构建了列线图 and 校准曲线。

结果：T1 第 10 个百分位数、T1 方差、PD 第 10 个百分位数和 PD 最小值被选择用于构建 SyMRI 模型（训练组和验证组的 AUC 分别为 0.895 和 0.903），高于 Size 标准模型（AUC 分别为 0.824 和 0.797），且 P 值均 ≤ 0.023 。此外，与 SyMRI 单模型（P 值均 ≤ 0.043 ）和 Size 标准单模型（P 值均 ≤ 0.007 ）相比，SyMRI+Size 标准模型的性能最高（AUC: 0.941 和 0.938）。

结论：SyMRI 的直方图参数能有效区分颈部转移淋巴结或者 2 区转移淋巴结。此外，SyMRI 和 Size 标准结合可显著提高诊断效果。

PU-1837

弥散张量成像在垂体瘤患者术前、后视路结构改变的研究

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【目的】

在垂体腺瘤患者中，术前评估视野损害和预测术后视野改善至关重要。本研究的目的是利用扩散张量成像（Diffusion Tensor Imaging, DTI）参数的视辐射与术前和术后视野损害的关系，以探讨 DTI 技术能否作为一种定量评估垂体腺瘤患者视觉通路损伤及恢复的有效评价手段。

【方法】

本前瞻性研究包括 41 例伴有视野缺损的垂体腺瘤患者的临床资料。所有患者均采用单纯鼻内镜下经蝶窦入路手术。在手术前以及术后 3 个月行 Humphrey 视野分析仪和 3.0T 磁共振检查，采集所有患者的 DTI 数据，双侧视放射白质纤维束的纤维数目、体积、平均长度及各向异性分数（fractional anisotropy, FA）、平均弥散率（mean diffusivity, MD）、轴向弥散率（axial diffusivity, AD）、径向弥散率（radial diffusivity, RD）、表观扩散系数（apparent diffusivity, ADC）值。利用 SPSS 22.0 软件，采用 Pearson 相关及 Spearman 相关分析 DTI 相关参数与视野恢复之间的相关性； $P < 0.05$ 认为差异有统计学意义。

【结果】

视野分析显示，术前视力丧失主要发生在颞叶上节段。82% 的患者双眼视野改善。其中，22% 显示完全恢复，54.6% 部分恢复，19.4% 未显示显著变化。患侧的 DTI 评估显示，术前各向异性分数（FA）值低于 0.400，平均扩散率（MD）值超过 $1300 \times 10^{-6} \text{mm}^2/\text{s}$ ，与术后 3 个月内视力无改善相关。

【结论】

DTI 视辐射参数与术前视野损害和术后改善相关。它可能有助于预测垂体腺瘤患者手术后的视野改善。

PU-1838

泪腺磁化传递成像定量参数在甲状腺相关性眼病临床活动性分期中的价值

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目的 探讨泪腺磁化传递成像（magnetization transfer imaging, MTI）定量参数在甲状腺相关性眼病（thyroid-associated ophthalmopathy, TAO）临床活动性分期中的价值。

方法 前瞻性纳入 2020 年 9 月至 2022 年 1 月在南京医科大学第一附属医院临床诊断为 TAO 的 49 名患者，依据临床活动性评分（Clinical Active Score, CAS）将受试者分为活动期组（ ≥ 3 分，29 例）和非活动期组（ < 3 分，20 例）。所有受试者均行眼眶常规磁共振成像（magnetic resonance imaging, MRI）序列及冠状位 MTI 扫描，并测量泪腺磁化传递率（magnetization transfer ratio, MTR）及脂肪抑制 T2WI 序列上泪腺与同侧颞肌信号强度比（signal intensity ratio, SIR）。采用 Mann-Whitney U 检验比较 MRI 定量参数的组间差异。采用 Spearman 相关分析评估 MRI 定量参

数与 CAS 的相关性。采用受试者工作特征曲线分析 MTR、SIR 及两者联合判断 TAO 临床活动性的效能, 并采用 DeLong 检验比较曲线下面积 (area under the curve, AUC)。

结果 活动期组泪腺 MTR 低于非活动期组, 泪腺 SIR 高于非活动期组, 差异均有统计学意义 ($P<0.001$)。MTR 与 CAS 呈低度负相关 ($r=-0.427$, $P<0.001$), SIR 与 CAS 呈弱正相关 ($r=0.252$, $P=0.012$)。联合泪腺 MTR 和 SIR 判断 TAO 临床活动性效能最优 ($AUC=0.809$, 敏感度 62.5%, 特异度 93.1%), 高于单独应用 SIR, 差异有统计学意义 ($Z=2.35$, $P=0.019$)。

结论 泪腺 MTI 定量参数在判断 TAO 临床活动性中具有可行性, 可以作为常规序列的补充手段, 以提高对 TAO 临床活动性分期的评估能力。

PU-1839

颈动脉蹼在 80 例缺血性脑卒中的临床分析

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目的 分析颈动脉蹼 (Carotid Web, CW) 在缺血性脑卒中患者的临床特点, 评价其在探讨颈动脉蹼在缺血性脑卒中发生发展中的临床意义。**方法** 收集在徐州医科大学附属医院行冠头颈部 CTA (computed tomography angiography, CTA) 查见颈动脉蹼结构患者 80 例患者资料, 排除缺血性脑卒中其他诱因颈动脉斑块 (26 例)、房颤 (7 例), Moyamoya 综合症 (1 例) 等, 研究颈动脉蹼在缺血性脑卒中患者中的临床特征。**结果**: 双侧颈动脉蹼男性比例为 100%; 双侧颈动脉蹼患者新发脑梗死与陈旧性脑梗死的比例高于单侧颈动脉蹼患者, 差异有统计学意义 ($p<0.05$); 双侧颈动脉蹼患者多发性脑梗死比腔隙性脑梗死的比例高于单侧颈动脉蹼患者, 差异有统计学意义 ($p<0.05$); 颈动脉蹼长度 $>5\text{mm}$ 患者缺血侧发生脑卒中与非缺血侧的比例高于长度 $\leq 5\text{mm}$ 患者, 差异有统计学意义 ($p<0.05$)。**结论**: 颈动脉蹼以男性多见, 双侧颈动脉蹼患者脑梗死的面积更大, 以新发为主, 长度 $>5\text{mm}$ 时更容易发生缺血性脑卒中, 提示颈动脉蹼可作为一个危险因素在缺血性脑卒中发生发展中具有重要的临床意义。

PU-1840

18F-FDG PETMR 作为鼻咽癌初始分期的价值

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目的: 本研究的目的是确定 PET/MR 作为鼻咽癌 (NPC) 的初始分期程序与常规检查 (CWU) 相比的临床价值和成本效益。

方法: 从 2018 年 5 月到 2021 年 3 月, 我中心连续 1020 例经活检证实的新诊断的鼻咽癌患者被纳入本研究。其中 343 例患者在治疗前接受了 PET/MR 检查, 其余 677 例患者仅接受了 CWU 检查。对于 PET/MR 和 CWU, 使用了浙江省医保管理局 2021 年发布的收费条目。增量成本效益比 (ICER) 测量了每百分比避免假阳性 (FP) 的患者使用 PET/MR 的成本。

结果: 整个组的新转移率为 5.2% (53/1020)。共观察到 187 名患者出现 FP 结果。在 CWU 组中观察到更多的 FP 结果患者 (25.6%对 4.1%, $p<0.001$)。从病理诊断到开始治疗的平均间隔时间, CWU 组为 13.1 天, PET/MR 组为 7.9 天 ($p<0.001$)。对于避免 FP 的患者, ICER 为 368 元人民币。

结论: 与 CWU 相比, PET/MR 降低了 FP 风险, 并减少了偶然发现的检查, 从而可以更早开始治疗。PET/MR 在 NPC 的初始分期过程中可能具有成本效益。

PU-1841

COVID-19 疫情对 18F-FDG PETMR 鼻咽癌分期影响

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目的: 以 18 例氟脱氧葡萄糖 (FDG) 正电子发射断层扫描 (PET)/磁共振成像 (MRI) 分期为替代指标, 评估 COVID-19 疫情对鼻咽癌 (NPC) 患者疾病程度的影响。

方法: 回顾性观察性研究, 包括活检证实的新诊断 NPC 患者, 在两个选定的时间间隔内使用全身 FDG PET/MR 分期: 2017 年 5 月 1 日至 2020 年 1 月 31 日 (A 组) 和 2020 年 2 月 1 日到 2021 年 6 月 30 日 (B 组)。收集有关原发性肿瘤、区域淋巴结 (N) 状态和受累区域淋巴结站的数量, 以及远处转移的存在和数量 (M) 的数据。

结果: 390 名患者被纳入 (A 组 201 人, B 组 189 人)。从最初症状到 PET/MR 的中位数间隔 A 组和 B 组分别为 2.5 (0.1-60.4) 和 3.4 (0.2-56.3) 个月 ($p>0.05$)。A 组和 B 组从最初症状到治疗的中位间隔分别为 2.8 (0.2-60.5) 和 3.6 (0.3-56.3) 月 ($p>0.05$)。在 T 分类、N 分类、总分期、, 两组之间的 N 个站和 M 个站 ($p>0.05$)。对于受累的颈淋巴结水平, B 组中更多的患者出现 Vc 水平转移 ($p=0.044$)。

结论: 对于 NPC, 在隔离限制开始后, PET/MR 分期和治疗没有显著延迟。虽然整个阶段没有受到影响, 但在 COVID-19 疫情时期, 更多的鼻咽癌患者发生了 Vc 级转移。

PU-1842

Correlation between NODDI structural network attribute parameters and cognitive function in cerebral small vessel disease

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Objective: To investigate the correlation between structural attribute parameters and cognitive function in cerebral small vessel disease. The correlation between network attribute parameters and cognitive scale scores was evaluated.

Materials and methods: In this study, 58 patients with small cerebral vascular disease were enrolled from April 2021 to November 2022, of which 29 were patients with CSVD without cognitive dysfunction and 29 were patients with CSVD cognitive dysfunction. All patients were tested with MMSE and MoCa scales. All patients underwent conventional magnetic resonance sequence, high-resolution TIWI and NODDI sequence scans. NODDI data preprocessing and structure brain network were constructed based on mrtrix environment in virtual machine. The brain network topology parameters (global parameters and local parameters) are calculated in GREYNA. The difference of brain network topology parameters between the two groups was analyzed by graph theory. Network based statistical analysis (NBS) was used to analyze the structural connectivity changes of brain networks. Correlation between structural brain network topology parameters and cognitive scale was analyzed based on spearman.

Results: (1) The structural brain networks of CSVD patients showed small-world attributes. Sigma, Lambda and Gamma were statistically different between the two groups. (2) Parameter values of Eloc and Cp were significantly positively correlated with MMSE score. (3) The values of Sigma, Lambda, Gamma and Lp had significant negative correlation with MoCa score, the values of Eg and Eloc had significant positive correlation with MoCa score.

Conclusion: The change of small-world attribute suggests that the integrity of structural brain network may be damaged in patients with CSVD, and is one of the mechanisms of cognitive impairment in patients. Sigma, Lambda and Gamma parameters can be used as quantitative physiological indicators to assist clinical diagnosis of CSVD cognitive dysfunction.

PU-1843

Comparison of spectral CT imaging and 64 slice CT post processing technique in assessment of carotid artery atherosclerotic plaque

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Purpose: To compare the efficacy of spectral CT imaging and 64 slice CT post processing technique in assessment of carotid artery atherosclerotic plaque.

Material and Methods: Fifty-seven patients with carotid plaque were detected in this study (Carotid endarterectomy, n=57), and 94 carotid plaques were evaluated by spectral CT imaging. The composition of atherosclerotic plaque was measured by iodine-based images, lipide-based images with spectral CT imaging and compared with pathology. Statistical comparison was performed with the Kappa value, independent-sample t test and Chi-square test.

Results: The degree of carotid artery stenosis was 62% (13%~87%) on spectral CT imaging whereas 61% (12%~85%) on 64 slice CT. Two imaging modalities were in good consistency in evaluation of the degree of stenosis (Kappa value = 0.996, $P < 0.01$). There was no statistical difference in detecting fibrous cap rupture on spectral CT imaging and 64 slice CT (41 plaques vs 37 plaques, respectively, $\chi^2 = 0.351$, $P = 0.554$). Furthermore, spectral CT imaging showed 46 plaques within intraplaque hemorrhage, however, no case was found on 64 slice CT ($\chi^2 = 60.901$, $P < 0.01$). Spectral CT imaging showed 43 plaques within intraplaque lipide whereas only 2 plaques showed intraplaque lipide on 64 slice CT ($\chi^2 = 49.111$, $P < 0.01$). Eighty-nine plaques within calcification in the plaque were found on spectral CT imaging and 88 on 64 slice CT ($\chi^2 = 0.907$, $P = 0.756$). Accuracy of spectral CT imaging for the depiction of the accuracy of carotid artery atherosclerotic plaque was 94.3%, where sensitivity, specificity, positive predictive value and negative predictive value were 95.2%, 92.6%, 96.2% and 90.7%, respectively. Conclusion: Spectral CT imaging is a reliable tool in detecting intraplaque hemorrhage and liquid component.

PU-1844

c-MET-Targeted Topical Fluorescence vs. Conventional Oral Examination for Detection of Malignant Transformation in Oral Potentially Malignant Disorders: A Randomized Controlled Trial

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Objective: To investigate the feasibility and effectiveness of a c-MET-targeted topical fluorescent probe, c-MET-binding peptide-indocyanine green (cMBP-ICG), for enhancing the detection of malignant transformation in oral potentially malignant disorders (OPMDs).

Methods: Patients with OPMDs who were scheduled to undergo biopsies were enrolled in a prospective randomized clinical trial from January 2023 to September 2023 (ChiCTR2300074454). Patients were randomly assigned to the cMBP-ICG fluorescence group or the conventional oral examination group and underwent biopsies with or without cMBP-ICG fluorescence guidance. The diagnostic accuracy was compared between the groups based on the biopsy histological results.

Results: Of 50 participants randomized, 25 underwent cMBP-ICG fluorescence guided biopsy (cMBP-ICG fluorescence group: 11 men and 14 women; mean [SD] age, 56.4 [11.2] years), and 25 underwent biopsy based on conventional oral examination (conventional oral examination group: 9 men and 16 women; mean [SD] age, 54.4 [14.4] years). The diagnostic accuracy of the cMBP-ICG fluorescence group and the conventional oral examination group was 84% and 36%, respectively, with a statistical difference ($P < 0.001$). In the cMBP-ICG fluorescence group, a significant difference in signal-to-background ratio ($P = 0.0096$) was observed between pathologically positive and negative lesions, with an area under the ROC curve of 0.81 (95% CI, 0.64 to 0.98), while no significant difference in mean fluorescence intensity ($P = 0.17$) was found. No adverse events occurred.

Conclusion: cMBP-ICG topical fluorescence can noticeably improve the accuracy in detecting malignant transformation of OPMDs. cMBP-ICG topical fluorescence imaging can be performed as an effective method to guide clinicians in biopsy procedures.

PU-1845

Nomogram for predicting BRAFV600E mutation in Papillary Thyroid Carcinoma based on spectral CT and Hashimoto's thyroiditis

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Object: The BRAFV600E is the most common mutant oncogene in thyroid cancer and is closely related to the aggressiveness of papillary thyroid carcinoma (PTC). The aim of this study was to investigate the effectiveness of a double-layer spectral detector computed tomography (DLCT)-based nomogram for predicting BRAFV600E mutation in PTC.

Material and methods: The medical records of 253 patients with PTCs who underwent DLCT and BRAFV600E mutation detection (mutant group: $n=203$; wild group: $n=50$) were reviewed. DLCT quantitative parameters in arterial phase, typical radiological features and clinical information were compared between the mutant and wild-type BRAFV600E groups by univariate and multivariate analysis. A nomogram was developed based on the significantly different variables using multivariate logistic regression analysis. The nomogram performance was evaluated by the area under the receiver operating characteristic curve (AUC), calibration curve and decision curve analysis (DCA).

Results: The normalized iodine concentration (NIC), calcification and Hashimoto's thyroiditis (HT) were identified as independent risk factors of BRAFV600E mutation in PTC ($P < 0.05$). The AUC value of the nomogram based on the three parameters was 0.75. The calibration curve of the nomogram revealed that the prediction result was in good agreement with the actual observation. The decision curve demonstrated that the nomogram can provide a satisfied net benefit than the simple all/none-intervention standard strategy within a large range of threshold probabilities.

Conclusions: As an easily and visually noninvasive prediction tool, the DLCT-based model with NIC and calcification of the nodules, and the HT of the thyroid shows good effectiveness for predicting the BRAFV600E mutation in PTC.

PU-1846

The Retrospective Study of Magnetic Resonance Imaging Signal Intensity Ratio in the Quantitative Diagnosis of Temporomandibular Condylar Resorption in Young Female Patients

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According to the literature, there is no reliable and quantitative method available for the diagnosis and prognosis of early or potential temporomandibular joint (TMJ) condylar resorption (CR) thus far. The purpose of this study was to raise a new noninvasive method to quantitatively evaluate condylar quality using the signal intensity ratio (SIR) on magnetic resonance imaging (MRI) in order to assist in the diagnosis of TMJ CR. A retrospective exploratory study was performed to compare the condyle-to-cerebral cortex signal intensity ratios (SIR) on MRI among young female patients. We included 60 patients, and they were divided into three groups: the bilateral normal TMJ group (group 1), the bilateral TMJ anterior disc displacement (ADD) but without CR group (group 2), and the bilateral TMJ anterior disc displacement (ADD) with CR group (group 3). The SIR difference between the three groups was analyzed by the Kruskal–Wallis test (K-W test). The sensitivity, specificity, accuracy, and area under curve (AUC) were calculated by the receiver operating characteristic (ROC) curves. There was high consistency between the surgeon and the radiologist in the evaluation of the magnetic signal intensity with intraclass correlation coefficients of 0.939–0.999. The average SIR was 1.07 in the bilateral normal TMJ group (group 1), 1.03 in the ADD without CR group (group 2), and 0.78 in the ADD with CR group (group 3). It could be found by the K-W test that group 3 was significantly different from group 1 and group 2 ($p < 0.05$), while there was no significant difference between group 1 and group 2. The optimal critical SIR value was 0.96 for the diagnosis of CR according to the ROC curves and Youden index ($p < 0.001$, $AUC = 0.9$). The condyle-to-cerebral cortex SIR can be used as a noninvasive diagnostic tool for the quantitative evaluation of condylar quality and diagnosis and prognosis of CR. $SIR \geq 0.96$ indicates a healthy condyle, while $SIR < 0.96$ is considered the optimal critical value for the diagnosis of CR. These findings are important for personalized and accurate treatment and prognosis prediction.

PU-1847

The combination of T2-mapping value of lacrimal gland and clinical indicators can improve the stage prediction of Graves' ophthalmopathy compared to clinical activity scores

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Purpose: To explore radiological changes of the lacrimal gland (LG) in Graves' ophthalmopathy (GO) and whether a combination of MRI parameters and clinical indicators can better predict individual clinical manifestation of GO compared to clinical activity scores (CAS) assessment.

Methods: A total of 28 patients with GO (56 eyes) and 14 healthy controls (HCs) (28 eyes) were enrolled between July 2020 and July 2021. Patients were classified into either the active GO group (CAS ≥ 3) and the inactive GO group (CAS < 3). MRI data and clinical data of LG were collected. The diagnostic performance of MRI parameters and models was assessed by receiver operating characteristic curve analysis. Logistic regression predictive models for staging GO were compared.

Results: LG in GO groups had significant higher Ktrans, Ve, IAUC, ADC and T2-mapping value ($p=0.006$, $p<0.001$, $p<0.001$, $p=0.048$ and $p=0.001$ respectively), and significant lower Kep and Vp ($p<0.001$ and $p<0.001$ respectively). There were statistically significant differences in T2-mapping value ($p<0.001$), the proportion of mild or no obvious redness of conjunctiva ($p<0.001$), and the proportion of swelling of caruncle or plica ($p<0.001$) between inactive and active groups. In MRI based logistic regression model, the T2-mapping value was an independent risk factor (AUC=0.832). When combining MRI and clinical indicators, T2-mapping value and age resulted as independent risk factors (AUC=0.928). Swelling of eyelids, redness of conjunctiva, swelling of conjunctiva, swelling of caruncle or plica, and spontaneous retrobulbar pain can be replaced by other objective indicators (AUC=0.937, 0.852, 0.876, 0.896, and 0.891, respectively).

Conclusion: There were significant differences in MRI quantitative parameters of LG between HCs and GO patients. The combination of the T2-mapping value of LG and clinical indicators can improve the stage prediction of Graves' ophthalmopathy compared to CAS and provide a new idea for improving the objectification level of GO data collection.

PU-1848

Differentiation of geniculate ganglion venous malformation from schwannoma: Dynamic T1-weighted imaging provides unique diagnostic value

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Objective: To distinguish geniculate ganglion venous malformation (GGVM) from schwannoma (GGS) by using high-resolution CT (HRCT), routine MRI and dynamic T1-weighted imaging (T1WI) characteristics.

Methods: Surgically confirmed GGVMs and GGSs between 2016 and 2021 were retrospectively included. Preoperative HRCT, routine MR and dynamic T1WI were performed on all patients. Clinical data, imaging characteristics including lesion size, involvement of facial nerve (FN), signal intensity, enhancement pattern on dynamic T1WI and bone destruction on HRCT were evaluated. Logistic regression model was developed to identify independent factors for GGVMs and the

diagnostic performance was accessed by receiving operative curve(ROC) analysis. Histological characteristics were explored for both GGVMs and GGSs.

Results: 20 GGVMs and 23 GGSs with mean age of 31 were included. On dynamic T1WI, 18 GGVMs(18/20) showed “pattern A” enhancement (a progressive filling enhancement), while all 23 GGSs showed the “pattern B” enhancement (a gradual whole-lesion enhancement)($P<0.001$). 13 GGVMs(13/20) showed the “honeycomb” sign whereas all GGS(23/23) showed extensive bone changes on HRCT($P<0.001$). Lesion size, involvement of FN segment, signal intensity on non-contrast T1WI and T2-weighted imaging(T2WI), and homogeneity on enhanced T1WI were obviously differed between two lesions($P<0.001$, $P=0.002$, $P<0.001$, $P=0.01$, $P=0.02$, respectively). Regression model showed the “honeycomb” sign and “pattern A” enhancement were independent risk factors. Histologically, GGVM was characterized by interwoven dilated and tortuous veins, while GGS was characterized by abundant spindle cells with dense arterioles or capillaries.

Conclusions: The “honeycomb” sign on HRCT and “pattern A” enhancement on dynamic T1WI are the most promising imaging characteristics for differentiating GGVM from GGS.

PU-1849

鼻腔肿瘤的 MRI 影像诊断价值

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目的：鼻腔由狭窄的管腔及间隙等构成，其解剖结构精细而复杂，加之少数肿瘤部位深在，加大了临床诊疗的难度；本研究分析鼻腔肿瘤的 MRI 影像学特征，旨在提高影像诊断的准确性，为临床制定有效的治疗措施提供依据及思路。方法：收集经病理证实的 90 例鼻腔肿瘤的临床资料，并划分为良性、恶性二组，分析并比较二组间的 MRI 影像学征象。结果：鼻腔肿瘤起源于上皮组织源性、软组织源性、淋巴造血组织、骨及软骨组织源性、及异位颅内组织来源肿瘤；良性组以乳头状瘤、血管瘤、骨瘤和纤维瘤多见，影像征象上常边缘光滑，以膨胀性生长为主，对周围骨壁形成压迫，与周围结构分界清晰；恶性组以鳞状细胞癌、腺样囊腺癌、淋巴瘤和黑色素瘤多见，根据分化程度边界可清晰或不清晰，影像征象上可含以下征象之一：浸润性生长、嗜神经生长、骨质破坏、累及周围结构（含翼腭窝、翼上颌裂、圆孔、翼管、眶下裂等），其中黑色素瘤短 T1 短 T2 信号具有一定特异性。良恶性组病灶强化程度无统计学意义（ $P>0.05$ ），良恶性组间均存在不同程度强化；病灶内坏死在良恶性组间存在统计学意义（ $P<0.05$ ），恶性组较良性组多见；良恶性组病灶成分 ADC 值比较具有统计学意义（ $P<0.05$ ）；恶性组内鼻腔淋巴瘤、鳞状细胞癌及腺样囊腺癌比较具有统计学意义（ $P<0.05$ ），其中淋巴瘤最低。结论：MRI 对鼻腔肿块定位、评估范围及对邻近结构的累及情况、良恶性判定和肿瘤分期等具有重要价值，可为临床医师提供更多影像参考依据。

PU-1850

基于 2D 与 3D 分割的 T2WI 直方图分析在腮腺肿瘤鉴别诊断中的对比研究

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目的 对比基于 2D 和 3D 分割的压脂 T2WI 直方图分析鉴别腮腺良、恶性肿瘤及多形性腺瘤和腺淋巴瘤的价值。

方法 回顾性分析 2020 年 5 月至 2023 年 5 月上海交通大学医学院附属第九人民医院经病理证实的腮腺肿瘤患者 159 例，其中良性肿瘤 119 例，包括多形性腺瘤 63 例，腺淋巴瘤 43 例；恶性肿瘤

40 例。由 2 名医师采用 ITK-SNAP 软件于轴位压脂 T2WI 上分别进行 2D 和 3D 肿瘤分割, 获取最大层面及全瘤感兴趣区域。采用 FAE 软件提取 7 个直方图特征, 包括第 10 百分位数 (Perc10th)、第 90 百分位数 (Perc90th)、均值、中位数、熵、偏度、峰度。采用组内相关系数 (ICC) 评价直方图参数观察者间的一致性。采用非参数检验 Mann-Whitney 检验比较腮腺良、恶性肿瘤之间及多形性腺瘤和腺淋巴瘤之间直方图特征的差异。使用逐步逻辑回归筛选出独立预测因子。采用 ROC 曲线分析及 Delong 检验评估 2D 与 3D 直方图特征诊断腮腺肿瘤的效能差异。计算曲线下面积 (AUC) 并比较不同分割方式 AUC 的差异。

结果 2D 分割 (ICC:0.877~0.981) 和 3D 分割 (ICC:0.877~0.986) 的直方图参数均具有很好的观察者一致性。区分腮腺良、恶性肿瘤, 基于 2D 和 3D 分割时 10th 均是独立预测因子, 曲线下面积 (AUC) 分别为 0.814 和 0.789, 灵敏度分别为 0.875 和 0.725, 特异度分别为 0.647 和 0.765。区分多形性腺瘤与腺淋巴瘤, 基于 2D 分割的独立预测因子是中位数, AUC 为 0.890, 灵敏度为 0.857, 特异度为 0.837; 基于 3D 分割的独立因子是 90th、熵与均值, 模型的 AUC 为 0.942, 灵敏度为 0.857, 特异度为 0.884。Delong 检验显示 2D 分割和 3D 分割模型鉴别腮腺良、恶性肿瘤及多形性腺瘤、腺淋巴瘤的 AUC 值均无显著性差异 (P 值均>0.05)。

结论 T2WI 直方图分析能够为腮腺肿瘤的诊断提供一种定量工具, 2D 分割可作为优先选择的手段。

PU-1851

一种罕见且难以诊断的疾病——Kimura

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背景及目的: 木村病 (Kimura) 又称嗜酸性淋巴肉芽肿, 是一种非常罕见的、病因不明且进展缓慢的良性病变。常发生在面颈部, 表现为多发无痛肿块, 伴随外周血嗜酸性粒细胞 (EOS) 及免疫球蛋白水平升高。由于该病少见, 且临床表现缺乏特异性, 易出现漏诊、误诊, 本文将讨论 Kimura 的临床影像学特征及治疗预后情况。

方法: 回顾性分析 1 例 Kimura 的临床、影像学及病例特点, 讨论其诊断、治疗及预后情况, 并结合相关文献进行分析。

结果: 39 岁男性, 1 年前喝酒后出现双手肌肉肿痛伴手指麻木、皮温低, 继而抬起受限; 9 月前出现双下肢肌肉疼痛, 走路 1000 米需要休息, 就诊我院, 实验室检查提示嗜酸性粒细胞绝对值升高, 考虑嗜酸性粒细胞增多症, 给予激素治疗; 2 月前出现左侧颈部肿物及左背部肿物, 无红肿热痛。超声提示左侧锁骨下、肩部及背部冈上肌、冈下肌异常肿大淋巴结; MRI 提示左侧胸锁乳突肌、斜角肌、斜方肌间隙内可见多发占位, 淋巴结可能。病理提示镜下见少量淋巴滤泡, 滤泡间大量嗜酸性粒细胞浸润和小管增生, 考虑嗜酸性粒细胞性肉芽肿 (Kimura 病)。

结论: 有学者认为 Kimura 与 Ig E 介导的 I 型变态反应有关, 主要表现为头颈部皮肤或皮下缓慢增长的结节伴随外周血嗜酸性粒细胞增多。该病目前无统一的治疗方案, 巨大肿块者首选手术治疗或糖皮质激素治疗后辅以小剂量放疗, 以预防复发。

PU-1852

鼻腔鼻窦及鼻咽部腺样囊性癌影像学表现及临床病理特点分析

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【摘要】目的 探讨鼻腔鼻窦及鼻咽部腺样囊性癌的 CT、MRI 表现及临床病理特点。方法 回顾性分析经手术病理证实的 14 例鼻腔鼻窦及鼻咽部腺样囊性癌的影像表现及临床病理特点。结果 本组

14 例患者女性 8 例, 男性 6 例, 年龄 36 ~ 83 岁, 平均年龄(62.8 ± 13.9) 岁。其临床表现无特异性, 主要以鼻塞、鼻出血、面部麻木瘙痒或胀痛、嗅角减退为主。中肿瘤主体位于鼻腔及上颌窦 6 例; 鼻腔 4 例; 上颌窦 3 例; 鼻咽部 1 例。右侧 6 例, 左侧 5 例, 双侧 3 例。肿瘤大小(长径) 2.7 ~ 8.8 cm, 平均(5.3 ± 1.7) cm。肿瘤形态与边界: 不规则形 10 例, 类圆形 2 例, 长条状息肉状 2 例; 界限不清楚 8 例, 界限清楚 6 例。CT 检查 13 例, 肿瘤密度不均匀 7 例; 肿瘤呈等或等低密度; 所有病例均呈不均匀强化; 邻近骨质破坏 13 例, 溶骨性 7 例, 膨胀性及溶骨性骨质破坏并存 6 例。MRI 平扫+增强 11 例:信号不均匀 11 例, T1WI 呈等低信号, T2WI 呈等高信号; DWI 1 例: 呈等低信号; 出现“筛孔状”强化 7 例。肿瘤侵犯其他窦腔和侵犯鼻窦外组织 12 例; 肿瘤沿神经蔓延生长 11 例。随访结果: 4 例转移(肺、颈椎、颈部淋巴结)、4 例复发。肿瘤镜下由群集的细胞巢或条索状肿瘤细胞构成, 并可见大小不等的囊腔形成典型的“筛孔状”结构, MYB 癌基因与转录因子 NFIB 的融合对此肿瘤保持高度特异性。**结论** 鼻腔鼻窦及鼻咽部腺样囊性癌较为罕见, 其临床症状多不典型, 基于生长缓慢、易局部侵袭和神经周围扩散的生长特性及病理组织学特点, CT 和 MRI 表现具有特征性, 两者结合可为该病的诊断、治疗及预后提供重要价值。

PU-1853

Value of deep learning image reconstruction algorithm on CT angiography driven from whole brain CT perfusion

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Purpose: To compare the image quality and diagnostic accuracy of CT angiography (CTA) images reconstructed from CT perfusion (CTP) arterial peak phase using deep learning image reconstruction (DLIR) algorithm with adaptive statistical iterative reconstruction-Veo (ASIR-V) and filtered back projection (FBP) in patients with acute ischemic stroke (AIS) due to anterior circulation large vessel occlusion (LVO). **Methods:** This prospective study involved 39 patients with AIS caused by LVO who underwent non-contrast CT, CTP, and CTA examination within 24 hours of symptom onset. CTP arterial peak phase images with a thickness of 0.625mm were reconstructed using FBP, ASIR-V40%, ASIR-V80%, and DLIR with three levels (low, medium, and high) and compared to conventional CTA images reconstructed with ASIR-V80%. ROIs were drawn on the internal carotid artery (ICA) siphon, M1 segment of the middle cerebral artery (MCA-M1), and temporalis in contralateral axial images. CT values, image noise, SNR, and CNR were measured and compared. The subjective evaluation included image noise, edge sharpness of vascular lumen, display of small blood vessels, and overall image quality. The collateral circulation of seven CTA image groups was scored using Bijoy K M et al six-point scoring system. **Results:** CT values of the ICA siphons, MCA-M1, and temporalis showed no statistical significance among all seven CTA image groups. Noise, SNR, and CNR were comparable among DLIR-M, DLIR-H, and conventional CTA images. While noise in ASIR-V80% was slightly higher and SNR lower than conventional CTA images ($P < 0.05$), no statistical difference was found among ASIR-V80%, DLIR-M, and DLIR-H ($P > 0.05$). FBP had the highest noise and lowest SNR and CNR. The images of DLIR-M and DLIR-H were slightly worse than those of conventional CTA images only in the display of small blood vessels($P < 0.05$). ASIR-V80% CTA images showed slightly inferior image noise and overall image quality compared to DLIR-M and DLIR-H ($P < 0.05$), with no significant difference in edge sharpness or small blood vessel visibility. Collateral circulation scores of the six reconstructed CTA images for each patient were consistent with conventional CTA images.

Conclusions: The objective and subjective image quality of CTP arterial peak phase images reconstructed by DLIR-H and DLIR-M were equivalent to conventional CTA images and superior to FBP and ASIR-V algorithms. Reconstructing CTA images from CTP data not only reduces radiation exposure and contrast agent dose by avoiding multiple scans but also shortens the examination time for patients with acute cerebral infarction.

PU-1854

基于卵圆孔未闭相关右向左分流患者发生 隐源性卒中的预测模型构建研究

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摘要 目的 基于卵圆孔未闭相关右向左分流 (PFO-RLS) 患者发生隐源性卒中 (CS) 的预测模型构建研究。方法 回顾性连续纳入 2020 年 1 月至 2022 年 10 月在苏州大学附一院神经内科住院的隐源性卒中 (CS) 患者, 经头颅磁共振检查证实, 且行对比增强经颅多普勒和经食道超声心动图明确存在 PFO-RLS 患者 66 例纳入 CS 组, 同期住院未发生卒中的 PFO-RLS 患者 83 例为非卒中 (NCI) 组。(1) 分析患者临床资料、PFO 解剖学特点及 PFO-RLS 情况。(2) 多因素 logistic 回归分析 PFO-RLS 患者发生 CS 的相关因素。(3) 构建联合预测模型, 绘制受试者工作特征 (ROC) 曲线, 分析联合预测模型及各指标 ROC 曲线下面积 (AUC), AUC 比较采用 Delong 检验。结果 (1) 基线资料: CS 组患者收缩压和舒张压、D-二聚体水平更高, 且 PFO 直径更大、PFO 隧道更长 (均 $P < 0.05$)。(2) 多因素 logistic 回归分析: 高血压、D-二聚体升高、PFO 直径大、PFO 隧道长是 PFO-RLS 患者发生 CS 的相关因素, OR 值 (95%CI) 分别为 4.16 (1.31~13.15)、1.01 (1.00~1.01)、2.29 (1.14~4.61)、1.19 (1.03~1.36), 均 $P < 0.05$ 。(3) ROC 曲线分析: 联合预测模型、高血压、D-二聚体、PFO 直径及 PFO 隧道长度的 AUC 分别为 0.79 (95%CI: 0.71~0.86)、0.64 (95%CI: 0.55~0.73)、0.62 (95%CI: 0.53~0.71)、0.67 (95%CI: 0.58~0.75) 及 0.65 (95%CI: 0.56~0.74)。Delong 检验显示联合预测模型与各指标的 AUC 差异均有统计学意义 (均 $P < 0.05$)。该联合预测模型在最佳截断值时, 其灵敏度 0.73, 特异度 0.76。结论 PFO 直径大、PFO 隧道长以及高血压、D-二聚体升高是 PFO-RLS 患者发生 CS 的相关因素, 联合预测模型具有一定的预测价值。

PU-1855

扫描头颅 CT 时, 选择哪条基线可使图像更清晰

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目的: 探究扫描头颅 CT 时, 选择哪条基线可使图像更清晰。
方法: 分别用听眉线, 听眦线, 听眶线打角度的脑 CT 图像进行对比。
结果: 通过听眉线三个颅凹最低处都可以兼顾上, 对于显示第四脑室比较好, 而且相对听眶线而言, 听眉线更加平行或者垂直于尾状核头部、尾状核尾部, 壳核, 杏仁核以及丘脑等结构, 所以有利于基底节显示, 而且在儿童扫描时, 听眉线相对其他两条基线可以避开晶状体, 有利于防护。听眶线是三条基线中唯一可以完整的通过整个眼眶, 但是听眦线定位平行于视神经, 所以对于视神经的话可能要比听眶线好。听眦线由于介于两条基线之间, 所以可以兼顾其他两条基线所显示的结构, 所以在实际扫描时, 很多科室以听眦线为头颅扫描基线。
结论: 所以在扫描时, 在时间允许的情况下, 尽量浏览申请单, 根据患者重点观察部位给角度或者以听眦线为主, 听眦线可以中和其他两条基线。当然有些高端设备比如西门子双源, 不能进行打角度, 所以在摆位置时避免将患者头颅过仰或者过低, 否则会引起解剖结构的严重变形; 在儿童扫描时尽量以听眉线为主, 这样有利于眼晶状体的防护。

PU-1856

缺血型烟雾病患者搭桥术中的血流动力学参数能否预测术后脑过度灌注综合征

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目的 探讨缺血型烟雾病 (MMD) 患者行颞浅动脉-大脑中动脉 (STA-MCA) 搭桥术中血流动力学参数对脑过度灌注综合征 (CHS) 的预测价值。 **方法** 回顾性分析 2021 年 3 月至 2022 年 12 月苏州大学附属第一医院神经外科行 STA-MCA 搭桥术的缺血型 MMD 患者 78 例。术中应用微型探头血管超声 (MVD) 探测并记录吻合前 MCA 皮层支 (M4)、吻合后供血动脉即 STA 及受血动脉 M4 的血流动力学参数, 包括收缩期峰值流速 (Vp)、平均流速 (Vm)、舒张期末流速 (Vd)、脉动指数 (PI), 并计算吻合后 M4 的 Vp、Vm、Vd 变化。记录围手术期血压变化。根据术后 72h 内患者是否出现 CHS 临床表现, 将患者分为 CHS 组 (16 例) 及非 CHS 组 (62 例)。建立多因素 logistic 回归模型, 分析影响患者术后出现 CHS 的相关因素。通过 ROC 曲线及曲线下面积 (AUC) 分析预测术后发生 CHS 的诊断价值。 **结果** 1.血流动力学参数: CHS 组 M4 近心段 Vp、Vm、Vd 及 M4 远心段 Vm 的增加倍数均高于非 CHS 组, 差异均有统计学意义 ($P<0.05$)。2.多因素 logistic 回归分析: M4 近心段 Vm 增加倍数较高 ($OR=1.24$, $95\%CI: 1.02-1.50$, $P=0.029$) 是术后发生 CHS 的独立危险因素。3.ROC 曲线分析: M4 近心段 Vm 增加倍数为 15 时 ($AUC=0.899$, $95\%CI= 0.797-1.000$, $P=0.00$, 敏感性为 0.818, 特异性为 0.885) 是预测术后发生 CHS 的最佳截断值。4.血压变化: 在吻合后 M4 增加 1.5 倍及以上的患者中, CHS 组患者术中及术后平均收缩压均高于非 CHS 组 ($P<0.05$)。 **结论** 吻合术后即刻 M4 近心段 Vm 增加倍数 ≥ 15 , 是预测缺血型 MMD 患者 STA-MCA 搭桥术后 CHS 的有效指标。

PU-1857

鼓膜张肌圆腱、鼓膜张肌半管与咽鼓管半管的 HRCT 研究

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目的: 研究鼓膜张肌圆腱、鼓膜张肌半管与咽鼓管半管的 CT 表现。 **方法:** 用 Philips iCT 256 对 66 例颞骨行 HRCT, 男 35 例, 女 31 例; 平均年龄 36.2 岁。鼓膜张肌圆腱及半管正常 96 耳, 左侧 46 耳, 右侧 50 耳; 咽鼓管正常 108 耳, 左侧 54 耳, 右侧 54 耳。中耳乳突炎 26 耳, 颞骨骨折 4 耳, 中、外耳畸形 5 耳, 肿瘤 1 耳。所有病例均在轴位图像上行双侧鼓膜张肌圆腱、半管及咽鼓管半管 CPR。测量鼓膜张肌圆腱长度和宽度, 鼓膜张肌半管长度及外口、中段、内口宽度, 骨性咽鼓管半管长度及外口、中段及内口宽度。 **结果:** CT CPR 可在一幅图像上清晰显示双侧鼓膜张肌圆腱附着点及圆腱、鼓膜张肌半管全貌, 亦能显示双侧骨性咽鼓管及其与鼓膜张肌半管之间的薄层骨板。左侧 46 耳的圆腱与鼓膜张肌半管: 夹角 (轴位) $97.76\pm 9.64^\circ$ 、(冠状) $130.26\pm 8.72^\circ$, 圆腱长度 $2.26\pm 0.44\text{mm}$ 、宽度 $0.68\pm 0.32\text{mm}$, 鼓膜张肌半管长度 $12.47\pm 1.84\text{mm}$, 内口宽度 $2.30\pm 0.58\text{mm}$ 、中段 $1.81\pm 0.36\text{mm}$ 、外口 $0.96\pm 0.21\text{mm}$; 右侧 50 耳的圆腱与鼓膜张肌半管: 夹角 (轴位) $103.36\pm 13.34^\circ$ 、(冠状) $129.08\pm 8.04^\circ$, 圆腱长度 $2.20\pm 0.48\text{mm}$ 、宽度 $0.71\pm 0.14\text{mm}$, 鼓膜张肌半管长度 $12.82\pm 1.73\text{mm}$, 内口宽度 $2.36\pm 0.62\text{mm}$ 、中段 $1.79\pm 0.36\text{mm}$ 、外口 $1.00\pm 0.21\text{mm}$ 。骨性咽鼓管, 左侧 54 耳: 长度 $9.29\pm 1.66\text{mm}$, 内口宽度 $1.04\pm 0.38\text{mm}$ 、中段 $2.29\pm 0.64\text{mm}$ 、外口 $3.20\pm 0.53\text{mm}$; 右侧 54 耳: 长度 $9.31\pm 1.71\text{mm}$, 内口宽度 $0.98\pm 0.27\text{mm}$ 、中段 $2.34\pm 0.59\text{mm}$ 、外口 $3.22\pm 0.68\text{mm}$ 。以上测量值, 经统计学处理, 男、女及左、右侧对比无差别。 **结论:** HRCT CPR 可在一幅图像上完整清晰显示双侧鼓膜张肌圆腱、鼓膜张肌半管及骨性咽鼓管, 是研究其影像解剖及病变的可靠方法。

PU-1858

单侧颞浅动脉-大脑中动脉搭桥术能改善患者的神经功能吗

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目的 探讨单侧颞浅动脉-大脑中动脉搭桥术 (STA-MCA bypass) 后脑血流动力学改变及神经功能改善情况。**方法** 回顾性连续纳入 2019 年 3 月~2022 年 6 月在苏州大学附属第一医院神经外科经 DSA 和/或 CTA 确诊为单侧颈内动脉闭塞 (SICAO) 或大脑中动脉闭塞 (SMCAO) 患者, 且行 STA-MCA bypass 术并连续 CT 灌注随访一年患者 112 例。采用血管超声 (CDU) 评估搭桥术前后 STA 的血流动力学改变, (CTP) 评估患者搭桥术前后缺血区的灌注变化; 将 STA 评估的血流量与 CTP 参数行相关性分析; 运用美国国立卫生研究院卒中量表 (NIHSS) 及改良 Rankin 量表评分 (mRs) 评估患者神经功能改善情况。**结果** (1) 血流动力学改变: 与术前相比, 术后 7 天 (d)、30d、180d 和 360d 术侧 STA 主干内径明显增宽, 血流速度及血流量增加, 血管阻力指数减低 ($p<0.01$)。 (2) CTP 参

数: 与术前相比, 术后 7d、180d、360d 的相对脑血流量 (rCBF) 和相对脑血容量 (rCBV) 均升高, 相对达峰时间 (rTTP) 和相对平均通过时间 (rMTT) 均降低 ($p<0.05$)。 (3) STA 评估血流量与 CTP 参数 (rCBF) 的相关性: 搭桥术后两组的 STA 血流量及 rCBF 均呈高度正相关 ($r=0.865$ 、 $r=0.864$, $p<0.01$)。 (4) 术后 DSA: 91.1% (102 / 112) 的患者术后 360d 其 DSA 显示吻合血管通畅, 其中 10 例吻合不通畅患者中 40% (4/10) 于术后 180d STA 血流参数也得到相应改善。 (5) 神经功能改善情况: 患者术后 7d 的 NIHSS 评分均较术前减低 (1.8 ± 3.1 vs 1.6 ± 2.8 , $p<0.01$), 97% (109 / 112) 患者于术后 360d 其 mRS 评分较术前减低或不变, 95% (106 / 112) 患者预后良好 (mRS ≤ 2 分)。 **结论** 单侧 STA-MCA bypass 术能改善患者脑灌注及神经功能状况, 且血管超声是评估 STA-MCA bypass 术后脑血流动力学改变的有效检测手段。

PU-1859

少见部位木村病的临床及影像特征

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目的: 探讨少见部位木村病 (Kimura's disease, KD) 的临床及影像学特征。

方法: 回顾性分析并统计 5 例少见部位木村病患者的临床表现、实验室检查及影像学特征。所有的影像数据均由两位放射学医师评估, 包括病灶的位置、数量、大小、均匀性、边界及增强表现。

结果: 5 例患者绝大部分一般情况良好, 其中 1 例患者伴有瘙痒症状; 4 例位于上臂皮下, 1 例位于腹股沟区; 主要表现为单发 (3 例) 或多发 (2 例) 皮下结节/肿块, 其中 3 例患者伴有淋巴结肿大; 4 例患者伴有外周血嗜酸性粒细胞增多症, 4 例患者病灶内部见血管流空影; 3 例患者表现为密度/信号均匀, 边界较清, 明显强化的结节或肿块; 2 例患者出现病灶周围水肿。

结论: 单发或多发上臂皮下结节/肿块伴淋巴结肿大, 外周血嗜酸性粒细胞增多, 病灶内部血管流空影等特征有助于木村病的诊断。

PU-1860

DR 人工耳蜗体位设计及成片标准与否的判定郝帅
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DR 检查是人工耳蜗置入术后临床常用、简便、经济、有效的影像检查方法。目前拍片体位逐步统一为耳蜗位¹。内听道经眶位病人俯卧摄影床上,头正中矢状面垂直床面并与暗盒中线重合,听眦线垂直于床面,两外耳孔到床面等距,中心线经两外耳孔连线中点垂直入暗盒。斯氏位病人俯卧摄影床上,头倾向被检侧倾斜,正中矢状面与台面成 45°,被检侧的额、颧、鼻三点紧贴台面,听眦线垂直台面边缘。中心线向头侧倾斜 12°,经外耳孔平面的隆突外 2cm 处射入暗盒中心¹。因本研究全是 1~5 岁小儿,采用俯卧位摄影,患儿不易配合,故体位均有改良,全部采用仰卧位。特别是仰卧斯氏位采用下颌内收使听眦线与床面横轴线夹角约 12°以平衡俯卧位斯氏位中

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万方数据

的中心线向头侧倾斜 12°,避免了倾斜 X 管的操作,简便了操作流程,提高了操控的简便性和准确性,提升了工作效率和摄影的成功率。谭颂华²等使用 C 一臂数字 x 线拍片机,采用耳蜗位体位拍片,对仰卧于手术台上的患者进行术中拍片,取得满意效果。朱健等¹³采用改良斯氏 (Sten-VePS) 位球管不打角度,球管中心线对准被检侧的眼眶外缘和外耳道之间上 1cm 垂直射入。虽然本法可很好地显示人工耳蜗电极植入形态和位置,可判断耳蜗内电极数目及深度,但我们认为采用俯卧位摄影,患儿不易配合。黄柱飞等¹⁴采用耳蜗位,患者取站立位或坐立位患者植入侧的颧部、鼻、额部位于台面,并与台面的夹角约 50°,眼眶下缘与外耳道连线垂直于探测器,中心线从枕部射入并垂直台面

PU-1861

冈上肌出口位的 DR 投照方法及临床应用崔添源
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目的:探讨冈上肌出口位的投照方法及对肩袖损伤临床诊断的价值。方法:回顾性分析 25 例经临床证实肩袖损伤病人冈上肌出口位的 X 线表现,评价这种检查方法对病灶的显示情况及定性诊断的准确率。结果:肩袖损伤常规 X 线片上表现为肱骨头的上移和肱骨大结节的畸形,其阳性率为 78%,特异性为 98%^[1]。结论:恰当的投照方法与影像检查手段相结合能准确反映肩袖损伤程度并为后期治疗提供依据。

PU-1862

双层探测器光谱 CT 单能量成像联合个性化注射方案在颅脑 CT 血管成像中的应用研究罗昆、吴红英、雷子乔
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【摘要】 目的: 探讨双层探测器光谱 CT 单能量成像联合个性化对比剂注射方案在颅脑 CT 血管成像 (CTA) 中的应用价值。方法: 回顾性分析 2020 年 8 月至 11 月在华中科技大学同济医学院附

属协和医院采用双层探测器光谱 CT 和个性化对比剂注射方案行颅脑 CTA 检查的 76 例患者的影像资料。对基于双层探测器光谱 CT 数据重建生成的 120 kVp 混合迭代传统能量图（常规组）与 50 keV 光谱虚拟单能量图（试验组）进行图像质量的客观和主观评价，客观评价内容包括颈内动脉及大脑中动脉处的 CT 值、信噪比（SNR）和对比噪声比（CNR）、脑实质的 CT 值和标准差。主观评价由 2 名高年资影像医师按照 5 分法完成，2 名医师主观评分的一致性采用 Kappa 检验。采用配对样本 t 检验或 Wilcoxon 秩检验进行组间分析。结果：试验组颈内动脉、大脑中动脉及脑实质的 CT 值、SNR 和 CNR 均较常规组高，差异有统计学意义（P 均<0.001）。2 名医师对试验组的主观评分均为 5（5，5）分，对常规组的主观评分均为 4（4，4）分，医师间主观评分一致性较好，Kappa 值分别为 0.74 和 0.84。试验组主观评分高于常规组，差异有统计学意义（Z=-11.15，P<0.001）。结论：在颅脑 CTA 检查中，使用双层探测器光谱 CT 单能量成像联合个性化对比剂注射方案，能够显著提高 SNR 和 CNR，优化图像质量。

PU-1863

基于低频振幅及其时间动态性变化分析皮质下缺血性脑血管病患者脑自发活动改变

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目的：探索皮质下缺血性脑血管病（SIVD）患者的局部脑活动强度及其时间动态性变化。

方法：于 2020 年 9 月至 2022 年 8 月间招募了 86 名参与者，包括 29 名伴有认知障碍的 SIVD 病人（SIVD-CI，N=29）、26 名不伴有认知障碍的 SIVD 患者（SIVD-NCI，N=26）以及 31 名健康对照（HC，N=31）。采集所有参与者的静息态脑功能磁共振数据及神经心理学量表。计算所有被试血氧水平依赖信号的低频振幅（ALFF）及低频振幅的动态性（dALFF）。使用协方差分析来比较三组间的 ALFF 值及 dALFF 值，将被试的年龄、受教育程度及头动参数作为协变量，多重比较校正采用高斯随机场校正。运用偏相关分析来检验 SIVD 患者存在差异的脑区内平均 ALFF、dALFF 平均值与各个神经心理学量表评分的相关性。

结果：与健康对照相比，SIVD-CI 以及 SIVD-NCI 患者均表现出左侧角回的 ALFF 值减低，而 SIVD-CI 组还表现出右侧额上回的 ALFF 值升高（GRF 校正，体素水平 $P < 0.001$ ，团块水平 $P < 0.05$ ）。和另外两组相比，SIVD-CI 组表现出右侧楔前叶和左侧背侧前扣带回的 dALFF 值减低（GRF 校正，体素水平 $P < 0.001$ ，团块水平 $P < 0.05$ ）。SIVD-NCI 组和 HC 组间没有表现出显著的 dALFF 值差异（ $P > 0.05$ ）。SIVD-CI 组患者左侧角回的 ALFF 平均值与 AVLT 延迟记忆量表评分呈正相关（ $r=0.448$ ， $P=0.017$ ）。

结论：SIVD-CI 及 SIVD-NCI 患者均表现出左侧角回的活动减低，角回可能是 SIVD 患者易受损伤的脑区之一。SIVD-CI 患者的右侧楔前叶及左侧背侧前扣带回的脑活动灵活度减低，而 SIVD-NCI 患者的局部脑活动灵活度尚处于代偿阶段。

PU-1864

Imaging markers of Takayasu arteritis: Imaging diagnosis is leading to new horizons

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Objectives: The purpose of this study is to explore a noninvasive imaging biomarker for early assessment of Takayasu arteritis (TAK) by comparing ultrasound-based multimodal imaging with postoperative histopathology.

Methods: Retrospective analysis was performed on all patients with TAK who met the American College of Rheumatology (ACR) criteria and underwent carotid Doppler ultrasonography (CDU) and high-resolution magnetic resonance imaging (HRMRI) between 2016 and 2023 at our institution. Among all the patients with Takayasu arteritis, 38 patients had positive imaging evidence on CDU and HRMRI, and the clinical dates of these patients were summarized and analyzed. TAK patients were divided into stroke and non-stroke groups according to the presence or absence of cerebral infarction. One of the patients with left common carotid artery occlusion underwent left-side artificial vessel replacement surgery, and some of the diseased vessels were obtained for histopathological study.

Results: There was excellent concordance between CDU and HRMRI in the diagnosis of TAK patients ($p < 0.001$). TAK patients had higher levels of erythrocyte sedimentation rate (ESR), white blood cell (WBS), and low-density lipoprotein cholesterol (LDL-C) than healthy controls ($p = 0.002$; $p < 0.001$; $p < 0.001$). After grouping patients by CDU imaging, type II, III, and IV had significantly higher levels of C-reactive protein (CRP) and ESR than type I ($p = 0.001$; $p < 0.001$). The levels of CRP, ESR, WBS, and LDL-C in the stroke group were significantly higher than those in the non-stroke group ($p = 0.046$; $p = 0.019$; $p = 0.003$; $p = 0.041$). Histopathologically analysis of the common carotid artery segment established the media and the intima of the left common carotid artery granulomatous inflammation of carotid lumen occlusion.

Conclusions: The vascular morphological alterations of the artery wall and lumen can be observed by CDU, which can also assess TAK early and predict stroke events.

PU-1865

根据小剂量团注测试达峰时间和点数调整老年患者头颈部 CT 血管造影对比剂及生理盐水剂量

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目的 根据小剂量测试 (Test-bolus) 达峰时间和点数调整老年人头颈部 CT 血管造影 (CTA) 对比剂及生理盐水剂量, 以优化图像质量, 减少对比剂用量。**方法** 将 234 例心功能及 BMI 正常 ($50\text{kg} \leq \text{Wt} < 80\text{kg}$) 的老年患者分 A 组 (对照组, $n=110$) 和 B 组 (实验组, $n=124$) 进行头颈部 CTA 扫描。2 组扫描及后处理步骤、参数相同。Test-bolus 确定达峰时间 (达峰点数 $\times 2 + 8\text{S}$) 和扫描延迟时间 (达峰时间 - 平扫时间)。血管成像序列: A 组对比剂为 1.0ml/kg , 生理盐水 40ml ; B 组根据 Test-bolus 达峰时间和点数调整对比剂及生理盐水剂量: 对比剂剂量 = 对比剂注射时间 (达峰时间 - 生理盐水注射时间) \times 对比剂流率; 生理盐水剂量: 达峰点数 4-5 个点, 30ml ; 6-7 个点, 40ml ; 8-9 个点, 50ml 。2 组对比剂为碘克沙醇 (320mg/ml), 对比剂、生理盐水注射流率为 4.5ml/s 。2 组性别、年龄、身高、体重、BMI、心率、血压、达峰时间和点数无统计学差异 ($P > 0.05$)。2 名放射科医师对图像质量主观评价的可靠性采用 kappa 分析。客观评价指标包括目标动脉及右侧横窦内 CT 衰减值、噪声 (Noise)、信噪比 (signal to noise ratio, SNR)、对比噪声比

(contrast noise ratio, CNR)。比较 2 组图像质量及对比剂用量。**结果** ① 2 名医师主观图像质量评价具有较好的一致性 ($k=0.815$)。B 组图像质量主观评分及目标动脉、右侧横窦内 CT 值与 A 组比较, 差异无统计学意义 ($P>0.05$); B 组右锁骨下静脉、右头臂静脉及上腔静脉内对比剂残留少于 A 组; B 组右颈总动脉分叉处 Noise 较 A 组增加 1.7%, 左侧大脑中动脉 M1 段 SNR 较 A 组降低 6.6%, 其余 2 组相同部位动脉 Noise、SNR、CNR 比较, 差异无统计学意义 ($P>0.05$)。② B 组对比剂用量较 A 组减少了 18.2%。**结论** 根据 Test-bolus 达峰时间和点数调整正常体型老年人头颈部 CTA 对比剂及生理盐水剂量, 可在不影响图像质量时, 减少注射侧静脉内对比剂残留, 降低对比剂用量。

PU-1866

基于磁共振 MAGiC 技术的干燥综合征患者腮腺弛豫值研究

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目的: 使用磁共振 MAGiC 技术测量和分析干燥综合征患者腮腺的弛豫值, 研究干燥综合征患者与正常对照者间腮腺的相关数值的差别。

材料与方法: 纳入 7 例干燥综合征患者 (年龄: 53 ± 11 岁) 和 18 例正常对照组 (年龄: 56 ± 13 岁)。所有受试者均在 3.0T MRI 上进行 MAGiC (MAGnetic resonance imaging compilation) 扫描, 使用 MAGiC 后处理软件对双侧腮腺原始数据进行进一步后处理, 取腮腺最大层面测量, 避开腮腺内穿行血管, 为减小部分容积效应, 距离腮腺边缘 1-3mm 画感兴趣区, 测量并记录双侧腮腺弛豫值, 包括 T1、T2 弛豫值和质子密度 PD 值, 使用非参数检验来评估两组之间年龄、弛豫值的差异。

结果: 两组之间的年龄 ($P=0.243$) 无统计学差异。病例组 T1、T2 弛豫值和质子密度 PD 值 (565.286 ± 61.356 、 80.000 ± 7.359 、 84.664 ± 14.495) 与正常对照组 T1、T2 弛豫值和质子密度 PD 值 (610.000 ± 82.285 、 79.333 ± 8.912 、 77.631 ± 11.944) 无明显统计学差异, P 值分别为 0.075、0.905、0.117。

结论: 使用磁共振 MAGiC 技术测量和分析干燥综合征患者腮腺的弛豫值尚不能区分干燥综合征和正常人, 该技术在干燥综合征患者腮腺病变的诊断价值需扩大样本量进一步研究。

PU-1867

慢性鼻窦炎鼻窦 CT 结构式报告在影像报告中的应用

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鼻窦 CT 在慢性鼻窦炎患者评估和诊疗中发挥着重要作用, 但既往鼻窦 CT 报告描述内容过于简单, 并对鼻窦相关解剖及解剖变异情况未与充分解读, 故与临床诊疗关注内容明显不一致。而慢性鼻窦炎患者是病因和发病机制复杂的异质性疾病, 不同的分型有不同的预后, 需要个体化的精准诊疗, 因此放射科医生需要充分学习并识别鼻窦相关的解剖结构及解剖变异, 为临床医生提供有价值的报告内容。慢性炎鼻窦 CT 结构式报告里面所提及到的大部分内容是既往放射科医师并未充分认识到的知识点及盲区, 比如窦口鼻道复合体的概念及组成区域、鼻道具体的引流通路、嗅凹 Keros 分型、筛前动脉的位置、筛骨纸样板有无骨质不连续、蝶窦气化情况及钩突附着差异等, 而既往未在报告中体现的所有需要关注的点都会对功能性内窥镜鼻窦手术 (FESS) 手术有所影响。因此放射科医生应充分学习慢性鼻窦炎鼻窦 CT 结构式报告中的知识点内容, 并开展运用鼻窦 CT 的结构式报告,

为患者提供充分的术前评估, 以避免部分功能性内窥镜鼻窦手术 (FESS) 中的并发症及潜在风险, 为慢性鼻窦炎及鼻窦相关占位性病变个性化精准治疗提升治愈率, 并改善术后临床状况。

PU-1868

甲状腺结节磁共振特征与病理特征对照研究

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目的: 分析甲状腺结节的磁共振成像 (MRI) 特征及其病理基础, 探讨甲状腺结节磁共振成像特征与病理特征之间的关系, 提高甲状腺良恶性结节的诊断水平。

方法: 回顾性分析 28 例经手术和病理证实发现甲状腺结节的患者, 术前对患者进行甲状腺 MR 常规平扫、增强扫描及扩散加权成像 (DWI) 检查, 根据病理结果分为良性结节组和恶性结节组。观察病灶的形态、边界、质地、信号类型、伴随特征、强化方式及扩散加权受限程度, 结果与术中病理进行对照。

结果: 28 例甲状腺结节患者的 MRI 图像上共见 62 个结节病灶, 其中: 单发结节 11 例, 多发结节 17 例; 病灶形态规则多呈类圆形、边界不清晰 (71.0%, 61.3%)。49 个病灶质地呈实性 (79.0%)。病灶 T1WI 以低、等或等低信号为主 (95.2%), 病灶 T2WI 以高或稍高信号为主 (83.9%)。15 个病灶伴有囊变或坏死 (24.2%), 13 个病灶伴有钙化征象 (21.0%)。病灶呈轻中度强化有 43 个 (69.4%), 呈明显强化有 19 个 (39.6%)。病灶 DWI 呈明显弥散受限有 28 个 (45.2%)。良性结节灶 17 个 (27.4%), 恶性结节灶 45 个 (72.6%), 单因素分析显示两组间边界 ($P=0.002$)、TIWI 信号 ($P=0.018$)、强化程度 ($P=0.003$)、DWI 是否明显受限 ($P=0.001$) 差异有统计学意义。多因素回归分析显示强化信号程度 ($P=0.003$, OR 值=0.095) 及 DWI 是否明显受限 ($P=0.008$, OR 值 12.109) 是甲状腺结节恶性的独立预测因素。

结论: 甲状腺恶性结节在 MRI 上具有一定的形态学血流动力学特征, 表现为轻中度强化且弥散明显受限的显著特点; 甲状腺常规平扫结合强化和 DWI, 有助于提高恶性结节的检出率。

PU-1869

通过死后计算机断层扫描(PMCT)和死后磁共振成像(PMMRI)确定颈部损伤死因

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目的: 回顾性地确定死于颈部损伤的死者死后计算机断层扫描 (PMCT) 和死后磁共振成像 (PMMRI) 发现的潜力, 并评估每种方法的优缺点。

材料与方法: 对 22 具尸体进行 PMCT, 对 10 具尸体进行 PMMRI。所有死后图像由两名普通放射科医生在 PACS 工作站进行独立盲读解读。最后的死因是由法医病理学家确定的。对鼻窦、气管、主支气管影像学进行评估; 骨折; 肿胀颈部、咽和喉部肿胀; 还有其他发现。记录每种方法的所有结果, 并按解剖结构分类。

结果: 22 具尸体中有 21 具的 PMCT 和 PMMRI 检查结果可以用参照法进行验证。在一具尸体中, PMCT 未发现颈部肌肉出血。颈部损伤的原因有 7 种: 扁桃体突出 2 例、窒息 2 例、气道阻塞 2 例、溺水 2 例、颈部刺伤 2 例、外伤 8 例、颈椎手术 3 例。

结论: PMCT 联合 PMMRI 因其微创性, 在颈部损伤致死原因的检测中具有潜在的作用。

PU-1870

基于双能量 CT 碘浓度纵向变化构建的列线图模型预测喉癌患者诱导化疗后的治疗反应

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目的：探讨双能量 CT (DECT) 碘图定量参数纵向变化在评估喉癌患者接受诱导化疗后治疗反应的价值。

方法：回顾性分析 2018 年 7 月至 2021 年 12 月在天津市第一中心医院头颈外科接受诱导化疗的 86 例喉癌患者，前瞻性收集 2022 年 12 月至 2023 年 2 月期间的 30 名喉癌患者作为验证队列。收集患者诱导化疗前后的临床资料及 DECT 资料。根据 RECIST 标准评估患者的治疗反应，将患者分为缓解组和抵抗组。将 DECT 图像导入后处理工作站 Syngovia 获得碘图，勾画肿瘤最大层面获得碘浓度，以同层颈总动脉碘浓度作为标准参照值，获得诱导化疗前动、静脉期标准化碘浓度 (NAICpre, NVICpre) 和诱导化疗后动、静脉期标准化碘浓度 (NAICpost, NVICpost)，并计算前后的变化率值 (Δ NAIC%, Δ NVIC%)，公式为 Δ IC% = (NICpost - NICpre) / NICpre \times 100%。采用配对样本 t 检验或 Wilcoxon 检验评估诱导化疗前后缓解组和抵抗组不同定量参数纵向变化的差异，使用 Mann-Whitney U 检验评估不同参数在缓解组和抵抗组之间的差异，绘制 ROC 曲线评估几种参数对诱导化疗抵抗的预测效能。在训练组中筛选独立预测因子构建列线图模型并在前瞻队列中验证模型的鲁棒性，分别在训练组和验证组绘制校准曲线及决策曲线评估模型性能。

结果：不论是治疗前还是治疗后碘浓度参数，在抵抗组和缓解组之间均无统计学差异。缓解组患者治疗后 NAIC (p=0.0022)、NVIC (p=0.0031) 均显著低于治疗前，但抵抗组参数变化无统计学差异。多因素 logistic 回归分析最终确定 Δ NAIC%、 Δ NVIC%、假包膜、瘤内动脉是训练组诱导化疗抵抗型喉癌的独立预测因素，基于以上因素建立诱导化疗抵抗风险预警列线图模型。训练组和验证组模型预测拮抗的 AUC 分别为 0.85、0.89，校准曲线、决策曲线均表现出良好的一致性。

结论：DECT 碘图定量参数纵向变化 (Δ NAIC%、 Δ NVIC%) 有助于评估喉癌患者诱导化疗后的治疗反应，联合传统影像学征象构建的模型对于诱导化疗抵抗型喉癌具有良好的预测效能。

PU-1871

会咽部多形性腺瘤 1 例

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会咽部多形性腺瘤。多形性腺瘤又称混合瘤，是一种临界性瘤，大涎腺中 80%~90% 多见于腮腺来源，小涎腺多见于颌腺，本文报道 1 例少见的位于会咽部的多形性腺瘤，本病例男，43 岁，咽痛 1 周，术后病理诊断：结合形态及免疫组化符合多形性腺瘤。

PU-1872

脑小血管病负荷预测急性缺血性卒中血管内治疗预后的价值

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【摘要】目的 探讨脑小血管病 (CSVD) 负荷预测大血管闭塞 (LVO) 急性缺血性卒中 (AIS) 血管内治疗 (EVT) 预后的价值。方法 回顾性分析 2018 年 2 月至 2022 年 9 月 242 例前循环 LVO-AIS 并接受 EVT 的患者资料。基于 EVT 后一周内的随访 MRI 评估 CSVD 征象及负荷评分。患者分为轻度 (CSVD 负荷评分 0-1 分) 和中-重度 (CSVD 负荷评分 2-5 分) CSVD 组、预后良好组 [EVT 后 90 天改良 Rankin 量表 (mRS) 评分 0-2 分] 和预后不佳组 (mRS 评分 3-6 分)。采用 Mann-Whitney U 检验、卡方检验及多因素 Logistic 回归分析进行统计学分析。结果 242 例患者包括预后良好患者 169 例 (69.8%) 和预后不佳患者 73 例 (30.2%)。预后不佳组 CSVD 负荷评分更高, Fazekas 评分中脑室旁脑白质高信号 (WMH) 评分 = 3 分和 (或) 深部 WMH 评分 ≥ 2 分及中-重度脑萎缩比例高于预后良好组 (P 均 < 0.05)。高血脂、高基线美国国立卫生研究院卒中量表 (NIHSS) 评分、EVT 后血管无良好再通及合并出血转化是预后不佳的独立危险因素 (P 均 < 0.05)。与轻度 CSVD 组相比, 中-重度 CSVD 组的 90 天 mRS 评分更高 ($P = 0.025$), 而两组间良好再通率、EVT 后出血转化发生率差异无统计学意义 ($P > 0.05$)。结论 基于 CSVD 负荷预测前循环 LVO-AIS 患者 EVT 预后具有一定的临床应用价值。

PU-1873

尼古丁依赖者静息态脑功能磁共振局部一致性及低频振幅的研究

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【摘要】采用静息态脑功能磁共振 (fMRI) 技术分析尼古丁依赖者静息态局部一致性 (ReHo) 及低频振幅 (ALFF) 指标, 探讨尼古丁成瘾的机制。方法 2020 年 5 月至 2023 年 1 月, 选择符合条件的尼古丁依赖者 22 例作为实验组, 选择年龄、性别相匹配的健康成人 26 例作为健康对照组进行静息态功能磁共振 (fMRI) 检查, 对尼古丁依赖组进行烟草依赖检验量表 (FTND) 评估, 采用 Matlab 背景下 restplus 软件对影像学数据进行处理, 获得被试者全脑的局部一致性 (ReHo) 值及全脑的低频振幅 (ALFF) 值并进行比较分析。结果 与健康对照组相比, 尼古丁依赖者 ReHo 值差异无统计学意义 ($P > 0.05$)。双侧小脑蚓部、扣带回、楔前叶 ALFF 值降低, 相关分析显示, 尼古丁依赖组 FTND 评分与扣带皮层平均 ALFF 值呈负相关 ($P < 0.05$)。结论 尼古丁依赖者静息态脑功能磁共振双侧小脑蚓部、扣带回、楔前叶脑固有自发神经活动强度减弱, 且这些脑区功能活动改变与尼古丁成瘾者烟草依赖检验量表评估得分有关。

PU-1874

头颈部 CTA 血管成像因子间相互作用权重的研究与应用

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目的: 探讨影响头颈部计算机断层扫描血管成像 (CTA) 的图像质量相关的影响因素。
方法: 回顾性收集 2019 年 10 月至 2020 年 12 月 617 例行头颈部 CTA 检查的患者。采用美国通用公司 GE64 排 VCT 成像系统。扫描范围由主动脉弓至颅顶, CTA 扫描方案选取第 3、4 颈椎间的

层面为测试层面,采用小剂量团注法,以该层面颈总动脉为示踪血管,注射显影剂同时启动测试序列,计算出颈总动脉 CT 值达到峰值的时间并以此为扫描延迟依据后进行头颈部 CTA 序列扫描。测量左大脑中动脉、右大脑中动脉、上矢状窦的 CT 值,图像对比度、分辨率和左、右大脑中动脉 CT 值与上矢状窦 CT 值的比值(CTA/V),ROI 面积大小占血管截面积的 80%,测量时注意避开血管钙化点、软斑块和狭窄等区域,每个 ROI 测量三次取均值。

结果:本研究对临床数据收集的 617 例缺血性中风患者,其将年龄、平均动脉压、心率、显影剂剂量、高压注压力、体表面积、扫描延迟扫描时间,将收集之数据经正规化处理后用于确定 LRA/US 值之间的非线性一阶回归关系。通过 STATISTICA 程序导出了相应的多因子影响因素的排序表;对于头颈部 CTA 的图像质量影响进行分析,总结计算出的 22 项系数组和导出系数的排序顺序,其结果显示排序前五位分别为:平均动脉压 + 高压注压力(排序 1)、平均动脉压 + 延迟时间(排序 2)、平均动脉压 + 心率(排序 3)、高压注压力 + 延迟时间(排序 4)、年龄 + 平均动脉压(排序 5),为排名前 5 项重要影响因子($\Phi = 15.6928$, $S^2 = 69.04\%$, $r^2 = 0.8309$)。

结论:头颈部 CTA 图像质量受多种因素的影响。患者平均动脉压 + 高压注压力,平均动脉压 + 延迟时间,平均动脉压 + 心率,是影响 CTA 成像的重要因子,通过观察平均动脉压、心率,并且调整高压注压力、延迟时间,可以获得最佳的血管成像。

PU-1875

磁共振弥散张量成像在巨大听神经瘤患者术前评估面神经中的临床应用

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目的:巨大听神经瘤患者的面神经由于受到肿瘤推挤,可向多个方向移位,因此在切除巨大听神经瘤时如何保护面神经对外科医生是一项艰巨的挑战。本研究旨在探讨利用磁共振弥散张量成像(DTI)通过追踪神经束的走行,从而实现术前评估面神经形态及与听神经瘤体的空间关系。

方法:本研究前瞻性收集 5 例巨大听神经瘤(肿瘤直径>2cm)患者,术前通过 House-Brackman 分级确定面神经功能正常。利用 GE 3.0T 磁共振先行桥小脑角区常规 T1WI 及 T2WI 扫描后,再行 DTI 功能成像,成像参数: $b=1000s/mm^2$ 序列扫描 64 个方向; $b=0$ 序列: TR 6900ms, TE 80ms, 层厚 1.5mm, 无间隔扫描, FOV 22.4x22.4mm, NEX=2, 扫描层数 55~65 层。然后行 T2 加权的 3D FIESTA 扫描,用于后处理时与 DTI 序列叠加定位的解剖学成像序列。利用 Functional tool 后处理工作站软件,第一步进行 EPI 图像形变矫正;第二步调整阈值,保证脑干区域脑组织及发出的神经被覆盖;第三步计算,得到 FA、ADC 等功能图像;第四步追踪纤维束,把 SeedROI 放到桥小脑角面神经发出的部位,点击 Tracking,或者再设置 TargetROI,放到内听道远端靠近耳蜗的位置,得到数条白质纤维束。然后导入 3D FIESTA 解剖学序列来修正 ROI 的放置位置,检验所追踪出的神经纤维束中哪一根为面神经,确定其与听神经瘤体的空间关系,并与术中所见进行对比验证。

结果:5 例听神经瘤患者中 4 例 DTI 追踪出了面神经, 1 例 DTI 未能追踪出面神经,可能是因为肿瘤太大(直径 4.6cm),术中发现面神经被挤压菲薄如纸,故未能成功追踪出神经束。4 例中 2 例面神经桥池段位于肿瘤前方中部, 1 例位于前方上部, 1 例位于前方下部, DTI 成像结果与术中所见结果相吻合。

结论:磁共振弥散张量成像(DTI)在巨大听神经瘤患者术前追踪面神经领域具有很高的临床应用价值,但当听神经瘤体过大时可能追踪失败,仍需对磁共振成像方法学和后处理技术做进一步探索和改进。

PU-1876

Clinical Application of Diffusion Tensor Imaging in Preoperative Evaluation of Facial Nerve in Patients with Giant Acoustic Neuroma

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Objective: In patients with giant acoustic neuroma, the adjacent facial nerve can be displaced in many directions due to the pushing of tumors. Therefore, it is a challenge for surgeons to protect the adjacent facial nerve when resecting giant acoustic neuroma. The purpose of this study was to investigate the spatial relationship between acoustic neuroma and the adjacent facial nerve by tracking the course of facial nerve tract by using diffusion tensor imaging (DTI).

Materials: Five cases of patients with giant acoustic neuroma (tumor diameters > 2 cm) were prospectively collected and facial nerve function was determined by using House-Brackman grading before operation. The cerebellopontine angle was scanned by conventional T1WI and T2 WI on a GE 3.0T MR and followed by DTI functional imaging. Imaging parameters: b=1000s/mm² sequence, 64 directions were scanned, and b=0 sequence: TR 6900ms, TE 80ms, slice thickness 1.5mm, no interval scanning, FOV 22.4 × 22.4mm, NEX = 2. T2-weighted 3D FIESTA scan was performed to superimpose and anatomically locate the DTI images on Functional Tool Post-Processing Workstation. The first step was to correct the deformation of EPI image; the second step was to adjust the threshold to ensure that the brain tissue and the nerves emitted from the brainstem were covered; the third step was to calculate the FA, ADC and other functional imaging data; and the fourth step was to track the fiber bundles. Seed ROI was placed at the site of the facial nerve in the cerebellopontine angle. Then we click Tracking and put target ROI at the distal end of the internal auditory canal near the cochlea, and several white matter bundles were obtained. After that, the 3D FIESTA anatomical images were used to determine the facial nerve fiber tract and its spatial relationship with the acoustic neuroma, which was compared with the intraoperative findings.

Results: Facial nerve was accurately traced by DTI in 4 of 5 cases, but failed in 1 case, probably due to the extremely large tumor size (4.6cm in diameter), which squeezed the adjacent facial nerve as thin as paper. Within the 4 succeed cases, the pontine cistern segment of the facial nerve was located in the middle anterior part of the tumors in 2 cases, and in the upper anterior part in 1 case and in the lower anterior part in 1 case. The DTI results were in accordance with intraoperative findings.

PU-1877

能谱联合自适应迭代重建技术对头颅 CTA 成像质量的应用价值

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目的: 探讨能谱联合自适应迭代重建技术对头颅 CTA 成像质量影响及应用价值。

方法: 本研究共收集 166 例自 2022 年 3 月-2023 年 1 月于本院行头颅 CTA 的患者; 所有患者均采用 GE 公司 Revolution APEX CT 机进行成像, 扫描范围由颅底至颅顶, 扫描层厚为 0.625mm, 采用能谱并结合自适应迭代 40%进行扫描后将原始数据进行重建取单能量 40keV 为 A1 组、60 keV 为 A2 组、80 keV 为 A3 组, 并对三组图像进行曲面重建及最大密度投影重建。测量三组图像区域包含左右大脑前中后动脉、基底动脉及前后交通动脉, 放置感兴趣区, 并且由 1 名工作 10 年

以上技师进行测量 ROI 内的 CT 值及标准差(Standard Deviation, SD) 值, 所有数据均测量三次取平均值作为最终统计结果。主观评价: 两名具有 7 年以上工作经验的放射科医师对两组图像的整体图像质量采用 5 分法进行评分。

结果: 三种能量重建下测得的左右大脑前中后动脉、基底动脉及前后交通动脉 CT 值、SD 值、SNR 值、CNR 值比较后 40keV>60keV>80keV ($P<0.05$)具有统计学意义。主观评价由两位诊断医师对于图像质量主观评分的 Kappa 值为 0.75, 一致性较强。MIP 重建图像评分, 各组间评分无统计学差异 ($P=0.467$)。CPR 重建图像评分 60keV>80keV >40keV, 各组间评分有统计学差异 ($P<0.05$); 进行血管比较时, 60keV>80keV>40keV ($P<0.05$)具统计学差异, 因 40keV CT 值远大于 60keV 和 80keV, 近似于颅骨 CT 值, 影响诊断, 得分最低具统计学差异, ($P<0.05$)。

结论: 头颅 CTA 检查中, 采用能谱单能 60 keV 结合自适应迭代 40% ASIR 扫描可以降低图像噪声, 提高图像的信噪比, 可以提高血管末梢细微段(c5~c7)检出率。

PU-1878

光谱 CT 诊断喉及下咽良恶性病变的价值

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目的 研究光谱 CT 定量参数诊断喉及下咽良恶性病变的价值。方法 回顾性分析本院 2020 年 10 月至 2023 年 6 月术前接受喉部或颈部 IQon 光谱 CT 双期增强扫描的 144 例喉及下咽肿物患者的临床及影像学资料。通过 Philips ISP 图像工作站获得 40~100 KeV 能级的虚拟单能图 (VMI)、虚拟平扫图、无水碘图、碘密度图、有效原子序数图和常规增强图, 选择病变最大层面、避开血管和坏死液化区勾画病灶感兴趣区 (ROI), 采集各个图像上的相应参数, 勾画同层颈动脉 ROI, 计算出标准化有效原子序数和标准化碘浓度; 使用 40 KeV VMI 和 100 KeV VMI 病灶的 CT 值计算能谱曲线的斜率(λ)。采用两独立样本 t 检验或秩和检验, 比较喉及下咽良恶性病变两组各项定量参数的差异; 绘制受试者工作特征曲线(ROC), 分析各定量参数诊断喉及下咽良恶性病变的效能, 采用 DeLong's 检验比较各 ROC 曲线。结果 喉及下咽良恶性病变两组动静脉期的各光谱 CT 参数差异均有统计学意义 ($p<0.05$)。静脉期各光谱 CT 参数中, 40 KeV VMI 的曲线下面积 (AUC) 最大, 为 0.932 (敏感度、特异度、准确率分别为 0.774、0.930、0.819), 与同期常规增强 AUC(0.866) 差异有统计学意义 ($P<0.05$)。动脉期各光谱 CT 参数中, 40 KeV VMI 的 AUC 最大, 为 0.870 (敏感度、特异度、准确率分别为 0.774、0.837、0.792), 与同期常规增强 AUC(0.837) 差异无统计学意义 ($P>0.05$)。结论 光谱 CT 对于喉及下咽良恶性病变具有较高的诊断价值, 低能级虚拟单能图优于常规增强, 且静脉期低能级虚拟单能图优于动脉期。

PU-1879

青少年髁突结构与颞下颌关节紊乱病的相关性研究

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目的: 评估青少年髁突结构参数与颞下颌关节紊乱病的相关性, 并探讨两者之间的关系。方法: 以 2019 年 1 月至 2020 年 12 月温州医科大学附属第二医院进行颞下颌关节 MRI 检查的 47 位患者、共 94 例颞下颌关节为研究对象, 其中关节盘无移位组 32 例、可复性移位组 22 例、不可复性移位组 40 例。采用 3.0T MRI 进行常规序列及 3D-CUBE T2、T2-mapping 序列扫描。在 3D-CUBE T2 序列图像上进行多平面重组 (MPR) 测量髁突最大左右径、前后径, 并计算两者乘积、除商共 4 项髁突结构参数。评估颞下颌关节紊乱病指标包括定性及定量两项指标: 对常规序列进行综合读片,

将关节盘移位进行定性分为无移位、可复性移位及不可复性移位 3 组；在 T2-mapping 序列上测量关节盘 T2 值作为定量指标。采用描述性统计、单因素方差分析、皮尔森相关分析统计学方法对 4 项髁突结构参数与 2 项关节盘损伤指标进行统计学分析。结果：髁突左右径、前后径及乘积 3 项结构参数在无移位、可复性移位及不可复性移位 3 组间差异有统计学意义 ($P<0.001$)，对应均值排序为无移位组>可复性移位组>不可复性移位组；髁突左右径、前后径及乘积与关节盘 T2 值存在轻度正相关 ($r=0.262$ 、 $r=0.317$ 、 $r=0.386$, $P<0.05$)。结论：髁突左右径、前后径及横截面积在颞下颌关节紊乱病中随着病情加重而减小，髁突结构参数可作为颞下颌关节紊乱病间接的影像学特征。

PU-1880

基于 CT 影像组学和深度学习的甲状腺癌淋巴结转移预测

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目的：本研究旨在探讨采用 CT 影像组学分析结合深度学习技术在预测甲状腺癌患者颈部淋巴结转移的可行性和准确性，为临床治疗提供可靠参考。

方法：回顾性分析我院 2021 年 4 月至 2023 年 3 月 112 例经手术证实的甲状腺癌颈部淋巴结转移患者的 CT 影像数据。首先，对照病理证实的甲状腺癌颈部转移淋巴结，在 CT 图像上找出对应淋巴结，通过卷积神经网络 (CNN) 对其进行图像分割，并提取形态特征、纹理特征和直方图统计特征等共 59 个特征。然后，应用特征选择方法，从中筛选出对淋巴结转移具有显著差异的特征。最后，使用逻辑回归模型进行预测建模，并评估其准确性和泛化能力。

结果：通过特征选择，我们选出了四个最优特征，包括角度二阶矩、熵、面积和方差。在测试集上，经过交叉验证和 ROC 曲线分析，逻辑回归模型在预测甲状腺癌颈部淋巴结转移方面的准确性为 88.2%，灵敏度为 84.0%，特异度为 92.4%，AUC 为 0.913。

结论：本研究证明了 CT 影像组学和深度学习技术可以用于预测甲状腺癌淋巴结转移情况。所提取的最优特征能够有效地区分有无淋巴结转移的甲状腺癌患者。逻辑回归模型具有较高的准确性和泛化能力，可以作为一种可靠的临床决策支持工具，帮助医生更好地制定治疗方案，提高治疗效果。未来，我们将进一步扩大样本量，完善算法性能，并开发基于 CT 影像组学和深度学习技术的自动化淋巴结转移预测系统。

PU-1881

基于 MRI 的鼻咽癌侵犯颈内动脉血管壁外膜的评估

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目的：本研究旨在探讨基于 MRI 的鼻咽癌侵犯颈内动脉血管壁外膜的评估方法，并提出了一种新的颈内动脉浸润评估标准。

方法：回顾性分析了 50 例经手术病理证实为鼻咽癌的患者，这些患者均接受过 MRI 扫描。根据 MRI 图像，对鼻咽癌浸润颈内动脉血管壁的情况进行分类和评估，并提出了一种新的颈内动脉浸润评估标准（共分为四个等级）。同时，还对其他常用的评估标准进行了比较和分析。

结果：通过对 MRI 图像的分析，50 例患者中有 12 例发现鼻咽癌侵犯颈内动脉血管壁外膜。在这些患者中，新提出的颈内动脉浸润评估标准能够更准确、更全面地评估鼻咽癌对颈内动脉血管壁的侵犯情况，并与其他评估标准相比具有更高的灵敏性和特异性。

结论：基于 MRI 的颈内动脉浸润评估标准可以更好地评估鼻咽癌对颈内动脉血管壁的侵犯情况，该评估标准具有更高的灵敏性和特异性，可以为患者提供更准确的诊断和治疗方案。这一研究结果

对于鼻咽癌的临床诊断和治疗具有重要意义, 并为进一步探讨颈内动脉浸润与预后的关系提供了基础。

PU-1882

基于多模态 CT 的血栓影像组学模型对急性缺血性脑卒中病因的预测价值

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目的: 研究基于多模态 CT 的血栓影像组学模型对急性缺血性脑卒 (AIS) 病因的预测价值。

方法: 本研究纳入了苏州市第一附属医院 2020 年 1 月至 2023 年 6 月发病在 24h 内的 134 例 AIS 患者, 所有患者均在入院后进行了常规 CT 平扫 (NCCT) 及双能 CTA (DECT) 检查。将 DECT 图像后处理重建为 70ev 虚拟单能量图及碘覆盖图 (IOM)。分别由两名医师在 NCCT、70kev 及 IOM 图像上使用 3D slicer 进行血栓 ROI 的分割, 使用 PyRadiomics 进行影像特征的提取。先采用组间相关系数筛选出一致性较高的特征, 再采用最大相关最小冗余及最小绝对收缩与选择算子算法回归分析进行特征筛选, 最后用筛选出的特征构建影像组学评分模型。采用 ROC 曲线对模型的性能进行评估, 并采用 Delong 检验对两组模型的 ROC 曲线下面积 (AUC) 进行比较。

结果: 共构建 5 个模型: 基于 NCCT、70Kev 及 IOM 图像特征分别构建模型 1-3; 联合 NCCT、70Kev 图像特征建立模型 4; 联合 NCCT、IOM 图像特征建立模型 5; 其中联合模型展示出较好的预测价值, 模型 5 在训练集及测试集中的 AUC 均大于 0.75, 为所有模型中最高 (delong 检验, p 值 <0.05)。

结论: 基于多模态 CT 建立的血栓影像组学模型可以预测 AIS 的病因, 指导临床治疗及二级预防方案的选择。

PU-1883

探讨冠状动脉和颅颈动脉一站式联合 CT 血管造影对于疑似冠状动脉或颅颈动脉疾病的诊断价值

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目的: 探讨对于疑似冠状动脉疾病(CAD)或颅颈动脉疾病(CCAD)患者行一站式冠脉和颅颈动脉联合 CT 血管造影(CTA)作为首诊方法的潜在诊断价值, 并将其与冠脉和颅颈动脉分开连续两次 CTA 扫描的临床表现进行比较。

方法: 对疑似但未确诊的 CAD 或 CCAD 的 130 被试进行前瞻性入组, 随机分为 2 组, 每组各 65 名被试, 组 1 所有 65 名被试采用冠脉轴向 CTA 后颅颈动脉螺旋 CTA 的一站式联合扫描方案检查, 组 2 被试采用冠脉 CTA 加颅颈动脉 CTA 连续扫描方案, 其中 36 名怀疑 CAD 的被试先行冠脉 CTA 检查再行颅颈动脉 CTA 检查, 29 名怀疑 CCAD 的被试先行颅颈动脉 CTA 检查再行冠脉 CTA 检查, 组 2 连续扫描方案的扫描是根据症状确定的, 针对主要关注的区域, 而组 1 联合方案是以不歧视的方式一站式进行的。评估靶区和非靶区的诊断发现, 比较两组被试的客观图像质量、总扫描时间、辐射剂量、造影剂用量。

结果: 1、非靶区病变数量: 组 1 为 44/65(67.7%), 组 2 为 41/65(63.1%), 再次说明了扩大扫描覆盖范围的必要性。2、怀疑为 CCAD 的患者比怀疑为 CAD 的患者更容易发现非靶区病变(71.4% vs

61.7%)。3、与组 2 连续扫描方案相比,组 1 联合扫描方案扫描时间缩短 21.5% (~51.1 s),造影剂用量减少 21.8% (~20.8 mL),两组的扫描均能获得高质量图像。

结论:与两次单独检查相比,一站式联合 CTA 扫描方案能够以更低的扫描时间和更少的造影剂用量有效地发现非靶区病变,因此值得作为疑似 CAD 或 CCAD 患者的首选检查。

PU-1884

颞骨软骨肉瘤诊断及颞骨 CT、MR 重建技术的应用

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摘要:目的 总结颞骨软骨肉瘤的 CT 及 MRI 表现,并探讨颞骨高分辨率 CT 平扫、多平面重组 MPR、曲面重组 CPR 技术对听小骨、面神经管破坏的诊断价值。方法 回顾性分析 2012 年-2022 年于我院就诊的 5 例颞骨软骨肉瘤患者的临床及影像学资料,总结其影像学表现特点,并通过 CT、MR 后处理技术分析病变对听小骨、面神经管的破坏情况。结果 5 例软骨肉瘤 CT 均呈溶骨性骨质破坏,并可见钙化,其中 1 例镫骨骨质吸收,3 例面神经管骨壁破坏;MRI 呈长 T1 长 T2 混杂信号,1 例呈蜂窝状改变,增强扫描呈不均匀、明显强化,局部呈花瓣状或蜂窝状。结论 对于颞骨软骨肉瘤的诊断,CT 可以很好地显示病变内钙化成分以及对颅底骨质的破坏情况,而 CT 后处理技术可以直观地显示听小骨、面神经管受累情况,MRI 则可以显示病变内软组织及黏液成分,病变范围更为明确。

PU-1885

基于双能量 CT 的改良 T1 分期预测声门型喉癌患者预后的研究

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目的 基于双能 CT (DECT)图像特征构建声门型喉癌(GC)的改良 T1 (m-T1)分期,并探讨 m-T1 分期预测预后及辅助制定手术方式方面的价值。

方法 回顾性连续纳入 2015 年 1 月 1 日至 2018 年 12 月 31 日行 DECT 检查的 147 例 AJCC 第 8 版 T1 期 (8th-T1) GC 患者。随访截止日期为 2021 年 12 月 31 日。在 DECT100kVp 数据集上评估原发灶的长径、浸润深度、肿瘤体积(TV)和前连合侵袭(ACI)状态。以术后组织学病理为金标准,采用 McNemar 试验评价 DECT 诊断 ACI 状态的准确性。使用无复发生存期(RFS)差异显著的特征或特征组合来建立 m-T1 分期。log-rank 检验用于评价不同手术方式间 RFS 的差异。

结果 DECT 与金标准对 ACI 状态的诊断准确率差异无统计学意义($p=0.182$, Kappa 值= 0.859)。中位随访时间为 44 个月(3-81 个月)。根据随访结果将所有患者分为复发组和非复发组。基于 TV 联合 ACI 状态构建 m-T1 分期,m-T1 组(TV 联合 ACI 状态)的 RFS 差异较 8th -T1 组显著($p = 0.019$ vs. 0.492)。m-T1b 期患者的复发率显著高于 m-T1a 期,而 8th-T1 的两个亚分期期间的复发率无显著差异 (8th-T1a vs 8th-T1b, $p=0.803$)。在高危人群(m-T1b 期)中,非激光手术患者的 RFS 较非激光手术者更长。

结论 与 8th-T1 分期相比,基于原发灶的 TV 和 ACI 状态构建的 m-T1 分期能筛选出 RFS 较短的高危人群。对于复发风险高的患者,非激光手术可以明显改善 RFS。

PU-1886

基于能谱 CT 基物质图像组学特征预测模型鉴别腮腺常见肿瘤类型

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目的:基于能谱 CT 平扫及增强图像重建碘基及水基图像,比较影像组学构建预测模型效能差异,探讨平扫、增强图像及其碘基、水基图像组学特征在腮腺常见肿瘤类型鉴别中的价值。

方法:搜集 2021 年 10 月-2023 年 2 月行能谱 CT 增强扫描且有明确病理诊断的腮腺肿物患者,共 88 例,其中良性 73 例(混合瘤 44 例、腺淋巴瘤 29 例),恶性 15 例。回顾性分析患者临床信息(年龄)以及平扫期,动脉期及静脉期影像,并重建各期碘基图、水基图。使用联影科研平台,于平扫及增强各期图像下手动逐层分割感兴趣区(ROI)并复制到相应的碘基、水基图像,尽量避开坏死囊变、钙化及血管影,得到感兴趣体积(VOI),提取影像组学特征,并纳入临床信息特征,通过 LASSO 算法筛选特征。采用五折交叉法验证,绝对值最大归一化预处理,通过随机森林(RF)建立预测模型并绘制受试者工作特征(ROC)曲线,计算训练集和测试集的曲线下面积(AUC)及灵敏度、特异度、准确率、精确率,分析并比较不同序列下预测模型的鉴别诊断效能。

结果:通过特征筛选,确定平扫期及其基物质序列共 9 个显著特征参数;动脉期及其基物质序列共 6 个显著特征参数;静脉期及其基物质序列共 8 个显著特征参数。绘制 ROC 曲线,计算常规平扫、碘基图、水基图训练集及测试集 AUC 分别为 0.952 和 0.904、0.945 和 0.884、0.971 和 0.962。动脉期、碘基图、水基图训练集及测试集 AUC 分别为 0.958 和 0.859、0.962 和 0.918、0.931 和 0.884。静脉期、碘基图、水基图训练集及测试集 AUC 分别为 0.96 和 0.912、0.965 和 0.897、0.98 和 0.912。水基图灵敏度、特异度、准确率、精确率(0.703、0.886、0.817、0.882)高于静脉期(0.686、0.864、0.786、0.863)。

结论:能谱 CT 基物质图像(特别是静脉期水基图),相较于常规平扫及增强图像,应用于组学特征机器学习建立随机森林预测模型,对于腮腺混合瘤,腺淋巴瘤及恶性肿瘤的鉴别具有更优的诊断效能。

PU-1887

“盐水袋”法在降低颈部 CT 射线束硬化伪影的价值

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目的 探讨在颈部两侧放置生理盐水袋(“盐水袋”法)对降低颈部 CT 射线束硬化伪影的价值。

方法 随机选取行颈部 CT 平扫+增强的患者 60 例,平均分为“盐水袋”组和对照组,“盐水袋”组采用盐水袋法进行颈部 CT 扫描,对照组进行常规 CT 扫描。由两名工作经验丰富的放射科医师对平扫、动脉期及静脉期图像质量进行主观评价,并测量两组图像的 CT 值、噪声标准差,计算信噪比(Signal to Noise Ratio, SNR)、对比噪声比(Contrast to Noise Ratio, CNR)以及射线束硬化伪影指数(Artifact Index, AI),比较两组图像质量的主观评价和客观评价结果。

结果 “盐水袋”组的主观评分及 AI 值均低于对照组,其中平扫及动脉期的主观评分及 AI 值差异均具有统计学意义($P<0.05$),静脉期的主观评分及 AI 值差异无统计学意义($P>0.05$)。

结论 “盐水袋”法能够降低颈部 CT 射线束硬化伪影,改善图像质量。

PU-1888

A Preliminary 4D Flow MRI Analysis of Blood Flow Characteristics in Cerebral Veins of Adults

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Objectives:

To evaluate blood flow characteristics in the cerebral veins of adults using 4-dimensional flow magnetic resonance (4D Flow MRI).

Materials and Methods:

A total of 65 volunteers prospectively underwent 4D Flow MRI and 12 volunteers underwent repeated scans during one month in a single center. Velocity, average blood flow rate ($Flow_{avg}$), and blood flow patterns of cerebral sinuses were evaluated for each volunteer. The mastoid emissary veins, posterior condylar emissary veins, and oblique occipital sinuses were also evaluated.

Results:

The mean age of volunteers was 36.31 ± 11.05 years old, including 3 (50.8%) females and 32 (49.2%) males. 4D Flow MRI data showed good reproducibility. The velocity and $Flow_{avg}$ of the superior sagittal sinus increased along the direction of flow and $Flow_{avg}$ near torcular herophili were 3.14 times that through the straight sinus. Slight fluctuations were found within a cardiac cycle. A vortex flow pattern was shown in 12.3% of torcular herophili, 7.5% of the transverse-sigmoid junction and 51.3% of jugular bulbs and was associated with increased blood flow velocity/rate in the upstream sinuses. Mastoid emissary veins, posterior condylar emissary veins and oblique occipital sinuses were all drained in the extracranial direction.

Conclusion:

Cerebral veins, including cerebral sinuses and emissary veins, could be measured visually and quantitatively in vivo by 4D Flow MRI. Cerebral veins' velocity varied with segments and showed slight fluctuations within a cardiac cycle. The analysis of cerebral blood flow in healthy volunteers lays the foundation for the study of cerebral venous system diseases.

PU-1889

多层螺旋 CT 定量分析在鉴别腮腺肿瘤的临床价值

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目的：探讨分析多层螺旋 CT 对腮腺良恶性病变的鉴别诊断价值。方法 回顾分析经病理证实的 42 例腮腺占位病变的 CT 影像学表现、CT 定量参数，包括病变的边界、大小、形态及 CT 值等。用两独立样本 t 检验及 Fisher 精确检验比较良恶性占位病变的差异，并用受试者工作特征(receiver operating characteristic, ROC)曲线评估诊断效能。结果：良性占位病变形态规整，边界较清，而恶性病变形态明显不规则，边界模糊、粘连不清晰，部分可见骨质破坏和颈部淋巴结及其他结构转移、侵犯。腮腺良恶性肿瘤最大径无明显统计学意义(2.60 ± 1.01 vs. 2.44 ± 1.19 cm, $P=0.88$)，但恶性病变体积明显大于良性病变(45.5 ± 20.6 vs. 27.6 ± 10.5 cc, $P<0.05$)。恶性病变平扫 CT 值与良性病变无明显统计学意义(40.2 ± 8.9 vs. 45.3 ± 8.1 Hu, $P=0.056$)，增强后 CT 值及 Δ CT 值均明显高于良性病变(70.9 ± 13.5 vs. 83.3 ± 11.8 Hu 及 25.5 ± 14.2 vs. 37.9 ± 13.3 Hu, $P<0.05$)。病变体积、增强后 CT 值及 Δ CT 值 ROC 曲线下面积(area under the curve, AUC)分别为 0.864、0.801 及 0.733。结论：多层螺旋 CT 可显示腮腺病变大小及其与邻近组织的关系等，定量 CT 参数对鉴别腮腺良恶性病变有重要参考价值。

PU-1890

阻塞性睡眠呼吸暂停低通气综合症动态 CT 检查方法及表现

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目的：观察男性 OSAHS 患者软腭平面气道塌陷及舌后区上气道塌陷在动态 CT 上的检查方法及上下气道的影像学表现；

材料和方法：2020 年 3 月至 2023 年 6 月，收集以下症状的男性患者作为研究对象：日间嗜睡和疲惫，频繁打鼾，睡眠中呼吸暂停，经证实为阻塞性睡眠呼吸暂停低通气综合征。所有研究对象接受了清醒状态下平静呼吸时、Muller 动作下和反咬合动作下的上气道 CT 扫描。在正中矢状平面测量各项指标。并将这些测量指标与 OSAHS 严重程度进行相关性研究和轻中度 OSAHS 患者和重度 OSAHS 患者进行对比。

结果：共有 47 名 OSAHS 患者，重度组 36 名，轻中度组 11 名。全部患者都出现软腭平面的气道阻塞。与平静呼吸状态相比，Muller 动作时腭后区最小截面面积明显减小、软腭明显延长，差异有统计学意义。在重度和轻中度 OSAHS 患者组间，除了舌骨位置外，其他测量指标均无统计学差异。而各组患者腭后区最小截面面积塌陷度较大，Muller 动作下腭后区最小截面面积更小，颈围更大，差异有统计学意义。舌后区气道最小截面面积减小，差异有显著统计学意义，舌体长度和舌骨位置未见有统计学意义的变化。反咬合动作下的舌后区气道最小截面面积增大，颈棘到咽后壁水平距离增加，舌骨向前、向上移位，差异均有显著统计学意义；舌后区最小截面面积增加值与颈棘到咽后壁水平距离增加值有统计学意义上的相关性。与轻中度 OSAHS 组比较，重度 OSAHS 组患者舌骨位置较低，反咬合动作时舌骨与颈棘相对位置的变化及变化率较小，差别均有统计学意义；Muller 动作时舌骨位置和舌体长度的改变两组间差异无统计学意义。

结论：本研究应用动态 CT 三维成像技术模拟了 OSAHS 患者显示了 OSAHS 患者上气道软腭平面的动态变化。全部患者均存在软腭平面不同程度的阻塞，但软腭平面的变化程度与 OSAHS 严重程度未见明显相关性；重度组 OSAHS 患者比轻中度组 OSAHS 患者舌骨位置更低；

PU-1891

头颈部孤立性纤维瘤的 CT 及 MR 分析

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目的 探讨头颈部孤立性纤维瘤的 CT 及 MR 表现，提高影像诊断水平。方法 回顾性分析经手术病理证实的 11 例头颈部 SFT 的临床、病理及术前 CT、MR 资料。结果 11 例患者均为单发病灶，呈圆形、类圆形或椭圆形软组织肿块，边界清晰，CT 平扫呈等/稍低密度，密度多不均匀；3 例见多发囊变；1 例合并多发点状钙化；3 例肿瘤周围骨质出现压迫性改变；8 例动态增强，动脉期轻中度强化，静脉期及延迟期强化范围增加。结论：头颈部 SFT 的 CT 表现为边界清楚软组织肿块，动态增强“快速强化缓慢廓清”的强化模式，要考虑到盆腔 SFT 的可能。

PU-1892

双源 CT(DSCT)在颈部淋巴结结核诊断中的价值

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目的:探讨双源 CT(DSCT)对颈部淋巴结结核的诊断价值。

方法:选取 45 例颈部淋巴结结核 DSCT 影像资料,记录病变分区、大小、密度、有无融合、强化方式等情况,进行综合分析。

结果:颈部淋巴结结核更易累及内颈链下组及锁骨上下区;多个淋巴结受累及常见,易融合成团,与邻近肌肉粘连,皮下脂肪层呈鱼网状改变,局部皮肤增厚或破溃;增强检查淋巴结多呈厚环强化;

结论:颈部淋巴结结核有其优势的解剖分布和影像学特征,DSCT 平扫+增强显示颈部淋巴结结核病变分区、强化方式及其与周围结构的关系,为颈部淋巴结结核与颈部其他常见肿块的鉴别诊断提供有价值信息。

PU-1893

西门子双源 CT 在鉴别颅内出血与碘造影剂上的应用

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西门子双源 CT 在鉴别颅内出血与碘造影剂上的应用

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目的:

使用西门子双源 CT 鉴别颅内出血与造影剂渗出,帮助及指导临床处理造影术后意识障碍患者的后期治疗方向及药物的使用。颅脑血管、心脏血管、腹主动脉、双侧髂动脉血管取栓、静脉滤过器的放置等等各类 DSA 造影检查及治疗的手术,都要用到造影剂,而造影剂外渗是确实存在的现象,CT 平扫下,脑内出血及造影剂外渗均表现出高密度影像,两者的鉴别直接影响了后期的治疗,西门子双源 CT 就解决了这一难题。

方法:

使用西门子 SIEMENS Healthineers SOMATOM Force 256 排双源螺旋 CT 对颅脑进行检查。

扫描:

双能量扫描,采用两套球管进行扫描,其高 Kv150,低 Kv80,使用西门子的 syngo.via 工作站,选择应用程序配置文件中的脑出血处理软件进行处理,得到 VNC 图、IOM 图、VMI 图。

结果:

后处理:虚拟平扫(virtual non-contrast imaging, VNC)是在物质分离过程中去除碘而得到的图像,DECT 的 VNC 图像质量与传统平扫图像在肉眼上无差别。碘图(iodine overlay map, IOM)是在物质分离中突出碘剂的图像,可突出显示碘含量及碘分布情况。虚拟单能量成像(virtual monochromatic imaging, VMI)是利用两种不同的多色能谱了解组织的射线衰减特性,并在多个模拟能级上创建虚拟单色图像。由 DECT 合成的高能级 VMI 可以减少光束硬化伪影,低能级 VMI 可以提高图像分辨率。

结论:

图像判断标准:仅有 VNC 图像上存在高密度灶时为出血;仅有碘图图像上存在高密度灶时为对比剂外渗;而 VNC 和碘图图像上均可见高密度灶时则为出血合并对比剂。常规 CT 无法区分脑出血与造影剂,常采用时间延迟法行当日及次日、48 小时甚至更长时间后多次扫描以区分造影剂代谢或者

出血灶的吸收,由此失去了患者治疗的黄金时期。因此双能量 CT 对鉴别诊断各类 DSA 血管内治疗后脑内出血与碘对比剂外渗意义更加重大。

PU-1894

低管电压联合全模型迭代重建技术对急诊颅脑 CT 图像质量和病灶显示的影响研究

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目的:在设备、扫描条件和参数均一致的前提下,比较 80、100 和 120kVp 管电压结合全模型迭代重建 IMR 对急诊颅脑 CT 图像质量和病灶显示的影响。

方法:收集符合入组条件的行急诊颅脑 CT 检查的患者 30 例,其中分为低、中、高剂量组,每组各 10 人。低、中、高剂量组分别采用管电压为 80、100、120kVp,其余扫描条件及重建参数相同。对 IMR-1 层厚为 1.5mm 的重建图像进行客观测量以及主观评价。客观评价:比较低剂量组、中剂量组和高剂量组之间颅骨、血管、脑组织、脑室的 CT 值、噪声、信噪比、对比噪声比以及脂肪密度分辨率。主观评价:针对三组图像的噪声、组织分层及细小结构的显示、整体图像质量以及对脑梗死、蛛网膜下腔出血等疾病的诊断可用性进行主观评分。记录计算机自动生成的剂量长度乘积和容积 CT 剂量指数,计算患者接受的辐射剂量用有效辐射剂量表示。

结果:低、中、高剂量患者在性别、年龄以及体重指数方面的差异均无统计学差异($P>0.05$)。低、中、高剂量组接受的有效辐射剂量分别为 $10.55\pm 2.8\text{m Sv}$ 、 $14.5\pm 2.1\text{m Sv}$ 、 $17.65\pm 1.47\text{m Sv}$,三组患者所接受的 ED 差异具有统计学差异($T=6.015, P<0.05$)。在低、中剂量扫描下头部各组织的 CT 值较高剂量组随着管电压的降低而逐渐增加,且三组间及两两比较差异均具有统计学意义($P<0.05$)。低、中剂量组各部分测得的噪声、信噪比和对比噪声比数值均高于高剂量组,具有统计学意义($P<0.05$)。与高剂量组相比,低、中剂量组计算得到的脂肪密度分辨率降低,但三组间及两两比较差异没有统计学意义($Z=-1.45, P=0.185$)。三组之间图像噪声及整体图像质量的主观评分差异具有统计学意义($P<0.05$),对三组图像的噪声、组织分层及细小结构的显示、整体图像质量以及对疾病诊断可用性的主观评分差异无统计学意义($P>0.05$)。

结论:低管电压联合 IMR 技术可以减少辐射剂量,虽然低、中、高剂量组的图像质量都可满足诊断需求,对疾病的诊断信心没有影响,但低剂量组的图像噪声、颗粒感加重。总体而言,低管电压联合 IMR 技术在临床上具有较强可用性。

PU-1895

头颈部炎性肌纤维母细胞肿瘤的 CT 及 MR 影像学特征分

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目的:探讨头颈部炎性肌纤维母细胞肿瘤 (Inflammatory myofibroblastic tumor, IMT) 的 CT 及 MR 影像学特征,以提高该肿瘤的术前正确诊断。方法:回顾性收集 2012 年 1 月至 2018 年 12 月上海交通大学医学院附属第九人民医院初诊并经术后病理证实的 29 例头颈部 IMT 患者,分析患者术前 CT 及 MRI 影像学表现。结果:29 例头颈部 IMT 患者中,67.0% (20/29) 的患者术前被误诊为恶性肿瘤。头颈部 IMT 的影像表现多样,局限性软组织内肿块 7 例,软组织肿块伴临近骨质破坏 12 例 (颞下窝 5 例,上颌窦 6 例,颌面部广泛软组织病变 1 例),骨内肿块 10 例 (上颌骨 5 例,下颌骨 4 例,颞骨 1 例)。89.7% (26/29) 病灶边界不清楚;75.9% (22/29) 病灶有骨质破坏,34.5% (10/29) 病灶骨质破坏与骨质增生硬化并存。8 例患者沿神经孔道侵犯邻近结构 (6 例发生

在颞下窝, 其中 4 例侵犯翼腭窝, 沿圆孔、卵圆孔累及颅内, 2 例侵犯眶尖视神经管; 2 例发生在下颌骨, 侵犯下颌神经管)。头颈部 IMT 在 CT 平扫时呈等或稍低密度, 均未见钙化, 增强扫描呈中度至明显强化。在 MR 上, 9 例呈 T1WI 等或稍低信号; 7 例呈 T2WI 低信号; 9 例呈 DWI 高信号, ADC 值约 $0.6-1.0 \times 10^{-3} \text{mm}^2/\text{s}$ 。TIC 曲线 I 型 7 例, II 型 2 例。均未出现颈淋巴结及远处转移。结论: 头颈部炎性肌纤维母细胞瘤的影像学特征与恶性肿瘤相近, 但头颈部炎性肌纤维母细胞肿瘤骨质破坏的同时伴有骨质增生硬化, T2WI 低信号, TIC 曲线以 I 型为主, 极少颈淋巴结及远处转移, 结合 CT、MRI 及功能学检查可以在一定程度上反映病灶的组织构成, 对术前的正确诊断提供重要依据, 以指导临床治疗

PU-1896

Dixon 定量技术在 TMD 髁突骨关节病中的诊断价值

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目的 Dixon 定量 MRI 技术通过化学位移分析分离脂肪和水, 实现直接脂肪定量, 可以检测到肉眼无法观察到的微妙脂肪变化。基于 Dixon 的方法采集时间短、敏感度低, 非常适合于头部成像, 近年来已得到初步应用。有文献显示, 基于 Dixon 序列对腰椎骨质具有较好的图像质量, Dixon 技术还可发现早期腰椎退变患者骨质脂肪分数高于健康人群, 提示基于 Dixon 的技术也有潜力用于髁突骨髓信号的评估。且基于 Dixon 技术的研究方法在髁突的评价中至今鲜有报道。探讨 3.0T 磁共振 T1 DIXON 定量技术在颞颌关节功能紊乱 (temporomandibular disorders, TMD) 髁突骨关节病中的诊断价值。方法 回顾性分析 20 例 TMD 髁突骨关节病患者及 20 例正常颞颌关节的髁突 MRI T1 DIXON 脂像, 测定并分析脂肪分数 (Fat Fraction, FF) 图像在 TMD 髁突骨关节病中的诊断效能; 比较正常颞颌关节髁突与骨关节病髁突 FF 值的差异, 使用独立样本 t 检验分析是否有统计学差异, 应用 ROC 曲线评估 FF 值的诊断效能。结果 TMD 髁突骨关节病的 FF 值明显低于正常髁突 ($t = -2.713$, $P < 0.05$), 其中 ROC 曲线下面积为 0.987, 截断值为 9.87%。结论 磁共振 T1 DIXON 能够定量测定 TMD 髁突骨关节病的脂肪含量, 对颞颌关节功能紊乱的髁突骨关节病诊断具有较高的诊断效能。

PU-1897

蝶窦气化停滞的影像学表现

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目的 探讨蝶窦气化停滞的 CT 及 MRI 影像学表现。方法 回顾性分析 20 例蝶窦气化停滞病例的 CT 及 MRI 表现。结果 20 例病例中, 男性及女性各 10 例, 年龄 34~81 岁, 平均为 59 ± 12.8 岁, 变异位于蝶骨体左侧者 11 例, 位于蝶骨体右侧者 4 例, 位于蝶骨体后部者 1 例, 蝶骨体左右两侧及中部均存在者 2 例, 蝶骨体后部及左下部者 1 例, 还有 1 例位于蝶骨体后部、右侧部及右侧蝶骨大翼、翼突。CT 图像上所有病例均含脂肪密度灶及卷曲样钙化灶, 变异周边有硬化边, 变异无占位效应, 邻近颅底孔道无变窄, 邻近骨质无破坏。MRI 图像上变异呈短 T1、长 T2 信号, 压脂序列呈低信号, 无弥散受限, 增强无强化, 变异边界清晰。结论 蝶窦气化停滞是一种容易被误诊的正常变异, 具有典型的 CT 及 MRI 表现。

PU-1898

种植螺丝固体桥边缘骨水平变化：一项前瞻性的初步研究

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背景：种植螺丝固定桥能减少粘接剂的刺激，且更利于戴牙完成后的维护，一直是种植修复的首选。目前为止，螺丝固位桥基台的选择并没有统一标准，而结合使用非抗旋基台是实现螺丝固体桥的一种修复方式，但临床研究较少。

目的：确定结合非抗旋基台的种植螺丝固位桥的稳定性和边缘骨水平变化，所有种植体都是同一品牌（Nobel Biocare），且都在种植三个月后负载。

材料和方法：共 38 枚种植体（SIC implant，瑞士）植入 19 名患者的后牙区，每位患者 2 枚植体，修复 2-3 个牙位。植入后三个月取模，制做 2 或 3 单元种植固定桥。基台的选择为 1 枚传统抗旋基台结合 1 枚非抗旋基台制做螺丝固位桥，不同基台在牙位的分布随机选择。负载时拍摄平行投照根尖片记录边缘骨水平的基线值，负载一年后再次拍摄平行投照根尖片并之前的比较，并记录修复体是否松动。之后通过已知的种植体长度使用 ImageJ 校正后测量 MBL（marginal bone loss）的变化。

结果：所有种植体都成功负载，负载一年后没有种植体失败且修复体稳定性良好。每个种植固定桥中 MBL 变化抗旋基台和非抗旋基台分别为 $-0.18\pm0.27\text{mm}$ 和 $-0.24\pm0.27\text{mm}$ ，这在统计学上并不显著（ $p>0.05$ ）。

结论：结合非抗旋基台的种植螺丝固定 2-3 单元桥的稳定性和 MBL 变化在种植负载的第一年是临床可接受的范围。

PU-1899

Case report : Embryonal rhabdomyosarcoma: clinical experience and literature review

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Abstract Content:**Background**

Rhabdomyosarcoma (RMS) is a rare and highly malignant tumor that originates from myogenic progenitor cells, and it is the most common soft tissue sarcoma in children, accounting for 2% to 5% of all soft tissue sarcomas. The World Health Organization classifies it into 4 types, with embryonic being the most common subtype, accounting for about 80% to 90%. ERMS exhibits high malignancy, strong invasion and rapid spread with clinical manifestations varying depending on its location within the body; commonly found sites include the head and neck region, urogenital tract, pelvic retroperitoneum, and occasionally limbs. Due to its high soft tissue resolution, MRI can observe tumor boundaries and enhancement features from different directions, and it is commonly used as an aid in diagnosis.

Case report

A 31-year-old female patient was admitted to the hospital due to a history of dizziness and headache lasting for 7 months, as well as decreased vision in her left eye for 10 days. Brain MRI revealed a lobed mass measuring approximately 57×50×40mm located at the bottom of the anterior cranial fossa. The mass exhibited slightly long T1T2 signal with clear boundaries and uniform signals. The bone signal of the local cranial plate was discontinuous, and it burst down into the sinus. Based on clinical presentation and imaging findings, an initial diagnosis of anterior

fossa floor meningioma was made by clinicians. ERMS was confirmed by pathological examination after operation.

Conclusion

In summary, the incidence of RMS is low, especially in adults. Its clinical manifestations are complex and diverse, and the lack of specificity is easy to lead to missed diagnosis and misdiagnosis. And its malignant degree is high, early hematogenous and lymphatic metastasis. Therefore, early diagnosis is crucial.

Key words: Embryonal rhabdomyosarcoma; Magnetic Resonance Imaging; Adult

PU-1900

鼻窦未分化癌影像表现一例并文献复习

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【摘要】 本文报道鼻窦未分化癌 1 例，患者男、54 岁。间断性头痛两月余，再发加重伴反应迟钝 1 天，1 天前头痛再发加重，伴反应迟钝，精神差，睡眠增多，伴交流困难。头颅 CT 示额区颅内板下团块影，宽基底，跨前纵裂生长，其内及周边见多发斑片状密度增高影，CT 值约 52-67HU，病变周围见大片状、伸指样水肿区，邻近脑沟裂变浅，展平，双侧脑室前角受压、变形。MRI 检查示额区颅内板下方见不规则团片状混杂 T1 混杂等、长 T2 信号影，边界欠清，部分向下突入邻近筛窦，病变与邻近脑实质分界不清、呈明显受压改变，DWI 呈混杂稍高信号及明显高信号影，周围见大片状长 T2 信号水肿带。增强后病灶呈明显不均匀强化，邻近硬脑膜增厚，呈条形强化，病变包绕邻近上矢状窦，相应上矢状窦显示不清。病理诊断：鼻窦未分化癌。

PU-1901

Sinonasal undifferentiated carcinoma with intraparenchymal haemorrhage

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Sinonasal undifferentiated carcinoma (SNUC) is an aggressive and rare cancer of the sinonasal tract and is often characterized by intracranial invasion. However, SNUC rarely with presents focal cerebral haemorrhage. In this paper, we present a case of focal cerebral haemorrhage and invasion of the anterior cranial fossa by an SNUC. A 54-year-old man presented to our hospital with a two-month history of intermittent headache, recurrent aggravation with unresponsiveness for 1 day, accompanied by slow response, poor spirits, increased sleep, and communication difficulties. Imaging studies showed a neoplasm of the ethmoid sinus with extension into the anterior cranial fossa. This lesion was aggressive with enhancement and mass effects. Intraparenchymal haemorrhage could be seen on the frontal lobes. The patient underwent resection of the carcinoma and began chemoradiotherapy. The pathological diagnosis was undifferentiated carcinoma of the sinuses. This case shows that SNUC is very aggressive and easily invades into the skull, causing focal haemorrhage in the brain parenchyma. Understanding these imaging features is more helpful for the diagnosis of undifferentiated sinus carcinoma.

PU-1902

Study in intracranial hemodynamic assessment based on four dimensional flow MRI (4D flow MRI) after implantation of blood flow diverter

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Objective: To investigate the feasibility and clinical significance of applying four-dimensional flow magnetic resonance imaging (4D flow MRI) technology for the assessment of post-implantation blood flow in flow diverter (FD) devices.

Methods: A retrospective analysis was conducted on eight patients who underwent flow diverter (FD) implantation procedures at our Stroke Center between January 2021 and May 2023. Prior to the procedures, all patients were confirmed to have significant unilateral stenosis of the middle cerebral artery through digital subtraction angiography (DSA), accompanied by distinct clinical symptoms. Original data for eight patients, including eight diseased vessels and their corresponding normal vessels on the contralateral side, were collected. These data included parameters such as arterial wall cross-sectional area, the extent of stenosis at the lesion site, plaque characteristics, and collateral circulation formation. Computational fluid dynamics (CFD) was utilized to calculate various hemodynamic parameters, such as through-plane velocity at the lesion site, maximum through-plane velocity, average velocity, maximum velocity, and average and maximum instantaneous blood flow rates.

Subsequently, 16 vessels were analyzed, comprising the eight diseased vessels and their corresponding normal vessels on the contralateral side from all eight patients. These vessels underwent magnetic resonance vascular imaging and 4D flow MRI processing, yielding velocity vector fields, streamlines, shear rates, wall shear stress, oscillatory shear index, and three-dimensional blood flow pathlines for the eight diseased vessels. Blood flow velocity at the lesion site was extracted, and the normalized root mean square error (NRMSE) and linear correlation coefficient (R²) were computed to compare the two methods.

One month following FD implantation, the eight patients underwent follow-up DSA examinations and 4D flow MRI assessments. Hemodynamic parameters were compared with preoperative data using paired t-tests and intergroup Chi-squared tests. Ultimately, comparative results between preoperative and postoperative 4D Flow MRI and CFD were obtained.

Results: Comparative analysis between 4D Flow MRI and CFD revealed similar flow patterns at the lesion site, with good agreement in average blood flow velocity within the diseased vessels. Prior to FD implantation, alterations in blood flow patterns were consistent with the measurements obtained from 4D Flow MRI and the calculations from CFD, indicating concurrence between the two methods.

Conclusion: There is a strong consistency between the measurements obtained from 4D Flow MRI and the calculations from CFD. 4D Flow MRI offers a comprehensive assessment of hemodynamics and, being non-invasive, provides more precise data. It can be valuable in the evaluation of FD implantation and holds significant clinical utility.

PU-1903

Development and validation of a prediction nomogram based on clinical and CT features for facial canal dehiscence in patients with cholesteatoma

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Purpose: To develop and validate a risk-prediction model for facial canal dehiscence (FCD) in patients with cholesteatoma.

Material and Methods: The primary cohort retrospectively enrolled patients who underwent high-resolution computed tomography on admission and subsequently underwent otologic surgery with a pathologically confirmed diagnosis of cholesteatoma. In a 7:3 ratio, the patients were randomly assigned to a training set ($n = 135$) and an internal test set ($n = 51$). An additional independent validation cohort contained 130 consecutive patients. A logistic regression analysis of the training cohort was conducted to identify clinical and CT-based risk factors for FCD. The prediction model derived from these risk factors was then validated in the internal test and independent validation sets using receiver operating characteristic analysis and calibration curves.

Results: Predictors contained in the individualized prediction model included stapes destruction, involvement of the mastoid process, lateral semicircular canal defect, and low-lying tegmen, which were significantly associated with FCD and were incorporated into the scoring system. The optimal cutoff value of the risk-prediction score was set at 2 points. The areas under the curve of the receiver operating characteristic curve in the training and internal test cohorts were 0.919 (95% confidence interval [CI]: 0.859–0.959) and 0.902 (95% CI: 0.786–0.968), respectively. Application of the risk-prediction score in the independent validation cohort still provided good discrimination (C-index, 0.927 [95% CI, 0.868–0.965]) and good calibration.

Conclusion: This risk-prediction model may aid clinicians in identifying cholesteatoma patients with FCD at decreased risk for intraoperative facial nerve injury.

PU-1904

四维血流磁共振成像（4D flow MRI）技术在颅内脑动静脉畸形血流动力学研究

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目的 探索四维血流磁共振成像（4D flow MRI）技术在颅内脑动静脉畸形(arteriovenous malformations, AVM)的血流评估中应用的可行性及临床价值。

方法 回顾分析 2022 年 1 月至 2023 年 7 月于我院脑卒中中心经 DSA 证实单侧颅内动静脉畸形且临床症状明显的 14 例患者，得到 14 例患者 14 个病灶的血管情况及对侧正常血管的原始数据（畸形血管团大小、供血动脉管壁横截面积、引流静脉血管管径、侧枝循环形成情况）并通过计算流体力学(computational fluid dynamics, CFD)得到血流动力学参数（通过病变部位平面速度/最大通过平面速度、平均速度、最大速度、平均及最大瞬时血流量）。14 位患者 14 个病灶血管及对侧正常血管均再次行磁共振血管成像及 4D flow MRI 技术处理，最终得到血管速度矢量场、流线、剪切速率、壁面剪切应力，振荡剪切指数，根据流速计算并显示病变血管的三维血液流动迹线(Pathline)；提取病变部位血流速度并计算两者之间的归一化均方根误差(normalized root mean square error, NRMSE)和线性相关系数(R2)；最后比较供血动脉速度分布图与对侧正常血管流速分布图差异，探讨 AVM 出血的血流动力学因素。

结果 4D Flow MRI 和 CFD 对比结果显示,血液在病变部位的流动状态相似;病灶供血动脉剪切速率、壁面剪切应力越高,AVM 病灶越容易出血。

结论 4D Flow MRI 的测量结果和 CFD 的计算结果之间具有较好的一致性,4D Flow MRI 可全面评估颅内 AVM 血流动力学,且为无创检查,能够提供更多精确数据,指导临床手术方式,有较高临床应用价值。

PU-1905

深度学习图像重建结合去金属伪影技术在口腔金属植入物患者颈动脉能谱 CTA 图像的应用

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目的 探讨深度学习图像重建 (DLIR) 结合去金属伪影 (MAR) 技术 (DLIR-MAR) 对口腔金属植入物患者颈动脉能谱 CTA (DECTA) 图像的影响。方法 前瞻性收集 30 例行颈动脉 DECTA 检查的口腔金属植入物患者纳入研究。在 50keV 下重建 DLIR-MAR、DLIR 和基于多模型的自适应统计迭代重组 (ASIR-V) 结合 MAR (ASIR-MAR) 图像。在轴位图像上测量金属伪影最严重的颈内动脉 (ICA)、同侧未受金属伪影影响的 ICA 及该层面颈部肌肉的 CT 值和噪声 (SD), 计算信噪比 (SNR)、对比度噪声比 (CNR) 和伪影指数 (AI)。两名放射科医生使用 Likert 5 分制法对受金属伪影影响的 ICA 进行血管可视化评分,并评估整体图像质量。通过 One-Way Repeated Measures ANOVA 检验和 Friedman 检验比较 DLIR-MAR、DLIR 和 ASIR-MAR 之间的定量和定性参数的差异。结果 与 ASIR-MAR 相比,DLIR-MAR 的图像噪声均降低 ($P<0.001$), SNR、CNR 均增加 ($P<0.001$), 同时获得了更高的整体图像质量 ($P<0.05$)。在金属伪影方面,与 DLIR 相比,DLIR-MAR 的 AI 显著降低 ($P<0.001$), 血管可视化评分更高 ($P<0.001$)。而 ASIR-MAR 与 DLIR-MAR 的 AI 和血管可视化评分无显著差异 ($P>0.05$)。结论 DLIR 结合 MAR 技术在口腔金属植入物患者中提供了更好的颈动脉 DECTA 图像,在 50keV 的重建中提高图像质量的同时兼顾伪影去除效果。

PU-1906

甲状腺结节钙化在 CT 诊断甲状腺癌中的应用有效性

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目的:分析甲状腺结节钙化在 CT 诊断甲状腺癌患者中的临床作用.方法:选取自 2019 年 6 月—2021 年 3 月于本院接收治疗的甲状腺结节患者 100 例作为研究对象,并将甲状腺恶性结节患者作为观察组,将甲状腺良性结节患者作为对照组,对所有患者均采用 CT 检查,分析其甲状腺钙化情况,并观察患者 CT 检查的影像学表现.结果:观察组患者单发结节明显高于对照组,多发结节明显低于对照组,对比差异明显($P<0.05$);观察组患者微钙化结节以及单发钙化结节明显高于对照组,粗钙化结节明显低于对照组患者,对比差异明显($P<0.05$);CT 诊断下良性结节患者主要表现为圆形、椭圆形、边界清除、包膜完整、内部低回声、增强回声,恶性结节主要表现为微小钙化、边缘不规则、纵横比 >1 等.结论:在甲状腺结节患者的诊断中,甲状腺结节钙化程度与甲状腺癌患者有一定的关联

PU-1907

Clinical characteristics and imaging findings of EBV-positive inflammatory pseudotumor-like follicular dendritic cell sarcoma: A case report and literature review

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EBV-positive inflammatory pseudotumor-like follicular dendritic cell sarcoma (IPT-like FDSC) is a rarely encountered tumor originated from the proliferation of follicular dendritic cells. It is a distinct subtype of FDSC, involving lymph nodes and/or extra-nodal sites, that is overwhelmingly associated with Epstein-Barr virus infection. As a result of low specificity and understanding in clinicopathologic and imaging manifestations, its preoperative diagnostic rate is always low. The present study reported the ultrasound, CT, PET-CT and clinicopathologic features of a patient with IPT-like FDSC at both lymph nodes and extra-nodal sites, and then made a literature review about its clinic and imaging features, and clinicopathologic findings so far, aiming to provide radiologists and surgeons with a broader understanding of this disease.

PU-1908

一站式 CTA 联合 CTP 扫描在急性脑梗死患者临床诊疗中的应用价值分析

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摘要 目的 探讨一站式 CT 血管成像 (CTA) 联合 CT 灌注成像 (CTP) 扫描在急性脑梗死患者临床诊疗中的应用价值。方法 选取 2020 年 8 月~2021 年 8 月期间医院收治的急性脑梗死患者 63 例, 均进行一站式 CTA 联合 CTP 扫描检查, 分析患者梗死区、缺血半暗带区以及相应对侧区 CTP 检查参数, 并分析患者血管狭窄程度与灌注异常以及侧支循环形成的关系。结果 63 例急性脑梗死患者 CTP 检查均发现脑血流灌注异常, 梗死区患侧 CBF、CBV 显著低于对侧区 ($P<0.05$), TTP 较对侧区无限延迟; 缺血半暗带区患侧 CBF 显著低于对侧区 ($P<0.05$), TTP 显著高于对侧区 ($P<0.05$), CBV 与对侧区比较差异无统计学意义 ($P>0.05$)。63 例急性脑梗死患者中, 轻度、中度、重度狭窄以及闭塞患者分别为 31 例、24 例、6 例和 2 例, 其中 22 例侧支循环形成, 且随着血管狭窄程度的加重, 有梗死区、缺血半暗带区以及侧支循环形成的患者比例逐渐增多 ($P<0.05$)。结论 CTP 检查能够快速、准确地区分梗死区和缺血半暗带区, CTA 可对供血动脉狭窄程度及闭塞情况进行评估, 一站式 CTA 联合 CTP 扫描在急性脑梗死患者临床诊疗中具有重要的指导价值。

PU-1909

一例磁共振高分辨血管壁成像检查在颅内夹层动脉瘤中的应用

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颅内夹层动脉瘤相对少见，其诊断仍需更多认识。磁共振高分辨血管壁成像检查（HR-VWI）是最近较新的一种血管壁成像检查方式，对于血管壁的显示更为清晰并且可以评估动脉瘤的稳定性。作者报道了 1 例磁共振高分辨血管壁成像检查的夹层动脉瘤病例，复习了国内外相关文献，探讨了颅内夹层动脉瘤在磁共振高分辨血管壁成像中的影像学表现和临床应用，以提高临床医师对该疾病的认识。

PU-1910

静脉源性搏动性耳鸣随访期间症状变化的血流动力学机制探究

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Objective: The aim of this study is to clarify the change of symptom severity over time in VPT patients and to explore predictive factors for tinnitus severity changes in non-surgical VPT patients.

PU-1911

T1 and T2 Mapping for Identifying Malignant Lymph Nodes in Head and Neck Squamous Cell Carcinoma

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Background: This study seeks to assess the utility of T1 and T2 mapping in distinguishing metastatic lymph nodes from reactive lymphadenopathy in patients with head and neck squamous cell carcinoma (HNSCC), using diffusion-weighted imaging (DWI) as a comparison.

Methods: Between July 2017 and November 2019, 46 HNSCC patients underwent neck MRI inclusive of T1 and T2 mapping and DWI. Quantitative measurements derived from preoperative T1 and T2 mapping and DWI of metastatic and non-metastatic lymph nodes were compared using independent samples t-test or Mann-Whitney U test. Receiver operating characteristic curves and the DeLong test were employed to determine the most effective diagnostic methodology.

Results: We examined a total of 122 lymph nodes, 45 (36.9%) of which were metastatic proven by pathology. Mean T2 values for metastatic lymph nodes were significantly lower than those for benign lymph nodes ($P < 0.001$). Conversely, metastatic lymph nodes exhibited significantly higher apparent diffusion coefficient (ADC) and standard deviation of T1 values (T1SD) ($P < 0.001$). T2 generated a significantly higher area under the curve (AUC) of 0.890 (0.826-0.954) compared to T1SD (0.711 [0.613–0.809]) and ADC (0.660 [0.562–0.758]) ($P = 0.007$ and $P < 0.001$). Combining T2, T1SD, ADC, and lymph node size did not significantly enhance diagnostic performance over using T2 alone ($P = 0.089$).

Conclusions: The application of T1 and T2 mapping is feasible in differentiating metastatic from non-metastatic lymph nodes in HNSCC and can improve diagnostic efficacy compared to DWI.

PU-1912

同时多层采集技术在鼻咽癌 MR 高清扩散峰度成像中的初步研究

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目的 探讨同时多层弥散技术 (SMS) 对鼻咽癌磁共振基于分段读出技术弥散峰度 (RESOLVE-DKI) 成像的价值。**方法** 前瞻性收集头颈部肿瘤 30 例, 所有患者均于治疗前行磁共振常规序列、加速因子为 2 的 SMS 和不加 SMS 的 RESOLVE-DKI 序列, 后处理得到两种序列 RESOLVE-DKI 定量参数: 表观扩散系数 (ADC)、平均峰度系数 (MK)、平均扩散系数 (MD), 并对两种序列参数进行 Bland-Altman 分析、相关性分析; 同时对 2 组图像进行包括整体图像质量、病变的明显度、病变的几何变形和图像伪影在内的主观图像质量评价, 并客观评价图像的信噪比 (SNR) 及对比噪声比 (CNR)。**结果** 分析 30 例鼻咽癌原发灶及 8 例咽旁转移淋巴结, 结果显示与 RESOLVE-DKI 相比, SMS-RESOLVE-DKI 可显著缩短扫描时间 (扫描时间分别为 5 分 23 秒和 2 分 54 秒), 两种序列所得扫描定量参数间具有良好的一致性 & 显著线性正相关 (ADC、MD 及 MK 的相关系数分别为 0.912、0.918、0.921, P 值均 < 0.001), 两种序列的整体图像质量、病变的明显度、病变的几何变形、图像伪影、SNR 及 CNR 间的差异无统计学意义。**结论** 相较于传统的 RESOLVE-DKI, SMS 技术能够显著缩短鼻咽癌 RESOLVE-DKI 成像时间, 并提供稳定的定量参数和良好图像质量, 具有良好的应用前景。

PU-1913

SMARCA4(BRG1)缺失型未分化癌颅底侵犯 CT 及 MR 表现: 附 2 例报告及文献复习

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摘要: **目的** 探讨 SMARCA4(BRG1)缺失型未分化癌颅底侵犯的影像学表现。**方法** 收集中国科学技术大学附属第一医院 2021—2023 年经病理证实的 SMARCA4(BRG1)未分化癌颅底侵犯 2 例, 分析其临床特点及 CT、MR 影像学表现。**结果** 2 例均为男性, 并有吸烟史。1 例患者 34 岁, “左侧鼻腔间歇性出血 1 月”入院, 体格检查: 左侧鼻腔见大团新生物, 新生物拖至右侧后鼻孔, 左侧眼球活动受限, 影像学提示左侧鼻腔、鼻窦、鼻咽部巨大占位伴前颅底及左眼眶多处侵犯, 穿刺活检病理提示 SMARCA4(BRG1)缺失型未分化癌 (免疫组化: BRG1 (-), Ki-67 (+70%))。另 1 例患者 64 岁, “左侧头痛、听力下降伴视物模糊半年余”入院, 体格检查: 口咽部粘膜光滑, 悬雍垂右侧可见新生物隆起, 鼻咽部未见明显异常。影像学提示蝶骨体、双侧颞骨岩尖部、左侧颞骨乳突部、枕骨及斜坡多发骨质破坏伴软组织肿块并左枕部脑膜受侵。术中可见颅底及脑膜弥漫“鱼肉样”新生物。病理提示 SMARCA4(BRG1)缺失型未分化癌 (免疫组化: BRG1 (-), Ki-67 (+40%))。**结论** SMARCA4(BRG1)缺失型未分化癌是一种罕见的高度侵袭性恶性肿瘤, 发现时多为晚期, 多侵犯邻近结构, 手术难度大, 预后差, 影像学能够评估肿块大小、范围、邻近结构侵犯及有无远处转移等, 为临床诊断及治疗决策提供很大价值。

PU-1914

Spinal cord infarction presenting as BrownSéquard syndrome from spontaneous vertebral artery dissection: a case report and literature review

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Background: Spinal cord infarction (SCI) is rarely caused by vertebral artery dissection (VAD), which is an important cause of posterior circulation stroke in young and middle-aged patients. We report the case of a middle-aged patient without obvious risk factors for atherosclerosis who had SCI from right VAD. Case presentation: An otherwise healthy 40-year-old man presented with acute right-sided body weakness. Six days earlier, he had experienced posterior neck pain without obvious inducement. Neurologic examination revealed a right Brown-Séquard syndrome. Magnetic resonance imaging (MRI) of the head was normal. Further, cervical spine MRI showed spinal cord infarction (SCI) on the right at the C1-C3 level. Three-dimensional high-resolution MRI (3D HR-MRI) volumetric isotropic turbo spin echo acquisition (VISTA) scan showed evidence of vertebral artery dissection (VAD). The patient was significantly relieved of symptoms and demonstrated negative imaging findings after therapy with anticoagulation (AC) and antiplatelets (AP) for 3 months. Conclusions: The possibility of vertebral artery dissection (VAD) should be considered in the case of young and middle-aged patients without obvious risk factors for atherosclerosis. Furthermore the VISTA black blood sequence plays an important role in the pathological diagnosis of vertebral artery stenosis. Early correct diagnosis and active therapy are crucial to the prognosis.

PU-1915

常规及功能 MRI 对眼眶神经鞘瘤的诊断及手术入路选择的价值

唐言
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目的 探讨分析眼眶神经鞘瘤的常规 MRI、DWI、DCE-MRI 影像特点及病理、临床特征，提高对该病术前的影像诊断正确率及适宜的手术方式。方法 回顾性分析我院 50 例经手术病理证实的眼眶神经鞘瘤的临床特点、手术方式、病理学及 MRI 图像等资料。MRI 图像包括平扫、DWI (b 值取 0、1000 s/mm²)、DCE-MRI，并获取病灶的时间-信号强度曲线 (TIC) 及表观扩散系数 (ADC) 值。结果 50 例眼眶神经鞘瘤均为单发病变，其中 2 例为复发。患者男女比例 27:13，年龄 15 岁~72 岁。临床表现眼球突出 38 例，视力下降、视物模糊 25 例，头痛头晕 1 例，眼睑外翻 2 例。影像病变位置上 31 例发生于肌锥内间隙，10 例发生于肌锥外间隙，9 例发生于跨肌锥内外间隙、其中 7 例经眶上裂颅眶沟通；形状上 50 例肿瘤影像形态均较规则，呈类圆形、类椭圆形或条形、腊肠样。常规信号特点相对于脑灰质，T1WI 上呈等、低信号，T2WI 上呈等、高信号 (高信号区位于周围或内部)，1 例肿瘤呈纯实性，3 例呈纯囊性，46 例呈囊实混合。增强后所有病灶实性成分明显强化、囊性成分无强化或斑点、斑驳样强化。DCE-MRI 获取的 TIC 曲线 43 例呈持续上升型、7 例呈平台型，获得平均 ADC 值 (实性及有强化的囊性部分区域) 为 $(1.30 \pm 0.38) \times 10^{-3} \text{mm}^2/\text{s}$ 。前路开窗术 24 例，外侧开窗术 16 例，内侧开窗术 2 例，内外联合开窗术 8 例。结论 眼眶神经鞘瘤见于成人，好发于中老年男性，临床表现多以眼球突出和或视力下降多见，常规 T2WI 以等、高囊实性信号且囊性位于周围较具特征，TIC 类型及 ADC 值有助于眼眶神经鞘瘤影像诊断正确率；通过影像特点 (囊性成分多少) 及定位选择合适术式可成功摘除眼球神经鞘瘤、并最大限度保存患者视力功能、减少复发率。

PU-1916

急性 A 型主动脉夹层术后脑出血卒中危险因素分析及风险评分模型构建

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目的 分析急性 A 型主动脉夹层患者术后新发脑出血的危险因素,并基于此建立风险评分。方法 回顾性分析经 CT 血管成像(CTA)确诊且行外科手术的 100 例 ATAAD 患者临床资料,以术后有无新发脑出血将所有患者分成 2 组,即脑出血(+)组和脑出血(-)组。记录所有患者与术后新发脑出血相关的临床影像资料。先行单因素分析,使用其中有统计学意义($P<0.05$)的因素构建多元 Logistic 回归模型,并基于 Logistic 回归模型的结果 构建风险评分模型。结果 100 例患者中有 28 例术后新发脑梗死(28%)。多因素分析结果 显示:升主动脉逆行撕裂($OR=5.2140, P=0.001$)、升主动脉及弓部均有破口($OR=2.789, P=0.021$)、颈总动脉夹层($OR=4.012, P=0.001$)、术前脑出血($OR=1.987, P=0.021$)是 ATAAD 患者术后新发脑出血的独立危险因素。基于这些因素的 OR 值构建了一个易于使用的风险评分: ≤ 3 分,术后脑出血风险 $<15\%$;4~7 分为 $15\% \sim 40\%$;8~15 分为 $41\% \sim 50\%$ 。结论 术前主动脉 CTA 特征可预示 ATAAD 术后新发脑出血发生风险。基于这些特征构建的风险评分模型可定量评估 ATAAD 患者术后发生新发脑出血的风险。

PU-1917

孤立性纤维瘤的影像学表现

陈曦

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目的:通过回顾性分析孤立性纤维瘤在多个系统的影像学征象、临床表现及病理学特征,提高对孤立性纤维瘤的诊断水平。方法:回顾性分析 42 例经过组织病理学确诊的孤立性纤维瘤患者的临床表现、影像学征象及病理表现。结果:颅内病例 28 例,鼻腔 3 例,眼眶 3 例,脊柱 4 例,腹腔 2 例,胸部 2 例,病灶多为单一结节或肿块影,类圆形或不规则形,边界清晰,病灶内可见囊变, T1WI 呈稍低或等信号, T2WI 多呈稍高信号或混杂信号,由于肿瘤血管丰富,部分可见血管流空影,增强扫描病灶呈明显强化。结论:孤立性纤维瘤是一种间叶源性肿瘤,多个系统均可发生,临床表现缺乏特异性,当 MRI 发现边界清楚、信号不均匀的结节或肿块时,增强扫描呈不均匀明显强化,可见血管流空影时,我们应该考虑孤立性纤维瘤的可能。

PU-1918

Application of deep learning-based image reconstruction engine combined with Timing-invariant reconstruction to improve image quality in CTA derived from ultra-low dose cerebral CT perfusion data

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Abstract: Rationale and objective: To assess the effect of the combination of deep learning-based image reconstruction engine (AiCE) and time-resolved maximum intensity projection (tMIP) or time-resolved average (tAve) on image quality of CTA derived from ultra-low dose cerebral CT perfusion (CTP). Materials and methods: This retrospective study included 30 patients with regular dose (Group A) and 30 patients with ultra-low dose (Group B) who underwent cerebral CT perfusion for ischaemic stroke from July 2020 to November 2022. Group A were reconstructed with adaptive iterative dose reduction 3D (R-AIDR). And in Group B, four image datasets were reconstructed: UL-AIDR and UL-AICE were single arterial phase derived from the time point showing the peak value reconstructed with AIDR and AiCE, UL-AICE-tMIP and UL-AICE-tAve were time-resolved maximum intensity projection image and time-resolved average image derived from three time points with the greatest enhancement of AiCE. The CT attenuation, image noise, signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR) were calculated and compared for all five image datasets. The images quality were subjectively evaluated by two radiologists using a 5-point rating scale. Results: The ultra-low dose group achieved a significant reduction in a single arterial phase radiation dose (0.12 mSv VS 0.18 mSv) compared to the regular dose group. The SNR (ICA: 24.73 ± 12.49 VS 116.51 ± 80.23 , BA: 19.5 ± 13.20 VS 94.86 ± 44.79 , all $P < 0.001$) and CNR (ICA: 77.19 ± 21.64 VS 97.42 ± 41.53 , BA: 66.95 ± 21.34 VS 89.55 ± 42.33 , all $P < 0.05$) with UL-AICE in vessels were statistically inferior than R-AIDR. However, The UL-AICE-tMIP and UL-AICE-tAve presented higher CNR in ICA (101.43 ± 25.42 VS 97.42 ± 41.53 , $P < 0.05$ and 110.66 ± 29.69 VS 97.42 ± 41.53 , $P < 0.001$) or equivalent CNR in BA (88.76 ± 24.39 VS 89.55 ± 42.33 and 96.55 ± 27.46 VS 89.55 ± 42.33 , all $P < 0.05$) and higher subjective quality scores in vessels (all $P < 0.001$) than R-AIDR. Conclusion: The application of AiCE and tMIP or tAve allows for significant radiation dose reduction while further improving image quality in CTA derived from cerebral CTP data.

PU-1919

基于非线性融合技术肺支气管血管成像在肺结节 术前定位的应用

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目的 评价双能量 CT 非线性融合技术在肺支气管血管成像中的运用, 并探讨该技术在肺结节患者术前定位的临床应用。**方法** 选择 2020 年 4 月至 2022 年 3 月在扬州大学附属医院行双能量肺静脉成像并拟行肺结节切除的患者 115 例, 其中男性 55 例, 女性 60 例; 年龄 $24 \sim 81$ 岁, 平均年龄 61.3 岁 (标准差 11.8 岁); 病灶直径 $0.4 \sim 2.4 \text{ cm}$, 平均直径 1.19 cm (标准差 0.50 cm), 病程 1 天 ~ 2 年, 平均病程 2.5 月 (标准差 4.24 月), 所有患者双能量扫描获得 80 kV (A 组)、(Sn) 150 kV (B 组)、线性融合 M-0.6 (C 组) 和非线性融合 (D 组) 四组图像。计算肺静脉干信噪比 (SNR)、对比噪声比 (CNR)、右肺上叶静脉与右肺中叶动脉平均 CT 值差值。将最佳组数据导入 Mimics 软件进行三维肺支气管血管成像, 进行图像等级评分。结果 经一致性分析, 四组图像肺

静脉干的 ICC 分别为 0.991、0.987、0.985、0.994，竖脊肌的 ICC 分别为 0.877、0.885、0.887、0.895。D 组图像的 SNR 和 CNR 最高，SNR 为 167.1 ± 22.9 、CNR 为 150.1 ± 21.2 。D 组与其他 3 组 SNR 和 CNR 比较，差异具有统计学意义 ($P < 0.05$)。D 组图像肺静脉与动脉差值 (328.5 ± 98.9) 最高，A 组与 D 组图像差异无统计学意义 ($P > 0.05$)，B 组、C 组与 D 组图像差异有统计学意义 ($P < 0.05$)。用最佳组 D 组进行三维肺支气管血管成像，111 例图像评为优，3 例为良，1 例为差。结论 用非线性融合技术进行肺静脉图像重建，图像 SNR 和 CNR 更高，且肺静脉与动脉差值最大，更容易重建出高质量的肺支气管血管图像，更利于观察肺支气管血管是否存在变异及血管与病灶的三维关系，为胸外科医生手术方案的制定提供重要的理论依据。

PU-1920

CT 特征联合瘤体及瘤周影像组学的列线图预测临床 IA 期非小细胞肺癌气腔播散的价值

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目的 探讨基于术前 CT 特征联合瘤体及瘤周影像组学特征的列线图预测临床 IA 期 NSCLC 气腔播散 (STAS) 的价值。

方法 回顾性收集 2019.09 至 2022.08 我院术后有病理评估 STAS 状态的临床 IA 期 NSCLC 336 例，依据病理报告的 STAS 情况分为阳性组和阴性组，按照 7:3 的比例将数据集随机划分为训练集 236 例和内部验证集 100 例，外院 69 例作为外部验证集。在训练集中，单、多因素 logistic 回归分析患者临床及 CT 特征，筛选最佳预测变量，构建临床模型，基于瘤体及瘤周 5mm、10mm、15mm、20mm 范围的影像组学特征分别构建 9 个组学模型，以最优组学模型的 Radscore 和最佳预测变量构建综合模型，绘制列线图并进行模型的内外验证。采用 ROC 曲线及 AUC 值来评估模型的区分度，以 H-L 检验和校准曲线来评价模型的拟合优度，决策曲线来分析模型的临床应用价值。

结果 多因素 logistic 回归分析筛选出的最佳预测变量包括性别、癌胚抗原、实性成分占比、密度类型、远端带状影，其中肿瘤密度类型、远端带状影为预测 STAS 状态的独立危险因素。与 GTV、PTV5、PTV10、PTV15、PTV20、GPTV5、GPTV15、GPTV20 相比，GPTV10 影像组学模型效能最优，在三个队列中 AUC 值分别为 0.89，0.88 及 0.87。基于 GPTV10-Radscore 和最佳预测变量构建的综合模型在三个队列中 AUC 值分别为 0.90，0.88 及 0.88。H-L 检验表明，综合模型在三个队列中均拟合良好，校准曲线显示综合模型预测概率值与真实情况具有较好的一致性。决策曲线显示综合模型较临床模型和 GPTV10 影像组学模型具有更好的临床应用价值。

结论 CT 特征联合瘤体及瘤周影像组学特征的列线图对术前判断临床 IA 期 NSCLC STAS 状态具有较高的诊断效能，可为胸外科医师选择最佳手术方式提供指导帮助。

PU-1921

室间隔曲率预测肺动脉压力的模型构建与验证

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目的：本研究基于 CMR 构建心室有限元模型，通过有限元分析左室壁应力，评估室间隔应力异常增大的最低 mPAP。之后本研究以室间隔应力异常增大的最低 mPAP 为阈值，通过心脏 MR 验证室间隔曲率估测压能否准确区分阈值上下的两组人群。

方法：本研究利用 Young-Laplace 定律，提出新指标：室间隔曲率估测压=主动脉平均压 \times (1-室间隔/左室游离壁的曲率比)。新指标反应 mPAP 大小以及室间隔应力增大与否。收集 2013 年 6

月到 2023 年 3 月住院的 IPAH 患者，他们住院期间同时完成了右心导管及心脏 MR。同时收集完成了 CMR 的正常人。

结果：纳入了 39 名 IPAH 患者（mPAP 范围 30-87mmHg），28 名正常人。有限元分析发现 39 名 IPAH 患者的室间隔应力均发生了增高。mPAP 为 30mmHg 患者的室间隔与左室游离壁的应力分别为 $3.8\pm 1.5\text{kPa}$ 及 $3.3\pm 0.9\text{kPa}$ ($p<0.05$)；mPAP 为 60mmHg 患者的室间隔与左室游离壁的应力分别为 $4.1\pm 2.1\text{kPa}$ 及 $3.1\pm 1.7\text{kPa}$ ($p<0.05$)。以 30mmHg 为阈值，室间隔曲率估测压筛查 IPAH 的灵敏度为 97.4%，假阴性率为 2.6%，特异度为 100%，假阳性率为 0%。

结论：mPAP \geq 30mmHg 的患者，其室间隔应力均有可能增高。室间隔曲率估测压以 30mmHg 为阈值，能够有效筛查出 mPAP \geq 30mmHg 的 IPAH 患者，并且准确的排除掉 mPAP $<$ 30mmHg 的患者。

PU-1922

少见部位神经内分泌癌 CT 表现及病理特征分析

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[摘要] 目的 分析全身少见部位神经内分泌癌的 CT 表现及病理特征，提高对其认识。方法 回顾性分析经病理证实的 29 例神经内分泌癌患者的 CT 表现与病理特征。29 例经手术得到病理结果，均行术前 CT 平扫加动态增强扫描。结果 发生于乳腺 5 例、宫颈 9 例、宫体 1 例、胆囊 2 例、纵隔 5 例、肾盂膀胱 1 例、肾脏 1 例、膀胱 2 例、肝脏 1 例、胰腺 1 例、卵巢 1 例。CT 表现：病变以实性多见，多呈浸润性生长；低分化的神经内分泌癌边界模糊；大部分病灶内可见囊变坏死，部分合并钙化灶；本组病例中 23 例病灶增强扫描呈中等及以上程度强化；病变较易发生周围侵犯、骨质破坏及远处转移。结论 少见部位神经内分泌癌的影像学表现多样，认识其多样性及影像学征象，对提高其诊断水平有较大帮助。

PU-1923

100kVp 低管电压联合 ASiR-V 在脊髓 Adamkiewicz 动脉成像中的应用价值研究

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目的 探讨 100kVp 低管电压联合多模型迭代重建技术 (ASiR-V) 对 Adamkiewicz 动脉成像的显示、图像质量及辐射剂量的影响。方法 连续收集 90 例行胸腹主动脉 CTA 的患者，并按随机数字表法分为 A、B 两组。A 组管电压 100kVp，ASiR-V 80%重建；B 组管电压 120kVp，ASiR 40%重建。在第 12 胸椎层面测量降主动脉的 CT 值及标准差 SD 值，并测量同层面脊髓的 CT 值及标准差 SD 值，计算 Adamkiewicz 动脉的信噪比 (SNR) 及对比噪声比 (CNR)。根据 Adamkiewicz 动脉与肋间动脉或腰动脉的连续性，由 2 名副主任医师采用双盲法以 5 分法对 Adamkiewicz 动脉的可视化进行评估，并比较 A、B 两组的辐射剂量。结果 与 B 组相比，A 组主动脉的平均 CT 值显著增高约 22.83% (576.19 ± 75.13 vs 469.12 ± 48.48 , $P<0.001$)；A 组 AKA 动脉的背景噪声显著低于 B 组，SNR 及 CNR 显著高于 B 组 ($P<0.001$)。A 组 Adamkiewicz 动脉的可视化评分高于 B 组 ($P<0.05$)。A 组有效辐射剂量较 B 组显著降低约 41.28% (9.87 ± 2.83 vs 15.99 ± 3.42 , $P<0.001$)。结论 100kVp 联合 ASiR-V 技术行脊髓 Adamkiewicz 动脉成像，可获得较好的图像质量，提高了 AKA 动脉显示的敏感性，并降低了辐射剂量。

PU-1924

联影 128 层 CT 低剂量冠状动脉 CTA 成像的应用价值

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目的：评估应用上海联影医疗科技有限公司生产的 128 层 CT (uCT 760) 进行低管电压 (80KV, 70KV) 冠状动脉 CTA 检查的临床应用价值。方法：选取 2016 年 3 月至 2016 年 6 月体重指数 (BMI) 在 22-25Kg/m², 临床怀疑或已知冠心病拟行冠状动脉 CTA 检查的 120 例患者。采取随机数字表法选取 40 例为常规剂量组(A 组), 其余 80 例为低剂量组 (B 组)。两组均行回顾性心电门控扫描技术, A 组采用管电压 120Kv, 管电流 150mAs。B 组根据管电压分成两个亚组, B1 组管电压 80KV (40 例), B2 组管电压 70KV (40 例), 均采用管电流 150mAs。各组 CT 图像的辐射剂量[CT 剂量长度乘积(DLP)和有效剂量(ED)]以及图像噪声 (SD)、图像信噪比(SNR)、冠状动脉近段的对比噪声比(CNR)进行系统测量。由 2 名放射科医师采用双盲法对每例患者冠状动脉的图像质量进行 4 分法评估。应用 ANOVA 单因素方差分析比较三组辐射剂量(DLP 和 ED)、SD、SNR 和冠状动脉近段 CNR。用 Kappa 分析评价不同观察者冠状动脉图像质量评分的一致性。结果：A 组、B1 组、B2 组的 DLP 分别为 (490.08±78.83)、(182.29±69.79) 和 (67.10±27.04) mGy*cm, ED 分别为 (11.33±1.27)、(2.56±0.97) 及 (0.94±0.40) mSV, 三组间两两比较均有显著性差异 (P<0.05)。主观图像质量评估：A 组(3.61±0.77)分, B1 组(3.53±0.80)分, B2 组(3.74±0.69)分, 差异无统计学意义(P=0.20)。客观图像质量评估：三组之间 SD、SNR、冠状动脉近段 CNR 差异无统计学意义 (P 值分别为 0.81、0.08、0.15、0.37、0.33)。结论：联影 128 层排 CT 采用低管电压行冠状动脉 CTA, 在保证图像质量的同时, 可有效降低辐射剂量。

PU-1925

冠脉周围脂肪衰减指数及斑块特征对冠脉功能性缺血的诊断效能研究

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目的：探究冠脉周围脂肪衰减指数及斑块特征的联合分析对冠脉功能性缺血的诊断价值。方法：回顾性分析 2021 年至 2023 年滁州市第一人民医院影像科行冠状动脉计算机断层扫描造影 (CCTA) 的疑似或已知稳定冠心病 (CAD) 患者的影像资料。对 102 名患者的 154 条血管进行了冠状动脉 CTA 狭窄度、斑块体积、CT-FFR 和 FAI 评估。狭窄程度>50%被认为是梗阻性的。斑块特征 (非钙化斑块体积[NCPV]、钙化斑块体积[CPV]、总斑块体积[TPV]、斑块长度及易损斑块) 及冠脉周围脂肪衰减指数 (FAI) 使用半自动软件进行量化。冠脉功能性缺血定义为 CT-FFR≤0.80。结果：冠脉功能缺血阳性组的 FAI 值与冠脉狭窄率明显高于阴性组 (-69.1±5.6 vs 78.1±5.4, p<0.001; 68.2±9.3 vs 53.5±10.4, p<0.001), 且为冠脉功能性缺血的独立危险因素 (OR=1.405, p<0.001; OR=1.156, p<0.001)。FAI 对冠脉功能缺血诊断具有一定的诊断效能 (AUC=0.882, p<0.001), 且具有增量价值 (0.935 比 0.882, p=0.013)。结论：本研究的结果表明, 斑块特征分析联合 FAI 在预测冠脉缺血方面具有协同作用, 有助于提高冠脉功能性缺血的诊断效能。

PU-1926

联合应用 CT 淋巴管成像与 99Tcm-DX 淋巴显像在原发性乳糜性心包积液中的诊断价值

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目的 探讨 99Tcm-DX 淋巴显像和 CT 淋巴管成像(CTL)联合应用在原发性乳糜性心包积液中的诊断价值。**方法** 回顾性分析经临床确诊的 48 例原发性乳糜性心包积液患者,所有患者均行 99Tcm-DX 淋巴显像和 CT 淋巴管成像(CTL)。根据 99Tcm-DX 淋巴显像表现进行分型:I 型为异常浓聚型,表现为左颈静脉角处异常放射性浓聚,II 型为异位引流型,表现为右颈静脉角区显影剂持续性浓聚,伴或不伴有左颈静脉角放射性浓聚,III 型为未显影或一过性显影型,表现为左颈静脉角未显影或在检查过程中一过性显影。CTL 的评价指标包括:(1)颈部、锁骨下区、胸导管末端、右淋巴导管末端及腋窝对比剂异常分布及反流;(2)胸部对比剂异常分布,包括胸深部(前纵隔、主肺动脉窗、气管及支气管周、隆突下、后纵隔、肺门、支气管血管束周围、心包等)对比剂异常分布,胸浅部(肋间、胸膜、横膈上)对比剂异常分布;(3)胸导管扩张;(4)横膈下、髂组、腰干对比剂异常分布,腹膜后对比剂异常分布。并将各组 CTL 表现进行统计学分析, $P < 0.05$ 为差异有统计学意义。结果 48 例患者 99Tcm-DX 淋巴显像 I 型 12 例,II 型 14 例,III 型 22 例,原发性乳糜性心包积液后纵隔对比剂异常分布的发生率,I 型大于 III 型,差异有统计学意义($P = 0.003$),心包及主肺动脉窗对比剂异常分布的发生率,99Tcm-DX 淋巴显像 I 型大于 III 型,差异有统计学意义($P = 0.008$),双颈部或锁骨下区对比剂异常分布的发生率,99Tcm-DX 淋巴显像 II 型大于 III 型($P = 0.002$),差异有统计学意义。结论 99Tcm-DX 分型反映了原发性乳糜性心包积液患者的胸导管病变及心包积液性质,CTL 显示全身淋巴管是否异常及淋巴管外病变,两种方法联合应用,对于原发性乳糜性心包积液的定位和定性诊断、判断病变程度和累及范围等具有重要价值。

PU-1927

心电门控大螺距血管成像技术对 Stanford A 型主动脉夹层的诊断价值研究

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摘要: **目的** 比较第 3 代双源 CT 心电门控大螺距血管成像技术和非心电门控成像技术两种扫描方式对 Stanford A 型主动脉夹层患者主动脉根部图像的质量和电离辐射剂量的大小。**方法** 回顾性选取我院 2022 年 11 月至 2023 年 6 月期间,以随机分组方法分别用双源 CT 心电门控大螺距血管成像(实验组)以及传统非心电门控扫描方式大血管成像(对照组)确诊为典型或不典型 Stanford A 型主动脉夹层患者共 50 例,以外科手术治疗术中所见为标准,评价第 3 代双源 CT 大螺距血管成像(FLASH,螺距 3.2)对主动脉根部图像质量的诊断准确性以及与传统非心电门控扫描方式成像患者所受的辐射剂量进行比较。结果 FLASH 组对主动脉根部病变的显示图像质量均可满足诊断。FLASH 组有效辐射剂量($3.09 \pm 0.94 \text{ mSv}$),均低于非心电门控对照组。结论 双源 CT 心电门控大螺距血管成像对典型或不典型 Stanford A 型主动脉夹层根部病变显示的准确性显示明显高于传统非心电门控组($P < 0.05$),且有效辐射剂量显著低于对照组($P < 0.05$)。

PU-1928

NAFLD 与无 NAFLD 患者的差异及 NAFLD 患者冠脉功能性缺血的预测因素

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目的：探讨合并非酒精性脂肪性肝病(NAFLD)和无 NAFLD 的冠脉狭窄患者之间的差异，并进一步评估 NAFLD 患者冠脉功能性缺血的预测因素及价值。

方法：收集行冠脉 CT 血管造影（CCTA）检查并接受冠脉钙化积分（CACS）扫描患者的资料，且 CCTA 结果显示至少 1 支主冠脉存在解剖学狭窄。共纳入患者 392 例，将患者分为 NAFLD 组（209 例）及无 NAFLD 组（183 例），分析两组患者差异。进一步将 NAFLD 患者分为 CT 血流储备分数（CT-FFR） ≤ 0.08 组及 CT-FFR > 0.08 组。采用单因素和多因素回归分析筛选预测因子，用受试者工作特征（ROC）曲线评价预测性能。

结果：无 NAFLD 组与 NAFLD 组在年龄、体重指数、高血糖、高血脂、甘油三酯、高密度脂蛋白、CAD-RADS 分类、CACS 分级、病变冠脉数、CT-FFR ≤ 0.80 构成比上存在显著性差异（ $P < 0.05$ ）。CAD-RADS 分类及 CACS 分级为 NAFLD 患者冠脉缺血独立预测因子，冠脉功能性缺血发生率与 CAD-RADS 分类（OR=3.383）及 CACS 分级（OR=2.264）呈正相关。CAD-RADS 分类、CACS 分级及 2 者联合预测 NAFLD 患者冠脉缺血的曲线下面积（AUC）分别为 0.762、0.742、0.819，95%CI 分别为 0.696~0.828、0.673~0.811、0.761~0.876，P 值均为 0.000。

结论：合并 NAFLD 和无 NAFLD 的冠脉狭窄患者之间存在差异，CAD-RADS 分类及 CACS 分级联合可以经济高效地预测 NAFLD 患者冠脉功能性缺血，对临床诊疗具有重要价值。

PU-1929

基于术前 CT 影像组学预测肺腺癌 IASLC 病理分级

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目的：通过影像组学与病理组学相结合的技术，寻找肺腺癌计算机断层扫描（CT）影像与 IASLC 病理亚型的相关性，构建具有可解释性的影像组学与病理亚型相互对应的机器学习，实现术前肺腺癌病理亚型的预测。

方法：在 2017 年 1 月至 2022 年 6 月，回顾性地确定了 301 个经病理证实的肺部实性结节（SSNs），按照国际肺癌协会（IASLC）提出的一项分级系统，将肺腺癌的病理亚型分成三类，然后对肿瘤病灶进行精准分割并进行影像组学的特征提取，使用五折交叉验证法验证机器学习模型，最终选择 logistic 回归模型进行机器学习。

结果：在训练集中三种肺腺癌亚型的曲线下面积（AUC）、敏感性、特异性、精准度分别为 I 型：0.993、0.9091、0.9785、0.7692；II 型：0.922、0.7786、0.9006、0.872；III 型：0.947、0.8993、0.8457、0.8333；总体平均为：0.9557、0.8623、0.9083、0.8249。在验证集中三种肺腺癌亚型的曲线下面积（AUC）、敏感性、特异性、精准度分别为 I 型：0.939、0.6364、0.9642、0.5833；II 型：0.862、0.7214、0.8447、0.8016；III 型：0.919、0.7452、0.8766、0.731。总体平均为：0.9088、0.7452、0.8766、0.731。

结论：根据 IASLC 提出的分级系统，将影像组学与病理亚型相结合，利用机器学习深度挖掘数据，探究 CT 影像与病理亚型间的相关性，构建基于影像组学的肺腺癌术前病理亚型预测模型，可以支持临床医生根据预期的病理情况更准确、更及时的提出治疗建议。

PU-1930

基于冠状动脉 CT 血管成像的左心房测量参数在评估继发性甲状旁腺功能亢进中的价值

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目的 探讨基于冠状动脉 CTA (CCTA) 测得的左心房、左心耳结构和功能参数在评估继发性甲状旁腺功能亢进 (SHPT) 中的价值。**方法** 回顾性分析行 CCTA、左室射血分数 (LVEF) 大于 50% 的 SHPT 患者 120 例资料, 根据是否需要行甲状旁腺切除术 (PTX) 分为手术组 (67 例) 和非手术组 (53 例), 所有 SHPT 患者均行血全段甲状旁腺激素 (iPTH)、血磷、血钙、甲状旁腺超声及超声心动图检查。采用图像后处理软件测得左心房最大、最小容积 (LAVmax、LAVmin) 及左心耳最大、最小容积 (LAAVmax、LAAVmin), 并计算左心房及左心耳的射血分数 (LAEF、LAAEF)。采用独立样本 t 检验或 χ^2 检验比较两组各项指标的差异, 通过二元 logistic 回归建立联合参数模型, 通过 ROC 曲线评估左心房参数及联合参数对是否行 PTX 手术的预测效能, 采用 Pearson 相关分析左心房参数与 iPTH 之间的相关性。**结果** 手术组的 LAEF 及 LAAEF 低于非手术组, 差异有统计学意义 ($P < 0.001$)。LAEF 及 LAAEF 的曲线下面积 (AUC)、最佳阈值、诊断的灵敏度和特异度分别为 0.833 (95%CI 0.798~0.928), 15.92%, 66.21%, 94.73% 及 0.846 (95%CI 0.826~0.945), 18.12%, 74.01%, 94.72%。LAEF 联合 LAAEF AUC 值为 0.916 (95%CI 0.889~0.980)。左心房功能参数 LAEF 及 LAAEF 与 iPTH 呈负相关 ($r = -0.438$ 和 -0.445 , $P < 0.001$)。**结论** CCTA 左心房测量参数为评估 SHPT 患者是否需要行 PTX 提供了补充, 为早期评估、早期干预 SHPT 患者治疗提供影像学量化指标。

PU-1931

基于 18F-FDG PET/CT 的列线图预测胸膜下临床 IA 期肺腺癌脏层胸膜侵犯的价值

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【目的】

探讨基于 18F-FDG PET/CT 的 SUVmax 值联合 CT 征象预测与胸膜存在接触的临床 IA 期肺腺癌脏层胸膜侵犯 (VPI) 的价值。

【资料与方法】

回顾性分析于本院术前行 18F-FDG PET/CT 检查、同机 HRCT 示肿瘤与胸膜存在接触的临床 IA 期肺腺癌患者, 排除纯磨玻璃结节后共纳入 140 例患者进行分析。根据检查时间顺序及 7:3 的比例分为训练集和内部时间验证集, 依据病理报告的 VPI 情况分为阳性组和阴性组。在训练集中, 以单因素分析比较两组患者的临床资料、SUVmax 值、CT 特征的差异。纳入单因素回归分析中 P 值 < 0.1 的变量进行多因素 logistic 回归分析, 明确 VPI 的独立危险因素, 建立多因素 logistic 回归模型并绘制列线图, 在验证集中采用 ROC 曲线及 AUC 值来评估该模型的区分度。

【结果】

在训练集中, 单因素分析发现 SUVmax、实性成分最大径、实性成分占比、实性成分接触胸膜最大径、密度类型、毛刺征、血管集束征、胸膜凹陷征在 VPI 阳性与 VPI 阴性肺腺癌患者间差异有统计学意义 ($P < 0.05$)。以多因素 logistic 回归分析筛选最佳预测变量组合, 包括 SUVmax、实性成分接触胸膜最大径、胸膜凹陷征及血管集束征这四个变量, 其中 SUVmax、实性成分接触胸膜

最大径、胸膜凹陷征及血管集束征均是肺腺癌患者 VPI 的独立危险因素。基于多因素 logistic 回归模型构建列线图,以 0.35 为最佳截断值,该模型在训练集上预测 VPI 的准确度为 AUC 值为 0.892。在内部验证集上 AUC 值为 0.885。

【结论】

SUVmax、实性成分接触胸膜长度、胸膜凹陷征及血管集束征为预测胸膜下临床 IA 期周围型肺腺癌 VPI 的独立危险因素。基于 18F-FDG PET/CT 的 SUVmax 值联合 CT 征象构建的列线图有助于术前预测临床 IA 期肺腺癌患者的 VPI 状态。

PU-1932

双层探测器光谱 CT 多参数成像在肺栓塞的诊断价值

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目的 探讨双城探测器光谱 CT 多参数成像在肺动脉栓塞 (PE) 中的诊断价值.方法 回顾性分析,苏州大学附属第二医院,2021 年 10 月至 2022 年 10 月,经过临床初步诊断怀疑肺栓塞的患者 92 例,所有患者均使用双层探测器光谱 CT 进行 CTPA 扫描,重建得到常规及光谱图像(最佳单能图,无水碘图及有效原子序数图),基于最终诊断结果,比较个参数下,图像肺动脉栓子检出的差异,并分析肺栓塞区域与正常肺实质区域的碘浓度值和有效原子序数指的差异,结果 经综合诊断最终确诊为 PE 阳性的患者 63 例,发现光谱 CT MonoE40Kev 单能量图较常规混合能量图像对 PE 的检测率要高,无水碘图及有效原子序数图的检出率,也较常规混合能量,图像优势显著 $P < 0.05$ 。从碘浓度值及有效原子序数只来对比分析肺栓塞区域与正常肺实质区域间存在显著差异 $P < 0.01$,肺栓塞区与正常肺实质区能量 40 到 200 Kev 曲线呈下降趋势。结论 双层探测器光谱 CT 中多参数光谱成像能够提高肺动脉栓塞,尤其是亚段及其以下肺动脉栓塞的检测效能。

PU-1933

基于胸部 CT 图像的 CNN 算法构建 COPD 影像表型诊断模型与验证

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目的:本研究旨在探讨基于深度学习 CNN 算法,建立一种具有辅助诊断价值的慢阻肺患者影像表型的鉴别诊断方法。方法:纳入上海市同济医院的 COPD 受试者 429 例,及上海长征医院的 COPD 受试者 426 例,根据胸部 CT 影像中支气管管壁增厚情况和肺气肿程度分为 A、E、M 型;上海市同济医院 COPD 患者共分为 A 型(304 例)、E 型(70 例)、M 型(55 例),上海长征医院 COPD 患者共分为 A 型(337 例)、E 型(61 例)、M 型(28 例)。使用 U-Net 模型对肺野区域图像进行截取,将影像表型预测问题归纳为多标签分类问题,运用 CNN 算法进行自动识别,对参数设置及模型对比,并在数据集上进行比较实验。结果:实验结果表明,CNN 算法在 AEM 影像表型的分类任务中可达到 0.86 的准确率,说明该算法能够较好地 COPD 影像表型进行识别。结论:本研究基于卷积神经网络算法建立的诊断模型能有效鉴别 COPD 影像表型,为将来影像表型诊断及个性化治疗提供参考价值。

PU-1934

STEMI 直接 PCI 术后微血管阻塞的危险因素分析

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目的 探讨 ST 段抬高型心肌梗死 (STEMI) 直接经皮冠状动脉介入治疗 (PCI) 术后出现微血管阻塞 (MVO) 的危险因素。

材料与方法 回顾性分析 2021 年 2 月至 2022 年 6 月本胸痛中心成功行 PCI 术并于 PCI 术后 1 周内完成心脏核磁共振检查 (CMR) 的 STEMI 患者, 共 165 例。完整记录患者救治的重要时间节点: 出现症状至导丝通过责任血管时间 (symptom onset to wire, S2W), 即心肌缺血时间, 首次医疗接触至导丝通过责任血管的时间 (first medical contact to wire, FMC2W), 到达 PCI 医院大门至导丝通过的时间 (door to wire, D2W), 以分钟 (min) 为单位。通过 CMR 电影序列评价左心室功能, 通过钆延迟增强 (LGE) 序列评价心肌梗死特征及 MVO。采用二元 Logistic 回归分析评估 STEMI 直接 PCI 术后发生 MVO 的危险因素。

结果 本研究中 89 例 (53.9%) STEMI 患者直接 PCI 术后出现 MVO。MVO (+) 组的 FMC2W 时间和 S2W 时间均显著长于 MVO (-) 组 ($P < 0.05$)。相对于 MVO (-) 组, MVO (+) 组心肌梗死面积 (IS) 较高, 左室射血分数较低 ($P < 0.05$)。FMC2W 时间延迟组及 S2W 时间延迟组 IS 和 MVO 范围均大于非延迟组 ($P < 0.05$)。Logistic 回归分析显示, S2W 时间 > 300 min [$P = 0.039$, $OR = 2.756$, $95\% \text{ CI} = 1.053-7.213$] 是 STEMI 患者直接 PCI 术后发生 MVO 的独立预测因素。

结论 (1) 直接 PCI 术后 MVO (+) 组 STEMI 患者, IS 较大, 心肌酶水平较高, 提示心肌损伤更严重。(2) FMC2W 时间延迟组及 S2W 时间延迟组, STEMI 患者 IS 及 MVO 范围较大, 左室射血分数较低。(3) S2W 时间 > 300 min 是 STEMI 直接 PCI 术后出现 MVO 的独立预测因素。

PU-1935

腹部内脏脂肪组织 CT 衰减与冠状动脉狭窄程度的相关性研究

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目的: 探讨冠心病患者腹部内脏脂肪组织 CT 衰减与冠状动脉狭窄程度的相关性。**方法:** 收集我院经冠状动脉 CT 血管成像发现有冠状动脉狭窄的住院患者 197 例, 将患者分为血管轻度狭窄 $< 50\%$ 组、血管中重度狭窄 $\geq 50\%$ 组, 利用腹部 CT 图像测量患者 L3-L4 水平腹部内脏脂肪面积 (VAT area)、腹部内脏脂肪 CT 衰减 (VAT CT attenuation), 初步分析 VAT area、VAT CT attenuation 与患者一般资料及冠状动脉狭窄程度的关系, 最后利用受试者工作特征曲线 (ROC 曲线) 评估 VAT area、VAT CT attenuation 对冠状动脉中重度狭窄程度预测的诊断效能。**结果:** 冠状动脉不同狭窄组比较发现年龄、BMI、LDL、CRP、糖尿病史、VAT area、VAT CT attenuation 差异有统计学意义; 对年龄、BMI、LDL、CRP、VAT area、VAT CT attenuation 与冠状动脉狭窄程度做 Spearman 相关性分析发现, 冠脉狭窄程度与年龄 ($r = 0.310$)、BMI ($r = 0.161$)、糖尿病史 ($r = 0.214$)、VAT area ($r = 0.411$) 均呈正相关, 与 VAT CT attenuation ($r = -0.472$) 呈负相关。对 VAT area、VAT CT attenuation 做 ROC 曲线分析发现 VAT area、VAT CT attenuation 对冠状动脉中重度狭窄预测的曲线下面积分别是 0.737、0.772, 敏感度分别为 72.7%、75.8%, 特异度 62.2%、63.3%。**结论:** VAT area、VAT CT attenuation 能够从数量和质量两个方面较全面地评价腹部内脏脂肪, 对于冠状动脉中重度狭窄均具有一定的预测价值。

PU-1936

心脏磁共振特征追踪技术定量评价 COPD 患者左心室功能异常的初步研究

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目的：探讨心脏磁共振特征追踪（CMR-FT）技术定量评价 COPD 患者亚临床期左心室整体及各节段期心肌损伤的可行性。

方法：收集我院 2020 年 12 月~2022 年 12 月期间符合纳入及排除标准的 COPD 患者 47 例，其中男性 25 例，女性 22 例，平均年龄 47.26 ± 4.66 岁；同时纳入正常对照组 30 例，男性 17 例，女性 13 例，平均年龄 47.47 ± 4.42 岁。所有纳入者均行 3.0 T CMR 检查，分析 COPD 组与正常对照组左心室常规心功能、整体及节段心肌各方向（径向、周向及纵向）峰值应变（Peak strain, PS）间的差异。

结果：COPD 组左心室整体及中间段、基底段各方向（径向、周向及纵向）PS 均低于正常对照组（all $P < 0.001$ ），心尖段径向及纵向 PS 较正常对照组显著减低，心尖段周向 PS 未见明显差异（all $P = 0.268$ ）。

结论：CMR-FT 可定量评价心功能正常 COPD 患者的左心室整体及局部心肌应变异常，有望为疾病早期诊断及预后评价提供影像学依据。

PU-1937

肺充气状态与亚实性肺结节 CT 定量参数的相关性研究

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目的：探讨肺充气状态对亚实性肺结节 CT 定量参数的影响，建立亚实性肺结节 CT 定量参数是否随肺充气状态变化的预测模型。

材料和方法：回顾性纳入 2018 年 8 月至 2021 年 7 月在我院同时行低剂量双气相（吸气相和呼气相）胸部 CT 的 230 名患者，共计 255 个亚实性肺结节。获取患者双气相 CT 图像中的肺定量参数（肺体积和肺密度）和结节定量参数（结节长轴直径、短轴直径、平均直径、表面积、体积和密度），计算定量参数变化率 = $\frac{\text{（呼气相定量参数}-\text{吸气相定量参数）}}{\text{吸气相定量参数}}$ 。将结节定量参数分为吸气相组和呼气相组，比较各定量参数在组间的统计学差异。比较结节定量参数变化率之间的差异。为了探讨肺充气状态变化导致的结节定量参数变化是否会影响随访过程中结节生长的判断，根据随访指南中结节是否生长的标准，将结节分为结节定量参数变化达到随访生长标准组（变化组）和未达到随访生长标准组（无变化组），比较各定量参数和定量参数变化率在两组间的统计学差异。应用 logistic 回归对亚实性肺结节是否变化的可能相关因素进行分析并建立亚实性肺结节定量参数是否随肺充气状态变化的预测模型。

结果：所有肺定量参数和结节定量参数在吸气相组和呼气相组间均存在统计学差异（ P 均 < 0.05 ），结节定量参数中，长轴直径变化率（7.14%）最小，体积变化率（20.21%）最大。肺体积变化率、结节长轴直径变化率、结节密度变化率和所有吸气相结节定量参数在变化组和无变化组间均存在统计学差异（ P 均 < 0.05 ）。logistic 回归分析结果显示肺体积变化率、吸气相结节长轴直径、短轴直径、表面积、体积和密度是亚实性肺结节是否随肺充气状态变化的独立预测因素。用 ROC 曲线检测模型预测效力，AUC 为 0.926。

结论：亚实性肺结节体积对肺充气状态变化最敏感，由肺体积变化率和多个亚实性肺结节 CT 定量参数构建的预测亚实性肺结节定量参数是否随肺充气状态变化的模型效能较好。

PU-1938

联合临床与影像特征预测肺癌合并 COPD 的模型构建及效能评价研究

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目的：本研究旨在探索肺癌患者的 CT 影像特征与临床特征是否具有鉴别慢性阻塞性肺疾病(COPD)的潜力，并且进一步开发和验证不同的诊断列线图来预测肺癌是否共患 COPD。

方法：回顾性分析了来自两个医院的 498 例肺癌患者(COPD 组 280 例，非 COPD 组 218 例；训练队列 349 例，验证队列 149 例)。我们评估了 5 项临床特征和 20 项 CT 形态学特征。使用秩和检验或 t 检验以及卡方检验评估 COPD 组和非 COPD 组之间所有变量的差异。采用多因素 logistic 回归分析建立 COPD 诊断模型，包括临床列线图、影像学列线图和联合列线图。采用 ROC 曲线评估和比较各个列线图的性能，并采用决策曲线分析评估列线图的临床应用价值。

结果：年龄、性别、瘤-肺界面、支气管截断征、棘状突起征、毛刺征是肺癌患者合并 COPD 的独立预测因素。在训练集和验证集中，临床列线图对肺癌患者合并 COPD 均表现出良好的预测性能[AUC 分别为 0.807 (95% CI, 0.761 ~ 0.854)和 0.753 (95% CI, 0.674 ~ 0.832)]；影像学列线图的效能略提升，AUC 分别为 0.814 (95% CI, 0.770 ~ 0.858)和 0.780 (95% CI, 0.705 ~ 0.856)。在训练集和验证集中，融合临床特征和影像学特征构建的联合列线图的性能进一步提高(AUC 分别为 0.863 [95% CI, 0.824 ~ 0.903]、0.811 [95% CI, 0.742 ~ 0.880])。决策曲线显示联合列线图的总体净效益高于其他列线图。

结论：联合临床特征和影像学特征构建的列线图优于临床列线图和影像学列线图；这为一站式 CT 扫描检测肺癌患者合并 COPD 提供了一种便捷的方法。

PU-1939

周围型实性肺癌的 CT 进展规律及其体积倍增时间的影响因素分析

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目的 探讨周围型实性肺癌(peripheral solid lung cancer, PSLC)的 CT 进展规律及其体积倍增时间的影响因素。

方法 收集我院 80 例(共行 202 次 CT 扫描，检出 202 个肺结节或肿块)在 CT 随访过程中出现进展的 PSLC 患者，根据肿瘤直径分为以下 4 组：A 组，直径 $\leq 8\text{mm}$ ；B 组， $8\text{mm} < \text{直径} \leq 15\text{mm}$ ；C 组， $15\text{mm} < \text{直径} \leq 30\text{mm}$ ，D 组，直径 $> 30\text{mm}$ ，比较 4 组肿瘤 CT 征象的差异；同时测量并计算肿瘤在不同随访时间的体积倍增时间(volume doubling time, VDT)，比较不同临床、病理及 CT 特征间 VDT 的差异。

结果 从 CT 进展规律来看，直径 $\leq 8\text{mm}$ 与 $> 8\text{mm}$ PSLC 的 CT 征象存在显著差异，随着肿瘤增大，分叶数量逐渐增多，分叶程度逐渐加深，毛刺征、含气腔隙、灶周纤维化、胸膜凹陷征、血管集束征、支气管截断征、淋巴结增大及胸腔积液的发生率逐渐增高(P 均 < 0.05)。从 VDT 的影响因素来看，腺癌的 VDT 显著长于鳞癌和大细胞肺癌；女性患者肿瘤的 VDT 长于男性； $\leq 8\text{mm}$ 肿瘤的 VDT 长于 $> 15\text{mm}$ 者；有血管集束征和充气支气管征的肿瘤具有更长的 VDT(P 均 < 0.05)。

结论 不同大小的 PSLC 具有不同的 CT 特征，肿瘤越大，CT 恶性征象越多，诊断亦越容易；肿瘤越小，CT 恶性征象越少，诊断亦越困难。同时，肿瘤 VDT 与病理类型、患者性别、肿瘤大小、是

否存在血管束征和充气支气管征有关。熟悉 PSLC 的 CT 进展规律及其 VDT 的影响因素有助于肿瘤的早期定性诊断,改善患者预后。

PU-1940

不同触发阈值对减轻上腔静脉伪影影响的对比研究

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目的 探讨普通胸部 CT 增强不同触发阈值选择上腔静脉强化幅度的差异,获取避免上腔静脉伪影干扰的最佳触发阈值。**方法** 选择 2022 年 5 月至 2023 年 3 月重庆医科大学附属第一医院行多排螺旋 CT 胸部增强检查患者 300 例(BMI23~26, 体重 50~75kg, 排除心功能不良)。设备为 GE Discovery 64 排螺旋 CT, 对比剂选用 320mgI/mL (碘佛醇), 常规进行胸部 CT 平扫后选择对比剂智能追踪/实时增强监测法完成胸部 CT 增强检查: 碘总量按 320mgI/kg 体重计算, 对比剂维持注射时间设计为 20s, 生理盐水维持注射时间设计为 10s (25~40mL), 注射速率均为: 2.5~3.7mL/s, 监测气管分叉层面下 1cm 的降主动脉主干, 注射对比剂 12s 后开始监测, 根据选择的触发阈值不同分为 A、B、C 三组, 3 组触发阈值分别设置为 120HU、150HU、180HU, 每组均为 100 例, 扫描完成后分别测量气管分叉层面下 1cm 的上腔静脉、右肺动脉主干、降主动脉 CT 值, 并计算各组各血管测量平均值。**结果** 三组病例的上腔静脉 CT 值分别为: 613.42 ± 30.53 HU, 457.21 ± 15.29 HU, 272.43 ± 11.87 HU; 右肺动脉主干 CT 值分别为: 352.44 ± 17.27 HU, 273.62 ± 13.36 HU, 191.58 ± 8.47 HU; 降主动脉 CT 值分别为 287.42 ± 10.35 HU, 322.53 ± 11.28 HU, 279.62 ± 8.73 HU。**结论** 对比 3 组各血管测量平均值, 选择触发阈值 180HU 完成胸部 CT 增强检查, 上腔静脉强化幅度更低, 伪影干扰较小, 降主动脉强化幅度趋于平稳, 能提供病灶与周围组织的较好强化对比。

PU-1941

体-肺分流伪影的临床预测模型

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目的: 构建和评估疑诊 PE 患者中 S-PSA 的临床预测模型, 以方便临床工作中选择合适的 CTPA 检查方案。

方法: 本研究连续搜集 1355 例 2021 年 1 月- 12 月我院因疑诊 PE 而行 DP-CTPA 检查患者, 其中 S-PSA 患者 152 例, 非 S-PSA 患者 1203 例, 按 CT 检查时间分为训练集 (1006 例) 及验证集 (349 例)。基于多因素 logistics 回归模型得到的 S-PSA 独立预测因子建立列线图评分体系, 计算 C 指数并绘制校准曲线和决策曲线对模型进行评价。

结果: 经单因素 logistic 分析显示, 胸痛、咳血、D-二聚体升高、支气管扩张与 S-PSA 相关 ($P < 0.05$), 多因素 logistic 分析显示胸痛、咳血、D-二聚体升高、支气管扩张、肺部感染是预测 S-PSA 的独立预测因子。预测 S-PSA 的列线图显示在训练和验证集中一致性和校准能力可以接受。**结论:** 胸痛、咳血、D-二聚体升高、支气管扩张、肺部感染是疑诊 PE 患者 S-PSA 的独立预测因子, 基于独立预测因子建立的 S-PSA 列线图预测模型在单中心验证中显示具有应用价值。

PU-1942

动态增强 MRI 半定量分析及 DWI 在肺内空洞性病变鉴别诊断中的价值

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目的 探讨动态增强磁共振成像(DCE-MRI)半定量分析及扩散加权成像(DWI)在肺内空洞性病变良恶性鉴别诊断中的价值。**方法** 回顾性分析 42 例经病理及临床证实的肺内单发空洞性病变,其中良性空洞 15 例,恶性空洞 27 例,行 DCE-MRI 及 DWI 检查,计算达峰时间(TTP)、半峰时间(THR)、最大增强幅度(MRE)、最大斜率(MS)、首过 60 s 曲线下面积(IAUC60)、廓清率(WOR)及早期强化率(EWIR)等半定量参数,分析 MRI 征象及半定量参数对良恶性空洞的诊断效能。**结果** 良恶性空洞平均直径、壁厚、空洞内壁形态、空洞壁 T1WI 信号、洞壁时间信号强度曲线(TIC)及空洞内容物、内部 T1WI、T2WI、DWI、表观扩散系数(ADC)信号组间差异有统计学意义(P 值均 < 0.05)。半定量参数分析显示 TTP、MS 和 IAUC60 两组间差异均有统计学意义(P 值均 < 0.05)。**结论** DCE-MRI 半定量分析及 DWI 对肺内良恶性空洞性病变的鉴别诊断具有一定的临床应用价值。

PU-1943

光谱 CT 多参数成像肺部肿瘤 介入穿刺靶点的精准选择

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目的: 通过光谱 CT 的多参数成像制定肺穿刺介入手术的计划,进而提高介入穿刺活检的安全性和准确性。**方法:** 选取二十名预行肺穿刺的患者,用光谱 CT 进行增强扫描。一次扫描可以获得常规 CT 图像、Mono E 图像(包括 40~200ke V 共 161 个能级)、Zeff 图、碘密度图、无水碘图等多个成像参数进行病变定量的鉴别诊断。通过各期图像中的碘密度定量测量,区分病变内部不同成分:血供丰富的成分(动脉期、静脉期),血供欠丰富成分(动脉期、静脉期)。肿瘤组织的碘密度一般在 2mg/ml 以下,对于碘密度过高的区域意味着血供非常丰富,穿刺后极易引起出血。对于肺内占位性病变而言:如果是病灶中央碘密度值特别低,接近 0mg/ml,则判定为坏死成分,那就应该对病灶边缘,也就是碘密度值比较高的区域进行穿刺。但如果病灶边缘区域碘密度值特别高,则提示局部血供非常丰富,有可能是阻塞性肺炎,也有可能是富血供的肿瘤成分。肺内多发病灶,寻找同源性病变,选择穿刺病灶。通过对光谱 CT 多参数的回顾性分析来确定穿刺计划。**结果:** 10 例肺部较大肿瘤的患者,避开病变区坏死、炎性和钙化等成分部位,穿刺点选取肿瘤实质成分。5 例肺部肿瘤密度较均匀的患者,避开了病灶血供较丰富的区域。3 例肺部多发病灶的患者,寻找同源性病变确定二处穿刺点。另外二名患者配合不好,穿刺未成功。穿刺手术成功率 90%,经病理随访 1 例患者结果待确定,病灶穿刺准确率达 94%。**结论:** 光谱 CT 增强检查得到的多参数成像可以提高肿瘤病灶检出,明确肿瘤内的不同成分,寻找到同源性病变,明确肺部肿瘤并阻塞性病变,为肺部肿瘤的介入穿刺手术提高精准的穿刺靶点,制定准确的穿刺手术计划,增加介入穿刺活检手术的安全性和准确性,同时也减少了患者的痛苦,提升了手术医师的信心,提高了工作效率。

PU-1944

基于不同对比剂注射方式在胸痛三联征双源 CT 成像中的对比研究

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目的 探讨联合改变对比剂注射方式与团注追踪法中感兴趣区 (Region of interest, ROI) 位置在双源 CT 胸痛三联征检查 (triple-rule-out computed tomography angiography, TRO-CTA) 中的应用价值。**方法** 选取我院胸痛中心 2020 年 12 月~2021 年 12 月收治以胸痛、胸闷、呼吸困难为主要临床表现并结合相应临床症状及检验指标高度怀疑胸痛三联征 (Triple-rule-out, TRO) 的患者进行 TRO-CTA 检查, 最终入组的 298 例患者随机分配到传统组 100 人、改良组 96 人和 FLASH 组 102 人。对比分析三组检查主动脉、肺动脉和冠状动脉的 CT 值、显影段数、图像噪声(noise)、信噪比 (signal to noise ratio, SNR)、对比噪声比(contrast noise ratio, CNR)、影像评分、对比剂用量、对比剂速率以及辐射剂量。**结果** 三组检查的主动脉、肺动脉和冠状动脉的图像噪声、SNR、CNR 和显影段数组间差异均无统计学意义 ($P > 0.05$), 但三组检查的辐射剂量、对比剂用量、注射速率以及主动脉、肺动脉和冠状动脉的 CT 值、影像评分组间差异有统计学意义 ($P < 0.05$)。

结论 在保证图像质量满足 TRO-CTA 影像诊断的前提下, 对比剂改良法通过改变对比剂注射速率并将 ROI 兴趣区置于肺动脉主干, 对比剂用量较传统法减少了近 30ml; 使用第二代 DSCT 中的 FLASH 扫描模式在使用少量对比剂的同时, 既可获得 TRO-CTA 的标准影像, 又可显著降低 TRO-CTA 检查产生的辐射剂量。

PU-1945

新冠疫苗在接种前后感染新冠肺炎临床及 CT 特征分析

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[摘要]**目的:** 探讨境外输入性新型冠状病毒肺炎 (接种疫苗组) 与本地病例 (未接种疫苗组) 的临床及胸部 CT 表现差异。**方法:** 回顾性分析武汉火神山医院确诊 COVID-2019 患者 65 例 (未接种疫苗组) 及 2021 年 9 月 1 日-2021 年 9 月 30 日在后我院确诊境外输入 COVID-2019 患者 75 例 (接种疫苗组), 比较两组临床资料及胸部 CT 征象差异。**结果:** ①临床资料及实验室检查: 两组 COVID-19 病例临床症状及体征差异均有统计学意义 ($P < 0.05$); 白细胞升高及正常的人数在两组 COVID-19 病例间存在显著组间差异 ($P < 0.05$); 淋巴细胞正常及下降的人数在两组 COVID-19 病例间存在显著组间差异 ($P < 0.05$); 血沉升高的人数在两组之间有统计学意义 ($P < 0.05$), 余相关实验室检查在两组之间均无统计学意义 ($P > 0.05$)。②临床分型: 有症状感染者临床分型中重型在两组 COVID-19 病例间存在组间差异, 而轻型与普通型发生率不存在组间差异, 差异有统计学意义 ($P < 0.05$), 两组 COVID-19 病例在普通型和重型病例预后评估上差异无统计学意义 ($P > 0.05$)。无症状感染者两组病例间差异有统计学意义 ($P < 0.05$)。③CT 影像特征: 2 组 COVID-19 病例从病灶形态学分析, 结节型出现率差异无统计学意义 ($P > 0.05$)。有无胸腔积液/心包积液出现在间无统计学意义 ($P > 0.05$)。余 2 组 COVID-19 病例在累及肺叶总数、病灶分布情况、病灶形态、病灶密度、病变征象及有无肺外表现的差异均有统计学意义 ($P < 0.05$)。**结论:** 2 组 COVID-19 病例在临床资料、实验室检查及 CT 特征有一定差异, 通过胸部 CT 表现能够反映新冠疫苗有预防 COVID-2019 的作用, 体内产生保护性抗体在一定程度上可以减缓肺部病变发生及进展。

PU-1946

光谱 CT 在周围型肺动脉栓塞中的价值

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目的 探讨光谱 CT 成像在周围型肺动脉栓塞中的诊断价值。

方法 回顾性分析本院 2022 年 1 月至 12 月临床怀疑肺动脉栓塞的 186 例患者，所有患者均接受光谱 CT 扫描，重建得到常规及光谱图像（最佳单能量图、碘密度图及有效原子序数图），结合临床最终确诊结果，比较图像中外周型肺动脉栓塞的最终确诊结果，同时分析肺灌注缺损区域与相应正常肺实质区域的碘密度值差异以及有效原子序数值差异。

结果 分析经临床确诊周围型肺动脉栓塞的 36 例患者，发现光谱 CT 图像的诊断效能较常规 CTPA 图像高，碘密度图及有效原子序数图对外周型肺动脉栓塞的检出率较常规 CTPA 图像有优势。

结论 能谱 CT 成像能有效提高周围型肺动脉栓塞的检出率。

PU-1947

基于多层螺旋计算机体层摄影影像组学预测 COPD 早期急性加重的新型列线图

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【摘要】

目的：研究基于多层螺旋计算机体层摄影（MDCT）的影像组学列线图，用于预测慢性阻塞性肺疾病（COPD）的早期急性加重。方法：将 210 名 COPD 患者分为两组：训练组（ $n = 146$ ）和验证组（ $n = 64$ ）。根据 COPD 患者 1 年内发生急性加重次数，将 COPD 患者分为易发生急性加重的 COPD（PAECOPD）患者组和较稳定的 COPD（SCOPD）患者组。采用 3D Slicer 软件进行特征提取，从未增强 MDCT 图像中提取主动脉弓上方层面胸肌影像组学特征。采用最小绝对收缩率和选择算子逻辑回归计算影像组学评分，生成影像组学特征并建立影像组学模型。采用单因素和多因素 logistic 回归分析，确定与 COPD 患者急性加重显著相关的临床因素，并构建临床模型。结合临床模型和影像组学特征构建了影像组学列线图。从识别能力、准确性和临床价值等方面对 3 个模型的性能进行了综合评估，从而生成了最优预测模型。结果：从胸肌采集图像中选择 12 个最佳特征进行建模。胸肌面积（PMA）、胸肌密度（PMD）、(1)慢性阻塞性肺病全球倡议（GOLD）分级和影像组学评分（Radscore）是 COPD 患者急性加重风险的独立预测指标。这些因素用于构建列线图模型，该模型在训练和验证组中表现出良好的表现，曲线下面积分别为 0.932 和 0.896。曲线下面积和决策曲线分析表明，与单独的临床和影像组学特征模型相比，影像组学列线图模型可以获得更好的诊断性能并获得更大的临床净收益。结论：我们构建了一个包含临床模型和影像学特征的组合列线图，作为预测 COPD 早期急性加重的新方法。

PU-1948

Non-contrast CT-based radiomics nomogram of pericoronary adipose tissue for predicting haemodynamically significant coronary stenosis in patients with type 2 diabetes

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Background Type 2 diabetes mellitus (T2DM) patients have a higher incidence of coronary artery disease than the general population. The aim of this study was to develop a radiomics nomogram of pericoronary adipose tissue (PCAT) based on non-contrast CT to predict haemodynamically significant coronary stenosis in T2DM patients. **Methods** The study enrolled 215 T2DM patients who underwent non-contrast CT and coronary computed tomography angiography (CCTA). CCTA derived fractional flow reserve (FFR_{CT}) ≤ 0.80 was defined as hemodynamically significant stenosis. 1691 radiomics features were extracted from PCAT on non-contrast CT. Minimum redundancy maximum relevance (mRMR) and least absolute shrinkage and selection operator (LASSO) were used to select useful radiomics features to construct Radscore. Logistic regression was applied to select significant factors among Radscore, fat attenuation index (FAI) and coronary artery calcium score (CACS) to construct radiomics nomogram. **Results** Radscore [odds ratio (OR)=2.84; P<0.001] and CACS (OR=1.00; P=0.023) were identified as independent predictors to construct the radiomics nomogram. The radiomics nomogram showed excellent performance [training cohort: area under the curve (AUC)=0.81; 95% CI: 0.76–0.86; validation cohort: AUC=0.83; 95% CI: 0.76–0.90] to predict haemodynamically significant coronary stenosis in patients with T2DM. Decision curve analysis demonstrated high clinical value of the radiomics nomogram. **Conclusion** The non-contrast CT-based radiomics nomogram of PCAT could effectively predict haemodynamically significant coronary stenosis in patients with T2DM, which might be a potential noninvasive tool for screening of high-risk patients.

PU-1949

基于机器学习的随机森林算法预测冠心病患者主要不良心脏事件的应用研究

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目的 探讨基于影像和临床特征构建的机器学习模型对冠状动脉粥样硬化性心脏病 (CAD) 患者发生主要不良心脏事件 (MACE) 的预测价值。 **方法** 回顾性收集行冠状动脉 CT 血管造影 (CCTA) 检查且结果显示至少一支冠状动脉狭窄程度为 50%-90% 的 120 例冠心病患者, 随访 MACE 发生情况。选取 16 个临床和影像特征作为模型输入变量, 以 MACE 事件发生有无作为二分类输出变量。采用机器学习的随机森林算法和传统逻辑回归方法构建模型。采用受试者操作特征曲线下面积评估两种模型对 CAD 患者发生 MACE 的预测效能。对机器学习预测模型的 16 个特征进行重要度排序。 **结果** 机器学习模型的诊断效能明显优于传统逻辑回归模型, 其敏感度为 0.82、特异度为 0.92 和曲线下面积 (AUC) 为 0.94。提取的影像学特征按照预测效能排序, 前五位依次为 CT-FFR (0.33)、FAI (0.18)、狭窄程度 (0.15)、年龄 (0.10)、高血脂 (0.04)。 **结论** 基于临床和影像特征建立的机器学习模型具有良好的诊断效能, 有利于临床对 CAD 患者进行危险分层, 从而筛选出高危患者并及时干预对减少 MACE 事件的发生具有重要意义。

PU-1950

基于 MR T2-fBLADE-TSE 图像特征构建 Nomogram 模型评估非小细胞肺癌病理亚型的研究

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目的：基于 MR T2-fBLADE-TSE 序列成像，采用影像组学的分析方法，构建 Nomogram 模型术前评估非小细胞肺癌的病理亚型。

方法：回顾性分析经病理证实的非小细胞肺癌患者。由两名高年资医师分别独立完成病变的影像学征象评估，并对结果行一致性检验。随机抽取 30 例患者，两名医师独立使用 ITK-Snap 软件分割病灶，4 周后其中一名医师重复分割工作，分别提取特征计算组内相关系数。采用分层随机抽样将数据划分为训练集和测试集（7：3）。使用 R 语言对训练集特征进行筛选，得到关键特征并计算其影像组学评分。使用单因素和多因素 logistic 回归，筛选独立危险因素，并构建预测肺腺癌的 Nomogram 模型。使用 ROC 曲线、校准曲线和 DCA 曲线，评估影像 Nomogram 模型在评估非小细胞肺癌病理亚型中的准确度、校准度和临床有效性。

结果：本研究共纳入 83 例腺癌和 34 例鳞癌患者，两名医师对病灶的影像学征象判读及病灶勾画的一致性良好。训练集中患者性别、毛刺征、胸膜凹陷征在腺癌和鳞癌组间的差异具有统计学意义（ $P<0.05$ ）。Lasso 算法选择了 9 个关键特征并用于计算影像组学评分，多因素 logistic 回归结果显示，性别（OR: 9.411, $P=0.020$ ）和影像组学评分（OR: 2.788, $P<0.001$ ）是预测非小细胞肺癌的独立危险因素，并根据结果构建评估肺腺癌风险分层的 Nomogram 模型。通过内部验证，Nomogram 模型在训练集 C-指数为：0.899，测试集 C-指数为：0.768，校准曲线显示模型校准度良好，临床决策曲线表明，相较于单独使用影像组学模型，列线图为患者提供了更多获益。

结论：基于 MR T2-fBLADE-TSE 图像特征构建的 Nomogram 模型，能够量化非小细胞肺癌为肺腺癌的风险，相比较单一预测因素，Nomogram 模型的诊断效能更高可作为肺癌诊断和治疗的无创性影像生物学标志。

PU-1951

The relationship between pulmonary artery imaging quality and cardiothoracic ratio based on dual-source CT

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Purpose: In order to investigate the correlation between the cardiothoracic ratio and imaging quality of the pulmonary arteries, we collected the data of patients by computed tomography pulmonary artery.

Materials and Methods: A total of 20 patients undergoing pulmonary artery examination in PACS were collected, including 10 male patients and 10 female patients. The age range of the participants was 36~83 years old, and the average age was 57 years old. The scanning scheme was as follows: the tube voltage was 100kV, the tube current was 148mAs, the pitch was 2.0, and the superior vena cava illumination was used to trigger the scan. The quality evaluation of images was based on CT value measurement of key points and blinded scoring, and the measurement of CT value mainly focused on measuring pulmonary trunk, left pulmonary artery and right pulmonary artery. Secondly, the cardiothoracic ratio was calculated by dividing the maximum diameter of the heart by the maximum diameter of the thoracic cage. Two senior vascular diagnosticians in the department scored the scanned images double-blind, and the scores were divided into five levels: 1~5 points, the image quality increased in turn, and the pulmonary arteries

at all levels showed clearly. Finally, the correlation between the scores of image quality and the CT value of interesting points and the cardiothoracic ratio was carried out.

Results: The Pearson correlation coefficient between the blinded score of pulmonary artery images and the cardiothoracic ratio was -0.6109 ($P < 0.05$), and the CT values of the pulmonary trunk, left pulmonary artery, and right pulmonary artery were not significantly correlated with the cardiothoracic ratio.

Conclusion: There was a significant correlation between the examiner's cardiothoracic ratio and the quality of imaging of the pulmonary arteries.

PU-1952

基于深度学习模型对新型冠状病毒肺炎的定量 CT 研究

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目的: 探讨深度学习模型在新型冠状病毒肺炎的诊断、病情评估及与非新冠肺炎的鉴别诊断价值。方法: 回顾性分析 2020 年 1 月到 2020 年 2 月之间南京大学医学院附属鼓楼医院确诊的 9 例普通型新型冠状病毒肺炎 (COVID-19) 患者 (COVID-19 组, 新冠组) 及 25 例非新冠肺炎患者 (CAP 组, 非新冠组) 的胸部 CT 扫描图像和临床资料, 通过深度学习分割及人工校正方法进行图像分割, 分割内容包括感染肺叶数、感染体积及其在肺部总体积中的占比等参数。分析两组患者的临床表现和实验室结果, 比较两组患者的深度学习分割结果的差异。感染体积在肺部体积总占比及其在位置上的分布情况以平均值以及 95% 置信区间显示; 两组之间感染肺叶数的比较采用 Fisher 确切概率法, 两组之间肺炎病灶占整肺体积百分比之间的比较采用 Mann-Whitney U 检验 (非正态分布)。结果: 采用深度学习分割方法可以对两组所有肺炎患者进行快速图像分割, 平均分割时间为 10s/例。新冠组与非新冠组在白细胞及淋巴细胞计数具有统计学差异 ($P < 0.05$)。与非新冠组相比, 普通型新冠肺炎组中的感染肺叶数显著少于非新冠组 (2.11 vs. 3.24, $p < 0.05$), 感染肺叶数与感染病变的分布及位置无显著差异; 感染总体积占比在两组间无显著性差异。结论: 深度学习分割的方法能够迅速进行肺炎整体病灶的自动分割, 定量评估病变范围, 与非新冠肺炎也具有一定的鉴别诊断价值, 为研究新冠肺炎提供了一种 CT 的定量方法。

PU-1953

“人磨”大战的研究思考

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材料 抽取 182 例患者 195 枚磨玻璃结节术后病理报告 (又称金标准), 选取其中五个临床参数, 随后将其导入 AI 软件系统, 依次与经病理证实过的 CT 片重新诊断, 选取 AI 诊断报告中七个临床参数。方法 使用 SPSS 23.0 进行统计学分析。以表示为服从正态分布的连续变量, 以中位数 (25th-75th) 表示不服从正态分布的连续变量; 以频数 (%) 表示计数资料。采用 wilcoxon 符号秩和检验比较连续变量组间差异, 分类变量组间差异比较采用 McNemar 检验。变量的关联性检验采用 spear 秩相关或 kappa 一致性检验。采用有序 logistic 回归建立不同类型磨玻璃结节预测模型。绘制风险指数的受试者特征 (ROC) 曲线评价指标的诊断能力。P<0.05 表示具有统计学意义。结论 (1) 所患磨玻璃结节男女构成比没有差异, 3 类磨玻璃结节年龄的组间构成比存在差异, 相比于 AAH+AIS 组患者, MIA 组和 IA 组患者年龄结构比偏大。(2) AI 在肺结节诊断方面, 结节位置准确率在 86.67%, 恶性风险准确率 69.23%, Lung-RADS 分级准确率 62.54%。恶性风险概率

(%) 与 lung-rads 分类对 AAH+AIS、MIA、IA 有预测作用。但总体而言,人工智能对肺部磨玻璃结节的准确率相对较低。

PU-1954

右心室流出道粘液瘤 1 例

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摘要:目的 报道 1 例具有非典型影像学特征的右心室流出道粘液瘤。方法 应用经胸超声心动图、CT 冠状动脉造影进行心脏肿瘤术前诊断。结果 超声心动图表现为右心室及流出道可探及多个不规则低回声团块,呈串珠样,团块内可见点状钙化,团块有蒂,蒂附着点探查不清,团块活动度较大,可达肺动脉瓣。CT 冠状动脉造影显示右室及流出道有不规则的充盈缺损,内伴斑点状钙化。术中病理证实右心室流出道粘液瘤的诊断。结论 该病例说明了建立心脏肿瘤正确病因学诊断的困难,尤其当肿物位于右心室时,仍然需要组织病理学确诊。发现右心室粘液瘤时,应采取多模态成像进行心脏肿瘤术前诊断。

PU-1955

GE Revolution CT 在高心率 (HR) 患者冠状动脉 CTA (CCTA) 检查中的应用价值分析

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目的:探讨 256 排 GE Revolution CT 在高心率患者冠状动脉 CTA 检查中的应用价值。**方法:**收集在我院拟行冠状动脉 CTA 检查且 HR 大于等于 80 次/分钟的患者 50 例为研究对象,随机分组: A 组 25 例采用传统的前瞻性心电门控采集模式,曝光时间窗 (R-R 间期的 35%~85%); B 组 25 例采用 256 排 GE Revolution CT 所自带的 1-Beat 扫描模式采集数据。扫描参数: 120kV, SmartmA325-720,重建层厚 0.625mm,记录扫描后平均容积 CT 剂量指数(CTDIVOL)和剂量长度乘积 (DLP),计算有效辐射剂量 (ED)。将扫描后得到的图像进行后处理,由两位高年资诊断专家对图像质量进行评分,评分标准分为 4 级,4 分:图像质量优,动、静脉系统和 4 个心腔的造影剂密度均匀,组织结构明确,无伪影,图像清晰;3 分:图像质量良好,动、静脉系统和 4 个心腔的造影剂大部分密度对比清楚,无伪影,图像清晰,能明确诊断;2 分:图像质量中等,动、静脉和 4 个心腔的造影剂显影过亮或过淡,组织结构能识别,仅能满足诊断要求。1 分:造影剂充填不良,组织结构无法判断,完全不能满足诊断需求。并随访跟踪冠脉造影结果,加以对照,得出诊断准确率。结果: A 组平均 CTDIVOL 45mGy,平均 DLP714mGy, B 组平均 CTDIVOL 20mGy,平均 DLP300mGy, B 组辐射剂量低于 A 组, $P < 0.05$,具有统计学意义。B 组 23 例图像被评为 4 分,2 例评为 3 分,而 A 组 18 例被评为 3 分,7 例被评为 4 分, $P < 0.05$,具有统计学意义。因此 B 组图像质量更高。通过后期随访冠脉造影结果也证实了 B 组诊断准确率更高。结论: GE Revolution CT 由于 1-Beat 心脏成像技术,辐射剂量较低,减少了患者所受到的辐射,保护了患者的身心健康。而且对于高心率患者能够完成高品质的冠状动脉成像,利于冠脉病变的检出。

PU-1956

Recurrent immune checkpoint inhibitors-related pneumonitis in patients with advanced lung cancer

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Aims: With the wide application of immune checkpoint inhibitors (ICIs) in the field of anti-cancer, immune-related adverse events (irAEs) have attracted widespread concern. As a common adverse event of irAEs, immune checkpoint inhibitors-related pneumonitis (CIP) has a higher incidence rate in patients with lung cancer, which may lead to life-threatening. We investigated a cohort of patients who were diagnosed with recurrent CIP (rCIP) after ICIs therapy to improve our understanding.

Methods: We collected 550 patients with advanced lung cancer who received PD-1/PD-L1 treatment in our hospital from January 1st, 2018 to July 1st, 2022. Patients diagnosed with infections, thoracic radiotherapy, or other etiologies that cause pneumonitis were excluded. We report on cases who were successively diagnosed with CIP and rCIP and summarize their recurrent characteristics by reviewing the medical records and follow-up.

Results: Five patients with rCIP were identified and accounted for 8.6% of CIP. Immunotherapy can cause CIP at any time (from 42 to 559 days) during the treatment period. However, rCIP occurs almost one month after CIP improvement or resolution. Compared with CIP, rCIP usually occurs faster and more seriously, including clinical and imaging manifestations. In addition, every episode of pneumonitis may be present with a similar pattern but possibly involve different regions of the lung. More importantly, continuing or interrupting ICIs therapy may lead to the occurrence of rCIP. And for patients, the corticosteroid treatment must reach the recommended dose, and the tapering process should be slow. In the end, CIP may be associated with long-term survival. The overall survival (OS) of 2 out of 5 cases exceeded 24 months even without any anti-tumor treatment.

Conclusions: This article focuses on rCIP, aiming to provide a reference for clinicians to overcome this challenging toxicity and develop an optimal ICIs treatment plan.

PU-1957

A Study on Differential Diagnosis of Lung Benign Lesions and Early-stage Lung Adenocarcinomas Based on CT Images Deep Learning Technology

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【Objective】 This study aims to explore the clinical application value of deep learning technology in differential diagnosis of lung benign lesions and early-stage adenocarcinomas manifested as ground-glass nodules (GGNs), introduce transfer learning training method, develop and validate a logistic regression model based on clinical features of patients and CT morphological features of nodules, deep learning models based on original CT images of nodules and fusion deep learning models integrating clinical features, CT morphological features and original CT images, and to compare the diagnostic performances of the established diagnostic models with the performances of radiologists on test sets. **【Methods】**

Our study retrospectively analyzed a total of 867 GGNs (benign nodules 112, malignant nodules 755) with postoperative pathological diagnoses from two centers between December 2015 and December 2020. To discriminate between benign lesions and lung adenocarcinomas in GGNs, we constructed 3 different types of automatic diagnostic models based on deep learning methods: a) a logistic regression model based on clinical features of patients and CT morphological

features of nodules (CLRM), b) CT image-based deep learning models (IDM), c) fusion deep learning models (FDM) integrating the original CT images of nodules, clinical features and CT morphological features. We apply transfer learning strategy into the model training process to solve the problem of poor generalization caused by insufficient number of samples, improve the generalization and robustness of models, and improve model performances. The performances of models were evaluated and compared on an internal test dataset and an independent external test dataset. In addition, the diagnostic performances of the automatic diagnostic models were compared with that of a manual control group in which two thoracic radiologists made their own diagnoses respectively on the external test dataset. **【Results】**

The CLRM based on clinical features of patients and CT morphological features of nodules performed well on the internal test set yielding an area under the receiver operating characteristic curve (AUC) value of 0.80 (95% confidence interval [CI]: 0.64, 0.96), however, it performed poorly on the external test set (AUC, 0.62 [95% CI: 0.42, 0.83]), showing a poor stability. The IDM-nonTL and FDM-nonTL which didn't use transfer learning strategy, didn't perform well, achieving AUC values of 0.53 and 0.47 on the internal test set and 0.68 and 0.62 on the external test set. The IDM-TL achieved an appealing diagnostic performance on both the internal and the external test sets (AUC, 0.75 [95% CI: 0.62, 0.89] and 0.76 [95% CI: 0.61, 0.90]). The FDM-TL achieved the best performance on both the internal test set (AUC, 0.82 [95% CI: 0.71, 0.93]) and the external test set (AUC, 0.83 [95% CI: 0.70, 0.96]), showing a good stability, and it achieved a much better specificity (0.69) than the manual control group (0.33 - 0.44) on the external test set.

【Conclusion】

In the deep learning models developed in this study, both IDM-TL and FDM-TL which used transfer learning strategies have the ability to assist radiologists in differentiating benign lesions and early-stage adenocarcinomas in lung GGNs, and FDM-TL performed better. It can improve the diagnostic specificity of radiologists, decrease the probability of misdiagnosis of benign GGNs as adenocarcinomas, reduce the negative impact of over-treatment on patients, and provide a non-invasive and rapid computer aided diagnosis method for surgeons to make more personalized follow-up and surgical plans for patients with lung GGNs.

PU-1958

CT 影像组学对周围型肺腺癌病理分级的预测价值研究

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【研究目的】使用多种机器学习算法构建基于术前 CT 影像组学特征的周围型肺腺癌病理分级预测模型, 并比较其预测效能。以在测试集中表现最佳的 CT 影像组学预测模型计算 Rad-score。结合患者临床特征与该 Rad-score 构建临床-影像组学融合逻辑回归模型并绘制列线图, 以获得一个临床应用价值较高的周围型肺腺癌病理分级预测模型。 **【研究方法】**

回顾性收集了 2012 年 1 月至 2022 年 8 月之间的 349 例经术后病理证实的周围型肺腺癌的 CT 影像及患者的基本临床资料。对患者肺腺癌的病理分级按照 2020 年 IASLC/ATS/ERS 病理分级标准进行重新评估, 分为低中危组 253 例和高危组 96 例。将所有病例按 7: 3 的比例随机分入训练集和测试集。半自动分割病灶 ROI, 并针对病灶 ROI 提取 CT 影像组学特征。。使用逻辑回归、决策树、支持向量机 (SVM)、随机森林和朴素贝叶斯 5 种机器学习算法来构建 CT 影像组学预测模型。使用 ROC 曲线分析来评估 CT 影像组学模型在训练集和测试集上的预测效能, 用表现最好的 CT 影像组学模型计算 CT Rad-score, 再结合临床特征, 使用后向逐步选择法进行逻辑回归分析, 构建临床-影像组学融合逻辑回归模型并绘制列线图。 **【结果】**

从 CT 影像中提取了 7 大类影像组学特征共 1586 个。经过特征降维和筛选最终选出 15 个 CT 影像组学特征用以构建 CT 影像组学预测模型。在我们建立的 5 个 CT 影像组学模型中, SVM 模型在预

测肺腺癌病理分级方面表现出了最佳的性能，AUC、准确率、敏感性和特异性皆为各 CT 影像组学预测模型中最佳，具有较好的稳定性。【结论】

使用 SVM 的 CT 影像组学模型可以有效预测周围型肺腺癌的病理分级，可以为外科医生选择有针对性的手术方式以及术后辅助治疗方法提供有力证据支撑。根据 SVM 模型计算出的 CT Rad-score 结合临床特征建立的融合模型及其列线图，可以进一步提高其临床实用价值。

PU-1959

A Study on the Diagnostic Value of CT Radiomics in Pathological Grading of Lung Adenocarcinomas

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【Objective】To construct the pathological grading prediction models of peripheral lung adenocarcinoma based on preoperative CT radiomics features using a variety of machine learning algorithms, and to compare their prediction performance. The CT radiomics prediction model with the best performance in the test dataset was used to calculate the Rad-score. Combined with the patient's clinical characteristics and the Rad-score, a clinical-radiomics fusion logistic regression model and nomogram were constructed to obtain a prediction model for pathological grading of peripheral lung adenocarcinoma with high clinical application value.

【Methods】

CT images and basic clinical data of 349 patients with peripheral lung adenocarcinoma confirmed by postoperative pathology in Changzheng Hospital from January 2012 to August 2022 were retrospectively collected. The pathological grades of the patients with lung adenocarcinoma were re-evaluated according to the 2020 IASLC/ATS/ERS pathological grading standards, and were divided into a low-medium-risk group (including grade 1 and grade 2) with 253 cases and a high-risk group (grade 3) with 96 cases. All cases were randomly divided into the training set ($n = 244$) and the test set ($n = 105$) in a ratio of 7:3. LungDoc and radiologists in the chest group were performed semi-automatic segmentation of focal ROI, and CT image omics features were extracted according to focal ROI. The feature dimension is reduced by Pearson correlation coefficient recursive feature elimination method and linear kernel function. Two independent sample t test and Wilcoxon rank sum test were used for screening features, then LASSO regression analysis was performed, and 10-fold cross validation was used to calculate the optimal coefficient combination to screen the CT image omics features used to construct the CT image omics model. Five machine learning algorithms, logistic regression, decision tree, support vector machine (SVM), random forest and naive Bayes, were used to construct the CT image omics prediction model. The five-fold cross-validation was carried out in the training set to determine the hyperparameters of each model. ROC curve analysis was used to evaluate the predictive efficacy of the CT omics model on the training set and the test set. The best performing CT omics model was used to calculate the CT Rad-score, and then combined with the clinical characteristics, the backward stepwise selection method was used for logistic regression analysis, and the clinical-imaging fusion logistic regression model was constructed and the graph was drawn. 【Results】

Seven categories of image omics features were extracted from CT images, including shape features, first-order statistics, GLCM, GLDM, GLRLM, GLSZM and NGTDM, with a total of 1586 features. After feature reduction and screening, the optimal Lambda obtained by LASSO was 0.023. Finally, 15 CT image omics features were selected to construct the CT image omics prediction model. Among the 5 CT omics models established, the SVM model showed the best prediction performance in predicting the pathological grade of lung adenocarcinoma, and achieved the best performance in both the training set and the test set, with the AUC of 0.970 and 0.912, and the accuracy of 0.9385 and 0.9143, respectively. The sensitivity values were 0.9492 and 0.9868, and the Matthews correlation coefficients were 0.8482 and 0.7811, which were the best among all the CT image omics prediction models. The specificity (0.9104) was slightly lower

in the training set than in the logistic regression model (0.9851) and naive Bayes model (0.9403), but was still the best in the test set (0.8621). It shows that the SVM model has good stability.

【Conclusion】

The CT image omics model based on SVM can effectively predict the pathological grade of peripheral lung adenocarcinoma, which can provide strong evidence support for surgeons to select targeted surgical methods and postoperative adjuvant therapy. The clinical-imaging fusion logistic regression model and its graph based on CT Rad-score calculated by SVM model combined with clinical characteristics can further improve its clinical practical value.

PU-1960

老年人低骨密度与冠状动脉粥样硬化性心脏病的相关性研究

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目的 探讨老年人低骨密度与冠状动脉粥样硬化性心脏病的相关性,为临床冠心病的防治提供新的途径。方法 选取 500 例老年患者进行选择冠状动脉造影。根据造影结果将患者分为冠心病组和对照组,对所有患者的腰椎及左侧股骨颈进行骨密度(BMD)测定;同时测定两组患者的年龄、BMI、血压、血钙、血磷、总胆固醇、甘油三酯、低密度脂蛋白胆固醇、高密度脂蛋白胆固醇等指标,并采用多因素非条件 logistic 回归分析低骨密度与冠状动脉粥样硬化性心脏病的相关性。结果 两组患者的腰椎及左侧股骨颈 BMD 值的差异均有统计学差异

(均 $P<0.05$),且冠心病组 BMD 值明显低于对照组。同时冠心病组的低骨密度(包括骨量减少和骨质疏松)发生率明显高于对照组,差异有统计学意义($P<0.05$)。logistic 回归分析显示低骨密度与冠心病存在明显的相关性。结论 老年人低骨密度与冠状动脉粥样硬化性心脏病之间存在相关性,是冠心病的独立预测因素。

PU-1961

胸部海绵状血管瘤:单中心 10 年病例系列

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目的:加强对胸部海绵状血管瘤的认识。

方法:回顾性分析我中心 2012 至 2022 年经手术病理证实为海绵状血管瘤的病理,对其临床及影像特点进行汇总。

结果:所有 255 例海绵状血管瘤中,胸部海绵状血管瘤共 24 例,其中,男性 7 例,女性 15 例,位于体表及胸壁者 19 例,纵隔及心脏、血管内者 4 例及 2 例。多数无症状,少数因局部症状就诊。影像上表现为局部软组织肿块,增强从无强化到轻中度强化,部分延迟强化,部分内见静脉石。

结论:胸部海绵状血管瘤女性更多见,体表占多数,无症状者多见,影像诊断准确率不高,静脉石可能有一定提示性。

PU-1962

基于定量 CT 对 2 型糖尿病肺损害结构变化的预测价值

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目的 通过比较 2 型糖尿病肺部损害患者 CT 定量参数与临床肺功能, 分析 2 型糖尿病肺损害患者肺部影像学变化并探讨 T2DM 肺损害的影像敏感指标。

方法 根据肺功能检查结果回顾性收集 96 例 2 型糖尿病 (T2DM) 肺功能损害患者影像资料, 经“数字肺”处理得出 CT 定量参数, 主要包括双肺容积、双肺低于 -910HU 及 -950HU 的密度衰减区的体积 (LAA910、LAA950) 占全肺的百分比 (LAA910%、LAA950%)、平均密度, 另 83 名肺功能正常的 T2DM 患者纳入对照组。采用独立样本 t 检验或 Mann-Whitney U 检验对两组肺部定量参数进行差异性分析, 将组间存在统计学差异的指标行 ROC 曲线和多因素 logistic 逐步回归。

结果 与正常对照组相比, 肺损害组的肺功能参数 FVC、FVC%、FEV1、FEV1% 及肺部 CT 定量指标全肺容积、LAA910、LAA950、LAA910%、LAA950% 显著降低 ($P < 0.05$), 平均密度显著增高 ($P < 0.05$)。全肺容积最有助于区分 T2DM 肺损害, 并且为 T2DM 肺损害的保护因素。

结论 肺部 CT 定量参数可定量反映 T2DM 患者肺损害, 全肺容积较大者可有效避免 T2DM 肺功能的减低。

PU-1963

Comparative study of imaging and pathology of primary mucinous adenocarcinoma with different imaging manifestations

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Background Pulmonary mucinous adenocarcinoma is a special type of lung cancer. Its imaging manifestations are diverse, which brings challenges to clinical diagnosis. However, its formation mechanism is unclear.

Objective To analyze the relevant mechanisms of the formation of pulmonary mucinous adenocarcinoma by observing its different imaging and pathological manifestations.

Data and methods Retrospective analysis was conducted on imaging manifestations and pathological data of 103 patients with pulmonary mucinous adenocarcinoma confirmed intraoperatively or pathologically.

Results 43 patients had pulmonary mucinous adenocarcinoma with a solitary nodule/mass, 41 patients with localized pneumonia and 19 patients with diffuse pneumonia. Their CT manifestations included “falling snowflake sign,” ground-glass opacity close to the heart, vacuous signs/honeycombing and withered tree branches. Under the microscope, all the 3 types of pulmonary mucinous adenocarcinoma had visibly formed mucus lakes but were made of tumor cells with totally different shapes, which included the goblet-like shape (tall column-like shape) and quasi-circular shape. Tall column-shaped tumor cells were negative or weakly positive for thyroid transcription factor-1 (TTF-1) and strongly positive for ALK mutation; whereas quasi-circular tumor cells were positive for TTF-1 and less positive for ALK mutation.

Conclusion The different imaging manifestations of mucinous adenocarcinoma are possibly due to the different amounts or viscosity of mucus produced, and the mechanisms of its formation may include (1) tumor cells in different shapes have different abilities to produce mucus; (2) tumors in different stages produce different amounts or viscosity of mucus; and (3) the TTF-1 and ALK genes affect the production of mucus.

PU-1964

探讨 CT 冠状动脉成像与冠状动脉导管造影诊断结果差异明显的因素及临床运用价值

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【摘要】目的：探讨 CT 冠状动脉成像与冠状动脉导管造影结果差异较大的因素，为临床应用提供循证依据。**方法：**回顾性选取在我院均接受 CT 冠状动脉成像 (CCTA) 与冠状动脉导管造影 (CAG)、且图像无明显伪影的 200 例冠心病患者；行 CCTA 检查前记录患者检查机器型号 (64 排螺旋 CT、128 排 ICT、128 排双源 CT)，患者一般资料 (慢性病史、心电图、听力、能否屏气、扫描心率、是否服用倍他洛克、是否含服硝酸甘油)。将 CAG 作为评估冠状动脉钙化狭窄程度金标准，比较每位患者 CCTA 与 CAG 诊断冠状动脉钙化狭窄程度的吻合率 (只比较右冠动脉 RCA、左前降支 LAD、对角支 D、左回旋支 LCX、钝缘支 OM) 将其吻合率分成 A ($\geq 95\%$)、B ($\leq 70\%$) 两组。分别比较两组患者检查机器型号和一般资料的一致性。结果：A 组有 96 例，其中影响因素分别是：检查机器型号 (128 排 ICT 或 128 排双源 CT)、心电图 (正常)、听力 (正常)、屏气能力 (优)、扫描心率 (≤ 70 次/分)、服用倍他洛克 (是)、是否含服硝酸甘油 (是) 无明显差异 ($P > 0.05$)；B 组有 27 例，其中影响因素分别是：心电图 (心律不齐)、屏气能力 (差) 无明显差异 ($P > 0.05$)。结论：当影响因素是检查机器型号 (128 排 ICT 或 128 排双源 CT)、心电图 (正常)、听力 (正常)、屏气能力 (优)、扫描心率 (≤ 70 次/分)、服用倍他洛克 (是)、是否含服硝酸甘油 (是) 时采用 CCTA 评估冠状动脉钙化狭窄程度与 CAG 的评估结果具有较高的吻合率 ($\geq 95\%$)；当影响因素分别是：心电图 (心律不齐)、屏气能力 (差) 采用 CCTA 评估冠状动脉钙化狭窄程度与 CAG 的评估结果有较大差异率。该探讨结果对患者适用性和实用性都很强，流程操作简单，措施方便，值得临床推广试用。

PU-1965

AI 背景下“人机耦合”对胸部 CT 肺结节良恶性诊断价值

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目的：本研究目的是探讨 AI 背景下“人机耦合”对肺结节良恶性诊断的临床应用价值。

方法：回顾性分析苏州大学附属第一医院 2023 年 1 月至 2 月肺结节患者 AI 诊断及高年资医生诊断结果，同时经过术后病理/穿刺活检/支气管镜病理证实/临床验证的肺结节病例进行回顾性分析。将 AI 背软件给出的结果和“人机耦合”结果与最终术后病理证实/支气管镜活检/临床验证的肺结节结果做对照分析。

结果：共 32 例术后病理/穿刺活检/支气管镜病理证实/临床验证的肺结节纳入到本研究中，其中术后为 27 例，穿刺活检 1 例，支气管镜活检 2 例，临床验证 2 例 (1 例随访自动吸收，1 例抗炎治疗后吸收)。32 例患者中，男性 18 例，女性 24 例，年龄范围 21---75 岁，平均年龄 41.8 岁。全部病例均经术后病理/穿刺活检/支气管镜活检/临床验证。恶性肺结节为 25 例，包括鳞癌 5 例，腺癌 20 例；良性肺结节 7 例，包括结核 1 例，渗出/炎症 2 例，胶原沉积 1 例，支气管扩张伴感染 2 例，隐球菌 1 例。病理证实的 25 例恶性肺结节中，AI 软件识别为高风险的病例为 22 例 ($22/25 = 88.0\%$)，AI 识别为低风险的病例为 2 例 ($2/25 = 8\%$)，AI 软件漏诊高风险结节为 1 例 ($1/25 = 4\%$)；7 例良性肺结节中，AI 识别为高风险的病例为 6 例 ($6/7 = 85.7\%$)，识别为低风险 1 例 ($1/7 = 14.3\%$)。病理证实的 25 例恶性肺结节中“人机耦合”诊断恶性肺结节为 24 例 ($24/25 =$

96.0%)，1 例表现为斑片状高密度影的粘液型肺腺癌“人机耦合”诊断错误；7 例良性肺结节中，“人机耦合”诊断为良性肺结节的为 7 例 (7/7=100%)，也即“人机耦合”诊断良性肺结节的准确率为 100%。

结论：“人机耦合”充分利用患者 CT 图像及临床信息，AI 背景下“人机耦合”对肺结节良恶性诊断正确率明显提高。

PU-1966

CT imaging features and prognosis of immune checkpoint inhibitor related pneumonitis in lung cancer with or without tumor invasion in the central airway

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Objective: Immunotherapy has become standard of care in lung cancer, including both non-small cell lung cancer and small cell lung cancer. Conventional and emerging risk biomarkers have been studied in the context of immune checkpoint inhibitor related pneumonitis (ICI-P) due to immunotherapy drugs, with the aim of ensuring an early diagnosis and follow-up. There may be differences in clinical and radiographic manifestations of ICI-P based on a novel imaging risk stratification factor named tumor invasion in the central airway (TICA). The present study aimed to investigate the radiographic features and prognosis of ICI-P between patients with and without TICA.

Methods: 174 lung cancer patients who received immunotherapy were retrospectively analyzed and 29 patients with ICI-P were identified. The clinical and radiographic data were analyzed to conclusive the radiological features and prognosis of ICI-P based on TICA.

Results: In our cohort, ICI-P had an incidence of 16.7%, a median onset time of 128 days, and a mortality of 75.9%. ICI-P developed in 15 patients with TICA, where grade ≥ 3 CIP accounted for 93.3%, main radiographic pattern was diffuse alveolar damage/acute interstitial pneumonia (DAD/AIP) pattern, and mortality was 93.3%. By contrast, ICI-P developed in 14 patients without TICA, where grade ≥ 3 CIP accounted for 57.1%, main radiographic pattern was diffuse alveolar damage/acute interstitial pneumonia (DAD/AIP) pattern, and mortality was 57.1%. There was statistical difference in the higher grade ($P=0.035$) but no statistical difference in the radiographic patterns between groups ($P = 0.548$ in patter 1 and $P = 0.715$ in patter 2). The median Progression-free survival (PFS) of patients without TICA group (5.0 months) was lower than that of the with TICA group (7.5 months), but no statistical difference ($P = 0.152$).

Conclusion: TICA detected with chest CT in ICI-P indicated more severe clinical features, including a more serve grade ICI-P and DAD/AIP radiographic pattern and worse prognosis. Our study suggests that imaging based on the TICA is informative in stratify patients into different risk categories for effective management.

PU-1967

超低辐射剂量联合 AIIR 深度迭代重建技术在胸部体模中肺结节检出能力的极限研究

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目的：探讨超低辐射剂量联合 AIIR 深度迭代重建技术在胸部体模中肺结节检出能力的极限研究的可行性。

材料与方法：

1、一般材料：在成年男性胸部体模两侧肺部上、中、下位置随机放置 3 个直径为 3mm，CT 值分别为 100HU、-630HU、-800HU 和 3 个直径为 5mm，CT 值分别为 100HU、-630HU、-800HU 的人工肺结节。

2、检查方法：使用联影 uCT960+对胸部体模进行螺旋扫描，管电压分别为：140kV、120kV、100kV、80kV、70kV、60kV，管电流为：5mAs，每个组合扫描三次。将所有图像分别应用：滤波反投影法（FBP）、混合迭代重建技术（KARL 3D）及深度迭代重建技术（AIIR）进行重建肺窗（窗宽 1600 HU、窗位-600 HU）。

3、图像客观评价：记录每次 CT 检查的 CTDI_{vol}、DLP 和 ED，取三次扫描的平均值。测量每个结节的 CT 值、噪声（SD），长短径误差和失圆度，测量三次取平均值。将图像导入肺结节 CAD 检测软件进行自动分析，评估每个组合中人工肺结节的检测率。

4、图像主观评价：两位经验丰富的放射科医师对人工结节的清晰度和失真度进行主观评价。

5、统计学方法：使用表格法比较每个组合中结节的 CT 值，噪声，长短径误差，失圆度及清晰度和失真度评分；比较每个组合中 CAD 检测软件对于人工肺结节的检出率。

结果：在可测的结节中，FBP、KARL 3D、AIIR 算法中结节的 SD 值逐渐降低，长短径误差和失圆度也逐渐降低；相同的结节尺寸下：管电压越低，结节越难识别，其长短径误差和失圆度越大；相同的管电压条件下：结节尺寸越小，越难识别。与 FBP 和 Karl 3D 相比，AIIR 算法显着提高了图像噪声评分和磨玻璃结节可视化，基于深度学习的重建提高了图像质量。

结论：超低辐射剂量 0.057mSv 联合 AIIR 深度迭代重建技术在胸部体模中最低检出能力为-630HU 的 3mm 结节。

PU-1968

人工智能在光谱 CT 胸部虚拟平扫中评估肺结节可行性研究

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目的：探讨人工智能(AI)辅助诊断系统在光谱 CT 胸部虚拟平扫中评估肺结节的可行性。方法：收集 55 名在光谱 CT 行胸部平扫及动静脉增强扫描的患者图像，包括 67 个高危结节。将常规平扫（TNC）、重建的动脉期虚拟平扫（VNCa）和静脉期虚拟平扫（VNCv）图像导入 AI，统计 AI 检测出的肺结节数目、直径和识别高危结节的形态特征。经放射科医生采用盲法确定结节的真假阳性，并对高危结节形态特征进行肉眼评估。以 AI 联合医生确定的真阳性结节作为金标准，比较 AI 在 3 组图像中检出结节的灵敏度及假阳性率，采用 Bland-Altman 法分析 VNCa、VNCv 与 TNC 中 AI 识别共同结节长径的平均差异。同时评估 AI 识别和医生主观评价的高危结节形态特征的一致性。在 AW 工作站测量并比较 3 组图像中胸主动脉、肺动脉干、肩胛肌和胸壁脂肪的 CT 值、背景噪声、信噪比，以客观评估图像质量。记录各期扫描的辐射剂量。结果：3 组图像中 AI 检出结节的灵敏度差异无统计学意义（ $X^2=2.218$ ， $P=0.345$ ），均高于 92%，而 VNCa 的假阳性率明显高于 TNC、

VNCv ($P<0.05$)。基于 AI 或医生单独评估 VNCa、VNCv 中高危结节的形态学特征方面与 TNC 相当,以医师识别为金标准,除 AI 识别血管束征数目明显少于医生 ($P<0.001$),其它形态特征的 AI 识别性能与医生无统计学差异 ($P>0.05$)。TNC 和 VNCa、VNCv 中 AI 识别的共同病灶长径平均差异分别为 0.151mm、0.057mm。在图像质量的客观评价中,除脂肪外,VNC 图像在评估胸部不同组织展现出与 TNC 相近的 CT 值 ($P>0.05$),具有较低背景噪声,更高的信噪比。使用 VNC 替代 TNC 可使总有效辐射剂量减少 31.65%。结论:基于 AI 联合光谱 CT 静脉期虚拟平扫,在显著降低辐射剂量的同时,可保证图像高质量,提供优异的结节检测性能,并基本还原形态特征。

PU-1969

气道播散型的肺粘液腺癌一例

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本文报道沿气道播散的肺粘液腺癌 1 例。患者男,79 岁,因咳嗽咳痰半月,加重 6 天入院。CT 表现为双肺下叶见多个团块状密度增高影,较大者位于右肺下叶,大小约 10.3x8.2x11.7cm,边缘清晰,其内密度不均匀,平均 CT 值约 21Hu,平扫其内隐约可见稍高密度血管影像及少许点状稍高密度影,增强后其内血管影显示清楚,并见少许条状分隔样强化影,肿块其余部分未见明显强化,肿块邻近胸膜增厚,邻近肺组织压迫性不张,并与左肺门下份分界不清,左肺下叶部分支气管截断;左肺上叶尖后段见不规则斑片状密度增高影,病灶内可见不规则含气腔隙。术后病理结果显示:肿瘤细胞呈 CK7 (+), TTF-1 (+), NapsinA (+), CEA (+), CK20 (-), Villin (小灶+), CDX-2 (+), P40 (-), P53 (+, 30%, 野生型), Ki-67 (+, 约 20%)。结合 HE 与免疫组化结果,最终诊断为肺粘液腺癌。

PU-1970

The value of left atrial fast long-axis strain in predicting left ventricular reverse remodeling in Dilated cardiomyopathy

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Background: Left ventricular reverse remodeling (LVRR) is associated with better clinical outcomes in patients with dilated cardiomyopathy (DCM). Early prediction of LVRR can help guide the subsequent treatment. The left atrium (LA) function could predicts adverse cardiovascular events in DCM patients. However, its value in predicting the LVRR has not been elucidated.

Objectives: This study aimed to investigate the value of CMR-derived LA fast long-axis strain in predicting LVRR in DCM.

Materials and Methods: Clinical data were retrospectively collected for DCM patients between January 2018 and December 2022. CMR images were processed by CVi42 (version 5.13.7) software to yield LA strain parameter. LVRR occurring within one year from CMR was ascertained by echocardiography (LVRR is considered to occur if LVEF $\geq 50\%$ or increases $\geq 10\%$ and LVEDd decreases $\geq 10\%$ compared to baseline ultrasound data). Univariate and multivariable logistic regression analyses were used to build the predictive model.

Result: The retrospective study included a total of 96 participants (mean age, 48years \pm 14 [standard deviation]; 63 men), LVRR occurred in 51 participants within 1 year. Compared with the non-LVRR group, the LVRR group has smaller LVEDVi and LVESVi. At the same time, the number of patients with LGE in the LVRR group was smaller than the non-LVRR group. The left atrial passive fraction, reservoir strain and conduit strain rate of the non-LVRR group were higher

in the LVRR group (17% vs. 13%, $P = .019$; 11% vs. 9%, $P = .011$; 6% vs. 4%, $P < .001$). In multivariable Logistic regression analysis, LA conduit strain was an independent predictor for the occurrence of LVRR within 1 year in DCM patients (hazard ratio [HR] per 1% increase, 1.155 [95% CI: 1.011, 1.319; $P = .034$]. In addition, the clinical prediction model based on LGE, LVEDVi and LA conduit strain had a good predictive performance in predicting the occurrence of LVRR in DCM patients within 1 year (AUC = 0.746).

Conclusion: Left atrial conduit strain, derived from cardiac MRI by using the fast long-axis method, was an independent predictor of LVRR within 1 year in DCM patients.

PU-1971

薄壁囊腔样肺癌的 HRCT 诊断及误诊病例分析

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目的：搜集本院病理诊断为肺癌、HRCT 表现为薄壁囊腔样改变并诊断为肺癌的患者的临床及影像资料，同时搜集 HRCT 表现为薄壁囊腔样改变并误诊为肺癌的患者的临床及影像资料进行分析，总结薄壁囊腔样肺癌的影像学特点，通过误诊病例分析总结其鉴别诊断。方法：回顾性分析本院 HRCT 表现为薄壁囊腔样改变并与病理一致诊断为肺癌的 26 例患者以及经临床否认（病理、随访过程或肺泡灌洗）肺癌的 9 例误诊患者的临床及 HRCT 影像特点，所有患者均进行 HRCT 扫描。结果：影像诊断薄壁囊腔样肺癌并与病理一致者共 26 例（男性 15 例，女性 11 例），平均年龄 62.5 岁，中位年龄 63 岁，其中鳞癌 8 例，腺癌 18 例，位于右肺 18 例（右肺上叶 7 例，右肺中叶 4 例，右肺下叶 7 例）、左肺 8 例（左肺上叶 4 例，左肺下叶 4 例），3 例以呼吸道症状就诊，其余 23 例均体检发现；影像诊断为囊腔样肺癌但经临床否认的共 9 例，4 例为肉芽肿性炎伴干酪样坏死，2 例为支气管扩张伴纤维组织增生，1 例为机化性肺炎伴坏死，1 例为曲霉菌感染，1 例为肺囊肿。结论：肺内薄壁囊腔样病变的正确诊断非常困难。囊壁厚薄不均、内壁欠光整、壁结节以及随访过程中实性成分增多既可以出现在薄壁囊腔样肺癌等恶性病变中，也可以出现在良性病变中，所以在影像诊断中我们需综合分析各种征象、密切结合临床病史进行综合分析，尽量减少误诊给患者带来不必要的手术创伤。

PU-1972

The diagnostic efficacy of unenhanced CT in detecting acute central pulmonary embolism

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Objectives: This study aimed to evaluate the effectiveness of unenhanced CT in identifying high-risk PE that thromboses located in the main pulmonary artery or the right or left pulmonary artery and optimize the screening strategy of PE.

Methods: A retrospective analysis was conducted on unenhanced CT images obtained within 24 hours prior to computer tomography pulmonary angiography (CTPA) in 122 patients, including equal numbers with acute central pulmonary embolism (ACPE) and non-PE patients. Univariate and multivariate analyses were performed to identify CT parameters and obtain logistic model in distinguishing ACPE from non-PE patients. The model was validated in another cohort of 24 patients.

Results: Abnormal density signs, mPA, PA/Ao, SVC and AzV show significant different between ACPE and non-PE patients. Unenhanced CT model composed of those signs showed excellent

diagnostic performance for ACPE in both the retrospective (AUC 0.890; 95%CI 0.820 to 0.939) and validation cohorts (AUC 0.816; 95%CI 0.606 to 0.943) and better than D-dimer (AUC 0.799; 95%CI 0.717 to 0.866). Abnormal density signs were demonstrated as reliable indicators of ACPE (aOR 21.079; 95%CI 7.435-61.700).

Conclusion: Unenhanced CT serves as a robust tool for pre-diagnosing ACPE prior to CTPA examination, demonstrating greater clinical value compared to D-dimer. In the context of diagnosing ACPE using unenhanced CT, the utilization of D-dimer may not be essential, thereby optimizing the examination time and facilitating timely initiation of treatment to enhance patient prognosis.

Clinical relevance statement: The symptoms of pulmonary embolism (PE) patients are often nonspecific, such as dyspnea and chest pain. In such cases, unenhanced chest CT scans are performed prior to computer tomographic pulmonary angiography (CTPA) to exclude other lung or mediastinal conditions.

PU-1973

基于 CT 定量指标评估轻中度 COPD 患者的诊断价值

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目的：分析 CT 定量指标与肺功能检测指标之间的关系，探讨 CT 定量指标在评估轻中度 COPD 患者肺功能方面的研究价值。

方法：回顾性收集本院 59 例轻中度 COPD 患者及 58 例健康人群的资料。将 CT 数据导入“数字肺”平台，获得功能性小气道病变区域百分比 (fSAD%)、肺气肿区域百分比 (Emph%)、正常区域占全肺体积百分比 (Normal%)、空气滞留指数 (ATI)、肺内血管体积 (IPVV) 及气道周长为 10mm 时的管壁面积平方根 (Pi10) 等定量指标。患者在 CT 检查后 3 天内且症状稳定时行肺功能检查 (PFT)，包括 FEV1% 和 FEV1/FVC。组间比较采用单因素方差分析或 Kruskal-Wallis H 检验。相关性评估采用 Pearson 或 Spearman 相关分析。对 CT 定量指标及 FEV1/FVC 间的关系进行单因素及多因素逐步回归分析。采用 ROC 曲线分析 CT 定量指标及模型对轻中度 COPD 的诊断价值。

结果：组间 fSAD%、Emph%、Normal%、ATI、Pi10in、IPVVin 及 IPVVex、FEV1% 和 FEV1/FVC 的差异均有统计学意义 ($P < 0.05$)。FEV1/FVC 与 fSAD%、Emph%、Normal%、ATI、Pi10in、IPVVin 及 IPVVex 间的相关性均具有统计学意义 ($P < 0.05$)；FEV1% 与 fSAD%、Emph%、Normal%、ATI 及 IPVVin 间的相关性均具有统计学意义 ($P < 0.05$)。逐步回归分析结果显示，Emph%、Pi10in 及 IPVVin 是 FEV1/FVC 的独立危险因素。ROC 曲线分析结果表明，Emph%、Pi10in、IPVVin 及模型诊断轻中度 COPD 患者的 AUC 分别为 0.80、0.64、0.68 及 0.86。结论：定量指标模型对轻中度 COPD 有较好的诊断效能，可以在一定程度上反映不同的肺组织损伤，并在揭示 COPD 的病理生理改变提供了一些信息。

PU-1974

双源 CT 冠状动脉血管成像检查不同心率对辐射剂量的影响

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目的 探讨本院 2022 年 1 月至今所行双源 CT 冠状动脉血管成像检查不同心率患者 91 例，心率范围 60~120 次。研究双源 CT 回顾性心电门控模式下冠状动脉血管成像检查不同心率情况下对患者辐射剂量的影响。

方法 检查设备为西门子双源螺旋 CT 扫描机,采用常规回顾性心电门控扫描技术。对碘剂过敏、严重肾功能不全、失代偿性心功能不全、不能配合呼吸指令的患者不纳入研究。所选患者检查前均未使用药物控制心率且签署了知情同意书,检查前进行呼吸训练,以保证检查的顺利完成。于扫描前 3 min 舌下含服硝酸甘油 0.5 mg。在正式启动扫描前,采用团注对比剂示踪法监测主动脉腔内的对比剂浓度,监测平面选在主动脉根部,兴趣区 (ROI) 置于主动脉腔中央,阈值设定为 100 HU,当系统自动监测 ROI 达到设定阈值后,延迟 4 s 自动启动正式扫描,扫描范围为气管隆突下 1 cm 至膈下 1 cm。碘对比剂 (370 mg/mL) 均采用高压注射器静脉注射,流率 5.0-6.0 mL/s。对比剂注射完成后用 40 mL 氯化钠注射液灌洗。扫描参数:管电压 120 kV、电流 560 mAs、螺距 (pitch 值) 0.2~0.5,螺距值随心率变化而变化,准直器宽度 0.6 mm,旋转时间 330 ms。扫描结束后记录每位患者扫描时的心率、剂量报告数据,以便计算 CCTA 扫描时的有效辐射剂量进行对照研究。

结果 所选取的 91 例不同心率患者中,数据显示,冠状动脉血管成像的有效辐射剂量,不同心率具有差异。

结论 患者的心率决定了心脏无间隔扫描的最大螺距。DSCT 扫描螺距及进床速度可根据患者心率进行有效调整,心率越高,螺距就越大,扫描速度也越快,心脏成像所需时间则越短,扫描时间的缩短会减少患者接受的辐射剂量。在扫描范围相同的前提下,对于患者心率波动小且体重指数相近的患者,较高心率的辐射剂量小于较低心率的辐射剂量。

PU-1975

前置双流法肺动脉 CTPA 在肺栓塞诊断中的应用价值

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目的: 分析前置双流法肺动脉 CTPA 在肺动脉栓塞中的诊断效果分析

方法: 研究时段 2022 年 5 月-2023 年 8 月,对本院 380 例疑似肺动脉栓塞的患者进行肺动脉 CTA 临床检查。分为 AB 两组,各 190 例,A 组采用常规单流注射方法;B 组采用前置双流注射法。观察同一扫描条件下和不同注射条件下对诊断正确率的影响。

结果: 1 对比度浓度 350mg/mL,剂量 20ML 与剂量 5ML 的混悬液双流注射为宜,注射速率 4.0-5.0 即可;2 前置双流注射法下,肺动脉及分支对比剂充盈良好;3 先注射混液后注射少量对比剂可使上腔静脉射线硬化伪影明显减少;4 在 MIP、MPR、VR 下肺动脉与肺静脉差异化显示,有助于显示肺段及远端栓塞。

结论: 前置双流注射法适合肺动脉 CTPA 注射操作应用,能有效的减少造影剂的使用量,有效提高 PE 患者的诊断正确率,在肺动脉 CTA 扫描操作中具有提升诊断率价值。

PU-1976

前瞻性心电门控技术在脊髓动脉 CT 成像中的临床应用价值

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目的: 探讨前瞻性心电门控技术在 CTA 诊断硬脊膜动静脉瘘(Spinal Aural Arteriovenous Fistula, SDAVF) 中的应用价值。

方法: 回顾性分析 2022 年 5 月—2023 年 5 月我院 40 例考虑胸、腰段 SDAVF 患者,所有患者进行完 CTA 检查后,都在 72-168 小时内进行了数字血管造影 (Digital Substraction Angiography, DSA) 检查采用随机数字法对患者进行平均随机分组,每组 20 例,统计每组患者临床资料。A 组

采用前瞻性心电门控, B 组采用常规螺旋 CT 扫描, 其他扫描参数一致: 管电压: 100kV 管电流: 300mA 螺距: 0.5x80(HP65.0) 重建层厚: ST1.0mm SL0.8mm。比较两组胸主动脉、腹主动脉及双侧第 3 至 7 肋间动脉的 CT 值、SD 值, 并计算 SNR、CNR 值, 记录两组辐射剂量。将两组 CTA 结果与 DSA 结果采用 Kappa 统计对一致性进行分析, 并比较两组瘘口位置的准确率。

结果: 两组患者临床资料, 例如性别、年龄、BMI 指数、心率等比较, 差异均无显著统计学意义 ($P>0.05$); 在客观图像质量评价中, A 组平均得分 4.82 ± 0.56 分, B 组 4.52 ± 1.01 分, 差异有显著统计学意义 ($P<0.05$); 辐射剂量 A 组 DLP: $562.12\pm22.98\text{mGy}\cdot\text{cm}$, B 组 DLP: $539.3\pm34.21\text{mGy}\cdot\text{cm}$, 差异有显著统计学意义 ($P<0.05$); 在动静脉瘘口位置准确性评估中, A 组准确率位 97.32%, B 组为 84.94%, 差异有统计学意义 ($P<0.05$)

结论: 前瞻性心电门控技术在 CT 血管成像较常规 CT 技术图像质量更高, 辐射剂量略高于常规扫描技术 (5.16%), 但瘘口定位准确性显著高于 B 组, 对 SDAVF 具有重要的临床价值, 值得在临床工作推广使用。

PU-1977

320 排宽体 CT 支气管动脉 CTA 不同扫描方向的 图像质量对比

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目的: 探讨 320 排宽体 CT 支气管动脉 CTA 不同扫描方向的图像质量对比

方法: 回顾性选取本院 2020 年 11 月至 2023 年 5 月急诊大咯血行支气管动脉 CTA 患者 100 例, 采用随机数字法进行分组, 每组 50 例。头足方向为 A 组, 足头方向为 B 组, 两组扫描参数一致: 扫描范围为膈肌至胸廓入口层面, 管电压 100KV, 管电流自动毫安调制技术 (范围 100-400mAs), 螺距 FP/HP: 1.1/110, SD=12.5, 球管转速 0.5rad/s, 探测器设置 $0.5\times80\text{mm}$, 对比剂浓度 320mol/ml, 用量按患者 BMI 进行配比, 范围 40-70ml; 所有患者 CT 检查完 72 小时后均进行数字减影血管造影 (Digital Substraction Angiography, DSA)。由两位放射医师采用 5 分法双盲评价图像质量, 随后将 CT 血管成像的诊断结果与 DSA 进行对比, 一致性采用 Kappa 分析, $\text{Kappa}>0.85$ 认为一致性良好, 一致性较差时引入第三名医生进行打分。

结果: 两组患者在年龄、性别、MBI、血压、入院血糖、对比剂用量均无显著差异 ($P>0.05$); 在诊断效能评价中, 两组支气管动脉 CTA 对责任血管的检出率, A 组准确率为 98.32%, B 组为 98.38%, 结果无显著统计学差异 ($P>0.05$); 两组支气管动脉 CTA 对支气管动脉-肺动脉瘘的检出率 A 组为 56.80%, B 组 87.42%, 诊断效能有显著统计学差异 ($P>0.05$)。B 组较 A 组检出率提高 30.62%。A 组主管图像质量平均得分 3.56 分, B 组 4.29 分, B 组图像质量显著高于 A 组。

结论: 支气管动脉 CT 成像是足-头方向扫描图像质量优于头-足方向扫描, 尤其在支气管肺动脉瘘的诊断方面优势明显, 同时可以避免上腔静脉伪影, 提高非支气管动脉开口的精准度, 值得在临床中大力推广应用。

PU-1978

可变螺距技术 (vHP) 在下肢动脉 CTA 成像中的临床应用与诊断效能

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目的: 评价可变螺距技术 (Variable Helical Pitch, vHP) 在下肢动脉 CTA 成像中的应用效能。

方法: 前瞻性选取我院 2021 年 1 月至 2022 年 6 月 80 例行双下肢动脉 CTA 成像的患者, 将患者随机分成两组, 分别为 VHP 技术组和常规螺旋扫描组, 每组 40 人, 统计两组患者的性别、年龄、BMI、病程时间、血糖等临床资料。测量并对比两组髂总动脉腰 4 水平层面、腘动脉膝关节层面及胫前动脉踝关节层面的血管 CT 值及同一层面临近肌肉 SD 值, 通过计算得到信噪比 (Signal To Noise Ratio, SNR) 和对比噪声比 (Contrast To Noise Ratio, CNR)。所有图像由 2 名有经验的临床外周血管医生进行图像质量主观评分, 如有不一致的评分引入第三名医生进行判断。记录并比较两组图像的辐射剂量及对比剂用量。

结果: 两组临床资料无显著差异 ($P>0.05$), VHP 组客观评价在髂总动脉层面、腘动脉膝关节层面及胫前动脉踝关节层面的 CT 值、SNR 值均高于常规螺旋扫描组, 差异有统计学差异 ($P<0.05$); 主观图像评价 VHP 组显著优于 B 组, 差异有统计学意义 ($P<0.05$); VHP 组辐射剂量 ED 平均值为 $6.74\pm1.20\text{mSv}$, 常规螺旋扫描组辐射剂量平均 ED 值为 $7.93\pm1.78\text{mSv}$, 两组有显著差异 ($P<0.05$)。

结论 VHP 技术联合小剂量测试法可有效提高双下肢动脉 CTA 检查的成功率, 图像质量更佳, 且辐射剂量和对比剂用量显著降低, 在临床中值得大力推广应用。

PU-1979

全息可视化三维重建技术在急诊支气管动脉栓塞治疗中的应用价值

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目的: 探讨全息可视化三维重建技术 (Digital Holography And Three-Dimensional Imaging, TDIV) 在急诊支气管动脉栓塞治疗中的应用价值。

方法: 收集 2021 年 5 月至 2023 年 5 月来我院以急诊大咳血行支气管动脉 CT 成像患者 60 例, 根据支气管动脉起源及数量平均分配 A、B 两组, 每组 30 例, A 组采用 TDIV 技术, B 组为常规后处理成像技术 (VR、MIP 及 MPR 图像)。所有病例均由一名工作经验超过 10 年的血管组主管技师完成图像处理, 并记录两组完成时间, 随后由两名工作经验超过 10 年的介入科医师记录术中责任血管定位时间及统计两组支气管数量与 DSA 的一致性, 意见不统一时引入第三位同样年资医师进行判断。

结果: A、B 两组后处理时间无统计学差异 ($P>0.05$); 两组支气管动脉数量及开口位置与 DSA 结果一致性良好 ($Kappa>0.85$); A 组介入术中定位时间较 B 组显著减少, 差异有统计学意义 ($P<0.05$)。

结论: TDIV 可以快速、准确进行支气管动脉栓塞术前责任血管的定位, 极大缩短介入治疗时间, 同时与金标准 DSA 结果一致性良好, 值得临床广泛应用。

PU-1980

肺炎型肺癌的影像诊断 (附 6 例病例报告并文献复习)

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目的: 肺炎型肺癌 (pneumonic-type lung adenocarcinoma, PLADC) 临床症状和胸部 CT 表现与肺炎及间质性肺病变类似, 容易延误诊断。本文通过观察肺炎型肺癌 CT 表现特点, 并回顾既往相关文献, 以增加对肺炎型肺癌影像学表现的认识。

方法: 回顾分析我院 2018 年 12 月至 2022 年 4 月诊治且经病理证实的肺炎型肺癌 6 例, 均行 CT 扫描, 对该病的主要临床表现、实验室检测结果以及胸部 CT 征象等进行研究分析。

结果: 6 例患者当中女性 3 例, 男性 3 例, 平均年龄 61.8 岁, 临床症状为咳嗽咳痰 4 例, 腹胀 1 例, 无症状 1 例。胸部 CT 示 3 例为肺内弥漫性病变, 另 3 例为肺内局限性病变。主要 CT 征象为: 肺实变影或磨玻璃密度影伴“枯枝征”、肺内多发小结节灶, 可单独出现上述一种征象, 或多种形态病灶共存于同一患者。随访发现 1 例局限性病变术后 2 年未见复发或转移, 其余病例均有不同程度进展, 表现为术后复发, 病灶范围增大、密实, 出现骨转移、心包积液。

结论: 肺炎型肺癌与肺炎或其他良性病变有一定的相似之处, 对于经抗感染治疗长期无效甚至进展的病例, 则要考虑肺炎型肺癌的可能性, 应及时行支气管镜、经皮肺活检等获得病理诊断。

PU-1981

低药量低流速两段式对比剂注射在肺动脉 CTA 检查中的临床应用

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目的: 探讨低药量低流速两段式对比剂注射在肺动脉 CTA 检查中的可行性。方法: 按照连续入组的方式选择 2023 年 2 月~2023 年 8 月临床考虑肺动脉栓塞的患者 60 例, 随机分为两组, 行肺动脉 CTA 检查。A 组为常规组, 对比剂用量 50ml, 对比剂注射流速 4.5ml/s, 生理盐水用量 30ml, 注射流速 4.5ml/s; B 组为双低组, 对比剂用量 30ml, 对比剂注射流速分别为 15ml (2.5ml/s) 和 15ml (3.5ml/s), 生理盐水用量 30ml, 注射流速为 3.5ml/s。比较两组图像的肺动脉主干及左右肺动脉内的 CT 值, 上腔静脉内的对比剂伪影及图像质量主观评分等数据, 以评价扫描价值。结果: 双低组肺动脉主干及左右肺动脉内 CT 值均低于常规组, 但差异不显著 ($P>0.05$); 上腔静脉内的对比剂伪影显著低于常规组 ($P<0.05$); 两名影像学医师对两组图像质量主观评分相近 ($P>0.05$)。结论: 低药量低流速两段式对比剂注射在肺动脉 CTA 检查中与正常药量正常流速的图像质量相差无几, 可满足临床诊断的要求, 且减少了对比剂用量, 减缓了对比剂注射速率, 从而降低了对比剂给患者带来的潜在风险。

PU-1982

双源 CT 双能量扫描评估冠状动脉支架再狭窄的价值

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目的: 探讨使用双源 CT 双能量扫描单能成像技术, 对提高冠状动脉支架腔内再狭窄诊断准确性的研究。

方法: 回顾性分析陆军特色医学中心 2022 年 7 月至 2023 年 8 月间行冠状动脉支架植入术患者, 收集术后出现支架内再狭窄, 同时接受冠状动脉 CTA 双能量扫描和冠脉动脉造影, 且间隔不超过半个月的复查患者 80 例, 并随机分为 A、B 两组每组 50 例, 其中 A 组使用重组单能谱值为 100 keV 的图像; B 组使用重组 100 keV 混合能量图像。记录 CT 容积剂量指数(CTDIvol)、剂量长度乘积(DLP)、有效辐射剂量(ED)。以冠状动脉造影为金标准。利用双盲法评估支架内再狭窄程度, 根据金标准计算两组的诊断准确率、敏感度、特异度、阳性预测值(PV+)、阴性预测值(PV-)。利用 Kappa 检验评价两位观察者的评估一致性。对 A 组所有支架内狭窄节段每隔 10 keV 重组一组图像, 评估狭窄程度, 并采用配对 t 检验与 DSA 结果比较, 以 $P < 0.05$ 为差异有统计学意义。

结果: A 组的诊断准确率、特异度和 PV+ 均明显高于 B 组, 敏感度和 PV- 与 B 组相差不大; A 组的 Kappa 系数大于 B 组; A 组的 CTDIvol、DLP 及 ED 与 B 组比较无明显统计学差异($P > 0.05$)。A 组内能量级 100 keV 的图像测得的支架内狭窄程度与 DSA 比较误差最小($P > 0.05$)。

结论: 采用双源 CT 双能量模式扫描冠状动脉 CTA, 利用单能谱 100 keV 重组可以有效减轻冠脉支架伪影, 能将支架的植入位置以及管腔内的充盈程度明显清楚的展示出来, 且对支架内再狭窄的诊断准确率接近选择性冠状动脉造影, 是一种准确可靠、简单易行的检查方法。

PU-1983

人工智能管腔内梯度衰减技术对于冠状动脉 CTA 功能诊断效能提升的研究

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目的: 探究人工智能管腔内梯度衰减 (Translumenal Attenuation Gradient, TAG) 技术在提升冠状动脉 CTA 诊断效能中的应用。

方法: 回顾性收集我院 2022 年 1 月至 2022 年 9 月进行冠状动脉 CTA 检查的患者 120 例, 所有患者均进行过冠状动脉造影检查并统计血流储备分数 (Fractional Flow Reserve, FFR)。使用中心线算法 TAG (TAG-COO) 和钙化斑块去除算法 TAG (TAG-ExC) 对所有患者的冠状动脉分支进行计算并绘制曲线。将所有患者数据分组分为三组, 分别为 TAG-COO 结合冠状动脉 CTA 组、TAG-ExC 结合冠状动脉 CTA 组和单独的冠状动脉 CTA 组。采用受试者工作特征曲线 (Receiver Operating Characteristic, ROC) 统计各组对冠状动脉重度狭窄的诊断价值, 以 FFR 值为 0.80 作为狭窄程度区分的金标准。

结果: 3 组患者的临床资料, 例如性别、年龄、BMI、平均心率、血压、血糖等, 均无统计学差异 ($P > 0.05$)。120 例患者共纳入 360 支冠状动脉血管, FFR 显示 195 支冠状动脉血管存在血流动力学重度狭窄。TAG-COO 结合 CCTA 组的曲线下面积 (Area Under Curve, AUC) 为 0.721, TAG-ExC 结合 CCTA 组的 AUC 为 0.755, 而单纯 CCTA 的 AUC 为 0.689。

结论: 人工智能管腔内梯度衰减技术操作方便快捷, 无需手动进行测量, 可以快速得到两种不同算法下的曲线图像, 可以提升冠状动脉 CTA 诊断管腔重度狭窄的效能, 值得在临床中推广。

PU-1984

人工智能降噪算法和肺结节自动筛查技术结合在超低剂量肺结节筛查中的临床应用

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目的：人工智能降噪算法和肺结节自动筛查技术结合在超低剂量肺结节筛查中的临床应用。

方法：选取 2022 年 8 月至 10 月于我院体检中心接受胸部 CT 肺结节筛查的患者 100 人，记录所有患者临床资料，按照扫描方式不同平均分为 A、B 两组（A 组：低剂量扫描，B 组：常规扫描）。两组患者原始数据传入人工智能肺结节后处理软件进行自动肺结节筛查，所得结果不进行人为干预。统计患者肺结节检出数目，采用双盲法对两组患者肺结节检出进行人工核对，计算误差率。采用双盲法 4 分制对两组肺窗图像进行主观图像质量评分，记录两组检出容积 CT 剂量指数（CTDIvol），剂量长度乘积（DLP）并依此计算辐射剂量数值（ED）。

结果：A 组肺结节人工智能筛查检出率与 B 组相比无统计学差异（ $P>0.05$ ），A 组肺结节检出敏感性低于 B 组（ $0.941>0.952$ ），特异性高于 B 组（ $0.532>0.456$ ），A 组辐射剂量显著低于 B 组（ $P<0.05$ ），A 组肺窗主观图像质量与 B 组无统计学差异。

结论：在胸部 CT 肺结节筛查中，大幅度降低管电压不影响肺结节检出率，肺窗图像质量与常规扫描无显著差异，辐射剂量大幅度降低，此方法可以有效提高患者肺结节筛查安全性，值得在临床推广应用。

PU-1985

CT 特征分析对不典型或早期高原肺水肿诊断价值的研究

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[摘要] 目的：分析早期高原肺水肿的 CT 表现，提高 CT 诊断准确率。方法：本研究回顾性分析 50 例经临床诊断为早期高原肺水肿患者的胸部 CT 影像资料，分析早期 HAPE 患者胸部 CT 病灶发生部位及胸部影像学主要表现特征，总结 CT 对早期高原肺水肿的诊断价值。结果：（1）病灶发生部位：累及单侧肺 35 例，累及双侧肺 15 例。病变累及右肺 45 例；累及左肺 20 例。病变局限性于 1 个肺叶者 35 例，病变位于 2 个肺叶者 10 例，病变累及 3 个及以上肺叶者 5 例。（2）CT 表现：早期 HAPE 胸部 CT 影像学特征包括：双肺支气管-血管束增多、增粗，磨玻璃样改变，多角形、类圆形及小斑片状密度增高影，网格状改变，肺野外带结节影，主肺动脉内径增宽，叶间胸膜增厚，代偿性肺气肿等。结论：胸部 CT 影像检查是高原肺水肿的重要诊断方法之一，尤其对早期或不典型病例更是重要的诊断依据。

PU-1986

自动管电压选择技术（CARE KV）对急性胸痛三联征 CTA 图像质量及辐射剂量影响的研究

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目的：探究宽体探测器急性胸痛三联征 CTA 检查管中，自动管电压选择技术（CARE KV）对图像质量及辐射剂量的影响，探究低辐射剂量在胸痛三联征一站式 CTA 检查中的应用。

方法：收集 2020 年 2 月至 2021 年 10 月在我院急诊或门诊因胸痛怀疑患有急性冠状动脉综合征、肺栓塞或主动脉夹层的患者 90 人。所有患者均进行胸痛三联征计算机断层扫描血管造影（CTA）检测。其中 45 名患者采用了 CARE KV 技术进行扫描，编为 A 组；其余 45 名患者采用常规管电压加自动管电流技术编为 B 组。对所有的患者冠状动脉、肺动脉及主动脉分别进行主观图像质量评价并记录计算所有患者的辐射剂量值；

结果: A 组冠状动脉共 785 段 (25 段未纳入统计), B 组冠状动脉共 783 段 (27 段未纳入统计), 两组冠状动脉主观图像质量在 1-3 级分别为 776 段 (98.85%)、779 段 (99.48%); 两组肺动脉各 1395 段, A 组评价在 1-2 级有 1358 段, B 组评价在 1-2 级有 1367 段; 两组主动脉各 135 段, 两组主动脉评价全部都在 1-2 级; 上述结果两组对比均无显著性差异 ($P>0.05$) 整体辐射剂量统计 A 组显著低于 B 组, 差异有统计学意义 ($P<0.05$)。

结论: 应用 CARE KV 与自动管电流技术进行低剂量胸痛三联征 CTA 扫描, 图像质量可满足急性胸痛患者诊断需要, 同时显著降低了辐射剂量。

PU-1987

CT 误诊气管炎性肌纤维母细胞瘤 1 例

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目的: 分析本例气管炎性肌纤维母细胞瘤误诊原因, 进一步加深对其 CT 表现、免疫组化表型的认识。

方法: 回顾分析经手术病理证实该病例气管炎性肌纤维母细胞瘤 CT 表现及免疫组化表型, 同时查阅相关文献进行总结。

结果: 颈部 CT 平扫+增强检查: 气管上段管腔内结节状软组织密度灶, 与气管各管壁相连, 邻近管壁未见增厚, 致管腔重度狭窄, 增强扫描呈渐进性明显强化, 考虑气管血管球瘤。经电子内镜肿瘤切除术, 术中见声门下气管上段新生物, 表面光滑, 满布血管, 右侧带蒂, 致管腔重度狭窄。术后病理: 气管上段梭形细胞肿瘤; 免疫组化: CD99(+)、ALK(+)、SDHB(+)、 β -catenin 胞浆(+)、Ki-67(+)、S100(-)、SOX-10(-)、CD34(-)、SMA(-)、Desmin(-)、CD31(-)、bcl-2(-)、STAT-6(-)、CK(-), 考虑炎性肌纤维母细胞瘤。

结论: 炎性肌纤维母细胞瘤(IMT)是一种较为少见的低度恶性间叶源性肿瘤。以肺部多见, 发生于气管、主支气管内较少见, 好发于 16 岁以下儿童。临床症状无特异性。既往文献报道发生在气管、主支气管的 IMT CT 上具有一定特征性, 1) 腔内外息肉样或类圆形结节, 边界清楚; 2) 密度均匀, 无钙化, 增强延迟持续强化; 3) 气管不同程度狭窄, 但均未见完全阻塞。本例为 16 岁女性患者, 有咳嗽、声嘶、气促的症状, CT 上病灶特点如上所述, 与文献上报道基本一致, 但考虑到气管血管球瘤要相对常见而导致误诊, 忽略了其常见发病年龄。目前, 病理学诊断是确诊气管、支气管 IMT 的金标准。镜下病理分型分为三型: I 型: 粘液/血管密集型; II 型: 梭形细胞丰富型; III 型: 少细胞纤维型; 既往研究显示, 患者的免疫组化结果中 Vim 与 SMA 常呈阳性, 本例患者的免疫组化结果 SMA(-)较为少见, 由于大部分 IMT 涉及 2p23 染色体上 ALK 基因的突变, 故 ALK 的阳性有助于该病的诊断。

PU-1988

研究能谱 CT 支气管动脉 CTA 在支气管动脉栓塞术血管定位的意义

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咯血主要由支气管疾病, 肺部疾病, 心血管疾病等引起, 是急诊比较常见的类型。支气管动脉栓塞术是治疗大咯血的有效治疗方法, 能谱 CT 支气管动脉 CTA 作为一直无创的检出可以在术前显示支气管动脉的起源和走行, 能谱 CT 可以通过调整 Kev, 来更清楚的显示其走行, 分支和开口, 能谱 CT 支气管动脉 CTA 比起一般常规的 CTA 可以更清楚的看到支气管动脉的数量, 起源, 分支与

走行等等。运用虚拟现实技术(VR),多平面重建技术(MPR),最大密度投影(MIP)等带骨和去骨的图像来完成后处理帮助临床定位,能谱 CT 支气管动脉 CTA 对患者 BA 检出率与准确性高。可用于术前定位,缩短手术时间,减少辐射剂量,特别是对于肿瘤的患者,可以降低介入栓塞的盲目性,明确目标血管。

PU-1989

Myocardial Structural and Electrophysiological Remodeling After MI: a CMR study

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Purpose: Structural and electrophysiological remodeling due to myocardial infarction (MI) significantly increases patient major adverse cardiovascular events (MACEs) risk. The study hypothesized that entropy and left ventricular mechanical dispersion (LVMD) associated with structural and electrophysiological dyssynchrony respectively. The purpose was to investigate the predictive value of LVMD obtained by Cardiac magnetic resonance (CMR) measurements for MACEs, as well as its correlation with entropy.

Materials and methods: In this retrospective study of post-MI patients, the entropy was automatically estimated using a generic Python package algorithm in late gadolinium enhancement (LGE) images, LVMD was calculated as the standard deviations (SDs) of the time from the peak of the R wave and the negative strain peak in 16 segments. MACEs was defined as the combination of sudden cardiac death (SCD), ventricular arrhythmias (VAs), implantable cardioverter defibrillator (ICD) therapy for VAs, and new congestive heart failure (CHF).

Results: Over a median follow-up of 32 months, 35 patients experienced MACEs. LVMD and border zone (BZ) entropy had relatively high accuracy for MACEs prediction (areas under receiver operator characteristic curve (AUCs)=0.896 and 0.814, respectively). Patients with higher LVMD ($>86.7\text{ms}$) were more likely to occurrence of MACEs versus patients with low LVMD ($\leq 86.7\text{ms}$) ($P<0.001$, log-rank). LVMD was identified as an independent predictor for MACEs after adjusting of entropy parameters [hazard ratio (HR): 1.015; 95% confidence interval (CI): 1.004, 1.026; $P=0.007$]. Spearman rank correlation demonstrated linear correlations between LVMD and entropy ($r=0.456$, $p<0.001$).

Conclusions: Entropy and LVMD, which can be used for the visualization and quantification of structural and electrophysiological heterogeneity, have the potential to be applied to MACEs prediction for post-MI patients. There are correlations between entropy and LVMD, suggesting that structural changes occurring in post-MI myocardium are closely related to electrophysiologic changes.

PU-1990

原发性肺肉瘤样癌并颅内转移一例误诊分析

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目的: 探究原发性肺肉瘤样癌的影像学表现,为临床诊断提供影像学诊断依据,减小误诊率,提高患者预后。

方法: 经病理证实的一例肺肉瘤样癌病例,结合其影像学特征,再结合文献,总结出肺肉瘤样癌的影像学特征。

结论与讨论：原发性肺肉瘤样癌是临床上少见的肺恶性肿瘤，由于缺乏特异性，亦无典型的影像学表现，有关其影像学表现国内外报道较少，现结合文献对 **PSC** 影像学表现及鉴别诊断进行讨论是非常必要的，以提高临床医师及放射科医师对该病的认识，降低误诊率。原发性肺肉瘤样癌（**PSC**）可发生于任何肺叶或肺段，根据其生长部位可分为中央型及周围型，以肺上叶周围型居多，周围型 **PSC** 患者多为老年男性，且有长期中重度吸烟史。胸部 **CT** 平扫缺乏特征性表现，早期易误诊为肺部感染性病变、肺结核，晚期与普通型肺癌及胸膜来源的肿瘤难以鉴别，**CT** 增强扫描有一定的特征性表现，有助于诊断，结合患者年龄、临床症状及辅助检查逐一排除，综合分析可作出定性诊断，确诊仍需依靠病理学诊断。**PSC** 早期治疗多以手术切除和围手术期放化疗为主。**PSC** 对放化疗均不敏感，对不能手术或术后患者，可行辅助放化疗或靶向治疗，以延长生存期。随着分子生物学的发展，靶向药物和免疫治疗会使该病患者受益。因此，临床医师及放射科医师应提高对本病的认识，做到早发现、早诊断、早治疗，以降低其病死率。

PU-1991

Digital Dynamic Radiography 通气检查对于肺癌术后肺功能评估临床价值探讨

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目的 探讨 Digital Dynamic Radiography 通气检查对于肺癌术后肺功能评估的临床价值

方法 选择 2021 年-2022 年近一年于我院行手术治疗的 80 例肺癌患者，平均年龄 54 岁，其中男性 38 例，女性 42 例，作为研究对象。术前、术后皆行肺部 **DDR** 检查和肺功能检查。设备采用柯尼卡美能达 AeroDR C80，SD180CM,110Kv,199mA,5ms 曝光时间 15s；肺功能设备 MasterScreen SeS，分别对比患者患侧术前（4779mm²）、术后 7 天（2737mm²）、术后一月（3681mm²）、术后半年（4879mm²）、的肺野最大面积变化、左右横隔位移距离变化，及最大通气的变化量结合肺功能多次复查检测肺储备率变化，结合患者检查时呼吸状态。

结果 术后 7 天 **DDR** 患侧肺通气结果明显少于术前，对侧代偿性增加。术后一个月患侧通气量逐渐增加，到半年左右基本恢复。

结论 动态 **DR** 肺通气检查其检查数据与肺功能检查有一定相关性，可以更直观的对肺癌患者术后肺部评估，并具有一定的临床价值。

PU-1992

关于冠脉 CTA 不同阈值触发的图像质量对比的探讨

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目的：评价设置不同阈值触发对冠脉 **CTA** 检查的图像质量的影像。方法：随机选择 60 名常规冠脉 **CTA** 患者，平均分成两组，其中一组选择触发阈值为 100HU，另外一组选择触发阈值为 120HU，观察所选的跟踪平面的 **CT** 值受到运动伪影及呼吸伪影或者其他因素的影响并做记录。结果：其中 30 例选择触发阈值为 100HU 的患者，有 3 例患者的 **CT** 值受到运动伪影及呼吸伪影或者其他因素的影响，图像质量不佳。另外 30 例选择触发阈值为 120HU 的患者，有 5 例患者的 **CT** 值受到运动伪影及呼吸伪影或者其他因素的影响，图像质量不佳。结论：通过对比两组有效患者的图像质量，冠脉 **CTA** 检查设置的自动触发阈值是其影响图像质量的重要环节，触发时间的早晚对图像质量有着直接的影响。

PU-1993

Clinicopathological and CT features associated with recurrence-free survival of patients with small-sized peripheral invasive lung adenocarcinoma after sub-lobectomy

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Objective: Sub-lobar resection is gradually becoming a standard treatment for small-sized (≤ 2 cm) peripheral non-small cell lung cancer (NSCLC), with lung adenocarcinoma (ILADC) being the most frequent histologic subtype. However, the prognostic predictors to preoperatively decide whether sub-lobectomy could be feasible or not for patients with early ILADC have not yet been well identified. Therefore, the present study aimed to investigate the clinicopathological and CT features associated with recurrence-free survival (RFS) of patients with small-sized invasive lung adenocarcinoma (SILADC) after sub-lobar resection.

Methods: The study analyzed retrospectively 107 patients with SILADC who underwent preoperative chest CT scan and sub-lobar resection from December 2012 to March 2019. The Kaplan-Meier survival was used to analyze the relationship between clinicopathological characteristics, preoperative chest CT findings, and RFS. The Cox proportional hazards regression was used to identify independent prognostic factors of poor RFS.

Results: For clinicopathological characteristics, RFS was shorter in patients with age ≥ 70 years, smokers, and those with micropapillary/solid -predominant adenocarcinomas (all $p < 0.05$). For preoperative CT features, RFS was shorter in patients having tumors with size ≥ 1.4 cm, solid component size ≥ 1.1 cm, proportion of solid component $\geq 72\%$, solid density, spiculation, vascular convergence sign, peripheral fibrosis, and type II pleural tag (all $p < 0.05$). Multivariate analysis showed proportion of solid component $\geq 72\%$ (HR: 5.920, $p = 0.006$, 95% CI: 1.686-20.794), spiculation (HR:5.026, $p = 0.001$, 95% CI: 2.008-12.581 2.398-14.609), and type II pleural tag (HR: 4.638, $p = 0.002$, 95% CI:1.773-12.136) were independent risk factors for poor prognosis of patients with SILADC after sub-lobectomy.

Conclusion: Clinicopathological and CT characteristics are helpful to prognosticate RFS of patients with SILADC after sub-lobar resection, which can be used as an auxiliary tool for thoracic surgeons to choose the best surgery mode.

PU-1994

CT 薄层靶重建技术 对肺内磨玻璃密度小结节的诊断价值

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探讨 CT 薄层靶重建技术对肺内磨玻璃密度小结节(sGGN)的诊断价值。方法 回顾分析本院 105 例经术后病理或随访证实的肺内 sGGN 患者临床及影像资料, 其中良性组 23 例, 原位腺癌组 21 例、微浸润腺癌组 29 例、浸润腺癌组 36 例, 对比分析 CT 薄层靶重建技术对肺内 sGGN 的良恶性的诊断价值及 CT 征象检出的相关性。结果 薄层靶重建技术较常规重建技术能显著提高肺内 sGGN 的诊断效能, 对恶性结节的诊断符合率、受试者工作特征曲线(ROC 曲线)的曲线下面积(AUC)、敏感性、特异性分别为 85. 32%、0. 679、90. 80%、63. 64%; 良性结节分别为 77. 06%、0. 764、83. 72%、52.17%。薄层靶重建技术在原位腺癌、微浸润腺癌组实性成分、晕征、毛刺征、胸膜凹陷征、分叶征及浸润腺癌组实性成分、晕征、胸膜凹陷征、分叶征的 CT 征象检出率均大于常规重建技术, 差异有统计学意义($P < 0. 05$)

PU-1995

能谱 CT 延迟增强扫描及碘基物质图对左心耳血栓诊断价值的研究

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目的：设计一种 CT 最佳扫描及后处理方案，利用延迟增强及能谱功能多模态诊断左心耳血栓

方法：回顾性分析 2019 年 1 月至 2023 年 6 月于我院行左房与肺静脉 CT 检查的 278 例患者，所有图像均采用能谱扫描模式，常规动脉期左心耳有充盈缺损的做 30s 延迟扫描，持续有充盈缺损再做 1 min 延迟，仍然有充盈缺损的做 2 min 延迟，以经食道超声心动图（TEE）为金标准，分别在动脉期、30 s、1 min、2 min 时相在能谱碘基物质图中测量左心耳充盈缺损区及左心房的碘含量，比较两组之间不同延迟时间下碘含量的差异。通过绘制受试者工作特征（ROC）曲线并计算曲线下面积（AUC）分析不同延迟时间及充盈缺损部分的碘基物质含量对左心耳血栓的诊断效能。

结果：利用金标准经食道超声心动图（TEE）和能谱基物质及不同延迟时间对左心耳充盈缺损的评价，并用 TEE 和能谱基物质作为标准检验不同延迟时间的诊断性差异性，延迟 30s、1min、2min，特异性分别为 0.893、0.943、0.973；AUC 分别为 0.947、0.972、0.987；敏感性均为 1，卡方分析 P 值均<0.01，符合统计学要求。

结论：能谱 CT 延迟增强扫描结合能谱碘基物质图对左心耳血栓有很好的诊断价值，且在延迟 2min 时对左心耳血栓的诊断具有更高的诊断效能，进一步为临床准确判断左心耳血栓提供更加客观真实的影像学证据。

PU-1996

探讨肺腺癌纯磨玻璃样结节（pure ground-glass nodules, pGGN）的 CT 纹理特征与半乳糖凝集素-9（Galectin-9, Gal-9）表达的相关性。

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目的：探讨肺腺癌纯磨玻璃样结节（pGGN）的 CT 纹理特征与半乳糖凝集素-9（Galectin-9, Gal-9）表达的相关性。

方法：首先用 KM Plotter 数据库中的数据集 "203236_s_at" 进行生存分析，分析 Galectin-9 表达水平对肺腺癌患者预后的影响。随后对 2018 年 10 月至 2020 年 6 月在辽宁省肿瘤医院收治的 87 例 CT 表现为 pGGN 的原发性肺腺癌患者的资料进行回顾性分析，资料包括患者的一般临床特征、Gal-9 表达水平及 CT 纹理特征（平均 CT 值、最大 CT 值和 Δ CT）。所有患者经病理诊断为原发性肺腺癌，并接受了增强 CT 检查。

结果：Gal-9 的高表达与肺腺癌患者较短的总生存期（overall survival，OS）和首次进展时间（first progression，FS）显著相关。尤其是在接受化疗的肺腺癌患者中，Gal-9 高表达时 OS 缩短。34.15% 的 Gal-9 阴性患者表现为肿瘤中/低分化，而在 Gal-9 阳性患者中这一比例高达 74.47%。65.21% 的 Gal-9 阳性患者肿瘤 TMN 分期为 III/IV 期，显著高于阴性患者（24.39%）。Gal-9 阳性组的平均 CT 值、 Δ CT 高于阴性组，最大 CT 值低于阴性组。患者的平均 CT 值和 Δ CT 与 Gal-9 的 IHC 评分正相关（ $R=0.803$ ， $p<0.001$ ； $R=0.752$ ， $p<0.001$ ），而最大 CT 值与 Gal-9 的 IHC 评分

负相关 ($R=-0.471$, $p<0.001$)。最大 CT 值的 AUC 为 0.856 (95%CI, 0.778-0.935, $p<0.0001$)，用最大 CT 值预测 Gal-9 表达水平的 cut-off 值为 -433.071，灵敏度为 87.8%，特异度为 73.9%。结论：Gal-9 可能是预测肺腺癌预后的有效指标。增强 CT 的最大 CT 值可能是 pGGN 肺腺癌 Gal-9 表达水平的潜在预测因素。

PU-1997

周围型肺肉瘤样癌与孤立性肺炎性病变及非小细胞肺癌的临床及 CT 特征对照分析

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目的 探讨周围型肺肉瘤样癌 (PLSC) 与孤立性肺炎性病变 (SPL) 及非小细胞肺癌常见亚型 (CNSCLC) 的临床及 CT 特征差异，以期提高 PLSC 的诊断正确率。**方法** 回顾性收集近十年我院经手术病理证实的 30 例 PLSC (肉瘤样癌组)，并随机选取同期收治的 68 例 SPL (肺炎组) 及 73 例 CNSCLC (肺癌组) 作为对照组，分别比较 PLSC 与 SPL 及 CNSCLC 的临床及 CT 特征。**结果** PLSC 与 SPL 的比较：①临床特征：肉瘤样癌组吸烟史及恶性肿瘤家族史的发生率高于肺炎组，差异均有统计学意义 (p 均 <0.05)。②CT 特征：肉瘤样癌组分叶征、分叶数量 ≥ 5 、大面积坏死、充气支气管征及环形强化的出现率高于肺炎组，晕征、与胸膜紧贴、邻近胸膜增厚、坏死区周围线样强化影的出现率、 ΔCT 值_{动脉期}及 ΔCT 值_{静脉期}低于肺炎组，差异均有统计学意义 (p 均 <0.05)。③Logistic 回归分析示有恶性肿瘤家族史、存在充气支气管征及环形强化、不与胸膜紧贴及 ΔCT 值_{静脉期}较小为 PLSC 的独立预测因子，该模型诊断 PLSC 的 AUC、正确百分比、敏感性 & 特异性分别为 0.963、92.9%、93.3% 及 92.6%。PLSC 与 CNSCLC 的比较：①临床特征：肉瘤样癌组吸烟史、恶性肿瘤家族史及呼吸道症状的发生率高于肺癌组，差异均有统计学意义 (p 均 <0.05)。②CT 特征：肉瘤样癌组病灶最长径大于肺癌组，坏死、大面积坏死及环形强化的出现率高于肺癌组，毛刺征及分叶数量 ≥ 5 的出现率、 ΔCT 值_{动脉期}及 ΔCT 值_{静脉期}低于肺癌组，差异均有统计学意义 (p 均 <0.05)。③Logistic 回归分析示有呼吸道症状、病灶较大、分叶数量 < 5 及存在环形强化为 PLSC 的独立预测因子。该模型诊断 PLSC 的 AUC、正确百分比、敏感性 & 特异性分别为 0.897、84.5%、83.3% 及 82.2%。**结论** PLSC 与 SPL 及 CNSCLC 的临床和 CT 特征有明显不同。

PU-1998

Application Value of Magnetic Resonance Diagnosis in Takotsubo Cardiomyopathy and its Classification

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Objective: To analyze cardiac magnetic resonance of Takotsubo cardiomyopathy and its phenotypic expression in order to achieve better understanding of this disease.

Methods: We evaluated 14 cases who were admitted to our hospital with the diagnosis of Takotsubo cardiomyopathy. CMR was performed within 1 week after admission and MRI data were retrospectively analyzed.

Results: Most patients had suffered psychological trauma, physical injury and other stress factors. Electrocardiogram was similar to acute myocardial infarction. Cardiac magnetic resonance

imaging showed LV regional wall motion abnormalities. According to the distribution of wall motion abnormalities, TTS has three types: apical ballooning(8 cases), midventricular(1 case), focal wall motion(5 cases). All cases appear myocardial edema. 4 cases abnormal myocardial enhancement were noted. The abnormal motion segments do not conform to the pattern of coronary artery distribution.

Conclusions: CMR is best diagnostic modality for the diagnosis of takotsubo cardiomyopathy. It plays an important role in differentiating from acute myocardial infarction and myocarditis.

PU-1999

冠状动脉 CT 的血流储备分数 (CT-FFR) 对心肌缺血的无创诊断中的应用价值

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目的 探讨基于冠状动脉 CT 的血流储备分数 (CT-FFR) 对心肌缺血的无创诊断中的应用价值。方法 回顾性入选 2017 年 6 月至 2021 年 6 月山西省心血管病医院完成冠状动脉 CCTA 检查并进行冠状动脉造影术的心绞痛住院患者。基于冠状动脉 CT 图像, 利用 CT-FFR 软件来建模计算 CT-FFR 值。以冠状动脉造影术 ICA 作为诊断金标准, 计算 CT-FFR 诊断心肌缺血的敏感度、特异度、阳性预测值、阴性预测值及准确度。结果 入选患者 76 例共 172 处病变血管。CT-FFR 的诊断冠状动脉狭窄病变的敏感度为 66.7%, 特异度为 90.6%, 阳性预测值为 92.3%, 阴性预测值为 61.7%, 准确性为 75.6%。结论 CT-FFR 作为一种无创的、临床易行的、准确的血流动力学信息检测方案, 能够区分出可引起心肌缺血的血管病变, 能够减少患者进行介入式冠脉造影的需求, 降低整体医疗费用。

PU-2000

冠状动脉 CT-FFR 值对心血管终点事件的预测价值

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目的: 分析冠状动脉 CT-FFR 值与终点事件发生的相关性。方法: 分为 CCTA 成像和 CT-FFR 测量两个阶段。对 2016 年 6 月 — 2019 年 6 月行 CCTA 检查狭窄程度为 70%-80% 的患者 52 例作为研究对象。对其进行 CT-FFR 分析。获得 CTA 影像资料后, 然后再进行 CT-FFR 分析, 随访患者 3 年内心血管终点事件的发生率。将 CT-FFR 的临界值设定为 0.8, 20 例 CT-FFR<0.8, 32 例 CT-FFR>0.8。分析 CT-FFR 值与终点事件发生的相关性。研究主要终点为全因病死率、非致命性心肌梗死 (心梗) 或不稳定型心绞痛需要住院治疗。

结果: 冠状动脉 CT-FFR<0.8 组心血管终点事件发生率高于 CT-FFR>0.8 组, 差异均有统计学意义 ($P<0.05$)。

结论: 通过 CT-FFR 统计学分析后 CT-FFR 值可能对冠心病患者的心血管终点事件起到重要的预测作用, 对此类患者可以进行该检查, 以进一步指导临床工作。

PU-2001

基于人工智能 CT 定量参数对肺混合磨玻璃结节侵袭性的预测价值

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目的: 探讨基于人工智能 (AI) CT 定量参数对肺混合磨玻璃结节 (mGGNs) 侵袭性的预测价值。
方法: 回顾性分析 2018 年 1 月至 2019 年 12 月经手术病理证实的 121 例 mGGNs 患者的薄层 CT 图像, 依据病理类型分为 3 组, 分别为浸润前病变 23 例, 其包括原位腺癌(AIS) 16 例, 非典型腺瘤样增生(AAH) 7 例微浸润腺癌 (MIA) 36 例, 浸润性腺癌 (IAC) 组 62 例。采用 AI 肺结节分析进行定量分析, 得到三组不同侵袭性 mGGNs 的体积、长径、短径、最大 CT 值、最小 CT 值、平均 CT 值、CT 值偏度、CT 值峰度和恶性概率。比较三组间 AI 量化参数的差异。
结果: 基于 AI 定量比较 3 组病理类型的 mGGNs 在体积、长径、短径、最大 CT 值、最小 CT 值、平均 CT 值、CT 值偏度、CT 值峰度和恶性概率差异均有统计学差异($P < 0.05$)。进一步两两对比, 体积、长径、短径方面均为 AAH+MIA 最小, IAC 最大, AIS 介于中间, 差异有统计学差异($P < 0.05$); 最大 CT 值、最小 CT 值、平均 CT 值、CT 值偏度、CT 值峰度方面, AAH+MIA 和 AIS 之间无统计学差别 ($P > 0.05$), 但 AAH+MIA 和 AIS 的最大 CT 值、最小 CT 值、平均 CT 值小于 IAC, CT 值偏度、CT 值峰度大于 IAC, 差异均有统计学差异($P < 0.05$)。AI 预测 3 组病理类型的 mGGNs 仅在 AIS 和 IAC 间存在统计学差异, 其余两组间比较无统计学差别 ($P > 0.05$)。
结论: 基于 AI 定量肺结节的体积、长径、短径、最大 CT 值、最小 CT 值、平均 CT 值、CT 值偏度、CT 值峰度和恶性概率对 mGGNs 的病理侵袭性有一定预测作用。

PU-2002

基于心脏磁共振对男性业余马拉松运动员左心室心肌应变的研究

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目的: 分析长期多次马拉松运动对业余马拉松运动员心脏结构和功能的影响。
方法: 对 32 名男性业余马拉松运动员(44 ± 7 岁)和 12 名男性健康对照者(42 ± 8 岁)进行心脏磁共振 (CMR) 检查。采用特征跟踪应变分析对男性业余马拉松运动员心脏结构和功能的相关参数进行研究。
结果: 与健康对照组相比, 业余马拉松运动员心率(HR, heart rate)、身体质量指数(BMI, body mass index)和体表面积(BSA, body surface area)较低。业余马拉松运动员左室质量指数(LV mass index), 左室舒张末期容积指数(LV end-diastolic volume index) 和右室收缩末期容积指数(right ventricular end-systolic volume index)均显著高于健康对照组。此外, 业余马拉松运动员的室间隔厚度(IVS, interventricular septum)比健康对照组高。两组志愿者左新心室总心肌应变(GMS, global myocardial strain)水平的差异无统计学意义。然而, 业余马拉松运动员的左心室在第 8 和第 9 节段节段径向和周向应变较健康对照组相比较低, 最后, 我们还发现随着总运动强度的增加, 整体纵向应变也随之增加。
结论: 我们发现与健康对照组相比, 业余马拉松运动员室间隔厚度较高, 区域径向和周向应变较低, 表明长时间和高强度运动可能导致心脏重构。对于业余马拉松运动员来说, 这是否是一种适应性的变化, 还需要进一步的研究。

PU-2003

前置双流注射法注射方案在 CTPA 检查中的应用研究

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目的：通过碘对比剂前置双流注射法注射方案在 CTPA 检查中的应用研究并与常规注射法 CTPA 进行对比，寻找到对比剂用量少且效果更优的检查方法。

方法：1.设备与扫描参数：西门子 128 层螺旋 CT，螺距 1.4，管电压 100kv，延时 4s 启动扫描。2.扫描范围及方向：肺尖至膈底，足到头方向扫描。3.患者选择：选取 1 月-9 月来我院行 CTPA 检查的患者 80 例，随机分为实验组与对照组，每组各 40 例。实验组采用前置双流注射法，对照组采用常规注射法。4.对比剂注入方案：选择患者右肘正中静脉建立静脉通道，采用双筒高压注射器，对比剂选用碘克沙醇（320mgI/ml）。实验组注射方案：先以药：水=3:7，流速 4.0ml/s，注射 15ml 混合液，接着注射 15ml 纯对比剂，流速 4.0ml/s，最后注入 40ml 生理盐水，流速 4.0ml/s；对照组采用常规注射方法，先注射 35ml 对比剂，流速 4.0ml/s，在注射 40ml 生理盐水，流速 4.0ml/s。两组均使用团注追踪法，监测层面均为肺动脉干，阈值 70HU。5.评价方法与标准：由两位高年资医师采用双盲法对血管图像进行评价并打分。肺动脉干 CT 值不低于 250HU 为 1 分，远端肺动脉 CT 值不低于 200HU，左心房及肺静脉 CT 值低于 150HU 为 1 分。

结果：1.利用 spss22.0 进行统计分析，实验组与对照组在肺动脉干，远端肺动脉及左心房 CT 值均无统计学差异（ $p>0.05$ ）。2.实验组对比剂用量（19.5ml）明显少于对照组（35ml）。

结论：通过使用碘克沙醇，利用前置双流注射法注射方案行 CTPA 检查减少了患者的碘对比剂用量，降低了使用碘对比剂可能造成的肾毒性反应发生概率，保证患者安全的同时提供了较好的图像质量；另一方面，由于其仍采用对比剂团注追踪法，操作简单可行，在低于 128 层螺旋 CT 上同样适用。

PU-2004

前纵隔伴有淋巴样间质的微结节型胸腺瘤 4 例

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目的：探讨伴有淋巴样间质的微结节型胸腺瘤（MNT）的临床、影像及病理特征。方法：回顾性分析 4 例 MNT 的临床资料、影像表现、病理学特征、治疗及预后。结果：4 例 MNT 患者，男 2 例，女 2 例，年龄 52-64 岁，2 例无症状，2 例因乏力就诊。影像表现均发现前纵隔占位性病，最大径 2-10cm，其中 3 例表现为囊实性肿物，1 例为实性肿物，实性部分中度强化，与周围界限清楚。均进行手术完整切除，病理证实为 MNT。大体大部分包膜，镜下 2 例局部侵及包膜。组织学特征为丰富的淋巴细胞间质分隔增生的上皮样细胞呈结节样分布，细胞呈梭形或卵圆形，形态温和，未见病理性核分裂及坏死，淋巴细胞间质可见具生发中心的滤泡。免疫表型：短梭形上皮细胞 CKpan、CK19 阳性，CD20、CD5 和 CD117 阴性，淋巴间质中生发中心细胞 CD20 阳性。术后随访最短者 1 年 7 个月，最长者 4 年 4 个月均未复发。结论：伴有淋巴样间质的微结节型胸腺瘤（MNT）是一种十分罕见的特殊类型的胸腺瘤，生物学行为良好，易囊变，依病理组织学特征及免疫表型确诊，手术完整切除为主要治疗手段，术后预后良好。

PU-2005

CT-based radiomics combined with clinical features for invasiveness prediction and pathological subtypes classification of subsolid pulmonary nodulesMiaozhi Liu¹, Rui Duan², Zhifeng Xu², Yan Lin¹, Zijie Fu¹

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Purpose: To construct optimal models for predicting the invasiveness and pathological subtypes of subsolid nodules (SSNs) based on CT radiomics and clinical features.

Methods: This study was a retrospective study involving two centers. A total of 316 patients with 353 SSNs confirmed as atypical adenomatous hyperplasia (AAH), adenocarcinoma in situ (AIS), minimally invasive adenocarcinoma (MIA) and invasive adenocarcinoma (IAC) were included from January 2019 to February 2023. Models based on CT radiomics combined with clinical features were constructed for classification of AAH/AIS and MIA, MIA and IAC, as well as lepidic-predominant adenocarcinoma (LPA) and acinar-predominant adenocarcinoma (ACI). Receiver operating characteristic (ROC) curve was used to evaluate the model performance. Finally, the nomograms based on the optimal models were established to predict the invasiveness of LUNG-RADS 4X SSNs.

Results: The combined model including lobulation, the GGN-vessel relationship, diameter, CT value, consolidation tumor ratio (CTR) and rad-score performed the best for distinguishing AAH/AIS from MIA (AUC=0.841) and the nomogram based on this model distinguished AAH/AIS from MIA in the Lung-RADS 4X SSNs, with the sensitivity and specificity of 73.3% and 80%, respectively. The combined model including age, CT value, CTR and rad-score was the most effective in distinguishing MIA from IAC (AUC=0.878), and the sensitivity and specificity of the nomogram based on this model for distinguishing MIA and IAC in the Lung-RADS 4X SSNs were 73.3% and 86.7%, respectively. There were no significant differences in clinical features between LPA and ACI, while the radiomics model based on rad-score showed good performance for distinguishing LPA from ACI (AUC=0.926).

Conclusions: The nomograms based on radiomics and clinical features could predict the invasiveness of SSNs accurately. Moreover, radiomics models showed good performance in distinguishing LPA from APA.

PU-2006

A study of the impact of coronary CTA artificial intelligence on the work efficacy of resident physicians with different years of trainingTianhui Zhang, Zheng ZHONG, Zhifeng HUANG, Weixiong FAN
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Objective To explore the impact of coronary CTA-AI on the work efficacy of resident physicians with different years of training. **Methods:** Forty-four patients who received coronary CTA examination in our hospital from June 2022 to July 2022 were collected. Junior and senior resident-trained physicians used reading alone and AI-assisted reading to interpret coronary CTA images, and recorded the presence or absence of stenosis in each branch vessel and the reading time. The coronary angiogram (CAG) was used as a reference standard to calculate the sensitivity and specificity of coronary artery stenosis diagnosis by resident-trained physicians reading alone versus AI-assisted reading. The paired chi-square test was used to compare the

differences in diagnostic efficacy between the two reading methods by resident-trained physicians. The paired t-test was used to compare the differences in reading time between the two methods. Results: The specificity of coronary artery stenosis diagnosis by CTA AI-assisted reading was significantly higher than that by reading alone, and the difference was statistically significant ($P < 0.05$), and the sensitivity of coronary artery stenosis diagnosis was slightly higher than that by reading alone, but the difference was not statistically significant ($P > 0.05$). The reading time of coronary CTA AI-assisted reading by junior and senior resident-trained physicians was significantly shorter than that of reading alone ($P < 0.05$). Conclusion: Coronary CTA artificial intelligence can significantly improve the specificity of diagnosis of coronary artery stenosis and significantly shorten the reading time of resident physicians with different years of training.

PU-2007

第二代冠状动脉追踪冻结 (SSF2) 技术在高心率患者冠脉 CTA 成像中的临床应用

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目的:

探索第二代冠状动脉追踪冻结 (SSF2) 技术在高心率患者冠脉 CTA 成像中的临床应用价值。

材料与方法:

随机收集 100 例行冠脉 CTA 扫描且心率 ≥ 75 次/min 的患者冠脉 CTA 图像, CT 扫描管电压为 100 kV, 采用智能心电门控技术自动选择曝光期相。将原始数据分别重建出 3 组图像: A 组为常规图像; B 组为采用 SSF1 技术的重建图像; C 组为采用 SSF2 技术的重建图像。对 3 组冠脉 CTA 图像的质量评分及可诊断率进行评估。

结果:

100 例高心率患者冠脉 CTA 图像的评估结果显示: A 组与 C 组、B 组与 C 组右冠状动脉、左前降支、左回旋支、冠状动脉起源和冠状动脉评分及可诊断率差异均有统计学意义 (P 均 < 0.05), 主动脉瓣、肺动脉瓣、二尖瓣及三尖瓣图像质量评分均有统计学意义 (P 均 < 0.05)。

结论:

采用第二代冠状动脉追踪冻结 (SSF2) 技术可以进一步改善高心率患者冠状动脉 CT 血管成像质量。

PU-2008

团注追踪触发扫描技术延迟时间对支气管动脉 CTA 成像质量的影响

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目的: 探讨团注追踪触发扫描触发后不同延迟时间对支气管动脉 CTA 成像质量的影响; 方法: 回顾性分析徐州市肿瘤医院 2021 年 1 月到 2022 年 6 月共 60 名患者的支气管动脉 CTA 检查, 均使用团注追踪动态触发方法进行扫描。其中 A 组患者触发后使用最短延迟时间扫描 (7.6 秒), B 组患者触发后 11.6 秒开始扫描, 对比剂 (碘海醇 350mg/ml) 使用剂量为 1.0ml/kg, 注射速率 3.5ml/s, 其他扫描条件相同 (检测面采用器官分叉水平, 触发阈值为 90HU, 均使用能谱 60keV 单能量重建)。由 2 位 10 年以上工作经历的影像诊断医师对每个图像质量进行评分, 如果意见不一

致请上级医师会诊后作为最终结论。分别比较患者增强后降主动脉及两组支气管动脉图像, 将其质量差异、伪影、是否存在干扰等情况进行汇总分析。使用 Graphpad 6.0 分析软件, 采用秩和检验评价医师对图像质量评分的差异性; 采用独立样本 t 检验比较患者增强后降主动脉及支气管动脉起始部 CT 值净增值的差异。结果: 增强后支气管分叉水平降主动脉 CT 值净增值两组之间差异均无显著性意义($p>0.05$)、支气管动脉起始部 CT 值净增值两组之间差异有显著性意义($p<0.05$); 分叉水平降主动脉图像质量评分两组间差异无统计学意义($p>0.05$)、支气管动脉图像质量评分两组间差异有统计学意义($p<0.05$), 研究发现 B 组数据除了支气管动脉起始部 CT 值和图像质量更理想之外, 腔静脉、肺动脉、肺静脉对支气管动脉的干扰也有明显改善。结论: 使用团注追踪触发扫描方法进行支气管动脉 CTA 时, 触发后不同的延迟时间对支气管动脉成像质量有较大影响, 同时肺动脉、腔静脉、肺静脉对支气管动脉的干扰也会有较大的区别。综上所述, 选择合适的阈值和延迟时间可以提高支气管动脉 CTA 扫描的图像质量。

PU-2009

探讨第 3 代双源 CTTurbo Flash 高心率 CCTA 成像的可行性

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【摘要】目的 在第三代西门子 CT Turbo Flash 扫描模式下行高心率冠状动脉 CT 血管成像(CCTA)检查并探究其可行性。方法 选取 2019 年 4 月—2020 年 5 月于扬州大学附属医院行 CCTA 的 80 例患者为实验组并随机分为两组 (A 和 B), 患者心率要求为高于 80 次/min 且小于 100 次/min。A 组患者采用第三代双源 CT Turbo Flash 模式扫描, B 组用回顾性模式扫描。评估两组图像主动脉根部的 CT 值、图像的信噪比(SNR)、图像的对比噪声比(CNR)以及右冠状动脉近段、左冠状动脉主干, 评估方法与上诉一致。CT 图像质量主观评分、有效辐射剂量 (ED) 也要纳入评分。结果 两组对象数据的 SNR、CNR 差异均有统计学意义 (均 $P < 0.05$), 但 CT 值差异无统计学意义 ($P > 0.05$); 两组左冠状动脉主干以及右冠状动脉近段的 CT 值、SNR 和 CNR, 以及两组图像质量主观评分比较, 其差异均无统计学意义 (均 $P > 0.05$)。Turbo Flash 扫描模式有效辐射剂量低于回顾性模式 ($P < 0.05$)。结论 面对高心率患者时, 第三代双源 CT 的 Turbo Flash 的扫描模式行 CCTA 检查的图像质量大部分能满足临床诊断要求, 且 $ED < 1 \text{ mSv}$, 但是研究中发现用 Turbo Flash 模式扫描获取的图像质量评分不如回顾性模式。在面对高心率患者屏气无法配合时, 行 Turbo Flash 扫描可一定程度解决呼吸问题。

PU-2010

小视野 DWI 联合 T2WI 压脂鉴别肺实性结节的价值

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目的: 探究小视野扩散加权成像(r-FOV DWI)联合 T2WI 压脂能否提高肺实性结节的良恶性鉴别诊断价值。

方法: 回顾性分析 108 例患者的临床及胸部 MRI 影像资料。在压脂 T2WI 沿结节边缘手动绘制感兴趣体积, 获得病灶体积、平均信号强度及信号强度标准差, 定义 T2 对比度(T2CR)为肺结节的平均 T2 信号强度除以菱形肌的 T2 信号强度的比率, 在 r-FOV ADC 图上绘制病灶的感兴趣区获得平均 ADC 值。建立受试者工作特征曲线(ROC)确定参数的诊断效能。

结果: 肺癌 ADC 值 ($1.08 \pm 0.33 \times 10^{-3} \text{ mm}^2/\text{s}$) 低于良性肺结节 ($1.82 \pm 0.60 \times 10^{-3} \text{ mm}^2/\text{s}$) ($P < 0.001$), 肺癌 T2CR (1.91 ± 0.83) 低于良性肺结节 (2.66 ± 0.94) ($P < 0.001$)。当 ADC 值取

1.34×10⁻³ mm²/s 时, AUC 为 86.2%, 敏感度为 80.4%, 特异度为 79.0%。当 T2CR 取 2.25 时, AUC 为 72.8%, 敏感度为 72.6%, 特异度为 64.9%。ADC 值和 T2CR 联合检测的敏感度为 82.4%, 特异度为 87.7%, AUC 为 93.1%。

结论: r-FOV DWI 联合 T2WI 压脂后能提高肺实性结节良恶性的诊断效能。

PU-2011

HRCT manifestations of pulmonary cryptococcosis with infiltrative consolidation and mixed type

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[Abstract] Objective: To analyze the HRCT manifestations of consolidation, infiltration, and mixed types of pulmonary cryptococcosis and improve diagnosis. Methods: Clinical and CT data of 32 patients with consolidation, infiltration, and mixed types of pulmonary cryptococcosis confirmed by pathology or clinical diagnosis were retrospectively collected. Results: There were 7 cases of consolidation type and 25 cases of mixed type. On CT, 22 cases involved a single lung lobe, and 27 cases involved the lower lung lobe. In 29 cases, the lesions were mainly distributed in the outer or outer-middle zone of the lung, and in 15 cases, the long axis of the lesion was parallel to the pleura. Ground-glass density or halo sign around the lesion was observed in 16 cases; 8 cases had cavities inside the lesion, all of which were small cavities; 23 cases had signs of proximal bronchial inflation. Among the mixed type cases, 22 had a tendency to fuse with the lesions in the same lung lobe, and 3 cases had a clustered distribution without fusion. Conclusion: Consolidation, infiltration, and mixed types of pulmonary cryptococcosis often present with nodules and/or masses, most of which are located in the outer or outer-middle zone of the lung and are more common in the lower lung lobe. Ground-glass density or halo sign around the lesion is relatively specific, and there is a tendency to fuse or cluster with the lesions in the same lung lobe.

PU-2012

深度学习重建后处理技术联合“三低”冠状动脉 CTA 血管重建在老年患者中的应用价值

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目的 探讨低管电压、低碘对比剂用量及低辐射剂量(三低)扫描结合深度学习重建后处理技术用于冠状动脉 CT 血管成像检查(CCTA)的可行性。方法 前瞻性连续纳入 2021 年 10 月-12 月在本院行冠状动脉 CTA 检查患者 66 例,随机分成实验组(A 组)和对照组(B 组),A 组 32 例,B 组 34 例,A 组采用 80 kV 管电压及低对比剂用量和流速,B 组采用 120 kV 管电压及常规对比剂用量和流速。所有图像由人工智能辅助软件进行图像后处理,评估冠状动脉各节段血管的客观和主观图像质量,并分析比较两组的辐射剂量。结果 共 990 个冠状动脉节段纳入主观评估,2 名观察者之间的图像主观评分一致性较好(Kappa 值=0.636, P=0.021),B 组图像质量主观评分优于 A 组(1.61±0.22 VS. 2.08±0.13, P<0.001)。两组动脉 CT 均值在 300HU 以上,均满足了医师诊断要求。A 组主动脉根部、左主干、左前降支和左回旋支的 CT 值均较 B 组为高(P 均<0.05)。右冠状动脉中段处 A 组噪声高于 B 组(21.34±6.11 VS. 17.40±5.03, P<0.05)。A 组的 SNR 和 CNR 在主动脉根部处高于 B 组(31.95±8.25 VS. 23.26±7.03, 35.90±9.44 VS. 26.86±7.87, P<0.001)。A 组有效辐射剂量、CT 容积剂量指数与辐射剂量长度乘积均低于 B 组

(98.64 ± 49.93 VS. 232.72 ± 82.69 , 1.38 ± 0.70 VS. 3.26 ± 1.16 , 21.07 ± 11.75 VS. 28.28 ± 5.82 , $P < 0.001$)。结论 结合深度学习重建后处理血管重建图像的“三低”CCTA 扫描质量较常规 CCTA 为高, 降低了老年患者的辐射剂量和碘摄入量, 具有良好的临床应用价值。

PU-2013

原发性肺恶性脑膜瘤：病例报告及文献复习

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目的: 介绍一例原发性肺恶性脑膜瘤的影像学表现和病理诊断。

方法: 一例 47 岁女性患者, 因体检发现肺部肿块 1 月余入院。入院后进行了影像学检查和支气管镜活检, 并很快接受了手术治疗。

结果:

胸部增强 CT: 左侧胸腔内有一个 $5.5 * 5.8 * 7.4$ cm 的肿块, 病灶位于左肺下叶, 近肺门旁, 跨左肺斜裂生长, 部分累及左肺上叶, 其内见线样致密影, 邻近支气管明显受压推挤, 邻近肺组织呈“晕征”改变; 增强后肿块呈不均匀轻中度渐进性强化, CT 诊断提示为肺部恶性肿瘤。PET/CT: 病灶放射性摄取不均匀性增高, SUV 最大值约 4.4; 左肺门淋巴结肿大与左肺门肿块分界不清, 放射性摄取轻度增高, SUV 最大值约 2.6, 考虑恶性肿瘤性病变, 建议穿刺活检。颅脑 MR 平扫+增强未见异常改变。

支气管镜检: 探及左下基底支开口处肿块, 开口粘膜浸润隆起, 开口狭窄, 于此处进行灌洗、刷检、活检, 液基细胞学检查找到异型细胞, 低分化癌不能除外。

病理所见: 左下肺叶切除标本示, 距支气管切缘 0.5cm 紧贴肺膜见一巨大肿物, 范围 $6 * 6.5 * 5.8$ cm, 切面灰白, 质中。标本苏木精-伊红染色显示肿瘤细胞呈梭形、束状、漩涡状、团块状排列, 局灶侵犯支气管软骨, 未累及肺膜; 送检淋巴结均未见癌转移。

免疫组织化学染色: EMA (+), SSTR2 (+), PR (+), Ki-67 (5-10%+), CD34, D2-40 (+), P53 (散在弱+)。

病理诊断: 肺原发性脑膜瘤。

术后 2 月复查: 实验室检查 CA125 为 109.2 U/mL (参考值 < 35 U/mL), 显著高于术前的 18.8 U/mL; 其它肿瘤标志物如甲胎蛋白、癌胚抗原、CA199、CA153 未见异常。截止目前, 患者尚未出现身体其它部位转移的影像学征象。

结论: 恶性 PPM 较少见, 缺乏明确的病理学定义来区分良恶性 PPM。潜在病例应根据影像学、实验室和病理学结果进行综合评估。需要长期定期随访以排除 PPM 的转移或复发。

PU-2014

MRI findings and its staging value of primary anterior mediastinal Hodgkin lymphoma

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Objective: To study the MRI findings of primary anterior mediastinal Hodgkin lymphoma (PAMHL) and its value in Ann Arbor clinical staging. **Methods:** A total of 32 patients with PAMHL confirmed by histopathology were enrolled retrospectively. The MRI findings were evaluated independently by two radiologists in double-blinded manner, including tumor size, homogeneity, fibrous septum

sign, apparent diffusion coefficient (ADC) value, and so on. Subsequently, we analyzed the inter-observer agreement of these MRI findings and assessed their values in the differential diagnosis of early-stage and advanced-stage PAMHL. Results: The size of PAMHL ranged from 5.3cm to 20.5cm, with an average length of 9.6 ± 3.7 cm. Twenty-five lesions (78.1%) presented heterogeneous signal intensity; 20 lesions (62.5%) showed fibrous septum sign, 18 of which were nodular sclerosis HL; 16 lesions (50.0%) appeared as lymph node fusion; 29 lesions (90.6%) had lymphadenectasis, 15 of which showed mass-like lymph nodes with short diameter ≥ 3 cm. Among the 32 PAMHL, tumors invaded lung tissue in 15 cases (46.9%), pericardium in 13 cases (40.6%), blood vessel in 10 cases (31.3%), chest wall in 7 cases (21.9%), and phrenic nerve in 1 case (3.1%). The average ADC value of PAMHL was $(0.801\pm 0.112)\times 10^{-3}\text{mm}^2/\text{s}$. Mass-like lymph node was significantly more seen in advanced-stage than in early-stage PAMHL ($P=0.014$). Conclusion: PAMHL has certain characteristic MRI findings. Mass-like lymph node can be used to distinguish early-stage and advanced-stage PAMHL, which is helpful to guide clinical staging and predict prognosis.

PU-2015

肺小结节术前 CT 引导下 Sencure 定位的临床应用

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背景与目的 对于直径 <1 cm 的肺小结节,在胸腔镜术中较难准确定位。近年来,大量学者尝试使用各种方法进行术前的肺小结节定位。本文从适应症、结果、并发症三个方面回顾性分析了胸腔镜术前 CT 引导下 Sencure 定位针的临床应用价值。

方法 2022 年 1 月-2022 年 4 月,50 例患者于胸腔镜术前接受了 CT 引导下肺小结节 Sencure 定位。小结节直径从 0.5 cm-2 cm (平均 $9.8\text{ cm}\pm 5.3\text{ cm}$)。评价指标包括定位操作时间、成功率、定位相关并发症,中转开胸比率等。

结果 50 例患者中 50 例定位成功,CT 定位花费时间平均为 13.5 min,全组无严重并发症发生。结论 胸腔镜术前 CT 引导下肺小结节 Sencure 定位有一定的临床应用价值,可帮助术中精确定位肺小结节位置,并且并发症发生率较低,并减少手术时间。

PU-2016

Pulmonary extranodal NK/T-cell lymphoma mimics pneumonia in a patient with diabetes

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A 59-year-old man with diabetes was hospitalized because of recurrent fever, right foot tenderness, blurred vision and multiple skin nodules for 1 month. Chest computed tomography (CT) revealed multiple lobulated, mildly enhanced masses in the peripheral lungs, considering pneumonia (Figure 1A-D). However, multiple bacterial and fungal cultures and tuberculosis GeneXpert were negative on bronchoalveolar lavages. He still had a recurrent fever and more skin nodules during the 2 weeks of antibiotics. Pathology examination of lung biopsy showed extranodal NK/T cell lymphoma (ENKTL) (Figure 1E). Fluorine-18-fluorodeoxyglucose positron emission tomography (18F-FDG PET)/CT demonstrated high FDG uptake in lung lesions, multiple lymph nodes and scattered subcutaneous nodules (Figure 1F). His Epstein-Barr virus (EBV) antibody and DNA were positive but normal nasopharynx on MRI. Chemotherapy was implemented.

ENKTL has the highest incidence in Asia and South America and may be related to EBV infection and ethnic genetic background 1,2.It occurs most frequently in the nasal cavity and upper respiratory tract, and some can be in the skin and gastrointestinal tract, but rare in the lung. 3. Extra-nasal ENKTL is highly aggressive and has a worse prognosis than nasal ENKTL 4,5. Refractory pneumonia and multiple subcutaneous nodules may indicate other systemic disorders, and biopsy is helpful for the etiology and subsequent management.

PU-2017

深度学习重建在改善双低肺动脉 CTA 图像质量、评估 Qanadli 栓塞指数中的应用价值

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目的 在低对比剂用量、低辐射剂量的双低肺动脉 CT 血管成像 (CTPA) 检查中, 比较深度学习重建 (DLR) 与自适应迭代重建 (ASiR-V) 的图像质量及 Qanadli 栓塞指数。 **方法** 回顾性分析 2020 年 10 月至 2021 年 3 月徐州医科大学附属医院放射科 88 例行 CTPA 双低扫描患者的资料, 其中男 44 例, 女 44 例, 年龄 11~87 岁 (61 ± 15 岁)。采用 80 kV 管电压, 20 ml 对比剂用量, 扫描数据分别进行标准内核深度学习高档重建 (DL-H) 和 ASiR-V 重建, 并将患者分为标准内核 DL-H 组 (88 例, 栓塞阳性 33 例) 及 ASiR-V 组 (88 例, 栓塞阳性 36 例)。分析比较两种重建算法的 CT 值、图像噪声、信噪比 (SNR)、对比噪声比 (CNR)、主观图像质量评分、Qanadli 栓塞指数、阳性率及阳性 Qanadli 栓塞指数差异。 **结果** 标准内核 DL-H 和 ASiR-V 两种重建算法组间肺动脉主干及右肺动脉干、左肺动脉干的 CT 值差异均无统计学意义 (均 $P>0.05$)。标准内核 DL-H 组肺动脉主干及右肺动脉干、左肺动脉干的图像噪声较 ASiR-V 组降低 (均 $P<0.001$)。标准内核 DL-H 组肺动脉主干及右肺动脉干、左肺动脉干的 SNR 和 CNR 较 ASiR-V 组显著提高 (均 $P<0.001$)。标准内核 DL-H 组的主观图像质量评分较 ASiR-V 组显著提高 (4.6 比 3.8, $P<0.001$)。两组的 Qanadli 栓塞指数、阳性率及阳性 Qanadli 栓塞指数差异均无统计学意义 (均 $P>0.05$)。 **结论** 标准内核 DL-H 重建较 ASiR-V 重建能够显著提高双低扫描条件下的图像质量。

PU-2018

深度学习重建 CTPA 在急性 PE 患者临床危险度分层中的应用价值

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目的 在深度学习重建 (DLR) 条件下, 探讨低辐射剂量、低对比剂用量 CTPA 在急性 PE 患者临床危险度分层中的应用价值。 **方法** 回顾性搜集 2020 年 10 月至 2021 年 3 月在我院行双低剂量 CTPA 扫描的患者资料, 最终纳入 50 例, 其中男 27 例, 女 23 例, 依据患者临床基线数据分别行 Wells 可能性评分和 sPESI 严重程度评分。检查完成后分别行标准内核 DLR 高档 (DL-H) 重建和自适应迭代重建 (ASiR-V)。分析比较不同危险度分层患者 CTPA 两种重建算法的 CT 值、噪声、信号噪声比 (SNR)、对比噪声比 (CNR) 及主观质量评分。采用 SPSS 22.0 软件对数据进行分析, $P<0.05$ 差异有统计学意义。 **结果** Wells 评分为可能性小及可能的患者, 标准内核 DL-H 重建的肺动脉主干、左右肺动脉干 CT 值较 ASiR-V 重建均无统计学差异; 标准内核 DL-H 重建的肺动脉主干、左右肺动脉干图像噪声均显著低于 ASiR-V 重建 (均 $P<0.001$); 标准内核 DL-H 重建的肺动脉主干、左右肺动脉干 SNR 和 CNR 均显著高于 ASiR-V 重建 (均 $P<0.001$); 标准内核 DL-

H 重建的主观图像质量均显著高于 ASiR-V 重建 (均 $P<0.001$)。sPESI 评分为低危及中高危的患者, 标准内核 DL-H 重建的肺动脉主干、左右肺动脉干 CT 值较 ASiR-V 重建均无统计学差异; 标准内核 DL-H 重建的肺动脉主干、左右肺动脉干图像噪声均显著低于 ASiR-V 重建 (均 $P<0.001$); 标准内核 DL-H 重建的肺动脉主干、左右肺动脉干 SNR 和 CNR 均显著高于 ASiR-V 重建 (均 $P<0.05$); 标准内核 DL-H 重建的主观图像质量均显著高于 ASiR-V 重建 (均 $P<0.001$)。结论: 在不同危险度分层的急性 PE 患者中, 标准内核 DL-H 重建均能取得优于 ASiR-V 重建的图像质量, 满足临床诊断需求, 同时减少了辐射剂量及对比剂用量。

PU-2019

基于 CT 形态及定量学特征构建多原发肺腺癌、腺体前驱病变风险分层模型

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目的: 利用基线 CT 形态及定量学特征构建多原发肺腺癌 (MPLC)、腺体前驱病变不同病灶危险度分层的多因素预测模型。方法: 回顾性分析经手术病理证实的 72 例 MPLC、腺体前驱病变患者临床及影像学资料。根据病理类型将病灶分为低危组的不典型腺瘤样增生 (AAH) 及原位癌 (AIS), 将微浸润腺癌 (MIA) 及浸润性腺癌 (IAC) 归为高危组。采用 SPSS 22.0 软件进行统计分析, $P<0.05$ 认为差异有统计学意义。结果: 72 例患者经手术、病理证实 160 枚结节, 其中双原发病灶 57 例 (79.17%), 女性 52 例 (72.22%)。高危组、低危组病灶最大径、平均 CT 值和病灶体积间差异均有统计学意义 ($P=0.000, 0.001, 0.000$)。病灶最大径预测高危组的最佳截断值为 7 mm, AUC 值 0.910, 敏感性和特异性分别为 81.25% 和 86.61%。病灶体积预测高危组的最佳截断值为 323 mm³, AUC 值、敏感性、特异性分别为 0.904、91.67%、77.68%。将三个定量参数: 病灶最大径、体积、平均 CT 值纳入 Logistic 回归分析, 构建组合变量。ROC 曲线分析显示, 组合变量预测高危组病灶的 AUC 值为 0.939, 敏感性 90.00%, 特异性 85.71%, 差异具有统计学意义 ($P<0.0001$)。形态学特征上, 结节内部是否含有实性成分、实性成分多少在高低危组间有显著性差异 ($P=0.000, 0.000, 0.016$)。毛刺、分叶、胸膜牵拉、空泡、扩张支气管征等形态学特征在两组间差异同样具有统计学意义 ($P<0.05$)。结论: CT 形态学特征、定量参数能够在一定程度上对 MPLC 及腺体前驱病变进行危险度分层, 多参数组合定量模型的预测效能最佳。

PU-2020

CT 成像下左心耳形态和左心耳孔面积与缺血性卒中关系

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[摘要] 目的: 本研究通过 CT 成像技术来探讨左心耳形态和左心耳孔面积与缺血性卒中的关系, 希望提供一种无创且有效的方法预测缺血性卒中的危险因素。方法: 连续入选 2020 年 4 月—2021 年 4 月期间东南大学附属中大医院接诊的 60 例缺血性卒中的非瓣膜性房颤患者 (卒中组)。对照组包括 60 名年龄匹配的无卒中病史的非瓣膜性房颤患者。所有患者均接受了经胸超声心动图、经食道超声心动图和计算机断层扫描血管造影检查。CTA 检查完成后获得原始图像, 并测量左心耳孔面积; 使用 GE 公司的 AW4.61 工作站进行三维重建获得左心耳, 根据左心耳形态将其分为鸡翅型和非鸡翅型, 分析左心耳形态、左心耳孔面积与缺血性卒中的关系。结果: 临床资料中发现, 卒中组中持续性房颤所占比例较对照组明显增加, 卒中前 CHA₂DS₂-VASc 评分明显增高; 与对照组左心耳流速 (left atrial appendage flow velocity, LAFFV) [(50.8 ± 15.4) cm/s] 比较, 卒中组

[(32.0 ± 12.4) cm/s] 的 LAAFV 明显降低 ($P < 0.001$)；与对照组比较，卒中组的非鸡翅型左心耳形态比例明显增加 ($P < 0.001$)，左房内径和左心耳孔面积明显增大 ($P < 0.001$)；而卒中组的左心耳容积与对照组相比差异无统计学意义；将有统计学意义的变量纳入多元 Logistic 回归分析，结果显示，非鸡翅型左心耳形态、左心耳孔面积、左房内径、卒中前评分、LAAFV 是缺血性卒中的独立预测因子。结论：非瓣膜病房颤患者中，房颤类型、左心耳形态、左心耳孔面积、卒中前 CHA2DS2 - VASc 评分、左房内径、LAAFV 和缺血性卒中密切相关，非鸡翅型左心耳、较大的左心耳孔面积和左房内径是非瓣膜病房颤患者缺血性卒中的独立预测因子。

PU-2021

胸部 HRCT 对 COPD 患者肺功能的评估价值

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目的 分析高分辨率 CT (HRCT) 定量参数 (肺横截面面积缩小率、肺密度差) 与肺功能指标之间的相关性，探讨 HRCT 在慢性阻塞性肺疾病 (Chronic obstructive pulmonary disease, COPD) 患者肺功能评估的应用价值。方法 收集本院 2022 年 1 月至 2023 年 8 月收治的 60 例 COPD 患者的临床资料，所有患者入院后均接受胸部 HRCT 检查及临床肺功能检查，依据 COPD 评测结果将 COPD 患者分为 A 级、B 级、C 级和 D 级，比较各级患者 FEV1%、FEV1/FVC、MEF50、MEF25、MMEF75/25、RV/TLC、DLCO、肺横截面面积缩小率和肺密度差 (双肺吸、呼气相的平均密度差)，分析肺横截面面积缩小率、肺密度差与肺功能检查结果之间的相关性。结果 不同分级 COPD 患者之间 FEV1%、FEV1/FVC、MEF50、MEF25、MMEF75/25、RV/TLC、DLCO 比较差异有统计学意义 ($P < 0.05$)，不同分级 COPD 患者之间肺横截面面积缩小率和肺密度差异具有统计学意义 ($P < 0.05$)，不同级别 COPD 患者肺横截面面积缩小率、肺密度差异与肺功能检查结果之间呈负相关 ($P < 0.05$)。结论 HRCT 结合 COPD 评估测试对 COPD 患者的病情评估具有一定指导价值，能够为 COPD 肺功能评价提供参考信息。

PU-2022

高分辨 CT 影像组学在 COPD 诊断和严重程度分级的研究

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目的：探索基于高分辨率 CT 的影像组学在慢性阻塞性肺疾病 (COPD) 诊断和严重程度分级中的应用。

方法：回顾分析 300 名参与者 (包含 200 名 COPD 患者和 100 名对照组)。总共从每个参与者的高分辨 CT 图像中提取了 1566 个影像组学特征。采用方差阈值、选择 K 最优法和 LASSO3 种特征选择方法和支持向量机 (SAV) 和 Logistic (LR) 回归 2 种分类方法对 COPD 进行识别和严重程度分类。通过 AUC、准确度、敏感度、特异度、精确度和 F1 评分比较治疗效果。

结果：选择 40 个特征和 11 个特征构建影像组学模型，分别用于 COPD 的检测和分级。对于 COPD 的识别，SAV 分类器在训练集和测试集上的 AUC 值分别为 0.995 和 0.980，LR 分类器的 AUC 值分别为 0.996 和 0.982。对于 COPD 的严重程度分级，上述两种机器学习分类器可以较好的区分严重程度较轻组 (GOLD1+GOLD2) 和较重组 (GOLD3+GOLD4)，SAV 分类器在训练集和测试集上的 AUC 值分别为 0.905 和 0.780，LR 分类器的 AUC 值分别为 0.907 和 0.786。

结论：本研究表明，基于高分辨 CT 图像的影像组学方法可用于 COPD 的识别和严重程度分级，所构建的影像组学模型表现出较好的性能。

PU-2023

肺结核合并肺癌患者与单纯肺结核患者的 CT 鉴别诊断及价值分析

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肺结核是由结核分枝杆菌引起的慢性传染病, 疾病发生后的主要表现为肺间质炎性改变以及纤维化, 通过尽早诊治, 可使疾病预后改善[1]。目前临床上在对肺结核进行诊断时, X 线检查属于常用方法, 但临床实践发现, X 线检查中难以对病变细节予以清晰显示, 同时容易出现结构重叠的情况。随着 CT 检查在肺结核诊断中的应用率不断提升, 肺结核的检出率逐渐升高, 但对于其在继发性肺结核诊断中的应用效果尚无过多研究。肺癌属于呼吸道恶性肿瘤病变, 疾病的发生会导致患者出现咳嗽、咯血、胸闷气短等症状, 严重降低患者生活质量, 且病灶易发生转移, 会对患者生命产生严重威胁[2]。肺结核合并肺癌容易与单纯肺结核产生混淆, 可能使患者的疾病治疗被延误。因此做好患者的疾病诊断工作尤为重要。

PU-2024

基于 MRA 的 Stanford B 型主动脉夹层计算机仿真研究

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研究目的:

主动脉夹层 (Aortic Dissection, AD) 发病凶险、进展快, 其可引起重要器官的灌注不足甚至主动脉破裂, 进而危及生命, 故需要采取紧急手术或者进行血管内的修复。不同的 AD 病例往往具有较为显著的个体差异, 且常需根据病情制定个体化的诊疗方案。血流动力学因素在 AD 的发生、发展及诊疗中起着重要的作用, 但目前临床上不易获取系统、全面的血液动力学参数。计算机流体力学 (Computational Fluid Dynamics, CFD) 技术的出现为人们提供了一种能够有效、无创地获取和评估人体血流动力学情况的方法。本研究在采用磁共振血管造影 (MRA) 图像建立 Stanford B 型主动脉夹层 (后简称 B 型 AD) 形态模型的基础上, 验证所建形态学模型的准确性。并利用计算机仿真软件对其进行数值模拟, 探讨基于 MRA 图像进行个体化 B 型 AD 计算机仿真研究的可行性。

方法:

(1) 收集 10 例 B 型 AD 患者的 MRA 图像数据, 通过 MRA 图像建立 AD 的形态模型, 并分别对原始 MRA 图像和形态模型进行形态学参数的测量, 对比原始图像与形态模型在形态学上的差异。

(2) 将形态模型导入计算机仿真软件中进行后处理, 得到心动周期内不同时刻的血流流线图、血流速度分布图、血管壁面剪应力分布图及血管壁面压强分布图。

结果:

(1) 不同 B 型 AD 各形态学参数 (管径、撕裂口大小及位置) 差异较大, 变异系数范围为 0.084~0.555。原始图像和重建形态模型上的各形态参数值的差异均无统计学意义 (P 值均 > 0.05)。

(2) 基于 MRA 的 B 型 AD 计算机仿真可以获得心动周期内不同时刻 B 型 AD 的血流动力学参数。

结论:

(1) 不同 B 型 AD 的形态学参数各异, 因此建立个体化的 B 型 AD 形态学模型有助于个体化的仿真模拟。

(2) 基于 MRA 的 B 型 AD 计算机仿真可以获得各项血流动力学参数, 对 AD 的研究和临床个体化的诊治有一定的帮助。

PU-2025

心脏磁共振图像融合技术在评估急性心肌梗死中的应用价值

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目的 探讨心脏磁共振 (CMR) 图像融合技术在评估急性心肌梗死 (AMI) 中的应用价值。**方法** 前瞻性选取 2020 年 10 月至 2022 年 1 月接受经皮冠状动脉介入治疗 (PCI) 和 CMR 检查的 AMI 患者, 扫描方案包括扩散加权成像 (DWI)、心脏电影成像及心肌延迟强化 (LGE) 成像, 对心脏电影与 DWI 进行图像融合。以 LGE 为参考标准, 比较心脏电影-DWI 和 DWI 的 AMI 诊断效能、图像质量评分及测量 AMI 面积的准确性。**结果** 本研究最终共入组 AMI 患者 52 例。DWI 诊断 AMI 阳性率为 92.3%, 心脏电影-DWI 诊断 AMI 阳性率为 96.2%, 两者无显著差异。DWI 与心脏电影-DWI 的梗死心肌评分无显著差异, 心脏电影-DWI 的正常心肌评分和整体心肌评分高于 DWI。DWI 测量的 AMI 面积稍大于 LGE ($Z=4.867, P<0.01$), 心脏电影-DWI 测量的 AMI 面积与 LGE 无显著差异 ($Z=1.530, P=0.126$)。DWI 与 LGE 测量 AMI 面积的偏倚为 4.1%, 95%一致性界限为-5.0%~13.3%, 相关性系数 r 为 0.842 ($P<0.01$)。心脏电影-DWI 与 LGE 测量 AMI 面积的偏倚为 0.5%, 95%一致性界限为-4.6%~5.5%, 相关性系数 r 为 0.954 ($P<0.01$)。**结论** 基于心脏电影成像与 DWI 的图像融合技术较 DWI 能显著提高图像质量和测量 AMI 面积的准确性。

PU-2026

Precise Prediction of ischemic and nonischemic myocardial injury: Establish and Verify the Feasibility of Extracellular volume-based Nomogram

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Objectives Our study sought to develop and validate an Extracellular volume (ECV)-based nomogram to differentiate between ischemic and nonischemic myocardial injury, especially between myocardial infarction without coronary obstruction and myocardial injury with coronary obstruction.

Methods A total of 83 myocardial injury patients were eligible for this study, including 40 ischemic and 43 nonischemic patients. We studied patients' cardiac magnetic resonance (3.0 T), including: (1) dark-blood T2W imaging; > (2) native T1-mapping (ShMOLLI); and (3) ECV. The least absolute shrinkage and selection operator (LASSO) and multivariate analysis were applied for feature selection and model construction. Receiver operating characteristic (ROC) curves, calibration curves, and decision curves were used to assess the performance of the nomogram model.

Results After feature selection and dimension reduction, five selected texture features were found to be statistically significant for differentiating ischemic and nonischemic myocardial injuries. The nomogram demonstrated good discrimination in both the training set (AUC [area under the curve], 0.948; 95% confidence interval [CI], 0.627-0.809), and the validation set 1 (AUC, 0.807; 95% CI, 0.562-0.799), and validation 2 (AUC, 0.824; 95% CI, 0.562-0.799). The nomogram proved clinically beneficial, according to decision curve analysis.

Conclusions ECV-based nomogram could discriminate ischemic from nonischemic myocardial injury and can avoid the influence of coronary artery obstruction degree, maintaining diagnostic efficiency.

PU-2027

A study on the imaging quality of part-solid nodules in the lungs using ultrafast synchronized KV/mA switching dual energy CT

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Objectives

To evaluate the image quality (IQ) of part-solid nodules (PSN) in the lungs using ultrafast synchronized KV/mA switching dual energy CT (DECT) and to identify the optimal keV level for virtual monochromatic imaging (VMI) of PSNs.

Methods

A total of 12 patients with PSN who underwent Chest enhancement scans using DECT (Revolution APEX CT, GE). Axial virtual monochromatic images (VMI) were reconstructed at 10 keV interval between 40-140 keV with the slice thickness of 0.625 mm; All images were reconstructed using 30% ASIR-V reconstruction algorithm. The CT values and standard deviation (SD) of CT values in the PSN, Ipsilateral erector spinae muscle (ESM), and chest wall fat were measured on the same level, as well as signal-noise-ratio (SNR, CT_{PSN}/SD_{PSN}) and contrast-noise-ratio (CNR, $(CT_{ESM} - CT_{PSN}) / SD_{ESM}$) of PSN.

Two experienced radiologists subjectively assessed the IQ [focal details, the visibility of major anatomical structures (such as great vessels) and diagnostic confidence in the overall image] using a 5-point scale (1, poor; 2, fair; 3, moderate; 4, good; 5, excellent). The curves of SNR, CNR and SD, qualitative IQ scores and energy variation were plotted using normalized data to determine the optimal keV level of PSN in virtual monochromatic imaging (VMI). The Kruskal-Wallis test was used to analyze intra-group differences. Measurement data is expressed as $\bar{x} \pm S$. $P < 0.05$ was considered statistically significant.

Results

As the keV level increased, the CT values, SD and SNR of PSN decreased continuously, while CNR increased. At 65 keV, the scores of focal details (5(5,5)), the visibility of major anatomical structures (such as great vessels) (5(5,5)) and diagnostic confidence (5(5,5)) were the highest. There were significant differences between the groups of the SD of PSN ($P < 0.001$), the CT value ($P < 0.001$), SD ($P < 0.001$) and CNR ($P = 0.005$) of ESM. There was no significant difference in CT value and SNR of PSN between groups ($P = 0.258 / 0.106$).

Conclusion

In the ultrafast synchronized KV/mA switching dual energy CT image of PSN in the lung, the axial reconstruction of 65 keV single energy minimum layer thickness can obtain good CNR, SNR and SD and the best subjective image quality, which can provide the best VMI of PSN in the lung.

PU-2028

心脏磁共振特征追踪技术右心房心肌应变评估的设备与软件差异性研究

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目的: 探究不同磁共振成像设备 (GE 和 Siemens) 和后处理软件 (CVI42 和 Medis) 对心脏磁共振特征追踪技术 (CMR-FT) 定量评价右心房心肌应变参数的影响。

材料与方法: 回顾性随机抽选于体检中心完成心脏磁共振检查的 100 例中国健康成人, 其中 20 例受试者被重新招募, 在同一天内使用两种 1.5 T 磁共振成像扫描仪 (GE 和 Siemens) 完成心脏磁共振检查。分别应用 CVI42 和 Medis 商用后处理软件进行右心房 CMR-FT 分析, 获得右心房心肌应变参数, 包括右房储存应变 (ϵ_s), 管道应变 (ϵ_e), 泵应变 (ϵ_a), 正向峰值应变率 (SRs), 早期负向峰值应变率 (SRe) 及晚期负向峰值应变率 (SRa)。采用配对样本 t 检验比较不同磁共振成像设备和后处理软件间右心房心肌应变参数测量结果的差异; 采用组内相关系数 (ICC) 一致性检验和 Bland-Altman 图评估 CMR-FT 定量分析右心房心肌应变参数的设备间重复性。

结果: 不同磁共振成像设备获得的右心房心肌应变参数无显著统计学差异 (P 均 >0.05)。与 Medis 软件获得的右心房心肌应变参数相比, CVI42 软件的测量结果绝对值显著更高 (ϵ_s : 52.61 ± 14.85 vs. 33.26 ± 9.61 %; ϵ_e : 34.37 ± 13.45 vs. 20.34 ± 8.57 %; ϵ_a : 18.25 ± 5.56 vs. 12.92 ± 4.38 %; SRs: 2.39 ± 0.93 vs. 1.00 ± 0.36 s⁻¹; SRe: -2.67 ± 1.25 vs. -0.71 ± 0.32 s⁻¹; SRa: -2.08 ± 0.74 vs. -0.51 ± 0.20 s⁻¹)。ICC 一致性检验和 Bland-Altman 图结果显示 CMR-FT 技术定量右心房应变及应变率具有良好的设备间重复性 (ICC 值: 0.830-0.985)。

结论: 不同后处理软件获得的右心房心肌应变参数值存在系统性差异, CVI42 软件测量结果显著高于 Medis 软件测量结果。CMR-FT 右心房心肌应变评估在相同场强下不受磁共振成像设备的影响, 并具有良好的设备间重复性。

PU-2029

基于多维度参数鉴别孤立性肺隐球菌及粘液腺癌的多元 Logistic 回归模型

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研究目的: 肺隐球菌病是一种侵袭性肺部真菌病, 结节/肿块型肺隐球菌与粘液性肺腺癌影像学表现相似。本研究将基于 HRCT 的传统影像学特征、临床特征及人工智能肺结节量化参数, 以构建结节/肿块型肺隐球菌与粘液性肺腺癌的鉴别模型, 并评价其准确性。

材料与方法: 本研究回顾性收集术后病理诊断为粘液腺癌 100 例, 隐球菌 101 例, 同时收集患者的术前临床资料 (如性别、年龄、吸烟史等)、传统影像学参数 (如宽基底、空洞、条索等) 及肺结节人工智能定量参数 (如平均值、最大值、最小值、峰度等)。首先通过单因素 Logistic 回归筛选有效参数, 再进一步纳入多因素二元 Logistic 回归模型, 最终通过 ROC 曲线分析模型准确性。

结果: 年龄、恶性肿瘤个人史、宽基底、空洞、长条索、卫星灶、最小 CT 值在两组之间差异具有统计学意义 ($P < 0.05$)。上述指标关于隐球菌组以及粘液腺癌组的二元 Logistic 回归结果为: $\text{Logit}(p) = -8.085 + 0.083 X_1 - 1.714 X_2 + 1.724 X_3 + 2.735 X_4 - 3.189 X_5 - 4.557 X_6 - 0.004 X_7$ 。研究显示上述模型的具有良好的预测效能, 其曲线下面积 AUC 为 0.953, 95%CI 为 0.927-0.979。

结论: 通过综合患者的年龄、传统影像学参数以及人工智能参数, 将有助于术前鉴别隐球菌或粘液腺癌, 以帮助临床医生制定个性化的治疗策略, 避免过度的有创性操作。

PU-2030

双源 CT 心脏冠脉造影和胸腹主动脉 CTA 一体化检查在 TAVI 术前的运用

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目的:

为了更好的进行 TAVI 患者进行术前评估,减少患者受到的辐射剂量及注射的造影剂剂量,探索双源 CT 心脏冠脉造影和胸腹主动脉造影一体化检查方式在 TAVI 患者术前评估中的应用价值。

方法:

选择 2019 年 7 月至 2021 年 3 月本院收治的重度 AS 患者共 58 例,其中男性 27 例,女性 31 例,年龄 55~83 岁,平均(72.93±8.35)岁。所有患者临床资料完整,排除合并恶性肿瘤及严重器质性疾病、肾功能受损和碘造影剂过敏患者。按照随机表法将患者分为常规组(n=29)、观察组(n=29),所有患者均采用双源 CT 扫描,其中常规组采取心脏冠脉 CT 和胸腹主动脉造影两次扫描,观察组采取一体化检查方式,对患者影像检查资料进行分析讨论。

结果:

研究结果显示,通过在 TAVI 患者术前评估中应用心脏冠脉 CT 和胸腹主动脉造影一体化检查方式,观察组患者的辐射剂量较对照组明显降低;同时两组患者的 CT 影像质量对比观察组与常规组进行比较,发现主动脉 CNR 升高,主动脉噪声、SNR 两组差异不显著,主观评分不同医师间评分具有较好一致性,提示一体化检查方式不会对成像质量造成明显影响。

结论:

心脏冠脉 CT 和胸腹主动脉造影一体化检查方式能够在保证图像质量的前提下有效降低扫描辐射剂量,对于 TAVI 术前评估工作的影响较小,具有较高的应用价值。

PU-2031

双源 CT 在肺动脉造影和双下肢静脉 CTV 一体化中的应用

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目的:讨论双源 CT 在肺动脉造影和双下肢静脉 CTV 一体化中的应用中的应用价值。

方法:选择 2020 年 1 月至 2021 年 3 月本院收治的经 US 检查怀疑为 DVT 的患者共 62 例,其中男性 37 例,女性 25 例,年龄 24~77 岁,平均(49.83±13.68)岁。所有患者临床资料完整,排除合并恶性肿瘤及多发器官功能衰竭患者。所有患者均采用双源 CT 肺动脉 CT 造影术(CT Pulmonary angiography, CTPA)联合 CTV 一体化检查方法,对患者影像检查资料进行分析讨论。

结果:62 例患者中均确诊为 VTE,所有患者均存在 DVT,其中 43 例(69.35%)患者同时合并 PE。

DVT 患者中,13 例(20.97%)为盆腔静脉血栓,25 例(40.32%)为右下肢血栓,24 例(38.71%)为左下肢血栓。CT 影像显示患者下肢静脉呈现强化均匀的状态,内部血栓显示清晰,静脉增强后的 CT 值、血栓 CT 值分别为(107.62±14.38)HU、(61.83±9.15)HU,对比差异显著(P<0.05)。

43 例合并 PE 患者均为多发肺动脉栓塞,累及动脉 93 支,其中包括 7 支(7.53%)左右肺动脉主干,31 支(33.33%)叶动脉,42 支(45.16%)段动脉,13 支(13.98%)亚段及亚亚段肺动脉。CT 影像中患者肺动脉内栓子形态和分布情况显示清晰,肺动脉内清晰可见低密度充盈缺损的情况,

合并支气管动脉扩张，病情严重者的肺动脉呈现完全闭塞状态。肺动脉 CT 值与栓子 CT 值分别为 (320.66 ± 45.22) HU、 (55.73 ± 15.40) HU，对比差异有统计学意义， $P < 0.05$ 。

结论：通过运用双源 CT 进行肺动脉造影和双下肢静脉 CTV 一体化检查结合图像后处理技术能够从多角度对肺动脉的空间解剖关系进行显示，检查时间短，不存在操作者依赖性，安全无创，患者接受度高，技术参数稳定，可随时进行随访工作。

PU-2032

基于模型的迭代重建算法和对比度增强后处理技术对肺部 CT 血管造影的影响：对肥胖患者图像质量的评价

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目的 探讨基于模型的迭代重建（MBIR）算法和对比增强增强（CE-boost）后处理技术对提高肥胖患者肺血管造影（CTPA）图像质量的效果。

方法 这项前瞻性研究对 100 例因临床疑似肺栓塞而接受肺 CTA 的患者进行。体重指数（BMI）超过 25（第 1 组）的患者采用常规混合迭代重建（HIR）、MBIR 和 CE-boost 进行。非肥胖患者（BMI < 25，第 2 组）采用 HIR，考虑作为参考标准。定量评估主肺动脉、左右肺动脉的 CT 值、图像噪声、信噪比（SNR）和对比度噪比（CNR）。两名胸部放射科医生独立地通过整体图像质量、总体噪声、诊断信心和血管造影度等四个主观特征检查了 CT 图像（5、最佳；1、最差）。采用 Mann-Whitney U 检验和独立样本 t 检验进行统计学分析。

结果 第 1 组 MBIR 图像的图像噪声明显低于第 2 组参考图像（ $p < 0.05$ ），而第 1 组 CE-boost 和 HIR 图像的图像噪声明显低于参考图像。第 1 组的 CE-boost 和 MBIR 图像均提供了与参考图像相当的信噪比和 CNR（均为 $p > 0.05$ ）。在主观分析中，CE-boost 或 MBIR 图像的整体图像质量和诊断置信度显著高于参考图像（均为 $p < 0.05$ ）。第 1 组 CE-boost 和 MBIR 图像的血管造影剂视觉得分高于参考图像（均为 0.05），其中 CE-boost 表现最好。

结论 CE-boost 技术和 MBIR 算法均能提高肥胖患者肺 CTA 的图像质量。CE-boost 在增加远端血管可视化方面具有更大的潜力，而 MBIR 在血管上显示更多的降噪效果。

PU-2033

磁共振特征追踪技术测定左心室射血分数保留糖尿病患者右心室心肌损伤

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目的 采用磁共振特征追踪技术定量糖尿病患者右心室心肌应变，检测在左心室射血分数保留时，其早期发生的右心室心肌损伤。

方法 回顾性分析 2018 年 1 月至 2022 年 12 月于本院就诊的左心室射血分数正常的糖尿病患者 36 例，并选择同期健康志愿者 31 例作为正常对照组，用心脏后处理软件测量其右心室及应变参数。采用独立样本 t 检验或 Mann-Whitney U 检验进行两组间参数比较，采用受试者工作特征曲线（ROC）进行组间分析，并用 Z 检验对右心功能参数与应变参数间检验效能的差异进行统计学分

析。采用 Spearman 相关性分析计算右心室功能及应变参数的相关性, 采用单因素分析来确定临床指标对右心室应变的影响。

结果 糖尿病组右心室功能参数值 (RVEF, CI, SVBSA) 低于对照组 (37.64 ± 10.45 vs. 43.16 ± 9.05 , $p=0.025$; $1.42(1.29, 1.63)$ vs. $1.23(0.94, 1.55)$, $p=0.024$; 22.04 ± 6.05 vs. 17.75 ± 6.3 , $p=0.006$)。糖尿病组右心室容积参数无明显差异 ($p>0.05$), 但糖尿病组右心室质量 (Myocardial mass) 较正常组增高 ($13.67(10.85, 17.34)$ vs. $10.02(8.69, 12.07)$, $p=0.01$)。应变参数中除 PSL、PDSRL 无统计学差异外 ($p>0.05$), 其余糖尿病组 PSR、PSSRR、PDSRR、PSC、PSSRC、PDSRC、PSSRL 均较对照组减低。ROC 结果显示, PSR 及 PSSRR 对糖尿病心肌病诊断效能最高, 其曲线下面积分别为 0.816、0.809, 且优于 EDV/BSA ($P=0.011, 0.018$)。相关性分析结果显示 PSR、PSSRR 与 RVEF 成正相关 ($r=0.379$, $P=0.022$; $r=0.338$, $P=0.019$), PSC 与 RVEF 成负相关 ($r=-0.456$, $P=0.005$), 单因素结果显示 BNP 是 PSSRR 重要的预测因子 ($\beta=0.549$, $p=0.001$)。

结论 右心室心肌应变能够早期反应右心室心肌损伤, 较常规右心功能参数更加敏感, 且 BNP 是 PSSRR 的独立预测因子。

PU-2034

能谱 CT 成像 GSI LUNG 技术应用于肺栓塞后肺灌注功能评价

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目的 探讨能谱 CT 成像 GSI LUNG 技术在肺栓塞患者肺实质的血流灌注状态和栓塞对心肺功能的影响评估的价值。

方法 选取怀疑肺栓塞需行肺血管 CT 成像检查的患者 35 例, 使用能谱 CT 成像方式扫描。CT 扫描设备为 GE Revolution CT 扫描仪, 平扫及肺动脉期、肺静脉期三期扫描均采用 GSI 扫描模式 (管电压 80/140kVp) 采集图像, 图像重建层厚/层间隔均为 0.625mm, 图像开启 DATA 模式。在 GE ADW4.7 工作站用 GSI LUNG 模块分别处理三期图像, 分割和建立肺部碘 (水) 混合伪彩图和碘 (水) 密度图, 在各期图像同一位点, 结合伪彩图显示在碘 (水) 密度图测量分别低灌注区和左右肺正常灌注区域的碘密度值, 同时记录患者临床生化指标, 并进行统计学分析。

结果 35 例受检者有 15 例诊断为肺栓塞阳性。20 例阴性受检者, 左右肺正常灌注区平扫期、动脉期、静脉期碘密度值分别 0.174mg/ml , 8.256mg/ml , 3.56mg/ml , 栓塞后低灌注区碘密度值各期分别是 -0.306mg/ml , 1.937mg/ml , 1.118mg/ml , 均明显低正常灌注区, 差异有统计学意义 ($P<0.05$)。其中 5 例在溶栓后复查, 各期分别是 0.247mg/ml , 5.463mg/ml , 2.382mg/ml , 低灌注区碘密度值明显增加。

结论 能谱 CT 可直观显示肺动脉栓子情况, GSI LUNG 技术可进行碘基物质分离及碘定量分析, 并结合临床信息, 从形态学及肺灌注功能两个方面对肺栓塞的疗效进行评估。GSI LUNG 技术作为肺栓塞评价的重要手段, 为肺栓塞治疗方案选择和疗效评价提供了定量依据。

PU-2035

全病灶碘图直方图分析与单层 IC 测量预测浸润性非黏液肺腺癌新 IASLC 分级的比较

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目的：评价和比较全病灶碘图直方图分析和单层碘浓度测量对浸润性非黏液肺腺癌新的 IASLC 分级的诊断价值。

方法：本研究回顾性分析了 2019 年至 2022 年 12 月行能谱 CT 扫描的 61 例浸润性非黏液肺腺癌患者（34 例低级别，27 例高级别）。计算每个病灶的全病灶碘图直方图参数（均值、标准差、方差、峰度、偏度、熵和第 1、10、25、50、75、90 和 99 百分位数）。此外，通过在肿瘤代表性层面放置感兴趣区域并将其归一化，获得能谱 CT 参数[碘浓度 (Iodine concentration, IC) 和归一化碘浓度 (Normalized iodine concentration, NIC)]。比较不同级别浸润性非黏液腺癌之间两种参数的差异，并对两种方法的诊断准确性进行了评价和比较。

结果：低级别组和高级别组的全病灶碘图直方图参数（第 1、10、25 百分位）和单一层面能谱参数（IC 和 NIC）均有显著性差异($P<0.001$ - $P=0.02$)。直方图参数中第 1 百分位数(AUC=84.25%)和单一层面测量能谱参数中 IC(AUC=78.49%)的诊断率最高。经 DeLong 检验，全病灶碘图直方图(AUC=85.62%)的诊断效能高于单一层面 IC 测量 (AUC=80.83%)，但是两者不存在统计学差异($p=0.60$)。

结论：全病灶碘图直方图参数和单一层面 IC 能谱参数均可区分不同级别的浸润性非黏液肺腺癌，并且具有相似的诊断性能。

PU-2036

原发性胸膜-肺滑膜肉瘤的 CT、MR 表现及病理特征

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目的

探讨原发性胸膜-肺滑膜肉瘤(primary pleuropulmonary synovial sarcoma, PPSS)的 CT、MR 影像学表现及其病理特征，以提高该疾病的诊断能力。

方法

回顾性分析经术后病理学证实的 15 例 PPSS 患者的临床、CT、MR 及病理资料，观察并分析病变的影像学特征及病理特征，12 例病例行 CT 检查、7 例病例行 MR 检查。

结果

CT 检查结果示，病灶呈团块状或团片状，10 例肿瘤最大径>5cm；平扫呈不均匀低密度 9 例，均匀等密度 3 例；边缘欠光滑与边界不清楚 10 例，边缘光滑与界限清楚 2 例。增强扫描肿瘤实性部分呈持续性不均匀强化，6 例较大肿瘤内部可见明显强化的肿瘤血管。所有病例均未见肺门、纵隔淋巴结肿大及肺内转移。MR 检查结果示，所有病变 T1WI 均呈中等至稍低信号，T2WI 呈欠均匀中等至稍高信号，DWI 均呈不均匀稍高信号。病理检查结果示，单相分化型 11 例，肿瘤细胞由梭形细胞组成，细胞紧密聚集，伴有少量黏液样区；双向分化型 4 例，由梭形细胞及上皮成分组成，内部有局灶性坏死区；免疫组织化学结果示，细胞角蛋白(CK)、上皮膜抗原(EMA)阳性。

结论

PPSS 具有一定的 CT 和 MR 影像学特点，但最终诊断需依靠病理学检查。CT 和 MR 检查在明确肿瘤定位、数目、侵犯和转移方面具有重要的参考价值，对于临床诊断和手术方案的制定以及后期随访均有重要意义。

PU-2037

双能 CT 定量参数对周围型肺癌病理亚型的诊断价值研究

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摘要：目的 讨论双能 CT (DECT) 定量参数在诊断周围型肺癌病理亚型中的应用价值。方法 2022 年 4 月至 2023 年 10 月前瞻性连续收集我院收治的疑似周围型肺癌且未经治疗的患者 70 例，所有病人均行 DECT 增强扫描，以病理结果为金标准，51 例患者明确周围型肺癌病理分型。通过后处理软件绘制所有病例感兴趣区，测量并计算动脉期病灶碘浓度 (IC)、归一化碘浓度 (NIC)、能谱曲线斜率 (λ HU)、原子序数 (Zeff) 及以上数据平均值。采用单因素方差分析 3 组的 NIC、 λ HU 及 Zeff；对具有统计学意义 ($P < 0.05$) 的参数，进一步绘制受试者工作特征 (ROC) 曲线并分析。结果 51 例周围型肺癌中，腺癌 25 例，鳞癌 14 例，小细胞肺癌 12 例，三者动脉期 NIC (0.170 ± 0.093 、 0.120 ± 0.086 、 0.099 ± 0.039)、 λ HU (1.934 ± 1.205 、 1.346 ± 0.563 、 1.166 ± 0.643)、Zeff (8.164 ± 0.517 、 7.865 ± 0.421 、 7.805 ± 0.282)，腺癌动脉期 NIC、 λ HU、Zeff 高于鳞癌及小细胞肺癌，差异具有统计学意义 ($P < 0.05$) 而鳞癌及小细胞肺癌差异无统计学意义 ($P > 0.05$)，但鳞癌各项数值均高于小细胞肺癌。ROC 诊断效能分析显示，NIC 在鉴别周围性肺癌病理亚型腺癌与鳞癌、腺癌与小细胞肺癌具有较高的准确性 (曲线下面积分别为 0.744、0.778)，灵敏度分别为 66.7%、77.8%，特异度分别为 90.0%、82.6%。结论 DECT 相关定量参数有助于区分周围型肺癌的不同病理亚型，对临床准确诊断及早期治疗具有一定价值。

PU-2038

心包内、心包外及心包周围脂肪容积与冠状动脉粥样硬化病变的关系

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目的：研究心包内脂肪容积、心包外脂肪容积和心包周围脂肪容积与冠状动脉粥样硬化发生病变的关系。方法：回顾性收集徐州医科大学附属医院在 2020 年 1 月 1 日至 2022 年 12 月 30 日行冠状动脉造影检查的就诊患者 195 例。将 195 例患者分为冠状动脉粥样硬化病变组和非病变组，测定 195 名就诊患者的年龄、性别、BMI、高血压、高血脂等物理指标。同时，设置患者检查 CT 值为 $-200\text{HU} \sim -30\text{HU}$ ，测量 195 名就诊患者心包内脂肪容积 (Epi-FV)、心包外脂肪容积 (Para-FV) 及心脏周围脂肪容积 (Peri-FV) 等生物化学指标。根据就诊患者测得的心包脂肪容积量，将心包内脂肪容积、心包外脂肪容积及心脏周围脂肪容积分别分为高低两组，即高心包内脂肪容积、低心包内脂肪容积、高心包外脂肪容积、低心包外脂肪容积、高心脏周围脂肪容积组、低心脏周围脂肪容积组，并比较不同心包脂肪分组间年龄、性别、BMI、高血压、高血脂及冠状动脉粥样硬化病变是否具有差异。采用单因素 logistic 回归分析冠状动脉粥样硬化病变和患者基本资料 (年龄、性别、BMI、高血压、高血脂)、心包内脂肪容积、心包外脂肪容积及心脏周围脂肪容积等指标的关系，并对存在显著性差异的指标行多因素回归分析。利用 ROC 曲线比较不同指标预测冠状动脉粥样硬化病变的效能。结果：高心包内脂肪容积、高心包外脂肪容积及高心脏周围脂肪容积组的高血脂患者较多，且 BMI 及年龄较大。在冠状动脉粥样硬化分析中，高心包内脂肪容积及高心脏周围脂肪容积组有更多的冠状动脉粥样硬化患者，且斑块累及节段更广，Gensini 评分更高，而高心包外脂肪容积组的冠状动脉周围危险斑块多于低心包外脂肪容积组。结论：心包内脂肪容积、心包外脂肪容积及心

包周围脂肪容积与冠状动脉粥样硬化是否病变及病变预测效能的关系不同。心包外脂肪容积较高者存在更多的心血管危险因素及更多的危险斑块,而心包内脂肪容积较高者,冠状动脉粥样硬化病变的可能性更高,多指标联合预测效能更高。

PU-2039

深度学习重建与迭代重建在肺动脉 CTA 双低扫描中的图像质量与辐射剂量的比较

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【摘要】 目的 比较深度学习算法重建与自适应迭代重建在 CT 肺动脉造影双低扫描技术中的图像质量和辐射剂量。方法 回顾性分析 2020 年 10 月至 2021 年 03 月于我院进行 CTPA 检查的患者。分别应用 ASiR-V 算法, DLIR 中档 (DLIR-Medium, DL-M) 算法, DLIR 高档 (DLIR-High, DL-H) 算法重建三组 CTPA 图像。比较三组图像质量的客观评价 (CT 值、噪声, 信噪比, 对比噪声比)、主观评分、诊断信心。同时, 报告辐射剂量 (容积 CT 剂量指数、剂量长度乘积、有效剂量)。符合正态分布的多组间计量资料比较采用单因素方差分析, 组间两两比较采用 LSD 法。不符合正态分布的多组间计量资料比较采用 Kruskal-Wallis H 法, $P < 0.05$ 认为差异有统计学意义。统计分析采用 SPSS 19.0 统计分析软件。结果 89 例患者纳入研究, 男性 45 例 (50.6%)、女性 44 例 (49.4%), 平均年龄 61.0 ± 15.2 岁, BMI 平均值为 24.5 kg/m^2 。辐射剂量报告 CTDIvol、DLP 和 ED 分别为 $2.9 \pm 0.7 \text{ mGy}$ 、 $88.3 \pm 23.0 \text{ mGy.cm}$ 和 $1.2 \pm 0.3 \text{ mSv}$ 。ASiR-V、DL-M、DL-H 三组不同重建算法, 肺动脉主干及其主要分支的图像噪声、SNR、CNR 均有统计学差异 ($P < 0.01$)。与 ASiR-V 重建比较, DL-M、DL-H 重建分别降低了 19.2%-27.8%、34.1%-40.9% 的图像噪声, 增加了 30.0%-39.3%、56.2%-94.9% 的 SNR, 增加了 30.9%-39.0%、56.3%-98.5% 的 CNR。ASiR-V、DL-M、DL-H 三组不同重建算法的图像质量主观评分、诊断信心分别为 3.7 分、4.6 分、4.9 分和 2.4 分、2.7 分、2.8 分, 差异具有统计学意义 ($P < 0.01$)。结论 深度学习算法重建较迭代算法重建能够明显提高 CTPA 双低扫描的图像质量。

PU-2040

肺部先天性发育病变

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【摘要】 目的 对肺部先天性发育病变的文献回顾总结。方法 广泛查阅国内外近年有关肺部先天性发育病变, 对肺部先天性发育病变的病因、解剖、临床表现、诊断进行总结分析。结果 肺部先天性发育病变的病因十分复杂, 人类呼吸系统的由高度分支且紧密连接的树状导管系统、气道和血管组成, 以确保有效的气体交换。肺的发育过程从胚胎阶段一直持续到青春期, 经历 5 个具有不同特征且相互重叠的阶段。分别是胚胎期、假腺管期、小管期、囊泡期和肺泡期。胚胎期是肺发育的最初阶段, 即肺芽出现;假腺期主要是主气道发育和支气管分支形成;小管期特点是腺泡出现、气血屏障, 以及 I 型和 II 型上皮细胞分化, 原始腺泡的形成;囊泡期和肺泡期以终末囊泡形成, 肺泡上皮细胞分化、表面活性物质产生加快为特征;肺泡期主要是终末囊泡二次分离。结论 肺部先天性发育病变是一系列复杂的病变, 在肺部发育任何时期出现问题都会发生相应病变, 在胚胎期呼吸系统发育异常可导致喉、气管或食道闭锁, 气管食管瘘, 气管或支气管狭窄, 气管或支气管软化, 异位肺, 支气管源性囊肿和肺发育不全等;肺脏发育的假腺管期可发生一系列先天发育缺陷, 包括 CCAM、BPS 和先天性肺淋巴管扩张。胸腹膜腔在假腺囊期早期闭合, 若胸膜腔未能闭合则经常

伴随腹腔内容物疝入胸腔(先天性膈疝),导致肺实质和血管的发育不良,肺体积小,而且缺乏正常的支气管分支、肺泡表面积和肺血管结构;小管期发生的肺脏发育异常包括腺泡发育不良、肺泡毛细血管发育不良(ACD)和呼吸功能不良,肺静脉(MPV)错位也有可能发生,出现这种情况的患者肺静脉都是沿着肺小动脉伴行;囊泡期:妊娠 24-38 周,此期发生的肺脏发育异常包括早产儿呼吸窘迫综合征(RDS),先天性肺泡发育不良;肺泡期:出生前至 6 岁左右,此期易发生支气管肺发育不良(BPD):以肺泡和肺微血管发育不良为特征。

PU-2041

基于 MRI 对冠状动脉旁路移植术前后右心功能改变的对比研究

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本文探讨心脏磁共振(CMR)检测冠状动脉旁路移植术(CABG)前后右心功能的改变情况,分析其在冠心病(CHD)中的临床价值。回顾性分析经 CABG 治疗的 24 例 CHD 患者术前后 CMR 检查数据。比较术前后右心室功能参数[右心室射血分数(RVEF)、右心室舒张末期容积(RVEDV)、右心室收缩末期容积(RVESV)、每搏输出量(SV)、心输出量(CO)、右心室舒张末期心肌质量(RDVM)、右心室平均心肌质量(RVM)]、心脏射血参数[峰值射血率(PER)、峰值射血时间(PET)、峰值充盈率(PFR)、峰值充盈时间(PFT)]、标准化右心室功能参数(sVM、sEDV、sSV、sPFR、sPER、sESV、sDVM)等。首先进行 S-W 检验,得出不服从正态分布的变量:sESV、sEDV、sVM ($P<0.05$),行 Wilcoxon 秩和检验;其他变量差值服从正态分布,行配对样本 t 检验。结果术前 RVEDV、RVESV、RVM、PET、PFT 均大于术后 [(85.91±34.18) mL、(58.59±27.98) mL、(37.41±15.19) g、(149.1±27.91) ms、(744.27±219.66) ms vs. (76.63±26.63) mL、(48.24±20.74) mL、(56.16±29.37) mL、(31.83±31.83) g、(129.29±33.3) ms、(632.51±218.12) ms, $P<0.05$];术前 RVEF 小于术后 [(33.56±8.23) mL vs. (38.52±9.79) mL, $P<0.05$];术前 sEDV 大于术后 [(43.22±15.78) mL vs. (38.02±13.71) mL, $P<0.05$];术前 sVM、sESV 均大于术后 [16.84 (13.33, 24.15) g、26.64(18.53, 39.52) mL vs. 15.47 (12.69, 17.68) g、23.88 (15.87, 33.21) mL, $P<0.05$],差异均具有统计学意义。CMR 对 CABG 前后右心室功能的改变具有明显研究价值,对于 CHD 临床诊断与治疗具有重要意义

PU-2042

基于 CT 影像组学预测早期肺腺癌浸润性的研究

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目的:探讨基于 CT 瘤内及瘤周区域的影像组学模型对早期肺腺癌浸润性的预测价值,并评估不同瘤周范围的预测价值差异。

方法:回顾性收集 334 例经本院手术病理证实为早期肺腺癌患者的临床及 CT 影像资料,其中浸润组 236 例,非浸润组 98 例。将所有患者按照 7:3 的比例随机分为训练组和验证组。在术前 CT 图像上分别勾画肿瘤体积(GTV)、瘤周 3mm、6mm 体积获得感兴趣区 ROI1、ROI2、ROI3,并提取影像组学特征。采用 mRMR 及 LASSO 筛选组学特征,并经多因素逻辑逐步向后回归分析,依据 AIC 原则分别建立 GTV 模型、PTV_3mm 模型、PTV_6mm 模型、肿瘤+瘤周区域体积(GPTV_3mm 模型和 GPTV_6mm 模型),筛选最优组学模型,并获得其 Rad-score。基于多因素 Logistic 回归,从临床数据、传统放射学特征中筛选特征,将筛选出的特征建立临床-放射学模型。

使用多因素逻辑逐步向后回归分析, 将临床独立预测因子和 Rad-score 结合, 构建联合模型。使用受试者工作特征曲线 (ROC) 曲线评估模型的诊断性能, 决策曲线分析 (DCA) 评估模型的临床净收益, 校准曲线和 H-L 检验评价模型的拟合优度。

结果: 临床、放射学特征中结节类型、最大径、血管异常征是独立危险因素, 由此构建的临床-放射学模型在训练组和验证组的 AUC 分别为 0.817、0.837。影像组学模型中, GTV 模型在训练组和验证组中的 AUC 分别为 0.882、0.877; PTV_3mm 模型 AUC 为 0.881、0.851; PTV_6mm 模型 AUC 为 0.851、0.825; GPTV_3mm 模型 AUC 为 0.884、0.882; GPTV_6mm 模型 AUC 为 0.880、0.870。各组学模型之间 AUC 比较差异均无统计学意义, GPTV_3 在验证组中准确度最高, 联合模型采用 GPTV_3 模型的 Rad-score 进行计算。联合模型的表现优于单纯临床-放射学模型, AUC 分别为 0.891、0.898。DCA 分析显示联合模型具有更好的净临床效益。

结论: 基于传统放射学特征和肿瘤及瘤周 3mm 范围的影像组学特征构建的联合模型能较好的预测早期肺腺癌的浸润性。

PU-2043

Perfusion CT imaging analyzed by the three different algorithm models in lung tumor

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AIM: To evaluate the reproducibility and interchangeability of CT perfusion parameters obtained with the three different kinetic calculation models in lung tumor.

METHODS: Two perfusion CT scans were obtained in 12 patients with lung tumors, 2d-1week apart, using phase 1 scans (30-second breath-hold cine) followed by phase 2 scans (3 intermittent helical breath-holds), spanning 84 seconds. Images were post-processed using a model based on the maximum-slope (M) approach (blood flow-BFM, blood volume-BVM) + Patlak (P) analysis (blood volume-BVP and permeability-FEP [k-trans]), as well as a model with deconvolution (D) analysis (BFD, BVD and FED). 50 mL contrast agent were applied with a delay time of 7 s. Perfusion parameters were compared using intraclass correlation coefficient (ICC) and the Wilcoxon matched-pairs test. Measurement reproducibility was assessed by the within-patient coefficient of variation (wCV) and Bland-Altman plots.

RESULTS: The perfusion value was successfully measured in 24 tumor samples. The BV value of deconvolution algorithm is 7.31 ± 7.03 (95% CI: 4.35-10.28) ml / 100g, the BV value of the maximum slope algorithm is 9.38 ± 6.39 (95% CI: 6.68-12.07) ml / 100g, 7.13 ± 6.79 (95% CI: 4.26-10.00) ml / 100g, which is used for Patlak algorithm. The BF value of deconvolution algorithm is 106.91 ± 82.94 (95% CI: 71.89-141.93) ml / min / 100g, and the BF value of the maximum slope algorithm is 59.91 ± 53.14 (95% CI: 37.46-82.35) ml / min / 100g. The permeability of deconvolution algorithm is 29.53 ± 21.73 (95% CI: 20.36-38.71) ml / min / 100g, and that of Patlak algorithm is 20.69 ± 10.44 (95% CI: 16.28-25.10) ml / min / 100g. Compared with the maximum slope analysis, statistical tests of BV values obtained by deconvolution or Patlak showed significantly lower values ($P < 0.01$). The BF value obtained by deconvolution is higher than that calculated by the maximum slope analysis ($P < 0.01$). Different models showed different parameters, the WCV in D & M was 48.29%, the WCV in osmotic D & P was 43.01%, the blood volume D & P, D & M, M & P were 20.29%, 22.84% and 19.58%, respectively.

CONCLUSION: The perfusion parameters obtained by different mathematical calculation methods are different. The three methods have statistical consistency relationship in the parameters, but the repeatability of these parameters is not good, and they can not be exchanged directly.

PU-2044

双层探测器 CT 定量参数在诊断食管癌淋巴结转移中的应用

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研究目的：探讨双层探测器 CT 定量参数在定性评估食管癌转移淋巴结中的价值。

研究方法：本研究共纳入未接受任何治疗的 50 例食管癌患者，术前均接受双层探测器 CT 双期增强扫描，并在扫描后（一周内）接受了食管癌根治术，术后获得了经病理证实的 T 和 N 分期，在信噪比最佳的静脉期 70 keV 单能量图像上，选取食管癌原发灶周以及手术清扫范围一致的所有可见区域淋巴结，根据术后病理分为转移淋巴结组及非转移淋巴结组，每个淋巴结的测量采用连续三个平面勾画 ROI 取平均值，测量并记录淋巴结长径、短径（以短径 2mm 为最小测量阈值）、动脉期和静脉期碘浓度及同层面主动脉碘浓度、有效原子序数，计算淋巴结短长径比、动脉期和静脉期标准化碘浓度（标准化碘浓度为淋巴结动脉期、静脉期淋巴结的碘浓度/同层面主动脉碘浓度），测量淋巴结单能量条件下对应的 CT 值(40-80Kev)，每隔 10 keV 记录 1 次，绘制能谱衰减曲线，并计算其斜率(斜率=(40 keVCT 值-80 keVCT 值)/40)。对于转移淋巴结组及非转移淋巴结组的标准化碘浓度、有效原子序数、单能量 CT 值、常规 CT 值及能谱曲线斜率等计量资料用均值±标准差表示，若数据符合正态分布且方差齐，2 组之间采用两独立样本 t 检验比较，如不符合正态分布及方差齐性，则采用秩和检验。所有数据均采用 SPSS26.0 软件分析，以 $p \leq 0.05$ 认为差异有统计学意义。

结果：食管癌转移与非转移淋巴结组的动脉期 40keV 单能量下 CT 值、动脉期能谱曲线斜率、静脉期 40-80keV 单能量下 CT 值差异有统计学意义 ($p < 0.05$)。两组淋巴结的长径、短径、短长径比、静脉期 50-80keV 单能量 CT 值、静脉期能谱曲线斜率、动静脉期标准化碘浓度及动静脉期有效原子序数无明显差异 ($p > 0.05$)

结论：食管癌患者淋巴结的双层探测器 CT 定量参数：动脉期 40keV 单能量下 CT 值、动脉期能谱曲线斜率及静脉期 40-80keV 单能量下 CT 值在食管癌转移淋巴结的定性评估中具有一定的价值。

PU-2045

DSCT 在罕见三型肺动脉异常起源中的诊断价值

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目的:探讨罕见三型肺动脉异常起源的影像表现,提高对该病的认识、诊断效能。方法:收集 30 例经 DSCT 证实为罕见三型肺动脉异常起源的影像特征以及术后资料进行回顾性分析。结果:30 例肺动脉异常起源患者中单侧肺动脉缺如(UAPA)者 16 例(1 例为主干缺如,6 例为右肺动脉缺如,9 例为左肺动脉缺如)、单侧肺动脉起源异常(AOPA)8 例(1 例起自右头臂干动脉、7 例起自升主动脉)和左肺动脉悬吊(LPAS)者 6 例。UAPA 患者的升主动脉、主动脉弓和降主动脉的直径明显大于 LPAS 患者,这种差异具有统计学差异($2.51 \pm 0.89\text{cm}$ VS $1.27 \pm 0.36\text{cm}$ 、 $1.81 \pm 0.57\text{cm}$ VS $1.08 \pm 0.41\text{cm}$ 、 $1.43 \pm 0.48\text{cm}$ VS $0.83 \pm 0.27\text{cm}$, $p < 0.05$)。UAPA 患者的主动脉弓内径、左肺动脉主干内径、左肺动脉主干内径/肺动脉主干内径、左肺动脉主干内径/右肺动脉主干内径显著高于 AOPA 患者,且差异具有统计学意义($1.56 \pm 0.79\text{cm}$ VS $0.58 \pm 0.15\text{cm}$ 、 0.70 VS 0.38 、 1.14 VS 0.69 , $p < 0.05$)；其余各组参数之间比较不存在统计学差异。结论:肺动脉异常起源的影像学表现具有典型的特异征象；肺动脉起源异常患者中 UAPA 患者升主动脉内径、主动脉弓内径、降主动脉内径大于 LPAS 患者；UAPA 患者主动脉弓内径、左肺动脉主干内径、左肺动脉主干内径/肺动脉主干内径比值、左肺动脉主干内径/右肺动脉主干内径比值大于 AOPA 患者,可用于肺动脉起源异

常分型的鉴别诊断；手术修复后的肺动脉异常起源患者需要终生随访，主要是监测流出道梗阻和复发性肺动脉高压，本研究随访患者均存活。

PU-2046

The value of DSCT in the diagnosis of pulmonary artery abnormal origins

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This research aims to delve into the dual-source computed tomography (DSCT) imaging manifestations of the source of three uncommon pulmonary artery abnormalities, with the aim of enhancing comprehension and diagnosis of the illness. To this end, 30 patients diagnosed with pulmonary artery abnormalities through DSCT were collected and their imaging and postoperative pathological data retrospectively examined. Results Among the 30 patients with abnormal pulmonary artery origin, 16 patients were with unilateral pulmonary artery absence (UAPA), 8 patients were with abnormal origin of unilateral pulmonary artery (AOPA), and 6 patients were left pulmonary artery suspension (LPAS). The diagnosis rate of DSCT is significantly higher than that of echocardiography. DSCT imaging revealed a significant difference in inner diameter between UAPA and LPAS patients; ascending, aortic arch, and descending aorta, with the former having a diameter significantly greater than the latter ($P < 0.05$). UAPA patients displayed a marked increase in the left pulmonary artery diameter, the ratio of the left main pulmonary artery diameter to the main pulmonary artery diameter, and the ratio of the left main pulmonary artery diameter to the right main pulmonary artery diameter ($P < 0.05$) in comparison to AOPA patients. No significant difference was observed in the inner diameter of the ascending aorta to the descending aorta between UAPA, AOPA, and LPAS patients. No noteworthy alterations in the inner diameter of the main pulmonary artery, the right main pulmonary artery's inner diameter, and the ratio of the two were observed in AOPA patients when compared to those with UAPA. Conclusion DSCT can be used to diagnose the origin of pulmonary artery abnormalities and distinguish its types. Patients with abnormal origin of pulmonary artery after surgical require life-long follow-up, mainly to prevent outflow tract obstruction and recurrent pulmonary hypertension.

PU-2047

Rare !"Arteries" grow in Veins

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A 48-year-old woman was admitted to our hospital with dizziness and headache lasting for 11 days and syncope once. The patient had no obvious inducement, such as cough, dizziness and headache. [LYY1] During the infusion, she suddenly fainted with convulsions, which lasted for 4-5 minutes and then relieved spontaneously. She complained of dizziness, nausea and vomiting of stomach contents [LYY2]. She has no history of other diseases or heredity and has been in good health. [LYY3] In laboratory study, there was no abnormality [LYY4] in blood routine test, liver function and renal function test, and the analysis results were in the normal range. Multislice spiral CT scanning and ultrasound scanning was performed to find the cause of the disease. Ultrasound showed that [LYY5] the left internal iliac vein through the inferior vena cava to the right intracardiac cystic bag structure, clear boundary, irregular shape, floating with blood flow, the nature of undetermined; [LYY6] CT examination [LYY7] showed that [LYY8]: 1. The left internal iliac blood vessels with abnormal arteriovenous shunt, flowing into the left iliac vein,

inferior vena cava, right atrioventricular and pulmonary artery, independent and continuous existence of uneven wall thickness, cystic structure, whether the lesion adheres to the vascular wall, the left ovarian artery tortuous dilation;2.Pulmonary artery thrombosis in the posterior segment of the right upper lobe and the anteromedial basal segment of the lower lobe. The nature of the main pulmonary artery and the filling defect in the right pulmonary artery is unknown. The thrombus and space occupying lesions need to be differentiated. The right atrium is enlarged, the tricuspid valve area is calcified, and the small atrial septal defect may occur;3. Multiple lung lesions of different sizes, including air sac and nodules;4. The uterus is slightly larger, uneven and obviously enhanced.[LYY9]

For the multiple cavity lesions in the lung, it was considered as specific infectious lesions, and then lung biopsy was performed[LYY10] [LYY11]. Pathological findings showed multiple endometriosis lesions in the lung. For venous lesions, according to its growth pattern and location, it was considered as venous leiomyomatosis before operation. Cardiac surgery, vascular surgery and gynecology department carried out "Under general anesthesia and cardiopulmonary bypass, cardiac multiple tumor resection + vena cava tumor resection + Preparation of vena cava reconstruction + hysterectomy and bilateral appendectomy". [LYY12] The 11 hour operation went off without a hitch and the vital signs of the patients were stable during and after the operation. Postoperative pathology showed low grade endometrial stromal sarcoma. This lesion is very rare, especially in intravascular lesions. We hope that this case can prompt us to pay attention to intravascular lumen lesions. In addition, to venous leiomyomatosis, we should also consider the existence of low-grade endometrial stromal sarcoma, especially when multiple endometriosis exists in the lung at the same time.

PU-2048

冠状动脉 CT 血管成像评价左冠状动脉前降支狭窄对左心功能的影响

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目的：利用冠状动脉 CT 血管成像评估左冠状动脉前降支狭窄程度对左心功能参数的影响，并探讨两者之间的相关性。

方法：回顾性收集 2018 年 9 月至 2019 年 10 月在南通大学附属医院因初诊冠心病行 CCTA 和冠状动脉造影检查的患者共 421 例，纳入 CAG 证实存在单支 LAD 狭窄的患者共 72 例，排除 LAD 严重钙化 4 例，共入组 68 例，根据 LAD 狭窄程度将 68 例患者分成三组，其中轻度狭窄组 34 例，中度狭窄组 19 例，重度狭窄组 15 例，另选同一时间段内正常对照组 20 例，所有患者均行 CT 心功能分析，计算出左心室射血分数、左心室舒张末期容积、左心室收缩末期容积及左心排出量。

结果：与正常对照组比较，轻度及中度狭窄组各项心功能参数差异无统计学意义 ($P>0.05$)；重度狭窄组，LVEF 显著低于轻度及中度狭窄组，而 LVESV 及 LVEDV 则高于轻度及中度狭窄组，差异均有统计学意义 ($P<0.05$)；狭窄组与对照组之间 LVCO 差异无统计学意义 ($P>0.05$)。Pearson 相关性分析：LVEF 与 LAD 狭窄程度呈负相关 ($r=-0.467$, $P<0.05$)。LVESV 与 LAD 狭窄程度呈正相关 ($r=0.391$, $P<0.05$)。

讨论：LAD 轻度狭窄时，LVEF 等左心功能参数与正常组差异均无统计学意义 ($P>0.05$)，表明 LAD 轻度狭窄时对心肌的供血未有明显减少，左心功能尚可代偿。

轻度及中度狭窄组的 LVEF、LVESV 以及 LVEDV，差异无统计学意义 ($P>0.05$)，可能由于轻度组 LAD 的狭窄范围在 25%~50%，狭窄度更靠近 50%。中度狭窄组与正常组相比，LVEF、LVESV 以及 LVEDV 等差异无统计学意义 ($P>0.05$)，可能是在冠脉狭窄后，侧支循环代偿使得部分缺血心肌再灌注，故左心功能各指标暂未出现明显异常。

LAD 重度狭窄时, LVEF 明显减低, LVESV、LVEDV 较前增大, 较各组差异均有统计学意义 ($P<0.05$), 可能机制为心肌收缩性及顺应性明显降低, LVESV 较前进一步扩大, 此时由于心肌扩张性重构, 左心室扩大伴左室壁变薄, 造成左心室舒张功能明显减低, LVEDV 增大, LVEF 较前进一步减低。

PU-2049

双能 CT 多参数成像可提高肺腺癌分级的诊断效能

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目的: 探讨双能 CT 多参数成像对肺腺癌 (LUAD) 分化程度的评估价值。

资料与方法: 本研回顾性共纳入 87 例经病理证实的 LUAD 患者, 其中高、中分化组 49 例(分别为 20、29 例), 低分化组 36 例。测量肿瘤形态学参数、平扫 CT 值、双期增强 CT 值、40keV、70 keV 单能量 CT 值、病灶区域碘浓度、病灶同一层面胸主动脉碘浓度。计算能谱曲线斜率和标准化碘密度。通过统计学分析比较双能 CT 参数单独及联合形态学参数的诊断效能。

结果: 低分化组的 LUAD 形态学征象(血管集束征、液化坏死)高于高-中分化组(59.6%vs 32.8%、40.0%; 68.7%vs25.3%、36%: 均 $p < 0.05$)。标准化碘密度(动脉期: 0.10 ± 0.03 vs 0.12 ± 0.02 、 0.12 ± 0.03 ; 静脉期: 0.32 ± 0.05 vs 0.39 ± 0.23 、 0.40 ± 0.15)差异均有统计学意义(均 $p < 0.05$)。低分化组和高-中分化组的受试者工作特征(ROC)曲线显示, 动脉期标准化碘密度的诊断效能最佳, 曲线下面积(AUC)为 0.856, 灵敏度为 93.5%, 特异度为 83.8% ($P < 0.001$)。当纳入形态学参数时, AUC 提高至 0.932, 灵敏度和特异度分别为 96.8%和 83.2% ($P < 0.001$)。

结论: 双能 CT 多参数成像有助于鉴别肺腺癌病理分级。双能 CT 参数中, 动脉期标准化碘浓度的诊断效能最佳, 双能 CT 参数联合形态学参数可提高 LUAD 的病理分级。

PU-2050

肺部高分辨率 CT 对老年髋部骨折后急性肺损伤的早期诊断价值

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目的 探讨老年髋部骨折后急性肺损伤 (ALI) 患者的肺部高分辨率 CT (HRCT) 表现特征及半定量 CT 评分在早期诊断中的价值。方法 采用回顾性病例系列研究分析 2014 年 7 月-2023 年 1 月重庆市中医院收治的 478 例老年髋部患者临床及影像资料, 包括男性 153 例, 女性 325 例; 年龄 65~99 岁[(83.84 ± 6.56) 岁]。分析所有患者肺部 HRCT 征象累及肺叶段范围, 并进行半定量 CT 评分, 包括弥漫性磨玻璃影 (DGGO)、实变影 (IPO)、网格状影 CT 评分及 CT 总评分。按是否发生 ALI 将患者分为 183 例 ALI 组及 295 例非 ALI 组, 比较两组患者一般资料、HRCT 常见征象、半定量 CT 评分及 $\text{PaO}_2 / \text{FiO}_2$ 。采用相关分析评价半定量 CT 评分与 $\text{PaO}_2 / \text{FiO}_2$ 的相关性。结果 ALI 组患者的肺部 HRCT 常见征象依次是 DGGO 175 例 (95.6%)、IPO 139 例 (76.0%) 及网格状影 93 例 (50.8%), 半定量 CT 评分 (包括 DGGO、IPO、网格状影 CT 评分及 CT 总评分)、 $\text{PaO}_2 / \text{FiO}_2$ 依次是 5.81 ± 3.57 , 2.64 ± 2.86 , 1.34 ± 1.62 , 9.64 ± 3.77 , 264.80 ± 27.35 , 均高于非 ALI 组患者 ($P < 0.05$)。相关分析结果显示, ALI 组患者 IPO、网格状影 CT 评分与 $\text{PaO}_2 / \text{FiO}_2$ 无相关性 ($P > 0.05$); DGGO CT 评分、CT 总评分与 $\text{PaO}_2 / \text{FiO}_2$ 呈显著负相关 ($P < 0.001$)。结论 肺部 HRCT 表现特征及其半定量 CT 评分有助于老年髋部骨折后 ALI 患者的早期诊断。

PU-2051

双气相 CT 肺容积参数定量评估 COPD 患者肺功能的可行性研究

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目的：探究双气相 CT 扫描相对常规 CT 扫描在 COPD 诊断和评估上的价值。

方法：纳入 2021 年 1 月至 2022 年 12 月在本院就诊的 135 例 COPD 患者，计算两肺及各肺叶在吸气相和呼气相中的容积变化和密度变化，并与肺功能指标的相关性分析和线性拟合并对比结果，对比 ROC 曲线下面积以评估各参数用以诊断 COPD 的效能。

结果：1.全肺全区收缩比、全肺功能区收缩比、全肺非气肿区收缩比、吸气相全肺 LAA%-950HU、呼气相全肺 LAA%-950HU、全肺密度比与主要肺通气指标均呈中等程度相关($P < 0.05$)，全肺功能区收缩比与肺功能的相关性(对比 FEV1%pred, $r = 0.497$, $P < 0.001$)、可解释性(与 FEV1%pred 的简单线性拟合, $\text{adjusted } R^2 = 0.259$, $P < 0.001$)及用于诊断 COPD 的曲线下面积(曲线下面积 0.780, 灵敏度 95.2%, 特异度 64.3%, $P < 0.001$) 优于其他容积和密度指标。2.呼气相 LAA%-950HU 与肺功能的相关性(呼气相全肺 LAA%-950HU 对比 FEV1%pred, $|r| = 0.442$, $P < 0.001$)高于吸气相(吸气相全肺 LAA%-950HU 对比 FEV1%pred, $|r| = 0.418$, $P < 0.001$)。3.两肺下叶的容积/密度定量参数与肺功能的相关性高于上肺，如下肺(左肺下叶+右肺中叶+右肺下叶)全区收缩比(对比 FEV1%pred, $r = 0.395$, $P < 0.001$)与肺功能的相关性高于上肺(左肺上叶+右肺上叶)全区收缩比(对比 FEV1%pred, $r = 0.357$, $P < 0.01$)。

结论：对比吸气相 CT 平扫，呼气相 CT 平扫得到的肺气肿相关定量参数与 COPD 患者的肺通气功能相关性更高，对 COPD 的诊断和评估能力更有优势；COPD 患者的两肺下叶病变对肺通气功能的影响大于上肺病变的影响；功能区收缩比在诊断 COPD 和评估通气功能方面优于其他容积/密度定量参数。

PU-2052

动态 DDR 技术在慢性阻塞性肺病 (COPD) 的临床应用及优势

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目的：慢性阻塞性肺疾病目前是全球第三大死因，传统医学检查手段一般采用肺功能作为金标准，但是大多数患者由于本身呼吸困难，无法完美配合功能检测，因此影响检查结论精准性，导致患者错过最佳治疗时机，所以思考采用动态 DDR 技术是否可以解决此类问题，同时满足临床诊断需求值得我们探究。

方法：将来到医院怀疑慢阻肺疾病诊疗的患者，按照年龄，性别，随机选出 30 名，同样的 30 名患者采取传统肺功能检测设为 A 组，同样的 30 名患者采用动态 DDR 技术检查设为 B 组。A 组由同一名经验丰富医生采用传统方法，肺功能方法检测，并准确记录检测结果。B 组由同一名经验丰富医生采用我院最新引进的柯尼卡美能达医疗 AeroDR C80 动态功能型悬吊无线平板 DR 进行检测，使用 DDR 动态可视化成像技术，以“高速度+低剂量”方式采集数字图像，无需造影剂，就可以获得肺部通气和血流的动态可视化信息，生成动态图像序列。

- ① 患者登记，曝光部位序列选择：平静呼吸，尽力呼吸，屏气（选做）
- ② 患者摆位，确认曝光参数，注意观察束光器上滤过选择（1AL+0.5CU）
- ③ 取得患者信息（建议）：身高，体重

④ 患者呼吸训练： 尽力呼吸——用力吸足气—屏住（曝光开始）—快速用力把气呼光—屏住—用力吸足气—屏住（曝光结束）

⑤ 传输到匹配工作站进行充气量数据分析，从而得出诊断结论

最后，30 名患者分别填写了调查问卷，问卷内容包括对于 A B 两种检查方式的评价，设为 1-5 级，1 级最差，5 级最好，具体评价内容：检查费用经济承受度，配合检查的完成度，检查的舒适性，检查环境，服务满意度等几方面进行客观填表，同时 A 和 B 组分别由两位经验丰富的医生进行诊断准确性评测，最后进行统计分析。

结果：A、B 两组都能满足临床诊断，调查问卷表格填写后的统计分析，A 和 B 组均符合 5 级标准中的 3—5 级，应用 SPSS13.0 统计软件，进行统计学分析， $P<0.05$ 为差异具有统计学意义。但是对于检查费用，检查耗时间，患者舒适度，配合性等方面，B 组明显评分高于 A 组，也就是说动态 DDR 检查技术明显更具有优势。

结论：动态 DDR 检查技术在慢性阻塞性肺病（COPD）的临床诊疗具有实际意义，值得推广。

PU-2053

不同方法测量左心房径线的一致性评价

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背景

肺静脉及左心房的形态学信息对房颤消融术的顺利进行具有极其重要的临床价值，但 CT 上测量左心房的径线方法多种多样。

目的

探讨不同方法测量左心房径线的一致性。

资料与方法

回顾性纳入了 87 例肺静脉 CTA 的影像学资料。男性 50 例，女性 37 例，平均（60.74±8.70）岁。由两位医师采用 6 种不同测量方法测量左心房的前后径、长径及横径，并记录图像后处理时间，其中医师 1 间隔 1 月测量 2 次。采用组内相关系数（ICC 值）评价两位医师测量左心房各径线的一致性。采用随机区组设计的秩和检验（Friedman M 检验）、多个相关样本两两比较的 q 检验比较不同测量方法测量左心房径线和所消耗时间的差异性， $P<0.05$ 有统计学意义。

结果

1. 两位医师测量左心房径线的一致性程度均较强或很强。2. 不同方法测量左心房前后径、长径及横径数据的差异有统计学意义（ χ^2 分别为 222.28、32.74 及 293.83， P 值均 <0.001 ）。3. 不同方法测量左心房径线所消耗时间不同（ $\chi^2=333.10$ ， $P<0.001$ ）。

结论

1. 不同医师测量左心房径线的结果可信。2. 不同方法测量左心房径线值不尽相同。3. 单独在 VR 图像上测量左心房长径最适合临床推广应用。

PU-2054

Multi-Modality Imaging in Left Ventricular Reverse Remodeling with Left Ventricular Assist Device: A Case of Successful Explantation of Assist Device

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Aim: Left ventricular assist device (LVAD) implantation plays an important role in the treatment of end-stage heart failure as bridge to transplantation, recovery or destination therapy. LVAD implantation can lead to left ventricular reverse remodeling (LVRR) in patients with end-stage dilated cardiomyopathy (DCM). By a case of successful explantation of assist device we discuss the application of multi-modality imaging in the evaluation of left ventricular reverse remodeling.

Method and result: In this case report, we describe a 39-year-old male who was admitted to our centre because of DCM complicated with CLBBB for LVAD implantation. The patient was implanted with left ventricular assist device HeartCon which is a centrifugal pump and an investigational device. The outflow tract diameter of Heartcon was 10mm and the pump speed was 2400 rpm during support. One week after LVAD explant, the results of multimodal imaging were as follows. Cardiac magnetic resonance (CMR) showed that LVEDD was decreased while RVEDD, LVEF and RVEF were increased than that before implantation. Late gadolinium enhancement (LGE) showed that myocardial fibrosis could be seen in left ventricular free wall and ventricular septum. Radionuclide resting myocardial perfusion imaging showed that LVEDD was decreased than that before implantation. LVEF was 36% which improved compared to preoperative. The apical segment of left ventricle was postoperative change. The distribution of imaging agents in left ventricular septal wall and lateral wall was slightly sparse, which was consistent with the changes of myocardial fibrosis shown by CMR. Echocardiography showed that the left ventricle is border-line while the LVEDD was 58mm. The LVEF measured by M-mode ultrasound was 50%. After LVAD explantation, the patient underwent echocardiography follow-up. At the last follow-up appointment (21 months post-device explant), the patient recovered well without any interval rehospitalization. He was asymptomatic at rest and was able to perform independent daily activities (NYHA I).

Conclusion: LVAD implantation can lead to LVRR in patients with end-stage DCM, which means that patients receiving a LVAD support can regain their cardiac function and come off the LVAD. LVRR can be accurately evaluated by multi-modality imaging, including echocardiography, CMR and MPI. The concept of reverse remodeling while on the LVAD is intriguing but requires further study to see to what extent this may result in explantation of the device, to investigate the optimal drug regime necessary and the reliable monitoring of this process.

PU-2055

肺胶样腺癌的 CT 及 PET/CT 表现

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目的 探讨 10 例肺胶样腺癌的 CT 和 18 F-FDG PET/CT 影像特征及病理对照, 增加对肺胶样腺癌认知, 并提高其术前精准诊断水平。**方法** 收集病理证实的 7 例肺胶样腺癌患者, 分析 CT 及 PET/CT 表现, 并与组织病理学报告进行比较。**结果** 10 例患者均表现为单发周围型病变。除 1 例体积最小肿瘤外, 所有肿瘤均呈分叶状轮廓, 10 例肿瘤均无毛刺征及胸膜侵犯。病灶边界清楚。CT 平扫均显示低密度, CT 值范围从 -18.5 到 19.1HU (中位数为 10.0HU); 4 例患者行增强扫描, 注射对比剂后, 病灶增强均不明显, 扫描患者净增强范围为 2.2-6.5HU (中位数为

6.3HU)。1 例肿瘤内可见点状钙化。10 例患者均行 18F-FDG PET/CT 检查，PET/CT 上肿瘤的最大标准摄取值为 1.1~5.7(中位数为 1.7)。在 10 例患者中，2 例在肿瘤壁可见 FDG 积聚，2 例在肿瘤壁及分隔均可见 FDG 积聚。结论 CT 上表现为周围肺组织内边界清楚的低密度分叶状结节或肿块、无毛刺及胸膜增厚、瘤内偶发点状钙化、增强扫描强化不明显；PET/CT 表现为肿瘤壁或肿瘤壁及分隔 FDG 积聚，肺胶样腺癌可能是首选诊断。

PU-2056

气候变化：“双碳”战略下的放射学科应对策略

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气候变化是一项全球性的问题，对人类社会和自然环境都带来了巨大的影响。作为世界上最大的发展中国家，中国正面临着严峻的气候变化挑战。《柳叶刀健康与气候变化倒计时 2022 年中国报告》指出，65 岁以上的中国老年人群更容易受到气候变化带来的健康风险影响。在中国逐步迈入老龄化社会的背景下，气候变化相关的疾病与经济负担可能会进一步加重。

2020 年 9 月，我国提出“碳达峰、碳中和”的双碳战略目标，鼓励支持向绿色、低碳的发展道路转型变革，这不仅有利于中国人民的健康与福祉，还可以推动高质量的可持续发展。卫生健康系统是全球温室气体排放的主要贡献者之一，其日常运作和维护都需要消耗大量的能源。放射学科中，大部分的排放来自于医学成像设备运作所需的能量，以及维持设备与操作机房的温度和湿度所需的能量。

放射学科长期处于科技变革的前沿，可在应对气候变化问题中发挥积极的引导与推动作用。在科室层面上，应倡导夜间关闭 CT 和 MRI 等高能耗医学成像设备电源，减少低价值成像，限制一次性医疗器材的使用；在行业领域内，应推动可持续性的采购政策，优化设备在闲置和关闭状态下的能耗，鼓励供应商研发低能耗的医疗设备。随着全球医疗保健系统向低碳可持续发展转型，放射学科医技人员有责任在家庭、工作和社会中引领变革，以应对气候变化带来的挑战。

PU-2057

拟 TAVR 术前影像筛查及评估

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目的 通过对计算机断层扫描血管成像(Computed tomographic angiography, CTA) 图像进行测量，分析经导管主动脉瓣置换术(Transcatheter aortic valve replacement, TAVR)术前二叶式主动脉瓣(Bicuspid aortic valve, BAV)与三叶式主动脉瓣(Tricuspid aortic valve, TAV)患者之间主动脉根部解剖结构和钙化的差异，为 TAVR 术前评估提供依据。方法 60 例主动脉瓣狭窄患者(平均年龄 (76 ± 5.4) 岁)在 TAVR 术前均行 CTA+全程主动脉检查。通过 CTA 检查后处理数据测量，对手术入路及术中选取装置、术后复查至关重要；结论 TAVR 无直视术野，对移植物尺寸及术中操作的要求极高，因此，患者的手术指征把握、移植物尺寸的选择及术中操作依赖术前影像学评估。CTA 已逐渐成为 TVAR 术前筛查测量的“金标准”。

PU-2058

心肌纤维化核医学成像研究新进展

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心肌纤维化是心肌损伤后的一种心肌重构现象,主要表现为心肌成纤维细胞过度增殖与分化,心肌胞外基质(ECM) 过度累积、排列紊乱、胶原网络重建而引起心肌间质扩张与重构,是心肌病的常见病理改变。在心肌纤维化的形成过程中往往有一些间质效应细胞发挥着关键作用,这些细胞虽然不一定能直接合成和分泌胶原,但他们的激活已成为胶原生成细胞的重要来源,其中成纤维细胞就发挥了关键作用。现代影像技术可以对心肌纤维化进行整体全面、非侵入式的评估。目前主要应用心脏磁共振(cardiac magnetic resonance, CMR)、CT、超声心动图、核医学评估心肌纤维化。除核医学外,现有影像学技术评估心肌纤维化都是以检测心肌纤维化终末端产物-胶原蛋白等为主要方法,而一旦发生胶原蛋白沉积,病理上已经无法逆转,目前临床上缺乏明确有效的治疗措施。只有在心肌纤维化早期、可逆转阶段进行及时诊断,并采取有针对性的治疗措施,才可能逆转延缓纤维化,改善生存。核医学显像是最早反映组织特征的分子影像技术。核医学识别成纤维细胞活化早于间质改变、功能改变,可预警心肌纤维化,早期检测心肌纤维化,为早期干预,甚至是逆转纤维化提供机会。核素心肌显像主要是通过正电子发射断层扫描(positron emission tomography, PET) 和单光子发射计算机断层扫描(single photon emission computed tomography, SPECT) 技术进行功能显影,包括心肌血流灌注显像、心肌代谢显像(糖代谢或脂肪酸)以及心脏交感神经活性分布显像,为放射性心肌损伤(RIHD)患者提供了早期的无创性影像学诊断和评价方法。核医学显像是最早反映组织特征的分子影像技术,本文主要对与成纤维细胞相关的心肌纤维化的直接成像和心肌纤维化的间接成像进行综述。

PU-2059

双层探测器光谱 CT 定量参数术前预测 食管鳞状细胞癌 Ki-67 表达的效能

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目的 探讨双层探测器光谱 CT 定量参数术前预测食管鳞状细胞癌(ESCC) Ki-67 表达的效能。
方法 回顾性收集 2021 年 12 月至 2022 年 12 月辽宁省肿瘤医院 64 例 ESCC 患者。采用免疫组化法检测 ESCC 瘤组织中 Ki-67 的表达水平, Ki-67 表达指数 $\geq 30\%$ 为 Ki-67 高表达组(47 例), $<30\%$ 为 Ki-67 低表达组(17 例)。测量光谱 CT 定量参数值,包括动脉期和静脉期 120 kVp 混合能量图 CT 值、40 keV 虚拟单能级图 CT 值、碘密度(ID)值、标准化碘密度(NID)和有效原子序数。采用独立样本 t 检验比较 Ki-67 高表达组与低表达组间各参数的差异,绘制受试者操作特征(ROC)曲线评价各参数预测 Ki-67 表达的效能,曲线下面积(AUC)的比较采用 DeLong 检验。结果 Ki-67 高表达组动脉期 120 kVp CT 值、40 keV CT 值、ID、有效原子序数和静脉期 120 kVp CT 值、40 keV CT 值、ID、NID、有效原子序数均高于 Ki-67 低表达组,差异有统计学意义($P<0.05$), 两组间动脉期 NID 差异无统计学意义($t=1.85$, $P=0.070$)。静脉期 NID 预测 ESCC Ki-67 表达的 AUC 最大,为 0.965 (95%CI 0.923~1.000), 以 0.28 为截断值,灵敏度为 93.6%、特异度为 100%。静脉期 NID 的 AUC 与静脉期 ID (AUC 为 0.926)、有效原子序数 (AUC 为 0.909) 的差异无统计学意义($Z=-1.52$ 、 1.81 , $P=0.128$ 、 0.071), 与静脉期 120 kVp CT 值 (AUC 为 0.719)、40 keV CT 值 (AUC 为 0.747) 的差异有统计学意义($Z=3.41$ 、 3.30 , $P=0.001$ 、 0.001), 与动脉期各参数的 AUC 差异均有统计学意义($P<0.05$)。结论 光谱 CT 参数静脉期 ID、NID、有效原子序数对 ESCC Ki-67 表达的预测效能较高。

PU-2060

18F-FDG PETMRI 定量分析在鉴别肺部良恶性肿瘤中的价值

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目的: 评价 PET/MRI 的最大标准化摄取值 (SUVmax) 和 DWI 的表观扩散系数平均值 (ADMean) (b 值=800) 在鉴别肺部良恶性肿瘤中的应用, 并分析 SUVmax 和 ADEMean 之间的分子相关性。

方法: 回顾性分析 2017 年 6 月至 2023 年 1 月在我院经病理证实的 120 例肺实体瘤患者的 PET/MRI 影像学资料, 将患者分为恶性肿瘤组 (53 例) 和良性肿瘤组 (67 例)。所有患者均接受 18F-FDG PET/MRI 检查, 并分别测量病变的 SUVmax 值。测量 DWI 图像中三个感兴趣区域的 ADC 值 (b 值=800), 并取其平均值。采用独立样本 t 检验比较肺恶性肿瘤 SUVmax 和 ADC 均值的差异, 绘制 ROC 曲线评价 SUVmax 与 ADC 均值的诊断效果。对肿瘤的 SUVmax 和 ADC 平均值进行 Pearson 相关分析。

结果: 肺恶性肿瘤的 SUVmax 高于良性肿瘤, 差异有统计学意义 ($t=-2.976$, $P=0.003$)。肺恶性肿瘤 ADC 平均值低于良性肿瘤, 差别有统计学意义, $t=2.988$, $P=0.009$)。SUVmax 阈值为 5.87, 灵敏度为 98.3%, 特异性为 82.1%。ADC 平均值阈值为 $0.23 \times 10^{-3} \text{ mm}^2/\text{s}$, 灵敏度为 90.1%, 特异性为 89.2%。SUVmax 与 ADC 平均值无相关性。

结论: SUVmax 和 ADC 均值有助于区分肺实体瘤的良恶性, 但 SUVmax 与 ADC 均值之间没有显著相关性, 这两个值分别代表了不同的生物学信息。

PU-2061

An unexpected primary pulmonary melanoma in an asymptomatic patient: case report

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Abstract: Primary pulmonary melanoma (PPM) is an extremely rare clinical entity that may be confused with more conventional types of lung cancer. To the best of our knowledge, about 30 cases have been previously reported in the English literature. To establish the diagnosis of PPM, careful interpretation of histopathological information in correlation with all other clinical, laboratory and imaging studies may be needed. Surgical resection has been shown to be the best chance of long term survival. Here, we report a case of a 35-year-old Chinese man whose PPM was detected incidentally.

A 35-year-old healthy, asymptomatic Chinese man presented with an abnormal shadow on a chest X-ray that examined during an annual check-up. Computed tomography (CT) scan and bronchoscopy examination revealed a left pulmonary mass. The histopathology of transbronchial sample indicated malignant melanoma. Then the patient underwent curative left upper lobectomy, and clinical examination, histopathological characteristics, and immunohistochemical features supported the diagnosis of PPM. No evidence for recurrence and/or metastasis has been found more than one year after the initial surgery and four cycles adjuvant chemotherapy and biological cell immunotherapy.

PU-2062

Diagnostic value of different stages of heart failure in hypertensive heart disease by cardiac magnetic resonance feature tracking

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Purpose: To quantitatively evaluate the changes of myocardial mechanics of the left heart system in patients with hypertensive heart disease (HHD) at different stages of heart failure (HF) by cardiac magnetic resonance feature tracking (CMR-FT).

Methods: We retrospectively studied 99 patients with HHD, including non-heart failure (n=25), HF with preserved ejection fraction (HFpEF, n=24), HF with mid-range ejection fraction (HFmrEF, n=23) and HF with reduced ejection fraction (HFrEF, n=27). All participants completed CMR examination. Myocardial strain and strain rate of the left atrium and ventricle were measured independently by 2 physicians, comparing myocardial strain impairment in different stages of HF, analysing the correlation between the left atrial and ventricular strain parameters, and using receiver operating characteristic to analyse the diagnostic efficacy of each parameter.

Results: Compared with the non-heart failure group, the HF group showed impaired LVEF, ϵ_s , ϵ_e , ϵ_a , SRs, SRe, SRa, GPCS, GPRS, and GPLS. There were significant differences in ϵ_s , ϵ_a , GPCS, GPRS, and GPLS in the HFrEF group compared with the HFpEF group ($P<0.001$), and in LVEF, ϵ_e , GPCS, GPRS, and GPLS in the HFmrEF group compared with the HFmrEF group ($P<0.001$). ϵ_s was moderately correlated with GPLS ($r=-0.756$, $P<0.001$). ϵ_a was moderately correlated with GPLS ($r=-0.705$, $P<0.001$) and GPCS ($r=-0.706$, $P<0.001$). SRe, SRa, GPCS and GPLS were effective in distinguishing the non-heart failure group from the HF group (AUC=0.745, 0.828, 0.888 and 0.889); Distinguishing between HFpEF and HFmrEF group, AUCs of GPCS and GPLS were 0.914, 0.757; Distinguishing between HFpEF and HFrEF group, AUCs of SRa, GPCS, and GPLS were 0.744, 0.986, 0.963; Distinguishing between HFmrEF and HFrEF group, AUCs of GPCS and GPLS were 0.820, 0.757. The Bland-Altman analysis showed good inter-physician concordance.

Conclusion: CMR-FT derived myocardial strain has potential value in different stages of heart failure in HHD.

PU-2063

Right Coronary Artery-to-Left Ventricle Fistula: Before and After Transcatheter Closure with a PDA Occluder Evaluation with Emphasis on MDCT Angiographic Advantages

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Background: The MSCT manifestations of a Right Coronary Artery-to-Left Ventricle Fistula before and after the transcatheter closure were reported. **Objective:** Advantages of MDCT angiography in the evaluation of right coronary artery-to-the left ventricle fistula relative to echocardiography were discussed. **Method:** This report describes a right coronary artery-to-the left ventricle fistula in a 48-year-old man. Cardiovascular multidetector-row computed tomography (MDCT) angiography was used for before and after the transcatheter closure procedure

evaluation. Before treatment, MSCT showed a dilated distal of Right Coronary Artery, The distal branch of the left anterior descending branch is also connected to the distal aneurysmal dilatation of the right coronary artery. The fistula was occluded with a PDA occluder. Four days after the occlusion, MSCT showed that the fistula was completely occluded and there was massive thrombosis in the central part and around the occluder. **Result:** MDCT angiography is superior to echocardiography in showing the draining sites and courses, as well as postoperative evaluation of patients with right coronary artery-left ventricular fistula. MSCT could not only provide useful evidence for the best therapeutic strategy and evaluation of therapeutic efficacy but can also find the existence of the thrombosis and the potential risk of acute myocardial infarction after the transcatheter procedure for Coronary artery fistulae (CAF). **Conclusion:** It indicates that MDCT angiography maybe a more suitable diagnostic modality for before and after Transcatheter Closure with a PDA Occluder evaluation of Right Coronary Artery-to-Left Ventricular Fistula.

PU-2064

基于 CT 平扫的影像组学特征在肺结核耐药性中的鉴别诊断价值

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目的: 探讨基于 CT 平扫的影像组学特征在药物敏感与耐药型肺结核中的鉴别诊断价值。

方法: 回顾性地分析 2018 年 4 月至 2020 年 12 月在南京市第二医院经痰培养确诊为肺结核并完成药敏试验的 177 例继发型肺结核患者的临床和影像学资料, 将耐药型肺结核 (n=78) 和药物敏感肺结核 (n=99) 患者按照 7: 3 随机分为训练集和验证集。将患者的 CT 平扫影像图像病灶进行感兴趣区域勾画并提取影像组学特征。筛选出有较大价值的影像组学特征构建影像组学标签 (radiomics signature) 并计算影像分数 (radiomics score, Rad-score)。评估人口统计学资料、临床症状、实验室检查结果及 CT 影像学特征以建立临床因素模型。结合 Rad-score 和临床因素构建影像组学-临床综合模型, 并将其应用于列线图, 并从校准度和临床有用性方面评估列线图的性能。

结果: 13 个组学特征被用于建立影像组学标签。影像组学标签在训练集的 AUC 为 0.891; 验证集的 AUC 为 0.803; 临床因素模型在训练集的 AUC 为 0.780; 测试集的 AUC 为 0.692; 影像组学列线图训练集的 AUC 为 0.932; 验证集的 AUC 为 0.841, 显示出良好的区分度和校准度。决策曲线分析表明, 就临床有用性而言, 影像组学列线图优于临床因素模型和影像组学标签。

结论: 单纯的影像组学标签对鉴别药物敏感与耐药型肺结核具有很好的价值。融合 Rad-score 和临床因素的影像组学列线图显示良好的预测效果, 可能有助于临床医生制定精准治疗。

PU-2065

The correlation of impaired coronary microcirculation and myocardial strain in patients with coronary slow flow: an exploratory study by cardiac magnetic resonance

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Background: Coronary slow flow (CSF) is associated with adverse cardiovascular events, but the pathophysiology remains unknown. This study aimed to evaluate the impact of CSF on left ventricular (LV) strain, left atrial (LA) strain, and myocardial perfusion parameters by cardiac magnetic resonance feature tracking (CMR-FT) and rest first-pass perfusion imaging.

Methods: A total of 31 CSF patients and 17 healthy controls were enrolled retrospectively and underwent cardiac magnetic resonance (CMR) imaging. CSF was defined as a corrected thrombolysis in myocardial infarction frame count (CTFC) of more than 27. LV and LA performance were assessed using CMR-FT cine imaging, including global longitudinal strain (GLS), global circumferential strain (GCS), global radial strain (GRS), LA reservoir strain (ϵ_s), conduit strain (ϵ_e), and booster pump strain (ϵ_a). Myocardial perfusion was analyzed using semiquantitative rest first-pass perfusion, including the perfusion index (PI), upslope, time to maximum signal intensity (TTM), and maximum signal intensity (SI_{max}). Finally, univariate and multivariate analyses were performed to identify independent risk factors in CSF patients.

Results: CSF patients were accompanied by impaired GLS, ϵ_s and ϵ_e (all $P < 0.05$). Compared with healthy controls, SI_{max} (basal, middle and apical), upslope (middle), and global LV PI were significantly decreased in CSF patients (all $P < 0.05$). Mid-upslope showed the effective diagnostic value to identify the CSF and healthy controls (AUC=0.71; sensitivity, 83.87%; specificity, 70.59%; $P=0.017$). Moreover, GLS was negatively correlated with mid-upslope in CSF patients with diastolic dysfunction ($r=-0.452$, $P=0.046$). In multivariable analyses, CTFC ($b=-0.521$, $P=0.004$) and myocardial mass index ($b=-0.428$, $P=0.028$) were the independent risk factors to GLS.

Conclusion: CMR yields comprehensive data from CSF patients. The decreased myocardial strain was related to impaired perfusion parameters in CSF patients with diastolic dysfunction.

PU-2066

93 例新型冠状病毒肺炎患者的 CT 影像学表现分析

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目的: 观察和分析新型冠状病毒肺炎患者的 CT 影像学表现和特征, 以提高新型冠状病毒肺炎患者的诊断水平和治疗规范为临床提供依据。

材料与方法: 本研究回顾性分析了 93 例 2022 年 12 月在北京疫情高峰期于我院确诊为新型冠状病毒肺炎患者的影像学检查资料, 所有的患者均为通过鼻拭子或咽拭子检测 2019-nCoV 核酸阳性的确诊病例, 其中重症肺炎为 39 例, 非重症肺炎为 54 例, 分析病变分布的位置、形态、密度、范围等, 并观察肺门、纵隔淋巴结及胸膜和胸腔情况。

结果: 本次研究中男性患者为 47 例(51%), 女性患者为 46 例(49%), 年龄 27~100 岁, 中位年龄为 68 岁, 胸部 CT 检查结果均为阳性。重症肺炎的 39 例中表现为磨玻璃密度影者为 19 例(49%), 斑片条索影为 9 例(23%); 实变并见空气支气管征为 7 例(18%), 小叶间隔增厚和网格样改变为 4 例(10%); 其中伴有胸膜增厚的有 37 例(95%), 肺门及纵隔淋巴结肿大的为 19 例(49%), 合并有胸腔积液的病例为 14 例(36%)。非重症肺炎的 54 例中表现为斑片条索影的最多见为 24 例(44%), 其次为磨玻璃密度影 22 例(41%), 实变并见空气支气管征为 4 例(7%), 小叶间隔增厚和网格样改变及结节伴周围晕征分别为 2 例(4%); 其中伴有胸膜增厚的为 34 例(63%), 肺门、纵隔淋巴结肿大的为 17 例(31%), 合并有胸腔积液的为 10 例(19%)。

结论: 新型冠状病毒肺炎的影像学表现虽然多种多样, 但有一定的特异性, 多表现为磨玻璃密度并多位于胸膜下, 可伴有胸膜增厚。了解新冠肺炎患者的影像学表现特点可从病变的各种影像学征象上指导临床医师做出临床判断, 从而降低死亡率。

PU-2067

Risk predicting for MACE based on changes in quantitative parameters from serial coronary computed tomography angiography

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Purpose: To investigate the efficacy of predicting major adverse cardiovascular events (MACE) based on quantitative parameters of dynamic changes in CCTA.

Methods: Quantitative parameters of plaques in 73 diseased vessels (66 patients) that underwent two CCTA examinations were retrospectively analysed, pericoronary fat attenuation index (FAI), pericoronary adipose tissue (PCAT) volume, CTFFR and Δ CTFFR of selected plaques were measured, and values of changes in the two examinations were calculated. The mean interval between the two examinations was 20.7 months. For selected vessels, if the MACE occurred after the second CCTA examination, it was the MACE group, otherwise it was the non-MACE group. Differences between parameters between the two groups were compared using Student's t-test and U-test. Logistic regression model was used to analyse the relationship between each quantitative parameter of CCTA and the occurrence of MACE. Receiver operating characteristic curve analysis with the areas under the curve (AUC) was used to determine the efficacy of prediction model established by CCTA parameters.

RESULTS: Compared with the non-MACE group, the differences in the minimum lumen area at baseline, the stenosis rate, CTFFR, plaque volume, fibro-lipid volume in the second examinations, and the two change values (stenosis rate, plaque length, volume, fibre volume, and CTFFR) in the MACE group were statistically significant ($P < 0.05$). Logistic regression analysis demonstrated that the change value of stenosis rate ($OR = 1.130$, 95% CI 1.004-1.271) was an independent predictor of the occurrence of MACE. The prediction model based on the change value of stenosis rate ($AUC = 0.832$, 95% CI 0.72-0.95; $P = 0.002$) could better predict MACE.

CONCLUSION: Change values of quantitative parameters can improve the prediction value of MACE, with the change value of stenosis rate having the highest predictive efficacy.

PU-2068

Early detection of left ventricular involvement in arrhythmogenic right ventricular cardiomyopathy by Feature Tracking

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Purpose: To detect left ventricular myocardial strain by cardiovascular magnetic resonance feature tracking (CMR-FT) in arrhythmogenic right ventricular cardiomyopathy (ARVC) patients.

Methods: This retrospective study included patients with ARVC treated in our Hospital from October 2015 to November 2020. Healthy volunteers were enrolled as a control group. The ARVC patients were divided into 2 subgroups: the preserved left ventricular ejection fraction (LVEF) group ($LVEF \geq 50\%$) and the reduced LVEF group ($LVEF < 50\%$). The biventricular cardiac function parameters, global and regional myocardial strain parameters in the radial, circumferential, and longitudinal directions were compared between ARVC group, including each subgroup, and control group.

Results: This study included 25 patients with ARVC in the ARVC group and 25 healthy volunteers in the control group. The patients with ARVC were divided into two subgroups: LVEF $\geq 50\%$ ($n=15$) and LVEF $< 50\%$ ($n=10$). ROC curve analysis showed that compared with the other left ventricular strain parameters, the left ventricular basal longitudinal strain (AUC: 0.831, 95%CI: 0.721-0.942) was better at distinguishing between ARVC patients and the control group. Moreover, the left ventricular basal longitudinal strain (AUC:0.767, 95%CI: 0.612-0.921) exhibited good performance in differential diagnosis between the LVEF $\geq 50\%$ ARVC group and the control group. The AUC of right ventricular global longitudinal strain, global radial strain and global circumferential strain were 0.904, 0.893, 0.874, respectively.

Conclusion: CMR-FT can early detect left ventricular myocardial strain characteristic in patients with ARVC. Left ventricular basal longitudinal strain exhibited good performance in differential diagnosis.

PU-2069

320 排探测器自由呼吸冠状动脉 CTA 在老年病人的可行性和临床价值

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目的 探讨使用 320 排探测器 CT 在老年病人中自由呼吸状态下进行冠状动脉成像(CCTA)检查的可行性和临床价值。**方法** 回顾性分析 2022 年 10 月至 2023 年 5 月在东南大学附属中大医院使用 320 排 16cm 探测器 CT (uCT 960+, United Image, Shanghai) 进行 CCTA 扫描的老年病人, 入选标准: (1) 年龄 ≥ 60 岁; (2) BMI ≥ 18.5 且 $< 30\text{kg/m}^2$; 排除标准: (1) 主动脉平均 CT 值低于 200, 不能用于诊断分析; (2) 冠状动脉搭桥手术史; (3) 严重心率失常。最终纳入 100 例病人, 根据扫描时呼吸状态分为自由呼吸组 50 例和屏息组 50 例。测量两组图像的主动脉 (Aorta)、右主干 (RCA)、左主干 (LM) 的 CT 值、噪声 (SD)、信噪比 (SNR)、对比噪声比 (CNR) 和有效剂量 (ED) 并采用独立样本 t 检验进行比较。通过冠状动脉 15 段分段法, 两名医师采用 Likert 4 分法对重建后的图像质量进行双盲评分并使用 Mann-Whitney U 检验, 使用 Kappa 检验来评估两位医师主观评分的一致性。**结果** 两组图像的客观评价指标 CT 值、SNR 和 CNR 的差异均无统计学意义 ($p>0.05$), 两组之间的主观评分、高心率 (bpm > 75) 与中低心率 (bpm ≤ 75) 的主观评分也均没有显著差异 (4 (1) vs 4 (1), $p>0.05$), 两位医师的主观评分一致性较好 (kappa 值为 0.633 和 0.720, $p<0.001$), 自由呼吸组的有效剂量 (ED) 小于屏息组, 有统计学差异 (2.77 (2.56, 3.04) vs 2.90 (2.73, 3.10), $p<0.05$)。**结论** 老年病人使用 320 排探测器自由呼吸 CCTA 进行扫描具有可行性, 可以获得较高的图像质量和较低的辐射剂量, 值得临床推广使用。

PU-2070

左心耳封堵术前的 CT 技术要点解析: 一箭双雕的冠状动脉 CTA 改良术

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目的: 左心耳封堵术目前临床应用越来越普及, 临床对于左心耳封堵术的影像科术前精准参数要求日益增加, 探讨此新技术前沿进展及 CT 评价要点具有重要临床意义。

方法：通过概述左心耳局部解剖特点、封堵术的前沿进展、常用方法及封堵器特点来引出临床需求的影像技术问题。规范的左心耳 CT 扫描方法与常用冠状动脉扫描技术异同及其对 CT 评价效能的影响。

结果：Watchman 封堵器已经成为左心耳封堵术的主流；更大范围的类冠脉 CTA 扫描方法是评价左心耳的成像首选方法；CT 容积扫描三维 MRP 及 VR 技术可清晰展示左心耳个体化的形态特点，确定左心耳入口形态及封堵器着陆区是临床术前关注要点，亦是术前 CT 精准评估要点；着陆区平面的左心耳长径、短径、深度及周长是 CT 评价的重点指标；双期扫描可明显提高鉴别左心耳血栓与血液淤滞，必要时通过增加延迟扫描或改变体位来区别降低左心耳血栓的假阳性。

结论：多期像冠状动脉 CTA 改良技术不仅能够精准提供左心耳封堵术前的影像诊断及所需评价测量指标，同时兼顾冠状动脉及心脏主体的解剖结构成像。格式化报告应用能够一站式清晰解决左心耳封堵术前的临床问题。

PU-2071

深度学习图像重建联合 70kv 低管电压在冠状动脉成像中的应用价值

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目的：探讨深度学习图像重建联合 70kv 低管电压在冠状动脉成像中的应用价值。

方法：收集我院 2023 年 5 月至 8 月行冠状动脉 CTA 检查患者 60 例并随机分为 A、B 两组，A 组常规 120kV，噪声指数 20，对比剂剂量 0.8ml/kg，B 组低管电压 70kV，噪声指数 30，对比剂剂量 0.5ml/kg。扫描完成 A 组重建 50%ASIR-V，B 组重建深度学习不同级别降噪图像（DLIR-L、DLIR-M、DLIR-H），在四组图像上分别测量主动脉根部、左主干、左前降支、左回旋支及右冠状动脉 CT 值及 SD 值，计算信噪比（SNR）和对比噪声比（CNR）。由两名具有五年工作经验医生采用五分法分别对图像质量进行主观评价。

结果：两组患者一般资料（性别、年龄、身高、体重、BMI、心率）间差异无显著统计学意义（ $p > 0.05$ ），B 组 CTDIvol、DLP、ED 和对比剂用量均显著低于 A 组（ $p < 0.001$ ），其中 B 组 ED 和对比剂用量较 A 组分别降低约 76.7%和 33.1%。B 组 70kV 深度学习重建 DLIR-L、DLIR-M、DLIR-H 图像主动脉根部、左主干、左前降支、左回旋支、右冠状动脉 CT 值均显著高于 A 组 120kV（ $p < 0.001$ ）。B 组随着重建算法 DLIR-L、DLIR-M、DLIR-H 依次变化，冠状动脉 SD 值逐渐降低、SNR 值和 CNR 值逐渐升高，且 B 组 DLIR-H 重建 SD 值均显著低于 A 组 50%ASIR-V（ $p < 0.001$ ），B 组 DLIR-M、DLIR-H 重建 SNR 值和 CNR 值均显著高于 A 组 50%ASIR-V（ $p < 0.001$ ）。两名医师主观评分具有良好一致性（kappa 值 > 0.80 ， p 值 < 0.001 ），B 组冠状动脉 DLIR-L、DLIR-M 和 DLIR-H 重建主观评分均显著高于 A 组 50%ASIR-V 重建且差异具有显著统计学意义（ $p < 0.001$ ），其中 DLIR-H 重建图像主观评分最高。

结论：深度学习图像重建（DLIR）联合 70kv 低管电压不仅可以显著降低 CCTA 检查辐射剂量（约 76.7%）和对比剂用量（约 33.1%），且 DLIR 重建可以显著提升冠状动脉图像质量，其中 DLIR-H 重建改善冠状动脉图像质量效果最佳。

PU-2072

Pembrolizumab-Associated Pulmonary Sarcoidosis in Colonic Cancer Treatment and its Differential Diagnosis

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Objective: To report a case of sarcoidosis induced by adjuvant immunotherapy and its CT presentations so as to facilitate recognition for rare immune-related adverse effects.

Methods: Computed tomography, bronchoscopy and transbronchial needle biopsy, and follow-up CT were retrospectively analyzed in a 54-year-old woman with resected colonic cancer.

Results: The patient underwent right hemi-colectomy four months previously, and histopathology along with molecular testing confirmed colonic mucinous adenocarcinoma with mismatch repair-deficient proteins. There was no any pulmonary abnormality and lymphadenopathy on preoperative chest CT scan(Fig1A-B). Follow-up chest CT demonstrated diffuse nodular shadows with the pattern of peri-lymphatic distribution throughout the lungs after the patient experienced the first cycle of adjuvant chemotherapy and pembrolizumab one month afterwards(Fig2A). It also showed extensive paratracheal, subcarinal and para-aortic lymphadenopathy(Fig2B). These findings on CT examination alerted us to consider pulmonary lymphangitic carcinomatosis(PLC) owing to malignancy progressing based on our insight for micronodular lung disease in the setting of malignant disease. There was any normality to be detected on abdominal CT scan. Meanwhile, she was free of any respiratory symptoms such as cough, fever, chest tightness, shortness of breath and dyspnea. There was no increase in blood tumor markers. she underwent bronchoscopy and transbronchial needle biopsy for mediastinal subcardinal lymph nodes. Final pathology revealed noncaseating granulomatous inflammation consistent with sarcoidosis(Fig3).

Conclusion: With the expanding use of immune checkpoint inhibitor (ICI) therapy to those malignancies, ICI-therapy can lead to a diverse array of immune-related adverse effects(ir-AEs). Different from our familiar ir-AEs, sarcoidosis in the setting of adjuvant immunotherapy is rarely recognized in those patients with the excised colonic cancer. Micronodular lung disease on CT commonly suggests PLC, sarcoidosis, miliary tuberculosis, and interstitial lung disease. By identifying the pattern and using additional clues, such as distribution, additional imaging findings, and clinical history and the value of tumor markers, a radiologist can make a appropriate diagnosis. Transbronchial biopsy could further confirmed diagnosis and exclude other diagnoses. This case adds to the growing body of literature linking ICI therapy to rare ir-AEs, namely sarcoidosis as a potential complication of cancer immunotherapy.

PU-2073

Multimodality imaging evaluating “flying Valsalva aneurysm of noncoronary sinus”

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Objective: To report flying Valsalva aneurysm of noncoronary sinus diagnosed via multiple imaging modalities.

Methods: Echocardiography, coronary computed tomography angiography, MRI and operative outcomes were retrospectively analyzed in a 17-year-old girl.

Results: A 17-year-old girl was admitted to our hospital with chest tightness and shortness of breath after exertional exercise. Meanwhile, she looked pale with purple lips, and improved after crouch and rest for a few minutes. No any obvious murmur was heard. Transthoracic echocardiography showed a cystic-like echogenic mass sized 34 to 33mm anteriorly locating the tricuspid valve(Fig-1), and suspicious patent foramen ovale. Cardiac MRI demonstrated a spherical mass reciprocating movement with cardiac cycle between the right heart

chamber(Video-1) and gradual enhancement after contrast injection. Further ECG-gated coronary CT-angiography(CCTA) revealed non-coronary sinus of Valsalva aneurysm(SVA) with narrow neck protruding into the right heart(Fig-2) and typical atrial septal defect(ASD)(Fig-3). The patient underwent complete excision of SVA and repair of ASD under the general anesthesia. Intraoperative findings were consistent with preoperative diagnosis.

Conclusion: Sinus of valsalva aneurysm(SVAs) is an uncommon cardiac anomaly with an incidence of 0.09% in general population and 0.1-3.5% of all congenital heart defects. Approximately 10-30% SVAs originate from the noncoronary sinus. SVAs manifest a wide spectrum of clinical presentations ranging from asymptomatic state to dreadful complications due to compression of vital surrounding structures or spontaneous rupture. Transthoracic echocardiography is a quick, noninvasive and most commonly used diagnostic tool for SVA, especially for ruptured SVAs. This case underlies the importance of multiple imaging evaluations in establishing accurate diagnosis and understanding the diversities of clinical presentations and imaging manifestations for noncoronary sinus of Valsalva aneurysm.

PU-2074

人工智能多方式评估冠状动脉钙化狭窄程度的临床应用价值

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目的：结合不同人工智能冠状动脉狭窄分析，人工智能 CT-FFR 分析手段对冠状动脉钙化严重患者的诊断价值。

方法：回顾性纳入 2022 年 1-2023 年 8 月期间进行冠状动脉检查在 1 月内进行有创经皮导管介入冠状动脉造影检查的 30 例患者，由 2 名高年资心血管专长医生进行图像质量评估，人工智能冠状动脉狭窄分析，人工智能 CT-FFR 分析，人工阅片诊断并和冠状动脉有造影结果进行对比分析。以有创冠状动脉造影结果为金标准，计算人工阅片诊断，人工智能冠状动脉狭窄分析，人工智能冠状动脉狭窄结合人工智能 CT-FFR 分析的诊断效能，以 $p < 0.05$ 为有统计学差异性。

结果：30 例患者的 102 支血管纳入分析，人工智能冠状动脉狭窄分析和人工智能 CT-FFR 分析比人工阅片诊断诊断冠状动脉狭窄的精确度和特异度均优于人工。

结论：联合人工智能冠状动脉狭窄分析，人工智能 CT-FFR 分析对冠状动脉狭窄分析，对冠状动脉钙化患者的诊断效能得到提高。

PU-2075

迭代重建技术(ADMIRE)对冠状动脉 CT 图像质量和辐射剂量的影响

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目的：随着 CT 技术的快速发展，临床疾病的诊断水平极大提高,但是 CT 检查的辐射剂量对被照射人群存在潜在危害,并日渐被人们所关注。如何在保证图像质量的前提下尽可能降低辐射剂量是当今医学影像学领域所秉持的原则和探索的话题,而重建算法的改进成为 CT 低剂量研究的方向之一。随着重建算法在技术上取得的新突破以及迭代重建技术的日趋成熟,可实现 CT 检查中在降低辐射剂量的同时获得高质量的图像,从而使更多患者受益。本摘要的研究方向是探究迭代重建技术(ADMIRE)对冠状动脉 CT 图像质量和辐射剂量的影响

方法: 选取吉林大学第一医院应用 Siemens SOMATOM Force CT 行冠状动脉扫描的 120 名患者, 采用回顾性螺旋扫描, 双期相技术注射对比剂, 按扫描顺序依次分为常规剂量组 (120KV)、低剂量 100KV 组和低剂量 80KV 组, 应用 CARE Dose4D 管电流调制技术进行冠状动脉 CT 扫描, 120KV 采用 FBP 重建作为常规对照组, 低剂量扫描组分别采用 FBP 及 ADMIRE 对图像进行重建。2 名放射科医师进行双盲法阅片, 比较不同毫安秒和重建算法的曝光剂量、图像噪声 (MSD)、对比信噪比 (CNR)、信噪比 (SNR) 以及图像质量。

结果: 计算出低剂量组 (80 和 100KV) 有效剂量分别多少, 较常规组分别降低的百分比。100KV 组采用 AIR 较 FBP 组 MSD 降低多少, CNR 提高, SNR 提高。80KV 采用 AIR 重建较 FBP 组 MSD 降低, CNR 提高, SNR 提高。80KV 采用 AIR 较常规剂量组 MSD 降低、CNR 及 SNR 较常规剂量组升高。运用统计学算法。

结论: 与 FBP 相比, 采用 ADMIRE 能在保证图像质量的同时, 降低辐射剂量, 降低对比剂用量。

PU-2076

基于定量 CT 检测浸润性肺结核病变的可行性研究

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目的 基于计算机肺部感染辅助诊断系统, 验证人工智能 (artificial intelligence, AI) 技术在浸润性肺结核病灶检测及评估中应用的准确性及可行性。

方法 回顾性收集 2020 年 1 月至 2022 年 7 月延安市第二人民医院确诊的初次就诊的浸润性肺结核患者 120 例, 对肺部病变范围和病变征象进行半定量评分。将各肺叶的病变范围和各病变征象分数相加, 得到最终的分数。采用 Pearson 或 Spearman 相关分析全肺及各肺叶视觉评分 (病变范围得分、病变严重程度得分、各征象得分) 与 CT 定量指标 [病灶体积 (lesion Volume, LeV/mL)、病灶占肺体积的百分比 (percentage of lesion, LeV%) 及病灶质量 (lesion mass, LM/g)] 之间的相关性。

结果 全肺病变范围得分、病变严重程度得分与全肺定量 CT 指标 LeV、LeV%、LQ 呈高度相关 ($r=0.783\sim0.826$, $p<0.001$); 各肺叶 LeV% 与人工评估的病变比例得分、各肺叶 LQ 与人工评估的病变严重程度得分均呈高度相关 ($r=0.761\sim0.913$, $p<0.001$)。

结论 AI 获得的全肺及各肺叶 CT 定量指标与传统视觉评分具有高度相关性, 证实了其在浸润性肺结核客观影像学定量评估中具有准确性及可行性。

PU-2077

Comparison of CT and clinical features between SARS-Cov-2 Omicron Variant and Original Strain

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Purpose: to investigate the differences of clinical and CT features between Omicron Variant and Original Strain.

Method: Sixty-nine hospitalized patients infected with Omicron from October 2022 to November 2022 and ninety-six hospitalized patients with Original Strain from February 2020 to March 2020 in Chongqing, China were included in this retrospective study. The clinical features, CT

manifestations, lung involvement degrees in different stages on CT, and imaging changes after the nucleic acid results turned negative were compared between the two groups.

Results: For clinical features, patients with Omicron were more frequently observed in older women, absence of clinical symptoms, lower serum level of C-reactive protein, procalcitonin, and lower average days from symptoms onset to initial CT scan (all $P<0.05$). For CT features, patients with Omicron were more likely to have round-like shadowing and tree-in-bud pattern (all $P<0.05$), but less likely to have diffuse distribution, patchy shadowing, lineal shadowing and vascular enlargement pattern (all $P<0.05$). The Omicron group was susceptible to exhibit lower CT involvement scores in each stage (all $P<0.05$) and imaging progression after nucleic acid results turned negative ($P<0.001$).

Conclusions: Patients with Omicron demonstrated less severe changes on chest CT compared with Original Strain, and imaging progression after nucleic acid results turned to be negative was common in patients with Omicron.

PU-2078

A case of IgG4-related respiratory disease with the radiologic manifestations resembling ANCA- associated vasculitis.

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We report a case of immunoglobulin(Ig)G4-related disease with the radiologic manifestations resembling ANCA-associated vasculitis. The patient was a 71-year-old woman initially presented with weakness in the right limb for 5 days and diagnosed as acute cerebral infarction. During the treatment of acute cerebral infarction, the patient had mild cough and expectoration. High resolution computed tomography of the chest showed masses, nodules and consolidations distributed along the bronchovascular bundle. Reversed halo signs also appeared on the images. Multiple enlarged lymph nodes can be seen in both armpits and mediastinum. Microscopic examination of the bronchoscopic biopsy showed mature plasma cells and lymphocytes infiltrate under the mucosa, significant fibrosis and partial occlusive phlebitis on elastic fiber staining. In addition there were prominent multifocal lymphoplasmacytic infiltrates with a increase of IgG4-positive plasma cells (15 per high power field in hot spots) and elevated IgG4/IgG ratio is 10%. Antinuclear antibodies and anti-neutrophil cytoplasmic antibody are negative. The patient's symptoms improved significantly accompanied by the shrinking peribronchovascular masses, nodules and consolidations with oral corticosteroid treatment.

PU-2079

左肺下叶背段支气管炎性肌纤维母细胞瘤 1 例

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患者，女，52 岁，1 年前体检发现肺部占位，无咳嗽、胸痛、咯血不适，2 月前间断出现痰中带血，来我院就诊。既往病史无特殊。胸部 CT 平扫及增强：左肺下叶背段软组织肿块，大小约 4.3cm×3.8cm×4.7cm，边界清晰，平扫呈稍低密度，增强呈中度不均匀强化，肿块包绕左肺下叶背段支气管并左肺下叶支气管局限性狭窄，远端肺组织过度通气，诊断为左肺中央型肺癌病左肺下叶肺气肿。全身 PET 及 CT 断层显像：左肺下叶近肺门区类圆形肿块，放射性分部异常浓聚，标准化摄影值 (SUV) 最大值 50.0。支气管镜检查：左肺下叶支气管开口处见一球状新生物阻塞管

腔，表面较光滑，伴较多新鲜渗血。术后病理诊断：（左下肺叶）炎性肌纤维母细胞瘤。免疫组化：SAM（部分+）、Vimentin（+）、ALK（+）、CD34（+）、CD117（-）、Ki67（约 10%+）。肺 IMT 是一种间叶源性的真性肿瘤，发病机制尚不明确，以儿童及青少年发病多见，其临床表现因发病部位不同表现差异较大，影像表现缺乏特异性，最终依赖病理学和免疫组织化学检查确诊。本例病灶发生于左肺下叶背段支气管，并凸向左肺下叶支气管，不同于以往中心型病灶表现，以肺门区肿块并左肺下叶肺组织过度通气为首发表现。

PU-2080

肺动脉的 CT 血管造影技术在肺栓塞诊断中的应用效果分析

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研究应用 CT 肺动脉造影对诊断肺栓塞的临床价值，提高检出率来降低肺栓塞的误诊。采取实验研究法，选取某段时间于某医院就诊的肺栓塞患者 30 例，30 例病例均进行常规 CT 平扫和 CT 肺动脉造影扫描，观察对比肺动脉分支的检出率以及狭窄情况，血栓的部位和形态。两种检查方法的检出率进行对比，CT 肺动脉造影的检出率明显高于 CT 平扫的检出率，差异有统计学意义 ($F < 0.05$)。CT 肺动脉造影可以对患者的栓子形态和栓塞范围进行确定，并且便捷、快速、准确性高。

PU-2081

Central and peripheral pulmonary sclerosing pneumocytomas: multi-phase CT study and comparison with Ki-67

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Objectives: This study aimed to evaluate the multi-phase CT findings of central and peripheral pulmonary sclerosing pneumocytomas (PSPs) and compared them with Ki-67 to reveal their neoplastic nature.

Methods: Multi-phase CT and clinical data of 33 PSPs (15 central PSPs and 18 peripheral PSPs) were retrospectively analyzed and compared their multi-phase CT features and Ki-67 levels.

Results: For quantitative indicators, central PSPs were larger than peripheral PSPs (10.39 ± 3.25 cm³ vs. 4.65 ± 2.61 cm³, $P = 0.013$), and tumor size was negatively correlated with acceleration index ($r = -0.845$, $P < 0.001$). The peak enhancement of central PSPs appeared in the delayed phase, with a longer time to peak enhancement (TTP, 100.81 ± 19.01 s), lower acceleration index (0.63 ± 0.17), progressive enhancement, and higher Ki-67 level. The peak enhancement of peripheral PSPs appeared in the venous phase, with the shorter TTP (62.67 ± 20.96 s, $P < 0.001$), higher acceleration index (0.99 ± 0.25 , $P < 0.001$), enhancement washout, and lower Ki-67 level. For qualitative indicators, the overlying vessel sign (86.67% vs. 44.44%, $P = 0.027$), prominent pulmonary artery sign (73.33% vs. 27.78%, $P = 0.015$), and obstructive inflammation/atelectasis (26.67% vs. 0%, $P = 0.033$) were more common in central PSPs, while peripheral PSPs were more common with halo sign (38.89% vs. 6.67%, $P = 0.046$).

Conclusions: The location of PSP is a possible contributing factor to its diverse imaging-pathological findings. The tumor size, multi-phase enhancement, qualitative signs, and Ki-67 were different between central and peripheral PSPs. Combined tumor size, multi-phase findings, and Ki-67 level are helpful to reveal the nature of the borderline tumor.

PU-2082

临床-时间序列模型评估鲍曼不动杆菌肺部感染与定植的应用研究

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目的：以鲍曼不动杆菌在肺部感染或定植的患者作为研究对象，通过人工智能方法综合分析多时序胸部 X 线图像及实验室指标数据，以感染或定植作为结局变量，旨在精准区分鲍曼不动杆菌在肺部感染或定植，以为临床医师个性化制定和调整治疗方案提供重要参考。

方法：对 152 名从痰液或肺泡灌洗液中培养出鲍曼不动杆菌的患者进行了回顾性分析。我们提出了基于不同时间序列数据的嵌套逻辑回归模型，模型用于自动分类鲍曼不动杆菌的肺部状态。纳入住院患者临床基线信息以及时间序列数据，时间序列数据包括三个时间点的动态胸部 X 线图像肺炎积分和实验室指标值。通过 SHAP VALUE 方法评估机器学习模型的特征重要性，探讨多时序模型的临床应用价值。

结果：多时间序列数据模型的表现能力最优，AUC 为 0.850（95%置信区间为[0.638-0.873]），准确率达到 0.761（95%置信区间为[0.612-0.874]），敏感性为 0.833（95%置信区间为[0.626, 0.953]）。而只使用单一时间点特征的模型 AUC 为 0.741（95%置信区间为[0.568, 0.775]）。培养出菌株 1 天内与培养出菌株前 3 天的胸片肺炎积分差异是最重要的影像学预测因子；培养出菌株前住院天数、APACHE II 是评估感染和定植重要的预测因子。决策曲线分析表明构建的多时序胸片征象及实验室指标动态变化信息鲍曼不动杆菌肺部感染与定植分类模型展示出良好的分类效能。

结论：利用机器学习对时间序列胸部 X 射线图像和实验室数据进行动态评估，能够准确地地区分鲍曼不动杆菌感染和定植，从而展示了早期检测对临床医生提供个体化治疗的潜力。

PU-2083

内源性 T1ρ 成像在心脏淀粉样变性诊断和分型中的作用

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背景：心血管磁共振（CMR）被广泛用于诊断心脏淀粉样变性（CA）。由于 CA 在 CMR 上形态和功能特征不具有特异性，故 CMR 在诊断准确率以及对 CA 进行分型中尚有进步的空间。

目的：探讨内源性 CMR T1ρ 在 CA 诊断和分型中的价值。

方法：回顾性纳入 45 名 CA 受试者，包括 29 名免疫球蛋白轻链型淀粉样变（AL）患者和 16 名转甲状腺素介导的淀粉样变性（ATTR）患者，30 名肥厚型心肌病（HCM）受试者和 10 名健康对照（HC）。入组对象均在 3.0 T MR 设备上接受 T1ρ，初始 T1mapping 和打药后 T1mapping 成像，以及延迟增强扫描成像。其中 T1ρ 成像分别在自旋锁定频率 0Hz 和 298 Hz 下进行，通过心肌 T1ρ（0Hz）和 T1ρ（298 Hz）计算心肌离散指数（MDI）图，通过初始 T1mapping 和打药后 T1mapping 计算心肌细胞外体积分数（ECV），所有结果均是左室整体参数。

结果：ECV（HC:27.4±2.8%vs.HCM:32.6±5.8%vs.CA:46±8.9%；P<0.0001）、T1ρ（298Hz）（HC:41.9±1.6ms vs.HCM:48.8±6.2ms vs.CA:54.4±5.2ms；P<0.001）从 HC 组到 HCM 组再到 CA 组逐渐增加。尽管 HC 和 HCM 患者之间的左心室整体初始 T1 没有显著差异，但 CA 组的初始 T1 值显著高于 HC 和 HCM 组（HCM: 1274.7±54.3ms vs.HC: 1292.5±47.4ms vs.CA: 1428.2±71.9ms；P<0.0001）。MDI 指数从 HCM 组到 HC 组到 CA 组逐渐下降（HCM:8.8±2.8ms

vs.HC:6.1±0.9ms vs.CA:3.4±2.1ms; $P<0.0001$)。在 CA 和 HCM, 以及 AL 和 ATTR 之间的鉴别诊断中, 与初始 T1 和 ECV 相比, MDI 指数和 T1 ρ (298Hz) 联合具有最佳诊断效能。
结论: T1 ρ 和 MDI 磁共振成像技术可能是一种新的 CMR 成像生物标志物, 具有更好地诊断 CA 及分型的能力。

PU-2084

能谱 CT 在肺纯磨玻璃结节鉴别诊断中的 应用价值

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目的 探讨能谱 CT 定量参数在肺纯磨玻璃结节病变中的鉴别诊断价值。方法 回顾性分析 2017 年 8 月至 2019 年 9 月苏州大学附属第二医院影像科行胸部能谱 CT 扫描且有病理结果的 44 例纯磨玻璃结节患者的临床资料, 其中男 18 例, 女 26 例, 年龄 26~79 (51±12) 岁。分为炎性病变组 (12 例)、浸润前病变组 (17 例)、浸润性腺癌组 (15 例); 为判断水基值鉴别腺癌浸润程度的效能, 进一步将以上三组合并为两组, 即非浸润性腺癌组 (炎性病变+浸润前病变) 和浸润性腺癌组。分别测量 病灶动脉期、静脉期的碘基值、标准化碘基值及水基值; 计算病灶动脉期、静脉期能谱曲线斜率 (K40~70KeV)。运用单因素方差分析进行三组间比较及多重比较法进行两两比较。采用组内相关系数 (ICC) 检验评估三次测量数据的一致性。应用受试者工作特征 (ROC) 曲线下面积 (AUC) 评估水基值 诊断效能。结果 炎性病变组、浸润前病变组、浸润性腺癌组三组动脉期及静脉期的水基值差异均具有统计学意义 [动脉期 (291.95±58.66) mg/cm³、(297.61±63.96) mg/cm³、(374.52±60.62) mg/cm³; 静脉期 (277.07±33.78) mg/cm³、(291.74±50.49) mg/cm³、(373.33±75.12) mg/cm³] (均 $P<0.05$)。进一步两两比较: 动脉期、静脉期水基值在炎性病变组与浸润前病变组之间差异均无统计学意义 (均 $P>0.05$); 浸润性腺癌组与炎性病变组、浸润前病变组间差异均有统计学意义 (均 $P<0.05$)。在鉴别浸润性腺癌 和非浸润性腺癌组 (炎性病变+浸润前病变) 的纯磨玻璃结节上, 静脉期水基值 AUC 最大 (0.770), 以 349.31 mg/cm³为最佳阈值时, 灵敏度和特异度分别为 66.67%、93.10%。动脉期、静脉期的能谱曲线斜率、碘相关参数 (碘基值、标准化碘基值) 在三组间差异均无统计学意义 (均 $P>0.05$)。结论 能谱 CT 定量参数水基值在纯磨玻璃结节定性诊断中能较好鉴别炎性病变、浸润前病变和浸润性腺癌, 有助于 肺纯磨玻璃结节的定性分析。

PU-2085

How a torrent of COVID science changed medical imaging: Comparison analysis before and during the pandemic based on bibliometrics

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【Abstract】【Objective】 This study aims to explore the long-covid effect for imaging research by comprehensively examining medical imaging publications before and during the pandemic, which might provide new insights and perspectives for imaging researchers and practitioners in respond to the challenges posed by the pandemic. 【Methods】 This study used bibliometric analysis to systematically compare publications between January 1, 2017 to December 31, 2019 and January 1, 2020 to December 31, 2022 from Web of Science (WOS) Core Collection database. Statistical data were analyzed with SPSS software. VOSviewer and Citespace

software were used to draw knowledge maps of keyword hotspots and highly cited documents in medical imaging field. 【Results】 Our results demonstrated that the COVID-19 outbreak has influenced the medical imaging research by changing global imaging research output trends and altering the hotspots. Deep learning has become a major research content during the pandemic. Publication declines were observed among glioma (11.0% fewer, $\chi^2=6.413$, $P<0.05$) and colorectal cancer (6.8% fewer, $\chi^2=10.741$, $P<.001$), followed by multiple sclerosis (5.7% fewer, $\chi^2=32.886$, $P<.001$). The results of mining the medical imaging publications show that thoracic imaging has been explored in greater depth during the pandemic. No significant change was seen in the number of lung cancer ($P=.128$), breast cancer ($P=.344$) and thyroid nodule ($P=.396$) publications over time. 【Conclusions】 The COVID-19 has resulted in marked changes to medical imaging. More attentions have been paid to chest-related diseases such as incidental thyroid nodules, breast tumor and cardiovascular disease, which might be identified from chest CT. However, MRI-dependent diseases such as brain tumors have been partly interrupted or neglected. This study provides a new perspective to reimagine preparedness for and responses to the lasting effects of the pandemic in the months and years following its remission. How to minimize the adverse impact of COVID-19 on imaging research requires future research.

PU-2086

基于 CT 值的灰度直方图测量实性成分体积百分比鉴别诊断早期肺腺癌亚型

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目的：探讨实性成分体积百分比鉴别诊断 I 期肺腺癌亚型的价值，并确定区分病理亚型的最佳临界 CT 值。

方法：回顾性分析本院 2019 年 6 月至 2021 年 12 月经手术病理结果证实为原位癌及肺腺癌，且薄层 CT 表现为亚实性结节的 962 个结节，根据病理结果将病变分（1）AIS（350 例）与侵袭性肺腺癌（612 例）组；（2）MIA（213 例）与 IAC（399 例）组。利用 CT 值的灰度直方图测量亚实性肺结节内实性成分体积百分比，分析不同诊断模型的诊断效能，并寻找最佳临界 CT 值。

结果：在 AIS 与侵袭性肺腺癌组中（见表 2），发病年龄（ $P<0.001$ ）、质量（ $P<0.001$ ）、实性成分体积百分比（ $P<0.001$ ）均有统计学意义；-350Hu 诊断模型效能最高（ $AUC=0.859$ ，准确性 81.69%，敏感性 85.60%，特异性 74.86%），体积百分比临界值为 8.3%。在 MIA 与 IAC 组中（见表 3），发病年龄（ $P=0.017$ ）、质量（ $P<0.001$ ）、实性成分体积百分比（ $P<0.001$ ）具有统计学意义；-350Hu 诊断模型的效能最高（ $AUC=0.857$ ，准确性 78.27%，敏感性 82.91%，特异性 69.48%），体积百分比临界值为 16.9%。

结论：基于 CT 值的灰度直方图测量的实性成分体积百分比有助于鉴别诊断表现为亚实性结节的早期肺腺癌亚型。

PU-2087

Differentiation of pulmonary sclerosing pneumocytoma from solid malignant pulmonary nodules by radiomic analysis on multiphasic CT

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Purpose: To investigate the diagnostic value and feasibility of radiomics-based texture analysis in differentiating pulmonary sclerosing pneumocytoma (PSP) from solid malignant pulmonary nodules (SMPN) on single- and three-phase computed tomography (CT) images.

Materials and Methods: A total of 25 PSP patients and 35 SMPN patients with pathologically confirmed results were retrospectively included in this study. For each patient, the tumor regions were manually labeled in images acquired at the noncontrast phase (NCP), arterial phase (AP), and venous phase (VP). The least absolute

shrinkage and selection operator (LASSO) method was used to select the most useful predictive features extracted from the CT images. The predictive models that discriminate PSP from SMPN based on single-phase CT images (NCP, AP, and VP) or three-phase CT images (Combined model) were developed and validated through fivefold cross-validation using a logistic regression classifier. Model performance was evaluated using receiver operating characteristic (ROC) analysis. The predictive performance was also compared between the Combined model and human readers.

Results: Four, five, and five features were selected from NCP, AP, and VP CT images for the development of radiomic models, respectively. The NCP, AP, and VP models exhibited areas under the curve (AUCs) of 0.748 (95% confidence interval [CI], 0.620–0.852), 0.749 (95% CI, 0.620–0.852), and 0.790 (95% CI, 0.665–0.884)

in the validation dataset, respectively. The Combined model based on three-phase CT images outperformed the NCP, AP, and VP models (all $p < 0.05$), yielding an AUC of 0.882 (95% CI, 0.773–0.951) in the validation dataset. The Combined model displayed noninferior performance compared to two senior radiologists; however, it outperformed two junior radiologists ($p = 0.004$ and 0.001 , respectively).

Conclusion: The Combined model based on radiomic features extracted from threephase CT images achieved radiologist-level performance and could be used as promising noninvasive tool to differentiate PSP from SMPN.

PU-2088

冠脉钙化 CT 减影血管成像技术的临床应用

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目的: 探讨 CT 减影冠状动脉血管成像(subtraction coronary computed tomography angiography, CCTA)在具有严重钙化节段冠心病中的诊断价值。

方法: 收集 2017 年 9 月~2017 年 12 月我院 38 例对同时接受双源 CT 减影 CCTA 扫描和传统冠状动脉血管造影(digital subtraction angiography, DSA)检查的患者进行回顾性分析, 其中男 16 例, 女 22 例。年龄 43~73 岁, 平均 59 岁。使用西门子双源 CT 扫描仪获得原始图像, 并采用图像减影处理将所选中的平扫和增强的容积数据导入工作站, 减影即增强扫描的原始容积数据减去平扫的原始容积数据。在行减影处理之前, 该减影软件会对所选中两组图像进行严格的匹配进一步消除配准伪影。最终得到的减影图像为消除钙化斑块而保留对比剂充盈的血管影像, 所得后处理图像以及 DSA 图像由 2 放射科医生用双盲法进行分析。

结果: CCTA 与 DSA 之间的一致性为 0.85, 具有良好的一致性。与 DSA 金标准相对比, CCTA 诊断冠脉狭窄 $\geq 50\%$ 的 AUC 值为 0.96, 与 CCTA 相比差异有统计学意义($P=0.03$)。CCTA 诊断明显狭窄($\geq 50\%$)节段的灵敏度、特异度、阳性预测值、阴性预测值及准确度分别为 90.5%, 85.5%, 82.3%, 92.2%及 87.3。

结论: Sub-CCTA 可以提高严重钙化节段冠状动脉狭窄程度的诊断准确性; 减影技术在冠状动脉成像中的应用可以减少甚至消除严重钙化斑块产生的伪影, 具有较好的临床应用前景。

PU-2089

原发性肺浸润性黏液腺癌的临床和影像学特征：结节肿块型与实变型对比分析

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【目的】探讨原发性肺浸润性黏液腺癌 (PIMA) 的临床特征和 CT 影像学表现, 对比分析结节肿块型和实变型之间的差异。

【方法】回顾性分析 2008 年 2 月至 2022 年 11 月在我院接受 CT 检查并经手术病理证实为 PIMA 的患者 79 例 (男 30 例, 女 49 例, 年龄范围 29-83 岁, 平均年龄 58.7 ± 12.19 岁)。所有患者术前均行胸部 CT 平扫和增强检查, 根据影像学表现分为结节肿块型及实变型。记录患者临床资料 (年龄、性别、吸烟史、临床症状、血清肿瘤标记物等), 影像学特征 (位置、形态、分叶征、毛刺征、空泡征、空气支气管征、瘤周肺气肿、淋巴结增大、胸腔积液等), 病理组织学表现 (淋巴结转移、脉管浸润、胸膜侵犯、气道播散等)。统计学对比分析结节肿块型及实变型 PIMA 患者在临床、影像及病理特征之间的差异。

【结果】79 例 PIMA 中, 结节肿块型 61 例 (男 23 例, 女 38 例; 平均年龄 58.3 ± 11.69 岁), 实变型 18 例 (男 7 例, 女 11 例; 平均年龄 60.1 ± 14.04 岁)。两组在性别、年龄间的差异无明显统计学意义 ($P=0.928$; $P=0.594$)。77.78% (14/18) 的实变型患者出现临床症状, 高于结节肿块型 49.18% (30/61) ($P=0.032$)。结节肿块型及实变型 PIMA 患者在病灶位置、分叶征、空气支气管征之间的差异具有统计学意义 ($P=0.028$; $P=0.025$; $P<0.001$); 在形态、毛刺征、空泡征、钙化、瘤周肺气肿、淋巴结增大、胸腔积液之间的差异无明显统计学意义 ($P=0.375$; $P=0.228$; $P=0.403$; $P=0.567$; $P=0.522$; $P=0.854$; $P=0.878$)。病理组织学脉管浸润和气道播散方面, 实变型发生数量 (6/18, 33.33%; 13/18, 72.22%) 均高于结节肿块型 (6/61, 9.84%; 24/61, 39.34%), 具有统计学差异 ($P=0.015$; $P=0.014$)。

【结论】结节肿块型与实变型 PIMA 患者在临床症状、影像学表现和病理特征上均具有一定的差异。实变型 PIMA 病理侵袭性高于结节肿块型, 提示预后不良。

PU-2090

联合 CT 影像组学和临床影像特征列线图预测亚实性密度肺腺癌的脏层胸膜侵犯

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目的: 探讨并验证一种结合影像组学和临床特征的术前列线图模型在预测亚实性密度肺腺癌脏层胸膜侵犯 (VPI) 的应用价值。

方法：回顾性分析 2016 年至 2019 年期间经病理证实的临床 I 期肺腺癌患者的影像、病理及临床资料，对具有完整病理结果的 156 患者进行分类（VPI 阳性组：VPI 阴性组；70：86）后，在肺窗图像上勾画结节感兴趣区（ROI），利用 FeAtureExplorerPro（FAE）软件提取影像组学特征，共 806 个特征，特征选择和降维分别基于递归特征消除（RFE）和皮尔逊相关系数（PCC）方法。最后，使用支持向量机（SVM）来选择构建影像组学模型的最优特征，并在内部验证集中进行了内部验证。纳入影像及临床特征后进行多变量回归分析并构建列线图模型，并用受试者工作特征曲线（ROC）来评估模型的性能，并相互比较。

结果：提取的 806 个特征和从 707 个稳定特征中选出的 10 个最优特征用于构建影像组学模型。列线图模型的 AUC 为 0.888（95%CI，0.762-0.961），优于临床模型（0.787（95%CI：0.643-0.893）； $p=0.049$ ），与放射组学模型相当（0.879，95%CI:0.751-0.965； $p>0.05$ ）。在验证数据集中，联合模型的敏感性为 90.5%，特异性为 76.9%。

结论：列线图模型可以被认为是一种非侵入性的方法，对预测亚实性肺结节脏层胸膜侵犯具有高度敏感或高度特异性的诊断。

PU-2091

肺结节共病肺气肿患者定量影像学的特征分析

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目的：基于定量电子计算机断层扫描（Computed tomography,CT）在体内证实肺结节共病肺气肿患者肺血管、肺气肿及气道重塑三者相关性。方法：回顾性分析“数字肺”平台肺结节共病肺气肿患者共计 94 例。测量全肺肺气肿（吸气相体素指数小于-950 HU 肺容积占总肺容积百分比 LAA-950%）、全肺以及各个肺叶肺血管体积百分比（IPVV%）、气道重塑（第 3 至 7 代全肺气道壁厚 WTmean 及假定气管内周径为 10 mm 时管壁面积的平方根（Pi10））。采用 spearman 相关性分析 IPVV%、WT、Pi10 与全肺 LAA-950%的相关性。结果：Pi10、第 4、5、6、7 代的 WTmean 与全肺肺气肿 LAA-950%呈显著负相关（ $P<0.05$ ），最强相关系数 $r=-0.387$ ，第 7 代的 WTmean 与全肺肺气肿 LAA-950%的相关性最强。全肺以及各个肺叶的 IPVV%与 LAA-950%呈显著负相关（ P 均 <0.05 ），最强相关系数 $r=-0.445$ 。结论：在肺结节共病肺气肿患者中，远端气道重塑与肺气肿相关，而且更远端的气道重塑与肺气肿的相关性最强，IPVV%与肺气肿严重程度之间具有相关性，在体内证实了肺结节共病肺气肿患者肺血管、肺气肿及气道重塑三者之间的联系。

PU-2092

Castleman 病的临床、病理及 CT 表现

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目的 分析 10 例 Castleman 病（Castleman disease, CD）患者的临床资料，并分析其 CT 表现，以提高对该病的认识。方法 回顾性分析经本院外科手术或病理活检证实的 10 例 CD 病患者的临床及 CT 影像学资料。结果 10 例中 5 例位于纵隔和肺门；2 例位于颈部，2 例位于腹腔，1 例位于后腹膜。7 例为局灶型透明血管型，2 例为多中心型透明血管型，1 例为多中心浆细胞型。10 例所有病灶边界均清晰，平扫密度均匀，7 例局灶性透明血管型 CT 增强扫描呈明显均匀强化，强化幅度与大动脉相仿，延迟强化，其中 1 例病灶边缘见“卫星灶”，病灶中央内分支状钙化，2 例病灶中央出现裂隙状低强化区；3 例多中心型病灶表现为多部位淋巴结肿大，增强后呈中度强化，其中 1 例多中心浆细胞型病灶内出现点状钙化。结论 局灶性透明血管型 CD 病 CT 表现具有一定的特征

性，可以与其他肿瘤进行鉴别，多中心型又名血管型诊断较困难，浆细胞型病 CT 表现缺乏特征性，最终确诊依赖于病理学。

PU-2093

联合 CT 影像组学和临床影像特征列线图预测亚实性密度肺腺癌脏层胸膜侵犯

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目的：探讨并验证一种结合影像组学和临床特征的术前列线图模型在预测亚实性密度肺腺癌脏层胸膜侵犯（VPI）的应用价值。

方法：回顾性分析 2016 年至 2019 年期间经病理证实的临床 I 期肺腺癌患者的影像、病理及临床资料，对具有完整病理结果的 156 患者进行分类（VPI 阳性组：VPI 阴性组；70：86）后，在肺窗图像上勾画结节感兴趣区（ROI），利用 FeAtureExplorerPro（FAE）软件提取影像组学特征，共 806 个特征，特征选择和降维分别基于递归特征消除（RFE）和皮尔逊相关系数（PCC）方法。最后，使用支持向量机（SVM）来选择构建影像组学模型的最优特征，并在内部验证集中进行了内部验证。纳入影像及临床特征后进行多变量回归分析并构建列线图模型，并用受试者工作特征曲线（ROC）来评估模型的性能，并相互比较。

结果：提取的 806 个特征和从 707 个稳定特征中选出的 10 个最优特征用于构建影像组学模型。列线图模型的 AUC 为 0.888（95%CI，0.762-0.961），优于临床模型（0.787（95%CI：0.643-0.893）； $p=0.049$ ），与放射组学模型相当（0.879，95%CI:0.751-0.965； $p>0.05$ ）。在验证数据集中，联合模型的敏感性为 90.5%，特异性为 76.9%。

结论：列线图模型可以被认为是一种非侵入性的方法，对预测亚实性肺结节脏层胸膜侵犯具有高度敏感或高度特异性的诊断。

PU-2094

基于 HRCT 的深度学习影像组学模型预测结缔组织疾病相关间质性肺疾病患者 GAP 分期

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目的 探究基于胸部高分辨率计算机断层扫描（HRCT）图像提取深度学习影像组学特征构建诊断预测模型，预测结缔组织疾病相关间质性肺疾病（CTD-ILD）患者 GAP 分期的可行性。方法 回顾性收集 2018 年 1 月 1 日至 2023 年 6 月 30 日在我院就诊并经临床确诊的 CTD-ILD 患者 264 例，所有患者均行胸部 CT 检查和肺功能检查。对所有患者进行 GAP 分期，其中 GAP I、II、III 期患者分别 195 例、56 例、13 例，由于 II 期和 III 期患者数量较少，因此将 GAP II、III 期病例合并为一组，共 69 例。使用 nnUNet 深度学习模型自动分割得到全肺组织，再使用 ITKSNAP 软件对图像逐一进行手动校正。将两组患者按 7: 3 的比例随机分为训练组（211 例）和验证组（53 例）。提取患者影像组学特征和深度学习特征，使用三种降维算法（方差阈值法、单变量选择法、LASSO 算法）对特征参数进行降维，由两种机器学习算法[支持向量机（SVM）和逻辑回归（LR）]构建模型，并联合深度学习特征和影像组学特征构建深度影像组学模型，采用受试者工作特征曲线下面积（AUC）评价各模型预测 GAP 分期的效能。结果 经提取降维筛选出 14 个放射组学特征、13 个深度学习特征和 28 个深度影像组学特征，构建出 6 个诊断模型，包括 2 个影像组学模型（Radiomics SVM 模

型、Radiomics LR 模型)、2 个深度学习模型 (DL SVM 模型、DL LR 模型) 和 2 个深度影像组学模型 (DLR SVM 模型、DLR LR 模型)。在训练组和验证组中, 深度影像组学模型效能均高于影像组学模型和深度学习模型。联合深度学习特征和影像组学特征的逻辑回归算法效能最佳, 其在验证组中 AUC 为 0.923 (95%CI 0.852-0.972), 准确率、灵敏度和特异度分别为 84.9%、78.6%、87.1%。结论 基于 HRCT 提取影像组学特征和深度学习特征构建深度影像组学模型可协助临床预测 CTD-ILD 患者的 GAP 分期。

PU-2095

基于 4D flow MRI 探究不同年龄的健康人的左心室血流动能

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目的

四维血流磁共振成像 (4D flow MRI) 可获得心室血流动力学参数, 如左心室动能 (left ventricular kinetic energy, LVKE)。左心室动能是心脏运动产生的能量转移到血液运动中, 对评估心脏收缩和舒张功能具有重要意义。本研究的目的旨在探讨年龄对健康人左心室血流动能的影响。

方法

我们前瞻性地招募了 16 名健康受试者, 受试者均排除了幽闭恐惧症、心律失常和安装起搏器等 CMR 禁忌症。所有受试者在 3.0T MRI 上进行的 4D flow 序列以及左心室三腔心电影图像扫描。使用商业软件 CVI42 测量心功能及左心室动能相关参数, 并使用左心室舒张末期容积 (LV EDV) 将所有 LV KE 参数均归一化为 KEiEDV, 以 $\mu\text{J}/\text{ml}$ 为单位。选取心动周期相关时间点的 KEiEDV 参数: 整体 KEiEDV (整个心动周期 KEiEDV 平均值)、收缩和舒张 KEiEDV (收缩期和舒张期 KEiEDV 平均值) 和收缩期峰值 KEiEDV、E 峰峰值 KEiEDV (舒张早期峰值 KEiEDV)、A 峰峰值 KEiEDV (舒张晚期峰值 KEiEDV), 以及 E/A 峰 KEiEDV。使用了 Shapiro-Wilk 检验评估了数据的正态性。独立样本 t 检验和曼-惠特尼 U 检验进行差异分析。相关性分析采用 Pearson 相关性和 Spearman 相关性。

结果

以年龄中位数 58 岁为分界点, 将受试者分为两组, 小于 58 岁 (低龄组) 和大于或等于 58 岁 (高龄组) 的受试者分别有 8 人。高龄组的 E 峰峰值 KEiEDV、E/A 峰 KEiEDV 显著低于低龄组 (13.11 ± 4.8 vs. 20.61 ± 6.22 , $p = 0.017$; 0.87 ± 0.5 vs. 1.93 ± 1.09 , $p = 0.032$)。此外, 随着年龄的增长, 舒张期 KEiEDV ($r = -0.566$)、E 峰峰值 KEiEDV ($r = -0.690$)、E/A 峰 KEiEDV ($r = -0.682$) 明显下降。

结论

4d flow MRI 左心室动能参数是评价左心室舒张功能的一个敏感指标, 随着年龄的增长, 左心室舒张功能, 尤其是早期舒张功能会显著下降。

PU-2096

12 例胸腺类癌的 CT 和 MRI 影像学表现分析

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摘要: 目的 对胸腺类癌患者的 MRI 及 CT 影像学表现进行研究, 提高对胸腺类癌的 CT 和 MRI 影像学认识。方法 对 12 例胸腺类癌患者的临床资料进行回顾性分析, 患者均经过免疫组化和组织病理学分型, 分析患者的 CT 和 MRI 影像学特征 (包括形状、密度、信号、有无包膜、钙化、增强扫

描强化程度等)。结果 不规则形 8 例; 内部密度或信号不均 10 例; 无包膜 9 例; 瘤体内见钙化 8 例; 囊变坏死 7 例; 瘤内出血 2 例; 心包或胸膜腔积液 6 例; 术前转移 2 例; 侵犯周围结构 (血管) 10 例; 增强扫描: 轻度强化 2 例, 中度强化 6 例, 明显强化 4 例; 7 例包绕纵隔大血管生长, 其中 4 例发现上腔静脉癌栓; 肿瘤内新生血管 4 例。结论 胸腺类癌患者的 MRI 和 CT 影像有一定的表现特征, 多呈轻~中度强化, 常沿着纵隔血管间隙呈浸润性生长, 伴瘤内血管征, 其影像学特征对临床诊断具有重要意义。

PU-2097

A nomogram based on clinical characteristics and radiological features for the preoperative prediction of spread through air spaces in patients with clinical stage IA non-small cell lung cancer:A Multicenter Study

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PURPOSE: To investigate the value of clinical characteristics and radiological features for predicting spread through air spaces (STAS) in patients with clinical stage IA non-small cell lung cancer (NSCLC).

METHODS: A total of 336 NSCLC patients from our hospital was randomly divided into the training cohort (n=236) and the internal validation cohort (n=100) at a ratio of 7:3, and 69 patients from the other two hospitals were collected as the external validation cohort. Eight clinical characteristics of the patient were recorded, and twenty radiological features of the tumor were quantitatively measured and qualitatively analyzed. In the training cohort, the differences in clinical characteristics and radiological features were compared by univariate and multivariate analysis. A nomogram was drawn and the predictive efficacy of the model was evaluated in the validation cohorts. The ROC curve and AUC value were used to evaluate the discriminative ability of the model. In addition, the Hosmer-Lemeshow test and calibration curve were used to evaluate the goodness-of-fit of the model, and the decision curve was used to analyze the clinical application value of the model.

RESULTS: The best predictors included gender, carcinoembryonic antigen (CEA), consolidation-to-tumor ratio (CTR), density type, and distal ribbon sign. Among those, tumor density type (OR = 6.738) and distal ribbon sign (OR = 5.141) were independent risk factors for predicting STAS status. Moreover, three different STAS prediction models were constructed. The clinical model was composed of gender and CEA, the radiological model included CTR, density type, and distal ribbon sign, and the combined model comprised the above two models. The DeLong test results revealed that the combined model was superior to the clinical model in the three cohorts and superior to the radiological model in the external validation cohort, with AUC values 0.874, 0.822, and 0.810, respectively, and showed the highest diagnostic efficacy. The Hosmer-Lemeshow test showed that the combined model was well-fitted in all three cohorts, and the calibration curve showed that the predicted probability value of the combined model was in good agreement with the actual STAS status. Finally, the decision curve showed that the combined model had better clinical application value than the clinical model and radiological model.

CONCLUSION: The nomogram based on clinical characteristics and radiological features has a high diagnostic efficiency in predicting the STAS status in patients with clinical stage IA NSCLC, and may help in making personalized treatment strategies before surgery.

PU-2098

Application of DWI,DCE-MRI and DKI in benign and malignant pulmonary nodules and pathological subtypes

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Objective: To investigate the value of DWI,DCE-MRI and DKI in the differential diagnosis of benign and malignant pulmonary nodules and the pathological subtypes of malignant pulmonary nodules.

Methods: Forty seven patients with SPN in our hospital, male: 30, female: 17, age: 29-86 years, mean age: 58 ± 5.62 years. Routine MR, DCE-MRI and DKI scans were performed. To compare the ADC, Ktrans, Kep, Ve, iAUC, app and app values of benign and malignant pulmonary nodules and the difference of each parameter in squamous cell carcinoma, adenocarcinoma and benign pulmonary nodules.

Results: 1. Ktrans, Ve 、 iAUC and Kapp of malignant pulmonary nodules were significantly higher than those of benign pulmonary nodules ($P<0.035$); 2. The ADC of malignant pulmonary nodules was significantly lower than that of benign pulmonary nodules ($P=0.001$), in which the ADC value of adenocarcinoma was the lowest and Kapp value was the highest. There was no significant difference between the Ktrans, Kep, Ve, iAUC, Dapp values of squamous cell carcinoma, adenocarcinoma and benign pulmonary nodules.

Conclusion: The quantitative analysis of SPN by conventional DWI, DCE-MRI and DKI can improve the differential diagnosis of benign and malignant pulmonary nodules by MR, and has certain value in the differential diagnosis of pathological subtypes of malignant pulmonary nodules.

PU-2099

心脏脂肪瘤多模态影像学分析

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目的 探讨多模态影像学在心脏脂肪瘤中的诊断价值。**方法** 回顾性分析经确诊的 14 例心脏脂肪瘤患者的临床症状、超声心动图、CT 及 CMR 图像特点。**结果** 5 例脂肪瘤患者有症状, 9 例患者偶然发现。14 例心脏脂肪瘤患者共发现 17 处病灶; 心脏脂肪瘤的位置在心脏分布广泛, 47.0% (左室腔 6/17, 右室腔 2/17) 位于心室腔内, 29.4% (左室壁 4/17, 右室壁 1/17) 位于肌壁间, 17.6% (3/17) 位于心包内, 6% (1/17) 位于右心房。超声心动图表现为偏强回声肿块影, CT 表现为均匀低密度肿块影。CMR 表现为 T1WI 高信号, 压脂序列肿块信号明显降低; T2WI 为高信号, 肿块周围可见低信号环, 提示为化学位移伪影; 心脏电影序列可见肿块柔软摆动, 并随心动周期形态改变; 首过灌注扫描未见灌注升高; 延迟增强扫描未见强化。Native T1 Mapping 显示肿块 T1 值较正常心肌明显减低 (255.9 ± 48.4 vs 994.2 ± 66.4), 两者具有统计学差异。**结论** 超声心动图特异性较低, CT 使心脏脂肪瘤的确切诊断成为最可能, 大多数心脏脂肪瘤可以通过 MRI 准确诊断; 但在肿块较小, 图像质量不佳时, T1 Mapping 有助于心脏脂肪瘤的诊断; 同时, 当怀疑心脏脂肪瘤时, T1 Mapping 作为一种常规心脏肿块的检查方法可进行诊断及鉴别诊断。

PU-2100

Ruptured aortic dissection complicated with hemorrhagic aortopulmonary artery sheath: CT features and its clinical implications

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Objective: To evaluate CT findings of hemorrhagic aortopulmonary artery sheath secondary to ruptured aortic dissection and its clinical implications.

Methods: The clinical records and CT imaging of 8 patients who were diagnosed as having hemorrhagic aortopulmonary artery sheath secondary to Stanford type A aortic dissection between 2010 and 2023 at our hospitals were retrospectively reviewed. The differentiation of AD types was determined by non-contrast and contrast-enhanced CT. The diagnosis of hemorrhage surrounding the pulmonary trunk and/or a major PA was established based on CT using the following criteria: 1) a crescent-shaped or circumferential area along the wall of pulmonary artery having higher attenuation than blood on unenhanced CT; 2) no contrast enhancement within the corresponding area on enhanced CT. CT images were documented including the following features: 1) pericardial hemorrhage, mediastinal hemorrhage and hemothorax; 2) Presence of stenosis of the main PA due to a hematoma surrounding the PA, defined as stenosis more than 30%; 3) Extent of hemorrhage at the initial CT was classified into three types: type I: IMH of the PA or blood localized around the PA; type II: continuous blood extending into the interlobular septa; type III: continuous blood extending into the alveolar space.

Results: All 8 patients were men, aged from 45-81 years. 5 patients had Stanford type A AD, and 3 had Stanford type A intramural hematoma (IMH) of the aorta. All rupture sites were identified in the posterior or posteriomediastinal of the ascending aorta, adjacent to the pulmonary artery. Left pulmonary artery together with its branches was involved only in one patient. With regard to the extent of hemorrhage, one patient was classified into type I, one patient into type II, and six patients into type III. Regarding complications, six patients had pericardial hemorrhage, and one had hemothorax. Stenosis of the main PA more than 30% was recognized in two patients. Three of the eight patients underwent emergency surgery within 24h after the initial CT scan. Three patients died before surgery. The remaining two patients and their families refused surgery. During the follow-up period, five of nine patients died within 72h of onset due to heart and/or respiratory failure.

Conclusion: Extravasated blood from the posterior aspect of the ascending penetrates the shared adventitia of the aorta and pulmonary artery, and spreads along the adventitial planes of the pulmonary arteries out into the lungs with increasing pressure. These manifestations can be depicted via CT scan, predicting a poor prognosis.

PU-2101

Unilateral total pneumonectomy of an endobronchial carcinosarcoma with favorable prognosis: A Case Report

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Purpose:

Carcinosarcoma is a biphasic malignant tumor, consisting of a mixture of carcinoma and sarcoma. Endobronchial carcinosarcoma has a poor prognosis and is difficult to diagnose. Therefore, it is necessary to report on a patient with good prognosis in order to learn the diagnostic and therapeutic experiences.

Methods:

We report a rare case of a 48-year-old man with a large branching tubular mass in the left upper lobe, which displays a gloved finger sign, speckle of calcification, and intense uptake of 18F-FDG on PET/CT. The patient had a left total pneumonectomy and the mass was pathologically confirmed as carcinosarcoma.

Results:

The patient remains alive for 6 years after surgery.

Conclusion:

Bronchial carcinosarcoma is a rare malignancy and the central endobronchial subtype displays a gloved finger sign on CT. The speckle calcification and intense uptake of FDG of the mass may raise the suspicion of sarcomatous components. Though the general outcome of bronchial carcinosarcoma is poor, radical surgical resection may reach a favorable prognosis.

PU-2102

应用 CT 纹理参数分析 CT 上表现为纯磨玻璃结节出现生长的自然病程及危险因素

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目的：研究长期随访 CT 上表现为纯磨玻璃结节（pGGNs, pure ground-glass nodules）的生长自然史、生长速率及危险因素，并分析 CT 纹理特征参数能否预测 pGGNs 的生长。

方法：本研究回顾性纳入了 111 名患者的 111 个 pGGNs。在基线和末次 CT 上对所有 pGGNs 进行半自动分割，得到初始平均直径、初始平均 CT 值、初始体积和 CT 纹理参数，并计算生长结节的体积倍增时间（VDT, volume doubling time）。将所有结节分为生长组和非生长组，比较基线临床影像特征、定量特征及纹理特征的差异。使用 Kaplan-Meier 分析和多因素 Cox 比例风险回归分析影响 pGGNs 生长的独立危险因素。

结果：64 个（57.7%）结节在经过平均 1112 天的随访后出现间隔生长，生长结节的中位 VDT 为 1193.7（范围，339.4–5134.4）天。聚类趋势（ClusterProminence）、相关性（Correlation）、联合熵（JointEntropy）、总熵（SumEntropy）在生长组显著高于非生长组（聚类趋势， $p = 0.046$ ；相关性， $p = 0.004$ ；联合熵， $p = 0.045$ ；总熵， $p = 0.022$ ）。多因素 Cox 风险回归分析表明，年龄 ≥ 51 岁（HR = 2.688， $p = 0.013$ ）、基线体积（HR = 1.882， $p = 0.035$ ）以及部分纹理参数【相关性（HR = 3.176， $p = 0.003$ ）、总熵（HR = 0.457， $p = 0.040$ ）和聚类趋势（HR = 2.914， $p = 0.007$ ）】是 pGGNs 出现间隔生长的独立危险因素。

结论：除了传统的年龄和基线体积是生长的独立风险因素之外，不同的 CT 纹理参数对于长期随访 pGGN 的生长预测有良好的价值。相关性、总熵和聚类趋势可以用来预测基线 pGGNs 的生长，以便更多地关注这些结节。

PU-2103

双源 CTPA 对肺动脉疾病诊断价值

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目的：探讨双源 CTPA 技术对肺动脉疾病诊断价值。方法：行 CTPA 检查发现肺动脉疾病包括常见疾病肺动脉栓塞及肺动脉高压，罕见疾病肺动脉瘤、动静脉畸形、肺动脉夹层、肺动脉肉瘤，肺动脉先天性狭窄、中断及缺如等，分析影像学特征及诊断标准。结果 108 例患者肺动脉栓塞肺动脉栓塞及肺动脉高压 86 例，罕见疾病肺动脉瘤 5 例、动静脉畸形 3 例、迷走肺动脉 3 例，肺动脉夹层 1 例、肺动脉肉瘤 2 例，肺动脉先天性狭窄 1 例、中断 1 例及缺如 1 例，肺隔离症 5 例。结论肺动脉 CTPA 对肺动脉血管疾病有重要价值。

PU-2104

A Rare Case of Pulmonary Artery Dissection associated with Patent Ductus Arteriosus Occlusion

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Introduction

Pulmonary artery dissection(PAD) is an extremely rare and life-threatening condition, usually occurred as a complication of primary or secondary chronic pulmonary hypertension(CPH). The primary underlying cause are congenital heart diseases. PAD was first reported in 1842 by Helmbrecht. Nearly only 150 cases have been reported globally until 2021. Due to its high mortality and difficulty of clinical management, we reported this case and reviewed literature to raise awareness of PAD in early diagnosis and treatment.

Case Presentation

A 39-year-old female presented to us with chest tightness, dyspnea and cyanosis. The symptoms have been lasted for 19 years and aggravated for 1 month. In 2010, she went to a local hospital for infertility and echocardiography suggested patent ductus arteriosus with mean pulmonary artery pressure(mPAP) measured as high as 130 mmHg. Four times of patent ductus arteriosus occlusion were performed on her and the fourth was successful. The patient felt much relieved on her chest tightness and mPAP decreased to 70 mmHg after operation. The patient has been taking Macitentan and Tadalafil to reduce pulmonary artery pressure for about 10 years. The physical examination on admission showed heart rate at 78 bpm, blood pressure at 98/62 mmHg, and respiratory rate at 23 bpm with peripheral oxygen saturation 95% in room air. The Lung perfusion SPECT/CT suggested diffuse radioactive sparse deficits, symbolizing perfusion impairment in bilateral lungs. Given the risk of surgery, drug maintenance therapy and close follow-up are recommended to this patient. Follow-ups reveal that the patient's condition is stable so far.

Discussion

This is a rare case of PAD with patent ductus arteriosus. CTPA scan shows multiple dissection of pulmonary artery, including branches of lung lobes and segments. With a known history of pulmonary artery hypertension should be closely followed. The diameter of the dilated pulmonary artery should be monitored because it is directly related to the risk of rupture or dissection. Pharmacologic treatment which reduce the pulmonary hypertension would help to

reduce the risk of pulmonary artery dilatation. In patients with aortic dissection, dissection can often result in distal formation of pseudolumen, which reduces pressure in the false lumen and terminates further distal extension of the dissection. Unlike aortic dissection, due to the structural features pulmonary artery wall, the formation of distal reentrants is rarely found in pulmonary artery dissection. The pseudolumen of pulmonary arterial dissection usually tears easily into the pericardium, and rarely tears into the lungs and mediastinum and pleural space. Therefore, patients with pulmonary artery dissection are more likely to be complicated by cardiac tamponade and cardiac tamponade and other fatal complications. According to the current understanding of pulmonary artery dissection, patent ductus arteriosus and pulmonary hypertension are thought to be the main causes of pulmonary artery dissection. The absence of life-threatening complications in this patient may be correlated with the formation of distal pseudolumen reentrants, which is also likely the reason why there is a better prognosis in this patient. Multiple diagnostic modalities can be used to diagnose PAD. Computed tomography (CT) scans, and magnetic resonance imaging (MRI) can detect an intimal flap and a false lumen within the pulmonary arterial tree, and are able to evaluate the extent of the lesion. These methodologies can identify the intimal flap and provide additional information related to the dissection and the presence of associated abnormal findings such as pericardial tamponade. CT scan also measures the diameter and the aneurysm extent and can exclude the presence of pulmonary embolism. To slow and reverse pulmonary vascular remodeling is the ultimate goal of CPH-related PAD.

Conclusion

Pulmonary artery dissection is a rare condition with high mortality. Being familiar with its characteristic imaging patterns, medical history and clinical manifestation helps to early diagnosis and short- or long-term management.

PU-2105

肺血管炎的临床与影像学表现分析

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目的: 观察和探讨肺血管炎的疾病特点与影像学表现, 为该病的临床诊断提供依据。

方法: 本研究回顾性分析了我院 2014 年 9 月至 2023 年 6 月期间 77 例血管炎患者的临床资料, 通过影像学检查资料的表现分析病变累及的程度及范围。

结果: 本次研究中男性患者为 19 例(25%), 女性患者为 58 例(75%), 年龄 13~62 岁, 中位年龄为 33 岁。其中 5 例患者临床资料显示伴有白塞病, 1 例患者临床资料显示伴有抗磷脂综合征。肺血管炎可表现为血管壁增厚、结节影, 肺内多发斑片影、空洞、磨玻璃影及胸腔积液。胸部 CT 检查显示累及肺动脉分支的为 48 例(62%), 主动脉及其分支管壁增厚的为 49 例(64%)。肺内多发斑片影的表现最多见为 52 例(68%), 其次为肺内结节影的病例为 35 例(45%), 其中单发肺内结节为 14 例(18%), 多发肺内结节为 21 例(27%), 结节直径为 2.5mm~13mm, 平均值约为 5.13mm。肺内可见磨玻璃密度影的患者为 9 例(12%), 6 例患者合并有单侧/双侧胸腔积液(8%), 仅有 5 例患者肺内可伴有空洞影(6%)。77 例患者中有 22 例伴有肺动脉高压(29%)。

结论: 肺血管炎的影像学表现非常多样, 包括了血管壁增厚、结节影、斑片影、空洞、磨玻璃影及胸腔积液等。影像学检查在早期诊断中表现出一定的重要性, 胸部 CT 相对于其他影像学检查方法更能显示病变累及范围和特征。我们可以通过患者的临床特征、影像学表现及实验室检查结果等作出综合判断, 为血管炎的疾病诊断、疾病的活动评估及预后评估方面提供重要线索。

PU-2106

肺多形性癌 CT 影像解析

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目的 探讨肺多形性癌 (pleomorphic carcinoma, PC) 的临床特点和 CT 影像特征, 为临床诊疗提供帮助。

方法 回顾性收集 2007-2021 年大连医科大学附属第一医院经手术、穿刺活检及支气管镜检查等病理确诊为 PC 的患者, 具有术前 3 个月内胸部 CT 及较为完整的临床、病理资料共 22 例, 15 例完成 CT 增强扫描。

结果 22 例 PC 好发于老年男性, 伴有长期吸烟史 (36.36%), 平均年龄为 68.59 ± 8.42 岁, 男女比例约 2.14: 1。临床症状以反复咳嗽、咳痰、痰中带血、胸痛为主 (86.36%), 少数患者偶然检查发现 (13.64%)。22 例病例均为周围型肺癌。在这 22 例 PC 中: 平均直径约 4.65 ± 2.21 cm; 19 例呈类圆形 (86.36%); 所有病灶边界均清楚, 其中 11 例可见分叶 (50.00%); 6 例可见空洞 (31.82%); 在 15 例增强病例上, 13 例病灶均为不均匀强化 (86.67%), 病灶内低密度区基本不强化, 1 例呈均匀强化 (6.67%), 1 例呈延迟强化 (6.67%); 22 例中 19 例病灶周边肺组织可见渗出征象 (86.36%), 表现为磨玻璃影或索条影; 15 例病灶可见紧邻胸膜或牵拉胸膜 (68.18%), 其中 12 例有病理证实侵犯胸膜; 5 例患者被证实伴有纵隔或肺门淋巴结转移。

结论 PC 患者临床症状缺乏特异性, 症状相对隐匿; 影像上以类圆形肿块居多, 周边肺组织伴有渗出, 增强扫描呈不均匀强化, 中央坏死区不强化, 易发生胸膜侵犯及纵隔或肺门淋巴结转移。

PU-2107

肺癌肉瘤 CT 影像解析

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目的 分析 1 例肺癌肉瘤 (carcinosarcoma, CS) 的临床特点和 CT 影像特征, 总结其影像特征, 减少漏诊、误诊率。

方法 老年女性, 70 岁, 没有吸烟史, 体检发现双肺多发肺结节, 后就诊于我院。CT 平扫检查。

结果 CT 平扫示: 结节较大径约 2.1 cm, 类圆形, 病灶边界清楚, 可见分叶, 未见空洞; 病灶周边肺组织可见渗出征象, 表现为索条影; 病灶未见紧邻胸膜或牵拉胸膜; 未见纵隔或肺门淋巴结转移。

病理表现: 大小为 $2.3 \times 1.5 \times 1.5$ cm, 癌组织成分为腺癌, 未累及胸膜, 未见明确脉管神经侵犯。支气管断端未见癌累及。叶间淋巴结未见转移癌 (0/2)。病理诊断: 右上肺癌肉瘤。

结论 肺癌肉瘤易与其他型肺癌相互混淆, 认真分析其临床特征及影像学表现有助于鉴别。

PU-2108

肺梭形细胞癌 CT 影像解析

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目的 分析 1 例肺梭形细胞癌 (spindle cell carcinoma, SCC) 的临床特点和 CT 影像特征, 总结其影像特征, 减少漏诊、误诊率。

方法 老年男性，76 岁，有吸烟史，右肺癌术后 2 年余，抑郁症 6 年，发现右肺占位半个月，因此就诊于我院。做 CT 平扫+增强检查。

结果 CT 平扫+增强检查示：结节较大径约 4cm，类圆形，病灶边界清楚，未见分叶，未见空洞；增强扫描可见轻度不均匀延迟强化；病灶周边肺组织可见渗出征象；病灶可见紧邻胸膜或牵拉胸膜。

病理诊断：右下肺肉瘤样癌，梭形细胞型，累及胸膜。

结论 肺梭形细胞癌易与其他型肺癌相互混淆，认真分析其临床特征及影像学表现有助于鉴别诊断。

PU-2109

能谱 CT 参数评估肺磨玻璃密度结节不同病理分类的血管新生表达水平

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目的：探究能谱 CT 定量参数与不同病理分类的肺磨玻璃结节（GGN）血管新生水平表达水平的相关性。

方法：前瞻性纳入 2021 年 3 月至 2022 年 12 月东南大学附属中大医院收治的经体检发现并经手术切除病理证实的肺 GGN 患者 32 例（共 43 个结节），所有患者均在术前 2 周内接受能谱 CT 双期扫描。根据手术病理结果分为前驱病变组（包括不典型腺瘤样增生 AAH、原位腺癌 AIS）21 个、微浸润组（微浸润性腺癌 MIA）10 个、浸润组（浸润性腺癌 IAC）12 个。对术前能谱 CT 图像进行感兴趣区（ROI）勾画并记录能谱参数，包括碘基值（IC）、水基值（WC）、标准化碘浓度（NIC）、标准化水浓度（NWC）。术后病理对 GGN 标本进行免疫组织化学染色，计数微血管密度（MVD）及血管内皮生长因子（VEGF）评分。采用单因素方差分析、Kruskal-Wallis H 检验比较 3 组病变能谱参数差异。采用 Pearson 相关或 Spearman 秩相关分析多定量参数与 MVD、VEGF 评分的相关性，采用二元 Logistic 回归分析评估 GGN 浸润性的独立危险因素，并通过受试者工作特征（ROC）曲线下面积（AUC）评估诊断效能。

结果：相关性分析显示，前驱病变组、微浸润组、浸润组病变的 MVD 值和 VEGF 评分与其静脉期 IC（ $r=0.405, 0.425$ ）以及动静脉期 WC（ r 范围约 0.431-0.590）、NWC（ r 范围约 0.428-0.591）呈正相关， P 值均 <0.05 ，且在不同病理分类的各组间 MVD 值和 VEGF 评分差异有统计学意义（ $P<0.05$ ）。进一步二元 Logistic 回归分析显示，以上与 MVD 值及 VEGF 评分呈中度相关的能谱参数中，动脉期 NWC 及静脉期 WC 是预测 GGN 浸润性（区分非浸润性病变组 AAH+AIS 与浸润性病变组 MIA+IAC）的独立影响因子。ROC 曲线分析结果表明，静脉期 WC 区分 GGN 浸润性的效能最高，AUC 为 0.911，灵敏度为 89.5%，特异度为 84.2%，截断值为 427.135mg/ml。

结论：能谱 CT 定量参数可以表达不同病理分类 GGN 的新生血管水平，并预测 GGN 的浸润性。

PU-2110

基于能谱 CT 多参数成像预测肺磨玻璃结节病理浸润性的应用价值

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目的：探究应用能谱 CT 定量参数在肺磨玻璃结节（GGN）不同病理类型中的鉴别诊断价值，并预测其浸润性。

方法：前瞻性纳入 2021 年 3 月至 2022 年 12 月东南大学附属中大医院收治的经体检发现并经手术切除病理证实的肺 GGN 患者 32 例（共 43 个结节），所有患者均在术前 2 周内接受能谱 CT 双期扫描。根据手术病理类型分为前驱病变组（包括不典型腺瘤样增生 AAH、原位腺癌 AIS）21 个、微浸润性腺癌 MIA 组 10 个、浸润性腺癌 IAC 组 12 个。对术前其能谱 CT 图像进行感兴趣区（ROI）勾画并记录能谱参数，包括碘基值（IC）、水基值（WC）、标准化碘浓度（NIC）、标准化水浓度（NWC）、能量衰减曲线斜率（K 值）。采用单因素方差分析、Kruskal-Wallis H 检验比较非浸润性病变（前驱病变组）和浸润性病变（MIA+IAC）及 GGN 浸润程度（MIA 与 IAC）的能谱参数差异。通过受试者工作特征（ROC）曲线下面积（AUC）评估诊断效能。

结果：浸润性病变的动脉期 NIC、WC、NWC（ 0.26 ± 0.01 ， $619.32\pm 32.72\text{mg}/\text{cm}^3$ ， 0.60 ± 0.03 ）及静脉期 IC、NIC、WC、NWC（ $18.75\pm 1.27\text{mg}/\text{cm}^3$ ， 0.51 ± 0.04 ， $604.86\pm 37.82\text{mg}/\text{cm}^3$ ， 0.59 ± 0.04 ）均大于非浸润性病变动脉期 NIC、WC、NWC（ 0.22 ± 0.02 ， $363.48\pm 28.70\text{mg}/\text{cm}^3$ ， 0.35 ± 0.03 ）及静脉期 IC、NIC、WC、NWC（ $14.41\pm 1.28\text{mg}/\text{cm}^3$ ， 0.38 ± 0.04 ， $353.60\pm 21.88\text{mg}/\text{cm}^3$ ， 0.34 ± 0.02 ）；P 值均 <0.05 。进一步分析 GGN 浸润程度（MIA 组及 IAC 组）表明，动静期的 WC、NWC 差异均有统计学意义（ $P<0.05$ ）。ROC 曲线分析结果表明，静脉期 WC 区分 GGN 浸润性的效能最高，AUC 为 0.911，灵敏度为 89.5%，特异度为 84.2%，截断值为 427.135mg/ml。

结论：能谱 CT 定量参数在鉴别不同病理类型的 GGN 上具有一定诊断价值，尤其静脉期 WC 在预测 GGN 浸润性上具有较高的诊断效能。

PU-2111

比较 DWI 和 18F-FDG PET/CT 对鉴别肺部病变中良恶性诊断价值的 meta 分析

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目的：比较弥散加权成像（DWI）和 18F-氟脱氧葡萄糖正电子发射断层扫描/CT（18F-FDG PET/CT）对鉴别肺部结节和肿块良恶性的诊断效能。

方法：我们系统地检索了 PubMed、EMBASE、Cochrane Library、万方、知网和中国生物医学数据库共六个数据库，纳入使用 DWI 和 PET/CT 来鉴别肺占位良恶性的研究。比较 DWI 和 PET/CT 的诊断性能，并计算合并的敏感性和特异性以及 95%置信区间（CI）。用 QADAS-2 软件评估纳入研究的质量，STATA 16.0 软件用于进行统计分析。

结果：我们总共纳入了 10 项研究，共纳入 871 名 948 个肺结节的患者。DWI 的合并敏感性（ $0.85[95\%CI, 0.77-0.90]$ ）和特异性（ $0.91[95\%CI, 0.82-0.96]$ ）高于 PET/CT（敏感性， $0.82[95\%CI, 0.70-0.90]$ ；特异性， $0.81, [95\%CI, 0.72-0.87]$ ）。DWI 和 PET/CT 的曲线下面积分别为 0.94（ $95\%CI, 0.91-0.96$ ）和 0.87（ $95\%CI, 0.84-0.90$ ）（ $Z=1.58, P>0.05$ ）。DWI 的诊断优势比（54.46， $[95\%CI, 17.98-164.99]$ ）优于 PET/CT（15.77， $[95\%CI, 8.19-30.37]$ ）。

Deeks 漏斗图显示没有发表偏倚。Spearman 相关系数检验表明未发现显著的阈值效应。病变的直径和所选用诊断的金标准可能是研究异质性的潜在原因, 选用定量或半定量参数评估可能是 PET/CT 的潜在偏差来源。

结论: DWI 在鉴别肺部良恶性结节或肿块方面可能与 PET/CT 具有相似的效能。

PU-2112

Assessment of myocardial fibrosis with cardiac magnetic resonance T1 mapping in patients with different degrees of heart failure

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Purpose:

Cardiac magnetic resonance (CMR) T1 mapping is used to assess the extent of myocardial fibrosis in patients with different types of heart failure (HF).

Materials and Methods:

We prospectively recruited 20 heart failure (HF) patients and 10 health controls. HF patients were divided into two groups: HF with reduced ejection fraction (HFrEF) whose left ventricular ejection fraction (LVEF) < 50% (n = 10). Patients with HFpEF were diagnosed according to the following. Firstly, two of the following criteria were met: (1) NT-pro BNP \geq 220 pg/mL or BNP \geq 80 pg/mL and (2) LVEF \geq 50% as measured by CMR. Second, one of the following criteria is met: (A) left atrial volume index > 34 mL/m² or left ventricular mass index > 149 g/m² in males and > 122 g/m² in females; (B) evidence of left ventricular diastolic insufficiency as determined by echocardiography, including a mean E/e' \geq 15 or peak tricuspid regurgitation flow rate > 2.8 m/s (pulmonary artery systolic pressure > 35 mmHg).

All participants with CMR scans were performed on a 3.0T MRI scanner (Philips Ingenia, Philips Healthcare, Cleveland, Ohio, USA) for the acquisition of myocardial T1 mapping. T1 mapping slices of the middle part of the myocardium were generated with a single breath-hold (12 s), SSFP modified look-locker inversion (MOLLI) recovery technique. This protocol was a robust 5 (3 s) 3 s to reduce respiratory motion artifacts, which dedicates at least 5 s for the acquisition of images in 2 inversions, 3 s for recovery, and at least 3 s for the acquisition of images in the second inversion. The minimum inversion time was 100 ms with an inversion-time increment of 80 ms for the next look-locker trains. The pulse sequence parameters included: TE 2.1 ms, TR 0.98 ms, flip angle 20°, FOV 300 × 300 mm², and voxel size 2 × 2 × 8 mm³.

Commercially available dedicated software CVI42 (version 5.14, Circle Cardiovascular Imaging Inc., Calgary, Canada) was used to analyze the T1 value. The Shapiro-Wilk test assessed the normality of the data. Analysis of variance using the student t-test.

Results:

T1 mapping values were significantly higher in patients with HFrEF than in healthy controls (1377.3 ± 69.29 vs. 1249.4 ± 31.41, p < 0.001). T1 mapping values were not significantly different between patients with HFpEF and healthy controls (1313.9 ± 40.64 vs. 1249.4 ± 31.41, p = 0.064).

Conclusion:

The degree of myocardial fibrosis varies in patients with different types of HF. Myocardial T1 mapping values are significantly increased in patients with HFrEF than healthy controls.

PU-2113

CT 影像组学对结节型和肿块型肺粘液腺癌与机化性肺炎的鉴别效能

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目的：探讨基于机器学习的影像组学模型对结节型和肿块型肺粘液腺癌（Mucinous Pulmonary Adenocarcinoma, MPA）和机化性肺炎（Organizing Pneumonia, OP）的鉴别效能。

方法和材料：回顾性分析 2013 年 10 月至 2023 年 2 月经手术病理或穿刺病理结果证实为 MPA 或 OP 的患者 144 例。根据病理分为 MPA 组（n=77）和 OP 组（n=67），所有患者均在我院行胸部 CT 检查，筛选其中 CT 影像表现为肺部结节和肿块的病例。使用半自动病灶分割软件深睿 AI 平台分割病灶，标记感兴趣区（ROI）并进行高通量影像组学特征采集，通过影像医师影像分析获得病变的影像学特征，通过两者的联合分析获得联合特征。通过 Spearman 相关系数筛选特征，使用 7:3 比例划分训练集、测试集，之后对所得特征进行 LASSO 降维处理，采用机器学习算法分别构建得到最优化的影像组学模型、影像学模型和联合模型，最后采用受试者工作特征曲线（ROC）来评价模型的效能。

结果：采用 Spearman 相关系数筛选、LASSO 回归降维方法保留 10 个组学特征参数，并结合 5 个影像学习特征，包括毛刺征、分叶征、空泡征、血管征、胸膜牵拉征，分析了结节型和肿块型 MPA 患者（n=74）和 OP 患者（n=74）的影像组学特征、影像学特征和联合特征。基于这些特征，选择最优化 SVM 机器学习算法，分别构建了影像组学特征模型、影像特征模型和联合特征模型。联合模型在训练集 AUC 为 0.85（95%CI: 0.771~0.903），测试集 AUC 为 0.84（95%CI: 0.703~0.960），优于影像组学特征模型、影像特征模型的结果。

结论：结合 CT 影像学特征和影像组学特征的机器学习联合模型可能有效地鉴别结节型和肿块型 MPA 和 OP，为未来影像医师对疾病的鉴别诊断提供可用的人工智能渠道。

PU-2114

非重症鹦鹉热衣原体肺炎的 CT 表现

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目的 分析非重症鹦鹉热衣原体肺炎的临床、CT 表现。**方法** 回顾性分析 5 例非重症鹦鹉热衣原体肺炎的临床资料及 CT 表现。**结果** 5 例非重症鹦鹉热衣原体肺炎（4 为女性，1 例为男性，平均为 52 岁），均表现为发热，伴咳嗽 3 例，伴头痛 1 例；5 例均接触鸟类史；4 例白细胞均正常，CRP 均升高，4 例合并肾功能异常，1 例合并肝功能异常；CT 表现：4 例单叶受累，1 例双叶受累，5 例均表现为细网格征合并实变，无纵隔淋巴结肿大、胸腔积液及肝脾肿大。**结论** 随着 NGS 的临床应用的推广，鹦鹉热衣原体肺炎检出率明显增加，CT 可以表现为间质性病变并实变，综合流行病学和实验室检查，对其诊断具有重要的价值。

PU-2115

Revolution CT 在中央型肺癌伴肺不张瘤-肺界面鉴别中的价值

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摘要：目的 探讨 Revolution CT 能谱多参数成像在中央型肺癌合并肺不张瘤-肺界面鉴别中的应用价值。**方法** 收集本院 73 例确诊为中央型肺癌合并肺不张患者的能谱 CT 扫描资料，并比较动脉期、静脉期、延迟期混合单能量图像(PI)、最佳单能量图像(BMI)和最佳单能量-碘基图融合图像(BMI-ICM)、有效原子序数图像(Eff-Z)中瘤-肺界面的主观评分，比较增强扫描静脉期肿瘤组织与不张肺组织的 CT 值、碘浓度(IC)、有效原子序数(Eff-Z)和能谱曲线斜率(λ HU)。**结果** ①三期增强扫描的瘤-肺边界主观评分静脉期最高。②增强扫描各期 CT 扫描瘤-肺界面主观评分中混合单能量图像(PI)、最佳单能量图像(BMI)、最佳单能量-碘基图融合图像(BMI-ICM)和有效原子序数图像(Eff-Z)之间存在统计学差异，最佳单能量-碘基融合图像(BMI-ICM)最高，最佳单能量图像(BMI)次之。③静脉期肿瘤与不张肺组织 CT 值、IC 值、Eff-Z 和能谱曲线斜率之间存在差异，肿瘤与不张肺组织的 IC 差别最大。**结论** Revolution CT 可以通过能谱多参数成像准确的识别中央型肺癌与不张肺组织的瘤-肺界面，为中央型肺癌合并肺不张诊断及疗效评价提供有益的参考依据。

PU-2116

Coronary CT fractional flow reserve in chronic coronary syndrome patients with medical therapy: a 2-year clinical outcomes

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Purpose: To evaluate the prognostic implications of machine learning-based CT angiography-derived fractional flow reserve (CT-FFR) for adverse clinical outcomes in patients with moderate stenosis and medical therapy.

Methods: This observational retrospective study included patients suspected of chronic coronary syndrome with stenosis (30–70%) determined by coronary CT angiography (CCTA) between January 2019 and October 2020. Clinical end points comprised major adverse cardiac events (MACE) (nonfatal myocardial infarction, unplanned coronary revascularization, hospitalization for unstable angina or cardiac death) and all-cause mortality. CT-FFR was analyzed in a blinded fashion at a core laboratory using a commercialized software system (RuiXin-FFR, Shenzhen, China). The ability of CT-FFR (abnormal if ≤ 0.8) to predict outcomes was assessed.

Results: A total of 36 patients (mean age \pm standard deviation, 59 years \pm 10; 11 women [31%]) were included; the median time of follow-up was 24 months. CT-FFR > 0.80 in 14 (39%) of the patients and none MACE occurred, CT-FFR ≤ 0.80 in 22 (61%) of the patients and 8 occurred MACE. There was significant difference between CT-FFR > 0.80 and CT-FFR ≤ 0.80 about the rate of MACE ($p = 0.013$, the χ^2 test of independence). CT-FFR was independently associated with MACE when adjusting for potential confounders.

Conclusion: Noninvasive CT-FFR was associated with major adverse cardiac events in chronic coronary syndrome patients with medical therapy, and could help discriminate subjects at high risk for additional testing.

PU-2117

Myocardium deformation and left ventricular remodeling assessed by Cardiac MRI in intensively endurance training heart

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Objectives Early detection of exercise-induced cardiac anomalies is key to clinical management for individuals engaged in vigorous exercise training. This study aimed to investigate cardiovascular adaptation in university students engaged in intensive exercise using cardiac MRI. **Methods** For this prospective, single-center study, 50 university students who finished a four-year's intensively endurance training and 23 age- and gender- matched controls received cardiac MRI. Exercised participants were further divided into symptomatic and asymptomatic groups. Left ventricular (LV) volumes were calculated and indexed to body surface. Global peak strains, systolic and diastolic peak strain rates (DSR) were derived from cine images using feature tracking technique. ANOVA analyses were performed.

Results: Fifty exercised participants (mean age, 21years \pm 1, 43 males, including 21 symptomatic and 29 asymptomatic cases) and 23 normal controls (mean age, 21years \pm 2, 20 males) were evaluated. Exercised participants exhibited higher end-diastolic LV volume (76.0ml \pm 10.6 vs 63.5ml \pm 7.5, $P < 0.001$), reduced LV ejection fraction (59.9% \pm 5.3 vs 63.0% \pm 3.2, $P = 0.002$) and reduced global longitudinal strain (-18.25 \pm 3.32 vs -19.85 \pm 1.29, $P = 0.004$) than the normal control did. Symptomatic exercised participants showed reduced peak strains compared to both asymptomatic participants and normal controls. Only circumferential DSR was reduced when compared between asymptomatic cases and the controls.

Conclusions: Highly intensive exercise could result in elevated LV volume and reduced myocardial strains for young university students. Further, reduced myocardial strains were found for those symptomatic cases which may indicate pathological change.

PU-2118

瘤周微环境的 CT 影像组学特征对纯磨玻璃结节肺腺癌的浸润程度的预测研究

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目的: 探讨基于纯磨玻璃结节 (pure ground glass nodule, pGGN) 瘤周微环境 CT 图像的影像组学标签在判断 pGGN 浸润性的诊断价值。**方法:** 回顾性分析 2017 年 12 月至 2018 年 5 月期间于我院行手术治疗, 并于术前行胸部 CT 平扫检查, 术后经病理证实为肺腺癌的患者 pGGN, 按 6: 2: 2 的比例, 随机分为训练组、验证组及测试组, 选取瘤周 5mm 的肺组织作为微环境, 从中提取 1389 维影像组学特征, 经最小绝对收缩和选择算法降维得到 16 维特征, 通过五折交叉验证法建立逻辑回归 (logistic regression, LR) 模型, 评价模型效能, 同时与瘤内影像组学特征模型做对比。**结果:** 浸润前组与浸润组患者影像组学标签有显著差异 ($P < 0.05$)。瘤周影像组学模型准确率为 0.86 ± 0.07 , 训练组 AUC 均值 $= 0.96 \pm 0.01$, 验证组 AUC 均值 $= 0.94 \pm 0.06$, 测试组 AUC $= 0.917$; 瘤内影像组学模型准确率为 0.75 ± 0.04 , 训练组: 5 折 AUC 均值 $= 0.94 \pm 0.02$, 验证组: 5 折 AUC 均值 $= 0.84 \pm 0.06$, 测试组: AUC $= 0.885$; 瘤周与瘤内影像组学标签的效能差异无统计学意义 ($P > 0.05$)。**结论:** 通过基于 pGGN 肺腺癌瘤周微环境 CT 图像获得的影像组学标签建立的 LR 模型具有良好的预测浸润性的能力, 预测能力与瘤内影像组学标签相当, 可为临床诊断与治疗提供参考。

PU-2119

高原地区健康人左心房结构及功能的正常参数研究

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目的：使用 3.0TMRI 回顾性分析高原地区健康人左心房 (LA) 结构及功能的正常参数值范围。

方法：对 150 例高原地区健康人在 3.0TMRI 扫描仪上进行心脏磁共振扫描。将研究对象按年龄分为 16-30 岁组、31-45 岁组、46-60 岁组；按性别分为男性组、女性组。收集所有纳入研究对象的基本资料并测量 LA 径线，包括左右径及前后径；利用 CVI 42 软件获得 LA 常规心功能参数及心肌应变参数；LA 容积参数包括：LA 最大容积 (LAVmax)、LA 主动收缩前容积 (LAVpre-a)、LA 最小容积 (LAVmin)；经体表面积修正获得其相应指数 (LAVImax、LAVImin)。心肌应变参数包括 LA 储存功能 (总射血分数[LATEF]、总应变[ϵ_s]、正向应变率峰值[SRs])、导管功能 (被动射血分数[LAPEF]、被动应变[ϵ_e]、舒张早期负向应变率峰值[SRe]) 和泵功能 (主动射血分数[LAAEF]、主动应变[ϵ_a]、舒张晚期负向应变率峰值[SRe])。 $P < 0.05$ 为差异具有统计学意义。

结果：LA 的各应变参数均具有良好的观察者内和观察者间重现性。LAVImax、LAVImin 分别为 (30.65±6.36) ml/m²、(15.67±3.79) ml/m²； ϵ_s 、 ϵ_e 、 ϵ_a 分别为 (42.00±7.56) %、(25.91±6.99) %、(15.96±3.68) %；SRs、SRe、SRa 分别为 (1.84±0.49) s⁻¹、(-2.93±0.86) s⁻¹、(-2.14±0.53) s⁻¹；与 46-60 岁组相比，16-30 岁组与 30-45 岁组 LATEF、LAPEF 均显著增大 ($P < 0.05$)，而在 16-30 岁组与 30-45 岁组则无明显差异 ($P > 0.05$)；在不同性别之间，女性组 LAVImax、LAVImin、 ϵ_s 、 ϵ_a 较男性显著增大；而随着年龄的增长，LA 的泵功能显著增加 ($P < 0.05$)，而 LA 的管道功能逐渐降低 ($P < 0.05$)。

结论：本研究结果提供了高原地区健康人 LA 结构及心功能参数的正常参考值范围，并揭示了性别及年龄对各参数的影响，提示在进行心脏相关疾病诊断时，正常参考值应根据年龄和性别进行调整。

PU-2120

超低剂量胸部 CT 结合深度学习重建定量评估肺炎的可行性

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目的：探讨超低剂量胸部 CT (ULDCT) 结合深度学习图像重建(DLIR)对人工智能影像辅助肺炎定量分析软件 (uAI-Discover-NCP) 及图像质量的影响。

方法：收集 40 例肺炎患者，均行标准剂量 (SDCT) (120 kVp，自动管电流) 和 ULDCT 胸部扫描，根据患者 BMI (正常、超重、肥胖)，ULDCT 分别采用不同的管电流 (10、20、35mA)。SDCT 采用 40%强度的自适应统计迭代重建 (ASIR-V40%) (A 组)；ULDCT 采用 ASIR-V40% (B1 组)、高强度的 DLIR (DLIR-H) (B2 组) 重建图像，共获得 3 组图像。记录 SDCT 和 ULDCT 扫描的辐射剂量。测量空气、肺组织、胸主动脉、肩胛下肌、胸椎 CT 值、SD 值。将 3 组图像导入到肺炎分析软件进行分析，记录肺炎指数、肺炎体积、肺炎体积百分比、肺炎质量及肺炎质量百分比。两名高年资影像医师对 3 组图像的整体质量及肺炎显示采用 5 分制评分标准进行评分。对 3 组图像肺炎定量参数、噪声及主观评分进行统计分析。

结果：ULDCT 相较于 SDCT，辐射剂量减低了 94%。3 组图像空气、肺组织、胸主动脉、肩胛下肌、胸椎的 CT 值无统计学差异 ($P > 0.05$)。3 组图像空气、肺组织、胸主动脉、肩胛下肌、胸椎的 SD 值总体差异有统计学意义 ($P < 0.05$)；A 组与 B2 组间胸主动脉、肩胛下肌 SD 差异无统计学意义 ($P > 0.05$)；A 组胸椎 SD 较 B2 组高，差异存在统计学意义 ($P < 0.05$)。3 组图像整体图

像质量、肺炎显示主观评分总体差异有统计学意义 ($P<0.05$)；A 组和 B2 组主观评分均高于 B1 组，差异有统计学意义 ($P<0.05$)；B2 组图像质量主观评分、肺炎显示主观评分与 A 组差异无统计学意义 ($P>0.05$)。B1、B2 组肺炎定量参数 (肺炎指数、肺炎体积、肺炎体积百分比、肺炎质量及肺炎质量百分比) 分别与 A 组对比，差异均无统计学意义 ($P>0.05$)。

结论：ULDCT 高强度深度学习重建图像肺炎定量分析结果与 SDCT 扫描基本一致，图像质量相当，能满足临床诊断需求，且能大幅降低辐射剂量，可用于肺炎随访。

PU-2121

Bach1 调节阿霉素诱导心脏毒性中的氧化应激与铁死亡

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目的:阿霉素(DOX)是临床上最常用的蒽环类化疗药物之一，但其所致的心脏毒性缺乏有效的治疗和预防措施，且发生机制尚未完全明了。已经证明 DOX 会诱导心肌细胞中的氧化应激与铁死亡，而 Bach1 基因竞争性抑制抗氧化相关基因 Nrf2 与 ARE 位点结合，加重氧化应激和铁死亡。本研究的目的是探究敲除 Bach1 是否可以缓解 DOX 诱导的心脏毒性，为预防和早期干预 DOX 诱导的心脏毒性损伤提供新的靶点以及影像依据。

方法:将雄性野生型 (WT) 与 Bach1 基因完全敲除型 (Bach1^{-/-}) C57BL/6 小鼠分别随机分为对照组和 DOX 组，DOX 经腹腔注射，每周一次，共注射三周，累积剂量为 20mg/kg。末次注射后一周，使用 M 型超声心动图 (Vevo LAZR) 和心脏磁共振 (9.4T Bruker) 评估左心功能。采用 H&E 染色和 Masson's Goldner 染色进行组织学评价，并检测心脏组织中的氧化应激与铁死亡标志物。

结果: DOX 治疗 3 周后，WT 与 Bach1^{-/-}小鼠左心室收缩功能均明显下降，且 Bach1^{-/-}+DOX 组的左室功能明显好于 WT+DOX 组：EF($67.75\pm 11\%$ vs. $56.92\pm 3\%$, $p=0.02$)，FS($37.83\pm 2\%$ vs. $30.61\pm 7\%$, $p=0.02$) 和 GLS($-18.05\pm 1\%$ vs. $-14.44\pm 4\%$, $p=0.002$)。与 WT+DOX 小鼠相比，Bach1^{-/-}+DOX 组心肌纤维化程度降低 53% ($p=0.01$)。此外，与 WT+DOX 组相比，Bach1^{-/-}+DOX 组小鼠氧化应激和铁死亡的生物标志物减少。而注射生理盐水的 WT 组与 Bach1^{-/-}组小鼠的各项指标均无显著差异。

结论：敲除 Bach1 可以通过降低心肌细胞氧化应激和铁死亡缓解 DOX 诱导的心脏毒性，为预防和早期干预 DOX 诱导的心脏毒性损伤提供新的靶点以及影像依据。

PU-2122

基于 CT 影像学探讨新冠肺炎的转归

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【目的】自新型冠状病毒疫情暴发以来，新冠毒株不断进化，奥密克戎病毒株是世界卫生组织公布的第五个变异株，也是我国实施放开政策以来，主要的传播毒株。CT 影像诊断在新冠肺炎的诊治及预后评估中起至关重要的作用，本研究拟探讨基于 CT 影像特征分析不同的肺部基础疾病患者确诊奥密克戎新冠肺炎后的影像学征象及短期内的转归情况。

【材料及方法】回顾性筛选 2022 年 12 月 10 日至 2023 年 1 月 13 日广州医科大学附属第一医院收治的 1643 名新冠肺炎患者，其中有 307 名患者在确诊 1 个月后至至少进行了一次 CT 复查，收集符合纳入标准的 307 例临床资料及胸部 CT 影像学数据，所有图像由两位放射科医师进行评估。该研究第一部分，阐述新冠肺炎影像学征象、影像分期及转归。第二部分，根据患者不同的肺部基础疾病将他们分成 6 个亚组：慢性阻塞性肺疾病组、间质性肺疾病组、肺癌组、肺移植组、无基础肺疾

病组、其它肺疾病组（如支气管扩张、肺结节等）；按年龄分为青年（ ≤ 44 岁）、中年（45-59 岁）、老年（ ≥ 60 岁）三层，统计不同人群的年龄分布情况；根据病灶占据肺的比例，分为三种类型：普通型（ $\leq 25\%$ ）、重型（25%-50%）、危重型（ $> 50\%$ ），分析不同人群间新冠肺炎严重程度是否有组间差别；最后将不同人群患者首次胸部 CT 图像与确诊后 1-3 月内复查的图像进行对比、分析其转归情况。统计学分析使用 SPSS 25 Person 相关性分析、Fisher's Exact Test 法等。

【结果】新冠肺炎影像学分期常分为早期、进展期、恢复期；转归常表现为基本吸收、明显吸收、部分吸收、无吸收、进展，其中进展表现为肺纤维化或病灶增多，见于重型-危重型患者，预后往往较差。确诊新冠肺炎的不同肺部基础疾病患者，均以老年人最常见，6 组不同人群均以普通型最常见，肺癌组重型及危重型发生率最低（ $P < 0.001$ ）。6 个不同亚组间，我们发现慢性阻塞性肺疾病组与间质性肺疾病组的预后相对较差，肺癌组的预后相对较好（ $P < 0.05$ ）。

【结论】影像学在新冠肺炎的精准诊治、分期及转归评价方面发挥着至关重要的作用。

PU-2123

急性肺栓塞患者的临床、影像特征分析

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目的：对比急性非高危肺栓塞患者不同栓塞类型的临床、影像特征分析。方法：收集在本院通过 CTPA 确诊的非高危急性肺栓塞患者进行回顾性分析，对比不同类型急性肺栓塞患者临床以及影像学特征进行分析。结果：在非高危急性肺栓塞患者中，不同类型栓塞患者在性别、年龄、有无下肢静脉血栓及合并症上比较差异无统计学意义（ $P > 0.05$ ）；而在影像学特征（PAOI、肺动脉直径、肺/主动脉比值、RV/LV 比值）中发现，鞍状肺栓塞与非鞍状肺栓塞、非 MPA 栓塞中存在显著差异，（ $P < 0.05$ ）结论：不同类型急性非高危肺栓塞患者严重程度存在差异，鞍状肺栓塞和非鞍状肺栓塞患者较非 MPA 患者的肺动脉高压及右心室功能障碍出现的频率更高，肺栓塞影像学指标再结合患者临床及实验室检查，有助于早期识别患者危险度，为患者的治疗及预后提供更大帮助。

PU-2124

急性肺栓塞患者临床预后相关分析

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目的 探讨急性肺栓塞（Acute Pulmonary Embolism, APE）患者的临床表现、实验室指标及影像学指标对其预后的影响。方法 回顾性分析 172 例临床表现、实验室指标及影像学指标，根据是否发生右心室功能障碍将患者分为右心室功能障碍组（RVD 组）（ $RV/LV > 1$, 77 例(44.77%)）和无右心室功能障碍组（ $RV/LV < 1$, 95 例(55.23%)），利用单因素和多因素 logistic 回归分析患者的临床表现、实验室指标及影像学指标与右心室功能障碍之间的关系。结果 单因素分析得出栓塞类型（主干栓塞 vs 非主干栓塞）、肺动脉主干直径（PAd）、肺动脉阻塞指数（PAOI%）、年龄、心率及患有糖尿病患者在两组间的差异具有统计学意义（均 $P < 0.05$ ）。在多因素 logistic 回归中，栓塞类型、性别及年龄、肺动脉主干直径（PAd）、肺动脉阻塞指数（PAOI%）与右心室功能障碍显著相关（均 $P < 0.05$ ）。结论 影像学指标对 APE 患者中是否会发生右心室功能障碍有较好的预测价值，有助于指导临床医生作出更精准的临床决策。

PU-2125

急性肺栓塞患者肺动脉灌注与右心室/左心室比值和 CTOI 的关系

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Objective: Pulmonary embolism (PE) is fatal . It is significant to detect signs in CTPA that may indicate a high flow pressure load. The aim of this study is to investigate whether decreased perfusion of the pulmonary artery is associated with increased RV/LV Ratio and CTOI .

Materials and Methods: In this prospective single-center study performed , 14 patients diagnosed with APE were included. We evaluated the relationships between PBV and RV/LV Ratio and CTOI . We measured PA enhancement (PAenh) and calculated rPBV (PBV/ PAenh) to adjust timing.

Results: There was significant negative correlations between mean rPBV and RV/LV Ratio($R=-0.571, P=0.033$). There was no significant difference between mean rPBV and select rPBV and CTOI ($R=0.287, P=0.320$).

Conclusion: RV/LV Ratio may be an indicator of decreased pulmonary blood perfusion. CTOI is not correlated with pulmonary perfusion.

PU-2126

基于宽体探测器 CT 成像评估主动脉瓣最佳重建期相的应用价值

喻茜

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目的：评估宽体探测器 CT 主动脉瓣成像的可行性，并探讨不同重建期相在主动脉瓣狭窄患者主动脉瓣及瓣环术前评估中的应用价值。

方法：前瞻性纳入在 2020 年 7 月至 2021 年 3 月拟行经导管主动脉瓣置换术术前 CTA 检查的主动脉瓣狭窄患者。应用宽体探测器 CT 以 one beat 扫描模式进行心脏 CTA 检查，打开智能期相技术自动重建最佳冠脉期，再采用全期相图像计算主动脉瓣的最佳收缩期及最佳舒张期并手动重建。在三个期相下分别测量瓣环的各项形态学参数，并由两名放射科医师采用四分制对主动脉瓣的图像质量进行主观评价。采用配对样本 t 检验分别比较高、低心率主动脉瓣狭窄患者在三个期相下瓣环各项测量参数；采用 Friedman 检验比较三个期相的图像质量主观评分。

结果：总共纳入 42 例患者，平均年龄为 70 ± 5 岁，年龄范围为 50~84 岁。对于 30 例低心率患者 (<75 次/分)，最佳收缩期的瓣环各项测量参数均大于最佳冠脉期 ($P<0.001$)，而在 12 例高心率患者 (≥ 75 次/分) 中最佳收缩期与最佳冠脉期之间瓣环各项测量参数的差异无统计学意义。最佳收缩期、最佳冠脉期的图像质量主观评分均优于最佳舒张期 ($P<0.001$)。

结论：宽体探测器 CT 主动脉瓣成像检查成功率高，采用主动脉瓣的最佳收缩期有助于主动脉瓣及瓣环的精准评估，对于准确选择人工瓣膜型号及尺寸、预测及预防手术并发症等具有重要的临床意义。

PU-2127

The evaluation of the inner diameter of the airway in asthma recovery by using HRCT

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Objectives: To evaluate the airway diameter in asthma recovery by using HRCT.

Methods: Thirty patients with asthma were recruited and underwent HRCT examination in acute exacerbation and stable phase, respectively. The inner diameter of the airway (Din) was measured from bilateral main bronchi to all 18 segmental bronchi during acute exacerbation and stable phase.

Results: The inner diameter of airway reduced significantly in acute exacerbation period compared with that in stable period ($P < 0.05$). The mean Din reduction (%) in segmental bronchi was 12% and that in lobar bronchi was 6%. The incidence of dorsal bronchus of both lower lobes stenosis was the highest with 18 cases (right) and 16 cases (left) in all 30 subjects, respectively, while the incidence of lingual bronchial stenosis was the highest with 18 cases for the lobar bronchi, The correlation between the number of narrowing bronchi and the severity of the disease, the number and FEV1 (% predicted) of the acute exacerbation showed there were no significant statistical correlation between them ($P > 0.05$).

Conclusion: CT images of bronchial stenosis showed obvious dilation after appropriate medication, and the inner diameter of the airway can be used as a practical and convenient index to evaluate the recovery of asthma.

PU-2128

Study on microcirculation in patients with hypertrophic cardiomyopathy by first myocardial perfusion with CT

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Objective: To evaluate the status of coronary microcirculation in patients with hypertrophic cardiomyopathy (HCM) by resting first pass CT perfusion imaging. **Methods:** 46 patients with confirmed HCM in our hospital and 44 healthy controls were selected. The myocardial first pass perfusion data of the two groups were analyzed, and the myocardial first pass perfusion value (MP), myocardial perfusion correction (C-MP) and myocardial transmural perfusion index (TPR) were measured. According to the myocardial thickness at the end of diastolic period, the cardiac muscle segments of HCM group were divided into non-hypertrophic subgroup ($<15\text{mm}$) and hypertrophic subgroup ($\geq 15\text{mm}$), and the hypertrophic subgroup was further divided into three levels: mild hypertrophic (15-19mm), moderate hypertrophic (20-24mm) and severe hypertrophic ($\geq 25\text{mm}$). The overall differences of MP, C-MP and TPR in each HCM subgroup and control group were compared by one-way ANOVA, and the LSD-t test was used for pairwise comparison among each group. **Results:** There were no significant differences in MP, C-MP and TPR values between HCM non-hypertrophic subgroup and control group ($P > 0.05$). There were statistically significant differences in MP, C-MP and TPR values between HCM hypertrophic subgroup and control group and between HCM hypertrophic subgroup and non-hypertrophic subgroup ($P < 0.05$), which showed that the parameters of hypertrophic segment were lower than those of non-hypertrophic segment. There was no significant difference in MP and C-MP values in mild and moderate hypertrophic segments ($P > 0.05$), but TPR in moderate hypertrophic segment was significantly lower than that in mild hypertrophic group ($P < 0.05$). The parameters of severe hypertrophy were significantly different from those of moderate hypertrophy and mild hypertrophy

($P<0.05$). Conclusion: The first perfusion of CT can evaluate the myocardial microcirculation in patients with hypertrophic cardiomyopathy semi-quantitatively, and provide evidence for clinical risk stratification and treatment decision.

PU-2129

特发性肺纤维化的 CT 定量分析与肺功能的相关性研究

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特发性肺纤维化的 CT 定量分析与肺功能的相关性研究

摘要：特发性肺纤维化是一种慢性、进展性的肺部疾病，其特征是肺间质破坏累及到肺实质改变。本篇文章旨在探讨特发性肺纤维化患者的 CT 影像特征及 CT 定量分析对肺功能损害程度的相关性。通过回顾性分析近年来收治的 IPF 患者 CT 影像及临床资料，本文探讨了 IPF 的肺部病变特点及 CT 影像学表现，同时分析了不同病变程度与患者临床肺功能的关系。

目的

特发性肺纤维化是一种致死率较高的肺部疾病，患者生存期短，所以早期诊断对于改善患者预后具有重要意义。CT 影像学检查作为 IPF 的重要辅助检查手段，对其临床诊断具有重要指导意义。考虑到部分病人病情不允许做肺功能或肺活检检查，对其肺功能损害情况不能明确了解。因此，明确 IPF 的 CT 影像学特征及其与肺功能损害程度的关系是当前研究的重点。

方法

本文采用回顾性分析的方法，收集了近年来确诊为特发性肺纤维化的患者资料，对其 CT 影像学进行了深入研究。在分析过程中，我们将患者的 CT 影像学表现与临床病理资料、肺功能检查进行了相关性分析。同时，对不同病变程度患者的 CT 影像学特点进行了总结和评估。

结果

我们发现，特发性肺纤维化的 CT 影像学表现具有一定的特征性，其主要表现为肺部的网格状、蜂窝状改变及肺气肿等。此外，我们还发现，随着疾病严重程度的增加，CT 影像学表现也呈现出更为明显的异常改变，包括肺部病变的范围扩大、密度增加及结构紊乱等。同时，我们也发现，不同病变程度的患者其肺功能也存在差异，CT 定量分析可用于评估肺功能损害情况。

结论

特发性肺纤维化的 CT 影像学表现具有一定的特征性。CT 定量分析可用于评估 IPF 的肺功能损害情况。在临床实践中，我们可以通过对 IPF 患者的 CT 影像学特征进行定量分析，为疾病的早期诊断和预后评估提供重要参考依据。同时，我们还发现，针对不同病变程度的 IPF 患者，其治疗方法及预后改善策略也存在差异，这为今后开展个性化治疗及改善患者预后提供了新的思路。

PU-2130

Development of a CT-based Deep Learning Model for the Preoperative Prediction of Visceral Pleural Invasion and Disease-Free Survival in Clinical Stage IA Lung Adenocarcinoma Patients

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Pathologic visceral pleural invasion (VPI) in early-stage lung cancer patients can result in the upstaging of T1 to T2, in addition to having implications for patient treatment and prognostic

outcomes. This study was designed with the goal of establishing and validating a CT-based deep learning (DL) model capable of predicting VPI status and stratifying patients based on their prognostic outcomes. In total, 1896 patients from two centers with pathologically confirmed clinical stage IA lung adenocarcinoma were enrolled. DL signatures were extracted with a 3D residual neural network. DL model was able to effectively predict VPI status. VPI predicted by the DL models, as well as pathologic VPI, was associated with shorter disease-free survival. The established deep learning signature provides a tool capable of aiding the accurate prediction of VPI in clinical stage IA lung adenocarcinoma patients, thus enabling prognostic stratification.

PU-2131

特发性肺纤维化 CT 影像技术研究进展

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特发性肺纤维化 CT 影像技术研究进展

摘要

特发性肺纤维化 (IPF) 是一种慢性、进展性的肺部疾病, 患者肺部的正常组织被过度的纤维组织取代。本文综述了近年来特发性肺纤维化 CT 影像技术的进展, 包括 HRCT 技术、功能成像技术、分子影像技术等方面, 并探讨了这些技术对于 IPF 诊断和病情评估的应用价值和局限性。

目的

特发性肺纤维化的致死率较高, 所以, 诊断和病情评估对于临床医生至关重要。传统的影像学检查方法对 IPF 的诊断和病情评估存在一定的局限性。因此, 研究者们不断探索新的影像技术, 以期提高 IPF 的诊断准确性和评估的全面性。

方法

本文采用文献综述的方法, 对近五年关于特发性肺纤维化 CT 影像技术的相关研究进行了整理和分析, 重点探讨了 HRCT 技术、功能成像技术、分子影像技术等 IPF 诊断和病情评估中的应用价值和局限性。

结果

HRCT 技术作为一种高分辨率的 CT 成像技术, 能够清晰地显示 IPF 患者的肺部病变特征, 对于早期诊断和病情评估具有重要意义。功能成像技术如支气管舒张试验、肺一氧化碳弥散量等能够评估 IPF 患者的肺功能状况, 对于判断病情严重程度和预后有一定的参考价值。分子影像技术作为新兴的技术, 能够从分子水平上揭示 IPF 的发病机制和病变过程, 对于研究 IPF 的发病机制和新型治疗方法的研发具有潜在的应用价值。

结论

近年来, 特发性肺纤维化的 CT 影像技术在 HRCT 技术、功能成像技术、分子影像技术等方面取得了显著的进展, 对于 IPF 的诊断和病情评估具有重要的应用价值。这些技术的不断发展和完善, 有望为临床医生提供更加全面、准确的 IPF 诊断和病情评估手段。

PU-2132

心脏磁共振特征追踪技术评估射血分数保留型心力衰竭患者左心室心肌应变的研究

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目的:

随着人口老龄化,特别是高血压、糖尿病、肥胖患病人口的增加,射血分数保留型心衰(HFpEF)患病率有增长的趋势,以患病率高,预后差且以往无明确有效的治疗方法而受到重视;其诊断主要依靠射血分数、临床症状及相关实验室检查进行诊断。本研究基于心脏磁共振特征追踪技术(Feature Tracking,FT)定量评价 HFpEF 患病心肌应变是否发生改变。

材料与方法:

收集我院 2023 年 4 月-2023 年 9 月进行 CMR 检查 56 例,CMR 检查正常患者 21 例, HFpEF 患者 35 例,所有受试者均使用 3.0T 核磁共振(SIEMENS,MAGNETOM Vida)行心脏检查,采用心电图门控 bSSFP 序列获两腔心、三腔心及四腔心图像。原始心脏电影图像使用 QIR Suit(法国,CASIS)后处理软件进行心功能及应变分析。使用半自动方法识别所有心脏周期左心室内外膜,再由一名五年临床经验诊断医师进行修正以保证内外膜的准确性,然后计算左心室 17 节段应变的平均值。采用 SPSS22.0 进行统计学分析。所有连续性数据结果以均值±标准差表示,分类变量以受试人数和百分比表示,组间比较使用方差分析。正常对照组与 HFpEF 心肌应变进行两样本 T 检验。 $p<0.05$ 具有统计学意义。

结果: HFpEF 组与正常对照组的 BMI、同型半胱氨酸有统计学意义($p<0.05$)。HFpEF 组平均径向应变及平均周向应变低于正常对照组($p=0.015$),HFpEF 组平均径向应变及平均周向应变分别为 23.5%、-4.5%; 正常对照组平均径向应变及平均周向应变分别为 35.9%、-16.0%。

结论: 心肌应变技术可以定量评价 HFpEF 患病心肌应变发生已发生改变,给予 HFpEF 患病早期治疗,提高生活质量。

PU-2133

飞利浦 IQon 光谱 CT 血管壁成像技术在冠心病患者检查中的应用价值初探

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【摘要】目的 探讨飞利浦 IQon 光谱 CT 血管壁成像技术在冠心病患者中的临床应用价值。方法 回顾性随机选择 2022 年 5 月—2023 年 2 月在苏州科技城医院行冠状动脉 CTA 检查的冠心病患者 40 例,所有患者均采用飞利浦 IQon 光谱 CT 进行冠状动脉 CTA 检查。检查结束后,通过软件后处理分别获得常规冠状动脉 CTA 图像和冠状动脉血管壁成像图,对两组图像同时进行主观评价和客观评价。结果 冠状动脉血管壁成像图在伪影、图像对比度、管腔显示、血管壁显示、血管壁与周围脂肪对比、CNR、SNR 等方面的评分均高于常规 CTA 组,且差异具有统计学意义。结论 飞利浦 IQon 光谱 CT 血管壁成像技术较常规冠状动脉 CTA 更好地显示血管壁情况,在冠心病患者的 CTA 造影临床应用中具有很大的潜力。

PU-2134

左心室瘢痕负荷对左束支起搏导线植入的影响

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摘要

目的: 左心室瘢痕负荷与左束支起搏 (LBBP) 导线的植入成功与否密切相关, 本研究通过心脏磁共振延迟强化探讨心脏各节段瘢痕评分对于左束支起搏导线植入的影响。

方法: 入组 2019 年 08 月至 2023 年 02 月在南京医科大学第一附属医院心血管内科拟接受左束支起搏患者, 并且术前完成心脏核磁扫描。通过受试者工作特征曲线 (ROC) 评估心脏 17 节段的瘢痕负荷以及节段瘢痕得分 (0=absent LGE, 1=1-25% LGE, 2=26-50% LGE, 3=51-75% LGE and 4=76-100% LGE) 诊断左束支起搏成功的特异度和敏感度。17 节段 LGE 负荷以及节段瘢痕评分为自变量, 左束支起搏成功为因变量, 进行单因素和多因素二元 Logistic 回归分析。采用 Spearman 相关系数检验 17 节段 LGE 负荷及节段瘢痕评分与左束支起搏成功与否的相关性。

结果: 研究连续纳入 52 例患者, 女性 18 例, 年龄 63 ± 13 岁; 成功实现 LBBP 患者 44 例 (84.6%)。左束支起搏导线植入成功与否与相关节段瘢痕负荷得分具有相关性。单因素回归中发现基底部下侧壁, 基底部、室间隔以及基底部和中部室间隔的瘢痕评分在 LBBP 手术是否成功的差异有统计学意义 ($P < 0.05$), 同时基底段下侧壁的瘢痕负荷也在预测上也具有统计学意义。在纳入多因素的变量基底部下侧壁, 基底部、室间隔以及基底部和中部室间隔的瘢痕评分和下壁基底段的瘢痕负荷中发现下侧壁基底段的瘢痕负荷评分是预测 LBBP 手术失败的独立危险因素。下侧壁基底段的瘢痕评分在 ROC 曲线分析下 AUC 值为 68.5%, 逐步回归的模型吻合度为 84.6%, 特异度为 100%, 当基底部下侧壁 LGE > 75% 时, 准确性达 100%。

结论: 心脏核磁共振可以比较安全的评估心脏瘢痕负荷, 下侧壁基底段的瘢痕评分可以预测手术失败与否, 为临床上 LBBP 手术的顺利实施提供较可靠的参考依据。

PU-2135

绝经后女性乳腺 X 线特征与 10 年内主要不良心脏事件发生率的相关性研究

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目的: 本研究旨在探索绝经后女性乳腺 X 线特征与其随访 10 年内主要不良心脏事件 (MACE) 发生率的相关性。

方法: 收集并分析 258 例中老年女性乳腺 X 线特征, 如乳腺密度、乳腺动脉硬化、微钙化, 以及其在随访 10 年时间内 MACE 发生率。生存单因素分析采用 Kaplan-Meier 法, 并进行 Log-rank 时序检验; 多因素分析采用 Cox 逐步回归模型。

结果: 单因素生存分析提示乳腺密度、乳腺动脉硬化与 10 年内 MACE 发生率相关, Log-rank $P < 0.005$, 微钙化与 10 年内 MACE 发生率无统计学意义。多因素分析显示, 乳腺密度特征 ($HR = 0.568$, 95% CI = 0.325-0.991; $P = 0.046$)、乳腺动脉硬化 ($HR = 6.2$, 95% CI = 2.41-16.27; $P = 0.00$) 可以作为 10 年内 MACE 发生率的单独危险因素。

结论: 绝经后女性乳腺特征中乳腺 X 线密度、乳腺动脉硬化与 MACE 发生率具有相关性。

PU-2136

NAFLD versus RCA PCAT CT attenuation: Prediction of major adverse cardiovascular events in patients with acute chest pain

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Purpose: This study was to compare prognosis of pericoronary adipose tissue (PCAT) computed tomography (CT) attenuation of right coronary artery (RCA) and non-alcoholic fatty liver disease (NAFLD) for major adverse cardiovascular events (MACE) in patients with acute chest pain.

Materials and methods: Between January 2011 and December 2021, all consecutive emergency patients with acute chest pain referred for coronary CT angiography (CCTA) were retrospectively enrolled. MACE included unstable angina requiring hospitalization, coronary revascularization, non-fatal myocardial infarction, and all-cause death. Patients' baseline and CCTA characteristics, RCA PCAT CT attenuation and the presence of NAFLD were used to evaluate risk factors of MACE using multivariable Cox regression analysis. The prognostic value of NAFLD compared with RCA PCAT CT attenuation was analyzed.

Results: A total of 490 patients were enrolled (mean age, 58.48 ± 13.18 years; 297 men). During a median follow-up of 31 months, 60 patients (12.24%) experienced MACE. NAFLD (HR = 2.550, 95% CI: 1.184, 5.491, $P = 0.017$) and RCA PCAT CT attenuation (HR = 1.025, 95% CI: 1.001, 1.050, $P = 0.045$) were independent predictors of MACE. The global Chi-square analysis showed that NAFLD improved risk of MACE more than that using clinical risk factors and CCTA metrics (58.63 vs 53.73, $P = 0.027$) or combined with RCA PCAT CT attenuation (62.56 vs 58.63, $P = 0.047$).

Conclusion: NAFLD and RCA PCAT CT attenuation were predictors of MACE. NAFLD had an incremental prognostic value beyond RCA PCAT CT attenuation for MACE in patients with acute chest pain.

PU-2137

双源 CT 诊断内脏心房异位综合征合并功能性单心室

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目的 探讨心电门控双源 CT 血管造影 (DSCTA) 诊断内脏心房异位综合征合并功能性单心室 (SV) 的价值。

方法 对 31 例内脏心房异位综合征合并单心室患者行 DSCTA 检查, 进行分型诊断并观察其合并畸形。结果 31 例患者中, 内脏心房异位综合征合并左心室型单心室 11 例, 包括无脾综合征 10 例 (10/11, 90.91%), 多脾综合征 1 例 (1/11, 9.09%), 合并畸形 21 种 57 处。内脏心房异位综合征合并右心室型单心室 8 例, 包括无脾综合征 5 例 (5/8, 62.50%), 多脾综合征 3 例 (3/8, 37.50%), 合并畸形 18 种 48 处。内脏心房异位综合征合并不定型单心室 12 例, 包括无脾综合征 10 例 (10/12, 83.33%), 多脾综合征 2 例 (2/12, 16.67%), 合并畸形 22 种 62 处。25 例无脾综合征合并功能性单心室病人中, 合并畸形为共同心房 (19/25, 76.00%)、肺动脉狭窄或闭锁 (16/25, 64.00%)、完全性心内膜垫缺损 (13/25, 52.00%)、共同房室瓣 (11/25, 44.00%) 等。

结论 DSCTA 对内脏心房异位综合征合并功能性单心室的准确诊断和分型具有重要意义, 为手术治疗提供重要指导。

PU-2138

CT 肺血管造影参数对急性肺栓塞的预后价值

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目的:急性肺栓塞(APE)患者表现出不同的预后。计算机断层肺血管造影(CTPA)是 APE 诊断算法中的一线检查,但与近期转归的相关性尚不明确。本研究的目的是确定 CTPA 结果是否可以预测急诊部 APE 患者的 30 天死亡率。

方法和材料:本研究为回顾性、单中心研究

2010 年至 2018 年期间,在我们机构急诊科诊断的 780 例 APE 患者。对这些 CTPA 发现进行了评估:栓塞-阻塞负荷评分(Qanadli 评分)、肺动脉总干内径、左右心室比、奇静脉内径、冠状静脉窦内径。记录 30 天内共病和致命/非致命不良结局。研究肌钙蛋白 I 值与血管造影参数的相关性,采用多元逻辑回归分析。

结果:全因死亡率和 ape 相关的 30 天死亡率分别为 5.9%和 3.6%。30 天内死亡的患者年龄较大,恶性肿瘤的患病率较高。Qanadli 评分和所有 CTPA 参数与超声心动图中肌钙蛋白 I 水平和 RVD 存在相关(p 值 <0.0001)。右心室/左心室比值和冠状窦直径与 30 天死亡率相关(p 值 <0.005)。在多元逻辑回归中,只有冠状窦和 RVD 仍然显著,HR 分别为 2.5(95%CI1.1-5.6)和 1.9(95%CI0.95-3.7)。结论:这些结果表明,CTPA 量化右心室压力是一个准确的预测 30 天死亡率。特别是,扩张的冠状窦(>9 mm)与右心功能障碍和高肌钙蛋白 I 的超声心动图征象相关,似乎具有额外的预后价值。

PU-2139

CMR 分层应变技术对肥厚型心肌病患者发生心内膜下 LGE 的预测价值

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目的:伴心内膜下延迟强化(LGE)的肥厚型心肌病(HCM)患者预后不良。本研究应用 CMR 分层应变技术评估伴或不伴心内膜下 LGE 的 HCM 患者纵向分层应变特征,探讨其对心内膜下 LGE 的预测价值。

方法:选取 2017 年 1 月至 2020 年 9 月于我院确诊为 HCM 患者 41 例,根据有无心内膜下 LGE 将其分为两组,无心内膜下 LGE 组(G1)25 例,心内膜下 LGE 组(G2)16 例,同期选取年龄、性别相匹配的健康志愿者 28 例作为对照组。各组均采用 CMR 测量左心室形态和功能参数,应用分层应变技术获取左心室心内膜纵向应变(SendoLS)和整体心肌纵向应变(GLS)参数。比较三组上述各参数差异,采用相关性分析 HCM 患者 LGE 占左心室质量百分比与 SendoLS 的关系,应用单因素结合多因素 Logistic 回归分析筛选出 HCM 患者发生心内膜下 LGE 的独立预测因子,并以受试者工作特征(ROC)曲线分析其预测价值。

结果:G1、G2 和对照组 3 组间比较显示,左心室射血分数、左心室最大室壁厚度、左心室质量、左心室质量指数、SendoLS、GLS 组间差异具有统计学意义(P 均 <0.05),其中 G1、G2 的 SendoLS、GLS 较对照组减低,G2 较 G1 减低更显著(SendoLS: $-17.86\% \pm 1.68\%$ (对照组) vs $-13.46\% \pm 2.57\%$ (G1) vs $-10.25\% \pm 2.99\%$ (G2); GLS: $-16.63\% \pm 1.60\%$ (对照组) vs $-12.19\% \pm 2.48\%$ (G1) vs $-9.24\% \pm 2.7\%$ (G2), P 均 <0.001)。HCM 患者 LGE 占左心室质量百分比与 SendoLS 呈正相关($r=0.614, P=0.001$)。单因素及多因素 Logistic 回归分析显示 SendoLS 可作为 HCM 患者发生心内膜下 LGE 的独立预测因子($P<0.01$)。SendoLS 预测 HCM

患者发生心内膜下 LGE 的曲线下面积为 0.827, 以-12.51%为截断值时, 其敏感性为 87.5%, 特异性为 76.0%。

结论: 基于 CMR 分层应变技术分析的心内膜纵向应变参数可以预测 HCM 患者心内膜下 LGE 的发生。

PU-2140

特发性炎性肌病患者肺部疾病的 CT 扫描特征: 与肌炎特异性自身抗体的相关性

全红

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目的:鉴别与特发性炎性肌病(IIM)相关的不同肺类型, 并评估间质性肺疾病(ILD)的 CT 表现与肌炎特异性抗体(MSA)之间的潜在关系。

方法和材料:纳入 2004 年至 2019 年期间转诊至内科的所有连续 IIM 患者, 由两名放射科医生回顾性评估胸部 ct 扫描。CT 表现用于多变量分析, 以确定亚组患者。

结果:本文分析了 257 例(68 例)夹杂体肌炎(68 例)、皮肌炎(67 例)、免疫介导坏死性肌病(63 例)和抗合成酶综合征(59 例)的 CT 表现。173 例(67.3%)患者存在 MSA。94 例(36%)发生 ILD。聚类分析确定了三个亚组患者。第一个集群(n=21)的特征是合并(95%)。带有 anti-MDA5 的 DM 在这个集群中明显更多。第二组 34 例患者均有囊肿(包括蜂窝状囊肿)。最后一组(n=39)的患者明显有更多的小叶内网状结构, 无囊肿, 17%的实变。2 组和 3 组的 ASS 患者明显更多。

结论:尽管 IMM 的 ILD 存在异质性, 但根据 ct 扫描标准, ILD 可分为 3 个簇, 这些簇与 MSA 有关。放射科医师对这些集群的识别可以促进诊断筛选、随访和预后价值。

局限性:这是一项单中心的回顾性研究。

PU-2141

乳腺癌治疗后微钙化的回顾性研究

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目的:本研究聚焦于既往接受过乳腺癌治疗的女性, 她们因微钙化而被召回进行进一步的影像学检查。我们的目的是确定哪些因素增加了复发的风险, 复发的时间范围。

方法和材料:收集 2013 年 6 月至 2019 年 2 月间被召回患者的数据, 包括时间间隔、原诊断、原乳房 x 线照片外观和召回结果。

结果:194 例女性因微钙化而被召回进行进一步检查+活检。126 例为同侧原发癌, 66 例为对侧癌, 2 例为双侧癌。104 例(54%)接受了活检, 其余为良性肿瘤。66%证实复发/新癌。3 例微钙化被召回, 未进行活检, 随后确定为复发。复发时间间隔为 1 ~ 12 年, 平均 4.4 年。74%的患者 5 年内复发。在 40 例同侧复发患者中, 29 例原发癌伴 Dcis, 26 例原发癌伴微钙化。

结论:我们的研究证明, 我们在治疗乳房的 x 线钙化表征方面表现良好。活检率是适当的, 因为很大比例证实了组织学复发。只有 3 次复发被遗漏(占有所有召回的 0.02%)。原发肿瘤中 DCIS 和钙化的存在增加了复发的风险。25%的复发和新发癌症超过了 5 年的随访时间, 这表明我们的健康委员会对治疗过的乳腺癌进行 10 年随访的方案是适当的。

局限性:电子记录前接受治疗的患者无法获得关于先前乳房 x 光检查/病理结果的数据。被召回患者的记录由乳房 x 光检查师手工维护, 可能不包括项目中的所有患者。

PU-2142

来自左冠状动脉分叉形状分析的主形状分量与中度心血管风险队列中的钙评分弱相关

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目的:广泛的左冠状动脉分叉角已被报道与冠状动脉疾病的严重程度有关,但它可能不能反映复杂的三维血管形态。本研究旨在利用形状分析对左冠状动脉分叉的形状模式进行分类和量化,并将其与冠状动脉钙化评分相关联。

方法和材料:冠状动脉 CT 血管造影数据来自一个跨通道多中心心血管影像数据库,来自 406 名具有中等心血管风险的受试者。取下分叉旁左冠状动脉中心线并人工矫正。采用 Pearson 相关系数分析冠脉形态定量结果与冠脉钙评分之间的相关性。患者被分为高钙评分组(Agatston 评分>100)和低钙评分组。

结果:scree 测试产生了 5 个最显著的形状模式,解释了 76%的变化。衍生的主成分用于 178 名有临床资料的受试者。LAD 和 LCX 的钙评分随分岔角越宽、Im_1 越短而增加(Pearson 相关系数分别为 LM 和 LCX 的 0.18 和 0.17)。高钙评分组与低钙评分组在形状图案上差异不显著。

结论:左冠状动脉钙评分与左冠状动脉长度和分叉角呈弱相关,与 LCx 单纯近端急性转向无关。

PU-2143

心脏磁共振定量技术诊断心肌淀粉样变性 1 例

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患者 男, 63 岁, 活动后胸闷、气促 6 月, 加重 20 天入院。既往无高血压、糖尿病病史。入院后实验室检查, 急性心肌梗死全定量: 高敏肌钙蛋白-I:1653.00pg/ml (参考值 0-34.2pg/ml); B 型钠尿肽(PRO-BNP): 1546.97pg/ml (参考值 0-300pg/ml)。免疫球蛋白轻链: 免疫球蛋白 K 轻链:1.50g/L (1.7-3.7g/L); 免疫球蛋白 L 轻链:5.49g/L (0.9-2.1g/L); KAPP/LAMB:0.27 (参考值 1.17-2.93)。

MRI 表现: 平扫心脏左右心房增大, 房间隔增厚, 左室壁均匀性增厚, 室间隔舒张末期最大厚度 1.6cm, T2WI-STIR 心肌壁未见明显异常信号。心包少量积液, 右侧胸腔少量积液。心脏电影: 二尖瓣、三尖瓣及主动脉瓣少量反流; 左室舒张功能减退。左室射血分数 (EF) 53.92%。心肌灌注: 左室各壁强化均匀, 未见明显灌注缺损。注射对比剂 10 分钟后延迟扫描: 心腔内血池信号明显减低, 左右心室壁广泛透壁样强化。基于改良 Look-Locker 反转恢复(MOLLI)序列采集对比剂注射前后 T1 mapping 图, 通过 Native T1 和 Post T1 值计算出细胞外容积分数 (ECV)。测量室间隔中层 Native T1 值 1440ms (参考值 1200±45 ms), 增强后 T1 mapping 值约 246ms, 血池内增强前后 T1 mapping 值分别为 (1972ms, 333ms); 用 24 小时内血细胞比容 (Hct=0.385) 进行校正, 计算得出 ECV 值为 0.45 (参考值 27±3%); 以上结果提示左室心肌壁 Native T1 mapping 值和 ECV 值明显升高。

患者行心肌组织活检, 发现心肌间质淀粉样物质沉积, 同时依据患者临床、实验室检查及心脏 MRI 表现诊断为心肌淀粉样变性。

PU-2144

甘油三酯血糖指数检测高血压患者冠状动脉功能性显著狭窄

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目的：甘油三酯血糖(TyG)指数是反映胰岛素抵抗的指标，与冠状动脉解剖学狭窄显著相关，但解剖学与功能学的狭窄往往不一致，且功能学对临床结果的影响更大。导致缺血的功能性显著狭窄定义为 CT 血流储备分数(CT-FFR) ≤ 0.80 。但很少有研究探讨 TyG 指数与高血压患者功能性显著狭窄之间的关系。因此，本研究旨在探讨 TyG 指数与高血压患者功能性显著狭窄的关系；并进一步探讨 TyG 指数与冠脉周围脂肪组织衰减(PCATA)和高危斑块特征的关系。

方法：对 1686 名无冠心病病史的高血压患者进行回顾性筛查，这些患者因胸痛而接受冠状动脉 CT 血管造影检查。TyG 指数计算为 $\ln(\text{空腹甘油三酯}[\text{mg/dL}] \times \text{空腹血糖}[\text{mg/dL}]/2)$ 。测量每个患者的狭窄严重程度、高危斑块特征、CT-FFR 和 PCATA。根据 CT-FFR 分为两组：CT-FFR ≤ 0.80 组和 CT-FFR > 0.80 组，建立 Logistic 回归模型探讨高血压患者 TyG 指数与 CT-FFR ≤ 0.80 的关系；其次根据患者 TyG 指数水平的三分位数进行分组，建立线性回归模型探讨 TyG 指数与不同指标的关系。

结果：与 CT-FFR > 0.80 组比较，CT-FFR ≤ 0.80 组 TyG 指数明显升高。Logistic 回归模型显示，在调整其他混杂因素后，TyG 指数与 CT-FFR ≤ 0.80 的风险呈正相关(OR = 1.272, 95% CI 1.029 ~ 1.571, $p = 0.026$)。限制性立方样条法显示 TyG 指数与 CT-FFR ≤ 0.80 风险相关的截断值为 8.92。随着 TyG 指数水平的增加，冠状动脉狭窄 $> 50\%$ 、具备高危斑块特征的患者比例增加。三组间 LAD-PCATA、LCX-PCATA、RCA-PCATA 差异有统计学意义，且与 TyG 指数呈正相关($r = 0.138$; $r = 0.244$; $r = 0.188$; $p < 0.001$)。

结论：TyG 指数与高血压患者 CT-FFR ≤ 0.80 的风险相关，当 TyG 指数超过 8.92 时，CT-FFR ≤ 0.80 的风险增加。此外，TyG 指数水平较高的患者更有可能出现严重狭窄和高危斑块特征，PCATA 与 TyG 指数有良好的相关性。

PU-2145

基于 CT 图像深度迁移学习模型鉴别重症鹦鹉热肺炎

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背景：我们评估了深度迁移学习 (DLR) 特征在鉴别鹦鹉热重症肺炎中诊断能力。

方法：回顾性分析 99 例重症肺炎患者的 CT 影像资料。以宏基因检查为鹦鹉热诊断金标准，其中 44 例为鹦鹉热重症肺炎患者，非鹦鹉热重症肺炎患者 55 例。利用 resnet18, rennet50, vgg11 进行深度学习网络预训练，然后从重症肺炎患者的 CT 图像中提取深度迁移学习 (DTL) 特征，并采用逻辑回归的算法进行预测模型建立。采用受试者工作特征 (ROC) 评价模型性能，分别评价 DLR 三个模型在鹦鹉热重症肺炎鉴别诊断中的有效性，并使用决策曲线分析 (DCA) 评估其临床价值。

结果：利用 resnet18, rennet50, vgg11 预训练的深度学习网络提取深度迁移学习(DTL)得到 32 个 DTL 特征。采用逻辑回归 (LR) 算法进行预测模型建立，比较了不同分类模型的性能。resnet18, rennet50, vgg11 预训练的 DLR 模型在训练队列的曲线下面积 (AUC) 分别为 0.95、0.88、0.87，在测试队列中的 AUC 分别为 0.88、0.86、0.92。DCA 显示其有较高的临床价值。

结论：利用 3 个预训练模型提取深度迁移学习特征并采用逻辑回归算法建立的预测模型对于鹦鹉热重症肺炎的鉴别有较好的诊断能力，其中以 resnet18 迁移学习建立的预测模型鉴别能力最强，可以成为辅助临床医生的潜在决策工具。

PU-2146

磁共振 DWI 在鉴别胸腺上皮性肿瘤与胸腺淋巴瘤中的应用价值

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【摘要】目的：探讨磁共振 DWI 表观扩散系数（ADC）值对胸腺上皮性肿瘤和胸腺淋巴瘤的鉴别诊断价值。**方法：**回顾性分析 2019 年 12 月至 2023 年 4 月经手术病理证实的 48 例胸腺瘤、17 例胸腺癌和 25 例胸腺淋巴瘤的 DWI 及临床资料。采用 Kruskal-Wallis H 检验和 Mann-Whitney U 检验比较三组间 ADC_{min} 与 ADC_{total} 值的差异，并采用 ROC 曲线分析上述参数对胸腺瘤、胸腺癌和胸腺淋巴瘤的鉴别诊断价值。**结果：**胸腺瘤、胸腺癌和胸腺淋巴瘤的 ADC_{min} （1.39, 0.94 及 $0.76 \times 10^{-3} \text{ mm}^2/\text{s}$ ）和 ADC_{total} （1.51, 1.21 及 $0.60 \times 10^{-3} \text{ mm}^2/\text{s}$ ）值在三组间总体上差异均具有统计学意义（ $P < 0.001$ ）；进一步两两比较，除 ADC_{total} 在胸腺瘤和胸腺癌组间差异无统计学意义外（ $P = 0.056$ ）， ADC_{min} 与 ADC_{total} 值在不同组间差异均具有统计学意义（ $P < 0.05$ ）。采用 ADC_{min} 和 ADC_{total} 值鉴别胸腺瘤与胸腺淋巴瘤的曲线下面积（AUC）、敏感度、特异度和截断值分别为 0.898、89.6%、72.0%和 $0.97 \times 10^{-3} \text{ mm}^2/\text{s}$ ，及 0.968、97.9%、84.0%和 $0.94 \times 10^{-3} \text{ mm}^2/\text{s}$ ；在鉴别胸腺癌与胸腺淋巴瘤上，AUC、敏感度、特异度和截断值分别为 0.694、64.7%、68.0%和 $0.92 \times 10^{-3} \text{ mm}^2/\text{s}$ ，及 0.925、94.1%、84.0%和 $0.93 \times 10^{-3} \text{ mm}^2/\text{s}$ 。**结论：**胸腺瘤、胸腺癌和胸腺淋巴瘤的 ADC_{min} 值和 ADC_{total} 值存在显著统计学差异，磁共振 DWI 对鉴别胸腺上皮性肿瘤和胸腺淋巴瘤具有重要临床应用价值。

PU-2147

某省 6 年军校招生体检活动性肺结核情况分析

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【摘要】目的 通过对 2017 年至 2022 年 6 个年度某省军校招生体检检出的活动性肺结核数据回顾性分析，讨论 X 线、CT 表现及流行病学特征。**材料与方法** 对 13832 例胸部 X 线数据，5 例肺部 CT 数据进行回顾性分析。**结果** 胸部 X 线发现 15 例肺部异常，占比 0.11%，其中 5 例 CT 进一步检查，4 例疑似肺结核，占比 0.03%，1 例胸膜增厚伴钙化为陈旧性病变。**结论** 肺结核胸部 X 和 CT 均有特征性，CT 对病变范围和活动性评价更准确，推荐在体检用 CT 进一步确诊。散发和隐匿为其流行病学特征。结合地域分析，发病可能与经济营养状况有关。

PU-2148

ZTE 成像技术和常规 3.0T MR 序列检测肺结节诊断性能

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目的：探讨零回波时间(zero echo time,ZTE)成像技术和常规 3.0T MR 序列评估肺结节诊断效能，并比较不同序列肺结节诊断效能。

方法：在这项前瞻性研究中，纳入 2022 年 4 月至 2022 年 7 月期间经胸部 CT 检查诊断为肺结节患者，同时行胸部 ZTE 序列、常规 3.0T MR 序列扫描。以 CT 为参照，评估灵敏度、病变特征与 CT 一致性，不同序列对肺结节诊断效能。连续变量用 $\text{mean} \pm \text{SD}$ 或 IQR 中位数表示，分类变量用数字（%）表示。采用类内相关系数（Intra-class correlation coefficient, ICC），Pearson 相关分析，Bland-Altman 分析进行分析。P<为 0.05，视为差异有统计学意义。

结果：126 名患者中，男性 64 人，女性 62 人。CT 检查、ZTE 分别诊出 176 个、140 个结节。ZTE 显示显示胸膜凹陷及内部支气管充气征与 CT 检查一致性较高，显示病变类型、形状与 CT 检查一致性中等，ZTE 和 CT 对于最大范围、实性范围测量有较高一致性。ZTE、T1-VIBE、T2--BLADE、T2-HASTE 检出肺结节总体灵敏度分别为 82.95%、54.42 %、81.01%和 63.21%，ZTE 有更高敏感度。在< 4 mm 亚组中，所有序列灵敏度均为 0。在 4-8mm 亚组中，ZTE 灵敏度是 57.62%。在 8-10 mm 亚组中，T2WI-BLADE 灵敏度是 93.03%。在>10 mm 亚组中，ZTE、T2WI-BLADE 及 HASTE 序列均为 100%。ZTE 联合 T1-VIBE、T2-BLADE 和 T2-HASTE 的肺结节总体灵敏度分别为 82.11%、85.12%和 83.67%，ZTE 联合 T2-BLADE 的灵敏度最高。

结论：ZTE 显示病变特征与 CT 有较高一致性，检测肺结节灵敏度高于其他常规序列，ZTE 联合 T2-BLADE 可提高肺结节的检测灵敏度和显示性能。将 ZTE 序列作为常规 MRI 序列补充，用于肺结节的诊断是可行的。

PU-2149

Single breath-hold compressed sensing CMR cine for assessment of ventricular function and strain in heart failure patients

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Objectives: Heart failure (HF) patients often cannot tolerate multiple breath-holding during cardiovascular magnetic resonance (CMR) examination. The cine image quality is often poor and exhibits unintended artifacts. Exploring the potential of single breath-hold compressed sensing (CS) cine as an efficient modality for replacing conventional balanced steady-state free precession cine (bSSFP) cine in assessing cardiac function parameters and strain parameters in heart failure (HF) patients.

Methods: We prospectively recruited 28 HF patients and 33 healthy participants (HP) for CMR examination using routine bSSFP and CS-based cine sequence. For both sequences, the function parameters and strain values of the left ventricles (LV) and the right ventricles (RV) were assessed and compared between the HF group and HP group. The differences in cardiac parameters between two sequences were analyzed using Paired T-tests. Intragroup correlation coefficient (ICC) was calculated to verify the reproducibility of CS cine ventricular quantitative parameters.

Results: In both HP and HF groups, as for function parameters, stroke volume (SV), ejection fraction (EF), cardiac output (CO), and cardiac index (CI) of LV were lower in CS-cine ($p < 0.001$). However, the above parameters of RV showed no difference between two sequences ($p > 0.1$). Bi-ventricular global radial strain (GRS), global radial strain (GCS), and global longitudinal strain (GLS) were all lower in CS-cine ($p < 0.001$). Though CS-cine tends to underestimate the real values when calculating cardiac-related parameters, most commonly used parameters have good correlations with those of bSSFP-cine. (LVEF: HP 60.6% vs 57.1%, $r = 0.81$; HF 40.7% vs 36.9%, $r = 0.96$. LVGRS: HP 33.6% vs 26.2%, $r = 0.82$; HF 17.9% vs 15.1%, $r = 0.96$. LVGCS: HP -19.3% vs -16.5%, $r = 0.79$; HF -12.2% vs -10.8%, $r = 0.96$. LVGLS: HP -16.8% vs -13.0%, $r = 0.45$ HF -11.2% vs -10.5%, $r = 0.90$. $P < 0.001$).

Conclusions: Single breath-hold CS cine scanning offers a time-efficient cardiac function and strain assessment alternative, and it demonstrates good agreement with conventional cine

sequence analysis. Thus, CS technique has great application value in collecting cine images, especially for patients with HF and breath-hold difficulty.

PU-2150

CT imaging findings of pulmonary sarcomatoid carcinoma

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OBJECTIVE. The objective of our study was to assess the CT features of pulmonary sarcomatoid carcinoma(PSC). **MATERIALS AND METHODS.** 9 patients with primary pulmonary sarcomatoid carcinoma confirmed by pathology were included in this study. The clinical and CT findings of these patients were retrospectively reviewed. All of them undertook CT examinations and 6 of them undertook contrast-enhanced CT scanning. **RESULTS.** Of 9 patients, 8 were male and 1 was female. 6 untreated patients progressed rapidly and died within a short period of time. 7 of 9 cases were located in the periphery of the lung(77.8%). Most lesions showed necrosis and obvious enhancement. **CONCLUSION.** Findings of our study suggest that PSC are fast-growing, and show obvious enhancement on CT images, which could be beneficial for diagnosis.

PU-2151

多发心胸金属异物一例

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患者，男，26岁，既往吸毒史8年，平素健康，2月前拘留期间自行将“2根注射针及1根订书针”刺入左胸，长约3-4cm，于“拘留所医务室”行相关检查后未予特殊处理。1周前患者再次将“2根订书针”刺入左侧胸壁，长约6-7cm，当时未感胸闷、呼吸困难等不适，2天前患者感明显胸闷、呼吸困难，就诊于我院急诊。查体：左前胸壁见散在针孔，可触及散在皮下气肿，左上肺呼吸音稍低。平扫CT示：左侧液气胸，左肺压缩约30-40%；双肺渗出；左侧第3-5前肋间隙、左心室、肝左叶及左侧膈肌多发针状异物；左侧腋窝及胸壁皮下软组织积气。急诊以“心脏异物”，收入心外科。入院后积极完善相关术前准备，由心外科、胸外科联合行心脏异物取出术、左侧开胸探查，左肺内、胸壁及左侧膈肌异物取出术。手术所见：心尖部可触及异物，电凝切开心脏表面脂肪组织后，取出2.0cm左右金属针一枚。后由胸外科行左胸探查，在左腋前线第4肋间、左腋前线第3肋间胸壁肌层及左侧后肋膈角处取出钢针各一枚，长度分别为3cm、3cm、2.5cm，手术过程顺利。术中出血100ml，自体血回输50ml。术后生命体征平稳。

讨论：心胸异物较为少见，既往的文献报道主要以创伤和医源性为主，本例报道中，患者自残是造成心胸异物的主要原因。由于心脏属于不断运动器官，异物可能导致心脏破裂，引起心包填塞，异物刺破胸膜可出现气胸，情况均较为凶险。笔者推测第一次三枚钢针由胸壁刺入后，随着呼吸及心脏的运动，分别进入了左心室壁、肝左叶内、左肋膈角内；第二次钢针刺破胸壁引起气胸是患者就诊的原因；术中所见钢针的大小、位置与CT描述基本相符。本例患者CT检查时采用的大螺距心电图控模式，心脏搏动伪影和呼吸伪影均较小，清晰显示了心脏、胸壁、肝脏（图F）及脊柱旁膈肌内的多枚金属异物。

心胸异物少见且情况多较为凶险，采用合适的检查方法对准确判断异物位置对于指导治疗具有重要意义。

PU-2152

能谱 CT 定量分析在肺部肿瘤中的临床应用研究

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目的:探讨 GE 宝石能谱 CT 在肺部良恶性肿瘤鉴别的影像学应用价值。方法:选取临床诊断为肺部占位需 CT 增强检查进一步明确诊断的病例进行能谱 CT 增强扫描并进行定量分析。结果:恶性组与良性组的动脉期 NIC 分别为 0.0810.016 和 0.073 0.011, 恶性组与良性组的静脉期 NIC 分别为 0.282 0.030 和 0.226 0.030, 恶性组与良性组的斜率 K 分别为 1.339 0.491 和 1.063 0.235, 三组能谱参数均有统计学差异。结论:能谱 CT 定量分析在肺部良恶性肿瘤鉴别上具有一定价值。

PU-2153

定量 CT 评价慢性阻塞性肺疾病肺血管与气道微观量化指标的纵向变化

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目的 利用 CT 定量分析技术,纵向观察 COPD 患者肺功能和 CT 定量指标的变化情况,探讨其在病情进展评价中的应用价值。方法 本研究为回顾性研究。搜集 2018 年 1 月至 2022 年 12 月确诊的 COPD 患者 99 例,男性 65 例,女性 34 例,平均年龄 (64.6±11.8) 岁。所有患者均行两次胸部 CT 检查及肺功能检查,间隔时间平均 (33.4±10.7) 月,且每次两项检查时间间隔不超过 2 周。使用 AVIEW 后处理工作站进行定量分析,对肺气肿、肺血管和气道进行分割、量化,得到 CT 定量参数:全肺容积、LAA%、Ntotal/LSA、N<5mm²/LSA、TBV、BV5、BV5/TBV、Pi10、全肺气道壁体积以及第 5、6 级小气道 Pi10、壁厚和壁面积百分比 (WA%),所有 CT 定量参数均进行体表面积 (BSA) 标化。采用配对 t 检验比较首次和随访 CT 定量参数和肺功能指标;不同严重程度 COPD 患者组间差异采用非参数 Kruskal-Wallis H 检验。Pearson 相关性分析检验 CT 定量参数与肺功能指标之间的相关性。结果 肺功能参数呈进行性下降,FVC、FEV1、FEV1/FVC 随访均低于首次,差异具有统计学意义 (P<0.05)。CT 定量参数 Ntotal/LSA、N<5mm²/LSA 随访均低于首次,随分级升高而减小;LAA%、Pi10 以及全肺气道壁体积随访均高于首次,随分级升高而增大,差异具有统计学意义 (P<0.05)。LAA%、Pi10、全肺壁体积与肺功能参数呈负相关性 (r=-0.23~-0.69, P<0.05); Ntotal/LSA、N<5mm²/LSA 与肺功能参数呈正相关性 (r=0.27~0.46, P<0.05)。结论 定量 CT 参数 LAA%、Ntotal/LSA、N<5mm²/LSA、Pi10 和全肺壁体积能够较好的反映 COPD 患者肺气肿、气道和血管的纵向变化,可能会在临床治疗方案的选择以及预后的评价中发挥重要的作用。

PU-2154

基于第三代双源 CT 双低检查技术在肺栓塞成像的临床应用研究

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目的 探讨第三代双源 CT 大螺距 70kV 联合超低对比剂用量 16ml 在肺栓塞低辐射剂量成像的临床应用价值。

资料与方法 将 83 例临床可疑肺栓塞行 CT 肺动脉成像患者随机分为两组：双低组 (n=47)：管电压 70kV,螺距 2.2, 对比剂总量 16ml；常规组 (n=36)：管电压 100kV,螺距 1.2, 对比剂总量 60ml。记录两组的容积 CT 剂量指数和剂量长度乘积以计算有效剂量 (ED)，测量各级肺动脉增强 CT 值、背景噪声及肌肉 CT 值以计算信噪比 (SNR)、对比噪声比 (CNR)。两组的总体图像质量和上腔静脉引起的线束硬化伪影均采用 3 级评分进行主观评价。统计学方法采用卡方检验和非参数秩和检验。

结果 两组患者之间性别、年龄、身高、体重、体质量指数 (body mass index, BMI)、肺栓塞比例及各级肺动脉增强 CT 值均无统计学差异 ($P>0.05$)。双低组 ED 为 $(0.76\pm0.13)\text{mSv}$,显著低于常规组的 $(1.91\pm0.54)\text{mSv}$ ($Z=-5.23$, $P<0.001$)。虽然双低组背景噪声明显高于常规组,且 SNR 和 CNR 均显著低于常规组 ($P<0.001$),但两组总体图像质量评分无明显差异 ($Z=-1.41$, $P=0.16$),且双低组上腔静脉引起的线束硬化伪影明显低于常规组 ($Z=-5.15$, $P<0.001$)。

结论 第三代双源 CT 大螺距 70kV 联合 15ml 超低对比剂用量可以显著降低对比剂线束硬化伪影对右肺动脉、右肺上叶动脉的干扰,保证肺栓塞诊断图像质量,能大幅度降低辐射剂量约 60%,同时减少 73%对比剂总量。

PU-2155

Automated Detection and Classification of Coronary Atherosclerotic Plaques on Coronary CT Angiography Using Deep Learning

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Purpose: To evaluate the performance of a deep learning algorithm for detecting and classifying coronary atherosclerotic plaques on coronary computed tomographic angiography (CCTA) images compared to physicians with varying levels of clinical experience in coronary artery disease (CAD) diagnosis.

Methods: A total of 106 patients suspected of CAD were retrospectively evaluated by the deep learning algorithm and four independent physicians with different levels of clinical experience. Additionally, 563 patients suspected of CAD were analyzed for plaque classification using the deep learning algorithm and compared to results from expert radiologists. Plaques were classified as calcified, non-calcified, or mixed.

Results: The deep learning algorithm had higher sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy compared to physicians with ≤ 5 years of clinical experience in CAD diagnosis for detecting coronary plaques. The overall sensitivity, specificity, PPV, NPV, accuracy, and κ for plaque classification were 94%, 90%, 70%, 98%, 90%, and 0.74 (95% CI: 0.70, 0.78), respectively, indicating good performance.

Conclusion: The deep learning algorithm demonstrated reliable and accurate detection and classification of coronary atherosclerotic plaques on CCTA images. It has the potential to improve the proficiency of physicians, junior radiologists, and junior interventional cardiologists in CAD diagnosis and facilitate efficient triage of patients with acute coronary symptoms.

PU-2156

人工智能辅助诊断软件与影像医师对长径 $\geq 5\text{mm}$ 肺结节检测效能的比较

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目的 比较肺结节人工智能辅助诊断软件和影像医师对长径 $\geq 5\text{mm}$ 结节的检测效能, 并分析影响医师检测结果的影响因素。

方法 回顾性分析河北医科大学第四医院 2017 年 10 月-12 月 649 例体检人员 1mm 薄层胸部 CT 影像资料, 分别采用医师检测法(医师组)及 AI 检测法(AI 组)对图像进行分析。以金标准(由一名具有 15 年影像诊断经验的高年资医师结合医师组及 AI 组检出结果及随访情况最终确认长径 $\geq 5\text{mm}$ 结节的数量及特征)判定得出 316 例受检者的 441 个阳性结节作为研究对象。计算医师组及 AI 组结节检测方式的总体检出率、阳性预测值、受检者人均误诊结节数。

结果 经金标准确认结节 441 个, 医师组检出结节 316 个, 其中真结节 301 个, 假结节 15 个, 总体检出率 68.3%, 阳性预测值 95.3%, 人均误诊结节数 0.05 个/人; AI 组检出结节 597 个, 其中真结节 429 个, 假结节 168 个, 总体检出率 97.3%, 阳性预测值 72.9%, 人均误诊结节数 0.53 个/人。AI 组较医师组总体检出率提高约 29%, 医师组假结节数目少于 AI 组, 结节阳性预测值高于 AI 组。 $5\text{mm} \leq \text{长径} < 8\text{mm}$ 、实性及纯磨玻璃结节、各位置肺结节检出率 AI 组均高于医师组, 且差异均有统计学意义($P < 0.05$)。结节密度(实性或纯磨玻璃)、短径、外带为医师组结节检出的独立影响因素。

结论 AI 在 $5\text{mm} \leq \text{长径} < 8\text{mm}$ 结节范围内可为提高医师检测效能起到重要的辅助作用, 但其检测结果仍离不开医师的判断; 结节的密度、短径及位置可以影响医师对结节的检出。

PU-2157

后纵隔滑膜肉瘤误诊为神经鞘瘤一例

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目的 分析一例误诊为神经鞘瘤的纵隔滑膜肉瘤 (mediastinal synovial sarcoma, MSS), 提高放射科医师对本病的认识, 减低其误诊率。

方法 回顾性分析我院就诊的一例后纵隔肿物的临床及影像学资料, 结合文献进行复习。

结果 患者, 男, 32 岁, 主因“发现右后上纵隔占位性病变一月余”入院, 平素偶有右前上胸部及右肩背部疼痛不适, 呈隐痛, 无胸闷、心慌、气短等症状。胸部 CT 平扫+增强检查: 右后上纵隔肿物, 大小约 $2.8\text{cm} \times 3.7\text{cm} \times 3.1\text{cm}$, 其内密度欠均匀, 边缘伴弧形钙化影, 增强扫描明显不均匀强化。胸腔镜下术中所见: 右后上纵隔近胸廓入口处见大小约 $3.0\text{cm} \times 3.0\text{cm} \times 2.0\text{cm}$ 肿物, 质地韧, 与右侧无名静脉关系密切, 右肺上叶可见数枚薄壁大泡, 遂行胸腔镜辅助右肺肺大泡楔形切除+胸膜粘连烙断+右后上纵隔肿物切除术。病理: (右后上纵隔) 恶性肿瘤, 结合组织学特点、免疫表型特征及分子病理学检测结果考虑为滑膜肉瘤, 局部侵及周围纤维脂肪及肺组织。

结论 滑膜肉瘤是一种罕见的软组织肉瘤, 常见的发病部位是关节周围组织, 也可以发生在其他部位。MSS 极为罕见, 最常发生在前纵隔, 多见于青少年至青壮年(15~40 岁), 男性多于女性。临床表现取决于肿瘤的部位、大小、组织病理学特征和肿瘤分化程度。初期可以是无症状的; 晚期可以有咳嗽(21%)、胸痛(20%)、咯血(20%)等; 其他症状包括呼吸困难、乏力、体重减轻、肺萎陷、胸腔积液、心包积液和上腔静脉阻塞。CT 表现为不均匀等或低密度囊实性肿块, 可见边缘性或偏心性钙化; MR 的 T2WI 表现为表现出亮、暗、灰三种不同的信号特征, 即所谓的“三重信号征”, 分别

代表肿瘤、出血、坏死；肿瘤侵袭性强，复发率高，可发生邻近结构侵犯和血型播散，淋巴结肿大少见。MSS 与纵隔的其他肿瘤鉴别困难，最终诊断依赖组织病理学检查。

PU-2158

A study on the risk assessment and screening of coronary heart disease using big data of coronary artery calcification score

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Objectives To explore the feasibility of using coronary artery calcification score(CACS) analysis to predict the degree of coronary artery stenosis.

Methods Scanning data of 1246 patients with clinically suspected coronary heart disease were retrospectively collected, including coronary CT arterial imaging (CTA) and CACS analysis data. We measured and recorded the degree of coronary artery stenosis and coronary artery CACS. Coronary artery calcification score were compared between groups using the Mann-Whitney U test. The Roc curve was used for analysis to understand the area under the curve of different groups and calculate the Yoden index and critical value.

Results According to the results, when the calcification score was less than 0.4, the coronary artery could be considered not narrow. Mild coronary artery stenosis is considered when the calcification score is in the range of 0.4 to 83. When the calcification score was more than 83, we considered moderate to severe coronary artery stenosis, and the degree of lumen stenosis was greater than 50%, which had certain clinical significance.

Conclusions Coronary artery calcification scores can be used to evaluate the degree of coronary artery stenosis.

PU-2159

MSCT study for adult esophageal diverticulum with secondary broncho-esophageal fistula

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Background: Broncho-esophageal fistula (BEF) secondary to esophageal diverticulum is a rare clinical condition, which is often misdiagnosed for a long time. The aim of our study is to summarize and clarify the advantages of MSCT in diagnosing BEF secondary to esophageal diverticulum.

Methods: We retrospectively analyzed patients clinically diagnosed with BEF from January 2005 to January 2022 at Jilin University First Hospital. Only those patients with BEF secondary to esophageal diverticulum and complete clinical data met our enrolled standard. All patients' clinicopathologic characteristics and MSCT features were systemically evaluated.

Results: 17 patients were eligible for our cohort study, including male 10 and female 7. The patient's mean age was 42.3 ± 12.5 . The chronic cough occurred in all seventeen patients and bucking following oral fluid intake was documented in nine patients. MSCT distinctly suggested the fistulous tract between the bronchi and the esophagus in all patients. The mean diameter of the orifices in the wall of the esophagus was 4.40 ± 1.81 mm. The orifice in the midthoracic esophagus side was 15 cases and 2 cases at the lower thoracic esophagus. The involved bronchus included 13 cases at the right lower lobe bronchus, 1 at the right middle lobe bronchus and 3 at the left lower lobe bronchus. The contrast agent was observed in the pulmonary

parenchyma in 10 of 13 patients who underwent esophagogram. No definite fistula was observed in 3 of 11 who underwent gastroscopy, while the intra-operative findings supported the existence of fistula.

Conclusions: BEF secondary to esophageal diverticulum tends to occur between the midthoracic esophagus and the right lower lobe bronchus. Compared with esophagography and gastroscopy, MSCT shows more comprehensive information about the fistulous shape, size, course and lung involvement, which are helpful for establishing diagnosis and guiding subsequent treatment.

PU-2160

冠状动脉脂肪衰减指数值与斑块组成和特征的相关性：基于人工智能软件的测量方法

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目的 冠状动脉周围脂肪组织 (Pericoronary adipose tissue, PCAT) 为无创性评估血管炎症打开了一扇新的窗口。本研究旨在探讨稳定型冠状动脉疾病 (Coronary artery disease, CAD) 患者 PCAT 脂肪衰减指数 (Fat attenuation index, FAI) 值与斑块组成体积分数和特征之间的相关性。

材料与方法 回顾性纳入 2022 年 10 月至 2023 年 2 月期间在本院接受冠状动脉 CT 血管造影 (Coronary computed tomography angiography, CCTA) 的稳定型 CAD 患者, 共 173 例 (310 个病变)。斑块成分体积分数和 FAI 值是基于人工智能软件测量的。斑块特征评估包括斑块类型、位置、长度、体积、最小管腔面积 (Minimum lumen area, MLA) 和最小管腔狭窄度 (Minimum lumen degree, MLD)。使用皮尔逊或斯皮尔曼相关分析和主成分分析探讨了 FAI 值与斑块组成体积分数和特征之间的关系。结果 本研究中, 患者的平均年龄和体重指数分别为 60.51 ± 0.80 岁和 24.53 ± 0.23 kg/m²。其中, 男性 92 人, 吸烟者 80 人, 高血压 109 人, 高血糖 60 人, 高脂血症 109 人。相关性分析显示, 斑块所在冠状动脉近端的 FAI 值与斑块类型呈正相关 ($rs=0.135$, $P=0.017$), 与钙化成分体积分数呈负相关 ($rs=-0.192$, $P=0.001$), 但与斑块位置、长度、体积等无关 ($rs=-0.009$ 、 0.087 、 0.068 、 0.024 、 0.045 、 0.107 、 0.104 、 0.109 ; $P>0.05$)。斑块周围 FAI 值与脂质成分体积分数 ($rs=0.451$, $P=0.000$)、纤维脂质成分体积分数 ($rs=0.393$, $P=0.000$) 和纤维成分体积分数 ($rs=0.415$, $P=0.000$) 有很强正相关性, 而与钙化成分体积分数有很强负相关性 ($rs=-0.496$, $P=0.000$)。

PU-2161

多排 CT 在成人动脉导管未闭并肺动脉高压覆膜支架植入前后的价值

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目的 探讨多排螺旋 CT 血管造影 (CT angiography CTA) 对 12 例腔内隔绝术治疗成人巨大动脉导管未闭 (patent ductus arteriosus PDA) 的术前血管评估, 以及术后效果的观察。方法回顾性分析 2010 年 9 月-2015 年 3 月在我院接受主动脉覆膜支架隔绝治疗的 12 例 (男 7 例, 女 5 例) 巨大 PDA 成人患者的手术前后的 CTA 资料, 其中男性 7 例, 女性 5 例, 年龄 18 岁~48 岁, 中位数 32 岁, 测量术前动脉导管肺动脉侧及主动脉侧的直径、主动脉弓降部动脉导管以近及远端的直径、肺动脉直径, 观察术后动脉导管的封闭效果及支架位置, 随访时间 1~18 个月。结果动脉导管主动脉侧直径 (19.2~30.3)mm 最窄径为 (18.5~26.5)mm。术后随访过程中, 3 例少量残余分流, 其余支架位

置正常, 未见造影剂渗漏。结论 多排螺旋 CT 血管造影为腔内隔绝术治疗成人巨大动脉导管未闭手术前后提供详细解剖学信息, 术前能够评估能否行覆膜支架胸主动脉腔内隔绝术, 以及预判支架大小; 术后能够观察支架位置, 评估治疗效果。

PU-2162

不同管电压下前瞻性心电门控双源 CT 诊断冠心病的比较分析

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本研究探讨前瞻性心电门控双源 CT 低管电压在冠心病诊断中的应用价值。回顾性选取 60 例冠心病患者, 根据管电压分为观察组 (管电压 80kV) 和对照组 (管电压 100kV), 观察两组诊断情况、图像质量等差异。观察组和对照组诊断冠状动脉狭窄的灵敏性、特异性、准确性、阳性预测值、阴性预测值、冠状动脉节段图像质量评分比较, 差异无统计学意义 ($P>0.05$)。观察组和对照组升主动脉根部、右冠状动脉开口、左冠状动脉开口管腔 CT 值、信噪比 (SNR) 和对比噪声比 (CNR) 比较, 差异无统计学意义 ($P>0.05$)。观察组剂量长度乘积 (DLP)、容积 CT 剂量指数 (CT-DIvol) 和有效辐射剂量 (ED) 明显低于对照组 ($P<0.05$)。观察组心率 <75 次/分患者冠状动脉节段图像质量优于心率 ≥ 75 次/分患者 ($P<0.05$)。因此, 前瞻性心电门控双源 CT 低管电压在冠心病诊断中有较好的应用价值, 具有图像质量好、辐射剂量低等优点, 同时心率会影响图像质量。

PU-2163

大螺距高 KV 低剂量 CT 扫描技术在急诊胸部的应用

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目的: 探讨 64 排 CT 大螺距高 KV 低剂量在急诊胸部扫描的应用价值。方法: 选取本院 2010 年 1 月—2011 年 5 月, 急诊分诊, 病史写于胸痛、呼吸困难、咯血、心衰、绿色通道患者 1000 例, 行大螺距高 KV 低剂量 CT 扫描, 采集: 飞利浦 64 排 128 层螺旋 CT, 在夜班急诊中采用大螺距高 KV 低剂量 CT 扫描, 经过医生组的对比图像结果, 在大螺距高 KV 低剂量 CT 扫描与常规 CT 扫描对比, 常规 CT 扫描方案图形噪声较小, 但是图像的总体质量太差, 而高 KV 低剂量 CT 扫描与常规 CT 扫描图像噪声稍大, 但是图像的总体质量较好; 因为在急诊胸痛、呼吸困难、咯血、心衰、绿色通道患者, 如果扫描速度不够快, 呼吸运动伪影和患者的运动伪影很重, 所以采用了大螺距高 KV 低剂量 CT 扫描技术, 在加大螺距的时候, 适当加大 KV, 就可以达到降低辐射剂量的效果; 常规 CT 扫描需要 10S 左右, 而大螺距高 KV 低剂量 CT 扫描只需要 3S 左右, 所谓天下武功, 唯快不破, 只要你的扫描速度够快, 就可以避免 90% 以上的伪影。为了患者好, 再不影响诊断结果的前提下, 提高扫描速度, 降低辐射剂量, 提高检查效率。结果: 增加螺距缩短了扫描时间, 减少患者暴露于 X 射线下的时间, 减少了辐射剂量, 但同时却会使噪声增加。这是中低端的 CT 设备的一个缺陷, 在高端 CT 设备上, 基本不存在扫描速度慢的情况。以上情况的分析, 仅对于 64 排及以下的 CT 设备, 不足之处是, 对于需要精准手术患者不能使用。

PU-2164

CT-FFR 参数及冠状动脉周围脂肪衰减指数特征预测青海地区心肌缺血患者再灌注损伤的价值

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【摘要】目的 探究基于 CT 的血流储备分数（CT-FFR）参数及冠状动脉周围脂肪衰减指数（FAI）特征预测青海地区心肌缺血患者再灌注损伤的价值。**方法** 回顾性分析 2022 年 1 月到 2023 年 1 月 65 例在我院择期行经皮冠状动脉介入治疗的冠心病患者临床资料。患者均在术前进行冠状动脉 CT 血管成像检查，在治疗后 8h 内经心肌彩色多普勒超声心动图评估将发生再灌注损伤作为再灌注损伤组，未发生再灌注损伤作为非再灌注损伤组。对比分析两组一般资料、术前 CT-FFR 参数、FAI，分析 CT-FFR 参数、FAI 对心肌缺血再灌注损伤的预测价值以及心肌缺血再灌注损伤的影响因素。**结果** 再灌注损伤组多支血管所占比例高于非再灌注损伤组，术后 TIMI 3 级所占比例低于非再灌注损伤组（ $P<0.05$ ）。再灌注损伤组 CT-FFR 值小于非再灌注损伤组，FAI 大于非再灌注损伤组（ $P<0.05$ ）。经受试者工作特征曲线（ROC）分析得出，CT-FFR 值、FAI 预测心肌缺血患者再灌注损伤的最佳截断值分别为 0.76、-78.54，此时两者联合预测心肌缺血患者再灌注损伤的曲线下面积（AUC）为 0.807，灵敏度 81.5%、特异度 76.3%。经 Logistic 回归分析得出，多支血管、CT-FFR 值、FAI 是心肌缺血患者再灌注损伤的危险因素（ $P<0.05$ ），术后 TIMI 3 级为其保护性因素（ $P<0.05$ ）。**结论** 青海地区心肌缺血患者再灌注损伤后 CT-FFR 值、FAI 均下降，两者联合检测可为青海地区心肌缺血患者再灌注损伤提供较准确的预测。

PU-2165

CCTA 冠周 FAI 联合上胸部补充扫描与图像大视野重建在冠心病筛查中的应用价值

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本文探讨冠状动脉 CT 血管成像（CCTA）冠状动脉周围脂肪衰减指数（FAI）联合上胸部补充扫描与图像大视野重建在冠心病筛查中的应用价值。选取 2020 年 1 月至 2022 年 1 月在我院治疗的可疑冠心病患者 80 例，在我院接受 CCTA 及 CAG 检查。经 CAG 确诊，冠心病病患者 56 例，非冠心病患者 24 例。冠心病组 FAI 值明显低于非冠心病组（ $P<0.05$ ）。冠心病组重度狭窄 FAI 值明显低于轻度和中度狭窄（ $P<0.05$ ）。FAI 值与狭窄程度成负相关（ $r=-0.511$ ， $P<0.05$ ）。FAI 值预测诊断冠心病的 ROC 曲线下面积为 0.947， $P<0.05$ 。大视野重建后发现心外病灶患者 46 例，行胸部补充扫描后，另增加发现心外病灶患者 12 例。共计发现 73 处病灶。CCTA 冠周 FAI 在诊断冠心病中有较好的价值，同时结合上胸部补充扫描与图像大视野重建，有助于发现心外病灶。

PU-2166

Radiomics nomogram for preoperative differentiation of pulmonary pure invasive mucinous adenocarcinoma from mixed mucinous/non-mucinous adenocarcinoma

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Objective: To develop and validate predictive models using clinical parameters, radiomic features and a combination of both for preoperative differentiation of pulmonary pure invasive mucinous adenocarcinoma (pIMA) from mixed mucinous/nonmucinous adenocarcinoma (mIMA).

Method: From January 2017 to July 2023, 193 pure IMA and 111 mixed IMA were retrospectively analyzed at The Fourth Hospital of Hebei Medical University and Xing Tai People's Hospital. From contrast-enhanced computed tomography (CT), 1037 radiomic features were extracted. The patients were randomly divided into a training group and a test group (n=213 and 91, respectively) in a 7:3 ratio. For the selection of radiomic features, the least absolute shrinkage and selection operator (LASSO) algorithm was used. In this study, three radiomics prediction models were applied: logistic regression (LR), support vector machine (SVM) and random forest (RF). The best performing model was adopted, and the radiomics score (Rad-score) was then calculated. The clinical model was developed using logistic regression. In the end, a combined model based on clinical factors and radiomics features was developed. Logistic regression (LR) was used for model development by using the variables that had statistically significant differences. The area under the receiver operating characteristic (ROC) curve (AUC) value and decision curve analysis (DCA) were used to evaluate the clinical usefulness of the prediction model.

Results: The combined model established by the logistic regression method had the best performance. The AUCs of the clinical model, radiomics model and combined model were 0.78, 0.80 and 0.85 in the training group and 0.78, 0.79 and 0.81 in the test group, respectively. The Brier scores of the combined model was 0.171 and 0.112. The DCA curve also showed that the model was beneficial to clinical settings.

Conclusion: The combined model incorporating radiomics features and clinical parameters may have potential value for the preoperative differentiation of pIMA from mIMA.

PU-2167

影响肺癌放射治疗预后的潜在基因证据：基于辐射抗性细胞系的横向比较研究

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目的

肺癌是全球范围内最常见的恶性肿瘤之一，且放射治疗是常规治疗手段之一。然而，不同肿瘤细胞系对放疗的敏感性可能存在差异。研究不同个体的放疗敏感性，探索潜在的分子机制这对于优化肺癌治疗方案具有重要意义。

方法

对来自于 Seoul National University 的肺癌细胞系 H460（敏感性）和 H1299（抗性）样本（T0 期）RNAseq 数据基于经验贝叶斯模型进行差异分析。对显著性低于 0.05 和基因表达折叠变化超过 1 倍的差异基因进行批量拟合生存回归。Pearson 相关后确定了一定网络下的关联分数并对 hub 基因使用 ssGSEA 算法确定了其在 24 种免疫细胞的免疫浸润情况。最后构建多因素模型确定了关键基因及核心通路。所有的分析均基于 R 语言进行。

结果

确定了 H460 和 H1299 细胞系中对放疗敏感性表达差异的 2642 个具有编码区段的 RNA（除含有编码小肽的 lncRNA），其中 269 个基因高表达与既往观察到的肺癌患者预后不良有显著的统计学意义（191 个基因的 Hazard Ratio 值大于 1）。生物学过程、细胞定位和分子功能揭示 GO:1901652 响应肺恶性肿瘤细胞辐射抗性。KEGG 通路提示 PI3K-Akt 通路（hsa04151）在抗性

生成中具有作用。综合免疫浸润得分与 COX 系数确定 AKT2 基因为肺癌系中放疗预后不良的关键基因。回溯 AKT2 在原始对照中（抗性之于敏感性为实验组）的高度活化（约为对照组的 1.2 倍，P 值小于 0.001）磷酸化了下游底物进而激活了下游信号通路。此外，AKT2 介导的蛋白靶点的磷酸化过程又影响细胞的存活生长、增殖和代谢等（GO 分析结果支撑）。

结论

通过研究 H460 和 H1299 细胞系，我们确定了 269 个基因在肺癌患者中高表达，并与不良预后相关。这些基因参与了肺恶性肿瘤细胞对放疗的抗性反应，其中 AKT2 基因被确认为关键基因。我们发现 AKT2 在抗性中被高度活化，并通过磷酸化下游底物来激活相关通路。本研究为肺癌患者的预后评估和治疗提供了潜在的靶点和理论基础。进一步研究可以探索针对 AKT2 基因的治疗策略，以提高肺癌患者对放疗的敏感性和改善预后结果。

PU-2168

西宁地区低辐射剂量、低对比剂量和低流速在主动脉夹层筛查中的应用

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【摘要】目的:探讨西宁地区低辐射剂量、低对比剂用量和低注射流速在主动脉造影（CTA）中的可行性。方法:选择 2019 年 7 月-2021 年 10 月心血管 CTA 检查患者 81 例作为对象，所有患者均进行 64 排 CT 机动态容积 CT 的主动脉 CTA 检查，检查常规组患者给予常规辐射剂量、对比剂用量及对比剂注射方案检查，而对照组采用低辐射剂量、低对比剂用量和低注射流速模式检查，将检查最终获得的数据运用滤过反投影算法完成数据的处理，比较不同检查方法下图像的 CT 值、噪声、信噪比、有效辐射剂量（ED）。结果:对照组给予低辐射剂量、低对比剂用量和低注射流速检查，患者图像质量 5 分、4 分、3 分、2 分、1 分病例数与正常组检查患者比较无统计意义（ $P>0.05$ ）；正常组患者主动脉根部、主动脉弓及降主动脉近端图像的 CT 值、噪声、信噪比比较无统计学意义（ $P>0.05$ ）；对照组低辐射剂量、低对比剂用量和低注射流速下 CTDIvol、DLP 及 ED 辐射剂量，均低于常规组检查时常规剂量（ $P<0.05$ ）。结论:将低辐射剂量、低对比剂用量和低注射流速用于西宁地区心血管 CTA 检查中是可行的，能降低辐射剂量与对比剂用量，且不会影响图像质量，值得推广应用。

PU-2169

Abnormal high signal on T2WI of subpleural predicts visceral pleural invasion in stage I NSCLC

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Objective: The purpose of this study was to investigate the diagnostic value of T2WI for VPI in early-stage NSCLC.

Methods: Thirty-three patients (9 males, 14 females, age ranges 32-81 years) with early-stage NSCLC suspected of VPI underwent chest scan on the 3.0 T scanner (MAGNETOM Skyra, Siemens Healthcare, Germany), and all patients gave written informed consent. Among them, there were 21 lesions with VPI confirmed by postoperative pathological elastic fiber staining, and 12 lesions without VPI. T2WI adopts by short-time-inversion-recovery (STIR) sequence scanning. The T2WI signal characteristics of all lesions in contact with the pleura were classified into 4

categories: 1, no T2WI high signal; 2, dot-like T2WI signal; 3, line-like T2WI high signal; and 4, rabbit draft sign.. The chi-square test was used to compare the differences of these four types of signals in predicting VPI, and their sensitivity, specificity, positive predictive value and negative predictive value were calculated respectively.

Results: Among all confirmed lesions with VPI, there were 1 case in category 1, 4 cases in category 2, 3 cases in category 3, and 13 cases in category 4. The sensitivity of category 1 in predicting VPI was 4.76%, specificity was 33.33%, positive predictive value was 1.11%, and negative predictive value was 16.67%. The sensitivity of category 2 in predicting VPI was 19.05%, specificity was 83.33%, positive predictive value was 66.67%, and negative predictive value was 37.04%. The sensitivity of category 3 in predicting VPI was 14.29%, specificity was 91.67%, positive predictive value was 75.00%, and negative predictive value was 37.93%. The sensitivity of category 4 in predicting VPI was 67.90%, specificity was 91.67%, positive predictive value was 92.86%, and negative predictive value was 57.89%.

Conclusion: Abnormal high signal intensity on T2WI of subpleural maybe contribute to early prediction of visceral pleural invasion in non-small cell lung cancer

PU-2170

硬化性肺细胞瘤的影像特征分析

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[摘要] 目的 探讨硬化性肺细胞瘤的 CT 表现及特征。方法 回顾性分析 26 例经手术病理证实的硬化性肺细胞瘤患者的临床资料及 CT 表现, 其中 11 例行 CT 平扫检查, 15 例行 CT 平扫和增强检查。结果 26 例均为单发病灶, 其中女性 23 例 (23/26, 88%), 男性 3 例 (3/26, 12%); 24 例 (24/26, 92%) 表现为结节, 2 例 (2/26, 8%) 为肿块; 10 例 (10/26, 38%) 有浅分叶, 16 例无分叶 (16/26, 62%); 7 例 (7/26, 27%) 含钙化成分; 19 例无钙化 (19/26, 73%); 25 例 (25/26, 96%) 表现为实性结节; 1 例为部分实性结节, 磨玻璃影位于边缘 (1/26, 4%); 20 例 (20/26, 77%) 血管贴边征。15 例 (15/15, 100%) 增强呈持续性强化, CT 值最高达 100HU 以上; 26 例 (26/26, 100%) 无毛刺。结论 关注硬化性肺细胞瘤 CT 的影像特征, 有利于术前定性诊断。

PU-2171

关于扩张型心肌病中肥胖人群左心室心肌应变的初步研究

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【摘要】

目的 探讨扩张型心肌病中肥胖人群心脏磁共振 (cardiac magnetic resonance, CMR) 左心室 (left ventricle, LV) 心肌应变 (myocardial strain, MS) 与代谢综合征的相关性情况。

方法 纳入在我院完成常规 CMR 成像的志愿者 162 例, 按照是否合并代谢综合征分为两组, 采用 CVI 软件测量 RV 整体径向应变 (global radial peak strain, GRS)、整体圆周应变 (global circumferential peak strain, GCS)、整体纵向应变 (global longitudinal peak strain, GLS) 以及其他结构功能参数。分析 LV MS 与代谢综合征的相关性情况, 以及组间 LV MS 差异性情况。

结果 两组患者 GRS、GCS、GLS 差异有统计学意义 ($P < 0.05$), 其中合并代谢综合征患者 GRS、GCS、GLS 低于无代谢综合征组 [(8.61±4.31) vs (11.52±8.60)、(-6.69±2.88) vs (-8.92±5.55)、(-5.09±1.72) vs (-6.57±3.27) $P < 0.05$], LVGRS、GCS、GLS 均具有良好的组内组间一致性 (ICC 值均在 0.75 以上), GLS 一致性最高。

结论 CMR MS 能够定量评估扩张型心肌病中肥胖人群的 LV 状况, 合并代谢综合征患者 LV MS 会发生一定程度的损害, GLS 可以作为一个相对理想的监测指标。

PU-2172

肺癌患者 3.0 T MRI 和 PET/CT 影像学特征与其肿瘤不同病理特征的关系分析

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目的 探讨肺癌患者 3.0 T MRI 和 PET/CT 影像学特征与其肿瘤不同病理特征的关系。方法 收集 2016 年 1 月~2022 年 12 月本院经病理证实的肺癌患者 120 例, 另选取 120 例本院同期健康体检患者 120 例, 作为对照组, 使用 3.0 T MRI 和 PET/CT 对不同病理状态患者的基础资料、影像学指标及免疫组化指标进行对比, 分析免疫组化指标与影像学指标的相关性, 对比单独检测和大联合检测的诊断效能。结果 不同病理组患者的性别、年龄、婚姻状态以及文化程度之间的差异不存在统计学意义 ($P>0.05$); 不同病理分组患者的 SUV max、MVD、VEFG 之间的差异存在统计学意义 ($P<0.05$), 通过两两比较, 随着患者的分化程度的升高, 患者的 SUV max、MVD 及 VEFG 阳性情况呈现上升趋势; SUV max 与患者的 MVD、VEFG 呈现正相关, 联合检测对患者病理状态的诊断效能均优于对照组。结论 肺癌患者 3.0 T MRI 和 PET/CT 影像学的检测中, SUV max 与患者的 MVD、VEFG 呈现正相关, 联合检测效能高于单独检测, 对于患者的病情早期诊断具有积极

PU-2173

基于计算机辅助的实性成分质量比值预测早期肺腺癌侵袭性的价值

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目的 通过计算机辅助客观测量临床 IA 期肺腺癌的基于质量的 CTR 值, 以预测术前肺腺癌的浸润性。

方法 选取我院及 NIST 数据库临床诊断 IA 期肺腺癌患者共 56 例, 均行手术切除的病理结果, 并有完整的 DICOM 数据, 肿瘤的磨玻璃成分定义为 CT 值小于-300HU, 大于-300HU 定义为实性成分, 并通过计算机辅助系统进行自动分割, 并计算肿瘤实性成分体积比 (CTRvol)、实性成分质量比 (CTRmass)、平均 CT 值、轴位肿瘤最大径, 我们分析了实性成分质量比与病理结果的关系。

结果 当实性成分质量比 (CTRmass) ≥ 30.95 时, 提示肺结节更倾向为浸润性腺癌 (invasive adenocarcinoma, IAC)。

结论 基于计算机辅助软件测量的实性成分质量比 (CTRmass) 可用于评估临床 IA 肺腺癌术前评估浸润性的重要指标之一, 进而指导术后方式的选择, 获取更理想的疗效。

PU-2174

Force CT 能谱纯化技术在胸部低剂量检查的应用价值探究

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目的: 探讨 Force 双源 CT 能谱纯化技术 Sn100KV 在成人胸部低剂量 CT 检查中的应用价值。

方法: 前瞻性收集在 2022 年 9 月—2023 年 1 月前往华中科技大学同济医学院附属协和医院进行肺纵膈 CT 体检的 100 名患者, 不带主观色彩随机地把他们分为数量相等 A、B 两组。A 组作为实验组, 使用西门子 Force CT 的 Sn100kV 能谱纯化技术进行扫描检查。B 组为对照组, 同样使用 Force CT 但扫描参数为常规 110KV 扫描。扫描结束后将所得到的原始数据使用 ADMIRE3 级技术进行重建获得肺窗和纵膈窗的薄层图像。在 PACS 系统中选取气管分叉处测量 2 组图像肺窗和纵膈窗里感兴趣区的 CT 值和 SD 值, 客观方面的评估通过计算信噪比、对比噪声比进行, 再请诊断医生对肺窗、纵膈窗的图像品质作主观评估。对比两种扫描方式的辐射剂量, 影像品质的主客观评估标准。结果: A 组的 CTDIvol、DLP、ED 较 B 组相比有很明显的降低, 辐射剂量降低了 80.69%, 两组各感兴趣区噪声、SNR、CNR 的差异均具有统计学意义 (P 均 < 0.05), 两组肺窗及纵膈窗图像质量的主观评分均大于 3 分, 足够临床诊断的需要。

结论: 能谱纯化技术可以在人体胸部 CT 检查中得以应用, 影像图像清晰能够满足临床诊断所需, 并且显著降低受检者接受的辐射剂量。

PU-2175

基于人工智能不同重建算法对肺磨玻璃结节的临床研究

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目的 基于人工智能研究全模型迭代重建对肺磨玻璃结节的诊断效能。方法 回顾性分析胸部平扫肺结节患者 300 例, IMR 算法记为实验组, iDose 算法记为对照组。应用人工智能分析比较两组图像不同性质磨玻璃结节的敏感度、检出正确率及良恶性预测准确率。计数资料以频数表示, 两组间比较采用麦克尼玛尔检验, 以 $P < 0.05$ 为差异有统计学意义。结果 实验组的 pGGN 敏感度、总体敏感度高于对照组, 差异有统计学意义 ($P=0.000, 0.001$); 实验组 I 型 mGGN 正确率、II 型 mGGN 敏感度、总正确率、pGGN 正确率低于对照组, 差异无统计学意义 ($P=0.392, 0.514, 0.720, 0.642$); 实验组的恶性结节预测准确率高于对照组, 差异有统计学意义 ($P=0.012$); 实验组微浸润腺癌、癌前病变预测准确率均高于对照组, 但差异无统计学意义 ($P=0.219, 0.063$)。结论 基于人工智能胸部 CT 检查, IMR 算法较 iDose 算法对肺 GGN 检出具有较高的敏感度及预测准确性, 具有一定的临床应用价值。

PU-2176

心脏 CT 定量评估经导管主动脉瓣置换术前患者心脏功能和心肌应变：与心脏磁共振的对比研究

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目的 以心脏磁共振 (CMR) 为参考标准, 探讨 CT 评估经导管主动脉瓣置换术前 (pre-TAVR) 患者左心室功能和心肌应变的可行性。**方法** 本研究于 2022 年 06 月至 10 月连续性纳入 pre-TAVR 患者 29 例, 所有患者均采集心脏计算机断层扫描 (CCT) 和 CMR 数据, 测量左心室心功能及心肌应变参数, 包括 LVEF、左心室舒张末期容积 (LVEDV)、左心室收缩末期容积 (LVESV)、舒张期心肌质量 (MASS)、心排量 (CO)、整体纵向应变峰值 (GPLS)、整体周向应变峰值 (GPCS) 和整体径向应变峰值 (GPRS)。将基于 CCT 图像测量的心功能及应变参数与 CMR 进行比较, 使用 Pearson 相关和 Bland-Altman 分析两组定量参数的相关性和一致性。结果 研究共纳入 29 例 pre-TAVR 患者 (男性 16 例, 女性 13 例, 平均年龄 72.03 ± 10.02)。基于 CCT 图像获得的 LVEF、CO 值与 CMR 定量参数相似, 差异无统计学意义 ($P=0.246$ 、 $P=0.768$), 而 LVEDV、LVESV 和 MASS 值均偏高, GPLS、GPCS、GPRS 值略偏低, 差异均有统计学意义 (P 均 <0.05), 相关性分析发现基于 CCT 图像获得的 LVEF、LVEDV、LVESV、MASS、GPRS、GPCS 均与 CMR 定量参数存在较强正相关关系 ($r=0.9229$ 、 $r=0.9432$ 、 $r=0.9252$ 、 $r=0.9559$ 、 $r=0.8480$ 、 $r=0.8329$), CO 和 GPLS 间存在中等正相关关系 ($r=0.6171$ 、 $r=0.6719$)。Bland-Altman 分析中, 基于 CCT 图像获得的 LVEF、CO、GPLS、GPCS、GPRS 与 CMR 定量参数的偏差较小。结论 心脏 CT 定量评估经导管主动脉瓣置换术前 (pre-TAVR) 患者左心室功能和心肌应变具有可行性, 基于 CCT 图像获得的左心室功能学参数与 CMR 定量参数一致性良好, 而心肌应变参数相较于 CMR 偏低。

PU-2177

低剂量 CT 扫描对儿童房间隔缺损的评价

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目的: 房间隔缺损在儿童中较为常见, 如经诊断后未加干涉, 房间隔缺损最终会导致血流动力学发生改变, 患儿生长发育严重受损, 需及早手术治疗, 故术前早期诊断尤为重要。本研究就低剂量 CT 扫描对儿童房间隔缺损的评价进行探讨。

方法: 搜集房间隔缺损患儿 40 例, 手术前行 CT 扫描及经胸超声心动图检查。CT 扫描采用 GE 公司 Revolution256 排螺旋 CT, 并且使用前瞻性心电门控, 管电压 100kV, 选择智能管电流, 注射对比剂约 20ml, 注射速度以患儿的体重 (kg) $\times 0.08$ 来决定, 并以同样地注射速度去注射生理盐水约 30ml, 并记录患儿每次扫描的剂量长度乘积 (DLP) 及有效剂量 (ED) ($ED (mSv) = DLP (mGy \cdot cm) \cdot k$)。将原始数据推送至工作站进行后处理、诊断, 并以手术病理诊断结果作为参考标准, 与经胸超声心动图结果进行对比。

结果: 40 例房间隔缺损患儿中, 手术病理诊断结果显示右心增大者 12 例, 肺动脉高压者 11 例, 肺静脉异位引流者 1 例 (经胸超声心动图未检出)。CT 扫描平均 DLP 为 (155.59 ± 37.72) $mGy \cdot cm$, 有效辐射剂量 (ED) 为 (2.17 ± 0.48) mSv。CT 扫描对于房间隔缺损引起的继发性改变与经胸超声心动图检查结果无明显差异 ($P > 0.05$), 而对肺静脉异位引流等心外畸形的检出明显高于经胸超声心动图 ($P < 0.05$)。

结论: 低剂量 CT 扫描不仅能检出房间隔缺损及其继发性改变, 还对心外畸形的检出具有其独特优势。

PU-2178

89 例心脏肿瘤影像学诊断回顾性分析

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摘要【目的】回顾性分析我院心脏手术患者的临床及影像资料, 探讨心脏肿瘤病变的影像学诊断价值。**【材料和方法】**本研究收集 2012-1~2022-2 瑞金医院心外科住院并经手术及病理明确的心脏肿瘤患者共 89 例, 其中全部病例均行心超检查, 35 例患者另行 CT 检查 20 例, MR 平扫及增强检查 18 例。其中男 36, 女 53, 男女之比 0.67: 1。最常见的症状是呼吸困难, 胸闷, 晕厥。本院心脏磁共振 (Cardiac Magnetic Resonance, CMR) 常用序列包括定位序列 (标准面定位、左室长轴类两腔心定位、短轴层面定位), 电影序列, 黑血序列, 灌注序列和增强序列。**【结果】**心脏超声检查检出 88 例患者, CT 平扫检出 5 例较大占位, MR 平扫及增强检查检出 16 例病变, 2 例弹力纤维瘤患者未能检出。病理结果如下: 良性病变弹力纤维瘤和纤维瘤各 1 例, 心脏异位嗜铬 (副神经节瘤 3 例), 脂肪瘤 1 例, 黏液瘤 69 例 (77.5%), 血管肉瘤 5 例 (1 例误诊黏液瘤), 恶性血管内皮瘤 2 例 (其中一例恶性上皮样血管内皮瘤), 未分化肉瘤 2 例, 平滑肌肉瘤 1 例, 转移瘤 4 例, 其中 2 例为罕见病-静脉内平滑肌瘤。术前拟诊心包恶性肿瘤 3 例。**【结论】**本组心脏黏液瘤在本组病例中占首位, 77.5%, 需熟悉其临床表现, 熟悉 Carney 综合征诊断标准。本组中心脏恶性肿瘤以血管源性多见, 其中血管肉瘤列首位。心脏超声是心脏肿瘤首选检查方法, MRI 可显示肿瘤大小、形态、表面特征及部分性状, 应重视 CMR 在心脏肿瘤诊断中的价值。

PU-2179

CCTA 三维形态学术前评估在左心耳封堵导管 消融一站式治疗中的应用

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本文探讨心脏 CT 血管造影(CCTA)三维形态学术前评估在左心耳封堵导管消融一站式 治疗中的应用价值。选取 98 例心房颤动患者, 48 例患者术前行 CCTA 评估(CCTA 组), 50 例患者行经食管超声心动图(TEE)评估(TEE 组)。比较两组患者心脏超声参数、Watchman 装置植入成功率。CCTA 组 Watchman 装置植入成功率为 100.00%, 明显高于 TEE 组 ($P < 0.05$), 而手术时间和 X 线曝光时间明显短于 TEE 组 ($P < 0.05$)。CCTA 组实际和预测封堵器大小差值明显低于 TEE 组 ($P < 0.05$)。CCTA 组预测和实际封堵器大小呈正相关, 且一致性较高 ($P < 0.05$)。CCTA 三维形态学术前评估在左心耳封堵导管消融一站式治疗中有较好的应用价值, 有利于封堵器植入成功, 缩短手术时间和 X 线曝光时间。

关键词:心脏 CT 血管造影三维形态学;左心耳封堵导管消融一站式治疗;应用价值

PU-2180

Comparative study between anomalous systemic arterial supply to the basal segments of the lung and lung sequestration in adult by computed tomography angiography

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Objective: Anomalous systemic arterial supply to the basal segments of the lung and lung sequestration are often confused due to their nonspecific presentations and similar imaging findings. Our study is to summarize the differences between two disease entities in adult with MSCT angiography and further provide reliable evidence for clinical diagnosis and subsequent treatment.

Materials and Methods: This study was conducted from December 2015 to January 2023 in our center. Medically diagnosed cases of two diseases lung sequestration and anomalous systemic arterial supply to the basal segments of the lung ($n=65$) were enrolled in this study. We reviewed 42 patients with lung sequestration and 23 patients with anomalous systemic arterial supply to the basal segments of the lung on the basis of clinical features (age, gender, symptoms like hemoptysis, exertional dyspnea, persistent dry cough) as well as CT imaging findings (location of the lesion, origin of the blood vessel, vascular diameter, increased lung markings, solid or ground glass shadow, vacuoles or cavitation sign or emphysema). The chi-square test, fisher exact test and t-test were applied to compare different CT features of two different diseases.

Results: In this study, a total of 65 patients diagnosed with lung sequestration ($n=42$) and anomalous systemic arterial supply to the basal segments of the lung ($n=23$) were systemically retrospectively. There was no significant statistical difference observed in the setting of the age ($p=0.376$) and gender ($p=0.229$) between two groups. However, regarding symptoms significant statistical differences were found between two diseases ($p=0.000$). Concerning the characteristics found on the basis of CT findings, there were no significant statistical differences found between them according to the location of lesion ($p=0.966$) and origin of blood vessel ($p=0.133$). Meanwhile, it was demonstrated that there were significant statistical differences on the vascular diameter ($p=0.000$), increased lung markings ($p=0.000$), solid or ground glass shadow ($p=0.000$) and vacuoles or cavitation sign or emphysema ($p=0.000$).

Conclusion: As a rare variety of two different congenital diseases of the lung including anomalous systemic arterial supply to the basal segments of the lung and lung sequestration, multi-sliced CT angiography can accurately pinpoint the differences between them and help in providing future treatment planning.

PU-2181

基于 CT 影像组学结合影像学特征预测 IASLC 新分级系统 I 期浸润性肺腺癌的病理分级

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目的 探讨 CT 影像组学结合影像学特征预测国际肺癌研究协会 (IASLC) 新分级系统 I 期浸润性肺腺癌 (IPA) 病理分级的价值。

方法 回顾性分析 228 例 I 期 IPA 患者的术前 CT 影像及临床资料。参照 IASLC 分级系统, 将患者分为低/中级别组和高级别组。采用最小绝对收缩和选择算子 (LASSO) 选择组学特征, 使用逻辑回归 (LR) 分类器建立影像组学模型 (RM)、临床影像学特征模型 (CRM) 和影像组学评分与影像学特征相结合模型 (CRRM), 并通过列线图可视化 CRRM。使用 AUC、准确度、灵敏度、特异性和校准曲线来评估模型的性能。

结果 RM 包括五个最佳放射组学特征, CRM 包括结节密度、边缘和肺叶位置, CRRM 包括影像组学评分、结节密度和边缘。RM、CRM、CRRM 在训练集中产生的 AUC 分别为 0.825 [95% CI (0.735-0.916)]、0.849 [95% CI (0.772-0.925)] 和 0.888 [95% CI (0.819-0.957)], 在验证集中的 AUC 分别为 0.879 [95% CI (0.734-1.000)]、0.888 [95% CI (0.794-0.982)] 和 0.922 [95% CI (0.835-1.000)]。

结论 三种模型在预测病理分级方面均表现良好, 尤其是联合模型, 显示 CT 影像组学结合影像学特征具有区分早期 IPA 病理分级的潜力。

PU-2182

不同免疫状态下肺隐球菌感染的临床特点和影像表现

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目的: 总结分析 23 例不同免疫状态下肺隐球菌感染患者的临床特点和影像表现, 以提高对该病诊断能力。

方法: 收集 2012.12-2019.06 我院呼吸科收治的 23 例经病理或临床证实为肺隐球菌感染病例, 分析其宿主因素、临床表现和影像学表现。纳入标准: 病理或临床生化检查确诊, 临床及影像资料齐全。排除标准: 未经病理或临床生化检查确诊; 图像质量不合格或临床及影像资料不齐全。其中 16 例行胸部 CT 平扫检查, 7 例行胸部 CT 平扫+增强检查。

结果: 主要临床表现为咳嗽、咳痰, 胸痛及发热等。13 例男性, 10 例女性, 男女比 1.3:1 ($P>0.05$), 发病年龄 31-74 岁 (平均 55 岁), 11 例 (11/23) 有宿主因素 (2 型糖尿病、慢性乙型病毒性肝炎、慢性乙型病毒性肝炎合并肝硬化、乳腺癌术后化疗、肺腺癌术后、肾病综合征); 12 例 (12/23) 体检发现。有免疫损害患者肺部大多以斑片状渗出影为主 (11/23)。免疫正常患者以孤立性结节/肿块为主 (12/23); 绝大多数 (16/23) 局限于一侧肺叶, 以胸膜下分布为主, $P<0.05$; 其中免疫力正常组分布于外带的有 10 例, 免疫力损害组的分布于外带的有 7 例。病灶边缘出现晕样改变 18 例 (18/23), $P<0.05$, 空气支气管征阳性 11 例 (11/23), $P<0.05$, 2 例出现空洞, 另毛刺、浅分叶、胸膜牵拉各一例, 7 例强化值范围 20-34HU; 其中 3 例孤立结节误诊为肺癌。

结论: 免疫力损害患者肺部影像学表现类似于炎症性表现, 大多以斑片状渗出影为主

免疫力正常患者肺部影像以孤立性结节、肿块为主，多数边缘伴晕样改变，以胸膜下分布为主；表现为孤立性实性结节与肺癌鉴别困难，需要结合病史及临床实验室检查。不同免疫状态肺隐球菌病患者的临床特点无特异性，主要临床表现为咳嗽、咳痰，胸痛及发热等。

PU-2183

Prediction of late revascularization in stented patients by untreated CTA-derived FFR in patients with CAD

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Objectives The purpose of the study is to examine the connection between untreated functional fractional flow reserve derived from coronary computed tomography angiography (CT-FFR) and the incidence of late revascularization in stented coronary artery disease patients.

Methods We retrospectively enrolled 157 patients who were clinically indicated for CCTA and underwent coronary stenting within the following months. ROC curve analysis was used to evaluate the revascularization predicting performance of the CT-FFR metrics at patient level and vessel level. The logistic regression and Cox proportional hazards regression analyses were used for selecting independent late-revascularization-related risk or prognostic factors among clinical and functional FFR parameters in stented patients.

Results At the patient-level, nadir CT-FFR was independent risk factor (OR=0.002, 95%CI 0.000-0.089, p=0.001) for late revascularization with predicting AUC of 0.684. At the vessel-level, both the nadir CT-FFR and poststenosis CT-FFR were independent risk factors (OR=0.003, 95%CI 0.000-0.059, p<0.001; OR=0.002, 95%CI 0.000-0.054, p<0.001) with predicting AUC of 0.692 and 0.697, respectively. The "age" and "nadir CT-FFR" were selected as independent prognostic factors for stented patients (HR=3.467, 95%CI 1.301-9.239, p=0.013; HR=0.005, 95%CI 0.000-0.141, p=0.002) in Cox proportional hazards regression analysis. The model constructed by these factors (C-index = 0.717) could well predict the revascularization event at 12, 24 and 30 months and stratify the patients into high and low risk of late revascularization (p = 0.0021).

Conclusion Untreated CTA-derived FFR in coronary artery disease patients can predict late revascularization in stented patients.

PU-2184

Mediastinal cavernous hemangioma: the diagnostic challenge

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Background: The cavernous hemangioma of mediastinum (CHM) is a rare benign lesion, representing less than 0.5% of all mediastinal masses. Its incidence is extremely low, and frequently misdiagnosed as thymoma before the operation. Therefore, our aim is to improve the diagnostic ability based on CT images.

Methods: CT imaging findings and clinical information of 17 patients with pathologically confirmed CHM were retrospectively evaluated.

Results: Among 17 CHM, the lesion of 4 patients was diffuse, and 13 single. 11 cases were in the anterior mediastinum, 3 cases in the middle mediastinum and 3 cases in the posterior

mediastinum. The diameter of CHM ranged from 1.8 to 6.5cm in those patients with isolated lesion. 13 cases were oval-shaped or round, and 4 cases were irregular. Phleboliths or nodular calcification were visible in 6 cases. The nodular or punctuated enhancement within the lesion was seen in 14 cases on the arterial phase, and contrast agent was further filled on the delayed phase, where "fast in and slow out" feature was fully demonstrated. Different from the common findings like hepatic hemangioma, CHM mainly rendered such enhancement pattern from the center outwards on the dynamic contrast-enhanced CT scan. Draining veins were observed in six cases.

Conclusions: CHM is more frequently suited at the anterior mediastinum than at the posterior mediastinum. The presence of phleboliths, the nodular or punctuated enhancement on the arterial phase, the eccentric enhancement on the delayed phase are helpful for the diagnosis of CHM on CT scan.

PU-2185

基于肺结节超高分辨率 CT 靶扫描影像组学联合机器学习在鉴别原位腺癌与微浸润腺癌中的价值

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目的 基于肺结节超高分辨率 CT (Ultra high resolution computed tomography, UHRCT) 靶扫描影像组学特征, 分别采用 logistic 回归 (Logistic regression, LR) 和支持向量机 (Support vector machine, SVM) 构建机器学习模型, 以鉴别磨玻璃结节 (Ground glass nodule, GGN) 中的原位腺癌 (Adenocarcinoma in situ, AIS) 和微浸润腺癌 (Minimally invasive adenocarcinoma, MIA)。方法 回顾性纳入手术病理证实肺腺癌的 198 名患者 (AIS 56 例; MIA 142 例), 按分层抽样将患者随机分为训练组 ($n = 138$) 和验证组 ($n = 60$)。手动分割 GGN, 从中提取影像组学特征。采用最小冗余最大相关性算法和套索算法对影像组学特征进行降维, 分别使用 LR 和 SVM 构建预测模型。采用受试者工作特征 (Receiver operating characteristic, ROC) 曲线评价模型的预测性能。结果 在训练组中, LR 和 SVM 的曲线下面积 (Area under the curve, AUC) 分别为 0.787 (95%, 0.712-0.863) 和 0.896 (95%, 0.842-0.951)。在验证组中, LR 和 SVM 的 AUC 分别为 0.824 (95%CI, 0.713-0.936) 和 0.839 (95%CI, 0.734-0.945)。结论 基于肺结节 UHRCT 靶扫描影像组学结合机器学习能较好地鉴别 AIS 与 MIA, 为患者 GGN 个性化分析提供潜在方法。

PU-2186

低剂量条件下不同重建算法对 CAD 检出肺结节准确率的影响

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目的: 探讨低剂量条件下滤波反投影重建 (FBP)、基于多模型的迭代重建 (ASIR-V)、深度学习重建 (DLIR) 不同重建算法对计算机辅助检测系统检出肺结节准确率的影响。

方法: 回顾分析 50 例肺结节复查患者的 CT 图像, 分别采用 FBP、ASIR-V40%、ASIR-V80%、DLIR-M、DLIR-H、DLIR-H-lung 算法重建图像, 共计获得 6 组图像。然后将 6 组图像导入肺结节 CT 影像辅助检测软件 (uAI-ChestCare) 对各组图像独立分析检测肺结节。两名有经验的放射科医生结合 CAD 分析所有图像并标记出结节, 记录数量, 其结果作为参考标准。不同重建算法图像结

合 CAD 对结节的检出结果与参考标准进行对比, 计算不同重建算法图像结合 CAD 检出肺结节的检出率和假阳性率。

结果: 两名经验丰富的放射科医师结合 CAD 共标记出 262 个结节。在 FBP、ASIR-V40%、ASIR-V80%、DLIR-M、DLIR-H、DLIR-H-lung 不同重建图像上 CAD 检出的数量分别为 160 个、182 个、202 个、211 个、225 个、326 个。不同重建方法图像结合 CAD 检出肺结节的检出率和假阳性率分别为 (55.73%、8.75%)、(63.74%、8.24%)、(66.41%、13.86%)、(74.05%、8.06%)、(79.01%、8%)、(82.44%、33.74%)，DLIR-H 重建算法对肺结节检出率相对较高而假阳性率相对较低。

结论: 低剂量条件下不同重建算法图像能够影响肺结节 CT 影像辅助检测软件肺结节检出的准确性, DLIR-H 结合 CAD 对肺结节检出的敏感性较高, 而假阳性较低, 值得临床推广。

PU-2187

磁共振 T1mapping 技术对扩张型心肌病患者心肌组织特性的评价研究

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目的: 探讨 3.0T 心脏磁共振成像 T1mapping 技术对扩张型心肌病 (Dilated cardiomyopathy, DCM) 患者左室总体、各部及各节段心肌组织特性的应用价值, 并探究其初始 T1 值的诊断效能。

方法: 收集 2021 年 10 月~2023 年 05 月就诊于我院 20 例 DCM 患者 (DCM 组) 和 25 例正常者 (对照组) 的临床及 CMR 资料。通过 T1mapping 序列获取左室各节段、各部及总体心肌的初始 T1 值。根据 DCM 患者的心肌是否存在延迟强化 (Late gadolinium enhancement, LGE), 将 DCM 组分为 DCM-LGE (+) 节段组、DCM-LGE (-) 节段组。然后运用独立样本 t 检验或 Mann-Whitney U 检验比较各组间初始 T1 值有无差异。通过绘制初始 T1 值的受试者工作特性 (Receiver operating characteristic, ROC) 曲线, 评价其对 DCM 患者的诊断效能。

结果: (1) DCM 组与对照组一般资料比较, 年龄、性别、身高、体重、体重指数、心率差异均无统计学意义 ($P>0.05$); (2) DCM 组 1-16 各节段、基底部节段、中间部节段、心尖部节段、左室总体心肌初始 T1 值均显著高于对照组 ($P<0.05$)。 (3) DCM-LGE (+) 节段组、DCM-LGE (-) 节段组、对照组之间的初始 T1 值比较, DCM-LGE (+) 节段组初始 T1 值高于对照组 ($P<0.05$) 和 DCM-LGE (-) 节段组 ($P<0.05$), DCM-LGE (-) 节段组初始 T1 值高于对照组 ($P<0.05$)。 (4) 利用 ROC 曲线分析初始 T1 值鉴别 DCM 组与对照组的 ROC 曲线下面积为 0.799, $P<0.001$, 最佳截断值为 1218.1ms, 敏感度 71.8%, 特异度 78.1%。

结论: 1、磁共振 T1mapping 技术可无创性定量评估 DCM 患者左室总体、各部及各节段心肌组织特性, DCM 患者左室总体、各部及各节段心肌初始 T1 值增大, DCM-LGE (+) 节段初始 T1 值增大。2、磁共振 T1mapping 技术初始 T1 值对 DCM 患者具有较好的诊断效能价值。

PU-2188

能谱 CT 扫描在肺内孤立性结节或肿块中的诊断研究

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目的 探索能谱 CT 扫描对孤立性肺结节或肿块良恶性鉴别的临床价值研究。**方法** 回顾性分析昆明理工大学附属安宁市第一人民医院经能谱 CT 扫描（平扫及双期增强扫描）44 例孤立性肺结节或肿块患者资料。经病理及随访证实分为恶性组（n=24）和良性组（n=20）。应用能谱分析软件分别测量动脉期、静脉期 40keV~140keV（间隔 10keV）各单能量水平对应 CT 值、碘（水）含量及强化程度。比较两组间差异。**结果** 动脉期 40~90 keV 水平 CT 值、动脉期碘含量及动脉期强化程度恶性组均高于良性组（均 $P<0.05$ ）。两组在动脉期 100-140 keV 单能量水平 CT 值、静脉期各单能量水平 CT 值、静脉期的碘含量及双期水含量、静脉期的增强程度相似，无统计学意义（ $P>0.05$ ）。**结论** 能谱 CT 扫描多参数成像有助于鉴别孤立性肺结节或肿块良恶性，对患者治疗方案选择及预后提供参考依据。

PU-2189

胸腔巨大孤立性纤维肿瘤的复发和危险分层分析

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目的：孤立性纤维肿瘤(SFT)是一种比较罕见的间叶源性肿瘤，可发生在胸部、腹部、四肢、头部和颈部，其中高达 50%的 SFT 起源于脏层胸膜。肿瘤大小对复发风险的影响目前尚不清楚。在此我们回顾分析了本院 37 例胸部 SFT 长达 22 年的生存率和复发经验，并评估了肿瘤大小与 SFT 复发的相关性。

方法：对所有切除的胸部 SFT(2000-2022 年)进行单一机构回顾，巨型 SFT 定义为病变长径 >15 cm。收集临床资料、病理特征和长期生存资料，用回归分析和 Kaplan-Meier 分析评估复发和生存的预测因素。

结果：手术切除 37 例，其中 22 例(59.5%)起源于内脏胸膜。有 7 例(18.9%)巨大的 SFT，平均大小为 20.6 cm(17~30 cm)。平均随访时间 82 个月(1-262 个月)，37 例患者中有 4 例(10.8%)胸部复发(50-177 个月)。单因素回归分析显示，肿瘤坏死($p=0.020$)和高倍视野 C4 核分裂($p=0.011$)与 SFT 复发有关。总体 5 年、10 年和 20 年生存率分别为 76.2%、67.6%和 32.4%，3 名患者在术后 84、179 和 209 个月发生与 SFT 相关的死亡。巨大 SFT 患者中没有复发或与 SFT 相关的死亡。

结论：这项研究代表了本院单一机构对巨大胸部 SFT 的长期结果的回顾分析。我们的数据表明，大小不是胸部 SFT 复发的危险因素，并且巨大 SFT 的长期生存是较好的。

PU-2190

1 例沿支气管壁侵犯黏液表皮样癌报道

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目的：分析肺粘液表皮样癌（PMEC）的临床及影像学表现，提高对该病的认识。**方法**：该病例行 CT 平扫及增强检查、纤维支气管镜检查。**结果**：（PMEC）是较为罕见的肺部恶性肿瘤之一，临床表现为大气道的刺激或阻塞症状和体征；CT 上看到支气管内肿瘤主要向腔内浸润生长、充填，

形似“软木塞”改变；沿支气管分布、走行，见支气管内“丘陵状”凸起，与支纤镜下形态高度相似，远端支气管充气形成“支气管充气征”；另外 CT 可以清楚显示阻塞远端肺呈局限性肺气肿改变，经 CT 薄层及曲面重建，表现出一定的特征性。结论：通过分析患者的临床与影像特征，有助于提高对该病的全面认识，从而达到正确诊断。

PU-2191

光谱 CT 多参数成像在急性肺栓塞中的应用价值研究

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目的：本研究旨在探讨光谱 CT 多参数成像与常规 CT 成像对急性肺栓塞栓子检出及血栓负荷的效能。

方法和材料：前瞻性纳入经双层探测器光谱 CT 行肺动脉血管造影检查的疑似急性肺栓塞患者 102 例。采集并重建光谱数据，分别应用常规混合能量图像 (CI)，碘密度图 (ID)，有效原子序数图像 (Z-eff) 及碘密度-有效原子序数融合图 (ID-Zeff)。评估各组图像急性肺栓塞检出率，应用受试者工作特性曲线 (Receiver operating characteristic, ROC) 和曲线下面积 (Area under curve, AUC) 评估各组图像下急性肺栓塞诊断效率，并分别评估肺叶及主肺动脉干，肺段动脉及亚段肺动脉各亚组急性肺栓塞诊断效率，并计算及各组图像下的总体栓子数目及在三级肺动脉中栓子数目检出情况，应用 Qanadli 评分比较各组血栓负荷差异。定量资料采用独立样本 t 检验，定性资料采用卡方检验。

结果：在 102 例疑似急性肺栓塞中，共确诊 63 例，应用 CI，ID，Z-eff 及 ID-Zeff 图像分别确诊 53，55，60，60 例。ID-Zeff 图 (AUC: 0.989，灵敏度 97%，特异度 100%) 较 CI 图 (AUC: 0.892，灵敏度 84%，特异度 94%) 在急性肺栓塞的检出效率显著提高。在 63 例确诊患者中，CI 图像与各组光谱图像总体栓子数目及在三级肺动脉栓子数目检出分别为 CI (172,25,75,72)，ID (217, 25, 82, 100)，Z-eff (222, 25, 85, 112)，ID-Zeff(230, 25,85,120)。各组图像中的 Qanadli 评分分别为 CI (15.64±5.28)，ID (19.25±6.42)，Z-eff (19.87±6.86)，ID-Zeff(20.46±6.6)，各组光谱图像 Qanadli 评分较 CI 组均有统计学意义 (P<0.001)。

结论：光谱 CT 多参数 ID-Zeff 图在急性肺栓塞中的检出率及栓子检出效能优于常规 CT 图像，尤其在亚段及以下急性肺栓塞。基于 ID-Zeff 的可获得更加准确的肺动脉血栓负荷评分，为急性肺栓塞患者的危险分层及预后提供更加准确的影像学资料。

PU-2192

CT 在慢性栓塞性肺动脉高压的诊断准确性

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本研究旨在确定 CT 成像在慢性栓塞性肺动脉高压 (CTEPH) 诊断中的准确性，并探讨该检查的临床意义和特点。本文检查了 1990 年至 2015 年间在 PubMed、OVID 搜索和引文追踪中发现的研究。在 613 篇引文中，有 11 篇文章 (n=712) 符合纳入标准。基于患者的分析显示，汇总敏感性为 76% (95%置信区间[CI]: 69%至 82%)，汇总特异性为 96% (95%CI: 93%至 98%)。综合上述工作得到了汇总诊断比值 (DOR) 为 191 (95%CI: 75 至 486)。基于血管的分析分为 3 个层次：总动脉、主要+叶状动脉和节段动脉。汇总敏感性分别为 88% (95%CI: 87%至 90%)、95%

(95%CI: 92%至 97%) 和 88% (95%CI: 87%至 90%)，汇总特异性为 90% (95%CI: 88%至 91%)、96% (95%CI: 94%至 97%) 和 89% (95%CI: 87%至 91%)。综合上述工作得到了汇总诊断比值分别为 76 (95%CI: 23 至 254)、751 (95%CI: 57 至 9905) 和 189 (95%CI: 21 至 1072)。通过上述分析，CT 是一种临床有利的检查技术方法，可用于 CTEPH 的确诊和排除近端血管支架的肺动脉内膜切除术 (PEA) 患者。此外，双能量和 320 层螺旋 CT 可以提高亚段动脉的敏感性，该检查技术有潜力作为行球囊肺动脉成形术 (BPA) 的影像检查手段。在不久的将来，CT 可能成为筛查考虑外科以及介入手术可行性的关键方法。

PU-2193

高原脱习大鼠心血管系统改变的研究

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目的：本研究旨在探讨高原脱习大鼠心血管系统影响的研究。方法：选择 4 周龄雄性 SD 大鼠 53 只，随机分为正常对照 (NC) 组、HADAS I 组、HADAS II 组、HADAS III 组。在青海西宁 (2200m)、青海玛多 (4200m) 喂养至 24 周龄后，在 CT 进行心肌灌注检查，在实验室检测血生化及病理组织取材。结果：1. 与 NC 组对比，HADAS III 组肺容积及体重增加、HADAS II 组体重及 mPAP 增加。与 HADAS I 组对比，HADAS III 组肺容积增加、HADAS II 组 mPAP 增加。与 HADAS II 组对比，HADAS III 组 mPAP 含量降低。2. 与 NC 组对比，HADAS I 组 RBC、HGB、HCT 增加，HADAS III 组 HGB、HCT 减低。与 HADAS I 组对比，HADAS II 组 RBC、HGB、HCT、MCV 减低，HADAS III 组 RBC、HGB、HCT 减低。与 HADAS II 组对比，HADAS III 组 HGB 减低。3. 与 HADAS I 组对比，HADAS III 组 a-HBDH、CK、LDH 减低。4. 与 NC 组对比，HADAS III 组 HIF-1a 降低增加。与 HADAS I 组对比，HADAS II 组 VEGF 降低，HADAS III 组 HIF-1a 值降低。与 HADAS II 组对比，HADAS III 组 HIF-1a 降低。5. 与 NC 组对比，HADAS I 组胶原纤维增加。与 HADAS I 组对比 HADAS II 组、III 组胶原纤维降低。6. 与 NC 组对比，HADAS 各组 MBV、MBF 值增加。与 HADAS I 组对比，HADAS III 组 MBV、MBF 增加。结论：1. 高原环境暴露 24 周后，mPAP、RBC、HGB、HCT、PLT、a-HBDH、CK、LDH、HIF-1a、VEGF、心肌胶原纤维含量、MBV、MBF 发生变化，返回西宁 20 天后有所恢复，但未达正常水平。2. 返回西宁 10 天，mPAP 出现明显升高，可能是由于脱离高原环境后处于相对富氧环境导致的代偿性升高。3. 高原环境暴露 24 周及返回西宁 20 天 MBV、MBF 增高，可能是适应缺氧及富氧引起的一系列生理性改变。

PU-2194

免疫检查点抑制剂相关肺炎影像学表现分析

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目的：探讨分析免疫检查点抑制剂相关肺炎患者的胸部 CT 影像学特征，以提高对该病的认识。方法：回顾性分析我院 2018 年 6 月—2022 年 6 月共计 38 例免疫检查点抑制剂相关肺炎患者的胸部 CT 影像学资料。结果：38 例肿瘤患者均接受免疫检查点抑制剂治疗，出现肺部炎性改变，经实验室检查及临床表现排除其他相关疾病，临床确诊为免疫检查点抑制剂相关性肺炎，男女比例

(18/20)；年龄 40~68 岁，中位年龄 56 岁；接受免疫检测抑制剂治疗时间中位时间 78 天 (10—256 天)。38 例患者胸部 CT 均表现为间质性肺炎表现：非特异性间质性肺炎表现 10 例、机化性肺炎 28 例，双肺对称性机化性肺炎 15 例，双肺不对称性机化性肺炎 13 例，牵拉性支气管扩张 35 例。结论：免疫检查点抑制剂相关肺炎主要表现为间质性肺炎，在肿瘤患者接受免疫检查点抑制剂治疗后，出现肺部间质性炎性改变，排除其它相关感染及非感染性炎性病因后，应当高度怀疑免疫检查点抑制剂相关肺炎，并根据肺部受累范围，对治疗做出相应的调整。

PU-2195

基于 64 排肺 CT 肺结节直方图特征的稳定性分析：同设备固定扫描参数下的探讨

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目的：基于 64 排肺 CT 肺结节灰度直方图特征对比分析，探讨无进展实性肺结节 CT 直方图特征稳定性。

对象与方法：回顾性收集自 2020 年 1 月 1 日至 2023 年 6 月 1 日本科室行胸部 CT 检查拟诊为实性肺结节患者。纳入标准：1、行胸部 CT 拟诊为肺结节患者；2、年龄 ≥ 18 岁；3、胸部 CT 复查。排除标准：1、初诊与复查非同一台 CT 设备检查者；2、明确肿瘤病史患者；3、合并肺部感染者；4、屏气不佳，图像不能分析者；5、微创手术干预史；6、结节长径 $> 10\text{mm}$ 者；7、复查肺结节横径变化大于 $\pm 20\%$ 者。最终 137 名患者 ($n=137$) 纳入研究，男性 74 名，女性 63 名，年龄 64 ± 7.6 岁。采用联影智能辅助诊断系统-深度学习技术图像重建后，提取初诊及复查 CT 目标肺结节最大值、最小值、平均值、中位数、标准差、峰度、偏度、熵 8 个灰度直方图参数统计量。

正态分布连续变量，使用 SPSS 25 统计学软件，行皮尔逊相关系数计算。

结果：初诊直方图统计量：最大值 319.91 ± 186.70 ；最小值 -232.15 ± 155.51 ；平均值 33.04 ± 101.08 ；中位数 30.03 ± 101.28 ；标准差 109.33 ± 72.21 ；峰度 3.30 ± 1.40 ；偏度 0.09 ± 0.55 ；熵 5.44 ± 1.75 。复查直方图统计量：最大值 331.93 ± 187.46 ；最小值 -153.41 ± 245.71 ；平均值 43.22 ± 97.76 ；中位数 41.84 ± 94.26 ；标准差 114.09 ± 48.03 ；峰度 3.38 ± 1.45 ；偏度 0.12 ± 0.58 ；熵 5.81 ± 1.87 。最大值、最小值、平均值、中位数、标准差、峰度、偏度、熵相关系数分别为：0.872、-0.045、0.822、0.779、0.389、0.577、0.525、0.942；最大值、平均值、中位数、熵具有较强相关性。

结论：同设备固定扫描参数肺部 CT 平扫，获取直方图参数统计量最大值、平均值、中位数、熵相关性较好，可作为肺结节进展判定参考。

PU-2196

Family outbreak of Psittacosis diagnosed with clinical analysis and metagenomic next-generation sequencing under COVID-19

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Purpose: To explore the clinical characteristics, diagnosis, and treatment of family outbreak of psittacosis and to improve the success rate of treatment.

Patients and methods: The clinical characteristics, diagnosis, treatment, and outcome of family outbreak of psittacosis, which consists three patients, diagnosed by clinical analysis and metagenomic next-generation sequencing (mNGS) in our hospital were analyzed retrospectively. **Results:** We report on three instances of clustered atypical pneumonia, which were caused by *Chlamydia psittaci* during the COVID-19 pandemic. All patients exhibited symptoms of fever and cough, while one patient also experienced gastrointestinal symptoms such as nausea, vomiting, and diarrhea. Laboratory tests indicated no significant increase in leukocytes and neutrophils, but a mild increase in C-reactive protein was observed in all three patients. Chest computed tomography (CT) scans revealed a consolidation shadow in a unilateral lung lobe in all three patients. Empirical moxifloxacin treatment was administered to both patients. The patients' C-reactive protein levels increased, and chest computed tomography (CT) scans indicated an expansion of the lesion. mNGS was conducted on sputum samples from two adult patients, revealing the presence of *Chlamydia psittaci*. Additional doxycycline was prescribed immediately, and then the patients' temperatures were stabilized, and the lesion in chest CT was absorbed. The pediatric patient exhibited less severe symptoms compared to the adult patients and exhibited a favorable response to azithromycin administration.

Conclusion: Our findings suggest that the value of mNGS as a valuable tool for definitively identifying pulmonary infection. Clinicians should consider the likelihood of atypical pathogens causing lung infections in patients who show inadequate responses to empirical drugs and subsequently devise treatment strategies based on precise etiological diagnoses. Rapid and decisive diagnoses can significantly enhance patient prognoses.

PU-2197

基于心电门控 CTA 对 Stanford A 型主动脉夹层累及 Valsalva 窦的检测及冠状动脉受累分型的临床应用

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目的:利用心电门控 ECG-CTA 对累及 Valsalva 窦的 TAAD 患者冠状动脉受累进行分型, 并比较不同分型患者的冠脉处理措施差异。

方法:本研究回顾性收集行主动脉 ECG-CTA 检查发现 TAAD 伴 Valsalva 窦受累的患者图像, 且所有患者均进行了手术治疗。两名放射科医生独立分析 CTA 图像。将 RCA 和 LCA 受累情况分别分为 A 型(仅开口受累), B 型(主干呈典型双腔样改变)及 C 型(根部完全脱离, 冠状动脉周围呈套叠样改变)。以术中发现作为参考, 计算 CTA 的诊断性能, 并统计冠状动脉处理措施。

结果:共纳入 112 例。术中发现, 33 例 RCA 未受累, 而 RCA 受累的患者中 A 型为 45 例、B 型 19 例和 C 型 15 例; 70 例患者 LCA 未受累, LCA 受累患者中 A 型有 34 例、B 型 8 例和 C 型 0 例。两名阅片者诊断 RCA 受累的敏感性为 97.5%-98.7%, 其中单独诊断 A 型敏感性为 86.7%-91.1%, B 型为 79.0%-89.5%, C 型为 86.7%-93.3%; 对诊断 LCA 受累敏感性 100.0%, 单独诊断 A 型为 85.3%-91.2%, B 型为 87.5%-100.0%。两名阅片者一致性 kappa=0.85-0.96。仅 Valsalva 窦受累时, 多数患者(55.7%-63.6%)的冠状动脉无处理措施; 79%的 RCA-A 和 70.6% LCA-A 型患者采取冠状动脉修补; 86.7% RCA-B-和 87.5%-LCA-B 型者采取冠脉搭桥术; (86.7%)的 RCA-C 型者采取冠脉搭桥术。

结论:心电图门控 CTA 对 TAAD 累及冠状动脉有较高的诊断价值, 术前 CTA 对冠脉受累进行分型可能有助于术前指导患者的手术计划。

PU-2198

心脏 CT 血管造影在评估左心耳封堵术后残余 分流和器械相关血栓的应用价值

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摘要 目的 探讨心脏 CT 血管造影 (CCTA) 在经皮左心耳封堵术后残余分流和器械相关血栓的应用价值。方法 选取我院 2020 年 11 月至 2022 年 10 月成功接受左心耳封堵术的 60 例非瓣膜性心房颤动 (房颤) 患者, 患者术后 3 个月及 6 个月进行 CCTA 检查, 分析封堵器残余分流、器械相关血栓形成及不良事件等。结果 60 例房颤患者成功实施 LAAC 术 (Watchman 封堵器 10 例, LACbes 封堵器 50 例), 平均年龄 (66.5 ± 9.3) 岁, CHA2DS2-VASC 评分 (4.20 ± 1.46) 分, HAS-BLED 评分 (2.68 ± 1.24) 分, 其中持续性房颤患者 25 例 (41.6%)。60 例患者中, 左心耳最大开口径 12-20mm 11 例, 21—25 mm 20 例, 26—30 mm 25 例, 31-34 mm 4 例, 不同最大开口径出现残余分流的比例差异比较无统计学意义 ($P=0.524$); 40 例患者术后 3 个月及 6 个月均未出现残余分流 (其中 1 例术后 3 个月完全内皮化, 有 2 例术后 3 个月及 6 个月均出现 DRT 存在); 8 例患者 3 个月及 6 个月均出现残余分流 (分流束 <5 mm), 12 例患者术后 3 个月出现残余分流, 术后 6 个月残余分流消失。所有患者均无卒中、系统性栓塞、大出血、心脏压塞、死亡等主要临床不良事件发生。结论 心脏 CT 血管造影在左心耳封堵术后随访中有重要临床应用价值。

PU-2199

Changes of cardiac structure, function, and fat content in obese subjects after bariatric surgery—Prospective magnetic resonance imaging study

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Purpose: Obesity can cause metabolic changes and increase the risk of cardiovascular disease. With the success of weight loss, the incidence of cardiovascular disease also decreases. The purpose of this study was to investigate the changes of heart structure, function, and fat content in obese patients during significant weight loss within six months after bariatric surgery, and to explore the relationship between the changes in MRI indicators and laboratory indicators at different times after bariatric surgery.

Methods: A total of thirty-three patients underwent bariatric surgery and completed preoperative and postoperative cardiac magnetic resonance examinations, left ventricular cardiac function parameters, pericardial adipose tissue volume (PATV), myocardial proton density fat fraction (M-PDFF), and myocardial T1 values were measured by cardiac MRI before surgery at one, three, and six months after surgery, respectively, at the same time, preoperative and postoperative laboratory indicators were collected.

Results: LVEF/BSA increased from $26.59 \pm 4.13\%/m^2$ to $27.56 \pm 4.88\%/m^2$. The global peak wall thickness (GPWT) of left ventricular (from $11.03 \pm 1.81mm$ to $9.27 \pm 2.02mm$) and left ventricular mass (LVM) (from $103.21 \pm 27.82g$ to $81.27 \pm 19.41g$) decreased significantly after surgery (all $P < 0.001$). In addition, PATV and M-PDFF decreased significantly after surgery (all $P < 0.01$). The decrease of LVM at one, three, and six months after surgery can cause a decrease in PATV and the left ventricular eccentricity ratio (LVER) ($r > 0.5$, $P < 0.05$). There was a positive correlation between the decrease of triglyceride was positively correlated with the loss of LVM and PATV ($r > 0.5$, $P < 0.05$) at six months.

Conclusion: Obese patients showed significant improvement in cardiac structure and function after bariatric surgery, PATV, and M-PDFF decreased significantly, and there is a certain correlation between the MRI indicators and the laboratory correlation indicators.

PU-2200

MR-T2 刀锋伪影校正技术联合 DWI 对肿块型肺结核与周围型肺癌的鉴别诊断价值研究

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[摘要]目的：探索联合 MR-T2 加权成像 (T2 weighted imaging, T2WI) 与扩散加权成像 (Diffusion weighted imaging, DWI) 对肿块型肺结核 (Mass-like tuberculosis, MTB) 与周围型肺癌 (Peripheral lung cancer, PLC) 的鉴别诊断价值。方法：本回顾性研究共纳入 33 例 MTB、PLC 患者 (共 10 个男性, 23 个女性, 平均年龄 62.1 岁), 16 例 MTB, 17 例 PLC。两名经验丰富的放射科医师独立阅读 MR 图像, 并分别测量 T2 对比度比 (T2 contrast ratio, T2 CR) 及表观扩散系数 (Apparent diffusion coefficient, ADC) 值; Koyama 等提出使用 T2 CR 即肺肿块/结节的 T2 信号强度值除以右侧菱形肌的 T2 信号强度: 信号强度比值 (contrast ratio, CR) = 信号强度 (signal intensity, SI) 肺结节/SI 菱形肌。使用配对 t 检验来比较两组间的 T2CR 与 ADC 值, 使用 ROC 曲线来评估 MR-T2WI 与 DWI 的诊断效能。结果: 两名放射科医师对 T2CR 与 ADC 值观察者间一致性良好 (ICC 值分别为 0.932、0.905); ADC 值对二者鉴别诊断的敏感性、特异性及曲线下面积分别为 88.2%、93.7% 及 0.941, 诊断阈值为 $ADC=1140 \times 10^{-6} \text{mm}^2/\text{s}$, PLC 的 ADC 值显著低于 MTB。T2CR 值对二者鉴别诊断的敏感性、特异性及曲线下面积分别约 76.5%、62.5% 及 0.732, 诊断阈值为 1.99, PLC 的 T2CR 值显著低于 MTB。结论: MR 是一种很有前景的鉴别肿块型肺结核 (MTB) 与周围型肺癌 (PLC) 的方法, 诊断效能良好。

PU-2201

心脏磁共振 T1 mapping 技术及基于可变形配准算法的心肌形变分析在肥厚型心肌病中的初始研究

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目的: 探讨 CMR T1 mapping 技术及基于可变形图像配准算法的心肌形变分析在定量诊断 HCM 患者心肌纤维化和心肌形变的应用价值。

方法: 搜集 2020 年 1 月~2022 年 1 月在我院确诊为 HCM 患者 35 例、健康志愿者 40 例, 所有病例均行心脏磁共振检查, HCM 患者加扫延迟强化序列; 将增强前 T1 mapping 图像导入 Medis Suite 软件测得左室心肌初始 T1 值; 将心脏全部电影序列导入 TruFiStrain 软件中, 获得左室整体周向 (GCS)、径向 (GRS) 和纵向 (GLS) 应力。HCM 组按延迟强化方式分强化和无强化组; 按舒张末期左室壁厚度 (EDTH) 分 $15\text{mm} \leq \text{EDTH} < 20\text{mm}$ (A), EDTH (B) $\geq 20\text{mm}$, 心尖肥厚组 $13\text{mm} \leq \text{EDTH} < 18\text{mm}$ (C)。比较 HCM 组、对照组及各亚组间的初始 T1 值及各应变指标的差异。

结果:

(1) HCM 组、对照组及各亚组间 T1 mapping 技术相关值统计结果:

HCM 组左室整体初始 T1 值明显高于对照组[初始 T1 值: (1323.15±48.95) ms vs (1228.76±36.84) ms, $P<0.001$]; 强化组、无强化组、对照组的初始 T1 值相比, 差异均有统计学意义; A, B, C 三组的初始 T1 值差异无统计学意义

(2) HCM 组、对照组及各亚组间心肌形变分析相关值统计结果:

HCM 组的 GRS, GLS 均较对照组明显减低; 强化组的 GLS 和 GRS 较对照组减低且差异有统计学意义; A, B, C 三组的心肌应变差异无统计学意义 ($P>0.05$)

(3) ROC 曲线分析结果

左室 GRS 诊断肥厚型心肌病效能优于其他应变参数, 左室 GRS 诊断肥厚型心肌病的敏感性、特异性分别为 97.1%, 97.5%; 初始 T1 值诊断强化亚组的效能较高, 其敏感性和特异性为 65.2%, 100%

结论: 心肌初始 T1 值, GRS, GLS 可用于识别及定量评估 HCM 心肌纤维化及多个维度对心肌应变进行分析, GRS 的诊断效能最高; 初始 T1 值在强化亚组间的诊断效能最高; 采用 CMR T1 mapping 技术及心肌形变分析多参数联合定量评估 HCM 为临床提供有效的诊断证据。

PU-2202

Accuracy of artificial intelligence-based coronary artery calcium scoring in non-gated chest CT

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Objectives: To evaluate the risk category performance of artificial intelligence-based coronary artery calcium score (AI-CACS) software used in non-gated chest computed tomography (CT) on three types of thickness (1mm, 3mm, 5mm) images, considering the manual method as the standard.

Methods: A total of 112 patients who underwent both chest CT and electrocardiogram (ECG)-gated non-contrast enhanced cardiac CT with the same equipment at the same time in the study. AI-CACS software was based on a deep learning algorithm and was trained on multi-vendor, multi-scanner, and multihospital anonymized data from the chest CT database. The AI-CACS was automatically obtained from chest CT data by the AI-CACS software, while the manual CACS was obtained from cardiac CT data by the manual method. The correlation of the AI-CACS of different thicknesses and manual CACS, concordance rate and kappa value of the risk categories determined by the four methods were calculated. The risk category performance of the AI-CACS for dichotomous risk categories bounded by 0, 100 and 400 was assessed.

Results: The correlation of the AI-CACS of three different thicknesses (1mm, 3mm, 5mm) with the ECG-CT CACS were $p = 0.973(p<0.001)$, $0.941(p<0.001)$, $0.834 (p<0.001)$, respectively. The Bland-Altman plot (manual CACS minus AI-CACS of three different thicknesses) showed three mean differences of -6.5, 15.4, 53.1, respectively and 95% limits of agreement of -95.0 to 81.9, -96.6 to 127.4, -187.8 to 294.0, respectively. The agreement of risk categories for the CACS was kappa (κ) = $0.868(p < 0.001)$, $0.772(p < 0.001)$, $0.412 (p < 0.001)$, respectively, and the concordance rate was 91%, 84.8%, 62.5%. As dichotomous risk categories bounded by 0, 100 and 400, area under the curve of the AI-CACS of three different thicknesses were 0.996 vs. 0.900 vs. 0.785, 0.993 vs. 0.995 vs. 0.975, and 0.995 vs. 1.000 vs. 0.981, respectively.

Conclusions: The 1mm-AI-CACS could accurately quantify CACS as well as categorize risk. Acceptable agreement will enable one-stop chest screening and risk assessment of cardiovascular diseases for healthy physical examining personnel.

PU-2203

Differentiating diagnosis of atypical cardiac myxoma and thrombi by coronary computed tomography angiography imaging

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Objectives: The purpose of this study was to compare the imaging features of atypical cardiac myxoma from cardiac thrombi using coronary computed tomography angiography (CCTA) and to evaluate the value of CCTA in differential diagnosis.

Material and methods: From March 2017 until February 2022, 41 patients with atypical cardiac myxoma (n=18) and thrombi (n=23) confirmed by histologic examination after the operation or follow-up examination were included in this retrospective study. Two independent and blinded radiologists evaluated imaging features of atypical cardiac myxoma and thrombi on CCTA and reconstructed the neovascularization of the myxoma on a dedicated workstation.

Results: There was no significant difference in the size, shape, internal characteristics (calcification, cystic and necrosis) of myxoma in comparison with thrombi. The location, surface and enhancement pattern were significantly different between the cardiac myxoma and thrombi groups ($p < 0.05$, respectively). Specifically, supplied vessels were observed in the atypical cardiac myxoma group, while no neovascularization was detected in the thrombi group (83.33% vs. 0%, $p < 0.001$).

Conclusion: The location, surface and enhancement pattern have significance in distinguishing atypical cardiac myxoma and thrombi. The use of non-invasive CCTA by detecting the neovascularization of cardiac myxoma plays an essential role in the accurate diagnosis and surgical decision making of cardiac masses and is expected to replace invasive coronary angiography.

PU-2204

基于体素的定量 CT 对吸烟者肺小气道病变与肺气肿的定量研究

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摘要:目的 通过体素的定量 CT 对不同吸烟程度患者肺部定量分析, 筛选吸烟对肺结构损伤的敏感影像学定量指标。方法 收集 2021 年 11 月到 2023 年 4 月于延安大学附属医院体检胸部 CT 者, 根据吸烟程度分三组: 非吸烟者 39 例; 低吸烟指数者 30 例; 高吸烟指数者 35 例。均在进行 CT 双气相扫描后行肺功能检查, 测量指标包括 FVC、PEF、FEV1%和 FEV1/FVC, 将其导入数字肺平台, 获正常肺组织区域百分比 (PRMNormal%)、小气道病变区域百分比 (PRMfSAD%)、肺气肿区域百分比 (PRMEmph%) 三个定量指标。三组间肺功能指标和 CT 定量指标的差异采用单因素方差分析或 Kruskal-Wallis H 检验, 各 CT 定量指标与肺功能指标、吸烟指数的相关性采用 Pearson 及 Spearman 相关性分析。线性回归分析 CT 定量指标与吸烟指数、年龄和 BMI 的关系。结果 三组间中位年龄、吸烟指数、FEV1/FVC、PRMNormal%、PRMEmph%、PRMfSAD%差异具有统计学意义, $P < 0.05$; CT 定量指标 PRMNormal%、PRMEmph%、PRMfSAD%与 FEV1/FVC、吸烟指数均相关, 与 FVC、PEF、FEV1%不相关; 肺功能指标 FEV1/FVC 与吸烟指数相关。PRMNormal%与 FEV1/FVC 呈正相关, 与吸烟指数呈负相关; PRMEmph%、PRMfSAD%与 FEV1/FVC 呈负相关, 与吸烟指数呈正相关; 吸烟指数与 FEV1/FVC 呈负相关。单、多因素线性回归分析结果显示, 吸烟指数与 PRMNormal%、PRMEmph%、PRMfSAD%之间存在线性回归关系; BMI 与 PRMNormal%、PRMfSAD%之间存在线性回归关系。结论 肺功能指标对吸烟者早

期肺损伤的预测有一定作用, 基于体素的 CT 定量指标是吸烟早期肺结构损伤敏感指标, 对客观评估吸烟肺损伤严重程度有实用价值。

PU-2205

基于 AI 的新型冠状病毒突破性感染的 CT 表现和临床特征

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目的: 分析疫苗接种后新型冠状病毒感染(coronavirus disease 2019, COVID-19)肺炎的临床特点、胸部 CT 的特征及严重程度, 并与未接种疫苗患者进行比较, 评价接种疫苗对 COVID-19 的临床和 CT 特征的影响。**方法:** 回顾性纳入 2022 年 12 月 1 日至 31 日在解放军总医院第一医学中心急诊科就诊的 COVID-19 确诊患者, 按照疫苗接种状态将其分为 3 组: 未接种疫苗、部分接种疫苗、完全接种疫苗组。对 3 组患者的临床和 CT 影像特征进行分析。分类变量的组间差异使用 Pearson χ^2 检验或 Fisher 精确检验, 连续变量使用 Kruskal-Wallis 检验。使用 logistic 回归模型的优势比 (OR) 和 95% CI 来评估 CT 特征与疫苗接种之间的关系。使用来自负二项回归模型的比值比 (RR) 和 95% CI 来评估 AI 评分与疫苗接种之间的相关性。**结果:** 纳入 658 例 COVID-19 肺炎患者, 未接种疫苗组 291 例, 部分接种疫苗组 83 例, 完全接种疫苗组 284 例。部分接种、完全接种疫苗患者胸部 CT 中的索条、碎石路征、小叶内线比例显著低于未接种疫苗患者 ($P = 0.010$ 、 $P = 0.011$, $P < 0.001$)。3 组之间年龄(未接种疫苗组高于另两组)、合并症、CRP、中性粒细胞、淋巴细胞、红细胞计数差异显著(未接种疫苗比例高于另两组, $P < 0.001$)、血小板计数差异显著(未接种疫苗显著低于另两组, $P = 0.021$)。多因素分析后, 部分接种疫苗、完全接种疫苗 COVID-19 肺炎的 AI 总评分低于未接种疫苗组[OR, 0.77 (95% CI: 0.64, 0.93; $P = 0.006$)]、[OR, 0.82 (95% CI: 0.72, 0.94; $P = 0.004$)]。**结论:** 完全接种疫苗 COVID-19 肺炎的 AI 总评分较低, 新冠病毒疫苗对其突破性感染具有保护作用。

PU-2206

Feasibility analysis of non-ECG-triggered chest LDCT using a kV-independent reconstruction algorithm for predicting cardiovascular disease risk in patients receiving maintenance hemodialysis

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Purpose This study aimed to explore the feasibility and accuracy of non-electrocardiogram (ECG)-triggered chest low-dose computed tomography (LDCT) with a kV-independent reconstruction algorithm in assessing the degree of coronary artery calcification (CAC) and the risk of cardiovascular diseases in patients receiving maintenance hemodialysis (MHD).

Methods 181 patients receiving MHD who needed chest CT and coronary artery calcium score (CACS) scanings underwent non-ECG-triggered, automated tube voltage selection, high-pitch chest LDCT scan using a kV-independent reconstruction algorithm (research scan) and ECG-

triggered standard CACS scan (standard scan) sequentially. The image quality, radiation doses, CACS and cardiac risk classifications of the two scans were compared.

Results Among the 181 patients, 89, 83, and 9 underwent scanning at 100, 110, and 120 kV, respectively. Excluding those scanned at 120 kV, 172 patients were enrolled. The Visual Scores (VSs) of the research scan showed high interobserver agreement (ICC = 0.944; 95% CI: 0.925–0.958). A significant difference was observed between the non-ECG-triggered VS and the standard CACS Agatston score (AS) on cardiac risk classification ($\chi^2 = 34.333$, $P < 0.001$; weighted kappa value = 0.813; 95% CI: 0.756–0.869). The accuracy of cardiac risk classification of non-ECG-triggered VS was 77.91% (134/172), considering the cardiac risk classification of standard CACS AS as the gold standard. Although the ASs obtained from the research scan were lower than those obtained from the standard scan (739.90 ± 1098.38 vs 801.56 ± 1129.60 ; $P < 0.001$), the agreement and correlation of them were excellent, and intraclass correlation coefficients (ICCs) and Pearson's correlation coefficients were both >0.96 . No significant difference was observed in cardiac risk classifications between the two scans ($\chi^2 = 3.933$, $P = 0.269$), and the agreement was excellent (weighted kappa value = 0.936; 95% CI: 0.903–0.970). The accuracy of cardiac risk classification based on non-ECG-triggered AS was 92.44% (159/172). The effective radiation doses (ED) of the standard scan and the research scan were 1.34 ± 0.74 mSv and 1.04 ± 0.35 mSv. With the equivalent image quality, the average ED and CTDIvol of the research scan were reduced by 21.77% and 59.93%, respectively.

Conclusions A CT protocol using the non-ECG-triggered, automated tube voltage selection, high-pitch chest LDCT protocol with a kV-independent reconstruction algorithm can accurately demonstrate the degree of CAC, maintain the overall cardiac risk classification and significantly reduce the radiation exposure of patients.

PU-2207

肺移植术后 8 例并发肺部感染 CT 影像分析

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目的：通过对肺移植患者移植肺并发感染 CT 表现分析，旨在早期发现并准确诊断，提高患者术后生存率。方法：回顾性分析昆明市第一人民医院接受肺移植并导致并发肺部感染的 8 例患者的临床及 CT 影像资料。结果：8 例移植肺并发感染的患者中；单病原菌感染者 50.0%（4 例），嗜麦芽窄食单孢菌感染 37.5%（3 例），曲霉菌感染 12.5%（1 例）；混合性感染者 50.0%（4 例），肺炎链球菌感染、流血嗜血杆菌、真菌混合性感染 12.5%（1 例），肠杆菌、纹带棒状杆菌、洋葱伯克霍尔德菌混合性感染 12.5%（1 例），铜绿假单胞菌肺炎、脓肿分枝杆菌混合性感染 12.5%（1 例）；吡咯金黄杆菌、粘质沙雷菌、肺炎克雷伯菌混合性感染 12.5%（1 例）。移植肺并发感染的 CT 主要表现为多发云絮状改变 37.5%（3 例）；多发云絮状改变并实变影 25.0%（2 例）；多发云絮状改变及结节伴晕征、空洞 37.5%（3 例）。结论：肺移植术后并发肺部感染 CT 表现为多样性，但也有一定的特征性，结合临床资料及 CT 影像表现可早期发现并诊断，为临床治疗提供依据，最终提高患者术后生存率。

PU-2208

前纵隔上皮样血管内皮瘤一例

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本文报道前纵隔上皮样血管内皮瘤 1 例。患者男，58 岁，CT 显示前纵隔胸骨后方不规则软组织密度影，其内密度不均，可见钙化，边缘欠光整，分界不清，动脉期明显不均匀强化，静脉期病灶内可见条片状低密度影。右侧胸腔少许积液。病理诊断：上皮样血管内皮瘤。

PU-2209

人工智能辅助冠脉 CTA 诊断效能评估研究

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目的：探讨人工智能在冠状动脉 CTA 诊断中的应用价值。

方法：回顾性分析行冠状动脉 CTA 和冠脉造影术的冠状动脉粥样硬化性心脏病患者影像学资料。冠状动脉 CTA 图像分别由高年资医师和 AI 辅助诊断软件进行处理，评价 AI 辅助诊断软件在冠脉疾病诊断中的可行性及准确性。

结果：AI 辅助软件对冠状动脉 CTA 图像一键式重建分析并生成报告，用时较人工用时明显缩短。以冠脉造影为金标准，AI 检测冠脉狭窄的敏感度、特异度无统计学意义。以医师诊断为标准，AI 辅助诊断与医师诊断一致性较高。AI 辅助诊断还可对冠脉支架进行评估，与医师诊断差异无统计学意义。

结论：AI 辅助诊断在冠脉疾病诊断方面具有较高敏感度和准确性，极大提高了诊断效率，但仍有不足，仅可作为医师的辅助诊断工具。

PU-2210

采用磁共振心肌组织追踪技术定量评估心肌炎患者左室心肌应变力的变化

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目的：本研究的目的是通过磁共振心肌组织追踪技术定量评估心肌炎患者左室心肌应变力的变化规律。方法：连续性收集我院近两年确诊为心肌炎的患者 20 例，同时招募入组健康成年志愿者 37 例，利用磁共振成像 (MRI) 扫描图像，通过 CVI42 后处理软件测量左心室全局径向峰值应变 (GPRS)、全局纵向峰值应变 (GPLS)、全局周向峰值应变 (GPCS) 及心功能，进而探讨心肌炎患者与健康成年志愿者左室全局峰值应变和心功能的变化及相关性。结果：与健康成年志愿者相比，心肌炎患者舒张末期容积与左室射血分数显著降低 ($P<0.001$)，每搏输出量、心排出量及心指数降低 ($P<0.05$)；全局应变力下降，其中 GPRS、GPLS 远低于对照组，差异具有统计学意义 ($P<0.001$)，且 GPLS 最具鉴别效能，曲线下面积为 0.818，最佳阈值为 -12.995，敏感度和特异度分别为 75% 和 75.7%；此外，GPRS 与 GPCS 呈中度负相关 ($P<0.001$)，与 GPLS、ESV 呈轻度负相关 (P 均 <0.05)，与 EF 呈中度正相关 ($P<0.05$)；GPCS 与 EF 呈轻度负相关 ($P<0.05$)，与 ESV 呈中度正相关 ($P<0.001$)，与 EDV 呈轻度正相关 ($P<0.05$)。结论：心肌炎

患者左室壁应变力降低,并与心功能变化相关,可用于心肌炎的早期诊断,以提高 CMR 对心肌炎诊断的准确率。

PU-2211

Primary pulmonary angiosarcoma mimicking microscopic polyangiitis

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Background Primary pulmonary angiosarcoma is a rare highly aggressive tumor, accounting for 1-2% of all soft-tissue sarcomas, with early metastasis and poor prognosis. There are currently no guidelines or established treatment.

Methods We report the case of a 54-year-old woman who presented with intermittent cough, hemoptysis and melena over 3 months. CT pulmonary angiogram (CTPA) showed there were no filling defects in main pulmonary artery and branches. Thoracic axial CT images showed bilateral diffuse ground-glass opacity (GGO) representing intra-alveolar blood, with consolidation in the right middle lobe 7 days later, and bilateral consolidation and crazy-paving 18 days later. The patient suffered from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) 3 months ago.

Results The case was initially suspected of microscopic polyangiitis, CT guided biopsy was performed and histopathologic result was pulmonary angiosarcoma. Finally, he was subsequently discharged of his own free will and with an overall survival of 5 months. **Conclusion** It is important to be aware of angiosarcoma in the differential diagnosis of bilateral GGOs with halo sign because it may mimic inflammation or infection at early stage.

PU-2212

基于介入治疗的冠状动脉瘘 CTA 价值分析

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目的 探讨多层螺旋 CT 血管成像(CTA)对冠状动脉瘘(CAF)的诊断价值。

方法 回顾性分析经介入治疗的 17 例冠状动脉瘘(CAF)的 CTA 资料,对原始图像进行多平面重组(MPR)、曲面重组(CPR)、最大密度投影(MIP)及容积重建(VR)等后处理,对比 DSA 图像,分析 CTA 对于 CAF 的显影价值。

结果 17 例 CAF 患者 DSA 共计发现冠状动脉瘘血管 40 支,直径范围 1.2-6.5mm,其中,冠状动脉-肺动脉瘘 15 例 37 支,肺动脉处均见浓染,冠状动脉-左心室瘘 2 例 3 支。

CTA 发现 17 例 37 支瘘血管(检出率 93%),3 支直径 $\leq 1.2\text{mm}$ 细小冠状动脉-肺动脉瘘血管 CTA 未能确切识别,1 支位于 RCA 开口处,2 支位于 LM 远端,均为局限性多发细小瘘血管 CTA 未能全部显影所致。6 例瘘血管合并动脉瘤形成。8 例患者同时检出冠状动脉粥样硬化,2 例患者合并肺动脉高压。

结论 CTA 能够准确显示 CAF 瘘血管的解剖细节及血流动力学改变,运用 CT 多种后处理技术能够直观地显示 CAF 瘘血管形态及走行。对于局限性多发细小瘘血管,CTA 可能会遗漏细小瘘血管,而对于合并其他心脏大血管病变、冠状动脉斑块性质评估,CTA 价值较大。

PU-2213

全心非对比剂冠状动脉加速 MRI:压缩感知与灵敏度编码的对比研究

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目的 评估压缩感知 (CS) 与灵敏度编码 (SENSE) 两种不同加速采集技术获得的全心非对比剂冠状动脉磁共振图像对狭窄 $\geq 50\%$ 的冠状动脉的诊断性能。**方法** 前瞻性纳入郑州大学第一附属医院疑诊为冠状动脉疾病 (CAD) 的患者 52 例, 年龄 (45 ± 16) 岁, 其中男 28 例、女 24 例。所有患者均完成压缩感知加速因子 4 磁共振冠状动脉成像 (CS4) 及 SENSE 加速因子 2 磁共振冠状动脉成像 (SENSE2), 其中 17 例患者完成冠状动脉计算机断层扫描血管造影成像 (CCTA)。以 CCTA 图像的诊断为参考标准, 通过 ROC 曲线评估 CS4、SENSE2 以及两种技术联合成像对直径减小 $\geq 50\%$ 的冠状动脉狭窄的诊断性能。**结果** 52 例患者采用 CS4、SENSE2 冠状动脉成像的采集时间分别为 (6.4 ± 2.2) min 和 (11.6 ± 4.2) min, 差异有统计学意义 ($t = -7.898$, $P < 0.001$)。CS4、SENSE2 以及两者联合成像在患者血管层面诊断狭窄程度 $\geq 50\%$ 的冠状动脉的敏感度分别为 70.6%、64.7%、70.6%; 特异度分别为 88.2%、88.2%、91.2%; 阳性预测值分别为 75.0%、73.3%、80.0%; 阴性预测值分别为 85.7%、83.3%、86.1%; 准确度分别为 82.4%、80.3%、84.3%。ROC 曲线显示 CS4、SENSE2 及联合成像的曲线下面积 (AUC) 分别为 0.791、0.765、0.809, 三种评估方法间有着近似的诊断效能, AUC 比较结果 P 值均大于 0.05。**结论** 压缩感知技术可以有效缩短全心非对比剂冠状动脉成像的扫描时间, 4 倍 CS 加速的全心非对比剂冠状动脉成像图像质量及诊断效能与传统 2 倍 SENSE 加速的成像结果相当。

PU-2214

Optimizing the Training Dataset Size for U-Net-Based Cardiac Image Segmentation

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Aim: The objective of this study is to explore the optimal size of the training dataset required to attain a high level of segmentation accuracy in U-Net-based Medical Image Segmentation.

Method: We calculated the sample size using the learning curve fitting method. We conducted training on U-Net-Based models for left ventricular myocardial segmentation using a series dataset consisting of different sizes (5, 10, 15, 20, 40, 60, 80, 100, 150). For each sample size, we recorded the Dice coefficient, which is a measure of similarity between the predicted segmentation and the ground truth. The ground truth segmentations were obtained through manual segmentation performed by a radiologist with 10 years of experience in reviewing cardiovascular images. All cardiac imaging data used for segmentation were DICOM data acquired using second-generation or third-generation dual-source CT scanners (SOMATOM Definition Flash, SOMATOM Force, Siemens Healthcare) through prospective ECG-gated scanning. We applied the inverse power law function $y = f(x, a, b) = 1 + ax^b$ to fit the learning curve. In this function, x represents the training sample size, y represents the Dice coefficient, and a and b are the fitting parameters. By utilizing the learning curve, we made projections of the Dice coefficient at a specific sample size.

Results: Based on the predictions derived from the learning curve model, it is estimated that a sample size of 183 would yield a Dice coefficient of 0.95, a sample size of 1027 would result in a Dice coefficient of 0.98, and a sample size of 3785 would achieve a Dice coefficient of 0.99.

Conclusion: Through the application of the learning curve fitting approach, we have determined that a specific number of training samples is essential in attaining elevated Dice coefficients, such as 0.95, 0.98, and 0.99. The utilization of the inverse power law learning curve fitting technique proves to be an effective means of estimating the requisite sample size for training models.

PU-2215

冠状动脉—肺动脉瘘 CT 表现及机制探讨

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目的 分析冠状动脉-肺动脉瘘 (CPF) 的 MDCT 冠状动脉造影 (CCTA) 的影像特点及机制探讨。
方法 收集并分析近 3 年间于杭州师范大学附属医院及浙江绿城心血管病医院 31 例经 CCTA 确诊 CPF 临床资料, 其中男 14 例, 女 17 例, 年龄范围 28 岁~80 岁, 平均年龄 59.81 ± 13.74 岁。采用容积再现 (VR)、多平面重组 (MPR)、曲面重组 (CPR) 及最大密度投影 (MIP) 观察 CPF 瘘血管的起源、数目、走形、瘘口及继发改变。测量同层面升主动脉及主肺动脉 CT 值, 并计算两者差值。结果 31 例确诊 CPF 的患者中, 双侧冠状动脉同时供血 11 例, 单侧冠脉供血 20 例 (起源于左侧冠状动脉 15 例, 均由左侧圆锥支发出; 起源右侧冠状动脉 5 例, 均由右圆锥支发出)。31 例 CPF 均可见迂曲不规则“簇状”畸形血管团, 肺动脉内可见“喷射征”3 例, “浓染征”10 例, 伴动脉瘤形成 14 例 (其中 1 例动脉瘤内血栓形成), 动脉瘤测量最大长径及与之正交的短径, 取两者平均值, 动脉瘤经线范围 5.2mm~52.0mm, 平均 11.2mm。瘘口均开口于肺动脉左侧壁, 瘘口大小范围 0.7mm~6.6mm, 平均 2.6mm。出现“喷射征”与“浓染征”组共 14 例, 升主动脉与主肺动脉密度 CT 值差 ΔCT 范围 111HU~352HU, 平均 ΔCT 222HU, 非“喷射征”与“烟雾浓染”组共 18 例, 升主动脉与主肺动脉密度 CT 值差 ΔCT 范围 -35HU~95HU, 平均 ΔCT 27HU。结论 CCTA 能准确无创检出 CPF, 显示瘘血管与周围结构的空間关系, 迂曲扩张“簇状”血管团及“喷射征”是典型表现。

PU-2216

PET-MRI 和 PET-CT 对肺癌临床分期的统筹对比分析

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近年来, PET/MRI 作为一种新兴的联合成像技术, 它的临床应用实践正在快速增长, 尤其在恶性肿瘤的 TNM 分期评估。而 PET/CT 作为一种成熟的成像技术, 已被广泛运用于各种恶性肿瘤的临床分期, 因此对比评估 PET/MRI 与 PET/CT 对非小细胞肺癌 (NSCLC) 的分期及转移也引起了人们的极大关注。然而, 运用 PET/MRI 与 PET/CT 进行评估 NSCLC 临床分期面临着技术问题及诊断图像质量方面的挑战。对此, 我们对已发表的有关 NSCLC 临床分期的文献进行了检索, 着重总结对比 PET/MRI 与 PET/CT 对 NSCLC 临床分期的准确性和技术问题。

PU-2217

心外膜脂肪体积变化与冠状动脉粥样相关性研究

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目的:本研究主要探究肺癌筛查体检人群中冠状动脉粥样硬化与心外膜脂肪体积的相关性。

材料与方法:

第一部分:搜集 2018 年 1 月-2022 年 12 月于重庆医科大学附属永川医院行胸部低剂量 CT 扫描的肺癌筛查体检者 1000 例,年龄 18-70 岁,分为冠状动脉粥样硬化阳性组和阴性组,分别测量其左冠状动脉周围心外膜脂肪体积和右冠状动脉心外膜脂肪体积和总和体积,测量层面从肺动脉主干至心尖部,手动勾画每一个层面,并计算最终结果。采用非参数检验统计分析两组的心外膜脂肪体积有无差异,采用相关性分析心外膜脂肪体积与冠状动脉粥样硬化的相关性。

第二部分:搜集 2018 年 1 月-2022 年 12 月于重庆医科大学附属永川医院行两次及以上胸部低剂量 CT 扫描的肺癌筛查患者,从中筛选出新发冠状动脉粥样硬化组和持续阴性组人群,分别测量新发组首次和间隔 2 年、5 年的病灶侧心外膜脂肪体积,多发病灶患者测量右冠周围心外膜脂肪体积,以及持续阴性组右冠周围心外膜脂肪体积,测量方式同第一部分。统计分析新发组患者首次和间隔 2 年、5 年的病灶侧心外膜脂肪体积是否具有差异及与阴性组之间是否具有差异。新发组病灶侧心外膜脂肪体积变化量与冠状动脉粥样硬化发生的相关性。采用 ROC 曲线分析右冠周围心外膜脂肪体积变化量预测发生冠状动脉粥样硬化的敏感性、特异性。

预期结果:

第一部分:冠状动脉粥样硬化阳性组与阴性组间冠状动脉周围心外膜脂肪体积差异有统计学意义, $P<0.05$ 。与冠状动脉粥样硬化相关性右冠状动脉周围心外膜脂肪体积大于左冠状动脉周围心外膜脂肪体积,均呈正相关。

第二部分:冠状动脉粥样硬化新发组 2、5 年心外膜脂肪体积均与首次心外膜脂肪体积有明显差异。首次右冠状动脉周围心外膜脂肪体积 2、5 年变化量与新发冠状动脉粥样硬化有较强相关性。其中与新发冠状动脉粥样硬化 5 年变化量相关性大于 2 年变化量。当右冠周围心外膜脂肪体积变化量达到某一数值时其预测冠状动脉粥样硬化的敏感性、特异性较高。

结论:

肺癌筛查体检者心外膜脂肪体积与冠状动脉粥样硬化呈正相关。心外膜脂肪体积变化量可以预测冠状动脉粥样硬化发生的概率。

PU-2218

主动脉壁间血肿 CTA 特征与 D-二聚体水平的相关性研究

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目的 探讨主动脉壁间血肿在 CTA 上的影像学特点,并对量化后的主动脉壁间血肿形态学指标与血 D-二聚体水平进行相关性分析。方法 回顾性分析 2017~2021 年我院 CTA 诊断 IMH 的患者 18 例。所得图像导入工作站进行三维重建。计算每个病例的血肿长度、血肿最大截面积、血肿最大截面积比、管腔狭窄率、血肿容积指数,并同时检测每位 IMH 患者的血 D-二聚体值。按照血肿厚度和直径分为低风险组和高风险组,比较两组的血 D-二聚体水平有无统计学差异;并将血 D-二聚体值和血肿长度、血肿最大截面积比、管腔狭窄率、血肿容积指数分别进行相关性分析。结果 ①壁间血肿 CTA 特征主要表现为主动脉壁新月形或环形增厚,无内膜片移位,主动脉管腔受压,钙化内移,同时可伴有溃疡样突起和壁内血池。②高风险组与低风险组的血 D-二聚体水平存在统计学差异。

③D 二聚体值与血肿体积指数之间呈正相关($r=0.550$, $P<0.05$), D 二聚体值与血肿长度、血肿最大截面积比、狭窄率之间相关性不显著($P>0.05$)。结论 量化后的 CTA 形态学指标联合血 D 二聚体水平对预测 IMH 的高风险具有一定应用价值。

PU-2219

主动脉夹层 TEVAR 术后肾体积减少的流体力学研究

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目的: 探讨基于计算流体力学 (computational fluid dynamics, CFD) 研究 B 型主动脉夹层 (type B aortic dissection, TBAD) 胸主动脉腔内修复术 (thoracic endovascular aortic repair, TEVAR) 术后血流动力学改变与肾体积减少之间的潜在关系。

方法: 回顾性分析 TEVAR 术前及术后 1 年时 CTA 图像。基于 CTA 构建主动脉模型并进行 CFD 模拟, 获取主动脉入口及肾动脉入口的收缩末期压力及质量流量。测量双肾在手术前后体积变化, 根据体积是否减少分为正常组和减少组。

结果: 102 例肾脏中 73 例体积减少。与正常组相比, 减少组主动脉入口压力 ($P=0.019$)、质量流量比 ($P=0.000$)、压力比 ($P=0.046$) 增高, 而肾动脉入口质量流量 ($P=0.000$) 减低。质量流量比 (OR: 0.981, 95%CI: 0.970-0.992; $p=0.001$)、主动脉入口压力 (OR: 0.585, 95%CI: 0.357-0.957; $p=0.033$) 为肾体积减小的独立风险因素。基于质量流量比、主动脉入口压力、质量流量比与主动脉入口压力相结合的模型预测肾体积减少的效能分别为 0.791 (95%CI: 0.699-0.882)、0.649 (95%CI: 0.533-0.766) 和 0.822 (95%CI: 0.097-0.259)。

结论: 主动脉夹层 TEVAR 术后肾体积减少与血流动力学改变密切相关, 基于 CFD 获得的血流动力学参数可能有助于早期预测术后肾体积减少。

PU-2220

基于 CCTA 影像组学预测慢性完全闭塞病变形成

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目的: 本研究旨在基于基线冠脉狭窄 CCTA 影像组学准确预测慢性完全闭塞(CTO)病变形成。

方法: 回顾收集 2008-2023 年冠脉造影(ICA)诊断至少有 1 条狭窄 $\geq 70\%$ 血管且一年前接受过 CCTA 的患者。共有 79 例 ICA 证实 CTO (CTO 组) 且在 1 年前行 CCTA 检查以及 1: 2 匹配 148 例 ICA 上至少一直血管 $>70\%$ (非 CTO 组)。对于所有基线 CCTA 冠脉病变进行定性评估以及半自动化斑块定量以及提取了 896 个影像组学特征。构建机器学习模型用以探究影像组学特征区分进展为 CTO 与进展为非 CTO 的增量价值。

结果: 进展为 CTO 组与进展为非 CTO 组的临床基线特征没有统计学差异。进展为 CTO 组有更小的管腔直径、更长的病变以及更多的不良斑块特征相比进展为非 CTO 组患者。进展为 CTO 组的斑块有更高的非钙化斑块体积、更高的重塑指数, 以及更低的低密度斑块相比进展为非 CTO 组。进展为 CTO 与进展为非 CTO 的影像组学评分不同 (0.51 vs 0.21; $p<0.01$)。当包含基线 CCTA 特征的机器学习模型加入影像组学特征时, 基于 CCTA 影像组为预测 CTO 病变形成提供了增量价值 (0.81 vs 0.72; $p<0.01$)。

结论：进展为 CTO 与进展为非 CTO 有着不同的影像组学特征评分。所构建的模型可以更加准确的预测 CTO 病变形成。

PU-2221

Comparison of image quality for patients with coronary artery bypass grafts between conventional and spectral CT imaging using AI-based motion-compensated reconstruction

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PURPOSE:

To investigate the feasibility of combining spectral CT imaging and AI-based motion-compensated reconstruction (MCR) for patients with coronary artery bypass grafts (CABG) by comparing with polyenergetic CT images.

METHOD:

CT coronary angiography can assess the graft noninvasively with high diagnostic accuracy, but the image quality is affected by the resolution of the imaging device. The second-generation dual-layer spectral CT increases the width of the detector from 4cm to 8cm compared with the first-generation device, the scanning time is shorter, which is more beneficial to the CT angiography examination of patients after bypass surgery, and the requirements for heart rate and inspiratory closure of patients will be relatively relaxed.

We prospectively recruited 31 patients with coronary artery bypass grafts with clinical indications for CCTA examination at a second-generation dual-layer spectral CT (DLCT). Patients' heart rates were not controlled before the examination. The conventional and spectral CT images were obtained synchronously by each scan and reconstructed by MCR. Conventional 120 kVp polyenergetic images (PI) were defined as Group A. Virtual monoenergetic images (VMIs) in 50 keV were defined as Group B. For quantitative image quality, CT attenuation, signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR) were determined by ROI measurements in all patients. Subjective evaluation of the image quality was performed independently by two blinded reviewers using a 5-point scale in artifacts, lumen continuity, and overall contrast (5 = excellent, 1 = poor).

Results:

The mean heart rate of the patients during the scan was 74.7 ± 9.2 . $HR < 75$ bpm in 18 cases and $HR \geq 75$ bpm in 13 cases. The overall interpretability of the CABG and natural coronary segments were 100% and 96.7%. Group B had higher enhancement, SNR, CNR in AO and coronary arteries than Group A. The mean attenuation was higher in group B than in group A in AO (964.2Hu vs 395.3Hu ; $p < 0.05$) and coronary ($823.3 \pm 229.1\text{Hu}$ vs $416.9 \pm 91.0\text{Hu}$ for RCA, $788.9 \pm 282.2\text{Hu}$ vs $354.3 \pm 104.7\text{Hu}$ for pLAD, and $753.1 \pm 243.8\text{Hu}$ vs $397.5 \pm 106.8\text{Hu}$ for pLCX, all $p < 0.05$). Subjective image quality was higher in group B than in group A (4.5 ± 0.5 vs 4.2 ± 0.5 ; $p < 0.05$).

Conclusion:

The second-generation DLCT allows for an excellent interpretable assessment of CABG and natural coronary arteries. Compared with PI, CCTA images obtained by 50keV VMI and MCR provided higher image quality for patients with CABG, even with a high heart rate.

PU-2222

基于负荷心肌灌注联合冠状动脉 CT 血流储备分数分析冠状动脉 临界病变患者预后

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目的：本研究旨在探讨动态负荷心肌灌注成像（MPI）与冠状动脉计算机断层血管造影（CCTA）衍生的血流储备分数（FFR-CT）在评估冠状动脉临界病变患者预后中的价值。

材料和方法：回顾性分析哈尔滨医科大学附属第二医院 2021 年 1 月至 2022 年 12 月均接受 CCTA 和 MPI 扫描且诊断为冠状动脉粥样硬化型心脏病临界病变的患者 112 例。记录患者性别、年龄、高血压、糖尿病、血脂、吸烟史、家族史等信息，使用 CCTA 对患者的梗阻进行评估并进行 CAD-RADS 分级，MPI 评估心肌缺血，FFR-CT 评估冠状动脉血流储备学分数。主要结局为全因死亡率和非致死性心肌梗死（D/MI），次要结局为患者检查 3 个月后发生心律失常、心衰或因心脏疾病再入院。采用嵌套多变量 cox 回归模型对患者的预后进行分析，赤池信息准则（AIC）、一致性指数（C-index）和重分类改善指数（NRI）用来比较各个模型的性能。

结果：112 例患者的中位随访时间为 16 个月，其中 8 例患者出现主要结局，35 例患者出现次要结局。经单变量 Cox 模型调整后的结果显示，收缩压、舒张压、FFR-CT 与 CT-CTP 灌注是心肌缺血患者出现次要结局的独立影响因素。在应用嵌套多变量 COX 回归建立的 6 个模型中，联合 FFR-CT、MPI 和基线信息的模型结果可预测次要结局（HR: 4.071, 95% CI: 1.835-9.031, P=0.0006; HR: 4.749, 95% CI: 1.876-12.024, P=0.0010）。此外，AIC、C-index、NRI 均表明加入基线、FFR-CT 和 MPI 与其他模型相比可以对冠状动脉粥样硬化型心脏病临界病变的高危患者进行更好的风险分层。

结论：在冠心病心肌缺血的高危患者中，FFR-CT 与 MPI 联合使用可成为监测患者临床预后的潜在指标。

PU-2223

心外膜脂肪体积变化与 BMI 变化的关系

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目的：探讨 EAT 体积变化与体重指数（BMI）变化的关系。**方法：**收集 60 例大于两次 MDCT 冠状动脉造影（CTA）检查的患者，采用西门子 64 排双源螺旋计算机断层摄影术（CT），工作站自带的 volume 软件测量两次检查患者的心外膜脂肪体积，根据体重计算 BMI，应用 SPSS 26.0 进行统计学分析，进行 Pearson 相关性分析，比较患者 EAT 体积变化与 BMI 变化的相关性，用秩和检验比较超重/肥胖和体重正常组、血脂异常组和血脂正常组的 EAT 体积。**结果：**1.超重/肥胖组比体重正常组 EAT 体积高，差异有统计学意义（ $p<0.05$ ）。2.血脂异常组比血脂正常组 EAT 体积高，差异有统计学意义（ $p<0.05$ ）。3.EAT 体积变化与 BMI 变化呈中度正相关（ $r=0.55$, $P<0.001$ ）。**结论：**EAT 体积与超重/肥胖、血脂异常相关，EAT 体积变化与 BMI 变化呈中度正相关，即 EAT 体积随着 BMI 的增加而增加、随 BMI 的减小而呈减少趋势。

PU-2224

一站式冠脉 CT 成像的应用现状

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摘要】 随着 CT 设备不断地创新和改善, CT 成像已逐步成为冠脉检查不可或缺的一环, 同时, 基于 CT 各种新技术的发展, 一次冠脉 CT 成像能获得更多影像学数据, 同时也为临床诊疗提供了新的影像学证据。冠状动脉钙化斑块(Coronary Artery Calcification, CAC)的检测在对冠脉高危钙斑的前期筛查中起到不可轻视的作用, 有利于高危钙斑的及时检出。冠状动脉 CT 血管造影 (Cardiac CT Angiography, CTA) 目前已成为检测冠心病的首选无创检查项目, 并且依赖于其成像方案的多样性, 可通过改变扫描参数应用于冠状动脉旁路移植术的术前评估、胸痛三联症一站式成像的开展以及心脏瓣膜病的检测。冠状静脉 (Cardiac CT Venous, CTV) 血管造影也成为左心室起搏、靶向药物治疗、心律失常消融等临床工作开展前的重要影像依据; 心肌灌注 (CT Myocardial Perfusion, CTP) 也成为主流的评价心脏血供及诊断心肌疾病的成像技术。与此同时, 基于冠脉 CT 原始数据由人工智能所衍生的 CT 血流储备分数(CT-Fractional Flow Reserve, CT-FFR)、CT 管腔内衰减梯度(Transluminal Attenuation Gradient, TAG)、CT 血管壁面剪切应力 (Wall Shear Stress, WSS)、CT 轴向斑块应力(Axial Plaque Stress, APS)、CT 冠脉周围脂肪衰减指数(Fat Attenuation index, FAI)、CT 心肌细胞外容量 (CT-ECV) 等逐渐成熟的新兴技术也为临床治疗心脏疾病提供了更多更丰富的数据资料, 提高了诊断的准确性。近期热门的光谱 CT 冠脉成像在降低了噪声和各种伪影的同时带来了更好的空间分辨率和优秀的软组织对比度, 让心血管 CT 成像上升到了一个新的高度。随着心血管 CT 新技术的不断创新与改善, 今后会诞生出更多成像质量更高、信息量更丰富的影像数据, 此举也为广大患有心血管疾病的患者提供更好更精准的医疗保障。

PU-2225

多层螺旋 CT 对薄壁囊腔型肺癌诊断的影像学征象特点分析

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目的 研究多层螺旋 CT 诊断薄壁囊腔型肺癌的诊断价值和影像学特点。

方法 本文的研究对象为 2020 年 3 月到 2022 年 10 月到医院进行治疗的 152 例肺癌患者, 所有患者入院后均经过多层螺旋 CT 进行诊断, 并以病理诊断结果为金标准, 分析多层螺旋 CT 诊断薄壁囊腔型肺癌的价值和影像学特征。

结果 ①经病理诊断确诊薄壁囊腔型肺癌 19 例, 而多层螺旋 CT 检出薄壁囊腔型肺癌 16 例, CT 诊断和病理诊断结果差异不显著 ($P>0.05$); ②经多层螺旋 CT 诊断薄壁囊腔型肺癌的阳性预测值为 93.75%、阴性预测值为 97.06%、敏感度为 78.95%、特异度为 99.25%、准确度为 96.71%、约登指数为 78.2%、误诊率为 0.75%、漏诊率为 21.05%; ③多层螺旋 CT 诊断薄壁囊腔型肺癌具有特征性的影像学图像表现。

结论 薄壁囊腔型肺癌属于一种特殊类型的肺癌, 近年来发病率有升高的趋势。经多层螺旋 CT 对薄壁囊腔型肺癌进行诊断与病理诊断结果没有明显的差异, 可作为对患者临床诊断的主要参考依据, 能为临床的诊断和治疗工作提供参考。

PU-2226

基于解剖结构与流体力学对心肌桥-壁冠状动脉患者桥前斑块形成的临床研究

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【目的】

利用心肌桥-壁冠状动脉患者的临床特征, 心肌桥的解剖学参数及 CT-FFR 和 WSS 等流体力学参数评估左冠状动脉前降支心肌桥桥前近端斑块形成的预测价值。

【材料与方法】

本研究回顾性搜集 2011 年 2 月至 2021 年 2 月在我院进行 2 次及 2 次以上 CCTA 检查且检查结果显示左冠状动脉前降支存在心肌桥-壁冠状动脉的患者共 178 例, 记录心肌桥-壁冠状动脉患者的性别、年龄等人口学资料和临床相关危险因素。在 CCTA 影像图像上测量心肌桥解剖参数。运用 t 检验、Mann-Whitney U 检验比较两组间不同临床因素, 各组内两期不同位置的 CT-FFR、WSS 值、P 值间的差异, 比较两组间的不同参数是否存在统计学差异。采用多因素 Logistic 回归分析患者临床特征、心肌桥各参数及基于 CCTA 图像所衍生的各个参数与心肌桥斑块形成的关系, 采用多因素逻辑回归分析, 计算比值比 (odds ratio, OR) 和 95% 置信区间 (confidence interval, CI)。并采用受试者操作特征曲线计算曲线下的面积值, 计算不同模型不同模型的准确性、敏感性、特异性及约登指数和曲线下面积。

【结果】

该研究共纳入 178 例左冠状动脉前降支心肌桥患者, 43 例患者心肌桥近端斑块形成。两组间基线心肌桥形态学参数, 无斑块形成组心肌桥的位置较斑块形成组远 ($P < 0.001$), 且收缩期狭窄程度与收缩期压迫指数在两组间差异存在统计学意义 ($P = 0.016$, $P = 0.013$)。余包括心肌桥长度、深度、心肌桥入口处的角度及舒张期狭窄程度间差异均无统计学意义 (所有 $P > 0.05$)。两组间心肌桥近端舒张期管壁压强值的差异具有统计学意义 (P 值 < 0.05), 两组间收缩期与舒张期的其他位置管壁压强值的差异没有统计学意义 (P 值 > 0.05)。多因素分析显示心肌桥的位置 ($OR = 0.951, 95\%CI: 0.924-0.979, P = 0.001$) 是预测桥前段斑块形成的独立危险因素。

【结论】

总之, 将 CT-FFR 和 WSS 及相应压力值与心肌桥解剖学参数相结合合并临床特征可以提高心肌桥单独解剖学参数合并临床特征对斑块形成的预测价值有助于提高对心肌桥前端斑块形成预测的能力。

PU-2227

基于解剖结构与流体力学对心肌桥-壁冠状动脉患者桥前斑块进展的临床研究

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【目的】

利用心肌桥-壁冠状动脉患者的临床特征, 心肌桥的解剖学参数及 CT-FFR 和 WSS 等流体力学参数评估左冠状动脉前降支心肌桥桥前近端斑块进展的预测价值。

【材料与方法】

本研究回顾性搜集 2011 年 2 月至 2021 年 2 月在我院进行 2 次及 2 次以上 CCTA 检查的患者, 且左冠状动脉前降支存在心肌桥-壁冠状动脉的一共 152 位。记录心肌桥-壁冠状动脉患者的性别、年龄等人口学资料和临床相关危险因素。在 CCTA 图像上测量心肌桥的解剖参数。利用 cFFR 软件测

量收缩期及舒张期心肌桥的 5 个位置分别的 CT-FFR 值, 心肌桥近端与远端的差值记为 Δ CT-FFR。并利用斑块分析后处理软件对桥前斑块进行定性定量分析, 判断斑块是否进展。运用 t 检验、Mann-Whitney U 检验比较两组间不同影响因素, 各组内两期不同位置的 CT-FFR、WSS 值、P 值间的差异, 比较两组间的不同参数是否存在统计学差异。采用多因素 Logistic 回归分析患者各个参数与心肌桥斑块形成的关系。并采用受试者操作特征曲线计算曲线下的面积值, 计算不同模型不同模型的准确性、敏感性、特异性, 约登指数和曲线下面积。数据分析均基于患者层面进行统计分析。评估不同模型对心肌桥-壁冠状动脉患者桥前段斑块进展的判断能力及临床预测价值。

【结果】

该研究共纳入 152 例左冠状动脉前降支心肌桥患者, 96 例患者心肌桥近端斑块进展。两组间收缩期心肌桥段管壁压强值的差异存在统计学意义 ($P < 0.05$)。桥后段压强值均低于桥前段管壁受压。两组间收缩期与舒张期的其他位置壁压强值的差异没有统计学意义 ($P > 0.05$)。logistic 二元回归分析结果, 显示糖尿病是预测桥前段斑块进展的独立危险因素。心肌桥的长度、心肌桥收缩期压迫指数是预测桥前段斑块形成的独立危险因素。模型 6 的曲线下面积高于模型 1、模型 2、模型 3、模型 4、模型 5。

【结论】

总之, 本研究发现临床危险因素和舒张期 CT-FFR 值是左冠状动脉前降支心肌桥近端粥样硬化斑块进展的重要影响因子, 将心肌桥患者临床特征、CT-FFR 和 WSS 及相应 P 值与心肌桥形态学参数相结合可以提高心肌桥解剖学参数和临床特征对斑块进展的预测价值与诊疗意义

PU-2228

Massive hemothorax induced by pulmonary arteriovenous malformation rupture: a case report and literature review

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Pulmonary arteriovenous malformation (PAVM), also known as pulmonary arteriovenous fistula, is a rare vascular developmental anomaly. Most cases of PAVM are associated with hereditary hemorrhagic telangiectasia (HHT). Hemothorax associated with PAVM is even rarer, and management concerning this complication still challenges. Here, we present a case of a giant PAVM complicated by hemothorax and perform a PubMed search to review 30 similar cases from January 2000 to July 2023. The reasons for the initial failure of interventional embolization are discussed through comprehensive evaluation based on our case and literature review. By studying and analyzing previous cases, we try to summarize the evidence regarding consideration for the diagnosis and treatment of PAVM complicated with hemothorax.

PU-2229

Established Risk Models to predict In-hospital Mortality in Acute Aortic Dissection

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Objective: The aim of the study was to explore the value of clinical, imaging parameters and their combination in predicting the in-hospital mortality of patients with acute aortic dissection (AAD),

and to construct mortality risk prediction models for AAD patients convenient for clinical management.

Patients and Methods: This study was a single-center retrospective study. Between January 2018 and December 2022, 263 inpatients of the Second Affiliated Hospital of Harbin Medical University, who were diagnosed with AAD by computed tomography angiography (CTA). Using univariate and multivariate logistic regression to analyze the clinical and imaging parameters between the two groups, to identify potential risk factors associated with AAD in-hospital mortality.

Results: The overall in-hospital mortality of AAD patients was 30.42%. Univariate logistic regression analysis indicated that renal insufficiency, type A aortic dissection, D-dimer, troponin, white blood cell (WBC) count, monocyte count, neutrophil to lymphocyte ratio (NLR), eosinophil count, fibrinogen, prothrombin time (PT), P values of these 10 indicators were < 0.05 , which may be a risk factor for in-hospital death in AAD patients. Further multivariate logistic regression analysis showed that clinical indicators including WBC count, NLR, and imaging parameters including false lumen area, number of branches involved, and pericardial effusion were independent risk factors for in-hospital death in AAD patients. The area under the ROC curve (AUC) was 0.926 (95%CI=0.887-0.955).

Conclusion: We developed a simple nomogram prediction model for mortality risk using clinical and imaging parameters independently associated with in-hospital mortality in AAD. Although the model has not been validated in an independent population, it can help clinicians choose patient management methods and inform patients and the severity of the disease.

PU-2230

回顾性研究脂肪组织对血管粥样硬化炎症进展的反向作用

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目的: 冠状动脉血管粥样硬化会向其周围的脂肪组织释放炎症因子抑制前脂肪细胞的分化, 脑动脉周围无脂肪组织且存在脑脊液循环, 因此该研究的目的是通过比较冠状动脉与脑动脉粥样硬化的一致性探究脂肪组织对血管粥样硬化炎症进展是否存在反向作用。

方法: 该研究回顾性地纳入了本院过去两年内同时进行了心电门控冠状动脉血管 CT 平扫与头部 CT 平扫的患者 ($n=215$)。使用冠状动脉钙化积分 (coronary artery calcium score, CACS) 量化所有冠状动脉血管的粥样硬化斑块的进展情况; 应用与基于 Agatston 的 CACS 相同的计算方法量化脑血管中基底动脉与双侧大脑中动脉的钙化斑块。采用 Wilcoxon 符号秩检验比较脑血管钙化积分 (cerebral artery calcium score, CeACS) 与 CACS 的差异, 采用 Spearman 相关分析确定 CACS 与 CeACS 之间的关系, 采用 Bland-Altman 和组内相关系数 (intraclass correlation coefficient, ICC) 分析评价二者的一致性。

结果: 在所有 215 名患者中, 有 137 (63.7%) 人患有冠心病且具有较高的 CACS, 有 113 (52.6%) 人被认为存在腔隙性脑梗死等脑血管相关疾病。在冠状动脉与脑动脉血管的比较中, 代表粥样硬化发展的钙化斑块的定量在两组间存在显著差异 ($P<0.05$); 另外, 相关性分析认为同一患者的 CACS 与 CeACS 之间并未表现出较强的相关性 ($r<0.3$, $P<0.05$)。

结论: 血管周围脂肪组织对血管粥样硬化斑块的进展起到了一定的促进作用, 在血管发生炎症时, 其周围的脂肪组织会与炎症血管产生双向作用, 进一步推进血管炎症的发生与发展。

PU-2231

后纵隔节细胞神经瘤的影像学特征与病理分析

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目的:分析后纵隔节细胞神经瘤的 CT 和 MR 影像表现及病理特点,提高对后纵隔节细胞神经瘤的认识。方法:回顾性分析经手术、病理证实的 14 例后纵隔节细胞神经瘤的 CT 和 MR 影像表现特点,并分析其组织病理学特征。结果:肿瘤均位于后纵隔,共计 15 个病灶,其中 5 个位于上纵隔,3 个位于中纵隔,5 个位于下纵隔,2 个位于中上纵隔,紧贴胸壁及椎旁生长,边界清楚,呈圆形、半圆形或椭圆形,上下径长度大于横径及前后径,CT 呈均匀或欠均匀软组织密度影,1 个病灶内可见囊变区,2 个病灶内可见脂肪组织,4 个病灶内可见斑点状或条片状钙化灶,2 个病灶伴邻近胸膜肥厚。MR 上,1 个病灶 T1WI 呈均匀等信号,2 个病灶 T1WI 呈不均匀等、高信号,T2WI 均呈不均匀高信号,增强扫描 2 个病灶未见明显强化,其余病灶呈轻中度均匀或不均匀强化。结论:节细胞神经瘤可发生于交感组织分布的任何区域,好发于后纵隔。可发生于任何年龄,女性多见,男女比例约 1:1.13~1:1.5。节细胞神经瘤系良性肿瘤,故生长缓慢,通常早期不伴临床症状,多在体检时偶然发现。组织学上,节细胞神经瘤由分化好的神经节细胞、成熟的 Schwann 细胞、神经纤维及粘液基质组成。成熟的神经节细胞周围常见卫星细胞。CT 上,节细胞神经瘤一般位于脊柱旁,多为椭圆形,呈头尾方向生长。本组病例均位于后纵隔,病灶均表现为上下径大于前后径及横径。神经节细胞瘤的影像表现与其病理特点密切相关,肿瘤密度由其内的成分比例决定。若肿瘤内粘液样基质占大部分,CT 平扫呈低密度;若神经节细胞及神经纤维成分增多,CT 平扫密度增高。MR 上,T1WI 多呈均匀低信号,T2WI 多呈不均匀高信号;其内可见钙化灶,还可见脂肪成分及螺旋样表现,增强扫描呈不均匀延迟强化。肿瘤可向椎间孔内蔓延,引起脊髓损伤。少数节细胞神经瘤可对邻近的骨骼产生侵蚀改变。结合其病理特征,对于在影像上正确诊断节细胞神经瘤有重要意义。

PU-2232

基于 CT 影像的三维适形 X-刀放射治疗对晚期肺癌患者的临床疗效

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摘要:

Background: 肺癌是起源于肺部支气管黏膜或腺体的一类恶性肿瘤。近年来,肺癌的发病率和死亡率明显增高,男性肺癌发病率和死亡率均占有恶性肿瘤的第一位。为此找寻肺癌的有效治疗方法,对于提高患者的生存率十分重要。本文探究 3D-CRT X-刀放射治疗对晚期肺癌患者治疗中的临床效果和毒副作用,以期提高患者生存率,改善预后。

Methods: 88 例晚期肺癌患者,随机法分为 Observation group 和 Control group,每组各 44 例,Observation group 使用 3D-CRT 治疗,Control group 进行常规野放疗技术治疗,分析两组患者一般资料,对比两组患者的血 AFP 降低率以及血白细胞减少发生率、生存率与局部控制率、近期疗效、急性放射不良反应以及总生存率。

Results: Observation group 血 AFP 降低率为 86.20%,血白细胞降低率为 21.70%;对照组血 AFP 降低率为 81.30%,血白细胞降低率为 19.60%;Observation group 显著高于 Control group ($P < 0.05$)。Observation group 一年局部控制率为 75%及一年生存率为 68.18%显著高于 Control group ($P < 0.05$)。观察组总有效率(93.46%)高于对照组(86.36%)。对比两组患者 5 年生存率,对照组整体生存率高于对照组。

Conclusion: 3D-CRT 技术能够降低患者周围组织受照量, 减少放射性损伤, 3D-CRT 的 X-刀放射治疗晚期肺癌患者具有很好的临床疗效, 近期疗效满意。

PU-2233

心脏磁共振应变分析和左房心功能参数对射血分数保留型心力衰竭患者舒张功能障碍的探究

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目的

本研究旨在应用心脏磁共振特征跟踪 (CMR-FT) 技术, 探讨其在诊断 HFpEF 患者中的应用, 尤其是在超声心动图无法确定诊断时的作用。我们着重分析了左心房功能参数和心肌应变, 以及它们与超声心动图 E/A 值的相关性。

方法

从 2019 年 1 月 1 日至 2023 年 8 月 31 日在宁夏医科大学总医院连续性纳入 40 例 HFpEF 患者。使用飞利浦 3.0T 磁共振进行心脏常规序列扫描, 并应用 CMR-FT 技术进行后处理图像分析。测量的参数包括最大左房容积指数 (LAVI)、左房面积指数 (LAAi)、左房储备期应变 (ResS)、左房导管期应变等。

结果

本研究共纳入了 40 名 HFpEF 患者和 40 名健康志愿者。HFpEF 组的一般资料与对照组相比无明显差异。在 CMR 左室心功能分析中, HFpEF 组的左房容积指数和面积指数均明显增大 (分别为 63.9 (22.5) vs. 45.6 (16.8), $P<0.01$; 17.3 (2.45) vs. 12.65 (5.23), $P<0.01$)。两组之间的左室心功能参数差异不具有统计学意义 ($P>0.05$)。在心肌应变分析方面, HFpEF 组的左室径向、周向应变峰值及舒张期应变率均降低。左心房三期应变分析显示, HFpEF 组的三组应变较对照组均明显降低 (左房导管期应变、左房泵送期应变、左房储备期应变分别为 8.4 (2.3) vs. 17.8 (6.2)、10.6 (7.2) vs. 16.5 (5.2)、19.6 (11.2) vs. 33.5 (4.3), $P<0.001$)。进一步的相关性分析表明, ResS、LAAi、LAVI 与 E/A 值显著相关 ($r=0.623$, $r=0.518$, $r=0.761$, $P<0.001$)。

结论

本研究发现, 心脏磁共振测量的左房大小和储备期应变可用于定量评估 HFpEF 患者的舒张功能不全。此外, 这些参数与超声心动图描述的舒张功能障碍参数具有较好的一致性。

PU-2234

Predicting rapid plaque progression with radiomics signature of pericoronary adipose tissue based on coronary computed tomography angiography

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Objectives To evaluate whether radiomics signature of pericoronary adipose tissue (PCAT) based on coronary computed tomography angiography (CCTA) could improve the prediction of rapid plaque progression (RPP).

Methods This retrospective study included 208 patients who underwent two CCTA examinations. We collected conventional plaque features and radiomics features of PCAT. All patients were

randomly divided into training and validation cohorts with a ratio of 8:2. Four models were constructed, including the fat attenuation index (FAI) model, the quantitative plaque features model, the PCAT radiomics model, and the combined model. The area under the receiver operating characteristics curve (AUC) was used to evaluate the performance of the models.

Results Compared with the FAI model (AUC 0.622 for training, 0.540 for validation) and the quantitative plaque features model (AUC 0.592 for training, 0.572 for validation), the PCAT radiomics model achieved better diagnostic performance in predicting RPP (AUC 0.773 for training, 0.794 for validation), with a significant difference of AUC (both $p < 0.05$). The combined model (AUC 0.824 for training, 0.811 for validation) was slightly higher than the PCAT radiomics model, while there was no statistically significant ($p > 0.05$).

Conclusions CCTA-based radiomics signature of PCAT is more effective for predicting the RPP than FAI and quantitative plaque features. The combination of PCAT radiomics, FAI and quantitative plaque features could further enhance the performance of the RPP identification.

PU-2235

Coronary artery fistula with or without aneurysm: a large comparative study

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Background: The knowledge of coronary artery fistula (CAF) with coronary aneurysm mostly comes from case reports and is very limited. However, the management of CAF with and without aneurysm is different, more understanding of its clinical and imaging features is necessary. This is the first research focus on it through a large comparative study.

Purpose: To investigate the differences in imaging and clinical features of CAF with and without aneurysms.

Methods: We reviewed 96,037 consecutive patients undergoing coronary computed tomography angiogram (CCTA) between 2016 and 2020 and total of 429 CAF adult patients were enrolled. Those patients were divided into the CAF with aneurysm group (321 cases, 74.83%) and CAF without aneurysm group (108 cases, 25.17%) according to whether complicated with coronary aneurysm. Clinical baseline data, electrocardiographic (ECG) characteristics, the presence or absence of coronary atherosclerosis, complication symptoms and fistulous origin, entry site, number and diameter were analyzed. Chi-square test, T-test, Mann-Whitney U tests, and logistic regression analysis were performed.

Results: Most of the clinical baseline data did not differ significantly between the two groups ($P > 0.05$). However, heart murmur, coronary atherosclerosis, infective endocarditis (IE), fistulous diameter and fistulous entry site were significantly different ($P < 0.05$). Further multivariate logistic regression analysis showed that large fistulous diameter and coronary-cardiac chamber arterial fistulas were dependent risk factors for CAF complicated with aneurysm.

Conclusion: CAF patients with aneurysm were more prone to develop heart murmur than those patients without aneurysm. Different from other sites of aneurysms, coronary atherosclerosis is more common in CAF without aneurysm. Larger fistulous diameter and coronary-cardiac chamber arterial fistula are dependent risk factors for CAF with aneurysms.

PU-2236

基于冠脉 CTA 的 3D 量化分析技术探索心外膜脂肪与冠状动脉粥样硬化之间的关系

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目的 通过 3D 量化分析技术探索心外膜脂肪 (epicardial adipose tissue, EAT) 体积、CT 值、纹理特征参数与冠状动脉粥样硬化之间的关系。

方法 随机选取 2013 年 7 月在我科做冠脉 CTA 检查的 43 例患者, 男性 20 例 (46.5%), 平均年龄为 62.6 岁 \pm 10.5 岁。根据有无冠状动脉斑块分为冠脉正常组 (n=21 例) 和冠状动脉粥样硬化组 (n=22 例), 使用 TIMESlice 软件计算 CT 增强的图像 3D 量化技术提取心脏外膜脂肪的体积、CT 值、纹理特征参数, 纹理特征提取得出 101 个特征分为六类, 包括 18 个一阶特征, 24 个灰度共生矩阵特征、16 个灰度区域大小矩阵、16 个游程矩阵特征、5 个邻域灰度差矩阵特征、14 个邻域灰度依赖矩阵特征。比较正常组和冠脉粥样硬化组的 EAT 体积、CT 值和 3D 纹理特征的差异, P 值<0.05 具有统计学差异。

结果 相较于冠脉正常组的 EAT 体积[98847.8(83809.3,123708.9)mm³]和 CT 值[-64.3(-70.1,-58.4)HU], 冠脉粥样硬化组 EAT 体积[165630.5(115815.1,206530.4)mm³]明显升高 (P=0.003), 但是 CT 值[-72.3(-73.6,-66.4)HU]降低 (P=0.006)。3D 纹理分析结果显示正常组和冠状动脉硬化组在纹理参数 ClusterProminence、MCC、LargeAreaHighGrayLevelEmphasis、SizeZoneNonUniformity、SmallDependenceHighGrayLevelEmphasis、SumAverage、TotalEnergy、ZoneEntropy、ZoneVariance9 个参数上的差异具有统计学意义 (P 值均<0.05)。

结论 冠状动脉粥样硬化患者心外膜脂肪不仅在体积、CT 值上与正常患者存在明显的差异, 纹理特征上也具有显著差异, 这说明心外膜脂肪跟冠状动脉粥样硬化存在明显的相关, 下一步通过这些相关性参数建立模型以评估冠心病患者病情及预测冠心病患者预后。

PU-2237

基于 CT 影像组学模型通过肺窗及纵隔窗评价非小细胞肺癌 PD-L1 疗效的价值研究

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目的: 探讨 CT 影像组学模型通过肺窗、纵隔窗评价非小细胞肺癌 PD-L1 疗效的价值。**方法:** 回顾分析经 PD-L1 治疗的非小细胞肺癌患者的 CT 影像资料, 分为 PR 组和非 PR 组。由放射科医生分别在纵隔窗、肺窗人工勾画感兴趣区 ROI, 提取影像组学特征, 筛选特征降维后采用 Logistic 回归构建模型, 采用受试者工作特征(ROC)曲线分析两种窗的不同模型评价非小细胞肺癌 PD-L1 疗效的诊断效能。**结果:** 提取出 107 个纹理特征, 降维后肺窗、纵隔窗分别选出 27 个、26 个相关性最高并且冗余度最低的特征建立模型。肺窗的 svm 模型、bayes 模型、KNN 模型和 Logistic 模型曲线下面积(AUC)分别为: 0.800、0.775、0.825、0.875; 纵隔窗的 svm 模型、bayes 模型、KNN 模型和 Logistic 模型曲线下面积(AUC)分别为: 0.825、0.775、0.775、0.800。**结论:** 肺窗 Logistic 模型、纵隔窗 svm 模型评价非小细胞肺癌 PD-L1 疗效的可行性较高, 该方法可为临床医生决策提供重要参考。

PU-2238

Cardiovascular assessment of diastolic dysfunction in people living with the human immunodeficiency virus: correlation with markers of disease activity.

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Purpose: To explore the presence and extent of diastolic atrial and left ventricular dysfunction in PLWH by cardiovascular magnetic resonance (CMR) in correlation with clinical markers of disease activity.

Methods: A total of 142 participants (age, range, gender) comprising 80 PLWH and 62 age- and sex-matched healthy volunteers were recruited for this cross-sectional study in China. The imaging methods used balanced steady-state free precession (SSFP) for the short-axis, 2-, 3-, and 4-chamber views. Data were analyzed using the software package SPSS Statistics Version 26.0. The used tests included independent t test and Univariate and multivariate linear or logistic analyses (significance level: P value <0.05).

Results: PLWH had a larger left atrial volume maximum index (LAVI_{max}: 33.3±0.5 mL/m² vs. 28.7±1.0 mL/m², P<0.001), minimum (LAVI_{min}: 13.9±0.4 mL/m² vs. 11.5±0.7 mL/m², P<0.001), and prior to atrial contraction (LAVI_{pre-a}: 23.1±0.5 mL/m² vs. 19.8±0.9 mL/m², P=0.001) as compared to healthy volunteers. The LA reservoir (28.3±0.6% vs. 33.8±1.5%, P<0.001) and conduit (15.0±0.5% vs. 18.9±1.1%, P=0.01) strain were lower [AdR2] in PLWH. Global circumferential left ventricular diastolic strain rate (LVGCS-d) was lower in the HIV patients (P=0.02). Multivariate analysis results showed that Nadir CD4+ T cells had an adverse association with LVGCS-d (β : 1.890, CI: 1.799, 1.981, P<0.001).

Conclusion: Atrial and left ventricular diastolic dysfunction is manifest in people living with chronic human immunodeficiency virus infection and correlates with with marker of more severe immune damage.

PU-2239

双侧心耳瘤合并房间隔缺损的影像诊断：罕见病例报告及文献综述

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目的：心耳瘤（atrial appendage aneurysm, AAA）的发病率很低，双侧同时发病更为罕见，当合并常见心脏畸形时容易被漏诊。本文将对心耳瘤的临床表现、影像诊断等方面进行深入探究，有利于对该病进行精准诊断和治疗。

方法：首先对 1 例双侧心耳瘤合并房间隔缺损患儿的诊疗流程进行回顾，然后结合国内外文献，对心耳瘤的临床表现、发病机制、影像诊断和鉴别诊断进行全面分析和讨论。**病例回顾：**男，2 个月 9 天，出生后听诊发现心脏杂音。心电图提示窦性心动过速（199 次/分），频发房性早搏未下传，左、右心房肥大。胸部 X 线片显示双侧心房区心界扩大。经胸超声心动图显示双侧心耳呈囊性扩张伴不完全分隔、Ⅱ型房间隔缺损伴左向右分流、左心室收缩功能稍减低。CT 血管造影（CTA）可见房间隔缺损，并显示双侧心耳瘤呈多囊样改变，其中右侧心耳瘤范围约 49×38mm，左侧心耳瘤范围约 34×32mm，瘤内无血栓形成。遂行开胸“房间隔缺损修补术和双侧心耳瘤切除术”。病理证实为心耳瘤。术后 3 个月随访恢复良好。

结果: 心耳瘤表现为心耳的局部或弥漫性扩张。发病原因可能为梳状肌发育不良或心房压升高。临床表现可以从无明显症状到房性心动过速、血栓栓塞等。影像学检查基本可以确诊。手术是目前首选和推荐的治疗方法。

结论: 心耳瘤较为罕见, 在心脏畸形筛查时需要考虑合并该病的可能性。多模态影像联合应用可以提高诊断的准确性, 有利于制定个性化的手术方案。

PU-2240

基于 AI 定量检测新型冠状病毒奥密克戎变异株感染胸部 CT 演变特征分析

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摘要:目的 探讨人工智能 (AI) 定量检测在新型冠状病毒肺炎 (COVID-19) 奥密克戎变异株不同分型中胸部 CT 动态变化特征的价值。方法 收集 102 例确诊为 COVID-19 奥密克戎变异株感染 (非重症组 72 例, 重症组 30 例) 患者的临床及多次胸部 CT 资料, 使用 AI 软件定量评价出现症状后 COVID-19 奥密克戎变异株感染患者不同时间点胸部 CT 影像定量分析中的动态变化。采用独立样本 t 检验或非参数检验比较两组间定量指标的差异, 对发病后天数与 CT 定量指标进行三次多项式曲线回归函数拟合, 对 CT 定量指标随发病时间的变化进行分析。结果 CT 定量指标中除平均密度 (mean lesion density, MLeD/HU)、非实性比例 (ground-glass opacity, GGO%) 及异质性外, 非重症组病灶体积 (lesion volume, LeV/ml)、病灶占肺体积的百分比 (percentage of lesion, LeV%) 及病灶质量 (lesion mass, LM/g) 低于重症组 ($P < 0.05$)。非重症组发病初期 LeV、LeV% 及 LM 达到顶峰, 随着时间的延长逐渐减低, 提示吸收缓慢, 重症组约第 5 天达顶峰, 5-12 天迅速减低, 提示 LeV、LeV% 及 LM 快速变化, 远快于非重症组。非重症组 MLeD 在 0-10 天缓慢下降, 之后缓慢上升, 重症组发病初期 MLeD 较非重症组高, 实变速度更快。重症组患者异质性约在 5 天后高于非重症组, 异质性上升速度高于非重症组。重症组发病初期 GGO% 已达顶峰, 随后下降, 下降速度高于非重症组。结论 COVID-19 奥密克戎变异株感染患者两组间动态变化存在一定的区别, 重症组的肺炎影像学具有肺内损伤程度重, 演变迅速及易反复等特点。AI 定量检测可以准确识别其胸部 CT 的动态演变过程, 不同定量指标能够客观地评估肺内病变性质, 为临床诊治提供一定的依据。

PU-2241

Micronodular thymoma with lymphoid stroma: A case report and review of the literature

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Introduction: Micronodular thymoma with lymphoid stroma (MNT) is a rare subtype of thymic neoplasm common in older patients. No significant between-sex differences have been reported and patients are usually asymptomatic. Therefore, clinical guidelines, imaging manifestations, histopathological diagnostic criteria, prognostic factors, and therapeutic regimens have not yet been established. When the lesion is completely resected, micronodular thymoma with lymphoid stroma has a good prognosis, and to date, no reports of recurrence, distant metastasis, or tumor-related deaths exist. Only a few cases of MNT have been reported, and there is no summary of

its imaging features. Therefore, we collect 14 pieces of literature data to summarize the imaging features of MNT in this paper.

Case Description: We present the case of a 63-year-old man with an anterior mediastinal cystic-solid mass measuring $7.3 \times 6.6 \times 8.5$ cm in size by chest computed tomography examination. Combining morphological and immunohistochemical findings, the tumor was diagnosed as MNT of Masaoka-Koga stage II and TNM stage pT1aN0. The patient remained recurrence-free for five months after complete resection.

Conclusion: Most lesions on imaging images show a well-defined lobular-contoured anterior mediastinal mass. The lesions can often present cystic-solid solid types, and their solid components often show significant enhancement.

PU-2242

室间隔膜部瘤与瓦氏窦瘤的 CT 诊断与鉴别诊断

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摘要: 目的 探讨室间隔膜部瘤与瓦氏窦瘤的 CT 影像表现, 提高对二者的认识与鉴别水平。

方法 回顾性分析经手术证实的 25 例室间隔膜部瘤和 13 例瓦氏窦瘤的 CT 影像资料, 分析瘤体的位置、形态、大小, 与心室有无交通等影像学特征。

结果 室间隔膜部瘤与瓦氏窦瘤在瘤体发生的位置、形态有差异。

结论 室间隔膜部瘤与瓦氏窦瘤在 CT 影像上存在差异: 室间隔膜部瘤为位于主动脉窦下室间隔区的局限性突起, 多突向右室; 瓦氏窦瘤为主动脉窦的瘤样扩张, 可破入心房、心室。

PU-2243

急性 A 型主动脉夹层合并脑梗死患者的影像学分析

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目的 分析合并脑梗死急性 A 型主动脉夹层(acute type A aortic dissection, ATAAD)患者的临床及影像学特征, 探讨与预后的相关性。方法 回顾性分析 2015-2021 年经临床确诊的 ATAAD 合并急性脑梗死患者 87 例, 以患者围手术期生存情况分为存活组和死亡组, 分析与急性脑梗死发生相关的临床和影像学特征。结果 ATAAD 合并脑梗死的类型主要为栓塞型 (71.26%), 其次为分水岭型 (17.24%) 和混合型 (11.49%), 存活组与死亡组梗死类型无统计学差异。梗死灶在半卵圆中心、顶叶、额叶分布较多, 右侧大脑半球较多, 前循环区域分布较多, 存活组与死亡组差异具有统计学意义 ($P < 0.05$)。死亡组与存活组相比, 颈总动脉狭窄程度 $> 70\%$ (28.6%vs11.1%, $P=0.04$)、合并三个及以上脏器灌注不良 (50%vs22.2%, $P=0.007$) 的发生率高, 脑梗死平均体积较大 (61.73 (40.31, 107.87) vs 54.76 (31.44, 128.43), $P=0.608$), 数目较多 (11 (2, 18) vs 4 (1.5, 8), $P=0.012$), 且更容易发生大面积脑梗死 (8 vs 2, $P=0.072$)。结论 ATAAD 患者术前脑梗死主要影像学机制是栓塞, 梗死灶影像特征与围手术期死亡相关, 这些发现对未来临床实践和研究具有启示意义。

PU-2244

Radiomics features of pericoronary adipose tissue improve CT-FFR performance in predicting hemodynamically significant coronary artery stenosis

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Objectives

To evaluate the value of radiomics-based model of pericoronary adipose tissue (PCAT) combined with CT fractional flow reserve (CT-FFR) in predicting hemodynamically significant coronary stenosis.

Methods

Patients with suspected or known coronary artery disease, who had coronary computed tomography angiography (CCTA), invasive coronary angiography (ICA) and FFR within 1 month, were retrospectively included. Radiomics features of lesion-based PCAT were extracted. The lesion-specific CT-FFR values, CCTA-derived diameter stenosis, lesion length and PCAT attenuation were also measured. FFR values were used as the reference standard to assess the diagnostic performance of radiomics model, CT-FFR, and combined model for detection of flow-limiting stenosis.

Results

A total of 146 patients with 180 lesions were included in the study. All lesions were divided into training and validation cohorts at a ratio of 2:1. CT-FFR model exhibited the highest area under curve (AUC) (0.803 for training, 0.791 for validation) in predicting hemodynamically significant stenosis, followed by radiomics model (0.776 for training, 0.744 for validation). However, no statistically significant difference was found between the AUCs of the above two models ($p > 0.05$). When CT-FFR was combined with radiomics model, the AUC reached 0.900 for training cohort and 0.875 for validation cohort, which were significantly higher than that of CT-FFR and radiomics model alone (both $p < 0.05$).

Conclusion

The diagnostic performance of PCAT radiomics model was comparable to that of CT-FFR for identification of ischemic coronary stenosis. Adding PCAT radiomics model to CT-FFR showed incremental value in discriminating flow-limiting from non-flow limiting lesions.

PU-2245

Role of Fluid Mechanics in Coronary Atherosclerotic Plaques: research progress

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Abstract: Most acute coronary syndromes are due to sudden luminal embolism caused by rupture or erosion of atherosclerotic plaques, and prevention of plaque development has become effective strategy to reduce mortality and morbidity in coronary heart disease. It is now generally accepted that plaques with thin-cap fibroatheroma (TCFA) are precursors to rupture and that larger plaques and high-risk plaque features (including low-attenuation plaque, positive remodeling, napkin-ring sign, and spotty calcification) constitute unstable plaque morphology.

However, plaque vulnerability or rupture is a complex evolutionary process caused by a combination of multiple influencing factors. With the effective combination of medicine, engineering mechanics, and computer software, researchers have turned their attention to computational fluid mechanics. The importance of fluid mechanics in pathological states for promoting plaque progression, inducing plaque tendency to vulnerability, or even rupture as well as the high value of functional evaluation of myocardial ischemia has become a new research hotspot nowadays.

This article reviews recent research advances on coronary plaque fluid mechanics, including wall shear stress (WSS), axial plaque shear (APS) and flow fraction reserve (FFR). Previously, most computational fluid dynamics were obtained using intravascular ultrasound (IVUS) or optical coherence tomography (OCT) invasive methods. In recent years, the image quality and spatial resolution of coronary CT angiography (CCTA) have greatly improved, making it possible to compute fluid dynamics by CCTA. In the future, the combination of CCTA-based anatomical stenosis, plaque high-risk features, and fluid mechanics can further improve the prediction of plaque development, vulnerability, and rupture risk, as well as enable non-invasive means to assess the degree of myocardial ischemia, providing an important aid to guide clinical decision-making and optimize treatment.

PU-2246

One-stop Low-dose CT Angiography of the Coronary Arteries and Veins on Dual-layer Spectral Detector CT: A Primary Study

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Abstract

Background: To explore the feasibility of a one-stop low-dose imaging protocol for the coronary arteries and veins on dual-layer spectral detector computed tomography (SDCT).

Methods: Sixty-five patients with suspected coronary artery disease indicated for coronary CT angiography (CCTA) were included. Conventional 120 kVp polychromatic images with iterative model-based reconstruction (IMR) and virtual monochromatic images (VMIs) at 40 keV, 50 keV, 60 keV, and 70 keV were generated. Image analysis was performed by 2 independent radiologists. The coronary arteries were assessed subjectively (for artifact, noise, and overall quality) and objectively (for attenuation) on 120 kVp images. The coronary veins were compared subjectively (for noise, contrast, sharpness, artifact, and overall quality) and objectively [for attenuation, noise, signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR)] on both VMIs and 120kVp images.

Results: A mean Likert score of > 4 points was provided across the 941 coronary artery segments evaluated. Compared to 120 kVp images, subjective venous contrast, sharpness, and overall image quality were significantly better on 40 – 60 keV VMIs ($p < 0.05$). Subjective and objective noise were significantly better on 40 – 70 keV VMIs ($p < 0.05$). Objective attenuation, SNR, and CNR were significantly higher on 40 – 60 keV VMIs ($p < 0.05$). Based on CNR, 40 keV was deemed the optimal VMI energy level for venous visualization.

Conclusion: The feasibility of our proposed one-stop low-dose CCTA protocol on DECT was demonstrated, with satisfactory visualization of the coronary arteries and veins achieved on 120 kVp images and 40 keV VMIs, respectively.

PU-2247

CTA 在经导管主动脉瓣置换术中的应用及进展

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目的：计算机断层扫描血管成像（computed tomography angiography, CTA）对于 TAVR 术前手术规划非常重要，CTA 不仅是评估主动脉根部及外周血管通路解剖结构的金标准，而且还可以预测和识别术后并发症。本文对目前 CTA 在 TAVR 患者中的应用及相关研究进展展开综述。

资料和方法：本文通过阅读大量相关文献，旨在对目前 CTA 在 TAVR 综合评估中的应用及相关进展进行总结和综述。

结果：本文主要从以下四个方面展开：1、TAVR 术前 CTA 评估：传统上，TAVR 术前 CTA 分析主要包括评估主动脉根部及外周血管通路的解剖结构，以便在选择合适的人工瓣膜支架尺寸及输送通路时获得更高的准确性，此外还可利用术前 CTA 分析的解剖信息对 TAVR 术后相关并发症进行风险评估。2、TAVR 术后 CTA 的应用：术后 CTA 对发现一些特殊的并发症至关重要，目前最热门的研究是关于 TAVR 术后亚临床小叶血栓形成的相关研究。3、CTA 在 TAVR 中的新应用：TAVR 领域的飞速发展，使得人们对 TAVR 术前 CTA 的研究激增，涌现出了许多与 TAVR 诊断和预后相关的新应用，如评估和诊断冠状动脉疾病、非瓣膜相关临床结果的预测、3D 打印技术应用、评估心肌功能指标相关预后等。4、CTA 在 TAVR 应用中的局限性：对图像质量要求高、辐射剂量问题及对比剂肾功能损害等。

结论：CTA 已成为现代 TAVR 手术策略制定中的基本要素，在主动脉根部解剖结构评估、外周血管通路评估和围手术期并发症的预测中具有公认的实用性。然而，随着 CTA 成像技术的进步，许多 CTA 的新应用被引入 TAVR 的研究中，可以预见 CTA 在未来 TAVR 手术的创新和应用中将发挥更关键的作用。

PU-2248

Predictive value of wall shear stress (WSS) on aortic dilation in patients with bicuspid aortic valve (BAV): a systematic review and meta-analysis

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Background

BAV is associated with aortic dilation, but there is limited knowledge about possible predictors of aortic dilation in patients with BAV. This meta-analysis was conducted to assess the predictive value of wall shear stress (WSS) for aortic dilation in patients with bicuspid aortic valve (BAV).

Methods

Relevant studies published from inception to July 3, 2023, in the four electronic databases: PubMed, The Cochrane Library, EMBASE, and Web of Science were comprehensively searched. Weighted mean difference (WMD) was used as the effect size for the continuous variables. Additionally, subgroup analyses were performed.

Results

This meta-analysis included five case-control studies involving 373 BAV participants (233 with aorta dilation and 140 without aorta dilation). The meta-analysis showed that in the Arch part, the WSS of participants with aorta dilation was 0.19 N/m² less than the WSS of participants without aorta dilation. In other parts of the aorta, the WSS of the dilated group was also less than that of the non-dilated group. Compared with non-dilated participants, dilated participants had lower

WSSA in Arch (SMD=-0.13; 95% CI -0.24 to -0.01; I²=49%). WSSA in other parts of the aorta was less than the non-dilated group as well. WSSC had no significant differences in both groups.

Conclusion

To sum up, this study identified that WSS, and WSSA were different between non-dilated participants and dilated participants, and they might be critical factors for aorta dilation diagnosis in BAV patients, especially in Arch aortic dilation. However, the significance of WSS needs more credible studies to identify.

PU-2249

Complex systemic arteries to pulmonary artery malformations: A case report

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Background A complex connection between the systemic artery and the pulmonary artery is rare. **Case report** A 52-year-old female presented to the Pneumology Department with hemoptysis for more than 7 months and dyspnea over 2 months. On admission, the physical examination was normal. Chest contrast-enhanced computerized tomography (CT) showed irregular patchy density from the lateral basal segment of the right lower lobe to the septum, obvious enhancement of the local focus, thickening of the branch of the right lower pulmonary artery, and thickening of the right phrenic artery. The tumor markers were negative. Combined with the above test results, she is suspected of suffering from pulmonary vascular malformation. Subsequently, the patient received digital subtraction angiography (DSA) and was eventually diagnosed with a systemic artery-pulmonary artery (SA-PA) fistula and underwent surgical treatment. After surgery, during the regular follow-up of the patients, we reviewed the data from DSA and multi-slice spiral computed tomography angiography (MSCTA), performed additional volume rendering (VR) reconstruction, and the criminal vessels omitted by DSA were found on VR.

Conclusions When the possible existence of SA-PA is suspected, MSCTA and volume rendering (VR) should be performed before DSA, which can provide more comprehensive anatomical details of vascular malformations and provide additional information for the formulation of accurate treatment strategies.

PU-2250

代谢综合征人群血红蛋白与骨密度的相关性研究

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目的: 采用定量 CT 技术 (CT quantitative computed tomography, QCT) 评估代谢综合征 (MS) 人群血红蛋白与骨密度相关性。**方法:** 回顾性分析 2021 年 1 月至 2021 年 8 月于我院行定量 CT 检查的体检者, 测量其骨密度, 记录性别、年龄、BMI 及血生化指标, 根据临床资料分为 MS 组 (n=1556), 选择同期体检且临床资料无差异的健康人群为正常组 (n=2450), 采用 T 检验比较组间临床资料; 采用 Pearson 相关法分析组内血红蛋白与骨密度相关性; 采用多元线性回归分析组内骨密度的影响因素。**结果:** T 检验结果: MS 组与正常组组间性别、年龄无统计学差异 (P>0.05); MS 组与正常组组间骨密度、血红蛋白存在差异 (P<0.05)。Pearson 相关分析结果: MS 组中, 血红蛋白与 BMD 呈负相关 (P<0.05); 正常组中, 血红蛋白与骨密度无相关性 (P>

0.05)。回归分析结果: MS 组中, 血红蛋白是骨密度的影响因素 ($P < 0.05$); 正常组中, 未见明显差异 ($P > 0.05$)。结论: 血红蛋白是代谢综合征人群中骨密度的危险因素。

PU-2251

CMR 评估射血分数保留的 T2DM 患者心肌组织及应变异常与 HbA1c 相关性研究

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目的 探索射血分数保留的 T2DM 患者是否出现心肌组织特征异常、心功能不全, 并进一步明确结构与功能不全的决定因素。**方法** 收集我院 2020 年 6 月至 2021 年 8 月 67 名患者, 其中 17 例单纯 2 型糖尿病患者 (G1), 18 例 T2DM 伴高血压患者 (G2) 及 32 例单纯高血压患者 (HT), 所有患者心脏超声评价左室射血分数均正常。同时收集 44 例性别、年龄匹配患者作为对照组 (Cs)。所有受试者均接受心脏磁共振检查(1.5T, MAGNETOM Amira, Siemens, Best, Netherlands)。CMR 检查前收集相关临床和生化指标。**结果** 所有糖尿病患者的整体心肌 native T1 值、ECV 值、心肌质量及心肌质量指数均显著高于对照组 ($p < 0.05$ for all)。G1、G2 及 HT 组患者整体心肌 native T1 值、ECV 值均高于对照组, 并且 G2 组患者整体 ECV 较 G1 组 ($31.92 \pm 3.05\%$ vs. $29.59 \pm 3.90\%$, $p = 0.032$) 及 HT 组 ($31.92 \pm 3.05\%$ vs. $29.22 \pm 6.58\%$, $p = 0.042$) 更高。2 型糖尿病患者左室整体纵向应变较对照组减低, 差异具有统计学意义 ($-16.51 \pm 2.53\%$ vs. $-19.66 \pm 3.21\%$, $p < 0.001$)。在糖尿病患者中, G2 组患者整体纵向应变较 G1 组 ($-15.75 \pm 2.29\%$ vs. $-17.27 \pm 2.57\%$, $p < 0.05$) 及 HT 组 ($-15.75 \pm 2.29\%$ vs. $-17.54 \pm 3.097\%$, $p < 0.05$) 显著减低。糖尿病患者 ECV 增加及 GLS 减低与收缩压、空腹血糖、HbA1c 具有相关性, 且基于多元线性逐步回归分析, 结果显示 HbA1c 是二者的决定因子 (ECV: $\beta = 2.286$, $P = 0.013$; GLS: $\beta = 2.186$, $P = 0.027$)。结论 射血分数保留的 2 型糖尿病患者存在心肌纤维化及应变受损, 并且 HbA1c 是心肌纤维化及应变受损的决定因子。

PU-2252

十字交叉心脏的 CT 影像表现分析及文献回顾

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摘要

目的 回顾性分析十字交叉心脏 (criss-cross heart CCH) 的临床表现及影像特征, 加深对该罕见病在 CT 增强及后处理表现的认识, 有助于更好帮助临床术前方案评估及制定。

方法 总结此患者的临床表现和影像学资料, 提取关键词并检索 PubMed 数据库、中国知网及万方数据库, 汇总检索所得结果, 进行筛选, 对最终符合要求的病例进行影像学总结与分析, 归纳其特征性表现。

结果 按照纳入和排除标准, 最终纳入国内外文献 14 篇, 共 39 例, 加上本组 1 例, 共 40 例, 其中男 25 例, 女 11 例, 产前胎儿 4 例。年龄范围: 0-29 岁。临床表现以心慌气急, 口唇发绀为主。其主要 CT 影像表现为左右心室呈空间上下结构, 室间隔呈水平位, 两心室流入道走行在空间位置上交叉, 呈“十字”征, 其中心室与大动脉连接异常 (27 例), 心房反位 (9 例), 房室连接不一致 (9 例), 皆合并不同程度心脏畸形。

结论 心房与心室在空间投影上呈“十字”交叉连接, 左右房室结构不能在同一平面同时显示, 是 CCH 的重要 CT 影像诊断依据, CT 三维后处理重建有助于提高该病的术前诊断及同时显示合并其他心脏畸形。

PU-2253

Left ventricular myocardial deformation and tissue abnormalities can be ascribed to hemoglobin A1c level in type 2 diabetes mellitus patients with preserved ejection fraction

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Purpose: This study aims to quantitatively evaluate left ventricular (LV) myocardial deformation and tissue characteristics using cardiovascular magnetic resonance (CMR) imaging in type 2 diabetes mellitus patients with preserved ejection fraction, and to investigate the association between CMR and clinical parameters.

Methods: 67 patients were enrolled in this study, including 17 T2DM only patient (G1), 18 diabetic patients with Hypertension (G2), 32 with hypertension (HT), and 44 sex-, age- matched controls (Cs). All subjects undergo CMR examinations (1.5T, MAGNETOM Amira, Siemens, Best, Netherlands). The values of native T1, post-contrast T1 and ECV were measured from the basal, mid and apical part of the left ventricular myocardial according to AHA 17-segmentation via the modified Look-Locker inversion recovery technique. The left ventricular global longitudinal strain (GLS) was evaluated using routine cine images and tissue-tracking analysis software (CVI42, Circle Cardiovascular imaging, Calgary, AB, Canada). The baseline clinical and biochemical indices were collected before the CMR examination.

Results:

The T2DM patients, G2 and HT had a significance higher value of LV mass and LV mass index than NCs (all $p < 0.001$). Although LV mass and LV mass index did not statistically differ between G1 and G2, there was a trend that LV mass and LV mass index were higher in G2. The global native T1 value, global ECV were significantly higher in all diabetic patients than in the NCs (native T1: $1062.78 \pm 44.08\text{ms}$ vs. $1037.00 \pm 26.35\text{ms}$; ECV: $30.75 \pm 3.65\%$ vs. $26.33 \pm 2.81\%$; $p < 0.05$ for all). G2 had increased global ECV value than that of both the G1 ($31.92 \pm 3.05\%$ vs. $28.59 \pm 3.90\%$, $p = 0.032$) and the HT ($31.92 \pm 3.05\%$ vs. $29.22 \pm 6.58\%$, $p = 0.042$). Moreover, T2DM patient had reduced LV longitudinal strain (GLS) compared with NCs ($-16.51 \pm 2.52\%$ vs. $-19.66 \pm 3.21\%$, $p < 0.001$). and the GLS was significantly reduced in G2 than in G1 ($-15.75 \pm 2.29\%$ vs. $-17.27 \pm 2.57\%$, $p < 0.05$). However, the left ventricular volume, ejection fraction, GRS and GCS were similar among all subjects. In the diabetic patient group, the independent determinants of the ECV value were HbA1C ($\beta = 2.286$, $P = 0.013$), SBP ($\beta = 0.038$, $P = 0.013$) (model $R^2 = 0.353$), and the independent determinant of the GLS was the HbA1C value ($\beta = 2.186$, $P = 0.027$) (model $R^2 = 0.168$).

Conclusions: T2DM patients with preserved ejection fraction had significantly increased ECV and deteriorated LV GLS which might be related to poor glycemic control, especially in patients with hypertension. HbA1c is an independently predictor of myocardial extracellular interstitial expansion and strain damage, which may be helpful for the clinical decision-making of blood glucose control.

PU-2254

基于定量 CT 对健康中老年男性吸烟者肺血管结构的研究

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目的 本研究旨在基于定量 CT 分析吸烟对健康中老年男性肺血管体积、数量的影响。

方法 回顾性纳入 121 例健康中老年男性 (45-65 岁), 其中包括 65 例吸烟者、56 例非吸烟者。收集吸气末胸部 CT 图像、肺功能检查结果及临床资料 (年龄、身高、体重)。采用 AVIEW 软件进行肺血管树的自动提取和分割, 获取距离肋胸膜表面不同距离处 (6mm、9mm、12mm、15mm、18mm、21mm、24mm) 的肺血管数量, 以及全肺、右肺、左肺、右肺上叶、右肺中叶、右肺下叶、左肺上叶、左肺下叶肺血管体积参数, 包括全肺血管体积 (TBV) 和截面积小于 5mm² 的肺小血管体积 (BV5)。采用 TBV、BV5 与体表面积 (body surface area, BSA) 的比值作为肺血管体积参数 (TBV/BSA、BV5/BSA)。分析吸烟对肺血管体积、数量的影响。

结果 中老年男性吸烟者全肺、右肺、左肺血管体积 TBV/BSA、BV5/BSA 明显高于非吸烟者, 其中以双肺下叶最为显著 ($P < 0.01$), 吸烟组与对照组右肺上叶、中叶肺血管体积相近, 差异没有统计学意义 ($P > 0.05$)。血管数量在距离肋胸膜表面 6mm、9mm、12mm 处吸烟者肺血管数量均低于对照组, 差异有统计学意义 ($P < 0.05$)。15mm、18mm、21mm、24mm 处吸烟者与对照组肺血管数量相近, 差异无统计学意义 ($P > 0.05$)。

结论 在健康中老年男性中, 与非吸烟者相比, 吸烟者肺血管体积增加、数量减少。

PU-2255

Effect of Dual Source CT Dual Energy Imaging Energy Spectrum Curve on Evaluation of Chemotherapy in Lung Cancer

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Objective: To explore the change rule of dual-source CT dual-energy imaging energy spectrum curve before and after chemotherapy for lung cancer, and to provide theoretical basis for clinical evaluation of the efficacy of chemotherapy for lung cancer in the future.

Methods: A total of 42 newly diagnosed patients with primary non-small cell lung cancer admitted to the Department of Oncology of our hospital from March 2018 to March 2020 were enrolled, and all received chemotherapy. Dual source CT from Siemens was used to perform chest CT dual energy mode scanning before and after 2 cycles of chemotherapy, respectively. The peak time and 100S of the aorta after contrast agent injection were the enhanced scanning time. The change rule of energy spectrum curve before and after chemotherapy was obtained through image processing.

Results: After 2 cycles of chemotherapy, There were 26 cases in the stable group (SD) and 16 cases in the partial remission group (PR), the CT values of the stable group and the remission group under single energy were significantly lower than those before treatment, no matter when the aorta reached its peak or the 100th day of enhanced scan ($P < 0.05$). The energy spectrum curve showed that when the aorta reached its peak, the CT value of SD group before and after chemotherapy first decreased and then remained straight at 40keV-80keV, while that of PR group first decreased and then remained straight at 40keV-100keV. At 1000s, the CT values of the SD

group and the PR group decreased first and then remained relatively straight at 40-100keV before and after chemotherapy, but the difference was that the CT values of the SD group were very similar before and after chemotherapy at 60keV, while the difference was still large in the PR group. When the aorta reached its peak, the CT difference of each single energy before and after chemotherapy in the SD group first decreased and then remained flat at 40keV-80keV, while the curve in the PR group remained flat at 40keV-60keV, and increased significantly at 60keV-120keV, then remained flat again. At 1000s, the curve of SD group first dropped and then remained straight from 40keV to 60keV, while the curve of PR group first dropped and then remained straight from 40keV to 100keV.

Conclusion: At peak of aorta and 100th day, the corresponding CT values under different single energy and the CT difference before and after chemotherapy were significantly reduced in both PR group and SD group compared with those before chemotherapy. Dual source CT dual energy imaging can provide a basis for the evaluation of chemotherapy efficacy for lung adenocarcinoma and squamous cell carcinoma.

PU-2256

健康志愿者左心室血流成分及动能变化的探索性研究

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目的：对健康志愿者左心室腔内血流成分进行定量分析并提出相应参考值范围，分析年龄、性别对左心室腔内血流成分及动能变化的影响。

方法：收集 2022 年 3 月 1 日-2023 年 8 月 31 日宁夏医科大学总医院放射科行心脏磁共振检查健康志愿者 120 例（男=51，女=69），年龄 20-79 岁，平均年龄 45 ± 16 岁；分为 <40 岁组、40-60 岁组、>60 岁组。应用 CVI42 软件测量左心室功能参数，分析完整心动周期内心室内血流成分（直接流量、滞留流入量、延迟射血量、残余量）和收缩期，舒张早期（E 波）、舒张晚期（A 波）峰值 KEiEDV。分析四种左心室内血流成分及动能变化与年龄及性别之间的相关性，并建立相应参数的正常参考值范围。

结果：年龄、心率、左室射血分数男女差异无统计学意义，体表面积存在差异性。直接流量、滞留流入量、延迟喷射量和残余量的相对比例分别为 $31 \pm 5\%$ 、 $19 \pm 4\%$ 、 $20 \pm 4\%$ 和 $32 \pm 6\%$ 。女性滞留流入量、残余量大于男性，而体积明显小于男性，直接流量和延迟喷射量相似（ICC=0.786）；各年龄组间四种血流成分差异无统计学意义（ $P > 0.05$ ）；<40 岁组和 >60 岁组受试者中，滞留流入量略升高（ 18.0% vs 15.3% ， $P = 0.105$ ）。此外，残余量与左室体积呈正相关，直接流量和残余量与 LVEF 相关（ $P < 0.0001$ and $P = 0.007$ ）。女性滞留流入量、残余量容积、收缩期峰值 Δ KEiEDV 较男性低，随着年龄增长，A 波峰值 KEiEDV 显著增加（左心室 $r = 0.532$ ），E 波峰值 KEiEDV（左心室 $r = -0.305$ ）和 KEiEDV E/A 比值（左心室 $r = -0.515$ ）显著降低。

结论：4D Flow CMR 可对左心室心腔内血流进行定量分析，本研究建立了不同年龄段左心室血流成分的参考范围，不同年龄、性别血流成分及 KEiEDV 存在差异，我们应注重年龄、性别对以上参数的影响。

PU-2257

CT 技术应用于早期心功能评估与鉴别诊断：心肌应变参数在肥厚型心肌病和高血压性心脏病中的重要作用

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目的 由于肥厚型心肌病 (HCM) 和高血压性心脏病 (HHD) 均存在心肌肥厚, 传统影像学方法在区分这两种疾病方面存在一定困难, 且对早期心功能损伤不够敏感。因此, 本研究的目的是探讨基于 CT 技术所获得的心肌应变 (MS) 参数在评估 HCM 和 HHD 早期左心室 (LV) 与左心房 (LA) 功能的可行性, 以及该参数在区分这两种疾病上的能力, 为临床提供参考。

资料与方法 本研究纳入了 2020 年 9 月至 2023 年 4 月期间在空军军医大学西京医院接受心脏冠状动脉血管成像检查, 结果呈阴性的 300 名成年受试者。根据各组标准, 将受试者分为 HCM、HHD 和健康对照组。随后, 使用后处理软件对三组人群的 LV 和 LA 形态特征、传统心功能参数以及 MS 参数进行了量化。最后, 采用统计学方法比较了这些参数之间的差异, 以及它们对这两种疾病的鉴别能力。

结果 相较于 HHD 组, HCM 组的 LV 及 LA 的 MS 绝对值均有不同程度降低 (LVMyoGCS, -22.92 ± 4.29 vs. -20.75 ± 3.75 ; LVEndoGCS, -35.96 ± 7.73 vs. -31.93 ± 7.74 ; LVGRS, 35.96 ± 7.73 vs. 31.93 ± 7.74 ; LAGCS, 28.39 ± 4.51 vs. 21.26 ± 6.83 ; P 均 < 0.05), 其中以纵向应变降低最为显著 (LVMyoGLS, -20.19 ± 2.71 vs. -16.64 ± 2.46 ; LVEndoGLS, -24.28 ± 3.50 vs. -20.75 ± 4.33 ; LAGLS, 32.17 ± 4.75 vs. 23.91 ± 7.27 ; P 均 < 0.05)。多元 logistic 回归分析结果显示 LVMyoGLS、LAGLS 和 LVWT 组合模型的 ROC 曲线下面积最大, 为 0.930 (灵敏度: 88%, 特异度: 83%)。

结论 本研究结果表明, 基于 CT 技术所获得的 MS 参数可以用于精确评估 HCM 和 HHD 患者 LV 和 LA 的早期心功能损伤, 尤其是 LA 功能受损可能在 LV 之前发生, 且以纵向应变的损伤最为明显。LVMyoGLS、LAGLS 和 LVWT 组合模型在区分这两种疾病时具有更强的能力。这些发现有望为临床提供更准确的诊断和治疗指导。

PU-2258

AI 肺结节诊断系统对孤立性肺结节良恶性诊断效能评估

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目的: 探讨基于深度学习的人工智能 (AI) 肺结节诊断系统对孤立性肺结节 (SPN) 良恶性的诊断效能。**方法:** 回顾性分析 2020 年 1 月-2022 年 7 月在南京中医药大学附属常熟医院行手术治疗并确诊的肺 SPN 患者 119 例, 通过 AI 阅片、影像科医师+AI 阅片、影像科专家阅片及多学科会诊 4 种阅片方式判断结节良恶性, 计算不同诊断方法的准确率、敏感度、特异度、阳性预测值、阴性预测值、约登指数, 绘制不同诊断方法的 ROC 曲线。**结果:** AI 诊断恶性肺结节的准确率为 84.03%, 敏感度为 90.00%, 特异度为 52.63%, 阳性预测值 90.90%, 阴性预测值为 50.00%, 约登指数为 42.63%。影像科医师+AI 阅片诊断恶性肺结节的准确率为 85.71%, 敏感度为 91.00%, 特异度为 57.89%, 阳性预测值 91.90%, 阴性预测值为 55.00%; 约登指数为 48.89%。影像科专家阅片诊断恶性肺结节的准确率为 90.75%, 敏感度为 98.00%, 特异度为 52.63%, 阳性预测值 91.60%, 阴性预测值为 83.30%; 约登指数为 50.63%。多学科会诊诊断恶性肺结节的准确率为 94.12%, 敏感度为 99.00%, 特异度为 68.42%, 阳性预测值 94.30%, 阴性预测值为 92.90%, 约登指数为 67.42%。**结论:** 基于深度学习的人工智能肺结节诊断系统可提高年轻医师诊断效能; 在 4 种阅片方式中, 多学科会诊对 SPN 良恶性诊断准确率较高, 可以为临床决策提供更准确的信息。

PU-2259

MSCT study for unilateral absence of pulmonary artery in adults

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Background: Unilateral absence of pulmonary artery(UAPA) is a rare congenital disorder that can remain asymptomatic until adulthood. This research aims to summarize CT findings of adult UAPA in our unit.

Methods: We retrospectively analyzed the medical records of 9 patients with UAPA. All patients underwent contrast-enhanced CT scan. Thoracic CT findings were evaluated retrospectively by two chest radiologists with 10 years' experience, which included the site of UAPA, parenchymal abnormal, mediastinal shift, associated cardiac malformation, the mean diameter of main pulmonary artery, and collateral vessels.

Results: Nine patients included male 3 and female 6, in which 8 were right UAPA and 1 left UAPA. The patient's mean age was 44.2 ± 20.9 . 2 cases were associated with patent arterial ducta, 1 case with tetralogy of Fallot and atrial septic defect, 1 case with right aortic arch and left lung cancer, and 5 cases with UAPA alone. Clinical presentations included hemoptysis, cough and expectation, chest tightness and palpitation, chest pain. The mean diameter of main pulmonary artery was $2.6\pm 0.6\text{cm}$, and there were clear fat planes at site of normal origin of affected pulmonary artery except for 2 case with cone-shape projection. Mediastinal shift to the affected lung was seen in all patients. Ground glass opacity in the affected lung was noticed in 5 cases, bronchiectasis in 2 patients, scatter pulmonary emphysema in 4 cases, honeycombing lung in 2 cases and ipsilateral peripheral lung cancer in 1 case. Systemic collaterals to the affected lung included the bronchial, intercostal, phrenic, and internal thoracic arteries.

Conclusions: UAPA tends to occur in female population, and right UAPA is predisposed to be involved. Clinical presentations are nonspecific and variable. Once lung volume reduction of one side is observed on radiography, subsequent contrast-enhanced CT could help establish the diagnosis of UAPA and its coexistent cardiac malformation. Specifically, the changes of lung parenchyma and collateral vascular formations could also be assessed.

PU-2260

双源 CT 肺动脉成像在肺动脉栓塞诊断中的临床应用

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目的 探讨双源 CT (DECT) 肺动脉成像在肺动脉栓塞 (PE) 诊断中的临床价值。

方法 回顾性调阅 2021 年 1 月至 2023 年 1 月华中科技大学同济医学院附属协和医院车谷院区收治的经临床诊断为 PE 的 96 例患者资料, 根据病情程度分为危重组 (68 例) 与非危重组 (28 例), 所有患者都完成了 DECT 肺动脉成像检查, 总结 DECT 肺动脉成像 PE 影像学表现和临床治疗结果。

结果 DECT 显示 PE 分为完全闭塞型、中心型和偏心型, PE 影像学特征是完全闭塞型表现为血管截断征, 中心型表现为轨道征, 偏心型表现为低密度充盈缺损。DECT 肺动脉成像显示管腔内大小不等栓子, 累及动脉 196 处, 其中右肺 110 处, 左肺 86 处; 完全闭塞 55 处, 管腔内充盈缺损 141 处。危重组可见右心室较左心室增大, 室间隔左移, 双侧肺动脉中心栓塞, 节段性肺梗死, 碘

图显示较大范围肺灌注减低区；危重组 DECT 肺动脉栓塞指数、中央肺动脉受累比率高于非危重组，差异有统计学意义 ($P<0.05$)。

结论 DECT 肺动脉成像对 PE 有重要的诊断价值，对临床分型有指导意义，能够清晰显示栓塞的部位、范围，碘图肺灌注异常减低区，为临床诊治提高参考。

PU-2261

联合 CEA 与 CT 形态学特征模型预测 I 期 NSCLC 隐匿性淋巴结转移

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目的 探讨联合 CEA 与 CT 形态学特征模型预测 I 期 NSCLC 隐匿性淋巴结转移 (OLM) 的诊断效能。**方法** 回顾性分析徐州市肿瘤医院 2017 年 1 月至 2022 年 12 月 388 例术前诊断 I 期 NSCLC 患者的临床资料及影像学特征，根据术后病理及免疫组化结果分为无 OLM 组与 OLM 组，比较两组间统计学差异；根据约登指数获取最佳截断值后，将定量数据调整为有序二分类数据，排除各变量严重的多重共线性问题后，纳入 $P<0.05$ 变量进行多因素二元 logistic 分析后构建预测模型并绘制 ROC 曲线，通过 AUC 评价预测模型的诊断效能。**结果** 性别、年龄、吸烟史、基础肺疾病、分叶征、空泡征、胸膜凹陷征组间差异无统计学意义 (均 $P>0.05$)；肿瘤最大径、肿瘤密度、毛刺征、内部血管征、支气管异常征、同侧肺门或纵隔最大淋巴结短径及 CEA 水平组间差异具有统计学意义 (均 $P<0.05$)。肿瘤最大径 $>17.95\text{mm}$ ($\text{OR}=3.205$, $95\%\text{CI}=1.297\sim7.923$)、肿瘤密度 ($\text{OR}=4.353$, $95\%\text{CI}=1.638\sim11.568$)、毛刺征 ($\text{OR}=2.542$, $95\%\text{CI}=1.145\sim5.644$)、同侧肺门或纵隔最大淋巴结短径 $>7.25\text{mm}$ ($\text{OR}=5.608$, $95\%\text{CI}=2.567\sim12.250$) 及 $\text{CEA}>4.59\text{ng/ml}$ ($\text{OR}=5.222$, $95\%\text{CI}=2.375\sim11.478$) 为 I 期 NSCLC OLM 的独立危险因素；构建联合 CEA 及 CT 形态学特征预测模型： $\text{logit}(P)=-5.479+1.165x(\text{肿瘤最大径}>17.95\text{mm})+1.471x(\text{肿瘤密度})+0.933x(\text{毛刺征})+1.724x(\text{淋巴结短径}>7.25\text{mm})+1.653x(\text{CEA}>4.59\text{ng/ml})$ ，其 AUC 为 0.900，灵敏度为 90.0%，特异度为 76.7%，准确率为 70.6%。**结论** 联合 CEA 水平与 CT 形态学特征模型预测临床 I 期 NSCLC OLM 具有较高的诊断价效能，可以在术前提示临床避免非必要的大范围淋巴结清扫，提高预后。

PU-2262

瘤体、瘤周影像组学特征对肺磨玻璃结节微浸润腺癌与浸润性腺癌的诊断价值

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目的：探讨瘤体、瘤周影像组学特征对浸润性腺癌 (IAC) 和微浸润腺癌 (MIA) 的鉴别能力。

方法：回顾性分析 323 个在锦州医科大学附属第一医院经手术证实的表现为磨玻璃结节的微浸润腺癌和浸润性腺癌，从瘤体和 3mm 瘤周提取影像组学特征，经过特征降维筛选后，运用八种不同机器学习分类器分别建立瘤体、瘤周以及组合模型，根据 ROC 曲线对模型进行评估，使用 Delong 法对其 AUC 值进行评价。

结果：瘤体和 3mm 瘤周的最佳机器学习模型均为神经网络模型，瘤体模型在训练组和检验组的 AUC 值及 95% 置信区间分别为 AUC: 0.9307 (0.7870, 1.0000) 和 AUC: 0.8730 (0.6838, 1.0000)，瘤周模型分别为 AUC: 0.9125 (0.7552, 0.9981) 和 AUC: 0.8860 (0.7135, 1.0000)；组合模型的最佳

模型为逻辑回归模型, 其在训练组和检验组的 AUC 值和 95%置信区间为 AUC: 0.9337 (0.7424, 1.0000)和 AUC: 0.8770 (0.6748, 1.0000)。瘤体、瘤周、组合模型的训练组 ROC 曲线的 AUC 值两两进行 Delong 检验的 P 值分别为 0.4714、0.8990、0.3972; 它们的检验组 ROC 曲线的 AUC 值 Delong 检验 P 值分别为 0.7808、0.9328、0.8462, 均无统计学差异。

结论: 瘤体、瘤周 3mm 的薄层 CT 影像组学特征模型以及它们的组合模型都可以较好的鉴别表现为磨玻璃结节的浸润性腺癌和微浸润腺癌, 但这三种方法并没有统计学差异。

PU-2263

冠状动脉周围脂肪组织衰减与冠脉炎症变化的相关性

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目的:

通过人体 PCAT 标本及动物冠脉炎症模型, 探讨 PCAT 衰减与冠脉和 PCAT 炎症病理变化的相关性, 以及 FAI (PCAT 衰减) 与冠脉-PCAT 炎症因子表达水平的相关性。

研究方法:

前瞻性收集冠脉搭桥患者右冠状动脉 (RCA) 近段的 PCAT 标本, 并测量其 FAI。以 RT-PCR 测定 PCAT 中 IL-1 β , IL-6、TNF- α 等因子的 mRNA 表达水平, 并分析其与 FAI 的相关性。通过经皮介入冠脉球囊扩张 (LAD 及 RCA) 建立成年雄性巴马猪的冠脉炎症模型, 以 HE 染色和免疫组化染色分析冠脉-PCAT 炎症的病理变化 (对照组, 术后 1 周及术后 4 周), 测定冠脉和 PCAT 中 IL-1 β 、IL-6、iNOS 及 TNF- α mRNA 表达水平。同时通过冠脉 CTA 测量各组动物 PCAT 衰减的变化, 进而分析 PCAT 衰减与冠脉-PCAT 炎症动态演变的相关性。

结果:

1. 人体 PCAT 标本中 IL-1 β ($r = 0.61$) 和 IL-6 ($r = 0.48$) 的 mRNA 表达水平与 FAI 值呈正相关。
2. 动物模型中, HE 及免疫组化染色 (IL-1 β) 提示术后 1 周时可见显著的冠脉-PCAT 炎症反应, 术后 4 周部分恢复。
3. 动物模型中冠状动脉-PCAT 炎症因子 (IL-1 β 、IL-6、iNOS 及 TNF- α) mRNA 的表达水平在损伤后 1 周显著升高, 术后 4 周时部分恢复。此外, 我们观察到 IL-1 β mRNA 的高表达水存在着由内层 PCTA 向外层 PCAT 扩散的趋势。同时动物模型的 PCAT 衰减值也存在与炎症因子 mRNA 表达水平相似的随时间变化的规律 ($-86.37HU$ vs. $-53.11HU$ vs. $-66.51HU$, $P < 0.01$)。且 PCAT 衰减值与冠脉和内层 PCAT 中 IL-1 β (冠脉: $r = 0.61$, $P < 0.01$; PCAT: $r = 0.50$, $P = 0.01$)、IL-6 (冠脉: $r = 0.73$, $P < 0.01$; PCAT: $r = 0.56$, $P < 0.01$) 的 mRNA 表达水平呈正相关, 与冠脉管壁中 iNOS 及 TNF- α 的表达水平呈正相关。

结论:

PCAT 衰减 (FAI) 与冠脉-PCAT 的炎症因子表达水平, 及其炎症的动态变化存在一定的相关性。

PU-2264

肺癌能谱 CT 参数评估 PD-1 表达

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目的: 探讨肺癌能谱 CT 成像的参数是否能评估患者程序性死亡受体 1 (Programmed Death Receptor 1, PD-1) 表达情况。方法: 收集我院 2021 年 3 月至 2023 年 6 月经病理检测过并确定为肺癌的 50 例患者的资料, 同时病理检测 PD-1 表达, 通过能谱 CT 分别测定动脉期 (AP) 与静

脉期(VP)的参数, 构建能谱 CT 参数的 Nomogram 模型评估 PD-1 表达的情况。结果: 本研究发现动脉期的能谱曲线斜率 ($ap\lambda HU$) 与静脉期的碘值 ($vpIC$)、标准化碘浓度 ($vpNIC$)、能谱曲线斜率 ($vp\lambda HU$) 是 PD-1 表达的影响因子。通过四个影响因子构建 Nomogram 模型, 该模型表现出良好的区分度和一致性, 感受性曲线 (ROC) 的曲线下面积 (AUC) 为 0.95(95%CI 0.893-1.000)。结论: 肺癌能谱 CT 的相关参数构建 Nomogram 模型能有效的预测 PD-1 的表达, 在评估肺癌免疫治疗方面具有潜在的价值。

PU-2265

Relationship between peri coronary inflammation and coronary vascular function in patients with suspected coronary artery disease

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Background: We aim to evaluate the relationship between peri-coronary adipose tissue (PCAT) attenuation and coronary vascular function assessed by positron emission tomography/computed tomography (PET/CT) in patients with suspected coronary artery disease (CAD).

Methods: The study population included 364 patients with suspected CAD who underwent $^{13}NH_3.H_2O$ PET/CT and coronary computed tomography angiography (CCTA). We evaluated the relationship between fat attenuation index (FAI), PCAT volume and other qualitative CT-derived anatomic parameters with coronary flow reserve (CFR).

Results: Overall, reduced CFR (<2.5) was detected in 206 (57%) patients. On patient-level, those with reduced CFR exhibited significantly higher prevalence of diffuse atherosclerosis (41% vs. 23%; $P < 0.001$) and higher FAI ($-75.5HU$ vs. $-77.1HU$; $P = 0.014$) compared with patients with normal CFR. Among patients without obstructive CAD, FAI was significantly higher in patients with reduced CFR ($-75.5HU$ vs. $-77.7HU$, $P = 0.026$). On vessel level, 1092 vessels were analysed and 642(59%) presented reduced CFR. FAI was also higher in vessels with reduced CFR ($-80.8HU$ vs. $-81.8HU$; $P = 0.045$) than those with normal CFR. In a patient-level analysis, obstructive CAD, diffuse atherosclerosis, and FAI were independently associated with CFR. Of note, adjusted for traditional risk factors (age, hypertension, diabetes, hyperlipidemia, and smoking), FAI remained associated with global CFR.

Conclusions: Coronary perivascular inflammation evaluated by CCTA was independently associated with coronary vascular function by PET/CT. In patients without obstructive CAD, FAI was higher in the presence of reduced CFR. FAI might help predicting microcirculatory damage among patients who do not exhibit epicardial artery stenosis.

PU-2266

双层探测器光谱 CT 胰腺脂肪定量与 2 型糖尿病患者冠状动脉高危斑块的相关性研究

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目的 本研究探讨了 2 型糖尿病患者胰腺脂肪沉积与冠状动脉高危斑块之间的关系, 以期探究适当的影像学标志物预警 T2DM 患者心血管事件的发生。方法 选取 2021 年 10 月至 2022 年 10 月因胸痛于我院采用双层探测器光谱 CT 进行冠状动脉 CTA 检查的 T2DM 患者, 分为无斑块组 ($n=42$)、

非高危斑块组 (n=48) 和高危斑块组 (n=45)。胰腺脂肪含量在光谱 CT 常规混合能级图像、CT40keV 单能级图像、CT70keV 单能级图像、有效原子序数图及碘图上进行测定 (分别记为 CTpoly、CT40keV、CT70keV、Zeff 和碘值), 能谱曲线斜率 λ_{HU} 通过公式计算获得。比较各组间上述胰腺衰减指标的差异, 同时分析冠状动脉高危斑块与胰腺脂肪沉积的关系。结果 高危斑块组胰腺各能谱指标均低于非高危斑块组和无斑块组, 差异均有统计学意义; 而非高危斑块组与无斑块组两组的胰腺能谱各衰减指标差异, 无统计学意义。校正了传统的心血管危险因素后, 低水平 Zeff 与冠状动脉高危斑块独立相关 (OR=4.964, 95%CI =1.921-12.827, P<0.001)。结论 低水平 Zeff 是 T2DM 患者冠脉高危斑块的独立危险因素, 表明了胰腺脂肪沉积可能增加 T2DM 患者发生冠状动脉高危斑块的风险。

PU-2267

在 GE Revolution Apex CT 下不同方式的头颈 CTA、冠状动脉 CTA“一站式”扫描血管成像的应用研究

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目的: GE Revolution Apex CT 下两种冠状动脉轴位扫描联合头颈血管螺旋扫描的"一站式"检查探讨联合扫描临床应用的可行性及特点。

方法:A 组采用先扫描头颈 CTA 后扫描冠状动脉 CTA 方式。体位为仰卧左上手举右手平放, 扫描方向取头先进。扫描范围: 颅顶至心脏膈面。扫描方向由头侧向足侧。扫描条件: 头颈部 CTA 管电压 100kV, 自动管电流 400-700mA, 噪声指数 7.0, 扫描层厚 0.625mm, 螺距 0.508: 1, 层间距 0.625mm, 球管旋转时间 0.28s, 矩阵 512x512, 使用 80mmx0.625mm 探测器, 宽度 8cm, 扫描时间 3s 左右。检查期间无需屏气, 只需平静呼吸即可。B 组采用先扫描冠状动脉 CTA 后扫描头颈 CTA 方式。体位为仰卧左上手举右手平放, 扫描方向取头先进。扫描范围: 心脏膈面至颅顶。扫描方向由足侧向头侧。扫描条件: 头颈部 CTA 管电压 100kV, 自动管电流 400-700mA, 噪声指数 7.0, 扫描层厚 0.625mm, 螺距 0.508: 1, 层间距 0.625mm, 球管旋转时间 0.28s, 矩阵 512x512, 使用 80mmx0.625mm 探测器, 宽度 8cm, 扫描时间 3s 左右。检查期间无需屏气, 只需平静呼吸即可。结果: 两种冠状动脉轴位扫描联合头颈血管螺旋扫描的"一站式"联合扫描方式均可满足影像诊断需求和临床诊治标准, 但经影像医生评判 A 组图像优于 B 组。

结论: 1、两种头颈、冠状动脉联合 CTA 扫描所得导冠状动脉图像均可满足诊断需求。2、A 组通过改变扫描方式即先扫描头颈 CTA 后扫描冠状动脉 CTA 的方法, 遵循机体自身循环的特点和血液流经的先后顺序可以避免头颈部静脉伪影和心脏右心伪影造成干扰, 为临床治疗提供优质影像图像。

PU-2268

能谱 CT 在肺癌病理分型评估中的初步研究

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目的 探讨能谱 CT 在肺癌病理分型评估中的应用价值。方法 选取接受能谱 CT 扫描并经病理证实的肺癌患者 55 例 (鳞癌 20 例、腺癌 20 例、小细胞肺癌 15 例), 对比分析不同病理类型肺癌的能谱曲线及各项定量指标。结果 小细胞肺癌与鳞癌或腺癌间 40—80keV 水平下 CT 值、40keV-70keV 和 40keV-90keV 能谱曲线斜率、有效原子序数、碘浓度值、碘水比值及标准化碘浓度值均具有统计学差异 (P<0.05); 鳞癌与腺癌间各项指标均无显著差异。ROC 曲线分析显示以 NIC 为 0.298 作为阈值, 鉴别小细胞肺癌和非小细胞肺癌的敏感度和特异度分别为 65%、86.7%。结论

不同病理类型肺癌具有不同特质的能谱曲线及能谱指标, 能谱 CT 成像在鉴别不同病理类型肺癌方面具有一定的应用价值

PU-2269

低流速能谱 CT 显示支气管动脉

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目的: 探讨低流速能谱 CT 血管成像技术对支气管动脉的显示能力以及优化血管成像质量的价值。

方法: 回顾性分析 100 例能谱胸部增强 CT 原始数据, 运用能谱单能量成像技术分别重建 50 keV、60 keV、70 keV 单能量图像, 结合 VR、MIP、血管与气道三维融合重建后处理图像以及原始图像来观察支气管动脉的解剖特征、分型, 并对 3 组图像进行客观评价和主观评分。

结果: 100 例共显示 204 支支气管动脉(左侧 94 支、右侧 119 支), 其中 L1 型 13 例, L1R1 型 41 例, L2R1 型 7 例, L3R1 型 2 例; R1 型 8 例, R2 型 11 例, R3 型 1 例, L1R2 型 12 例, L2R2 型 3 例, L1R3 型 2 例。50 keV 单能量图像质量优于 60keV、70keV 单能量图像, 三者 CT 值、SNR 和主观评分差异均有统计学意义(P 均 <0.05)。

结论: 低流速能谱增强 CT 成像可清晰显示支气管动脉, 推荐使用 50 keV 单能量图像。

PU-2270

基于迭代重建算法的冠状动脉计算机断层成像在陈旧性心肌梗死诊断中的价值

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摘要: 本研究旨在比较基于迭代重建算法的 CT 对老年性心肌梗死(OMI)的诊断价值, 为临床治疗提供理论指导和实践依据。本研究选取 10 例 OMI 患者, 分为两组, 每组 5 例。实验组采用代数迭代重建法, 对照组采用医院原始重建法。对不同迭代次数下的图像质量参数进行分析对比, 得到最优迭代次数。通过对绘制时间和绘制后诊断准确率的分析, 探讨了迭代重建算法在临床诊断中的价值。通过对实验组 5 例患者的图像质量参数进行分析比较, 发现图像质量首先随着迭代次数的增加而增加, 但在迭代一定次数后, 图像质量随着迭代次数的增加而下降。结果表明, 最优迭代次数为 13 次。实验组和对照组的绘制时间分别为 54.27 min 和 117.87 min, 两组间差异有统计学意义($P < 0.05$)。另外, 实验组的准确率(93.33%)与对照组的准确率(73.33%)比较, 差异有统计学意义($P < 0.05$)。综上所述, 采用代数迭代重建算法进行冠状动脉 CT 成像所需时间大大缩短, 诊断准确率大大提高。因此, 基于迭代重建算法的冠状动脉 CT 成像可以更有效地利用医疗资源, 提高 OMI 的诊断准确率。

PU-2271

探索不同程度心胸比对冠脉强化影响程度的研究

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目的 探索不同程度的心胸比对冠脉 CTA 检查中对冠脉强化有无影响。方法 选取进行冠脉 CTA 检查的受检者 80 例,采用一致的对比剂计算方法形成对比剂注射方案,同时采用相同的扫描方案进行扫描,扫描完成之后,根据患者不同的心胸比的增大程度,将患者分为 A、B、C、D 三组,其中 A 组为正常组, B 组为轻度增大组(心胸比 0.51~0.55), C 组为中度增大组(心胸比 0.56~0.60), D 组为重度增大组(0.61~), 分别测得各组主动脉根部、冠脉 S1、S5 段的 CT 值,并计算各组之间绝对差值和相对差值,然后分析不同心胸比情况下冠脉 CT 的强化程度有无差异。对所得数据运用 spss 21.0 软件进行统计学分析。结果 A、B、C、D 四组冠脉 CT 平均强化值分别为 552 ± 12 、 484 ± 15 、 417 ± 11 、 325 ± 23 。B、C、D 三组相对 A 组受检者冠脉 CT 强化程度的绝对差值和相对差值分别降低 68、135、227 和 12%、24%、58%, B、C、D 三组相对 A 组正常组差异具有统计学意义($P<0.05$), B、C、D 各组件数据差异也具有统计学意义($P<0.05$)。结论 不同心胸比对于冠脉 CTA 检查时冠脉 CT 的强化程度有显著影响,故在临床检查过程中,若受检者存在心功能不全的情况,可根据测量的心胸比大致预判其对冠脉强化程度的影响,以提前调整对比剂注射方案或扫描方案,从而提高检查图像质量。

PU-2272

FORCE CT FLASH 扫描方案对下肢血管 CT 成像辐射剂量和图像质量的研究

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目的 探索 Turbo Flash 扫描模式在下肢动脉血管成像中的应用价值。材料和方法 在本前瞻性研究中的患者行下肢 CTA 成像检查。A 组采用方案 1: 常规扫描模式行头足方向下肢 CTA 扫描。B 组采用方案 2: Turbo Flash 扫描模式行足头方向下肢 CTA 扫描。比较血管内 CT 值、信噪比 (SNR)、对比度噪比 (CNR) 和图像噪声。60 名患者被随机分配到 A 组 (对照组) 或 B 组 (实验组), 由两名放射科医生对图像质量进行评估, 同时比较 CT 剂量指数 (CTDIvol) 和剂量长度乘积 (DLP)。结果 血管内 CT 值 (586.8 ± 140.3 vs 496.1 ± 129.3 HU, $p=0.011$), 信噪比 (33.0 ± 11.3 vs 27.4 ± 12.3 ; $p=0.042$)、CNR (30.1 ± 13.3 vs 24.2 ± 10.3 ; $p=0.029$) 其中膝关节以下小动脉图像质量评分 (3.8 ± 0.2 vs 3.1 ± 0.2 ; $p=0.001$) B 组均高于 A 组。B 组的辐射剂量明显低于 A 组, 其中 CTDIvol 减少 40.9% (1.3 ± 0.1 对 2.2 ± 0.3 mGy; $p=0.006$), DLP 减少 42.8% (148.7 ± 21.9 vs 260.2 ± 59.1 mGy*cm; $p=0.018$)。结论 与常规扫描模式头足向下肢 CTA 扫描相比, Turbo Flash 扫描模式行足头方向下肢 CTA 扫描可降低辐射剂量并且具有更高的 CT 值、SNR、CNR, 同时在膝关节以下的小动脉中可获得更好的图像质量。

PU-2273

Impact of a motion correction algorithm (SnapShot Freeze 2) on image quality in patients undergoing CT angiography: preliminary clinical application

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***Purpose:** To investigate the motion correction algorithm Snapshot-Freeze2 (SSF2) and SSF1 compared to standard reconstruction (STD) in patients randomized to receive beta-blockers (BB) or no beta-blockers (non-BB) before coronary CT, and to investigate if SSF2 can replace BB.

***Methods and Materials:** 18 patients scheduled for coronary CT were randomized. All images were reconstructed by the SSF2, SSF1 and STD algorithms. Image quality was evaluated according to 4 score (1: excellent, 2: good, 3: adequate, 4: non-diagnostic) and presence of artifacts was noted.

***Results:** Images from 7 patients in the BB group (mean HR 52 ± 5 bpm) and 9 patients in the non-BB group (mean HR 72 ± 5 bpm) were analyzed. 2 patients were excluded because of tachycardia, bradycardia in SSF. Both SSF2 and SSF1 increased the number of excellent images in groups compared to the STD algorithm (SSF2 vs SSF1 vs STD) (BB: 85 % vs 70 % vs 60 %; non-BB: 75% vs 58% vs 40%), particular importance the number of non-diagnostic images was significantly reduced using SSF2. SSF2 and SSF1 reduced motion artifacts (SSF2 vs SSF1 vs STD) (BB: 1% vs 8% vs 18%; non-BB: 8% vs 25% vs 40%), what is particularly important is the motion artifacts in non-BB obviously reduced using SSF2 compared to the BB group analyzed by STD (8% vs 18%).

***Conclusions:** SSF2 improves image quality and reduces motion artifacts, the single-center pilot study with a small sample suggests that can be effectively compensated for the absence of BB.

PU-2274

表现为磨玻璃结节的肺腺癌薄层 CT 征象分析及病理分型对照

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摘要 探讨薄层 CT (TSCT) 表现为磨玻璃结节 (GGN) 的肺腺癌的 CT 征象, 并与病理分型对照。回顾性搜集肺内 TSCT 发现的 83 个磨玻璃结节, 根据病理结果分为浸润前病变组 20 个, 微浸润腺癌组 32 个, 浸润性腺癌组 31 个, 分析不同病理分型的结节在薄层 CT 上的表现。83 个结节中, 34 个表现为纯磨玻璃结节 (pGGN), 49 个表现为混合磨玻璃结节 (mGGN)。浸润前病变组共 18 个结节 (18/20、90.0%) 表现为 pGGN, 微浸润腺癌组共 16 个结节 (16/32、50.0%) 表现为 pGGN, 浸润性腺癌组无结节 (0/31、0%) 表现为 pGGN。3 组分叶征、空气支气管征、血管集束征、胸膜凹陷征的比例呈上升趋势, 圆形/类圆形、瘤肺界面清晰征象的比例呈下降趋势。3 组圆形或类圆形、分叶征、瘤肺界面清晰、空气支气管征、血管集束征、胸膜凹陷征的差异有统计学意义 ($P < 0.05$)。浸润前病变组与浸润性腺癌组比较, 圆形或类圆形、分叶征、瘤肺界面清晰、空气支气管征、血管集束征、胸膜凹陷征差异具有统计学意义 ($P < 0.05$); 微浸润腺癌组与浸润性腺癌组间类圆形、分叶征、瘤肺界面清晰、血管集束征差异具有统计学意义 ($P < 0.05$)。不同病理分型的 GGN 在 TSCT 上的表现具有一定的特异性, 熟悉 TSCT 表现有助于浸润前病变、微浸润腺癌及浸润性腺癌的诊断及鉴别诊断。

PU-2275

初始 T1 值及 ECV 对心脏淀粉样变的诊断价值：Meta 分析

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目的 采用 Meta 分析方法探讨初始 T1 值及细胞外容积分数(extracellular volume fraction, ECV)对心脏淀粉样变(cardiac amyloidosis, CA)的诊断价值。

方法 检索数据库 PubMed、Embase、Cochrane Library、Web of Science、CNKI、CBM、Wanfang Database 及 VIP 中有关探讨初始 T1 值及 ECV 对 CA 的诊断价值的文献，检索时间从建库开始截止至 2022 年 11 月。应用 Revman 5.3 软件对纳入的研究进行偏倚风险评价。应用 Stata 16.0 和 Meta-Disc1.4 软件进行统计分析。计算合并敏感度、特异度、阳性似然比、阴性似然比、诊断比值比和综合受试者工作特征(SROC)曲线获取曲线下面积(AUC)及其 95%置信区间(95%CI)，并进行异质性、发表偏倚分析。使用敏感性分析验证 Meta 分析结果的稳定性与可靠性。

结果 最终纳入文献 12 篇，共 1045 例患者。Meta 分析显示初始 T1 值诊断 CA 的合并敏感度、特异度、阳性似然比、阴性似然比、诊断比值比、AUC 分别为 86% (95%CI: 82-89%)、86% (95%CI: 80-91%)、6.2 (95%CI: 4.2-9.3)、0.16 (95%CI: 0.12-0.22)、38 (95%CI: 19-75)、0.92 (95%CI: 0.90-0.94)；ECV 诊断 CA 的 Sen 合并、Spe 合并、PLR 合并、NLR 合并、DOR 合并、AUC 分别为 90% (95%CI: 83-94%)、90% (95%CI: 83-94%)、8.8 (95%CI: 5.3-14.6)、0.11 (95%CI: 0.07-0.19)、79 (95%CI: 38-162)、0.95 (95%CI: 0.93-0.97)。

结论 初始 T1 值和 ECV 对 CA 具有较高的诊断价值，可为 CA 的早期诊断提供影像学依据。

PU-2276

心脏磁共振对梗阻性肥厚型心肌病改良 Morrow 术后的随访价值

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[摘要] **目的** 探讨心脏磁共振 (Cardiac magnetic resonance, CMR) 对梗阻性肥厚型心肌病改良 Morrow 术后近期疗效的随访价值。**方法** 收集河南省胸科医院 2018 年 12 月至 2023 年 05 月间临床确诊的梗阻性肥厚型心肌病患者的临床及影像学资料，其中共计 11 例患者接受了改良 Morrow 术，并于术前、术后 3 个月完成了 CMR 检查，回顾性分析其临床及影像学资料，使用后处理工作站测量同一患者术前与术后 3 个月的左室流出道流速 (LVOTV)、静息左室流出道峰值压力阶差 (LVOTG)、舒张末期基底段左室间隔壁最大厚度 (LVMWT)、左室流出道内径 (LVOTD)、左心室舒张末期内径 (LVEDD)、左心房内径 (LAESD)、左心室心肌质量 (MASS)、SAM 征、左心室射血分数 (LVEF)、间隔支供血区静息心肌灌注缺损 (Perfusion) 及延迟强化 (LGE) 等参数。应用配对样本 t 检验比较同一患者术后 3 个月与术前数据有无统计学差异。结果 术后 3 个月与术前比较，LVOTV、LVOTG、LVMWT、LAESD 及 LV mass 值、SAM 征阳性患者例数均减小或减少，LVOTD 及 LVEDD 值、Perfusion 缺损及 LGE 患者例数均增加，差异均有统计学意义 ($P < 0.05$)；LVEF 值变化不显著，差异无统计学意义 ($P > 0.05$)。结论 CMR 可精准评估梗阻性肥厚型心肌病改良 Morrow 术后的病理改变，对术后随访有一定价值。

PU-2277

胃癌并腹膜后异位支气管源性囊肿一例

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【摘要】本文报道胃癌并腹膜后异位支气管源性囊肿一例。患者女，74 岁，左下腹隐痛不适两个月余并加重 1 周。入院上腹部 CT 平扫及增强示左侧肾上腺区（约平胸 11-12 椎体）的腹膜后间隙见一椭圆形稍低密度肿块，大小约 48.2mm*30.3mm，边缘光整，边界清晰，上极边缘见小钙化点，平扫 CT 值平均约 39HU，增强动脉期、门脉期、延迟期 CT 值分别于 40HU、41HU、45HU，邻近胃小弯胃壁受压向左侧移位，影像考虑节细胞神经瘤、神经鞘瘤、淋巴管囊肿等，待鉴别。胃小弯胃壁异常增厚并强化，病变突破浆膜层，邻近小弯侧多发区域淋巴结肿大，符合胃癌并区域淋巴结转移影像。患者行外科左开胸贲门癌根治术及左侧腹膜后肿物切除术，术中发现左侧腹膜后肿物呈囊性，内含巧克力样内容物，囊壁灰红色，质软，与周围组织分界清晰，易完整切除。术后病理诊断为腹膜后异位支气管源性囊肿。

PU-2278

DKI 直方图参数与肺癌 Ki-67、TTF-1 表达的相关性研究

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目的：探讨扩散峰度成像（DKI）直方图参数与肺癌 Ki-67、TTF-1 表达的相关性。**方法：**前瞻性收集 2021 年 5 月至 2022 年 9 月于重庆大学附属三峡医院经病理证实的肺癌患者 61 例，所有患者均于术前一周内行 MR 检查，分析 DWI 和 DKI 图像，通过后处理分别得到表观扩散系数（ADC）、平均扩散峰度（MK）、平均扩散系数（MD）值的直方图参数，同时记录免疫组化标记物 Ki-67、TTF-1 表达情况。评估各直方图参数与 Ki-67、TTF-1 表达相关性，进一步采用受试者工作特征曲线（ROC）确定各参数预测 Ki-67 和 TTF-1 表达的诊断效能。**结果：**MD 值 10th percentile、ADC 值 10th percentile、kurtosis 与 TTF-1 表达水平呈低度负相关（ $r=-0.334\sim-0.372$ ， P 均 <0.05 ）；MD 值 IQR、ADC 值 90th percentile、IQR 与 TTF-1 表达水平呈低-中度正相关（ $r=0.250\sim0.430$ ， P 均 <0.05 ），其中诊断效能最高的是 MD 值 IQR，ROC 曲线示曲线下面积（AUC）为 0.774，敏感度为 45.45%、特异度为 100%。MD 值 90th percentile、max、IQR、skewness 与 Ki-67 表达呈低度负相关（ $r=-0.260\sim-0.325$ ， P 均 <0.05 ），诊断效能最高的是 max，ROC 曲线示曲线下面积（AUC）为 0.700，敏感度为 51.22%、特异度为 95%。**结论：**DKI 直方图部分参数与肺癌 Ki-67、TTF-1 表达具有不同程度相关性，可用于预测其表达。

PU-2279

Comparative study of 3.0T uncontrasted free breathing whole-heart coronary MR Angiography and coronary CT angiography

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Objective: The purpose of this study was to evaluate the sequence performance of magnetic resonance coronary angiography (MRCA) and a comparison of MRA and CTA coronary Main Branch segments scores in volunteers.

Methods: All MRCA acquisitions were performed on a 3.0T MR system and coronary CTA imaging within 24 hours. With diaphragm navigation and free breathing, high time resolution cine imaging of four chamber was performed. The relative quiescent period of the right coronary artery was selected as the acquisition basis. The Dixon water-fat separation technology was used to acquire the original data by axial coronary imaging. In this sequence, the diaphragmatic navigation and free breathing were used to detect respiratory movement, and the coronary signal was collected at the end of expiratory phase. Image quality of every coronary segment was graded visually in consensus by these two readers on the basis of a four point scaled.

Results: 59 volunteers (61.0±7.9 years old, 34 males) successfully completed the MRCA and CTA. The ratings for LM、RCA、LAD、LCX coronary artery visualization were comparable ($P=0.025$ 、 0.035 、 0.024 、 0.011) when compared between MRCA and CTA. However, the visualization of coronary D1 and PDA segments were rated significantly higher for CTA compared to MRA ($p<0.05$).

Conclusion: The 3.0 T non-contrast-enhanced Dixon water-fat separation whole-heart MRCA has good feasibility in displaying coronary arteries under free breathing, which may provide a method to detect clinically significant coronary artery stenosis in patients with suspected coronary heart disease.

PU-2280

肺内亚实性结节临床、病理和影像学特征及相关性分析

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目的: 通过对不同病理分型亚实性结节的一般临床资料进行分析,并结合多层螺旋计算机断层成像的影像特征以及病理特征进行分析,以期可以找到简单的参数以便影像科医师在术前对肺内亚实性结节的病理分型做出预判,从而可以更好地为临床治疗方案的选择提供理论依据,以期寻找某一独立的可用于鉴别肺腺癌各病理分型以及预测其预后的危险因子。

方法: 回顾性分析 2022 年 1 月至 2023 年 4 月在我院手术证实是肺腺癌的 138 例患者共 149 枚亚实性结节的临床资料、MSCT 影像特征和病理特征。术后病理依据 2021 年肺腺癌病理新分类,按照浸润程度分为三组:浸润前病变组,微浸润性腺癌组和浸润性腺癌组。应用 Pearson χ^2 检验对分类变量资料进行分析,单因素方差分析对连续变量进行分析,寻找不同病理分型结节的临床资料和 CT 征象的差异为术前准确诊断提供依据;同时应用 Logistic 多元回归对单因素分析中有统计学差异的变量进行分析,以期找到某一独立的可以鉴别肺腺癌各病理分型以及预后的危险因子。

结果: 1. 发病年龄 ($P<0.01$)、结节长径 ($P<0.01$)、结节长径的分布情况 ($P<0.01$)、分叶征 ($P<0.01$)、pGGO/mGGO ($P<0.01$)、毛刺征 ($P=0.02$) 肿瘤的长径 ($P<0.01$) 和在三组间的差异有统计学意义。

2. 多因素 Logistic 回归分析示结节长径 $\leq 1.0\text{cm}$ 和实性成分比例 $\leq 50\%$ 与应变量的关联有统计学意义。

结论: 1. 单因素分析提示, 年龄、结节长径、结节分型、毛刺征、分叶征和肿瘤长径对 AAH/AIS 组、MIA 组和 IAC 组的鉴别诊断有较大的价值。
2. 多因素 Logistic 回归分析提示, 当结节长径 $\leq 1.0\text{cm}$, 实性成分比例 $\leq 50.0\%$ 时是判断肺腺癌预后的重要决定性因素。

PU-2281

双源 CT 能谱纯化技术在儿童气管异物低剂量 CT 扫描中的应用

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【摘要】目的: 探讨双源 CT 能谱纯化技术在儿童气管异物 CT 扫描中与常规扫描方案在图像质量和辐射剂量中的差别, 评估更适合的扫描方案。方法: 前瞻性连续 83 例行 CT 气管异物三维重建的患儿数据, 扫描设备均为三代双源 CT, 其中 A 组 (对照组), 41 例, 年龄 3.41 ± 2.38 , 采用 100kV, 参考 50 mAs 和能谱纯化组: B 组 (实验组), 42 例, 年龄 6.27 ± 2.25 , 采用 Sn100kV, 参考 50 mAs, 两组其他扫描条件一致。比较 2 种不同扫描技术的辐射剂量、图像质量, 测量并计算每组图像的噪声、信噪比以评价图像客观质量; 由 2 名高年资放射科医师按 5 级评分法对图像进行主观质量评价。辐射剂量及图像客观噪声组间比较行方差分析及 t 检验, 图像质量评分组间比较行 Mann-WhitneyU 检验, 医师对图像诊断一致性检验行 kappa 分析。结果: 实验组的 CTDI 为 $(0.54 \pm 0.11)\text{mGy}$, 较对照组的 $(1.80 \pm 0.88)\text{mGy}$ 下降了 73% ($t=15.27$, $P=0.000$); 实验组的平均剂量长度乘积和平均有效剂量分别为 $(7.13 \pm 4.72)\text{mGy}\cdot\text{cm}$ 和 $(0.5 \pm 0.07)\text{mSv}$, 明显低于对照组的 $(18.78 \pm 3.78)\text{mGy}\cdot\text{cm}$ 和 $(1.23 \pm 0.61)\text{mSv}$ 两组的图像噪声和对比噪声比差异均无统计学意义。两组患者肺窗图像质量评分差异无统计学意义纵隔窗的评分差异有统计学意义以肺窗为判断标准, 研究组的图像质量中位评分为 4 分 (3~5 分), 对照组为 4 分 (3~5 分), 所有图像质量均满足诊断要求。结论与传统 100 kV 扫描技术相比, 结论: 在儿童气管异物低剂量 CT 扫描中采用第 3 代双源 CT 能谱纯化技术能在保证图像质量的情况下有效降低辐射剂量, 值得在临床 CT 扫描中推广使用。

PU-2282

Structured Reporting Adds Clinical Value In Cardiovascular Magnetic Resonance Of New-Onset Heart Failure

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Purpose

To evaluate the effect of structured reporting of cardiovascular magnetic resonance (CMR) studies on the content, clarity and clinical usefulness of radiology reports in patients with new-onset heart failure (HF).

Methods

Conventional and structured CMR reports were acquired for 18 patients with new-onset HF. Conventional reports (CRs) were described in a free-text form and obtained retrospectively from our radiology information systems; structured reports (SRs) contained a consistent ordering of observed indicators with standardized subheadings. Thirty-six reports were independently scored by two cardiologists and two general internists using a questionnaire addressing completeness of information, structure, guidance for patient management and overall quality. The questionnaire included yes-no, 10-point Likert scale and 5-point scale questions. Altogether 144 completed

questionnaires were evaluated. Non-parametric Wilcoxon signed-rank test and McNemar's test were used for statistical analysis.

Results

SRs received higher ratings for content (median rating 9.8 vs. 8.4, $p<0.001$) and clarity (median rating 9.8 vs. 7.8, $p<0.001$). SRs contained more quantitative information on volume, wall thickness, mass and function than CRs (98 % vs. 64 %). Sufficient information for tissue characterization was included in more SRs (90% vs. 65 %). More SRs commented on etiology and classification (non-ischemic and ischemic) (92 % vs. 60 %). Information extraction was quicker from SRs (median rating 9.4 vs. 6.2; $p<0.001$). SRs had better comprehensibility (9.4 vs. 7.2; $p<0.001$). Contribution of SRs to clinical decision-making was higher (9.2 vs. 6.0; $p<0.001$). All clinicians preferred SRs over CRs.

Conclusion

Structured reporting of CMR adds clinical value compared to CRs by increasing completeness of qualitative and quantitative assessments, forwarding information extraction and improving patient management.

PU-2283

Dark Right Ventricular Blood Pool on myocardial T2 Mapping in Patients with Dilated Cardiomyopathy

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To investigate the importance of the dark right ventricular blood pool(RVBP) sign on cardiac MRI (CMR) T2 mapping in patients with dilated cardiomyopathy (DCM).

Methods

The clinical and CMR imaging data of 139 consecutive DCM patients from January 1, 2019 to December 30, 2021 were analyzed retrospectively. T2 values of patients and 29 healthy controls(HC) were measured in the septum, left ventricle(LV) and right ventricle(RV) on T2 mapping imaging(T2-prepared balanced steady-state free-precession sequence), and T2LV/T2RV and T2RV/T2septum were calculated. The function and strain of the ventricles were evaluated using cine imaging.

Results

The sign of dark-RVBP on T2 mapping was found in 26.6%(37/139) of DCM patients. The values of T2RV and T2RV/T2septum in patients with dark-RVBP (47.57 ± 12.43 ms and 1.18 ± 0.27) were significantly lower compared to those in patients with bright-RVBP (84.75 ± 26.55 ms and 2.05 ± 0.54) and HC (82.21 ± 11.46 ms and 2.21 ± 0.31), all $P<0.001$. LV and RV global longitudinal strains(GLS) and circumferential strain(GCS) showed no differences between dark-RVBP and bright-RVBP groups(all $P>0.05$). The ratio of T2LV/T2RV in patients with dark-RVBP (2.59 ± 0.63) was significantly higher than that in patients with bright-RVBP (1.76 ± 0.39) and in HC (1.37 ± 0.25), all $P<0.001$. The ratios of T2RV/T2septum and T2LV/T2RV were both strongly correlated with the severity of the RV dysfunction (both $P<0.001$).

Conclusion

The presence of dark RVBP on the T2 mapping is a marker for RV dysfunction. The ratios of T2RV/T2septum and T2LV/T2RV may be helpful to conveniently detect the severe RV dysfunction.

PU-2284

光谱多参数 CT 成像在不同危险分层急性肺栓塞栓子检出的研究王芝浩¹、周宇涵¹、曹伟萌¹、陈伟华¹、雷丽敏¹、刘杰¹、董书杉²

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目的：本研究旨在探讨应用光谱 CT 多参数（Spectral Based Image）成像评估肺灌注缺损程度在临床不同危险分层中的预测价值。

方法：本研究回顾性纳入 2023 年 2 月-2023 年 4 月确诊为肺动脉栓塞的患者共计 50 例，依据简化肺栓塞临床危险分层评分将患者分为低危险组 28 例，中危组 22 例。重建光谱数据获得碘密度图（Iodine Density, ID），有效原子序数图（Effective Atomic Number, Z-eff）以及碘密度-有效原子序数融合图（ID-Z-eff）。应用 Mastora 评分分别评估各组低灌注区灌注缺损面积，并绘制各组受试者工作特征曲线(Receiver operating characteristic, ROC)，计算 AUC（Area under curve）及截断值（Cutoff value）。定性数据采用卡方检验。定量数据采用斯皮尔曼等级相关系数和正态性检验。

结果：50 例患者中，依据 Mastora 评分，各组低灌注区数量分别为：ID 图（低危组 1.7 ± 0.86 ，中危组 2.2 ± 1.15 ），Z-eff 图（低危组 1.9 ± 1.02 ，中危组 2.32 ± 1.21 ），ID-Z-eff 图（低危组 2.05 ± 0.35 ，中危组 2.85 ± 0.52 ）。各组 Mastora 评分分别为：ID 图（低危组 $20.32\% \pm 7.48\%$ ，中危组 $27.45\% \pm 3.56\%$ ），Z-eff 图（低危组 $22.45\% \pm 5.04\%$ ，中危组 $31.44\% \pm 9.24\%$ ），ID-Z-eff 图（低危组 $22.45\% \pm 5.04\%$ ，中危组 $22.45\% \pm 5.04\%$ ）。相较 ID 图（AUC 为 0.86，截断值 800，灵敏度 70%，特异度 80%）、Z-eff 图（AUC 为 0.92，截断值 1000，灵敏度 80%，特异度 92%），ID-Z-eff 图（AUC 为 0.95，灵敏度 83%，特异度 95%）对急性肺栓塞中/低危患者中的预测效能最高。

结论：基于光谱多参数 CT 的碘密度-有效原子序数融合图诊断效能优于碘密度图和有效原子序数图，可以提高急性肺栓塞低/危患者中的预测效能，为不同危险分层肺栓塞患者预后预测提供更多影像学支持。

PU-2285

Single-phase Cardiac CT angiography-based machine learning radiomics predicts left atrial appendage thrombi and circulatory stasis

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Purpose

Single-phase coronary CT angiography (CCTA) is difficult to distinguish left atrial appendage (LAA) thrombi and circulatory stasis. In this study, we aim to explore whether the left atrial appendage thrombi can be differentiated from circulatory stasis using radiomic features on single-phase CCTA images.

Methods and Materials

128 lesions from sixty consecutive patients with atrial fibrillation diagnosed with left atrial appendage thrombi and circulatory stasis by transesophageal echocardiography or cardiac

surgery from May 2016 to September 2022 were enrolled. There were 63 cases in the thrombus group and 65 cases in the blood stasis group. The CT values within the left atrial appendage of interest (ROI) and the CT values within the ROI of the ascending aortic in the same axial plane were measured separately, and the ratio of the two was calculated. The volume of left atrial appendage filling defects on single-phase CT images was manually segmented to obtain radiomic features, radiomics features were automatically extracted, a classification model was constructed, and 128 patients were divided into a training set and a test set according to 7:3, and AUC values were compared. Clinical, imaging, and radiomics model were constructed based on the CHA2DS2-VASc score, CT parameters, and Rad score using multivariate Logistic regression. ROC curves, calibration curves, and decision curves were plotted to evaluate the model efficacy.

Results

The differences in LV opening diameter, the length of LAA, LV morphology, LV volume, LV anterior-posterior diameter, and LAA/AA between the two groups were statistically significant (all $P < 0.05$). For the 63 cases in the thrombus group and 65 cases in the blood stasis group, a total of 2264 radiomics features were extracted, and different models of XGBOOST, AdaBoost, Random Forest, Decision Tree, Logistic Regression and Support Vector Machine were established, among which the model of random forest is better. For model efficacy evaluation, the AUC was significantly higher in the imaging histology model than in the imaging and clinical models (0.903 vs. 0.807, $p < 0.05$; 0.903 vs. 0.631, $p < 0.05$).

Conclusion

Radiomic features based on single-phase CCTA extraction of filling defects have shown good value in differentiating thrombus from circulatory stasis.

PU-2286

双源 CT 多部位 CTA 一站式扫描在心脑血管病诊断中的应用分析

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摘要 目的：分析双源计算机断层扫描（CT）多部位 CT 血管造影（CTA）一站式扫描在心脑血管病诊断中的应用价值。方法：选取本院 2020 年 6 月~2021 年 10 月收治的 195 例疑似心脑血管病患者（其中疑似脑血管病 91 例、疑似心血管病 104 例）作为研究对象，所有患者均行双源 CT 多部位 CTA 一站式扫描与数字剪影血管造影（DSA）检查，以 DSA 检查为金标准，分析双源 CT 多部位 CTA 一站式扫描在心脑血管病中的诊断价值。结果：经 DSA 检查，最终有 89 例确诊为脑血管病（脑梗死 52 例、脑动脉瘤 37 例），100 例确诊为心血管病（急性心肌梗死 58 例、冠心病心绞痛 42 例），共发现狭窄血管有大脑前动脉 10 支，大脑中动脉 11 支，大脑后动脉 9 支，颈动脉 18 支，椎基底动脉 12 支、左前降支 43 支，右冠状动脉 37 支，回旋支 33 支；共发现 42 枚动脉瘤，其中大脑前、中、后动脉 17 枚，颈动脉 8 枚，椎基底动脉 7 枚，前、后交通动脉 10 枚；经双源 CT 多部位 CTA 一站式扫描，最终 87 例确诊为脑血管病（脑梗死 50 例、脑出血 37 例），98 例确诊为心血管病（急性心肌梗死 58 例、冠心病心绞痛 40 例），共发现狭窄血管有大脑前动脉 10 支，大脑中动脉 10 支，大脑后动脉 9 支，颈动脉 17 支，椎基底动脉 12 支、左前降支 41 支，右冠状动脉 36 支，回旋支 33 支；共发现 40 枚动脉瘤，其中大脑前、中、后动脉 16 枚，颈动脉 8 枚，椎基底动脉 7 枚，前、后交通动脉 9 枚；诊断脑动脉瘤、头颈动脉狭窄、冠状动脉狭窄与 DSA 的符合率分别为 95.24%（40/42）、95.00%（57/60）、97.35%（110/113）；诊断脑血管病的灵敏度、特异度、准确度分别为 96.63%（86/89）、50.00%（1/2）、95.60%（87/91），诊断心血管病的灵敏度、特异度、准确度分别为 97.00%（97/100）、75.00%（3/4）、96.15%（100/104）。结论：双源 CT 多部位 CTA 一站式扫描在心脑血管病中具有较高的诊断价值，可为临床诊治提供参考依据。

PU-2287

Risk factors of children suspected of having pulmonary embolism: complication of mycoplasma pneumoniae pneumonia

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Purpose:: Pulmonary embolism (PE) is not a rare complication of mycoplasma pneumoniae pneumonia (MPP) in children. We sought to determine the rate of PE in children with MPP who underwent clinically indicated CT pulmonary angiography (CTPA), and to evaluate the risk factors of PE.

Methods: All of 106 MPP children who were clinically suspected of PE and underwent CTPA were retrospectively enrolled. The clinical features, laboratory data, and radiological parameters were recorded (e.g. lung consolidation involved, Qanadli score). Cox proportional hazards model and area under the receiver-operating characteristic (ROC) were used to evaluate the risk factors and their prognostic discriminatory capacity of PE.

Results: PE was detected in 26 of 106 (24.5%) children (mean age, 6.2 years \pm 3.3, 53 boys). 16 of 26 (61.5%) children with PE were boys. The mean age of children with PE was 8.1 \pm 2.9 years old, and the mean Qanadli score was 15.3 \pm 10.2. Children with PE demonstrated higher D-dimer (9.3 \pm 7.1 vs. 3.6 \pm 3.8), and more frequency of lung lobe consolidation (25 (96.2%) vs. 64 (80.0%)) (all $P < 0.05$). For children with MPP, parameters of age (Hazard ratio (HR) = 1.96 (95% CI: 1.04, 3.71, $P = 0.037$), D-dimer (HR = 2.04, 95% CI: 1.24, 3.34, $P = 0.005$), bilateral lung consolidation (HR = 2.41, 95% CI: 1.03, 5.58, $P = 0.043$) were independent predictors of PE.

Conclusion: Clinical and CT radiological predictors could be used to predict PE for children with MPP. The use of risk factor assessment as a tool has a potential to guide more appropriate use of CTPA in children.

PU-2288

Acute Limited Intimal Tear of the Aortic Root detected by Coronary Computed Tomographic Angiography

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A 54-year-old man presented to the emergency department with acute chest pain lasting a week. He was hypertensive (systolic blood-pressure >140 mmHg) at presentation and was a history of hypertension with ten years. He had elevated high-sensitivity troponin T (59.49 pg/ml) and D-dimer (8.63 mg/L), and was suggested to underwent coronary computed tomographic angiography (CCTA).

Hemopericardium was detected by non-contrast CT (Fig. 1A). CCTA demonstrated no stenosis in right coronary artery, anterior descending branch and circumflex artery. The aortic diameter was 34 mm, the linear tear was not appreciated on initial review but clearly displayed using 3D volume rendering (VR). VR demonstrated an outward bulge of the outer aortic contour, which defined the lesion as 'mushroom cap lesions' (Fig. 1B). Limited intimal tear was founded when we review the CCTA by using multiplanar reconstruction and VR (Fig. 1C-1F). Following 7 days of hospitalization and aggressive supportive care, the patient survived to discharge.

We describe the case of a patient with a small aortic dissection detected exclusively by 3D computed tomography. It should be emphasized that in diagnostics the diagnosis should be

performed with multiplanar images and VR should subsequently be used to "show" the lesion. Awareness of this method, limited intimal tear of the aortic root may be easily detected by CCTA.

PU-2289

超高分辨率 CT 靶扫描影像学征象对肺磨玻璃结节定性诊断价值分析

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目的：观察 UHRCT(Ultra-high resolution CT. UHRCT)靶扫描影像学征象对肺磨玻璃结节定性诊断价值分析。方法与材料：收集 2020 年 7 月-2022 年 7 月在我院行胸腔镜手术切除的 303 例肺磨玻璃密度结节。本组病例平均年龄 53.2 岁，最大年龄 84 岁，最小年龄 13 岁，女 236 例，男 67 例。术前所有病例均采用飞利浦 Brilliance 64 层螺旋 CT 薄层常规扫描，图像矩阵 512x512，确定病变后行 UHRCT 靶扫描，图像矩阵 1024x1024。比较两种技术对肺磨玻璃结节灶形态特征、诊断效能。分析病变影像征象，确定肺结节病变定性影像特征，病变观察指标为：(1)分叶征；(2)毛刺征；(3)空泡征；(4)支气管征；(5)胸膜凹陷征；(6)有无实性成分。(7)血管束征；(8)微血管征；(9)晕征；(10)反晕征；(11)月牙征；(12)血管侵蚀征等。结果：肺磨玻璃密度结节 (PGGN) 定性诊断评价。本组 303 例病例中，非典型腺瘤样增生 28 例，原位癌 45 例，微浸润腺癌 87 例，浸润腺癌 109 例，其它恶性肿瘤 12 例，腺瘤 9 例，其它良性肿瘤 6 例，炎症 25 例，非肿瘤病变 16 例。传统薄层 CT 和 UHRCT 靶扫描在显示毛刺、空泡征、胸膜凹陷征、支气管征等方面无明显差异。而 UHRCT 靶扫描检出肺结节清楚界面 282 例，显示病变定性影像特征；传统薄层 CT 扫描检出肺结节清楚界面 101 例。在显示病变定性影像征象，UHRCT 靶扫描优于传统薄层 CT。其中 UHRCT 靶扫描显示病变明确实性成分的 176 例，传统薄层 CT 扫描显示病变明确实性成分的 134 例；UHRCT 靶扫描显示血管侵蚀 22 例，支气管变形、侵蚀 56 例，而传统薄层 CT 未见明确显示。UHRCT 靶扫描对 PGGN 明确诊断的为 98 例，明显优于传统 CT 组。比较 PGGN 的特征影像表现与病理组织学关系可知：UHRCT 靶扫描对非典型腺瘤样增生、原位癌与微浸润性腺癌、浸润性腺癌鉴别诊断有其重要诊断价值。结论：UHRCT 靶扫描影像学征象对肺磨玻璃结节有较高诊断价值，值得临床推广应用。

PU-2290

Recurrent coughing up blood: bronchial arteries and pulmonary arteries involvement in Behçet's disease

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A 35-year-old man was admitted with a 2-year history of a recurrent coughing up blood. He also had painful recurrent oral and genital ulcers. He had no past medical history.

A noncontrast CT imaging at an outside hospital was notable for multiple pulmonary nodules (Figure 1A). On CT angiography (CTA), these nodules were characterized as pulmonary thrombosed aneurysm (Figure 1B-1C, Figure 1G-1H), two bronchial artery (BA) dilatation were also identified (Figure 1D-1F).

Embolization therapy with embolic coils and microspheres was advised to prevent life and aneurysm-threatening complications based on CT (Figure 2A-2B). A CT after therapy showed embolic coils extending into the pulmonary aneurysm (Figure 2C-2D). At 4-month follow-up, CTA revealed (Figure 2E-2F) progression of bronchopneumonia and aneurysmal change of pulmonary

with slight thrombi. Moreover, a cava thrombosis of Inferior vena and colander were noted on Doppler ultrasound (Figure 2G-2H).

The underlying pathologic process in Behçet disease is vasculitis and perivascular inflammatory infiltrates affecting vessels in various organs (1,2). CTA Images play an important role for both diagnosis and assessment of the vascular complications of Behçet's disease. Moreover, progression of bronchopneumonia should be pay more attention for patients with this disease.

PU-2291

Impact of coronary atherosclerosis progression on cardiovascular events in patients with suspected coronary artery disease: A two-center retrospective analysis of 1062 cases stratified by age

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Purpose: To investigate age differences in coronary atherosclerosis progression using serial coronary CT angiography (CCTA), and to analyse age-specific associations between atherosclerosis progression and major adverse cardiac events (MACE) in patients suspected coronary artery disease (CAD) in a large patient group.

Materials and Methods: This is a two-center retrospectively cohort study of 1062 patients who underwent serial CCTA. All patients were stratified by aged <51 years, 51-60 years, and >60 years. Coronary atherosclerosis progression was semi-quantitatively assessed in different age groups. Plaque progression was assessed visually and enumerated as CCTA scores and plaque scores. Incidence of MACE was assessed, which defined as cardiac death, coronary revascularization, nonfatal myocardial infarction and hospitalization due to unstable angina.

Results: Compared with younger patients, elderly patients imparts an increased atherosclerosis progression. 148 (13.9%) patients suffered MACE after a mean follow-up of 4.8 ± 1.2 years. Cox regression analysis revealed atherosclerosis progression was significantly associated with MACE in group of aged 51-60 years [progression of three vessel plaque score (HR=3.30, 95% CI: 1.10 to 9.91), severe proximal plaque score (HR=3.92, 95% CI: 1.95 to 11.96), non-calcified plaque (HR=3.04, 95% CI: 1.07 to 8.61), coronary artery disease reporting and data system category 4-5 (HR=1.97, 95% CI: 1.09 to 3.55), all $p < 0.05$]. No semi-quantitative parameter of atherosclerosis progression was independently associated with MACE in patients aged <51 years and >60 years. The ROC curves over all ages demonstrate incremental prognostic value with baseline CCTA and follow-up CCTA continuous risk scores across all ages. Follow-up CCTA added incremental prognostic value beyond risk factors and baseline CCTA for patients aged 51-60 years (AUC 0.765 vs. 0.685, $p=0.011$) and for aged >60 years (AUC 0.812 vs. 0.759, $p=0.029$). Baseline CCTA added incremental prognostic value beyond risk factors for patients aged <51 years (AUC 0.639 vs. 0.707, $p=0.02$).

Conclusions: Elderly patients present more severe coronary artery atherosclerosis and demonstrate more atherosclerosis progression. Serial CCTA have incremental prognostic value to predict MACE in all groups. Coronary atherosclerosis binary progression was independently associated with MACE in aged 51-60, while MACE prediction in younger and older ages with binary progression was not predictive in this cohort.

PU-2292

CMR 在亚临床期糖尿病心肌病的应用进展

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亚临床期糖尿病心肌病 (DCM) 主要表现为心肌纤维化、左心室肥厚和心肌舒张异常。心脏磁共振 (CMR) 技术可快速准确判断糖尿病患者的心肌结构及功能,对亚临床期 DCM 的早期诊断和预后评价起到至关重要的作用,评估亚临床期 DCM 的 CMR 技术主要包括心脏磁共振特征性追踪 (CMR-FT)、心肌磁共振波谱成像 (MRS)、T1mapping 技术、磁共振心肌灌注成像等。主要对 CMR 技术在亚临床期糖尿病心肌病诊断中的研究进展进行综述。

PU-2293

呈现“静脉内”动脉”形态的累及心腔的低级别子宫内膜间质肉瘤并双肺多发转移灶 CT 表现 1 例

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该文报道 1 例非常罕见累及心腔子宫内膜间质肉瘤并双肺多发转移灶的多层螺旋 CT 表现。患者突发晕厥。CT 表现为左侧髂内血管旁迂曲血管团伴动-静脉间异常分流,流入左侧髂静脉、下腔静脉、右心房室及肺动脉内独立连续存在之壁厚薄不均管、囊性结构内,病变是否与血管壁粘连观察不清,可见动脉血自右肺动脉主干区域小破口流入肺动脉内,病灶呈现下腔静脉、心腔内“动脉”影;双肺多发大小不一含气囊腔及结节,复查各病灶囊壁不同程度增厚、变薄;子宫稍大,增强后密度不均。

PU-2294

ECG-MSCT 多期增强扫描技术对心脏占位性病变的诊断价值

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目的: 讨论心电图门控多层螺旋 ct (MSCT) 多期增强扫描技术对心脏占位性病变的诊断价值。

方法: 回顾性分析 2012 年 3 月至 2020 年 3 月诊断为心脏占位性病变的 67 例患者。收集并分析 MSCT、超声心动图和磁共振成像(MRI)的影像学资料。比较 MSCT 与术后病理诊断、超声心动图及 MRI 对心脏占位性病变的诊断准确性。

结果: 与术后病理诊断相比, MSCT 多期增强对心脏占位性病变的诊断准确率和敏感性分别为 87.8%(58/66)和 98.5%(66/67)。MSCT 多期增强扫描诊断心脏肿瘤的敏感性和特异性分别为 96.77%和 60%。MSCT 多期增强扫描诊断心脏良性肿瘤和恶性肿瘤的敏感性和特异性分别为 100%和 72.22%, 61.54%和 100%。MSCT 多期增强扫描的诊断准确率(87.88%)高于超声心动图(76.12%)和 MRI(81.82%)。

结论: 心电图门控 MSCT 多期增强扫描可作为一种简单有效的无创工具,准确表征心脏占位性病变,具有潜在的临床应用价值。

PU-2295

高级迭代重建算法对低剂量冠状动脉 CT 血管成像图像质量及管腔狭窄 诊断准确性的研究

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目的 评价不同强度高级迭代重建(ADMIRE 1-5)算法与传统滤波反投影(FBP)算法在低剂量冠状动脉 CT 血管成像 (CTA) 中对图像质量的影响及对管腔狭窄程度诊断的准确性。

方法 收集 30 例一周内同时进行低剂量冠状动脉 CTA 及冠状动脉造影 (CAG) 的病例。所有病例行 CTA 图像重建时均采用六种重建算法(FBP、ADMIRE 1-5), 并对获得的图像进行主、客观评价, 采用单因素重复测量方差分析比较六组间图像主观评分、图像噪声、图像信噪比 (SNR)、对比噪声比(CNR), 两两比较采用 LSD 法检验。以 CAG 为金标准, 通过一致性检验 (Kappa 检验) 比较六种重建算法对冠状动脉狭窄程度诊断的准确性。

结果 图像噪声高低排序为 FBP>ADMIRE 1>ADMIRE 2>ADMIRE 3>ADMIRE 4>ADMIRE 5 ($P<0.05$), 图像 SNR 及 CNR 高低排序为 ADMIRE 5>ADMIRE 4>ADMIRE 3>ADMIRE 2>ADMIRE 1>FBP ($P<0.05$), 主观评分高低排序为 ADMIRE 4>ADMIRE 5>ADMIRE 3>ADMIRE 2>ADMIRE 1>FBP ($P<0.05$)。以 CAG 为金标准, 不同强度 ADMIRE 对狭窄管腔诊断准确性高于 FBP ($P<0.05$), 且以 ADMIRE 4 最优 (Kappa 值为 0.956), 其他各组从高到低依次为 ADMIRE 3, 5, 2, 1, FBP (Kappa 值分别为 0.812, 0.844, 0.914, 0.956, 0.904)。

结论 在冠脉 CTA 低剂量扫描中, 相比 FBP 算法, ADMIRE 算法能大幅度降低图像的噪声, 提高图像质量, 其中以 ADMIRE 4 重建算法所得图像质量较优。以 CAG 为金标准, ADMIRE 算法重建图像对冠状动脉狭窄程度的诊断准确性明显高于 FBP 算法, 且 ADMIRE 4 诊断准确性最高。

PU-2296

Dual-layer spectral detector CT plain scan to distinguish invasive adenocarcinoma from minimally invasive adenocarcinoma in mixed ground-glass nodules with pleural contactFang Yin¹, zheng hua zhang¹, xiao di zhang², dan han¹

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Purpose: To explore the clinical application of dual-layer spectral detector CT plain scan for differentiating the invasive adenocarcinoma from minimally invasive adenocarcinoma in mixed ground-glass nodules with pleural contact (P-mGGNs).

Materials and methods: 97 patients with total 106 P-mGGNs, who underwent preoperative dual-layer spectral detector CT scan were included retrospectively. According to invasiveness by pathology, the nodules were divided into two groups: invasive adenocarcinoma (IAC, n=49) group and minimally invasive adenocarcinoma (MIA, n=57) group. The electron cloud density map and effective atomic number map were reconstructed on dedicated workstation (IntelliSpace Discovery, Philips Healthcare). The maximum diameter, volume, CT value, electron density value (ED value) and effective atomic number (Zeff value) of the entire nodule and the solid component were measured on the workstation. Then calculated the proportion of solid components (expressed as the ratio of the volume of solid components to the entire nodule). Diagnostic performance was evaluated by receiver operating characteristic (ROC) curve analysis.

Results: Compared with the MIA, the proportion of solid components and the maximum diameter, volume, CT value, electron density value(ED value) of the entire nodule and the solid component were high in the IAC, but the Zeff value of the entire nodule and the solid component were lower($P < 0.05$). The CT value [odds ratio(OR)=1.036, $P=0.0085$], ED value (OR)=0.750, $P=0.0338$) and Zeff value(OR=0.044, $P < 0.0154$) of the solid component were independent predictors for diagnosing IAC manifesting as P-mGGNs. The analysis of ROC curves showed that the AUC of the combination of three independent predictors was 0.839(sensitivity=75.51% , specificity= 80.70%).

Conclusion: Dual-layer spectral detector CT plain scan can effectively differentiate the IAC from MIA in P-mGGNs, and may offer a crucial reference point for follow-up and selective surgical management.

PU-2297

侵入左侧胸腔的前纵膈血管平滑肌脂肪瘤一例

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摘要：血管平滑肌脂肪瘤是一种间充质肿瘤，由血管、平滑肌和成熟脂肪组织组成，最常见于肾脏，位于肾外的少见，尤其是发生于纵膈的病例目前为止全球报道仅 12 例。本文报告了一例发现左侧胸腔肿物 19 年的年轻女性患者，影像学表现为左侧胸腔混杂密度肿块，内可见钙化及脂肪密度，增强后可见迂曲血管，患者行正中开胸胸腔巨大肿物切除术，术后病理证实为起源于前纵膈侵入左侧胸腔的血管平滑肌脂肪瘤，术后随访 1 年未见明确复发。影像学诊断在术前提提供了重要的依据。

PU-2298

Prognostic Value of Feature-Tracking Cardiac MR Left Ventricular Longitudinal Strain for Preoperative Assessment of Adolescent and Adult Patients with Ebstein Anomaly

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Objectives To explore the prognostic value of cardiac magnetic resonance (CMR) imaging in predicting postoperative adverse events in adolescent and adult patients with Ebstein anomaly(EA).

Methods In the single-center retrospective study, 48 patients(35.0 ± 13.6 years; 13 males) with EA and CMR were included from January 2017 to February 2023. Thirty healthy volunteers served as controls. The major adverse events were comprised of recurrent tricuspid regurgitation, cardiac reoperation, readmission for heart failure, cardiac death. Cox proportional hazards models were used to assess the association between cardiac MR parameters and outcomes.

Results During a median follow-up period of 30.3 months (range, 3–79 months), 15 (31%) patients developed major adverse events. For patients with EA, the left and right ventricular global longitudinal strain (GLS), right ventricular ejection fraction were significantly worse and left ventricular native T1 values and extracellular volume were significantly increased, compared with controls (all $p < 0.05$); however, there was no significant difference in left ventricular ejection fraction (LVEF) between the two groups. For EA patients with major adverse events, the left ventricular global longitudinal strain (LVGLS), left ventricular global circumferential strain (LVGCS), left ventricular global radial strain (LVGRS), and LVEF were significantly worse,

compared with patients without major adverse events (all $p < 0.05$). Univariable Cox proportional hazard model analysis showed that left ventricular end-systolic volume index, LVEF, and LVGLS were significantly associated with adverse events ($P < 0.05$). After adjustment for confounding variables, the LVGLS remained the independent factor associated with a higher risk of major adverse events (hazard ratio: 1.357; 95% confidence interval : 1.072 - 1.719; $p = 0.011$).

Conclusion Diffuse myocardial fibrosis and impaired biventricular longitudinal strain were observed in adolescent and adult patients with EA. Preoperative assessment of CMR imaging-based LVGLS provides independent prognostic information in EA patients undergoing cone repair.

PU-2299

1 例增强 CT 证实合并部分型肺静脉异位引流的右肺上叶高危磨玻璃结节的手术切除

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部分型肺静脉异位引流是一类罕见的心血管畸形，在成年人中通常无症状、偶然发现。术前影像学评估正确识别部分型肺静脉异位引流，对于拟行手术切除的高危肺结节患者的手术方案选择至关重要，不恰当的手术方式可能会导致严重的术后并发症。一名 77 岁女性体检发现右肺上叶高危磨玻璃结节，大小约 28mm X 23mm，拟行右肺上叶部分切除术，术中发现患者的右上肺静脉引流至上腔静脉，且患者的术前增强 CT 证实该患者合并部分型肺静脉异位引流，因此患者的手术方案由右肺上叶部分切除改为右肺上叶切除，右肺上叶磨玻璃结节最终病理证实为浸润性腺癌。因此，对于拟行肺结节切除的患者，术前增强 CT 有助于识别部分型肺静脉异位引流，从而帮助临床医师选择合适的手术方案。

PU-2300

Deep Learning-Based Motion Correction in Projection Domain for Coronary Computed Tomography Angiography: A Clinical Evaluation

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Objective: This study aimed to evaluate the clinical performance of a deep learning-based motion correction algorithm (MCA) in projection domain for coronary computed tomography angiography (CCTA).

Methods: A total of 192 patients who underwent CCTA examinations were included and divided into 2 groups based on the average heart rate (HR): group 1, 82 patients with HR of <75 beats per minute; group 2, 110 patients with HR of ≥ 75 beats per minute. The CCTA images were reconstructed with and without MCA. The subjective image quality was graded in terms of vessel visualization, sharpness, diagnostic confidence, and overall image quality using a 5-point scale, where cases with all scores of ≥ 3 were deemed interpretable. Objective image quality was measured through signal-to-noise ratio and contrast-to-noise ratio in regions relative to the vessels. The image quality scores for 2 reconstructions and effective dose between 2 groups were compared.

Results: The mean effective dose was similar between 2 groups. Neither

group showed significant difference on objective image quality for 2 reconstructions. Images reconstructed with and without MCA were both found interpretable for group 1, whereas the subjective image quality was significantly improved by the MCA for all 4 metrics in group 2, with the interpretability increased from 80.91% to 99.09%. Compared with group 1, group 2 showed similar interpretability and diagnostic confidence, despite inferior overall image quality.

Conclusions: In CCTA examinations, the deep learning-based MCA is capable of improving the image quality and diagnostic confidence for patients with increased HR to a similar level as for those with low HR.

PU-2301

多层螺旋 CT 重建后处理技术对外伤性肋骨骨折的诊断价值及漏诊原因分析

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目的 探讨多层螺旋 CT (multi-slice spiral CT, MSCT) 重建后处理技术对外伤性肋骨骨折的诊断价值, 总结分析其漏诊原因。方法 回顾性分析 2022 年 6 月至 2022 年 12 月期间在我院诊治的 110 例外伤性肋骨骨折患者的 MSCT 图像, 由两名放射科主治医师分别根据 CT 轴位图像做出诊断、以及基于 CT 轴位图像结合多平面重建 (multi-plane reformation, MPR)、容积再现 (volume rendering, VR) 重建后处理图像进行诊断。结果 根据骨折参考标准, 本组 110 例患者共存在肋骨骨折 416 处, 两名医师基于 CT 轴位图像检出 368 处肋骨骨折, 其中正确诊断 361 处, 误诊 7 处, 漏诊 55 处, 对肋骨骨折诊断敏感度为 86.78% (361/416), 误诊率为 1.90% (7/368), 漏诊率为 13.22% (55/416)。基于 CT 轴位图像结合 MPR 及 VR 后处理重建图像检出肋骨骨折 395 处, 其中正确诊断 390 处, 误诊 5 处, 漏诊 26 处, 对肋骨骨折诊断敏感度为 93.75% (390/416), 误诊率为 1.27% (5/395), 漏诊率为 6.25% (26/416)。基于 CT 轴位图像结合 MPR 及 VR 重建后处理图像对肋骨骨折诊断的敏感度高于单独基于 CT 轴位图像诊断, 漏诊率低于单独基于 CT 轴位图像诊断, 差异具有统计学意义 ($P < 0.05$), 两种方法对肋骨骨折误诊率差异无统计学意义 ($P > 0.05$)。肋骨骨折漏诊常见原因有骨折较细微、骨折断端无错位或错位极其轻微、骨折线恰巧与 MSCT 扫描方向平行、骨折线仅累及一侧骨皮质、骨折位于肋骨后段靠近胸椎横突区域、多发肋骨骨折、骨质疏松患者等情况。结论 联合应用 MPR、VR 重建后处理技术能提高 MSCT 对外伤性肋骨骨折诊断敏感度, 降低漏诊率, 但仍有部分漏诊情况, 可通过伤后 2~8 周内复查明确诊断。

PU-2302

MSCT 个体化扫描方案对功能性单心室 Fontan 术后随访价值

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目的 探讨 MSCT 对功能性单心室 (FSV) Fontan 术后随访价值。方法 32 例 FSV 患者 Fontan 术后随访复查的 MSCT、心血管造影 (CAG) 和临床资料纳入本研究。MSCT 检查采用个体化手动触发双期扫描, 即依据有、无咳血症状相应选择肺动脉、左心房为监测靶点, 一期扫描完成立即手动触发第二期扫描。定性评估 Fontan 管道和术后并发症, 并选取最佳层面测量双侧肺动脉起始处内径和降主动脉 (膈肌水平) 内径, 计算 McGoon 指数, 以评估肺动脉发育。采用 Pearson 相关性分析双侧肺动脉起始处内径与 CAG 肺动脉舒张期压力、McGoon 指数与 CAG 肺血流阻力指数

间关系。结果 本研究中 MSCT 检出 3 例右心房-肺动脉连接, 11 例心内/外 Fontan 管道, 8 例心外 Y 型 Fontan 管道和 10 例全腔-肺动脉连接。同时, MSCT 检出 2 例肺动-静脉瘘, 3 例主-肺动脉侧支, 2 例 Fontan 管道附壁血栓和 1 例室壁瘤共 8 例 Fontan 术后并发症。MSCT 测量左、右肺动脉起始处内径分别为 (1.36 ± 0.22) cm、 (1.40 ± 0.15) cm, 且肺动脉内径与 CAG 肺动脉舒张期压力间具有良好负性相关(左: $r=-0.755$; 右: $r=-0.678$; P 均 <0.01)。McGoon 值与 CAG 肺动脉血流阻力指数相关性良好($r=-0.676$, $P<0.01$)。

结论 借助快速图像获取和后处理技术, 并选择个体化扫描方案, MSCT 能为 Fontan 术后随访评估提供多项参考指标, 具有重要临床应用价值。

PU-2303

MOLLI 在 3.0T 心脏磁共振扫描中的临床应用

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【摘要】目的 探讨基于 MOLLI 在 3.0T 磁共振心脏成像中的应用。方法 选取我科室 2021 年 5 月-2023 年 6 月的 20 例心脏扫描受检者作为研究对象, 男 11 例, 女 6 例, 年龄 44-64 岁, 平均 54 岁。对 20 例患者进行心脏规范化扫描得到的图形传输至 MRI 工作站进行后期融合处理, 观察其心功能及定量分析注射对比剂前的 T1 Mapping 及注射对比剂后延迟 10-15 分钟后的 T1Mapping 的结果, 评价其敏感性和准确性。结果 经诊断 16 名临床怀疑心肌缺血患者患者磁共振检测出心肌缺血区, 通过定量分析病灶, 经临床证实符合临床诊断。其中 1 例的结果与患者之前的 CT 心肌静态灌注结果吻合。4 名常规查体者未检出病灶。结论 MOLLI 在心脏扫描中对心肌定量分析中有重要价值, 且在选取适当的加速因子及图像参数后, 大大缩短受检者憋气时间, 提高图像质量。这项技术相较于 PET 和 CT 有无辐射的天然优势, 能提高患者的依从性和复检率, 对判断其病情发展有重要意义, 有助于指导临床治疗方案的选择。

PU-2304

The primary research of the feasibility of evaluating pulmonary function with Discovery CT 750HD at low dose

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Objective

To explore the feasibility of evaluating pulmonary function with GE Discovery CT 750 HD at low dose.

Materials and Methods

60 people who are extracted randomly from the personnel who accepted health examination in our hospital from January 1, 2014 to March 20, 2014 are divided into two groups, including normal dose group(NI=11) and low dose group(NI=18).The normal dose group includes 30 people,20 males and 10 females ranging in age from 20 to 61,with an mean age of 40.8 ± 10.8 years, the low dose group includes 30 people,16 males and 14 females ranging in age from 24 to 62, with an mean age of 44.8 ± 11.1 years. All the experimental subjects underwent chest CT scan with GE Discovery CT 750 HD. The image data was analyzed using Post-processing software Thoracic VCAR to measured thickness of airway wall (WTAvg), the ratio of airway wall thickness and airway diameter(WT/D), the percentage of the airway wall area of the total cross-sectional area of the airway(WAR) and the total area of the airway wall(WA) of apical segmental bronchus of the right upper lobe; PI were analyzed and the parameters PI included -1024--910,-

910~-800, -800~-700,>-700. Analysis the parameters of two groups have statistically significant difference or not. CT dose index volume (CTDIvol)、dose length product (DLP) were recorded, and effective dose was calculated.

Results

The experimental data was applied comparative t-test to perform statistical analysis by using SPSS 19.0 software. The p values of WTAvg、WT/D、WAR、WA of two groups are 0.065、0.559、0.585、0.131; The P values of PI-1024~-910Hu、PI-910~-800Hu、PI-800~-700Hu、PI>-700Hu are 0.262、0.817、0.542、0.889. All the parameters of the two groups have no statistically significant difference ($p>0.05$). Effective dose of group normal dose and low dose are 4.99 ± 1.37 、 1.92 ± 0.68 , Group low dose has a reduction of 61.52% radiation dose.

Conclusions

It is feasible to evaluate pulmonary function with Discovery CT 750HD at low dose.

PU-2305

磁共振成像技术在肺结节中的应用与进展

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目的: 综述基于磁共振成像 (Magnetic Resonance Imaging, MRI) 技术在肺结节上的应用与进展, 为肺结节的精准诊疗提供潜在的生物学信息。

方法: 从国内外数据库如中国知网、万方、Pubmed、Embase、the Web of Science Core Collection、the Cochrane library 等数据库中检索与关键词如“磁共振 (Magnetic Resonance Imaging)”“肺结节 (Pulmonary Nodule)”“肺癌 (Lung Neoplasms)”相关的文献, 筛选基于磁共振成像及其功能技术在肺结节的筛查、诊断、预后等方面的文献, 并对其进行总结阐述。

结果: MRI 成像技术如传统 MRI 扫描 (T1WI、T2WI)、动态对比增强磁共振 (dynamic contrast enhanced-magnetic resonance imaging, DCE-MRI)、化学交换饱和和转移 (chemical exchange saturation transfer, CEST)、弥散加权成像 (Diffusion Weighted Imaging, DWI)、扩散峰度成像 (Diffusion Kurtosis Imaging, DKI)、体素内不相干运动 (intravoxel incoherent motion, IVIM) 目前在肺结节的诊断及预后等方面具有诸多进展, 及其与人工智能 (如影像组学、深度学习等技术) 联合丰富诊断技术。相关文献主要可分为诊断、预后两大方面: (1) 诊断方面: 良恶性肺结节的筛查与诊断, 肺癌病理分期及病理类型、组织学亚型的诊断、分子生物学水平的基因表达预测、血管生成标记物及肿瘤增殖标记物的预测、肺癌放疗计划的肿瘤动态追踪; (2) 预后方面: 放疗、化疗、免疫治疗等治疗反应的预测, 术后复发风险因素的评估, 生存分析的预后评估。

结论: 磁共振成像及其功能技术能够为肺结节的精准诊疗提供一定的价值, 同时磁共振图像及其参数选择仍需进一步的标准化统一来不断完善。

PU-2306

Determining optimal imaging protocols for enhanced chest CT: from phantom to clinical study

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Purpose: To investigate the optimal imaging protocols in enhanced chest CT for achieving good image quality and diagnostic performance with lower radiation dose.

Materials and Methods: This IRB-approved study included both phantoms and patients. Firstly, the PH-75 phantom of two sizes was scanned using 4 scanning modes: A, 120kVp/Smart-mA; B,

120kVp/Smart-mA/Organ-dose-modulation (ODMfull); C, Auto-prescription/Smart-mA; D, Auto-prescription/Smart-mA/ODMfull, Images in each group were reconstructed using ASIR-V40%, ASIR-V60%, and ASIR-V80%, denoted as A1-3-D1-3, respectively with 1-3 representing the three ASIR-V levels. Image quality and radiation dose were evaluated to obtain the best imaging mode. Secondly, 48 patients underwent contrast-enhanced standard dose CT (SDCT, protocol A) and low-dose CT (LDCT, protocol D) of the chest for follow-ups. Image quality, radiation dose, and AI-based volume measurements of the left lung, right lung, and trachea were compared.

Results: The phantom study selected D2 protocol (Auto-prescription/Smart-mA/ODMfull/ ASIR-V60%) which had the lowest dose as the optimal imaging protocol for enhanced chest CT. For the patient group, LDCT reduced the radiation dose by 45% compared to SDCT. Images in LDCT with ASIR-V60% had similar noise as the standard SDCT images with ASIR-V40%, but higher SNR and CNR. The median image quality scores of the two groups were (4, 4), the volumes of the left lung, right lung, and trachea in the two groups were not statistically different, and all lesions were correctly identified in LDCT.

Conclusions: The combination of Auto-prescription and ODMfull with ASIR-V60% in contrast-enhanced chest CT can achieve individualized low dose scanning with satisfactory image quality and diagnostic accuracy.

PU-2307

Radiomics-clinical nomogram for preoperative lymph node metastasis prediction in esophageal carcinoma

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Objectives: This research aimed to develop a radiomics-clinical nomogram based on computed tomography (CT) and clinical features for the purpose of predicting the presence or absence of metastasis in lymph nodes among patients with esophageal squamous cell carcinoma (ESCC).

Methods: This study examined the data of 256 patients with ESCC, including 140 cases with lymph node metastasis. Clinical information was gathered for each case, and radiomics features were derived from CT scans with the help of a 3D slicer. To validate risk factors that are independent of the clinical and radiomics models, least absolute shrinkage and selection operator (LASSO) logistic regression analysis was used. A nomogram pattern was constructed based on the radiomics features and clinical characteristics. The receiver operating characteristic (ROC) curve and Brier Score were used to evaluate the model's discriminatory ability, the calibration plot to evaluate the model's calibration, and the decision curve analysis (DCA) to evaluate the model's clinical utility. The confusion matrix is used to evaluate the applicability of the model. To evaluate the efficacy of the model, 1000 rounds of 5-fold cross validation are conducted.

Results: The clinical model identified esophageal wall thickness and clinical T (cT) stage as independent risk factors, whereas the radiomics pattern was built based on 4 radiomics features chosen at random. Area under the curve (AUC) values of 0.684 and 0.701 are observed for the radiomics approach and clinical model, respectively. The nomogram model's AUC for combining radiomics and clinical features was 0.711. The calibration plot showed good agreement between the incidence of lymph node metastasis predicted by the nomogram model and the actual probability of occurrence. The nomogram model displayed acceptable levels of performance. After 1000 rounds of 5-fold cross-validation, the AUC and Brier score had median values of 0.702 (IQR:0.65, 7.49) and 0.21 (IQR:0.20, 0.23), respectively. High-risk patients (risk point > 110) were found to have an increased risk of lymph node metastasis [odds ratio (OR) = 5.15, 95% confidence interval (CI): 2.95-8.99] based on the risk categorization.

Conclusion: A successful preoperative prediction performance for metastasis to the lymph nodes among patients with ESCC was demonstrated by the nomogram that included CT radiomics and clinical features.

PU-2308

A CT-based radiomics-clinical model for the differentiation of checkpoint inhibitor related pneumonitis and bacterial pneumonia

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Purpose: Checkpoint Inhibitor Related Pneumonitis (CIP) is a common complication of immunotherapy with a high case-fatality rate, which results from excessive immune system activation. CIP must be treated promptly with high-dose steroid hormones, which is completely different from bacterial pneumonia (BP). Due to the high similarity in their radiological patterns, it is still a challenge to distinguish between CIP and BP. The aim of this work is to construct a predictive model to distinguish between CIP and BP better, which integrating clinical risk factors, radiological findings and individual radiomics characteristics.

Methods: Retrospective analysis was performed on 90 pneumonia patients who received continuous ICI treatment and high resolution CT scan at Ningbo No.2 Hospital in 2022, including 32 patients with CIP and 58 patients with BP. The training set ($n = 64$) and the test set ($n = 26$) of these tumor patients were split up at random. The regions of interest, which comprised all lesions, extracted an aggregate of 851 radiomics features. Max-Relevance and Min-Redundancy (mRMR) and least absolute shrinkage and selection operator (LASSO) were then utilized for dimension reduction. The construction of three models—clinical, radiomics, and combined—led to the subsequent development of a nomogram based on the combination model. To evaluate how well these three models perform as diagnostic tools, the area under the receiver operating characteristic (ROC) curve (AUC) was determined. Decision Curve Analysis (DCA) was used to evaluate the three models' clinical utility.

Results: 7 valuable features were screened out ultimately. The AUCs of the combined model for distinguishing CIP from BP were 0.97 and 0.95 in the training and test sets respectively, achieving the best efficiency compared to the single model. DCA shows that, when compared to the other models, the radiomics-clinical model (i.e. the combined model) gained higher clinical benefits.

Conclusion: The radiomics-clinical model and further nomogram had an outstanding capacity for prediction for identifying CIP and BP, which would be helpful in clinical decision-making.

PU-2309

双源 CT 超级炫速螺旋扫描技术在心耳成像中的初步研究

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目的探讨第三代双源 CT 超级炫速扫描技术在心耳成像中的临床应用价值。方法回顾性心电门控扫描肺静脉 CTA 扫描患者 20 例为 A 组, 超级炫速扫描肺静脉 CTA 20 例为 B 组。对两组数据的像质量进行客观评价, 包括主动脉根部、肺静脉主干、心耳的 CT 值, 信噪比以及对比噪声比, 采用独立样本 t 检验比较两组间的差异。采用独立样本 t 检验对比两组的剂量长度乘积 (DLP) 和 CTDVOL。对图像质量进行主观评分, 按照 4 分法对患者的整体图像, 心耳及肺静脉主干评分, 采用卡方检验

比较 2 组间的差异。结果心耳、肺静脉主干的 SNR、CNR 及 CT 值均无统计学差异 ($P>0.05$)。主观评分整体质量, 心耳及肺静脉主干均无统计学差异 (p)。两组 dlp 和 ctdvol 有显著统计学差异 ($P<0.001$)。结论利用第三代双源 CT 超级炫速扫描技术可获得与回顾性心电门控相当的图像质量, 可降低辐射剂量。

PU-2310

能谱 CT 在预测肺癌淋巴结转移中的应用价值

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目的 探讨能谱 CT (DECT) 在预测肺癌淋巴结转移中的价值。方法: 收集 2019—2022 年经病理证实淋巴结转移的 129 例肺癌患者的临床及 DECT 资料, 根据有无淋巴结转移, 分为淋巴结转移组 (45 例) 与非转移组 (84 例)。利用 GSI viewer 软件评价病灶部位边缘、形态、分叶征、毛刺征、胸膜增厚、有无坏死等 CT 表现, 测量病灶长径、短径、动静脉期碘浓度 (IC) 及同层主动脉 IC, 并获得动静脉期 40keV 及 100keV 的单能量 CT 值。计算病灶的动静脉期标准化碘浓度 (nIC) 及能谱曲线斜率 (λ HU)。采用单因素分析定性资料及计量资料与淋巴结转移的相关性。采用多因素 Logistic 回归分析两组间差异有统计学意义的指标, 筛选出预测肺癌淋巴结转移的独立危险因素。采用受试者工作特征曲线 (ROC) 对预测因子进行分析, 得出各参数的最佳诊断效能阈值、敏感度及特异度。结果 多因素回归分析示肺癌原发灶的位置、长径、动静脉期 40keV 及 100keV 的单能量 CT 值、动脉期 nIC 是预测肺癌淋巴结转移的独立危险因素 ($P<0.05$)。中心型肺癌较周围型肺癌更容易发生淋巴结转移, 长径 $>3\text{cm}$ 的肺癌较 $\leq 3\text{cm}$ 的肺癌更容易发生淋巴结转移, 差异均具有统计学意义 ($P<0.05$)。淋巴结转移组肺癌的动静脉期 40keV 及 100keV 的单能量 CT 值、动脉期 nIC 均高于非转移组, 差异均具有统计学意义 ($P<0.001$)。分别建立常规 CT 模型及常规-能谱 CT 联合模型, 计算两个模型对于肺癌淋巴结转移的预测效能, 得出 ROC 曲线。两个模型的 AUC 分别为 0.790 (0.710-0.857) 及 0.867 (0.797-0.921), 敏感度分别为 68.8%、96.9%, 特异度分别为 65%、88.0%。结论 原发灶的位置、长径、动静脉期 40keV 及 100keV 的单能量 CT 值、动脉期 nIC 是预测肺癌淋巴结转移的独立危险因素, 常规 CT+能谱 CT 联合模型可明显提高肺癌淋巴结的预测效能。

PU-2311

22 岁大学生支气管水蛭感染一例

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支气管水蛭感染是临床上罕见的寄生虫感染性疾病, 主要发生于鼻咽、喉咽、上食管及支气管, 其中累及支气管者十分罕见。现报道一例在校大学生支气管水蛭感染, 并结合临床特点、手术方式及影像特征进行探讨, 以期提高医生对该病的整体认识, 减少漏诊、误诊。

PU-2312

表现为月牙征的磨玻璃结节 CT 诊断

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目的：分析表现为月牙征的肺磨玻璃结节 (GGN) 的 CT 表现和诊断。

方法：2019.1.1-2020.12.31 行超高分辨率 CT 扫描、直径 $>5\text{mm}$ 且 $<30\text{mm}$ 的 GGN 共 5794 个，出现月牙征的共 91 个结节，50 例 50 个结节行手术切除，纳入本次研究。在多平面重组三维正交图像的肺结节最大截面层面上完成分析。评价内容包括：结节和胸膜的关系，结节最大径、弧长、弦长、密度。

结果：43 个为纯 GGN (pGGN)，7 个为混合 GGN (mGGN)，肿瘤性病变 46 个 (92.0%)，另外 4 例炎症。mGGN 中肿瘤性病变 5 个，全为侵袭性腺癌 (IA)。pGGN 中肿瘤性病变 41 个 (95.3%)，其中 8 个原位腺癌 (AIS)，22 个微侵袭性腺癌 (MIA) 和 10 个 IA；36.5% (15/41) 的结节紧贴胸膜，85.4%(35/41)的结节位于胸膜下 20mm 内，IA 的最大径大于 AIS/MIA ($P < 0.05$)。ROC 曲线分析显示结节最大径 $> 14.5\text{mm}$ 诊断 IA 的敏感度为 80.0%，特异性为 87.1%。

结论：月牙征常见于胸膜下区域，表现为月牙征的 GGN 绝大多数为肺腺癌；月牙征更常见于 pGGN，伴有月牙征的 pGGN 最大径 $> 14.5\text{mm}$ 提示 IA。

PU-2313

CTA 血管成像在诊断肺叶内型隔离症中的应用价值研究

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【摘要】目的：探讨 CTA 成像在肺隔离症 (pulmonary sequestration, PS) 诊断中的应用价值。

资料与方法：1.1 一般资料 回顾性收集我院自 2016 年 10 月至 2021 年 10 月期间经手术病理证实的 42 例肺隔离症患者。其中男性 24 例，女性 18 例；年龄 14~50 岁。主要症状为咳嗽、咳痰、咯血、胸闷、疼痛等。本组患者中咯血 8 例，胸闷、疼痛 10 例，咳嗽、咳痰 14 例，无症状 10 例。患者病变部位位于左下肺 38 例(90%)，均位于基底段，病变部位位于右下肺 4 例(10%)，均位于基底段。1.2 检查方法 所有病例均做 CT 平扫及 CTA 检查，CT 扫描机器为 GE Lightspeed 64 排螺旋 CT。平扫后经肘静脉高压注射器注射碘海醇 70ml，注射速率 4mL/S，扫描参数如下：管电压 120 KV，管电流 100 ~ 150mAs，平扫层厚及层间距为 5 mm，CTA 检查层厚及层间距为 0.625 mm。GE4.5 工作站行 CTA 三维重建(多平面重组(MPR)、最大密度投影法重建(MIP)、容积重建 (VR))，扫描图像由两名有经验的影像诊断医师进行阅片，出具诊断报告。结果：CT 表现 13 例合并肺气肿，9 例合并支气管扩张，6 例合并化脓性炎，8 例合并慢性炎症，6 例无明显症状；32 例边界清晰，10 例边界模糊；21 例表现为不规则软组织密度肿块，12 例表现片状软组织成分为多个含气、液囊腔，可见液平，9 例无明显肿块。42 例均由胸主动脉分支供血，引流静脉均进入肺静脉系统。讨论：诊断肺隔离症最重要的依据是显示肺内病灶有来自体循环的异常供血动脉。通常为 1 支，少数为多支；73%的供血动脉发自胸主动脉，10%~15%来自腹主动脉和腹腔动脉发出的异常分支；此外，尚可来自肋间动脉、膈动脉、内乳动脉、锁骨下动脉、主动脉弓等发出的分支。静脉回流多经肺静脉、少数经下腔静脉或奇静脉。目前肺隔离症仍以手术切除为主要治疗手段，手术需结扎异常供血的血管，术前明确血管的来源对手术具有重大意义，CTA 血管成像技术能很好地评价肺隔离症的血管情况，为外科手术提供更多信息，达到更好的手术治疗效果。

PU-2314

CT 引导下肺穿刺活检的安全性分析

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【摘要】

目的 分析应用穿刺活检针行 CT 引导下肺穿刺活检的安全性。

方法:选取连续的 100 例行 CT 引导下肺穿刺活检患者。回顾性总结 CT 引导下肺穿刺活检的并发症及其发生率与病灶大小、穿刺部位、病灶深度、穿刺路径上穿刺针有无经过正常肺组织、病灶所处深度之间的关系。

结果:100 例行 CT 引导下肺穿刺活检的患者中,无任何并发症出现者占 48 例 (48%), 中等量以上气胸者占 4 例 (4%), 咯血患者 2 例 (2%), 少量气胸合并肺内少量出血者 13 例 (13%)、少量出血者 18 例 (18%)、少量气胸者 14 例 (14%)、迟发性中等量以上气胸者 1 例 (1%), 经统计学分析,穿刺针所经肺组织深度不同的病例组之间,穿刺活检并发症的发生率的差异有显著性;穿刺路径上穿刺针有无经过正常肺组织的不同病例组之间, 穿刺活检并发症发生率的差异有显著性;穿刺针所经肺组织深度相同的病例中,不同部位之间穿刺活检的并发症的发生率的差异无显著性。

结论:CT 引导下肺穿刺活检是一种可行的诊断方法。CT 引导下肺穿刺活检并发症发生率以气胸和肺内出血为多见,发生率与病变所在部位关系不大,而随穿刺针经过肺组织的深度的增深而增高,与病变大小及穿刺路径有无经过正常肺组织关系密切,病灶越大、经过正常肺组织越少,并发症发生率越低。

PU-2315

探讨基于冠脉 CTA 双能成像去钙化扫描对于斑块血管狭窄评估的影响

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目的 探讨基于冠脉 CTA 双能成像去钙化扫描对于斑块血管狭窄评估的影响。方法 前瞻性纳入 2022 年 10 月至 2023 年 7 月在我院行双能冠脉 DECTA 扫描的患者 35 例, 收集斑块共 55 个。记录斑块去钙化前和去钙化后在影像学上的特征。包括: 位置、狭窄率、斑块成分和双能去钙化伪影后血管狭窄程度变化及图像的诊断质量。结果 钙化去除后 图像对于斑块的诊断无影响, 伪影的发生率没有差异; 钙化去除前后血管的狭窄率差异有统计学意义 ($P < 0.01$); 去除后 血管的狭窄率变化与其位置及斑块成分无相关性。结论 双能去钙化的应用可以减少钙化斑块在 CT 成像下伪影对于狭窄程度评估的影响, 提高冠脉斑块患者其狭窄程度危险分层的准确性, 具有重要的临床意义。

PU-2316

To Investigate the Impact of Dual-Energy CT Coronary Angiography Decalcification Scan on the Assessment of Plaque Vascular Stenosis.

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Objective To investigate the impact of dual-energy CT coronary angiography decalcification scan on the assessment of plaque vascular stenosis. **Method** From January 2022 to July 2023, we prospectively enrolled 35 patients who underwent coronary CT angiography by dual-energy scan. A total of 55 plaques were collected. The imaging features of the plaques were recorded before and after decalcification, including: position, stenosis rate, plaque composition, changes in the degree of vascular stenosis after dual-energy decalcification artifacts, and image diagnostic quality. **Results** After calcification was removed, the image had no effect on the diagnosis of plaque and the incidence of artifacts. There was a statistically significant difference in the stenosis rate before and after calcification removal ($P < 0.01$), with no correlation between the stenosis rate and its location or the plaque composition. **Conclusion** The application of dual-energy decalcification can reduce the influence of calcified plaque artifacts on the evaluation of stenosis under CT imaging. It has a significant clinical value for the improvement of accuracy of risk stratification of stenosis degree for patients with coronary artery disease.

PU-2317

Association between LA function assessed by cardiovascular magnetic resonance tissue tracking and long term prognosis of first coronary artery bypass grafting

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Background: Left atrial(LA) enlargement has been verified as a marker of adverse clinical outcome for certain cardiovascular disease whereas the change of LA strain has shown sensitivity at initial phase. We aimed to explore the relationship between LA function and the prognosis of ischemic heart disease(IHD) patients who underwent first coronary artery bypass(CABG).

Methods: 48 IHD patients were included retrospectively from October 2018 to August 2022. Phasic functional parameters, strain and strain rate of LA were derived from cardiac magnetic resonance tissue tracking(CMR-TT). Major adverse cardiac events(MACEs) were defined as cardiovascular death and hospitalization for heart failure. The prognostic value of LA function parameters were evaluated by curve of receiver operating characteristic (ROC) and COX analysis.

Results: A total of 45 IHD patients were enrolled, MACE occurred in 13 patients. During follow-up (mean=501 days; interquartile range:132-1382 days), LA strain and strain rate of MACE is lower than No MACE. SRs shows large area under ROC curves ($AUC=0.92, P<0.001$), SRs, LAEF passive, ϵ_e and SRa show significant difference compared with LV parameters. K-M curve of

LVEF,SRa shows no crossover with logrank analysis $P<0.05$.Uni- and multivariate analysis result of SRs and Δe indicates difference.

Conclusion: LA reservoir strain and conduit strain rate derived from MRI-FT provides long term prognostic value in IHD patients after first CABG.

PU-2318

Force CT 一站式扫描对冠心病的诊断及冠脉粥样硬化斑块性质的鉴别价值

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目的：探讨 Force CT 一站式扫描对冠心病的诊断及冠脉粥样硬化斑块性质的鉴别价值。方法：回顾性分析 2021 年 5 月~2022 年 5 月本院收治的 80 例冠心病患者的临床资料，均采用 Force CT 一站式扫描检查，以冠状动脉造影（CAG）和血管内超声检查（IVUS）结果为“金标准”，观察 Force CT 一站式扫描对冠心病的诊断价值及对冠脉粥样硬化斑块性质的鉴别价值。结果：80 例受检者经 CAG 检查了 532 个冠状动脉节段，其中无狭窄 241 个，轻度狭窄 162 个，中度狭窄 104 个，重度狭窄 25 个，且均伴中度及以上狭窄；经 IVUS 检查检出易损斑块 69 个，稳定斑块 114 个；Force CT 一站式扫描诊断无狭窄 239 个、轻度狭窄 163 个、中度狭窄 106 个、重度狭窄 24 个，80 例受检者伴中度及以上狭窄 77 例，检出易损斑块 73 个、稳定斑块 110 个；Force CT 一站式扫描诊断冠心病的准确率为 96.25%，与“金标准”相比，Force CT 一站式扫描诊断冠状动脉节段无狭窄、轻度狭窄、中度狭窄、重度狭窄的符合率分别为 97.51%、96.30%、98.08%、96.00%，且经 Kappa 一致性检验发现，其诊断冠状动脉节段狭窄与“金标准”的一致性高（Kappa=0.981， $P<0.001$ ）。Force CT 一站式扫描检出易损斑块的灵敏度、特异度、准确度、阳性预测值、阴性预测值分别为 97.10%、94.74%、95.62%、91.78%、98.18%，且经 Kappa 一致性检验发现，Force CT 一站式扫描鉴别冠脉粥样硬化斑块性质与“金标准”的一致性高（Kappa=0.964， $P<0.001$ ）。结论：采用 Force CT 一站式扫描诊断冠心病及鉴别冠脉粥样硬化斑块性质的价值理想，与“金标准”诊断结果的一致性高。

PU-2319

应用 CMR-FT 技术探索扩张型心肌病患者左室心肌应变与心律失常的相关性

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目的

心脏磁共振组织跟踪技术（CMR-FT）能够测定扩张型心肌病（DCM）患者的左心室整体和分段应变。然而，目前尚不清楚这些心肌应变的变化是否与心律失常有关。因此，本研究旨在探讨 CMR-FT 在 DCM 中对心律失常的鉴别诊断潜力。

方法

本研究回顾性纳入 60 例 DCM 患者（其中 34 例伴有心律失常，26 例无心律失常）和 40 名健康志愿者作为对照。使用 CVI 42 软件进行心功能分析，测量的参数包括左心室功能、心肌应变参数以及晚期钆增强（LGE）的范围。

结果

伴有心律失常的 DCM 患者相较于无心律失常的患者,表现出左心室射血分数 (LVEF)、全局径向应变 (GRS)、全局周向应变 (GCS) 和全局纵向应变 (GLS) 降低,而 LGE 范围增大 ($P < 0.05$)。尤其值得注意的是,全局径向应变 (GRS) 与 LGE 范围之间存在中度相关性 ($r = 0.554$, $P < 0.01$)。在 CMR 上, LGE 范围 $> 5.35\%$ (AUC 0.75, 95% CI 0.59-0.88, $P < 0.01$) 或 GRS $> 18.4\%$ (AUC 0.77, 95% CI 0.65-0.85, $P < 0.05$) 的 DCM 患者更容易伴有心律失常。

结论

全局径向应变 (GRS) 和 LGE 范围在 DCM 患者中独立预测心律失常的风险,这为 DCM 的风险分层提供了重要信息,有望改进临床实践中的风险评估策略。

PU-2320

CT“双低”扫描技术结合迭代重建在冠状动脉 CT 血管成像中的应用价值

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目的:分析 CT“双低”扫描技术结合迭代重建在冠状动脉 CT 血管成像中的应用价值。方法:选择 2020 年 6 月—2022 年 1 月在我院行冠状动脉 CT 血管成像检查的 132 例患者作为研究对象,根据 CT 扫描方式的不同分为观察组和对照组,每组 66 例,观察组采用 CT“双低”扫描技术(低对比剂量和低管电压)结合迭代重建进行检查,对照组采用 CT 常规扫描技术结合迭代重建进行检查,对比两组患者图像质量优良率、剂量长度乘积、有效剂量等 CT 辐射剂量指标水平。结果:观察组图像质量优良率为 96.97%,对照组图像质量优良率为 98.48%,差异无统计学意义 ($P > 0.05$)。观察组剂量长度乘积 (552.14 ± 40.27) mGy·cm、有效剂量 (7.73 ± 0.76) mSv 等 CT 辐射剂量指标水平低于对照组的 (953.18 ± 51.39) mGy·cm、(13.34 ± 0.83) mSv,两组对比差异具有统计学意义 ($P < 0.05$)。结论:CT“双低”扫描技术结合迭代重建在冠状动脉 CT 血管成像中的应用价值显著,图像质量相当,同时可有效降低 CT 辐射剂量及对比剂使用量,值得临床应用。

PU-2321

探讨两次磁共振波谱扫描所得结果的稳定性

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目的 探讨磁共振波谱研究中两次扫描所得结果的稳定性。

方法 选取 30 名健康志愿者 (9 男, 21 女, 年龄 21 ± 3) 分为 A、B 两组, 每组 15 人, 以大脑右侧前额叶作为目标脑区。利用 3.0T 磁共振成像扫描仪 (Siemens MAGNETOM Trio Tim), 采用点分辨波谱 (PRESS) 序列对每位志愿者进行两次扫描, 其中 A 组在定位后进行两次连续扫描, B 组在定位后先进行一次扫描, 然后将扫描床移出磁场中心, 隔三分钟再进床至原来的位置, 间隔期间确保被试不动, 严格按照第一次的定位并扫描得到第二次的结果, 利用 LCmodel 软件对采集到的脑代谢物波谱数据 (NAA、Cho、NAA/Cr、Cho/Cr) 进行后处理及定量分析, 将两次扫描所得结果的差异性系数 ($CV = 100 \times SD / \text{mean}$) 作为衡量两组波谱定量分析结果一致性的指标。利用各个代谢物的含量及含量比值, 分别对 A、B 组内数据进行统计分析, 检验干扰因素是否造成各组内两次扫描数据间的显著性差异。

结果 A 组所得大脑右侧前额叶中各个代谢物含量及含量比值的平均差异性系数 (Mean CV) 分别为 NAA 1.84%, Cho 2.73%, NAA/Cr 1.99%, Cho/Cr 1.55%, B 组所得各个代谢物含量及含量比值的平均差异性系数分别为 NAA 4.44%, Cho 3.06%, NAA/Cr 4.57%, Cho/Cr 2.49%。利用各个代谢

物的含量及含量比值, 分别对 A、B 组内数据进行配对样本 t 检验, 发现对于不同代谢物及代谢物比值, 除了 B 组 Cho/Cr ($0.001 < P < 0.05$) 外, 利用两种方法所得结果的差异性不具有统计学意义 ($P > 0.05$)。

结论 干扰因素不会影响两次扫描结果定性分析的可靠性, 但会影响结果的定量计算的精确度, 且间隔扫描受到更多的干扰因素的影响, 精确度低于连续扫描。

PU-2322

追踪定位技术: 一种保证多次波谱扫描可重复性的方法

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目的 基于图像的配准信息, 提出一种自动重定位感兴趣体素 (VOI) 的方法, 提高重定位的准确性和效率, 并降低对操作者的依赖性。

方法 将医学图像的配准方法应用于磁共振波谱的研究过程中。每次采集磁共振波谱数据前, 均采集一高分辨结构像。将后续扫描时的结构像与第一次扫描的结构像进行配准, 获取被试的位置变动信息, 计算得到波谱扫描 VOI 的定位信息, 以此完成定位, 得到理想位置的波谱数据。为了对定位方法进行评估, 选取 20 名被试在 3T 磁共振仪上进行多次扫描, 其中后续扫描分别通过手动定位和追踪定位两种方法进行重定位。我们通常用体素的重合率和波谱含量的差异系数 (CV) 来评价重定位方法提高波谱测量结果可重复性的效果。按照组织类型的不同对 VOI 内的脑区进行分割并记录灰白质的含量, 以此计算体素重合率。分别计算 NAA、Cr、Cho、NAA/Cr 和 Cho/Cr 的 CV 值, CV 通过公式 $CV = 100 \times SD / \text{mean}$ 计算出来, 其中 SD 代表每组数据的标准差, mean 代表每组数据的平均值, 平均 CV 作为衡量化合物含量以及含量比值的可重复性的指标。将两种定位方法所得结果进行比较。

结果 利用追踪定位技术得到的 VOI 与初始定位的 VOI, 体素内白质和灰质的重合率分别为 98% 和 94%, 体素内化合物含量及含量比值的差异性系数分别为 NAA 1.84 ± 2.11 , Cho 2.73 ± 2.45 , NAA/Cr 1.99 ± 1.54 , Cho/Cr 1.55 ± 1.38 , 与连续两次扫描所得差异性系数接近, 符合文献报道连续扫描的合理范围。

结论 本文提出的方法能够有效地提高重定位的准确率和定位效率, 对于身体不灵活, 不能严格配合摆位要求的病人同样适用, 保证了纵向研究的可行性, 同时降低了对操作者的依赖性, 减少了主观性的误差。

PU-2323

结合 AIRTMRecon DL 技术重建后的 propeller 弥散在优化头颅磁共振弥散加权成像图像质量中的应用价值

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目的: 探讨结合 AIRTMRecon DL 技术重建后的 propeller 弥散在优化有金属假牙患者头颅磁共振弥散加权成像图像质量中的临床应用价值。方法: 对 60 名戴有金属假牙无法摘除的患者分别行常规头颅弥散加权成像与结合 AIRTMRecon DL 技术重建后的 propeller 弥散加权成像, 将两组弥散加权图像质量进行对比分析。结果: 结合 AIRTMRecon DL 技术重建后的 propeller 弥散在不增加扫描时间的前提下, 图像信噪比和组织对比度较传统重建图像都有显著提高, 而且在伪影抑制和图像形变控制上有明显改善。结论: 对于有金属假牙的患者来说, 结合 AIRTMRecon DL 技术重建后的 propeller 弥散图像质量明显优于常规头颅弥散加权成像。

PU-2324

动态化介入护理工作记录单在介入质量管理中的应用

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研究背景和目的 我院建立介入中心平台，由放射科管理全院介入手术。在此模式下，专业差异会造成医生、技师、护士团队工作连接不紧密；放射科对护理的质量考评不统一；科研资料不易规范收集等问题。为了针对性改进质量问题，我们设计了动态化介入护理工作记录单，探索其在介入质量管理中的价值。

方法 介入中心设计了介入护理工作记录单，要求技师和护士即时记录手术过程中操作的时间节点、辐射剂量、术中用药、造影剂参数、耗材使用、术中抢救、设备和环境的情况等基本内容。根据出现的问题，再动态化设计调整记录单，如增加了手术空台时间、科研资料等内容。将记录单作为护理工作质量考评的重点，出现一个问题扣质量系数 0.01，护理责任共担，按 60%与 40%落实到责任人，纳入月底考评。放射科组成立质量分析小组，分析问题产生的原因，做好改进措施，跟踪效果反馈，动态优化调整记录单内容。

结果 使用记录单后，护理手术协作意识和积极性都有了显著提高，手术医生对护理人员的满意度从 69% 提高到 88% ($P<0.05$)。护理人员工作质量系数从 0.92 ± 0.02 提高到 0.97 ± 0.03 ，差异有统计学意义 ($T=5.67$, $P<0.05$)。当日手术空台时间从 (125.2 ± 16.4) 分钟降低到 (72.5 ± 14.2) 分钟 ($T=13.23$, $P<0.05$)。将造影剂肾性反应和 CTA 和 DSA 狭窄对比等科研目标纳入记录单，收集病例资料的时间较纳入前明显减短，能更快更完整地收集病例资料的收集工作 ($P<0.05$)，总计收集病例 2000 多例，以此为基础发表文章 4 篇。

结论 介入护理工作记录单将所有护理工作融合兼顾，将护理工作质量和考评统一起来。对于质量管理和科研需求的重点目标，记录单进行动态化增减，灵活调整，引导护理团队重视改进各项问题，深入科研采样和创新，激发了护理团队的协作精神，在介入中心的管理和教研方面发挥了重要的作用，其应用价值值得更深入的研究和探索。

PU-2325

鼻腔鼻窦肿瘤和肿瘤样病变的 CT 与 MRI 扫描规范及诊断

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目的：探讨鼻腔鼻窦 CT 与 MRI 扫描规范及诊断分析思路。**方法：**通过总结多年来首都医科大学附属北京同仁医院放射科鼻腔鼻窦肿瘤和肿瘤样病变 CT 与 MRI 扫描技术、方法的不断改进和诊断分析思路，探讨鼻腔鼻窦肿瘤和肿瘤样病变的 CT 与 MRI 扫描规范及诊断、鉴别诊断要点、分析思路。**结果：**鼻腔鼻窦肿瘤和肿瘤样病变在头颈部较常见，CT 与 MRI 扫描范围较大，CT 多采用螺旋 CT 扫描和多平面重组技术，MRI 多采用常规 T1WI、T2WI、DWI、动态增强扫描序列以及脂肪抑制技术，合理应用 CT 与 MRI 可明显提高鼻腔鼻窦肿瘤和肿瘤样病变的检出和诊断准确率。**结论：**鼻腔鼻窦肿瘤和肿瘤样病变的 CT 与 MRI 扫描规范已相对成熟，且 CT 与 MRI 联合应用可明显提高鼻腔鼻窦肿瘤和肿瘤样病变的检出和诊断准确率。

PU-2326

影像质量控制人工智能系统的初步探讨

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目的：影像质量控制是保证影像检查质量、同质化和临床价值的重要环节，在影像实际工作中是必不可少的环节，然而近十年来每个医疗机构的影像检查人次每年增长率较高，传统的人工质量控制方式只能对部分检查进行抽检，无法对全部影像检查实行质量控制，迫切需要研发影像质量控制人工智能系统，帮助实现实时的全过程影像质量控制与评价。方法：在确定好质量控制与评价标准后，采用深度学习方法和建立质量控制与评价模型，并将模型评估结果与人工质量控制和评价进行比较分析，针对问题进一步研究改进模型。结果和结论：获得性能较好的影像质量控制人工智能系统。

PU-2327

O-MAR 技术对髋关节置换去金属伪影的临床应用可行性探讨

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目的 比较髋关节置换后双能 CT 光谱探测器获得的虚拟单能图像与常规多能 CT 扫描获得的混合能量图像的差异，得到抑制伪影的最优 keV 值。方法 回顾性搜集采用光谱探测扫描仪(IQon Spectral CT)在 40~140 keV 范围进行扫描的 50 例患者，利用 IQon CT 每隔 20 keV 获得一次图像，共得到 6 组的不同单一能量图像，采用定性及定量分析与常规 CT 混合能量图像分别比较。结果 keV 越高，O-MAR 的信噪比(SNR)与对比噪声比(CNR)在均升高，在同一 keV 能级参数设置下，NO-MAR 组 AI 均低于 O-MAR 组，尤其在 140keV 效果明显。结论 与常规 CT 多能图像相比，光谱探测器 CT 提供的图像可以显示最佳的伪影抑制水平，尤其在 140keV 效果明显，虚拟单能图像加 O-MAR 技术，能够在不影响图像质量情况下最大限度去除金属伪影。

PU-2328

双源 CT 分析结石成分在临床应用的进展

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目的：泌尿系结石是泌尿外科的常见病，结石成分的判定对于临床治疗方式的选择非常重要。近年来出现第三代双源 CT，可用于对泌尿系结石成分更深一步的研究。国内目前大多数对泌尿系结石成分的研究分析主要以定性为主，国外已经开始对结石成分定量研究。本文综述三代双源 CT 用于泌尿系结石分析的研究进展，以期进一步探究第三代双源 CT 用于定量分析结石成分的准确性。方法：泌尿系结石在临床上大多是以混合结石存在，目前的研究随着双源 CT 技术的发展不断地深入。当双能量技术用于第一代双源 CT 时，大多数学者对泌尿系结石成分的研究从体外评估开始，直到大量体外研究数据得到证实后，人们将这一技术用于体内初步诊断。随着技术的不断进步，设备不断改善，学者刚开始是对纯结石展开研究，到后来对混合结石进行研究，截止到第三代双源 CT 出现，对纯结石的区分越来越准确，能辨别的混合结石成分越来越多，甚至能够量化混合结石成分，但用于体内的诊断还需要大量的临床实验来证实。

结果：第三代双源 CT 较之前两代增加了高能 X 线管（150kV），以及在球管前设置了锡滤过器（Sn150），提高了 X 线的能谱纯度，使双源 CT 不仅可以区分纯结石：尿酸与非尿酸结石、尿酸结石与含钙结石等，还可以区分混合结石：含尿酸，草酸钙和胱氨酸的混合结石。虽然体内分析的结果不如体外分析的准确，但就目前文献报道的结果来看，尿酸与草酸的分析对临床具有相对较高的实用价值。而相关研究指出，纯草酸钙结石与碳酸磷、草酸钙混合结石等衰减特性相近，不易区分，本文认为日后随着能谱纯化技术更加细化，有望能区分原子序数较相近的成分。国外有研究表明使用第三代双源 CT 可以量化含尿酸与非尿酸的混合结石。

结论：将来可以进一步量化非尿酸成分结石，这是今后研究的方向。因为非尿酸成分组成的混合结石之间有效原子数的差异比尿酸与非尿酸的混合结石还要小，但若能量化非尿酸成分的混合结石，对临床的意义是非常重大的。

PU-2329

三星 DR 下肢全长板拍摄足负重侧位的应用

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目的：通过三星 DR 的下肢全长板拍摄足负重侧位，准确评估无症状扁平足疾病，以及提供给骨外科详细的足踝疾病的诊断。与外翻足扁平，舟骨结节处肿胀和压痛，仔细鉴别诊断。

方法：使用设备：三星 GC85V DR。随机采集疑是患有扁平足的案例，共 30 例，年龄在 15~25 岁之间，男性青少年，体型相当，每人分别拍摄两组足负重侧位片。一组是非单脚站立拍，使用一把椅子，放在胸片架前，让患者将患侧足放在椅子上，用上身的力量往下压，非患侧足站在地上。另一组是完全单脚站立拍，将下肢全长板移至胸片架前，让患者将患侧足踩在板子上，非患侧足抬起，单脚站立。拍摄条件相同，控制变量为是否完全单脚站立，行足负重侧位拍摄。对比这两组的诊断结果，利用影像学测量软件，记录足弓角度，哪一组检出扁平足的概率大。利用 SPSS19.0 对两组所测角度进行独立样本 T 检验。由三位主治医师在双盲条件下，在相同窗宽窗位的环境下进行图像诊断。

结果：完全单脚站立位条件下所摄足负重侧位片较非完全单脚站立条件下足弓的降低更为明显。 $P<0.01$ ，其差异具有统计学意义。所测得的角度更精确，更加有利于临床做判断，以及手术的进一步开展，也为病人提供了更好的矫正方案。并且图像更加有利于医生快速诊断扁平足。

结论：第一：足负重侧位，必须是以足踝能够承受身体重量的姿势单脚站立，才能看出扁平足和足踝隐藏的疾病。以前我们的拍法是使用一把椅子，让病人把患侧放在在椅子上，并且足用力往下压，但这种力度肯定不如单脚站立的来得大。如果不单脚站立着拍，那么这个站立位就失去了它的意义。第二：大多数机器并未配备负重位拍摄的道具，而三星 DR 的下肢全长板刚好可以代替，而且拍摄下肢全长的机器，其胸片架和球管的下降程度可以达到离地面 10cm。第三：能够准确直接地判断无症状扁平足疾病，准确测量足弓形态，有利于临床手术方案的设计。

PU-2330

MDCT 对甲状腺肿瘤的鉴别诊断价值

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目的 分析各种甲状腺肿瘤的 MDCT 征象, 探讨 MDCT 对甲状腺肿瘤鉴别诊断的价值。

方法 回顾性分析本院收治的 50 例甲状腺肿瘤患者影像学资料及手术病理结果。所有患者术前行 MDCT 检查, MDCT 图像由 2 位中级职称以上影像科医师共同阅片, 分析甲状腺肿瘤边界、密度、强化方式、肿瘤与邻近器官关系; 肿瘤以外甲状腺组织的密度、强化情况、边界; 颈部淋巴结情况。

结果 50 例甲状腺肿瘤中, 良性肿瘤 35 例; 恶性肿瘤 15 例。35 例甲状腺良性肿瘤均为甲状腺腺瘤, MDCT 平扫表现为甲状腺内低密度肿块, 边界清晰, 增强后可更清楚显示病灶边界。肿瘤以外甲状腺组织包膜完整, 强化后密度均匀。其中 19 例腺瘤发生囊变, 17 例囊变区形态规则, 另 2 例囊变区形态不规则; 增强后囊变区内无强化, 囊变区周围见完整强化环。其余 16 例腺瘤呈实质性肿块, 8 例增强早期强化均匀, 2 例早期出现岛状强化, 另 6 例早期呈不规则强化; 延迟后 16 例实质性肿块均呈均匀强化。4 例腺瘤出现钙化, 1 例钙化为块状, 3 例钙化为弧形。35 例腺瘤患者均未发现颈部淋巴结肿大。15 例甲状腺恶性肿瘤中 14 例为甲状腺癌, 1 例为淋巴瘤。MDCT 平扫多表现为甲状腺内低密度肿块, 病灶内密度不均匀。恶性肿瘤边缘不规则, 7 例边缘呈蟹足状改变, 3 例出现包膜节段征。增强后 11 例恶性肿瘤呈不规则强化, 延迟后密度不均匀。14 例甲状腺癌中 8 例肿块内出现钙化, 其中细颗粒状钙化 3 例, 点状钙化 4 例, 不规则钙化 1 例。3 例甲状腺癌病灶突破甲状腺包膜。1 例甲状腺恶性肿瘤出现颈动脉受侵, 2 例出现食管受侵, 另有 2 例肿块突入气管内、导致气管壁连续性中断。本组甲状腺恶性肿瘤中 8 例发现颈部淋巴结肿大, 1 例有纵隔淋巴结肿大。

结论 MDCT 对甲状腺肿瘤的鉴别诊断具有重大价值, 可为临床确诊甲状腺肿瘤提供有价值的依据。

PU-2331

The Feasibility of Amide Proton Transfer Imaging of Bladder Cancer at 3 T: A Preliminary Study

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Purposes: This study was aimed to explore the optimal scan parameters for Amide Proton Transfer (APT) Imaging of Bladder Cancer, explore the influence of different protein concentrations and pH values on APT parameter and establish the reliability of APT imaging of healthy volunteers and bladder cancer patients.

Materials and Methods: The optimal scan parameters for Amide Proton Transfer (APT) Imaging of Bladder Cancer were experimentally optimized on cross-linked bovine serum albumin (BSA) phantoms. Different scan parameters, such as different saturation power, saturation duration and number of excitation (NEX), were performed on BSA phantoms. Image quality, signal to noise ratio (SNR) and scanning time were compared. As the optimal scan parameters, image quality as well as clinical scanning time is reasonably ensured. Different protein concentrations and pH values solutions were performed on BSA phantoms. The repeatability and consistency tests of MTRasym (asymmetric magnetization transfer ration) were assessed in 11 healthy volunteers and 14 bladder cancer patients.

Results: In consideration of image signal-to-noise ratio, scanning time, image contrast, optimal scanning scheme was excitation number of 1 and saturation power of 2uT, saturation time of 2s. The APT signal intensity increases as the protein concentration increases while as the PH value decreases. The contribution of the PH value to the APT signal is almost negligible. Good

consistency and repeatability of MTRasym between health volunteers and bladder cancer patients. The MTRasym of bladder cancer patients was significantly higher than that of healthy volunteers and the normal bladder wall of bladder cancer($P < 0.05$). There was no significant difference between the bladder wall of healthy volunteers and the normal bladder wall of bladder cancer.

Conclusion: Amide proton transfer (APT) imaging has shown great potential value in bladder cancer.

PU-2332

The comparison of display capabilities between dual source dual-energy computed tomography (DECT) and single source dual-energy computed tomography (SDECT) for patients with gouty tophus

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Background and purpose

Gout is a kind of inflammatory joint disease, characterized by acute arthritis, later stage may cause tophus formation, joint movement disorders, renal insufficiency, and even cardiovascular diseases. There are a lot of studies showing that the dual source dual-energy CT(DECT) equipped with two X-ray tubes for the diagnosis of gout has great applicability in most cases. In the past few years, there have been studies using traditional single tube for dual energy CT scan, which uses a generator that allows fast switching between high and low tube voltage in 0.5 milliseconds during one rotation, the so-called single source dual-energy CT (SDECT).

This study using dual-source dual-energy CT (DECT) and single source dual-energy CT (SDECT) to scan a group of patients with gout, comparing the tophus display capabilities of two methods of imaging.

Materials and methods

Collecting 22 gout patients diagnosed at Zhongshan hospital, Fudan university, China, between 2016.10 and 2017.02 as the object of study, conformed to 2015 ACR/EULAR classification criteria of gout. All patients with acute attack within one week without lowering uric acid drugs accept DECT and SDECT foot,ankle/knee/wrist scanning , the interval time between two scans no more than two days,. Two radiologists who were blinded to the clinical data and diagnosis, independently read and analyzed the DECT and SDECT images of all patients. They observed whether there was a tophus locating in joints, synovial, tendons and ligaments, then recorded tophus sedimentation location, size, urate contents within the tophus and the radiation dose. A consensus was achieved by discussion when initial opinions differed. SPSS 19.0 software was used for analysis, the imaging findings of patients with chi-square test, $P < 0.05$ was considered statistically significant.

Results

With the comparison,two groups of N (the total tophus), especially the Nb1 (mottling) and Nb2 (nodular) with statistical significance ($P < 0.001$, $P = 0.038$), with more,the DLP between the two groups also statistically significant ($P < 0.001$).

Conclusion

For tophus display capabilities, especially for those $d < 1.0\text{cm}$, DECT is superior to SDECT, be applicable to the clinical monitoring of people with urate-lowering therapy(ULP).The radiation dose of SDECT is smaller than DECT,be applicable to those people who have special requirements of radiation dose such as in poor condition.

PU-2333

基于多维度脑网络连接组学特征的轻度认知障碍早期精准诊断

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目的：聚焦静息态功能磁共振 Resting-fMRI，提取多维度功能脑网络连接组学特征，结合机器学习特征选择和特征融合算法，旨在识别最具判别价值的功能脑网络连接组学特征以及改变模式分析，并最终实现轻度认知障碍和正常对照组的分类诊断。

方法：研究采集 39 名 MCI 患者和 60 名 NC 的 rs-fMRI，基于 264 脑功能图谱将大脑分割成 264 个 ROI 脑区，构建 264×264 功能脑网络矩阵，通过 Gretna 软件得到包括功能连接边、全局图论属性和节点图论属性在内的功能脑网络连接组学属性。创新性采用 t-test 和组-LASSO 算法对脑网络功能连接和节点图论属性进行关键判别性特征选择，结合多核支持向量机实现 MCI/NC 的分类诊断。

结果：研究发现 MCI 的全脑功能连接强度较 NC 普遍减低，采用 t-test 特征选择方法保留最具显著性差异的前 100 条功能连接边，主要分布在 DMN、背侧注意网络等子网络当中。在全局图论属性方面，研究发现 MCI 和 NC 均具有小世界属性。在节点图论属性方面，采用组-LASSO 的特征选择算法，发现最具判别性的关键脑区主要分布在颞叶、扣带回、额上回、舌回以及顶叶等脑区，这些脑区主要分布在默认网络、背侧注意网络等为主的子网络当中。进一步组间比较发现，与 NC 组相比，MCI 患者在额、颞、顶叶和边缘叶关键脑区的介数中心性、度中心性显著降低，节点最短路径显著增加，而在枕叶关键脑区节点，介数中心性、度中心性增加且最短路径降低。通过 MK-SVM 将包括功能连接、全局图论属性和节点图论属性在内的多维度脑网络连接组学特征进行融合，最优分类准确性达到 92.93%，AUC 0.9728。

结论：MK-SVM 可以实现多维度功能脑网络连接组学特征的融合获得最优诊断，节点图论属性为最具判别能力的功能脑网络连接组学特征，枕叶局部脑区存在功能增强的代偿性表现。

PU-2334

DCE-MRI 定量直方图分析和 PI-RADS v2.1 评分对外周带前列腺癌的诊断价值

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目的：探讨动态对比增强磁共振成像 (DCE-MRI) 定量参数直方图分析法及 2.1 版前列腺影像报告与数据系统 (PI-RADS v2.1) 对外周带前列腺癌 (PCa) 的诊断价值。

方法：收集因可疑 PCa 行多参数磁共振成像检查及获得病理结果的 211 例患者的影像及临床资料。所有入组患者均使用 Siemens Verio 3.0T MR，MRI 检查后 2 个月内接受了超声引导下穿刺活检或前列腺根治性切除术。使用 Siemens 后处理工作站 Tissue 4D 模块自动生成定量参数直方图。采用独立样本 t 检验或 Mann-Whitney U 检验比较 PCa 组和非肿瘤组定量直方图参数水平差异。采用 Mann-Whitney U 检验、ROC 曲线、二元 Logistic 回归及 Z 检验进行统计。

结果：入组病例 211 例，其中非肿瘤 126 例 (59.7%)，PCa 85 例 (40.3%)。PCa 组 Ktrans 及 Kep、Ve 均大于非肿瘤组，差异具有统计学意义 (P 均 < 0.05)。Ktrans 及 Kep 各直方图参数较 Ve 25% 位数具有较好的诊断效能，AUC 值均大于 0.7。PI-RADS v2.1 检出 PCa 及 csPCa 的 AUC=0.870 (95%CI 0.821-0.919)、0.904 (95%CI 0.862-0.947)，均在评分为 4 分时约登指数最大。Ktrans25%位数联合 PI-RADS、Kep 中位数联合 PI-RADS 及三者联合应用较其单独应用具有更高的 AUC 且差异具有统计学意义 (AUC 均 > 0.9, P < 0.05)。

结论: DCE-MRI 定量直方图分析能较好地反映肿瘤的异质性, 有助于 PCa 的检出。不同年资的放射科诊断医师 PI-RADS v2.1 评分一致性较好。PI-RADS v2.1 评分对 PCa 的检出具有较好的诊断价值。DCE-MRI 定量直方图参数与 PI-RADS v2.1 联合诊断模型对 PCa 的检出具有更高的诊断效能。

PU-2335

3T 磁共振动态增强在肝脏疾病诊断中的技术应用

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目的 探讨 3T 磁共振动态增强扫描技术对肝脏不同疾病诊断的应用价值, 及对肝脏病变的鉴别诊断价值及不同病变的强化特征。

方法 对 40 例临床怀疑肝脏占位病变的病人进行肝脏动态增强三期扫描。所有患者均行 MRI 平扫和动态增强扫描, 患者取仰卧位, 腹部以专用腹部相控表面线圈固定, 常规行冠状位, 横断位定位扫描后, 采用 (1) 冠状位 **haste T2WI**; (2) 横断位 **haste T2WI**, 横断位 **T1WI**, **T2WI** 加脂肪抑制; (3) 动态增强扫描三期 (动脉期, 门脉期, 平衡期) 横断位。检查前用 20G 静脉留置针建立静脉通道, 对比剂采用 **GD-DTPA30ml**, 生理盐水 20ml 高压注射器静脉快速团注 3ml / s。

结果 12 例原发性肝癌病人发现病灶 16 个, 动脉期呈均匀或不均匀明显强化, 门脉期病灶强化明显消退, 平衡期病灶信号强度低于周围均匀强化的肝组织。5 例肝转移瘤病人发现病灶 13 个动脉期, 门脉期, 平衡期均呈呈环型强化。17 例海绵状血管瘤病人发现病灶 22 个, 动脉期病灶周边呈结节状强化, 门脉期明显或轻度强化, 延迟期(2~8 分钟后)病灶呈均匀明显强化。6 例局灶性结节增生病人发现病灶 6 个, 动脉期明显强化, 门脉期明显或轻度强化, 延迟期病灶强化明显消退而瘢痕轻度或中度强化。

结论 3.0T 磁共振动态增强扫描具有极高的时间分辨率, 结合常规序列, 动态增强技术能在极短的时间内获得肝脏增强多个时相, 在 MR 腹部增强扫描中具有显著价值。选择正确合理的扫描序列, 把握正确的扫描时间, 诊断结果具有很高的参考价值, 对原发性肝癌、肝血管瘤、肝转移癌等病变的鉴别诊断可起到非常大的帮助, 更为临床的下一步治疗提供了好的依据。

PU-2336

不同类型浸润性肾盂癌: MDCT 动态增强表现及误诊分析

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【摘要】目的: 分析浸润性肾盂癌的 CT 增强表现, 旨在提高诊断正确率。方法: 回顾性分析经病理证实的 20 例浸润性肾盂癌的 CT 影像表现特点, 术前均行多排螺旋 CT 及 CTU 扫描。根据影像学图像上肾盂内肿块形态及肾实质浸润程度将本组病例分为 I 型: 肿块浸润型, 肾盂内明显肿块, 病变隆起高度 (H) \geq 横径 (L), 肾窦脂肪受侵, 伴或不伴肾实质浸润; II 型: 浅表浸润型, 肾盂内扁平型肿块, 病变隆起高度 (H) $<$ 横径 (L), 肾窦脂肪消失, 肾实质受侵, 扁平的肾盂肿块、增厚肾盂壁及肾实质融合; III 型: 深部浸润型, 向肾盂外浸润生长, 肾盂内无明显肿块, 增厚的肾盂壁、肿块及肾实质融合, 常伴肿大淋巴结、邻近血管及输尿管受侵。结果: 20 例中, 16 例术前诊断为肾盂癌, 2 例误诊为肾癌, 1 例误诊为急性肾盂肾炎, 还有 1 例误诊为集合管癌, 经病理诊断全部为浸润性肾盂癌。I 型 4 例, II 型 4 例, III 型 12 例。结论: 浸润性肾盂癌不仅仅是肾盂内肿块伴肾窦脂肪和肾实质浸润, 部分肿瘤、肾盂、肾实质融合, 部分肿瘤肾盂外浸润明显而肾盂壁增厚相对不显著。认识浸润性肾盂癌不同表现有助于提高诊断准确性。

PU-2337

Features of tophus distribution and bone destruction in patients of foot and ankle joints with gouty arthritis by dual-energy CT (DECT)

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Background and purpose

In recent years, the incidence of gout have a rising trend as people living standard gradually improved, it has developed into a common disease. The gold standard for the diagnosis of gout is the detection of urate crystals in the synovial fluid under polarized light microscopy. However, this method has certain limitations, some parts of joint fluid is not easy to get, which could affect accuracy and specificity, and aspiration is an invasive procedure which may lead to complications such as infections and hemorrhage, etc. DECT is a rapid, non-invasive imaging method, the study of gout having made considerable progress in recent years. Tophus in DECT image of gout patients were analyzed, to explore the features of tophus deposition and bone destruction in foot and ankle joints which related to acute gouty arthritis attack.

Materials and methods

Collecting 94 gout patients diagnosed at Zhongshan hospital, Fudan university, China, between 2015.10 and 2016.10, 47 cases with positive monosodium urate (MSU) crystals in soft tissue as the object of study. This study used the first generation dual-source CT system (Siemens 64 row CT, Siemens, Munich, Germany) with two X-ray tubes, transmit data to the Siemens Syngo multimodality workplace workstation (MMWP) to do the image post-processing. Two radiologists who were blinded to the clinical data and diagnosis, they independently read and analyzed the dual-energy CT images of all patients. A consensus was achieved by discussion when initial opinions was different.

The features of tophus deposition in foot and ankle joints which related to acute gouty arthritis attack were evaluated with chi-square test and the correlation analysis to study the relation between bone destruction with urate content in tophus was used. All data analysis was analyzed by SPSS software, P values < 0.05 was considered as effective.

Results

Among 47 patients into the group, dual-energy CT detected 239 tophus totally. 42 cases of them had the symptoms of first plantar toe acute arthritis, and 9 with acute ankle arthritis. Part I ($\chi^2=9.12, P<0.05$) and Part III ($\chi^2=8.356, P<0.05$) with tophus were prone to the corresponding clinical acute gouty arthritis, among them, the first metatarsophalangeal joint ($\chi^2=9.78, P<0.05$) and the distal fibula ($\chi^2=9.12, P<0.05$) were more accurate, what's more, episode of acute arthritis was more likely to appear when the nodules were multiple distribution in ankle ($\chi^2=3.945, P<0.05$). We founded the correlation between tophus and urate content had statistical significance ($r=0.370, 95\%CI 0.260-0.757, P=0.01$), there was a correlation between urate content with bone destruction ($r=0.345, 95\%CI 0.142-0.520, P<0.01$), in addition, tophus number and bone destruction was also statistically significant ($r=0.265, 95\%CI 0.030-0.458, P<0.05$).

Conclusion

1. Tophus distribution area and quantity has an effect on acute gouty arthritis, and the extension of course can increase the risk of episode, remind us the close follow-up with patients and early treatment is necessary, aiming to reduce arthritis episodes, and to improve the survival quality.

2. DECT is a reliable method to assess tophus distribution and bone destruction, which can be used to guide the clinical management of gouty arthritis and the prevention of joint damage.

PU-2338

站立位全脊柱正位摄影的质量控制

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目的 分析影响站立位全脊柱正位摄影质量的因素, 针对性整改, 进一步提高全脊柱正位摄影的图像质量。

方法 使用联影 uDR 770i 数字化 X 线摄片机, 对 77 疑似脊柱侧弯畸形患者进行负重站立位全脊柱正位摄影, 通过分次快速曝光获得图像后拼接成全脊柱正位图像。对图像质量进行评分, 将图像分为“1-2”分和“3”分两组, 统计两组患者的年龄、分段图像的 mAs、曝光指数 (EI)、感兴趣区 (ROI) 平均面积、平均标准偏差 (SD) 值、下肢长度百分比和空气面积百分比等并进行统计学分析。

结果 77 例患者均进行了全脊柱正位三段摄影, 并拼接成功。对所得拼接图像进行质量评分: 评为“1”分的 22 例, 约占 28.57%; 评为“2”分的 14 例, 约占 18.18%; 评为“3”分的 41 例, 约占 53.25%。下段图像平均 SD 值的 Welch 和 Brown-Forsythe 检验的统计量都是 48.721, $P < 0.001$, 差异具有统计学意义。下段图像的 mAs、EI、下肢长度百分比和空气面积百分比等统计量的 F 值分别为: 37.320、69.199、100.461 和 19.451, $P < 0.001$, 差异具有统计学意义; 上段和中段图像的 mAs、EI、平均 ROI 面积及平均 SD 值等统计量的 P 均 > 0.05 , 无统计学意义。线性回归方程如下: 下段图像平均 SD 值 = $49.361(\text{下肢长度百分比}) + 31.407(\text{空气面积百分比})$, ($P < 0.01$)。Durbin-Watson 值为 1.696, 查询 Durbin Watson 表发现其恰好出现在无自相关的值域之中, 认定残差独立, 通过检验。

结论 使用电离室进行全脊柱正位摄影中, 精准定位, 避免下肢包含过多, 从而避免下段图像曝光不足, 可以明显改善全脊柱正位图像的质量。

PU-2339

基于互认信息的放射影像检查项目统计与分析

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目的: 2023 年浙江省已实现全省域放射检查互联互通互认共享, 基于互认编码信息可对全省放射检查项目数量及分布情况进行精准统计分析, 为医疗资源合理化配置、针对基层医院的精准帮扶提供数据支撑。

方法: 调取了 2023 年 5 月 22 日当日全省 872 家医疗机构 211,061 例次全样本影像检查, 统计分析 1) DR、CT 和 MRI 检查数量和占比; 2) 不同等级和类别医院 DR、CT 和 MRI 检查数量和占比; 3) DR、CT 和 MRI 前十位检查项目及其占比; 4) 三级和二级医院 DR、CT 和 MRI 前 10 位检查项目及其特点; 5) 不同等级、类别医院 CT、MRI 强化率。

结果: 经数据清洗, 得到 622 家医疗机构 149,128 例次含精准编码信息数据, 其中 DR 检查 48,223 例次 (32.34%)、CT 检查 85,477 例次 (57.32%) 和 MRI 检查 15,428 例次 (10.35%); 不同等级、类别医疗机构存在统计学差异; DR 前 10 位检查项目分别是胸部正位、胸部正侧位、腰椎正侧位、颈椎正侧位、左膝关节正侧位、右膝关节正侧位、骨盆正位、右足正斜位、右踝关节正侧位和左踝关节正侧位, 占全部 DR 检查的 65.8%; CT 前 10 位检查项目分别是肺部 CT 平扫、头颅 CT 平扫、肺高分辨率 CT 平扫、全腹部 CT 平扫、肺低剂量 CT 平扫、上腹部 CT 平扫、腰椎间盘 CT 平扫、全腹部 CT 增强、下腹部 CT 平扫和肋骨 CT 平扫, 占全部 CT 的 82.9%; MRI 前 10 位检查项目是头颅 MRI 平扫+DWI、腰椎 MRI 平扫、颈椎 MRI 平扫

头颅 MRI 平扫、右膝 MRI 平扫、左膝 MRI 平扫、头颅 MRA、右肩 MRI 平扫、头颅 MRI 增强和左肩 MRI 平扫, 占全部 MRI 的 74.1%。三甲医院 CT 强化例次占 71.0%、MRI 占 79.0%; 全省 CT 强化率平均 7.5%, MRI 强化率平均 12.9%。

结论: 基于互认信息的放射影像检查项目数据统计分析, 可为医疗资源合理化配置提供数据依据。

PU-2340

对比分析压缩感知的 3D-T1 序列与常规 2D-T1 序列的图像质量及临床应用价值

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摘要: 目的 分析比较压缩感知 (compressed sensing, CS) 技术的 3D-T1 序列与常规 2D-T1 序列的图像质量及临床应用价值。方法 回顾性收集徐州医科大学附属医院 20 例行颅脑 CS 3D-T1 平扫+增强序列、20 例行颅脑 2D-T1 平扫+增强序列患者的影像资料。由两名 5 年以上工作经验的医师或技师测量平扫及增强图像的信噪比 (signal-to-noise ratio, SNR) 和对比噪声比 (contrast noise ratio, CNR), 对图像质量进行评分, 统计图像伪影情况, 并在增强图像上分析病灶显示情况, 分析结果不统一时, 由第三名高级职称医师进行判定。应用 SPSS 软件, 两组间比较采用 Wilcoxon 秩和检验。结果 CS 技术的 3D-T1 与 2D-T1 序列的扫描时间相差不大。相对于常规 2D-T1 平扫及增强序列, CS 3D-T1 平扫及增强序列的 SNR 及 CNR 均较高, 差异具有统计学意义 (P 均 < 0.05)。图像质量评分方面以及病灶的显示方面, CS 3D-T1 平扫及增强序列要优于常规 2D-T1 平扫+增强序列。特别是对于较小的强化影, 2D-T1 序列的诊断信心不足, 而 3D-T1 序列层厚较薄, 并且能够进行三维重建, 能够克服这一缺点。结论 在扫描时间相差不大的情况下, CS 3D-T1 序列的图像质量较好, 对于较小强化影的显示优于常规 2D-T1 序列, 更利于病变的检出及诊断, 值得临床推广应用。

PU-2341

磁共振波谱成像技术参数变量在颌面部肿瘤中应用价值的探索

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目的 探讨磁共振波谱成像参数变量中 TE 时间变化对颌面部肿瘤检测的区别和价值。材料与方法 选取我院确诊为颌面部舌鳞癌患者 40 例和正常对照组 20 例。将其分为短 TE 肿瘤组 (A 组 $n=20$)、短 TE 对照组 (B 组 $n=10$)、长 TE 肿瘤组 (C 组 $n=20$)、长 TE 对照组 (D 组 $n=10$)。所有病例均行术前 MRS 检查并进行后处理分析, 测量比较 Cho、Cr、Cho/Cr 比值、LL。将取值采用两独立样本 t 检验方法进行统计学分析。结果 (1) A 组与 B 组比较 Cho、Cr、Cho/Cr、LL 峰差异有统计学意义 ($P<0.01$); (2) C 组与 D 组比较 Cho、Cr、Cho/Cr、LL 差异有统计学意义 ($P<0.01$); (3) A 组与 C 组 Cho、Cr、Cho/Cr、LL 差异有统计学意义 ($P<0.01$)。结论 磁共振波谱成像能在舌鳞癌诊疗中提供一定的诊断信息, 参数变量 TE 时间的取值决定了不同的谱峰含量和形态, 具有一定的临床应用价值。

PU-2342

放射科等级评分报告质量控制系统在住院医师规范化培训中的应用探索

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目的 设计出符合培养放射科住院医师的质量控制系统,并且在评价中加入学员的质控过程,提高住院医师医学理论知识、基于实践的报告书写与改进等核心能力。**方法** 选取我院 10 名放射科住院医师作为研究对象,在放射科报告评价及质量控制体系中使用等级评分,在应用报告书写评价系统第 1 和第 6 个月进行报告质量评价数据分析对比。**结果** 经过 6 个月的培训,考核学员的报告书写质量明显改善,差异有统计学意义。**结论** 应用报告质量控制系统能更好的完成放射科的住院医师规范化培训,能够积极推进学员的主观能动性,提高他们的核心岗位胜任能力。

PU-2343

自适应迭代算法结合深度学习重建算法降低冠状动脉 CTA 辐射剂量的研究与应用

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目的: 探讨不同迭代算法 (ASiR-V) 与深度学习重建算法降低冠状动脉 CTA 辐射剂量的研究与应用价值

方法: 前瞻性纳入行冠状动脉 CTA 检查受检者 100 例,随机分为 A、B 两组对应 100KV, 70KV 管电压,固定 300MA,每组 50 例,分别重建 50%ASIR-V、DLIR-M、DLIR-H。测量主动脉根部、左主干动脉,右冠状动脉,左旋支动脉,左前降支动脉近段,主动脉根部邻近脂肪组织的 CT 值及噪声,测量时尽量避开血管壁、病灶、钙化及非钙化斑块。分别计算信噪比 (SNR) 和对比噪声比 (CNR), $SNR = \text{管腔强化 CT 值} / \text{管腔 SD 值}$; $CNR = (\text{管腔强化 CT 值} - \text{背景 CT 值}) / \text{背景 SD 值}$ 。由两位具有 5 年以上工作经验的主治医师以上的医生对每段血管按照 5 分法对各组的图像质量进行评价: 1 分: 血管图像质量极差,对比度差,伪影重,管腔无法评估; 2 分: 血管图像质量较差,伪影较重或噪声大,管腔不均质。3 分: 血管图像边缘模糊,管腔内欠均质,有伪影,噪声大但不影响管腔评估; 4 分: 血管对比度可,边缘清楚,管腔内质地均匀,有轻微伪影或少量噪声,不影响诊断; 5 分: 血管图像对比度佳,边缘清晰锐利,管腔内质地均匀,无伪影,无明显噪声。

结果: 两组客观评价测量的得出在 70KV-50%ASIR 时有最高的 CT 值、SD 值、最低的 SNR 值与 CNR 在值均有统计学差异 ($P < 0.05$)。主观评价, 2 名医师评价图像质量的一致性较高 ($Kappa = 0.71$), A、B 两组均能达到诊断要求,在 B 组比较中 $DLIR-M > DLIR-H > 50\%ASIR-V$ 。研究结果显示两组的辐射剂量分别为 A 组 (8.8 ± 2.09) mSv、B 组 (3.18 ± 1.12) mSv, B 组辐射剂量降低约 51.8%

结论: 本研究将管电压从 100KV 降到 70kv 时,使用 DLIR-M 可降低病人接受辐射剂量并可获得临床诊断需求的高质量图像。

PU-2344

磁共振检查技术扫描规范及质量控制持续性改进的研究

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目的: 进一步规范磁共振检查扫描技术, 针对个性化的患者实行统一、明确的扫描计划, 我科在对各部位扫描协议中进行规范化调整, 达到各个技师扫描时具有相同思维的扫描方式和方法。然后每月抽查各部位各 50 例, 对扫描质量进行评分、汇总, 纳入每月质量控制考核, 并持续性改进。

方法: 根据现有的磁共振检查技术专家共识经验, 在各高年资技师共同商榷之下, 归纳整理出符合并适用于我院患者对磁共振检查的需求的扫描协议, 并在此基础上从 2021 年 1 月持续至今, 我科成立质控小组, 要求每位扫描技师严格遵循扫描协议, 不随意更改参数, 扫描结束后上传图像至 PACS 系统。然后在每月开始 5 个工作日内完成上月的各部位, 如头颅、颈部、胸部、腹部及脊柱、四肢躯干等的图像扫描质量控制, 在扫描定位、序列选择、伪影控制、序列上传及图像信噪比五个方面进行评定, 设定一个总分, 根据轻、中、重三个等级评价得分, 然后汇总各部位得分, 换算成平均分, 纳入每位扫描技师的上月的绩效考核的一部分。

结果: 通过我科开展的检查技术扫描规范与质量控制持续性改进管理措施后, 提高了每位技师的工作人员工作积极性, 患者的满意度也有所提升。质量控制之后的得分也展示出各技师的工作质量明显提高, 为患者提供更加优质的服务创造了机会。

结论: 本实验研究结果表明, 对磁共振检查技术扫描规范及质量控制持续性改进可明显提高技师的工作能力及效率, 达到培养优质人才的目的。此外, 保证放射技术质量, 能够进一步适应当前临床的发展, 为临床解决更多疑难杂症提供保障。

PU-2345

PDCA 管理对钆塞酸二钠 MRI 增强检查图像质量的影响研究

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目的: 探讨 PDCA 管理对钆塞酸二钠 (Gd-EOD-DTPA) MRI 增强检查图像质量的影响。

方法: 本院放射科磁共振质控小组以达到诊断目的为标准, 将钆塞酸二钠 MRI 增强检查图像分为优片 (图像分辨率、对比度较好, 扫描时机准确, 伪影较少, 能达到诊断目的) 和差片 (分辨率、对比度差, 扫描时机不准确, 伪影重, 无法诊断) 两组, 通过采用 PDCA 循环管理模式, 分析钆塞酸二钠 MRI 增强检查的现状及其影响其图像质量的因素, 将影响图像质量的原因分为四类: 患者准备、技师操作、对比剂注射方案及设备条件。根据不同影响图像质量的原因制定适宜解决方法并实施检查, 比较 PDCA 管理前后图像质量情况。

结果: PDCA 管理后钆塞酸二钠 MRI 增强检查图像优片率为 90.6%, 管理前优片率为 81.3%, 差异具有统计学意义 ($P < 0.05$)。

结论: PDCA 管理能明显提高钆塞酸二钠 MRI 增强检查图像优片率, 为临床治疗提供更准确可靠的影像学依据。

PU-2346

低剂量多层螺旋 CT 全模型迭代重建技术在肺动脉造影中的应用研究

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【摘要】目的：探讨低剂量多层螺旋 CT 结合全模型迭代重建技术在肺动脉造影中应用的价值。**方法：**收集 2019.10~2021.10 于锦州医科大学附属第一医院就诊的疑似肺动脉栓塞患者 86 例，按照随机原则分为 2 组，每组 43 例。实验组采用 80 kV、50 mAs 扫描，对照组采用 120 kV、自动毫安秒技术扫描。实验组数据采用滤波反投射及全模型迭代重建技术进行处理，对照组数据采用滤波反投射技术进行处理。记录并计算 2 组数据肺动脉 CT 值、有效剂量(ED)、信噪比(SNR)、对比噪声比(CNR)、CT 剂量容积指数(CTDI vol)、剂量长度乘积(DLP)，并评价肺动脉 CT 造影图像质量。**结果：**两组的 ED、SNR、CNR、CTDI vol、DLP 均具有统计学差异($P<0.05$)；两组肺动脉 CT 值无统计学差异($P>0.05$)；两组肺动脉造影的图像质量无统计学差异($P>0.05$)。**结论：**低剂量多层螺旋 CT 结合全模型迭代重建技术在患者大幅度降低辐射剂量的同时，能够确保肺动脉成像的质量。

PU-2347

低剂量 CT 扫描在经皮肺结节术前定位中的应用对比分析

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摘要

目的：探讨常规剂量与低剂量 CT 扫描对于经皮肺结节术前定位的应用对比分析。**方法：**对 2020 年 1 月到 2021 年 1 月期间，对我院进行的经皮肺结节手术病人进行了系统的回顾和评估。分为两组，每组 100 例。第一组的 CT 扫描是以常规剂量（120kV、150mAs）为基础的。第二组使用了低剂量（80kV、60mAs）的 CT 扫描。研究发现，两组都采用了一样的 CT 机（GE RT590），并且拥有一致的扫描参数，手术过程中的定位时长都是 15 分钟。两组中，男性比例分别为 48.3%和 53.7%，女性的比例分别为 51.7%和 46.3%。年龄范围为 18 岁至 85 岁，平均年龄为 54 岁。两组中，左肺占总肺面积的比例分别为 44.9%和 55.1%，右肺占总肺面积的比例分别为 55.8%和 44.2%。两组中，有 22 个患者存在合并疾病，其中高血压病 5 人，糖尿病 5 人，慢性阻塞性肺疾病 10 人，其他合并症各 2 人。**结果：**两组中，不同的剂量对肺结节术前定位的精确性没有明显差异，术后病理证实肿瘤类型与预后相似。**结论：**低剂量 CT 扫描对经皮肺结节术前定位具有一定的临床应用价值，可以减少辐射暴露量，降低病人的风险。常规剂量的 CT 扫描在定位方面具有一定的优势，常规剂量的优点是图像清晰度高、解剖结构显示清楚。低剂量 CT 扫描在降低放射线照射的同时，也存在一定的局限性。但是患者在达到预期目的同时减少了辐射剂量的摄取。在实际操作过程中，需要根据具体情况灵活运用这两种技术手段。

PU-2348

探讨深度学习图像重建算法在肝脏增强 CT 成像中改善图像质量及优化病灶显示中的应用价值

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目的:探讨深度学习图像重建(DLIR)算法对肝脏增强 CT 门静脉期图像质量及病灶检出率的影响。**方法:**选取因可疑肝占位行腹部增强 CT 扫描患者 65 例,对上述患者门静脉期原始 CT 数据分别进行 30%和 70%迭代重建算法(ASiR-V 30%和 70%),低等级 DLIR(DLIR-L)、中等级 DLIR(DLIR-M)、高等级 DLIR(DLIR-H)算法重建。比较 5 种算法间客观图像质量(参数包括:图像噪声、信噪比(SNR)、对比噪声比(CNR))、主观图像质量(参数包括图像噪声、伪影、门静脉清晰度、主病灶清晰度、总体图像质量)评分统计学差异。对随后行肝脏 MRI 增强检查的患者进行病灶计数,以 MRI 结果作为参考金标准,比较 5 种算法间病灶检出率。**结果:**在客观参数方面,DLIR-H 的图像质量优于 ASiR-V,图像噪声更低、信噪比更高(均 $P < 0.05$),ASiR-V 70%、DLIR-M、DLIR-H 间 CNR 均无统计学差异(均 $P > 0.05$)。在主观参数方面:DLIR-H 图像质量优于 ASiR-V,图像噪声更低(均 $P < 0.05$),随着 DLIR 强度的增加,有且仅有噪声参数具有统计学意义降低(均 $P < 0.05$)。在病变检出率方面,MRI 检查共检出 45 个病灶,5 种算法病灶检出率相近(25/45,55.6%)。**结论:**与 ASiR-V 算法相比,DLIR 算法可显著提高肝脏增强 CT 图像质量,保证病灶检出率的同时,更加清晰显示病灶细节。

PU-2349

PICC 术后床边 DR 影像的质量控制

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【摘要】目的:对 picc 术后床边 DR 的影像进行技术分析,探讨床边 DR 影像质控的方法,提高 PICC 术后床边 DR 的影像质量。**方法:**对 85 例 PICC 术后床边 DR 的影像进行综合分析,质量评价,确定影响图像质量的因素。**结果:**优质图像 54 例,非优质图像 31 例。对 31 例非优质图像进行重点分析,发现①患者不配合导致摄片体位不正确②体外异物③床边 X 线机的工作性能不稳定④摄片技术参数设定不当⑤图像后处理技术运用不当,均会对床边 DR 图像质量产生不同程度的影响,而导致 PICC 导管显示不佳,产生非优质图像。**结论:**影响床边 DR 图像质量的因素较多,要获得优良的 PICC 导管影像,床边 DR 检查必须规范化。

PU-2350

低管压 CT 对胸痛三联检查图像质量及辐射剂量的影响

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目的:研究低管电压 CT 对胸痛三联征排查图像质量及辐射剂量的影响,探讨这种扫描方法的可行性。**方法:**随机分为观察组(100KV)与对照组(120KV),采用 4 分法评价主动脉、肺动脉及冠状动脉图像质量(包括 CT 值,图像噪声 N、信噪比 SNR、对比噪声比 CNR)

PU-2351

评价人文关怀方案配合技患沟通应用于 CT 增强检查中的价值

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目的 评价人文关怀方案配合技患沟通应用于 CT 增强检查中的价值。

方法 选取 2023 年 6 月—2023 年 8 月吉林大学白求恩第一医院 CT 增强检查患者 100 例,开展随机分组干预,50 例采取常规方案者为对照组,50 例采取人文关怀与技患沟通护理方案者为观察组,比较两组图像质量、检查配合度、检查满意度。

结果 干预后两组图像质量均高于干预前,且观察组比对照组更高,差异有统计学意义 ($P<0.05$);干预后观察组呼吸配合程度、体位配合程度均高于对照组,差异有统计学意义 ($P<0.05$);干预后观察组总满意率 (96.00%) 较对照组 (82.00%) 更高,差异有统计学意义 ($P<0.05$)。

结论 CT 增强检查中开展人文关怀与技患沟通配合沟通方案,能更好地改善其图像质量、检查配合度且检查满意度较高。

PU-2352

2 种注射方法对 MR 血管扫描的图像质量影响

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目的: 比注射液 (欧乃影) 人工和高压注射器注射 2 种方法的不良反应和对图像质量的影响

方法: 收入医院血管增强影像资料 24 例,随机选取 2022 年 4-6 月期间该院收治的采用欧乃影行血管磁共振成像增强扫描的 24 例患者按入院先后顺序分为人工注射组(A 组)和高压注射器注射组(B 组),每组 12 例。造影前根据病变或血管的大小,首先预设置流速、流量及注射时间。作为对照,另一组患者采用手推方式注射,并对检查后图像做对比分析。结果: 所有检查均成功,图像均达标准。但根据图像显示注射器组优于手推组。

结论: 高压注射器可保持稳定速度,确保对比剂浓度以完成准确注射,并可根据血管造影成像程序调节速度和时间,更为精确地进行上述检查。

PU-2353

基于残差网络自动识别腹部增强 CT 期相的研究

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目的 开发并验证一种基于残差网络的人工智能 (artificial intelligence, AI) 腹部电子计算机体层扫描 (computed tomograph, CT) 增强期相判断系统。

方法 回顾性连续收集 2023 年 4 月在北京友谊医院行腹部增强 CT 患者图像 433 例,并将其分为训练集 (303 例)、验证集 (87 例) 和测试集 (43 例)。使用残差网络 ResNet18(pretrain)构建了模型。通过计算模型的精准率、敏感性及准确率 (ACC) 以检验该模型性能。此外,我们还收集了来自北京肿瘤医院、北京大学第三医院、北京中关村医院、房山市第一人民医院、大连医科大学附属第二医院及内江市第一人民医院共计 266 例腹部增强 CT 图像作为独立外部验证集以验证模型性能。

结果 在内部验证集中,模型识别动脉期、门静脉期及平衡期的敏感性、阳性预测值及 ACC 分别为 100.00%、100.00%和 99.48%;其中,模型识别动脉早期及动脉晚期敏感性、阳性预测值及 ACC 分别为 99.00%、98.00%和 95.05%。在外部验证集中,模型识别动脉早期、动脉晚期、门静脉期及平衡期敏感性、阳性预测值及 ACC 分别为 99.00%、99.00%和 96.93%。

结论 该模型能自动准确识别腹部 CT 增强期相,将有望辅助临床减少腹部疾病的漏诊与误诊。

PU-2354

能谱 CT 联合双低技术优化下腔静脉成像的应用研究

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目的 探究能谱单能量成像技术结合能谱智能匹配技术 (GSI Assist) 在优化下腔静脉成像质量及降低辐射剂量、对比剂剂量的应用价值。方法 收集行下腔静脉 CTV 检查患者 72 例,将患者随机分为能谱组和常规组进行检查。能谱组患者 36 例,使用能谱模式扫描,80-140kvp 瞬时切换,使用 GSI Assist mA Mode。常规组患者 36 例,使用常规模式扫描,固定 120kVp,采用 SmartmA mA Mode,两组其余扫描参数均保持一致。两组对比剂均使用碘普罗胺 (370mgI/ml),能谱组用量为 1.0ml/kg,注射速率为 3-4ml/s,常规组用量为 1.3ml/kg,注射速率为 4.5ml/s。能谱组重建 50keV、70keV 两组图像,对三组图像的各段下腔静脉 CT 值、信噪比 (SNR)、对比噪声比 (CNR) 以及图像噪声进行测量统计,由两名高年资医师对三组图像进行主观质量评分,同时记录两组患者的对比剂用量及容积 CT 剂量指数 (CTDIvol) 和剂量长度乘积 (DLP),并计算有效辐射剂量 (ED),使用 SPSS 26.0 进行统计学分析。结果 能谱 50keV、70keV 组图像噪声较常规组升高了 70%、5%,50keV 组各段下腔静脉 CT 值、SNR、CNR 相比常规组显著提高 (P 均 <0.05),70keV 组除肝段、肾上段下腔静脉 CT 略高于常规组 (P 均 <0.05),其余各段下腔静脉 CT 值与各段 SNR、CNR 均与常规组无明显差异 (P 均 >0.05)。两位医师对三组图像的主观评分一致性良好,三组图像主观质量评分无统计学差异 (P 均 >0.05)。能谱组对比剂用量及有效辐射剂量相比常规组降低了 21%、27%。结论 在下腔静脉 CTV 成像中,使用能谱模式扫描可以在保证图像质量的同时有效降低辐射剂量及对比剂剂量,具有很好的临床推广价值。

PU-2355

谈核磁共振设备的安装

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安装调试 MRI 需要注意以下六步:机房选址(地面承重,房间尺寸,运输通道,电源配置及上下水供应);放射防护及屏蔽;配备附属设备;配备网络设备;设备安装调试;售后培训,需要周密安排,否则影响设备正常运转,降低图像质量,影响临床诊断正确性。

PU-2356

谈核磁共振设备的质量控制

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安装核磁共振设备需要从以下几个方面着手：选好机房地址，做好射频屏蔽，配备合适附属设备，规范，严格安装调试；强化售后培训，就能保证核磁设备顺利安装和调试，保证设备和人员安全，保证图像质量，提高开机率，延长设备使用寿命。

PU-2357

医疗失效模式与效应分析在放射科技术部门持续质量改进中的应用

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目的：大型三甲教学医院放射科技术部门患者的流通量大，在岗的年轻技师和轮转的实习生较多，对该部门的质量管理带来较大挑战。持续质量改进是在全面质量管理基础上发展起来的注重过程管理、环节质量控制的管理理论。本文将介绍医疗失效模式与效应分析（Healthcare Failure Mode and Effect Analysis, HFMEA）方法在放射科技术部门持续质量改进中的应用经验。

材料与方法：运用 HFMEA 方法对“头脑风暴”中产生 14 类普放技术部门的不良事件或流程缺陷进行风险评估，包括左右标识错误率、跌倒坠床率、患者身份识别差错率、防辐射用品使用率、候诊时间过长、图像不合格率、职业防护率、网络传输故障率、院感合格率、患者就诊满意度、结果延迟率、申请项目失查率、技师素养以及设备故障率。根据 R 值的排序结果最终筛选出 10 个质量监测指标。针对质量指标采取完善工作制度、制定标准工作流程、明确监测方案以及加强专项培训等措施，自 2020 年 6 月开始持续管理至 2023 年 6 月。质量指标监测每月汇总，分为达到目标值、与目标值的差距<5%，与目标值差距≥5%，阈值逐年严苛。

结果：10 个质量监测指标中，跌倒坠床率、召回重拍率、申请单项目失查率、儿童防护用品使用率、X 线摄影设备故障率、图像传输失败率、结果延迟率（技术因素）以及候检平均时长这 8 个指标均达到目标值。患者身份识别正确率设置的达标阈值为 100%，每 12 个月中达标率分别为 1 个月、2 月与 3 个月，与目标值的差距<5%分别为 11 个月、10 月与 9 个月，与目标值差距≥5%为 0 个月。左右表示错误率设置的达标阈值为 0，每 12 个月中与目标值的差距<5%分别为 7 个月、8 月与 10 个月，与目标值差距≥5%为 3 个月、2 个月与 1 个月。

结论：采取 HFMEA 方法的持续质量改进应用于普通放射技术部门对质量全面管理具有较大的指导意义，有助于减少医疗纠纷，具有在推广的潜在意义。

PU-2358

螺旋 CT 三维重建在诊断鼻骨骨折中的应用价值

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目的:分析螺旋 CT 在诊断鼻骨骨折方面的应用价值。

方法:选取 2023 年 7 月 -2023 年 8 月吉大一院收治的经 X 线和二维扫描确诊鼻骨骨折的患者 50 例,先予以螺旋 CT 扫描,再进行三维重建,观察其影像图片,分析三维重建诊断鼻骨骨折的准确性。患者取仰卧位,对患者额骨至鼻尖采用 0°横断面扫描,层厚 1.5 mm,间距 2.5 mm。根据实际情况采用两种模式:(1)高质量扫描,速度 3.75mm/s,螺距 3mm;(2)高速模式扫描,速度 7.5mm/s,螺距为 6mm,孔径为 200~250mm,120kV,200mA。扫描结束,对其图像做 2.5mm、间距 1mm 重建,经过专业软件处理,形成螺旋 CT 三维重建。

三维重建方法:

表面覆盖法三维重建图的优点是解剖情况清晰、图像的立体感强。由于其原理是表面成像技术,容易丢失较多的容积资料,其缺点是线样骨折不易显示、细节不够多。多平面重建成像的基础是横断扫描,上升为矢状面、冠状面和任意层面的扫描图像,所以包含了较多的三维信息,补充了普通的二维图像的不足,最大的优点是通过有效的调节窗位和窗宽,很容易的在软组织窗和骨窗之间进行切换,既能完全地显示骨折的情况,还可清晰的显示骨折周围软组织的情况。

螺旋 CT 三维成像技术在鼻骨骨折中的应用最为主要的方面是显示骨折线及骨折位移的情况。图像立体感强、能够准确显示骨折位移的方向和程度是表面遮盖显示法的最大优点,但是很难显示线形骨折的情况,必须结合多平面重建成像。多平面重建成像可以直接显示骨折的形态及骨折位移的方向及骨折附近的组织损伤情况,有利于临床医生的诊断和治疗鼻骨骨折。

结果:显示骨折位置、骨折类型、骨折范围等方面,三维重建诊断结果准确率高

结论:螺旋 CT 三维重建在诊断鼻骨骨折方面具有较高的临床价值。

PU-2359

肝脏强化 CT 使用不同浓度碘造影剂的对比研究

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目的:比较两种浓度造影剂(400 和 300mg I/ml)上腹部增强 CT 的血管和肝实质的强化效果,使用相近的碘流率(iodine delivery rate IDR)0.88、0.9gl/s 和 450 mg I/kg 的碘负荷。方法:160 例患者随机分为两组,分别使用碘美普尔(400 mg I/mL)和碘海醇(300mg I/mL)。分别测量两组不同扫描期相的主要解剖结构的 CT 衰减值,分析比较两组图像质量。记录造影剂注射时的压强峰值,局部不适感(如发热、疼痛等)。结果:动脉晚期 A 组腹主动脉平均衰减值为 313.6 ± 29.6 , B 组腹主动脉平均衰减值为 322.4 ± 30.1 ($p=0.8$); 门静脉期 A 组和 B 组的门静脉平均增强值分别为 176.2 ± 19.3 和 165.9 ± 24.5 ($p=0.6$)。门静脉期 A 组和 B 组的肝实质平均 CT 值分别为 117.1 ± 15.3 和 108.8 ± 18.7 ($p=0.9$)。两组图像质量比较无统计学差异 ($p>0.05$)。造影剂注射压强峰值 (psi) A 组与 B 组比较无统计学差异 ($p>0.05$), 局部不适两组比较无统计学差异 ($p>0.05$)。结论:使用相似碘流率和相同碘负荷时,不同浓度 CT 造影剂的主客观图像质量基本一致,能够满足诊断需求。

PU-2360

深度学习算法在体模低剂量 CT 扫描中的应用价值研究

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目的:对比分析体模(JIS 分辨率 Phantom)常规剂量和低剂量 CT 扫描中,不同程度深度学习重建算法(Deep Learning Image Reconstruction, DLIR)和不同比例后置迭代重组算法的图像质量,

探讨深度学习重建算法在低剂量扫描中对图像质量的影响。方法：在 GE(Revolution)CT 设备上分别用常规剂量和低剂量扫描体模 (JIS 分辨率 Phantom)，常规剂量组根据后置 ASIR-V 的比例不同分别分为 0%ASIR-V、40%ASIR-V 和 80%ASIR-V 3 个亚组。低剂量组根据 DLIR 的程度不同，分别分为低度 DLIR (LDLIR)、中度 DLIR (MDLIR) 和高度 DLIR (HDLIR) 3 个亚组。测量常规剂量组和低剂量组图像的 CT 值，图像噪声 SD 和信号噪声比 (Signal-Noise Ratio, SNR)，对体模中的线对进行主观评分。结果：两组图像的 CT 值组内以及组间之间差异均无统计学意义。常规剂量组的图像噪声均随后置 ASIR-V 的比例升高而降低，SNR 均随后置 ASIR-V 的比例升高而升高。低剂量组图像噪声均随 DLIR 的深度升高而降低，SNR 均随 DLIR 的程度升高而升高。常规剂量组主观评分 0%ASIR-V (4.82 ± 0.41) > 40%ASIR-V (3.73 ± 0.47) > 80%ASIR-V (3.27 ± 0.47)。低剂量组主观评分 LDLIR (3.64 ± 0.51) < MDLIR (3.82 ± 0.41) < HDLIR (3.91 ± 0.16)。比较常规剂量组 40%ASIR-V 与低剂量组 HDLIR 两个亚组的 CT 值差异无统计学意义 ($t = -3.24, p > 0.05$)，SD 值差异有统计学意义 ($t = 13.56, p < 0.05$)，SNR 差异无统计学意义 ($t = -15.98, p > 0.05$)，主观评分 (3.73 ± 0.47 , 3.91 ± 0.16) 差异无统计学意义。结论：低剂量 CT 扫描的 HDLIR 的图像优于常规剂量的后置 ASIR-V 40% 的图像。

PU-2361

深度学习重建在头颈 CTA 图像质量中的临床应用价值

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目的 通过与滤波反投影重建 (FBP) 与自适应统计迭代重建 (ASIR) 的对比，探讨深度学习图像重建 (DLIR) 算法在提高头颈 CTA 图像质量中的临床应用价值。方法 选择 35 例疑诊头颈部动脉疾病的患者，采用 GE APEX CT 进行头颈部 CTA 成像，分别利用滤波反投影重建 (FBP)，自适应统计迭代重建 (ASIR-V50%、ASIR-V80%)，深度学习重建算法 (低 DLIR-L、中 DLIR-M、高 DLIR-H)，重建出 6 种图像。通过对比图像 CT 值、噪声值、信噪比 (SNR)、对比度噪声比 (CNR) 进行不同图像重建算法间的客观评价。由 2 名分别具有 3 年、10 年工作经验的放射科医师采用盲法，以 Likert 5 分制对 6 组图像质量进行主观评估，评分不一致时由第 3 名医师综合判定。结果 六组重建所得图像的 SNR、CNR 从高到低依次是：DLIR-H、DLIR-M、ASIR-V80%、DLIR-L、ASIR-V50%、FBP，差异具有统计学意义 ($P < 0.05$)；六组图像的主观评分中，DLIR-H 主观图像质量评分高于其他五组，差异有统计学意义 ($P < 0.05$)。结论 深度学习图像重建算法能显著降低噪声，提高头颈 CTA 图像质量，尤以 DLIR-H 重建算法效果最佳，在临床应用方面具有很大的潜力。

PU-2362

基于肺功能结果对肺部 CT 图像的质量控制研究

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目的：通过定量分析肺容积、肺实质密度等肺部 CT 定量参数与常规肺功能结果的相关性来设计描述患者呼吸状态的回归方程，评价肺双气相 CT 检查是否在最佳吸气/呼气状态下完成。方法：选取患者 67 例进行肺功能检查，并对患者用双源 CT 定量成像技术扫描测定肺功能定量参数，分析 CT 定量参数与肺功能指标间的相关性，通过二者具有良好相关性的双气相 CT 定量参数设计回归方程来对肺部双气相 CT 图像质量进行评价。结果：当定量肺 CT 与相关的 PFT 参数具有良好的相关性时，得出回归方程 $(V_{in}-V_{ex})/VC$ (预测) $= 0.525 + 0.147 \times (V_{in}-V_{ex}) \times 0.001 - 0.942 \times fSAD\%$ 。结论：

当(Vin-Vex)/VC 通过上述方程计算结果越接近于 1 时可认为达到最佳吸气/呼气状态, 此时肺部双气相 CT 图像质量较高。

PU-2363

深度学习重建算法在胸部低剂量 CT 成像中改善图像质量的应用研究

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目的: 对比分析深度学习重建算法在改善胸部低剂量 CT 成像中图像质量的应用研究。

方法: 前瞻性纳入 57 例在我院接受胸部低剂量 CT 检查的受检者, 采用 256 排 512 层 CT 进行扫描, 分别用 FBP、ASIR-V40%、DLIR-L、M、H 这 5 种算法进行重建, 重建层厚为 0.625 mm、层间距为 0.6 mm 薄层图像, 客观评价升主动脉、右肺动脉及降主动脉、右侧竖脊肌、左右肺的前段和背段等图像噪声 (SD)、信噪比 (SNR)、对比噪声比 (CNR) 并进行主观评价, 评价内容图像噪声、血管边缘的锐利度及图像质量等, 最后进行分析对比。

结果: 客观评价: 不同重建算法的 CT 值比较无统计学差异 ($P > 0.05$), 五组不同重建算法(滤波反投影法 FBP、ASIR-V 以及 DLIR-L、DLIR-M、DLIR-H) 中 SD、SNR、CNR 均具有统计学差异 ($P < 0.001$) 且 SD 中 $DLIR-H > DLIR-M > DLIR-L > ASIR-V > FBP$ 比较有统计学意义。主观评价: 两位诊断医师对于图像质量的主观评分 $DLIR-H > DLIR-M > DLIR-L > ASIR-V > FBP$, 比较有统计学差异 ($P < 0.001$), 主观上: FBP 重建出来的图像质量差, 血管边缘和血管腔不清晰; ASIR-V 重建出来的图像质量良好, 血管边缘和血管腔显示良好; DLIR-L 重建出来的图像质量较好, 血管边缘和血管腔显示可以; DLIR-M 重建出来的图像质量良好, 血管边缘和血管腔显示良好; DLIR-HASIR-V 重建出来的图像质量好, 血管边缘和血管腔显示优。结论: 深度学习图像重建算法 (DLIR) 可以随着强度的增加智能地降低图像噪声, 恢复噪声纹理, 并且在低剂量的条件下与滤波后的反投影 (FBP) 和自适应迭代重建 (AIR) 相比, 该算法大大提高了主观图像的质量, 可以显著降低图像噪声, 改善解剖和病理细节显示。

PU-2364

不同重建算法在胸部低剂量扫描中提高图像质量的应用价值

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目的: 探讨 3 种不同重建技术滤波反投影法 (FBP)、自适应统计迭代重建 (ASIR-V)、深度学习算法重建 (DLIR-L、DLIR-M、DLIR-H) 在胸部低剂量扫描中提高图像质量的应用价值。

方法: 收集 68 例患者首诊和 3 个月内复查低剂量的 2 组胸部 CT 图像。所有患者首诊均采用常规剂量方案[预设噪声指数 (NI) = 8], 图像采用 ASIR 60% 进行重建, 复查采用低剂量方案 (预设 NI = 16), 分别采用 FBP、ASIR-V、DLIR-L、DLIR-M、DLIR-H 5 种不同重建算法进行重建。记录下图像噪声 (SD)、信噪比 (SNR)、对比噪声比 (CNR) 及 2 组容积 CT 剂量指数 (CTDIvol) 及有效剂量 (ED)。由两名放射科诊断医生选取主支气管分叉层面, 分别在升主动脉、右肺动脉及降主动脉、右侧竖脊肌、左右肺的前段和背段分别放置感兴趣区, 以其范围面积内的 CT 值的标准差来作为图像的噪声大小, 分别用公式计算 SNR、CNR 和噪声降低率, 各个参数须在同一期相的同一层面上进行测量, CT 值和 SD 值分别要重复的测量 3 次, 再取其平均值作为噪声大小。

结果: DLIR-H 在 2 种条件下的 SD 最低, CNR 和 SNR 最优且低剂量 DLIR-H 的 SD 值显著低于低剂量的 ASIR-V 和 FBP, 稍低于常规剂量的 DLIR-M, 差异有统计学意义 ($P < 0.05$); 低剂量 DLIR-H 的

SNR 显著高于低剂量的 ASIR-V 和 FBP,稍高于常规剂量 DLIR-M,差异有统计学意义 ($P < 0.05$)。图像主观评分,低剂量 DLIR-H 图像显著优于低剂量 ASIR-V 和低剂量 FBP,略优于常规剂量 DLIR-M,差异有统计学意义($P < 0.05$).与常规方案相比,低剂量的 ED 降低约 77.8%($P < 0.05$)。结论:与 FBP 和 ASIR-V 相比,DLIR-H 可以显著降低图像噪声,提高图像的信噪比,以及在低剂量 CT 扫描条件下使用 DLIR-H 将获得具有较高的图像质量。

PU-2365

儿童青少年 X 线全脊柱拼接正侧位摄影的图像质量

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〔摘要〕目的 探讨儿童 青少年 X 线全脊柱拼接正侧位摄影的图像质量。方法 回顾性分析 2023 年 5—8 月于深圳市儿童医院接受 X 线全脊柱拼接正侧位检查的 2856 例患者的临床资料,参照世界卫生组织 (WHO) 对年龄段的划分分为 A 组 (儿童) (4-6, 952 例)、B 组 (青少年) (7-16 岁, 1904 例), 2 组均采用美国锐科 DRX-Evolution Plus 设备正常脊柱摄影程序进行数据采集并完成全景拼接,由于 A 组身高较矮,设定 2 张全景拼接。B 组身高较 A 组高设定 3 张全景拼接,B 组 3 张拼接中有一张影像经过隔肌水平,需要患者训练呼吸提高拼接的影像质量,减少重拍率。并由 1 名资深放射科副主任技师和 1 名资深放射科副主任诊断医生对图像质量进行评价。结果 2 组正侧位图像的信噪比 (SNR) 值比较,差异无统计学意义 ($P > 0.05$); 2 组正位侧位摄影得分比较、B 组平均得分高于 A 组,差异有统计学意义 ($P < 0.05$); 2 组全景拼接质量 A 组平均得分高于 B 组,差异有统计学意义 ($P < 0.05$)。结论 年龄及训练呼吸是影响 X 线全脊柱拼接正侧位摄影图像质量的重要因素,年龄较大及呼吸配合的患者图像的质量更佳。

〔关键词〕脊柱全长; 全景拼接技术; DR X 线数字摄影

PU-2366

能谱 CT 联合双低对比剂在 2 型糖尿病患者下肢 CTA 中的临床应用价值

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目的: 本研究通过 2 型糖尿病患者行下肢 CTA 检查,观察能谱 CT 联合双低对比剂在降低患者辐射剂量及对比剂用量方面的效能。方法: 收集行下肢 CTA 检查的 2 型糖尿病患者 60 例,随机分成两组: 对照组采用常规 CT 扫描,经肘静脉注入碘佛醇 350mgI/mL,用量按 1.5mL/kg 计算; 观察组使用能谱 CT 扫描,经肘静脉注入碘海醇 300mgI/mL,按体重 1.2mL/kg 计算总量。主观图像质量评价由两位高年资影像科医师采用双盲进行评分进行。客观图像质量评价采用两组图像的图像噪声、对比噪声比、信噪比判断。同时对两组的剂量长度乘积、平均 CT 容积剂量指数、有效辐射剂量及有效摄碘量进行分析。结果: 观察组腹主动脉、股动脉及腘动脉 CT 值高于对照组,差异有统计学意义 ($p < 0.05$); 观察组 SNR、图像噪声高于对照组 ($p < 0.05$); 观察组与对照组 CNR、图像质量评分差异无统计学意义 ($p > 0.05$); 观察组 CTDI、DLP、ED、有效摄碘量均较对照组明显下降 ($p < 0.05$)。结论: 在低对比剂浓度、低对比剂总量的条件下行下肢 CTA 能谱 CT 扫描,既可保证图像质量不受影响,亦可明显降低患者受到的辐射剂量和有效摄碘量。

PU-2367

放射防护对于放射检查的必要性

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放射防护科普文章

随着放射检查日益增多,人们对于放射检查了解逐渐熟悉。放射线对于人体有一定危害,因此放射防护的必要性就此展露出来。放射防护是为了保护放射工作人员和接受放射检查的被检者不暴露在辐射环境下以及辐射区域范围内,从而降低辐射对于人体的伤害。那么从哪个方面进行放射防护是极其重要的。首先了解一下放射防护三要素为时间防护、距离防护、屏蔽防护。时间防护是指做缩短放射检查的时间,避免长时间接受射线。对于普通患者做放射检查最好间隔三个月左右,避免超出年辐射剂量。距离防护是外部辐射防护有效方法,增加放射源与被检者之间的距离,让放射剂量在安全的剂量范围内,从而保护人体安全。屏蔽防护是指射线穿过某种材料会是放射性降低从而达到防护要求。常见的 x 线检查防护为铅围裙、铅衣、铅围脖等。其实对于放射检查人们不必惊慌,每年人们接受辐射剂量都会有一个参考范围,基本上不会让体内射线超标导致危害身体,所以大家正面对放射检查,他并没有那么可怕!

PU-2368

影像技师团队在医学影像互认提升影像质量工作中的作用和展望

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目的:探讨影像技师团队在全科影像质量管理中作用及实施路径。方法:通过深化技师团队管理模式,在技师长制管理模式,引入分组导师制、机长制等多维管理模式,推进技术团队质量提升。由技师长分管全科技术团队日常业务管理;技师长作为放射科的技术负责人外,增加了机长制管理,以影像科大型设备为基石,管控本设备本检查室单元的安全、质量、设备应用、技术开发、带教培训及创新等多项职能,尤其注重影像质量的提升,以医学影像互认为导向,逐步实现两个维度,数个模块的现代新型技术管理模式,建立影像技术管理人才团队,实现从管事到管人,从定方向到拿结果的新型高效管理模式。

PU-2369

幼儿 X 线检查辅助装置的临床应用

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[摘要]目的:研究如何更好的让幼儿配合完成 X 线检查,比如常见的小儿胸部 X 线摄影检查。方法:选取笔者所在医院 2023 年 2-8 月需进行 X 线检查的 8 月-4 岁的幼儿 200 例,其中 100 例使用幼儿 X 线检查辅助装置(观察组),100 例不使用幼儿 X 线检查辅助装置(对照组),在相同照射技术条件下,比较两组患儿完成 X 线检查的情况及获得 X 线图像的质量。结果:使用辅助装置的观察组患儿均未出现哭闹,较轻松的配合完成了检查,不需要或需要 1 名陪检家属即可,均获得合格的 X 线图像;对照组患儿均出现哭闹、恐惧,延长了检查时间,且 80 例患儿需要 2 位家属按压才能完成检查,有 10 例患儿初次拍片图像不清,需二次拍摄。结论:通过使用辅助装置,降低

了幼儿 X 线检查时的紧张、恐惧情绪,使其能较轻松、愉快的完成检查,缩短检查时间,减少了陪检家属,提高了 X 线图像合格率,并可获得正常的或更清晰的 X 线图像。

PU-2370

肾癌术前 CTA 评估及结构化报告的价值

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肾癌的治疗越来越倾向个性化治疗,以期达到延长生存时间、提高生活质量的目的。对局限性肾肿瘤从早期经典的根治性肾切除术(RN)逐渐转变为保留肾单位手术。NSS 难易程度及术后可能出现的并发症与肾癌的解剖特征、周围环境的复杂程度(包括肾周脂肪的粘性、肾血管变异等情况)密切相关。CTA 及后处理技术 MPR、MIP、CPR 等可直观、立体、多角度的对肾肿瘤进行三维重组,全方位地了解肿瘤的位置、大小、形态,肿瘤与肾血管、集合系统的关系,肾周脂肪情况,反映肿瘤解剖学特征及周围环境的复杂程度。

标准化肾肿瘤解剖学特征、量化评估具有重要意义;目前,大多影像报告只是对肾肿瘤进行一般的定性描述(即文本报告);临床医师很难依据影像报告对肾肿瘤解剖特征有个全面的了解,且不同医师,对影像报告做出不同的选择,没有统一的标准,使得影像学资料在指导临床医师制定治疗方案方面存在不足。结构化报告是采用结构化格式、标准化术语、前后一致的组织结构书写的影像学报告。在开发结构化报告模板时,可以将临床需要的关键影像结果列入其中。结构化报告有助于提高影像报告的完整性和清晰度,易于阅读和信息提取,提高临床医师的满意度。

PU-2371

低剂量 CT 结合深度学习重建算法对腹部图像质量的影响

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【摘要】目的:探讨超低剂量 CT 结合深度学习图像重建算法(DLIR)对腹部 CT 图像质量的影响。方法:选取我院 170 例因临床诊疗需求行腹部 CT 检查的患者(男 88 例,女 82 例),分别采取了常规剂量 CT 扫描和超低剂量 CT 扫描。常规剂量 CT 扫描使用滤波反投影技术(FBP)进行 0.625mm 层厚重建,超低剂量 CT 扫描分别使用滤波反投影技术(FBP)、不同权重迭代重建技术(ASIR-V30%、ASIR-V50%、ASIR-V70%)、不同等级的深度学习重建技术(DLIR-L、DLIR-M、DLIR-H)进行 0.625mm 层厚重建。由三名放射科医生分别对图像质量(1-5 分)、图像噪声(1-5 分)、诊断可信度(1-5 分)、边缘锐利度(1-4 分)以及伪影(1-4 分)进行主观评分。通过测量肝脏、脾脏、肾脏、主动脉、腰大肌、皮下脂肪的标准差值和 CT 值,客观评价图像质量(图像噪声、信噪比、对比噪声比)。

结果:超低剂量组较常规剂量组相比,辐射剂量降低了 89%。超低剂量 CT 扫描使用 DLIR-H 重建的图像质量与常规剂量 CT 扫描使用 FBP 重建的图像质量大致相仿,差异无统计学意义($P > 0.05$);超低剂量 CT 扫描使用 DLIR-M、DLIR-L、ASIR-70%重建的图像质量较常规剂量 CT 扫描使用 FBP 重建的图像质量较差($P < 0.05$),而超低剂量 CT 扫描使用 ASIR-50%、ASIR-30%、FBP 重建的图像质量基本不能满足诊断需求。超低剂量 CT 在结合 DLIR-H 重建图像检测出肝囊肿(61 例),肾囊肿(63 例)及肾结石(24 例),与常规剂量 CT 利用 FBP 重建图像病灶检出率差异无统计学意义。

结论:超低剂量 CT 结合深度学习重建技术在满足临床诊疗需求的基础上,能明显降低辐射剂量,具有较好的临床应用价值。

PU-2372

CT 扫描仿真系统在医学影像质量与安全控制中的应用

彭锐

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目的：本研究的目的是探讨 CT 扫描仿真系统在医学影像质量与安全控制中的应用。

方法：本研究采用计算机仿真技术对 CT 扫描过程进行模拟和优化。通过模拟不同的扫描参数和扫描条件，评估不同参数对影像质量的影响。例如，研究人员可以通过调整扫描参数，如曝光时间和管电压，来观察对图像分辨率、对比度和噪声控制的影响。此外，通过模拟患者的解剖结构和病变情况，医生可以在没有真实患者的情况下进行诊断和制定治疗方案。例如，研究人员可以模拟不同类型的肿瘤，以帮助医生更好地理解病变的特征和位置。

结果：通过优化扫描参数，可以获得更高的图像分辨率、对比度和噪声控制，从而提高医学影像的质量。通过调整扫描参数，可以显著提高肺部 CT 图像的分辨率，从而更准确地检测肺部病变。同时，通过模拟不同病变的 CT 图像，医生可以提高诊断准确性和治疗效果。医生在使用 CT 扫描仿真系统进行乳腺癌诊断时，与实际患者相比，其准确性提高了 10%。此外，通过模拟不同的扫描场景和操作过程，帮助医生和技术人员熟悉和掌握 CT 扫描设备的操作流程，可以减少操作失误和提高工作效率，从而提高患者的安全性。通过使用 CT 扫描仿真系统进行培训，操作人员的操作失误率降低了 30%。

结论：本研究表明，CT 扫描仿真系统在医学影像质量与安全控制中具有重要的应用价值。通过优化扫描参数、模拟病变情况和操作过程，可以提高医学影像的质量，提高诊断准确性，减少操作失误，确保患者的安全。通过使用 CT 扫描仿真系统进行培训，可以显著提高操作人员的技能水平，从而减少患者的辐射暴露风险。

PU-2373

上肢 CT 动静脉同时增强法对影像质量和辐射剂量的影响

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目的：探讨上肢 CTA（CT 血管造影）两段式注射对比剂动静脉同时增强扫描的可行性，及其对影像质量和辐射剂量的影响。

方法：前瞻性纳入 2023 年 2 月至 8 月在襄阳市中心医院因为肾衰竭并行桡动脉-头静脉端侧吻合术，动静脉瘘手术后行上肢 CTA 的 20 例患者为试验组，上肢 CTA 采用两段式注射对比剂动静脉同时增强法。对比剂用量按照患者体质量计算，采用两段注射的方法，第一段对比剂用量为 0.7 ml/kg，中间注射生理盐水，第 25 秒注射第二段对比剂，用量为 0.5 ml/kg。回顾性收集 2022 年 12 月至 2023 年 1 月间性别、年龄与试验组匹配的 20 例患者为对照组，对照组采用传统动脉期和静脉期双期扫描方法，对比剂用量为 1.2 ml/kg，采用造影剂自动追踪技术，监测主动脉根部感兴趣区，触发阈值为 150 HU。达到阈值延迟 8S 后自动触发扫描，动脉期后延时 25s 扫描静脉期。测量试验组和对照组上肢动脉、静脉、动静脉瘘的动脉流入部、吻合口部、静脉流出部的 CT 值及噪声。并对试验组图像和对照组动脉期、静脉期图像进行评分。计算两组患者的有效剂量。

结果：试验组上肢动脉 CT 值低于对照组动脉期，差异均有统计学意义 ($P<0.05$)。试验组上肢静脉 CT 值高于对照组静脉期，差异有统计学意义 ($P<0.05$)。动脉流入部、吻合口部、静脉流出部的 SNR 和 CNR 无显著差异。试验组辐射有效量较对照组下降 49.2%，差异有统计学意义 ($P<0.05$)。

结论：两段式注射对比剂动静脉同时增强法进行上肢 CTA 增强扫描可以得到动脉期和静脉期的综合图像，实现上肢动脉、静脉同时强化，并降低辐射剂量。

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ZOOMit DWI 与 TGSE DWI 技术对前列腺成像质量的对比研究

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王冬翠、谢芳芳、殷瑾、周高峰

中南大学湘雅医院

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The diagnostic value of T1 mapping and diffusion-weighted imaging in evaluating the pathological types of lung cancer

Yehai Jiang, Nan Yu

Shaanxi University of Chinese medicine

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RESOLVE(Readout Segmentation of Long Variable Echo-trains)-DWI 技术对急性期内听动脉卒中的诊断优势

郑辉、黄一豪、雷子乔

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In-vivo Glutamine Mapping by Magnetic Resonance Spectroscopy Imaging in Gliomas Treatment Applications: A Brief Review

Jiayu Wang
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Coilshim and Sliceadjust techniques significantly improves image quality of neck diffusion weighted imaging

Ning Zhang¹, Bei Liu¹, Gaofeng Shi¹, Qian Xu¹, Qinglei Shi², Mengzhu Wang², Hui Liu¹, Xuechan Qiu¹
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2. Diagnosis Imaging, Siemens Healthcare Ltd., Beijing, China

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多序列 MRI 影像组学模型术前预测子宫内膜癌肌层浸润深度

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Jiahui Yao, Qingxin Zhang
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Yue He
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唐鑫悦、杨梓彬
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An AI-Based Automated MR Image Analysis System for Brainstem Glioma Diagnosis

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Linked patterns of symptoms and cognition with brain controllability in major depressive disorder

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肋间神经扫描的一些探讨

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Characteristics of Intracranial Artery Involvement in Takayasu Arteritis on MR Angiography and High- Resolution Magnetic Resonance Vessel Wall Imaging

Haiyang Xu, wei Yu, Yumeng Sun, Lu Li, Meng Yang, Zhenjia Wang, Tingting Li
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Dynamic Brain Activity States of Memory Impairment in Stroke Patients with Varying Motor Outcomes

Caihong Wang, Peifang Miao, Ying Wei, Jingliang Cheng
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基于 MRI GRASP 动态增强在垂体腺瘤诊断应用

谭博友
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心外膜脂肪体积变化预测冠状动脉粥样硬化斑块特征研究

周微
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向波、易丽荣
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子宫颈胃型腺癌一例

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王欢欢
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李解
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Correlation analysis of IVIM-DWI quantitative parameters with Ki67 proliferation index, MVD score, and VEGF expression in S180 sarcoma mouse model

Shuying Jia,Lei Chen
Shanghai Minhang District Cancer Hospital

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血管爆破介导 AuNPs-CpG 促进肿瘤放射与免疫治疗的实验研究

刘佳豪、容鹏飞
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Liangrui Fang,Jun Zhao
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抑郁症患者形态学特征谐波差异性分析

徐凯、李科

中国人民解放军战略支援部队特色医学中心

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非典型皮质下梗死和白质脑病的常染色体显性遗传性脑动脉病 1 例报道并文献复习

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LT-0115

基于人工智能-压缩感知的多参数集成序列对膝关节成像的影响

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压缩感知技术在重 T2 加权腰骶丛神经成像中的应用

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Robustness of quantitative diffusion metrics from four models: a prospective study on influence of scan-rescans, voxel size, coils, and observers

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妊娠中期胎儿纹状体形态发育的区域特异性及半球不对称性

田迷迷、林祥涛、张忠和
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肛瘘诊断、分型及相关并发症的高分辨 MRI 精准、综合评估

赵妮妮、毕玉瑜、杨勇
陕西中医药大学附属西安医院 (西安市中医医院) 影像科

LT-0120

改良 TOF-MRV 诊断髂静脉压迫综合征的应用价值

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Yingjuan Chang,Ziliang Xu,Yuanqiang Zhu
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核酸适配体介导的氧化铁纳米颗粒对 4T1 乳腺癌细胞的热疗效应

吕亚楠、谷丛丛、王玉堂、黄俊霖、张前、黄娅楠、祖涵瑜*、姜兴岳*
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康厚艺
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少量酒精摄入后健康青年人注意力 相关脑功能变化的多模态磁共振研究

赵莹、刘启、陈清威
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磁共振波谱检测轻度脑外伤后代谢物浓度改变及其影响因素

黄思泓、刘军
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CMR 在 COVID-19 相关心肌炎检测和管理中的作用

杜少华
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范圣宇、陈伟志
锦州医科大学附属第一医院

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基于双分支注意力多示例学习的肝脏纤维化分期

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凌春香、冯吉贞
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侯国瑞
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李梅成、彭鹏、曾红秀、唐成、罗朝天
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余杨红
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河南省肿瘤医院

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郭莹莹
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劳群
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管艳、宋晨、李素红、徐树明
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王丹
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张航
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刘西兰

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Morphometric Analysis of Brain in Glutaric Aciduria Type 1 patients

Bingyang Bian, Dan Li

First Hospital of Jilin University

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儿童大脑皮层肿瘤的影像诊断及鉴别要点

张增俊、崔光彬、雷学斌、闫卫强、南海燕、贺延莉、李刚锋、田强、荣伟程
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CT manifestation of retroperitoneal neuroblastoma in children

Zengjun Zhang, Guangbin Cui, Yanli He, Gangfeng Li, 海燕 Nan, Weiqiang Yan
Tangdu Hospital the Air Force Military Medical University

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小儿结肠粘液癌并印戒细胞癌 1 例报告并文献复习

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陈超、王小飞
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Bin Yang, DaJiang ZHANG
Children's Hospital of Fudan University

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刘新顶、武鹏、靳翠翠、刘思萌、杨潇、周珊珊、赵德利
哈尔滨医科大学附属第六医院

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张增俊、崔光彬 李刚锋 闫卫强 段世军 南海燕 贺延莉 雷学斌 田强
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邓虹、沈君、杨泽宏

中山大学孙逸仙纪念医院

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徐汉友

浙江省遂昌康复医院

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孟莉

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刘娇阳

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提高 MRI 预约成功率

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提升介入室耗材管理

王浙烽
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溃疡性胃癌

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马铃薯冰敷在 CT 增强造影剂渗漏中的疗效观察

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护理工作锐器刺伤的原因及防范措施

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张亚萍
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新沂市人民医院

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吴梦婕
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陈婷、郭大静、何晓静
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李鑫
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LT-0204

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昆明市第一人民医院甘美医院

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新疆生产建设兵团医院

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李彬
孝感市中心医院

LT-0208

**人工智能影像辅助诊断平台在影像技术专业
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刚亚栋、汪祝莎
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李铭华、王培军
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魏春晓
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赵小虎
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赵小虎
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LT-0220

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赵小虎
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LT-0221

能量多普勒超声对类风湿性胫后肌腱损伤 早期诊断价值及手术对照研究

赵小虎
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LT-0223

高频超声诊断冈上肌腱撕裂

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LT-0224

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LT-0225

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马孟玉
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LT-0227

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李芸菲
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李芸菲
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**Shorter TR Combined with Finer Atlas Positively Modulate
Topological Organization of Brain Network:
A Resting-State fMRI Study**

Qili Hu
Shanghai Fifth People's Hospital

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**The effects of insulin therapy on maternal blood pressure
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Fanhua Meng
Shanghai Fifth People's Hospital

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**Imaging Manifestations of Multiple Primary
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Tianyuyi Feng
Shanghai Fifth People's Hospital

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**Elevated plasma neurofilament light was associated with
multi-modal neuroimaging features in Alzheimer Disease
signature regions and predict future tau deposition**

Qili Hu
Shanghai Fifth People's Hospital

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**Sample entropy and surrogate data analysis
for Alzheimer's disease**

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LT-0234

Testing nonlinearity in topological organization of functional brain networks

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Test-Retest Reliability of Graph Metrics in Functional Brain Networks: A Resting-State fNIRS Study

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LT-0236

Association of total cerebral small vessel disease burden with the cavitation of recent small subcortical infarcts

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LT-0237

18F-FDG PET/CT 影像组学特征用于诊断癌症相关恶病质

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LT-0238

PET/CT 对淋巴瘤的诊疗价值

李霄麟、张沉石、张茸、邹薇薇

中国人民解放军海军军医大学第二附属医院

LT-0239

**Emerging Delivery Strategies of Carbon Monoxide
for Therapeutic Applications: from CO Gas
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Haili Yan, Jiangfeng Du
The First Hospital of Shanxi Medical University

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心肌纤维化正电子发射型计算机断层显像研究进展

李梦迪
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LT-0241

基于 CT 的影像组学鉴别根据 NLR 分类的肺曲霉病患者

黄仁军、李勇刚
苏州大学附属第一医院

LT-0242

**Evaluation of PD-L1 expression in patients
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Chen Yang, Fandong Zhu, Zhenhua Zhao
Shaoxing People's Hospital

LT-0243

**Abnormalities of cerebral blood flow and the regional
brain function in Parkinson's disease: A multimodal
meta-analysis of resting state functional
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Hao Xie
The Second Affiliated Hospital of the Chinese People's Liberation Army Air Force Military Medical University

LT-0244

体素内非相干运动磁共振成像 (IVIM MRI) 技术的原理解析、研究进展与未来展望

王磊、李笑石、李馨、牛微、田娟、秦越
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LT-0245

Abnormal static and dynamic functional connectivity in tension-type headache: A support vector machine analysis

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LT-0246

Pd-Cu NCs 纳米平台用于 NIR-II/PA 引导的肿瘤光动力/光热协同治疗

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LT-0247

新冠病毒肺部感染咳嗽继发多发肋骨骨折 PET-CT 显像一例

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LT-0248

¹⁸F-FDG PET/CT 诊断成人多系统 受累朗格汉斯细胞组织细胞增多症一例

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LT-0249

能谱 CT 正负造影剂用于精准监控疾病过氧化氢微环境

高嘉浩、张家文
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STING-targeted PET Imaging of Inflammation in Autoimmune Myocarditis

Duo Xu,Zhou Ye,Xin Lu,Dan Li
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LT-0251

抑制肿瘤血管生长的靶向诊疗一体化研究

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Structural and functional disorders in patients with insomnia disorders: a neuroimaging meta-analysis

Sining Li,Hao Xie,Pan Dai,Xinyu Cao,Yanyan Cui,Ying Yu,Guangbin Cui,Linfeng Yan
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LT-0253

基于低频振幅的区域影像组学相似性网络揭示帕金森病患者脑网络拓扑属性异常

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LT-0254

卒中后抑郁脑功能网络连接改变的静息态磁共振成像研究

吴秀梅、吕亚婷

杭州师范大学附属医院认知与脑疾病研究中心

LT-0255

纳米氧化铁联合肠道菌群抑制结肠癌肝转移

胡秋慧、曾萍、胡红杰

浙江大学医学院附属邵逸夫医院

LT-0256

影像组学在乳腺病灶良恶性鉴别中的初步应用

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LT-0257

叶酸靶向相变型 PLGA 纳米粒 对肝细胞癌的体内外显像及治疗研究

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LT-0258

双肺多发结节 18F-FDG PET/CT 显像两例鉴别诊断

洪浩然

辽宁省肿瘤医院

LT-0259

**体素内不相干运动(IVIM)定量参数
在宫颈癌组织 PD-L1 表达预测中的临床价值**

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LT-0260

**Preoperative Metabolic Parameters of 18F-FDG PET/CT
is Associated with TNM Stage and Prognosis
of Colorectal Cancer Patients**

Xia Lu, Mingyu Zhang, Jigang Yang

Beijing Friendship Hospital, Capital Medical University

LT-0261

**负载透明质酸酶(Hase)的介孔硅纳米平台
增强乳腺癌光动力治疗疗效**

彭昕

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LT-0262

**不同 MYCN 基因扩增状态神经
母细胞瘤的 18F-FDG PET/MR 影像学表现**

梁江涛、许远帆、潘建虎

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LT-0263

18F-FDG PET/MR 对黑色素瘤术后转移及再分期的应用价值

王芳晓、许远帆、潘建虎

杭州全景医学影像诊断中心

LT-0264

18F-FDG PET/MR 代谢参数及扩散参数 对非小细胞肺癌患者预后评估价值

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LT-0265

18F-FDG PETMR 影像组学特征在预测肝硬化 再生结节(RN),肝不典型增生结节(DN) 和小肝癌结节(sHCC)中的价值

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LT-0266

18F-PSMA-1007 PET/CT 和 PET/MRI 在前列腺癌和转移诊断中的价值

王芳晓、许远帆、潘建虎
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LT-0267

双模态影像自组装纳米平台在三阴性乳腺癌诊疗一体化中的应用

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LT-0268

Abnormal changes of brain structure and function in patients with T2DM-related cognitive impairment: a neuroimaging meta-analysis

Pan Dai,Ying Yu,Guang-Bin Cui,Lin-Feng Yan
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LT-0269

正常人脑老化过程中逐渐降低的谷胱甘肽 与视觉空间记忆力的下降有关

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LT-0270

18F-FDG PET/CT 显像在早期活动性大动脉炎诊断中的价值分析

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LT-0271

18F-FDG PET/CT 显像对多发性骨髓瘤 与非骨源性恶性骨病变的鉴别诊断研究

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LT-0272

An integrated nanoplatform based on polyDOPA-b-polysarcosine nanomicelles for magnetic resonance imaging and cancer chemotherapy

Jingya Xia, Jihong Sun
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LT-0273

人工智能检测系统基于超声图像分析预测 甲状腺结节恶性风险的临床应用

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LT-0274

肝脏脂肪含量对急性胰腺炎严重程度的预测价值

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LT-0275

基于多参数磁共振的乳腺癌血流灌注 和细胞增殖异质性的可视化研究

陈晓燕、张晓磊、周涵、付尧、吴仁华、林艳

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LT-0276

基于全脑静息态 fMRI 在长期夜班人群中 睡眠剥夺后低频振幅改变的研究

钱一帆、王磊、李笑石、李馨、牛微、秦越

西安大兴医院

LT-0277

A few-view CT reconstruction method based on a dynamic two-step SART-TV iterative algorithm

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LT-0278

Protein Corona Dynamicity Contributes the Biological Destiny Disparities of Nanoparticles

Liang Zhang, Mingfu Gong, Tao Sun, Chunyu Zhou, Dong Zhang
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LT-0279

基于 BOLD、DTI 技术探究慢性失眠人群 脑血管反应性及类淋巴系统循环的研究

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LT-0280

18F-FDG 联合 18F-PSMA-1007 PET/CT 对前列腺癌 TNM 分期及临床治疗决策的影响

安荣臣、王云华、袁佳莹、马晓伟、董楚宁、鲁心宇、魏红辉、尹璇
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LT-0281

18F-FDG PET/CT 代谢参数结合临床病理参数 对皮肤恶性黑色素瘤的预后

安荣臣、王云华、马晓伟、鲁心宇、周廉博、董楚宁、向馨、尹璇、魏红辉、袁佳莹
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LT-0282

18F-FDG PET/CT 在朗格罕细胞组织细胞增多症中的应用价值

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LT-0283

NMR-based metabolomics combined with metabolic pathway analysis reveals metabolic heterogeneity of colorectal cancer tissue at different anatomical locations and stages

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LT-0284

Early diagnosis of bilirubin encephalopathy based on chemical exchange saturation transfer technique

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LT-0285

结节性硬化症一家系分析及文献复习

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LT-0286

基于影像基因组学对浆液性卵巢癌亚型分类的研究

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LT-0287

利用 MEGA- PRESS 检测抑郁症患者前扣带回代谢物及其症状的相关性分析

田诗云
大连医科大学附属第一医院

LT-0288

Explore the Heterogeneity of Glioblastoma Based on Genes Related to Glutamine Metabolism

Ling Wang, Su Hu, Chunhong Hu
The First Affiliated Hospital of Soochow University

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氧化铈纳米颗粒作为肾保护性 CT 对比剂的可行性研究

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LT-0290

肌肉浸润性膀胱癌的分子异质性与预后的 MRI 影像基因组学研究

樊知昌、王效春
山西医科大学第一医院

LT-0291

大鼠脑创伤半暗带演变 与学习记忆功能变化的相关性评估模型研究

王讯、鲁宏
重庆理工大学

LT-0292

用于磁共振成像和生物发光成像的多功能钒酸稀土纳米颗粒

朱冠楠
四川大学华西医院

LT-0293

探究氙代谢成像不同定量方法的优缺点

万佳语、杨炼
华中科技大学同济医学院协和医院

LT-0294

A pH-responsive T1-T2 dual-modal MRI contrast agent for cancer imaging

Xinyi Ding, Zhongling Wang
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LT-0295

抑制 P2X4 受体增加三阴性乳腺癌对光动力治疗的敏感性

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LT-0296

7.0T 多参数磁共振成像对利鲁唑治疗阿尔兹海默症疗效的可视化评估

沈苑玉¹、刘思奇¹、辛丽静²、张晓磊¹、陈粤¹、庄彩玉³、郑欣慧⁴、吴仁华¹、林艳¹
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LT-0297

QCT 骨密度检测和 99mTc-MDP 骨显像在混合型颈椎病及痹病中的应用价值

罗冬云
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LT-0298

负载槲皮素的纳米铁掺杂碳点 通过抑制巨噬细胞焦亡治疗动脉粥样硬化

王胜
中国人民解放军东部战区总医院

LT-0299

探讨磁共振纵向弛豫时间成像 在鉴别非小细胞肺癌病理类型及分化程度中的研究价值

李广政、李勇刚
苏州大学附属第一医院

LT-0300

PI-RADS 评分结合标化 ADC 值 和 PSAD 对前列腺癌 GS7 分患者不同分级的研究

李漾丹、赵新湘
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LT-0301

Application of nanomaterials in imaging of central nervous system diseases

Houfan Li,Zongqian Wu,Lihua Deng,Chen Liu
Army Medical University (Third Military Medical University)

LT-0302

磁共振 VDMP-CEST 技术结合非线性拟合 在 GABA 加权在体检测上的应用

陈粤、刘思奇、张晓磊、吴仁华
汕头大学医学院第二附属医院

LT-0303

**基于 ^{18}F -FDG PET/CT 多参数预测
同时性腹膜转移风险的列线图开发与验证**

张丁、郑冰姝、吴一聪、徐刘炜、季丹丹、谭忠华、孙春锋
南通大学附属医院

LT-0304

**工程化菌诱导瘤内三级淋巴结联合
免疫检查点抗肿瘤分子影像机制研究**

米泽
中南大学湘雅三医院

LT-0305

**Mitoxantrone-Loaded Pyropheophorbide-alpha
Nanoparticles for Chemo-Photodynamic Combination
Therapy of Colorectal Cancer**

Yanan Li
First Hospital of Shanxi Medical University

LT-0306

**Diagnostic value of ^{18}F -FDG PET/CT in parametrial
infiltration of cervical cancer**

Xiaoyan Li
Fifth Affiliated Hospital of Sun Yat-sen University

LT-0307

**对苯二异硫氰酸酯@吡啶菁绿纳米探针制备及其用于荧光成像
介导的三阴性乳腺癌化疗/光热/光动力联合治疗**

李亚楠
山西医科大学第一医院

LT-0308

具有 AIE 效应的姜黄类二氟硼染料衍生物的合成及应用

李亚楠
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LT-0309

磁共振引导的 PDT/PTT 协同治疗仿生纳米材料

周梦洋
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LT-0310

脑肿瘤 2D-APT 与 3D-APT 成像的一致性研究

刘娜
大连大学附属中山医院

LT-0311

脑肿瘤 2D-APT 成像饱和射频脉冲参数优化

刘娜
大连大学附属中山医院

LT-0312

双靶向 TGF- β 和 VEGF 协同促进鼻咽癌血管 正常化及多参数 MRI 评估

于静
贵州医科大学附属医院

LT-0313

QSM 联合 AQP-MRI、VBM 研究 阿尔茨海默病患者脑功能及形态变化

李朝阳
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LT-0314

基于蛋白质组学和影像组学的 MTM-HCC 新型标志物研究

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LT-0315

Advances and Prospects in Deuterium Metabolic Imaging (DMI): A Systematic Review in Mammals

Feng Pan, Jiayu Wan, Lian Yang

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LT-0316

青少年椎管内髓外硬脊膜间叶性软骨肉瘤一例

史荣超、王颖倩、王锡明

山东省立医院医学影像科

LT-0317

超顺磁性四氧化三铁多功能分子探针 在兔早期小肠缺血的应用研究

谷丛丛、吕亚楠、王玉堂、黄俊霖、黄娅楠、祖涵瑜、姜兴岳

滨州医学院附属医院

LT-0318

Case report: A Case of High-Grade Hidradenocarcinoma of the Chest Wall with 18F-FDG PET/CT and Literature

Wenxin Li

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LT-0319

1 例肠道病变 18F-FDG PET/CT 显像

陈涛
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LT-0320

The value of DWIBS combined with arterial spin labeling technique (FAIR) in the preoperative evaluation of rectal cancer

Qinyan Xu,Xizhen WANG,Xihe SUN,Shuxian ZHANG,Zilong MA
Affiliated Hospital of Weifang Medical University

LT-0321

1 例脾脏病变 18F-FDG PET/CT 显像

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LT-0322

罕见低代谢弥漫生长胃肠道外间质瘤 18F-FDG PET/CT 显像一例

高巧灵、郭修玉、张晓辉、江茂情
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LT-0323

CT 影像组学与 PET 衍生参数对宫颈癌盆腔淋巴结转移 诊断价值的临床对比研究

王小娟
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LT-0324

18F-FDG PET/CT、血清肿瘤标志物和组织病理分型 在肺癌骨转移中的预测作用

江茂情、张晓辉、郭修玉、高巧灵、张景峰、郑建军
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LT-0325

非小细胞肺癌患者吸烟史、18F-FDG PET/CT 代谢 表型和 EGFR 突变状态的相关性研究

江茂情、张晓辉、郭修玉、高巧灵、张景峰、郑建军
宁波市第二医院

LT-0326

Prognostic significance of whole-body total lesion glycolysis on baseline 18F-FDG PET/CT in patients with lung adenocarcinoma: further stratification of the 8th Edition of TNM classification

Maoqing Jiang,Xiaohui Zhang,Xiuyu Guo,Qiaoling Gao,Jingfeng Zhang,Jianjun Zheng
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LT-0327

基于增强 CT 联合模型对预测胃肠道间质瘤危险度分级的研究

李天龙、雷振
锦州医科大学

LT-0328

探讨机器学习联合血清学对鉴别 肝细胞癌病理分化等级的价值研究

王子文、王刚
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LT-0329

扩散峰度成像直方图分析在术前预测脑膜瘤脑侵犯的研究

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LT-0330

高级模型扩散成像直方图分析在脑膜瘤分级的研究

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LT-0331

Mediation Effect of pre-SMA Activation Between Insula GABA Levels and Response Inhibition in Go/No-go Task

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肝恶性肿瘤的分子影像研究及新进展

吉佳琳

锦州医科大学

LT-0333

3.0T 弥散加权成像 ADC 值对评价肾盂癌侵袭性的价值

吕琦、王培军

上海市同济医院

LT-0334

横结肠系膜破裂出血 CT 表现及文献复习

张国平、吕长磊、寇明清、许兵强、陈小龙、张艳、黄明刚
陕西省人民医院

LT-0335

QCT 评估 HCC 患者体成分变化结合 患者血清指标预测术后复发的价值研究

韩剑剑
皖南医学院第一附属弋矶山医院

LT-0336

双源 CT 碘浓度评估胃癌肿瘤相关巨噬细胞浸润状态的价值

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胰腺浆液性囊腺瘤的 CT 表现类型分析

陈伯柱
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体素内不相干扩散加权成像评估胰腺 导管腺癌纤维化程度的可行性研究

刘琪
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LT-0339

双能 CT 检查技术评价肥胖症患者腹部肌细胞减少症的应用价值

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LT-0340

肝血管肉瘤：1 例报告及影像诊断文献回顾

杜伟
西安市中心医院

LT-0341

以自发性肝破裂出血为首发症状的肝脏淀粉样变性一例

魏泽华、刘星星、陈欣、丁墩
西安交通大学第二附属医院

LT-0342

基于定量 CT 分析内脏脂肪及皮下脂肪 与主动脉夹层发生的相关性

刘雪成
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LT-0343

Readout-Segmented Echo-planar Imaging and Conventional Single-Shot Echo-Planar Imaging for Determining Cervical Cancer Image quality, Lymphovascular Space Invasion and Lymph Node Metastasis Status: A Comparative Study

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LT-0344

升结肠及结肠肝曲旁网膜梗死伴肝区网膜、血管扭转一例

刘红、侯淳凯、肖刚、牛微、韩亚峰、李笑石、秦越
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LT-0345

直肠胃肠间质瘤脊柱多节段转移一例

郝清、苏海燕、杨丽
河北医科大学第四医院

LT-0346

Association between disease activity and psychological change among Crohn's disease: a cross-sectional study

Mengting Huang^{1,2}, Xin Li^{1,2}, Linxia Wu^{1,2}, Yan Zou^{1,2}, Chen Huang^{1,2}, Ping Lei^{1,2}, Lian Yang^{1,2}, Ping Han^{1,2}
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LT-0347

剖宫产术后放线菌感染一例

王彦添、王景宇
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LT-0348

内脏脂肪对于胃的形态影响

林美姝
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LT-0349

轴外室管膜瘤一例

黄佳、宋亨
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LT-0350

前列腺癌根治术患者术前 MRI 风险 评估及手术切缘阳性预测因素

王一丁
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LT-0351

ZOOMit-DWI 与 TGSE-BLADE-DWI 序列 对临床有意义前列腺癌诊断价值的比较

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2. 苏州市相城人民医院

LT-0352

个案报道—VHL 综合征

李欣怡、张金玲、张晓悦
哈尔滨医科大学附属第二医院

LT-0353

子宫内膜非典型息肉样腺肌瘤的 MRI 表现

张敏、杨创勃
陕西中医药大学附属医院

LT-0354

A tale of destruction from prostate to lung caused by *Klebsiella pneumoniae*

Yingjie Peng
Hunan Normal University First Hospital; Hunan Provincial People's Hospital

LT-0355

特殊病理类型子宫平滑肌瘤的影像学特点

刘洋
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LT-0356

原发性肾肉瘤 3 例病例报道

张丽花、周莉
南昌大学第一附属医院

LT-0357

CT 增强、MRI 及 DWI 对胆囊炎合并胆囊癌的诊断价值

夏方方、唐腾、王城钧、张英、徐红维
西安凤城医院

LT-0358

Image quality evaluation of low-keV virtual monoenergetic images acquired at 100 kVp using second-generation dual-layer spectral detection CT in patients with hepatocellular carcinoma

Zhuo Chen,Ruokun Li
Ruijin Hospital, Shanghai Jiaotong University School of Medicine

LT-0359

一例胆囊副神经节瘤影像学表现

吕高星、赵建华
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LT-0360

CT 联合超声诊断 HELLP 综合征致肝破裂 1 例并文献学习

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LT-0361

肝硬化肝脏中的局灶性良恶性病变的诊断要点和误区

张艳秋
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郑州大学人民医院

LT-0362

肾上皮样血管平滑肌脂肪瘤的 MR 特征

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LT-0363

PI3K δ 抑制剂 PI-3065 通过靶向 survivin 诱导肝癌细胞凋亡

魏宇泽
辽宁省肿瘤医院 医学影像科

LT-0364

CT 增强扫描在肝细胞癌微血管侵犯术前评估中的应用

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LT-0365

膀胱纤维上皮性息肉一例

杨丽、周刚、吴玲、邓开闯、龙艳
个旧市人民医院

LT-0366

疑难罕见病例：肠系膜血管瘤 1 例

韦霞俊
株洲市中心医院

LT-0367

对比分析 CT 与增强 CT 在诊断腹部肿瘤腹腔转移的临床价值

韦霞俊
株洲市中心医院

LT-0368

胰腺肉瘤样癌的影像学特征

李子园
河南省人民医院

LT-0369

原发腹膜后去分化脂肪肉瘤一例并文献复习

杨丽、周刚、邓开闯、吴玲、龙艳
个旧市人民医院

LT-0370

腹内型侵袭性纤维瘤病增强 CT 及 18F-FDG PET/CT 显像一例

郭修玉、张晓辉、高巧灵、江茂情
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LT-0371

巨大陈旧性宫外孕 CT 表现一例报告

陈慧英
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LT-0372

全脊柱磁共振在银屑病性脊柱关节炎活动性诊断中的临床应用

张泽坤、王达、李蕊
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LT-0373

骨嗜酸性肉芽肿的影像学分析

刘杰
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LT-0374

三维核磁共振在青少年前交叉韧带重建患者术后移植物评估中的应用

齐岩松、徐永胜
内蒙古自治区人民医院

LT-0375

脊柱旁尤因肉瘤的 CT 及 MRI 表现 1 例报告并文献复习

顾韵泽、王存强、贺顺岭
新乡医学院附属人民医院

LT-0376

基于 MRI 观察运动伤所致前交叉韧带撕裂的情况分析

陈帅、王丹丹、张联合
浙江省武警总队医院

LT-0377

踝关节 MRI 检查在十六通道膝关节线圈与四通道相控阵表面线圈中的应用比较

周婕
中国人民解放军陆军特色医学中心

LT-0378

颈长肌肌腱炎的 MRI 诊断价值

乔艳强、李笑石、侯丽娟、曹星辰、李春梅、秦越
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LT-0379

膝关节半月板撕裂 MRI 诊断与关节镜比较分析

乔艳强、贺鹏博、李春梅、侯丽娟、李笑石、秦越
西安大兴医院

LT-0380

基于不同管电压下测得的腰椎骨密度用于患者低剂量扫描的研究

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LT-0381

CT 联合 DCE-MRI 在鉴别骶尾部骨 巨细胞瘤和脊索瘤中的价值研究

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下肢原发性软组织淋巴瘤的多模态 MRI 表现一例

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能谱 CT 检测骶髂炎骨髓水肿的应用

赵爽
天津市天津医院

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奇异性骨旁骨软骨瘤样增生误诊为异位骨化一例

周慧颖、方军杰、张景峰
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张越、郭林
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腓肠肌 T2WI 纹理分析对大鼠糖尿病肌少症的评估价值研究

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COPD 并发症骨质疏松症的研究进展

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LT-0388

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钱堃
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LT-0389

藏区青少年双侧胫骨对称性疲劳骨折 1 例

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LT-0390

髌关节撞击综合征中医证型与影像分型的相关性研究

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LT-0391

健康体检人群骨密度与血压、血脂、空腹血糖的相关性分析

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6. 河南省人民医院影像科

LT-0392

腹主动脉假性动脉瘤并周围血肿侵蚀腰椎 1 例

马朝俊
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额顶骨区原发性骨母细胞型骨肉瘤一例

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LT-0394

色素沉着绒毛结节性滑膜炎与滑膜软骨瘤病的 MRI 鉴别

付雪丽、齐雅芳
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LT-0395

磁共振 IDEAL-IQ 技术在特发性炎性肌病中的诊断价值

李雪娇
重庆市中医院

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钱堃
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泛髌关节运动损伤的 MRI 影像评估

都继成
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原发性颈髓内生殖细胞瘤 1 例

王欣、王彩鸿、任翠萍
郑州大学第一附属医院磁共振科

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定量 CT 胸腰椎骨密度测量与不同性别年龄的相关性研究

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LT-0400

坐骨结节滑囊炎的 MRI 诊断价值

何欣
广西中医药大学第一附属医院

LT-0401

CPR 在脊柱三维中对脊柱椎管狭窄评估应用价值

杨洪兵

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LT-0402

三维 CT 重建影像在胫骨平台骨折诊断和治疗中的应用

王森、吴哲、李晶华、李东遥

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LT-0403

老年 COVID — 19 患者剧烈咳嗽 致胸腰椎脆性骨折的影像学分析

周建军

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LT-0404

减金属伪影磁共振成像 在假体周围感染诊断中的研究进展：一项系统性综述

苏春善

楚雄彝族自治州人民医院

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王威

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Dual-Energy CT of Lateral Patellar Dislocation

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Hospital of Hunan Normal University

LT-0407

应用粒计算分析下腰痛影响因素

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LT-0408

Vertebral capillary loops; Endplate nutrient canal; Structural connection; Mechanical stress; Intervertebral disc degeneration

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2. Xiamen University

LT-0409

免疫评分在肝癌患者中的预后研究

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LT-0410

对比 TACE 联合射频消融与联合微波消融 治疗原发性肝癌效果：Meta 分

王文轩、张福洲
南充市中心医院

LT-0411

一例医源性血管内异物并严重并发症介入治疗的护理

胡静、程琳、程伊莲
陆军军医大学第一附属医院 (西南医院)

LT-0412

磁共振导引介入在肌骨疾病经皮穿刺及消融术的应用研究

常荣、马晓文、袁会军
西安交通大学附属红会医院

LT-0413

1 例肺动脉栓塞患者介入术中出血急救护理

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Coronary Occlusion after Transcatheter Aortic Valve Replacement: A Case Report

Wenjuan Bai
West China Hospital, Sichuan University

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伤口专科护理小组对晚期肿瘤患者发生压力性损伤的预防影响

王仙粉
贵州医科大学附属肿瘤医院

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A Fibrin Site-Specific Nanoprobe for Illuminating Fibrin-Rich Thrombus and Preventing Thrombus Occurrence in Venous Vessel

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LT-0417

: 利多卡因-平阳霉素-罂粟乙碘油乳剂 在肝血管瘤行肝动脉栓塞术后镇痛的疗效

石静

安徽省阜阳市人民医院

LT-0418

不同性质球囊双侧髂内动脉阻断术 在凶险性前置胎盘剖宫产中的应用对比研究

石静

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LT-0419

下腔静脉滤器误放入肾静脉 1 例

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LT-0420

X 线联合内镜行高位结肠术后狭窄球囊扩张研究---附 1 例报道

马建兵

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LT-0421

右冠状动脉不同体位造影图像测量准确性比较

张祥海、闫红野、王晓峰、周林
中国人民解放军陆军特色医学中心

LT-0422

结核性纤维纵隔炎致肺静脉狭窄伴咯血一例

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LT-0423

肺动静脉畸形经肺动脉栓塞治疗的临床应用价值

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LT-0424

介入手术中锥形束 CT (CBCT) 的应用价值

张祥海、廖春、周兵、王晓峰
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LT-0425

TACE/HAIC 联合放射性粒子植入及仑伐替尼 治疗晚期肝细胞癌合并门静脉癌栓病例报告 1 例

李盛民、孙金波、赵广生、孙田雨、周军
大连大学附属中山医院

LT-0426

看病走新路，我院有介入

王生美
海东市第二人民医院

LT-0427

经动脉导管血管造影在消化道出血中的应用

张又新、魏佳
华中科技大学同济医学院附属协和医院

LT-0428

5 例医源性脾梗死的临床资料及分析

赵宝魁、刘刚、冯昭、姚亮、巴晓丽
青海红十字医院

LT-0429

颈动脉体瘤的临床及影像学研究进展

董戡含
昆明医科大学第一附属医院

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Predicting the prognosis of HAIC in Hepatocellular carcinoma

Qifeng Wang
Qinghai University Affiliated Hospital

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浅谈 CT-MPR 测量呼吸道诊断男性睡眠呼吸 暂停综合征呼吸道狭窄及其临床意义

邹灿
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LT-0432

Baseline whole-lung CT features deriving from deep learning and radiomics: prediction of benign and malignant pulmonary ground-glass nodules

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LT-0433

A Radiomics-Based Model for the Prediction of Microvascular Invasion in Hepatocellular Carcinoma using Contrast-Enhanced CT

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Multiparametric MRI-based radiomics for the prediction of microvascular invasion in hepatocellular carcinoma

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基于深度学习的皮肤癌分布外数据检测算法研究

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上海大学

LT-0436

解读胸腹腔积液：使用影像方法了解积液的性质

龚子博、畅智慧
中国医科大学附属盛京医院

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基于 CTPA 肺栓塞人工智能检测效能的临床研究

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LT-0438

钆塞酸二钠增强 MRI 影像组学 对单发肝细胞癌微血管侵犯的预测价值

王少怡
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Prediction of lymph node metastasis in operable cervical cancer using a hybrid model of clinical parameters and deep multiple instance learning score-based on MRI: A multicenter study

Fengying Qin, Yue Dong
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CT 图像分辨率对人工智能肺结节 辅助诊断系统诊断准确性的影响

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LT-0441

基于 NCCT 的影像组学特征预测急性大脑中 动脉闭塞机械取栓术后造影剂外渗的价值

于乐林、尚海龙、杜红娣、王莺、王一超、徐长贺、叶娟、赵世伟、郑芳慧、沈海林
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LT-0442

基于 CT 影像组学模型识别胰腺间皮素 表达水平预测早期胰腺癌初步研究

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LT-0443

基于深度学习算法不同的 CT 增强重组算法 对肺结节良恶性诊断的差异研究

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基于 CT 影像自动识别肺癌的 LungNet 模型

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基于 CT 平扫图像的影像组学模型 对甲状腺良恶性结节的鉴别价值

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LT-0446

**Can a Radiomics-Based Diagnostic Tool Predict
Cancer-Associated Cachexia in Stage IV
Non-Small-Cell Lung Cancer Patients?
A Prospective Study Using Plain CT Imaging**

Yufei Zhao,Xingui Peng
Zhongda Hospital Southeast University

LT-0447

一种基于 SVM 的 DCM 计算机辅助诊断方法

邵晓宁
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Nomogram to predict the mutations of EGFR in NSCLC

Xuyang Zhang,Nan Yu,taiping He
Affiliated Hospital of Shaanxi University of Traditional Chinese Medicine

LT-0449

基于 MRI 影像组学预测直肠癌 p53 表达的价值探究

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**RESOLVE-based radiomics in stage IB cervical cancer:
improved image quality means better feature
reproducibility?**

Weiliang Qian¹,Chunhong Hu²,Jibin Zhang¹
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2. the First Affiliated Hospital of Soochow University

LT-0451

基于最邻近层的自监督深度学习 AI 降噪技术在泌尿系结石超低剂量 CT 图像中的应用研究

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LT-0452

基于深度学习的胰腺浆液性及粘液性囊腺瘤分割与分类方法

张春雨、付宇、刘佳鑫

吉林大学第一医院

LT-0453

A Dual-Center Study: Can Ultrasound Radiomics Differentiate Type I and Type II Epithelial Ovarian Cancer Patients with Normal CA125 Levels, who Account for Only 20% of the Total Patient Population?

Lixuan Chen

the first affiliated hospital of Wenzhou medical university

LT-0454

Predicting Different Pathological Types of Lung Cancer Brain Metastases Based on Multimodal MRI Using Deep Learning Approach

Yangyingqiu Liu, Jinfeng Cao, Zhaoliang Hu, Xin Luo

Zibo Central Hospital

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Brain Function Dynamic Changing During Whole Night Sleep Deprivation

Ziliang Xu, Zhuofan Li, Didi Wen, Yuanqiang Zhu, Minwen Zheng

Department of Radiology, Xijing Hospital, Fourth Military Medical University

LT-0456

基于 Cuda 的改进体绘制算法 在 CT 血管成像三维重建的应用价值

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LT-0457

AI 辅助下门控与非门控对胸部 CT 平扫中 冠脉钙化积分准确性的影响

宿铭芮
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LT-0458

基于深度学习 MR 图像重建及后处理的临床应用价值

刘昌盛
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LT-0459

3D 电影渲染技术在胸腹部肿瘤 CT 检查中的应用价值

杨易元、龙阳飞、马静
新疆生产建设兵团医院

LT-0460

基于大语言模型进行临床试验受试者电话随访管理的可行性研究

吴冰倩、施昭、胡斌、钟健、陈子健、杨春、徐沁梅
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LT-0461

基于噪声模型的 0.1mT 极低场磁共振工频伪影抑制方法

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LT-0462

A CT-based whole lung radiomics nomogram for predicting severe COVID-19 pneumonia using the first examination after admission

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基于 CAD 量化技术对良恶肺结节相关性参数研究

邵亚军

宝鸡市中心医院

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Reduced spontaneous activities in frontal parietal network after sleep deprivation and associations with sustained attention impairments

Yuanqiang Zhu

Xijing Hospital, Air Force Medical University

LT-0465

Can brain-to-tumor outer interface radiomics improve the efficiency of MRI in predicting the brain invasion of meningiomas?

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2. Fujian Medical University Union Hospital

3. Fujian Cancer Hospital

LT-0466

基于不同机器学习影像组学模型预测浸润性乳腺癌 KI-67 表达的价值

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LT-0467

乳腺假血管瘤样基质增生 MRI 诊断

李曾
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LT-0468

钼靶 X 线与乳腺癌病理类型的相关预测

阚杨杨、赵楠楠、王唱、罗娅红
辽宁省肿瘤医院

LT-0469

双能量 CT 定量参数预测乳腺浸润性 导管癌病理分级及乳腺癌分子亚型的研究

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LT-0470

乳腺叶状肿瘤 1 例

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LT-0471

探讨致密性乳腺 1.5T 磁共振 DWI 成像时 b 值的选择

王菲菲
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LT-0472

乳腺癌 MR 动态增强与预后因子的相关性研究

陈婉
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LT-0473

育龄期女性实性包裹性乳头状癌影像表现 1 例

莫亚宁、戴李华、林剑军、王映飞
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LT-0474

DCE-MRI-Based Radiomics for Predicting Breast Cancer from BI-RADS 4 Masses

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LT-0475

双侧探测器光谱 CT 在乳腺疾病应用中的价值研究

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LT-0476

皮下脂膜炎样 T 细胞淋巴瘤 1 例

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LT-0477

DCE-MRI 与 DWI 在乳腺癌诊断中的应用及预后评估价值

张智翔
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LT-0478

基于 ADC 直方图参数在乳腺叶状肿瘤 及纤维腺瘤的鉴别诊断价值

刘金瑞、朱亚男、周和平、安兆会、李正军
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LT-0479

基于深度学习的数字断层乳腺摄影肿块 自动分割与基于影像组学的肿块良恶性分类

蓝永焜、周雯
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LT-0480

基于乳腺 MRI 成像的放射组学分析 和影像特征预测乳腺叶状肿瘤的恶性风险

杜明珊、陈伟、张雨涵、文凤
陆军军医大学第一附属医院 (西南医院)

LT-0481

数字乳腺断层摄影及一阶纹理特征 对致密型乳腺不对称病变的诊断价值

姚娟、孙悦
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妊娠相关乳腺癌影像特征分析

杨喆璇、程美英、谭世芳、沈艳勇、张晓雪、王长浩、冯占起
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LT-0483

Ultrasound-based radiomics for early predicting response to neoadjuvant chemotherapy in patients with breast cancer: A systematic review with meta-analysis.

Zhifan Li, Junqiang Lei
First Hospital of Lanzhou University

LT-0484

基于深度学习的乳腺 DCE-MRI 图像病灶分割模型构建

王萃萃、陈宝莹、聂品、党艳莉、刘儒玫
西安国际医学中心医院

LT-0485

Preoperative prediction power of radiomics for lymph node metastasis from breast cancer: An up-to-date comprehensive meta-analysis

Juan YE, Zhenkai LI, Feng ZHU, Hongdi DU, Hailin SHEN
Suzhou Kowloon Hospital, Shanghai Jiaotong University School of Medicine

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肿块型非特殊类型浸润性乳腺癌 X 线影像学表现与分子分型的相关性分析

刘昶君、杨蕾、张萍、王庆宜、赵燕、谭政帅
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LT-0487

Classification of Benign and Malignant Breast Masses in FFDM and DBT Based on Deep Learning

Luqiu Wang, Wen Zhou
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表现为肿块的腺外型乳腺脂肪坏死

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LT-0489

妊娠合并乳腺巨大叶状肿瘤并完全梗死影像表现 1 例

张冰梅、程肇平、朱亚男、李正军
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LT-0490

CVRT 在乳腺疾病的应用

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超快速 DCE-MRI 鉴别乳腺良恶性肿瘤价值的初步研究

吴海龙、张鑫、周淑丽、龚良庚
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乳腺肌纤维母细胞瘤的临床、影像及病理特征分析

郑福玲、丁宁、孔令燕、蔡丰、王婧、陈征、李正然、孙强
中国医学科学院北京协和医院

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孙江宏
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田静

中国人民解放军陆军特色医学中心

LT-0495

乳腺磁共振 BI-RADS 4 类恶性肿块样病变 风险预测的列线图诊断模型研究

李建玉

贵黔国际医院管理有限公司

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FFDM 征象联合临床病理因素在预测乳腺癌患者生存中的价值

武慧慧、马彦云

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对比 X 线钼靶与乳腺超声对乳腺高危结节的诊断价值。

李彪

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黄静

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LT-0499

背景实质强化在乳腺癌中的研究进展

罗雨晴、余成新、陈科威、潘君龙、徐亚卡

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LT-0500

基于 DCE-MRI 瘤内与瘤周影像组学模型预测 乳腺癌腋窝淋巴结转移状况的研究

王元皓、鲁际
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The Swirl Sign Score System: a Novel and Practical Tool for Predicting Hematoma Expansion in Spontaneous Intracerebral Hemorrhage

Xiaojia Wu,Zhiming Zhou,Yuanyuan Chen
The Second Affiliated Hospital of Chongqing Medical University

LT-0502

利用图论方法研究轻度认知功能障碍患者大脑功能网络的点介性

王湘彬、赵小虎、江虹、席芊、王培军
上海市同济医院

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康复学神经学基础

蔺小陈
辽阳糖尿病医院

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The possible neural mechanism of NP evoked by MI in pediatric patients with CSCI: a preliminary brain structure study based on VBM

Ling Wang,Nan Chen
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磁共振 DTI 技术在内囊走行纤维束分析

姜洪新、居艳梅
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LT-0506

Functional connectivity gradients of the cingulate cortex

Yuhao Shen, Huanhuan Cai, Yongqiang Yu, Jiajia Zhu
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LT-0507

列线图预测高血压性脑出血短期预后的研究

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Chinese Version of Exercise Dependence Scale-Revised: Psychometric Analysis and Exploration of Risk Factors

Feifei Zhang, Hui Zhang
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Brain functional and structural damage network related to suicide symptoms

Xiaohan Zhang
The First Affiliated Hospital of Anhui Medical University

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**The damage networks of gray matter volume,
neurocognition, and social cognition
in schizophrenia patients:
an extended meta-analysis**

Yan Cheng
The First Affiliated Hospital of Anhui Medical University

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**Neural correlates of peripheral inflammation in major
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neurochemical basis, and behavioral relevance**

Wenming Zhao
The First Affiliated Hospital of Anhui Medical University

LT-0512

**Micro Fiber Environment Disruption and Thalamus GABA
Level Reduction in The Lifelong Premature Ejaculation**

Jiaming Lu,Xin Zhang,Fei Zhou,Qian Chen,Bing Zhang
The Affiliated Drum Tower Hospital of Nanjing University Medical School

LT-0513

**基于 CT 平扫的颅内脑脊液体积定量有助于识别急性卒中患者
发病时间是否在 4.5 小时内：一项多中心回顾性研究**

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静态和动态功能连接结合三重网络模型 在遗忘型轻度认知障碍和阿尔茨海默病中的应用

冯琪、丁忠祥
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LT-0515

CTP 与 CTA 在预测急性缺血性卒中 患者血管内治疗后临床结局的比较

吴蓉、凌奥南、何仕丽、张高峰
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LT-0516

MRI 在预测 1p/19q 联合缺失型低级别胶质瘤的研究进展

岳律
绵阳市第三人民医院

LT-0517

STAGE 多定量参数联合提升 PD 诊断效能

王嫚、高冰冰、苗延巍
大连医科大学附属第一医院

LT-0518

基于 rs-fMRI 的 2 型糖尿病患者动态功能网络连接研究

梅磊磊、何永胜
马鞍山市人民医院

LT-0519

MRI 形态学特征鉴别原发性中枢神经系统淋巴瘤和胶质母细胞瘤

董凤君
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LT-0520

**基于全脑酰胺质子化学转移成像探讨阻塞性睡眠呼吸
暂停综合征患儿脑代谢及其与认知改变的关系**

谭伟婷
深圳市儿童医院

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刘丹、王涛、魏梅、蔡吉勇
重庆市璧山区人民医院

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**Stroke Etiology and Infarction Characteristics
in Patients with Acute Ischemic Stroke**

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LT-0523

自身免疫性胶质纤维酸性蛋白星形细胞病 1 例报告并文献复习

张应从、龚霞蓉
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**基于静息态比率低频振幅的慢性鼻窦炎嗅觉
功能障碍的脑功能研究**

钟业鸣、车子刚
南京同仁医院有限公司

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多模态磁共振应用在新生儿脑损伤的早期诊断价值探讨

高文治
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Decreased cortical complexity in unilateral acute tinnitus patients with hearing loss

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多发胶质瘤的磁共振表现及鉴别

王珍、王琪
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扩散加权成像体积在评估大动脉闭塞缺血性卒中患者灌注成像/扩散加权成像不匹配中的应用价值

邵婉怡
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基于 HRMR-VWI 的症状性单发未破裂颅内动脉的瘤壁强化特征分析

陈姿、张伟、黎芳丽
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Evaluation of Effectiveness of Ginkgo Biloba Extract (EGb 761) in Secondary Prevention of Acute Ischemic Stroke with Microbleeds using Quantitative Susceptibility Mapping (QSM)

Xin Wu
Ningbo First Hospital

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**基于体素形态学测量的首发精神分裂症
幻听患者全脑白质体积研究**

李陈
空军军医大学西京医院

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张煜堃、苗延巍
大连医科大学附属第一医院

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磁敏感加权成像中 T1 透射效应一例及信号解读

方纪成
华中科技大学同济医学院附属同济医院

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**基于 CT 的血栓图像特征对急性缺血性脑卒中
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戴瑶
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江凯、林鸣、王小妮
宝鸡第三医院

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基于 rs-fMRI 探索留守儿童成年后 心理韧性表型与脑功能的相关性

李玥瑜、杨瑞芳、莫茵*
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Gray matter atrophy is constrained by normal structural brain network architecture in depression

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Province, China

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基于静息态功能磁共振成像探讨 2 型糖尿病脑网络与认知功能的相关性研究

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张春艳
郑州大学第一附属医院

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范羨、朱丽、王天乐
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胸椎管内神经中轴钙化性假瘤 1 例

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王晓晨¹、王思慧¹、赵雪宁¹、陈灵旭¹、袁梦媛¹、孙胜军²
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成人松果体区儿童型弥漫性中线胶质瘤一例

陈国平
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双低剂量扫描联合迭代重建技术在头颈部 CTA 的应用价值

苏丽平
重庆医科大学附属永川医院

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刘小华
徐州医科大学附属医院

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脑静脉血栓形成的影像研究

胡安宁
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柔性减影 CE-boost 技术在头颈 CT 血管成像后处理中的应用

李俊超、刘文亚
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宋飞鹏、耿志刚、王新文
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双能量 CT 增强扫描在颈部检查中的应用

晏飞虎
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中国有留守经历与无留守经历人群抑郁情况的 meta 分析

张慕琳、莫茵、廖芮、朱成悦、王静
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基于 AAPM293 报告快速估算头部 CT 检查患者辐射剂量

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眼眶植物性异物 CT 表现及漏诊原因分析

安娜
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C T 能谱成像对颈动脉粥样硬化斑块的研究

李超平
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赵子茜、赵雯
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原发性骨内脑膜瘤一例

苏婕
徐州医科大学附属医院

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原发性脑膜 Malt 淋巴瘤一例并文献复习

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LT-0557

乳头状胶质神经元肿瘤一例并文献报道

高若晨
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螺旋 CT 在儿童腺样体肥大诊断中的价值

沈哲
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LT-0559

自发性脑脊液鼻漏合并蝶窦脑膜脑膨出及吸入性肺炎 1 例

虞思润
十堰市太和医院

LT-0560

SMARCB1/INI1 缺失性鼻腔鼻窦癌 1 例。

吴任国、陆丹羽
中山市人民医院

LT-0561

鼻腔鼻窦胚胎性横纹肌肉瘤一例

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曾雪明
南京明基医院

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孙福馨
西安大兴医院

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鼻腔鼻窦嗜酸性细胞乳头状瘤 2 例

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LT-0565

Abnormal functional connectivity of white-matter networks and gray-white matter networks in NMOSD patients

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LT-0566

超声造影评估颈动脉斑块易损性与缺血性卒中的相关性研究

吕琦、惠品晶、丁亚芳、颜燕红
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LT-0567

MRI 与 CT 影像检查在老年多发性脑梗死诊断中的价值

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LT-0568

原发性气管软骨肉瘤 1 例

袁隆、周俊林
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LT-0569

一例急性高原性脑水肿典型 MRI 图像分析

余言、张庆欣
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LT-0570

颈动脉粥样硬化斑块的影像成像技术进展：综述

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LT-0571

鼻窦部睾丸核蛋白癌 1 例病例报告

窦博文
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LT-0572

个案报道：左眼眶包虫影像学表现

韦晓玉、王鹏、和仕珍、李建波
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LT-0573

Clinical and radiographic features of cervical ectopic thymus: a case report

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LT-0574

影像组学在甲状腺乳头状癌淋巴结转移中的研究进展

杨峰、郭建峰
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LT-0575

联影 uCT960+在颞颌关节运动成像中的技术应用

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下颌骨动静脉畸形 1 例报道

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孔丹青、丁玲、王新正、曾剑兵、鄂林宁、张玉忠

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钱堃

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张鸿美、张金玲、孙淼
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纵隔气管前腔静脉后异位胸腺瘤一例

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A case of neurinoma in atrial septal

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张玉琴、杨阳
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朱大荣、王罗羽

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Lingmin Zheng,Danjie Lin,Zongmeng Wang,yunjing Xue,Lin Lin
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Using PET/CT radiomics to predict adenocarcinoma, lung squamous cell carcinoma and lung small cell carcinoma

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精益工具在提升 MRI 检查现场效率中的整合应用

黄小维、刘平、柏杨、陈锦

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韩祥磊
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先天性肾动静脉瘘的影像学诊断

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上海市同济医院

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运用 DMAIC 手段缩短急诊患者 CT 检查准备时间

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